

High Voltage Standard Rectifier Module

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

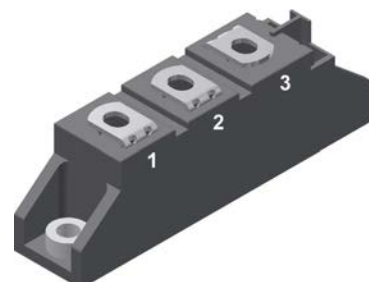
$$I_{FAV} = 2 \times 99\text{ A}$$

$$V_F = 1,22\text{ V}$$

Common Anode

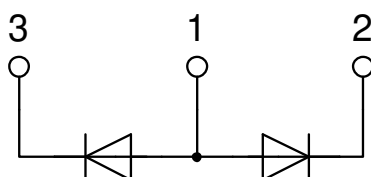
Part number

MDA72-16N1B



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

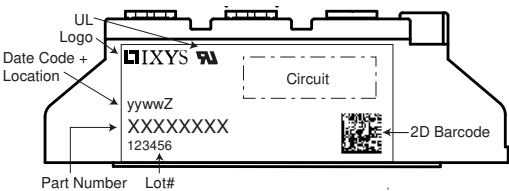
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	<i>max. non-repetitive reverse blocking voltage</i>	$T_{VJ} = 25^{\circ}\text{C}$				1700	V
V_{RRM}	<i>max. repetitive reverse blocking voltage</i>	$T_{VJ} = 25^{\circ}\text{C}$				1600	V
I_R	<i>reverse current</i>	$V_R = 1600\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			200	μA
		$V_R = 1600\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$			15	mA
V_F	<i>forward voltage drop</i>	$I_F = 150\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			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}	<i>average forward current</i>	$T_C = 100^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			99	A
$I_{F(RMS)}$	<i>RMS forward current</i>	180° sine				180	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>					2,3	m Ω
R_{thJC}	<i>thermal resistance junction to case</i>					0,35	K/W
R_{thCH}	<i>thermal resistance case to heatsink</i>				0,2		K/W
P_{tot}	<i>total power dissipation</i>		$T_C = 25^{\circ}\text{C}$			357	W
I_{FSM}	<i>max. forward surge current</i>	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}\text{C}$			1,70	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			1,84	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}\text{C}$			1,45	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			1,56	kA
I^2t	<i>value for fusing</i>	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}\text{C}$			14,5	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			14,0	kA ² s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}\text{C}$			10,4	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			10,1	kA ² s
C_J	<i>junction capacitance</i>	$V_R = 400\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		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} ≤ 1 mA	4800			V
		t = 1 minute		4000			V

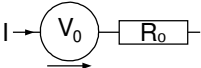


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDA72-16N1B	MDA72-16N1B	Box	36	482501

