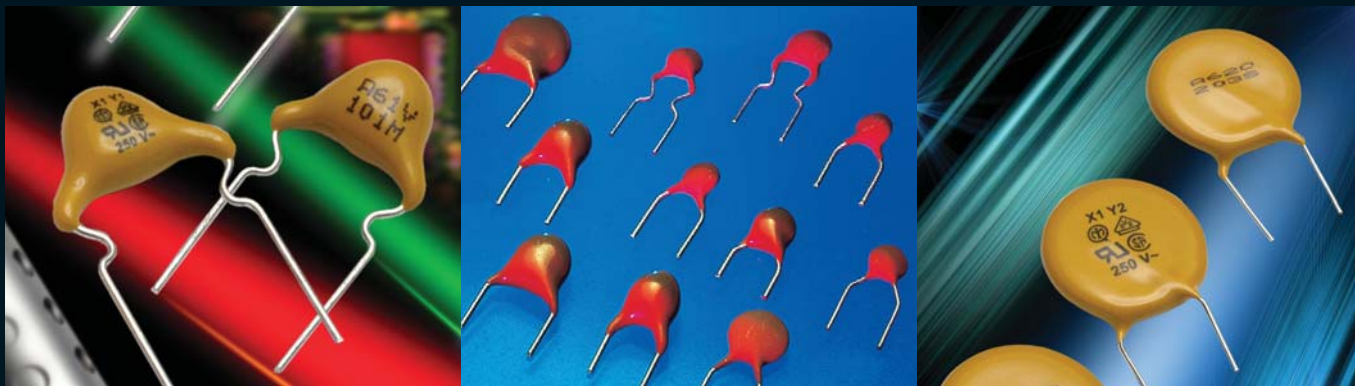


AVX Disc Ceramic Capacitors



Version 7.1

AVX
A KYOCERA GROUP COMPANY

Disc Ceramic Capacitors



Selection Guide

	General Purpose		Professional Application		Class	Voltage (dc)	Capacitance C _R (min.~ max.)		Tolerance	R isol Min.
	Ref	TC	Ref	TC						
LOW VOLTAGE (up to 500V)	5WF 5YF	Y5P Y5U	6WF 6YF	Y5P Y5U	III	25V	4.7nF 4.7nF	100nF 220nF	±20% / -20 + 50% -20 + 80%	1... 12 M Ω
	5WH 5YH	Y5P Y5U	6WH 6YH	Y5P Y5U	III	50V	4.7nF 4.7nF	100nF 100nF	±20% / -20 + 50% -20 + 80%	1... 12 M Ω
	5ZH	Y5V	6ZH	Y5V	III	50V	4.7nF	220nF	±20% / -20 + 80%	100 M Ω
	5AK 5GK 5HK	NP0 N750 N1500	6AK 6GK 6HK	NP0 N750 N1500	I	100V	1.0pF 1.5pF 5.6pF	390pF 270pF 330pF	CR < 10pF → ±0.25pF / ±0.5pF CR ≥ 10pF → ±5% / ±10%	10 G Ω
	5MK 5NK 5OK 5SK 5TK 5UK	Y5E Y5F Y5P Y5U Y5V Z5V	6MK 6NK 6OK 6SK 6TK 6UK	X5E X5F X5P X5U X5V Z5V	II	100V	56pF 390pF 470pF 680pF 1.2nF 4.7nF	3.3nF 4.7nF 6.8nF 12nF 22nF 100nF	±10% / 20% ±10% / 20% ±10% / 20% ±20% / -20 + 50% -20 + 50% -20 + 50%	10 G Ω
	5AQ 5GQ 5HQ	NP0 N750 N1500	6AQ 6GQ 6HQ	NP0 N750 N1500	I	500V	1.0pF 1.5pF 5.6pF	330pF 330pF 330pF	CR < 10pF → ±0.25pF / ±0.5pF CR ≥ 10pF → ±5% / ±10%	10 G Ω
	5MQ 5NQ 5OQ 5SQ 5TQ	Y5E Y5F Y5P Y5U Y5V	6MQ 6NQ 6OQ 6SQ 6TQ	X5E X5F X5P X5U X5V	II	500V	56pF 390pF 330pF 680pF 1.2nF	4.7nF 4.7nF 10nF 100nF 33nF	±10% / 20% ±10% / 20% ±10% / 20% ±20% / -20 + 50% -20 + 50%	10 G Ω
	5KK 5KQ	P350... ...N1500			SL	100V 500V	1.0pF	1000pF	CR < 10pF → ±0.25pF / ±0.5pF CR ≥ 10pF → ±5% / ±10% / ±20%	10 G Ω
	5AR 5AS 5AT 5AU 5GR 5GS 5GT 5GU 5GW	NP0 NP0 NP0 NP0 N750 N750 N750 N750 N750			I	1kV 2kV 3kV 4kV 1kV 2kV 3kV 4kV 5kV	2.2pF 3.9pF 2.2pF 4.7pF 8.2pF 6.8pF 6.8pF 10pF 8.2pF	180pF 150pF 120pF 100pF 270pF 330pF 220pF 120pF 120pF	CR < 10pF → ±0.25pF / ±0.5pF CR ≥ 10pF → ±5% / ±10%	10 G Ω
	5NR 5NS 5NT 5SR 5SS 5ST 5SU 5SW 5TR 5TS 5TT	Y5F Y5F Y5F Y5U Y5U Y5U Y5U Y5U Y5V Y5V Y5V			II	1kV 2kV 3kV 1kV 2kV 3kV 4kV 5kV 1kV 2kV 3kV	47pF 47pF 47pF 100pF 330pF 100pF 100pF 100pF 820pF 1.0nF 1.2nF	4.7nF 5.6nF 3.9nF 100nF 12nF 10nF 6.8nF 4.7nF 22nF 22nF 10nF	±10% / ±20% ±10% / ±20% ±10% / ±20% ±20% / -20 + 50% ±20% / -20 + 50% ±20% / -20 + 50% ±20% / -20 + 50% ±20% / -20 + 50% -20 + 50% -20 + 50% -20 + 50%	10 G Ω
	5KR 5KS 5KT	N1000			SL	1kV 2kV 3kV	47pF 47pF 22pF	1000pF 1000pF 1000pF	CR < 10pF → ±0.25pF / ±0.5pF CR ≥ 10pF → ±5% / ±10% / ±20%	10 G Ω
SAFETY	61V 62O 65N	SAFETY			II	250 (AC) 250 (AC) 400 (AC)	33pF 33pF 220pF	10nF 10nF 10nF	±10%* / ±20% / -20 + 50%	10 G Ω
	6LR 6LS 6LT	Y5P Y5P Y5P			II	1kV 2kV 3kV	100pF 100pF 220pF	4.7nF 4.7nF 4.7nF	±10% / ±20% / -20 + 50%	10 G Ω
SWITCH MODE	67S 68S	Y5U Y5V			II	2kV 2kV	1000pF 4.7nF	10nF 10nF	±20% / -20 + 50% -20 + 50%	10 G Ω

*Upon request



Disc Ceramic Capacitors



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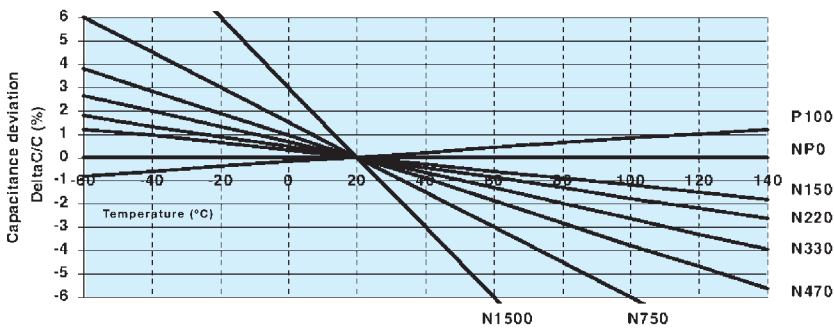


Disc Ceramic Capacitors

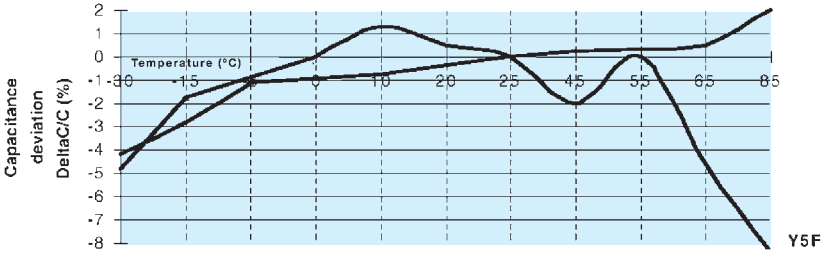


Temperature Coefficient - Typical Curves

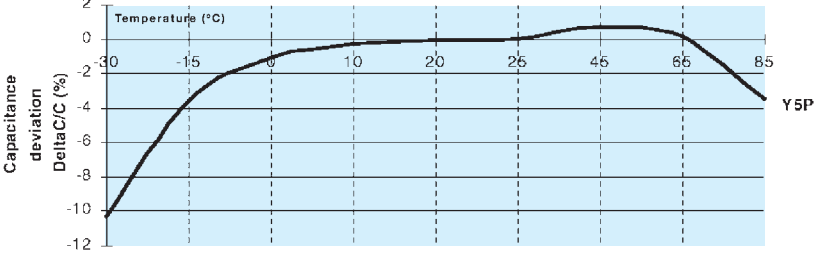
Class I



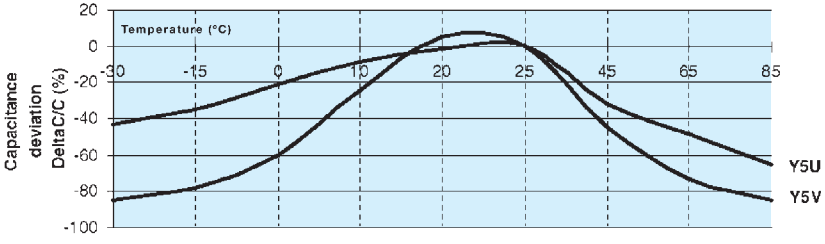
Class II



Class II / III



Class II / III



Disc Ceramic Capacitors



General Specifications

TEMPERATURE COEFFICIENT - CLASS I AND SL GENERAL PURPOSE AND PROFESSIONAL

DIG. 1&2	T.C. (ppm) = $10^{-6} \text{ }^{\circ}\text{C}^{-1}$		Tolerance (ppm)				Aging $\Delta \text{ C/C/log}(10\text{xhours})$
			$\leq 2\text{pF}$	$2\text{pF} < \dots \leq 3\text{pF}$	$3\text{pF} < \dots \leq 10\text{pF}$	$\geq 10\text{pF}$	
5B	*P100	+100 ppm	± 250	± 120	± 60	± 30	0 typical
5A	NP0	0 ppm	± 250	± 120	± 60	± 30	0 typical
5C	*N150	-150 ppm	± 250	± 120	± 60	± 30	0 typical
5D	*N220	-220 ppm	± 250	± 120	± 60	± 30	0 typical
5E	*N330	-330 ppm	± 250	± 120	± 60	± 60	0 typical
5F	*N470	-470 ppm	± 250	± 120	± 80	± 80	0 typical
5G	N750	-750 ppm	± 250	± 120	± 120	± 120	-0.1% typical
5H	N1500	-1500 ppm	± 250	± 250	± 250	± 250	-0.1% typical
5K	SL	+350... -1500 ppm	± 250	± 250	± 250	± 250	-0.1% typical

