

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.

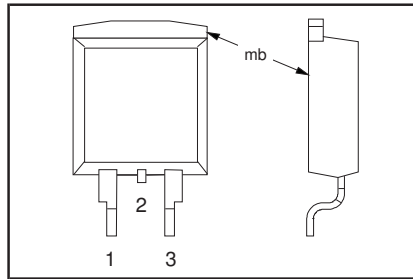
QUICK REFERENCE DATA

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

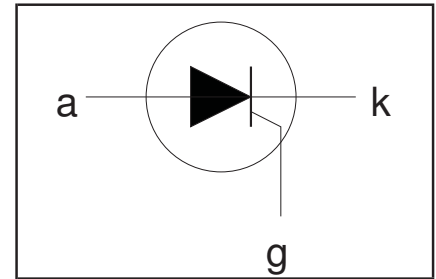
PINNING - SOT404

| 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 ¹ | -600R 650 ¹ | -800R 800 | |
| V_{DRM} | Repetitive peak off-state voltages | | - | | | | V |
| $I_{T(AV)}$ | Average on-state current | half sine wave; $T_{mb} \leq 103\text{ }^\circ\text{C}$ | - | 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; $T_j = 25\text{ }^\circ\text{C}$ prior to surge $t = 10\text{ ms}$ | - | 200 | | | A |
| I^2t | I^2t for fusing | $t = 8.3\text{ ms}$ | - | 220 | | | A |
| di_T/dt | Repetitive rate of rise of on-state current after triggering | $t = 10\text{ ms}$ $I_M = 50\text{ A}; I_G = 0.2\text{ A};$ $di_G/dt = 0.2\text{ A}/\mu\text{s}$ | - | 200 | | | A ² 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 | | | $^\circ\text{C}$ |
| 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 | 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/ μ 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 | - | μ 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 | - | μ s |

Thyristors

BT152B series

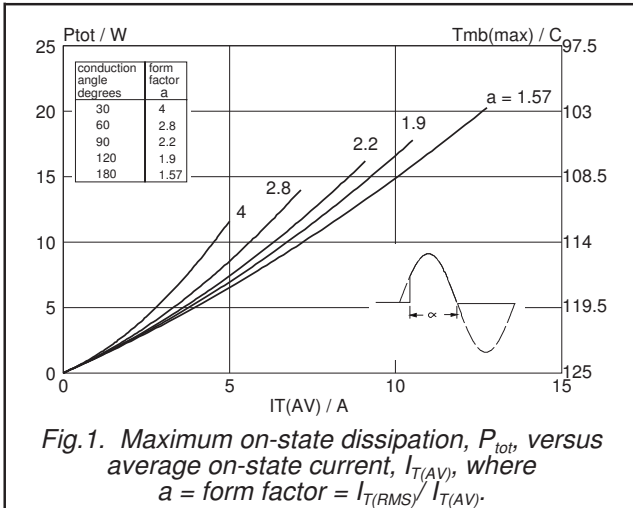


Fig. 1. Maximum on-state dissipation, P_{tot} , versus average on-state current, $I_{T(AV)}$, where $a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$.

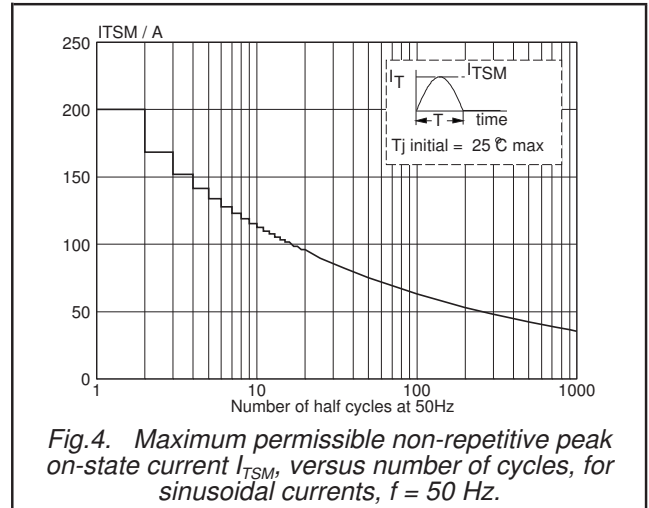


Fig. 4. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50 \text{ Hz}$.

