Standard Rectifier Module

V_{RRM} = 2x 1400 V
I_{FAV} = 310 A
V_F = 1.03 V

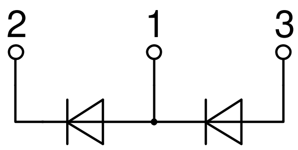
Phase leg

Part number

MDD312-14N1

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

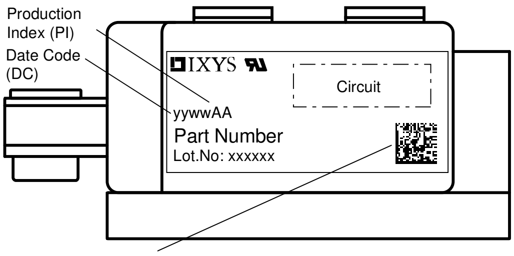
Package: Y1
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Base plate: Copper internally DCB isolated
- Advanced power cycling

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			1500	V
V_{RRM}	*max. repetitive reverse blocking voltage*			T_{VJ} = 25°C			1400	V
I_R	*reverse current*	V_R = 1400 V		T_{VJ} = 25°C			500	µA
		V_R = 1400 V		T_{VJ} = 150°C			30	mA
V_F	*forward voltage drop*	I_F = 300 A		T_{VJ} = 25°C			1.13	V
		I_F = 600 A					1.33	V
		I_F = 300 A		T_{VJ} = 125°C			1.03	V
		I_F = 600 A					1.29	V
I_{FAV}	*average forward current*	T_C = 100°C		T_{VJ} = 150°C			310	A
$I_{F(RMS)}$	*RMS forward current*	180° sine	d = 0.5				520	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			1040	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine		T_{VJ} = 45°C			10.8	kA
		t = 8,3 ms; (60 Hz), sine		V_R = 0 V			11.7	kA
		t = 10 ms; (50 Hz), sine		T_{VJ} = 150°C			9.18	kA
		t = 8,3 ms; (60 Hz), sine		V_R = 0 V			9.92	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine		T_{VJ} = 45°C			583.2	kA²s
		t = 8,3 ms; (60 Hz), sine		V_R = 0 V			566.1	kA²s
		t = 10 ms; (50 Hz), sine		T_{VJ} = 150°C			421.4	kA²s
		t = 8,3 ms; (60 Hz), sine		V_R = 0 V			409.0	kA²s
C_J	*junction capacitance*	V_R = 400 V; f = 1 MHz		T_{VJ} = 25°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
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; $I_{ISOL} \le 1$ mA	3600			V
		t = 1 minute	3000			V



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

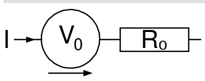
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD312-14N1	MDD312-14N1	Box	3	463434

Similar Part	Package	Voltage class
MDD312-12N1	Y1-CU	1200
MDD312-16N1	Y1-CU	1600
MDD312-18N1	Y1-CU	1800
MDD312-20N1	Y1-CU	2000

