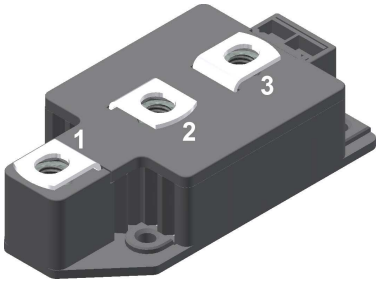
Standard Rectifier Module

V_{RRM}	= 2x 1400	V
I_{FAV}	= 300	A
V_F	= 1	V

Phase leg

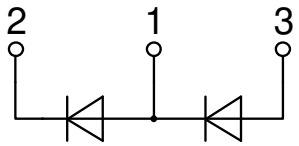
Part number

MDD310-14N1



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

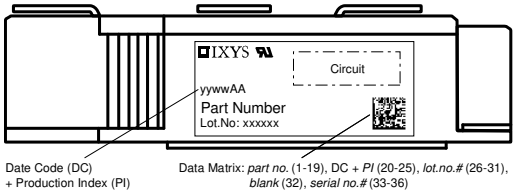
Package: Y2

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Rectifier

Symbol	Definition	Conditions		Ratings 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			1	mA
		V_R = 1400 V	T_{VJ} = 150°C			20	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			1.00	V
		I_F = 600 A				1.29	V
I_{FAV}	*average forward current*	T_C = 100°C	T_{VJ} = 150°C			300	A
$I_{F(RMS)}$	*RMS forward current*	180° sine				480	A
V_{F0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.75	V
r_F	*slope resistance* }					0.63	mΩ
R_{thJC}	*thermal resistance junction to case*					0.13	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.04		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			960	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			11.5	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			12.4	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			9.78	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			10.6	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			661.3	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			641.7	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			477.8	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			463.5	kA²s
C_J	*junction capacitance*	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°C		381		pF

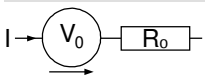
Package Y2				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal				600	A
T_{VJ}	*virtual junction temperature*			-40		150	°C
T_{op}	*operation temperature*			-40		125	°C
T_{stg}	*storage temperature*			-40		125	°C
Weight					254		g
M_D	*mounting torque*			2.5		5	Nm
M_T	*terminal torque*			12		15	Nm
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*		*terminal to terminal*	13.0			mm
$d_{Spb/Apb}$			*terminal to backside*	13.0			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3600			V
		t = 1 minute		3000			V



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD310-14N1	MDD310-14N1	Box	2	429163

