

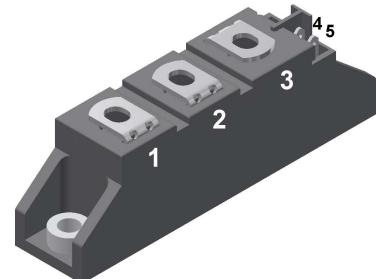
Thyristor \ Diode Module

$V_{RRM} = 2 \times 1600 \text{ V}$
 $I_{TAV} = 60 \text{ A}$
 $V_T = 1.24 \text{ V}$

Phase leg

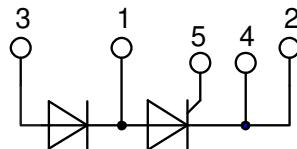
Part number

MCD56-16io1B



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: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Disclaimer Notice

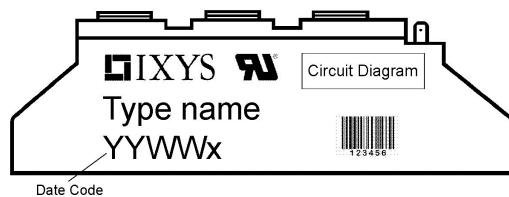
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Rectifier

Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^\circ C$			1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^\circ C$			1600	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1600 V$ $V_{R/D} = 1600 V$	$T_{VJ} = 25^\circ C$ $T_{VJ} = 125^\circ C$		200 5	μA mA
V_T	forward voltage drop	$I_T = 100 A$	$T_{VJ} = 25^\circ C$		1.26	V
		$I_T = 200 A$			1.57	V
		$I_T = 100 A$	$T_{VJ} = 125^\circ C$		1.24	V
		$I_T = 200 A$			1.62	V
I_{TAV}	average forward current	$T_C = 85^\circ C$	$T_{VJ} = 125^\circ C$		60	A
$I_{T(RMS)}$	RMS forward current	180° sine			94	A
V_{T0}	threshold voltage	r_T slope resistance } for power loss calculation only	$T_{VJ} = 125^\circ C$		0.85	V
	slope resistance				3.7	$m\Omega$
R_{thJC}	thermal resistance junction to case				0.45	K/W
R_{thCH}	thermal resistance case to heatsink			0.20		K/W
P_{tot}	total power dissipation		$T_C = 25^\circ C$		222	W
I_{TSM}	max. forward surge current	$t = 10 ms; (50 Hz)$, sine	$T_{VJ} = 45^\circ C$		1.50	kA
		$t = 8,3 ms; (60 Hz)$, sine	$V_R = 0 V$		1.62	kA
		$t = 10 ms; (50 Hz)$, sine	$T_{VJ} = 125^\circ C$		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	$T_{VJ} = 45^\circ C$		11.3	kA^2s
		$t = 8,3 ms; (60 Hz)$, sine	$V_R = 0 V$		10.9	kA^2s
		$t = 10 ms; (50 Hz)$, sine	$T_{VJ} = 125^\circ C$		8.13	kA^2s
		$t = 8,3 ms; (60 Hz)$, sine	$V_R = 0 V$		7.87	kA^2s
C_J	junction capacitance	$V_R = 400 V$ $f = 1 MHz$	$T_{VJ} = 25^\circ C$	74		pF
P_{GM}	max. gate power dissipation	$t_p = 30 \mu s$	$T_C = 125^\circ C$		10	W
		$t_p = 300 \mu s$			5	W
					0.5	W
P_{GAV}	average gate power dissipation					
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^\circ C$; $f = 50 Hz$	repetitive, $I_T = 150 A$		150	$A/\mu s$
		$t_p = 200 \mu s$; $di_G/dt = 0.45 A/\mu s$				
		$I_G = 0.45 A$; $V = \frac{2}{3} V_{DRM}$	non-repet., $I_T = 60 A$		500	$A/\mu s$
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^\circ C$		1000	$V/\mu s$
		$R_{GK} = \infty$; method 1 (linear voltage rise)				
V_{GT}	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^\circ C$		1.5	V
			$T_{VJ} = -40^\circ C$		1.6	V
I_{GT}	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^\circ C$		100	mA
			$T_{VJ} = -40^\circ C$		200	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^\circ C$		0.2	V
I_{GD}	gate non-trigger current				10	mA
I_L	latching current	$t_p = 10 \mu s$ $I_G = 0.45 A$; $di_G/dt = 0.45 A/\mu s$	$T_{VJ} = 25^\circ C$		450	mA
I_H	holding current	$V_D = 6 V$ $R_{GK} = \infty$	$T_{VJ} = 25^\circ C$		200	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^\circ C$		2	μs
		$I_G = 0.45 A$; $di_G/dt = 0.45 A/\mu s$				
t_q	turn-off time	$V_R = 100 V$; $I_T = 150 A$; $V = \frac{2}{3} V_{DRM}$ $T_{VJ} = 100^\circ C$ $di/dt = 10 A/\mu s$ $dv/dt = 20 V/\mu s$ $t_p = 200 \mu s$		150		μs

