MP03TT300

Dual Thyristor Water Cooled Module

Preliminary Information

DS5428-1.1 June 2001

FEATURES

- Dual Device Module
- Electrically Isolated Package
- Pressure Contact Construction
- International Standard Footprint
- Alumina (Non Toxic) Isolation Medium
- Integral Water Cooled Heatsink

APPLICATIONS

- Motor Control
- Controlled Rectifier Bridges
- Heater Control
- AC Phase Control

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V_{DRM} V_{RRM} V	Conditions
MP03TT300-18 MP03TT300-17 MP03TT300-16 MP03TT300-15	1800 1700 1600 1500	T_{vj} = 0˚ to 125˚C, I_{DRM} = I_{RRM} = 30mA V_{DSM} = V_{RSM} = V_{DRM} = V_{RRM} + 100V respectively

Lower voltage grades available

ORDERING INFORMATION

Order As:

MP03TT300-XX W1	With 1/4 BSP connection
MP03TT300-XX W2	1/4 – 18 NPT connection
MP03TT300-XX W3	1/4 – 18 NPT connection
MP03TT300-XX W3A	1/4 – 18 NPT water connection thread
MP03TT300-XX W4	With 1/4 BSP connection

XX shown in the part number about represents V_{DRM}/100 selection required, e.g. MP03TT300-16-W3

Note: When ordering, please use the whole part number.

Auxiliary gate and cathode leads can be ordered separately.

KEY PARAMETERS

V_{DRM}	**1800V**
$I_{T(AV)}$	**310A**
$I_{TSM(per\ arm)}$	**8100A**
$I_{T(RMS)}$	**490A**
V_{isol}	**3000V**

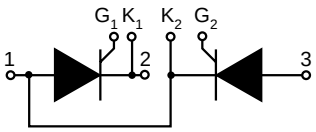
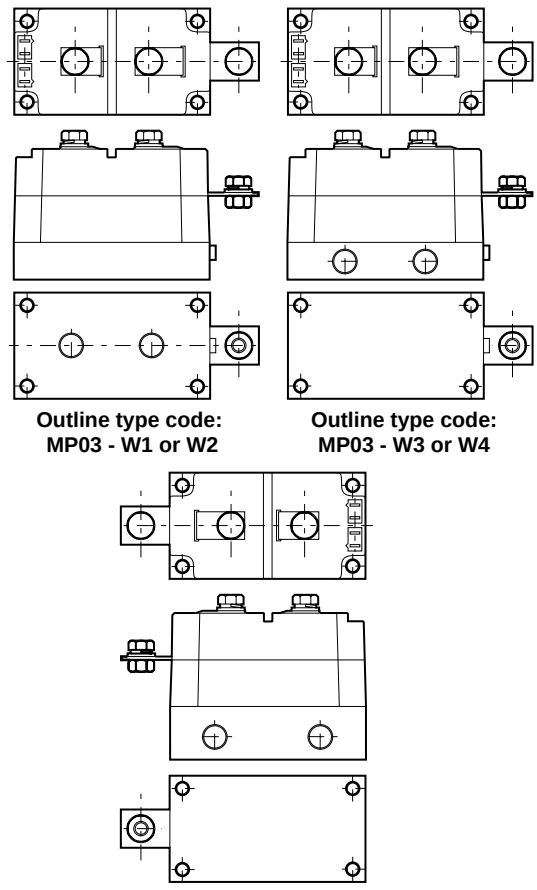


Fig. 1 Circuit diagram



(See package details for further information)

Fig. 2 Electrical connections - (not to scale)

ABSOLUTE MAXIMUM RATINGS - PER ARM

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed. Exposure to Absolute Maximum Ratings may affect device reliability.

Symbol	Parameter	Test Conditions		Max.	Units
$I_{T(AV)}$	Mean on-state current	Half wave resistive load,	$T_{water\ (in)}$ = 25˚C	360	A
		4.5 Ltr/min	$T_{water\ (in)}$ = 40˚C	310	A
			$T_{water\ (in)}$ = 50˚C	280	A
$I_{T(RMS}$	RMS value	$T_{water\ (in)}$ = 25˚C @ 4.5 Ltr/min		565	A
		$T_{water\ (in)}$ = 40˚C @ 4.5 Ltr/min		490	A
I_{TSM}	Surge (non-repetitive) on-current	10ms half sine, T_j = 125˚C		8.1	kA
I^2t	I^2t for fusing	V_R = 0		$0.33x10^6$	A^2s
I_{TSM}	Surge (non-repetitive) on-current	10ms half sine, T_j = 125˚C		6.5	kA
I^2t	I^2t for fusing	V_R = 50% V_{DRM}		$0.21x10^6$	A^2s
V_{isol}	Isolation voltage	Commoned terminals to base plate. AC RMS, 1 min, 50Hz		3000	V

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
$R_{th(j-w)}$	Thermal resistance - junction to water	dc, 4.5 Ltr/min	-	0.175	˚C/kW
	(per thyristor)	Half wave, 4.5 Ltr/min	-	0.185	˚C/kW
		3 Phase, 4.5 Ltr/min	-	0.195	˚C/kW
T_{vj}	Virtual junction temperature	Reverse (blocking)	-	125	˚C
T_{stg}	Storage temperature range	-	–40	125	˚C
-	Screw torque	Mounting - M6	5(44)	-	Nm (lb.ins)
		Electrical connections - M4	8(70	9(80)	Nm (lb.ins)
-	Weight (nominal)	-	-	Refer to drawing	g

