

Thyristor Module

$$V_{RRM} = 2 \times 1600 \text{ V}$$

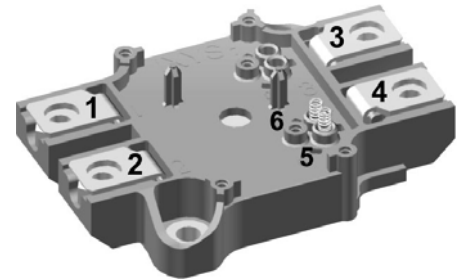
$$I_{TAV} = 200 \text{ A}$$

$$V_T = 1.13 \text{ V}$$

Phase leg

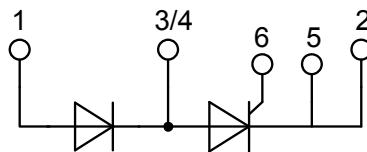
Part number

MCMA200PD1600SA



Backside: isolated

 E72873



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Copper base plate with Direct Copper Bonded Al₂O₃-ceramic
- Spring contacts for solder-free dirver connection

Applications:

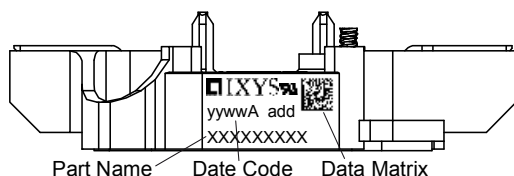
- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

Package: SimBus A

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Gate: Spring contacts for solder-free PCB-mounting
- Height: 17 mm
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1600	V
I_{RD}	reverse current, drain current	$V_{RD} = 1600\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			200	μA
		$V_{RD} = 1600\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			15	mA
V_T	forward voltage drop	$I_T = 200\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.16	V
		$I_T = 400\text{ A}$				1.40	V
		$I_T = 200\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.13	V
		$I_T = 400\text{ A}$				1.44	V
I_{TAV}	average forward current	$T_C = 90^{\circ}\text{C}$	$T_{VJ} = 140^{\circ}\text{C}$			200	A
$I_{T(RMS)}$	RMS forward current	180° sine				314	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 140^{\circ}\text{C}$			0.81	V
r_T	slope resistance					1.6	m Ω
R_{thJC}	thermal resistance junction to case					0.15	K/W
R_{thCH}	thermal resistance case to heatsink				0.08		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$			760	W
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			6.00	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			6.48	kA
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 140^{\circ}\text{C}$			5.10	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			5.51	kA
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			180.0	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			174.7	kA ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 140^{\circ}\text{C}$			130.1	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			126.3	kA ² s
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		273		pF
P_{GM}	max. gate power dissipation	$t_P = 30\text{ }\mu\text{s}$	$T_C = 140^{\circ}\text{C}$			120	W
		$t_P = 300\text{ }\mu\text{s}$				60	W
P_{GAV}	average gate power dissipation					8	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 140^{\circ}\text{C}; f = 50\text{ Hz}$ repetitive, $I_T = 600\text{ A}$				150	A/ μs
		$t_P = 200\text{ }\mu\text{s}; di_G/dt = 0.5\text{ A}/\mu\text{s};$ $I_G = 0.5\text{ A}; V_D = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 200\text{ A}$				500	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V_D = \frac{2}{3} V_{DRM}$ $T_{VJ} = 140^{\circ}\text{C}$ $R_{GK} = \infty$; method 1 (linear voltage rise)				1000	V/ μs
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			2.5	V
			$T_{VJ} = -40^{\circ}\text{C}$			2.6	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	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140^{\circ}\text{C}$			0.2	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	$t_P = 30\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$			300	mA
		$I_G = 0.5\text{ A}; di_G/dt = 0.5\text{ A}/\mu\text{s}$					
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
		$I_G = 0.5\text{ A}; di_G/dt = 0.5\text{ A}/\mu\text{s}$					
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 200\text{ A}; V_D = \frac{2}{3} V_{DRM}$ $T_{VJ} = 140^{\circ}\text{C}$ $di/dt = 10\text{ A}/\mu\text{s}; dv/dt = 20\text{ V}/\mu\text{s}; t_P = 200\text{ }\mu\text{s}$			150		μs

