

### APPLICATIONS

- High Frequency High Power Choppers And Inverters.
- Ultrasonic Generators.
- Welding.
- PWM Inverters.

### KEY PARAMETERS

$V_{DRM}$	<b>1400V</b>
$I_{TSM}$	<b>2000A</b>
$I_{T(AV)}$ per arm	<b>110A</b>
$V_{isol}$	<b>2500V</b>
$t_q$	<b>10/12/15<math>\mu</math>s</b>

### DESCRIPTION

The MAS 110S is a fast thyristor/diode module in an electrically isolated package. The semiconductors are pressure contact mounted giving high resistance to thermal fatigue, and having excellent heat dissipation qualities.

Isolation medium is non-toxic alumina.

The MAS110S is recognised under the 'Recognised Component Program of Underwriters Laboratories Inc. USA. File number E151069. 

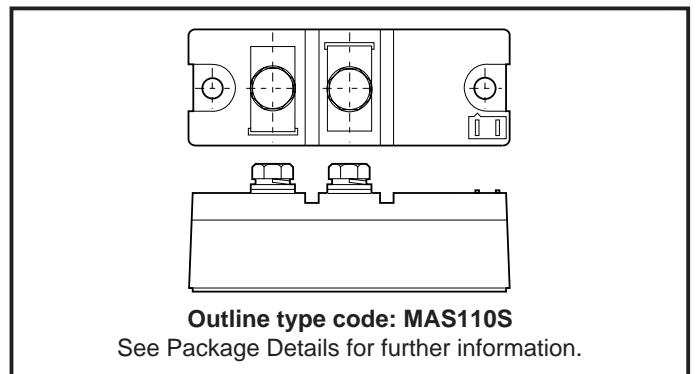


Fig.1 Package outline (not to scale)

### VOLTAGE RATINGS

Type Number	Repetitive Peak Off-state Voltage $V_{DRM}$ V	Conditions
MAS110S 14	1400	$T_{vj} = 125^{\circ}\text{C}$ , $I_{DRM} = 50\text{mA}$ , $V_{DSM} = V_{DRM} + 100\text{V}$
MAS110S 12	1200	
MAS110S 10	1000	
MAS110S 08	800	
MAS110S 06	600	

For full description of part number see 'Ordering Information'.

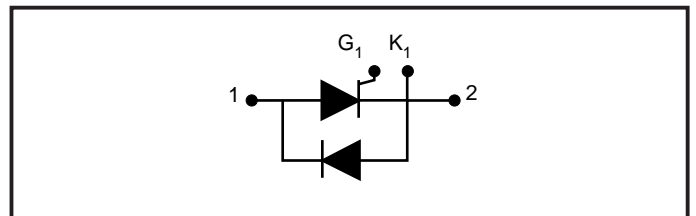


Fig.2 Single circuit

### THYRISTOR CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{T(AV)}$	Mean forward current	Half wave resistive load, $T_{case} = 75^{\circ}\text{C}$	110	A
$I_{T(RMS)}$	RMS value	$T_{case} = 75^{\circ}\text{C}$	175	A

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## THYRISTOR SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine; $T_{case} = 125^{\circ}C$	2.0	kA
$I^2t$	$I^2t$ for fusing	$V_R = 0\% V_{DRM}$	$20.0 \times 10^3$	A <sup>2</sup> s

## THYRISTOR DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions	Min.	Max.	Units	
$V_{TM}$	Maximum on-state voltage	At 600A peak, $T_{case} = 25^{\circ}C$	-	2.9	V	
$I_{DRM}$	Peak off-state current	At $V_{DRM}$ , $T_{case} = 125^{\circ}C$	-	70	mA	
dV/dt	Maximum linear rate of rise of off-state voltage	To 60% $V_{DRM}$ , $T_j = 125^{\circ}C$ , Gate open circuit	-	1000	V/ $\mu$ s	
dI/dt	Rate of rise of on-state current	From 67% $V_{DRM}$ to 600A, Gate source 20V, 20 $\Omega$ $t_r = < 0.5\mu$ s, $T_j = 125^{\circ}C$	Repetitive 50Hz	-	500	A/ $\mu$ s
$V_{T(TO)}$	Threshold voltage	At $T_{vj} = 125^{\circ}C$	-	1.6	V	
$r_T$	On-state slope resistance	At $T_{vj} = 125^{\circ}C$	-	1.4	m $\Omega$	
$t_q$	Turn-off time	$I_T = 100A$ , $T_j = 125^{\circ}C$ , $dI_R/dt = 30A/\mu$ s, $V_{GK} = 0V$ $dV/dt = 20V/\mu$ s to 60% $V_{DRM}$ , $V_R = 1V$ .	$t_q$ code: W	-	10	$\mu$ s
			$t_q$ code: S	-	12	$\mu$ s
			$t_q$ code: X	-	15	$\mu$ s

