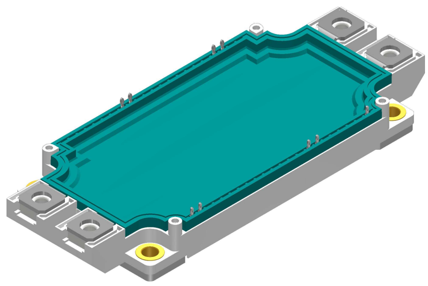
Thyristor \ Diode Module

V_{RRM} = 2x 1600 V
I_{TAV} = 400 A
V_T = 1.28 V

Phase leg + NTC

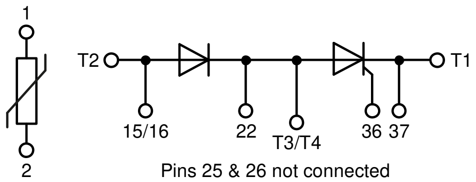
Part number

MCMA400PD1600PTSF



Backside: isolated

E72873



Features / Advantages:
- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al2O3-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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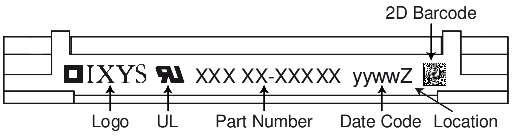
Rectifier

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			300	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 140°C			20	mA
V_T	*forward voltage drop*	I_T = 400 A	T_{VJ} = 25°C			1.31	V
		I_T = 800 A				1.70	V
		I_T = 400 A	T_{VJ} = 125°C			1.28	V
		I_T = 800 A				1.74	V
I_{TAV}	*average forward current*	T_C = 85°C	T_{VJ} = 140°C			400	A
$I_{T(RMS)}$	*RMS forward current*	sine 180° d = 0.5				630	A
V_{T0}	*threshold voltage*	*for power loss calculation only*	T_{VJ} = 140°C			0.82	V
r_T	*slope resistance*					1.14	mΩ
R_{thJC}	*thermal resistance junction to case*					0.07	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.04		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			1640	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			10.0	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			10.8	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			8.50	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			9.18	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			500.0	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			485.2	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			361.3	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			350.6	kA²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		482		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*					20	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 140 °C; f = 50 Hz	repetitive, I_T = 1200 A			100	A/µs
		t_P = 200 µs; di_G/dt = 0.45 A/µs;					
		I_G = 0.45 A; V = ⅔ V_{DRM}	non-repet., I_T = 400 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	V
			T_{VJ} = -40°C			3	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			150	mA
			T_{VJ} = -40°C			220	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 140°C			0.25	V
I_{GD}	*gate non-trigger current*					10	mA
I_L	*latching current*	t_p = 30 µs	T_{VJ} = 25°C			200	mA
		I_G = 0.45 A; di_G/dt = 0.45 A/µs					
I_H	*holding current*	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			150	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 = 400A; V = ⅔ V_{DRM}	T_{VJ} = 125 °C		350		µs
		di/dt = 10 A/µs dv/dt = 50 V/µs t_p = 200 µs					

Package	SimBus F				Ratings			
Symbol	Definition	Conditions			min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal					tbd	A
T_{VJ}	*virtual junction temperature*				-40		140	°C
T_{op}	*operation temperature*				-40		125	°C
T_{stg}	*storage temperature*				-40		125	°C
Weight						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	50/60 Hz, RMS; $I_{ISOL} \le 1$ mA		4300			V
		t = 1 minute			3600			V



Part description

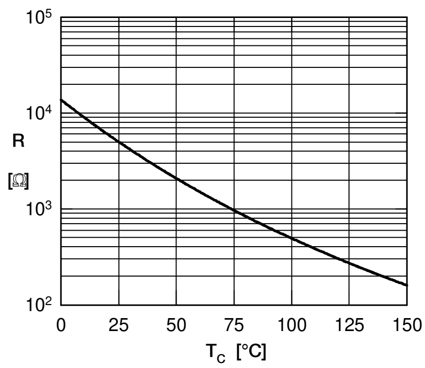
M = Module
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
400 = Current Rating [A]
PD = Phase leg
1600 = Reverse Voltage [V]
PT = PressFit-Pin, Thermistor
SF = SimBus F
\- = Hyphen
PC = Phase Change Material

