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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 1800 V

220 A

 $V_{T}$ 1.18 V

## Phase leg

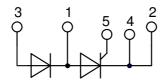
#### Part number

#### MCD225-18io1



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

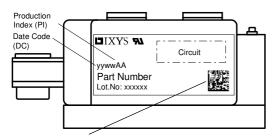
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Rectifier					Ratings	1	1
Symbol	Definition	Conditions		min.	typ.	max.	Ur
V <sub>RSM/DSM</sub>	max. non-repetitive reverse/forwa	rd blocking voltage	$T_{VJ} = 25^{\circ}C$			1900	
V <sub>RRM/DRM</sub>	max. repetitive reverse/forward bl		$T_{VJ} = 25^{\circ}C$			1800	
I <sub>R/D</sub>	reverse current, drain current	$V_{R/D} = 1800 \text{ V}$	$T_{VJ} = 25^{\circ}C$			1	m
		$V_{R/D} = 1800 \text{ V}$	$T_{VJ} = 125^{\circ}C$			40	m
V <sub>T</sub>	forward voltage drop	I <sub>T</sub> = 200 A	$T_{VJ} = 25^{\circ}C$			1.04	
		$I_T = 400 \text{ A}$				0.97	
		$I_{T} = 200 \text{ A}$	$T_{VJ} = 125$ °C			1.18	
		$I_{T} = 400 \text{ A}$				1.14	
I <sub>TAV</sub>	average forward current	T <sub>C</sub> = 85°C	T <sub>vJ</sub> = 140°C			220	
I <sub>T(RMS)</sub>	RMS forward current	180° sine				400	
V <sub>T0</sub>	threshold voltage		T <sub>v.i</sub> = 140°C			0.79	
r <sub>T</sub>	slope resistance	oss calculation only	VJ			0.83	m!
R <sub>thJC</sub>	thermal resistance junction to cas	e				0.157	K/V
R <sub>thCH</sub>	thermal resistance case to heatsi				0.040		K/V
P <sub>tot</sub>	total power dissipation		$T_{\rm C} = 25^{\circ}{\rm C}$			730	٧
I <sub>TSM</sub>	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{V,I} = 45^{\circ}C$			8.00	k
•ISM		t = 8.3  ms; (60 Hz), sine	$V_{R} = 0 \text{ V}$			8.64	1
		t = 0.0  ms; (50 Hz), sine	$T_{VJ} = 140^{\circ}C$			6.80	Î
		t = 8.3  ms; (60  Hz),  sine	$V_R = 0 V$			7.35	k
l²t	value for fusing	t = 10 ms; (50 Hz), sine	$V_R = 0 V$ $T_{VJ} = 45^{\circ}C$				kA <sup>2</sup>
-t	value for fusing	* * * * * * * * * * * * * * * * * * * *	$V_{R} = 0 V$			320.0 310.5	1
		t = 8.3  ms; (60 Hz), sine t = 10  ms; (50 Hz), sine	$V_R = 0 \text{ V}$ $T_{VJ} = 140 \text{ °C}$				
						231.2	ĺ
_	i unation consoitance	t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$		000	224.4	
C,	junction capacitance	V <sub>R</sub> = 400 V f = 1 MHz	$T_{VJ} = 25^{\circ}C$		366	400	р
$P_{GM}$	max. gate power dissipation	$t_P = 30 \mu s$	$T_{C} = 140 ^{\circ}C$			120	į
_		$t_{P} = 500 \mu s$				60	۷
P <sub>GAV</sub>	average gate power dissipation					20	۷
(di/dt) <sub>cr</sub>	critical rate of rise of current	,	epetitive, $I_T = 660 \text{ A}$			100	A/μ
		$t_P = 200 \mu s; di_G/dt = 1 A/\mu s; -$					
			on-repet., $I_T = 220 A$			500	<u> </u>
(dv/dt) <sub>cr</sub>	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140$ °C			1000	V/μ
		R <sub>GK</sub> = ∞; method 1 (linear volta					! !
$V_{GT}$	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			2	,
			$T_{VJ} = -40$ °C			3	,
I <sub>GT</sub>	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			150	m
			$T_{VJ} = -40$ °C			220	m
$V_{\sf GD}$	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140^{\circ}C$			0.25	1
I <sub>GD</sub>	gate non-trigger current					10	m
I <sub>L</sub>	latching current	t <sub>p</sub> = 30 μs	$T_{VJ} = 25$ °C			200	m
		$I_G = 0.45 A;  di_G/dt = 0.45 A/\mu s$	5				 
I <sub>H</sub>	holding current	V <sub>D</sub> = 6 V R <sub>GK</sub> = ∞	$T_{VJ} = 25$ °C			150	m
t <sub>gd</sub>	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	T <sub>VJ</sub> = 25°C			2	μ
34	-	$I_G = 1 \text{ A}; \text{ di}_G/\text{dt} = 1 \text{ A}/\mu \text{s}$				_	
t <sub>q</sub>	turn-off time	$V_{\rm R} = 100 \text{ V}; \ I_{\rm T} = 220 \text{ A}; \ V = \frac{2}{3}$			200		μ
• q	· · · · · · · · · · · · · · · · · ·	·H - 100 v, IT - 22071, v - 7	- DHW 1.07 - 1.72 O		_00		μ



