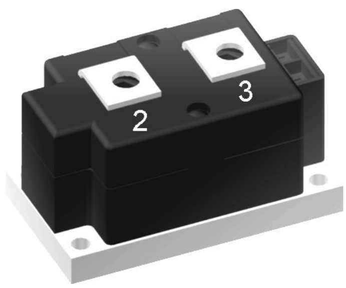
Standard Rectifier Module

V_{RRM} = 1600 V
I_{FAV} = 560 A
V_F = 0.98 V

Single Diode

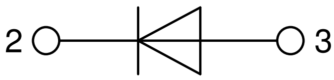
Part number

MDO500-16N1



Backside: isolated

E72873



Features / Advantages:

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

Applications:

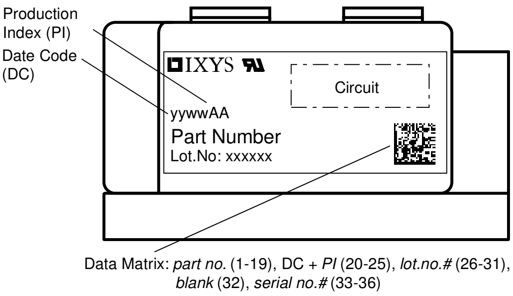
- Diode for main rectification
- For single and three phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

Package: Y1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Rectifier				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
V_{RSM}	*max. non-repetitive reverse blocking voltage*		T_{VJ} = 25°C			1700	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			1600	V
I_R	*reverse current*	V_R = 1600 V	T_{VJ} = 25°C			1	mA
		V_R = 1600 V	T_{VJ} = 140°C			30	mA
V_F	*forward voltage drop*	I_F = 500 A	T_{VJ} = 25°C			1.09	V
		I_F = 1000 A				1.24	V
		I_F = 500 A	T_{VJ} = 125°C			0.98	V
		I_F = 1000 A				1.17	V
I_{FAV}	*average forward current*	T_C = 85°C	T_{VJ} = 140°C			560	A
$I_{F(RMS)}$	*RMS forward current*	180° sine d = 0.5					A
V_{F0}	*threshold voltage*	*for power loss calculation only*	T_{VJ} = 140°C			0.80	V
r_F	*slope resistance*	*for power loss calculation only*				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°C			1600	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°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°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°C			1.13	MA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.09	MA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			812.8	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			788.8	kA²s
C_J	*junction capacitance*	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°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; 50/60 Hz, RMS; $I_{ISOL} \le 1$ mA	3600			V
		t = 1 minute	3000			V

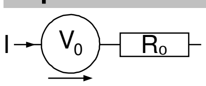


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDO500-16N1	MDO500-16N1	Box	3	464813

Similar Part	Package	Voltage class
MDO500-12N1	Y1-2-CU	1200
MDO500-14N1	Y1-2-CU	1400
MDO500-18N1	Y1-2-CU	1800
MDO500-20N1	Y1-2-CU	2000
MDO500-22N1	Y1-2-CU	2200

