

DATA SHEET

BT138X series Triacs

Product specification

July 2001



Triacs

BT138X series

GENERAL DESCRIPTION

Passivated triacs in a full pack 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.

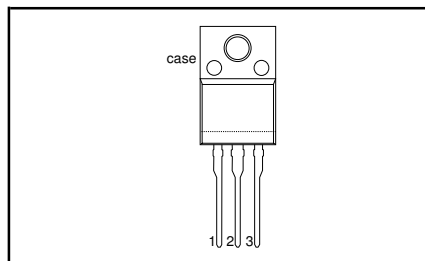
QUICK REFERENCE DATA

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

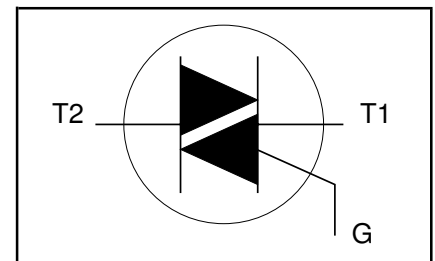
PINNING - SOT186A

PIN	DESCRIPTION
1	main terminal 1
2	main terminal 2
3	gate
case	isolated

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
				-600 600 ¹	-800 800	
V_{DRM}	Repetitive peak off-state voltages		-	-600 600 ¹	-800 800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{hs} \leq 56\text{ °C}$	-	12		A
I_{TSM}	Non-repetitive peak on-state current	full sine wave; $T_j = 25\text{ °C}$ prior to surge	-	95		A
I^2t	I^2t for fusing	$t = 20\text{ ms}$	-	105		A
di_T/dt	Repetitive rate of rise of on-state current after triggering	$t = 16.7\text{ ms}$	-	45		A ² s
		$t = 10\text{ ms}$	-	10		A ² s
		$I_{TM} = 20\text{ A}; I_G = 0.2\text{ A}; di_G/dt = 0.2\text{ A}/\mu\text{s}$	-	2		A
I_{GM}	Peak gate current		-	5		V
V_{GM}	Peak gate voltage		-	5		W
P_{GM}	Peak gate power		-	0.5		W
$P_{G(AV)}$	Average gate power	over any 20 ms period	-	150		°C
T_{stg}	Storage temperature		-40	125		°C
T_j	Operating junction temperature		-			°C
		T2+ G+	-	50		A/ μs
		T2+ G-	-	50		A/ μs
		T2- G-	-	50		A/ μs
		T2- G+	-	10		A/ μs

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/ μs .

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ISOLATION LIMITING VALUE & CHARACTERISTIC

$T_{hs} = 25\text{ °C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	R.M.S. isolation voltage from all three terminals to external heatsink	$f = 50\text{-}60\text{ Hz}$; sinusoidal waveform; $R.H. \leq 65\%$; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	$f = 1\text{ MHz}$	-	10	-	pF

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j\text{-}hs}$	Thermal resistance junction to heatsink	full or half cycle with heatsink compound	-	-	4.0	K/W
$R_{th\ j\text{-}a}$	Thermal resistance junction to ambient	without heatsink compound in free air	-	55	5.5	K/W

STATIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.		UNIT
I_{GT}	Gate trigger current	BT138X- $V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	-F	
		T2+ G+	-	5	35	25	mA
		T2+ G-	-	8	35	25	mA
		T2- G-	-	10	35	25	mA
		T2- G+	-	22	70	70	mA
I_L	Latching current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	-	-	-	
		T2+ G+	-	7	40	40	mA
		T2+ G-	-	20	60	60	mA
		T2- G-	-	8	40	40	mA
		T2- G+	-	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	$V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	0.7	1.5		V
		$V_D = 400\text{ V}; I_T = 0.1\text{ A}; T_j = 125\text{ °C}$	0.25	0.4	-		V
I_D	Off-state leakage current	$V_D = V_{DRM(max)}; T_j = 125\text{ °C}$	-	0.1	0.5		mA

