

# Standard Rectifier Module

$$V_{RRM} = 2 \times 1600 \text{ V}$$

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

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

Phase leg

Part number

**MDMA380P1600KC**



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

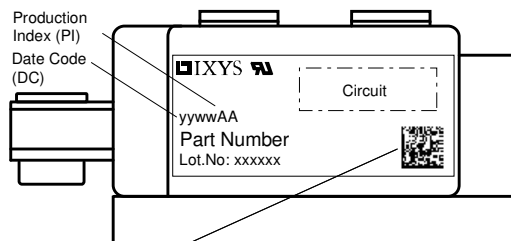
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM}$	max. non-repetitive reverse blocking voltage					1700	V
$V_{RRM}$	max. repetitive reverse blocking voltage					1600	V
$I_R$	reverse current	$V_R = 1600$ V		$T_{VJ} = 25^\circ\text{C}$		500	$\mu\text{A}$
		$V_R = 1600$ 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	$T_C = 100^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		380	A
		rectangular	d = 0.5				
$V_{F0}$	threshold voltage			$T_{VJ} = 150^\circ\text{C}$		0.75	V
$r_F$	slope resistance					0.53	m $\Omega$
		} for power loss calculation only					
$R_{thJC}$	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 <sup>2</sup> s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		587.1	kA <sup>2</sup> s
		t = 10 ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		437.1	kA <sup>2</sup> s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		424.4	kA <sup>2</sup> 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
<b>Weight</b>				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
- M = Standard Rectifier
- A = (up to 1800V)
- 380 = Current Rating [A]
- P = Phase leg
- 1600 = Reverse Voltage [V]
- KC = Y1-CU

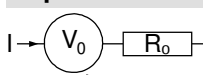
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDMA380P1600KC	MDMA380P1600KC	Box	3	512611