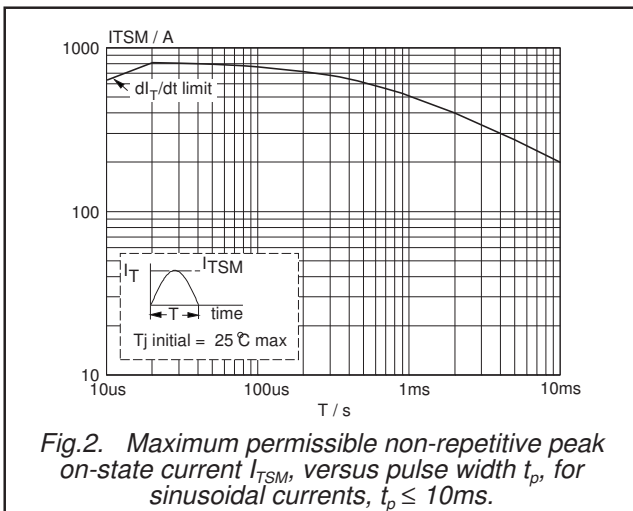


Fig. 2. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 10 \text{ ms}$.

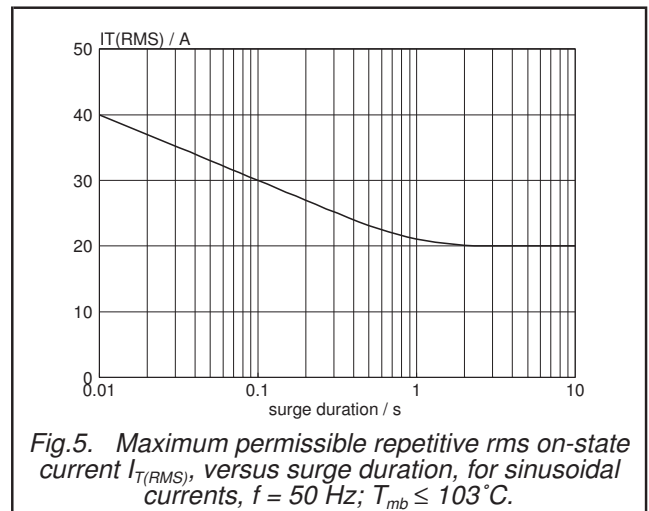


Fig. 5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50 \text{ Hz}$; $T_{mb} \leq 103^\circ\text{C}$.

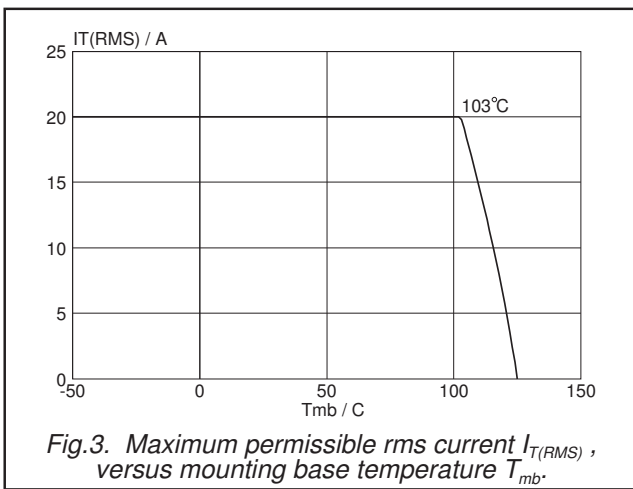


Fig. 3. Maximum permissible rms current $I_{T(RMS)}$, versus mounting base temperature T_{mb} .

