

1. General description

Planar passivated four quadrant triac in a ITO3P package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This triac will commute the full RMS current at the maximum rated junction temperature ($T_{j(max)} = 150\text{ °C}$). It is used in applications where "high junction operating temperature capability" is required.

2. Features and benefits

- High current TRIAC
- Low thermal resistance
- High junction operating temperature capability ($T_{j(max)} = 150\text{ °C}$)
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Insulated tab rated at 2500 V rms

3. Applications

- High current / high surge applications
- High power / industrial controls -- e.g. heating, motors, lighting

4. Quick reference data

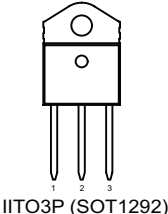
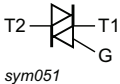
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Values | Unit |
|--------------------------------|--------------------------------------|---|--------|------|
| Absolute maximum rating | | | | |
| V_{DRM} | repetitive peak off-state voltage | | 600 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 105\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | 40 | A |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $t_p = 20\text{ ms}$; $T_{j(init)} = 25\text{ °C}$; Fig. 4 ; Fig. 5 | 400 | A |
| | | full sine wave; $t_p = 16.7\text{ ms}$; $T_{j(init)} = 25\text{ °C}$ | 440 | A |
| T_j | junction temperature | | 150 | °C |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|--|-----|-----|-----|------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+$ $T_j = 25\text{ °C};$ Fig. 7 | - | - | 50 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-$ $T_j = 25\text{ °C};$ Fig. 7 | - | - | 50 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-$ $T_j = 25\text{ °C};$ Fig. 7 | - | - | 50 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G+$ $T_j = 25\text{ °C};$ Fig. 7 | - | - | 70 | mA |
| I_H | holding current | $V_D = 12\text{ V}; T_j = 25\text{ °C};$ Fig. 9 | - | - | 80 | mA |
| V_T | on-state voltage | $I_T = 56.6\text{ A}; T_j = 25\text{ °C};$ Fig. 10 | - | 1.2 | 1.5 | V |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 536\text{ V}; T_j = 125\text{ °C}; (V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 750 | - | - | V/ μ s |
| | | $V_{DM} = 536\text{ V}; T_j = 150\text{ °C}; (V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 500 | - | - | V/ μ s |
| dI_{com}/dt | rate of change of commutating current | $V_D = 400\text{ V}; T_j = 125\text{ °C}; I_{T(RMS)} = 20\text{ A};$ $dV_{com}/dt = 20\text{ V}/\mu\text{s};$ gate open circuit | 20 | - | - | A/ms |
| | | $V_D = 400\text{ V}; T_j = 150\text{ °C}; I_{T(RMS)} = 20\text{ A};$ $dV_{com}/dt = 20\text{ V}/\mu\text{s};$ gate open circuit | 10 | - | - | A/ms |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------|--|---|
| 1 | T1 | main terminal 1 |  <p>IITO3P (SOT1292)</p> |  <p>sym051</p> |
| 2 | T2 | main terminal 2 | | |
| 3 | G | gate | | |
| mb | n.c. | mounting base; isolated | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|-------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| BTA41-600B | IITO3P | BTA41-600BQ | Tube | 30 | SOT1292 | 21-Jul-2017 |

7. Marking

Table 4. Marking codes

| Type number | Marking codes |
|-------------|---------------|
| BTA41-600B | BTA41-600B |

8. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Values | Unit |
|--------------|--------------------------------------|--|------------|------------------------|
| V_{DRM} | repetitive peak off-state voltage | | 600 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 105^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | 40 | A |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $t_p = 20\text{ ms}$; $T_{j(\text{init})} = 25^{\circ}\text{C}$; Fig. 4 ; Fig. 5 | 400 | A |
| | | full sine wave; $t_p = 16.7\text{ ms}$; $T_{j(\text{init})} = 25^{\circ}\text{C}$ | 440 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ms}$; sine wave | 800 | A^2/s |
| dI_T/dt | rate of rise of on-state current | $I_G = 150\text{mA}$ | 150 | $\text{A}/\mu\text{s}$ |
| I_{GM} | peak gate current | $t_p = 20\mu\text{s}$ | 8 | A |
| P_{GM} | peak gate power | $t_p = 20\mu\text{s}$ | 40 | W |
| $P_{G(AV)}$ | average gate power | over any 20 ms period | 1 | W |
| T_{stg} | storage temperature | | -40 to 150 | $^{\circ}\text{C}$ |
| T_j | junction temperature | | 150 | $^{\circ}\text{C}$ |

