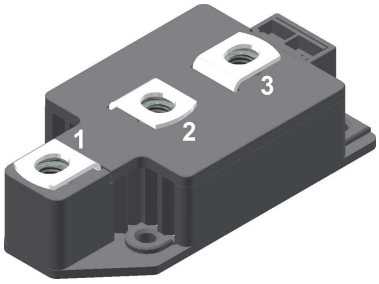
Standard Rectifier Module

V_{RRM} = 2x 1800 V
I_{FAV} = 300 A
V_F = 1 V

Phase leg

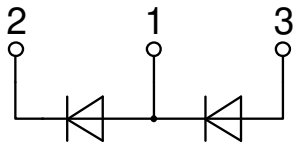
Part number

MDD310-18N1



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

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.

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Rectifier

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
V_{RSM}	*max. non-repetitive reverse blocking voltage*		T_{VJ} = 25°C			1900	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			1800	V
I_R	*reverse current*	V_R = 1800 V	T_{VJ} = 25°C			1	mA
		V_R = 1800 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

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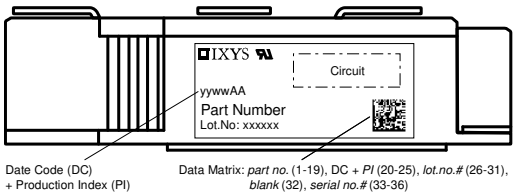
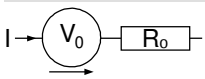
Package Y2				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal				600	A
T_{VJ}	*virtual junction temperature*			-40		150	°C
T_{op}	*operation temperature*			-40		125	°C
T_{stg}	*storage temperature*			-40		125	°C
Weight					254		g
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	MDD310-18N1	MDD310-18N1	Box	2	463973

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

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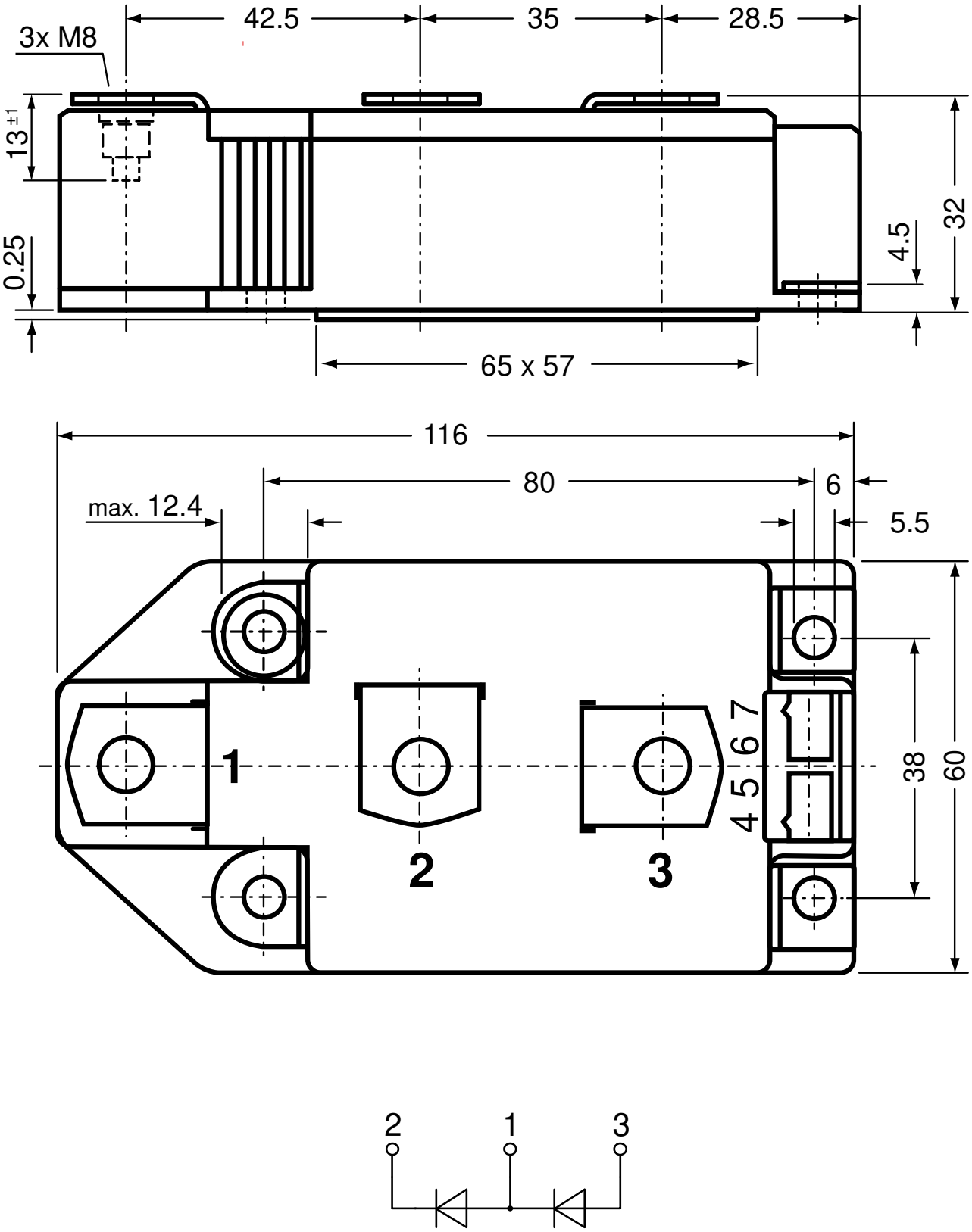
Outlines Y2



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Rectifier

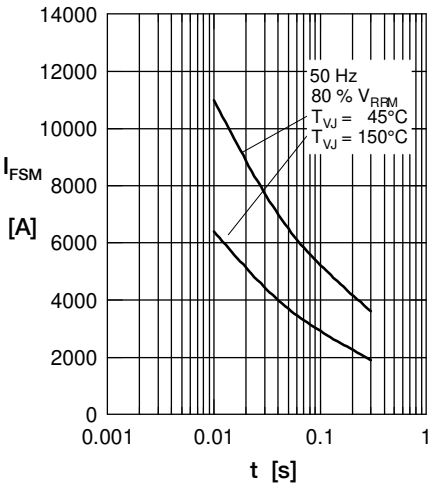

Fig. 1 Surge overload current
I_{FSM}: Crest value, t: duration

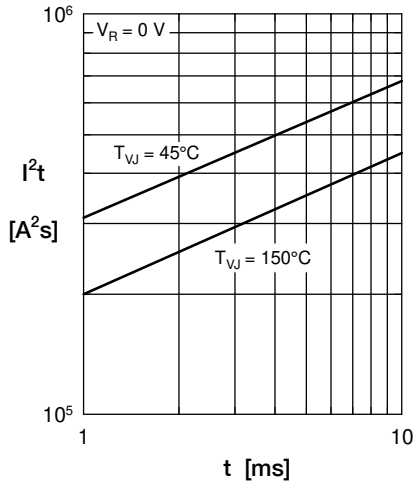

Fig. 2 I^2t versus time (1-10 ms)

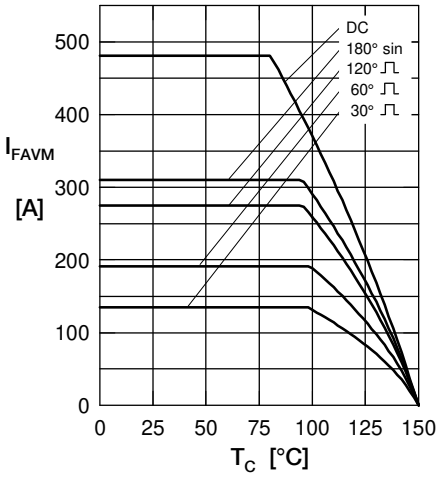

Fig. 3 Maximum forward current at case temperature

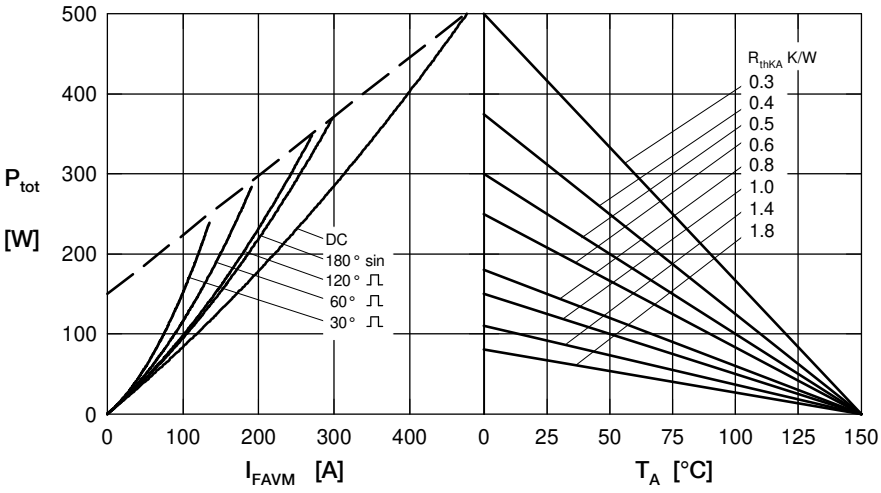

Fig. 4 Power dissipation versus forward current and ambient temperature (per diode)

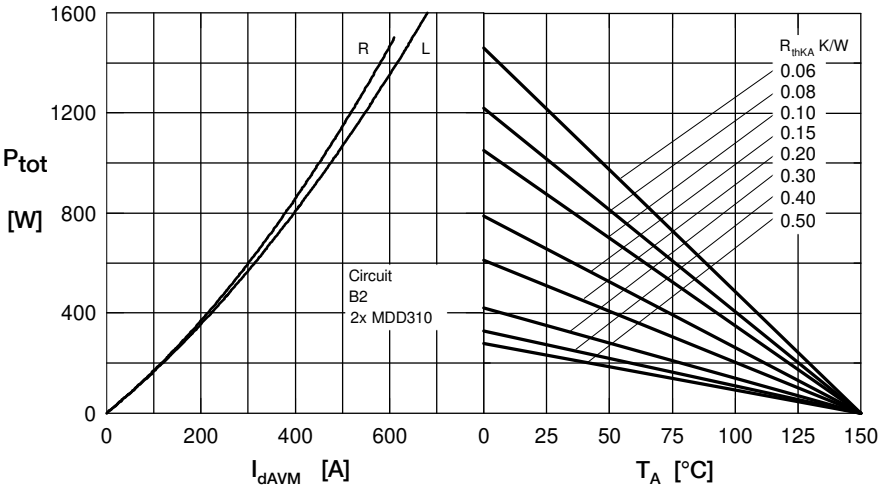

Fig. 5 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature *R = resistive load, L = inductive load*

