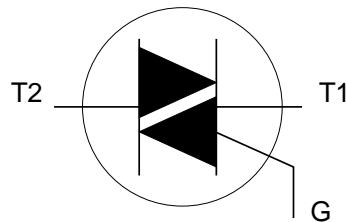


**GENERAL DESCRIPTION**

Glass passivated triacs in a plastic envelope, intended for use in applications requiring high bidirectional transient and blocking voltage capability and high thermal cycling performance. Typical applications include motor control, industrial and domestic lighting, heating and static switching.

**SYMBOL**

**TO-220AB**

**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
$V_{DRM}$	Repetitive peak off-state voltages	<b>BT138-500</b>	<b>600</b>	<b>800</b>	V
		<b>BT138-500F</b>	<b>600F</b>	<b>800F</b>	
		<b>BT138-500G</b>	<b>600G</b>	<b>800G</b>	
$I_{T(RMS)}$	RMS on-state current	12	12	12	A
$I_{TSM}$	Non-repetitive peak on-state current	95	95	95	A

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
				-500	-600	-800	
$V_{DRM}$	Repetitive peak off-state voltages		-	500 <sup>1</sup>	600 <sup>1</sup>	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 99^\circ C$	-	12			A
$I_{TSM}$	Non-repetitive peak on-state current	full sine wave; $T_j = 25^\circ C$ prior to surge $t = 20$ ms	-	95			A
		$t = 16.7$ ms	-	105			A
$I^2t$	$I^2t$ for fusing	$t = 10$ ms	-	45			A <sup>2</sup> s
$di_T/dt$	Repetitive rate of rise of on-state current after triggering	$I_{TM} = 20$ A; $I_G = 0.2$ A; $di_G/dt = 0.2$ A/ $\mu$ s					
		T2+ G+	-	50			A/ $\mu$ s
		T2+ G-	-	50			A/ $\mu$ s
		T2- G-	-	50			A/ $\mu$ s
		T2- G+	-	10			A/ $\mu$ s
$I_{GM}$	Peak gate current		-	2			A
$V_{GM}$	Peak gate voltage		-	5			V
$P_{GM}$	Peak gate power		-	5			W
$P_{G(AV)}$	Average gate power	over any 20 ms period	-	0.5			W
$T_{stg}$	Storage temperature		-40	150			$^\circ C$
$T_j$	Operating junction temperature		-	125			$^\circ C$

<sup>1</sup> Although not recommended, off-state voltages up to 800V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 15 A/ $\mu$ s.

**THERMAL RESISTANCES**

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base	full cycle	-	-	1.5	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	half cycle in free air	-	60	2.0	K/W

**STATIC CHARACTERISTICS**
 $T_j = 25\text{ }^\circ\text{C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.			UNIT
$I_{GT}$	Gate trigger current	<b>BT138-</b> $V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	-	...	...F	...G	
		T2+ G+	-	5	35	25	50	mA
		T2+ G-	-	8	35	25	50	mA
		T2- G-	-	10	35	25	50	mA
		T2- G+	-	22	70	70	100	mA
$I_L$	Latching current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	-	-	-	-	
		T2+ G+	-	7	40	40	60	mA
		T2+ G-	-	20	60	60	90	mA
		T2- G-	-	8	40	40	60	mA
		T2- G+	-	10	60	60	90	mA
$I_H$	Holding current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	6	30	30	60	mA
$V_T$	On-state voltage	$I_T = 15\text{ A}$	-	1.4	1.65			V
$V_{GT}$	Gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	0.7	1.5			V
		$V_D = 400\text{ V}; I_T = 0.1\text{ A};$ $T_j = 125\text{ }^\circ\text{C}$	0.25	0.4	-			V
$I_D$	Off-state leakage current	$V_D = V_{DRM(max)};$ $T_j = 125\text{ }^\circ\text{C}$	-	0.1	0.5			mA

**DYNAMIC CHARACTERISTICS**
 $T_j = 25\text{ }^\circ\text{C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.			TYP.	MAX.	UNIT
$dV_D/dt$	Critical rate of rise of off-state voltage	<b>BT138-</b> $V_{DM} = 67\% V_{DRM(max)};$ $T_j = 125\text{ }^\circ\text{C};$ exponential waveform; gate open circuit	...	...F	...G	250	-	V/ $\mu\text{s}$
$dV_{com}/dt$	Critical rate of change of commutating voltage	$V_{DM} = 400\text{ V}; T_j = 95\text{ }^\circ\text{C};$ $I_{T(RMS)} = 12\text{ A};$ $dl_{com}/dt = 5.4\text{ A/ms};$ gate open circuit	-	-	10	20	-	V/ $\mu\text{s}$
$t_{gt}$	Gate controlled turn-on time	$I_{TM} = 16\text{ A}; V_D = V_{DRM(max)};$ $I_G = 0.1\text{ A}; dl_G/dt = 5\text{ A}/\mu\text{s}$	-	-	-	2	-	$\mu\text{s}$