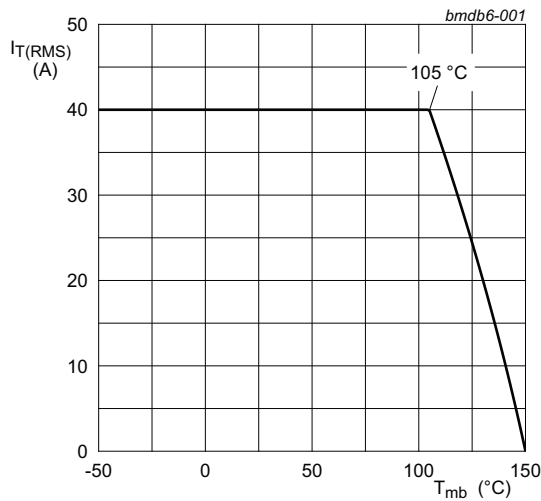
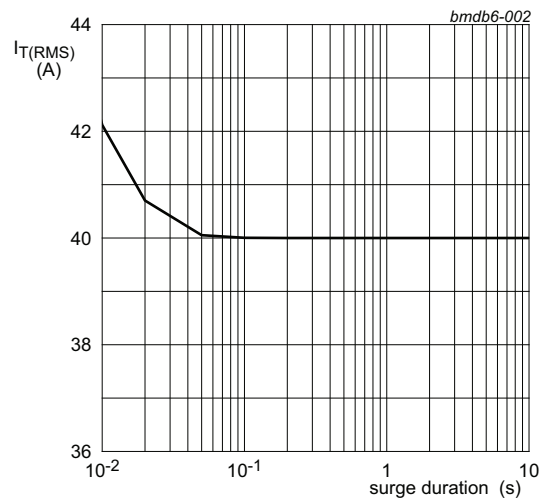


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{Hz}$; $T_{mb} = 105^{\circ}\text{C}$

