

Standard Rectifier Module

$$V_{RRM} = 2 \times 1600 \text{ V}$$

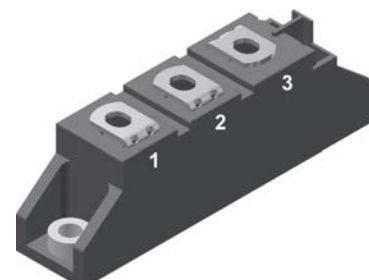
$$I_{FAV} = 71 \text{ A}$$

$$V_F = 1,14 \text{ V}$$

Phase leg

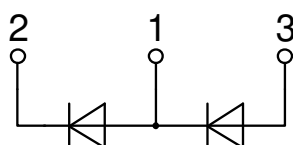
Part number

MDD56-16N1B



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

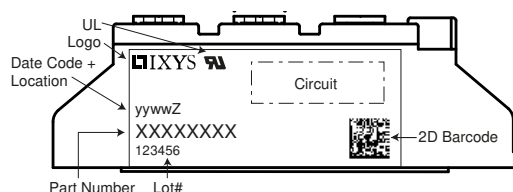
- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Disclaimer Notice

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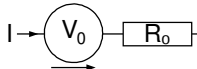
Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	<i>max. non-repetitive reverse blocking voltage</i>	$T_{VJ} = 25^{\circ}\text{C}$				1700	V
V_{RRM}	<i>max. repetitive reverse blocking voltage</i>	$T_{VJ} = 25^{\circ}\text{C}$				1600	V
I_R	<i>reverse current</i>	$V_R = 1600\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			200	μA
		$V_R = 1600\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$			10	mA
V_F	<i>forward voltage drop</i>	$I_F = 100\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1,21	V
		$I_F = 200\text{ A}$				1,48	V
		$I_F = 100\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1,14	V
		$I_F = 200\text{ A}$				1,45	V
I_{FAV}	<i>average forward current</i>	$T_C = 100^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			71	A
$I_{F(RMS)}$	<i>RMS forward current</i>	180° sine				150	A
V_{F0}	<i>threshold voltage</i>	} <i>for power loss calculation only</i>	$T_{VJ} = 150^{\circ}\text{C}$			0,80	V
r_F	<i>slope resistance</i>					3	m Ω
R_{thJC}	<i>thermal resistance junction to case</i>					0,51	K/W
R_{thCH}	<i>thermal resistance case to heatsink</i>				0,2		K/W
P_{tot}	<i>total power dissipation</i>		$T_C = 25^{\circ}\text{C}$			245	W
I_{FSM}	<i>max. forward surge current</i>	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}\text{C}$			1,40	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			1,51	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}\text{C}$			1,19	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			1,29	kA
I^2t	<i>value for fusing</i>	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}\text{C}$			9,80	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			9,49	kA ² s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}\text{C}$			7,08	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			6,87	kA ² s
C_J	<i>junction capacitance</i>	$V_R = 400\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		27		pF

Package TO-240AA				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	<i>RMS current</i>	per terminal				200	A
T_{VJ}	<i>virtual junction temperature</i>			-40		150	°C
T_{op}	<i>operation temperature</i>			-40		125	°C
T_{stg}	<i>storage temperature</i>			-40		125	°C
Weight					76		g
M_D	<i>mounting torque</i>			2,5		4	Nm
M_T	<i>terminal torque</i>			2,5		4	Nm
$d_{Spp/App}$	<i>creepage distance on surface striking distance through air</i>	<i>terminal to terminal</i>	13,0	9,7			mm
$d_{Spb/Apb}$		<i>terminal to backside</i>	16,0	16,0			mm
V_{ISOL}	<i>isolation voltage</i>	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	4800			V
		t = 1 minute		4000			V