TEMPERATURE COEFFICIENT - CLASS II AND III GENERAL PURPOSE

DIG. 1&2		Temperature range		Capacitance deviation typical	Reference curve	Aging $\Delta \text{ C/C/log}(10\text{xhours})$	
Class II	Class III	Class II	Class III				
5M		-30... +85°C		$\pm 5\%$	Y5E	-1.5%	typical
5N		-30... +85°C		$\pm 8\%$	Y5F	-1.5%	typical
5O	5W	-30... +85°C	-30... +85° C	$\pm 12\%$	Y5P	-2.5%	typical
5S	5Y	-30... +85°C	-30... +85° C	+30 -65%	Y5U	-3.5%	typical
5T	5Z	-30... +85°C	-30... +85° C	+30 -85%	Y5V	-5%	typical
5U		+10... +85°C		+22 -85%	Z5V	-5%	typical

TEMPERATURE COEFFICIENT - CLASS II AND III PROFESSIONAL

DIG. 1&2		Temperature range		Capacitance deviation typical	Reference curve		Aging $\Delta \text{ C/C/log}(10\text{xhours})$	
Class II	Class III	Class II	Class III		Class II	Class III		
5M		-55... +85°C		$\pm 5\%$	X5E		-1.5%	typical
5N		-55... +85°C		$\pm 8\%$	X5F		-1.5%	typical
5O	5W	-55... +85°C	-30... +85° C	$\pm 12\%$	X5P	Y5P	-2.5%	typical
5S	5Y	-55... +85°C	-30... +85° C	+30 -65%	X5U	Y5U	-3.5%	typical
5T	5Z	-55... +85°C	-30... +85° C	+30 -85%	X5V	Y5V	-5%	typical
5U		+10... +85°C		+22 -85%	Z5V		-5%	typical

RECOMMENDED SHELF CONDITIONS

45°C temperature (max) 10°C temperature (min)
60% relative humidity (max)
2 years (max)

INSPECTION LEVEL: II

Electrical	AQL	0.1%
Visual	AQL	1%

FOR SAFETY PARTS

AQL	Electrical	Visual
Level II	0.065%	0.065%

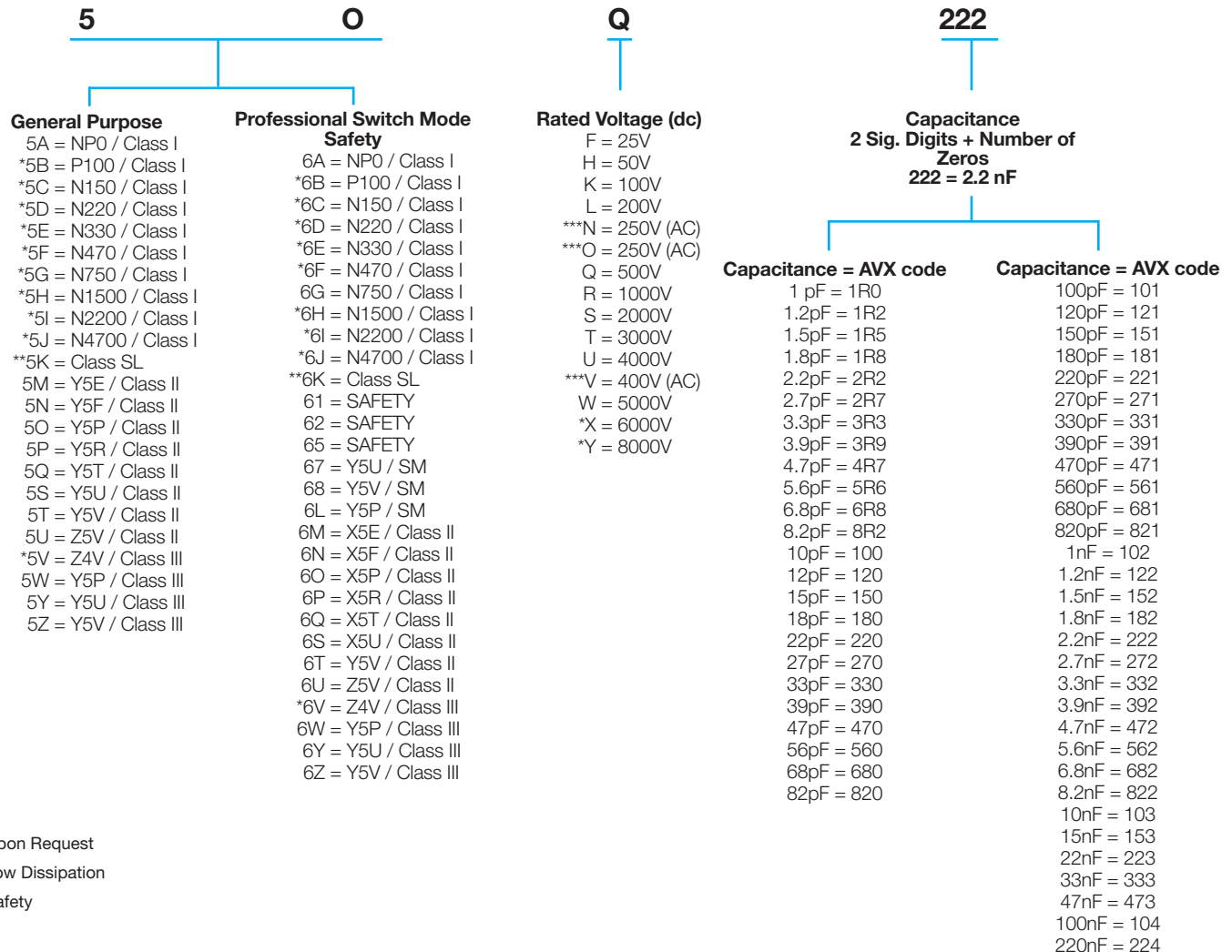
*Upon request

Disc Ceramic Capacitors



Ordering Code

HOW TO ORDER



DIMENSIONS

millimeters (inches)

Digit 9 (ø)	D ± 2 (0.079)	T max. Low Voltage	T max. High Voltage	Available Lead Spacing				
				Vn = 100V/500V	Vn = 1000V	Vn = 2000V	Vn = 3000V	Vn = 4000/5000V
A/B	5.0 (0.197)	3.0 (0.118)	5.0 (0.197)	A,B,E,O,R,X	A,B,E,N,R,X	A,B,E,N,R	B,E	
C	6.0 (0.236)	3.0 (0.118)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
D	7.0 (0.276)	4.0 (0.157)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E	C
E	8.0 (0.315)	4.0 (0.157)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,Q,R,X	A,B,C,E,N,Q,R	B,C,E	C
F	9.0 (0.354)	5.0 (0.197)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
G	10.0 (0.394)	5.0 (0.197)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,R,X	A,B,C,E,N,R	B,C,E	C
H	11.0 (0.433)	5.0 (0.197)	5.0 (0.197)	A,B,C,E,O,R,X	A,B,C,E,N,R,W	A,B,C,E,N,R,W	B,C,E,W	C
J	12.0 (0.472)	5.0 (0.197)	5.0 (0.197)	B,C,R,W	B,C,N,R,W	B,C,W	B,C,W	C
K	14.0 (0.551)	6.0 (0.236)	6.0 (0.236)	B,C,R,W	B,C,N,R,W	B,C,W	B,C,W	C
L	16.0 (0.630)	6.0 (0.236)	6.0 (0.236)	B,C,R,W	B,C,N,R,W	B,C,W	B,C,W	C
M	19.0 (0.748)	7.0 (0.276)	7.0 (0.276)	B,C	B,C	B,C	B,C	C
S	23.0 (0.906)	7.0 (0.276)	7.0 (0.276)	C	C	C	—	—

(E), (X), (W): upon request



Disc Ceramic Capacitors

Ordering Code



M

Tolerance

C = ± 0.25 pF
D = ± 0.50 pF
J = $\pm 5\%$
K = $\pm 10\%$
M = $\pm 20\%$
S = -20+50%
Z = -20+80%
P = 0+100%

A

Lead Forming

Lead Spacing		Digit 8 - Standard Lead Form		
F				
mm	inches			
5.00 $+0.60$ -0.20	0.197 $+0.024$ -0.008	A	O	N
6.00 $+0.60$ -0.20	0.236 $+0.024$ -0.008	E	X	-
7.50 $+1.00$ -0.50	0.295 $+0.039$ -0.020	B	R	Q
10.0 $+0.50$ -1.00	0.394 $+0.020$ -0.039	C	W	-

For special Lead Form and Space please contact factory.

E

Capacitor Diameter ± 2 (0.079)

A/B = 5 (0.197)
C = 6 (0.236)
D = 7 (0.276)
E = 8 (0.315)
F = 9 (0.354)
G = 10 (0.394)
H = 11 (0.433)
J = 12 (0.472)
K = 14 (0.551)
L = 16 (0.630)
M = 19 (0.748)
S = 23 (0.905)

A

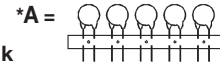
Finishing

Digit 10	Coating	Description	Wire
A/J	Phenolic	25V – 500V General Purpose	0.55 $\pm$ 0.1 (0.022 $\pm$ 0.004)
S	Epoxy	25V – 500V Professional	0.55 $\pm$ 0.1 (0.022 $\pm$ 0.004)
C	Epoxy	1000V – 8000V	0.55 $\pm$ 0.1 (0.022 $\pm$ 0.004)
I	Epoxy	1000V – 8000V	0.80 $\pm$ 0.1 (0.032 $\pm$ 0.004)
L	Phenolic	1000V	0.55 $\pm$ 0.1 (0.022 $\pm$ 0.004)

A

Packaging

Cardboard Strips



Bulk

C = 10 (0.394)
*D = 25 (0.984)
E = 5.0 (0.197)
F = 4.0 (0.157)
T = 4.5 (0.177)
W = 3.5 (0.138)
N = 3.0 (0.118)

Taping

Reel



Avisert				Panaset			
H	L	L	L	J	L	L	L

Ammo Pack



Avisert				Panaset			
I	M	M	M	K	M	M	M

*Only available above 500V (High Voltage Discs)



mm (inches)

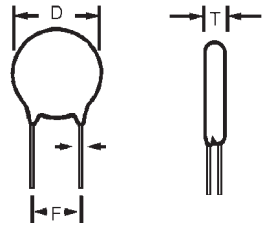
Please note that not all code combinations are either possible or available.

