

Standard Rectifier Module

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

$$I_{FAV} = 59 \text{ A}$$

$$V_F = 1.26 \text{ V}$$

Phase leg

Part number

MDD44-16N1B



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

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	$T_{VJ} = 25^{\circ}C$			1700	V	
V_{RRM}	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1600	V	
I_R	reverse current	$V_R = 1600 V$	$T_{VJ} = 25^{\circ}C$		100	μA	
		$V_R = 1600 V$	$T_{VJ} = 150^{\circ}C$		10	mA	
V_F	forward voltage drop	$I_F = 100 A$	$T_{VJ} = 25^{\circ}C$		1.30	V	
		$I_F = 200 A$			1.60	V	
		$I_F = 100 A$	$T_{VJ} = 125^{\circ}C$		1.26	V	
		$I_F = 200 A$			1.67	V	
I_{FAV}	average forward current	$T_C = 100^{\circ}C$	$T_{VJ} = 150^{\circ}C$		59	A	
$I_{F(RMS)}$	RMS forward current	180° sine			100	A	
V_{F0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		0.80	V	
r_F	slope resistance				4.3	m Ω	
R_{thJC}	thermal resistance junction to case				0.59	K/W	
R_{thCH}	thermal resistance case to heatsink			0.2		K/W	
P_{tot}	total power dissipation		$T_C = 25^{\circ}C$		212	W	
I_{FSM}	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		1.15	kA	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		1.24	kA	
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		980	A	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		1.06	kA	
I^2t	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		6.62	kA ² s	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		6.40	kA ² s	
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		4.80	kA ² s	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		4.63	kA ² s	
C_J	junction capacitance	$V_R = 400 V; f = 1 \text{ MHz}$	$T_{VJ} = 25^{\circ}C$		27	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		4800		V	
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	4000		V	



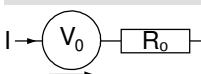
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD44-16N1B	MDD44-16N1B	Box	36	458058

Similar Part	Package	Voltage class
MDD44-08N1B	TO-240AA	800
MDD44-12N1B	TO-240AA	1200
MDD44-14N1B	TO-240AA	1400
MDD44-18N1B	TO-240AA	1800

Equivalent Circuits for Simulation

* on die level

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



Rectifier

$V_{0\ max}$	threshold voltage	0.8	V
$R_{0\ max}$	slope resistance *	3.1	mΩ



Outlines TO-240AA



General tolerance: DIN ISO 2768 class „c“





Rectifier

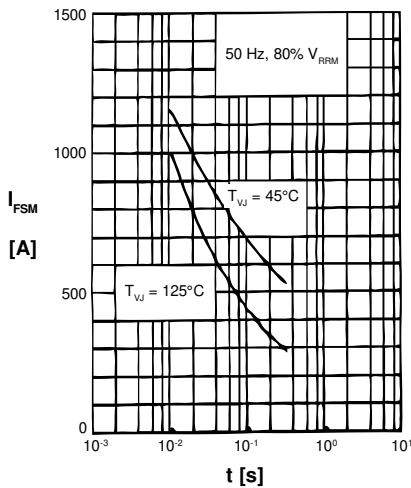


Fig. 1 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t : duration

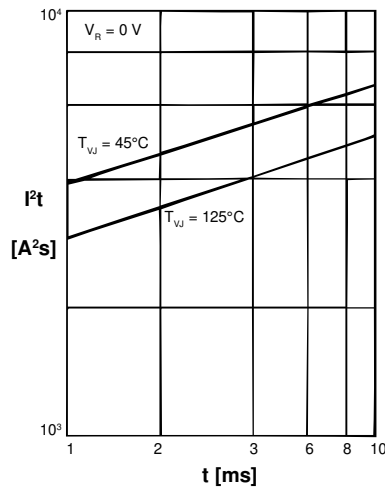


Fig. 2 I^2t versus time (1-10 ms)

