TRIACS

Also available to BS9343-F001

Silicon triacs in metal envelopes, intended for industrial a.c. power control and are particularly suitable for static switching of 3-phase induction motors. They may also be used for furnace control, lighting control and other static switching applications up to an r.m.s. on-state current of 15 A.

Two grades of commutation performance are available, 10 V/μs at 5 A/ms (suffix G) and 10 V/μs at 12 A/ms (suffix H).

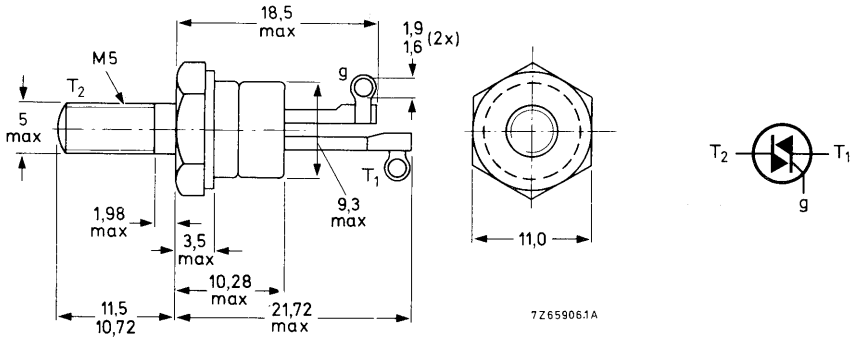
QUICK REFERENCE DATA

		BTW43–	600	800	1000	1200	
Repetitive peak off-state voltage	V_{DRM}	max.	600	800	1000	1200	V
R.M.S. on-state current			$I_{T(RMS)}$		max.	15	A
Non-repetitive peak on-state current			I_{TSM}		max.	120	A
Rate of rise of commutating voltage that will not trigger any device (see page 3)			dV_{com}/dt		<	10	V/μs

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-64: with metric M5 stud (ϕ 5 mm).



Net mass: 7 g
Diameter of clearance hole: max. 5,2 mm
Accessories supplied on request: 56295
(PTFE bush, 2 mica washers, plain washer, tag)

Supplied with the device: 1 nut, 1 lock washer
Nut dimensions across the flats: 8,0 mm

Torque on nut: min. 0,9 Nm
(9 kg cm)
max. 1,7 Nm
(17 kg cm)

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages (in either direction)*

			BTW43–	600	800	1000	1200	
Non-repetitive peak off-state voltage ($t \leqslant 10$ ms)	V_{DSM}	max.		600	800	1000	1200	V
Repetitive peak off-state voltage	V_{DRM}	max.		600	800	1000	1200	V
Crest working off-state voltage	V_{DWM}	max.		400	600	700	800	V

Currents (in either direction)

R.M.S. on-state current (conduction angle 360°)				
up to T_{mb} = 75 °C	$I_{T(RMS)}$	max.	15	A
at T_{mb} = 85 °C	$I_{T(RMS)}$	max.	12	A
Average on-state current for half-cycle operation (averaged over any 20 ms period)				
up to T_{mb} = 35 °C	$I_{T(AV)}$	max.	9,5	A
at T_{mb} = 85 °C	$I_{T(AV)}$	max.	5,5	A
Repetitive peak on-state current	I_{TRM}	max.	50	A
Non-repetitive peak on-state current T_j = 125 °C prior to surge; t = 20 ms; full sine-wave	I_{TSM}	max.	120	A
I^2t for fusing (t = 10 ms)	I^2t	max.	72	A^2s
Rate of rise of on-state current after triggering with I_G = 0,5 A to I_T = 25 A; dI_G/dt = 0,5 A/μs	dI_T/dt	max.	50	A/μs

Gate to terminal 1

Power dissipation

Average power dissipation (averaged over any 20 ms period)	$P_{G(AV)}$	max.	1	W
Peak power dissipation	P_{GM}	max.	10	W

Temperatures

Storage temperature	T_{stg}	– 55 to + 125		°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to mounting base				
full-cycle operation	$R_{th\ j\text{-}mb}$	=	2,0	°C/W
half-cycle operation	$R_{th\ j\text{-}mb}$	=	4,0	°C/W
From mounting base to heatsink with heatsink compound	$R_{th\ mb\text{-}h}$	=	0,5	°C/W
Transient thermal impedance; t = 1 ms	$Z_{th\ j\text{-}mb}$	=	0,2	°C/W

* To ensure thermal stability: $R_{th\ j\text{-}a} < 6$ °C/W (full-cycle or half-cycle operation). For smaller heatsinks $T_{j\ max}$ should be derated (see Figs 2 and 3).