Disc Ceramic Capacitors

General Specifications - Class I Temperature Compensating

DIELECTRIC - CLASS I

These ceramic capacitors have linear temperature coefficient, very low tolerances, low losses, high insulation resistance and are specially suitable for tuned circuits, timing and other precision circuits. Meets IEC 384-8 (1988).



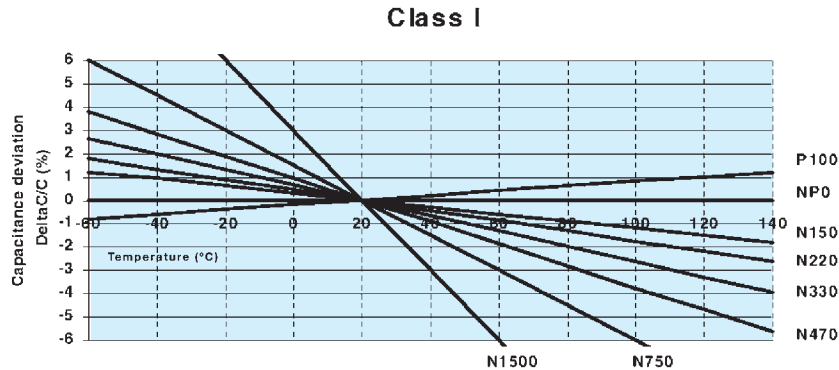
HOW TO ORDER

5A	K	101	K	A	F	A	A
Product Code	Voltage	Capacitance	Tolerance	Lead Forming	Capacitor Diameter	Finishing	Packaging

PERFORMANCE CHARACTERISTICS

Voltage Rating	100 V → 500 V	1kV → 5kV
Measured at	1.0 MHz @ 1.0 Vrms / 25°C	1.0 MHz @ 1.0 Vrms / 25°C
Dissipation Factor (%)	$C_R \leq 30 \text{ pF} \rightarrow \leq 1/C_R + 0.07$ $C_R > 30 \text{ pF} \rightarrow \leq 0.1\%$	$C_R \leq 30 \text{ pF} \rightarrow \leq 1/C_R + 0.07$ $C_R > 30 \text{ pF} \rightarrow \leq 0.1\%$
Tolerance	$C_R < 10 \text{ pF} \rightarrow \pm 0.25 \text{ pF}, \pm 0.5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\%, \pm 10\%$	$C_R < 10 \text{ pF} \rightarrow \pm 0.25 \text{ pF}, \pm 0.5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\%, \pm 10\%$
Insulation Resistance (IR)	@ $V_R \geq 10 \text{ G}\Omega$	@ $500\text{V} \geq 10 \text{ G}\Omega$
Dielectric Strength NOTE: Charging current limited to 50 mA	@ $V_R = 100\text{V} \rightarrow V_t = 250\text{V (DC)}$ @ $V_R = 500\text{V} \rightarrow V_t = 1250\text{V (DC)}$	$1.5 \times V_R + 500 \text{ (DC)}$
Operating Temperature Range (°C)	-30 → +85°C	-30 → +85°C -30 → +125°C
Climatic Category	30 / 85 / 21 Phenolic Coated	30 / 085 / 21 Phenolic Coated 30 / 085 / 56 Epoxy Coated

TEMPERATURE COEFFICIENT – TYPICAL CURVES



Disc Ceramic Capacitors



Dimension Table - Class I Temperature Compensating

CLASS I - CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Temp. Coefficient	NP0					
Digits 1, 2, 3 of P.N.	5AK	5AQ	5AR	5AS	5AT	5AU
Rated Voltage (V _R)	100 VDC	500 VDC	1000 VDC 130 VAC	2000 VDC 250 VAC	3000 VDC 380 VAC	4000 VDC 440 VAC
C _R (pF)						
1.0	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)
1.2						
1.5						
1.8						
2.2						
2.7						
3.3						
3.9						
4.7						
5.6						
6.8						
8.2						
10						
12						
15						
18						
22						
27						
33						
39						
47	7.0 (0.276)	7.0 (0.276)	8.0 (0.315)	8.0 (0.315)	9.0 (0.354)	10.0 (0.394)
56						
68						
82	8.0 (0.315)	8.0 (0.315)	9.0 (0.354)	9.0 (0.354)	11.0 (0.433)	12.0 (0.472)
100						
120						
150	11.0 (0.433)	11.0 (0.433)	12.0 (0.472)	12.0 (0.472)	14.0 (0.551)	14.0 (0.551)
180						
220						
270	12.0 (0.472)	12.0 (0.472)	14.0 (0.551)	14.0 (0.551)	16.0 (0.630)	16.0 (0.630)
330						
390						

CLASS I - CAPACITANCE VS. DISC DIAMETER

Temp. Coefficient	N750							N1500					
Digits 1, 2, 3 of P.N.	5GK	5GQ	5GR	5GS	5GT	5GU	5GW	5HK	5HQ				
Rated Voltage (V _R)	100 VDC	500 VDC	1000 VDC 130 VAC	2000 VDC 250 VAC	3000 VDC 380 VAC	4000 VDC 440 VAC	5000 VDC 550 VAC	100 VDC	500 VDC				
C _R (pF)													
1.5	5.0 (0.197)	5.0 (0.197)											
1.8													
2.2													
2.7													
3.3													
3.9													
4.7													
5.6													
6.8													
8.2													
9.0		5.0 (0.197)		5.0 (0.197)	5.0 (0.197)	6.0 (0.236)	5.0 (0.197)	5.0 (0.197)					
10													
12													
15													
18													
22													
27													
33													
39													
47													
56	6.0 (0.236)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	9.0 (0.354)	11.0 (0.433)	12.0 (0.472)						
68													
82													
100								8.0 (0.315)	9.0 (0.354)	10.0 (0.394)	11.0 (0.433)	12.0 (0.472)	14.0 (0.551)
120													
150													
180													
220													
270													
330													
10.0 (0.394)	11.0 (0.433)	12.0 (0.472)	14.0 (0.551)	16.0 (0.630)		8.0 (0.315)	9.0 (0.354)						
11.0 (0.433)													
14.0 (0.551)													
16.0 (0.630)													
10.0 (0.394)													
11.0 (0.433)													
12.0 (0.472)													
14.0 (0.551)													
16.0 (0.630)													
18.0 (0.723)													

Disc Ceramic Capacitors



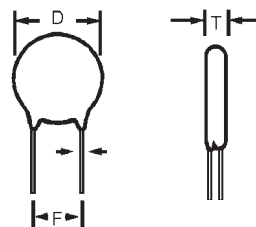
General Specifications - SL

CAPACITORS - CLASS SL

These capacitors have wide temperature characteristics but still offer low loss and linear type TC's.

They are specially designed to be smaller alternative to standard Class I capacitors of linear temperature coefficient.

Typical application is RF tuning and decoupling.



HOW TO ORDER

5K	K	101	K	A	B	A	A
Product Code	Voltage	Capacitance	Tolerance	Lead Forming	Capacitor Diameter	Finishing	Packaging

PERFORMANCE CHARACTERISTICS

	Low Voltage	High Voltage
Measured at	$C_R \leq 100 \text{ pF} \rightarrow 1\text{MHz}/1.0 \text{ Vrms} / 25^\circ\text{C}$ $C_R > 100 \text{ pF} \rightarrow 1\text{kHz}/0.3 \text{ Vrms} / 25^\circ\text{C}$	1.0kHz @ 0.3 Vrms / 25°C
Dissipation Factor (%)	$C_R \leq 100 \text{ pF} \dots 0.10\%$ 1MHz @ 1.0 Vrms $C_R > 100 \text{ pF} \dots 1.0\%$ 100kHz @ 0.3 Vrms $C_R > 100 \text{ pF} \dots 0.10\%$ 1kHz @ 0.3 Vrms	1MHz @ 1.0 Vrms 100kHz @ 0.3 Vrms 1kHz @ 0.3 Vrms
Tolerance	$C_R \leq 10 \text{ pF} \rightarrow \pm 0.25 \text{ pF}, \pm 0.5 \text{ pF}$ $C_R > 10 \text{ pF} \rightarrow \pm 5\%, \pm 10\%, \pm 20\%$	$C_R \leq 10 \text{ pF} \rightarrow \pm 0.25 \text{ pF}, \pm 0.5 \text{ pF}$ $C_R > 10 \text{ pF} \rightarrow \pm 5\%, \pm 10\%, \pm 20\%$
Temperature Coefficient	+350 ppm... -1500 ppm (P350... N1500)	
Insulation Resistance (IR)	@ $V_R \rightarrow \geq 10 \text{ G}\Omega$	@ 500V $\rightarrow \geq 10 \text{ G}\Omega$
Dielectric Strength NOTE: Charging current limited to 50 mA	@ $V_R = 100\text{V} \rightarrow V_t = 250\text{V (DC)}$ @ $V_R = 500\text{V} \rightarrow V_t = 1250\text{V (DC)}$	$1.5 \times V_R + 500 \text{ (DC)}$
dV/dt Test	up to 1.5 kV/ μsec	up to 10 kV/ μsec
Operating Temperature Range (°C)	-30... +85°C	-30... +125°C
Climatic Category	30 / 85 / 21 Phenolic Coated	30 / 85 / 56 Epoxy Coated

Note: Damp Heat Steady State: 90... 95% R.H. 40°C / 21 days. No voltage to be applied.

Disc Ceramic Capacitors



Dimension Table - SL - Low Dissipation Class

SL – CAPACITANCE VS. DISC DIAMETER

millimeters (inches)									
Type	Phenolic Coating		Epoxy Coating						
Digits 1, 2, 3 of P.N.	5KK	5KQ	5KR	5KS	5KT				
Rated Voltage (V _R) C _R (pF)	100 VDC 50 VAC	500 VDC 100 VAC	1000 VDC 100 VAC	2000 VDC 150 VAC	3000 VDC 150 VAC				
1.0	5.0 (0.197)	5.0 (0.197)							
1.2									
1.5									
2.2									
2.7									
3.3									
3.9									
4.7									
5.6									
8.2									
10									
12									
15									
18									
22									
27									
33									
39						6.0 (0.236)	6.0 (0.236)	6.0 (0.236)	6.0 (0.236)
47									
56							8.0 (0.315)	8.0 (0.315)	8.0 (0.315)
68									
82	9.0 (0.354)	9.0 (0.354)							
100									
120	10.0 (0.394)	10.0 (0.394)							
150									
180	12.0 (0.472)	12.0 (0.472)							
220									
270									
330									
390									
470									
560	6.0 (0.236)	8.0 (0.315)	12.0 (0.472)	12.0 (0.472)					
680	7.0 (0.276)								
820	8.0 (0.315)								
1000	8.0 (0.315)								

Diameter (φ) = 9th Part Number Digit

Disc Ceramic Capacitors



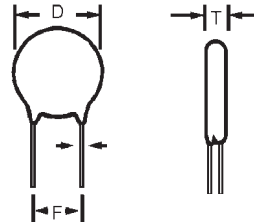
General Specifications - Class II General Purpose

DIELECTRIC - CLASS II

These ceramic capacitors have a high dielectric constant, what makes possible high capacitance values in reduced dimensions, however temperature coefficient and loss factor are greater than Class I.