Similar Part	Package	Voltage class
MDNA380P2200KC	Y1-CU	2200

### Equivalent Circuits for Simulation

\* on die level

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

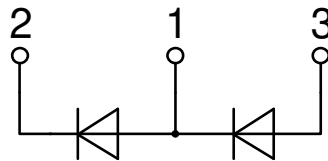
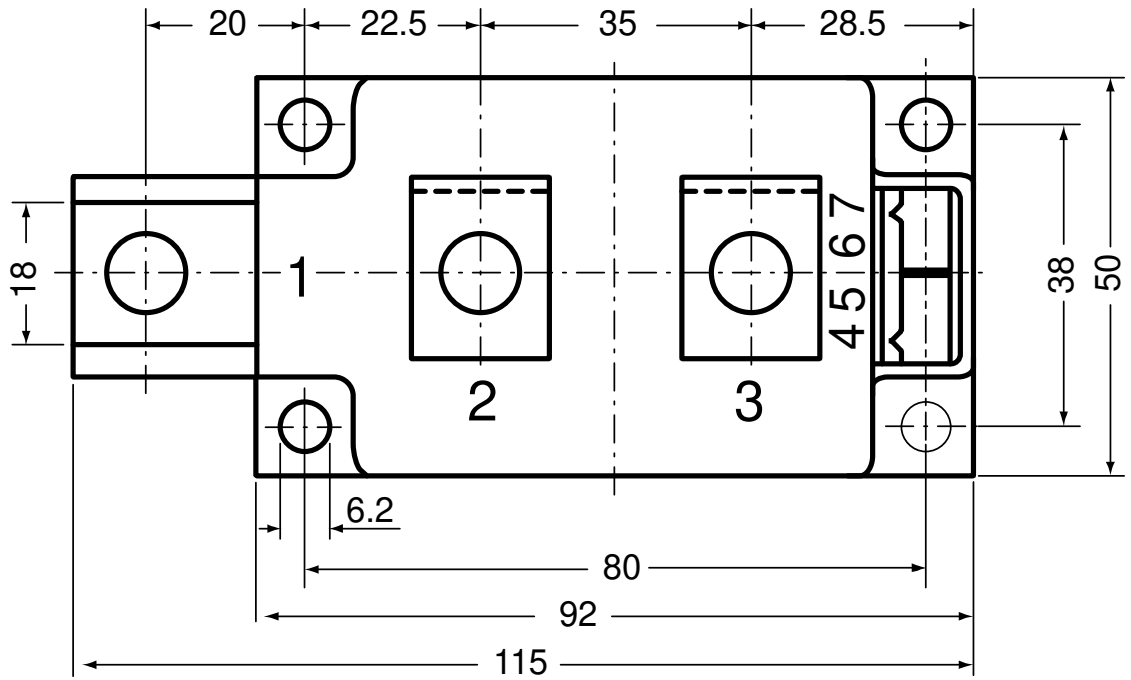
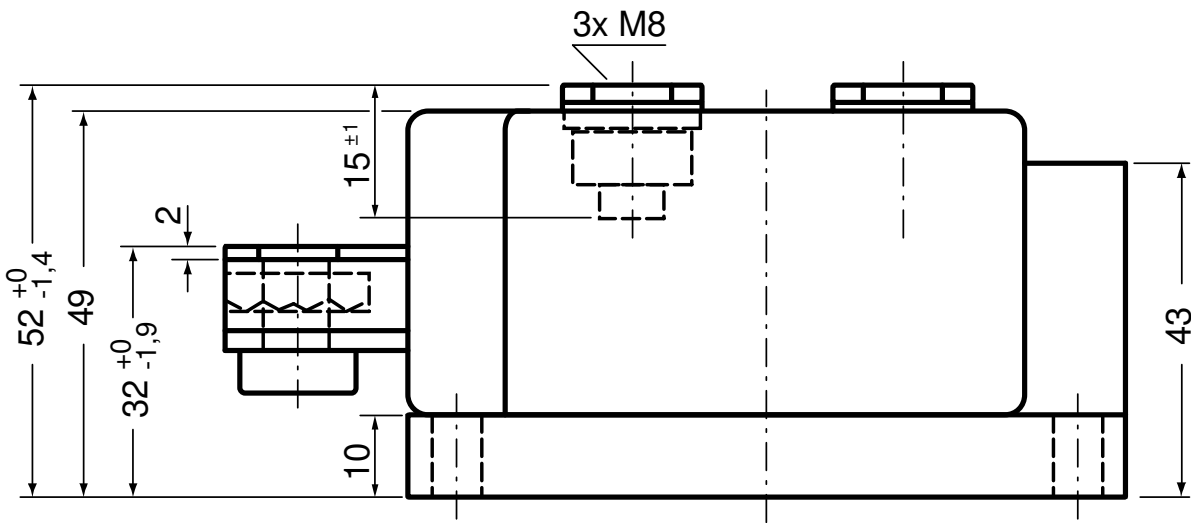


Rectifier

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



Outlines Y1



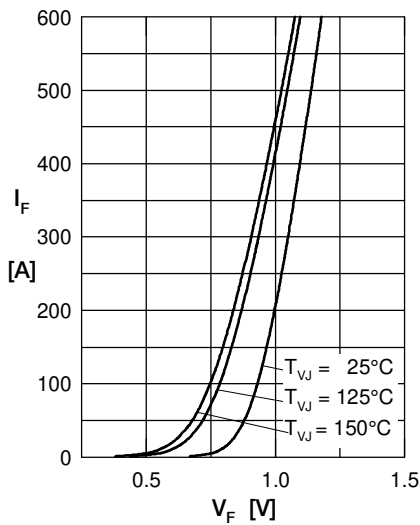
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