## THYRISTOR GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions	Typ.	Max.	Units
$V_{GT}$	Gate trigger voltage	$V_{DRM} = 12V, T_{case} = 25^{\circ}C, R_L = 30\Omega$	-	4.0	V
$I_{GT}$	Gate trigger current	$V_{DRM} = 12V, T_{case} = 25^{\circ}C$	-	250	mA
$V_{RGM}$	Peak reverse gate voltage		-	7.0	V
$I_{FGM}$	Peak forward gate current	Anode positive with respect to cathode	-	10	A
$P_{GM}$	Peak gate power	-	-	50	W
$P_{G(AV)}$	Mean gate power	Average timing = 10ms	-	15	W

## DIODE CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{T(AV)}$	Mean forward current	Half wave resistive load, $T_{case} = 75^{\circ}C$	112	A
$I_{T(RMS)}$	RMS value	$T_{case} = 75^{\circ}C$	175	A

## DIODE SURGE RATINGS - PER ARM

Symbol	Parameter	Conditions	Max.	Units
$I_{FSM}$	Surge (non-repetitive) forward current	10ms half sine; $T_{case} = 130^{\circ}C$	3.5	kA
$I^2t$	$I^2t$ for fusing	$V_R = 0\% V_{RRM}$	$61.25 \times 10^3$	A <sup>2</sup> s

## DIODE DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions	Max.	Units
$V_{FM}$	Forward voltage	At 600A, $T_{case} = 25^{\circ}C$ .	2.65	V
$I_{RRM}$	Peak reverse current	At $V_{RRM}, T_{case} = 125^{\circ}C$ .	70	mA
$t_{rr}$	Reverse recovery time	$T_{case} = 125^{\circ}C, di_R/dt = -50V/\mu s, I_{FM} = 200A$	1.3	$\mu s$
$V_{TO}$	Threshold voltage	At $T_{vj} = 125^{\circ}C$ .	1.6	V
$r_T$	Forward slope resistance	At $T_{vj} = 125^{\circ}C$ .	1.5	m $\Omega$

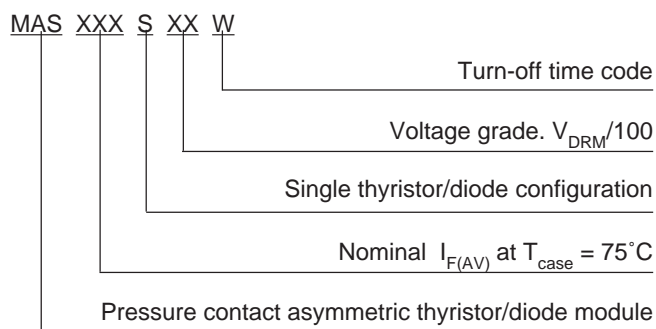
# MAS110S

## THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case (Thyristor or diode)	dc	-	0.21	°C/W
$R_{th(c-h)}$	Thermal resistance - case to heatsink (Thyristor or diode)	Mounting force 6Nm with mounting compound.	-	0.07	°C/W
$T_{vj}$	Virtual junction temperature	-	-	125	°C
$T_{op}$	Operating temperature range	-	-40	125	°C
$T_{stg}$	Storage temperature range	-	-40	125	°C
$V_{isol}$	Isolation voltage	Commoned terminals to base plate. AC RMS, 1 min, 50Hz.	-	2.5	kV
-	Mounting torque	-	-	6.0	Nm

## ORDERING INFORMATION

The module type number is made up as follows:



Examples:

MAS 110 S 12 W  
MAS 110 S 08 X

## MODULE MOUNTING RECOMMENDATIONS

■ Adequate heatsinking is required to maintain the base temperature at 75°C if full rated current is to be achieved. Power dissipation may be calculated by use of  $V_{T(TO)}$  and  $r_T$  information and loss curves in accordance with standard formulae. We can provide assistance with calculations or choice of heatsink if required.