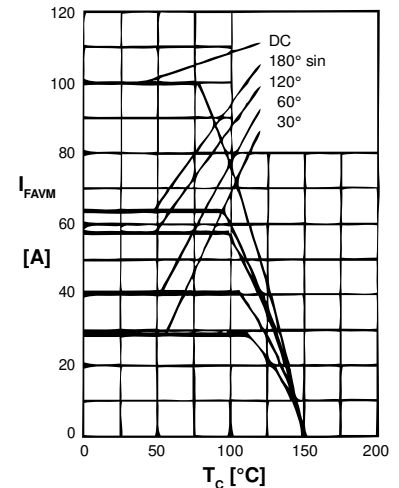


Fig. 3 Maximum forward current at case temperature

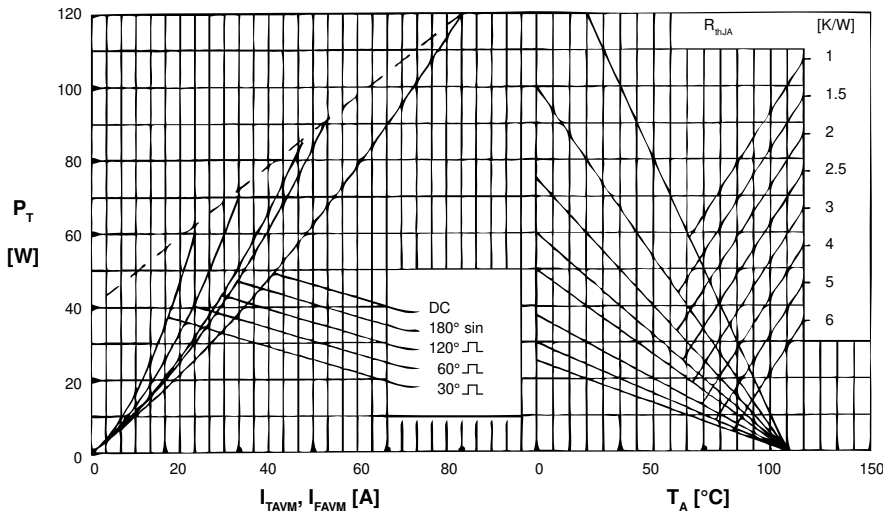


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

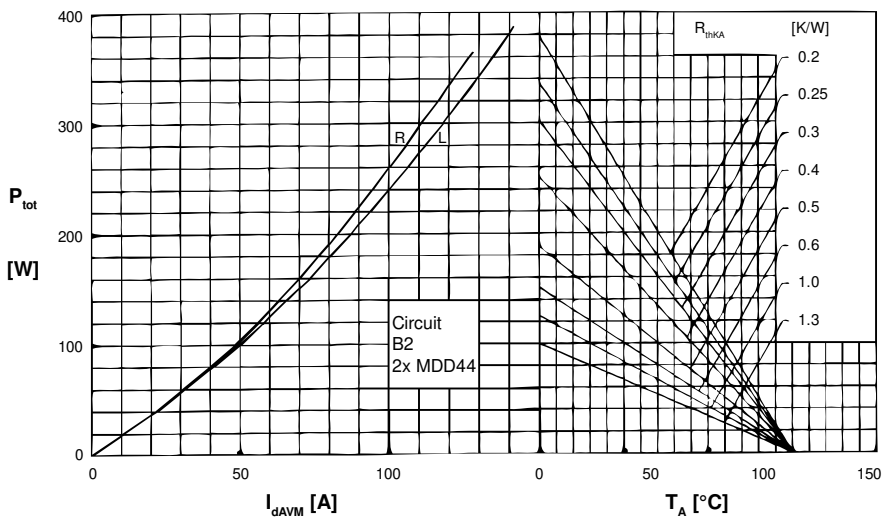


Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load, L = inductive load

Rectifier

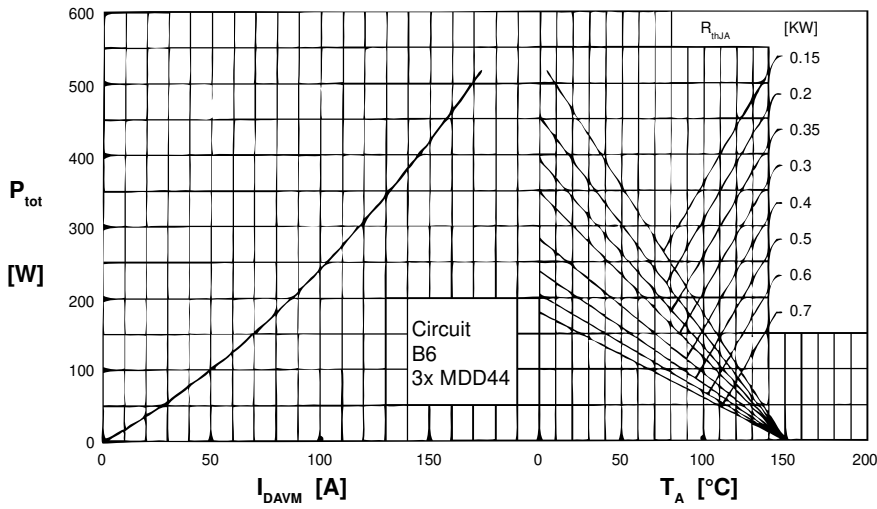


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

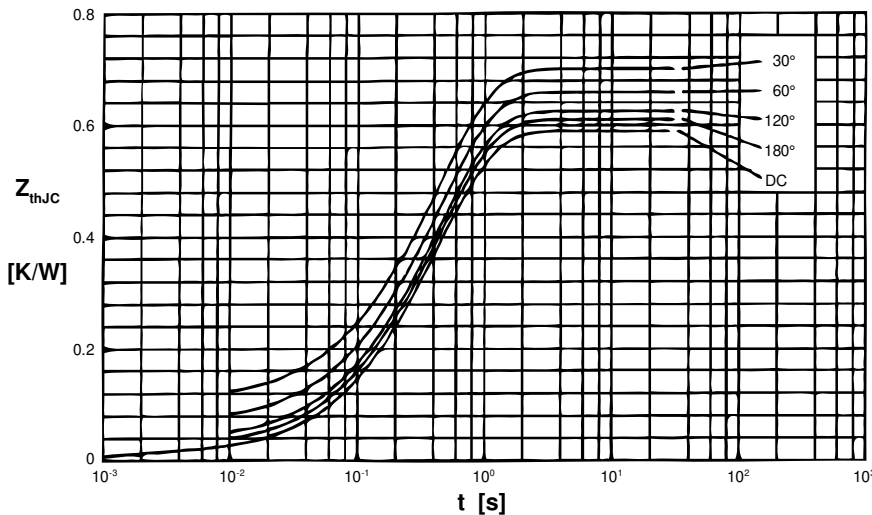


Fig. 7 Transient thermal impedance junction to case (per diode)

$R_{\theta JC}$ for various conduction angles d:

d	$R_{\theta JC}$ [K/W]
DC	0.59
180°	0.61
120°	0.63
60°	0.66
30°	0.70

Constants for $Z_{\theta JC}$ calculation:

i	$R_{\theta i}$ [K/W]	t_i [s]
1	0.012	0.0012
2	0.045	0.0950
3	0.533	0.4550

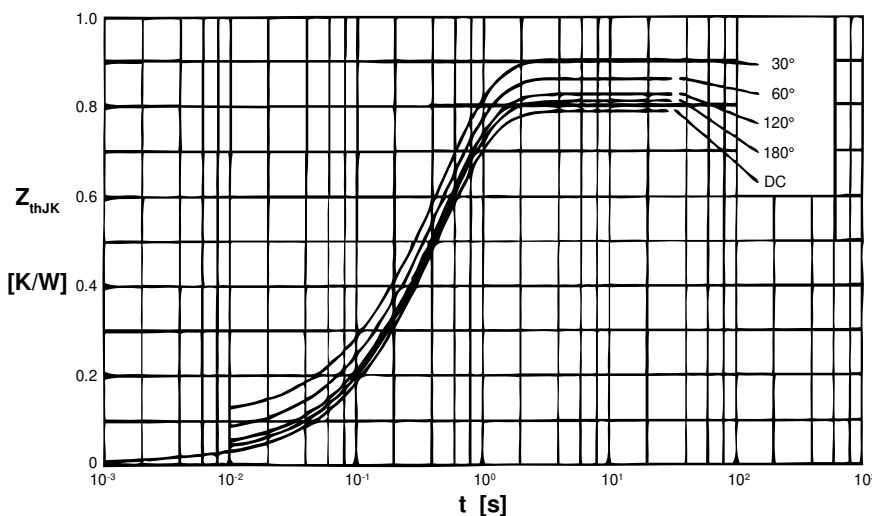


Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

$R_{\theta JK}$ for various conduction angles d:

d	$R_{\theta JK}$ [K/W]
DC	0.79
180°	0.81
120°	0.83
60°	0.86
30°	0.90

Constants for $Z_{\theta JK}$ calculation:

i	$R_{\theta i}$ [K/W]	t_i [s]
1	0.012	0.0012
2	0.045	0.0950
3	0.533	0.4550
4	0.200	0.4950