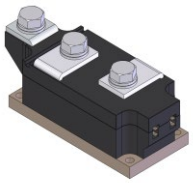
IXYS
A Littelfuse Technology

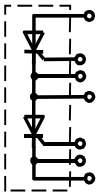
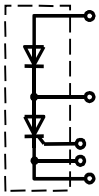


Date: 14th May 2026

Data Sheet Issue: 1

Thyristor/Diode Modules M## 501

Absolute Maximum Ratings

V_{RRM} V_{DRM} [V]	 MCC	 MCD
1400	501-14io3	501-14io3
1600	501-16io3	501-16io3
1800	501-18io3	501-18io3

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V_{DRM}	Repetitive peak off-state voltage [1]	1400-1800	V
V_{DSM}	Non-repetitive peak off-state voltage [1]	1500-1900	V
V_{RRM}	Repetitive peak reverse voltage [1]	1400-1800	V
V_{RSM}	Non-repetitive peak reverse voltage [1]	1500-1900	V

	OTHER RATINGS	MAXIMUM LIMITS	UNITS
$I_{T(AV)M}$	Maximum average on-state current, T_C = 85°C [2]	500	A
$I_{T(AV)M}$	Maximum average on-state current. T_C = 100°C [2]	340	A
$I_{T(RMS)M}$	Nominal RMS on-state current, T_C = 55°C [2]	1215	A
$I_{T(d.c.)}$	D.C. on-state current, T_C = 55°C	925	A
I_{TSM}	Peak non-repetitive surge t_p = 10 ms, V_{RM} = 60%V_{RRM} [3]	14.45	kA
I_{TSM2}	Peak non-repetitive surge t_p = 10 ms, $V_{RM} \leq$ 10V [3]	17	kA
I^2t	I^2t capacity for fusing t_p = 10 ms, V_{RM} = 60%V_{RRM} [3]	1.044×10^6	A^2s
I^2t	I^2t capacity for fusing t_p = 10 ms, $V_{RM} \leq$ 10 V [3]	1.445×10^6	A^2s
$(di/dt)_{cr}$	Critical rate of rise of on-state current (repetitive) [4]	200	A/µs
V_{RGM}	Peak reverse gate voltage	5	V
$P_{G(AV)}$	Mean forward gate power	4	W
P_{GM}	Peak forward gate power	50	W
V_{ISOL}	Isolation Voltage [5]	3000	V
$T_{vj\ op}$	Operating temperature range	-40 to +125	°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, 125°C T_{vj} initial.
4) T_j = 125°C.
5) AC RMS voltage, 50 Hz, 1min test

Characteristics

	PARAMETER	MIN.	TYP.	MAX.	TEST CONDITIONS [1]	UNITS
V_{TM}	Maximum peak on-state voltage	-	-	1.45	I_{TM} = 1500 A @25°C	V
V_{TM}	Maximum peak on-state voltage	-	-	1.40	I_{TM} = 1500 A	V
V_{T0}	Threshold voltage	-	-	1.01		V
r_T	Slope resistance	-	-	0.25		mΩ
$(dv/dt)_{cr}$	Critical rate of rise of off-state voltage	1000	-	-	V_{DR} = 67% V_{DRM}	V/µs
I_{DRM}	Peak off-state current	-	-	80	Rated V_{DRM}	mA
I_{RRM}	Peak reverse current	-	-	80	Rated V_{RRM}	mA
V_{GT}	Gate trigger voltage	-	-	3.0	T_{vj} = 25°C, V_D = 12 V, I_T = 3 A	V
I_{GT}	Gate trigger current	-	-	200		mA
V_{GD}	Gate non-trigger voltage	0.25	-	-	67% V_{DRM}	V
I_L	Latching current	-	-	1500	V_D = 12 V, T_{vj} = 25°C	mA
I_H	Holding current	-	-	300	V_D = 12 V, T_{vj} = 25°C	mA
R_{thJC}	Thermal resistance, junction to case, sin 180°	-	-	0.061	Single Thyristor (per arm)	K/W
		-	-	0.031	Whole Module	K/W
R_{thJC}	Thermal resistance, junction to case, rec 120°	-	-	0.070	Single Thyristor (per arm)	K/W
		-	-	0.035	Whole Module	K/W
R_{thCH}	Thermal resistance, case to heatsink	-	-	0.02	Single Thyristor	K/W
		-	-	0.01	Whole Module	K/W
F_1	Mounting force (to heatsink)	5.1	-	6.9		Nm
F_2	Mounting force (to terminals)	10.2	-	13.8	[2]	Nm
W_t	Weight	-	1.5	-		kg

