on request

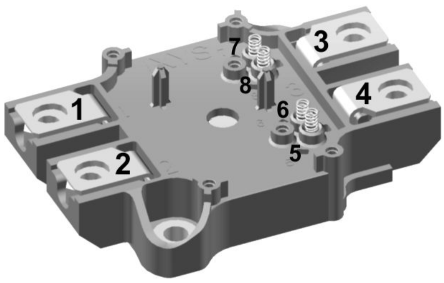
Thyristor Module

V_{RRM} = 2x 1600 V
I_{TAV} = 200 A
V_T = 1.13 V

Phase leg

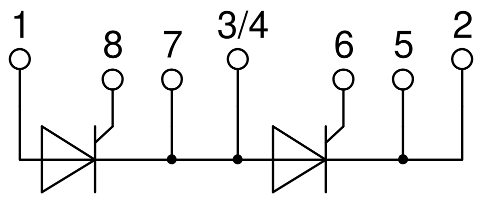
Part number

MCMA200P1600SA



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

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.

on request

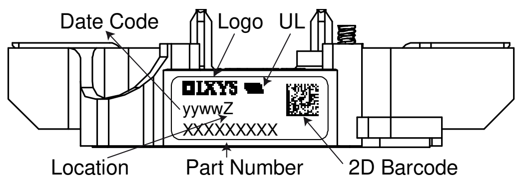
Thyristor

Symbol	Definition	Conditions		Ratings 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			200	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 125°C			15	mA
V_T	*forward voltage drop*	I_T = 200 A	T_{VJ} = 25°C			1.16	V
		I_T = 400 A				1.40	V
		I_T = 200 A	T_{VJ} = 125°C			1.13	V
		I_T = 400 A				1.44	V
I_{TAV}	*average forward current*	T_C = 90°C	T_{VJ} = 140°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°C			0.81	V
r_T	*slope resistance*					1.6	mΩ
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°C			760	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			6.00	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			6.48	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			5.10	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			5.51	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			180.0	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			174.7	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			130.1	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			126.3	kA²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		273		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 140°C			120	W
		t_P = 300 µs				60	W
P_{GAV}	*average gate power dissipation*					8	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 140 °C; f = 50 Hz	repetitive, I_T = 600 A			150	A/µs
		t_P = 200 µs; di_G/dt = 0.5 A/µs;					
		I_G = 0.5 A; V = ⅔ V_{DRM}	non-repet., I_T = 200 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V = ⅔ V_{DRM}	T_{VJ} = 140°C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	*gate trigger voltage*	V_D = 6 V	T_{VJ} = 25°C			2.5	V
			T_{VJ} = -40°C			2.6	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			150	mA
			T_{VJ} = -40°C			200	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 140°C			0.2	V
I_{GD}	*gate non-trigger current*					10	mA
I_L	*latching current*	t_p = 30 µs	T_{VJ} = 25°C			300	mA
		I_G = 0.5 A; di_G/dt = 0.5 A/µs					
I_H	*holding current*	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			200	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 = 200A; V = ⅔ V_{DRM}	T_{VJ} = 125 °C		150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs	t_p = 200 µs				

on request

Package SimBus A

Symbol	Definition	Conditions	Ratings 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; $I_{ISOL} \le 1$ mA	4800			V
		t = 1 minute	4000			V



Part description

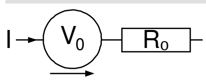
M = Module
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
200 = Current Rating [A]
P = Phase leg
1600 = Reverse Voltage [V]
SA = SimBus A

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA200P1600SA	MCMA200P1600SA	Blister	9	510387

Similar Part	Package	Voltage class
MCMA200PD1600SA	Simbus A	1600

Equivalent Circuits for Simulation

* on die level $T_{VJ} = 140°C$



Thyristor

Symbol	Definition	Value	Unit
$V_{0\,max}$	*threshold voltage*	0.81	V
$R_{0\,max}$	*slope resistance **	0.8	mΩ

