



BTA208S-600B

3Q Hi-Com Triac

11 August 2014

Product data sheet

1. General description

Planar passivated high commutation three quadrant triac in a SOT428 (DPAK) surface mountable plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series B" triac will commute the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

2. Features and benefits

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High voltage capability
- Less sensitive gate for very high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package
- Triggering in three quadrants only

3. Applications

- Electronic thermostats
- General purpose motor controls
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

4. Quick reference data

Table 1. Quick reference data

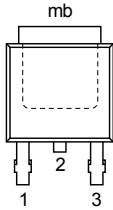
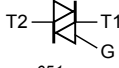
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|--------------------------------------|---|-----|-----|-----|------|
| V_{DRM} | repetitive peak off-state voltage | | - | - | 600 | V |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5 | - | - | 65 | A |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 102\text{ °C}$; 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+; $T_j = 25\text{ °C}$; Fig. 7 | 2 | 18 | 50 | mA |



| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-----------|--|-----|-----|-----|------|
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7 | 2 | 21 | 50 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7 | 2 | 34 | 50 | mA |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------------------|---|--|
| 1 | T1 | main terminal 1 |  <p style="text-align: center;">DPAK (SOT428)</p> |  <p style="text-align: center;"><i>sym051</i></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 |
| BTA208S-600B | DPAK | plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) | SOT428 |

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 | | - | 600 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 102\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 8 | A |
| 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 |
| | | full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 16.7\text{ ms}$ | - | 72 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; SIN | - | 21 | A^2s |
| di_T/dt | rate of rise of on-state current | $I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$ | - | 100 | $\text{A}/\mu\text{s}$ |
| 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 | $^{\circ}\text{C}$ |
| T_j | junction temperature | | - | 125 | $^{\circ}\text{C}$ |

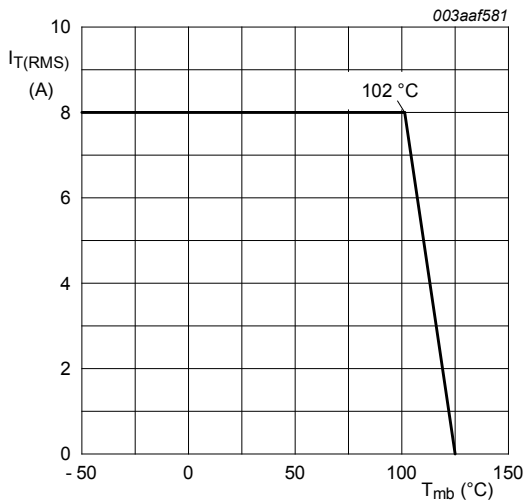
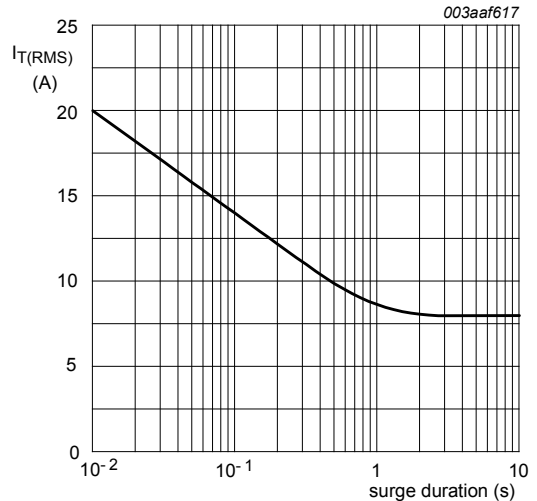