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
14	1400	1500	1050
16	1600	1700	1200
18	1800	1900	1350

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

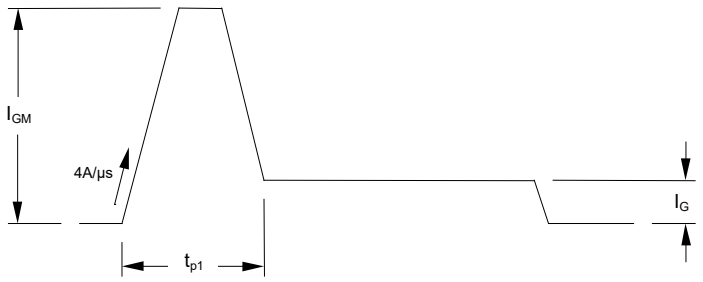
When selecting snubber components, care must be taken not to use excessively large values of snubber capacitor or excessively small values of snubber resistor. Such excessive component values may lead to device damage due to the large resultant values of snubber discharge current. If required, please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

6.0 Rate of rise of on-state current

For repetitive performance, the on-state rate of rise of current must not exceed 200A/µs at any time during turn-on. Note that this value of rate of rise of current applies to the total device current including that from any local snubber network.

7.0 Gate Drive

The nominal requirement for a typical gate drive is illustrated below. An open circuit voltage of at least 30V is assumed. This gate drive must be applied when using the full di/dt capability of the device.



The magnitude of I_{GM} should be between five and ten times I_{GT}, which is shown on page 2. Its duration (t_{p1}) should be 20µs or sufficient to allow the anode current to reach ten times I_L, whichever is greater. Otherwise, an increase in pulse current could be needed to supply the necessary charge to trigger. The 'back-porch' current I_G should remain flowing for the same duration as the anode current and have a magnitude in the order of 1.5 times I_{GT}.

8.0 Computer Modelling Parameters

8.1 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:

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

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

Where V_{T0} = 1.01 V, r_T = 0.25 mΩ.

8.2 Calculating thyristor V_T using ABCD Coefficients

The on-state characteristic I_T vs. V_T, on page 6 is represented by a set of constants A, B, C, D, forming the coefficients of the representative equation for V_T in terms of I_T given below:

$$V_T = A + B \cdot \ln(I_T) + C \cdot I_T + D \cdot \sqrt{I_T}$$

The constants, derived by curve fitting software, are given below for both hot and cold characteristics. The resulting values for V_T agree with the true device characteristic over a current range, which is limited to that plotted.

125°C Coefficients	
A	1.396928676
B	-0.135986141
C	-2.33986×10^{-5}
D	0.026541657

