

1. General description

Passivated, sensitive gate thyristors in a plastic envelope, intended for use in general purpose switching and phase control applications. These devices are intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

2. Features and benefits

- Sensitive gate
- Planar passivated for voltage ruggedness and reliability
- Direct triggering from low power drivers and logic ICs
- Surface mountable package

3. Applications

- General purpose switching and phase control
- Ignition circuits, CDI for 2- and 3-wheelers
- Motor control - e.g. small kitchen appliances

4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|--------------------------------------|--|-----|-----|-----|------|
| V_{DRM} | repetitive peak off-state voltage | | - | - | 600 | V |
| $I_{T(AV)}$ | average on-state current | half sine wave; $T_{mb} \leq 111\text{ °C}$; Fig. 1 | - | - | 5 | A |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{mb} \leq 111\text{ °C}$; Fig. 2 ; Fig. 3 | - | - | 8 | A |
| I_{TSM} | non-repetitive peak on-state current | half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5 | - | - | 75 | A |
| | | half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$ | - | - | 82 | A |
| T_j | junction temperature | [1] | - | - | 125 | °C |
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 7 | - | 50 | 200 | μA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 100\text{ }\Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; Fig. 12 | 50 | 100 | - | V/μs |

[1] Operation above 110°C may require the use of a gate to cathode resistor of 1kΩ or less.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-----------------------------------|--------------------|----------------|
| 1 | K | cathode | | |
| 2 | A | anode | | |
| 3 | G | gate | | |
| mb | A | mounting base; connected to anode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|-------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| BT258-600R | TO220 | BT258-600R,127 | Tube | 50 | SOT78 | 13-Jun-2008 |

7. Marking

Table 4. Marking codes

| Type number | Marking codes | |
|-------------|-----------------------------|-----------------------------|
| | Assembly factory: d | Assembly factory: A |
| BT258-600R | BT258 600R PJdxxxx xx | BT258 600R PJAxxxx xx |

