

High Voltage Standard Rectifier Module

$$V_{RRM} = 2 \times 2200 \text{ V}$$

$$I_{FAV} = 224 \text{ A}$$

$$V_F = 1.07 \text{ V}$$

Phase leg

Part number

MDD200-22N1



Backside: isolated

 E72873



Features / Advantages:

- Package with DCB ceramic
- Improved temperature and power cycling
- Planar passivated chips
- Very low forward voltage drop
- Very low leakage current

Applications:

- Diode for main rectification
- For single and three phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

Package: Y4

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage					2300	V
V_{RRM}	max. repetitive reverse blocking voltage					2200	V
I_R	reverse current	$V_R = 2200\text{ V}$		$T_{VJ} = 25^\circ\text{C}$		1	mA
		$V_R = 2200\text{ V}$		$T_{VJ} = 150^\circ\text{C}$		20	mA
V_F	forward voltage drop	$I_F = 300\text{ A}$		$T_{VJ} = 25^\circ\text{C}$		1.16	V
		$I_F = 600\text{ A}$				1.39	V
		$I_F = 300\text{ A}$		$T_{VJ} = 125^\circ\text{C}$		1.07	V
		$I_F = 600\text{ A}$				1.36	V
I_{FAV}	average forward current	$T_C = 100^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		224	A
$I_{F(RMS)}$	RMS forward current	180° sine	d = 0.5			350	A
V_{F0}	threshold voltage	} for power loss calculation only		$T_{VJ} = 150^\circ\text{C}$		0.80	V
r_F	slope resistance					0.6	mΩ
R_{thJC}	thermal resistance junction to case					0.13	K/W
R_{thCH}	thermal resistance case to heatsink				0.08		K/W
P_{tot}	total power dissipation			$T_C = 25^\circ\text{C}$		960	W
I_{FSM}	max. forward surge current	t = 10 ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		10.5	kA
		t = 8,3 ms; (60 Hz), sine		$V_R = 0\text{ V}$		11.3	kA
		t = 10 ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		8.93	kA
		t = 8,3 ms; (60 Hz), sine		$V_R = 0\text{ V}$		9.64	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		551.3	kA ² s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0\text{ V}$		535.0	kA ² s
		t = 10 ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		398.3	kA ² s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0\text{ V}$		386.6	kA ² s
C_J	junction capacitance	$V_R = 1100\text{ V}; f = 1\text{ MHz}$		$T_{VJ} = 25^\circ\text{C}$		230	pF



Package Y4				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
I_{RMS}	RMS current	per terminal			300	A	
T_{VJ}	virtual junction temperature		-40		150	°C	
T_{op}	operation temperature		-40		125	°C	
T_{stg}	storage temperature		-40		125	°C	
Weight					150	g	
M_D	mounting torque		2.25		2.75	Nm	
M_T	terminal torque		4.5		5.5	Nm	
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	14.0	10.0		mm	
$d_{Spb/Apb}$		terminal to backside	16.0	16.0		mm	
V_{ISOL}	isolation voltage	t = 1 second			3600	V	
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		3000	V	



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	MDD200-22N1	MDD200-22N1	Box	6	500701

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150^{\circ}C$



Rectifier

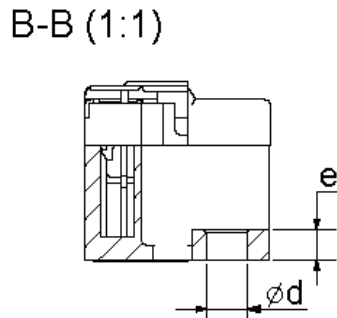
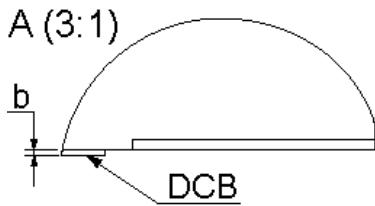
$V_{0\ max}$	threshold voltage	0.8	V
$R_{0\ max}$	slope resistance *	0.4	mΩ



