Standard Rectifier Module

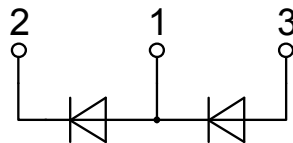|		
V_{RRM}	=	2x 1200 V
I_{FAV}	=	71 A
V_F	=	1.14 V

Phase leg

Part number

MDD56-12N1B
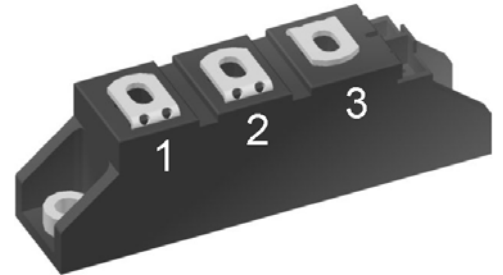
Backside: isolated

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: TO-240AA
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Rectifier · Ratings

Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage		T_{VJ} = 25°C			1300	V
V_{RRM}	max. repetitive reverse blocking voltage		T_{VJ} = 25°C			1200	V
I_R	reverse current	V_R = 1200 V	T_{VJ} = 25°C			200	μA
		V_R = 1200 V	T_{VJ} = 150°C			10	mA
V_F	forward voltage drop	I_F = 100 A	T_{VJ} = 25°C			1.21	V
		I_F = 200 A				1.48	V
		I_F = 100 A	T_{VJ} = 125 °C			1.14	V
		I_F = 200 A				1.45	V
I_{FAV}	average forward current	T_C = 100°C	T_{VJ} = 150°C			71	A
$I_{F(RMS)}$	RMS forward current	180° sine				150	A
V_{F0}	threshold voltage } for power loss calculation only		T_{VJ} = 150°C			0.80	V
r_F	slope resistance }					3	mΩ
R_{thJC}	thermal resistance junction to case					0.51	K/W
R_{thCH}	thermal resistance case to heatsink				0.20		K/W
P_{tot}	total power dissipation		T_C = 25°C			245	W
I_{FSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.40	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.51	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			1.19	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.29	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			9.80	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			9.49	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			7.08	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			6.87	kA²s
C_J	junction capacitance	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°C		27		pF

Package	TO-240AA			Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal				200	A
T_{VJ}	virtual junction temperature			-40		150	°C
T_{op}	operation temperature			-40		125	°C
T_{stg}	storage temperature			-40		125	°C
Weight					90		g
M_D	mounting torque			2.5		4	Nm
M_T	terminal torque			2.5		4	Nm
$d_{Spp/App}$	creepage distance on surface | striking distance through air	terminal to terminal	13.0	9.7			mm
$d_{Spb/Apb}$		terminal to backside	16.0	16.0			mm
V_{ISOL}	isolation voltage	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \le 1$ mA	3600			V
		t = 1 minute		3000			V
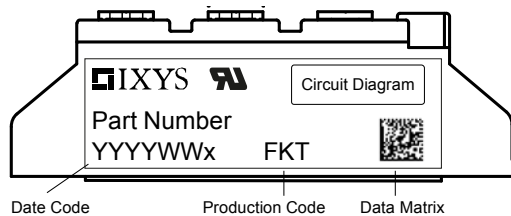
Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD56-12N1B	MDD56-12N1B	Box	6	458066

Equivalent Circuits for Simulation   *on die level* $T_{VJ} = 150$ °C
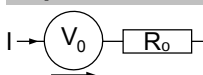
Rectifier