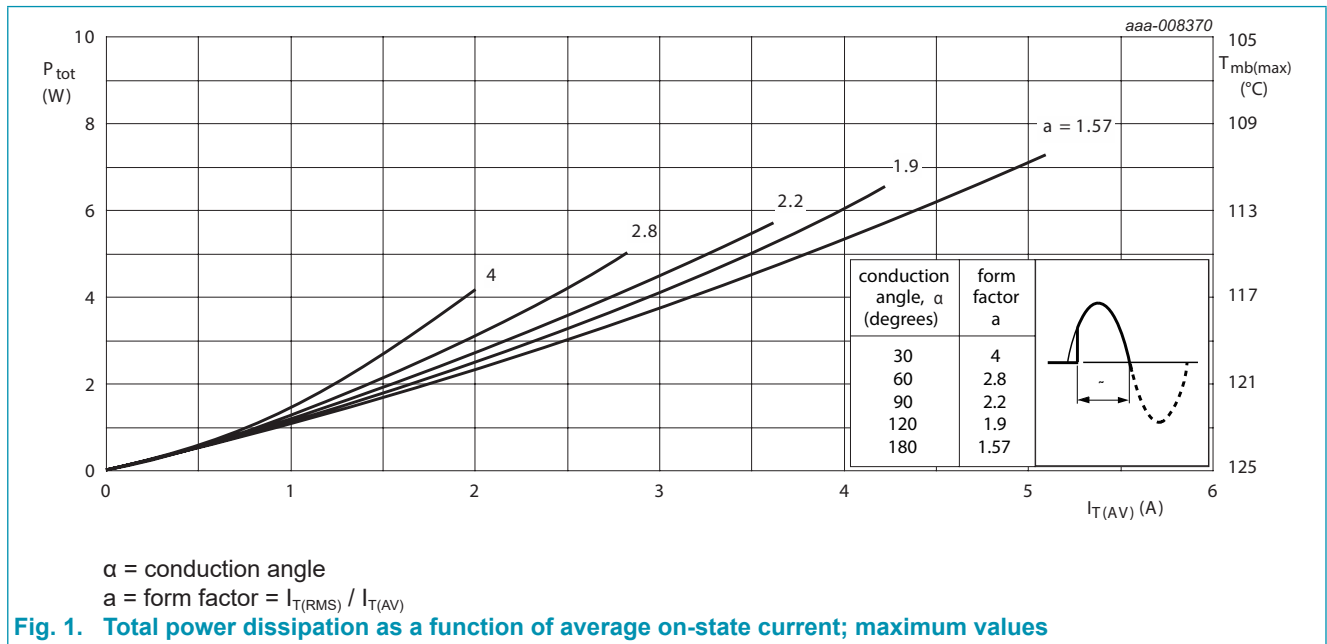
8. Limiting values

Table 5. 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 | | - | 600 | V |
| V_{RRM} | repetitive peak reverse voltage | | - | 600 | V |
| $I_{T(AV)}$ | average on-state current | half sine wave; $T_{mb} \leq 111\text{ }^\circ\text{C}$; Fig. 1 | - | 5 | A |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{mb} \leq 111\text{ }^\circ\text{C}$; Fig. 2; Fig. 3 | - | 8 | A |
| I_{TSM} | non-repetitive peak on-state current | half sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$; Fig. 4; Fig. 5 | - | 75 | A |
| | | half sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 8.3\text{ ms}$ | - | 82 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; SIN | - | 28 | A^2s |
| di_T/dt | rate of rise of on-state current | $I_T = 10\text{ A}$; $I_G = 50\text{ mA}$; $di_G/dt = 50\text{ mA}/\mu\text{s}$ | - | 50 | $\text{A}/\mu\text{s}$ |
| I_{GM} | peak gate current | | - | 2 | A |
| V_{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 | junction temperature | [1] | - | 125 | $^\circ\text{C}$ |

[1] Operation above 110°C may require the use of a gate to cathode resistor of 1kΩ or less.



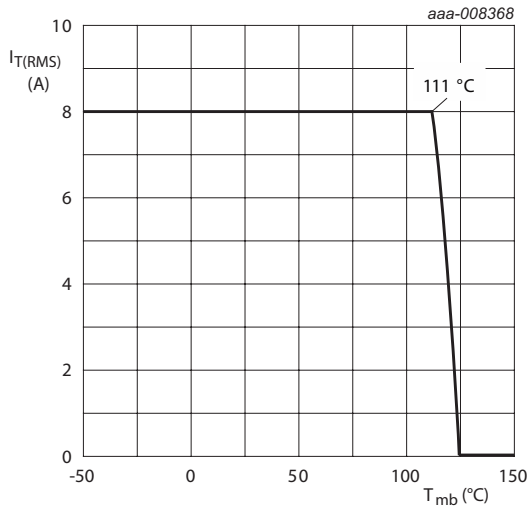


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values

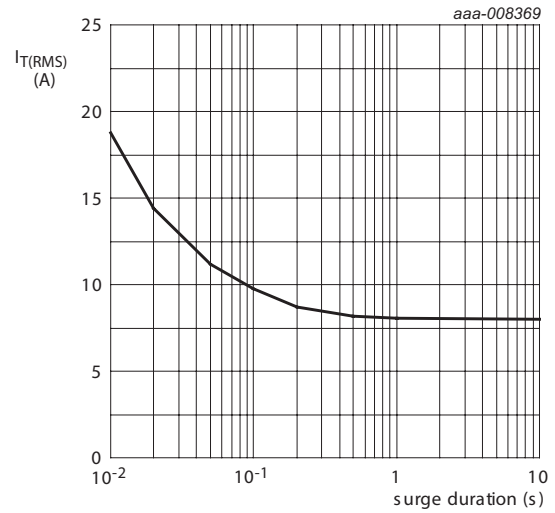


Fig. 3. RMS on-state current as a function of surge duration; maximum values
 $f = 50 \text{ Hz}; T_{mb} = 111 \text{ °C}$