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DYNAMIC CHARACTERISTICS $T_j = 25\text{ °C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.		TYP.	MAX.	UNIT
dV_D/dt	Critical rate of rise of off-state voltage	BT138X- $V_{DM} = 67\% V_{DRM(max)}$; $T_j = 125\text{ °C}$; exponential waveform; gate open circuit	100	50	250	-	V/ μ s
dV_{com}/dt	Critical rate of change of commutating voltage	$V_{DM} = 400\text{ V}$; $T_j = 95\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; $di_{com}/dt = 5.4\text{ A/ms}$; gate open circuit	-	-	20	-	V/ μ s
t_{gt}	Gate controlled turn-on time	$I_{TM} = 16\text{ A}$; $V_D = V_{DRM(max)}$; $I_G = 0.1\text{ A}$; $di_G/dt = 5\text{ A}/\mu$ s	-	-	2	-	μ s

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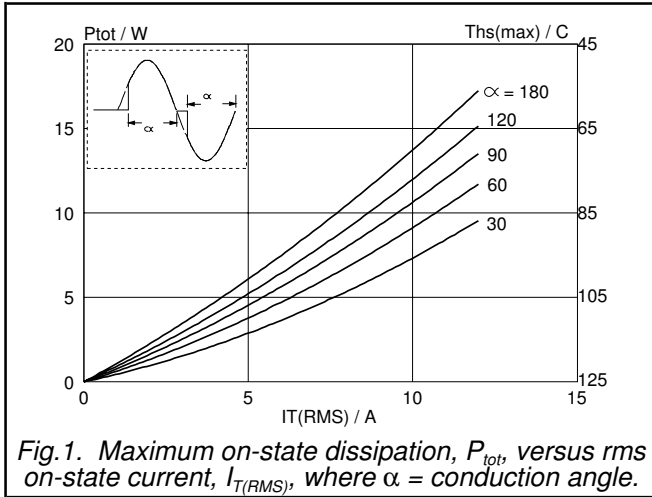


Fig. 1. Maximum on-state dissipation, P_{tot} , versus rms on-state current, $I_{T(RMS)}$, where α = conduction angle.

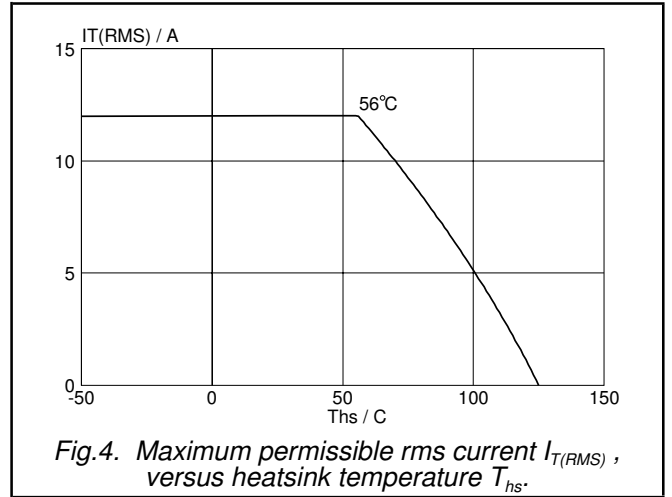


Fig. 4. Maximum permissible rms current $I_{T(RMS)}$, versus heatsink temperature T_{hs} .

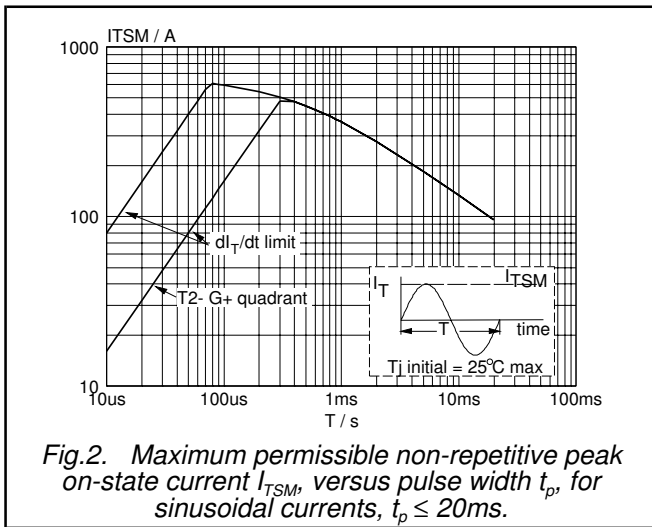


Fig. 2. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 20$ ms.

