



# Thyristor Module

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

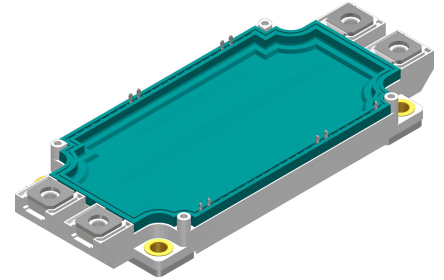
$I_{TAV} = 150\text{ A}$

$V_T = 1.35\text{ V}$

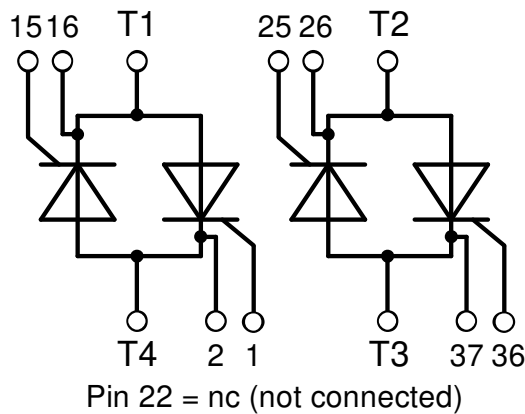
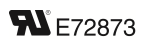
AC Controlling  
2~ full-controlled

Part number

**MCMA300MC1600PSF**



Backside: isolated



**Features / Advantages:**

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al<sub>2</sub>O<sub>3</sub>-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

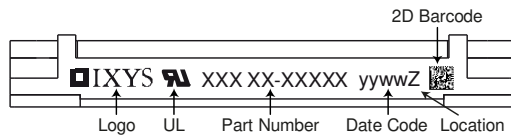
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Thyristor				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage					1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage					1600	V
$I_{RD}$	reverse current,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



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
<b>Weight</b>				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

