High Voltage Standard Rectifier Module

V_{RRM} = 2x 2200 V
I_{FAV} = 270 A
V_F = 1,08 V

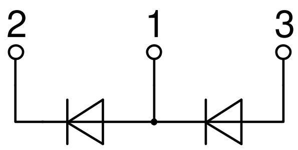
Phase leg

Part number

MDD255-22N1

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

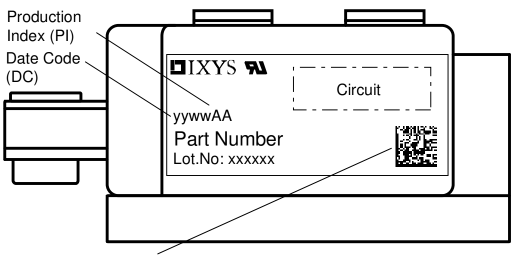
Package: Y1
- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

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°C			2300	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			2200	V
I_R	*reverse current*	V_R = 2200 V	T_{VJ} = 25°C			500	µA
		V_R = 2200 V	T_{VJ} = 150°C			20	mA
V_F	*forward voltage drop*	I_F = 300 A	T_{VJ} = 25°C			1,19	V
		I_F = 600 A				1,40	V
		I_F = 300 A	T_{VJ} = 125°C			1,08	V
		I_F = 600 A				1,35	V
I_{FAV}	*average forward current*	T_C = 100°C	T_{VJ} = 150°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°C			0,80	V
r_F	*slope resistance*					0,6	mΩ
R_{thJC}	*thermal resistance junction to case*					0,12	K/W
R_{thCH}	*thermal resistance case to heatsink*				0,04		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			890	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			9,80	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			10,6	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			8,33	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			9,00	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			480,2	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			466,1	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			346,9	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			336,6	kA²s
C_J	*junction capacitance*	V_R = 700 V; f = 1 MHz	T_{VJ} = 25°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	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	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)

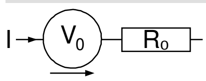
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD255-22N1	MDD255-22N1	Box	3	498807

