

# Standard Rectifier Module

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

$$I_{FAV} = 280 \text{ A}$$

$$V_F = 1.05 \text{ V}$$

Phase leg

Part number

**MDMA280P1600YD**



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: Y4

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

### Disclaimer Notice

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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		$T_{VJ} = 25^\circ\text{C}$		1	mA
		$V_R = 1600$ V		$T_{VJ} = 150^\circ\text{C}$		20	mA
$V_F$	forward voltage drop	$I_F = 280$ A		$T_{VJ} = 25^\circ\text{C}$		1.14	V
		$I_F = 560$ A				1.36	V
		$I_F = 280$ A		$T_{VJ} = 125^\circ\text{C}$		1.05	V
		$I_F = 560$ A				1.32	V
$I_{FAV}$	average forward current	$T_C = 100^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		280	A
		rectangular	d = 0.5				
$V_{FO}$	threshold voltage			$T_{VJ} = 150^\circ\text{C}$		0.74	V
$r_F$	slope resistance					1	mΩ
		} for power loss calculation only					
$R_{thJC}$	thermal resistance junction to case					0.13	K/W
$R_{thCH}$	thermal resistance case to heatsink				0.06		K/W
$P_{tot}$	total power dissipation			$T_C = 25^\circ\text{C}$		960	W
$I_{FSM}$	max. forward surge current	t = 10 ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		10.5	kA
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		11.3	kA
		t = 10 ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		8.93	kA
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		9.64	kA
$I^2t$	value for fusing	t = 10 ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		551.3	kA <sup>2</sup> s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		535.0	kA <sup>2</sup> s
		t = 10 ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		398.3	kA <sup>2</sup> s
		t = 8,3 ms; (60 Hz), sine		$V_R = 0$ V		386.6	kA <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 400$ V; f = 1 MHz		$T_{VJ} = 25^\circ\text{C}$		381	pF



Package Y4				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$I_{RMS}$	RMS current	per terminal			300	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>					150	g	
$M_D$	mounting torque		2.25		2.75	Nm	
$M_T$	terminal torque		4.5		5.5	Nm	
$d_{Spp/APP}$	creepage distance on surface   striking distance through air	terminal to terminal	14.0	10.0		mm	
$d_{Spb/APb}$		terminal to backside	16.0	16.0		mm	
$V_{ISOL}$	isolation voltage	t = 1 second		4800		V	
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	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)
- 280 = Current Rating [A]
- P = Phase leg
- 1600 = Reverse Voltage [V]
- YD = Y4-M6

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDMA280P1600YD	MDMA280P1600YD	Box	6	518448

Similar Part	Package	Voltage class
MDMA180P1600YD	Y4-M6	1600
MDMA210P1600YD	Y4-M6	1600