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

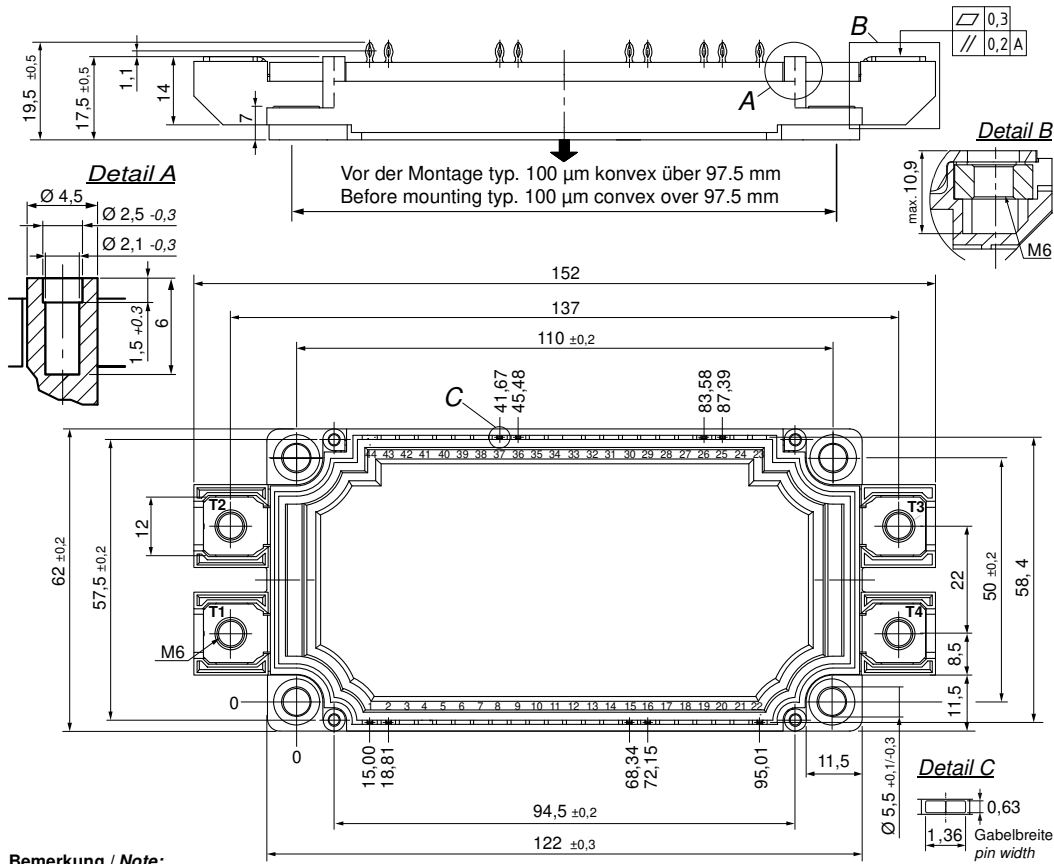


Thyristor

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



**Outlines SimBus F**

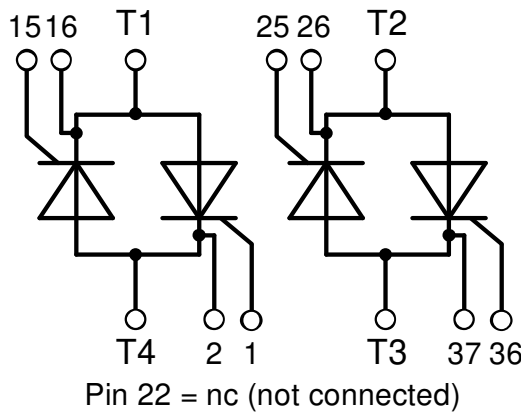


**Bemerkung / Note:**

- 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  $\mu\text{m}$ )
- Beschichtung / Plating: chem. Sn max. 15  $\mu\text{m}$
- Einpresskraft / Insert Force: per terminal with a typ. insert speed of 1 mm/s: typ. 90 N
- Weitere Angaben / Further information: [www.ixys.com](http://www.ixys.com) Application note IXAN0077
- Montageanleitung / Mounting instruction: [www.ixys.com](http://www.ixys.com) Application note IXAN0024

**Detail A:** PCB-Montage / Mounting on PCB<sup>L</sup>

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



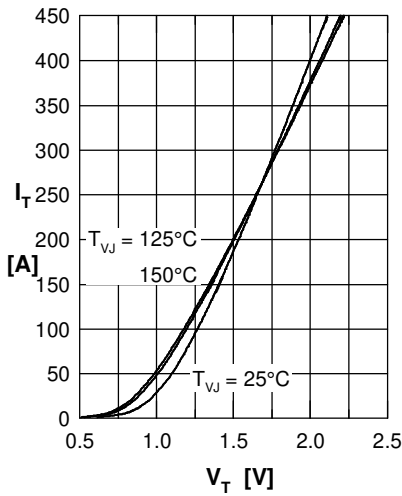
**Thyristor**


Fig. 1 Forward characteristics

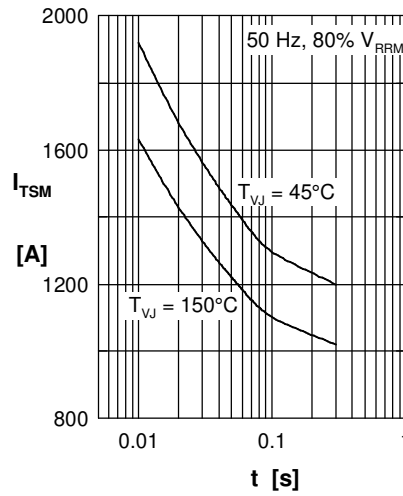
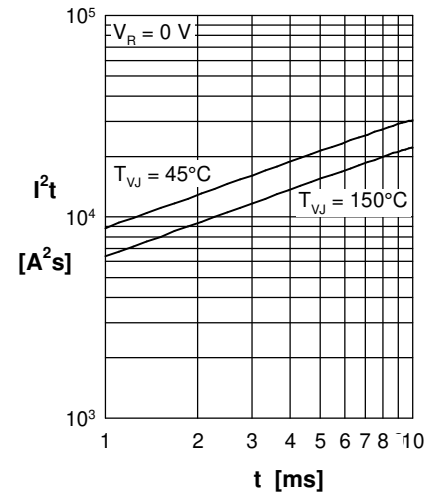
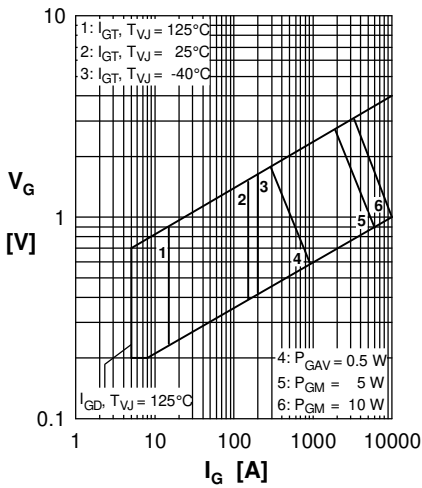