■ The heatsink surface must be smooth and flat; a surface finish of N6 (32µin) and a flatness within 0.05mm (0.002") are recommended.

■ Immediately prior to mounting, the heatsink surface should be lightly scrubbed with fine emery, Scotch Brite™ or a mild chemical etchant and then cleaned with a solvent to remove oxide build up and foreign material. Care should be taken to ensure no foreign particles remain.

■ An even coating of thermal compound (eg. Unial) should be applied to both the heatsink and module mounting surfaces. This should ideally be 0.05mm (0.002") per surface to ensure optimum thermal performance.

■ After application of thermal compound, place the module squarely over the mounting holes, (or 'T' slots) in the heatsink. Using a torque wrench, slowly tighten the recommended fixing bolts at each end, rotating each in turn no more than 1/4 of a revolution at a time. Continue until the required torque of 6Nm (55lb.ins) is reached at both ends.

■ It is not acceptable to fully tighten one fixing bolt before starting to tighten the others. Such action may DAMAGE the module.

Curves

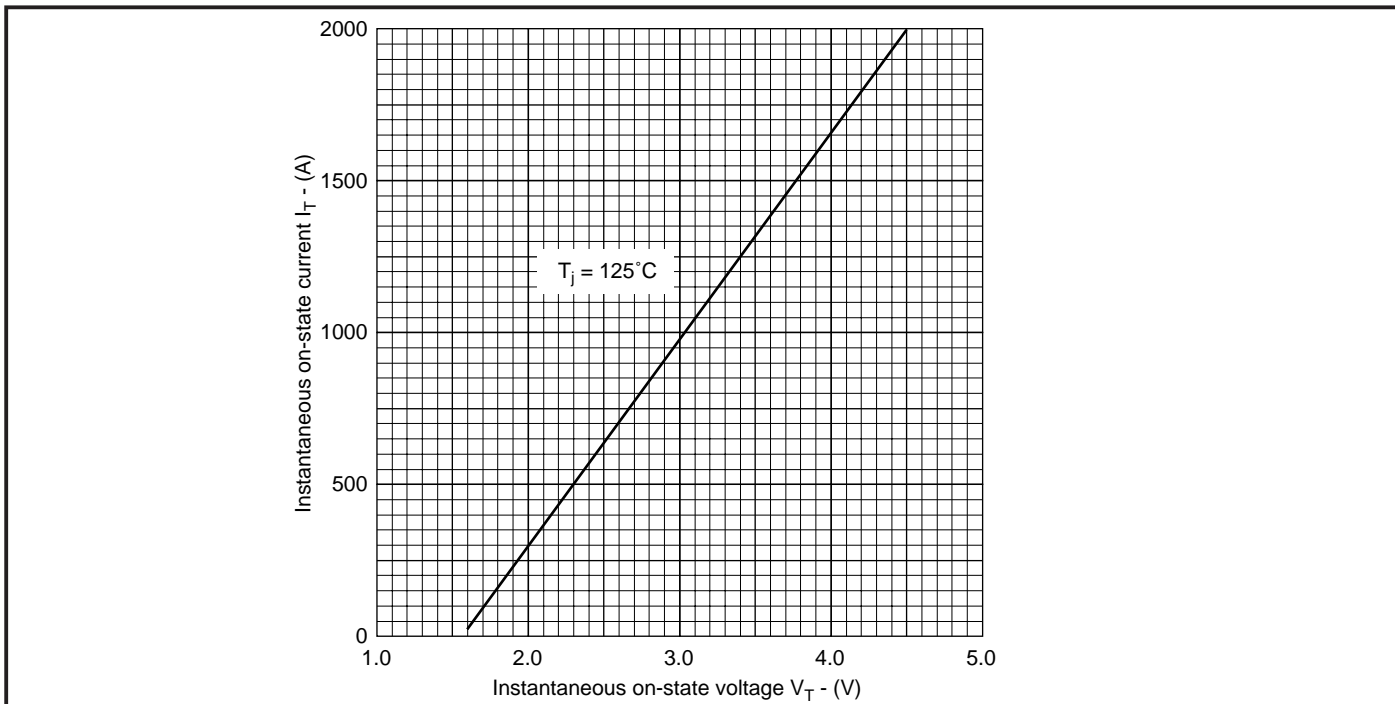


Fig.3 Maximum (limit) on-state characteristics (thyristor only)

