Standard Rectifier Module

V_{RRM} = 2x 1400 V
I_{FAV} = 270 A
V_F = 1,08 V

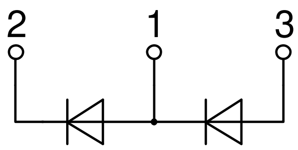
Phase leg

Part number

MDD255-14N1

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: Y1

- Isolation Voltage: 4800 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*		T_{VJ} = 25°C			1500	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			1400	V
I_R	*reverse current*	V_R = 1400 V	T_{VJ} = 25°C			500	µA
		V_R = 1400 V	T_{VJ} = 150°C			20	mA
V_F	*forward voltage drop*	I_F = 300 A	T_{VJ} = 25°C			1,19	V
		I_F = 600 A				1,40	V
		I_F = 300 A	T_{VJ} = 125°C			1,08	V
		I_F = 600 A				1,35	V
I_{FAV}	*average forward current*	T_C = 100°C	T_{VJ} = 150°C			270	A
$I_{F(RMS)}$	*RMS forward current*	180° sine				450	A
V_{F0}	*threshold voltage*	*for power loss calculation only*	T_{VJ} = 150°C			0,80	V
r_F	*slope resistance*					0,6	mΩ
R_{thJC}	*thermal resistance junction to case*					0,14	K/W
R_{thCH}	*thermal resistance case to heatsink*				0,04		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			890	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			9,80	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			10,6	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			8,33	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			9,00	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			480,2	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			466,1	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			346,9	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			336,6	kA²s
C_J	*junction capacitance*	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°C		381		pF

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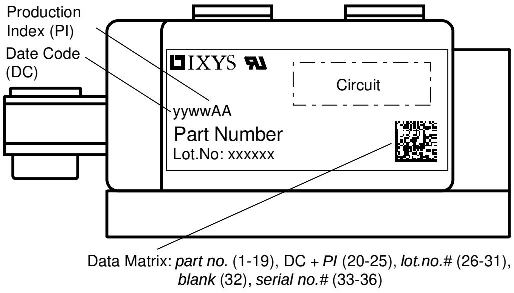
Package Y1			Ratings			
Symbol	**Definition**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal			600	A
T_{VJ}	*virtual junction temperature*		-40		150	°C
T_{op}	*operation temperature*		-40		125	°C
T_{stg}	*storage temperature*		-40		125	°C
Weight				680		g
M_D	*mounting 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*	16,0			mm
V_{ISOL}	*isolation voltage*	t = 1 second; 50/60 Hz, RMS; $I_{ISOL} \le 1$ mA	4800			V
		t = 1 minute	4000			V



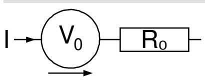
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD255-14N1	MDD255-14N1	Box	3	464007

Similar Part	Package	Voltage class
MDD255-12N1	Y1-CU	1200
MDD255-16N1	Y1-CU	1600
MDD255-18N1	Y1-CU	1800
MDD255-20N1	Y1-CU	2000

MDD255-22N1	Y1-CU	2200

Equivalent Circuits for Simulation

* *on die level* $T_{VJ} = 150°C$



		Rectifier	
$V_{0\ max}$	*threshold voltage*	0,8	V
$R_{0\ max}$	*slope resistance **	0,4	mΩ

