

FEATURES

- High Surge Capability

APPLICATIONS

- High Power Drives
- High Voltage Power Supplies
- DC Motor Control
- Welding
- Battery Chargers

KEY PARAMETERS

V_{DRM} 2000V

$I_{T(AV)}$ 75A

I_{TSM} 1400A

dV/dt^* 200V/ μ s

dI/dt 500A/ μ s

**Higher dV/dt selections available*

VOLTAGE RATINGS

| Type Number | Repetitive Peak Voltages V_{DRM} V_{RRM} V | Conditions |
|----------------|--|--|
| TK12 20 M or K | 2000 | $T_{vj} = 0^\circ$ to 125° C, $I_{DRM} = I_{RRM} = 100$ mA, $V_{DRM}, V_{RRM} t_p = 10$ ms, V_{DSM} & $V_{RSM} =$ V_{DRM} & $V_{RRM} + 100$ V Respectively |
| TK12 18 M or K | 1800 | |
| TK12 16 M or K | 1600 | |
| TK12 14 M or K | 1400 | |

Lower voltage grades available.

ORDERING INFORMATION

When ordering, select the required part number shown in the Voltage Ratings selection table, then:-

Add K to type number for 1/2" 20 UNF thread, e.g. **TK12 18K**.

or

Add M to type number for M12 thread, e.g. **TK12 14M**.

Note: Please use the complete part number when ordering and quote this number in any future correspondence relating to your order.

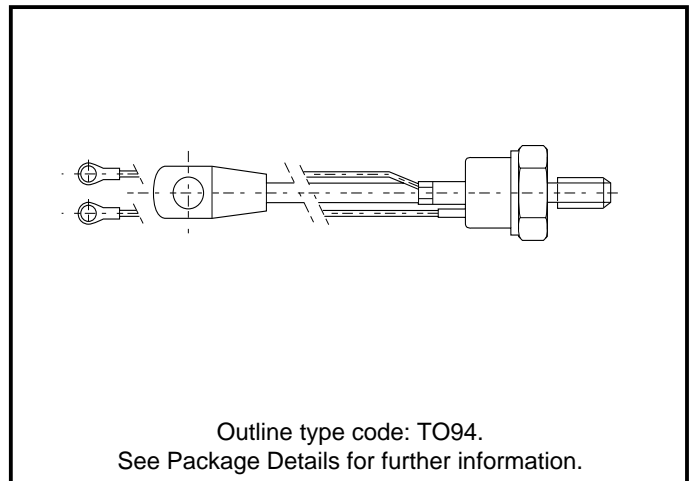


Fig. 1 Package outline

CURRENT RATINGS

$T_{case} = 60^{\circ}\text{C}$ unless stated otherwise.

| Symbol | Parameter | Conditions | Max. | Units |
|--------------|--------------------------------------|--------------------------|------|-------|
| $I_{T(AV)}$ | Mean on-state current | Half wave resistive load | 104 | A |
| $I_{T(RMS)}$ | RMS value | - | 163 | A |
| I_T | Continuous (direct) on-state current | - | 139 | A |

$T_{case} = 80^{\circ}\text{C}$ unless stated otherwise.

| Symbol | Parameter | Conditions | Max. | Units |
|--------------|--------------------------------------|--------------------------|------|-------|
| $I_{T(AV)}$ | Mean on-state current | Half wave resistive load | 75 | A |
| $I_{T(RMS)}$ | RMS value | - | 120 | A |
| I_T | Continuous (direct) on-state current | - | 100 | A |

SURGE RATINGS

| Symbol | Parameter | Conditions | Max. | Units |
|-----------|---|--|-------------------|----------------------|
| I_{TSM} | Surge (non-repetitive) on-state current | 10ms half sine; $T_{case} = 125^{\circ}\text{C}$ | 1.12 | kA |
| I^2t | I^2t for fusing | $V_R = 50\% V_{RRM}$ - 1/4 sine | 6.2×10^3 | A^2s |
| I_{TSM} | Surge (non-repetitive) on-state current | 10ms half sine; $T_{case} = 125^{\circ}\text{C}$ | 1.4 | kA |
| I^2t | I^2t for fusing | $V_R = 0$ | 9.8×10^3 | A^2s |

