

FAST TURN-OFF THYRISTORS



Glass-passivated, asymmetrical, fast turn-off, forward blocking thyristors (ASCR) in TO-48 envelopes, suitable for operation in fast power inverters. For reverse-blocking operation use with a series diode, for reverse-conducting operation use with an anti-parallel diode.

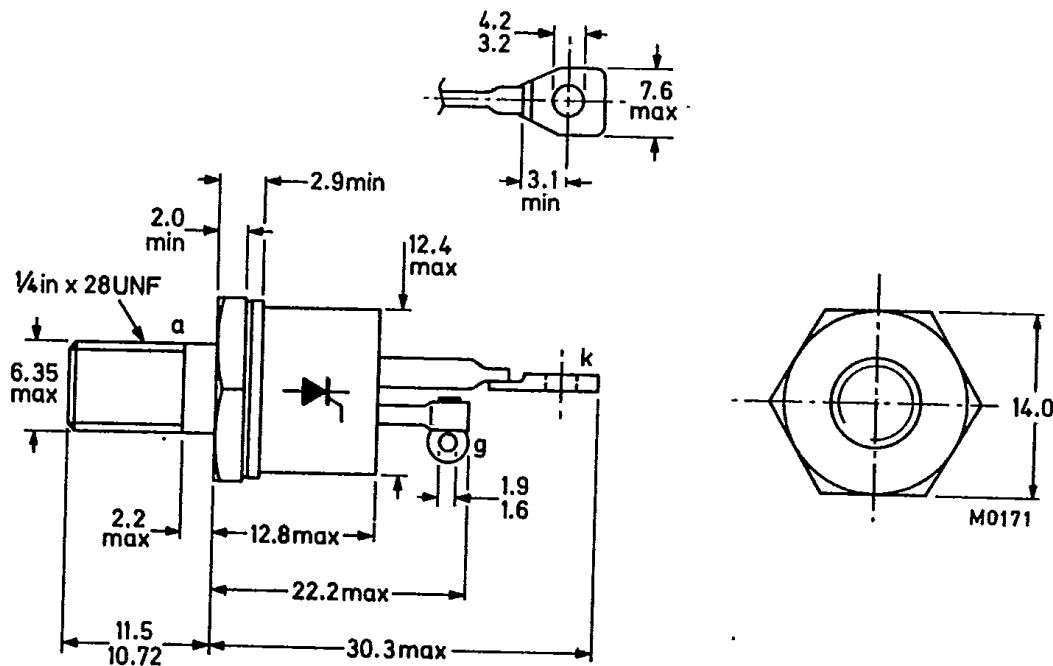
QUICK REFERENCE DATA

		BTW63-600R			800R	1000R	
Repetitive peak off-state voltage	$V_{DRM}$	max.	600	800	1000		V
Average on-state current	$I_{T(AV)}$	max.	25				A
Repetitive peak on-state current	$I_{TRM}$	max.	250				A
Circuit-commutated turn-off time							
suffix K	$t_q$	<	4				$\mu s$
suffix N	$t_q$	<	6				$\mu s$

MECHANICAL DATA

Fig.1 TO-48

Dimensions in mm



Net Mass. 14 g

Diameter of clearance hole. max. 6.5 mm

Accessories supplied on request:

56264a (mica washer);

56264b (insulating bush).

Supplied with device: 1 nut, 1 lock washer.

Torque on nut: min. 1.7 Nm (17 kg cm)

max. 3.5 Nm (35 kg cm)

Nut dimensions across the flats: 11.1 mm

Products approved to CECC 50 011-010 available on request.

