



BT137-800

4Q Triac

12 June 2014

Product data sheet

1. General description

Planar passivated four quadrant triac in a SOT78 plastic package intended for use in bidirectional switching and phase control applications.

2. Features and benefits

- High blocking voltage capability
- Less sensitive gate for improved noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in all four quadrants

3. Applications

- General purpose motor control
- General purpose switching

4. Quick reference data

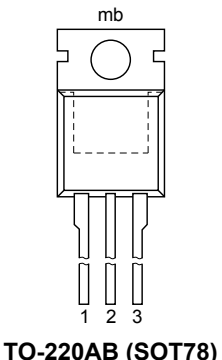
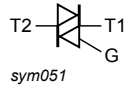
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|--------------------------------------|---|-----|-----|-----|------|
| V_{DRM} | repetitive peak off-state voltage | | - | - | 800 | V |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5 | - | - | 65 | A |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 102\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 8 | A |
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7 | - | 5 | 35 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7 | - | 8 | 35 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7 | - | 11 | 35 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G+; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7 | - | 30 | 70 | mA |



5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------------------|---|---|
| 1 | T1 | main terminal 1 |  <p>TO-220AB (SOT78)</p> |  <p>sym051</p> |
| 2 | T2 | main terminal 2 | | |
| 3 | G | gate | | |
| mb | T2 | mounting base; main terminal 2 | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|----------|--|---------|
| | Name | Description | Version |
| BT137-800 | TO-220AB | plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB | SOT78 |

7. Limiting values

Table 4. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|--------------|--------------------------------------|--|-----|-----|------------------|
| V_{DRM} | repetitive peak off-state voltage | | - | 800 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 102\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 8 | A |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5 | - | 65 | A |
| | | full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$ | - | 71 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; SIN | - | 21 | A ² s |
| di_T/dt | rate of rise of on-state current | $I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; T2+ G+ | - | 50 | A/ μs |
| | | $I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; T2+ G- | - | 50 | A/ μs |
| | | $I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; T2- G- | - | 50 | A/ μs |
| | | $I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; T2- G+ | - | 10 | A/ μs |
| I_{GM} | peak gate current | | - | 2 | A |
| 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 | °C |
| T_j | junction temperature | | - | 125 | °C |

