

Standard Rectifier Module

$$V_{RRM} = 2 \times 1200 \text{ V}$$

$$I_{FAV} = 99 \text{ A}$$

$$V_F = 1.22 \text{ V}$$

Phase leg

Part number

MDD72-12N1B



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: TO-240AA

- Isolation Voltage: 4800 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	$T_{VJ} = 25^{\circ}\text{C}$				1300	V
V_{RRM}	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1200	V
I_R	reverse current	$V_R = 1200\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			200	μA
		$V_R = 1200\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$			15	mA
V_F	forward voltage drop	$I_F = 150\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.27	V
		$I_F = 300\text{ A}$				1.60	V
		$I_F = 150\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.22	V
		$I_F = 300\text{ A}$				1.60	V
I_{FAV}	average forward current	$T_C = 100^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			99	A
$I_{F(RMS)}$	RMS forward current	180° sine				180	A
V_{F0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}\text{C}$			0.80	V
r_F	slope resistance					2.3	m Ω
R_{thJC}	thermal resistance junction to case					0.35	K/W
R_{thCH}	thermal resistance case to heatsink				0.2		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$			357	W
I_{FSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			1.70	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			1.84	kA
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			1.45	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			1.56	kA
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			14.5	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			14.0	kA ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			10.4	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			10.1	kA ² s
C_J	junction capacitance	$V_R = 400\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		116		pF

Package TO-240AA				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal				200	A
T_{VJ}	virtual junction temperature			-40		150	°C
T_{op}	operation temperature			-40		125	°C
T_{stg}	storage temperature			-40		125	°C
Weight					76		g
M_D	mounting torque			2.5		4	Nm
M_T	terminal torque			2.5		4	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	13.0	9.7			mm
$d_{Spb/Apb}$		terminal to backside	16.0	16.0			mm
V_{ISOL}	isolation voltage	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	4800			V
		t = 1 minute		4000			V



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD72-12N1B	MDD72-12N1B	Box	36	453188

Similar Part	Package	Voltage class
MDD72-08N1B	TO-240AA	800
MDD72-14N1B	TO-240AA	1400
MDD72-16N1B	TO-240AA	1600
MDD72-18N1B	TO-240AA	1800

