

Triacs

BT138 series

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.

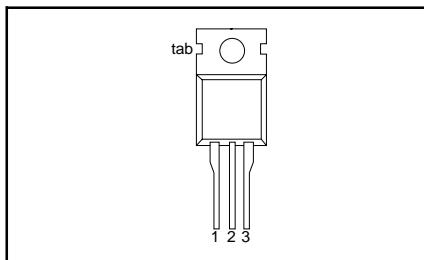
QUICK REFERENCE DATA

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

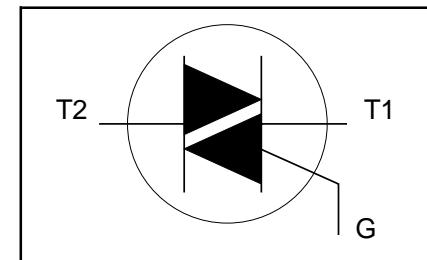
PINNING - TO220AB

PIN	DESCRIPTION
1	main terminal 1
2	main terminal 2
3	gate
tab	main terminal 2

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

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

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

¹ 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/ μ s.

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THERMAL RESISTANCES

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

STATIC CHARACTERISTICS

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

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

DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.			TYP.	MAX.	UNIT
dV_D/dt	Critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(\text{max})};$ $T_j = 125^\circ\text{C}$; exponential waveform; gate open circuit	100	50	200	250	-	V/ μ s
dV_{com}/dt	Critical rate of change of commutating voltage	$V_{DM} = 400\text{ V}; T_j = 95^\circ\text{C};$ $I_{T(\text{RMS})} = 12\text{ A};$ $dI_{com}/dt = 5.4\text{ A/ms}$; gate open circuit	-	-	10	20	-	V/ μ s
t_{gt}	Gate controlled turn-on time	$I_{TM} = 16\text{ A}; V_D = V_{DRM(\text{max})};$ $I_G = 0.1\text{ A}; dI_G/dt = 5\text{ A/\mus}$	-	-	-	2	-	μ s

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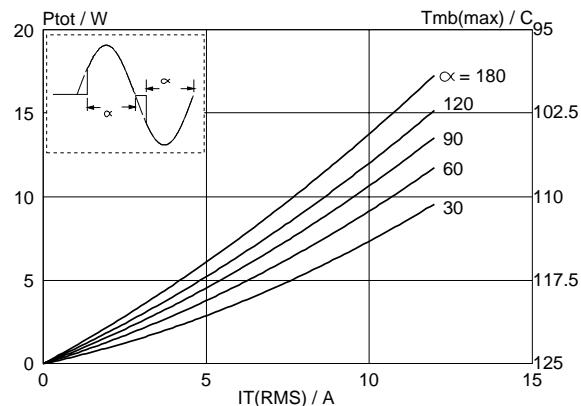


Fig.1. Maximum on-state dissipation, P_{tot} , versus rms on-state current, $I_{T(RMS)}$, where α = conduction angle.

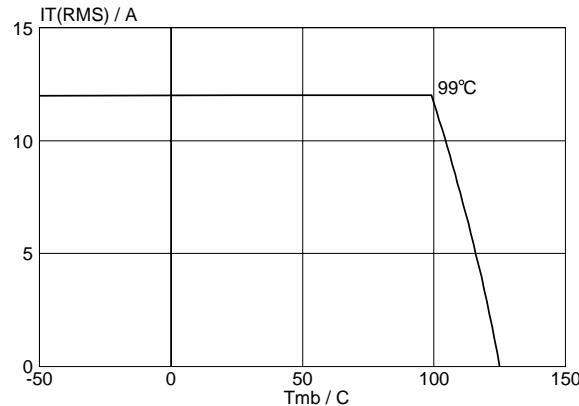


Fig.4. Maximum permissible rms current $I_{T(RMS)}$, versus mounting base temperature T_{mb} .