CHARACTERISTICS

Polarities positive or negative, are identified with respect to T_1.

Voltages (in either direction)

On-state voltage
I_T = 20 A; T_j = 25 °C — V_T < 2,2 V*

Rate of rise of off-state voltage that will not trigger any device; exponential method; V_D = 2/3 V_{DRMmax}; T_j = 125 °C — dV_D/dt < 200 V/μs

Rate of rise of commutating voltage that will not trigger any device; $I_{T(RMS)}$ = 12 A; V_D = V_{DWMmax}; T_{mb} = 85 °C

	dV_{com}/dt (V/μs)	$-dI_T/dt$ (A/ms)
BTW43-600G to 1200G	< 10	5
BTW43-600H to 1200H	< 10	12

Currents (in either direction)

Off-state current
V_D = V_{DWMmax}; T_j = 125 °C — I_D < 5 mA

		T_2 pos.	T_2 neg.
Latching current; T_j = 25 °C			
G positive	I_L	< 200	200 mA
G negative	I_L	< 200	200 mA
Holding current; T_j = 25 °C			
G positive or negative	I_H	< 100	100 mA

Gate to terminal 1

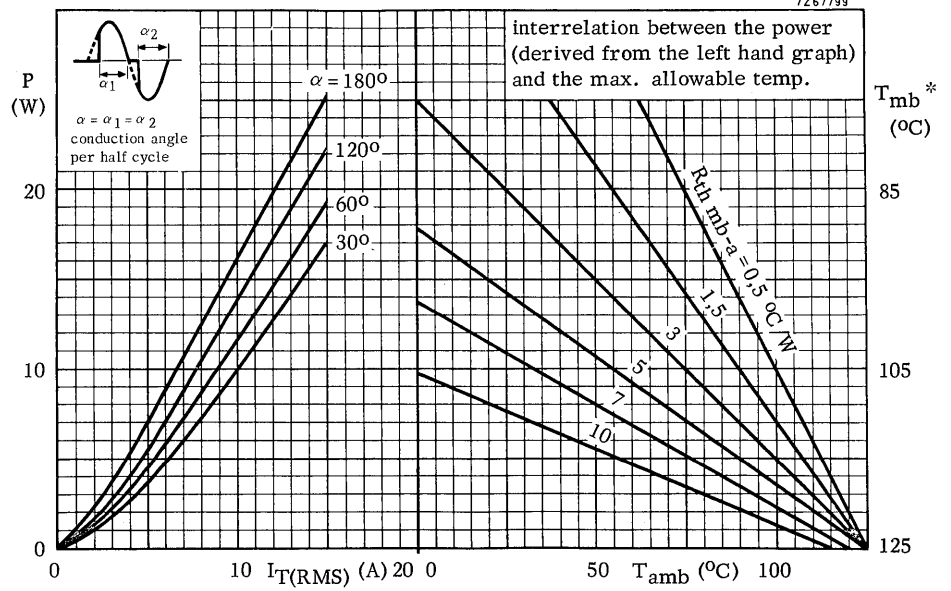
Voltage and current that will trigger all devices
V_D = 12 V; T_j = 25 °C

G positive	V_{GT}	> 2,5	5,0 V
	I_{GT}	> 100	200 mA
G negative	$-V_{GT}$	> 2,5	2,5 V
	$-I_{GT}$	> 100	100 mA

Voltage that will not trigger any device
V_D = V_{DRMmax}; T_j = 125 °C; G positive or negative — V_{GD} < 0,2 — 0,2 V

