

# DATA SHEET

## **BT152B series** Thyristors

Product specification

September 1997



# Thyristors

# BT152B series

## GENERAL DESCRIPTION

Glass 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.

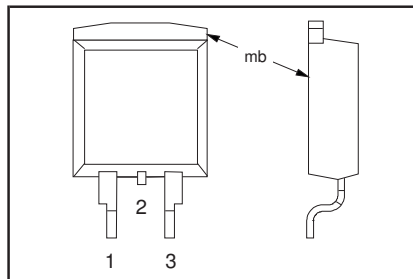
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
$V_{DRM}$	<b>BT152B-</b> Repetitive peak off-state voltages Average on-state current RMS on-state current Non-repetitive peak on-state current	<b>400R</b>	<b>600R</b>	<b>800R</b>	V
$V_{RRM}$		450	650	800	
$I_{T(AV)}$		13	13	13	A
$I_{T(RMS)}$		20	20	20	A
$I_{TSM}$		200	200	200	A

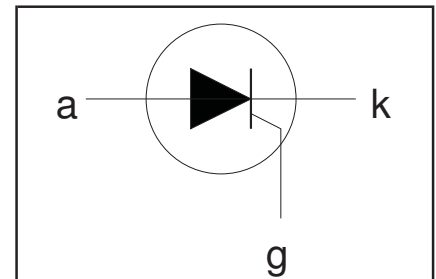
## PINNING - SOT404

PIN	DESCRIPTION
1	cathode
2	anode
3	gate
mb	anode

## PIN CONFIGURATION



## SYMBOL



## LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
				-400R 450 <sup>1</sup>	-600R 650 <sup>1</sup>	-800R 800	
$V_{DRM}$	Repetitive peak off-state voltages		-				V
$I_{T(AV)}$	Average on-state current	half sine wave; $T_{mb} \leq 103\text{ °C}$	-	13			A
$I_{T(RMS)}$	RMS on-state current	all conduction angles	-	20			A
$I_{TSM}$	Non-repetitive peak on-state current	half sine wave; $T_j = 25\text{ °C}$ prior to surge	-	200			A
		$t = 10\text{ ms}$	-	200			A
		$t = 8.3\text{ ms}$	-	220			A
$I^2t$	$I^2t$ for fusing	$t = 10\text{ ms}$	-	200			A <sup>2</sup> s
$di_T/dt$	Repetitive rate of rise of on-state current after triggering	$I_M = 50\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $di_G/dt = 0.2\text{ A}/\mu\text{s}$	-	200			A/ $\mu\text{s}$
$I_{GM}$	Peak gate current		-	5			A
$V_{GM}$	Peak gate voltage		-	5			V
$V_{RGM}$	Peak reverse gate voltage		-	5			V
$P_{GM}$	Peak gate power		-	20			W
$P_{G(AV)}$	Average gate power	over any 20 ms period	-	0.5			W
$T_{stg}$	Storage temperature		-40	150			°C
$T_j$	Operating junction temperature		-	125			°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/ $\mu\text{s}$ .

## Thyristors

## BT152B series

**THERMAL RESISTANCES**

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base	minimum footprint, FR4 board	-	-	1.1	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient		-	55	-	K/W

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{GT}$	Gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	3	32	mA
$I_L$	Latching current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	25	80	mA
$I_H$	Holding current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	15	60	mA
$V_T$	On-state voltage	$I_T = 40\text{ A}$	-	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	$V_D = V_{DRM(max)}; I_T = 0.1\text{ A}; T_j = 125\text{ °C}$ $V_D = V_{DRM(max)}; V_R = V_{RRM(max)}; T_j = 125\text{ °C}$	0.25	0.4	-	V
			-	0.2	1.0	mA

