

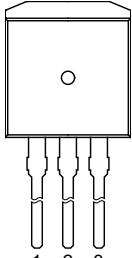

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------|--------------------------------------|---|-----|-----|-----|------|
| V _{DRM} | repetitive peak off-state voltage | | - | - | 600 | V |
| I _{T(RMS)} | RMS on-state current | full sine wave; T _{mb} ≤ 118 °C; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 12 | A |
| I _{TSM} | non-repetitive peak on-state current | full sine wave; T _{j(init)} = 25 °C; t _p = 20 ms; Fig. 4 ; Fig. 5 | - | - | 100 | A |
| | | full sine wave; T _{j(init)} = 25 °C; t _p = 16.7 ms | - | - | 110 | A |
| T _j | junction temperature | | - | - | 150 | °C |

Static characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|--|-----|-----|-----|------------------|
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; T2+ G+; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | - | - | 35 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | - | - | 35 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | - | - | 35 | mA |
| I_H | holding current | $V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9 | - | - | 35 | mA |
| V_T | on-state voltage | $I_T = 15\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10 | - | - | 1.6 | V |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 402\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 300 | - | - | V/ μs |
| dI_{com}/dt | rate of change of commutating current | $V_D = 400\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit | 8 | - | - | A/ms |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------------------|---|---|
| 1 | T1 | main terminal 1 |  <p>I2PAK (SOT226A)</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 |
| BTA312G-600CT | I2PAK | plastic single-ended package (I2PAK); TO-262 | SOT226A |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|---------------|---------------|
| BTA312G-600CT | BTA312G-600CT |

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 |
| $I_{\text{T(RMS)}}$ | RMS on-state current | full sine wave; $T_{\text{mb}} \leq 118\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 12 | A |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $T_{\text{j(init)}} = 25\text{ °C}$; $t_{\text{p}} = 20\text{ ms}$; Fig. 4 ; Fig. 5 | - | 100 | A |
| | | full sine wave; $T_{\text{j(init)}} = 25\text{ °C}$; $t_{\text{p}} = 16.7\text{ ms}$ | - | 110 | A |
| I^2t | I^2t for fusing | $t_{\text{p}} = 10\text{ ms}$; sine-wave pulse | - | 50 | A ² s |
| di_{T}/dt | rate of rise of on-state current | $I_{\text{G}} = 70\text{ mA}$ | - | 100 | A/ μs |
| I_{GM} | peak gate current | $t = 20\text{ }\mu\text{s}$ | - | 2 | A |
| P_{GM} | peak gate power | | - | 5 | W |
| $P_{\text{G(AV)}}$ | average gate power | over any 20 ms period | - | 0.5 | W |
| T_{stg} | storage temperature | | -40 | 150 | °C |
| T_{j} | junction temperature | | - | 150 | °C |