Package SimBus A				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal				300	A
T_{VJ}	virtual junction temperature			-40		140	°C
T_{op}	operation temperature			-40		125	°C
T_{stg}	storage temperature			-40		125	°C
Weight					152		g
M_D	mounting torque			3		5	Nm
M_T	terminal torque			2.5		5	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	14.0	10.0			mm
$d_{Spb/Apb}$		terminal to backside	14.0	10.0			mm
V_{ISOL}	isolation voltage	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	4800			V
		t = 1 minute		4000			V



Part number

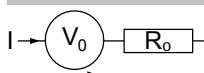
M = Module
 C = Thyristor (SCR)
 M = Thyristor
 A = (up to 1800V)
 200 = Current Rating [A]
 PD = Phase leg
 1600 = Reverse Voltage [V]
 SA = SimBus A

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA200PD1600SA	MCMA200PD1600SA	Blister	9	510380

Similar Part	Package	Voltage class
MCMA200P1600SA	Simbus A	1600

Equivalent Circuits for Simulation

* on die level

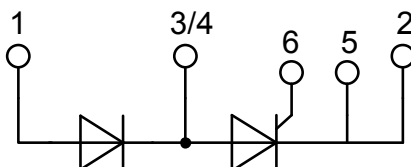
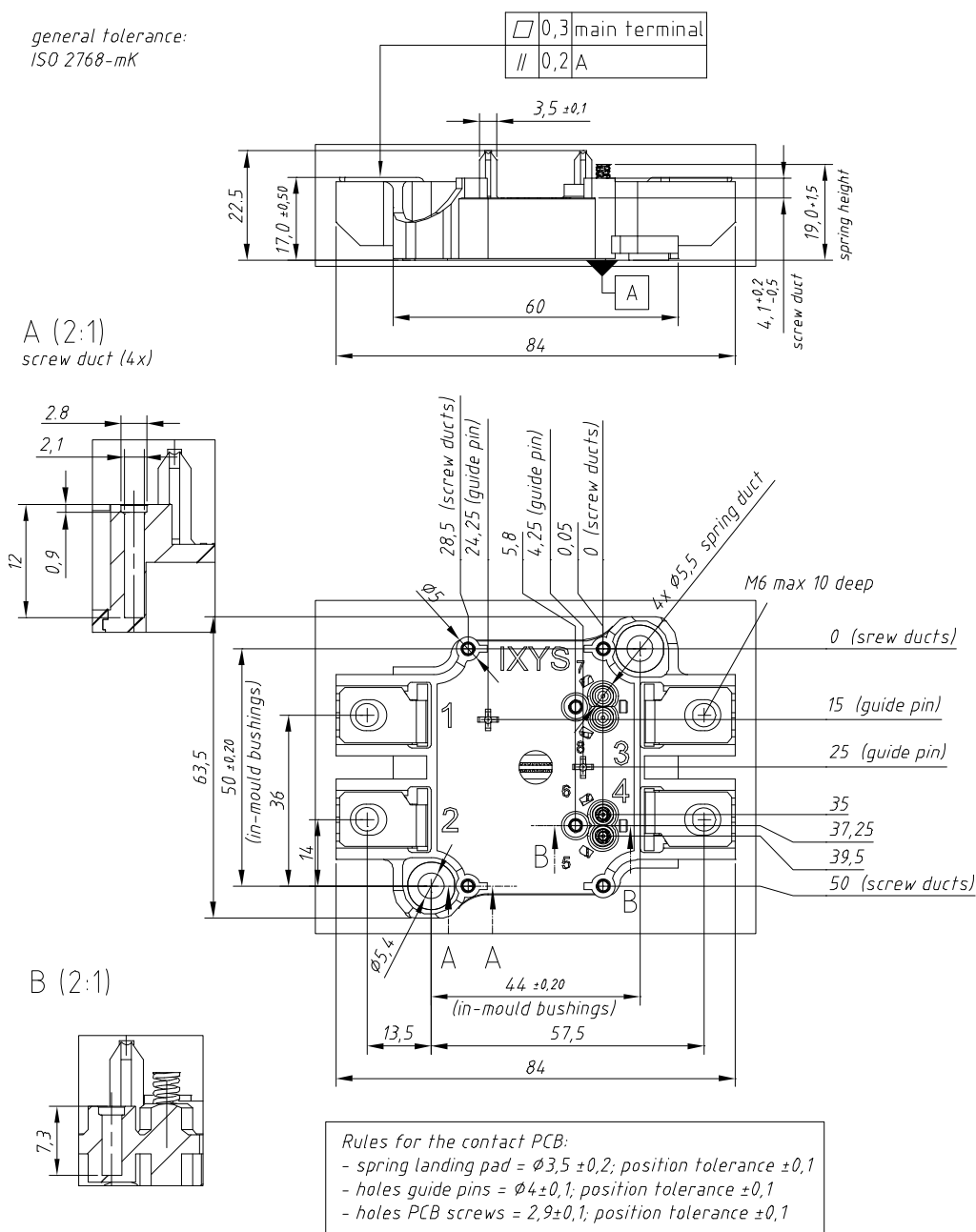
 $T_{VJ} = 140\text{ °C}$ 