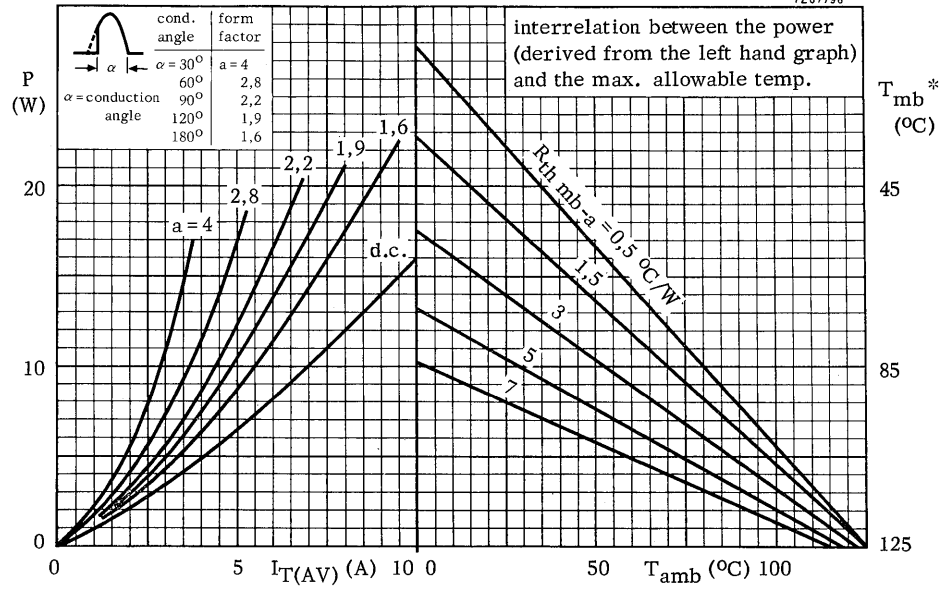
* Measured under pulse conditions to avoid excessive dissipation.

Fig. 2. FULL CYCLE OPERATION



* T_{mb}-scale is for comparison purposes only and is correct only for $R_{th\ mb\text{-}a} \leqslant 4$ °C/W.

Fig. 3. HALF-CYCLE OPERATION



* T_{mb}-scale is for comparison purposes only and is correct only for $R_{th\ mb\text{-}a} \leqslant 2$ °C/W.

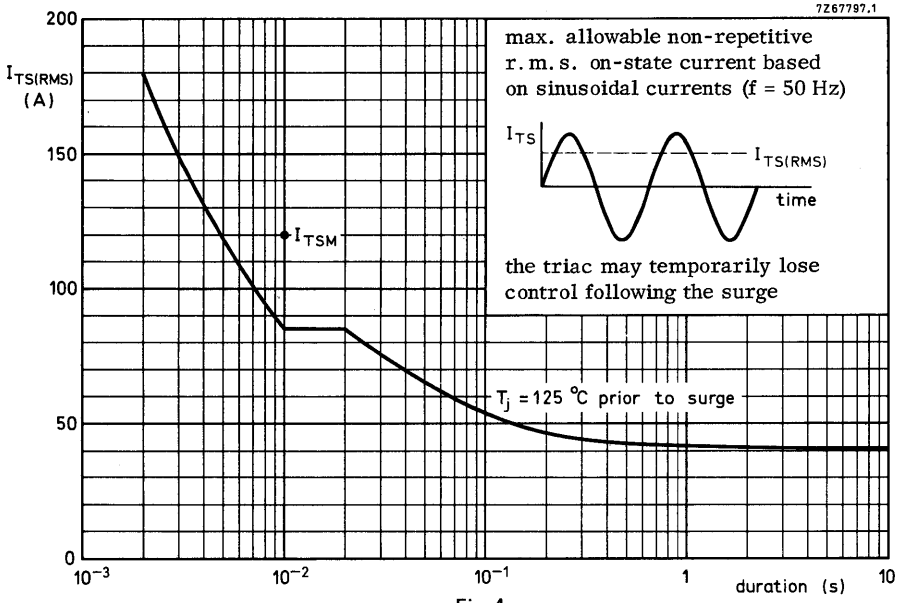

7Z67797.1
200
150
100
50
0
$I_{TS(RMS)}$ (A)
I_{TSM}
10^{-3}
10^{-2}
10^{-1}
1
10
duration (s)
max. allowable non-repetitive r.m.s. on-state current based on sinusoidal currents (f = 50 Hz)
I_{TS}
$I_{TS(RMS)}$
time
the triac may temporarily lose control following the surge
T_j = 125 °C prior to surge

Fig. 4.