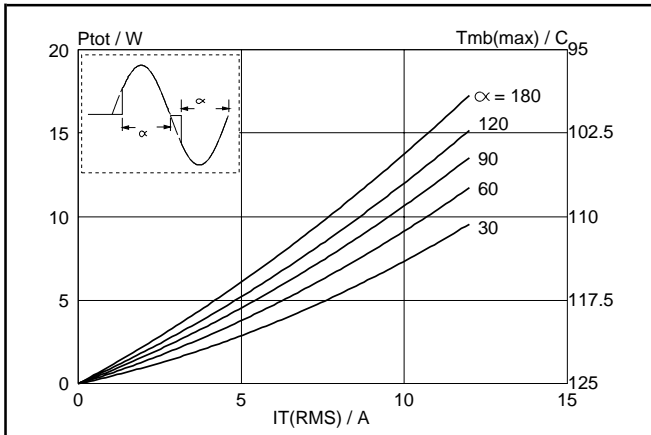


Fig. 1. Maximum on-state dissipation,  $P_{tot}$ , versus rms on-state current,  $I_{T(RMS)}$ , where  $\alpha =$  conduction angle.

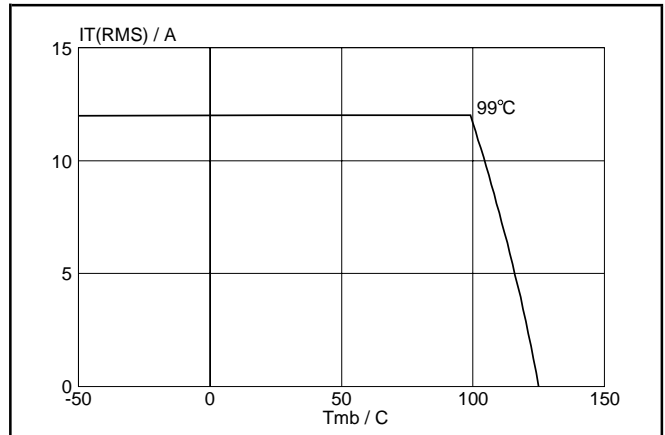


Fig. 4. Maximum permissible rms current  $I_{T(RMS)}$ , versus mounting base temperature  $T_{mb}$ .

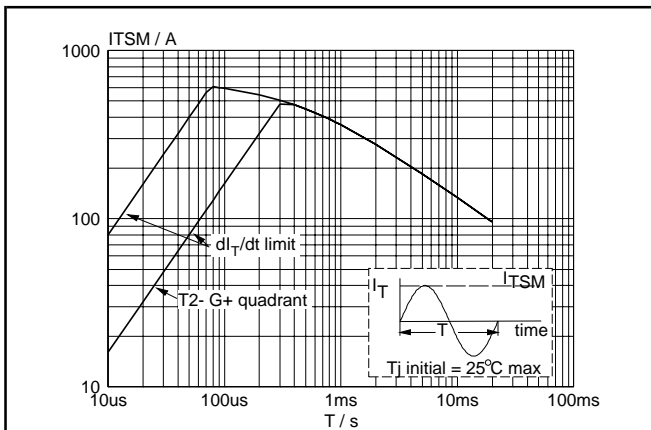


Fig. 2. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus pulse width  $t_p$ , for sinusoidal currents,  $t_p \leq 20ms$ .

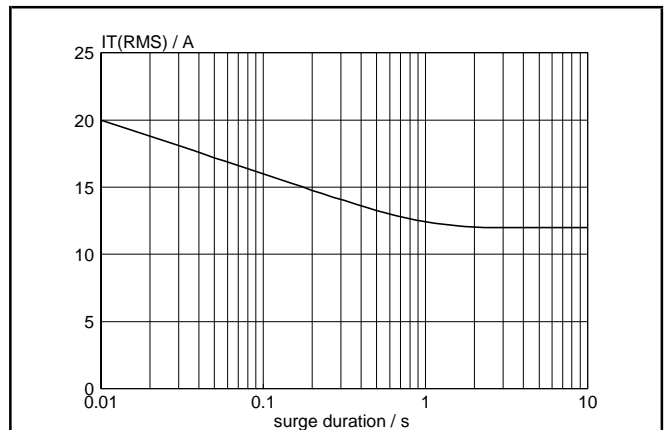


Fig. 5. Maximum permissible repetitive rms on-state current  $I_{T(RMS)}$ , versus surge duration, for sinusoidal currents,  $f = 50 Hz$ ;  $T_{mb} \leq 99^{\circ}C$ .