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Rectifier

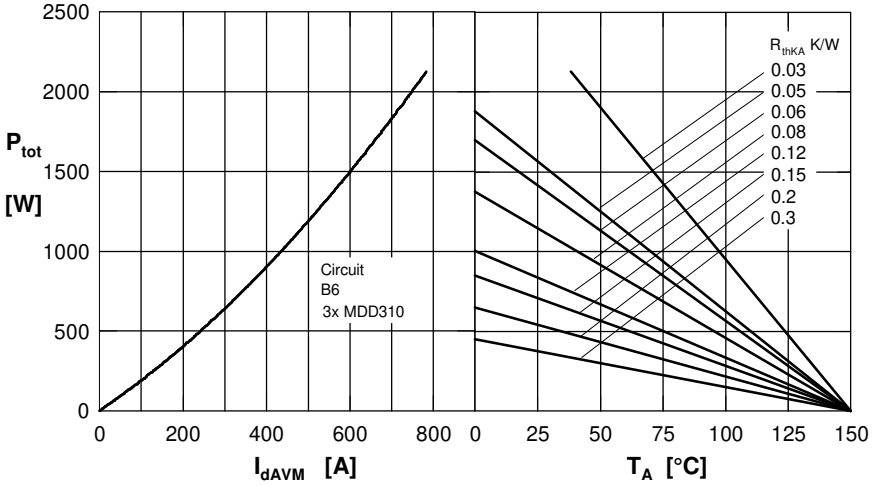
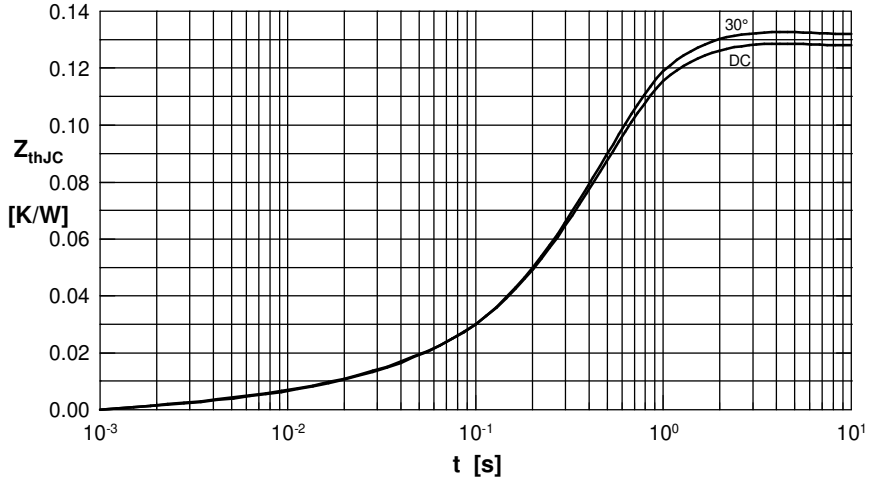


Fig.6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature



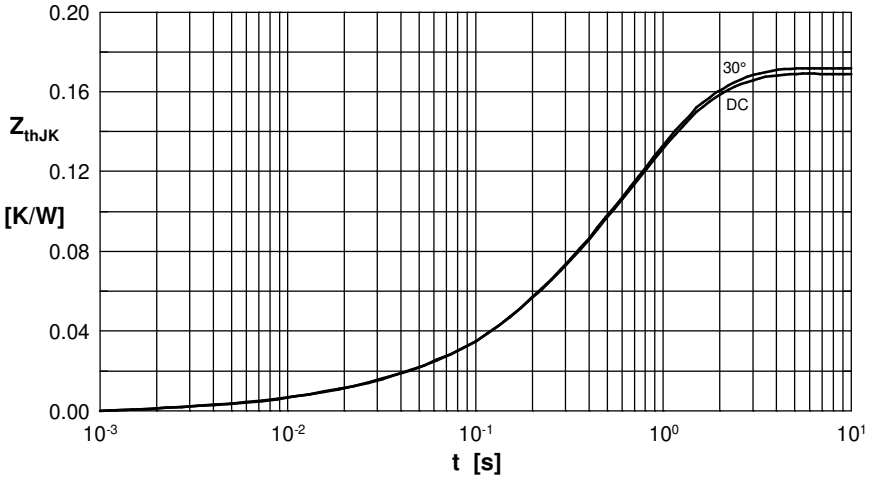
R_{thJC} for various conduction angles d:

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)

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