

Thyristors

BT151S series

GENERAL DESCRIPTION

Passivated thyristors in a plastic envelope, suitable for surface mounting, intended for use in applications requiring high bidirectional blocking voltage capability and high thermal cycling performance. Typical applications include motor control, industrial and domestic lighting, heating and static switching.

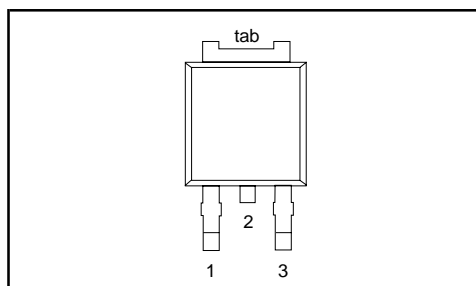
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
V_{DRM} , V_{RRM}	BT151S - Repetitive peak off-state voltages	500R 500	650R 650	800R 800	V
$I_{T(AV)}$	Average on-state current	7.5	7.5	7.5	A
$I_{T(RMS)}$	RMS on-state current	12	12	12	A
I_{TSM}	Non-repetitive peak on-state current	100	100	100	A

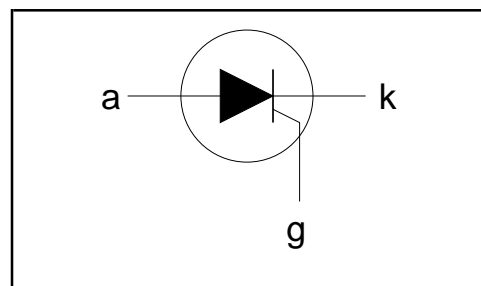
PINNING - SOT428

PIN NUMBER	
1	cathode
2	anode
3	gate
tab	anode

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
V_{DRM} , V_{RRM}	Repetitive peak off-state voltages		-	-500R 500 ¹	650R 650 ¹	-800R 800	V
$I_{T(AV)}$	Average on-state current	half sine wave; $T_{mb} \leq 103\text{ }^{\circ}\text{C}$	-	7.5			A
$I_{T(RMS)}$	RMS on-state current	all conduction angles	-	12			A
I_{TSM}	Non-repetitive peak on-state current	half sine wave; $T_j = 25\text{ }^{\circ}\text{C}$ prior to surge	-	100			A
		$t = 10\text{ ms}$	-	110			A
I^2t	I^2t for fusing	$t = 8.3\text{ ms}$	-	50			A^2s
di_T/dt	Repetitive rate of rise of on-state current after triggering	$t = 10\text{ ms}$	-	50			$\text{A}/\mu\text{s}$
		$I_{TM} = 20\text{ A}$; $I_G = 50\text{ mA}$; $di_G/dt = 50\text{ mA}/\mu\text{s}$	-	50			
I_{GM}	Peak gate current		-	2			A
V_{RGM}	Peak reverse 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			$^{\circ}\text{C}$
T_j	Operating junction temperature		-	125			$^{\circ}\text{C}$

¹ Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ μs .

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THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base	pcb (FR4) mounted; footprint as in Fig.14	-	-	1.8	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient		-	75	-	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	$V_D = 12\ \text{V}$; $I_T = 0.1\ \text{A}$	-	2	15	mA
I_L	Latching current	$V_D = 12\ \text{V}$; $I_{GT} = 0.1\ \text{A}$	-	10	40	mA
I_H	Holding current	$V_D = 12\ \text{V}$; $I_{GT} = 0.1\ \text{A}$	-	7	20	mA
V_T	On-state voltage	$I_T = 23\ \text{A}$	-	1.4	1.75	V
V_{GT}	Gate trigger voltage	$V_D = 12\ \text{V}$; $I_T = 0.1\ \text{A}$	-	0.6	1.5	V
I_D, I_R	Off-state leakage current	$V_D = V_{DRM(max)}$; $I_T = 0.1\ \text{A}$; $T_j = 125\ ^\circ\text{C}$	0.25	0.4	-	V
		$V_D = V_{DRM(max)}$; $V_R = V_{RRM(max)}$; $T_j = 125\ ^\circ\text{C}$	-	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	$V_{DM} = 67\% V_{DRM(max)}$; $T_j = 125\ ^\circ\text{C}$; exponential waveform;	50 200	130 1000	-	V/ μs
		Gate open circuit $R_{GK} = 100\ \Omega$				
t_{gt}	Gate controlled turn-on time	$I_{TM} = 40\ \text{A}$; $V_D = V_{DRM(max)}$; $I_G = 0.1\ \text{A}$; $dI_G/dt = 5\ \text{A}/\mu\text{s}$	-	2	-	μs
t_q	Circuit commutated turn-off time	$V_D = 67\% V_{DRM(max)}$; $T_j = 125\ ^\circ\text{C}$; $I_{TM} = 20\ \text{A}$; $V_R = 25\ \text{V}$; $dI_{TM}/dt = 30\ \text{A}/\mu\text{s}$; $dV_D/dt = 50\ \text{V}/\mu\text{s}$; $R_{GK} = 100\ \Omega$	-	70	-	μs

