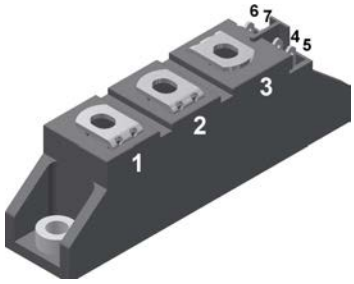
Thyristor Module

V_{RRM} = 2x 1600 V
I_{TAV} = 60 A
V_T = 1,24 V

Phase leg

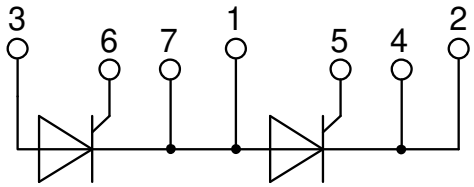
Part number

MCC56-16io1B



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: TO-240AA

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- 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.

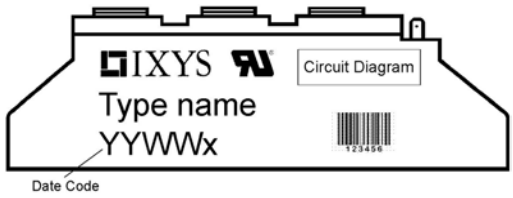
© 2025 IXYS all rights reserved

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			5	mA
V_T	*forward voltage drop*	I_T = 100 A	T_{VJ} = 25°C			1,26	V
		I_T = 200 A				1,57	V
		I_T = 100 A	T_{VJ} = 125°C			1,24	V
		I_T = 200 A				1,62	V
I_{TAV}	*average forward current*	T_C = 85°C	T_{VJ} = 125°C			60	A
$I_{T(RMS)}$	*RMS forward current*	180° sine				94	A
V_{T0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 125°C			0,85	V
r_T	*slope resistance* }					3,7	mΩ
R_{thJC}	*thermal resistance junction to case*					0,45	K/W
R_{thCH}	*thermal resistance case to heatsink*				0,2		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			222	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1,50	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1,62	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 125°C			1,28	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1,38	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			11,3	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			10,9	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 125°C			8,13	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			7,87	kA²s
C_J	*junction capacitance*	V_R = 400V f = 1 MHz	T_{VJ} = 25°C		74		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 125°C			10	W
		t_P = 300 µs				5	W
P_{GAV}	*average gate power dissipation*					0,5	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 125°C; f = 50 Hz repetitive, I_T = 150 A				150	A/µs
		t_P = 200 µs; di_G/dt = 0,45 A/µs;					
		I_G = 0,45A; V_D = ⅔ V_{DRM} non-repet., I_T = 60 A				500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 125°C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	*gate trigger voltage*	V_D = 6 V	T_{VJ} = 25°C			1,5	V
			T_{VJ} = -40°C			1,6	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			100	mA
			T_{VJ} = -40°C			200	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 125°C			0,2	V
I_{GD}	*gate non-trigger current*					10	mA
I_L	*latching current*	t_p = 10 µs	T_{VJ} = 25°C			450	mA
		I_G = 0,45A; di_G/dt = 0,45 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 = 0,45A; di_G/dt = 0,45 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 150A; V_D = ⅔ V_{DRM}	T_{VJ} =100 °C		150		µs
		di/dt = 10 A/µs; dv/dt = 20 V/µs; t_p = 200 µs					

© 2025 IXYS all rights reserved

Package TO-240AA					Ratings			
Symbol	Definition	Conditions			min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal					200	A
T_{VJ}	*virtual junction temperature*				-40		125	°C
T_{op}	*operation temperature*				-40		100	°C
T_{stg}	*storage temperature*				-40		125	°C
Weight						81		g
M_D	*mounting torque*				2,5		4	Nm
M_T	*terminal torque*				2,5		4	Nm
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*		*terminal to terminal*	13,0	9,7			mm
$d_{Spb/Apb}$			*terminal to backside*	16,0	16,0			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA		4800			V
		t = 1 minute			4000			V

