

Standard Rectifier Module

preliminary

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

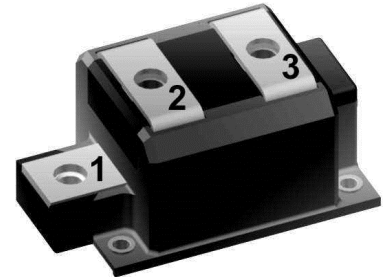
$$I_{FAV} = 2 \times 700 \text{ A}$$

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

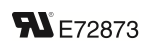
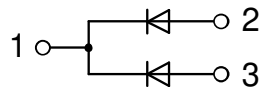
Common Cathode

Part number

MDMA1400C1600CC



Backside: isolated

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: ComPack

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

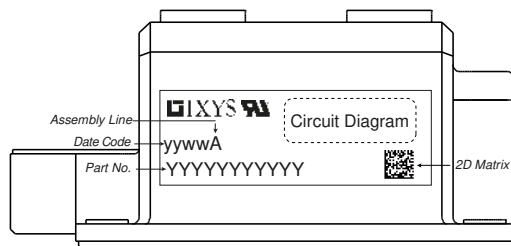
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage					1700	V
V_{RRM}	max. repetitive reverse blocking voltage					1600	V
I_R	reverse current	$V_R = 1600$ V		$T_{VJ} = 25^\circ\text{C}$		500	μA
		$V_R = 1600$ V		$T_{VJ} = 150^\circ\text{C}$		20	mA
V_F	forward voltage drop	$I_F = 700$ A		$T_{VJ} = 25^\circ\text{C}$		1.14	V
						1.35	V
		$I_F = 1400$ A		$T_{VJ} = 125^\circ\text{C}$		1.05	V
						1.30	V
I_{FAV}	average forward current	$T_C = 100^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		700	A
$I_{F(RMS)}$	RMS forward current	rectangular	$d = 0.5$			1700	A
V_{F0}	threshold voltage	} for power loss calculation only		$T_{VJ} = 150^\circ\text{C}$		0.78	V
r_F	slope resistance					0.35	m Ω
R_{thJC}	thermal resistance junction to case					0.055	K/W
R_{thCH}	thermal resistance case to heatsink				0.02		K/W
P_{tot}	total power dissipation			$T_C = 25^\circ\text{C}$		2270	W
I_{FSM}	max. forward surge current	$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		20.0	kA
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		21.6	kA
		$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		17.0	kA
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		18.4	kA
I^2t	value for fusing	$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		2.00	MA ² s
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		1.94	MA ² s
		$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		1.45	MA ² s
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		1.40	MA ² s
C_J	junction capacitance	$V_R = 400$ V; $f = 1$ MHz		$T_{VJ} = 25^\circ\text{C}$		781	pF

Package ComPack		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			1200	A
T_{VJ}	virtual junction temperature		-40		150	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		125	°C
Weight				500		g
M_D	mounting torque		3		5	Nm
M_T	terminal torque		12		14	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	21.0			mm
$d_{Spb/Apb}$		terminal to backside	18.0			mm
V_{ISOL}	isolation voltage	t = 1 second	4800			V
		t = 1 minute	4000			V

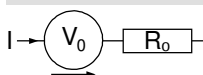

Part description

- M = Module
- D = Diode
- M = Standard Rectifier
- A = (up to 1800V)
- 1400 = Current Rating [A]
- C = Common Cathode
- 1600 = Reverse Voltage [V]
- CC = ComPack

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDMA1400C1600CC	MDMA1400C1600CC	Box	3	520221

