



Authorized Distributor:
 Darrah Electric Company
 www.darrahelectric.com

TK18

Phase Control Thyristor

Replaces January 2000 version, DS45253-4.0

DS4253-5.0 July 2001

FEATURES

- High Surge Capability

APPLICATIONS

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

KEY PARAMETERS

- V_{DRM} 1200V
- $I_{T(AV)}$ 115A
- I_{TSM} 2000A
- $dVdt^*$ 200V/ μ s
- dI/dt 500A/ μ s

*Higher dV/dt selections available

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V_{DRM} V_{RRM}	Conditions
TK18 12 M or K TK18 10 M or K	1200 1000	$T_{vj} = 0^\circ$ 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

Lower voltage grades available.

ORDERING INFORMATION

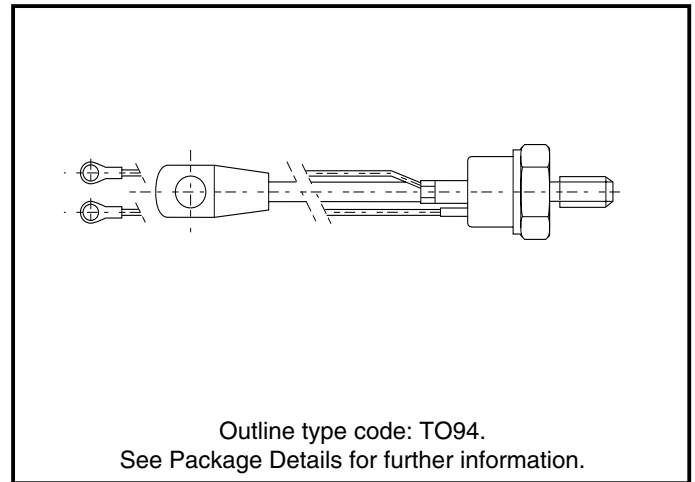
When ordering, select the required part number shown in the Voltage Ratings selection table, then:-

Add K to type number for 1/2" 20 UNF thread, e.g. **TK18 12K**.

or

Add M to type number for M12 thread, e.g. **TK18 12M**.

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



Outline type code: TO94.
 See Package Details for further information.

Fig. 1 Package outline



Darrah Electric Company
 5914 Merrill Avenue
 Cleveland, OH 44102 USA
 216-631-0912
 216-631-0440 fax
 www.darrahelectric.com

CURRENT RATINGS

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

Symbol	Parameter	Conditions	Max.	Units
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	152	A
$I_{T(RMS)}$	RMS value	-	239	A
I_T	Continuous (direct) on-state current	-	206	A

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

Symbol	Parameter	Conditions	Max.	Units
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	115	A
$I_{T(RMS)}$	RMS value	-	180	A
I_T	Continuous (direct) on-state current	-	155	A

SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine; $T_{\text{case}} = 125^{\circ}\text{C}$	1.6	kA
I^2t	I^2t for fusing	$V_R = 50\% V_{RRM}$ - 1/4 sine	12.8×10^3	A^2s
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine; $T_{\text{case}} = 125^{\circ}\text{C}$	2.0	kA
I^2t	I^2t for fusing	$V_R = 0$	20.0×10^3	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

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DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions	Min.	Max.	Units	
V_{TM}	Maximum on-state voltage	At 300A peak, $T_{case} = 25^{\circ}C$	-	1.5	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, 20Ω $t_r \leq 0.5\mu$ s, $T_j = 125^{\circ}C$	Repetitive 50Hz	-	500	A/ μ s
			Non-repetitive	-	800	A/ μ s
$V_{T(TO)}$	Threshold voltage	At $T_{vj} = 125^{\circ}C$	-	0.9	V	
r_T	On-state slope resistance	At $T_{vj} = 125^{\circ}C$	-	2.0	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

