FULL-PACK TRIACS

Glass-passivated 8 ampere triacs in SOT-186 envelopes, which feature an electrically isolated seating plane. They are intended for use in applications requiring high bidirectional transient and blocking voltage capability. These triacs feature a high surge current capability and a range of gate current sensitivities between 5 and 50 mA. Typical applications include AC power control circuits such as motor, industrial lighting, industrial and domestic heating control and static switching systems.

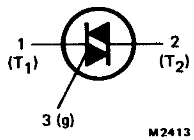
QUICK REFERENCE DATA

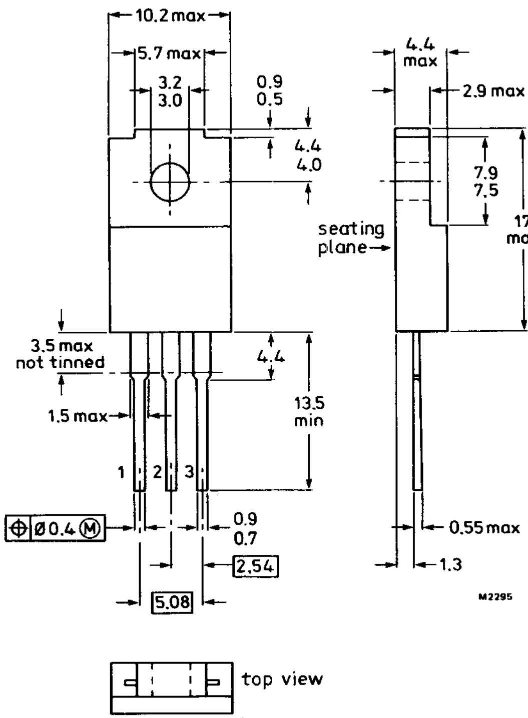
			BT137F−500	600	800	
Repetitive peak off-state voltage	V_{DRM}	max.	500	600	800	V
R.M.S. on-state current	$I_{T(RMS)}$	max.		8		A
Non-repetitive peak on-state current	I_{TSM}	max.		55		A

MECHANICAL DATA

Dimensions in mm

Fig.1 SOT-186





Net mass: 2 g.
The seating plane is electrically isolated from all terminals.
Accessories supplied on request (see data sheets Mounting instructions for F-pack devices and Accessories for SOT-186 envelopes).

blue binder, tab 10

RATINGS

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

Voltages (in either direction)

			BT137F–500	600	800	
Non-repetitive peak off-state voltage † (t ≤ 10 ms)	V_{DSM}	max.	500*	600*	800	V
Repetitive peak off-state voltage (δ ≤ 0.01) †	V_{DRM}	max.	500	600	800	V
Crest working off-state voltage	V_{DWM}	max.	400	400	400	V

Currents (in either direction)

R.M.S. on-state current (conduction angle 360°) up to T_h = 71 °C	$I_{T(RMS)}$	max.	8	A
Repetitive peak on-state current	I_{TRM}	max.	55	A
Non-repetitive peak on-state current; T_j = 120 °C prior to surge; t = 20 ms; full sine-wave	I_{TSM}	max.	55	A
I^2t for fusing (t = 10 ms)	I^2t	max.	15	A^2s
Rate of rise of on-state current after triggering with I_G = 200 mA to I_T = 12 A; dI_G/dt = 0.2 A/μs	dI_T/dt	max.	20	A/μs

Gate to terminal 1

POWER DISSIPATION

Average power dissipation (averaged over any 20 ms period)	$P_{G(AV)}$	max.	0.5	W
Peak power dissipation	P_{GM}	max.	5	W

Temperatures

Storage temperature	T_{stg}		–40 to +125	°C
Operating junction temperature				
full-cycle operation	T_j	max.	120	°C
half-cycle operation	T_j	max.	110	°C

ISOLATION

From all three terminals to external heatsink (peak)**	$V_{(isol)M}$	min.	1500	V
Capacitance from T_2 to external heatsink	$C_{(isol)}$	typ.	12	pF

† For BT137F–500D/600D use $R_{(G-T_1)}$ = 1kΩ.

