



Date: 20.08.2015

Data Sheet Issue: 1

# **Diode Modules MD#275**

# **Absolute Maximum Ratings**

V <sub>RRM</sub> V <sub>DRM</sub> [V]				
[ ^ ]	MDD	MDA	MDK	
3000	275-30N3	275-30N3	275-30N3	
3600	275-36N3	275-36N3	275-36N3	

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
$V_{RRM}$	Repetitive peak reverse voltage 1)	3000-3600	٧
$V_{RSM}$	Non-repetitive peak reverse voltage 1)	3100-3700	V

	OTHER RATINGS	MAXIMUM LIMITS	UNITS
$I_{F(AV)M}$	Maximum average forward current, T <sub>C</sub> = 85°C <sup>2)</sup>	290	Α
$I_{F(AV)M}$	Maximum average forward current. T <sub>C</sub> = 100°C <sup>2)</sup>	245	Α
I <sub>F(RMS)M</sub>	Nominal RMS forward current, T <sub>C</sub> = 55°C <sup>2)</sup>	580	Α
I <sub>F(d.c.)</sub>	D.C. forward current, T <sub>C</sub> = 55°C	510	Α
I <sub>FSM</sub>	Peak non-repetitive surge t <sub>p</sub> = 10 ms, V <sub>RM</sub> = 60%V <sub>RRM</sub> <sup>3)</sup>	4.5	kA
I <sub>FSM2</sub>	Peak non-repetitive surge $t_p$ = 10 ms, $V_{RM} \le 10V^{3}$	5.0	kA
I <sup>2</sup> t	$I^{2}t$ capacity for fusing $t_p = 10$ ms, $V_{RM} = 60\%V_{RRM}^{3}$	101	kA <sup>2</sup> s
I <sup>2</sup> t	$I^2t$ capacity for fusing $t_p$ = 10 ms, $V_{RM} \le 10 \text{ V}^{3}$	125	kA <sup>2</sup> s
V <sub>ISOL</sub>	Isolation Voltage 4)	3000	V
T <sub>vj op</sub>	Operating temperature range	-40 to +150	°C
T <sub>stg</sub>	Storage temperature range	-40 to +150	°C

### Notes:

- 1) De-rating factor of 0.13% per °C is applicable for  $T_{\nu j}$  below 25°C.
- 2) Single phase; 50 Hz, 180° half-sinewave.
- 3) Half-sinewave, 150°C T<sub>vj</sub> initial.
- 4) AC RMS voltage, 50 Hz, 1min test



# **Characteristics**

	PARAMETER	MIN.	TYP.	MAX.	TEST CONDITIONS 1)	UNITS
$V_{FM}$	Maximum peak forward voltage	-	-	2.00	I <sub>TM</sub> = 785 A, T <sub>VJ</sub> = 25°C	V
$V_{T0}$	Threshold voltage	-	-	0.90		V
r <sub>T</sub>	Slope resistance	-	-	1.57		mΩ
I <sub>RRM</sub>	Peak reverse current	-	-	30	Rated V <sub>RRM</sub>	mA
Б	The arms of an existence is uncation to some	-	0.1100	-	Single Arm	K/W
$R_{thJC}$	Thermal resistance, junction to case	-	0.0550	-	Whole Module	K/W
Б	The survey was interested as a second	-	0.040	-	Single Arm	K/W
R <sub>thCH</sub>	Thermal resistance, case to heatsink	-	0.020	-	Whole Module	K/W
F <sub>1</sub>	Mounting force (to heatsink)	-	6.00	-		Nm
F <sub>2</sub>	Mounting force (to terminals)	-	9.00	-	2)	Nm
Wt	Weight	-	800	-		g

#### Notes:

- Unless otherwise indicated T<sub>vj</sub>=125°C.
   Screws must be lubricated.



#### **Notes on Ratings and Characteristics**

#### 1.0 Voltage Grade Table

Voltage Grade	V <sub>DRM</sub> V <sub>RRM</sub> V	V <sub>DSM</sub> V <sub>RSM</sub> V	V <sub>D</sub> V <sub>R</sub> DC V
30	3000	3100	1750
36	3600	3700	1900

#### 2.0 Extension of Voltage Grades

This report is applicable to other voltage grades when supply has been agreed by Sales/Production.