THERMAL AND MECHANICAL DATA

| Symbol | Parameter | Conditions | Min. | Max. | Units |
|---------------|---------------------------------------|---|------|------|-----------------------------|
| $R_{th(j-c)}$ | Thermal resistance - junction to case | dc | - | 0.24 | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(c-h)}$ | Thermal resistance - case to heatsink | Mounting torque 15.0Nm with mounting compound | - | 0.08 | $^{\circ}\text{C}/\text{W}$ |
| T_{vj} | Virtual junction temperature | On-state (conducting) | - | 125 | $^{\circ}\text{C}$ |
| | | Reverse (blocking) | - | 125 | $^{\circ}\text{C}$ |
| T_{stg} | Storage temperature range | | -40 | 150 | $^{\circ}\text{C}$ |
| - | Mounting torque | | 12.0 | 15.0 | Nm |

DYNAMIC CHARACTERISTICS

| Symbol | Parameter | Conditions | Min. | Max. | Units | |
|-------------------|--|---|-----------------|------|------------|------------|
| V_{TM} | Maximum on-state voltage | At 150A peak, $T_{case} = 25^{\circ}C$ | - | 2.0 | V | |
| I_{RRM}/I_{DRM} | Peak reverse and off-state current | At V_{RRM}/V_{DRM} , $T_{case} = 125^{\circ}C$ | - | 10 | mA | |
| dV/dt | Maximum linear rate of rise of off-state voltage | To 60% V_{DRM} , $T_j = 125^{\circ}C$, Gate open circuit | - | 200 | V/ μ s | |
| dI/dt | Rate of rise of on-state current | Gate source 20V, 20 Ω $t_r \leq 0.5\mu$ s, $T_j = 125^{\circ}C$ | Repetitive 50Hz | - | 500 | A/ μ s |
| | | | Non-repetitive | - | 800 | A/ μ s |
| $V_{T(TO)}$ | Threshold voltage | At $T_{vj} = 125^{\circ}C$ | - | 1.4 | V | |
| r_T | On-state slope resistance | At $T_{vj} = 125^{\circ}C$ | - | 4.0 | m Ω | |
| t_{gd} | Delay time | $V_D = 300V$, $I_G = 1A$, $I_T = 50A$, dI/dt = 50A/ μ s, dI _G /dt = 1A/ μ s, $T_j = 25^{\circ}C$ | - | 1.5 | μ s | |
| I_L | Latching current | $T_j = 25^{\circ}C$, $V_D = 12V$ | - | - | mA | |
| I_H | Holding current | $T_j = 25^{\circ}C$, $V_D = 12V$, $I_{TM} = 1A$ | - | 50 | mA | |

GATE TRIGGER CHARACTERISTICS AND RATINGS

| Symbol | Parameter | Conditions | Typ. | Max. | Units |
|-------------|---------------------------|--|------|------|-------|
| V_{GT} | Gate trigger voltage | $V_{DRM} = 12V$, $T_{case} = 25^{\circ}C$, $R_L = 6\Omega$ | - | 3.0 | V |
| I_{GT} | Gate trigger current | $V_{DRM} = 12V$, $T_{case} = 25^{\circ}C$, $R_L = 6\Omega$ | - | 125 | mA |
| V_{GD} | Gate non-trigger voltage | At V_{DRM} , $T_{case} = 125^{\circ}C$, $R_L = 12\Omega$ | - | 0.2 | V |
| V_{FGM} | Peak forward gate voltage | Anode positive with respect to cathode | - | 3.0 | 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 | - | 4 | A |
| P_{GM} | Peak gate power | - | - | 16 | W |
| $P_{G(AV)}$ | Mean gate power | | - | 3 | W |