Equivalent Circuits for Simulation

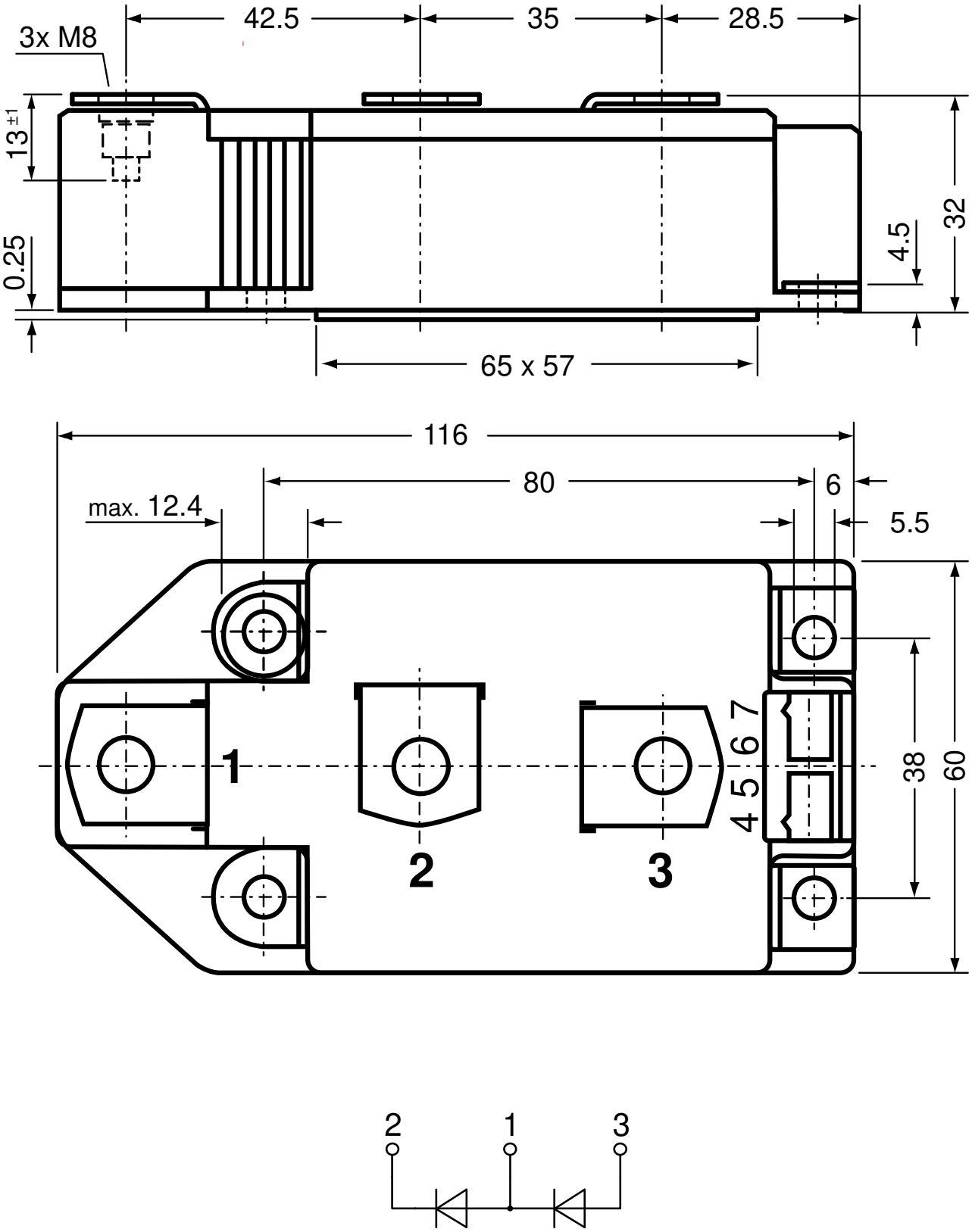
** on die level* T_{VJ} = 150°C



Rectifier

$V_{0\,max}$	*threshold voltage*	0.75	V
$R_{0\,max}$	*slope resistance **	0.34	mΩ

Outlines Y2



Rectifier

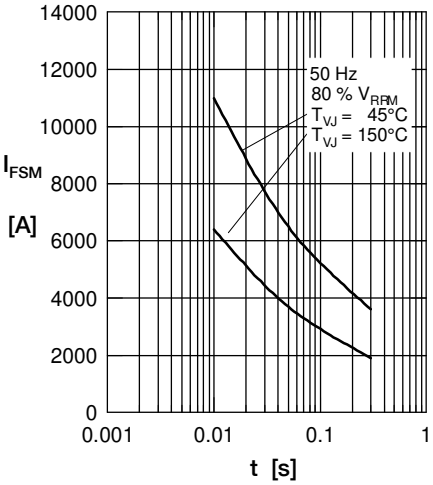


Fig. 1 Surge overload current
I_{FSM}: Crest value, t: duration

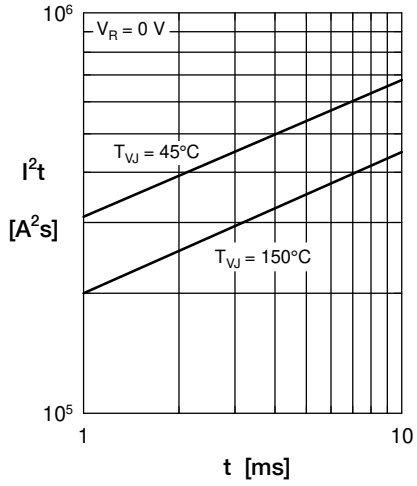


Fig. 2 I^2t versus time (1-10 ms)

