



# Standard Rectifier Module

$V_{RRM} = 2 \times 2000 \text{ V}$

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

$V_F = 1.13 \text{ V}$

Phase leg

Part number

**MDD95-20N1B**



Backside: isolated



### 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: 3600 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	
$V_{RSM}$	max. non-repetitive reverse blocking voltage				2100	V	
$V_{RRM}$	max. repetitive reverse blocking voltage				2000	V	
$I_R$	reverse current	$V_R = 2000\text{ V}$			200	$\mu\text{A}$	
		$V_R = 2000\text{ V}$			15	mA	
$V_F$	forward voltage drop	$I_F = 150\text{ A}$			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	$T_C = 100^\circ\text{C}$			120	A	
$I_{F(RMS)}$	RMS forward current	180° sine			180	A	
$V_{F0}$	threshold voltage	} for power loss calculation only			0.75	V	
$r_F$	slope resistance				1.95	m $\Omega$	
$R_{thJC}$	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 <sup>2</sup> s	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$		38.1	kA <sup>2</sup> s	
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$		28.3	kA <sup>2</sup> s	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$		27.5	kA <sup>2</sup> 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	
<b>Weight</b>					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			3600	V	
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		3000	V	



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD95-20N1B	MDD95-20N1B	Box	36	470228

**Equivalent Circuits for Simulation**

\* on die level

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



**Rectifier**

$V_{0\ max}$	threshold voltage	0.75	V
$R_{0\ max}$	slope resistance *	0.76	mΩ



Outlines TO-240AA



General tolerance: DIN ISO 2768 class „c“





**Rectifier**

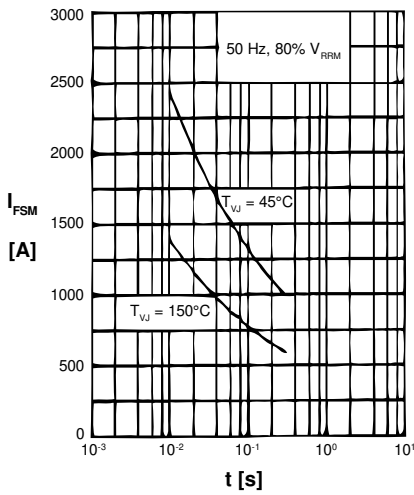


Fig. 1 Surge overload current  
 $I_{TSM}$ ,  $I_{FSM}$ : Crest value,  $t$ : duration

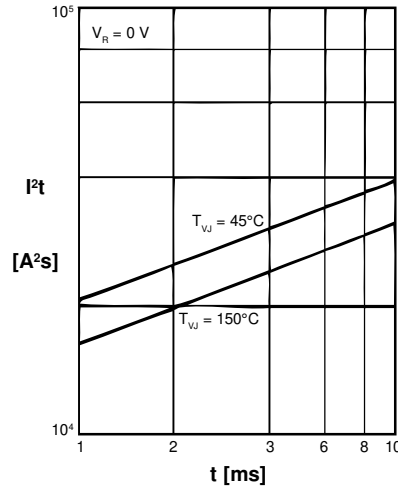


Fig. 2  $I^2t$  versus time (1-10 ms)