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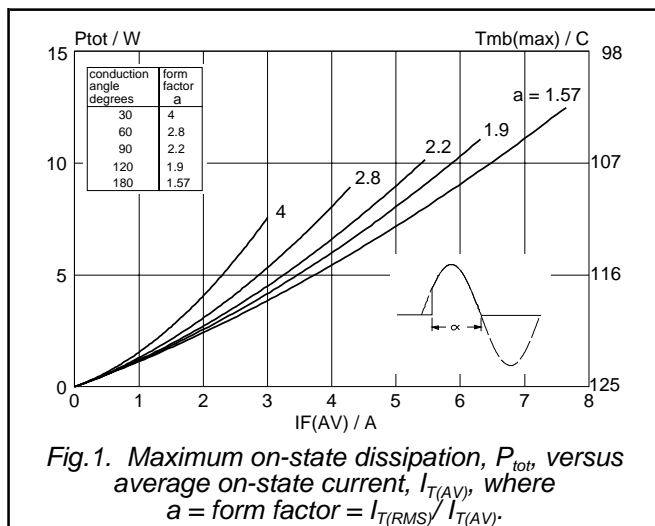


Fig.1. Maximum on-state dissipation, P_{tot} , versus average on-state current, $I_{T(AV)}$, where $a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$.

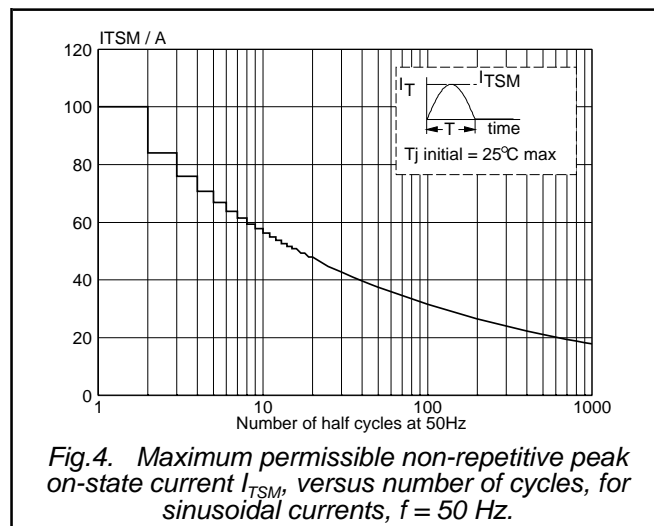


Fig.4. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50 \text{ Hz}$.

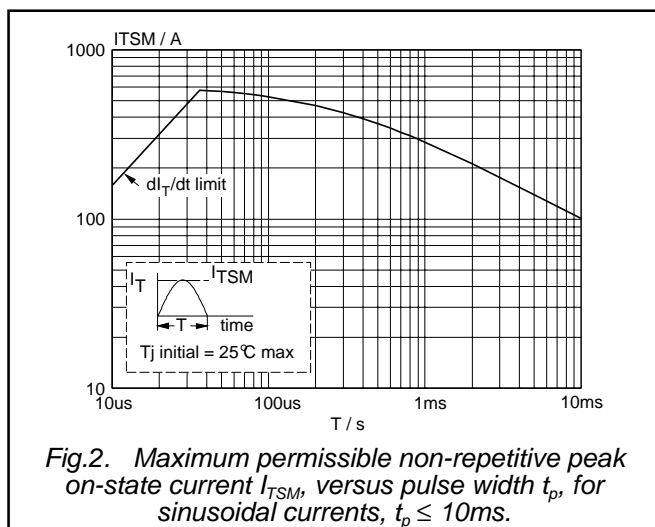


Fig.2. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 10 \text{ ms}$.

