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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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Thyristor \ Diode Module

= 2x 1200 V

320 A

 V_{T} 1.06 V

Phase leg

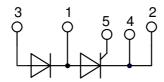
Part number

MCD312-12io1



Backside: isolated





Features / Advantages:

- International standard package
- Direct copper bonded Al2O3-ceramic with copper base plate
- Planar passivated chip
- Isolation voltage 3600 V~
- Keyed gate/cathode twin pins

Applications:

- Motor control, softstarter
- Power converter
- · Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Package: Y1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: Copper internally DCB isolated
- 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 60747 and per semiconductor unless otherwise specified

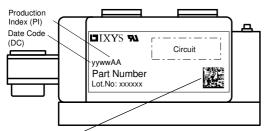
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Rectifier				Ì	Ratings		1
Symbol	Definition	Conditions		min.	typ.	max.	Uni
V _{RSM/DSM}	max. non-repetitive reverse/forwa	rd blocking voltage	$T_{VJ} = 25^{\circ}C$			1300	١
V _{RRM/DRM}	max. repetitive reverse/forward bl	ocking voltage	$T_{VJ} = 25^{\circ}C$			1200	١
I _{R/D}	reverse current, drain current	$V_{R/D} = 1200 \text{ V}$	$T_{VJ} = 25^{\circ}C$			1	m/
		$V_{R/D} = 1200 \text{ V}$	$T_{VJ} = 140$ °C			40	m/
V _T	forward voltage drop	I _T = 300 A	$T_{VJ} = 25^{\circ}C$			1.12	١
		$I_{T} = 600 \text{ A}$				1.32	٧
		$I_{T} = 300 \text{ A}$	T _{vJ} = 125°C			1.06	٧
		$I_T = 600 \text{ A}$				1.29	\
I _{TAV}	average forward current	T _c = 85°C	T _{vJ} = 140°C			320	A
I _{T(RMS)}	RMS forward current	180° sine				520	Α
V _{T0}	threshold voltage		T _{v.1} = 140°C			0.80	٧
r _T	slope resistance	oss calculation only	VO			0.68	mΩ
R _{thJC}	thermal resistance junction to cas					0.12	K/W
R _{thCH}	thermal resistance case to heatsi				0.040		K/W
P _{tot}	total power dissipation		T _C = 25°C		0.0.0	960	W
	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{V,I} = 45^{\circ}C$			9.60	kA
I _{TSM}	max. forward surge current	t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			10.4	kA
							k/
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140$ °C			8.16	į
101	salas factorias	t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			8.82	kA
l²t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$			460.8	kA ² S
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			447.4	1
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140$ °C			332.9	kA2s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			323.3	kA ² s
C _J	junction capacitance	$V_R = 400 V$ f = 1 MHz	$T_{VJ} = 25^{\circ}C$		438		pF
P_{GM}	max. gate power dissipation	$t_P = 30 \mu s$	$T_{C} = 140 ^{\circ}\text{C}$			120	W
		$t_P = 500 \mu s$				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 re	epetitive, $I_T = 960 A$			100	A/μs
		$t_P = 200 \mu s; di_G/dt = 1 A/\mu s; -$					<u> </u>
		$I_G = 1 A; V = \frac{2}{3} V_{DRM}$ no	on-repet., $I_T = 320 \text{ A}$			500	A/μs
(dv/dt) _{cr}	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	T _{vJ} = 140°C			1000	V/µs
		R _{GK} = ∞; method 1 (linear volta	ge rise)				
V _{GT}	gate trigger voltage	V _D = 6 V	$T_{VJ} = 25^{\circ}C$			2	٧
G1		b .	T _{vJ} = -40°C			3	٧
I _{GT}	gate trigger current	$V_D = 6 \text{ V}$	$T_{VJ} = 25^{\circ}C$			150	mA
-G1	gane ingger can an	V _D = C V	$T_{VJ} = -40$ °C			220	mA
V _{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140^{\circ}C$			0.25	V
	gate non-trigger current	v _D - /3 v _{DRM}	1 VJ = 140 O			10	1 .
I _{GD}		1 00	T 0500				mA
I _L	latching current	$t_p = 30 \mu s$ $I_G = 0.45 A$; $di_G/dt = 0.45 A/\mu s$	$T_{VJ} = 25$ °C			200	mA
I _H	holding current	$V_D = 6 \text{ V } R_{GK} = \infty$	$T_{VJ} = 25$ °C			150	mA
	gate controlled delay time	$V_D = 0 V V_{GK} = 0$ $V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25 ^{\circ}\text{C}$ $T_{VJ} = 25 ^{\circ}\text{C}$			2	Ì
t _{gd}	gate controlled delay little						μs
_	turn off time	$I_{G} = 1 \text{ A}; \text{ di}_{G}/\text{dt} = 1 \text{ A}/\mu \text{s}$			000		1
t _q	turn-off time	$V_R = 100 \text{ V}; I_T = 300 \text{ A}; V = \frac{2}{3}$			200		με
		$di/dt = 10 A/\mu s dv/dt = 50 V$	$/\mu s t_p = 200 \mu s$				i



