

# Thyristor High Repetitive Surge

**BTH151S-650R**

## GENERAL DESCRIPTION

Passivated thyristor in a plastic envelope, suitable for surface mounting, intended for use in applications requiring high bidirectional blocking voltage capability and high thermal cycling performance. This thyristor has a high repetitive surge specification which makes it suitable for applications where high inrush currents or stall currents are likely to occur on a repetitive basis.

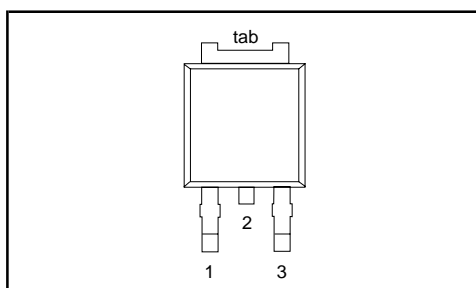
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
$V_{DRM}, V_{RRM}$	Repetitive peak off-state voltages	650	V
$I_{T(AV)}$	Average on-state current	7.5	A
$I_{T(RMS)}$	RMS on-state current	12	A
$I_{TSM}$	Non-repetitive peak on-state current	110	A
$I_{TRM}$	Repetitive peak on-state current	60	A

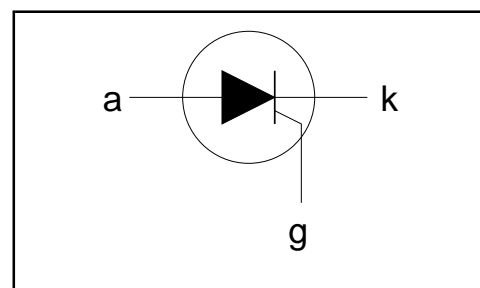
## PINNING - SOT428

PIN	DESCRIPTION
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	half sine wave;	-	<sup>1</sup> 650	V
$I_{T(AV)}$	Average on-state current	$T_{mb} \leq 103\text{ }^{\circ}\text{C}$	-	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 $t = 10\text{ ms}$	-	110	A
		$t = 8.3\text{ ms}$	-	121	A
$I_{TRM}$	Repetitive peak on-state current	$t = 10\text{ms}, \tau = 3\text{s}, T_{mb} \leq 45\text{ }^{\circ}\text{C}, \text{no. of surges} = 100\text{k}$	-	60	A
$I^2t$	$I^2t$ for fusing	$t = 10\text{ ms}$	-	61	$\text{A}^2\text{s}$
$di_T/dt$	Repetitive rate of rise of on-state current after triggering	$I_{TM} = 20\text{ A}; I_G = 50\text{ mA}; di_G/dt = 50\text{ mA}/\mu\text{s}$	-	50	$\text{A}/\mu\text{s}$
$I_{GM}$	Peak gate current		-	2	A
$V_{GM}$	Peak gate voltage		-	5	V
$V_{RGM}$	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	$^{\circ}\text{C}$

<sup>1</sup> 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/ $\mu\text{s}$ .

**Thyristor  
High Repetitive Surge**

**BTH151S-650R**

**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**

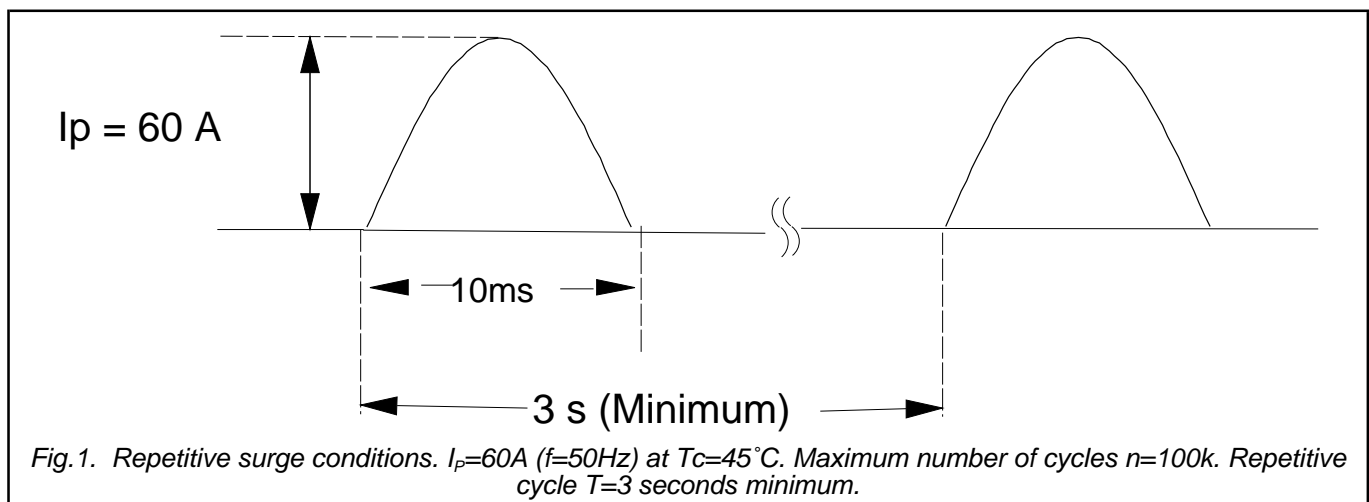
$T_j = 25\text{ }^\circ\text{C}$  unless otherwise stated

