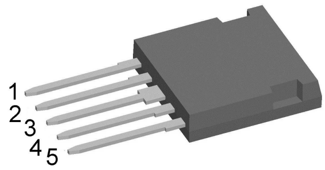
Thyristor

V_{RRM} = 2x 1600 V
I_{TAV} = 50 A
V_T = 1,23 V

Phase leg

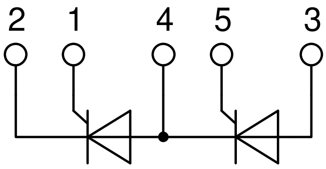
Part number

CMA50P1600FC



Backside: isolated

E72873



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability

Applications:

- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

Package: i4-Pac

- Isolation Voltage: 3000 V~
- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

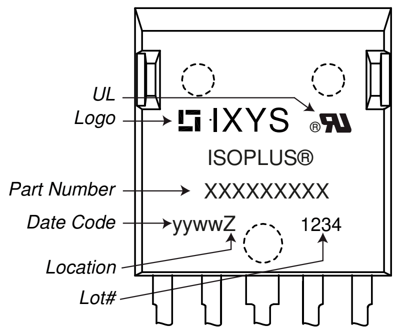
Thyristor

Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1700	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1600	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1600 V	T_{VJ} = 25°C			50	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 125°C			3	mA
V_T	*forward voltage drop*	I_T = 50 A	T_{VJ} = 25°C			1,30	V
		I_T = 100 A				1,58	V
		I_T = 50 A	T_{VJ} = 125°C			1,23	V
		I_T = 100 A				1,56	V
I_{TAV}	*average forward current*	T_C = 90°C	T_{VJ} = 150°C			50	A
$I_{T(RMS)}$	*RMS forward current*	180° sine				79	A
V_{T0}	*threshold voltage*	*for power loss calculation only*	T_{VJ} = 150°C			0,88	V
r_T	*slope resistance*					6,7	mΩ
R_{thJC}	*thermal resistance junction to case*					0,7	K/W
R_{thCH}	*thermal resistance case to heatsink*				0,2		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			170	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			850	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			920	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			725	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			780	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			3,62	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			3,52	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			2,63	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			2,53	kA²s
C_J	*junction capacitance*	V_R = 400V f = 1 MHz	T_{VJ} = 25°C		32		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 150°C			10	W
		t_P = 300 µs				5	W
P_{GAV}	*average gate power dissipation*					0,5	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 125°C; f = 50 Hz	repetitive, I_T = 150 A			150	A/µs
		t_P = 200 µs; di_G/dt = 0,3 A/µs;					
		I_G = 0,45A; V_D = ⅔ V_{DRM}	non-repet., I_T = 50 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 125°C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	*gate trigger voltage*	V_D = 6 V	T_{VJ} = 25°C			1,4	V
			T_{VJ} = -40°C			1,6	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			80	mA
			T_{VJ} = -40°C			200	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 150°C			0,2	V
I_{GD}	*gate non-trigger current*					5	mA
I_L	*latching current*	t_p = 10 µs	T_{VJ} = 25°C			450	mA
		I_G = 0,3A; di_G/dt = 0,3 A/µs					
I_H	*holding current*	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			100	mA
t_{gd}	*gate controlled delay time*	V_D = ½ V_{DRM}	T_{VJ} = 25°C			2	µs
		I_G = 0,5A; di_G/dt = 0,5 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 50A; V_D = ⅔ V_{DRM}	T_{VJ} =125 °C		150		µs
		di/dt = 10 A/µs; dv/dt = 20 V/µs; t_p = 200 µs					

Data according to IEC 60747and per semiconductor unless otherwise specified

Package i4-Pac				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal				70	A
T_{VJ}	*virtual junction temperature*			-40		150	°C
T_{op}	*operation temperature*			-40		125	°C
T_{stg}	*storage temperature*			-40		150	°C
Weight					6		g
F_C	*mounting force with clip*			20		120	N
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*		*terminal to terminal*	1,7			mm
$d_{Spb/Apb}$			*terminal to backside*	5,1			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3000			V
		t = 1 minute		2500			V

Product Marking



Part description

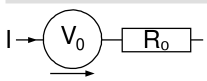
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
50 = Current Rating [A]
P = Phase leg
1600 = Reverse Voltage [V]
FC = i4-Pac (5)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CMA50P1600FC	CMA50P1600FC	Tube	25	507603