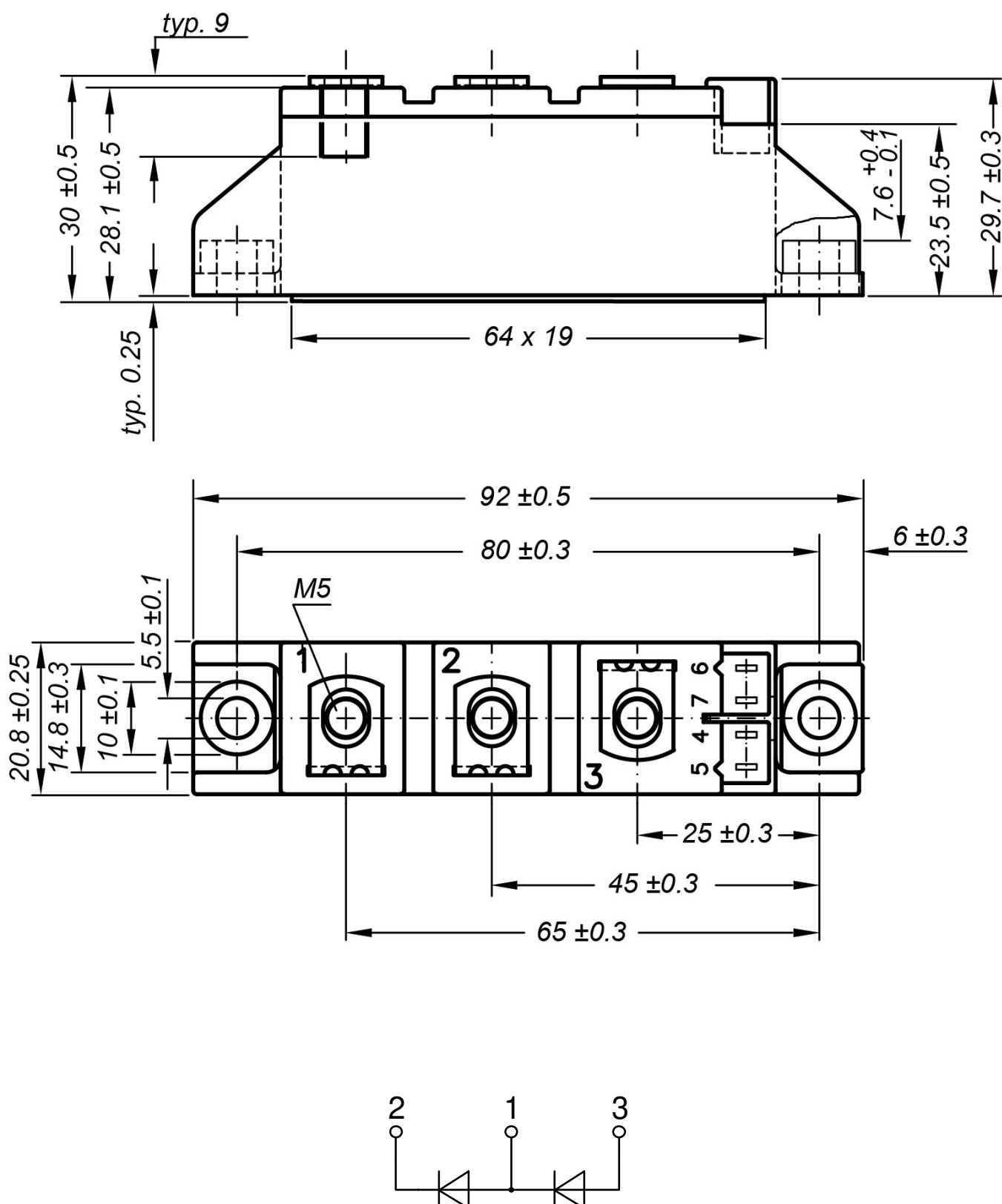


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD56-16N1B	MDD56-16N1B	Box	36	458082

Similar Part	Package	Voltage class
MDD56-08N1B	TO-240AA	800
MDD56-12N1B	TO-240AA	1200
MDD56-14N1B	TO-240AA	1400
MDD56-18N1B	TO-240AA	1800

Equivalent Circuits for Simulation			* on die level	$T_{VJ} = 150^{\circ}\text{C}$
		Rectifier		
$V_{0 \max}$	<i>threshold voltage</i>	0,8		V
$R_{0 \max}$	<i>slope resistance *</i>	1,8		mΩ

Outlines TO-240AA



Rectifier

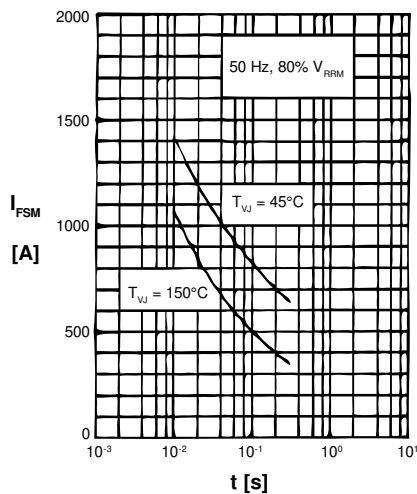


Fig. 1 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t : duration

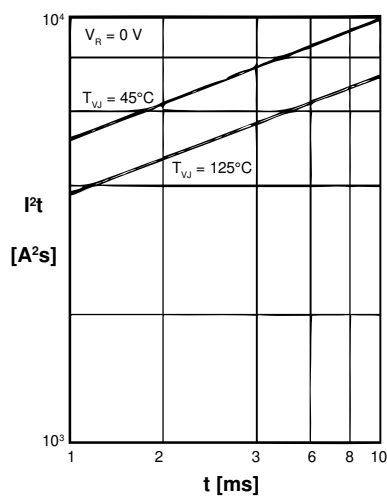


Fig. 2 I^2t versus time (1-10 ms)