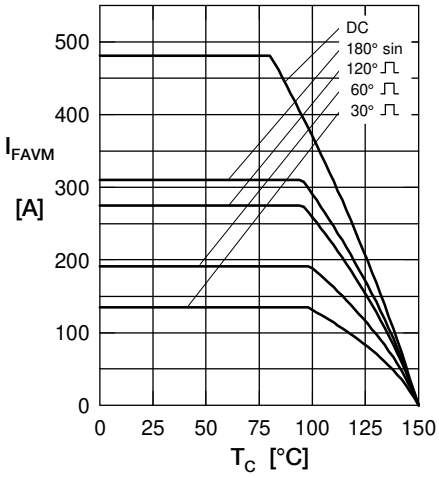


Fig. 3 Maximum forward current at case temperature

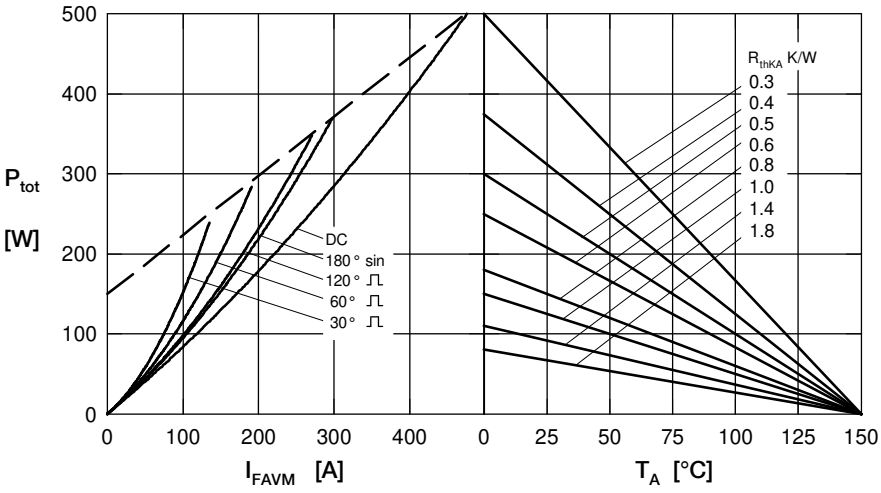


Fig. 4 Power dissipation versus forward current and ambient temperature (per diode)

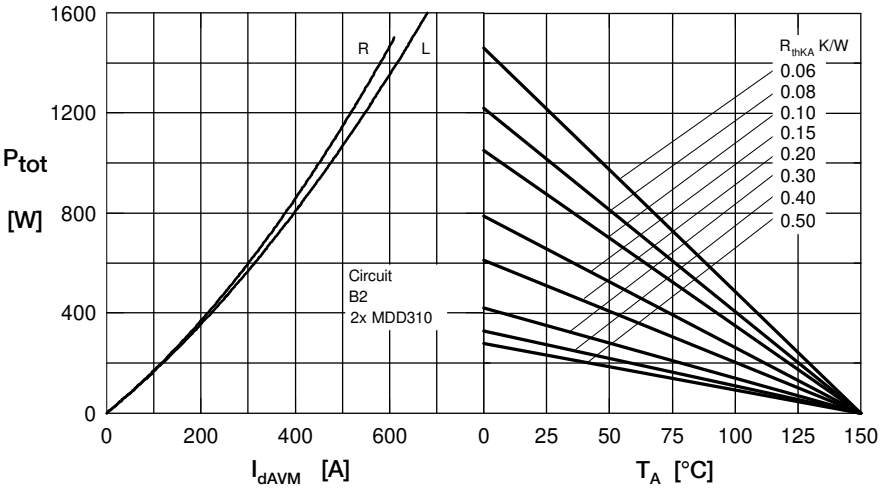


Fig. 5 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature *R = resistive load, L = inductive load*