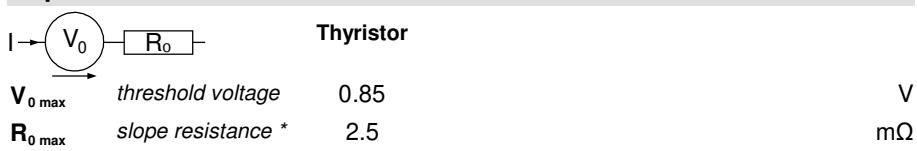
Package TO-240AA
Ratings

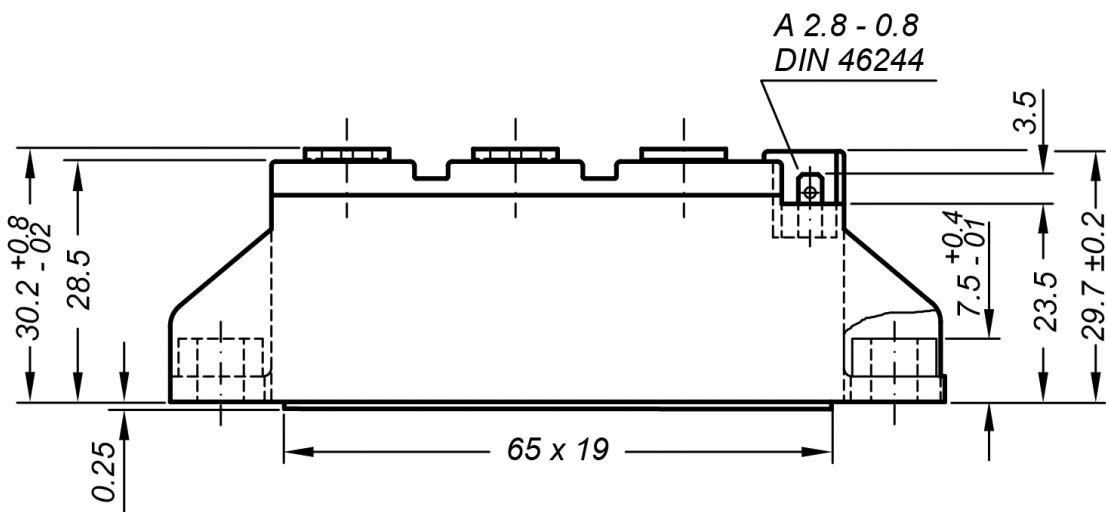
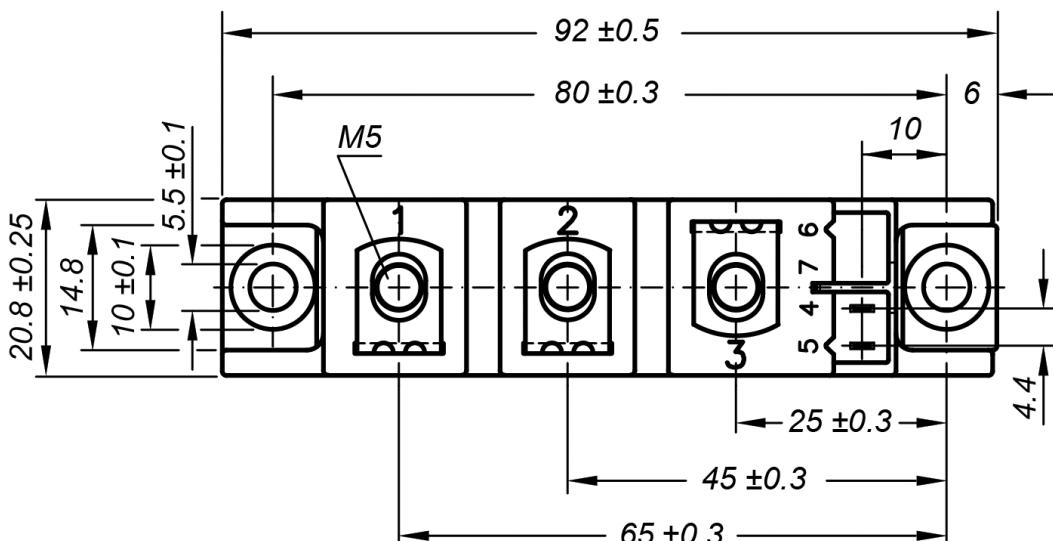
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			200	A
T_{VJ}	virtual junction temperature		-40		125	°C
T_{op}	operation temperature		-40		100	°C
T_{stg}	storage temperature		-40		125	°C
Weight				81		g
M_D	mounting torque		2.5		4	Nm
M_T	terminal torque		2.5		4	Nm
$d_{Spp/App}$	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 t = 1 minute 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		3600		V
				3000		V