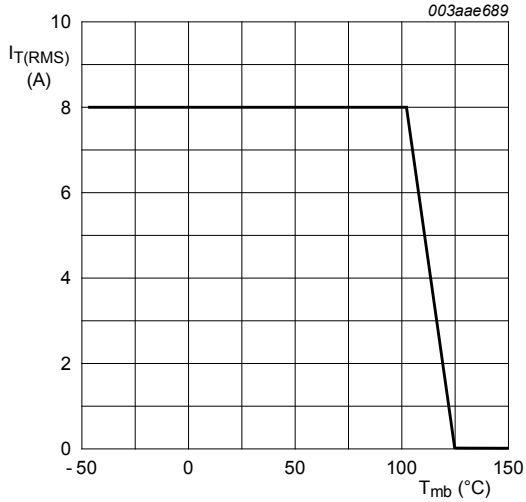
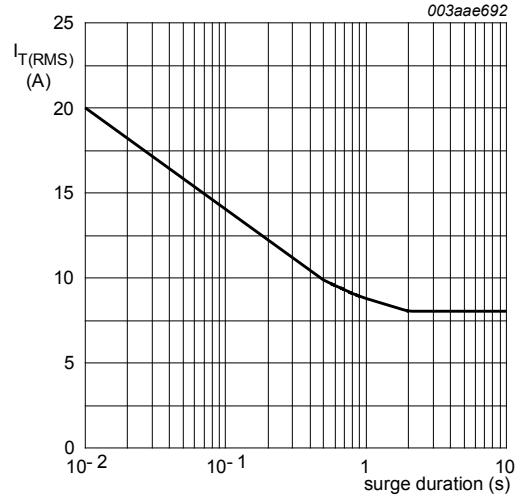
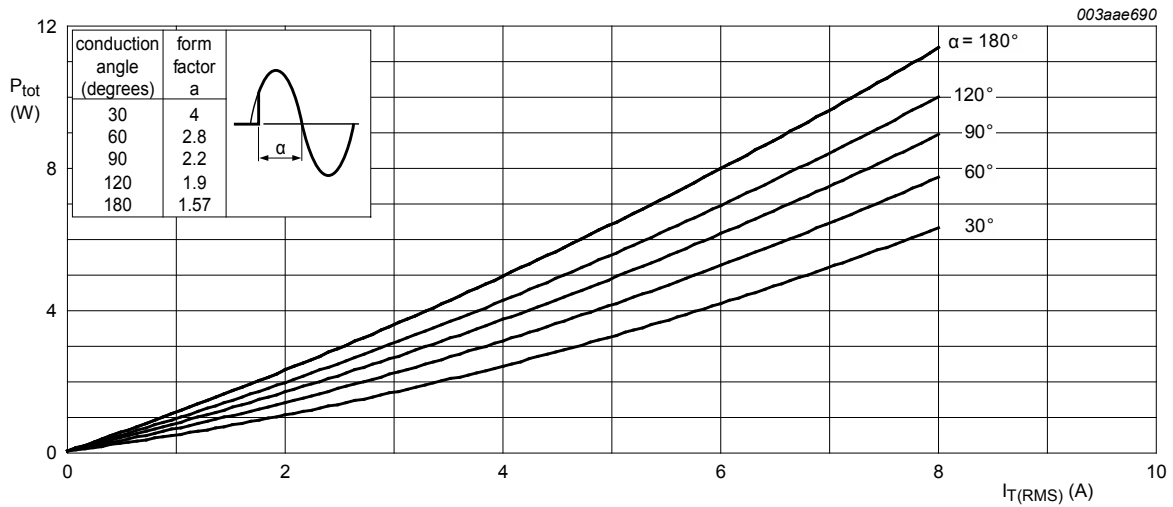


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz
 $T_{mb} \leq 102\text{ }^{\circ}\text{C}$