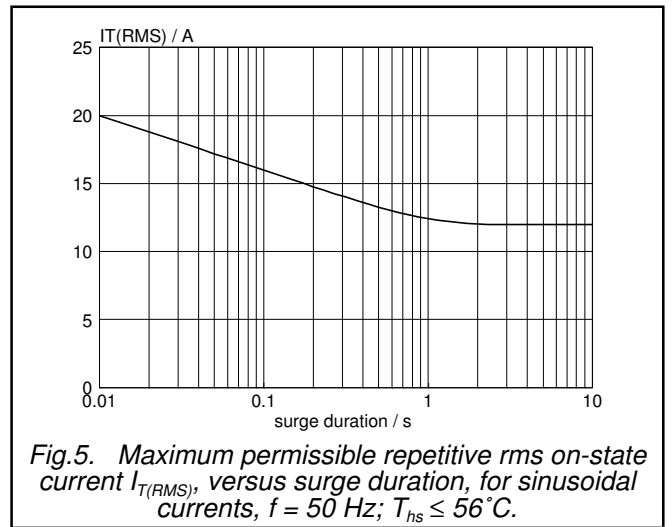


Fig. 5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50$ Hz; $T_{hs} \leq 56$ C.

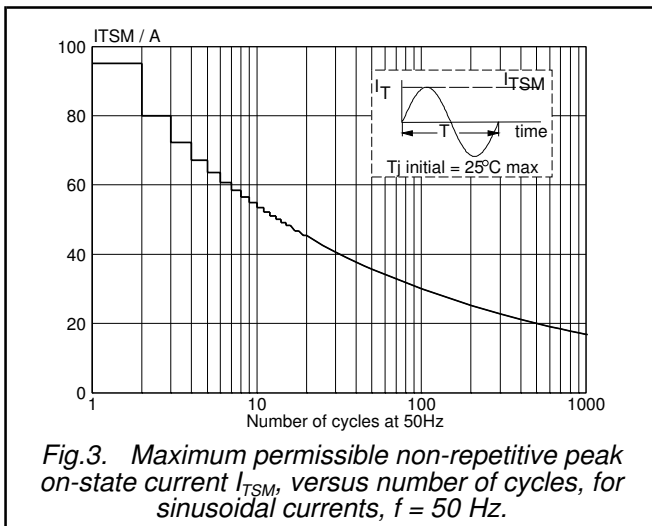


Fig. 3. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50$ Hz.