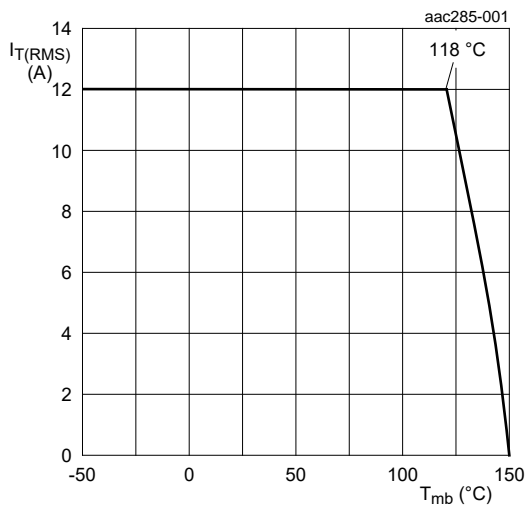


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values

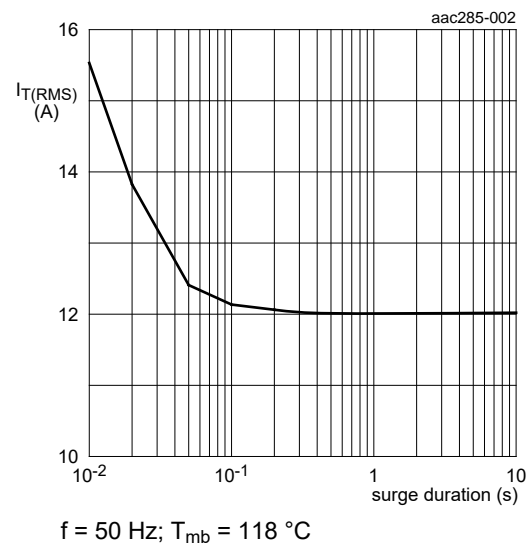


Fig. 2. RMS on-state current as a function of surge duration; maximum values

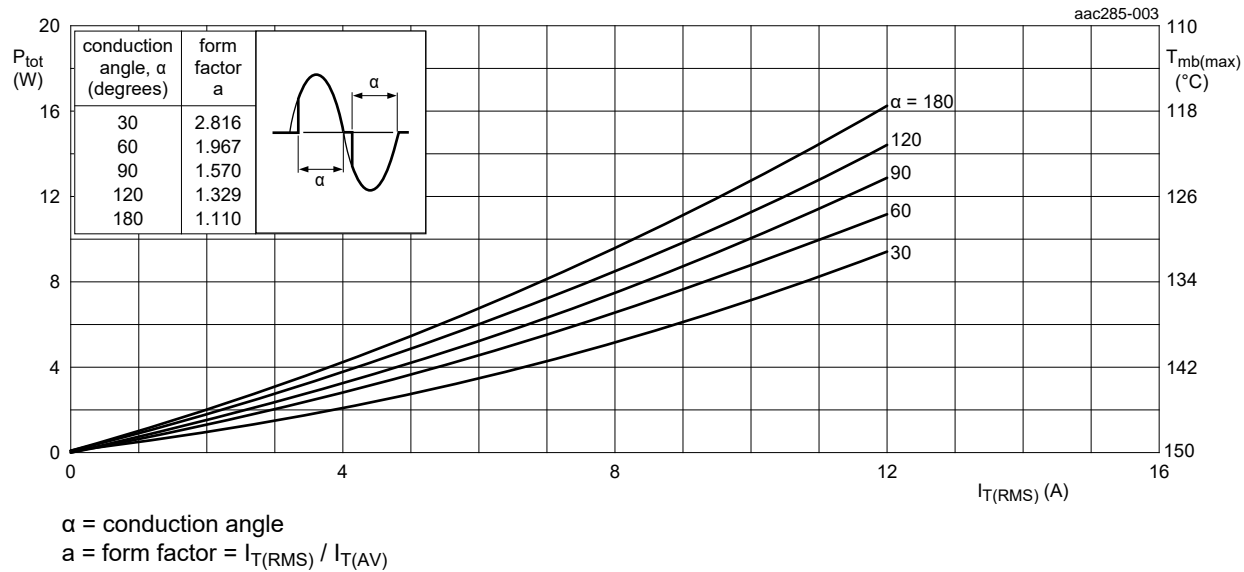


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