Curves

Figure 1 – On-state characteristics of Limit device

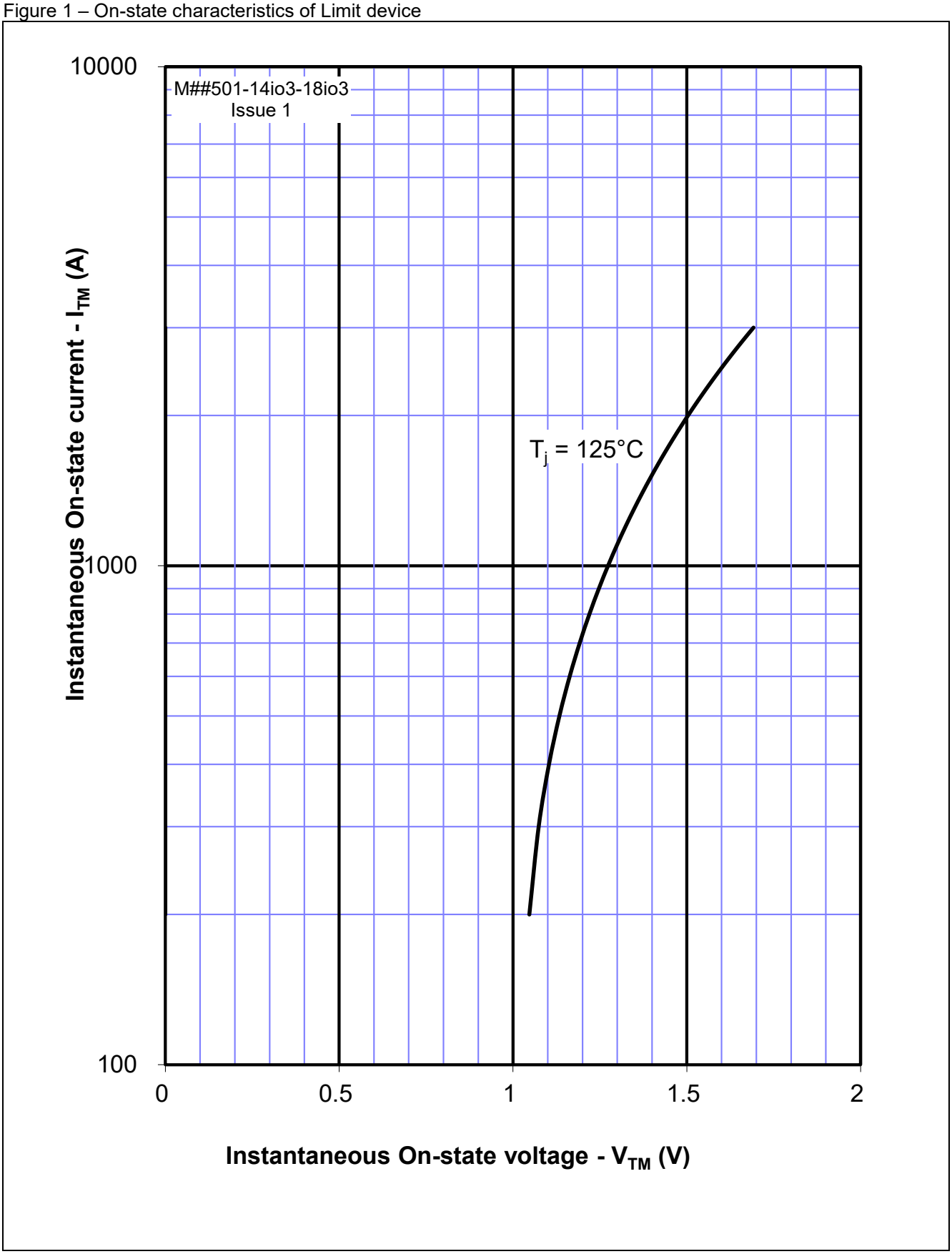


Figure 2 – Gate characteristics – Trigger limits

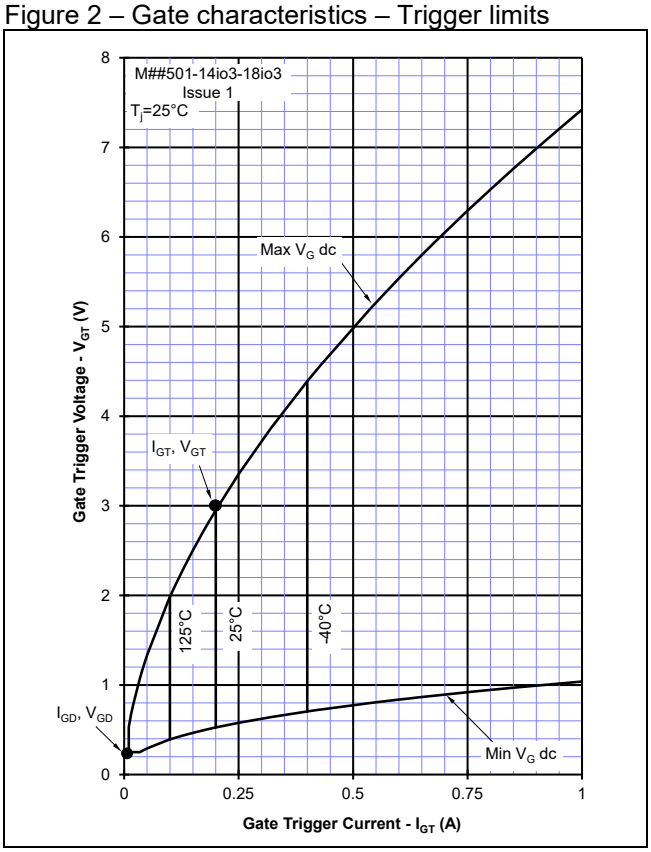