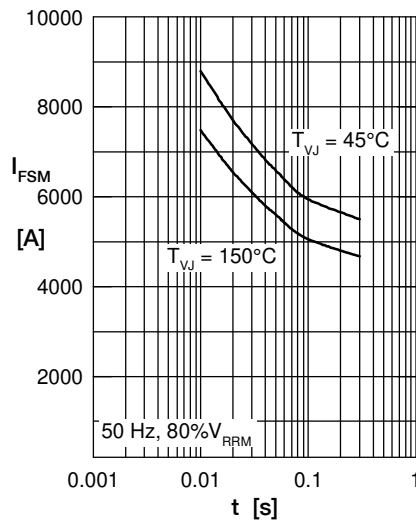


Fig. 2 Surge overload current vs. time per diode

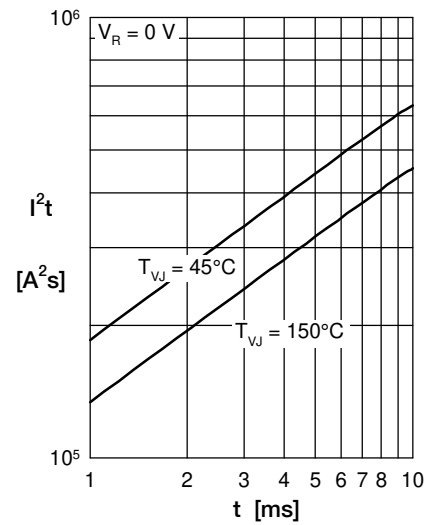
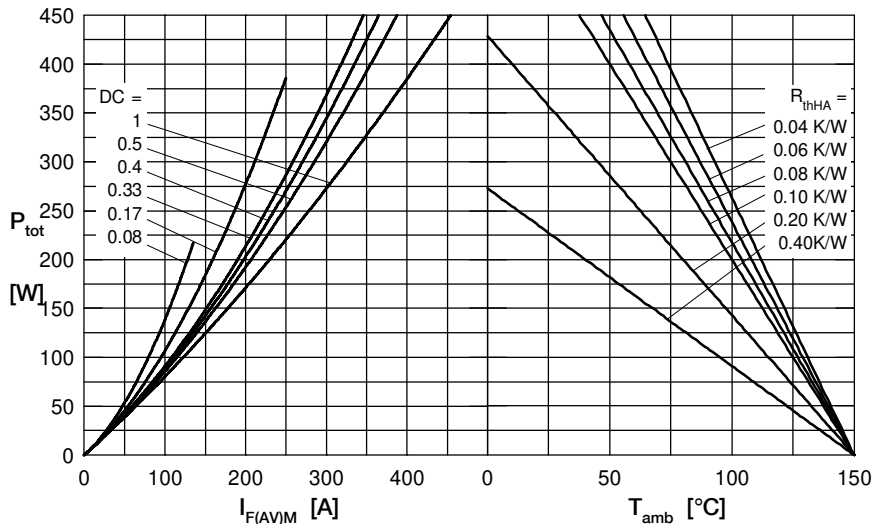

 Fig. 3  $I^2t$  versus time per diode


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

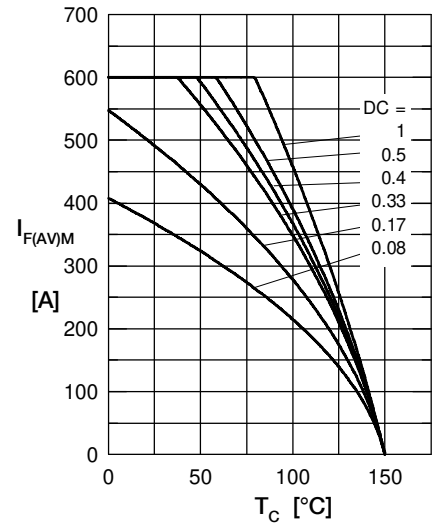


Fig. 5 Max. forward current vs. case temperature per diode

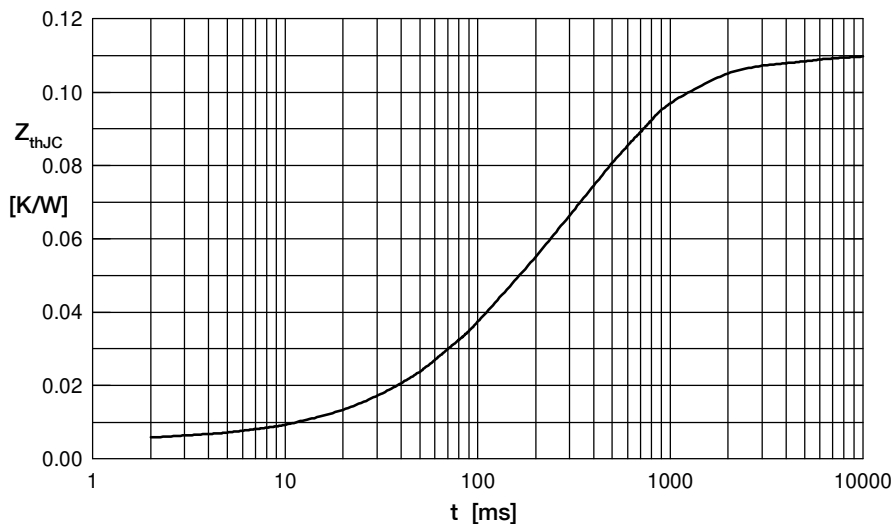


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 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