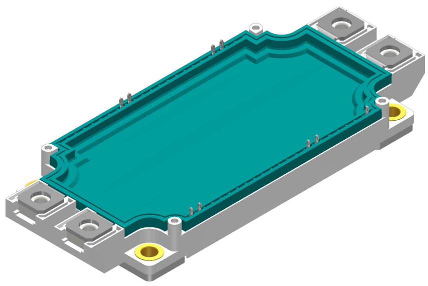
Thyristor \ Diode Module

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

Phase leg + NTC

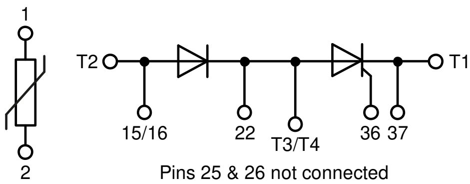
Part number

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

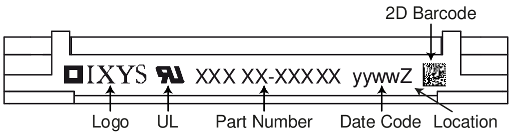
- Isolation Voltage: 4300 V~
- Industry standard outline
- RoHS compliant
- PressFit-Pins for PCB mounting
- Height: 17 mm
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

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°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

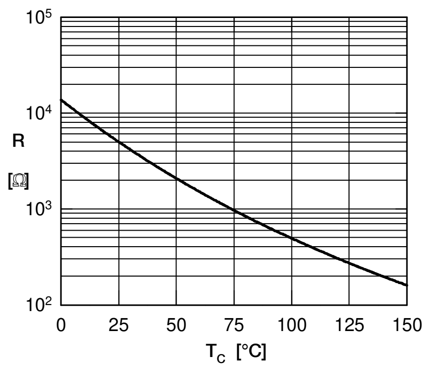
M = Module
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
400 = Current Rating [A]
PD = Phase leg
1600 = Reverse Voltage [V]
PT = PressFit-Pin, Thermistor
SF = SimBus F
\- = Hyphen
PC = Phase Change Material

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

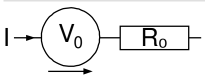
Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	*resistance*	T_{VJ} = 25°	4.85	5	5.15	kΩ
$B_{25/50}$	*temperature coefficient*			3375		K



