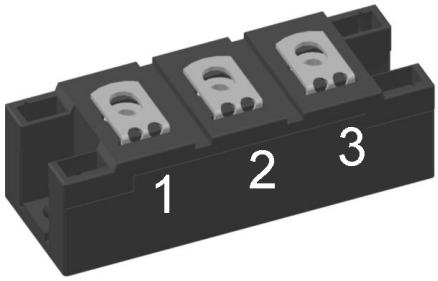
Standard Rectifier Module

V_{RRM} = 2x 1400 V
I_{FAV} = 190 A
V_F = 0.96 V

Phase leg

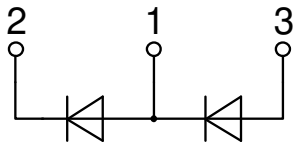
Part number

MDD172-14N1



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

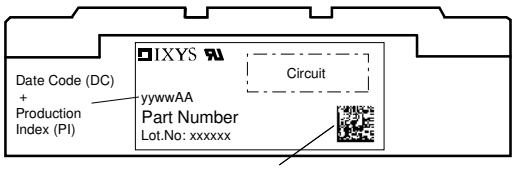
Package: Y4

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

Rectifier

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
V_{RSM}	*max. non-repetitive reverse blocking voltage*		T_{VJ} = 25°C			1500	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			1400	V
I_R	*reverse current*	V_R = 1400 V	T_{VJ} = 25°C			1	mA
		V_R = 1400 V	T_{VJ} = 150°C			20	mA
V_F	*forward voltage drop*	I_F = 150 A	T_{VJ} = 25°C			1.07	V
		I_F = 300 A				1.22	V
		I_F = 150 A	T_{VJ} = 125°C			0.96	V
		I_F = 300 A				1.16	V
I_{FAV}	*average forward current*	T_C = 100°C	T_{VJ} = 150°C			190	A
$I_{F(RMS)}$	*RMS forward current*	180° sine				300	A
V_{F0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.80	V
r_F	*slope resistance* }					0.8	mΩ
R_{thJC}	*thermal resistance junction to case*					0.21	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.08		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			600	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			6.60	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			7.13	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			5.61	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			6.06	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			217.8	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			211.5	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			157.4	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			152.8	kA²s
C_J	*junction capacitance*	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°C		238		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
Weight					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	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3600			V
		t = 1 minute		3000			V

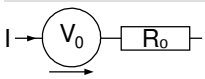


Data Matrix: *part no.* (1-19), DC + *PI* (20-25), *lot.no.#* (26-31), *blank* (32), *serial no.#* (33-36)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD172-14N1	MDD172-14N1	Box	6	429716

