

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

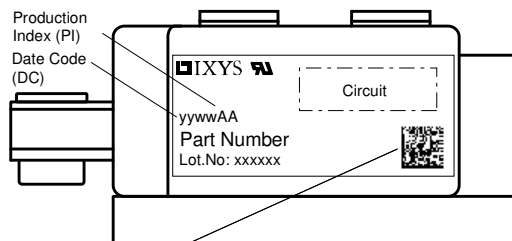
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage					2300	V
V_{RRM}	max. repetitive reverse blocking voltage					2200	V
I_R	reverse current	$V_R = 2200$ V	$T_{VJ} = 25^\circ\text{C}$			500	μA
		$V_R = 2200$ V	$T_{VJ} = 150^\circ\text{C}$			20	mA
V_F	forward voltage drop	$I_F = 300$ A	$T_{VJ} = 25^\circ\text{C}$			1.05	V
		$I_F = 600$ A				1.18	V
		$I_F = 300$ A	$T_{VJ} = 125^\circ\text{C}$			0.93	V
		$I_F = 600$ A				1.10	V
I_{FAV}	average forward current	$T_C = 100^\circ\text{C}$ rectangular	$T_{VJ} = 150^\circ\text{C}$ d = 0.5			380	A
V_{FO}	threshold voltage	} for power loss calculation only				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 ms; (50 Hz), sine	$T_{VJ} = 45^\circ\text{C}$			11.0	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			11.9	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$			9.35	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			10.1	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^\circ\text{C}$			605.0	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			587.1	kA ² s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$			437.1	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			424.4	kA ² s
C_J	junction capacitance	$V_R = 400$ V; f = 1 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
$d_{Spb/Apb}$		terminal to backside	16.0			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)

Part description

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

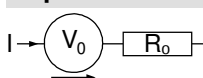
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDNA380P2200KC	MDNA380P2200KC	Box	3	517449