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



α = conduction angle
 a = form factor = $I_{T(RMS)}/I_{T(AV)}$

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

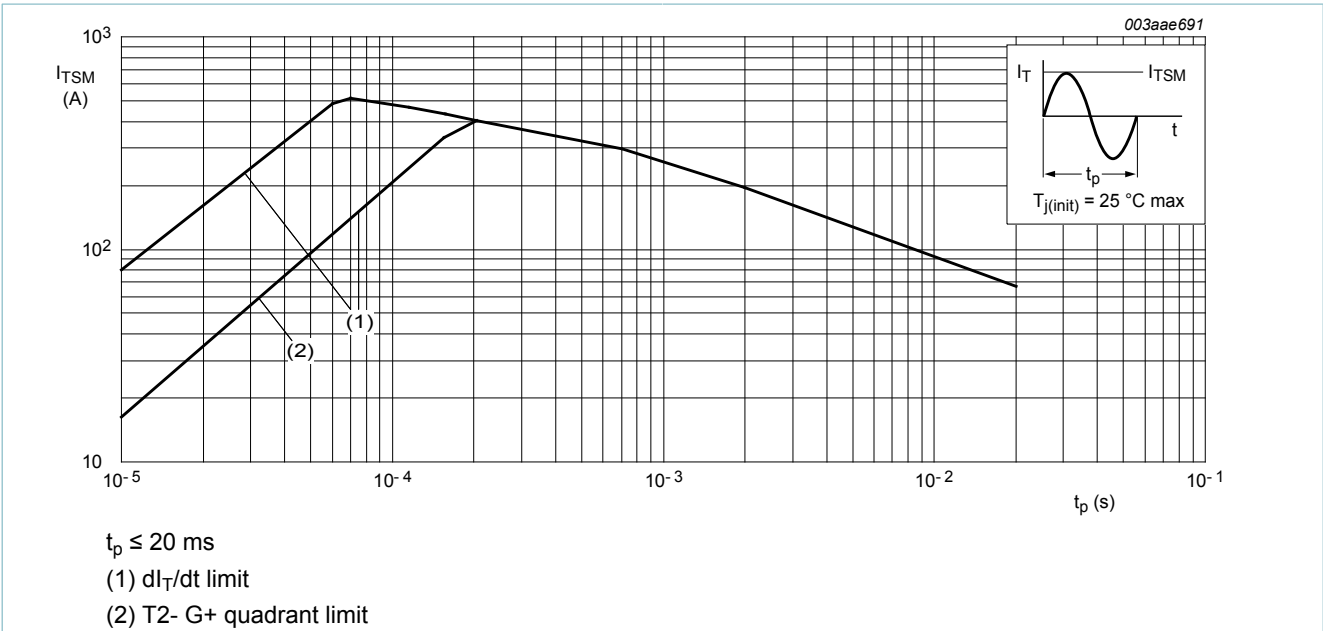


Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

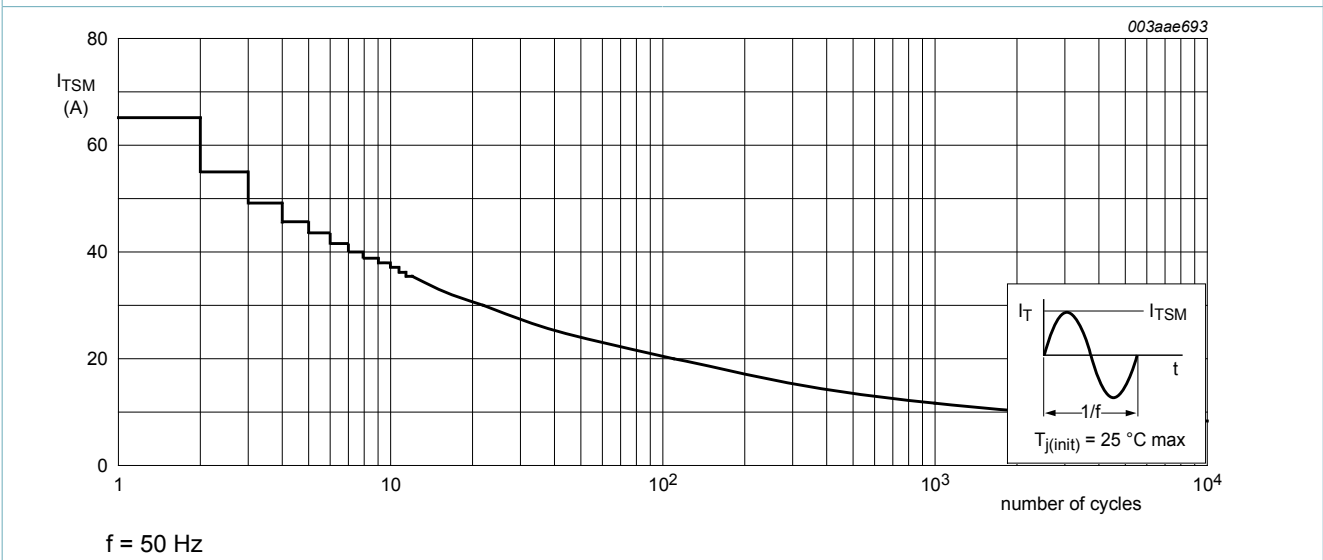


Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|---|------------------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | half cycle; Fig. 6 | - | - | 2.4 | K/W |
| | | full cycle; Fig. 6 | - | - | 2 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | - | 60 | - | K/W |

