

High Voltage Standard Rectifier Module

$$\begin{aligned} V_{RRM} &= 2 \times 2000 \text{ V} \\ I_{FAV} &= 270 \text{ A} \\ V_F &= 1,08 \text{ V} \end{aligned}$$

Phase leg

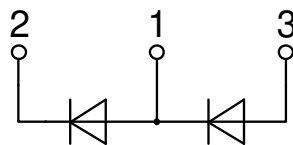
Part number

MDD255-20N1



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.

Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				2100	V
V_{RRM}	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				2000	V
I_R	reverse current	$V_R = 2000\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			500	μA
		$V_R = 2000\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$			20	mA
V_F	forward voltage drop	$I_F = 300\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			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	$T_C = 100^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			270	A
$I_{F(RMS)}$	RMS forward current	180° sine				450	A
V_{F0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}\text{C}$			0,80	V
r_F	slope resistance					0,6	m Ω
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 ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			466,1	kA ² s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}\text{C}$			346,9	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			336,6	kA ² s
C_J	junction capacitance	$V_R = 700\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		288		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
Weight				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

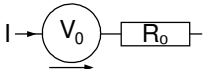


Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

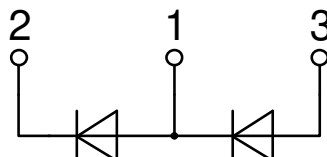
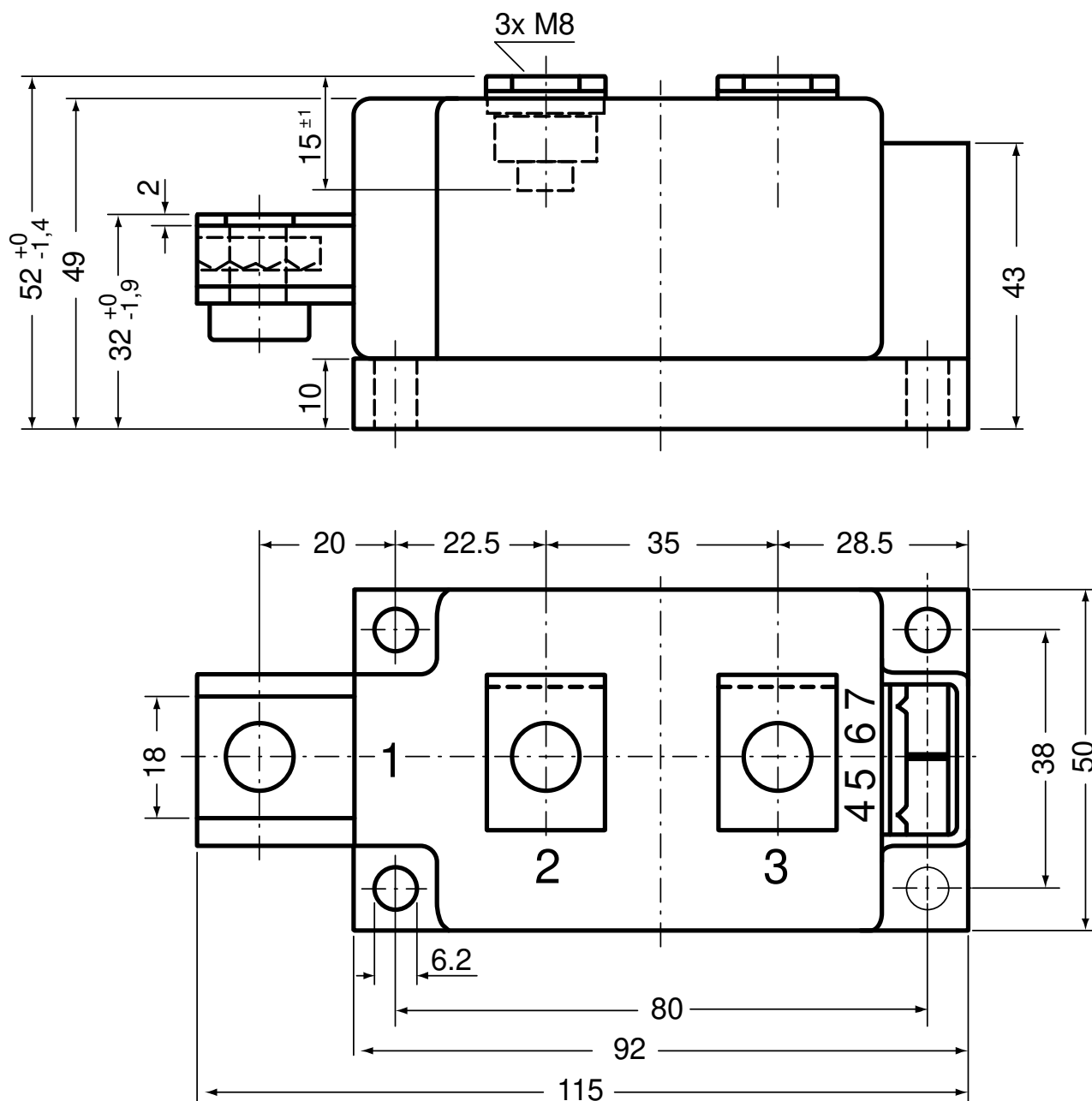
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD255-20N1	MDD255-20N1	Box	3	498815