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	$V_D = V_{DRM(max)}; I_T = 0.1\text{ A}; T_j = 125\text{ }^\circ\text{C}$	0.25	0.4	-	V
		$V_D = V_{DRM(max)}; V_R = V_{RRM(max)}; T_j = 125\text{ }^\circ\text{C}$	-	0.1	0.5	mA

**DYNAMIC CHARACTERISTICS**

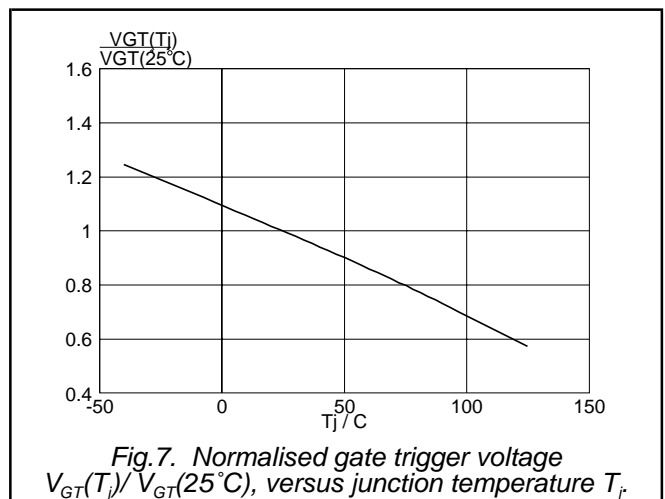
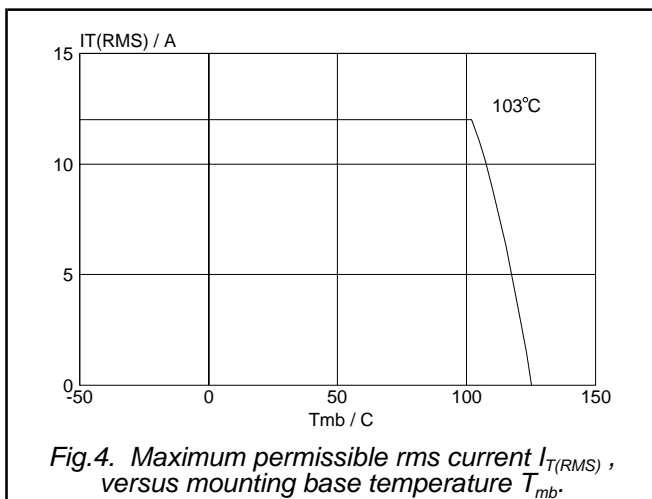
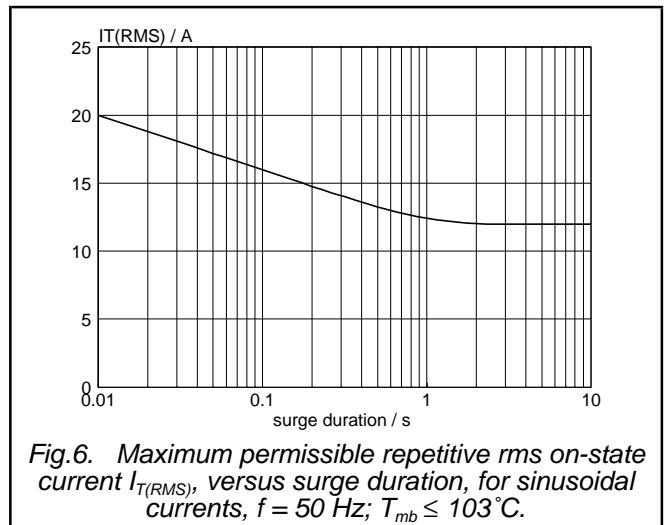
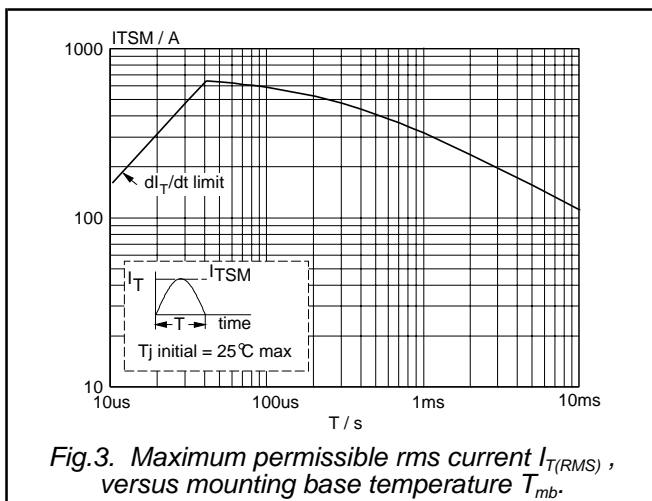
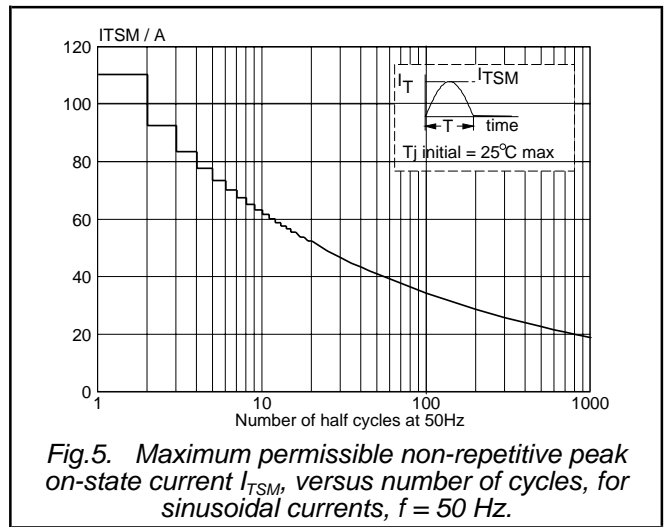
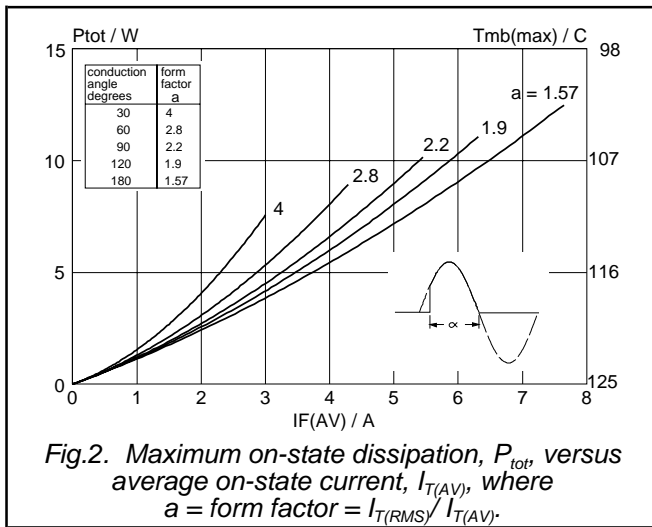
$T_j = 25\text{ }^\circ\text{C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$dV_D/dt$	Critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)}; T_j = 125\text{ }^\circ\text{C};$ exponential waveform;				
		Gate open circuit $R_{GK} = 100\ \Omega$	50	130	-	V/ $\mu\text{s}$
$t_{gt}$	Gate controlled turn-on time	$I_{TM} = 40\text{ A}; V_D = V_{DRM(max)}; I_G = 0.1\text{ A};$ $di_G/dt = 5\text{ A}/\mu\text{s}$	200	1000	-	V/ $\mu\text{s}$
$t_q$	Circuit commutated turn-off time	$V_D = 67\% V_{DRM(max)}; T_j = 125\text{ }^\circ\text{C};$ $I_{TM} = 20\text{ A}; V_R = 25\text{ V}; di_{TM}/dt = 30\text{ A}/\mu\text{s};$ $dV_D/dt = 50\text{ V}/\mu\text{s}; R_{GK} = 100\ \Omega$	-	70	-	$\mu\text{s}$



