

High Voltage Standard Rectifier Module

$$V_{RRM} = 2 \times 2800 \text{ V}$$

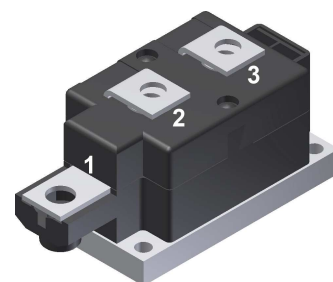
$$I_{FAV} = 240 \text{ A}$$

$$V_F = 1.01 \text{ V}$$

Phase leg

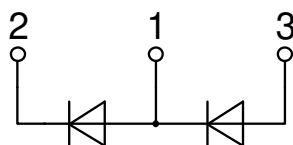
Part number

MDD175-28N1



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

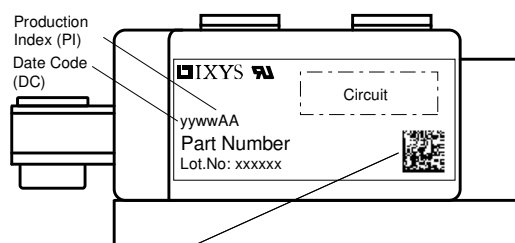
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				2900	V
V_{RRM}	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				2800	V
I_R	reverse current	$V_R = 2800\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			1	mA
		$V_R = 2800\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$			5	mA
V_F	forward voltage drop	$I_F = 200\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.07	V
		$I_F = 400\text{ A}$				1.26	V
		$I_F = 200\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.01	V
		$I_F = 400\text{ A}$				1.26	V
I_{FAV}	average forward current	$T_C = 100^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			240	A
		180° sine $d = 0.5$					
V_{F0}	threshold voltage	} for power loss calculation only		$T_{VJ} = 150^{\circ}\text{C}$		0.74	V
r_F	slope resistance					1.27	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	$T_C = 25^{\circ}\text{C}$				900	W
I_{FSM}	max. forward surge current	$t = 10\text{ ms; (50 Hz), sine}$	$T_{VJ} = 45^{\circ}\text{C}$			8.50	kA
		$t = 8,3\text{ ms; (60 Hz), sine}$	$V_R = 0\text{ V}$			9.18	kA
		$t = 10\text{ ms; (50 Hz), sine}$	$T_{VJ} = 150^{\circ}\text{C}$			7.23	kA
		$t = 8,3\text{ ms; (60 Hz), sine}$	$V_R = 0\text{ V}$			7.81	kA
I^2t	value for fusing	$t = 10\text{ ms; (50 Hz), sine}$	$T_{VJ} = 45^{\circ}\text{C}$			361.3	kA²s
		$t = 8,3\text{ ms; (60 Hz), sine}$	$V_R = 0\text{ V}$			350.6	kA²s
		$t = 10\text{ ms; (50 Hz), sine}$	$T_{VJ} = 150^{\circ}\text{C}$			261.0	kA²s
		$t = 8,3\text{ ms; (60 Hz), sine}$	$V_R = 0\text{ V}$			253.4	kA²s
C_J	junction capacitance	$V_R = 1100\text{ V; } f = 1\text{ MHz}$			182		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		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	4800			V
		t = 1 minute	4000			V
		50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA				



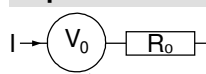
Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD175-28N1	MDD175-28N1	Box	3	504295