Equivalent Circuits for Simulation

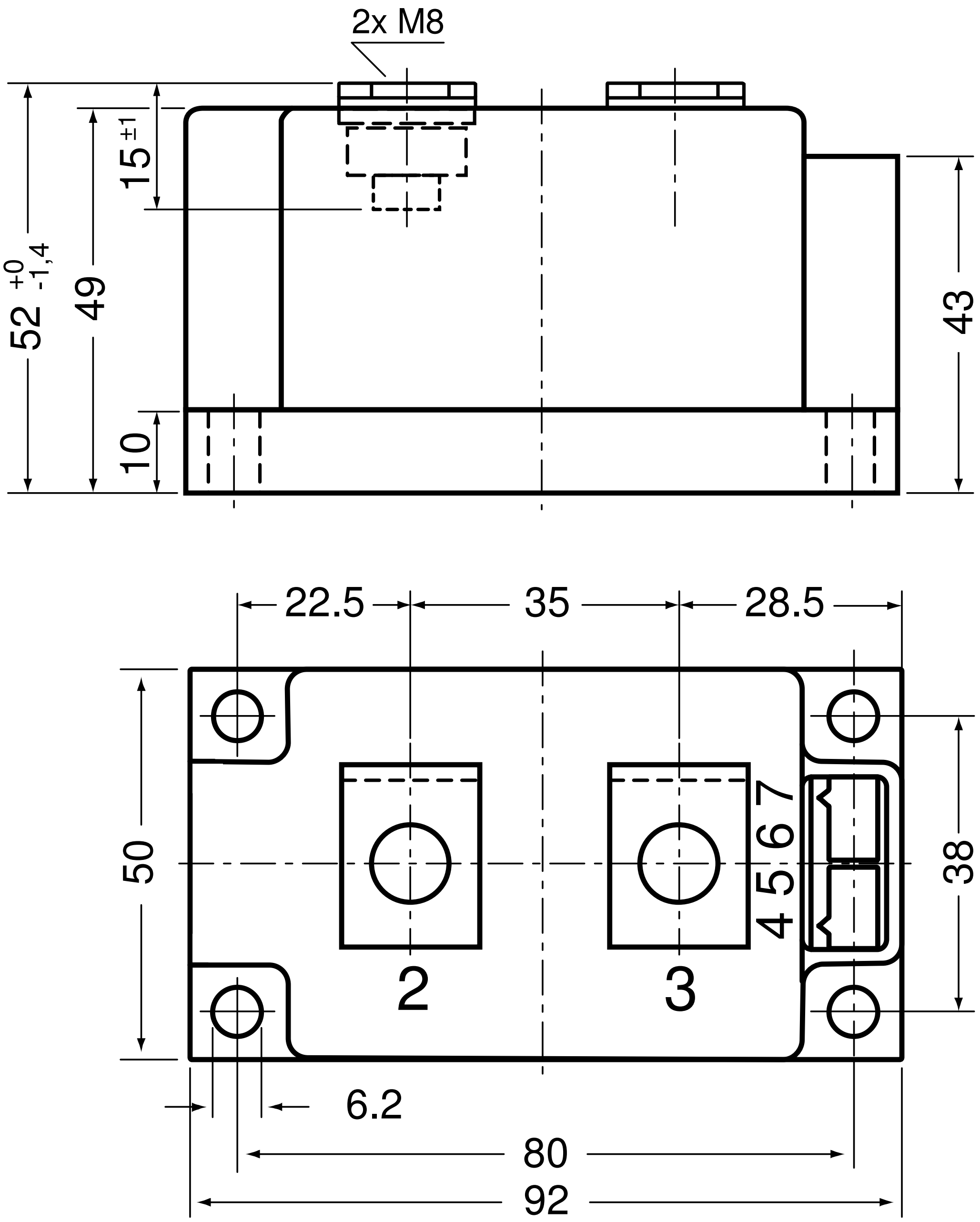
** on die level* $T_{VJ} = 140\,°C$

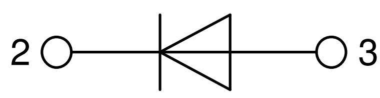


Rectifier

$V_{0\,max}$	*threshold voltage*	0.8	V
$R_{0\,max}$	*slope resistance **	0.19	mΩ

Outlines Y1





Rectifier

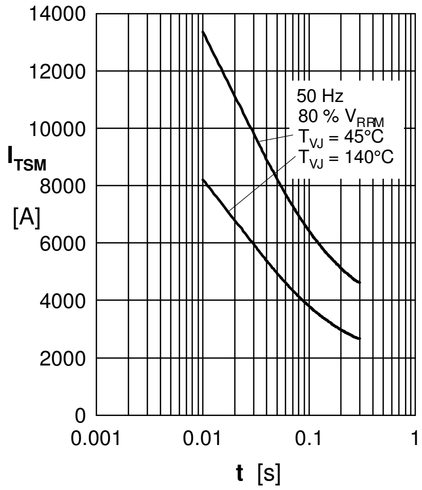


Fig. 1 Surge overload current
I_{FSM}: Crest value, t: duration

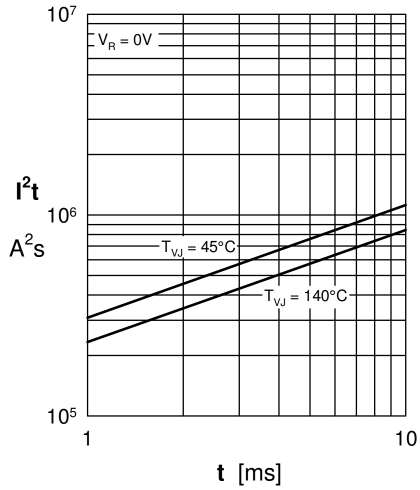


Fig. 2 I^2t versus time (1-10 ms)

