

High Voltage Standard Rectifier Module

$$V_{RRM} = 2 \times 2200 \text{ V}$$

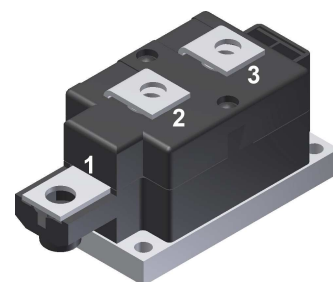
$$I_{FAV} = 380 \text{ A}$$

$$V_F = 0.93 \text{ V}$$

Phase leg

Part number

MDNA380P2200KC



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

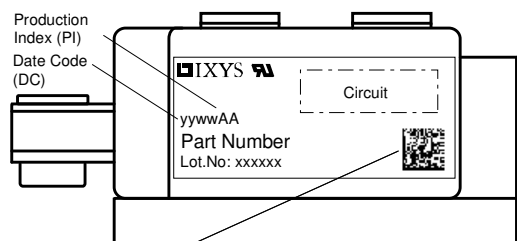
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				2300	V
V_{RRM}	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				2200	V
I_R	reverse current	$V_R = 2200\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			500	μA
		$V_R = 2200\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$			20	mA
V_F	forward voltage drop	$I_F = 300\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.05	V
		$I_F = 600\text{ A}$				1.18	V
		$I_F = 300\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			0.93	V
		$I_F = 600\text{ A}$				1.10	V
I_{FAV}	average forward current	$T_C = 100^{\circ}\text{C}$ rectangular $d = 0.5$	$T_{VJ} = 150^{\circ}\text{C}$			380	A
V_{F0}	threshold voltage	} for power loss calculation only		$T_{VJ} = 150^{\circ}\text{C}$		0.75	V
r_F	slope resistance					0.53	m Ω
R_{thJC}	thermal resistance junction to case					0.11	K/W
R_{thCH}	thermal resistance case to heatsink				0.04		K/W
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$				1140	W
I_{FSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			11.0	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			11.9	kA
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			9.35	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			10.1	kA
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			605.0	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			587.1	kA ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			437.1	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			424.4	kA ² s
C_J	junction capacitance	$V_R = 400\text{ V}; f = 1\text{ MHz}$		$T_{VJ} = 25^{\circ}\text{C}$	27		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
$d_{Spp/Apb}$		terminal to backside		16.0			mm
V_{ISOL}	isolation voltage	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	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)

Part description

M = Module
 D = Diode
 N = High Voltage Standard Rectifier
 A = ($\geq 2000V$)
 380 = Current Rating [A]
 P = Phase leg
 2200 = Reverse Voltage [V]
 KC = Y1-CU

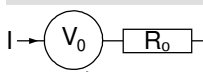
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDNA380P2200KC	MDNA380P2200KC	Box	3	517449