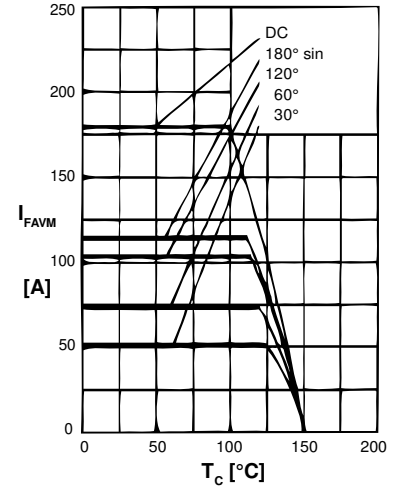


Fig. 3 Maximum forward current at case temperature

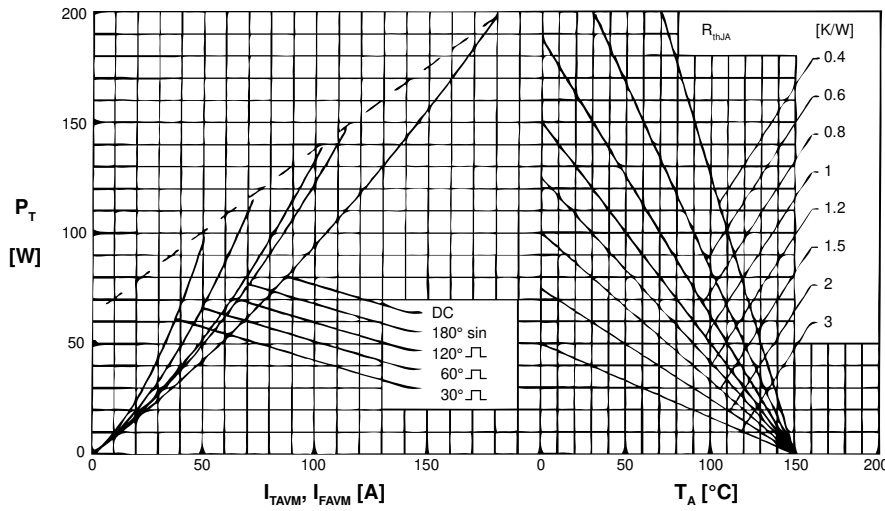


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

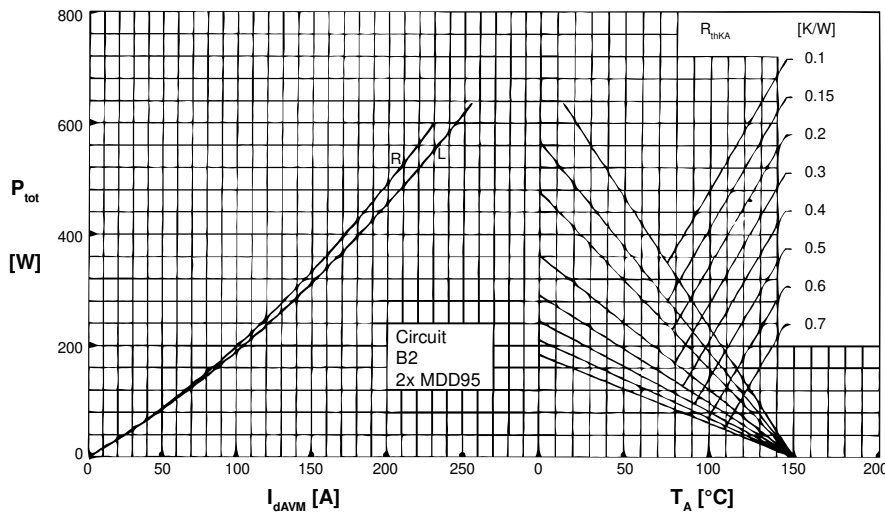


Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load, L = inductive load

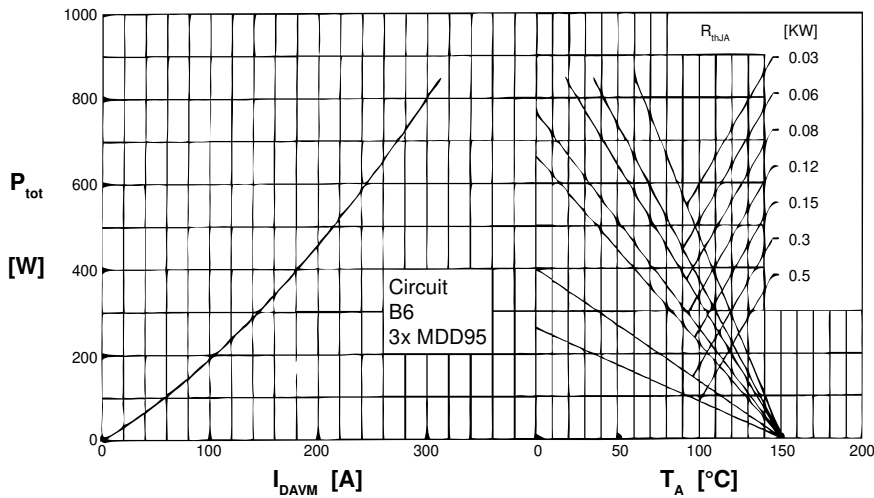
**Rectifier**


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

