



Standard Rectifier Module

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

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

$V_F = 1.13 \text{ V}$

Phase leg

Part number

MDD95-12N1B



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

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

Rectifier				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
V_{RSM}	max. non-repetitive reverse blocking voltage				1300	V	
V_{RRM}	max. repetitive reverse blocking voltage				1200	V	
I_R	reverse current	$V_R = 1200\text{ V}$			200	μA	
		$V_R = 1200\text{ V}$			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 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				481	W	
I_{FSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^\circ\text{C}$			2.80	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			3.03	kA
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^\circ\text{C}$			2.38	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			2.57	kA
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^\circ\text{C}$			39.2	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			38.1	kA ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^\circ\text{C}$			28.3	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			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}	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			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	MDD95-12N1B	MDD95-12N1B	Box	36	453145

Similar Part	Package	Voltage class
MDD95-08N1B	TO-240AA	800
MDD95-14N1B	TO-240AA	1400
MDD95-16N1B	TO-240AA	1600
MDD95-18N1B	TO-240AA	1800

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

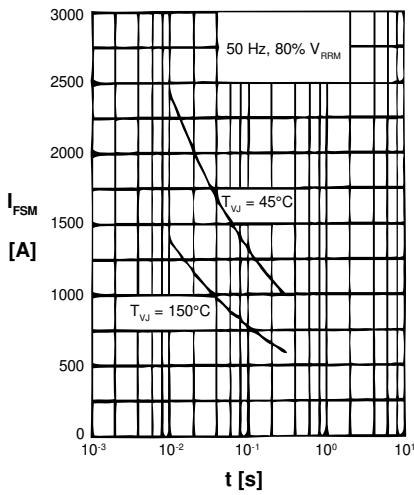


Fig. 1 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t : duration

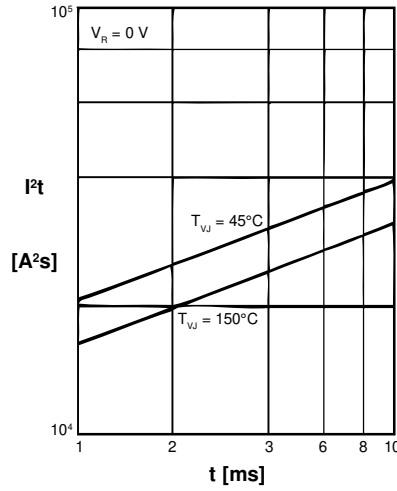


Fig. 2 I^2t versus time (1-10 ms)