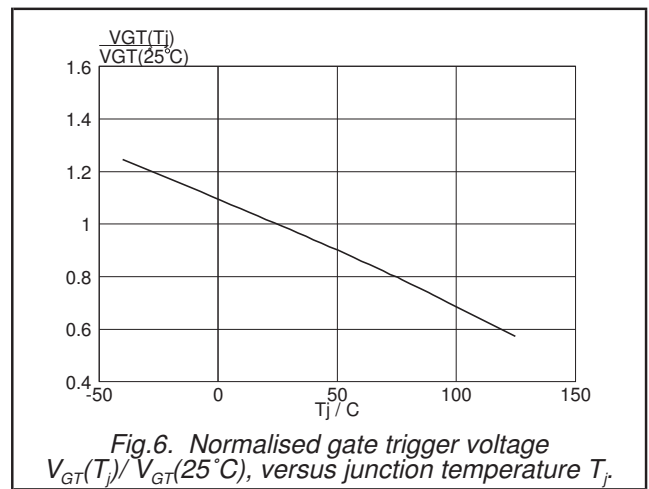
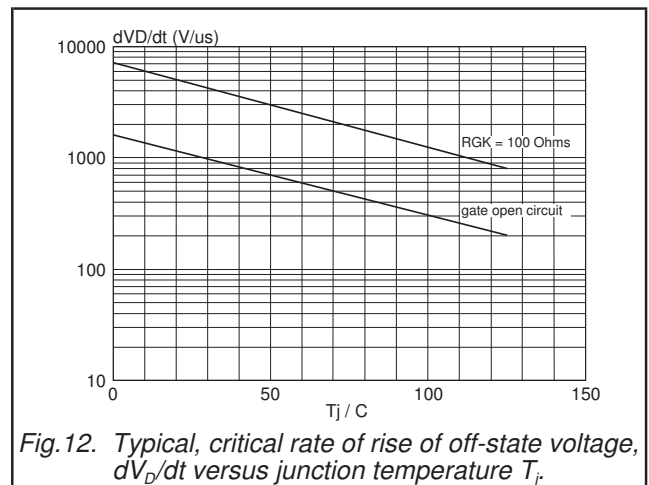
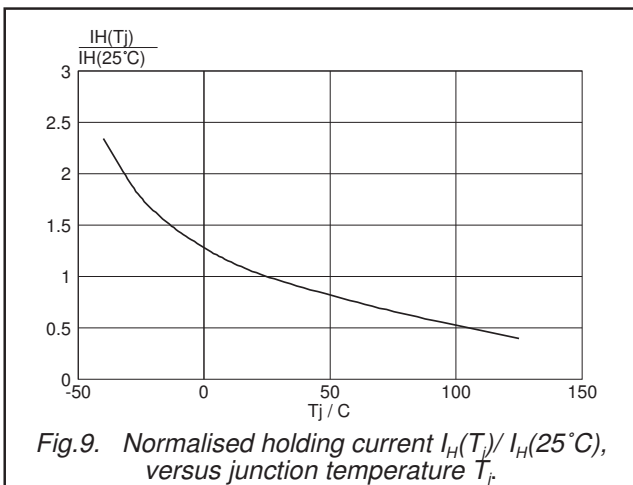
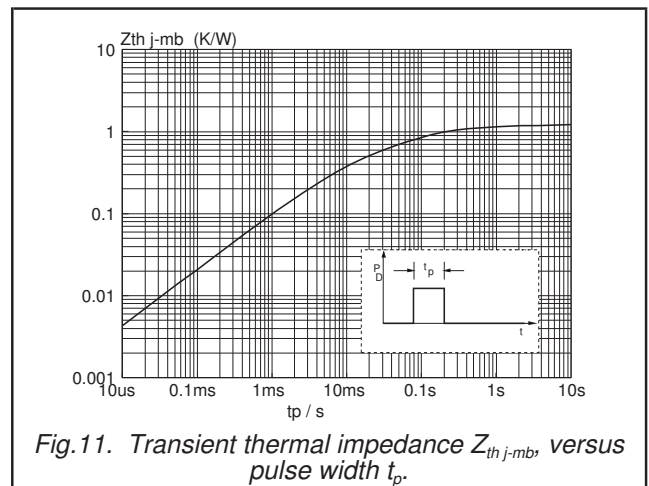