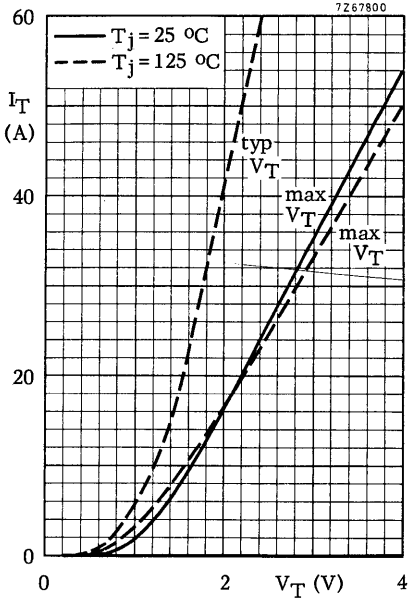

7Z67800
T_j = 25 °C
T_j = 125 °C
60
40
20
0
I_T (A)
typ V_T
max V_T
max V_T
0
2
4
V_T (V)

Fig. 5.

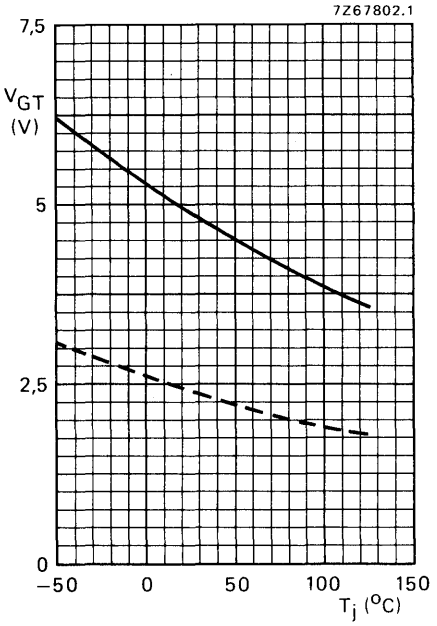


Fig. 6 Minimum gate voltage that will trigger all devices as a function of T_j.

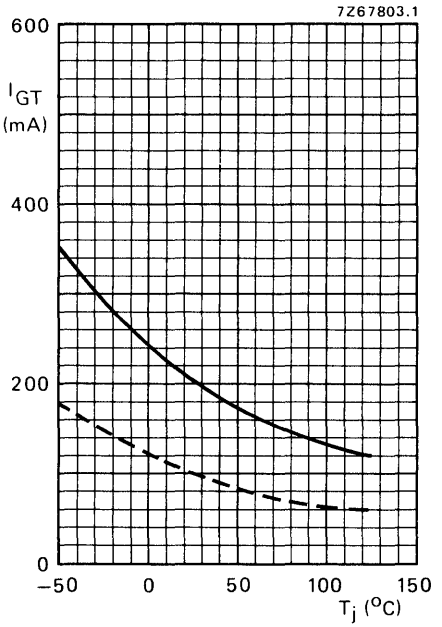


Fig. 7 Minimum gate current that will trigger all devices as a function of T_j.