Fig. 2. RMS on-state current as a function of surge duration; maximum values

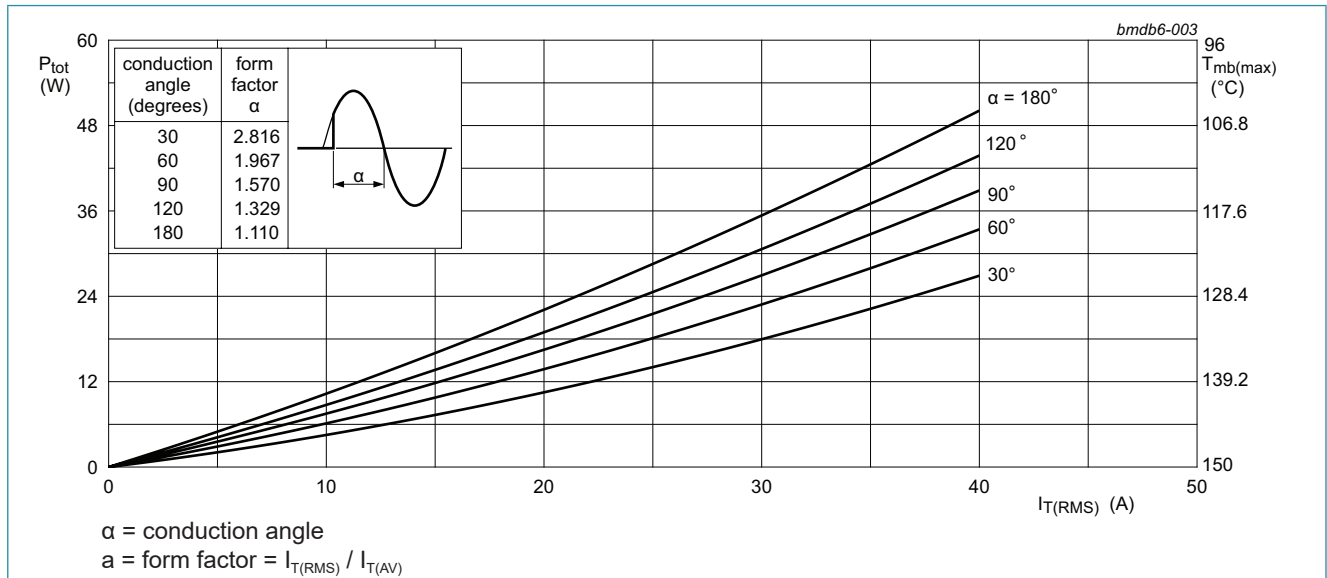


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

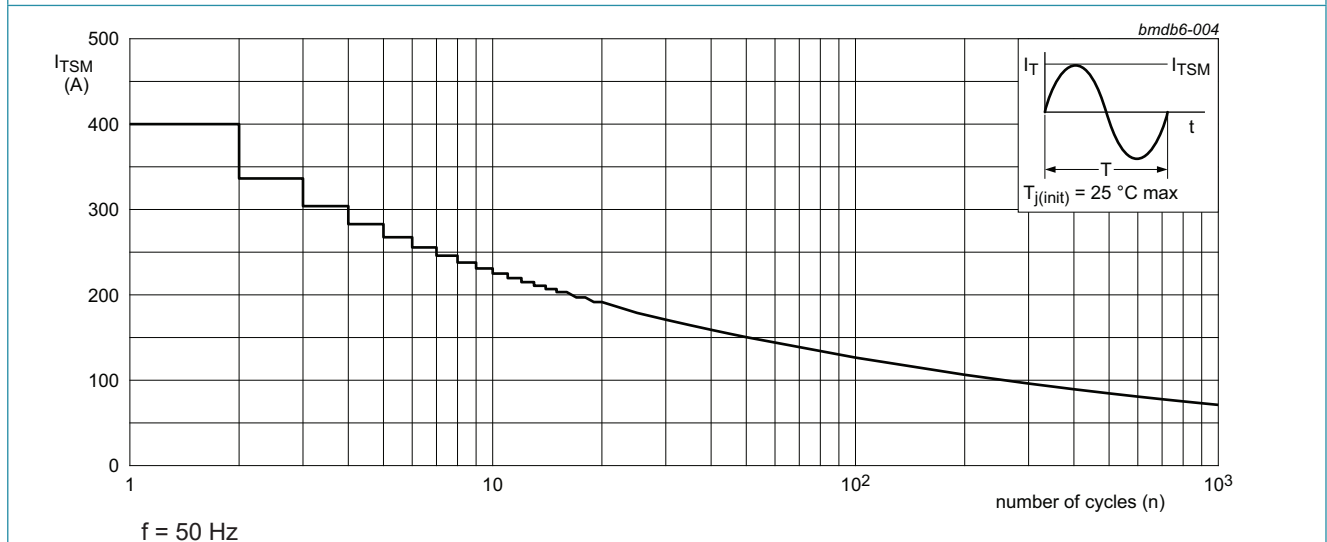


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

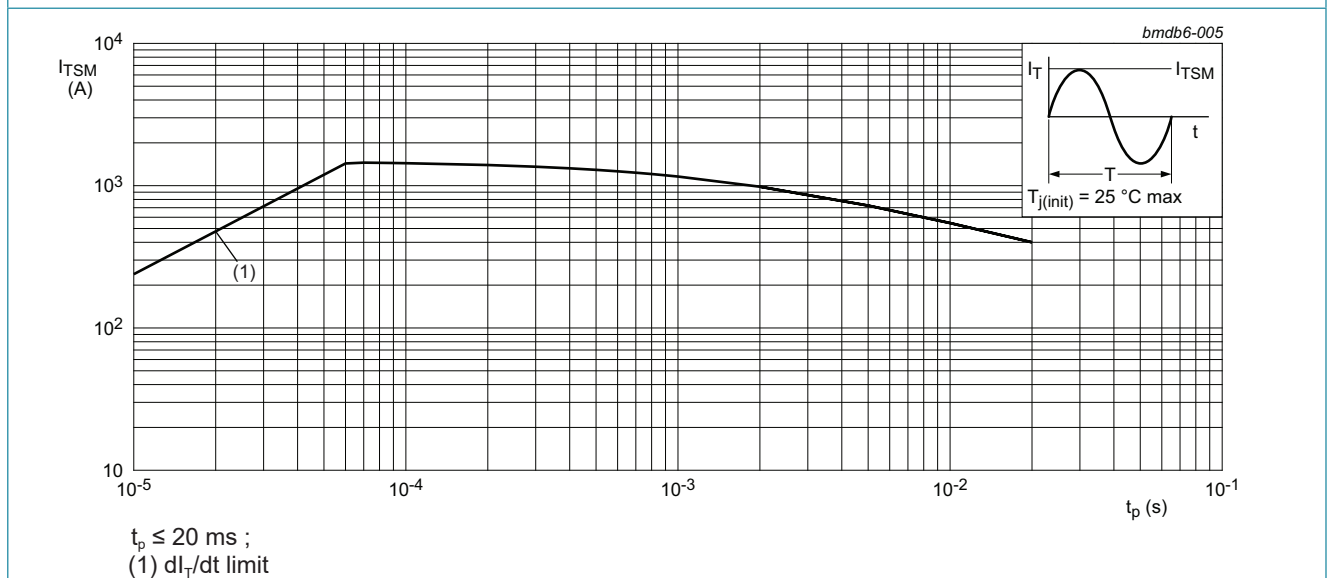
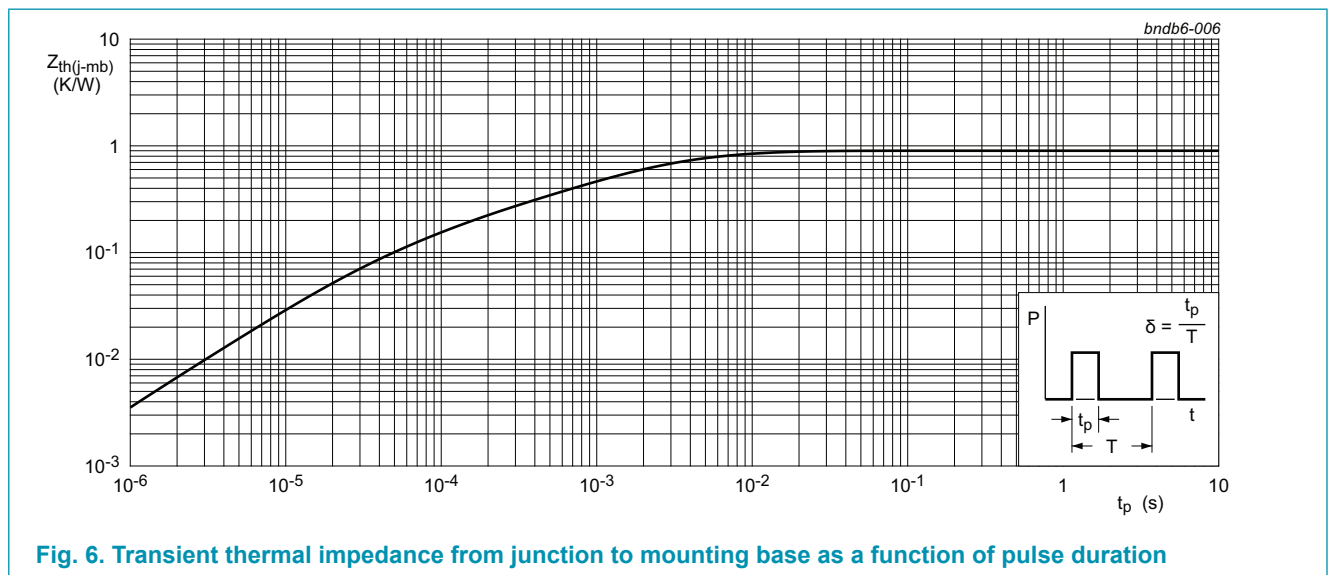


Fig. 5. Total power dissipation as a function of RMS on-state current; maximum values

9. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | Fig. 6 | - | - | 0.9 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 50 | - | K/W |



10. Isolation characteristics

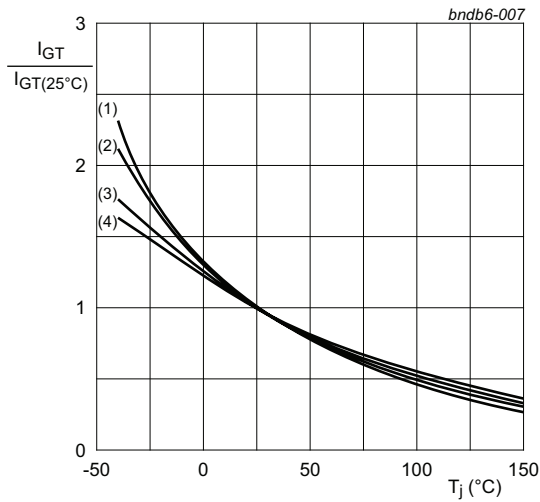
Table 6. Isolation characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------|-----------------------|--|-----|-----|------|------|
| $V_{isol(RMS)}$ | RMS isolation voltage | from all terminal to external heatsink; sinusoidal waveform; clean and dust free; 50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; T _h = 25 °C | - | - | 2500 | V |

11. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|--|-----|------|-----|------------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+;$ $T_J = 25\text{ °C};$ Fig. 7 | - | - | 50 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-;$ $T_J = 25\text{ °C};$ Fig. 7 | - | - | 50 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-;$ $T_J = 25\text{ °C};$ Fig. 7 | - | - | 50 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G+;$ $T_J = 25\text{ °C};$ Fig. 7 | - | - | 70 | mA |
| I_L | latching current | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+;$ $T_J = 25\text{ °C};$ Fig. 8 | - | - | 100 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-;$ $T_J = 25\text{ °C};$ Fig. 8 | - | - | 160 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-;$ $T_J = 25\text{ °C};$ Fig. 8 | - | - | 100 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G+;$ $T_J = 25\text{ °C};$ Fig. 8 | - | - | 100 | mA |
| I_H | holding current | $V_D = 12\text{ V}; T_J = 25\text{ °C};$ Fig. 9 | - | - | 80 | mA |
| V_T | on-state voltage | $I_T = 56.6\text{ A}; T_J = 25\text{ °C};$ Fig. 10 | - | 1.2 | 1.5 | V |
| V_{GT} | gate trigger voltage | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_J = 25\text{ °C};$ Fig. 11 | - | 0.8 | 1.3 | V |
| | | $V_D = 400\text{ V}; I_T = 0.1\text{ A}; T_J = 150\text{ °C};$ Fig. 11 | 0.2 | 0.45 | - | V |
| I_D | off-state current | $V_D = 600\text{ V}; T_J = 25\text{ °C}$ | - | - | 10 | μA |
| | | $V_D = 600\text{ V}; T_J = 150\text{ °C}$ | - | - | 2.5 | mA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 536\text{ V}; T_J = 125\text{ °C}; (V_{DM} = 67\%$ of $V_{DRM});$ exponential waveform; gate open circuit | 750 | - | - | V/ μs |
| | | $V_{DM} = 536\text{ V}; T_J = 150\text{ °C}; (V_{DM} = 67\%$ of $V_{DRM});$ exponential waveform; gate open circuit | 500 | - | - | V/ μs |
| dI_{com}/dt | rate of change of commutating current | $V_D = 400\text{ V}; T_J = 125\text{ °C}; I_{T(RMS)} = 20\text{ A};$ $dV_{com}/dt = 20\text{ V}/\mu\text{s};$ gate open circuit | 20 | - | - | A/ms |
| | | $V_D = 400\text{ V}; T_J = 150\text{ °C}; I_{T(RMS)} = 20\text{ A};$ $dV_{com}/dt = 20\text{ V}/\mu\text{s};$ gate open circuit | 10 | - | - | A/ms |