**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	$V_{DM} = 67\% V_{DRM(max)}; T_j = 125\text{ °C};$ exponential waveform gate open circuit	200	300	-	V/ $\mu$ s
$t_{gt}$	Gate controlled turn-on time	$V_D = V_{DRM(max)}; I_G = 0.1\text{ A}; dI_G/dt = 5\text{ A}/\mu\text{s};$ $I_{TM} = 40\text{ A}$	-	2	-	$\mu$ s
$t_q$	Circuit commutated turn-off time	$V_D = 67\% V_{DRM(max)}; T_j = 125\text{ °C};$ $I_{TM} = 50\text{ A}; V_R = 25\text{ V}; dI_{TM}/dt = 30\text{ A}/\mu\text{s};$ $dV_D/dt = 50\text{ V}/\mu\text{s}; R_{GK} = 100\ \Omega$	-	70	-	$\mu$ s

Thyristors

BT152B series

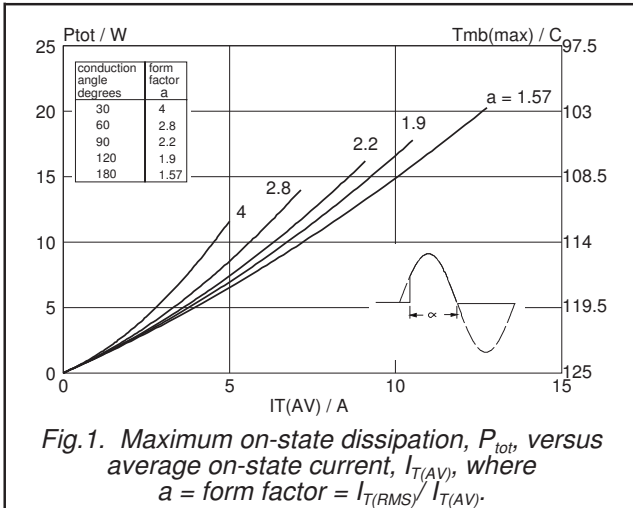


Fig. 1. Maximum on-state dissipation,  $P_{tot}$ , versus average on-state current,  $I_{T(AV)}$ , where  $a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$ .

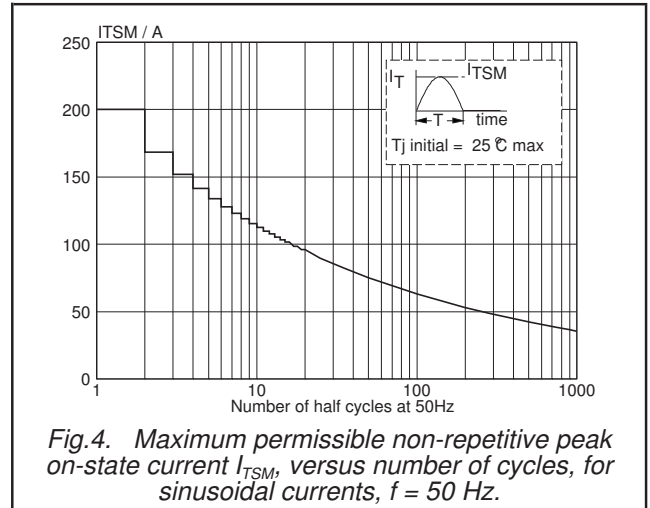


Fig. 4. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus number of cycles, for sinusoidal currents,  $f = 50 \text{ Hz}$ .

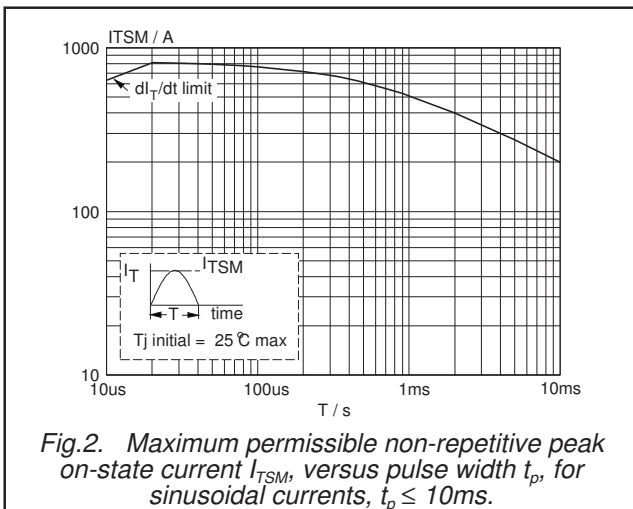


Fig. 2. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus pulse width  $t_p$ , for sinusoidal currents,  $t_p \leq 10 \text{ ms}$ .