$V_{0 max}$	threshold voltage	0.8	V
$R_{0 max}$	slope resistance *	1.8	mΩ

Outlines   TO-240AA

M5x10

10

30

7.5

Ø5.5

65

0.25

29.7

20

20

25

20.8

1

2

3
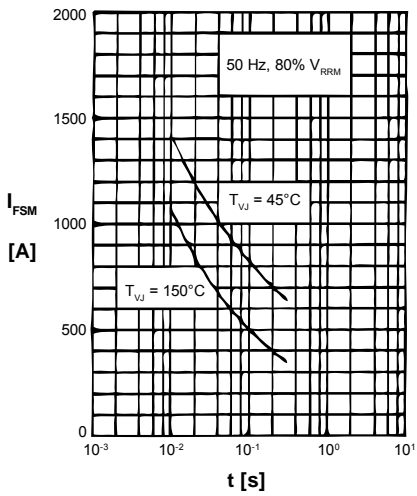
80

92

2   1   3
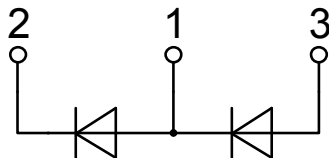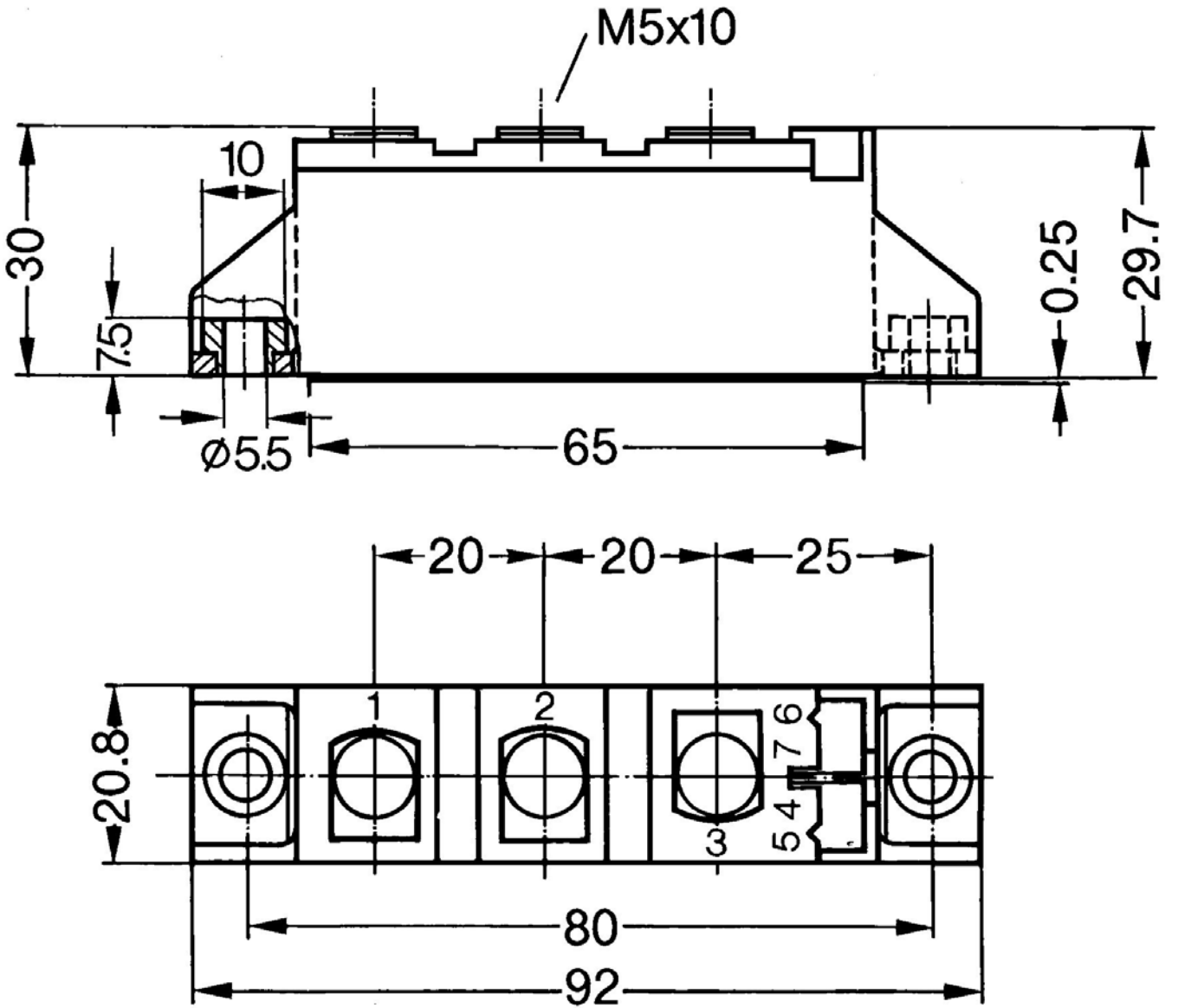
Rectifier

Fig. 1 Surge overload current
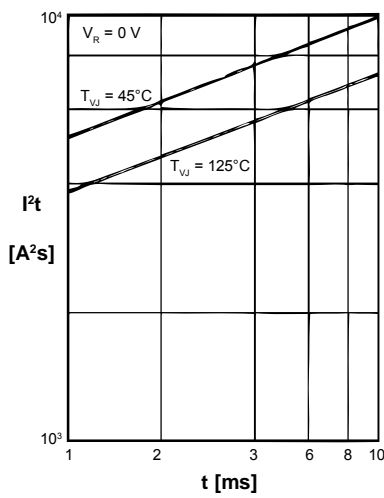I_{TSM}, I_{FSM}: Crest value, t: duration
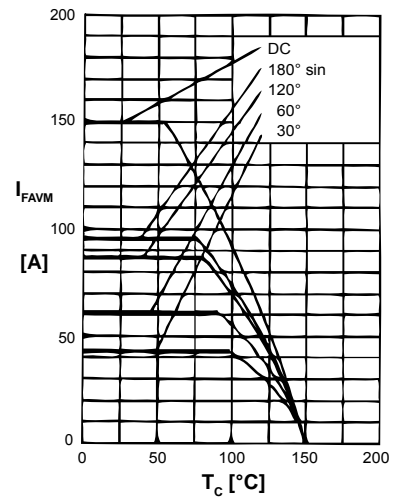

Fig. 2 I²t versus time (1-10 ms)

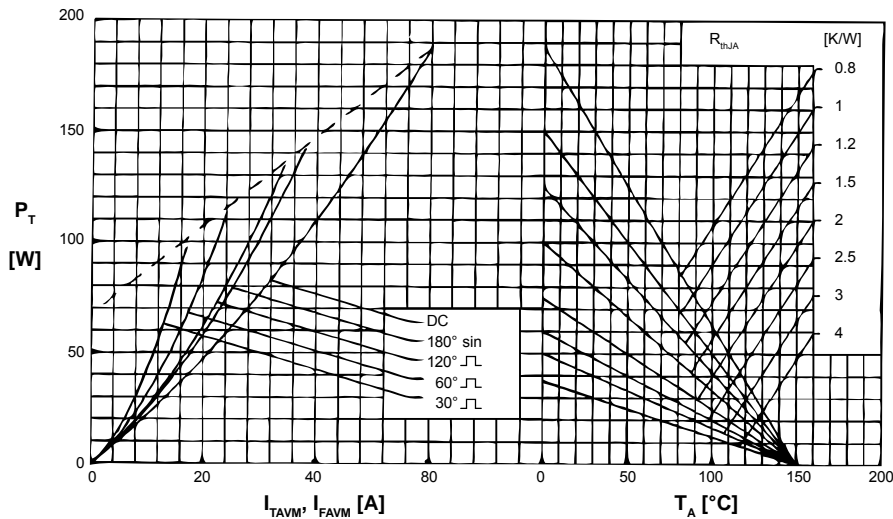Fig. 3 Maximum forward current
at case temperature

Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)
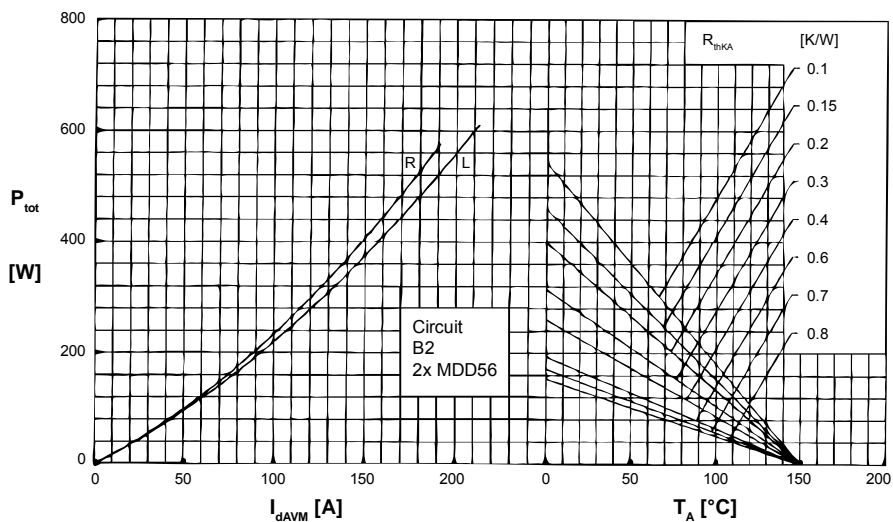

Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current
and ambient temperature; R = resistive load, L = inductive load

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IXYS reserves the right to change limits, conditions and dimensions.

Data according to IEC 60747and per semiconductor unless otherwise specified
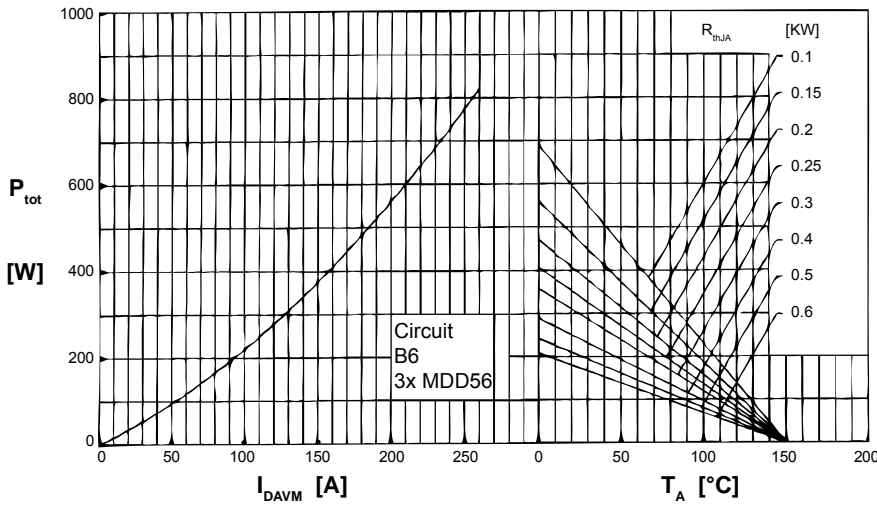
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Rectifier

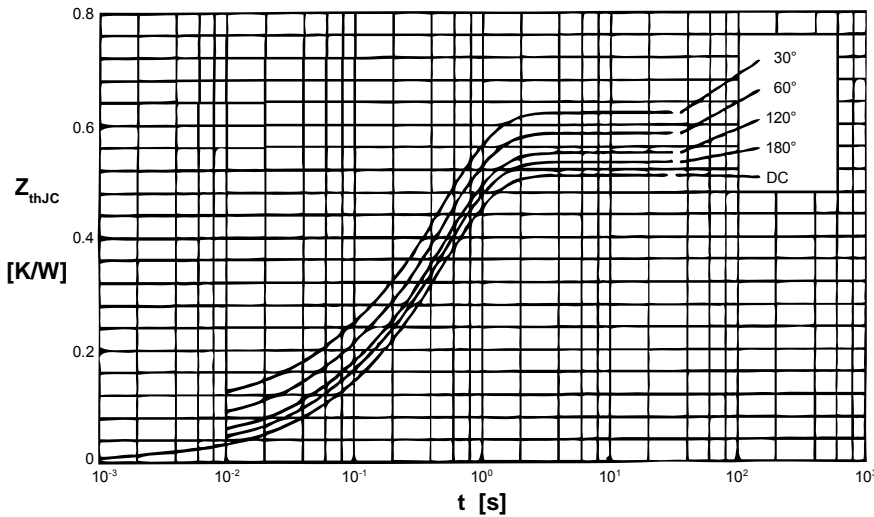Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

Fig. 7 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.51
180°	0.53
120°	0.55
60°	0.58
30°	0.62

Constants for Z_{thJC} calculation:

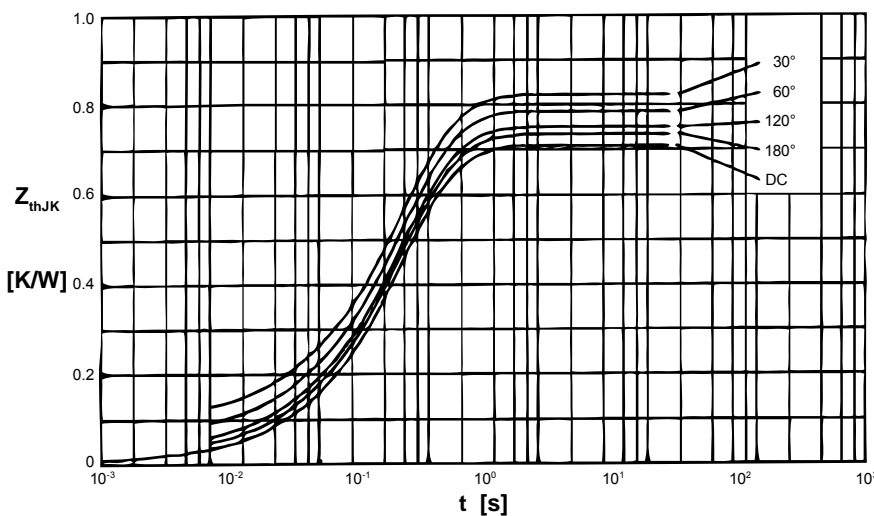| i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0015
2	0.055	0.0450
3	0.442	0.4850

Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.71
180°	0.73
120°	0.75
60°	0.78
30°	0.82

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0015
2	0.055	0.0450
3	0.442	0.4850
4	0.200	1.2500