Equivalent Circuits for Simulation

* on die level

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



Rectifier

$V_{0\text{ max}}$

$R_{0\text{ max}}$

threshold voltage

slope resistance *

0,8

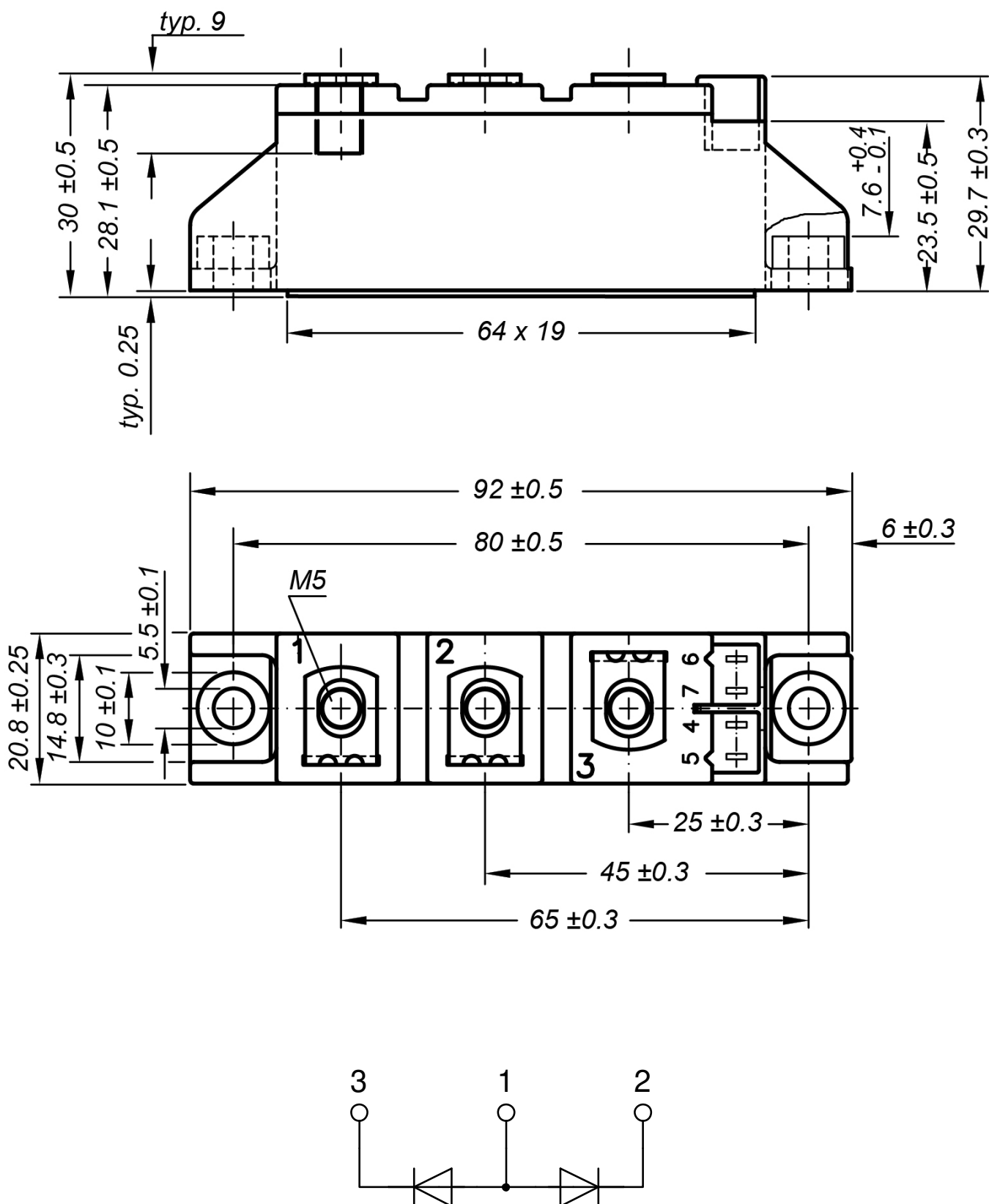
1,1

V

mΩ



Outlines TO-240AA



Rectifier

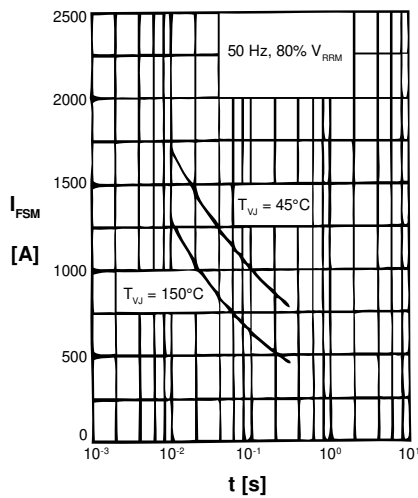


Fig. 1 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t : duration

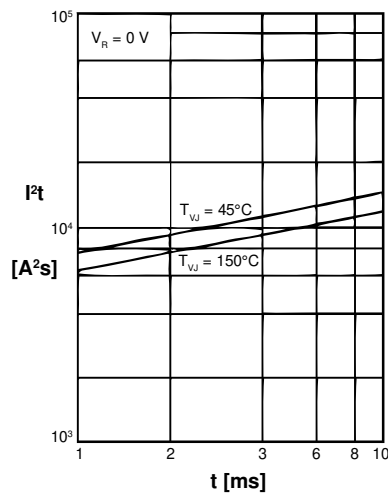


Fig. 2 I^2t versus time (1-10 ms)