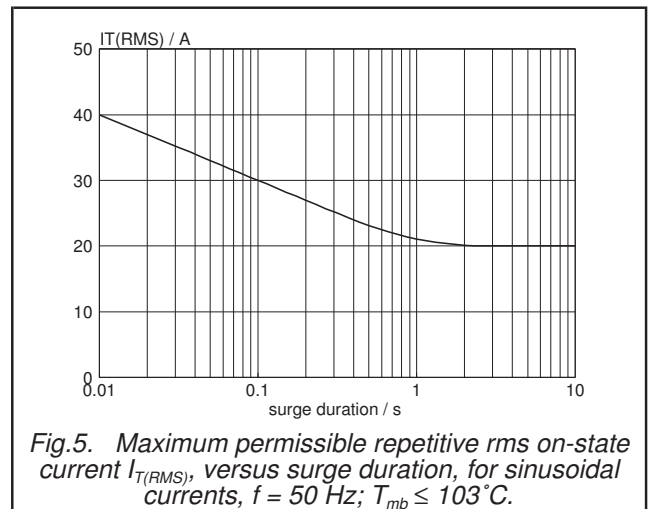


Fig. 5. Maximum permissible repetitive rms on-state current  $I_{T(RMS)}$ , versus surge duration, for sinusoidal currents,  $f = 50 \text{ Hz}$ ;  $T_{mb} \leq 103^\circ\text{C}$ .

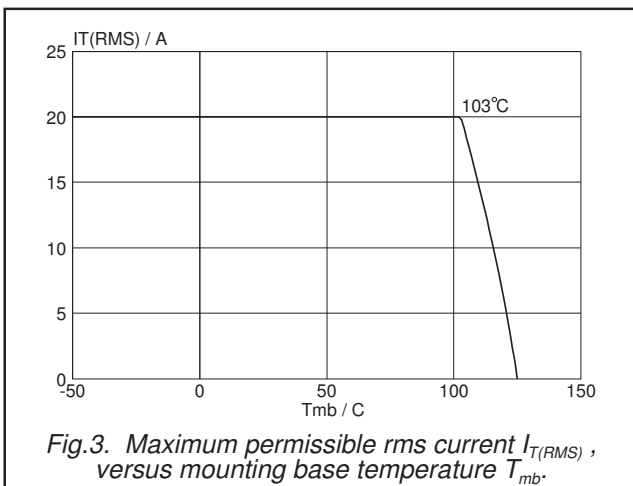


Fig. 3. Maximum permissible rms current  $I_{T(RMS)}$ , versus mounting base temperature  $T_{mb}$ .