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM}, T_j = 125˚C	-	30	mA
dV/dt	Linear rate of rise of off-state voltage	To 67% V_{DRM}, T_j = 125˚C	-	1000	V/µs
dI/dt	Rate of rise of on-state current	From 67% V_{DRM} to 500A, gate source 10V, 5Ω t_r = 0.5µs, T_j = 125˚C	-	500	A/µs
$V_{T(TO)}$	Threshold voltage	At T_{vj} = 125˚C	-	0.93	V
r_T	On-state slope resistance	At T_{vj} = 125˚C	-	0.67	mΩ

Note: The data given in this datasheet with regard to forward voltage drop is for calculation of the power dissipation in the semiconductor elements only. Forward voltage drops measured at the power terminals of the module will be in excess of these figures due to the impedance of the busbar from the terminal to the semiconductor.

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
V_{GT}	Gate trigger voltage	V_{DRM} = 5V, T_{case} = 25°C	3	V
I_{GT}	Gate trigger current	V_{DRM} = 5V, T_{case} = 25°C	150	mA
V_{GD}	Gate non-trigger voltage	At V_{DRM} T_{case} = 125°C	0.25	V
V_{FGM}	Peak forward gate voltage	Anode positive with respect to cathode	30	V
V_{FGN}	Peak forward gate voltage	Anode negative with respect to cathode	0.25	V
V_{RGM}	Peak reverse gate voltage	-	5	V
I_{FGM}	Peak forward gate current	Anode positive with respect to cathode	10	A
P_{GM}	Peak gate power	See table fig. 5	100	W
$P_{G(AV)}$	Mean gate power	-	5	W

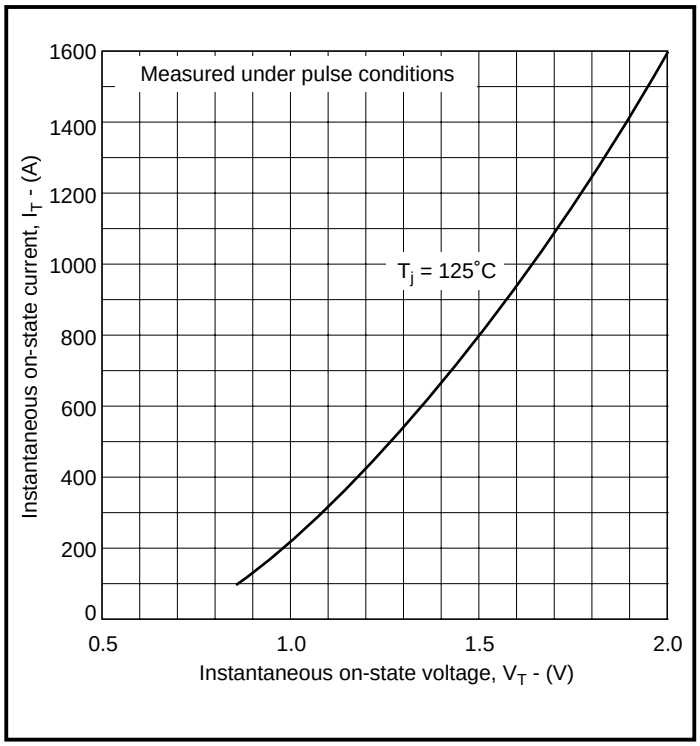


Fig. 3 Maximum (limit) on-state characteristics

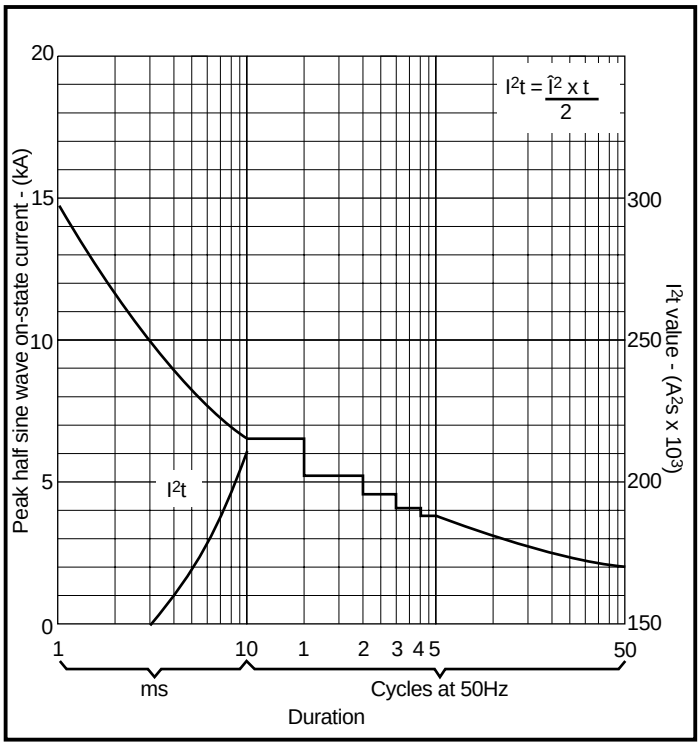


Fig. 4 Surge (non-repetitive) on-state current vs time (with 50% V_{RSM} at T_{case} = 125˚C)