**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC134)

Anode to cathode		BTW63-600R	800R	1000R	
Transient off-state voltage	$V_{DSM}$	max. 800	1000	1000	V
Repetitive peak off-state voltage	$V_{DRM}$	max. 600	800	1000	V
Continuous off-state voltage	$V_D$	max. 500	650	700	V
Transient reverse voltage ( $t_p \leq 5 \mu s$ )		$V_{RSM}$	max.	15	V
Average on-state current averaged over any 20 ms period; → up to $T_{mb} = 85^\circ C$		$I_T(AV)$	max.	25	A
R.M.S. on-state current		$I_T(RMS)$	max.	40	A
Repetitive peak on-state current; $t_p = 50 \mu s$ ; $\delta = 0.05$		$I_{TRM}$	max.	250	A
Non-repetitive peak on-state current $T_j = 125^\circ C$ prior to surge; $t = 10$ ms; half sine-wave		$I_{TSM}$	max.	370	A
$I^2 t$ for fusing; $t = 10$ ms		$I^2 t$	max.	700	$A^2 s$
Rate of rise of on-state current after triggering with $I_G = 1.25$ A; $I_T = 80$ A		$di_T/dt$	max.	1000	$A/\mu s$
<b>Gate to cathode</b>					
Average power dissipation (averaged over any 20 ms period)		$P_G(AV)$	max.	1	W
Peak power dissipation; $t = 10 \mu s$		$P_{GM}$	max.	10	W
<b>Temperatures</b>					
Storage temperature		$T_{stg}$		-40 to +125	$^\circ C$
Operating junction temperature		$T_j$	max.	125	$^\circ C$
<b>THERMAL RESISTANCE</b>					
→ From junction to mounting base		$R_{th j-mb}$	=	0.8	K/W
From mounting base to heatsink with heatsink compound		$R_{th mb-h}$	=	0.2	K/W

**OPERATING NOTE**

The terminals should be neither bent nor twisted; they should be soldered into the circuit so that there is no strain on them.  
During soldering the heat conduction to the junction should be kept to a minimum.

**CHARACTERISTICS**

Anode to cathode

On-state voltage

$I_T = 50 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$

$V_T$	<	2.6	V*
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Off-state current

$V_D = V_{Dmax}; T_j = 125 \text{ }^\circ\text{C}$

$I_D$	<	6.0	mA
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Holding current;  $T_j = 25 \text{ }^\circ\text{C}$

$I_H$	<	400	mA
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Gate to cathode

Voltage that will trigger all devices

$V_D = 12 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$

$V_{GT}$	>	2.0	V
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Current that will trigger all devices

$V_D = 12 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$

$I_{GT}$	>	250	mA
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Switching characteristics (see Fig.2)

Circuit commutated turn-off time

$dV_D/dt = 500 \text{ V}/\mu\text{s}$  (linear to  $V_{DRMmax}$ );

$R_{GK} = 10 \text{ } \Omega; V_G = 0; T_j = 125 \text{ }^\circ\text{C};$

when switched from  $I_T = 100 \text{ A}; t_p = 150 \text{ } \mu\text{s}$

$-dI_T/dt = 50 \text{ A}/\mu\text{s}$

suffix K

suffix N

$t_q$	<	6	$\mu\text{s}$
$t_q$	<	9	$\mu\text{s}$

$-dI_T/dt = 10 \text{ A}/\mu\text{s}$

suffix K

suffix N

$t_q$	<	4	$\mu\text{s}$
$t_q$	<	6	$\mu\text{s}$

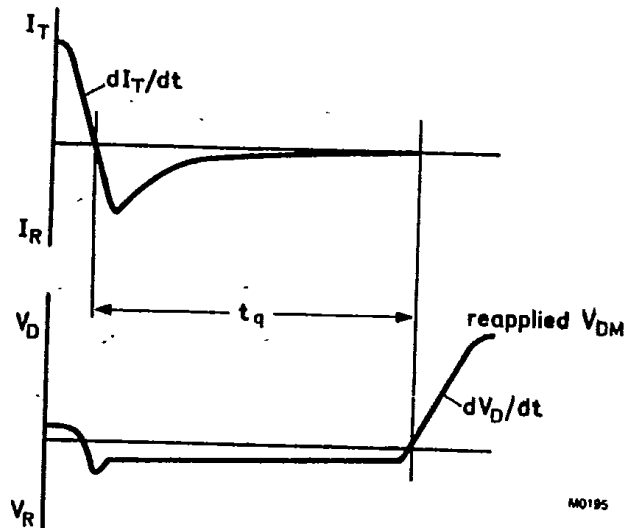


Fig.2 Circuit-commutated turn-off time definition.

\*Measured under pulse conditions to avoid excessive dissipation.