Similar Part	Package	Voltage class
MDMA380P1600KC	Y1-CU	1600

Equivalent Circuits for Simulation

* on die level

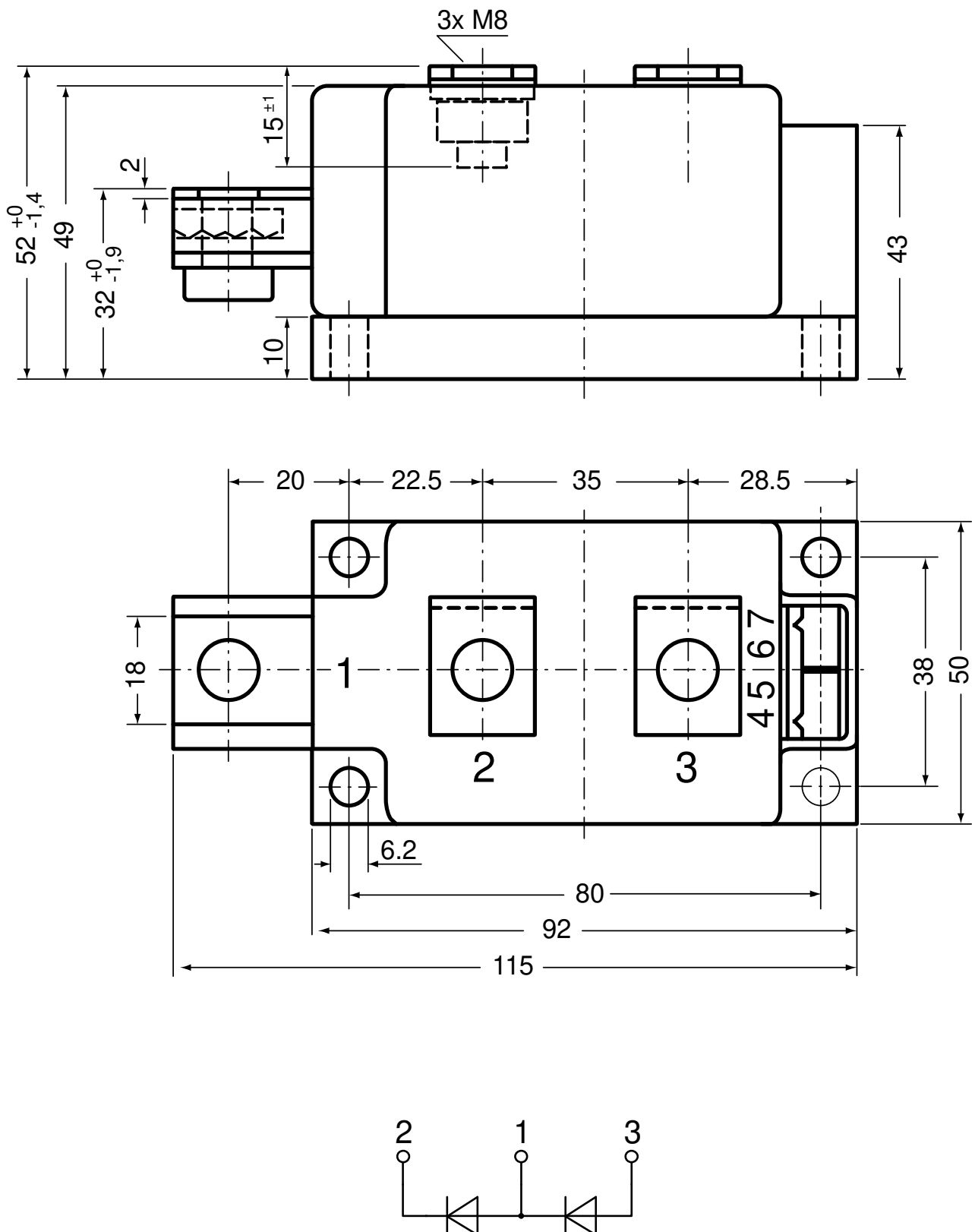
$T_{VJ} = 150^\circ\text{C}$



Rectifier

$V_{0\max}$	threshold voltage	0.75	V
$R_{0\max}$	slope resistance *	0.34	mΩ

Outlines Y1



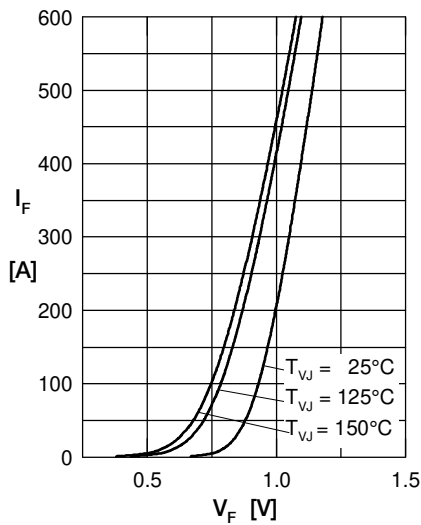
Rectifier


Fig. 1 Forward current versus voltage drop per diode

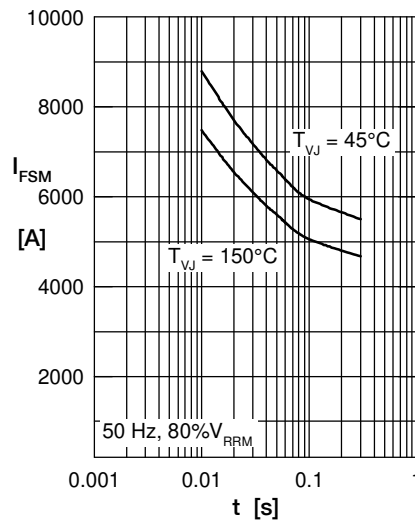