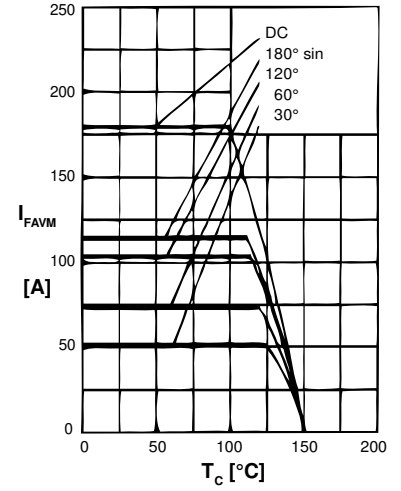


Fig. 3 Maximum forward current at case temperature

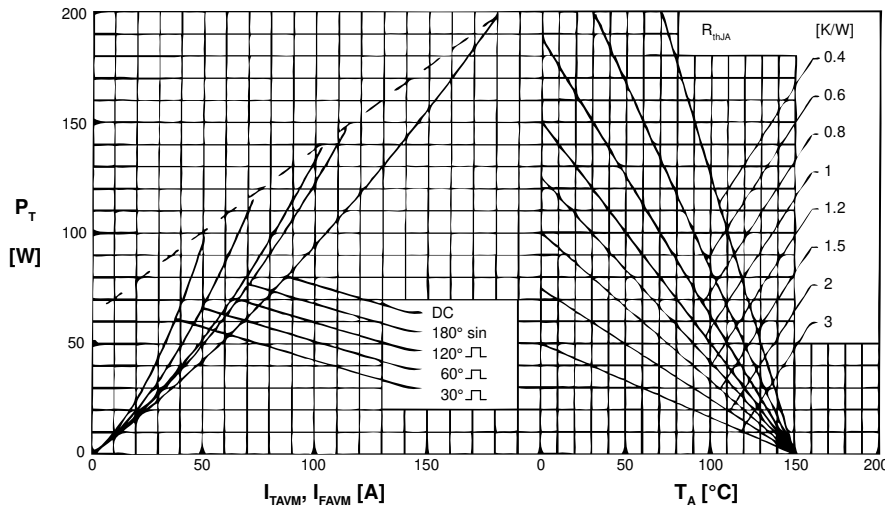


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

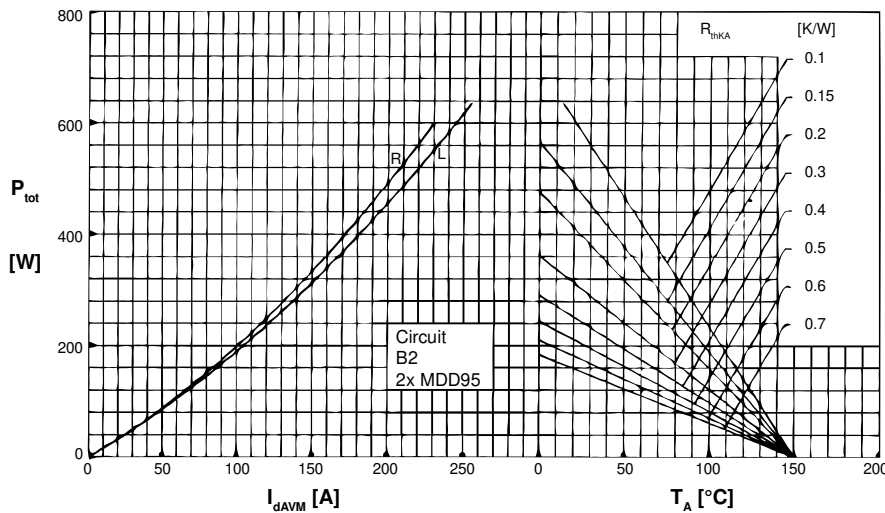


Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load, L = inductive load

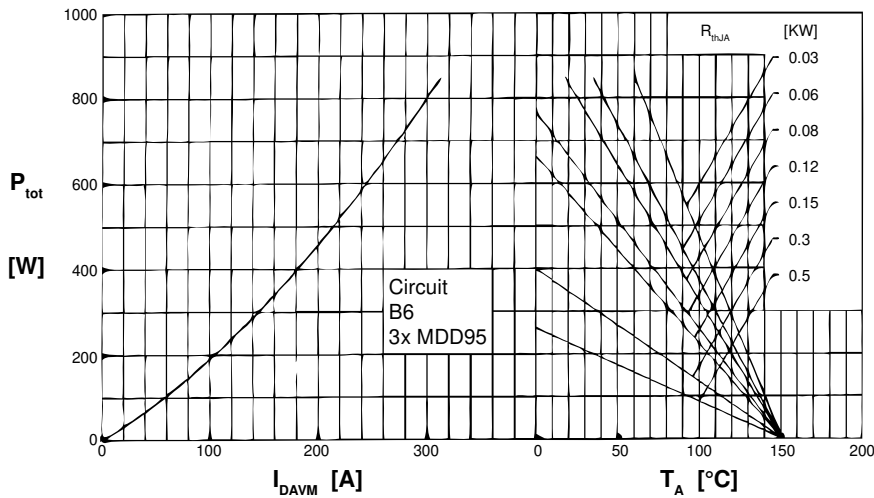
Rectifier


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

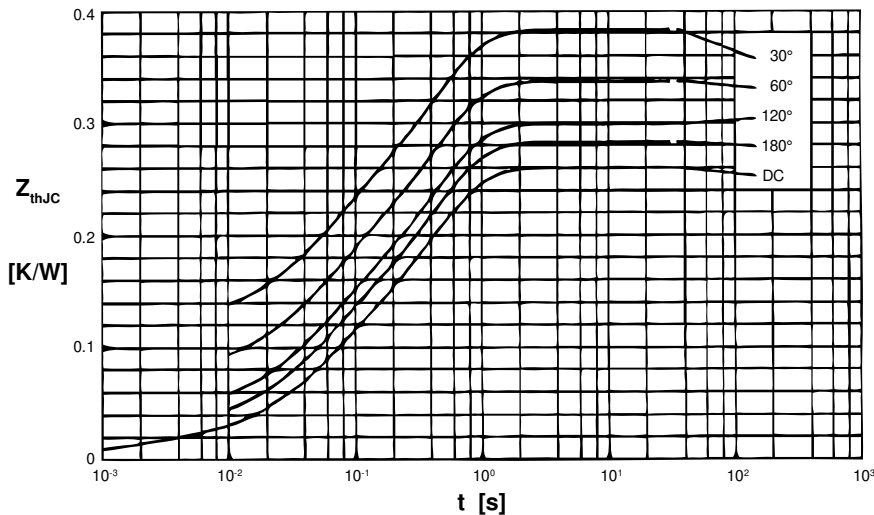


Fig. 7 Transient thermal impedance junction to case (per diode)

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

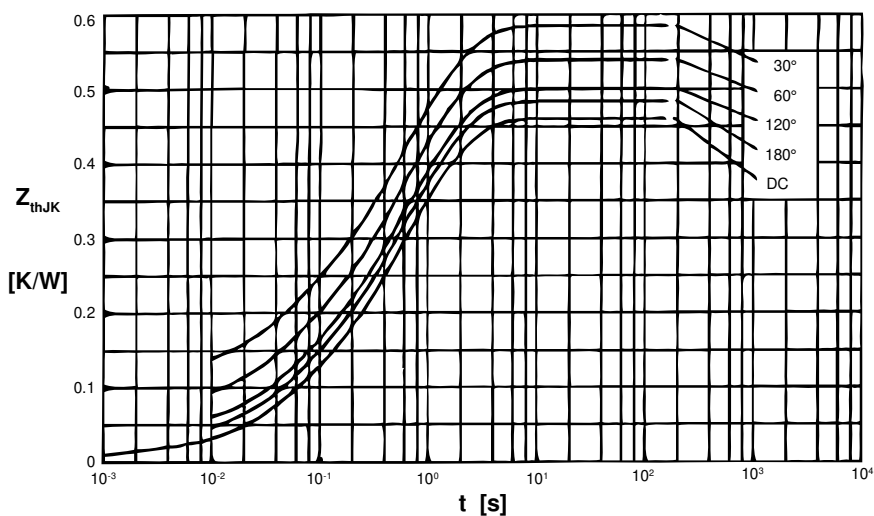


Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

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