Typ. NTC resistance vs. temperature

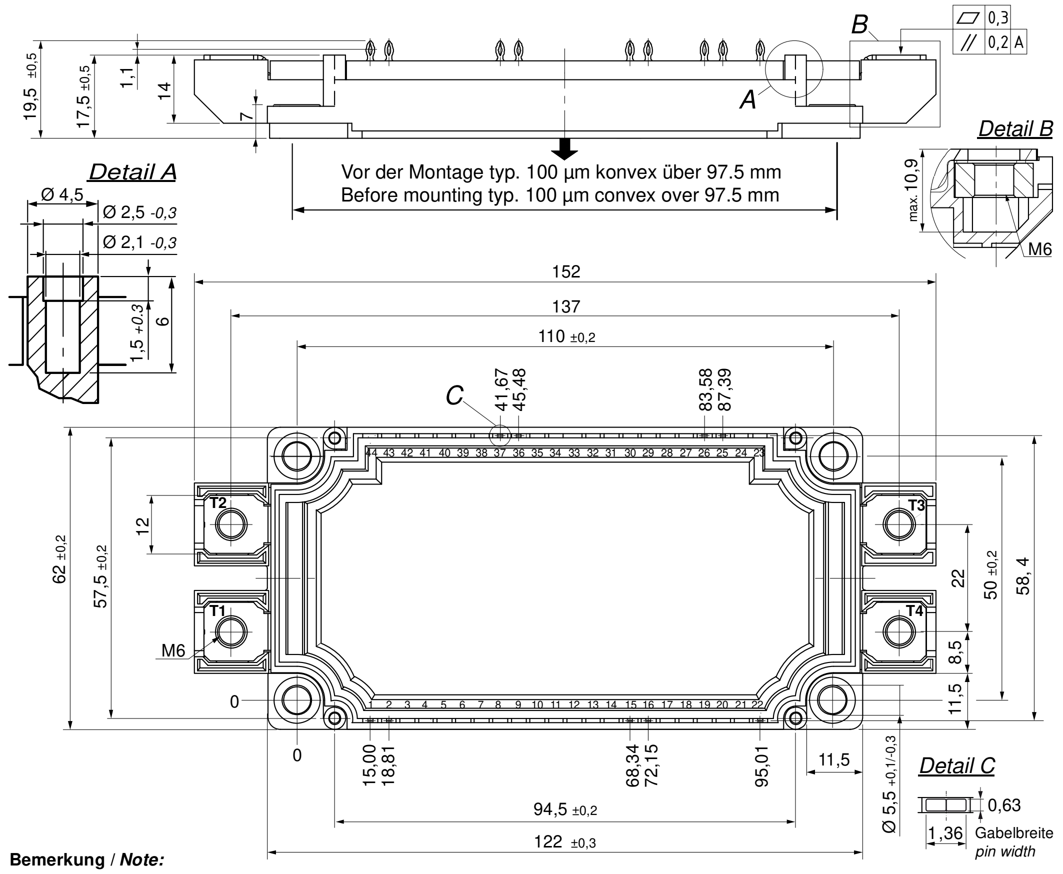
Equivalent Circuits for Simulation

** 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

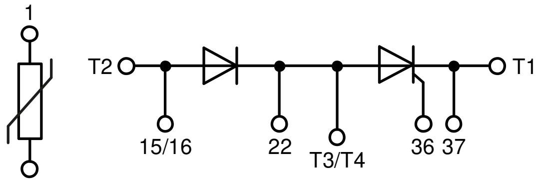


Bemerkung / ***Note:***

- 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

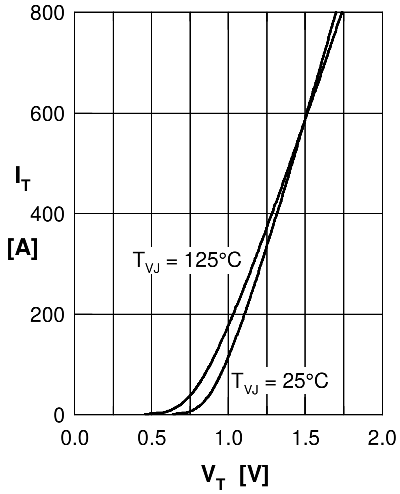


Fig. 1 Forward characteristics

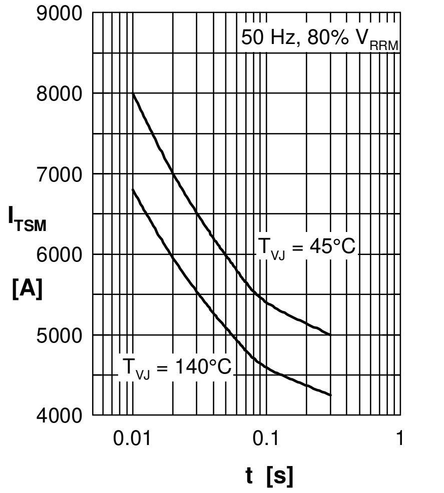


Fig. 2 Surge overload current
I_{TSM}: crest value, t: duration

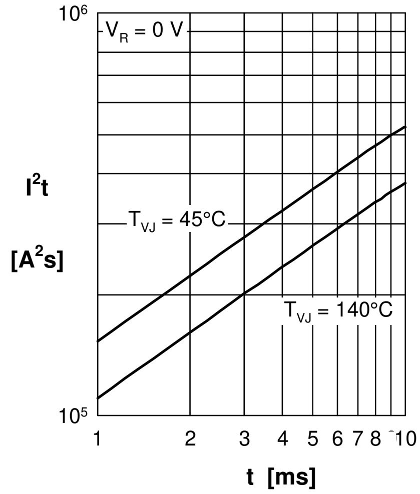


Fig. 3 I^2t versus time (1-10 s)