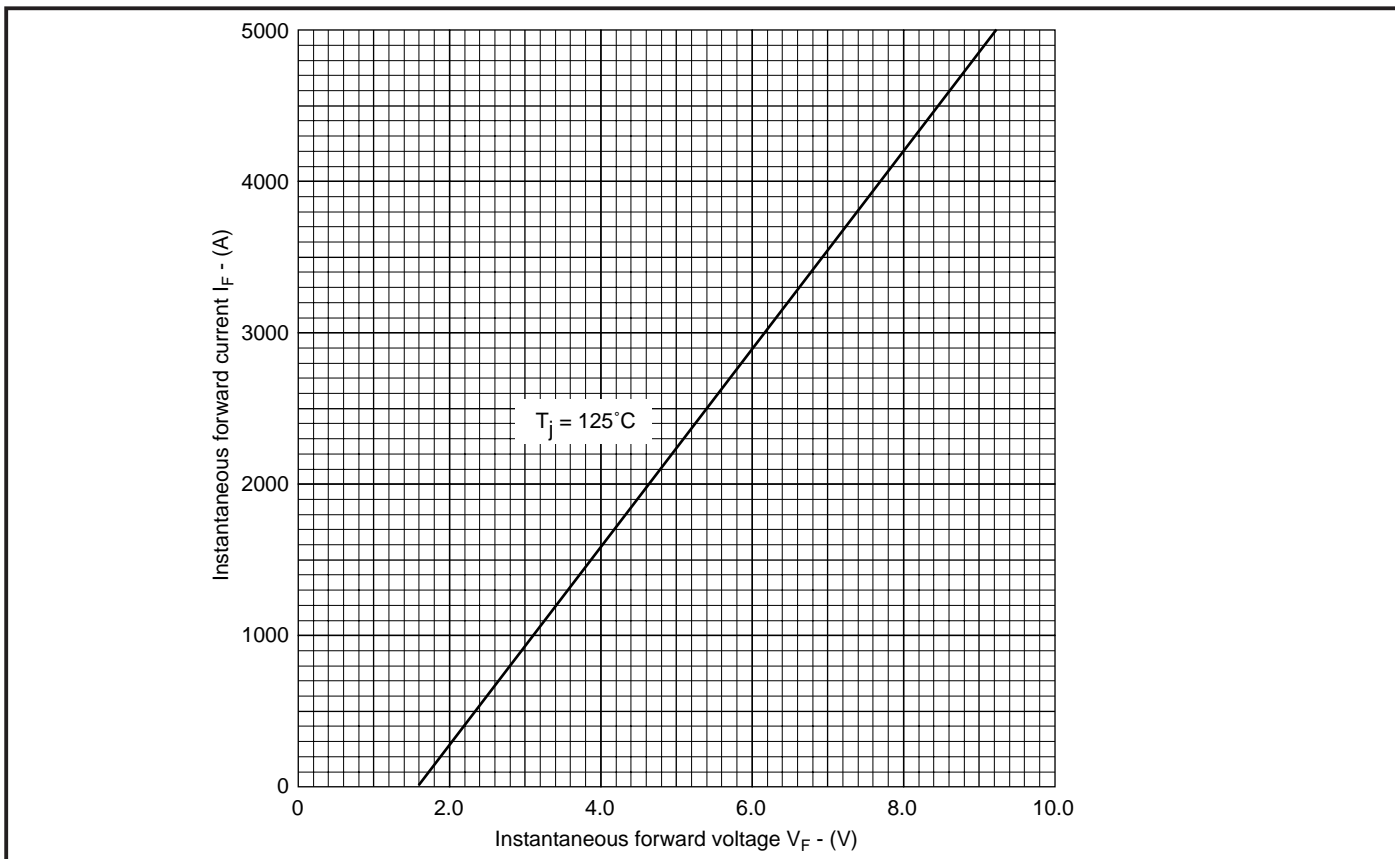