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



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

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

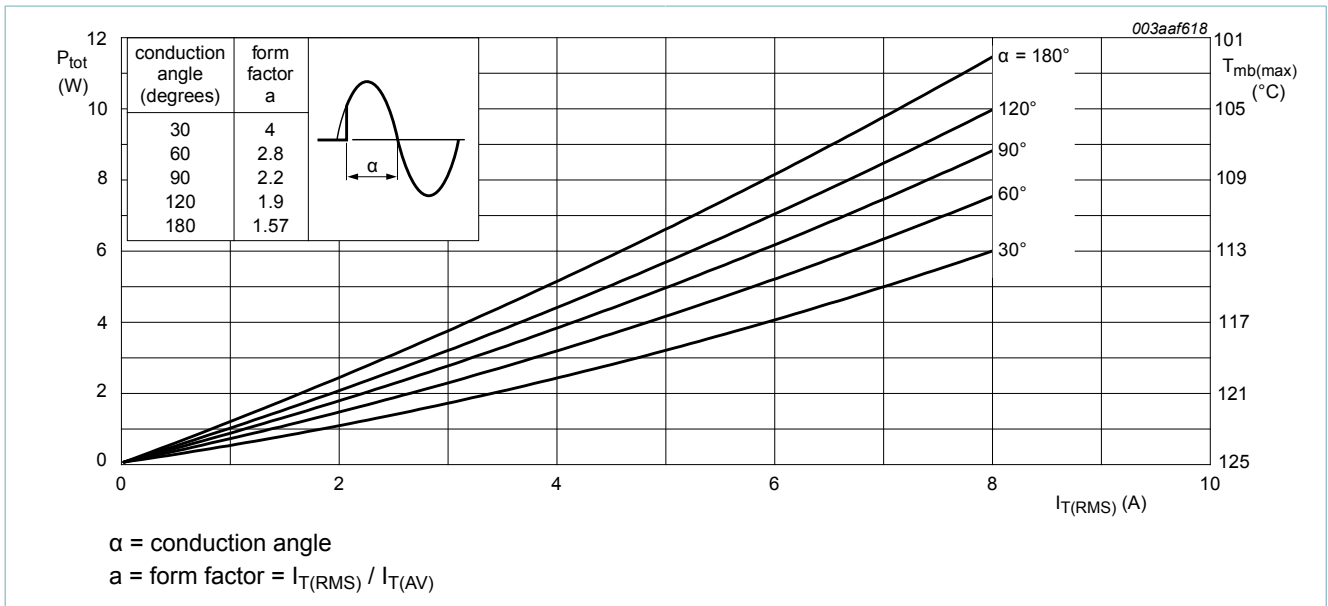


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

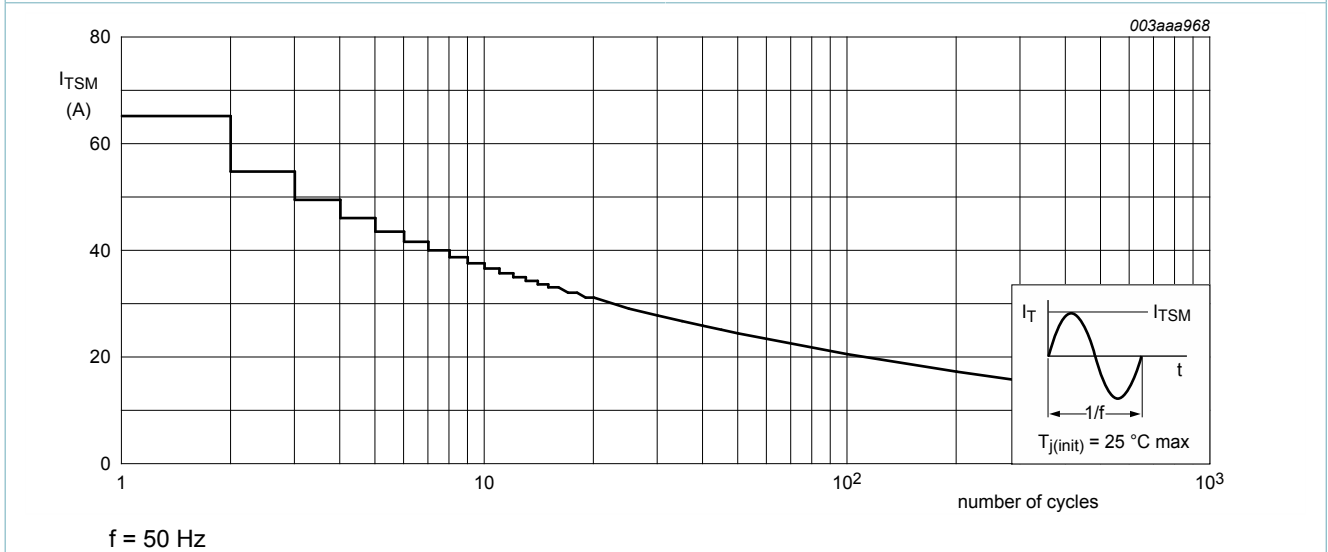