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



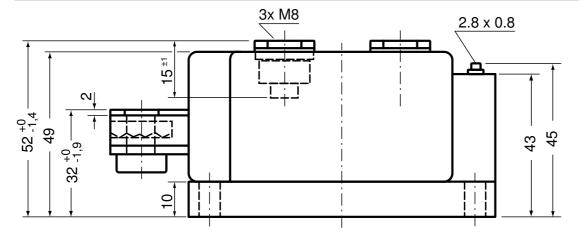
Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

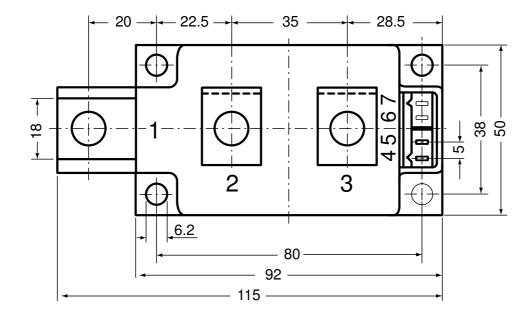
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD225-18io1	MCD225-18io1	Box	3	473596

Equiva	alent Circuits for	Simulation	* on die level	T <sub>vJ</sub> = 140 °C
$I \rightarrow V_0$	$R_0$	Thyristor		
V <sub>0 max</sub>	threshold voltage	0.79		V
$R_{0 \; max}$	slope resistance *	0.64		$m\Omega$



### Outlines Y1

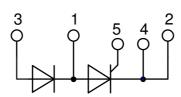




Optional accessories for modules

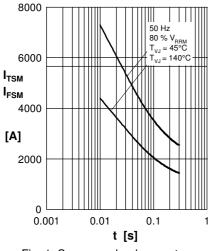
. Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red

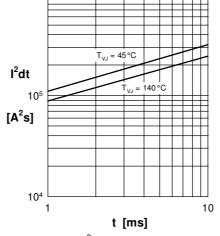
Type ZY 180L (L = Left for pin pair 4/5) Type ZY 180R (R = Right for pin pair 6/7) UL 758, style 3751





### **Thyristor**





10<sup>6</sup>

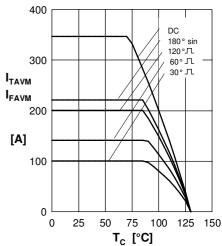
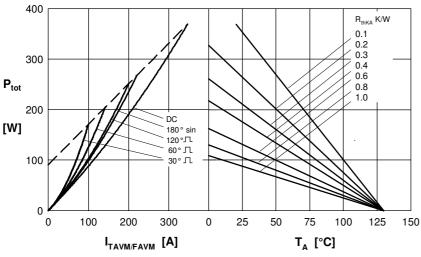


