

Standard Rectifier Module

$$V_{RRM} = 1200\text{ V}$$

$$I_{FAV} = 560\text{ A}$$

$$V_F = 0,98\text{ V}$$

Single Diode

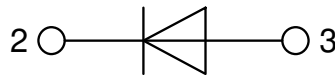
Part number

MDO500-12N1



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

Disclaimer Notice

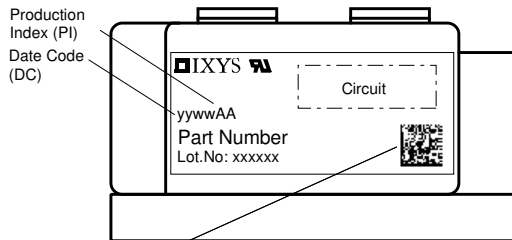
Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.



Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage					1300	V
V_{RRM}	max. repetitive reverse blocking voltage					1200	V
I_R	reverse current	$V_R = 1200\text{ V}$		$T_{VJ} = 25^\circ\text{C}$		1	mA
		$V_R = 1200\text{ V}$		$T_{VJ} = 140^\circ\text{C}$		30	mA
V_F	forward voltage drop	$I_F = 500\text{ A}$		$T_{VJ} = 25^\circ\text{C}$		1,09	V
		$I_F = 1000\text{ A}$				1,24	V
		$I_F = 500\text{ A}$		$T_{VJ} = 125^\circ\text{C}$		0,98	V
		$I_F = 1000\text{ A}$				1,17	V
I_{FAV}	average forward current	$T_C = 85^\circ\text{C}$		$T_{VJ} = 140^\circ\text{C}$		560	A
$I_{F(RMS)}$	RMS forward current	180° sine	d = 0.5				A
V_{F0}	threshold voltage			$T_{VJ} = 140^\circ\text{C}$		0,80	V
r_F	slope resistance					0,38	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		$V_R = 0\text{ V}$		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		$V_R = 0\text{ V}$		13,8	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		1,13	MA ² s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0\text{ V}$		1,09	MA ² s
		t = 10 ms; (50 Hz), sine		$T_{VJ} = 140^\circ\text{C}$		812,8	kA ² s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0\text{ V}$		788,8	kA ² s
C_J	junction capacitance	$V_R = 400\text{ V}; f = 1\text{ MHz}$		$T_{VJ} = 25^\circ\text{C}$		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
Weight				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	MDO500-12N1	MDO500-12N1	Box	2	464791

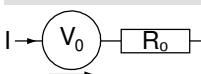
Similar Part	Package	Voltage class
MDO500-14N1	Y1-2-CU	1400
MDO500-16N1	Y1-2-CU	1600
MDO500-18N1	Y1-2-CU	1800
MDO500-20N1	Y1-2-CU	2000