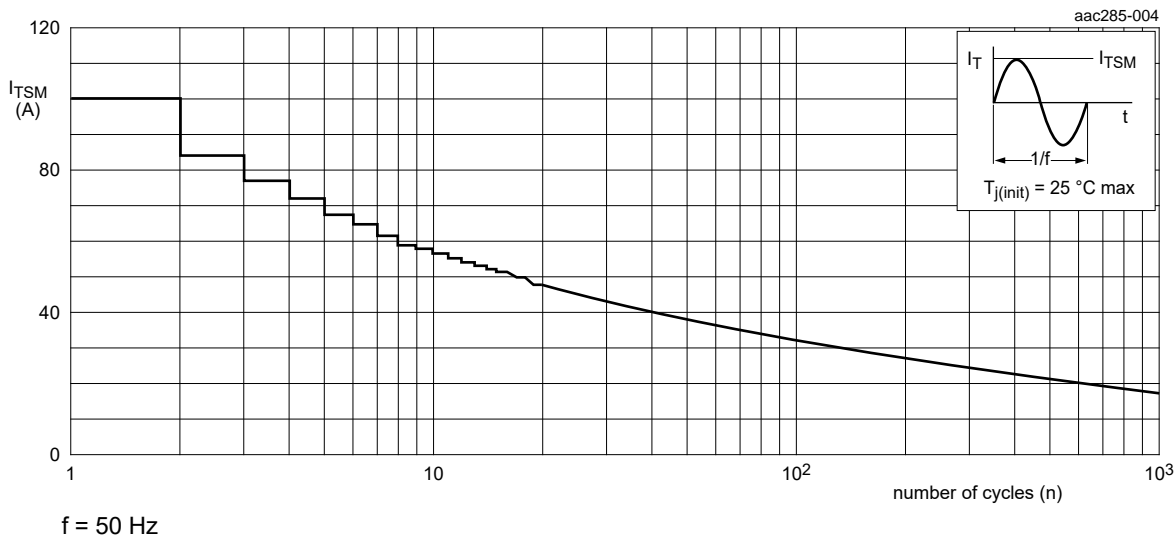
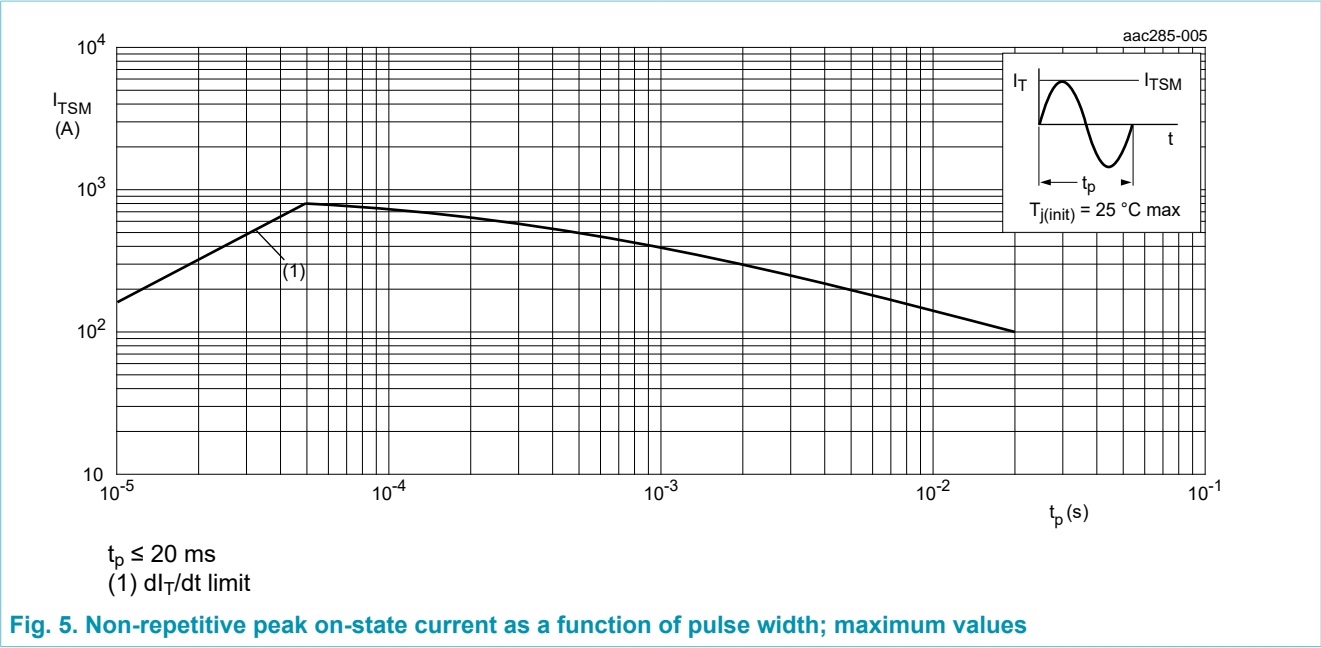


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



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 | 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 free air | in free air | - | 60 | - | K/W |