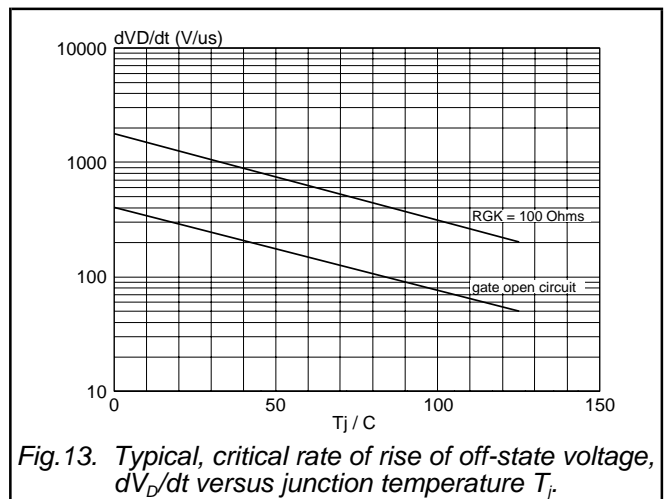
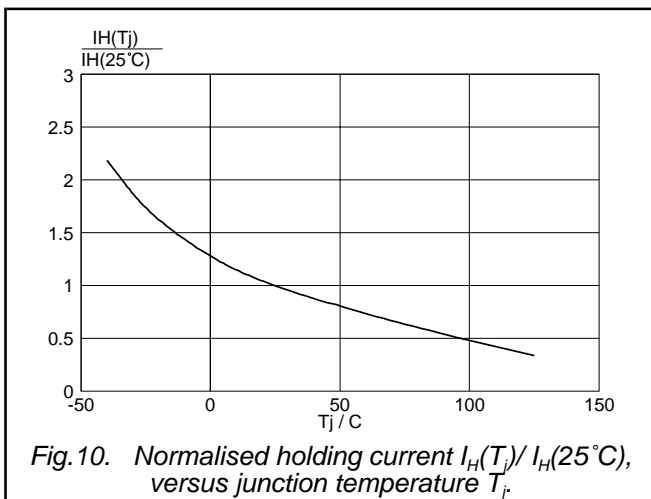
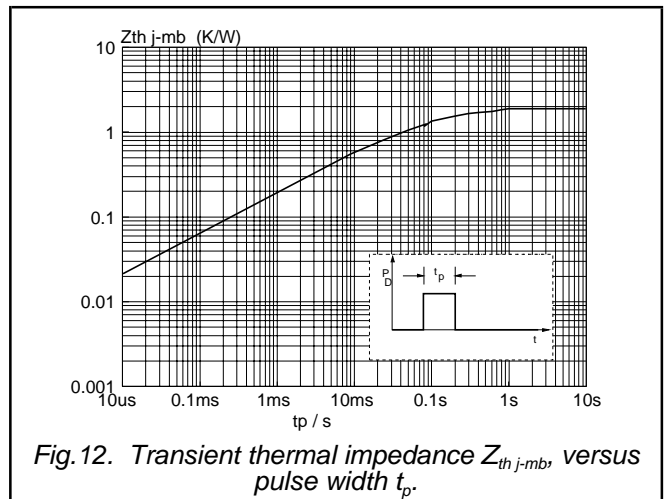