MDO500-22N1	Y1-2-CU	2200
-------------	---------	------

Equivalent Circuits for Simulation

* on die level

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

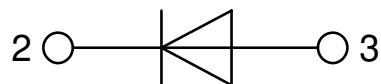
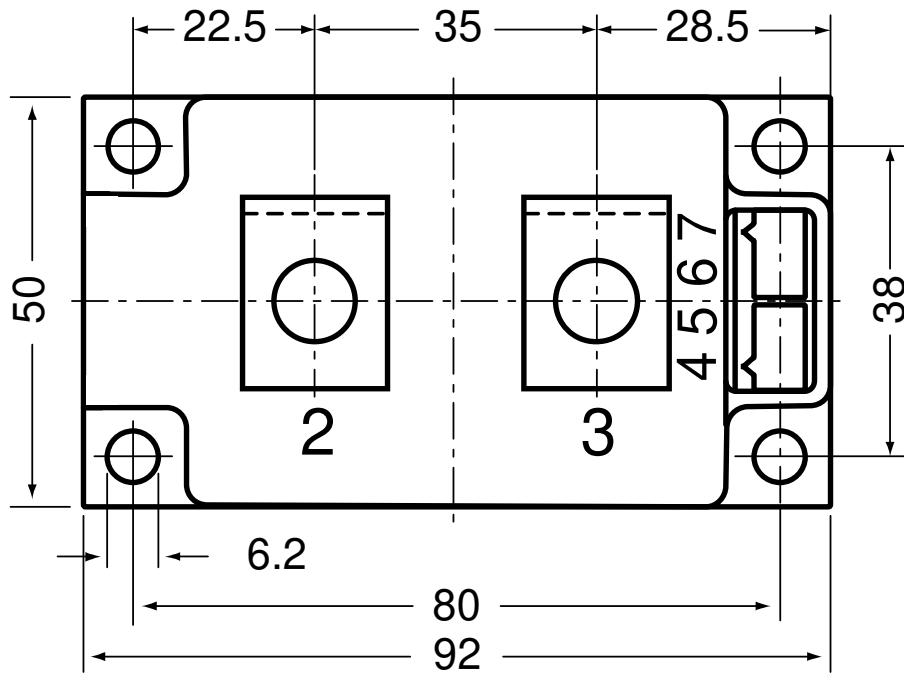
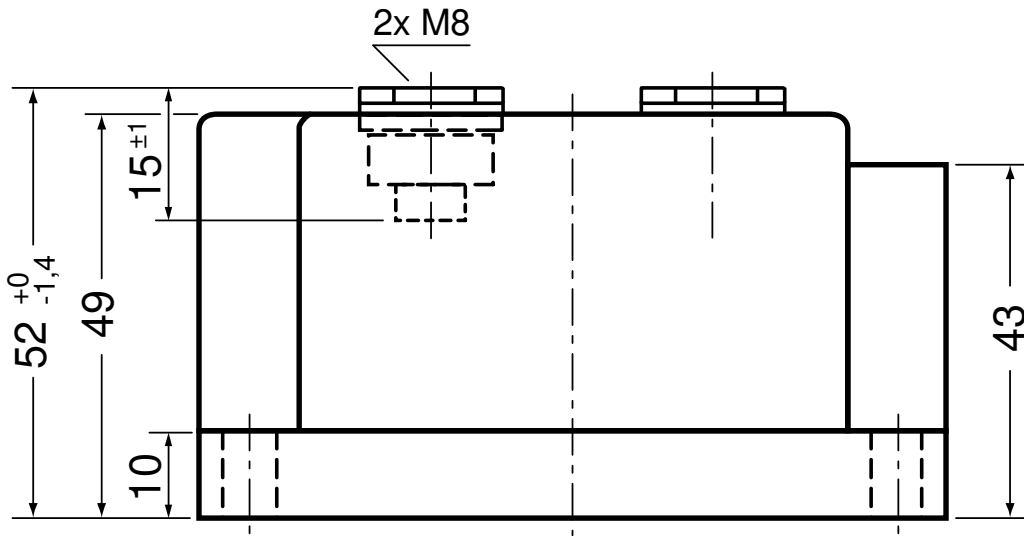