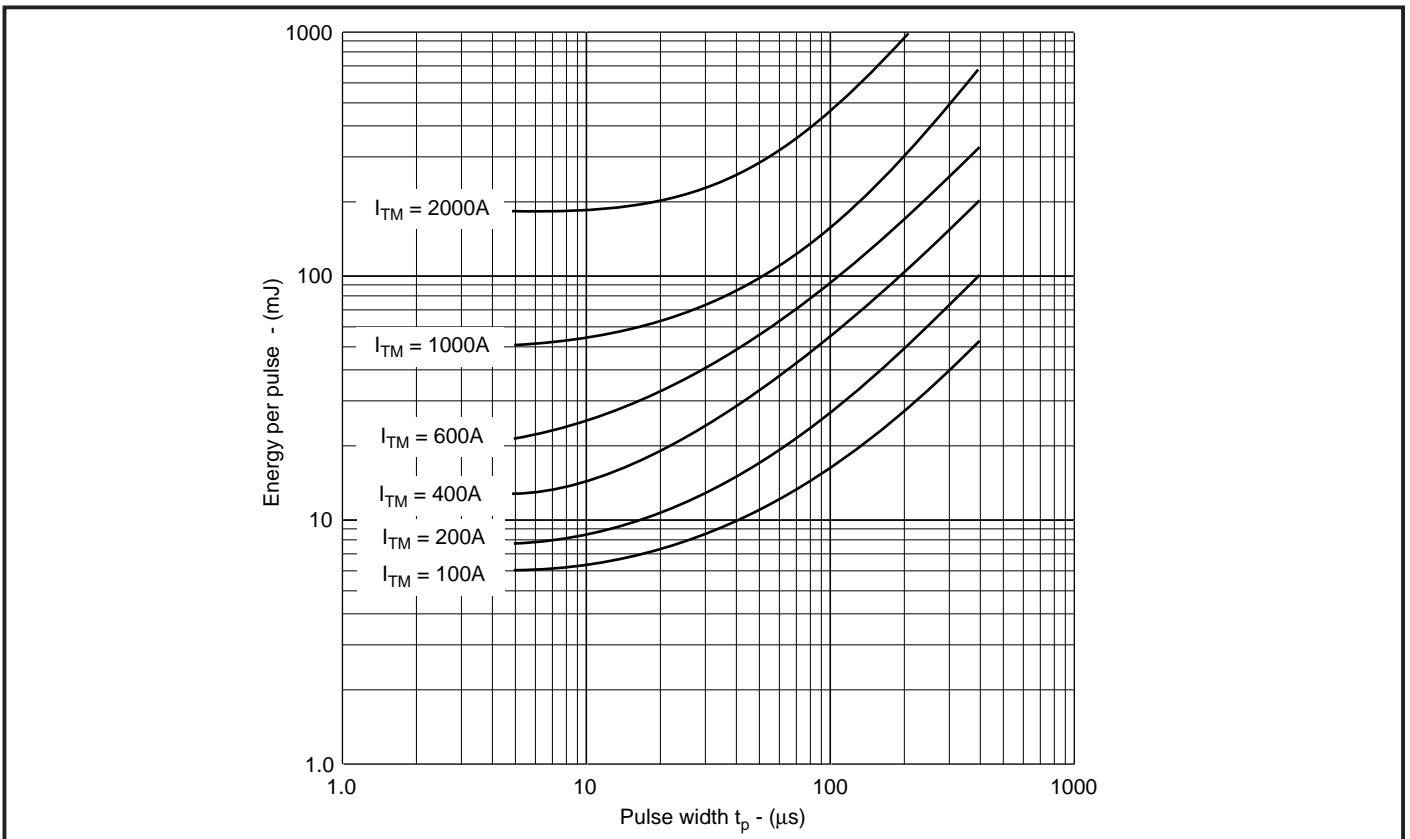