MDD312-22N1	Y1-CU	2200

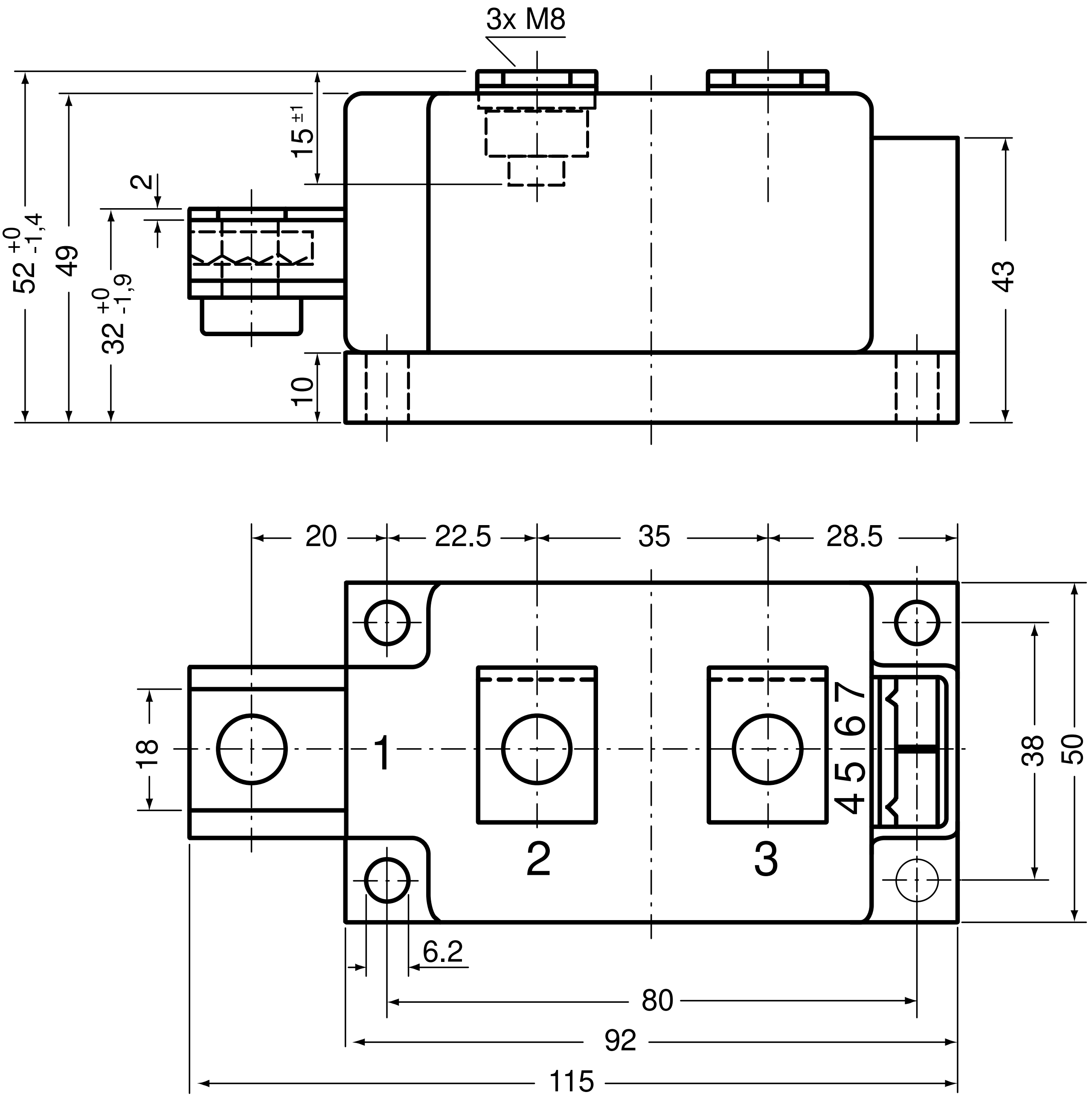
Equivalent Circuits for Simulation

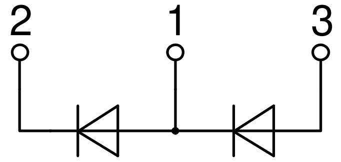
* *on die level* $T_{VJ} = 150°C$



		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

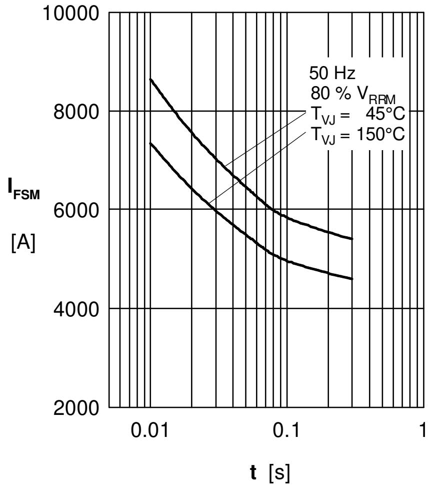


Fig. 1 Surge overload current
I_{FSM}: Crest value, t: duration

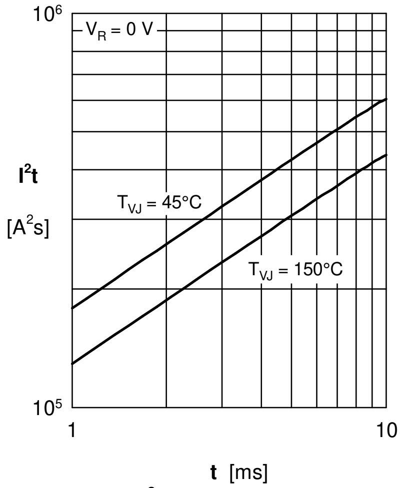


Fig. 2 I^2t versus time (1-10 ms)