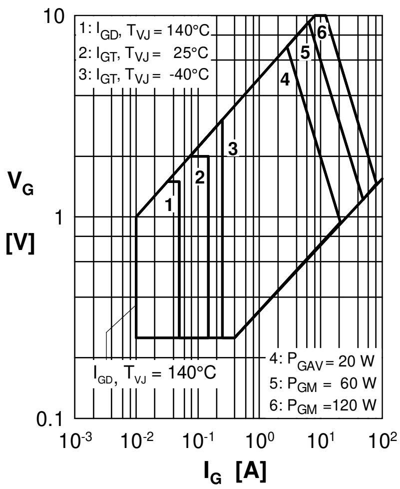


Fig. 4 Gate voltage & gate current

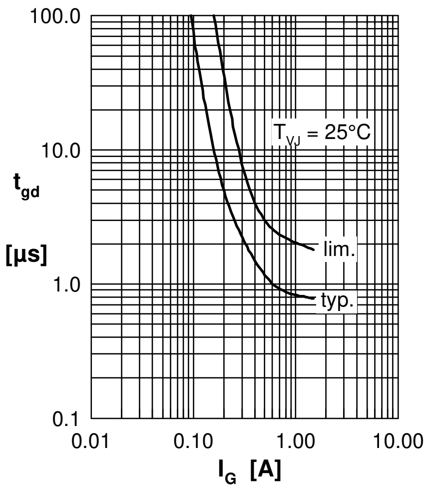


Fig. 5 Gate controlled delay time t_{gd}

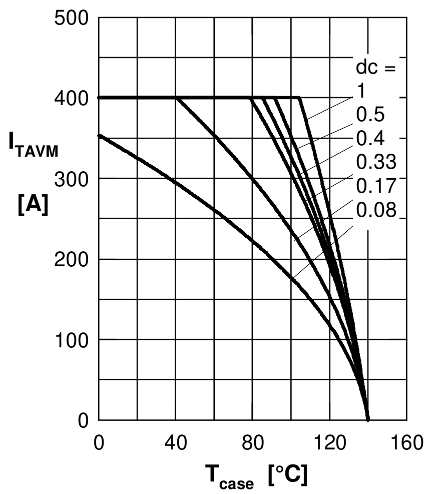


Fig. 6 Max. forward current at case temperature

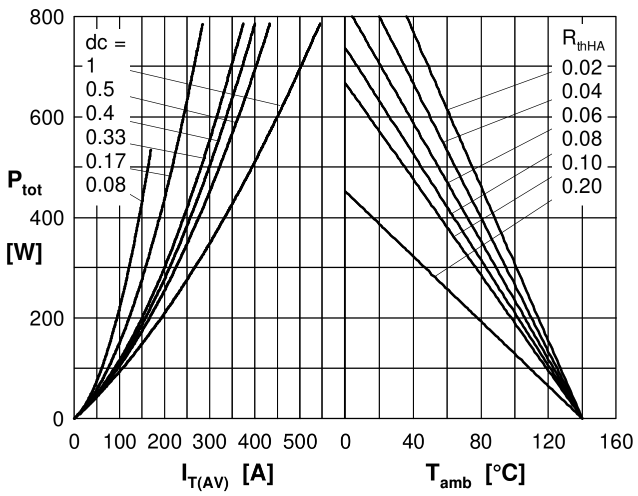
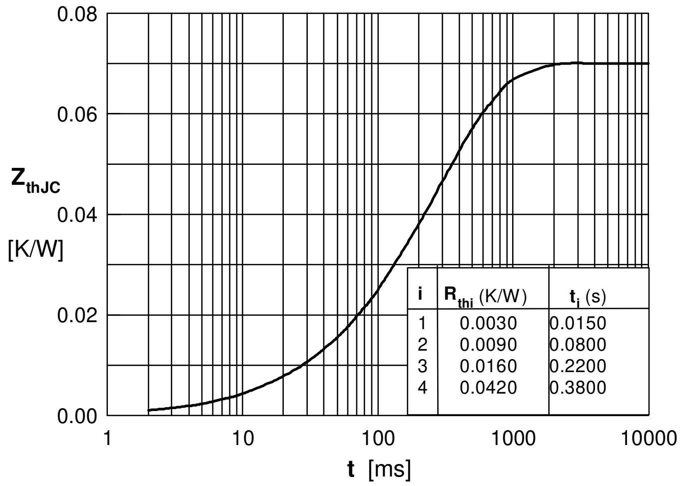


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature



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