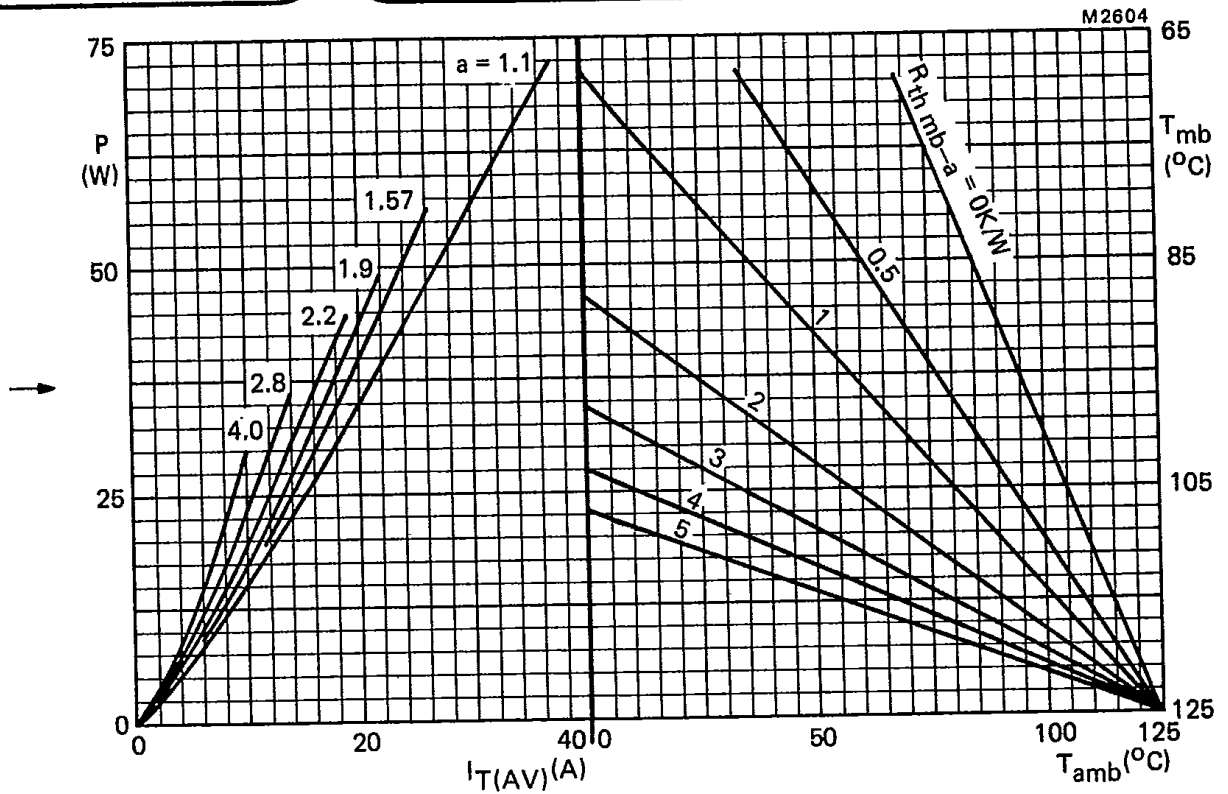


Fig.3 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.