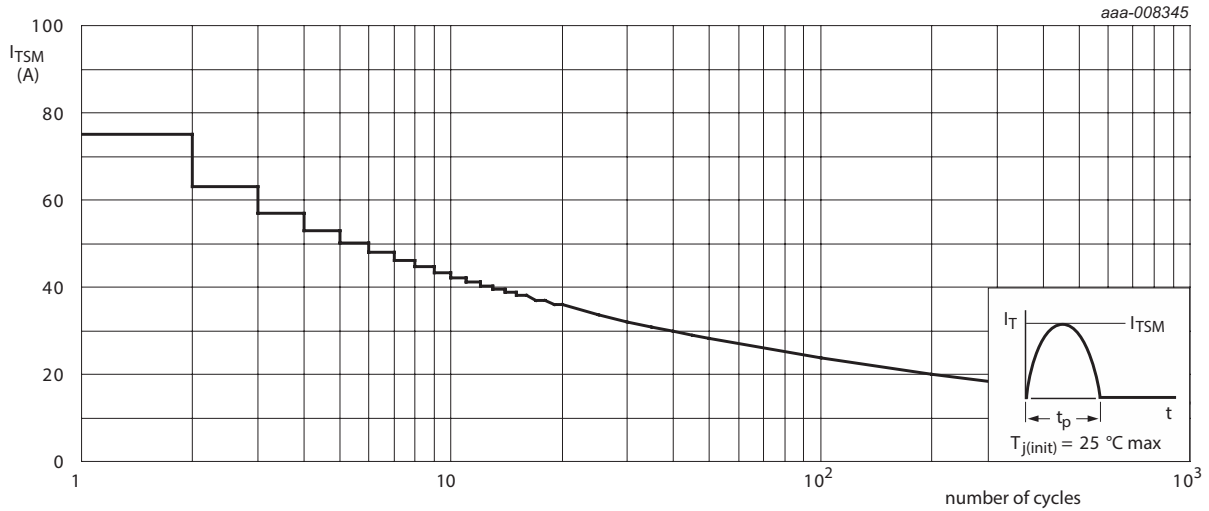
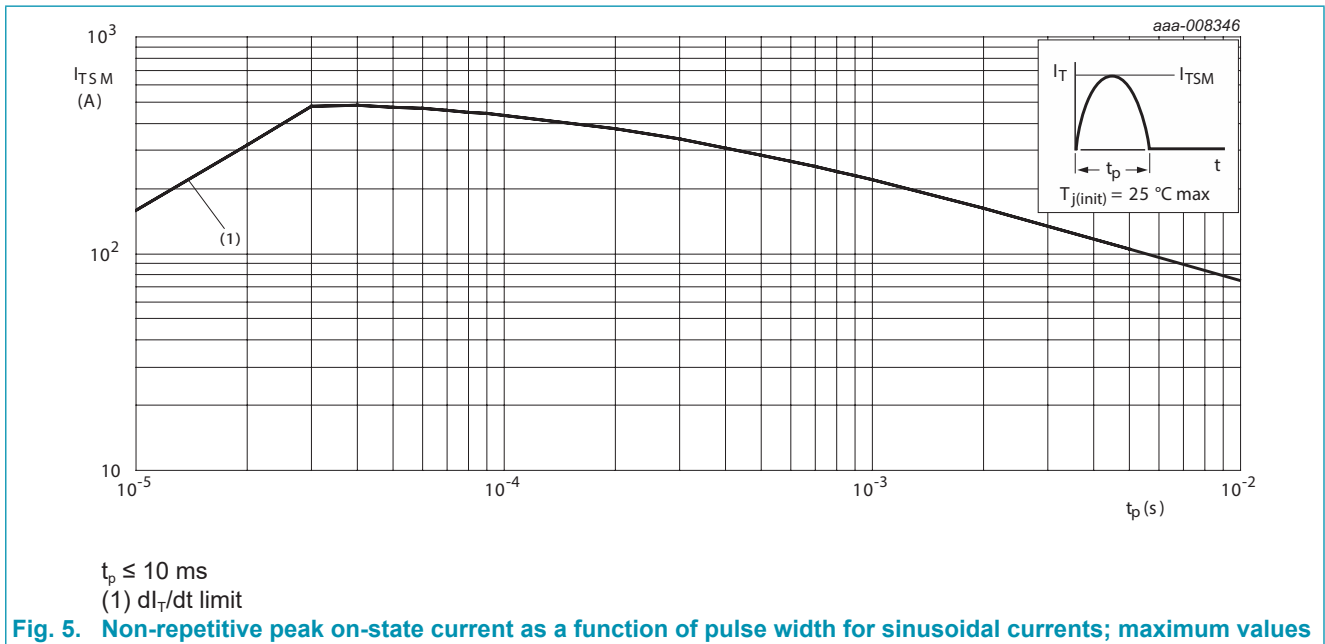