#### 3.0 De-rating Factor

A blocking voltage de-rating factor of 0.13%/°C is applicable to this device for T<sub>vi</sub> below 25°C.

#### 4.0 Repetitive dv/dt

Standard dv/dt is 1000V/µs.

#### 5.0 Snubber Components

When selecting snubber components, care must be taken not to use excessively large values of snubber capacitor or excessively small values of snubber resistor. Such excessive component values may lead to device damage due to the large resultant values of snubber discharge current. If required, please consult the factory for assistance.

# 6.0 Computer Modelling Parameters

#### 6.1 Thyristor Dissipation Calculations

$$I_{\scriptscriptstyle AV} = \frac{-V_{\scriptscriptstyle T0} + \sqrt{{V_{\scriptscriptstyle T0}}^2 + 4 \cdot \mathit{ff}^2 \cdot \mathit{r}_{\scriptscriptstyle T} \cdot W_{\scriptscriptstyle AV}}}{2 \cdot \mathit{ff}^2 \cdot \mathit{r}_{\scriptscriptstyle T}} \qquad \text{and:} \qquad W_{\scriptscriptstyle AV} = \frac{\Delta T}{R_{\scriptscriptstyle th}} \\ \Delta T = T_{\scriptscriptstyle j\, \rm max} - T_{\scriptscriptstyle C}$$

Where  $V_{T0} = 0.9 \text{ V}$ ,  $r_T = 1.57 \text{ m}\Omega$ .

 $R_{th}$  = Supplementary thermal impedance, see table below and

ff = Form factor, see table below.

Supplementary Thermal Impedance							
Conduction Angle 30° 60° 90° 120° 180° 270° d.c.							d.c.
Square wave	3.46	2.45	2	1.73	1.41	1.15	1
Sine wave	3.98	2.78	2.22	1.88	1.57		

Form Factors							
Conduction Angle	30°	60°	90°	120°	180°	270°	d.c.
Square wave	3.464	2.449	2	1.732	1.414	1.149	1
Sine wave	3.98	2.778	2.22	1.879	1.57		



#### 6.2 D.C. Thermal Impedance Calculation

$$r_t = \sum_{p=1}^{p=n} r_p \cdot \left(1 - e^{\frac{-t}{\tau_p}}\right)$$

Where p = 1 to n and:

n = number of terms in the series

t = Duration of heating pulse in seconds

rt = Thermal resistance at time t

 $r_p$  = Amplitude of  $p_{th}$  term

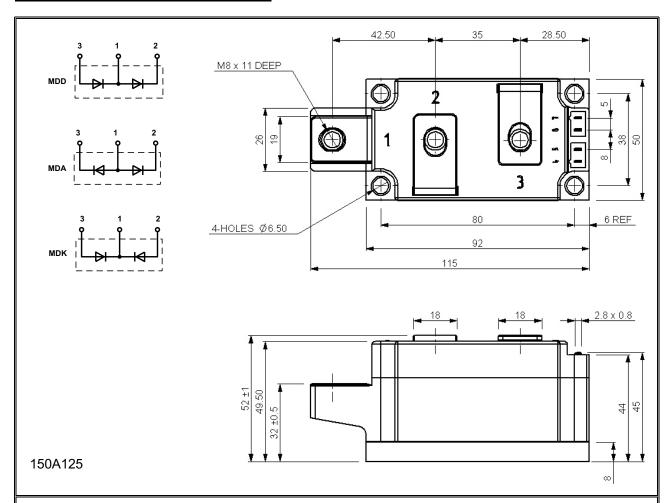
 $\tau_p$  = Time Constant of  $r_{th}$  term

The coefficients for this device are shown in the table below:

D.C.								
Term	1	2	3	4	5	6		
$r_p$	0.1293	0.01314	0.02771	-0.05535	0.0528	0.002749		
$ au_{ ho}$	2.823	1.393	0.3322	0.0611	0.05731	0.002713		



## **Outline Drawing & Ordering Information**



	ORDERING INFO	DRMATION	(Please quote 11 digit code as below)		
M	D#	275	<b>*</b> *	N	3
Fixed Type Code	Configuration code DD, DA or DK	Fixed Type Code	Voltage code V <sub>RRM</sub> /100 30-36	Standard Diode	Fixed Version Code

Typical order code: MDD275-30N3- MDD configuration, 3000V VRRM

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