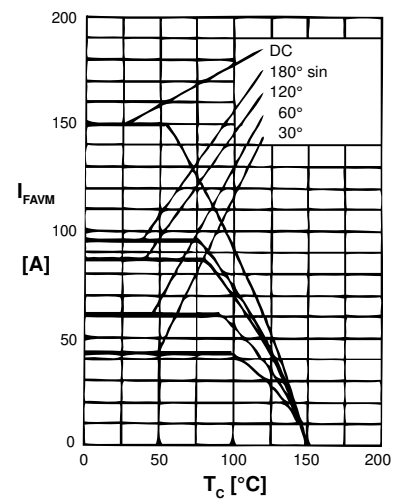


Fig. 3 Maximum forward current
at case temperature

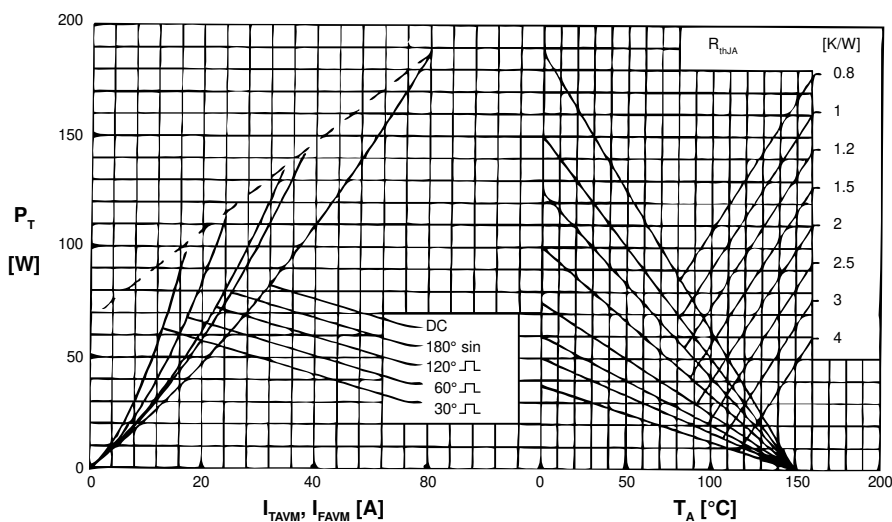


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

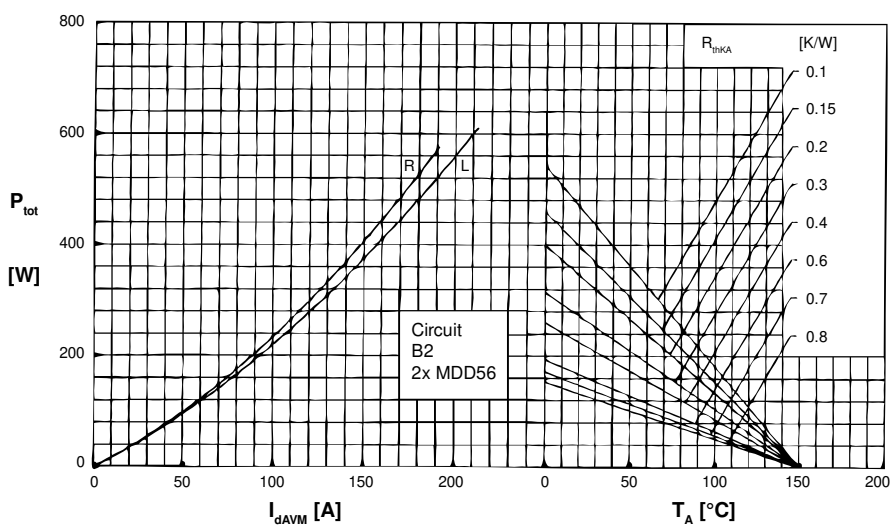


Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current
and ambient temperature; R = resistive load, L = inductive load