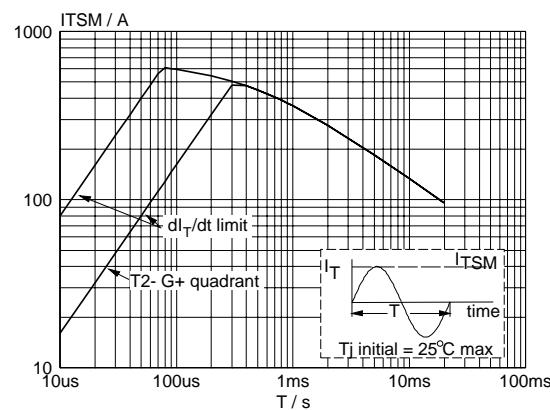


Fig.2. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 20ms$.

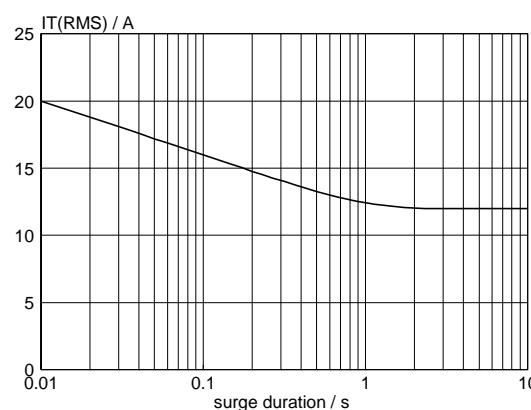


Fig.5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50$ Hz; $T_{mb} \leq 99$ °C.

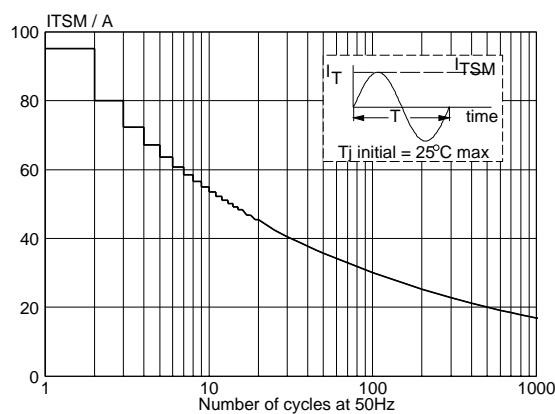


Fig.3. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50$ Hz.

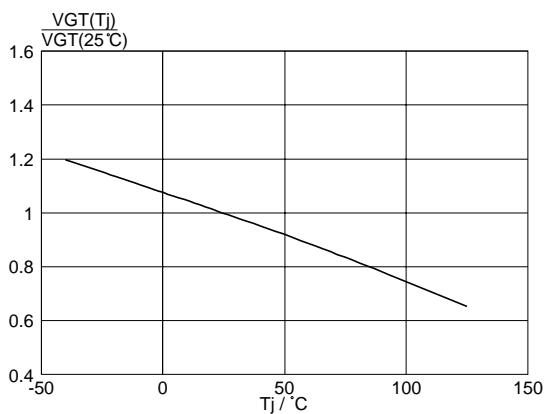


Fig.6. Normalised gate trigger voltage $V_{GT}(T_j)/V_{GT}(25^\circ C)$, versus junction temperature T_j .

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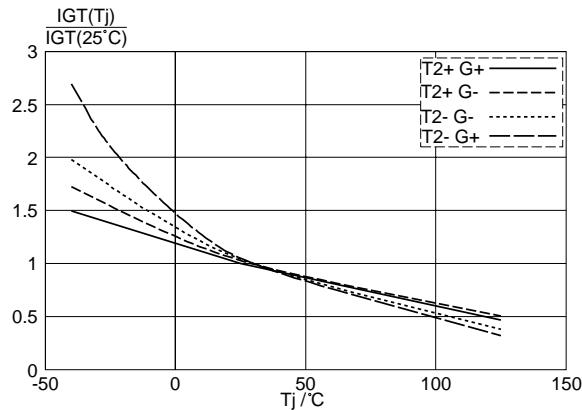


Fig.7. Normalised gate trigger current $I_{GT}(T_j)/I_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

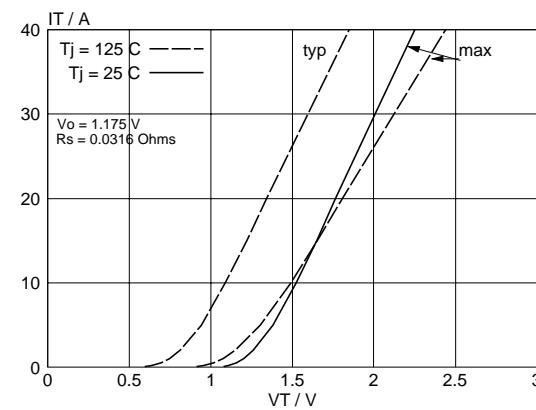


Fig.10. Typical and maximum on-state characteristic.