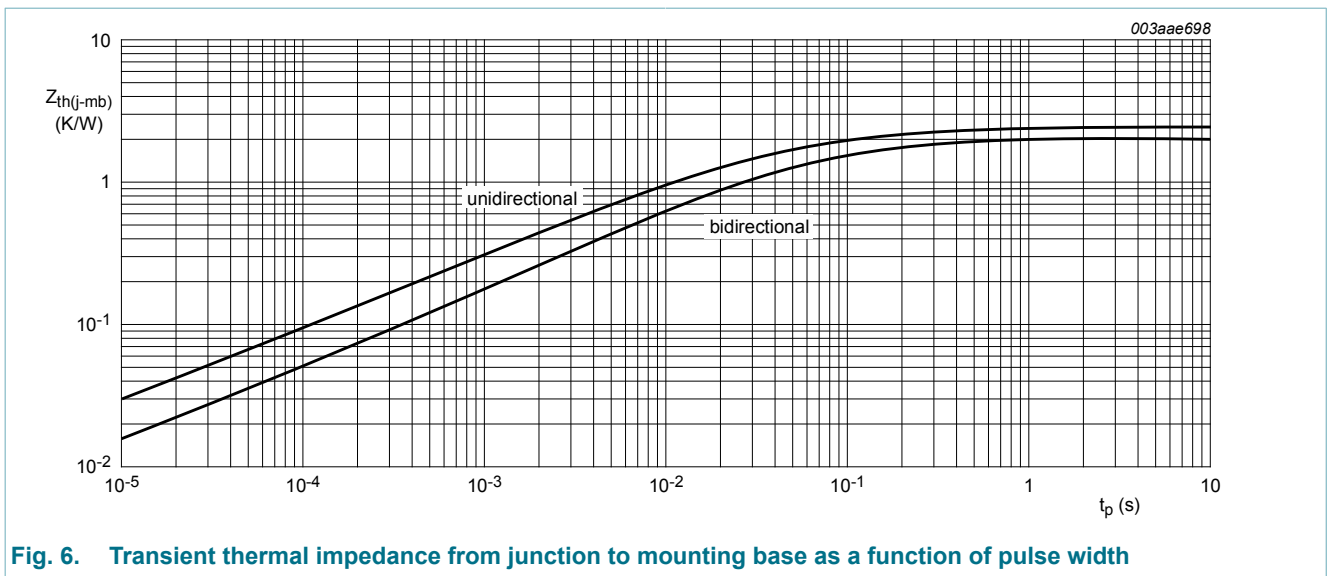


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|---|------|-----|------|------|
| Static characteristics | | | | | | |
| I _{GT} | gate trigger current | V _D = 12 V; I _T = 0.1 A; T2+ G+; T _j = 25 °C; Fig. 7 | - | 5 | 35 | mA |
| | | V _D = 12 V; I _T = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 7 | - | 8 | 35 | mA |
| | | V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; Fig. 7 | - | 11 | 35 | mA |
| | | V _D = 12 V; I _T = 0.1 A; T2- G+; T _j = 25 °C; Fig. 7 | - | 30 | 70 | mA |
| I _L | latching current | V _D = 12 V; I _G = 0.1 A; T2+ G+; T _j = 25 °C; Fig. 8 | - | 7 | 30 | mA |
| | | V _D = 12 V; I _G = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 8 | - | 16 | 45 | mA |
| | | V _D = 12 V; I _G = 0.1 A; T2- G-; T _j = 25 °C; Fig. 8 | - | 5 | 30 | mA |
| | | V _D = 12 V; I _G = 0.1 A; T2- G+; T _j = 25 °C; Fig. 8 | - | 7 | 45 | mA |
| I _H | holding current | V _D = 12 V; T _j = 25 °C; Fig. 9 | - | 5 | 20 | mA |
| V _T | on-state voltage | I _T = 10 A; T _j = 25 °C; Fig. 10 | - | 1.3 | 1.65 | V |
| V _{GT} | gate trigger voltage | V _D = 12 V; I _T = 0.1 A; T _j = 25 °C; Fig. 11 | - | 0.7 | 1 | V |
| | | V _D = 400 V; I _T = 0.1 A; T _j = 125 °C; Fig. 11 | 0.25 | 0.4 | - | V |
| I _D | off-state current | V _D = 800 V; T _j = 125 °C | - | 0.1 | 0.5 | mA |
| Dynamic characteristics | | | | | | |
| dV _D /dt | rate of rise of off-state voltage | V _{DM} = 536 V; T _j = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit | 100 | 250 | - | V/μs |
| dV _{com} /dt | rate of change of commutating voltage | V _D = 400 V; T _j = 95 °C; dI _{com} /dt = 3.6 A/ms; I _T = 8 A; gate open circuit | - | 20 | - | V/μs |
| t _{gt} | gate-controlled turn-on time | I _{TM} = 12 A; V _D = 800 V; I _G = 0.1 A; dI _G /dt = 5 A/μs | - | 2 | - | μs |

