Thyristor

V_{RRM}	=	2 x 1600 V
I_{TAV}	=	50 A
V_T	=	1.23 V

Phase leg
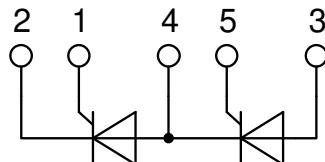
Part number

CMA50P1600FC

1
2
3
4
5

Backside: isolated

U E72873

2 1 4 5 3

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

Disclaimer Notice
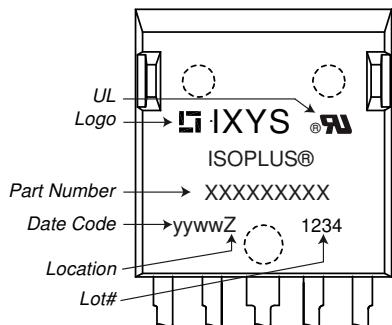
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Thyristor

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		$T_{VJ} = 150°C$			0.88	V
r_T	slope resistance	for power loss calculation only				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	$T_{VJ} = 45°C$			720	A
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			780	A
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150°C$			610	A
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			660	A
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			2.59	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			2.53	kA²s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150°C$			1.86	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			1.81	kA²s
C_J	junction capacitance	$V_R = 400$ V 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;					
		$I_G = 0.45$ A; $V = ⅔ V_{DRM}$ non-repet., $I_T = 50$ A				500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = ⅔ V_{DRM}$	$T_{VJ} = 125°C$			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
		$I_G = 0.3$ A; $di_G/dt = 0.3$ 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
		$I_G = 0.5$ A; $di_G/dt = 0.5$ A/µs					
t_q	turn-off time	$V_R = 100$ V; $I_T = 50$A; $V = ⅔ V_{DRM}$ $T_{VJ} = 125°C$			150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs $t_p = 200$ µs					

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20191202c

Package   i4-Pac

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; $I_{ISOL} \leq 1$ mA	3000			V
		t = 1 minute		2500			V

Product Marking

UL Logo
ISOPLUS®
Part Number → XXXXXXXXX
Date Code → yywwZ   1234
Location
Lot#

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)
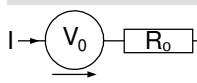
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CMA50P1600FC	CMA50P1600FC	Tube	25	507603
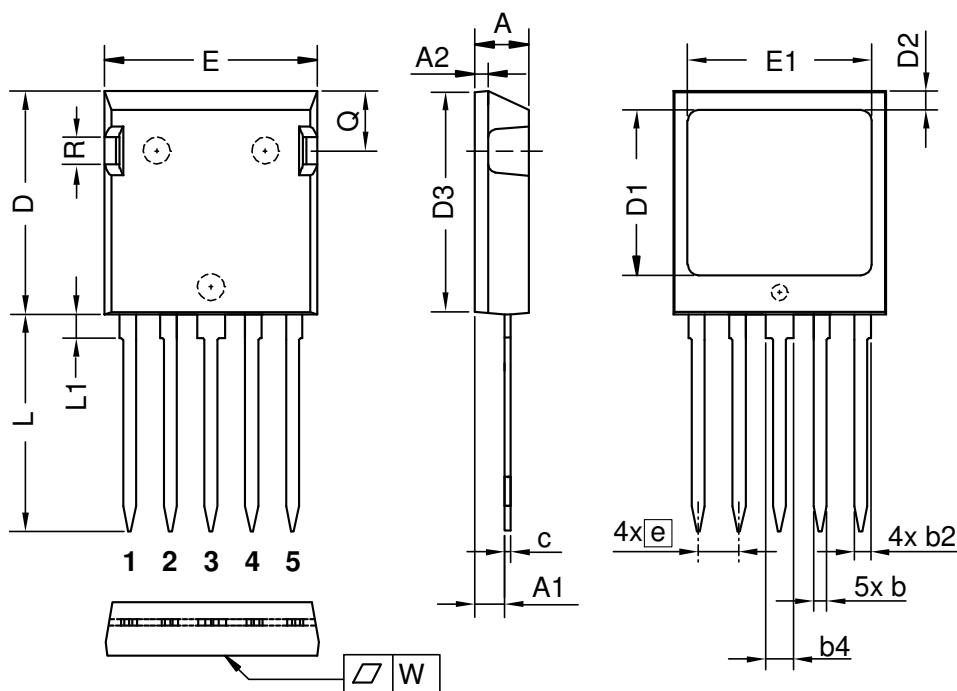
Similar Part	Package	Voltage class
CMA30P1600FC	i4-Pac (5)	1600

