imall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from, Europe, America and south Asia, supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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MCD56-14io1B

 $= 2 \times 1400 \text{ V}$

60 A

1.24 V

Thyristor \ Diode Module

Phase	leg
-------	-----

Part number

MCD56-14io1B



=

=

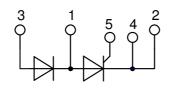
 V_{RRM}

I TAV

VT



Backside: isolated **E**72873



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

20161222b

- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Terms Conditions of usage:

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office. Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office. Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

to perform joint risk and quality assessments;
the conclusion of quality agreements;

- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

IXYS reserves the right to change limits, conditions and dimensions.

Data according to IEC 60747and per semiconductor unless otherwise specified

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MCD56-14io1B

Symbol	Definition	Conditions		min.	typ.	max.	Uni
-			T _{vJ} = 25°C	min.	typ.	1500	Uni \
V _{RSM/DSM}	max. non-repetitive reverse/forwa		$T_{VJ} = 25 °C$ $T_{VJ} = 25 °C$			1400	، ۱
V _{RRM/DRM}	max. repetitive reverse/forward b	$V_{\rm R/D} = 1400 \text{ V}$	$T_{VJ} = 25 °C$ $T_{VJ} = 25 °C$			200	μA
R/D	reverse current, drain current						1
V	forward voltage drop	$V_{\rm R/D} = 1400 \text{ V}$	$T_{VJ} = 125^{\circ}C$			1.00	m/ ۱
VT	Torward voltage drop	$I_{T} = 100 \text{ A}$	$T_{VJ} = 25^{\circ}C$			1.26	1
		$I_{T} = 200 \text{ A}$	T 10500			1.57	
		$I_{T} = 100 \text{ A}$	$T_{VJ} = 125 ^{\circ}C$			1.24	
	avarage forward average	$I_{T} = 200 \text{ A}$	T 10500			1.62	\ /
	average forward current	$T_c = 85^{\circ}C$	$T_{VJ} = 125^{\circ}C$			60	i
T(RMS)	RMS forward current	180° sine	T (0500			94	4
V _{T0}	threshold voltage } for power l	oss calculation only	$T_{VJ} = 125$ °C			0.85	١
r _T	siope resistance					3.7	mΩ
R _{thJC}	thermal resistance junction to case					0.45	K/W
R _{thCH}	thermal resistance case to heats	ink			0.20		K/W
P _{tot}	total power dissipation		$T_c = 25^{\circ}C$			222	W
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
l²t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$			11.3	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_{R} = 0 V$			10.9	kA ² s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 125^{\circ}C$			8.13	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_{R} = 0 V$			7.87	kA ² s
C	junction capacitance	$V_{R} = 400 V f = 1 MHz$	$T_{vJ} = 25^{\circ}C$		74		pF
Р _{бм}	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 _{vi} = 125°C; f = 50 Hz re	epetitive, $I_{T} = 150 \text{ A}$			150	A/μs
, yo.		$t_{\rm P}$ = 200 µs; $di_{\rm G}/dt$ = 0.45 A/µs; –	•				<u> </u>
			on-repet., $I_{T} = 60 \text{ A}$			500	A/µs
(dv/dt) _{cr}	critical rate of rise of voltage	$V = \frac{2}{3} V_{\text{DBM}}$	T _{vi} = 125°C			1000	
(/0		$R_{GK} = \infty$; method 1 (linear volta					
V _{gT}	gate trigger voltage	$V_{\rm D} = 6 \text{ V}$	$T_{vJ} = 25^{\circ}C$			1.5	V
G			$T_{\rm VJ} = -40^{\circ}\rm C$			1.6	V
I _{gt}	gate trigger current	$V_{D} = 6 V$	$T_{vJ} = 25^{\circ}C$			100	mA
■GT	gate ingger our ent	V _D = 0 V	$T_{VJ} = -40^{\circ}C$			200	
V _{gd}	gate non-trigger voltage	$V_{\rm D} = \frac{2}{3} V_{\rm DBM}$	$T_{VJ} = -40^{\circ} \text{C}$ $T_{VJ} = 125^{\circ} \text{C}$			0.2	\ \
	gate non-trigger current	$\mathbf{v}_{\rm D} = 73 \mathbf{v}_{\rm DRM}$	T _{VJ} = 123 O			10	_
		10	т огоо				m A
I.	latching current	$t_p = 10 \ \mu s$	$T_{vJ} = 25 °C$			450	mA
		$I_{\rm G} = 0.45 \rm{A}; di_{\rm G}/dt = 0.45 \rm{A}/\mu s$				000	
I _H	holding current	$V_{\rm D} = 6 V R_{\rm GK} = \infty$	$T_{VJ} = 25 ^{\circ}C$			200	mA
t _{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25 °C$			2	με
		$I_{G} = 0.45 \text{ A}; \ di_{G}/dt = 0.45 \text{ A}/\mu s$					-
t _q	turn-off time	$V_{R} = 100 \text{ V}; I_{T} = 150 \text{ A}; \text{ V} = 3$	∕₃ V _{DRM} T _{VJ} =100 °C		150		με
		di/dt = 10 A/µs dv/dt = 20 V	//μs t _p = 200 μs				

