Standard Rectifier Module

V_{RRM}	$=$	2×1800 V
I_{FAV}	$=$	165 A
V_F	$=$	1.05 V

Phase leg

Part number

MDD142-18N1
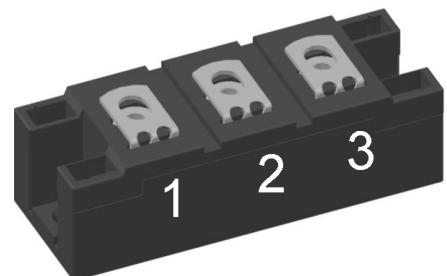
Backside: isolated

E72873

2   1   3
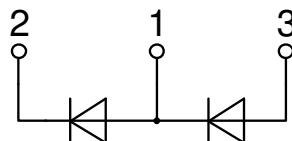
Features / Advantages:
● Package with DCB ceramic
● Improved temperature and power cycling
● Planar passivated chips
● Very low forward voltage drop
● Very low leakage current

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		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage		$T_{VJ} = 25°C$			1900	V
V_{RRM}	max. repetitive reverse blocking voltage		$T_{VJ} = 25°C$			1800	V
I_R	reverse current	$V_R = 1800$ V	$T_{VJ} = 25°C$			1	mA
		$V_R = 1800$ V	$T_{VJ} = 150°C$			20	mA
V_F	forward voltage drop	$I_F = 150$ A	$T_{VJ} = 25°C$			1.12	V
		$I_F = 300$ A				1.30	V
		$I_F = 150$ A	$T_{VJ} = 125°C$			1.05	V
		$I_F = 300$ A				1.26	V
I_{FAV}	average forward current	$T_C = 100°C$	$T_{VJ} = 150°C$			165	A
$I_{F(RMS)}$	RMS forward current	180° sine				300	A
V_{F0}	threshold voltage		$T_{VJ} = 150°C$			0.80	V
r_F	slope resistance } for power loss calculation only					1.3	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	$T_{VJ} = 45°C$			4.70	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			5.08	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150°C$			4.00	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			4.32	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			110.5	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			107.1	kA²s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150°C$			79.8	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			77.5	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		3600			V
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	3000			V

Date Code (DC) + Production Index (PI)

yywwAA
Part Number
Lot.No: xxxxxx
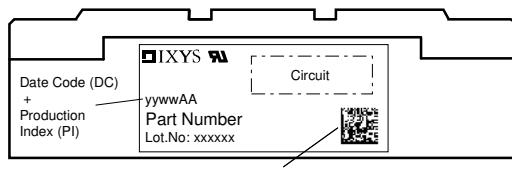
Circuit

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	MDD142-18N1	MDD142-18N1	Box	6	454435

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

Rectifier
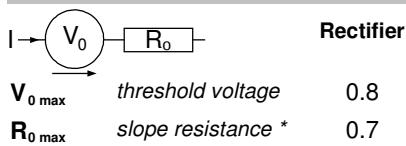
$V_{0\ max}$	threshold voltage	0.8	V
$R_{0\ max}$	slope resistance *	0.7	mΩ