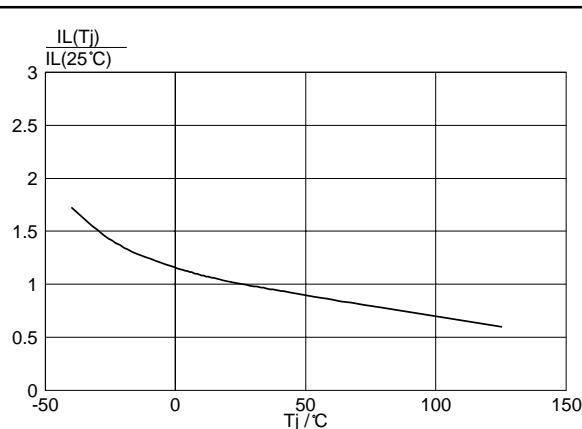


Fig.8. Normalised latching current $I_L(T_j)/I_L(25^\circ\text{C})$, versus junction temperature T_j .

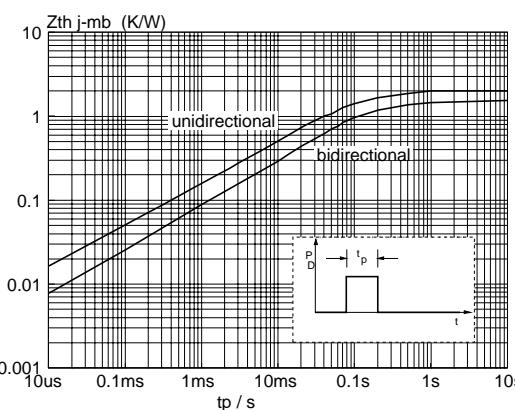


Fig.11. Transient thermal impedance $Z_{th,j-mb}$, versus pulse width t_p .

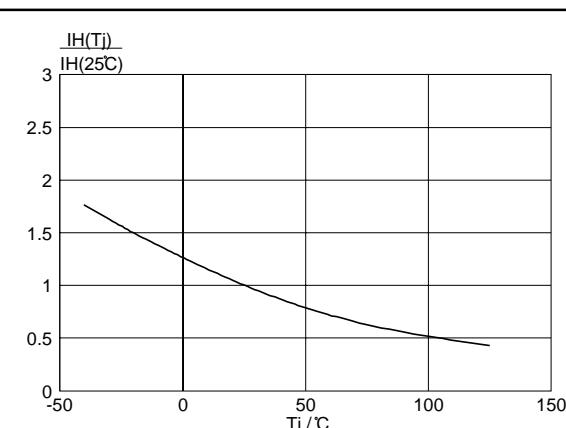


Fig.9. Normalised holding current $I_H(T_j)/I_H(25^\circ\text{C})$, versus junction temperature T_j .

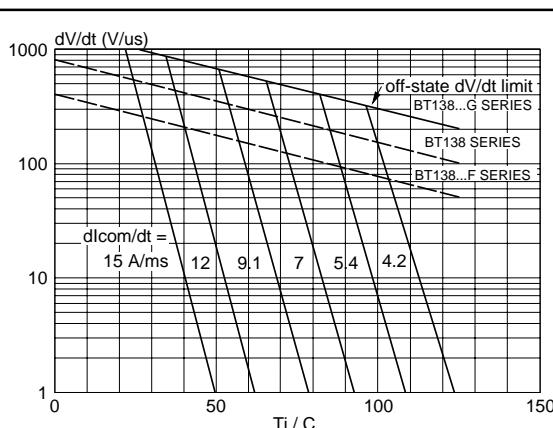


Fig.12. Typical commutation dV/dt versus junction temperature, parameter commutation dI_T/dt . The triac should commutate when the dV/dt is below the value on the appropriate curve for pre-commutation dI_T/dt .

MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

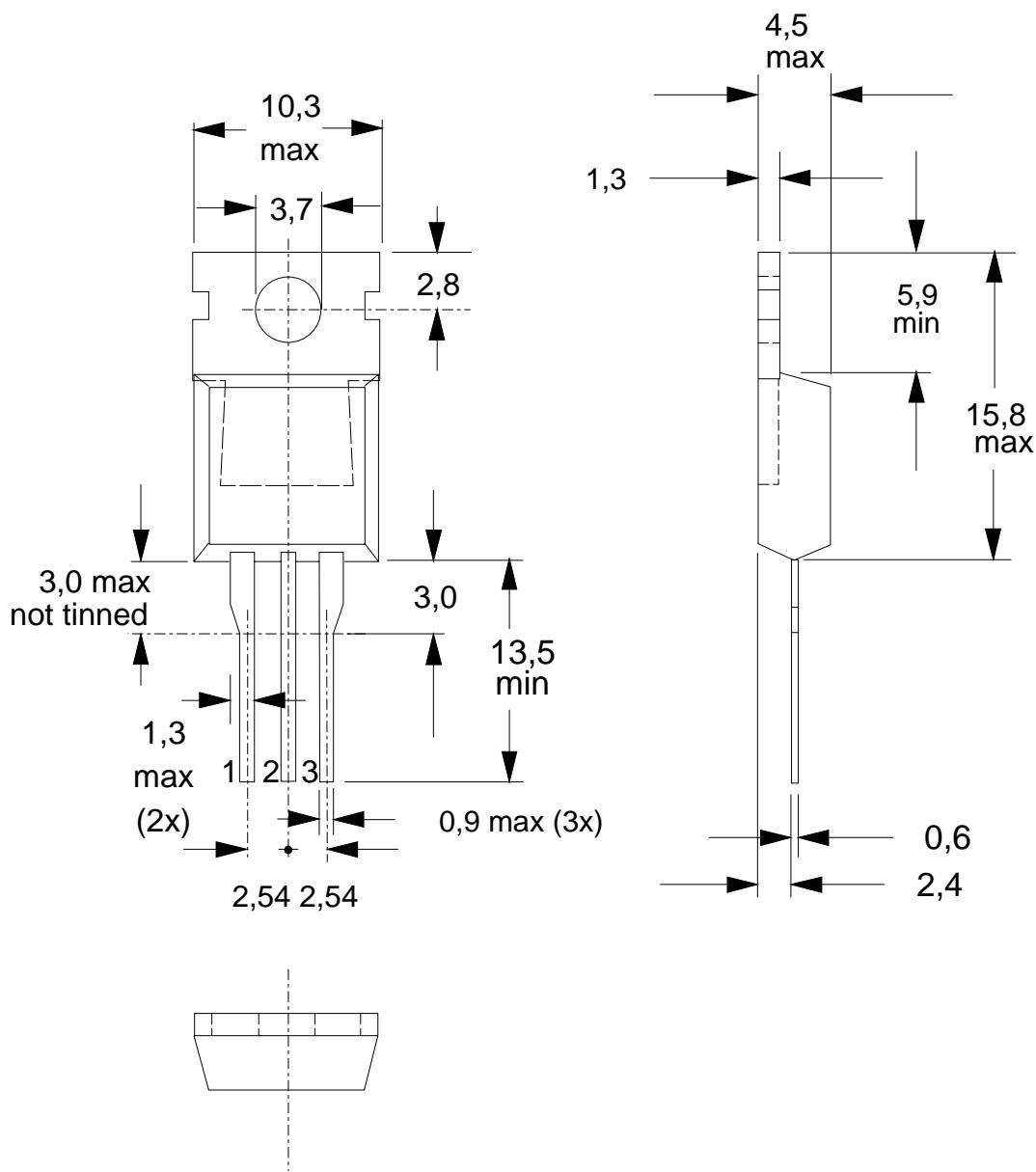


Fig.13. TO220AB; pin 2 connected to mounting base.

Notes

Notes

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

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	
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