Equivalent Circuits for Simulation

* on die level

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



Rectifier

$V_{0\max}$ threshold voltage 0.8

$R_{0\max}$ slope resistance * 1.1

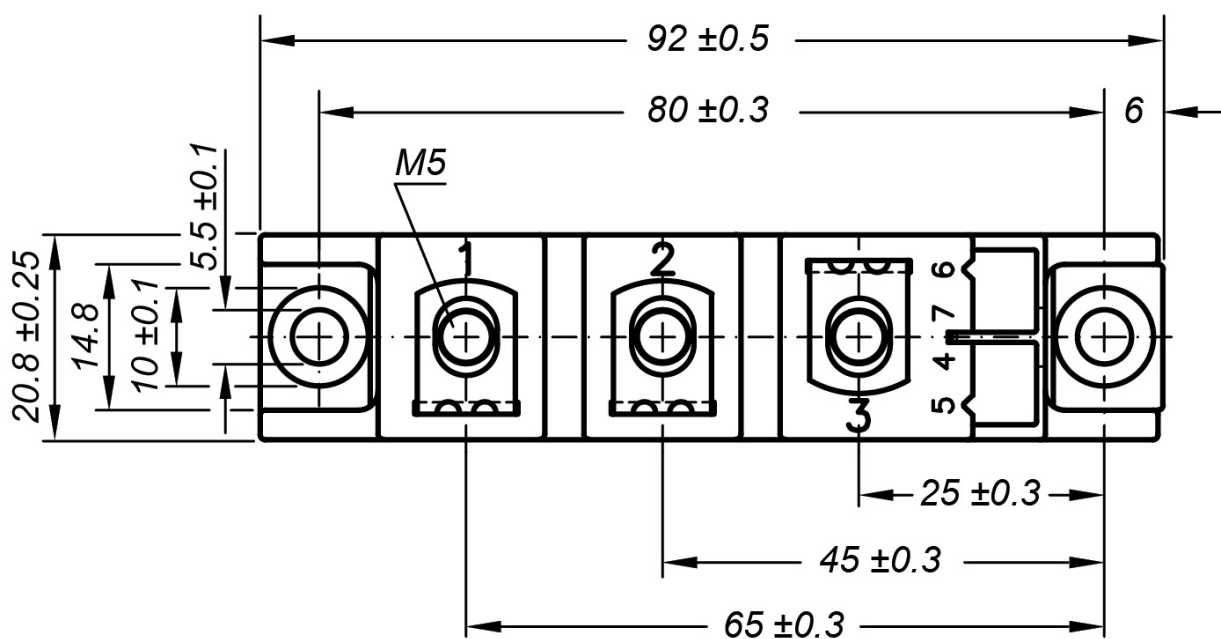
V

mΩ

Outlines TO-240AA



General tolerance: DIN ISO 2768 class „c“



Rectifier

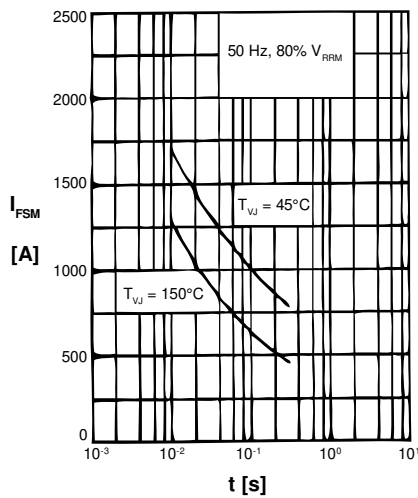


Fig. 1 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t : duration

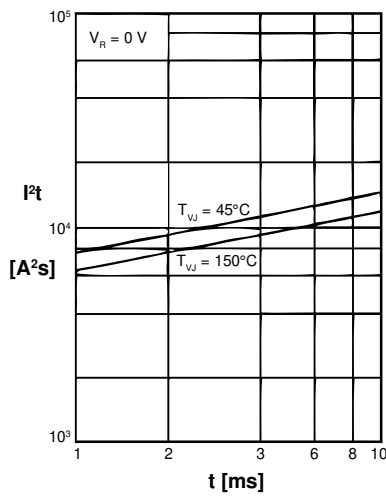


Fig. 2 I^2t versus time (1-10 ms)

