

Thyristor \ Diode Module

= 2x 1400 V

216 A

 V_{τ} 1.1 V

Phase leg

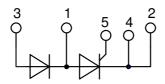
Part number

MCD200-14io1



Backside: isolated

F1 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: Y4

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

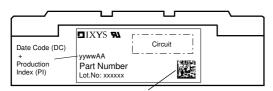
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Rectifier					Ratings	> 	!
Symbol	Definition	Conditions		min.	typ.	max.	Un
V _{RSM/DSM}	max. non-repetitive reverse/forwa	rd blocking voltage	$T_{VJ} = 25^{\circ}C$			1500	١
$V_{RRM/DRM}$	max. repetitive reverse/forward bl	ocking voltage	$T_{VJ} = 25^{\circ}C$			1400	١
I _{R/D}	reverse current, drain current	$V_{\text{R/D}} = 1400 \text{ V}$	$T_{VJ} = 25^{\circ}C$			400	μΑ
		$V_{R/D} = 1400 \text{ V}$	$T_{VJ} = 125^{\circ}C$			15	m/
V _T	forward voltage drop	I _T = 200 A	$T_{VJ} = 25^{\circ}C$			1.20	١
		$I_T = 400 \text{ A}$				1.52	١
		I _T = 200 A	T _{vJ} = 125°C			1.10	١
		$I_{T} = 400 \text{ A}$				1.50	١
I _{TAV}	average forward current	T _C = 85°C	T _{vJ} = 125°C			216	1
I _{T(RMS)}	RMS forward current	180° sine				340	1
V _{T0}	threshold voltage		T _{v.i} = 125°C			0.80	١
r _T	slope resistance for power lo	oss calculation only	***			1.4	mΩ
R _{thJC}	thermal resistance junction to cas	e				0.13	K/W
R _{thCH}	thermal resistance case to heatsi				0.050		K/W
P _{tot}	total power dissipation		T _C = 25°C			770	V
I _{TSM}	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	$V_R = 0 V$			8.64	k/
		t = 0.0 ms; (50 Hz), sine	$T_{V,I} = 125$ °C			6.80	k/
		t = 8.3 ms; (60 Hz), sine	$V_R = 0 V$			7.35	k/
12+	value for fusing	t = 10 ms; (50 Hz), sine	$V_R = 0 V$ $T_{VJ} = 45^{\circ}C$			320.0	kA ²
l²t	value for fusing		$V_R = 0 V$			310.5	kA2
		t = 8.3 ms; (60 Hz), sine t = 10 ms; (50 Hz), sine	$V_{R} = 0 V$ $T_{V,I} = 125 ^{\circ}C$				<u> </u>
			• •			231.2	kA2
_	iunation canacitanas	t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$		000	224.4	!
C,	junction capacitance	V _R = 400 V f = 1 MHz	$T_{VJ} = 25^{\circ}C$		366	400	pl
\mathbf{P}_{GM}	max. gate power dissipation	$t_P = 30 \mu s$	$T_{C} = 125^{\circ}C$			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	· · · · · · · · · · · · · · · · · · ·	epetitive, $I_T = 600 A$			100	A/µ
		$t_P = 200 \mu s; di_G/dt = 0.5 A/\mu s; -$					
			on-repet., $I_T = 200 A$				A/µs
(dv/dt) _{cr}	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}C$			1000	V/µ
		R _{GK} = ∞; method 1 (linear volta	ge rise)				
V_{GT}	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			2	١
			$T_{VJ} = -40$ °C			3	١
I _{GT}	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			150	m/
			$T_{VJ} = -40$ °C			220	m/
V _{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}C$			0.25	١
I _{GD}	gate non-trigger current					10	m/
I _L	latching current	t _p = 30 μs	$T_{VJ} = 25$ °C			200	m/
		$I_{G} = 0.5 \text{ A}; \text{ di}_{G}/\text{dt} = 0.5 \text{ A}/\mu\text{s}$	3				İ
I _H	holding current	V _D = 6 V R _{GK} = ∞	$T_{VJ} = 25$ °C			150	m/
t _{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25$ °C			2	μ
yu	-	$I_{\rm G} = 0.5 \text{A}; \text{di}_{\rm G}/\text{dt} = 0.5 \text{A}/\mu \text{s}$				_	F.,
t _q	turn-off time	$V_R = 100 \text{ V}; I_T = 300 \text{ A}; V = \frac{2}{3}$			200		μ
•q	-	$di/dt = 10 \text{ A}/\mu \text{s} \text{ dv/dt} = 50 \text{ V}$			_500		μ



Package Y4			Ratings					
Symbol	Definition	Conditions			min.	typ.	max.	Unit
RMS	RMS current	per terminal					300	Α
T _{VJ}	virtual junction temperature		-40		125	°C		
T _{op}	operation temperature			-40		100	°C	
T _{stg}	storage temperature			-40		125	°C	
Weight						150		g
M _D	mounting torque		2.25		2.75	Nm		
$\mathbf{M}_{_{T}}$	terminal torque		4.5		5.5	Nm		
d _{Spp/App}	creepage distance on surface striking distance through a	striking distance through air	terminal to terminal	14.0	10.0			mm
$d_{Spb/Apb}$	creepage distance on surface	striking distance through an	terminal to backside	16.0	16.0			mm
V _{ISOL}	isolation voltage	t = 1 second			3600			٧
.002	t = 1 minu		50/60 Hz, RMS; IISOL ≤ 1 mA		3000			٧



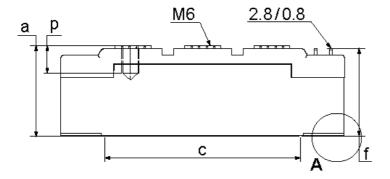
Data Matrix: part no. (1-19), DC + Pl (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

