

Thyristor Module

$$V_{RRM} = 1600 \text{ V}$$

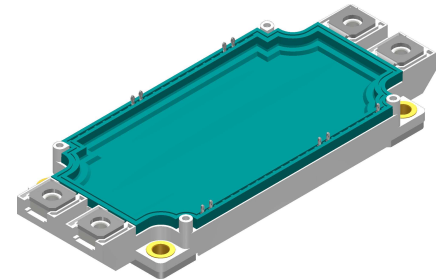
$$I_{TAV} = 150 \text{ A}$$

$$V_T = 1.35 \text{ V}$$

AC Controlling
 2~ full-controlled

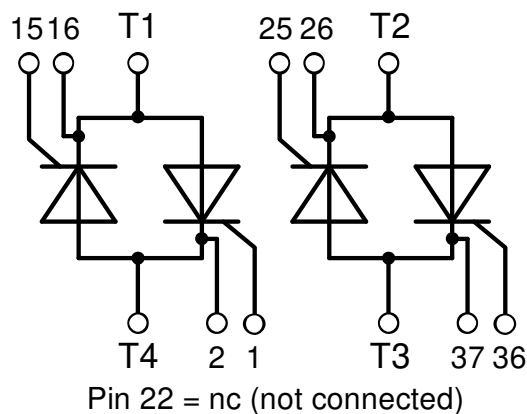
Part number

MCMA300MC1600PSF



Backside: isolated

 E72873



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al₂O₃-ceramic

Applications:

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

Package: SimBus F

- Isolation Voltage: 4300 V~
- Industry standard outline
- RoHS compliant
- PressFit-Pins for PCB mounting
- Height: 17 mm
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

Disclaimer Notice

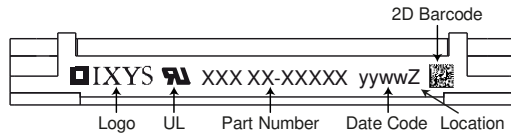
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Thyristor				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage					1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage					1600	V
I_{RD}	reverse current, drain current	$V_{R/D} = 1600\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			300	μA
		$V_{R/D} = 1600\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$			20	mA
V_T	forward voltage drop	$I_T = 150\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.40	V
		$I_T = 300\text{ A}$				1.77	V
		$I_T = 150\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.35	V
		$I_T = 300\text{ A}$				1.79	V
I_{TAV}	average forward current	$T_C = 100^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			150	A
I_{RMS}	RMS forward current per phase	sine 180° $d = 0.5$				330	A
V_{T0}	threshold voltage					0.90	V
r_T	slope resistance	} for power loss calculation only				2.92	m Ω
R_{thJC}	thermal resistance junction to case					0.17	K/W
R_{thCH}	thermal resistance case to heatsink				0.08		K/W
P_{tot}	total power dissipation			$T_C = 25^{\circ}\text{C}$		735	W
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			2.40	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			2.59	kA
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			2.04	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			2.21	kA
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			28.8	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			27.9	kA ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			20.8	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			20.2	kA ² s
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		118		pF
P_{GM}	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 150^{\circ}\text{C}$			10	W
		$t_p = 300\text{ }\mu\text{s}$				5	W
P_{GAV}	average gate power dissipation					0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 150^{\circ}\text{C}; f = 50\text{ Hz}$ repetitive, $I_T = 450\text{ A}$				150	A/ μs
		$t_p = 200\text{ }\mu\text{s}; di_G/dt = 0.45\text{ A}/\mu\text{s};$ $I_G = 0.45\text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 150\text{ A}$				500	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}\text{C}$			1000	V/ μs
		$R_{GK} = \infty$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			1.5	V
			$T_{VJ} = -40^{\circ}\text{C}$			1.6	V
I_{GT}	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			150	mA
			$T_{VJ} = -40^{\circ}\text{C}$			200	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}\text{C}$			0.2	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	$t_p = 30\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$			200	mA
		$I_G = 0.45\text{ A}; di_G/dt = 0.45\text{ A}/\mu\text{s}$					
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}\text{C}$			200	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}\text{C}$			2	μs
		$I_G = 0.45\text{ A}; di_G/dt = 0.45\text{ A}/\mu\text{s}$					
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 150\text{ A}; V = \frac{2}{3} V_{DRM}$ $T_{VJ} = 125^{\circ}\text{C}$ $di/dt = 10\text{ A}/\mu\text{s}$ $dv/dt = 20\text{ V}/\mu\text{s}$ $t_p = 200\text{ }\mu\text{s}$			350		μs