Figure 3 – Gate characteristics – Power curves

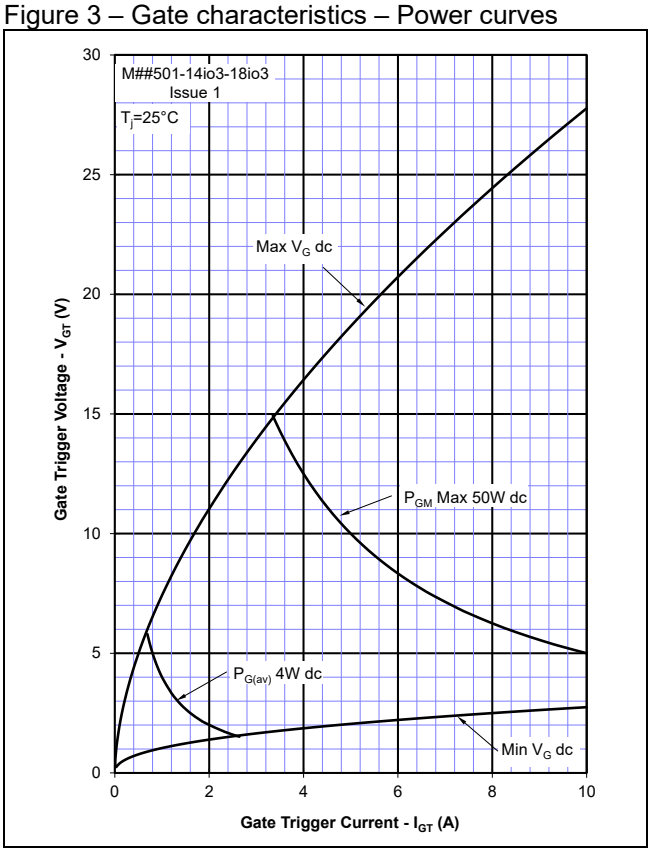


Figure 4 – On-state current vs. Power dissipation – Sine wave