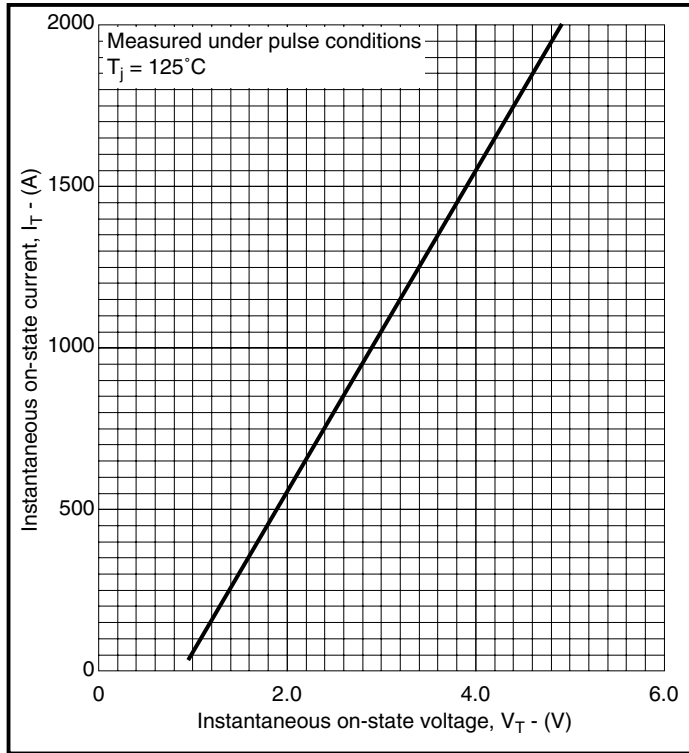
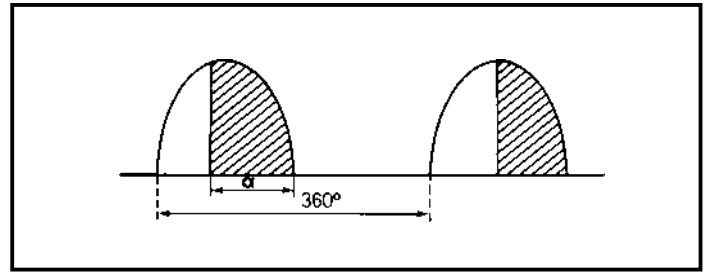


Fig.2 Maximum (limit) on-state characteristics

SINUSOIDAL CURRENT WAVEFORM



RECTANGULAR CURRENT WAVEFORM

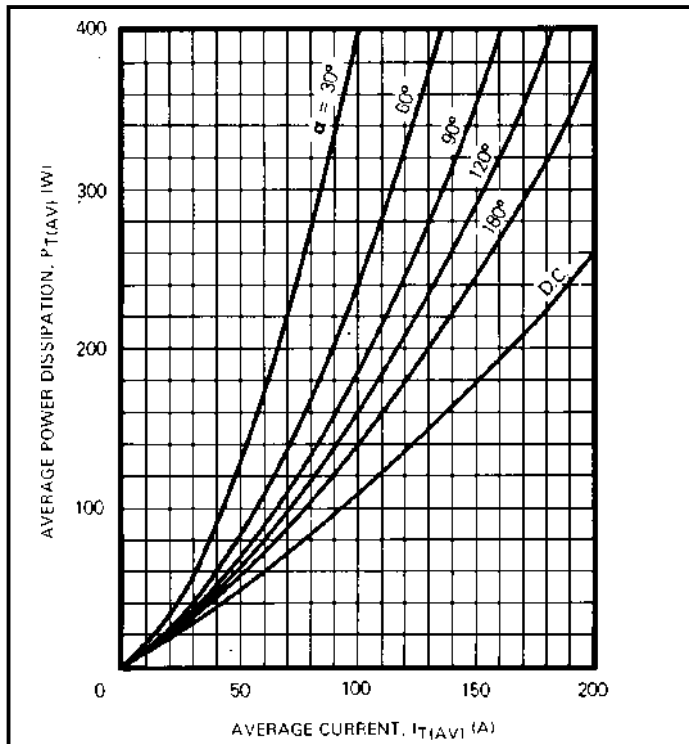
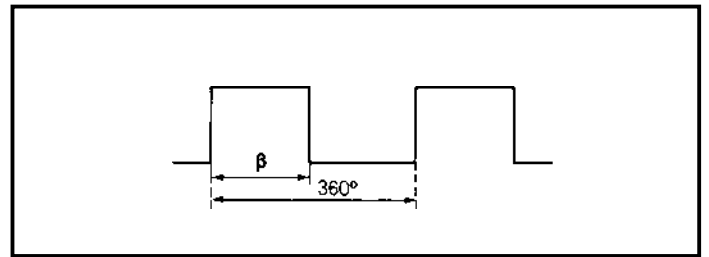


