

## Standard Rectifier Module

$$V_{RRM} = 2 \times 1400 \text{ V}$$

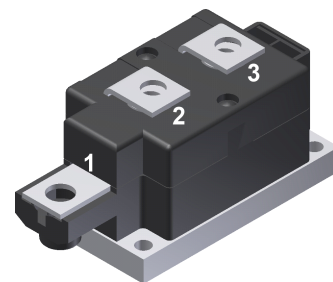
$$I_{FAV} = 270 \text{ A}$$

$$V_F = 1.08 \text{ V}$$

Phase leg

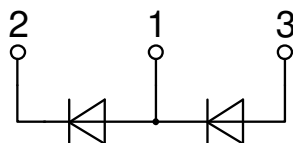
Part number

**MDD255-14N1**



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: Y1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

### Terms Conditions of usage:

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office.

Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

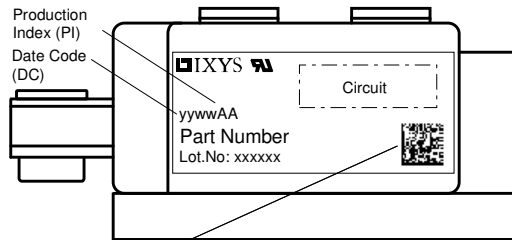
- to perform joint risk and quality assessments;

- the conclusion of quality agreements;

- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

Rectifier				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM}$	max. non-repetitive reverse blocking voltage				1500	V	
$V_{RRM}$	max. repetitive reverse blocking voltage				1400	V	
$I_R$	reverse current	$V_R = 1400\text{ V}$			500	$\mu\text{A}$	
		$V_R = 1400\text{ V}$			20	mA	
$V_F$	forward voltage drop	$I_F = 300\text{ A}$			1.19	V	
		$I_F = 600\text{ A}$			1.40	V	
		$I_F = 300\text{ A}$	$T_{VJ} = 125^\circ\text{C}$			1.08	V
		$I_F = 600\text{ A}$				1.35	V
$I_{FAV}$	average forward current	$T_C = 100^\circ\text{C}$			270	A	
$I_{F(RMS)}$	RMS forward current	180° sine			450	A	
$V_{F0}$	threshold voltage	} for power loss calculation only			0.80	V	
$r_F$	slope resistance				0.6	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				0.14	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.04		K/W	
$P_{tot}$	total power dissipation				890	W	
$I_{FSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^\circ\text{C}$			9.80	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			10.6	kA
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^\circ\text{C}$			8.33	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			9.00	kA
$I^2t$	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^\circ\text{C}$			480.2	kA <sup>2</sup> s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			466.1	kA <sup>2</sup> s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^\circ\text{C}$			346.9	kA <sup>2</sup> s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			336.6	kA <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 400\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^\circ\text{C}$		381	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	
<b>Weight</b>					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	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)

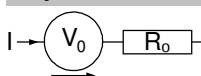
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDD255-14N1	MDD255-14N1	Box	3	464007

Similar Part	Package	Voltage class
MDD255-12N1	Y1-CU	1200
MDD255-16N1	Y1-CU	1600
MDD255-18N1	Y1-CU	1800
MDD255-20N1	Y1-CU	2000
MDD255-22N1	Y1-CU	2200