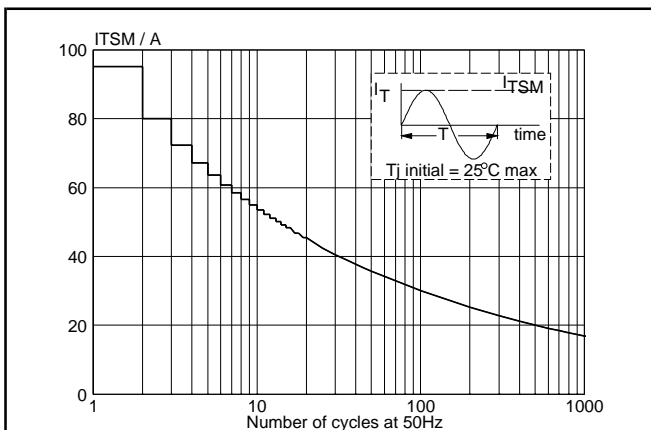


Fig. 3. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus number of cycles, for sinusoidal currents,  $f = 50 Hz$ .

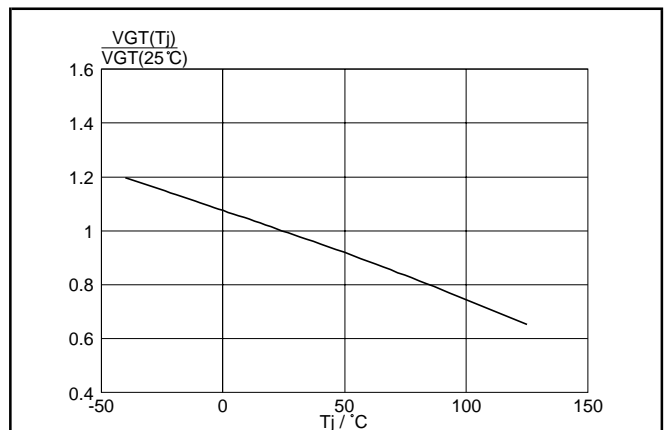
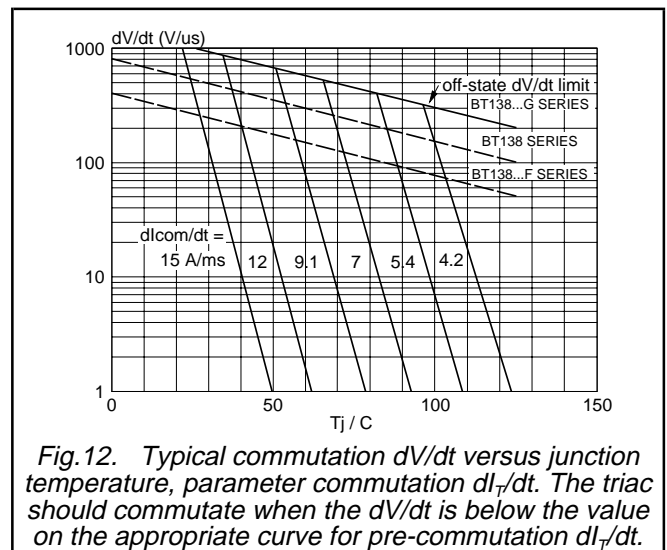
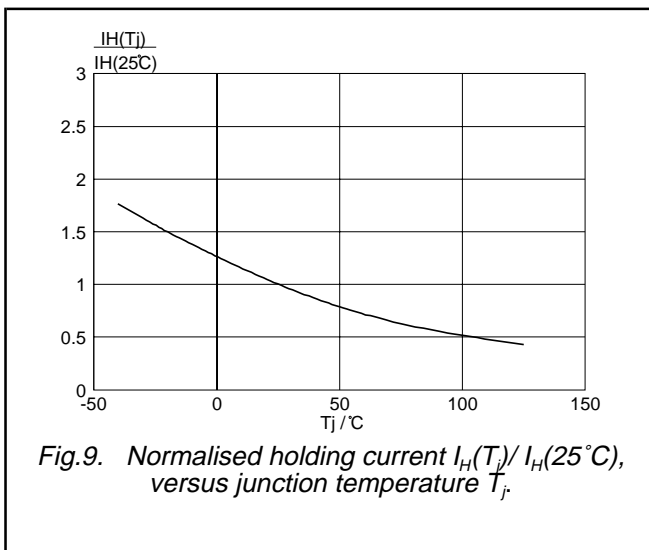