- (1) T2- G+
- (2) T2- G-
- (3) T2+ G-
- (4) T2+ G+

Fig. 7. Normalized gate trigger current as a function of junction temperature

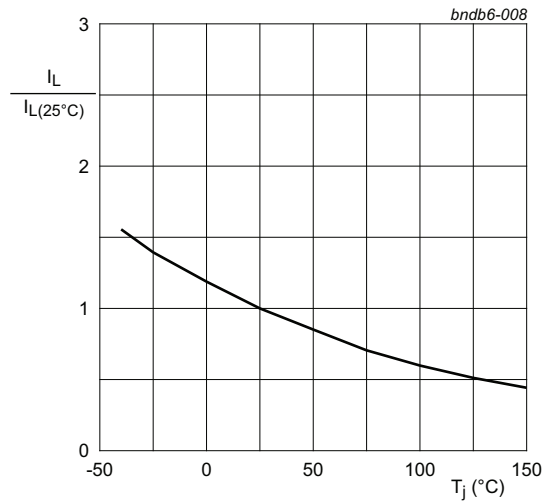


Fig. 8. Normalized latching current as a function of junction temperature

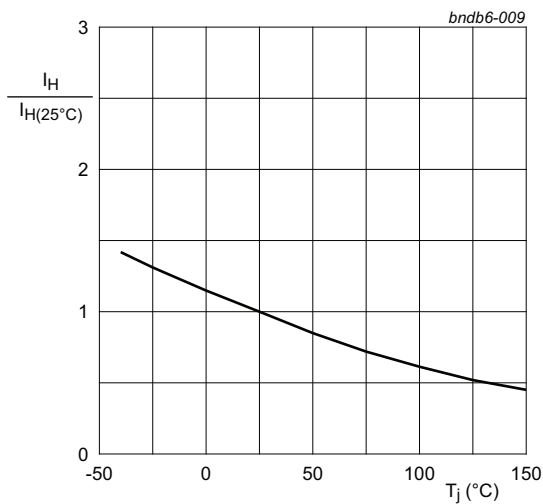
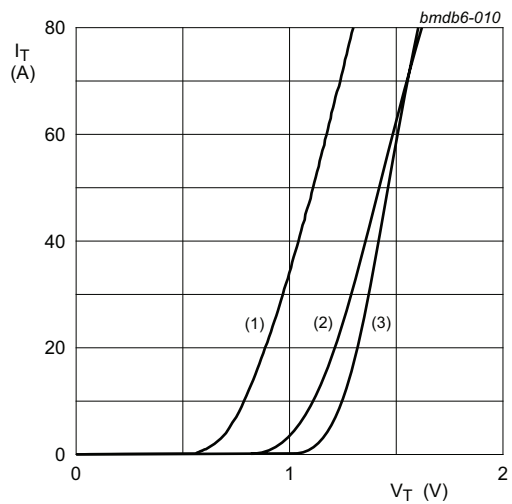


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.063 \text{ V}$; $R_s = 0.0074 \ \Omega$

- (1) $T_j = 150 \text{ }^\circ\text{C}$; typical values
- (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
- (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

Fig. 10. On-state current as a function of on-state voltage

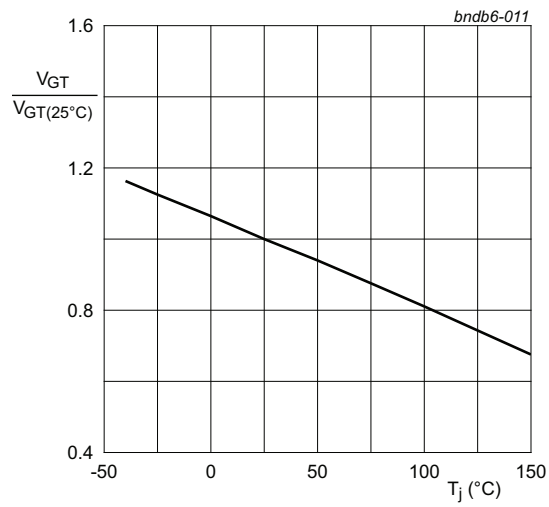
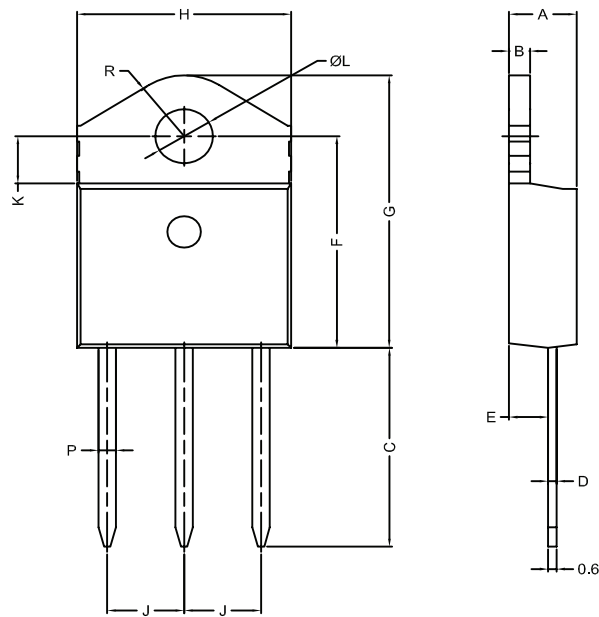


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

12. Package outline

Plastic single-ended through-hole package; isolated heatsink mounted; 1 mounting hole; 3-lead TO3P

SOT1292



| Unit | | A | B | C | D | E | F | G | H | J | K | L | P | R |
|------|-----|------|------|-------|------|------|-------|-------|-------|------|------|------|------|---------------|
| mm | min | 4.75 | 1.45 | 14.35 | 0.50 | 2.70 | 15.80 | 20.40 | 15.10 | 5.40 | 3.40 | 4.08 | 1.20 | 4.6 (typ.) |
| | max | 4.95 | 1.55 | 15.60 | 0.70 | 2.90 | 16.50 | 21.10 | 15.50 | 5.65 | 3.65 | 4.17 | 1.40 | |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|--|---------------------|------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT1292 | | - | | | | |

13. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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- [2] The term 'short data sheet' is explained in section "Definitions".
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