### Equivalent Circuits for Simulation

\* on die level

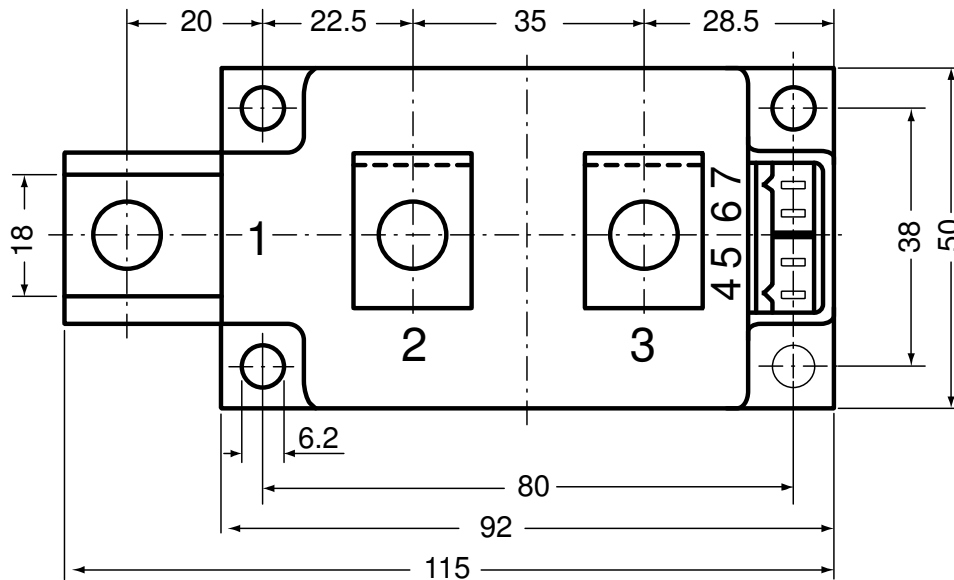
$T_{VJ} = 150\text{ °C}$



**Rectifier**

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

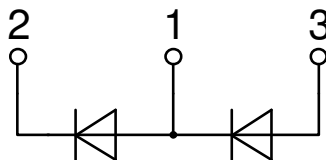
**Outlines Y1**



**Optional accessories for modules**

Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red

Type ZY 180L (L = Left for pin pair 4/5)  
 Type ZY 180R (R = Right for pin pair 6/7) } UL 758, style 3751



## Rectifier

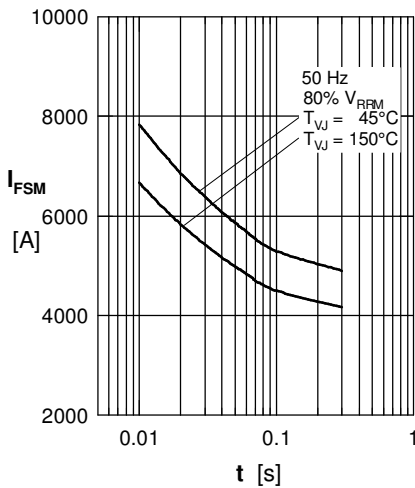


Fig. 1 Surge overload current  
 $I_{FSM}$ : Crest value,  $t$ : duration

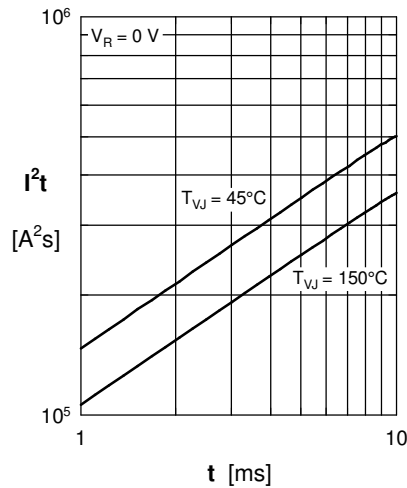


Fig. 2  $I^2t$  versus time (1-10 ms)

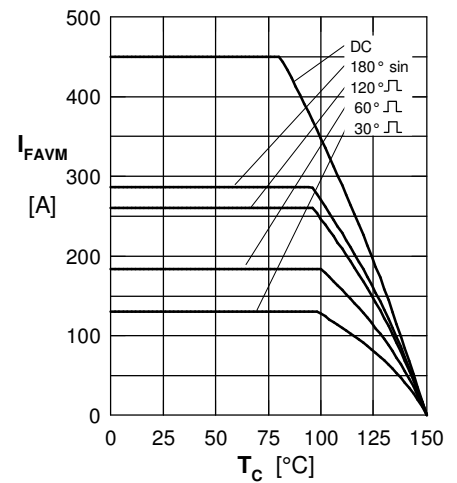


Fig. 3 Max. forward current  
 at case temperature

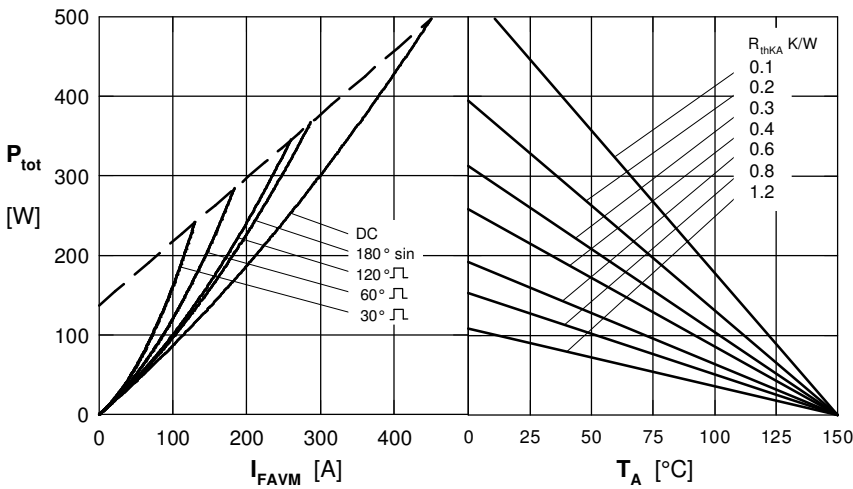


Fig. 4 Power dissipation vs. forward current & ambient temperature (per diode)