CURVES

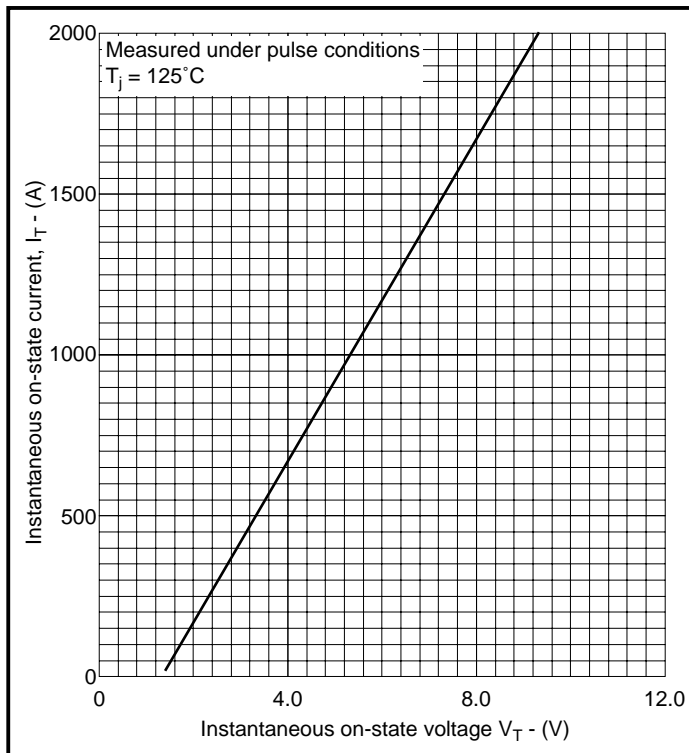
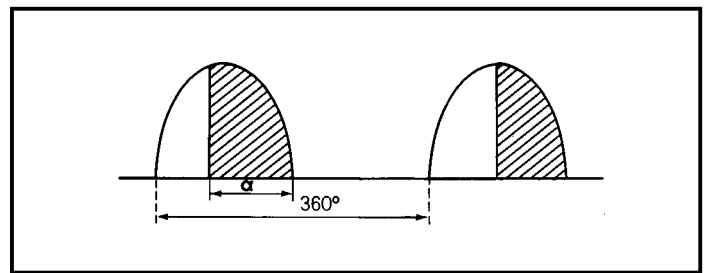


Fig.2 Maximum (limit) on-state characteristics

SINUSOIDAL CURRENT WAVEFORM



RECTANGULAR CURRENT WAVEFORM

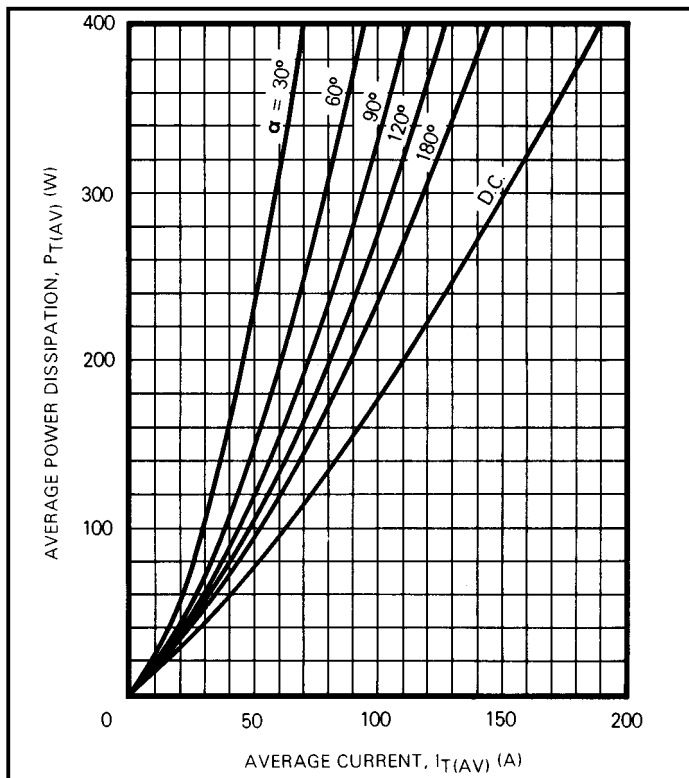
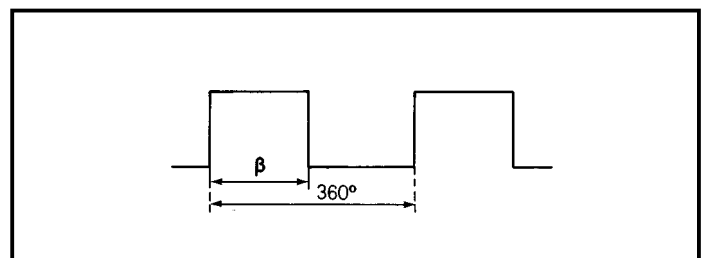