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

MDD255-20N1	Y1-CU	2000

Equivalent Circuits for Simulation

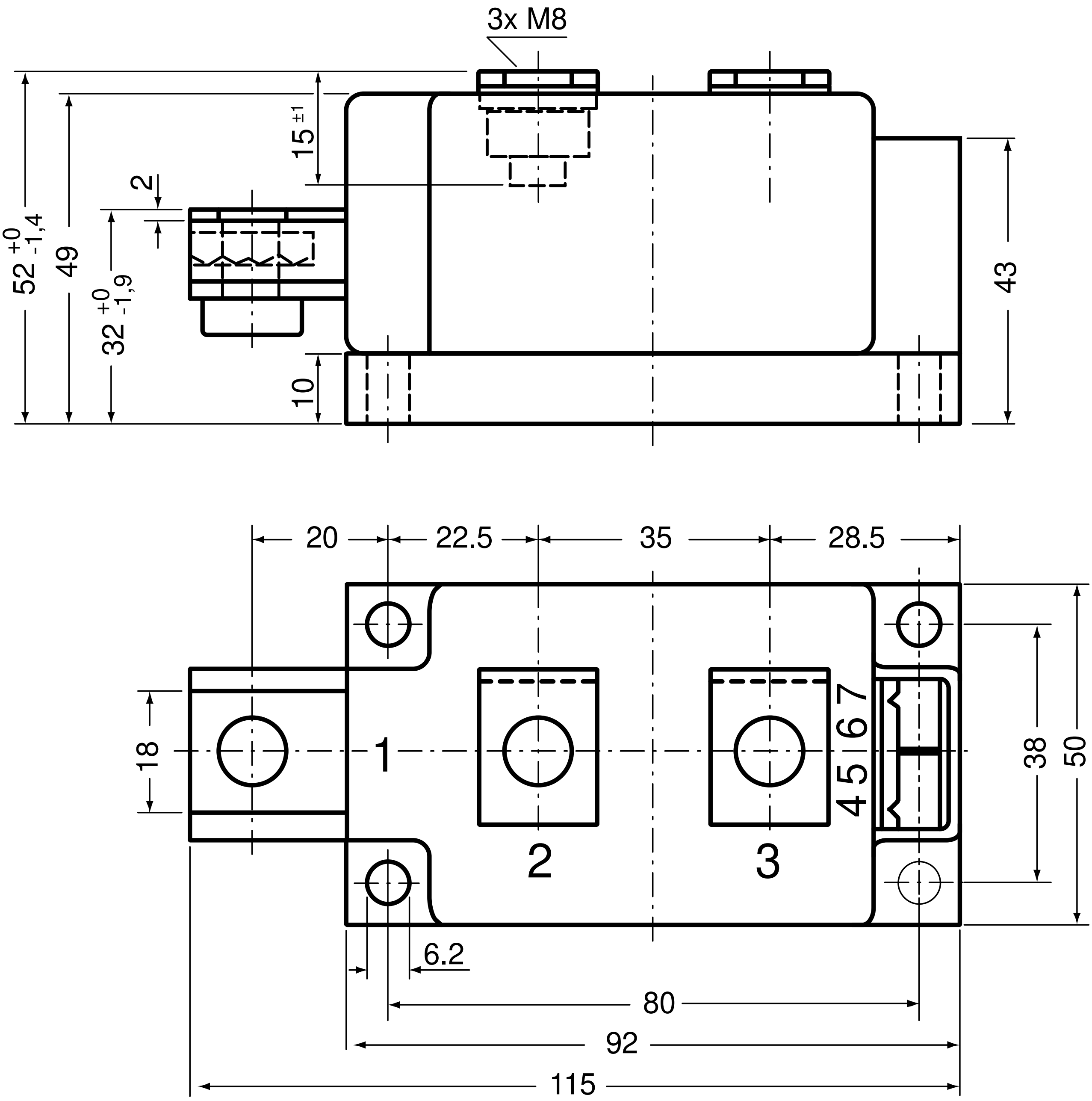
** on die level* $T_{VJ} = 150°C$

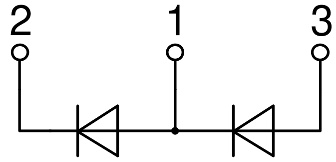


Rectifier

$V_{0\ max}$	*threshold voltage*	0,8	V
$R_{0\ max}$	*slope resistance **	0,4	mΩ

Outlines Y1


3x M8
15 ±1
2
52 +0 -1,4
49
32 +0 -1,9
10
43
20
22.5
35
28.5
18
1
2
3
4 5 6 7
38
50
6.2
80
92
115


2
1
3

Rectifier

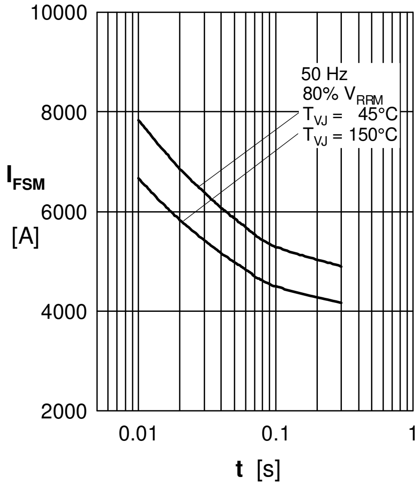


Fig. 1 Surge overload current I_{FSM}: Crest value, t: duration

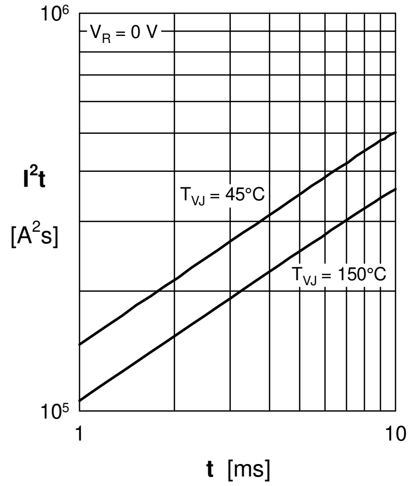


Fig. 2 I^2t versus time (1-10 ms)