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values
 $f = 50 \text{ Hz}$



9. Thermal characteristics

Table 6. Thermal characteristics

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

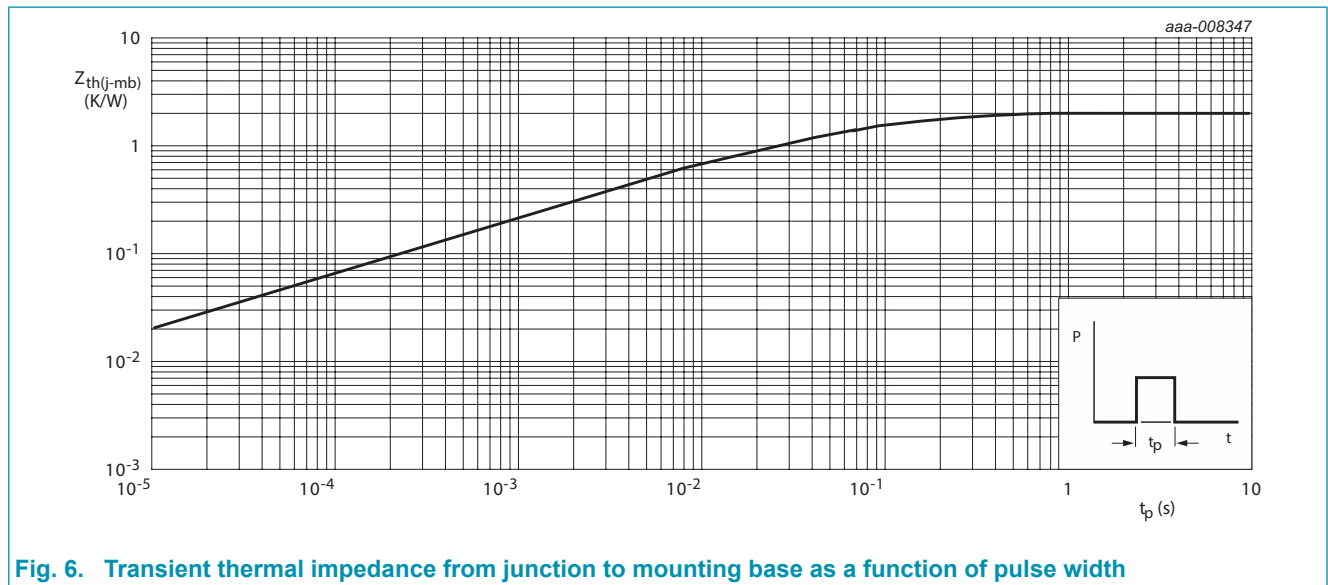
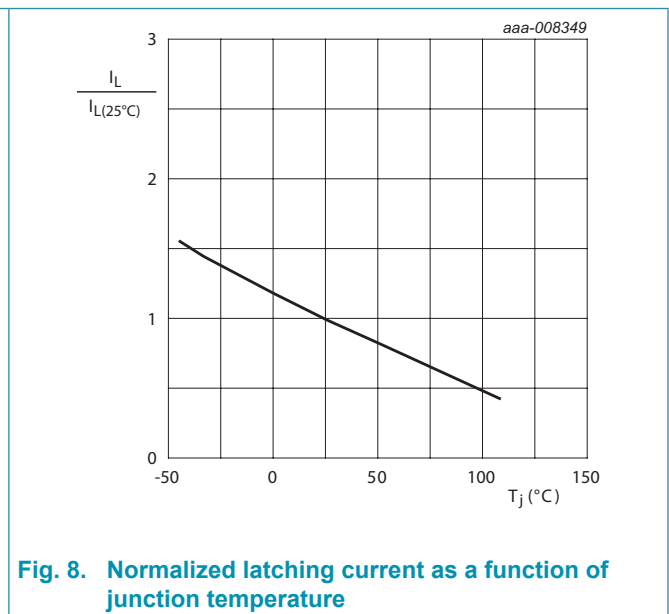
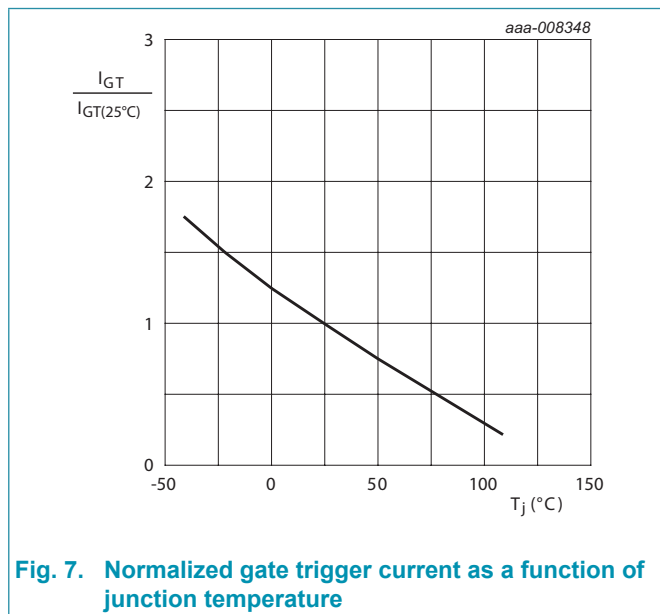