Fig.3 Maximum on-state power dissipation for sinusoidal current waveform

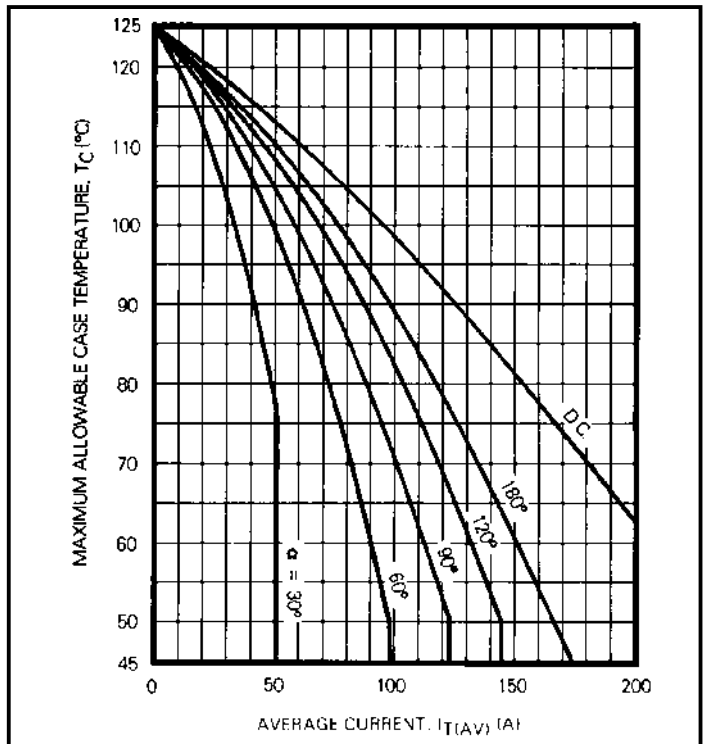


Fig.4 Maximum allowable case temperature for sinusoidal current waveform

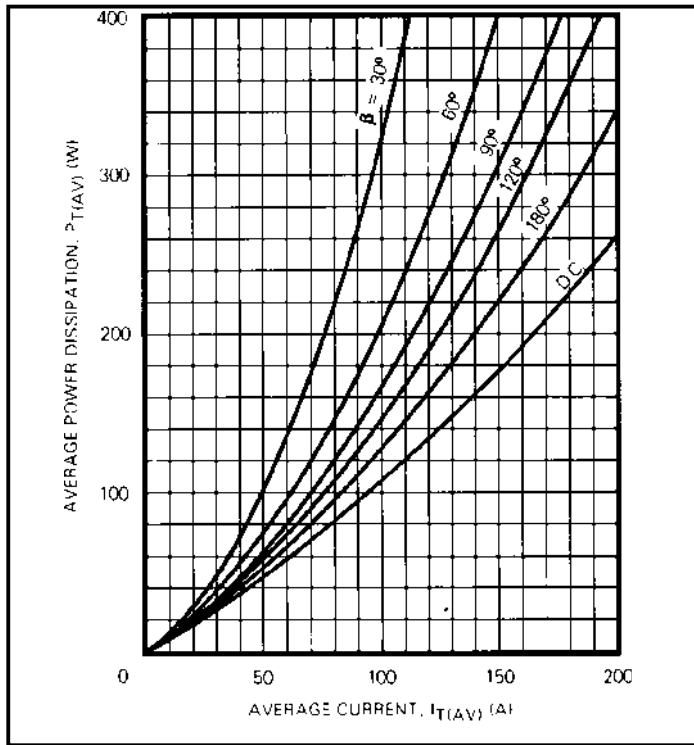


Fig.5 Maximum on-state power dissipation for rectangular current waveform

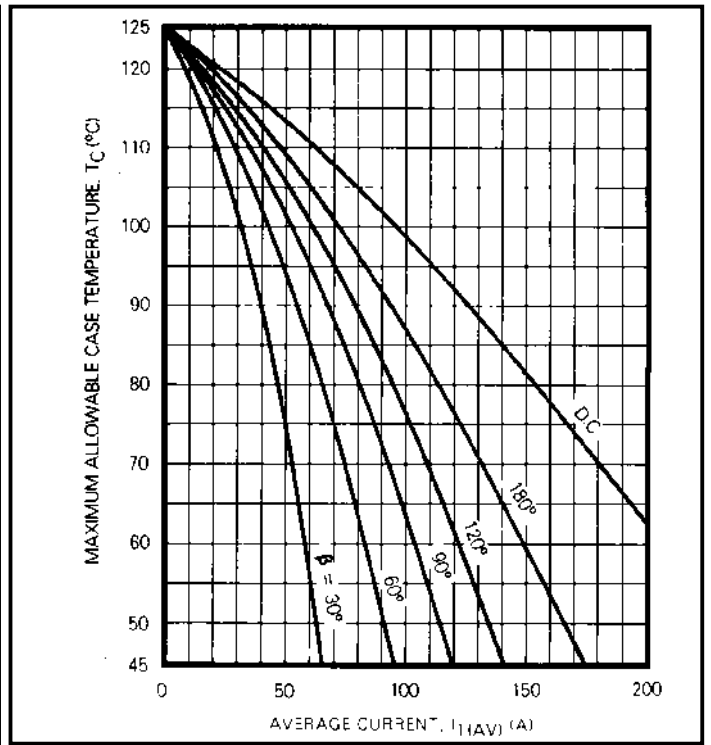