* Although not recommended, off-state voltages up to 800 V may be applied without damage, but the triac may switch into the on-state. The rate of rise of on-state current should not exceed 6 A/μs.

** Measured with relative humidity <65% under clean and dust-free conditions.

THERMAL RESISTANCE

1. Heatsink mounted with clip (see mounting instructions)

Thermal resistance from junction to external heatsink

With heatsink compound	$R_{th\ j\text{-}h}$	=	4.5	K/W
Without heatsink compound	$R_{th\ j\text{-}h}$	=	6.5	K/W

2. Free-air operation

The quoted values of $R_{th\ j\text{-}a}$ should be used only when no leads of other dissipating components run to the same tie-point.

Thermal resistance from junction to ambient in free air: mounted on a printed-circuit board at any lead length	$R_{th\ j\text{-}a}$	=	55	K/W

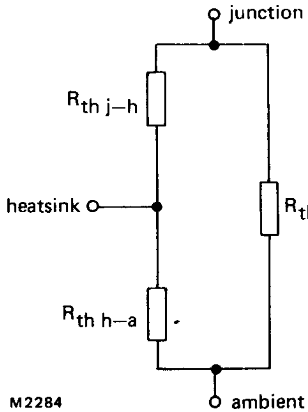


Fig.2 Components of thermal resistance.

CHARACTERISTICS (T_j = 25 °C unless otherwise stated)

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

Voltages and currents (in either direction)

On-state voltage (measured under pulse conditions to prevent excessive dissipation)				
I_T = 10 A	V_T	<	1.65	V
Rate of rise of off-state voltage that will not trigger any device; T_j = 120 °C; gate open circuit				
BT137F series	dV_D/dt	<	100	V/μs
BT137F series G	dV_D/dt	<	200	V/μs
BT137F series F	dV_D/dt	<	50	V/μs
BT137F series E	dV_D/dt	typ.	50	V/μs
→ BT137F–500D/600D ($R_{(G-T_1)}$ = 1kΩ)	dV_D/dt	typ.	5	V/μs
Rate of change of commutating voltage that will not trigger any device when $-dI_{com}/dt$ = 3.6 A/ms; $I_{T(RMS)}$ = 8 A; T_h = 54 °C; gate open circuit; $V_D = V_{DWMmax}$				
BT137F series	dV_{com}/dt	typ.	10	V/μs
BT137F series G	dV_{com}/dt	<	10	V/μs
BT137F series F	dV_{com}/dt	typ.	10	V/μs
Off-state current				
$V_D = V_{DWMmax}$; T_j = 120 °C	I_D	<	0.5	mA
Gate voltage that will trigger all devices	V_{GT}	>	1.5	V
Gate voltage that will not trigger any device $V_D = V_{DWMmax}$; T_j = 120 °C; T_2 and G positive or negative	V_{GD}	<	250	mV

Gate current that will trigger all devices (I_{GT}); G to T_1

Holding current (I_H)

Latching current (I_L); V_D = 12 V

			T_2+ G+	T_2+ G–	T_2– G–	T_2– G+	
BT137F series	I_{GT}	>	35	35	35	70	mA
	I_H	<	20	20	20	20	mA
	I_L	<	30	45	30	45	mA
BT137F series G	I_{GT}	>	50	50	50	100	mA
	I_H	<	40	40	40	40	mA
	I_L	<	45	60	45	60	mA
BT137F series F	I_{GT}	>	25	25	25	70	mA
	I_H	<	20	20	20	20	mA
	I_L	<	30	45	30	45	mA
BT137F series E	I_{GT}	>	10	10	10	25	mA
	I_H	<	20	20	20	20	mA
	I_L	<	25	35	25	35	mA
→ BT137F–500D/600D	I_{GT}	>	5	5	5	10	mA
	I_H	<	15	15	15	15	mA
	I_L	<	15	20	15	20	mA

