

Standard Rectifier Module

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

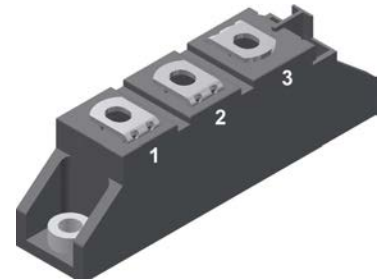
$$I_{FAV} = 120 \text{ A}$$

$$V_F = 1,13 \text{ V}$$

Phase leg

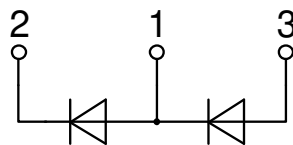
Part number

MDD95-16N1B



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

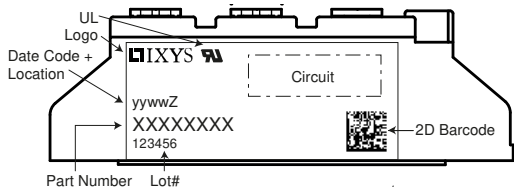
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1700	V
V_{RRM}	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1600	V
I_R	reverse current	$V_R = 1600\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			200	μA
		$V_R = 1600\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$			15	mA
V_F	forward voltage drop	$I_F = 150\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1,20	V
		$I_F = 300\text{ A}$				1,43	V
		$I_F = 150\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1,13	V
		$I_F = 300\text{ A}$				1,46	V
I_{FAV}	average forward current	$T_C = 100^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			120	A
$I_{F(RMS)}$	RMS forward current	180° sine				180	A
V_{F0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}\text{C}$			0,75	V
r_F	slope resistance					1,95	m Ω
R_{thJC}	thermal resistance junction to case					0,26	K/W
R_{thCH}	thermal resistance case to heatsink				0,2		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$			481	W
I_{FSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}\text{C}$			2,80	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			3,03	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}\text{C}$			2,38	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			2,57	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}\text{C}$			39,2	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			38,1	kA ² s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}\text{C}$			28,3	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			27,5	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}	<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} ≤ 1 mA		4800		V
		t = 1 minute			4000		V



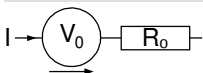
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD95-16N1B	MDD95-16N1B	Box	36	453161

Similar Part	Package	Voltage class
MDD95-08N1B	TO-240AA	800
MDD95-12N1B	TO-240AA	1200
MDD95-14N1B	TO-240AA	1400
MDD95-18N1B	TO-240AA	1800

Equivalent Circuits for Simulation

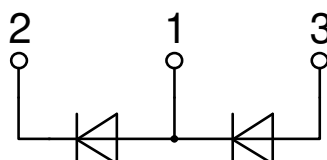
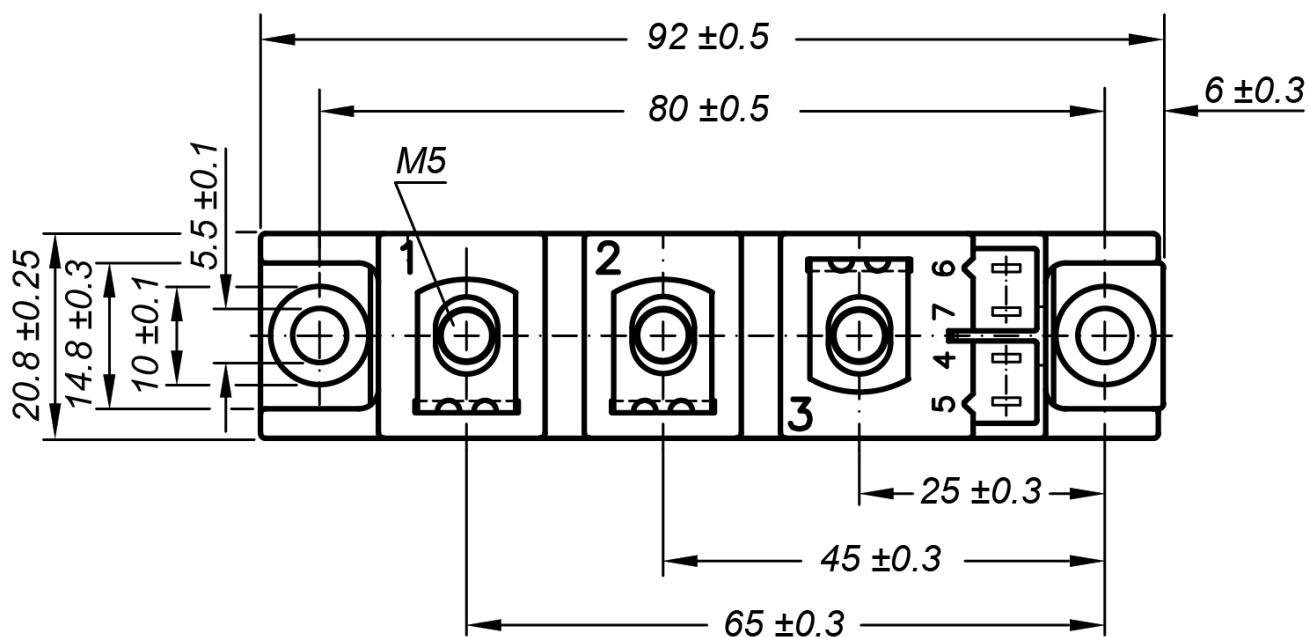
* on die level