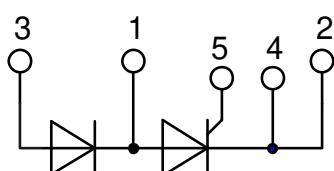
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD56-16io1B	MCD56-16io1B	Box	36	465984

Similar Part	Package	Voltage class
MCMA65PD1600TB	TO-240AA-1B	1600
MCMA85PD1600TB	TO-240AA-1B	1600

Equivalent Circuits for Simulation
* on die level
 $T_{VJ} = 125$ °C


Outlines TO-240AA

General tolerance: DIN ISO 2768 class „c“

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) UL 758, style 3751



Thyristor

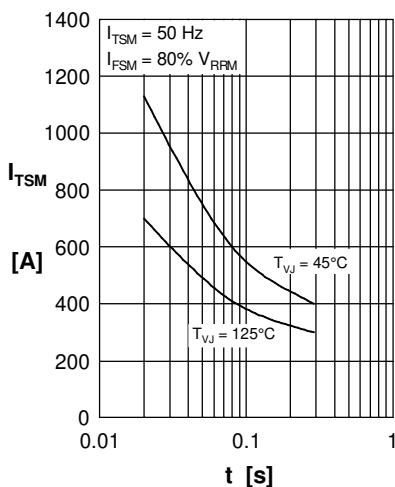


Fig. 1 Surge overload current I_{TSM} ,
 I_{FSM} : Crest value, t : duration

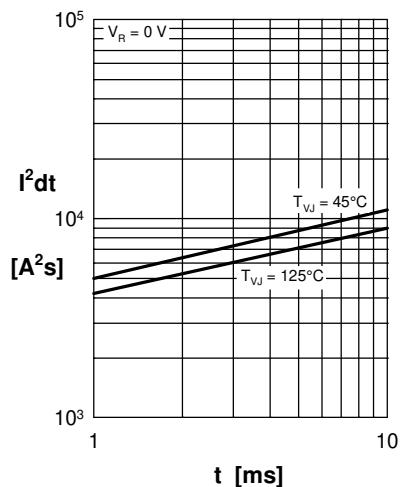


Fig. 2 I^2t versus time (1-10 ms)

