High Voltage Standard Rectifier Module

V_{RRM}	= 2x 2200	V
I_{FAV}	= 380	A
V_F	= 0.93	V

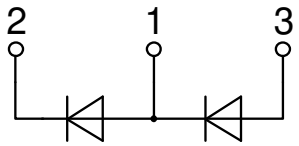
Phase leg

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

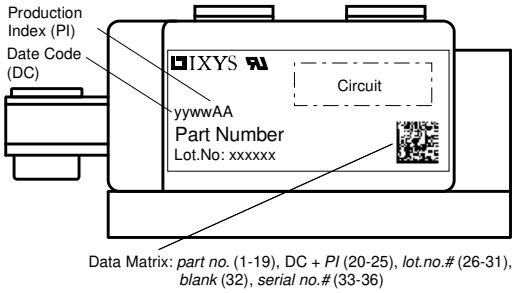
Package: Y1

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

Rectifier

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
V_{RSM}	*max. non-repetitive reverse blocking voltage*		T_{VJ} = 25°C			2300	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			2200	V
I_R	*reverse current*	V_R = 2200 V	T_{VJ} = 25°C			500	µA
		V_R = 2200 V	T_{VJ} = 150°C			20	mA
V_F	*forward voltage drop*	I_F = 300 A	T_{VJ} = 25°C			1.05	V
		I_F = 600 A				1.18	V
		I_F = 300 A	T_{VJ} = 125°C			0.93	V
		I_F = 600 A				1.10	V
I_{FAV}	*average forward current*	T_C = 100°C	T_{VJ} = 150°C			380	A
		rectangular d = 0.5					
V_{F0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.75	V
r_F	*slope resistance* }					0.53	mΩ
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°C			1140	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°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°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°C			605.0	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			587.1	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			437.1	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			424.4	kA²s
C_J	*junction capacitance*	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°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	50/60 Hz, RMS; I_{ISOL} ≤ 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

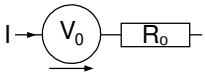
M = Module
D = Diode
N = High Voltage Standard Rectifier
A = (>= 2000V)
380 = Current Rating [A]
P = Phase leg
2200 = Reverse Voltage [V]
KC = Y1-CU

