Standard Rectifier Module

V_{RRM} = 2x 1200 V
I_{FAV} = 310 A
V_F = 1,03 V

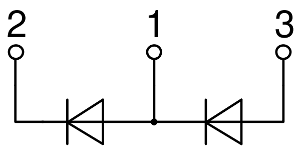
Phase leg

Part number

MDD312-12N1

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:

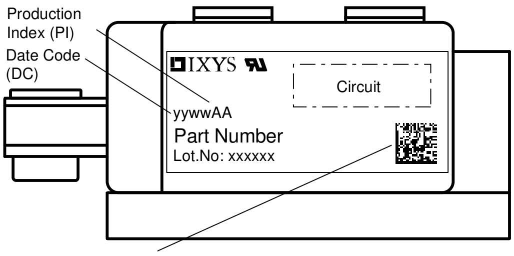
- Diode for main rectification
- For single and three phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

Package: Y1

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Rectifier					Ratings		
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	*max. non-repetitive reverse blocking voltage*		T_{VJ} = 25°C			1300	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			1200	V
I_R	*reverse current*	V_R = 1200 V	T_{VJ} = 25°C			500	µA
		V_R = 1200 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} ≤ 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)

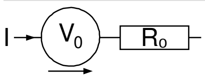
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD312-12N1	MDD312-12N1	Box	3	463426

Similar Part	Package	Voltage class
MDD312-14N1	Y1-CU	1400
MDD312-16N1	Y1-CU	1600
MDD312-18N1	Y1-CU	1800
MDD312-20N1	Y1-CU	2000