Similar Part	Package	Voltage class
MDMA380P1600KC	Y1-CU	1600

Equivalent Circuits for Simulation

* on die level

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

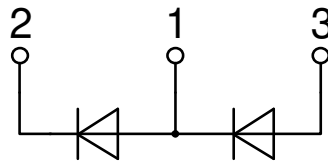
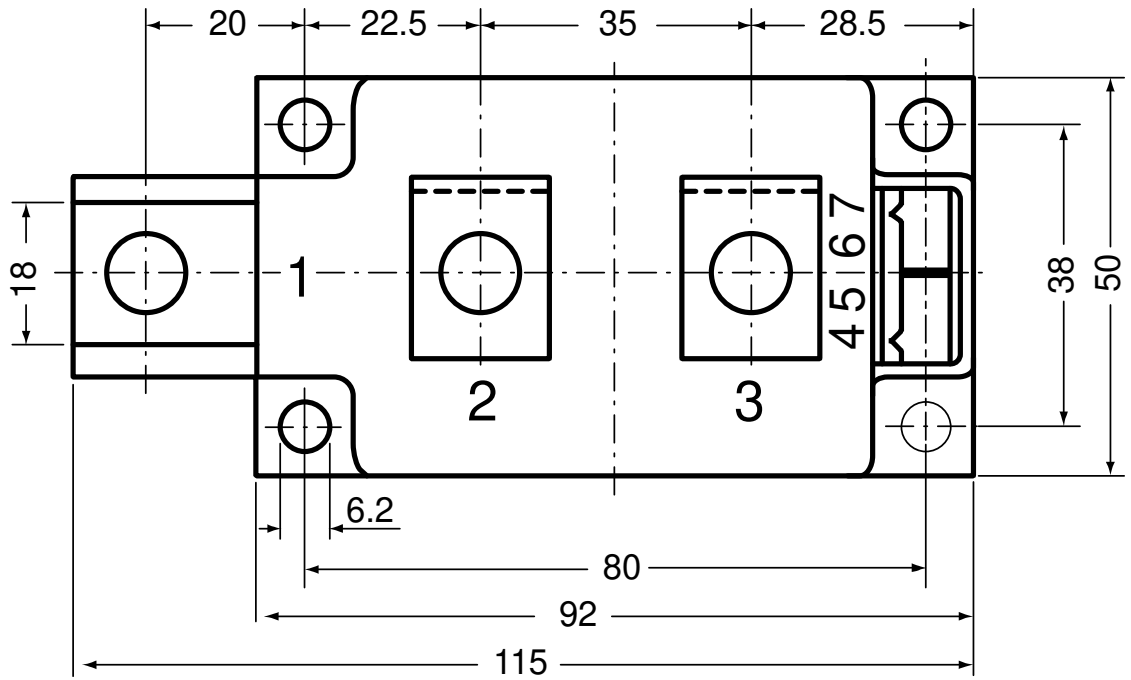
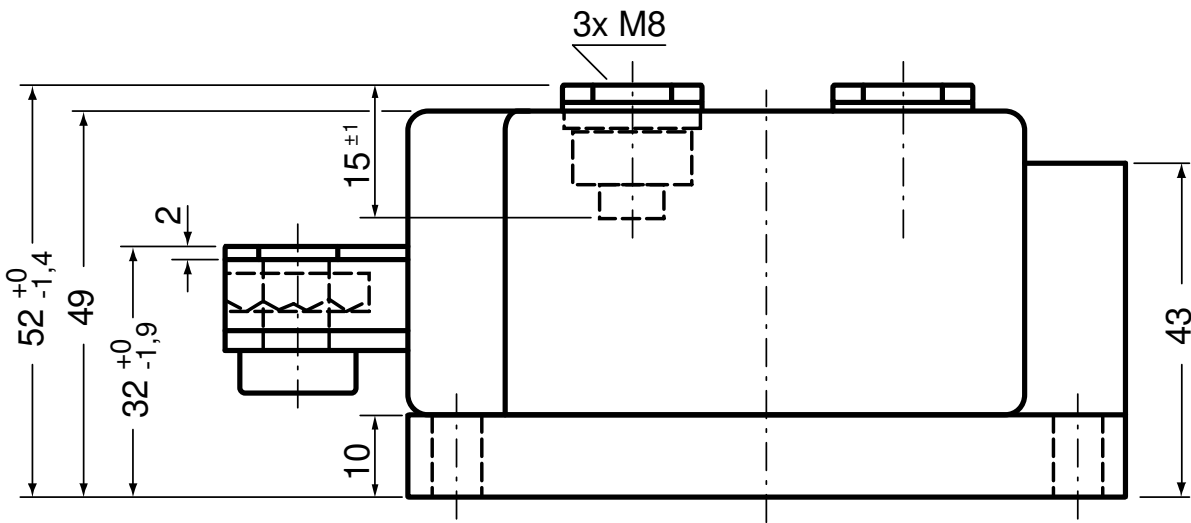