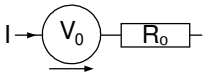


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCC56-16io1B	MCC56-16io1B	Box	36	452769

Similar Part	Package	Voltage class
MCMA65P1600TA	TO-240AA-1B	1600
MCMA85P1600TA	TO-240AA-1B	1600

Equivalent Circuits for Simulation

** on die level* T_{VJ} = 125°C

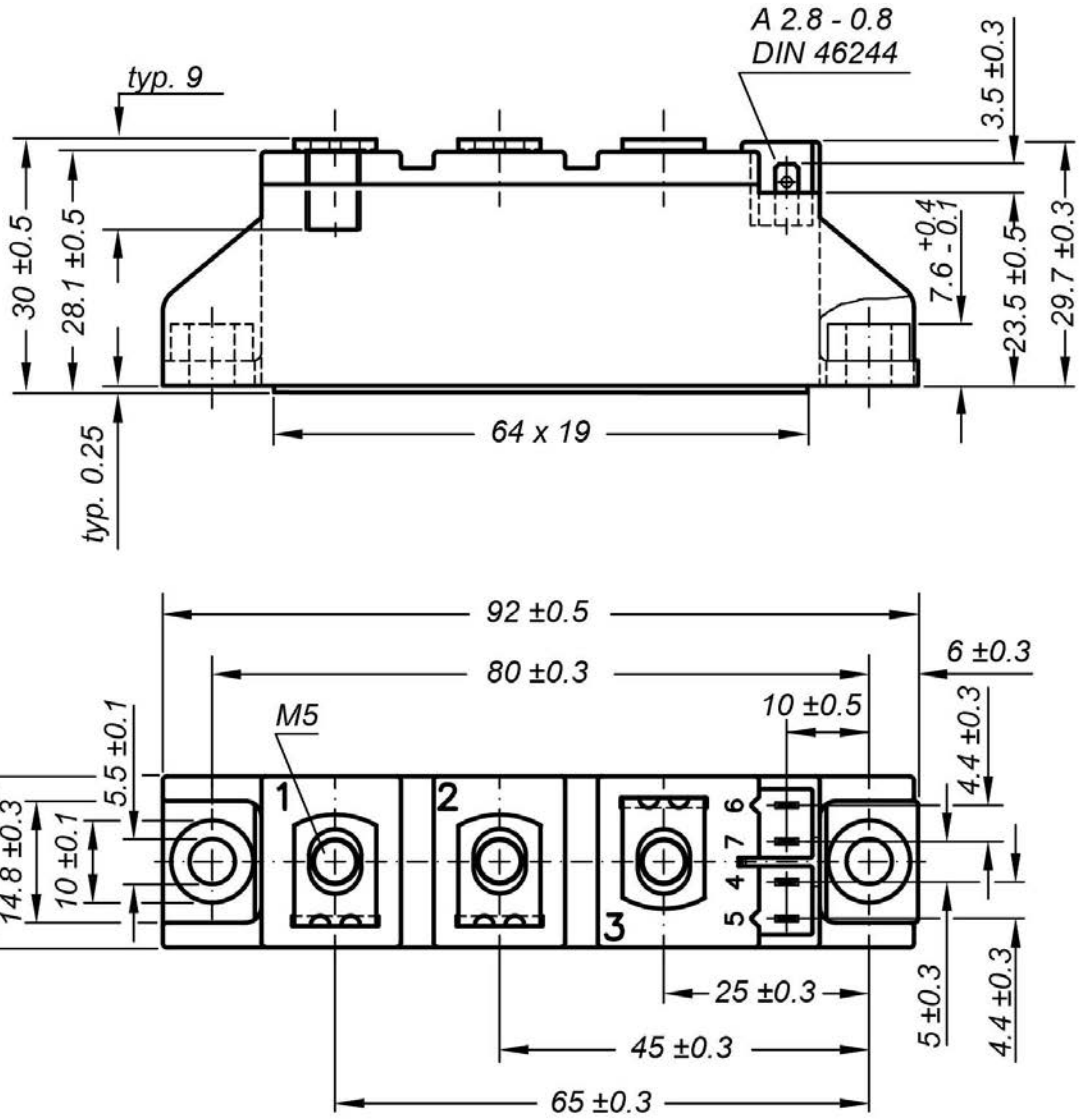


Thyristor

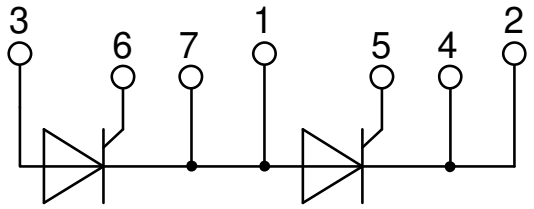
$V_{0\,max}$	*threshold voltage*	0,85	V
$R_{0\,max}$	*slope resistance **	2,5	mΩ

© 2025 IXYS all rights reserved

Outlines TO-240AA



Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red
Type ZY 200L (L = Left for pin pair 4/5)
Type ZY 200R (R = Right for pin pair 6/7) } UL 758, style 3751



© 2025 IXYS all rights reserved

Thyristor

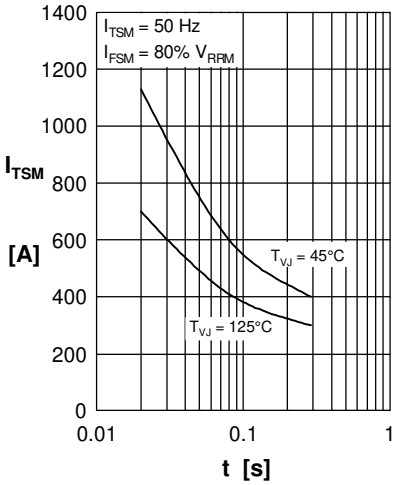


Fig. 1 Surge overload current I_{TSM}, I_{FSM}: Crest value, t: duration

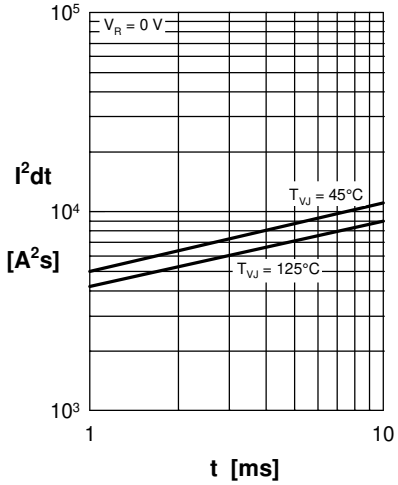


Fig. 2 I^2t versus time (1-10 ms)