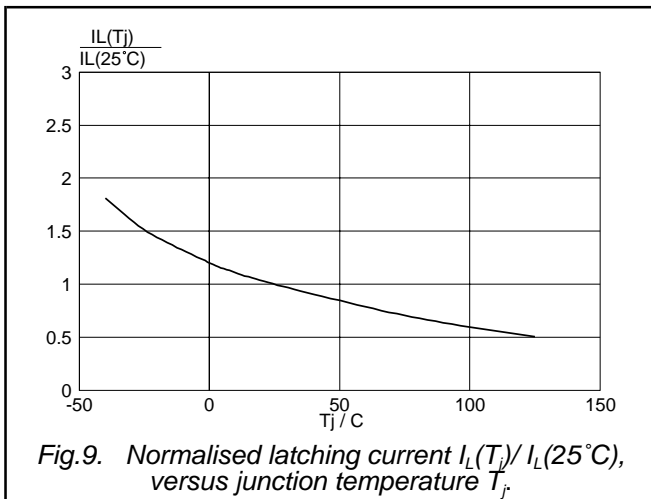
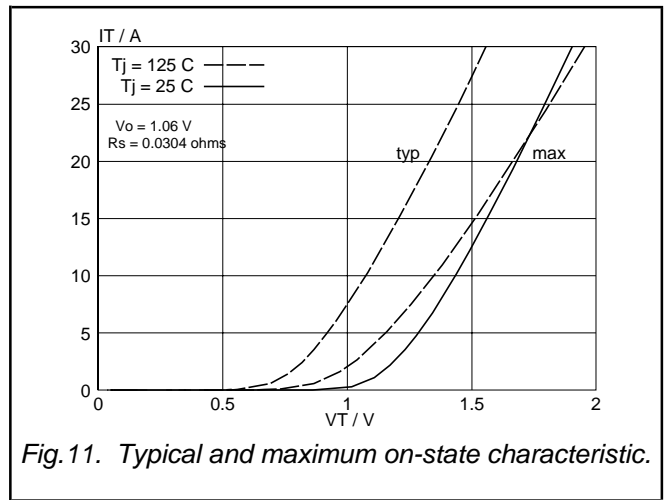
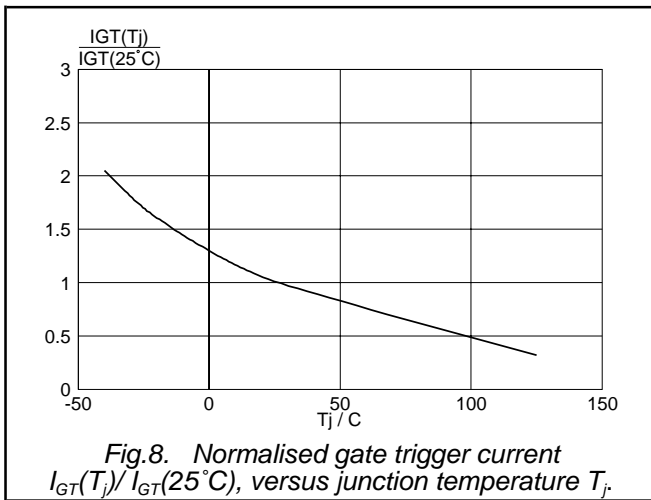
Thyristor  
High Repetitive Surge