Outlines Y4



Dim.	MIN [mm]	MAX [mm]	MIN [inch]	MAX [inch]
a	30.0	30.6	1.181	1.205
b	typ. 0.25		typ. 0.010	
c	64.0	65.0	2.520	2.559
d	6.5	7.0	0.256	0.275
e	4.9	5.1	0.193	0.201
h	93.5	94.5	3.681	3.720
i	79.5	80.5	3.130	3.169
k	33.4	34.0	1.315	1.339
l	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
o	14.0	15.0	0.551	0.591
p	typ. 10.5		typ. 0.413	



Rectifier

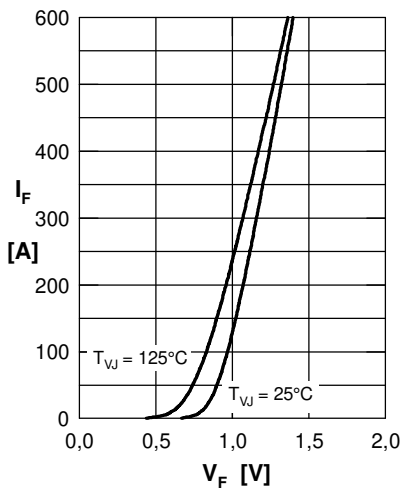


Fig. 1 Forward current versus voltage drop

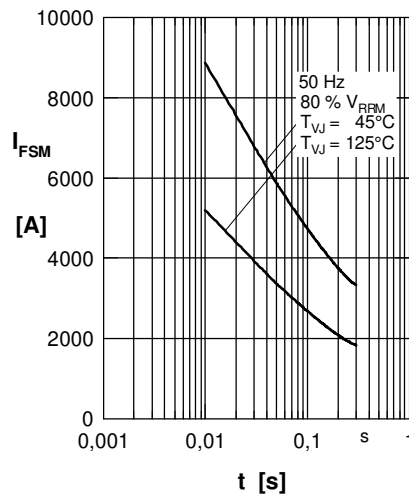


Fig. 2 Surge overload current
 I_{FSM} : Crest value, t : duration

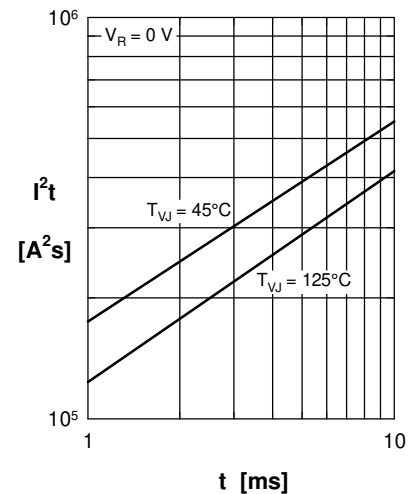


Fig. 3 I^2t versus time (1-10 ms)

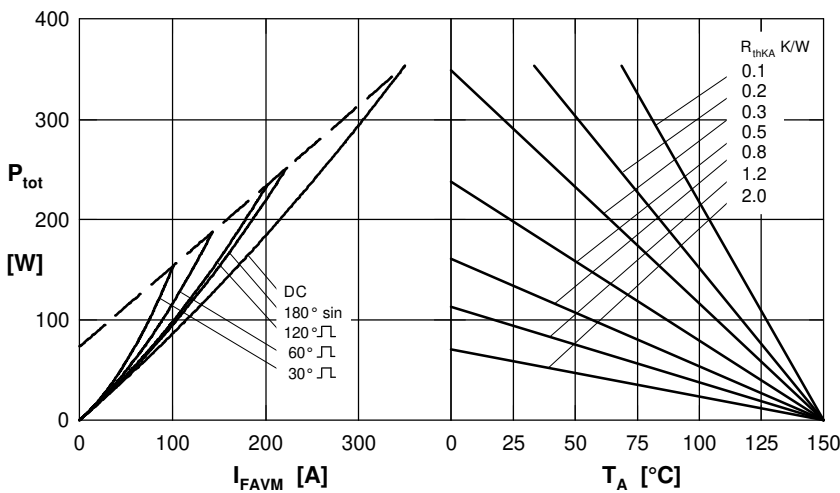


Fig.4 Power dissipation versus forward current and ambient temperature (per diode)