Rectifier

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



Outlines Y1



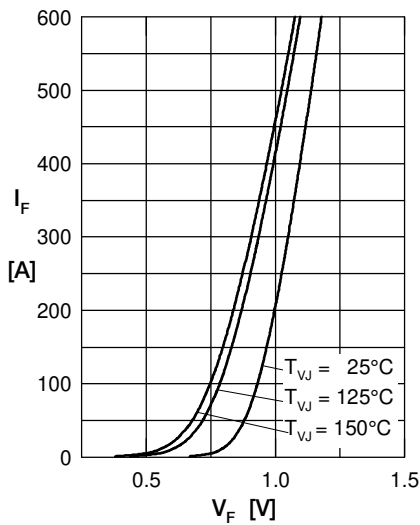
Rectifier


Fig. 1 Forward current versus voltage drop per diode

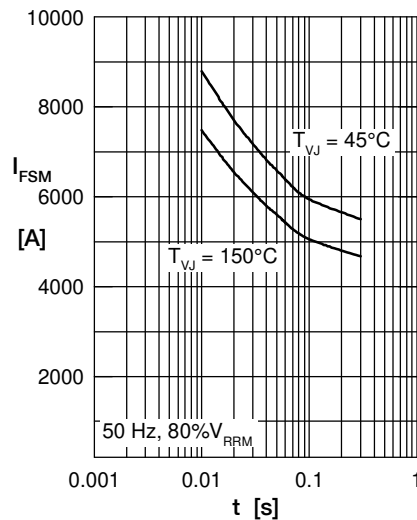


Fig. 2 Surge overload current vs. time per diode

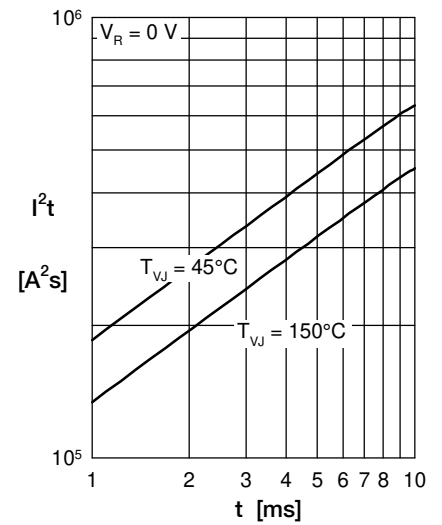
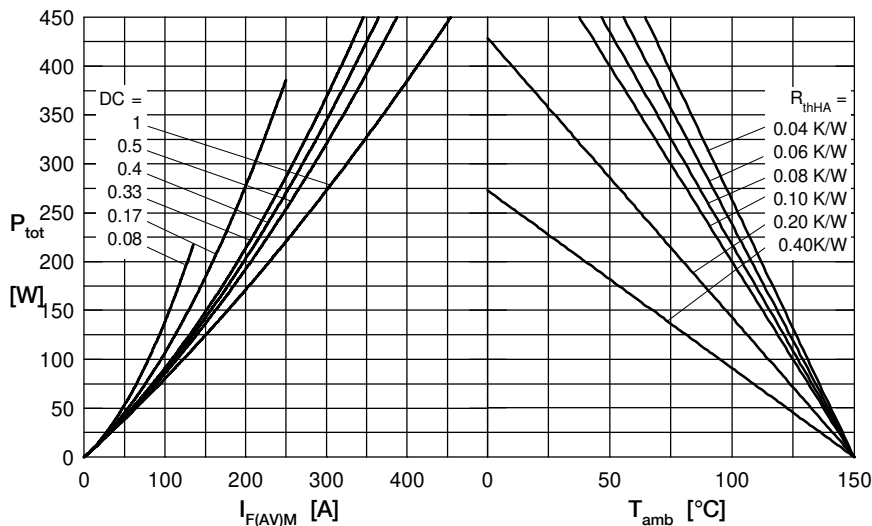

 Fig. 3 I^2t versus time per diode


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

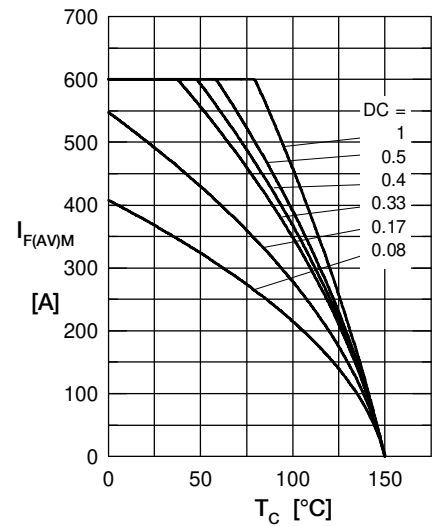


Fig. 5 Max. forward current vs. case temperature per diode

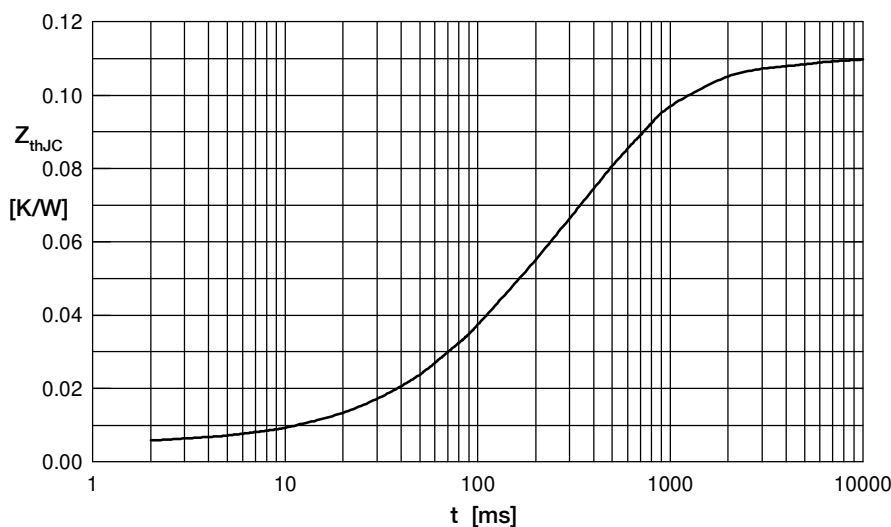


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 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