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

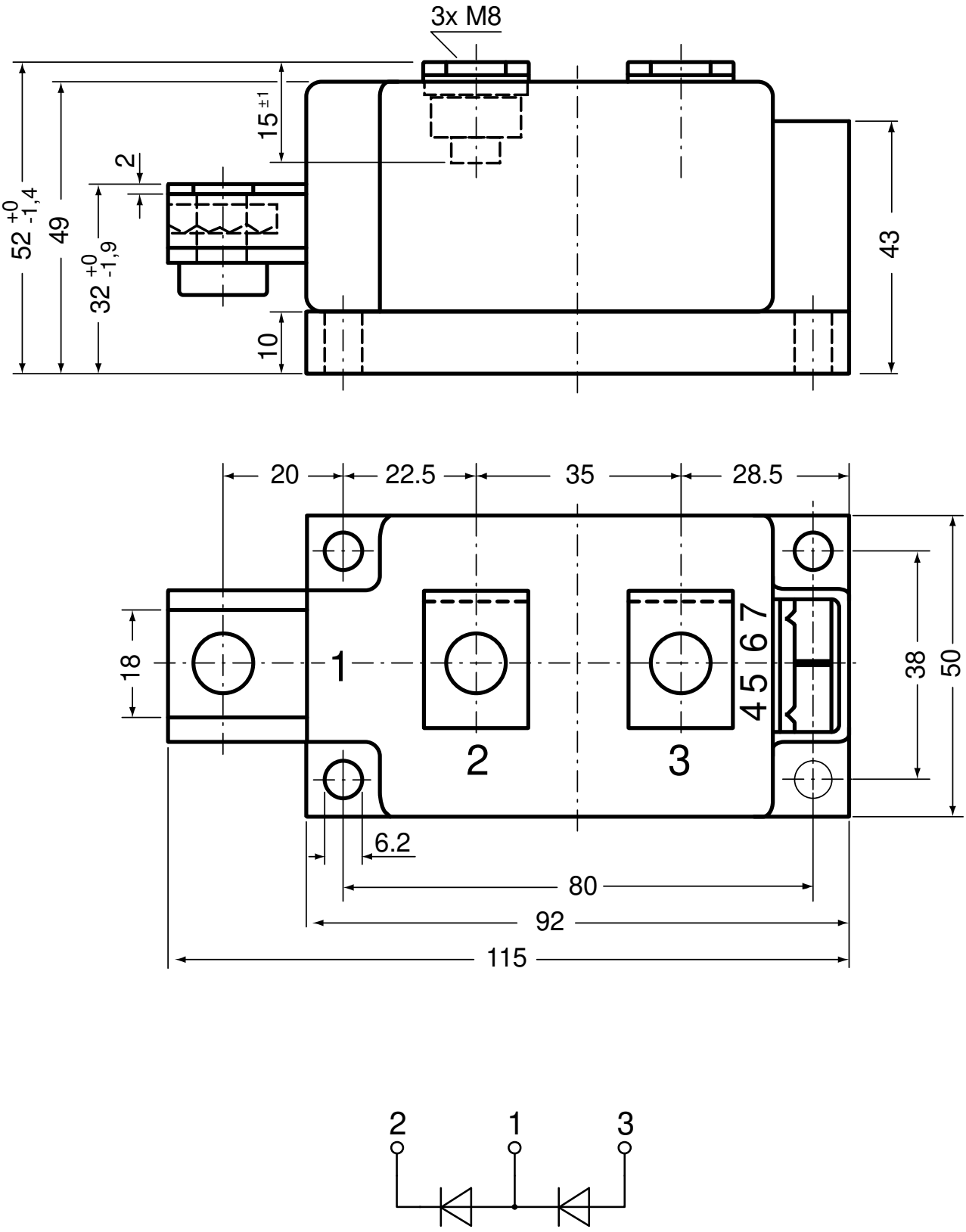
** on die level* T_{VJ} = 150°C



Rectifier

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

Outlines Y1



Rectifier

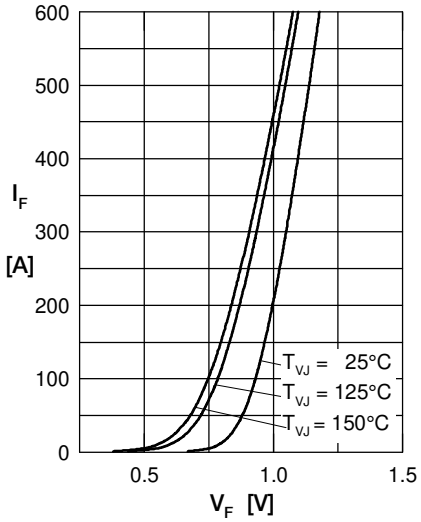


Fig. 1 Forward current versus voltage drop per diode

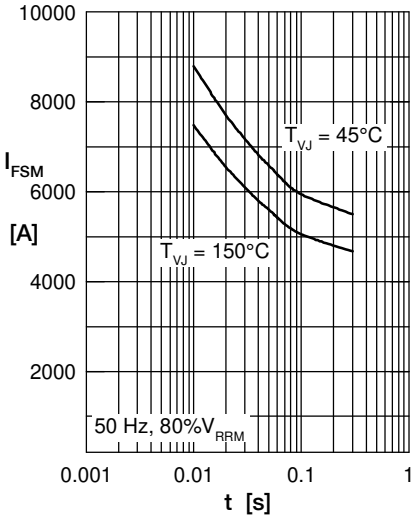


Fig. 2 Surge overload current vs. time per diode