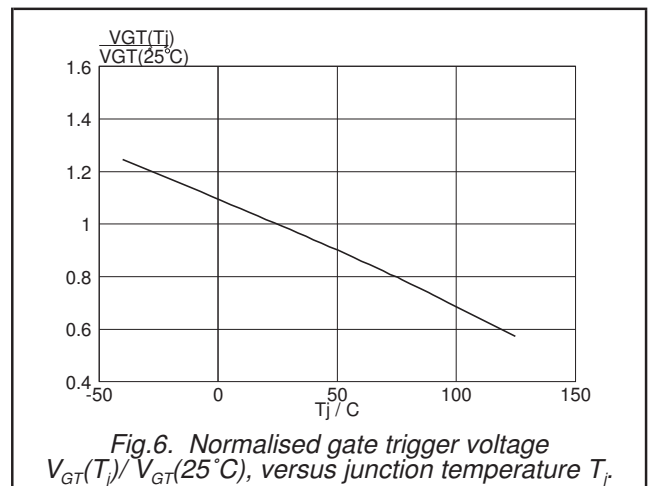
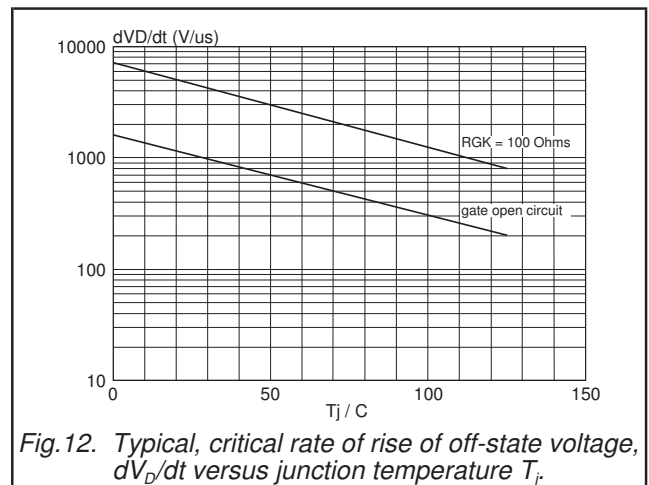
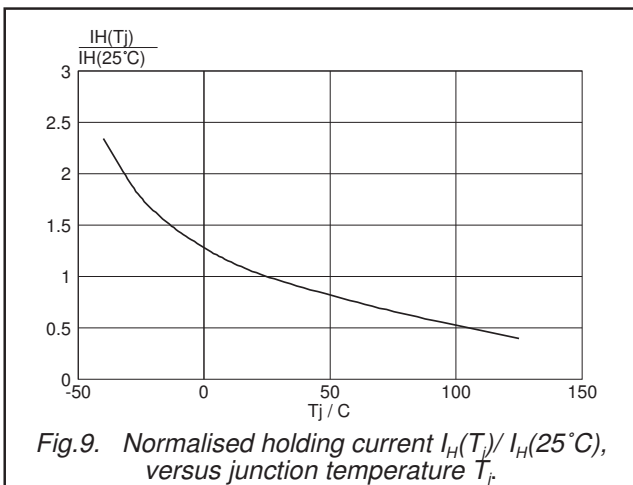
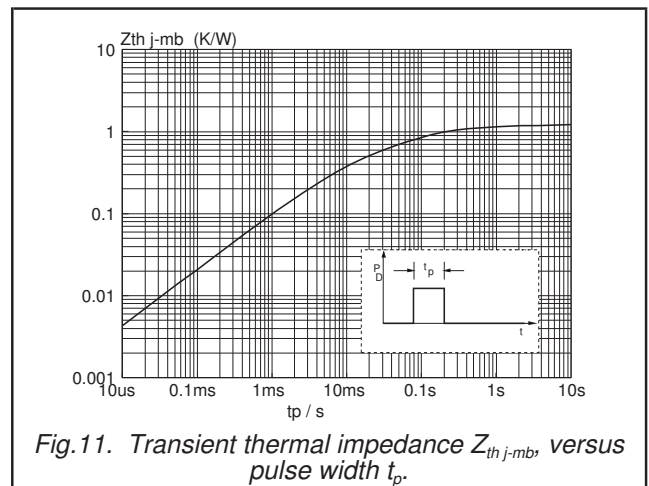