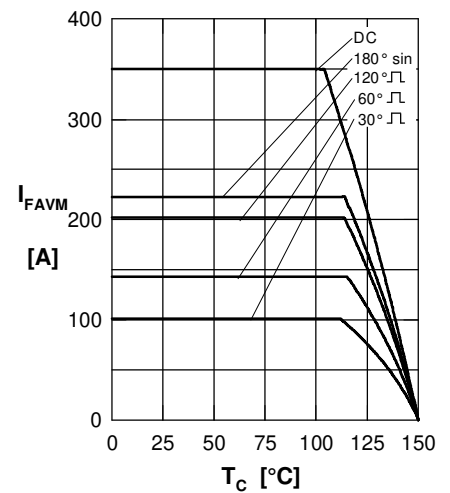


Fig. 5 Maximum forward current at case temperature

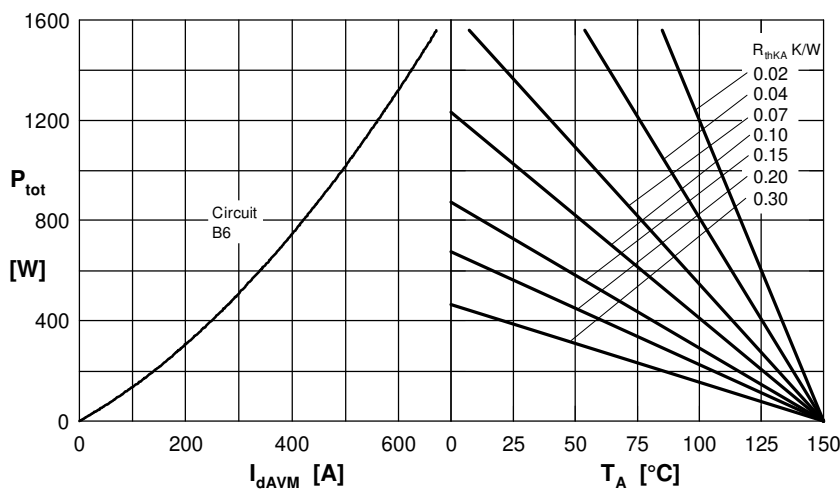


Fig.6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

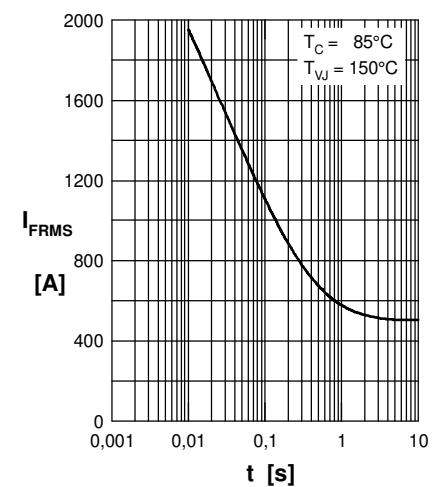
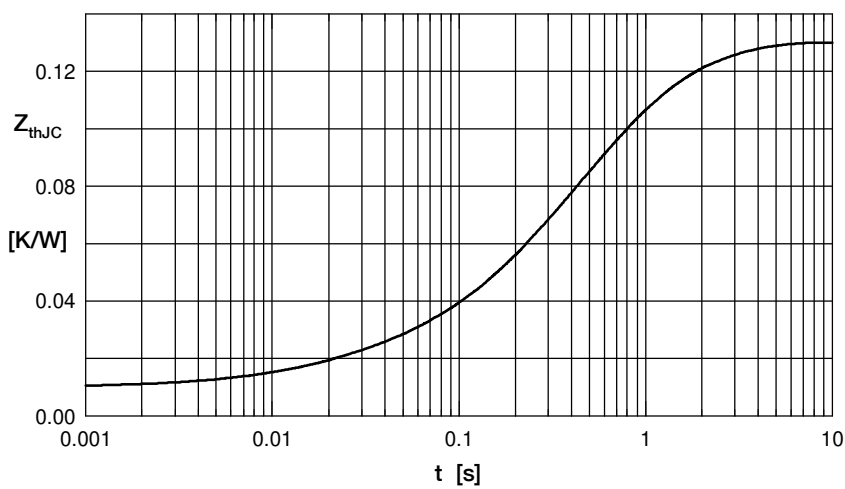


Fig. 7 Rated RMS current versus time (360° conduction)



Rectifier



Constants for Z_{thJC} calculation:

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. 8 Transient thermal impedance junction to case