Package Y1			Ratings				
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I _{RMS}	RMS current	per terminal				600	Α
T _{VJ}	virtual junction temperature			-40		140	°C
Top	operation temperature			-40		125	°C
T _{stg}	storage temperature		-40		125	°C	
Weight					680		g
M _D	mounting torque			4.5		7	Nm
$\mathbf{M}_{_{T}}$	terminal torque			11		13	Nm
d _{Spp/App}	creepage distance on surface s	atriking diatanaa through air	terminal to terminal	16.0			mm
$d_{Spb/Apb}$	creepage distance on surface (s	striking distance through air	terminal to backside	16.0			mm
V _{ISOL}	isolation voltage	t = 1 second		3600			٧
1002		t = 1 minute	50/60 Hz, RMS; IISOL ≤ 1 mA	3000			٧



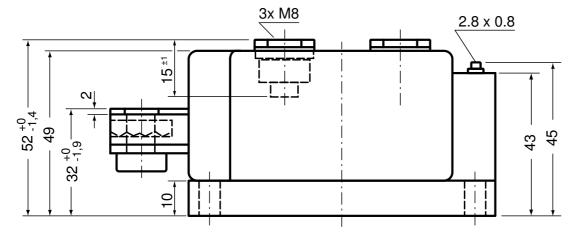
Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

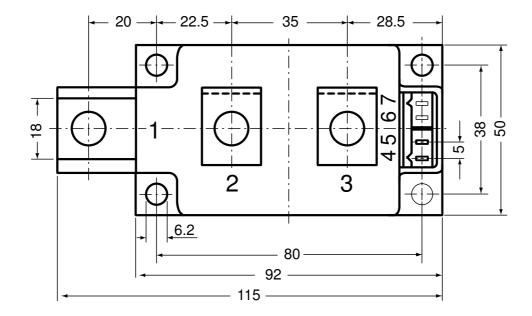
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD312-12io1	MCD312-12io1	Box	3	461849

Equivalent Circuits for Simulation		* on die level	$T_{VJ} = 140 ^{\circ}\text{C}$	
$I \rightarrow V_0$	R_0	Thyristor		
V _{0 max}	threshold voltage	8.0		V
$R_{0 \text{ max}}$	slope resistance *	0.5		$m\Omega$



Outlines Y1

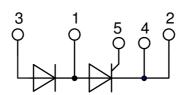




Optional accessories for modules

. Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red

Type ZY 180L (L = Left for pin pair 4/5) Type ZY 180R (R = Right for pin pair 6/7) UL 758, style 3751