Typical applications are decoupling and by pass.

Meets IEC 384-9 (1988).



HOW TO ORDER

5M	K	101	K	A	B	A	A
Product Code	Voltage	Capacitance	Tolerance	Lead Forming	Capacitor Diameter	Finishing	Packaging

100V / 500V PERFORMANCE CHARACTERISTICS CLASS II

Voltage Rating	100V ... 500V	1kV ... 5kV
Measured at	1.0 kHz @ 0.3 Vrms / 25°C	1.0 kHz @ 0.3 Vrms / 25°C
Dissipation Factor (%)	Y5E / Y5F / Y5P ≤ 2.5% Y5U / Y5V / Z5V ≤ 3.0%	Y5F ≤ 2.5% Y5U / Y5V ≤ 3.0%
Tolerance	$C_R < 10 \text{ pF} \rightarrow \pm 0.25 \text{ pF}, \pm 0.5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\%, \pm 10\%$	$C_R < 10 \text{ pF} \rightarrow \pm 0.25 \text{ pF}, \pm 0.5 \text{ pF}$ $C_R \geq 10 \text{ pF} \rightarrow \pm 5\%, \pm 10\%$
Insulation Resistance (IR)	@ $V_R \rightarrow \geq 10 \text{ G}\Omega$	@ 500V $\rightarrow \geq 10 \text{ G}\Omega$
Dielectric Strength NOTE: Charging current limited to 50 mA	@ $V_R = 100\text{V} \rightarrow V_t = 250\text{V (DC)}$ @ $V_R = 500\text{V} \rightarrow V_t = 1250\text{V (DC)}$	$1.5 \times V_R + 500 \text{ (DC)}$
dV/dt test	–	up to 3.0 kV/μsec for 5NR; 5NS Series
Operating Temperature Range (°C)	-30... +85°C	-30 ... +85°C Phenolic Coated -30 ... +125°C Epoxy Coated
Climatic Category	30 / 085 / 21 Phenolic Coated	30 / 85 / 21 Phenolic Coated 30 / 85 / 56 Epoxy Coated

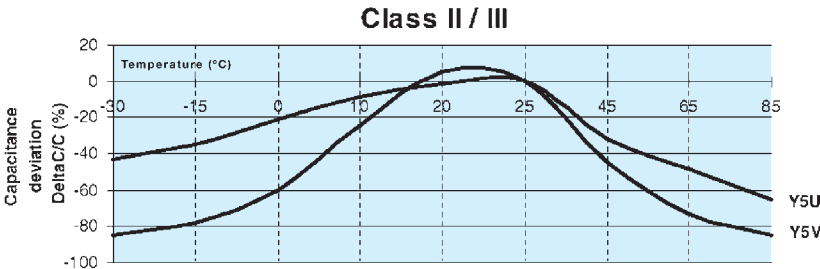
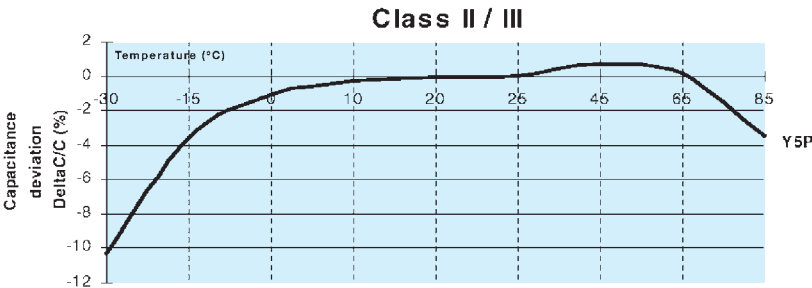
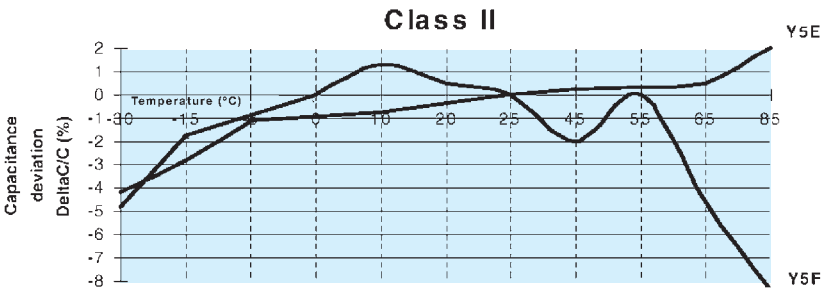
Note: Damp Heat Steady State: 90... 95% R.H. 40°C / 21 days. No voltage to be applied.

Disc Ceramic Capacitors



General Specifications - Class II General Purpose

TEMPERATURE COEFFICIENT – TYPICAL CURVES



Disc Ceramic Capacitors

Dimension Table - Class II

Low and Medium Voltage General Purpose



100V / 500V CLASS II – CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Temp. Coefficient	Y5E		Y5F		Y5P		Y5U		Y5V		Z5V											
Digits 1,2,3 of P.N.	5MK	5MQ	5NK	5NQ	5OK	5OQ	5SK	5SQ	5TK	5TQ	5UK											
Rated Voltage (V _R)	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC											
C _R (pF)																						
56	5.0 (0.197)	5.0 (0.197)																				
68																						
82																						
100																						
120																						
150																						
180																						
220																						
270																						
330																						
390																						
470																						
560	6.0 (0.236)	6.0 (0.236)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)																
680																						
820	7.0 (0.276)	7.0 (0.276)	6.0 (0.236)	7.0 (0.276)	6.0 (0.236)	6.0 (0.236)	5.0 (0.197)	5.0 (0.197)														
1,000																						
1,200																						
1,500																						
1,800	9.0 (0.354)	9.0 (0.354)	7.0 (0.276)	9.0 (0.354)	7.0 (0.276)	7.0 (0.276)				5.0 (0.197)												
2,200																						
2,700	10.0 (0.394)	11.0 (0.433)	9.0 (0.354)	10.0 (0.394)	9.0 (0.354)	10.0 (0.394)	6.0 (0.236)		5.0 (0.197)													
3,300	11.0 (0.433)	12.0 (0.472)																				
3,900		12.0 (0.472)	11.0 (0.433)	11.0 (0.433)	9.0 (0.354)	10.0 (0.394)	7.0 (0.276)	7.0 (0.276)														
4,700																						
5,600															11.0 (0.433)	14.0 (0.551)	7.0 (0.276)	9.0 (0.354)			6.0 (0.236)	5.0 (0.197)
6,800																						
8,200																						
10,000																						
12,000																						
15,000																						
22,000																						
33,000																						
47,000																						
100,000																						

Diameter (φ) = 9th Part Number Digit

Disc Ceramic Capacitors

Dimension Table - Class II

High Voltage - Class II General Purpose



1kV / 5kV CLASS II – CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Temp. Coefficient	Y5F			Y5U					Y5V																																																																																																																																										
Digits 1,2,3 of P.N.	5NR	5NS	5NT	5SR	5SS	5ST	5SU	5SW	5TR	5TS	5TT																																																																																																																																								
Rated Voltage (V _R)	1000 VDC 100 VAC	2000 VDC 150 VAC	3000 VDC 150 VAC	1000 VDC 100 VAC	2000 VDC 150 VAC	3000 VDC 150 VAC	4000 VDC 150 VAC	5000 VDC 150 VAC	1000 VDC 100 VAC	2000 VDC 150 VAC	3000 VDC 150 VAC																																																																																																																																								
C _R (pF)																																																																																																																																																			
47	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)																																																																																																																																								
56																																																																																																																																																			
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560																																																																																																																																																			
680	6.0 (0.236)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																																																																																									
820	9.0 (0.354)																																																																																																																																																		
1,000	9.0 (0.354)										10.0 (0.394)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																																																																																
1,200	10.0 (0.394)										11.0 (0.433)									8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																																																																								
1,500	11.0 (0.433)										12.0 (0.472)																	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																																																																
1,800	12.0 (0.472)										13.0 (0.511)																									8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																																																								
2,200	13.0 (0.511)										14.0 (0.551)																																	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																																																
2,700	14.0 (0.551)										15.0 (0.591)																																									8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																																								
3,300	15.0 (0.591)										16.0 (0.630)																																																	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																																
3,900	16.0 (0.630)										17.0 (0.670)																																																									8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																								
4,700	17.0 (0.670)										18.0 (0.710)																																																																	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																																
5,600	18.0 (0.710)										19.0 (0.750)																																																																									8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																								
6,800	19.0 (0.750)										20.0 (0.790)																																																																																	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																																
8,200	20.0 (0.790)										21.0 (0.830)																																																																																									8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																								
10,000	21.0 (0.830)										22.0 (0.870)																																																																																																	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																																
12,000	22.0 (0.870)										23.0 (0.910)																																																																																																									8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																								
15,000	23.0 (0.910)										24.0 (0.950)																																																																																																																	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)																
22,000	24.0 (0.950)										25.0 (0.990)																																																																																																																									8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)								
50,000	25.0 (0.990)										26.0 (1.030)																																																																																																																																	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)
100,000	26.0 (1.030)										27.0 (1.070)																																																																																																																																								

Diameter (φ) = 9th Part Number Digit

Disc Ceramic Capacitors

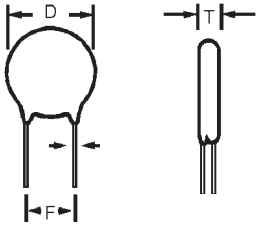


General Specifications - Class III Semi Conducting

DIELECTRIC - CLASS III

A thin dielectric layer is grown on a disc of conductive ceramic. Very large capacitances can be obtained due to reduced thickness of this barrier layer and its inherently high dielectric constant. Due to its small dimensions, they are a less expensive replacement of multilayer ceramic or polyester capacitors. An equivalent circuit is shown below:

Meets IEC 324 (1970).