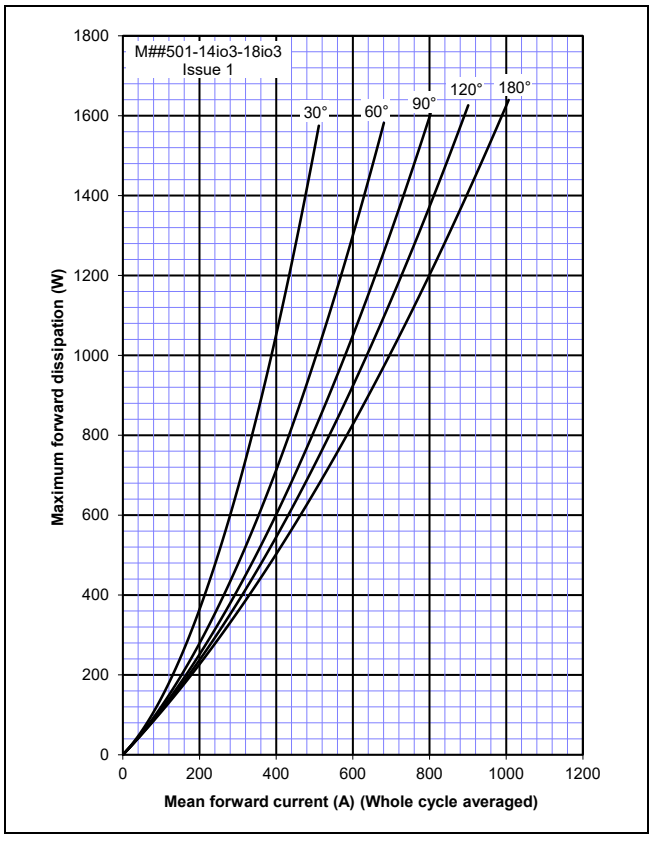


Figure 5 – On-state current vs. Heatsink temperature – Sine wave

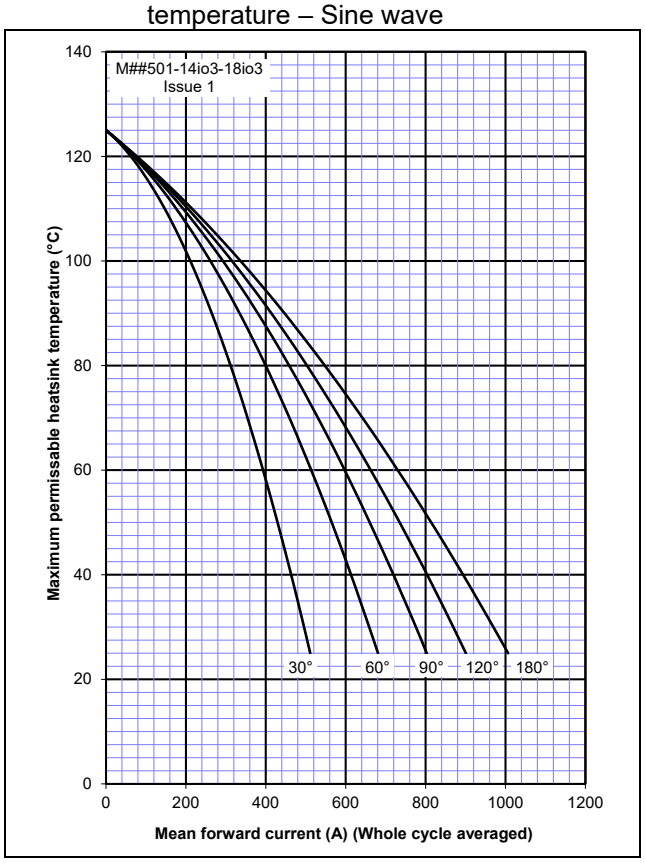


Figure 6 – On-state current