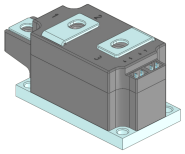
IXYS

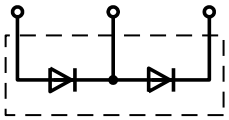
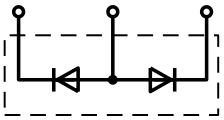
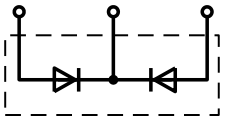


Date: 20.08.2015

Data Sheet Issue: 1

Diode Modules MD#510

Absolute Maximum Ratings

V_{RRM} V_{DRM} [V]	 MDD	 MDA	 MDK
1800	510-18N3	510-18N3	510-18N3

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V_{RRM}	Repetitive peak reverse voltage [1]	1800	V
V_{RSM}	Non-repetitive peak reverse voltage [1]	1900	V

	OTHER RATINGS	MAXIMUM LIMITS	UNITS
$I_{F(AV)M}$	Maximum average forward current, T_C = 85°C [2]	545	A
$I_{F(AV)M}$	Maximum average forward current. T_C = 100°C [2]	445	A
$I_{F(RMS)M}$	Nominal RMS forward current, T_C = 55°C [2]	1135	A
$I_{F(d.c.)}$	D.C. forward current, T_C = 55°C	890	A
I_{FSM}	Peak non-repetitive surge t_p = 10 ms, V_{RM} = 60%V_{RRM} [3]	10.9	kA
I_{FSM2}	Peak non-repetitive surge t_p = 10 ms, $V_{RM} \leq$ 10V [3]	12.0	kA
I^2t	I^2t capacity for fusing t_p = 10 ms, V_{RM} = 60%V_{RRM} [3]	594	kA^2s
I^2t	I^2t capacity for fusing t_p = 10 ms, $V_{RM} \leq$ 10 V [3]	720	kA^2s
V_{ISOL}	Isolation Voltage [4]	3000	V
$T_{vj\ op}$	Operating temperature range	-40 to +150	°C
T_{stg}	Storage temperature range	-40 to +150	°C

Notes:

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

Characteristics

	PARAMETER	MIN.	TYP.	MAX.	TEST CONDITIONS [1]	UNITS
V_{FM}	Maximum peak forward voltage	-	-	1.20	I_{TM} = 785 A, T_{VJ} = 25°C	V
V_{T0}	Threshold voltage	-	-	0.75		V
r_T	Slope resistance	-	-	0.25		mΩ
I_{RRM}	Peak reverse current	-	-	30	Rated V_{RRM}	mA
R_{thJC}	Thermal resistance, junction to case	-	0.1100	-	Single Arm	K/W
		-	0.0550	-	Whole Module	K/W
R_{thCH}	Thermal resistance, case to heatsink	-	0.040	-	Single Arm	K/W
		-	0.020	-	Whole Module	K/W
F_1	Mounting force (to heatsink)	-	6.00	-		Nm
F_2	Mounting force (to terminals)	-	9.00	-	[2]	Nm
W_t	Weight	-	800	-		g

Notes:

1) Unless otherwise indicated T_{vj}=125°C.
2) Screws must be lubricated.

Notes on Ratings and Characteristics

1.0 Voltage Grade Table

Voltage Grade	V_{DRM} V_{RRM} V	V_{DSM} V_{RSM} V	V_D V_R DC V
18	1800	1900	1150

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_{vj} 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

$$I_{AV} = \frac{-V_{T0} + \sqrt{V_{T0}^{\,2} + 4 \cdot ff^2 \cdot r_T \cdot W_{AV}}}{2 \cdot ff^2 \cdot r_T}$$

and:

$$W_{AV} = \frac{\Delta T}{R_{th}}$$

$$\Delta T = T_{j\max} - T_C$$

Where V_{T0} = 0.75 V, r_T = 0.25 mΩ.