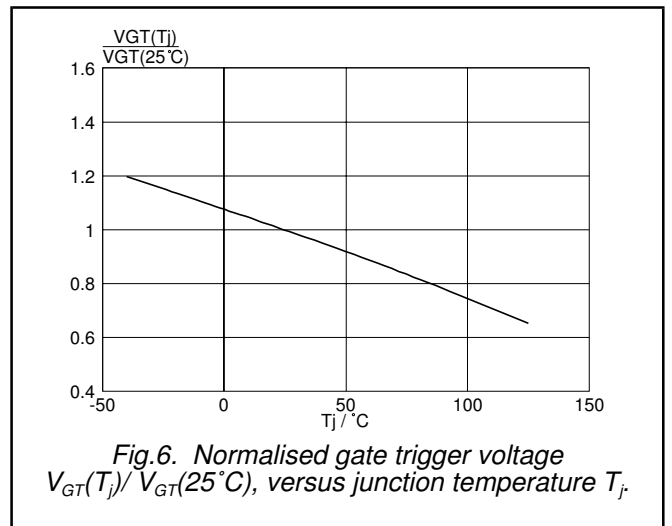
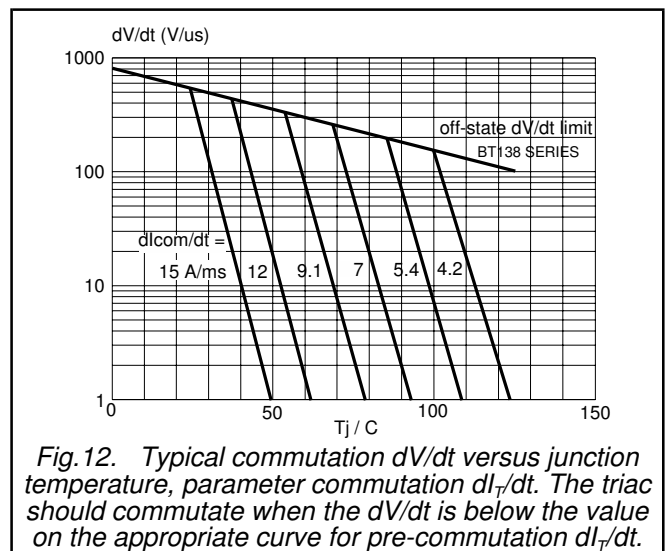
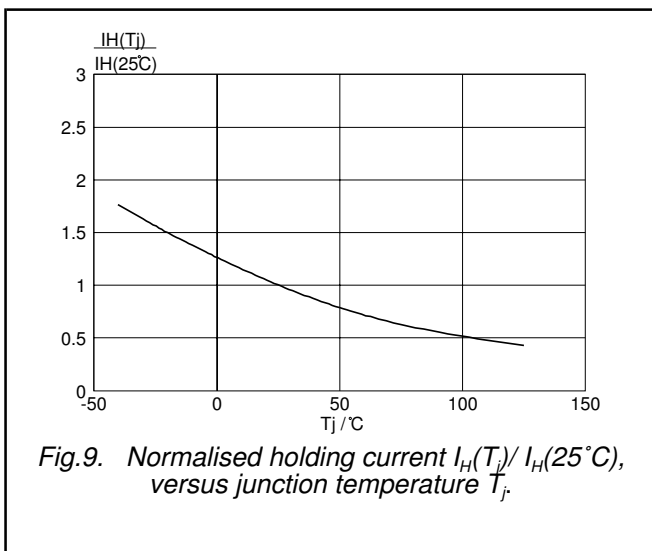
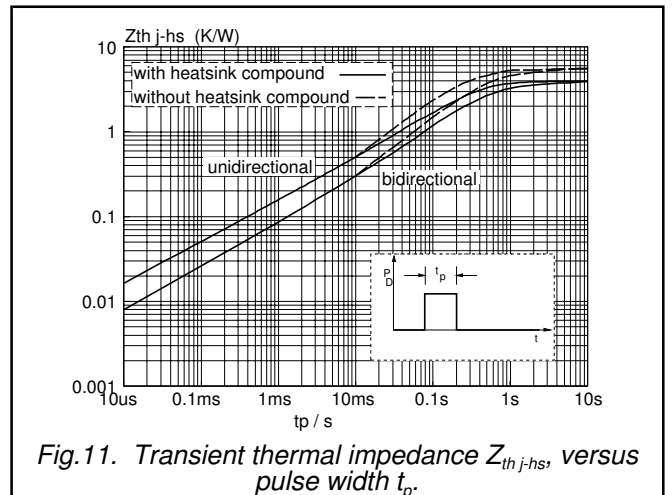
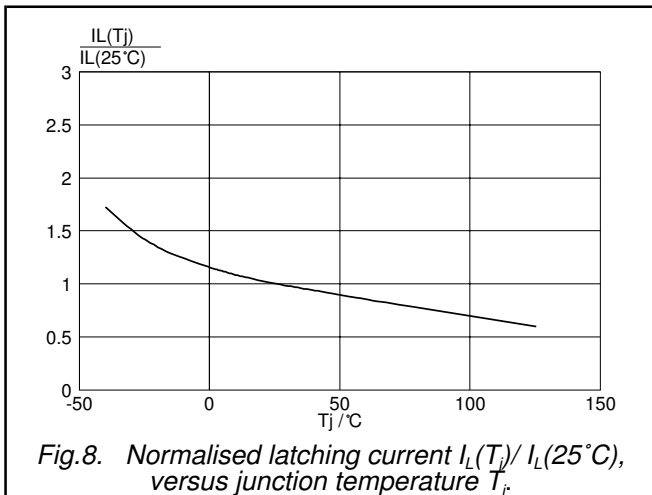
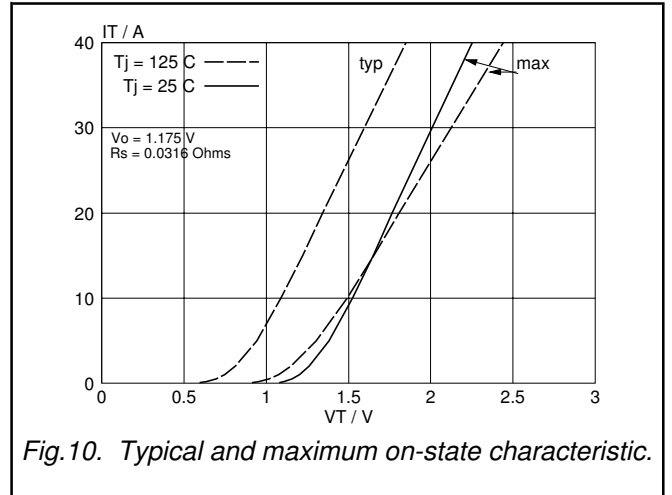
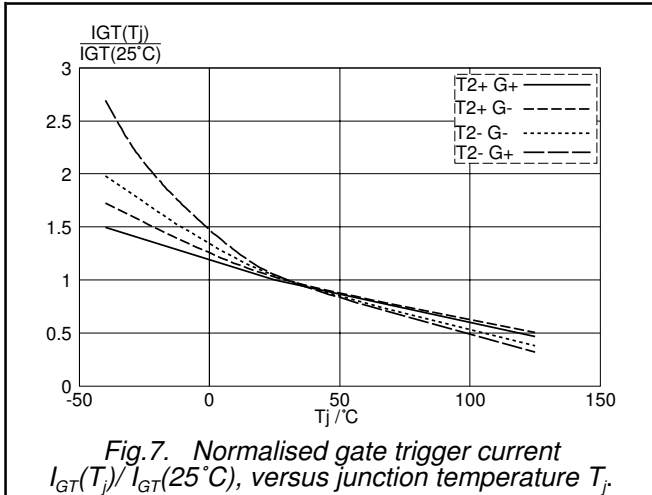