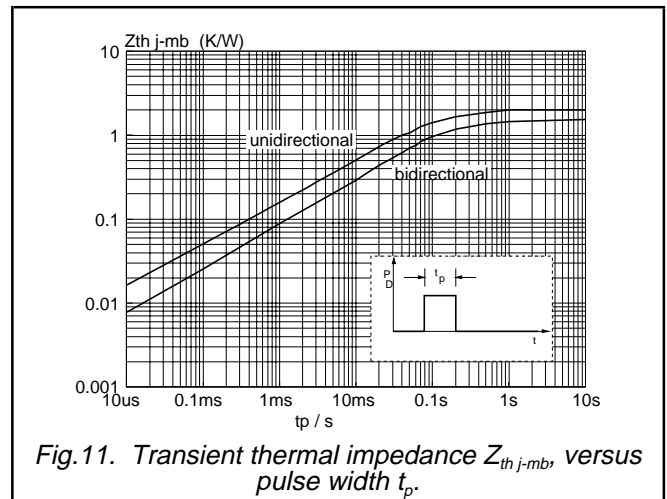
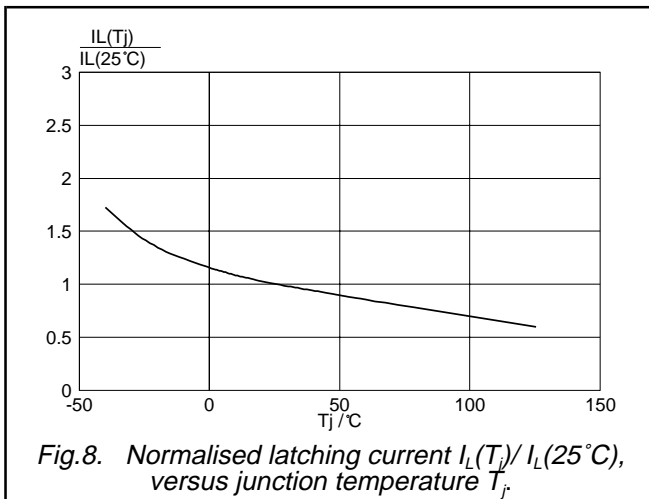
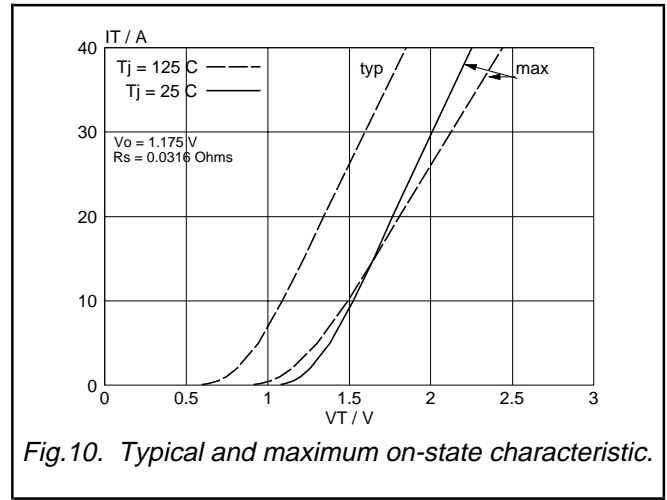
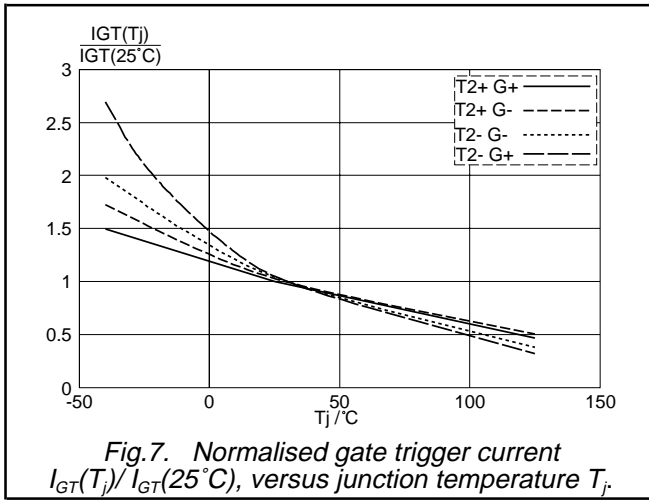


Fig. 6. Normalised gate trigger voltage  $V_{GT}(T_j) / V_{GT}(25^{\circ}C)$ , versus junction temperature  $T_j$ .