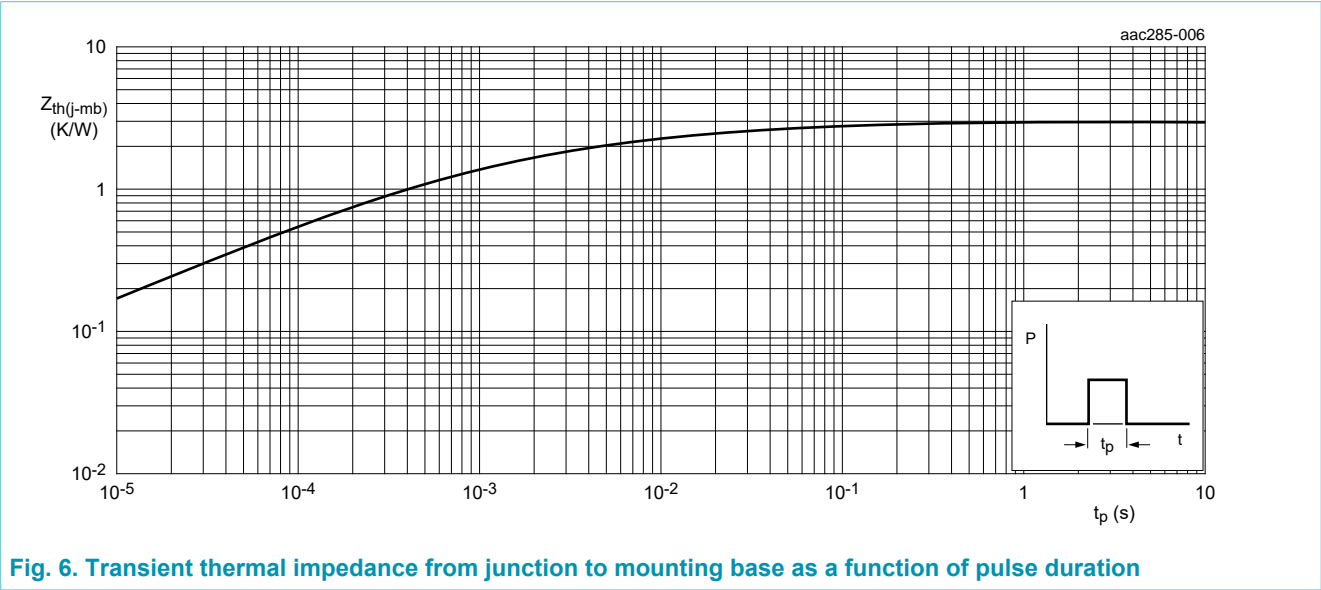
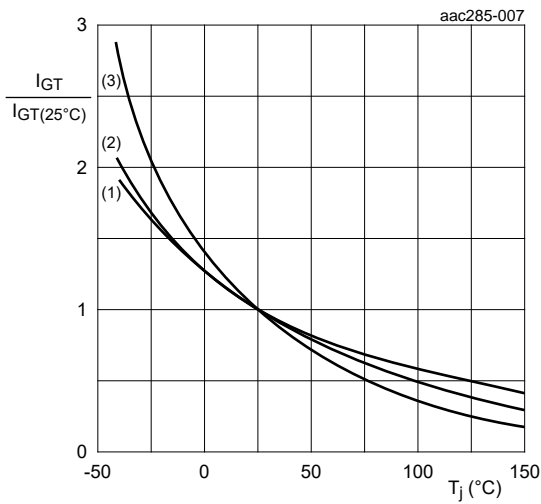


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-------------------------|---------------------------------------|--|--|-----|------|-----|------|
| Static characteristics | | | | | | | |
| I _{GT} | gate trigger current | V _D = 12 V; I _T = 100 mA; T2+ G+; T _j = 25 °C; Fig. 7 | | - | - | 35 | mA |
| | | V _D = 12 V; I _T = 100 mA; T2+ G-; T _j = 25 °C; Fig. 7 | | - | - | 35 | mA |
| | | V _D = 12 V; I _T = 100 mA; T2- G-; T _j = 25 °C; Fig. 7 | | - | - | 35 | mA |
| I _L | latching current | V _D = 12 V; I _G = 100 A; T2+ G+; T _j = 25 °C; Fig. 8 | | - | - | 50 | mA |
| | | V _D = 12 V; I _G = 100 A; T2+ G-; T _j = 25 °C; Fig. 8 | | - | - | 60 | mA |
| | | V _D = 12 V; I _G = 100 A; T2- G-; T _j = 25 °C; Fig. 8 | | - | - | 50 | mA |
| I _H | holding current | V _D = 12 V; T _j = 25 °C; Fig. 9 | | - | - | 35 | mA |
| V _T | on-state voltage | I _T = 15 A; T _j = 25 °C; Fig. 10 | | - | - | 1.6 | V |
| V _{GT} | gate trigger voltage | V _D = 12 V; I _T = 100 mA; T _j = 25 °C; Fig. 11 | | - | 0.8 | 1 | V |
| | | V _D = 400 V; I _T = 100 mA; T _j = 150 °C; Fig. 11 | | 0.2 | 0.45 | - | V |
| I _D | off-state current | V _D = 600 V; T _j = 25 °C | | - | - | 10 | μA |
| | | V _D = 600 V; T _j = 150 °C | | - | 0.4 | 2 | mA |
| Dynamic characteristics | | | | | | | |
| dV _D /dt | rate of rise of off-state voltage | V _{DM} = 402 V; T _j = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit | | 300 | - | - | V/μs |
| dI _{com} /dt | rate of change of commutating current | V _D = 400 V; T _j = 150 °C; I _{T(RMS)} = 12 A; dV _{com} /dt = 20 V/μs; (snubberless condition); gate open circuit | | 8 | - | - | A/ms |