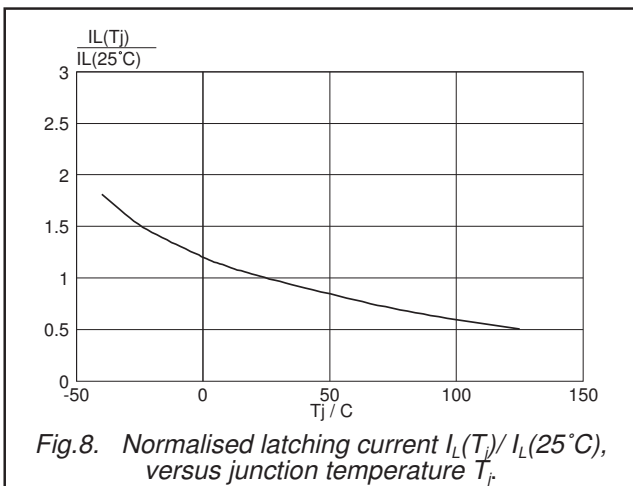
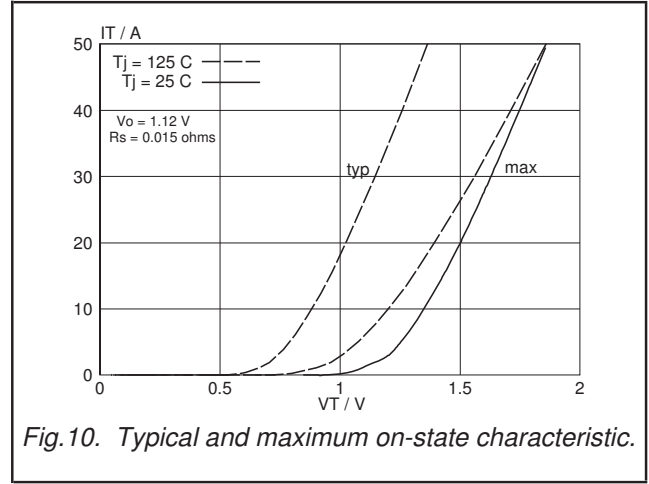
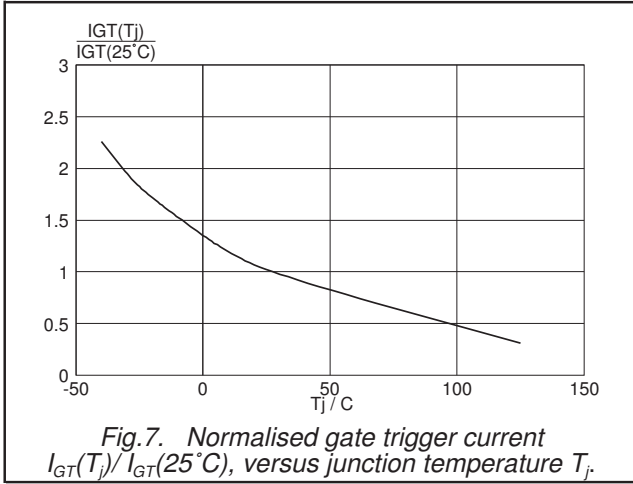