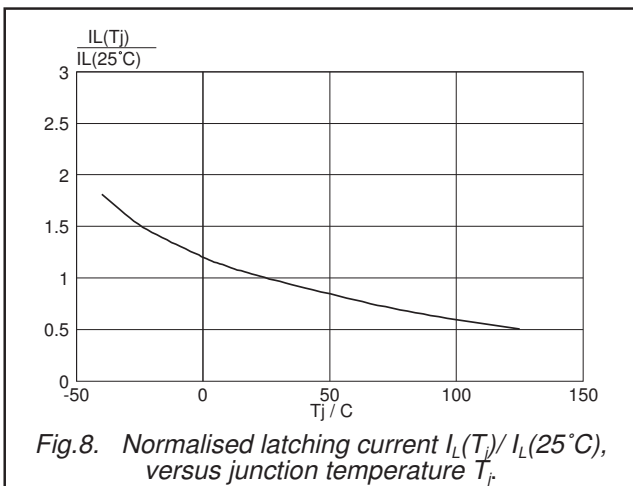
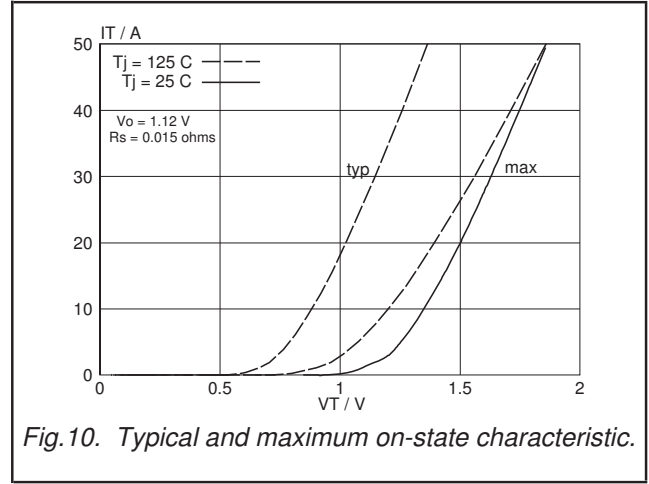
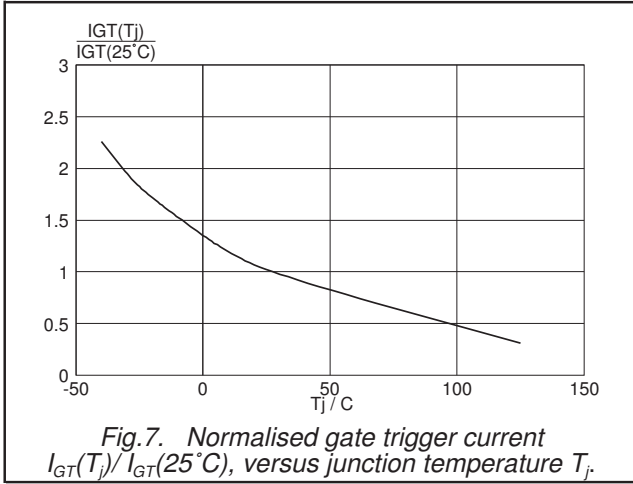