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

			Rectifier
$V_{0\text{ max}}$	threshold voltage	0,75	V
$R_{0\text{ max}}$	slope resistance *	0,76	mΩ

Technical drawing of a rectangular box with dimensions and tolerances:

- Overall height: 30 ± 0.5
- Internal height: 28.1 ± 0.5
- Top surface width: 64×19
- Right side height: 23.5 ± 0.5
- Right side width: $7.6^{+0.4}_{-0.1}$
- Overall width: 29.7 ± 0.3
- Top surface material: *typ. 9*
- Bottom surface material: *typ. 0.25*



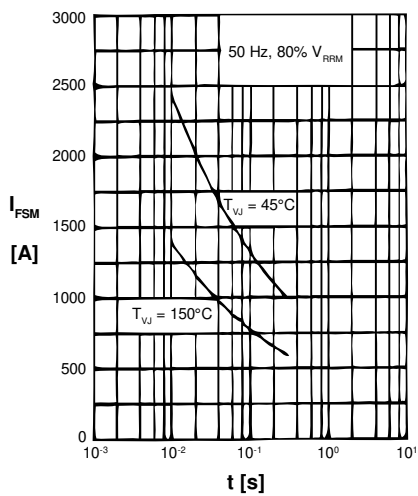
Rectifier


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

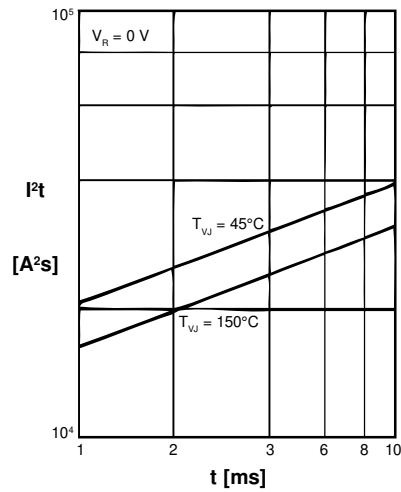


Fig. 2 I^2t versus time (1-10 ms)