Thyristor

$V_{0\max}$	threshold voltage	0.81	V
$R_{0\max}$	slope resistance *	0.8	mΩ

Outlines SimBus A

general tolerance:
ISO 2768-mK



Thyristor

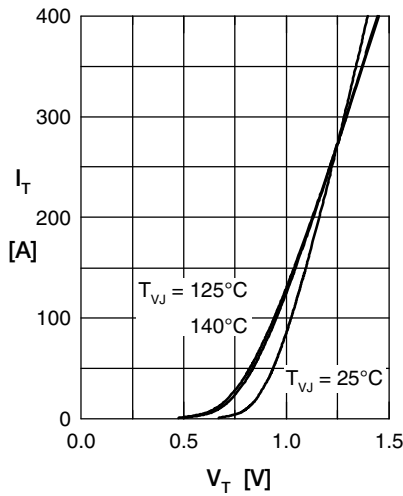


Fig. 1 Forward current vs. voltage drop per thyristor

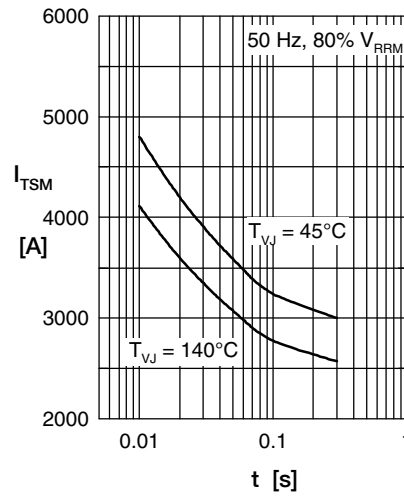


Fig. 2 Surge overload current vs. time per thyristor

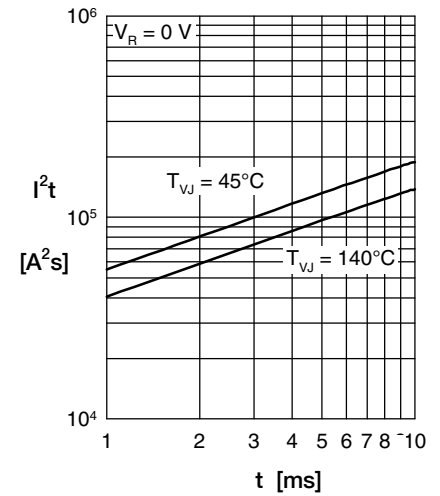


Fig. 3 I^2t vs. time per thyristor

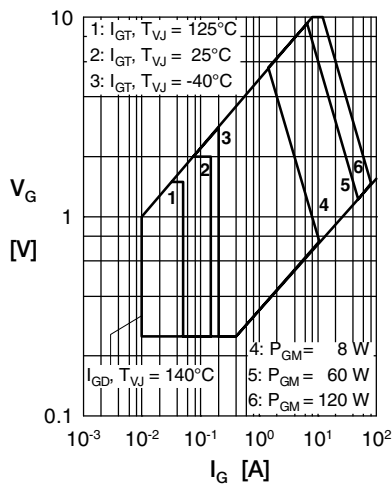


Fig. 4 Gate voltage & gate current