Fig. 6. Normalised gate trigger voltage $V_{GT}(T_j) / V_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

Thyristors

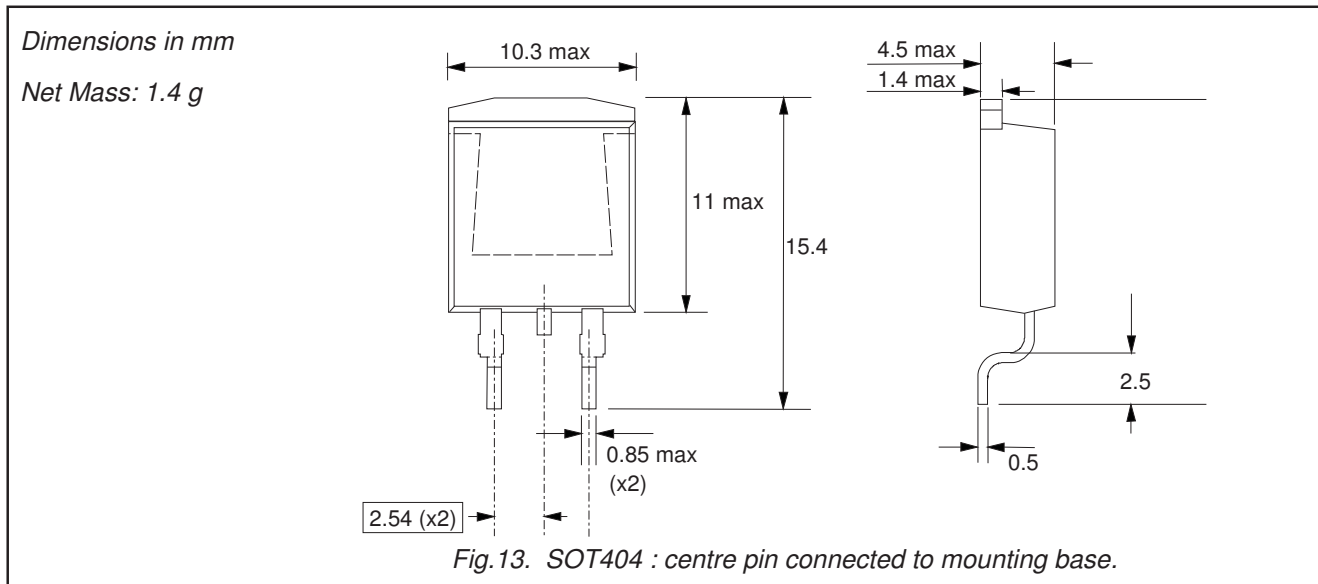
BT152B series



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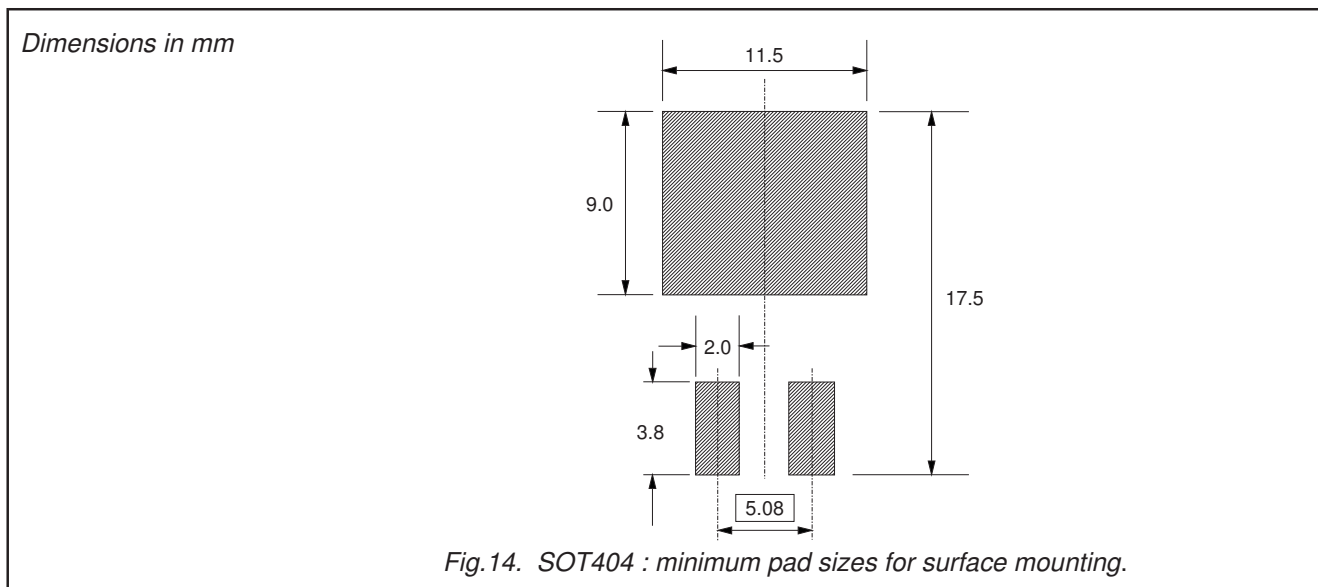
MECHANICAL DATA



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 ⁽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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For sales offices addresses send e-mail to: salesaddresses@nxp.com

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