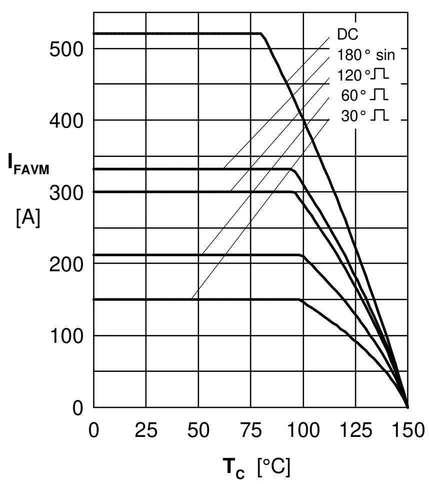


Fig. 3 Maximum forward current at case temperature

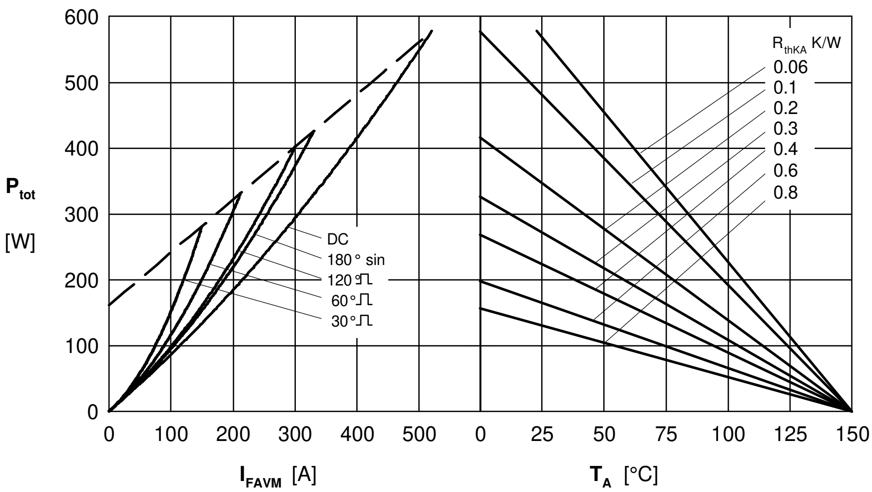


Fig. 4 Power dissipation vs. forward current & ambient temperature (per diode)

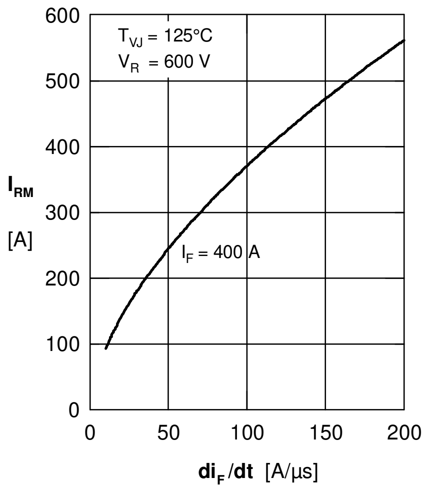


Fig. 5 Typ. peak reverse current

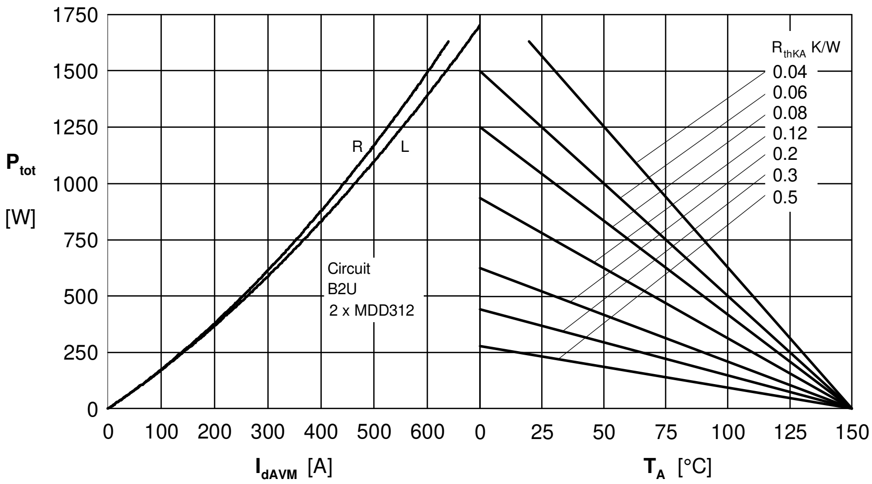


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature *R = resistive load, L = inductive load*