MOUNTING INSTRUCTIONS

1. The triac may be soldered directly into the circuit, but the maximum permissible temperature of the soldering iron or bath is 275 °C; it must not be in contact with the joint for more than 5 seconds. Soldered joints must be at least 4.7 mm from the seal.
2. The leads should not be bent less than 2.4 mm from the seal, and should be supported during bending. The leads can be bent, twisted or straightened by 90° maximum. The minimum bending radius is 1 mm.
3. Mounting by means of a spring clip is the best mounting method because it offers good thermal contact under the crystal area and slightly lower $R_{th\ j\text{-}h}$ values than screw mounting. However, if a screw is used, it should be M3 cross-recess pan-head. Care should be taken to avoid damage to the plastic body.
4. For good thermal contact heatsink compound should be used between seating plane and heatsink. Values of $R_{th\ j\text{-}h}$ given for mounting with heatsink compound refer to the use of a metallic-oxide loaded compound. Ordinary silicone grease is not recommended.
5. Rivet mounting is not recommended.
6. The heatsink must have a flatness in the mounting area of 0.02 mm maximum per 10 mm. Mounting holes must be deburred.

FULL-WAVE CONDUCTION (with heatsink compound)

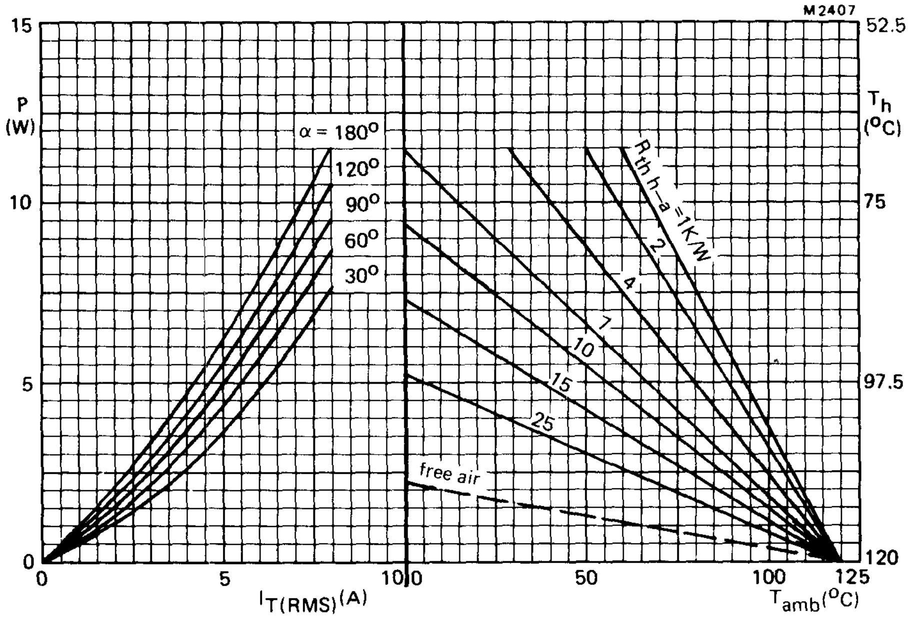
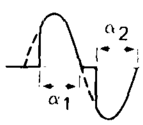


Fig.3 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.



$\alpha = \alpha_1 = \alpha_2$: conduction angle per half cycle

OPERATING NOTES

Dissipation and heatsink considerations:

a. The method of using Figs.3 and 4 is as follows:

Starting with the required current on the $I_{T(AV)}$ or $I_{T(RMS)}$ axis, trace upwards to meet the appropriate form factor or conduction angle curve. Trace horizontally and upwards from the appropriate value on the T_{amb} scale. The intersection determines the $R_{th\ mb\ a}$. The heatsink thermal resistance value ($R_{th\ h\text{-}a}$) can now be calculated from:

$R_{th\ h\text{-}a} = R_{th\ mb\text{-}a} - R_{th\ mb\text{-}h}$.

b. Any measurement of heatsink temperature should be made immediately adjacent to the device.