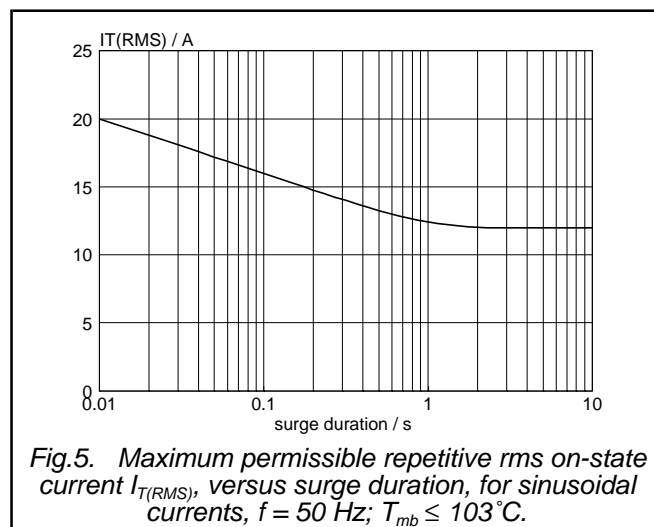


Fig.5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50 \text{ Hz}$; $T_{mb} \leq 103^\circ\text{C}$.

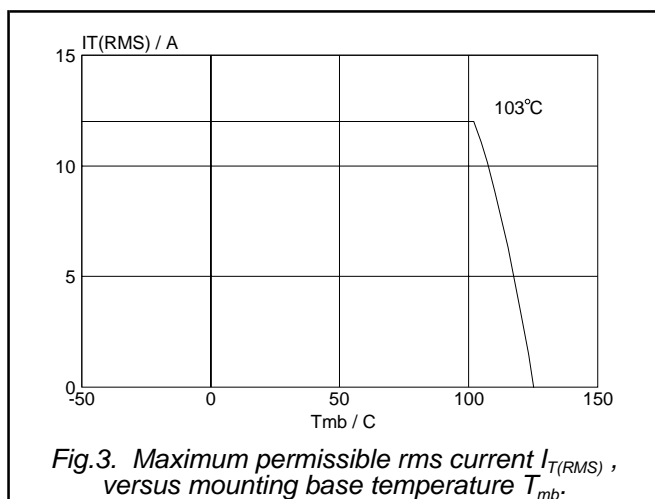


Fig.3. Maximum permissible rms current $I_{T(RMS)}$, versus mounting base temperature T_{mb} .

