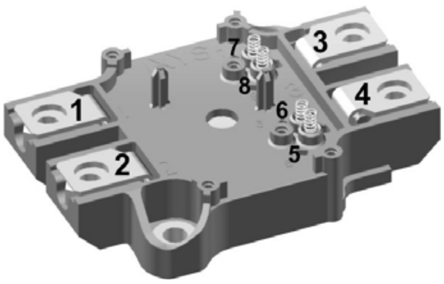
Thyristor Module

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

Phase leg

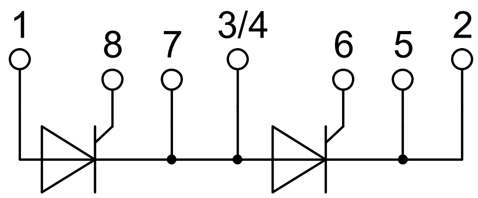
Part number

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:

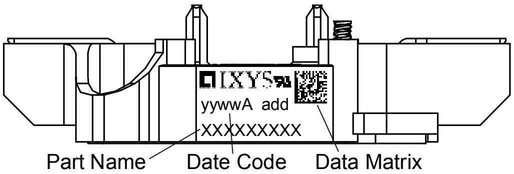
- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

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

Thyristor				Ratings			
Symbol	Definition	Conditions		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 = 0.5A; V_D = ⅔ V_{DRM}	non-repet., I_T = 200 A			500	A/μs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V_D = 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 = 0.5A; 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 = 0.5A; di_G/dt = 0.5 A/μs					
t_q	*turn-off time*	V_R = 100 V; I_T = 200 A; V_D = ⅔ V_{DRM}	T_{VJ} = 140°C		150		μs
		di/dt = 10 A/μs; dv/dt = 20 V/μs; t_p = 200 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; $I_{ISOL} \le 1$ mA		4800			V
		t = 1 minute		4000			V



Part number

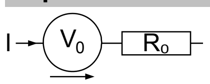
M = Module
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
200 = Current Rating [A]
P = Phase leg
1600 = Reverse Voltage [V]
SA = SimBus A

