

# Standard Rectifier Module

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

$$I_{FAV} = 270 \text{ A}$$

$$V_F = 1,08 \text{ V}$$

Phase leg

Part number

**MDD255-16N1**



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: Y1

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

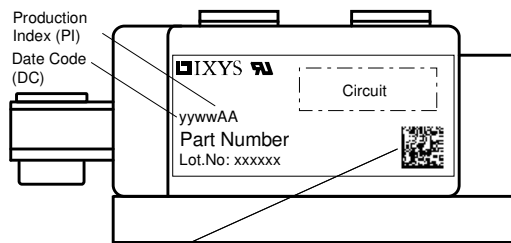
### Disclaimer Notice

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](http://www.littelfuse.com/disclaimer-electronics).

Rectifier				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM}$	max. non-repetitive reverse blocking voltage				1700	V	
$V_{RRM}$	max. repetitive reverse blocking voltage				1600	V	
$I_R$	reverse current	$V_R = 1600\text{ V}$			500	$\mu\text{A}$	
		$V_R = 1600\text{ V}$			20	mA	
$V_F$	forward voltage drop	$I_F = 300\text{ A}$			1,19	V	
		$I_F = 600\text{ A}$			1,40	V	
		$I_F = 300\text{ A}$	$T_{VJ} = 125^\circ\text{C}$			1,08	V
		$I_F = 600\text{ A}$				1,35	V
$I_{FAV}$	average forward current	$T_C = 100^\circ\text{C}$			270	A	
$I_{F(RMS)}$	RMS forward current	180° sine			450	A	
$V_{F0}$	threshold voltage	} for power loss calculation only			0,80	V	
$r_F$	slope resistance				0,6	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				0,14	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0,04		K/W	
$P_{tot}$	total power dissipation		$T_C = 25^\circ\text{C}$		890	W	
$I_{FSM}$	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^\circ\text{C}$		9,80	kA	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$		10,6	kA	
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$		8,33	kA	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$		9,00	kA	
$I^2t$	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^\circ\text{C}$		480,2	kA <sup>2</sup> s	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$		466,1	kA <sup>2</sup> s	
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$		346,9	kA <sup>2</sup> s	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$		336,6	kA <sup>2</sup> s	
$C_J$	junction capacitance	$V_R = 400\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^\circ\text{C}$		381	pF	



Package Y1				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$I_{RMS}$	RMS current	per terminal			600	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>					680	g	
$M_D$	mounting torque		4,5		7	Nm	
$M_T$	terminal torque		11		13	Nm	
$d_{Spp/App}$	creepage distance on surface   striking distance through air	terminal to terminal	16,0			mm	
$d_{Spb/Apb}$		terminal to backside	16,0			mm	
$V_{ISOL}$	isolation voltage	t = 1 second	4800			V	
		t = 1 minute	4000			V	



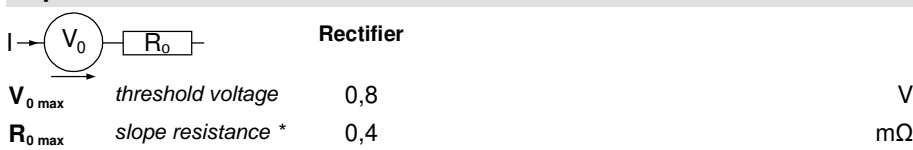
Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD255-16N1	MDD255-16N1	Box	3	461881

Similar Part	Package	Voltage class
MDD255-12N1	Y1-CU	1200
MDD255-14N1	Y1-CU	1400
MDD255-18N1	Y1-CU	1800
MDD255-20N1	Y1-CU	2000