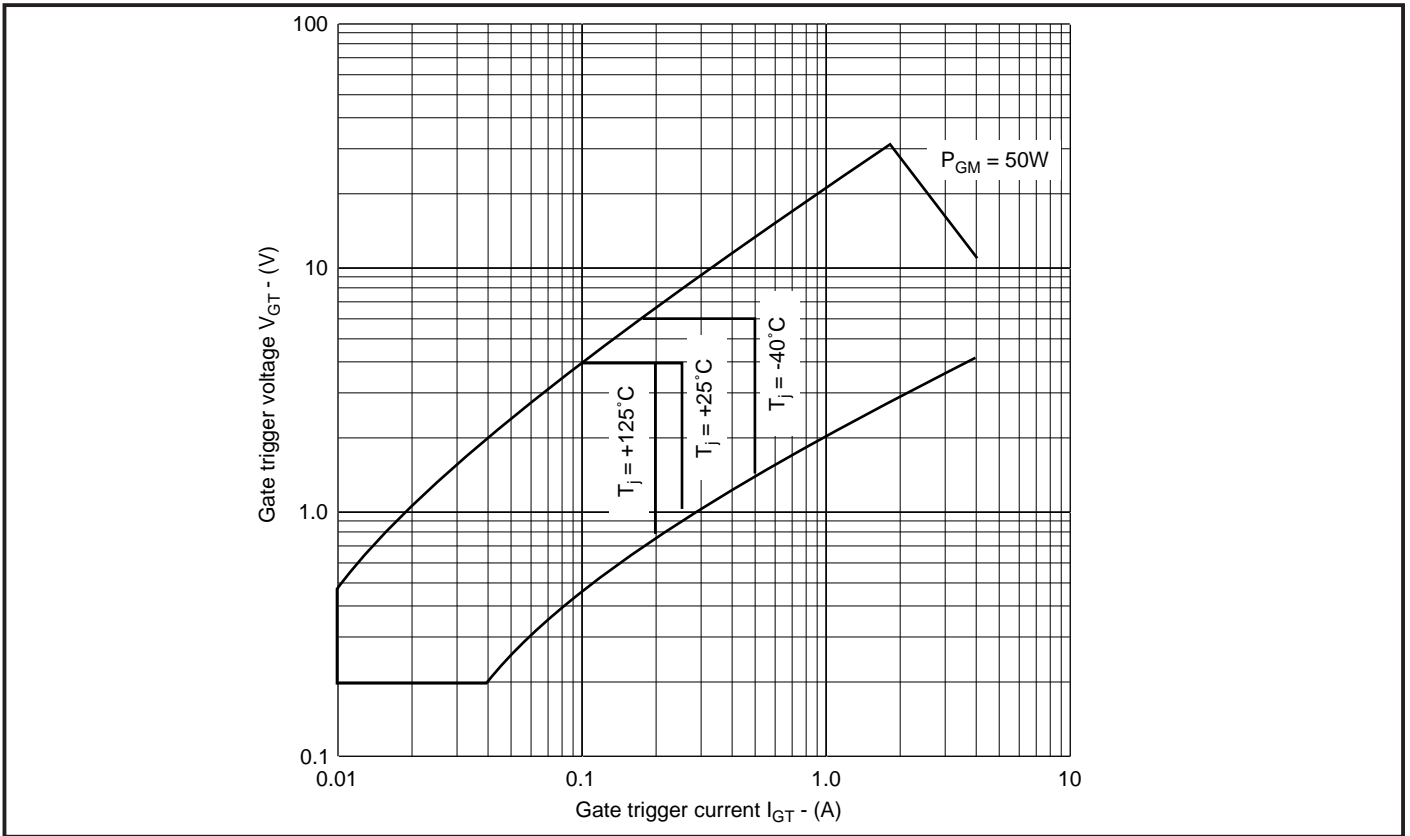