**Equivalent Circuits for Simulation**

\* on die level

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

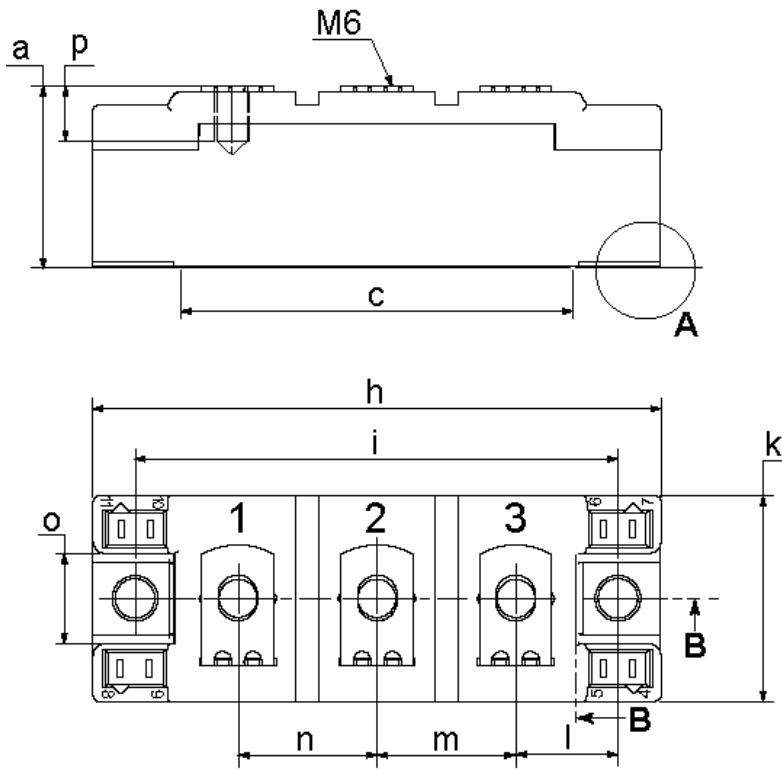


**Rectifier**

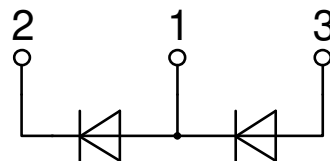
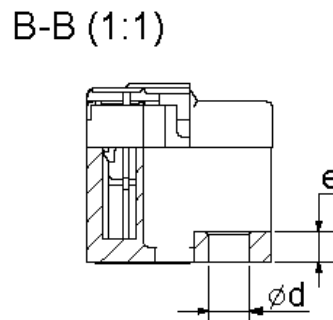
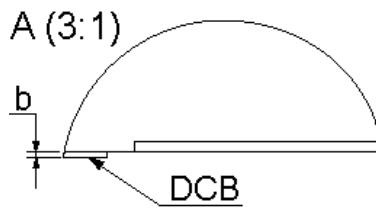
$V_{0 \max}$	threshold voltage	0.74	V
$R_{0 \max}$	slope resistance *	0.35	mΩ



**Outlines Y4**



Dim.	MIN [mm]	MAX [mm]	MIN [inch]	MAX [inch]
a	30.0	30.6	1.181	1.205
b	typ. 0.25		typ. 0.010	
c	64.0	65.0	2.520	2.559
d	6.5	7.0	0.256	0.275
e	4.9	5.1	0.193	0.201
h	93.5	94.5	3.681	3.720
i	79.5	80.5	3.130	3.169
k	33.4	34.0	1.315	1.339
l	16.7	17.3	0.657	0.681
m	22.7	23.3	0.894	0.917
n	22.7	23.3	0.894	0.917
o	14.0	15.0	0.551	0.591
p	typ. 10.5		typ. 0.413	



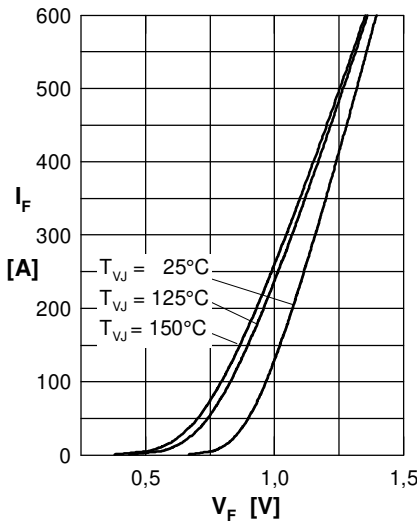
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