$$a = \text{form factor} = \frac{I_T(RMS)}{I_T(AV)}$$

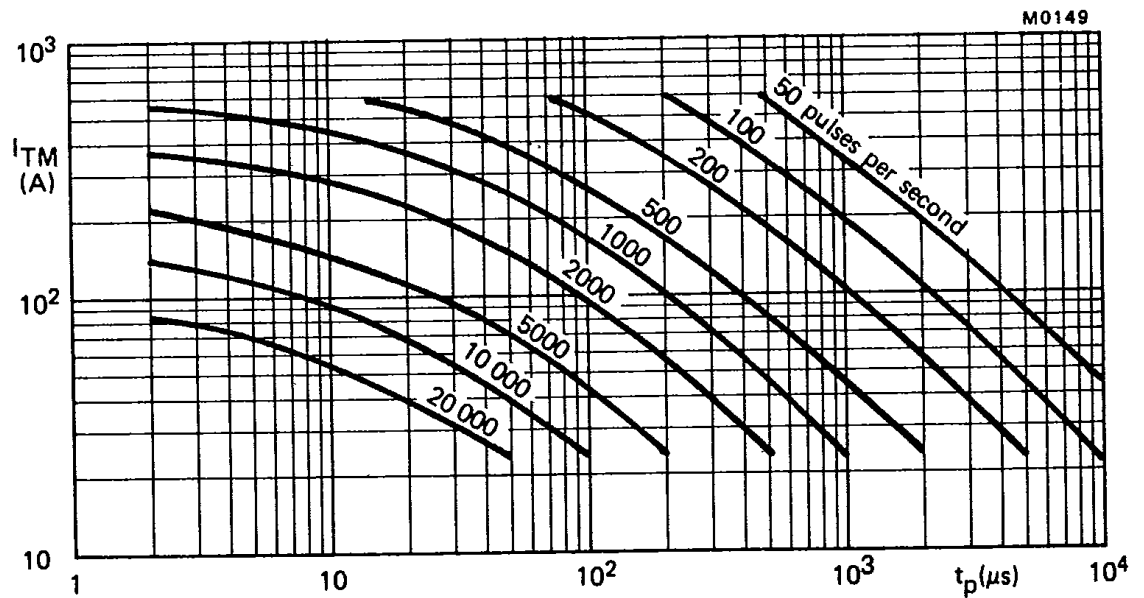


Fig.4 Maximum allowable peak on-state current versus pulse width;  $T_{mb} = 85^{\circ}C$ .

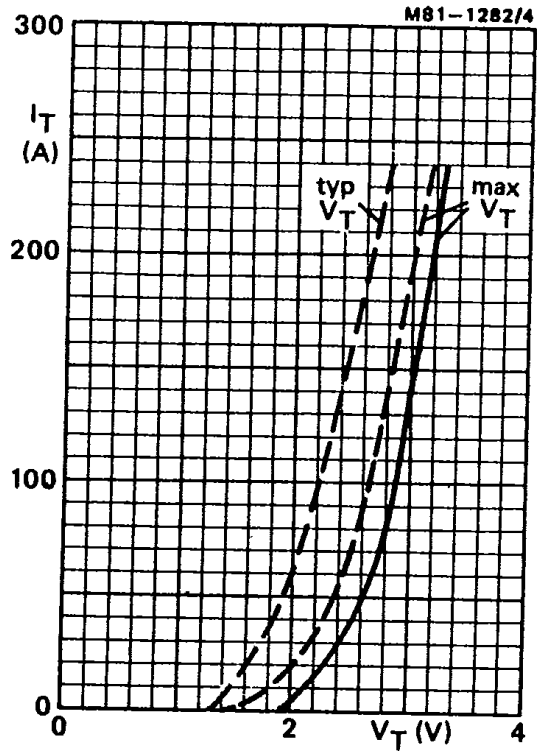


Fig.5 —  $T_j = 25\text{ }^\circ\text{C}$ ; ---  $T_j = 125\text{ }^\circ\text{C}$ ;  
 $t_p = 200\text{ }\mu\text{s}$ .

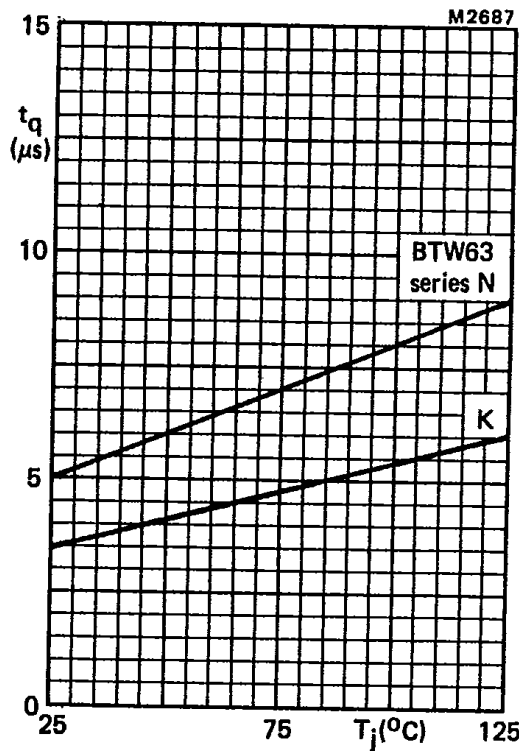


Fig.6a Variation of  $t_q$  with  $T_j$ ;  
 $-di_T/dt = 50\text{ A}/\mu\text{s}$ ;  $dV_D/dt = 500\text{ V}/\mu\text{s}$   
 (linear to  $V_{DRMmax}$ );  $I_T = 100\text{ A}$ ;  $t_p = 150\text{ }\mu\text{s}$ ;  
 $R_{GK} = 10\text{ }\Omega$ ;  $V_G = 0$ ; maximum values.