Package SimBus F		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			300	A
T_{VJ}	virtual junction temperature		-40		150	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		125	°C
Weight				350		g
M_D	mounting torque		3		6	Nm
M_T	terminal torque		3		6	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	13.3	10.0		mm
$d_{Spb/Apb}$		terminal to backside	10.2	10.2		mm
V_{ISOL}	isolation voltage	t = 1 second		4300		V
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	3600		V



Part description

- M = Module
- C = Thyristor (SCR)
- M = Thyristor
- A = (up to 1800V)
- 300 = Current Rating [A]
- MC = 2~ full-controlled
- 1600 = Reverse Voltage [V]
- P = PressFit-Pin
- SF = SimBus F

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA300MC1600PSF	MCMA300MC1600PSF	Blister	24	525675
Alternative	MCMA300MC1600PSF-PC	MCMA300MC1600PSF	Blister	24	

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150^{\circ}C$

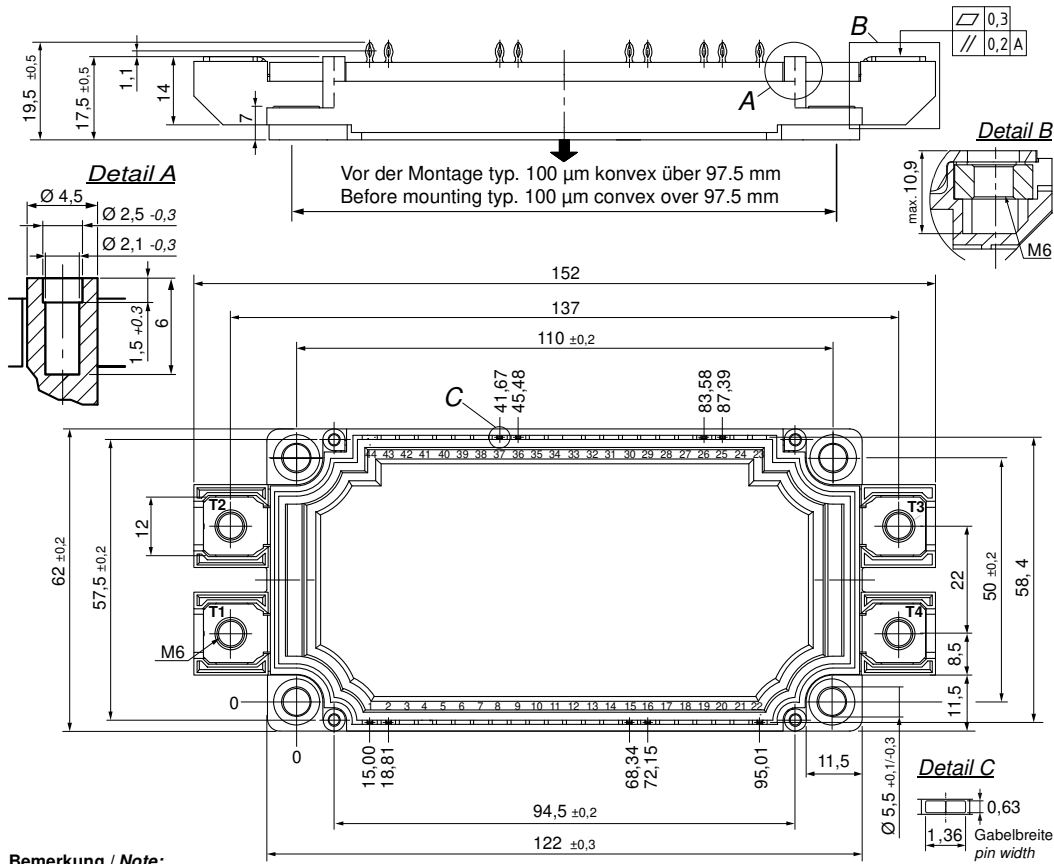


Thyristor

$V_{0\ max}$	threshold voltage	0.9	V
$R_{0\ max}$	slope resistance *	1.48	mΩ



Outlines SimBus F

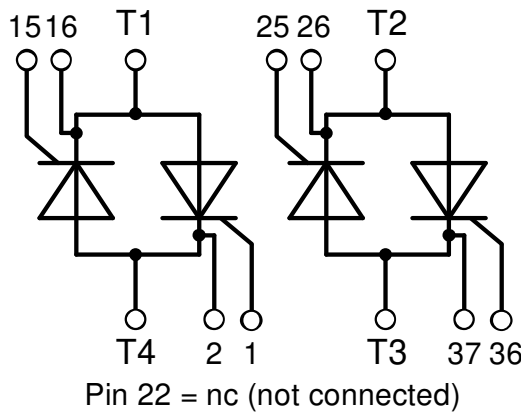


Bemerkung / Note:

- Nichttolerierete Maße nach / Measure w/o tolerances acc. DIN ISO 2768-T1-m
- PCB-Lochmuster / PCB hole pattern: see pin position
- Toleranz Pin-Position und PCB-Lochmuster / Tolerance of pin position and PCB hole pattern: $\oplus 0.1$
- Bohrlochdurchmesser / Diameter of drill: $\varnothing 1.16$ mm
- Endlochdurchmesser / Diameter of plated holes: $\varnothing 1.00 - 1.10$ mm (Cu thickness in via typ. 50 μm)
- Beschichtung / Plating: chem. Sn max. 15 μm
- Einpresskraft / Insert Force: per terminal with a typ. insert speed of 1 mm/s: typ. 90 N
- Weitere Angaben / Further information: www.ixys.com Application note IXAN0077
- Montageanleitung / Mounting instruction: www.ixys.com Application note IXAN0024

Detail A: PCB-Montage / Mounting on PCB^L

- Empfohlene, selbstschneidende Schraube / Recommended, self-tapping screw: **EJOT PT®** (Größe / size: **K25**)^L
- Max. Schraubenlänge / Max. screw length: **PCB-Dicke / thickness + 6 mm** (max. Lochtiefe / hole depth)^L
- Empfohlenes Drehmoment / Recommended mounting torque: **1.5 Nm**



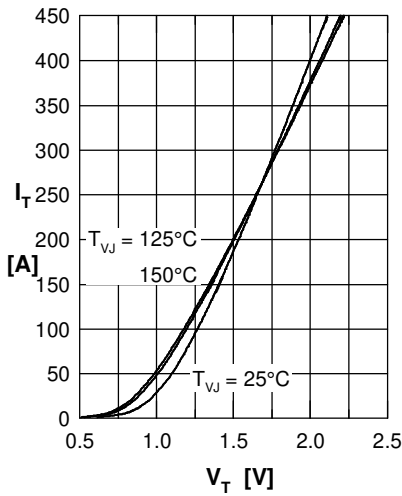
Thyristor


Fig. 1 Forward characteristics

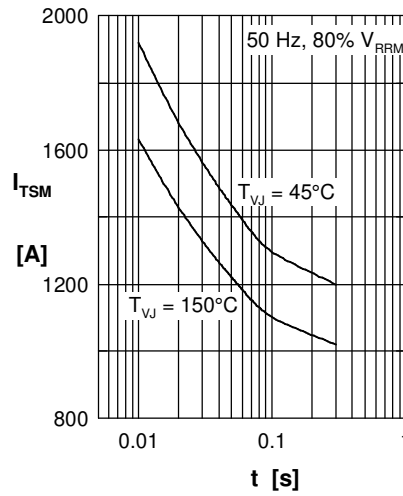
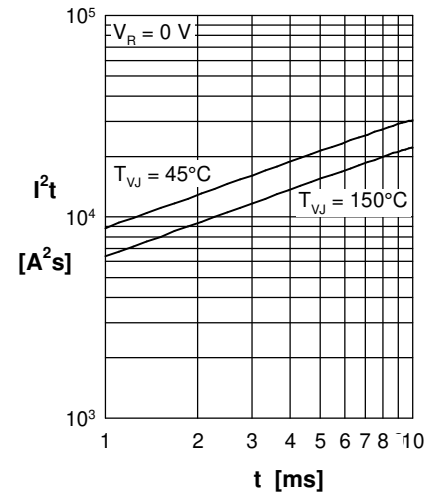
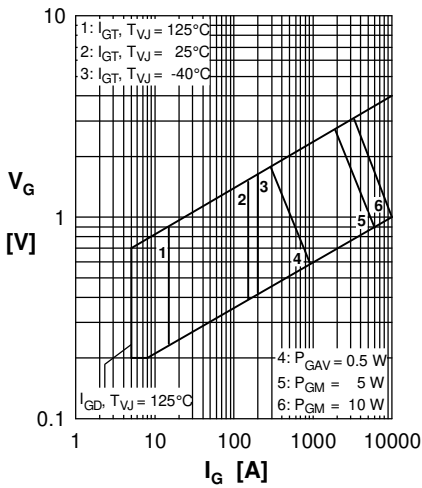