MDD255-22N1	Y1-CU	2200
-------------	-------	------

**Equivalent Circuits for Simulation** \* on die level  $T_{VJ} = 150^{\circ}C$





Outlines Y1



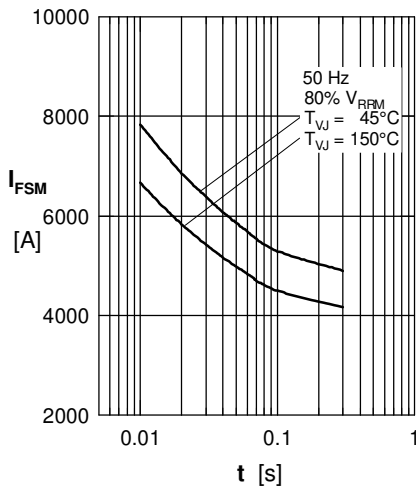
**Rectifier**


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

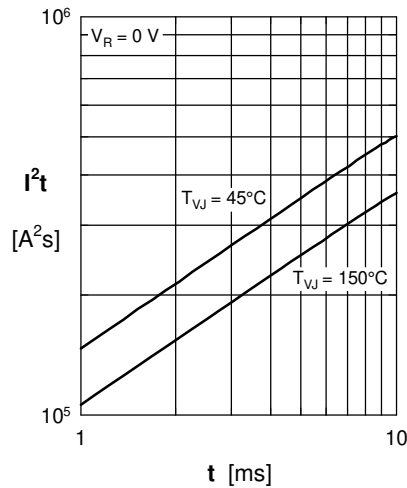


Fig. 2  $I^2t$  versus time (1-10 ms)

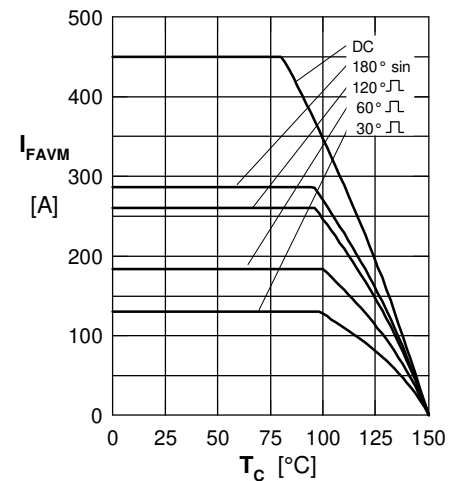


Fig. 3 Max. forward current  
 at case temperature

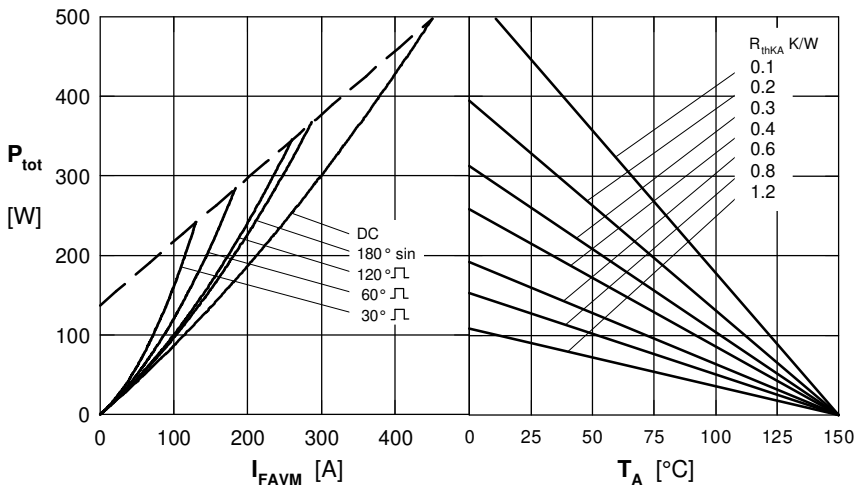


Fig. 4 Power dissipation vs. forward current & ambient temperature (per diode)