Rectifier

$V_{0\ max}$	threshold voltage	0,8	V
$R_{0\ max}$	slope resistance *	0,19	mΩ



Outlines Y1





Rectifier



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



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

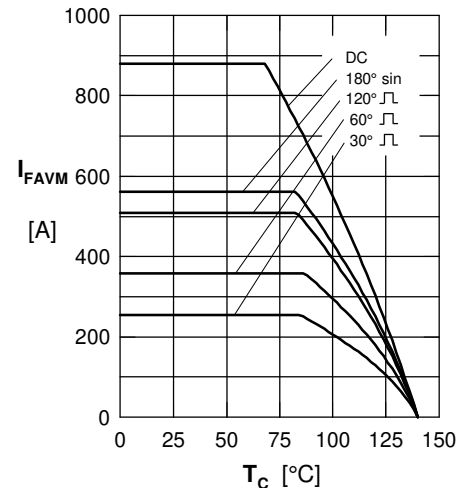


Fig. 3 Maximum forward current at case temperature

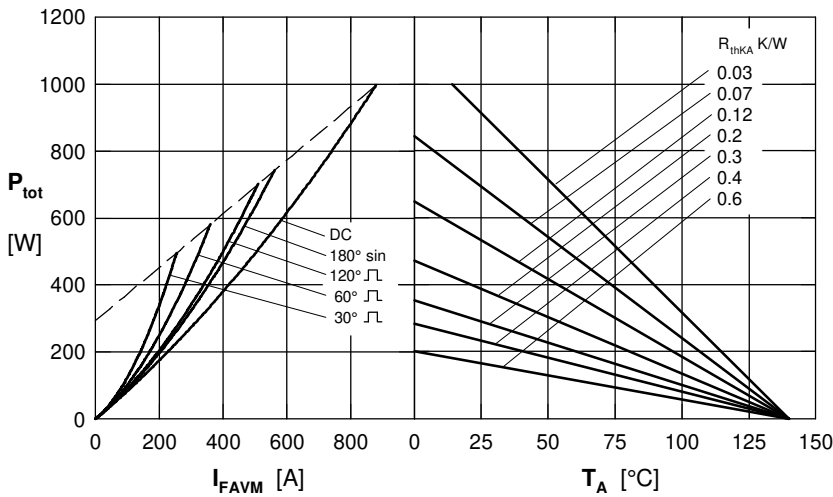


Fig. 4 Power dissipation vs. forward current and ambient temperature

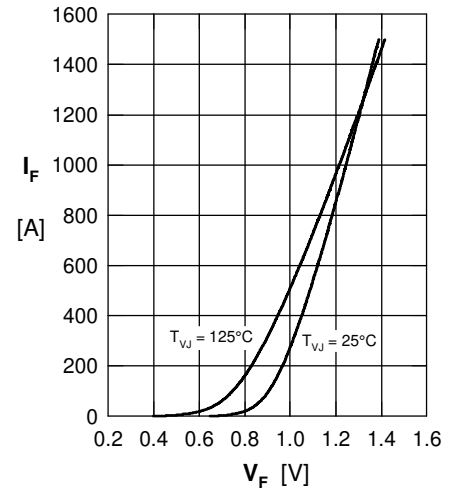


Fig. 5 Forward current I_F versus V_F

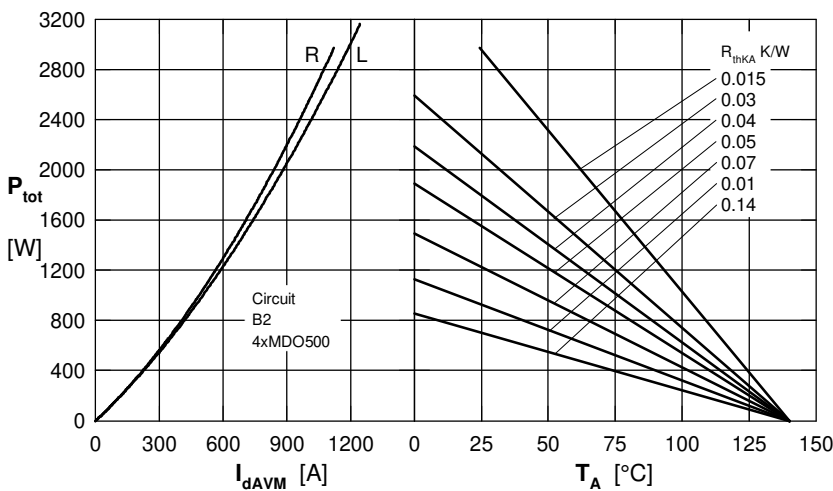


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature. R = resistive load, L = inductive load