Equivalent Circuits for Simulation

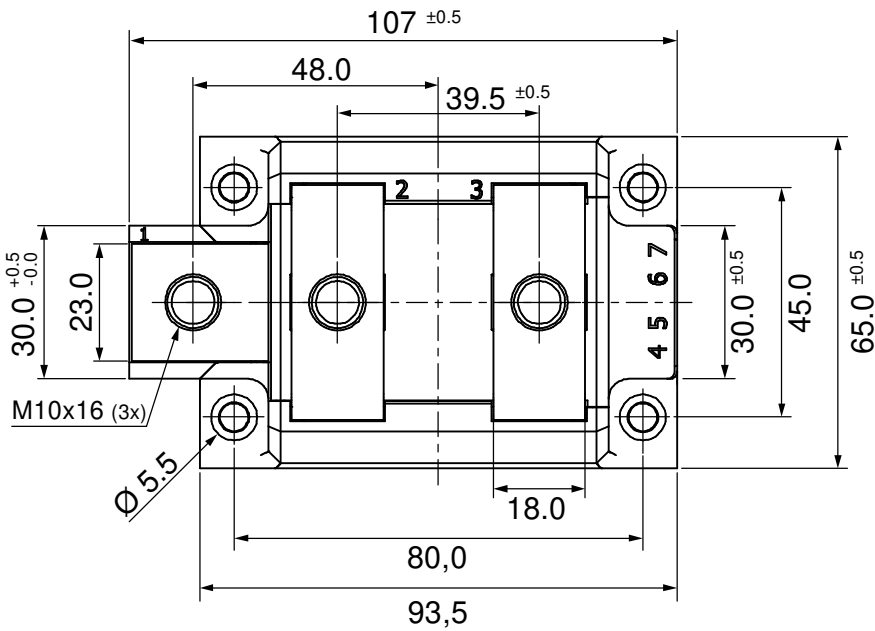
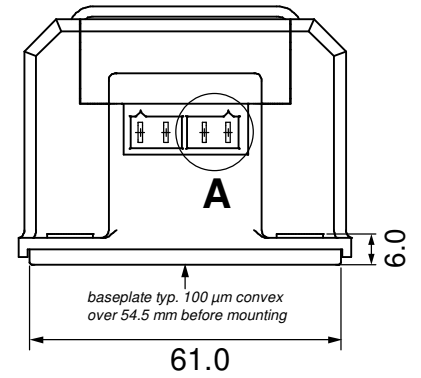
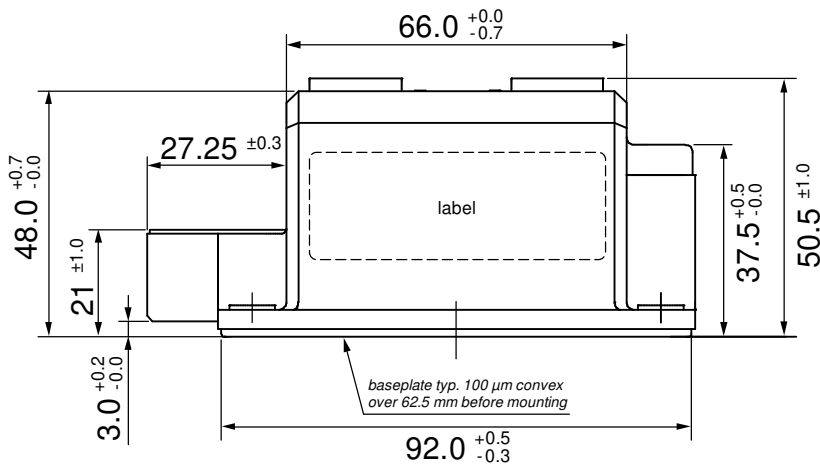
* on die level

 $T_{VJ} = 150\text{ °C}$

Rectifier

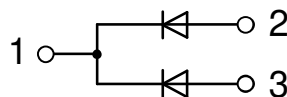
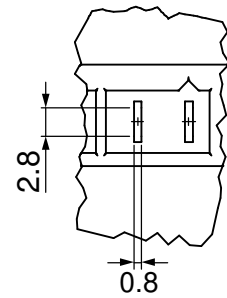
$V_{0\ max}$	threshold voltage	0.78	V
$R_{0\ max}$	slope resistance *	0.16	mΩ



Outlines ComPack



A (2:1)