MDD312-22N1	Y1-CU	2200

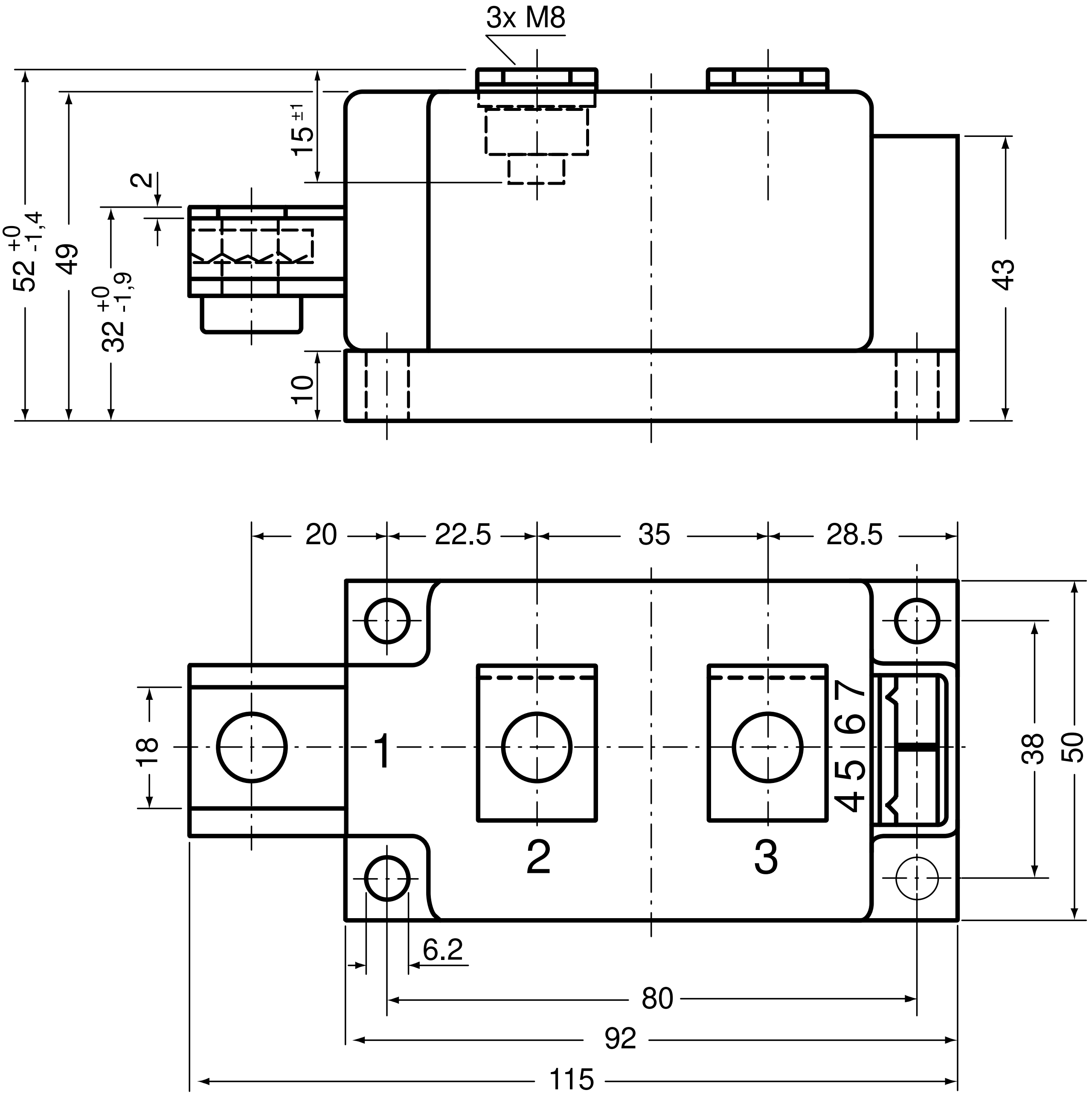
Equivalent Circuits for Simulation

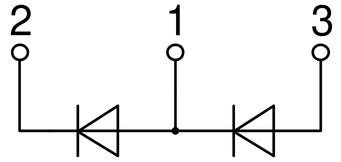
* *on die level* $T_{VJ} = 150°C$



		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

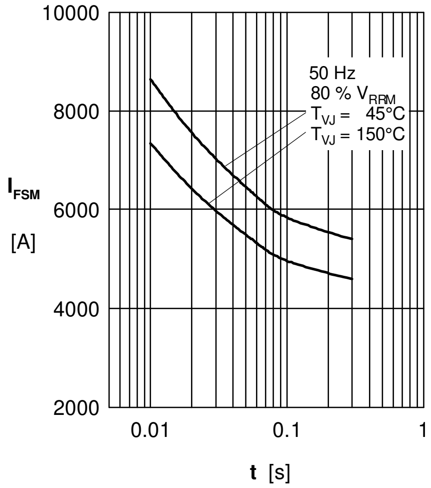


Fig. 1 Surge overload current
I_{FSM}: Crest value, t: duration

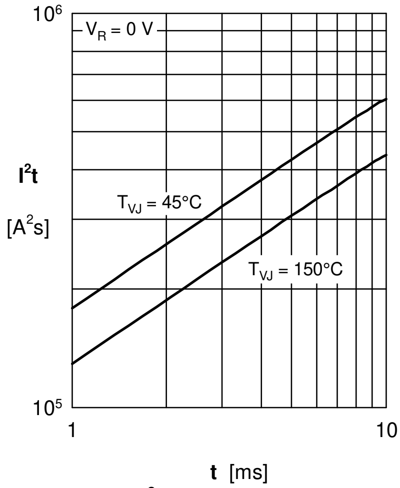


Fig. 2 I^2t versus time (1-10 ms)