Similar Part	Package	Voltage class
CMA30P1600FC	i4-Pac (5)	1600

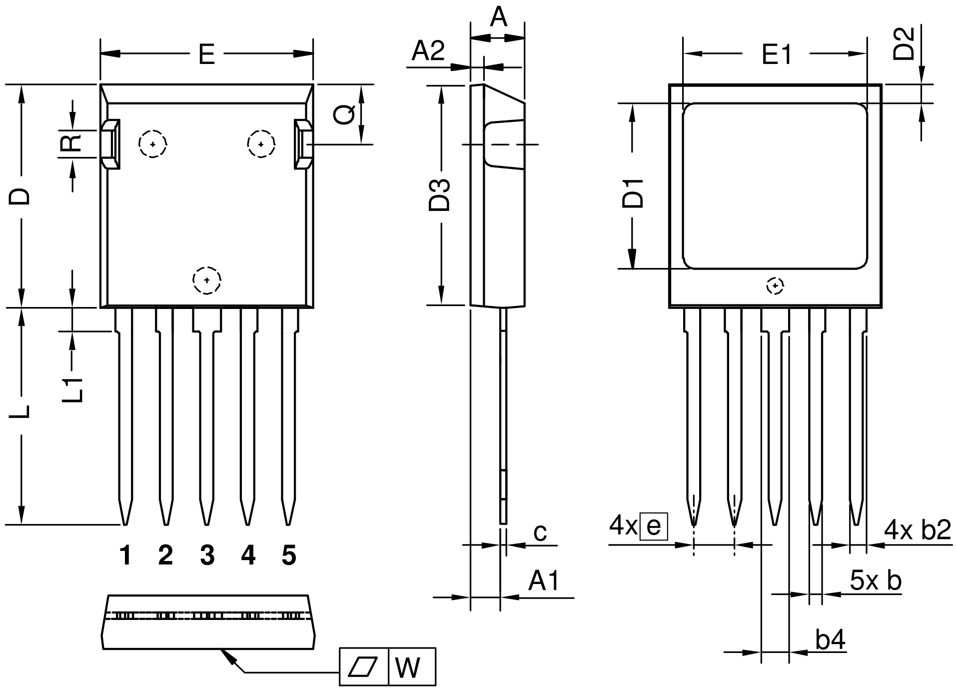
Equivalent Circuits for Simulation

** on die level* $T_{VJ} = 150°C$



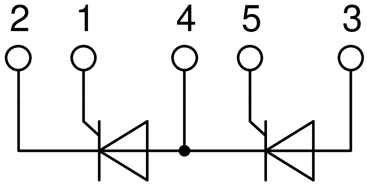
		Thyristor	
$V_{0\ max}$	*threshold voltage*	0,88	V
$R_{0\ max}$	*slope resistance **	4,2	mΩ

Outlines i4-Pac



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.83	5.21	0.190	0.205
A1	2.59	3.00	0.102	0.118
A2	1.17	2.16	0.046	0.085
b	1.14	1.40	0.045	0.055
b2	1.47	1.73	0.058	0.068
b4	2.54	2.79	0.100	0.110
c	0.51	0.74	0.020	0.029
D	20.80	21.34	0.819	0.840
D1	14.99	15.75	0.590	0.620
D2	1.65	2.03	0.065	0.080
D3	20.30	20.70	0.799	0.815
E	19.56	20.29	0.770	0.799
E1	16.76	17.53	0.660	0.690
e	3.81 BSC		0.150 BSC	
L	19.81	21.34	0.780	0.840
L1	2.11	2.59	0.083	0.102
Q	5.33	6.20	0.210	0.244
R	2.54	4.57	0.100	0.180
W	-	0.10	-	0.004

Die konvexe Form des Substrates ist typ. < 0.05 mm über der Kunststoffoberfläche der Bauteilunterseite
The convexbow of substrate is typ. < 0.05 mm over plastic surface level ofdevice bottom side



Thyristor

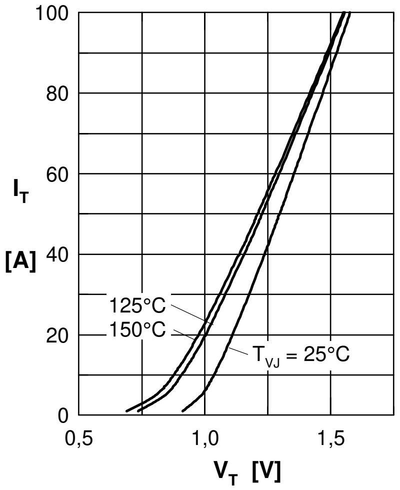


Fig. 1 Forward characteristics

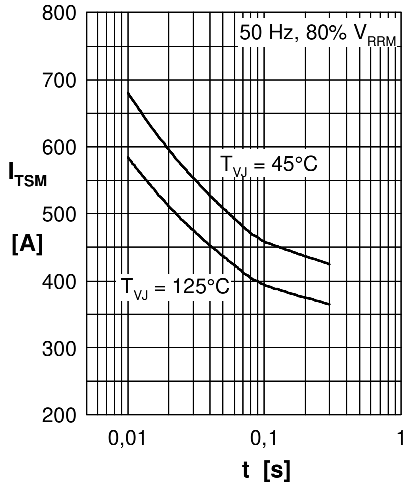


Fig. 2 Surge overload current

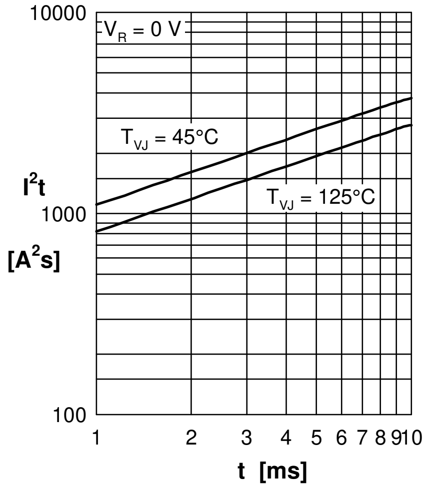


Fig. 3 I^2t versus time (1-10 ms)