Fig.4 Maximum (limit) forward characteristics (diode only)



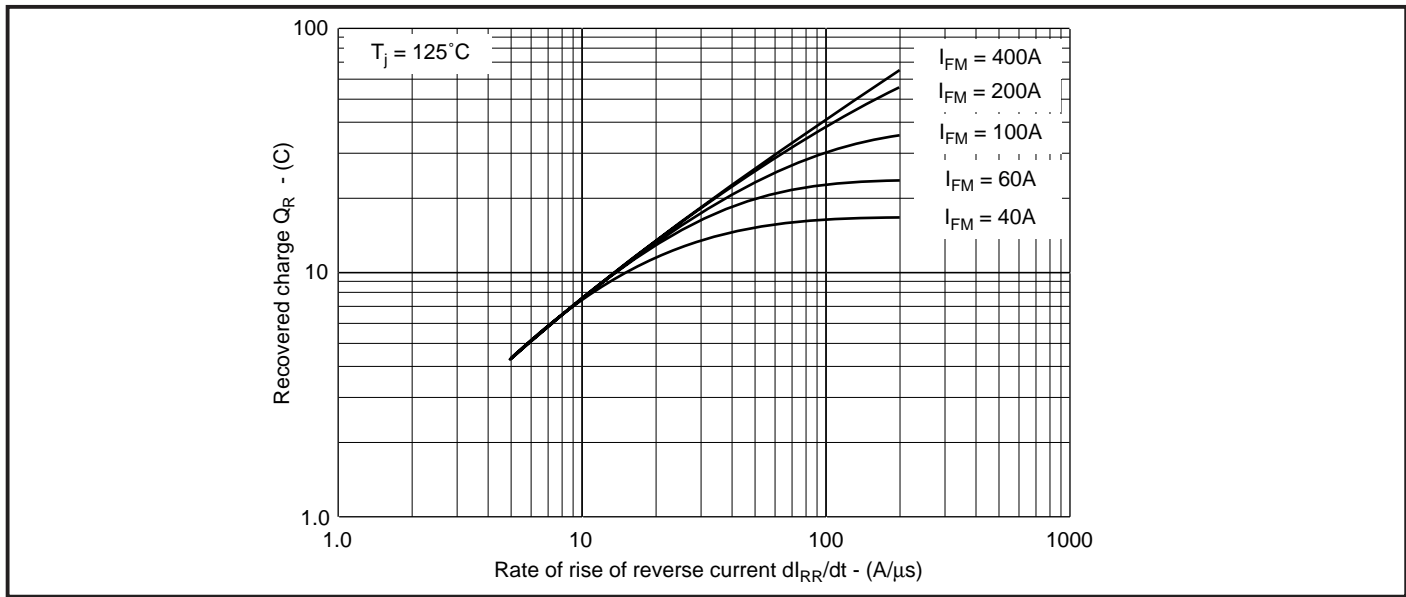


Fig.7 Recovered charge (diode only)