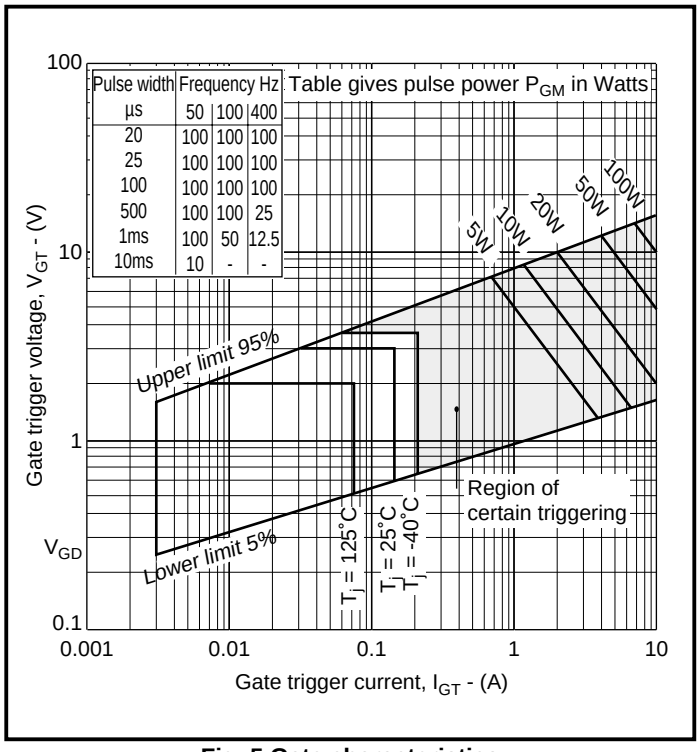


Fig. 5 Gate characteristics

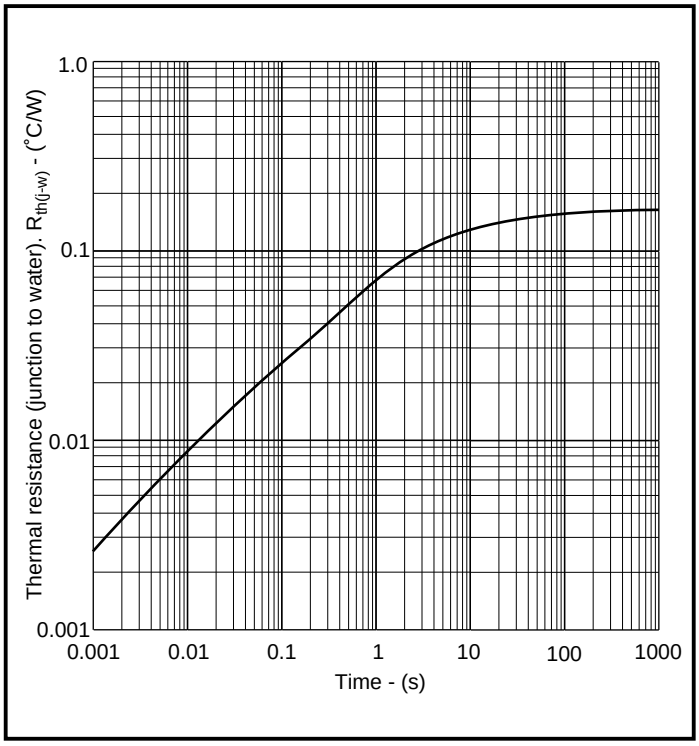


Fig. 6 Transient thermal impedance - dc

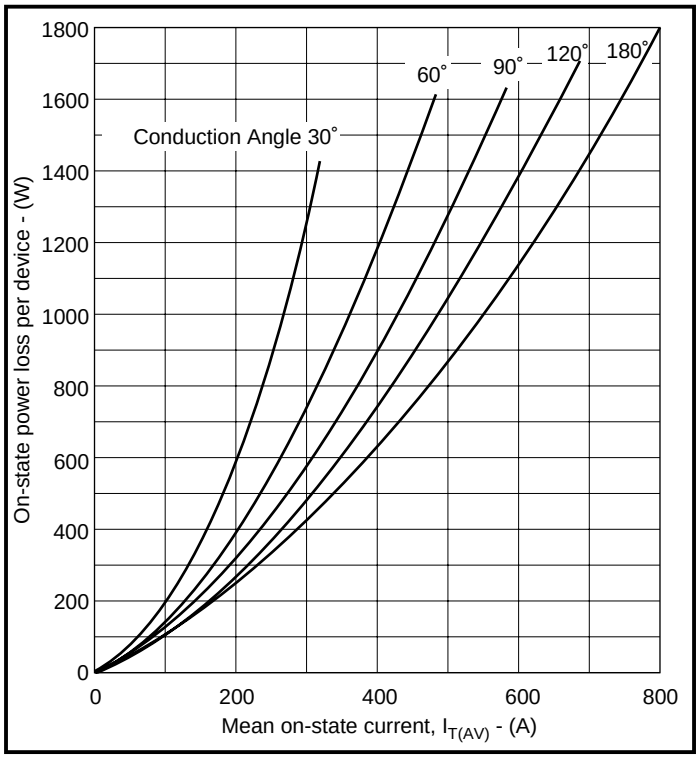


Fig. 7 On-state power loss per arm vs on-state current at specified conduction angles, sine wave 50/60Hz