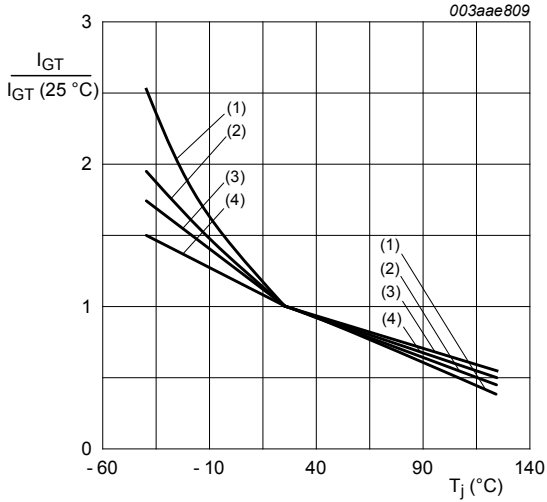


Fig. 7. Normalized gate trigger current as a function of junction temperature

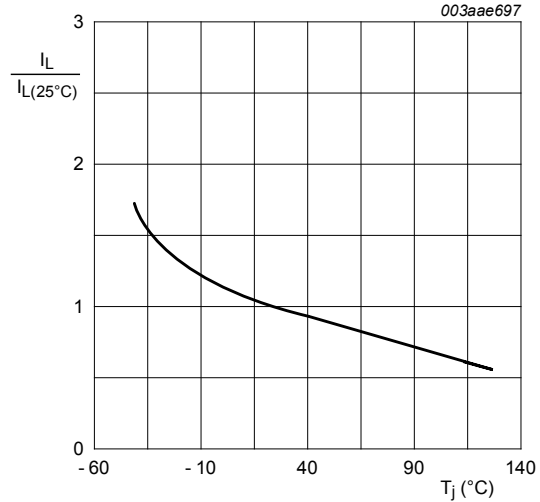


Fig. 8. Normalized latching current as a function of junction temperature

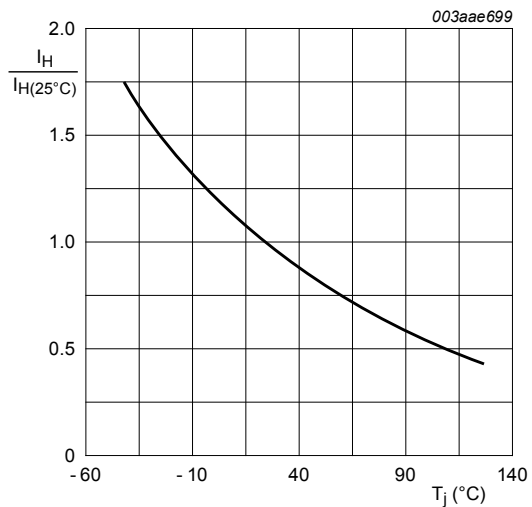
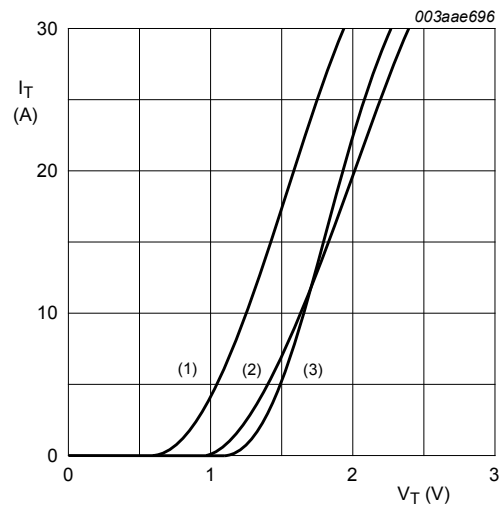