vs. Power dissipation – Square wave

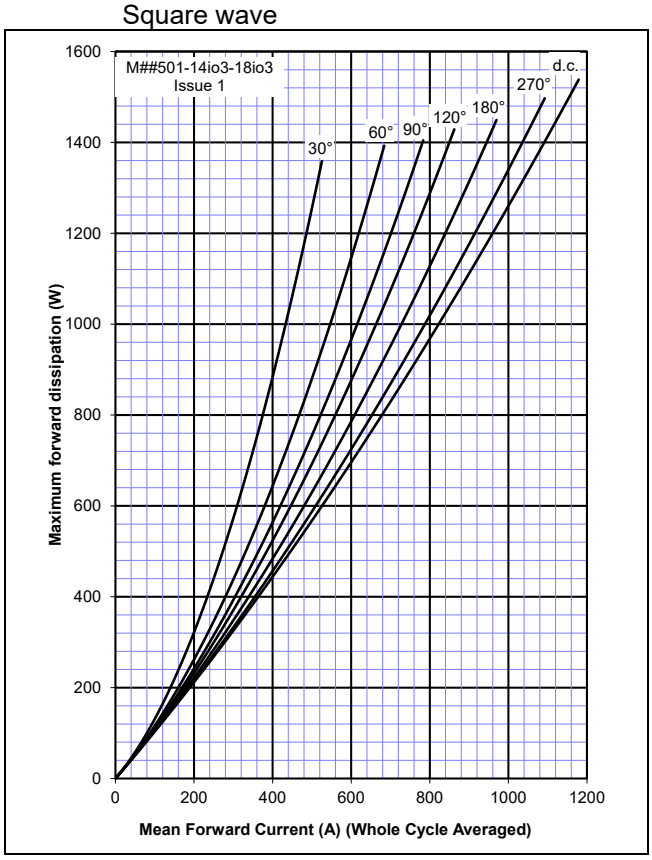


Figure 7 – On-state current vs. Heatsink temperature – Square wave

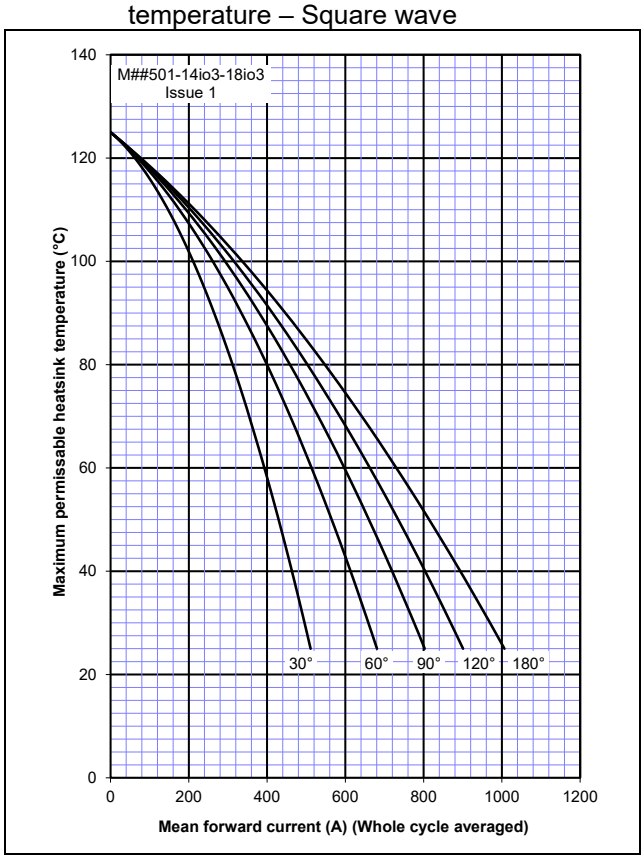