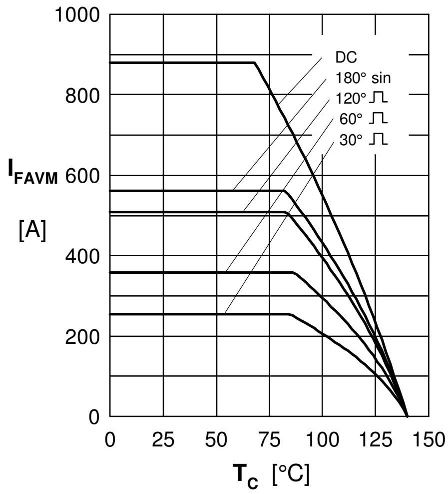


Fig. 3 Maximum forward current at case temperature

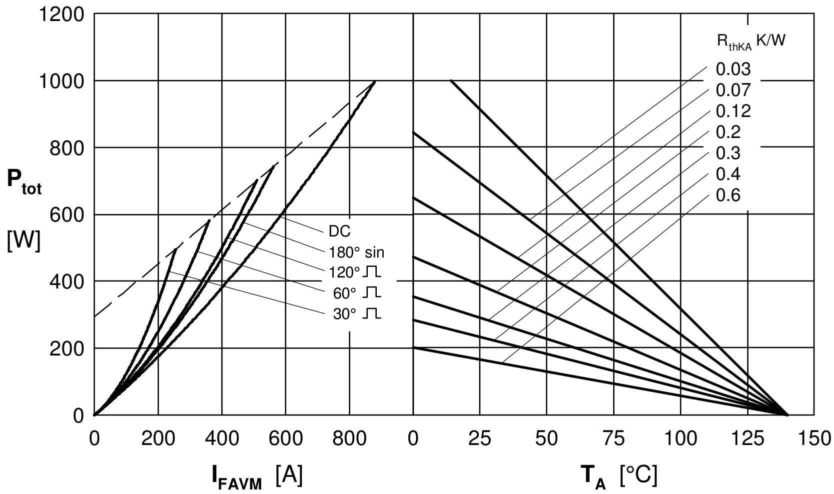


Fig. 4 Power dissipation vs. forward current and ambient temperature

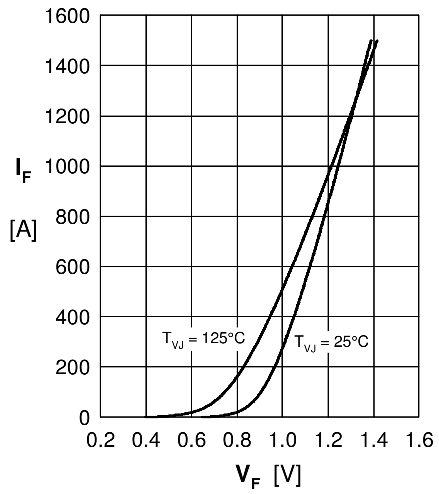


Fig. 5 Forward current I_F versus V_F

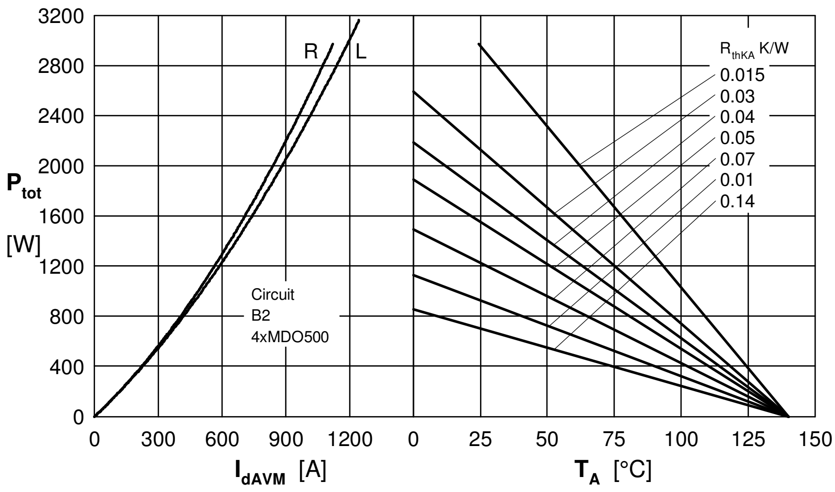


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature. R = resistive load, L = inductive load