Fig. 6. Normalised gate trigger voltage  $V_{GT}(T_j) / V_{GT}(25^\circ\text{C})$ , versus junction temperature  $T_j$ .

Thyristors

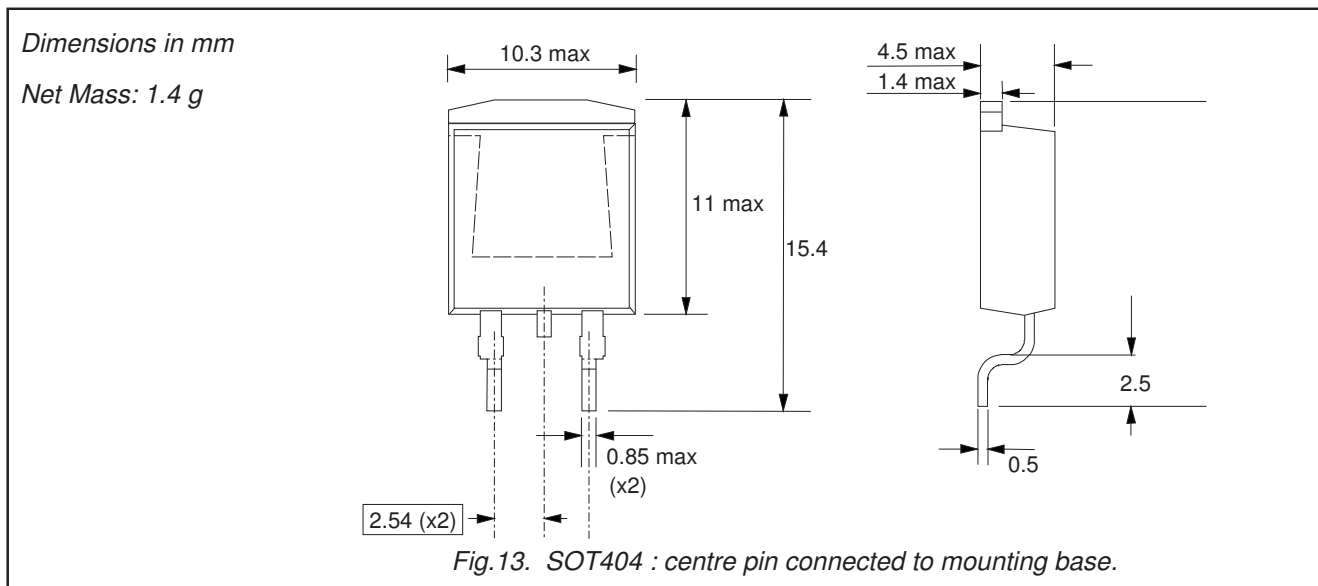
BT152B series



Thyristors

BT152B series

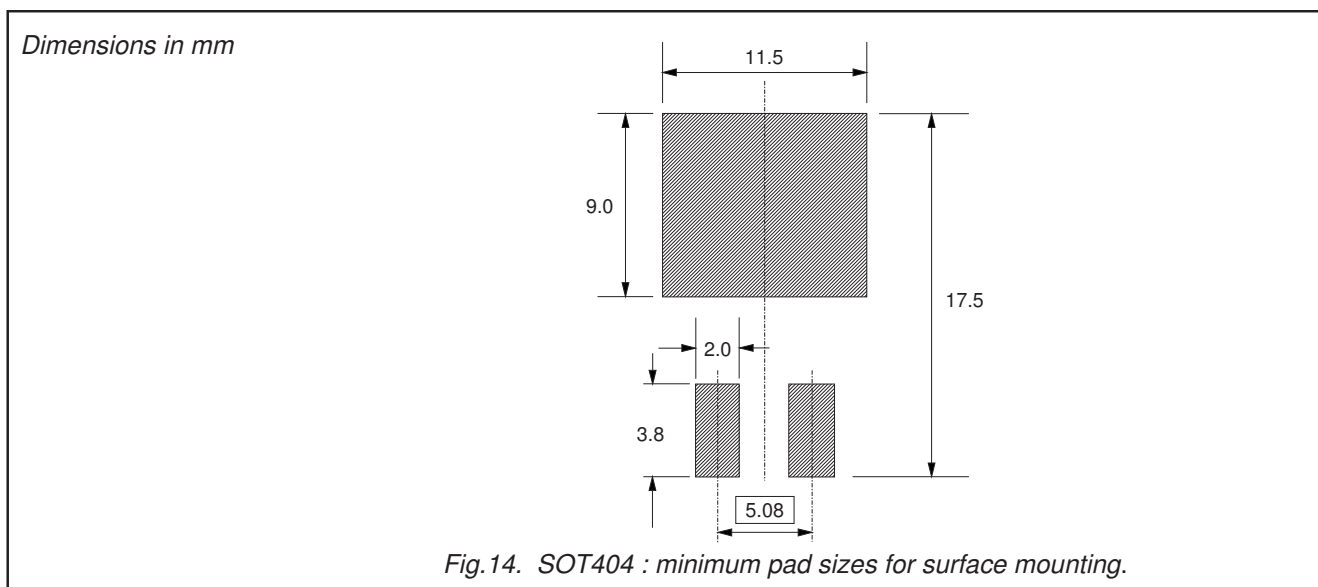
**MECHANICAL DATA**



**Notes**

- 1. Epoxy meets UL94 V0 at 1/8".

**MOUNTING INSTRUCTIONS**



**Notes**

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

## Legal information

### DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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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