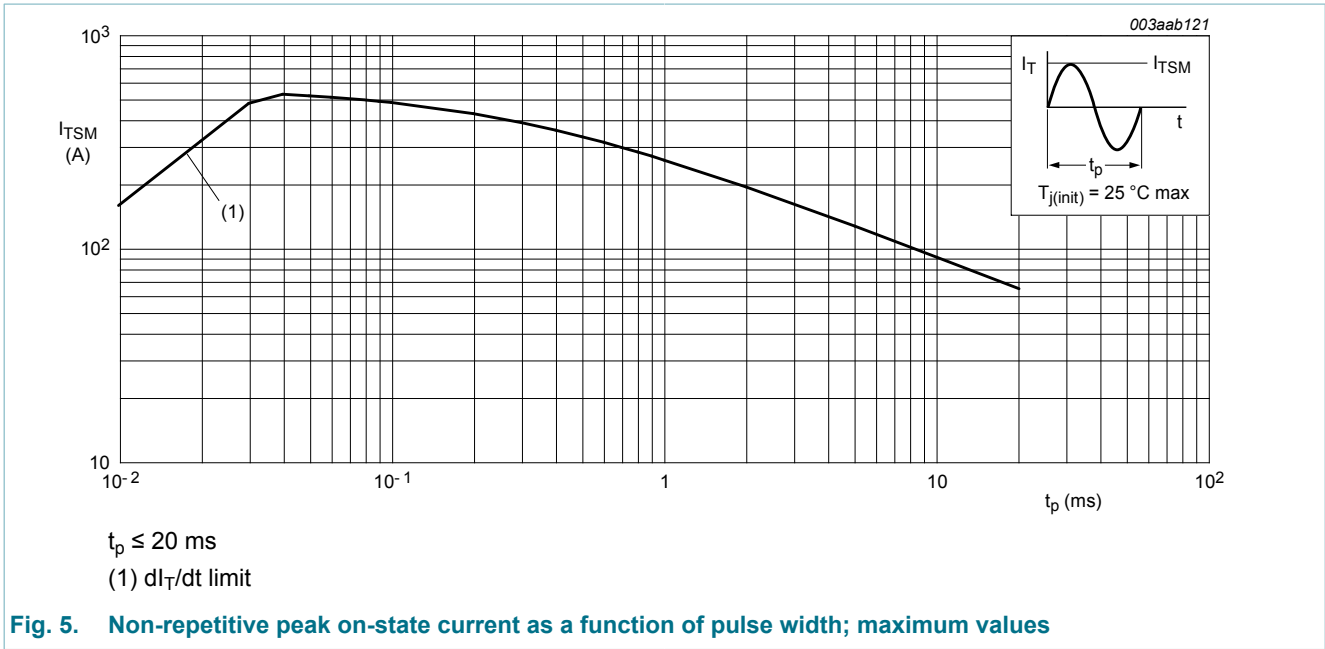


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



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 | full cycle; Fig. 6 | - | - | 2 | K/W |
| | | half cycle; Fig. 6 | - | - | 2.4 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | printed circuit board (FR4) mounted | - | 75 | - | K/W |