Fig.3 Maximum on-state power dissipation for sinusoidal current waveform

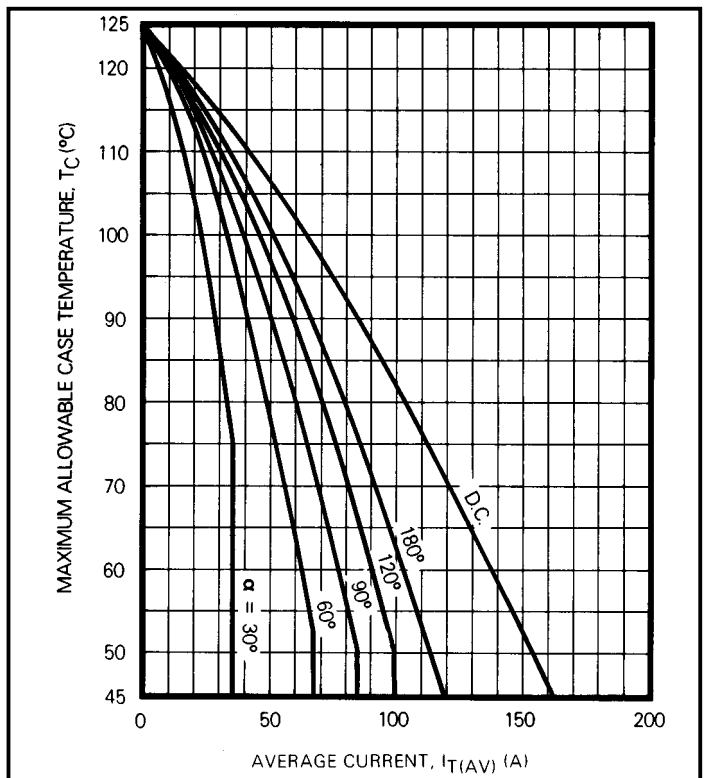


Fig.4 Maximum allowable case temperature for sinusoidal current waveform

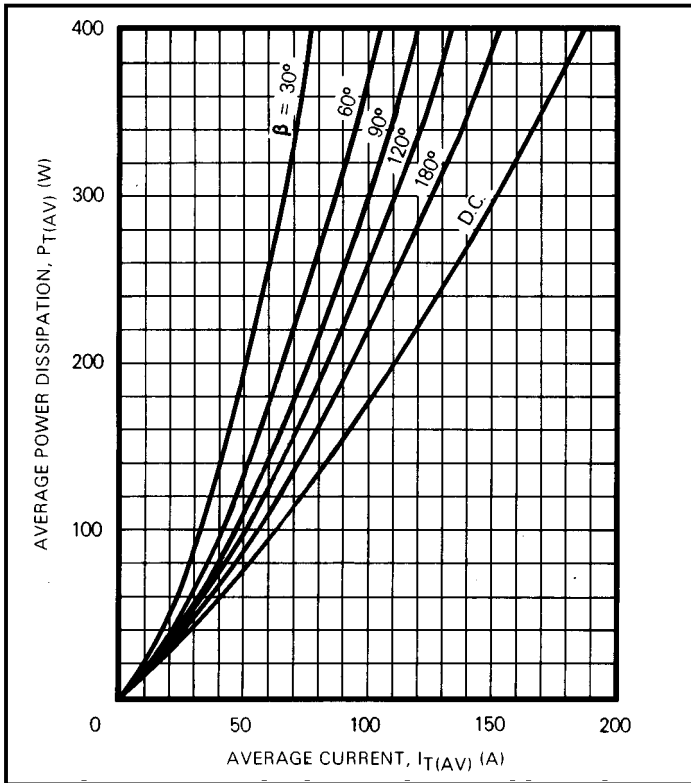


Fig.5 Maximum on-state power dissipation for rectangular current waveform

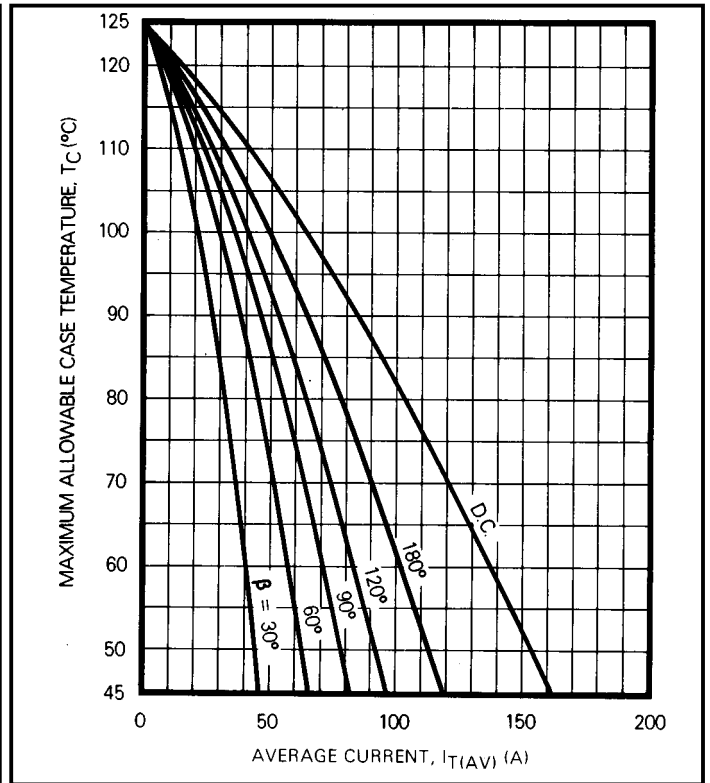