HOW TO ORDER

5Z	H	104	Z	A	C	A	A
Product Code	Voltage	Capacitance	Tolerance	Lead Forming	Capacitor Diameter	Finishing	Packaging

PERFORMANCE CHARACTERISTICS CLASS III

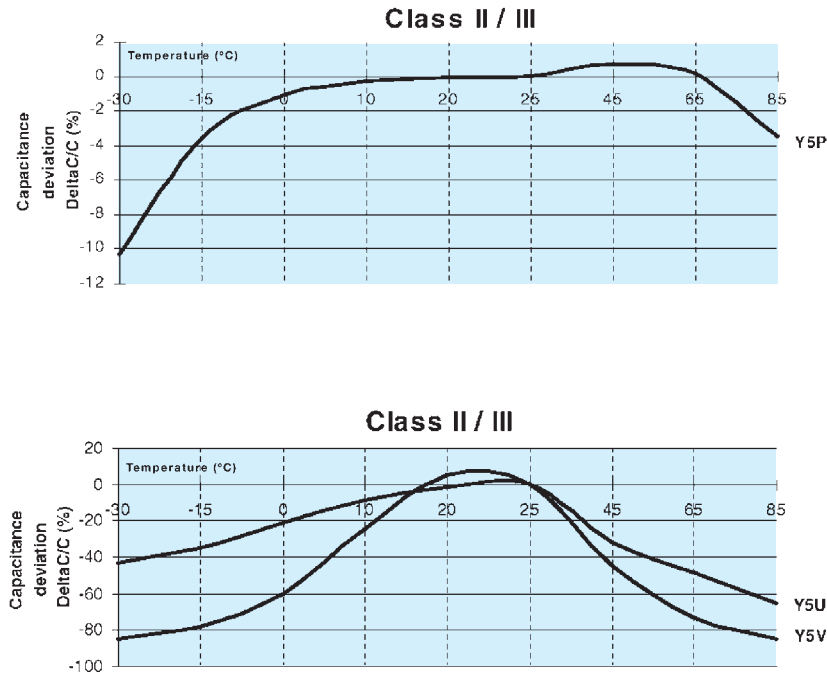
Measured at	1.0 kHz / 0.1 Vrms / 25°C	
Dissipation Factor (%)	$C_R \leq 22 \text{ nF} \rightarrow Y5V, Y5U \leq 7.5\%$ $C_R > 22 \text{ nF} \rightarrow Y5V, Y5P \leq 5.0\%$	
Tolerance	$Y5P \rightarrow \pm 20\% / -20 + 50\%$ $Y5U \rightarrow \pm 20\% / -20 + 50\%$ $Y5V \rightarrow -20\% + 50\% / -20 + 80\%$	
Insulation Resistance (IR)	Y5P	$\geq 12 \text{ M}\Omega$
	Y5U	$4.7 \text{ nF} \dots 100 \text{ nF} \rightarrow \geq 10 \text{ M}\Omega$ $200 \text{ nF} \rightarrow \geq 1 \text{ M}\Omega$
	Y5V	$\geq 100 \text{ M}\Omega$
Dielectric Strength NOTE: Charging current limited to 50 mA	Between leads	$V_t = 1.25 V_R$
	Body insulation	$V_R = 25V \quad V_t = 100V \text{ (DC)}$ $V_R = 50V \quad V_t = 150V \text{ (DC)}$
Operating Temperature Range (°C)	-30... +85°C	
Climate Category	30 / 85 / 21	

Disc Ceramic Capacitors

General Specifications - Class III Semi Conducting



TEMPERATURE COEFFICIENT – TYPICAL CURVES



PHENOLIC COATED – CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Class III	$\Delta C/C$ (max.) $\pm 12\%$ Range -30... +85°C		$\Delta C/C$ (max.) +30 -65% Range -30... +85°C		$\Delta C/C$ (max.) +30 -65% Range -30... +85°C
Temp. Coefficient	Y5P		Y5U		Y5V
Digits 1,2,3 of P.N.	5WF	5WH	5YF	5YH	5ZH
Rated Voltage (V _R)	25 VDC	50 VDC	25 VDC	50 VDC	50 VDC
C _R (pF)					
4,700	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)
10,000	6.0 (0.236)	6.0 (0.236)		6.0 (0.236)	
22,000	7.0 (0.276)	8.0 (0.315)			
33,000	8.0 (0.315)	9.0 (0.354)	6.0 (0.236)	7.0 (0.276)	6.0 (0.236)
47,000	9.0 (0.354)		7.0 (0.276)	8.0 (0.315)	
50,000					
68,000	11.0 (0.433)	11.0 (0.433)	8.0 (0.315)	9.0 (0.354)	6.0 (0.236)
100,000					
200,000					10.0 (0.394)

Note: Damp Heat Steady State: 90... 95% R.H. 40°C / 21 days. No voltage to be applied.

Disc Ceramic Capacitors



Safety Ceramic Capacitors

DEFINITIONS (IEC 384-14 1993)

X FUNCTION: applications where the capacitor failure does not lead to danger of electrical shock. There are three subclasses related to the peak voltage of the impulses superimposed to the mains voltage:

Subclass X1: impulses up to 4000V

Subclass X2: impulses up to 2500V

Subclass X3: impulses up to 1200V

Y FUNCTION: applications where the capacitor failure may lead to danger of electrical shock. There are four subclasses related to the peak voltage of the impulses applied before the life test:

Subclass Y1: impulses up to 8000V

Subclass Y2: impulses up to 5000V

Subclass Y3: rated 250Vac without impulses

Subclass Y4: impulses up to 2500V

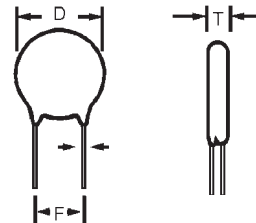
ANTENNA: the capacitors are used to decouple the antenna leads of video and audio equipment, whose failure may lead to danger of electrical shock.

TPC Safety Capacitors:

61V (GZO): meets subclasses X1, Y1 Test voltage 4000 VAC

62O (GKO): meets subclasses X1, Y2 Test voltage 2500 VAC

65N (GAY): meets subclasses X2, Y3 Test voltage 1800 VAC



HOW TO ORDER

61	V	101	K	B	D	C	A
Product Code	Voltage	Capacitance	Tolerance	Lead Forming	Capacitor Diameter	Finishing	Packaging

PERFORMANCE CHARACTERISTICS

	61V	62O	65N
Measured at	1.0 kHz / 0.3 Vrms / 25°C	1.0 kHz / 0.3 Vrms / 25°C	1.0 kHz / 0.3 Vrms / 25°C
Capacitance Tolerance	±20% / -20 +50%	±20% / -20 +50%	±20% / -20 +50%
D.F max. @ 25°C	1.5%	1.5%	1.5%
Insulation Resistance (IR)	≥ 10 GΩ	≥ 10 GΩ	≥ 10 GΩ
Test Voltage Between Leads*	4.000 VAC	2.500 VAC	1.800 VAC
Test Voltage Leads to Body	4.000 VAC	2.500 VAC	1.800 VAC
Operating Temperature Range (°C)	-40 +125	-40 +125	-40 +125

* Main reference voltage

CERTIFICATION BODY APPROVALS

	Standard	61V			62O			65N		
		Certificate Number	Rated Voltage	Climatic Category	Certificate Number	Rated Voltage	Climatic Category	Certificate Number	Rated Voltage	Climatic Category
UL	UL 1414	E 147842 (N)	250 VAC		E 147842 (N)	250 VAC		E 147842 (N)	250 VAC	-
CAS	CAN/CSA - C22.2 No. 1-94	LR 100430-2	250 VAC		LR 100430-1	250 VAC		-	-	-
VDE	DIN BDE 0560 Part 2	-	-		76830 76804	400 VAC	25/85/21	-	-	-
	DIN EN 132400: 1995	94612 94610 94634	X1: 400 VAC Y1: 250 VAC	40/85/21/C	101384	X1: 400 VAC Y1: 250 VAC	40/85/21/C	-	-	-
	IEC 384-14: 1993									
IMQ	EN 132400: 1994 IEC 384-14: 1993	V4551	X1: 400 VAC Y1: 250 VAC	40/125/21/C	V4635	X1: 400 VAC Y2: 250 VAC	40/125/21/C	-	-	-

Disc Ceramic Capacitors

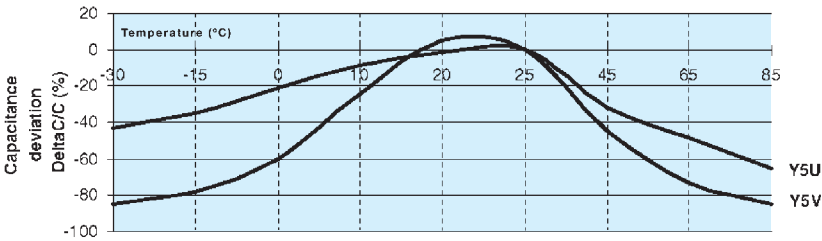
Safety Ceramic Capacitors Epoxy Coated



CAPACITANCE VS. DISC DIAMETER

Digits 1, 2, 3 of P.N. C _R (pF)	61V	620	65N	
33	6.0 (0.236)	6.0 (0.236)		
39				
47				
56				
68				
82	7.0 (0.276)			
100				
120				
150				
180				
220				
270				
330				
390				
470				
560				
680				
820	8.0 (0.315)	8.0 (0.315)		
1000				
1200				
1500				
1800	10.0 (0.394)	10.0 (0.394)		
2200	11.0 (0.433)			
2700	12.0 (0.472)			
3300	14.0 (0.551)			
3900	14.0 (0.551)	12.0 (0.472)		
4700	16.0 (0.630)			
8200				
10000	19.0 (0.748)	16.0 (0.630)	16.0 (0.630)	
20000				

TEMPERATURE COEFFICIENT – TYPICAL CURVES



Disc Ceramic Capacitors



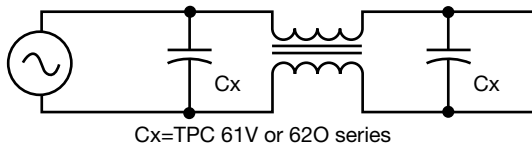
Safety Ceramic Capacitors Epoxy Coated

APPROVED LOGOS

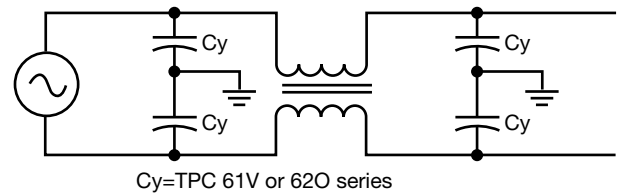


TYPICAL APPLICATION FOR SAFETY CERAMIC DISCS AND SWITCH MODE

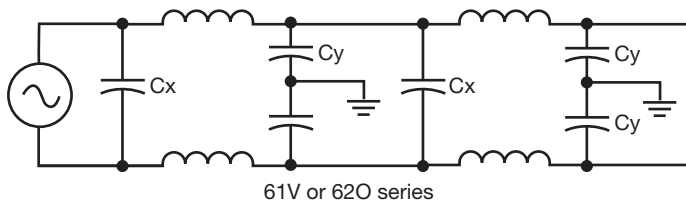
Across the line capacitors for noise suppression



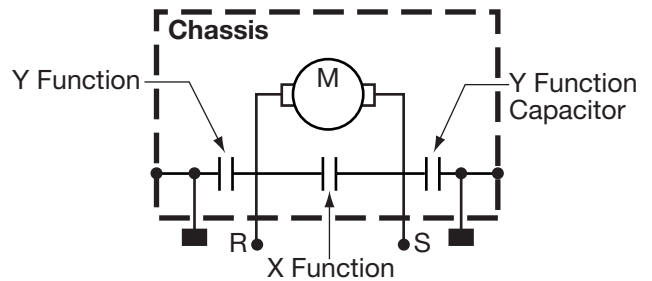
Line by-pass for noise suppression



Typical X and Y function application



Protection and suppression of a motor (X and Y function)



Disc Ceramic Capacitors



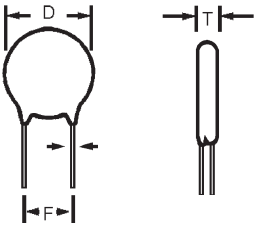
AC and Switch Mode Epoxy Coated

CAPACITORS FOR AC AND SWITCH MODE APPLICATIONS

These capacitors are made of a new dielectric compound specially developed for AC or switch mode circuits that can generate dielectric heat which is limiting factor on other ceramic disc capacitors.