Outlines   Y4
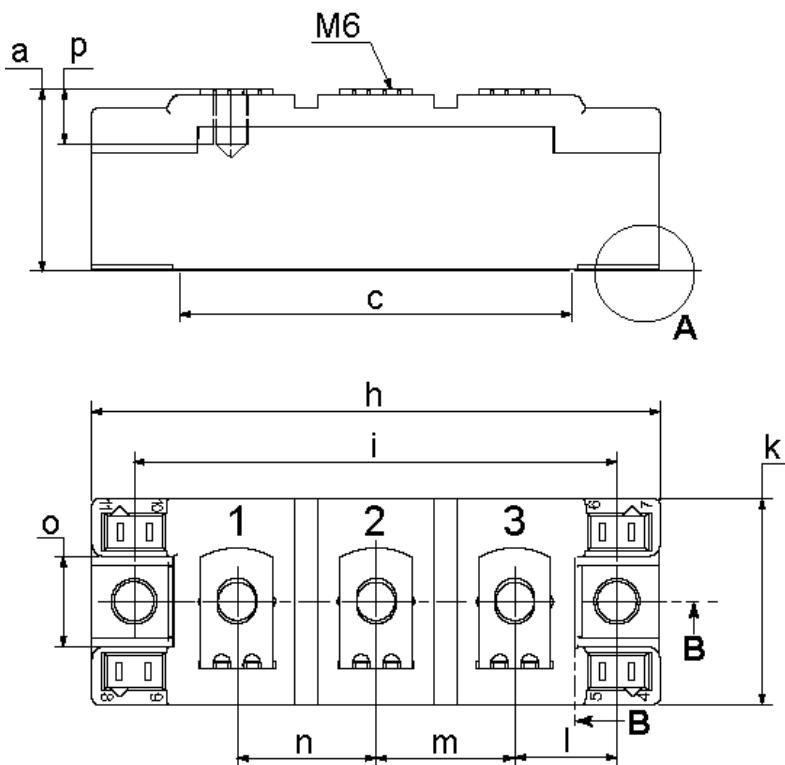
Dim.	MIN [mm]	MAX [mm]	MIN [inch]	MAX [inch]
a	30.0	30.6	1.181	1.205
b	typ. 0.25		typ. 0.010	
c	64.0	65.0	2.520	2.559
d	6.5	7.0	0.256	0.275
e	4.9	5.1	0.193	0.201
h	93.5	94.5	3.681	3.720
i	79.5	80.5	3.130	3.169
k	33.4	34.0	1.315	1.339
l	16.7	17.3	0.657	0.681
m	22.7	23.3	0.894	0.917
n	22.7	23.3	0.894	0.917
o	14.0	15.0	0.551	0.591
p	typ. 10.5		typ. 0.413	

A (3:1)

B-B (1:1)

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20160408c
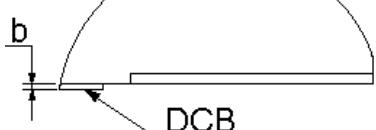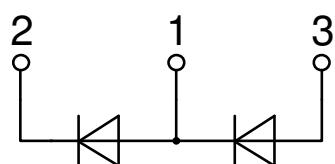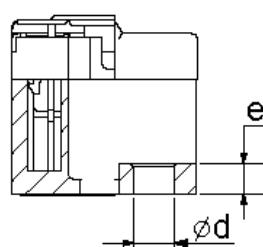
Rectifier
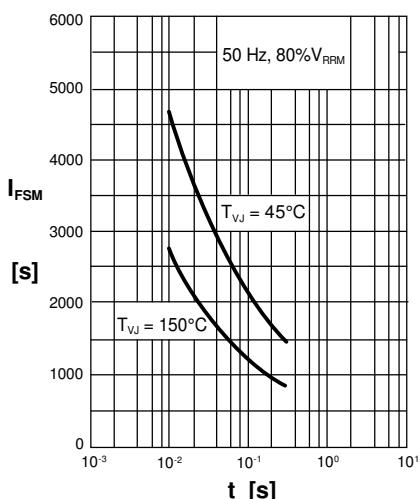
Fig. 1 Surge overload current
I_{FSM}: Crest value, t: duration
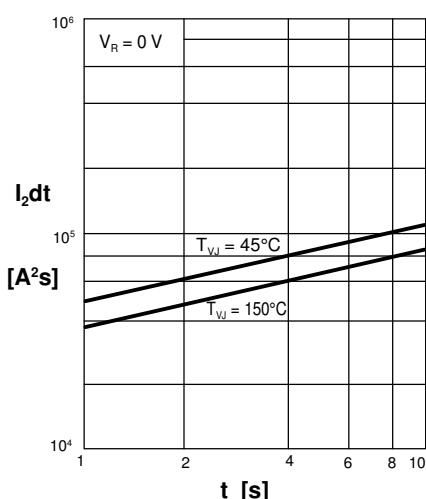