FULL-WAVE CONDUCTION (without heatsink compound)

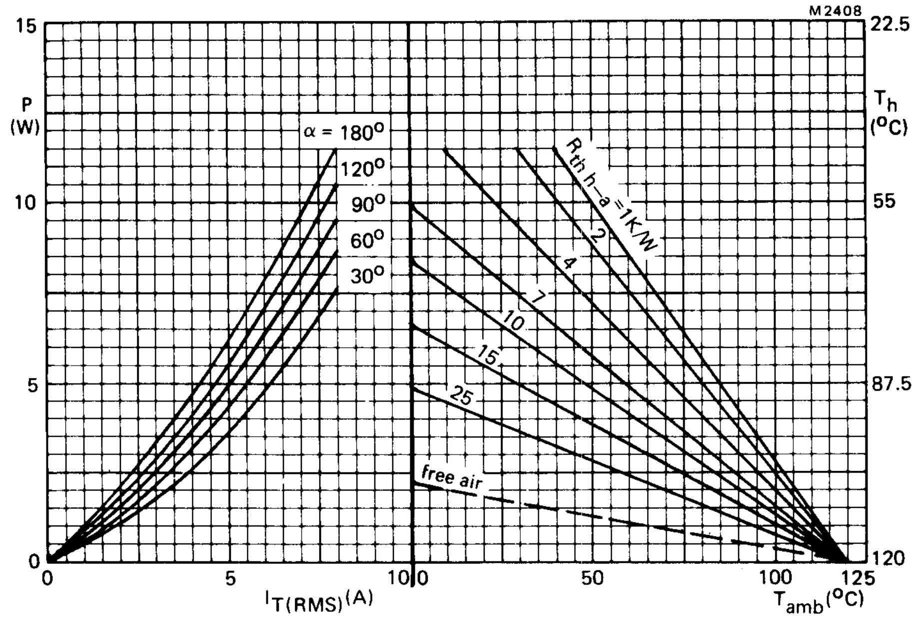
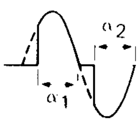


Fig.4 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.



$\alpha = \alpha_1 = \alpha_2$: conduction angle per half cycle

OVERLOAD OPERATION

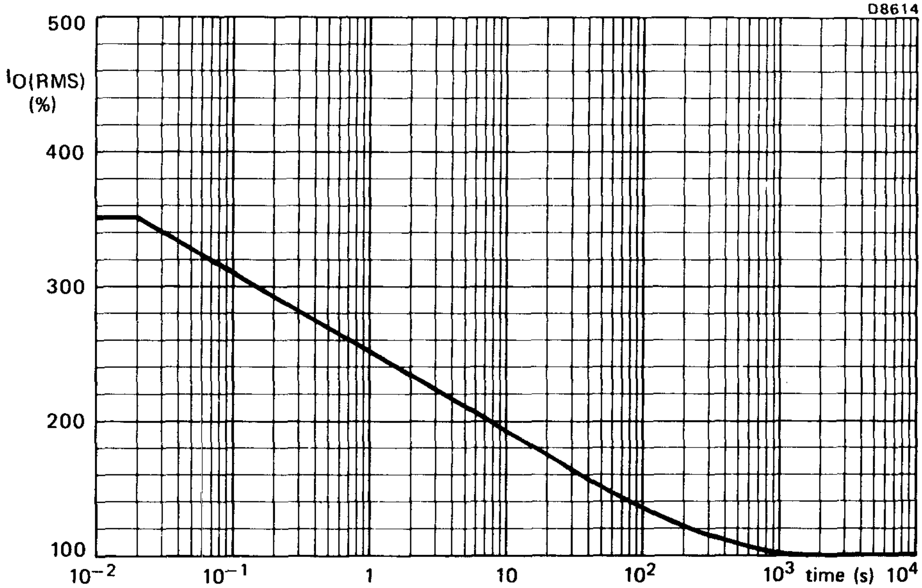


Fig.5 Maximum permissible duration of steady overload (provided that T_h does not exceed 120 °C during and after overload) expressed as a percentage of the steady state r.m.s. rated current. For high r.m.s. overload currents precautions should be taken so that the temperature of the terminals does not exceed 125 °C. During these overload conditions the triac may lose control. Therefore the overload should be terminated by a separate protection device.