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.264\text{ V}$

$R_s = 0.038\ \Omega$

(1) $T_j = 125^\circ\text{C}$; typical values

(2) $T_j = 125^\circ\text{C}$; maximum values

(3) $T_j = 25^\circ\text{C}$; maximum values

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

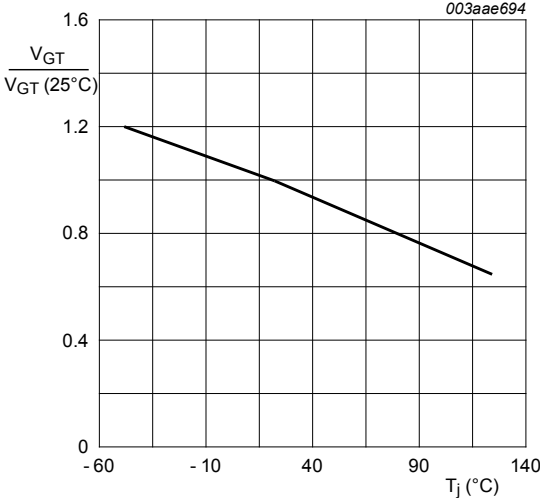
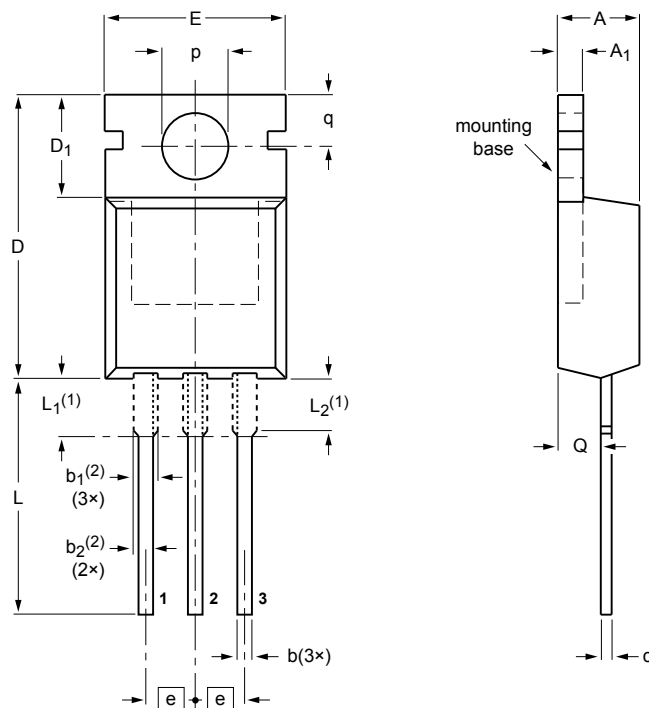


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ | b | b ₁ (2) | b ₂ (2) | c | D | D ₁ | E | e | L | L ₁ (1) | L ₂ (1) max. | p | q | Q |
|------|------------|----------------|------------|--------------------|--------------------|------------|--------------|----------------|-------------|------|--------------|--------------------|-------------------------|------------|------------|------------|
| mm | 4.7 4.1 | 1.40 1.25 | 0.9 0.6 | 1.6 1.0 | 1.3 1.0 | 0.7 0.4 | 16.0 15.2 | 6.6 5.9 | 10.3 9.7 | 2.54 | 15.0 12.8 | 3.30 2.79 | 3.0 | 3.8 3.5 | 3.0 2.7 | 2.6 2.2 |

Notes

- Lead shoulder designs may vary.
- Dimension includes excess dambar.

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-----------------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT78 | | 3-lead TO-220AB | SC-46 | | 08-04-23 08-06-13 |

Fig. 12. Package outline TO-220AB (SOT78)

11. Legal information

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| 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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