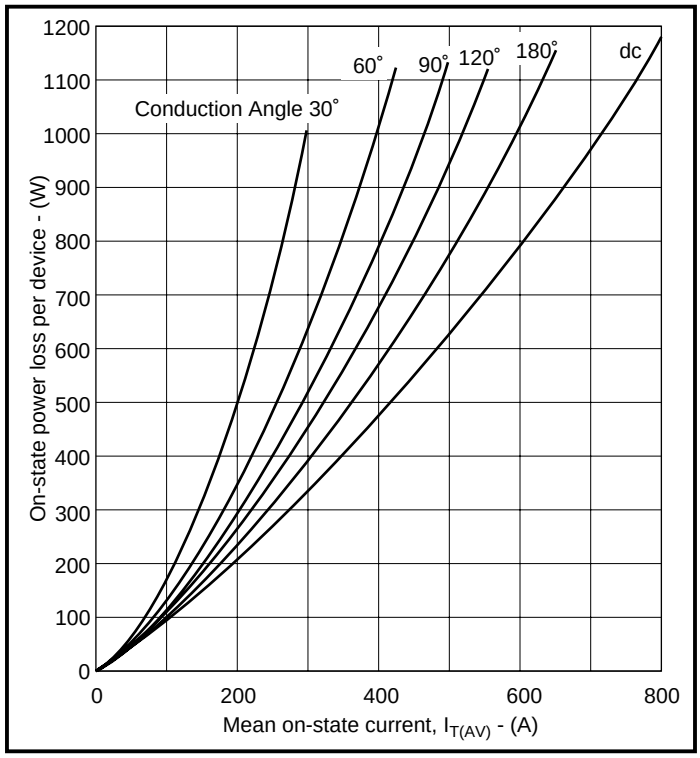


Fig. 8 On-state power loss per arm vs on-state current at specified conduction angles, square wave 50/60Hz

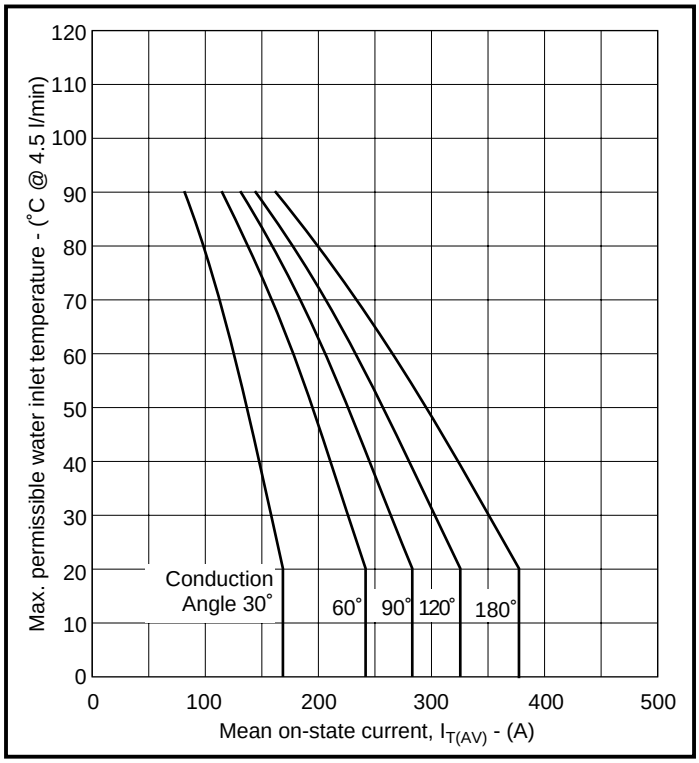


Fig. 9 Maximum permissible water inlet temperature vs on-state current at specified conduction angles, sine wave 50/60Hz

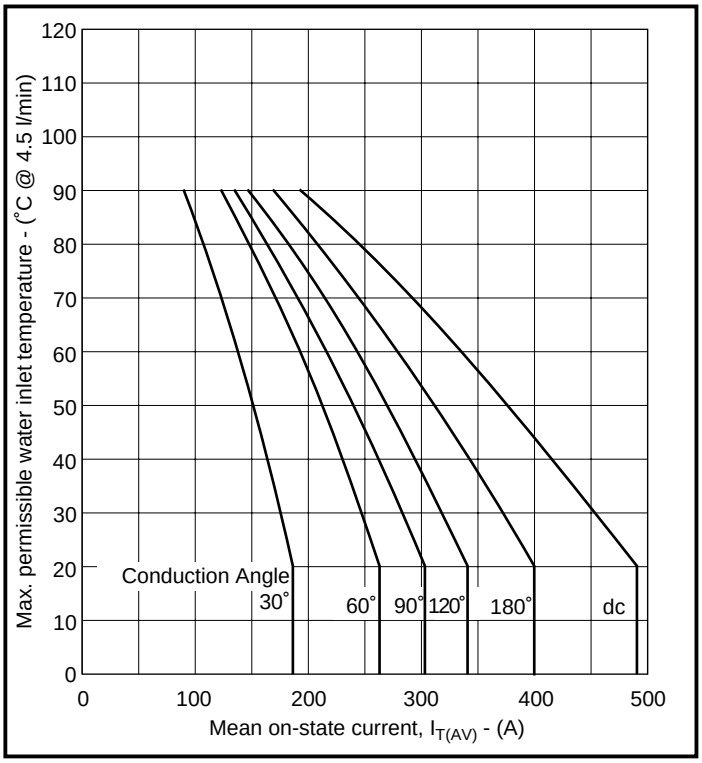


Fig. 10 Maximum permissible water inlet temperature vs on-state current at specified conduction angles, square wave 50/60Hz