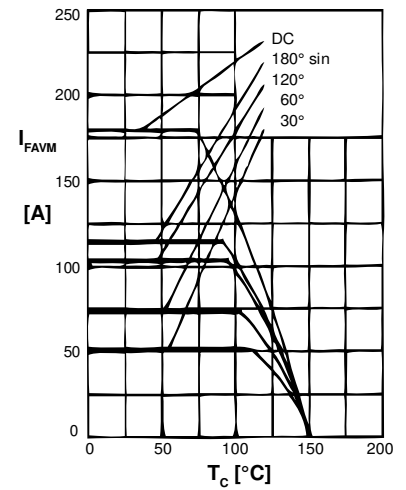


Fig. 3 Maximum forward current at case temperature

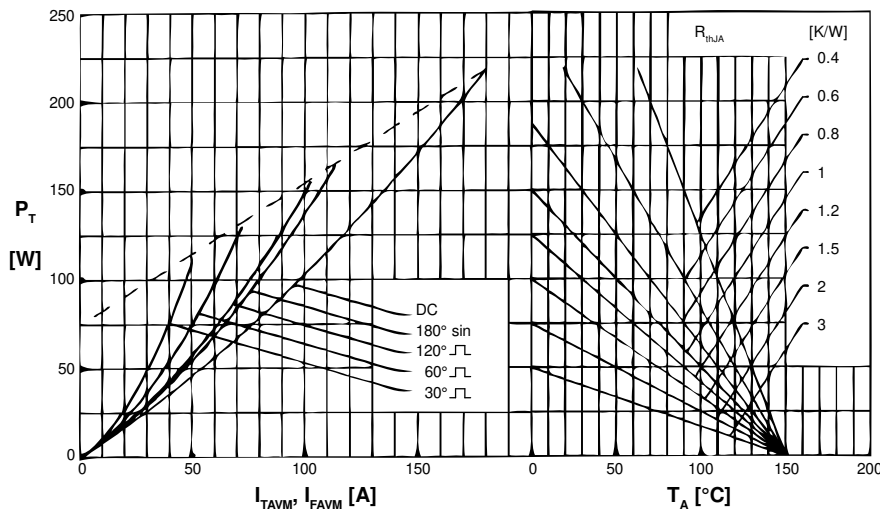


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

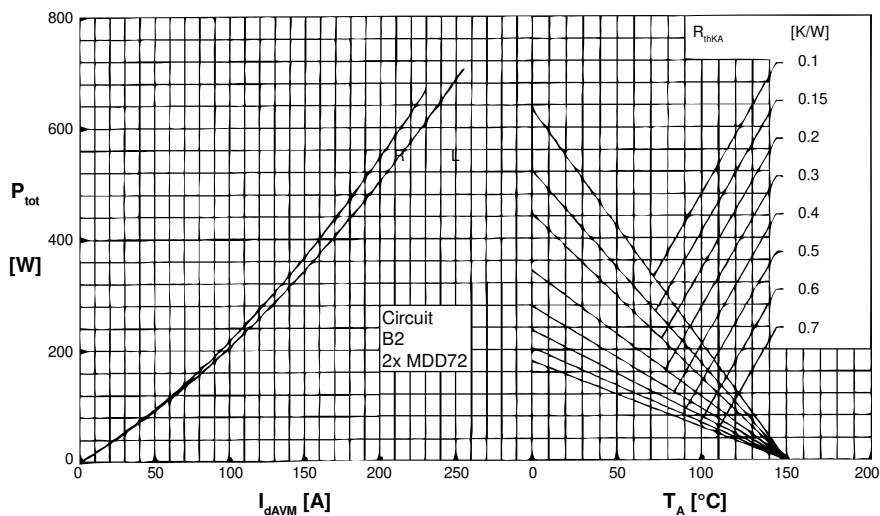


Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load, L = inductive load

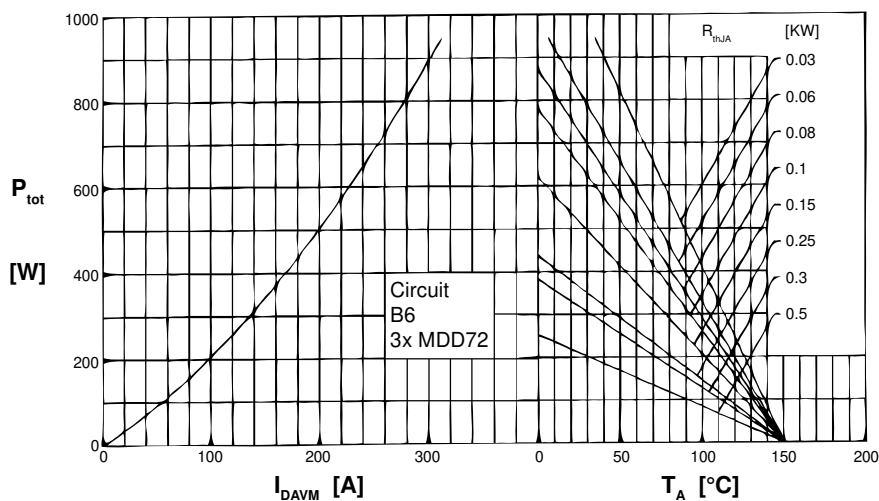
Rectifier


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

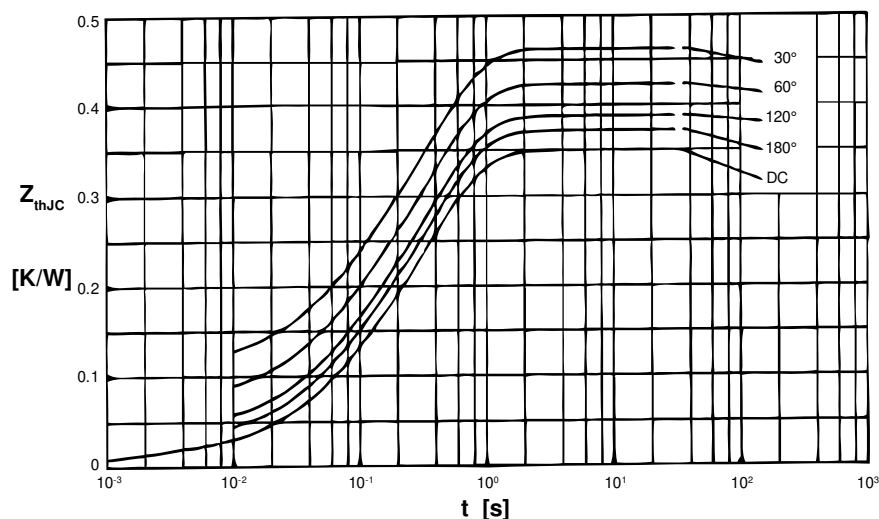


Fig. 7 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.35
180°	0.37
120°	0.39
60°	0.43
30°	0.47

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0014
2	0.072	0.0620
3	0.265	0.3750

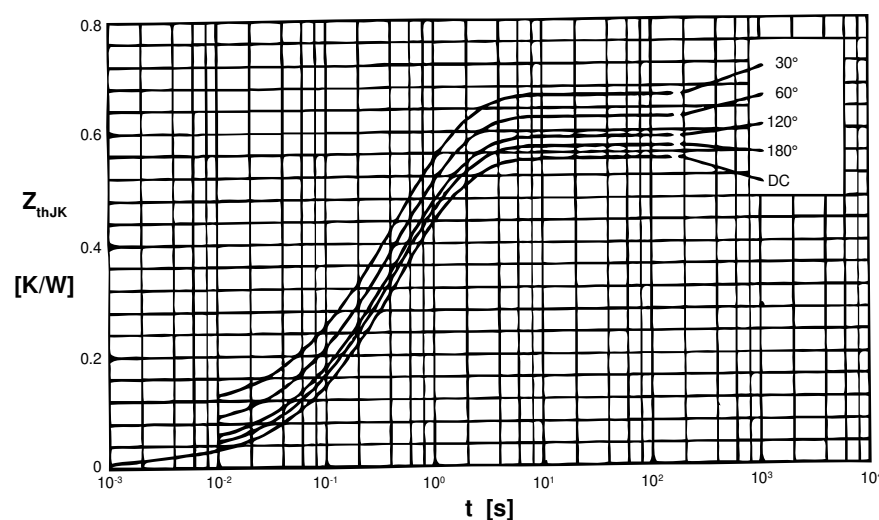


Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.55
180°	0.57
120°	0.59
60°	0.63
30°	0.67

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0014
2	0.072	0.0620
3	0.265	0.3750
4	0.200	1.3200