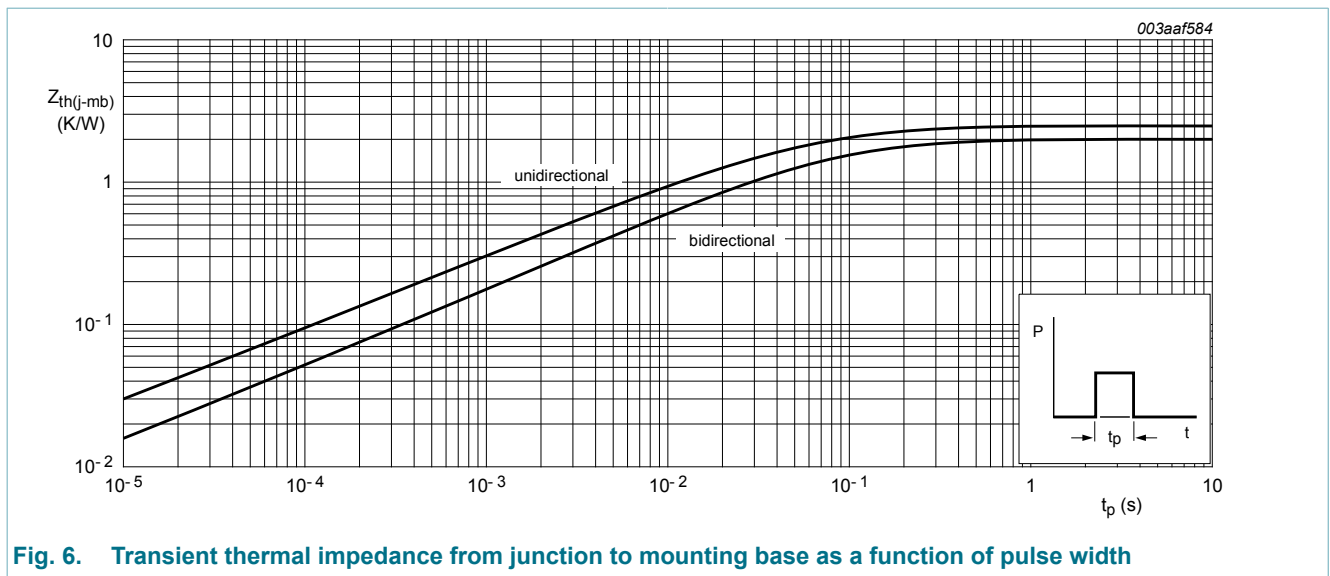
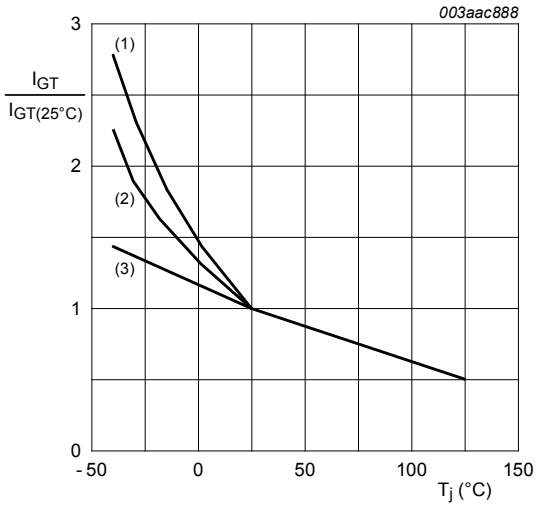