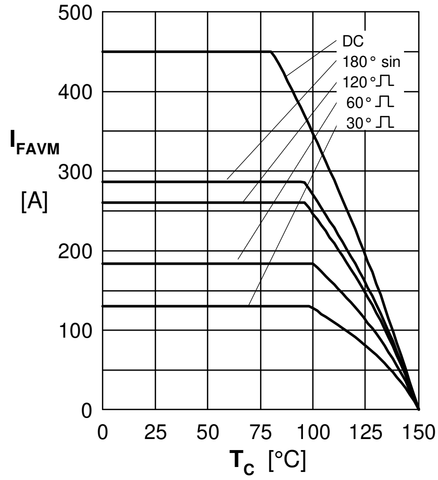


Fig. 3 Max. forward current at case temperature

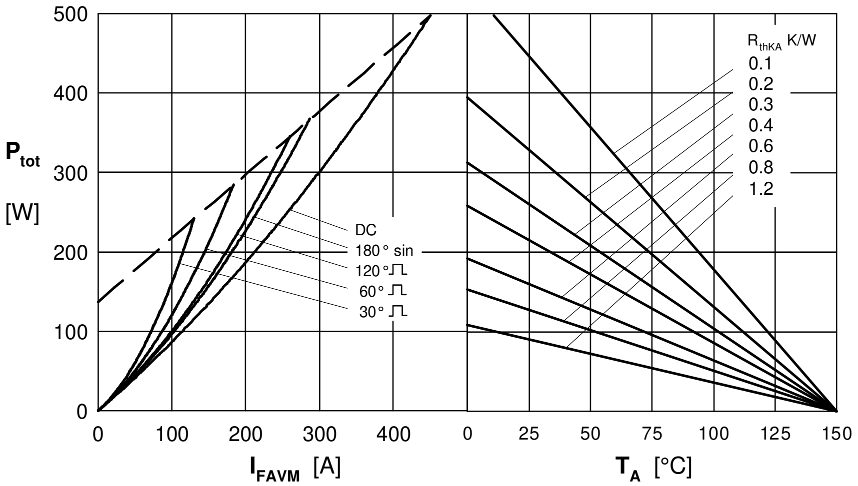


Fig. 4 Power dissipation vs. forward current & ambient temperature (per diode)

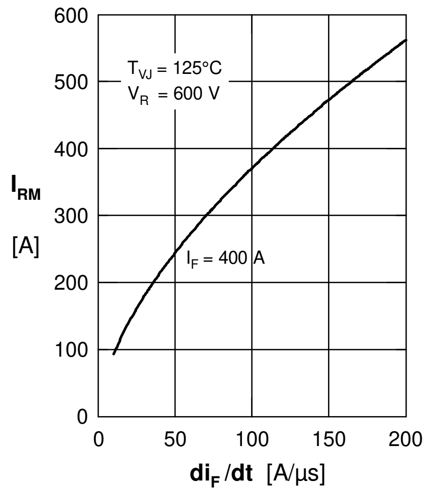


Fig. 5 Typ. peak reverse current I_{RM} versus -diF/dt

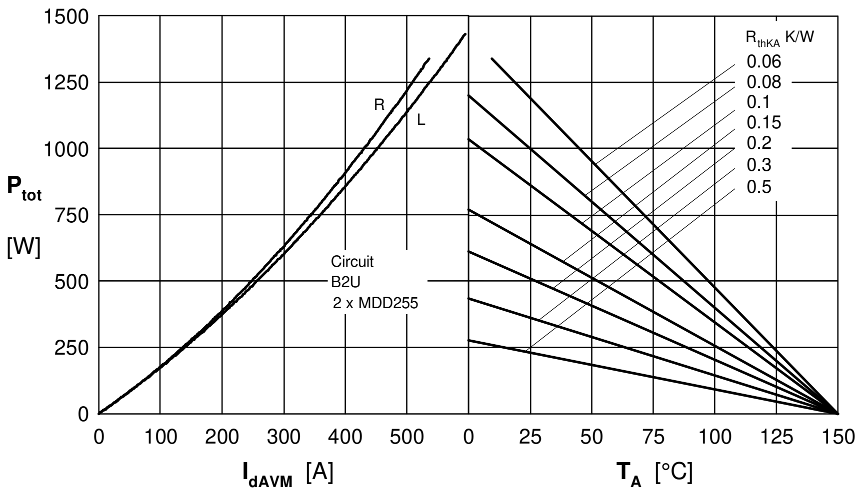


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current & ambient temperature. R = resistive load, L = inductive load