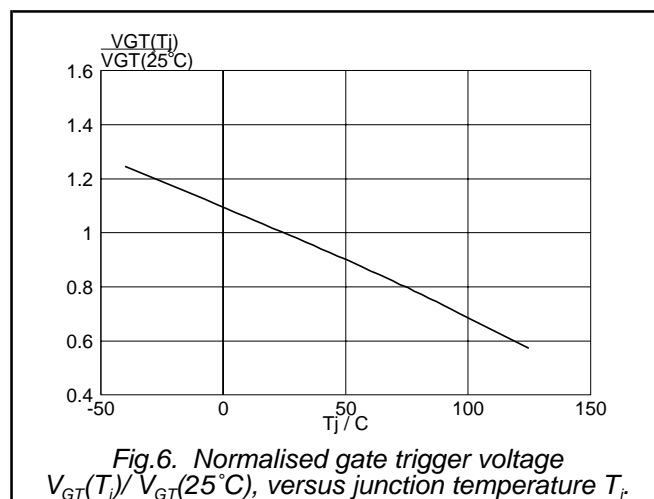
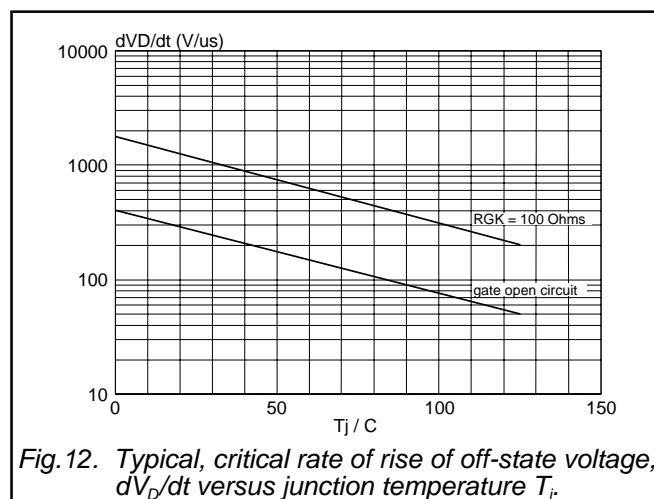
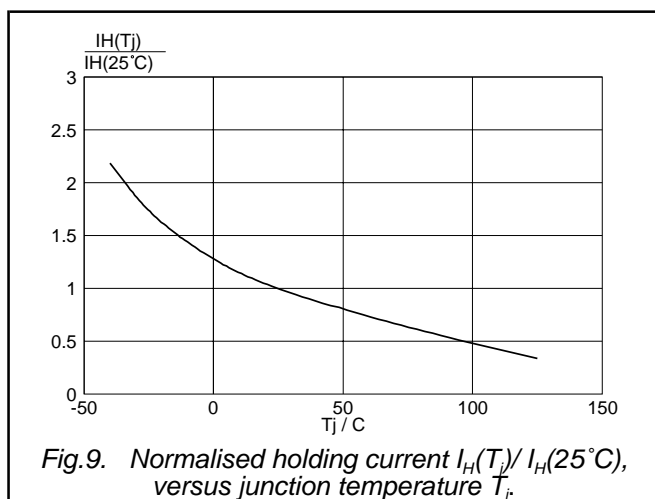
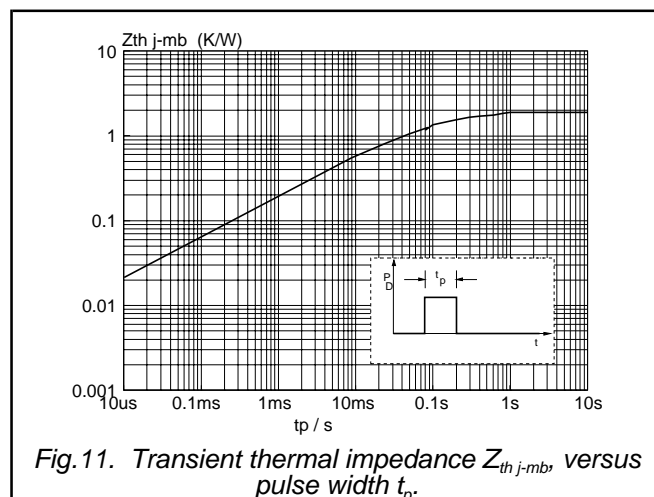
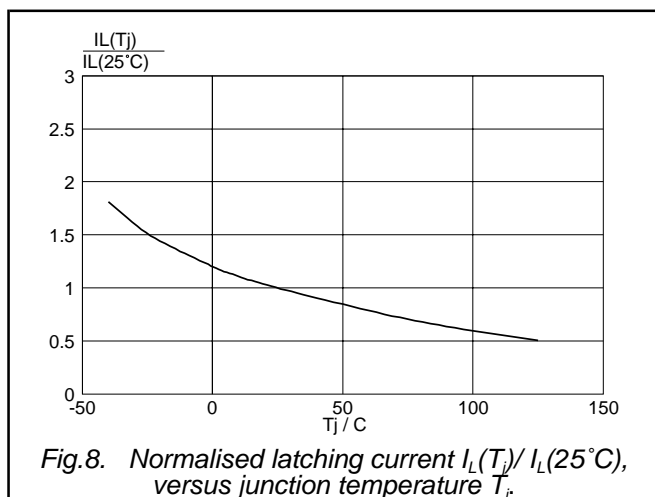
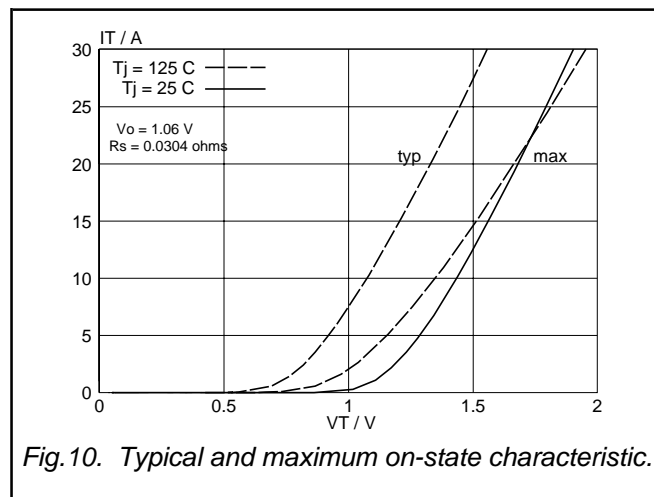
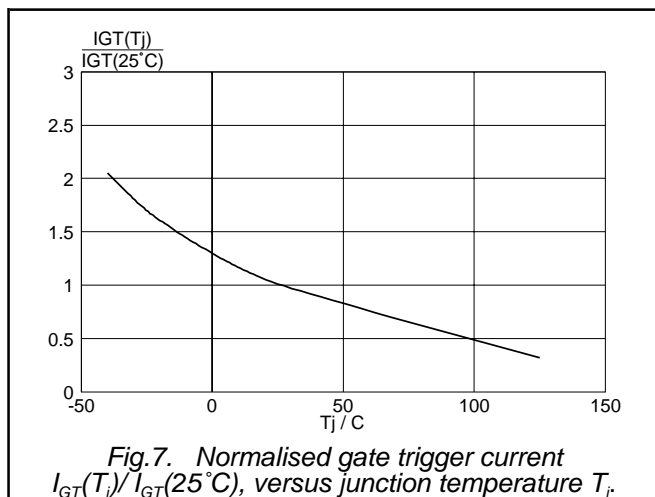