Fig. 1 Surge overload current  $I_{TSM/FSM}$ : Crest value, t: duration

Fig. 2 I<sup>2</sup>dt versus time

Fig. 3 Max. forward current at case temperature



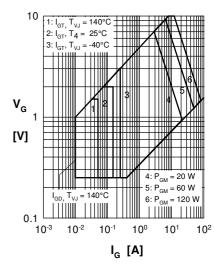
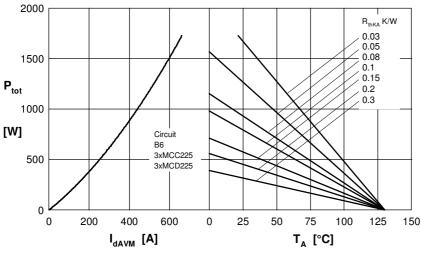


Fig. 4 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

Fig. 5 Gate voltage and current



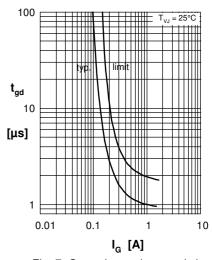
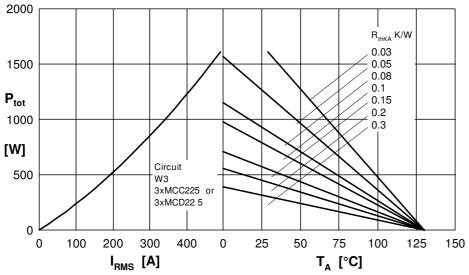


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

Fig. 7 Gate trigger characteristics







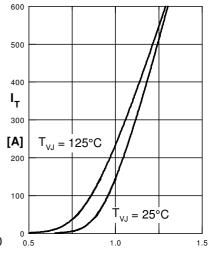
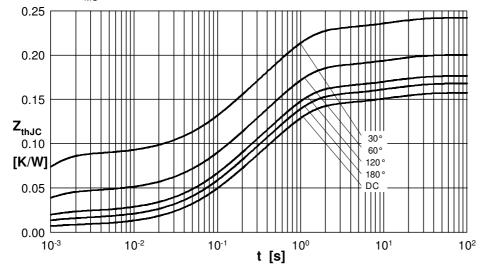


Fig. 8 Three phase AC-controller: Power dissipation versus  $R_{\rm MS}$  output current and ambient temperature

Fig. 9 Forward characteristics

 $R_{thJC}$  for various conduct. angles d:

 $V_T$  [V]

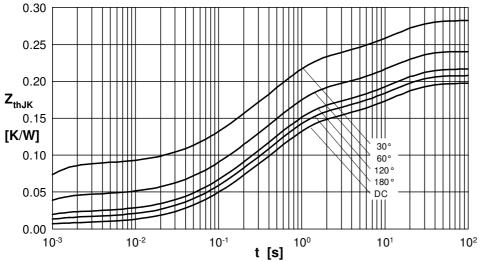


d	$R_{th,IC}$ (K/W)
DC	0.157
180°	0.168
120°	0.177
60°	0.200
30°	0.243

Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	t (s)
1	0.0076	0.00054
2	0.0406	0.09800
3	0.0944	0.54000
4	0.0147	12.0000

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



 $R_{_{thJK}}$  for various conduct. angles d:

d	R <sub>.,,,,,,,</sub> (K/W)
DC	0.197
180°	0.208
120°	0.217
60°	0.240
30°	0.283

Constants for  $Z_{thJK}$  calculation:

i	$R_{thi}$ (K/W)	t (s)
1	0.0076	0.00054
2	0.0406	0.09800
3	0.0944	0.54000
4	0.0147	12.0000
5	0.0400	12.0000

Fig. 11 Transient thermal impedance junction to heatsink (per thyristor/diode)