Rectifier

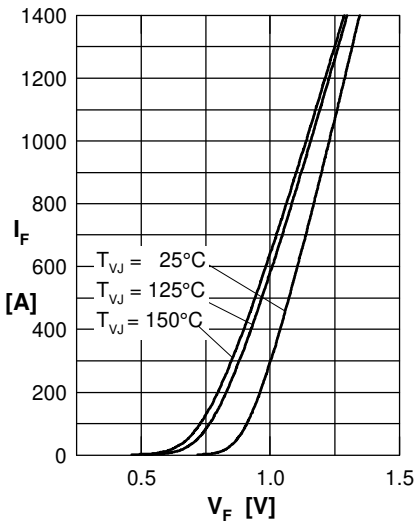


Fig. 1 Forward current versus voltage drop per diode

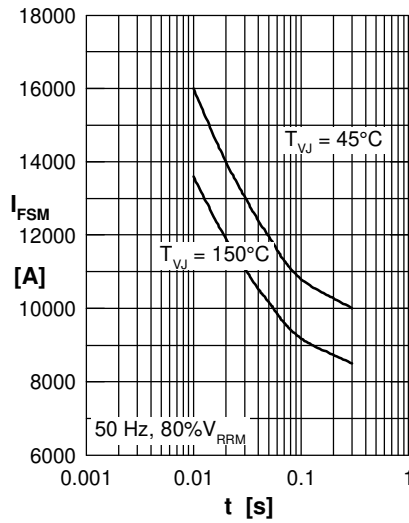


Fig. 2 Surge overload current vs. time per diode

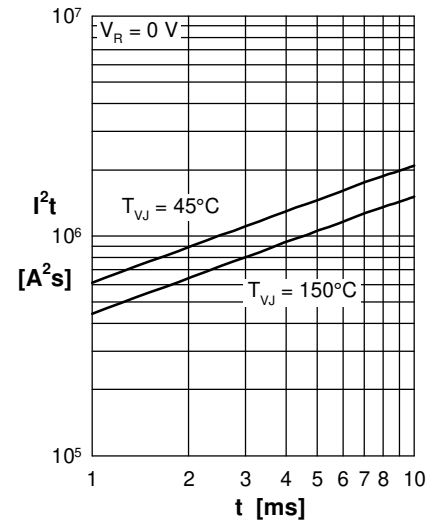


Fig. 3 I^2t versus time per diode

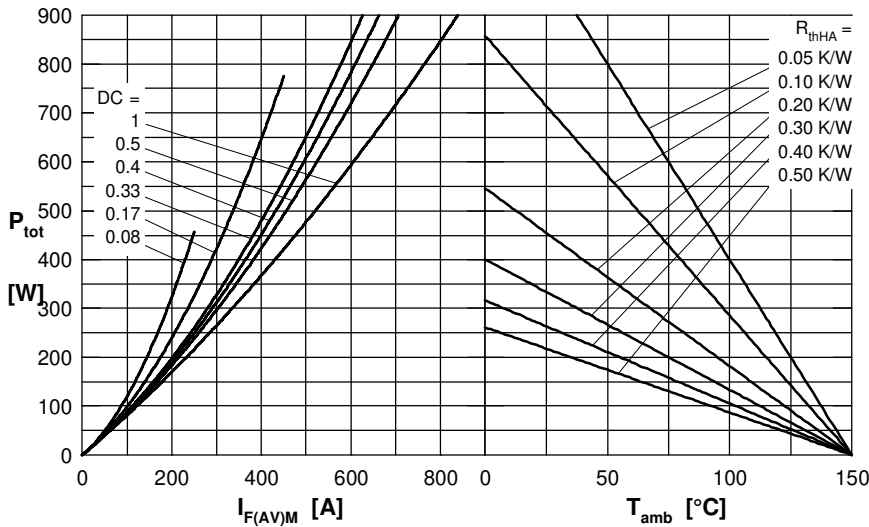


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

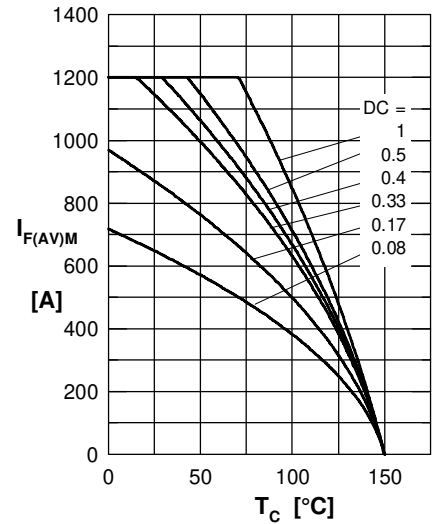


Fig. 5 Max. forward current vs. case temperature per diode

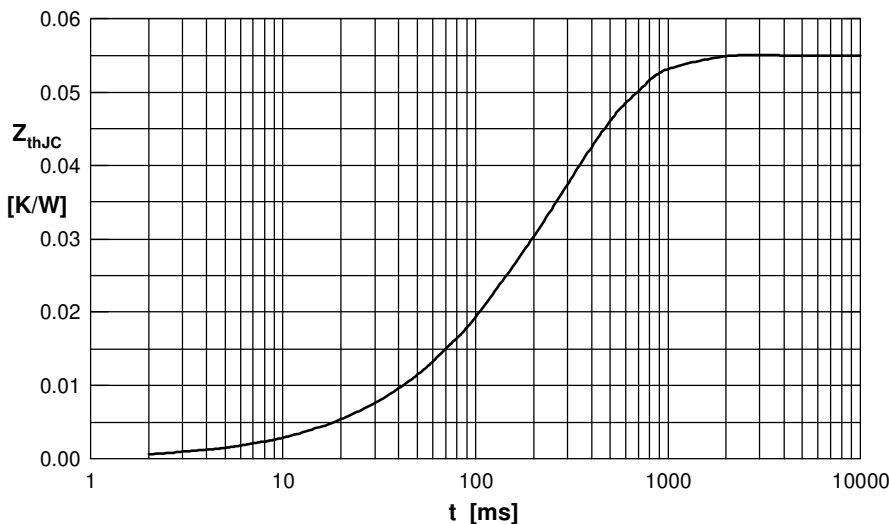


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.001	0.0150
2	0.004	0.0600
3	0.017	0.2000
4	0.033	0.3400