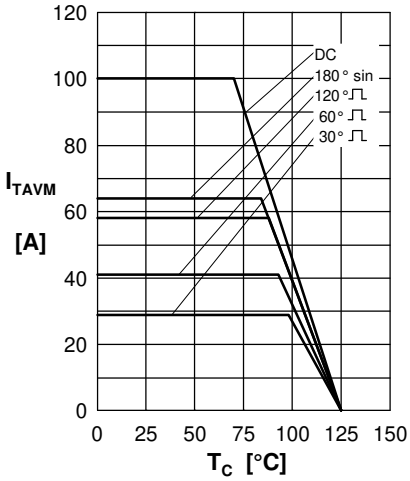


Fig. 3 Max. forward current at case temperature

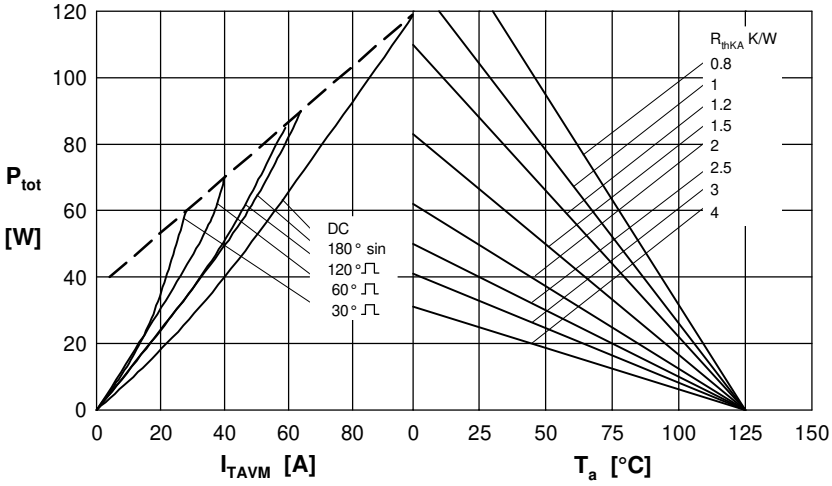


Fig. 4 Power dissipation vs. on-state current & ambient temperature (per thyristor or diode)