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

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

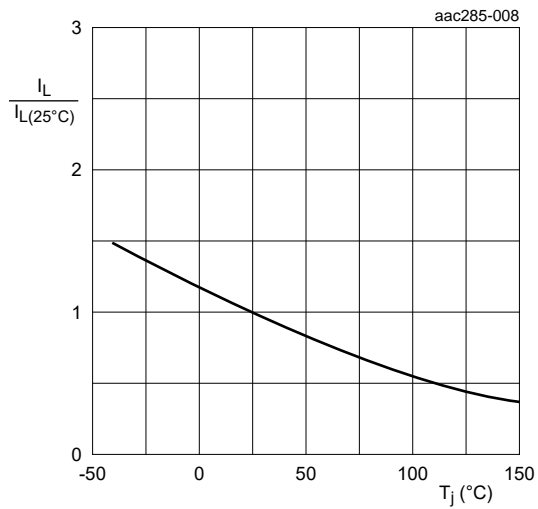


Fig. 8. Normalized latching current as a function of junction temperature

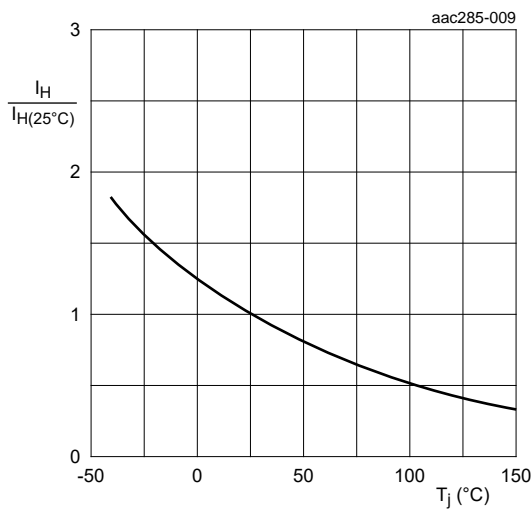
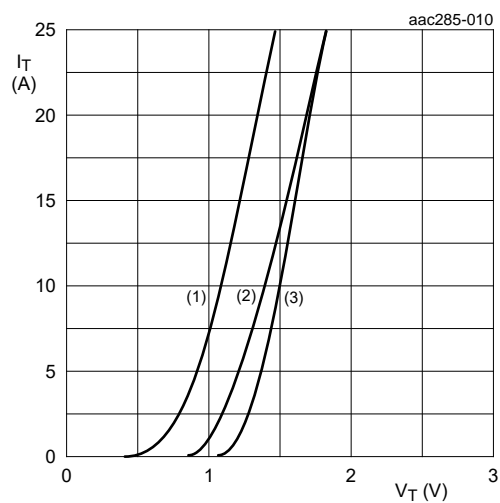


Fig. 9. Normalized holding current as a function of junction temperature



- $V_o = 1.037 \text{ V}; R_s = 0.034 \Omega$
- (1) $T_j = 150^{\circ}\text{C}$; typical values
 - (2) $T_j = 150^{\circ}\text{C}$; maximum values
 - (3) $T_j = 25^{\circ}\text{C}$; maximum values