Fig. 2 Surge overload current vs. time per diode

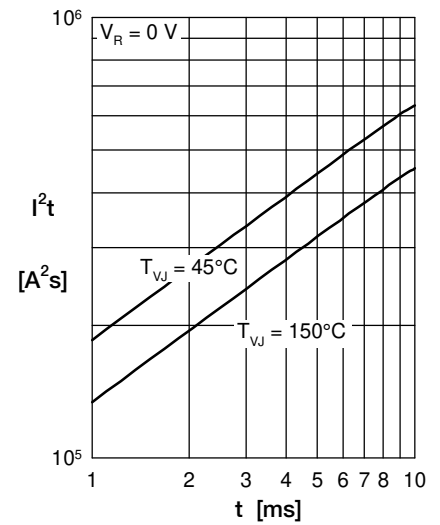
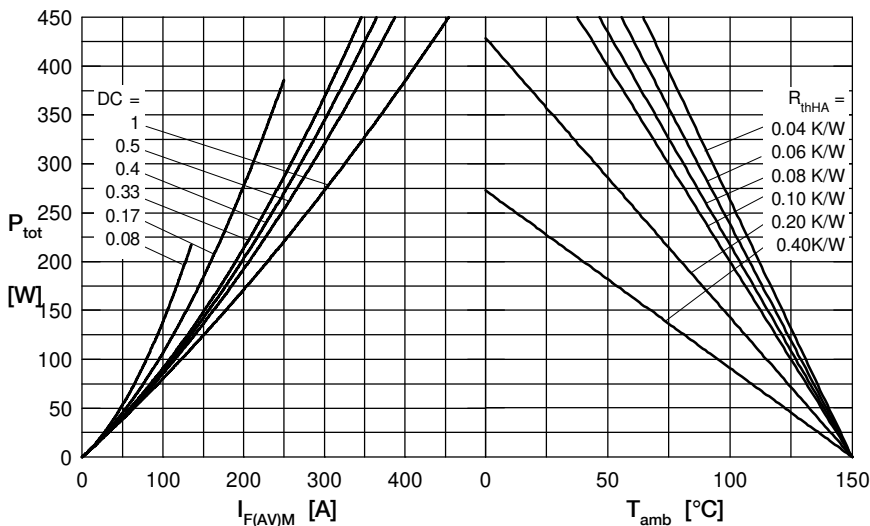

 Fig. 3 I^2t versus time per diode


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

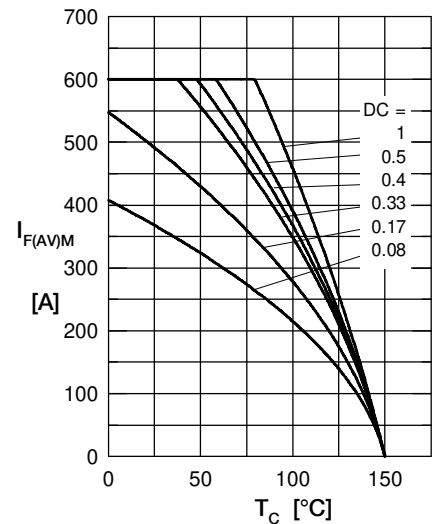


Fig. 5 Max. forward current vs. case temperature per diode

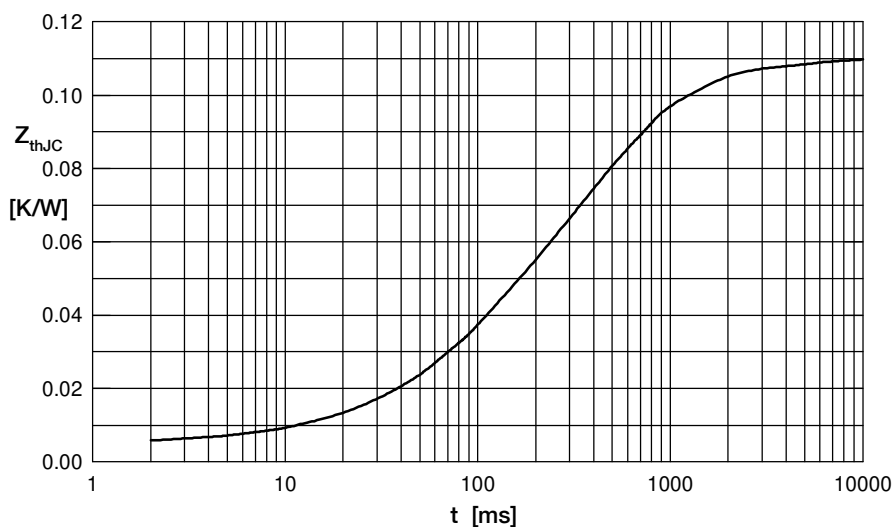


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.005	0.0005
2	0.029	0.0980
3	0.068	0.4500
4	0.008	3.0000