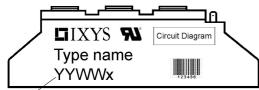
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MCD56-14io1B

Package	TO-240AA				F	Rating	S	
Symbol	Definition	Conditions			min.	typ.	max.	Unit
	RMS current	per terminal					200	Α
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}	croopago distanco on surfac	e striking distance through air	terminal to terminal	13.0	9.7			mm
d _{Spb/Apb}	creepage uistance on surract	e Striking distance through an	terminal to backside 16.0		16.0			mm
V	isolation voltage	t = 1 second			3600			V
		50/60 Hz, RMS; lıso∟ ≤ 1 mA		3000			v	



Date Code

[Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
	Standard	MCD56-14io1B	MCD56-14io1B	Box	36	464848

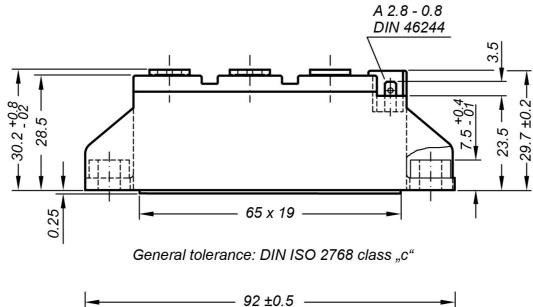
Similar Part	Package	Voltage class
MCMA65PD1600TB	TO-240AA-1B	1600
MCMA85PD1600TB	TO-240AA-1B	1600

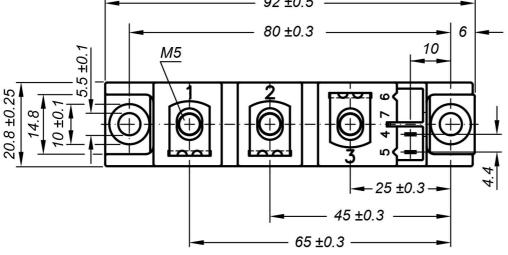
Equiva	lent Circuits for	Simulation	* on die level	T _{vj} = 125 °C
	⊢R₀−	Thyristor		
V _{0 max}	threshold voltage	0.85		V
$\mathbf{R}_{0 \max}$	slope resistance *	2.5		mΩ

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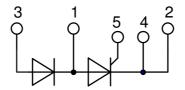
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Outlines TO-240AA





Optional accessories: Keyed gate/cathode twin plugs Wire length: 350 mm, gate = white, cathode = red UL 758, style 3751 Type **ZY 200L** (L = Left for pin pair 4/5)