Equivalent Circuits for Simulation   * on die level $T_{VJ} = 150°C$
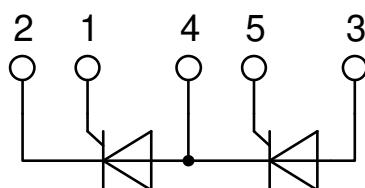
Thyristor

$V_{0\,max}$	threshold voltage	0.88	V
$R_{0\,max}$	slope resistance *	4.2	mΩ

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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 convex bow of substrate is typ. < 0.05 mm over plastic surface level of device bottom side

Thyristor
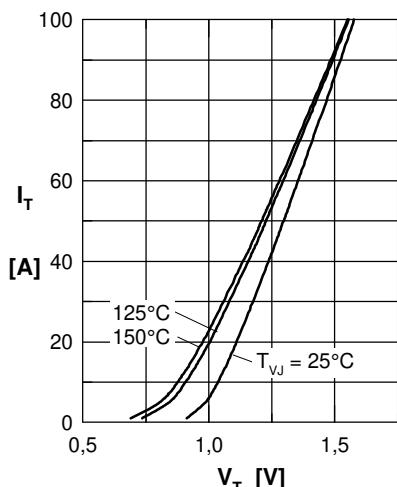
Fig. 1 Forward characteristics
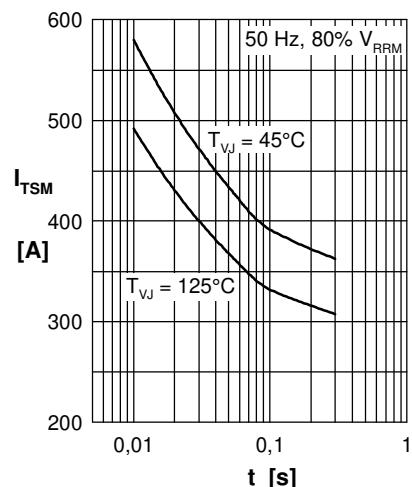
Fig. 2 Surge overload current
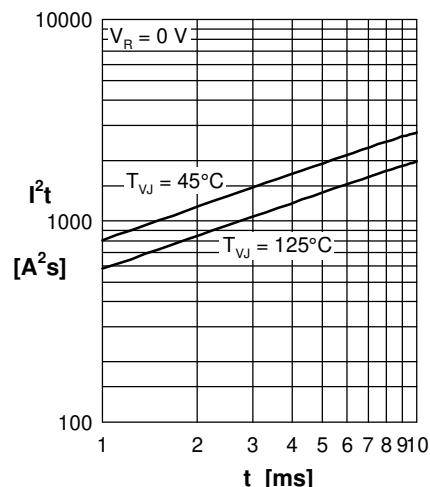