This new series adds the advantages of class I (low loss factor) with the advantages of class II capacitors (small sizes and lower costs).

The capacitors are epoxy coated, flame retardant class UL 94-V0. They meet the standards of the telecom and data processing industry. They are particularly suited for TV deflection and power supply circuits.



HOW TO ORDER

6L	S	102	K	A	F	C	A
Product Code	Voltage	Capacitance	Tolerance	Lead Forming	Capacitor Diameter	Finishing	Packaging

PERFORMANCE CHARACTERISTICS

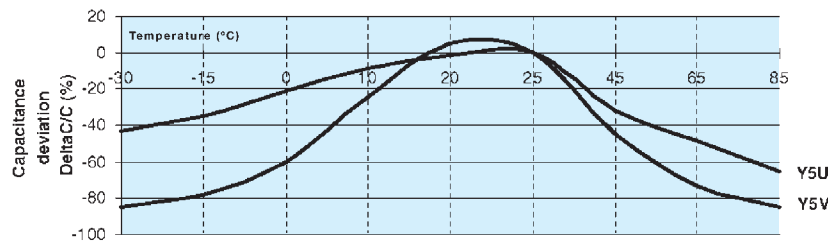
Measured at	1.0 kHz / 0.3 Vrms / 25°C				
Dissipation Factor (%)	6LR / 6LS / 6LT ≤ 0.5% 67S / 68S ≤ 0.8%				
Capacitance Tolerance	6LR ±10% ±20% -20 +50%	6LS ±10% ±20% -20 +50%	6LT ±10% ±20% -20 +50%	67S ±20% -20 +50%	68S -20 +50%
Insulation Resistance (IR)	@ 500V → ≥ 10 GΩ				
Dielectric Strength NOTE: Charging current limited to 50 mA	1.5 x V _R + 500 (DC) Between leads and body insulation				
dV/dt test	up to 3.5 kV/μsec				
Operating Temperature Range (°C)	-40... +125°C				
Climatic Category	30 / 85 / 56 Epoxy Coated				
Max. Temp. rise on the external surface of the capacitor related to ambient	Measured at 20mm from the capacitor				T _{max} . = T _{amb} + 20°C

Disc Ceramic Capacitors

AC Switch Mode Epoxy Coated



TEMPERATURE COEFFICIENT – TYPICAL CURVES



CERTIFICATION BODY APPROVALS

	Standard	6LR		6LS		67S	
		Certificate Number	Rated Voltage	Certificate Number	Rated Voltage	Certificate Number	Rated Voltage
UL	UL 1414	E 147842	250 VAC	E 147842	250 VAC	E 147842	250 VAC

APPROVED LOGOS



CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Temp. Coefficient	Y5P			Y5U	Y5V
Digits 1, 2, 3 of P.N.	6LR	6LS	6LT	67S	68S
Rated Voltage (V _R)	1000 VDC 130 VAC	2000 VDC 250 VAC	3000 VDC 380 VAC	2000 VDC 250 VAC	2000 VDC 250 VAC
C _R (pF)					
100	6.0 (0.236)	6.0 (0.236)			
120					
150					
180					
220			6.0 (0.236)		
270	7.0 (0.276)	8.0 (0.315)			
330			8.0 (0.315)		
390					
470			9.0 (0.354)		
560					
680	8.0 (0.315)	9.0 (0.354)			
820			10.0 (0.394)		
1000				8.0 (0.315)	
1200			12.0 (0.472)		
1500	11.0 (0.394)	12.0 (0.472)			
1800			14.0 (0.551)		
2200				9.0 (0.354)	
2700			16.0 (0.630)		
3300		16.0 (0.630)		10.0 (0.394)	
3900	16.0 (0.630)	19.0 (0.748)	19.0 (0.748)		
4700				12.0 (0.472)	8.0 (0.315)
10000				14.0 (0.551)	11.0 (0.433)



Disc Ceramic Capacitors



Professional Ceramic Capacitors - Class I, II and III

MIL-STD-202F

The professional ceramic disc capacitors were specially developed for applications in severe environmental conditions, high humidity, temperature, gas, vapor and solvents.

The capacitors are flame retardant epoxy coated, meeting UL 94-V0 flammability specifications. The capacitors are 100% screened on following electrical parameters: Capacitance, loss factor, test voltage. After the 100% test, the capacitors are audited on its electrical and mechanical parameters with the following AQL:

Electrical parameters: 0.065% level II

Mechanical parameters: 0.65% level II

The capacitors withstand the following reliability essays:

Terminal strength: method 211 – condition A

Resistance to solvents: method 215

Resistance to soldering heat: method 210 – condition B

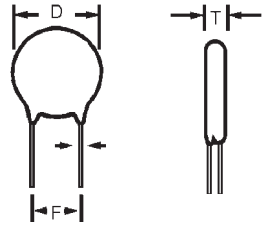
Solderability: method 208

Thermal shock: method 107 – condition A

Humidity (steady state): method 103 – condition B

Life (at elevated ambient temperature): method 108 – condition D

Operating temperature and storage: -55... +125° C



HOW TO ORDER

6A	K	101	K	A	F	S	A
Product Code	Voltage	Capacitance	Tolerance	Lead Forming	Capacitor Diameter	Finishing	Packaging

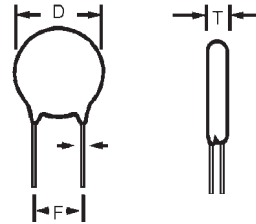
Disc Ceramic Capacitors



General Specifications - Class I and II Professional

DIELECTRIC - CLASS I

These ceramic capacitors have linear temperature coefficient, very low tolerances, low losses, high insulation resistance and are specially suitable for tuned circuits, timing and other precision circuits.



100V ... 500V PERFORMANCE CHARACTERISTICS CLASS I

Measured at	1.0 MHz @ 1.0 Vrms / 25°C	Dielectric Strength NOTE: Charging current limited to 50 mA	@ V _R = 100V → V _t = 250V (DC) @ V _R = 500V → V _t = 1250V (DC)
Dissipation Factor (%)	C _R ≤ 30 pF → ≤ 1/C _R + 0.07 C _R > 30 pF → ≤ 0.1%	Operating Temperature Range (°C)	-55... +125°C Epoxy Coated
Tolerance	C _R < 10 pF → ±0.25 pF, ±0.5 pF C _R ≥ 10 pF → ±5%, ±10%	Climatic Category	30 / 85 / 56
Insulation Resistance (IR)	@ V _R → ≥ 10 GΩ		

DIMENSION TABLE - CLASS I LOW AND MEDIUM VOLTAGE PROFESSIONAL

100V / 500V CLASS I EPOXY COATED – CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

Temp. Coefficient	NP0		N750		N1500	
Digits 1, 2, 3 of P.N.	6AK	6AQ	6GK	6GQ	6HK	6HQ
Rated Voltage (V _R)	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC
C _R (pF)						
1.0	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)
1.2						
1.5						
1.8						
2.2						
2.7						
3.3						
3.9						
4.7						
5.6						
6.8						
8.2						
10						
12						
15						
18						
22						
27						
33						
39						
47	7.0 (0.276)	6.0 (0.236)	7.0 (0.276)	6.0 (0.236)	7.0 (0.276)	6.0 (0.236)
56		7.0 (0.276)				
68	8.0 (0.315)	8.0 (0.315)	8.0 (0.315)	7.0 (0.276)	8.0 (0.315)	7.0 (0.276)
82		9.0 (0.354)				
100	9.0 (0.354)	11.0 (0.433)	10.0 (0.394)	9.0 (0.354)	10.0 (0.394)	9.0 (0.354)
120		12.0 (0.472)				
150	11.0 (0.433)	14.0 (0.551)	11.0 (0.433)	14.0 (0.551)	11.0 (0.433)	10.0 (0.394)
180		16.0 (0.630)				
220	12.0 (0.472)	19.0 (0.748)				
270						
330						

Diameter (φ) = 9th Part Number Digit



Disc Ceramic Capacitors

Dimension Table - Class II

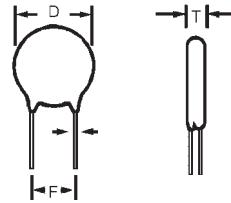
Low and Medium Voltage Professional



DIELECTRIC - CLASS II

These ceramic capacitors have a high dielectric constant, making possible high capacitance values in reduced dimensions, however temperature coefficient and loss factor are greater than Class I.

Typical applications are decoupling and by pass.



100V AND 500V PERFORMANCE CHARACTERISTICS CLASS II

Measured at	1.0 kHz @ 0.3 Vrms / 25°C	Dielectric Strength	@ $V_R = 100V \rightarrow V_t = 250V$ (DC) @ $V_R = 500V \rightarrow V_t = 1250V$ (DC) Between leads and body insulation
Dissipation Factor (%)	X5E / X5F / X5P $\leq 2.5\%$ X5U / X5V / Z5V $\leq 3.0\%$	NOTE: Charging current limited to 50 mA	
Capacitance Tolerance	X5E / X5F / X5P $\rightarrow \pm 10\%$ X5U / X5V / Z5V $\rightarrow -20 +50\%$ X5E / X5F / X5P / X5U $\rightarrow \pm 20\%$	Operating Temperature Range (°C)	-55... +125°C Epoxy Coated
Insulation Resistance (IR)	@ $V_R \rightarrow \geq 10 \text{ G}\Omega$	Climatic Category	30 / 85 / 56

Note: Damp Heat Steady State: 90... 95% R.H. 40°C / 56 days. No voltage to be applied.