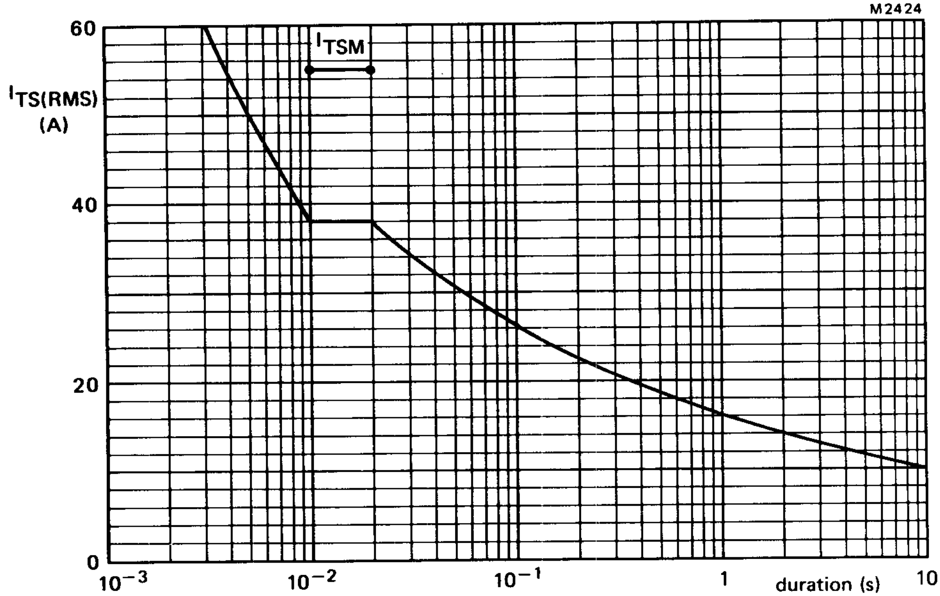
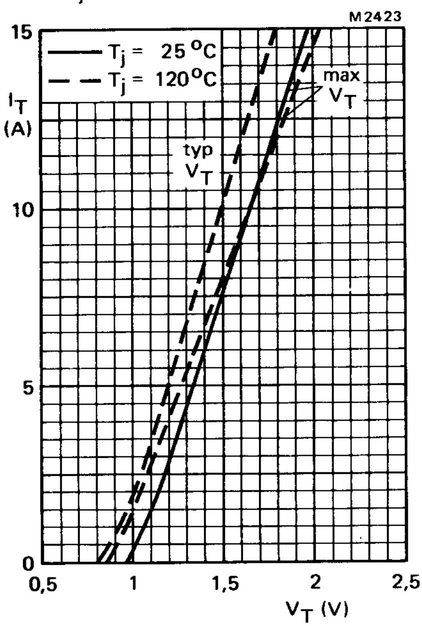


Fig.6 Maximum permissible non-repetitive r.m.s. on-state current based on sinusoidal currents (f = 50 Hz); T_j = 120 °C prior to surge. The triac may temporarily lose control following the surge.



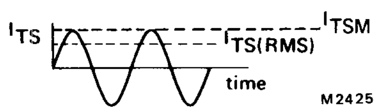


Fig.7 On-state voltage drop (V_T) versus on-state current (I_T) .

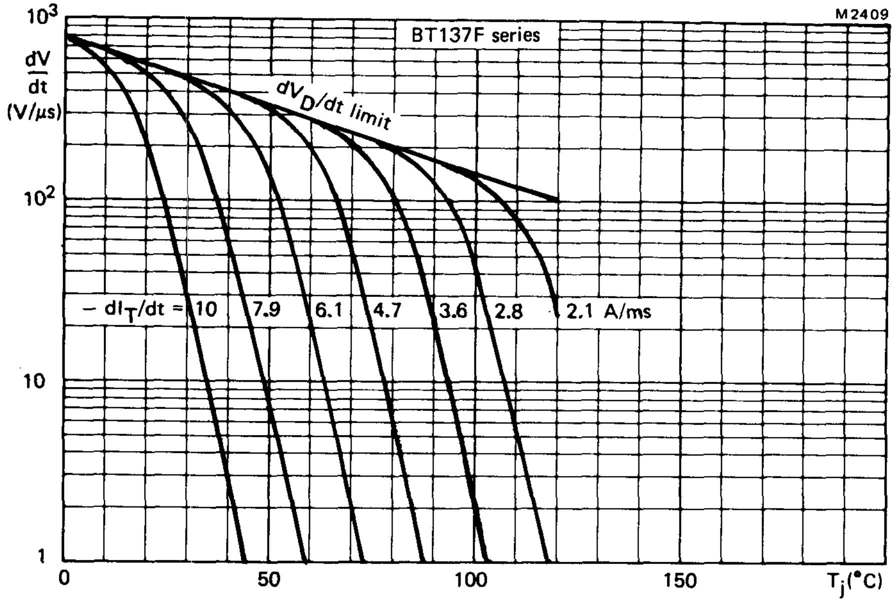


Fig.8 Typical commutation dV/dt for BT137F series versus T_j. The triac should commutate when the dV/dt is below the value on the appropriate curve for pre-commutation dI_T/dt.