Conditions for Figs 6 and 7:

——— T_2 negative, gate positive with respect to T_1
– – – – all other conditions

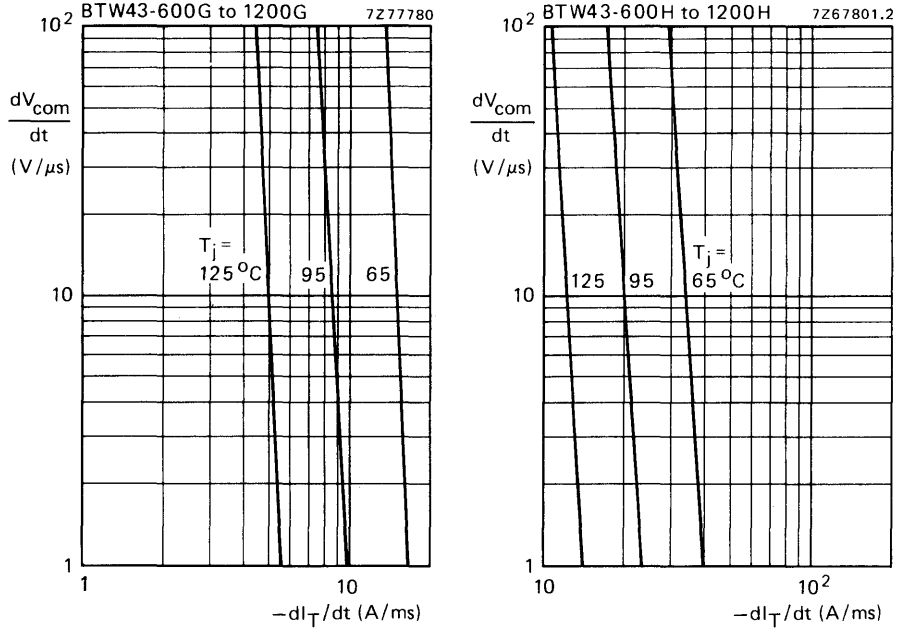


Fig. 8 Maximum rate of rise of commutating voltage that will not trigger any device as a function of rate of fall of on-state current; $I_{T(RMS)}$ = 12 A; $V_D = V_{DWMmax}$.

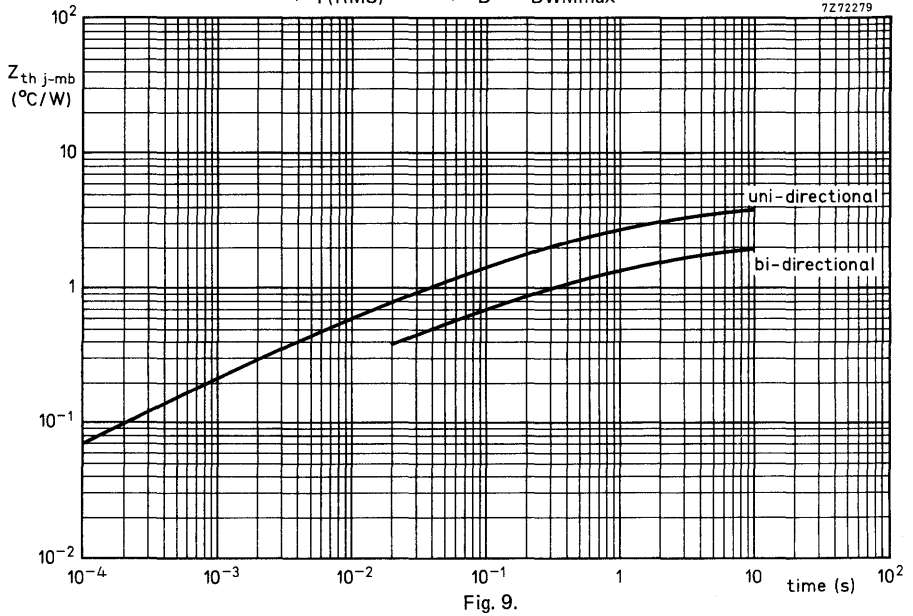


Fig. 9.