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.
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

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

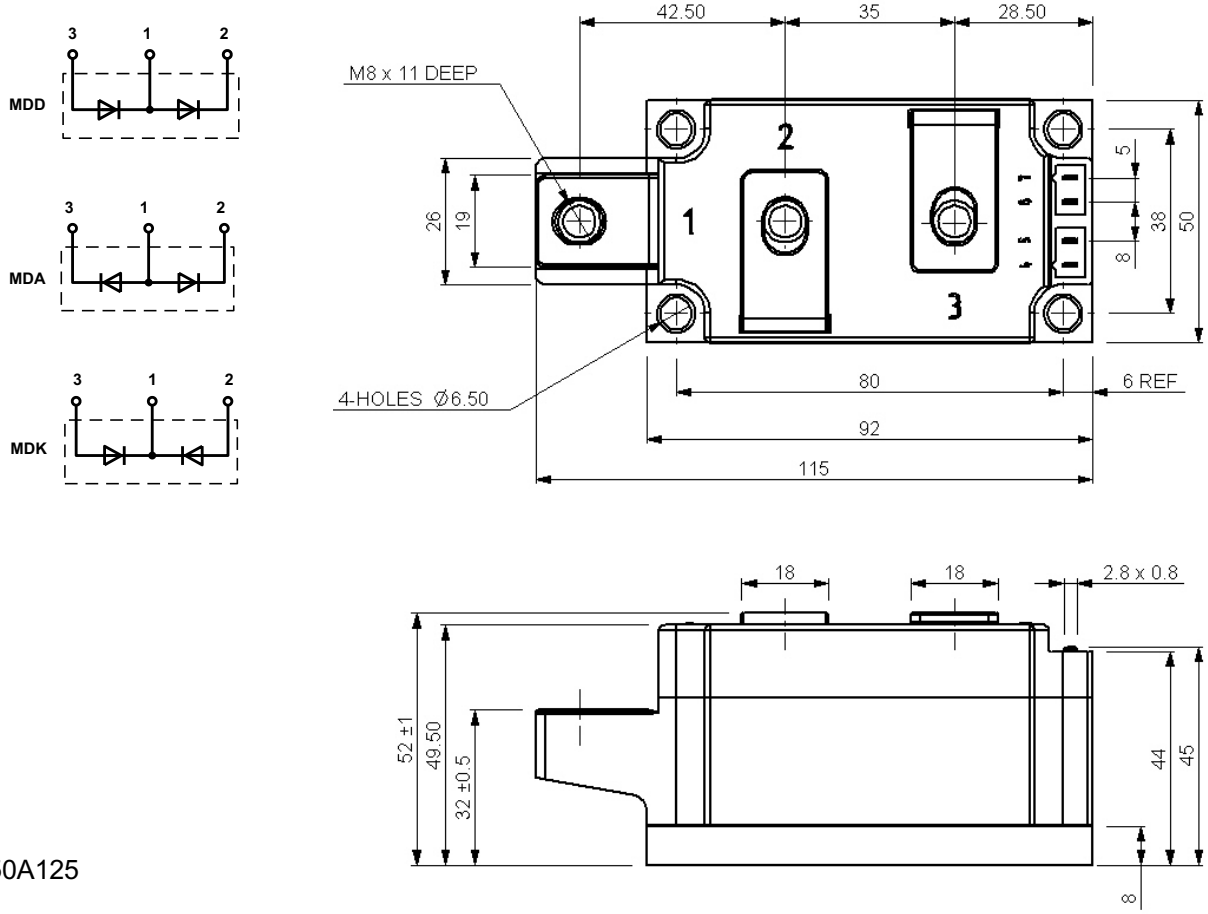
Where *p = 1* to *n and:*

n = number of terms in the series
t = Duration of heating pulse in seconds
r_t = Thermal resistance at time t
r_p = Amplitude of p_{th} term
τ_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
τ_p	2.823	1.393	0.3322	0.0611	0.05731	0.002713

Outline Drawing & Ordering Information



ORDERING INFORMATION			(Please quote 11 digit code as below)		
M	**D#**	**510**	**♦♦**	**N**	**3**
Fixed Type Code	Configuration code DD, DA or DK	Fixed Type Code	Voltage code V_{RRM}/100 18	Standard Diode	Fixed Version Code

Typical order code: MDD510-18N3– MDD configuration, 1800V V_{RRM}

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