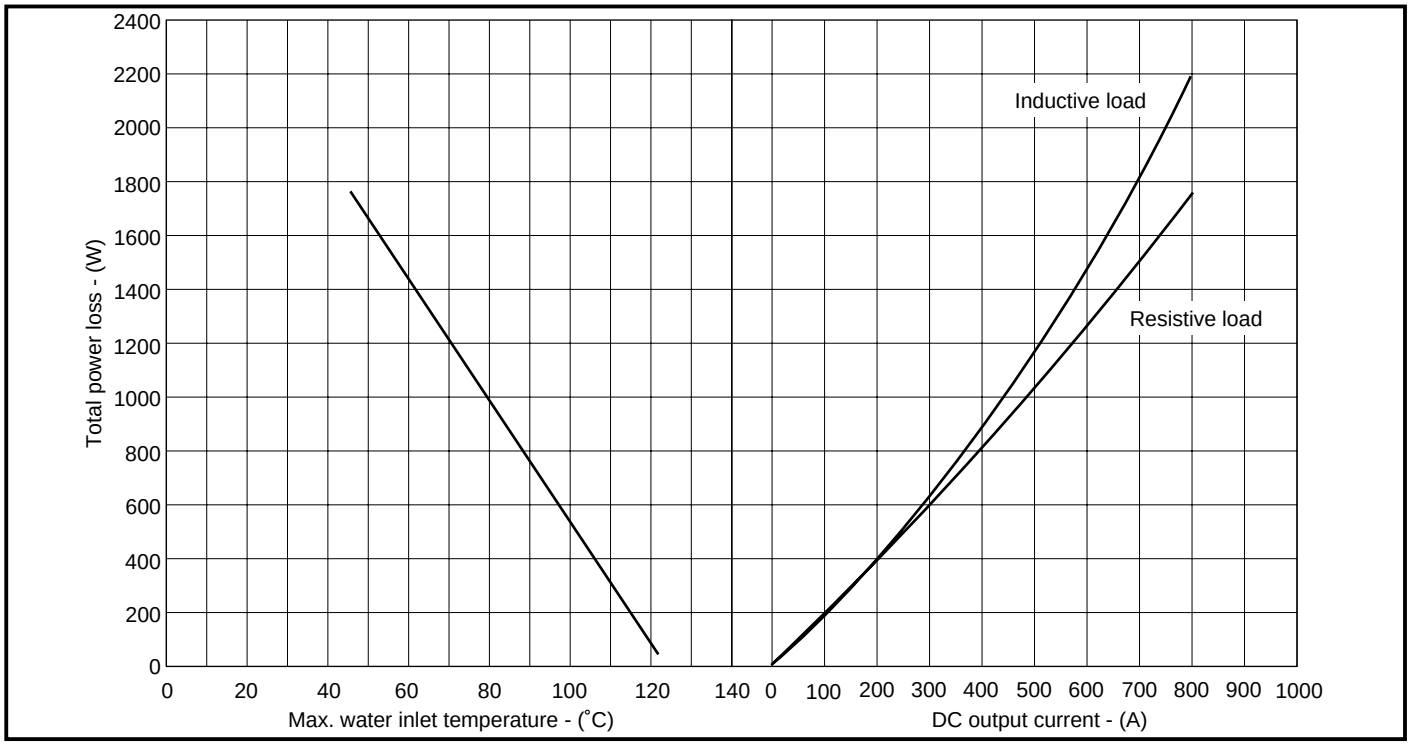


Fig. 11 50/60Hz single phase bridge DC output current vs power loss and maximum permissible water inlet temperature for specified values of heatsink thermal resistance