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA400PD1600PTSF	MCMA400PD1600PTSF	Blister	24	522726
Alternative	MCMA400PD1600PTSF-PC	MCMA400PD1600PTSF	Blister	24	522719

Similar Part	Package	Voltage class
MCMA280PD1600PTSF	SimBus F	1600
MCMA550PD1600PTSF	SimBus F	1600

Temperature Sensor NTC

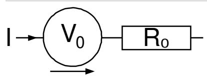
Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	*resistance*	T_{VJ} = 25°	4.85	5	5.15	kΩ
$B_{25/50}$	*temperature coefficient*			3375		K



Typ. NTC resistance vs. temperature

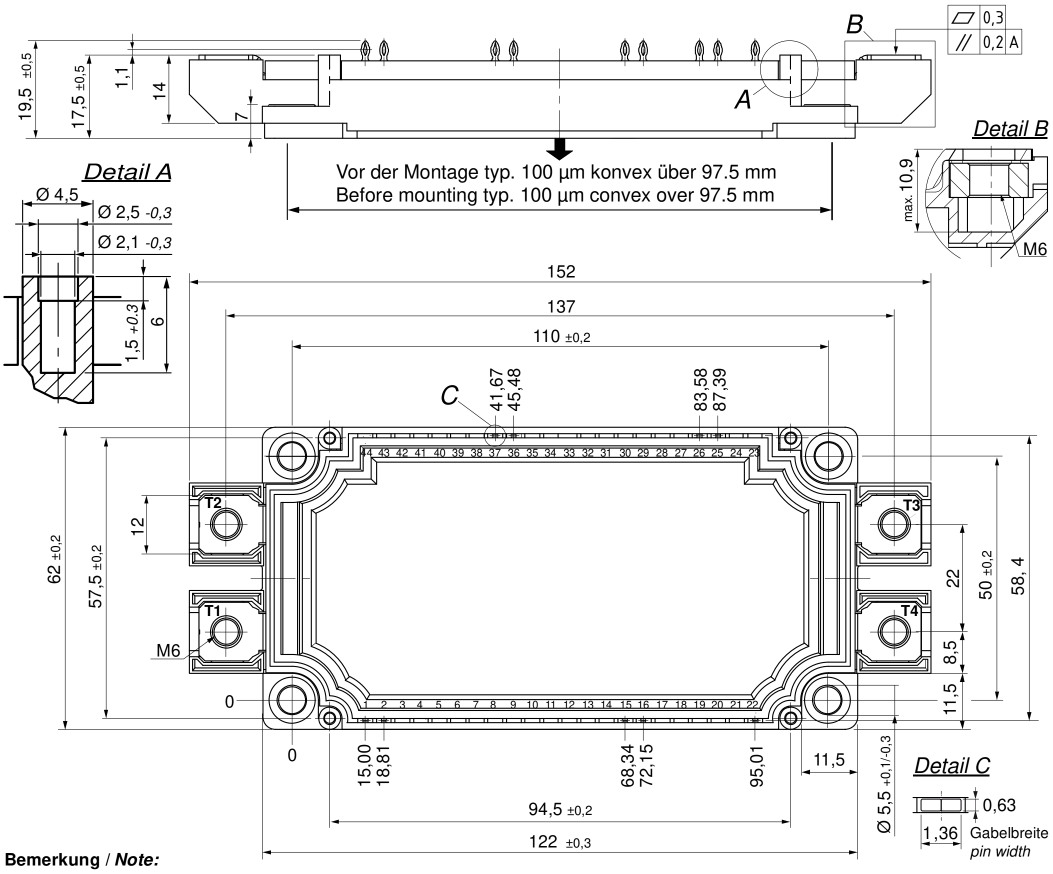
Equivalent Circuits for Simulation

** on die level* $T_{VJ} = 140°C$



		Thyristor	
$V_{0\,max}$	*threshold voltage*	0.82	V
$R_{0\,max}$	*slope resistance **	0.43	mΩ