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|--|------|------|------|------------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; Fig. 7 | 2 | 18 | 50 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 7 | 2 | 21 | 50 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 7 | 2 | 34 | 50 | mA |
| I_L | latching current | $V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; Fig. 8 | - | 31 | 60 | mA |
| | | $V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 8 | - | 34 | 90 | mA |
| | | $V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 8 | - | 30 | 60 | mA |
| I_H | holding current | $V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9 | - | 31 | 60 | mA |
| V_T | on-state voltage | $I_T = 10\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10 | - | 1.3 | 1.65 | V |
| V_{GT} | gate trigger voltage | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11 | - | 0.7 | 1 | V |
| | | $V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$; Fig. 11 | 0.25 | 0.4 | - | V |
| I_D | off-state current | $V_D = 600\text{ V}$; $T_j = 125\text{ °C}$ | - | 0.1 | 0.5 | mA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 1000 | 4000 | - | V/ μs |
| dI_{com}/dt | rate of change of commutating current | $V_D = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 8\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; snubberless condition; gate open circuit; Fig. 12 | - | 14 | - | A/ms |
| t_{gt} | gate-controlled turn-on time | $I_{TM} = 12\text{ A}$; $V_D = 600\text{ V}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$ | - | 2 | - | μs |



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

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

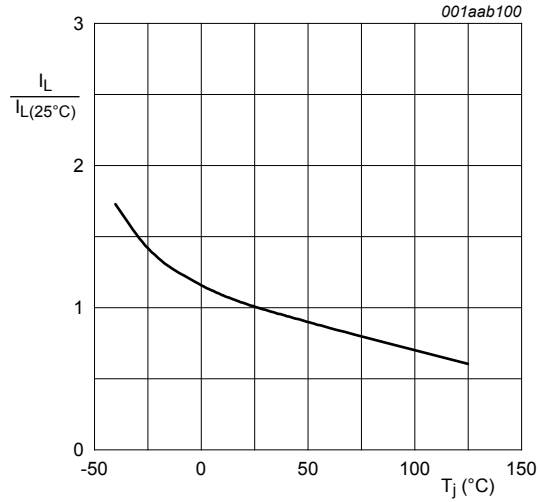


Fig. 8. Normalized latching current as a function of junction temperature

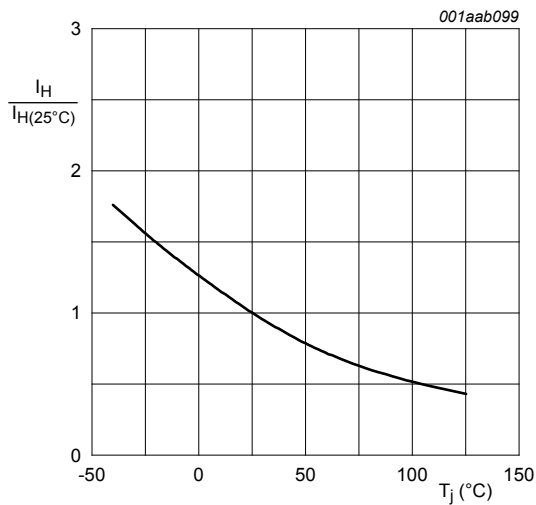
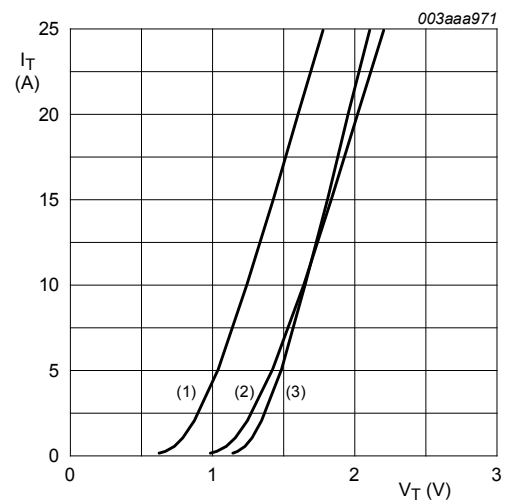


