

1. General description

Planar passivated high commutation three quadrant triac in a SOT428 (DPAK) surface-mountable plastic package. This "series E" triac balances the requirements of commutation performance and gate sensitivity and is intended for interfacing with low power drivers and logic ICs including microcontrollers.

2. Features and benefits

- 3Q technology for improved noise immunity
- Direct triggering from low power drivers and logic ICs
- High blocking voltage capability
- High commutation capability with sensitive gate
- Planar passivated for voltage ruggedness and reliability
- Sensitive gate for easy logic level triggering
- Surface-mountable package
- Triggering in three quadrants only

3. Applications

- AC solenoids
- General purpose motor control
- Home appliances

4. Quick reference data

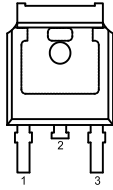

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| V_{DRM} | repetitive peak off-state voltage | | - | - | 800 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 107\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 4 | 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 | - | - | 25 | A |
| | | full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$ | - | - | 27 | A |
| T_j | junction temperature | | - | - | 125 | °C |
| 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 | - | - | 10 | mA |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|------------------|
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7 | - | - | 10 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7 | - | - | 10 | mA |
| I_H | holding current | $V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 9 | - | - | 12 | mA |
| V_T | on-state voltage | $I_T = 5\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 10 | - | 1.4 | 1.7 | V |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 536\text{ V}; T_j = 125\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 30 | - | - | V/ μs |
| dI_{com}/dt | rate of change of commutating current | $V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 4\text{ A};$ $dV_{com}/dt = 10\text{ V}/\mu\text{s};$ gate open circuit | 2.1 | - | - | A/ms |
| | | $V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 4\text{ A};$ $dV_{com}/dt = 0.1\text{ V}/\mu\text{s};$ 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>DPAK (SOT428)</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 |
| BTA204S-800E | 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 | | - | 800 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 107\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 4 | A |
| 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 | - | 25 | A |
| | | full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$ | - | 27 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; SIN | - | 3.1 | A ² s |
| di_T/dt | rate of rise of on-state current | $I_G = 0.2\text{ A}$ | - | 100 | A/ μ 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 | °C |
| T_j | junction temperature | | - | 125 | °C |