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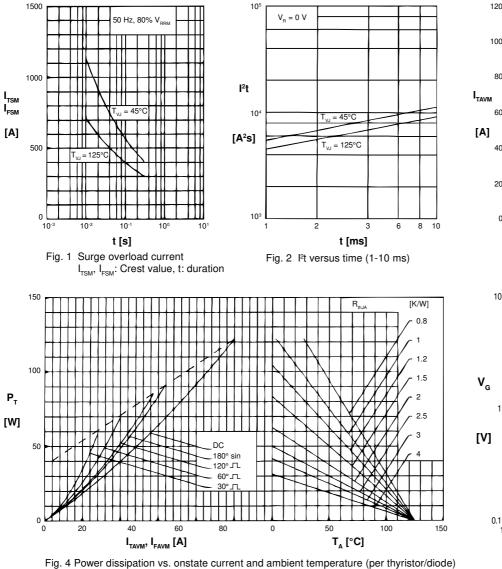
DC

180° sin 120°-√_

60° _⊤_ 30° □

150

Thyristor



600 R_{thK} [K/W] 0.1 500 0.15 0.2 400 0.25 \mathbf{P}_{tot} 0.3 300 [W] 0.4 0.5 200 0.6 Circuit B6 3x MCC56 or 100 3x MCD56 0 50 100 150 0 50 100 150 I_{dAVM} [A] T_^ [°C] Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current

80

60

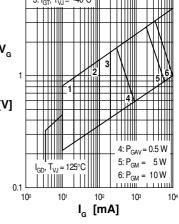


Fig. 5 Gate trigger charact.

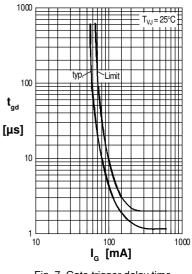


Fig. 7 Gate trigger delay time

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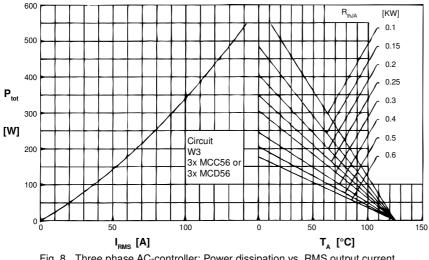


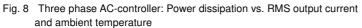
and ambient temperature

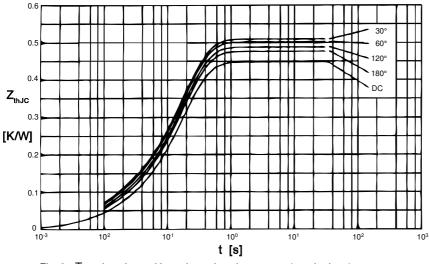
[[]A] 40 20 0 50 100 0 **T**_c [°**C**] Fig. 3 Maximum forward current at case temperature 10 1: I_{GT} , $T_{VJ} = 125^{\circ}C$ 2: I_{GT} , T_{VJ} = 25°C 3: I_{GT} , T_{VJ} = -40°C ۷_g [V]

MCD56-14io1B

Rectifier





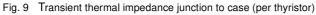


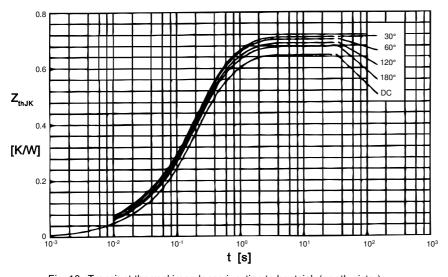
R _{thJC} for varie	ous conduction angles d:					
d R _{tt}	_{.Jc} [K/W]					
DC	0.450					
180°	0.470					
120°	0.490					
60°	0.505					
30°	0.520					
Constants for Z_{thJC} calculation:						
i R _{thi} [K/W] t _i [s]					
1 0.014	0.0150					

0.0095

0.1750

10 ¹			10 ⁰		10)1		1() ²		10) ³
		t	[s]									





 $R_{th,IK}$ for various conduction angles d: d R. ... [K/W]

	• thJK • •	
DC	0.65	0
180°	0.67	0
120°	0.69	0
60°	0.70	5
30°	0.72	0
otont	s for 7	calculation.

Constants for	Z _{thJK} calculation.
i R., [K/W]	t, [s]

	un	
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)

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2

3

0.026

0.410