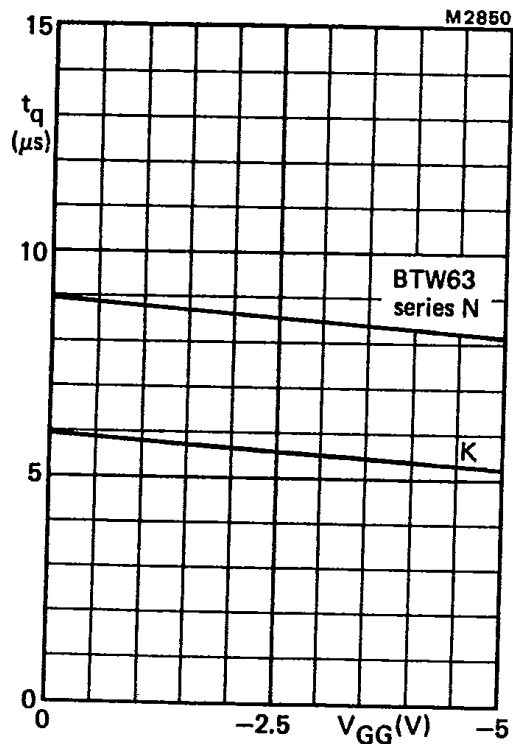


Fig.6b Variation of  $t_q$  with negative bias;  
 $-di_T/dt = 50\text{ A}/\mu\text{s}$ ;  $dV_D/dt = 500\text{ V}/\mu\text{s}$   
 (linear to  $V_{DRMmax}$ );  $I_T = 100\text{ A}$ ;  $t_p = 150\text{ }\mu\text{s}$ ;  
 $T_j = 125\text{ }^\circ\text{C}$ ; maximum values.