Fig.6. Normalised gate trigger voltage $V_{GT}(T_j) / V_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

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MECHANICAL DATA

Dimensions in mm

Net Mass: 1.1 g

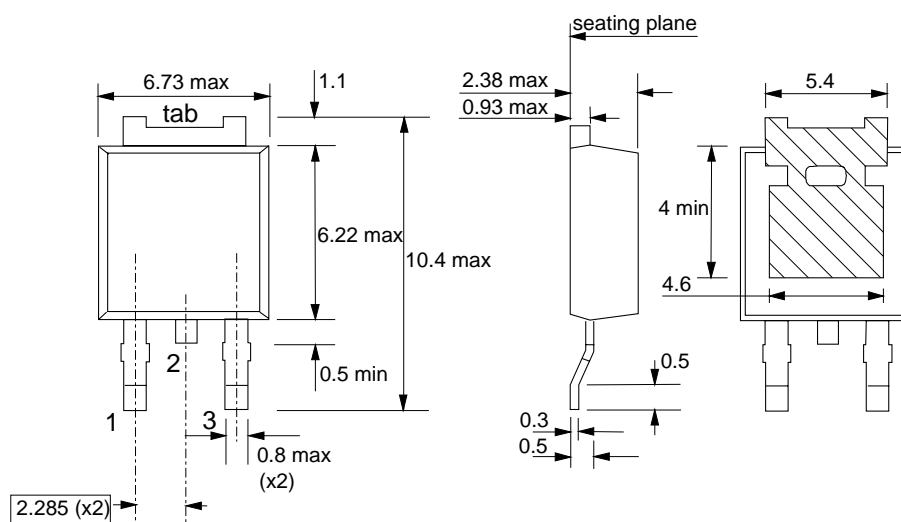


Fig. 13. SOT428 : centre pin connected to tab.

MOUNTING INSTRUCTIONS

Dimensions in mm

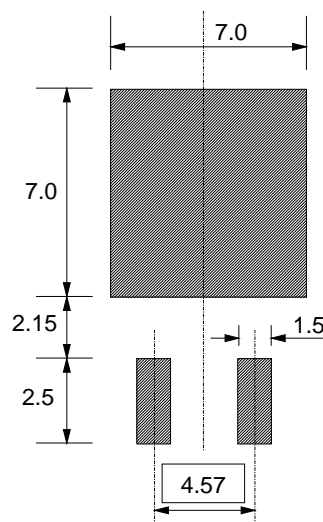


Fig. 14. SOT428 : minimum pad sizes for surface mounting.

Notes

1. Plastic meets UL94 V0 at 1/8".

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DEFINITIONS

DATA SHEET STATUS		
DATA SHEET STATUS ²	PRODUCT STATUS ³	DEFINITIONS
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product
Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A
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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