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse width

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-----------------------------------|--|-----|-----|-----|------------------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | - | 50 | 200 | μA |
| I_L | latching current | $V_D = 12\text{ V}; I_G = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C}$; Fig. 8 | - | 0.4 | 10 | mA |
| I_H | holding current | $V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C}$; Fig. 9 | - | 0.4 | 6 | mA |
| V_T | on-state voltage | $I_T = 16\text{ A}; T_j = 25\text{ }^\circ\text{C}$; Fig. 10 | - | 1.3 | 1.6 | V |
| V_{GT} | gate trigger voltage | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C}$; Fig. 11 | - | 0.4 | 1 | V |
| | | $V_D = 600\text{ V}; I_T = 0.1\text{ A}; T_j = 110\text{ }^\circ\text{C}$ | 0.1 | 0.2 | - | V |
| I_D | off-state current | $V_D = 600\text{ V}; T_j = 125\text{ }^\circ\text{C}$ | - | 0.1 | 0.5 | mA |
| I_R | reverse current | $V_R = 600\text{ V}; T_j = 125\text{ }^\circ\text{C}$ | - | 0.1 | 0.5 | mA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 402\text{ V}; T_j = 125\text{ }^\circ\text{C}; R_{GK} = 100\text{ }\Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; Fig. 12 | 50 | 100 | - | $\text{V}/\mu\text{s}$ |
| t_{gt} | gate-controlled turn-on time | $I_{TM} = 10\text{ A}; V_D = 600\text{ V}; I_G = 5\text{ mA}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}$ | - | 2 | - | μs |
| t_q | commutated turn-off time | $V_{DM} = 402\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{TM} = 12\text{ A}; V_R = 24\text{ V}$; (dI_T/dt) _M = $10\text{ A}/\mu\text{s}; dV_D/dt = 2\text{ V}/\mu\text{s}$; $R_{GK(ext)} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM}) | - | 100 | - | μs |



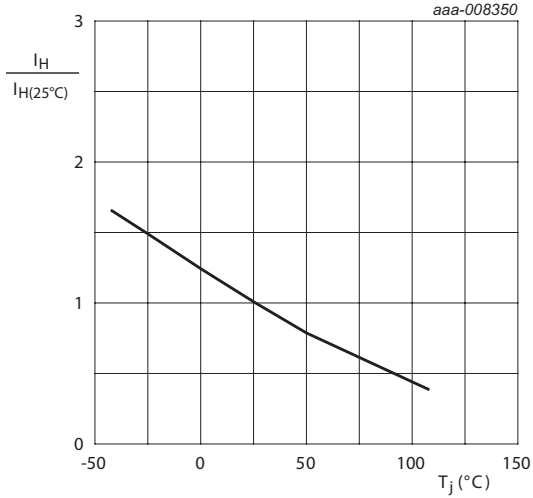
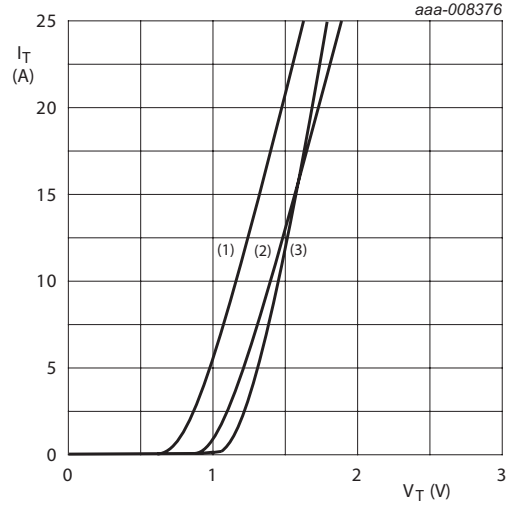