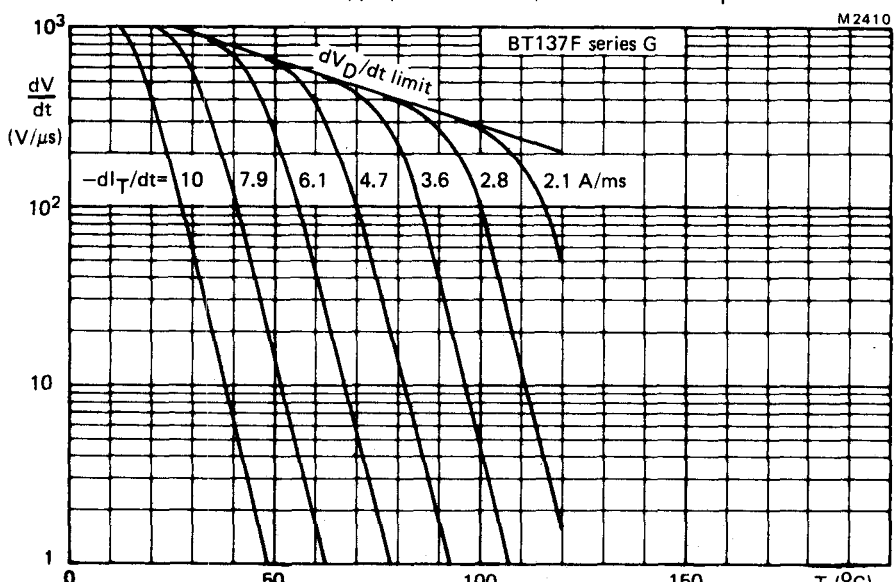


Fig.9 Limit commutation dV/dt for BT137F series G versus T_j. The triac should commutate when the dV/dt is below the value on the appropriate curve for pre-commutation dI_T/dt.

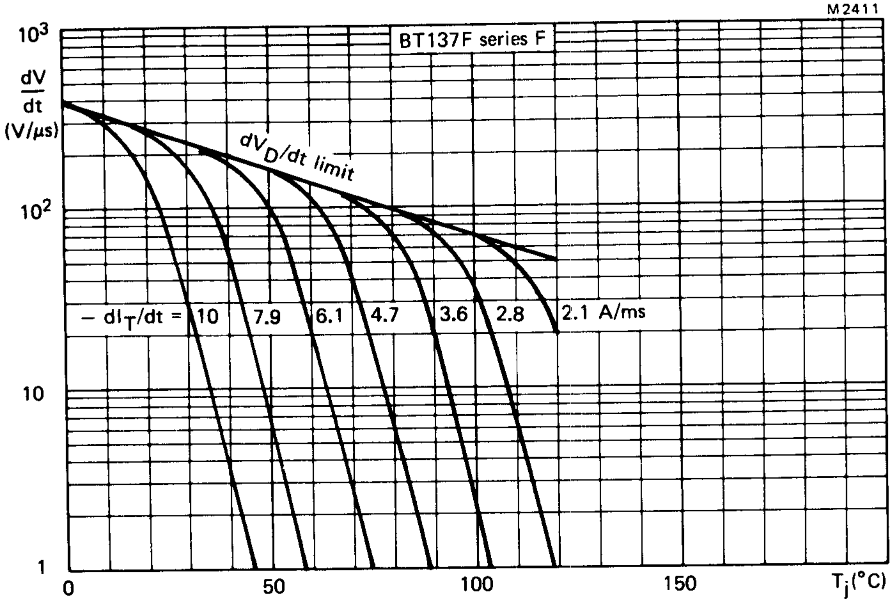


Fig.10 Typical commutation dV/dt for BT137F series F versus T_j. The triac should commutate when the dV/dt is below the value on the appropriate curve for pre-commutation dI_T/dt.