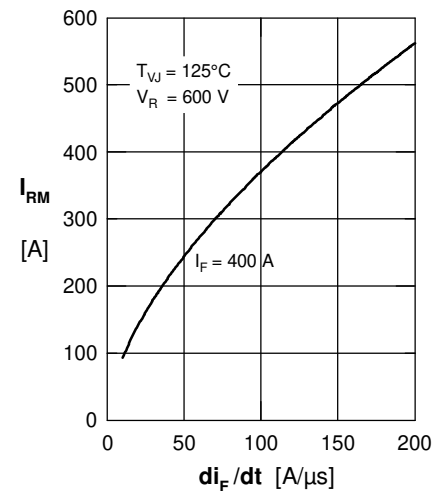


Fig. 5 Typ. peak reverse current  
 $I_{RM}$  versus  $-di_F/dt$

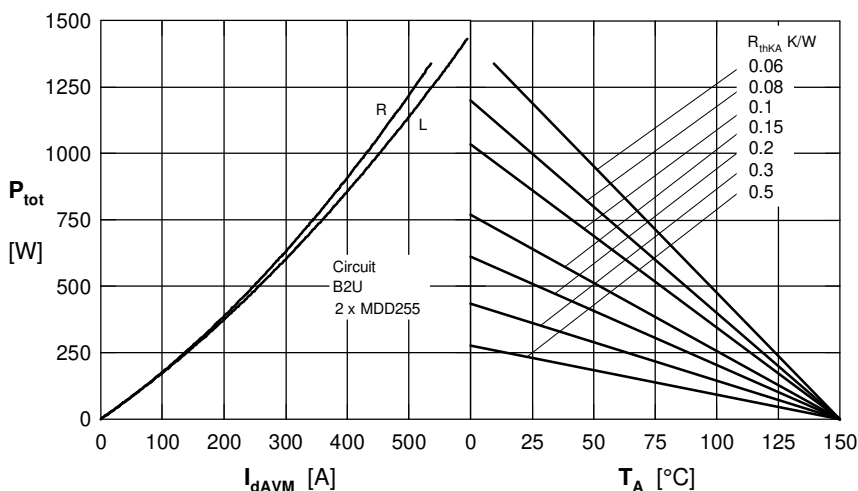


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current & ambient temperature. R = resistive load, L = inductive load

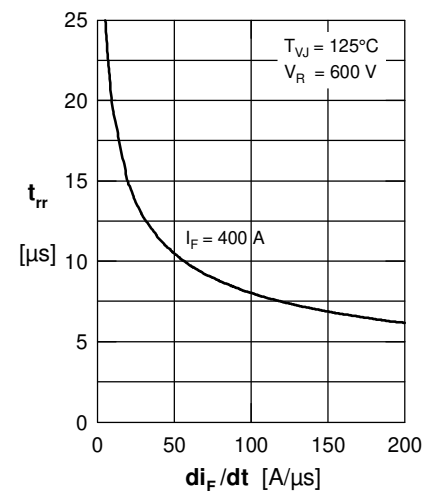


Fig. 7 Typ. recovery time  $t_{tr}$   
 versus  $-di_F/dt$



**Rectifier**

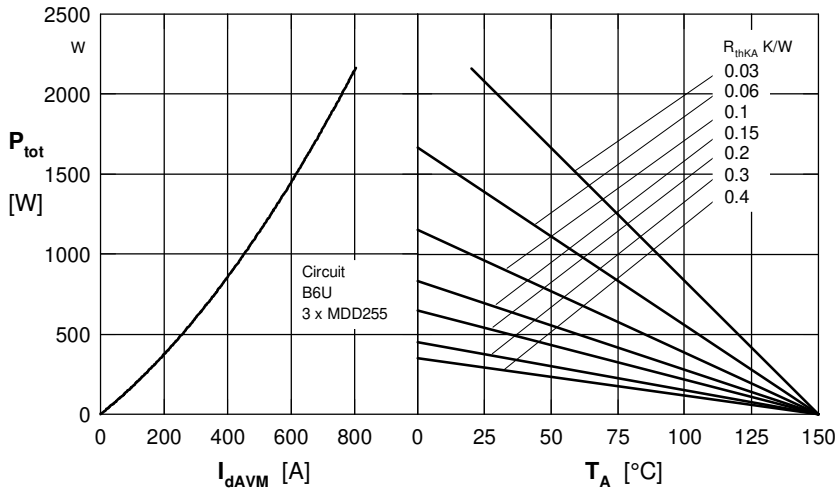


Fig. 8 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature



Fig. 9 Transient thermal impedance junction to case (per diode)

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

$d$	$R_{thJC}$ [K/W]
DC	0.139
180°	0.148
120°	0.156
60°	0.176
30°	0.214

Constants for  $Z_{thJC}$  calculation:

$i$	$R_{thi}$ [K/W]	$t_i$ [s]
1	0.0066	0.00054
2	0.0358	0.09800
3	0.0831	0.54000
4	0.0129	12.0000



Fig. 10 Transient thermal impedance junction to heatsink (per diode)

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

$d$	$R_{thJK}$ [K/W]
DC	0.179
180°	0.188
120°	0.196
60°	0.216
30°	0.254

Constants for  $Z_{thJK}$  calculation:

$i$	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.0066	0.00054
2	0.0358	0.09800
3	0.0831	0.54000
4	0.0129	12.0000
5	0.0400	12.0000