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

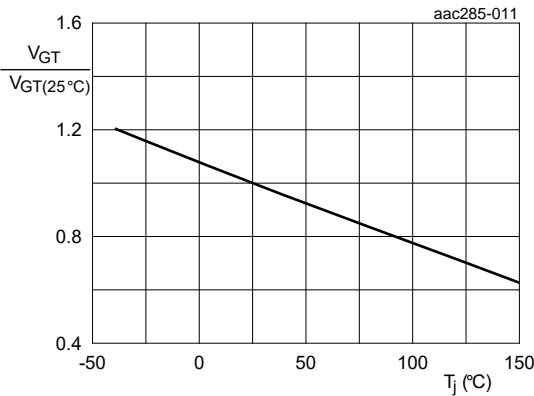
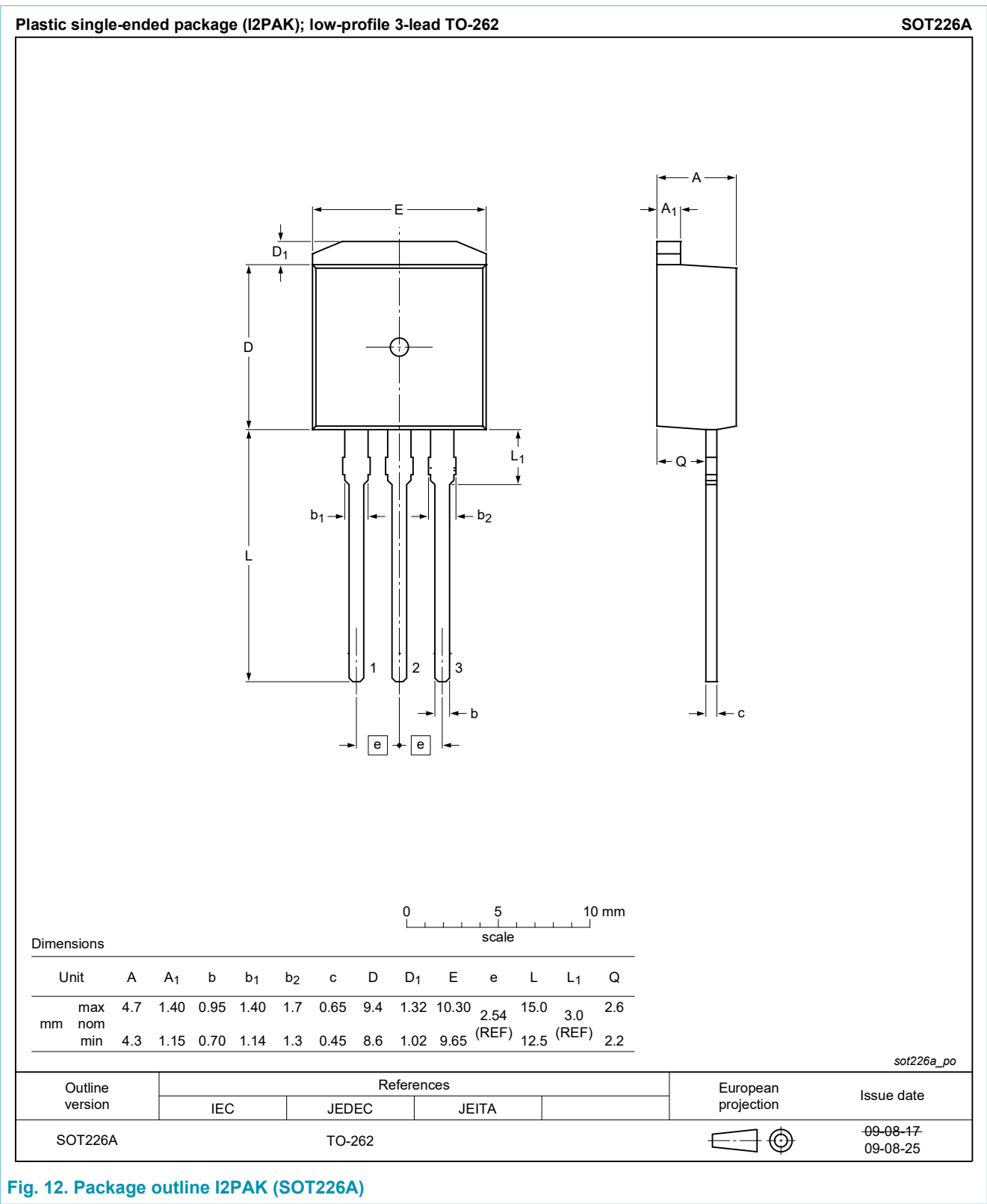


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

11. Package outline



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. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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