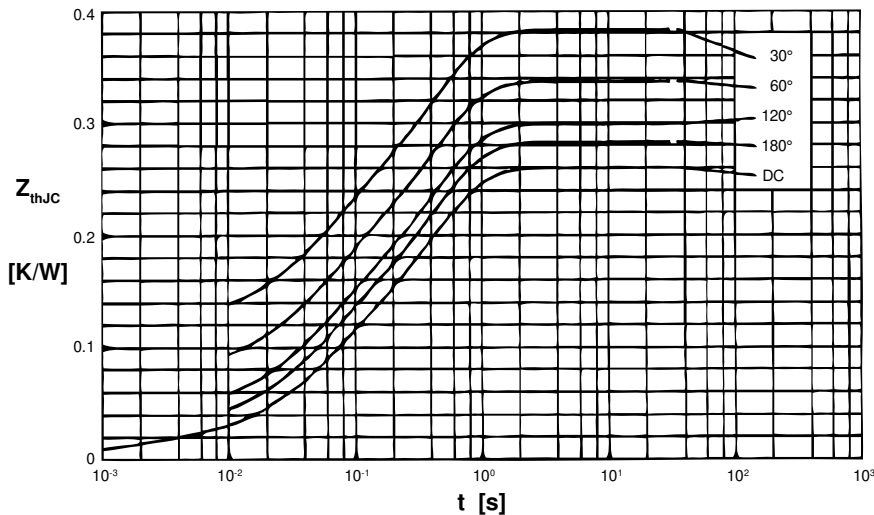


Fig. 7 Transient thermal impedance junction to case (per diode)

 $R_{thJC}$  for various conduction angles d:

d	$R_{thJC}$ [K/W]
DC	0.26
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

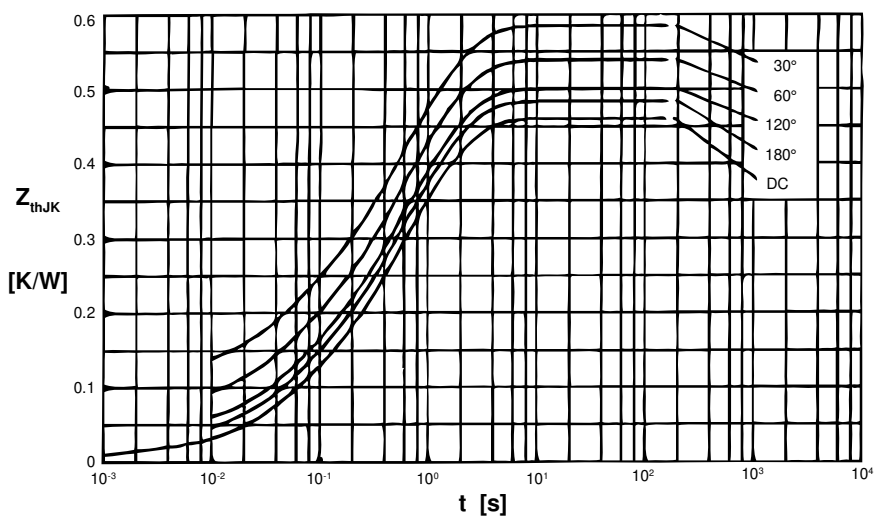


Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

 $R_{thJK}$  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