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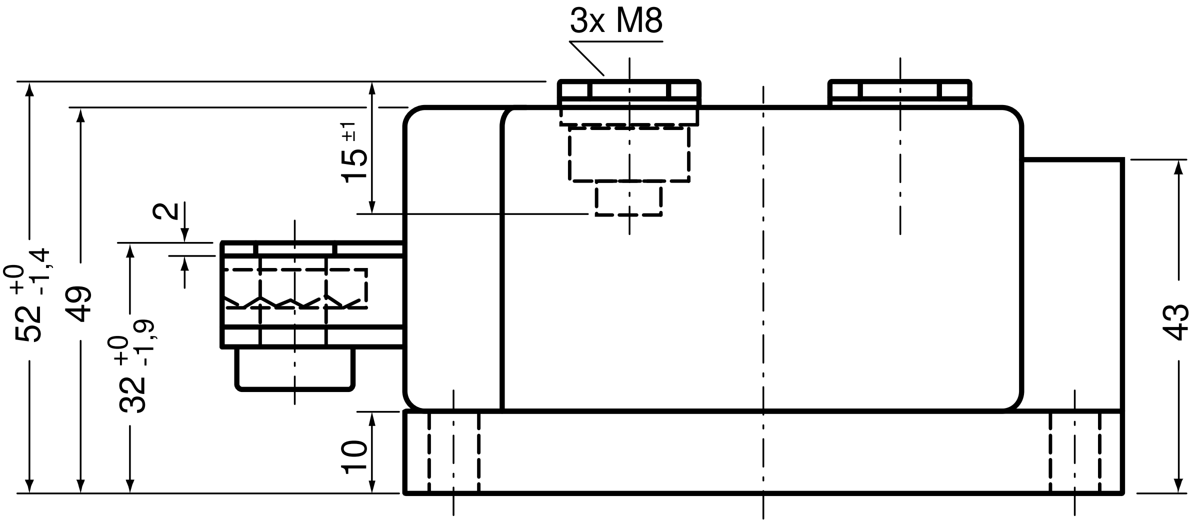
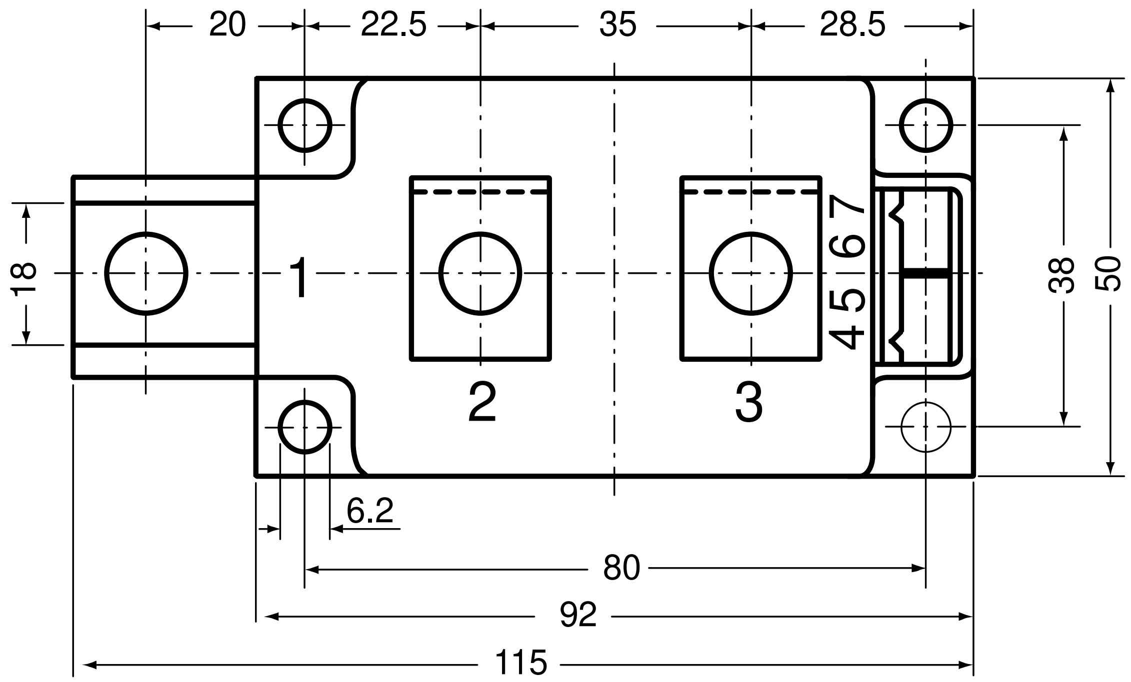
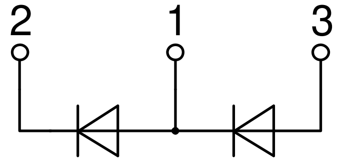
Outlines Y1







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Rectifier

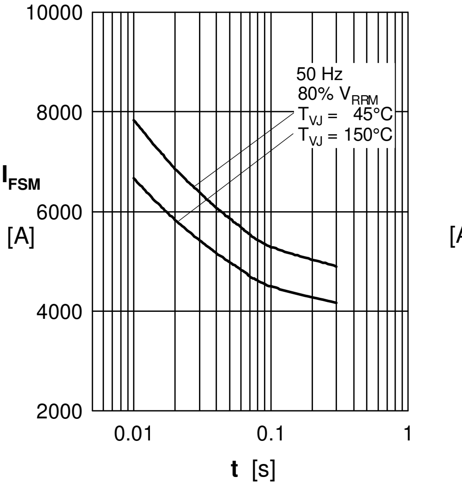

Fig. 1 Surge overload current
I_{FSM}: Crest value, t: duration

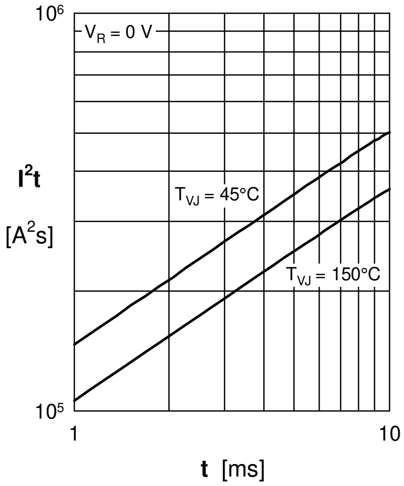

Fig. 2 I^2t versus time (1-10 ms)

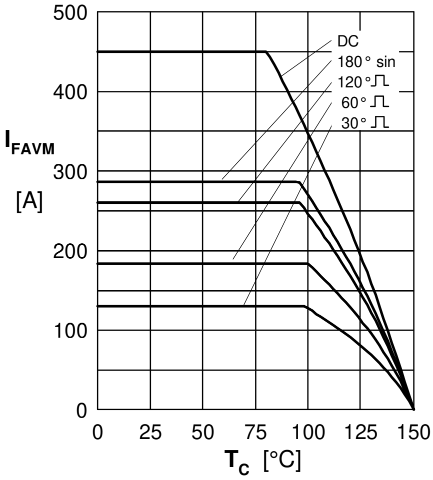

Fig. 3 Max. forward current at case temperature

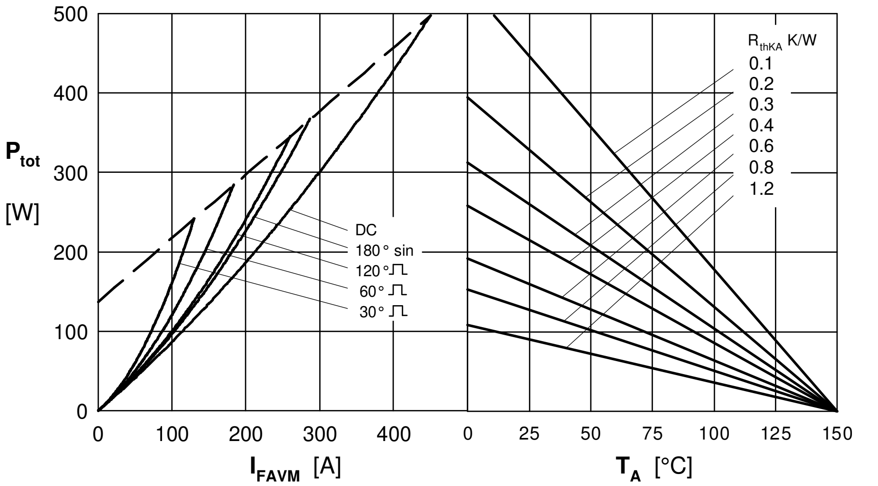

Fig. 4 Power dissipation vs. forward current & ambient temperature (per diode)

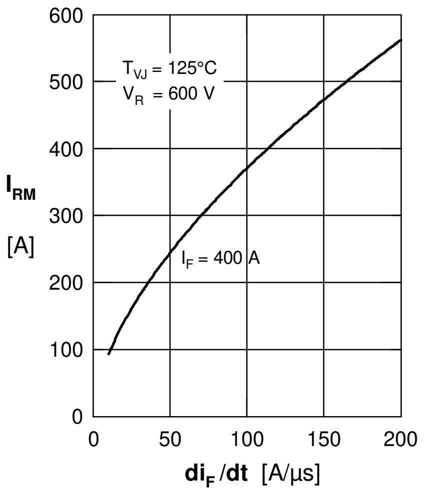

Fig. 5 Typ. peak reverse current I_{RM} versus -diF/dt

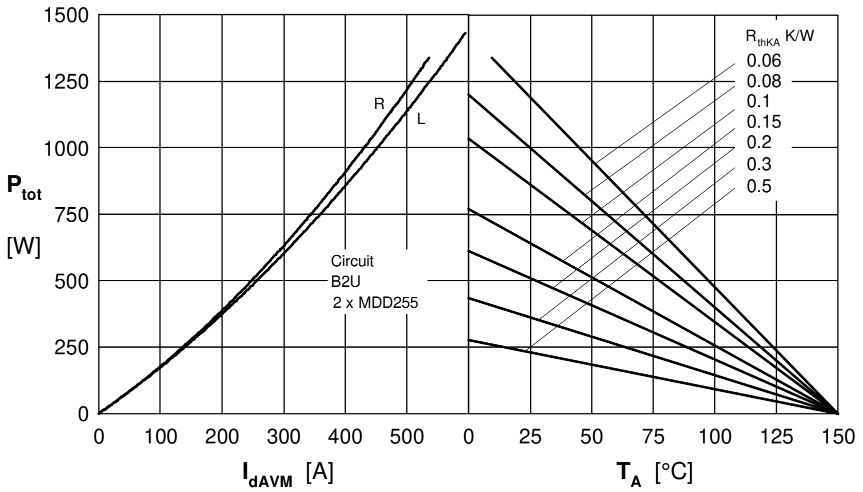

Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current & ambient temperature. R = resistive load, L = inductive load

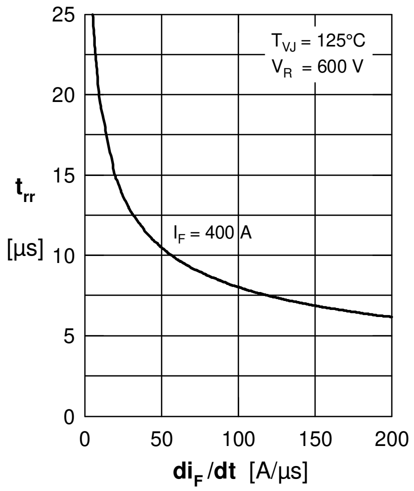

Fig. 7 Typ. recovery time t_{rr} versus $-di_F/dt$

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Rectifier

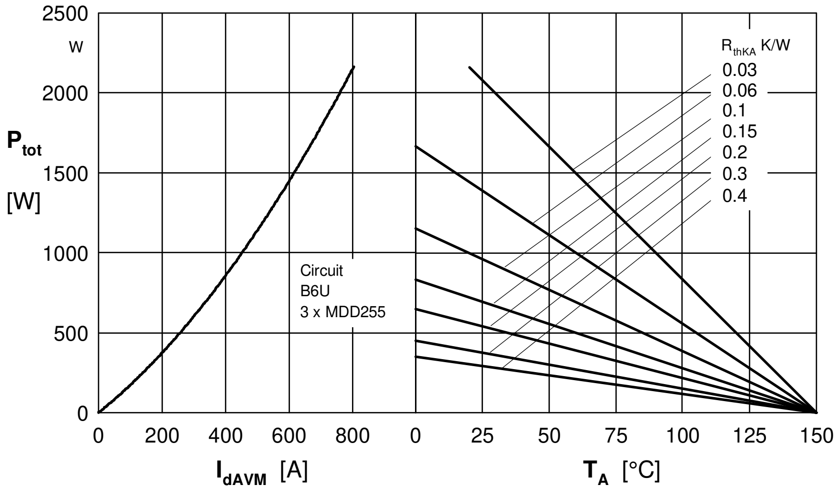

Fig. 8 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

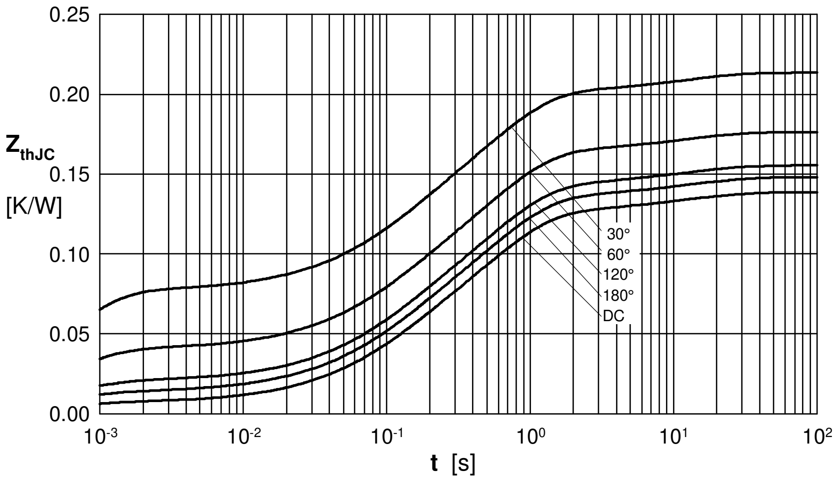

Fig. 9 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.139
180°	0.148
120°	0.156
60°	0.176
30°	0.214

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.0066	0.00054
2	0.0358	0.09800
3	0.0831	0.54000
4	0.0129	12.0000

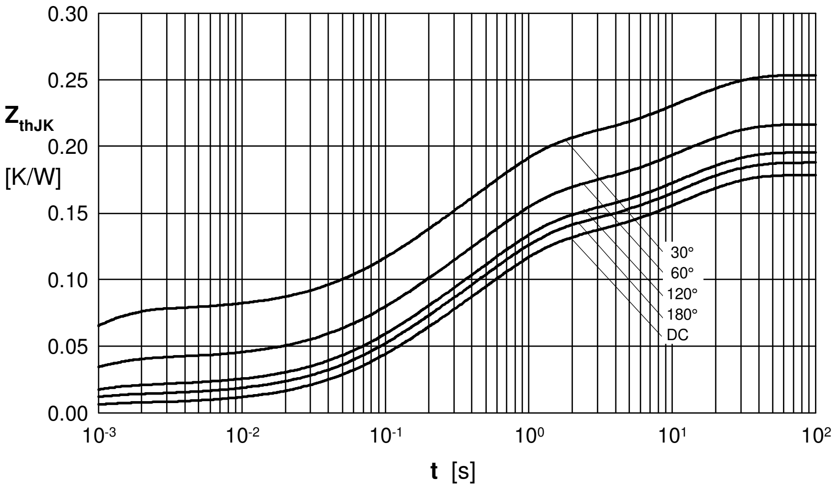

Fig. 10 Transient thermal impedance junction to heatsink (per diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.179
180°	0.188
120°	0.196
60°	0.216
30°	0.254

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0066	0.00054
2	0.0358	0.09800
3	0.0831	0.54000
4	0.0129	12.0000
5	0.0400	12.0000

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