Figure 8 – Maximum surge and I^2t Ratings

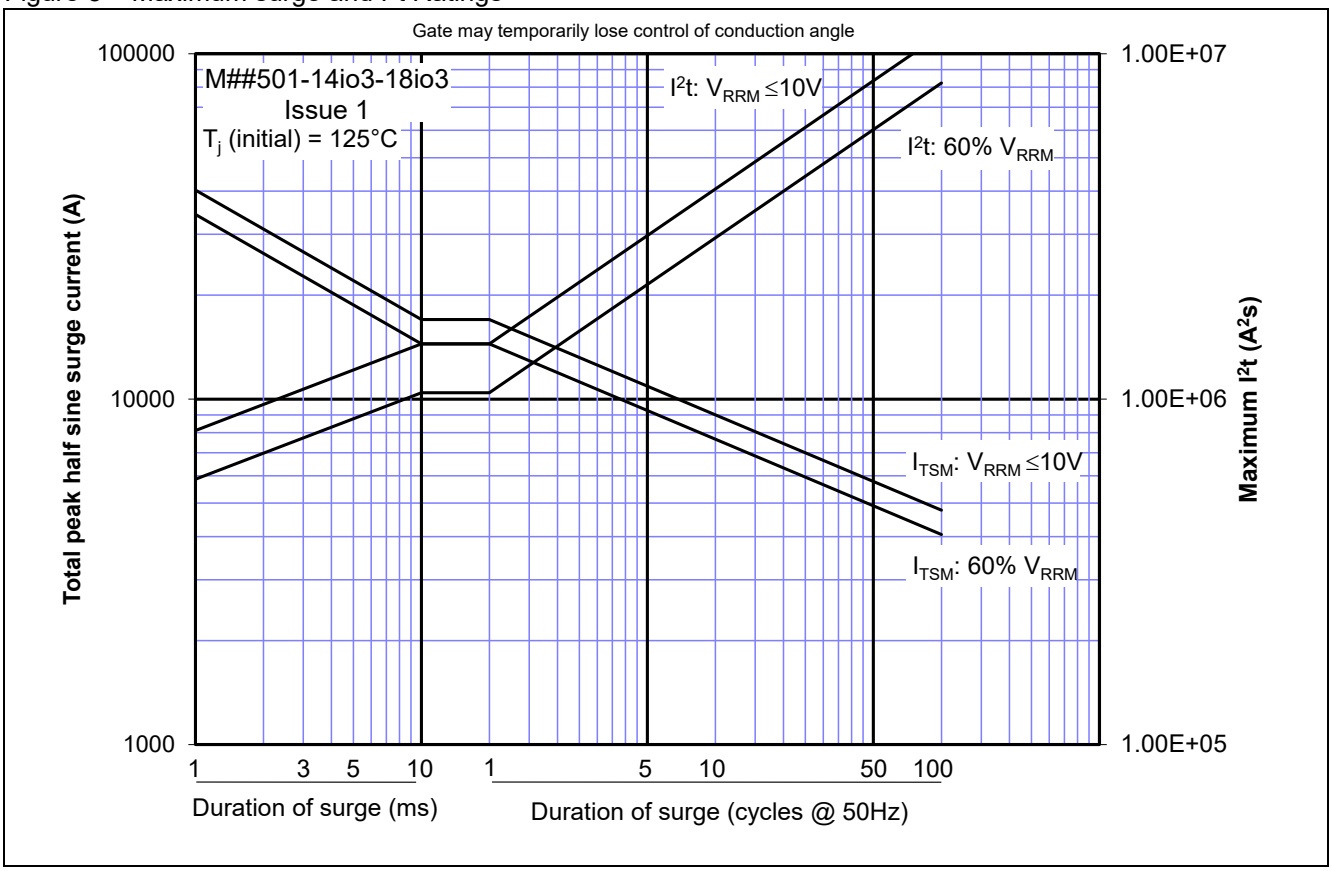
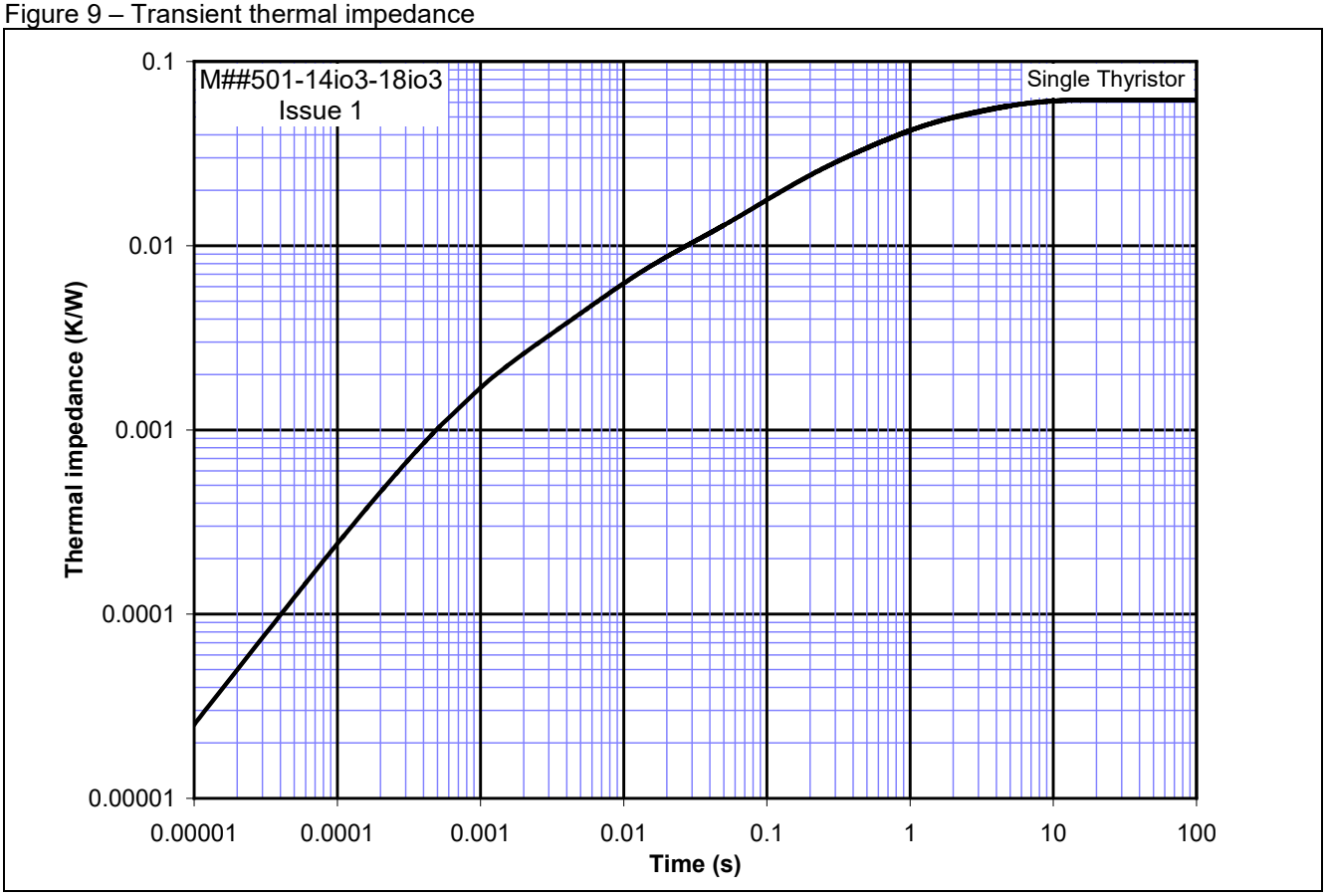
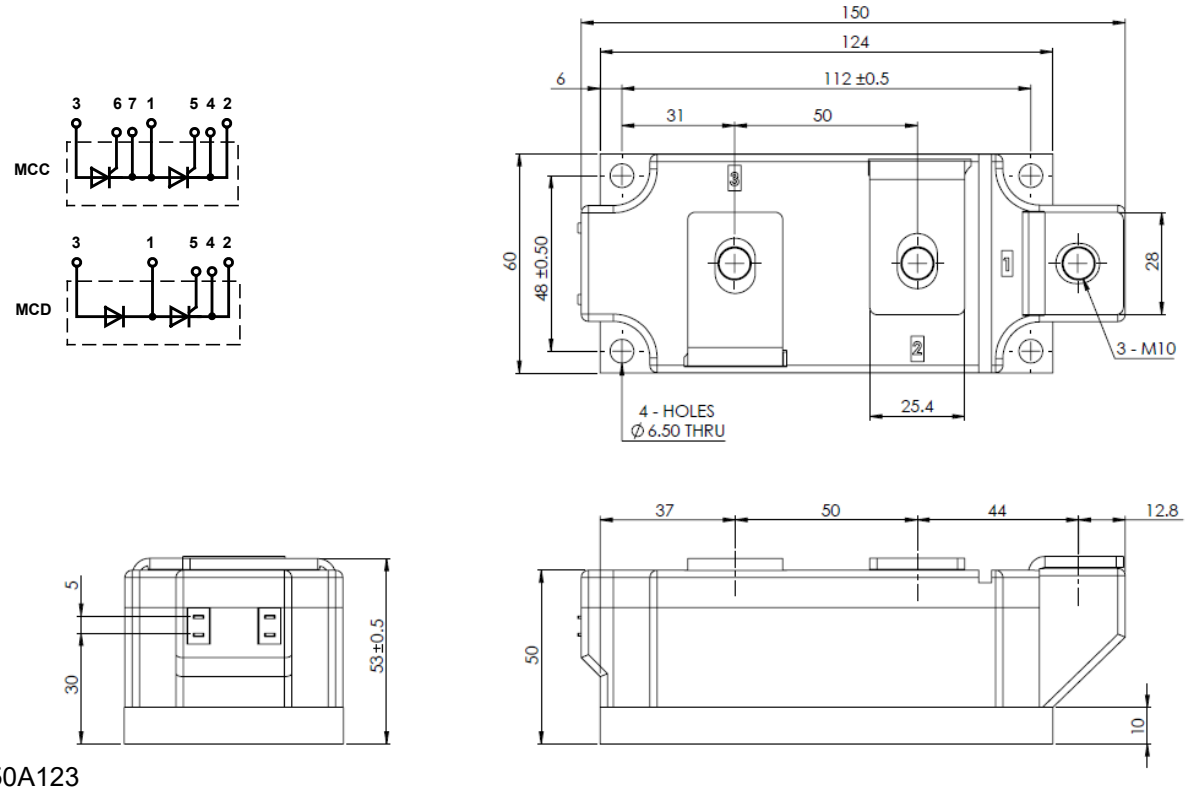