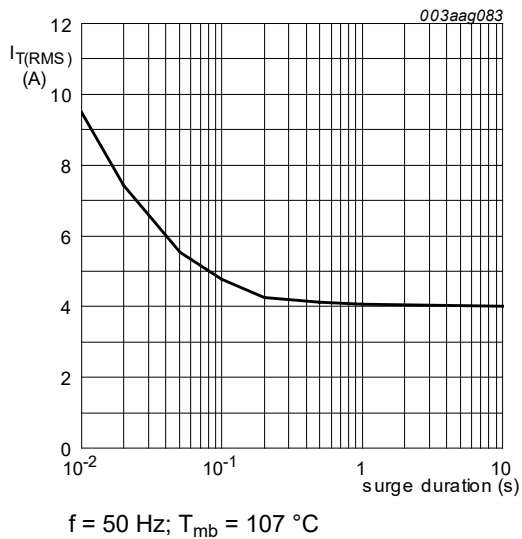


Fig. 1. RMS on-state current as a function of surge duration; maximum values

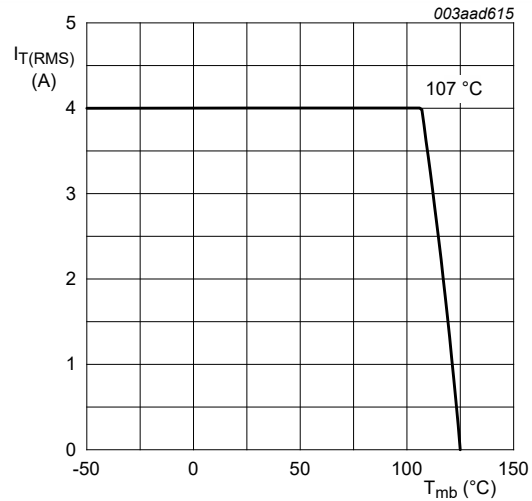


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values