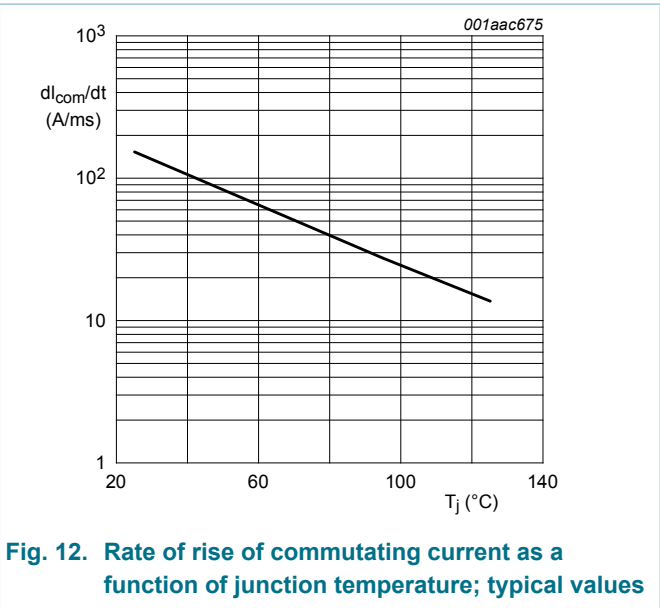
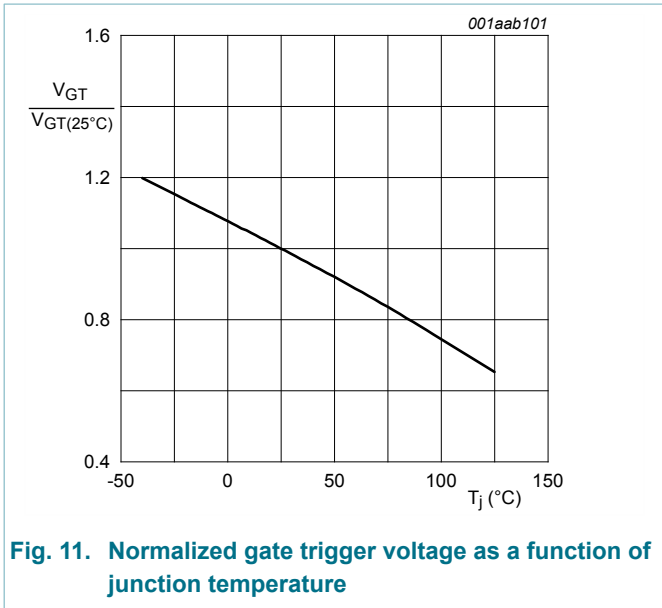
Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.264$ V; $R_s = 0.0378$ Ω