Rectifier

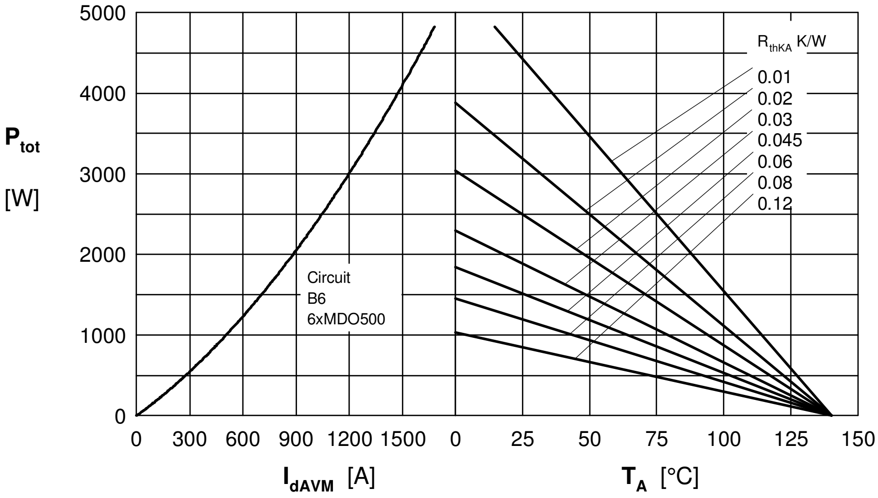


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

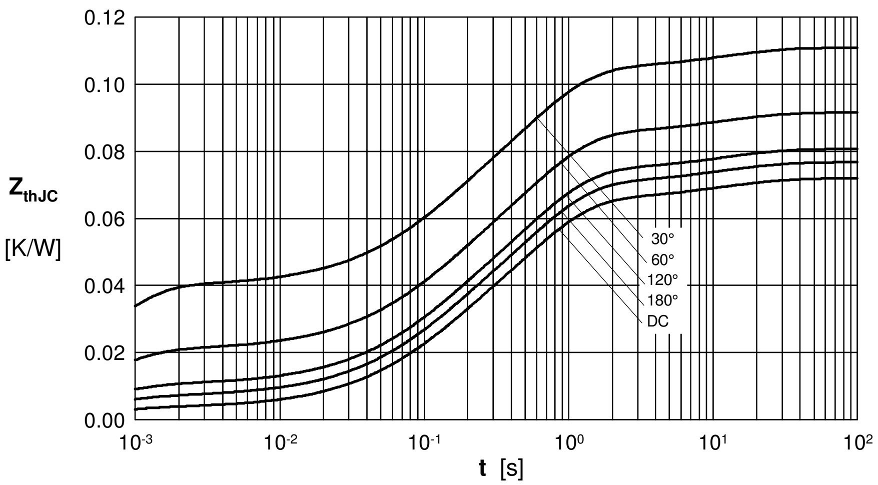


Fig. 7 Transient thermal impedance junction to case

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

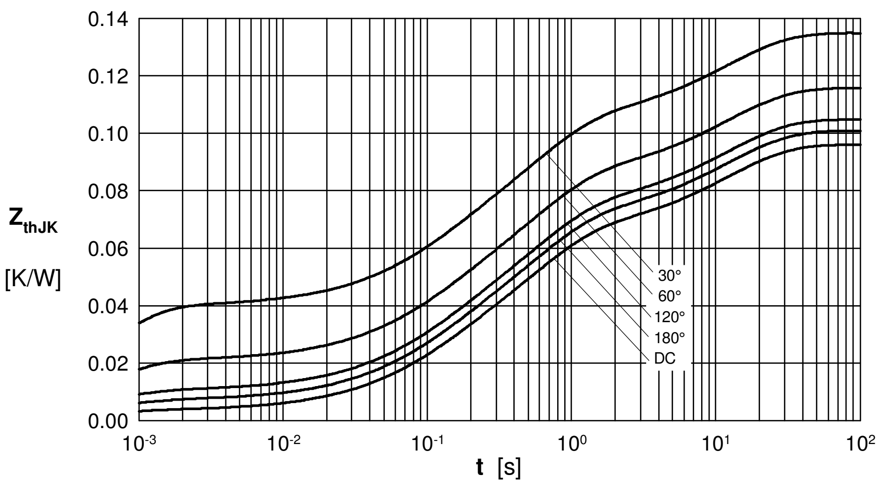


Fig. 8 Transient thermal impedance junction to heatsink

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