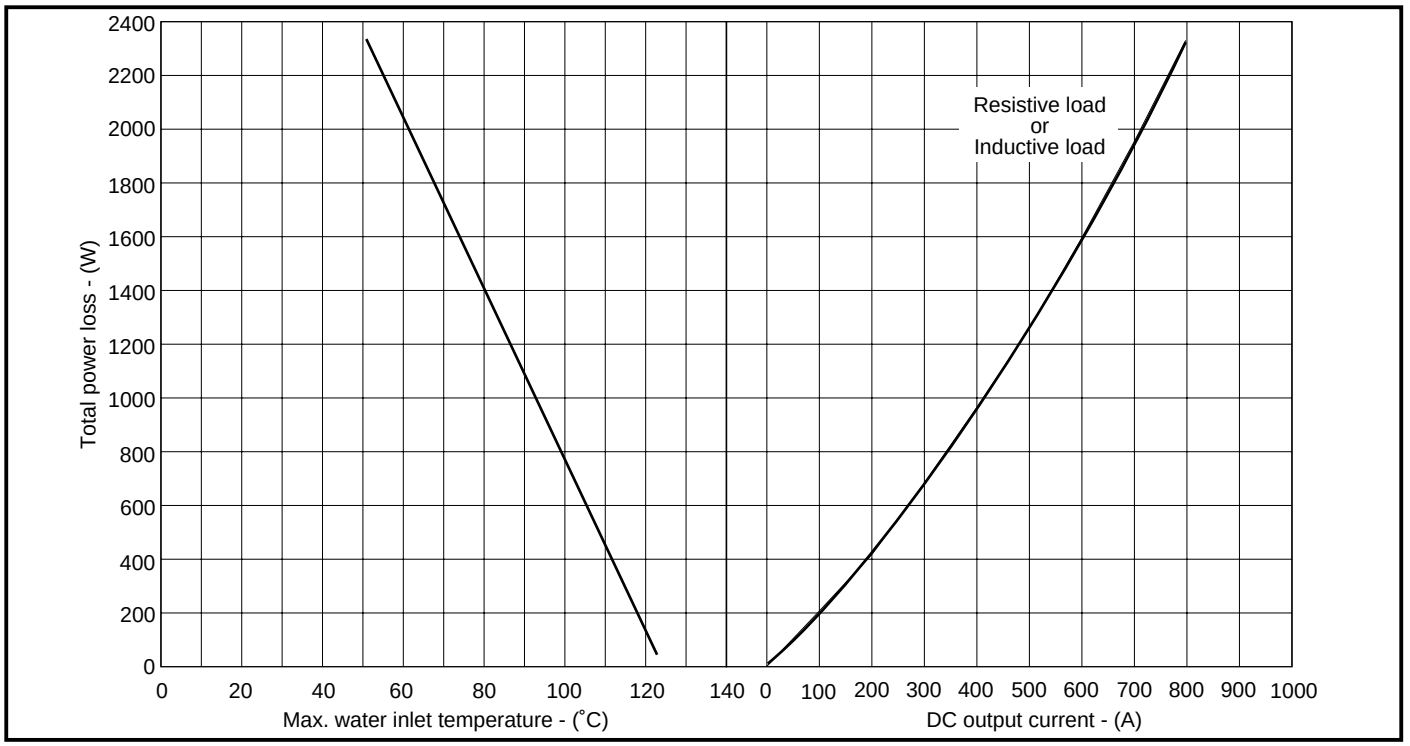
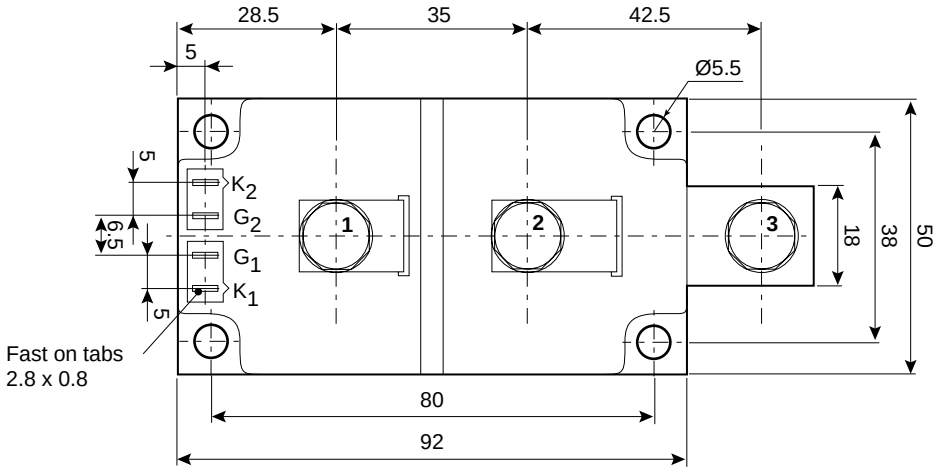
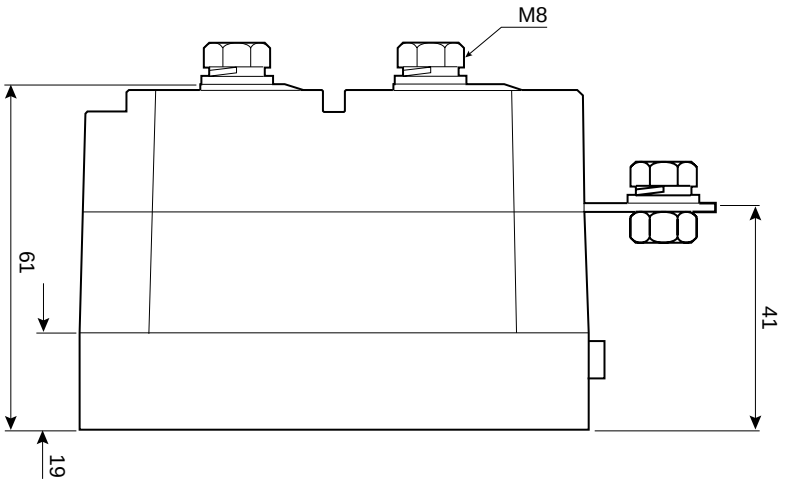


