



on request

Thyristor \ Diode Module

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

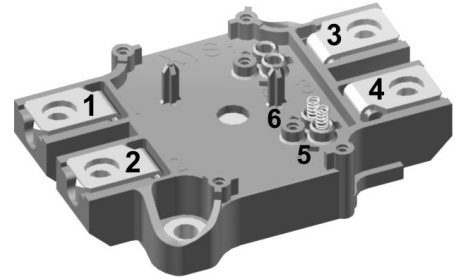
$$I_{TAV} = 200 \text{ A}$$

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

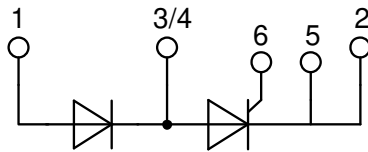
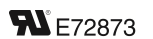
Phase leg

Part number

MCMA200PD1600SA



Backside: isolated



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

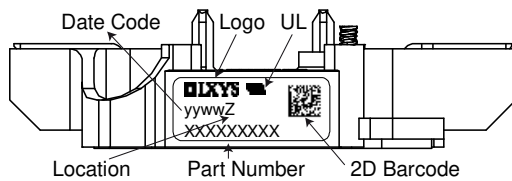
Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

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

on request

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	4800			V
		t = 1 minute	4000			V


Part description

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	Ordering 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

 $T_{VJ} = 140^{\circ}\text{C}$

Thyristor

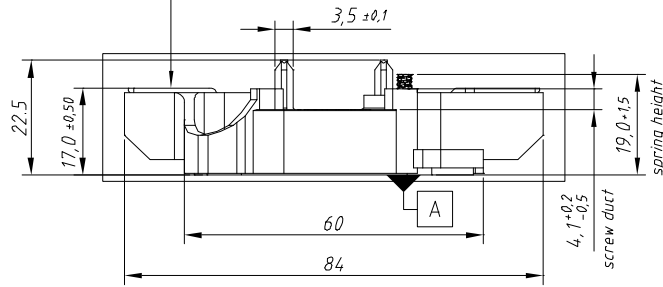
$V_{0\ max}$	threshold voltage	0.81	V
$R_{0\ max}$	slope resistance *	0.8	mΩ



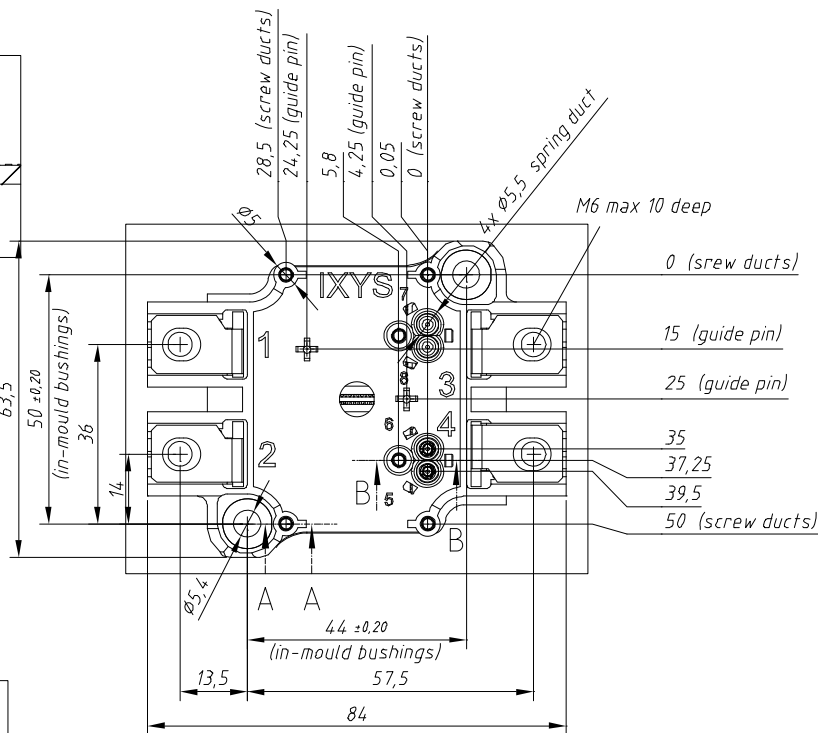
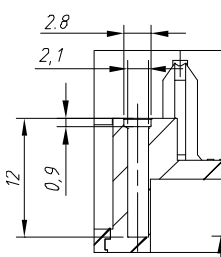
Outlines SimBus A