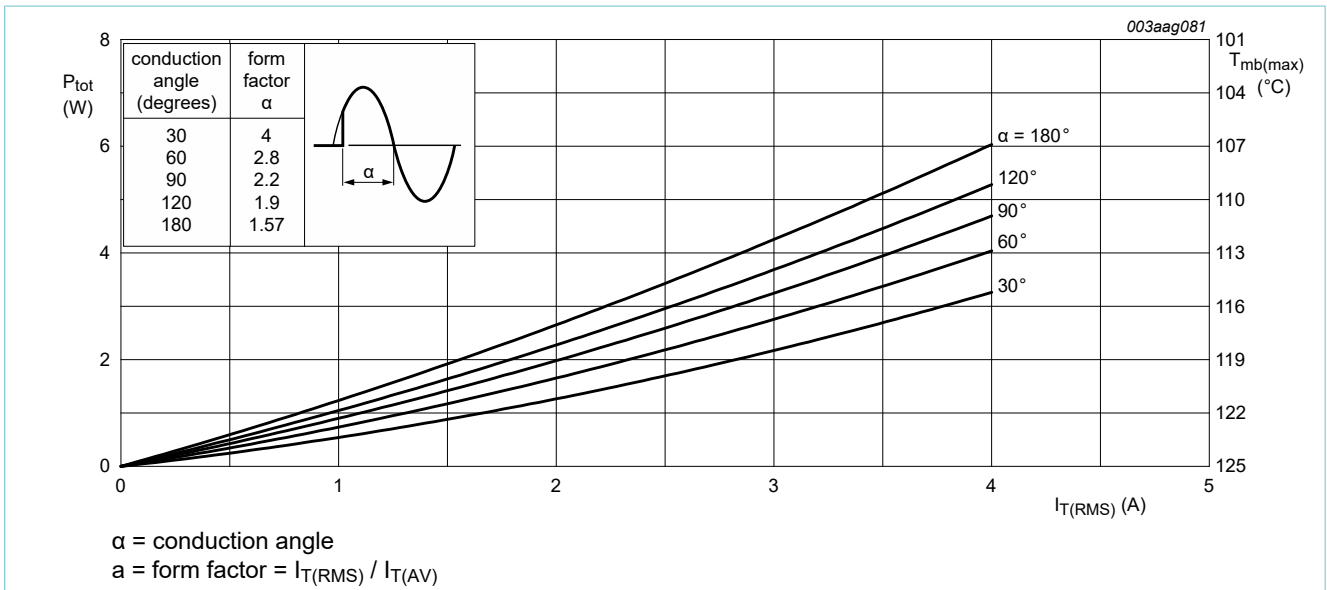


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

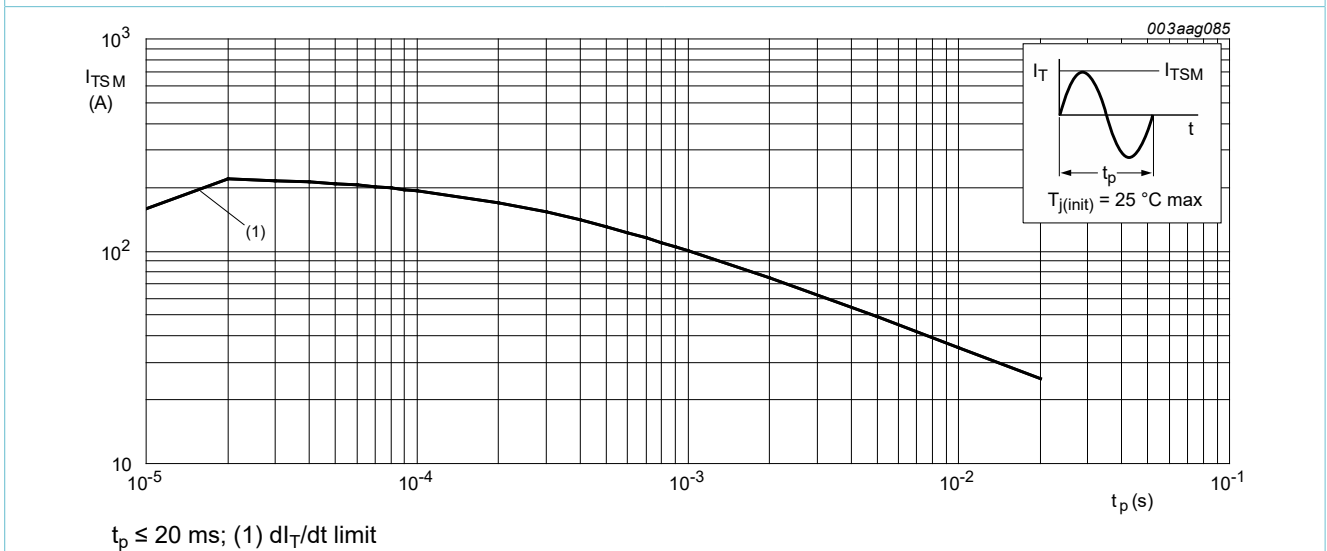
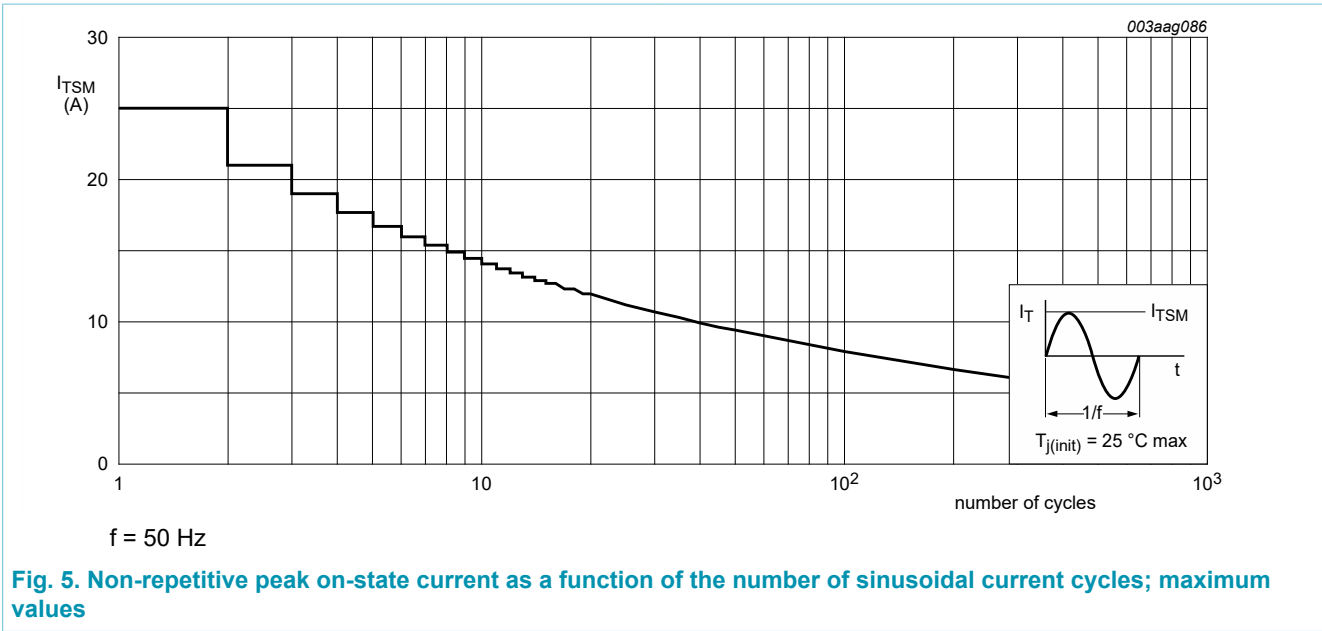