Figure 9 – Transient thermal impedance



Outline Drawing & Ordering Information



150A123

ORDERING INFORMATION			(Please quote 11 digit code as below)		
M	**##**	**501**	**♦♦**	**io**	**3**
Fixed Type Code	Configuration code CC	Fixed Type Code	Voltage code V_{RRM}/100 14-18	i = Critical dv/dt 1000 V/µs o = Typical turn-off time	Fixed Version Code

Typical order code: MCC501-18io3, MCC configuration, 1800V V_{RRM}

IXYS UK Westcode Ltd
Langley Park Way,
Langley Park,
Chippenham,
Wiltshire,
SN15 1GE.
Tel: +44 (0)1249 444524
https://www.littelfuse.com/contactus.aspx

www.littelfuse.com

www.littelfuse.com/products/power-semiconductors/high-power

The information contained herein is confidential and is protected by Copyright. The information may not be used or disclosed except with the written permission of and in the manner permitted by the proprietors IXYS UK Westcode Ltd.

© IXYS UK Westcode Ltd.

In the interest of product improvement, IXYS UK Westcode Ltd reserves the right to change specifications at any time without prior notice.

Devices with a suffix code (2-letter, 3-letter or letter/digit/letter combination) added to their generic code are not necessarily subject to the conditions and limits contained in this report.

Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics