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.

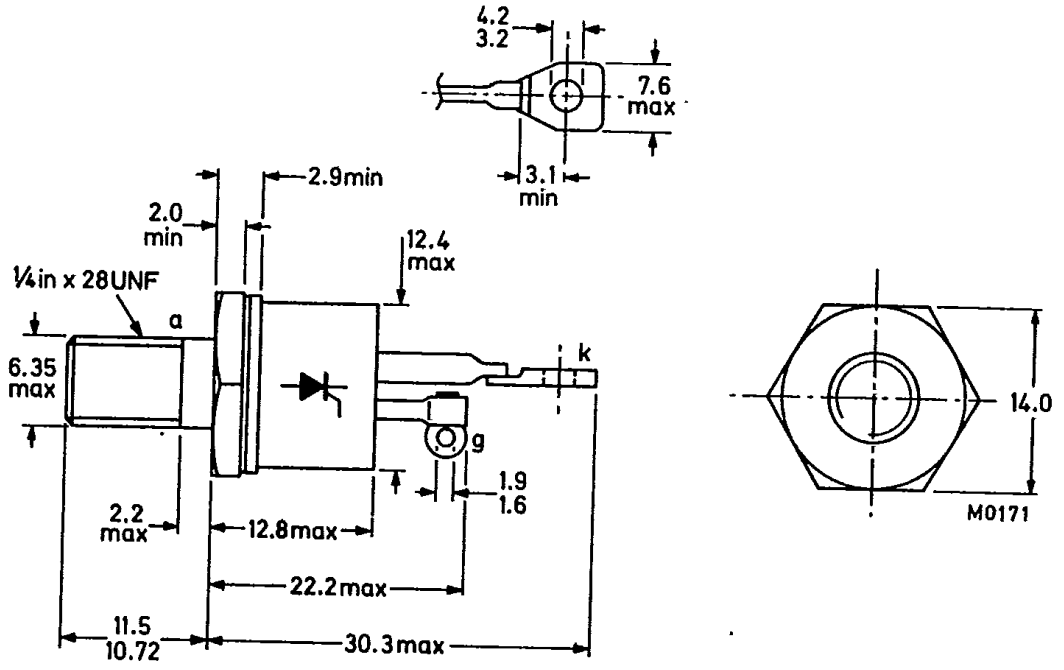
QUICK REFERENCE DATA

			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		μs
suffix N	t_q	<			6		μs

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 ($t_p \leqslant 5\ \mu s$)	V_{RSM}	max.	15	V
Average on-state current averaged over any 20 ms period; up to $T_{mb} = 85\ ^oC$	$I_{T(AV)}$	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 $T_j = 125\ ^oC$ prior to surge; $t = 10$ ms; half sine-wave	I_{TSM}	max.	370	A
I^2t for fusing; $t = 10$ ms	I^2t	max.	700	A^2s
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/μs

Gate to cathode

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

Temperatures

Storage temperature	T_{stg}		−40 to +125	°C
Operating junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	0.8	K/W
From mounting base to heatsink with heatsink compound	$R_{th\ mb\text{-}h}$	=	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 A; T_j = 25 °C	V_T	<	2.6	V*
Off-state current $V_D = V_{Dmax}$; T_j = 125 °C	I_D	<	6.0	mA
Holding current; T_j = 25 °C	I_H	<	400	mA

Gate to cathode

Voltage that will trigger all devices V_D = 12 V; T_j = 25 °C	V_{GT}	>	2.0	V
Current that will trigger all devices V_D = 12 V; T_j = 25 °C	I_{GT}	>	250	mA

Switching characteristics (see Fig.2)

Circuit commutated turn-off time

dV_D/dt = 500 V/μs (linear to V_{DRMmax});
R_{GK} = 10 Ω; V_G = 0; T_j = 125 °C;
when switched from I_T = 100 A; t_p = 150 μs

$-dI_T/dt$ = 50 A/μs				
suffix K	t_q	<	6	μs
suffix N	t_q	<	9	μs
$-dI_T/dt$ = 10 A/μs				
suffix K	t_q	<	4	μs
suffix N	t_q	<	6	μs

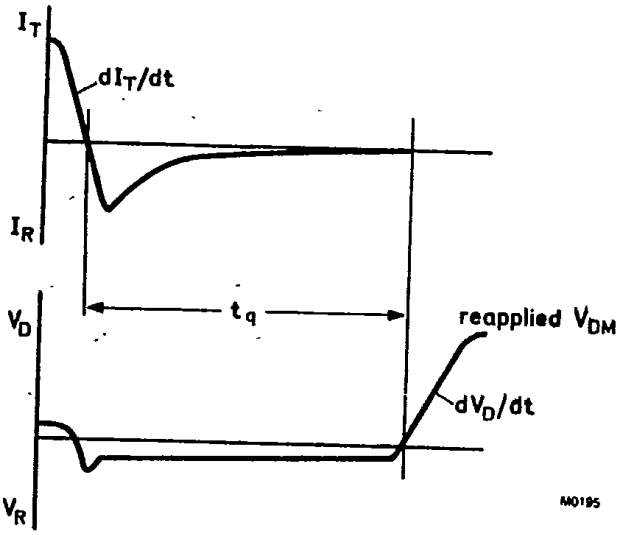


Fig.2 Circuit-commutated turn-off time definition.

*Measured under pulse conditions to avoid excessive dissipation.

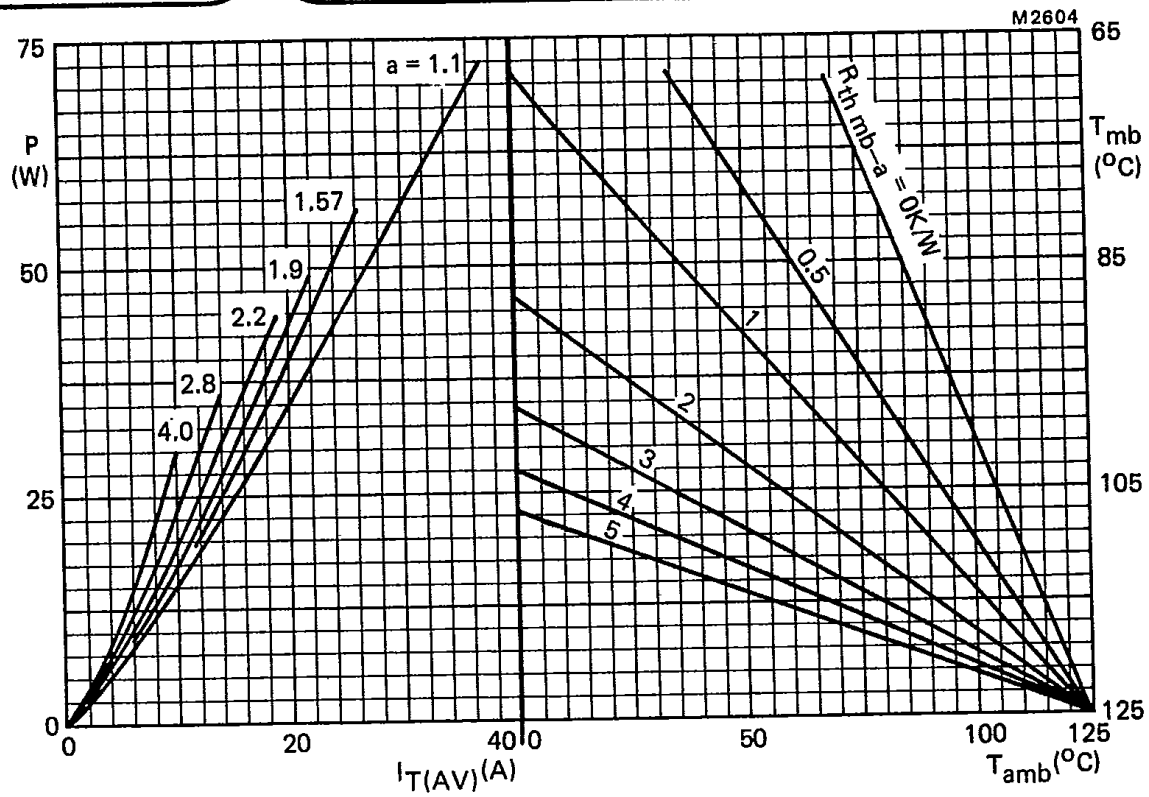


Fig.3 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.

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

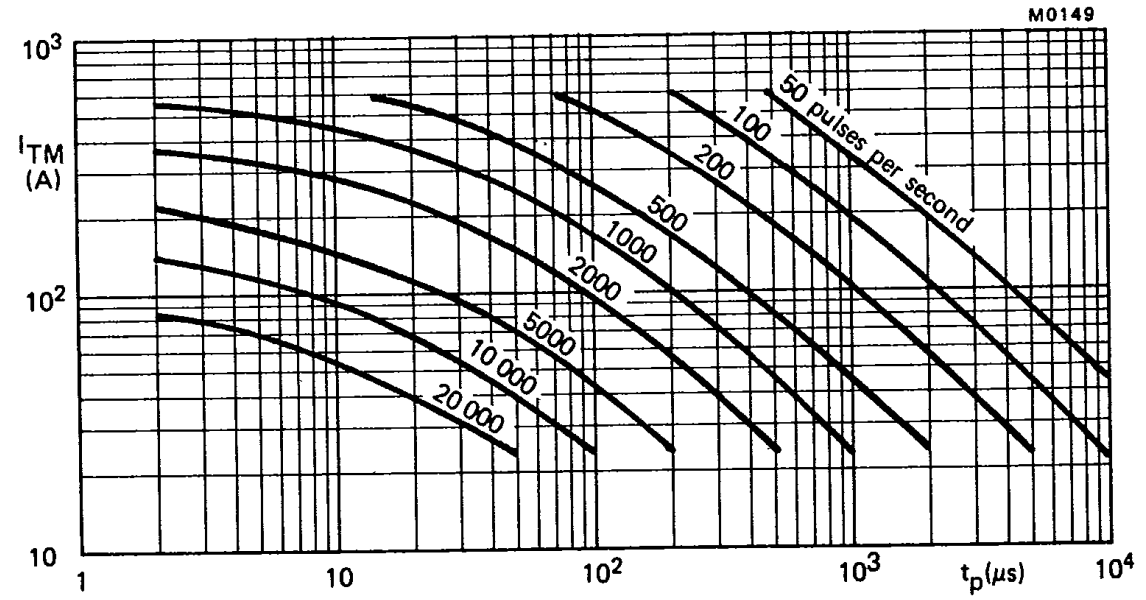


Fig.4 Maximum allowable peak on-state current versus pulse width; T_{mb} = 85 °C.

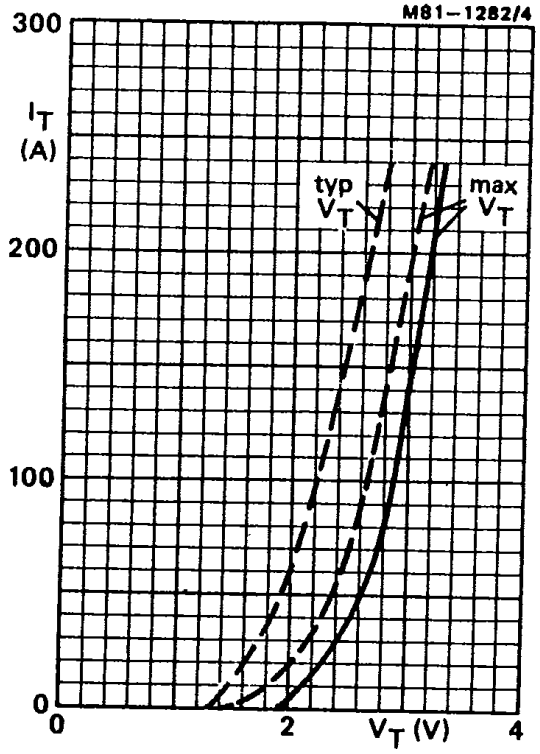


Fig.5 —— T_j = 25 °C; – – – T_j = 125 °C; t_p = 200 μs.

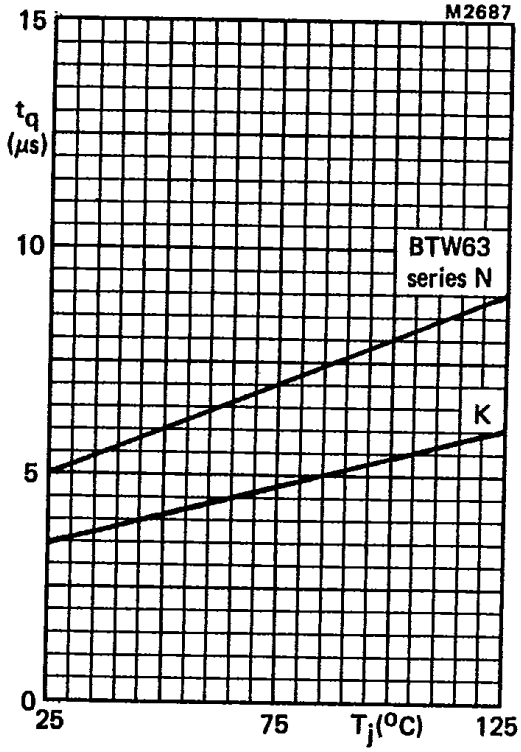


Fig.6a Variation of t_q with T_j; $-dI_T/dt$ = 50 A/μs; dV_D/dt = 500 V/μs (linear to V_{DRMmax}); I_T = 100 A; t_p = 150 μs; R_{GK} = 10 Ω; V_G = 0; maximum values.

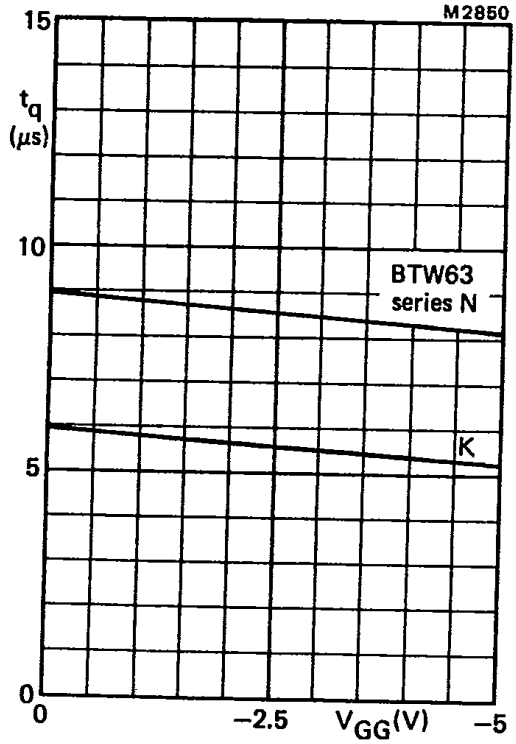


Fig.6b Variation of t_q with negative bias; $-dI_T/dt$ = 50 A/μs; dV_D/dt = 500 V/μs (linear to V_{DRMmax}); I_T = 100 A; t_p = 150 μs; T_j = 125 °C; maximum values.

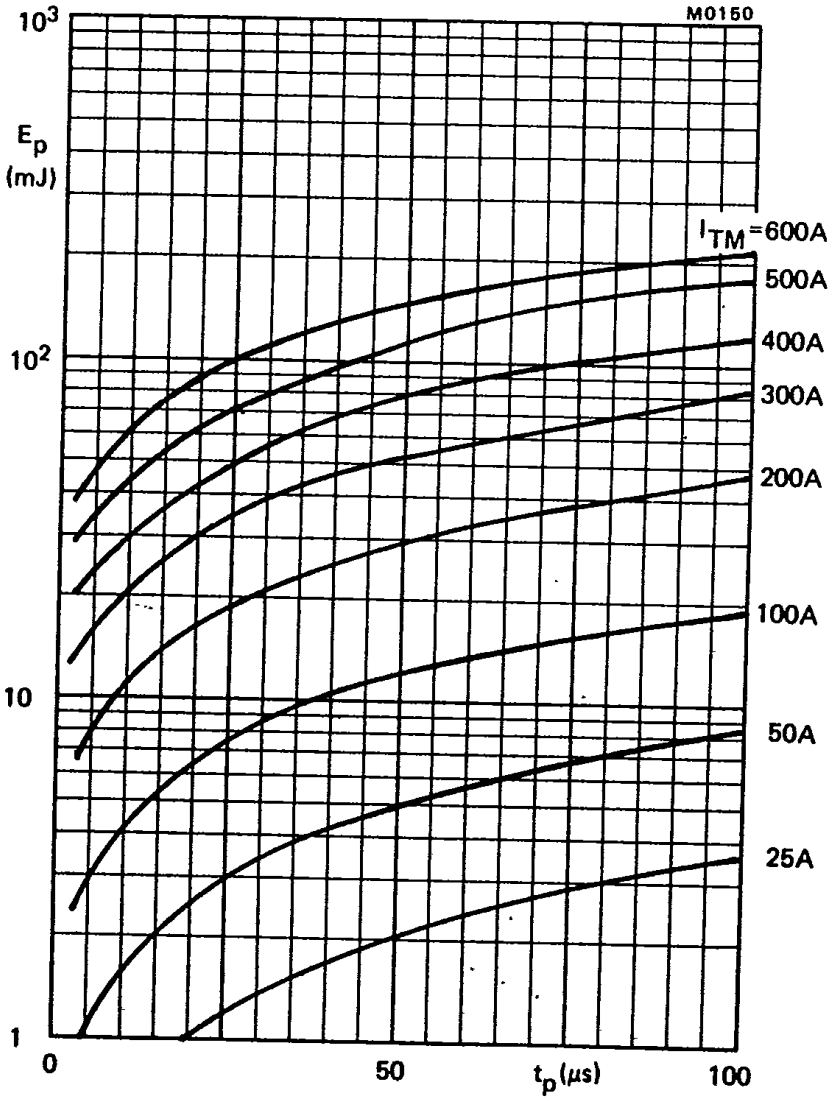


Fig.7 Maximum total energy loss per pulse when switching a half-sinusoidal pulse from 600 V.
Device power (W) = Energy per pulse (J) x No. of pulses per second.
For pulse widths > 100 μs use Fig.3.

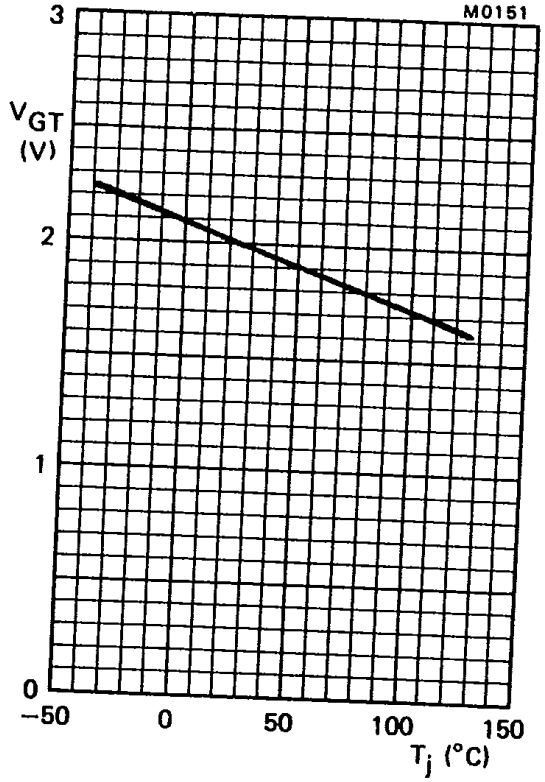


Fig.8 Minimum gate voltage that will trigger all devices plotted against junction temperature.

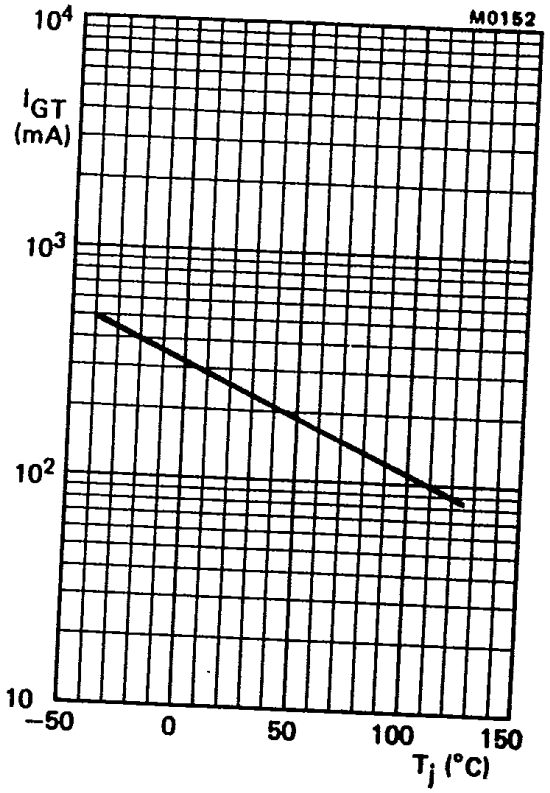


Fig.9 Minimum gate current that will trigger all devices plotted against junction temperature.