Similar Part	Package	Voltage class
MDD255-12N1	Y1-CU	1200
MDD255-14N1	Y1-CU	1400
MDD255-16N1	Y1-CU	1600
MDD255-18N1	Y1-CU	1800

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

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 *	0,4	mΩ

Outlines Y1



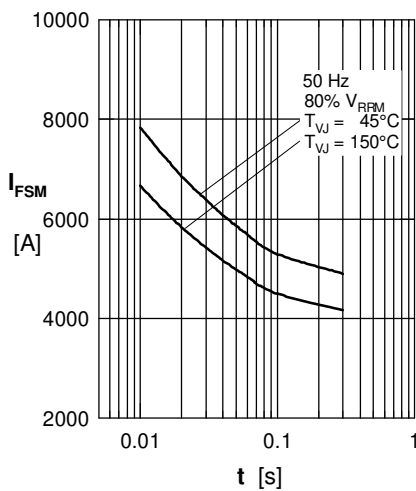
Rectifier


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

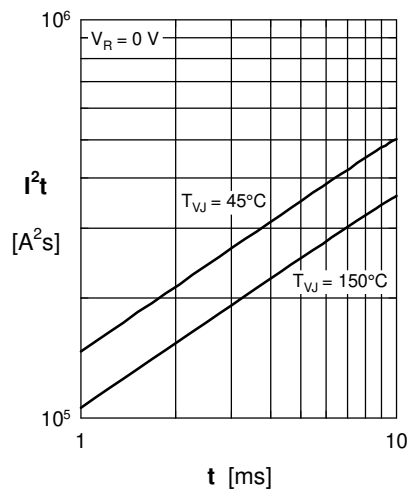


Fig. 2 I^2t versus time (1-10 ms)