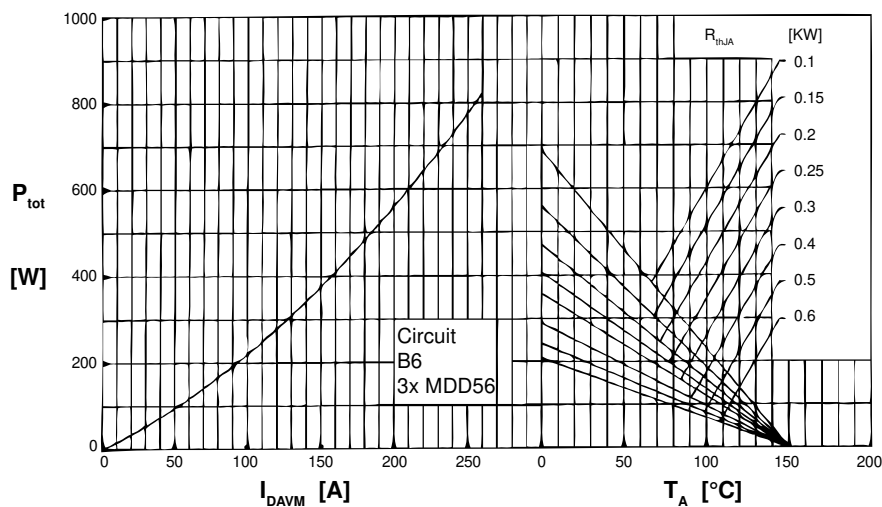
Rectifier


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

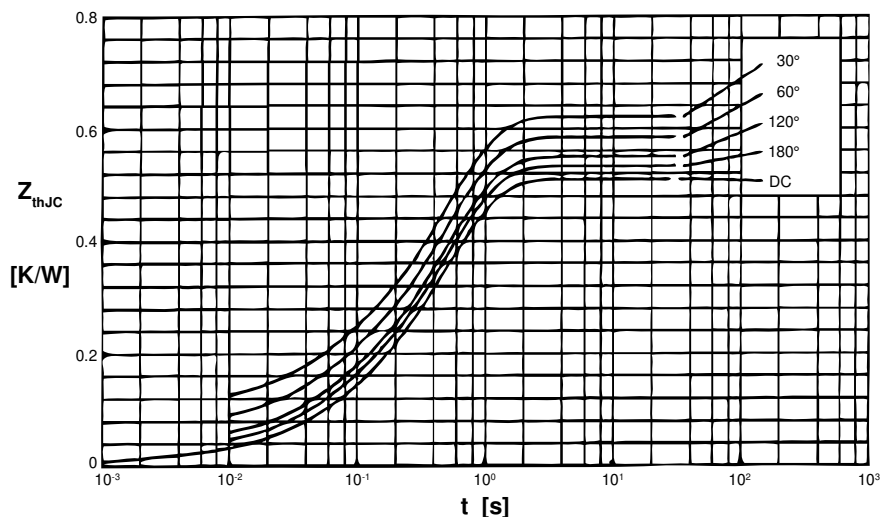


Fig. 7 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.51
180°	0.53
120°	0.55
60°	0.58
30°	0.62

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0015
2	0.055	0.0450
3	0.442	0.4850

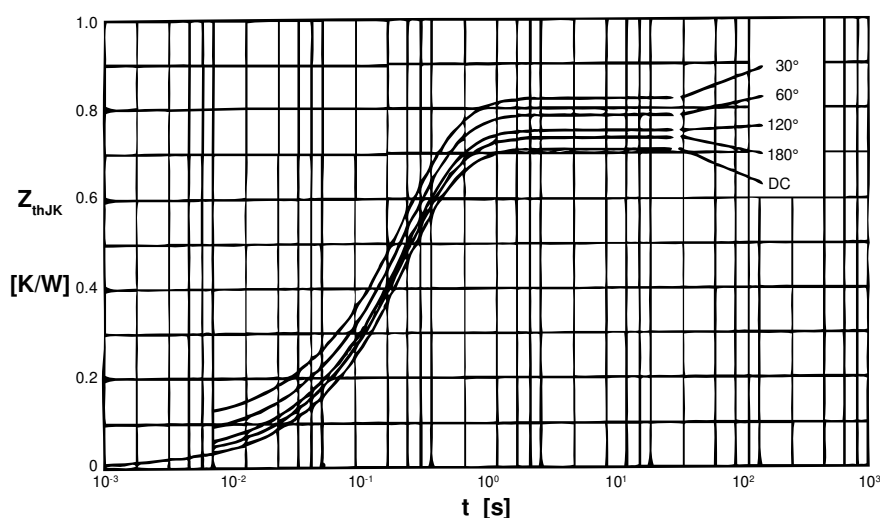


Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.71
180°	0.73
120°	0.75
60°	0.78
30°	0.82

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0015
2	0.055	0.0450
3	0.442	0.4850
4	0.200	1.2500