Equivalent Circuits for Simulation

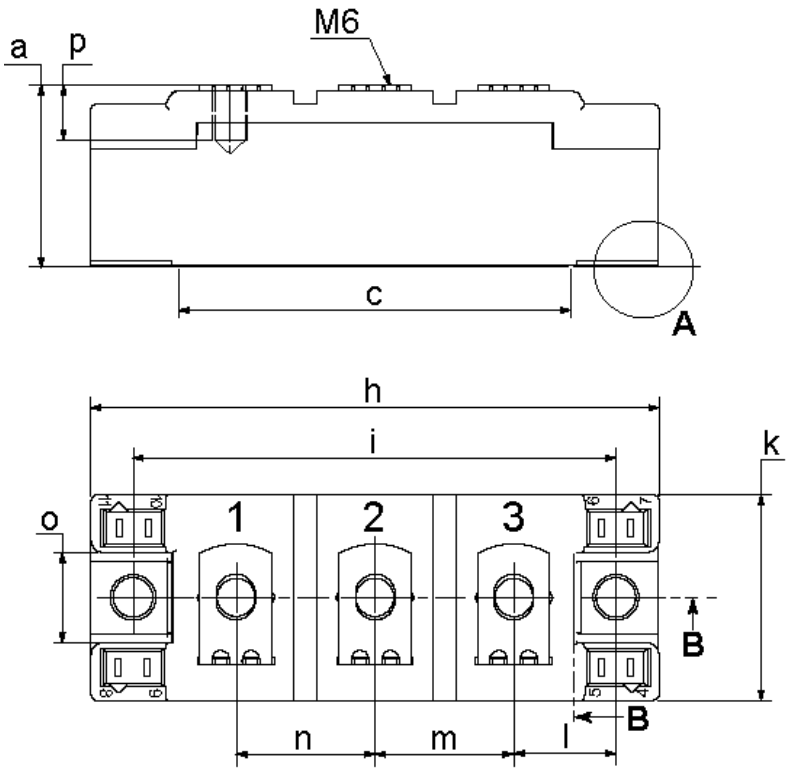
** on die level* T_{VJ} = 150°C



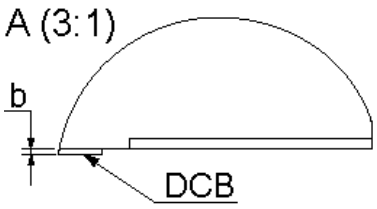
Rectifier

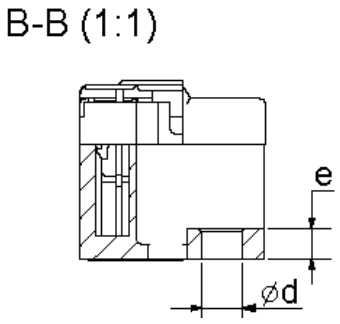
$V_{0\,max}$	*threshold voltage*	0.8	V
$R_{0\,max}$	*slope resistance **	0.4	mΩ

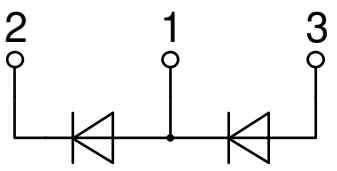
Outlines Y4



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

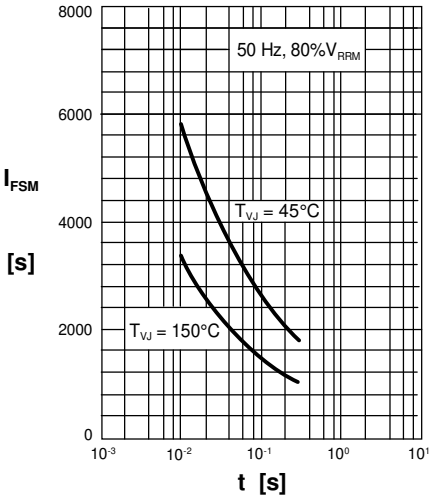


Fig. 1 Surge overload current
I_{FSM}: Crest value, t: duration

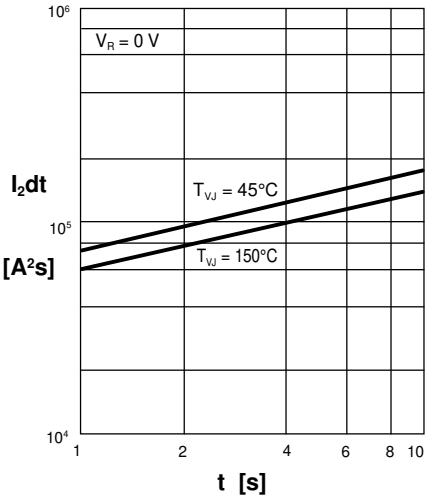


Fig. 2 •I²dt versus time (1-10 ms)