 Fig. 2 Surge overload current
 I_{TSM} : crest value, t : duration

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


Fig. 4 Gate voltage & gate current

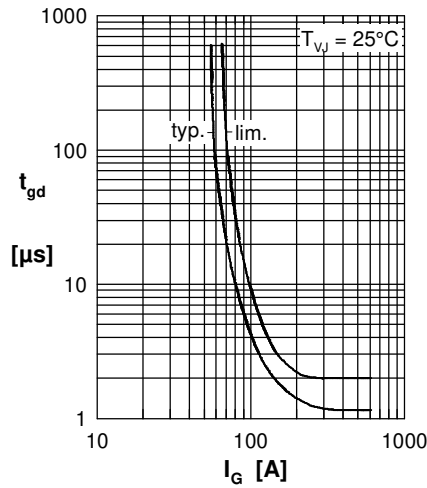
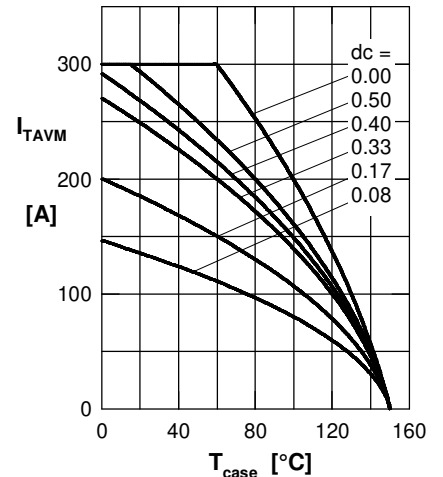

 Fig. 5 Gate controlled delay time t_{gd}


Fig. 6 Max. forward current at case temperature

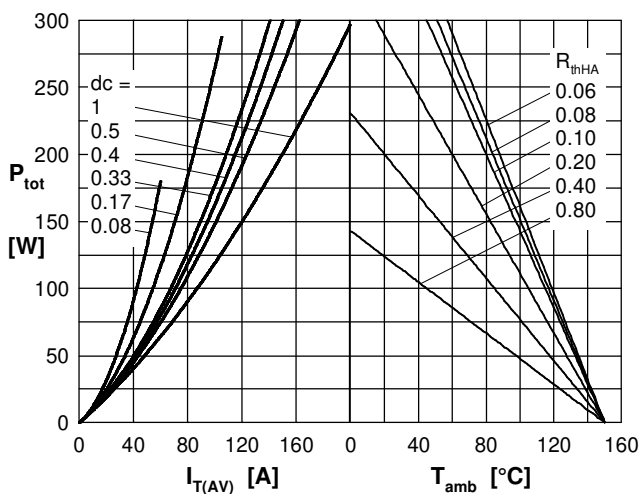
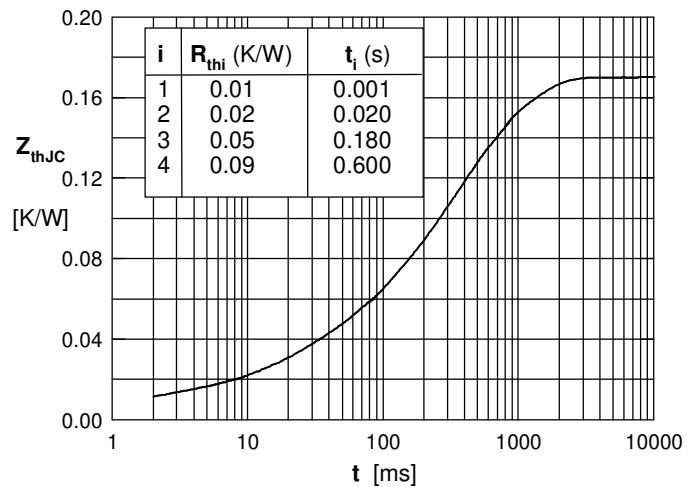

 Fig. 7a Power dissipation versus direct output current
 Fig. 7b and ambient temperature


Fig. 8 Transient thermal impedance junction to case