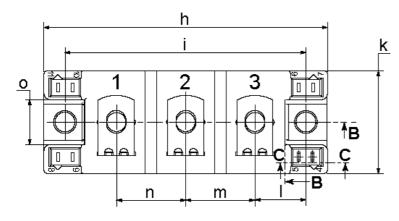
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD200-14io1	MCD200-14io1	Box	6	498270

Equiva	alent Circuits for	Simulation	* on die level	$T_{VJ} = 125 ^{\circ}\text{C}$
$I \rightarrow V_0$	R_0	Thyristor		
V _{0 max}	threshold voltage	0.8		V
$R_{0 max}$	slope resistance *	0.7		$m\Omega$

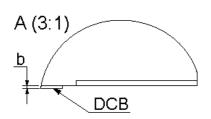


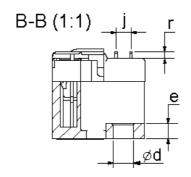
Outlines Y4



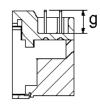


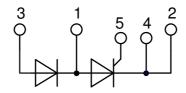
D:	MIN	MAX	MIN	MAX	
Dim.	[mm]	[mm]	[inch]	[inch]	
а	30.0	30.6	1.181	1.205	
b	typ.	0.25	typ. (p. 0.010	
С	64.0	65.0	2.520	2.559	
d	6.5	7.0	0.256	0.275	
е	4.9	5.1	0.193	0.201	
f	28.6	29.2	1.126	1.150	
g	7.3	7.7	0.287	0.303	
h	93.5	94.5	3.681	3.720	
j	79.5	80.5	3.130	3.169	
j	4.8	5.2	0.189	0.205	
k	33.4	34.0	1.315	1.339	
	16.7	17.3	0.657	0.681	
m	22.7	23.3	0.894	0.917	
n	22.7	23.3	0.894	0.917	
0	14.0	15.0	0.551	0.591	
р	typ.	10.5	typ. 0.413		
r	1.8	2.4	0.071	0.041	













Thyristor

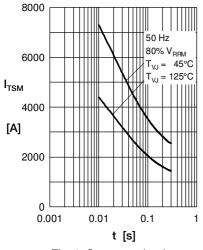


Fig. 1 Surge overload current I_{TSM} , I_{FSM} : Crest value, t: duration

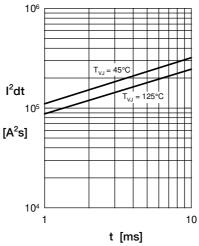


Fig. 2 I²t versus time (1-10 ms)

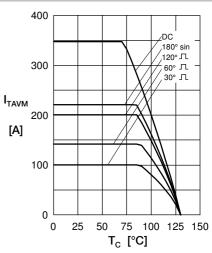


Fig. 3 Max. forward current at case temperature

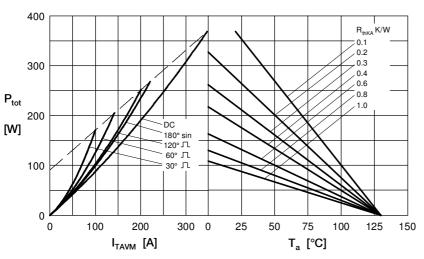


Fig. 4 Power dissipation vs. on-state current & ambient temperature (per thyristor or diode)

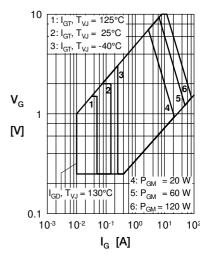


Fig. 5 Gate trigger characteristics

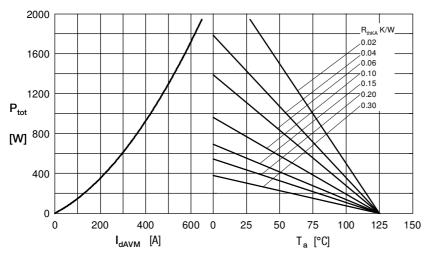


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

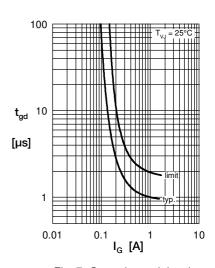


Fig. 7 Gate trigger delay time



Rectifier

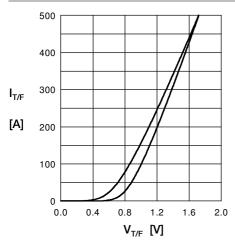


Fig. 8 Forward current versus voltage drop

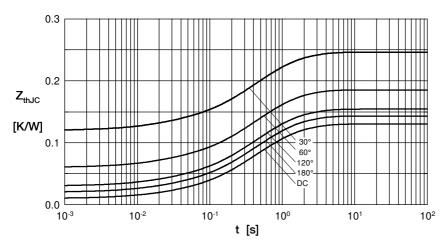
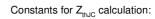


Fig. 9 Transient thermal impedance junction to case at various conduction angles



i	R_{thi} [K/W]	t _i [s]
1	0.0100	0.00014
2	0.0065	0.019
3	0.0250	0.180
4	0.0615	0.520
5	0.0270	1.600

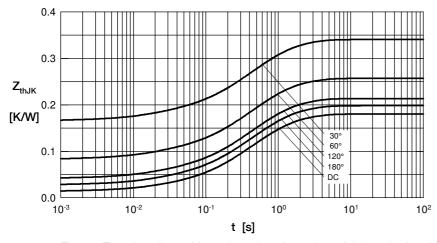


Fig. 10 Transient thermal impedance junction to heatsink (per thyristor/diode)