BTH151S-650R



Thyristor  
High Repetitive Surge

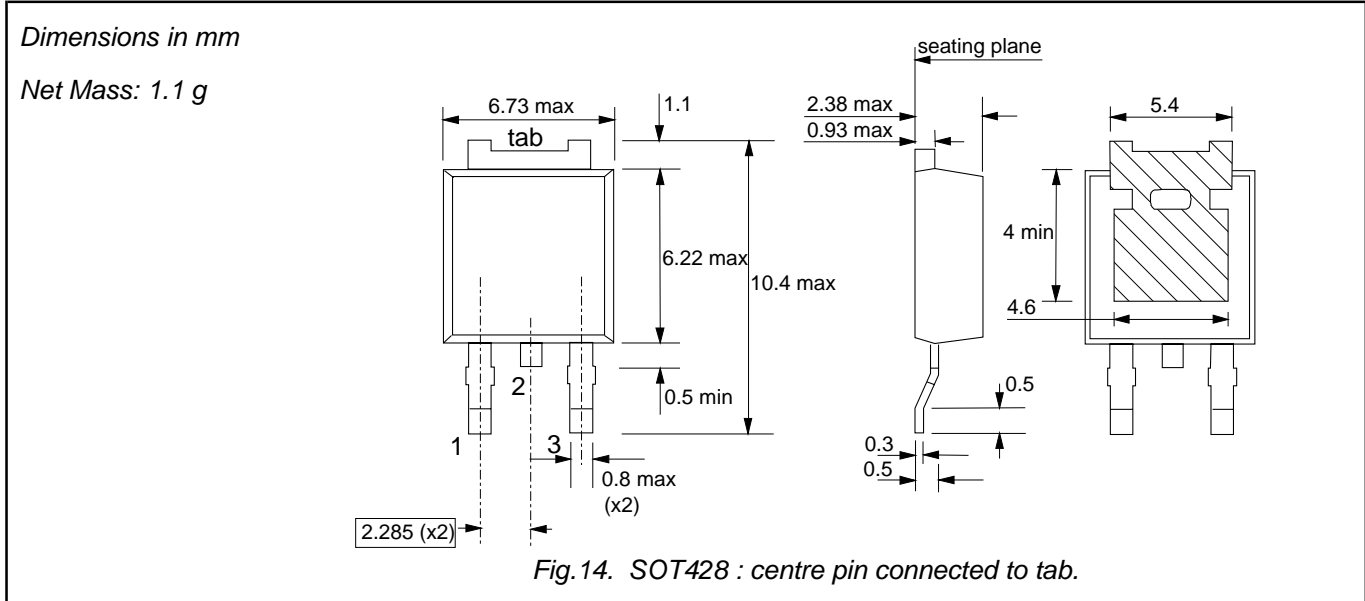
BTH151S-650R



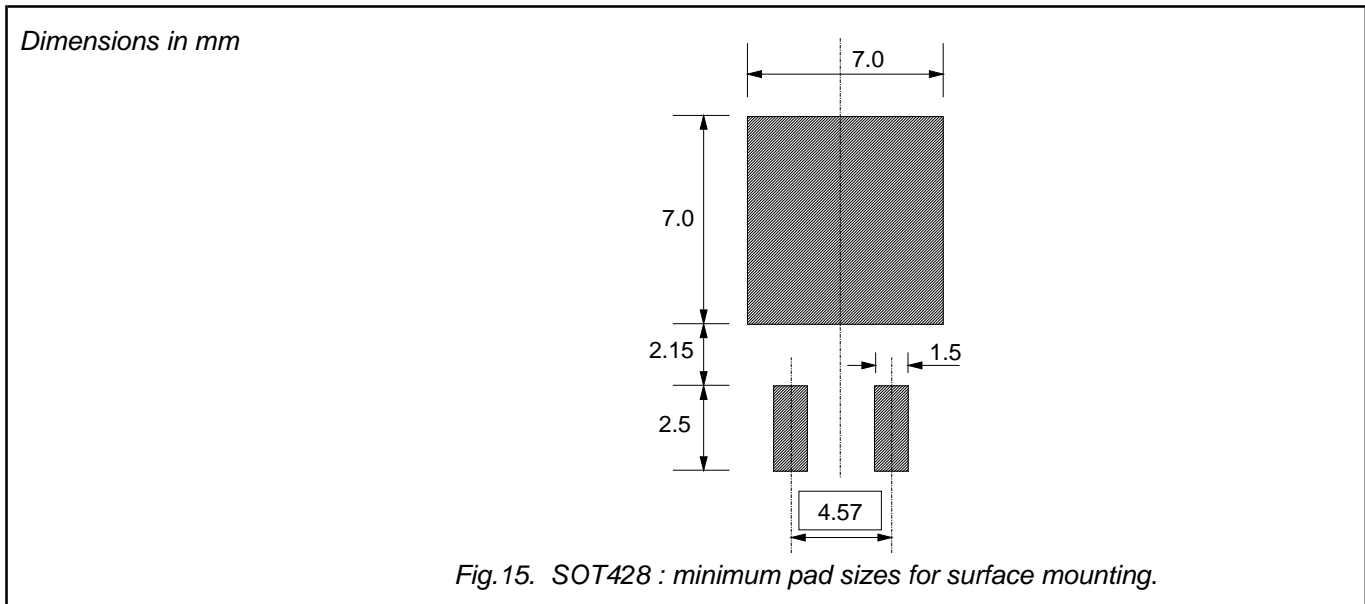
Thyristor  
High Repetitive Surge

BTH151S-650R

**MECHANICAL DATA**



**MOUNTING INSTRUCTIONS**



**Notes**

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

# Thyristor High Repetitive Surge

BTH151S-650R

## DEFINITIONS

<b>Data sheet status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	
© Philips Electronics N.V. 2001	
All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.	
The information presented in this document does not form part of any quotation or contract, it is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent or other industrial or intellectual property rights.	

## LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.