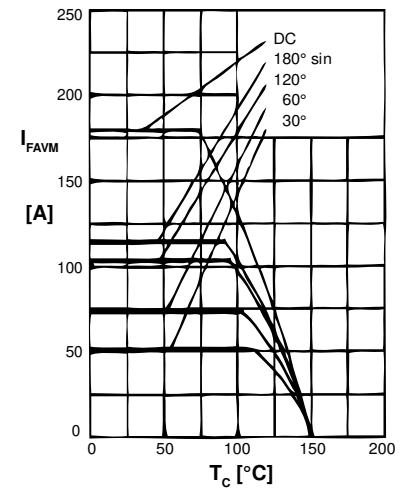


Fig. 3 Maximum forward current at case temperature

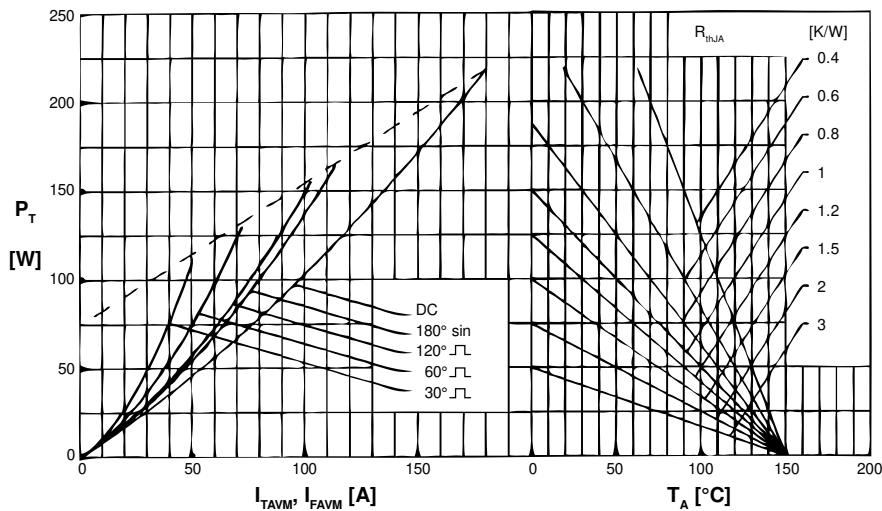


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

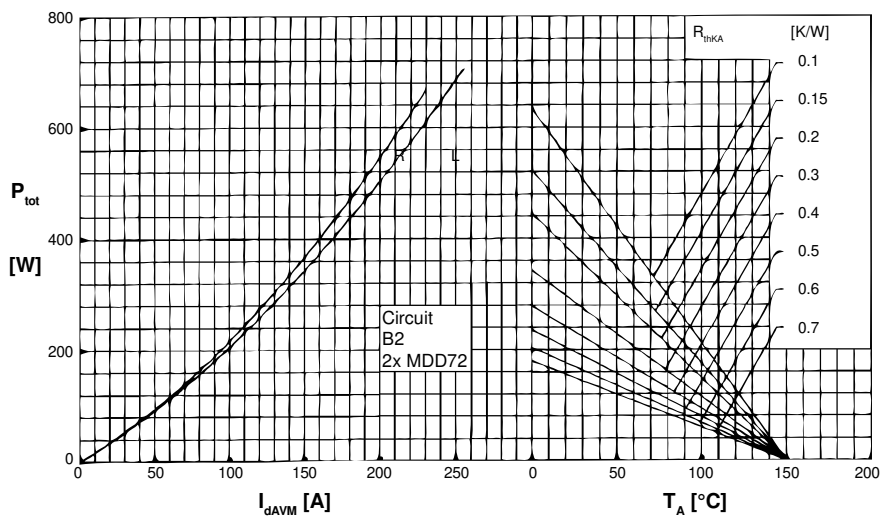


Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load, L = inductive load

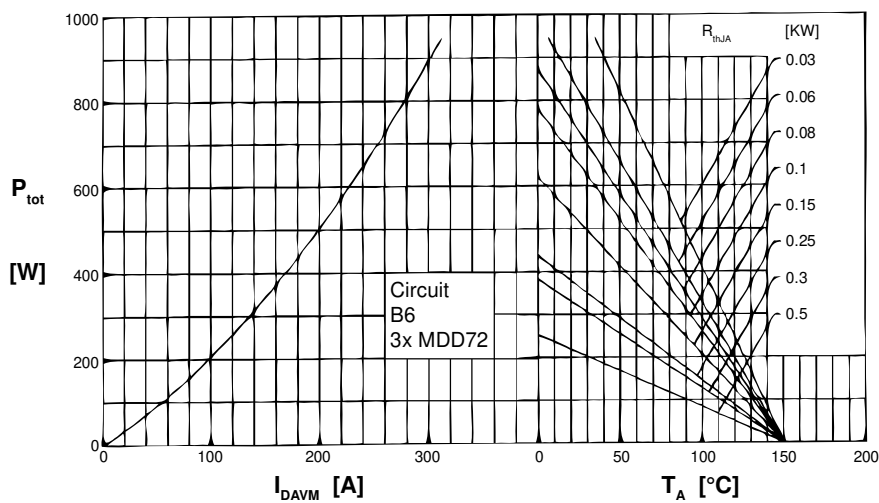
Rectifier