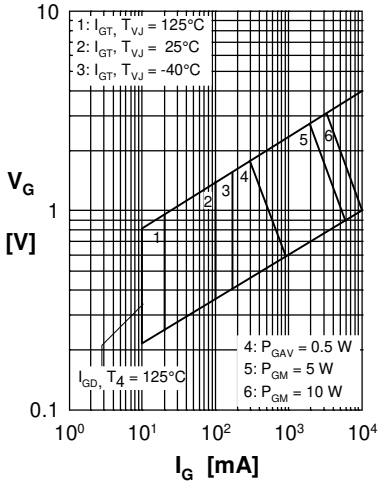


Fig. 5 Gate trigger characteristics

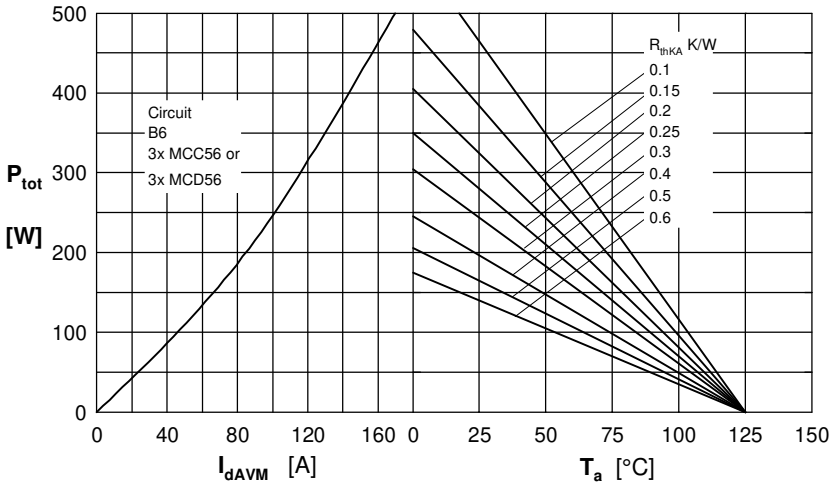


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

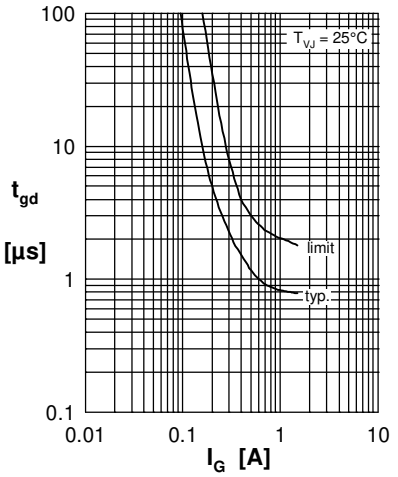


Fig. 7 Gate trigger delay time

© 2025 IXYS all rights reserved

Thyristor

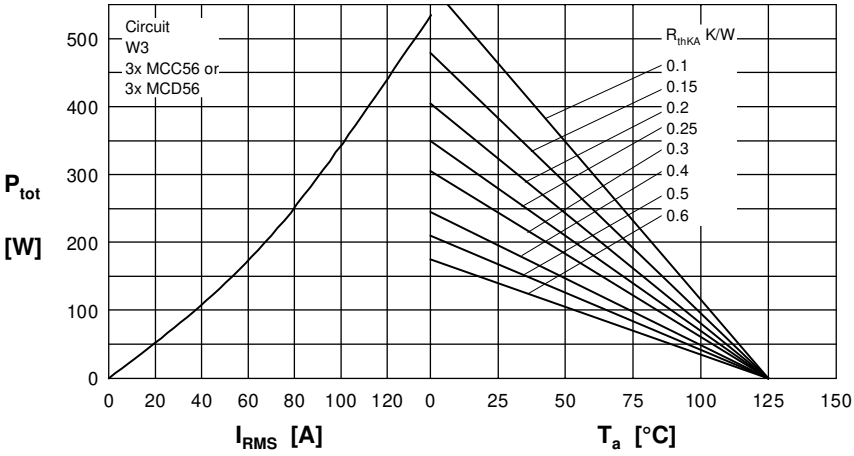
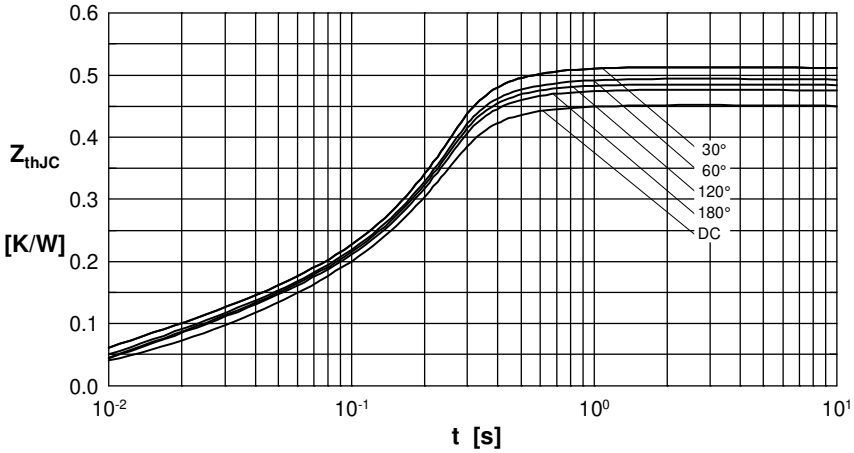


Fig. 8 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature



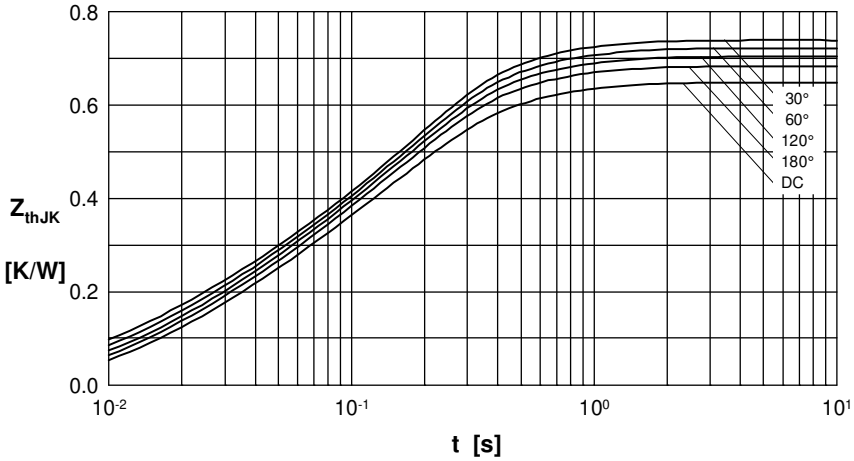
R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.450
180°	0.470
120°	0.490
60°	0.505
30°	0.520

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.014	0.0150
2	0.026	0.0095
3	0.410	0.1750

Fig. 9 Transient thermal impedance junction to case (per thyristor/diode)



R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.650
180°	0.670
120°	0.690
60°	0.705
30°	0.720

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.014	0.0150
2	0.026	0.0095
3	0.410	0.1750
4	0.200	0.6700

Fig. 10 Transient thermal impedance junction to heatsink (per thyristor/diode)

© 2025 IXYS all rights reserved