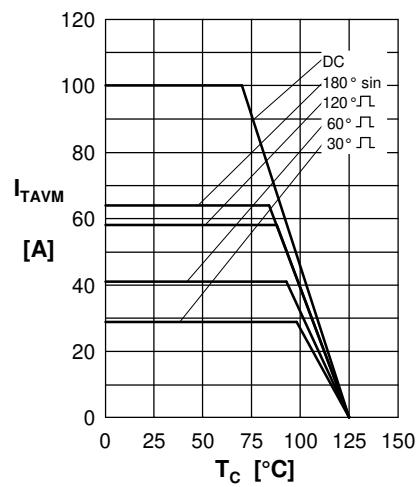


Fig. 3 Max. forward current
at case temperature

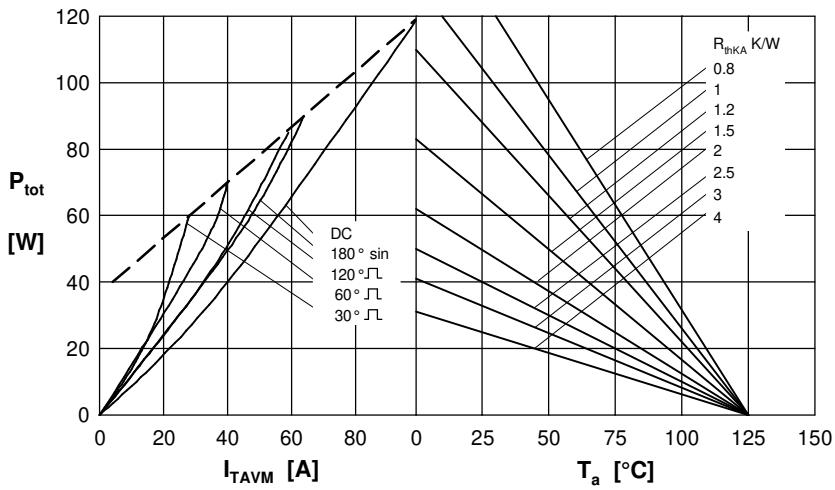


Fig. 4 Power dissipation vs. on-state current & ambient temperature
(per thyristor or diode)