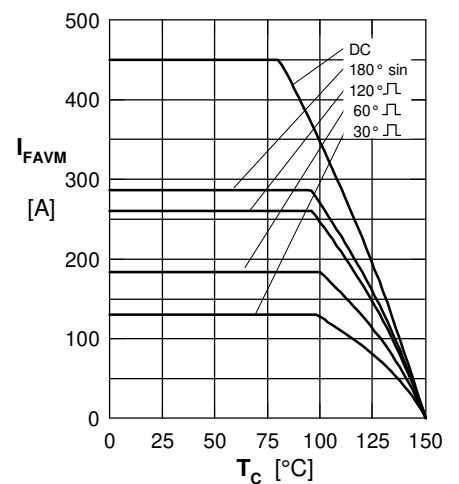


Fig. 3 Max. forward current
 at case temperature

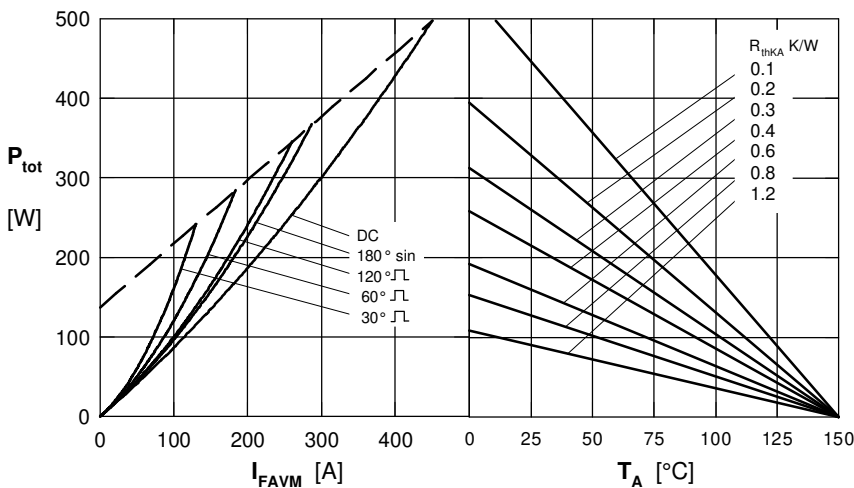


Fig. 4 Power dissipation vs. forward current & ambient temperature (per diode)

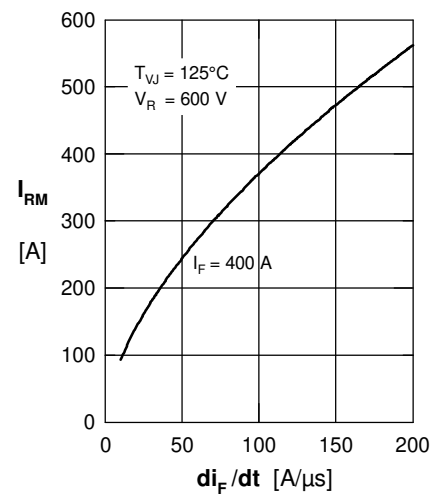


Fig. 5 Typ. peak reverse current
 I_{RM} versus $-di_F/dt$

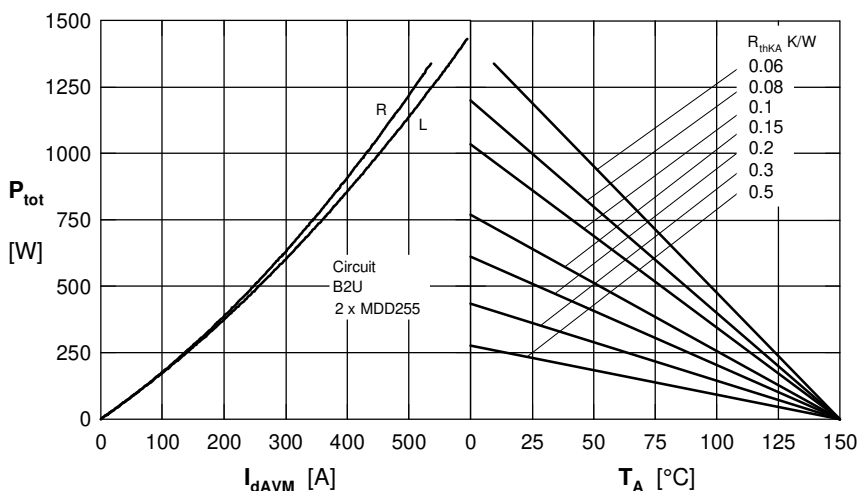


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current
 & ambient temperature. R = resistive load, L = inductive load