Outlines SimBus F

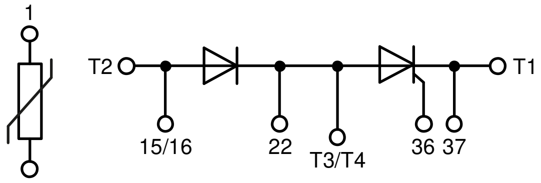


Bemerkung / ***Note:***

- Nichttolerierte 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: ⌖ 0.1
- Bohrlochdurchmesser / Diameter of drill: Ø 1.16 mm
- Endlochdurchmesser / Diameter of plated holes: Ø 1.00 - 1.10 mm (Cu thickness in via typ. 50 µm)
- Beschichtung / Plating: chem. Sn max. 15 µm
- Einpresskraft / Insert Force: per terminal with a typ. insert speed of 1 mm/s: typ. 90 N
- Weitere Angaben / Further information: www.ixys.com Application note IXAN0077
- Montageanleitung / Mounting instruction: www.ixys.com Application note IXAN0024

Detail A: PCB-Montage / *Mounting on PCB*

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



Pins 25 & 26 not connected

Thyristor

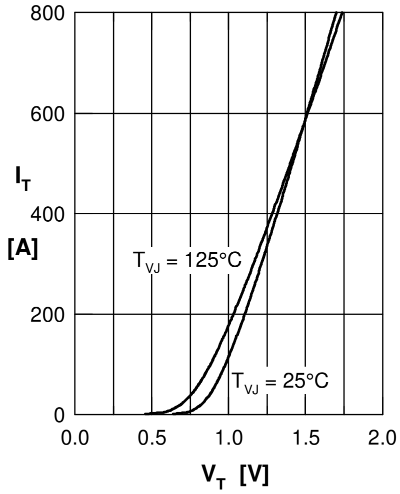


Fig. 1 Forward characteristics

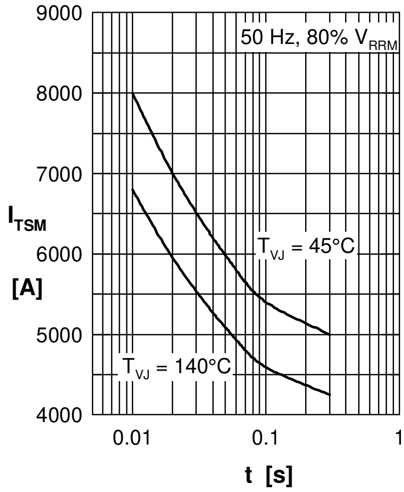


Fig. 2 Surge overload current
I_{TSM}: crest value, t: duration

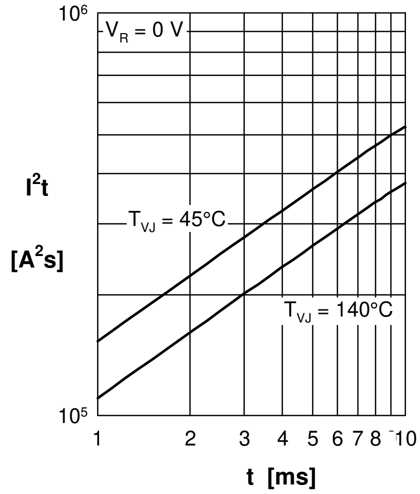


Fig. 3 I^2t versus time (1-10 s)