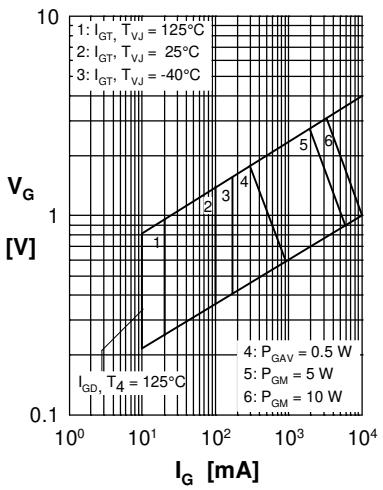


Fig. 5 Gate trigger characteristics

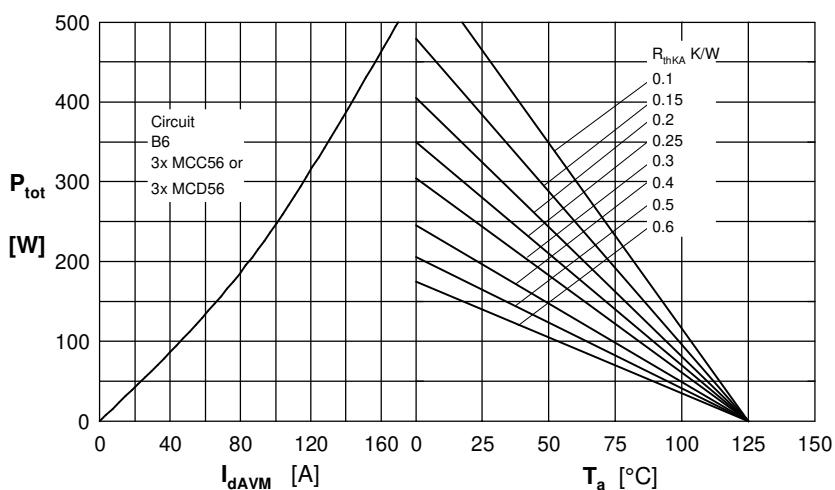


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

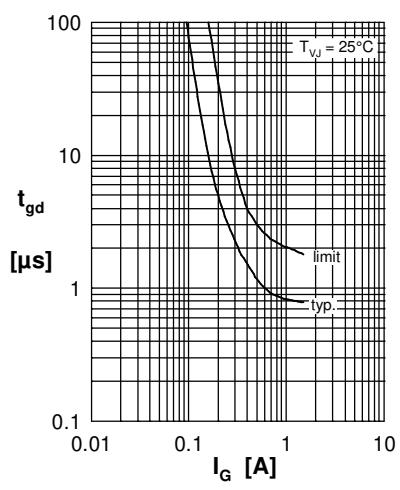


Fig. 7 Gate trigger delay time

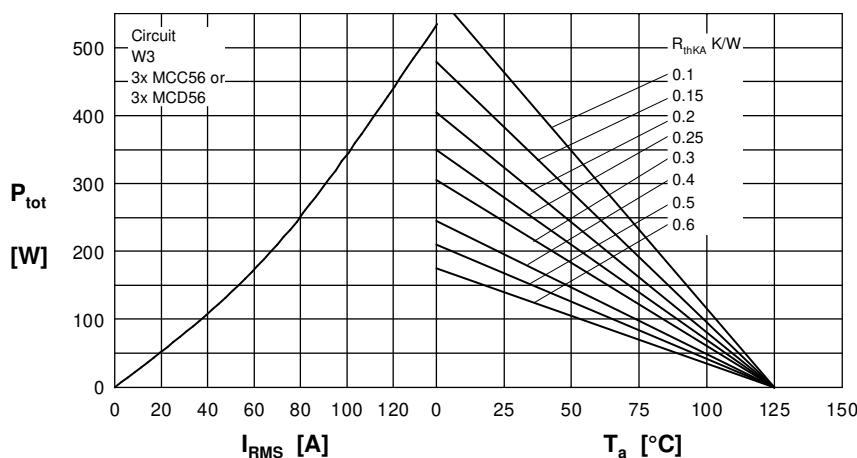
Rectifier


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

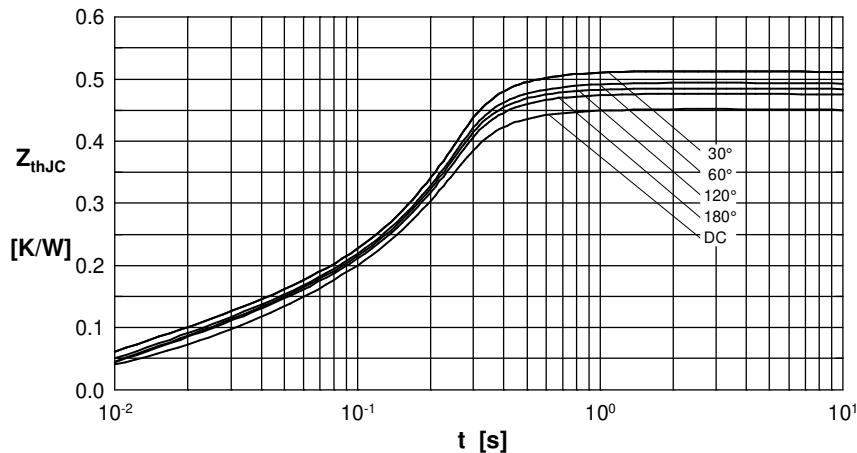


Fig. 9 Transient thermal impedance junction to case (per thyristor/diode)

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

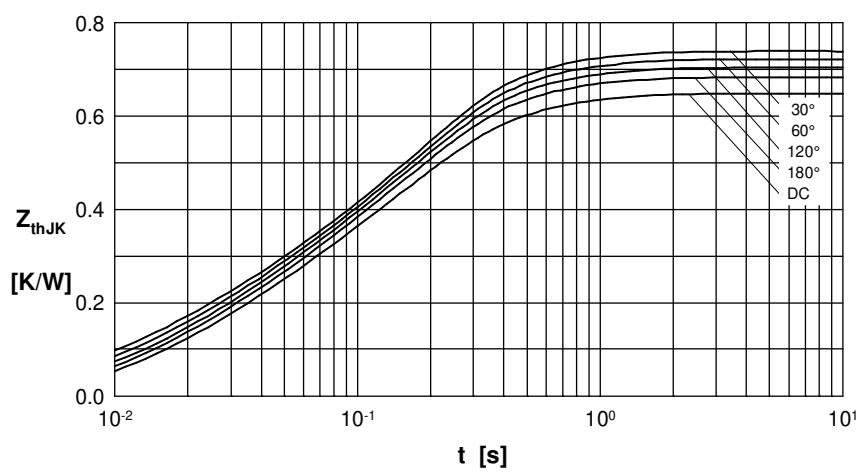


Fig. 10 Transient thermal impedance junction to heatsink (per thyristor/diode)

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



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Электрон
Связь**

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