Fig.6 Maximum allowable case temperature for rectangular current waveform

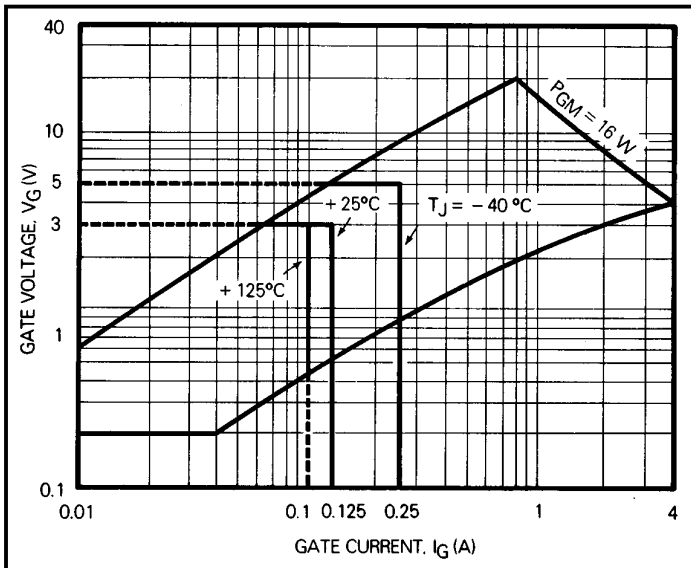


Fig.7 Gate trigger characteristics

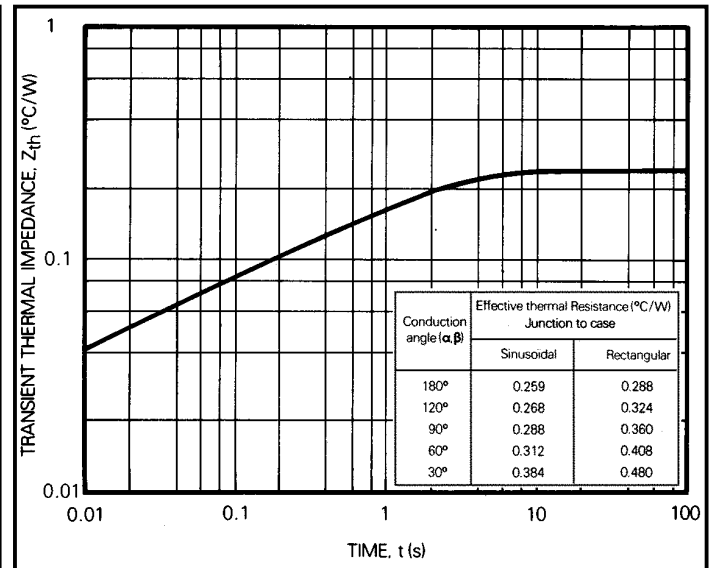


Fig.8 Transient thermal impedance - junction to case

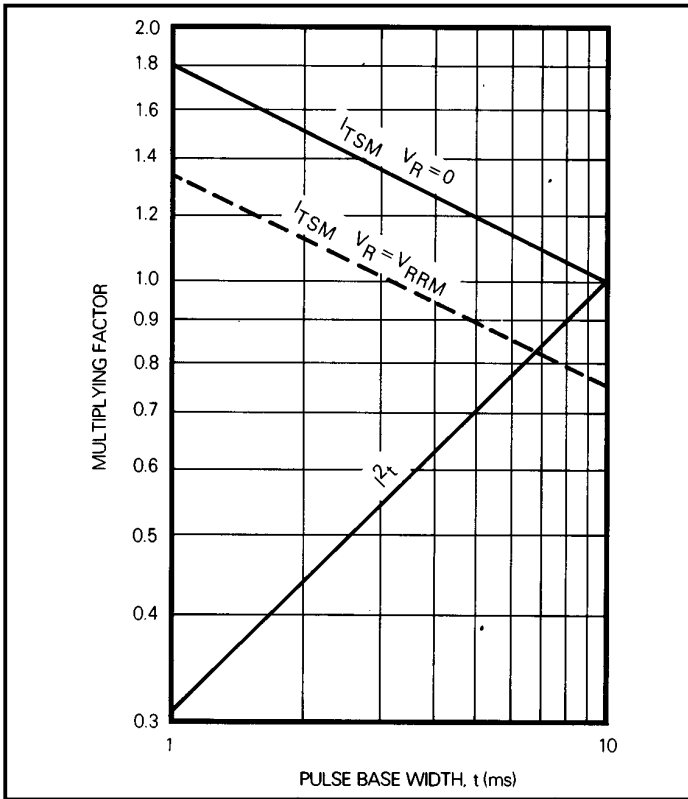


Fig.9 Multiplying factor for non-repetitive sub-cycle surge on-state current and I^2t rating