Fig.6 Maximum allowable case temperature for rectangular current waveform

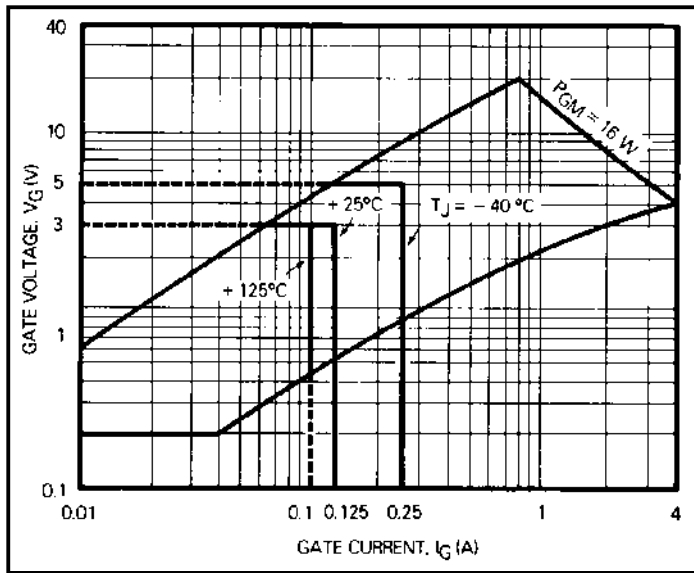


Fig.7 Gate trigger characteristics

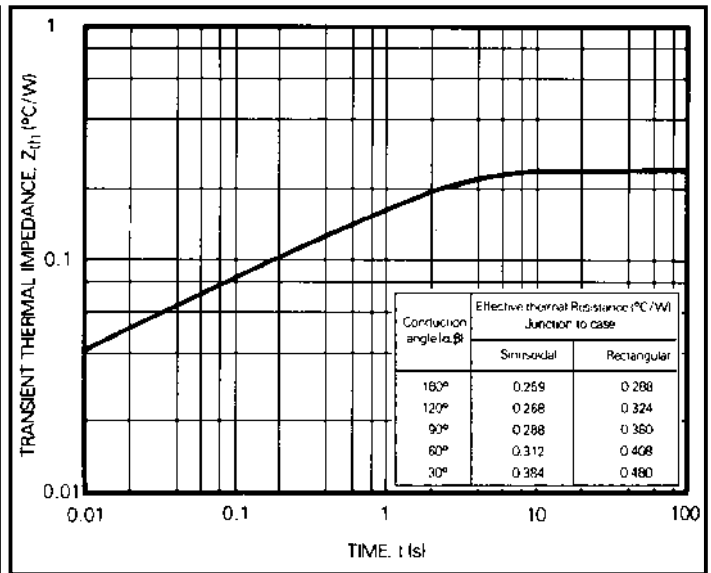


Fig.8 Transient thermal impedance - junction to case

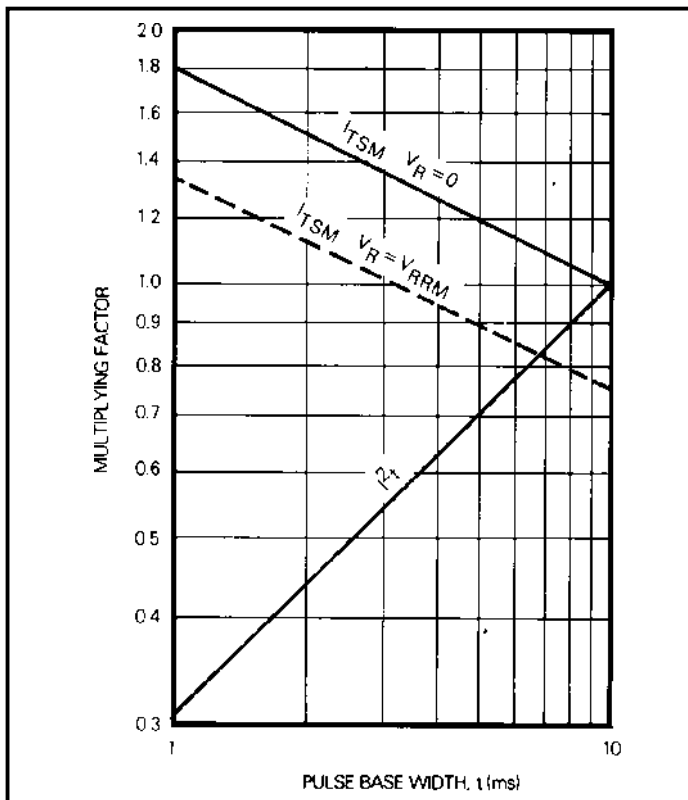


Fig.9 Multiplying factor for non-repetitive sub-cycle surge on-state current and I^2t rating