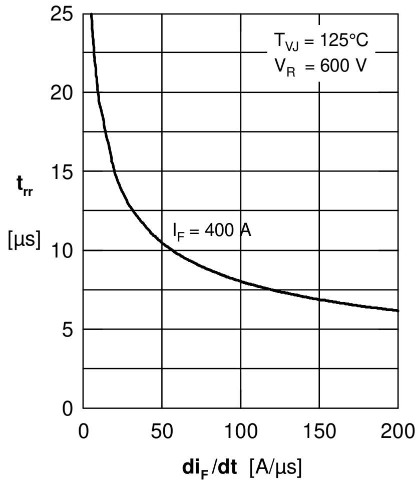


Fig. 7 Typ. recovery time t_{rr} versus $-di_F/dt$

Rectifier

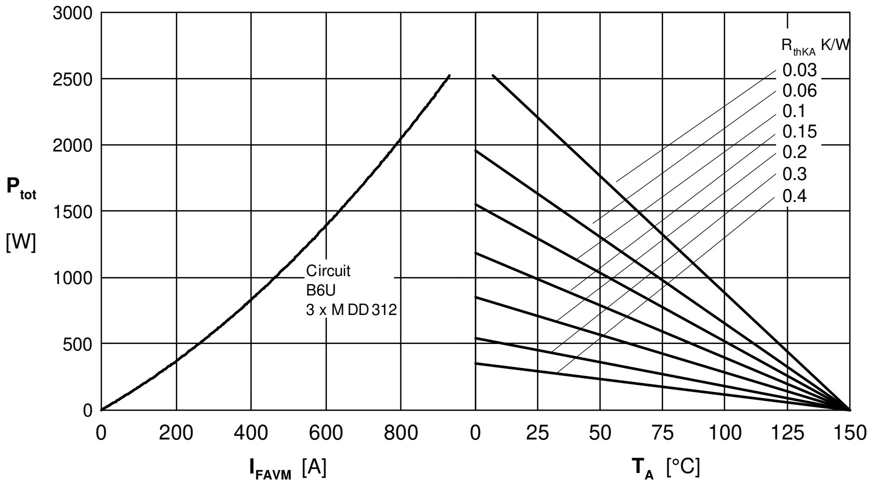


Fig. 8 Three phase rectifier bridge: Power dissipation vs. direct output current & ambient temperature

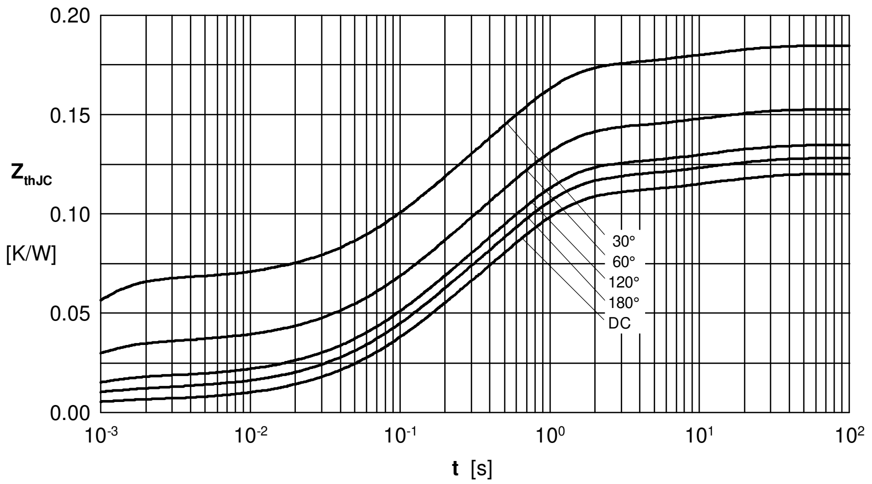


Fig. 9 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.120
180°	0.128
120°	0.135
60°	0.153
30°	0.185

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0058	0.00054
2	0.0310	0.09800
3	0.0720	0.54000
4	0.0112	12.0000

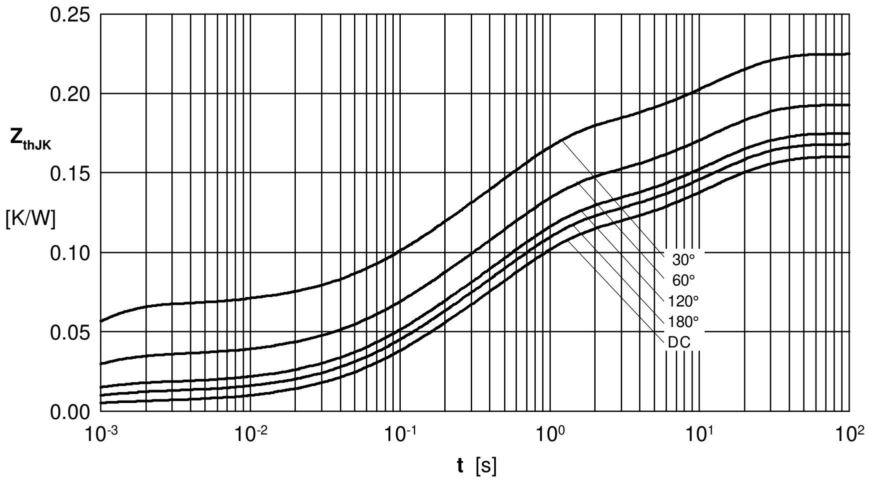


Fig. 10 Transient thermal impedance junction to heatsink (per diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.160
180°	0.168
120°	0.175
60°	0.193
30°	0.225

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0058	0.00054
2	0.0310	0.09800
3	0.0720	0.54000
4	0.0112	12.0000
5	0.0400	12.0000