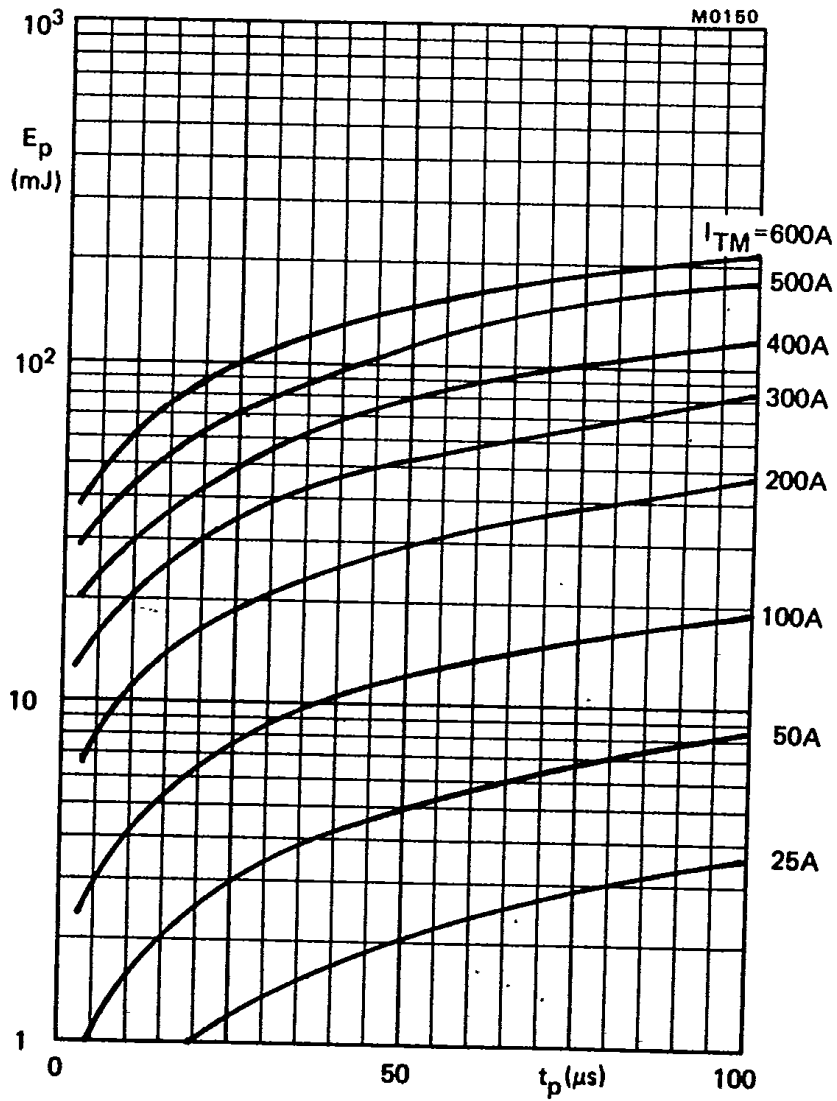


Fig.7 Maximum total energy loss per pulse when switching a half-sinusoidal pulse from 600 V.  
 Device power (W) = Energy per pulse (J) x No. of pulses per second.  
 For pulse widths  $> 100 \mu s$  use Fig.3.

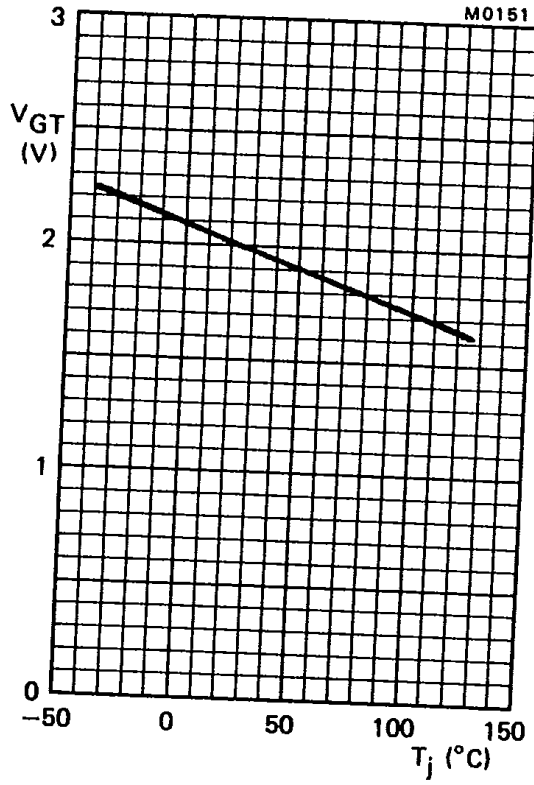


Fig.8 Minimum gate voltage that will trigger all devices plotted against junction temperature.

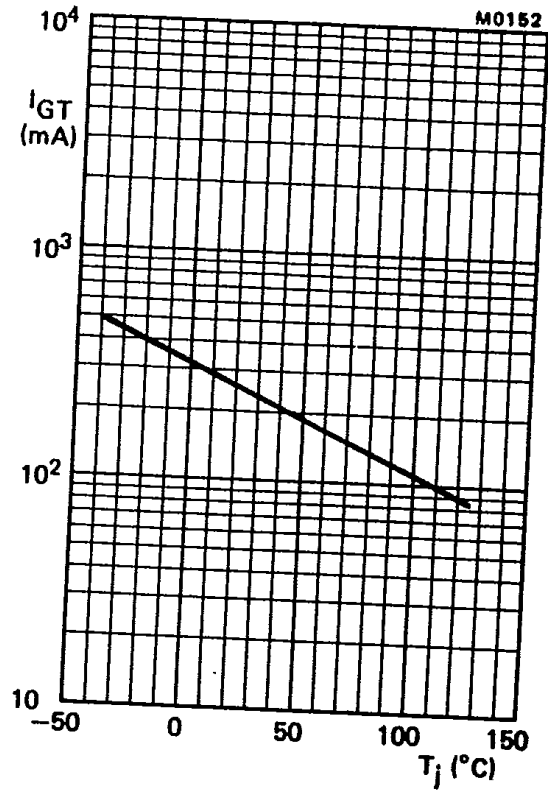


Fig.9 Minimum gate current that will trigger all devices plotted against junction temperature.