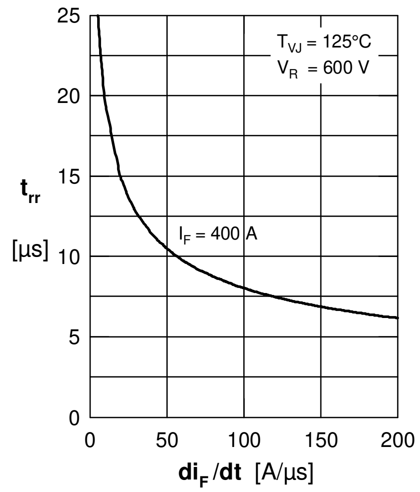


Fig. 7 Typ. recovery time t_{rr} versus $-di_F/dt$

Rectifier

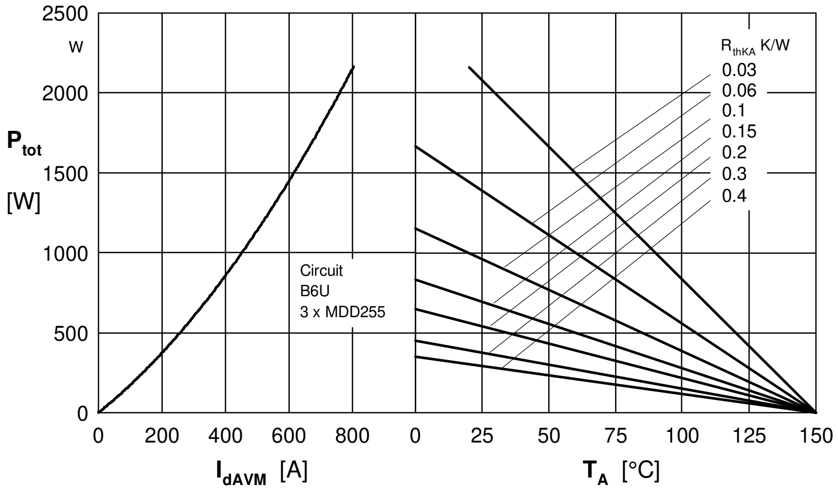


Fig. 8 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

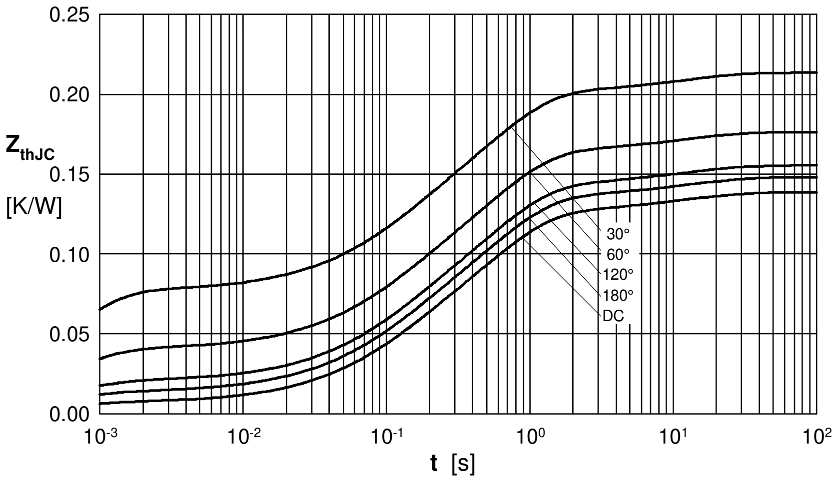


Fig. 9 Transient thermal impedance junction to case (per diode)

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

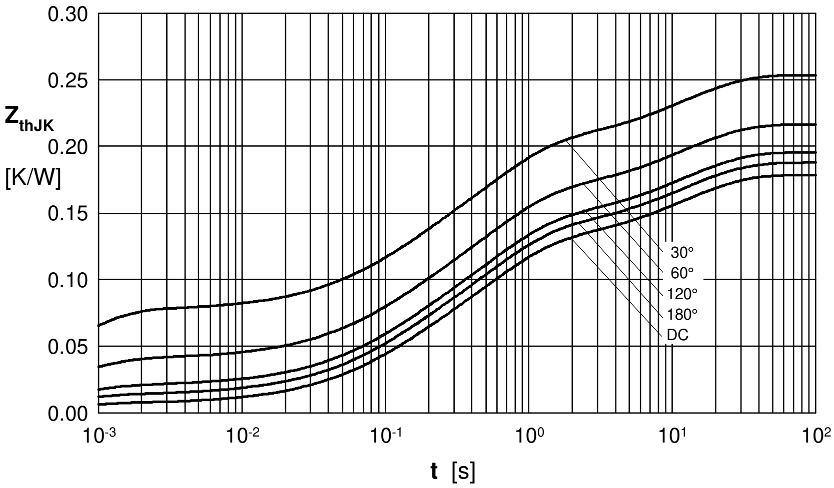


Fig. 10 Transient thermal impedance junction to heatsink (per diode)

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