DIMENSION TABLE - CLASS II LOW AND MEDIUM VOLTAGE PROFESSIONAL

100V / 500V CLASS II EPOXY COATED

millimeters (inches)

Temp. Coefficient	X5E		X5F		X5P		X5U		X5V		Z5V									
Digits 1,2,3 of P.N.	6MK	6MQ	6NK	6NQ	6OK	6OQ	6SK	6SQ	6TK	6TQ	6UK									
Rated Voltage (V _R)	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC	500 VDC	100 VDC									
C _R (pF)																				
56	5.0 (0.197)	5.0 (0.197)																		
68																				
82																				
100																				
120																				
150																				
180																				
220																				
270																				
330																				
390																				
470																				
560	6.0 (0.236)	6.0 (0.236)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)														
680																				
820																				
1,000	7.0 (0.276)	7.0 (0.276)	6.0 (0.236)	7.0 (0.276)	6.0 (0.236)	7.0 (0.276)	5.0 (0.197)	5.0 (0.197)												
1,200																				
1,500																				
1,800	9.0 (0.354)	9.0 (0.354)	7.0 (0.276)	9.0 (0.354)	7.0 (0.276)	9.0 (0.354)	6.0 (0.236)	7.0 (0.276)	5.0 (0.197)	5.0 (0.197)										
2,200																				
2,700																				
3,300	10.0 (0.394)	11.0 (0.433)	11.0 (0.433)	10.0 (0.394)	9.0 (0.354)	10.0 (0.394)	7.0 (0.276)	7.0 (0.276)	5.0 (0.197)	5.0 (0.197)										
3,900					11.0 (0.433)	10.0 (0.394)					12.0 (0.472)	14.0 (0.551)	16.0 (0.630)	10.0 (0.394)	12.0 (0.472)					
4,700											7.0 (0.276)					9.0 (0.354)		6.0 (0.236)	5.0 (0.197)	
5,600																				
6,800																				
8,200											14.0 (0.551)					16.0 (0.630)	10.0 (0.394)	11.0 (0.433)	7.0 (0.276)	6.0 (0.236)
10,000																				
12,000																				
15,000																	10.0 (0.394)	12.0 (0.472)	7.0 (0.276)	7.0 (0.276)
22,000																				
33,000																				
47,000																				
100,000																				

Diameter (ϕ) = 9th Part Number Digit



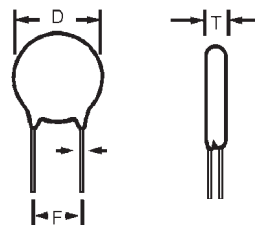
Disc Ceramic Capacitors



General Specifications - Class III Professional

DIELECTRIC - CLASS III

These ceramic capacitors have linear temperature coefficient, very low tolerances, low losses, high insulation resistance and are specially suitable for tuned circuits, timing and other precision circuits. Meets IEC 384-8 (1988).



PERFORMANCE CHARACTERISTICS CLASS III

Measured at	1.0 kHz / 0.1 Vrms / 25°C	
Dissipation Factor (%)	$C_R \leq 22 \text{ nF} \rightarrow Y5V, Y5U \leq 7.5\%$ $C_R > 22 \text{ nF} \rightarrow Y5V, Y5P \leq 5.0\%$	
Tolerance	$Y5P \rightarrow \pm 20\% / -20 +50\%$ $Y5U \rightarrow \pm 20\% / -20 +50\%$ $Y5V \rightarrow -20\% +50\% / -20 +80\%$	
Insulation Resistance (IR)	Y5P	$\geq 12 \text{ M}\Omega$
	Y5U	$4.7 \text{ nF} \dots 100 \text{ nF} \rightarrow \geq 10 \text{ M}\Omega$ $200 \text{ nF} \rightarrow \geq 1 \text{ M}\Omega$
	Y5V	$\geq 100 \text{ M}\Omega$
Dielectric Strength NOTE: Charging current limited to 50 mA	Between leads	$V_t = 1.25 V_R$
	Body insulation	$V_R = 25V \quad V_t = 100V \text{ (DC)}$ $V_R = 50V \quad V_t = 150V \text{ (DC)}$
Operating Temperature Range (°C)	-55... +125°C	
Climatic Category	30 / 085 / 56	

EPOXY COATED – CAPACITANCE VS. DISC DIAMETER

millimeters (inches)

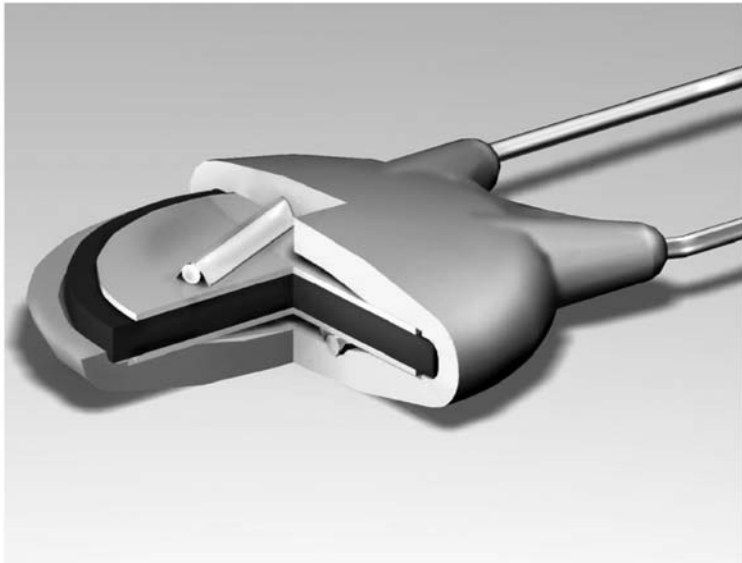
Class III	Δ C/C (max.) ±12%	Range -30... +85°C	Δ C/C (max.) +30 -65%	Range -30... +85°C	Δ C/C (max.) +30 -65%	Range -30... +85°C
Temp. Coefficient	Y5P		Y5U		Y5V	
Digits 1,2,3 of P.N.	6WF	6WH	6YF	6YH	6ZH	
Rated Voltage (V_R)	25 VDC	50 VDC	25 VDC	50 VDC	50 VDC	
C_R (pF)						
4,700	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	5.0 (0.197)	
10,000	6.0 (0.236)	6.0 (0.236)				
22,000	7.0 (0.276)	8.0 (0.315)		6.0 (0.236)		
33,000	8.0 (0.315)	9.0 (0.354)	6.0 (0.236)	7.0 (0.276)		
47,000	9.0 (0.354)		7.0 (0.276)	8.0 (0.315)	6.0 (0.236)	
50,000						
68,000		11.0 (0.433)	11.0 (0.433)	9.0 (0.354)		
100,000	8.0 (0.315)					
220,000						10.0 (0.394)

Disc Ceramic Capacitors



Construction and Marking

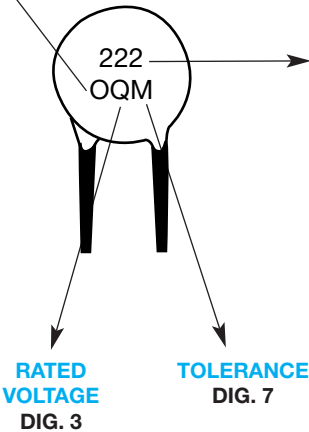
CONSTRUCTION DETAILS



MARKING DETAILS

TEMP COEFFICIENT / CLASS

DIG. 2



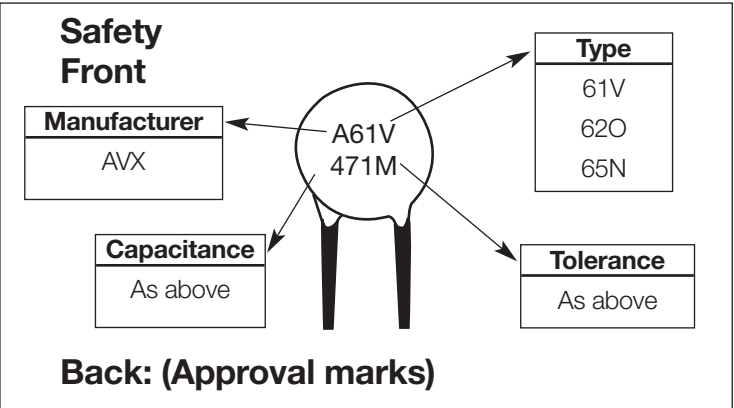
CAPACITANCE

Expressed by three digits. The first and second digits are significant digits, and the third digit expresses the number of zeros which follow the two numbers. If there is a decimal point, it is expressed by the capital letter "R".

In this case all digits are significant.

Ex: 222 = 2200pF; 8R2 = 8.2pF.

Logo: Only in diam. $\geq$ 6mm



Disc Ceramic Capacitors



Packaging

IDENTIFICATION AND TRACEABILITY

On all TPC ceramic capacitors packages, you will find a bar code label with the following information:

Diagram of a barcode label with the following fields:

- Lot Number:** (H) Lot: F500626130X024
- Quantity of parts per packaging:** (Q) Qty: 2000
- Product Part Number:** (2W) TPC-PN: 50Q102K0CAM
- Spec Number:** 7R330102
- RoHS Compliant:** Pb e3
- Temperature:** 260°C

TAPED PARTS QUANTITY TABLE

millimeters (inches)

Rated Voltage (Vr)	Diameter D	Quantities	
		Ammopack	Reel
Vr ≤ 500V	D ≤ 7 (0.276)	2000	2500
	7 < D ≤ 11 (0.433)	2000	2000
500V < Vr ≤ 2kV	D ≤ 11 (0.433)	1500	2000
2kV < Vr = 5kV	D ≤ 11 (0.433)	1000	1500

CARDBOARD STRIPS QUANTITY TABLE

millimeters (inches)

Rated Voltage (Vr)	Diameter D	Lead Space	
		≤ 5 (0.197)	> 5 (0.197)
Vr ≤ 500V	D ≤ 8 (0.315)	2500	1500
	8 (0.315) ≤ D ≤ 11 (0.433)	1500	-
	8 (0.315) ≤ D ≤ 13 (0.512)	-	1000
	11 (0.433) ≤ D ≤ 15 (0.591)	1000	-
	13 (0.512) ≤ D ≤ 19 (0.748)	-	500
	D ≤ 19 (0.748)	500	-
500V < Vr ≤ 2kV	D ≤ 9 (0.354)	1500	1000
	9 (0.354) ≤ D ≤ 11 (0.433)	-	1000
	9 (0.354) ≤ D ≤ 13 (0.512)	1000	-
	11 (0.433) ≤ D ≤ 19 (0.748)	-	500
	13 (0.512) ≤ D ≤ 19 (0.748)	500	-
2kV < Vr ≤ 5kV Safety 65N 62O	D ≤ 9 (0.354)	1500	-
	D ≤ 11 (0.433)	-	1000
	D ≤ 13 (0.512)	500	500
Safety 61V	D ≤ 6 (0.236)	1500	1500
	7 (0.275) ≤ D ≤ 9 (0.354)	1000	1000
	9 (0.354) ≤ D	500	500

Quantities for alternative package, upon request.