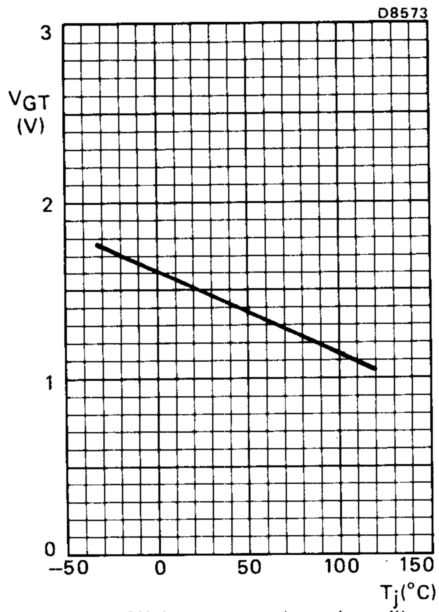


Fig.11 Minimum gate voltage that will trigger all devices; all conditions.

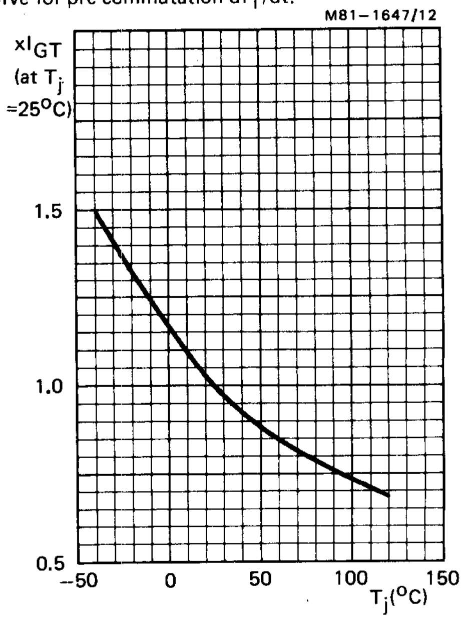


Fig.12 Normalised gate current that will trigger all devices; all conditions.

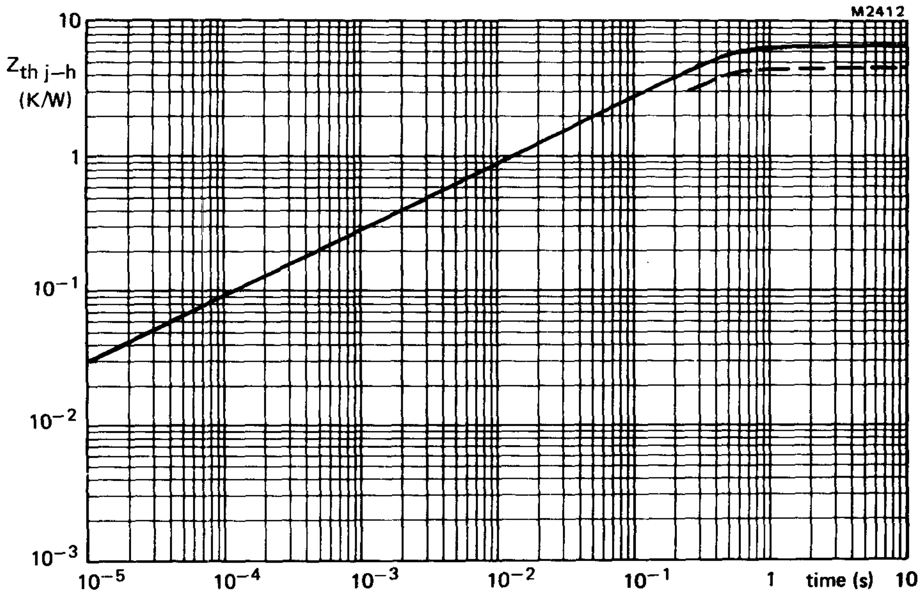


Fig.13 Transient thermal impedance, – – – with heatsink compound; —— without heatsink compound.

June 1988

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M88-1367/CP

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