**MECHANICAL DATA**

Dimensions in mm

Net Mass: 2 g

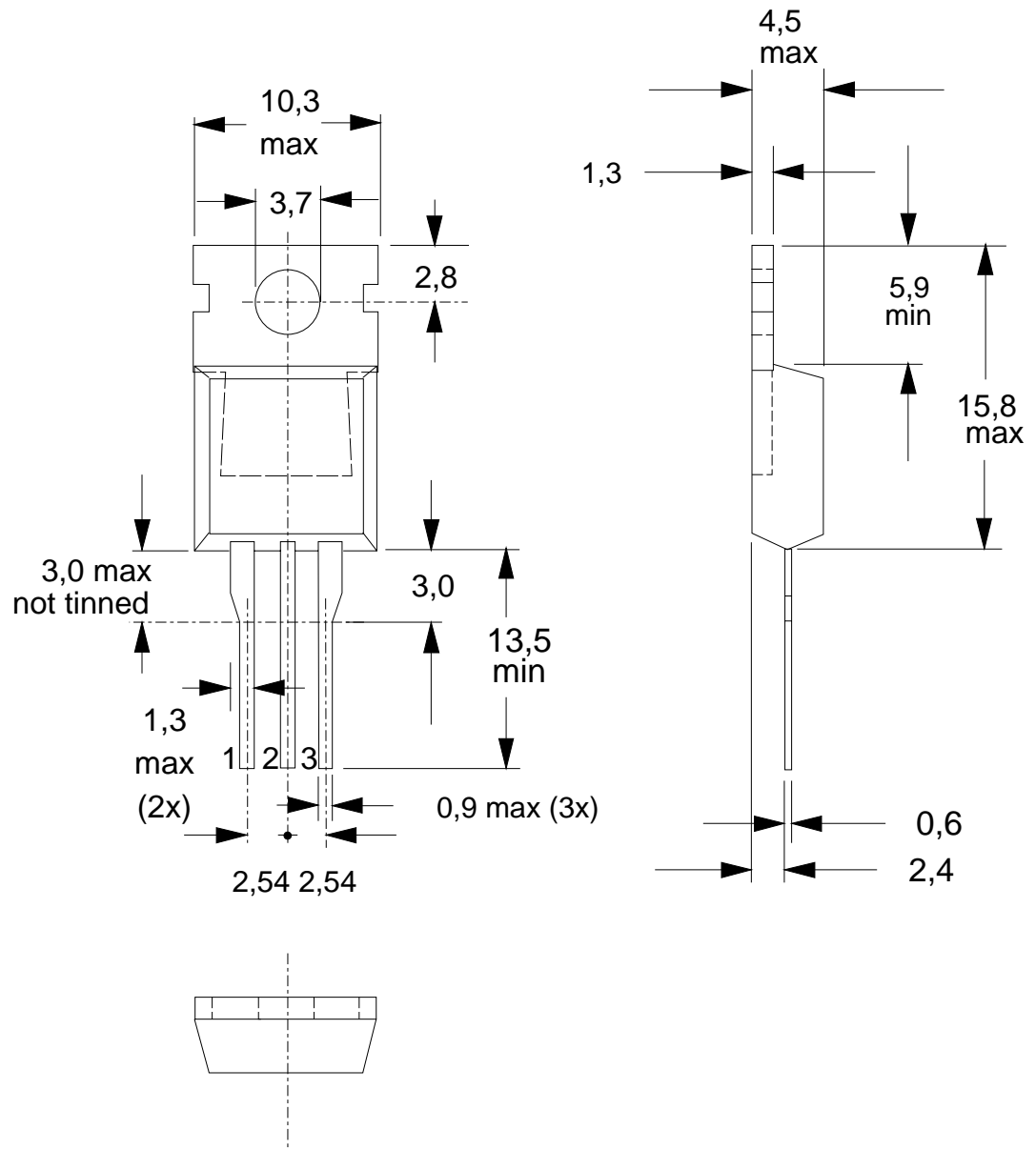


Fig.13. TO220AB; pin 2 connected to mounting base.

**Notes**

1. Refer to mounting instructions for TO220 envelopes.
2. Epoxy meets UL94 V0 at 1/8".