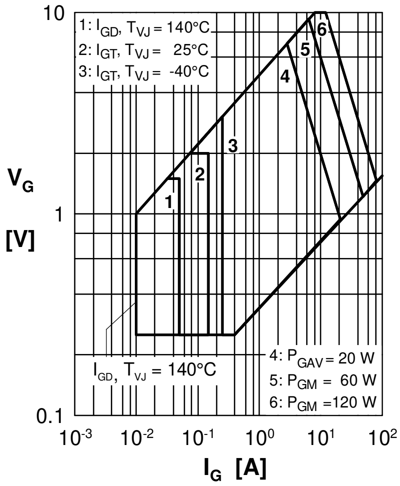


Fig. 4 Gate voltage & gate current

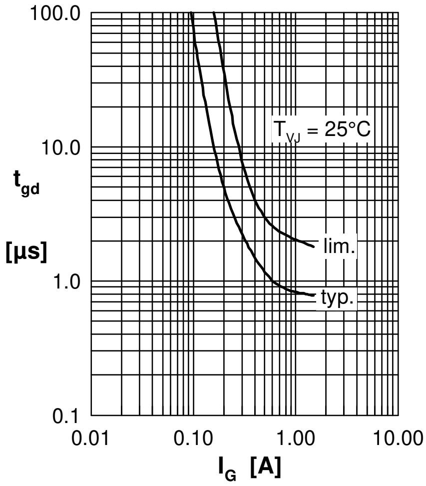


Fig. 5 Gate controlled delay time t_{gd}

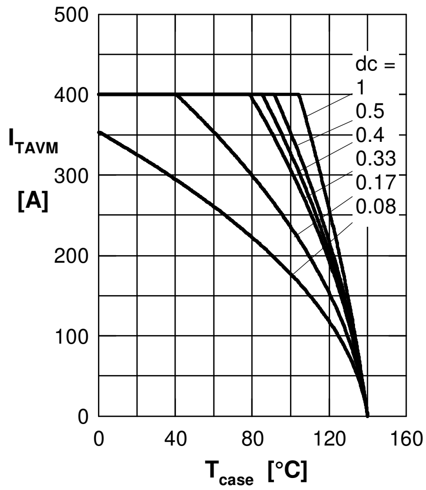


Fig. 6 Max. forward current at case temperature

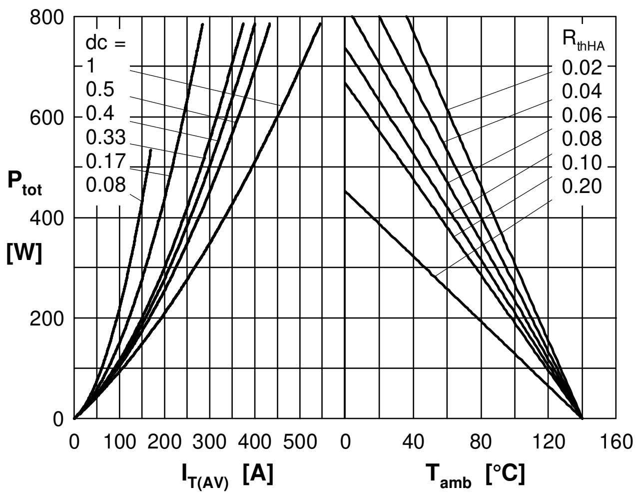
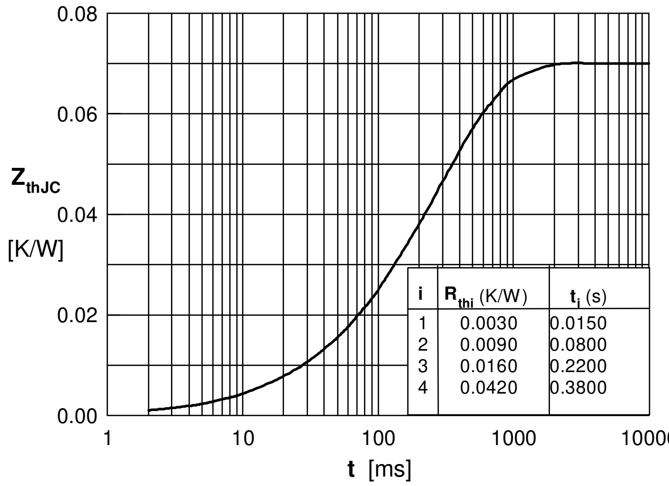


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature



i	R_{thi} (K/W)	t_i (s)
1	0.0030	0.0150
2	0.0090	0.0800
3	0.0160	0.2200
4	0.0420	0.3800

Fig. 8 Transient thermal impedance junction to case