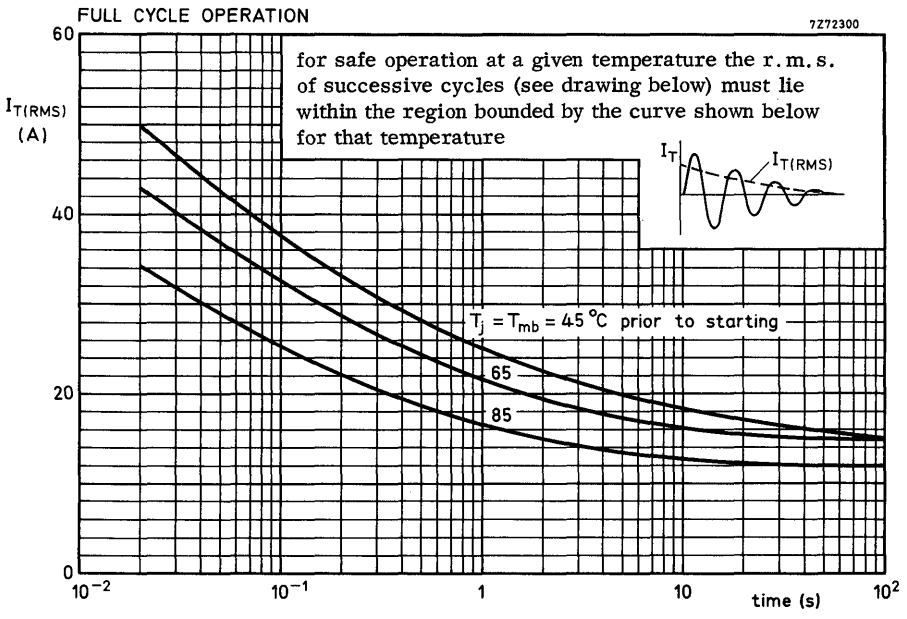

FULL CYCLE OPERATION
7Z72300
for safe operation at a given temperature the r.m.s. of successive cycles (see drawing below) must lie within the region bounded by the curve shown below for that temperature
I_T
$I_{T(RMS)}$
$I_{T(RMS)}$ (A)
60
40
20
0
$T_j = T_{mb} = 45\,°C$ prior to starting
65
85
10^{-2}
10^{-1}
1
10
10^2
time (s)

Fig. 10.

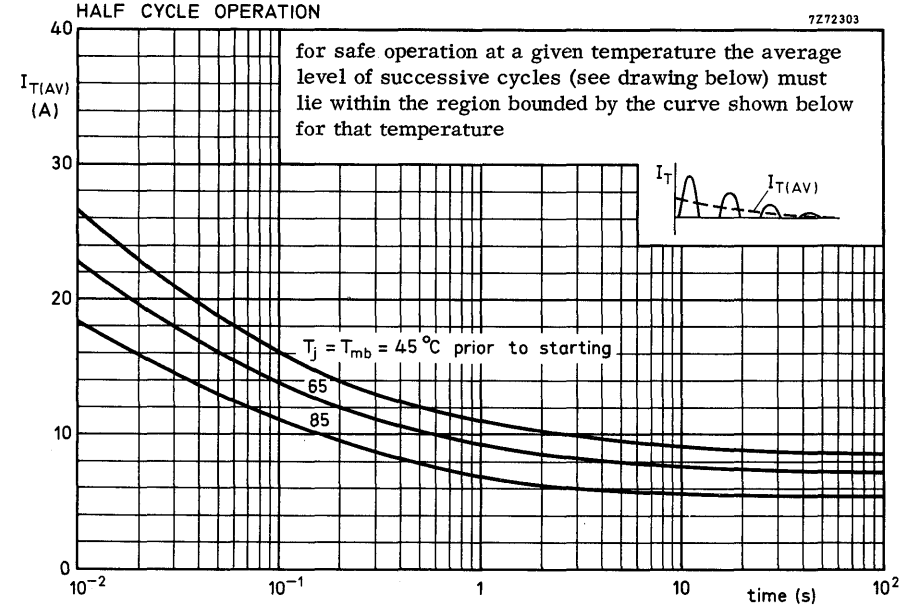

HALF CYCLE OPERATION
7Z72303
for safe operation at a given temperature the average level of successive cycles (see drawing below) must lie within the region bounded by the curve shown below for that temperature
I_T
$I_{T(AV)}$
$I_{T(AV)}$ (A)
40
30
20
10
0
$T_j = T_{mb} = 45\,°C$ prior to starting
65
85
10^{-2}
10^{-1}
1
10
10^2
time (s)

Fig. 11.