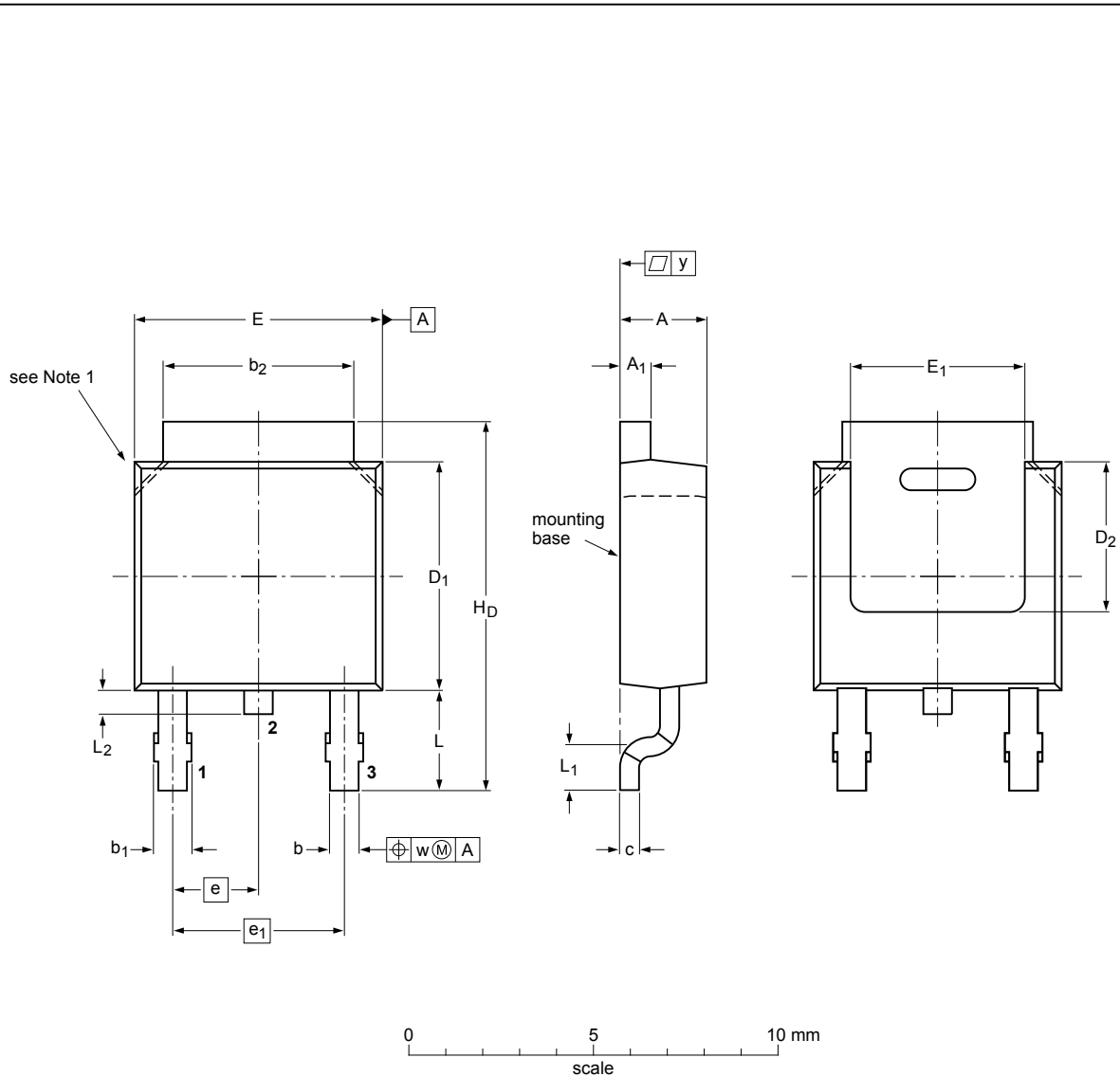
- (1) $T_j = 125^\circ\text{C}$; typical values
- (2) $T_j = 125^\circ\text{C}$; maximum values
- (3) $T_j = 25^\circ\text{C}$; maximum values

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



10. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) SOT428



Dimensions (mm are the original dimensions)

| Unit | A | A ₁ | b | b ₁ | b ₂ | c | D ₁ | D ₂ | E | E ₁ | e | e ₁ | H _D | L | L ₁ | L ₂ | w | y |
|------|------|----------------|------|----------------|----------------|------|----------------|----------------|------|----------------|-------|----------------|----------------|------|----------------|----------------|-----|-----|
| max | 2.38 | 0.93 | 0.89 | 1.1 | 5.46 | 0.56 | 6.22 | | 6.73 | | | | 10.4 | 2.95 | | 0.9 | | 0.2 |
| nom | | | | | | | | | | | 2.285 | 4.57 | | | | | 0.2 | |
| min | 2.22 | 0.46 | 0.71 | 0.9 | 5.00 | 0.20 | 5.98 | 4.0 | 6.47 | 4.45 | | | 9.6 | 2.55 | 0.5 | 0.5 | | |

Note

1. Plastic body may have 45° chamfer.

sot428_po

| Outline version | References | | | European projection | Issue date |
|-----------------|------------|--------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT428 | | TO-252 | SC-63 | | 06-03-16 14-06-10 |

Fig. 13. Package outline DPAK (SOT428)