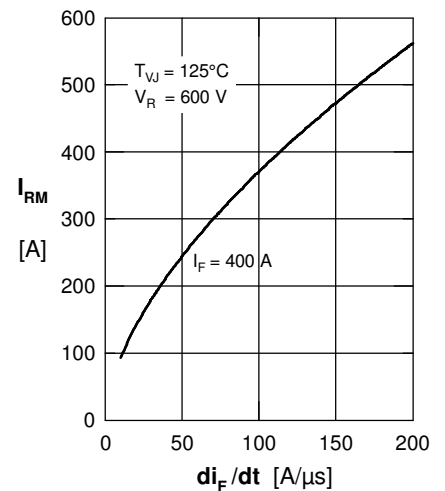


Fig. 5 Typ. peak reverse current  
 $I_{RM}$  versus  $-di_F/dt$

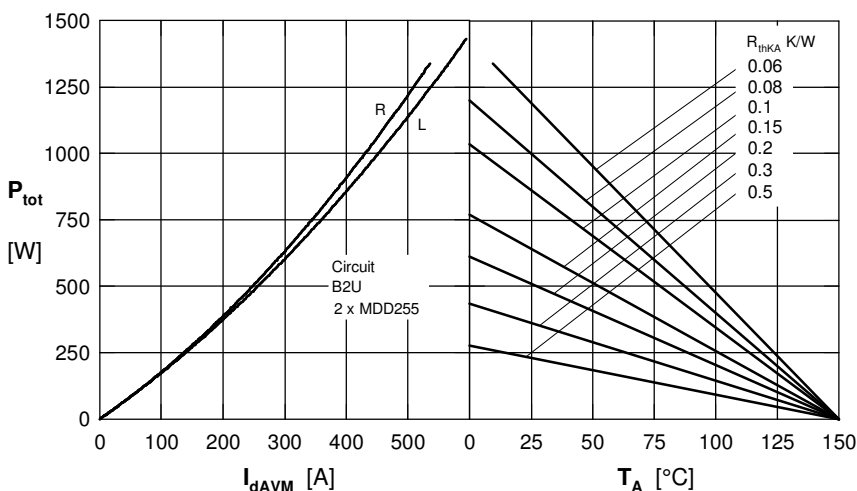


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current & ambient temperature. R = resistive load, L = inductive load