Fig. 2 •I^2dt versus time (1-10 ms)
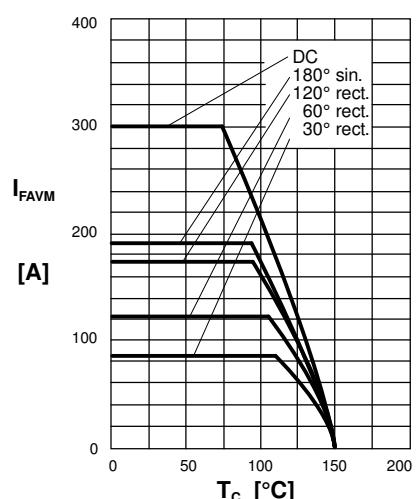
Fig. 2a Maximum forward current
at case temperature
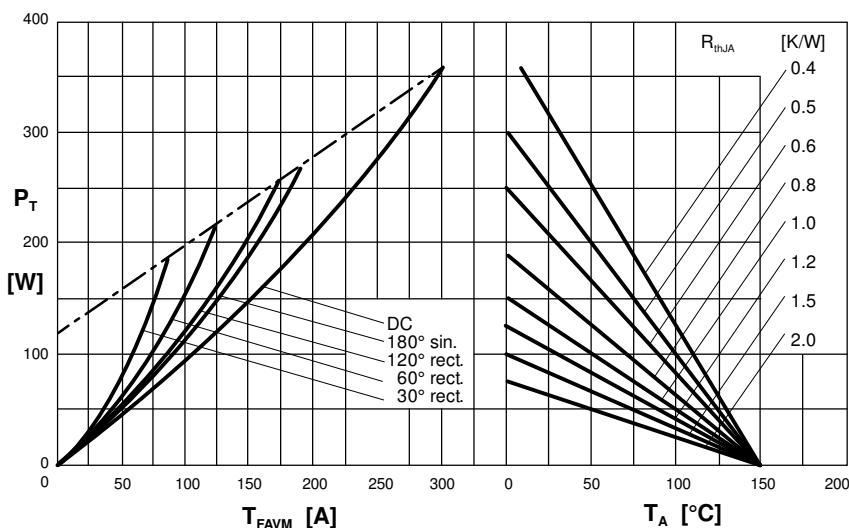
Fig. 3 Power dissipation vs. forward current and ambient temperature (per diode)
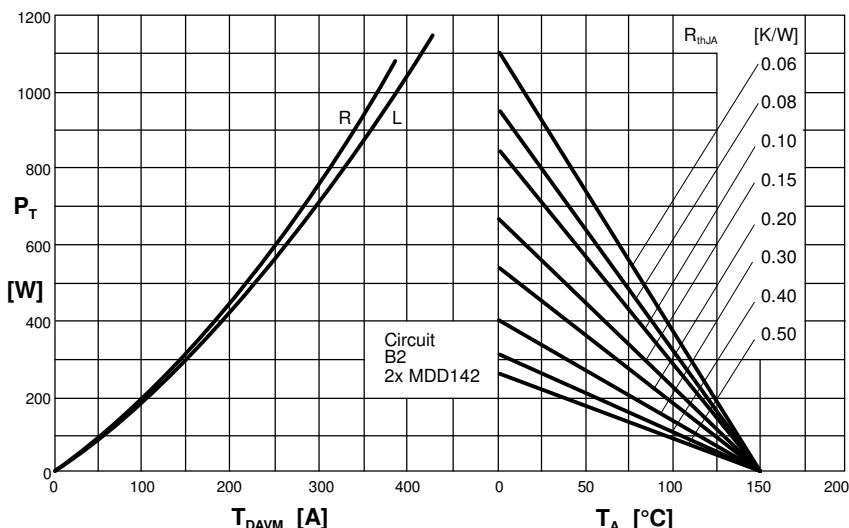