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

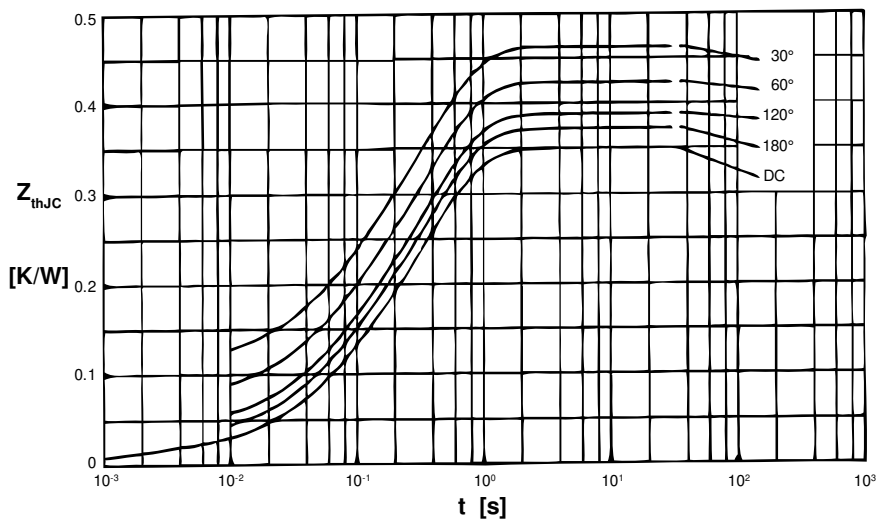


Fig. 7 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.35
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

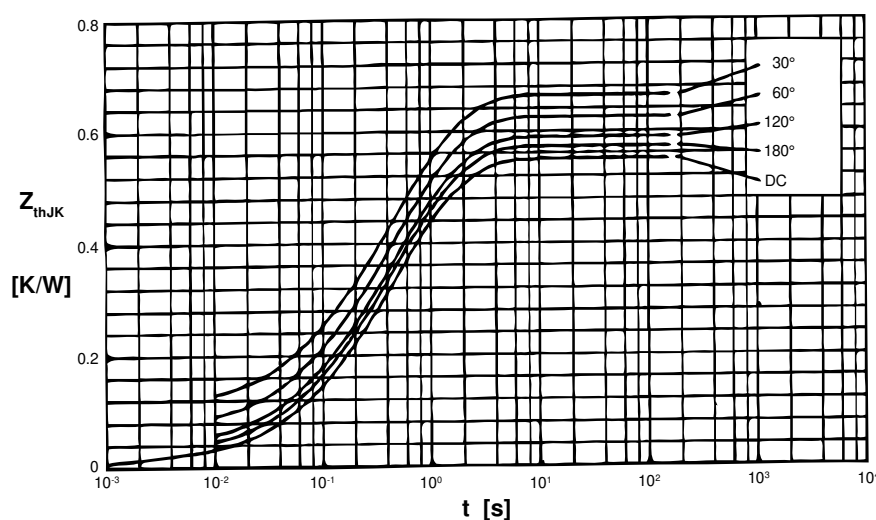


Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

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