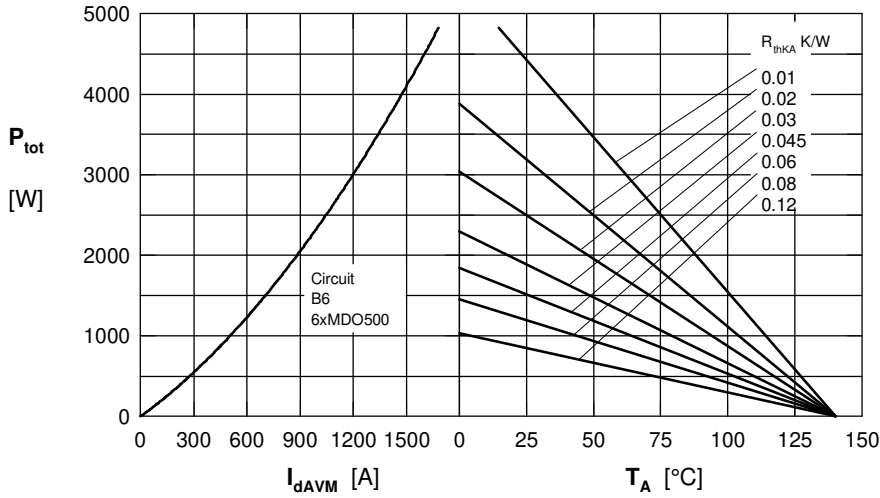
Rectifier


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

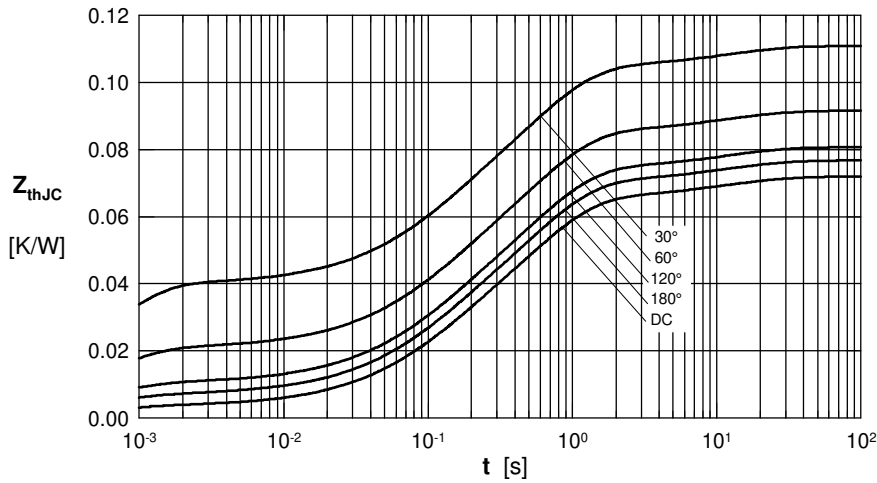


Fig. 7 Transient thermal impedance junction to case

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

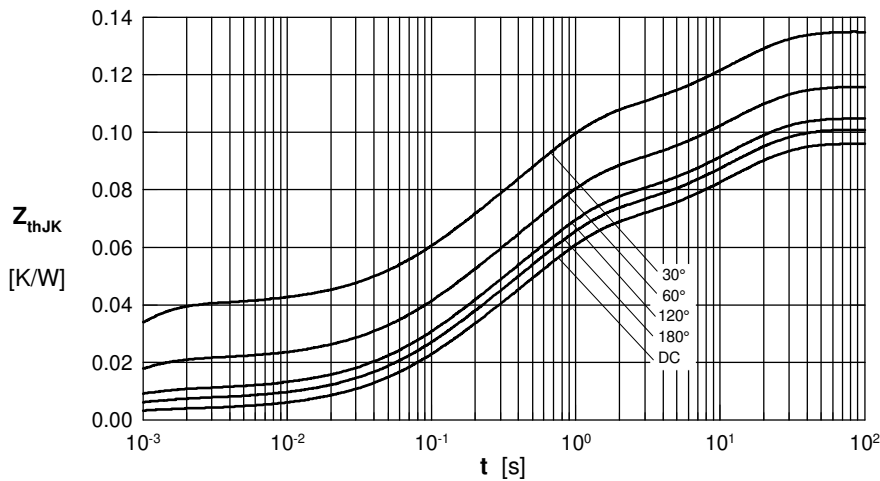


Fig. 8 Transient thermal impedance junction to heatsink

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.096
180°	0.1
120°	0.105
60°	0.116
30°	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	0.0067	12
5	0.024	12