Rectifier

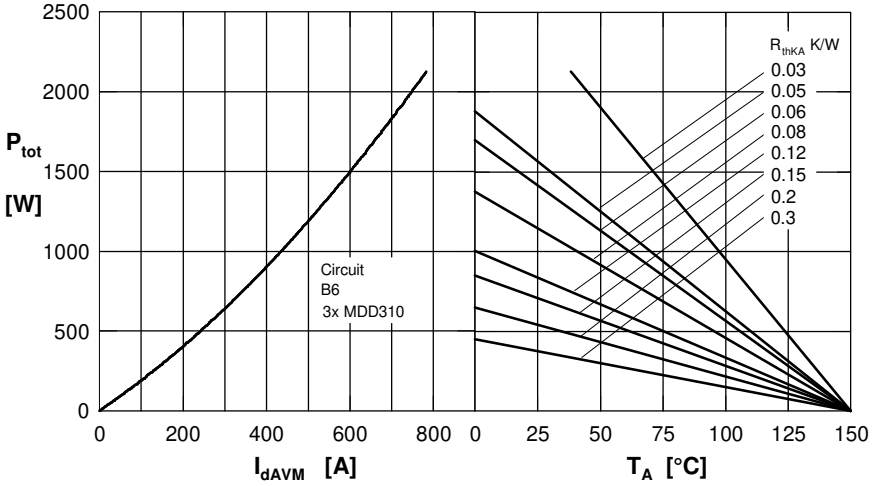
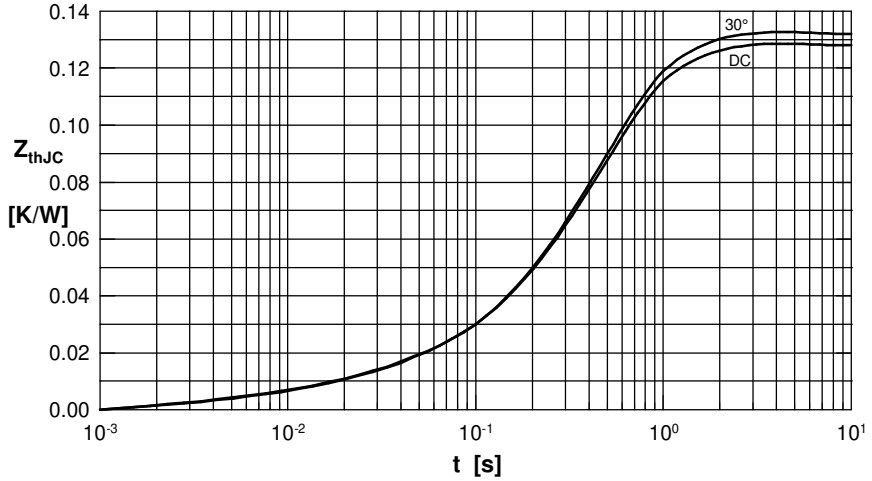


Fig.6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature



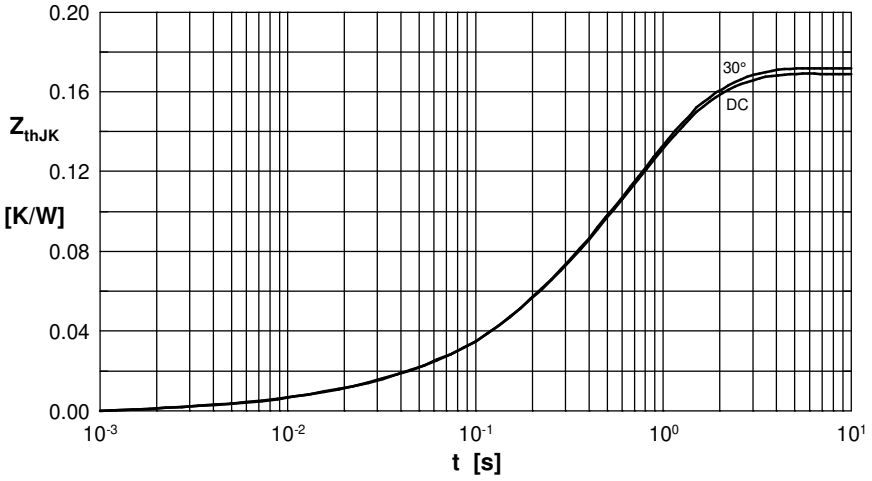
R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.129
180°	0.131
120°	0.132
60°	0.132
30°	0.133

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.0035	0.0099
2	0.0165	0.1680
3	0.1091	0.4560

Fig. 7 Transient thermal impedance junction to case (per diode)



R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.169
180°	0.171
120°	0.172
60°	0.172
30°	0.173

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0035	0.0099
2	0.0165	0.1680
3	0.1091	0.4560
4	0.0400	1.3600

Fig. 8 Transient thermal impedance junction to heatsink (per diode)