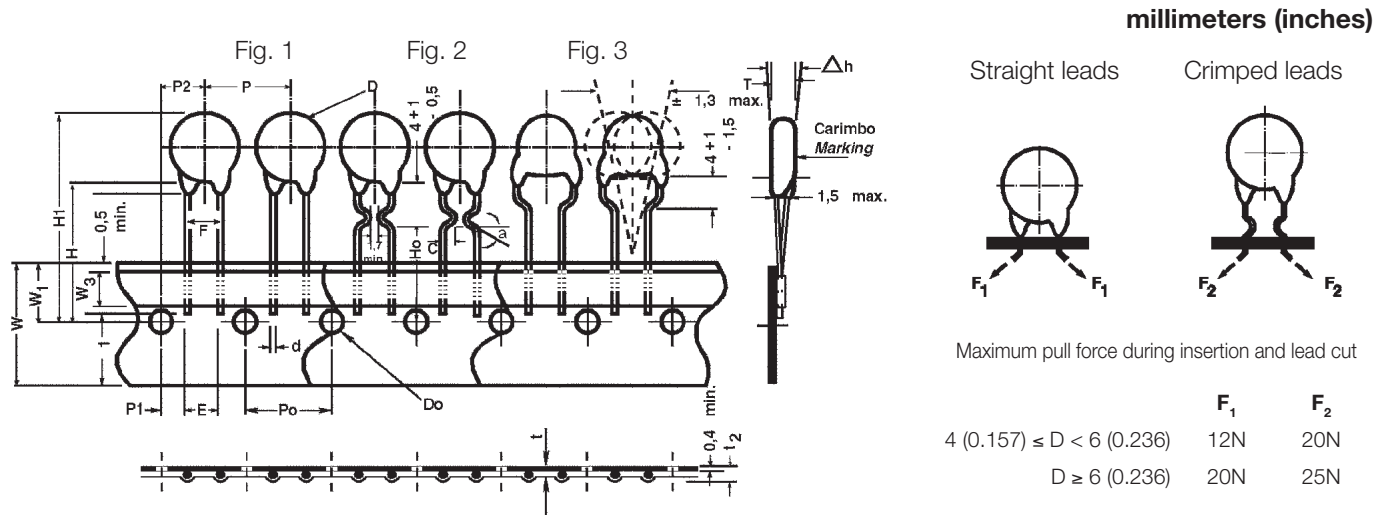
Disc Ceramic Capacitors



Tape and Reel Specifications

There are two types of taped disc ceramic capacitors:
Straight leads or crimped leads.

Both types can be shipped on reels or ammpack.
The standard packaging is shown below:



Digit 11	Available Tapings		Digit 9
L	➔	Sizes 4 (0.157) ≤ D ≤ 11 (0.433)	A... H
M			
J H	➔	Sizes 6 (0.236) ≤ D ≤ 11 (0.433)	C... H
K I			

TPC Code Digit 11

Packaging	Avisert				Panaset			
Reel								
	FIGURE 1	FIGURE 2	FIGURE 3	FIGURE 4	FIGURE 1	FIGURE 2	FIGURE 3	FIGURE 4
Ampack								
	FIGURE 1	FIGURE 2	FIGURE 3	FIGURE 4	FIGURE 1	FIGURE 2	FIGURE 3	FIGURE 4

Figure 2: Inside Crimp 100V... 1000V

Figure 3: Outside Crimp 1000V

Disc Ceramic Capacitors

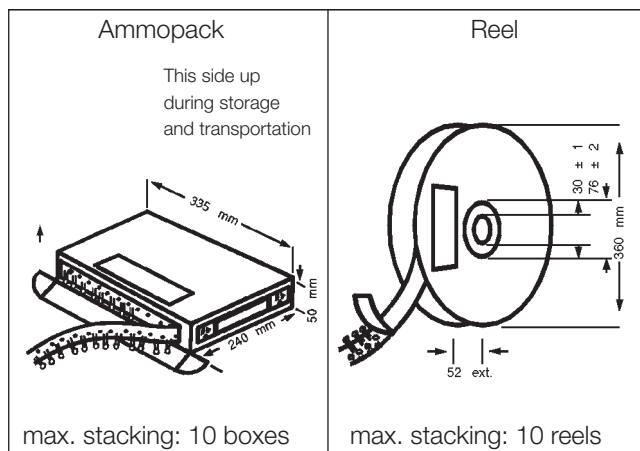


Tape and Reel Specifications

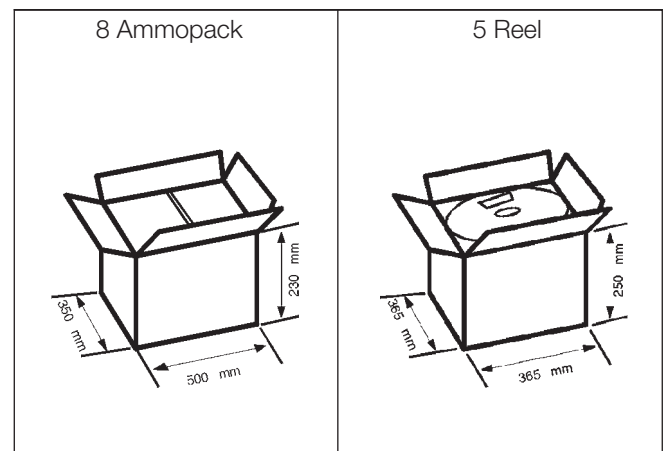
		millimeters (inches)		
Description of Symbols		Straight Leads		Crimped
		Figure 1		Figure 2 & 3
		A (Avisert)	P (Panaset)	Avisert & Panaset
Crimp angle	∞	—	—	20°...45°
Crimp length	C	—	—	1.7 (0.067) min.
Lead diameter	d	0.60 ± 0.1 (0.024 ± 0.004)		
Disc diameter	D	11 (0.433) max.		
Lead hole diameter	Do	4.0 ± 0.2 (0.157 ± 0.008)		
Disc thickness	T	See Catalog		
Lead spacing	F	5.0 ^{+0.6} _{-0.2} (0.197 ^{+0.024} _{-0.008})		
Component alignment, front-rear	Δh	0 ± 1 (0.000 ± 0.039)		
Height of component from tape center	H	19.5 ± 0.5 (0.768 ± 0.020)	16.5 ± 0.5 - 0 (0.650 ± 0.020 - 0)	—
Height from tape center to crimp	Ho	—	—	16 + 0.5 (0.630 + 0.020)
Component height	H1	32.25 (1.270) max.	>23.5 (>0.925) <32.25 (<1.270)	32.25 (1.270) max.
Distance from component leads to tape bottom	ℓ_1	12 (0.472) max.		
Tape width	W	18 ⁺¹ _{-0.5} (0.709 ^{+0.039} _{-0.020})		
Bonding tape width	W ₃	5.5 (0.217) min.		
Feed hole position	W ₁	9.0 ± 0.5 (0.354 ± 0.020)		
Pitch between discs	P	12.7 ± 1 (0.500 ± 0.039)		
Feed hole pitch	Po	12.7 ± 0.3 (0.500 ± 0.012)		
Hole center to lead	P1	3.85 ± 0.7 (0.152 ± 0.028)		
Feed hole center to component center	P2	6.35 ± 1 (0.250 ± 0.039)		
Tape + bonding tape thickness	t	0.7 ± 0.2 (0.028 ± 0.008)		
Total tape thickness, including lead	t ₂	1.5 (0.059) max.		

*Also available P = 25.4 (1.00)

PACKAGING



SHIPPING CONTAINER



Disc Ceramic Capacitors

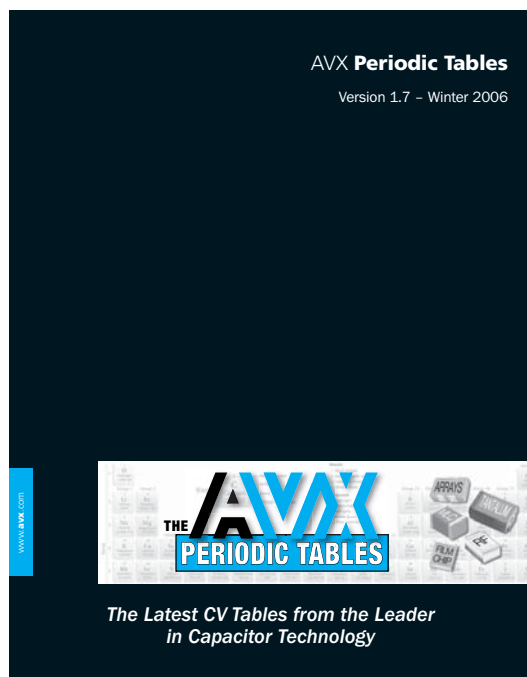
Normalized Series and Associated Values



E 6 ±20%	E 12 ±10%	E 24 ±5%	E 48 ±2%	E 96 ±1%
100	100	100	100	100
				102
			105	105
				107
		110	110	110
				113
			115	115
				118
	120	120	121	121
				124
			127	127
				130
		130	133	133
				137
			140	140
				143
			147	147
				150
150	150	150	154	154
				158
			162	162
				165
		169	169	169
				174
			178	178
				182
	180	180	187	187
				191
			196	196
				200
		205	205	205
				210
			215	215
				221
220	220	220	226	226
				232
			237	237
				243
		249	249	249
				255
			261	261
				267
	270	270	274	274
				280
			287	287
				294
		301	301	301
				309

E 6 ±20%	E 12 ±10%	E 24 ±5%	E 48 ±2%	E 96 ±1%
330	330	330	316	316
				324
			332	332
				340
		360	348	348
				357
			365	365
				374
	390	390	383	383
				392
			402	402
				412
		430	422	422
				432
			442	442
				453
470	470	470	464	464
				475
			487	487
				499
		510	511	511
				523
			536	536
				549
	560	560	562	562
				576
			590	590
				604
		620	619	619
				634
			649	649
				665
680	680	680	681	681
				698
			715	715
				732
		750	750	750
				768
			787	787
				806
	820	820	825	825
				845
			866	866
				887
		910	909	909
				931
			953	953
				976





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Supercapacitors

This quick reference guide provides the very latest capacitor capability charts for a broad range of dielectrics available from AVX Corporation.

As a market leader in capacitor technology, AVX Corporation continues to develop new materials and process technology to expand our product portfolio. This document is intended to assist engineers in achieving the best possible design solution. Selection of the most appropriate capacitor technology, case size and other parametric options can help maximize system performance and cost-effectiveness.

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AMERICAS

AVX Myrtle Beach, SC
Corporate Offices
Tel: 843-448-9411
FAX: 843-448-1943

AVX Northwest, WA
Tel: 360-699-8746
FAX: 360-699-8751

AVX North Central, IN
Tel: 317-848-7153
FAX: 317-844-9314

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Tel: 905-238-3151
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AVX South America
Tel: ++55-11-2193-7200
FAX: ++55-11-2193-7210

EUROPE

AVX Limited, England
European Headquarters
Tel: ++44 (0) 1252-770000
FAX: ++44 (0) 1252-770001

AVX/ELCO, England
Tel: ++44 (0) 1638-675000
FAX: ++44 (0) 1638-675002

AVX S.A., France
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AVX GmbH, Germany
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AVX srl, Italy
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AVX Czech Republic
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AVX/Kyocera, Singapore
Asia-Pacific Headquarters
Tel: (65) 6286-7555
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AVX/Kyocera, Hong Kong
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AVX/Kyocera, Korea
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AVX/Kyocera, Taiwan
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AVX/Kyocera, Malaysia
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Elco, Japan
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FAX: 045-943-2910

Kyocera, Japan - AVX
Tel: (81) 75-604-3426
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AVX/Kyocera, Shanghai, China
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