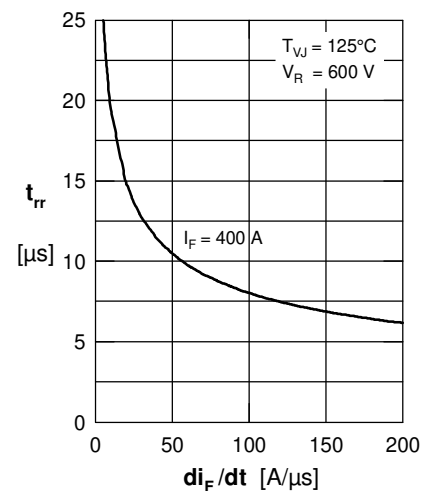


Fig. 7 Typ. recovery time t_{rr}
 versus $-di_F/dt$

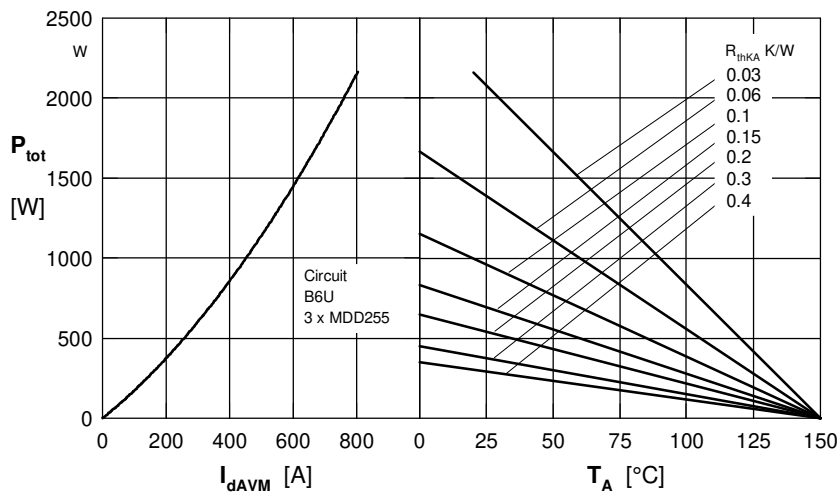
Rectifier


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

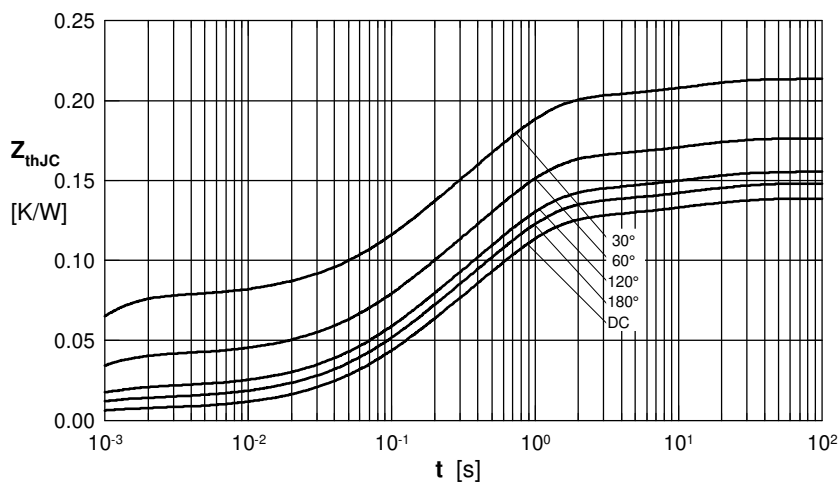


Fig. 9 Transient thermal impedance junction to case (per diode)

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

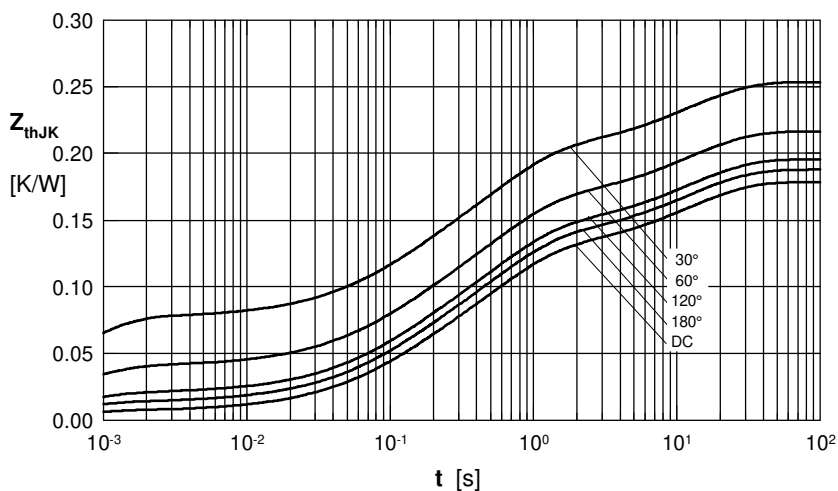


Fig. 10 Transient thermal impedance junction to heatsink (per diode)

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