 Fig. 2 Surge overload current  
 $I_{TSM}$ : crest value,  $t$ : duration

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


Fig. 4 Gate voltage &amp; gate current

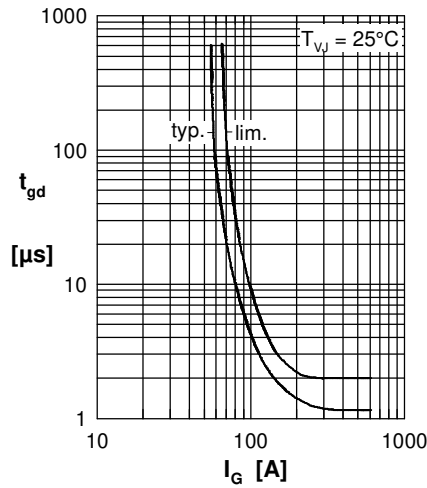
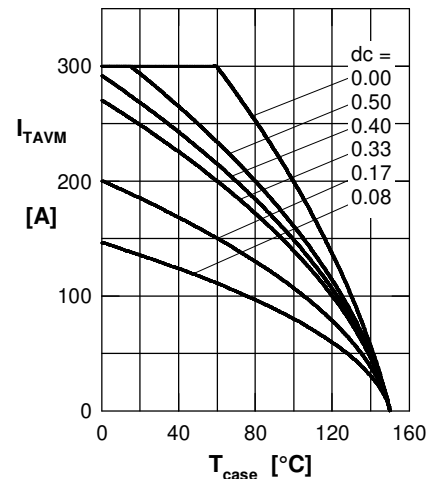

 Fig. 5 Gate controlled delay time  $t_{gd}$ 


Fig. 6 Max. forward current at case temperature

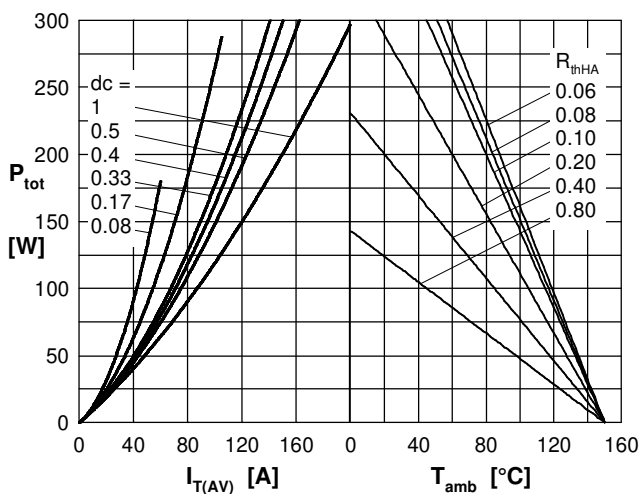
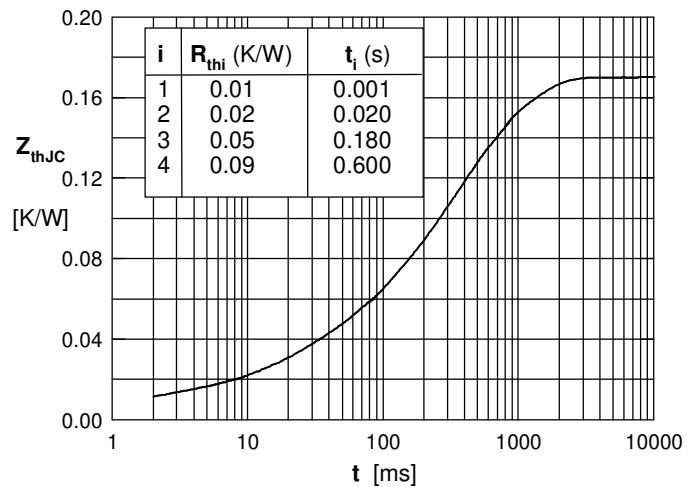

 Fig. 7a Power dissipation versus direct output current  
 Fig. 7b and ambient temperature


Fig. 8 Transient thermal impedance junction to case