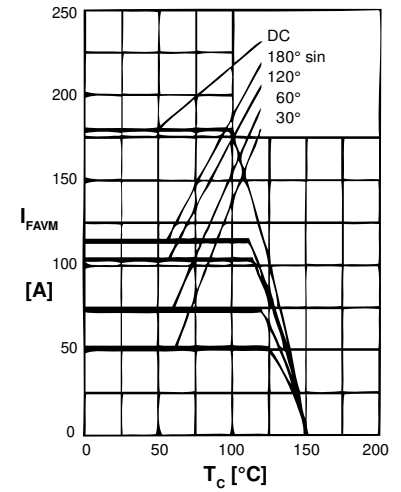


Fig. 3 Maximum forward current at case temperature

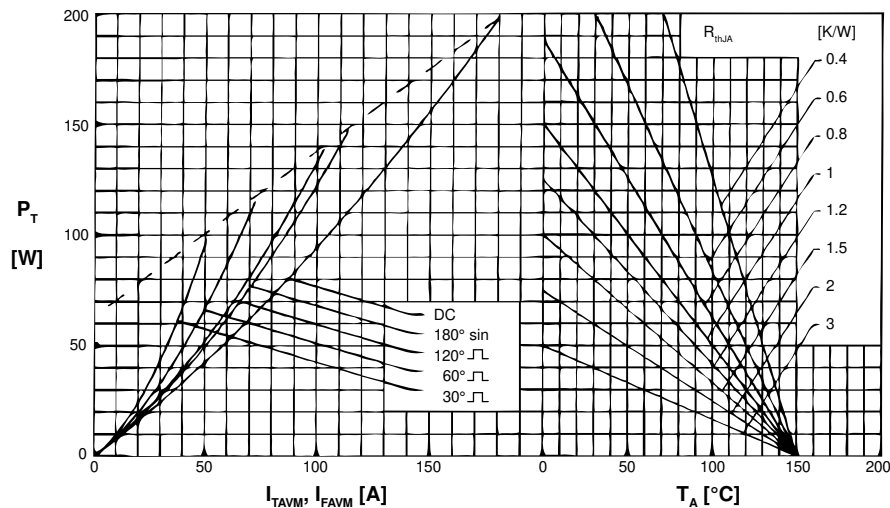


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

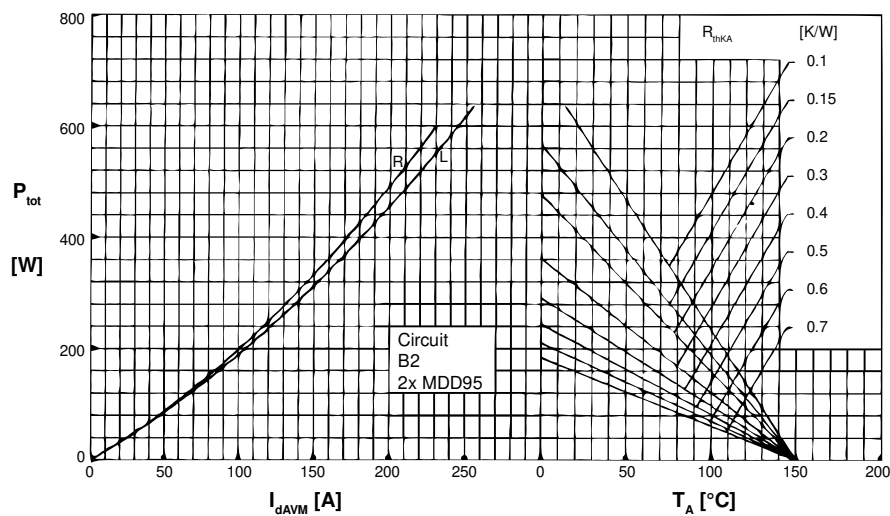


Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load, L = inductive load

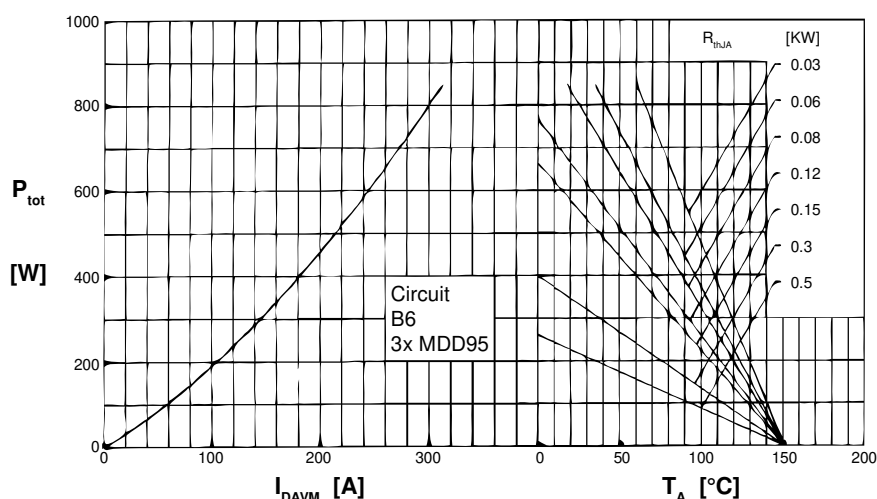
Rectifier


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

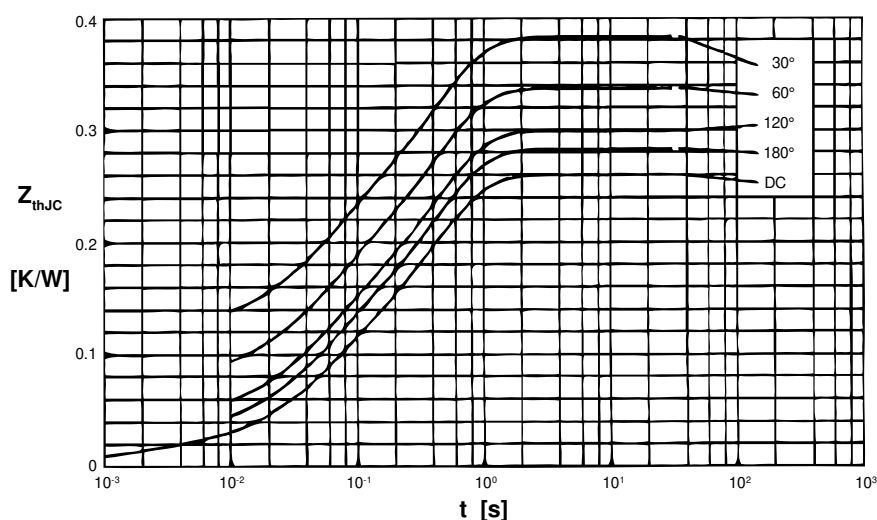