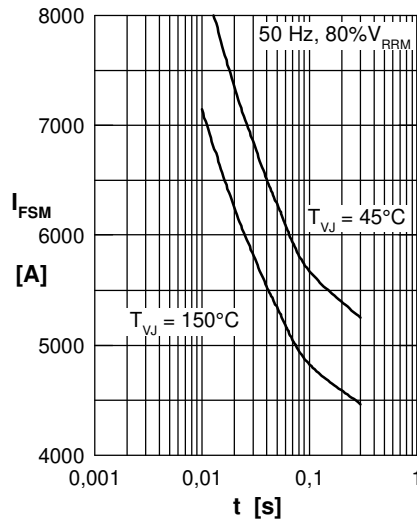


Fig. 2 Surge overload current vs. time per diode

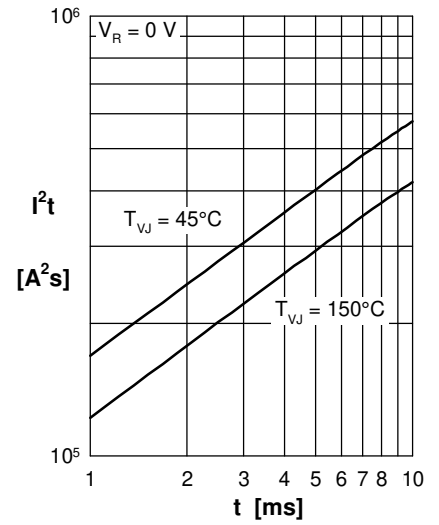
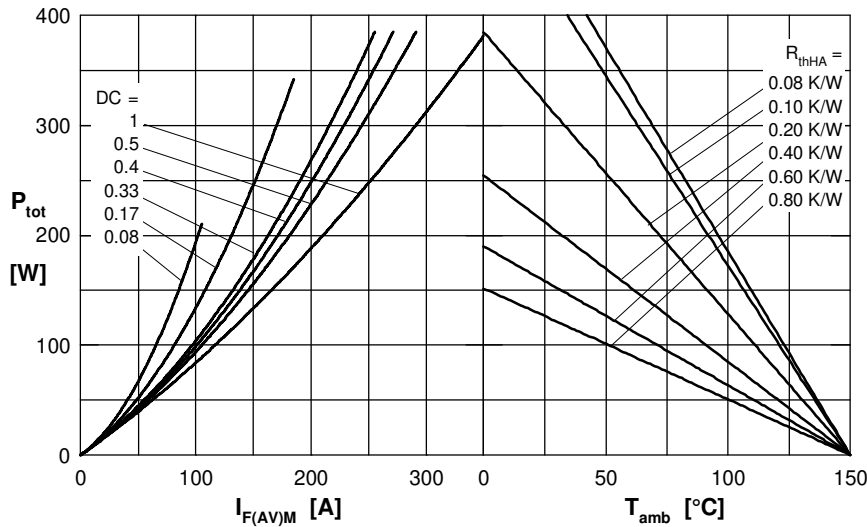

 Fig. 3  $I^2t$  versus time per diode


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

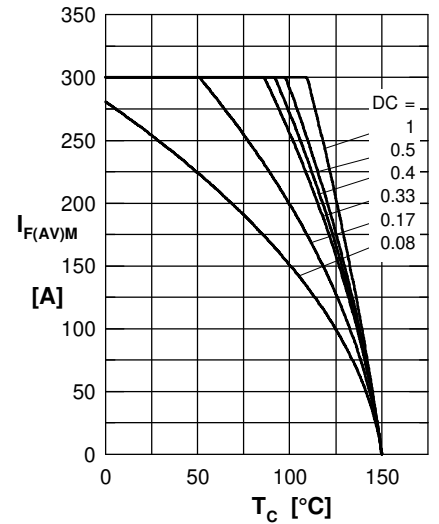


Fig. 5 Max. forward current vs. case temperature per diode

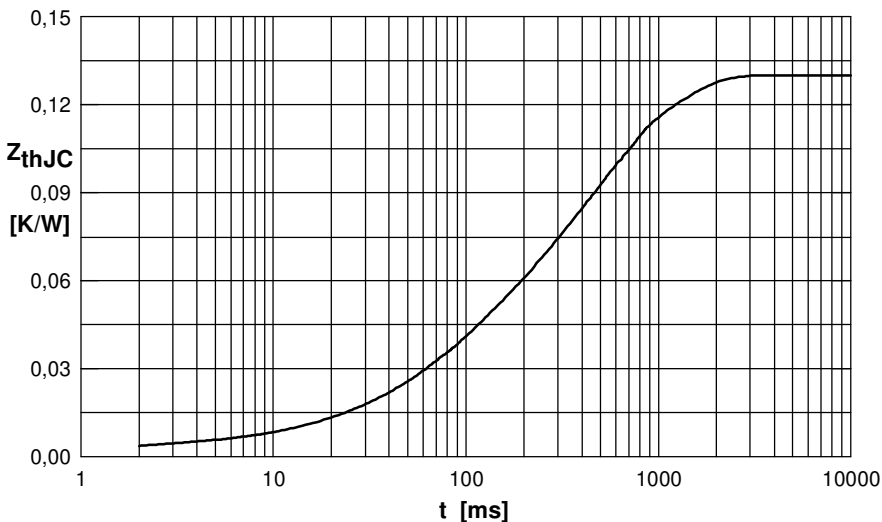


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.003	0.0010
2	0.025	0.0700
3	0.045	0.3800
4	0.057	0.6100