Fig. 9. Normalized holding current as a function of junction temperature



$V_0 = 1.0 \text{ V}; R_s = 0.04 \ \Omega$
 (1) $T_j = 125 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 125 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

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

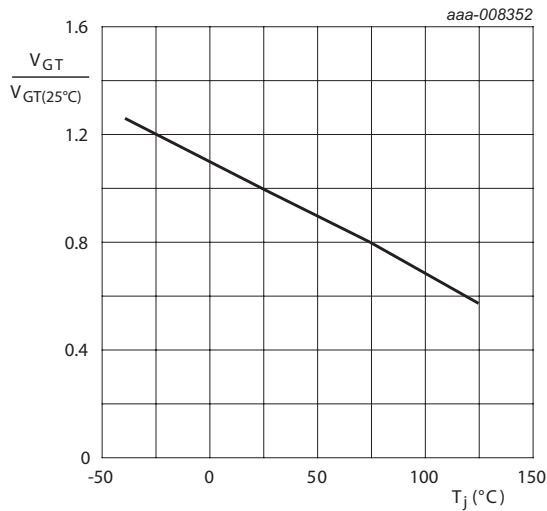
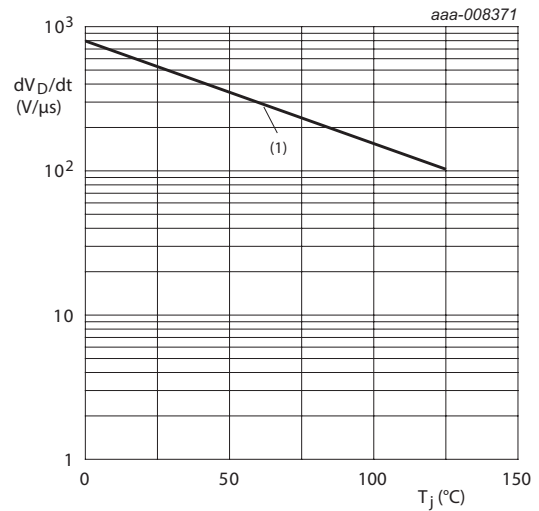


Fig. 11. Normalized gate trigger voltage as a function of junction temperature



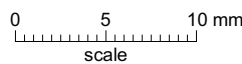
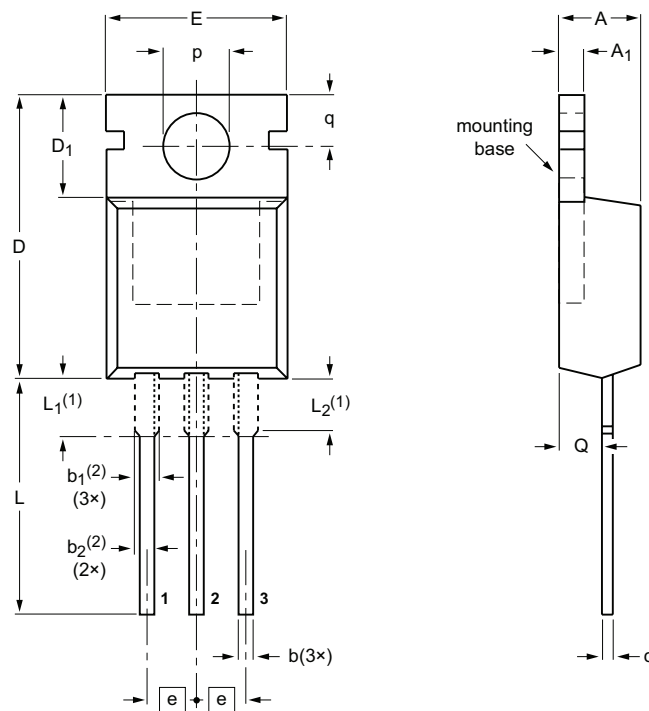
(1) $R_{GK} = 100 \ \Omega$
 Fig. 12. Critical rate of rise of off-state voltage as a function of junction temperature; typical values

11. Package outline

Assembly factory: d & A

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

- 1. Lead shoulder designs may vary.
- 2. 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 |

12. 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. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
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- [2] The term 'short data sheet' is explained in section "Definitions".
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For sales office addresses, please send an email to: salesaddresses@ween-semi.com
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