Fig. 7 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.26
180°	0.28
120°	0.30
60°	0.34
30°	0.38

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0012
2	0.072	0.0470
3	0.175	0.3940

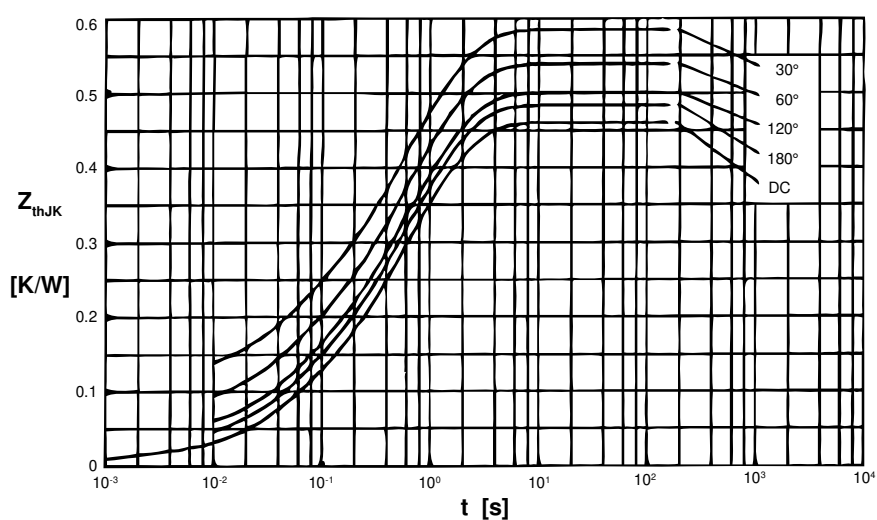


Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.46
180°	0.48
120°	0.50
60°	0.54
30°	0.58

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0012
2	0.072	0.0470
3	0.175	0.3940
4	0.200	1.3200