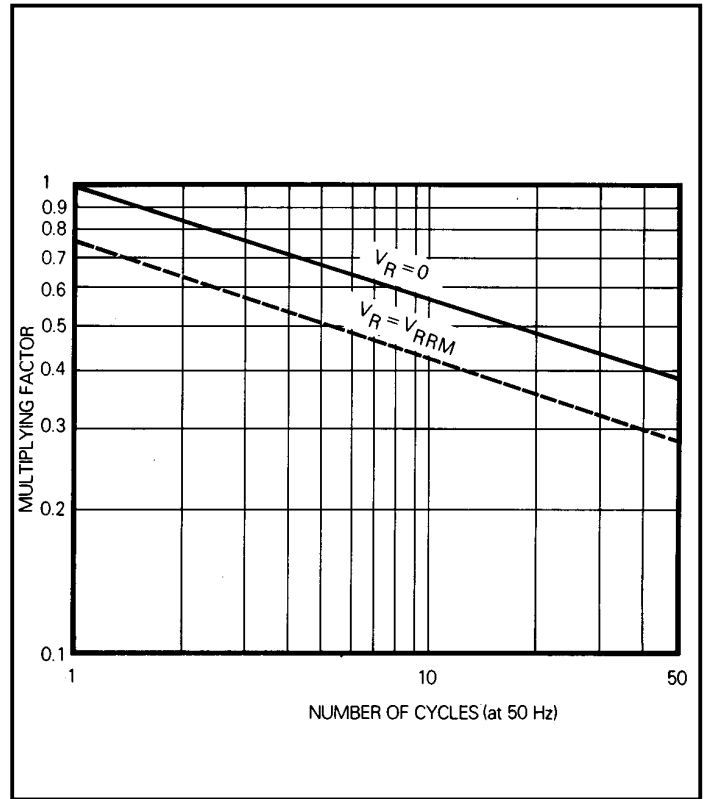
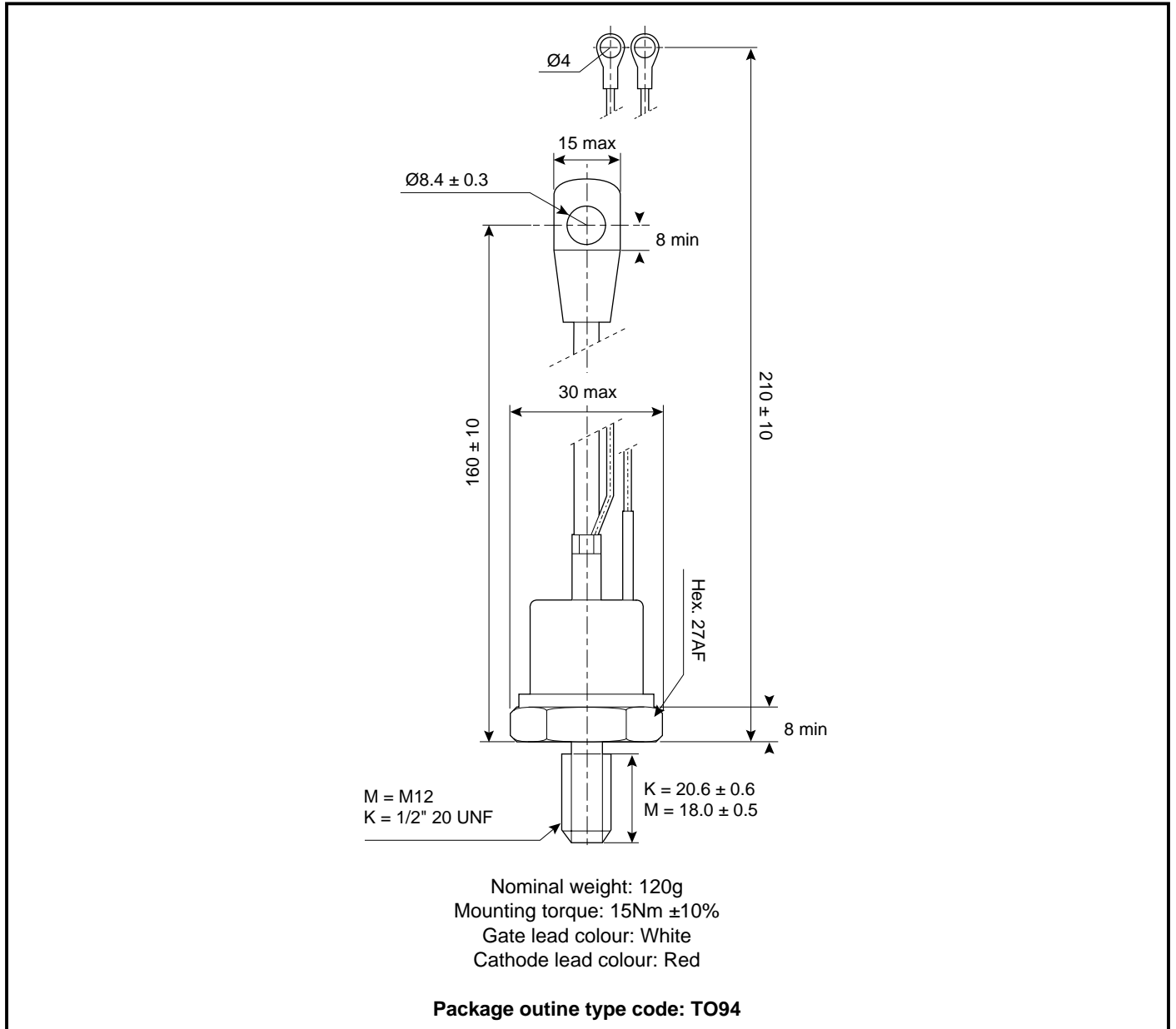


Fig.10 Multiplying factor for non-repetitive surge on-state current

PACKAGE DETAILS

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



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 and clamping systems in line with advances in device voltages 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 latest CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete Solution (PACs).

DEVICE CLAMPS

Disc devices require the correct clamping force to ensure their safe operation. The PACS range includes a varied selection of pre-loaded clamps to suit all of our manufactured devices. Types available include cube clamps for single side cooling of 'T' 23mm and 'E' 30mm discs, and bar clamps right up to 83kN for our 'Z' 100mm thyristors and diodes.

Clamps are available for single or double side cooling, with high insulation versions for high voltage assemblies.

Please refer to our application note on device clamping, AN4839

HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks. They have been 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.



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

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

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