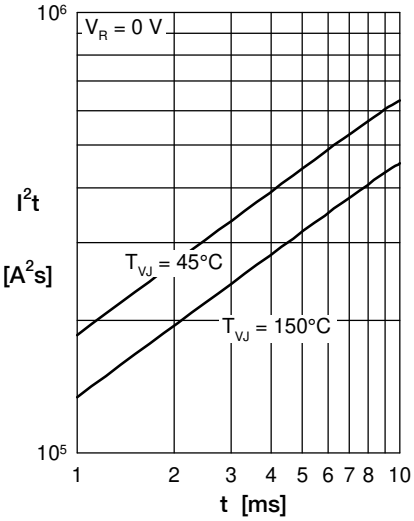


Fig. 3 I^2t versus time per diode

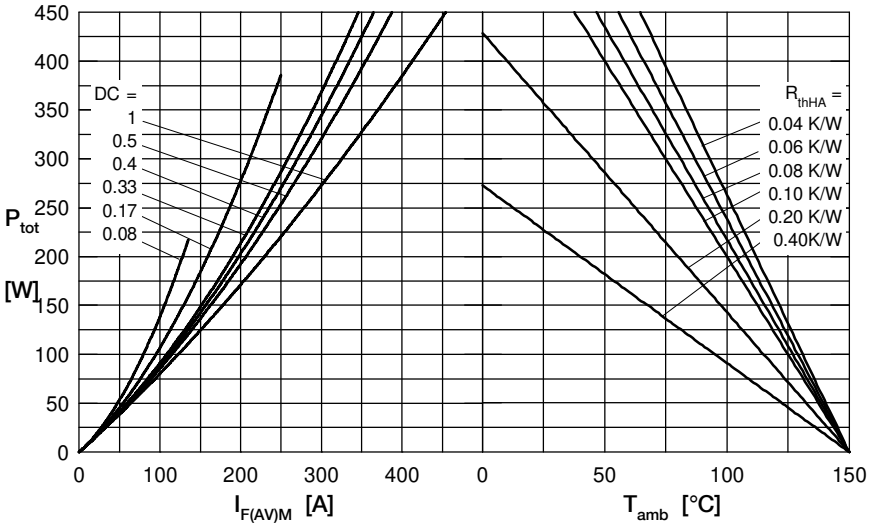


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

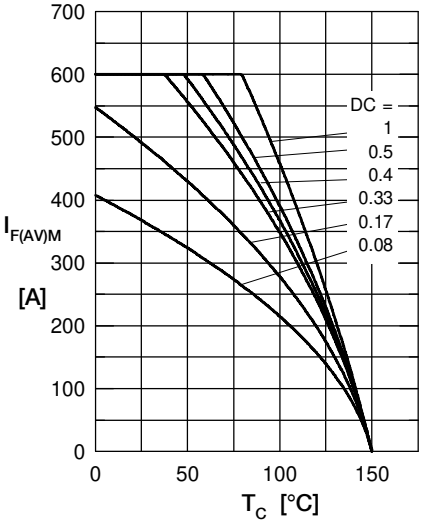


Fig. 5 Max. forward current vs. case temperature per diode

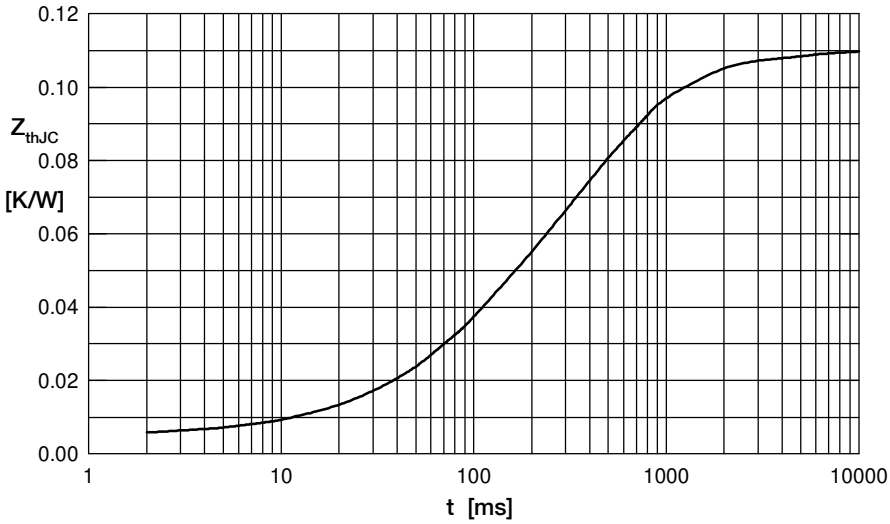


Fig. 6 Transient thermal impedance junction to case vs. time per diode

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