Fig. 6. Normalised gate trigger voltage $V_{GT}(T_j) / V_{GT}(25^\circ C)$, versus junction temperature T_j .

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MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

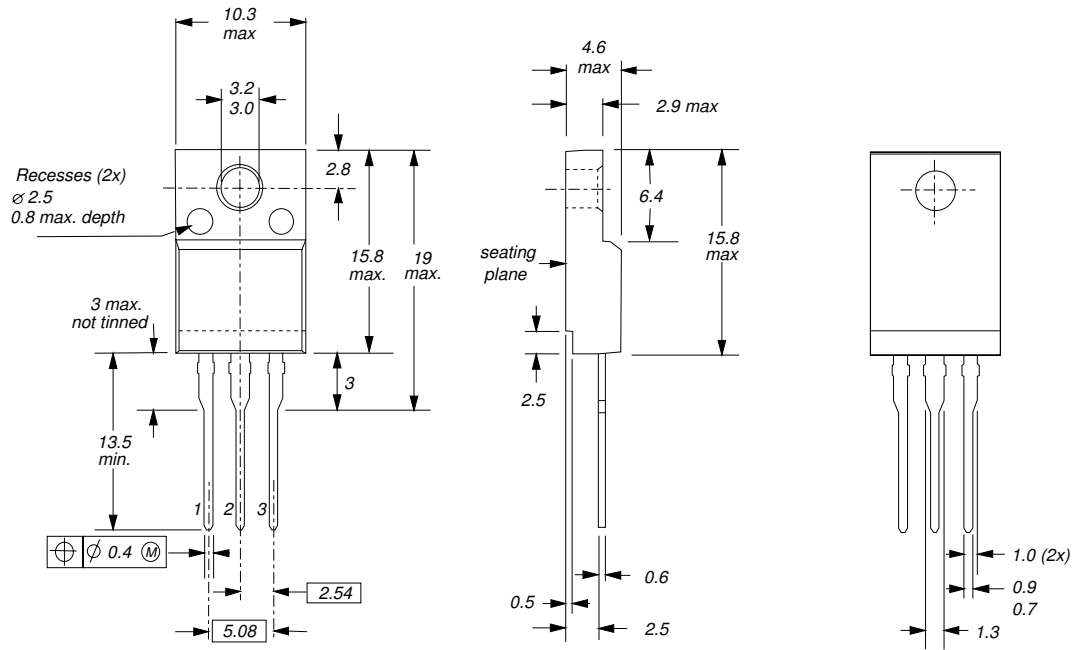


Fig.13. SOT186A; The seating plane is electrically isolated from all terminals.

Notes

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

Legal information

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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