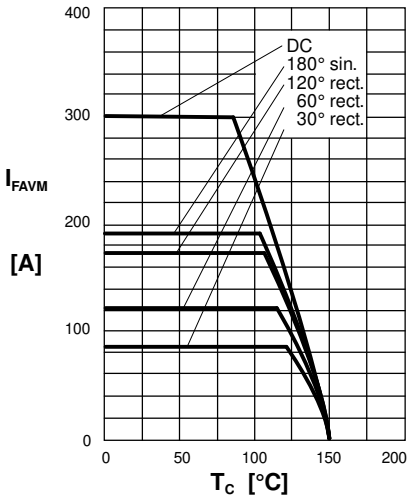


Fig. 2a Maximum forward current at case temperature

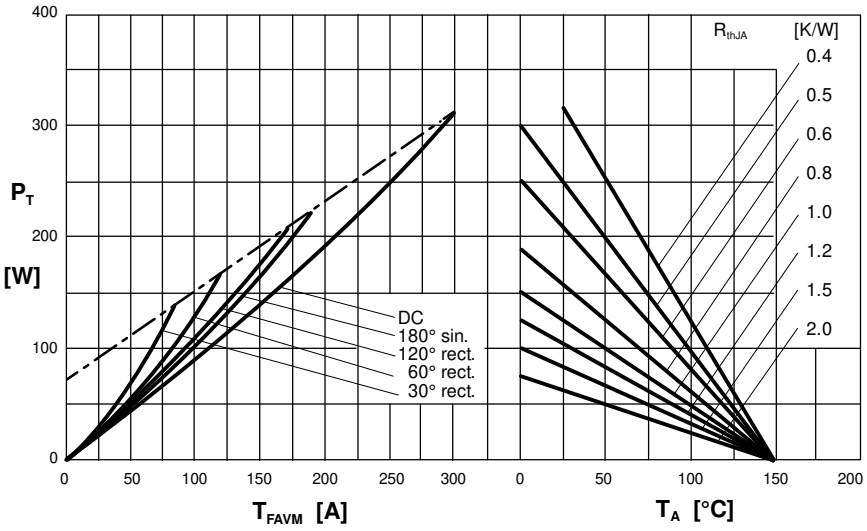
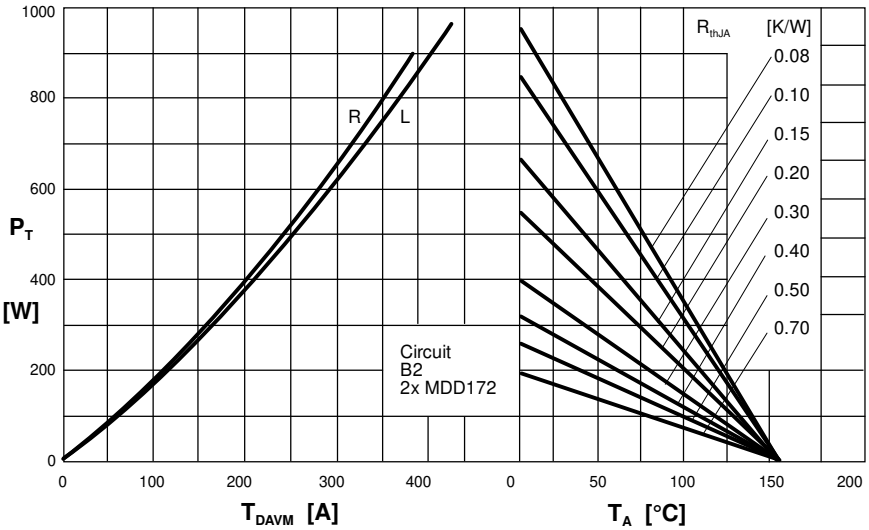


Fig. 3 Power dissipation vs. forward current and ambient temperature (per diode)



R = resistive load
L = inductive load

Fig. 4 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient

Rectifier

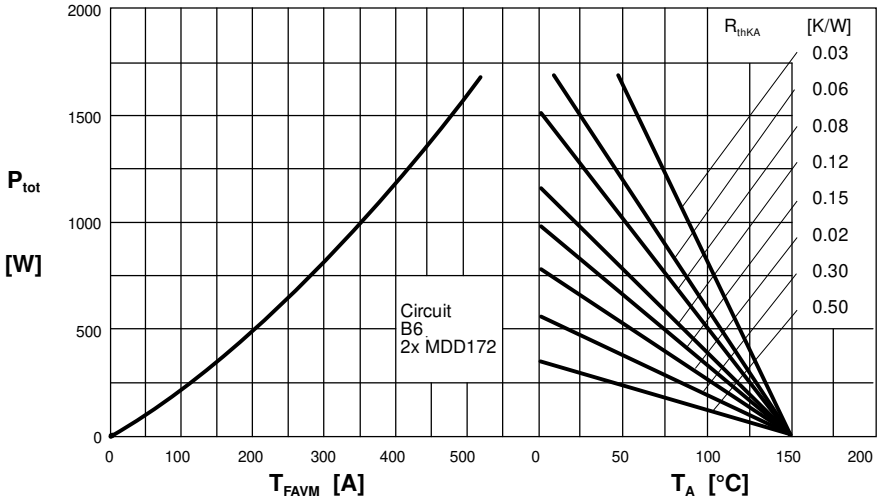


Fig. 5 Three phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature

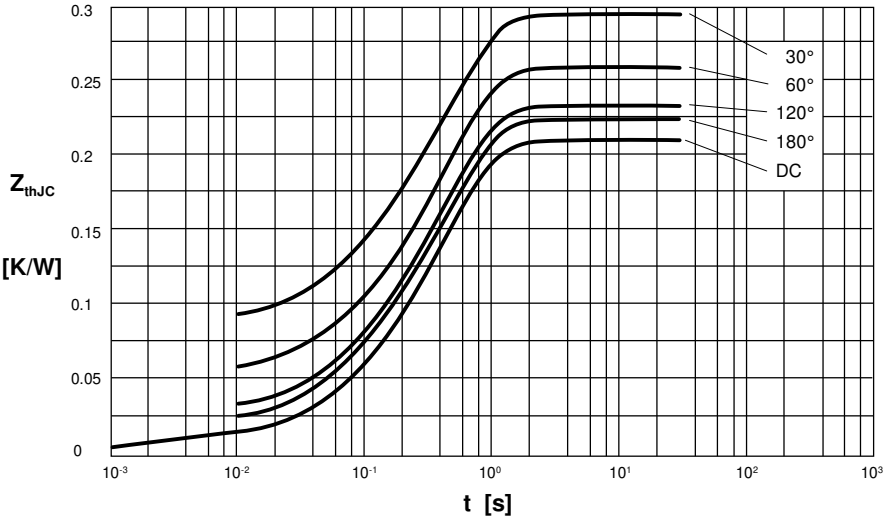


Fig. 6 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.210
180°	0.223
120°	0.233
60°	0.260
30°	0.295

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.0087	0.001
2	0.0163	0.065
3	0.1850	0.400

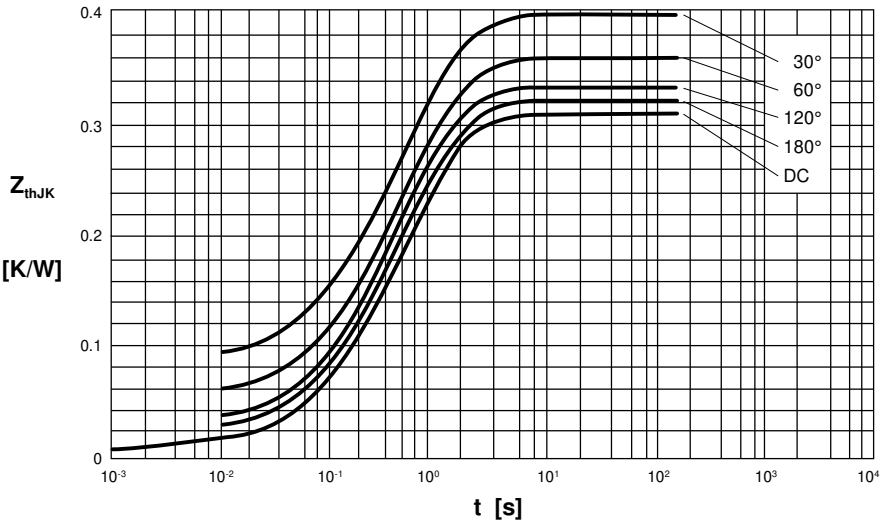


Fig. 7 Transient thermal impedance junction to heatsink (per diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.310
180°	0.323
120°	0.333
60°	0.360
30°	0.395

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.0087	0.001
2	0.0163	0.065
3	0.1850	0.400
4	0.1000	1.290