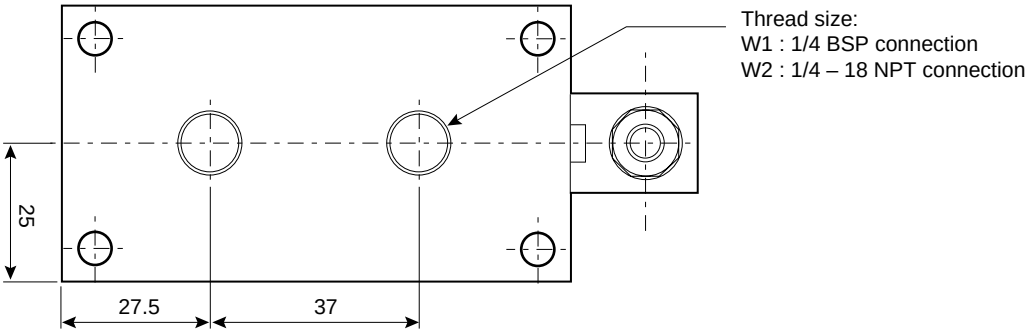
Fig. 12 Fig. 11 50/60Hz Three phase bridge DC output current vs power loss and maximum permissible water inlet temperature for specified values of heatsink thermal resistance

PACKAGE DETAILS

For further package information, please visit our website or contact your nearest Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.





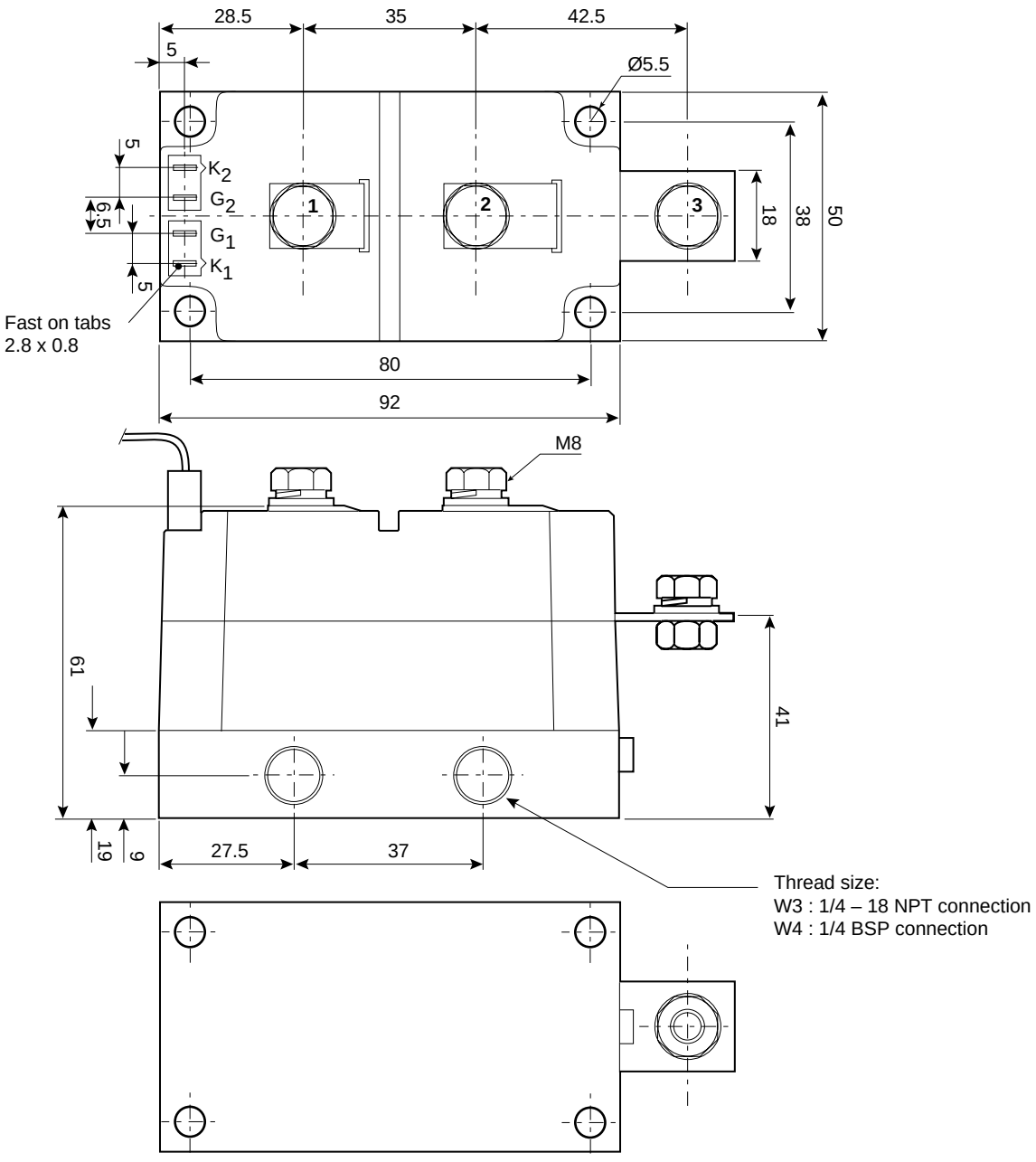


Recommended fixings for mounting: M5 socket head cap screws
Nominal weight: 1100g
Auxiliary gate/cathode leads not supplied as standard, but maybe purchased separately.

Module outline type code: MP03-W1 and W2

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For further package information, please visit our website or contact your nearest Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.