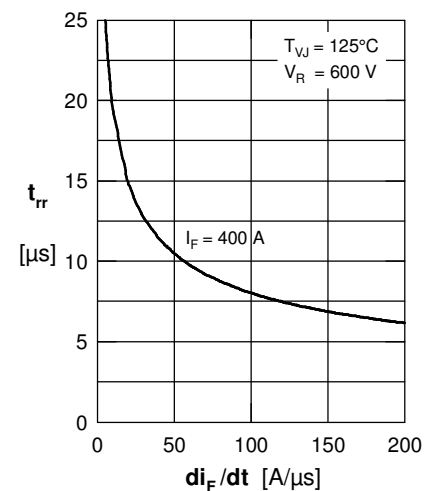


Fig. 7 Typ. recovery time  $t_{rr}$   
 versus  $-di_F/dt$

**Rectifier**

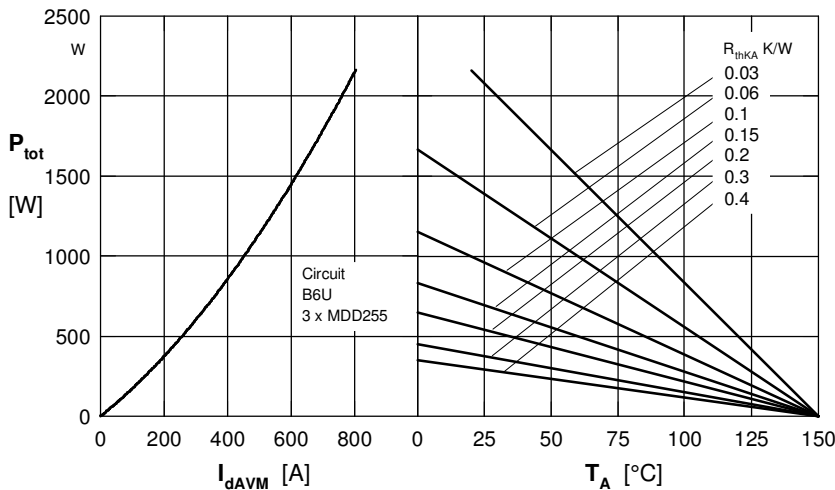


Fig. 8 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

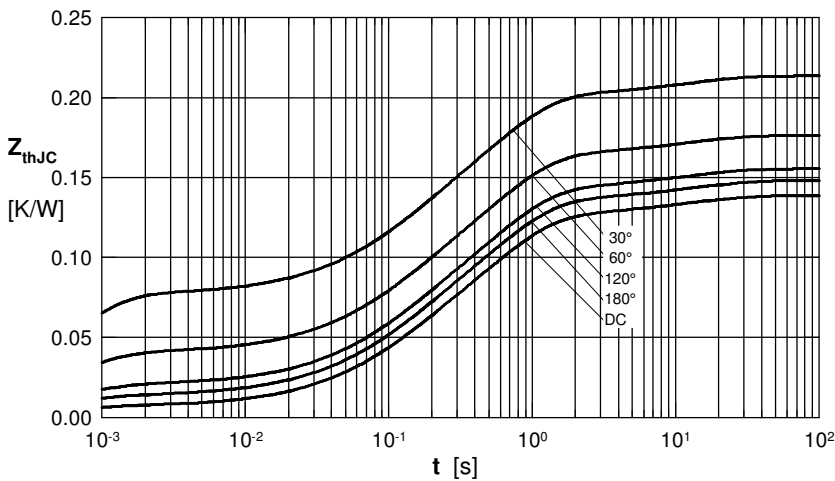


Fig. 9 Transient thermal impedance junction to case (per diode)

$R_{thJC}$  for various conduction angles  $d$ :

$d$	$R_{thJC}$ [K/W]
DC	0.139
180°	0.148
120°	0.156
60°	0.176
30°	0.214

Constants for  $Z_{thJC}$  calculation:

$i$	$R_{thi}$ [K/W]	$t_i$ [s]
1	0.0066	0.00054
2	0.0358	0.09800
3	0.0831	0.54000
4	0.0129	12.0000

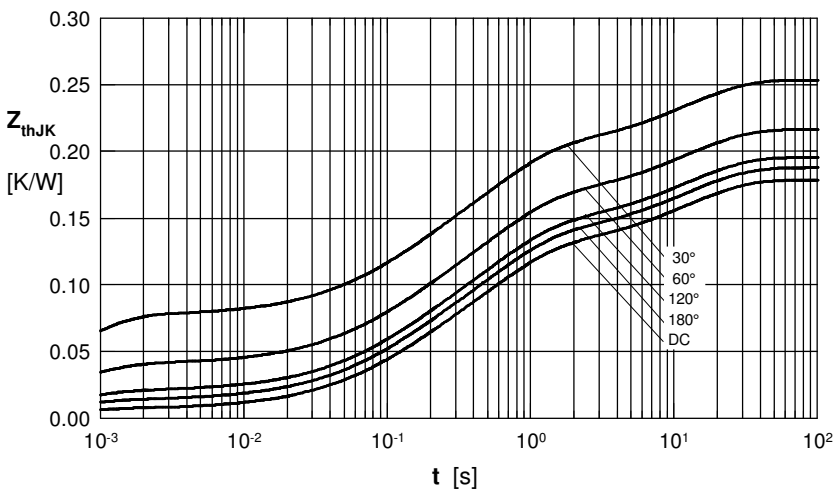


Fig. 10 Transient thermal impedance junction to heatsink (per diode)

$R_{thJK}$  for various conduction angles  $d$ :

$d$	$R_{thJK}$ [K/W]
DC	0.179
180°	0.188
120°	0.196
60°	0.216
30°	0.254

Constants for  $Z_{thJK}$  calculation:

$i$	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.0066	0.00054
2	0.0358	0.09800
3	0.0831	0.54000
4	0.0129	12.0000
5	0.0400	12.0000