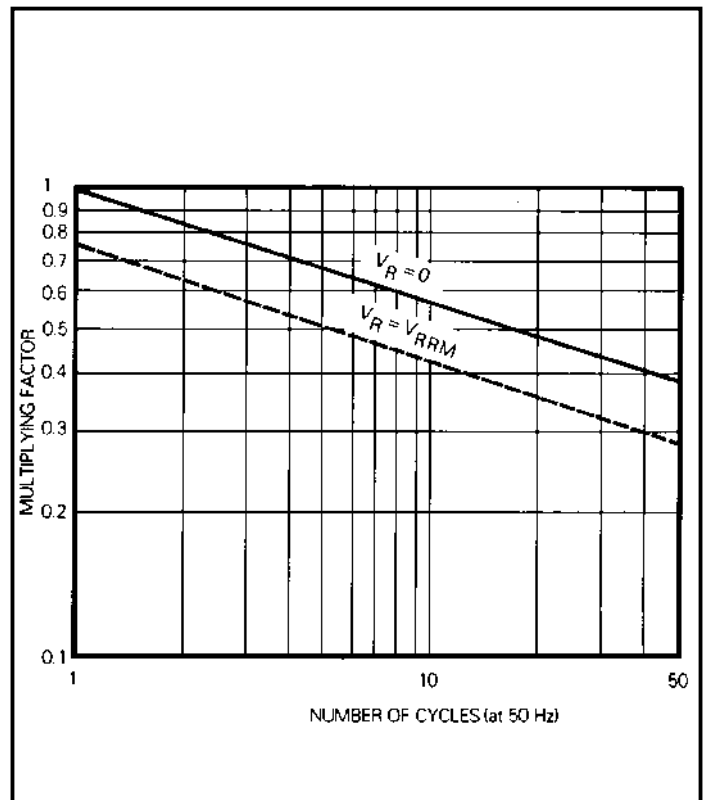
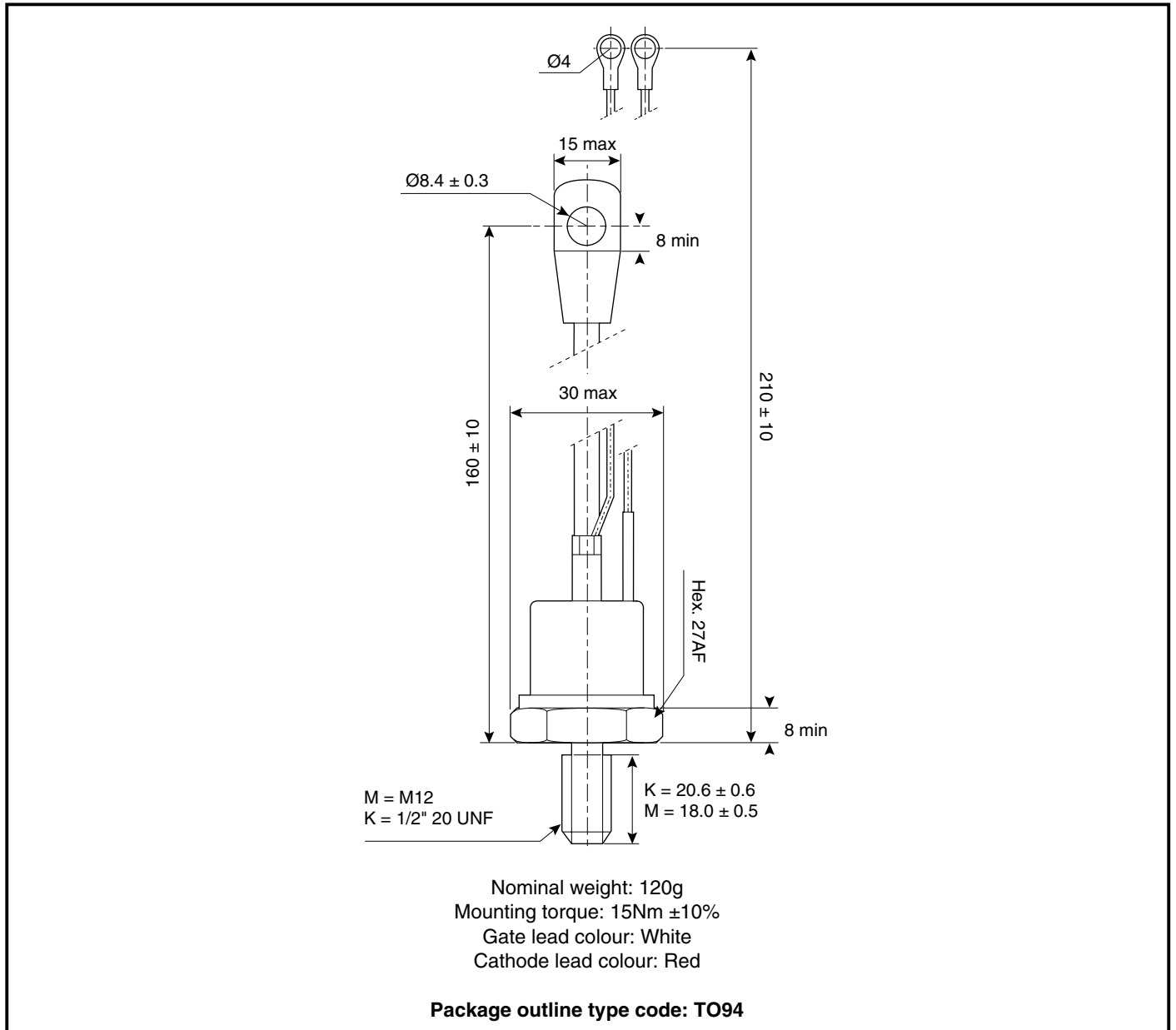


Fig.10 Multiplying factor for non-repetitive surge on-state current

PACKAGE DETAILS

For further package information, please contact Customer Services. 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 offers 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).

HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks which 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 Services.

Stresses above those listed in this data sheet 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.



<http://www.dynexsemi.com>

e-mail: power_solutions@dynexsemi.com

HEADQUARTERS OPERATIONS
DYNEX SEMICONDUCTOR LTD
Doddington Road, Lincoln.
Lincolnshire. LN6 3LF. United Kingdom.
Tel: +44-(0)1522-500500
Fax: +44-(0)1522-500550

CUSTOMER SERVICE
Tel: +44 (0)1522 502753 / 502901. Fax: +44 (0)1522 500020

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