Fig. 3 I^2t versus time (1-10 ms)
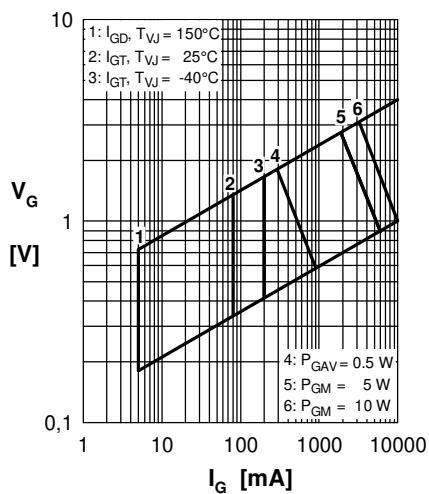
Fig. 4 Gate trigger characteristics
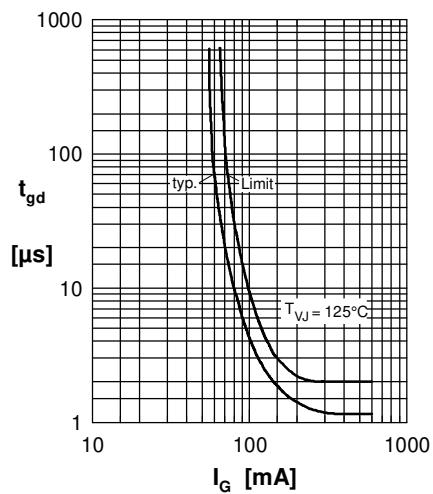
Fig. 5 Gate controlled delay time
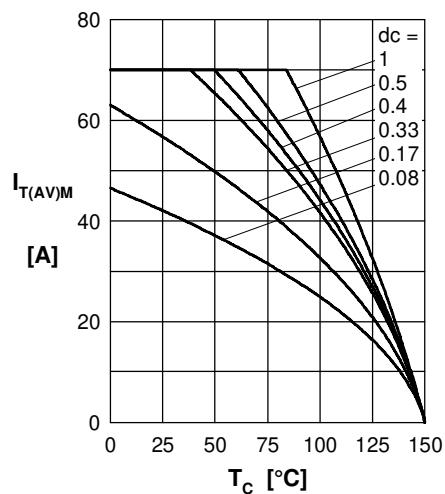
Fig. 6 Max. forward current
at case temperature
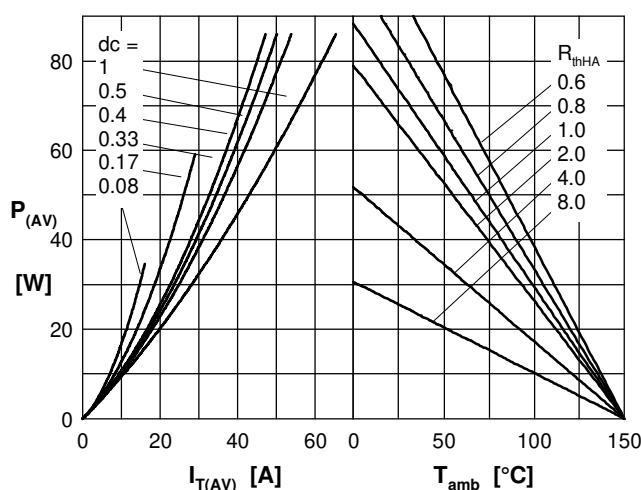
Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature
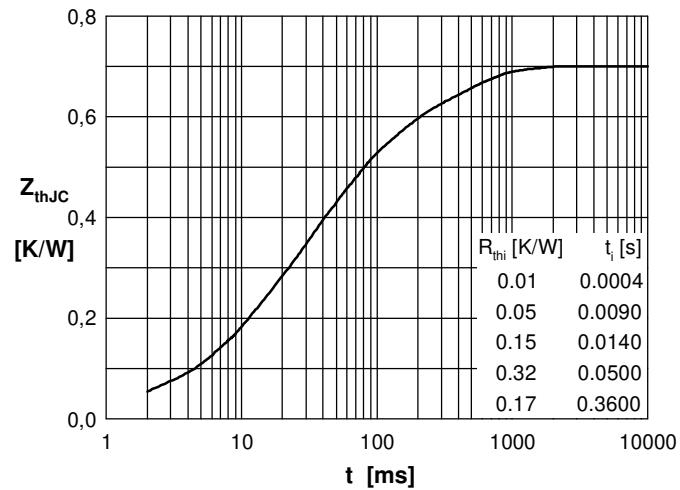
Fig. 8 Transient thermal impedance

R_{thi} [K/W]	t_i [s]
0.01	0.0004
0.05	0.0090
0.15	0.0140
0.32	0.0500
0.17	0.3600

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