R = resistive load

L = inductive load

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

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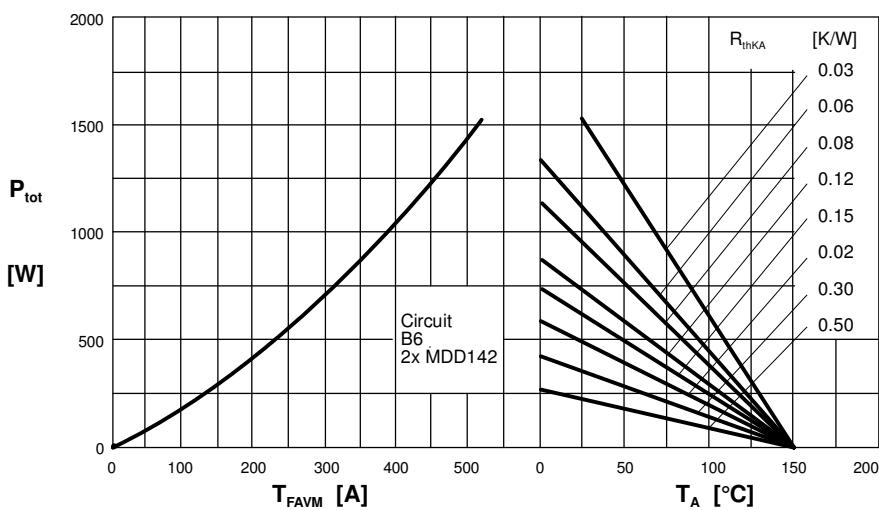
Rectifier

Fig. 5 Three phase rectifier bridge: Power dissipation
vs. direct output current and ambient temperature
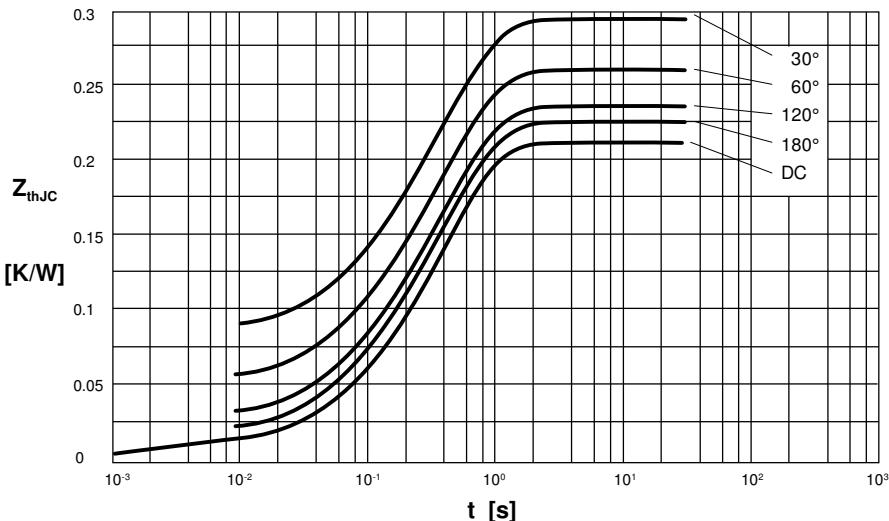
Fig. 6 Transient thermal impedance junction to case (per diode)

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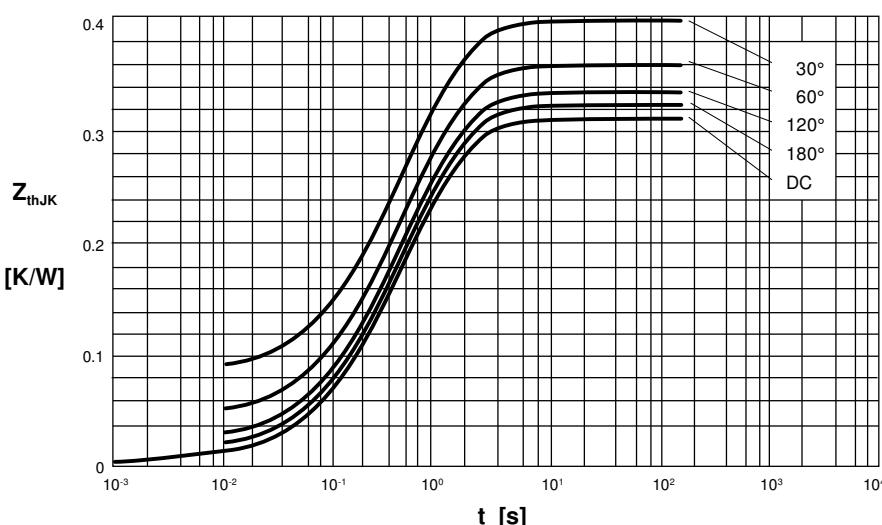
Fig. 7 Transient thermal impedance junction to heatsink (per diode)

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