general tolerance:
ISO 2768-mK

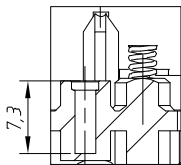
	0,3	main terminal
	0,2	A



A (2:1)
screw duct (4x)

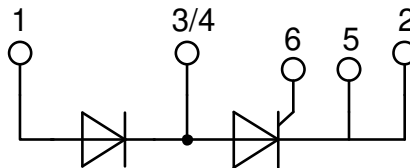


B (2:1)



Rules for the contact PCB:

- spring landing pad = $\phi 3.5 \pm 0.2$; position tolerance ± 0.1
- holes guide pins = $\phi 4 \pm 0.1$; position tolerance ± 0.1
- holes PCB screws = 2.9 ± 0.1 ; position tolerance ± 0.1



Thyristor

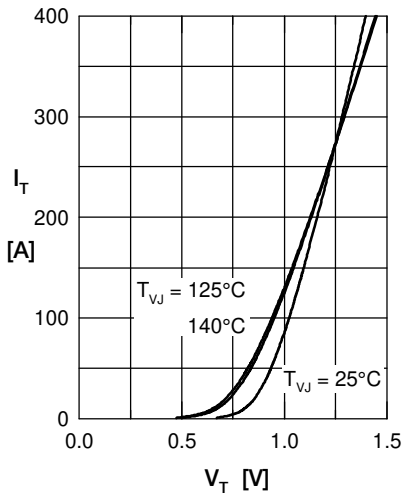


Fig. 1 Forward current vs. voltage drop per thyristor

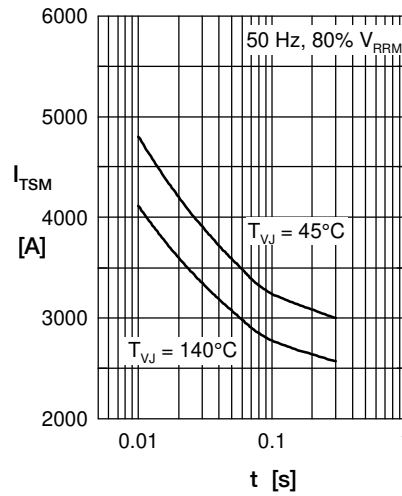


Fig. 2 Surge overload current vs. time per thyristor