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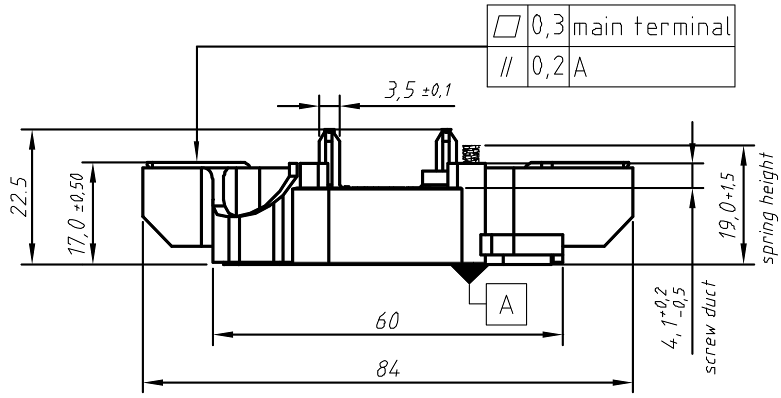
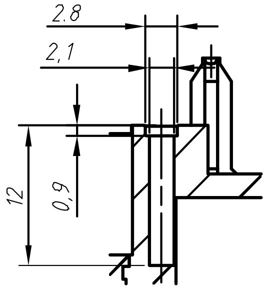
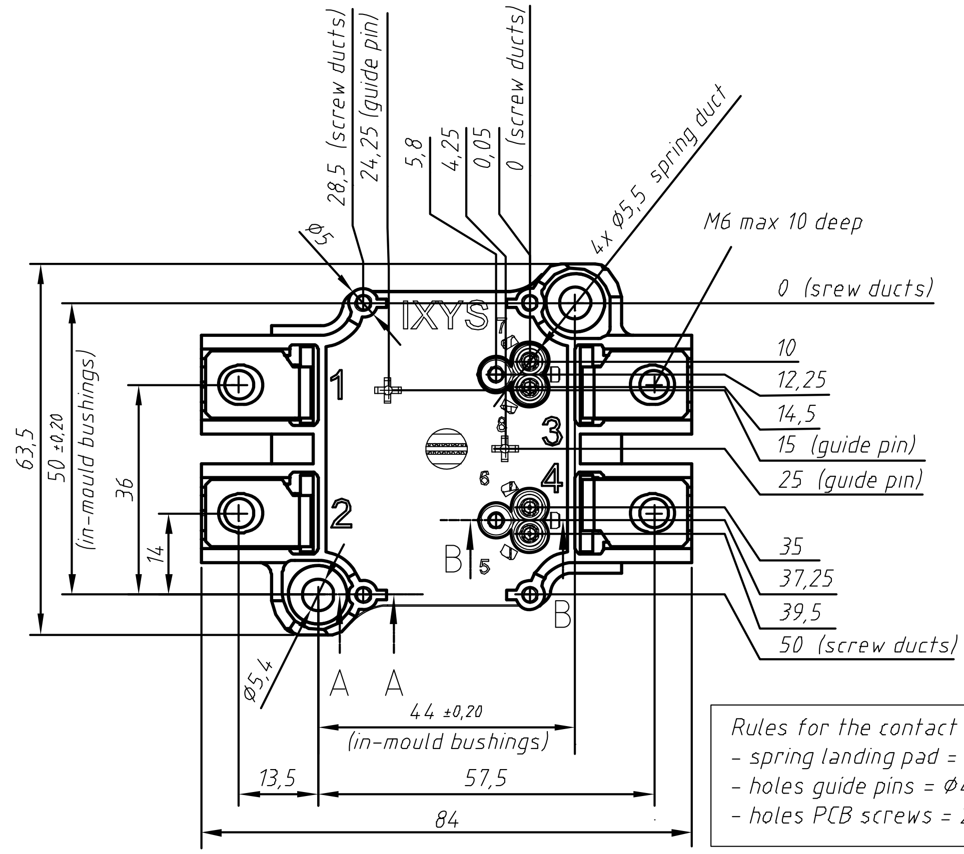
Outlines SimBus A