Ordering	Part 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

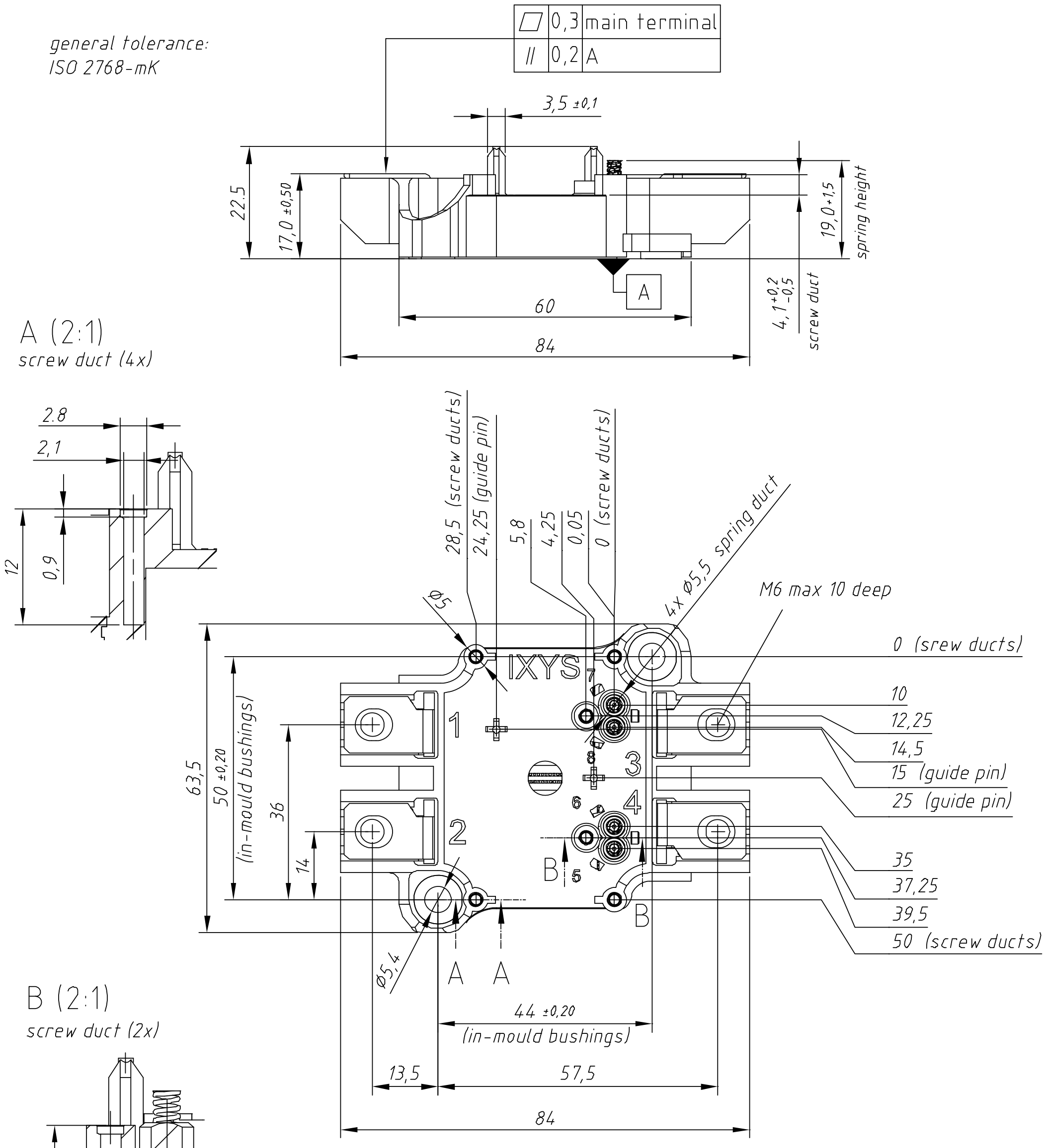
** on die level* $T_{VJ} = 140\,°C$



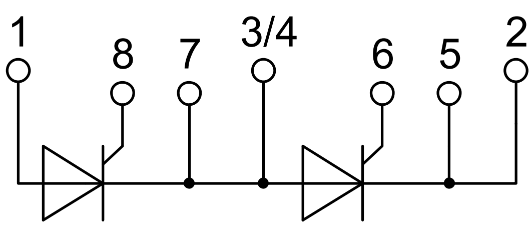
Thyristor

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

Outlines SimBus A



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



Thyristor

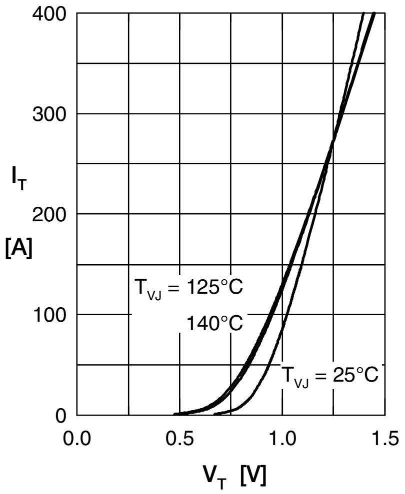


Fig. 1 Forward current vs. voltage drop per thyristor

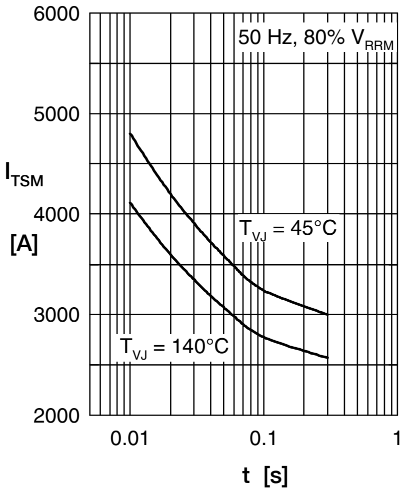


Fig. 2 Surge overload current vs. time per thyristor

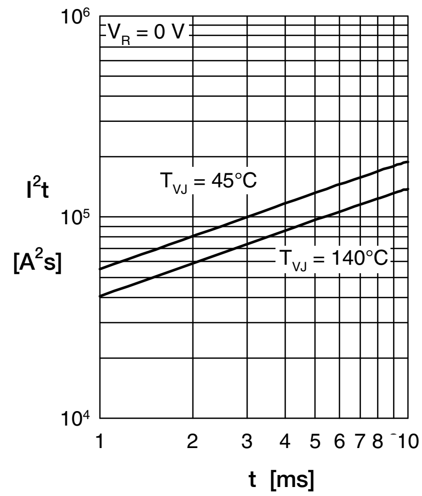


Fig. 3 I^2t vs. time per thyristor

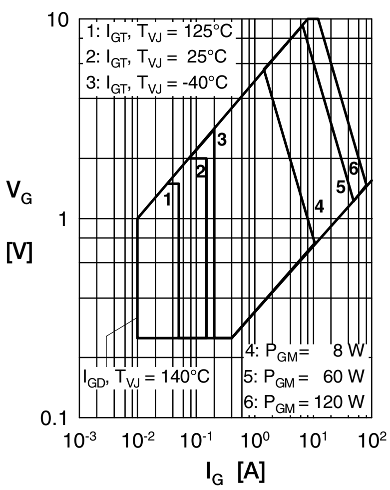


Fig. 4 Gate voltage & gate current

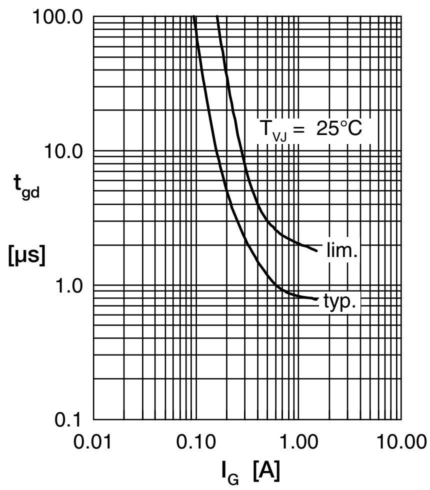


Fig. 5 Gate controlled delay time t_{gd}

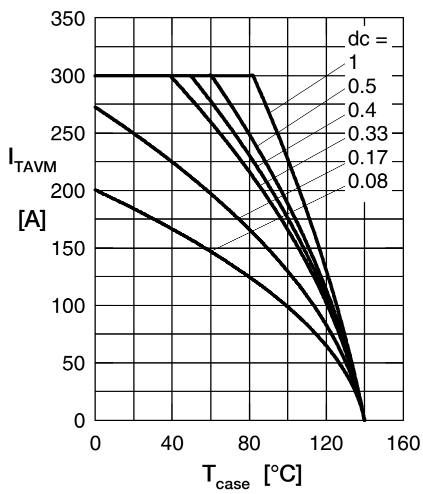


Fig. 6 Max. forward current vs. case temperature per thyr.

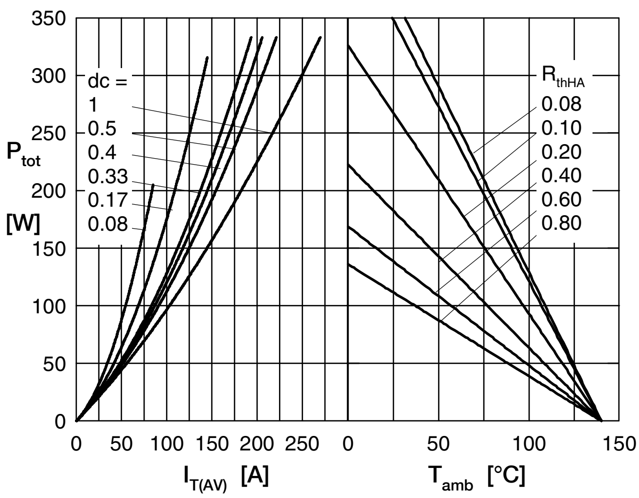
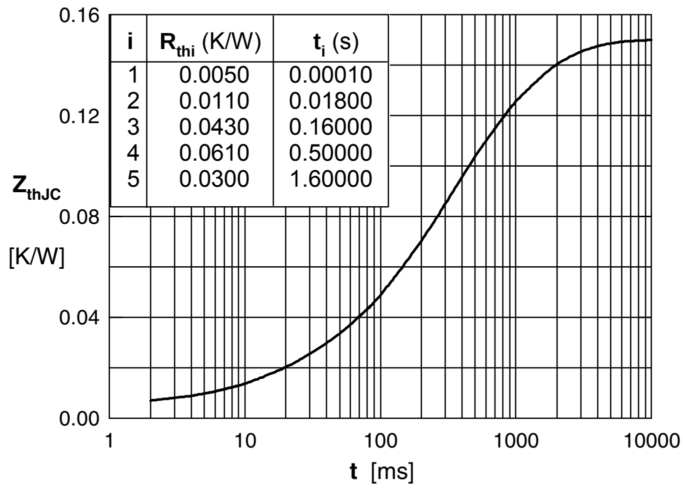


Fig. 7 Power dissipation vs. forward current and ambient temperature per thyristor



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