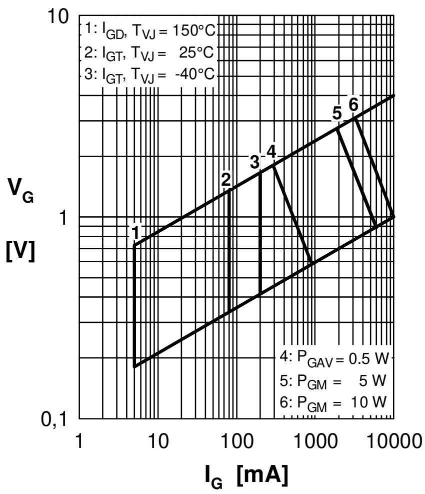


Fig. 4 Gate trigger characteristics

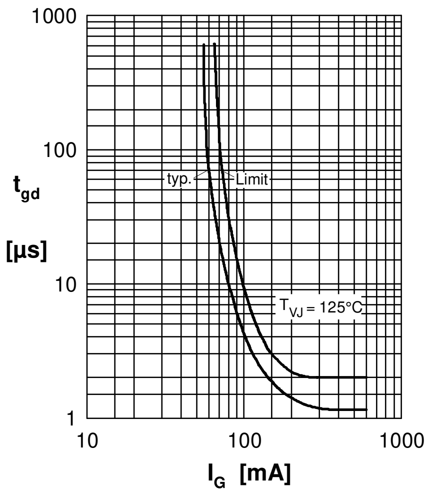


Fig. 5 Gate controlled delay time

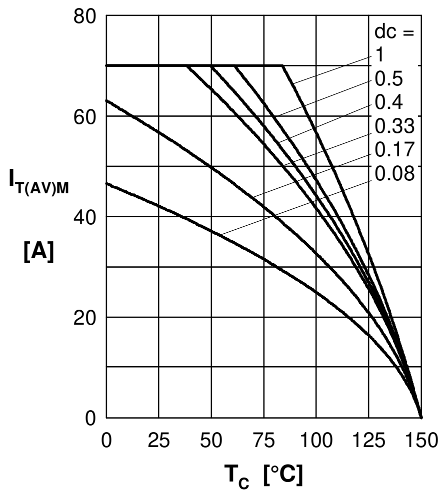


Fig. 6 Max. forward current at case temperature

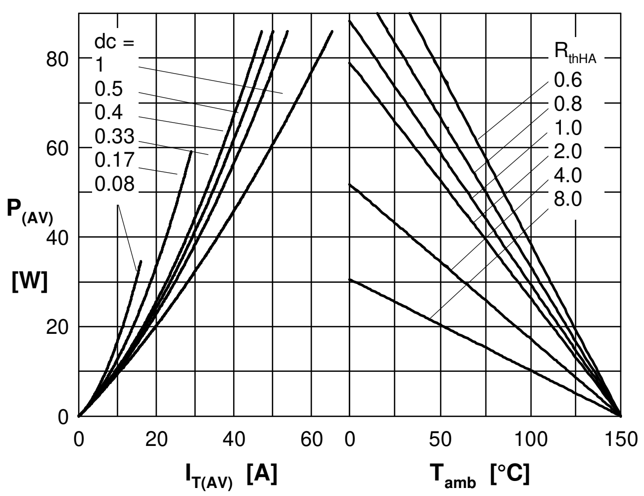


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

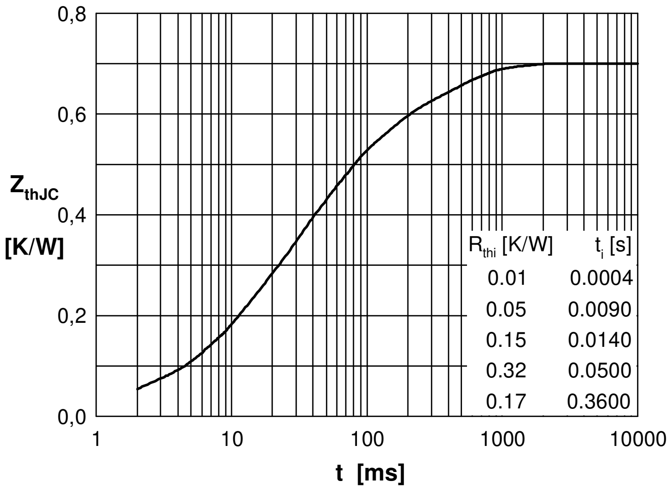


Fig. 8 Transient thermal impedance