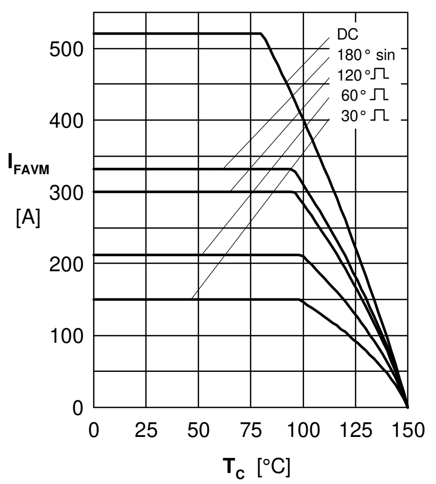


Fig. 3 Maximum forward current
at case temperature

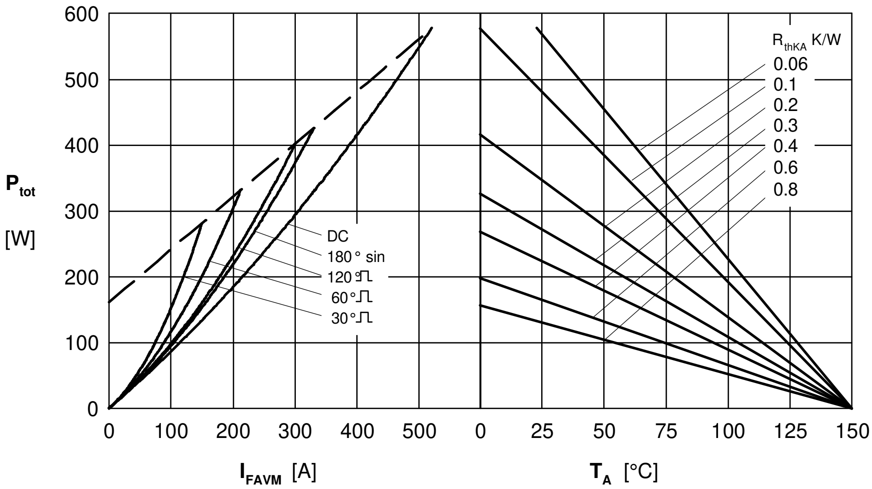


Fig. 4 Power dissipation vs. forward current & ambient temperature (per diode)

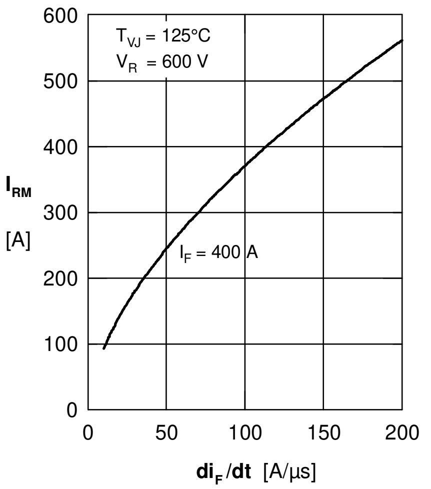


Fig. 5 Typ. peak reverse current

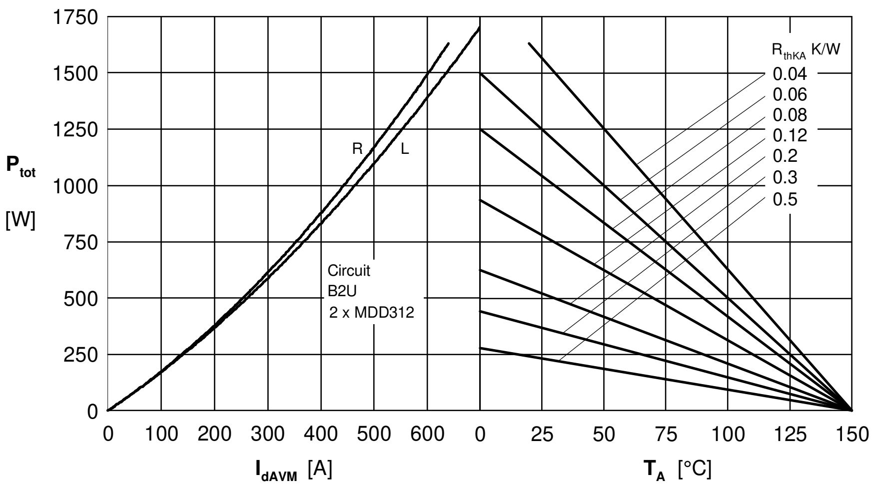


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current
and ambient temperature *R = resistive load, L = inductive load*