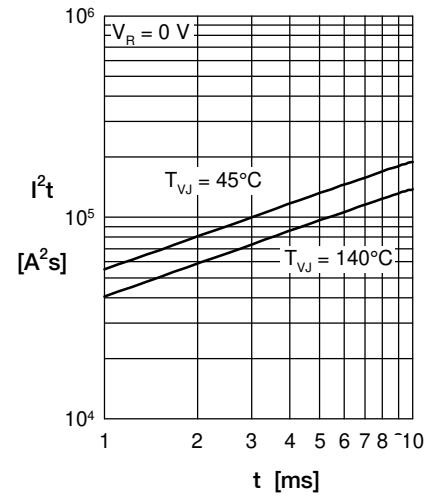


Fig. 3 I^2t vs. time per thyristor

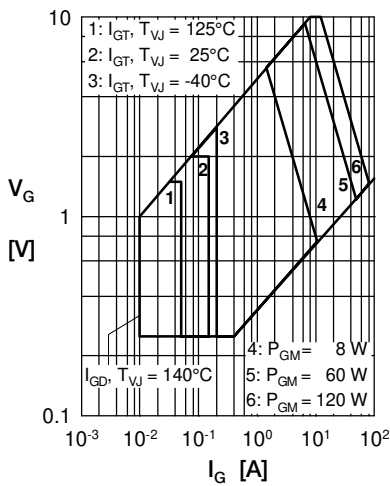


Fig. 4 Gate voltage & gate current

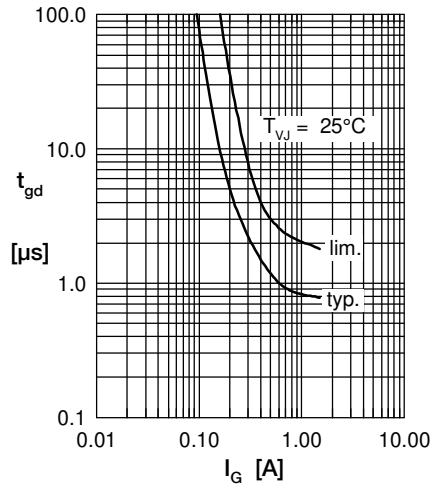


Fig. 5 Gate controlled delay time t_{gd}

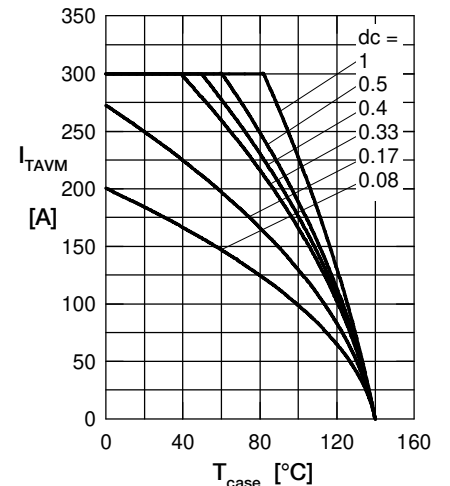


Fig. 6 Max. forward current vs. case temperature per thyristor.

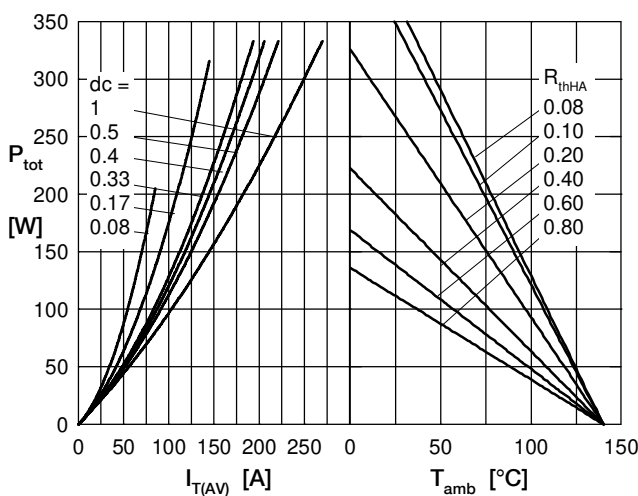


Fig. 7 Power dissipation vs. forward current and ambient temperature per thyristor

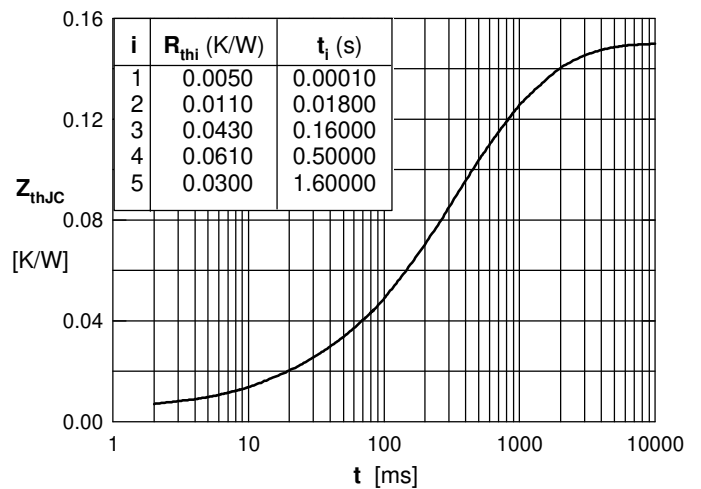


Fig. 8 Transient thermal impedance junction to case vs. time per thyristor