11. Soldering

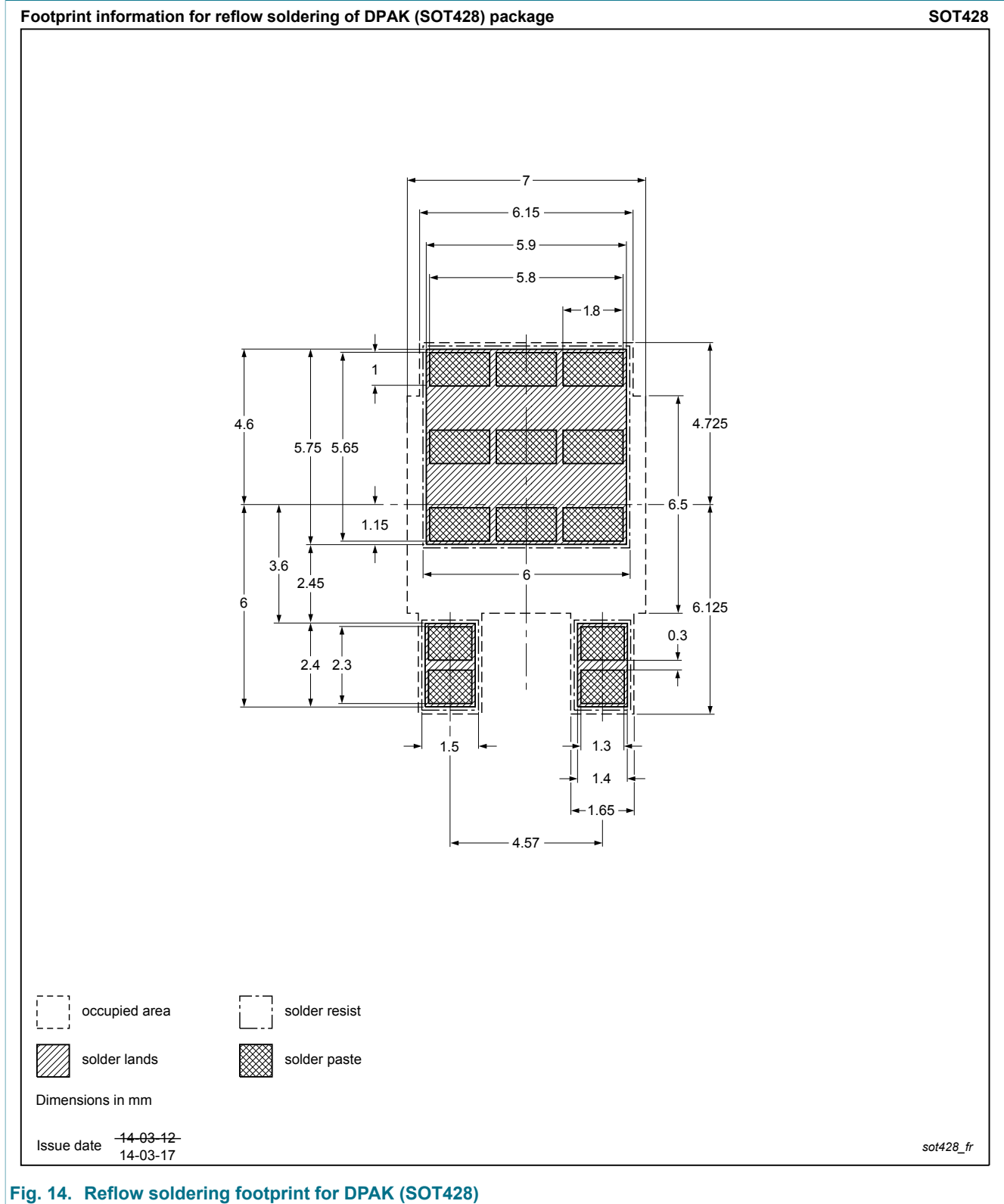


Fig. 14. Reflow soldering footprint for DPAK (SOT428)

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|--------------------------------|--------------------|---|
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