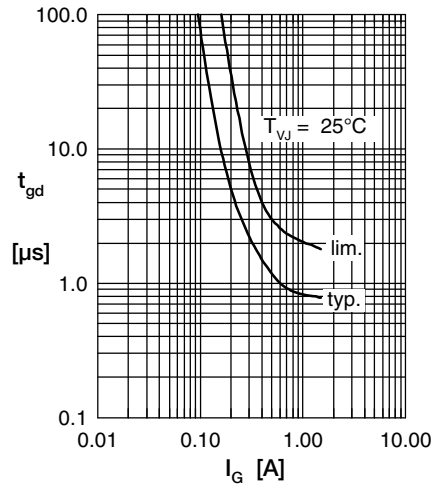


Fig. 5 Gate controlled delay time t_{gd}

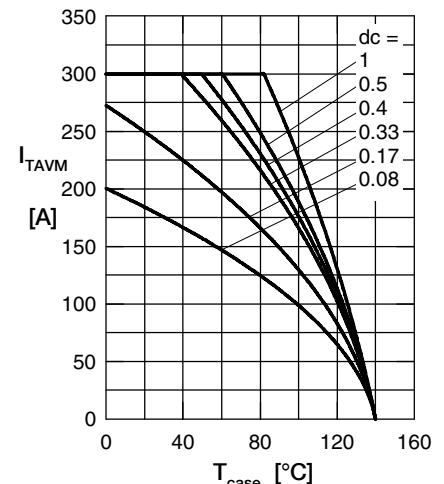


Fig. 6 Max. forward current vs. case temperature per thyrr.

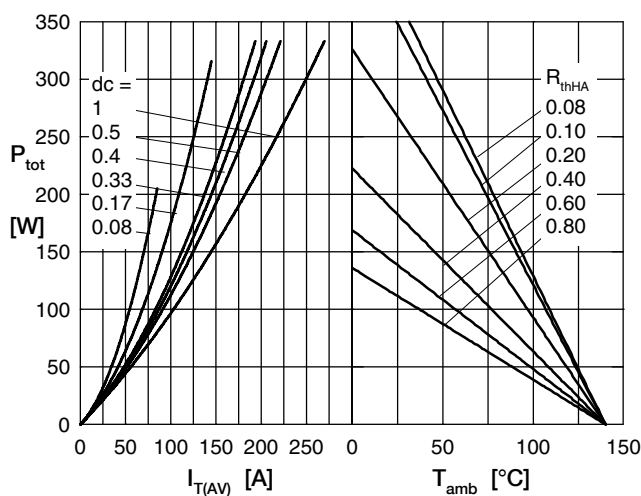


Fig. 7 Power dissipation vs. forward current and ambient temperature per thyristor

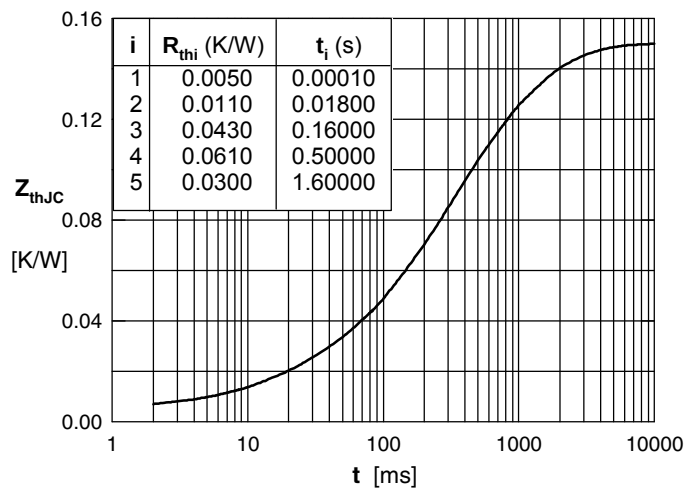


Fig. 8 Transient thermal impedance junction to case vs. time per thyristor

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