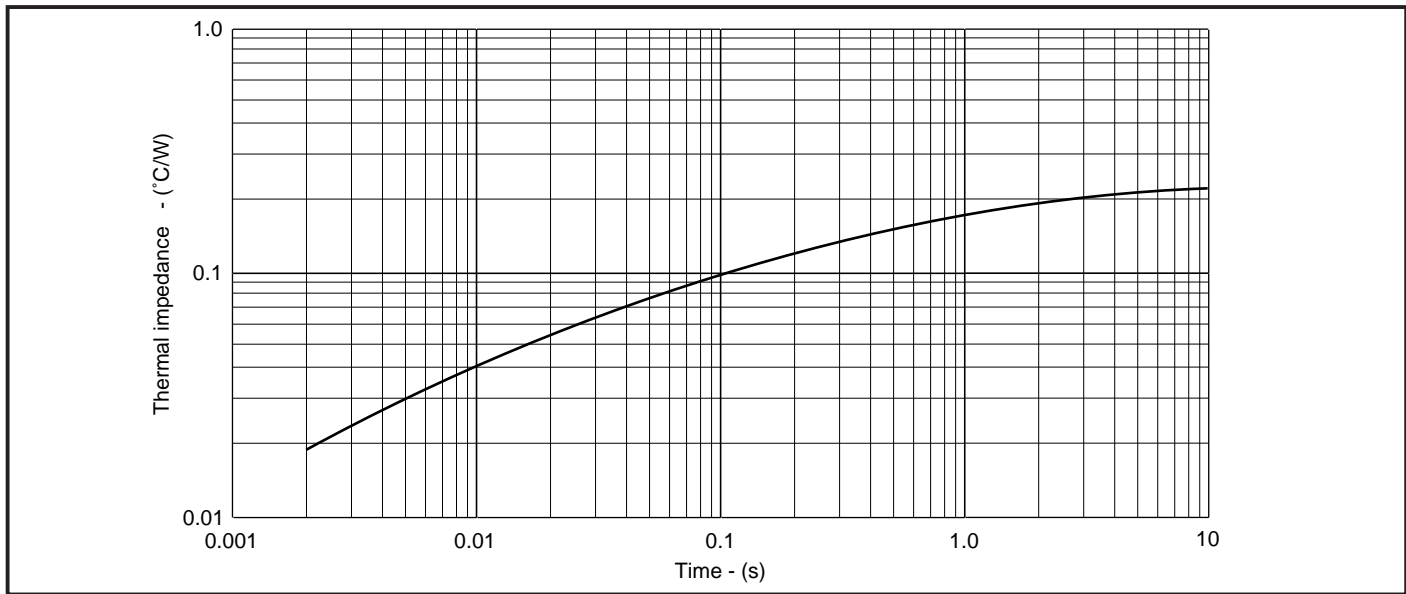
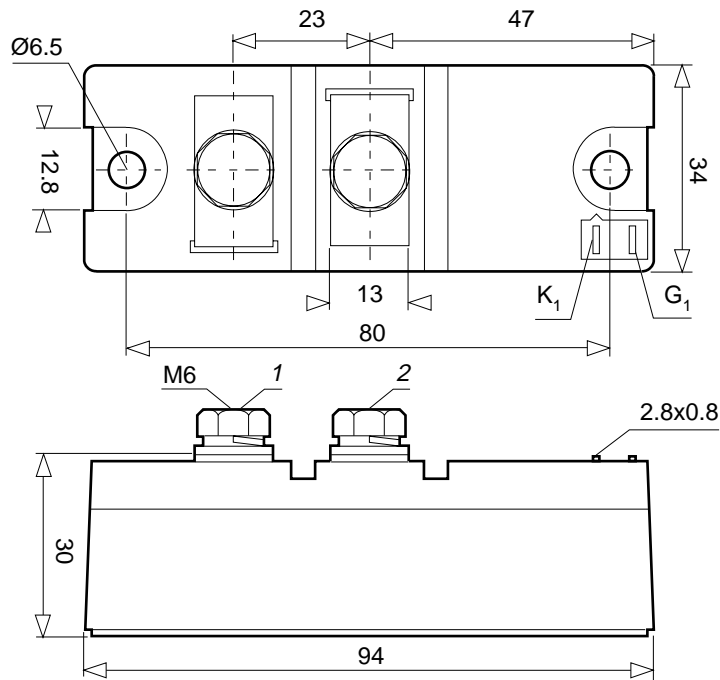


Fig.8 Maximum (limit) transient thermal impedance (thyristor only)

# MAS110S

## PACKAGE DETAILS

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



Recommended fixings for mounting:	M6 socket head cap screws.
Recommended mounting torque:	6Nm (55lb.ins)
Recommended torque for electrical connections:	5Nm (44lb.ins)
Maximum torques for electrical connections:	8Nm (70lb.ins)
Nominal weight:	350g

**Module outline type code: MP02**



## POWER ASSEMBLY CAPABILITY

The Power Assembly group was set up to provide a support service for those customers requiring more than the basic semiconductor, and has developed a flexible range of heatsink / clamping systems in line with advances in device types and the voltage and current capability of our semiconductors.

We offer an extensive range of air and liquid cooled assemblies covering the full range of circuit designs in general use today. The Assembly group continues to offer high quality engineering support dedicated to designing new units to satisfy the growing needs of our customers.

Using the up to date CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete solution (PACs).

## HEATSINKS

Power Assembly has its own proprietary range of extruded aluminium heatsinks. They have been designed to optimise the performance of our semiconductors. Data with respect to air natural, forced air and liquid cooling (with flow rates) is available on request.

For further information on device clamps, heatsinks and assemblies, please contact your nearest Sales Representative or the factory.



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