

# Standard Rectifier Module

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

$$I_{FAV} = 608\text{ A}$$

$$V_F = 1,01\text{ V}$$


## Single Diode

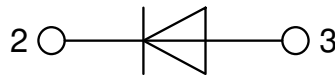
Part number

**MDO600-16N1**



Backside: isolated

 E72873



### Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour

### 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

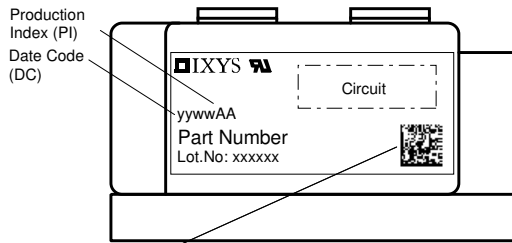
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM}$	max. non-repetitive reverse blocking voltage					1700	V
$V_{RRM}$	max. repetitive reverse blocking voltage					1600	V
$I_R$	reverse current	$V_R = 1600$ V		$T_{VJ} = 25^\circ\text{C}$		1	mA
		$V_R = 1600$ V		$T_{VJ} = 140^\circ\text{C}$		30	mA
$V_F$	forward voltage drop	$I_F = 600$ A		$T_{VJ} = 25^\circ\text{C}$		1,12	V
		$I_F = 1200$ A				1,30	V
		$I_F = 600$ A		$T_{VJ} = 125^\circ\text{C}$		1,01	V
		$I_F = 1200$ A				1,23	V
$I_{FAV}$	average forward current	$T_C = 85^\circ\text{C}$		$T_{VJ} = 140^\circ\text{C}$		608	A
		180° sine	d = 0.5				
$V_{FO}$	threshold voltage	} for power loss calculation only		$T_{VJ} = 140^\circ\text{C}$		0,76	V
$r_F$	slope resistance					0,32	mΩ
$R_{thJC}$	thermal resistance junction to case					0,072	K/W
$R_{thCH}$	thermal resistance case to heatsink				0,024		K/W
$P_{tot}$	total power dissipation			$T_C = 25^\circ\text{C}$		1600	W
$I_{FSM}$	max. forward surge current	t = 10 ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		15,0	kA
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		16,2	kA
		t = 10 ms; (50 Hz), sine		$T_{VJ} = 140^\circ\text{C}$		12,8	kA
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		13,8	kA
$I^2t$	value for fusing	t = 10 ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		1,13	MA <sup>2</sup> s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		1,09	MA <sup>2</sup> s
		t = 10 ms; (50 Hz), sine		$T_{VJ} = 140^\circ\text{C}$		812,8	kA <sup>2</sup> s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		788,8	kA <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 400$ V; f = 1 MHz		$T_{VJ} = 25^\circ\text{C}$		762	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		140	°C	
$T_{op}$	operation temperature		-40		125	°C	
$T_{stg}$	storage temperature		-40		125	°C	
<b>Weight</b>					650	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	25,0			mm	
$V_{ISOL}$	isolation voltage	t = 1 second	4800			V	
		t = 1 minute	4000			V	



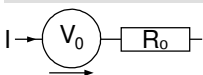
Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDO600-16N1	MDO600-16N1	Box	2	509707

**Equivalent Circuits for Simulation**

\* on die level

$T_{VJ} = 140^{\circ}C$

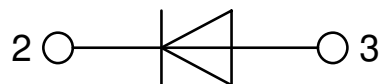
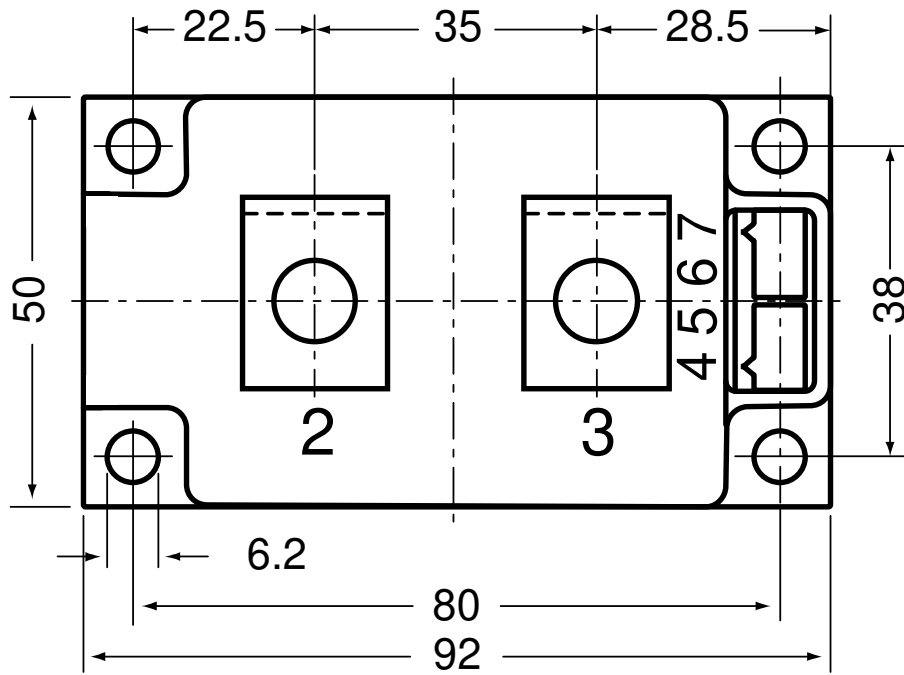
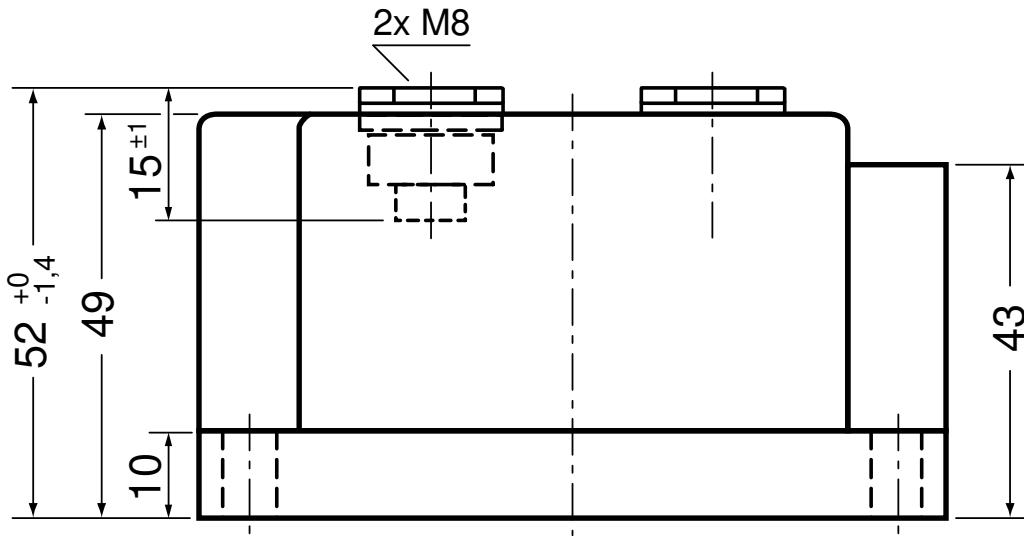


**Rectifier**

$V_{0\ max}$	threshold voltage	0,76	V
$R_{0\ max}$	slope resistance *	0,13	mΩ



Outlines Y1



**Rectifier**

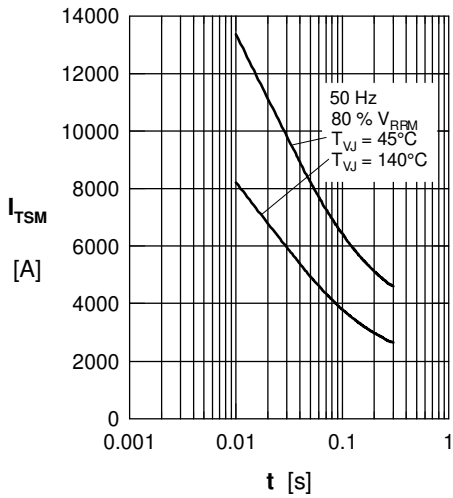


Fig. 1 Surge overload current  
 $I_{FSM}$ : Crest value, t: duration

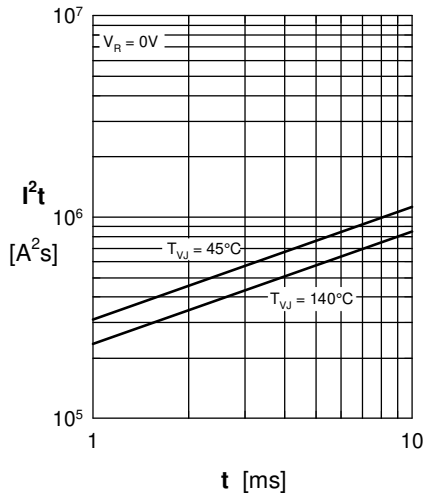


Fig. 2  $I^2t$  versus time (1-10 ms)

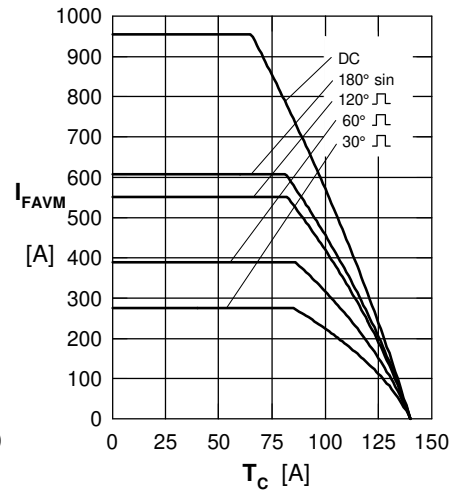


Fig. 3 Max. forward current at case temperature

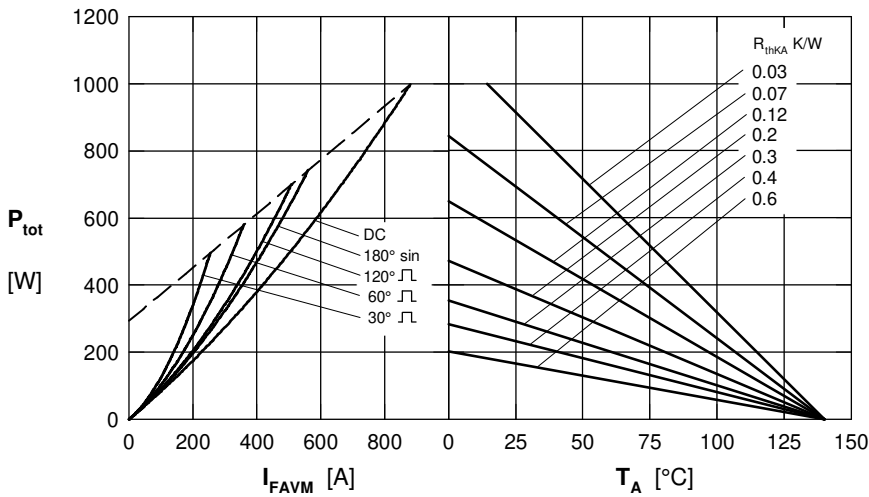


Fig. 4 Power dissipation vs. forward current and ambient temperature

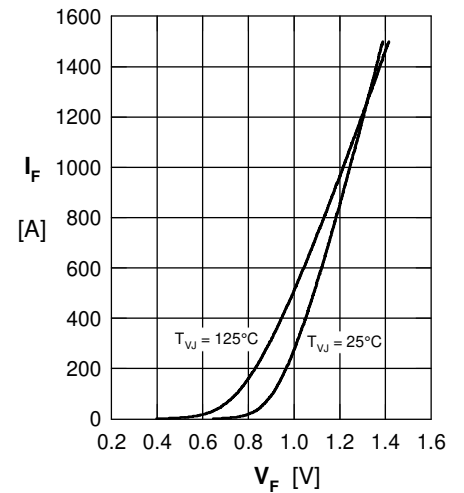


Fig. 5 Forward current  $I_F$  vs.  $V_F$

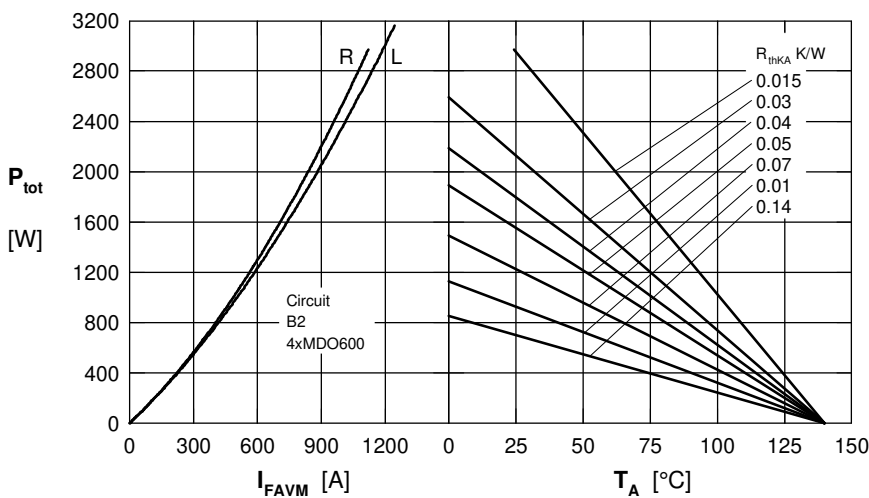


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature R = resistive load, L = inductive load

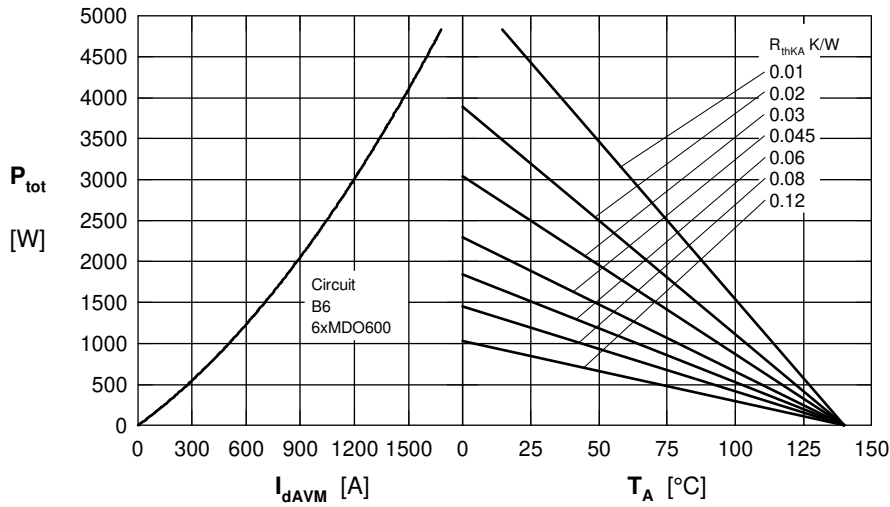
**Rectifier**


Fig. 7 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

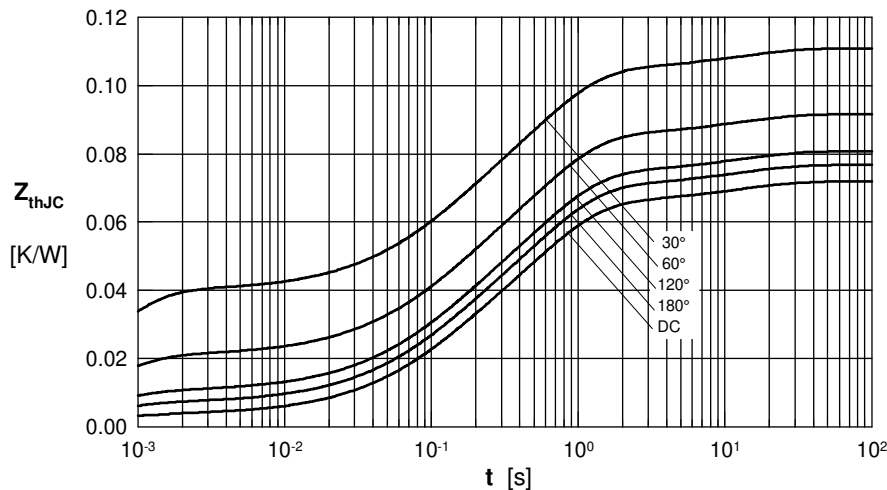


Fig. 8 Transient thermal impedance junction to case

$R_{thJC}$  for various conduction angles d:

d	$R_{thJC}$ (K/W)
DC	0.072
180°	0.0768
120°	0.081
60°	0.092
30°	0.111

Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.0035	0.0054
2	0.0186	0.098
3	0.0432	0.54
4	0.0067	12

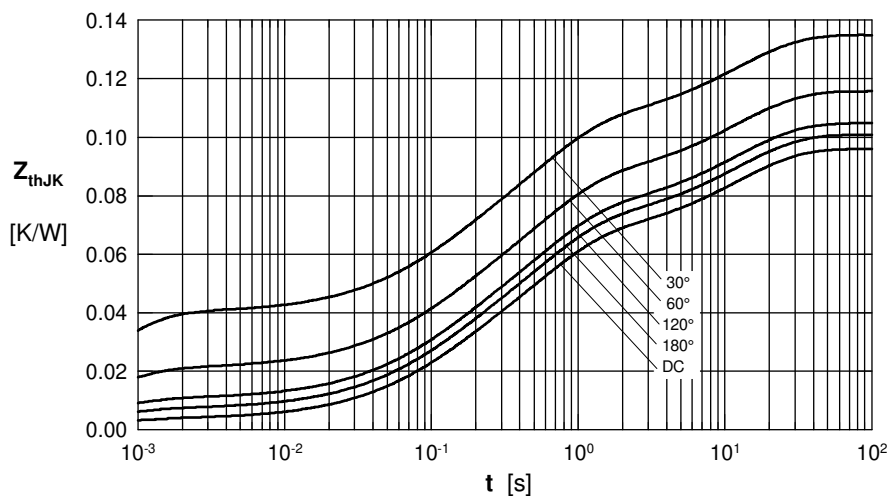


Fig. 9 Transient thermal impedance junction to heatsink

$R_{thJK}$  for various conduction angles d:

d	$R_{thJK}$ (K/W)
DC	0.096
180°C	0.1
120°C	0.105
60°C	0.116
30°C	0.135

Constants for  $Z_{thJK}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.0035	0.0054
2	0.0186	0.098
3	0.0432	0.54
4	0.067	12
5	0.024	12