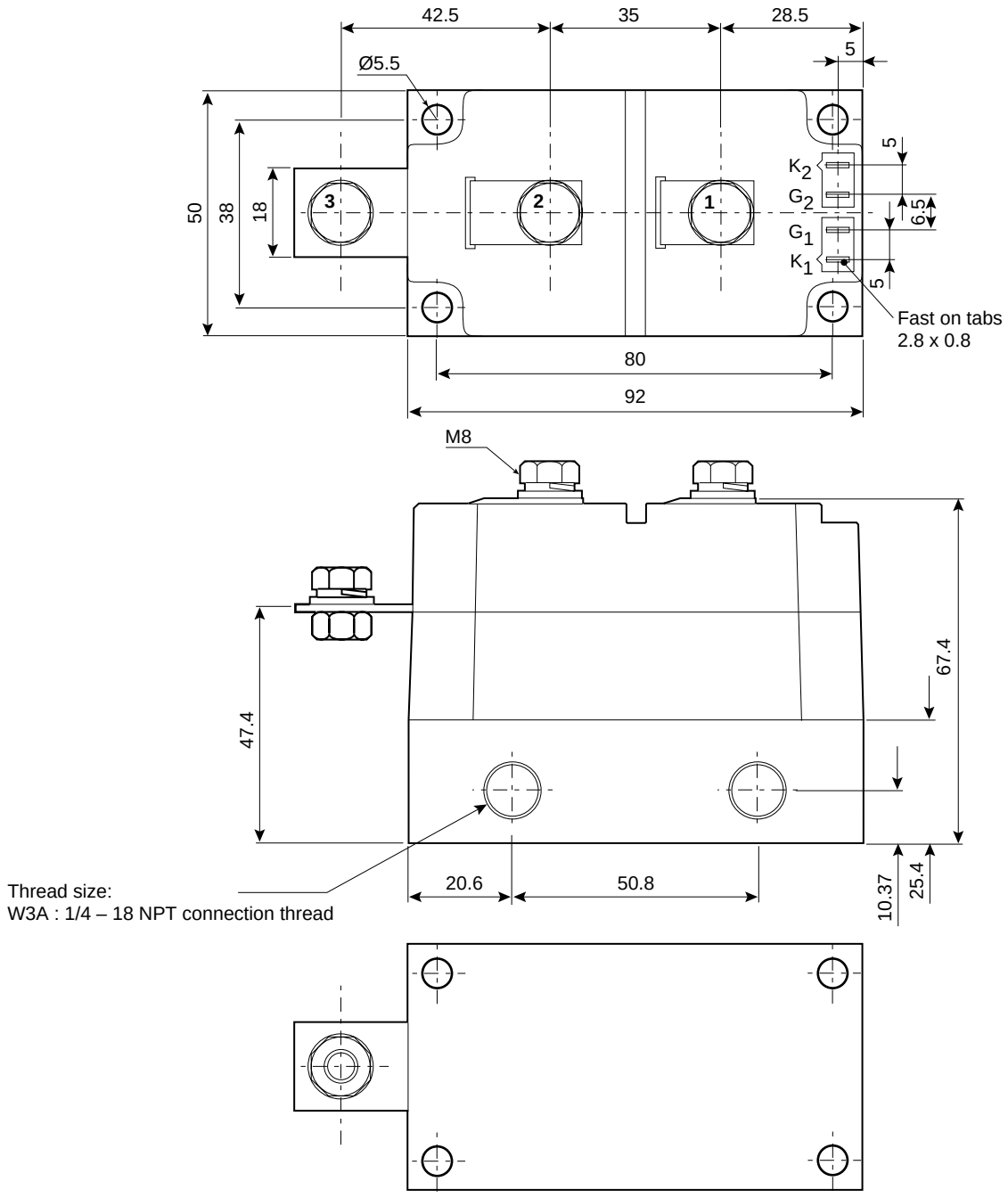


Recommended fixings for mounting: M5 socket head cap screws
Nominal weight: 1100g
Auxiliary gate/cathode leads not supplied as standard, but maybe purchased separately.

Module outline type code: MP03-W3 and W4

PACKAGE DETAILS

For further package information, please visit our website or contact your nearest Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



Recommended fixings for mounting: M5 socket head cap screws
Nominal weight: 1300g
Auxiliary gate/cathode leads not supplied as standard, but maybe purchased separately.

Module outline type code: MP03-W3A

POWER ASSEMBLY CAPABILITY

The Power Assembly group provides support for those customers requiring more than the basic semiconductor switch. Using CAD design tools the group has developed a flexible range of heatsink / clamping systems in line with advances in device types and the voltage and current capability of Dynex semiconductors.

An extensive range of air and liquid cooled assemblies is available covering the range of circuit designs in general use today.

HEATSINKS

The Power Assembly group has a proprietary range of extruded aluminium heatsinks. These were designed to optimise the performance of Dynex 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 customer service office.

http://www.dynexsemi.com

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Target Information: This is the most tentative form of information and represents a very preliminary specification. No actual design work on the product has been started.

Preliminary Information: The product is in design and development. The datasheet represents the product as it is understood but details may change.

Advance Information: The product design is complete and final characterisation for volume production is well in hand.

No Annotation: The product parameters are fixed and the product is available to datasheet specification.

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