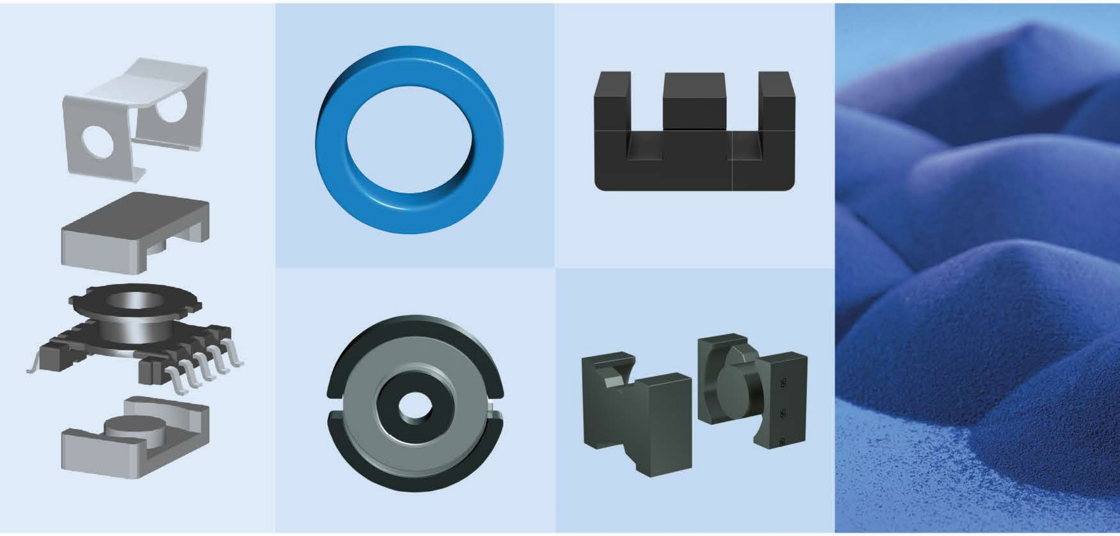
EPCOS Data Book 2017

Ferrites and Accessories



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RM cores

Core type	Standards	Mounting dimensions (mm) of assembly set Base area × H [1)]	Individual parts of assembly set	Part number	Page (Data book)
RM 4	IEC 62317-4		Core	B65803	216
		$10.16^2 \times 10.8$	Coil former	B65804	218
			Clamp	B65806	219
			Insulating washers	B65804	219
			Adjusting screws	B65539/	
				B65806	220
RM 4 LP	IEC 62317-4		Core	B65803	221
			Coil former	B65804	222
			Insulating washers	B65804	224
		$14 \times 17.5 \times 8.1$	Coil former/Clamp SMD	B65804	223, 224
RM 5	IEC 62317-4		Core	B65805	226
		$12.7^2 \times 10.8$	Coil former	B65806	228
			Clamp	B65806	229
			Insulating washers	B65806	229
		$16.5 \times 19 \times 10.6$	Coil former SMD	B65822	230, 231
			Clamp SMD	B65806	230, 231
			Adjusting screws	B65539/	
				B65806/	232
				B65518	
RM 5 LP	IEC 62317-4	$20 \times 16 \times 8$	Core	B65805	233
RM 6	IEC 62317-4		Core	B65807	235
		$15.24^2 \times 12.8$	Coil former	B65808	237
			Coil former for SMPS transf.	B65808	238
		$19.5 \times 25 \times 12.8$	Coil former for power appl.	B65808	239
			Clamp/Insulating washers	B65808	240
		$19.6 \times 22.2 \times 13$	Coil former SMD	B65821	241
			Clamp SMD	B65808	241
			Adjusting screws	B65659	242
RM 6 LP	IEC 62317-4		Core	B65807	243

1) Height above mounting plane

RM cores (continued)

Core type	Standards	Mounting dimensions (mm) of assembly set Base area × H 1)	Individual parts of assembly set	Part number	Page (Data book)
RM 7	IEC 62317-4		Core	B65819	245
		$17.78^2 \times 13.8$	Coil former	B65820	247
			Clamp/Insulating washers	B65820	248
			Adjusting screws	B65659	249
RM 7 LP	IEC 62317-4		Core	B65819	250
RM 8	IEC 62317-4		Core	B65811	252
		$20.32^2 \times 16.8$	Coil former	B65812	254
			Coil former for SMPS transf.	B65812	255
		$26 \times 30 \times 16.8$	Coil former for power appl.	B65812	256
			Clamp/Insulating washers	B65812	257
			Adjusting screw	B65812	258
RM 8 LP	IEC 62317-4		Core	B65811	259
			Clamp/Insulating washers	B65812	260
RM 10	IEC 62317-4		Core	B65813	262
		$25.4^2 \times 19$	Coil former	B65814	264
		$31 \times 40 \times 19$	Coil former for power appl.	B65814	265
			Clamp/Insulating washers	B65814	266
			Adjusting screws	B65679	267
RM 10 LP	IEC 62317-4		Core	B65813	268
RM 12	IEC 62317-4		Core	B65815	270
		$30.48^2 \times 24.9$	Coil former	B65816	271
		$32 \times 45.7 \times 24.9$	Coil former for power appl.	B65816	272
			Clamp	B65816	273
RM 12 LP	IEC 62317-4		Core	B65815	274
RM 14	IEC 62317-4		Core	B65887	276
		$35.56^2 \times 30.5$	Coil former	B65888	277
		$44 \times 29 \times 30.5$	Coil former for power appl.	B65888	278
			Clamp/Insulating washer	B65888	279
RM 14 LP	IEC 62317-4		Core	B65887	280

1) Height above mounting plane

PQ cores

Core type	Standards	Mounting dimensions (mm) of assembly set Base area × H [1)]	Individual parts of assembly set	Part number	Page (Data book)
PQ 16/11.6	IEC 62317-13		Core	B65885A	282
PQ 20/16	IEC 62317-13		Core	B65875B	283
PQ 20/20	IEC 62317-13		Core	B65875A	284
PQ 26/20	IEC 62317-13		Core	B65877B	285
		27 × 30 × 25.2	Coil former	B65878E	286
PQ 26/25	IEC 62317-13		Core	B65877A	287
		27 × 30 × 29.3	Coil former	B65878E	288
PQ 32/20	IEC 62317-13		Core	B65879A	289
		32.3 × 34.3 × 20.2	Coil former	B65880E	290
PQ 32/30	IEC 62317-13		Core	B65879B	291
		33.2 × 34.7 × 33.1	Coil former	B65880E	292
PQ 35/35	IEC 62317-13		Core	B65881A	293
PQ 40/30	IEC 62317-13		Core	B65883B	294
PQ 40/40	IEC 62317-13		Core	B65883A	295
		40.3 × 42.3 × 45.3	Coil former	B65884E	296
PQ 50/40	IEC 62317-13		Core	B65981B	297
PQ 50/50	IEC 62317-13		Core	B65981A	298
		51.3 × 51.9 × 52.5	Coil former	B65982E	299

1) Height above mounting plane

PM cores

Core type	Standards	Mounting dimensions (mm) of assembly set Base area × H [1]	Individual parts of assembly set	Part number	Page (Data book)
PM 50/39	IEC 61247		Core	B65646	302
		65 × 52 × 45	Coil former	B65647	303
			Mounting assembly	B65647	304
PM 62/49	IEC 61247		Core	B65684	305
		76 × 64 × 55	Coil former	B65685	306
			Mounting assembly	B65685	307
PM 74/59	IEC 61247		Core	B65686	308
		85.5 × 75 × 65	Coil former	B65687	309
			Mounting assembly	B65687	310
PM 87/70	IEC 61247		Core	B65713	311
		101 × 87 × 72	Coil former	B65714	312
PM 114/93	IEC 61247		Core	B65733	313
		114 × 92 × 93	Coil former	B65734	314

1) Height above mounting plane

EP cores

Core type	Standards	Mounting dimensions (mm) of assembly set Base area × H [1)]	Individual parts of assembly set	Part number	Page (Data book)
EP 5			Core	B65855A	317
EP 6			Core	B65855B	318
EP 7	IEC 62317-5		Core	B65839	319
		7.5 × 10 × 10	Coil former	B65840	321
		13 × 9.2 × 8.8	Coil former SMD	B65840	322
EPX 7/9		12.6 × 9.4 × 12.4	Core	B65857A	324
EPX 9/9			Core	B65857C	326
EP 10	IEC 62317-5		Core	B65841	328
		12 × 14.2 × 12.5	Coil former	B65842	330
			Mounting assembly	B65842	331
EPX 10			Core	B65859	332
EP 13	IEC 62317-5		Core	B65843A	333
		15 × 16 × 13.7	Coil former	B65844	335
		15 × 16 × 13.7	Coil former for high-voltage applications	B65844	336
			Mounting assembly	B65844	337
EPO 13	—		Core	B65843P	338
		15 × 16 × 13.7	Coil former	B65844	340
		15 × 16 × 13.7	Coil former for high-voltage applications	B65844	340
EP 17	IEC 62317-5		Core	B65845	342
		20 × 21.6 × 16.2	Coil former	B65846	343
			Mounting assembly	B65846	344
EP 20	IEC 62317-5		Core	B65847	345
		23 × 27.5 × 20.5	Coil former	B65848	346
			Mounting assembly	B65848	347

1) Height above mounting plane

P cores (pot cores)

Core type	Standards	Mounting dimensions (mm) of assembly set Base area × H 1)	Individual parts of assembly set	Part number	Page (Data book)
P 3.3 × 2.6	IEC 62317-2		Core	B65491	350
P 4.6 × 4.1			Core	B65495	351
P 5.8 × 3.3			Core	B65501	352
P 7 × 4			Core	B65511	354
		7.5 × 7.5 × 7.1	Coil former	B65512	355
			Mounting assembly	B65512	356
P 9 × 5	IEC 62317-2		Core	B65517	358
		9.9 × 9.9 × 8.3 (4 solder terminals)	Coil former	B65522	359
		9.9 × 12.3 × 8.3 (6 solder terminals)			
		12.2 × 17 × 6.0	Coil former SMD	B65524	360
			Mounting assembly	B65518	361
P 11 × 7	IEC 62317-2		Core	B65531	363
			Coil former	B65532	364
		12.3 × 12.3 × 9.5 (4 solder terminals)	Mounting assembly	B65535	365
		12.3 × 14.6 × 9.5 (8 solder terminals)			
			Adjusting screws	B65539 B65806	366
P 14 × 8	IEC 62317-2		Core	B65541	368
		16.8 × 15 × 11.3 (4 solder terminals)	Coil former	B65542	369
		16.8 × 19.6 × 11.3 (6 solder terminals)	Mounting assembly	B65545	370
			Adjusting screws	B65549	371
P 18 × 11	IEC 62317-2		Core	B65651	373
		19.9 × 20.7 × 13.5	Coil former	B65652	374
			Mounting assembly	B65655	375
			Adjusting screws	B65659	376

1) Height above mounting plane

P cores (pot cores) (continued)

Core type	Standards	Mounting dimensions (mm) of assembly set Base area × H[1]	Individual parts of assembly set	Part number	Page (Data book)
P 22 × 13	IEC 62317-2	24.5 × 26 × 16.6	Core	B65661	378
			Coil former	B65662	379
			Mounting assembly	B65665	380
			Adjusting screw	B65812	381
P 26 × 16	IEC 62317-2	27.8 × 28.5 × 19	Core	B65671	383
			Coil former	B65672	385
			Mounting assembly	B65675	386
			Adjusting screws	B65679	387
P 30 × 19	IEC 62317-2	32.5 × 33.5 × 22.8	Core	B65701	389
			Coil former	B65702	390
			Mounting assembly	B65705	391
			Adjusting screws	B65679	392
P 36 × 22		40 × 41.8 × 27.5	Core	B65611	394
			Coil former	B65612	395
			Mounting assembly	B65615	396
			Adjusting screws	B65679	397
P 41 × 25			Core	B65621	399
			Mounting assembly	B65623	400
P 47 × 28			Core	B65631	401
P 59 × 36			Core	B65691	402

1) Height above mounting plane

P core halves and PS cores

Core type (∅ × height)	Standards	Material	Individual parts of assembly set	Part number	Page (Data book)
PS 7.35 × 3.6	IEC 62323	N22, M33	Core	B65933	404
			Coil former	B65512	404
PS 9 × 3.5	IEC 62323	N22, M33	Core	B65935	405
			Coil former	B65936	405
PCH 14 × 7.5		N22	Core	B65937	406
			Coil former	B65542	406
PS 25 × 8.9	IEC 62323	N22	Core	B65939	407
			Coil former	B65940	407
PS 30.5 × 10.2	IEC 62323	N22	Core	B65941	408
			Coil former	B65942	408
PS 35 × 10.8	IEC 62323	N22	Core	B65947	409
PS 47 × 14.9	IEC 62323	N22	Core	B65943	410
PS 68 × 14.5	IEC 62323	N22	Core	B65928	411
			Coil former	B65946	411
PCH 70 × 14.5		N22	Core	B65945	412
			Coil former	B65946	412
PCH 150 × 30		N27	Core	B65949	413

Selector guide

E cores

Core type[1]	Standards	Mounting dimensions (mm) of assembly set L × W × H[2]	Individual parts of assembly set	Part number	Page (Data book)
E 5	IEC 62317-8		Core	B66303	420
E 6.3	IEC 62317-8		Core	B66300	421
		9 × 8 × 5.7	Coil former/Cover cap SMD	B66301	422
E 8.8	IEC 62317-8		Core	B66302	423
		10 × 12.5 × 5.5	Coil former/Cover cap SMD	B66302	424
E 10/5.5/5			Core	B66322	425
E 12.7/6/6			Core	B66492	426
E 13/6.5/3.7			Core	B66543	433
E 13/6/6.15			Core	B66536	434
E 13/7/4	IEC 62317-8		Core	B66305	427
(EF 12.6)		15 × 17 × 12	Coil former (horizontal)	B66202	429
		10 × 15 × 17	Coil former (vertical)	B66202	429
			Yoke	B66202	430
		13.5 × 19.5 × 9.3	Coil former SMD	B66306	431
			Cover plate	B66414	432
E 14/8/4			Core	B66219	435
E 16/6/5			Core	B66393	436
E 16/7/5			Core	B66500	437
E 16/8/5	IEC 62317-8		Core	B66307	438
(EF 16)		18 × 20 × 14	Coil former (horizontal)	B66308	440
		11 × 18 × 20	Coil former (vertical)	B66308	441
			Yoke	B66308	441
E 16/8/8			Core	B66392	442
E 19/8/5			Core	B66379	443
E 20/9/6			Core	B66312	444
E 20/10/6	IEC 62317-8		Core	B66311	445
(EF 20)		22 × 22 × 17	Coil former (horizontal)	B66206	447
		15 × 22 × 24	Coil former (vertical)	B66206	447
		24 × 21.5 × 14	Coil former (right-angle pins)	B66206	447
			Yoke	B66206	448
		15 × 22 × 24	Coil former for luminaires	B66206	450
			Yoke	B66206	450
E 20/10/11			Core	B66310	451
E 21/9/5			Core	B66314	452
E 22/15/6			Core	B66486	453

1) The E core designations have been brought into line with IEC; the previous designations are given in parentheses.
2) Height above mounting plane

E cores (continued)

Core type[1]	Standards	Mounting dimensions (mm) of assembly set L × W × H[2]	Individual parts of assembly set	Part number	Page (Data book)
E 25/13/7	IEC 62317-8		Core	B66317	454
(EF 25)		28 × 28 × 21	Coil former (horizontal)	B66208	456
		18 × 28 × 29	Coil former (vertical)	B66208	456
			Yoke	B66208	456
		19 × 26 × 30	Coil former for SMPS	B66208	458
			Yoke	B66208	458
E 25.4/10/7			Core	B66315	459
E 28/10/11			Core	B66489	461
E 30/15/7			Core	B66319	462
		36 × 36 × 12	Coil former (horizontal)	B66232	464
		19 × 36 × 36	Coil former (vertical)	B66232	465
			Yoke	B66232	464
E 32/16/9	IEC 62317-8		Core	B66229	466
(EF 32)		35 × 37 × 24	Coil former	B66230	467
			Yoke	B66230	467
E 32/16/11			Core	B66233	468
E 34/14/9			Core	B66370	469
E 36/18/11			Core	B66389	470
		39 × 38 × 31	Coil former	B66390	471
E 40/16/12			Core	B66381	472
E 42/21/15	IEC 62317-8		Core	B66325	473
E 42/21/20	IEC 62317-8		Core	B66329	475
		38 × 46 × 52	Coil former	B66243	477, 478
E 47/20/16			Core	B66383	479
E 55/28/21	IEC 62317-8		Core	B66335	480
E 55/28/25			Core	B66344	482
E 56/24/19			Core	B66385	484
E 65/32/27			Core	B66387	485
		67 × 66 × 80	Coil former	B66388	486
E 70/33/32			Core	B66371	487
		72 × 66 × 90	Coil former	B66372	489
E 80/38/20			Core	B66375	490
E 100/60/28			Core	B66894	491

1) The E core designations have been brought into line with IEC; the previous designations are given in parentheses.
2) Height above mounting plane

E cores with distributed air gap

Core type	Standards	Mounting dimensions (mm) of assembly set L × W × H	Individual parts of assembly set	Part number	Page (Data book)
E 42/21/15DG			Core	B66325DG	492
E 42/21/20DG			Core	B66329DG	493
E 47/20/16DG			Core	B66383DG	494
E 55/28/21DG			Core	B66335DG	495
E 55/28/25DG			Core	B66344DG	496
E 65/32/27DG			Core	B66387DG	497
E 70/33/32DG			Core	B66371DG	498
E 80/38/20DG			Core	B66375DG	499

ELP cores

Core set	Standards	Core types	Individual parts of assembly set	Part number		Page (Data book)
				with clamp recess	w/o clamp recess	
EELP 14	IEC 62317-9	ELP 14/3.5/5	ELP core		B66281G	502
EILP 14	IEC 62317-9	I 14/1.5/5 (+ ELP 14/3.5/5)	I core		B66281K	503
EELP 18	IEC 62317-9	ELP 18/4/10	ELP core	B66283G	B66453G	504, 505, 507, 508
			Clamp	B65804		504
EILP 18	IEC 62317-9	I 18/2/10	I core	B66283K	B66453K	505, 508
		(+ ELP 18/4/10)	Clamp	B66284		506
EELP 22	IEC 62317-9	ELP 22/6/16	ELP core	B66285G	B66455G	509, 511, 513, 514
EILP 22	IEC 62317-9	I 22/2.5/16	I core	B66285K	B66455K	511, 514
		(+ ELP 22/6/16)	Clamp	B65804		512
EELP 32	IEC 62317-9	ELP 32/6/20	ELP core	B66287G	B66457G	515, 516
			Clamp	B65808		516
EILP 32	IEC 62317-9	I 32/3/20 (+ ELP 32/6/20)	I core	B66287K	B66457K	517
			Clamp	B66288		517
EELP 38	IEC 62317-9	ELP 38/8/25	ELP core	B66289G	B66459G	521, 523
EILP 38	IEC 62317-9	I 38/4/25 (+ ELP 38/8/25)	I core	B66289K	B66459K	522, 524
EELP 43	IEC 62317-9	ELP 43/10/28	ELP core	B66291G	B66461G	525, 527
EILP 43	IEC 62317-9	I 43/4/28 (+ ELP 43/10/28)	I core	B66291K	B66461K	526, 528
EELP 58	IEC 62317-9	ELP 58/11/38	ELP core		B66293G	529
EILP 58	IEC 62317-9	I 58/4/38 (+ ELP 58/11/38)	I core		B66293K	530
EELP 64	IEC 62317-9	ELP 64/10/50	ELP core		B66295G	531
EILP 64	IEC 62317-9	I 64/5/50 (+ ELP 64/10/50)	I core		B66295K	532
EELP 102	IEC 62317-9	ELP 102/20/38	ELP core		B66297G	533, 534
EILP 102	IEC 62317-9	I 102/20/38 (+ ELP 102/20/38)	I core		B66297K	534

EQ cores

Core set	Standards	Core types	Individual parts of assembly set	Part number	Page (Data book)
EEQ 13	IEC 62317-9	EQ 13/2.85/9	Core	B66479	536
EIQ 13	IEC 62317-9	EQ 13/2.85/9	EQ core	B66479G	537
		+ I 13/1/8.7	I core	B66479K	537
EEQ 20	IEC 62317-9	EQ 20/6.3/14	Core	B66483	538
EIQ 20	IEC 62317-9	EQ 20/6.3/14	EQ core	B66483G	539
		+ I 20/2.3/14	I core	B66483K	539
EEQ 25	IEC 62317-9	EQ 25/5.6/18	Core	B66481	540
EIQ 25	IEC 62317-9	EQ 25/5.6/18	EQ core	B66481G	541
		+ I 25/2.3/18	I core	B66481K	541
EEQ 30	IEC 62317-9	EQ 30/8/20	Core	B66506	542
EIQ 30	IEC 62317-9	EQ 30/8/20	EQ core	B66506G	543
		+ I 30/2.7/20	I core	B66506K	543

Selector guide

ER planar cores

Core types	Standards	Mounting dimensions (mm) of assembly set L × W × H[1)]	Individual parts of assembly set	Part number	Page (Data book)
ER 9.5/5	IEC 62317-9		Core	B65523	546
		12 × 10 × 5.7	Coil former SMD	B65527	547
			Yoke	B65527	547
ER 11/5	IEC 62317-9		Core	B65525	548
		12.8 × 11.7 × 6	Coil former SMD	B65526	549
			Yoke	B65526	549
ER 14.5/6	IEC 62317-9		Core	B65513	550
ER 18/3/10	IEC 62317-9		Core	B66480	551
ER 23/5/13	IEC 62317-9		Core	B66482	552
ER 23/5/13	IEC 62317-9		ER core	B66482G	553
+ I 23/2/13			I core	B66482K	553
ER 25/6/15	IEC 62317-9		Core	B66484	554
ER 25/6/15	IEC 62317-9		ER core	B66484G	555
+ I 25/3/15			I core	B66484K	555
ER 32/5/21	IEC 62317-9		Core	B66501	556

ER cores

Core types	Standards	Mounting dimensions (mm) of assembly set L × W × H[1)]	Individual parts of assembly set	Part number	Page (Data book)
ER 28/17/11	IEC 62317-7		Core	B66433	558
ER 35/20/11	IEC 62317-7		Core	B66350	559
ER 42/22/15			Core	B66347	560
ER 46/17/18			Core	B66377	561
ER 49/27/17	IEC 62317-7		Core	B66391	562
ER 54/18/18			Core	B66357	563

1) Height above mounting plane

ETD cores

Core type	Standards	Mounting dimensions (mm) of assembly set L × W × H[1)]	Individual parts of assembly set	Part number	Page (Data book)
ETD 29/16/10	IEC 62317-6		Core	B66358	566
		35.5 × 35.5 × 25.5	Coil former (horizontal)	B66359	568
		24 × 35.5 × 41.2	Coil former (vertical)	B66359	569
			Yoke	B66359	568, 569
ETD 34/17/11	IEC 62317-6		Core	B66361	570
		43 × 40 × 35	Coil former (horizontal)	B66362	572
		27.5 × 40 × 46	Coil former (vertical)	B66362	573
			Yoke	B66362	572, 573
ETD 39/20/13	IEC 62317-6	48 × 45 × 38	Core	B66363	574
			Coil former/Yoke	B66364	576
ETD 44/22/15	IEC 62317-6		Core	B66365	577
		53 × 50 × 41	Coil former/Yoke	B66366	579
ETD 49/25/16	IEC 62317-6		Core	B66367	580
		58 × 55 × 43.5	Coil former/Yoke	B66368	582
ETD 54/28/19	IEC 62317-6		Core	B66395	583
		62 × 62 × 47	Coil former/Yoke	B66396	585
ETD 59/31/22	IEC 62317-6		Core	B66397	586
		67 × 71 × 50	Coil former/Yoke	B66398	588

1) Height above mounting plane

EFD, EV cores

Core type	Mounting dimensions (mm) of assembly set L × W × H [1])	Individual parts of assembly set	Part number	Page (Data book)

EFD cores

EFD 10/5/3		Core	B66411	591
EFD 15/8/5		Core	B66413	592
	19.3 × 17 × 8	Coil former/Yoke	B66414	593
	21 × 16 × 8	Coil former/Yoke SMD	B66414	594
		Cover plate	B66414	594
EFD 20/10/7		Core	B66417	595
	24.3 × 22 × 10	Coil former/Yoke	B66418	597
EFD 25/13/9		Core	B66421	598
	29.3 × 27.3 × 12.5	Coil former/Yoke	B66422	599
EFD 30/15/9		Core	B66423	600
	34.4 × 32.5 × 12.5	Coil former/Yoke	B66424	601

EV cores

EV 15/9/7		Core	B66434	602
EV 25/13/13		Core	B66408	603
EV 30/16/13		Core	B66432	604
EV 36/19/16		Core	B66567	605

1) Height above mounting plane

U, UI cores

Toroids (ring cores)

Double-aperture cores

FPC film

Index of part numbers

(In numerical order)

Part number	Page	Type
B65671	383	P 26 × 16 core
B65672	385	P 26 × 16 coil former, insulating washer
B65675	386	P 26 × 16 mounting assembly
B65679	267, 387, 392, 397	Adjusting screw for RM 10, P 26 × 16, P 30 × 19, P 36 × 22
B65684	305	PM 62/49 core
B65685	306, 307	PM 62/49 coil former, mounting assembly
B65686	308	PM 74/59 core
B65687	309, 310	PM 74/59 coil former, mounting assembly
B65701	389	P 30 × 19 core
B65702	390	P 30 × 19 coil former, insulating washer
B65705	391	P 30 × 19 mounting assembly
B65713	311	PM 87/70 core
B65714	312	PM 87/70 coil former
B65733	313	PM 114/93 core
B65734	314	PM 114/93 coil former
B65803	216, 221	RM 4 core, RM 4 low-profile core
B65804	218, 222 223, 224 504, 512	RM 4 coil former, insulating washer, RM 4 low-profile clamp, insulating washer, coil former (SMD) ELP 18, ELP 22 clamp
B65805	226, 233	RM 5 core, RM 5 low-profile core
B65806	219, 220 228, 229 230, 231, 232 366	RM 4 clamp, adjusting screw RM 5 coil former, clamp, insulating washer RM 5 clamp, adjusting screw, coil former (SMD) Adjusting screw for P 11 × 7
B65807	235, 243	RM 6 core, RM 6 low-profile core
B65808	237 … 242 516	RM 6 coil former, clamp, insulating washer, adjusting screw ELP 32 clamp
B65811	252, 259	RM 8 core, RM 8 low-profile core
B65812	254 … 258 260, 381	RM 8 coil former, clamp, insulating washer, adjusting screw RM 8 low-profile clamp, insulating washer, P 22 × 13 adjusting screw
B65813	262, 268	RM 10 core, RM 10 low-profile core
B65814	264, 265, 266	RM 10 coil former, clamp, insulating washer
B65815	270, 274	RM 12 core, RM 12 low-profile core
B65816	271, 272	RM 12 coil former
B65819	245, 250	RM 7 core, RM 7 low-profile core
B65820	247, 248	RM 7 coil former, clamp, insulating washer
B65821	241	RM 6 coil former (SMD)
B65822	230, 231	RM 5 coil former (SMD)

Index of part numbers

Index of part numbers

Index of part numbers

Index of part numbers

Index of part numbers

SIFERRIT materials

Based on IEC 60401-3, the data specified here are typical data for the material in question, which have been determined principally on the basis of toroids (ring cores).

The purpose of such characteristic material data is to provide the user with improved means for comparing different materials.

There is no direct relationship between characteristic material data and the data measured using other core shapes and/or core sizes made of the same material. In the absence of further agreements with the manufacturer, only those specifications given for the core shape and/or core size in question are binding.

1 Material application survey

Usage	Frequency range	Material	Specific application	Core type
High Q inductors in resonant circuits and filters	up to 0.1 MHz	N48	Filters in telephony, MW IF filters	Gapped RM, P, adjusting cores
	0.2 – 1.6 MHz	M33		
	1.5 – 12 MHz	K1		
Current transformers	up to 3 MHz	T36[1)]	Energy meters	Toroids
Broadband transformers (e.g. antenna transformers, ISDN transformers, digital data transformers (xDSL, LAN)	up to 3 MHz	T46	Impedance and matching transformers (ISDN, xDSL using paired core shapes with air gap)	Toroids
		T38		EP, RM, toroids
		T66[1)]		
		N45[1)]		
	up to 10 MHz	M33	Radio-frequency transformers	Double aperture, toroids
	up to 100 MHz	T57	LAN (also suitable for xDSL in paired core shapes)	Toroids
		M33	Balun transformers	Double aperture, toroids
		K1		
Electromagnetic Interference (EMI)	up to 3 MHz	T38	Current-compensated chokes	E, toroids
		T37		
		T36[1)]		
		T35		
		T65		
	up to 5 MHz	N30		E, toroids
	up to 100 MHz	K10	Line attenuation, current-compensated chokes	Toroids
Sensors, ID systems	up to 1 MHz	N22[1)]	Inductive proximity switches	P core halves
	up to 2 MHz	M33		
Medium and high frequency switch-mode power supplies	up to 100 kHz	N27	Power transformers and chokes	E, ETD, ER, EQ, EFD, EV, ELP, RM, RM LP, PM, PQ, U
	up to 500 kHz	N87		
		N88		
		N95		
		N96		
		N97		
	300 kHz to 1 MHz	N49		
	1 MHz to 4 MHz	PC200		
	up to 100 kHz	N41[1)]	Chokes	E, ETD, ER, EQ, EFD, EV, ELP, RM, RM LP, PM
		N51		
	up to 500 kHz	N92	High voltage transformers and power chokes	
	up to 200 kHz	N72[1)]	Electronic lamp ballast devices	E, ETD

1) Not for new design

2 Material properties

Preferred application			Resonant circuit inductors		Inductors for line attenuation
Material			K1	N48	K10
Base material			NiZn	MnZn	NiZn
Color code (adjuster)			violet	—	—
	Symbol	Unit			
Initial permeability (T = 25 °C)	μ_i		80 ±25%	2300 ±25%	800 ±25%
Meas. field strength Flux density (near saturation) (f = 10 kHz)	H B_S (25 °C) B_S (100 °C)	A/m mT mT	5000 310 280	1200 420 310	5000 320 240
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C)	A/m A/m	380 350	26 19	40 25
Optimum frequency range	f_{min} f_{max}	MHz MHz	1.5 12	0.01 0.1	0.1 1.0
Relative loss factor at f_{min} at f_{max}	$\tan \delta/\mu_i$	10^{-6} 10^{-6}	<40 <120	<4 <6	<15 <60
Hysteresis material constant	η_B	10^{-6}/mT	<36	<0.4	<5
Curie temperature	T_C	°C	>400	>170	>150
Relative temperature coefficient at 25 … 55 °C at 5 … 25 °C	α_F	10^{-6}/K	2 … 8 7 … 1	0.3 … 1.3 0.3 … 1.3	— —
Mean value of α_F at 25 … 55 °C		10^{-6}/K	4	0.70	10.0
Density (typical values)		kg/m³	4800	4700	5000
Disaccommodation factor at 25 °C	DF	10^{-6}	20	2	—
Resistivity	ρ	Ωm	10^5	3	10^5
Core shapes			RM, P, Toroid, Double-aperture, P core half	RM, P	Toroid, Double-aperture
Other material properties (graphs) see page			55	71	57

Material properties (continued)

Preferred application			Proximity switches	
Material			M33[1]	N22[2]
Base material			MnZn	MnZn
Color code (adjuster)			white	red
	Symbol	Unit		
Initial permeability (T = 25 °C)	μ_i		750 ±25%	2300 ±25%
Meas. field strength Flux density (near saturation) (f = 10 kHz)	H B_S (25 °C) B_S (100 °C)	A/m mT mT	2000 400 310	1200 370 260
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C)	A/m A/m	80 65	18 14
Optimum frequency range	f_{min} f_{max}	MHz MHz	0.2 1.0	0.001 0.2
Relative loss factor at f_{min} at f_{max}	$\tan \delta/\mu_i$	10^{-6} 10^{-6}	<12 <20	<2 <20
Hysteresis material constant	η_B	10^{-6}/mT	<1.8	<1.4
Curie temperature	T_C	°C	>200	>145
Relative temperature coefficient at 25 … 55 °C at 5 … 25 °C	α_F	10^{-6}/K	0.5 … 2.6 —	— —
Mean value of α_F at 25 … 55 °C		10^{-6}/K	1.6	0.9
Density (typical values)		kg/m^3	4700	4700
Disaccommodation factor at 25 °C	DF	10^{-6}	8	4
Resistivity	ρ	Ωm	5	1
Core shapes			RM, P, Toroid, Double-aperture, P core half	P core half
Other material properties (graphs) see page			58	60

1) For threaded cores μ_i = 600 ±20%
2) Not for new design, to be replaced by N48

Material properties (continued)

Preferred application			Broadband transformers			
Material			N45[1)]	T57	N30	T65
Base material			MnZn	MnZn	MnZn	MnZn
	Symbol	Unit				
Initial permeability (T = 25 °C)	μ_i		3800 ±25%	4000 ±25%	4300 ±25%	5200 ±30%
Meas. field strength Flux density (near saturation) (f = 10 kHz)	H B_S (25 °C) B_S (100 °C)	A/m mT mT	 550 435	1200 430 270	1200 380 240	1200 460 320
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C)	A/m A/m	15 21	14 12	12 8	12 11
Optimum frequency range	f_{min} f_{max}	MHz MHz	0.01 0.10	0.01 0.5	0.01 0.40	0.01 0.20
Relative loss factor at f_{min} at f_{max}	$\tan \delta/\mu_i$	10^{-6} 10^{-6}	<1.0 <2.0	<5 <70	<2 <60	<1.5 <25
Hysteresis material constant	η_B	10^{-6}/mT	<0.3	<0.3	<1.1	<1.1
Curie temperature	T_C	°C	>255	>140	>130	>160
Relative temperature coefficient at 25 … 55 °C at 5 … 25 °C	α_F	10^{-6}/K	 –8 … –5.0 1.5 … 3.0	 — —	 — —	 — —
Mean value of α_F at 25 … 55 °C		10^{-6}/K	—	0.5	0.6	– 0.5
Density (typical values)		kg/m³	4900	4900	4900	4900
Disaccommodation factor at 25 °C	DF	10^{-6}	—	—	—	—
Resistivity	ρ	Ωm	11	3	0.5	0.30
Core shapes			ER, EP, RM	RM, P, EP, Toroid	RM, P, EP, E, Toroid, Double-aperture	RM, P, Toroid, EP
Other material properties (graphs) see page			69	115	64	117

1) Not for new design

Material properties (continued)

Preferred application			Broadband transformers		
Material			T35	T37	T36[1)]
Base material			MnZn	MnZn	MnZn
	Symbol	Unit			
Initial permeability (T = 25 °C)	μ_i		6000 ±25%	6500 ±25%	7000 ±25%
Meas. field strength Flux density (near saturation) (f = 10 kHz)	H B_S (25 °C) B_S (100 °C)	A/m mT mT	1200 390 270	1200 380 240	1200 400 240
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C)	A/m A/m	12 9	9 8	22 24
Optimum frequency range	f_{min} f_{max}	MHz MHz	0.01 0.20	0.01 0.30	0.05 kHz 100 kHz
Relative loss factor at f_{min} at f_{max}	$\tan\delta/\mu_i$	10^{-6} 10^{-6}	<4 <60	<2 <60	<3 <30
Hysteresis material constant	η_B	10^{-6}/mT	<1.1	<1.1	<1.1
Curie temperature	T_C	°C	>130	>130	>130
Relative temperature coefficient at 25 … 55 °C at 5 … 25 °C	α_F	10^{-6}/K	— —	— —	— —
Mean value of α_F at 25 … 55 °C		10^{-6}/K	0.8	– 0.3	0.5
Density (typical values)		kg/m^3	4900	4900	4950
Disaccommodation factor at 25 °C	DF	10^{-6}	—	—	—
Resistivity	ρ	Ωm	0.2	0.2	0.2
Core shapes			RM, P, EP, Toroid	Toroid	Toroid
Other material properties (graphs) see page			105	109	107

1) Not for new design

Material properties (continued)

Preferred application			Broadband transformers		
Material			T38	T66	T46[1)]
Base material			MnZn	MnZn	MnZn
	Symbol	Unit			
Initial permeability (T = 25 °C)	μ_i		10000 ±30%	13000 ±30%	15000 ±30%
Meas. field strength Flux density (near saturation) (f = 10 kHz)	H B_S (25 °C) B_S (100 °C)	A/m mT mT	1200 430 260	1200 360 —	1200 400 240
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C)	A/m A/m	8 7	8 7	7 6
Optimum frequency range	f_{min} f_{max}	MHz MHz	0.01 0.10	0.01 0.10	0.01 0.10
Relative loss factor at f_{min} at f_{max}	$\tan \delta/\mu_i$	10^{-6} 10^{-6}	<2.0 <20	<1 <30	<8 <100
Hysteresis material constant	η_B	10^{-6}/mT	<0.3	<0.3	<2.0
Curie temperature	T_C	°C	>130	>100	>130
Relative temperature coefficient at 25 … 55 °C at 5 … 25 °C	α_F	10^{-6}/K	— —	0.78 0.40	— —
Mean value of α_F at 25 … 55 °C		10^{-6}/K	– 0.2	—	– 0.6
Density (typical values)		kg/m³	4900	4950	4950
Disaccommodation factor at 25 °C	DF	10^{-6}	—	—	—
Resistivity	ρ	Ωm	0.1	0.8	0.01
Core shapes			RM, P, EP, ER, Toroid, E	EP, Toroid, RM	Toroid, E
Other material properties (graphs) see page			111	119	113

1) Material values defined on the basis of small toroids (≤R10)

Material properties (continued)

Preferred application			Power transformers		
Material			N49	PC200	N92
Base material			MnZn	MnZn	MnZn
	Symbol	Unit		NEW	
Initial permeability (T = 25 °C)	μ_i		1500 ±25%	800 ±25%	1500 ±25%
Flux density (H = 1200 A/m, f = 10 kHz)	B_S (25 °C) B_S (100 °C)	mT mT	490 400	480 410	500 440
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C)	A/m A/m	38 33	51 48	24 13
Optimum frequency range	f_{min} f_{max}	kHz kHz	300 1000	700 4000	25 500
Hysteresis material constant	η_B	10^{-6}/mT	<0.4		<1.4
Curie temperature	T_C	°C	>240	>280	>280
Mean value of α_F at 25 … 55 °C		10^{-6}/K	—		—
Density (typical values)		kg/m^3	4750	4800	4850
Relative core losses (typical values)	P_V				
25 kHz, 200 mT, 100 °C		kW/m^3	—	—	70
100 kHz, 200 mT, 100 °C		kW/m^3	—	—	410
300 kHz, 100 mT, 100 °C		kW/m^3	330	—	410
500 kHz, 50 mT, 100 °C		kW/m^3	80	60	230
1 MHz, 50 mT, 100 °C		kW/m^3	475	—	—
Resistivity	ρ	Ωm	17	22	8
Core shapes			RM, EFD, ELP, Toroid, EQ, ER	RM, EFD, ELP, Toroid, EQ, ER, EP	RM, ETD, EFD, ER, E, ELP, Toroid, EQ, ER
Other material properties (graphs) see page			73	101	89

Material properties (continued)

Preferred application			Power transformers			
Material			N27	N87	N97	N72[1)]
Base material			MnZn	MnZn	MnZn	MnZn
	Symbol	Unit				
Initial permeability (T = 25 °C)	μ_i		2000 ±25%	2200 ±25%	2300 ±25%	2500 ±25%
Flux density (H = 1200 A/m, f = 10 kHz)	B_S (25 °C) B_S (100 °C)	mT mT	500 410	490 390	510 410	480 370
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C)	A/m A/m	23 19	21 13	21 12	15 11
Optimum frequency range	f_{min} f_{max}	kHz kHz	25 150	25 500	25 500	25 300
Hysteresis material constant	η_B	10^{-6}/mT	<1.5	<1.0	<1.0	<1.4
Curie temperature	T_C	°C	>220	>210	>230	>210
Mean value of α_F at 25 … 55 °C		10^{-6}/K	3	4	4	3
Density (typical values)		kg/m³	4800	4850	4850	4750
Relative core losses (typical values)	P_V					
25 kHz, 200 mT, 100 °C		kW/m³	155	57	45	80
100 kHz, 200 mT, 100 °C		kW/m³	920	375	300	540
300 kHz, 100 mT, 100 °C		kW/m³	—	390	340	500
500 kHz, 50 mT, 100 °C		kW/m³	—	215	205	—
Resistivity	ρ	Ωm	3	10	8	12
Core shapes			P, PM, ETD, ER, E, U, Toroid	RM, P, PM, ETD, EFD, E, ER, EP, EQ, ELP, U, Toroid	RM, PM, ETD, EFD, ER, EQ, E, ELP, Toroid	E, EFD
Other material properties (graphs) see page			61	82	98	79

1) Not for new design

Material properties (continued)

Preferred application			Power transformers	
Material			N88	N96
Base material			MnZn	MnZn
	Symbol	Unit		
Initial permeability (T = 25 °C)	μ_i		1900 ±25%	2900 ±25%
Flux density (H = 1200 A/m, f = 10 kHz)	B_S (25 °C) B_S (100 °C) B_S (140 °C)	mT mT mT	500 400 340	500 410
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C) H_c (140 °C)	A/m A/m A/m	16 10 12	16 15
Optimum frequency range	f_{min} f_{max}	kHz kHz	25 500	25 500
Hysteresis material constant	η_B	10^{-6}/mT	<1.5	<0.5
Relative at f_{min} loss factor at f_{max}	tan δ/μ_i	10^{-6} 10^{-6}	<10 <30	<2 <20
Curie temperature	T_C	°C	>220	>240
Mean value of α_F at 25 … 55 °C		10^{-6}/K	4	1
Density (typical values)		kg/m^3	4900	4850
Relative core losses (typical values)	P_V			
100 kHz, 200 mT, 25 °C		kW/m^3	720	325
100 kHz, 200 mT, 60 °C		kW/m^3	—	330
100 kHz, 200 mT, 100 °C		kW/m^3	380	390
100 kHz, 200 mT, 140 °C		kW/m^3	340	—
300 kHz, 100 mT, 100 °C		kW/m^3	—	—
Resistivity	ρ	Ωm	10	10
Core shapes			E, ER, ETD, U	E, EQ, PQ, ETD
Other material properties (graphs) see page			85	95

Material properties (continued)

Preferred application			Power transformers		
Material			N41[1)]	N51	N95
Base material			MnZn	MnZn	MnZn
	Symbol	Unit			
Initial permeability (T = 25 °C)	μ_i		2800 ±25%	3000 ±25%	3000 ±25%
Flux density (H = 1200 A/m, f = 10 kHz)	B_S (25 °C) B_S (100 °C)	mT mT	490 390	480 380	525 410
Coercive field strength (f = 10 kHz)	H_c (25 °C) H_c (100 °C)	A/m A/m	22 20	5 5	18 19
Optimum frequency range	f_{min} f_{max}	kHz kHz	25 150	25 150	25 500
Hysteresis material constant	η_B	10^{-6}/mT	<1.4	<0.4	<0.6
Curie temperature	T_C	°C	>220	>220	>220
Mean value of α_F at 25 … 55 °C		10^{-6}/K	4	2	2
Density (typical values)		kg/m³	4750	4800	4900
Relative core losses (typical values)	P_V				
25 kHz, 200 mT, 25 °C		kW/m³	—	75	—
100 kHz, 200 mT, 25 °C		kW/m³	—	450	425
300 kHz, 100 mT, 25 °C		kW/m³	—	400	455
500 kHz, 50 mT, 25 °C		kW/m³	—	—	250
25 kHz, 200 mT, 100 °C		kW/m³	180	110	—
100 kHz, 200 mT, 100 °C		kW/m³	1400	700	350
300 kHz, 100 mT, 100 °C		kW/m³	—	630	410
500 kHz, 50 mT, 100 °C		kW/m³	—	—	250
Resistivity	ρ	Ωm	2	6	6
Core shapes			RM, P	E, ER, ETD	E, ER, ETD
Other material properties (graphs) see page			66	76	92

1) Not for new design

Material properties (continued)

Preferred application			Film	
Material			Ferrite polymer composite (FPC)	
Base material			C350	C351
	Symbol	Unit		
Initial permeability f = 1 MHz	μ_i		9±30%	9±30%
Flux density (near saturation) H = 25 kA/m f = 10 kHz	B_S (25 °C)	mT	255	255
Remanent induction H = 25 kA/m f = 10 kHz	B_r (25 °C)	mT	9	9
Coercive field strength H = 25 kA/m f = 10 kHz	H_C (25 °C)	A/m	600	600
Relative loss factor f = 1 MHz f = 100 MHz f = 1 GHz	$\tan \delta/\mu_i$		 <0.005 <0.400	 <0.005 <0.400
Hysteresis material constant	η_B	10^{-3}/mT	<2	<2
Temperature coefficient	$\alpha=\Delta\mu/\mu\Delta T$	1/K	$<5 \cdot 10^{-5}$	$<5 \cdot 10^{-5}$
Density		kg/m^3	2930	2930
Resistivity f = 1 kHz f = 10 kHz f = 10 MHz	ρ	Ωm	 500 100	 500 100
Relative permittivity f = 1 kHz f = 10 kHz f = 10 MHz	ε_r		 700 21	 700 21
Maximum operating temperature	T_{max}	°C	120	200
Dielectric strength	E	kV/mm	1	0.8
Tensile strength[1)]	σ_Z	N/mm^2	1.5	2.5
Tearing resistance[1)]		%	25	25
Compressibility[1)]	κ	N/mm^2	70	70
Other material properties (graphs) see page			—	—

1) T = 23 °C and 50% relative humidity

3 Measuring conditions

The following measuring conditions, which correspond largely to IEC 60401-3, apply for the material properties given in the table:

Properties (valid only for ring cores of sizes R 10 to R 36)			Measuring conditions			
			Frequency	Field strength (material-dependent)	Max. flux density	Temper-ature
	Symbol	Unit	kHz	kA/m	mT	°C
Initial permeability	μ_i		≤10		≤0.25	25
Flux density near to saturation	B	mT	≤10	≥1.2		25; 100
Coercive field strength	H_c	A/m kA/m	≤10	≥1.2	near saturation	25; 100
Relative loss factor	$\tan \delta/\mu_i$		—		≤0.25	25
Hysteresis material constant	η_B	10^{-6}/mT	 10 ($\mu_i \geq 500$) 100 ($\mu_i < 500$)		B_1 B_2 1.5 3.0 0.3 1.2	25
Curie temperature	T_c	°C	≤10		≤0.25	
Relative temperature coefficient	α_F	10^{-6}/K	≤10		≤0.25	5 … 25 25 … 55
Density		kg/m^3				25
Disaccommodation factor	DF	10^{-6}	≤10		≤0.25	25; 60 1)
Resistivity	ρ	Ωm	DC			25

The following properties are given only for materials for power applications:

Power loss	P_V	kW/m^3	25 100 300 500 1000		200 200 100 50 50	100

1) Higher temperature than specified by IEC (40 °C)

4 Specific material data

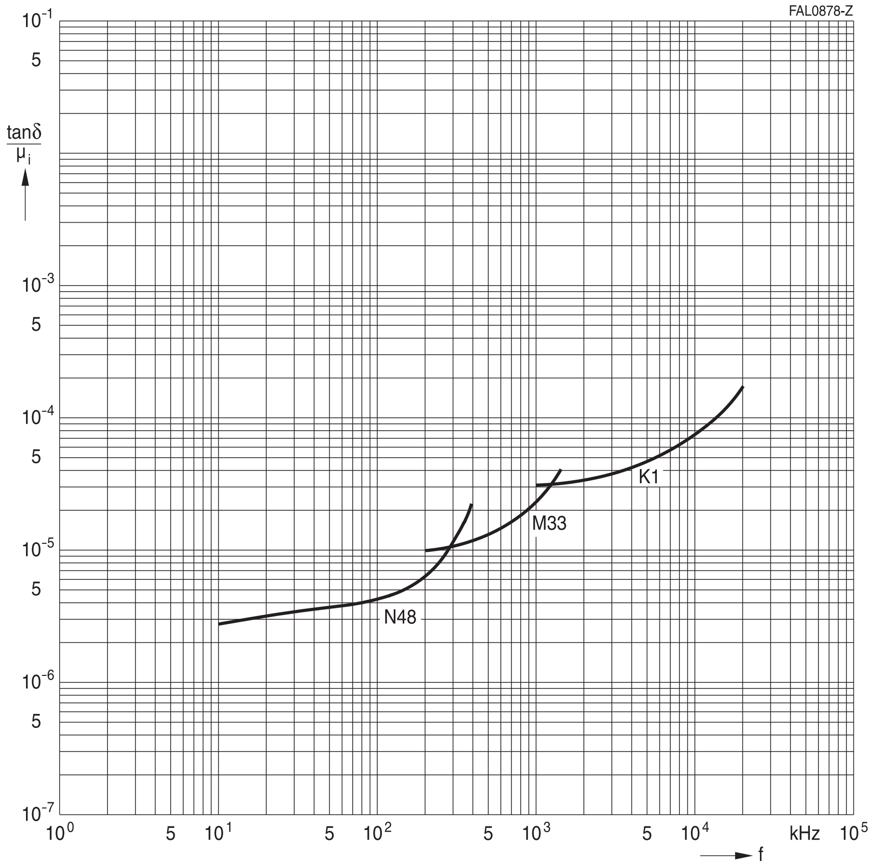
DC magnetic bias

$$H_{DC} = \frac{I_{DC} \cdot N}{l_e}$$

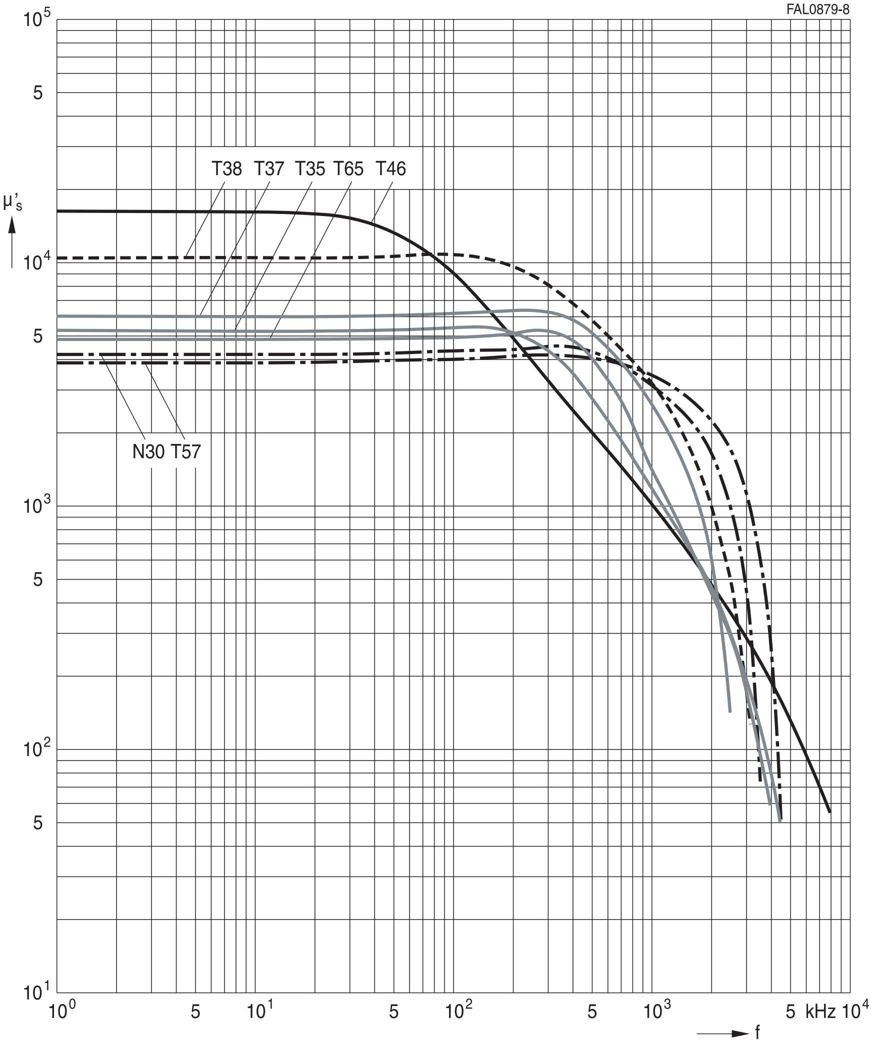
H_{DC}	DC field strength (A/m)
I_{DC}	Direct current (A)
N	Number of turns
l_e	Effective magnetic path length (m)

The curves of $\mu_{rev} = f(H_{DC})$ allow an approximate calculation of the variation in reversible permeability (μ_{rev}) and A_L value caused by magnetic bias. These curves are of particular interest for cores for transformers and chokes, since magnetic bias should be avoided if possible with inductors requiring high stability (filter inductors etc.). In the case of geometrically similar cores (i.e. in particular the same A_{min}/A_e ratio) the effective permeability of the core in question in conjunction with the given curves suffices to determine the reversible permeability to a close approximation.

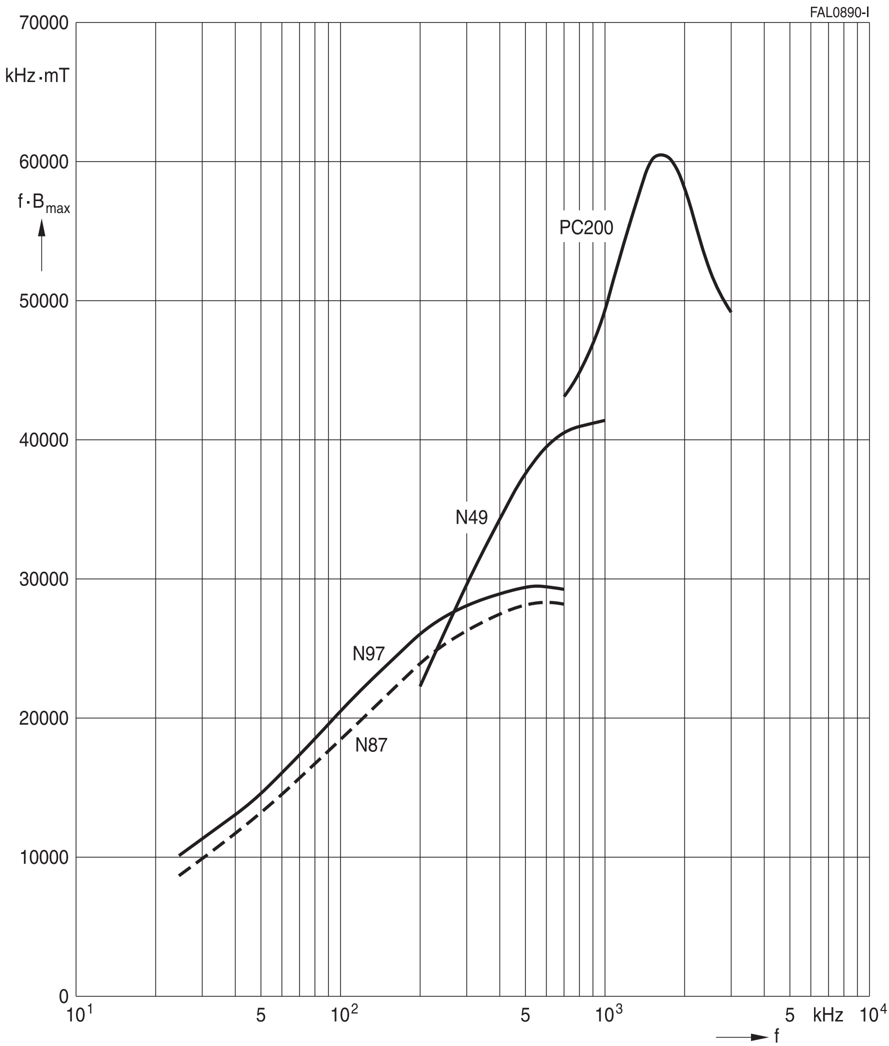
Relative loss factor versus frequency
(measured with ring cores, measuring flux density $\hat{B} \leq 0{,}25$ mT)



Relative inductance component versus frequency
(measured with ring cores, measuring flux density $\hat{B}$ ≤0,25 mT)

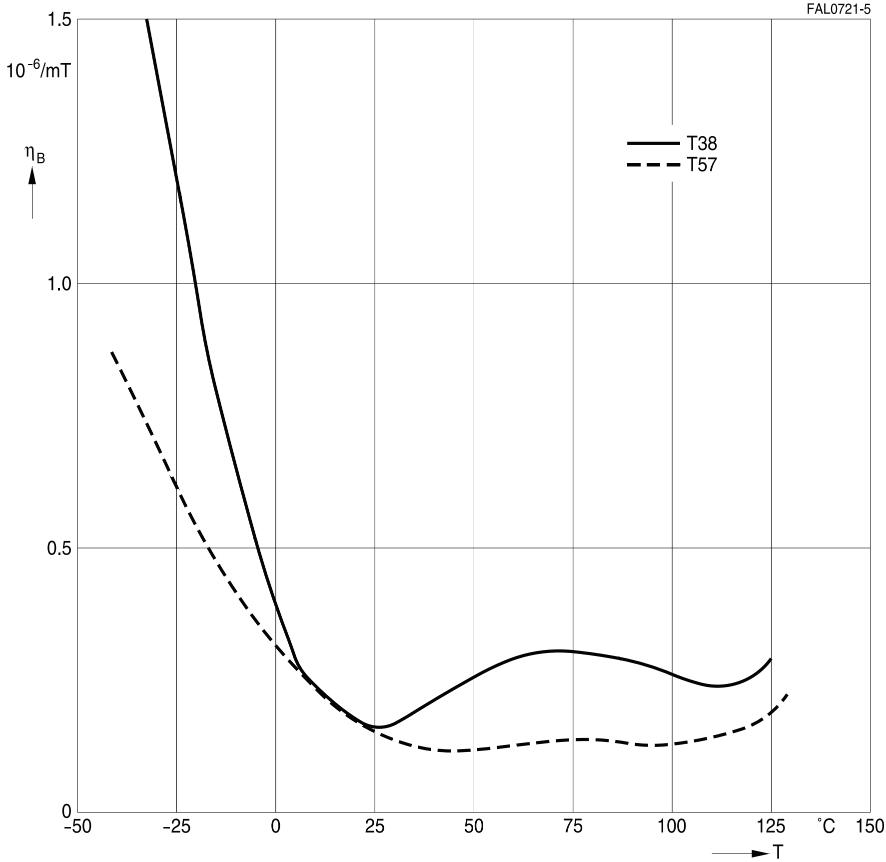


Performance factor versus frequency
(measured with ring cores R29, T = 100 °C, PV = 300 kW/m³)



For definition of performance factor see page 132.

Standardized hysteresis material constant versus temperature

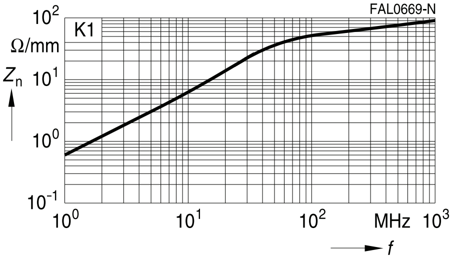


For definition of performance factor see page 134.

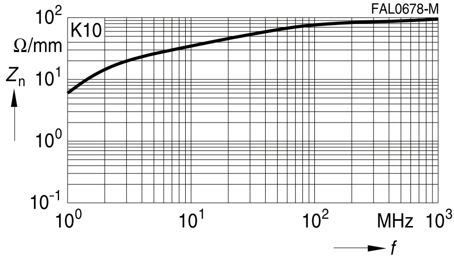
SIFERRIT materials

Normalized impedance

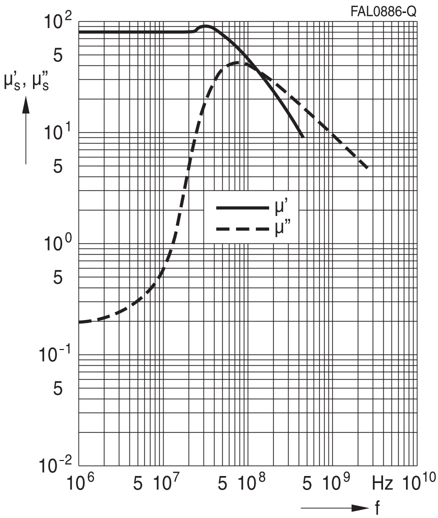
K1



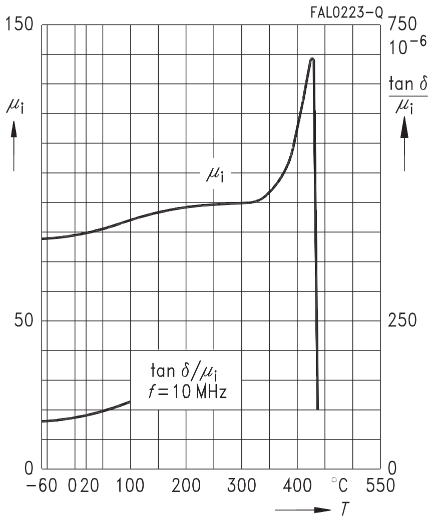
K10



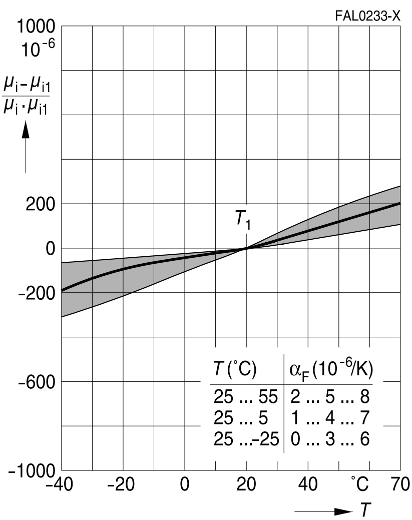
Complex permeability
versus frequency
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



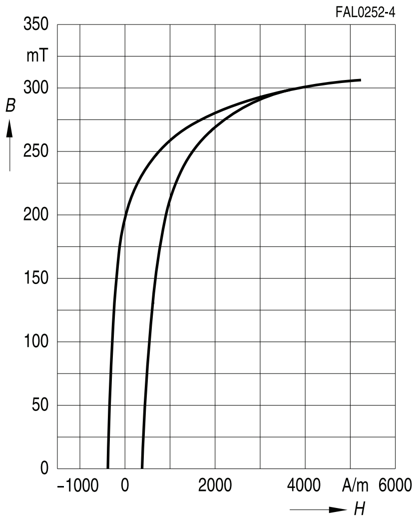
Initial permeability μ_i and relative loss factor
tan δ/μ_i versus temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



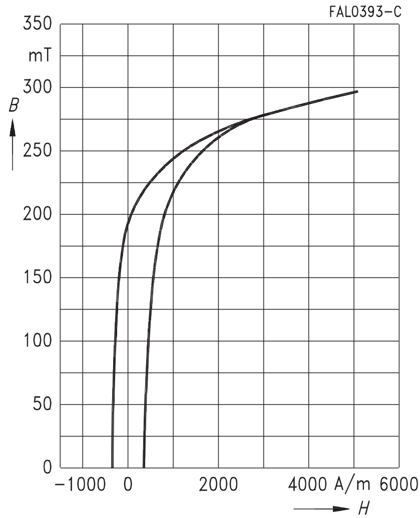
Permeability factor versus temperature
(measured on P and RM cores,
$\hat{B} \leq 0.25$ mT), $\mu_i \approx 80$



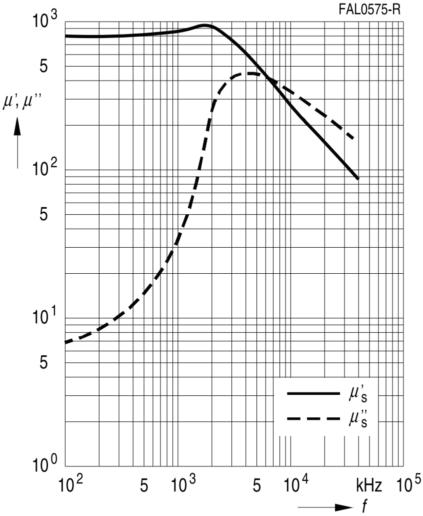
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



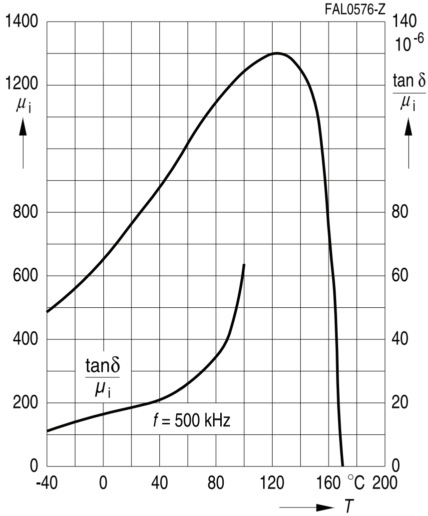
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



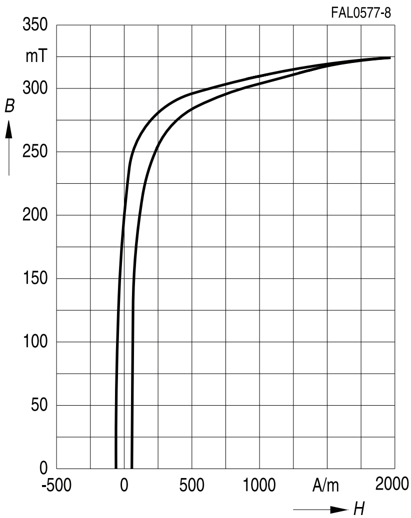
Complex permeability
versus frequency
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



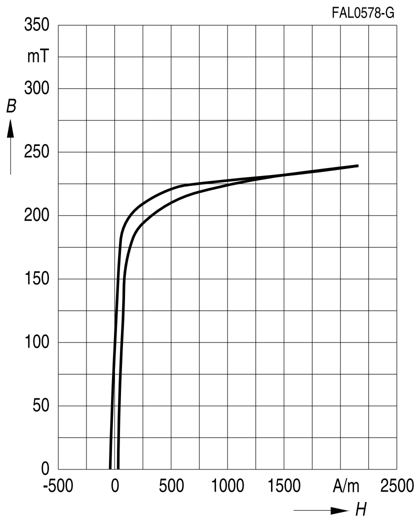
Initial permeability μ_i and relative loss factor
tan δ/μ_i versus temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



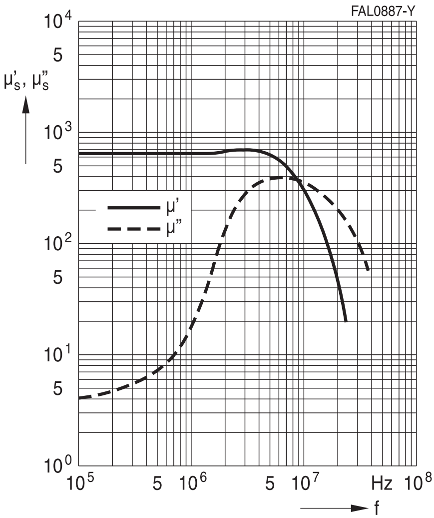
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



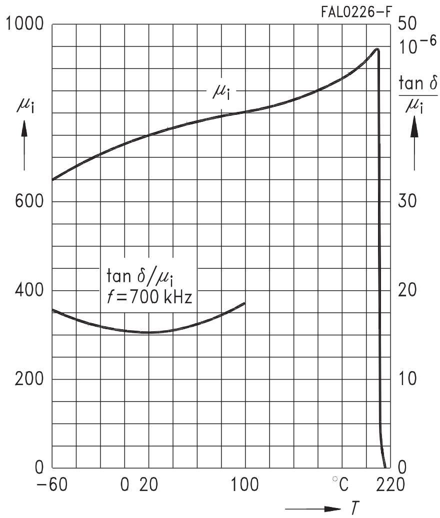
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



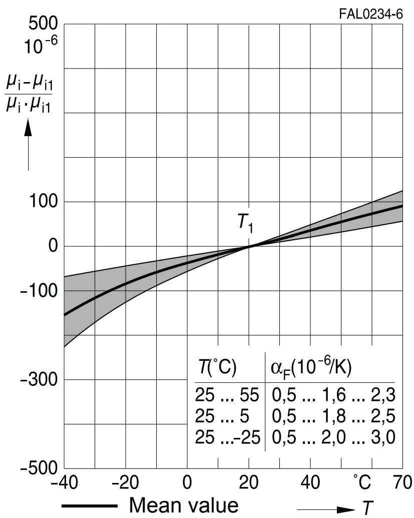
Complex permeability
versus frequency
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



Initial permeability μ_i and relative loss factor
tan δ/μ_i versus temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)

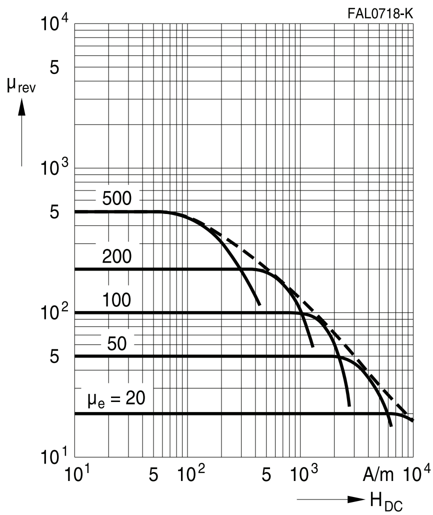


Permeability factor versus temperature
(measured on P and RM cores,
$\hat{B} \leq 0.25$ mT), $\mu_i \approx 750$

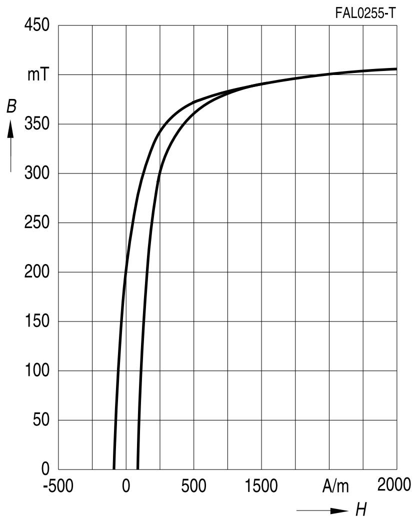


T(°C)	α_F(10^{-6}/K)
25 ... 55	0,5 ... 1,6 ... 2,3
25 ... 5	0,5 ... 1,8 ... 2,5
25 ...-25	0,5 ... 2,0 ... 3,0

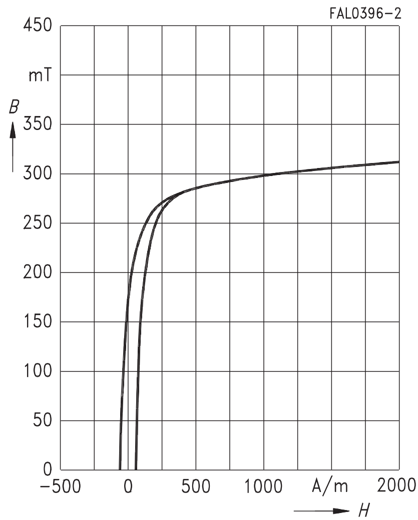
DC magnetic bias of P and RM cores
(typical values)
($\hat{B} \leq 0.25$ mT, f = 10 kHz, T = 25 °C)



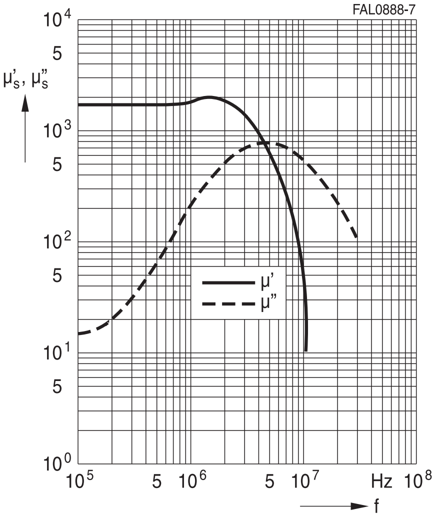
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



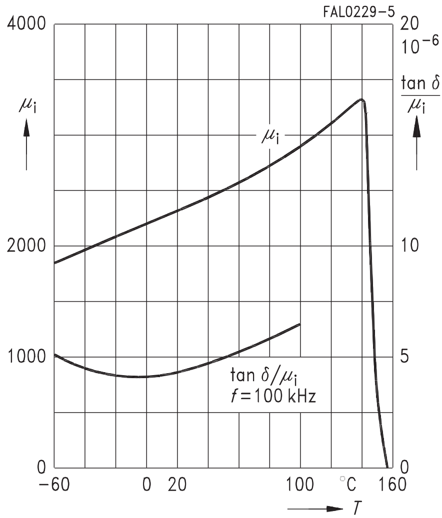
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



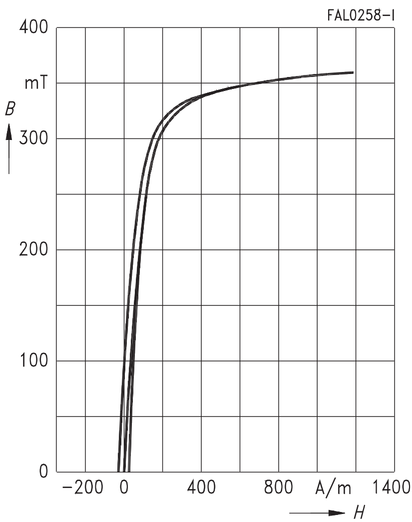
Complex permeability
versus frequency
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



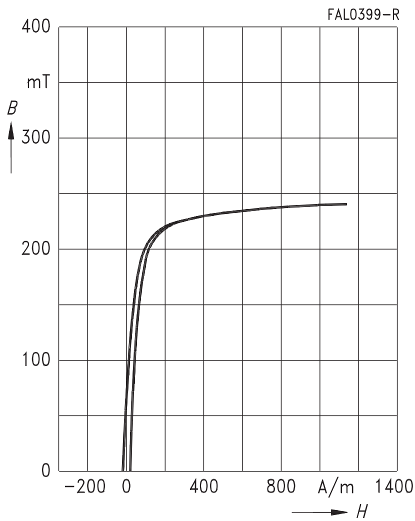
Initial permeability μ_i and relative loss factor
tan δ/μ_i versus temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



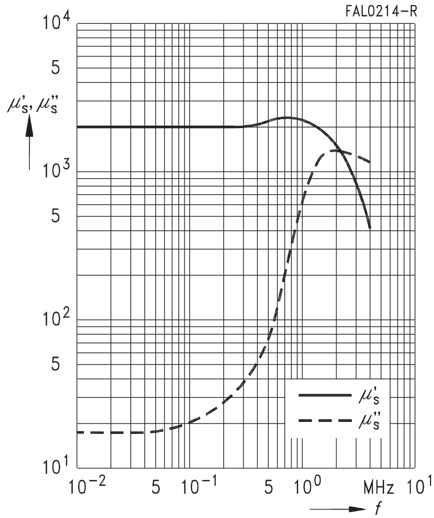
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



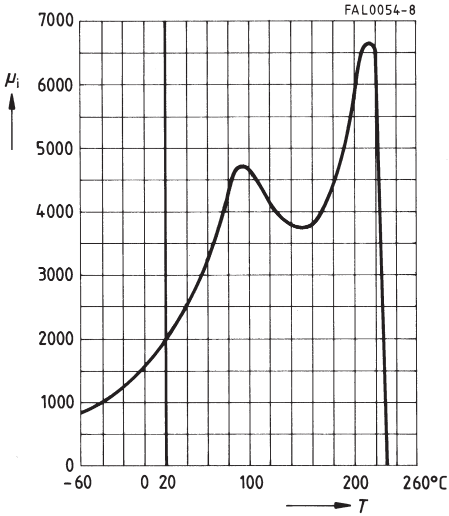
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



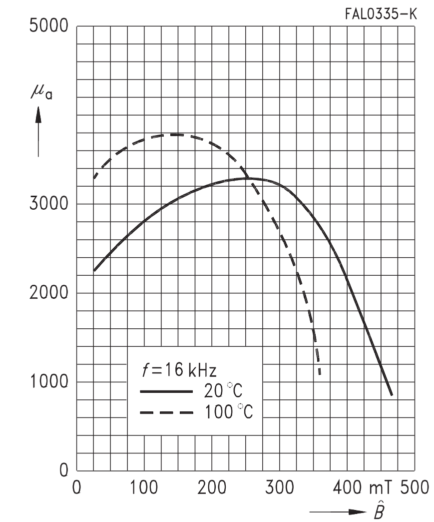
Complex permeability
versus frequency
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



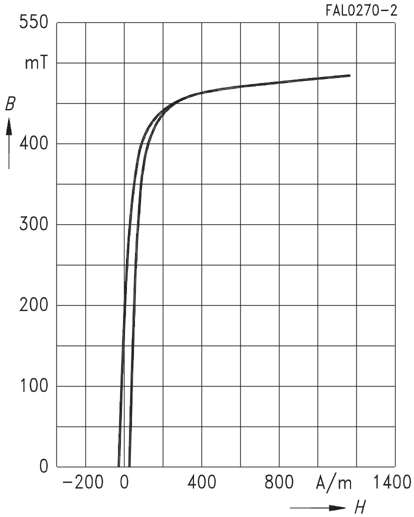
Initial permeability μ_i
versus temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



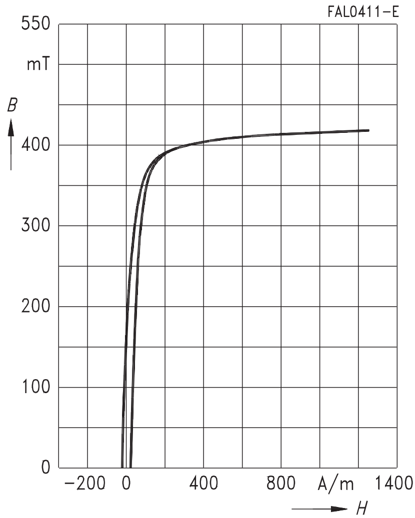
Amplitude permeability versus AC field
flux density
(measured on ungapped E cores)



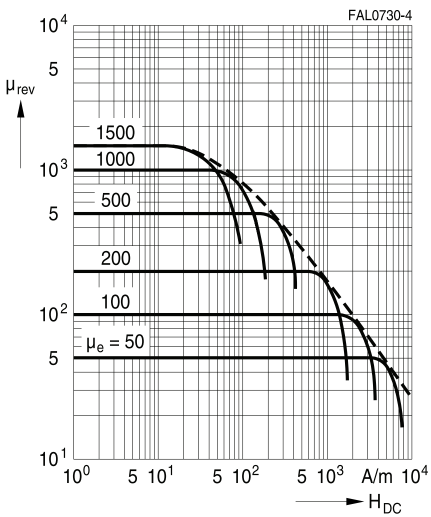
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



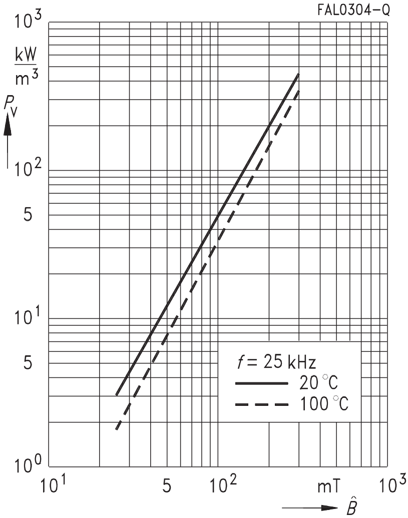
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



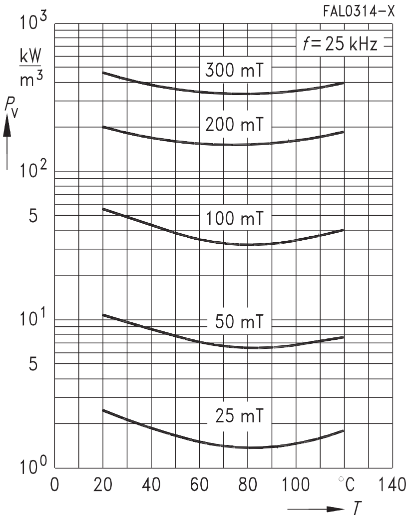
DC magnetic bias
measured on ETD cores
($\hat{B} \leq 0.25$ mT, f = 10 kHz, T = 25 °C)



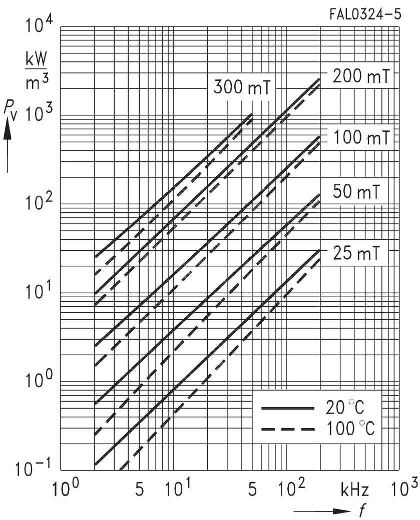
Relative core losses versus AC field flux density
(measured on R16 toroids)



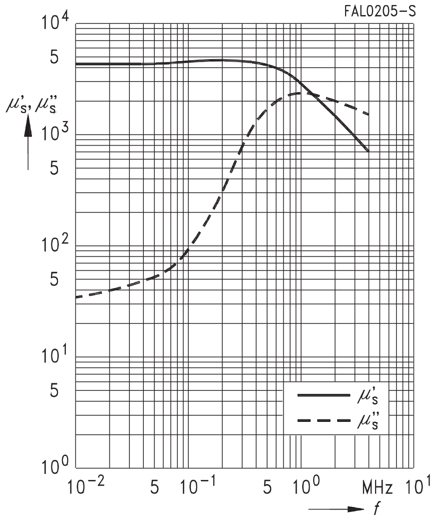
Relative core losses versus temperature
(measured on R16 toroids)



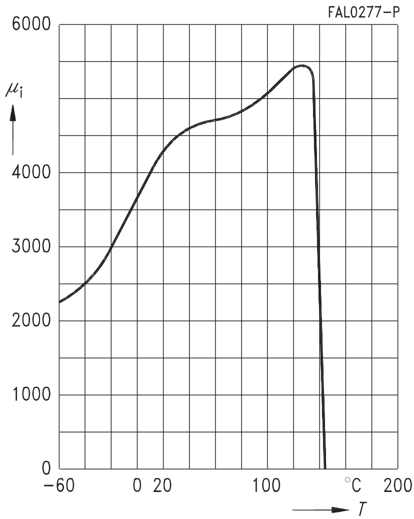
Relative core losses versus frequency
(measured on R16 toroids)



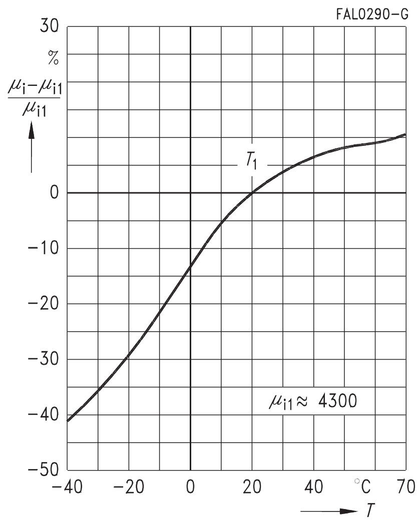
Complex permeability
versus frequency
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



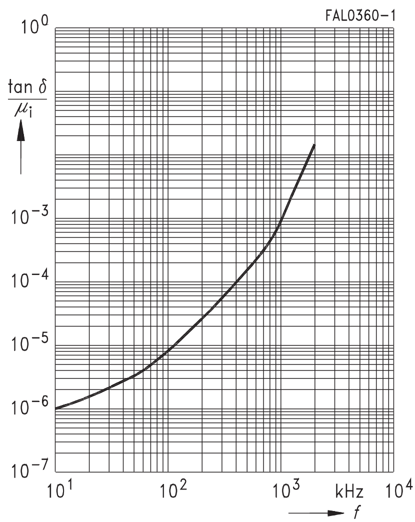
Initial permeability μ_i
versus temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



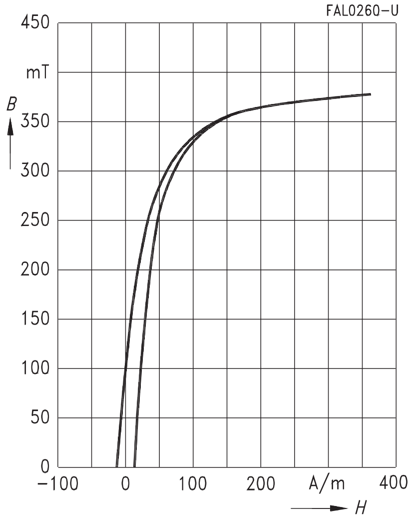
Variation of initial permeability
with temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



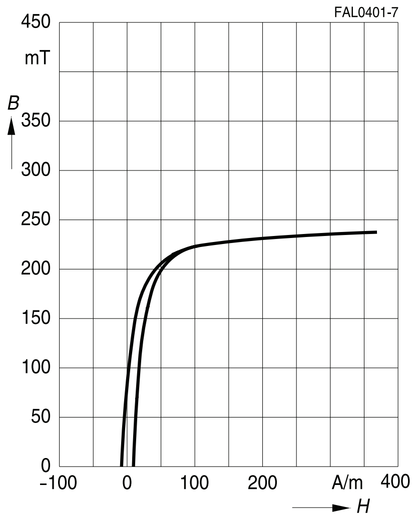
Relative loss factor
versus frequency
(measured on R20 toroids, $\hat{B} \leq 0.25$ mT)



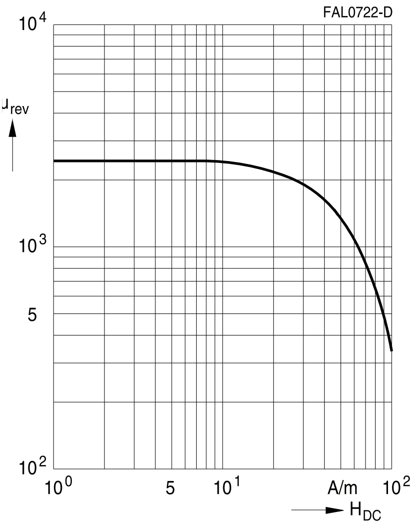
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



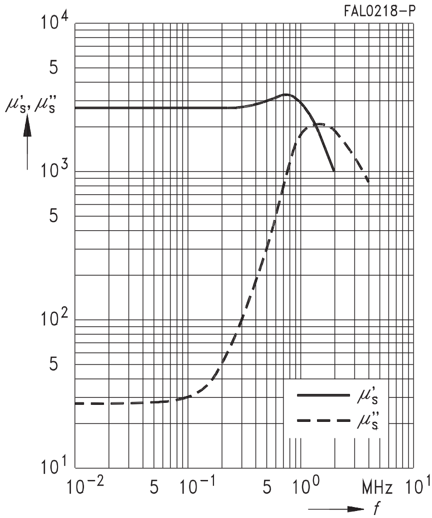
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



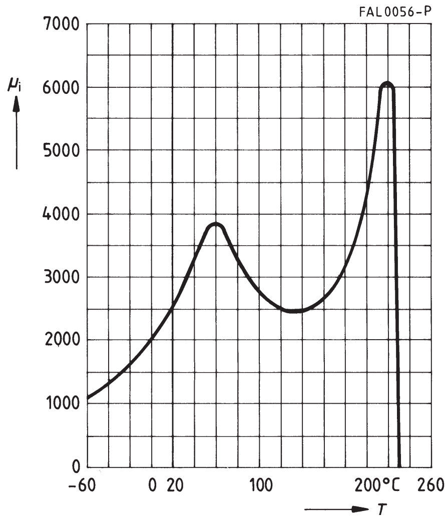
DC magnetic bias of RM cores
(typical values)
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



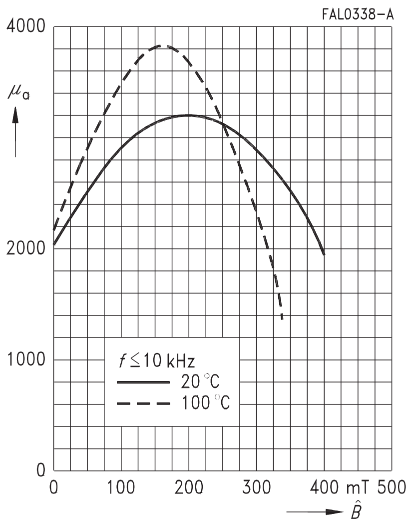
Complex permeability
versus frequency
(measured with R10 ring cores, $\hat{B} \leq 0.25$ mT)



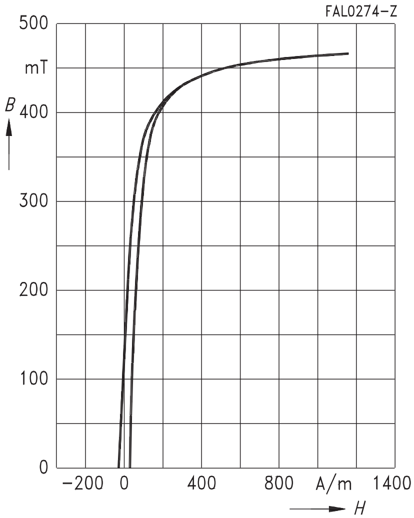
Initial permeability μ_i
versus temperature
(measured with R10 ring cores, $\hat{B} \leq 0.25$ mT)



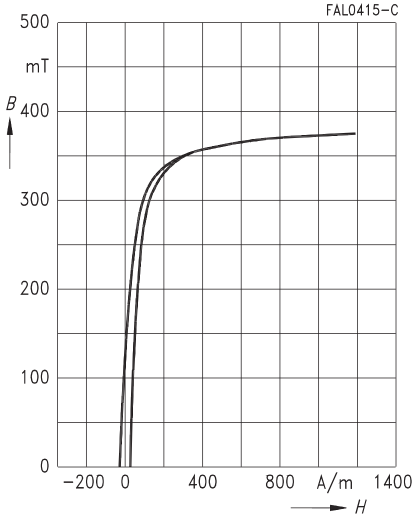
Amplitude permeability
versus AC field flux density
(measured on ungapped E cores)



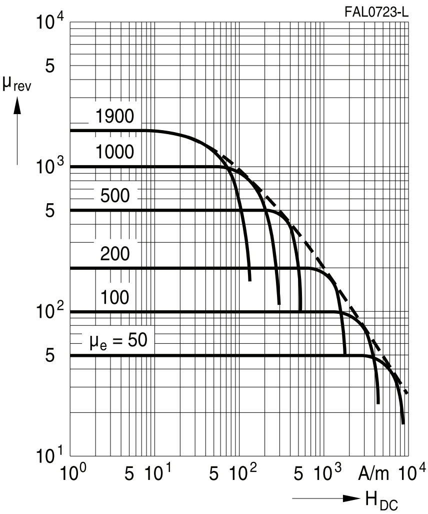
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



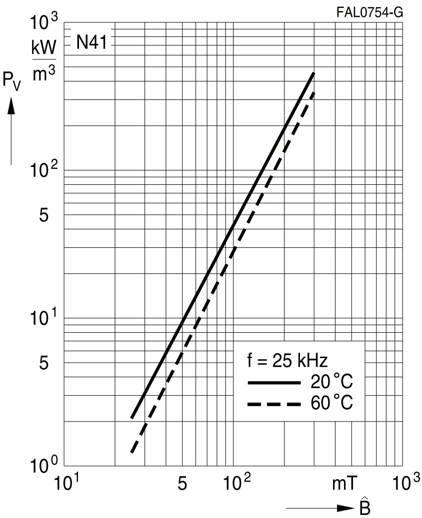
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



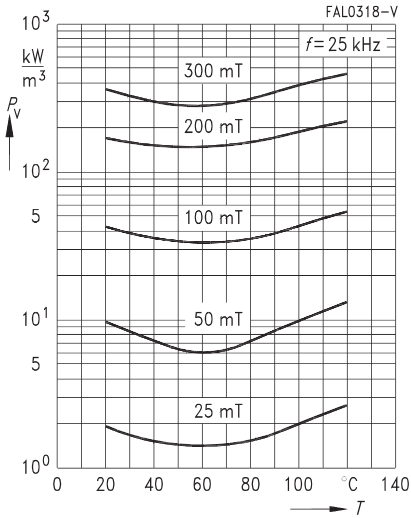
DC magnetic bias
of P and RM cores
($\hat{B} \leq 0.25$ mT, f = 10 kHz, T = 25 °C)



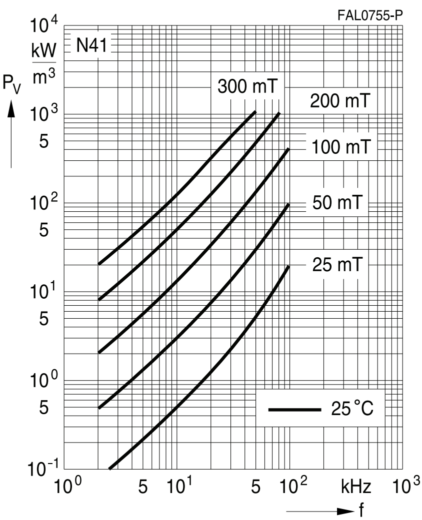
Relative core losses
versus AC field flux density
(measured on R16 toroids)



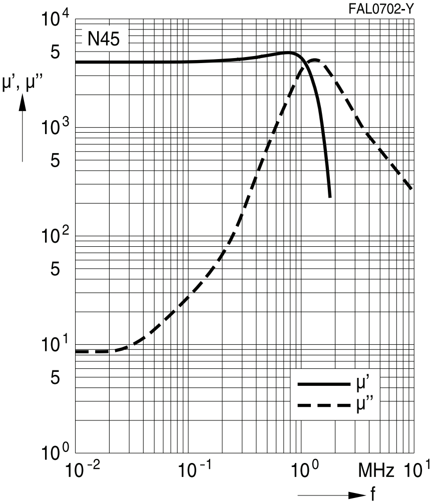
Relative core losses
versus temperature
(measured on R16 toroids)



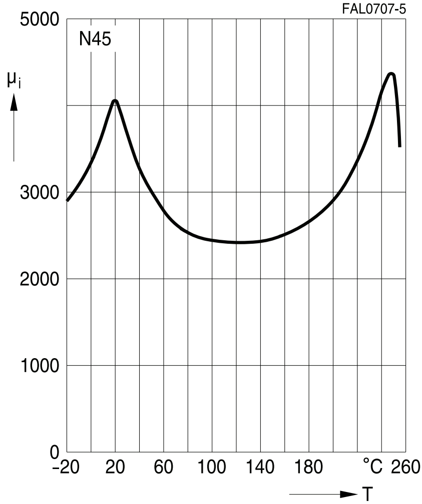
Relative core losses
versus frequency
(measured on R16 toroids)



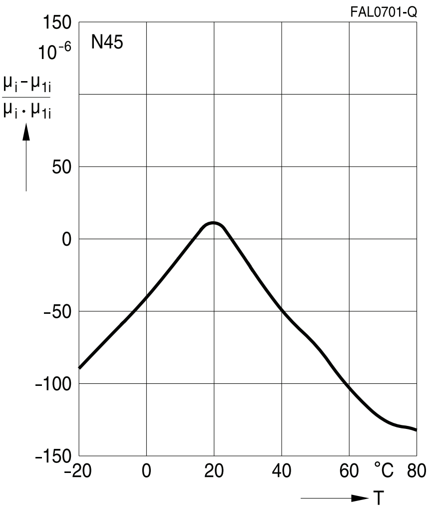
Complex permeability
versus frequency
(measured on R29 toroids, $\hat{B} \le 0.25$ mT)



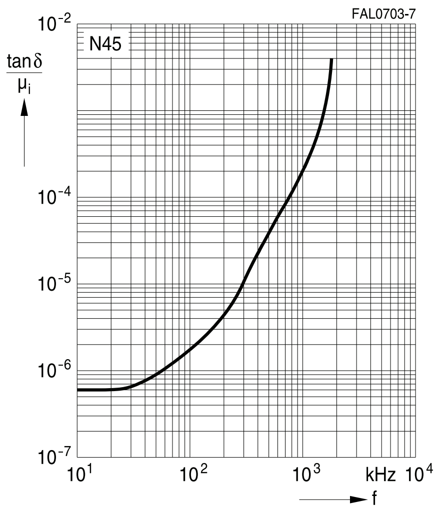
Initial permeability μ_i
versus temperature
(measured on R29 toroids, $\hat{B} \le 0.25$ mT)



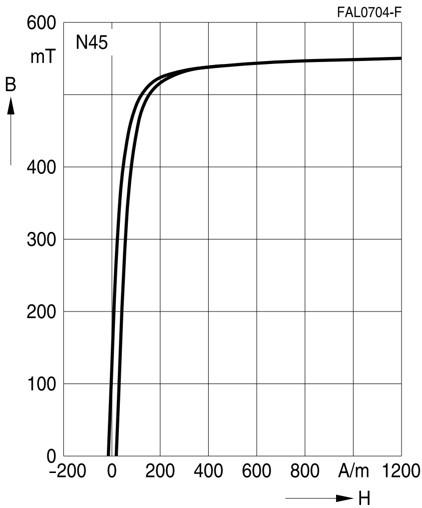
Variation of initial
permeability with temperature
(measured on R29 toroids, $\hat{B} \le 0.25$ mT)



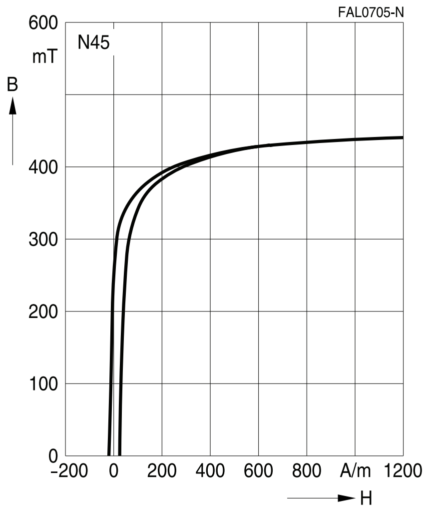
Relative loss factor
versus frequency
(measured on R29 toroids, $\hat{B} \le 0.25$ mT)



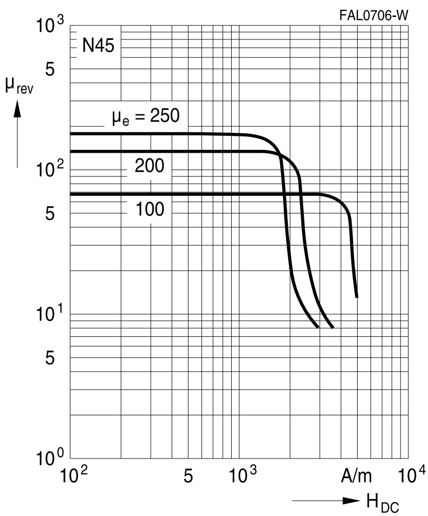
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



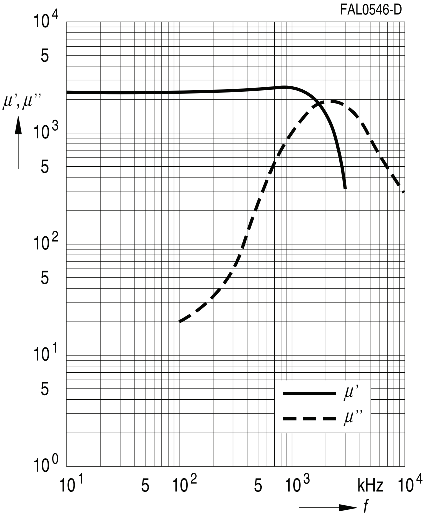
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



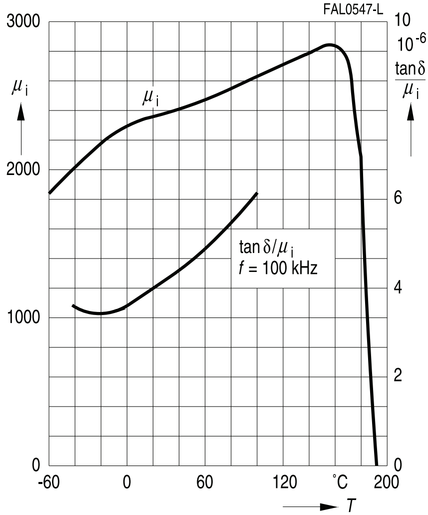
DC magnetic bias of P and RM cores
(typical values)
($\hat{B} \leq 0.25$ mT, f = 10 kHz, T = 25 °C)



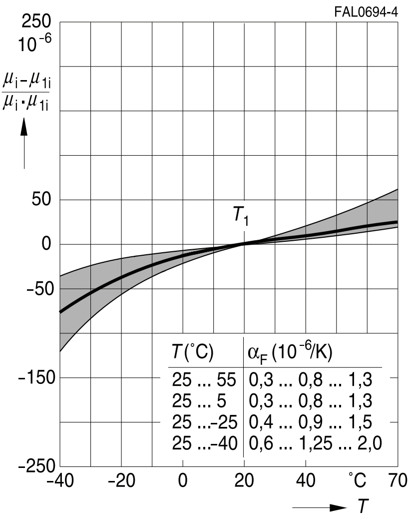
Complex permeability
versus frequency
(measured on R10 toroids, B̂ ≤0.25 mT)



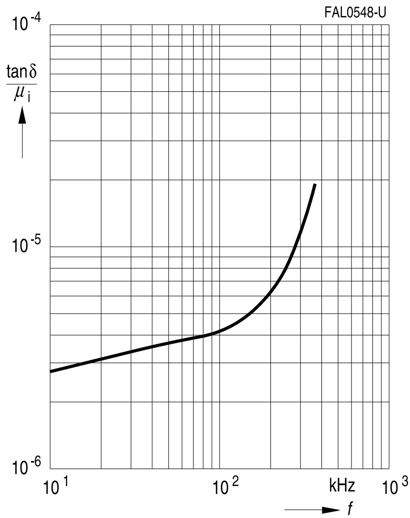
Initial permeability μ_i and relative loss factor tan δ/μ_i versus temperature
(measured on R10 toroids, B̂ ≤0.25 mT)



Permeability factor versus temperature
(measured on P and RM cores, B̂ ≤0.25 mT),
$\mu_i \approx 2300$

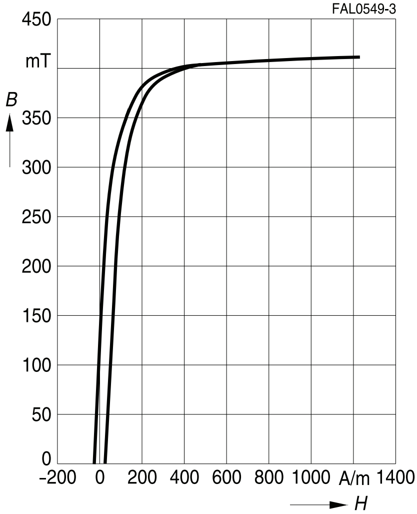


Relative loss factor tan δ/μ_i
versus frequency
(measured on R29 toroids)

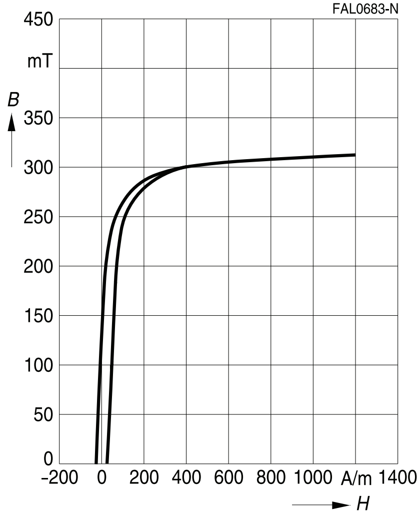


Please read *Important notes* on page 2
and *Cautions and warnings* on page 674

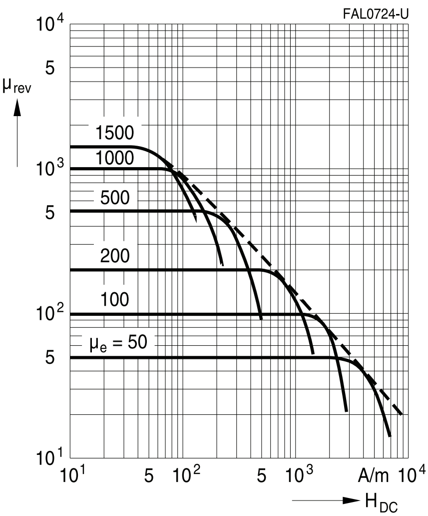
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



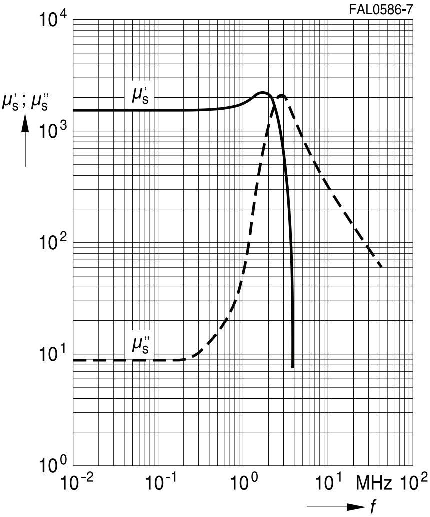
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



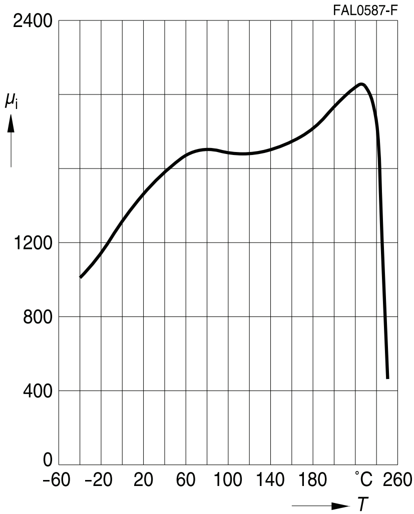
DC magnetic bias
(measured on ETD cores, typical values)
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



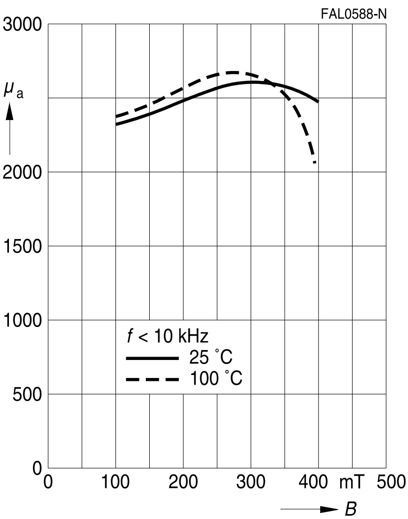
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



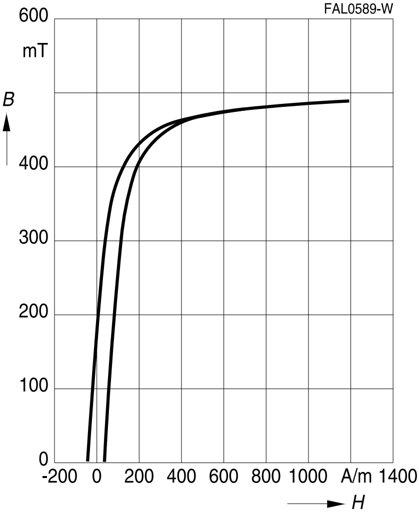
Initial permeability μ_i
versus temperature
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



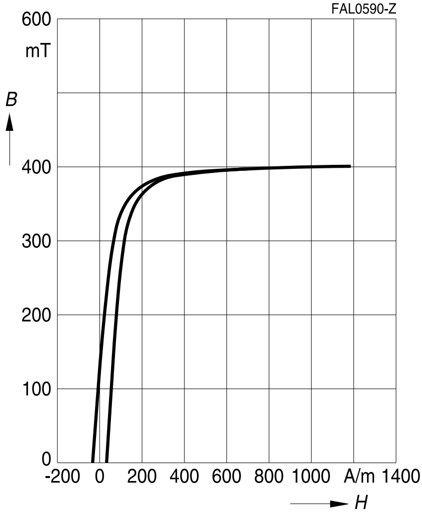
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



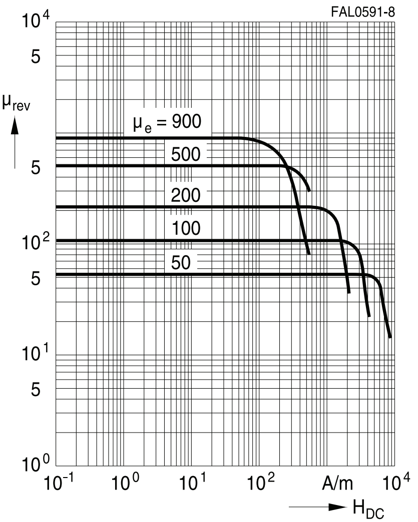
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



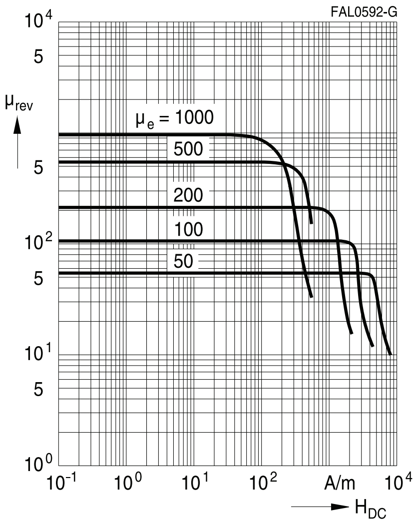
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



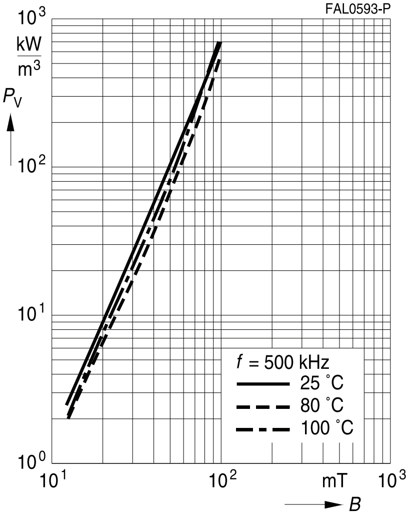
DC magnetic bias
measured on ETD cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



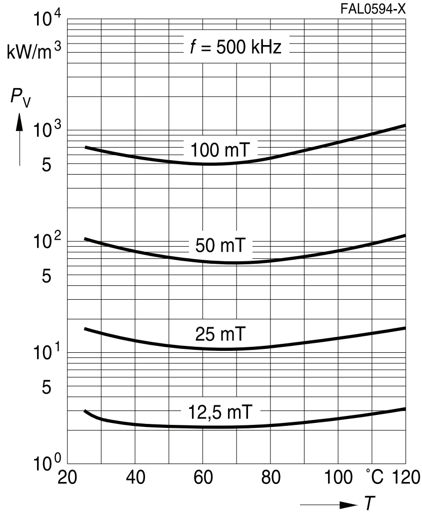
DC magnetic bias
measured on ETD cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 100 °C)



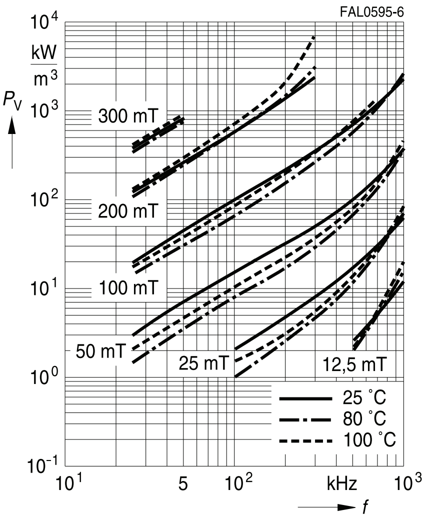
Relative core losses
versus AC field flux density
(measured on R34 toroids)



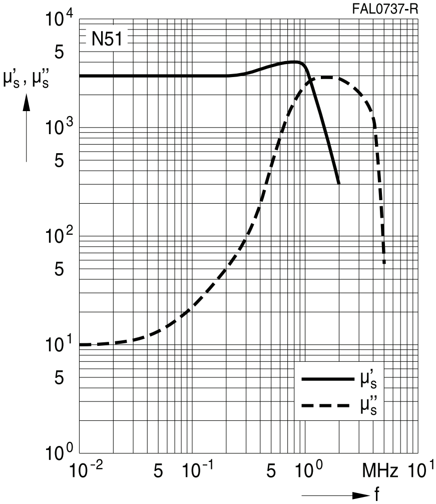
Relative core losses
versus temperature
(measured on R34 toroids)



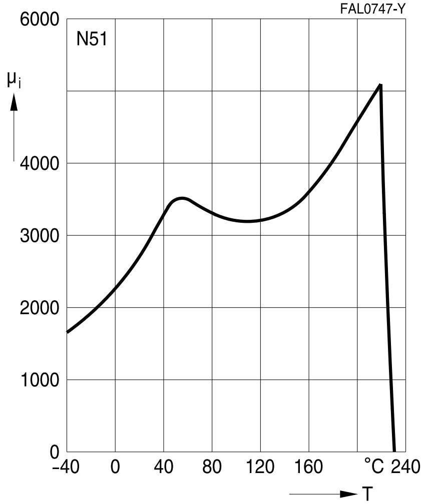
Relative core losses
versus frequency
(measured on R34 toroids)



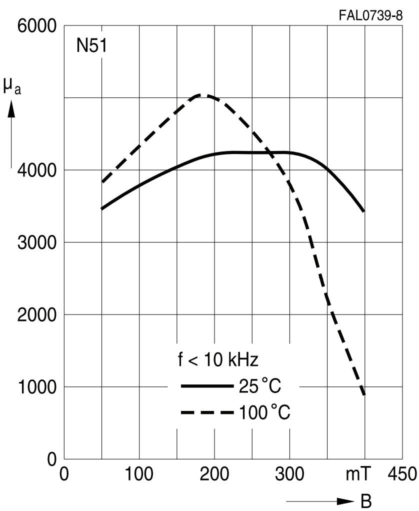
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



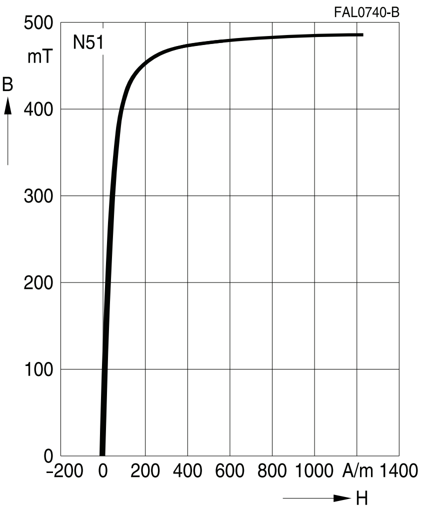
Initial permeability μ_i
versus temperature
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



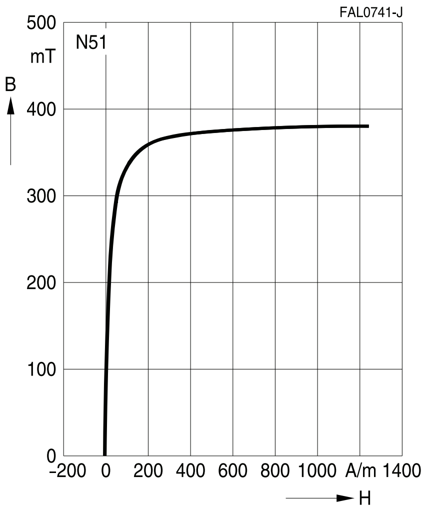
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



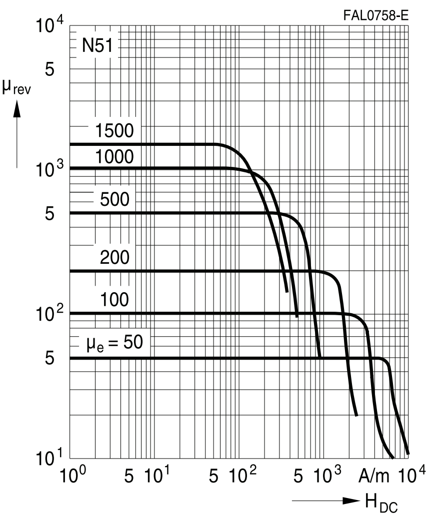
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



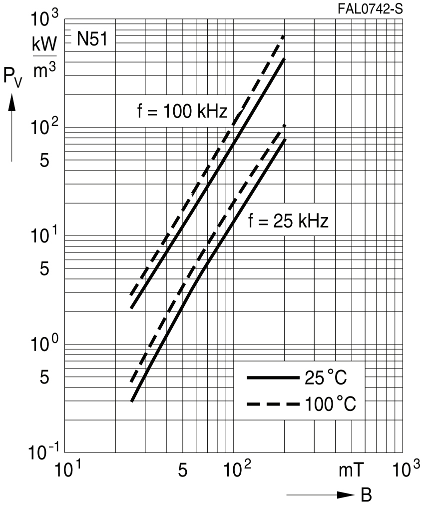
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



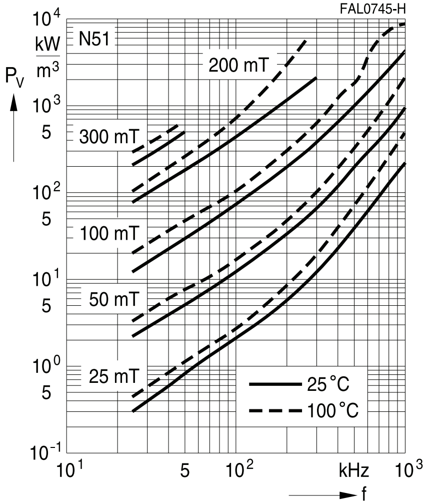
DC magnetic bias
measured on E cores
($\hat{B} \leq 0.25$ mT, f = 10 kHz, T = 25 °C)



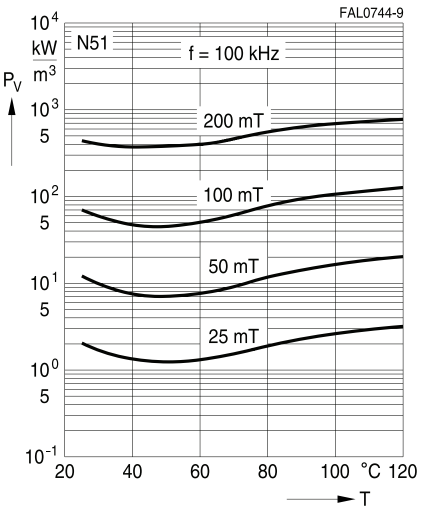
Relative core losses
versus AC field flux density
(measured on R34 toroids)



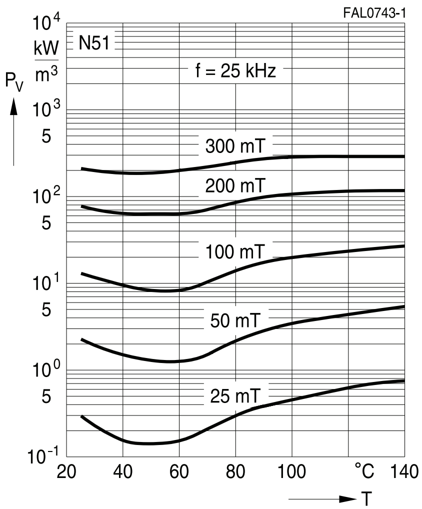
Relative core losses
versus frequency
(measured on R34 toroids)



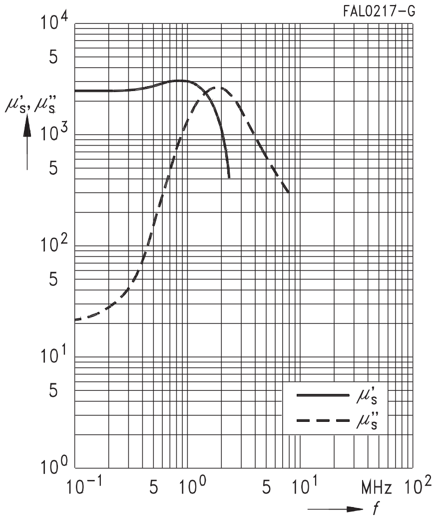
Relative core losses
versus temperature
(measured on R34 toroids)



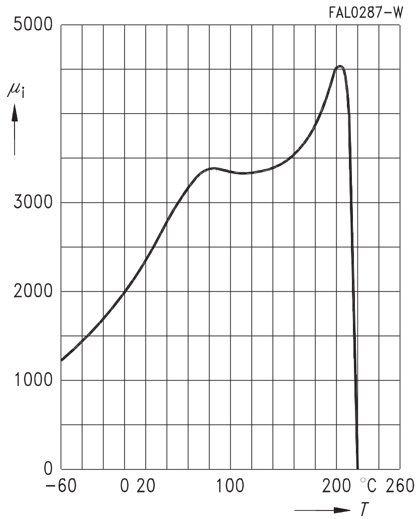
Relative core losses
versus temperature
(measured on R34 toroids)



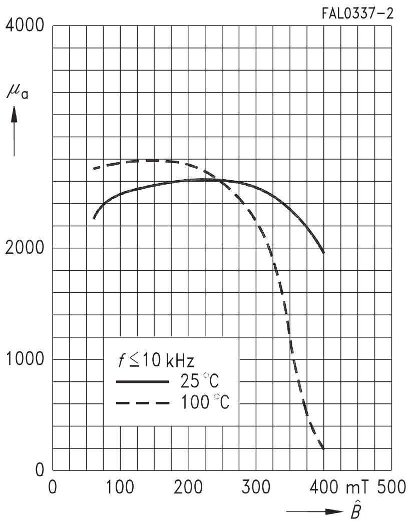
Complex permeability
versus frequency
(measured on R29 toroids, $\hat{B}$ ≤0.25 mT)



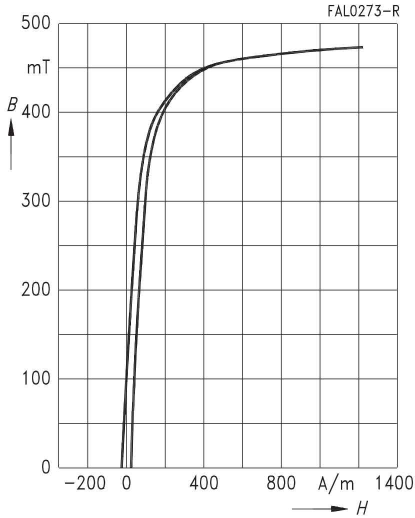
Initial permeability μ_i
versus temperature
(measured on R29 toroids, $\hat{B}$ ≤0.25 mT)



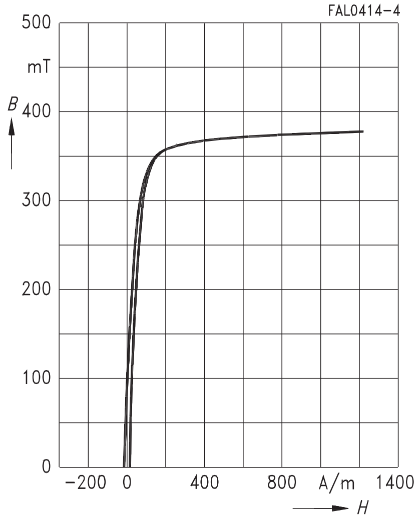
Amplitude permeability versus AC field
flux density
(measured on ungapped U cores)



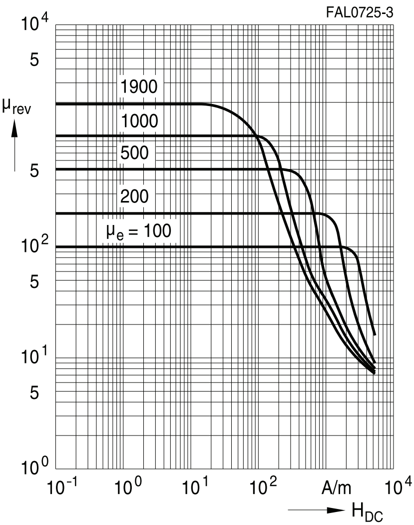
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



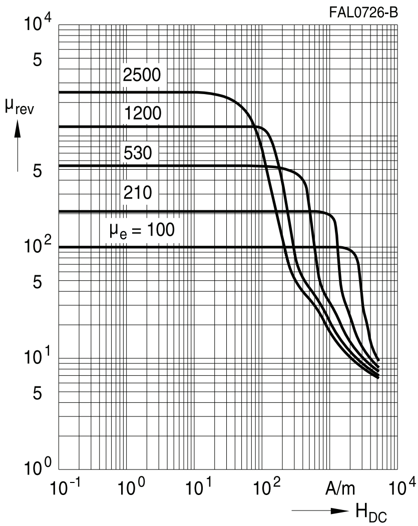
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



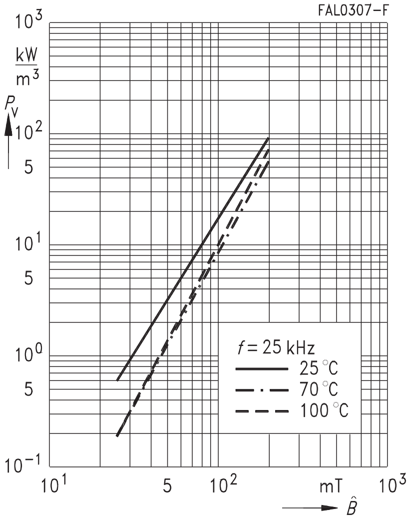
DC magnetic bias measured on E cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



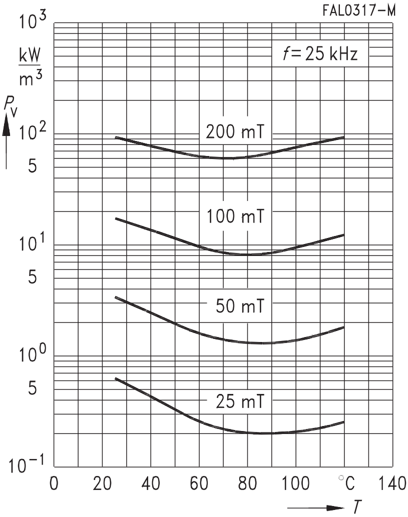
DC magnetic bias measured on E cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 100 °C)



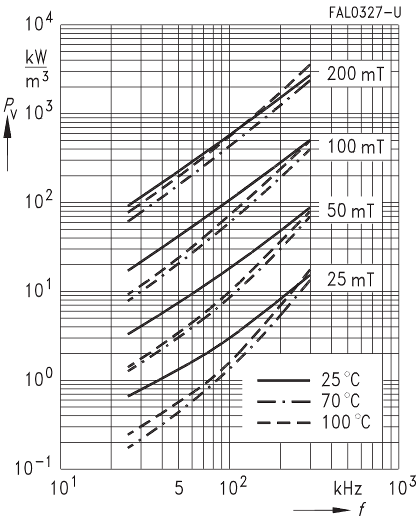
Relative core losses versus AC field flux density
(measured on R29 toroids)



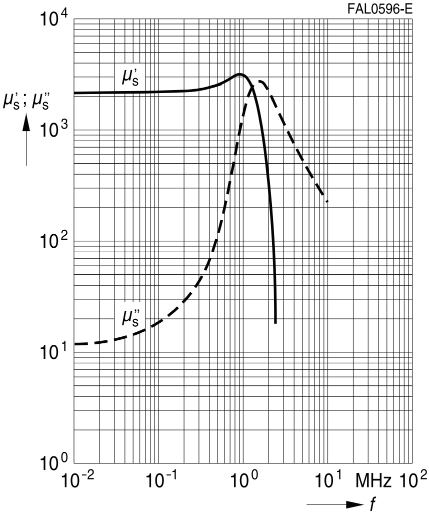
Relative core losses
versus temperature
(measured on R29 toroids)



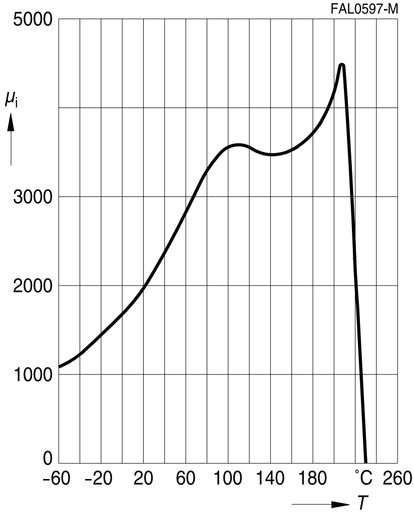
Relative core losses
versus frequency
(measured on R29 toroids)



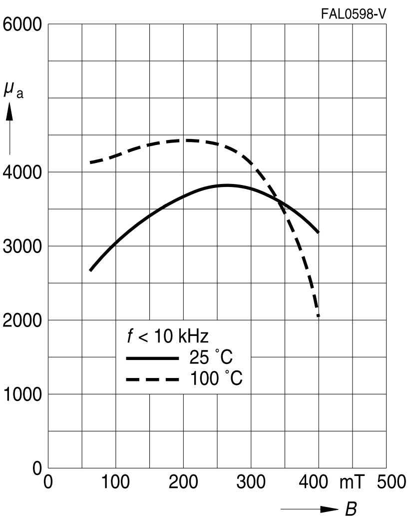
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



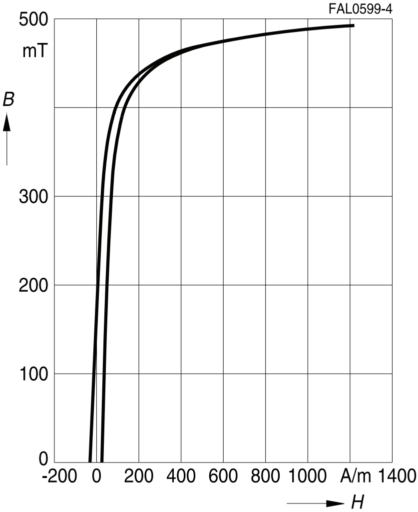
Initial permeability μ_i
versus temperature
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



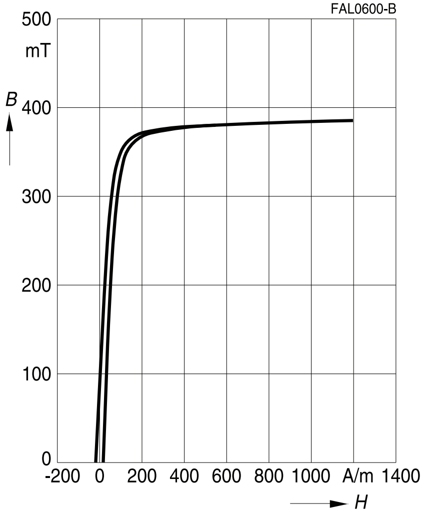
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



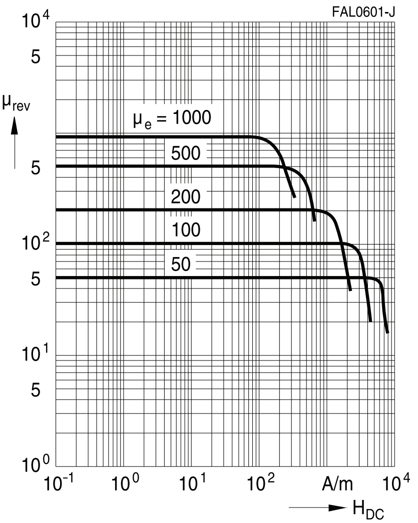
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



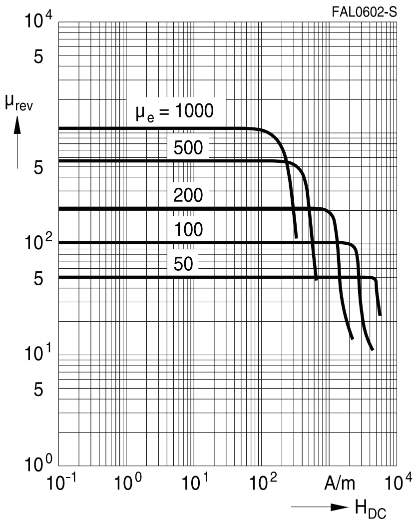
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



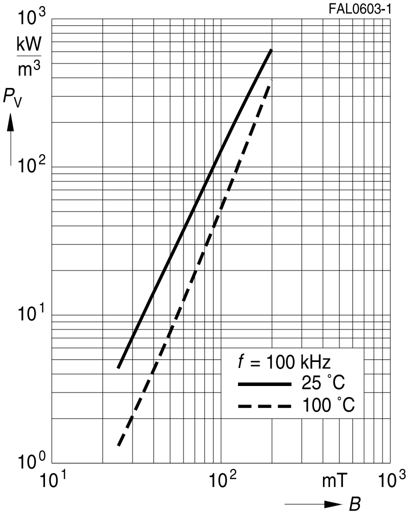
DC magnetic bias
of P, RM, PM and E cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



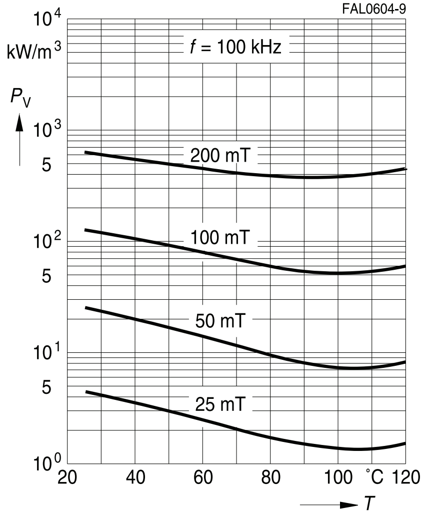
DC magnetic bias
of P, RM, PM and E cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 100 °C)



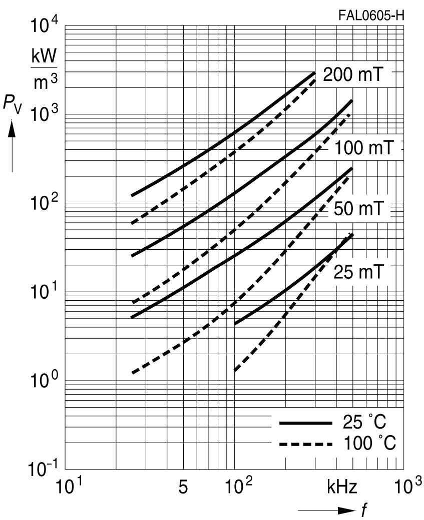
Relative core losses
versus AC field flux density
(measured on R34 toroids)



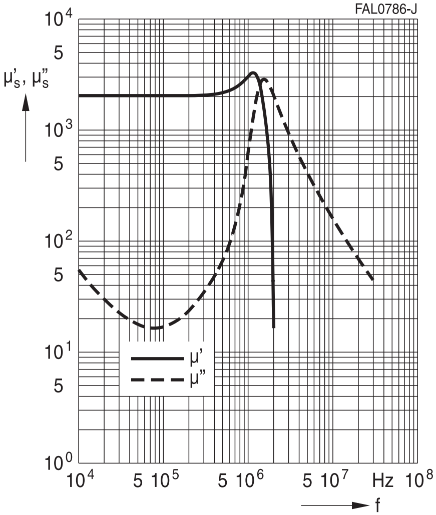
Relative core losses
versus temperature
(measured on R34 toroids)



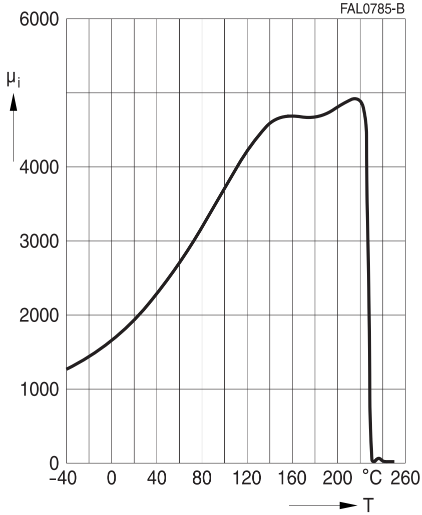
Relative core losses
versus frequency
(measured on R34 toroids)



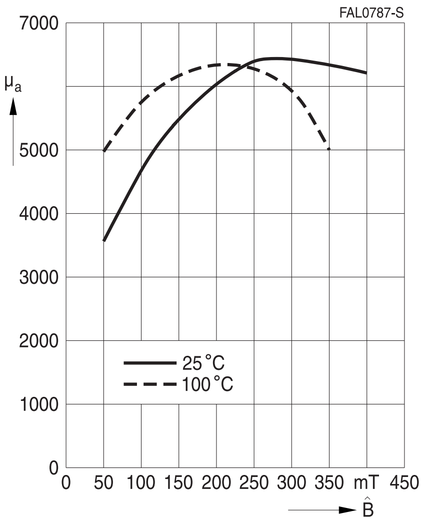
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B}$ ≤0.25 mT)



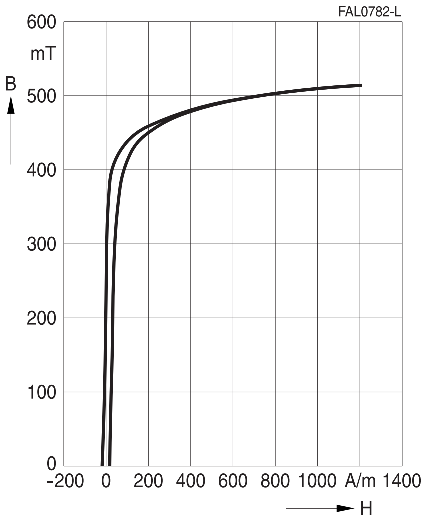
Initial permeability μ_i
versus frequency
(measured on R34 toroids, $\hat{B}$ ≤0.25 mT)



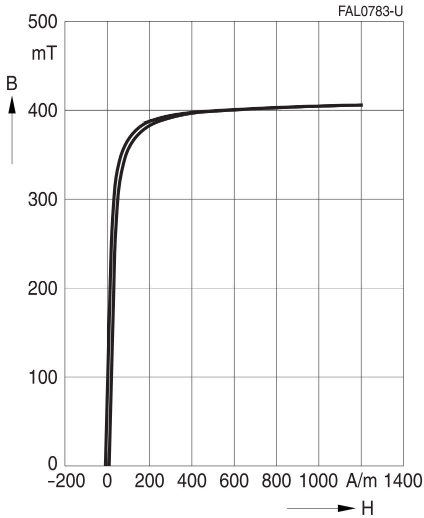
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, f < 10 kHz)



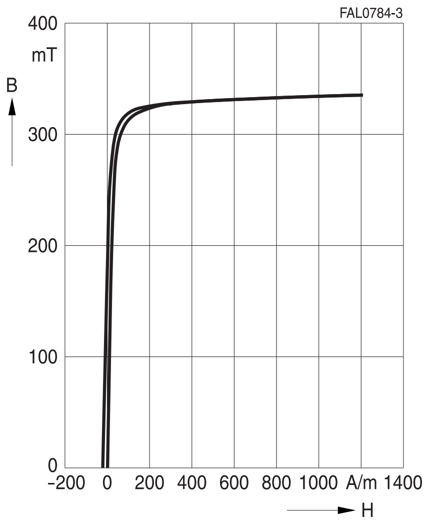
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



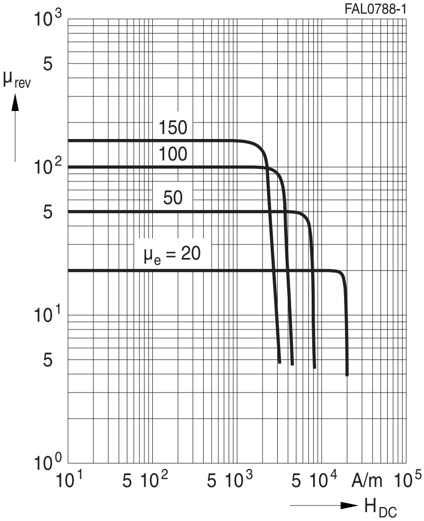
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



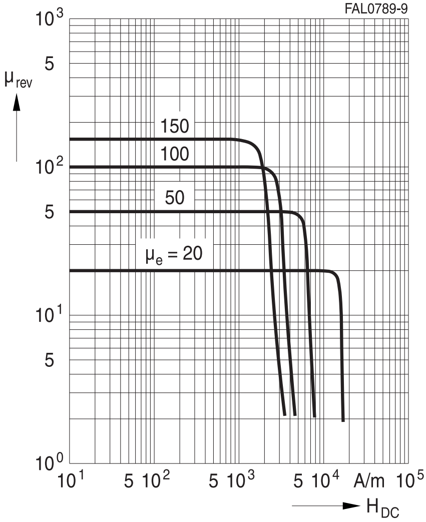
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 140 °C)



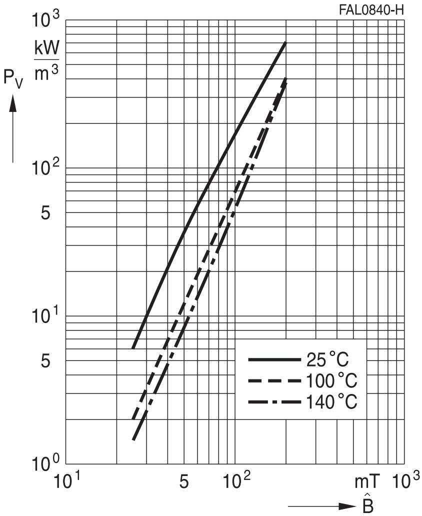
DC Magnetic bias
measured on ETD29 cores
($\hat{B} \leq 0.25$ mT, f =10 kHz, T = 25 °C)



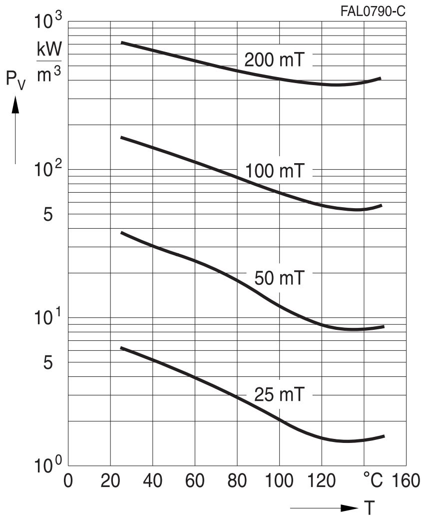
DC Magnetic bias
measured on ETD29 cores
($\hat{B} \leq 0.25$ mT, f =10 kHz, T = 100 °C)



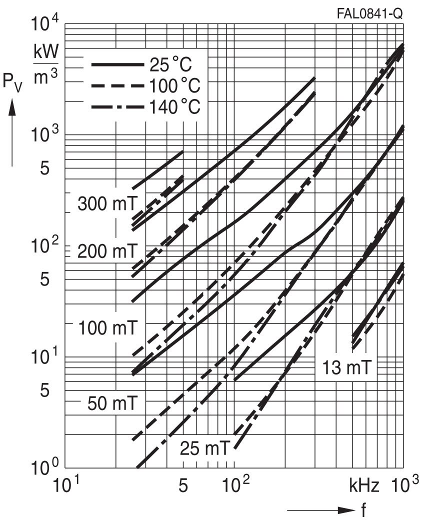
Relative core losses
versus AC field flux density
(measured on R34 toroids)



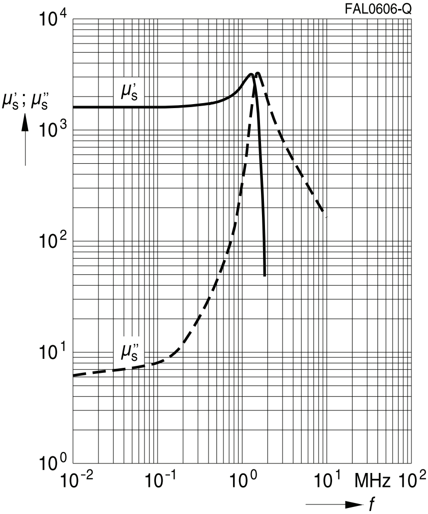
Relative core losses
versus temperature
(measured on R34 toroids, f = 100 kHz)



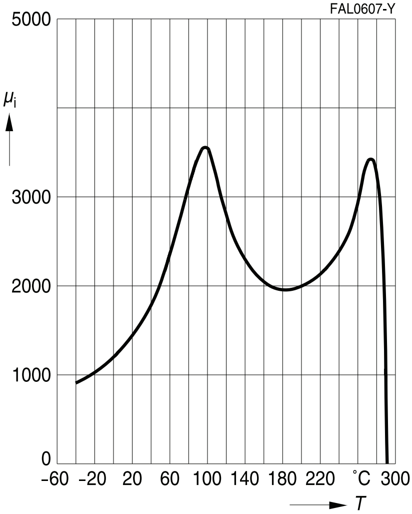
Relative core losses
versus frequency
(measured on R34 toroids)



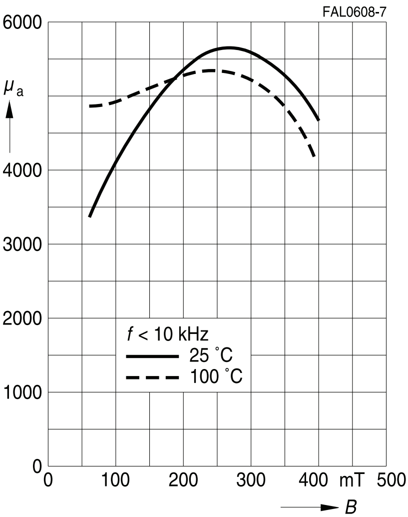
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



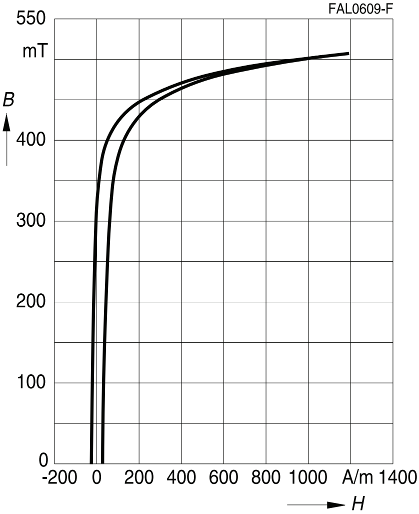
Initial permeability μ_i
versus temperature
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



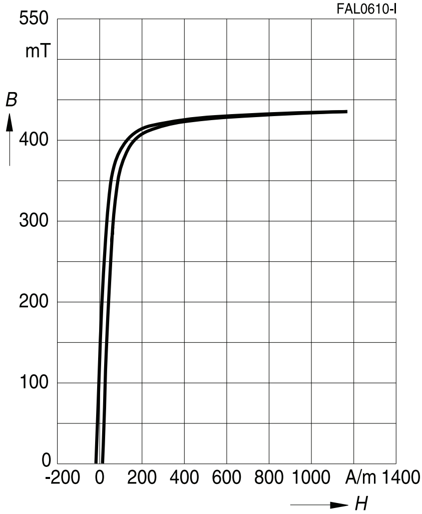
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



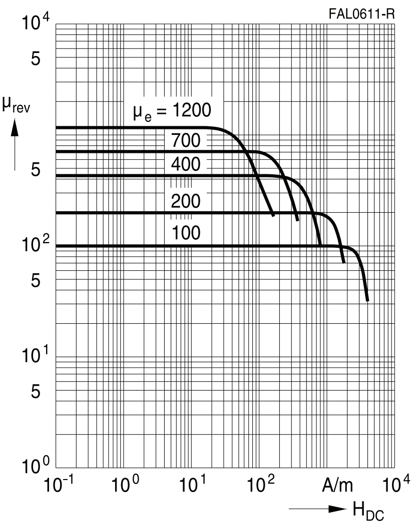
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



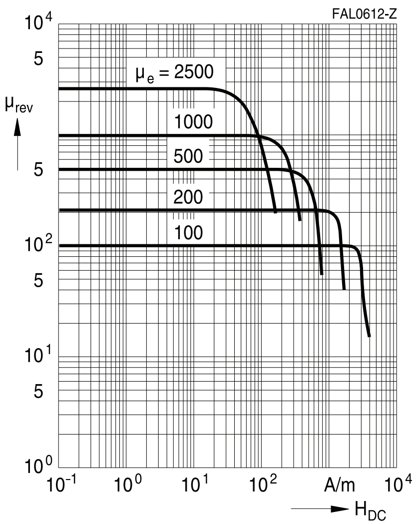
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



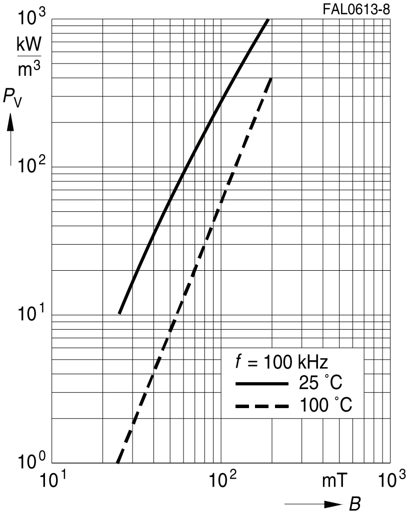
DC magnetic bias
measured on ETD cores
($\hat{B} \leq 0.25$ mT, f = 10 kHz, T = 25 °C)



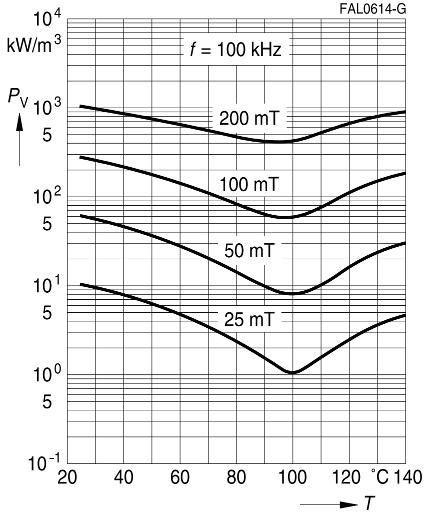
DC magnetic bias
measured on ETD cores
($\hat{B} \leq 0.25$ mT, f = 10 kHz, T = 100 °C)



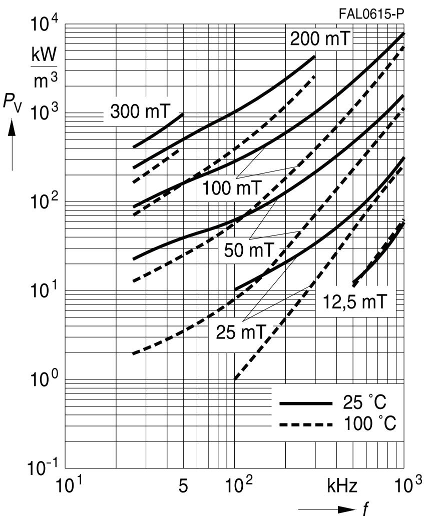
Relative core losses
versus AC field flux density
(measured on R34 toroids)



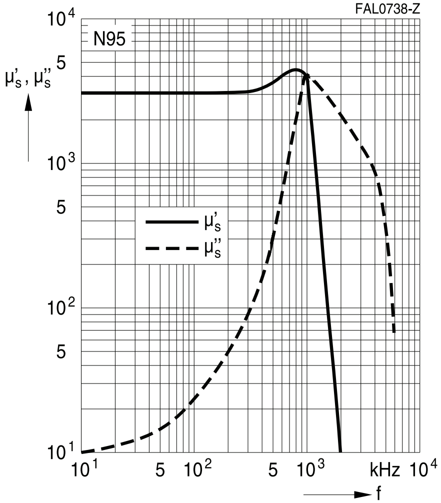
Relative core losses
versus temperature
(measured on R34 toroids)



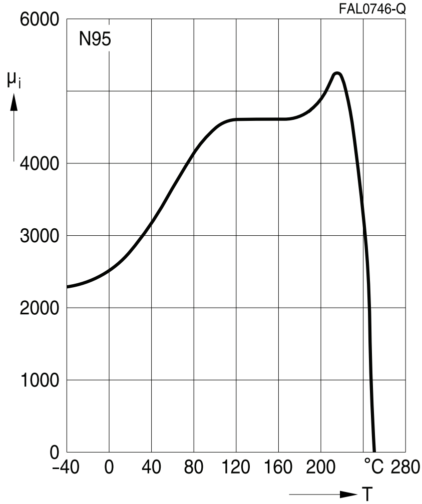
Relative core losses
versus frequency
(measured on R34 toroids)



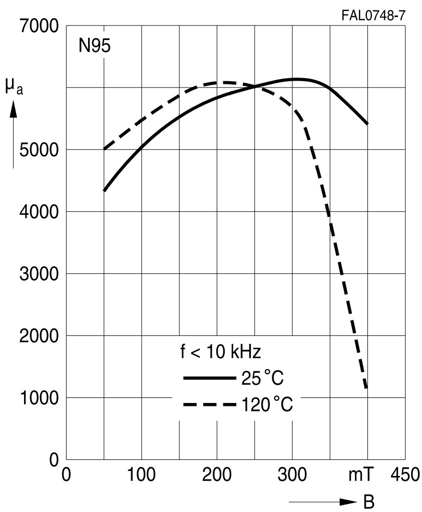
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



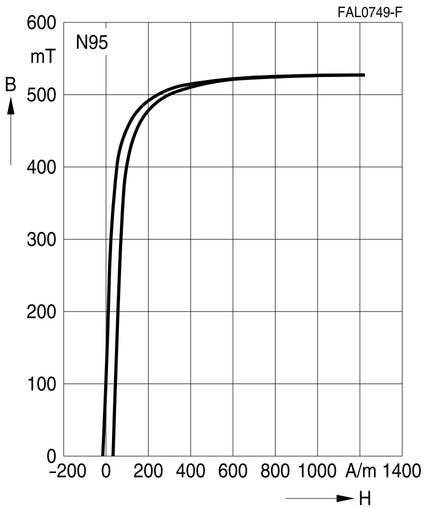
Initial permeability μ_i
versus temperature
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



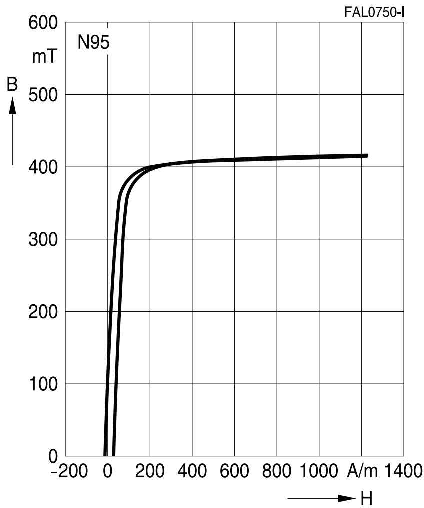
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



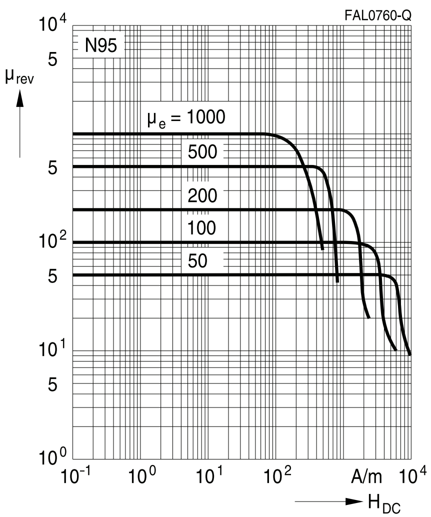
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



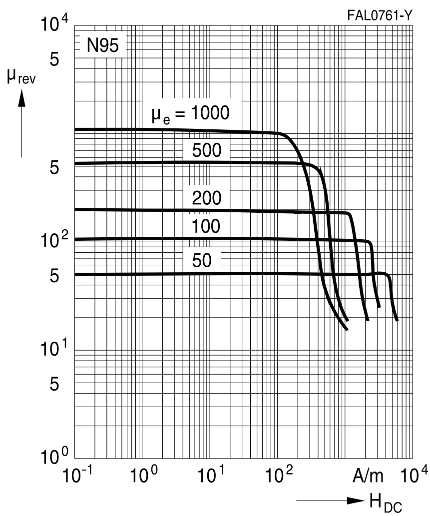
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



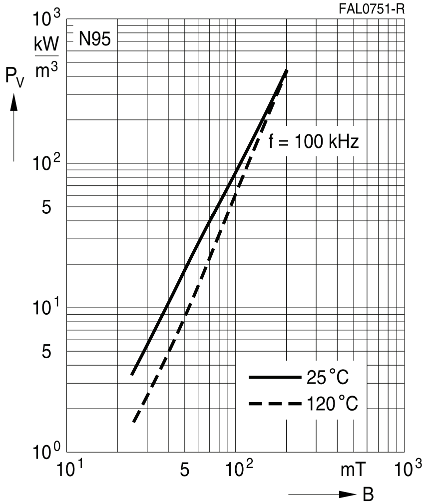
DC magnetic bias
measured on ETD cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



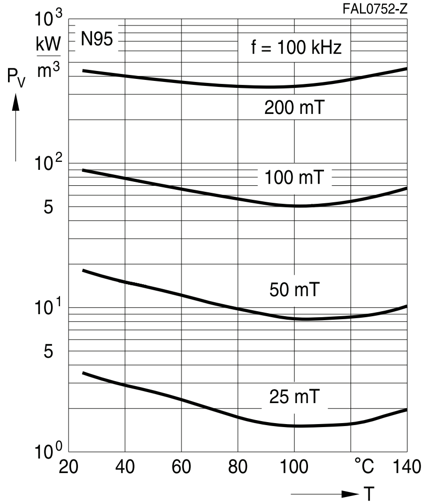
DC magnetic bias
measured on ETD cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 100 °C)



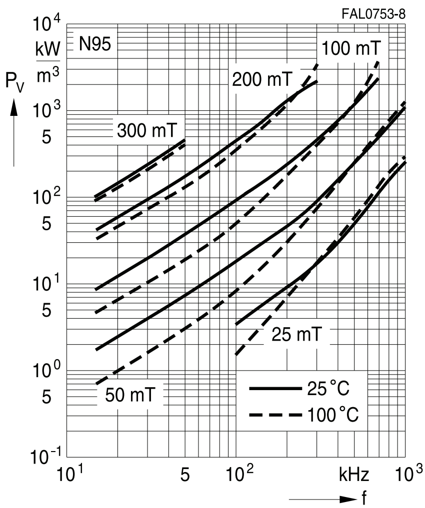
Relative core losses
versus AC field flux density
(measured on R34 toroids)



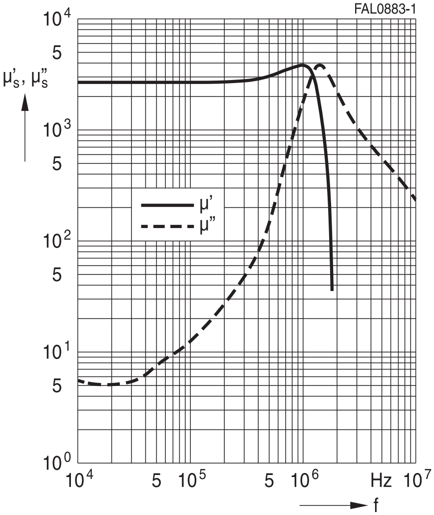
Relative core losses
versus temperature
(measured on R34 toroids)



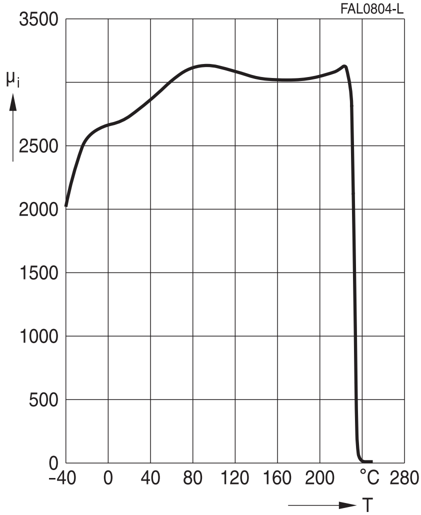
Relative core losses
versus frequency
(measured on R34 toroids)



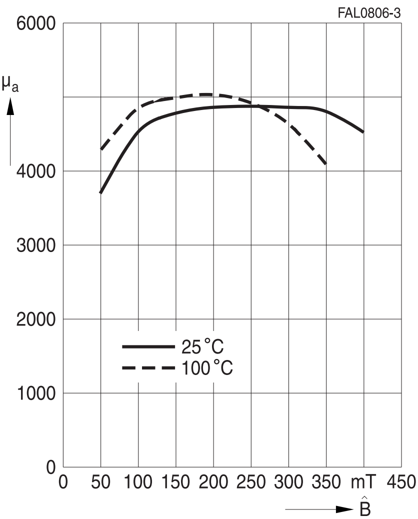
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



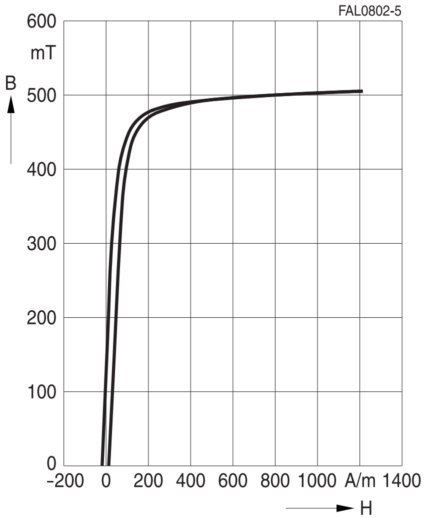
Initial permeability μ_i
versus temperature
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



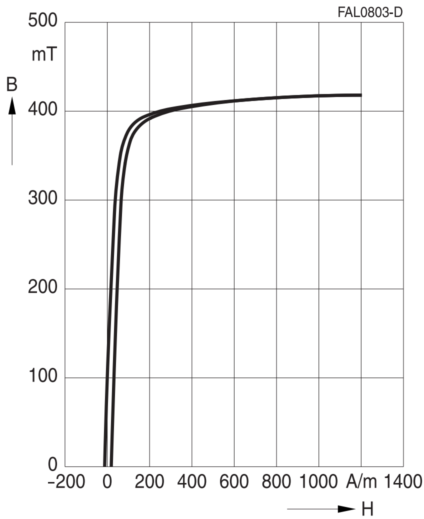
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, f < 10kHz)



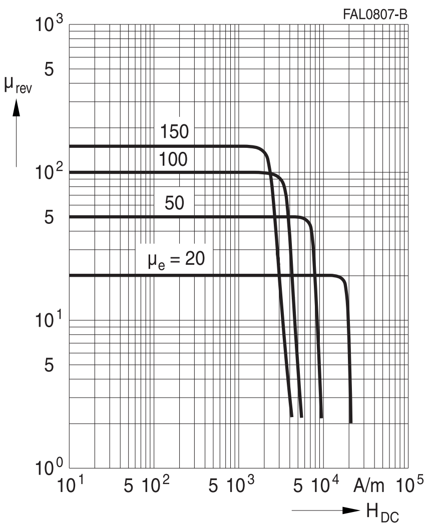
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



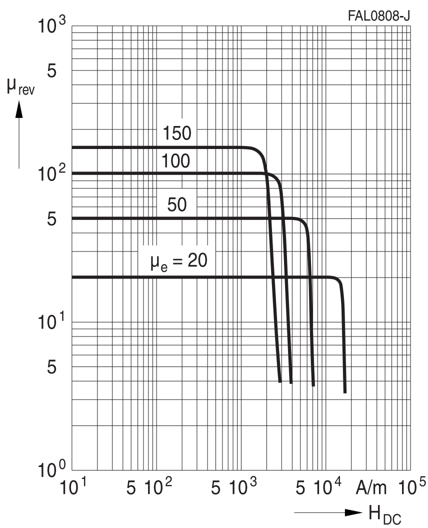
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



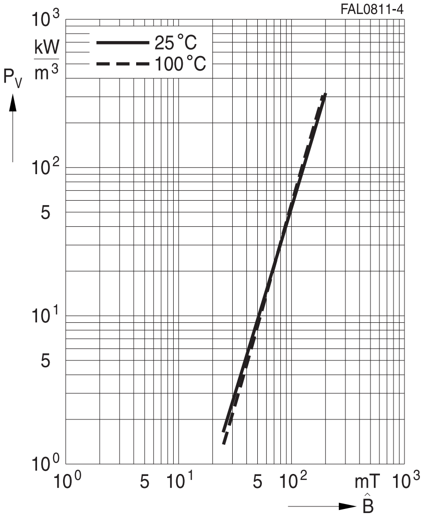
DC Magnetic bias
measured on EQ30 cores
($\hat{B}$ ≤0.25 mT, f =10 kHz, T = 25 °C)



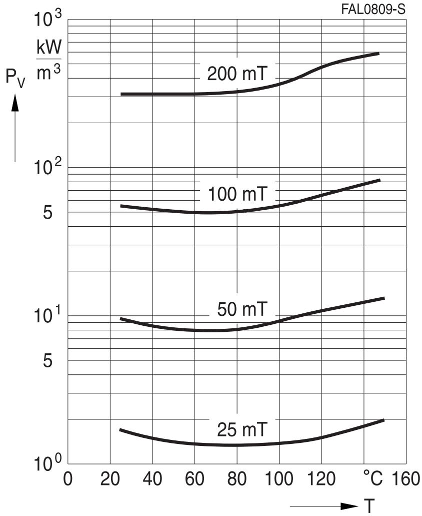
DC Magnetic bias
measured on EQ30 cores
($\hat{B}$ ≤0.25 mT, f =10 kHz, T = 100 °C)



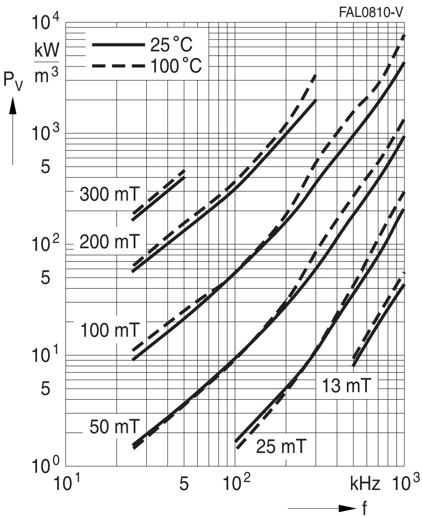
Relative core losses
versus AC field flux density
(measured on R34 toroids)



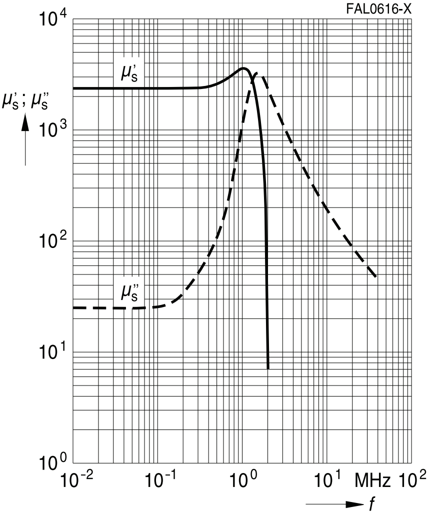
Relative core losses
versus temperature
(R34 toroids, f = 100 kHz)



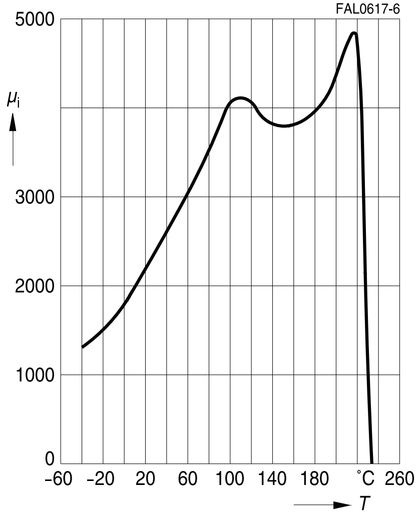
Relative core losses
versus frequency
(measured on R34 toroids)



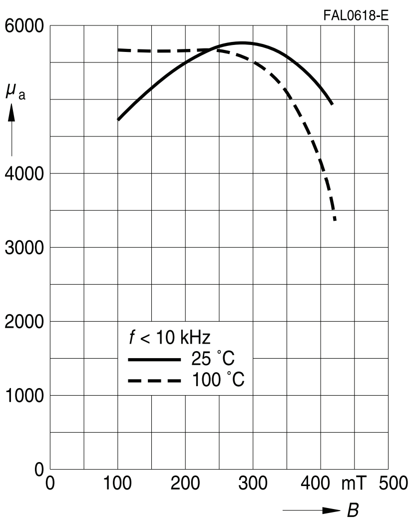
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



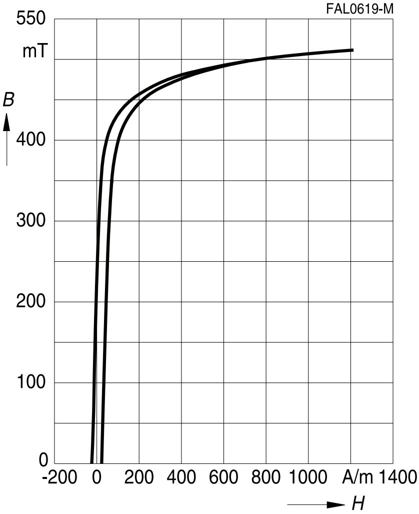
Initial permeability μ_i
versus temperature
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



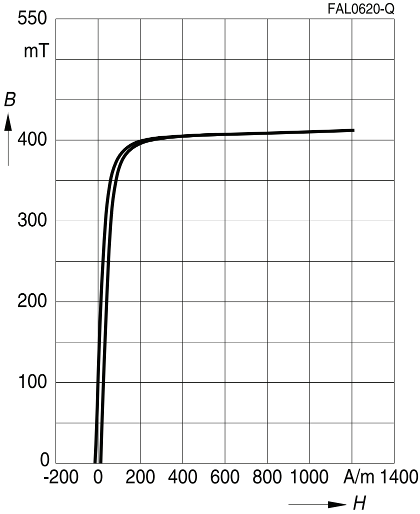
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



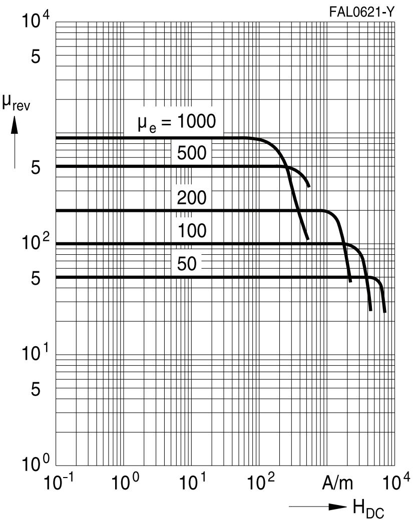
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



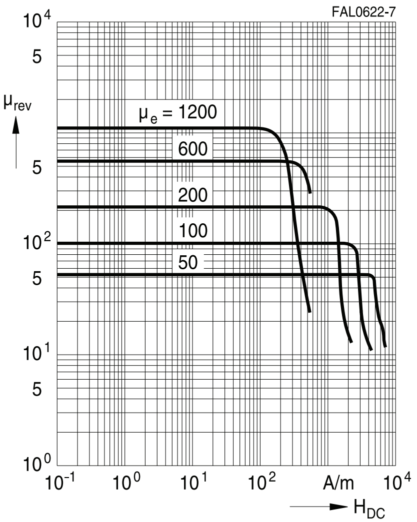
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



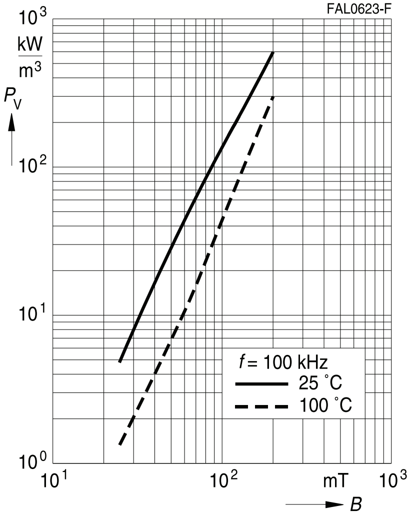
DC magnetic bias
measured on ETD cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



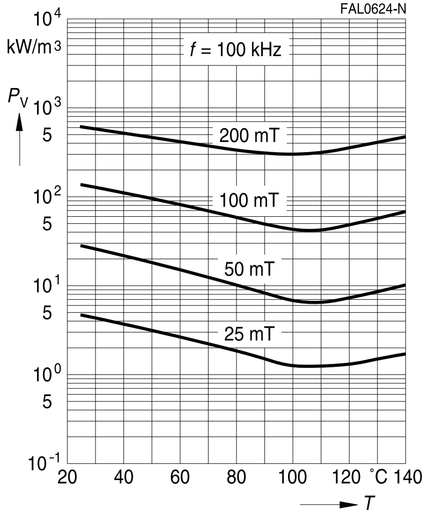
DC magnetic bias
measured on ETD cores
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 100 °C)



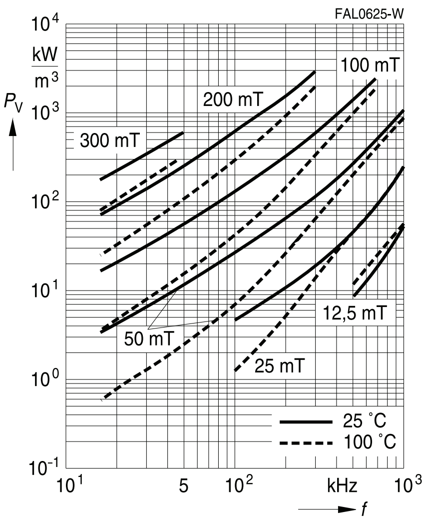
Relative core losses
versus AC field flux density
(measured on R34 toroids)



Relative core losses
versus temperature
(measured on R34 toroids)

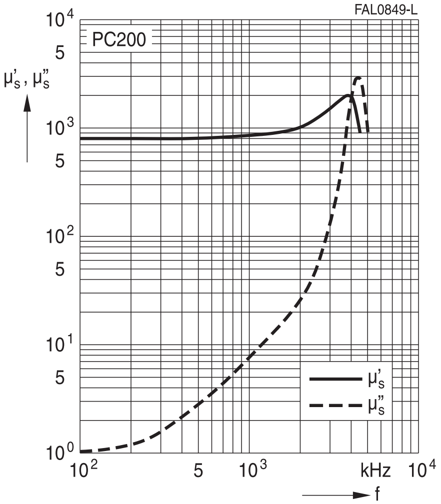


Relative core losses
versus frequency
(measured on R34 toroids)

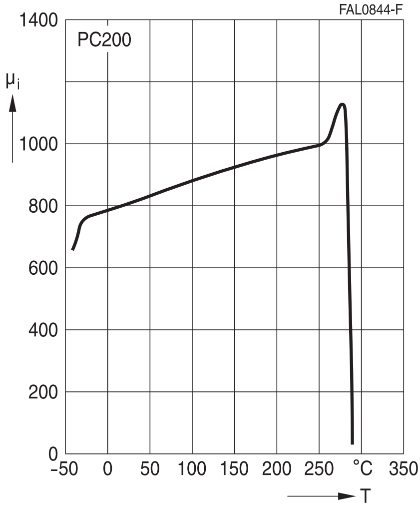


PC200

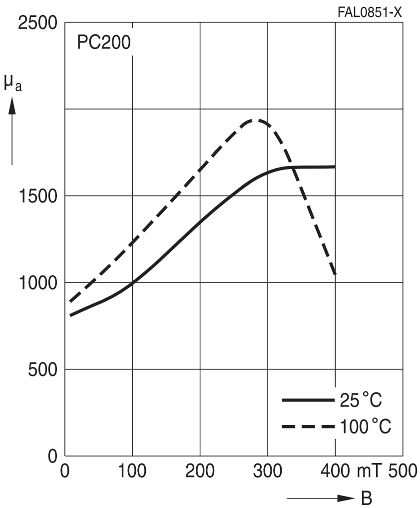
Complex permeability
versus frequency
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



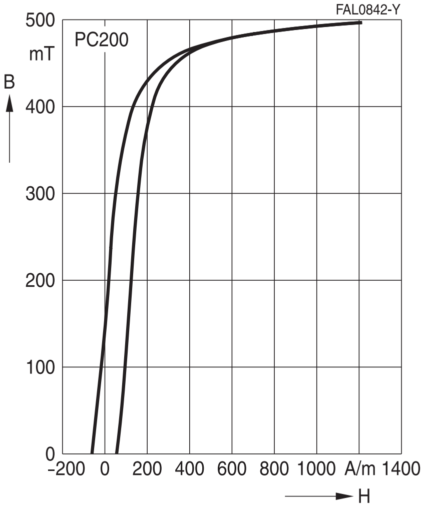
Initial permeability μ_i
versus temperature
(measured on R34 toroids, $\hat{B} \leq 0.25$ mT)



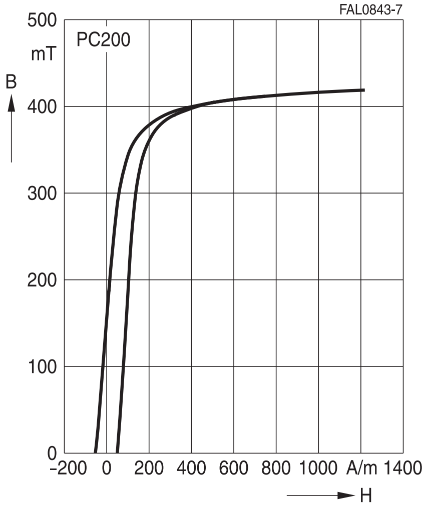
Amplitude permeability
versus AC field flux density
(measured on R34 toroids, f ≤10 kHz)



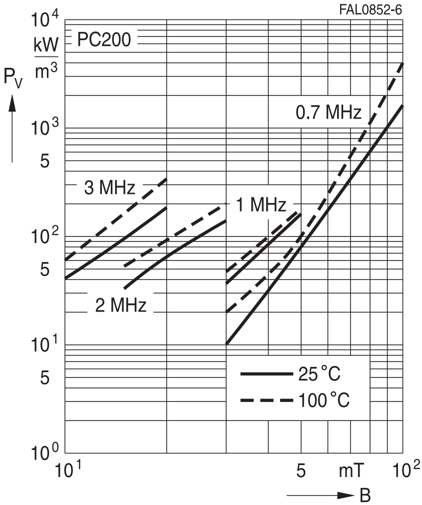
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



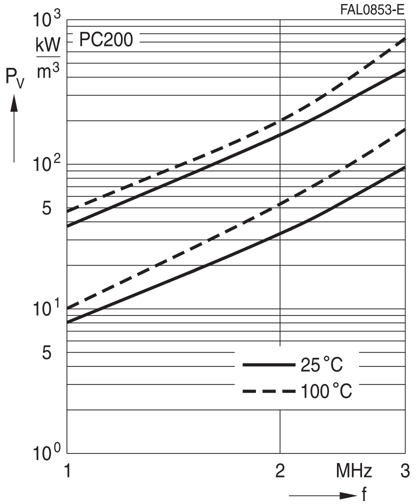
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



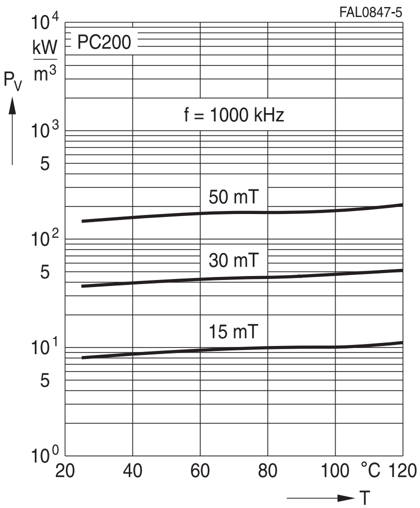
Relative core losses
versus AC field flux density
(measured on R20 toroids)



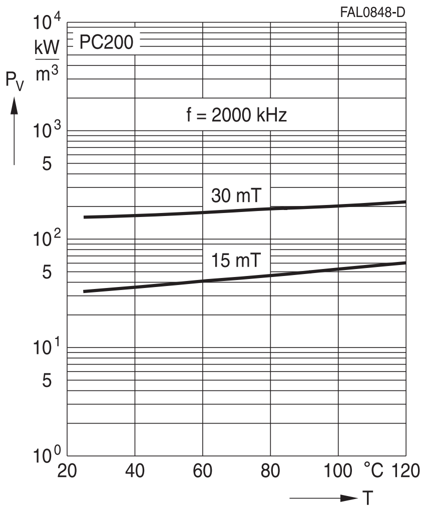
Relative core losses
versus frequency
(measured on R20 toroids)



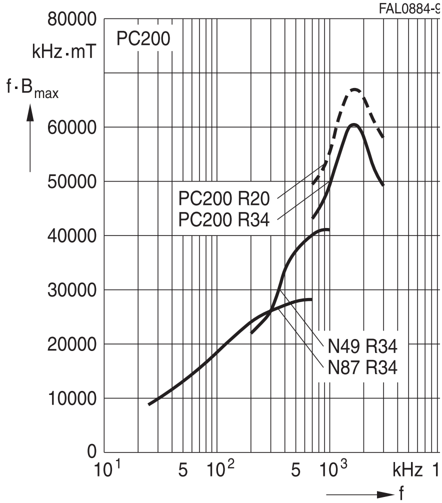
Relative core losses
versus temperature
(measured on R20 toroids, f = 1000 kHz)



Relative core losses
versus temperature
(measured on R20 toroids, f = 2000 kHz)



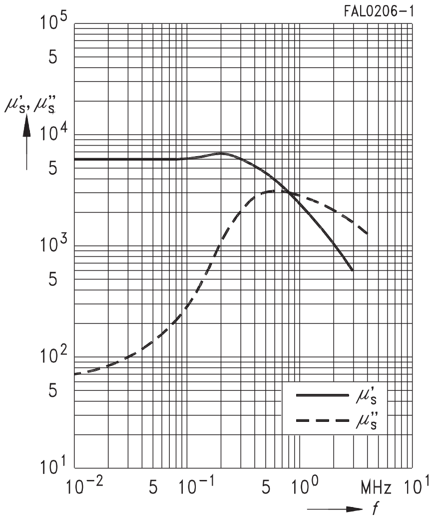
Performance factor
measured frequency
(T = 100 °C, P_V = 300 kW/m^3)



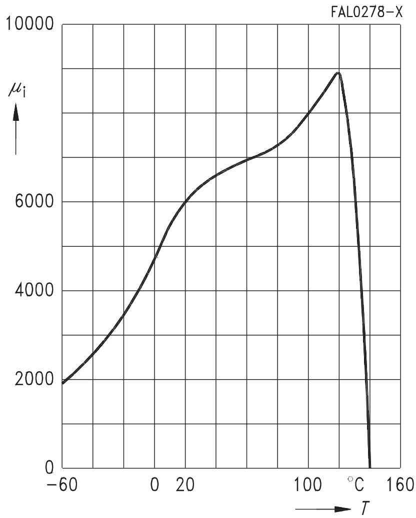
SIFERRIT materials

T35

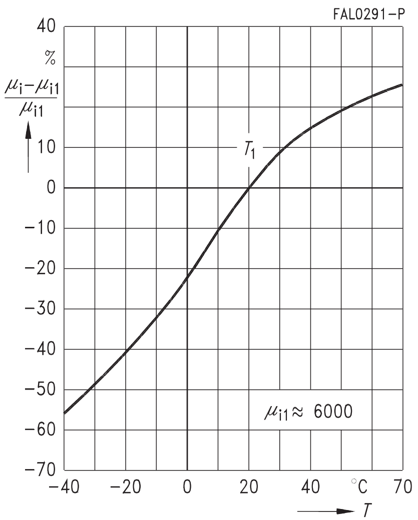
Complex permeability
versus frequency
(measured on R10 toroids, $\hat{B}$ ≤0.25 mT)



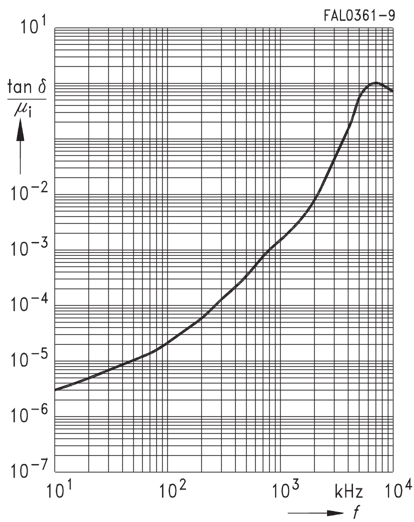
Initial permeability μ_i
versus temperature
(measured on R16 toroids, $\hat{B}$ ≤0.25 mT)



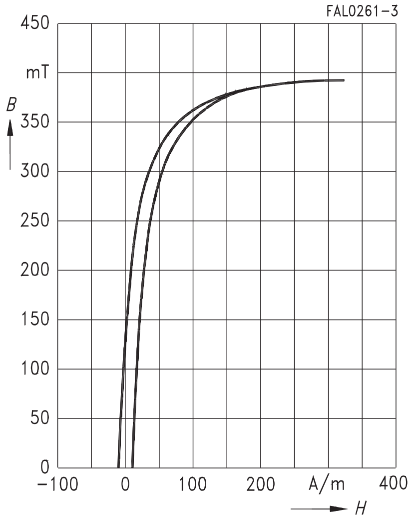
Variation of initial permeability
with temperature
(measured on R16 toroids, $\hat{B}$ ≤0.25 mT)



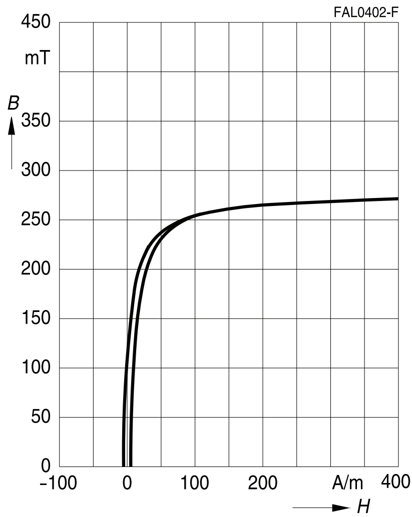
Relative loss factor
versus frequency
(measured on R16 toroids, $\hat{B}$ ≤0.25 mT)



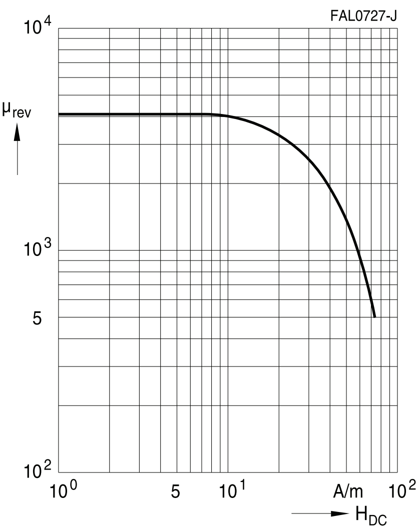
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



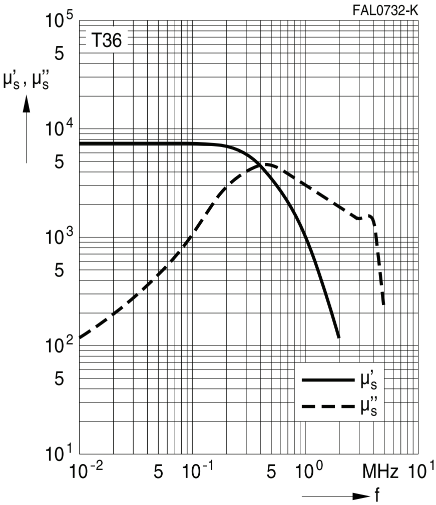
DC magnetic bias
(measured on RM cores, typical values)
($\hat{B} \leq 0.25$ mT, f = 10 kHz, T = 25 °C)



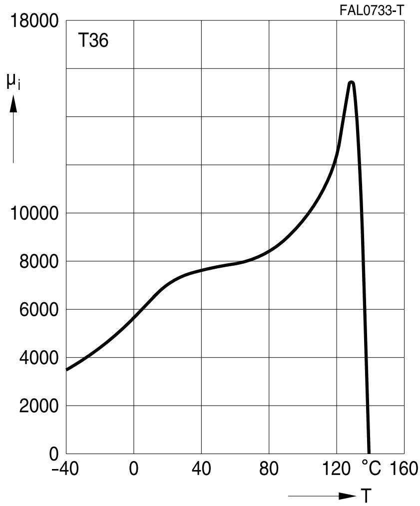
SIFERRIT materials

T36

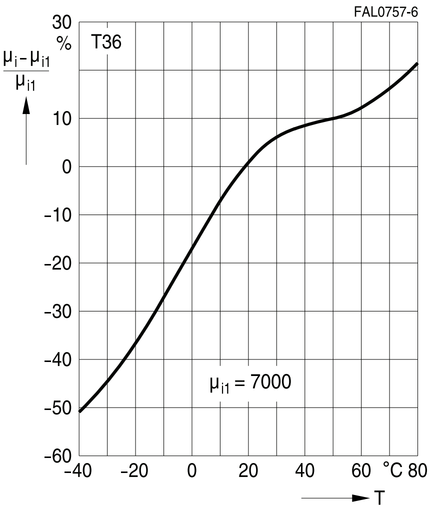
Complex permeability
versus frequency
(measured on R22 toroids, $\hat{B} \leq 0.25$ mT)



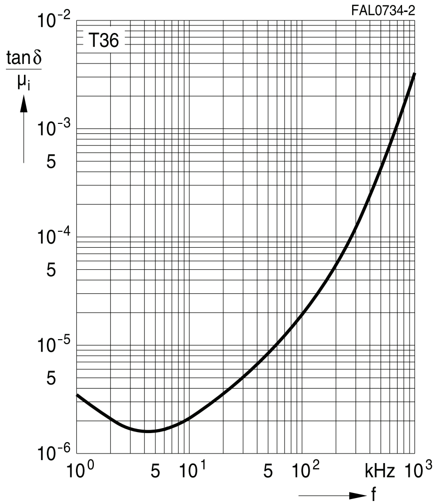
Initial permeability μ_i
versus temperature
(measured on R22 toroids, $\hat{B} \leq 0.25$ mT)



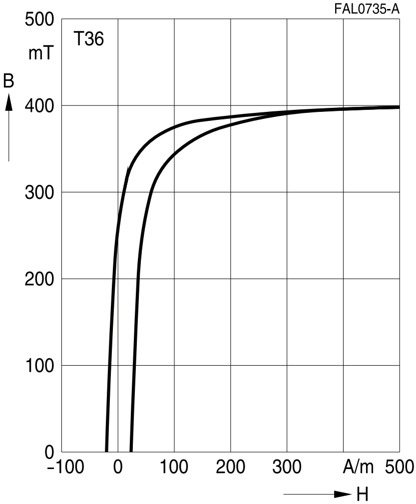
Variation of initial permeability
with temperature
(measured on R22 toroids, $\hat{B} \leq 0.25$ mT)



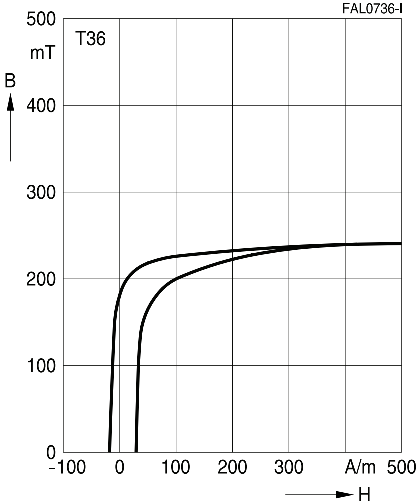
Relative loss factor
versus frequency
(measured on R22 toroids, $\hat{B} \leq 0.25$ mT)



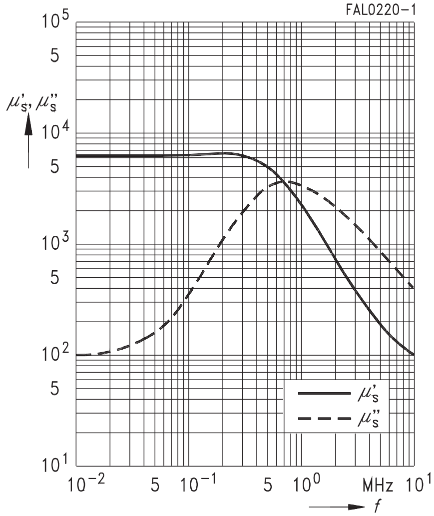
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



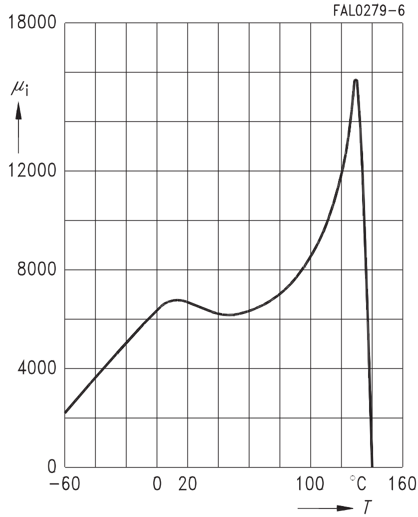
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



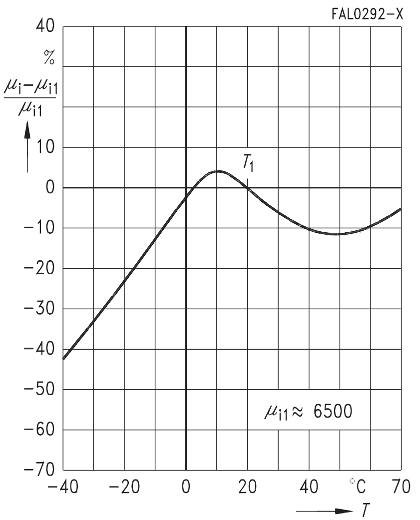
Complex permeability
versus frequency
(measured on R16 toroids, $\hat{B}$ ≤0.25 mT)



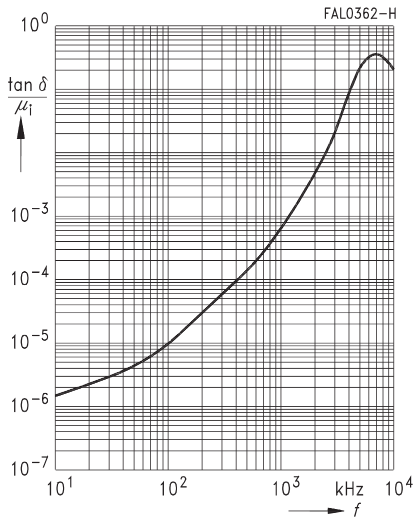
Initial permeability μ_i
versus temperature
(measured on R22 toroids, $\hat{B}$ ≤0.25 mT)



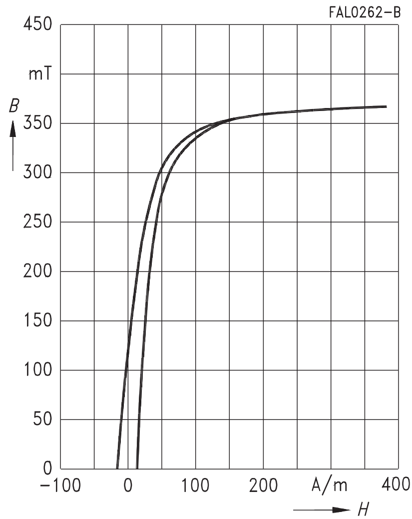
Variation of initial permeability
with temperature
(measured on R22 toroids, $\hat{B}$ ≤0.25 mT)



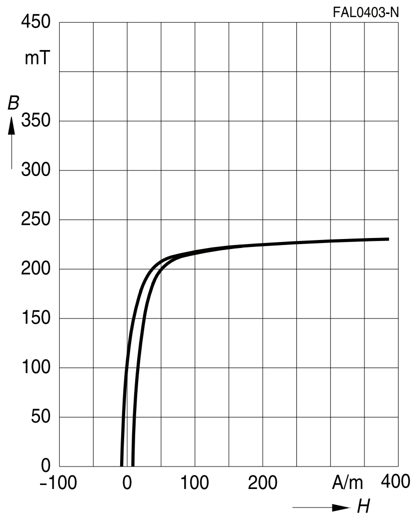
Relative loss factor
versus frequency
(measured on R16 toroids, $\hat{B}$ ≤0.25 mT)



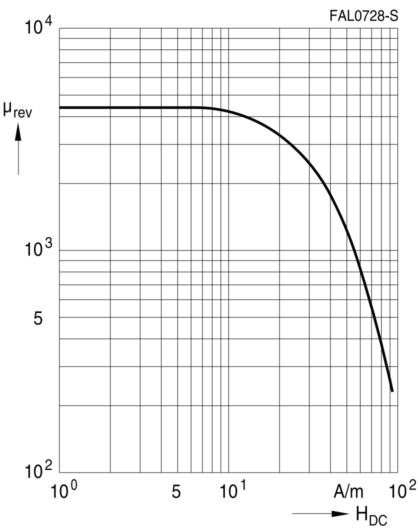
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



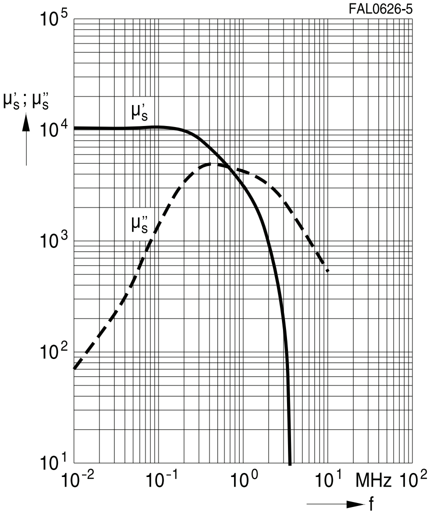
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



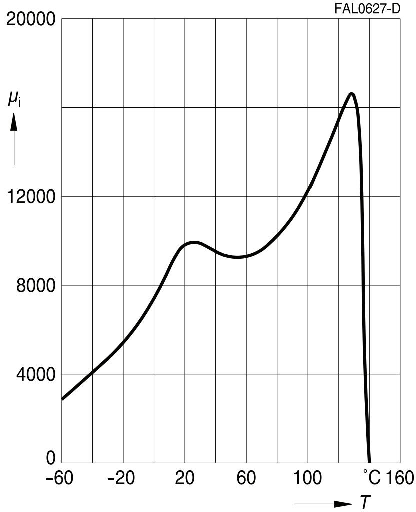
DC magnetic bias
(measured on RM cores, typical values)
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



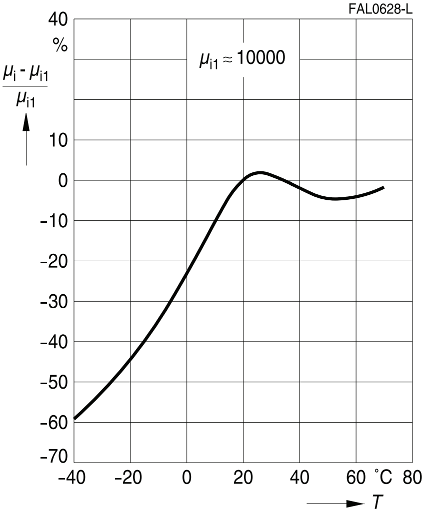
Complex permeability
versus frequency
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



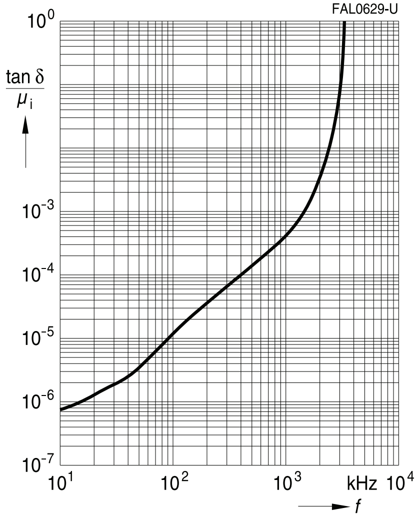
Initial permeability μ_i
versus temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



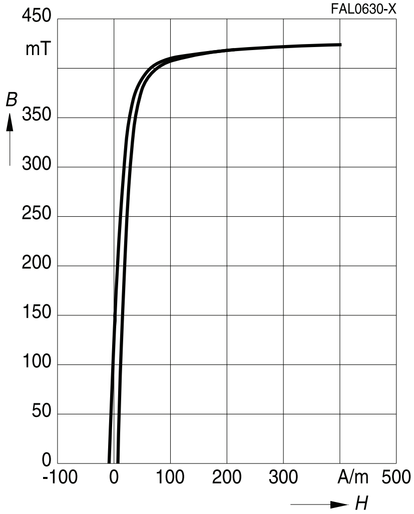
Variation of initial permeability
with temperature
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



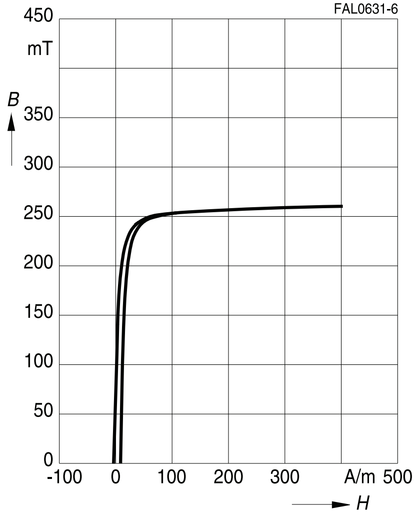
Relative loss factor
versus frequency
(measured on R10 toroids, $\hat{B} \leq 0.25$ mT)



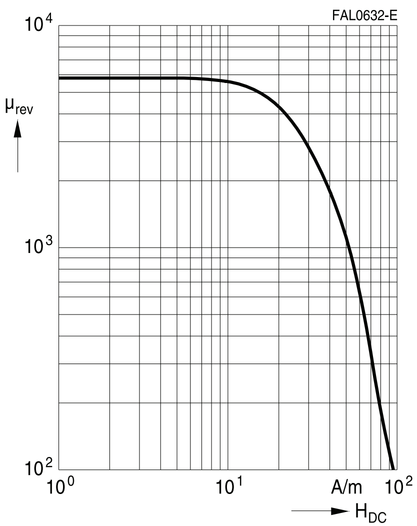
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



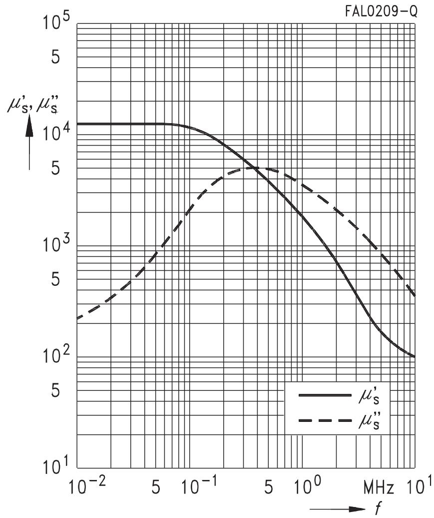
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



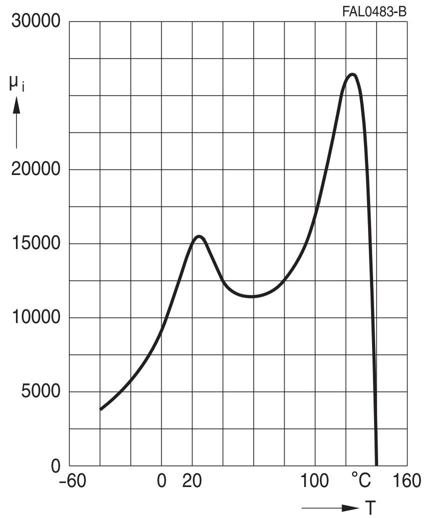
DC magnetic bias
(measured on RM cores, typical values)
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



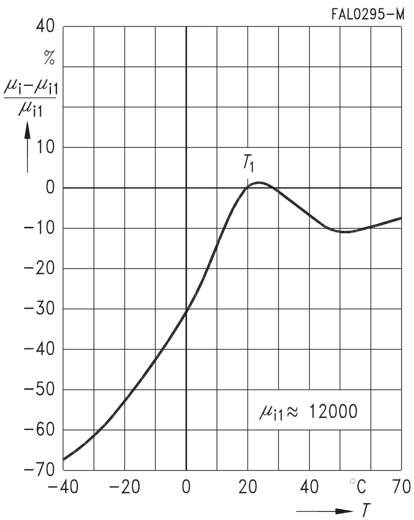
Complex permeability
versus frequency
(measured on R9.5 toroids, $\hat{B} \leq 0.25$ mT)



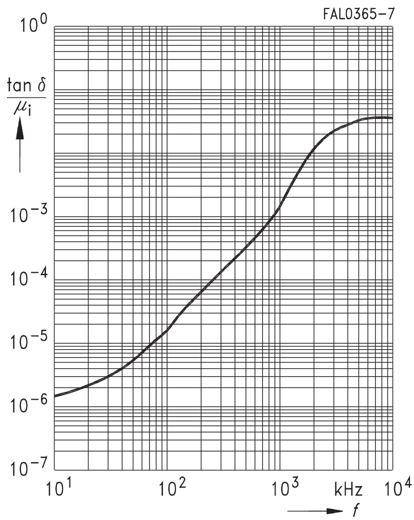
Initial permeability μ_i
versus temperature
(measured on R9.5 toroids, $\hat{B} \leq 0.25$ mT)



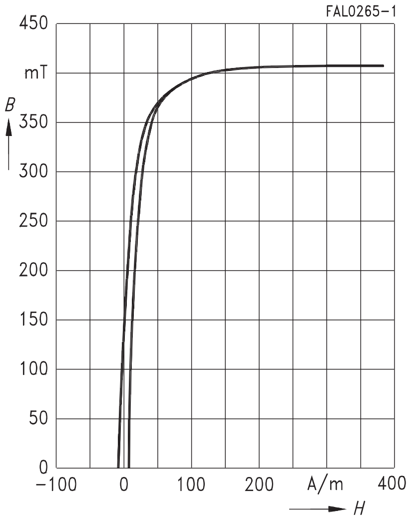
Variation of initial permeability
with temperature
(measured on R9.5 toroids, $\hat{B} \leq 0.25$ mT)



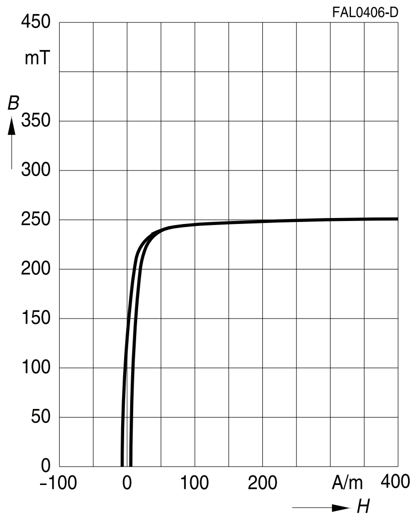
Relative loss factor
versus frequency
(measured on R9.5 toroids, $\hat{B} \leq 0.25$ mT)



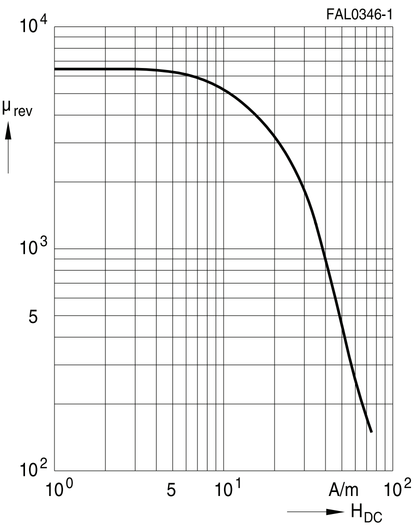
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



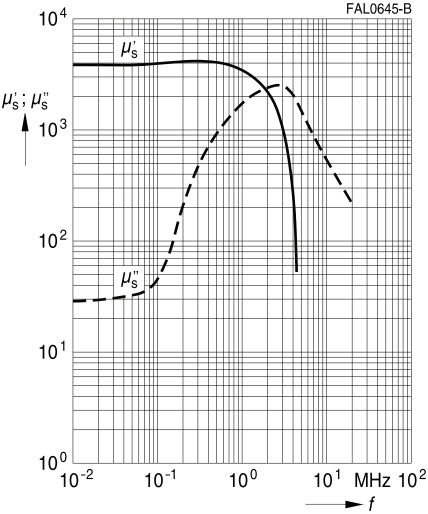
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



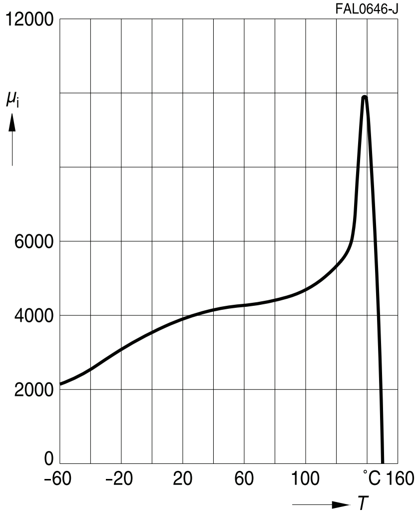
DC magnetic bias
(measured on RM cores, typical values)
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



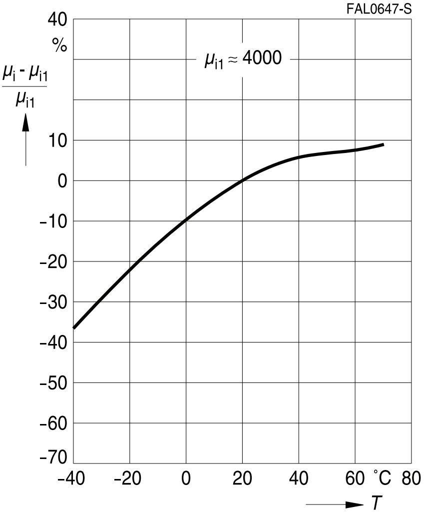
Complex permeability
versus frequency
(measured on R17 toroids, $\hat{B} \leq 0.25$ mT)



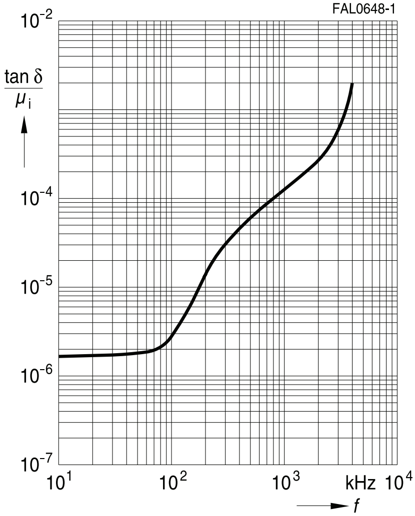
Initial permeability μ_i
versus temperature
(measured on R17 toroids, $\hat{B} \leq 0.25$ mT)



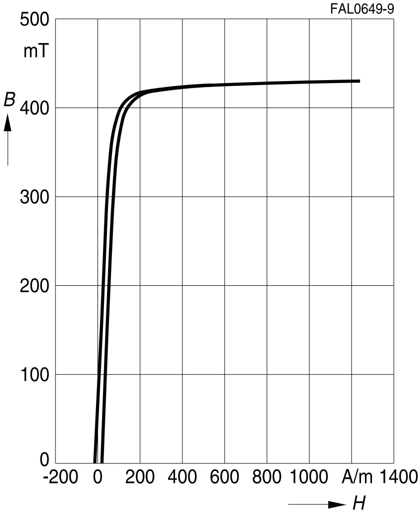
Variation of initial permeability
with temperature
(measured on R17 toroids, $\hat{B} \leq 0.25$ mT)



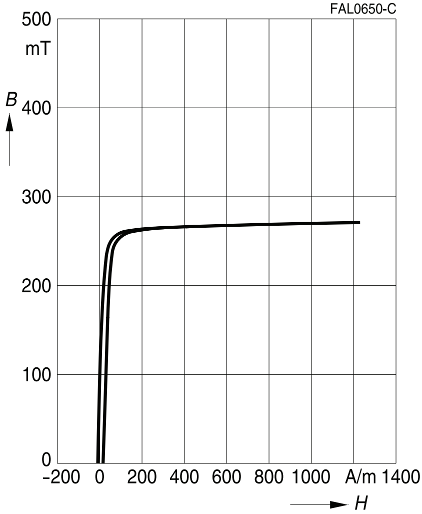
Relative loss factor
versus frequency
(measured on R17 toroids, $\hat{B} \leq 0.25$ mT)



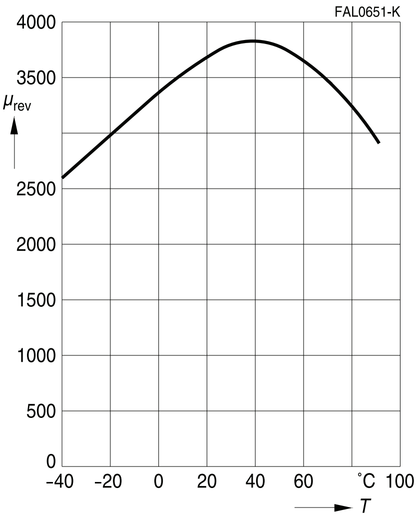
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



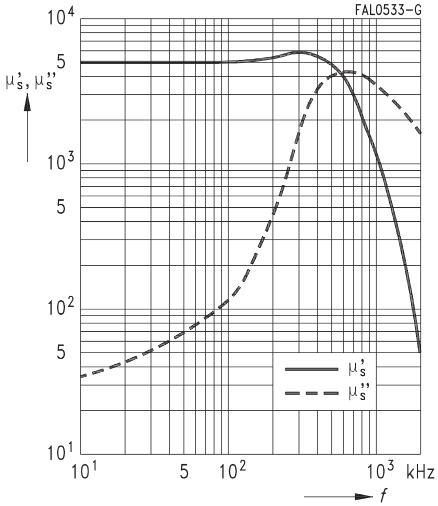
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



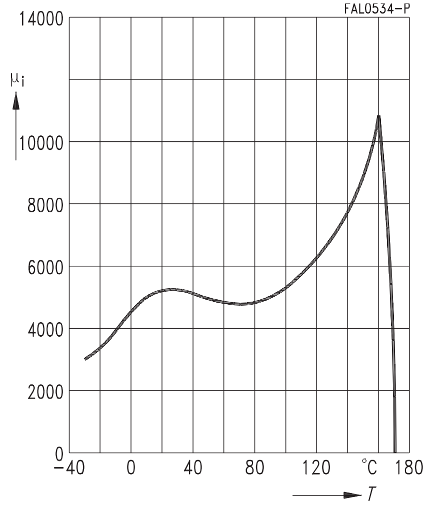
Reversible permeability versus temperature
(measured on toroids at f = 100 kHz,
H_{DC} = 27.5 A/m, $\hat{B} = 6$ mT)



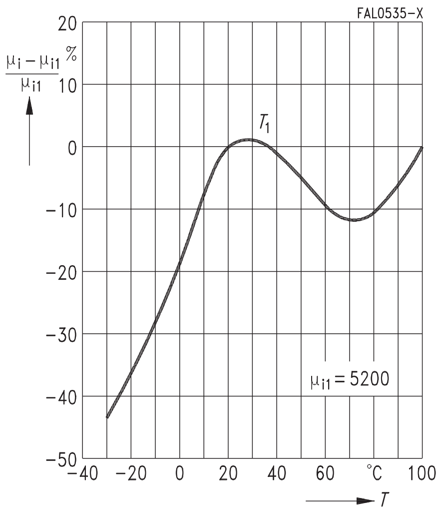
Complex permeability
versus frequency
(measured on R29 toroids, $\hat{B} \leq 0.25$ mT)



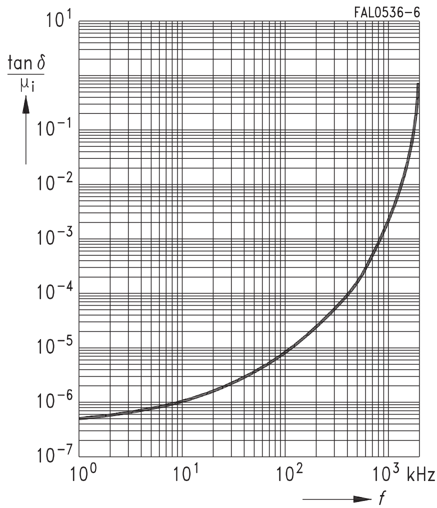
Initial permeability μ_i
versus temperature
(measured on R29 toroids, $\hat{B} \leq 0.25$ mT)



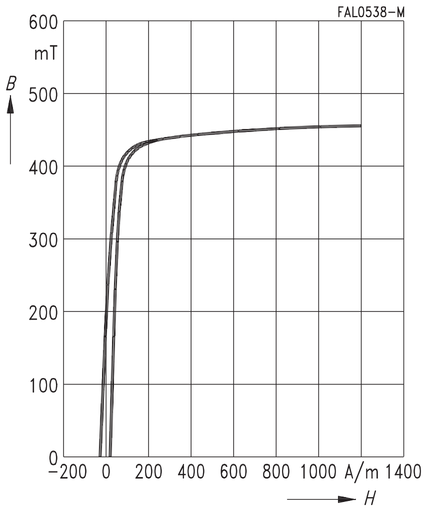
Variation of initial permeability
with temperature
(measured on R29 toroids, $\hat{B} \leq 0.25$ mT)



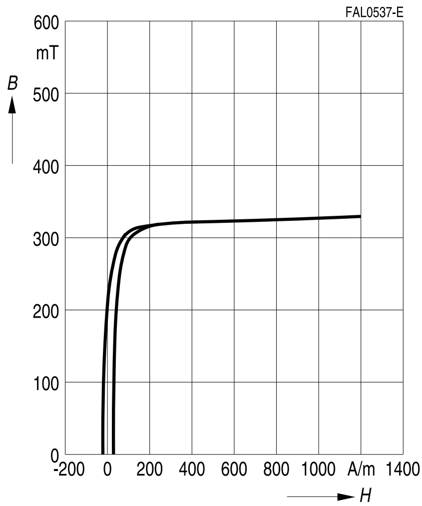
Relative loss factor
versus frequency
(measured on R29 toroids, $\hat{B} \leq 0.25$ mT)



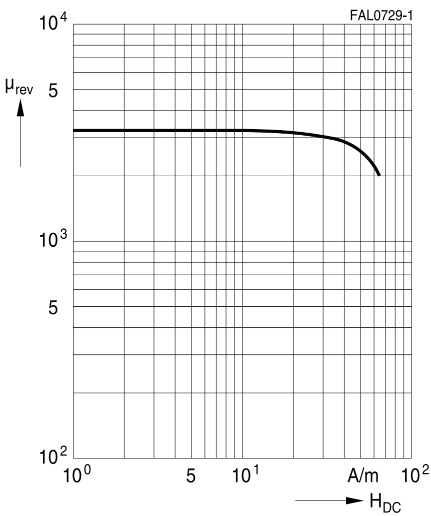
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



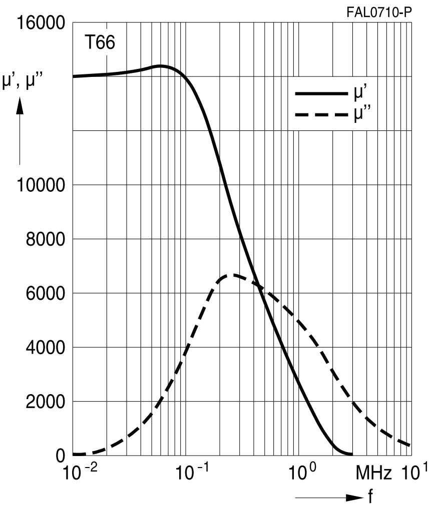
Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 100 °C)



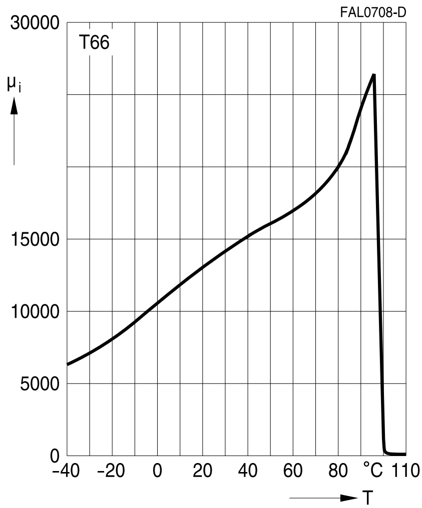
DC magnetic bias
(measured on RM cores, typical values)
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



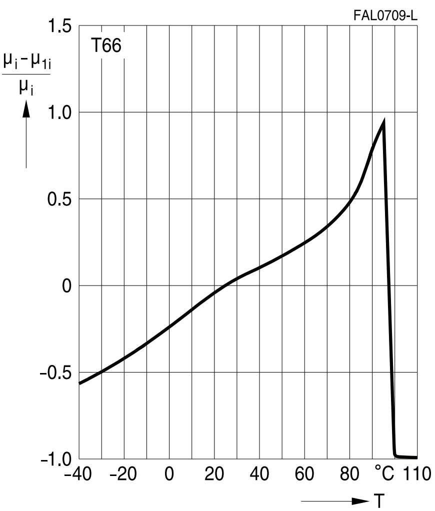
Complex permeability
versus frequency
(measured on R9.5 toroids, $\hat{B} \leq 0.25$ mT)



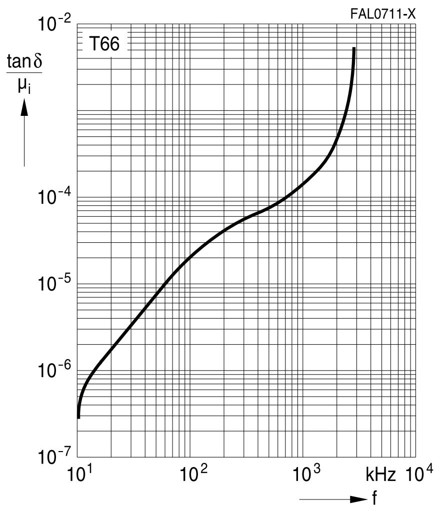
Initial permeability μ_i
versus temperature
(measured on R9.5 toroids, $\hat{B} \leq 0.25$ mT)



Variation of initial permeability
with temperature
(measured on R9.5 toroids, $\hat{B} \leq 0.25$ mT)



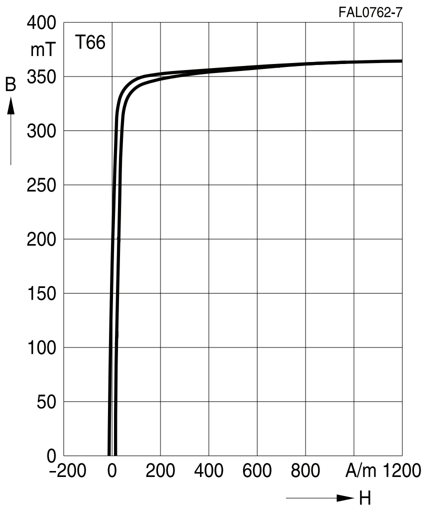
Relative loss factor
versus frequency
(measured on R9.5 toroids, $\hat{B} \leq 0.25$ mT)



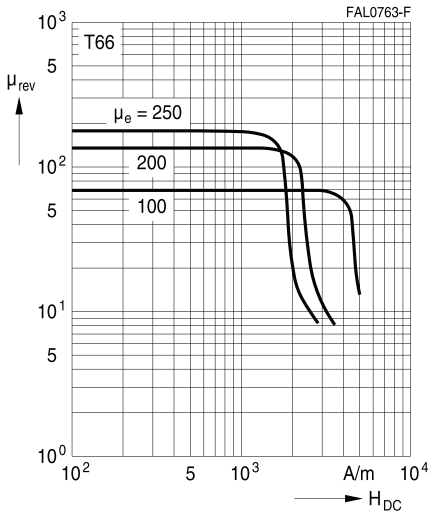
SIFERRIT materials

T66

Dynamic magnetization curves
(typical values)
(f = 10 kHz, T = 25 °C)



DC magnetic bias
(measured on RM cores, typical values)
($\hat{B}$ ≤0.25 mT, f = 10 kHz, T = 25 °C)



5 Plastic materials, manufacturers and UL numbers

- RM, EP, EFD and PQ coil formers of thermosetting plastic, color code black (post-inserted pins):
  Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
  Sumikon PM 9820® [E41429 (M)], SUMITOMO BAKELITE CO LTD
- EP and EFD coil formers of thermosetting plastic, color code green (post-inserted pins):
  Vyncolit/X611® [E167521 (M)], VYNCOLIT NV
- RM power, P, PS, PM, E, ETD, ER coil formers
  and terminal carriers P9×5, P11×7, P36×22 (Polyterephthalate):
  Valox 420-SE0® [E45329 (M)], SABIC INNOVATIVE PLASTICS
  Valox 420-SE0® [E207780 (M)], SABIC INNOVATIVE PLASTICS
  Valox 420-SE0® [E121562 (M)], SABIC INNOVATIVE PLASTICS
  Durethan BKV 30H, [E 245249 (M)], LANXESS AG
  Ultramid A3X2G5 [E41871 (M)], BASF AKTIENGESELLSCHAFT
  Ultramid A3X2G7 [E41871 (M)], BASF AKTIENGESELLSCHAFT
  Ultradur 4090G6 [E41871 (M)], BASF SE
  Crastin SK 645 FR [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
  Pocan B4235® [E245249 (M)], LANXESS AG
  Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
- Terminal carriers P14×8, P18×11, P26×16, P30×19, P22×13 (Polyterephthalate):
  Pocan B4235® [E245249 (M)], LANXESS AG
- PM114 coil former and terminal carrier P7×4 (PPS)
  Ryton R-4-230, [E95746 (M)], SOLVAY SPECIALITY POLYMERS
  Ryton R-4-230, [E95746 (M)], SOLVAY SPECIALITY POLYMERS
- SMD coil formers (Liquid cristal polymer):
  Sumika Super E4008® [E54705 (M)], SUMITOMO CHEMICAL CO LTD
  Zenite 7130® [E344082 (M)], CELANESE INTERNATIONAL CORP.
  Vectra C 130 [E106764 (M)], POLYPLASTICS CO LTD
  Vectra E 130i [E106764 (M)], POLYPLASTICS CO LTD
  Vectra E 130i [E83005 (M)], CELANESE INTERNATIONAL CORP.
  Stanyl TW250F6 [E47960 (M)], DSM ENGINEERING PLASTICS B V
- Insulating washers:
  Makrofol FR7-2, [E168120 (M)], COVESTRO AG
  Aryphan F685, [E167358 (M)], LOFO HIGH TECH FILM GMBH
- Adjusting screws and threaded sleeves:
  Pocan B3235® [E245249 (M)], LANXESS AG
  Rilsan BZM30, [E45228 (M)], ARKEMA SA (for threaded sleeves)
- PQ coil formers:
  Phenolic T375 J [E59481 (M)], CHANG CHUN PLASTICS CO LTD
- Ring core housings: Makrolon 9415 [E41613 (M)] COVESTRO AG

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Further information is given on the packing label.

Plastic materials

The trade names are registered trademarks of the listed manufacturers.

Further information to the UL certifications are available in the internet under http//:www.UL.com Here you get the newest update of the yellow card.

EPCOS is an assigned molder with the UL file no. E178263 (M).

The assigned designation is A1770.

1 Hysteresis

The special feature of ferromagnetic and ferrimagnetic materials is that spontaneous magnetization sets in below a material-specific temperature (Curie point). The elementary atomic magnets are then aligned in parallel within macroscopic regions. These so-called Weiss' domains are normally oriented so that no magnetic effect is perceptible. But it is different when a ferromagnetic body is placed in a magnetic field and the flux density B as a function of the magnetic field strength H is measured with the aid of a test coil. Proceeding from H = 0 and B = 0, the so-called initial magnetization curve is first obtained. At low levels of field strength, those domains that are favorably oriented to the magnetic field grow at the expense of those that are not. This produces what are called wall displacements. At higher field strength, whole domains overturn magnetically – this is the steepest part of the curve – and finally the magnetic moments are moved out of the preferred states given by the crystal lattice into the direction of the field until saturation is obtained, i.e. until all elementary magnets in the material are in the direction of the field. If H is now reduced again, the B curve is completely different. The relationship shown in the hysteresis loop (figure 1) is obtained.

1.1 Hysteresis loop

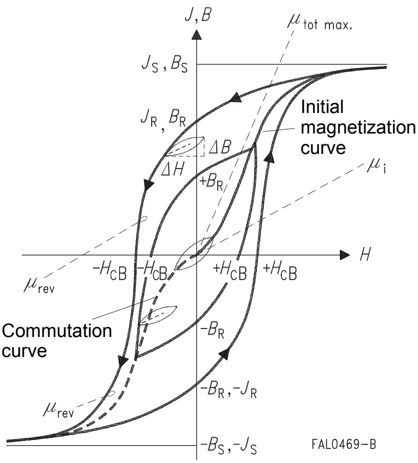


Figure 1
Magnetization curve
(schematic)

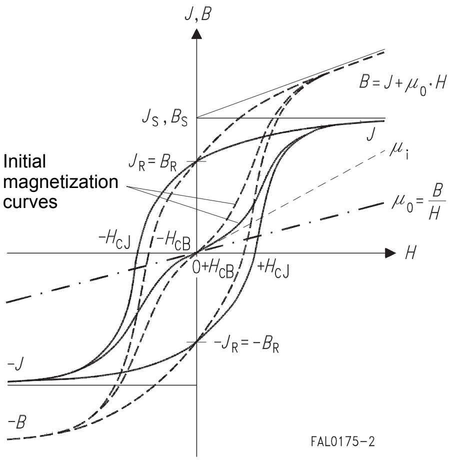


Figure 2
Hysteresis loops for different
excitations and materials

Magnetic field strength $H = \frac{I \cdot N}{l} = \frac{\text{ampere-turns}}{\text{length in m}}$ $\left[\frac{A}{m}\right]$

Magnetic flux density $B = \frac{\phi}{A} = \frac{\text{magnetic flux}}{\text{permeated area}}$ $\left[\frac{Vs}{m^2}\right] = [T(\text{Tesla})]$

Polarization J $J = B - \mu_0 H$ $\mu_0 \cdot H \ll J \Rightarrow B \approx J$

General relationship between B and H:

$B = \mu_0 \cdot \mu_r(H) \cdot H$

μ_0 Magnetic field constant

μ_0 $1.257 \cdot 10^{-6} \left[\frac{Vs}{Am}\right]$

μ_r Relative permeability

In a vacuum, $\mu_r = 1$; in ferromagnetic or ferrimagnetic materials the relation B(H) becomes nonlinear and the slope of the hysteresis loop $\mu_r \gg 1$.

1.2 Basic parameters of the hysteresis loop

1.2.1 Initial magnetization curve

The initial magnetization curve describes the relationship $B = \mu_r \mu_0 H$ for the first magnetization following a complete demagnetization. By joining the end points of all "sub-loops", from H = 0 to $H = H_{max}$, (as shown in figure 1), we obtain the so-called commutation curve (also termed normal or mean magnetization curve), which, for magnetically soft ferrite materials, coincides with the initial magnetization curve.

1.2.2 Saturation magnetization B_S

The saturation magnetization B_S is defined as the maximum flux density attainable in a material (i.e. for a very high field strength) at a given temperature; above this value B_S, it is not possible to further increase B(H) by further increasing H.

Technically, B_S is defined as the flux density at a field strength of H = 1200 A/m. As is confirmed in the actual magnetization curves in the chapter on "Materials", the B(H) characteristic above 1200 A/m remains roughly constant (applies to all ferrites with high initial permeability, i.e. where $\mu \geq 1000$).

1.2.3 Remanent flux density $B_R(H)$

The remanent flux density (residual magnetization density) is a measure of the degree of residual magnetization in the ferrite after traversing a hysteresis loop. If the magnetic field H is subsequently reduced to zero, the ferrite still has a material-specific flux density $B_R \neq 0$ (see figure 1: intersection with the ordinate H = 0).

1.2.4 Coercive field strength H_C

The flux density B can be reduced to zero again by applying a specific opposing field $-H_C$ (see figure 1: intersection with the abscissa B = 0).

The demagnetized state can be restored at any time by:

a) traversing the hysteresis loop at a high frequency and simultaneously reducing the field strength H to H = 0.
b) by exceeding the Curie temperature T_C.

2 Permeability

Different relative permeabilities μ are defined on the basis of the hysteresis loop for the various electromagnetic applications.

2.1 Initial permeability μ_i

$$\mu_i = \frac{1}{\mu_0} \cdot \frac{\Delta B}{\Delta H} \qquad (\Delta H \rightarrow 0)$$

The initial permeability μ_i defines the relative permeability at very low excitation levels and constitutes the most important means of comparison for soft magnetic materials. According to IEC 60401-3, μ_i is defined using closed magnetic circuits (e.g. a closed ring-shaped cylindrical coil) for f $\leq$10 kHz, B <0.25 mT, T = 25 °C.

2.2 Effective permeability μ_e

Most core shapes in use today do not have closed magnetic paths (only ring, double E or double-aperture cores have closed magnetic circuits), rather the circuit consists of regions where $\mu_i \neq 1$ (ferrite material) and $\mu_i = 1$ (air gap). Figure 3 shows the shape of the hysteresis loop of a circuit of this type.

In practice, an effective permeability μ_e is defined for cores with air gaps.

$$\mu_e = \frac{1}{\mu_0}\frac{L}{N^2}\sum\frac{l}{A}$$

$\sum\frac{l}{A}$ Form factor
L Inductance
N Number of turns

It should be noted, for example, that the loss factor tan δ and the temperature coefficient for gapped cores reduce in the ratio μ_e/μ_i compared to ungapped cores.

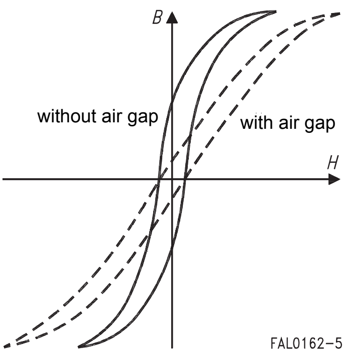


Figure 3
Comparison of hysteresis loops for a core with and without an air gap

The following approximation applies for an air gap $s \ll l_e$:

$$\mu_e = \frac{\mu_i}{1 + \frac{s}{l_e} \cdot \mu_i}$$

s Width of air gap

l_e Effective magnetic path length

For more precise calculation methods, see for example E.C. Snelling, “Soft ferrites”, 2nd edition.

2.3 Apparent permeability μ_{app}

$$\mu_{app} = \frac{L}{L_0} = \frac{\text{inductance with core}}{\text{inductance without core}}$$

The definition of μ_{app} is particularly important for specification of the permeability for coils with tubular, cylindrical and threaded cores, since an unambiguous relationship between initial permeability μ_i and effective permeability μ_e is not possible on account of the high leakage inductances. The design of the winding and the spatial correlation between coil and core have a considerable influence on μ_{app}. A precise specification of μ_{app} requires a precise specification of the measuring coil arrangement.

2.4 Complex permeability $\overline{\mu}$

To enable a better comparison of ferrite materials and their frequency characteristics at very low field strengths (in order to take into consideration the phase displacement between voltage and current), it is useful to introduce μ as a complex operator, i.e. a complex permeability $\overline{\mu}$, according to the following relationship:

$\overline{\mu} = \mu_s' - j \cdot \mu_s''$

where, in terms of a series equivalent circuit, (see figure 5)

μ_s' is the relative real (inductance) component of $\overline{\mu}$

and μ_s'' is the relative imaginary (loss) component of $\overline{\mu}$.

Using the complex permeability $\overline{\mu}$, the (complex) impedance of the coil can be calculated:

$\overline{Z} = j\,\omega\,\overline{\mu}\,L_0$

where L_0 represents the inductance of a core of permeability $\mu_r = 1$, but with unchanged flux distribution.

(cf. also section 4.1: information on tan δ)

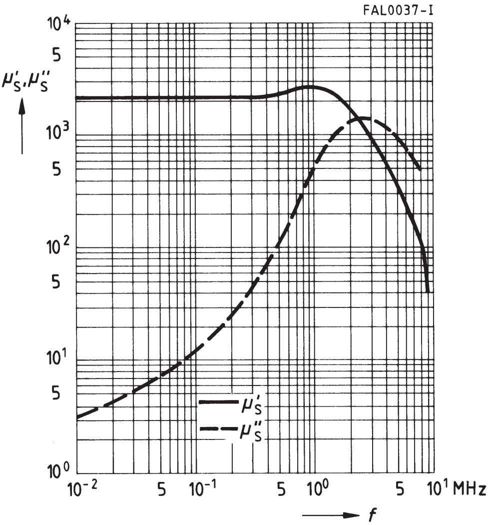


Figure 4
Complex permeability versus frequency
(measured on R10 toroids, N48 material, measuring flux density $\hat{B} \leq 0.25$ mT)

Figure 4 shows the characteristic shape of the curves of μ_s' and μ_s'' as functions of the frequency, using N48 material as an example. The real component μ_s' is constant at low frequencies, attains a maximum at higher frequencies and then drops in approximately inverse proportion to f. At the same time, μ'' rises steeply from a very small value at low frequencies to attain a distinct maximum and, past this, also drops as the frequency is further increased.

The region in which μ' decreases sharply and where the μ'' maximum occurs is termed the cut-off frequency f_{cutoff}. This is inversely proportional to the initial permeability of the material (Snoek's law).

2.5 Reversible permeability μ_{rev}

$$\mu_{rev} = \frac{1}{\mu_0} \cdot \lim_{\Delta H \to 0} \left(\frac{\Delta B}{\Delta H}\right)_{H_{DC}}$$

(Permeability with superimposed DC field H_{DC})

In order to measure the reversible permeability μ_{rev}, a small measuring alternating field is superimposed on a DC field. In this case μ_{rev} is heavily dependent on H_{DC}, the core geometry and the temperature.

Important application areas for DC field-superimposed, i.e. magnetically biased coils are broadband transformer systems (feeding currents with signal superimposition) and power engineering (shifting the operating point) and the area known as “nonlinear chokes” (cf. chapter on RM cores). For the magnetic bias curves as a function of the excitation H_{DC} see the chapter on “SIFERRIT materials”.

2.6 Amplitude permeability μ_a, A_{L1} value

$$\mu_a = \frac{\hat{B}}{\mu_0 \hat{H}}$$ (Permeability at high excitation)

$\hat{B}$ Peak value of flux density
$\hat{H}$ Peak value of field strength

For frequencies well below cut-off frequency, μ_a is not frequency-dependent but there is a strong dependence on temperature. The amplitude permeability is an important definition quantity for power ferrites. It is defined for specific core types by means of an A_{L1} value for f ≤10 kHz, B = 320 mT (or 200 mT), T = 100 °C.

$$A_{L1} = \frac{\mu_0 \cdot \mu_a}{\sum \frac{l}{A}}$$

3 Magnetic core shape characteristics

Permeabilities and also other magnetic parameters are generally defined as material-specific quantities. For a particular core shape, however, the magnetic data are influenced to a significant extent by the geometry. Thus, the inductance of a slim-line ring core coil is defined as:

$$L = \mu_r \cdot \mu_0 \cdot N^2 \cdot \frac{A}{l}$$

Due to their geometry, soft magnetic ferrite cores in the field of such a coil change the flux parameters in such a way that it is necessary to specify a series of effective core shape parameters in each data sheet. The following are defined:

l_e	Effective magnetic length
A_e	Effective magnetic cross section
A_{min}	Min. magnetic cross section of the core (required to calculate the max. flux density)
$V_e = A_e \cdot l_e$	Effective magnetic volume

With the aid of these parameters, the calculation for ferrite cores with complicated shapes can be reduced to the considerably more simple problem of an imaginary ring core with the same magnetic properties. The basis for this is provided by the methods of calculation according to IEC 60205, which allow to calculate the effective core shape parameters of different core shapes.

3.1 Form factor

$$\sum \frac{l}{A} = \frac{l_e}{A_e}$$

The inductance L can then be calculated as follows:

$$L = \frac{\mu_e \cdot \mu_0 \cdot N^2}{\sum \frac{l}{A}}$$

where μ_e denotes the effective permeability or another permeability μ_{rev} or μ_a (or μ_i for cores with a closed magnetic path) adapted for the B/H range in question.

3.2 Inductance factor, A_L value

$$A_L = \frac{L}{N^2} = \frac{\mu_e \cdot \mu_0}{\sum \frac{l}{A}}$$

A_L is the inductance referred to number of turns = 1. Therefore, for a defined number of turns N:

$$L = A_L \cdot N^2$$

3.3 Tolerance code letters

The tolerances of the A_L are coded by the letters in the third block of the ordering code in conformity with IEC 62358.

Code letter	Tolerance of A_L value	Code letter	Tolerance of A_L value
A	±3%	L	±15%
B	±4%	M	±20%
C	±6%	Q	+30/–10%
D	±8%	R	+30/–20%
E	±7%	U	+80/–0%
H	±12%	X	filling letter
J	±5%	Y	+40/–30%
K	±10%		

The tolerance values available are given in the individual data sheets.

4 Definition quantities in the small-signal range

4.1 Loss factor tan δ

Losses in the small-signal range are specified by the loss factor tan δ.

Based on the impedance $\overline{Z}$ (cf. also section 2.4), the loss factor of the core in conjunction with the complex permeability $\overline{\mu}$ is defined as

$$\tan\delta_s = \frac{\mu_s''}{\mu_s'} = \frac{R_s}{\omega L_s} \quad \text{and} \quad \tan\delta_p = \frac{\mu_p''}{\mu_p'} = \frac{\omega \cdot L_p}{R_p}$$

where R_s and R_p denote the series and parallel resistance and L_s and L_p the series and parallel inductance respectively.

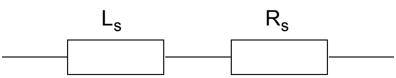


Figure 5
Lossless series inductance L_s with loss resistance R_s resulting from the core losses.

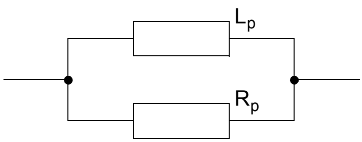


Figure 6
Lossless parallel inductance L_p with loss resistance R_p resulting from the core losses.

From the relationships between series and parallel circuits we obtain:

$$\mu_p' = \mu_s' \cdot (1 + (\tan\delta)^2)$$

$$\mu_p'' = \mu_s'' \cdot \left(1 + \left(\frac{1}{\tan\delta}\right)^2\right)$$

4.2 Relative loss factor tan δ/μ_i

In gapped cores the material loss factor tan δ is reduced by the factor μ_e/μ_i. This results in the relative loss factor tan δ_e (cf. also section 2.2):

$$\tan\delta_e = \frac{\tan\delta}{\mu_i} \cdot \mu_e$$

The table of material properties lists the relative loss factor tan δ/μ_i. This is determined to IEC 60401-3 at B = 0.25 mT, T = 25 °C.

4.3 Quality factor Q

The ratio of reactance to total resistance of an induction coil is known as the quality factor Q.

$$Q = \frac{\omega L}{R_L} = \frac{\text{reactance}}{\text{total resistance}}$$

The total quality factor Q is the reciprocal of the total loss factor tan δ of the coil; it is dependent on the frequency, inductance, temperature, winding wire and permeability of the core.

4.4 Hysteresis loss resistance R_h and hysteresis material constant η_B

In transformers, in particular, the user cannot always be content with very low saturation. The user requires details of the losses which occur at higher saturation, e.g. where the hysteresis loop begins to open.

Since this hysteresis loss resistance R_h can rise sharply in different flux density ranges and at different frequencies, it is measured to IEC 60401-3 for μ_i values greater than 500 at B_1 = 1.5 and B_2 = 3 mT (ΔB = 1.5 mT), a frequency of 10 kHz and a temperature of 25 °C (for $\mu_i < 500$: f = 100 kHz, B_1 = 0.3 mT, B_2 = 1.2 mT). The hysteresis loss factor tan δ_h can then be calculated from this.

$$\tan \delta_h = \frac{R_h}{\omega \cdot L} = \tan \delta(B_2) - \tan \delta(B_1)$$

For the hysteresis material constant η_B we obtain:

$$\eta_B = \frac{\tan \delta_h}{\mu_e \cdot \Delta \hat{B}}$$

The hysteresis material constant, η_B, characterizes the material-specific hysteresis losses and is a quantity independent of the air gap in a magnetic circuit.

The hysteresis loss factor of an inductor can be reduced, at a constant flux density, by means of an (additional) air gap

$$\tan \delta_h = \eta_B \cdot \Delta \hat{B} \cdot \mu_e$$

For further details on the measurement techniques see IEC 62044-2.

5 Definition quantities in the high-excitation range

While in the small-signal range ($H \leq H_c$), i.e. in filter and broadband applications, the hysteresis loop is generally traversed only in lancet form (figure 2), for power applications the hysteresis loop is driven partly into saturation. The defining quantities are then

μ_{rev} = reversible permeability in the case of superimposition with a DC signal (operating point for power transformers)
μ_a = amplitude permeability and
P_V = core losses.

5.1 Core losses P_V

The losses of a ferrite core or core set P_V is proportional to the area of the hysteresis loop in question. It can be divided into three components:

$$P_V = P_{V,\ hysteresis} + P_{V,\ eddycurrent} + P_{V,\ residual}$$

Owing to the high specific resistance of ferrite materials, the eddy current losses in the frequency range common today (1 kHz to 2 MHz) may be practically disregarded except in the case of core shapes having a large cross-sectional area.

The power loss P_V is a function of the temperature T, the frequency f, the flux density B and is of course dependent on ferrite material and core shape.

The temperature dependence can generally be approximated by means of a third-order polynomial, while

$$P_V(f) \sim f^{(1+x)} \qquad 0 \leq x \leq 1$$

applies for the frequency dependence and

$$P_V(B) \sim B^{(2+y)} \qquad 0 \leq y \leq 1$$

for the flux density dependence. The coefficients x and y are dependent on core shape and material, and there is a mutual dependence between the coefficients of the definition quantity (e.g. T) and the relevant parameter set (e.g. f, B).

In the case of cores which are suitable for power applications, the total core losses P_V are given explicitly for a specific frequency f, flux density B and temperature T in the relevant data sheets.

When determining the total power loss for an inductive component, the winding losses must also be taken into consideration in addition to the core-specific losses.

$$P_{V,\ tot} = P_{V,\ core} + P_{V,\ winding}$$

where, in addition to insulation conditions in the given frequency range, skin effect and proximity effect must also be taken into consideration for the winding.

5.2 Performance factor (PF = f · B_{max})

The performance factor is a measure of the maximum power which a ferrite can transmit, whereby it is generally assumed that the loss does not exceed 300 kW/m^3. Heat dissipation values of this order are usually assumed when designing small and medium-sized transformers. Increasing the performance factor will either enable an increase of the power that can be transformed by a core of identical design, or a reduction in component size if the transformed power is not increased.

If the performance factors of different power transformer materials are plotted as a function of frequency, only slight differences are observed at low frequencies (<300 kHz), but these differences become more pronounced with increasing frequency. This diagram can be used to determine the optimum material for a given frequency range.

6 Influence of temperature

6.1 μ(T) curve, Curie temperature T_C

The initial permeability μ_i as a function of T is given for all materials (see chapter on SIFERRIT materials). Important parameters for a μ(T) curve are the position of the **s**econdary **p**ermeability **m**aximum (SPM) and the Curie temperature. Minimum losses occur at the SPM temperature.

Above the Curie temperature T_C ferrite materials lose their ferrimagnetic properties, i.e. μ_i drops to $\mu_i = 1$. This means that the parallel alignment of the elementary magnets (spontaneous magnetization) is destroyed by increasing thermal activation. This phenomenon is reversible, i.e. when the temperature is reduced below T_C again, the ferrimagnetic properties are restored.

The Curie tempertature T_C is defined as the cross of the straight line between 80% and 20% of L_{max} with the temperature axes (figure 7).

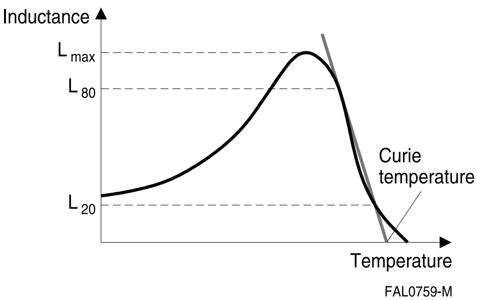


Figure 7
Definition of Curie temperature

6.2 Temperature coefficient of permeability α

By definition the temperature coefficient α represents a straight line of average gradient between the reference temperatures T_1 and T_2. If the μ(T) curve is approximately linear in this temperature range, this is a good approximation; in the case of heavily pronounced maxima, as occur particularly with highly permeable broadband ferrites, however, this is less true. The following applies:

$$\alpha = \frac{\mu_{i2} - \mu_{i1}}{\mu_{i1}} \cdot \frac{1}{T_2 - T_1}$$

μ_{i1} Initial permeability μ_i at T_1 = 25 °C
μ_{i2} The initial permeability μ_i associated with the temperature T_2

6.3 Relative temperature coefficient α_F

$$\alpha_F = \frac{\alpha}{\mu_i} = \frac{\mu_{i2} - \mu_{i1}}{\mu_{i2} \cdot \mu_{i1}} \cdot \frac{1}{T_2 - T_1}$$

In a magnetic circuit with an air gap and the effective permeability μ_e the temperature coefficient is reduced by the factor μ_e/μ_i (cf. also section 2.2).

6.4 Permeability factor

The first factor in the equation for determining the relative temperature coefficient $\frac{\mu_{i2} - \mu_{i1}}{\mu_{i2} \cdot \mu_{i1}}$ is known as the permeability factor.

In the case of SIFERRIT materials for resonant circuits, the temperature dependence of the permeability factor can be seen from the relevant diagram.

6.5 Effective temperature coefficient α_e

$$\alpha_e = \frac{\mu_e}{\mu_i} \cdot \alpha$$

In the case of the ferrite materials for filter applications, the α/μ_i values for the ranges 25 to 55 °C and 5 to 25 °C are given in the table of material properties.

The effective permeability μ_e is required in order to calculate α_e; therefore this is given for each core in the individual data sheets.

6.6 Relationship between the change in inductance and the permeability factor

The relative change in inductance between two temperature points can be calculated as follows:

$$\frac{L_2 - L_1}{L_1} = \frac{\alpha}{\mu_i} \cdot (T_2 - T_1) \cdot \mu_e$$

$$\frac{L_2 - L_1}{L_1} = \frac{\mu_{i2} - \mu_{i1}}{\mu_{i2} \cdot \mu_{i1}} \mu_e$$

6.7 Temperature dependence of saturation magnetization

The saturation magnetization B_S drops monotonically with temperature and at T_C has fallen to B_S = 0 mT. The drop for B_S(25 °C) and B_S(100 °C), i.e. the main area of application for the ferrites, can be taken from the table of material properties.

6.8 Temperature dependence of saturation-dependent permeability (amplitude permeability)

It can be seen from the μ_a(B) curves for the different materials that μ_a exhibits a more pronounced maximum with increasing temperature and drops off sooner on account of decreasing saturation.

7 Disaccommodation

Ferrimagnetic states of equilibrium can be influenced by mechanical, thermal or magnetic changes (shocks). Generally, an increase in permeability occurs when a greater mobility of individual magnetic domains is attained through the external application of energy. This state is not temporally stable and returns logarithmically with time to the original state.

7.1 Disaccommodation coefficient d

$$d = \frac{\mu_{i1} - \mu_{i2}}{\mu_{i1} \cdot (\lg t_2 - \lg t_1)}$$

μ_{i1} Permeability at time t_1
μ_{i2} Permeability at time t_2 and $t_2 > t_1$

7.2 Disaccommodation factor DF

$$DF = \frac{d}{\mu_{i1}}$$

Accordingly, a change in inductance can be calculated with the aid of DF:

$$\frac{L_1 - L_2}{L_1} = DF \cdot \mu_e \cdot \log\frac{t_2}{t_1}$$

8 General mechanical, thermal, electrical and magnetic properties of ferrites

Typical figures for the mechanical and thermal properties of ferrites

Tensile strength	approx. 30 N/mm^2
Compressive strength	approx. 800 N/mm^2
Vickers hardness HV_{15}	approx. 600 N/mm^2
Modulus of elasticity	approx. 150000 N/mm^2
Fracture toughness K_{1c}	approx. 0.8 … 1.1 MPa·m$^{1/2}$
Thermal conductivity	approx. 4 … 7·10^{-3} J/mm·s·K
Coefficient of linear expansion	approx. 7 … 10·10^{-6} 1/K
Specific heat	approx. 0.7 J/g·K

8.1 Mechanical properties

Ferrite cores have to meet mechanical requirements during assembling and for a growing number of applications. Since ferrites are ceramic materials one has to be aware of the special behavior under mechanical load.

As valid for any ceramic material, ferrite cores are brittle and sensitive to any shock, fast changing or tensile load. Especially high cooling rates under ultrasonic cleaning and high static or cyclic loads can cause cracks or failure of the ferrite cores.

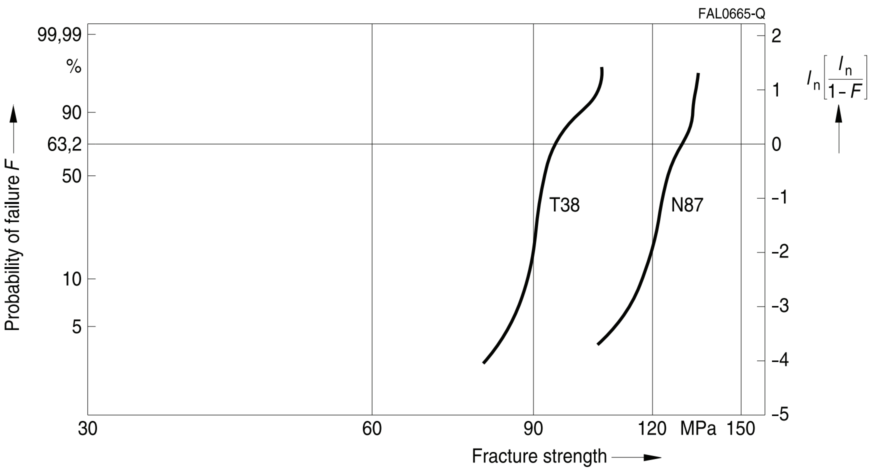


Figure 8
Weibull plot of fracture strength values of the materials T38 and N87

There are two modes of crack growth: fast (critical) or slow (subcritical) crack propagation. In the first case spontaneous breakdown occurs. In the second case the crack propagates slowly during static or cycling loading, and then the sample can only fail if a critical crack length is achieved. According to the linear elastic fracture mechanics these two mechanisms could be described in terms of stress intensity factors. For life time predictions the knowledge of subcritical crack growth and R- (respectively K_R–) curve behavior of the material is essential.

The reduction of the material strength by temperature induced propagating microstructural cracks can be described as follows:

$$\sigma = \alpha \cdot \Delta T \frac{E_0}{1 + 2\pi N l^2}$$

σ	Effective strength
α	Coefficient of thermal expansion (7 to 12 · 10^{-6} 1/K)
E_0	Modulus of elasticity
N	Number of temperature changes
l	Crack length

The brittleness of ferrite materials can be quantified by means of the fracture toughness. High fracture toughness values indicate decreased material brittleness. The quantity of the fracture toughness is a measure for the stress in the core necessary for a propagating crack. For the crack propagation it is required that the stress intensity factor exceeds the fracture toughness.

$$K_1 \geq K_{1C} \quad \text{with} \quad K_1 = \sigma_{appl} \sqrt{l} \cdot Y \quad \text{and} \quad K_{1C} = \sqrt{G_C E}$$

K_1	Stress intensity facture
K_{1C}	Fracture toughness
σ_{appl}	Applied stress
Y	Factor for fracture/sample geometry
G_C	Critical fracture area energy
E	Modulus of elasticity

Typical fracture toughness values are approx. 0.8 to 1.1 MPa·$m^{1/2}$.

Ferrite materials have a pronounced R curve behavior, i. e. the fracture toughness increases with propagating crack length. In practice there is a rather tolerant behavior towards moderate single stress events.

8.2 Stress sensitivity of magnetic properties

Stresses in the core affect not only the mechanical but also the magnetic properties. It is apparent that the initial permeability is dependent on the stress state of the core. With

$$\mu_i \cong \frac{1}{\frac{1}{\mu_{io}} + k \cdot \sigma_T}; \qquad k \approx 30 \cdot 10^{-6} \cdot \frac{1}{\text{MPa}}$$

where μ_{io} is the initial permeability of the unstressed material, it can be shown that the higher the stresses are in the core, the lower is the value for the initial permeability. Embedding the ferrite cores (e.g. in plastic) can induce these stresses. A permeability reduction of up to 50% and more can be observed, depending on the material. In this case, the embedding medium should have the greatest possible elasticity.

8.3 Magnetostriction

Linear magnetostriction is defined as the relative change in length of a magnetic core under the influence of a magnetic field. The greatest relative variation in length $\lambda = \Delta l/l$ occurs at saturation magnetization. The values of the saturation magnetostriction (λ_s) of our ferrite materials are given in the following table (negative values denote contraction).

SIFFERIT material	K1	N48
λ_s in 10^{-6}	–18	–1.5

Magnetostrictive effects are of significance principally when a coil is operated in the frequency range <20 kHz and then undesired audible frequency effects (distortion etc.) occur.

8.4 Resistance to radiation

SIFERRIT materials can be exposed to the following radiation without significant variation ($\Delta L/L \leq 1\%$ for ungapped cores):

gamma quanta:	10^9 rad
quick neutrons	$2 \cdot 10^{20}$ neutrons/m²
thermal neutrons	$2 \cdot 10^{22}$ neutrons/m²

8.5 Resistivity ρ, dielectric constant ε

At room temperature, ferrites have a resistivity in the range 1 Ωm to 10^5 Ωm; this value is usually higher at the grain boundaries than in the grain interior. The temperature dependence of the core resistivity corresponds to that of a semiconductor:

$$\rho \sim e^{\frac{E_a}{k \cdot T}}$$

E_a Activation energy (0.1 to 0.5 eV)
k Boltzmann constant
T Absolute temperature (K)

Thus the resistivity at 100 °C is one order of magnitude less than at 25 °C, which is significant, particularly in power applications, for the magnitude of the eddy-current losses.

Similarly, the resistivity decreases with increasing frequency.

Example: Material N48

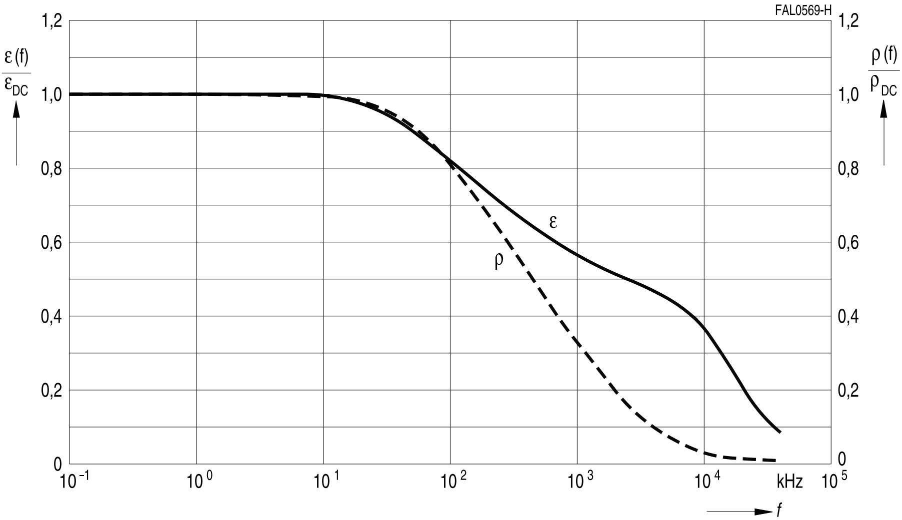


Figure 9
Resistivity and dielectric constant versus frequency

The different resistivity values for grain interior and grain boundary result in high (apparent) dielectric constants ε at low frequencies. The dielectric constant ε for all ferrites falls to values around 10 to 20 at very high frequencies. NiZn ferrites already reach this value range at frequencies around 100 kHz.

SIFFERIT material	Resistivity (approx.) Ωm	Dielectric constant ε at (approximate values)				
		10 kHz	100 kHz	1 MHz	100 MHz	300 MHz
K1 (NiZn)	10^5	30	15	12	11	11
N48 (MnZn)	1	$140 \cdot 10^3$	$115 \cdot 10^3$	$80 \cdot 10^3$		

Magnetostrictive effects are of significance principally when a coil is operated in the frequency range <20 kHz and then undesired audible frequency effects occur.

9 Coil characteristics

Resistance factor A_R

The resistance factor A_R, or A_R value, is the DC resistance R_{Cu} per unit turn, analogous to the A_L value.

$$A_R = \frac{R_{Cu}}{N^2}$$

When the A_R value and number of turns N are given, the DC resistance can be calculated from $R_{CU} = A_R N^2$.

From the winding data etc. the A_R value can be calculated as follows:

$$A_R = \frac{\rho \cdot l_N}{f_{Cu} \cdot A_N}$$

where ρ = resistivity (for copper: 17.2 $\mu\Omega$ mm), l_N = average length of turn in mm, A_N = cross section of winding in mm^2, f_{Cu} = copper space factor. If these units are used in the equation, the A_R value is obtained in $\mu\Omega = 10^{-6}\ \Omega$. For calculation of l_N and A_N the middle dimensions are used.

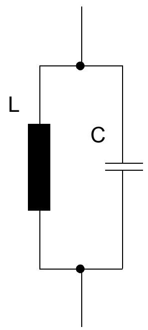
For coil formers, A_R values are given in addition to A_N and l_N. They are based on a copper filling factor of f_{Cu} = 0.5. This permits the A_R value to be calculated for any filling factor f_{Cu}:

$$A_{R(f_{Cu})} = A_{R(0.5)} \cdot \frac{0.5}{f_{Cu}}$$

For rough estimation a copper filling factor of f_{Cu} = 0.5 is sufficient.

1 Cores for filter applications

1.1 Gapped cores for filter/resonant circuits



Basic requirements:

- Low tan δ
- Close tolerance for A_L value
- Close tolerance for temperature coefficient
- Low disaccommodation factor DF
- Wide adjustment range

Gapped cores are therefore always used in high quality circuits (for materials see application survey).

In the case of small air gaps (max. 0.2 mm) the air gap can be ground into only one core half. In this case the half with the ground air gap bears the stamp. The other half is blank.

The air gap enables the losses in the small-signal area and the temperature coefficient to be reduced by a factor of μ_e/μ_i in the small-signal area. More important, however, is that close A_L value tolerances can be achieved.

The rated A_L values for cores with ground air gap can be obtained from the individual data sheets. The data for the individual cores also include the effective permeability μ_e used to approximately determine the effective loss factor tan δ_e and the temperature coefficient of the effective permeability α_e from the ring core characteristics (see table of material properties).

It should be noted at this point that in cores with a larger air gap the stray field in the immediate vicinity of the air gap can cause additional eddy current losses in the copper winding. If the coil quality must meet stringent requirements, it is therefore advisable to wind several layers of polystyrene, nylon tape or even FPC film under the wire in the part of the winding that is in the proximity of the air gap; with a 3-section coil former this would be the part of the center section near the air gap.

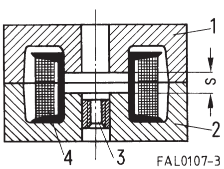


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Figure 10

Schematic drawing showing the construction of a P or RM core set with a total air gap s, comprising 2 core halves (1 and 2), threaded part (3) and padded winding (4)

1.2 P and RM cores with threaded sleeves

Most of P and RM cores are supplied with a glued-in threaded sleeve. EPCOS uses automatic machines featuring high reliability in dosing of the adhesive and in positioning the threaded sleeve in the core.

The tight fit of the threaded sleeve is regularly checked – including a humid atmosphere of 40 °C/93% r.h. (to IEC 60068-2-3-78) over 4 days – and also by periodic tests over 3 weeks. The usual bonding strengths of 20 N for ∅ 2 mm holes (e.g. for RM 5) and 30 N for ∅ 3 mm holes (e.g. for P 14 × 11, RM 6) are greatly exceeded, reaching an average of >100 N. The threaded sleeve is continuously checked for proper centering. Overall, the controlled automated procedure guarantees higher reliability than manual gluing with its unavoidable inadequacies. Owing to the porosity of the ferrite, tension of the ferrite structure due to hardened adhesive that has penetrated cannot always be avoided. Hence, the relative temperature coefficient α_F may be increased by approximately $0.2 \cdot 10^{-6}$/K.

1.3 Typical calculation of a resonant circuit inductor

The following example serves to illustrate the dependencies to be considered when designing a resonant circuit inductor:

A SIFERRIT pot core inductor is required with an inductance of L = 640 µH and a minimum quality factor Q = 400 ($\tan \delta_L = 1/Q = 2.5 \cdot 10^{-3}$) for a frequency of 500 kHz. The temperature coefficient α_e of this inductor should be $100 \cdot 10^{-6}$/K in the temperature range +5 to +55 °C.

a) Choice of material

According to the table of material properties and the $\tan \delta/\mu_i$ curves (see chapter "SIFERRIT materials") the material M33, for example, can be used for 500 kHz.

b) Choice of A_L value

The Q and temperature coefficient requirements demand a gapped pot core. The relative temperature coefficient α_F of SIFERRIT M33 according to the table of material properties is on average about $1,6 \cdot 10^{-6}$/K. Since the required α_e value of the gapped P core should be about $100 \cdot 10^{-6}$/K, the effective permeability is

$$\alpha_F = \frac{\alpha_e}{\mu_e} \qquad \Rightarrow \qquad \mu_e = \frac{\alpha_e}{\alpha/\mu_i} = 100 \cdot 10^{-6}/\mathrm{K} \cdot \frac{1}{1.6 \cdot 10^{-6}/\mathrm{K}} = 62.5$$

With pot core P 18 × 11 (B65651): μ_e = 47.9 for A_L = 100 nH.
With pot core P 22 × 13 (B65661): μ_e = 39.8 for A_L = 100 nH.

c) Choice of winding material

RF litz wire 20 × 0.05 with single natural silk covering is particularly suitable for frequencies around 500 kHz. The overall diameter of the wire including insulation of 0.367 mm and the average resistivity of 0.444 Ω/m are obtained from the litz-wire table (refer to pertinent standard). It is recommended that the actual overall diameter always be measured, and this value used for the calculation.

d) Number of turns and type of core

For an A_L value of 100 nH and an inductance of 640 µH the equation $N = (L/A_L)^{1/2}$ yields 80 turns. The nomogram for coil formers shows that for a wire with an external diameter of 0.367 mm the two-section coil former for core type P 18 × 11 can easily take 80 turns. This core type can therefore be used with a one-section coil former.

e) Length of wire and DC resistance

The length of an average turn l_N on the above former is 35.6 mm. The length of litz wire necessary for the coil is therefore 80 · 35.6 mm = 2848 mm plus say 2 · 10 cm for the connections, giving a total length of 3.04 m. The average resistivity of this wire is 0.444 Ω/m; the total DC resistance is thus 3.04 m · 0,444 Ω/m ≈ 1,35 Ω. It should be noted that the length of an average turn l_N given in the individual data sheets always refers to the fully wound former. If the former is not fully wound, the length of an average turn must be corrected according to the extent of the winding.

f) Checking the temperature coefficient

The core P 18 × 11 with A_L = 100 nH has an effective permeability μ_e = 47.9. SIFERRIT M33 has a relative temperature coefficient $\alpha_F \approx 1.6 \cdot 10^{-6}$/K; therefore the following temperature coefficient can be calculated

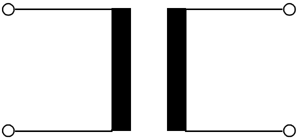
$$\alpha_e = \mu_e \cdot \alpha_F = 47.9 \cdot 1.6 \cdot 10^{-6} \text{ § K} = 76.6 \cdot 10^{-6} \text{ § K}$$

Actual measurement yielded $90 \cdot 10^{-6}$/K.

It should be pointed out that with pot cores the temperature coefficient of the unwound coil has almost no influence since the flux density lies primarily in the core.

For effective permeabilities μ_e <80, however, due to the influence of the winding an additional temperature coefficient of approx. (10 to 30) · 10^{-6}/K must be included in the calculation.

2 Cores for broadband transformers



General requirements:

- High A_L values (≙ high effective permeability) to restrict number of turns
- Good broadband properties, i.e. high impedance up to highest possible frequencies
- Low total harmonic distortion (≙ low hysteresis material constant η_B)
- Low sensitivity to superimposed DC currents (≙ highest possible values for T_C and B_S)
- Low tan δ for high-frequency applications

2.1 Precision-ground, ungapped cores for broadband transformers

For fields of application such as matching transformers in digital telecommunication networks or pulse signal transformers, either cores which form a closed magnetic circuit (toroids, double E or double-aperture cores) or paired core sets without air gap are used. In order to achieve the highest possible effective permeability here, these cores are precision ground with residual air gaps s ~ 1 µm. By selecting the low-profile core types, the A_L value can be further increased, and the number of turns reduced.

For this reason, RM and pot cores made of materials N30, T38, T46 and T66 are especially suitable for these applications. For high-frequency applications, N22, M33 and K1 are suitable.

2.2 Fundamentals for broadband transformers in the range 10 kHz to over 1 GHz – an example

Broadband transformers are constructed primarily using closed core shapes, i.e. toroids and double-aperture cores. Divided core designs such as P/RM cores or small E/ER cores, which allow more simple winding, are particularly suitable for transformers up to approximately 200 MHz.

The bandwidth $\Delta f = f_{oG} - f_{uG}$ (f_{oG} = upper cut-off frequency, f_{uG} = lower cut-off frequency) is considered the most important transformer characteristic.

Cut-off frequency: Frequency at which the voltage at the transformer drops by 3 dB (≙ –30%)

The following holds true for circuit quality Q >10 (typical value):

$$\Delta f = \frac{f_r}{R_i} \cdot \sqrt{\frac{L_H}{C_0}}$$

f_r Resonance frequency
R_i Internal resistance of generator (normally, R_i << loss resistance of ferrite)
L_H Main inductance
C_0 Winding capacitance

Transmission loss curve:

$$\alpha = \ln\frac{U}{U_r}$$

U_r Voltage at f_r
α Attenuation when matched with line impedance (e.g. 50 Ω)

Example: 1 : 1 transformer based on E6.3/T38 with 2 ×10 turns

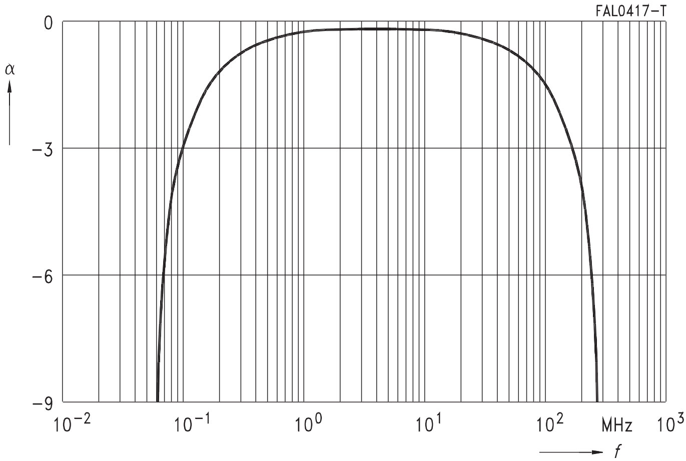


Figure 11
Transmission loss curve for transformer E6.3/T38 with 2 ×10 turns (parallel)

2.3 Low-distortion transformers for digital data transmission (ISDN, xDSL)

The digital transmission technologies over copper like ISDN, HDSL (high-rate digital subscriber line) and ADSL (asymmetric digital subscriber line) require very small harmonic distortion in order to maintain maximal line length. This requirement can be calculated from material parameters for the third harmonic distortion with the Rayleigh model for small-signal hysteresis (sinusoidal current).

For a typical design a transformer has to be matched to a chipset via the turn ratios N1 : N2 : N3 …, the inductances L_1, L_2, L_3 … and the maximum DC resistances R_1, R_2, R_3 …

The third harmonic distortion for winding j can then be calculated as

$$k_3 = \frac{0.6}{\mu_0} \cdot \underbrace{\eta_B}_{\text{Material}} \cdot \underbrace{\frac{\hat{U}}{2\pi f}}_{\substack{\text{Circuit} \\ \text{conditions}}} \cdot \underbrace{L_j \cdot \left[\frac{\rho}{f_{Cu}} \sum_{j=1} \left(\frac{N_j}{N_1}\right)^2 \cdot \frac{1}{R_j}\right]^{3/2}}_{\text{Design constraints}} \cdot \underbrace{\underbrace{\frac{\sum_i l_i}{l_e} \cdot \frac{l_e}{A_e^2}}_{\text{Core}} \cdot \underbrace{\frac{l_N^{3/2}}{A_N^{3/2}}}_{\text{Coil former}}}_{\text{Geometry}}$$

This equation shows the contribution of the various design parameters:

– The material is characterized by the hysteresis material constant η_B. Limit values for this parameter are given in the SIFERRIT material tables. The actual level for η_B varies for different cores. In order to select the best material for an application, the normalized temperature dependence $\eta_B(T)/\eta_B(25\ °C)$ is of great help. Being mainly composition-dependent, these curves are thus material-specific.
– The geometry can be taken into account by a core distortion factor (CDF) defined as

$$\text{CDF} = \frac{\sum l_i}{l_e} \cdot \frac{l_e}{A_e^2} \cdot \frac{l_N^{3/2}}{A_N^{3/2}}$$

The factor $\Sigma l_i/l_e$ is the closer to 1, the less the core section varies along the magnetic path (homogeneous core shape). The values for CDF are given in the following table for the core shapes preferred for these applications.

Cores w/o hole	CDF ($mm^{-4.5}$)	Cores w. hole	CDF ($mm^{-4.5}$)	EP cores	CDF ($mm^{-4.5}$)
P 9 × 5	1.25	P 3.3 × 2.6	85.9	EP 5	10.6
P 11 × 7	0.644	P 4.6 × 4.1	46.7	EP 6	9.99
P 14 × 8	0.164	P 7 × 4	4.21	EP 7	1.68
P 18 × 11	0.0470	P 9 × 5	1.72	EPX 7/9	0.749
P 22 × 13	0.0171	P 11 × 7	0.790	EPX 9/9	0.457
P 26 × 16	0.00723	P 14 × 8	0.217	EP 10	0.506
P 30 × 19	0.00311	P 18 × 11	0.0545	EPX 10	0.329
P 36 × 22	0.00149	P 22 × 13	0.0220	EP 13	0.191
RM 4	0.498	P 26 × 16	0.0099	EPO 13	0.172
RM 5	0.184	P 30 × 19	0.00366	EP 17	0.0619
RM 6	0.0576	P 36 × 22	0.00166	EP 20	0.00945
RM 7	0.0339	P 41 × 25	0.00112	EFD 10	3.919
RM 8	0.0162	RM 4	0.814	EFD 15	0.376
RM 10	0.00676	RM 5	0.243	EFD 20	0.0837
RM 12	0.00215	RM 6	0.0779	EFD 25	0.0231
RM 14	0.00100	RM 7	0.0415	EFD 30	0.0161
		RM 8	0.0235	ER 9.5	2.557
		RM 10	0.00906	ER 11	1.453

The values of this parameter indicate that roughly

$$\text{CDF} \sim \frac{1}{V_e^{3/2}}$$

I.e. the larger the core, the smaller is the distortion. Due to space restriction, however, the choice has to be made among the core shapes of a given size.

– The circuit conditions, i.e. voltage amplitude û and frequency f affect directly the flux density in the core. For increasing flux density, a deviation of the absolute value of k_3 from the calculated test value is expected, since the tan δ_h vs. $\hat{B}$ curve deviates from linear.
– The distortion k_{3c} for a transformer in a circuit with given impedance conditions can be obtained from the following formula:

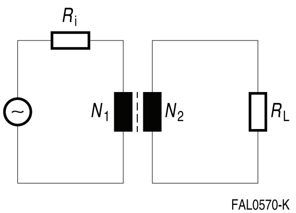


Figure 12

Equivalent circuit diagram for a broadband transformer

$$k_{3c} = \frac{k_3}{\sqrt{1 + \left[3\omega L_1 \cdot \left(\frac{1}{R_i} + \left(\frac{N_2}{N_1}\right)^2 \cdot \frac{1}{R_L}\right)\right]^2}}$$

R_i Internal resistance of generator
R_L Load resistance
L_1 Primary inductance

The actual circuit distortion k_{3c} will in general be smaller than the calculated sinusoidal current value k_3.

3 Cores for LAN applications

LAN (**L**ocal **A**rea **N**etwork) is a connection of local computers in most cases inside a building. The transfer rate values between 10 Mbit/s and 100 Mbit/s. The transmission rates are 10 Mbit/s (10 Base T), 100 Mbit/s (100 Base T) and 1 Gbit/s (Gigabit Ethernet).

3.1 Signal transformers

To design the signal 1:1 transformer small toroids are typically used. Its functions are impedance matching and network termination. Due to space restriction the core has to be the smallest possible, that still meets the inductance requirement under the given working conditions (100 kHz).

The mostly used core sizes are beginning from outer/inner diameters of 2.54/1.27 mm (0.1/0.05 inch) up to 3.94/2.24 mm (0.155/0.088 inch) with different variations of inner diameter and core height (refer also to chapter *"Toroids"*).

The multi-level coding of the digital waveform is not always symmetrical to the zero line. This imbalance results in an effective DC current, which is allowed to value 8 mA max. Therefore the inductance of the ferrite toroid is specified under a constant DC current of 8 mA. The saturation flux density values 430 mT at 25 °C and the initial permeability is 4000 (figure 13).

For indoor application the temperature range is 0 to 70 °C. To use the LAN technology also in outdoor application the temperature range needs to be extended from –40 to +85 °C without changing the electrical specification.

The material T57 enables design in both temperature ranges.

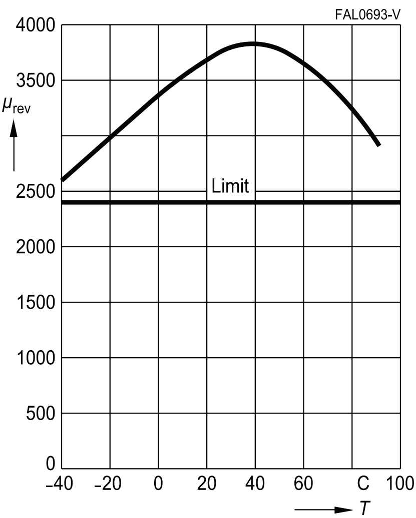


Figure 13

μ_{rev} versus temperature, measured on toroid R 3.43/1.78/2.11; material T57 f = 100 kHz, $\hat{B}$ = 6 mT, N = 26, H_{DC} = 27 A/m. (I_{DC} = 8 mA)

3.2 Common-mode chokes

For the suppression of common-mode interference in the frequency range from about 30 MHz to 300 MHz it is necessary to use current-compensated chokes in the LAN network.

The corresponding ferrite material is K10, which is a NiZn material with a permeability of approx. 700 for small Parylene coated cores. The impedance versus frequency curve of K10 is ideally adapted to the suppression requirement in the LAN network (figure 14).

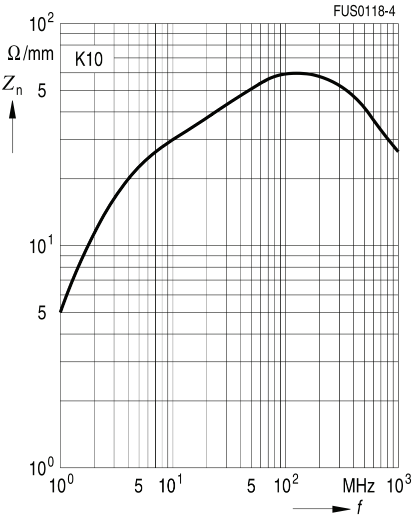


Figure 14

Normalized impedance curve, measured on toroid R 10 (N = 2 turns)

3.3 Coating to ensure highest insulation resistance

Typically the toroid has to withstand 1 kV Hipot test. Therefore the toroids needs to be coated with Parylene which ensures highest insulation resistance. With 17 µm (0.0007 inch) a breakdown voltage of 2.7 kV can be achieved. The coating will also protect the wire during winding operation.

4 Cores for EMI applications

4.1 Ring cores to suppress line interference

With the ever-increasing use of electrical and electronic equipment, it becomes increasingly important to be able to ensure that all facilities will operate simultaneously in the context of electromagnetic compatibility (EMC) without interfering with each others' respective functions. The EMC legislation which came into force at the beginning of 1996 applies to all electrical and electronic products marketed in the EU, both new and existing ones. So the latter may have to be modified so that they are neither susceptible to electromagnetic interference, nor emit spurious radiation. Ferrite cores are ideally suited for this purpose since they are able to suppress interference over a wide frequency range.

At frequencies above 1 MHz, ferrite rings slipped over a conductor lead to an increase in the impedance of this conductor. The real component of this impedance absorbs the interference energy.

A ferrite material's suitability for suppressing interference within a specific frequency spectrum depends on its magnetic properties, which vary with frequency. Before the right material can be selected, the impedance IZI must be known as a function of frequency.

The curve of impedance as a function of frequency is characterized by the sharp increase in loss at resonance frequency.

Measurement results:

The measurements shown here were made at room temperature (25 ±2) °C using an HP 4191A RF impedance analyzer with a flux density of $\hat{B} \leq 1$ mT.

The maximum of the impedance curve shifts to lower frequencies as the number of turns increases; this is due to the capacitive effect of the turns (figure 15, using R 25/15 as an example).

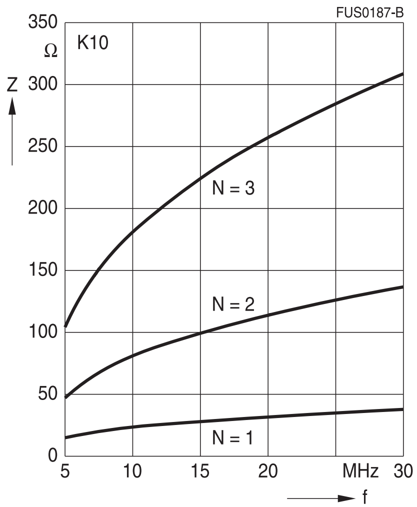


Figure 15

Impedance characteristic curve

The impedance curves of different materials are summarized for direct comparison. The normalized impedance $|Z|_n = |Z| / N^2 \times \Sigma (l_e/A_e)$ were used to display material properties only. The geometry factor was calculated on the basis of the core dimensions.

These normalized impedance curves are guide values, mostly measured using toroidal core R 10 with a number of turns N = 1 (wire diameter 0.7 mm); they may vary slightly, depending on the geometry.

4.2 Common-mode chokes

Compact electrical and electronic equipment primarily generates common-mode interference. In order to be able to meet the safety requirements (keeping within the leakage current limits), chokes with a high asymmetrically effective inductance must be used. Current-compensated chokes with a closed core topology are especially suitable for this purpose. The problem of core material saturation due to the useful current is solved in these designs by winding two coils with equal number of turns on the core. These coils are connected in such a way that the magnetic flux induced by the upper coil is compensated by the lower coil.

The new Magnetic Design Tool of EPCOS contains the normalized impedance versus frequency curves of all ferrite materials, which are suitable for EMI applications.

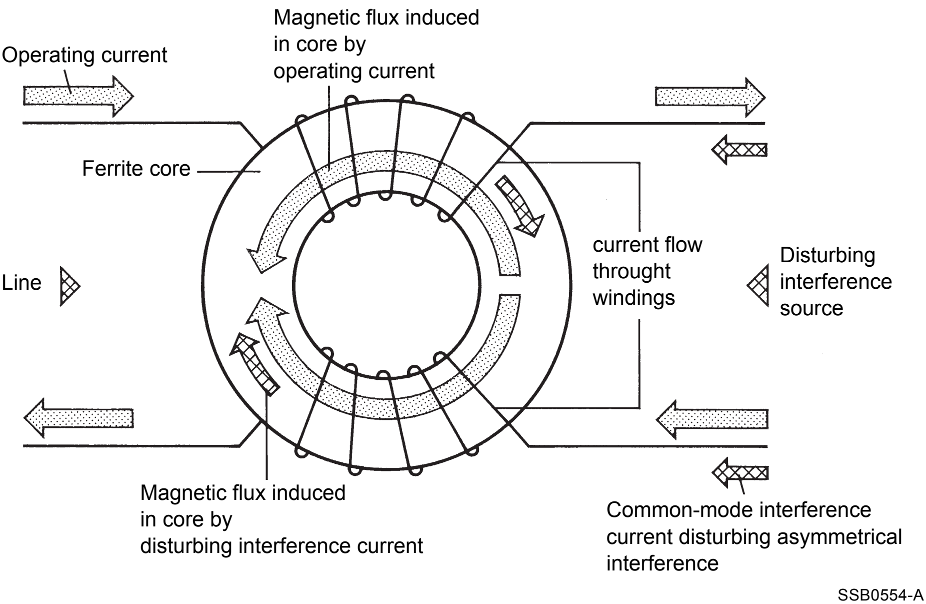


Figure 16

Current-compensated toroid choke; double choke shown as an example

4.3 NiZn ferrites

Toroidal cores of NiZn ferrites are especially suitable for the suppression of high frequency interference, because of the high ohmic resistance of these materials (ca. 10^5 Ωm). Therefore the negative effect of eddy current is negligible and the usage of these materials allow relatively high impedance values even at frequency well above 100 MHz. There is limiting factor to create NiZn ferrites with higher initial permeability, because with increasing permeability the Curie temperature decreases. For example the Curie temperature for a NiZn ferrite of μ_i = 800 (K10) is specified >150 °C, which is at the limit for many applications.

An applicacion example in the automotive sector is the CAN bus choke, where core sizes from outer diameter 2.5 mm to 6.3 mm (0.1 to 0.29 inch) in material K10 are used. As the transmission frequencies in the telecom industry are rising, it is also expected, that the demand for NiZn ferrites will grow.

Another application example for NiZn ferrite toroids is the usage of cores alone on component leads or in board level circuitry either

– to prevent any parasitic oscillations or
– to attenuate unwanted signal pickup or transmissions which might travel along component leads or interconnecting wires, traces, or cables.

4.4 MnZn ferrites

For the application as current-compensated chokes MnZn ferrites are widely used in the whole range of sizes. The advantage of the MnZn materials is the much higher permeability, which can be realised together with a sufficiently high Curie temperature. Using very high permeability ferrites reduces the number of turns, which are necessary to reach a certain inductance. This avoids the negative impact of a high number of turns like DC resistance or parasitic capacitance and not at least costs.

Small cores R 2.5 up to R 12.5 in the materials N30, T38, T46 can be used for example in Telecom networks like ISDN.

Cores of mid range sizes from R 13.3 to R 26 are used as choke in power lines usually in electronic ballasts in lamps, switch-mode power supplies in TV sets, washing machines and chargers. Ferrite materials: N30, T65, T35, T37, T38 and T46.

The usage for core sizes R 34 and bigger are in industrial applications, in filters for frequency converters (lifts, pumps, traction systems, conveyer systems, air conditioning systems), general-purpose application in power electronics, UPS and wind-driven power plants. Especially for high temperarure or/and high current application in these fields our material T65 is the most suitable because of its high saturation flux density of 460 mT and high Curie temperature of >160 °C. The initial permeability on big cores is about 4500 to 5000.

If there is not especially high current or high temperature applied, we recommend to use our materials N30 (μ_i = 4300) and T37 (μ_i approx. 5500 to 6000 on big cores). The choice of material depends on the frequency range, which has to be covered by the attenuation. This is determined by the characteristic of permeability.

5 Cores for inductive sensors

The proximity switch, widely used in automation engineering, is based on the damping of a high-frequency LC oscillator by the approach of a metal. The oscillator inductor consists of a cylindrical coil and a ferrite core half whose open side forms what is known as the active area. The function of the ferrite core consists in spatially aligning the magnetic field so as to restrict the interaction area.

The oscillator design must take into account that the inductor forms a magnetically open circuit. The inductance and quality are decisively dependent on the coil design, unlike in the case of closed circuits. The initial permeability plays a subordinate role here, as is shown by the following example:

Core:	P 9 × 5 (B65517D*)
Coil:	100 turns, 0.08 CuL
Current:	1 mA
Frequency:	100 kHz

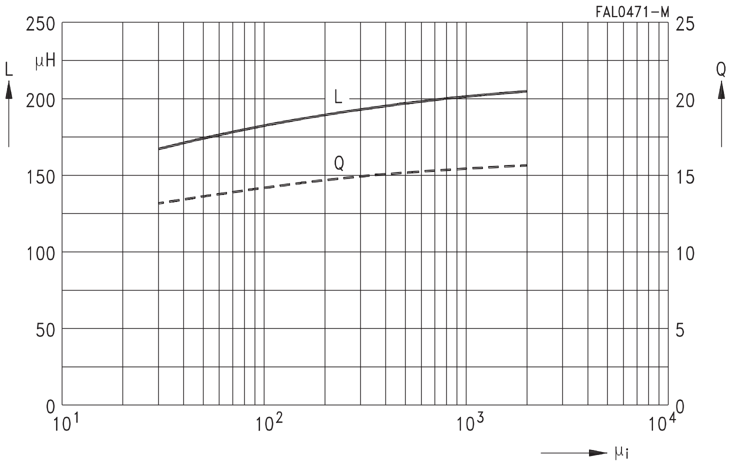


Figure 17

Inductance and quality versus initial permeability
P 9.3 × 2.7, N = 100, f = 100 kHz, I = 1 mA

Decisive for this application is the attainment of as high a Q as possible, with the lowest possible dependence on temperature at the oscillator frequency. When the distance between the damping lug and the active area changes, the oscillator Q should however change as strongly as possible.

If the relative change in Q ΔQ/Q exceeds a predefined threshold, e.g. 10%, a switching operation is initiated at the so-called operating distance. Attainment of the target values depends on appropriate coil dimensioning and can generally only be performed empirically.

6 Cores for power applications

6.1 Core shapes and materials

The enormously increased diversity of application in power electronics has led to a considerable expansion not only in the spectrum of core shapes but also in the range of materials.

To satisfy the demands of higher-frequency applications, the EFD cores have been developed in sizes EFD 10, 15, 20, 25 and EFD 30. These are characterized by an extremely flat design, optimized cross-sectional distribution and optimized winding shielding.

For many standard applications up to 100 kHz, materials N27, N41 and N72 can be used. For the range up to 500 kHz, materials N92, N87, N88, N95, N96 and N97 are suitable. N49 covers the range from 300 kHz to 1 MHz, PC200 to 4 MHz e.g. for DC/DC (resonance) converters.

For detailed information on core shapes see the individual data sheets, for general information on materials see the chapter on SIFERRIT materials.

6.2 Low-profile cores for planar magnetics

The design of planar devices has attracted the attention of magnetic design engineers, since this type of devices has interesting advantages over conventional wound components (cf. figure 18):

- Low total height
- Outstanding reproducibility of electrical parameters
- Excellent thermal performance
- High degree of integration

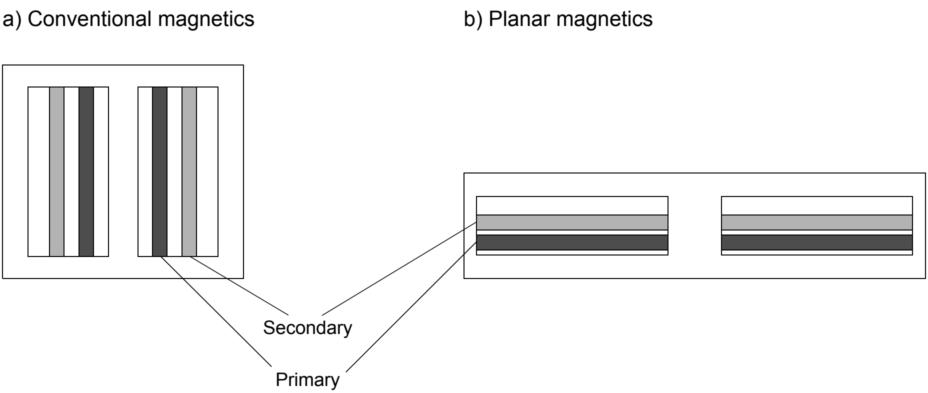


Figure 18

Principle of conventional and planar magnetics

In order to fulfill the requirements of this technology, suitable cores are needed. The most common designs of low-profile cores have been adopted in the IEC standards IEC 62317-4 for RM LP cores and IEC 62317-9 for ELP, EQ and ER planar cores to offer geometrically compatible cores for this application. A common denominator of these cores is that the length of the core is larger than both its total height and its width.

The advantages of this core design are:

- High A_L values
- High core surface to volume ratio
- Large core surface to contact heat sink

The preferred materials used in combination with low-profile cores are N87, N88, N95, N96, N97, N92, N49 and PC200 for power applications as well as T38 and T46 for applications requiring high inductance values.

6.3 Correlation: Applications – core shape/material

6.3.1 Step-down converters

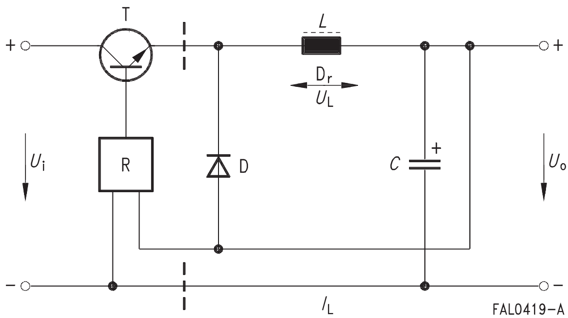


Figure 19 Typical circuit diagram

Advantages

- Only one choke required
- High efficiency
- Low radio interference

Disadvantages

- Only one output voltage
- Restricted short-circuit withstand capability (no line isolation)

Application areas

- Providing a constant output voltage, isolated from input voltage
- Regulation in a forward converter
- Regulated voltage inversion
- Sinusoidal line current draw

Core/material requirements

- Standard requirements regarding losses and saturation

EPCOS recommendations for core shape/material

- E/ETD/U/RM cores made of
  N27 (standard)
  N87, N97 (low losses, high saturation)
  N88 (low losses in high temperature range)
  N95 (low losses in wide temperature range)
  N96 (low losses in low temperature range)
  N92 (high saturation)

6.3.2 Single-ended flyback converter

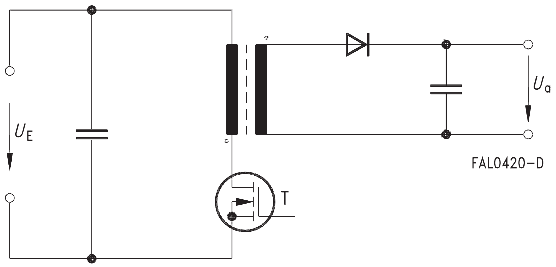


Figure 20 Typical circuit diagram

Advantages

- Simple circuit variant (low cost)
- Low component requirement
- Only one inductive component
- Low leakage losses
- Several easily regulatable output voltages

Disadvantages

- Close coupling of primary and secondary sides
- High eddy current losses in the air gap area
- Large transformer core with air gap restricts possible applications
- Average radio interference
- Exacting requirements on the components

Application areas

- Low and medium powers up to max. 200 W with wide output voltage range
- Maximum operating frequency approx. 100 kHz

Core/material requirements

- Low power losses at high temperature
- Very high saturation with low dependence on temperature
- Gapped cores (recently also with A_L value guarantee)

EPCOS recommendations for core shape/material

- E/U cores made of
  N27 (standard)
  N87, N92, N97 (low losses, high saturation)
  N88 (low losses in high temperature range)
  N95 (low losses in wide temperature range)
  N96 (low losses in low temperature range)

6.3.3 Single-ended forward converter

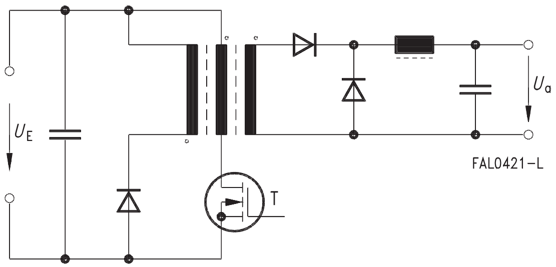


Figure 21 Typical circuit diagram

Advantages

- Higher power range than flyback converter
- Lower demands on circuit components
- High efficiency

Disadvantages

- 2 inductive components
- Large choke
- Demagnetization winding
- High radio interference suppression complexity
- Increased component requirement, particularly with several regulated output voltages

Application areas

- Medium and high powers (up to 500 W) especially in the area of low output voltages
- PWM (pulse width) modulation up to approx. 500 kHz

Core/material requirements

- Low losses at high temperatures and at high frequencies (low eddy-current losses)
- Generally, ungapped cores

EPCOS recommendations for core shape/material

- E/ETD, small EFD cores, RM/PM cores made of
  N27, N41 (up to 100 kHz)
  N87, N97 (up to 500 kHz)
  N49 (up to 700 kHz)
  PC200 (up to 4 MHz)
  N88 (low losses in high temperature range)

6.3.4 Push-pull converter

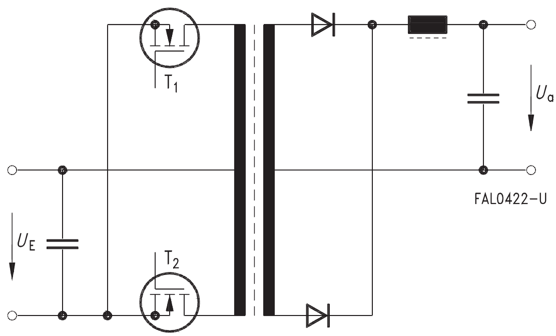


Figure 22 Typical circuit diagram

Advantages

- Powers up to the kW range
- Small choke
- High efficiency
- Low radio interference suppression complexity

Disadvantages

- 2 inductive components
- Complex winding
- High component requirement, particularly with several regulated output voltages

Application areas

- High powers (»100 W), also at high output voltages
- PWM (pulse width) modulation up to 500 kHz

Core/material requirements

- Low losses at high temperatures
- Low eddy-current losses since application areas is up to 500 kHz and above
- Generally, ungapped cores

EPCOS recommendations for core shape/material

- Large E/ETD, RM/PM cores made of
  N27, N97, N87 (with large core cross sections (A_e ≥250 mm^2), on account of eddy-current losses
  N87 must be used even where f <100 kHz)
  N88 (low losses in high temperature range)
  N95 (low losses in wide temperature range)

6.3.5 Electronic lamp ballast device

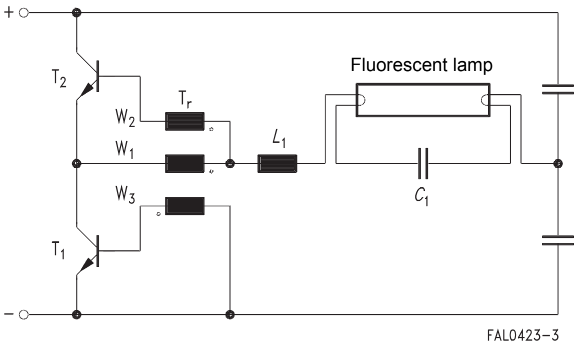


Figure 23 Typical circuit diagram

Advantages

- Considerably reduced size compared to 50 Hz line solution
- Significantly higher efficiency than line voltage regulator

Disadvantages

- High component requirement

Application areas

- Control unit for fluorescent lamps

Core/material requirements

- Low losses in the range 50 to 80 °C
- Pulse power requirements
- Gapped and ungapped E cores
- Ring cores with defined pulse characteristic

EPCOS recommendations for core shape/material

- E/ETD/EFD cores made of N72 for L_1

6.4 Selection of switch-mode power supply transformer cores

The previous section (Correlation: Applications – core shape/material) provides a guide for the rough selection of core shape and material.

The following procedure should be followed when selecting the actual core size and material:

1) Definition of requirements
   – Range of power capacities P_{trans}
   – Specification of the SMPS type
   – Specification of pulse frequency and maximum temperature rise
   – Specification of the maximum volume
2) Selection of “possible” core shapes/materials on the basis of the “Power capacity” tables starting on page 165.

These tables associate core shape/material combinations (and the volume V) with the power capacity of the different converter types at a “typical” frequency f_{typ} and a “cut-off frequency” f_{cutoff}.

The typical frequency specified here is a frequency for which specific applications are known, or which serves as the base frequency for the specified core loss values.

The cut-off frequency is selected such that the advantages of other materials predominate above this frequency and that it is therefore advisable to switch to a different material which is better optimized for this range.

3) Final selection of core shape/material

The core shapes/materials selected as possibilities under 2) must now be compared with the relevant data sheets for the specific core types and the material data (typical curves), taking the following points into consideration:

– Volume
– Accessories (power coil former)
– A_L values of ungapped core
– A_L values/air gap specifications
– Temperature minimum for losses, Curie temperature T_C, saturation magnetization B_S, magnetic bias characteristic, amplitude permeability characteristic

Core shape/material combinations which are not contained in the individual data sheets can be requested from EPCOS.

6.5 Selection tables: Power capacities

In order to calculate the transmissible power, the following relationship is used (transformer with two equal windings):

$$P_{trans} = C\,\Delta B\,fA_e \cdot A_N \cdot j$$

where C is a coefficient characterizing the converter topolgy[1], i.e.

C = 1: push-pull converter
C = 0.71: single-ended converter
C = 0.62: flyback converter

Both the core losses associated with the flux swing ΔB and the copper losses due to the current density j result in a temperature increase ΔT. Assuming that both loss contributions are equal and that $P_V \sim B^2$, the power capacity can be approximated by

$$P_{trans} \approx C \cdot \underbrace{\frac{PF}{\sqrt{P_V}}}_{\text{Material}} \cdot \underbrace{\frac{\Delta T}{R_{th}}}_{\text{Thermal design}} \cdot \underbrace{\sqrt{\frac{f_{Cu}}{\rho_{Cu}}}}_{\text{Winding}} \cdot \underbrace{\sqrt{\frac{A_N \cdot A_e}{l_N \cdot l_e}}}_{\text{Geometry}}$$

The equation shows how the different aspects in the design contribute to the power capacity:

– The material term is the performance factor PF divided by the square root of the specific core loss level for which it was derived. For a given core shape deviations from this value are possible as given by its data sheet.

– The values for ΔT are associated with the material according to the following table.

Material	ΔT K
N27	30
N41	30
N49	20
N51	10
N72	40
N87	50
N88	90
N92	50
N95	50
N96	30
N97	50
PC200	20

1) G. Roespel, "Effect of the magnetic material on the shape and dimensions of transformers and chokes in switched-mode power supplies", J. of Magn. and Magn. Materials 9 (1978) 145-49

– The thermal resistance is defined as

$$R_{th} = \frac{\Delta T}{P_{Vcore} + P_{Vcopper}}$$

– These values should be regarded as typical for a given core shape. They were determined by measurement under the condition of free convection in air and are given in the table on page 172 ff.
For actual designs the actual values for R_{th} should be determined and the tabulated P_{trans} values (cf. page 171 ff.) adjusted accordingly.

– The winding design was taken into account in the calcualtions by f_{Cu} = 0.4 and ρ_{Cu} for DC. In actual design large deviations of the DC resistance due to high frequency effects (skin effect, proximity effect) occur, unless special wire types such as litz wires are used. If the R_{AC}/R_{DC} ratio for a given winding is known, this can be used to correct the tabulated power capacities accordingly.

– The geometry term is related to the core shape and size. However, note that the thermal resistance is also size-dependent via the empirical relation (cf. figure 24):

$$R_{th} \sim \frac{1}{\sqrt{V_e}}$$

The tabulated power capacities provide a means for making a selection among cores, although the absolute values will not be met in practice for the reasons explained before.

In the calculation of power capacities the following conditions were also applied:

– The application area for flyback converters was restricted to f <150 kHz.

– The power specifications for N49 should be read as applicable to DC/DC (quasi) resonance converters (single-ended forward operation).

– The maximum flux densities were defined as follows:
For flyback converters: ΔB ≤200 mT (ΔB ≤50 mT for material N49)
For push-pull converters: ΔB ≤400 mT.

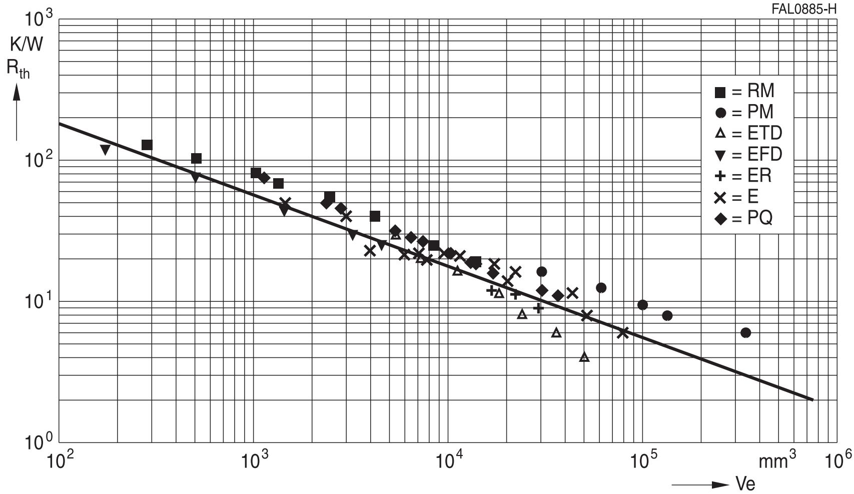


Figure 24

Thermal resistance versus core effective volume

P_{trans} of cores for wound transformers (f_{Cu} = 0.4)

	N27	N41	N49	N72	N87	N92	N95	N97
f_{typ} (kHz)	25	25	500	25	100	100	100	100
RM 4 LP			19		20	18		
RM 4			22		24			31
RM 5 LP			29		35	32		
RM 5		9	38		48			61
RM 6 LP			45		56	51		
RM 6		17	64		79			101
RM 7 LP			67		82	75		
RM 7		23	86		107			137
RM 8 LP			97		121	111		
RM 8		35	131		162			207
RM 10 LP			173		214	196		
RM 10		63	234		289			370
RM 12 LP			366		453	416		
RM 12		136	503		622			796
RM 14 LP			611		756	694		
RM 14		229	846		1046			1339
PQ 16.11	27		47		68	39	45	77
PQ 20/16	61		105		153	88	102	172
PQ 20/20	74		127		185	107	123	209
PQ 26/20	121		207		302	174	201	341
PQ 26/25	150		256		373	215	248	420
PQ 32/20	170		290		423	244	281	477
PQ 32/30	256		437		636	367	424	718
PQ 35/35	348		594		866	500	576	977
PQ 40/30	359		613		893	515	595	1008
PQ 40/40	471		804		1171	676	780	1321
PQ 50/40	729		1244		1813	1046	1207	2044
PQ 50/50	860		1468		2139	1234	1424	2413
PM 50/39	391				1742			
PM 62/49	673				2999			
PM 74/59	1131				5036			
PM 87/70	1567				6982			
PM 114/93	2963				13196			

P_{trans} of cores for wound transformers (f_{Cu} = 0.4)

	N27	N41	N49	N72	N87	N92	N95	N97
f_{typ} (kHz)	25	25	500	25	100	100	100	100
EP 5					2.6			
EP 6					2.7			
EP 7					13			
EP 10					25			
EP 13					55			
EP 17					114			
EP 20					329			
P 9 × 5					14			
P 11 × 7					25			
P 14 × 8		12			62			
P 18 × 11					133			
P 22 × 13					232			
P 26 × 16					394			
P 30 × 19					613			
E 5	0.3				1.7			1.8
E 6.3	0.5				2.4			2.5
E 8.8	1.0				5.0			5.2
E 10/5.5/5	4.7				24			25
E 12.7/6/6	10				48			50
E 13/6/6.15	10				49			51
E 13/6.5/3.7	6.0				31			32
E 13/7/4	5.6				28			29
E 14/8/4	9.3							
E 16/6/5	9.4				48			50
E 16/7/5	13				65			68
E 16/8/5	14	13.2			68			71
E 16/8/8	26				115			125
E 19/8/5	17				82			89
E 20/9/6	26				118			128
E 20/10/6	28				125			136
E 20/10/11	50				227			246
E 21/9/5								
E 22/15/6	44				198			215

P_{trans} of cores for wound transformers (f_{Cu} = 0.4)

	N27	N41	N49	N72	N87	N92	N95	N97
f_{typ} (kHz)	25	25	500	25	100	100	100	100
E 25/13/7	49				221			240
E 25.4/10/7	43				191			208
E 28/10/11	75				338			367
E 30/15/7	94				421			458
E 32/16/9	118				530			576
E 32/16/11	132				595			647
E 34/14/9	109				489			531
E 36/18/11	167				751			816
E 40/16/12	173			574	776			843
E 42/21/15	215				968		993	1051
E 42/21/20	289				1299		1332	1411
E 47/20/16	304				1365			1483
E 55/28/21	538				2419			2628
E 55/28/25	772				3473			3772
E 56/24/19	537				2414			2622
E 65/32/27	1105				4971			5400
E 70/33/32	1431				6439			6993
E 80/38/20	1503				6761			7343
E 100/60/28	2640				11890			12945
EEQ 13/2.85			49		43	42		48
EIQ 13/3.85			28		25	24		28
EEQ 20/6.3			212		202	196		220
EIQ 20/8.6			145		137	132		145
EEQ 25/8			294		286	278		310
EIQ 25/7.9			182		175	169		190
EEQ 30/8			503		501	486		540
EIQ 30/10.7			360		351	340		380
ER 9.5					9			
ER 11/5			15		14			
ER 14.5/6			15		12	11		12.5
ER 18/3/10			75		69	66		76
EER 23/5/13			177		167	162	171	183
EIR 23/7/13			111		105	101		114

P_{trans} of cores for wound transformers (f_{Cu} = 0.4)

	N27	N41	N49	N72	N87	N92	N95	N97
f_{typ} (kHz)	25	25	500	25	100	100	100	100
ER 25/6/15			247		238	230		258
ER 25/9/15			155		147	143		161
ER 28/17/11				290				
ER 32/5/21			387		381	370		412
ER 35/20/11	309				1388			
ER 42/22/15	384				1725			
ER 46/17/18	376							
ER 49/27/17	636							
ER 54/18/18	482				2168			
ETD 29/16/10	96				428			548
ETD 34/17/11	151				674			863
ETD 39/20/13	230				1023			1309
ETD 44/22/15	383				1708			2186
ETD 49/25/16	594				2645			3385
ETD 54/28/19	897				3998			5116
ETD 59/31/22	1502				6692			8564
EFD 10/5/3			13		12			12.5
EFD 15/8/5			38		42			44
EFD 20/10/7			93		115			119
EFD 25/13/9					245			266
EFD 30/15/9			258		319			345
EV 15/9/7	29				119			135
EV 25/13/13	60				248			279
EV 30/16/13	142				588			664
EV 36/19/16	163				678			765
UI 26/22/16	120				530			
U 30/26/26	240				1060			
UI 93/104/16	1028				4600			
UU 93/152/16	1413				6350			
UI 93/104/20	1283				5750			
UU 93/152/20	1780				8000			
UI 93/104/30	1784				7950			
UU 93/152/30	2874				12800			

P_{trans} of cores for wound transformers (f_{Cu} = 0.4)

	N27	N41	N49	N72	N87	N92	N95	N97
f_{typ} (kHz)	25	25	500	25	100	100	100	100
U 101/76/30	4400				19750			
UU 126/182/20					16150			
UI 126/119/20					10850			
U 141/78/30	4300				19300			

P_{trans} of low-profile cores for planar transformers (f_{Cu} = 0.1)

	N49	N87	N92	N95	N97
f_{typ} (kHz)	500	100	100	100	100
RM 4 LP	9.5	10			
RM 5 LP	14	17.5			
RM 6 LP	22	28			
RM 7 LP	33	41			
RM 8 LP	48	60			
RM 10 LP	86	107			
RM 12 LP	183	226			
RM 14 LP	305	378			
ER 9.5		4.5			
ER 11/5	7.5	7			
ER 14.5/6	13	12	11		12
EILP 14	12	11	10		10
EELP 14	16	17	16	18.5	16
EILP 18	30	37	34		36
EELP 18	44	55	50		59
EILP 22	78	96	88		105
EELP 22	109	134	123		146
EILP 32	143	177	171	186	192
EELP 32	203	252	244	261	274
EILP 38	262	323	313		352
EELP 38	380	470	454		510
EILP 43	360	445	430		482
EELP 43	500	619	599	666	672
EILP 58		731			
EELP 58		1046			
EILP 64	800	991			
EELP 64	1130	1397			

6.6 Thermal resistance for the main power transformer core shapes

Core shapes	R_{th} (K/W)	Core shapes	R_{th} (K/W)	Core shapes	R_{th} (K/W)
RM 4	120	P 30 × 19	22	EI LP 32	26
RM 4 LP	135	P 36 × 22	17	EI LP 64	9.5
RM 5	100	E 5	313	EE LP 64	9
RM 5 LP	111	E 6.3	284	EE LP 32	24
RM 6	80	E 8.8	204	EI LP 38	20
RM 6 LP	90	E 10/5.5/5	106	EE LP 38	18
RM 7	68	E 12.7/6/6	75	EI LP 43	16
RM 7 LP	78	E 13/6/6.15	79	EE LP 43	15
RM 8	57	E 13/6.5/3.7	91	EI LP 58	12
RM 8 LP	65	E 13/7/4	94	EE LP 58	11
RM 10	40	E 14/8/4	79	ER 9.5	164
RM 10 LP	45	E 16/6/5	76	ER 11/5	134
RM 12	25	E 16/7/5	69	ER 14.5/6	99
RM 12 LP	29	E 16/8/5	65	ER 28/17/11	22
RM 14	18	E 16/8/8	49	ER 35/20/11	18
RM 14 LP	21	E 19/8/5	60	ER 42/22/15	14
PQ 16/11.6	77	E 20/9/6	49	ER 46/17/18	13
PQ 20/16	51	E 20/10/6	46	ER 49/27/17	9
PQ 20/20	46	E 20/10/11	34	ER 54/18/18	11
PQ 26/20	32	E 21/9/5	59	ETD 29/16/10	28
PQ 26/25	29	E 22/15/6	38	ETD 34/17/11	20
PQ 32/20	27	E 25/13/7	40	ETD 39/20/13	16
PQ 32/30	22	E 25.4/10/7	41	ETD 44/22/15	11
PQ 35/35	19	E 28/10/11	28	ETD 49/25/16	8
PQ 40/30	19	E 30/15/7	23	ETD 54/28/19	6
PQ 40/40	16	E 32/16/9	22	ETD 59/31/22	4
PQ 50/40	12	E 32/16/11	21	EFD 10/5/3	120
PQ 50/50	11	E 34/14/9	23	EFD 15/8/5	75
PM 50/39	15	E 36/18/11	18	EFD 20/10/7	45
PM 62/49	12	E 40/16/12	20	EFD 25/13/9	30
PM 74/59	9.5	E 42/21/15	19	EFD 30/15/9	25
PM 87/70	8	E 42/21/20	15	EV 15/9/7	55
PM 114/93	6	E 47/20/16	13	EV 25/13/13	27
EP 5	329	E 55/28/21	11	EV 30/16/13	21
EP 6	318	E 55/28/25	8	EV 36/19/16	16
EP 7	141	E 56/24/19	9.5	U26/22/16	21
EP 10	122	E 65/32/27	6.5	U30/26/26	13
EP 13	82	E 70/33/32	5.5	UU 93/152/16	4.5
EP 17	58	E 80/38/20	7	UI 93/104/16	5
EP 20	32	E 100/60/28	4	UU 93/152/20	4
P 9 × 5	142	EI LP 14	116	UI 93/104/20	4.5
P 11 × 7	106	EE LP 14	105	UU 93/152/30	3
P 14 × 8	73	EI LP 22	38	UI 93/104/30	4
P 26 × 16	27	EE LP 22	35	U 101/76/30	3.3
P 18 × 11	51	EI LP 18	61	U 141/78/30	2.5
P 22 × 13	37	EE LP 18	56		

1 Gapped and ungapped ferrite cores

Even with the best grinding methods known today, a certain degree of roughness on ground surfaces cannot be avoided, so that the usual term "without air gap" or "ungapped" does not imply no air gap at all. The A_L values quoted allow for a certain amount of roughness of the ground faces. The tolerance of the A_L value for ungapped cores is –20 to +30% or –30 to +40%. Closer tolerances are not available for several reasons. The spread in the A_L values of ungapped cores practically equal the spread in ring core permeability (±20% … ±30%), and the A_L value largely depends on the grinding quality of the matching surfaces.

The following are normally defined:

precision-ground/lapped cores	s_{resid}	$\approx$ 1 µm
normally ground cores	s_{resid}	$\approx$ 10 µm
gapped cores	s	$\geq$ 10 µm

The residual air gap s_{resid} here is the total of the residual air gaps at the leg or centerpost contact surfaces.

With increasing material permeability the influence of the inevitable residual air gap grows larger. The spreads in the A_L value may also be increased by the mode of core assembly. Effects of mounting and gluing can result in a reduction of the A_L value. An appropriate wringing of cores with polished surface is used to improve reproducibility of the measurement (it is recommended to rub the mating surfaces themselves six times in a circular or elliptic arc that matches the core profile before measuring A_L).

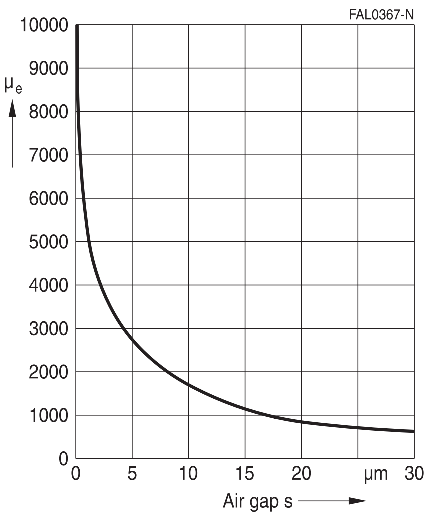


Figure 25
Relationship between permeability μ_e and air gap s for an RM 4/T38 ferrite core

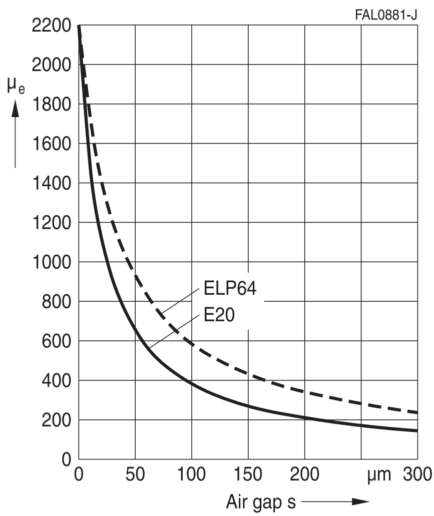


Figure 26
Relationship between permeability μ_e and air gap s for an E 20/10/11 N87 and ELP 64/10/50 N87 ferrite core

1.1 Air gaps and distributed air gaps in ferrite cores - E, EQ, ER, ETD, PM, PQ cores

Applications

- Power chokes
- Flyback converters

Technique

- The gap delays the core saturation
- The gap is required to increase the power handling capability
- The gap makes the core inductance independent of the material permeability and thereby narrows down the spread of inductance.

Benefits

- The core size can be reduced by one class due to lower winding loss (e.g. ETD 59 → ETD 54 or E 65 →E 55)
- Additional costs for creating the “triple gap” are compensated by the smaller core.

Core types

		
Figure 1: E Core	Figure 2: EQ Core	Figure 3: ER Core

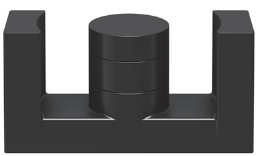
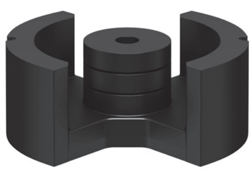
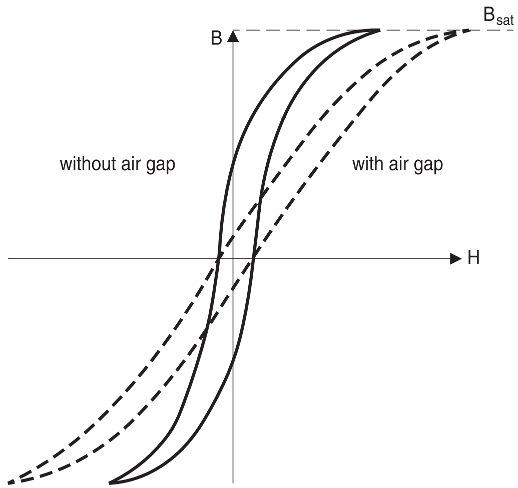

	

Figure 4: ETD Core	Figure 5: PM Core	Figure 6: PQ Core

Technique

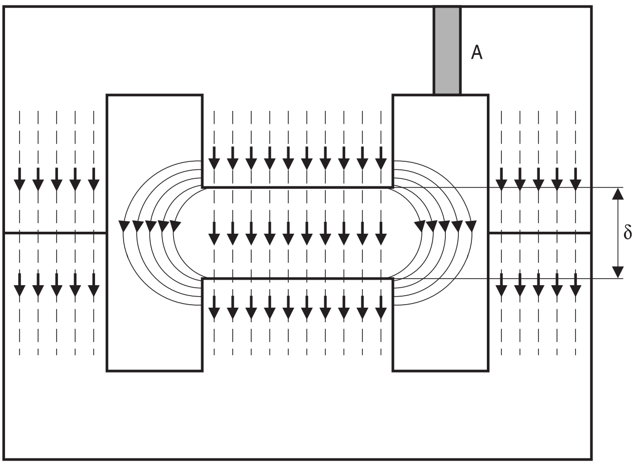
The gap delays the core saturation.



$$I_{sat} = \frac{B_{sat} A_e}{n} (R_c + R_g)$$

R_c = Resistance of the core
R_g = Resistance of air gap
n = Number of turns

The gap is required to increase the power handling capabability.



$$W = \frac{1}{2} \frac{B^2}{\mu_0} \left(\frac{l_e}{\mu_r} + \delta\right) A$$

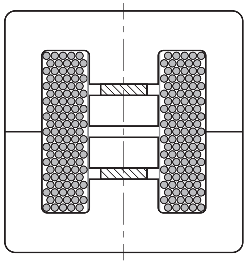
The gap makes the core inductance independent of the material permeability.

For more information, please read chapter „General – Definitions – 2 Permeability“

Simulation with ferrite cores E 55/28/25

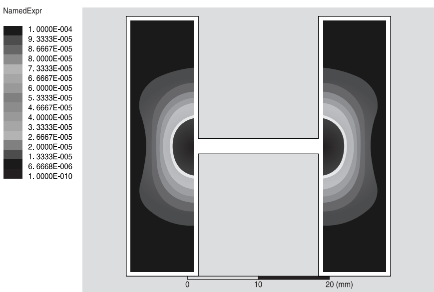
The main effect of gaps of different sizes and locations will be changing the loss in the adjacent winding. The size of this effect depends on the stray field which enters the winding. The total gap remains identical, only the location and the individual size per gap are changed.

The average of the square of the local flux density in the winding is used for comparing the results, since they would induce eddy currents and lead to losses and heating governed by $P = R * I^2$.



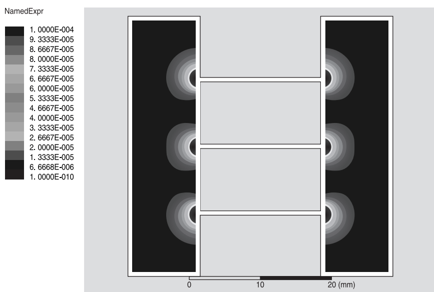
FEK0858-K

The worst effect is seen for a large single gap.



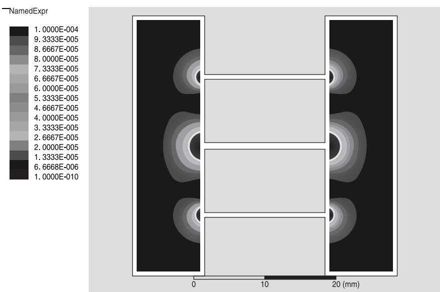
FEK0859-T

Creating more and smaller gaps improves the situation compared to the single gap.



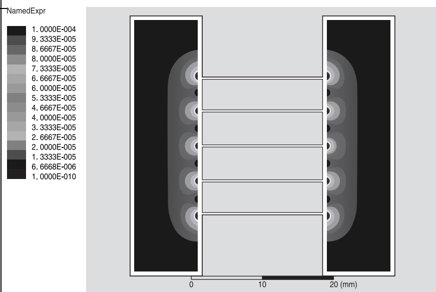
FEK0860-W

Uneven distribution of gaps leads to the larger local losses close to the larger gaps.



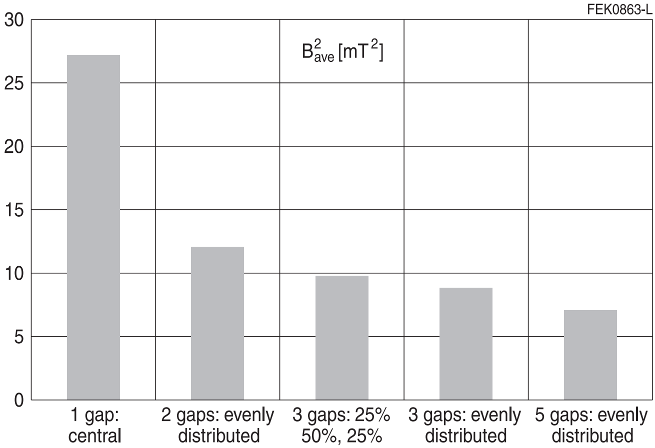
FEK0861-5

Five evenly distributed gaps.

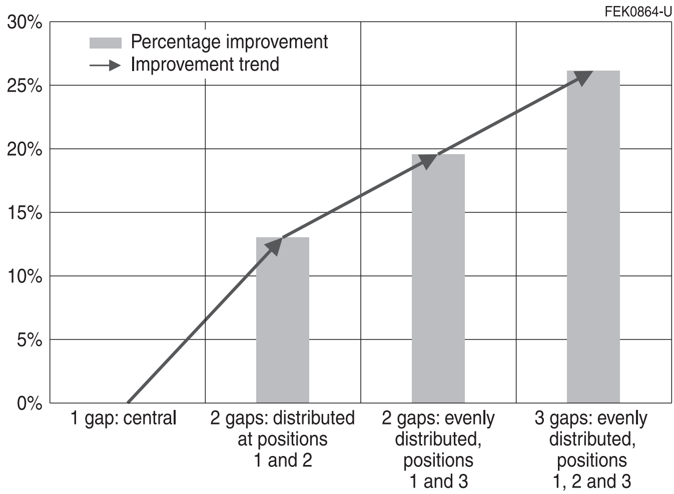


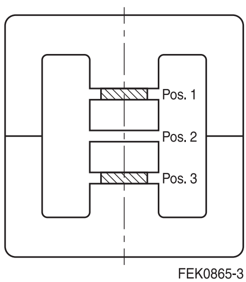
FEK0862-D

Average B^2 in winding depending on each gap size (total gap is same) and location.



Improvement in DC current for a 20% drop in initial Inductance for different gap sizes and structures (total gap is same).





Conclusion

In comparison between one gap and three evenly distributed gaps in the core it is seen that the square of the average flux B^2_{ave}, causing winding loss is lower in the later case.

In applications, there are consequently lower electromagnetic emissions and heating.

2 Processing notes for the manufacture of wound products for small-signal and power applications

2.1 Winding design

For the most common core types the maximum number of turns for the individual coil formers can be seen from the following nomograms. The curves have been derived from the equation

$$N = \frac{A_N}{A_{wire}} \cdot f_{Cu}$$

where

N	Max. number of turns
A_N	Winding cross section in mm^2
A_{wire}	Wire cross section in mm^2
f_{Cu}	Copper space factor versus wire diameter (f_{Cu} approx. 0.55 for wire diameter 0.05)

Common wires and litz wires are specified in the pertinent standards (IEC 60317).

As can be seen from Figure 26, as high a winding level as possible should be employed because at low μ_e values in particular a low winding level (h/H ratio) can cause an A_L drop of up to 10% compared to the maximum value with full winding. (By our standards, the A_L values are always related to fully wound 100-turn coils.)

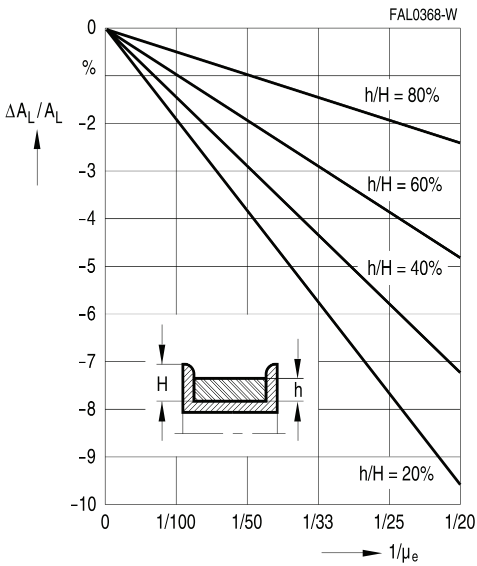
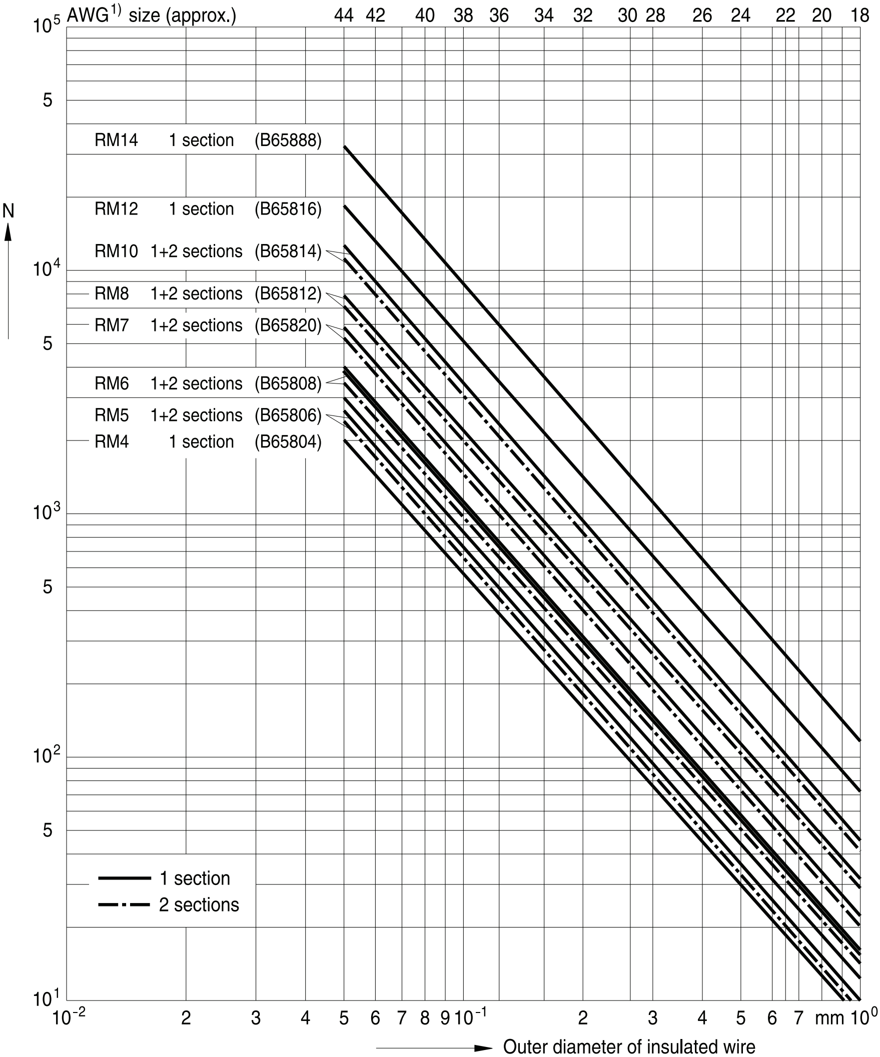


Figure 27
Percentage change in A_L value versus relative winding height h/H

RM cores

Maximum number of turns N for coil formers

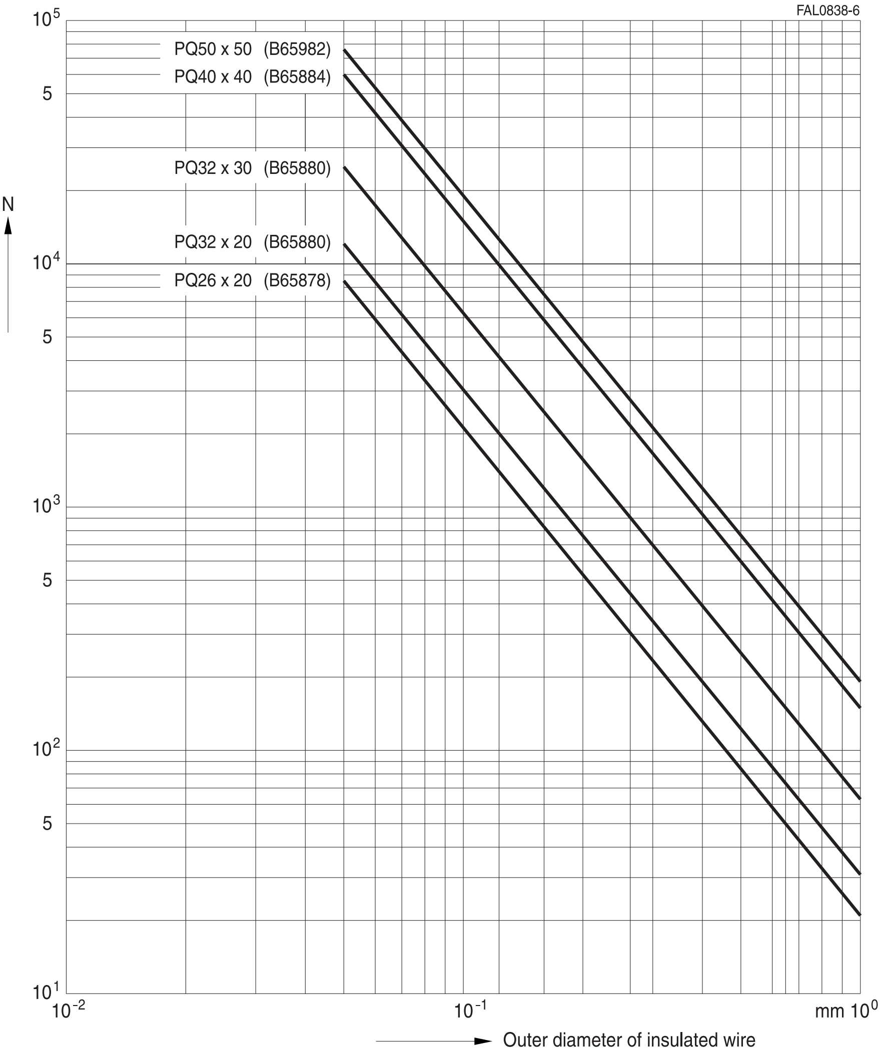


FAL0712-6

1) American Wire Gauge (AWG)

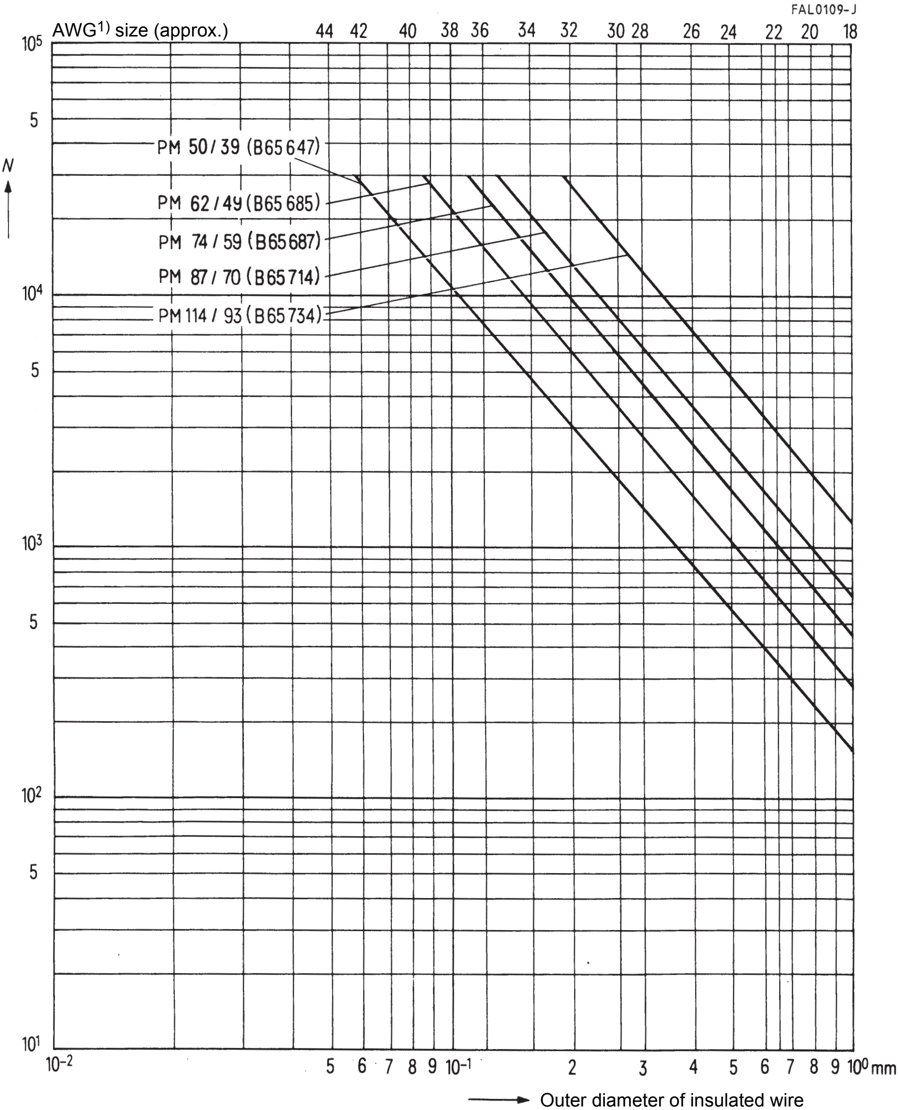
PQ cores

Maximum number of turns N for coil formers



PM cores

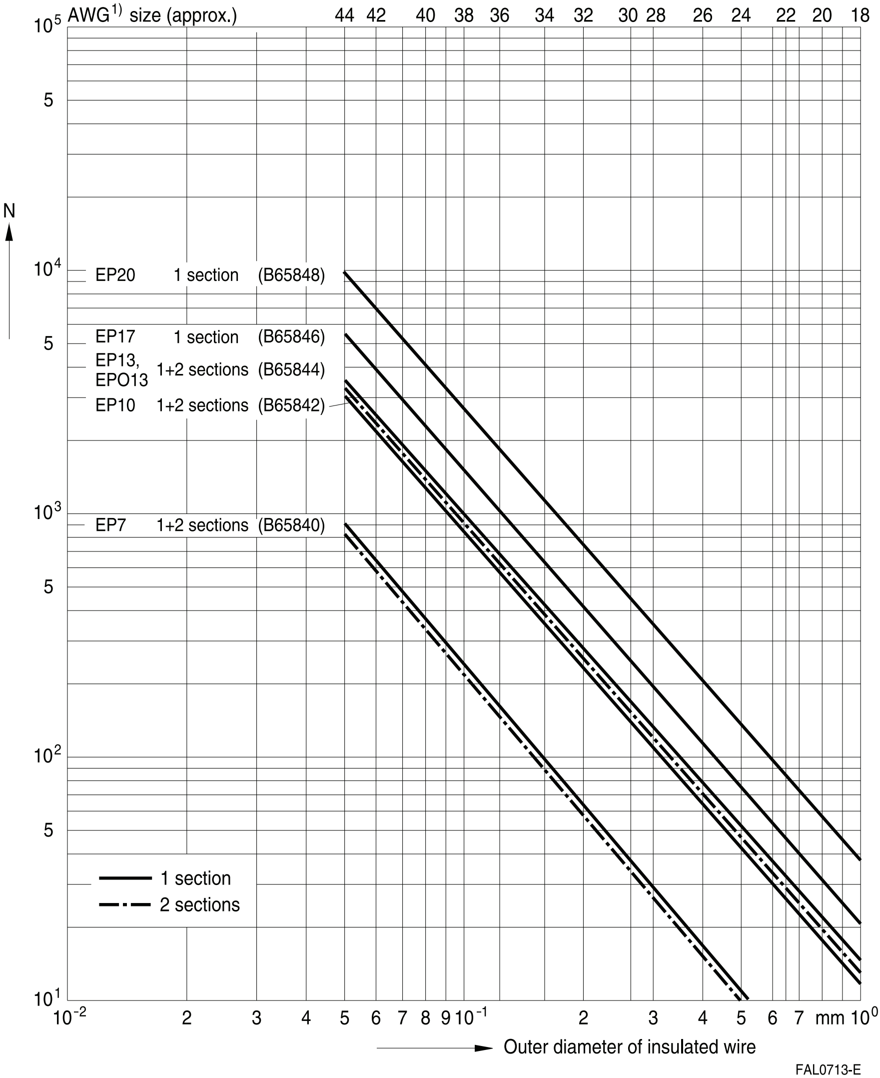
Maximum number of turns N for coil formers



1) American Wire Gauge (AWG)

EP cores

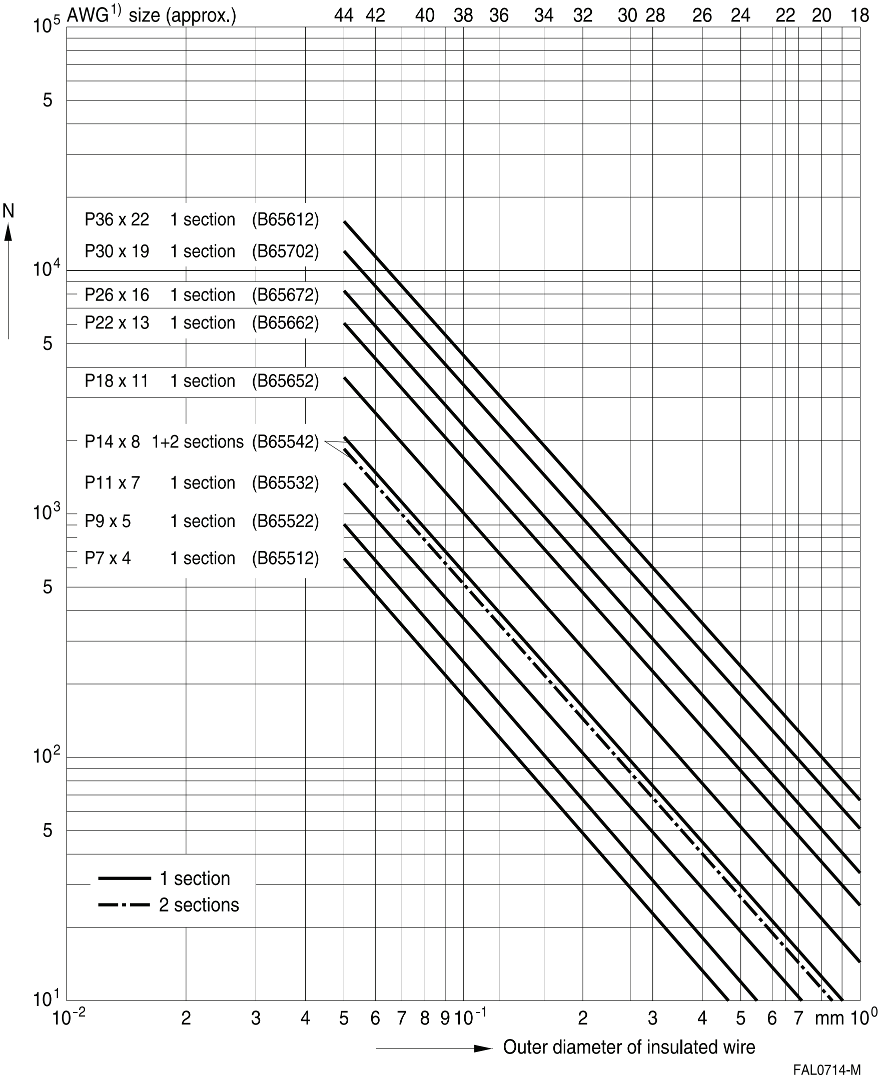
Maximum number of turns N for coil formers



1) American Wire Gauge (AWG)

P cores

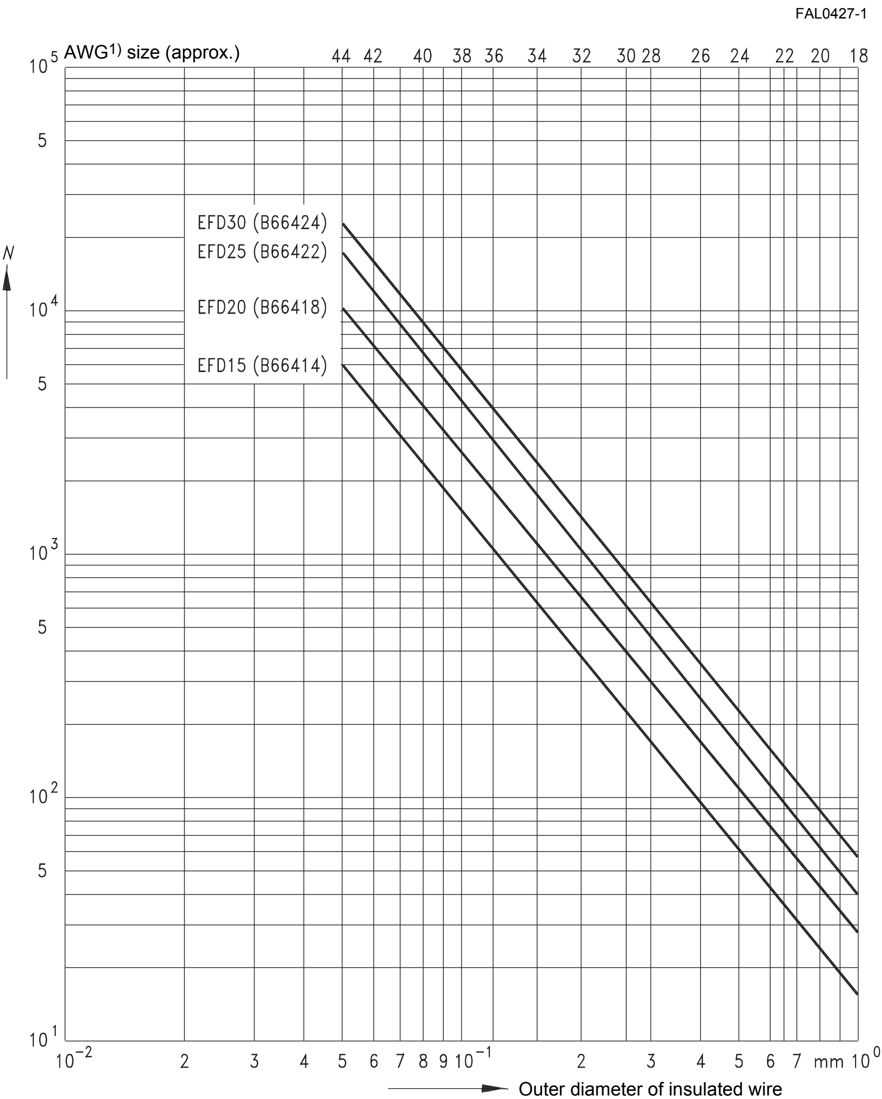
Maximum number of turns N for coil formers



1) American Wire Gauge (AWG)

EFD cores

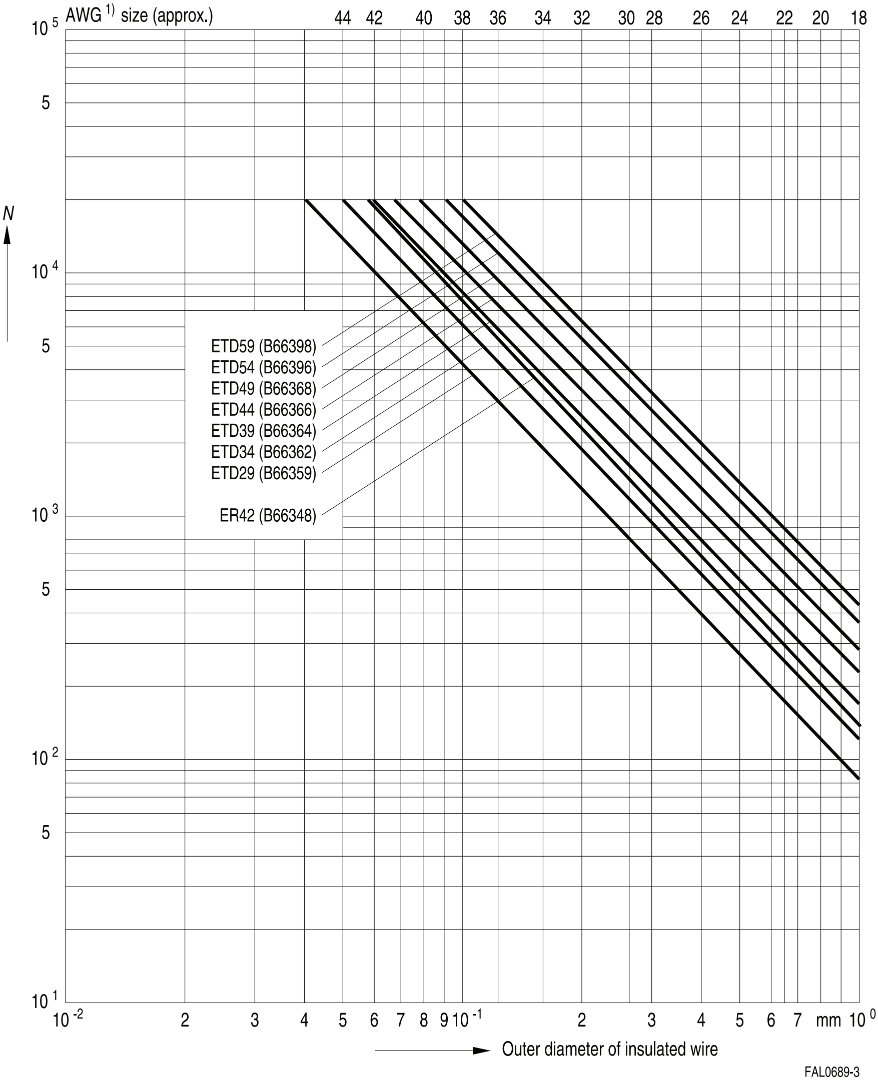
Maximum number of turns N for coil formers



1) American Wire Gauge (AWG)

ETD and ER cores

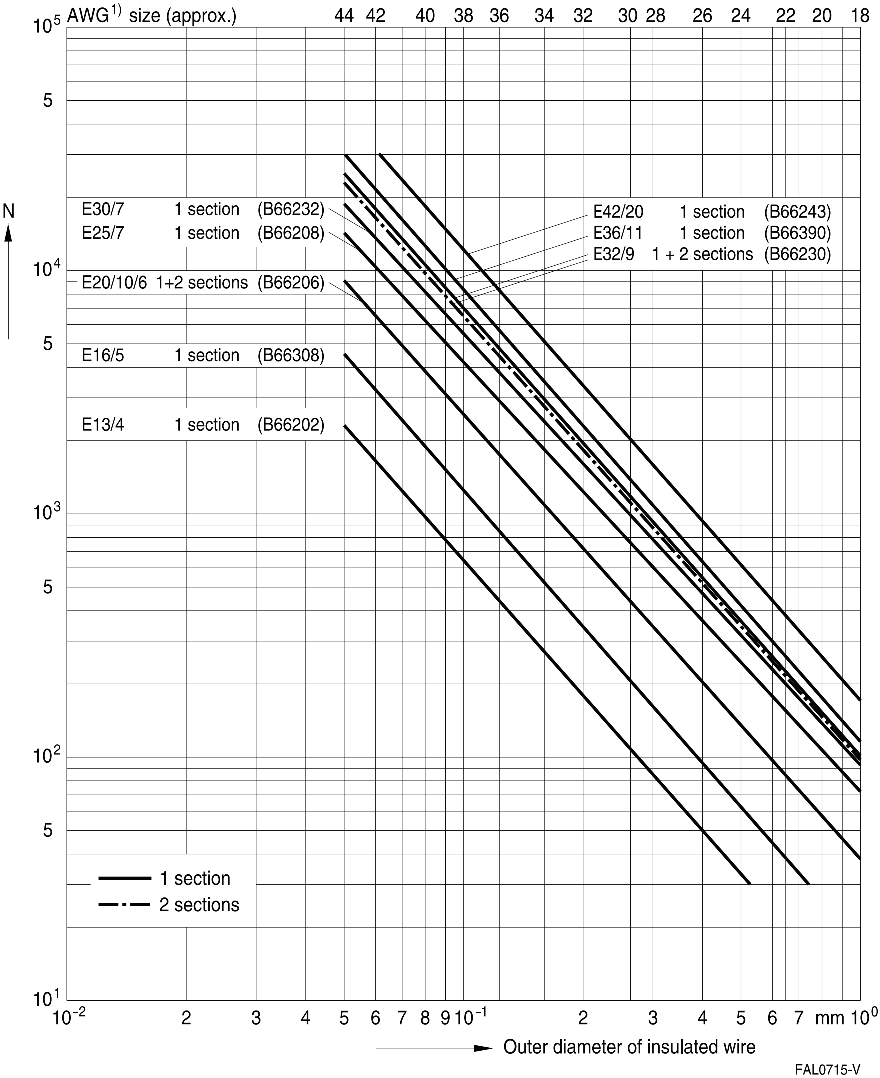
Maximum number of turns N for coil formers



1) American Wire Gauge (AWG)

E cores

Maximum number of turns N for coil formers

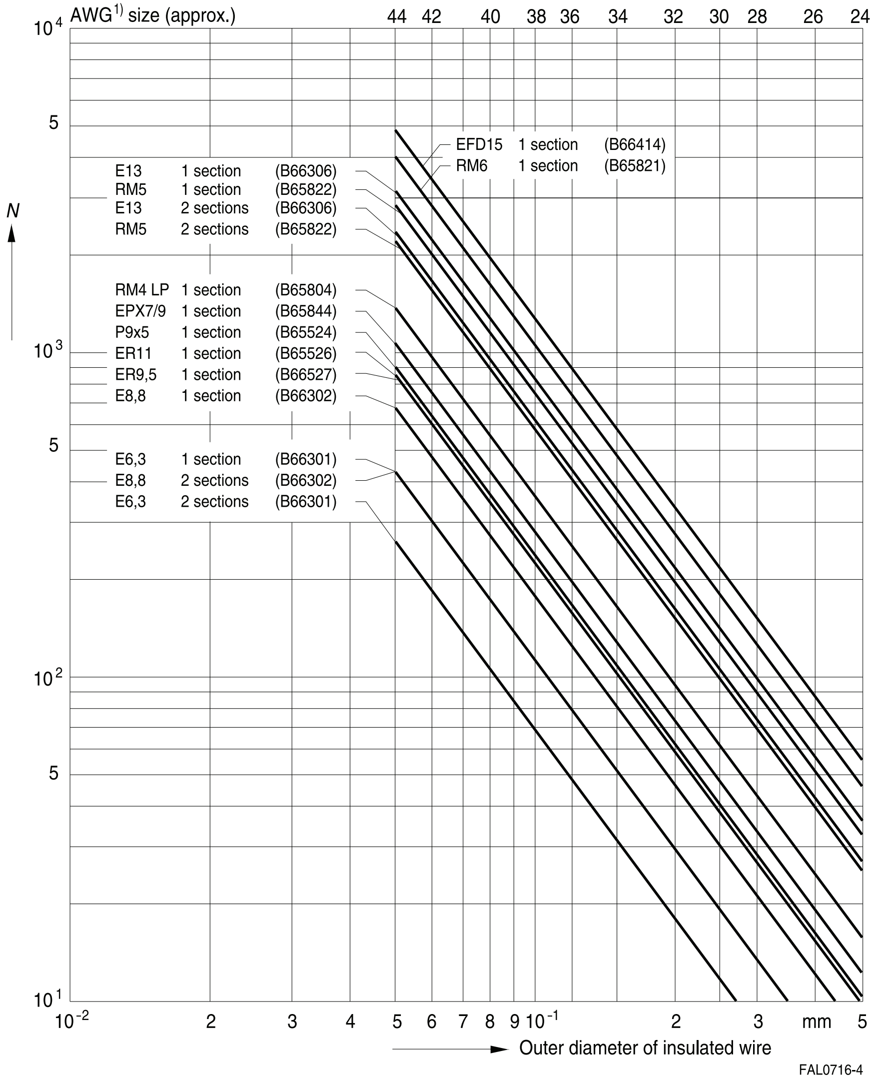


FAL0715-V

1) American Wire Gauge (AWG)

SMD types

Maximum number of turns N for coil formers



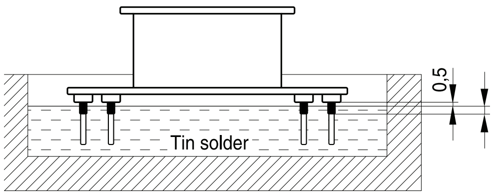
1) American Wire Gauge (AWG)

2.2 Soldering/Inductor assembly

The winding wires are preferably connected to the pins by dip soldering. Note the following when soldering:

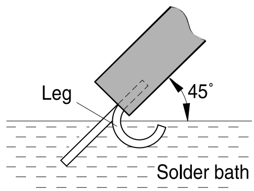
– Prior to every dip soldering process the oxide film must be removed from the surface of the solder bath.
– 2 to 3 turns of the wire are dipped into the solder bath; the coil former must not be allowed to come too close to the solder or remain there for too long (see diagram).
– Typical values are: Bath temperature: 400 °C, soldering time: 1 s.

Soldering of PTH (pin through hole)



FAL0115-T

Soldering of J-leg



FAL0680-Y

For inductor assembly, it is advisable to clamp the cores with the associated relevant mounting assemblies for the coil formers and cores. In this way it is possible to avoid the effects of external mechanical stress.

2.3 Design and processing information for SMD components

2.3.1 Automatic placement

EPCOS ferrite accessories are suitable for automatic placement. Many automatic placement machines pick up the components with suction probes and pliers, so the inductive components should have simple and clear contours as well as a sufficiently large and flat surface. Ferrite cores with a perpendicular magnetic axis, e.g. RM and ER cores, have a smooth surface and the flange for the coil former is styled right for the purpose. For cores with a horizontal magnetic axis, e.g. E cores and toroids, we provide cover caps to meet these requirements.

2.3.2 Coplanarity

Coplanarity means the maximum spacing between a terminal and a plane surface. If inductive components are fabricated with coplanarity of <0.2 mm for example, then one or more terminals may be spaced maximally 0.2 mm from a plane surface.
Inductive components are fabricated to standard with coplanarity of <0.2 mm. Coplanarity is influenced by a number of factors:

a) Coil former specification
The coplanarity of the coil former is <0.1 mm for manufacturing reasons.

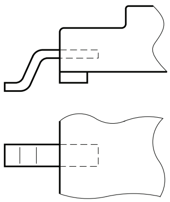
b) Winding wire
Use of thick winding wire (e.g. 0.25 mm diameter in model ER 11) leads to considerable mechanical strain on the terminal during winding, and this can degrade coplanarity.

c) Soldering temperature and duration
When winding wire is soldered to a terminal, the coil former is subjected to high thermal stress. If thick wires have to be soldered, the soldering temperature and/or duration increase and thus the thermal stress on the coil former too. This also degrades coplanarity.

Consequently the use of thick wires degrades coplanarity in two ways: greater mechanical strain when winding, and greater thermal stress during soldering.

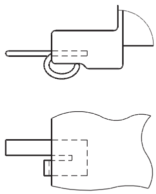
If electrical requirements call for the use of thick wires, either the manufacturing effort is greater (it takes longer and the costs are higher), or a terminal geometry has to be chosen that is suitable for the use of thick wires. EPCOS offers two different SMD lead geometries: gullwings and J terminals.

Gullwing terminals



FAL0498-P

Molded-in J terminals



FAL0497-G

With gullwings the wire is wound direct on the terminal, which is then soldered on the circuit board. With J terminals the wire is wound on a separate pin, and the J terminal is soldered to the circuit board.

So gullwings are suitable for applications with thin wire (up to approx. 0.18 mm in diameter), and J terminals for use with thick wire (upwards from 0.18 mm in diameter). These figures for wire diameter are only intended as guidelines. Depending on wire diameter, the winding arrangement, the pinning and electrical requirements, one has to decide from case to case which solution is best for the particular application.

2.3.3 Solder paste application

Coplanarity has to be considered when determining the thickness of the solder paste. If coplanarity is <0.2 mm for example, the solder paste has to be applied at least 0.2 mm thick to ensure proper soldering.

2.4 Adhesive application and core mating

A quantity of adhesive appropriate to the area in question is applied to the cleaned surface of the core's side walls. The centerpost must remain free of adhesive. The two core halves without coil former are then placed on a mandrel and rotated against each other two or three times to spread the adhesive. A slight ring of adhesive exuding around the edges indicates that sufficient adhesive has been applied.

On porous, low-permeability SIFERRIT materials (K) the adhesive should be applied and spread twice.

The next step should follow immediately since the adhesive film easily attracts dust and absorbs moisture. Therefore, the core pair with adhesive already applied is opened for a short time and the wound coil is inserted without touching the mating surfaces.

The wound coil is then fixed into position. This can be done by using resilient spacers which must be inserted before applying the adhesive. Appropriate spacers are available on request.

The coil former can also be fixed by gluing, e.g. using adhesive d), but only at one spot on the core bottom to avoid any mechanical stress caused by the difference in thermal expansion of core and coil former.

Adhesive e) is suitable for external gluing, which implies only four dots of adhesive at the joints on both sides of the openings. Because of the somewhat lower torsional strength, it should be noted that this kind of gluing should only be used with mounted cores.

2.5 Holding jigs

The core assembly is cured under pressure in a centering jig. The core center hole – where present – is used for centering, and two to eight coils can be held in one jig with a pressure spring. Spacers will ensure that the pressure is only exerted on the side walls of the core.

Single jigs facilitate the coil inductance measurement, which has proved useful for checking cores with small air gaps before the adhesive has hardened. Small inductance corrections can be made by slightly turning the core halves relative to each other.

2.6 Final adjustment

(possible only with adjustable cores)

With all assembled ferrite cores, a magnetic activation takes place as a result of mounting influences such as clamping, gluing and soldering, i.e. a disaccommodation process commences. Therefore the final adjustment for high-precision inductors should take place no earlier than one day after assembly; preferably, one week should first elapse.

2.7 Hole arrangement

For drilling the through-holes into the PC board we recommend the dimensions given in the hole arrangement for each coil former, which depend on the distance of the pins on the pin outlet level.

2.8 Creepage and clearance

For telecom transformers the clearance and creepage distances and the thickness of insulation must be considered acc. EN 60950 subclause 2.9.

Survey of packing modes

Ferrite cores

	Type	Packing	Para.	Page
RM cores	RM 4 … RM 10 RM 12, RM 14	Blister tape Standard tray	3.2 2.2.1	196 194
PQ cores	PQ 16 … PQ 50 PQ 26 … PQ 32	Standard tray Cardbord tray on request	2.2.1 2.5	194 195
PM cores	PM 50/39 … PM 114/93	Standard tray	2.2.1	194
P cores	All P cores P 9 × 5 … P 22 × 13 PCH 4.6	Standard tray Blister tape on request Vacuum bag	2.2.1 3.2	194 196
P core halves	7.35 × 3.6 … 150 × 30	Standard tray	2.2.1	194
EP cores	EP 5 … EP 20, EPX 9/9 EPX 7/9, EPX 10, EPO 13 EP 11	Standard tray Blister tape on request Cardbord tray with vacuum bag	2.2.1 3.2 2.6	194 196 195
E cores	E 5 … E 10 E 5 and E 6.3 Core length 12.6 … 36 mm Core length > 36 mm E 47	Standard tray Blister tape on request Block packing Standard tray Skin packing	2.2.1 3.3 2.2.2 2.2.1 3.6	194 197 194 194 201
ELP cores	All ELP cores ELP 43, I 43	Standard tray Skin packing	2.2.1 3.6	194 201
ER cores	All ER cores ER 32 ER 14.5	Standard tray (blister tape on request) Skin packing Cardbord tray with vacuum bag	2.2.1 3.2 3.6 2.6	194 196 201 195
EQ cores ETD cores EFD cores EV cores		Standard tray	2.2.1	194
U and I cores	I 126 I 18.4 I 10	Cardboard tray Vacuum bag Blister tape	2.5 3.2	195 196
Toroids (ring cores)	Packing depends on size and version (coated/uncoated)	Standard tray Box Bag Skin packing	2.2.1 2.3.2 2.3.1	194 195 195
Double-aperture cores		Bag	2.3.1	195

Accessories

Coil formers	Polystyrene boards, carton boxes, bags and blister trays	2.4	195
Mounting assemblies	Boxes	2.3.2	195
Clamps	Bags (individual clamps)	2.3.1	195
Insulating washers	Bags (individual washers), boxes	2.3.1	195
Insulating washers	Packed on reels	2.3.2	195

We can supply the packaging according to customer requirement.

1 General information

Our product packaging modes ensure maximum protection against damage during transportation. Moreover, our packing materials are selected with environmental considerations in mind. They are marked with the appropriate recycling symbols.

Because of the large variety of types and sizes, we use five basic kinds of packing, which are described in points 2 and 3 below:

- Blister tape
- Tray
- Container
- Reel
- Magazine

The packing units are based on the following system:

1.1 Packing unit (PU)

Usually, a packing unit is a collection of a number of basic packages. The size of the packing unit is stated for the particular components in their data sheets. When ordering, please state complete packing units if possible. We reserve the right to round the ordered quantity accordingly.

1.2 Dispatch unit

A number of packing units are combined to form a dispatch unit. Standard dispatch units for large quantities are a Europallet or pallet carton. For small quantities, folding corrugated cardboard boxes are used in standard sizes. In the case of small quantities a dispatch unit may also include packages with other components.

1.3 Barcode label

On the product packing label (standard label) we include bar-code information in addition to plain text. In addition to benefits relating to the internal flow of goods, this provides above all a more rapid and error-free means of identification checking for the customer.

2 Modes of packing

2.1 Blister tape

Blister packing was specially devised for handling by automatic systems but has also proved to be very good for conventional handling, especially where small quantities are concerned. See point 3.2 for a detailed description and a list of the core types that can be supplied in this type of packing.

2.2 Tray (pallet)

2.2.1 Standard tray

The polystyrene tray (basic package) is the standard packing for most types of core. The area of 200 mm × 300 mm corresponds to the module dimensions of DIN 55 510 and is based on the area of the 800 mm × 1200 mm Europallet. Depending on the overall height of the trays and the numbers contained, several trays will be stacked to form a packing unit and provided with a corrugated cardboard cover. For the protection of the cores the entire stack is also shrink-wrapped in polyethylene film.

Each core is enclosed in a separate compartment. When P cores and similar types are packed in sets, the halves of the core pairs are packed so that their pole faces are opposite one another. As a rule their association is identified by markings in the polystyrene (recessed webs, thinner webs). In the case of P 3.3 × 2.6 and P 4.6 × 4.1 cores the halves of a set are not located in a single tray but in different trays of a packing unit.

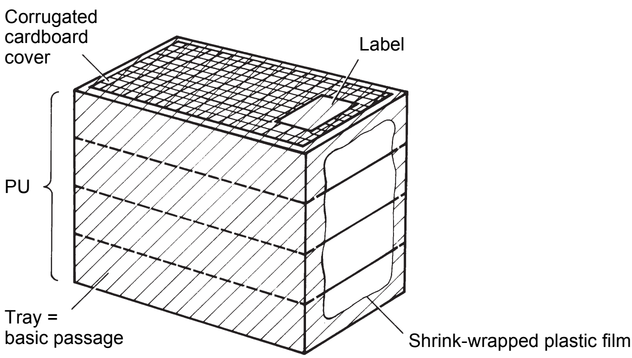
2.2.2 Block packing

For E and U core we prefer block packing in trays with the dimensions 200 mm × 300 mm. The symmetry, position, length and spacing of the blocks are always the same. The height of the tray is dependent on the size of the core. For the makeup of a packing unit see point 2.2.1.

Block packing can be supplied in boxes of corrugated cardboard (special packing unit!) on request.

Block packing permits highly rationalized handling and is designed for automatic processing.

Packing unit for standard or block packing



2.3 Container

2.3.1 Bag

Small ferrite parts are packed in flat polyethylene vacuum bags. The number per bag depends on the volume of the parts. Generally four bags in a corrugated cardboard box form a packing unit.

Small accessories (clamps, pinless and SMD coil formers) are also packed in this way. The size of the bag depends on the volume of the parts (packing unit).

2.3.2 Boxes

Coated ring cores of medium size are packed in cardboard boxes with cardboard or polyethylene foam inlays. The number per box depends on the volume of the cores.

Accessories (large mounting assemblies, clamps, washers packed on reels etc.) are packed in boxes of cardboard or corrugated cardboard.

2.4 Packing for coil formers

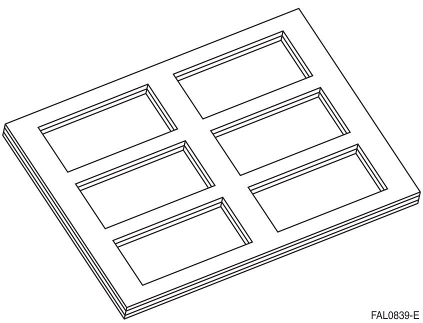
For coil formers we use different packing types depending on size, pin type and packing equipment. So we use polystyrene boards for some PTH coil formers like RM types. For most of the other PTH coil formers and some SMD coil formers we use cardboard boxes as bulk packaging. Coil formers without pins are mainly packed in plastic bags. For some SMD coil formers we also use blister tray packaging.

2.5 Cardboard tray

Cardboard trays are a new ecological packing system, stacked in a cardboard box or in a plastic bag.

Advantages:
- Environmentally friendly solution with easy-to-recycle materials.
- Good removing cores from tray.

Packing unit for cardboard trays



2.6 Cardboard tray with vacuum bag

There is used a cardboard tray without slots for individual cores. The tray with cores is placed in vacuum bag, which protects the cores during a transport. The package is suitable for smaller cores that are not too high. The cores are not oriented on the tray.

3 Delivery modes for automatic processing

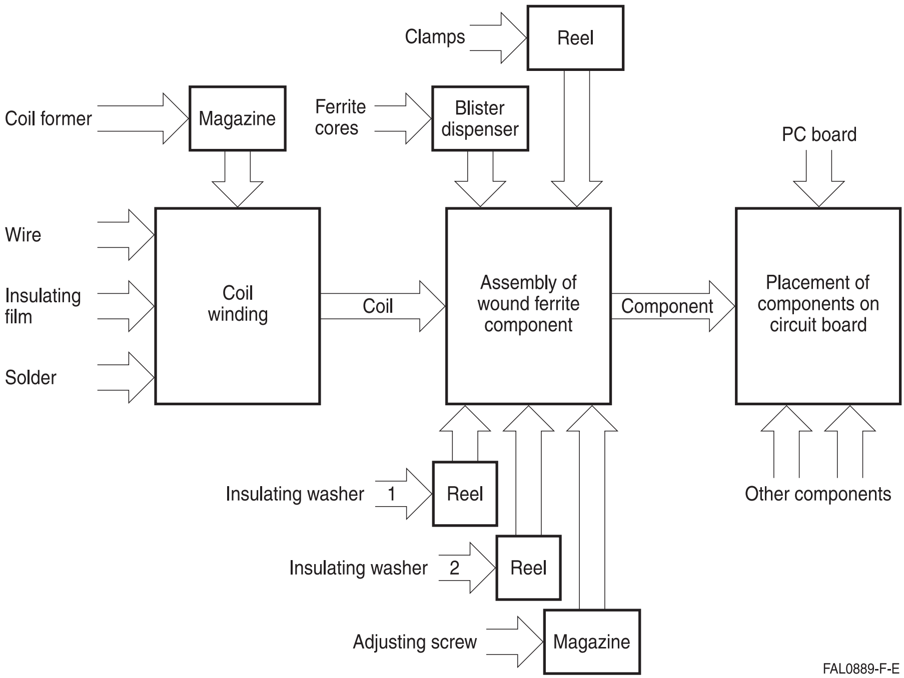
3.1 General information on inductor production

The inductor parts described in the following can be handled by automatic manufacturing systems. In addition to automatic winding machines – which can be combined with wrapping, fluxing and soldering stations – flexible, high-performance automatic assembly lines are available. Design and packing of the individual parts (ferrite cores, coil formers, clamps, insulating washers and adjusting screws) have been optimized for automatic processing and permit easy feeding to the various stations of production lines.

We supply RM cores up to RM 10 (P and EP cores on request) blister-taped in dispenser boxes. By inserting a plate-shaped resilient insulating washer between core and coil former, gluing can be dispensed with.

We also provide consulting services with examples of implementations to customers planning to introduce automatic production lines.

Production sequence



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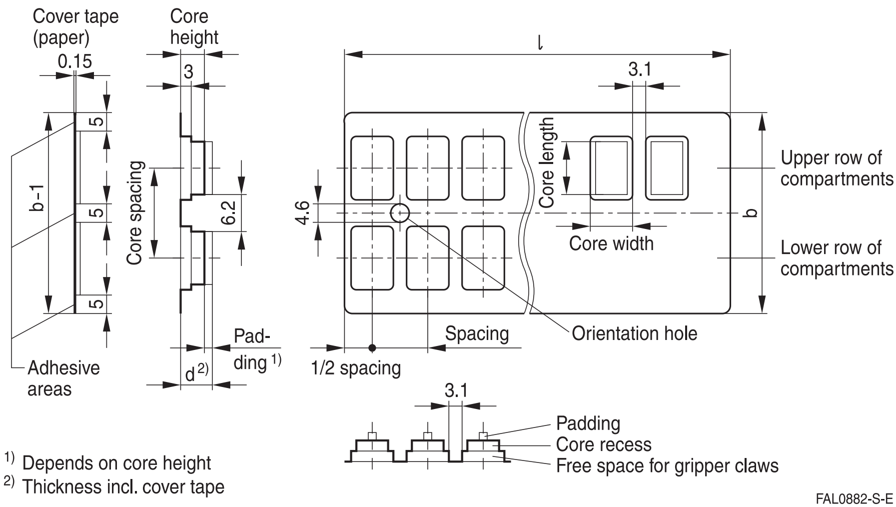
3.2 Cores in blister tape (strips)

The cores are packed in sets ready for assembly, i.e. a stamped core with the base upwards and an unstamped core (possibly with a threaded sleeve) with the pole face upwards. The blister tapes have a hole at one end for orientation purposes (see also illustration). The tapes are sealed with a paper cover. Looking at a tape with the hole on the left and the paper cover on top, then after removing the paper cover the stamped cores will be in the upper row and the unstamped cores of the sets in the lower row.



The blister compartments always comprise the following function spaces: a free space for the gripper claws, the recess in which the core rests and the padding.

The free space enables the cores to be removed by mechanical grippers. On the reverse side of the blister, these free spaces lead to a regular grid arrangement with a spacing of 6.2 mm and 3.1 mm. The blisters should be guided and stopped at these intervals. A hanging arrangement is to be preferred, because this avoids problems arising in case the blister height or padding thickness varies.

The core recess centers the core in the blister compartment.

The padding serves as protection during transport and as spacing to achieve correct filling of the dispenser pack. The shape and position of the padding may vary, depending on the production method used. All padding dimensions given must therefore be considered to be subject to change at any time.

Several blister tapes are combined in a box with a perforated tear-off cover (dispenser pack) to form a packing unit. The tapes are packed so that the orientation hole appears in the dispenser opening. The box is shrink-wrapped in polyethylene film.

Packing

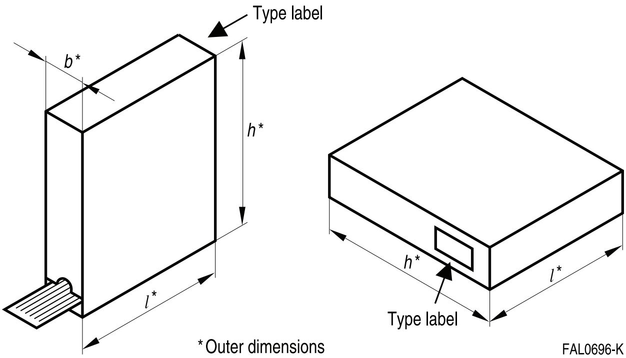
The following table lists the core types which are available in blister tape:

Type	Dimensions of blister tape l × b × d mm	Spacing mm	Spacing upper/ lower row mm	Dimensions of dispenser pack l × b × h mm	Sets/ tape	Tapes/ box	Sets/ box	Approx. net weight g
RM cores								
RM 4	340 × 60 × 6.6	17.0	27.5	349 × 63 × 203	20	30	600	1000
RM 4 LP	340 × 60 × 5.0	17.0	27.5	349 × 63 × 203	20	40	800	
RM 5	340 × 60 × 8.0	17.0	27.5	349 × 63 × 203	20	25	500	1550
RM 6	340 × 60 × 8.0	17.0	27.5	349 × 63 × 203	20	25	500	2550
R 6	340 × 60 × 8.0	17.0	27.5	349 × 63 × 203	20	25	500	2550
RM 7	295 × 82 × 9.4	29.5	38.5	301 × 85 × 240	10	25	400	1925
RM 8	295 × 82 × 11.8	29.5	38.5	301 × 85 × 240	10	20	200	2600
RM 10	295 × 82 × 11.8	29.5	38.5	301 × 85 × 240	10	20	200	4600
RM 10 LP	295 × 82 × 9.4	29.5	38.5	301 × 85 × 240	10	25	250	
EP cores (on request)								
EP 7	340 × 60 × 5.0	17.0	27.5	349 × 63 × 203	20	40	800	1260
EP 10	340 × 60 × 8.0	17.0	27.5	349 × 63 × 203	20	25	500	1375
EP 13	340 × 60 × 8.0	17.0	27.5	349 × 63 × 203	20	25	500	2550
EP 17	295 × 82 × 11.8	29.5	38.5	301 × 85 × 240	10	20	200	2220
EP 20	295 × 82 × 11.8	29.5	38.5	301 × 85 × 240	10	20	200	5640
P cores (on request)								
P 9 × 5	340 × 60 × 4.0	17.0	27.5	349 × 63 × 203	20	50	1000	800
P 11 × 7	340 × 60 × 4.0	17.0	27.5	349 × 63 × 203	20	50	1000	1700
P 14 × 8	295 × 82 × 5.9	29.5	38.5	301 × 85 × 240	10	40	400	1280
P 18 × 11	295 × 82 × 9.4	29.5	38.5	301 × 85 × 240	10	25	250	1500
P 22 × 13	295 × 82 × 9.4	29.5	38.5	301 × 85 × 240	10	25	250	3250

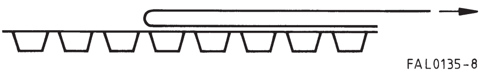
For ordering codes refer to the individual data sheets.

Dimensions are nominal; tolerances given in design drawings.

3.3 Dispenser pack



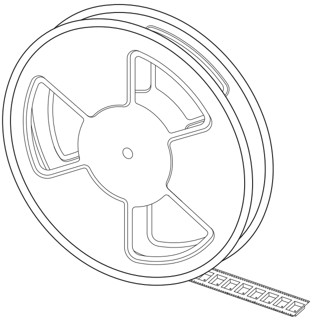
To open a blister tape manually, peel back the paper cover tape smoothly but not too quickly, along the axis of the tape as shown in the following illustration.



When opening a blister tape automatically, it is advisable not to completely remove the paper cover. Rather, the cover paper should be divided up by means of 4 longitudinal cuts so that the mating surfaces remain on the blister (cf. blister tape illustration). The paper strips produced above the two rows of compartments can then be easily lifted. This avoids malfunctions resulting from fluctuations in the adhesive properties of the paper sealing tape.

3.4 Cores in blister tape (reeled)

Small and low profile cores can also be supplied taped an reeled as per IEC 60286-3, optionally in conductive or non-conductive tapes. The cores are oriented for automatic feeding. The tapes are sealed with a transparent cover tape and wound on 330-mm polystyrol reels. Each reel is identified with a barcode label and a release label.



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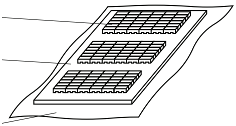
The following table lists the core types which are available in tape on reel.

Type	Width of blister tape (reeled) mm	Reel diameter	Pieces / Blister tape	Pieces / cardboard box
ELP cores				
ELP 18/4/10	32	“13“	1000	2000
ELP 22/6/16	32	“13“	325	650
ER cores				
ER 11/2.5/6	24	“13“	1800	3600
ER 14.5/3/7	24	“13“	1400	2800
ER 18/3/10	32	“13“	1000	2000
ER 23/5/13	44	“13“	800	1600
I cores				
I 22/2.5/16	44	“13“	325	650
I 22/2/13	44	“13“	1600	3200

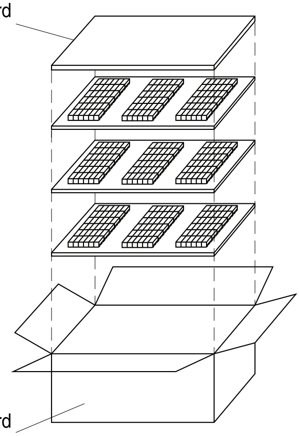
3.5 Skin packing

Skin packing is a new and very compact packing method.

Several cores are placed on a cardboard pallet and sealed in GLTE film by heat shrinking. The various pallets are then stacked in a cardboard box.



FAL0697-T



FAL0677-E

Advantages

- Environmentally friendly solution with easy-to-recycle materials
- Suitable for all cores larger than E 30
- Good protection of mating surface
- Film can be peeled back very easily
- Code numbers printed on cores can be read through transparent film

Corporate goals

Our aim is to play a leading role among the world's most competitive companies in the sector of electronic components. This aim is shared by the EPCOS quality and environment management system:

1 EPCOS quality system

1.1 Extract from EPCOS quality policy

- The quality of our products and services represents a key constituent of our corporate strategy, whose principal aim is customer satisfaction.
- Our quality management system is continuously oriented to the international standards that stipulate the highest requirements.

1.2 Quality management system

The quality management system to ISO/TS 16949 is applied throughout the company and is used to implement the EPCOS quality policy. The implications include:

– As a rule, product and process developments follow the rules of APQP[1],
– Quality tools such as FMEA[2], DoE[3] and SPC[4] minimize risks and ensure continuous improvements in conjunction with regular internal audits and QM reviews.

1.3 Certification

The EPCOS quality management system forms the basis for the certification to ISO 9001 and ISO/TS 16949 that includes all EPCOS plants and sales organizations. The company certificates are posted on the EPCOS Internet (www.epcos.com/quality).

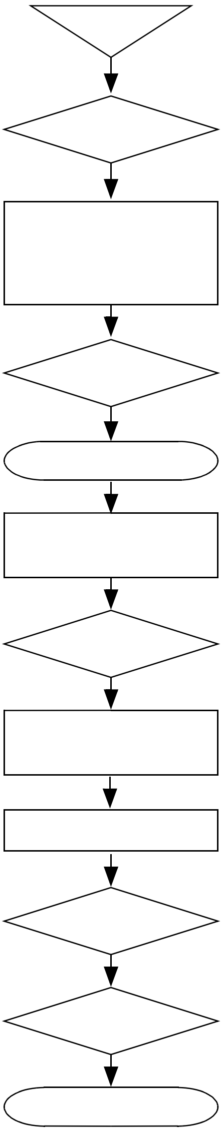
1.4 Production sequence and quality assurance

The business units implement the corporate specifications for quality management in procedural and work instructions referred to products and processes.

1) APQP = Advanced Product Quality Planning
2) DoE = Design of Experiments
3) FMEA = Failure Modes and Effects Analysis
4) SPC = Statistical Process Control

Production sequence and quality assurance during ferrite manufacture (schematic)

The following example shows quality assurance applied to the production sequence of ferrites.



Production steps	Quality assurance
Raw materials (powder)	
Incoming inspection Analysis of chemical comp. (X-ray fluorescence analysis)	X-ray fluorescence analysis reports
Granulate production Weighing, mixing, presintering, milling. Homogenization, spraying incl. process control checks	
Batch release Chemical analysis Manufacture and testing of sample cores	Batch release report
Granulate storage	
Cores production Pressing, debindering, sintering incl. process control checks	
Sinter check Testing of electrical and mechanical properties	Sinter check test report
Cores processing e.g. surface grinding, A_L grinding, etc. incl. process control checks	
Packing in PU (factory packing)	
Final inspection/Monitoring Testing electr./mech. properties	Final inspection reports
Delivery release, Outgoing inspection, Checking of reports and finish labeling	Date code and batch number on packing
Sales warehouse	

1.5 Delivery quality

“Delivery quality” means compliance with the agreed data at the time of delivery.

1.6 Failure criteria

A component is defective if one of its features does not correspond to the specification of the data sheet or an agreed delivery specification.

1.7 Incoming goods inspection at the customer

For the incoming inspection, we recommend the use of a random sampling plan to DIN ISO 2859 Part 1 (contents compliant with MIL STD 105 D or IEC 60410).

The test methods used and the AQL must be agreed between the customer and supplier.

1.8 Final inspection/approval for shipment

Final inspection verifies the major properties of the end products batch by batch, usually by means of fully automated selection tests.

Approval for shipment helps certify that products shipped comply with specifications. It includes:

- testing of principal parameters,
- identification check and visual assessment,
- examination of papers accompanying the batch.

1.9 Reliability

A variety of endurance tests and environmental tests are conducted to assure the product reliability. These tests are derived from the extremes of expected application conditions, with test conditions intensified to obtain authoritative results within a reasonable period.

The reliability testing programs of EPCOS are based on the test plans of international standards and customer requirements.

EPCOS performs reliability tests to qualify new component families and for periodic requalification.

1.10 Traceability

By recording the lot or batch numbers on the documentation accompanying the process, complete traceability is maintained in the production sequence.

After delivery, traceability to the internal release inspections (“quality control gates”) is ensured by the batch number which is printed on the label.

1.11 Electrical properties

The measuring conditions can be found in the chapter “General – Definitions”. The product data and relevant tolerance limits are defined in the respective data sheets. The material data given in the chapter “SIFERRIT materials” are to be understood as typical values.

Measuring conditions deviations from the data book require an agreement between the customer and the EPCOS.

1.12 Dimensions

The dimensional drawings in the individual data sheets are definitive for the dimensions.

1.13 Finish

Assessment of the finish of ferrite cores is performed in accordance with EPCOS finish specifications. These are based on IEC 60424. Detailed drawings, which are available on request, specify the maximum permissible limit values for damage which can never be totally excluded with ceramic components. Assessment of the solderability of terminal pins for coil formers and clamps is carried out for PTH types to IEC 60068-2-20, test Ta, method 1 (aging 3) and for SMD types to IEC 60068-2-58.

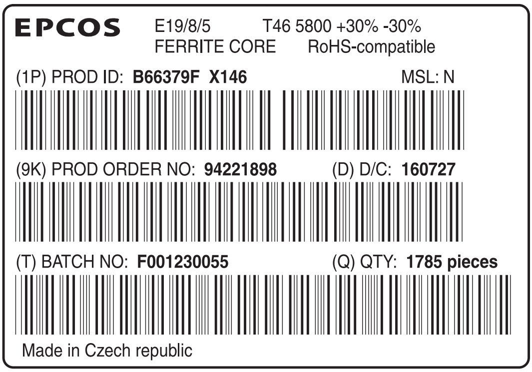
1.14 AQL values

Within the framework of our quality goals, we are gradually tightening the AQL values which are intended for use in the customer's incoming goods inspection, currently the value AQL 0.25 is applicable, if not otherwise specified.

1.15 Barcode label

The packing of all EPCOS components bears a barcode label stating the type, production ID (1P), production order number (9K), data code (D), batch number (T), and quantity (Q). This enables a component to be traced back through the production process, together with its batch and test report.

Example for core label



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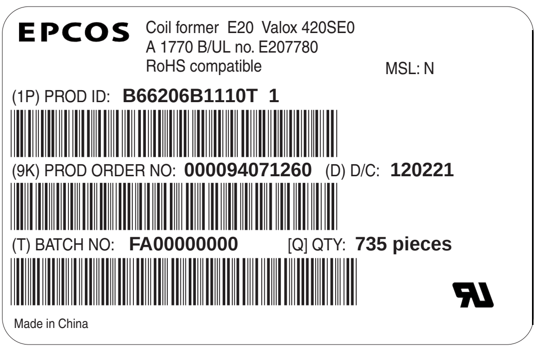
Example for accessories label



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1.16 Conditions of use

EPCOS products may only be used in line with the technical specifications and installation instructions and must comply with the state of the art. Non-observance of limits, operating conditions or handling guidelines can lead to disturbances in the circuit and other undesirable consequences such as a higher failure rate.

Please note the “Important notes”.

Should you have any application-referred questions, please contact our experts, who will be pleased to advise you.

1.17 Storage conditions

For all components the following storage conditions apply:

- storage takes place in original packages in non aggressive atmosphere,
- storage temperature should not be less than –25 °C (–13 °F) and not exceed +40 °C (+104 °F),
- relative humidity should be ≤75% as an annual average and ≤ 95% on max. 30 days per annum, condensation is not allowed.

1.18 Shelf life

Shelf life of electronic components is limited by material characteristics or decreasing solderability of the terminations.

The default shelf life of following electronic components:

- Ferrites cores: 5 years
- Ferrite accessories – solderable parts: 6 months
- Ferrite accessories – FPC foils (self-adhesive): 6 months
- Ferrite accessories – other parts: 2 years

Internal quality check is performed in terms of above mentioned periods The items which become out of shelf life are checked by the quality control procedures and if quality parameters fit the required values, then the shelf life can be prolonged accordingly.

1.19 Customer complaints

If a fault occurs in a product despite careful manufacture and testing, please contact your local sales organization. They will register your complaint as an RMA[1)] process and forward it to the relevant technical departments for rapid handling.

EPCOS treats technical complaints according to the 8D methodology; i.e. with the use of interdisciplinary teams who aim to implement rapid countermeasures and sustained corrections and answer all complaints with an 8D report (8D = 8 disciplines).

In order to be able to deal quickly and smoothly with complaints, the following data are helpful:

- Number of components subject to complaint or returned
- Fault description
- How and when was the fault detected?
- Logistics data (date code, delivery note no.)
- Operating conditions
- Operating duration up to occurrence of the fault
- Measurement parameters in the case of divergent technical data

In the event of transport damage, we would ask you to describe this in more detail and if required to mark it so that it can be distinguished from any further damage sustained during the return shipment. The original package should also be checked and any damage to be described. In order to avoid further damage, the original packaging should also be used for the return shipment.

1) RMA = Return of Material Authorization

2 Environmental management system

2.1 Environmental policy

Our fundamental commitment to environmental protection is laid down in the EPCOS environmental policy:

1. We work continuously toward reducing the burden on the environment, toward minimizing associated risks and toward lowering the use of energy and resources, above and beyond the legal requirements.
2. We take appropriate precautions to avoid environmental hazards and to prevent damage to the environment.
3. Potential impact on the environment is assessed and incorporated in process and product planning at the earliest possible stage.
4. By applying environmental, energy and occupational safety management, we ensure that this policy is implemented effectively. The technical and organizational procedures required to do this are monitored regularly and constantly further developed.
5. Each employee is required to act in an environmentally conscious manner. It is the constant duty of management to increase and encourage awareness of responsibility for environment, energy consumption and occupational safety at all levels.
6. We work with our business partners to promote conformity with similar objectives. We supply our customers with information on ways to minimize any potentially adverse environmental impacts of our products.
7. We work in a spirit of cooperation with the relevant authorities.
8. We inform the public of the impact on the environment caused by the company and our activities related to the environment and occupational health and safety.
9. We consider ensuring a safe, healthy and comfortable work environment as first priority. To regard the rules of labor safety is the task of each employee. We comply with all applicable legal requirements and with all requirements that relate to OH&S hazards.
10. We take preventive measures to avoid work-related injury and ill health and strive for continual improvement of our OH&S management system and the OH&S performance.
11. We support purchase of energy efficient products, machines and services, which will improve our energy related performance.

2.2 Environmental management system

The EPCOS ISO 14001 based environmental management system is applied company wide for implementing the EPCOS environmental policy. It is posted on the EPCOS Intranet and is thus accessible to all employees.

2.3 Certification

The EPCOS Group operates an environmental management system that conforms to the requirements of ISO 14001 and is mandatory for all plants.

The company certificate is posted on the EPCOS internet:
(www.epcos.com/environmental_management).

2.4 RoHS

The term "RoHS-compatible" shall mean the following:

Components defined as “RoHS-compatible” are compatible with the requirements of Art. 4 of Directive 2011/65/EU (“RoHS II”) of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment of 8 June 2011 and with the requirements of the provisions which will result from transposition of RoHS II into national law to the extent such provisions reflect the directive.

“RoHS-compatible” components do not contain any of the following substances at a content exceeding the maximum concentration limits of 0.1% for lead, mercury, hexavalent chromium, PBB, PBDE, and 0.01% for cadmium at a homogeneous material level, except the application is exempted by Annex III of “RoHS II”.

2.5 REACH

According to Art. 33 we are obliged to inform our customers immediately or on request a consumer within 45 days if we get knowledge that a Substance of Very High Concern (SVHC) is contained in a product or it’s packaging with more than 0.1% w/w. Provided this substance is published by the European Chemical Agency via the candidates list. Respective information is provided via www.epcos.com/reach (Link: REACH Candidates List and Information according REACH Art. 33, concerning EPCOS Products).

2.6 Banned and hazardous substances in components

As a manufacturer of passive components, we develop our products on the basis of sustainability.

In order to establish a standardized procedure for EPCOS worldwide, a material compliance management and a mandatory list of banned and declarable substances and substances of special interest (EPCOS BAD-SL) are part of our quality management system. The planning and development instructions include regulations and guidelines that aim to identify environmental aspects and to optimize products and processes with respect to material use and environmental compliance, to design them with sparing use of resources and to substitute hazardous substances as far as possible.

Consideration of the environmental aspects is checked and recorded in the design reviews: the environmental officer provides support in the assessment of the environmental impacts of a development project.

2.7 Material data sheets for product families

EPCOS posts material data sheets on the Internet (www.epcos.com/material) that show typical compositions of product groups by selected representatives. The materials are listed with their percentage weight distribution referred to the respective component.

As per IEC/PAS 61906, all materials with a weight percentage exceeding 0.1% are listed. All specifications are typical data and may vary slightly within a product group or production lot.

The material data sheets do not represent guaranteed properties, but are merely given for purposes of information.

Please note in this connection the “Important notes”.

2.8 Disposal

All ferrite cores and accessories can be disposed of, reused or recycled. However as disposal is regulated by national law, the respective national provisions have to be observed.

1 IEC standards

Please refer also the latest CO publications (www.iec.ch)

Standard	Title
IEC 62317-2 Ed. 1.0	Ferrite cores – Dimensions – Part 2: Pot-cores for use in telecommunications, power supply, and filter applications (replaces IEC 60133 Ed. 4.0)
IEC 60205 Ed. 3.0	Calculation of the effective parameters of magnetic piece parts
IEC 60401-1 Ed. 1.0	Terms and nomenclature for cores made of magnetically soft ferrites – Part 1: Terms used for physical irregularities
IEC 60401-2 Ed. 2.0	Terms and nomenclature for cores made of magnetically soft ferrites – Part 2: Reference of dimensions
IEC 60401-3 Ed. 2.0	Terms and nomenclature for cores made of magnetically soft ferrites – Part 3: Guidelines on the format of data appearing in manufacturers catalogues of transformer and inductor cores
IEC 60424-1 Ed. 2.0	Ferrite cores – Guidelines on the limits of surface irregularities – Part 1: General specification
IEC 60424-2 Ed. 2.0	Ferrite cores – Guidelines on the limits of surface irregularities – Part 2: RM-cores
IEC 60424-3 Ed. 2.0	Ferrite cores – Guidelines on the limits of surface irregularities – Part 3: ETD-cores, EER-cores, EC-cores and E-cores
IEC 60424-4 Ed. 2.0	Ferrite cores – Guidelines on the limits of surface irregularities – Part 4: Ring-cores
IEC 60424-5 Ed. 1.0	Ferrite cores – Guide on the limits of surface irregularities – Part 5: Planar-cores
IEC 62317-11 Ed. 1.0	Ferrite cores – Dimensions – Part 11: EC-cores for use in power supply applications (replaces IEC 60647 Ed. 1.0)
IEC 60732 Ed. 1.0	Measuring methods for cylinder cores, tube cores and screw cores of magnetic oxides
IEC 62317-6-Ed. 1.0	Ferrite cores – Dimensions – Part 6: ETD-cores for use in power supplies (replaces IEC 61185 Ed. 2.0)
IEC 62317-8 Ed. 1.0	Ferrite cores – Dimensions – Part 8: E-cores (replaces IEC 61246 Ed. 1.1)
IEC 61247 Ed. 1.0	PM-cores made of magnetic oxides and associated parts – Dimensions
IEC 61332 Ed. 2.0	Soft ferrite material classification
IEC 61333 Ed. 1.0	Marking on U and E ferrite cores
IEC 62317-13 Ed. 2.0	Ferrite cores – Dimensions – Part 13: PQ-cores for use in power supply applications

Standard	Title
IEC 60424-8 Ed. 1.0	Ferrite cores – Guidelines on the limits of surface irregularities – Part 8: PQ-cores
IEC 62317-5 Ed. 1.0	Ferrite cores – Dimensions – Part 5: EP-cores and associated parts for use in inductors and transformers (replaces IEC 61596 Ed. 1.0)
IEC 61631 Ed. 1.0	Test method for the mechanical strength of cores made of magnetic oxides
IEC 62044-1 Ed. 1.0	Cores made of soft magnetic materials – Measuring methods – Part 1: Generic specification
IEC 62044-2 Ed. 1.0	Cores made of soft magnetic materials – Measuring methods – Part 2: Magnetic properties at low excitation level
IEC 62044-3 Ed. 1.0	Cores made of soft magnetic materials – Measuring methods – Part 3: Magnetic properties at high excitation level
IEC 62317-4 Ed. 1.0	Ferrite cores – Dimensions – Part 4: RM-cores and associated parts (replaces IEC 60431 Ed. 2.0)
IEC 62317-7 Ed. 1.0	Ferrite cores – Dimensions – Part 7: EER-cores
IEC 62317-9 Ed. 1.0	Ferrite cores – Dimensions – Part 9: Planar cores
IEC 62323 Ed. 1.0	Dimensions of half pot-cores made of ferrite for inductive proximity switches
IEC 62358 Ed. 2.0	Ferrite cores – Standard inductance factor for gapped cores and its tolerance
IEC/TR 61604 Ed. 1.0	Dimensions of uncoated ring cores of magnetic oxides

1.1 Quality assessment

The IEC standards mainly specify dimensions, designations and magnetic characteristics, whereas the European system of quality assessment CECC and the harmonized DIN-CECC standards additionally define methods of measurement and quality levels.

Since 1982 the IEC has been establishing the so-called IEC Q-system, which will have worldwide applicability. German DIN IEC standards are being harmonized with this quality system.

CECC and IEC-Q standards have a similar structure: they are subdivided into generic specifications (GS), sectional specifications (SS) and blank detail specifications (BDS). The numbering system of QC is analogous to that of CECC.

The detail specifications of CECC and IEC do not fully correspond to each other.

A quality assessment system of “Capability Approval” for the production of ferrite parts is being established.

1 General information

The demand for coil formers with integrated pins for efficient winding gave rise to the development of compact RM (**R**ectangular **M**odular) cores. Furthermore, this design allows high PCB packing densities. RM coil formers and accessories are suited to automatic processing.

During assembly, RM cores are held in place by clamps which engage in recesses in the core base. The various clamping forces defined, which have been verified by EPCOS through measurements, are specified in the individual data sheets.

The core dimensions are matched to standard PCB grids. RM 6 means, for example, that the core with coil former fills a square basic area 6 × 6 modules (1 module ≙ 2.54 mm) = 15.24 × 15.24 mm^2. The mainly used core sizes RM 4 through RM 14 are specified in IEC 62317.

2 Applications

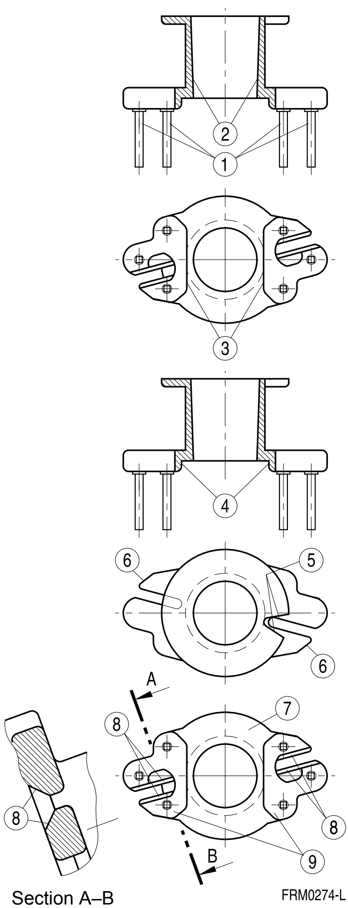
- Originally RM cores from Siemens (today EPCOS) were essentially designed for two major applications, i.e.
  - very low-loss, highly stable filter inductors and other resonance determining inductors (materials N48, M33 and K1) and
  - low-distortion broadband transmission at low signal modulation (materials T66, T38, T57, N30).

  Even today there is still a high demand for RM cores suited to these applications.
- RM cores are increasingly required for power applications. For this purpose our core series made of materials N87, N97, N88, N96, N95, N92, N49 and PC200 (ungapped) is particularly well suited. Matching coil formers with larger pin spacings are available. RM cores without center hole (higher A_L value and greater power capacity) are used for transformer applications.
- Our product range also includes low-profile RM cores, whose significantly reduced overall height makes them suitable for small-signal, interface and matching transformers and also for transformer and energy storage chokes in DC/DC converters with a high pulse rate (materials N87, N49 and PC200). The low-profile types are particularly suited for applications where the winding is printed onto the PCB and the core is fitted to the board from either side.
- In addition to conventional accessories, SMD coil formers are available for RM 4 LP, RM 5 and RM 6.
- RM cores with or without center hole can be supplied in any material on request.
- For power applications, particularly for compact energy storage chokes, we supply the RM 12 and RM 14 cores with optimized, strengthened base thickness.

3 Coil formers for automatic processing

Automated manufacture is gaining more and more importance for the low-cost production of inductive components. The prerequisites are high-performance winding and assembly machines on the one hand, and suitable accessories on the other.

The new EPCOS RM coil formers were developed to meet this demand. These coil formers are not only matched to the versatile concepts of automation, but also offer advantages for manual winding. The essential improvements of the version optimized for automatic processing will be described in the following, taking the example of an RM6 coil former. The consistent utilization of these benefits will in most cases bring about a reduction of production costs for inductors and transformers.



① Squared pins or pin squared in the start-of-winding area:
Secure restraint of the ends of the winding even with 2 to 3 winding corners; the winding process is considerably accelerated.

② Internal diameter slightly conical and highly accurate:
Easy and fast slipping-on and snug fit on the winding tools.

③ Shortened wire guidance slots:
Substantially higher flange breaking strength.

④ Almost parallel flanges with minimum radii at the winding cylinder to the flange:
Correct winding layers, more turns, neat and rapid winding.

⑤ V-shaped slot in the pinless flange:
Automatic loading and unloading of winding machine possible. Substantially more accurate fixing and arrangement of the coil formers.

⑥ Lengthened wire catching nose:
Leads all wires safely into the wire guidance slots, even at high winding speed.

⑦ Pinless flange without marking:
Substantially more accurate arrangement of the coil formers for winding and wrapping.

⑧ Slot outlet stepped in height:
Owing to the transfer of the wire crossing to the level of the slot, short circuit is prevented when soldering the ends of the winding to the pins.

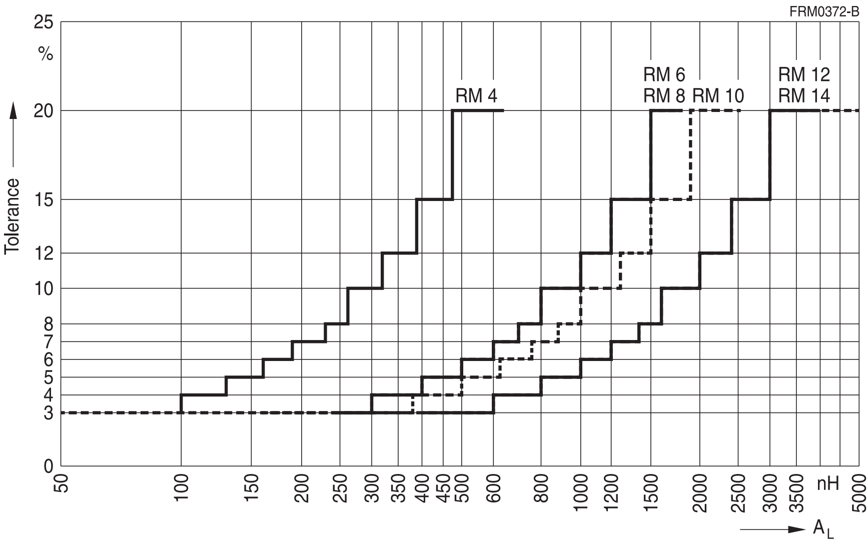
⑨ Insulation web:
Improved insulation between the winding wires and the ferrite core.

4 Tolerances for RM cores

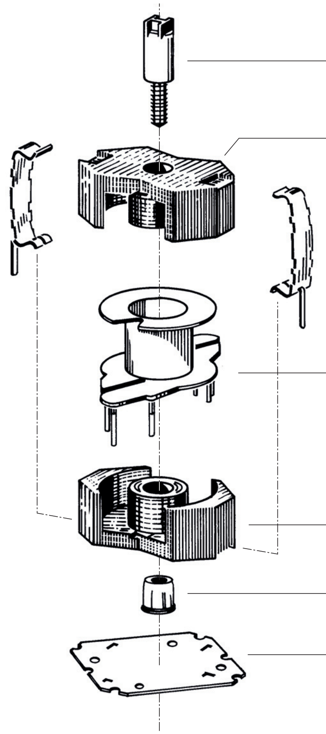
The A_L value tolerances for RM cores have consequently been defined with consideration of optimized process parameters for all materials with an initial permeability μ_i in the region of 2200 to 10000 as a step function (see figure below).

The "quantized" A_L step values should preferably be used. They are still available in their respective lower tolerance ranges. Thus a tolerance of ±5% can be determined for a RM 8 made of N87 material for an A_L value of 500 nH.

With this type of tolerance definition, EPCOS has defined standard A_L values and the associated tolerance for the first time. Based on initial permeability tolerance can be slightly lower or higher.



Core and accessories



Example of an assembly set

Individual parts	Part no.	Page
Adjusting screw	B65539 B65806	 220
Core	B65803	216
Clamp	B65806	219
Coil former	B65804	218
Core	B65803	216
Threaded sleeve (glued-in)		
Insulating washer	B65804	219

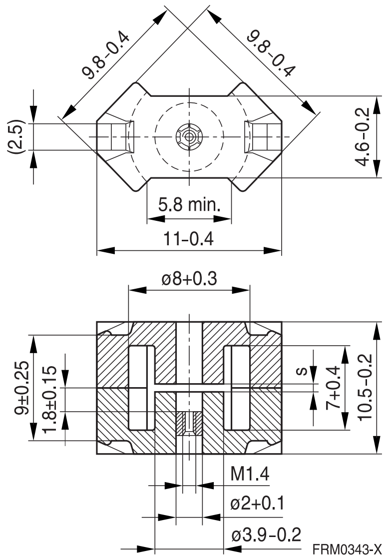
Also available:

RM 4 low profile:		
Core	B65803	221
Coil former	B65804	222
SMD coil former with J terminals	B65804	223
Clamp	B65804	224
Insulatimg washer	B65804	224

RM 4

Core **B65803**

- To IEC 62317-4
- Core without center hole
  for transformer applications
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	1.9	1.7	mm^{-1}
l_e	21	22	mm
A_e	11	13	mm^2
A_{min}	—	11.3	mm^2
V_e	231	286	mm^3

Approx. weight (per set)

m	1.45	1.65	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code[1)] -A with center hole -N with threaded sleeve
K1	16 ±3%	1.0	24.2	B65803+0016A001
	25 ±3%	0.40	37.8	B65803+0025A001
M33	40 ±3%	0.36	60.4	B65803+0040A033
	63 ±3%	0.18	96	B65803+0063A033
N48	63 ±3%	0.16	96	B65803+0063A048
	100 ±3%	0.10	152	B65803+0100A048
	160 ±3%	0.06	243	B65803+0160A048

1) Replace the + by the code letter “A” or “N” for the required version.

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -J without center hole
N45	1700 +30/–20%	2290		B65803J0000R045
N30	1900 +30/–20%	2560		B65803J0000R030
T35	2800 +40/–30%	3770		B65803J0000Y035
T38	3700 +40/–30%	4980		B65803J0000Y038
N49	750 +30/–20%	1010	< 0.04 (50 mT, 500 kHz, 100 °C)	B65803J0000R049
N87	1100 +30/–20%	1480	< 0.20 (200 mT, 100 kHz, 100 °C)	B65803J0000R087
N97	1100 +30/–20%	1480	< 0.15 (200 mT, 100 kHz, 100 °C)	B65803J0000R097

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

RM 4

Accessories B65804

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMIMOTO BAKELITE CO LTD

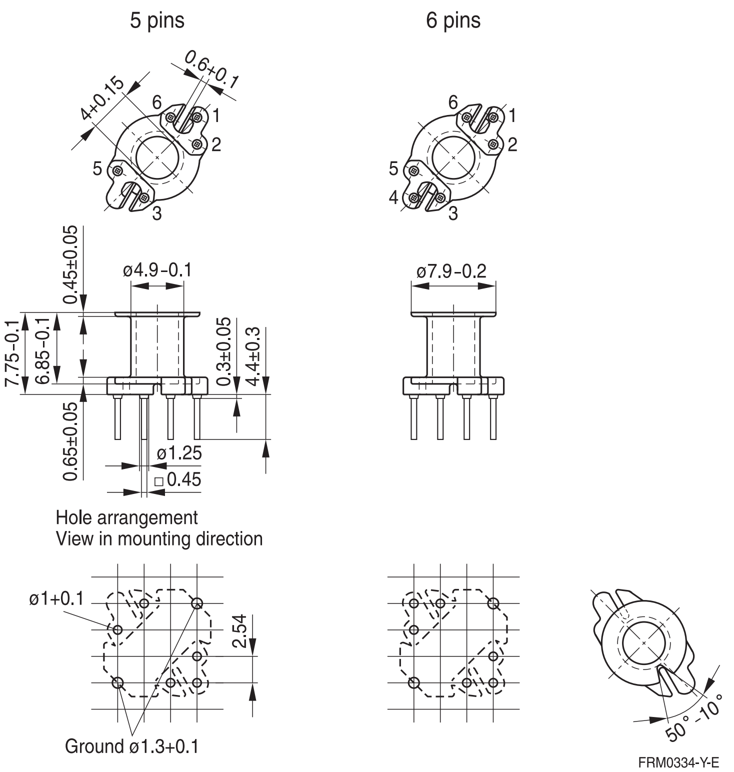
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Winding: see Processing notes, 2.1

For matching clamp and insulating washers see page 219.

Sections	A_N mm^2	l_N mm	A_R value μΩ	Pins	Ordering code
1	7.7	20	89	5 6	B65804N1105D001 B65804N1106D001



Clamp

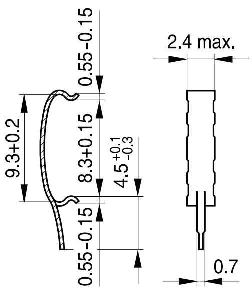
- With ground terminal, made of stainless spring steel (tinned), 0.3 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer for double-clad PCBs

- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.25 mm thick Makrofol FR7-2 [E168120 (M)], COVESTRO AG

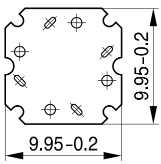
	Ordering code
Clamp (ordering code per piece, 2 are required)	B65806B2203X000
Insulating washer (bulk)	B65804C2005X000

Clamp



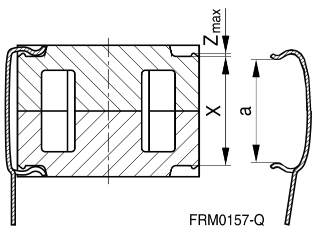
FRM0012-J

Insulating washer



FRM0306-T

Clamping forces for RM 4



FRM0157-Q

F_{min}: Extension of clamp from a to a_2 = X_{min}
F_{max}: Extension of clamp from a to a_1 = X_{max}

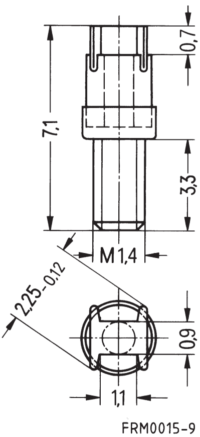
Clamp opening a (mm)		8.3 +0.15
Core nose Z_{max} (mm)		0.15
Height of core pair X (mm)	X_{min} X_{max}	8.75 9.25
Clamping force F (N)	F_{min} F_{max}	5 40

Adjusting screw

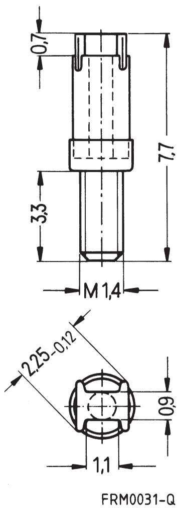
- Tube core with thread and core brake made of GFR polyterephthalate Pocan B3235® [E245249 (M)], LANXESS AG

Figure	Tube core			Ordering code
	∅ × length (mm)	Material	Color code	
a	1.81 × 2.0	K1	yellow	B65539C1003X001
a	1.81 × 2.7	N22	red	B65539C1002X022
b	1.81 × 3.4	N22	green	B65806C3001X022

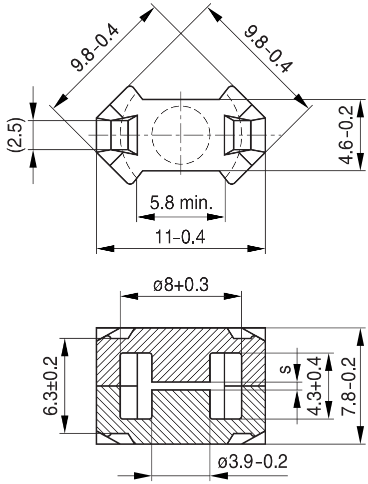
a



b



- To IEC 62317-4
- For compact transformers with high inductance
- Without center hole
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.2 mm^{-1}
l_e = 17.3 mm
A_e = 14.5 mm^2
A_{min} = 11.3 mm^2
V_e = 251 mm^3

Approx. weight 1.2 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
T38	5000 +40/–30%	4750		B65803P0000Y038
N49	950 +30/–20%	900	< 0.04 (50 mT, 500 kHz, 100 °C)	B65803P0000R049
N92	1000 +30/–20%	950	< 0.14 (200 mT, 100 kHz, 100 °C)	B65803P0000R092
N87	1300 +30/–20%	1230	< 0.12 (200 mT, 100 kHz, 100 °C)	B65803P0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMIMOTO BAKELITE CO LTD

Solderability: to IEC 60068-2-58, test Ta, method 1 (aging 3): 235 °C, 2 s

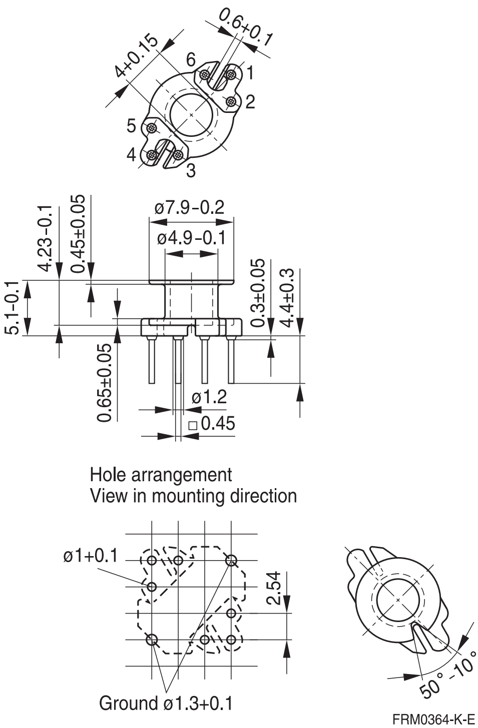
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 2 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

Winding: see Processing notes, 2.1

For matching clamp and insulating washers, see page 224.

Sections	A_N mm²	l_N mm	A_R value μΩ	Terminals	Ordering code
1	4.7	20.1	147	6	B65804N1206D001

Coil former



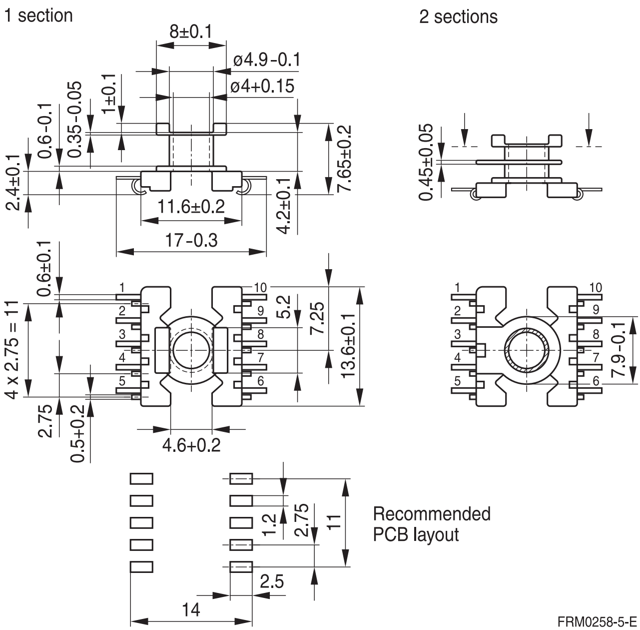
SMD

SMD coil former with J terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Vectra C 130 [E83005 (M)], CELANESE INTERNATIONAL CORP.
Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s
Winding: see Processing notes, 2.1
For matching clamp, see page 224.

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals 1)	Ordering code
1	5.0	20.1	138	10	B65804B6010T001
2	4.4	20.1	157	10	B65804B6010T002

Coil former



1) 6 and 8 terminals on request

Clamp

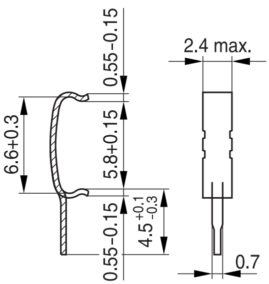
- With ground terminal, made of stainless spring steel (tinned), 0.3 mm thick,
  Without ground terminal, made of stainless spring steel, 0.3 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer for double-clad PCBs

- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.25 mm thick
  Makrofol FR7-2 [E168120 (M)], COVESTRO AG

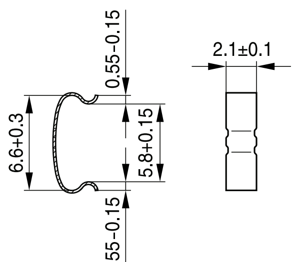
	Ordering code
Clamp with ground terminal (ordering code per piece, 2 are required)	B65804P2203X000
Clamp without ground terminal (ordering code per piece, 2 are required)	B65804P2204X000
Insulating washer (bulk)	B65804C2005X000

Clamp with ground terminal



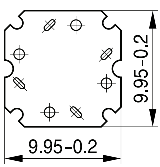
FRM0335-7

Clamp without ground terminal



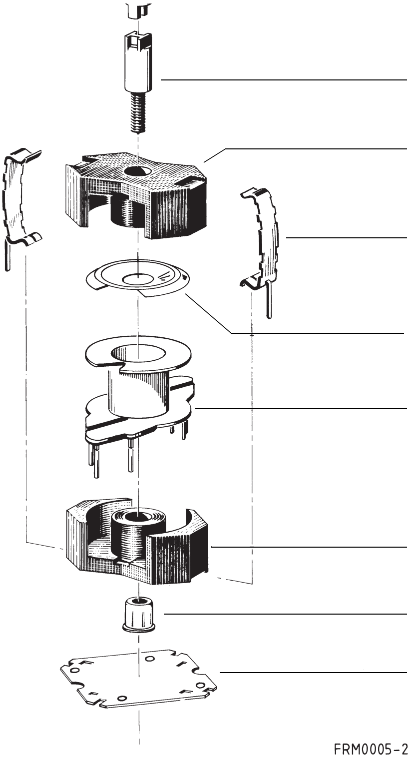
FRM0153-S

Insulating washer



FRM0306-T

Core and accessories



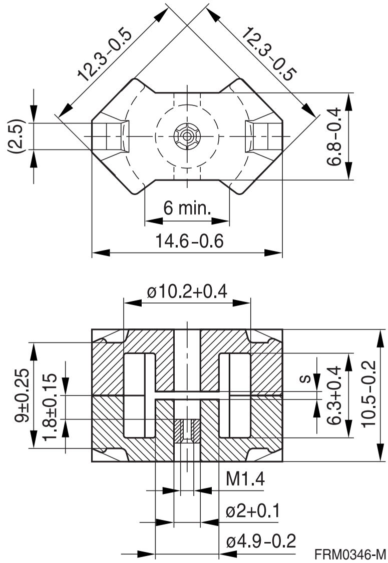
Example of an assembly set

Individual parts	Part no.	Page
Adjusting screw	B65518 B65539 B65806	232
Core	B65805	226
Clamps	B65806	229
Insulating washer 1	B65806	229
Coil former	B65806	228
Core	B65805	226
Threaded sleeve (glued-in)		
Insulating washer 2	B65806	229

Also available:

SMD coil formers	B65822	230, 231
Clamps	B65806	230, 231
<u>RM 5 low profile:</u>		
Core	B65805P	233

- To IEC 62317-4
- Core without center hole for transformer applications
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
$\Sigma l/A$	1.0	0.93	mm^{-1}
l_e	20.8	22.1	mm
A_e	20.8	23.8	mm^2
A_{min}	—	18	mm^2
V_e	433	526	mm^3

Approx. weight (per set)

m	2.9	3.0	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code[1)] -C with center hole -N with threaded sleeve
K1	25 ±3% 40 ±3%	1.0 0.40	19.9 31.8	B65805+0025A001 B65805+0040A001
M33	63 ±3% 100 ±3%	0.4 0.2	50.2 79.6	B65805+0063A033 B65805+0100A033
N48	160 ±3% 250 ±3% 315 ±3%	0.12 0.06 0.03	127 199 251	B65805+0160A048 B65805+0250A048 B65805+0315A048

1) Replace the + by the code letter “C” or “N” for the required version.

Ungapped

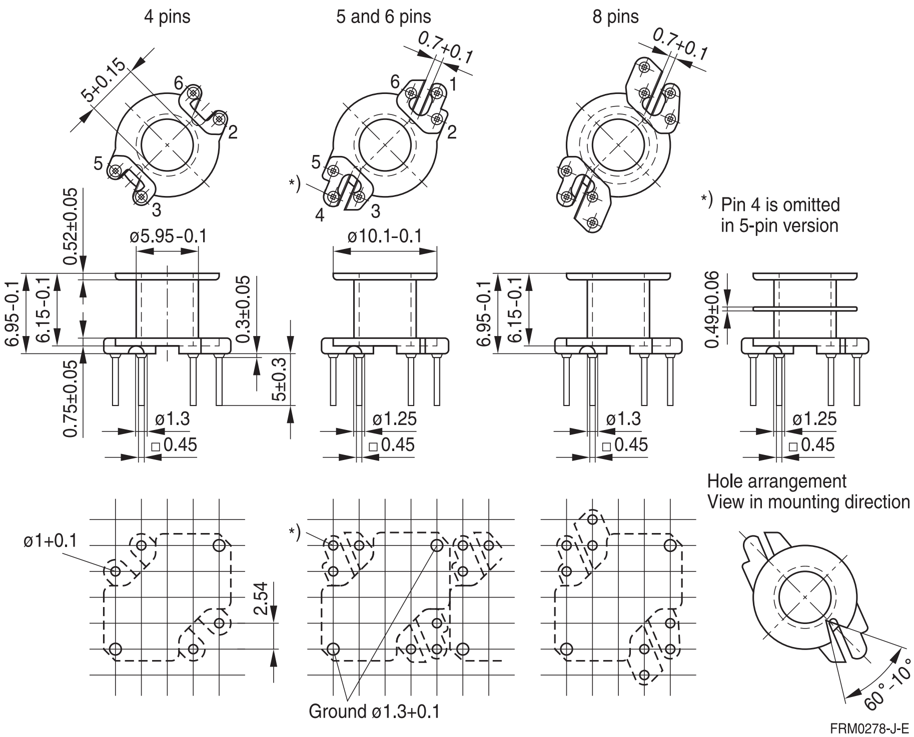
Material	A_L value nH	μ_e	P_V W/set	Ordering code -C with center hole -J without center hole
N48	1800 +30/–20%	1430		B65805C0000R048
N45	2600 +30/–20%	1920		B65805J0000R045
N30	3500 +30/–20%	2590		B65805J0000R030
T38	6700 +40/–30%	4950		B65805J0000Y038
T66	9600 +40/–30%	7090		B65805J0000Y066
N49	1300 +30/–20%	960	< 0.06 (50 mT, 500 kHz, 100 °C)	B65805J0000R049
N87	2000 +30/–20%	1480	< 0.32 (200 mT, 100 kHz, 100 °C)	B65805J0000R087
N97	2000 +30/–20%	1480	< 0.24 (200 mT, 100 kHz, 100 °C)	B65805J0000R097
N41	2600 +30/–20%	1920	< 0.10 (200 mT, 25 kHz, 100 °C)	B65805J0000R041

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black SUMIKON PM 9630 [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
For matching clamps and insulating washers see page 229.

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	9.5	25	90	4 5 6 8	B65806N1104D001 B65806N1105D001 B65806N1106D001 B65806N1108D001
2	8.7	25	94	6	B65806N1106D002



Clamp

- With ground terminal, made of stainless spring steel (tinned), 0.3 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer 1 between core and coil former

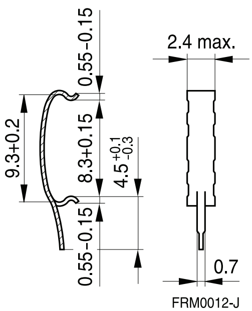
- For tolerance compensation and for insulation
- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.08 mm thick Aryphan F685, [E167358 (M)], natural color, LOFO HIGH TECH FILM GMBH

Insulating washer 2 for double-clad PCBs

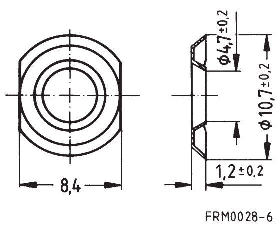
- Made of polycarbonate (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.25 mm thick Makrofol FR7-2 [E168120 (M)], COVESTRO AG

	Ordering code
Clamp (ordering code per piece, 2 are required)	B65806B2203X000
Insulating washer 1 (reel packing, PU = 1 reel)	B65806A5000X000
Insulating washer 2 (bulk)	B65806D2005X000

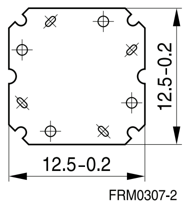
Clamp



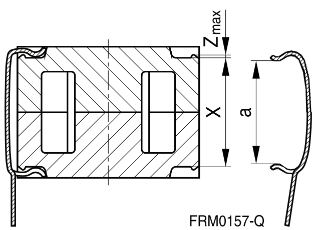
Insulating washer 1



Insulating washer 2



Clamping forces for RM 5



F_{min}: Extension of clamp from a to $a_2 = X_{min}$
F_{max}: Extension of clamp from a to $a_1 = X_{max}$

Clamp opening a (mm)		8.3 +0.15
Core nose Z_{max} (mm)		0.15
Height of core pair X (mm)	X_{min} X_{max}	8.75 9.25
Clamping force F (N)	F_{min} F_{max}	5 40

SMD

SMD coil former with gullwing terminals

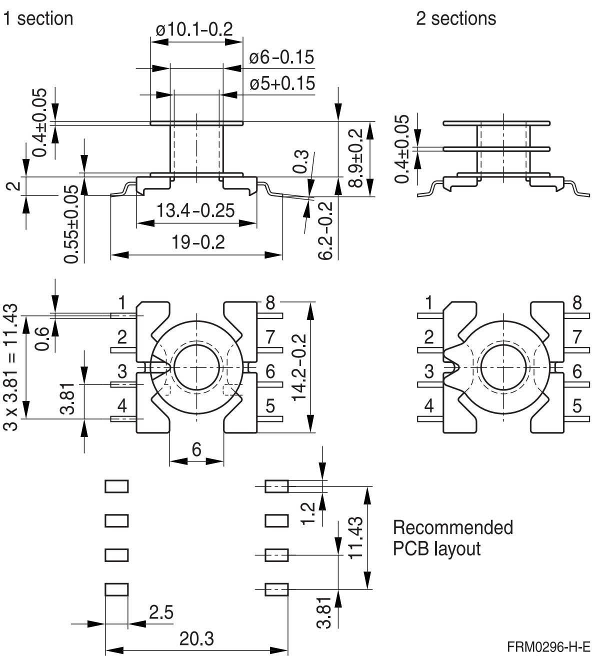
Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Vectra C 130 [E83005 (M)], CELANESE INTERNATIONAL CORP.
Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s
Winding: see Processing notes, 2.1

Clamp

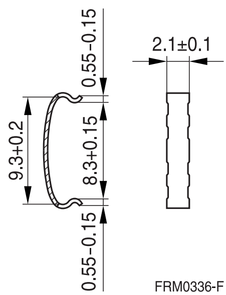
- Without ground terminal, made of stainless spring steel, 0.335 mm thick

Sections	A_N mm^2	l_N mm	A_R value $\mu\Omega$	Terminals	Ordering code
1	11.1	25	77	8	B65822F1008T001
2	10.2	25	85	8	B65822F1008T002
Clamp(ordering code per piece, 2 are required)					B65806J2204X000

Coil former



Clamp



SMD

SMD coil former with J terminals

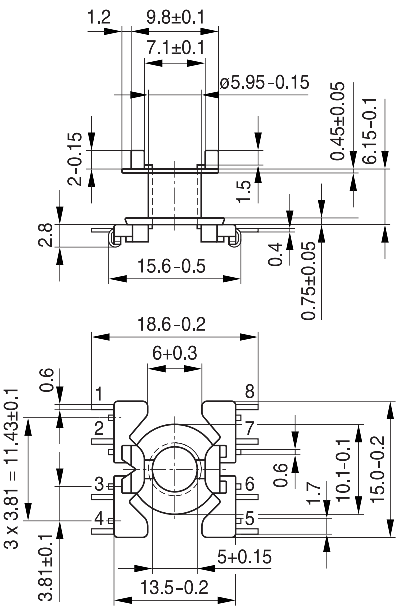
Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Vectra C 130 [E83005 (M)], CELANESE INTERNATIONAL CORP.
Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s
Winding: see Processing notes, 2.1

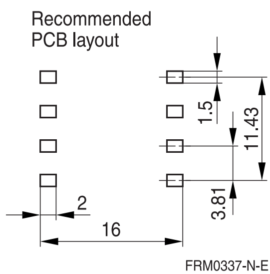
Clamp

- Without ground terminal, made of stainless spring steel, 0.335 mm thick

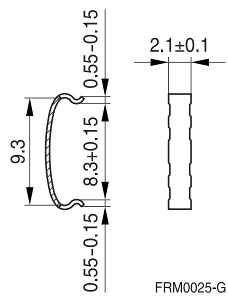
Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	11.1	25	73	8	B65822J1008T001
Clamp(ordering code per piece, 2 are required)					B65806J2204X000

Coil former





Clamp

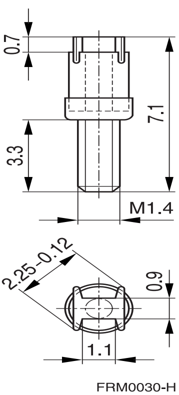


Adjusting screw

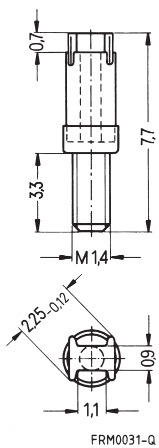
- Tube core with thread and core brake made of GFR polyterephthalate
  Pocan B3235® [E245249 (M)], LANXESS AG

Figure	Tube core ∅ × length (mm)	Material	Color code	Ordering code
a	1.81 × 2.0	K1	yellow	B65539C1003X001
a	1.81 × 2.7	N22	red	B65539C1002X022
b	1.81 × 3.4	N22	green	B65806C3001X022
c	1.81 × 2.0	K1	blue	B65518C3000X001

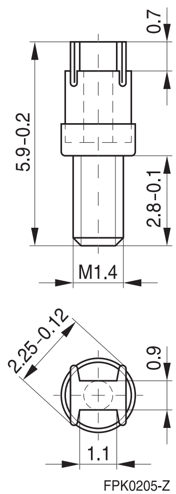
a



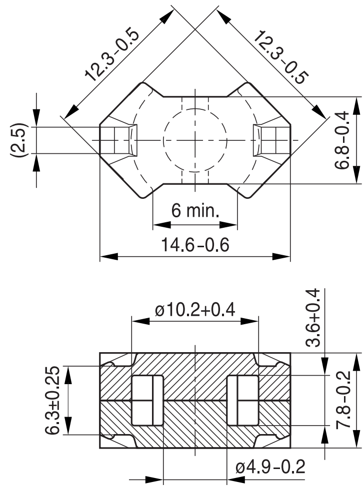
b



c



- To IEC 62317-4
- For compact transformers
- Without center hole
- Delivery mode: sets



FRM0347-V

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.71 mm^{-1}
l_e = 17.5 mm
A_e = 24.5 mm^2
A_{min} = 18 mm^2
V_e = 430 mm^3

Approx. weight 2.6 g/set

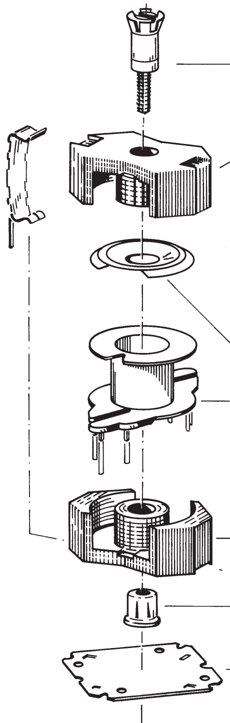
Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
T38	7700 +40/–30%	4380		B65805P0000Y038
N49	1700 +30/–20%	970	< 0.09 (50 mT, 500 kHz, 100 °C)	B65805P0000R049
N92	1900 +30/–20%	1080	< 0.29 (200 mT, 100 kHz, 100 °C)	B65805P0000R092
N87	2400 +30/–20%	1360	< 0.26 (200 mT, 100 kHz, 100 °C)	B65805P0000R087

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

RM 6

Core and accessories



Example of an assembly set

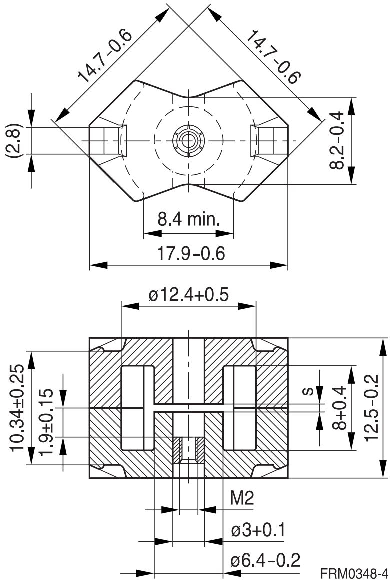
Individual parts	Part no.	Page
Adjusting screw	B65659	242
Core	B65807	235
Clamps	B65808	240
Insulating washer 1	B65808	240
Coil former	B65808	237, 238, 239
Core	B65807	235
Threaded sleeve (glued-in)		
Insulating washer 2	B65808	240

Also available:

Coil former for SMPS transf.	B65808	238
Coil former for power applications	B65808	239
SMD coil former	B65821	241
Clamp	B65808	241
<u>RM 6 low profile:</u>		
Core	B65807P	243

RM 6
Core B65807

- To IEC 62317-4
- Core without center hole
  for transformer applications
- Delivery mode: sets



FRM0348-4

Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	0.86	0.78	mm^{-1}
l_e	26.9	28.6	mm
A_e	31.3	36.6	mm^2
A_{min}	—	31	mm^2
V_e	840	1050	mm^3

Approx. weight (per set)

m	4.9	5.1	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code 1) -J without center hole -N with threaded sleeve -C with center hole
K1	40 ±3%	0.80	27.4	B65807+0040A001
M33	63 ±3%	0.60	43.2	B65807+0063A033
	100 ±3%	0.38	68.5	B65807+0100A033
N48	160 ±3%	0.22	109	B65807+0160A048
	250 ±3%	0.12	171	B65807+0250A048
	315 ±3%	0.08	215	B65807+0315A048
	400 ±3%	0.05	274	B65807+0400A048
N41	250 ±3%	0.17	155	B65807J0250A041

1) Replace the + by the code letter “C” or “N” for the required version. Standard version is “C”.

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -C with center hole -J without center hole
N48	2200 +30/–20%	1500		B65807C0000R048
N45	3500 +30/–20%	2180		B65807J0000R045
N30	4300 +30/–20%	2670		B65807J0000R030
T35	6200 +30/–20%	3860		B65807J0000R035
T38	8600 +40/–30%	5350		B65807J0000Y038
T66	12300 +40/–30%	7650		B65807J0000Y066
N49	1700 +30/–20%	1060	< 0.15 (50 mT, 500 kHz, 100 °C)	B65807J0000R049
N87	2400 +30/–20%	1490	< 0.51 (200 mT, 100 kHz, 100 °C)	B65807J0000R087
N97	2400 +30/–20%	1490	< 0.39 (200 mT, 100 kHz, 100 °C)	B65807J0000R097
N95	2800 +30/–20%	1740	< 0.45 (200 mT, 100 kHz, 100 °C)	B65807J0000R095
N41	3100 +30/–20%	1930	< 0.16 (200 mT, 25 kHz, 100 °C)	B65807J0000R041

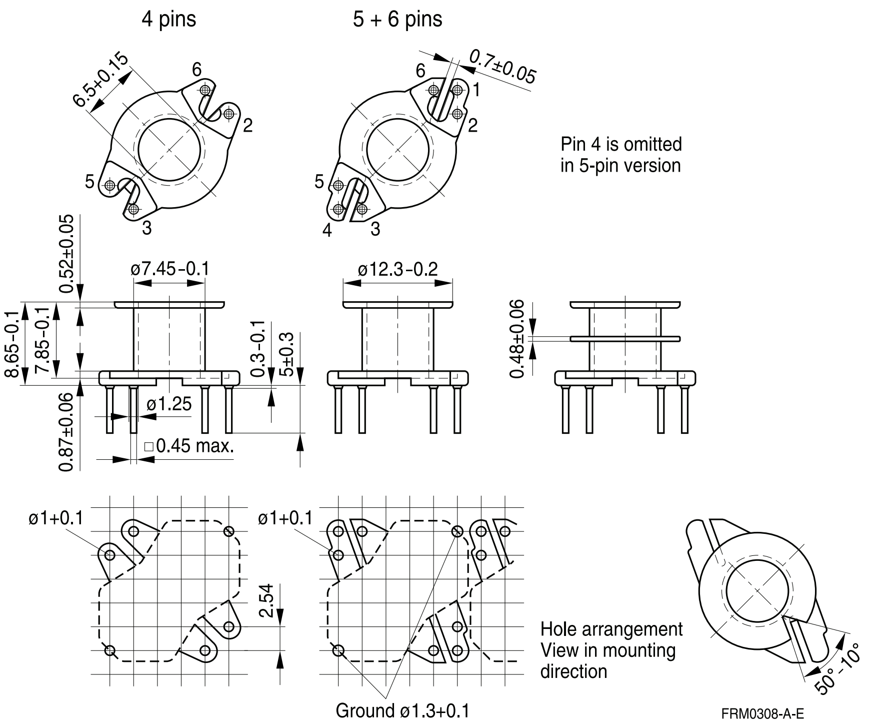
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former, squared pins

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

For matching clamp and insulating washers see page 240.

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	15	30	69	4 5 6	B65808N1004D001 B65808N1005D001 B65808N1006D001
2	14	30	73	4 6	B65808N1004D002 B65808N1006D002



Coil former for SMPS transformers with line isolation

The creepage distances and clearances are designed such that the coil former is suitable for use in SMPS transformers with line isolation.

- Closed center flange with external wire guide
- Optimized for use with automatic winding machines

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD

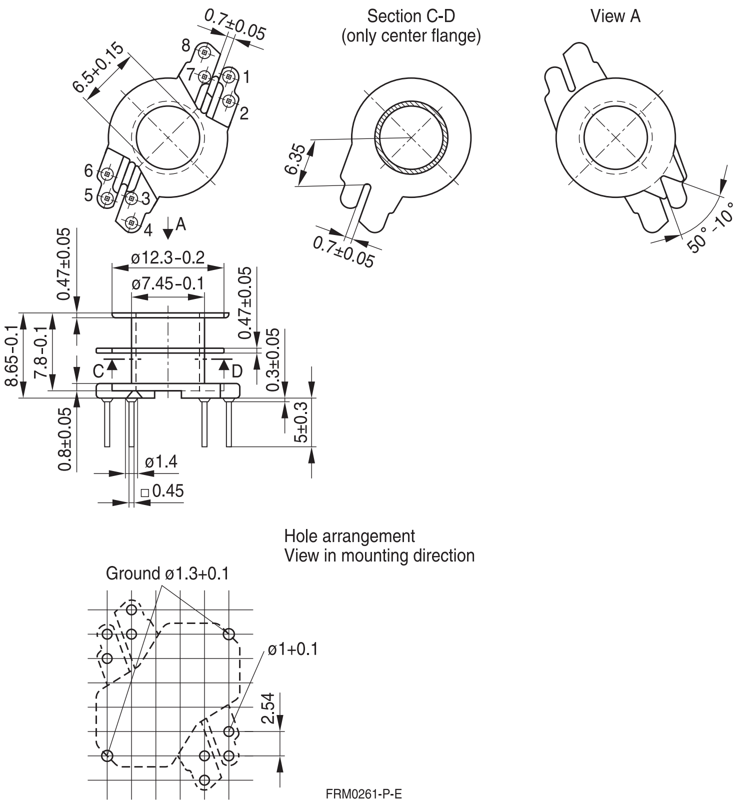
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Winding: see Processing notes, 2.1

For matching clamp and insulating washers see page 240.

Sections	A_N mm²	l_N mm	A_R value μΩ	Pins	Ordering code
2	14	30	73	8	B65808N1108D002



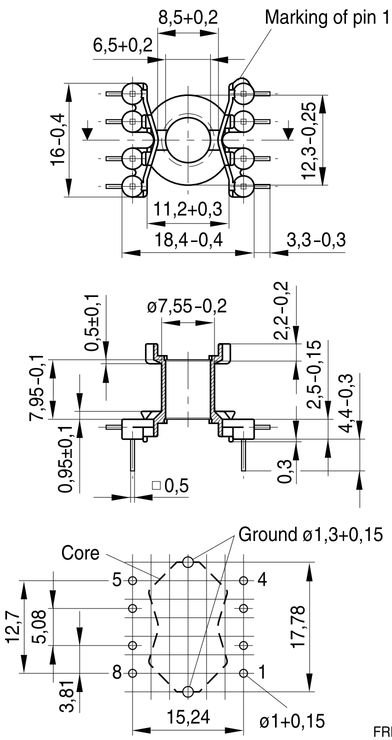
FRM0261-P-E

Coil former for power applications with angled pins

Optimized for automatic winding
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

For matching clamp and insulating washer 1 see page 240.

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	15	30	69	8	B65808E1508T001



Hole arrangement
View in mounting direction

FRM0298-Y

Clamp

- With ground terminal, made of stainless spring steel (tinned), 0.4 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer 1 between core and coil former

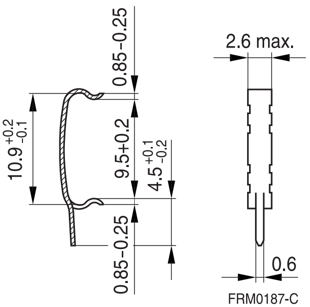
- For tolerance compensation and for insulation
- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.08 mm thick Aryphan F685, [E167358 (M)], natural color, LOFO HIGH TECH FILM GMBH

Insulating washer 2 for double-clad PCBs

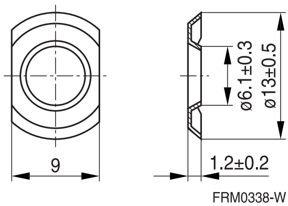
- Made of polycarbonate (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.25 mm thick Makrofol FR7-2 [E168120 (M)], COVESTRO AG

	Ordering code
Clamp (ordering code per piece, 2 are required)	B65808B2203X000
Insulating washer 1 (reel packing, PU = 1 reel)	B65808A5000X000
Insulating washer 2 (bulk)	B65808C2005X000

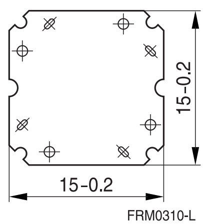
Clamp



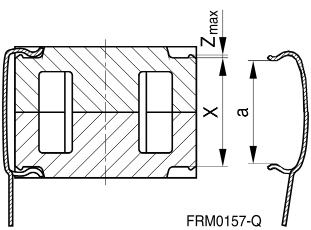
Insulating washer 1



Insulating washer 2



Clamping forces for RM 6



F_{min}: Extension of clamp from a to $a_2 = X_{min}$
F_{max}: Extension of clamp from a to $a_1 = X_{max}$

Clamp opening a (mm)		9.5 +0.2
Core nose Z_{max} (mm)		0.22
Height of core pair X (mm)	X_{min}	10.1
	X_{max}	10.6
Clamping force F (N)	F_{min}	7
	F_{max}	50

SMD

SMD coil former with gullwing terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Vectra E 130i [E106764 (M)], POLYPLASTICS CO LTD
Vectra E 130i [E83005 (M)], CELANESE INTERNATIONAL CORP.

Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s

Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

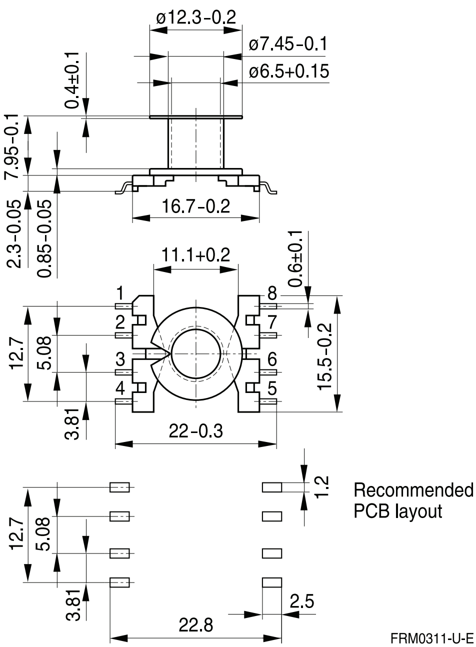
Winding: see Processing notes, 2.1

Clamp

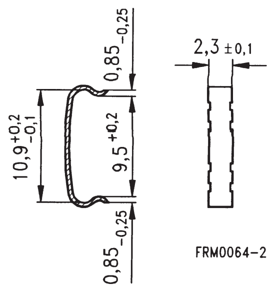
- Without ground terminal, made of stainless spring steel, 0.435 mm thick

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	16.2	31	66	8	B65821C1008T001
Clamp(ordering code per piece, 2 are required)					B65808J2204X000

Coil former



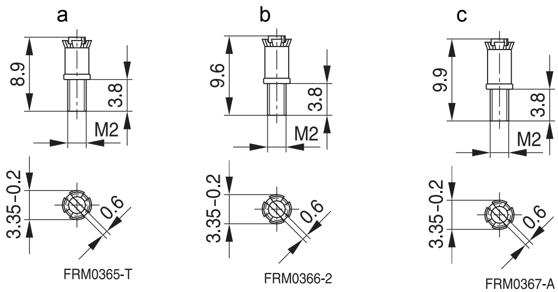
Clamp



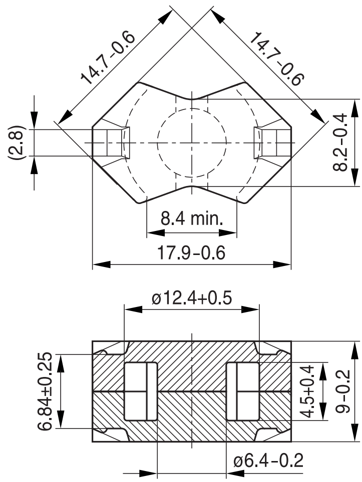
Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate Pocan B3235® [E245249 (M)], LANXESS AG

Figure	Tube core ∅ × length (mm)	Material	Color code	Ordering code
a	2.62 × 3.6	N22	red	B65659F0001X023
b	2.75 × 4.4	N22	black	B65659F0003X023
c	2.82 × 4.4	N22	yellow	B65659F0004X023



- To IEC 62317-4
- For compact transformers
- Without center hole
- Delivery mode: sets



FRM0349-C

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.58 mm^{-1}
l_e = 21.8 mm
A_e = 37.5 mm^2
A_{min} = 31.2 mm^2
V_e = 820 mm^3

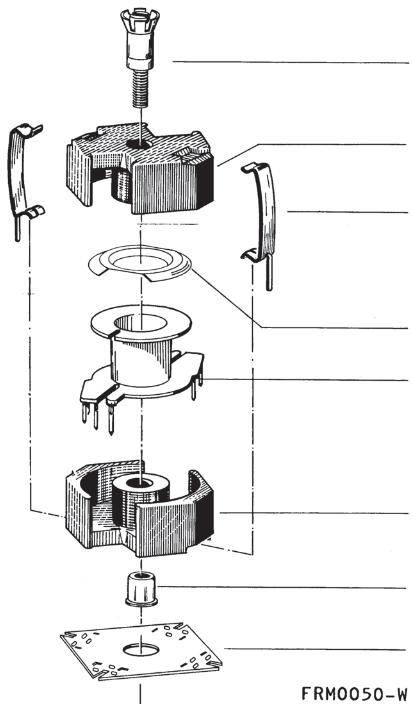
Approx. weight 4.0 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
T38	10500 +40/–30%	4860		B65807P0000Y038
N49	2200 +30/–20%	1020	< 0.14 (50 mT, 500 kHz, 100 °C)	B65807P0000R049
N92	2300 +30/–20%	1060	< 0.44 (200 mT, 100 kHz, 100 °C)	B65807P0000R092
N87	3000 +30/–20%	1390	< 0.40 (200 mT, 100 kHz, 100 °C)	B65807P0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core and accessories



Example of an assembly set

Individual parts	Part no.	Page
Adjusting screw	B65659	249
Core	B65819	245
Clamps	B65820	248
Insulating washer 1	B65820	248
Coil former	B65820	247
Core	B65819	245
Threaded sleeve (glued-in)		
Insulating washer 2	B65820	248

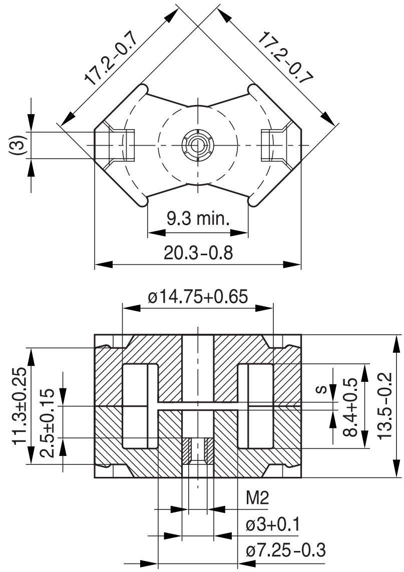
Also available:

RM 7 low profile:		
Core	B65819P	249

RM 7

Core **B65819**

- To IEC 62317-4
- Core without center hole
  for transformer applications
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
$\Sigma l/A$	0.75	0.7	mm^{-1}
l_e	29.8	30.4	mm
A_e	40	43	mm^2
A_{min}	—	39	mm^2
V_e	1190	1310	mm^3

Approx. weight (per set)

m	6.5	7.2	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code[1)] -A with center hole -N with threaded sleeve -J without center hole
N41	160 ±5% 250 ±5%	0.30 0.18	90 141	B65819J0160J041 B65819J0250J041
N48	250 ±3% 315 ±3%	0.16 0.12	148 187	B65819+0250A048 B65819+0315A048

1) Replace the + by the code letter "A" or "N" for the required version.

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -J without center hole
N30	5000 +30/–20%	2810		B65819J0000R030
T38	10000 +40/–30%	5630		B65819J0000Y038
N49	1900 +30/–20%	1070	< 0.22 (50 mT, 500 kHz, 100 °C)	B65819J0000R049
N87	2700 +30/–20%	1520	< 0.77 (200 mT, 100 kHz, 100 °C)	B65819J0000R087
N97	2700 +30/–20%	1520	< 0.58 (200 mT, 100 kHz, 100 °C)	B65819J0000R097
N95	3300 +30/–20%	1860	< 0.65 (200 mT, 100 kHz, 100 °C)	B65819J0000R095

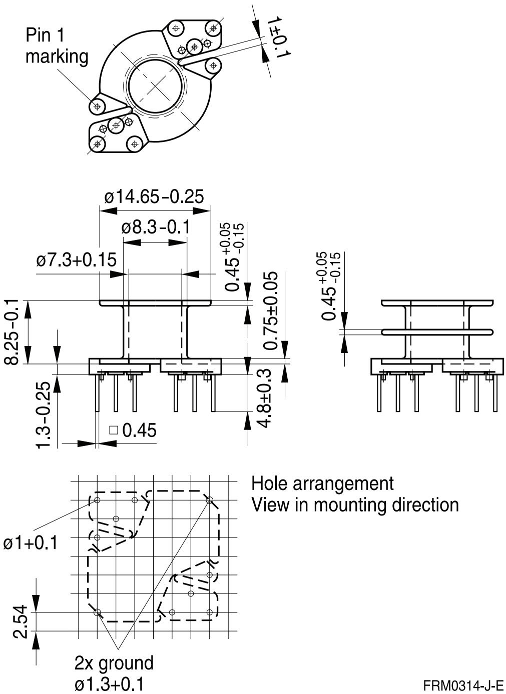
Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Pins: Squared pins
For matching clamp and insulating washers see page 248.

Sections	A_N mm²	l_N mm	A_R value μΩ	Pins	Ordering code
1	22.4	36.0	55.4	8	B65820W1008D001
2	21.9	36.0	56.5	8	B65820W1008D002



FRM0314-J-E

Clamp

- With ground terminal, made of spring steel (tinned), 0.4 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer 1 between core and coil former

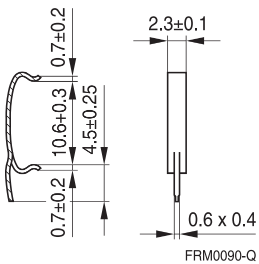
- For tolerance compensation and for insulation
- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.08 mm thick Aryphan F685, [E167358 (M)], natural color, LOFO HIGH TECH FILM GMBH

Insulating washer 2 for double-clad PCBs

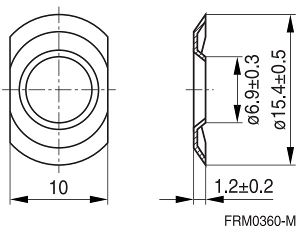
- Made of polycarbonate (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.3 mm thick Makrofol FR7-2 [E168120 (M)], COVESTRO AG

	Ordering code
Clamp (ordering code per piece, 2 are required)	B65820B2001X000
Insulating washer 1 (reel packing, PU = 1 reel)	B65820A5000X000
Insulating washer 2 (bulk)	B65820D2005X000

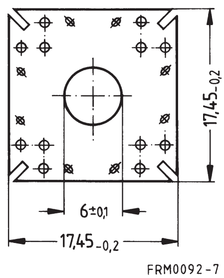
Clamp



Insulating washer 1



Insulating washer 2

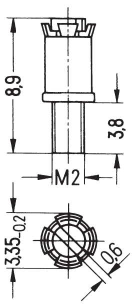


Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate
  Pocan B3235® [E245249 (M)], LANXESS AG

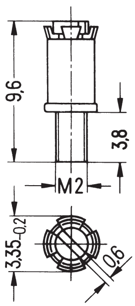
Figure	Tube core ∅ × length (mm)	Material	Color code	Ordering code
a	2.62 × 3.6	N22	red	B65659F0001X023
b	2.75 × 4.4	N22	black	B65659F0003X023
c	2.82 × 4.4	N22	yellow	B65659F0004X023

a



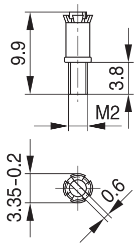
FRM0093-F

b



FRM0094-N

c

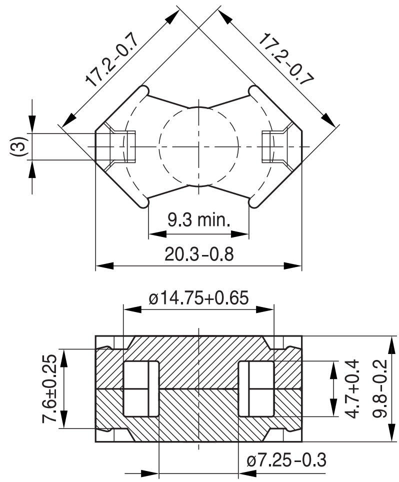


FRM0368-I

RM 7 »Low Profile«

Core **B65819P**

- To IEC 62317-4
- For compact transformers
- Without center hole
- Delivery mode: sets



FRM0351-N

M**agnetic characteristics** (per set)

$\Sigma l/A$ = 0.52 mm^{-1}
l_e = 23.5 mm
A_e = 45.3 mm^2
A_{min} = 39.6 mm^2
V_e = 1060 mm^3

Approx. weight 5.7 g/set

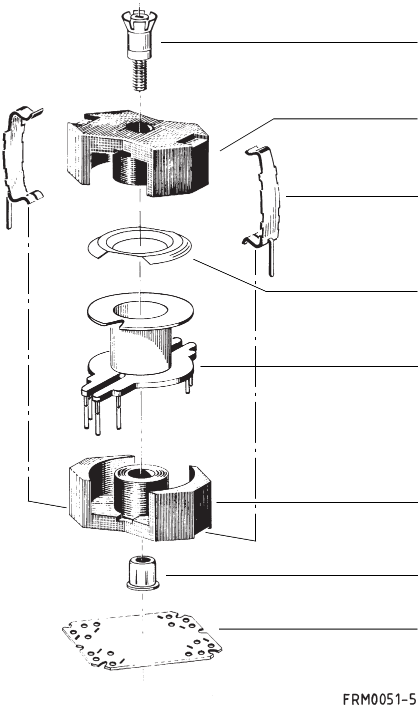
Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
T38	11500 +40/–30%	4750		B65819P0000Y038
N49	2400 +30/–20%	990	< 0.21 (50 mT, 500 kHz, 100 °C)	B65819P0000R049
N92	2600 +30/–20%	1070	< 0.63 (200 mT, 100 kHz, 100 °C)	B65819P0000R092
N87	3300 +30/–20%	1360	< 0.57 (200 mT, 100 kHz, 100 °C)	B65819P0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

RM 8

Core and accessories



Example of an assembly set

Individual parts	Part no.	Page
Adjusting screw	B65812	258
Core	B65811	252
Clamps	B65812	257
Insulating washer 1	B65812	257
Coil former	B65812	254
Core	B65811	252
Threaded sleeve (glued-in)		
Insulating washer 2	B65812	257

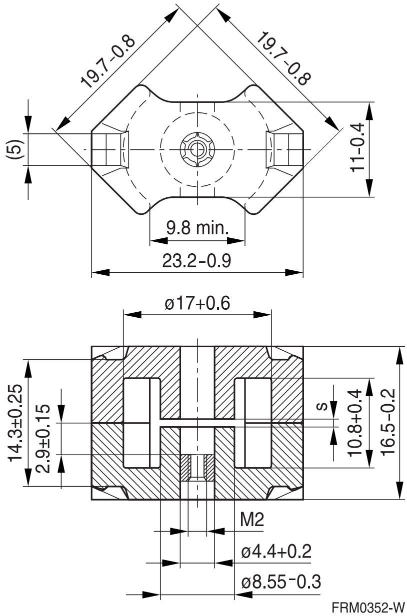
Also available:

Coil former for SMPS transformers	B65812	255
Coil former for power applications	B65812	256
RM 8 low-profile:		
Core	B65811P	259
Clamp	B65812	260
Insulating washers 1 + 2	B65812	260

RM 8

Core **B65811**

- To IEC 62317-4
- Cores without center hole for transformer applications
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	0.68	0.59	mm^{-1}
l_e	35.1	38	mm
A_e	52	64	mm^2
A_{min}	—	55	mm^2
V_e	1825	2430	mm^3

Approx. weight (per set)

m	10.7	12	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code[1)] -D with center hole -F with threaded sleeve -J without center hole
N48	250 ± 3%	0.23	134	B65811+0250A048
	315 ± 3%	0.17	169	B65811+0315A048
	400 ± 3%	0.14	215	B65811+0400A048
	630 ± 5%	0.10	338	B65811+0630J048
N41	160 ± 3%	0.49	76	B65811J0160A041
	250 ± 5%	0.24	118	B65811J0250J041
	630 ± 5%	0.11	298	B65811J0630J041
	1600 ±10%	0.04	756	B65811J1600K041
N87	250 ± 3%	0.30	118	B65811J0250A087
	400 ± 3%	0.18	189	B65811J0400A087

1) Replace the + by the code letter “F” or “D” for the required version. Standard version is “D”.

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -D with center hole -J without center hole
N48	2900 +30/–20%	1550		B65811D0000R048
N30	5700 +30/–20%	2690		B65811J0000R030
T38	12500 +40/–30%	5910		B65811J0000Y038
N49	2200 +30/–20%	1040	< 0.37 (50 mT, 500 kHz, 100 °C)	B65811J0000R049
N87	3300 +30/–20%	1560	< 1.20 (200 mT, 100 kHz, 100 °C)	B65811J0000R087
N97	3300 +30/–20%	1560	< 1.00 (200 mT, 100 kHz, 100 °C)	B65811J0000R097
N41	4100 +30/–20%	1940	< 0.37 (200 mT, 25 kHz, 100 °C)	B65811J0000R041
N95	4100 +30/–20%	1940	< 1.10 (200 mT, 100 kHz, 100 °C)	B65811J0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former, squared pins

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

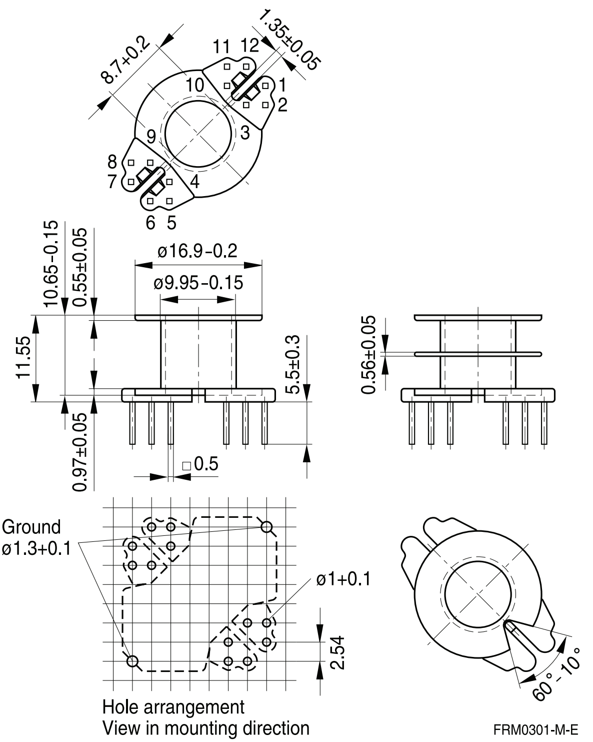
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Winding: see Processing notes, 2.1

For matching clamp and insulating washers see page 257.

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	30	42	47	5 8 12	B65812N1005D001 B65812N1008D001 B65812N1012D001
2	28.4	42	50	5 8 12	B65812N1005D002 B65812N1008D002 B65812N1012D002

12 pins



Version	Pins omitted
5 pins	3, 4, 6, 7, 9, 10, 12
8 pins	3, 4, 9, 10

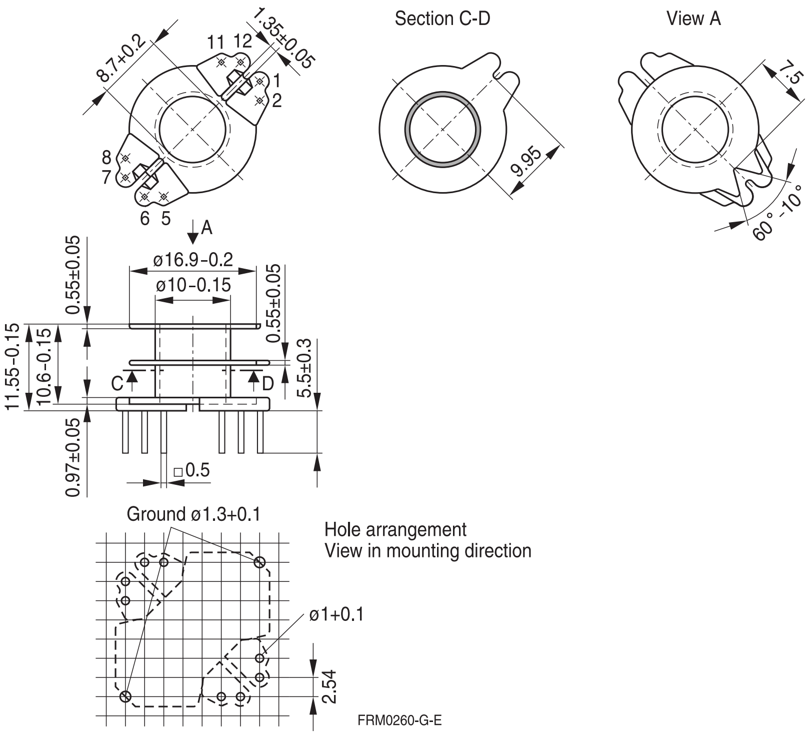
Coil former for SMPS transformers with line isolation

The creepage distances and clearances are designed such that the coil former is suitable for use in SMPS transformers with line isolation.

- Closed center flange with external wire guide
- Optimized for use with automatic winding machines

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
2	28.4	42	50	8	B65812N1108D002

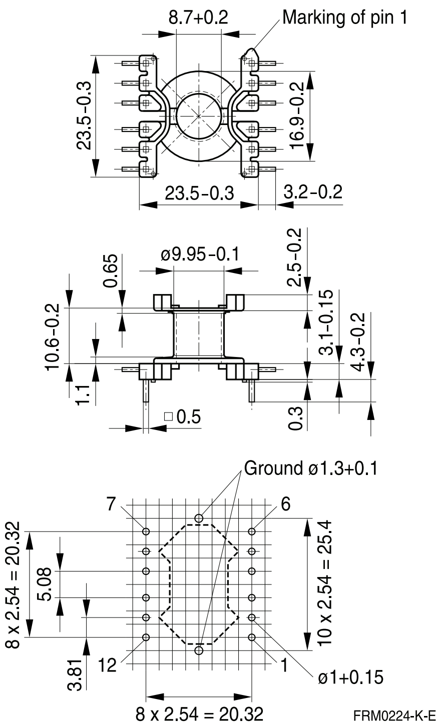


Coil former for power applications

Optimized for automatic winding
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

For matching clamp and insulating washer 1 see page 257.

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	30	42	47	12	B65812C1512T001



Hole arrangement
View in mounting direction
(Note half pitch!)

Clamp

- With ground terminal, made of stainless spring steel (tinned), 0.4 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer 1 between core and coil former

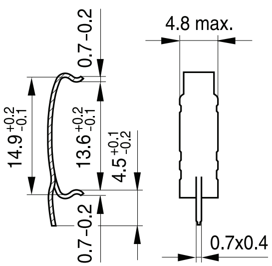
- For tolerance compensation and for insulation
- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.08 mm thick Aryphan F685, [E167358 (M)], natural color, LOFO HIGH TECH FILM GMBH

Insulating washer 2 for double-clad PCBs

- Made of polycarbonate (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.25 mm thick Makrofol FR7-2 [E168120 (M)], COVESTRO AG

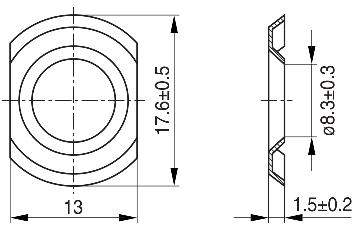
	Ordering code
Clamp (ordering code per piece, 2 are required)	B65812A2203X000
Insulating washer 1 (reel packing, PU = 1 reel)	B65812A5000X000
Insulating washer 2 (bulk)	B65812C2005X000

Clamp



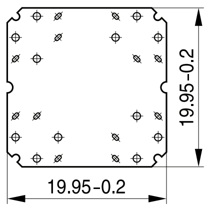
FRM0105-8

Insulating washer 1



FRM0106-G

Insulating washer 2

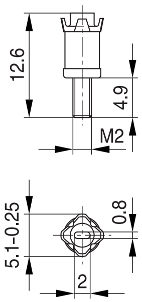


FRM0312-3

Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate
  Pocan B3235® [E245249 (M)], LANXESS AG

Tube core ∅ × length (mm)	Material	Color code	Ordering code
3.85 × 5.0	N22	gray	B65812B3003X022

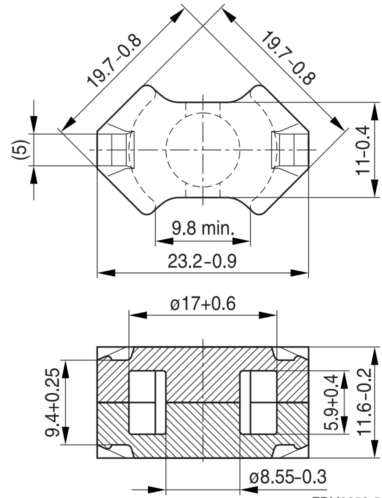


FRM0108-X

RM 8 »Low Profile«

Core B65811P

- To IEC 62317-4
- For compact transformers
- Without center hole
- Delivery mode: sets



FRM0353-5

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.44 mm^{-1}
l_e = 28.7 mm
A_e = 64.9 mm^2
A_{min} = 55.4 mm^2
V_e = 1860 mm^3

Approx. weight 9.2 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	2900 +30/–20%	1020	< 0.33 (50 mT, 500 kHz, 100 °C)	B65811P0000R049
N92	3100 +30/–20%	1090	< 1.10 (200 mT, 100 kHz, 100 °C)	B65811P0000R092
N87	4100 +30/–20%	1440	< 0.92 (200 mT, 100 kHz, 100 °C)	B65811P0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Clamp

- With ground terminal, made of stainless spring steel (tinned), 0.4 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer 1 between core and coil former

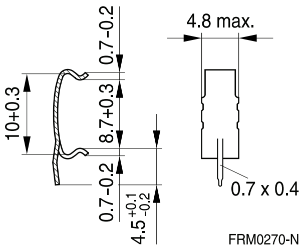
- For tolerance compensation and for insulation
- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.08 mm thick Aryphan F685, [E167358 (M)], natural color, LOFO HIGH TECH FILM GMBH

Insulating washer 2 for double-clad PCBs

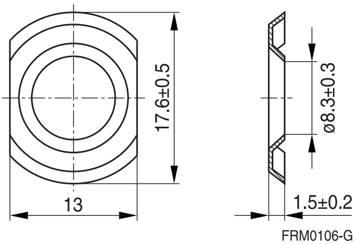
- Made of polycarbonate (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.25 mm thick Makrofol FR7-2 [E168120 (M)], COVESTRO AG

	Ordering code
Clamp (ordering code per piece, 2 are required)	B65812P2203X000
Insulating washer 1 (reel packing, PU = 1 reel)	B65812A5000X000
Insulating washer 2 (bulk)	B65812C2005X000

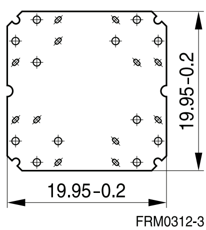
Clamp



Insulating washer 1

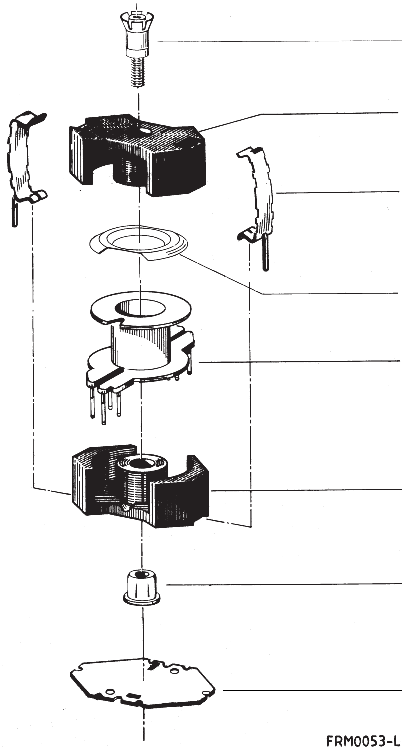


Insulating washer 2



RM 10

Core and accessories



Example of an assembly set

Individual parts	Part no.	Page
Adjusting screw	B65679	267
Core	B65813	262
Clamps	B65814	266
Insulating washer 1	B65814	266
Coil former	B65814	264
Core	B65813	262
Threaded sleeve (glued-in)		
Insulating washer 2	B65814	266

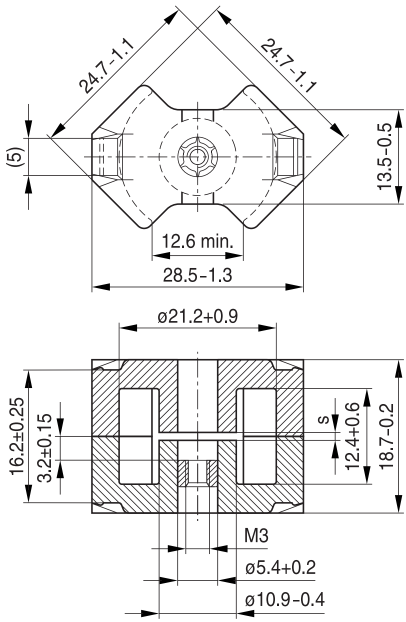
Also available:

Coil former for power applications	B65814	265
RM 10 low-profile:		
Core	B65813P	268

RM 10

Core **B65813**

- To IEC 62317-4
- Cores without center hole for transformer applications
- Delivery mode: sets



FRM0354-D

Magnetic characteristics (per set)

	with center hole	without center hole	
$\Sigma l/A$	0.5	0.45	mm^{-1}
l_e	42	44	mm
A_e	83	98	mm^2
A_{min}	—	90	mm^2
V_e	3490	4310	mm^3

Approx. weight (per set)

m	20.7	22	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code[1)] -D with center hole -N with threaded sleeve -J without center hole
N48	400 ± 3% 630 ± 3%	0.21 0.13	161 254	B65813+0400A048 B65813+0630A048
N41	250 ± 3% 630 ± 5% 1600 ±10%	0.44 0.13 0.04	89 225 572	B65813J0250A041 B65813J0630J041 B65813J1600K041

1) Replace the + by the code letter “D” or “N” for the required version.

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -J without center hole
N30	7600 +30/–20%	2720		B65813J0000R030
T38	16000 +40/–30%	5720		B65813J0000Y038
N49	2900 +30/–20%	1040	< 0.75 (50 mT, 500 kHz, 100 °C)	B65813J0000R049
N87	4200 +30/–20%	1500	< 2.30 (200 mT, 100 kHz, 100 °C)	B65813J0000R087
N97	4200 +30/–20%	1500	< 2.00 (200 mT, 100 kHz, 100 °C)	B65813J0000R097
N41	5500 +30/–20%	1960	< 0.80 (200 mT, 25 kHz, 100 °C)	B65813J0000R041
N95	5500 +30/–20%	1960	< 2.20 (200 mT, 100 kHz, 100 °C)	B65813J0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

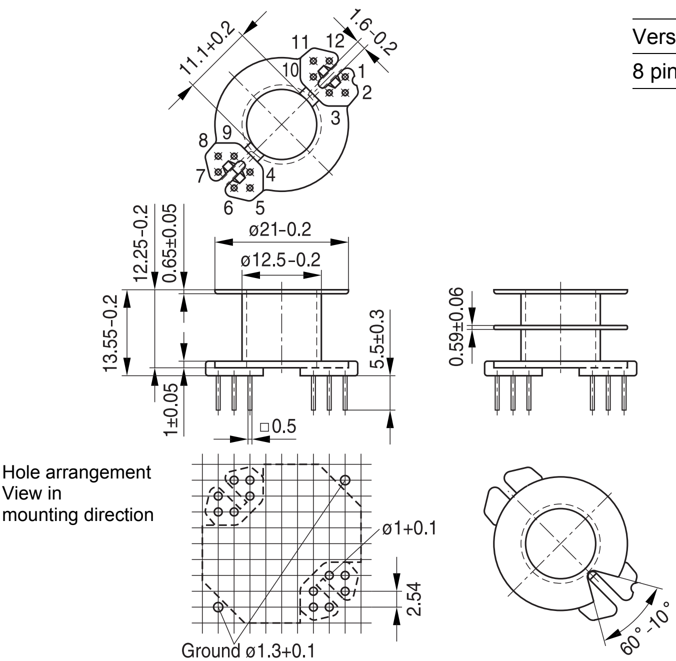
Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Pins: Squared pins
For matching clamp and insulating washers see page 266.

Sections	A_N mm²	l_N mm	A_R value μΩ	Pins	Ordering code
1	41.5	52	43	8 12	B65814N1008D001 B65814N1012D001
2	39	52	46	8 12	B65814N1008D002 B65814N1012D002

12 pins

Version	Pins omitted
8 pins	2, 5, 8, 11



FRM0271-W-E

Coil former for power applications

Optimized for automatic winding

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V

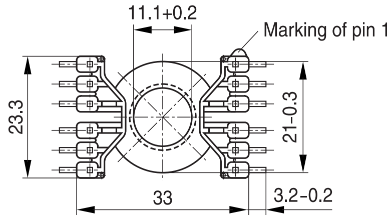
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

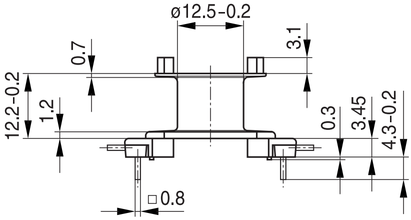
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

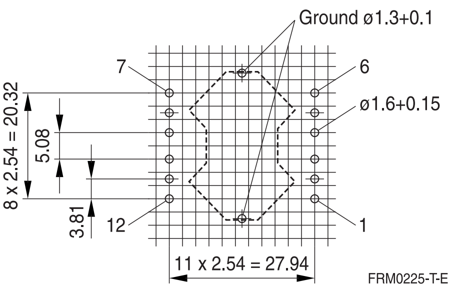
Winding: see Processing notes, 2.1

For matching clamp and insulating washer 1 see page 266.

Sections	A_N mm^2	l_N mm	A_R value μΩ	Pins	Ordering code
1	41.5	52	43	12	B65814C1512T001







Hole arrangement
View in mounting direction
(Note half pitch!)

RM 10

Accessories B65814

Clamp

- With ground terminal, made of stainless spring steel (tinned), 0.4 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer 1 between core and coil former

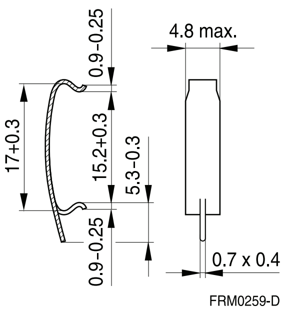
- For tolerance compensation and for insulation
- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.08 mm thick
  Aryphan F685, [E167358 (M)], natural color, LOFO HIGH TECH FILM GMBH

Insulating washer 2 for double-clad PCBs

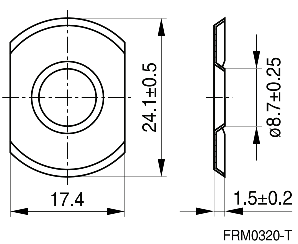
- Made of polycarbonate (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.25 mm thick
  Makrofol FR7-2 [E168120 (M)], COVESTRO AG

	Ordering code
Clamp (ordering code per piece, 2 are required)	B65814B2203X000
Insulating washer 1 (reel packing, PU = 1 reel)	B65814B5000X000
Insulating washer 2 (bulk)	B65814B2005X000

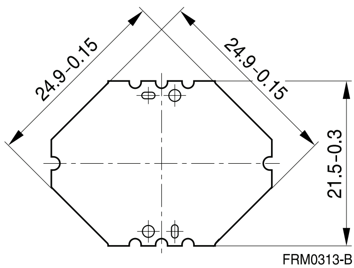
Clamp



Insulating washer 1



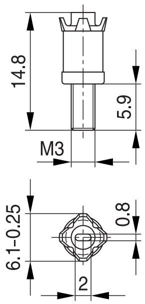
Insulating washer 2



Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate Pocan B3235® [E245249 (M)], LANXESS AG

Tube core ∅ × length (mm)	Material	Color code	Ordering code
4.55 × 6.3	N22	red	B65679E0003X022
4.98 × 6.3	N22	black	B65679E0002X022

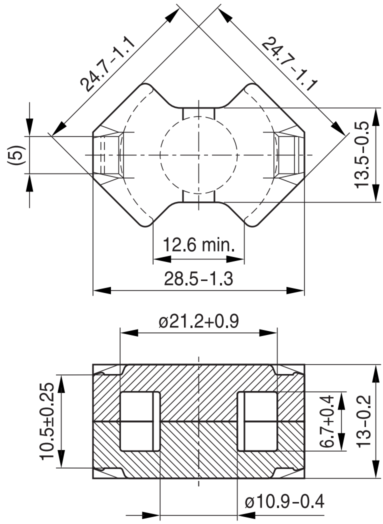


FRM0125-M

RM 10 »Low Profile«

Core **B65813P**

- To IEC 62317-4
- For compact transformers
- Without center hole
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.34 mm^{-1}
l_e = 33.9 mm
A_e = 99.1 mm^2
A_{min} = 90.0 mm^2
V_e = 3360 mm^3

Approx. weight 17.2 g/set

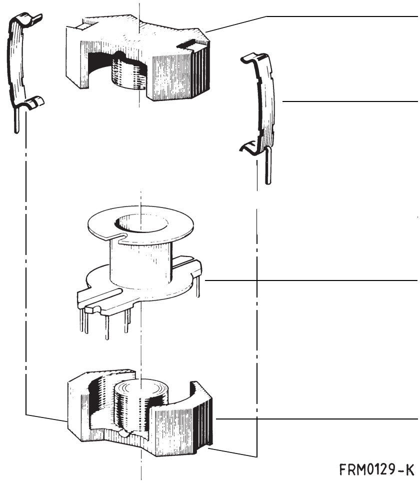
Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3700 +30/–20%	1000	< 0.62 (50 mT, 500 kHz, 100 °C)	B65813P0000R049
N92	4000 +30/–20%	1090	< 1.90 (200 mT, 100 kHz, 100 °C)	B65813P0000R092
N87	5200 +30/–20%	1410	< 1.72 (200 mT, 100 kHz, 100 °C)	B65813P0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

RM 12

Core and accessories



Example of an assembly set

Individual parts	Part no.	Page
Core	B65815	270
Clamps	B65816	273
Coil former	B65816	271
Core	B65815	270

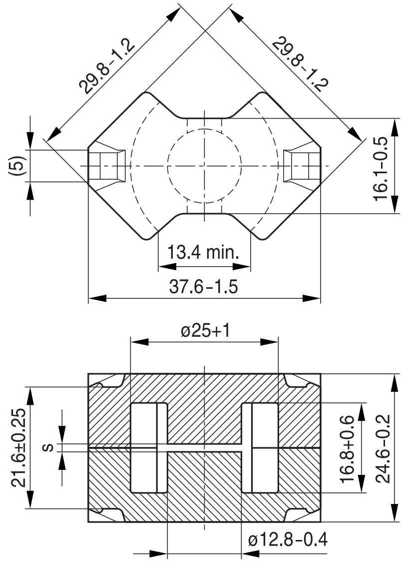
Also available:

Coil former for power applications	B65816	272
RM 12 low-profile:		
Core	B65815P	274

RM 12

Core B65815

- Optimized core cross section and increased thickness of base for power applications
- Without center hole
- Delivery mode: sets



FRM0356-U

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.39 mm^{-1}
l_e = 57 mm
A_e = 146 mm^2
A_{min} = 125 mm^2
V_e = 8320 mm^3

Approx. weight 45 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code -E without center hole
N41	160 ±3%	1.30	50	B65815E0160A041
	250 ±3%	0.70	78	B65815E0250A041
	400 ±5%	0.35	124	B65815E0400J041
	1000 ±5%	0.12	311	B65815E1000J041

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -E without center hole
N30	8700 +30/–20%	2700		B65815E0000R030
N49	3700 +30/–20%	1150	< 1.41 (50 mT, 500 kHz, 100 °C)	B65815E0000R049
N87	5300 +30/–20%	1640	< 4.50 (200 mT, 100 kHz, 100 °C)	B65815E0000R087
N97	5300 +30/–20%	1640	< 3.60 (200 mT, 100 kHz, 100 °C)	B65815E0000R097
N41	6000 +30/–20%	1860	< 1.50 (200 mT, 25 kHz, 100 °C)	B65815E0000R041

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

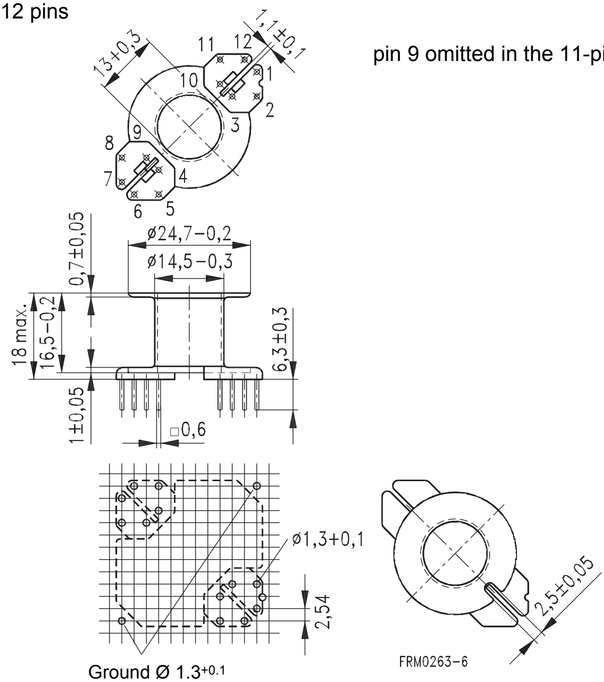
Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Pins: Squared pins
For matching clamp see page 273.

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	73	61	28.7	12 11	B65816N1012D001 B65816N1011D001

12 pins

pin 9 omitted in the 11-pin version



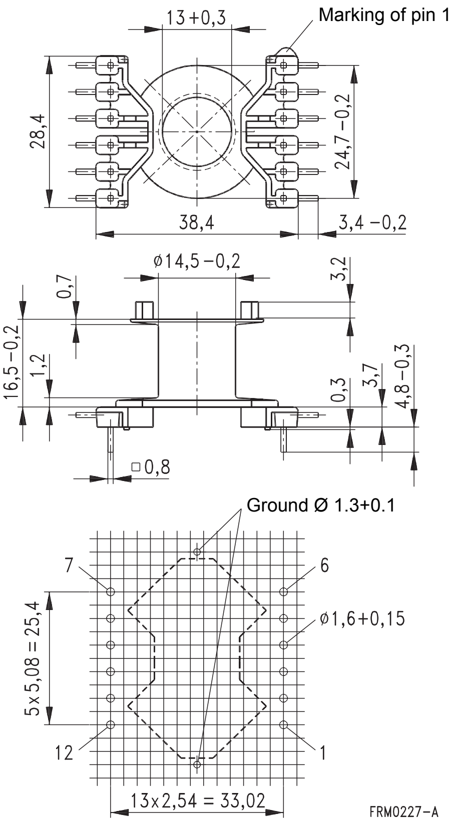
Hole arrangement
View in mounting direction

Coil former for power applications

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

For matching clamp see page 273.

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	72	61	28.7	12	B65816C1512T001

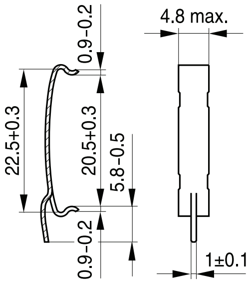


Hole arrangement
View in mounting direction
(Note half pitch!)

Clamp

- With ground terminal, made of spring steel (tinned), 0.5 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

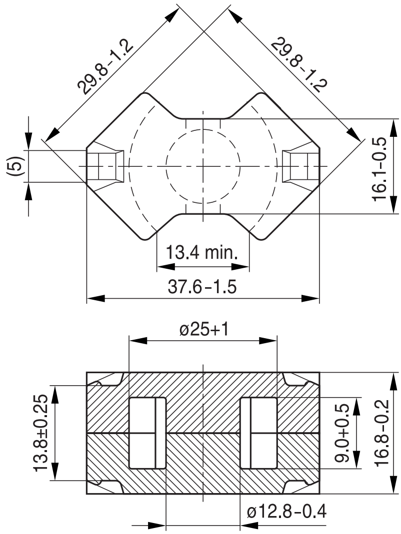
	Ordering code
Clamp (ordering code per piece, 2 are required)	B65816A2002X000



RM 12 »Low Profile«

Core **B65815P**

- For compact transformers
- Without center hole
- Delivery mode: sets



FRM0357-3

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.29 mm^{-1}
l_e = 42 mm
A_e = 147.5 mm^2
A_{min} = 124.7 mm^2
V_e = 6195 mm^3

Approx. weight 33.6 g/set

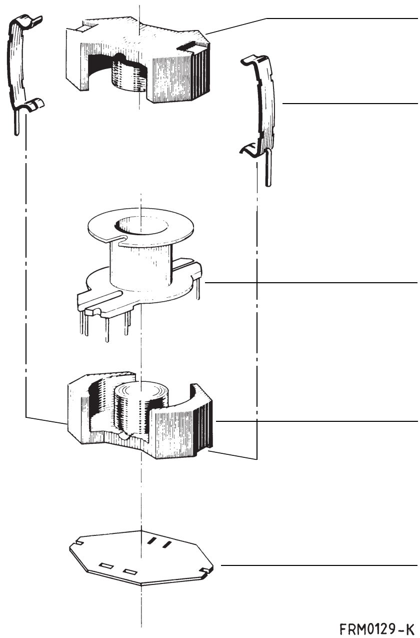
Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	4500 +30/–20%	1020	< 1.21 (50 mT, 500 kHz, 100 °C)	B65815P0000R049
N92	4800 +30/–20%	1090	< 3.70 (200 mT, 100 kHz, 100 °C)	B65815P0000R092
N87	6300 +30/–20%	1430	< 3.36 (200 mT, 100 kHz, 100 °C)	B65815P0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

RM 14

Core and accessories



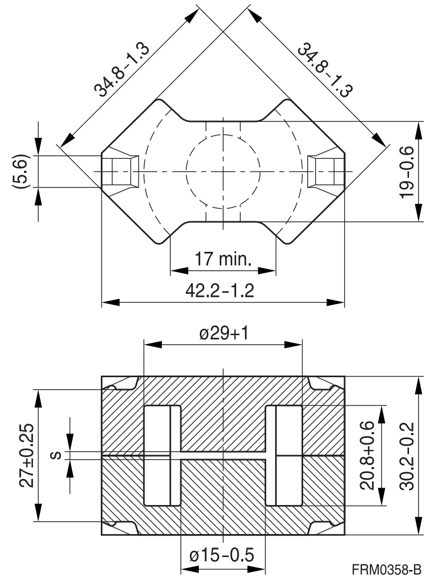
Example of an assembly set

Individual parts	Part no.	Page
Core	B65887	276
Clamps	B65888	279
Coil former	B65888	277
Core	B65887	276
Insulating washer	B65888	279

Also available:

Coil former for power applications	B65888	278
RM 14 low-profile:		
Core	B65887P	280

- To IEC 62317-4
- Optimized core cross section and increased thickness of base for power applications
- Without center hole
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.35 mm^{-1}
l_e = 70 mm
A_e = 200 mm^2
A_{min} = 170 mm^2
V_e = 14000 mm^3

Approx. weight 74 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code -E without center hole
N41	160 ±3%	1.90	45	B65887E0160A041
	250 ±3%	1.00	70	B65887E0250A041
	400 ±3%	0.50	111	B65887E0400A041
	1000 ±5%	0.15	279	B65887E1000J041

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -E without center hole
N49	3900 +30/–20%	1090	< 2.37 (50 mT, 500 kHz, 100 °C)	B65887E0000R049
N87	6000 +30/–20%	1670	< 7.40 (200 mT, 100 kHz, 100 °C)	B65887E0000R087
N97	6000 +30/–20%	1670	< 5.60 (200 mT, 100 kHz, 100 °C)	B65887E0000R097
N41	6800 +30/–20%	1890	< 2.52 (200 mT, 25 kHz, 100 °C)	B65887E0000R041

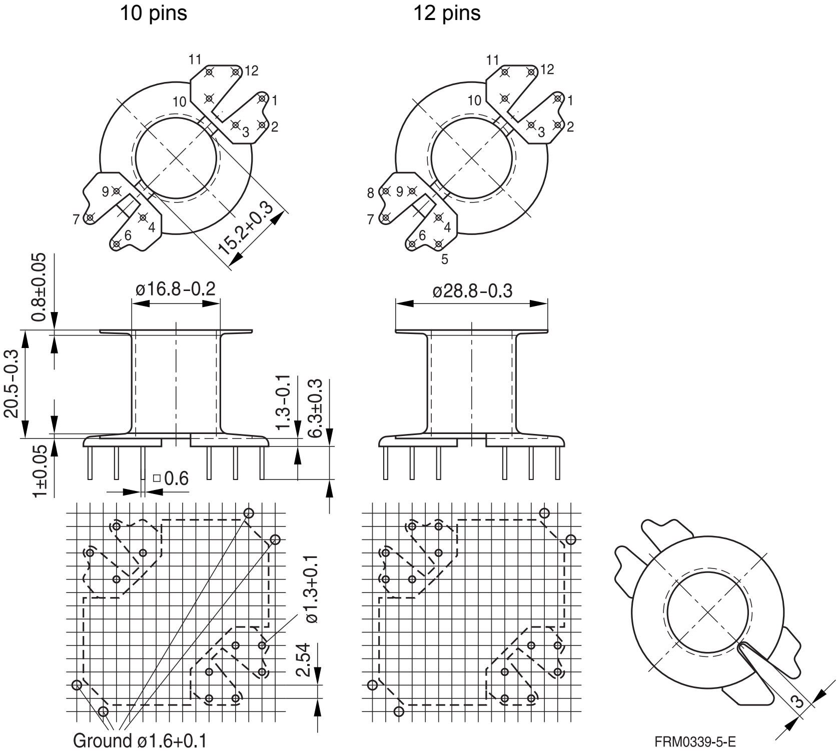
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 180 °C), color code black Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Pins: Squared pins
For matching clamp and insulating washer see page 279.

Sections	A_N mm²	l_N mm	A_R value μΩ	Pins	Ordering code
1	107	71.5	23	10 12	B65888N1010D001 B65888N1012D001



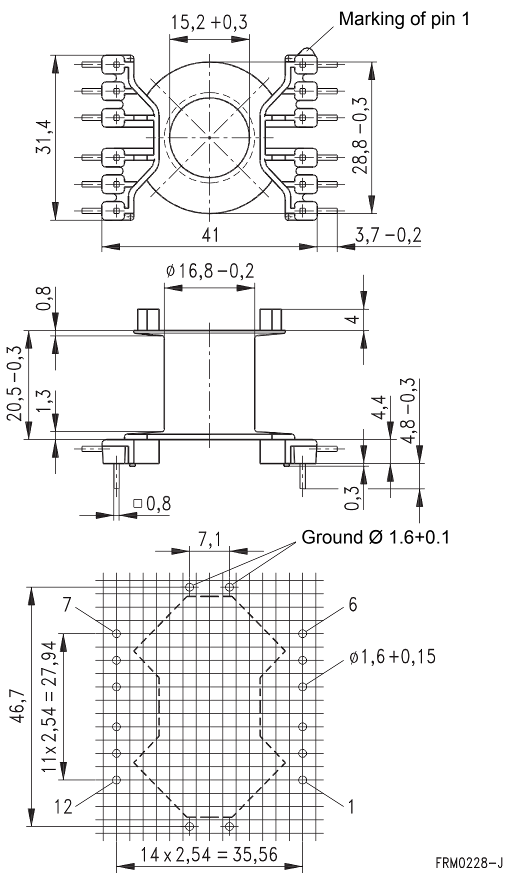
Hole arrangement
View in mounting direction

Coil former for power applications

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

For matching clamp and insulating washer see page 279.

Sections	A_N mm²	l_N mm	A_R value μΩ	Pins	Ordering code
1	106	71.5	23	12	B65888C1512T001



Hole arrangement
View in mounting direction
(Note half pitch!)

Clamp

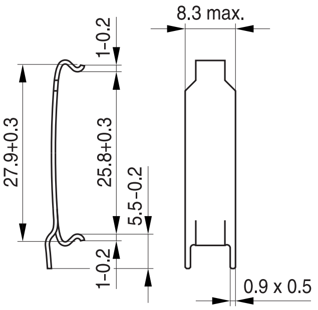
- With ground terminal, made of stainless spring steel (tinned), 0.5 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Insulating washer for double-clad PCBs

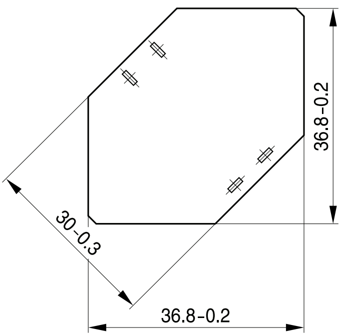
- Made of polyarylate film (UL 94 V-0, insulation class to IEC 60085: E ≙ 120 °C), 0.25 mm thick Makrofol FR7-2 [E168120 (M)], COVESTRO AG

	Ordering code
Clamp (ordering code per piece, 2 are required)	B65888A2002X000
Insulating washer (bulk)	B65888B2005X000

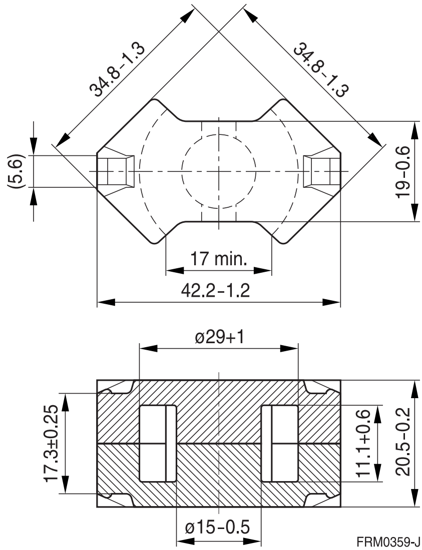
Clamp



Insulating washer



- To IEC 62317-4
- For compact transformers
- Without center hole
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.25 mm^{-1}
l_e = 50.9 mm
A_e = 201 mm^2
A_{min} = 170 mm^2
V_e = 10230 mm^3

Approx. weight 55 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	5100 +30/–20%	1030	< 2.0 (50 mT, 500 kHz, 100 °C)	B65887P0000R049
N92	5400 +30/–20%	1090	< 6.1 (200 mT, 100 kHz, 100 °C)	B65887P0000R092
N87	7100 +30/–20%	1430	< 5.5 (200 mT, 100 kHz, 100 °C)	B65887P0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

PQ cores

General information

PQ cores for switch-mode power supplies

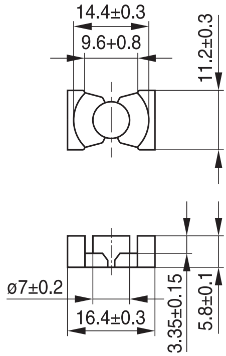
These cores are a preferred shape for power conversion. The main advantages compared to conventional round or rectangular E type cores are the optimized round leg and wider outer surface. The round leg reduces winding length and hence copper cost in production and the wider surface area lowers the thermal resistance by offering a larger area for heat dissipation. The shape also provides better shielding to the winding.

EPCOS offers the extended PQ series from PQ 16 up to PQ 40 and PQ 50 in the typical power materials (N87, N97, N95, N49 and N92). PQ cores are supplied in sets. Selected bobbins are also available.

PQ 16/11.6

Core **B65885A**

- To IEC 62317-13
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.641 mm^{-1}
l_e = 27.00 mm
A_e = 42.10 mm^2
A_{min} = 38.50 mm^2
V_e = 1140 mm^3

Approx. weight 6.0 g/set

Ungapped

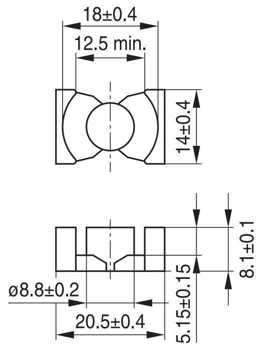
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	1900 +30/–20%	970	< 0.40 (50 mT, 500 kHz, 100 °C)	B65885A0000R049
N92	1900 +30/–20%	970	< 0.70 (200 mT, 100 kHz, 100 °C)	B65885A0000R095
N87	2350 +30/–20%	1200	< 0,70 (200 mT, 100 kHz, 100 °C)	B65885A0000R087
N97	2450 +30/–20%	1250	< 0.60 (200 mT, 100 kHz, 100 °C)	B65885A0000R097
N95	2750 +30/–20%	1400	< 0.65 (200 mT, 100 kHz, 25 °C – 100 °C) < 0.80 (200 mT, 100 kHz, 120 °C)	B65885A0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

PQ 20/16

Core **B65875B**

- To IEC 62317-13
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.588 mm^{-1}
l_e = 37.2 mm
A_e = 63.2 mm^2
A_{min} = 54.4 mm^2
V_e = 2360 mm^3

Approx. weight 13 g/set

Ungapped

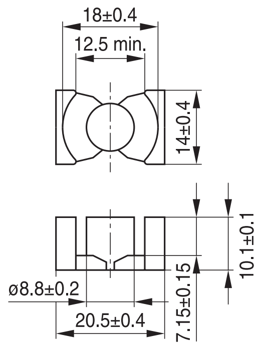
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	2400 +30/–20%	1105	< 0.75 (50 mT, 500 kHz, 100 °C)	B65875B0000R049
N92	2400 +30/–20%	1105	< 1.45 (200 mT, 100 kHz, 100 °C)	B65875B0000R092
N87	3100 +30/–20%	1430	< 1.40 (200 mT, 100 kHz, 100 °C)	B65875B0000R087
N97	3200 +30/–20%	1475	< 1.25 (200 mT, 100 kHz, 100 °C)	B65875B0000R097
N95	3750 +30/–20%	1730	< 1.35 (200 mT, 100 kHz, 25 °C – 100 °C) < 1.62 (200 mT, 100 kHz, 120 °C)	B65875B0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

PQ 20/20

Core **B65875A**

- To IEC 62317-13
- Delivery mode: sets



FPK0471-U

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.718 mm^{-1}
l_e = 45.20 mm
A_e = 62.90 mm^2
A_{min} = 54.40 mm^2
V_e = 2850 mm^3

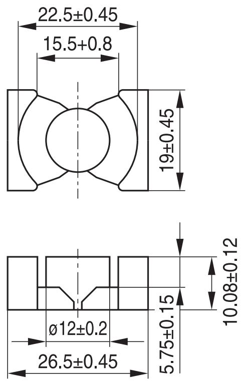
Approx. weight 15.6 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	2000 +30/–20%	1150	< 0.90 (50 mT, 500 kHz, 100 °C)	B65875A0000R049
N87	2650 +30/–20%	1515	< 1.65 (200 mT, 100 kHz, 100 °C)	B65875A0000R087
N97	2750 +30/–20%	1565	< 1.50 (200 mT, 100 kHz, 100 °C)	B65875A0000R097
N95	3300 +30/–20%	1860	< 1.60 (200 mT, 100 kHz, 25 °C – 100 °C) < 1.92 (200 mT, 100 kHz, 120 °C)	B65875A0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

- To IEC 62317-13
- Delivery mode: sets



FPK0472-3

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.362 mm^{-1}
l_e = 44.4 mm
A_e = 122.6 mm^2
A_{min} = 108.8 mm^2
V_e = 5440 mm^3

Approx. weight 31 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3850 +30/–20%	1110	< 1.90 (50 mT, 500 kHz, 100 °C)	B65877B0000R049
N92	3850 +30/–20%	1110	< 3.70 (200 mT, 100 kHz, 100 °C)	B65877B0000R092
N87	5000 +30/–20%	1440	< 3.20 (200 mT, 100 kHz, 100 °C)	B65877B0000R087
N97	5150 +30/–20%	1480	< 2.70 (200 mT, 100 kHz, 100 °C)	B65877B0000R097
N95	6300 +30/–20%	1820	< 3.00 (200 mT, 100 kHz, 25 °C – 100 °C) < 3.60 (200 mT, 100 kHz, 120 °C)	B65877B0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

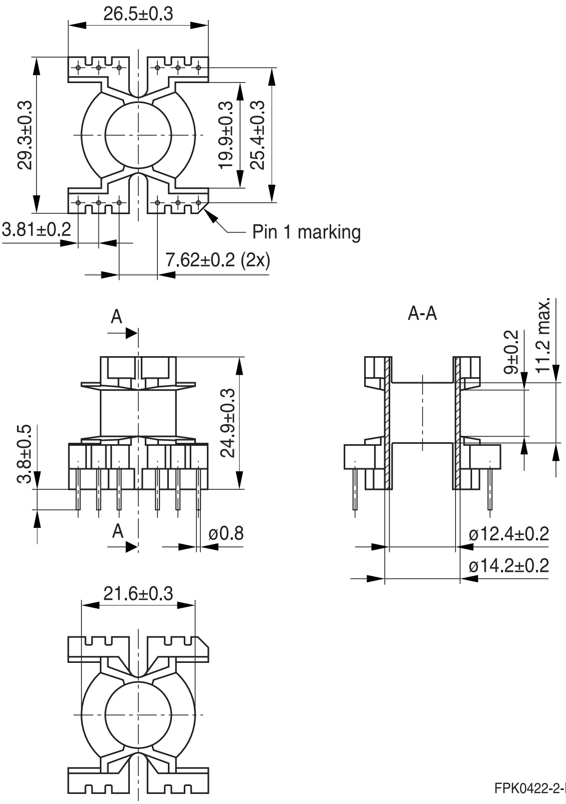
Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9820® [E41429 (M)], SUMITOMO BAKELITE CO LTD

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Sections	A_N mm²	l_N mm	A_R value μΩ	Terminals	Ordering code
1	33	56	58	12	B65878E0012D001

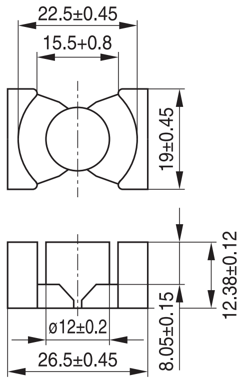


FPK0422-2-E

PQ 26/25

Core **B65877A**

- To IEC 62317-13
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.438 mm^{-1}
l_e = 53.5 mm
A_e = 122.2 mm^2
A_{min} = 108.8 mm^2
V_e = 6540 mm^3

Approx. weight 36 g/set

Ungapped

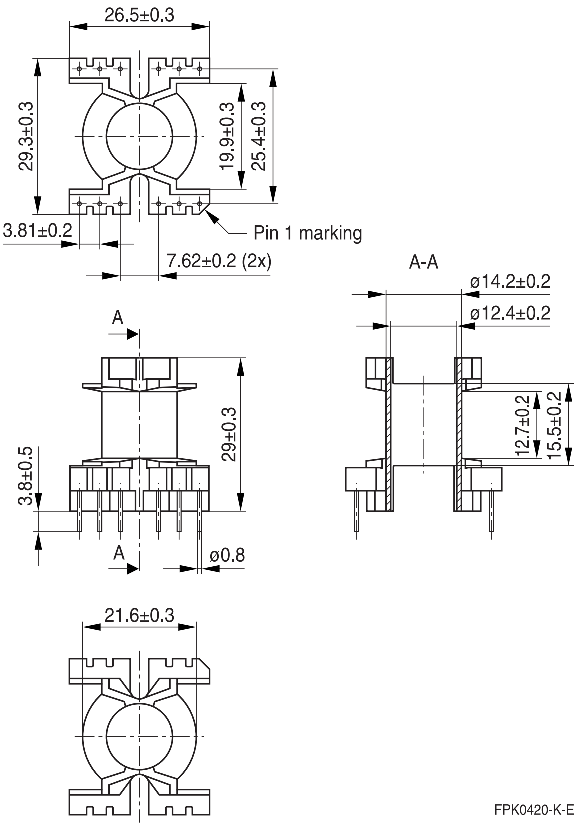
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3300 +30/–20%	1235	< 2.30 (50 mT, 500 kHz, 100 °C)	B65877A0000R049
N87	4500 +30/–20%	1550	< 3.75 (200 mT, 100 kHz, 100 °C)	B65877A0000R087
N97	4650 +30/–20%	1620	< 3.30 (200 mT, 100 kHz, 100 °C)	B65877A0000R097
N95	5700 +30/–20%	1980	< 3.60 (200 mT, 100 kHz, 25 °C – 100 °C) < 4.32 (200 mT, 100 kHz, 120 °C)	B65877A0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9820® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

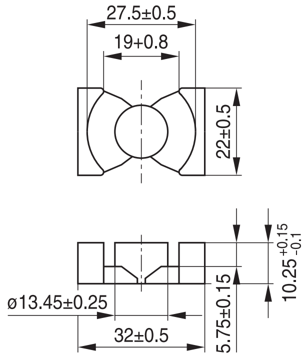
Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	47	56	41	12	B65878E1012D001



PQ 32/20

Core B65879A

- To IEC 62317-13
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.314 mm^{-1}
l_e = 48.4 mm
A_e = 154.2 mm^2
A_{min} = 127.5 mm^2
V_e = 7460 mm^3

Approx. weight 41 g/set

Ungapped

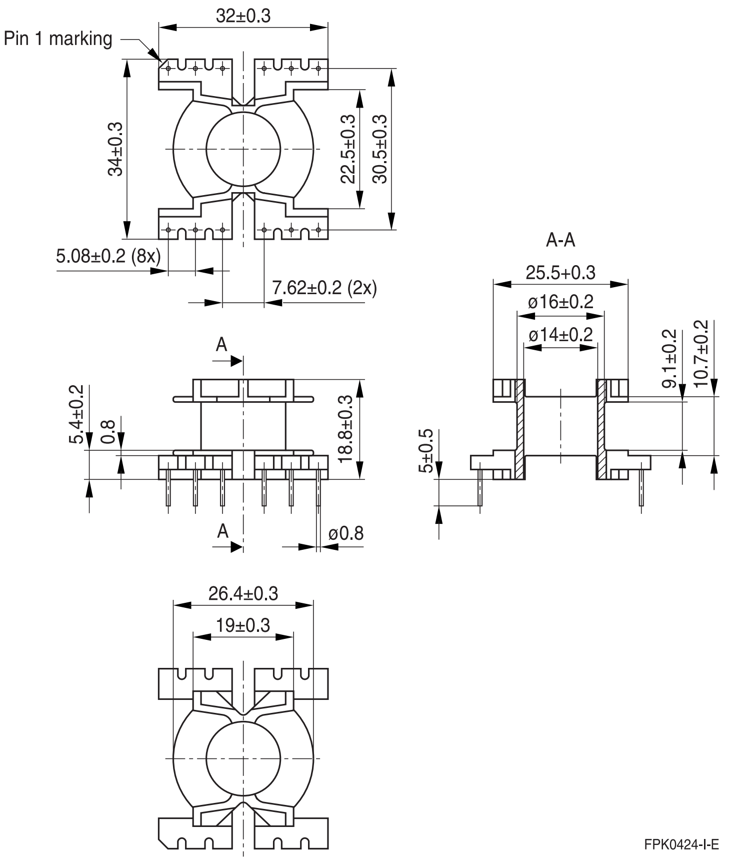
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	4600 +30/–20%	1150	< 2.65 (50 mT, 500 kHz, 100 °C)	B65879A0000R049
N87	6300 +30/–20%	1580	< 5.50 (200 mT, 100 kHz, 100 °C)	B65879A0000R087
N97	6500 +30/–20%	1625	< 4.60 (200 mT, 100 kHz, 100 °C)	B65879A0000R097
N95	7600 +30/–20%	1895	< 4.70 (200 mT, 100 kHz, 25 °C – 100 °C) < 5.64 (200 mT, 100 kHz, 120 °C)	B65879A0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

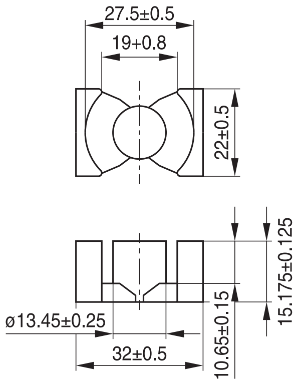
Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9820® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	47	66	48	12	B65880E0012D001



- To IEC 62317-13
- Delivery mode: sets



FPK0475-S

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.441 mm^{-1}
l_e = 67.80 mm
A_e = 153.8 mm^2
A_{min} = 127.5 mm^2
V_e = 10440 mm^3

Approx. weight 57.4 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3450 +30/–20%	1210	< 3.65 (50 mT, 500 kHz, 100 °C)	B65879B0000R049
N87	4800 +30/–20%	1700	< 7.00 (200 mT, 100 kHz, 100 °C)	B65879B0000R087
N97	5000 +30/–20%	1760	< 5.80 (200 mT, 100 kHz, 100 °C)	B65879B0000R097
N95	6100 +30/–20%	2140	< 6.30 (200 mT, 100 kHz, 25 °C – 100 °C) < 7.56 (200 mT, 100 kHz, 120 °C)	B65879B0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

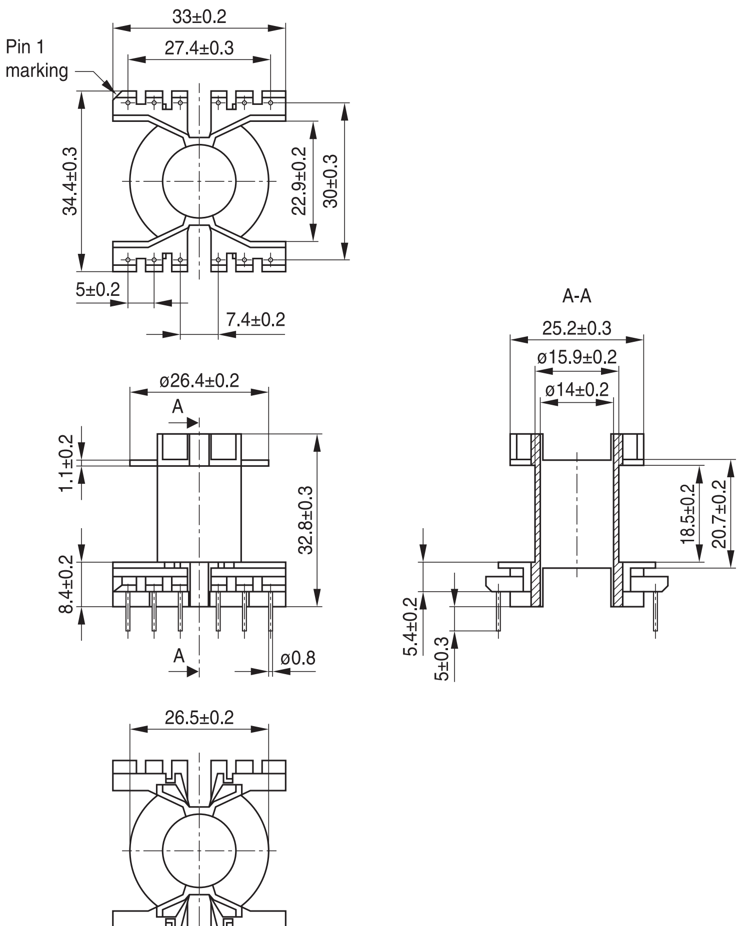
Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9820® [E41429 (M)], SUMITOMO BAKELITE CO LTD

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	104	62	21	12	B65880E2012D001

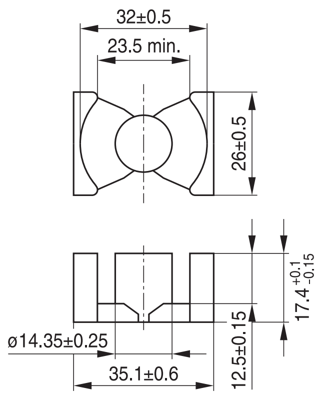


FPK0483-I-E

PQ 35/35

Core **B65881A**

- To IEC 62317-13
- Delivery mode: sets



FPK0476-1

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.465 mm^{-1}
l_e = 79.7 mm
A_e = 171 mm^2
A_{min} = 161 mm^2
V_e = 13650 mm^3

Approx. weight 74 g/set

Ungapped

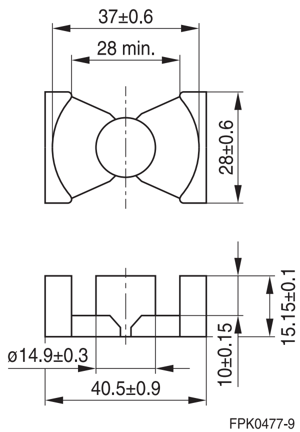
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3300 +30/–20%	1225	< 3.75 (50 mT, 500 kHz, 100 °C)	B65881A0000R049
N92	3300 +30/–20%	1225	< 10.50 (200 mT, 100 kHz, 100 °C)	B65881A0000R092
N87	4500 +30/–20%	1670	< 8.75 (200 mT, 100 kHz, 100 °C)	B65881A0000R087
N97	4700 +30/–20%	1750	< 7.10 (200 mT, 100 kHz, 100 °C)	B65881A0000R097
N95	5700 +30/–20%	2120	< 7.92 (200 mT, 100 kHz, 25 °C – 100 °C) < 9.50 (200 mT, 100 kHz, 120 °C)	B65881A0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

PQ 40/30

Core **B65883B**

- To IEC 62317-13
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.389 mm^{-1}
l_e = 74.10 mm
A_e = 190.4 mm^2
A_{min} = 174.4 mm^2
V_e = 14120 mm^3

Approx. weight 74 g/set

Ungapped

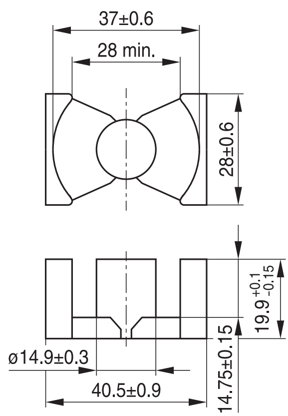
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3900 +30/–20%	1210	< 3.80 (50 mT, 500 kHz, 100 °C)	B65883B0000R049
N92	3900 +30/–20%	1210	< 2.50 (100 mT, 100 kHz, 100 °C)	B65883B0000R092
N87	5200 +30/–20%	1615	< 1.50 (100 mT, 100 kHz, 100 °C)	B65883B0000R087
N97	5300 +30/–20%	1650	< 1.40 (100 mT, 100 kHz, 100 °C)	B65883B0000R097
N95	6500 +30/–20%	2020	< 1.56 (100 mT, 100 kHz, 25 °C) < 1.45 (100 mT, 100 kHz, 50 °C – 100 °C) < 1.70 (100 mT, 100 kHz, 120 °C)	B65883B0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

PQ 40/40

Core **B65883A**

- To IEC 62317-13
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.492 mm^{-1}
l_e = 93 mm
A_e = 189 mm^2
A_{min} = 174 mm^2
V_e = 17580 mm^3

Approx. weight 90 g/set

Ungapped

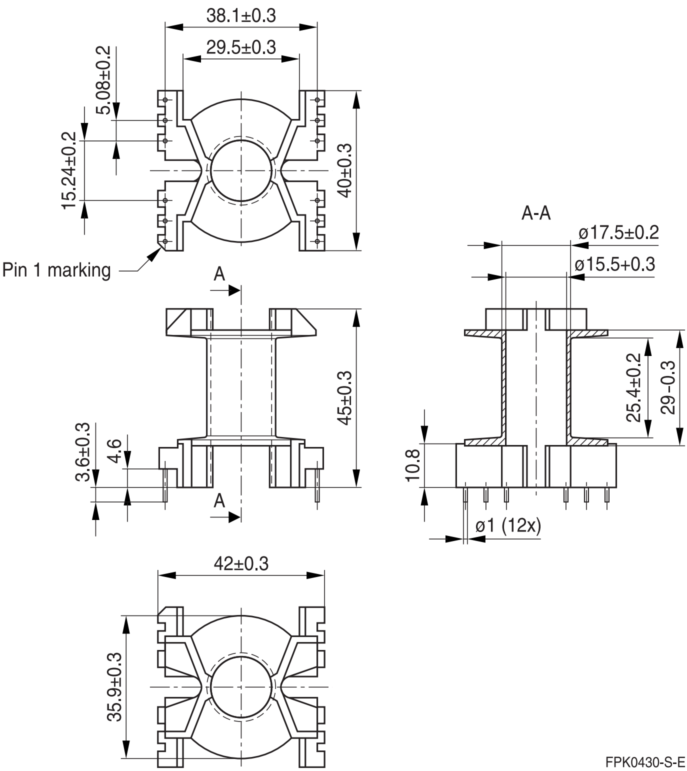
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3200 +30/–20%	1250	< 4.80 (50 mT, 500 kHz, 100 °C)	B65883A0000R049
N92	3200 +30/–20%	1250	< 3.10 (100 mT, 100 kHz, 100 °C)	B65883A0000R092
N87	4300 +30/–20%	1680	< 1.80 (100 mT, 100 kHz, 100 °C)	B65883A0000R087
N97	4500 +30/–20%	1755	< 1.65 (100 mT, 100 kHz, 100 °C)	B65883A0000R097
N95	5500 +30/–20%	2145	< 1.95 (100 mT, 100 kHz, 25 °C) < 1.75 (100 mT, 100 kHz, 50 °C – 100 °C) < 2.10 (100 mT, 100 kHz, 120 °C)	B65883A0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

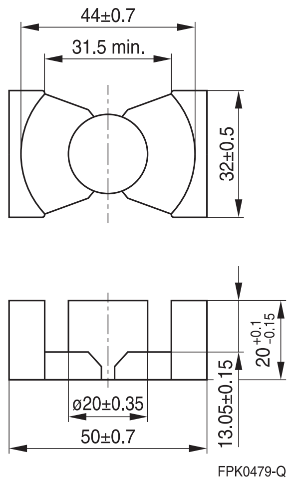
Material: PMC thermosetting plastics (UL 94 V-0), color code black,
Phenolic T375 J [E59481 (M)], CHANG CHUN PLASTICS CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	309	87	10	12	B65884E0012D001



Core **B65981B**

- To IEC 62317-13
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.280 mm^{-1}
l_e = 93 mm
A_e = 334 mm^2
A_{min} = 314 mm^2
V_e = 31250 mm^3

Approx. weight 170 g/set

Ungapped

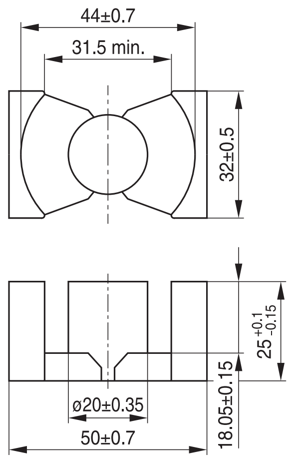
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N92	5500 +30/–20%	1240	< 5.40 (100 mT, 100 kHz, 100 °C)	B65981B0000R092
N87	7600 +30/–20%	1710	< 3.20 (100 mT, 100 kHz, 100 °C)	B65981B0000R087
N97	7800 +30/–20%	1760	< 2.90 (100 mT, 100 kHz, 100 °C)	B65981B0000R097
N95	9400 +30/–20%	2120	< 3.70 (100 mT, 100 kHz, 25 °C – 100 °C) < 4.50 (100 mT, 100 kHz, 120 °C)	B65981B0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

PQ 50/50

Core **B65981A**

- To IEC 62317-13
- Delivery mode: sets



FPK0480-T

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.342 mm^{-1}
l_e = 113.0 mm
A_e = 332 mm^2
A_{min} = 314 mm^2
V_e = 37630 mm^3

Approx. weight 190 g/set

Ungapped

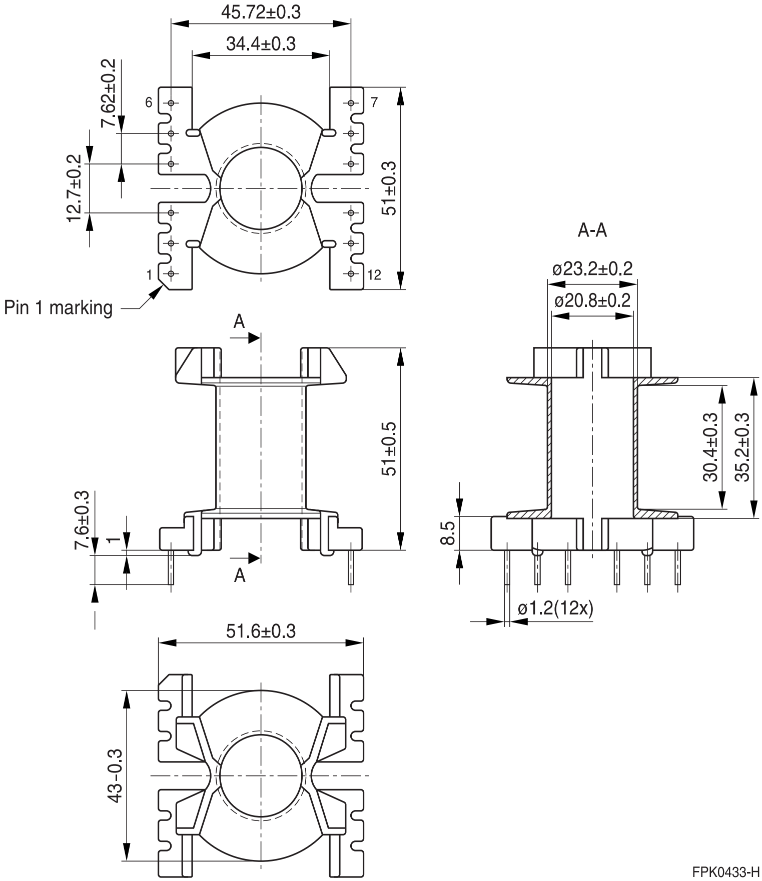
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N92	4700 +30/–20%	1280	< 6.50 (100 mT, 100 kHz, 100 °C)	B65981A0000R092
N87	6500 +30/–20%	1770	< 3.80 (100 mT, 100 kHz, 100 °C)	B65981A0000R087
N97	6700 +30/–20%	1825	< 3.50 (100 mT, 100 kHz, 100 °C)	B65981A0000R097
N95	8200 +30/–20%	2230	< 4.50 (100 mT, 100 kHz, 50 °C – 100 °C) < 5.40 (100 mT, 100 kHz, 120 °C)	B65981A0000R095

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: PMC thermosetting plastics (UL 94 V-0), color code black,
Phenolic T375 J [E59481 (M)], CHANG CHUN PLASTICS CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Sections	A_N mm²	l_N mm	A_R value μΩ	Terminals	Ordering code
1	340	100.5	10.2	12	B65982E0012D001



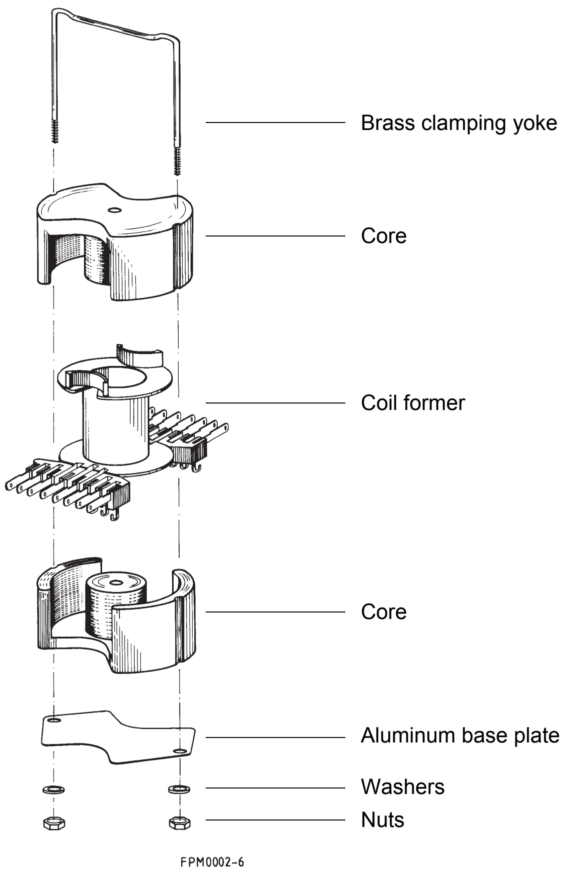
FPK0433-H

PM cores are particularly suitable for use in transformers handling high powers in the frequency range up to 300 kHz. For numerous design tasks in telecommunications and industrial electronics (e.g. power pulse transformers in radar transmitters, antenna matching networks, machine control systems, thyristor firing transformers, energy storage chokes in switch-mode power supply equipment and others), the pot core shape offers various advantages: wide flux area for high power at a minimum number of turns, thus causing only low magnetic leakage and stray capacitance, as well as good shielding owing to the closed form, precisely ground air gaps, straightforward assembly and economic mounting.

A family of large pot cores, briefly designated PM cores (for **P**ot core **M**odule), is presented in the following.

Due to the weight of these pot cores, particularly in the case of the large cores 87/70 and 114/93, mounting on PC boards may not always be possible. In these cases, the coil former should be mounted with its terminals upwards.

Example of an assembly set
PM 74/59



1 Core losses

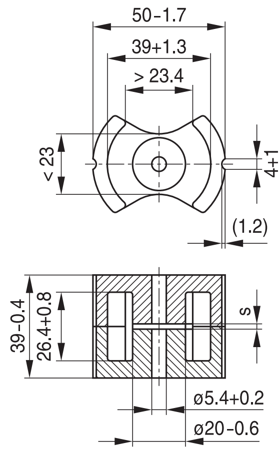
For each core type, the maximum dissipation loss is specified in W/set with the relevant measurement parameters. The flux density has been calculated on the basis of a sinusoidal voltage and is referred to the minimum cross-sectional area A_{min}.

2 Tightening torque

When using the mounting assembly, the torques for tightening the nuts (without printed circuit board) are as follows:

Type	Torque Nm
PM 50/39	0.4
PM 62/49	0.6
PM 74/59	0.8
PM 87/70	1.0
PM 114/93	1.2

■ To IEC 61247
■ Particularly suitable for power transformers and energy storage chokes
■ Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.227 mm^{-1}
l_e = 84 mm
A_e = 370 mm^2
A_{min} = 280 mm^2
V_e = 31000 mm^3

Approx. weight 140 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N27	250 ±3%	2.00	45	B65646A0250A027
	630 ±3%	0.63	114	B65646A0630A027

Ungapped

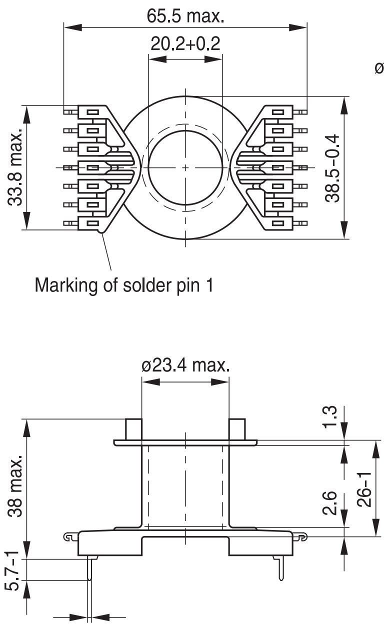
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	7400 +30/–20%	1340	< 4.2 (200 mT, 25 kHz, 100 °C)	B65646A0000R027
N87	7400 +30/–20%	1340	< 15.5 (200 mT, 100 kHz, 100 °C)	B65646A0000R087
N97	7400 +30/–20%	1340	< 13.3 (200 mT, 100 kHz, 100 °C)	B65646A0000R097

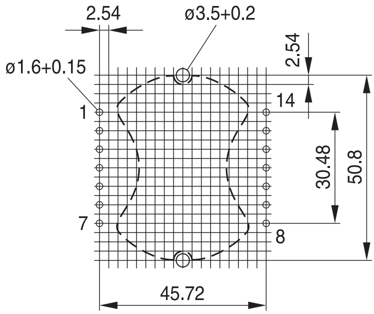
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value µΩ	Solder pins	Ordering code
1	154	96.8	21.6	14	B65647B1014T001





Hole arrangement view
in mounting direction

FPM0019-1-E

Mounting assembly

- For chassis mounting[1)] or printed circuit boards
- The set comprises a yoke and a base plate
- Fixing nuts M3 and washers are supplied

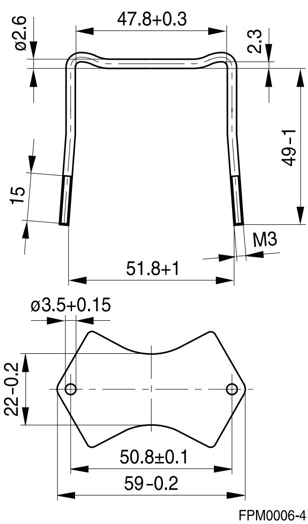
Yoke

- Material: Brass clamping yoke (∅ 2.6 mm) with thread

Base plate

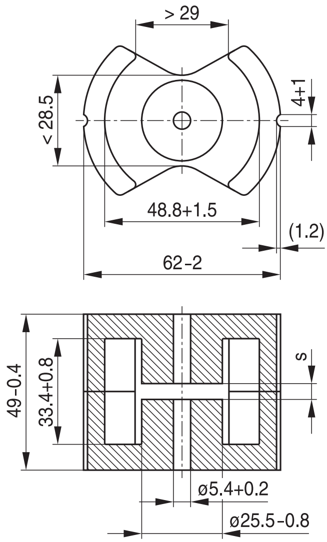
- Material: Aluminum (0.6 mm)

	Ordering code
Complete mounting assembly including nuts and washers	B65647A2000X000



1) On a chassis the coil former must be mounted with its solder pins upward.

- To IEC 61247
- Particularly suitable for power transformers and energy storage chokes
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.191 mm^{-1}
l_e = 109 mm
A_e = 570 mm^2
A_{min} = 470 mm^2
V_e = 62000 mm^3

Approx. weight 280 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N27	315 ±3% 630 ±3%	2.60 1.10	48 95	B65684A0315A027 B65684A0630A027

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	9200 +30/–20%	1400	< 9.5 (200 mT, 25 kHz, 100 °C)	B65684A0000R027
N87	9200 +30/–20%	1400	< 5.8 (100 mT, 100 kHz, 100 °C)	B65684A0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

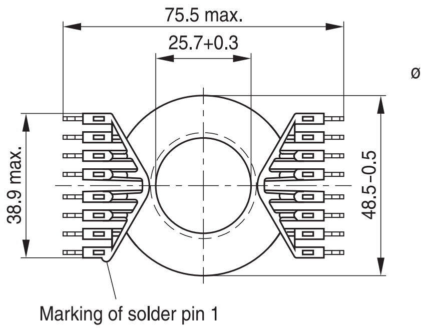
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

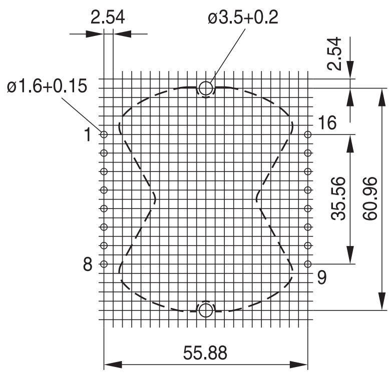
Winding: see Processing notes, 2.1

Pins: Pins squared in the start-of-winding area

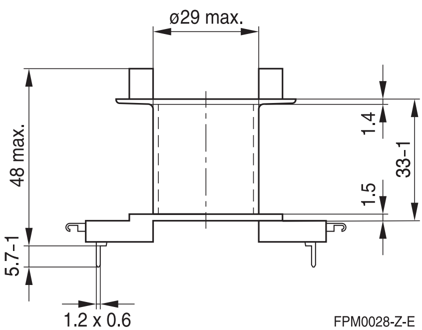
Also available without solder pins.

Sections	A_N mm²	l_N mm	A_R value µΩ	Solder pins	Ordering code
1	270	120	15.4	16	B65685B1016T001
1	270	120	15.4	—	B65685A1000T001





Hole arrangement
View in mounting direction



FPM0028-Z-E

Mounting assembly

- For chassis mounting[1)] or printed circuit boards
- The set comprises a yoke and a base plate
- Fixing nuts M3 and washers are supplied

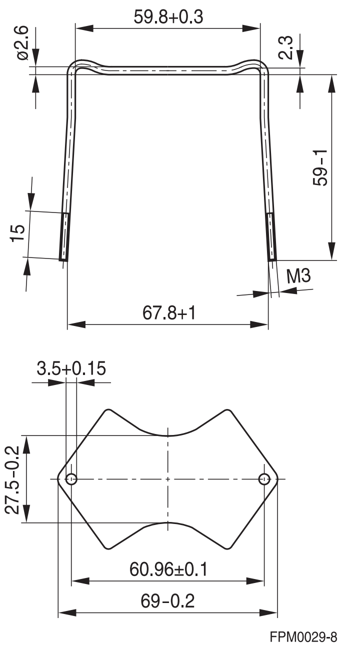
Yoke

- Material: Brass clamping yoke (∅ 2.6 mm) with thread

Base plate

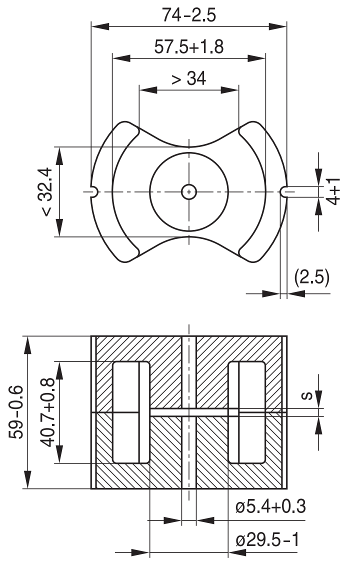
- Material: Aluminum (0.6 mm)

	Ordering code
Complete mounting assembly including nuts and washers	B65685A2000X000



1) On a chassis the coil former must be mounted with its solder pins upward.

- To IEC 61247
- Particularly suitable for power transformers and energy storage chokes
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.162 mm^{-1}
l_e = 128 mm
A_e = 790 mm^2
A_{min} = 630 mm^2
V_e = 101000 mm^3

Approx. weight 460 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N27	315 ±3% 630 ±3%	3.80 1.50	41 81	B65686A0315A027 B65686A0630A027

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	10000 +30/–20%	1290	< 7.5 (150 mT, 25 kHz, 100 °C)	B65686A0000R027
N87	10000 +30/–20%	1290	< 9.6 (100 mT, 100 kHz, 100 °C)	B65686A0000R087

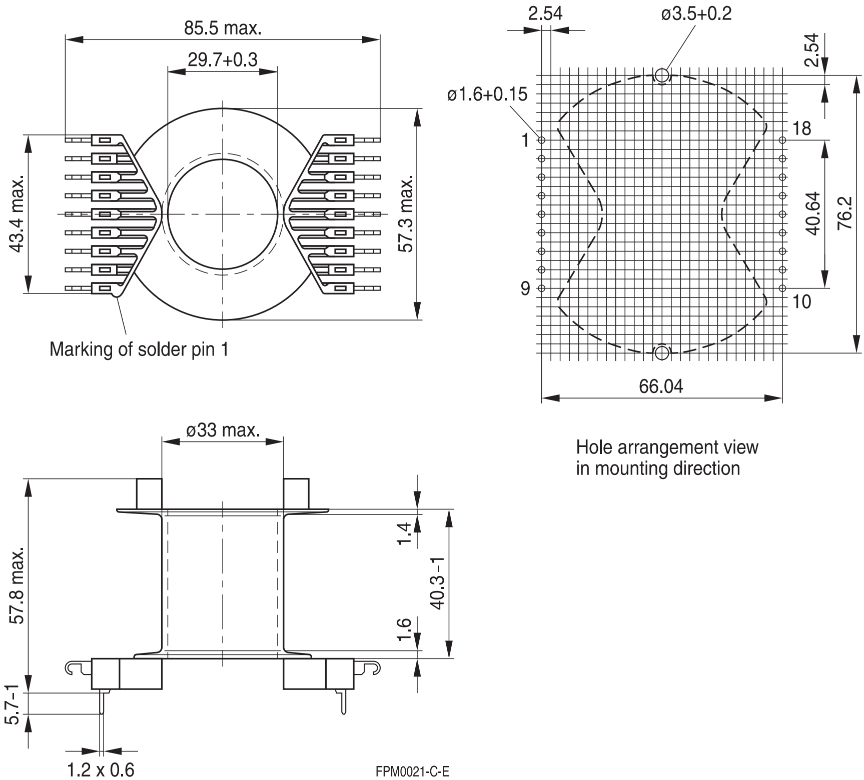
Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Also available without solder pins.

Sections	A_N mm²	l_N mm	A_R value µΩ	Solder pins	Ordering code
1	442	140	10.9	18	B65687A1018T001
1	442	140	10.9	—	B65687A1000T001



Mounting assembly

- For chassis mounting[1)] or printed circuit boards
- The set comprises a yoke and a base plate
- Fixing nuts M3 and washers are supplied

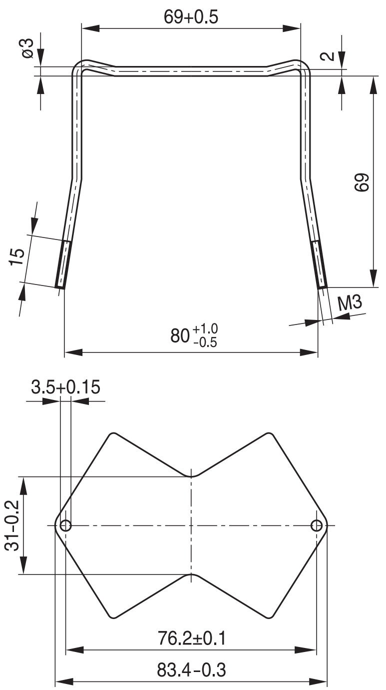
Yoke

- Material: Brass clamping yoke (∅ 3 mm) with thread

Base plate

- Material: Aluminum (0.6 mm)

	Ordering code
Complete mounting assembly including nuts and washers	B65687A2000X000



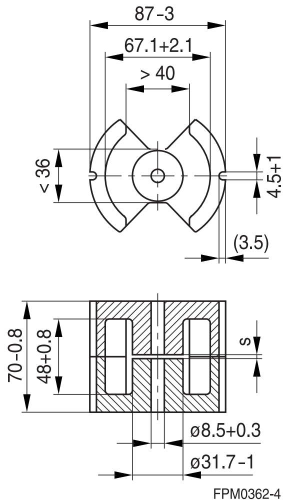
FPM0030-B

1) On a chassis the coil former must be mounted with its solder pins upward.

PM 87/70

Core **B65713**

- To IEC 61247
- For power transformers >1 kW (20 kHz) and energy storage chokes
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.16 mm^{-1}
l_e = 146 mm
A_e = 910 mm^2
A_{min} = 700 mm^2
V_e = 133000 mm^3

Approx. weight 770 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N27	400 ± 3% 5000 ±15%	3.50 0.14	51 638	B65713A0400A027 B65713A5000L027

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	12000 +30/–20%	1530	< 12.4 (150 mT, 25 kHz, 100 °C)	B65713A0000R027
N87	12000 +30/–20%	1530	< 8.0 (100 mT, 100 kHz, 100 °C)	B65713A0000R087

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E45329 (M)] SABIC INNOVATIVE PLASTICS B V

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

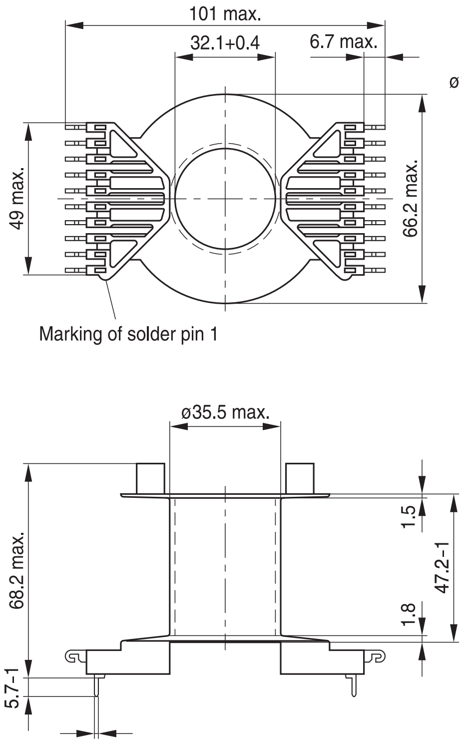
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

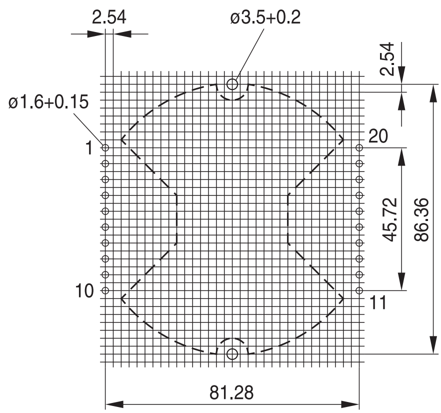
Winding: see Processing notes, 2.1

Pins: Pins squared in the start-of-winding area

Also available without solder pins.

Sections	A_N mm²	l_N mm	A_R value µΩ	Solder pins	Ordering code
1	657	158	8.27	20	B65714K1020T001
1	657	158	8.27	—	B65714J1000T001

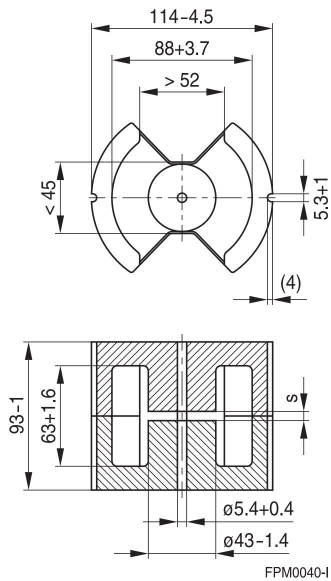




Hole arrangement view in mounting direction

FPM0022-K-E

- To IEC 61247
- For power transformers
  >1 kW (20 kHz) and energy storage chokes
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.116 mm^{-1}
l_e = 200 mm
A_e = 1720 mm^2
A_{min} = 1380 mm^2
V_e = 344000 mm^3

Approx. weight 1940 g/set

Gapped (AL values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N27	630 ± 3% 6300 ±15%	3.80 0.22	58 583	B65733A0630A027 B65733A6300L027

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	16000 +30/–20%	1480	< 14.0 (100 mT, 25 kHz, 100 °C)	B65733A0000R027
N87	16000 +30/–20%	1480	< 10.0 (50 mT, 100 kHz, 100 °C)	B65733A0000R087

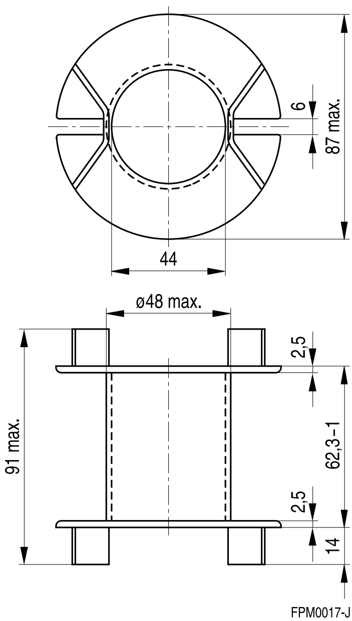
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former without solder pins

Material: Polyphenylene sulphide (UL 94 V-0, insulation class to IEC 85:
F ≙ max. operating temperature 155 °C), color code black
Ryton R-4-230 [E95746 (M)] SOLVAY SPECIALITY POLYMERS

Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value μΩ	Ordering code
1	1070	210	6.75	B65734B1000T001



EP, EPX, EPO cores

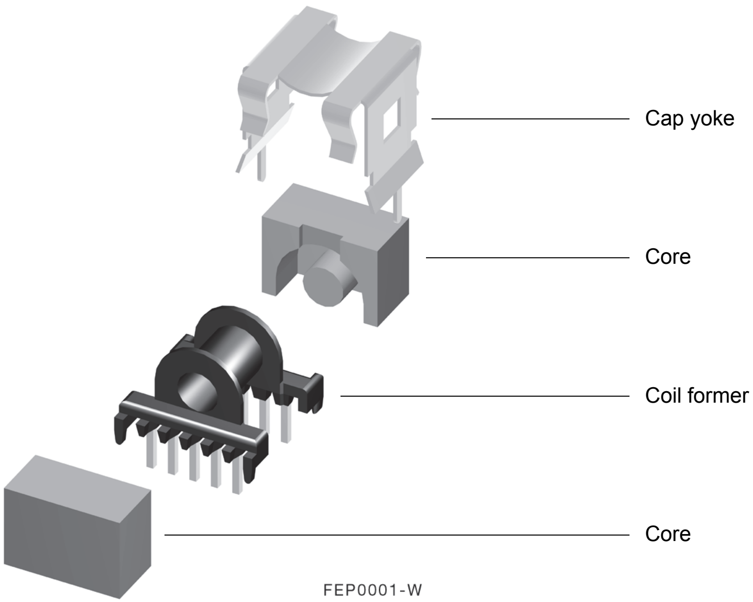
General information

EP, EPX and EPO cores are typically used for transformer applications. Their cubic shape provides an excellent volume ratio to total space used and permits high PCB packing densities. The compact design and the broadband materials used (N30, T38, T57, T65 and T66) ensure low magnetic leakage, low signal distortion and excellent properties for broadband small-signal transmission (xDSL).

EP cores are increasingly being used for power applications. Here we recommend the series EP 7 through EP 20 made of N87 for operation up to about 300 kHz.

Matching pinned and SMD coil formers suitable for automatic processing and shielding accessories (yoke, clamp or cap yoke) complete the product line.

1 Example of an assembly set EP 13



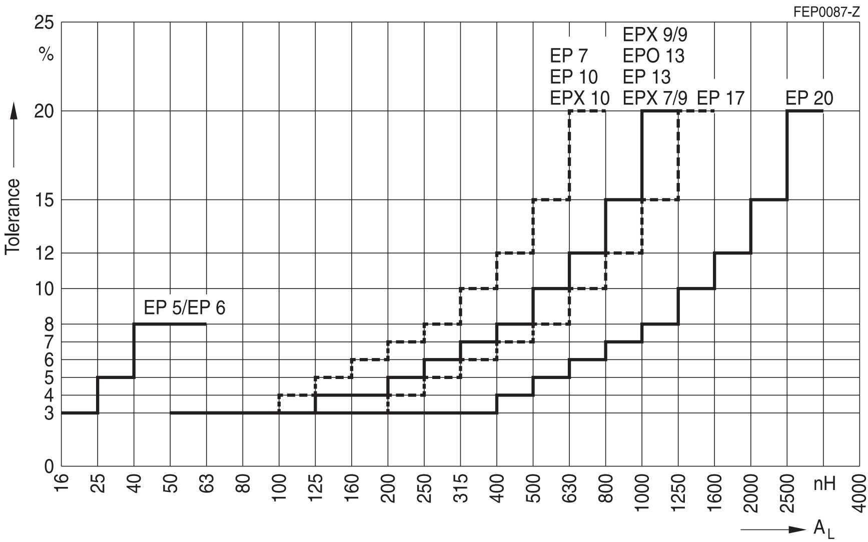
2 Core losses

The maximum dissipation loss for each core type employing power materials is specified in W/set together with the measurement parameters. The flux density has been calculated on the basis of a sinusoidal voltage and is referred to the minimum cross-sectional area A_{min}.

3 Tolerance for EP cores

The A_L value tolerances for EP cores have consequently been defined with consideration of optimized process parameters for all materials with an initial permeability μ_i in the region of 1400 to 15000 as a step function (see figure below).

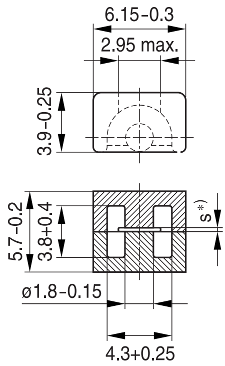
The "quantized" A_L step values should preferably be used. They are still available in their respective lower tolerance ranges. Thus a tolerance of ±5% can be determined for an EP 13 made of T38 material for an A_L value of 250 nH.



EP 5

Core B65855A

- For small interface transformers and filter chokes
- Suitable for high precise feedthrough gapping
- Same footprint as EE 5
- A_L value increases about 40% against EE 5
- Winding area larger than EE 5
- Delivery mode: sets



*) gapped (one-sided)

FRM0363-C-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 3.149 mm^{-1}
l_e = 9.73 mm
A_e = 3.09 mm^2
A_{min} = 2.30 mm^2
V_e = 30 mm^3

Approx. weight 0.5 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	μ_e	s approx. mm	Ordering code
T38	16 ±3%	40	0.24	B65855A0016A038
	25 ±3%	63	0.15	B65855A0025A038
	40 ±5%	100	0.10	B65855A0040J038
	63 ±8%	158	0.06	B65855A0063D038

Ungapped

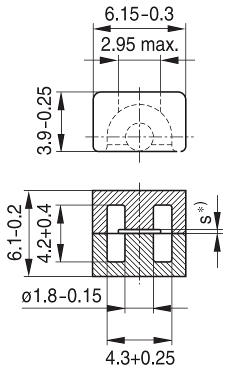
Material	A_L value nH	μ_e	Ordering code
N49	350 +30/–20%	880	B65855A0000R049
N92	350 +30/–20%	880	B65855A0000R092
N87	430 +30/–20%	1100	B65855A0000R087
N45	550 +30/–20%	1380	B65855A0000R045
T57	560 +30/–20%	1400	B65855A0000R057
T38	2000 +40/–30%	5000	B65855A0000Y038
T66	2200 +40/–30%	5500	B65855A0000Y066

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

EP 6

Core **B65855B**

- For small interface transformers and filter chokes
- Suitable for high precise feedthrough gapping
- Same footprint as EE 5
- Winding area larger than EE 5
- Delivery mode: sets



*) gapped (one-sided)

FEP0071-G-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 3.359 mm^{-1}
l_e = 10.28 mm
A_e = 3.06 mm^2
A_{min} = 2.30 mm^2
V_e = 31 mm^3

Approx. weight 0.6 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	μ_e	s approx. mm	Ordering code
T38	16 ±3%	43	0.24	B65855B0016A038
	25 ±3%	67	0.15	B65855B0025A038
	40 ±5%	107	0.10	B65855B0040J038
	63 ±8%	168	0.06	B65855B0063D038

Ungapped

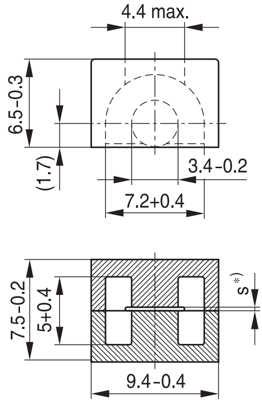
Material	A_L value nH	μ_e	Ordering code
N92	340 +30/–20%	910	B65855B0000R092
N87	410 +30/–20%	1100	B65855B0000R087
N45	530 +30/–20%	1400	B65855B0000R045
T57	900 +30/–20%	2400	B65855B0000R057
T66	1700 +40/–30%	4500	B65855B0000Y066
T38	1900 +40/–30%	5100	B65855B0000Y038

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

EP 7

Core B65839

- To IEC 62317-5
- For transformers featuring high inductance and low overall height
- For power applications
- Delivery mode: sets



*) gapped (one-sided)

FEP0073-J-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.52 mm^{-1}
l_e = 15.7 mm
A_e = 10.3 mm^2
A_{min} = 8.5 mm^2
V_e = 162 mm^3

Approx. weight 1.4 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
T38	63 ±3%	0.20	76	B65839A0063A038
	100 ±3%	0.13	121	B65839A0100A038
	160 ±5%	0.08	194	B65839A0160J038
	200 ±6%	0.06	243	B65839A0200C038
	250 ±7%	0.05	303	B65839A0250E038
T57	63 ±3%	0.20	76	B65839A0063A057
	100 ±3%	0.13	121	B65839A0100A057
	160 ±5%	0.08	194	B65839A0160J057
	200 ±6%	0.06	243	B65839A0200C057
	250 ±7%	0.05	303	B65839A0250E057
N45	63 ±3%	0.20	76	B65839A0063A045
	100 ±3%	0.13	121	B65839A0100A045
	160 ±5%	0.08	194	B65839A0160J045
	200 ±6%	0.06	243	B65839A0200C045
	250 ±7%	0.05	303	B65839A0250E045
N87	63 ±3%	0.20	76	B65839A0063A087
	100 ±3%	0.12	121	B65839A0100A087
	160 ±5%	0.07	194	B65839A0160J087
	200 ±6%	0.06	243	B65839A0200C087
	250 ±7%	0.05	303	B65839A0250E087

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N45	1500 +30/–20%	1820		B65839A0000R045
N30	2000 +30/–20%	2430		B65839A0000R030
T57	1500 +30/–20%	1820		B65839A0000R057
T65	3000 +30/–20%	3640		B65839A0000R065
T38	5200 +40/–30%	6310		B65839A0000Y038
T66	5800 +40/–30%	7040		B65839A0000Y066
N87	1100 +30/–20%	1330	< 0.08 (200 mT, 100 kHz, 100 °C)	B65839A0000R087

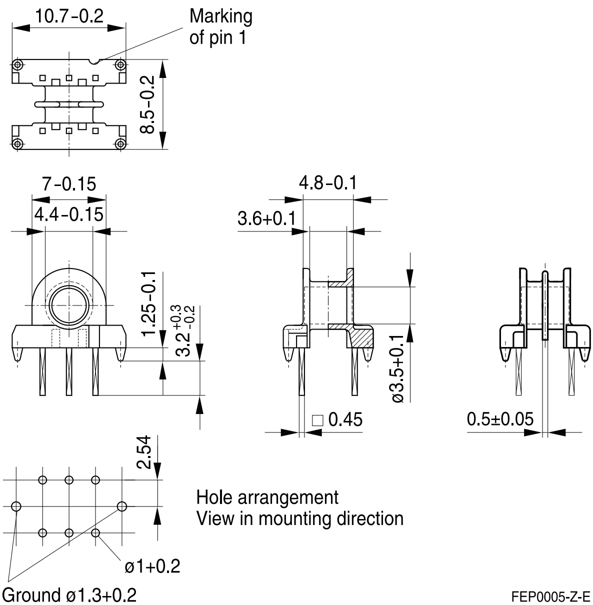
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code green
B65840B1006D001: Sumikon PM 9630® [E41429 (M)], color code black, SUMITOMO BAKELITE CO LTD
B65840B1006D002: Vyncolit/X611® [E167521 (M)], VYNCOLIT NV
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value µΩ	Terminals	
1	4.7	17.7	128.7	6	B65840B1006D001
2	4.2	17.7	143.8	6	B65840B1006D002

Coil former



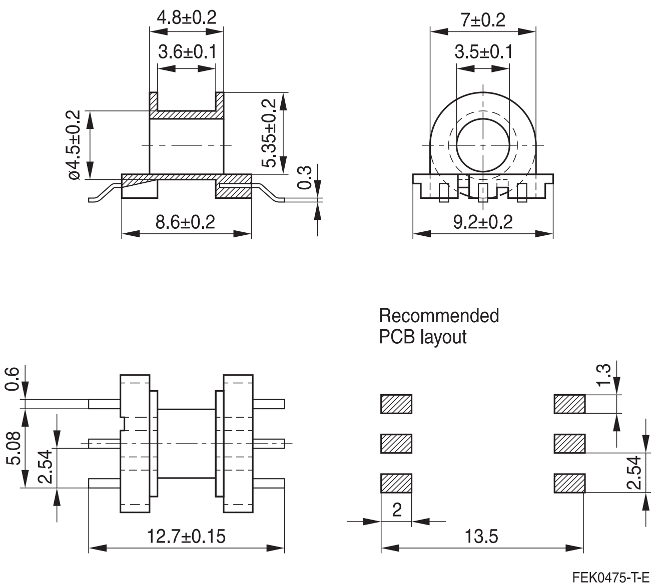
FEP0005-Z-E

SMD

SMD coil former with gullwing terminals

Material: GFR liquid crystal polymer (UL 94 V-0), color code black
Sumika Super E4008® [E54705 (M)], SUMITOMO CHEMICAL CO LTD
Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

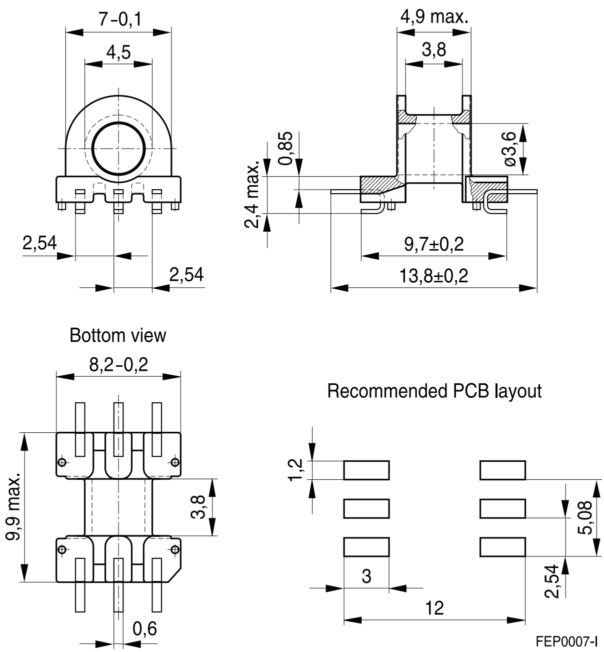
Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	4.5	18.1	138.1	6	B65840N1106T001



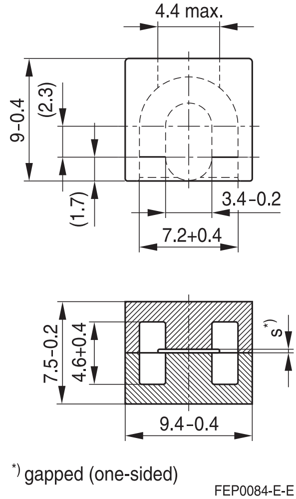
Coil former

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085: F = max. operating temperature 155°C), color code black
Sumika Super E4008 [E54705 (M)], SUMITOMO CHEMICAL CO LTD
Solderability: IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

Sections	A_N mm²	l_N mm	A_R value μΩ	Terminals	Ordering code
1	4.7	18	132.9	6	B65840H1106T001



- For xDSL line transformer
- Foot print of EP 7
- Height of EP 13
- Optimized design for low distortion
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.91 mm^{-1}
l_e = 15.7 mm
A_e = 17.2 mm^2
A_{min} = 13.9 mm^2
V_e = 270 mm^3

Approx. weight 2.8 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
T38	63 ±3%	0.35	46	B65857A0063A038
	100 ±3%	0.22	73	B65857A0100A038
	160 ±4%	0.14	116	B65857A0160B038
	200 ±4%	0.11	145	B65857A0200B038
	250 ±5%	0.09	182	B65857A0250J038
	315 ±6%	0.06	229	B65857A0315C038
	400 ±7%	0.05	291	B65857A0400E038
T57	63 ±3%	0.35	46	B65857A0063A057
	100 ±3%	0.22	73	B65857A0100A057
	160 ±4%	0.14	116	B65857A0160B057
	200 ±4%	0.11	145	B65857A0200B057
	250 ±5%	0.09	182	B65857A0250J057
	315 ±6%	0.06	229	B65857A0315C057
	400 ±7%	0.05	291	B65857A0400E057
T66	63 ±3%	0.35	46	B65857A0063A066
	100 ±3%	0.22	73	B65857A0100A066
	160 ±4%	0.14	116	B65857A0160B066
	200 ±4%	0.11	145	B65857A0200B066
	250 ±5%	0.09	182	B65857A0250J066
	315 ±6%	0.06	229	B65857A0315C066
	400 ±7%	0.05	291	B65857A0400E066

Gapped

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N45	63 ±3%	0.35	46	B65857A0063A045
	100 ±3%	0.22	73	B65857A0100A045
	160 ±4%	0.14	116	B65857A0160B045
	200 ±4%	0.11	145	B65857A0200B045
	250 ±5%	0.09	182	B65857A0250J045
	315 ±6%	0.06	229	B65857A0315C045
	400 ±7%	0.05	291	B65857A0400E045

Ungapped

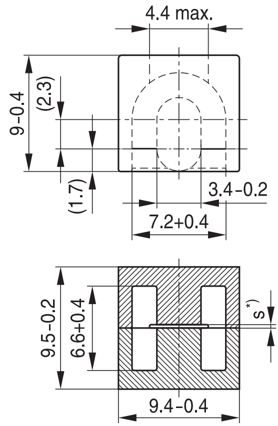
Material	A_L value nH	μ_e	Ordering code
N45	2500 +30/–20%	1820	B65857A0000R045
T57	2600 +30/–20%	1890	B65857A0000R057
T38	9000 +40/–30%	6540	B65857A0000Y038
T66	10500 +40/–30%	7630	B65857A0000Y066

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

EPX 9/9

Core **B65857C**

- For xDSL line transformers
- Height of EP 13
- Optimized design for low distortion
- Delivery mode: sets



*) gapped (one-sided)

FEP0085-R-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.09 mm^{-1}
l_e = 19.0 mm
A_e = 17.5 mm^2
A_{min} = 13.9 mm^2
V_e = 333 mm^3

Approx. weight 3 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
T38	63 ±3%	0.35	54	B65857C0063A038
	100 ±3%	0.22	86	B65857C0100A038
	160 ±4%	0.14	138	B65857C0160B038
	200 ±4%	0.11	173	B65857C0200B038
	250 ±5%	0.09	216	B65857C0250J038
	315 ±6%	0.07	272	B65857C0315C038
	400 ±7%	0.05	346	B65857C0400E038
T57	63 ±3%	0.34	54	B65857C0063A057
	100 ±3%	0.22	86	B65857C0100A057
	160 ±4%	0.13	138	B65857C0160B057
	200 ±4%	0.11	173	B65857C0200B057
	250 ±5%	0.08	216	B65857C0250J057
	315 ±6%	0.07	272	B65857C0315C057
	400 ±7%	0.05	346	B65857C0400E057
T66	63 ±3%	0.35	54	B65857C0063A066
	100 ±3%	0.22	86	B65857C0100A066
	160 ±4%	0.14	138	B65857C0160B066
	200 ±4%	0.11	173	B65857C0200B066
	250 ±5%	0.09	216	B65857C0250J066
	315 ±6%	0.07	272	B65857C0315C066
	400 ±7%	0.05	346	B65857C0400E066

Gapped

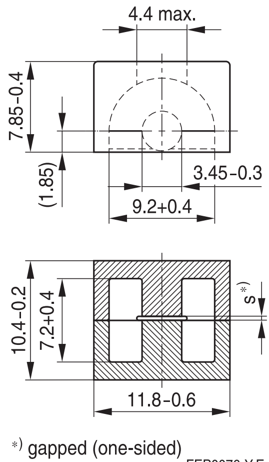
Material	A_L value nH	s approx. mm	μ_e	Ordering code
N45	63 ±3%	0.34	54	B65857C0063A045
	100 ±3%	0.21	86	B65857C0100A045
	160 ±4%	0.13	138	B65857C0160B045
	200 ±4%	0.10	173	B65857C0200B045
	250 ±5%	0.08	216	B65857C0250J045
	315 ±6%	0.06	272	B65857C0315C045
	400 ±7%	0.05	346	B65857C0400E045

Ungapped

Material	A_L value nH	μ_e	Ordering code
N45	2400 +30/–20%	2070	B65857C0000R045
T57	2400 +30/–20%	2070	B65857C0000R057
T38	8000 +40/–30%	6910	B65857C0000Y038
T66	8100 +40/–30%	7000	B65857C0000Y066

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

- To IEC 62317-5
- For transformers featuring high inductance and low overall height
- For power applications
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.7 mm^{-1}
l_e = 19.2 mm
A_e = 11.3 mm^2
A_{min} = 8.5 mm^2
V_e = 217 mm^3

Approx. weight 2.8 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
T38	63 ±3%	0.22	85	B65841A0063A038
	100 ±3%	0.14	135	B65841A0100A038
	160 ±5%	0.09	216	B65841A0160J038
	200 ±6%	0.07	270	B65841A0200C038
	250 ±7%	0.05	338	B65841A0250E038
T57	63 ±3%	0.22	85	B65841A0063A057
	100 ±3%	0.14	135	B65841A0100A057
	160 ±5%	0.09	216	B65841A0160J057
	200 ±6%	0.07	270	B65841A0200C057
	250 ±7%	0.05	338	B65841A0250E057
N45	63 ±3%	0.22	85	B65841A0063A045
	100 ±3%	0.14	135	B65841A0100A045
	160 ±5%	0.08	216	B65841A0160J045
	200 ±6%	0.07	270	B65841A0200C045
	250 ±7%	0.05	338	B65841A0250E045
N87	63 ±3%	0.22	85	B65841A0063A087
	100 ±3%	0.13	135	B65841A0100A087
	160 ±5%	0.08	216	B65841A0160J087
	200 ±6%	0.06	270	B65841A0200C087
	250 ±7%	0.05	338	B65841A0250E087

Ungapped

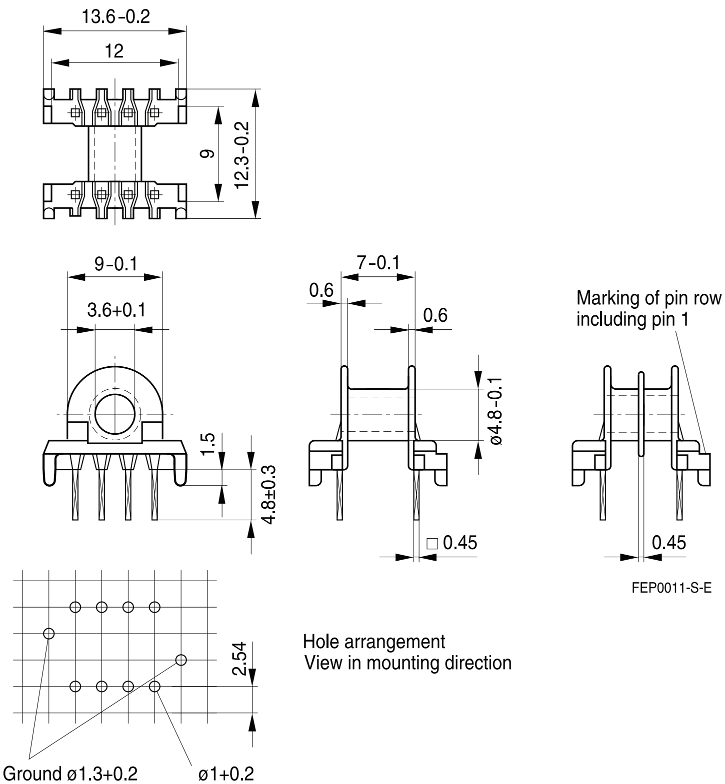
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N45	1600 +30/–20%	2160		B65841A0000R045
N30	2000 +30/–20%	2700		B65841A0000R030
T57	1600 +30/–20%	2160		B65841A0000R057
T65	2900 +30/–20%	3920		B65841A0000R065
T38	4800 +40/–30%	6490		B65841A0000Y038
T66	6000 +40/–30%	8100		B65841A0000Y066
N87	1100 +30/–20%	1480	< 0.1 (200 mT, 100 kHz, 100 °C)	B65841A0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former, squared pins

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 68-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	12.1	21.5	61.3	8	B65842W1008D001
2	11.6	21.5	63.7	8	B65842W1008D002



Mounting assembly

The set comprises a yoke and a clamp

Yoke

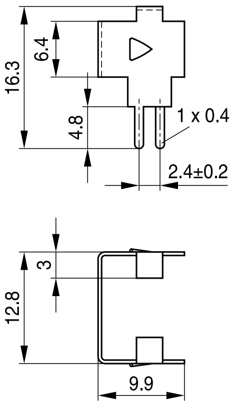
Made of rolled steel (0.4 mm) with ground terminal (tinned)

Clamp

Spring clamp, made of bronze (0.3 mm), tinned

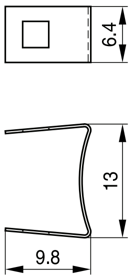
	Ordering code
Complete mounting assembly	B65842S2000X000

Yoke



FEP0063-F

Clamp

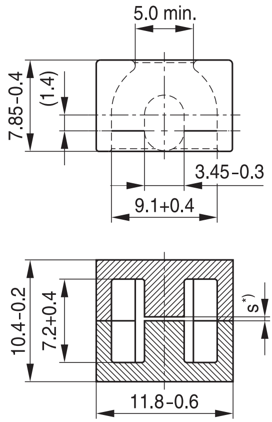


FEP0064-G

EPX 10

Core **B65859**

- For xDSL line transformers
- Outer dimensions of EP 10
- Optimized design for low distortion
- Delivery mode: sets



*) gapped (one-sided)

FEP0086-T-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.37 mm^{-1}
l_e = 21.7 mm
A_e = 15.9 mm^2
A_{min} = 13.2 mm^2
V_e = 345 mm^3

Approx. weight 2.8 g/set

Gapped (A_L values/air gaps examples)

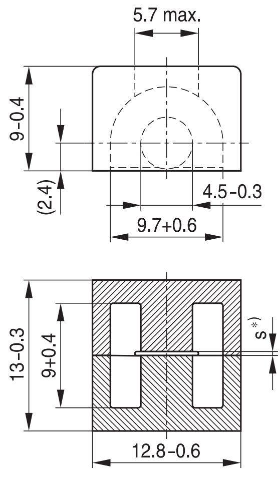
Material	A_L value nH	s approx. mm	μ_e	Ordering code
T38	63 ±3%	0.31	68	B65859A0063A038
	100 ±3%	0.20	109	B65859A0100A038
	160 ±5%	0.12	174	B65859A0160J038
	200 ±6%	0.10	217	B65859A0200C038
	250 ±7%	0.08	271	B65859A0250E038
T57	63 ±3%	0.31	68	B65859A0063A057
	100 ±3%	0.20	109	B65859A0100A057
	160 ±5%	0.12	174	B65859A0160J057
	200 ±6%	0.10	217	B65859A0200C057
	250 ±7%	0.08	271	B65859A0250E057

Ungapped

Material	A_L value nH	μ_e	Ordering code
N45	1900 +30/–20%	2060	B65859A0000R045
T57	2000 +30/–20%	2170	B65859A0000R057
T38	6100 +40/–30%	6630	B65859A0000Y038

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

- To IEC 62317-5
- For transformers featuring high inductance and low overall height
- For power applications
- Delivery mode: sets



*) gapped (one-sided)

FEP0078-C-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.24 mm^{-1}
l_e = 24.2 mm
A_e = 19.5 mm^2
A_{min} = 14.9 mm^2
V_e = 472 mm^3

Approx. weight 4.5 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
T38	63 ±3%	0.39	62	B65843A0063A038
	100 ±3%	0.24	99	B65843A0100A038
	160 ±4%	0.15	158	B65843A0160B038
	200 ±4%	0.12	198	B65843A0200B038
	250 ±5%	0.10	247	B65843A0250J038
	315 ±6%	0.08	311	B65843A0315C038
	400 ±7%	0.06	395	B65843A0400E038
T57	63 ±3%	0.38	62	B65843A0063A057
	100 ±3%	0.24	99	B65843A0100A057
	160 ±4%	0.15	158	B65843A0160B057
	200 ±4%	0.12	198	B65843A0200B057
	250 ±5%	0.09	247	B65843A0250J057
	315 ±6%	0.07	311	B65843A0315C057
	400 ±7%	0.06	395	B65843A0400E057
T66	63 ±3%	0.39	62	B65843A0063A066
	100 ±3%	0.24	99	B65843A0100A066
	160 ±4%	0.15	158	B65843A0160B066
	200 ±4%	0.12	198	B65843A0200B066
	250 ±5%	0.10	247	B65843A0250J066
	315 ±6%	0.08	311	B65843A0315C066
	400 ±7%	0.06	395	B65843A0400E066

EP 13

Core **B65843A**

Gapped

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N45	63 ±3%	0.38	62	B65843A0063A045
	100 ±3%	0.24	99	B65843A0100A045
	160 ±4%	0.15	158	B65843A0160B045
	200 ±4%	0.12	198	B65843A0200B045
	250 ±5%	0.09	247	B65843A0250J045
	315 ±6%	0.07	311	B65843A0315C045
	400 ±7%	0.05	395	B65843A0400E045
N87	63 ±3%	0.37	62	B65843A0063A087
	100 ±3%	0.23	99	B65843A0100A087
	160 ±4%	0.14	158	B65843A0160B087
	200 ±4%	0.11	198	B65843A0200B087
	250 ±5%	0.09	247	B65843A0250J087
	315 ±6%	0.07	311	B65843A0315C087
	400 ±7%	0.05	395	B65843A0400E087

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N45	2400 +30/–20%	2370		B65843A0000R045
T57	2500 +30/–20%	2470		B65843A0000R057
N30	2800 +30/–20%	2765		B65843A0000R030
T65	4000 +30/–20%	3950		B65843A0000R065
T38	7000 +40/–30%	6910		B65843A0000Y038
T66	8500 +40/–30%	8400		B65843A0000Y066
N49	1000 +30/–20%	990	< 0.06 (50 mT, 500 kHz, 100 °C)	B65843A0000R049
N87	1600 +30/–20%	1580	< 0.18 (200 mT, 100 kHz, 100 °C)	B65843A0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former, squared pins

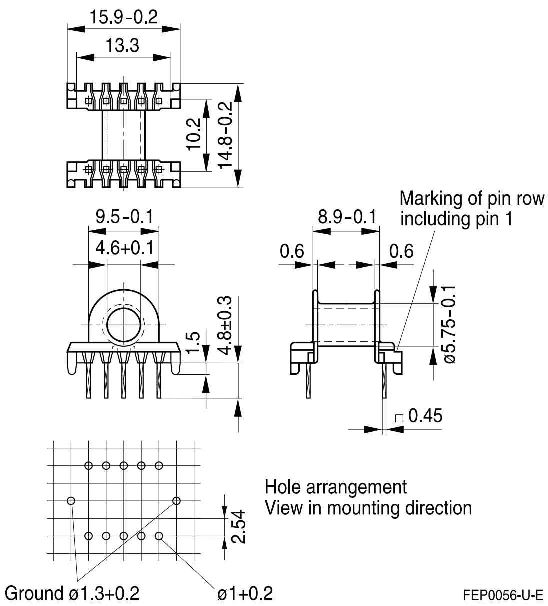
Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Winding: see Processing notes, 2.1

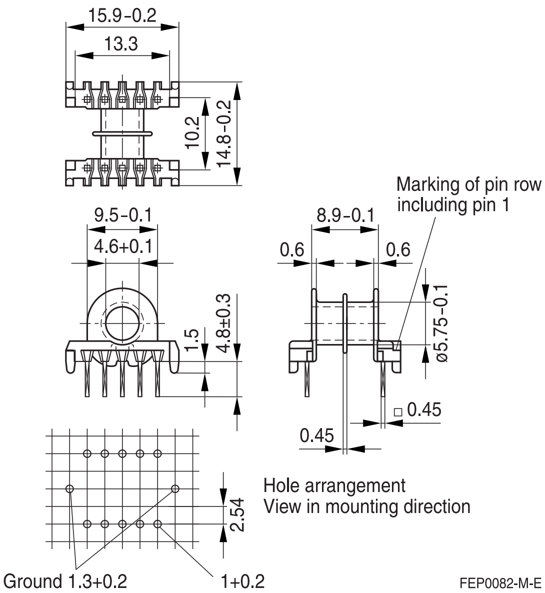
Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	14.3	23.8	57.1	10	B65844W1010D001



Coil former with closed center flange for high-voltage applications

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
2	13.9	23.8	58.9	10	B65844X1010D002



Mounting assembly

The set comprises a yoke and a clamp

Yoke

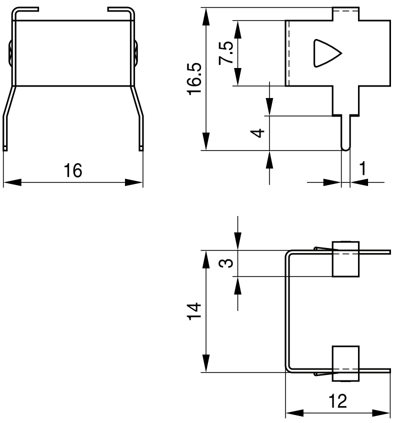
Made of cold rolled steel (0.4 mm) with ground terminal (tinned)

Clamp

Spring clamp, made of bronze (0.3 mm)

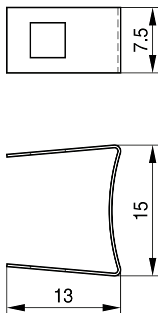
	Ordering code
Complete mounting assembly	B65844S2000X000

Yoke



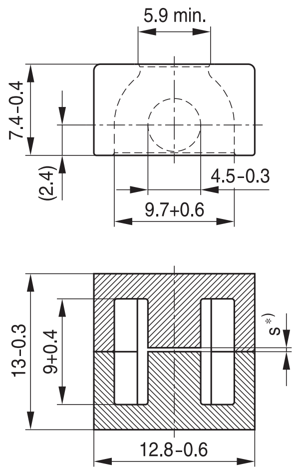
FEP0065-H

Clamp



FEP0066-V

- Recommended for xDSL applications with transformer height constraints
- Low-profile version of EP 13 (1.6 mm lower than EP 13)
- Distortion performance close to EP 13
- Fully compatible with EP 13 coils
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.34 mm^{-1}
l_e = 25.8 mm
A_e = 19.3 mm^2
A_{min} = 14.9 mm^2
V_e = 498 mm^3

Approx. weight 3 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
T38	63 ±3%	0.38	67	B65843P0063A038
	100 ±3%	0.24	106	B65843P0100A038
	160 ±4%	0.15	170	B65843P0160B038
	200 ±4%	0.12	213	B65843P0200B038
	250 ±5%	0.09	266	B65843P0250J038
	315 ±6%	0.07	335	B65843P0315C038
	400 ±7%	0.06	426	B65843P0400E038
T57	63 ±3%	0.38	67	B65843P0063A057
	100 ±3%	0.24	106	B65843P0100A057
	160 ±4%	0.15	170	B65843P0160B057
	200 ±4%	0.11	213	B65843P0200B057
	250 ±5%	0.09	266	B65843P0250J057
	315 ±6%	0.07	335	B65843P0315C057
	400 ±7%	0.05	426	B65843P0400E057

Ungapped

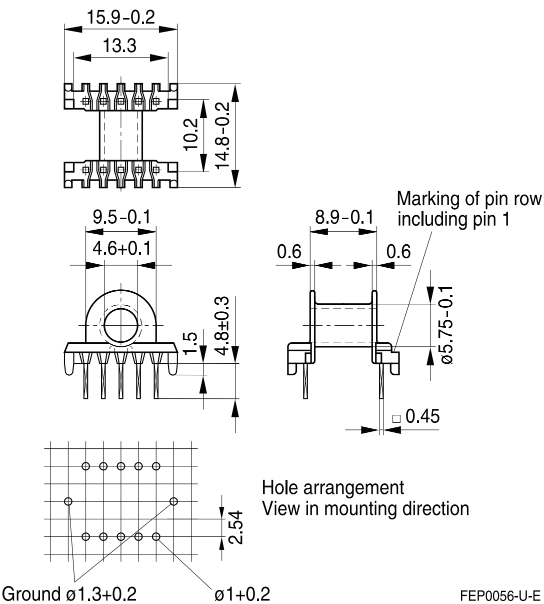
Material	A_L value nH	μ_e	Ordering code
N45	2200 +30/–20%	2340	B65843P0000R045
T57	2400 +30/–20%	2550	B65843P0000R057
T38	6600 +40/–30%	7020	B65843P0000Y038

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former, squared pins

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature +155 °C), color code black Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

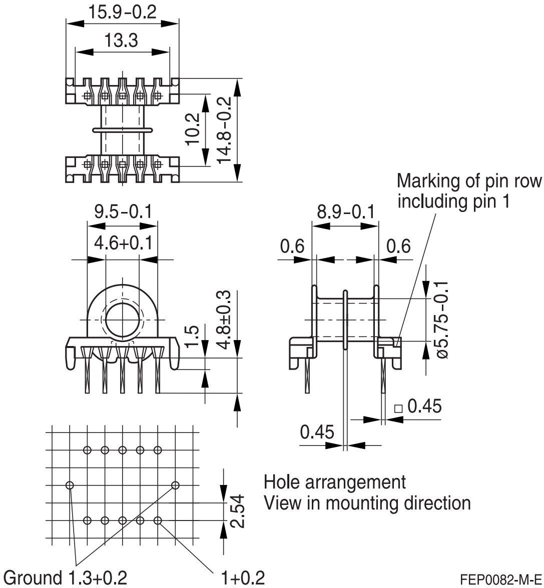
Sections	A_N mm²	l_N mm	A_R value μΩ	Terminals	Ordering code
1	14.3	23.8	57.1	10	B65844W1010D001



Coil former with closed center flange for high-voltage applications

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature +155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

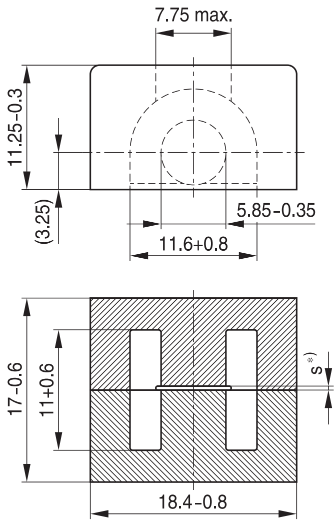
Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
2	13.9	23.8	58.9	10	B65844X1010D002



EP 17

Core B65845

- To IEC 62317-5
- For transformers featuring high inductance and low overall height
- For power applications
- Delivery mode: sets



*) gapped (one-sided)

FEP0080-B-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.84 mm^{-1}
l_e = 28.5 mm
A_e = 33.9 mm^2
A_{min} = 25.5 mm^2
V_e = 966 mm^3

Approx. weight 12 g/set

Ungapped

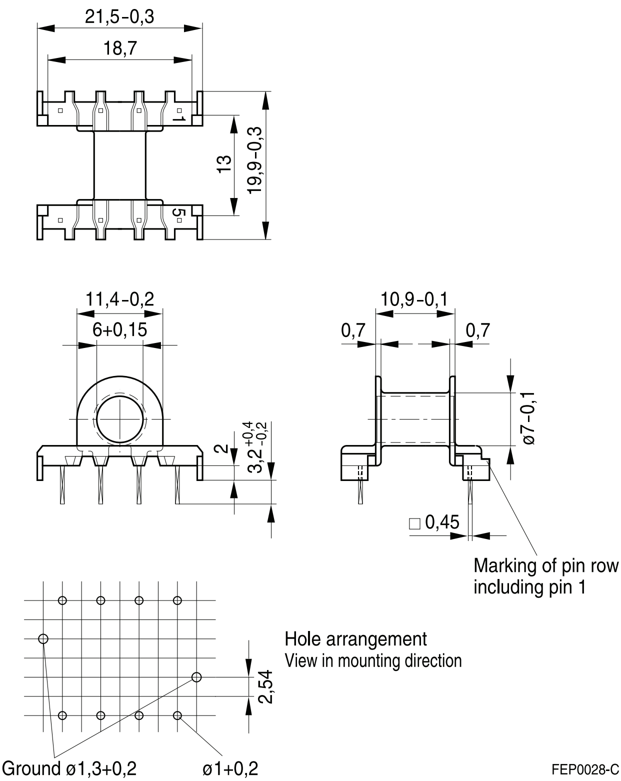
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	4300 +30/–20%	2870		B65845J0000R030
T65	6200 +30/–20%	4150		B65845J0000R065
T38	10800 +40/–30%	7220		B65845J0000Y038
T66	13000 +40/–30%	8700		B65845J0000Y066
N87	2400 +30/–20%	1600	< 0.4 (200 mT, 100 kHz, 100 °C)	B65845J0000R087

Other AL values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature +155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	20.3	28.7	48.6	8	B65846W1008D001



Mounting assembly

The set comprises a yoke and a clamp

Yoke

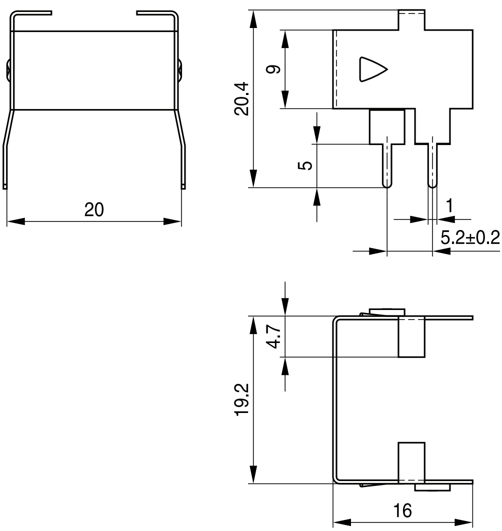
Made of cold rolled steel (0.4 mm) with ground terminal (tinned)

Clamp

Spring clamp, made of bronze (0.4 mm)

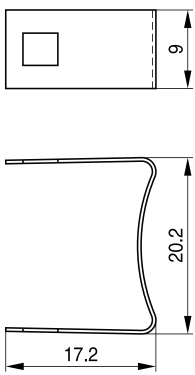
	Ordering code
Complete mounting assembly	B65846S2000X000

Yoke



FEP0067-A

Clamp

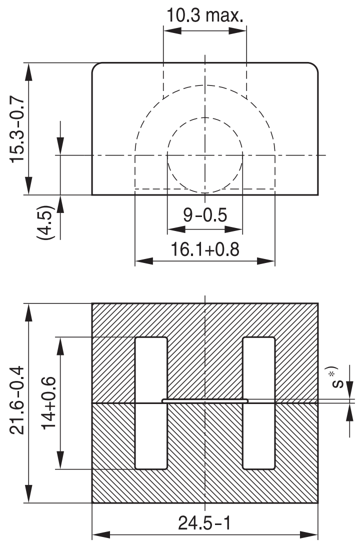


FEP0068-S

EP 20

Core **B65847**

- To IEC 62317-5
- For transformers featuring high inductance and low overall height
- For power applications
- Delivery mode: sets



*) gapped (one-sided)   FEP0081-N-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.51 mm^{-1}
l_e = 40 mm
A_e = 78 mm^2
A_{min} = 60 mm^2
V_e = 3120 mm^3

Approx. weight 27.5 g/set

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N87	200 ±3%	0.47	82	B65847A0200A087

Ungapped

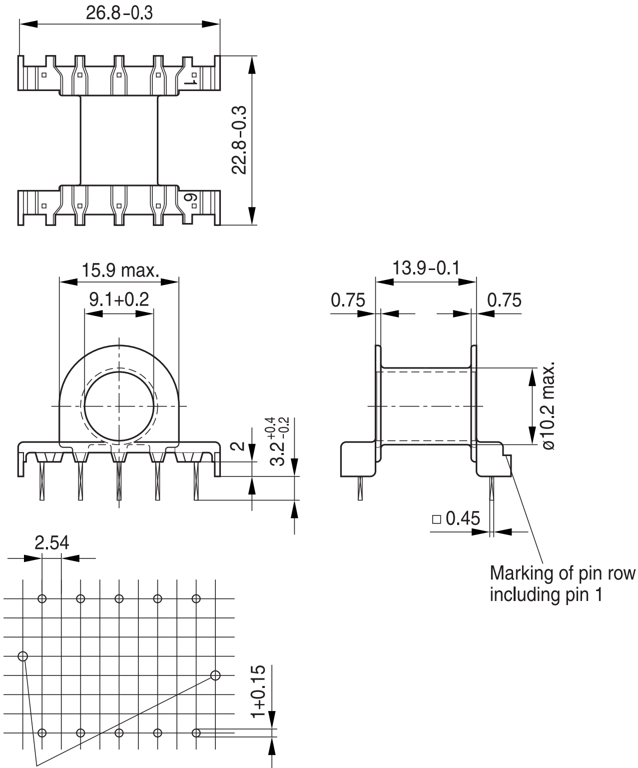
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	6700 +30/–20%	2730		B65847A0000R030
T65	10200 +30/–20%	4160		B65847A0000R065
T38	18700 +40/–30%	7630		B65847A0000Y038
N87	4000 +30/–20%	1630	< 1.2 (200 mT, 100 kHz, 100 °C)	B65847A0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code green Vyncolit/X611® [E167521 (M)], VYNCOLIT NV
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Sections	A_N mm²	l_N mm	A_R value μΩ	Terminals	Ordering code
1	35.4	40.6	39.5	10	B65848D1010D001



FEP0083-W-E

Mounting assembly

The set comprises a yoke and a clamp

Yoke

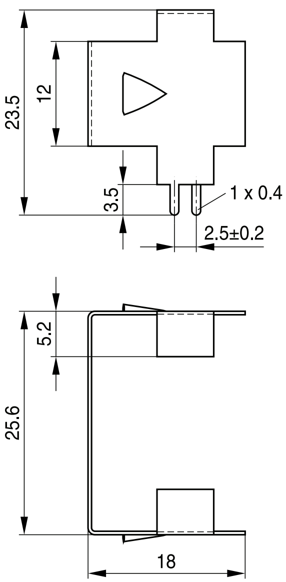
Made of nickel bronze (0.4 mm) with ground terminal (tinned)

Clamp

Spring clamp, made of stainless spring steel (0.4 mm)

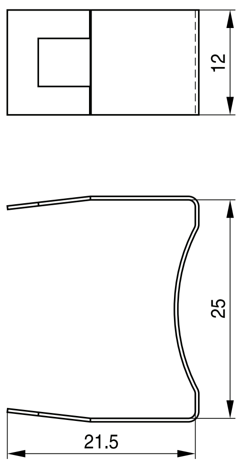
	Ordering code
Complete mounting assembly	B65848S2000X000

Yoke



FEP0069-D

Clamp



FEP0070-F

1 General information

P cores (**P**ot cores) are available in a wide range of sizes; 7 types in our product line comply with IEC 62317-2. We offer a choice of different SIFERRIT materials, which permits the cores to be used for a large variety of applications to over 100 MHz. Since the wound coil is completely enclosed by the ferrite core, P cores feature low magnetic leakage. They can be easily and precisely adjusted to the most manifold inductor requirements.

We naturally also supply the appropriate accessories for each core version. Most of the cores are available with threaded sleeves and screws for precision inductance adjustment. Adjustment curves are given for this purpose. These relate to the particular recommended combination of screw core/core material A_L value and must be understood as typical values.

2 Applications

The cores are suitable for:

- High-quality resonant circuit inductors (filters) with high inductance stability (materials K1, M33, N48).
- Low-distortion broadband small-signal transformers in materials T38 and N30 with high A_L value
- Power applications. Here, pot cores without center hole made of material N87 are used as standard. As a result of their larger effective magnetic cross-sectional area, these types are characterized by a higher A_L value, better flux density distribution and, consequently, a reduced power loss.

3 Marking

The material and the A_L value are always stamped on P cores with a diameter > 5.8 mm, the material and “o. L.”(= without air gap) are stamped on ungapped cores. Only one core half of the two comprising a set carries the marking. With cores having an unsymmetrical air gap (the total air gap is ground into one half) the ground half carries the marking, with cores including a glued-in threaded sleeve the half without sleeve is marked.

4 Power loss

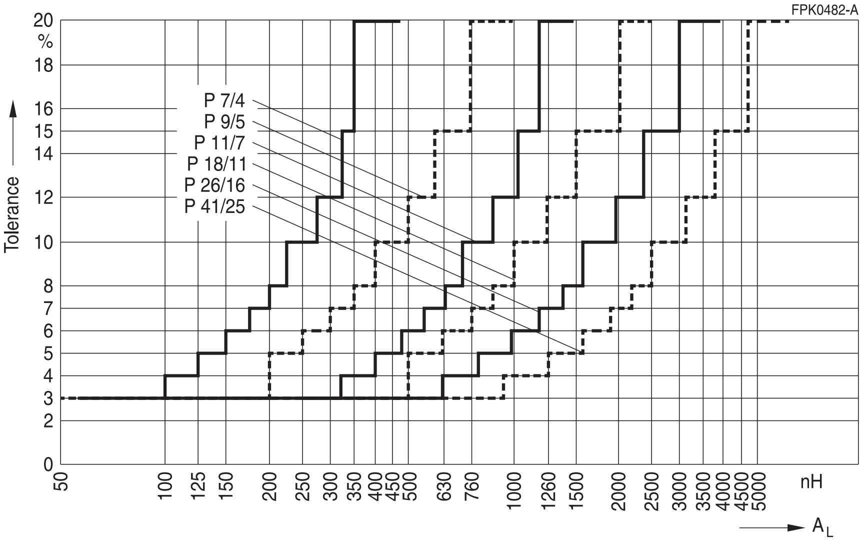
For each core type with power materials the maximum power loss is specified in W/set. The flux density has been calculated on the basis of a sinusoidal voltage and is referred to the minimum cross-sectional area A_{min}.

5 Tolerances for P cores

The A_L value tolerances for P cores have consequently been defined with consideration of optimized process parameters for all materials with an initial permeability μ_i in the region of 2200 to 10000 as a step function (see figure below).

The "quantized" A_L step values should be preferably used. They are still available in their respective lower tolerance ranges. Thus a tolerance of ±10% can be determined for a P 9/5 made of N48 material for an A_L value of 500 nH.

With this type of tolerance definition, EPCOS has defined standard A_L values and the associated tolerance for the first time. Based on initial permeability tolerance can be slightly lower or higher.



P 3.3 × 2.6

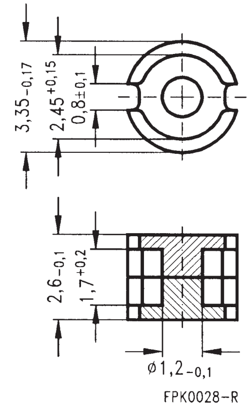
Core **B65491**

- To IEC 62317-2
- Delivery mode: sets

Magnetic characteristics (per set)

$\Sigma l/A$ = 3.72 mm^{-1}
l_e = 5.10 mm
A_e = 1.37 mm^2
V_e = 7 mm^3

Approx. weight 0.06 g/set



Ungapped

Material	A_L value nH	μ_e	Ordering code -C without center hole
K1	25 +40/–30%	75	B65491C0000Y001
M33	150 +40/–30%	440	B65491C0000Y033
N30	500 +40/–30%	1480	B65491C0000Y030

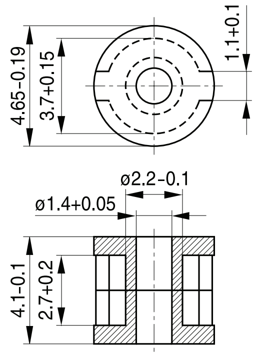
Winding data

Usable winding cross section A_N without coil former mm^2	Average length of turn A_N mm	A_R value µΩ
0.65	5.8	310

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

P 4.6 × 4.1

Core **B65495**



FPK0350-1

Miniature pot cores

- The unit can be fixed to the terminal carrier by glue
- Space requirements of the inductor 5 × 5.1 mm (without terminals)
- Delivery mode: sets

Magnetic characteristics (per set)

$\Sigma l/A$ = 2.7 mm^{-1}
l_e = 7.6 mm
A_e = 2.8 mm^2
V_e = 21.3 mm^3

Approx. weight 0.17 g/set

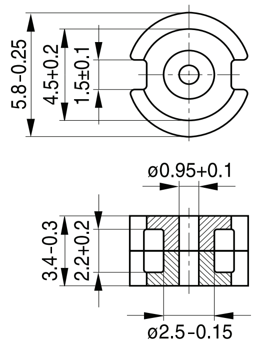
Ungapped

Material	A_L value nH	μ_e	Ordering code -B with center hole
M33	200 +40/–30%	430	B65495B0000Y033
N30	800 +40/–30%	1730	B65495B0000Y030

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

P 5.8 × 3.3

Core **B65501**



FPK0232-W

- Delivery mode: sets

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.68 mm^{-1}
l_e = 7.9 mm
A_e = 4.7 mm^2
V_e = 37 mm^3

Approx. weight 0.2 g/set

Ungapped [1)]

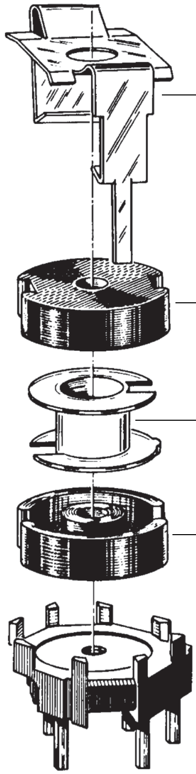
Material	A_L value nH	μ_e	Ordering code -D with center hole
K1	60 +40/–30%	80	B65501D0000Y001
M33	350 +30/–20%	470	B65501D0000R033
N48	800 +40/–30%	1070	B65501D0000Y048

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

1) Gapped pot cores on request

P 7 × 4

Core and accessories



Individual parts	Part no.	Page
Yoke	B65512	356
Core	B65511	354
Coil former	B65512	355
Core	B65511	354
Terminal carrier with thread	B65512	356

Example of an assembly set
for printed circuit boards

P 7 × 4

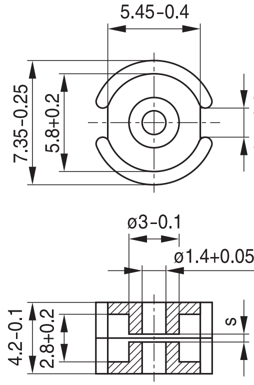
Core **B65511**

- Delivery mode: sets

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.43 mm^{-1}
l_e = 10 mm
A_e = 7 mm^2
V_e = 70 mm^3

Approx. weight 0.5 g/set



Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code -A with center hole
K1	25 ±3%	0.23	28	B65511A0025A001
M33	63 ±3%	0.13	72	B65511A0063A033
N48	100 ±3%	0.10	114	B65511A0100A048

Ungapped

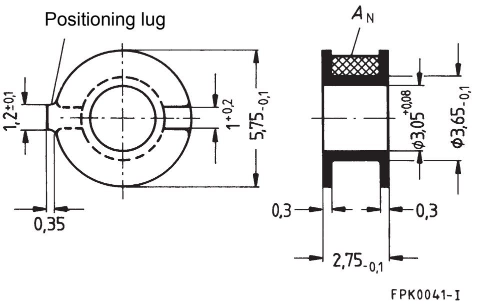
Material	A_L value nH	μ_e	Ordering code -A with center hole
M33	450 +40/–30%	510	B65511A0000Y033
N48	1000 +40/–30%	1140	B65511A0000Y048
N30	2000 +40/–30%	2270	B65511A0000Y030

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former with positioning lug

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value µΩ	Ordering code
1	2.2	14.6	240	B65512C0000T001



Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

Terminal carrier

- With thread for the adjusting screw

Material: GFR polyphenylene sulphide (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Ryton R-4-230, [E95746 (M)], SOLVAY SPECIALITY POLYMERS

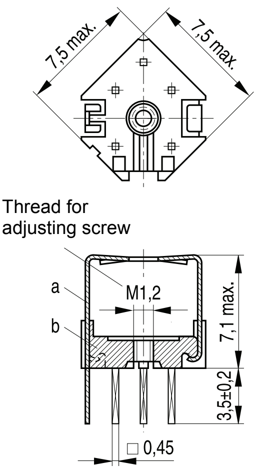
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

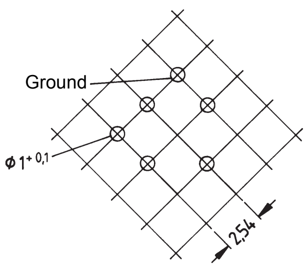
Yoke

Spring yoke, made of tinned nickel silver (0.2 mm), with ground terminal

Complete mounting assembly (5 solder terminals)
Ordering code: B65512C2001X000



FPK0042-R

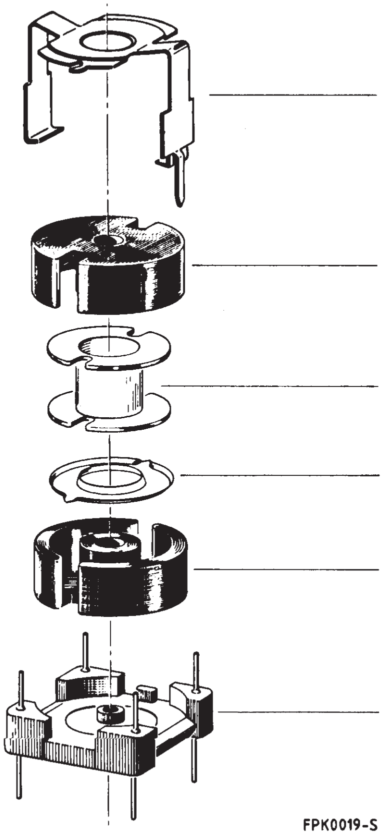


FPK0043-Z

a) Yoke
b) Terminal carrier with 5 solder terminals

P 9 × 5

Core and accessories



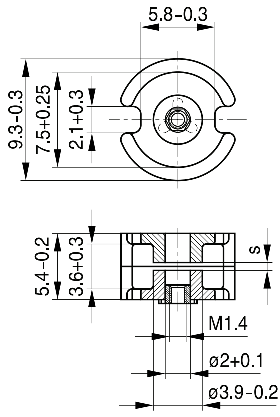
Example of an assembly set
for printed circuit boards

Individual parts	Part no.	Page
Yoke	B65518	361
Core	B65517	358
Coil former	B65522	359
Insulating washer		
Core	B65517	358
Terminal carrier with thread	B65518	361
Also available: SMD coil former	B65524	360

P 9 × 5

Core B65517

- To IEC 62317-2
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	1.25	1.13	mm^{-1}
l_e	12.5	13.4	mm
A_e	10	11.9	mm^2
A_{min}	—	9.3	mm^2
V_e	125	159	mm^3

Approx. weight (per set)

m	0.8	1.0	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code [1)] -D with center hole -T with threaded sleeve
K1	25 ±3% 40 ±3%	0.45 0.26	25 40	B65517+0025A001 B65517+0040A001
M33	63 ±3%	0.20	63	B65517D0063A033
N48	100 ±3% 160 ±3% 200 ±3% 250 ±5%	0.10 0.06 0.04 0.03	100 159 200 249	B65517+0100A048 B65517+0160A048 B65517D0200A048 B65517D0250J048

Ungapped

Material	A_L value nH	μ_e	Ordering code -D with center hole -W without center hole
N48	1300 +30/–20%	1290	B65517D0000R048
N30	2500 +30/–20%	2490	B65517D0000R030
T38	5500 +40/–30%	4930	B65517W0000Y038

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

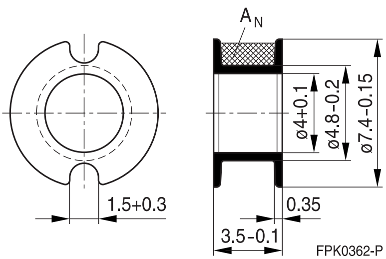
1) Replace the + by the code letter ”D“ or ”T“ for the required version.

Coil former

Standard: to IEC 62317-2
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0® [E45329 (M)], SABIC INNOVATIVE PLASTICS
Winding: see Processing notes, 2.1

Coil former				Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	
1	3.6	19.2	183	B65522B0000T001

Coil former

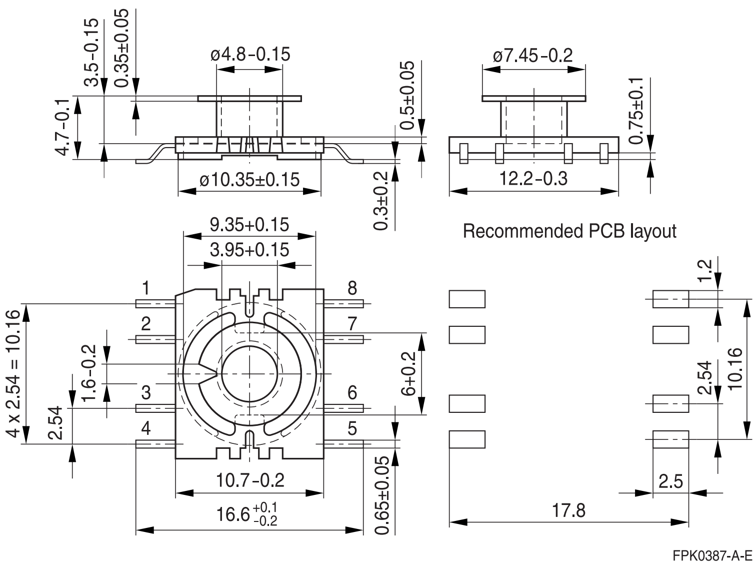


SMD

SMD coil former with gullwing terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Sumika Super E4008® [E54705 (M)], SUMITOMO CHEMICAL CO LTD
Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s
Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	3.4	19.2	194	4	B65524C1004T001
	3.4	19.2	194	8	B65524C1008T001



In the 4-terminal version terminals 2, 3, 6 and 7 are omitted.

Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

Terminal carrier

- With thread for the adjusting screw (to be combined with core version ”D“)

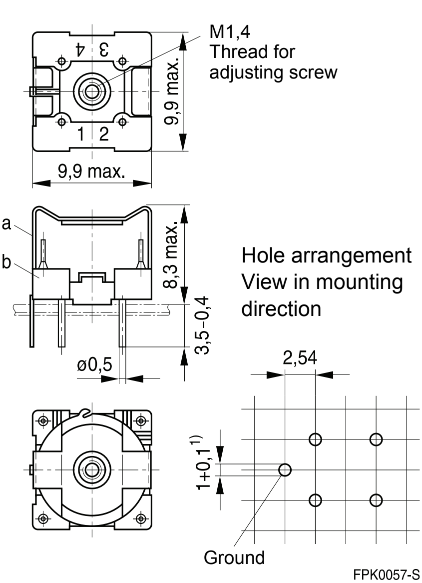
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Yoke

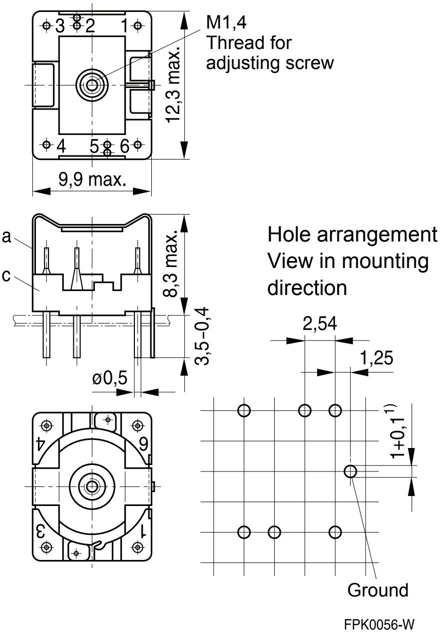
Spring yoke, made of tinned nickel silver (0.25 mm), with ground terminal

Complete mounting assembly (4 solder terminals) Ordering code: B65518D2001X000	Complete mounting assembly (6 solder terminals) Ordering code: B65518D2002X000

4 solder terminals



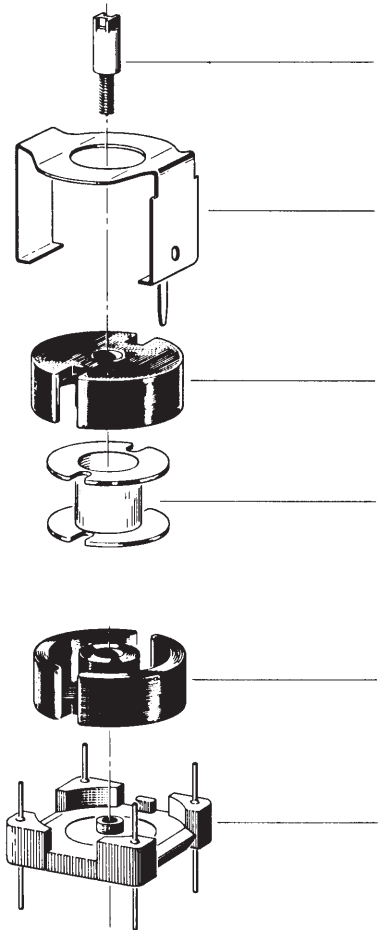
6 solder terminals



1) 1.3 hole also permissible
a) Yoke
b) Terminal carrier with 4 solder terminals
c) Terminal carrier with 6 solder terminals

P 11 × 7

Core and accessories



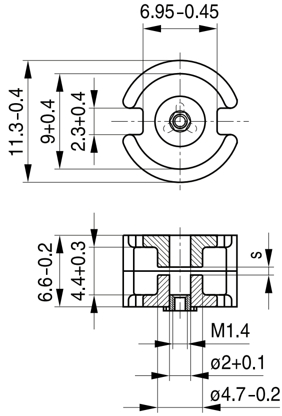
Example of an assembly set for printed circuit boards

Individual parts	Part no.	Page
Adjusting screw	B65539	
	B65806	366
Yoke	B65535	365
Core	B65531	363
Coil former	B65532	364
Core	B65531	363
Terminal carrier with thread	B65535	365

P 11 × 7

Core **B65531**

- To IEC 62317-2
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
$\Sigma l/A$	1.0	0.92	mm^{-1}
l_e	15.9	16.3	mm
A_e	15.9	17.7	mm^2
A_{min}	—	14.1	mm^2
V_e	253	289	mm^3

Approx. weight (per set)

m	1.7	1.8	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code [1] -D with center hole -T with threaded sleeve
K1	25 ±3%	1.00	20	B65531D0025A001
	40 ±3%	0.41	32	B65531D0040A001
M33	40 ±3%	0.64	32	B65531D0040A033
	63 ±3%	0.38	50	B65531D0063A033
N48	100 ±3%	0.20	80	B65531D0100A048
	160 ±3%	0.10	127	B65531+0160A048
	250 ±3%	0.06	199	B65531+0250A048
	400 ±5%	0.03	318	B65531D0400J048

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -D with center hole -W without center hole
M33	780 +30/–20%	620		B65531D0000R033
N48	1800 +30/–20%	1430		B65531D0000R048
N30	3500 +30/–20%	2560		B65531W0000R030
T38	7000 +40/–30%	5130		B65531W0000Y038
N87	2000 +30/–20%	1470	< 0.12 (200 mT, 100 kHz, 100 °C)	B65531W0000R087

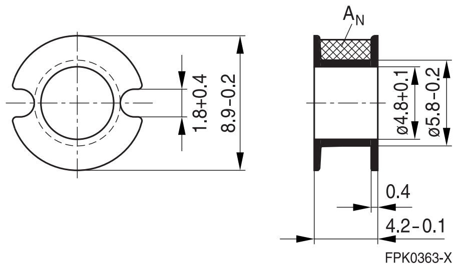
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

1) Replace the + by the code letter ”D“ or ”T“ for the required version.

Coil former

Standard: to IEC 62317-2
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0® [E45329 (M)], SABIC INNOVATIVE PLASTICS
Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value µΩ	Ordering code
1	4.2	22	180	B65532B0000T001



Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

Terminal carrier

- With thread for the adjusting screw (to be combined with core version ”D“)

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature + 155 °C), color code black
4 solder terminals: Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO
8 solder terminals: Pocan B4235® [E245249 (M)], LANXESS AG

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

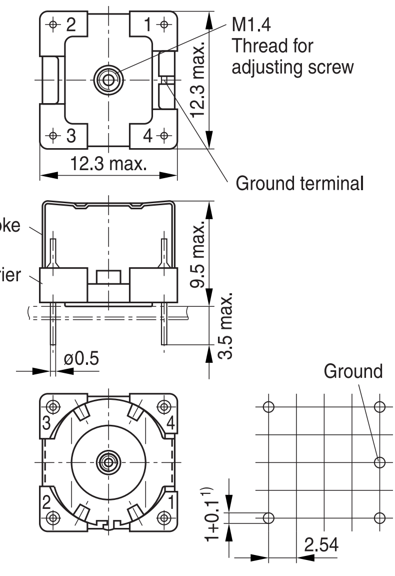
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Yoke

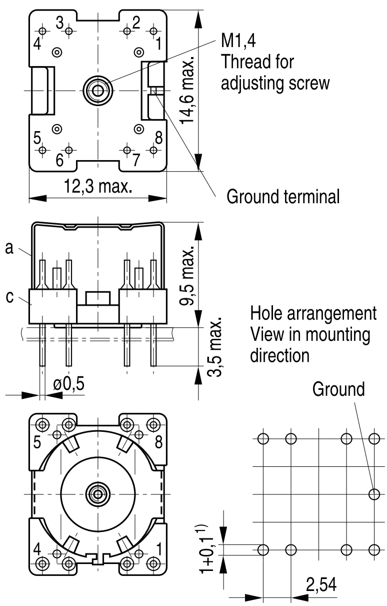
Spring yoke, made of tinned nickel silver (0.25 mm), with ground terminal

Complete mounting assembly (4 solder terminals) Ordering code: B65535B0002X000	Complete mounting assembly (8 solder terminals) Ordering code: B65535B0003X000

4 solder terminals



8 solder terminals



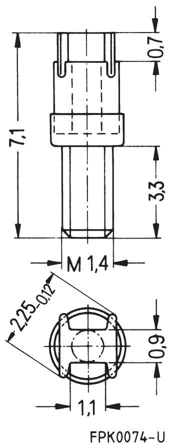
1) 1.3 hole also permissible
a) Yoke
c) Terminal carrier with 8 solder terminals

Adjusting screw

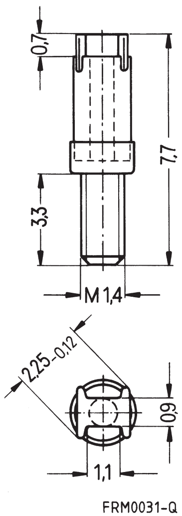
- Tube core with thread and core brake made of GFR polyterephthalate
  Pocan B3235® [E245249 (M)], LANXESS AG

Figure	Tube core			Ordering code
	∅ × length (mm)	Material	Color code	
a	1.81 × 2.0	K1	yellow	B65539C1003X001
a	1.81 × 2.7	N22	red	B65539C1002X022
b	1.81 × 3.4	N22	green	B65806C3001X022

a

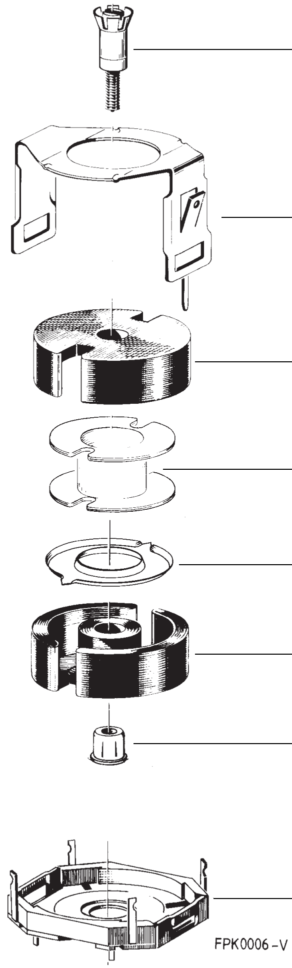


b



P 14 × 8

Core and accessories



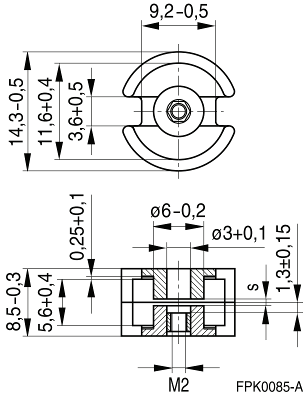
Individual parts	Part no.	Page
Adjusting screw	B65549	371
Yoke	B65545	370
Core	B65541	368
Coil former	B65542	369
Insulating washer		
Core	B65541	368
Threaded sleeve (glued-in)		
Terminal carrier	B65545	370

Example of an assembly set
for printed circuit boards

P 14 × 8

Core **B65541**

- To IEC 62317-2
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	0.8	0.73	mm^{-1}
l_e	20	21	mm
A_e	25	28.7	mm^2
A_{min}	20	23.6	mm^2
V_e	500	603	mm^3

Approx. weight (per set)

m	3.2	3.5	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code 1) -D with center hole -T with threaded sleeve
M33	100 ±3%	0.30	64	B65541+0100A033
N48	160 ±3% 250 ±3% 315 ±3% 400 ±3%	0.16 0.10 0.08 0.05	102 159 201 255	B65541+0160A048 B65541+0250A048 B65541+0315A048 B65541+0400A048

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -D with center hole -W without center hole
K1	140 +30/–20%	89		B65541D0000R001
M33	970 +30/–20%	618		B65541D0000R033
N48	2100 +30/–20%	1340		B65541D0000R048
N30	4600 +30/–20%	2680		B65541W0000R030
T38	9800 +40/–30%	5710		B65541W0000Y038
N87	2800 +30/–20%	1630	< 0.26 (200 mT, 100 kHz, 100 °C)	B65541W0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

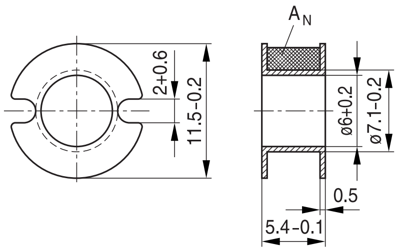
1) Replace the + by the code letter ”D“ or ”T“ for the required version.

Coil former

Standard: to IEC 62317-2
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature + 155 °C), color code black
Crastin SK 645 FR [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Winding: see Processing notes, 2.1

Coil former				Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	
1	8.4	28	115	B65542B0000T001

Coil former



Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

Terminal carrier

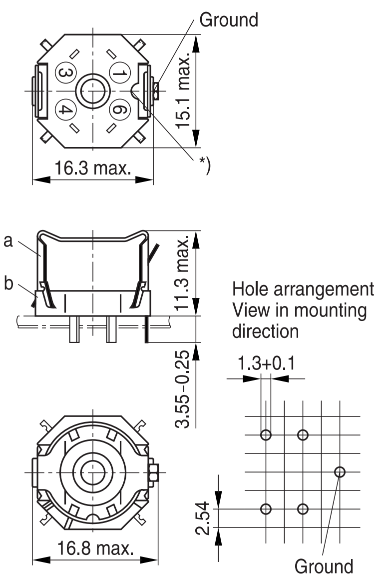
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code gray
Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Yoke

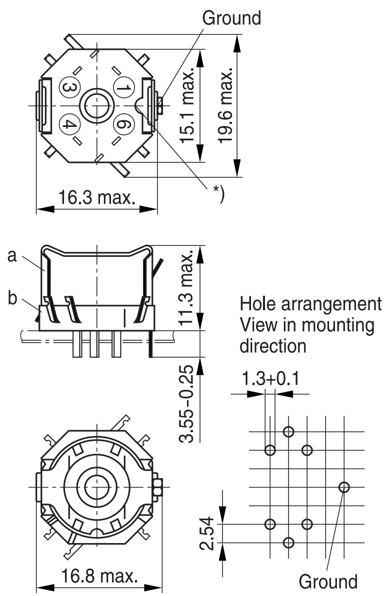
Spring yoke, made of tinned nickel silver (0.25 mm), with ground terminal

Complete mounting assembly (4 solder terminals) Ordering code: B65545B0009X000	Complete mounting assembly (6 solder terminals) Ordering code: B65545B0010X000

4 solder terminals



6 solder terminals



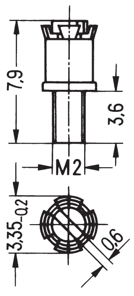
FPK0447-M-E

*) This recess must be on the side of the grounding pin to ensure that the yoke locks in position.
a) Yoke
b) Terminal carrier with 4 solder terminals
c) Terminal carrier with 6 solder terminals

Adjusting screw

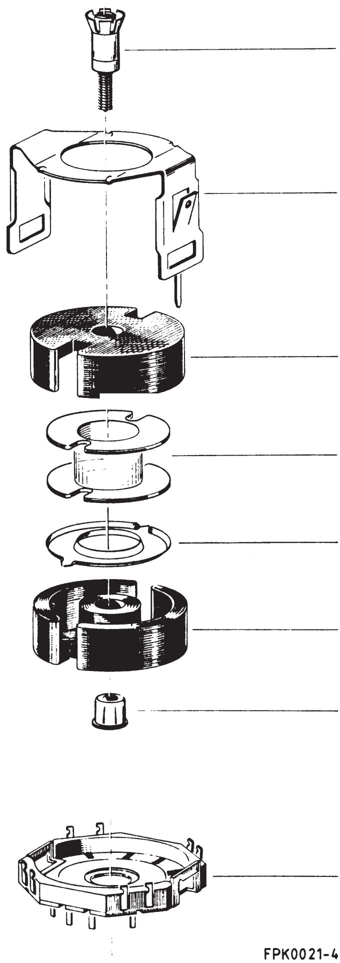
- Tube core with thread and core brake made of GFR polyterephthalate
  Pocan B3235® [E245249 (M)], LANXESS AG

Tube core ∅ × length (mm)	Material	Color code	Ordering code
2.76 × 2.9	N22	black	B65549E0004X023



P 18 × 11

Core and accessories



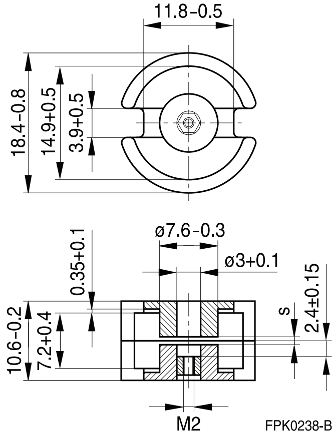
Individual parts	Part no.	Page
Adjusting screw	B65659	376
Yoke	B65655	375
Core	B65651	373
Coil former	B65652	374
Insulating washer		
Core	B65651	373
Threaded sleeve (glued-in)		
Terminal carrier	B65655	375

Example of an assembly set
for printed circuit boards

P 18 × 11

Core **B65651**

- To IEC 62317-2
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	0.6	0.57	mm^{-1}
l_e	25.9	26.6	mm
A_e	43	46.7	mm^2
A_{min}	—	33.9	mm^2
V_e	1114	1242	mm^3

Approx. weight (per set)

m	6.0	6.6	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code [1] -D with center hole -T with threaded sleeve
K1	40 ±3%	1.60	19	B65651+0040A001
M33	100 ±3%	0.60	48	B65651+0100A033
N48	160 ±3%	0.32	77	B65651+0160A048
	250 ±3%	0.20	120	B65651+0250A048
	315 ±3%	0.15	151	B65651+0315A048
	400 ±3%	0.10	192	B65651+0400A048
	500 ±3%	0.07	240	B65651+0500A048
	630 ±5%	0.05	302	B65651D0630J048

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -D with center hole -W without center hole
K1	180 +30/–20%	90		B65651D0000R001
N48	2800 +30/–20%	1340		B65651D0000R048
N30	5900 +30/–20%	2680		B65651W0000R030
T38	12600 +40/–30%	5710		B65651W0000Y038
N87	3600 +30/–20%	1630	< 0.46 (200 mT, 100 kHz, 100 °C)	B65651W0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

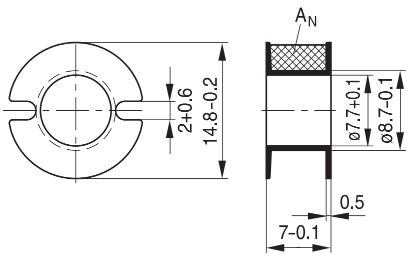
1) Replace the + by the code letter "D" or "T" for the required version.

Coil former

Standard: to IEC 62317-2
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0® [E45329 (M)], Sabic Innovative Plastic
Winding: see Processing notes, 2.1

Coil former				Bestellnummer
Sections	A_N mm^2	l_N mm	A_R value μΩ	
1	16	35.6	87	B65652B0000T001

Coil former



Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

Terminal carrier

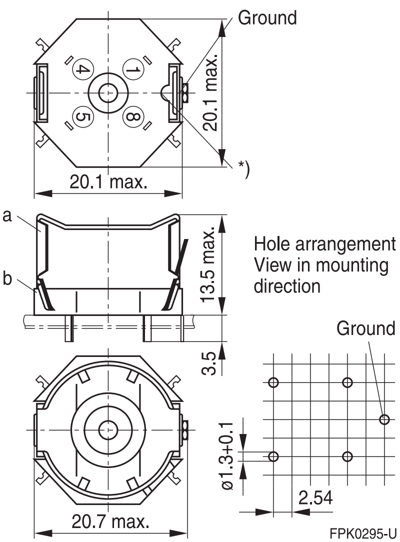
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code gray
Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Yoke

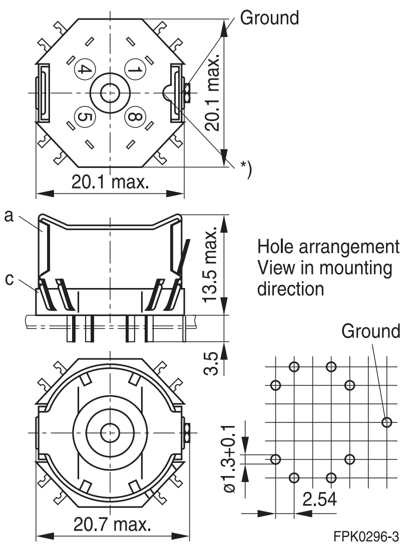
Spring yoke, made of tinned nickel silver (0.3 mm), with ground terminal

Complete mounting assembly (4 solder terminals) Ordering code: B65655B0009X000	Complete mounting assembly (8 solder terminals) Ordering code: B65655B0010X000

4 solder terminals



8 solder terminals



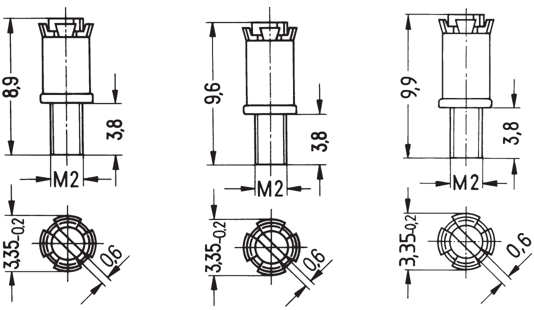
*) This recess must be on the side of the grounding pin to ensure that the yoke locks in position.
a) Yoke
b) Terminal carrier with 4 solder terminals
c) Terminal carrier with 8 solder terminals

Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate
  Pocan B3235® [E245249 (M)], LANXESS AG

Figure	Tube core ∅ × length (mm)	Material	Color code	Ordering code
a	2.62 × 3.6	N22	red	B65659F0001X023
b	2.75 × 4.4	N22	black	B65659F0003X023
c	2.82 × 4.4	N22	yellow	B65659F0004X023

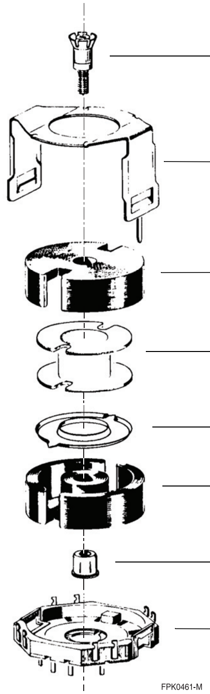
a b c



FRM0068-Z FRM0069-8 FRM0066-I

P 22 × 13

Core and accessories



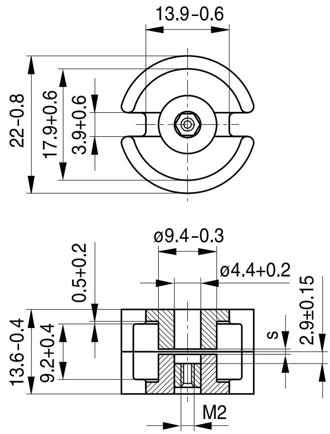
Individual parts	Part no.	Page
Adjusting screw	B65812	381
Yoke	B65665	380
Core	B65661	378
Coil former	B65662	379
Insulating washer 1		
Core	B65661	378
Threaded sleeve (glued-in)		
Terminal carrier	B65665	380

Example of an assembly set
for printed circuit boards

P 22 × 13

Core **B65661**

- To IEC 62317-2
- Delivery mode: sets



FPK0118-Q

Magnetic characteristics (per set)

	with center hole	without center hole	
$\Sigma l/A$	0.5	0.46	mm^{-1}
l_e	31.6	33.2	mm
A_e	63	72.6	mm^2
A_{min}	—	58.1	mm^2
V_e	1990	2410	mm^3

Approx. weight (per set)

m	13	14	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code [1)] -D with center hole -N with threaded sleeve
N48	160 ± 3%	0.50	64	B65661+0160A048
	250 ± 3%	0.26	100	B65661+0250A048
	315 ± 3%	0.22	126	B65661+0315A048
	630 ± 3%	0.10	251	B65661+0630A048
	1250 ±10%	0.05	499	B65661D1250K048

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -D with center hole -W without center hole
K1	220 +30/–20%	88		B65661D0000R001
M33	1600 +30/–20%	640		B65661D0000R033
N48	3800 +30/–20%	1520		B65661D0000R048
N30	8300 +30/–20%	3020		B65661W0000R030
T38	16000 +40/–30%	5820		B65661W0000Y038
N87	4400 +30/–20%	1600	< 1.1 (200 mT, 100 kHz, 100 °C)	B65661W0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

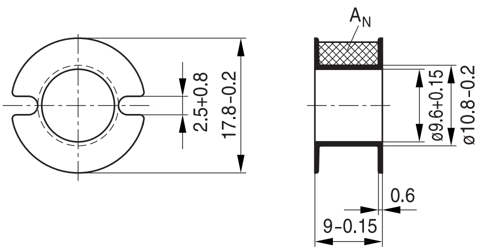
1) Replace the + by the code letter "D" or "N" for the required version.

Coil former

Standard: to IEC 62317-2
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
Winding: see Processing notes, 2.1

Coil former				Ordering code
Sections	A_N mm^2	l_N mm	A_R value μΩ	
1	23.4	44	67	B65662B0000T001

Coil former



Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

Terminal carrier

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black,
Pocan B4235 [E245249 (M)], LANXESS AG

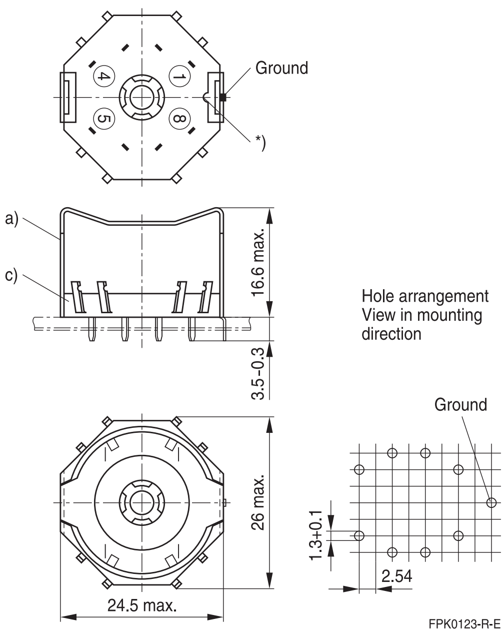
Solderability: IEC60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC60068-2-20, test Tb, method 1b: 350 °C, 3.5 s

Yoke

Spring yoke, made of tinned nickel silver (0.3 mm), with ground terminal

	Ordering code
Complete mounting assembly (8 solder terminals)	B65665C0004X000

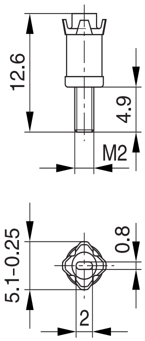


*) This recess must be on the side of the grounding pin to ensure that the yoke locks in position.
a) Yoke
c) Terminal carrier with 8 solder terminals

Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate
  Pocan B3235® [E245249 (M)], LANXESS AG

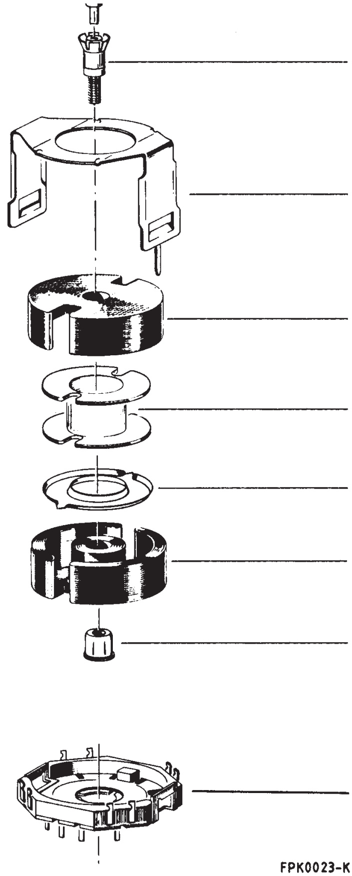
Tube core ∅ × length (mm)	Material	Color code	Ordering code
3.85 × 5.0	N22	gray	B65812B3003X022



FRM0108-X

P 26 × 16

Core and accessories



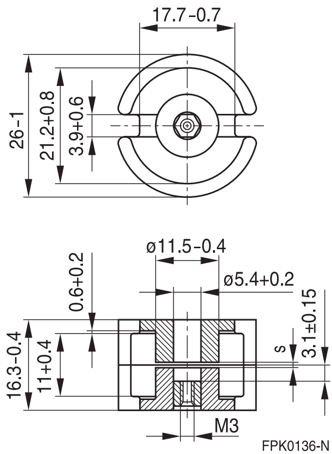
Individual parts	Part no.	Page
Adjusting screw	B65679	387
Yoke	B65675	386
Core	B65671	383
Coil former	B65672	385
Insulating washer		
Core	B65671	383
Threaded sleeve (glued-in)		
Terminal carrier	B65675	386

Example of an assembly set
for printed circuit boards

P 26 × 16

Core B65671

- To IEC 62317-2
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	0.4	0.37	mm^{-1}
l_e	37.2	40	mm
A_e	93	108	mm^2
A_{min}	76.5	87	mm^2
V_e	3460	4320	mm^3

Approx. weight (per set)

m	21	23	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code [1] -D with center hole -T with threaded sleeve
K1	100 ±3%	0.90	32	B65671+0100A001
M33	100 ±3%	1.52	32	B65671+0100A033
	160 ±3%	0.78	51	B65671+0160A033
N48	160 ±3%	0.80	51	B65671+0160A048
	250 ±3%	0.40	80	B65671+0250A048
	315 ±3%	0.34	100	B65671+0315A048
	400 ±3%	0.24	127	B65671+0400A048
	630 ±3%	0.15	201	B65671+0630A048
	800 ±3%	0.11	255	B65671+0800A048
	1000 ±5%	0.10	318	B65671D1000J048

1) Replace the + by the code letter ”D“ or ”T“ for the required version.

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -D with center hole -W without center hole
K1	270 +30/–20%	90		B65671D0000R001
M33	2000 +30/–20%	640		B65671D0000R033
N48	4900 +30/–20%	1560		B65671D0000R048
N30	9700 +30/–20%	2860		B65671W0000R030
T38	22000 +40/–30%	6480		B65671W0000Y038
N87	5500 +30/–20%	1620	< 1.9 (200 mT, 100 kHz, 100 °C)	B65671W0000R087

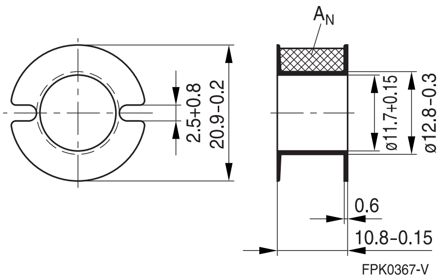
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Coil former

Standard: to IEC 62317-2
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
Winding: see Processing notes, 2.1

Coil former				Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	
1	32.0	52	55	B65672B0000T001

Coil former



Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

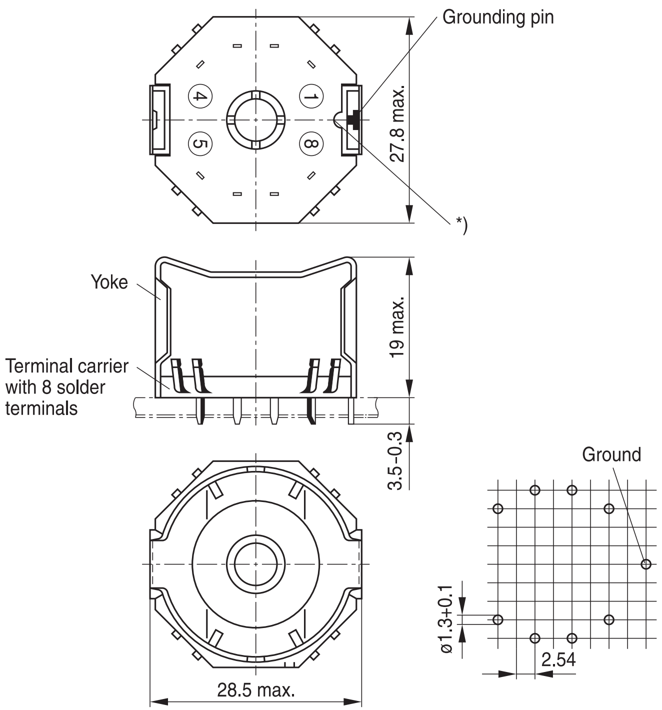
Terminal carrier

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code gray
Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Yoke

Spring yoke, made of tinned nickel silver (0.4 mm), with ground terminal

Complete mounting assembly (8 solder terminals)
Ordering code: B65675B0005X000



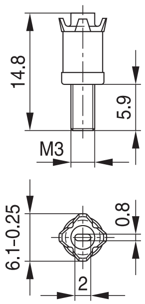
*) This recess must be on the side of the grounding pin to ensure that the yoke locks into position.

FPK0379-J-E

Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate Pocan B3235® [E245249 (M)], LANXESS AG

Tube core ∅ × length (mm)	Material	Color code	Ordering code
4.55 × 6.3	N22	red	B65679E0003X022
4.98 × 6.3	N22	black	B65679E0002X022



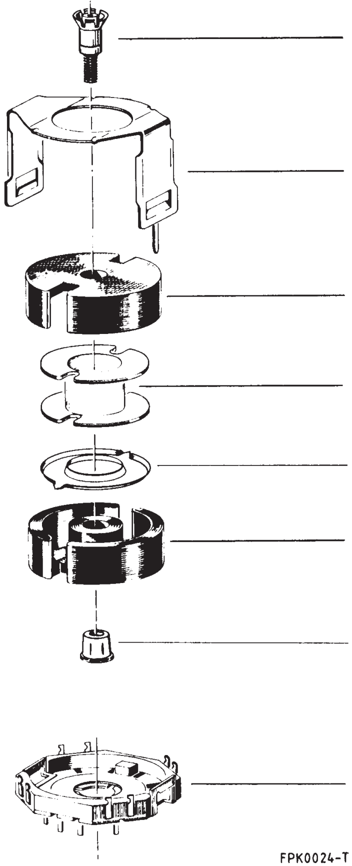
FPK0380-M

Note:

Due to the limited distance between adjusting screw and internal borehole, the entire assembly must be accurately centered.

P 30 × 19

Core and accessories



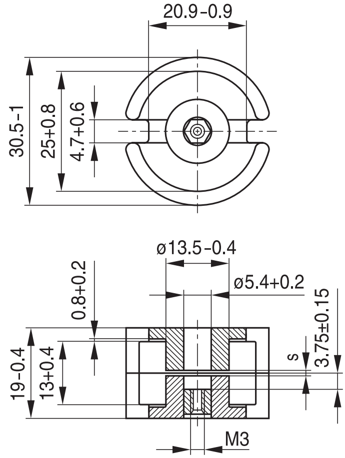
Individual parts	Part no.	Page
Adjusting screw	B65679	392
Yoke	B65705	391
Core	B65701	389
Coil former	B65702	390
Insulating washer		
Core	B65701	389
Threaded sleeve (glued-in)		
Terminal carrier	B65705	391

Example of an assembly set
for printed circuit boards

P 30 × 19

Core **B65701**

- To IEC 62317-2
- Delivery mode: sets



Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	0.33	0.32	mm^{-1}
l_e	45	46	mm
A_e	136	145	mm^2
A_{min}	—	117	mm^2
V_e	6120	6670	mm^3

Approx. weight (per set)

m	36	38	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code [1)] -D with center hole -T with threaded sleeve
N48	250 ± 3%	0.72	66	B65701+0250A048
	400 ± 3%	0.40	105	B65701+0400A048
	630 ± 3%	0.22	166	B65701+0630A048
	1000 ± 3%	0.12	263	B65701+1000A048
	2000 ±10%	0.05	527	B65701D2000K048

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code -D with center hole -W without center hole
M33	2400 +30/–20%	630		B65701D0000R033
N48	6200 +30/–20%	1630		B65701D0000R048
N30	11500 +30/–20%	2900		B65701W0000R030
T38	28000 +40/–30%	7070		B65701W0000Y038
N87	6400 +30/–20%	1620	< 2.5 (200 mT, 100 kHz, 100 °C)	B65701W0000R087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

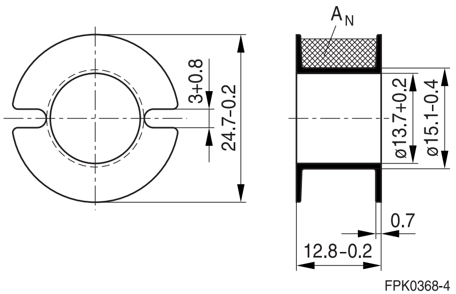
1) Replace the + by the code letter ”D“ or ”T“ for the required version.

Coil former

Standard: to IEC 62317-2
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
Winding: see Processing notes, 2.1

Coil former				Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	
1	48	60	46	B65702B0000T001

Coil former



Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

Terminal carrier

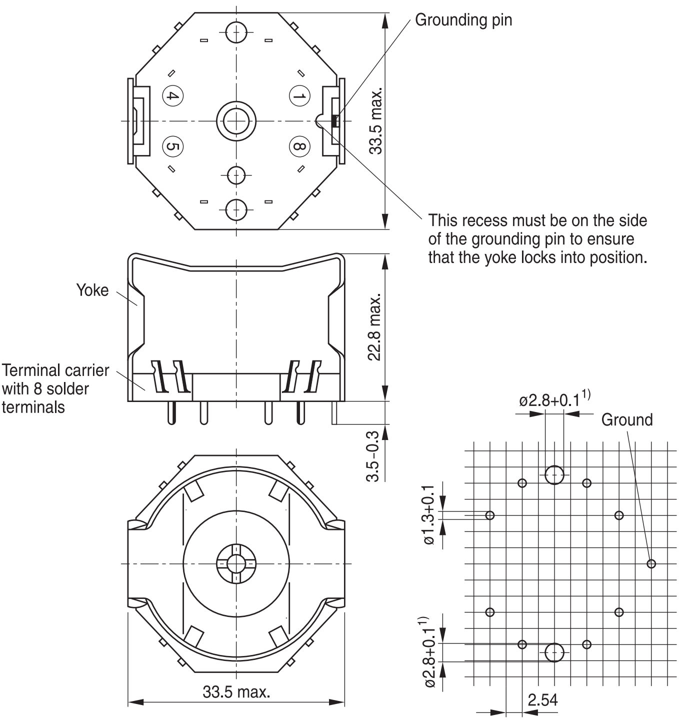
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 85:
F ≙ max. operating temperature 155 °C), color code gray
Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 68-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 68-2-20, test Tb, method 1B: 350 °C, 3.5 s

Yoke

Spring yoke, made of tinned nickel silver (0.5 mm), with ground terminal

---

Complete mounting assembly (8 solder terminals)
Ordering code: B65705B0003X000



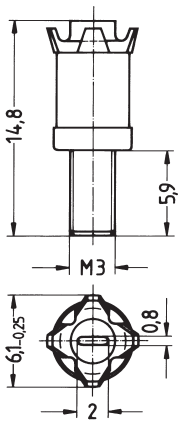
1) The 2.8 mm hole is only necessary for additional fixing with M2.5 screw.

FPK0382-4-E

Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate Pocan B3235® [E245249 (M)], LANXESS AG

Tube core ∅ × length (mm)	Material	Color code	Ordering code
4.55 × 6.3	N22	red	B65679E0003X022
4.98 × 6.3	N22	black	B65679E0002X022

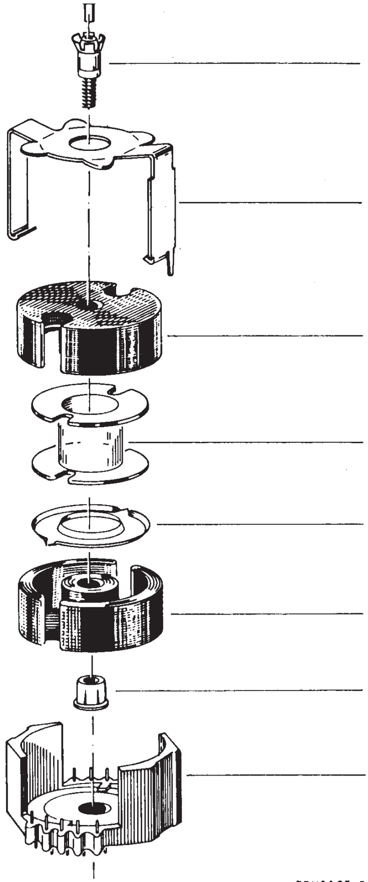


Note:

Due to the limited distance between adjusting screw and internal borehole, the entire assembly must be accurately centered.

P 36 × 22

Core and accessories



FPK0025-2

Individual parts	Part no.	Page
Adjusting screw	B65679	397
Yoke	B65615	396
Core	B65611	394
Coil former	B65612	395
Insulating washer		
Core	B65611	394
Threaded sleeve (glued-in)		
Terminal carrier	B65615	396

Example of an assembly set
for printed circuit boards

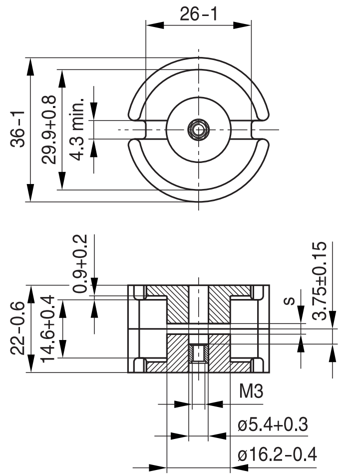
P 36 × 22

Core **B65611**

- Delivery mode: sets

Magnetic characteristics (per set)

	with center hole	without center hole	
Σl/A	0.26	0.25	mm^{-1}
l_e	52	53.5	mm
A_e	202	213	mm^2
A_{min}	—	173	mm^2
V_e	10500	11400	mm^3



FPK0437-F

Approx. weight (per set)

m	57	59.5	g

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code 1) -D with center hole -T with threaded sleeve
N48	250 ±3%	1.20	51	B65611+0250A048
	400 ±3%	0.62	82	B65611+0400A048
	630 ±3%	0.35	129	B65611+0630A048
	1000 ±3%	0.22	205	B65611+1000A048

Ungapped

Material	A_L value nH	μ_e	Ordering code -D with center hole -W without center hole
N48	7600 +30/–20%	1560	B65611D0000R048
N87	8000 +30/–20%	1600	B65611W0000R087
N30	15200 +30/–20%	3040	B65611W0000R030

Other A_L values/air gaps and materials on request – see Processing notes on page 173.

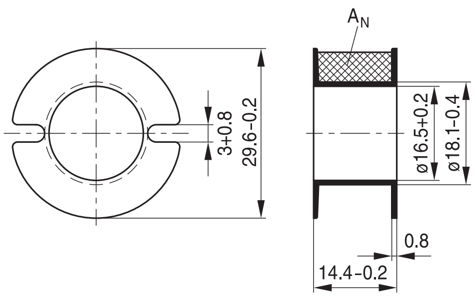
1) Replace the + by the code letter "D" or "T" for the required version.

Coil former

Standard: to IEC 62317-2
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
Winding: see Processing notes, 2.1

Coil former				Ordering code
Sections	A_N mm^2	l_N mm	A_R value µΩ	
1	63	73	39	B65612B0000T001

Coil former



Mounting assembly for printed circuit boards

- The set comprises a terminal carrier and a yoke
- For snap-in connection

Terminal carrier

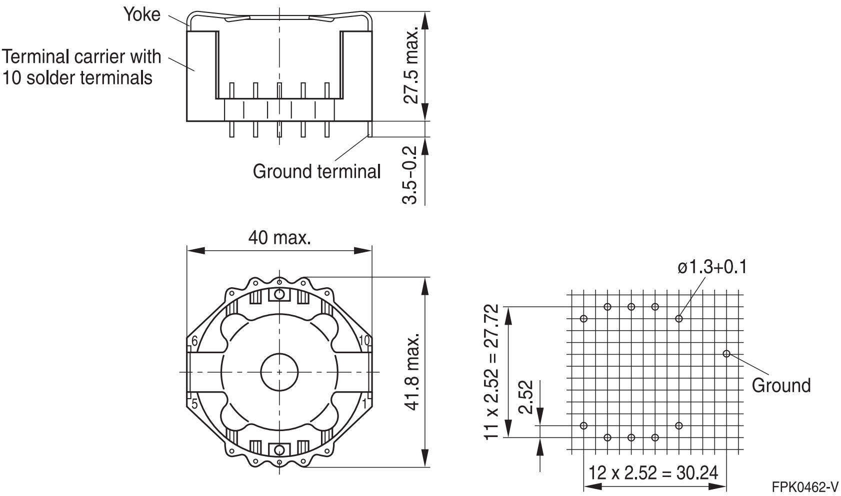
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Yoke

Spring yoke, made of nickel silver (0.6 mm), with ground terminal

---

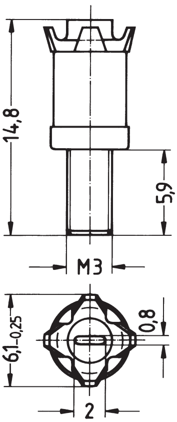
Complete mounting assembly (10 solder terminals)
Ordering code: B65615B0001X000



Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate Pocan B3235® [E245249 (M)], LANXESS AG

Tube core ∅ × length (mm)	Material	Color code	Ordering code
4.55 × 6.3	N22	red	B65679E0003X022
4.98 × 6.3	N22	black	B65679E0002X022



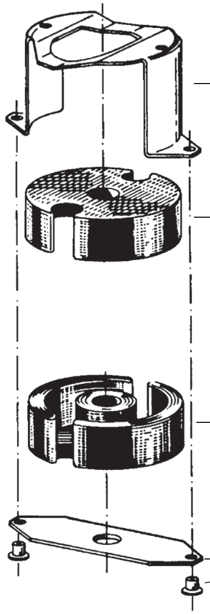
FPK0141-P

Note:

Due to the limited distance between adjusting screw and internal borehole, the entire assembly must be accurately centered.

P 41 × 25

Core and accessories



Individual parts	Part no.	Page
Yoke	B65623	400
Core	B65621	399
Core	B65621	399
Base plate with 2 tubular rivets	B65623	400

Example of an assembly set

P 41 × 25

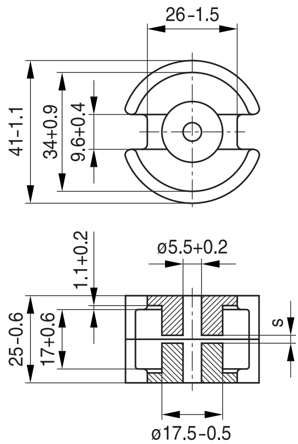
Core **B65621**

- Delivery mode: sets

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.264 mm^{-1}
l_e = 60.4 mm
A_e = 229 mm^2
A_{min} = 201 mm^2
V_e = 13832 mm^3

Approx. weight 82 g/set



FPK0438-N

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code -J with center hole
N48	250 ± 3% 630 ± 3% 3150 ±10%	1.35 0.43 0.05	51 129 643	B65621J0250A048 B65621J0630A048 B65621J3150K048

Ungapped

Material	A_L value nH	μ_e	Ordering code -J with center hole
N48	8400 +30/–20%	1720	B65621J0000R048

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

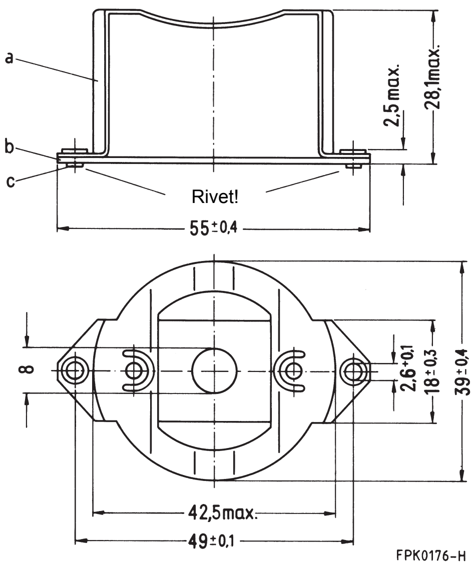
Mounting assembly for chassis mounting

- The set comprises a yoke and a metal base plate
- Fixing by screws or rivets

Yoke

Spring yoke, made of nickel silver (0.5 mm)

Complete mounting assembly (with tubular rivets)
Ordering code: B65623A0001X000



a) Yoke
b) Base plate
c) Tubular rivets

P 47 × 28

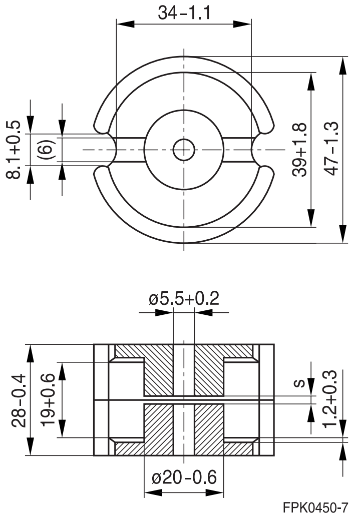
Core **B65631**

- Delivery mode: sets

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.22 mm^{-1}
l_e = 69.1 mm
A_e = 310 mm^2
A_{min} = 263 mm^2
V_e = 21428 mm^3

Approx. weight 125 g/set



Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code -J with center hole
N48	100 ±3% 250 ±3%	3.9 1.5	18 44	B65631J0100A048 B65631J0250A048

Ungapped

Material	A_L value nH	μ_e	Ordering code -J with center hole
N48	9500 +30/–20%	1690	B65631J0000R048

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

P 59 × 36

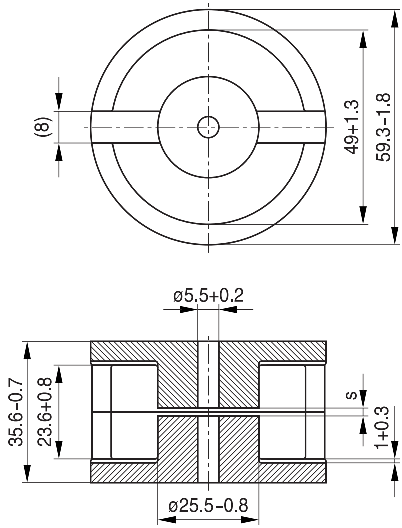
Core **B65691**

- Delivery mode: sets

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.181 mm^{-1}
l_e = 88 mm
A_e = 485 mm^2
A_{min} = 445 mm^2
V_e = 42680 mm^3

Approx. weight 270 g/set



FPK0435-Y

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code -K with center hole
N48	100 ± 3% 1000 ± 3% 6500 ±10%	6 0.57 0.06	14 144 940	B65691K0100A048 B65691K1000A048 B65691K6500K048

Ungapped

Material	A_L value nH	μ_e	Ordering code -K with center hole
N48	12500 +30/–20%	1800	B65691K0000R048

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

P core halves for proximity switches (PS cores)

General information

Inductive proximity switches can be used as noncontacting motion detectors and output indicators. Possible applications:

– Detection of the final position on conveyor belts
– Counters at rotating parts
– Contactless detection of pointer position of pointer-type measuring and control instruments

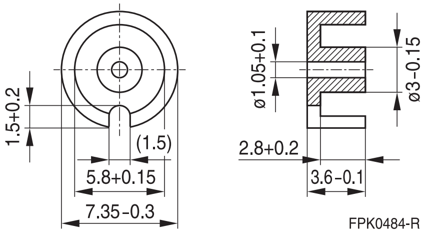
The advantages of proximity switches are bounceless switching, no mechanical wear, insensitivity to contamination and detection of metallic parts only.

We supply P core halves/PS cores with diameters ranging from 7.35 to 150 mm for inductive proximity switches. Their dimensions are matched to standardized switches. Maximum operating distances can thus be achieved for the individual P core sizes. The SIFERRIT material N22 is particularly suitable for the frequency range from 0.1 to 0.8 MHz. The material M33 is additionally available for higher frequencies (core types with 5.6 to 14.0 mm diameter).

Thermoplastic coil formers can be supplied for most of the core types. This material permits an operating temperature range of –60 to +120 °C. Consequently, temperatures of up to +120 °C are also permissible during encapsulation.

Core

- To IEC 62323
- Recommended for new designs
- For inductive proximity switches
- Material N22 for the frequency range from about 80 to 800 kHz
- Material M33 for higher frequencies up to about 1.6 MHz



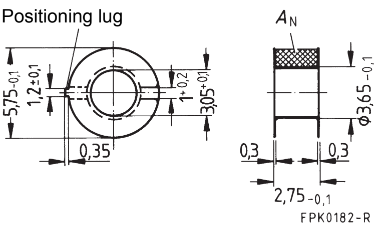
Material	Approx. weight g	Ordering code
N22	0.3	B65933A0000X022
M33	0.3	B65933A0000X033

Other materials available on request – see Processing notes on page 173.

Coil former with positioning lug

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0® [E45329 (M)], Sabic Innovative Plastic

A_N mm^2	l_N mm	A_R value μΩ	Ordering code
2.2	14.6	240	B65512C0000T001

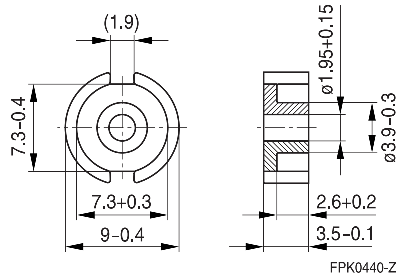


PS 9 × 3.5

Core and accessories B65935, B65936

Core

- To IEC 62323
- Recommended for new designs
- For inductive proximity switches
- Material N22 for the frequency range from about 80 to 800 kHz
- Material M33 for higher frequencies up to about 1.6 MHz



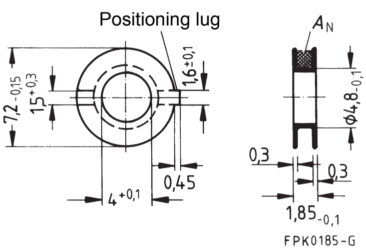
Material	Approx. weight g	Ordering code
N22	0.6	B65935E0000X022
M33	0.6	B65935E0000X033

Other materials available on request – see Processing notes on page 173.

Coil former with positioning lug

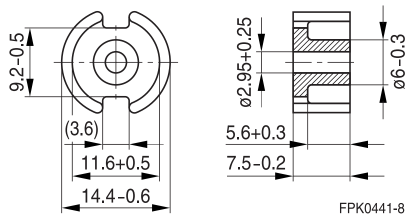
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Pocan B4235® [E245249 (M)], LANXESS AG

A_N mm^2	l_N mm	A_R value μΩ	Ordering code
1.5	18.6	470	B65936A0000T001



Core

- For inductive proximity switches
- Material N22 for the frequency range from about 70 to 700 kHz



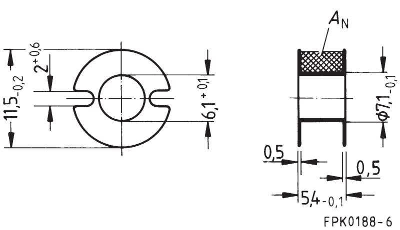
Material	Approx. weight g	Ordering code
N22	2.5	B65937A0000X022

Other materials available on request – see Processing notes on page 173.

Coil former

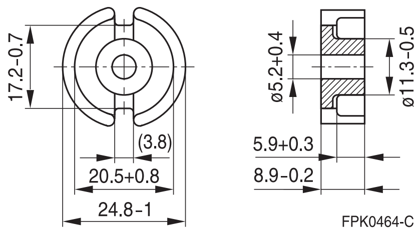
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Crastin SK 645 FR® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC

A_N mm^2	l_N mm	A_R value μΩ	Ordering code
8.4	28	115	B65542B0000T001



Core

- To IEC 62323
- Recommended for new designs
- For inductive proximity switches
- Material N22 for the frequency range from about 60 to 600 kHz



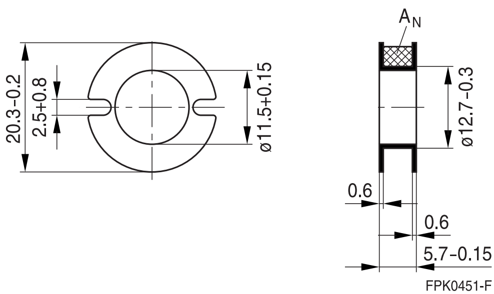
Material	Approx. weight g	Ordering code
N22	9	B65939A0000X022

Other materials available on request – see Processing notes on page 173.

Coil former

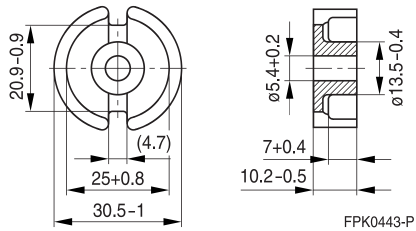
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E121562 (M)] SABIC INNOVATIVE PLASTICS US L L C

A_N mm^2	l_N mm	A_R value μΩ	Ordering code
16.7	51	105	B65940B0000T001



Core

- To IEC 62323
- Recommended for new designs
- For inductive proximity switches
- Material N22 for the frequency range from about 50 to 500 kHz



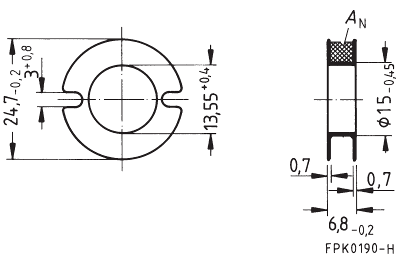
Material	Approx. weight g	Ordering code
N22	18	B65941A0000X022

Other materials available on request – see Processing notes on page 173.

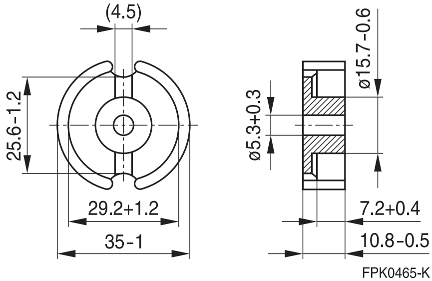
Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C

A_N mm^2	l_N mm	A_R value μΩ	Ordering code
24.4	62	87	B65942B0000T001



- To IEC 62323
- Recommended for new designs
- For inductive proximity switches
- Material N22 for the frequency range from about 40 to 400 kHz



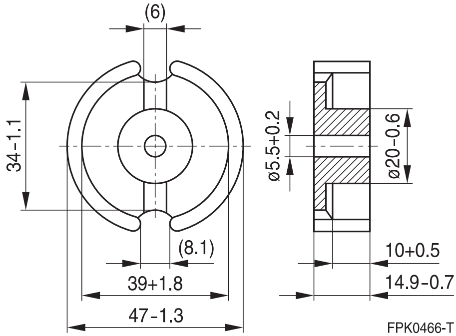
Material	Approx. weight g	Ordering code
N22	28	B65947A0000X022

Other materials available on request – see Processing notes on page 173.

PS 47 × 14.9

Core B65943

- Recommended for new designs
- For inductive proximity switches
- Material N22 for the frequency range from about 30 to 300 kHz



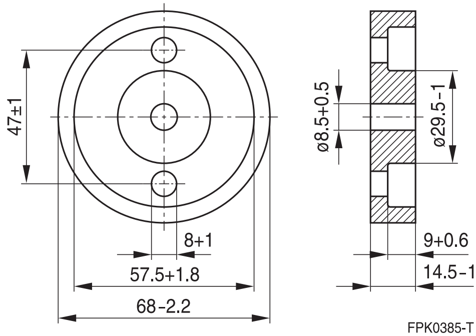
FPK0466-T

Material	Approx. weight g	Ordering code
N22	62	B65943A0000X022

Other materials available on request – see Processing notes on page 173.

Core

- To IEC 62323
- Recommended for new designs
- For inductive proximity switches
- Material N22 for the frequency range from about 20 to 200 kHz



FPK0385-T

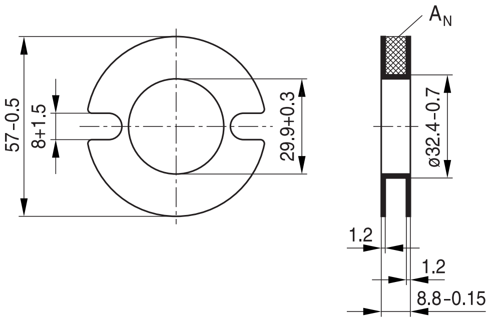
Material	Approx. weight g	Ordering code
N22	130	B65928A0000X022

Other materials available on request – see Processing notes on page 173.

Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C

A_N mm^2	l_N mm	A_R value μΩ	Ordering code
77	140	62	B65946B0000T001



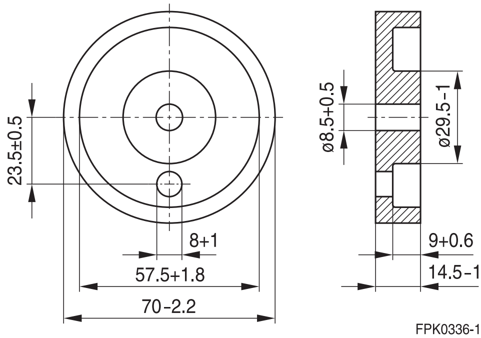
FPK0452-N

P core half 70 × 14.5

Core and accessories — B65945, B65946

Core

- For inductive proximity switches
- Material N22 for the frequency range from about 20 to 200 kHz



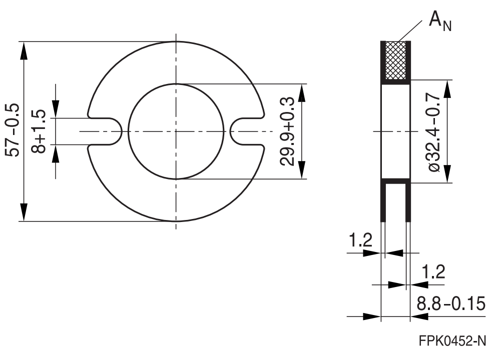
Material	Approx. weight g	Ordering code
N22	160	B65945A0000X022

Other materials available on request – see Processing notes on page 173.

Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0® [E45329 (M)], SABIC INNOVATIVE PLASTICS

A_N mm²	l_N mm	A_R value μΩ	Ordering code
77	140	62	B65946B0000T001

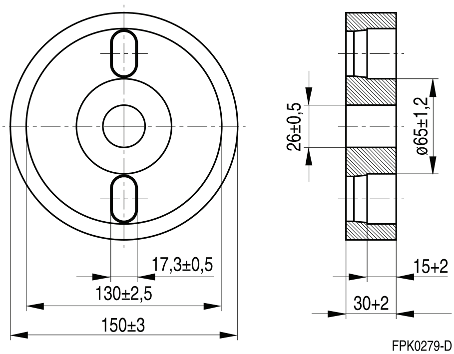


P core half 150 × 30

Core B65949

Large-volume pot core

- Unground core for inductive proximity switches with wide operating distances
- Application examples:
  - Rotary transformers for non-contact power and information transmission
  - Inductive power transmission (non-contact charging of electric cars)
- Options:
  a) Ground version for transformers up to 30 kW
  b) Core height up to 45 mm for transformers up to 100 kW



FPK0279-D

Magnetic characteristics for option a)
(per set)

$\Sigma l/A$ = 0.044 mm^{-1}
l_e = 160 mm
A_e = 3580 mm^2
A_{min} = 2800 mm^2
V_e = 566000 mm^3

Material	Approx. weight g	Ordering code
N27	1700	B65949A0000X027

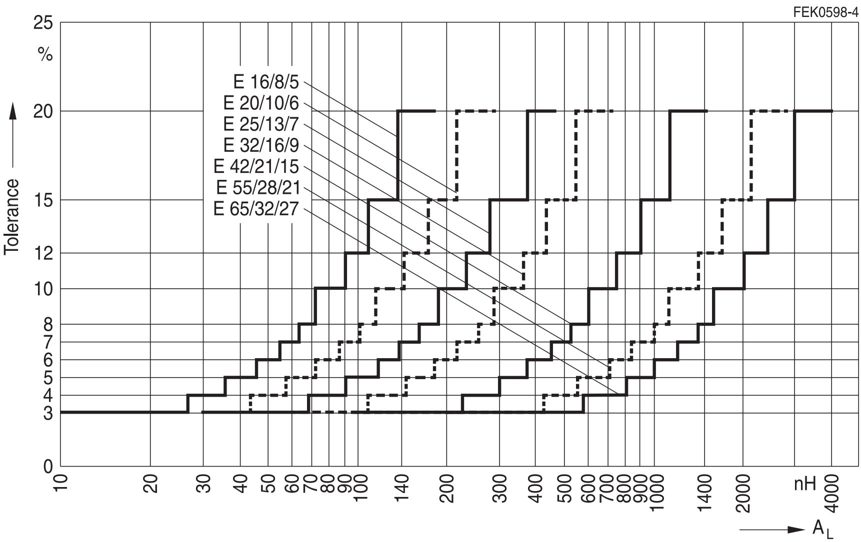
Other materials available on request – see Processing notes on page 173.

1 Tolerances for E cores

The A_L value tolerances for E cores have consequently been defined with consideration of optimized process parameters for all materials with an initial permeability μ_i in the region of 2200 to 10000 as a step function (see figure below).

The quantized A_L step values should preferably be used. They are still available in their respective lower tolerance ranges. Thus a tolerance of ±15% can be determined for an E 42/21/15 made of N87 material for an A_L value of 1190 nH.

With this type of tolerance definition, EPCOS has defined standard A_L values and the associated tolerance for the first time. Based on the initial permeability the tolerance can be slightly lower or higher.



2 Core shapes and materials

The preferred materials for manufacture of E cores are the SIFERRIT materials N27, N87, N97, N88, N95, N96, N92, T46 and N30. N27 is recommended for power applications in the frequency range up to about 100 kHz and N87, N97, N88, N95, N96 and N92 for the frequency range up to 500 kHz; EFD cores made of N49 are particularly suitable for frequencies up to 1 MHz (PC200 up to 4 MHz). These materials feature a high saturation flux density and low power loss.

Material N30 is particularly suitable for broadband small-signal applications and also for interference suppression chokes.

The E core spectrum contained in this data book comprises five basic core shapes, which can be used not only for transformers but also for chokes with a power capacity of up to 10 kW.

a) Types with round center leg

We offer the following types:

- ER cores
- EQ cores
- ETD cores to IEC 62317-6 (Economic Transformer Design)

E cores with round center leg offer the advantage of easy winding, particularly when thick winding wires are used, compact mounting dimensions and wide openings on each side. ETD cores have the additional benefit of an almost constant cross section along the magnetic path. A wide variety of optimized accessories is available. ER cores in sizes 9.5 and 11/5 are particularly suitable for designing transformers with low overall height and high inductance. They come in material T38 for broadband applications plus in N87, N97, N88, N95, N96, N92 and N49 for power transformers for frequencies up to and over 500 kHz (PC200 up to 4 MHz).

b) Types with rectangular center leg

- E cores
- EFD cores (Economic Flat Transformer Design); EV cores

The conventional E cores with rectangular center leg are available in a wide variety of sizes.

EFD cores have an optimized cross section and enable the design of very flat and compacts transformers, even for high-frequency applications.

c) ELP cores (E Low Profile)

ELP cores enable the design of very flat transformers and feature excellent thermal performance due to the large core surface. ELP cores are now specified in IEC 62317-9.

3 Ordering, marking, delivery

E cores are supplied as single units (except ER 9.5, ER 11 and ER 14.5/6: in sets), with each packing unit (PU) exclusively containing cores with or without shortened center leg (air gap dimension „g“).

Gapped EFD cores are supplied with toleranced A_L value as specified in the data sheets. All other E cores are availble with toleranced A_L value on request.

There are two possibilites of air gap distribution, either symmetrical (each core of a set has the same air gap size) or unsymmetrical (a gapped core is combined with an ungapped core).

E and U cores are marked using the same system. Hence, the following description applies to both core shapes.

- **E 5**, **E 6.3, E 8.8, EFD 10** and **I cores** are not marked.
- **E cores** are marked by an ink-jet printer on the outside of the legs (figure 1).

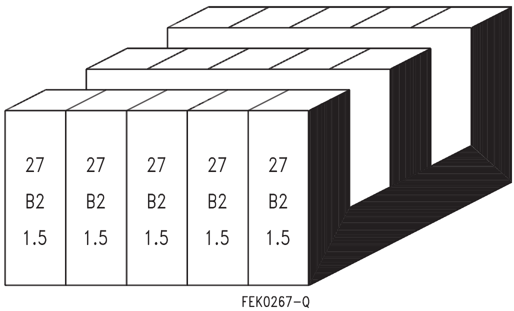


Fig. 1 Marking by ink-jet printer

Gapped cores:

with toleranced air gap: material, date code and size of air gap,
e.g.: 27 B2 1.5

with toleranced A_L value:

symmetrical version: material, date code, A_L value and code for A_L value tolerance, e.g.: 27 B230A

unsymmetrical version: material, date code and size of air gap,
e.g.: 27 B2 1.5

Ungapped cores are marked with material and date code, e.g.: 27 B2.

Depending on their height and width, there is not enough space on all cores for complete marking, meaning that simplification is necessary. So only the material and the date code will be stated. This ensures that there is space for at least one complete marking (two characters per line) on the core. To avoid confusion of names like N27 and N72, the beginning of the material designation coincides with the position of the letter in the date code.

Example: ↓

727272

2B2B2B

means N27 (not N72)

Remark: in some exception cases parts are stamped with rolls on the back (gapped EFD 15 for example).

Date code:

Date coding is based on a two-week period (see tables, counting by calendar weeks CW).

In the following year lines 1 and 2 will we swapped (material and date code). The position of letters and digits will not be swapped. Counting started in 1996.

Coding of two-week production periods

CW	Code	CW	Code	CW	Code
1 and 2	A	19 and 20	J	37 and 38	S
3 and 4	B	21 and 22	K	39 and 40	T
5 and 6	C	23 and 24	L	41 and 42	U
7 and 8	D	25 and 26	M	43 and 44	V
9 and 10	E	27 and 28	N	45 and 46	W
11 and 12	F	29 and 30	O	47 and 48	X
13 and 14	G	31 and 32	P	49 and 50	Y
15 and 16	H	33 and 34	Q	51 and 52	Z
17 and 18	I	35 and 36	R	53	AA

Coding of week day

	Day	Code		Day	Code
CW_n	Monday Tuesday Wednesday Thursday Friday Saturday Sunday	1 2 3 4 5 5 +	CW_{n+1}	Monday Tuesday Wednesday Thursday Friday Saturday Sunday	6 7 8 9 0 0 —

The black ink is insoluble in water, but it will dissolve in fluids based on ketones. It will also dissolve if left for a long time in an ultrasonic bath. Different colored markings are not feasible.

4 Cores with toleranced air gap

The following tolerances for dimension „g“ apply to all E cores:

Dimension g mm	Tolerance mm
g < 0.10	±0.01
0.10 ≤ g < 0.5	±0.02
g ≥ 0.5	±0.05

As is the case with ungapped cores, a certain degree of roughness cannot be avoided on the ground surfaces of the outer legs.

5 Cores with toleranced A_L value

The tolerance of the A_L value depends on the magnitude of the A_L value and the core shape. Tolerance figures are therefore given only on a core-type-specific basis.

6 Calculation formulae

Calculation formulae a) and b) apply to the A_L value under the following measuring conditions:

Measuring flux density $\hat{B} \leq 0.25$ mT, measuring frequency f = 10 kHz,
measuring temperature T = 25 ±3 °C, measuring coil: N = 100 turns, fully wound

a) Air gap and A_L *value*

The typical A_L value tabulated in the individual data sheets refers to a core set comprising a gapped core with dimension „g“ and an ungapped core with „g“ approx. 0.

By inserting the core-specific constants K1 and K2, a nominal A_L value can be calculated for the materials N27 and N87 within the relevant quoted air-gap validity range:

$$s = \left(\frac{A_L}{K1}\right)^{\frac{1}{K2}} \qquad s = [\text{mm}] \quad A_L = [\text{nH}]$$

Production variations with regard to μ_i and grinding quality should be taken into account additionally.

b) DC magnetic bias I_{DC}

By using the core-shape-related factors K3 and K4, nominal values can be determined for the DC magnetic biasing characteristic of E, ETD and EFD cores made of N27 and N87 and ELP cores made of N87 at temperature 25 °C and 100 °C.

The direct current I_{DC} at which the A_L value drops by 10% compared to the A_L value without magnetic biasing (I_{DC} = 0 A) is determined for a coil with 100 turns.

Calculation of I_{DC} at T = 25 °C:
The factors K3 and K4 for T = 25 °C and the A_L value without magnetic biasing are inserted into the equation for the calculation.

Calculation of I_{DC} at T = 100 °C:

The factors K3 and K4 for T = 100 °C are inserted into the equation for the calculation. The value for T = 25 °C without magnetic biasing should be used here as the A_L value.

$$I_{DC} = \left(\frac{0.9 \cdot A_L}{K3}\right)^{\frac{1}{K4}} \qquad \begin{aligned} I_{DC} &= [A] \\ A_L &= [nH] \end{aligned} \quad \text{(without magnetic biasing)}$$

7 Magnetic characteristics

The set characteristics Σl/A, l_e, A_e, A_{min} and V_e required for the calculation of field strength, flux density and hysteresis losses have been determined to IEC 60205 (A_{min} = minimum cross section relative to the nominal dimensions).

8 Core losses

The maximum power loss for each core type is specified in W/set together with the measurement parameters. The flux density has been calculated on the basis of a sinusoidal voltage and is referred to the minimum cross-sectional area A_{min}.

9 Accessories

The coil formers for all ETD, EFD and ER cores and most of the E cores are designed so that they can be wound fully automatically.

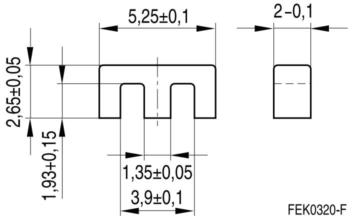
With the ETD cores and most E cores, each core half and its mounting assembly can be fitted to the coil former from the same side, thus permitting simple fully automatic assembly.

If coil formers are used for cores with a rectangular cross section (E cores), the indication of the winding height represents only a theoretical value. The use of thicker wires or litz wires results in a gradual rounding of the winding from layer to layer. In such cases the planned winding design should be verified by means of a winding test.

SMD coil formers are available as accessory.

E 5

Core B66303



- To IEC 62317-8
- For small impedance-matching transformers in telecom applications
- For miniature transformers, e.g. DC/DC converters for surface mounting
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 4.86 mm^{-1}
l_e = 12.6 mm
A_e = 2.6 mm^2
A_{min} = 2.5 mm^2
V_e = 33 mm^3

Approx. weight 0.16 g/set

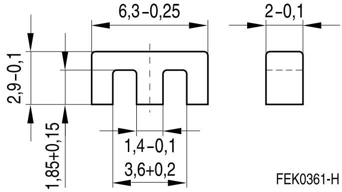
Ungapped

Material	A_L value nH	μ_e	Ordering code
N87	270 +30/–20%	1000	B66303G0000X187
T38	1400 +40/–30%	5190	B66303G0000X138

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 6.3

Core **B66300**



- To IEC 62317-8
- For miniature transformers, e.g. DC/DC converters for surface mounting
- Available with SMD coil former
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 3.7 mm^{-1}
l_e = 12.2 mm
A_e = 3.3 mm^2
A_{min} = 2.6 mm^2
V_e = 40.3 mm^3

Approx. weight 0.24 g/set

Ungapped

Material	A_L value nH	μ_e	Ordering code
N87	380 +30/–20%	1120	B66300G0000X187
N30	700 +40/–30%	2059	B66300G0000X130
T38	1700 +40/–30%	4990	B66300G0000X138

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

SMD coil former with gullwing terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
B66301B: Vectra E 130i [E106764 (M)], POLYPLASTICS CO LTD
Vectra E 130i [E83005 (M)], CELANESE INTERNATIONAL CORP.
B66301C: Vectra C 130 [E106764 (M)], POLYPLASTICS CO LTD

Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s

Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

Winding: see Processing notes, 2.1

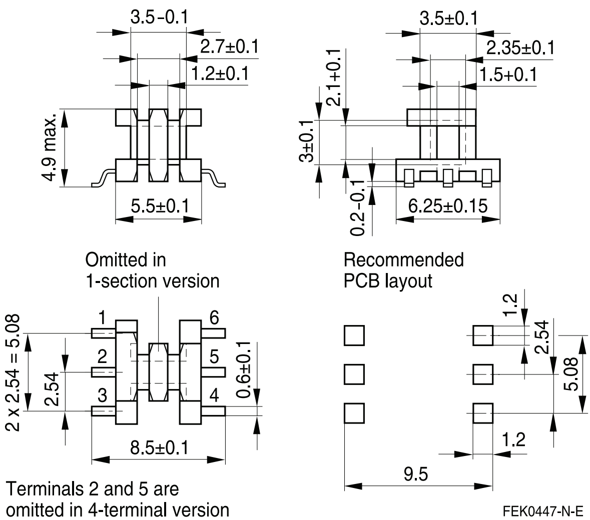
Plastic cover cap

Used to protect the transformer against external influences, for stamping and for improved processing on assembly machines.

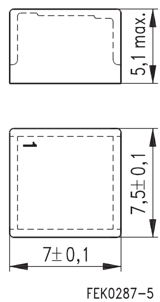
Material: see coil former, color code white

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	
1	1.62	12.8	272	4 6	B66301B1004T001 B66301B1006T001
2	0.9	12.8	490	6	B66301B1006T002
Plastic cover cap					B66301C2000X000

Coil former

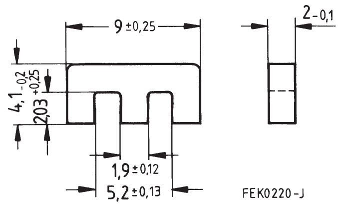


Plastic cover cap



E 8.8

Core **B66302**



- To IEC 62317-8
- For miniature transformers, e.g. DC/DC converters for surface mounting
- Available with SMD coil former
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 3.1 mm^{-1}
l_e = 15.5 mm
A_e = 5 mm^2
A_{min} = 3.6 mm^2
V_e = 78 mm^3

Approx. weight 0.50 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	1000 +30/–20%	2460		B66302G0000X130
T38	2100 +40/–30%	5170		B66302G0000X138
N49	400 +30/–20%	760	< 0.065 (100 mT, 500 kHz, 100 °C)	B66302G0000X149
N87	550 +30/–20%	1350	< 0.035 (200 mT, 100 kHz, 100 °C)	B66302G0000X187

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

SMD

SMD coil former with gullwing terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black (coil former) and white (cover cap).
Vectra E 130i [E106764 (M)], POLYPLASTICS CO LTD
Vectra E 130i [E83005 (M)], CELANESE INTERNATIONAL CORP.
Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s
Winding: see Processing notes, 2.1

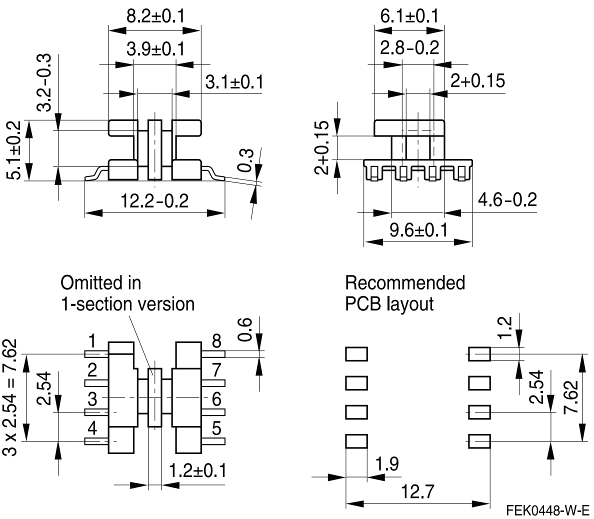
Plastic cover cap

Used to protect the transformer against external influences, for stamping and for improved processing on assembly machines.

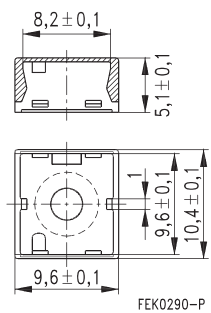
Material: GFR polyamide (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code white
Stanyl TW250F6 [E47960 (M)], DSM ENGINEERING PLASTICS B V

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	2.7	14.9	190	8	B66302D1008T001
2	1.7	14.9	302	8	B66302D1008T002
Plastic cover cap					B66302A2000X000

Coil former



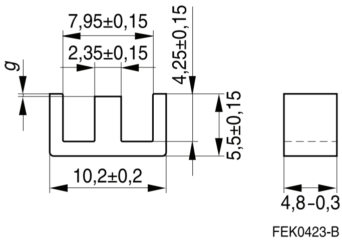
Plastic cover cap



E 10/5.5/5

Core **B66322**

- Compact E core with large winding area
- Suitable for the design of compact battery chargers
- Gapped cores available for flyback converters
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 2.41 mm^{-1}
l_e = 26.3 mm
A_e = 10.9 mm^2
A_{min} = 10.4 mm^2
V_e = 287 mm^3

Approx. weight 1.4 g/set

Ungapped

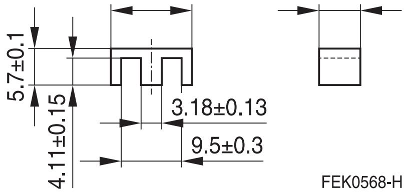
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	750 ±25%	1430	< 0.41 (200 mT, 100 kHz, 100 °C)	B66322G0000X127
N87	800 ±25%	1530	< 0.15 (200 mT, 100 kHz, 100 °C)	B66322G0000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 12.7/6/6

Core B66492

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.42 mm^{-1}
l_e = 28.3 mm
A_e = 19.9 mm^2
A_{min} = 19.4 mm^2
V_e = 564 mm^3

Approx. weight 2.9 g/set

Ungapped

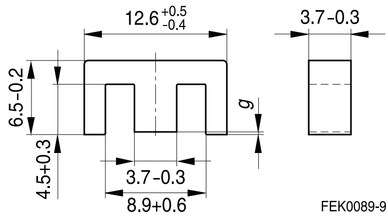
Material	A_L value nH	μ_e	P_V W/set	Ordering code
T65	2400 ±25%	2715		B66492G0000X165
N87	1400 ±25%	1580	< 0.29 (200 mT, 100 kHz, 100 °C)	B66492G0000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 13/7/4 (EF 12.6)

Core **B66305**

- To IEC 62317-8
- For miniature transformers
- Available with SMD coil former
- E cores with high permeability for common-mode chokes and broadband applications
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 2.39 mm^{-1}
l_e = 29.6 mm
A_e = 12.4 mm^2
A_{min} = 12.2 mm^2
V_e = 367 mm^3

Approx. weight 2 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	1000 +30/–20%	1900		B66305G0000X130
T65	1300 ±30%	2470		B66305G0000X165
T65	1900 ±30%	3610		B66305F0000X165
T46	3600 ±30%	6839		B66305F0000X146
N27	800 +30/–20%	1510	< 0.40 (200 mT, 100 kHz, 100 °C)	B66305G0000X127
N87	850 +30/–20%	1620	< 0.20 (200 mT, 100 kHz, 100 °C)	B66305G0000X187

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	0.04 ±0.01 0.5 ±0.05	250 45	454 85	B66305G0040X127 B66305G0500X127
N87	0.04 ±0.01 0.13 ±0.02 0.30 ±0.02	280 112 64	530 215 122	B66305G0040X187 B66305G0130X187 B66305G0300X187

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	28.4	–0.676	36.5	–0.847	33.2	–0.865
N87	28.4	–0.676	37.5	–0.796	32.1	–0.873

Validity range: K1, K2: 0.03 mm < s < 1.00 mm
K3, K4: 30 nH < A_L < 260 nH

Coil former (magnetic axis horizontal or vertical)

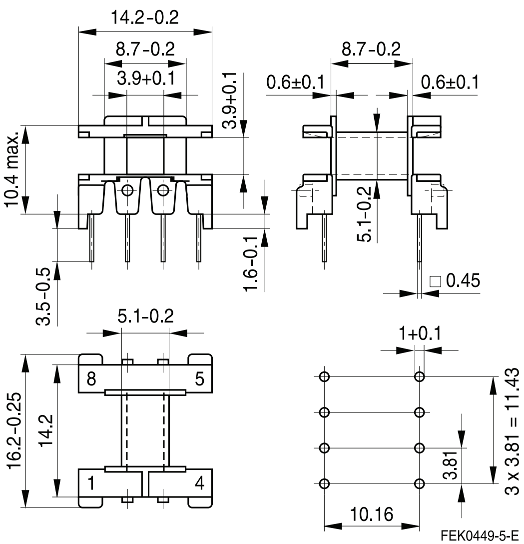
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0® [E207780 (M)], SABIC JAPAN L L C
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

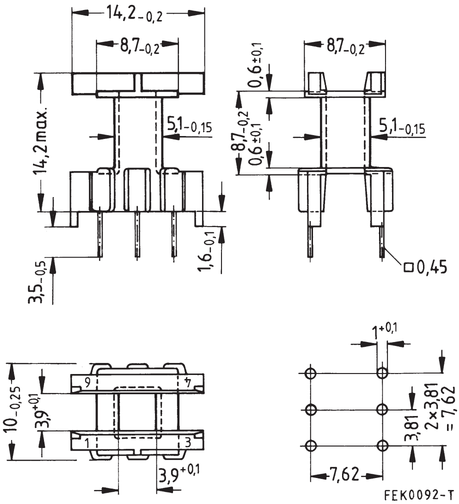
Material: Stainless spring steel (0.2 mm)

Coil former						Ordering code
Version	Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
Horizontal	1	11.6	27.2	80.6	8	B66202B1108T001
Vertical	1	11.6	27.2	80.6	6	B66202B1106T001
Yoke (ordering code per piece, 2 are required)						B66202A2010X000

Horizontal version

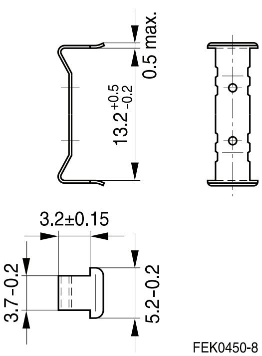


Vertical version



Hole arrangement
View in mounting direction

Yoke



SMD coil former with gullwing terminals

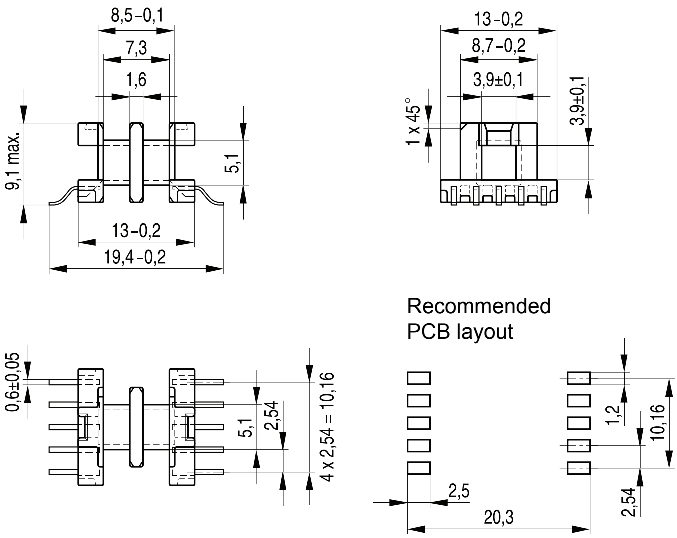
Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Vectra E 130i [E106764 (M)], POLYPLASTICS CO LTD
Vectra E 130i [E83005 (M)], CELANESE INTERNATIONAL CORP.

Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s

Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	Ordering code
1	13.0	27	71	10	B66306C1010T001
2	10.2	27	91	10	B66306C1010T002



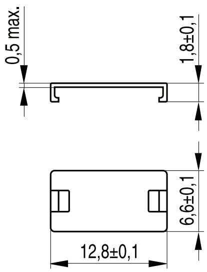
FEK0291-X

Cover plate

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Sumika Super E4008® [E54705 (M)], SUMITOMO CHEMICAL CO LTD

- For stamping and for improved processing on assembly machines
- See under SMD coil former for material and resistance to soldering heat

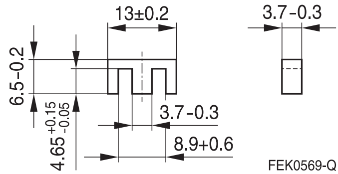
	Ordering code
Cover plate	B66414A7000X000



FEK0260-3

E 13/6.5/3.7

Core **B66543**



- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 2.35 mm^{-1}
l_e = 30 mm
A_e = 12.7 mm^2
A_{min} = 12.1 mm^2
V_e = 382 mm^3

Approx. weight 2 g/set

Ungapped

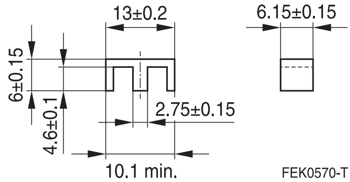
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N87	850 +30/–20%	1590	< 0.22 (200 mT, 100 kHz, 100 °C)	B66543G0000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 13/6/6.15

Core **B66536**

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.77 mm^{-1}
l_e = 30.2 mm
A_e = 17.1 mm^2
A_{min} = 16.9 mm^2
V_e = 516 mm^3

Approx. weight 2.7 g/set

Ungapped

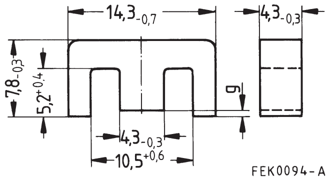
Material	A_L value nH	μ_e	P_V W/set	Ordering code
T65	1350 +30/–20%	1910		B66536G0000X165
N87	900 +30/–20%	1270	< 0.38 (200 mT, 100 kHz, 100 °C)	B66536G0000X187
N97	950 +30/–20%	1340	< 0.32 (200 mT, 100 kHz, 100 °C)	B66536G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 14/8/4

Core **B66219**

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 2.19 mm^{-1}
l_e = 33.9 mm
A_e = 15.5 mm^2
A_{min} = 13.1 mm^2
V_e = 525 mm^3

Approx. weight 2.8 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	1250 +30/–20%	2170		B66219G0000X130
N27	860 +30/–20%	1490	< 0.11 (200 mT, 25 kHz, 100 °C)	B66219G0000X127
N41	1050 +30/–20%	1830	< 0.50 (200 mT, 25 kHz, 100 °C)	B66219G0000X141

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

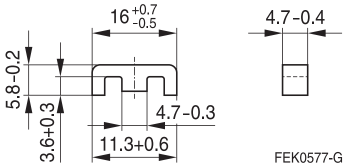
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	36.8	–0.712	44.6	–0.847	40.8	–0.865

Validity range: K1, K2: 0.03 mm < s < 1.00 mm
K3, K4: 30 nH < A_L < 260 nH

E 16/6/5

Core B66393

- Shortened leg compared with E 16/8/5
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.49 mm^{-1}
l_e = 28.6 mm
A_e = 19.2 mm^2
A_{min} = 17.6 mm^2
V_e = 549 mm^3

Approx. weight 3 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	1100 +30/–20%	1300	< 0.10 (200 mT, 25 kHz, 100 °C)	B66393G0000X127
N87	1200 ±25%	1420	< 0.30 (200 mT, 100 kHz, 100 °C)	B66393G0000X187
N97	1250 ±25%	1480	< 0.24 (200 mT, 100 kHz, 100 °C)	B66393G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

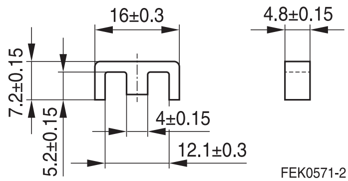
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	42.0	–0.764	56.7	–0.847	51.7	–0.865

Validity range: K1, K2: 0.05 mm < s <1.50 mm
K3, K4: 40 nH < A_L <430 nH

E 16/7/5

Core **B66500**

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.826 mm^{-1}
l_e = 35.1 mm
A_e = 19.2 mm^2
A_{min} = 19.2 mm^2
V_e = 680 mm^3

Approx. weight 3.4 g/set

Ungapped

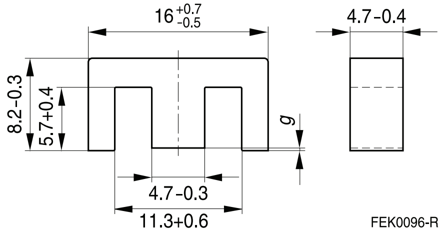
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	950 +30/–20%	1380	< 0.15 (200 mT, 25 kHz, 100 °C)	B66500G0000X127
N87	1000 +30/–20%	1450	< 0.40 (200 mT, 100 kHz, 100 °C)	B66500G0000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 16/8/5 (EF 16)

Core **B66307**

- To IEC 62317-8
- E cores with high permeability for common-mode chokes and broadband applications
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.87 mm^{-1}
l_e = 37.6 mm
A_e = 20.1 mm^2
A_{min} = 19.4 mm^2
V_e = 756 mm^3

Approx. weight 3.6 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	1400 +30/–20%	2080		B66307G0000X130
T65	1700 +30/–20%	2180		B66307G0000X165
T65	2500 +30/–20%	3700		B66307F0000X165
T46	5100 ±30%	7590		B66307F0000X146
N27	950 +30/–20%	1410	< 0.14 (200 mT, 25 kHz, 100 °C)	B66307G0000X127
N87	1000 +30/–20%	1490	< 0.38 (200 mT, 100 kHz, 100 °C)	B66307G0000X187
N97	1050 +30/–20%	1560	< 0.32 (200 mT, 100 kHz, 100 °C)	B66307G0000X197

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.06 ±0.01 0.10 ±0.02 0.24 ±0.02 0.50 ±0.05	303 212 110 69	450 315 170 102	B66307G0060X1** B66307G0100X1** B66307G0240X1** B66307G0500X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	42.2	–0.701	57.0	–0.847	52.1	–0.865
N87	42.2	–0.701	57.8	–0.796	50.4	–0.873

Validity range: K1, K2: 0.05 mm < s < 1.50 mm
K3, K4: 30 nH < A_L < 330 nH

Coil former (magnetic axis horizontal or vertical)

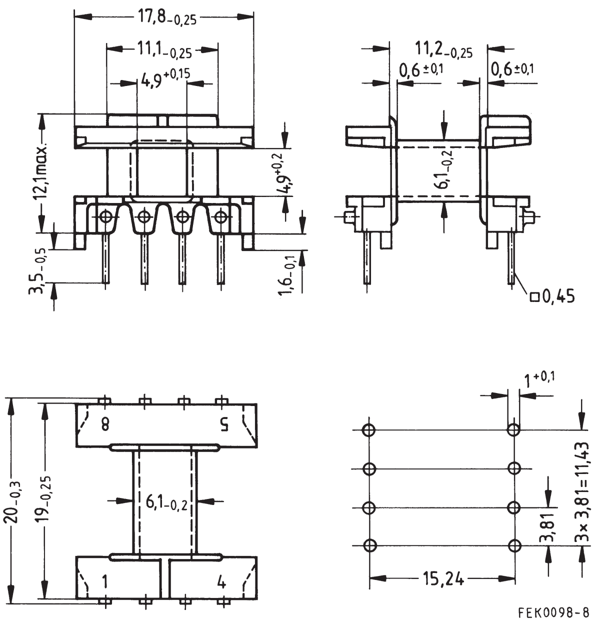
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

Material: Stainless spring steel (0.2 mm)

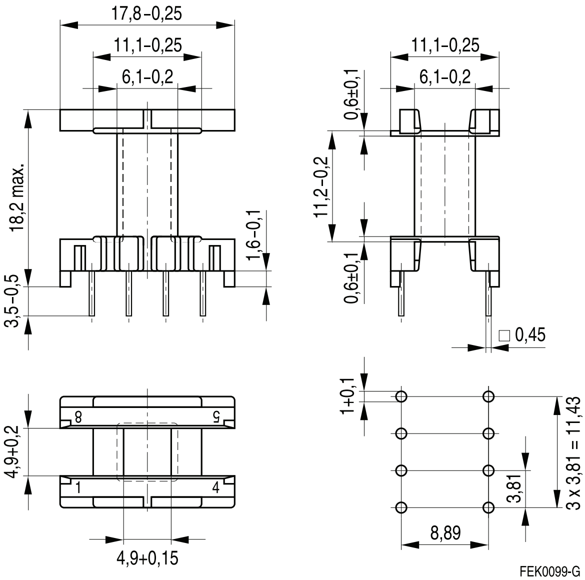
Coil former						Ordering code
Version	Sections	A_N mm^2	l_N mm	A_R value µΩ	Pins	
Horizontal	1	22.3	34	52.4	8	B66308B1108T001
Vertical	1	22.3	34	52.4	8	B66308W1108T001
Yoke (ordering code per piece, 2 are required)						B66308A2010X000

Horizontal version



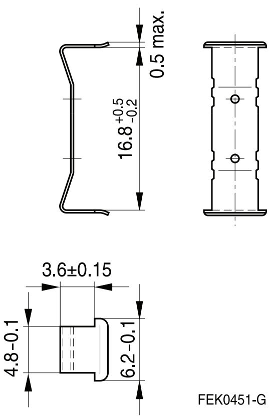
Hole arrangement
View in mounting direction

Vertical version



Hole arrangement
View in mounting direction

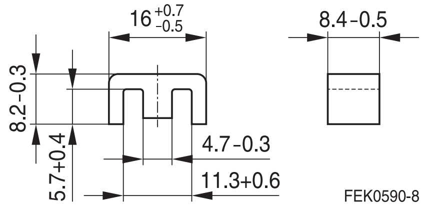
Yoke



E 16/8/8

Core **B66392**

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.036 mm^{-1}
l_e = 37.6 mm
A_e = 36.3 mm^2
A_{min} = 35 mm^2
V_e = 1370 mm^3

Approx. weight 6.8 g/set

Ungapped

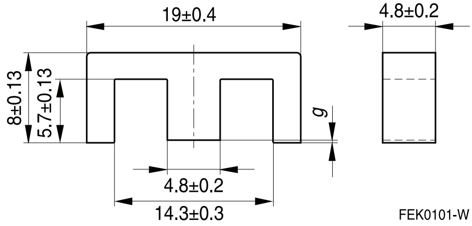
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	1800 +30/–20%	1480	< 0.22 (200 mT, 25 kHz, 100 °C)	B66392G0000X127
N87	1900 +30/–20%	1570	< 0.70 (200 mT, 100 kHz, 100 °C)	B66392G0000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 19/8/5

Core **B66379**

- Size based on US lam. size E cores US designation E 187
- E cores with high permeability for common-mode chokes and broadband applications
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.76 mm^{-1}
l_e = 39.6 mm
A_e = 22.5 mm^2
A_{min} = 22.1 mm^2
V_e = 891 mm^3

Approx. weight 4.4 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	1700 +30/–20%	2380		B66379G0000X130
T46	5800 ±30%	8120		B66379F0000X146
N27	1050 +30/–20%	1470	< 0.18 (200 mT, 25 kHz, 100 °C)	B66379G0000X127
N87	1150 +30/–20%	1610	< 0.50 (200 mT, 100 kHz, 100 °C)	B66379G0000X187

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

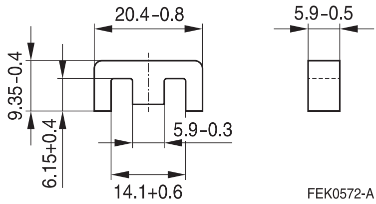
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	46.4	–0.697	63.3	–0.847	57.9	–0.865
N87	46.4	–0.697	64.1	–0.796	56.1	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 40 nH < A_L < 350 nH

E 20/9/6

Core B66312

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.336 mm^{-1}
l_e = 42.9 mm
A_e = 32.1 mm^2
A_{min} = 31.9 mm^2
V_e = 1380 mm^3

Approx. weight 6.8 g/set

Ungapped

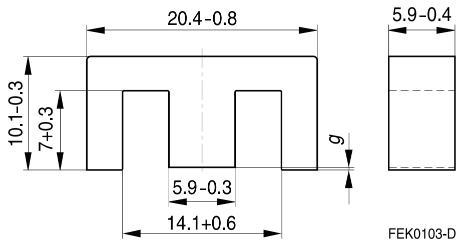
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	2200 +30/–20%	2340		B66312G0000X130
N27	1300 +30/–20%	1380	< 0.25 (200 mT, 25 kHz, 100 °C)	B66312G0000X127
N87	1400 +30/–20%	1490	< 0.70 (200 mT, 100 kHz, 100 °C)	B66312G0000X187
N97	1500 +30/–20%	1600	< 0.65 (200 mT, 100 kHz, 100 °C)	B66312G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 20/10/6 (EF 20)

Core **B66311**

- To IEC 62317-8
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.44 mm^{-1}
l_e = 46.3 mm
A_e = 32.1 mm^2
A_{min} = 31.9 mm^2
V_e = 1490 mm^3

Approx. weight 7.3 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	2150 +30/–20%	2460		B66311G0000X130
T46	7500 ±30%	8610		B66311F0000X146
N27	1300 +30/–20%	1490	< 0.27 (200 mT, 25 kHz, 100 °C)	B66311G0000X127
N87	1470 +30/–20%	1680	< 0.75 (200 mT, 100 kHz, 100 °C)	B66311G0000X187
N97	1500 +30/–20%	1720	< 0.70 (200 mT, 100 kHz, 100 °C)	B66311G0000X197

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27,	0.09 ±0.01	363	415	B66311G0090X1**
N87	0.10 ±0.02	345	395	B66311G0100X1**
	0.15 ±0.02	250	290	B66311G0150X1**
	0.17 ±0.02	227	259	B66311G0170X1**
	0.25 ±0.02	171	195	B66311G0250X1**
	0.50 ±0.05	103	118	B66311G0500X1**
	1.00 ±0.05	60	70	B66311G1000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 20/10/6 (EF 20)

Core **B66311**

Calculation factors (for formulas, see *“E cores: general information”*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	61.6	–0.737	88.1	–0.847	80.9	–0.865
N87	61.6	–0.737	88.5	–0.796	78.4	–0.873

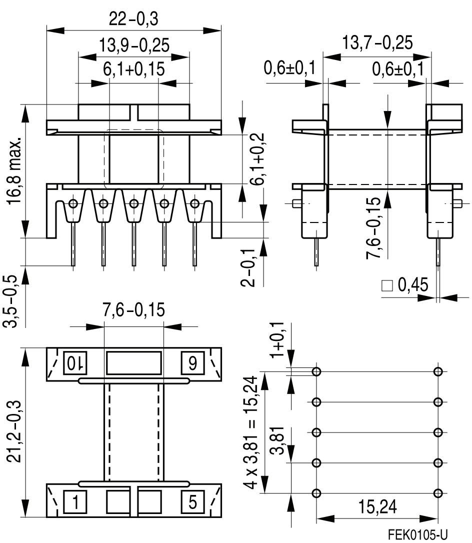
Validity range: K1, K2: 0.05 mm < s < 1.50 mm
K3, K4: 50 nH < A_L < 430 nH

Coil former (magnetic axis horizontal or vertical)

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins. For matching yoke see next page.

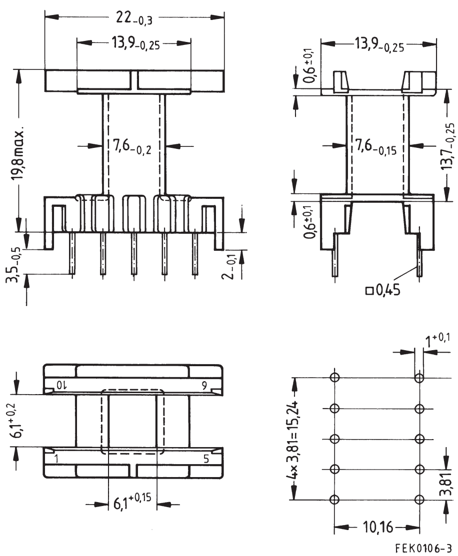
Version	Sections	A_N mm^2	l_N mm	A_R value µΩ	Pins	Ordering code
Horizontal	1	34	41.2	42	10	B66206B1110T001
Vertical	1	34	41.2	42	10	B66206W1110T001

Horizontal version



Hole arrangement
View in mounting direction

Vertical version



Hole arrangement
View in mounting direction

Coil former (with right-angle pins)

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

Material: Stainless spring steel (0.2 mm)

Coil former						Ordering code
Figure	Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
1	1	34	41.2	42	12	B66206C1012T001
2	1	34	41.2	42	14	B66206C1014T001
3	Yoke (ordering code per piece, 2 are required)					B66206A2010X000

Figure 1, coil former (12 pins)

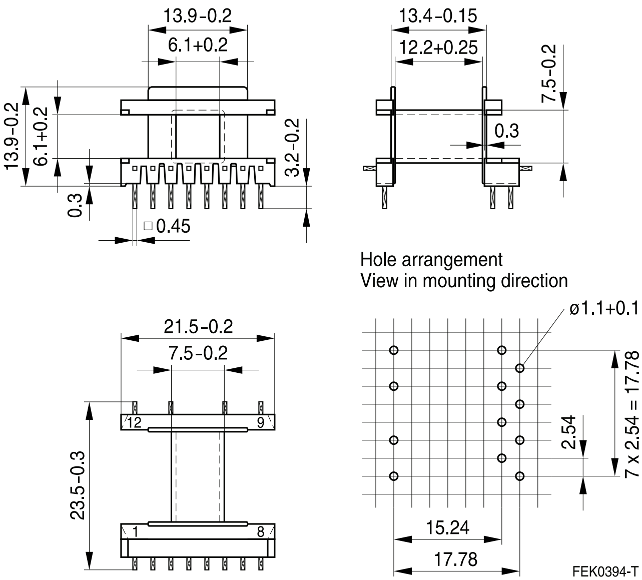


Figure 2, coil former (14 pins)

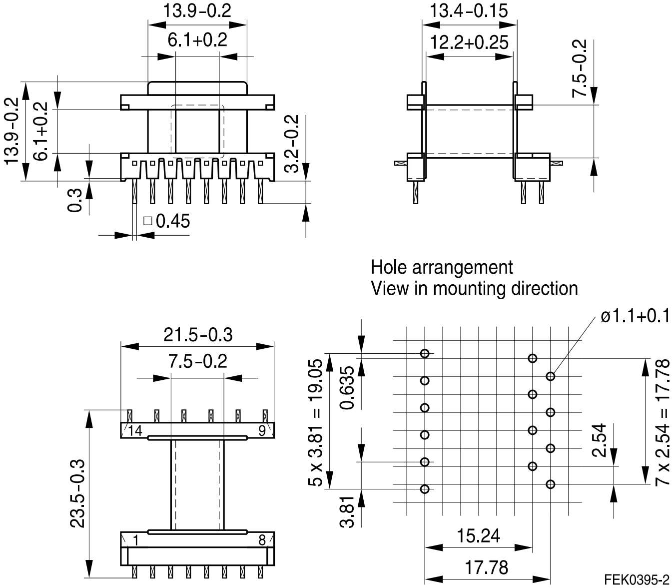
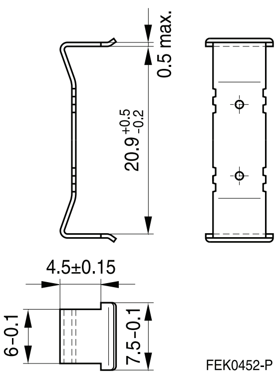


Figure 3, Yoke



E 20/10/6 (EF 20)

Accessories **B66206**

Coil former for luminaires

- Also to be used without clamps

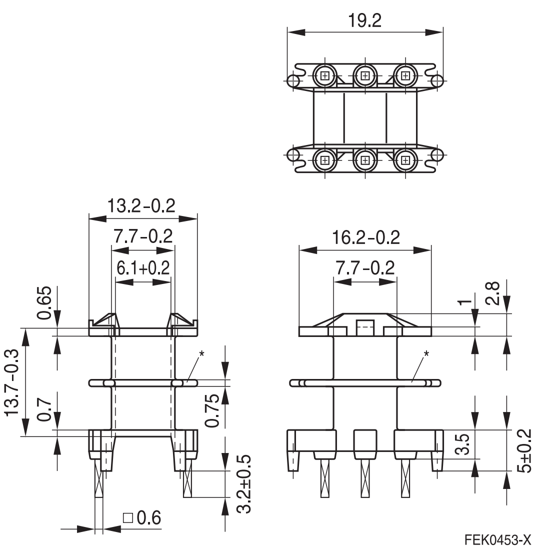
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
H ≙ max. operating temperature 180 °C), color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

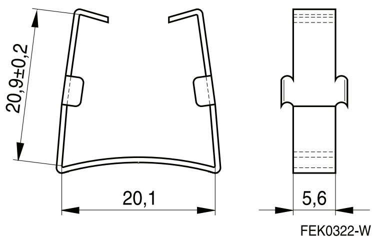
Material: Nickel silver (0.3 mm)

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	32.7	42.3	44.5	6	B66206J1106T001
2	30.7	42.3	34.4	6	B66206K1106T002
Yoke					B66206A2001X000

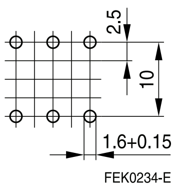
Coil former



Yoke



Hole arrangement
View in mounting direction

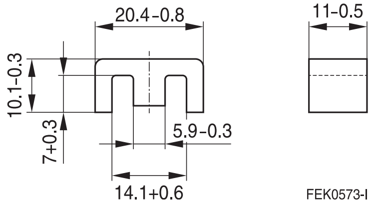


* Omitted for one-section version.

E 20/10/11

Core **B66310**

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.759 mm^{-1}
l_e = 46.3 mm
A_e = 61.0 mm^2
A_{min} = 60.5 mm^2
V_e = 2830 mm^3

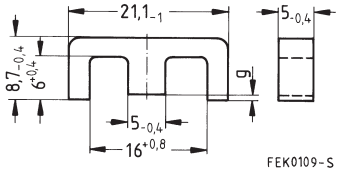
Approx. weight 13.8 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	2300 +30/–20%	1390	< 0.52 (200 mT, 25 kHz, 100 °C)	B66310G0000X127
N87	2500 +30/–20%	1510	< 1.40 (200 mT, 100 kHz, 100 °C)	B66310G0000X187
N97	2500 +30/–20%	1510	< 1.33 (200 mT, 100 kHz, 100 °C)	B66310G0000X197
N95	3000 +30/–20%	1810	< 1.38 (200 mT, 100 kHz, 25 °C) < 1.38 (200 mT, 100 kHz, 100 °C)	B66310G0000X195

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

■ Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 2.01 mm^{-1}
l_e = 43.4 mm
A_e = 21.6 mm^2
A_{min} = 20.2 mm^2
V_e = 937 mm^3

Approx. weight 4.8 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	1500 +30/–20%	2390		B66314G0000X130
N27	900 +30/–20%	1440	< 0.18 (200 mT, 25 kHz, 100 °C)	B66314G0000X127

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

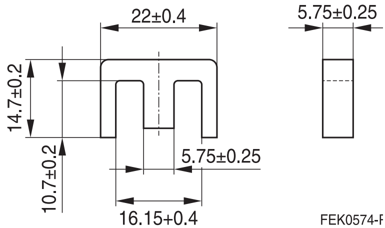
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	47.4	–0.682	59.9	–0.847	54.9	–0.865

Validity range: K1, K2: 0.05 mm < s < 1.50 mm
K3, K4: 30 nH < A_L < 310 nH

E 22/15/6

Core B66486

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.78 mm^{-1}
l_e = 63.2 mm
A_e = 35.5 mm^2
A_{min} = 33.1 mm^2
V_e = 2250 mm^3

Approx. weight 11.8 g/set

Ungapped

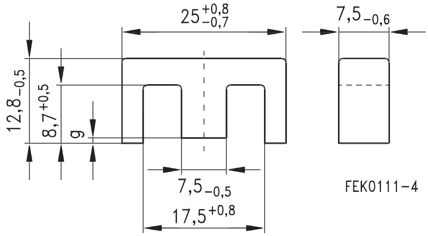
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N87	1200 +25%	1700	< 1.20 (200 mT, 100 kHz, 100 °C)	B66486G0000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 25/13/7 (EF 25)

Core **B66317**

- To IEC 62317-8
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.1 mm^{-1}
l_e = 57.5 mm
A_e = 52.5 mm^2
A_{min} = 51.5 mm^2
V_e = 3020 mm^3

Approx. weight 16 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	2900 +30/–20%	2530		B66317G0000X130
N27	1750 +30/–20%	1520	< 0.59 (200 mT, 25 kHz, 100 °C)	B66317G0000X127
N87	1850 +30/–20%	1620	< 1.60 (200 mT, 100 kHz, 100 °C)	B66317G0000X187
N97	1950 +30/–20%	1700	< 1.40 (200 mT, 100 kHz, 100 °C)	B66317G0000X197

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.10 ±0.02	489	425	B66317G0100X1**
	0.16 ±0.02	347	302	B66317G0160X1**
	0.25 ±0.02	250	218	B66317G0250X1**
	0.50 ±0.05	151	131	B66317G0500X1**
	1.00 ±0.05	91	79	B66317G1000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	90	–0.731	139	–0.847	129	–0.865
N87	90	–0.731	139	–0.796	125	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 60 nH < A_L < 570 nH

Coil former (magnetic axis horizontal or vertical)

Material: GFR polyterephthalate, UL 94 V-0, insulation class to IEC 60085:
B66208B, X: F ≙ max. operating temperature 155 °C, color code black
Valox 420-SE0® [E207780 (M)], SABIC JAPAN L L C
B66208-W: H ≙ max. operating temperature 180 °C, color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

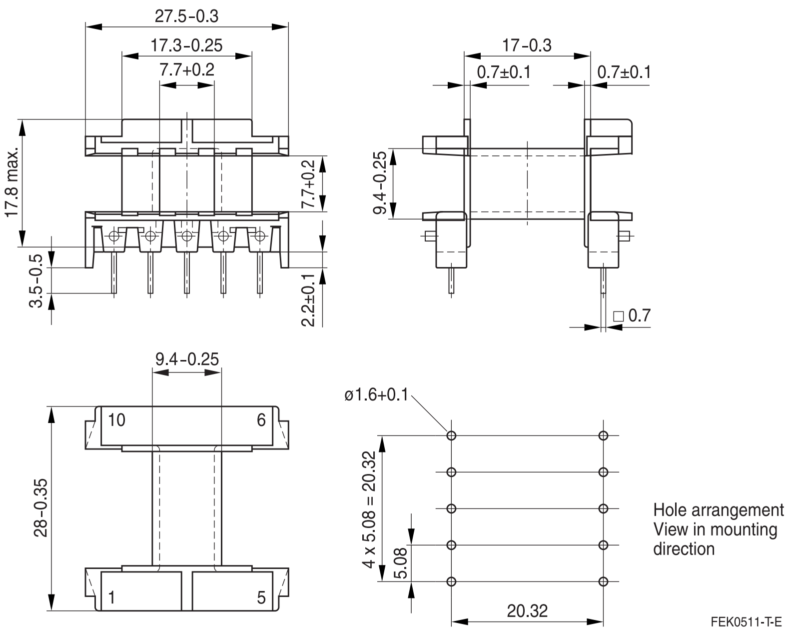
Winding: see Processing notes, 2.1

Pins: Squared pins

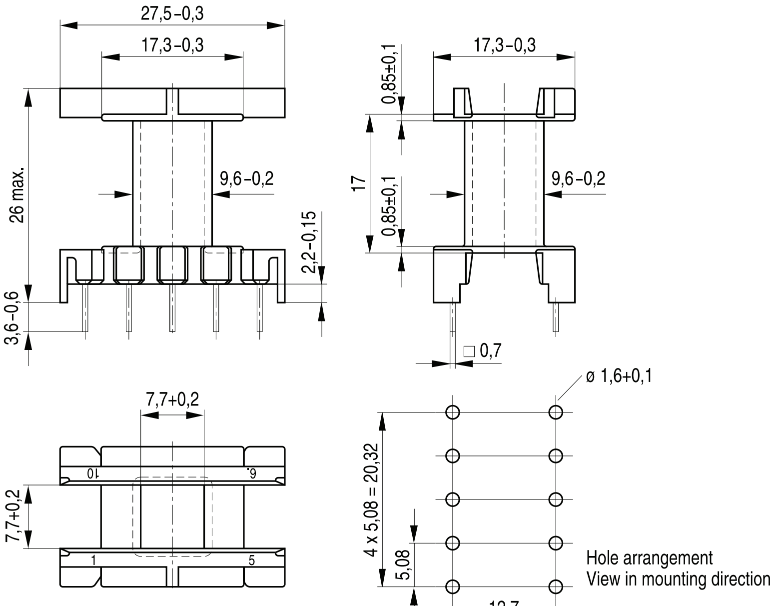
Yoke Material: Stainless spring steel (0.25 mm)

Coil former						Ordering code
Version	Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
Horizontal	1	61	50	28	10	B66208B1110T001
Vertical	1	61	50	28	10	B66208X1010T001 B66208W1010T001
Yoke (ordering code per piece, 2 are required)						B66208A2010X000

Horizontal version (B66208B)

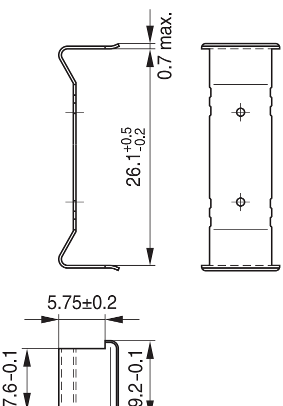


Vertical version (B66208X, B66208W)



FEK0323-5

Yoke



FEK0551-M

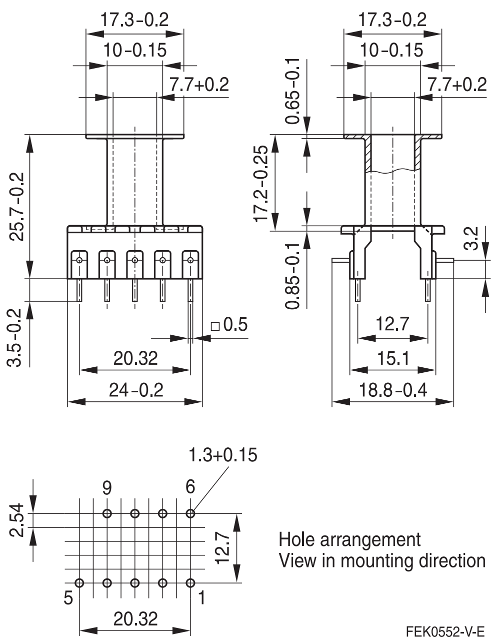
Coil former for SMPS transformers with line isolation

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
H ≙ max. operating temperature 180 °C), color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke Material: Nickel silver (0.3 mm) with ground terminal

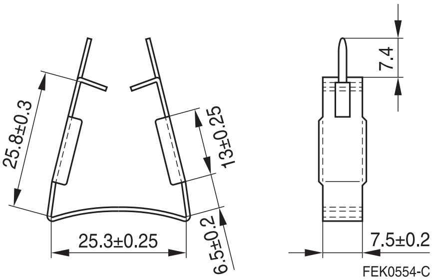
Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value μΩ	Pins	
1	56.9	69.2	41.8	9	B66208L1009T001
Yoke (ordering code per piece)					B66208A2003X000
Yoke (ordering code per piece)					B66208A2001X000

Coil former



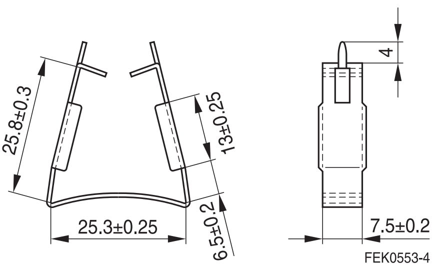
FEK0552-V-E

Yoke B66208A2003X000



FEK0554-C

B66208A2001X000

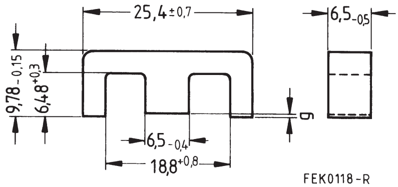


FEK0553-4

E 25.4/10/7

Core **B66315**

- Size based on US lam. size E cores
  US designation E2425
- E cores with high permeability for common-mode chokes and broadband applications
- Delivery mode: single units



FEK0118-R

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.27 mm^{-1}
l_e = 49.2 mm
A_e = 38.8 mm^2
A_{min} = 38.4 mm^2
V_e = 1910 mm^3

Approx. weight 9.6 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	2700 +30/–20%	2720		B66315G0000X130
T38	3750 +30/–20%	3790		B66315G0000X138
T46	8500 ±30%	8570		B66315F0000X146
N27	1500 +30/–20%	1510	< 0.36 (200 mT, 25 kHz, 100 °C)	B66315G0000X127
N87	1670 +30/–20%	1690	< 1.00 (200 mT, 100 kHz, 100 °C)	B66315G0000X187

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	0.50 ±0.05	122	123	B66315G0500X127

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension *g* > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	75	–0.707	106	–0.847	97	–0.865
N87	75	–0.707	106	–0.796	94	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 50 nH < A_L < 500 nH

E 28/10/11

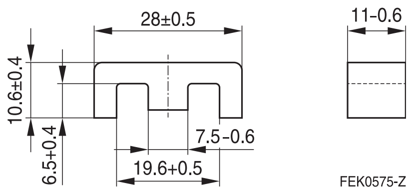
Core **B66489**

- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.632 mm^{-1}
l_e = 51.6 mm
A_e = 81.7 mm^2
A_{min} = 77 mm^2
V_e = 4220 mm^3

Approx. weight 21.8 g/set



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N87	3200 +30/-20%	1610	< 2.40 (200 mT, 100 kHz, 100 °C)	B66489G0000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 30/15/7

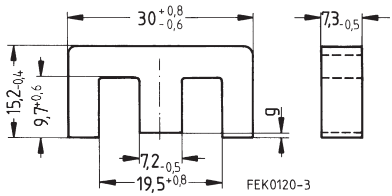
Core B66319

- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.12 mm^{-1}
l_e = 67 mm
A_e = 60 mm^2
A_{min} = 49 mm^2
V_e = 4000 mm^3

Approx. weight 22 g/set



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	3100 +30/–20%	2760		B66319G0000X130
N27	1700 +30/–20%	1510	< 0.81 (200 mT, 25 kHz, 100 °C)	B66319G0000X127
N87	1900 +30/–20%	1690	< 2.20 (200 mT, 100 kHz, 100 °C)	B66319G0000X187

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.10 ±0.02	460	410	B66319G0100X1**
	0.18 ±0.02	300	265	B66319G0180X1**
	0.34 ±0.02	195	175	B66319G0340X1**
	0.50 ±0.05	145	130	B66319G0500X1**
	1.00 ±0.05	90	80	B66319G1000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	90	–0.708	156	–0.847	144	–0.865
N87	90	–0.708	154	–0.796	140	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 560 nH < A_L < 60 nH

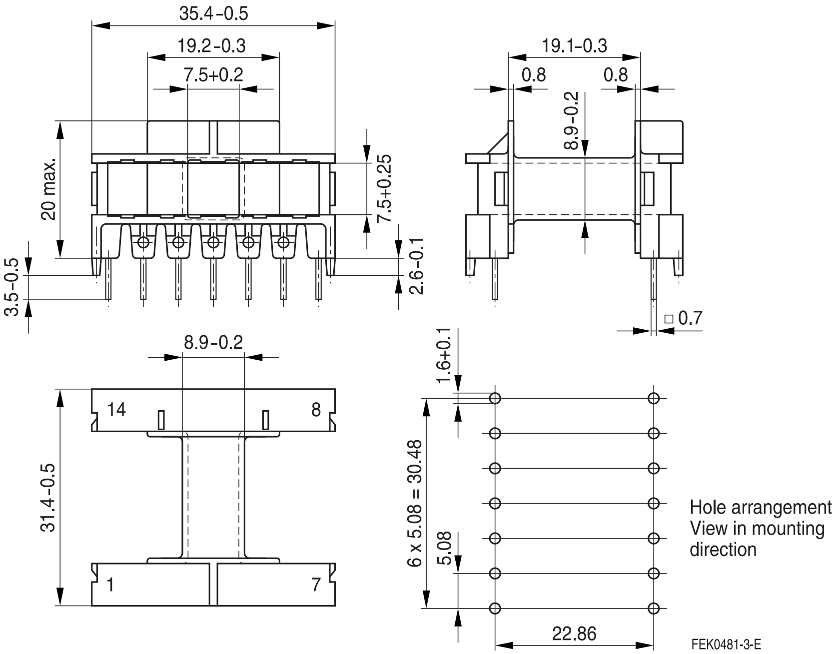
Coil former (magnetic axis horizontal or vertical)

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
B66232B: Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
B66232J: Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

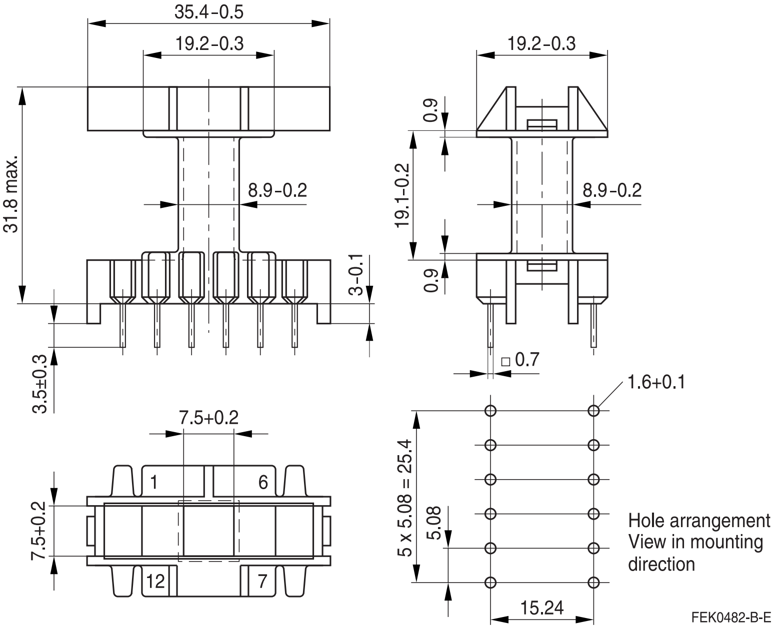
Yoke Material: Stainless spring steel (0.4 mm)

Coil former						Ordering code
Version	Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
Horizontal	1	90	56	21	14	B66232B1114T001
Vertical	1	90	56	21	12	B66232J1112T001
Yoke (ordering code per piece, 2 are required)						B66232A2010X000

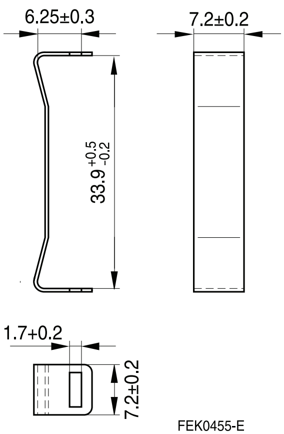
Horizontal version



Vertical version



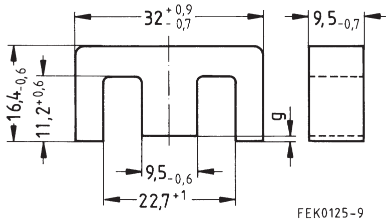
Yoke



E 32/16/9 (EF 32)

Core **B66229**

- To IEC 62317-8
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.89 mm^{-1}
l_e = 74 mm
A_e = 83 mm^2
A_{min} = 81.4 mm^2
V_e = 6140 mm^3

Approx. weight 30 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	3800 +30/–20%	2690		B66229G0000X130
N27	2100 +30/–20%	1480	< 1.10 (200 mT, 25 kHz, 100 °C)	B66229G0000X127
N87	2300 +30/–20%	1630	< 3.00 (200 mT, 100 kHz, 100 °C)	B66229G0000X187
N97	2400 +30/–20%	1700	< 2.70 (200 mT, 100 kHz, 100 °C)	B66229G0000X197

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.50 ±0.05 1.00 ±0.05	244 145	172 103	B66229G0500X1** B66229G1000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	145	–0.748	212	–0.847	196	–0.865
N87	145	–0.748	208	–0.796	191	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.50 mm
K3, K4: 70 nH < A_L < 710 nH

Coil former

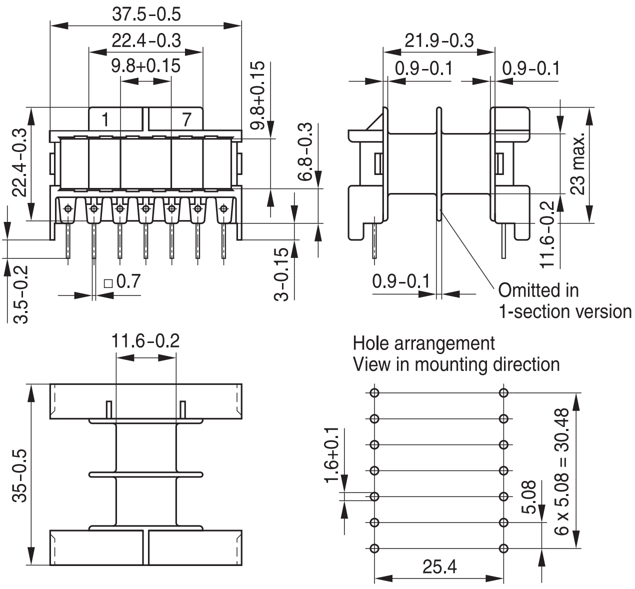
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

Material: Stainless spring steel (0.4 mm)

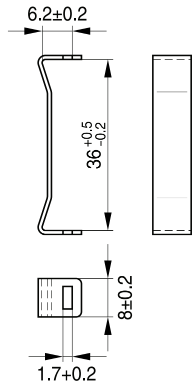
Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
1	108.50	64.4	20.42	14	B66230A1114T001
Yoke (ordering code per piece, 2 are required)					B66230A2010X000

Coil former



FEK0456-M-E

Yoke



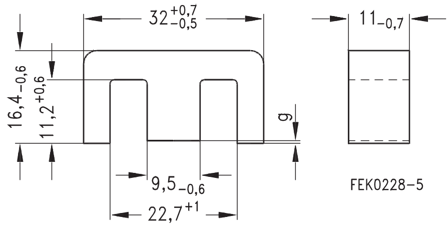
FEK0457-V

■ Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.76 mm^{-1}
l_e = 74 mm
A_e = 97 mm^2
A_{min} = 95 mm^2
V_e = 7187 mm^3

Approx. weight 37 g/set



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N87	2900 +30/–20%	1750	< 3.70 (200 mT, 100 kHz, 100 °C)	B66233G0000X187
N97	3000 +30/–20%	1820	< 3.20 (200 mT, 100 kHz, 100 °C)	B66233G0000X197

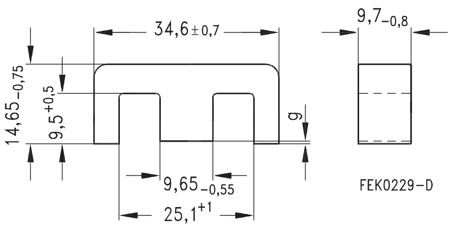
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	165	–0.711	243	–0.796	223	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.50 mm
K3, K4: 90 nH < A_L < 800 nH

- Size based on US lam. size E cores
  US designation E375
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.82 mm^{-1}
l_e = 69.6 mm
A_e = 84.8 mm^2
A_{min} = 83.2 mm^2
V_e = 5900 mm^3

Approx. weight 30 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	2300 +30/–20%	1498	< 1.10 (200 mT, 25 kHz, 100 °C)	B66370G0000X127
N87	2450 +30/–20%	1600	< 3.00 (200 mT, 100 kHz, 100 °C)	B66370G0000X187
N72	2700 +30/–20%	1770	< 0.60 (200 mT, 25 kHz, 100 °C)	B66370G0000X172

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

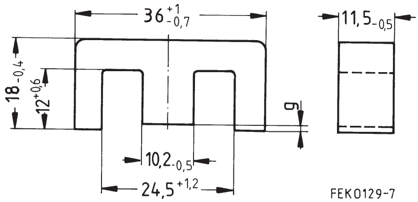
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	146	–0.719	219	–0.847	202	–0.865

Validity range: K1, K2: 0.10 mm < s < 2.50 mm
K3, K4: 80 nH < A_L < 770 nH

E 36/18/11

Core **B66389**

- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.68 mm^{-1}
l_e = 81 mm
A_e = 120 mm^2
A_{min} = 112 mm^2
V_e = 9720 mm^3

Approx. weight 50 g/set

Ungapped

Material	value nH	μ_e	P_V W/set	Ordering code
N27	2900 +30/–20%	1550	< 1.85 (200 mT, 25 kHz, 100 °C)	B66389G0000X127
N87	3100 +30/–20%	1680	< 5.00 (200 mT, 100 kHz, 100 °C)	B66389G0000X187

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	0.50 ±0.05	300	160	B66389G0500X127
	1.00 ±0.05	183	96	B66389G1000X127

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

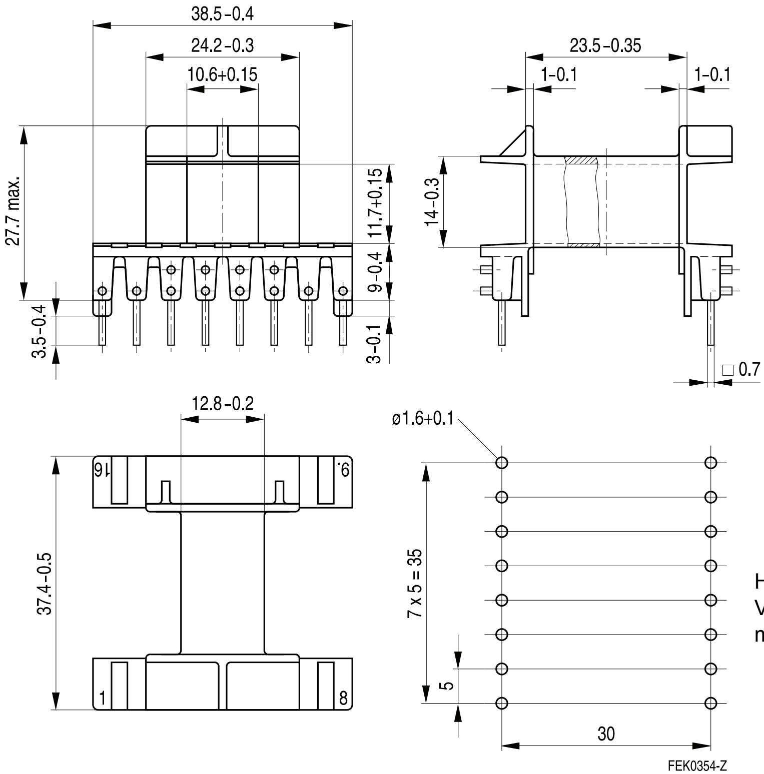
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	182	–0.749	302	–0.847	280	–0.865
N87	182	–0.749	295	–0.796	273	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.50 mm
K3, K4: 100 nH < A_L < 930 nH

Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Pocan B4235® [E245249 (M)], LANXESS AG
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

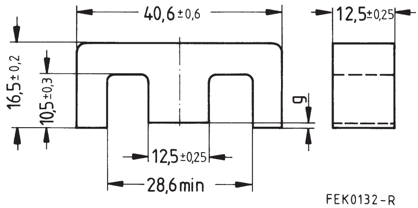
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	122.55	76.4	21.45	16	B66390A1016T001



Hole arrangement
View in
mounting direction

E 40/16/12

Core **B66381**



- Size based on US lam. size E cores
  US designation E 21
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.52 mm^{-1}
l_e = 77 mm
A_e = 149 mm^2
A_{min} = 143 mm^2
V_e = 11500 mm^3

Approx. weight 58 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	3800 +30/–20%	1560	< 2.15 (200 mT, 25 kHz, 100 °C)	B66381G0000X127
N87	4150 +30/–20%	1710	< 5.80 (200 mT, 100 kHz, 100 °C)	B66381G0000X187
N72	4600 +30/–20%	1900	< 1.12 (200 mT, 25 kHz, 100 °C)	B66381G0000X172

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	0.50 ±0.05	411	166	B66381G0500X127

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

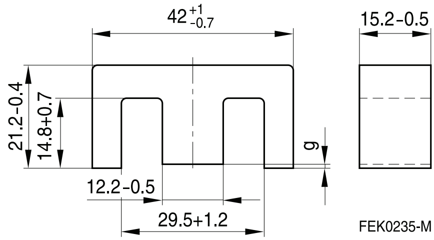
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	239	–0.782	378	–0.847	351	–0.865

Validity range: K1, K2: 0.10 mm < s < 2.50 mm
K3, K4: 130 nH < A_L < 1200 nH

E 42/21/15

Core **B66325**

- To IEC 62317-8
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.54 mm^{-1}
l_e = 97 mm
A_e = 178 mm^2
A_{min} = 175 mm^2
V_e = 17300 mm^3

Approx. weight 88 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N30	7500 +30/–20%	3252		B66325G0000X130
N27	3500 +30/–20%	1510	< 3.30 (200 mT, 25 kHz, 100 °C)	B66325G0000X127
N87	3950 +30/–20%	1690	< 9.00 (200 mT, 100 kHz, 100 °C)	B66325G0000X187
N97	4100 +30/–20%	1778	< 9.00 (200 mT, 100 kHz, 100 °C)	B66325G0000X197
N95	5100 +30/–20%	2292	< 9.60 (200 mT, 100 kHz, 25 °C) < 8.70 (200 mT, 100 kHz, 100 °C)	B66325G0000X195

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.10 ±0.02	1497	647	B66325G0100X1**
	0.25 ±0.02	759	328	B66325G0250X1**
	0.50 ±0.05	454	196	B66325G0500X1**
	0.64 ±0.05	378	164	B66325G0640X1**
	1.00 ±0.05	272	118	B66325G1000X1**
	1.50 ±0.05	201	87	B66325G1500X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

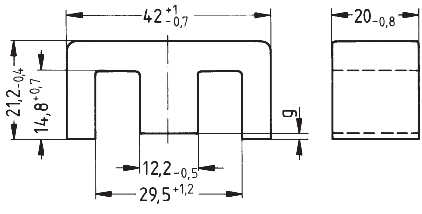
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	272	–0.741	436	–0.847	406	–0.865
N87	272	–0.741	423	–0.796	396	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.50 mm
K3, K4: 1210 nH < A_L < 130 nH

- To IEC 62317-8
- Delivery mode: single units



FEK0137-X

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.41 mm^{-1}
l_e = 97 mm
A_e = 234 mm^2
A_{min} = 229 mm^2
V_e = 22700 mm^3

Approx. weight 116 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	4750 +30/–20%	1560	320	< 4.40 (200 mT, 25 kHz, 100 °C)	B66329G0000X127
N87	5200 +30/–20%	1690	320	< 12.00 (200 mT, 100 kHz, 100 °C)	B66329G0000X187
N97	5400 +30/–20%	1781	320	< 10.20 (200 mT, 100 kHz, 100 °C)	B66329G0000X197
N95	6700 +30/–20%	2292	320	< 12.60 (200 mT, 100 kHz, 25 °C) < 11.50 (200 mT, 100 kHz, 100 °C)	B66329G0000X195

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.25 ±0.02	1029	338	B66329G0250X1**
	0.50 ±0.05	603	198	B66329G0500X1**
	1.00 ±0.05	354	116	B66329G1000X1**
	1.50 ±0.05	259	85	B66329G1500X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

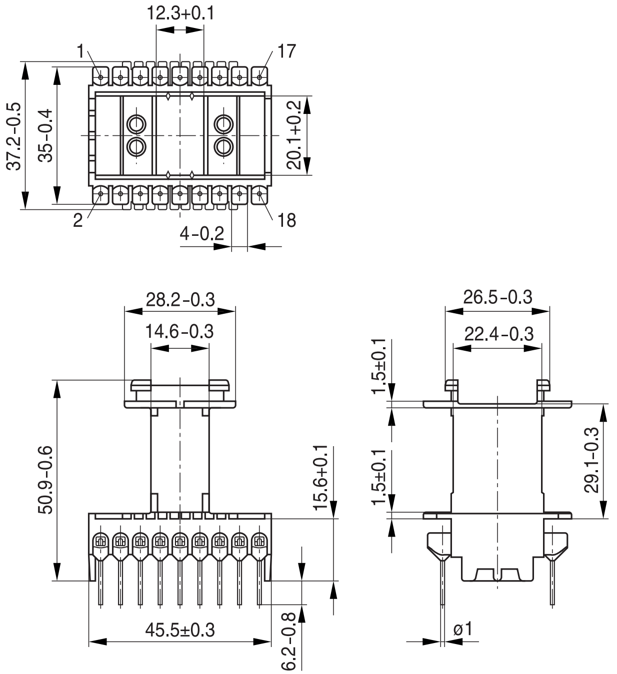
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	354	–0.770	574	–0.847	534	–0.865
N87	354	–0.770	555	–0.796	521	–0.873

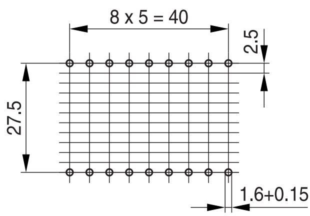
Validity range: K1, K2: 0.10 mm < s < 3.00 mm
K3, K4: 160 nH < A_L < 1500 nH

Coil former

Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Valox 420-SE0 [E121562 (M)] SABIC INNOVATIVE PLASTICS US L L C
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Sections	A_N mm^2	l_N mm	A_R value μΩ	Pins	Ordering code
1	172	100	20	18	B66243B1018T001





Hole arrangement
View in mounting direction

FEK0512-2-E

Coil former

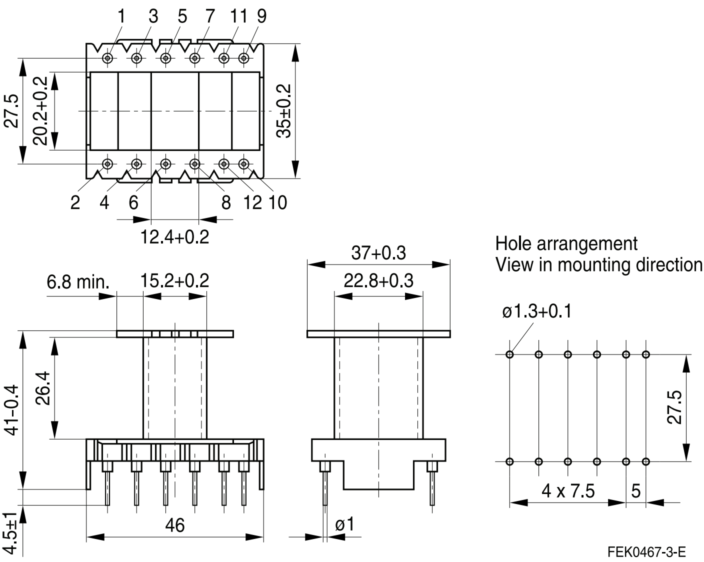
Material: Polyterephthalate GV (UL 94 V-0, insulation class to IEC 60085:
H ≙ max. operating temperature 180 °C), color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Winding: see Processing notes, 2.1

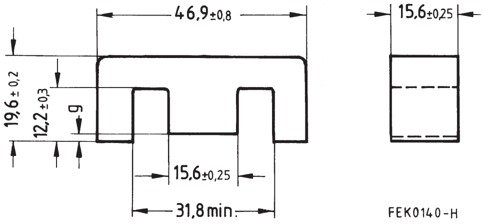
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	187	133	24.4	12	B66243S1012T001



E 47/20/16

Core **B66383**

- Size based on US lam. size E cores
  US designation E 625
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.38 mm^{-1}
l_e = 89 mm
A_e = 233 mm^2
A_{min} = 226 mm^2
V_e = 20700 mm^3

Approx. weight 106 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	5100 +30/–20%	1550	320	< 3.95 (200 mT, 25 kHz, 100 °C)	B66383G0000X127
N87	5600 +30/–20%	1690	320	< 11.10 (200 mT, 100 kHz, 100 °C)	B66383G0000X187

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

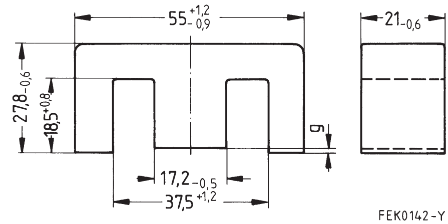
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	364	–0.773	579	–0.847	538	–0.865
N87	364	–0.773	562	–0.796	524	–0.873

Validity range: K1, K2: 0.10 mm < s < 3.00 mm
K3, K4: 170 nH < A_L < 1640 nH

E 55/28/21

Core **B66335**

- To IEC 62317-8
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.35 mm^{-1}
l_e = 124 mm
A_e = 354 mm^2
A_{min} = 351 mm^2
V_e = 43900 mm^3

Approx. weight 215 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	5800 +30/–20%	1610	320	< 8.00 (200 mT, 25 kHz, 100 °C)	B66335G0000X127
N87	6400 +30/–20%	1780	320	< 3.80 (100 mT, 100 kHz, 100 °C)	B66335G0000X187
N97	6700 +30/–20%	1868	320	< 3.34 (100 mT, 100 kHz, 100 °C)	B66335G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.50 ±0.05	843	234	B66335G0500X1**
	1.00 ±0.05	496	138	B66335G1000X1**
	1.50 ±0.05	364	101	B66335G1500X1**
	2.00 ±0.05	292	81	B66335G2000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

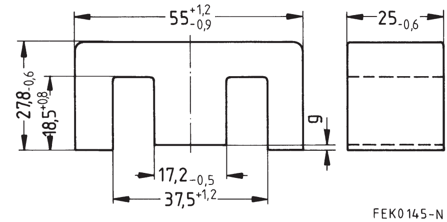
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	496	–0.764	836	–0.847	781	–0.865
N87	496	–0.764	800	–0.796	765	–0.873

Validity range: K1, K2: 0.15 mm < s < 3.50 mm
K3, K4: 180 nH < A_L < 1799 nH

E 55/28/25

Core **B66344**

- To IEC 62317-8
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.3 mm^{-1}
l_e = 124 mm
A_e = 420 mm^2
A_{min} = 420 mm^2
V_e = 52100 mm^3

Approx. weight 256 g/set

Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	6800 +30/–20%	1600	310	< 9.50 (200 mT, 25 kHz, 100 °C)	B66344G0000X127
N87	7300 +30/–20%	1740	310	< 4.80 (100 mT, 100 kHz, 100 °C)	B66344G0000X187
N97	7700 +30/–20%	1810	310	< 4.00 (100 mT, 100 kHz, 100 °C)	B66344G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	2.50 ±0.05	295	70	B66344G2500X127

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

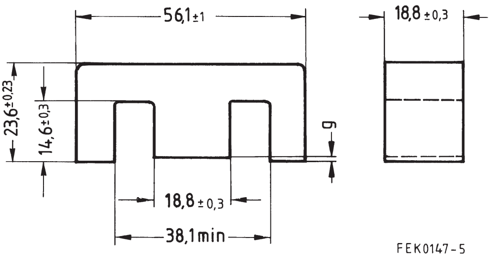
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	596	–0.769	992	–0.847	927	–0.865
N87	596	–0.769	950	–0.796	905	–0.873

Validity range: K1, K2: 0.15 mm < s < 3.50 mm
K3, K4: 220 nH < A_L < 2130 nH

E 56/24/19

Core **B66385**

- Size based on US lam. size E cores
  US designation E 75
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.31 mm^{-1}
l_e = 107 mm
A_e = 340 mm^2
A_{min} = 327 mm^2
V_e = 36400 mm^3

Approx. weight 184 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	6300 +30/–20%	1570	320	< 6.8 (200 mT, 25 kHz, 100 °C)	B66385G0000X127
N87	6900 +30/–20%	1730	320	< 3.2 (100 mT, 100 kHz, 100 °C)	B66385G0000X187

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	500	–0.784	821	–0.847	765	–0.865

Validity range: K1, K2: 0.10 mm < s < 3.00 mm
K3, K4: 200 nH < A_L < 2000 nH

E 65/32/27

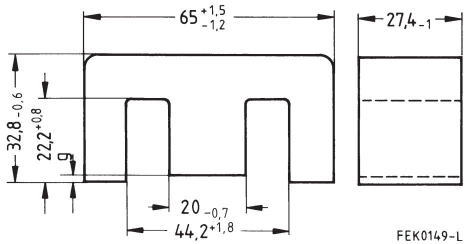
Core **B66387**

- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.27 mm^{-1}
l_e = 147 mm
A_e = 535 mm^2
A_{min} = 529 mm^2
V_e = 78650 mm^3

Approx. weight 394 g/set



Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N92	5800 +30/–20%	1250	340	< 7.5 (100 mT, 100 kHz, 100 °C)	B66387G0000X192
N27	7200 +30/–20%	1570	320	< 14.6 (200 mT, 25 kHz, 100 °C)	B66387G0000X127
N87	7900 +30/–20%	1700	320	< 6.7 (100 mT, 100 kHz, 100 °C)	B66387G0000X187
N97	7900 +30/–20%	1730	330	< 6.3 (100 mT, 100 kHz, 100 °C)	B66387G0000X197
N95	11000+30/-20%	2410	330	< 7.3 (100 mT, 100 kHz, 25 °C) < 6.5 (100 mT, 100 kHz, 100 °C)	B66387G0000X195

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.50 ±0.05	1214	265	B66387G0500X1**
	1.00 ±0.05	716	156	B66387G1000X1**
	1.50 ±0.05	526	115	B66387G1500X1**
	2.50 ±0.05	360	80	B66387G2500X1**
	4.00 ±0.05	230	50	B66387G4000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

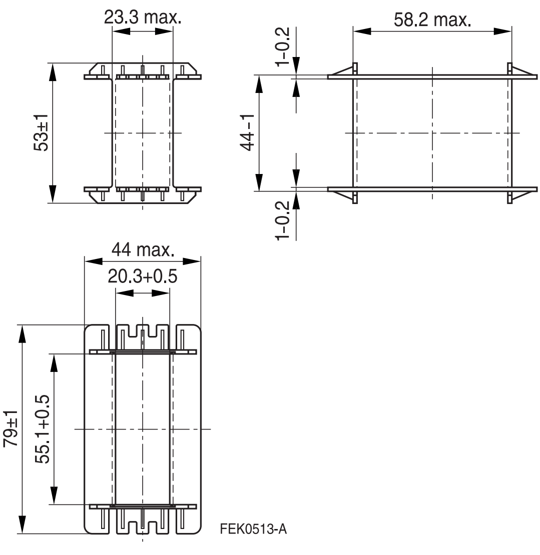
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	716	–0.762	1231	–0.847	1154	–0.865
N87	716	–0.762	1168	–0.796	1131	–0.873

Validity range: K1, K2: 0.20 mm < s < 5.00 mm
K3, K4: 230 nH < A_L < 2290 nH

Coil former

Material: Polyphenylene suplhide (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code natur
Ryton R-4-230, [E95746 (M)], SOLVAY SPECIALITY POLYMERS
Winding: see Processing notes, 2.1

Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	Ordering code
1	435	246	19.5	–	B66388A2000T001



FEK0513-A

E 70/33/32

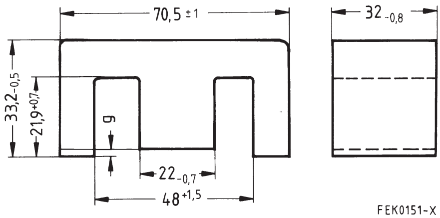
Core B66371

- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.22 mm^{-1}
l_e = 149 mm
A_e = 683 mm^2
A_{min} = 676 mm^2
V_e = 102000 mm^3

Approx. weight 514 g/set



Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	8850 +30/–20%	1530	320	< 19.00 (200 mT, 25 kHz, 100 °C)	B66371G0000X127
N87	9700 +30/–20%	1700	320	< 9.50 (100 mT, 100 kHz, 100 °C)	B66371G0000X187
N97	10000+30/–20%	1740	330	< 8.60 (100 mT, 100 kHz, 100 °C)	B66371G0000X197
N95	13000+30/–20%	2260	330	< 8.95 (100 mT, 100 kHz, 25 °C) < 8.95 (100 mT, 100 kHz, 100 °C)	B66371G0000X195

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	1.50 ±0.05	655	113	B66371G1500X127
N87	2.00 ±0.05 2.50 ±0.05 4.00 ±0.05	520 435 200	90 75 35	B66371G2000X187 B66371G2500X187 B66371G4000X187

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	903	–0.789	1568	–0.847	1470	–0.865
N87	903	–0.789	1485	–0.796	1438	–0.873

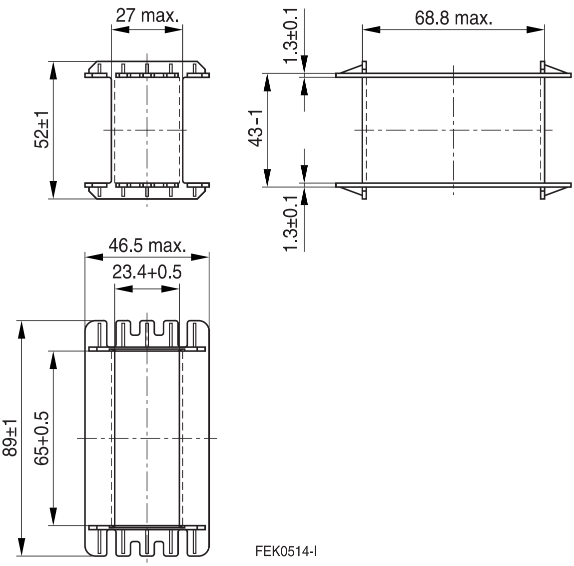
Validity range: K1, K2: 0.20 mm < s < 5.00 mm
K3, K4: 290 nH < A_L < 2880 nH

Coil former

Material: B66372A: Polyphenylene suplhide, UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code natur
Ryton R-4-280 [E95746 (M)] SOLVAY SPECIALITY POLYMERS
B66372B: GFR ASA/ PBT, UL 94 HB, insulation class to IEC 60085:
H ≙ max. operating temperature 130 °C), color code black
Ultradur 4090G6 [E41871 (M)], BASF SE

Winding: see Processing notes, 2.1

Sections	A_N mm^2	l_N mm	A_R value µΩ	Pins	Ordering code
1	389	230.5	20	–	B66372A2000T001 B66372B2000T001

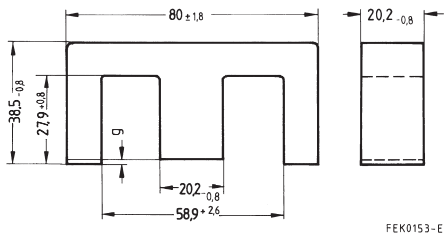


FEK0514-I

E 80/38/20

Core **B66375**

■ Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.47 mm^{-1}
l_e = 184 mm
A_e = 390 mm^2
A_{min} = 388 mm^2
V_e = 71800 mm^3

Approx. weight 358 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	4150 +30/–20%	1550	320	< 13.30 (200 mT, 25 kHz, 100 °C)	B66375G0000X127
N87	4500 +30/–20%	1680	320	< 6.50 (100 mT, 100 kHz, 100 °C)	B66375G0000X187
N97	4700 +30/–20%	1770	330	< 6.20 (100 mT, 100 kHz, 100 °C)	B66375G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	0.50 ±0.05	882	329	B66375G0500X127
N87	0.25 ±0.02	1440	540	B66375G0250X187

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	539	–0.710	867	–0.847	816	–0.865
N87	539	–0.710	804	–0.796	806	–0.873

Validity range: K1, K2: 0.20 mm < s < 5.00 mm
K3, K4: 140 nH < A_L < 1330 nH

E 100/60/28

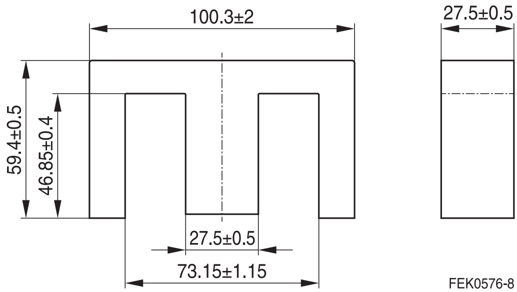
Core **B66894**

- Delivery mode: singles units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.373 mm^{-1}
l_e = 274 mm
A_e = 735 mm^2
A_{min} = 690 mm^2
V_e = 201390 mm^3

Approx. weight 987 g/set

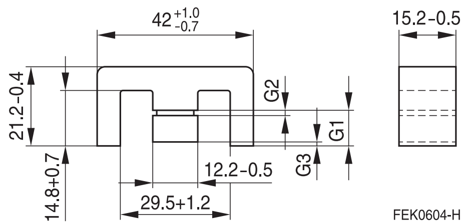


Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N87	6500 +30/–20%	1930	< 4.70 (100 mT, 25 kHz, 100 °C)	B66894G0000X187
N97	6800 +30/–20%	2020	< 4.40 (100 mT, 25 kHz, 100 °C)	B66894G0000X197
N95	8500 +30/–20%	2520	< 8.40 (100 mT, 25 kHz, 25 °C) < 4.80 (100 mT, 25 kHz, 100 °C)	B66894G0000X195

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

- The glue and the spacers used are RoHs compliant.
- Max. operating temperature: 150 °C
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.54 mm^{-1}
l_e = 97 mm
A_e = 178 mm^2
A_{min} = 175 mm^2
V_e = 17300 mm^3

Approx. weight 88 g/set

Gapped

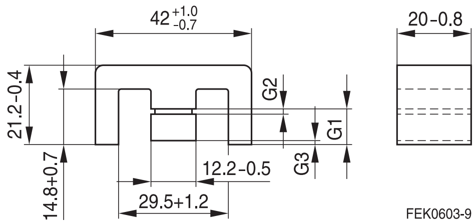
Material	A_L value nH	(G1) approx. mm	Air gap (G2) approx. mm	Air gap (G3) approx. mm	Ordering code
N87	96 ±10%	8.3	1.0	0.5	B66325Q0096K187
	115 ±12%	8.2	0.8	0.4	B66325Q0115H187
	147 ±12%	8.0	0.6	0.3	B66325Q0147H187
	207 ±15%	7.9	0.4	0.2	B66325Q0207L187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 42/21/20DG

Core **B66329**

- The glue and the spacers used are RoHs compliant.
- Max. operating temperature: 150 °C
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.41 mm^{-1}
l_e = 97 mm
A_e = 243 mm^2
A_{min} = 229 mm^2
V_e = 22700 mm^3

Approx. weight 116 g/set

Gapped

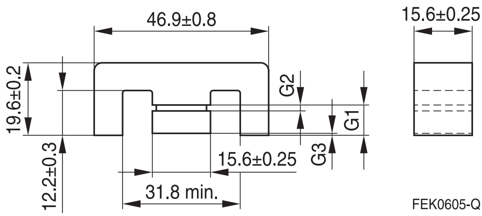
Material	A_L value nH	(G1) approx. mm	Air gap (G2) approx. mm	Air gap (G3) approx. mm	Ordering code
N87	123 ±10%	8.3	1.0	0.5	B66329Q0123K187
	148 ±12%	8.2	0.8	0.4	B66329Q0148H187
	188 ±12%	8.0	0.6	0.3	B66329Q0188H187
	267 ±15%	7.9	0.4	0.2	B66329Q0267L187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 47/20/16DG

Core **B66383**

- Size based on US lam. size E cores
  US designation E 625
- The glue and the spacers used are RoHs compliant.
- Max. operating temperature: 150 °C
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.38 mm^{-1}
l_e = 89 mm
A_e = 233 mm^2
A_{min} = 226 mm^2
V_e = 20700 mm^3

Approx. weight 106 g/set

Gapped

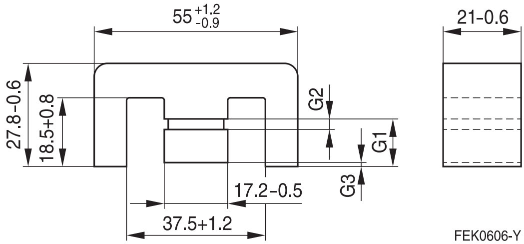
Material	A_L value nH	(G1) approx. mm	Air gap (G2) approx. mm	Air gap (G3) approx. mm	Ordering code
N87	121 ±10%	6.85	1.0	0.5	B66383Q0121K187
	146 ±12%	6.70	0.8	0.4	B66383Q0146H187
	187 ±12%	6.55	0.6	0.3	B66383Q0187H187
	266 ±15%	6.40	0.4	0.2	B66383Q0266L187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 55/28/21DG

Core **B66335**

- The glue and the spacers used are RoHs compliant.
- Max. operating temperature: 150 °C
- Delivery mode: single units



FEK0606-Y

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.35 mm^{-1}
l_e = 124 mm
A_e = 354 mm^2
A_{min} = 351 mm^2
V_e = 43900 mm^3

Approx. weight 215 g/set

Gapped

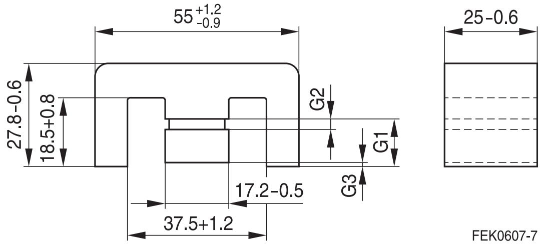
Material	A_L value nH	(G1) approx. mm	Air gap (G2) approx. mm	Air gap (G3) approx. mm	Ordering code
N87	179 ±10%	10.20	1.0	0.5	B66335Q0179K187
	216 ±12%	10.05	0.8	0.4	B66335Q0216H187
	277 ±12%	9.90	0.6	0.3	B66335Q0277H187
	394 ±15%	9.75	0.4	0.2	B66335Q0394L187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 55/28/25DG

Core **B66344**

- The glue and the spacers used are RoHs compliant.
- Max. operating temperature: 150 °C
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.3 mm^{-1}
l_e = 124 mm
A_e = 420 mm^2
A_{min} = 420 mm^2
V_e = 52100 mm^3

Approx. weight 256 g/set

Gapped

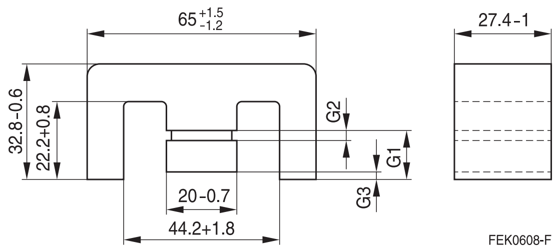
Material	A_L value nH	(G1) approx. mm	Air gap (G2) approx. mm	Air gap (G3) approx. mm	Ordering code
N87	209 ±10%	10.20	1.0	0.5	B66344Q0209K187
	253 ±12%	10.05	0.8	0.4	B66344Q0253H187
	325 ±12%	9.90	0.6	0.3	B66344Q0325H187
	463 ±15%	9.75	0.4	0.2	B66344Q0463L187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 62/32/27DG

Core **B66387**

- The glue and the spacers used are RoHs compliant.
- Max. operating temperature: 150 °C
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.27 mm^{-1}
l_e = 147 mm
A_e = 535 mm^2
A_{min} = 529 mm^2
V_e = 78600 mm^3

Approx. weight 394 g/set

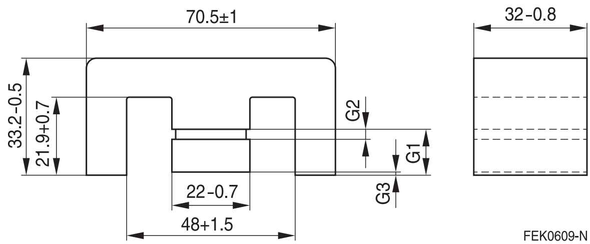
Gapped

Material	A_L value nH	(G1) approx. mm	Air gap (G2) approx. mm	Air gap (G3) approx. mm	Ordering code
N87	262 ±10%	12.05	1.0	0.5	B66387Q0262K187
	317 ±12%	11.90	0.8	0.4	B66387Q0317H187
	407 ±15%	11.75	0.6	0.3	B66387Q0407L187
	477 ±15%	11.68	0.4	0.2	B66378Q0477L187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 70/33/32DG

Core **B66371**



- The glue and the spacers used are RoHs compliant.
- Max. operating temperature: 150 °C
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.22 mm^{-1}
l_e = 149 mm
A_e = 683 mm^2
A_{min} = 676 mm^2
V_e = 102000 mm^3

Approx. weight 514 g/set

Gapped

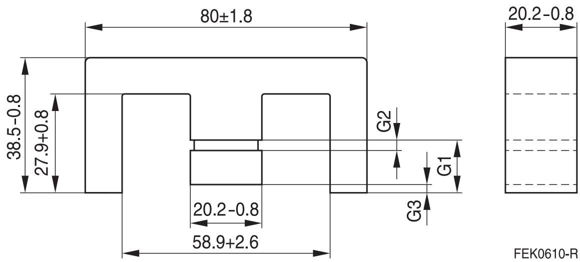
Material	A_L value nH	(G1) approx. mm	Air gap (G2) approx. mm	Air gap (G3) approx. mm	Ordering code
N87	328 ±10%	11.90	1.0	0.5	B66371Q0328K187
	398 ±12%	11.70	0.8	0.4	B66371Q0398H187
	512 ±15%	11.60	0.6	0.3	B66371Q0512L187
	602 ±15%	11.50	0.4	0.2	B66371Q0602L187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

E 80/38/20DG

Core **B66375**

- The glue and the spacers used are RoHs compliant.
- Max. operating temperature: 150 °C
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.47 mm^{-1}
l_e = 184 mm
A_e = 390 mm^2
A_{min} = 388 mm^2
V_e = 71800 mm^3

Approx. weight 358 g/set

Gapped

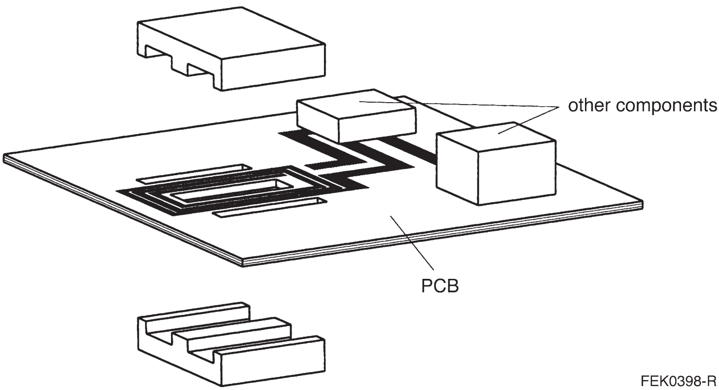
Material	A_L value nH	(G1) approx. mm	Air gap (G2) approx. mm	Air gap (G3) approx. mm	Ordering code
N87	197 ±10%	14.90	1.0	0.5	B66375Q0197K187
	237 ±12%	14.75	0.8	0.4	B66375Q0237H187
	302 ±12%	14.60	0.6	0.3	B66375Q0302H187
	352 ±15%	14.50	0.4	0.2	B66375Q0352L187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Example of an assembly set ELP 32/6/20

1 Total integration

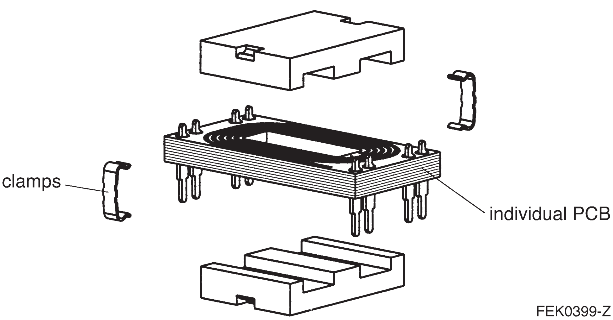
Assembling by gluing technology (ELP without clamp recess)



FEK0398-R

2 Individual integration

Assembling by clamping technology (ELP with clamp recess)



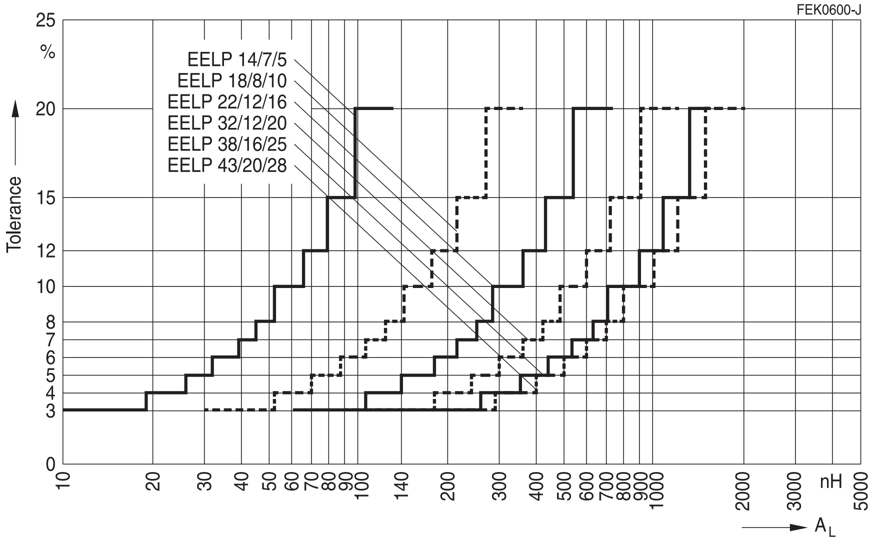
FEK0399-Z

3 Tolerances for ELP cores

The A_L value tolerances for ELP cores have consequently been defined with consideration of optimized process parameters for all materials with an initial permeability μ_i in the region of 2200 to 10000 as a step function (see figure below).

The “quantized” A_L step values should preferably be used. They are still available in their respective lower tolerance ranges. Thus a tolerance of ±10% can be determined for a EELP 32/12/20 made of N87 material for an A_L value of 600 nH.

With this type of tolerance definition, EPCOS has defined standard A_L values and the associated tolerance for the first time. Based on initial permeability tolerance can be slightly lower or higher.



ELP 14/3.5/5

Core (without clamp recess) **B66281**

Core set EELP 14
Combination: ELP 14/3.5/5 with ELP 14/3.5/5

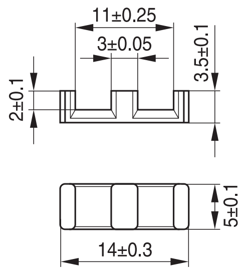
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.45 mm^{-1}
l_e = 20.7 mm
A_e = 14.3 mm^2
A_{min} = 13.9 mm^2
V_e = 296 mm^3

Approx. weight 1.6 g/set

ELP 14/3.5/5



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code (per piece)
N49	800 ±25%	920	< 0.08 (50 mT, 500 kHz, 100 °C)	B66281G0000X149
N92	850 ±25%	980	< 0.22 (200 mT, 100 kHz, 100 °C)	B66281G0000X192
N87	1100 ±25%	1270	< 0.20 (200 mT, 100 kHz, 100 °C)	B66281G0000X187
N97	1150 ±25%	1320	< 0.16 (200 mT, 100 kHz, 100 °C)	B66281G0000X197
N95	1300 ±25%	1225	< 0.20 (200 mT, 100 kHz, 25 °C) < 0.18 (200 mT, 100 kHz, 100 °C)	B66281G0000X195

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 14:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	29.0	–0.772	47	–0.796	39	–0.873

Validity range: K1, K2: 0.05 mm < s < 1.00 mm
K3, K4: 20 nH < A_L < 200 nH

Core set EILP 14
Combination:
ELP 14/3.5/5 with I 14/1.5/5

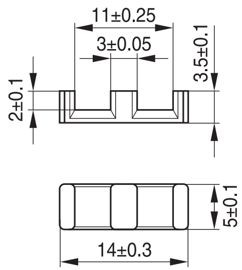
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.15 mm^{-1}
l_e = 16.7 mm
A_e = 14.5 mm^2
A_{min} = 13.9 mm^2
V_e = 242 mm^3

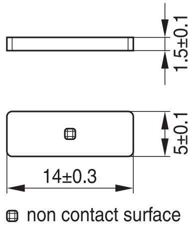
Approx. weight 1.3 g/set

ELP 14/3.5/5



FEK0369-D

I 14/1.5/5



FEK0534-X

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code (per piece)
N49	850 ±25%	780	< 0.06 (50 mT, 500 kHz, 100 °C)	B66281G0000X149 (ELP core) B66281K0000X149 (I core)*
N92	900 ±25%	820	< 0.18 (200 mT, 100 kHz, 100 °C)	B66281G0000X192 (ELP core) B66281K0000X192 (I core)*
N87	1250 ±25%	1140	< 0.16 (200 mT, 100 kHz, 100 °C)	B66281G0000X187 (ELP core) B66281K0000X187 (I core)*
N97	1300 ±25%	1190	< 0.13 (200 mT, 100 kHz, 100 °C)	B66281G0000X197 (ELP core) B66281K0000X197 (I core)*
N95	1450 ±25%	1330	< 0.14 (200 mT, 100 kHz, 100 °C)	B66281G0000X195 (ELP core) B66281K0000X195 (I core)*

* Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 14:

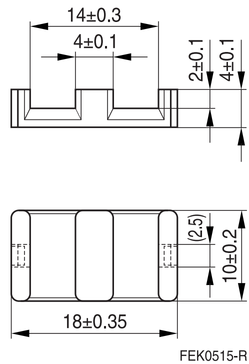
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	38.7	–0.691	49	–0.796	40	–0.873

Validity range: K1, K2: 0.05 mm < s < 1.00 mm
K3, K4: 20 nH < A_L < 200 nH

Core set EELP 18
Combination: ELP 18/4/10 with ELP 18/4/10

- To IEC 62317-9
- Delivery mode: single units

ELP 18/4/10



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.62 mm^{-1}
l_e = 24.3 mm
A_e = 39.3 mm^2
A_{min} = 38.9 mm^2
V_e = 955 mm^3

Approx. weight 4.8 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code (per piece)
N49	1900 ±25%	930	< 0.25 (50 mT, 500 kHz, 100 °C)	B66283G0000X149
N92	2050 ±25%	1010	< 0.66 (200 mT, 100 kHz, 100 °C)	B66283G0000X192
N87	2600 ±25%	1270	< 0.60 (200 mT, 100 kHz, 100 °C)	B66283G0000X187
N97	2670 ±25%	1314	< 0.47 (200 mT, 100 kHz, 100 °C)	B66283G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 18:

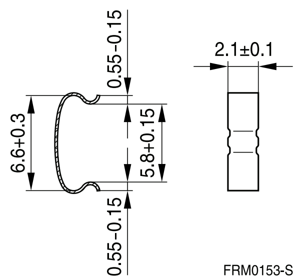
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	71.1	–0.773	124	–0.796	104	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 50 nH < A_L < 500 nH

Clamp

Ordering code per piece, 2 pieces required

Ordering code: B65804P2204X000



ELP 18/4/10 with I 18/2/10

Core (with clamp recess) **B66283**

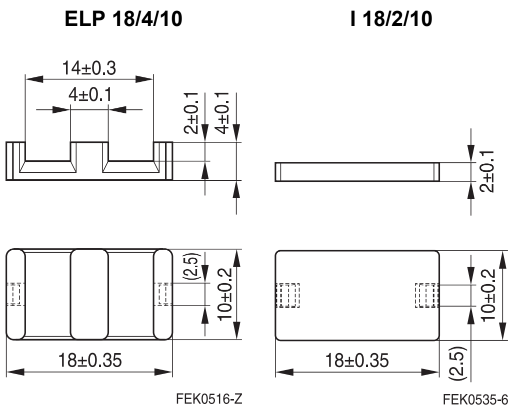
Core set EILP 18
Combination:
ELP 18/4/10 with I 18/2/10

- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.51 mm^{-1}
l_e = 20.3 mm
A_e = 39.5 mm^2
A_{min} = 38.9 mm^2
V_e = 802 mm^3

Approx. weight 4.1 g/set



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code (per piece)
N49	2100 ±25%	860	< 0.20 (50 mT, 500 kHz, 100 °C)	B66283G0000X149 (ELP core) B66283K0000X149 (I core)*
N92	2300 ±25%	930	< 0.55 (200 mT, 100 kHz, 100 °C)	B66283G0000X192 (ELP core) B66283K0000X192 (I core)*
N87	2900 ±25%	1180	< 0.50 (200 mT, 100 kHz, 100 °C)	B66283G0000X187 (ELP core) B66283K0000X187 (I core)*
N97	3000 ±25%	1230	< 0.42 (200 mT, 100 kHz, 100 °C)	B66283G0000X197 (ELP core) B66283K0000X197 (I core)*

* Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 18:

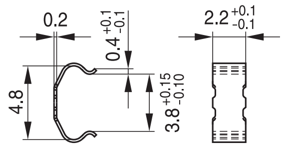
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	77.4	–0.774	129	–0.796	107	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 50 nH < A_L < 500 nH

Clamp

Ordering code per piece, 2 pieces required

Ordering code: B66284F2204X000



FEK0589-5

Core set EELP 18
Combination: ELP 18/4/10 with ELP 18/4/10

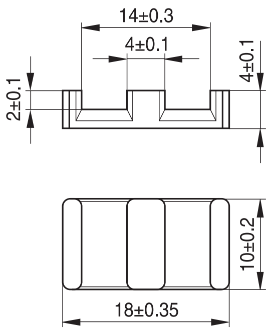
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.62 mm^{-1}
l_e = 24.3 mm
A_e = 39.3 mm^2
A_{min} = 38.9 mm^2
V_e = 955 mm^3

Approx. weight 4.8 g/set

ELP 18/4/10



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code (per piece)
N49	1900 ±25%	930	< 0.25 (50 mT, 500 kHz, 100 °C)	B66453G0000X149
N92	2050 ±25%	1010	< 0.66 (200 mT, 100 kHz, 100 °C)	B66453G0000X192
N87	2600 ±25%	1270	< 0.60 (200 mT, 100 kHz, 100 °C)	B66453G0000X187
N97	2650 ±25%	1300	< 0.50 (200 mT, 100 kHz, 100 °C)	B66453G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 18:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	71.1	–0.773	124	–0.796	104	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 50 nH < A_L < 500 nH

ELP 18/4/10 with I 18/2/10

Core (without clamp recess) B66453

Core set EILP 18
Combination:
ELP 18/4/10 with I 18/2/10

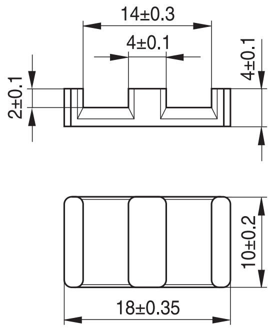
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.51 mm^{-1}
l_e = 20.3 mm
A_e = 39.5 mm^2
A_{min} = 38.9 mm^2
V_e = 802 mm^3

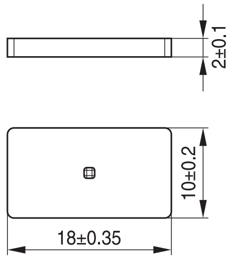
Approx. weight 4.1 g/set

ELP 18/4/10



FEK0400-7

I 18/2/10



non contact surface

FEK0536-E-E

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code (per piece)
N49	2100 ±25%	860	< 0.20 (50 mT, 500 kHz, 100 °C)	B66453G0000X149 (ELP core) B66453K0000X149 (I core)*
N92	2300 ±25%	930	< 0.55 (200 mT, 100 kHz, 100 °C)	B66453G0000X192 (ELP core) B66453K0000X192 (I core)*
N87	2900 ±25%	1180	< 0.50 (200 mT, 100 kHz, 100 °C)	B66453G0000X187 (ELP core) B66453K0000X187 (I core)*
N97	3000 ±25%	1230	< 0.42 (200 mT, 100 kHz, 100 °C)	B66453G0000X197 (ELP core) B66453K0000X197 (I core)*

* Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 18:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	77.4	–0.774	129	–0.796	107	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 50 nH < A_L < 500 nH

Core set EELP 22
Combination: ELP 22/6/16 with ELP 22/6/16

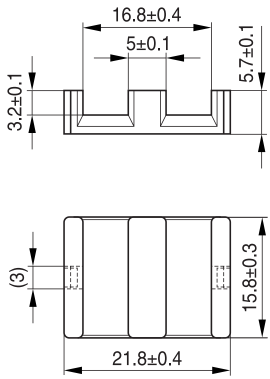
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.41 mm^{-1}
l_e = 32.5 mm
A_e = 78.3 mm^2
A_{min} = 77.9 mm^2
V_e = 2540 mm^3

Approx. weight 13 g/set

ELP 22/6/16



FEK0518-G

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	3100 ±25%	1010	250	< 0.65 (50 mT, 500 kHz, 100 °C)	B66285G0000X149
N92	3400 ±25%	1110	350	< 1.65 (200 mT, 100 kHz, 100 °C)	B66285G0000X192
N87	4500 ±25%	1470	300	< 1.50 (200 mT, 100 kHz, 100 °C)	B66285G0000X187
N97	4600 ±25%	1520	310	< 1.20 (200 mT, 100 kHz, 100 °C)	B66285G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N87	0.05 ±0.01	1520	500	B66285G0050X187
	0.10 ±0.02	820	270	B66285G0100X187
	0.30 ±0.02	330	110	B66285G0300X187
	0.50 ±0.05	220	70	B66285G0500X187
	1.00 ±0.05	125	40	B66285G1000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 22:

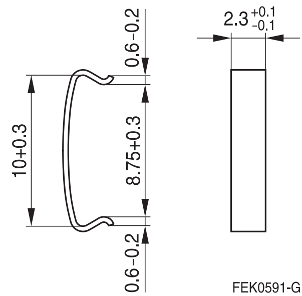
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	126	–0.814	232	–0.796	200	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 100 nH < A_L < 700 nH

Clamp

Ordering code per piece, 2 pieces required

Ordering code: B66286A2000X000



FEK0591-G

Core set EILP 22
Combination:
ELP 22/6/16 with I 22/2.5/16

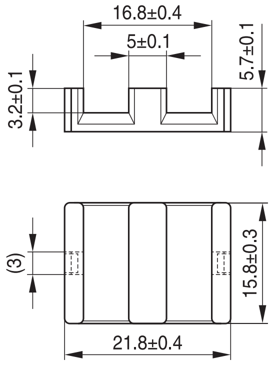
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

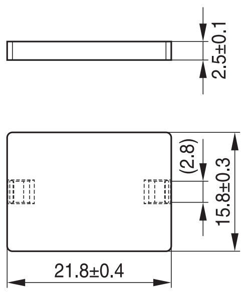
$\Sigma l/A = 0.33\ mm^{-1}$
$l_e = 26.1\ mm$
$A_e = 78.5\ mm^2$
$A_{min} = 77.9\ mm^2$
$V_e = 2050\ mm^3$

Approx. weight 10.5 g/set

ELP 22/6/16



I 22/2.5/16



Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	3700 ±25%	960	250	< 0.50 (50 mT, 500 kHz, 100 °C)	B66285G0000X149 (ELP core) B66285K0000X149 (I core)**
N92	4000 ±25%	1050	350	< 1.38 (200 mT, 100 kHz, 100 °C)	B66285G0000X192 (ELP core) B66285K0000X192 (I core)**
N87	5200 ±25%	1360	300	< 1.25 (200 mT, 100 kHz, 100 °C)	B66285G0000X187 (ELP core) B66285K0000X187 (I core)**
N97	5250 ±25%	1390	310	< 1.00 (200 mT, 100 kHz, 100 °C)	B66285G0000X197 (ELP core) B66285K0000X197 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)
EILP 22:

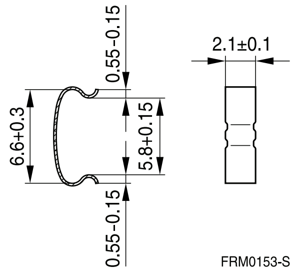
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	134	–0.806	243	–0.796	206	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 100 nH < A_L < 700 nH

Clamp

Ordering code per piece, 2 pieces required

Ordering code: B65804P2204X000



FRM0153-S

ELP 22/6/16

Core (without clamp recess) B66455

Core set EELP 22
Combination: ELP 22/6/16 with ELP 22/6/16

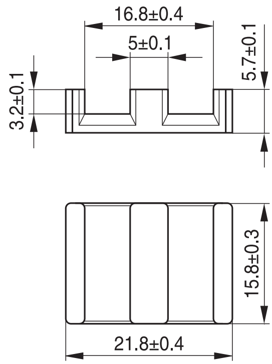
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.41 mm^{-1}
l_e = 32.5 mm
A_e = 78.3 mm^2
A_{min} = 77.9 mm^2
V_e = 2540 mm^3

Approx. weight 13 g/set

ELP 22/6/16



FEK0402-N

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	3100 ±25%	1010	250	< 0.65 (50 mT, 500 kHz, 100 °C)	B66455G0000X149
N92	3400 ±25%	1110	350	< 1.65 (200 mT, 100 kHz, 100 °C)	B66455G0000X192
N87	4500 ±25%	1470	300	< 1.50 (200 mT, 100 kHz, 100 °C)	B66455G0000X187
N97	4600 ±25%	1520	310	< 1.20 (200 mT, 100 kHz, 100 °C)	B66455G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 22:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	126	–0.814	232	–0.796	200	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 100 nH < A_L < 700 nH

ELP 22/6/16 with I 22/2.5/16

Core (without clamp recess) **B66455**

Core set EILP 22
Combination:
ELP 22/6/16 with I 22/2.5/16

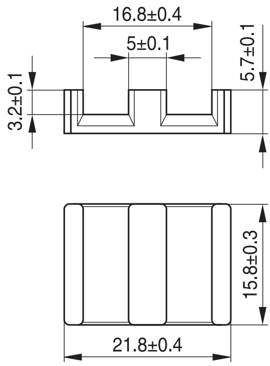
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

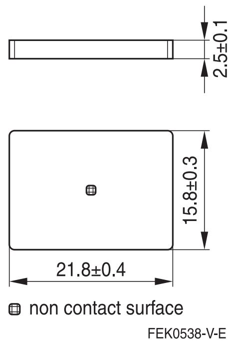
$\Sigma l/A$ = 0.33 mm^{-1}
l_e = 26.1 mm
A_e = 78.5 mm^2
A_{min} = 77.9 mm^2
V_e = 2050 mm^3

Approx. weight 10.5 g/set

ELP 22/6/16



I 22/2.5/16



Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	3700 ±25%	960	250	< 0.50 (50 mT, 500 kHz, 100 °C)	B66455G0000X149 (ELP core) B66455K0000X149 (I core)**
N92	4000 ±25%	1050	350	< 1.38 (200 mT, 100 kHz, 100 °C)	B66455G0000X192 (ELP core) B66455K0000X192 (I core)**
N87	5200 ±25%	1360	300	< 1.25 (200 mT, 100 kHz, 100 °C)	B66455G0000X187 (ELP core) B66455K0000X187 (I core)**
N97	5250 ±25%	1390	310	< 1.00 (200 mT, 100 kHz, 100 °C)	B66455G0000X197 (ELP core) B66455K0000X197 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 22:

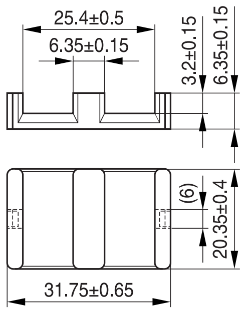
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	134	–0.806	243	–0.796	206	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 100 nH < A_L < 700 nH

Core set EELP 32
Combination: ELP 32/6/20 with ELP 32/6/20

- To IEC 62317-9
- Delivery mode: single units

ELP 32/6/20



FEK0520-S

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.32 mm^{-1}
l_e = 41.4 mm
A_e = 130 mm^2
A_{min} = 128 mm^2
V_e = 5390 mm^3

Approx. weight 28 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	3900 ±25%	990	250	< 1.40 (50 mT, 500 kHz, 100 °C)	B66287G0000X149
N92	4300 ±25%	1090	350	< 3.70 (200 mT, 100 kHz, 100 °C)	B66287G0000X192
N87	5700 ±25%	1450	300	< 3.40 (200 mT, 100 kHz, 100 °C)	B66287G0000X187
N97	5700 ±25%	1440	310	< 2.60 (200 mT, 100 kHz, 100 °C)	B66287G0000X197
N95	6900 ±25%	1740	310	< 3.40 (200 mT, 100 kHz, 25 °C) < 3.10 (200 mT, 100 kHz, 100 °C)	B66287G0000X195

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N87	0.26 ±0.02 0.40 ±0.02	625 440	155 112	B66287G0260X187 B66287G0400X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)
EELP 32:

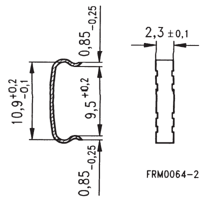
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	208	–0.819	367	–0.796	322	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 150 nH < A_L < 1000 nH

Clamp

Ordering code per piece, 2 pieces required

Ordering code: B65808J2204X000



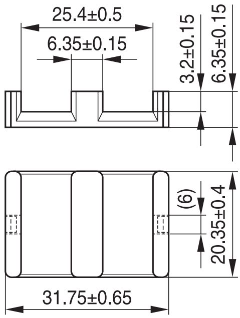
Core set EILP 32
Combination:
ELP 32/6/20 with I 32/3/20

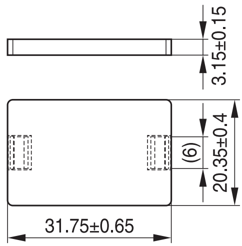
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.27 mm^{-1}
l_e = 35.1 mm
A_e = 130 mm^2
A_{min} = 128 mm^2
V_e = 4560 mm^3

Approx. weight 24 g/set





Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	4400 ±25%	950	250	< 1.20 (50 mT, 500 kHz, 100 °C)	B66287G0000X149 (ELP core) B66287K0000X149 (I core)**
N92	4800 ±25%	1031	350	< 3.20 (200 mT, 100 kHz, 100 °C)	B66287G0000X192 (ELP core) B66287K0000X192 (I core)**
N87	6300 ±25%	1350	300	< 2.90 (200 mT, 100 kHz, 100 °C)	B66287G0000X187 (ELP core) B66287K0000X187 (I core)**
N97	6300 ±25%	1350	310	< 2.20 (200 mT, 100 kHz, 100 °C)	B66287G0000X197 (ELP core) B66287K0000X197 (I core)**
N95	7550 ±25%	1618	310	< 2.90 (200 mT, 100 kHz, 25 °C) < 2.60 (200 mT, 100 kHz, 100 °C)	B66287G0000X195 (ELP core) B66287K0000X195 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)
EILP 32:

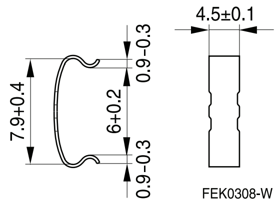
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	234	–0.777	379	–0.796	329	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 150 nH < A_L < 1000 nH

Clamp

Ordering code per piece, 2 pieces required

Ordering code: B66288F2204X000



ELP 32/6/20

Core (without clamp recess) B66457

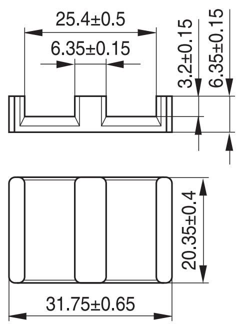
Core set EELP 32
Combination: ELP 32/6/20 with ELP 32/6/20

- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.32 mm^{-1}
l_e = 41.4 mm
A_e = 130 mm^2
A_{min} = 128 mm^2
V_e = 5390 mm^3

Approx. weight 28 g/set



Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	3900 ±25%	990	250	< 1.40 (50 mT, 500 kHz, 100 °C)	B66457G0000X149
N92	4300 ±25%	1090	350	< 3.70 (200 mT, 100 kHz, 100 °C)	B66457G0000X192
N87	5700 ±25%	1450	300	< 3.40 (200 mT, 100 kHz, 100 °C)	B66457G0000X187
N97	5700 ±25%	1440	310	< 2.60 (200 mT, 100 kHz, 100 °C)	B66457G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 32:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	208	–0.819	367	–0.796	322	–0.873

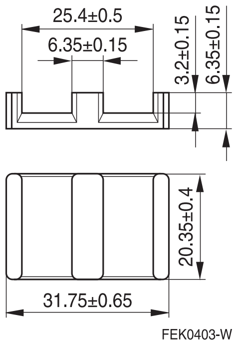
Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 150 nH < A_L < 1000 nH

Core (without clamp recess) B66457

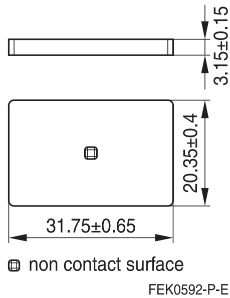
Core set EILP 32
Combination:
ELP 32/6/20 with I 32/3/20

- To IEC 62317-9
- Delivery mode: single units

ELP 32/6/20



I 32/3/20



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.27 mm^{-1}
l_e = 35.1 mm
A_e = 130 mm^2
A_{min} = 128 mm^2
V_e = 4560 mm^3

Approx. weight 24 g/set

Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	4400 ±25%	950	250	< 1.20 (50 mT, 500 kHz, 100 °C)	B66457G0000X149 (ELP core) B66457K0000X149 (I core)**
N92	4800 ±25%	1031	350	< 3.20 (200 mT, 100 kHz, 100 °C)	B66457G0000X192 (ELP core) B66457K0000X192 (I core)**
N87	6300 ±25%	1350	300	< 2.90 (200 mT, 100 kHz, 100 °C)	B66457G0000X187 (ELP core) B66457K0000X187 (I core)**
N97	6300 ±25%	1350	310	< 2.20 (200 mT, 100 kHz, 100 °C)	B66457G0000X197 (ELP core) B66457K0000X197 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 32:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	234	–0.777	379	–0.796	329	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 150 nH < A_L < 1000 nH

Core set EELP 38
Combination: ELP 38/8/25 with ELP 38/8/25

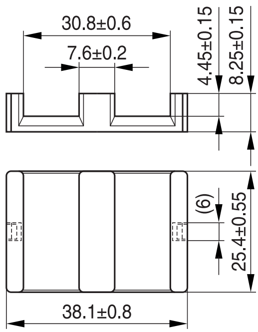
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.27 mm^{-1}
l_e = 52.4 mm
A_e = 194 mm^2
A_{min} = 192 mm^2
V_e = 10200 mm^3

Approx. weight 52 g/set

ELP 38/8/25



Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	4850 ±25%	1040	250	< 2.60 (50 mT, 500 kHz, 100 °C)	B66289G0000X149
N92	5400 ±25%	1160	350	< 6.65 (200 mT, 100 kHz, 100 °C)	B66289G0000X192
N87	7200 ±25%	1550	300	< 6.05 (200 mT, 100 kHz, 100 °C)	B66289G0000X187
N97	7400 ±25%	1590	310	< 5.15 (200 mT, 100 kHz, 100 °C)	B66289G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N87	0.12 ±0.02 0.60 ±0.05	1700 400	370 90	B66289G0120X187 B66289G0600X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 38:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	302	–0.815	522	–0.796	466	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 180 nH < A_L < 1500 nH

Core set EILP 38
Combination:
ELP 38/8/25 with I 38/4/25

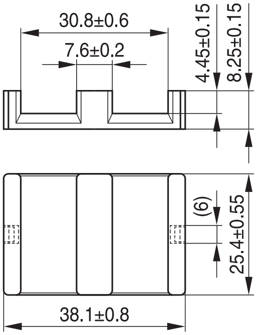
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.22 mm^{-1}
l_e = 43.6 mm
A_e = 194 mm^2
A_{min} = 192 mm^2
V_e = 8460 mm^3

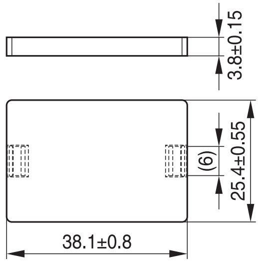
Approx. weight 44 g/set

ELP 38/8/25



FEK0524-Q

I 38/4/25



FEK0541-F

Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	5700 ±25%	1000	250	< 2.20 (50 mT, 500 kHz, 100 °C)	B66289G0000X149 (ELP core) B66289K0000X149 (I core)**
N92	6200 ±25%	1110	350	< 5.30 (200 mT, 100 kHz, 100 °C)	B66289G0000X192 (ELP core) B66289K0000X192 (I core)**
N87	8300 ±25%	1450	300	< 5.15 (200 mT, 100 kHz, 100 °C)	B66289G0000X187 (ELP core) B66289K0000X187 (I core)**
N97	8400 ±25%	1500	310	< 4.40 (200 mT, 100 kHz, 100 °C)	B66289G0000X197 (ELP core) B66289K0000X197 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)
EILP 38:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	328	–0.788	541	–0.796	477	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 180 nH < A_L < 1500 nH

ELP 38/8/25

Core (without clamp recess) **B66459**

Core set EELP 38
Combination: ELP 38/8/25 with ELP 38/8/25

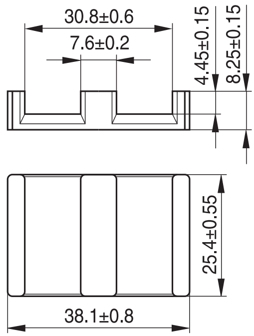
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.27 mm^{-1}
l_e = 52.4 mm
A_e = 194 mm^2
A_{min} = 192 mm^2
V_e = 10200 mm^3

Approx. weight 52 g/set

ELP 38/8/25



Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	4850 ±25%	1040	250	< 2.60 (50 mT, 500 kHz, 100 °C)	B66459G0000X149
N92	5400 ±25%	1160	350	< 6.65 (200 mT, 100 kHz, 100 °C)	B66459G0000X192
N87	7200 ±25%	1550	300	< 6.05 (200 mT, 100 kHz, 100 °C)	B66459G0000X187
N97	7400 ±25%	1590	310	< 5.15 (200 mT, 100 kHz, 100 °C)	B66459G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 38:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	302	–0.815	522	–0.796	466	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 180 nH < A_L < 1500 nH

TDK

ELP 38/8/25 with I 38/4/25

Core (without clamp recess) B66459

Core set EILP 38
Combination:
ELP 38/8/25 with I 38/4/25

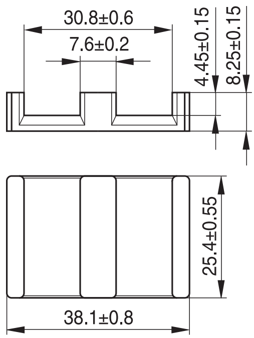
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

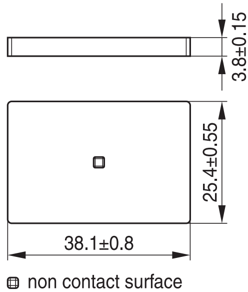
$\Sigma l/A$ = 0.22 mm^{-1}
l_e = 43.6 mm
A_e = 194 mm^2
A_{min} = 192 mm^2
V_e = 8440 mm^3

Approx. weight 44 g/set

ELP 38/8/25



I 38/4/25



Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	5700 ±25%	1000	250	< 2.20 (50 mT, 500 kHz, 100 °C)	B66459G0000X149 (ELP core) B66459K0000X149 (I core)**
N92	6200 ±25%	1110	350	< 5.30 (200 mT, 100 kHz, 100 °C)	B66459G0000X192 (ELP core) B66459K0000X192 (I core)**
N87	8300 ±25%	1450	300	< 5.15 (200 mT, 100 kHz, 100 °C)	B66459G0000X187 (ELP core) B66459K0000X187 (I core)**
N97	8400 ±25%	1500	310	< 4.40 (200 mT, 100 kHz, 100 °C)	B66459G0000X197 (ELP core) B66459K0000X197 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 38:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	328	–0.788	541	–0.796	477	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 180 nH < A_L < 1500 nH

ELP 43/10/28

Core (with clamp recess) **B66291**

Core set EELP 43
Combination: ELP 43/10/28 with ELP 43/10/28

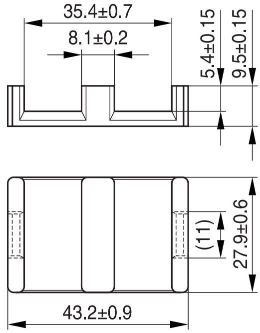
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.274 mm^{-1}
l_e = 61.6 mm
A_e = 225 mm^2
A_{min} = 217 mm^2
V_e = 13748 mm^3

Approx. weight 70 g/set

ELP 43/10/28



FEK0526-7

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	5000 ±25%	1070	250	< 3.5 (50 mT, 500 kHz, 100 °C)	B66291G0000X149
N92	5500 ±25%	1170	350	< 9.0 (200 mT, 100 kHz, 100 °C)	B66291G0000X192
N87	7300 ±25%	1560	300	< 8.0 (200 mT, 100 kHz, 100 °C)	B66291G0000X187
N97	7500 ±25%	1590	310	< 7.0 (200 mT, 100 kHz, 100 °C)	B66291G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N87	0.1 ±0.02 1.0 ±0.05	2225 355	470 75	B66291G0100X187 B66291G1000X187

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 43:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	358	–0.794	597	–0.796	540	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 200 nH < A_L < 2200 nH

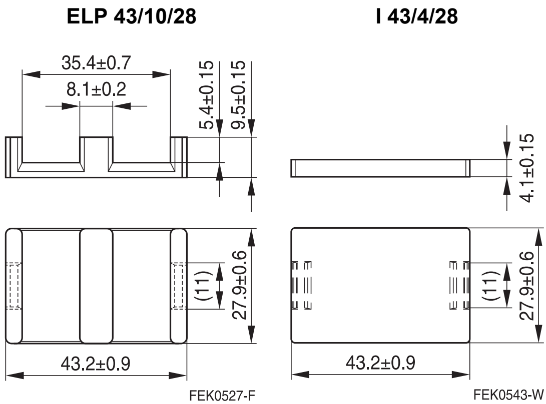
Core set EILP 43
Combination:
ELP 43/10/28 with I 43/4/28

- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.225 mm^{-1}
l_e = 50.8 mm
A_e = 225 mm^2
A_{min} = 217 mm^2
V_e = 11430 mm^3

Approx. weight 60 g/set



Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	5900 ±25%	1030	250	< 3.0 (50 mT, 500 kHz, 100 °C)	B66291G0000X149 (ELP core) B66291K0000X149 (I core)**
N92	6400 ±25%	1120	350	< 7.8 (200 mT, 100 kHz, 100 °C)	B66291G0000X192 (ELP core) B66291K0000X192 (I core)**
N87	8500 ±25%	1480	300	< 7.0 (200 mT, 100 kHz, 100 °C)	B66291G0000X187 (ELP core) B66291K0000X187 (I core)**
N97	8700 ±25%	1525	310	< 6.0 (200 mT, 100 kHz, 100 °C)	B66291G0000X197 (ELP core) B66291K0000X197 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 43:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	390	–0.784	621	–0.796	553	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 200 nH < A_L < 2200 nH

Core set EELP 43
Combination: ELP 43/10/28 with ELP 43/10/28

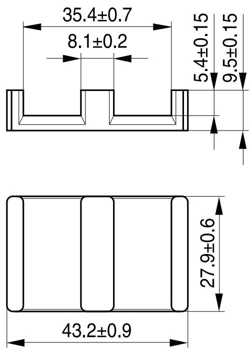
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.274 mm^{-1}
l_e = 61.6 mm
A_e = 225 mm^2
A_{min} = 217 mm^2
V_e = 13748 mm^3

Approx. weight 70 g/set

ELP 43/10/28



FEK0408-3

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	5000 ±25%	1070	250	< 3.50 (50 mT, 500 kHz, 100 °C)	B66461G0000X149
N92	5500 ±25%	1170	350	< 9.00 (200 mT, 100 kHz, 100 °C)	B66461G0000X192
N87	7300 ±25%	1560	300	< 8.00 (200 mT, 100 kHz, 100 °C)	B66461G0000X187
N97	7500 ±25%	1590	310	< 7.00 (200 mT, 100 kHz, 100 °C)	B66461G0000X197
N95	9000 ±25%	2012	310	< 8.25 (200 mT, 100 kHz, 25 °C) < 7.50 (200 mT, 100 kHz, 100 °C)	B66461G0000X195

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 43:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	358	–0.794	597	–0.796	540	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 200 nH < A_L < 2200 nH

ELP 43/10/28 with I 43/4/28

Core (without clamp recess) **B66461**

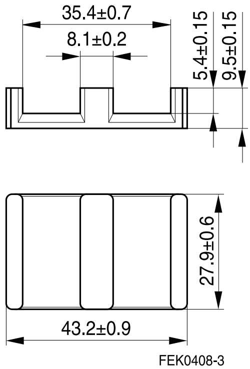
Core set EILP 43
Combination:
ELP 43/10/28 with I 43/4/28

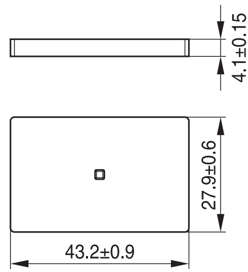
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.225 mm^{-1}
l_e = 50.8 mm
A_e = 225 mm^2
A_{min} = 217 mm^2
V_e = 11430 mm^3

Approx. weight 60 g/set





Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	5900 ±25%	1030	250	< 3.0 (50 mT, 500 kHz, 100 °C)	B66461G0000X149 (ELP core) B66461K0000X149 (I core)**
N92	6400 ±25%	1120	350	< 7.8 (200 mT, 100 kHz, 100 °C)	B66461G0000X192 (ELP core) B66461K0000X192 (I core)**
N87	8500 ±25%	1480	300	< 7.0 (200 mT, 100 kHz, 100 °C)	B66461G0000X187 (ELP core) B66461K0000X187 (I core)**
N97	8700 ±25%	1525	310	< 6.0 (200 mT, 100 kHz, 100 °C)	B66461G0000X197 (ELP core) B66461K0000X197 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 43:

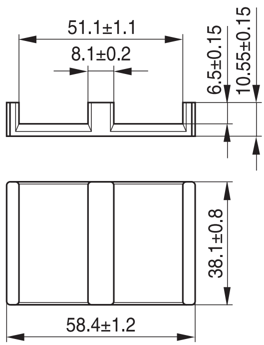
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	390	–0.784	621	–0.796	553	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 200 nH < A_L < 2200 nH

Core set EELP 58
Combination: ELP 58/11/38 with ELP 58/11/38

- To IEC 62317-9
- Delivery mode: single units

ELP 58/11/38



FEK0410-E

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.26 mm^{-1}
l_e = 80.7 mm
A_e = 310 mm^2
A_{min} = 308 mm^2
V_e = 25000 mm^3

Approx. weight 130 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N87	7400 ±25%	1540	300	< 15.0 (200 mT, 100 kHz, 100 °C)	B66293G0000X187

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 58:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	521	–0.732	763	–0.796	705	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 50 nH < A_L < 500 nH

Core set EILP 58
Combination:
ELP 58/11/38 with I 58/4/38

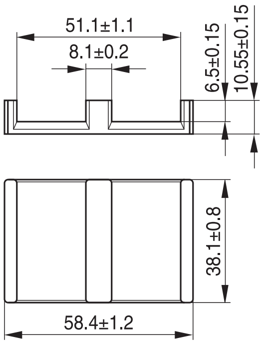
- To IEC 62317-9
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.22 mm^{-1}
l_e = 67.7 mm
A_e = 310 mm^2
A_{min} = 308 mm^2
V_e = 21000 mm^3

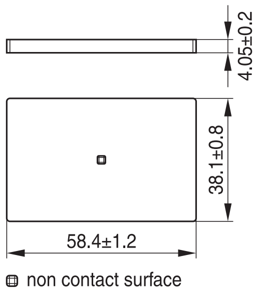
Approx. weight 110 g/set

ELP 58/11/38



FEK0410-E

I 58/4/38



FEK0545-D-E

Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N87	8400 ±25%	1450	300	< 13.0 (200 mT, 100 kHz, 100 °C)	B66293G0000X187 (ELP core) B66293K0000X187 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request - see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 58:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	591	–0.685	791	–0.796	721	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.50 mm
K3, K4: 50 nH < A_L < 500 nH

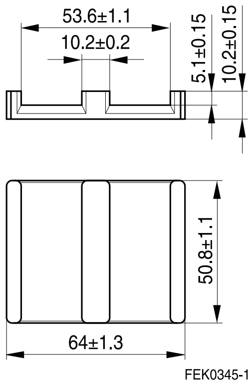
ELP 64/10/50

Core (without clamp recess) **B66295**

Core set EELP 64
Combination: ELP 64/10/50 with ELP 64/10/50

- To IEC 62317-9
- Delivery mode: single units

ELP 64/10/50



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.15 mm^{-1}
l_e = 79.9 mm
A_e = 519 mm^2
A_{min} = 518 mm^2
V_e = 41500 mm^3

Approx. weight 210 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	8000 ±30%	980	250	< 10.7 (50 mT, 500 kHz, 100 °C)	B66295G0000X149
N87	12500 ±25%	1490	300	< 26.0 (200 mT, 100 kHz, 100 °C)	B66295G0000X187
N97	12500 ±25%	1531	310	< 19.0 (200 mT, 100 kHz, 100 °C)	B66295G0000X197
N95	15500 ±25%	1880	320	< 25.0 (200 mT, 100 kHz, 25 °C) < 22.5 (200 mT, 100 kHz, 100 °C)	B66295G0000X195

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EELP 64:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	820	–0.767	1280	–0.796	1182	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 480 nH < A_L < 4800 nH

ELP 64/10/50 with I 64/5/50

Core (without clamp recess) B66295

Core set EILP 64
Combination:
ELP 64/10/50 with I 64/5/50

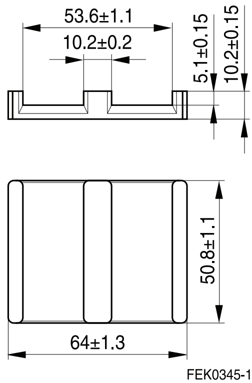
- To IEC 62317-9
- Delivery mode: single units

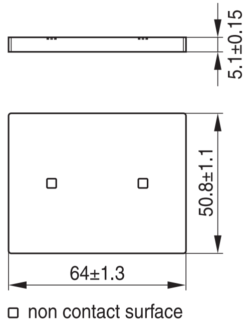
Magnetic characteristics (per set)

$\Sigma l/A$ = 0.13 mm^{-1}
l_e = 69.7 mm
A_e = 519 mm^2
A_{min} = 518 mm^2
V_e = 36200 mm^3

Approx. weight 185 g/set

ELP 64/10/50 **I 64/5/50**





Ungapped

Mate-rial	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code (per piece)
N49	8900 ±30%	950	250	< 9.3 (50 mT, 500 kHz, 100 °C)	B66295G0000X149 (ELP core) B66295K0000X149 (I core)**
N87	14000 ±25%	1450	300	< 23.0 (200 mT, 100 kHz, 100 °C)	B66295G0000X187 (ELP core) B66295K0000X187 (I core)**

* H = 250 A/m; f = 10 kHz; T = 100 °C
** Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)
EILP 64:

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	835	–0.790	1316	–0.796	1203	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 480 nH < A_L < 4800 nH

Core set EELP 102
Combination: ELP 102/20/38 with ELP 102/20/38

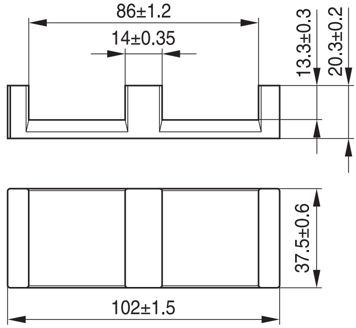
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.274 mm^{-1}
l_e = 147.6 mm
A_e = 538 mm^2
A_{min} = 524.5 mm^2
V_e = 79410 mm^3

Approx. weight 405 g/set

ELP 102/20/38



FEK0533-P

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code (per piece)
N87	8200 ±25%	1790	< 11.0 (100 mT, 100 kHz, 100 °C)	B66297G0000X187
N97	8500 ±25%	1855	< 9.7 (100 mT, 100 kHz, 100 °C)	B66297G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EILP 102
Combination:
ELP 102/20/38
with I 102/7/38

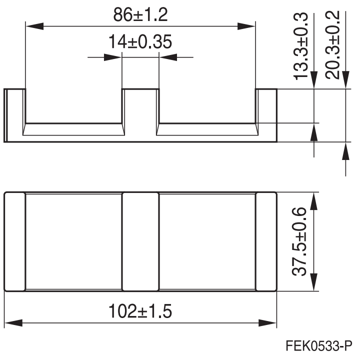
- Delivery mode: single units

Magnetic characteristics (per set)

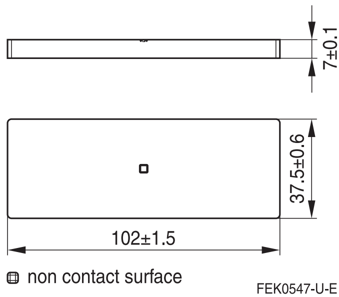
$\Sigma l/A$ = 0.227 mm^{-1}
l_e = 121.2 mm
A_e = 534.2 mm^2
A_{min} = 524.5 mm^2
V_e = 67745 mm^3

Approx. weight 330 g/set

ELP 102/20/38



I 102/7/38



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code (per piece)
N87	9300 ±25%	1680	< 8.8 (100 mT, 100 kHz, 100 °C)	B66297G0000X187 (ELP core) B66297K0000X187 (I core)
N97	9600 ±25%	1740	< 8.0 (100 mT, 100 kHz, 100 °C)	B66297G0000X197 (ELP core) B66297K0000X197 (I core)

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

EQ planar cores for power applications

Integrating ferrite cores into the PCB has become a common technology in the power supply market. In those low-profile designs ferrite planar cores with low losses and high saturation are widespread. The trends are increasing the power density of the throughput transformer and the current in the output inductor. Ferrite cores are considered a key component for these targets. EPCOS has extended the range of planar ferrite cores to meet the new requirements.

Besides the standard ELP core series EPCOS offers now extended series of planar cores with round center post: EQ 13 to EQ 30 and ER 9.5 to ER 32. This wide range of shapes improves the design capabilities for individual power converter solutions. Customer-specific heights can be supplied as well as different air gap requirements for all series.

All EPCOS planar cores are available in the well-known EPCOS power materials. Preferred materials are N97 and N92. N97 is optimized for low losses, N92 for high saturation current in the output chokes. N87 is suitable for standard requirements. For frequencies higher than 400 kHz, we recommend N49. The material N95 is available for several EQ planar cores and provides stable low power losses across a temperature range from +25 °C up to +120 °C.

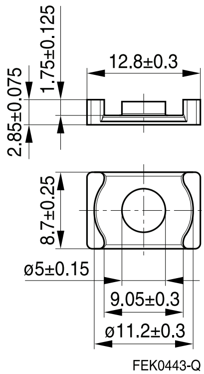
EQ 13/2.85/8.7

Core **B66479**

Core set EEQ 13
Combination: 13/2.85/8.7 with EQ 13/2.85/8.7

- To IEC 62317-9
- Optimized cross section
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

EQ 13/2.85/8.7



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.9 mm^{-1}
l_e = 17.5 mm
A_e = 19.8 mm^2
A_{min} = 19.2 mm^2
V_e = 347 mm^3

Approx. weight 1.8 g/set

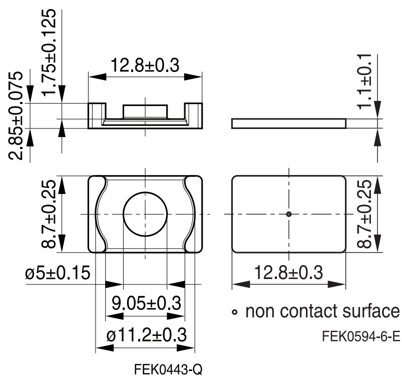
Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N92	1320 ±25%	940	< 0.28 (200 mT, 100 kHz, 100 °C)	B66479G0000X192
N49	1360 ±25%	1360	< 0.07 (50 mT, 500 kHz, 100 °C)	B66479G0000X149
N87	1640 ±25%	1170	< 0.22 (200 mT, 100 kHz, 100 °C)	B66479G0000X187
N97	1700 ±25%	1196	< 0.18 (200 mT, 100 kHz, 100 °C)	B66479G0000X197
N95	2250 ±25%	1583	< 0.20 (200 mT, 100 kHz, 100 °C)	B66479G0000X195

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EIQ 13
Combination: EQ 13/2.85/8.7 with I 13/1/8.7

- To IEC 62317-9
- Optimized cross section
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.803 mm^{-1}
l_e = 15.9 mm
A_e = 19.8 mm^2
A_{min} = 19.2 mm^2
V_e = 315 mm^3

Approx. weight 1.5 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N92	1550 ±25%	990	< 0.25 (200 mT, 100 kHz, 100 °C)	B66479G0000X192 (EQ core) B66479K0000X192 (I core)*
N49	1600 ±25%	1020	< 0.06 (50 mT, 500 kHz, 100 °C)	B66479G0000X149 (EQ core) B66479K0000X149 (I core)*
N87	1700 ±25%	1100	< 0.20 (200 mT, 100 kHz, 100 °C)	B66479G0000X187 (EQ core) B66479K0000X187 (I core)*
N97	1800 ±25%	1150	< 0.16 (200 mT, 100 kHz, 100 °C)	B66479G0000X197 (EQ core) B66479K0000X197 (I core)*

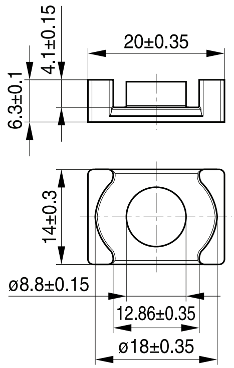
*Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EEQ 20
Combination: EQ 20/6.3/14 with EQ 20/6.3/14

- To IEC 62317-9
- Optimized cross section
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

EQ 20/6.3/14



FEK0444-Y

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.56 mm^{-1}
l_e = 33.2 mm
A_e = 59.0 mm^2
A_{min} = 55.0 mm^2
V_e = 1960 mm^3

Approx. weight 11 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	2400 ±25%	1070	< 0.51 (50 mT, 500 kHz, 100 °C)	B66483G0000X149
N92	2450 ±25%	1090	< 1.80 (200 mT, 100 kHz, 100 °C)	B66483G0000X192
N87	3100 ±25%	1400	< 1.10 (200 mT, 100 kHz, 100 °C)	B66483G0000X187
N97	3200 ±25%	1430	< 1.00 (200 mT, 100 kHz, 100 °C)	B66483G0000X197
N95	3700 ±25%	1657	< 1.05 (200 mT, 100 kHz, 100 °C)	B66483G0000X195

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EIQ 20
Combination: EQ 20/6.3/14 with I 20/2.3/14

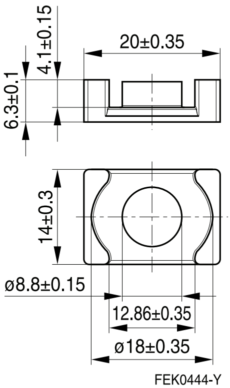
- To IEC 62317-9
- Optimized cross section
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

Magnetic characteristics (per set)

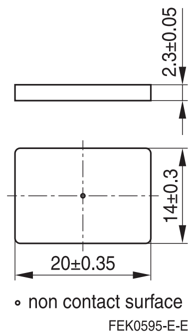
$\Sigma l/A$ = 0.42 mm^{-1}
l_e = 25.1 mm
A_e = 59.8 mm^2
A_{min} = 55.0 mm^2
V_e = 1500 mm^3

Approx. weight 8.5 g/set

EQ 20/6.3/14



I 20/2.3/14



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N92	2950 ±25%	985	< 1.50 (200 mT, 100 kHz, 100 °C)	B66483G0000X192 (EQ core) B66483K0000X192 (I core)*
N49	3000 ±25%	1000	< 0.40 (50 mT, 500 kHz, 100 °C)	B66483G0000X149 (EQ core) B66483K0000X149 (I core)*
N87	3680 ±25%	1230	< 0.85 (200 mT, 100 kHz, 100 °C)	B66483G0000X187 (EQ core) B66483K0000X187 (I core)*
N97	3770 ±25%	1260	< 0.81 (200 mT, 100 kHz, 100 °C)	B66483G0000X197 (EQ core) B66483K0000X197 (I core)*
N95	4600 ±25%	1537	< 0.83 (200 mT, 100 kHz, 100 °C)	B66483G0000X195 (EQ core) B66483K0000X195 (I core)*

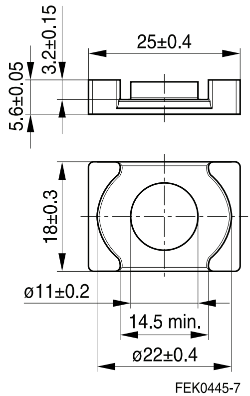
* Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EEQ 25
Combination: EQ 25/5.6/18 with EQ 25/5.6/18

- To IEC 62317-9
- Optimized cross section
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

EQ 25/5.6/18



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.352 mm^{-1}
l_e = 32.95 mm
A_e = 93.51 mm^2
A_{min} = 86.40 mm^2
V_e = 3082 mm^3

Approx. weight 16 g/set

Ungapped

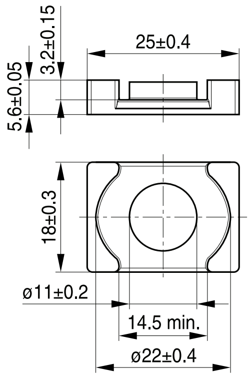
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3600 ±25%	1010	< 0.80 (50 mT, 500 kHz, 100 °C)	B66481G0000X149
N92	3650 ±25%	1030	< 2.60 (200 mT, 100 kHz, 100 °C)	B66481G0000X192
N87	4700 ±25%	1310	< 1.85 (200 mT, 100 kHz, 100 °C)	B66481G0000X187
N97	4800 ±25%	1350	< 1.54 (200 mT, 100 kHz, 100 °C)	B66481G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

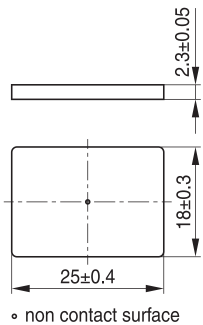
Core set EIQ 25
Combination: EQ 25/5.6/18 with I 25/2.3/18

- Optimized cross section
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

EQ 25/5.6/18



I 25/2.3/18



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.294 mm^{-1}
l_e = 26.4 mm
A_e = 89.7 mm^2
A_{min} = 82.8 mm^2
V_e = 2370 mm^3

Approx. weight 13 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N92	4150 ±25%	970	< 2.10 (200 mT, 100 kHz, 100 °C)	B66481G0000X192 (EQ core) B66481K0000X192 (I core)*
N49	4200 ±25%	990	< 0.65 (50 mT, 500 kHz, 100 °C)	B66481G0000X149 (EQ core) B66481K0000X149 (I core)*
N87	5100 ±25%	1200	< 1.50 (200 mT, 100 kHz, 100 °C)	B66481G0000X187 (EQ core) B66481K0000X187 (I core)*
N97	5300 ±25%	1250	< 1.25 (200 mT, 100 kHz, 100 °C)	B66481G0000X197 (EQ core) B66481K0000X197 (I core)*

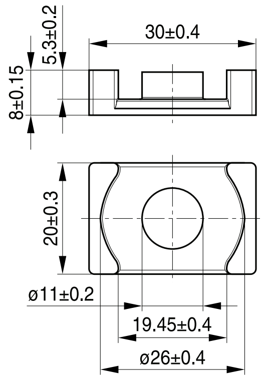
* Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EEQ 30
Combination: EQ 30/8/20 with EQ 30/8/20

- To IEC 62317-9
- Optimized cross section
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

EQ 30/8/20



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.426 mm^{-1}
l_e = 46 mm
A_e = 108 mm^2
A_{min} = 95 mm^2
V_e = 4970 mm^3

Approx. weight 23 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N92	3270 ±25%	1110	< 4.25 (200 mT, 100 kHz, 100 °C)	B66506G0000X192
N49	3330 ±25%	1130	< 1.43 (50 mT, 500 kHz, 100 °C)	B66506G0000X149
N87	4300 ±25%	1470	< 2.70 (200 mT, 100 kHz, 100 °C)	B66506G0000X187
N97	4500 ±25%	1540	< 2.50 (200 mT, 100 kHz, 100 °C)	B66506G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EIQ 30
Combination: EQ 30/8/20 with I 30/2.7/20

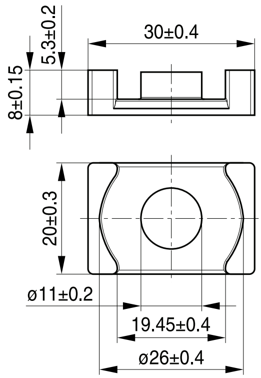
- Optimized cross section
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

Magnetic characteristics (per set)

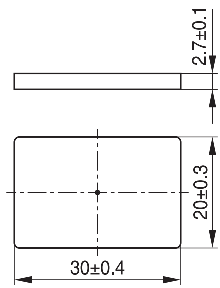
$\Sigma l/A$ = 0.29 mm^{-1}
l_e = 31.5 mm
A_e = 108.0 mm^2
A_{min} = 95.0 mm^2
V_e = 3400 mm^3

Approx. weight 21.5 g/set

EQ 30/8/20



I 30/2.7/20



Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	4350 ±25%	1000	< 1.10 (50 mT, 500 kHz, 100 °C)	B66506G0000X149 (EQ core) B66506K0000X149 (I core)*
N92	4450 ±25%	1020	< 3.40 (200 mT, 100 kHz, 100 °C)	B66506G0000X192 (EQ core) B66506K0000X192 (I core)*
N87	5600 ±25%	1300	< 2.15 (200 mT, 100 kHz, 100 °C)	B66506G0000X187 (EQ core) B66506K0000X187 (I core)*
N97	5750 ±25%	1330	< 2.00 (200 mT, 100 kHz, 100 °C)	B66506G0000X197 (EQ core) B66506K0000X197 (I core)*

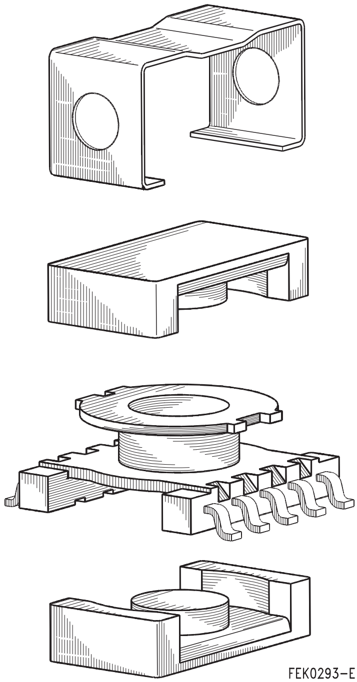
* Plate-type tool

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

ER planar cores

General information

Example of an assembly set ER 11/5

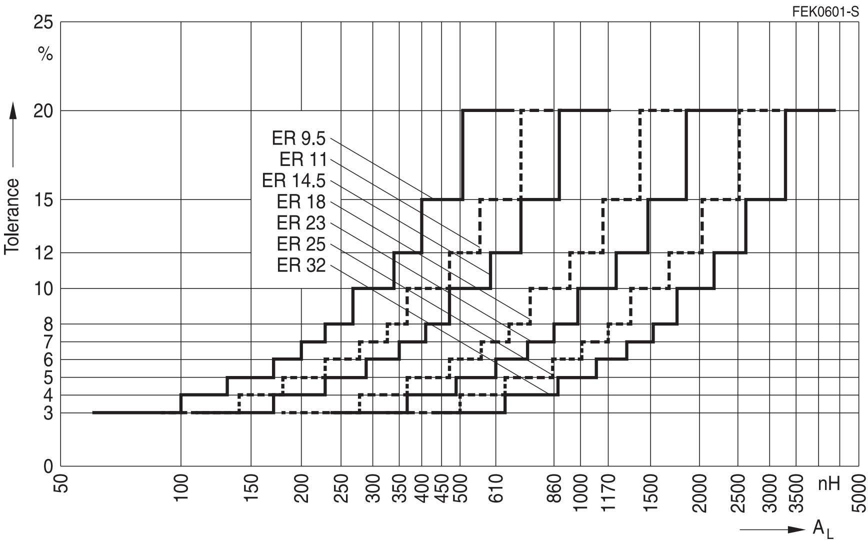


Tolerances for ER cores

The A_L value tolerances for ER cores have consequently been defined with consideration of optimized process parameters for all materials with an initial permeability μ_i in the region of 2200 to 10000 as a step function (see figure below).

The "quantized" A_L step values should preferably be used. They are still available in their respective lower tolerance ranges. Thus a tolerance of ±3% can be determined for a ER 14.5 made of N87 material for an A_L value of 130 nH.

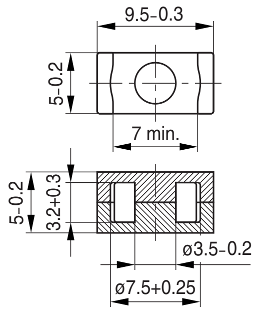
With this type of tolerance definition, EPCOS has defined standard A_L values and the associated tolerances for the first time. Based on initial permeability tolerance can be slightly lower or higher.



ER 9.5/5

Planar core **B65523**

- To IEC 62317-9
- For transformers featuring high inductance and low overall height
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.54 mm^{-1}
l_e = 13.6 mm
A_e = 8.81 mm^2
A_{min} = 7.6 mm^2
V_e = 120 mm^3

Approx. weight 0.6 g/set

Ungapped

Material	A_L value nH	μ_e	Ordering code
N92	660 +30/–20%	811	B65523J0000R092
N87	800 +30/–20%	1000	B65523J0000R087
N97	840 +30/–20%	1032	B65523J0000R097
T38	4500 +40/–30%	5680	B65523J0000Y038

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N49	40 ±5%	0.27	49	B65523J0040J049
N87	100 ±5% 400 ±10%	0.14 0.02	90 491	B65523J0100J087 B65523J0400K087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

ER 9.5/5

Accessories B65527

SMD

SMD coil former with gullwing terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Vectra E 130i [E106764 (M)], POLYPLASTICS CO LTD
Vectra E 130i [E83005 (M)], CELANESE INTERNATIONAL CORP.

Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s

Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

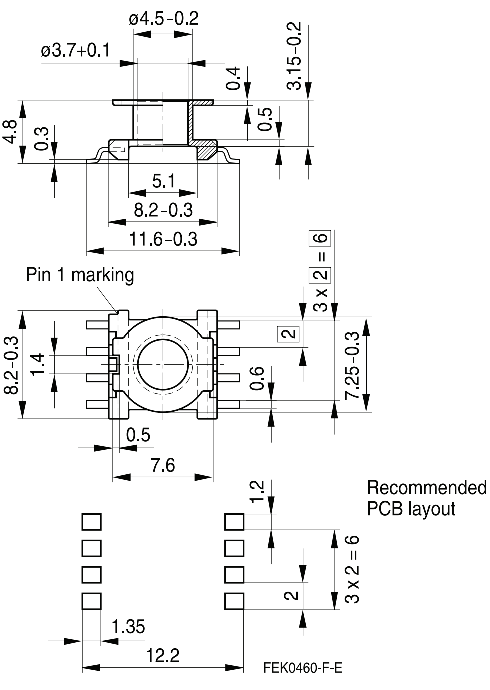
Winding: see Processing notes, 2.1

Yoke

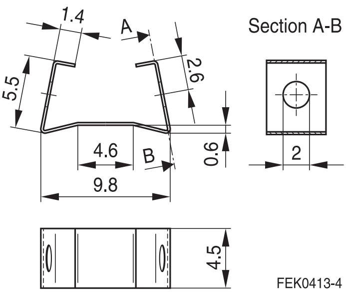
Material: Stainless spring steel (0.1 mm)

Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value µΩ	Terminals	
1	3.23	18.4	196	8	B65527B1008T001
Yoke					B65527A2000X000

Coil former



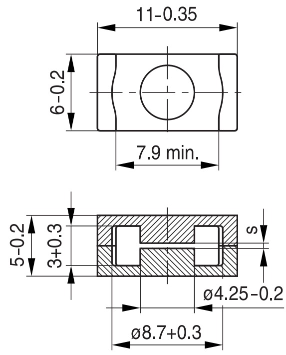
Yoke



ER 11/5

Planar core B65525

- To IEC 62317-9
- For transformers featuring high inductance and low overall height
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.1 mm^{-1}
l_e = 14.1 mm
A_e = 12.4 mm^2
A_{min} = 10.3 mm^2
V_e = 174 mm^3

Approx. weight 0.85 g/set

Ungapped

Material	A_L value nH	μ_e	Ordering code
N49	800 +30/–20%	715	B65525J0000R049
N92	900 +30/–20%	814	B65525J0000R092
N87	1200 +30/–20%	1050	B65525J0000R087
N97	1200 +30/–20%	1086	B65525J0000R097
T38	6400 +40/–30%	5600	B65525J0000Y038

Gapped (A_L values/air gaps examples)

Material	A_L value nH	s approx. mm	μ_e	Ordering code
N87	160 ±3% 100 ±3%	0.08 0.14	140 90	B65525J0160A087 B65525J0100A087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

SMD

SMD coil former with gullwing terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Zenite 7130® [E344082 (M)], CELANESE INTERNATIONAL CORP.

Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s

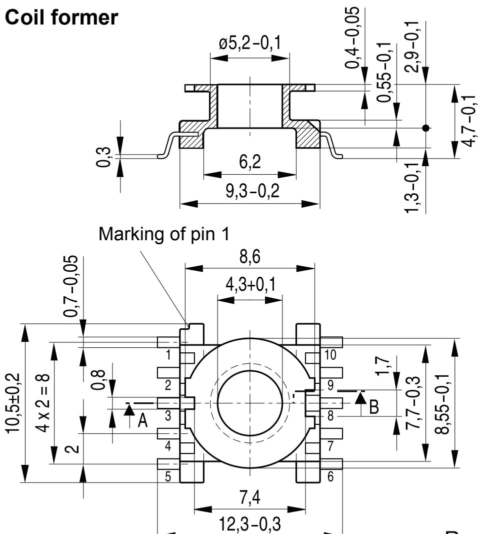
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

Winding: see Processing notes, 2.1

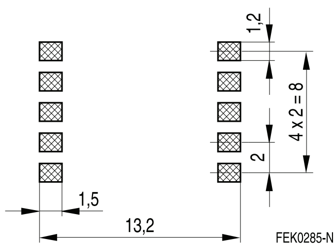
Yoke Material: Stainless spring steel (0.15 mm)

Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value $\mu\Omega$	Terminals	
1	3.3	21.6	225	10	B65526B1010T001
Yoke					B65526A2000X000

Coil former

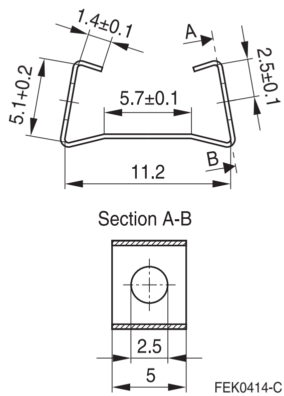


Recommended PCB layout



FEK0285-N

Yoke

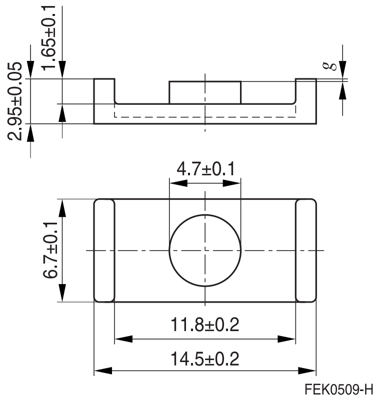


FEK0414-C

ER 14.5/6

Planar core B65513

- To IEC 62317-9
- For transformers featuring high inductance and low overall height
- Delivery mode: sets



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.1 mm^{-1}
l_e = 19 mm
A_e = 17.6 mm^2
A_{min} = 17.3 mm^2
V_e = 334 mm^3

Approx. weight 1.8 g/set

Ungapped

Material	A_L value nH	μ_e	Ordering code
N49	1100 +30/–20%	800	B65513J0000R049
N92	1100 +30/–20%	970	B65513J0000R092
N87	1500 +30/–20%	1250	B65513J0000R087
N97	1500 +30/–20%	1290	B65513J0000R097
T38	6600 +40/–30%	5670	B65513J0000Y038

Gapped (A_L values/air gaps examples)

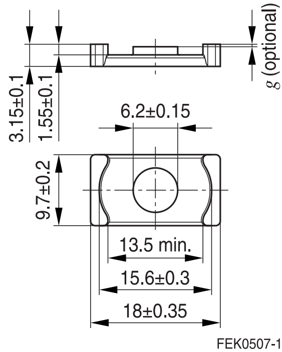
Material	A_L value nH	s approx. mm	μ_e	Ordering code
N87	100 ±30%	0.21	86	B65513J0100A087

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

ER 18/3/10

Planar core B66480

- To IEC 62317-9
- Optimized winding area
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.732 mm^{-1}
l_e = 22.1 mm
A_e = 30.2 mm^2
A_{min} = 30.1 mm^2
V_e = 667 mm^3

Approx. weight 3.5 g/set

Ungapped

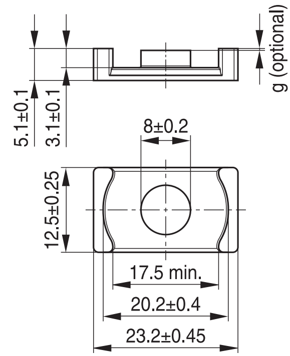
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	1800 ±25%	1050	< 0.10 (50 mT, 500 kHz, 100 °C)	B66480G0000X149
N92	1800 ±25%	1050	< 0.39 (200 mT, 100 kHz, 100 °C)	B66480G0000X192
N87	2300 ±25%	1340	< 0.35 (200 mT, 100 kHz, 100 °C)	B66480G0000X187
N97	2300 ±25%	1340	< 0.30 (200 mT, 100 kHz, 100 °C)	B66480G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EER 23
Combination: ER 23/5/13 with ER 23/5/13

- To IEC 62317-9
- Optimized winding area
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

ER 23/5/13



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.648 mm^{-1}
l_e = 32.6 mm
A_e = 50.3 mm^2
A_{min} = 50.0 mm^2
V_e = 1640 mm^3

Approx. weight 7.8 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N49	2200 ±25%	1140	250	< 0.25 (50 mT, 500 kHz, 100 °C)	B66482G0000X149
N92	2200 ±25%	1140	350	< 0.95 (200 mT, 100 kHz, 100 °C)	B66482G0000X192
N87	3000 ±25%	1550	300	< 0.86 (200 mT, 100 kHz, 100 °C)	B66482G0000X187
N97	3000 ±25%	1550	310	< 0.69 (200 mT, 100 kHz, 100 °C)	B66482G0000X197
N95	3700 ±25%	1835	310	< 1.05 (200 mT, 100 kHz, 25 °C) < 0.86 (200 mT, 100 kHz, 100 °C)	B66482G0000X195

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

ER 23/5/13 with I 23/2/13

Planar core **B66482**

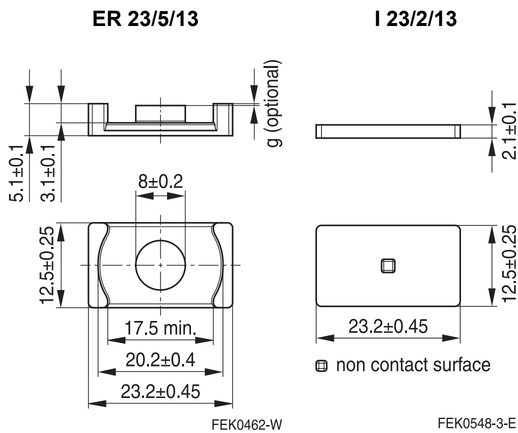
Core set EIR 23
Combination:
ER 23/5/13 with I 23/2/13

- To IEC 62317-9
- Optimized winding area
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.53 mm^{-1}
l_e = 26.6 mm
A_e = 50.3 mm^2
A_{min} = 50.0 mm^2
V_e = 1335 mm^3

Approx. weight 6.4 g/set



Ungapped

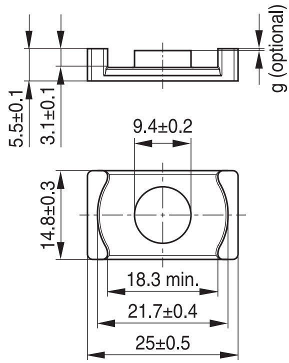
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	2600 ±25%	1100	< 0.21 (50 mT, 500 kHz, 100 °C)	B66482G0000X149 (ER core) B66482K0000X149 (I core)
N92	2600 ±25%	1100	< 0.77 (200 mT, 100 kHz, 100 °C)	B66482G0000X192 (ER core) B66482K0000X192 (I core)
N87	3400 ±25%	1430	< 0.70 (200 mT, 100 kHz, 100 °C)	B66482G0000X187 (ER core) B66482K0000X187 (I core)
N97	3400 ±25%	1430	< 0.56 (200 mT, 100 kHz, 100 °C)	B66482G0000X197 (ER core) B66482K0000X197 (I core)

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Core set EER 25
Combination: ER 25/6/15 with ER 25/6/15

- To IEC 62317-9
- Optimized winding area
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

ER 25/6/15



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.482 mm^{-1}
l_e = 34.1 mm
A_e = 70.8 mm^2
A_{min} = 69.4 mm^2
V_e = 2414 mm^3

Approx. weight 14.2 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3000 ±25%	1150	< 0.34 (50 mT, 500 kHz, 100 °C)	B66484G0000X149
N92	3000 ±25%	1150	< 1.40 (200 mT, 100 kHz, 100 °C)	B66484G0000X192
N87	4100 ±25%	1570	< 1.27 (200 mT, 100 kHz, 100 °C)	B66484G0000X187
N97	4100 ±25%	1570	< 1.01 (200 mT, 100 kHz, 100 °C)	B66484G0000X197

Gapped (A_L values/air gaps examples)

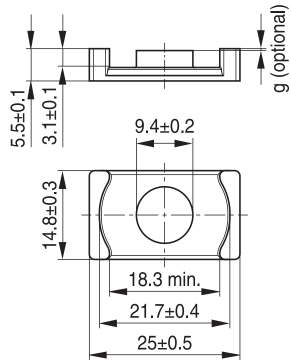
Material	A_L value nH	s approx. mm	μ_e	Ordering code
N97	400 ±12%	0.2	153	B66484U0400H197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

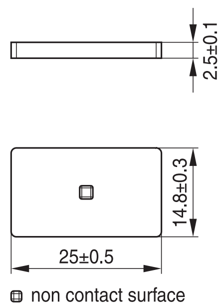
Core set EIR 25
Combination:
ER 25/6/15 with I 25/3/15

- To IEC 62317-9
- Optimized winding area
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units

ER 25/6/15



I 25/3/15



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.399 mm^{-1}
l_e = 28.1 mm
A_e = 70.4 mm^2
A_{min} = 69.4 mm^2
V_e = 1978 mm^3

Approx. weight 11.5 g/set

Ungapped

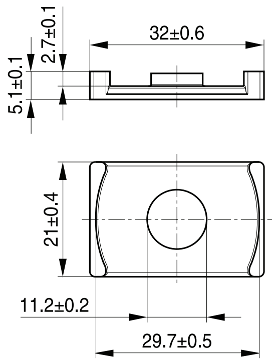
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	3400 ±25%	1080	< 0.30 (50 mT, 500 kHz, 100 °C)	B66484G0000X149 (ER core) B66484K0000X149 (I core)
N92	3400 ±25%	1080	< 1.14 (200 mT, 100 kHz, 100 °C)	B66484G0000X192 (ER core) B66484K0000X192 (I core)
N87	4600 ±25%	1460	< 1.04 (200 mT, 100 kHz, 100 °C)	B66484G0000X187 (ER core) B66484K0000X187 (I core)
N97	4600 ±25%	1460	< 0.83 (200 mT, 100 kHz, 100 °C)	B66484G0000X197 (ER core) B66484K0000X197 (I core)

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Planar core

B66501

- To IEC 62317-9
- Optimized winding area
- Small overall footprint (core and winding)
- Less EMI
- Minimized winding length
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.381 mm^{-1}
l_e = 38.3 mm
A_e = 100.5 mm^2
A_{min} = 98.5 mm^2
V_e = 3847 mm^3

Approx. weight 23.3 g/set

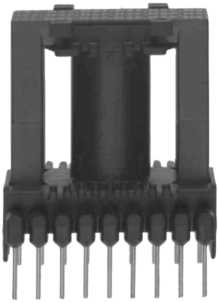
Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N49	3800 ±25%	1050	250	< 0.59 (50 mT, 500 kHz, 100 °C)	B66501G0000X149
N92	3800 ±25%	1050	350	< 2.40 (200 mT, 100 kHz, 100 °C)	B66501G0000X192
N87	4900 ±25%	1350	300	< 2.40 (200 mT, 100 kHz, 100 °C)	B66501G0000X187
N97	5000 ±25%	1380	320	< 2.20 (200 mT, 100 kHz, 100 °C)	B66501G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Example of an assembly set ER 42



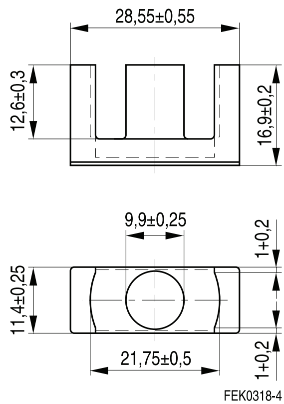
ER cores are the ideal answer when compact winding structures with low leakage inductance are needed. The round center leg is an advantage together with thick wires or bands.

Because of their good thermal response, ER cores are especially suitable for applications with high power density. E.g. they are used in flyback converters for TVs and monitors.

ER 28/17/11

Core **B66433**

- To IEC 62317-7
- Round center leg particularly suitable for use of thick winding wires or tapes
- For compact winding design with low leakage inductance
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.88 mm^{-1}
l_e = 75.0 mm
A_e = 85.4 mm^2
A_{min} = 77.0 mm^2
V_e = 6400 mm^3

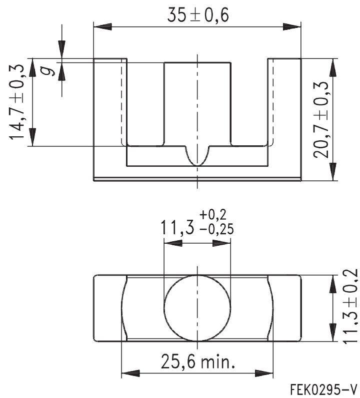
Approx. weight 32 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N72	2700 +30/–20%	1890	< 0.80 (200 mT, 25 kHz, 100 °C)	B66433G0000X172

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

- To IEC 62317-7
- Round center leg particularly suitable for use of thick winding wires or tapes
- For compact winding design with low leakage inductance
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.81 mm^{-1}
l_e = 89.6 mm
A_e = 111 mm^2
A_{min} = 101 mm^2
V_e = 9950 mm^3

Approx. weight 52 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	2500 +30/–20%	1610	< 1.95 (200 mT, 25 kHz, 100 °C)	B66350G0000X127
N87	2700 +30/–20%	1735	< 5.20 (200 mT, 100 kHz, 100 °C)	B66350G0000X187

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	0.50 ±0.05	275	177	B66350G0500X127
	1.00 ±0.05	170	109	B66350G1000X127
	1.50 ±0.05	125	80	B66350G1500X127

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

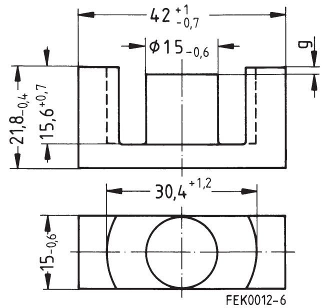
Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	169	–0.706	275	–0.847	256	–0.865

Validity range: K1, K2: 0.10 mm < s < 2.50 mm
K3, K4: 90 nH < A_L < 600 nH

ER 42/22/15

Core **B66347**



- Round center leg particularly suitable for use of thick winding wires or tapes
- For compact winding design with low leakage inductance
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.58 mm^{-1}
l_e = 99 mm
A_e = 170 mm^2
A_{min} = 170 mm^2
V_e = 16800 mm^3

Approx. weight 84 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	3200 +30/–20%	1480	320	< 3.1 (200 mT, 25 kHz, 100 °C)	B66347G0000X127
N87	3700 +30/–20%	1710	320	< 9.0 (200 mT, 100 kHz, 100 °C)	B66347G0000X187

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	1.00 ±0.05	257	119	B66347G1000X127

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

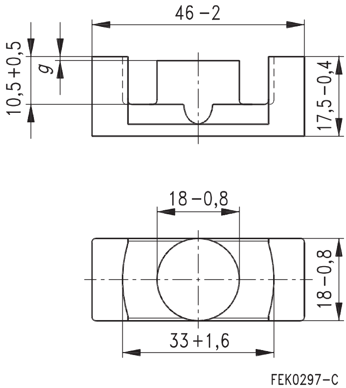
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	257	–0.741	415	–0.847	387	–0.865
N87	257	–0.741	401	–0.796	377	–0.873

Validity range: K1, K2: 0.10 mm < s < 3.00 mm
K3, K4: 110 nH < A_L < 1100 nH

- Round center leg particularly suitable for use of thick winding wires or tapes
- For compact winding design with low leakage inductance
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.34 mm^{-1}
l_e = 79 mm
A_e = 233 mm^2
A_{min} = 226 mm^2
V_e = 18400 mm^3

Approx. weight 98 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	5700 +30/–20%	1550	< 3.62 (200 mT, 25 kHz, 100 °C)	B66377G0000X127

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	1.00 ±0.05	343	93	B66377G1000X127

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

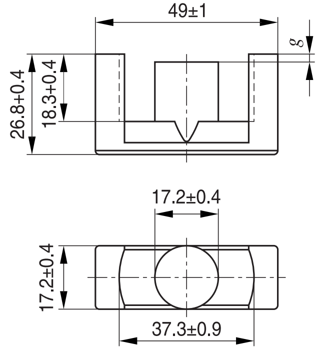
Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	343	–0.826	589	–0.847	546	–0.865

Validity range: K1, K2: 0.10 mm < s < 1.00 mm
K3, K4: 190 nH < A_L < 1850 nH

ER 49/27/17

Core **B66391**

- To IEC 62317-7
- Round center leg particularly suitable for use of thick winding wires or tapes
- For compact winding design with low leakage inductance
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.49 mm^{-1}
l_e = 118 mm
A_e = 243 mm^2
A_{min} = 225 mm^2
V_e = 28700 mm^3

Approx. weight 146 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	3500 +30/–20%	1350	< 5.38 (200 mT, 25 kHz, 100 °C)	B66391G0000X127

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

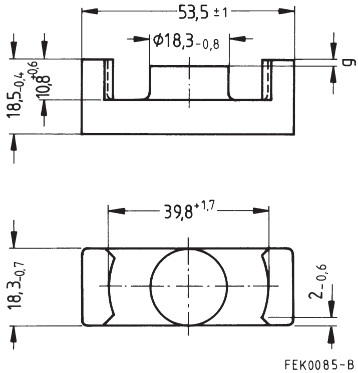
Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	342	–0.750	578	–0.847	540	–0.865

Validity range: K1, K2: 0.10 mm < s < 3.50 mm
K3, K4: 130 nH < A_L < 1300 nH

ER 54/18/18

Core B66357



- Round center leg particularly suitable for use of thick winding wires or tapes
- For compact winding design with low leakage inductance
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.35 mm^{-1}
l_e = 90 mm
A_e = 256 mm^2
A_{min} = 252 mm^2
V_e = 23000 mm^3

Approx. weight 119 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	5600 +30/–20%	1560	320	< 4.4 (200 mT, 25 kHz, 100 °C)	B66357G0000X127
N87	5800 +30/–20%	1620	320	< 12.5 (200 mT, 100 kHz, 100 °C)	B66357G0000X187

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code
N27	0.50 ±0.05	620	173	B66357G0500X127

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

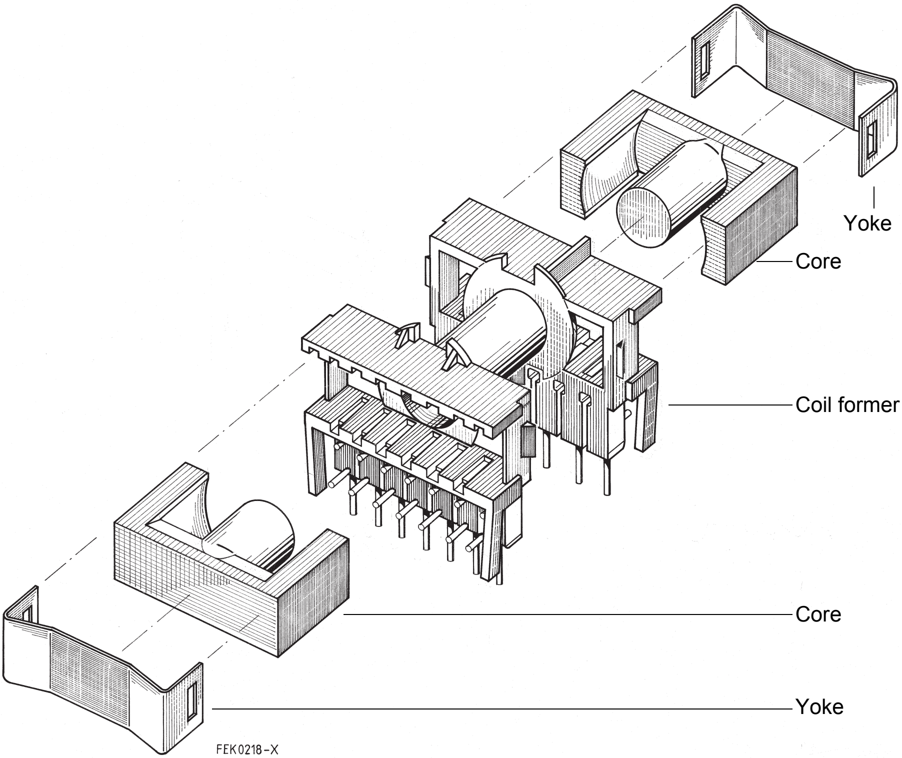
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	360	–0.786	635	–0.847	590	–0.865
N87	360	–0.786	616	–0.796	574	–0.873

Validity range: K1, K2: 0.15 mm < s < 3.50 mm
K3, K4: 180 nH < A_L < 1800 nH

Example of an assembly set ETD 34

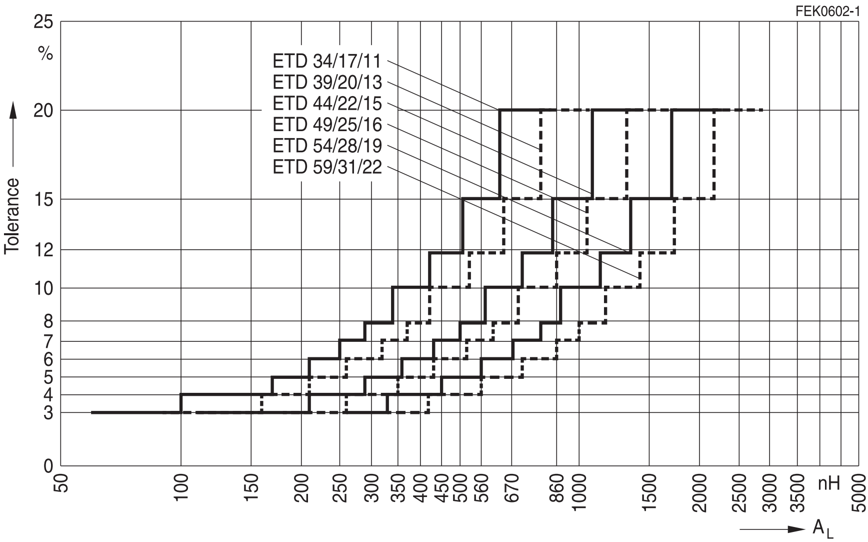


Tolerances for ETD cores

The A_L value tolerances for ETD cores have consequently been defined with consideration of optimized process parameters for all materials with an initial permeability μ_i in the region of 2200 to 10000 as a step function (see figure below).

The "quantized" A_L step values should preferably be used. They are still available in their respective lower tolerance ranges. Thus a tolerance of ±10% can be determined for a ETD 54/28/19 made of N87 material for an A_L value of 1000 nH.

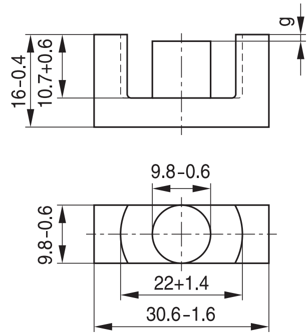
With this type of tolerance definition, EPCOS has defined standard A_L values and the associated tolerances for the first time. Based on initial permeability tolerance can be slightly lower or higher.



ETD 29/16/10

Core **B66358**

- To 62317-6
- For SMPS transformers with optimum weight/performance ratio at small volume
- Delivery mode: single units



FEK0044-8

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.93 mm^{-1}
l_e = 70.4 mm
A_e = 76.0 mm^2
A_{min} = 71.0 mm^2
V_e = 5350 mm^3

Approx. weight 28 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	2000 +30/–20%	1470	< 1.04 (200 mT, 25 kHz, 100 °C)	B66358G0000X127
N87	2200 +30/–20%	1610	< 2.80 (200 mT, 100 kHz, 100 °C)	B66358G0000X187
N97	2250 +30/–20%	1670	< 2.40 (200 mT, 100 kHz, 100 °C)	B66358G0000X197

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.10 ±0.02	621	457	B66358G0100X1**
	0.20 ±0.02	383	281	B66358G0200X1**
	0.50 ±0.05	201	148	B66358G0500X1**
	1.00 ±0.05	124	91	B66358G1000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	124	–0.7	195	–0.847	181	–0.865
N87	124	–0.7	192	–0.796	176	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 70 nH < A_L < 680 nH

Coil former (magnetic axis horizontal)

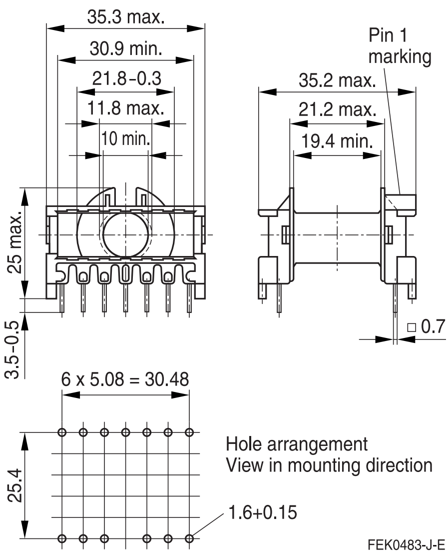
Material: GFR polyterephthalate, UL 94 V-0, insulation class to IEC 60085:
B66359B: F ≙ max. operating temperature 155 °C, color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
B66359W: H ≙ max. operating temperature 180 °C, color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

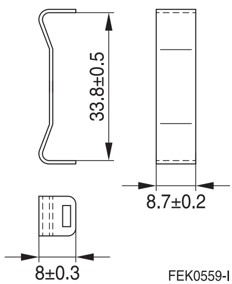
Material: Stainless spring steel (0.3 mm)

Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value $\mu\Omega$	Pins	
1	97	52.8	18.7	13	B66359B1013T001 B66359W1013T001
Yoke (ordering code per piece, 2 are required)					B66359S2000X000

Coil former



Yoke



Coil former (magnetic axis vertical)

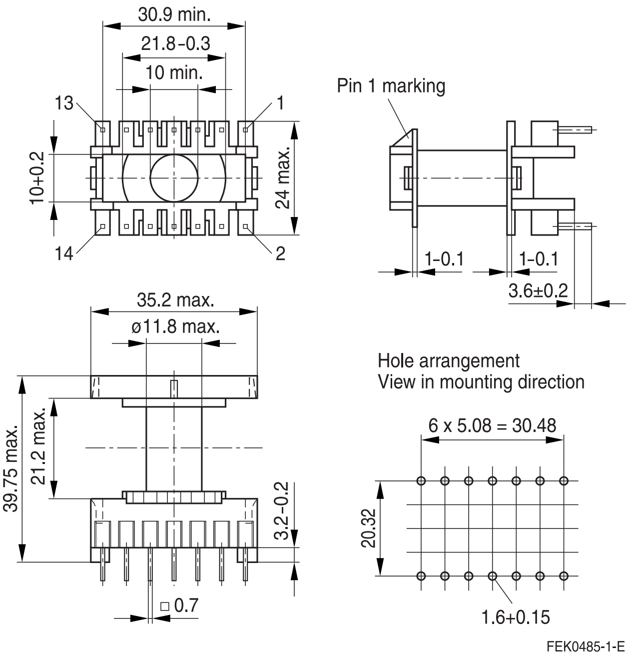
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
H ≙ max. operating temperature 180 °C), color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

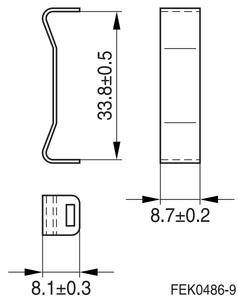
Material: Stainless spring steel (0.3 mm)

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
1	97	52.8	18.7	14	B66359X1014T001
Yoke (ordering code per piece, 2 are required)					B66359S2000X000

Coil former



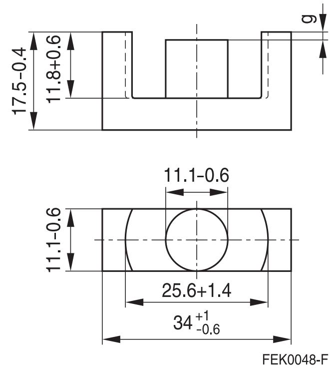
Yoke



ETD 34/17/11

Core **B66361**

- To IEC 62317-6
- For SMPS transformers with optimum weight/performance ratio at small volume
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.81 mm^{-1}
l_e = 78.6 mm
A_e = 97.1 mm^2
A_{min} = 91.6 mm^2
V_e = 7630 mm^3

Approx. weight 40 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	2400 +30/–20%	1540	< 1.48 (200 mT, 25 kHz, 100 °C)	B66361G0000X127
N87	2600 +30/–20%	1670	< 4.00 (200 mT, 100 kHz, 100 °C)	B66361G0000X187
N97	2650 +30/–20%	1710	< 3.40 (200 mT, 100 kHz, 100 °C)	B66361G0000X197
N95	3300 +30/-20%	2170	< 4.00 (200 mT, 100 kHz, 25 °C) < 3.70 (200 mT, 100 kHz, 100 °C)	B66361G0000X195

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.10 ±0.02	790	508	B66361G0100X1**
	0.20 ±0.02	482	310	B66361G0200X1**
	0.50 ±0.05	251	161	B66361G0500X1**
	1.00 ±0.05	153	98	B66361G1000X1**
	2.50 ±0.05	80	50	B66361G2500X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	153	–0.713	245	–0.847	227	–0.865
N87	153	–0.713	240	–0.796	222	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.50 mm
K3, K4: 80 nH < A_L < 780 nH

Coil former (magnetic axis horizontal)

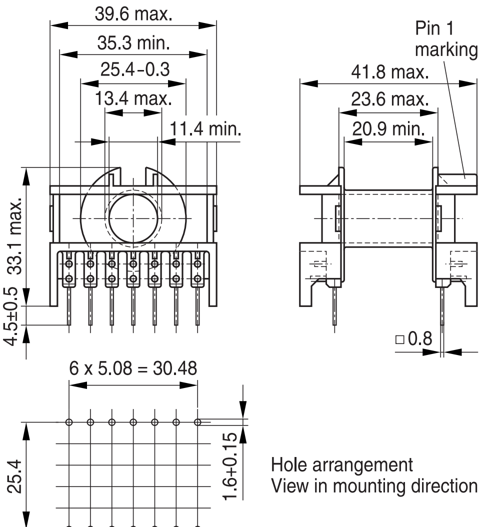
Material: GFR polyterephthalate, UL 94 V-0, insulation class to IEC 60085:
B66362B: F ≙ max. operating temperature 155 °C, color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
B66362W: H ≙ max. operating temperature 180 °C, color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Yoke

Material: Stainless spring steel (0.4 mm)

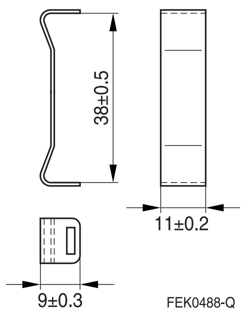
Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value μΩ	Pins	
1	122	60.5	17	14	B66362B1014T001 B66362W1014T001
Yoke (ordering code per piece, 2 are required)					B66362A2000X000

Coil former



FEK0487-H-E

Yoke



FEK0488-Q

Coil former (magnetic axis vertical)

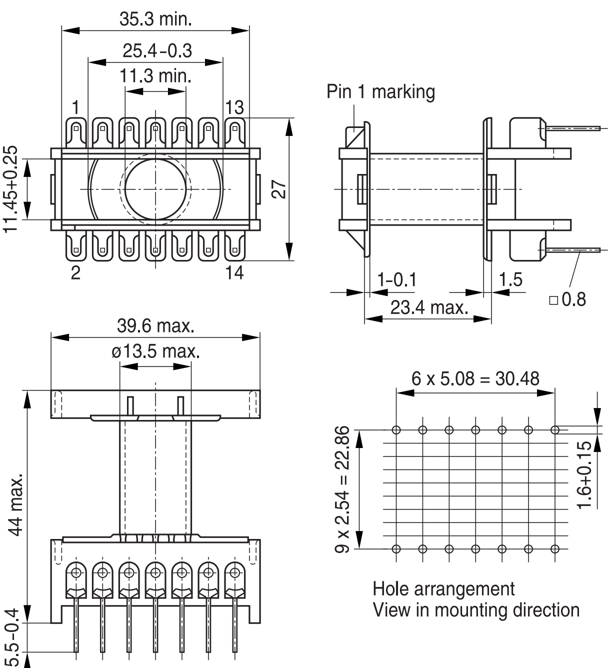
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
H ≙ max. operating temperature 180 °C), color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Yoke

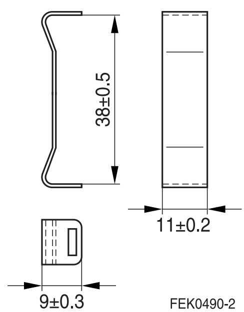
Material: Stainless spring steel (0.4 mm)

Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value µΩ	Pins	
1	122	60.5	17	14	B66362X1014T001
Yoke (ordering code per piece, 2 are required)					B66362A2000X000

Coil former **Yoke**



FEK0510-K-E

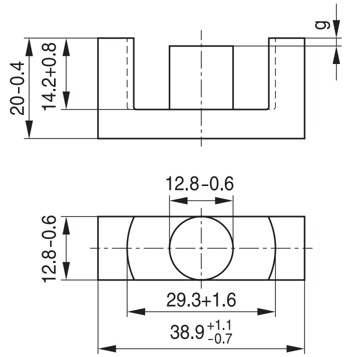


FEK0490-2

ETD 39/20/13

Core **B66363**

- To IEC 62317-6
- For SMPS transformers with optimum weight/performance ratio at small volume
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.74 mm^{-1}
l_e = 92.2 mm
A_e = 125 mm^2
A_{min} = 123 mm^2
V_e = 11500 mm^3

Approx. weight 60 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	2550 +30/–20%	1500	320	< 2.22 (200 mT, 25 kHz, 100 °C)	B66363G0000X127
N87	2700 +30/–20%	1600	320	< 6.00 (200 mT, 100 kHz, 100 °C)	B66363G0000X187
N97	2800 +30/–20%	1650	320	< 5.10 (200 mT, 100 kHz, 100 °C)	B66363G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.10 ±0.02	1062	622	B66363G0100X1**
	0.20 ±0.02	639	374	B66363G0200X1**
	0.50 ±0.05	326	191	B66363G0500X1**
	1.00 ±0.05	196	115	B66363G1000X1**
	2.00 ±0.05	115	65	B66363G2000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	196	–0.734	308	–0.847	287	–0.865
N87	196	–0.734	300	–0.796	280	–0.873

Validity range: K1, K2: 0.10 mm < s < 3.00 mm
K3, K4: 90 nH < A_L < 850 nH

Coil former

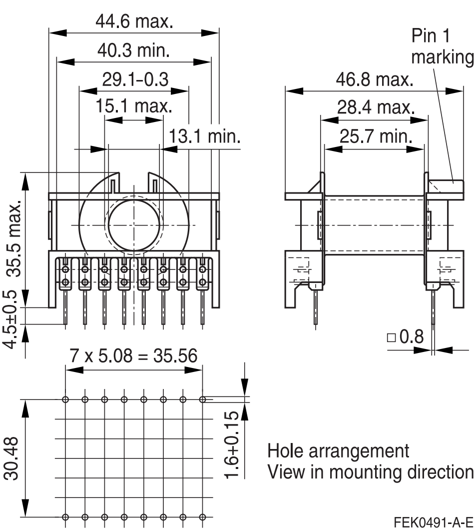
Material: GFR polyterephthalate, UL 94 V-0, insulation class to IEC 60085:
B66364B: F ≙ max. operating temperature 155 °C, color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
B66364W: H ≙ max. operating temperature 180 °C, color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Yoke

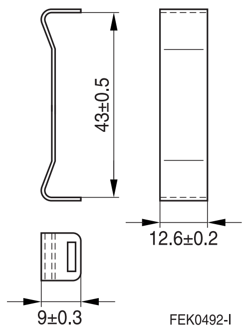
Material: Stainless spring steel (0.4 mm)

Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value µΩ	Pins	
1	178	69	13.3	16	B66364B1016T001 B66364W1016T001
Yoke (ordering code per piece, 2 are required)					B66364A2000X000

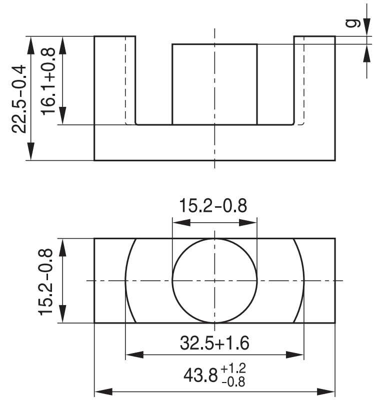
Coil former



Yoke



- To IEC 62317-6
- For SMPS transformers with optimum weight/performance ratio at small volume
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.6 mm^{-1}
l_e = 103 mm
A_e = 173 mm^2
A_{min} = 172 mm^2
V_e = 17800 mm^3

Approx. weight 94 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	3300 +30/–20%	1560	320	< 3.48 (200 mT, 25 kHz, 100 °C)	B66365G0000X127
N87	3500 +30/–20%	1650	320	< 9.40 (200 mT, 100 kHz, 100 °C)	B66365G0000X187
N97	3600 +30/–20%	1720	320	< 8.00 (200 mT, 100 kHz, 100 °C)	B66365G0000X197
N95	4400 +30/–20%	2085	330	< 8.85 (200 mT, 100 kHz, 100 °C)	B66365G0000X195

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.20 ±0.02	862	407	B66365G0200X1**
	0.50 ±0.05	438	207	B66365G0500X1**
	1.00 ±0.05	262	124	B66365G1000X1**
	1.50 ±0.05	194	92	B66365G1500X1**
	2.00 ±0.05	150	70	B66365G2000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Calculation factors (for formulas, see *“E cores: general information”*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	262	–0.74	420	–0.847	391	–0.865
N87	262	–0.74	420	–0.796	382	–0.873

Validity range: K1, K2: 0.10 mm < s < 3.50 mm
K3, K4: 110 nH < A_L < 1060 nH

Coil former

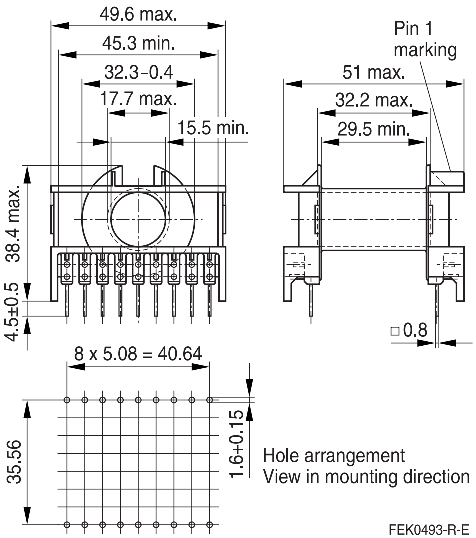
Material: GFR polyterephthalate, UL 94 V-0, insulation class to IEC 60085:
B66366B: F ≙ max. operating temperature 155 °C, color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
B66366W: H ≙ max. operating temperature 180 °C, color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Yoke

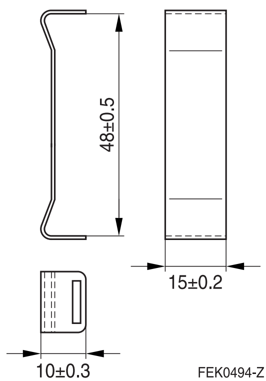
Material: Stainless spring steel (0.4 mm)

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
1	210	77.7	12.7	18	B66366B1018T001 B66366W1018T001
Yoke (ordering code per piece, 2 are required)					B66366A2000X000

Coil former



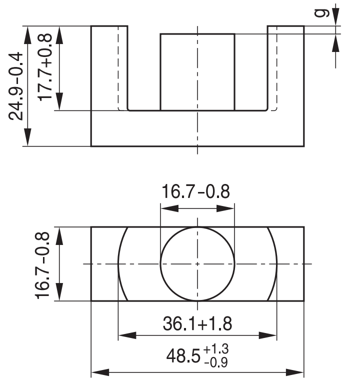
Yoke



ETD 49/25/16

Core **B66367**

- To IEC 62317-6
- For SMPS transformers with optimum weight/performance ratio at small volume
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.54 mm^{-1}
l_e = 114 mm
A_e = 211 mm^2
A_{min} = 209 mm^2
V_e = 24100 mm^3

Approx. weight 124 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	3700 +30/–20%	1590	320	< 4.59 (200 mT, 25 kHz, 100 °C)	B66367G0000X127
N87	3800 +30/–20%	1630	320	< 12.40 (200 mT, 100 kHz, 100 °C)	B66367G0000X187
N97	3900 +30/–20%	1680	320	< 10.60 (200 mT, 100 kHz, 100 °C)	B66367G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.20 ±0.02	1035	444	B66367G0200X1**
	0.50 ±0.05	525	225	B66367G0500X1**
	1.00 ±0.05	314	135	B66367G1000X1**
	1.50 ±0.05	230	100	B66367G1500X1**
	2.00 ±0.05	188	81	B66367G2000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	314	–0.741	504	–0.847	470	–0.865
N87	314	–0.741	485	–0.796	460	–0.873

Validity range: K1, K2: 0.10 mm < s < 3.50 mm
K3, K4: 120 nH < A_L < 1160 nH

Coil former

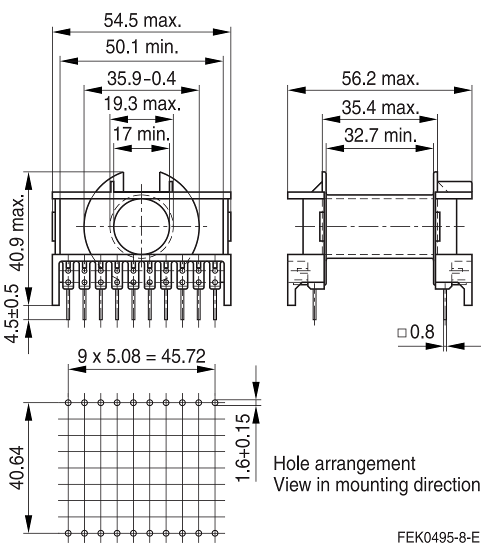
Material: GFR polyterephthalate, UL 94 V-0, insulation class to IEC 60085:
B66368B: F ≙ max. operating temperature 155 °C, color code black
Valox 420-SE0 [E207780 (M)] SABIC JAPAN L L C
B66368W: H ≙ max. operating temperature 180 °C, color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Yoke

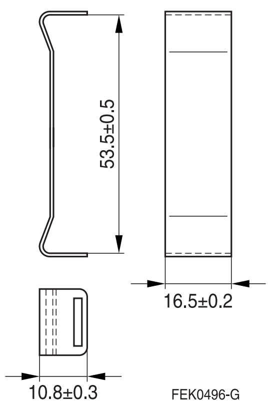
Material: Stainless spring steel (0.4 mm)

Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value µΩ	Pins	
1	269.4	86	11	20	B66368B1020T001 B66368W1020T001
Yoke (ordering code per piece, 2 are required)					B66368A2000X000

Coil former



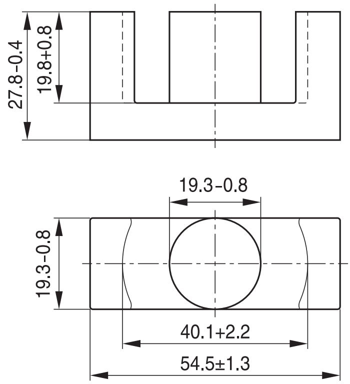
Yoke



ETD 54/28/19

Core **B66395**

- To IEC 62317-6
- For SMPS transformers with optimum weight/performance ratio at small volume
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.45 mm^{-1}
l_e = 127 mm
A_e = 280 mm^2
A_{min} = 280 mm^2
V_e = 35600 mm^3

Approx. weight 180 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	4200 +30/–20%	1510	320	< 6.66 (200 mT, 25 kHz, 100 °C)	B66395G0000X127
N87	4450 +30/–20%	1600	320	< 3.20 (100 mT, 100 kHz, 100 °C)	B66395G0000X187
N97	4600 +30/–20%	1650	320	< 2.60 (100 mT, 100 kHz, 100 °C)	B66395G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.20 ±0.02	1377	496	B66395G0200X1**
	0.50 ±0.05	670	240	B66395G0500X1**
	1.00 ±0.05	393	141	B66395G1000X1**
	1.50 ±0.05	287	103	B66395G1500X1**
	2.00 ±0.05	229	82	B66395G2000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	393	–0.779	658	–0.847	615	–0.865
N87	393	–0.779	630	–0.796	603	–0.873

Validity range: K1, K2: 0.10 mm < s < 3.50 mm
K3, K4: 140 nH < A_L < 1390 nH

Coil former

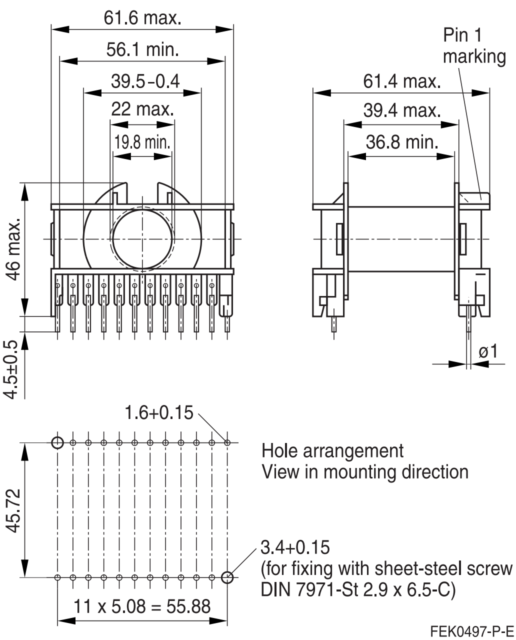
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
H ≙ max. operating temperature 180 °C), color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

Yoke

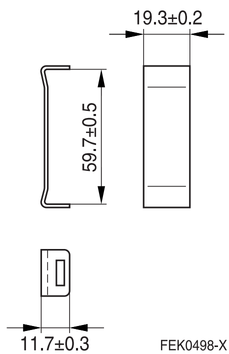
Material: Stainless spring steel (0.4 mm)

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
1	315.6	96	10.5	22	B66396W1022T001
Yoke (ordering code per piece, 2 are required)					B66396A2000X000

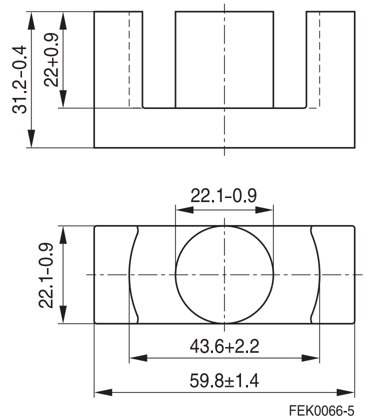
Coil former



Yoke



- To IEC 62317-6
- For SMPS transformers with optimum weight/performance ratio at small volume
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.38 mm^{-1}
l_e = 139 mm
A_e = 368 mm^2
A_{min} = 368 mm^2
V_e = 51200 mm^3

Approx. weight 260 g/set

Ungapped

Material	A_L value nH	μ_e	B_S* mT	P_V W/set	Ordering code
N27	5000 +30/–20%	1500	320	< 9.62 (200 mT, 25 kHz, 100 °C)	B66397G0000X127
N87	5300 +30/–20%	1590	320	< 5.20 (100 mT, 100 kHz, 100 °C)	B66397G0000X187
N97	5500 +30/–20%	1660	320	< 4.50 (100 mT, 100 kHz, 100 °C)	B66397G0000X197

* H = 250 A/m; f = 10 kHz; T = 100 °C

Gapped (A_L values/air gaps examples)

Material	g mm	A_L value approx. nH	μ_e	Ordering code ** = 27 (N27) = 87 (N87)
N27, N87	0.20 ±0.02	1588	476	B66397G0200X1**
	1.00 ±0.05	508	152	B66397G1000X1**
	1.50 ±0.05	381	114	B66397G1500X1**
	2.00 ±0.05	311	93	B66397G2000X1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Other A_L values/air gaps and materials available on request — see Processing notes on page 173.

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N27	508	–0.708	853	–0.847	799	–0.865
N87	508	–0.708	812	–0.796	783	–0.873

Validity range: K1, K2: 0.10 mm < s < 3.50 mm
K3, K4: 170 nH < A_L < 1660 nH

Coil former

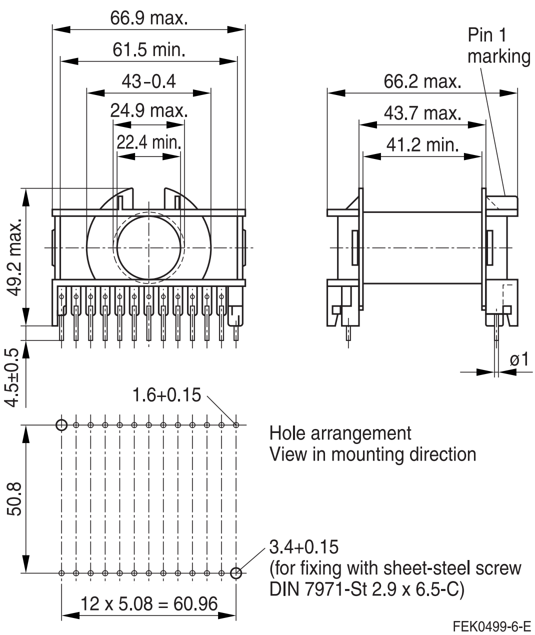
Material: GFR polyterephthalate (UL 94 V-0, insulation class to IEC 60085:
H ≙ max. operating temperature 180 °C), color code black
Rynite FR 530® [E41938 (M)], E I DUPONT DE NEMOURS & CO INC
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1

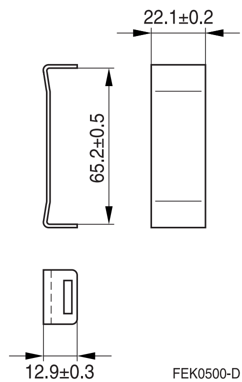
Yoke

Material: Stainless spring steel (0.4 mm)

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value μΩ	Pins	
1	365.6	106.1	10.0	24	B66398W1024T001
Yoke (ordering code per piece, 2 are required)					B66398A2000X000

Coil former **Yoke**

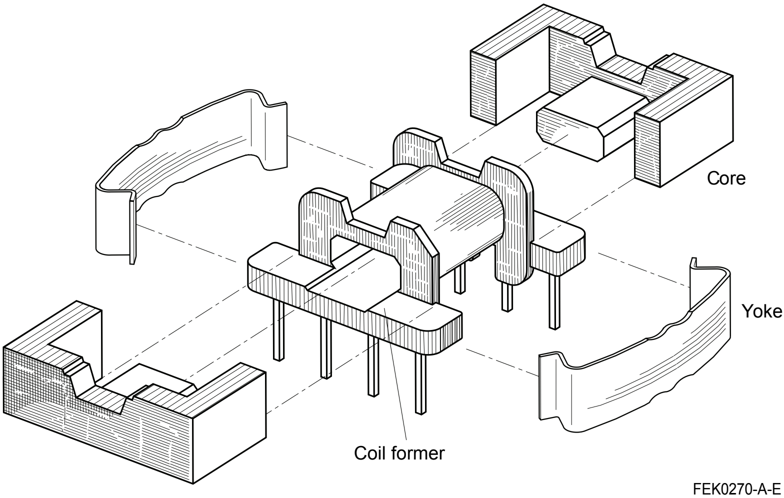




EFD cores

General information

Example of an assembly set EFD 30/15/9



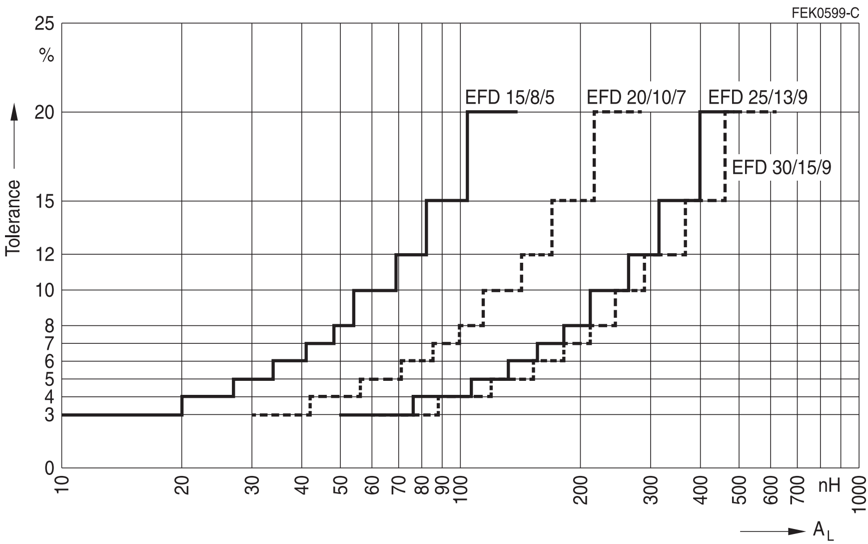
FEK0270-A-E

Tolerances for EFD cores

The A_L value tolerances for EFD cores have consequently been defined with consideration of optimized process parameters for all materials with an initial permeability μ_i in the region of 2200 to 10000 as a step function (see figure below).

The "quantized" A_L step values should preferably be used. They are still available in their respective lower tolerance ranges. Thus a tolerance of ±10 can be determined for a EFD 30/15/9 made of N87 material for an A_L value of 250 nH.

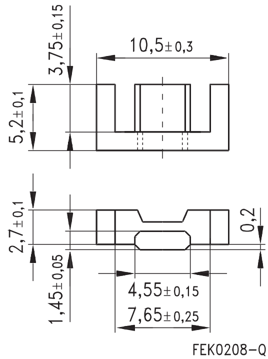
With this type of tolerance definition, EPCOS has defined standard A_L values and the associated tolerances for the first time. Based on initial permeability tolerance can be slightly lower or higher.



EFD 10/5/3

Core **B66411**

- E core with flattened, lower center leg for especially flat transformer design
- For DC/DC converters
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 3.21 mm^{-1}
l_e = 23.1 mm
A_e = 7.2 mm^2
A_{min} = 6.5 mm^2
V_e = 166 mm^3

Approx. weight 0.8 g/set

Ungapped

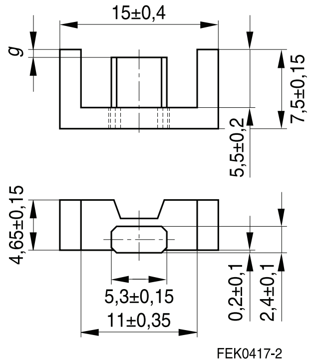
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	370 +30/–20%	940	< 0.032 (50 mT, 500 kHz, 100 °C)	B66411G0000X149
N87	450 +30/–20%	1150	< 0.090 (200 mT, 100 kHz, 100 °C)	B66411G0000X187
N97	470 +30/–20%	1200	< 0.080 (200 mT, 100 kHz, 100 °C)	B66411G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

EFD 15/8/5

Core B66413

- E core with flattened, lower center leg for especially flat transformer design
- For DC/DC converters
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 2.27 mm^{-1}
l_e = 34 mm
A_e = 15 mm^2
A_{min} = 12.2 mm^2
V_e = 510 mm^3

Approx. weight 2.8 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	600 +30/–20%	1080	< 0.11 (50 mT, 500 kHz, 100 °C)	B66413G0000X149
N87	780 +30/–20%	1400	< 0.28 (200 mT, 100 kHz, 100 °C)	B66413G0000X187
N97	820 +30/–20%	1480	< 0.23 (200 mT, 100 kHz, 100 °C)	B66413G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Gapped (A_L values/air gaps examples)

Material	A_L value nH	μ_e	g approx. mm	Ordering code ** = 87 (N87) = 97 (N97)
N87, N97	50 ±5%	90	0.46	B66413U0050J1**
	100 ±10%	180	0.17	B66413U0100K1**
	125 ±10%	225	0.12	B66413U0125K1**
	160 ±15%	288	0.08	B66413U0160L1**

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	29.7	–0.676	44.2	–0.796	33.2	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.00 mm
K3, K4: 30 nH < A_L < 280 nH

EFD 15/8/5

Accessories **B66414**

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max.operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Winding: see Processing notes, 2.1

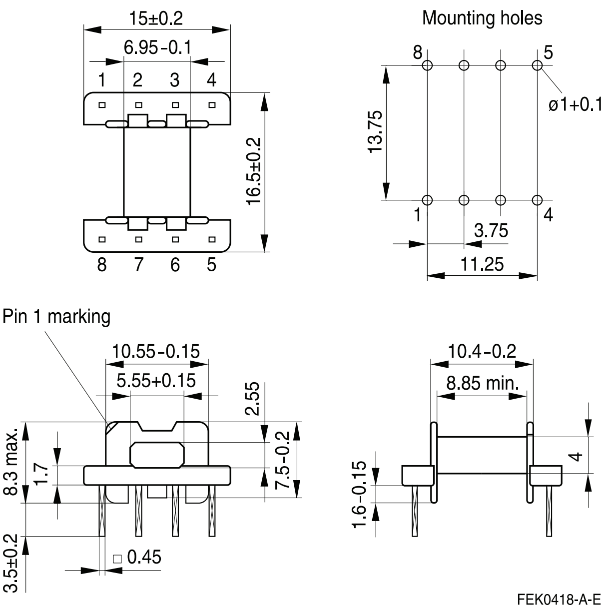
Pins: Squared pins

Yoke

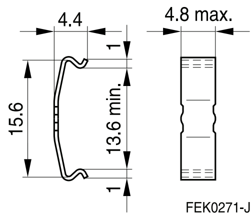
Material: Stainless spring steel (0.25 mm)

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
1	15.5	35.9	79.7	8	B66414W1008D001
Yoke (ordering code per piece, 2 are required)					B66414B2000X000

Coil former



Yoke



EFD 15/8/5

Accessories B66414

SMD coil former with J terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085: F ≙ max. operating temperature 155 °C), color code black
Vectra C 130 [E83005 (M)], CELANESE INTERNATIONAL CORP.
Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s
Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s
Winding: see Processing notes, 2.1

Yoke

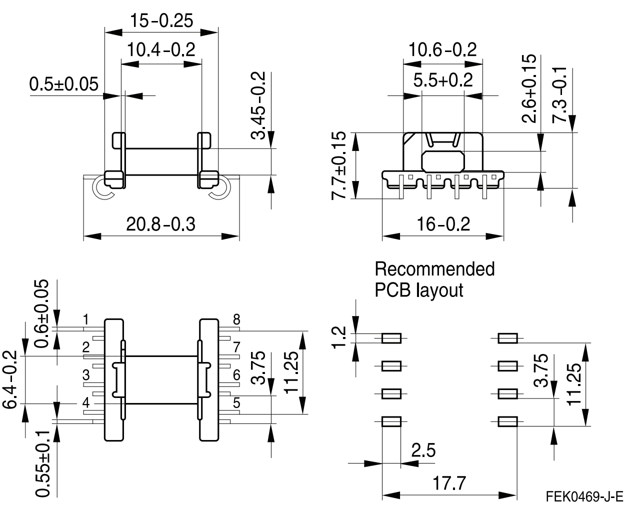
Material: Stainless spring steel (0.25 mm)
Mounting: Preferred assembly direction from the top

Cover plate

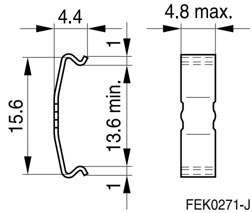
For marking and improved processing on assembly machines.
See under coil former for material and resistance to soldering heat.
Material: Sumika Super E4008® [E54705 (M)], SUMITOMO CHEMICAL CO LTD

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Terminals	
1	18.1	35.1	66.7	8	B66414B6008T001
Yoke (ordering code per piece, 2 are required)					B66414B2000X000
Cover plate					B66414A7000X000

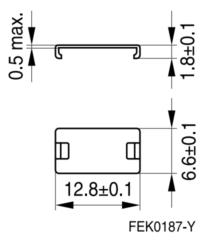
Coil former



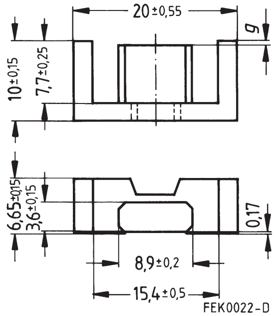
Yoke



Cover plate



- E core with flattened, lower center leg for especially flat transformer design
- For DC/DC converters
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 1.52 mm^{-1}
l_e = 47 mm
A_e = 31 mm^2
A_{min} = 31 mm^2
V_e = 1460 mm^3

Approx. weight 7.2 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	910 +30/–20%	1100	< 0.29 (50 mT, 500 kHz, 100 °C)	B66417G0000X149
N87	1200 +30/–20%	1440	< 1.05 (200 mT, 100 kHz, 100 °C)	B66417G0000X187
N97	1250 +30/–20%	1510	< 0.80 (200 mT, 100 kHz, 100 °C)	B66417G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Gapped (A_L values/air gaps examples)

Material	A_L value nH	μ_e	g approx. mm	Ordering code
N87	100 ±10%	120	0.49	B66417U0100K187
	160 ±10%	193	0.25	B66417U0160K187
	250 ±10%	300	0.13	B66417U0250K187
	330 ±10%	398	0.09	B66417U0330K187
	400 ±12%	483	0.07	B66417U0400H187
	450 ±15%	543	0.06	B66417U0450L187

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	61.1	–0.699	85.4	–0.796	75.7	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.40 mm
K3, K4: 50 nH < A_L < 410 nH

Coil former

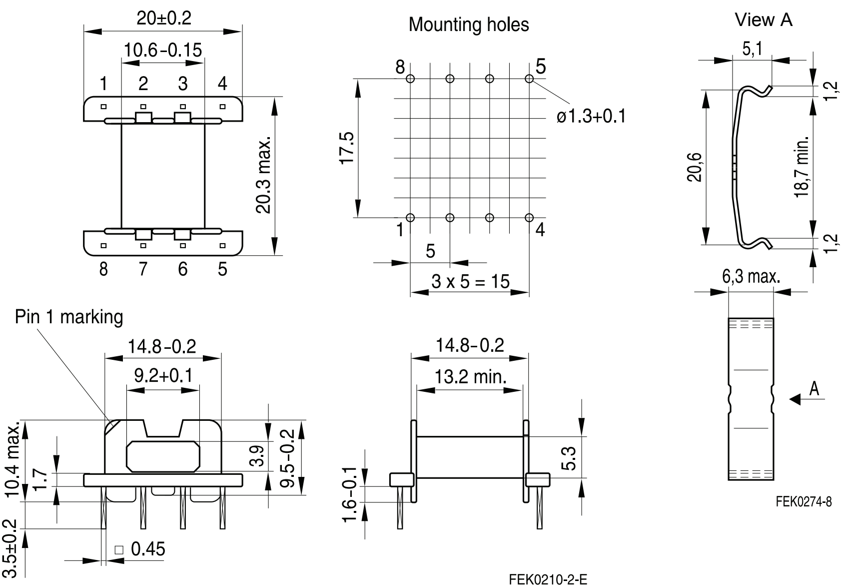
Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

Material: Stainless spring steel (0.3 mm)

Coil former					Ordering code
Sections	A_N mm^2	l_N mm	A_R value µΩ	Pins	
1	28.1	40.2	49.2	8	B66418W1008D001
Yoke (ordering code per piece, 2 are required)					B66418B2000X000

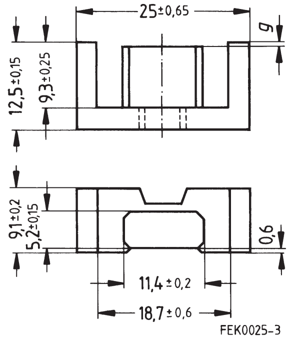
Coil former **Yoke**



EFD 25/13/9

Core **B66421**

- E core with flattened, lower center leg for especially flat transformer design
- For DC/DC converters
- Delivery mode: single units



Magnetic characteristics (per set)

$\Sigma l/A$ = 0.98 mm^{-1}
l_e = 57 mm
A_e = 58 mm^2
A_{min} = 57 mm^2
V_e = 3310 mm^3

Approx. weight 16.6 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N87	2000 +30/–20%	1560	< 1.8 (200 mT, 100 kHz, 100 °C)	B66421G0000X187
N97	2100 +30/–20%	1640	< 1.5 (200 mT, 100 kHz, 100 °C)	B66421G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Gapped (A_L values/air gaps examples)

Material	A_L value nH	μ_e	g approx. mm	Ordering code
N87	160 ±10% 250 ±10% 315 ±10%	125 195 246	0.55 0.30 0.22	B66421U0160K187 B66421U0250K187 B66421U0315K187
N97	160 ±10%	125	0.50	B66421U0160K197

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	103	–0.734	154	–0.796	138	–0.873

Validity range: K1, K2: 0.10 mm < s < 1.40 mm
K3, K4: 50 nH < A_L < 410 nH

Coil former

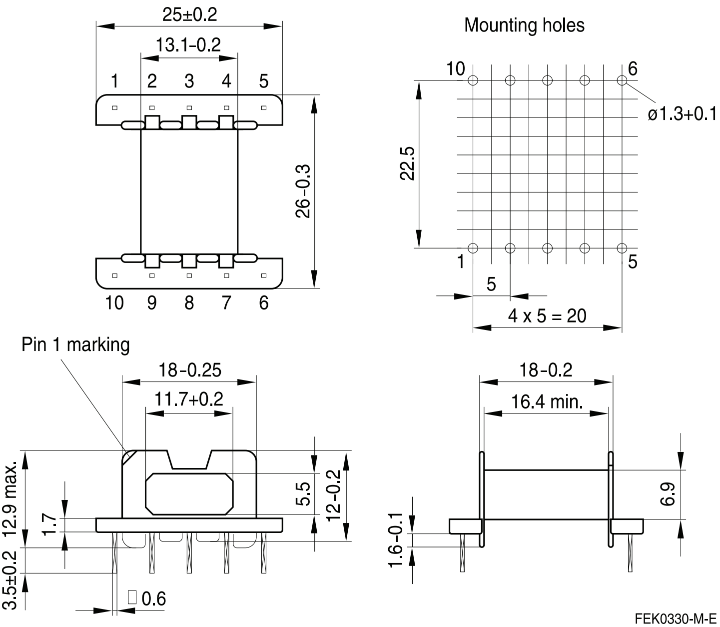
Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: F ≙ max.operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD
Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s
Winding: see Processing notes, 2.1
Pins: Squared pins

Yoke

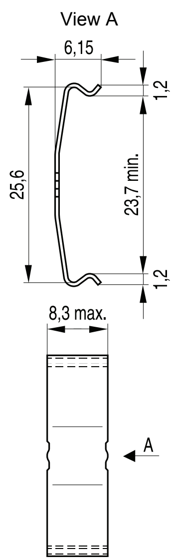
Material: Stainless spring steel (0.4 mm)

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
1	40.7	50	42.3	10	B66422W1010D001
Yoke (ordering code per piece, 2 are required)					B66422B2000X000

Coil former **Yoke**



FEK0330-M-E

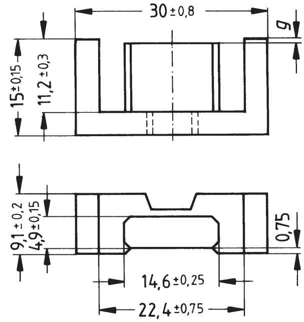


FEK0273-Z

EFD 30/15/9

Core **B66423**

- E core with flattened, lower center leg for especially flat transformer design
- For DC/DC converters
- Delivery mode: single units



FEK0028-S

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.99 mm^{-1}
l_e = 68 mm
A_e = 69 mm^2
A_{min} = 69 mm^2
V_e = 4690 mm^3

Approx. weight 24 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N87	2050 +30/–20%	1610	< 2.6 (200 mT, 100 kHz, 100 °C)	B66423G0000X187
N97	2150 +30/–20%	1690	< 2.2 (200 mT, 100 kHz, 100 °C)	B66423G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

Gapped (A_L values/air gaps examples)

Material	A_L value nH	μ_e	g approx. mm	Ordering code
N87	160 ±10% 250 ±10% 315 ±10%	125 196 246	0.71 0.38 0.27	B66423U0160K187 B66423U0250K187 B66423U0315K187

The A_L value in the table applies to a core set comprising one ungapped core (dimension g = 0 mm) and one gapped core (dimension g > 0 mm).

Calculation factors (for formulas, see *"E cores: general information"*)

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	125	–0.712	176	–0.796	161	–0.873

Validity range: K1, K2: 0.10 mm < s < 2.00 mm
K3, K4: 70 nH < A_L < 630 nH

EFD 30/15/9

Accessories **B66424**

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:
F ≙ max. operating temperature 155 °C), color code black
Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

Winding: see Processing notes, 2.1

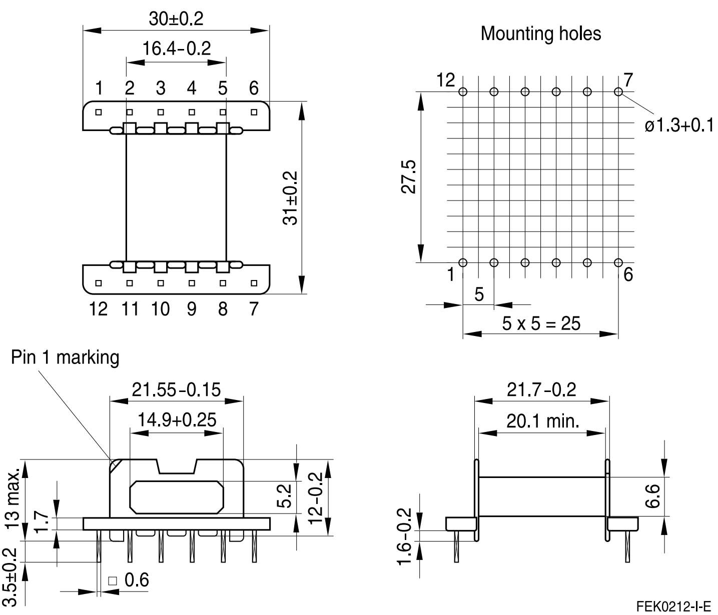
Pins: Squared pins

Yoke

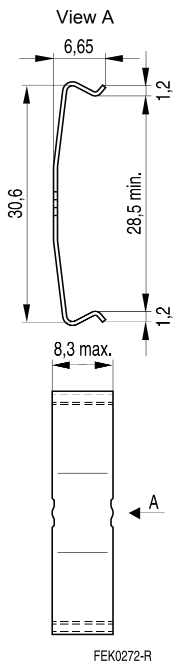
Material: Stainless spring steel (0.45 mm)

Coil former					Ordering code
Sections	A_N mm²	l_N mm	A_R value µΩ	Pins	
1	52.3	56.7	37.3	12	B66424W1012D001
Yoke (ordering code per piece, 2 are required)					B66424B2000X000

Coil former



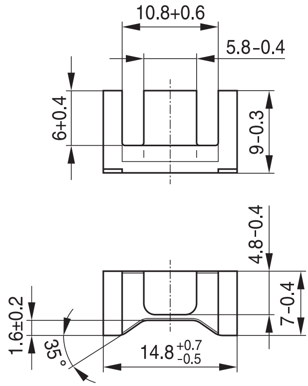
Yoke



EV 15/9/7

Core B66434

- For DC/DC converters, storage chokes and EMI suppression chokes
- Delivery mode: single units



FEK0560-L

Magnetic characteristics (per set)

$\Sigma l/A$ = 1.4 mm^{-1}
l_e = 38.7 mm
A_e = 27.7 mm^2
A_{min} = 25.8 mm^2
V_e = 1070 mm^3

Approx. weight 5.7 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	1150 ±25%	1280	< 0.22 (200 mT, 25 kHz, 100 °C)	B66434G0000X127
N87	1250 ±25%	1390	< 0.60 (200 mT, 100 kHz, 100 °C)	B66434G0000X187
N97	1300 ±25%	1445	< 0.50 (200 mT, 100 kHz, 100 °C)	B66434G0000X197

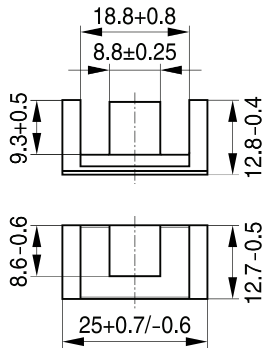
Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

- For DC/DC converters, storage chokes and EMI suppression chokes
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.8 mm^{-1}
l_e = 59 mm
A_e = 74 mm^2
A_{min} = 73 mm^2
V_e = 4370 mm^3

Approx. weight 22 g/set



FEK0335-T

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	2400 +30/–20%	1520	< 0.80 (200 mT, 25 kHz, 100 °C)	B66408G0000X127
N87	2500 +30/–20%	1590	< 2.20 (200 mT, 100 kHz, 100 °C)	B66408G0000X187
N97	2600 +30/–20%	1650	< 2.05 (200 mT, 100 kHz, 100 °C)	B66408G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

EV 30/16/13

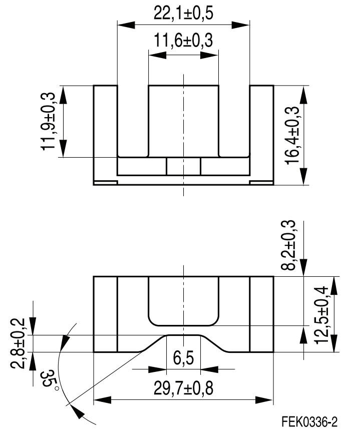
Core B66432

- For DC/DC converters, storage chokes and EMI suppression chokes
- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.76 mm^{-1}
l_e = 74.8 mm
A_e = 99 mm^2
A_{min} = 95 mm^2
V_e = 7410 mm^3

Approx. weight 37 g/set



Ungapped

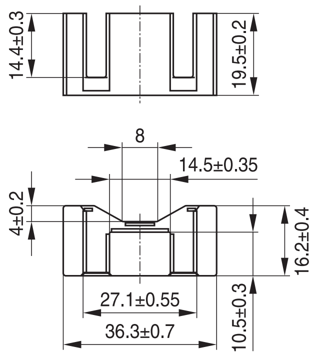
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	2600 +30/–20%	1570	< 1.4 (200 mT, 25 kHz, 100 °C)	B66432G0000X127
N87	2800 +30/–20%	1690	< 3.7 (200 mT, 100 kHz, 100 °C)	B66432G0000X187
N97	2900 +30/–20%	1750	< 3.0 (200 mT, 100 kHz, 100 °C)	B66432G0000X197
N95	3500 +30/–20%	2104	< 3.6 (200 mT, 100 kHz, 100 °C)	B66432G0000X195

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.

EV 36/19/16

Core **B66567**

- For DC/DC converters, storage chokes and EMI suppression chokes
- Delivery mode: single units



Magnetic characteristics (per set)

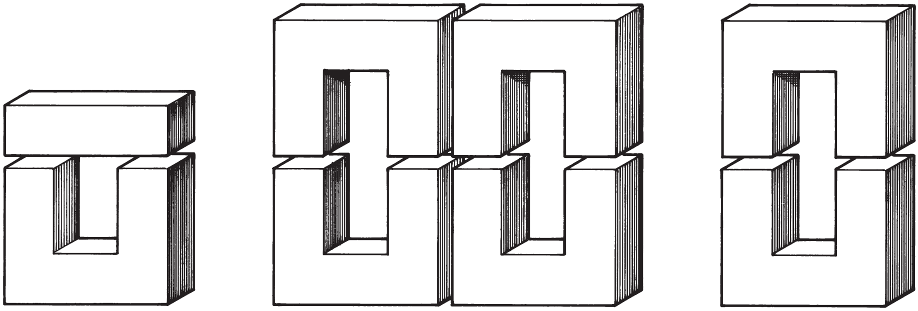
$\Sigma l/A$ = 0.57 mm^{-1}
l_e = 87.4 mm
A_e = 154 mm^2
A_{min} = 149 mm^2
V_e = 13440 mm^3

Approx. weight 66 g/set

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N87	3500 +30/–20%	1580	< 6.8 (200 mT, 100 kHz, 100 °C)	B66567G0000X187
N97	3600 +30/–20%	1630	< 5.8 (200 mT, 100 kHz, 100 °C)	B66567G0000X197

Other A_L values/air gaps and materials available on request – see Processing notes on page 173.



1 Core shapes and materials

U cores of rectangular cross section and I cores are made of SIFERRIT materials N27 and N87. Owing to their high saturation flux density, high Curie temperature and low dissipation losses, they are suitable for power, pulse and high-voltage transformers. UU and UI cores are preferred for power ratings, since they can be combined in various ways (see illustration above) to produce transformers in the kilowatt range.

2 Ordering, marking and delivery

U and I cores are supplied as single units, not as sets.

U cores with one shortened leg (≙ air gap) are available on request.

U and I cores are not marked.

3 A_L and core loss specification

The corresponding test results are tabulated separately for each core shape.

a) A_L value (see also *"General – Definitions"*)
The A_L value is measured with a fully wound 100-turn coil at a flux density of $\hat{B}$ = 0.25 mT and a frequency of f = 10 kHz. The temperature of the core is equal to room temperature.

b) Power loss P_V
The dissipation loss is specified in W/set. The data are maximum values under the specified measuring conditions. The flux density has been calculated on the basis of a sinusoidal voltage and is referred to the minimum cross-sectional area A_{min} of the core.

U 26/22/16

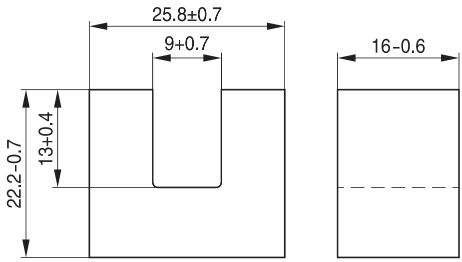
Core **B67355**

- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.75 mm^{-1}
l_e = 98 mm
A_e = 131 mm^2
A_{min} = 129 mm^2
V_e = 12800 mm^3

Approx. weight 33 g/pc.



FUS0183-D

The A_L value in the table applies to a core set comprising two ungapped cores.

Material	A_L value nH	μ_e	P_{Vmax} W/set	Ordering code
N27	2500 +30/–20%	1480	< 1.4 (200 mT, 16 kHz, 100 °C)	B67355A0001X027
N87	2800 +30/–20%	1667	< 6.5 (200 mT, 100 kHz, 100 °C)	B67355G0000X187

U 30/26/26

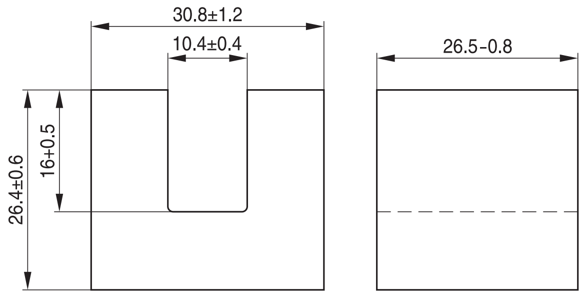
Core **B67362**

- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.45 mm^{-1}
l_e = 118 mm
A_e = 265 mm^2
A_{min} = 265 mm^2
V_e = 31300 mm^3

Approx. weight 73 g/pc.



FUS0185-U

The A_L value in the table applies to a core set comprising two ungapped cores.

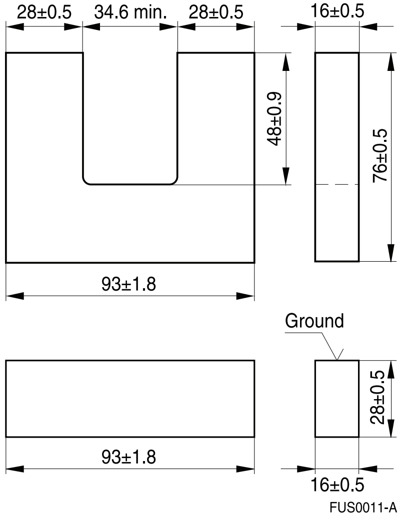
Material	A_L value nH	μ_e	P_{Vmax} W/set	Ordering code
N27	4400 +30/–20%	1560	< 3.0 (200 mT, 16 kHz, 100 °C)	B67362A0001X027
N87	4800 +30/–20%	1710	< 15.0 (200 mT, 100 kHz, 100 °C)	B67362G0000X187

U 93/76/16 cores
UI 93/104/16 cores — B67345

- Delivery mode: single units
- For power transformers >1 kW (20 kHz)

Magnetic characteristics (per set)

	UU 93/152/16	UI 93/104/16	
$\Sigma l/A$	0.79	0.58	mm^{-1}
l_e	354	258	mm
A_e	448	448	mm^2
A_{min}	448	448	mm^2
V_e	159000	116000	mm^3
m	800	600	g/set



The A_L value in the table applies to a core set comprising two ungapped cores.

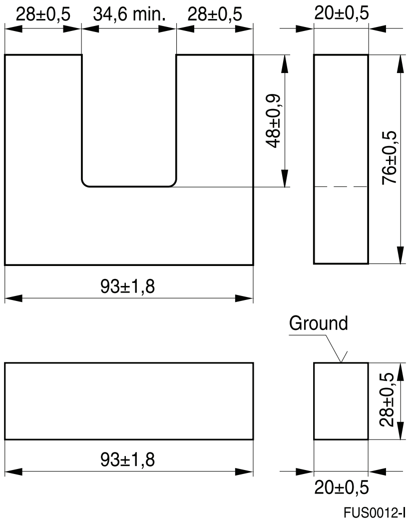
Material	A_L value nH	μ_e	P_V W/set	Ordering code
Combination UU 93/152/16				
N27	2900 +30/–20%	1820	< 32.0 (200 mT, 25 kHz, 100 °C)	B67345B0003X027
N87	3100 +30/–20%	1950	< 14.0 (200 mT, 25 kHz, 100 °C)	B67345B0003X087
N95	4100 +30/–20%	2578	< 9.5 (200 mT, 25 kHz, 100 °C)	B67345B0003X095
Combination UI 93/104/16				
N27	3800 +30/–20%	1740	< 24.0 (200 mT, 25 kHz, 100 °C)	B67345B0003X027 (U) B67345B0004X027 (I)
N87	4100 +30/–20%	1880	< 11.0 (200 mT, 25 kHz, 100 °C)	B67345B0003X087 (U) B67345B0004X087 (I)
N95	5300 +30/–20%	2429	< 7.0 (200 mT, 25 kHz, 100 °C)	B67345B0003X095 (U) B67345B0004X095 (I)

U 93/76/20 cores
UI 93/104/20 cores B67345

- Delivery mode: single units
- For power transformers >1 kW (20 kHz)

Magnetic characteristics (per set)

	UU 93/152/20	UI 93/104/20	
Σl/A	0.63	0.46	mm^{-1}
l_e	354	258	mm
A_e	560	560	mm^2
A_{min}	560	560	mm^2
V_e	198000	144000	mm^3
m	1000	750	g/set



The A_L value in the table applies to a core set comprising two ungapped cores.

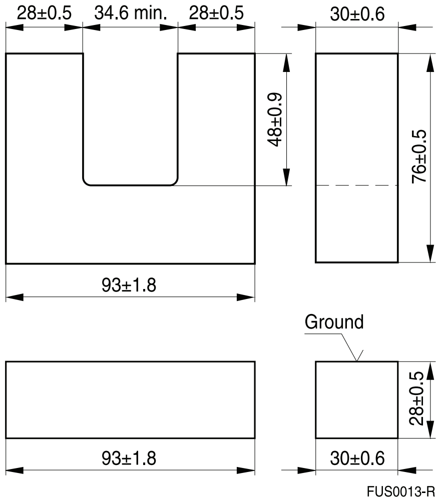
Material	A_L value nH	μ_e	P_V W/set	Ordering code
Combination UU 93/152/20				
N27	3600 +30/–20%	1800	< 11.0 (100 mT, 25 kHz, 100 °C)	B67345B0010X027
N87	3900 +30/–20%	1960	< 4.0 (100 mT, 25 kHz, 100 °C)	B67345B0010X087
Combination UI 93/104/20				
N27	4900 +30/–20%	1790	< 8.0 (100 mT, 25 kHz, 100 °C)	B67345B0010X027 (U) B67345B0011X027 (I)
N87	5300 +30/–20%	1950	< 3.0 (100 mT, 25 kHz, 100 °C)	B67345B0010X087 (U) B67345B0011X087 (I)

U 93/76/30 cores
UI 93/104/30 cores B67345

- Delivery mode: single units
- For power transformers >1 kW (20 kHz)

Magnetic characteristics (per set)

	UU 93/152/30	UI 93/104/30	
$\Sigma l/A$	0.42	0.31	mm^{-1}
l_e	354	258	mm
A_e	840	840	mm^2
A_{min}	840	840	mm^2
V_e	297000	217000	mm^3
m	1500	1100	g/set



The A_L value in the table applies to a core set comprising two ungapped cores.

Material	A_L value nH	μ_e	P_V W/set	Ordering code
Combination UU 93/152/30				
N27	5400 +30/–20%	1800	< 16.0 (100 mT, 25 kHz, 100 °C)	B67345B0001X027
N87	5700 +30/–20%	1900	< 5.5 (100 mT, 25 kHz, 100 °C)	B67345B0001X087
N97	5700 +30/–20%	1900	< 4.0 (100 mT, 25 kHz, 100 °C)	B67345B0001X097
Combination UI 93/104/30				
N27	7400 +30/–20%	1850	< 12.0 (100 mT, 25 kHz, 100 °C)	B67345B0001X027 (U) B67345B0002X027 (I)
N87	7900 +30/–20%	1930	< 4.0 (100 mT, 25 kHz, 100 °C)	B67345B0001X087 (U) B67345B0002X087 (I)

U 101/76/30

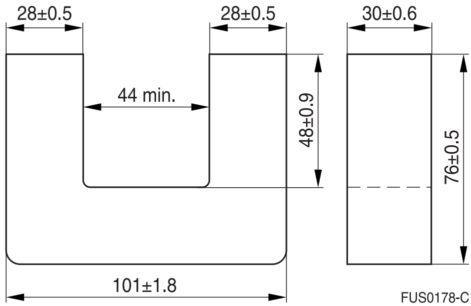
Core **B67370**

- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.44 mm^{-1}
l_e = 368 mm
A_e = 840 mm^2
A_{min} = 840 mm^2
V_e = 310800 mm^3

Approx. weight 1600 g/set



The A_L value in the table applies to a core set comprising two ungapped cores.

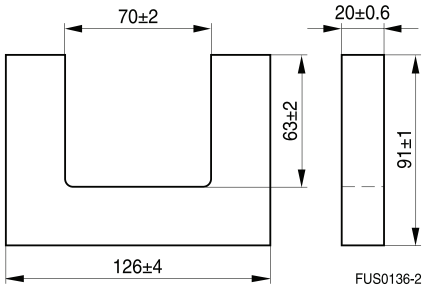
Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	4600 +30/–20%	1580	< 16.5 (100 mT, 25 kHz, 100 °C)	B67370A0002X027
N87	5700 +30/–20%	1990	< 6.0 (100 mT, 25 kHz, 100 °C)	B67370A0002X187
N97	5900 +30/–20%	2060	< 4.2 (100 mT, 25 kHz, 100 °C)	B67370A0002X197

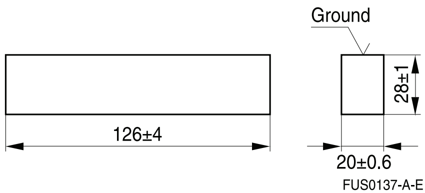
U 126/91/20 cores
UI 126/119/20 cores B67385

- Delivery mode: single units
- For power transformers >1 kW (20 kHz)

Magnetic characteristics (per set)

	UU 126/182/20	UI 126/119/20	
$\Sigma l/A$	0.86	0.63	mm^{-1}
l_e	480	354	mm
A_e	560	560	mm^2
A_{min}	560	560	mm^2
V_e	269000	198000	mm^3
m	1300	950	g/set





The A_L value in the table applies to a core set comprising two ungapped cores.

Material	A_L value nH	μ_e	P_V W/set	Ordering code
Combination UU 126/182/20				
N87	3000 ±25%	2000	< 4.7 (100 mT, 25 kHz, 100 °C)	B67385G0000X187
Combination UI 126/119/20				
N87	3900 ±25%	1950	< 3.5 (100 mT, 25 kHz, 100 °C)	B67385G0000X187 (U) B67385P0000X187 (I)

U 141/78/30

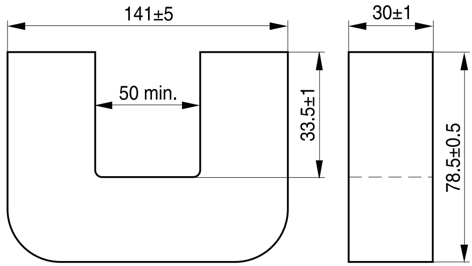
Core B67374

- Delivery mode: single units

Magnetic characteristics (per set)

$\Sigma l/A$ = 0.28 mm^{-1}
l_e = 377 mm
A_e = 1350 mm^2
A_{min} = 1350 mm^2
V_e = 508950 mm^3

Approx. weight 2500 g/set

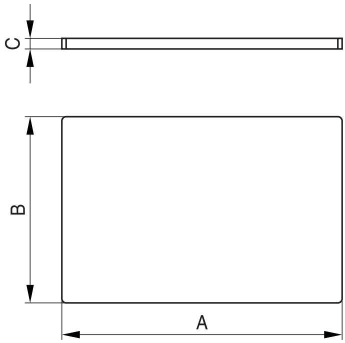


FUS0113-X

The A_L value in the table applies to a core set comprising two ungapped cores.

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N27	7500 ±30%	1670	< 22.0 (100 mT, 25 kHz, 100 °C)	B67374G0000X127
N97	8400 ±30%	1870	< 3.3 (100 mT, 25 kHz, 100 °C)	B67374G0000X197
N87	8900 ±30%	1970	< 10.0 (100 mT, 25 kHz, 100 °C)	B67374G0000X187

- For combination with large volume E, U cores when sides ground (on request)
- For wireless application
- Various thickness possible
- Delivery mode: pieces



FUS0179-K

Material	A mm	B mm	C - optional mm	Approx. weight g	Ordering code
N27	30 ± 0.5	28 ± 0.5	46.5 ± 0.9 4)	190	B67345B0007X027
N49	155 ± 2.0	110 ± 2.0	23.0 ± 1.0 1)	1900	B67410A0107X049
N87	155 ± 2.0	110 ± 2.0	23.0 ± 1.0 1)	1900	B67410A0107X087
	100 ± 1.5	20 ± 0.3	40.0 ± 0.5 2)*)	390	B67410A0105X087
N95	100 ± 2.0	100 ± 2.0	5.0 ± 0.4 3)*)	240	B67410A0218X195
	100 ± 2.0	100 ± 2.0	6.0 ± 0.5 3)*)	290	B67410A0289X195
	150 ± 2.0	100 ± 2.0	5.0 ± 0.5 3)*)	380	B67410A0201X195
	150 ± 2.0	100 ± 2.0	8.0 ± 0.5 3)*)	580	B67410A0259X195
	155 ± 2.0	110 ± 2.0	23.0 ± 1.0 1)	1900	B67410A0107X095
N97	155 ± 2.0	110 ± 2.0	23.0 ± 1.0 1)	1900	B67410A0107X097

Other material combinations on request.

----
1) Optional height up to 25 mm
2) Optional height up to 45 mm
3) Optional height up to 35 mm
4) Optional height up to 50 mm
*) Thickness C is ground

General information

An impeder core is an essential accessory for the welding of tubes and pipes using high frequency waveguide heating. The characteristics and durability of the impeder core have a significant effect on the efficiency and stability of the welding process.

The impeder core concentrates the magnetic flux generated by the work coil into the area of the pipe joint. As a result, the use of an impeder core significantly increases the efficiency of the welding process.

Various diameters, types (ZR, ZRH, ZRS, ZRSH) and lengths are available.

Please refer to the separate *EPCOS Product Brief 2017 - Impeder Cores* for more details.

Our product line includes a wide range of toroids with finely graded diameters ranging from 2.5 to 202 mm.

Other core heights can be supplied on request. All cores are available in the usual materials.

1 Applications

- Toroids are primarily used as EMC chokes for suppressing RF interference in the MHZ region and in signal transformers.

  Typical applications for toroids of NiZn ferrites are LAN chokes. One of the materials available for this purpose is K10; other materials on request.

  The following high-permeability MnZn materials are available for interference suppression:

  – R 2.5 through R 12.5 for telecommunications (N30, T38, T46)
  – R 13.3 through R 26 for power line chokes (N30, T65, T35, T37, T38)
  – >R 34 for chokes and filters in industrial use (T65)

- Toroids are also increasingly used for power applications. Here, the typical values for amplitude permeability and power loss, as summarized in the section on "*SIFERRIT Materials*" (page 36), are applicable to the special power materials.

2 Coating

Toroids are available in different coating versions, thus offering the appropriate solution for every application. The coating not only offers protection for the edges but also provides an insulation function.

For small ring cores, we have introduced a parylene coating which features a low coating thickness and high dielectric strength.

A coating of the core will cause μ_i to drop, depending on the core size. A similar effect might occur when the core is subjected to high winding forces, especially cores made of the high permeability materials, T38 and T46.

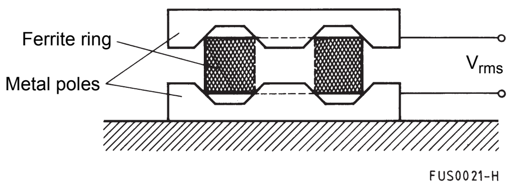
Coatings of ring cores

Version	Epoxy (blue)	Parylene (transparent)
Main application	Medium/big sizes (≥R 9.53)	Small sizes (<R 9.53)
Layer thickness	<0.4 mm	0.012 or 0.025 mm
Breakdown voltage (minimum values)	>1.0 kV (for R 9.53; R 10) >1.5 kV (for R 12.5 thru R 20) >2.0 kV (for >R 20)	>1 kV (standard value)
Mechanical quality	High firmness	Smooth surface
Maximum temperature (short-time)	approx. 180 °C	approx. 130 °C
Maximum temperature (long-time)	approx. 130 °C	approx. 130 °C
Advantage	Low influence on A_L value	Very low thickness
UL rating	UL 94 V-0	UL 94 V-0
UL file number	E194412/E257941	E194412
Ordering code	B64290**L**…	B64290**P**…

3 Dielectric strength test

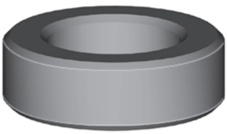
The following test setup is used to test the dielectric strength of the insulating coating: A copper ring is pressed to the top edge of the ring. It touches the ferrite ring at the edges (see diagram).

The test duration is 2 seconds.



4 Chamfer

Large toroidal cores use thick wires that are partially subjected to high mechanical stress during winding. This can damage the wire insulation as well as the coating of the cores, thus reducing the breakdown voltage. To avoid this, EPCOS toroids have a chamfer. This prevents any insulation damage, and produces uniform coating thickness at the same time.



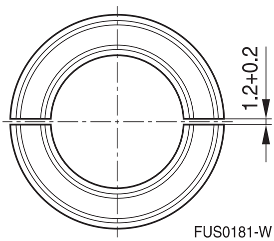
FUS0127-3

Core size	Design
Small	Edges rounded by tumbling
Medium	Chamfer on edges and/or radius on the surface
Medium/big	Chamfer on edges

5 Cutting

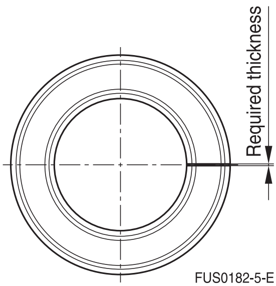
Middle size and large toroids are available with gap:

1.) Cut into 2 halves with typical cuting wheel thickness 1.2 mm.



FUS0181-W

2.) Cut gap in required thickness.



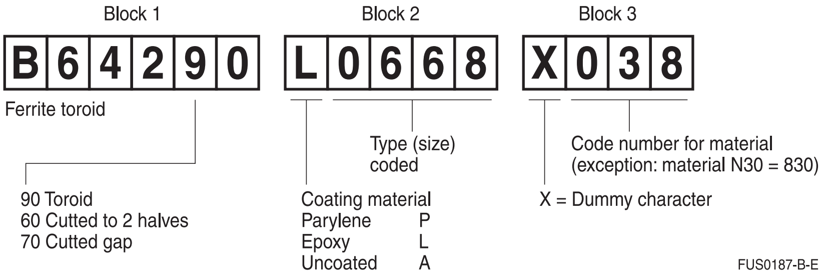
FUS0182-5-E

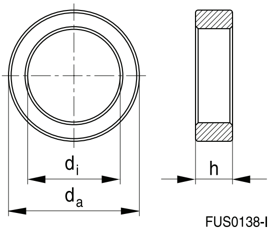
Three basic questions have to be answered during order:

- toroid cuts into 2 halves/only gap (picture 1 or 2)
- cutting before/after coating
  - before: air gap is coated
  - after: air gap is not coated, a measurement fixture can be placed into the air gap
- required thickness of the gap

6 Structure of the ordering code (part number)

Compilation of the ordering code



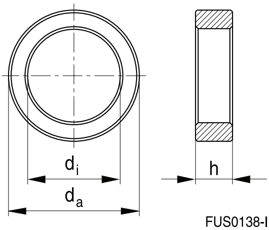


Overview of available sizes

Type Toroid size ($d_a \times d_i \times h$) mm	inch	Type code (ordering code, block 2)	Page (Data book)
R 2.50 × 1.50 × 1.00	R 0.098 × 0.059 × 0.039	P0035	624
R 2.50 × 1.50 × 1.30	R 0.098 × 0.059 × 0.051	P0072	624
R 2.54 × 1.27 × 1.27	R 0.100 × 0.050 × 0.050	P0734	625
R 3.05 × 1.27 × 1.27	R 0.120 × 0.050 × 0.050	P0683	625
R 3.05 × 1.27 × 2.54	R 0.120 × 0.050 × 0.100	P0739	626
R 3.05 × 1.78 × 2.03	R 0.120 × 0.070 × 0.080	P0733	626
R 3.43 × 1.78 × 1.78	R 0.135 × 0.070 × 0.070	P0731	627
R 3.43 × 1.78 × 2.03	R 0.135 × 0.070 × 0.080	P0745	627
R 3.94 × 1.78 × 1.78	R 0.155 × 0.070 × 0.070	P0732	628
R 3.94 × 2.24 × 1.30	R 0.155 × 0.088 × 0.051	P0061	628
R 3.94 × 2.24 × 2.30	R 0.155 × 0.088 × 0.090	P0723	629
R 4.00 × 2.40 × 1.60	R 0.157 × 0.094 × 0.063	P0036	629
R 4.00 × 2.40 × 1.80	R 0.157 × 0.094 × 0.071	P0692	630
R 5.84 × 3.05 × 1.52	R 0.230 × 0.120 × 0.060	P0056	630
R 5.84 × 3.05 × 3.00	R 0.230 × 0.120 × 0.118	P0687	631
R 6.30 × 3.80 × 2.50	R 0.248 × 0.150 × 0.098	P0037	631
R 8.00 × 4.00 × 4.00	R 0.315 × 0.158 × 0.158	P0751	632
R 9.53 × 4.75 × 3.17	R 0.375 × 0.187 × 0.125	L0062	632
R 10.0 × 6.00 × 4.00	R 0.394 × 0.236 × 0.157	L0038	633
R 10.0 × 6.00 × 7.00	R 0.394 × 0.236 × 0.318	L0783	633
R 12.5 × 7.50 × 5.00	R 0.492 × 0.295 × 0.197	L0044	634
R 12.7 × 7.90 × 6.35	R 0.500 × 0.311 × 0.250	L0742	634
R 13.3 × 8.30 × 5.00	R 0.524 × 0.327 × 0.197	L0644	635
R 14.0 × 9.00 × 5.00	R 0.551 × 0.354 × 0.197	L0658	635
R 15.0 × 10.4 × 5.30	R 0.591 × 0.409 × 0.209	L0623	636
R 15.8 × 8.90 × 4.70	R 0.622 × 0.350 × 0.185	L0743	636
R 16.0 × 9.60 × 6.30	R 0.630 × 0.378 × 0.248	L0045	637

Toroids (ring cores)

Overview **B64290**



FUS0138-I

Overview of available sizes (continued)

Type Toroid size ($d_a \times d_i \times h$) mm	inch	Type code (ordering code, block 2)	Page (Data book)
R 17.0 × 10.7 × 6.80	R 0.669 × 0.421 × 0.268	L0652	638
R 18.4 × 5.90 × 5.90	R 0.724 × 0.232 × 0.232	L0697	638
R 20.0 × 10.0 × 7.00	R 0.787 × 0.394 × 0.276	L0632	639
R 20.0 × 10.0 × 10.0	R 0.787 × 0.394 × 0.394	L0631	639
R 20.0 × 10.0 × 15.0	R 0.787 × 0.394 × 0.591	L0710	640
R 22.1 × 13.7 × 6.35	R 0.870 × 0.539 × 0.250	L0638	640
R 22.1 × 13.7 × 7.90	R 0.870 × 0.539 × 0.311	L0719	641
R 22.1 × 13.7 × 12.5	R 0.870 × 0.539 × 0.492	L0651	641
R 22.6 × 14.7 × 9.20	R 0.890 × 0.579 × 0.362	L0626	642
R 25.3 × 14.8 × 10.0	R 0.996 × 0.583 × 0.394	L0618	642
R 25.3 × 14.8 × 15.0	R 0.996 × 0.583 × 0.590	L0615	643
R 25.3 × 14.8 × 20.0	R 0.996 × 0.583 × 0.787	L0616	643
R 29.5 × 19.0 × 14.9	R 1.142 × 0.748 × 0.587	L0647	644
R 30.5 × 20.0 × 12.5	R 1.201 × 0.787 × 0.492	L0657	644
R 34.0 × 20.5 × 10.0	R 1.339 × 0.807 × 0.394	L0058	645
R 34.0 × 20.5 × 12.5	R 1.339 × 0.807 × 0.492	L0048	645
R 36.0 × 23.0 × 15.0	R 1.417 × 0.906 × 0.591	L0674	646
R 38.1 × 19.05 × 12.7	R 1.500 × 0.750 × 0.500	L0668	646
R 40.0 × 24.0 × 16.0	R 1.575 × 0.945 × 0.630	L0659	647
R 41.8 × 26.2 × 12.5	R 1.646 × 1.031 × 0.492	L0022	647
R 50.0 × 30.0 × 20.0	R 1.969 × 1.181 × 0.787	L0082	648
R 58.3 × 32.0 × 18.0	R 2.295 × 1.260 × 0.709	L0043	649
R 58.3 × 40.8 × 17.6	R 2.295 × 1.606 × 0.693	L0040	650
R 58.3 × 40.8 × 20.2	R 2.295 × 1.606 × 0.795	L0042	651
R 63.0 × 38.0 × 25.0	R 2.480 × 1.496 × 0.984	L0699	652
R 68.0 × 48.0 × 13.0	R 2.677 × 1.890 × 0.512	L0696	653
R 87.0 × 54.3 × 13.5	R 3.425 × 2.138 × 0.531	L0730	654
R 102 × 65.8 × 15.0	R 4.016 × 2.591 × 0.591	L0084	655

Toroids (ring cores)

Overview

Type Toroid size ($d_a \times d_i \times h$) mm	inch	Type code (ordering code, block 2)	Page (Data book)
R 140 × 103 × 25.0	R 5.512 × 4.055 × 0.984	A0705	656
R 202 × 153 × 25.0	R 7.953 × 6.024 × 0.984	A0711	657

■ Parylene coating

R 2.50 × 1.50 × 1.00 (mm)
R 0.098 × 0.059 × 0.039 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
2.50 ±0.12	1.50 ±0.1	1.00 ±0.1	0.098 ±0.005	0.059 ±0.004	0.039 ±0.004	uncoated 1)
2.67 max.	1.35 min.	1.15 max.	0.105 max.	0.053 min.	0.045 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				Σl/A mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	70 ±25%	700	B64290P0035X010	12.30	6.02	0.49	3.00	0.01
T57	410 ±25%	4000	B64290P0035X057					
N30	440 ±25%	4300	B64290P0035X830					
T65	470 ±30%	4600	B64290P0035X065					
T38	1020 ±30%	10000	B64290P0035X038					
T46	1530 ±30%	15000	B64290P0035X046					

■ Parylene coating

R 2.50 × 1.50 × 1.30 (mm)
R 0.098 × 0.059 × 0.051 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
2.50 ±0.12	1.50 ±0.1	1.30 ±0.12	0.098 ±0.005	0.059 ±0.004	0.051 ±0.005	uncoated 1)
2.67 max.	1.35 min.	1.47 max.	0.105 max.	0.053 min.	0.057 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				Σl/A mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	93 ±25%	700	B64290P0072X010	9.41	6.02	0.64+-	3.85	0.02
T57	530 ±25%	4000	B64290P0072X057					
T65	600 ±30%	4600	B64290P0072X065					
T38	1320 ±30%	10000	B64290P0072X038					
T46	2000 ±30%	15000	B64290P0072X046					

1) On request.

■ Parylene coating

R 2.54 × 1.27 × 1.27 (mm)
R 0.100 × 0.050 × 0.050 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
2.54 ±0.12	1.27 ±0.12	1.27 ±0.12	0.100 ±0.005	0.050 ±0.005	0.050 ±0.005	uncoated[1)]
2.71 max.	1.12 min.	1.44 max.	0.107 max.	0.044 min.	0.057 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	120 ±25%	700	B64290P0734X010	7.18	5.53	0.77	4.29	0.02
T57	690 ±25%	3900	B64290P0734X057					
T65	800 ±30%	4500	B64290P0734X065					
T38	1760 ±30%	10000	B64290P0734X038					
T46	2640 ±30%	15000	B64290P0734X046					

■ Parylene coating

R 3.05 × 1.27 × 1.27 (mm)
R 0.120 × 0.050 × 0.050 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
3.05 ±0.12	1.27 ±0.12	1.27 ±0.12	0.120 ±0.005	0.050 ±0.005	0.050 ±0.005	uncoated[1)]
3.22 max.	1.10 min.	1.44 max.	0.127 max.	0.043 min.	0.057 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	160 ±25%	700	B64290P0683X010	5.65	5.99	1.06	6.4	0.04
T57	830 ±25%	3700	B64290P0683X057					
T65	1000 ±30%	4500	B64290P0683X065					
T38	2200 ±30%	9900	B64290P0683X038					
T46	3340 ±30%	15000	B64290P0683X046					

1) On request.

■ Parylene coating

R 3.05 × 1.27 × 2.54 (mm)
R 0.120 × 0.050 × 0.100 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
3.05 ±0.12	1.27 ±0.12	2.54 ±0.12	0.120 ±0.005	0.050 ±0.005	0.100 ±0.005	uncoated[1)]
3.22 max.	1.10 min.	2.71 max.	0.127 max.	0.043 min.	0.107 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	330 ±25%	700	B64290P0739X010	2.82	5.99	2.12	12.7	0.08
T57	1700 ±25%	3800	B64290P0739X057					
T65	2000 ±30%	4500	B64290P0739X065					
T38	4200 ±30%	9400	B64290P0739X038					
T46	6500 ±30%	15000	B64290P0739X046					

■ Parylene coating

R 3.05 × 1.78 × 2.03 (mm)
R 0.120 × 0.070 × 0.080 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
3.05 ±0.12	1.78 ±0.12	2.03 ±0.12	0.120 ±0.005	0.070 ±0.005	0.080 ±0.005	uncoated[1)]
3.22 max.	1.61 min.	2.20 max.	0.127 max.	0.063 min.	0.087 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	160 ±25%	700	B64290P0733X010	5.75	7.23	1.26	9.10	0.05
T57	870 ±25%	4000	B64290P0733X057					
T65	1000 ±30%	4600	B64290P0733X065					
T38	2150 ±30%	9900	B64290P0733X038					
T46	3250 ±30%	15000	B64290P0733X046					

1) On request.

■ Parylene coating

R 3.43 × 1.78 × 1.78 (mm)
R 0.135 × 0.070 × 0.070 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
3.43 ±0.12	1.78 ±0.12	1.78 ±0.12	0.135 ±0.005	0.070 ±0.005	0.070 ±0.005	uncoated 1)
3.60 max.	1.61 min.	1.95 max.	0.142 max.	0.063 min.	0.077 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K10	160 ±25%	700	B64290P0731X010	5.38	7.63	1.42	10.7	0.06
N95	760 ±25%	3000	B64290P0731X095					
T57	930 ±25%	4000	B64290P0731X057					
T65	1050 ±30%	4500	B64290P0731X065					
T38	2300 ±30%	10000	B64290P0731X038					
T46	3400 ±30%	15000	B64290P0731X046					

■ Parylene coating

R 3.43 × 1.78 × 2.03 (mm)
R 0.135 × 0.070 × 0.080 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
3.43 ±0.12	1.78 ±0.12	2.03 ±0.12	0.135 ±0.005	0.070 ±0.005	0.080 ±0.005	uncoated 1)
3.60 max.	1.61 min.	2.20 max.	0.142 max.	0.063 min.	0.087 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K10	190 ±25%	700	B64290P0745X010	4.72	7.63	1.62	12.2	0.07
N95	760 ±25%	3000	B64290P0745X095					
T57	1060 ±25%	4000	B64290P0745X057					
T65	1200 ±30%	4500	B64290P0745X065					
T38	2650 ±30%	10000	B64290P0745X038					
T46	4000 ±30%	15000	B64290P0745X046					

1) On request.

■ Parylene coating

R 3.94 × 1.78 × 1.78 (mm)
R 0.155 × 0.070 × 0.070 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
3.94 ±0.12	1.78 ±0.12	1.78 ±0.12	0.155 ±0.005	0.070 ±0.005	0.070 ±0.005	uncoated 1)
4.11 max.	1.61 min.	1.95 max.	0.162 max.	0.063 min.	0.077 max.	coated

Characteristics and ordering codes

Material	A_L value	μ_i	Ordering code	Magnetic characteristics				Approx. weight
	nH	(approx.)		$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	g
K10	200 ±25%	700	B64290P0732X010	4.44	8.10	1.82	14.8	0.08
T57	1100 ±25%	3900	B64290P0732X057					
T65	1350 ±30%	4800	B64290P0732X065					
T38	2830 ±30%	10000	B64290P0732X038					
T46	4200 ±30%	15000	B64290P0732X046					

■ Parylene coating

R 3.94 × 2.24 × 1.30 (mm)
R 0.155 × 0.088 × 0.051 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
3.94 ±0.12	2.24 ±0.12	1.30 ±0.12	0.155 ±0.005	0.088 ±0.005	0.051 ±0.005	uncoated 1)
4.11 max.	2.07 min.	1.47 max.	0.162 max.	0.081 min.	0.058 max.	coated

Characteristics and ordering codes

Material	A_L value	μ_i	Ordering code	Magnetic characteristics				Approx. weight
	nH	(approx.)		$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	g
K10	100 ±25%	700	B64290P0061X010	8.56	9.21	1.08	9.90	0.05
T57	550 ±25%	3800	B64290P0061X057					
T65	700 ±30%	4800	B64290P0061X065					
T38	1470 ±30%	10000	B64290P0061X038					
T46	2200 ±30%	15000	B64290P0061X046					

1) On request.

R 3.94 × 2.24 × 2.30	B64290P0723
R 4.00 × 2.40 × 1.60	B64290P0036

■ Parylene coating

R 3.94 × 2.24 × 2.30 (mm)
R 0.155 × 0.088 × 0.090 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
3.94 ±0.12	2.24 ±0.12	2.30 ±0.15	0.155 ±0.005	0.088 ±0.005	0.090 ±0.006	uncoated 1)
4.11 max.	2.07 min.	2.50 max.	0.162 max.	0.081 min.	0.098 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K10	180 ±25%	700	B64290P0723X010	4.85	9.21	1.90	17.5	0.09
T57	990 ±25%	3800	B64290P0723X057					
T65	1200 ±30%	4800	B64290P0723X065					
T38	2600 ±30%	10000	B64290P0723X038					
T46	3890 ±30%	15000	B64290P0723X046					

■ Parylene coating

R 4.00 × 2.40 × 1.60 (mm)
R 0.157 × 0.094 × 0.063 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
4.00 ±0.12	2.40 ±0.12	1.60 ±0.1	0.157 ±0.005	0.094 ±0.004	0.063 ±0.004	uncoated 1)
4.17 max.	2.23 min.	1.75 max.	0.164 max.	0.087 min.	0.069 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N30	700 ±25%	4300	B64290P0036X830	7.7	9.63	1.25	12.0	0.05
T65	750 ±30%	4600	B64290P0036X065					
T38	1630 ±30%	10000	B64290P0036X038					
T46	2450 ±30%	15000	B64290P0036X046					

1) On request.

■ Parylene coating

R 4.00 × 2.40 × 1.80 (mm)
R 0.157 × 0.094 × 0.071 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
4.00 ±0.12	2.40 ±0.12	1.80 ±0.12	0.157 ±0.005	0.094 ±0.004	0.071 ±0.005	uncoated 1)
4.17 max.	2.23 min.	1.97 max.	0.164 max.	0.087 min.	0.078 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N30	790 ±25%	4300	B64290P0692X830	6.83	9.63	1.41	13.6	0.07
T65	840 ±30%	4600	B64290P0692X065					
T38	1840 ±30%	10000	B64290P0692X038					
T46	2760 ±30%	15000	B64290P0692X046					

■ Parylene coating

R 5.84 × 3.05 × 1.52 (mm)
R 0.230 × 0.120 × 0.060 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
5.84 ±0.12	3.05 ±0.12	1.52 ±0.12	0.230 ±0.005	0.120 ±0.005	0.060 ±0.005	uncoated 1)
6.01 max.	2.88 min.	1.69 max.	0.240 max.	0.113 min.	0.067 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N95	580 ±25%	3000	B64290P0056X095	6.36	13.03	2.05	26.7	0.15
N30	850 ±25%	4300	B64290P0056X830					
T65	1020 ±30%	4600	B64290P0056X065					
T38	1900 ±30%	10000	B64290P0056X038					
T46	2900 ±30%	15000	B64290P0056X046					

1) On request.

■ Parylene coating

R 5.84 × 3.05 × 3.00 (mm)
R 0.230 × 0.120 × 0.118 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
5.84 ±0.12	3.05 ±0.12	3.00 ±0.15	0.230 ±0.005	0.120 ±0.005	0.118 ±0.005	uncoated 1)
6.01 max.	2.88 min.	3.20 max.	0.240 max.	0.113 min.	0.126 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N30	1680 ±25%	4300	B64290P0687X830	3.22	13.03	4.04	52.6	0.3
T65	1800 ±30%	4600	B64290P0687X065					
T38	3900 ±30%	10000	B64290P0687X038					
T46	5850 ±30%	15000	B64290P0687X046					

■ Parylene coating

R 6.30 × 3.80 × 2.50 (mm)
R 0.248 × 0.150 × 0.098 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
6.30 ±0.15	3.80 ±0.12	2.50 ±0.12	0.248 ±0.006	0.150 ±0.005	0.098 ±0.005	uncoated 1)
6.50 max.	3.63 min.	2.67 max.	0.256 max.	0.143 min.	0.105 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K1	20 ±25%	80	B64290P0037X001	4.97	15.21	3.06	46.5	0.2
N49	330 ±25%	1500	B64290P0037X049					
N87	560 ±25%	2200	B64290P0037X087					
N30	1090 ±25%	4300	B64290P0037X830					
T65	1160 ±30%	4600	B64290P0037X065					
T38	2530 ±30%	10000	B64290P0037X038					
T46	3600 ±30%	14000	B64290P0037X046					

1) On request.

R 8.00 × 4.00 × 4.00 **B64290P0751**
R 9.53 × 4.75 × 3.17 **B64290L0062**

■ Parylene coating

R 8.00 × 4.00 × 4.00 (mm)
R 0.315 × 0.158 × 0.158 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
8.00 ±0.18	4.00 ±0.12	4.00 ±0.12	0.315 ±0.007	0.158 ±0.005	0.158 ±0.005	uncoated[1)]
8.23 max.	3.83 min.	4.17 max.	0.324 max.	0.151 min.	0.164 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	1200 ±25%	2200	B64290P0751X087	2.26	17.42	7.70	134	0.7
N30	2400 ±25%	4300	B64290P0751X830					
T65	2550 ±30%	4600	B64290P0751X065					
T38	5500 ±30%	10000	B64290P0751X038					
T46	8000 ±30%	15000	B64290P0751X046					

■ Epoxy coating

R 9.53 × 4.75 × 3.17 (mm)
R 0.375 × 0.187 × 0.125 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
9.53 ±0.19	4.75 ±0.12	3.17 ±0.15	0.375 ±0.007	0.187 ±0.005	0.125 ±0.006	uncoated[1)]
10.5 max.	3.8 min.	4.1 max.	0.413 max.	0.130 min.	0.161 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	970 ±25%	2200	B64290L0062X087	2.85	20.72	7.28	151	0.8
N30	1900 ±25%	4300	B64290L0062X830					
T65	2050 ±30%	4600	B64290L0062X065					
T35	2650 ±25%	6000	B64290L0062X035					
T38	4410 ±30%	10000	B64290L0062X038					
T46	6400 ±30%	15000	B64290L0062X046					

1) On request.

■ Epoxy coating

R 10.0 × 6.00 × 4.00 (mm)
R 0.394 × 0.236 × 0.157 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
10.0 ±0.2	6.0 ±0.15	4.00 ±0.15	0.394 ±0.008	0.236 ±0.006	0.157 ±0.006	uncoated 1)
10.8 max.	5.25 min.	4.75 max.	0.433 max.	0.199 min.	0.195 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K1	33 ±25%	80	B64290L0038X001	3.07	24.07	7.83	188	0.9
N49	610 ±25%	1500	B64290L0038X049					
N87	900 ±25%	2200	B64290L0038X087					
N30	1760 ±25%	4300	B64290L0038X830					
T65	1900 ±30%	4700	B64290L0038X065					
T35	2460 ±25%	6000	B64290L0038X035					
T37	2660 ±25%	6500	B64290L0038X037					
T38	4090 ±30%	10000	B64290L0038X038					
T46	6000 ±30%	15000	B64290L0038X046					

■ Epoxy coating

R 10.0 × 6.00 × 7.00 (mm)
R 0.394 × 0.236 × 0.318 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
10.0 ±0.2	6.0 ±0.15	7.00 ±0.15	0.394 ±0.008	0.236 ±0.006	0.275 ±0.006	uncoated 1)
10.8 max.	5.25 min.	7.75 max.	0.433 max.	0.199 min.	0.318 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K10	450 ±25%	630	B64290L0783X010	1.76	24.07	13.7	330	1.7
N30	3070 ±25%	4300	B64290L0783X830					
T65	3360 ±30%	4700	B64290L0783X065					
T38	7150 ±30%	10000	B64290L0783X038					
T46	10700 ±30%	15000	B64290L0783X046					

1) On request.

■ Epoxy coating

R 12.5 × 7.50 × 5.00 (mm)
R 0.492 × 0.295 × 0.197 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
12.5 ±0.3	7.5 ±0.2	5.00 ±0.15	0.492 ±0.012	0.295 ±0.008	0.197 ±0.005	uncoated 1)
13.6 max.	6.5 min.	5.95 max.	0.535 max.	0.256 min.	0.234 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N49	660 ±25%	1300	B64290L0044X049	2.46	30.09	12.23	368	1.8
N87	1120 ±25%	2200	B64290L0044X087					
N30	2200 ±25%	4300	B64290L0044X830					
T65	2400 ±30%	4700	B64290L0044X065					
T35	3060 ±25%	6000	B64290L0044X035					
T37	3320 ±25%	6500	B64290L0044X037					
T38	5110 ±30%	10000	B64290L0044X038					

■ Epoxy coating

R 12.7 × 7.90 × 6.35 (mm)
R 0.500 × 0.311 × 0.250 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
12.7 ±0.3	7.9 ±0.25	6.35 ±0.2	0.500 ±0.012	0.311 ±0.010	0.250 ±0.008	uncoated 1)
13.6 max.	7.10 min.	7.15 max.	0.535 max.	0.281 min.	0.281 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	1330 ±25%	2200	B64290L0742X087	2.08	31.17	14.96	466	2.4
N30	2600 ±25%	4300	B64290L0742X830					
T65	2850 ±30%	4700	B64290L0742X065					
T35	3620 ±25%	6000	B64290L0742X035					
T37	3920 ±25%	6500	B64290L0742X037					
T38	6030 ±30%	10000	B64290L0742X038					

1) On request.

■ Epoxy coating

R 13.3 × 8.30 × 5.00 (mm)
R 0.524 × 0.327 × 0.197 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
13.3 ±0.3	8.3 ±0.3	5.00 ±0.15	0.524 ±0.012	0.327 ±0.012	0.197 ±0.005	uncoated 1)
14.4 max.	7.2 min.	5.95 max.	0.567 max.	0.283 min.	0.234 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	1040 ±25%	2200	B64290L0644X087	2.67	32.70	12.27	401	1.8
N30	2030 ±25%	4300	B64290L0644X830					
T65	2300 ±30%	4900	B64290L0644X065					
T35	2830 ±25%	6000	B64290L0644X035					
T37	3060 ±25%	6500	B64290L0644X037					
T38	4700 ±30%	10000	B64290L0644X038					

■ Epoxy coating

R 14.0 × 9.00 × 5.00 (mm)
R 0.551 × 0.354 × 0.197 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
14.0 ±0.3	9.0 ±0.25	5.00 ±0.2	0.551 ±0.012	0.354 ±0.012	0.197 ±0.008	uncoated 1)
15.1 max.	7.95 min.	6.0 max.	0.594 max.	0.313 min.	0.236 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	970 ±25%	2200	B64290L0658X087	2.84	34.98	12.30	430	2.0
N30	1900 ±25%	4300	B64290L0658X830					
T65	2300 ±30%	5200	B64290L0658X065					
T35	2650 ±25%	6000	B64290L0658X035					
T37	2880 ±25%	6500	B64290L0658X037					
T38	4420 ±30%	10000	B64290L0658X038					

1) On request.

■ Epoxy coating

R 15.0 × 10.4 × 5.30 (mm)
R 0.591 × 0.409 × 0.209 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
15.0 ±0.5	10.4 ±0.4	5.30 ±0.3	0.591 ±0.020	0.409 ±0.016	0.209 ±0.012	uncoated 1)
16.3 max.	9.2 min.	6.4 max.	0.642 max.	0.362 min.	0.252 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	850 ±25%	2200	B64290L0623X087	3.24	39.02	12.05	470	2.4
N30	1670 ±25%	4300	B64290L0623X830					
T65	2020 ±30%	5200	B64290L0623X065					
T35	2330 ±25%	6000	B64290L0623X035					
T37	2520 ±25%	6500	B64290L0623X037					
T38	3880 ±30%	10000	B64290L0623X038					

■ Epoxy coating

R 15.8 × 8.90 × 4.70 (mm)
R 0.622 × 0.350 × 0.185 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
15.8 ±0.38	8.9 ±0.25	4.70 ±0.13	0.622 ±0.015	0.350 ±0.010	0.185 ±0.005	uncoated 1)
16.8 max.	8.05 min.	5.45 max.	0.661 max.	0.317 min.	0.215 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	1190 ±25%	2200	B64290L0743X087	2.33	36.75	15.78	580	3.0
N30	2320 ±25%	4300	B64290L0743X830					
T65	2800 ±30%	5200	B64290L0743X065					
T35	3240 ±25%	6000	B64290L0743X035					
T37	3500 ±25%	6500	B64290L0743X037					
T38	5400 ±30%	10000	B64290L0743X038					

1) On request.

■ Epoxy coating

R 16.0 × 9.60 × 6.30 (mm)
R 0.630 × 0.378 × 0.248 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
16.0 ±0.4	9.6 ±0.3	6.30 ±0.2	0.630 ±0.016	0.378 ±0.012	0.248 ±0.008	uncoated 1)
17.2 max.	8.5 min.	7.3 max.	0.677 max.	0.335 min.	0.287 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K1	52 ±25%	80	B64290L0045X001	1.95	38.52	19.73	760	3.7
N49	970 ±25%	1500	B64290L0045X049					
N87	1420 ±25%	2200	B64290L0045X087					
N30	2770 ±25%	4300	B64290L0045X830					
T65	3350 ±30%	5200	B64290L0045X065					
T35	3870 ±25%	6000	B64290L0045X035					
T37	4190 ±25%	6500	B64290L0045X037					
T38	6440 ±30%	10000	B64290L0045X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 0.45 W/core

1) On request.

■ Epoxy coating

R 17.0 × 10.7 × 6.80 (mm)
R 0.669 × 0.421 × 0.268 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
17.0 ±0.4	10.7 ±0.3	6.80 ±0.2	0.669 ±0.016	0.421 ±0.012	0.268 ±0.008	uncoated 1)
18.2 max.	9.6 min.	7.8 max.	0.717 max.	0.378 min.	0.307 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N87	1390 ±25%	2200	B64290L0652X087	2.00	42.00	21.04	884	4.4
N30	2710 ±25%	4300	B64290L0652X830					
T65	3250 ±30%	5200	B64290L0652X065					
T35	3770 ±25%	6000	B64290L0652X035					
T37	4080 ±25%	6500	B64290L0652X037					
T38	6280 ±30%	10000	B64290L0652X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 0.55 W/core

■ Epoxy coating

R 18.4 × 5.90 × 5.90 (mm)
R 0.724 × 0.232 × 0.232 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
18.4 ±0.4	5.9 ±0.3	5.90 ±0.2	0.724 ±0.016	0.232 ±0.012	0.232 ±0.008	uncoated 1)
19.5 max.	4.8 min.	6.7 max.	0.768 max.	0.189 min.	0.264 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N87	2950 ±25%	2200	B64290L0697X087	0.94	31.03	33.14	1029	6.9
N30	5770 ±25%	4300	B64290L0697X830					
T65	6680 ±30%	5000	B64290L0697X065					
T35	8020 ±25%	6000	B64290L0697X035					
T37	8690 ±25%	6500	B64290L0697X037					
T38	13400 ±30%	10000	B64290L0697X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 0.82 W/core

1) On request.

■ Epoxy coating

R 20.0 × 10.0 × 7.00 (mm)
R 0.787 × 0.394 × 0.276 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
20.0 ±0.4	10.0 ±0.25	7.00 ±0.3	0.787 ±0.016	0.394 ±0.010	0.276 ±0.012	uncoated [1)]
21.2 max.	8.95 min.	8.1 max.	0.835 max.	0.352 min.	0.319 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				Σl/A mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	2130 ±25%	2200	B64290L0632X087	1.30	43.55	33.63	1465	7.6
N95	2600 ±25%	3000	B64290L0632X095					
N30	4160 ±25%	4300	B64290L0632X830					
T35	5000 ±25%	5100	B64290L0632X035					
T65	5050 ±30%	5200	B64290L0632X065					
T37	6280 ±25%	6500	B64290L0632X037					
T38	9740 ±30%	10000	B64290L0632X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 0.95 W/core
N95: P_V (200 mT, 100 kHz, 100 °C) < 0.8 W/core

■ Epoxy coating

R 20.0 × 10.0 × 10.00 (mm)
R 0.787 × 0.394 × 0.394 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
20.0 ±0.4	10.0 ±0.25	10.0 ±0.2	0.787 ±0.016	0.394 ±0.010	0.394 ±0.008	uncoated [1)]
21.2 max.	8.95 min.	11.0 max.	0.835 max.	0.352 min.	0.433 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				Σl/A mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	3000 ±25%	2200	B64290L0631X087	0.906	43.55	48.05	2093	10.4
N30	5560 ±25%	4300	B64290L0631X830					
T65	7200 ±30%	5200	B64290L0631X065					
T35	7760 ±25%	6000	B64290L0631X035					
T37	8400 ±25%	6500	B64290L0631X037					
T38	12940 ±30%	10000	B64290L0631X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 1.3 W/core

1) On request.

- Epoxy coating

R 20.0 × 10.0 × 15.0 (mm)
R 0.787 × 0.394 × 0.591 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
20.0 ±0.4	10.0 ±0.25	15.0 ±0.4	0.787 ±0.016	0.394 ±0.010	0.591 ±0.016	uncoated[1)]
21.2 max.	8.95 min.	16.2 max.	0.835 max.	0.352 min.	0.638 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	4500 ±25%	2200	B64290L0710X087	0.604	43.55	72.07	3139	17.3
N30	8550 ±25%	4300	B64290L0710X830					
T65	10300 ±30%	5200	B64290L0710X065					
T35	10800 ±25%	5500	B64290L0710X035					
T37	12900 ±25%	6500	B64290L0710X037					
T38	19880 ±30%	10000	B64290L0710X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 2 W/core

- Epoxy coating

R 22.1 × 13.7 × 6.35 (mm)
R 0.870 × 0.539 × 0.250 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
22.1 ±0.4	13.7 ±0.3	6.35 ±0.3	0.870 ±0.016	0.539 ±0.012	0.250 ±0.012	uncoated[1)]
23.3 max.	12.6 min.	7.4 max.	0.917 max.	0.496 min.	0.291 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	1340 ±25%	2200	B64290L0638X087	2.07	54.15	26.17	1417	6.8
N30	2610 ±25%	4300	B64290L0638X830					
T65	3160 ±30%	5200	B64290L0638X065					
T35	3200 ±25%	5300	B64290L0638X035					
T37	3950 ±25%	6500	B64290L0638X037					
T38	6070 ±30%	10000	B64290L0638X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 0.85 W/core

1) On request.

■ Epoxy coating

R 22.1 × 13.7 × 7.90 (mm)
R 0.870 × 0.539 × 0.311 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
22.1 ±0.4	13.7 ±0.3	7.90 ±0.3	0.870 ±0.016	0.539 ±0.012	0.311 ±0.012	uncoated 1)
23.3 max.	12.6 min.	9.0 max.	0.917 max.	0.496 min.	0.354 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N49	1130 ±25%	1500	B64290L0719X049	1.66	54.2	32.6	1763	8.4
N87	1660 ±25%	2200	B64290L0719X087					
N30	3250 ±25%	4300	B64290L0719X830					
T65	3930 ±30%	5200	B64290L0719X065					
T35	4000 ±25%	5300	B64290L0719X035					
T37	4900 ±25%	6500	B64290L0719X037					
T38	7570 ±30%	10000	B64290L0719X038					

N49: P_V (50 mT, 500 kHz, 100 °C) < 0.30 W/core
N87: P_V (200 mT, 100 kHz, 100 °C) < 1.05 W/core

■ Epoxy coating

R 22.1 × 13.7 × 12.5 (mm)
R 0.870 × 0.539 × 0.492 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
22.1 ±0.4	13.7 ±0.3	12.5 ±0.5	0.870 ±0.016	0.539 ±0.012	0.492 ±0.020	uncoated 1)
23.3 max.	12.6 min.	13.8 max.	0.917 max.	0.496 min.	0.543 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	2630 ±25%	2200	B64290L0651X087	1.05	54.15	51.15	2789	14
N30	5140 ±25%	4300	B64290L0651X830					
T35	6000 ±25%	5000	B64290L0651X035					
T65	6200 ±30%	5200	B64290L0651X065					
T37	7770 ±25%	6500	B64290L0651X037					
T38	12000 ±30%	10000	B64290L0651X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 1.75 W/core

1) On request.

■ Epoxy coating

R 22.6 × 14.7 × 9.20 (mm)
R 0.890 × 0.579 × 0.362 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
22.6 ±0.4	14.7 ±0.2	9.20 ±0.2	0.890 ±0.016	0.579 ±0.008	0.362 ±0.008	uncoated[1]
23.8 max.	13.7 min.	10.2 max.	0.937 max.	0.539 min.	0.402 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N87	1740 ±25%	2200	B64290L0626X087	1.59	56.82	35.78	2033	9.8
N30	3420 ±25%	4300	B64290L0626X830					
T65	4100 ±30%	5200	B64290L0626X065					
T35	4200 ±25%	5300	B64290L0626X035					
T37	5170 ±25%	6500	B64290L0626X037					
T38	7900 ±30%	10000	B64290L0626X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 1.25 W/core

■ Epoxy coating

R 25.3 × 14.8 × 10.0 (mm)
R 0.996 × 0.583 × 0.394 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
25.3 ±0.5	14.8 ±0.5	10.0 ±0.2	0.996 ±0.020	0.583 ±0.020	0.394 ±0.008	uncoated[1]
26.6 max.	13.5 min.	11.0 max.	1.047 max.	0.531 min.	0.433 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N87	2360 ±25%	2200	B64290L0618X087	1.17	60.07	51.26	3079	16
N95	3200 ±25%	3000	B64290L0618X095					
N30	4620 ±25%	4300	B64290L0618X830					
T65	5350 ±30%	5000	B64290L0618X065					
T35	5400 ±25%	5000	B64290L0618X035					
T37	6970 ±25%	6500	B64290L0618X037					
T38	10700 ±30%	10000	B64290L0618X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 2 W/core
N95: P_V (200 mT, 100 kHz, 100 °C) < 1.85 W/core

1) On request.

- Epoxy coating

R 25.3 × 14.8 × 15.0 (mm)
R 0.996 × 0.583 × 0.590 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
25.3 ±0.5	14.8 ±0.5	15.0 ±0.4	0.996 ±0.020	0.583 ±0.020	0.590 ±0.016	uncoated[1)]
26.6 max.	13.5 min.	16.2 max.	1.047 max.	0.531 min.	0.638 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	3500 ±25%	2200	B64290L0615X087	0.78	60.07	76.89	4619	24
N30	6930 ±25%	4300	B64290L0615X830					
T65	8000 ±30%	5000	B64290L0615X065					
T37	10460 ±25%	6500	B64290L0615X037					
T38	16100 ±30%	10000	B64290L0615X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 3 W/core

- Epoxy coating

R 25.3 × 14.8 × 20.0 (mm)
R 0.996 × 0.583 × 0.787 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
25.3 ±0.5	14.8 ±0.5	20.0 ±0.5	0.996 ±0.020	0.583 ±0.020	0.787 ±0.020	uncoated[1)]
26.6 max.	13.5 min.	21.3 max.	1.047 max.	0.531 min.	0.839 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	4680 ±25%	2200	B64290L0616X087	0.59	60.07	102.5	6157	33
N30	9160 ±25%	4300	B64290L0616X830					
T65	10600 ±30%	5000	B64290L0616X065					
T35	10700 ±25%	5000	B64290L0616X035					
T37	13800 ±25%	6400	B64290L0616X037					
T38	21300 ±30%	10000	B64290L0616X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 4.1 W/core

1) On request.

■ Epoxy coating

R 29.5 × 19.0 × 14.9 (mm)
R 1.142 × 0.748 × 0.587 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
29.5 ±0.7	19.0 ±0.5	14.9 ±0.4	1.142 ±0.028	0.748 ±0.020	0.587 ±0.016	uncoated 1)
31.0 max.	17.7 min.	16.1 max.	1.220 max.	0.697 min.	0.634 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N87	2880 ±25%	2200	B64290L0647X087	0.96	73.78	76.98	5680	27
N95	3700 ±25%	3000	B64290L0647X095					
N30	5630 ±25%	4300	B64290L0647X830					
T65	6800 ±30%	5200	B64290L0647X065					
T37	8500 ±25%	6500	B64290L0647X037					
T38	13100 ±30%	10000	B64290L0647X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 2.95 W/core
N95: P_V (200 mT, 100 kHz, 100 °C) < 3.10 W/core

■ Epoxy coating

R 30.5 × 20.0 × 12.5 (mm)
R 1.201 × 0.787 × 0.492 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
30.5 ±1.0	20.0 ±0.6	12.5 ±0.4	1.201 ±0.039	0.787 ±0.024	0.492 ±0.016	uncoated 1)
32.1 max.	18.8 min.	13.5 max.	1.264 max.	0.694 min.	0.531 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N87	2320 ±25%	2200	B64290L0657X087	1.19	77.02	64.66	4980	25
N30	4540 ±25%	4300	B64290L0657X830					
T65	5400 ±30%	5100	B64290L0657X065					
T37	6400 ±25%	6100	B64290L0657X037					
T38	10600 ±30%	10000	B64290L0657X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 2.65 W/core

1) On request.

■ Epoxy coating

R 34.0 × 20.5 × 10.0 (mm)
R 1.339 × 0.807 × 0.394 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
34.0 ±0.7	20.5 ±0.5	10.0 ±0.3	1.339 ±0.028	0.807 ±0.020	0.394 ±0.012	uncoated 1)
35.5 max.	19.2 min.	11.1 max.	1.398 max.	0.756 min.	0.437 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N87	2230 ±25%	2200	B64290L0058X087	1.24	82.06	66.08	5423	27
N30	4360 ±25%	4300	B64290L0058X830					
T65	5100 ±30%	5000	B64290L0058X065					
T37	6100 ±25%	6000	B64290L0058X037					
T38	10100 ±30%	10000	B64290L0058X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 3.4 W/core

■ Epoxy coating

R 34.0 × 20.5 × 12.5 (mm)
R 1.339 × 0.807 × 0.492 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
34.0 ±0.7	20.5 ±0.5	12.5 ±0.3	1.339 ±0.028	0.807 ±0.020	0.492 ±0.012	uncoated 1)
35.5 max.	19.2 min.	13.6 max.	1.398 max.	0.756 min.	0.535 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K1	100 ±25%	80	B64290L0048X001	0.99	82.06	82.60	6778	33
N87	2790 ±25%	2200	B64290L0048X087					
N30	5460 ±25%	4300	B64290L0048X830					
T65	6400 ±30%	5000	B64290L0048X065					
T37	7600 ±25%	6000	B64290L0048X037					
T38	12700 ±30%	10000	B64290L0048X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 4.2 W/core

1) On request.

R 36.0 × 23.0 × 15.0 **B64290L0674**

R 38.1 × 19.05 × 12.7 **B64290L0668**

■ Epoxy coating

R 36.0 × 23.0 × 15.0 (mm)
R 1.417 × 0.906 × 0.591 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
36.0 ±0.7	23.0 ±0.5	15.0 ±0.4	1.417 ±0.028	0.906 ±0.020	0.591 ±0.016	uncoated 1)
37.5 max.	21.7 min.	16.2 max.	1.476 max.	0.854 min.	0.638 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N49	1300 ±25%	1500	B64290L0674X049	0.94	89.65	95.89	8597	43
N87	2940 ±25%	2200	B64290L0674X087					
N30	5750 ±25%	4300	B64290L0674X830					
T65	6800 ±30%	5000	B64290L0674X065					
T37	8000 ±25%	6000	B64290L0674X037					
T38	13500 ±30%	10000	B64290L0674X038					

N49: P_V (50 mT, 500 kHz, 100 °C) < 0.97 W/core
N87: P_V (200 mT, 100 kHz, 100 °C) < 5.4 W/core

■ Epoxy coating

R 38.1 × 19.05 × 12.7 (mm)
R 1.500 × 0.750 × 0.500 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
38.1 ±0.5	19.05 ±0.4	12.7 ±0.3	1.500 ±0.020	0.750 ±0.016	0.500 ±0.012	uncoated 1)
39.4 max.	17.85 min.	13.8 max.	1.551 max.	0.703 min.	0.543 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
N87	3870 ±25%	2200	B64290L0668X087	0.71	82.97	116.2	9644	52
N30	7570 ±25%	4300	B64290L0668X830					
T65	8800 ±30%	5000	B64290L0668X065					
T37	10500 ±25%	6000	B64290L0668X037					
T38	17600 ±30%	10000	B64290L0668X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 6.5 W/core

1) On request.

■ Epoxy coating

R 40.0 × 24.0 × 16.0 (mm)
R 1.575 × 0.945 × 0.630 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
40.0 ±1.0	24.0 ±0.7	16.0 ±0.4	1.575 ±0.039	0.945 ±0.028	0.630 ±0.016	uncoated[1)]
41.8 max.	22.5 min.	17.2 max.	1.646 max.	0.886 min.	0.677 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	3590 ±25%	2200	B64290L0659X087	0.77	96.29	125.3	12070	61
N30	7000 ±25%	4300	B64290L0659X830					
T65	8200 ±30%	5000	B64290L0659X065					
T35	8200 ±25%	5000	B64290L0659X035					
T37	9800 ±25%	6000	B64290L0659X037					

N87: P_V (200 mT, 100 kHz, 100 °C) < 7.6 W/core

■ Epoxy coating

R 41.8 × 26.2 × 12.5 (mm)
R 1.646 × 1.031 × 0.492 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
41.8 ±1.0	26.2 ±0.6	12.5 ±0.3	1.646 ±0.039	1.031 ±0.024	0.492 ±0.012	uncoated[1)]
43.6 max.	24.8 min.	13.6 max.	1.717 max.	0.976 min.	0.535 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
N87	2560 ±25%	2200	B64290L0022X087	1.08	103.0	95.75	9862	50
N30	5000 ±25%	4300	B64290L0022X830					
T65	5800 ±30%	5000	B64290L0022X065					
T37	7000 ±25%	6000	B64290L0022X037					
T38	11600 ±30%	10000	B64290L0022X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 6 W/core

1) On request.

- Epoxy coating

R 50.0 × 30.0 × 20.0 (mm)
R 1.969 × 1.181 × 0.787 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
50.0 ±1.0	30.0 ±0.7	20.0 ±0.5	1.969 ±0.039	1.181 ±0.028	0.787 ±0.020	uncoated[1)]
51.8 max.	28.5 min.	21.3 max.	2.039 max.	1.122 min.	0.839 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K10	1400 ±25%	700	B64290A0082X010	0.62	120.4	195.7	23560	120
N87	4460 ±25%	2200	B64290L0082X087					
N30	8700 ±25%	4300	B64290L0082X830					
T65	10000 ±30%	4900	B64290L0082X065					
T37	12000 ±25%	6000	B64290L0082X037					
T38	17400 ±30%	8500	B64290L0082X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 14.2 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 75 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 115 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

■ Epoxy coating

R 58.3 × 32.0 × 18.0 (mm)
R 2.295 × 1.260 × 0.709 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
58.3 ±1.0	32.0 ±0.7	18.0 ±0.5	2.295 ±0.039	1.260 ±0.028	0.709 ±0.020	uncoated 1)
60.1 max.	30.5 min.	19.3 max.	2.366 max.	1.201 min.	0.760 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	1500 ±25%	700	B64290A0043X010	0.58	134.0	230.0	30710	160
N87	4800 ±25%	2200	B64290L0043X087					
N30	9300 ±25%	4300	B64290L0043X830					
T37	13000 ±25%	6000	B64290L0043X037					
T65	10000 ±30%	4800	B64290L0043X065					
T38	17200 ±30%	8000	B64290L0043X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 19 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 80 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 120 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

■ Epoxy coating

R 58.3 × 40.8 × 17.6 (mm)
R 2.295 × 1.606 × 0.693 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
58.3 ±1.0	40.8 ±0.8	17.6 ±0.4	2.295 ±0.039	1.606 ±0.031	0.693 ±0.016	uncoated 1)
60.1 max.	39.2 min.	18.8 max.	2.366 max.	1.543 min.	0.740 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K10	900 ±25%	700	B64290A0040X010	1.00	152.4	152.4	23230	115
N87	2760 ±25%	2200	B64290L0040X087					
N30	5400 ±25%	4300	B64290L0040X830					
T65	6250 ±30%	5000	B64290L0040X065					
T37	7160 ±25%	5700	B64290L0040X037					

N87: P_V (200 mT, 100 kHz, 100 °C) < 14.5 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 45 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 70 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

■ Epoxy coating

R 58.3 × 40.8 × 20.2 (mm)
R 2.295 × 1.606 × 0.795 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
58.3 ±1.0	40.8 ±0.8	20.2 ±0.5	2.295 ±0.039	1.606 ±0.031	0.795 ±0.016	uncoated 1)
60.1 max.	39.2 min.	21.5 max.	2.366 max.	1.543 min.	0.846 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K10	1000 ±25%	700	B64290A0042X010	0.87	152.4	174.9	26660	130
N87	3200 ±25%	2200	B64290L0042X087					
N30	6200 ±25%	4300	B64290L0042X830					
T65	7200 ±30%	5000	B64290L0042X065					
T37	8000 ±25%	5600	B64290L0042X037					

N87: P_V (200 mT, 100 kHz, 100 °C) < 16.6 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 50 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 80 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

■ Epoxy coating

R 63.0 × 38.0 × 25.0 (mm)
R 2.480 × 1.496 × 0.984 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
63.0 ±1.5	38.0 ±1.2	25.0 ±0.8	2.480 ±0.059	1.496 ±0.047	0.984 ±0.031	uncoated 1)
65.3 max.	36.0 min.	26.6 max.	2.571 max.	1.417 min.	1.047 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				Σl/A mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	1800 ±25%	700	B64290A0699X010	0.50	152.1	305.9	46530	240
N87	5000 ±25%	2200	B64290L0699X087					
N30	10800 ±25%	4300	B64290L0699X830					
T65	12600 ±30%	5000	B64290L0699X065					
T37	13900 ±25%	5500	B64290L0699X037					
T38	17600 ±30%	7000	B64290L0699X038					

N87: P_V (100 mT, 100 kHz, 100 °C) < 5.2 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 95 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 140 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

- Epoxy coating

R 68.0 × 48.0 × 13.0 (mm)
R 2.677 × 1.890 × 0.512 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
68.0 ±1.2	48.0 ±1.0	13.0 ±0.4	2.677 ±0.047	1.890 ±0.039	0.512 ±0.015	uncoated [1)]
70.0 max.	46.2 min.	14.2 max.	2.756 max.	1.819 min.	0.559 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	600 ±25%	700	B64290A0696X010	1.39	178.6	128.7	22980	115
N87	1990 ±25%	2200	B64290L0696X087					
N30	3890 ±25%	4300	B64290L0696X830					
T65	4500 ±30%	5000	B64290L0696X065					
T37	5000 ±25%	5500	B64290L0696X037					
T38	7700 ±30%	8500	B64290L0696X038					

N87: P_V (200 mT, 100 kHz, 100 °C) < 13 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 30 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 50 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

■ Epoxy coating

R 87.0 × 54.3 × 13.5 (mm)
R 3.425 × 2.138 × 0.531 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
87.0 ±1.5	54.3 ±1.1	13.5 ±0.3	3.425 ±0.059	2.138 ±0.043	0.531 ±0.012	uncoated 1)
89.3 max.	52.4 min.	14.8 max.	3.516 max.	2.063 min.	0.583 max.	coated

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				Σl/A mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	900 ±25%	700	B64290A0730X010	0.99	213.9	216.7	46360	235
N87	2790 ±25%	2200	B64290L0730X087					
N30	5400 ±25%	4300	B64290L0730X830					
T65	6280 ±30%	5000	B64290L0730X065					
T37	7000 ±25%	5500	B64290L0730X037					

N87: P_V (100 mT, 100 kHz, 100 °C) < 5 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 45 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 70 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

■ Epoxy coating

R 102 × 65.8 × 15.0 (mm)
R 4.016 × 2.591 × 0.591 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
102.0 ±2.0	65.8 ±1.3	15.0 ±0.5	4.016 ±0.079	2.591 ±0.051	0.591 ±0.020	uncoated 1)
104.8 max.	63.7 min.	16.5 max.	4.126 max.	2.508 min.	0.650 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics $\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	Approx. weight g
K10	900 ±25%	700	B64290A0084X010	0.96	255.3	267.2	68220	330
N87	2880 ±25%	2200	B64290L0084X087					
N30	5500 ±25%	4200	B64290L0084X830					
T65	6500 ±30%	5000	B64290L0084X065					
T38	7900 ±30%	6000	B64290L0084X038					

N87: P_V (100 mT, 100 kHz, 100 °C) < 7.8 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 50 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 75 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

■ Without coating

R 140 × 103 × 25.0 (mm)
R 5.512 × 4.055 × 0.984 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
140.0 ±3.0	103 ±2.0	25.0 ±1.0	5.512 ±0.118	4.055 ±0.079	0.984 ±0.039	uncoated
143.8 max.	100.2 min.	27.2 max.	5.661 max.	3.945 min.	1.071 max.	coated

Characteristics and ordering codes

Mate-rial	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	1100 ±25%	700	B64290A0705X010	0.82	375.8	458.9	172440	860
N87	3400 ±25%	2200	B64290L0705X087					
N30	6200 ±25%	4000	B64290L0705X830					
T37	8400 ±25%	5500	B64290L0705X037					

N87: P_V (100 mT, 100 kHz, 100 °C) < 20 W/core
K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 55 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 85 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

- Without coating

R 202.0 × 153 × 25.0 (mm)
R 7.953 × 6.024 × 0.984 (inch)

Dimensions

d_a (mm)	d_i (mm)	Height (mm)	d_a (inch)	d_i (inch)	Height (inch)	
202.0 ±4.0	153.0 ±3.0	25.0 ±1.0	7.953 ±0.157	6.024 ±0.118	0.984 ±0.039	uncoated
207.0 max.	149.0 min.	27.5 max.	8.150 max.	5.866 min.	1.083 max.	coated [1)]

Characteristics and ordering codes

Material	A_L value nH	μ_i (approx.)	Ordering code	Magnetic characteristics				Approx. weight g
				$\Sigma l/A$ mm^{-1}	l_e mm	A_e mm^2	V_e mm^3	
K10	970 ±25%	700	B64290A0711X010	0.90	550.5	608.6	335030	1600
N30	5200 ±25%	3700	B64290A0711X830					

K10: Z (0.25 mT, 25 MHz, 25 °C, 1 turn): 50 Ω typ.
(0.25 mT, 100 MHz, 25 °C, 1 turn): 75 Ω typ.

The capacitive effect of turns is not evaluated. Minimum impedance is $|Z|_{typ}$ -15%.

1) On request.

Toroids (ring cores) accessories

General information

Examples of final applications of ring core accessories

Application of ring core housings – horizontal / vertical version

Application of ring core base plate

Epoxy coated ring cores and accessories is ideal combination for current-compensated chokes. Combination of various wire diameters and hole/pin arrangement offer many alternatives of application.

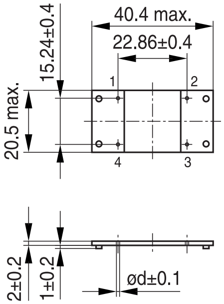
Base plate for ring cores

Material: GFR polycarbonate UL94 V-0
Makrolon 9415 [E41613], color code blue, COVESTRO AG

Base plate					Ordering code
Figure	Dimensions mm	Hole diameter d mm	Lead spacing mm	Holes	
a	40.4 × 20.5	1.1	22.86 × 15.24	4	B64293A1000X000
	40.4 × 20.5	1.4	22.86 × 15.24	4	B64293A1100X000
b	∅ 47.8	1.7	see picture	8	B64293A1200X000 1)
c	∅ 64.0	2.9	see picture	6	B64293A1300X000 2)
	∅ 64.0	2.1	see picture	6	B64293A1400X000 2)

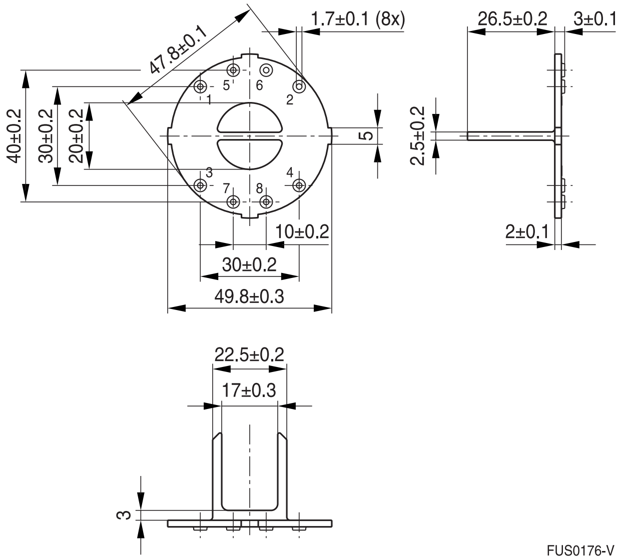
1) Combination with ring core housing B64291A1704X000
2) Hole diameter 1.0 … 3.1 mm possible

Figure a



FUS0174-E

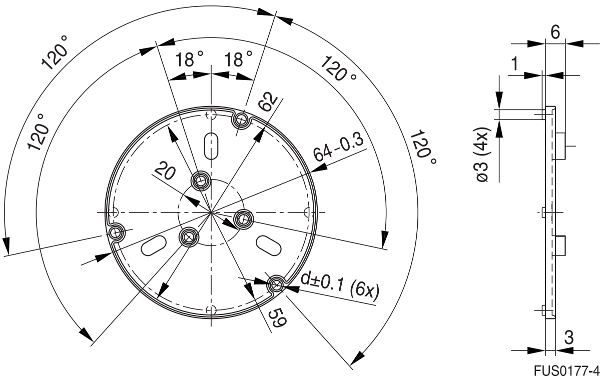
Figure b *)



FUS0176-V

*) Combination with ring core housing B64291A1704X000

Figure c



FUS0177-4

Tolerances to ISO 2768-C unless otherwise noted.
Dimensions in mm.

Housings for ring cores – horizontal version

Material: B64291A: GFR polycarbonate UL94 V-0
Makrolon 9415 [E41613], color code blue, COVESTRO AG
B64291B: GFR liquid crystal polymer UL94 V-0
Vectra E130i [E83005], color code natural, CELANESE INTERNATIONAL CORP.

Solderability (lead-free): to IEC 60068-2-20, test Ta, + 245 ± 5 °C, 3 ± 0.3 s
Resistance to soldering heat (wave soldering): to IEC 60068-2-20, test Tb, + 260 ± 5 °C, 10 ± 1 s

Housings – horizontal version					Ordering code
Figure	Inner diameter d_i mm	Height mm	Lead spacing mm	Pins	
a	11.6	9.6	10 × 10	4	B64291A1004X000
b	12.0	8.0	see picture	8	B64291B1008X000
c	20.4	13.3	20 × 12.5	4	B64291A1104X000
d	26.0	16.8	25 × 15	4	B64291A1204X000
e	30.0	19.7	30 × 20	4	B64291A1304X000
f	30.0	25.0	30 × 20	4	B64291A1404X000
g	39.3	25.0	15 × 40	4	B64291A1504X000
h	39.3	30.0	15 × 40	4	B64291A1604X000
i	48.0	32.0	–	–	B64291A1704X000 1)
j	70.6	39.1	–	–	B64291A1804X000

1) Combination with base plate B64293A1200X000

Figure a

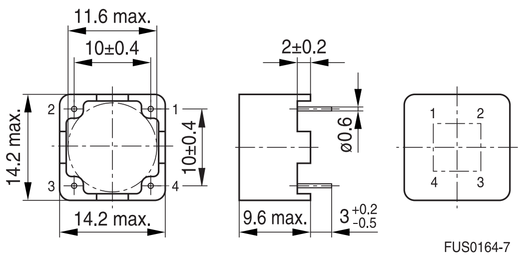
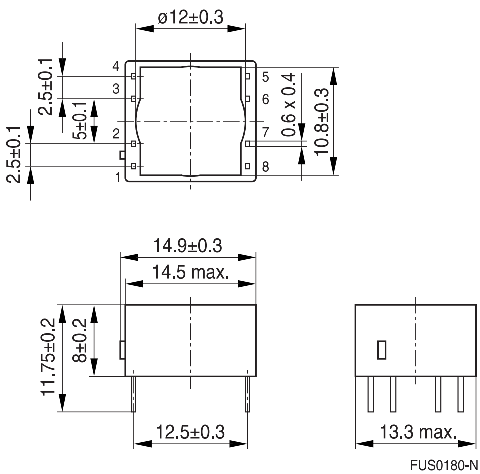


Figure b



Tolerances to ISO 2768-C unless otherwise noted.
Dimensions in mm.

Figure c

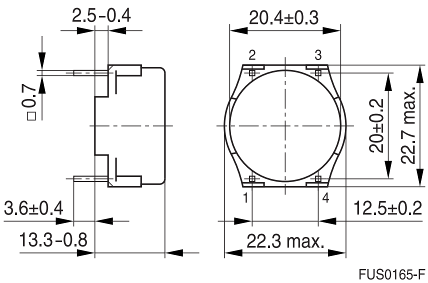


Figure d

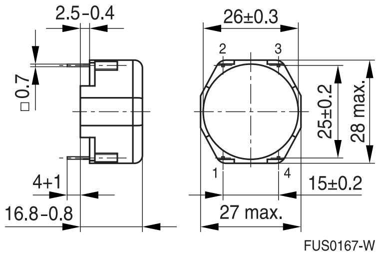


Figure e

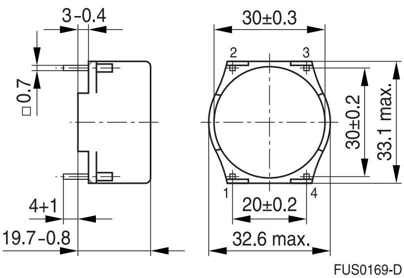


Figure f

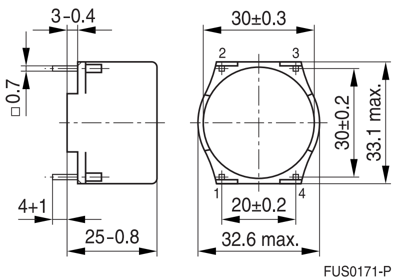
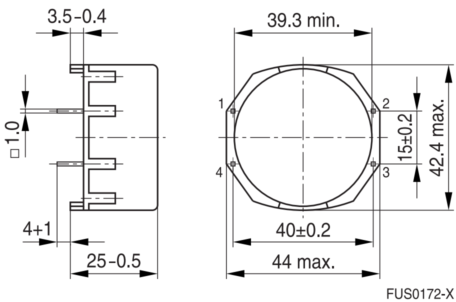


Figure g



Tolerances to ISO 2768-C unless otherwise noted.
Dimensions in mm.

Figure h

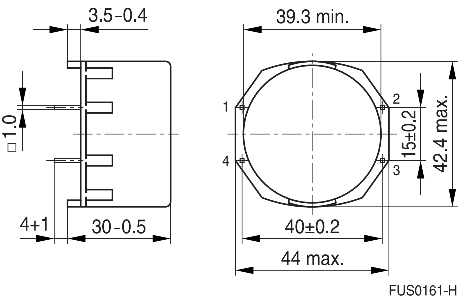


Figure i*)

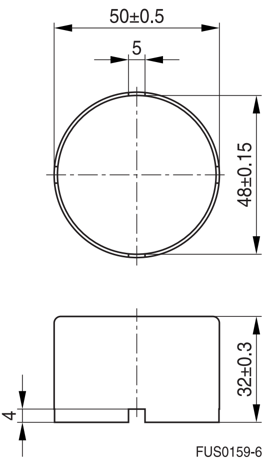
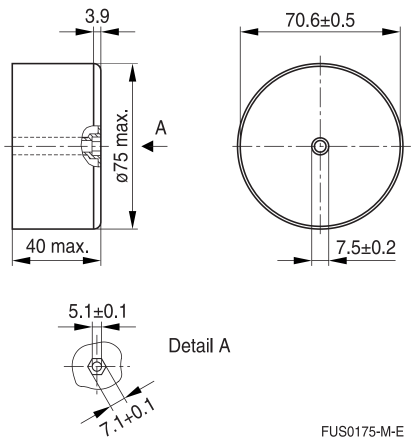


Figure j



*) Combination with base plate B64293A1200X000

Tolerances to ISO 2768-C unless otherwise noted.
Dimensions in mm.

Housings for ring cores – vertical version

Material: B64292A: GFR polycarbonate UL94 V-0
Makrolon 9415 [E41613], color code blue, COVESTRO AG
B64292B: GFR liquid crystal polymer UL94 V-0
Vectra E130i [E83005], color code natural, CELANESE INTERNATIONAL CORP.

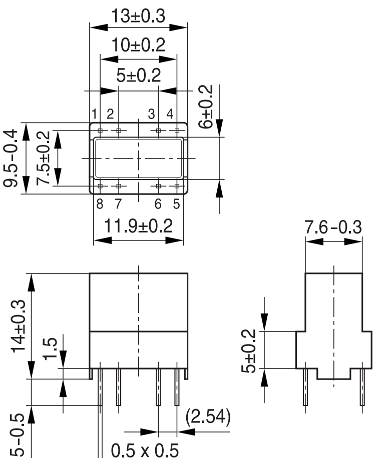
Solderability (lead-free): to IEC 60068-2-20, test Ta, + 245 ± 5 °C, 3 ± 0.3 s

Resistance to soldering heat (wave soldering): to IEC 60068-2-20, test Tb, + 260 ± 5 °C, 10 ± 1 s

Housings – vertical version					Ordering code
Figure	Inner diameter d_i mm	Height mm	Lead spacing mm	Pins	
a	11.9 × 6.0	14.0	10.0 × 7.5	4	B64292A1004X000
	11.9 × 6.0	14.0	10.0 × 7.5	4	B64292B1004X000
	11.9 × 6.0	14.0	see picture	8	B64292A1008X000
b	21.0 × 10.5	25.4	10.0 × 12.5	4	B64292A1104X000
c	25.7 × 13.2	30.5	12.5 × 15.0	4	B64292A1204X000
d	29.0 × 11.3	33.2	12.5 × 15.0	4	B64292A1304X000
e	38.3 × 13.3	40.0	12.5 × 17.5	4	B64292A1404X000

1) B64292A1604X000 with unsymetrical lead spacing (12.7 × 2.54/5.08 mm)

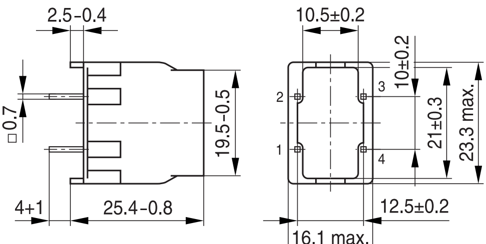
Figure a*)



FUS0160-9

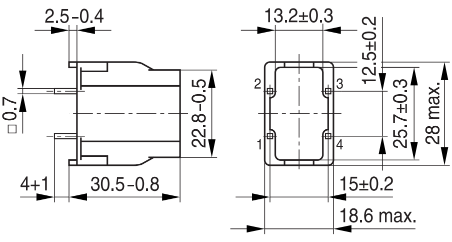
*) For 4 PIN version B64292A1004X000
and B64292B1004X000 PIN 2, 3, 6 and 7 omitted

Figure b



FUS0166-N

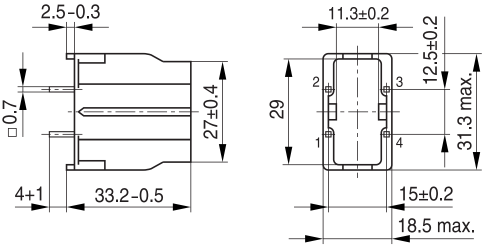
Figure c



FUS0168-5

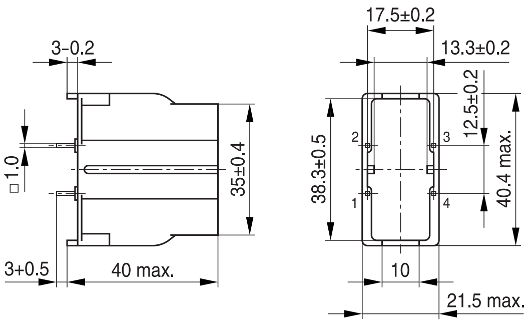
Tolerances to ISO 2768-C unless otherwise noted.
Dimensions in mm.

Figure d



FUS0170-G

Figure e



FUS0173-6

Tolerances to ISO 2768-C unless otherwise noted.
Dimensions in mm.

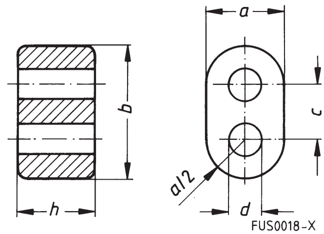
Double-aperture cores

B62152

Primarily used for broadband transformers up to high frequencies

Application examples

- SIFERRIT material N30 for low frequencies and for pulse applications
- SIFERRIT material K1 for matching transformers and baluns up to about 250 MHz in antenna feeders or in input circuits of VHF and TV receivers



Dimensions[1]					Magnetic characteristics				Weight
h mm	b mm	a mm	c mm	d mm	$\Sigma l/A$[2] mm^{-1}	l_e[2] mm	A_e[2] mm^2	V_e[2] mm^3	 g
14.5 – 1.0	14.50 – 1.0	8.5 – 0.5	5.85 ±0.25	3.4 + 0.60	0.31	15.3	49.7	760	4.0
8.3 – 0.6	14.50 – 1.0	8.5 – 0.5	5.85 ±0.25	3.4 + 0.60	0.54	15.3	28.4	435	2.5
6.2 – 0.5	7.25 – 0.5	4.2 – 0.4	2.90 ±0.15	1.7 + 0.30	0.75	7.6	10.2	78	0.4
2.5 – 0.2	3.60 – 0.3	2.1 – 0.3	1.45 ±0.10	0.8 + 0.15	1.78	3.7	2.1	7.8	0.1
2.0 – 0.2	3.60 – 0.3	2.1 – 0.3	1.45 ±0.10	0.8 + 0.15	2.20	3.7	1.7	6.3	0.1
1.4 – 0.2	3.60 – 0.3	2.1 – 0.3	1.45 ±0.10	0.8 + 0.15	3.22	3.7	1.2	4.5	0.05

Dimensions with parylene coating[3]				
Core	Max. coated h mm	Max. coated b mm	Max. coated a mm	Min. coated d mm
DL 14.5/14.5 /8.5	14.55	14.55	8.55	3.35
DL 8.3/14.5 /8.5	8.35	14.55	8.55	3.35
DL 6.2/ 7.25/4.2	6.25	7.30	4.25	1.65
DL 2.5/ 3.6 /2.1	2.55	3.65	2.15	0.75
DL 2.0/ 3.6 /2.1	2.05	3.65	2.15	0.75
DL 1.4/ 3.6 /2.1	1.45	3.65	2.15	0.75

1) Cores made of NiZn ferrite may exceed the specified dimensions by up to 5%.
2) Magnetic characteristics and A_L value are based on winding of center leg.
3) Double-aperture cores are available with parylene coating on request. Ordering code for coated version: B62152P…

Overview of available types

Core height h mm	Material	A_L value[1] nH (Tol. ±30%)	Ordering code[2]
14.5 –1.0	K1	330	B62152A0001X001
8.3 –0.6	K1 N30	190 10000	B62152A0004X001 B62152A0004X030
6.2 –0.5	K1 N30	140 7300	B62152A0007X001 B62152A0007X030
2.5 –0.2	K1 N30	60 3100	B62152A0008X001 B62152A0008X030
2.0 –0.2	K1 N30	42 2400	B62152A0027X001 B62152A0027X030
1.4 –0.2	N30	1600	B62152A0015X030

1) Magnetic characteristics and A_L value are based on winding of center leg.
2) Double-aperture cores are available with parylene coating on request.
Ordering code for coated version: B62152P…

Ferrite polymer composites

General information

Ferrite cores are familiar as brittle, rigid and bulky components for high-inductance coils and transformers. The performance of such ferrites depends very much on external influences such as temperature, pressure, electromagnetic fields and frequency.

FPC is a homogeneous mixture of ferrite powder and plastic with outstanding mechanical and magnetic properties. This rugged material can be processed into injection-molded parts or thin, flexible film to open up innovative applications.

The new C351 film is suitable for high-temperature applications up to 200 °C and is UL 94-V0-listed. It is also available in various thicknesses from 0.2 to 0.4 mm. Special shape of foil on request (various width, separated piece by piece, etc.). FPC film of materials C350 and C351 can also be supplied in self-adhesive versions.

FPC film is ideal for EMC applications, e.g. to shield coils against metals or absorb interference at frequencies of 500 MHz and higher. It opens up many other applications, such as implementation of low-profile coils for identification systems and electronic article surveillance in retailing and logistics, for sensors or contactless smart cards. This innovative material is also suitable as spacing between ferrite cores – instead of air gaps or non-magnetic films – to suppress leakage fields, for instance, or to adjust the biasing curve.

Basic features

- FPC is a composite material of polymer and ferrite
- FPC film is a thin, mechanically flexible film

Technical benefits

- Stable magnetic characteristics
- Low weight: FPC film is 40% lower in density than ferrite
- High mechanical strength
- Shaping as required: customer-specific solutions possible
- Economy: easy transport and storage,
  simple, rationalized processing, low mounting volume
- C351 film suitable for high-temperature applications (up to 200 °C)
- Material C351 approved to UL 94-V0 (E 140 693)
- Various film thickness (from 0.2 to 0.4 mm), thickness tolerance ±15%
- Self-adhesive versions (limited shelf life)

Applications

- Implementation of low-profile coils, e.g. for
  – identification systems
  – security tags for electronic article surveillance
  – sensors
  – inductive reading of smart cards
- Electromagnetic shielding of coils from metals to prevent interference
- EMC: absorption of radiated emissions at frequencies ≥500 MHz
- Compensation of deflection yokes to correct distortion at the corners of TV screens and monitors
- Spacing between ferrite cores (as a substitute for air gaps or non-magnetic films) for
  – suppression of the leakage field
  – adjustment of the biasing curve

Ordering details

The ordering codes are structured as follows:

1st group Design	2nd group Film thickness/width		3rd group Copper coating[1]/material	
B68450 = Film on reel	A = 0.2 mm B = 0.3 mm	0080 = 80 mm	X = Default letter	350 = C350 351 = C351
B68451 = Film on reel, self-adhesive				

Material	Thickness (mm)	Extra features	Ordering code
C350	0.2		B68450A0080X350
C351	0.2		B68450A0080X351
C350	0.2	self-adhesive	B68451A0080X350[2]
C351	0.3	self-adhesive	B68451B0080X351[2]

FPC film is supplied in units of 50 m length.

1) Copper coating only in combination with C351.
2) On request

Physical properties (material values defined on 0.2 mm thick film)

Material	Symbol	Unit	C350	C351[3]
Initial permeability[1] f = 1 MHz	μ_i		9 ±30%	9 ±30%
Flux density (near saturation)[1] H = 25 kA/m f = 10 kHz	B_S	mT	255	255
Remanent flux density[1] H = 25 kA/m f = 10 kHz	B_r	mT	9	9
Coercive field strength[1] H = 25 kA/m f = 10 kHz	H_C	A/m	600	600
Relative loss factor[1] f = 10 MHz f = 1 GHz	$\tan\delta/\mu_i$		 <0.005 <0.400	 <0.005 <0.400
Hysteresis material constant	η_B	10^{-3}/mT	<2	<2
Temperature coefficient[1]	$\alpha = \Delta\mu/\mu\Delta T$	1/K	$<5 \cdot 10^{-5}$	$<5 \cdot 10^{-5}$
Density		kg/m^3	2930	2930
Resistivity [1] f = 1 kHz f = 10 MHz	ρ	Ωm	 500 100	 500 100
Dielectric constant[1] f = 1 kHz f = 10 MHz	ε_r		 700 21	 700 21
Dielectric strength		kV/mm	1	0.8
Max. operating temperature	T_{max}	°C	120	200
Tensile strength[2]	σ_Z	N/mm^2	1.5	2.5

1) T = 25 °C to IEC 51 (CO) 282
2) T = 23 °C and 50% r.h.
3) UL 94, flame class V0 (listed E 140 693)

Mechanical stress and mounting

Ferrite cores have to meet mechanical requirements during assembling and for a growing number of applications. Since ferrites are ceramic materials one has to be aware of the special behavior under mechanical load.

As valid for any ceramic material, ferrite cores are brittle and sensitive to any shock, fast temperature changing or tensile load. Especially high cooling rates under ultrasonic cleaning and high static or cyclic loads can cause cracks or failure of the ferrite cores.

For detailed information see data book, chapter *"General - Definitions, 8.1"*.

Effects of core combination on A_L value

Stresses in the core affect not only the mechanical but also the magnetic properties. It is apparent that the initial permeability is dependent on the stress state of the core. The higher the stresses are in the core, the lower is the value for the initial permeability. Thus the embedding medium should have the greatest possible elasticity.

For detailed information see data book, chapter *"General - Definitions, 8.1"*.

Heating up

Ferrites can run hot during operation at higher flux densities and higher frequencies.

NiZn-materials

The magnetic properties of NiZn-materials can change irreversible in high magnetic fields.

Ferrite Accessories

EPCOS ferrite accessories have been designed and evaluated only in combination with EPCOS ferrite cores. EPCOS explicitly points out that EPCOS ferrite accessories or EPCOS ferrite cores may not be compatible with those of other manufacturers. Any such combination requires prior testing by the customer and will be at the customer‘s own risk.

EPCOS assumes no warranty or reliability for the combination of EPCOS ferrite accessories with cores and other accessories from any other manufacturer.

Processing remarks

The start of the winding process should be soft. Else the flanges may be destroyed.

– Too strong winding forces may blast the flanges or squeeze the tube that the cores can not be mounted any more.
– Too long soldering time at high temperature (>300 °C) may effect coplanarity or pin arrangement.
– Not following the processing notes for soldering of the J-leg terminals may cause solderability problems at the transformer because of pollution with Sn oxyde of the tin bath or burned insulation of the wire. For detailed information see chapter *"Processing notes"*, section 2.2.
– The dimensions of the hole arrangement have fixed values and should be understood as a recommendation for drilling the printed circuit board. For dimensioning the pins, the group of holes can only be seen under certain conditions, as they fit into the given hole arrangement. To avoid problems when mounting the transformer, the manufacturing tolerances for positioning the customers' drilling process must be considered by increasing the hole diameter.

Display of ordering codes for EPCOS products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications and the website of EPCOS, or in order-related documents such as shipping notes, order confirmations and product labels. **The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products**. Detailed information can be found on the Internet under www.epcos.com/orderingcodes.

Ferrites and accessories

Symbols and terms

Symbol	Meaning	Unit
A	Cross section of coil	mm^2
A_e	Effective magnetic cross section	mm^2
A_L	Inductance factor; $A_L = L/N^2$	nH
A_{L1}	Minimum inductance at defined high saturation ($\hat{=}\ \mu_a$)	nH
A_{min}	Minimum core cross section	mm^2
A_N	Winding cross section	mm^2
A_R	Resistance factor; $A_R = R_{Cu}/N^2$	$\mu\Omega = 10^{-6}\ \Omega$
B	RMS value of magnetic flux density	Vs/m^2, mT
ΔB	Flux density deviation	Vs/m^2, mT
$\hat{B}$	Peak value of magnetic flux density	Vs/m^2, mT
$\Delta\hat{B}$	Peak value of flux density deviation	Vs/m^2, mT
B_{DC}	DC magnetic flux density	Vs/m^2, mT
B_R	Remanent flux density	Vs/m^2, mT
B_S	Saturation magnetization	Vs/m^2, mT
C_0	Winding capacitance	F = As/V
CDF	Core distortion factor	$mm^{-4.5}$
DF	Relative disaccommodation coefficient DF = d/μ_i	
d	Disaccommodation coefficient	
E_a	Activation energy	J
f	Frequency	s^{-1}, Hz
f_{cutoff}	Cut-off frequency	s^{-1}, Hz
f_{max}	Upper frequency limit	s^{-1}, Hz
f_{min}	Lower frequency limit	s^{-1}, Hz
f_r	Resonance frequency	s^{-1}, Hz
f_{Cu}	Copper filling factor	
g	Air gap	mm
H	RMS value of magnetic field strength	A/m
$\hat{H}$	Peak value of magnetic field strength	A/m
H_{DC}	DC field strength	A/m
H_c	Coercive field strength	A/m
h	Hysteresis coefficient of material	10^{-6} cm/A
h/μ_i^2	Relative hysteresis coefficient	10^{-6} cm/A
I	RMS value of current	A
I_{DC}	Direct current	A
$\hat{I}$	Peak value of current	A
J	Polarization	Vs/m^2
k	Boltzmann constant	J/K
k_3	Third harmonic distortion	
k_{3c}	Circuit third harmonic distortion	
L	Inductance	H = Vs/A

Symbol	Meaning	Unit
$\Delta L/L$	Relative inductance change	H
L_0	Inductance of coil without core	H
L_H	Main inductance	H
L_p	Parallel inductance	H
L_{rev}	Reversible inductance	H
L_s	Series inductance	H
l_e	Effective magnetic path length	mm
l_N	Average length of turn	mm
N	Number of turns	
P_{Cu}	Copper (winding) losses	W
P_{trans}	Transferrable power	W
P_V	Relative core losses	mW/g
PF	Performance factor	
Q	Quality factor ($Q = \omega L/R_s = 1/\tan \delta_L$)	
R	Resistance	Ω
R_{Cu}	Copper (winding) resistance (f = 0)	Ω
R_h	Hysteresis loss resistance of a core	Ω
ΔR_h	R_h change	Ω
R_i	Internal resistance	Ω
R_p	Parallel loss resistance of a core	Ω
R_s	Series loss resistance of a core	Ω
R_{th}	Thermal resistance	K/W
R_V	Effective loss resistance of a core	Ω
s	Total air gap	mm
T	Temperature	°C
ΔT	Temperature difference	K
T_C	Curie temperature	°C
t	Time	s
t_v	Pulse duty factor	
$\tan \delta$	Loss factor	
$\tan \delta_L$	Loss factor of coil	
$\tan \delta_r$	(Residual) loss factor at $H \to 0$	
$\tan \delta_e$	Relative loss factor	
$\tan \delta_h$	Hysteresis loss factor	
$\tan \delta/\mu_i$	Relative loss factor of material at $H \to 0$	
U	RMS value of voltage	V
$\hat{U}$	Peak value of voltage	V
V_e	Effective magnetic volume	mm^3
Z	Complex impedance	Ω
Z_n	Normalized impedance $\lvert Z\rvert_n = \lvert Z\rvert / N^2 \times \varepsilon\, (l_e/A_e)$	Ω/mm

Symbols and terms

Symbol	Meaning	Unit
α	Temperature coefficient (TK)	1/K
α_F	Relative temperature coefficient of material	1/K
α_e	Temperature coefficient of effective permeability	1/K
ε_r	Relative permittivity	
Φ	Magnetic flux	Vs
η	Efficiency of a transformer	
η_B	Hysteresis material constant	mT^{-1}
η_i	Hysteresis core constant	$A^{-1}H^{-1/2}$
λ_s	Magnetostriction at saturation magnetization	
μ	Relative complex permeability	
μ_0	Magnetic field constant	Vs/Am
μ_a	Relative amplitude permeability	
μ_{app}	Relative apparent permeability	
μ_e	Relative effective permeability	
μ_i	Relative initial permeability	
μ_p'	Relative real (inductive) component of $\overline{\mu}$ (for parallel components)	
μ_p''	Relative imaginary (loss) component of $\overline{\mu}$ (for parallel components)	
μ_r	Relative permeability	
μ_{rev}	Relative reversible permeability	
μ_s'	Relative real (inductive) component of $\overline{\mu}$ (for series components)	
μ_s''	Relative imaginary (loss) component of $\overline{\mu}$ (for series components)	
μ_{tot}	Relative total permeability derived from the static magnetization curve	
ρ	Resistivity	Ωm^{-1}
$\Sigma l/A$	Magnetic form factor	mm^{-1}
τ_{Cu}	DC time constant $\tau_{Cu} = L/R_{Cu} = A_L/A_R$	s
ω	Angular frequency; $\omega = 2\,\Pi f$	s^{-1}

All dimensions are given in mm.

SMD Surface-mount device

Ordering code structure

RM, P,PQ, EP, ER9,5, ER11 cores

(Example here RM 4)

B65803	N	0160	A	048

- B65803: Part number
- N: Code letter for revision status and version
- 0160: A_L value in nH
  Given only for gapped cores.
  Not specified for ungapped cores
  (e.g. B65803J0000R030)
- A: Letter giving A_L value tolerance
- 048: Short designation for the SIFERRIT material
  (048 ≙ N48, 001 ≙ K1, 033 ≙ M33 etc.)

Letter giving A_L value tolerance

A ≙ ± 3%	K ≙ ±10%
B ≙ ± 4%	L ≙ ±15%
C ≙ ± 6%	M ≙ ±20%
D ≙ ± 8%	R ≙ +30/–20%
E ≙ ± 7%	U ≙ +80/– 0%
H ≙ ±12%	Y ≙ +40/–30%
J ≙ ± 5%	X ≙ Filling letter

E, ELP, EQ, ER, ETD, EFD, EV cores

These cores are supplied as single units; each packing unit contains only cores either with or without shortened center leg (gap dimension »g«). The typical value given in the tables for the A_L value applies to a core set consisting of one core with a shortened center leg and one core without a shortened center leg (dimension »g« approx. 0). E cores with a toleranced A_L value are available on request. We then prefer a symmetrical air gap distribution.

Ordering example (here ETD 29)

B66358	G	1000	X	1	27

- B66358: Part number
- G: See table “Code letters of E cores”
- 1000: See table “Code letters of E cores”
- X: Code letter for A_L tolerance (see table) or filling number
- 1 27: Short designation for the SIFERRIT material
  (027 ≙ N27, 087 ≙ N87 etc.)

Versions (code letters) of RM cores

Type	with center hole (without threaded sleeve)	with center hole (with threaded sleeve)	without center hole	low-profile version
RM 4	A	N	J	P
RM 5	C	N	J	P
RM 6	C	N	J	P
RM 7	A	N	J	P
RM 8	D	F	J	P
RM 10	D	N	J	P
RM 12	—	—	E	P
RM 14	—	—	E	P

Versions (code letters) of P cores

Type	with center hole (without threaded sleeve)	with center hole (with threaded sleeve)	without center hole
P 3,3 × 2,6	—	—	C
P 4,6 × 4,1	B	—	—
P 5,8 × 3,3	D	—	—
P 7 × 4	A	—	—
P 9 × 5	D	T	W
P 11 × 7	D	T	W
P 14 × 8	D	T	W
P 18 × 11	D	T	W
P 22 × 13	D	N	W
P 26 × 16	D	T	W
P 30 × 19	D	T	W
P 36 × 22	D	T	W
P 41 × 25	J	—	—

Versions (code letters) of E cores

Code letter	Pairing	Code number	Tolerance
G	E – E	Air gap dimensions in µm Not specified for ungapped cores	Air gap toleranced
U	E – E	A_L value in nH	A_L value, asymmetric air gap
A	E – E	A_L value in nH	A_L value, symmetric air gap
W	E – I (for ELP, EQ and ER planar cores)	A_L value in nH	A_L value
K	I core (plate for ELP, EQ and ER planar cores)	—	—
E	Customized set	—	—
F	Mirror polished	—	—
H	E – E	Stepped air gap	—
Q	E – E	Distributed air gap	A_L priority
R	E – E	Distributed air gap	Air gap priority

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