Thyristor

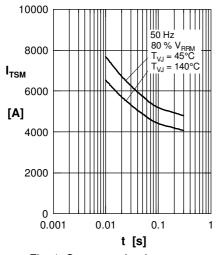


Fig. 1 Surge overload current I_{TSM}:Crest value, t: duration

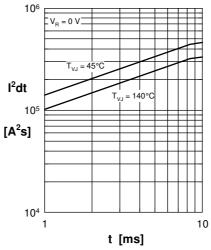


Fig. 2 I²dt versus time

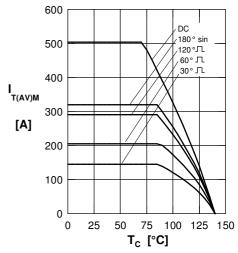


Fig. 3 Max. forward current at case temperature

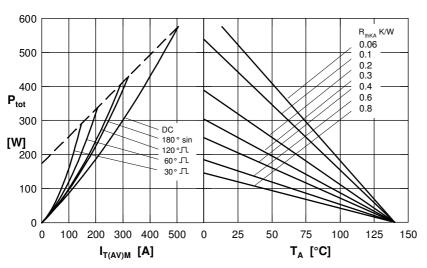


Fig. 4 Power dissipation versus on-state current and ambient temperature (per thyristor)

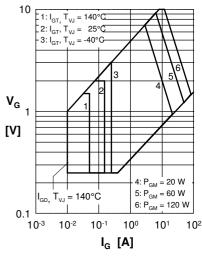


Fig. 5 Gate voltage & gate current

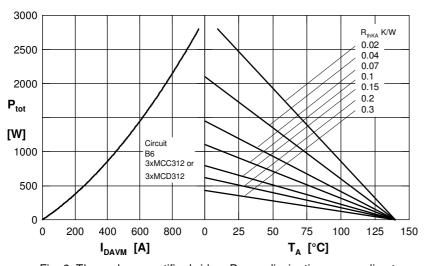


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

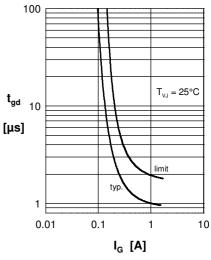


Fig. 7 Gate controlled delay time t_{qd}



Rectifier

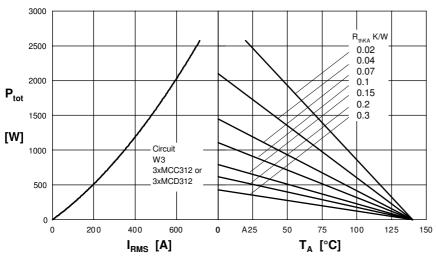


Fig. 8 Three phase AC-controller: Power dissipation versus $\rm R_{MS}$ output current and ambient temperature

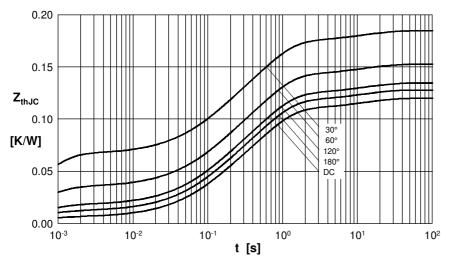


Fig. 9 Transient thermal impedance junction to case (per thyristor)

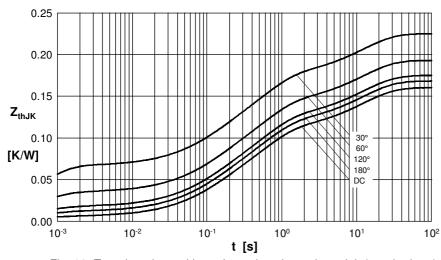


Fig. 10 Transient thermal impedance junction to heatsink (per thyristor)

 R_{thJC} for various conduct. angles d:

d	R _{thJC} [K/W]
DC	0.120
180°	0.128
120°	0.135
60°	0.153
30°	0.185

Constants for Z_{thJC} calculation:

i	R _{thi} [K/W]	t _i [s]
1	0.0058	0.00054
2	0.0310	0.098
3	0.0720	0.54
4	0.0112	12

 \mathbf{R}_{thJK} for various conduct. angles d:

d	R _{thJK} [K/W]
DC	0.160
180°	0.168
120°	0.175
60°	0.193
30°	0.225

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t _i [s]
1	0.0058	0.00054
2	0.0310	0.098
3	0.0720	0.54
4	0.0114	12
5	0.0400	12