

# Standard Rectifier Module

$$V_{RRM} = 2 \times 1600 \text{ V}$$

$$I_{FAV} = 300 \text{ A}$$

$$V_F = 1 \text{ V}$$

Phase leg

Part number

**MDD310-16N1**



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

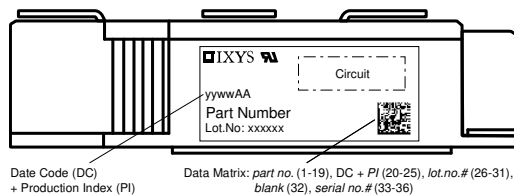
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Rectifier				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM}$	max. non-repetitive reverse blocking voltage				1700	V	
$V_{RRM}$	max. repetitive reverse blocking voltage				1600	V	
$I_R$	reverse current	$V_R = 1600\text{ V}$			1	mA	
		$V_R = 1600\text{ V}$			20	mA	
$V_F$	forward voltage drop	$I_F = 300\text{ A}$			1.13	V	
		$I_F = 600\text{ A}$			1.33	V	
		$I_F = 300\text{ A}$	$T_{VJ} = 125^\circ\text{C}$			1.00	V
		$I_F = 600\text{ A}$				1.29	V
$I_{FAV}$	average forward current	$T_C = 100^\circ\text{C}$			300	A	
$I_{F(RMS)}$	RMS forward current	180° sine			480	A	
$V_{F0}$	threshold voltage	} for power loss calculation only			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		$T_C = 25^\circ\text{C}$		960	W	
$I_{FSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^\circ\text{C}$		11.5	kA	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		12.4	kA	
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^\circ\text{C}$		9.78	kA	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		10.6	kA	
$I^2t$	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^\circ\text{C}$		661.3	kA <sup>2</sup> s	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		641.7	kA <sup>2</sup> s	
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^\circ\text{C}$		477.8	kA <sup>2</sup> s	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		463.5	kA <sup>2</sup> s	
$C_J$	junction capacitance	$V_R = 400\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^\circ\text{C}$		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	
<b>Weight</b>					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	3600			V	
		t = 1 minute	3000			V	



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD310-16N1	MDD310-16N1	Box	2	429198

Similar Part	Package	Voltage class
MDD310-12N1	Y2-DCB	1200
MDD310-14N1	Y2-DCB	1400
MDD310-18N1	Y2-DCB	1800
MDD310-20N1	Y2-DCB	2000

MDD310-22N1	Y2-DCB	2200
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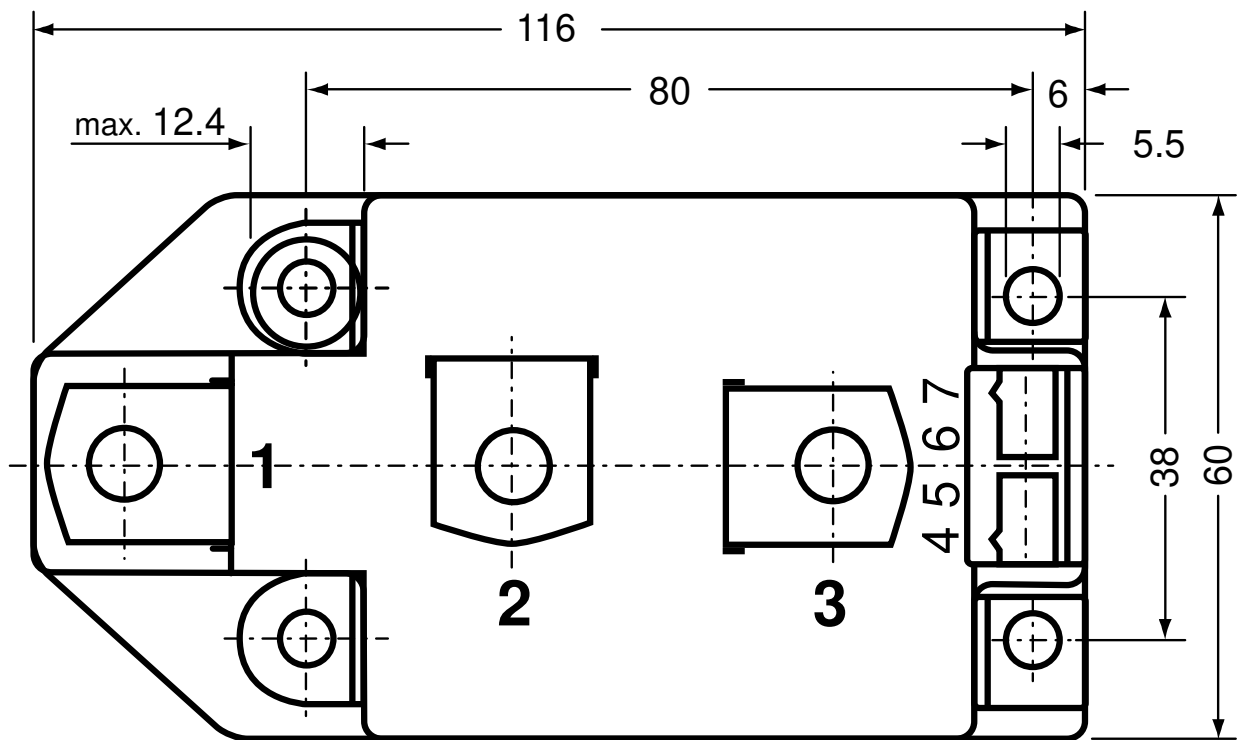
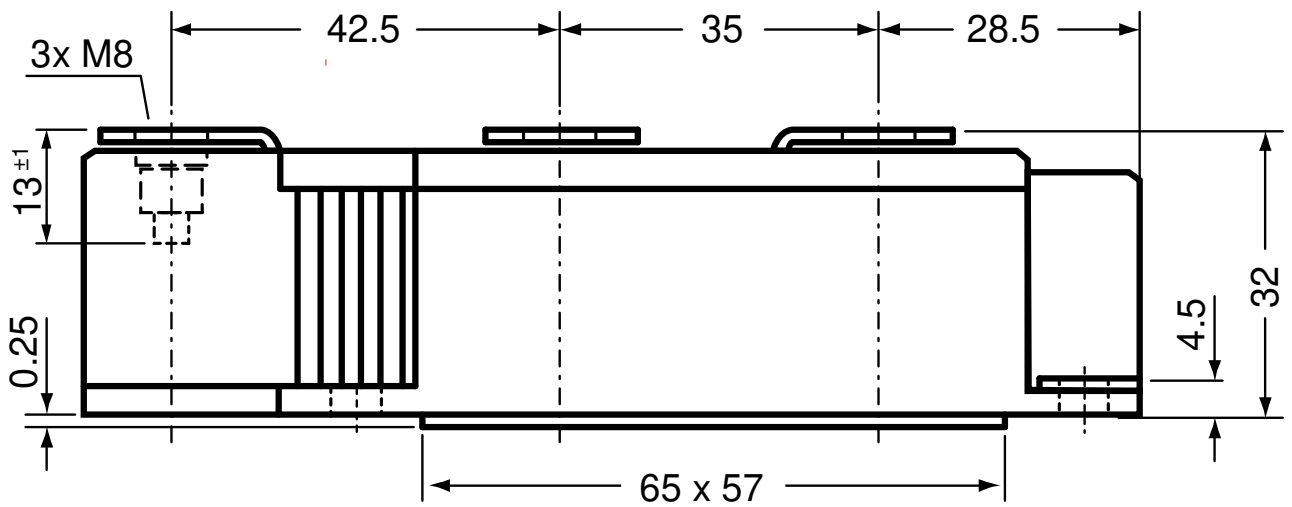
**Equivalent Circuits for Simulation**
*\* on die level*
 $T_{VJ} = 150^{\circ}\text{C}$ 

**Rectifier**

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



Outlines Y2



**Rectifier**

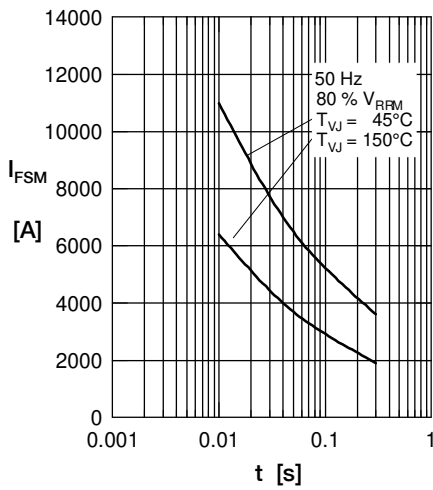


Fig. 1 Surge overload current  
 $I_{FSM}$ : Crest value,  $t$ : duration

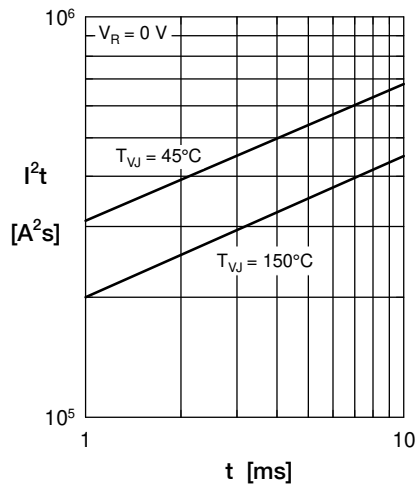


Fig. 2  $I^2t$  versus time (1-10 ms)

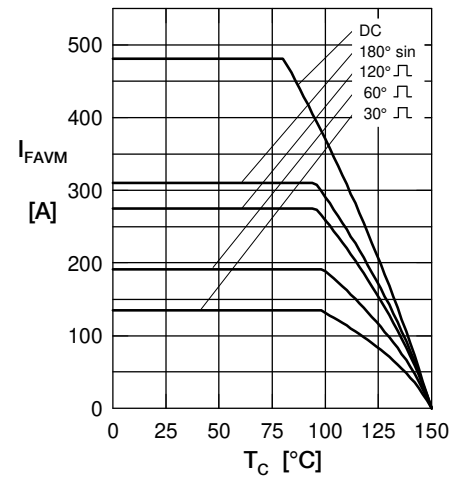


Fig. 3 Maximum forward current at case temperature

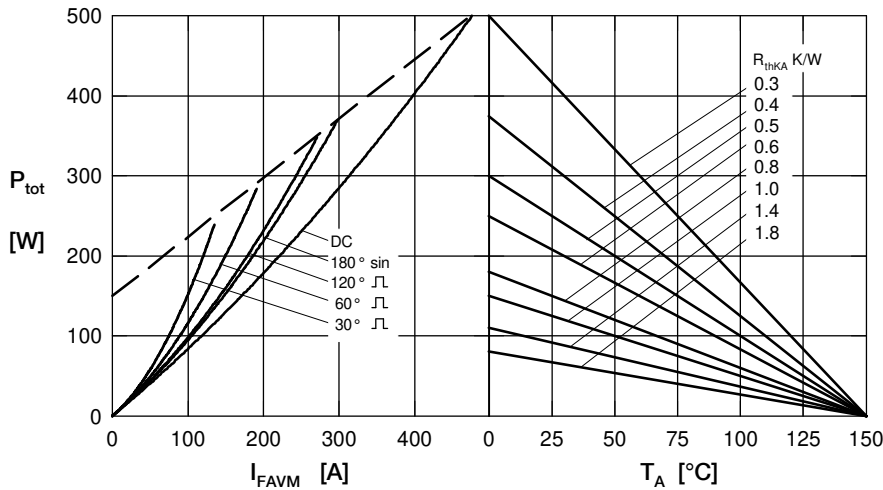


Fig. 4 Power dissipation versus forward current and ambient temperature (per diode)

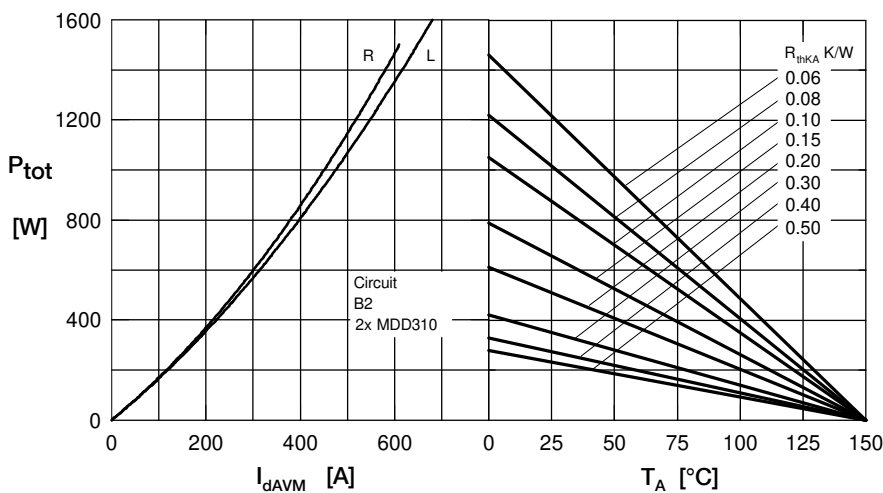


Fig. 5 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature  $R$  = resistive load,  $L$  = inductive load