Equivalent Circuits for Simulation

* on die level

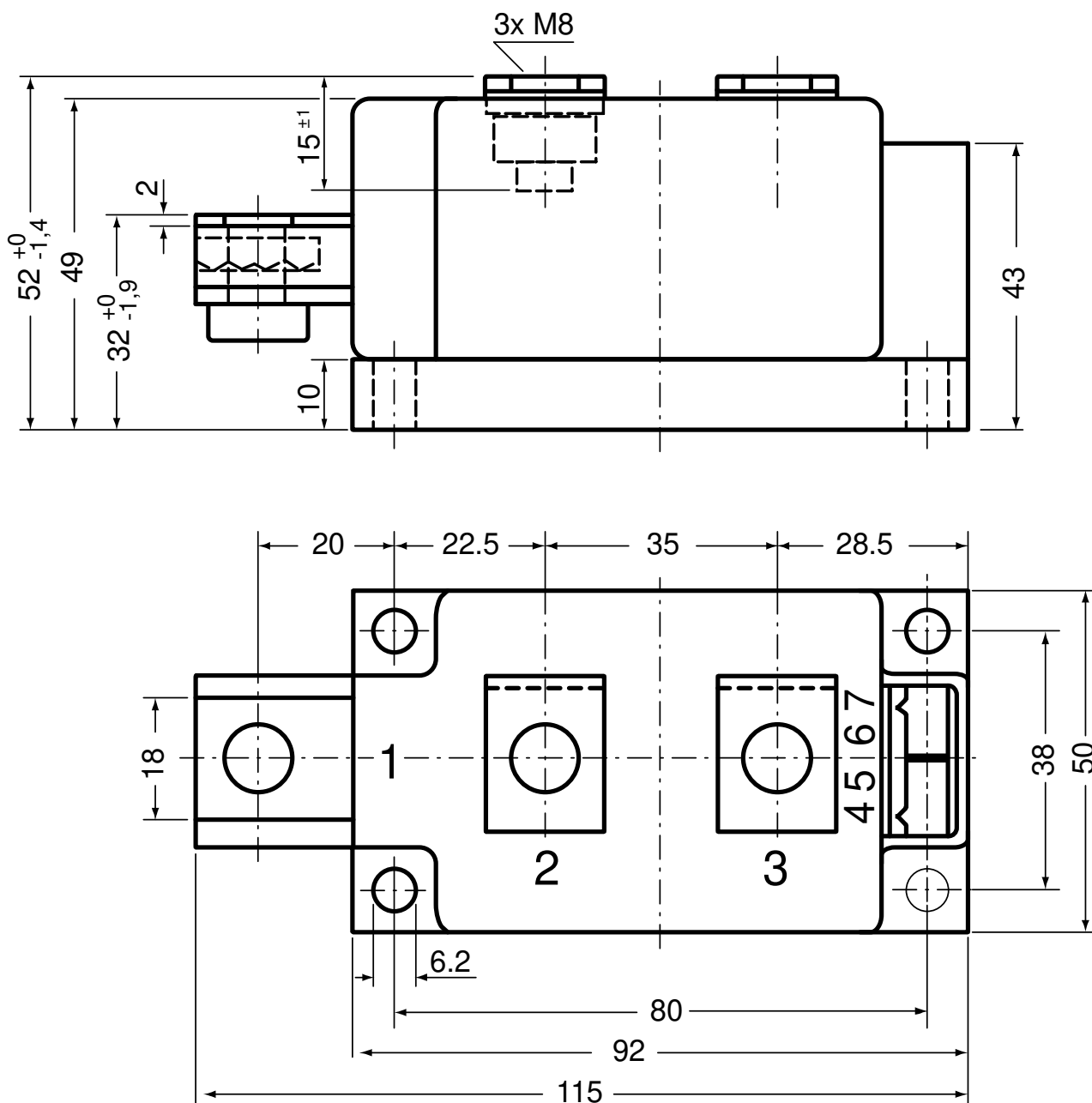
$T_{VJ} = 150^{\circ}\text{C}$



Rectifier

$V_{0\max}$	threshold voltage	0.74	V
$R_{0\max}$	slope resistance *	0.75	mΩ

Outlines Y1



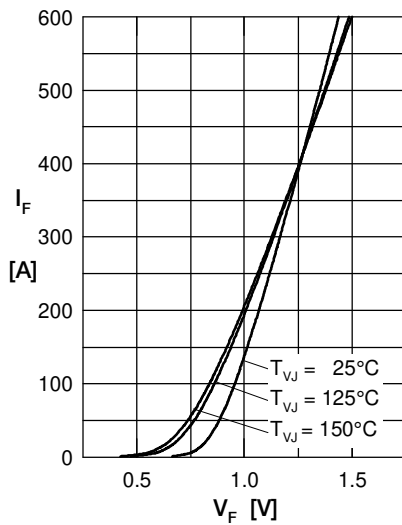
Rectifier


Fig. 1 Forward current versus voltage drop per diode

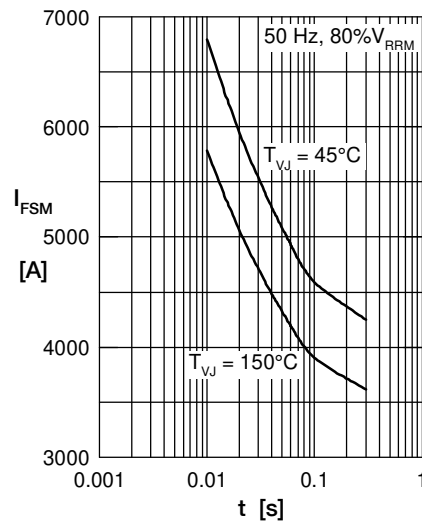


Fig. 2 Surge overload current

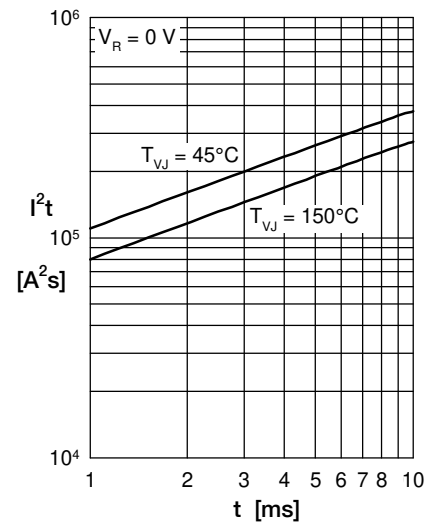
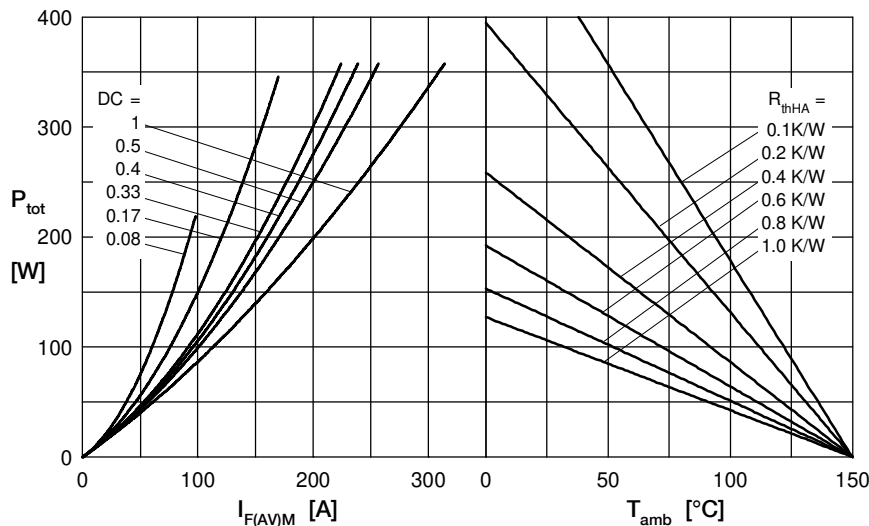

 Fig. 3 I^2t versus time per diode


Fig. 4 Power dissipation vs. direct output current and ambient temperature

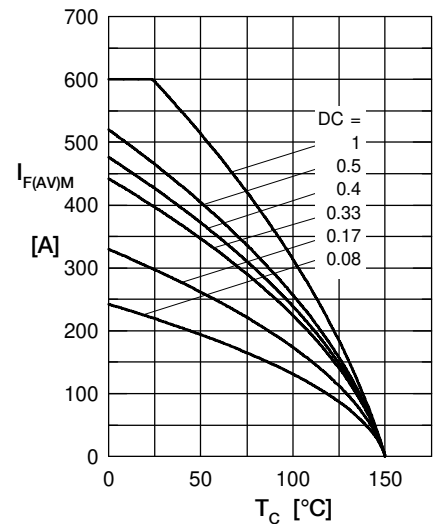


Fig. 5 Max. forward current vs. case temperature

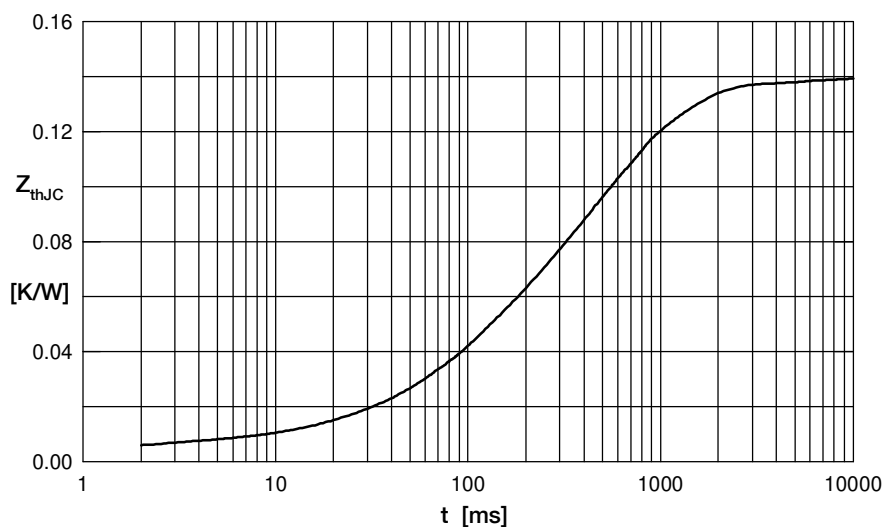


Fig. 6 Transient thermal impedance junction to case

 Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.155	0.0005
2	0.332	0.0095
3	0.713	0.17
4	0.3	0.8
5	0.00001	0.00001