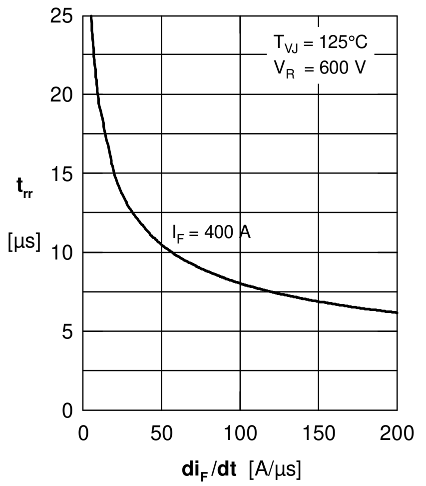


Fig. 7 Typ. recovery time t_{rr}
versus $-di_F/dt$

Rectifier

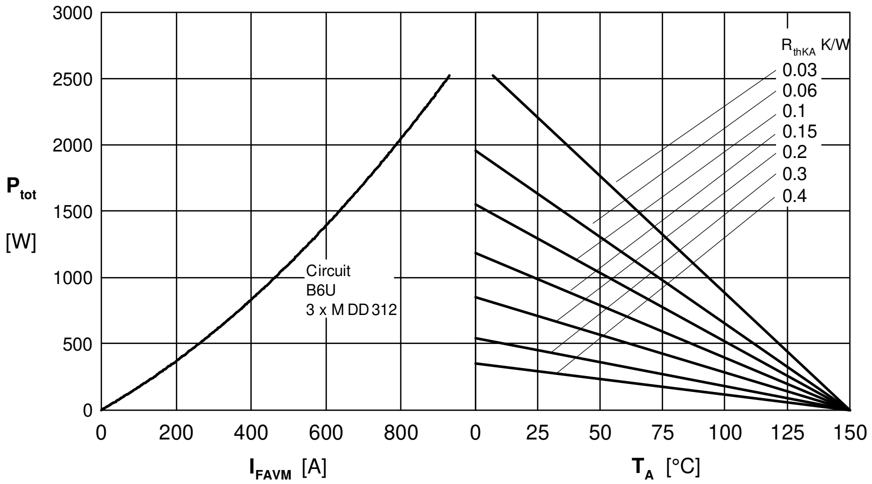


Fig. 8 Three phase rectifier bridge: Power dissipation vs. direct output current & ambient temperature

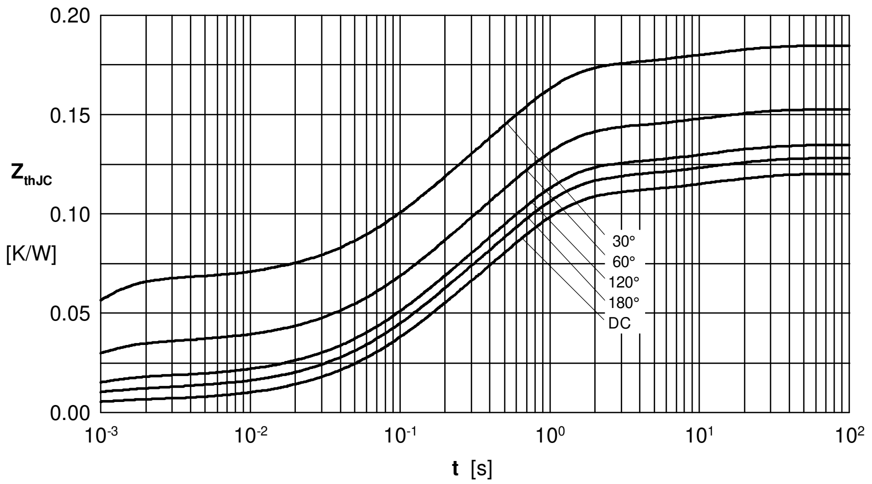


Fig. 9 Transient thermal impedance junction to case (per diode)

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

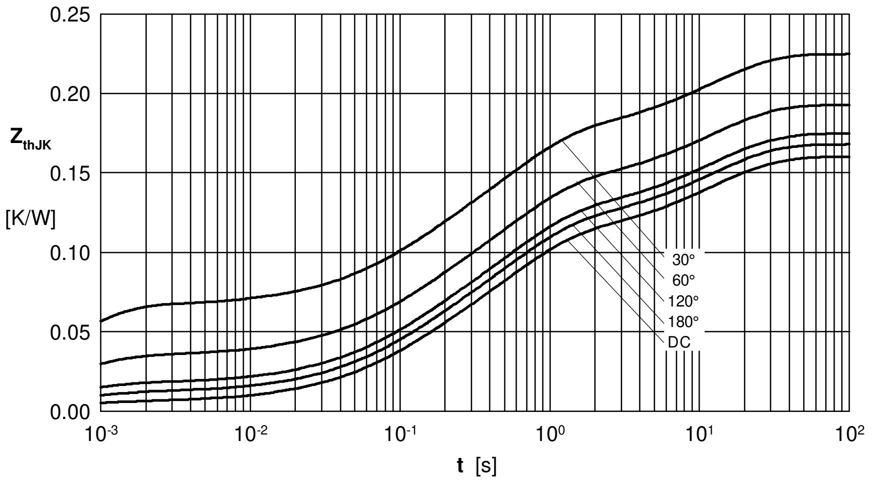


Fig. 10 Transient thermal impedance junction to heatsink (per diode)

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