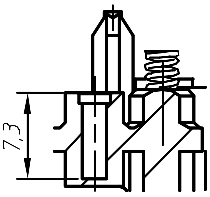


A (2:1)
screw duct (4x)



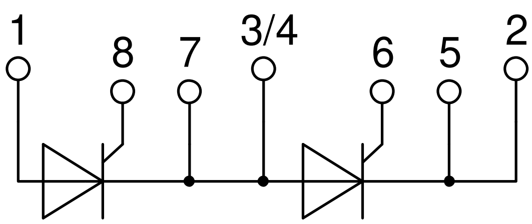


B (2:1)
screw duct (2x)



general tolerance:
ISO 2768-mK

Rules for the contact PCB:
- spring landing pad = Ø3,5 ±0,2; position tolerance ±0,1
- holes guide pins = Ø4±0,1; position tolerance ±0,1
- holes PCB screws = 2,9±0,1; position tolerance ±0,1



on request

Thyristor

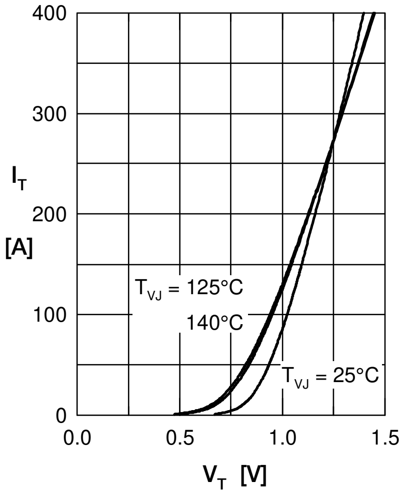


Fig. 1 Forward current vs. voltage drop per thyristor

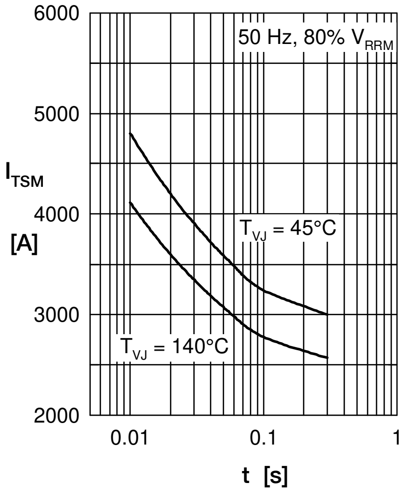


Fig. 2 Surge overload current vs. time per thyristor

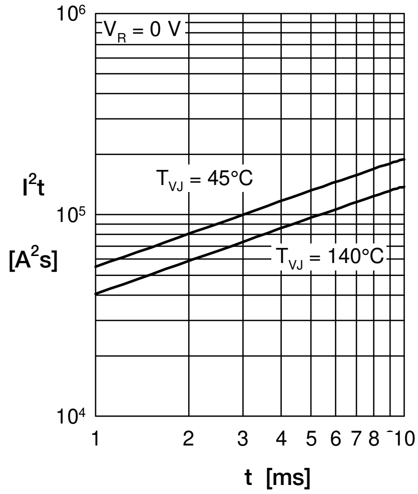


Fig. 3 I^2t vs. time per thyristor

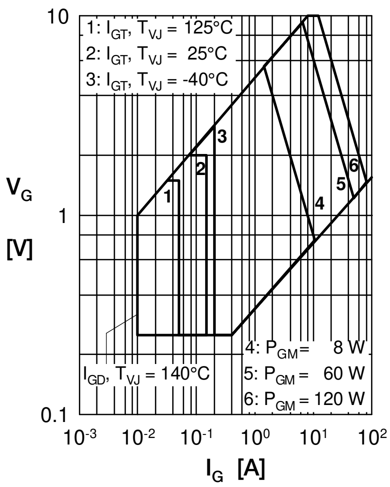


Fig. 4 Gate voltage & gate current

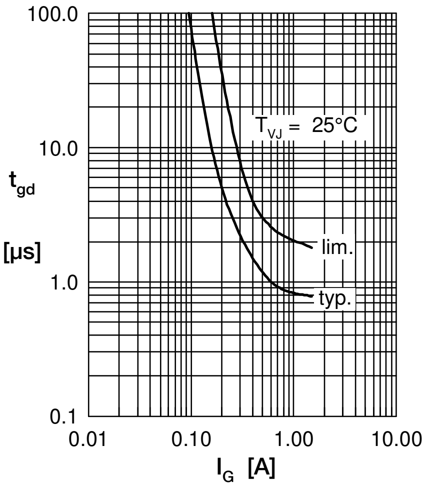


Fig. 5 Gate controlled delay time t_{gd}

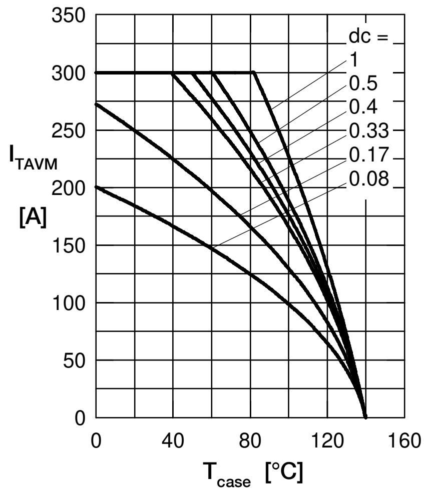


Fig. 6 Max. forward current vs. case temperature per thyr.

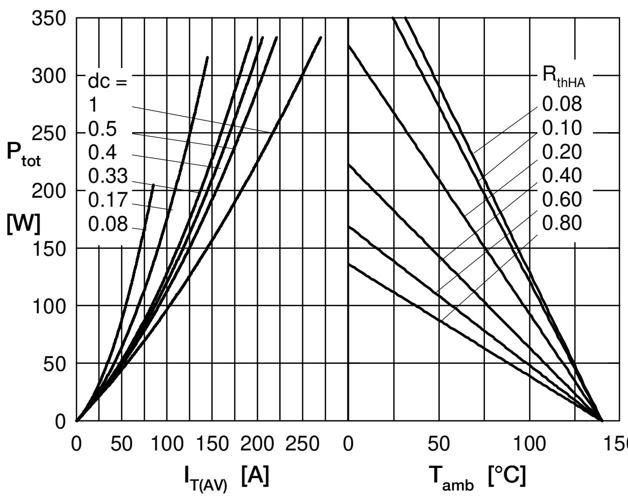
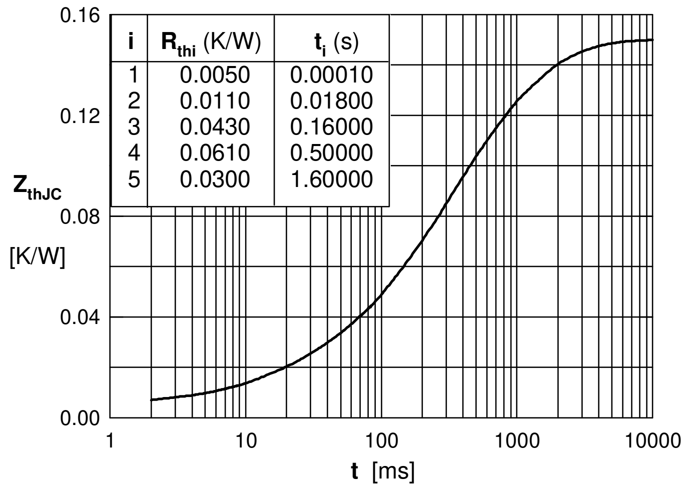


Fig. 7 Power dissipation vs. forward current and ambient temperature per thyristor



i	R_{thi} (K/W)	t_i (s)
1	0.0050	0.00010
2	0.0110	0.01800
3	0.0430	0.16000
4	0.0610	0.50000
5	0.0300	1.60000

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