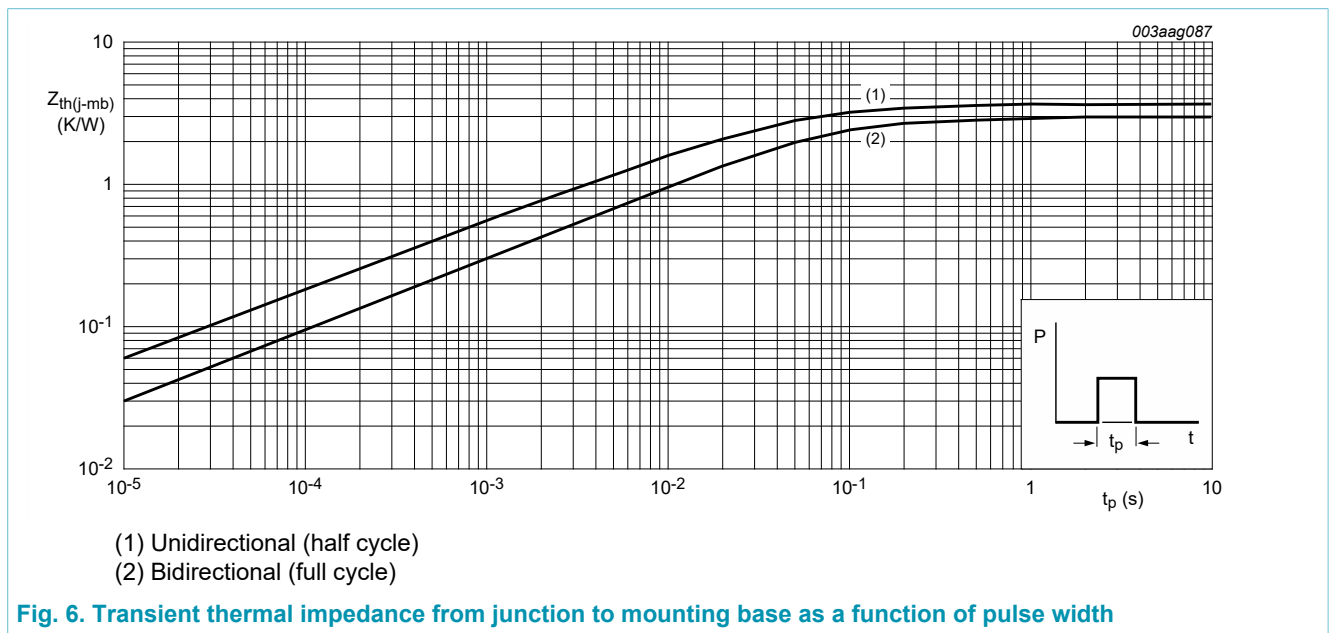
Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values



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 | - | - | 3 | K/W |
| | | half cycle; Fig. 6 | - | - | 3.7 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air; printed circuit board (FR4) mounted | - | 75 | - | K/W |



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+; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | - | - | 10 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | - | - | 10 | mA |
| | | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | - | - | 10 | mA |
| I_L | latching current | $V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ }^\circ\text{C}$; Fig. 8 | - | - | 12 | mA |
| | | $V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 8 | - | - | 18 | mA |
| | | $V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 8 | - | - | 12 | mA |
| I_H | holding current | $V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9 | - | - | 12 | mA |
| V_T | on-state voltage | $I_T = 5\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10 | - | 1.4 | 1.7 | 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 | - | 0.7 | 1 | V |
| | | $V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ }^\circ\text{C}$; Fig. 11 | 0.25 | 0.4 | - | V |
| I_D | off-state current | $V_D = 800\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$ | - | 0.1 | 0.5 | mA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 536\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 30 | - | - | V/ μs |
| dI_{com}/dt | rate of change of commutating current | $V_D = 400\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 4\text{ A}$; $dV_{com}/dt = 10\text{ V}/\mu\text{s}$; gate open circuit | 2.1 | - | - | A/ms |
| | | $V_D = 400\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 4\text{ A}$; $dV_{com}/dt = 0.1\text{ V}/\mu\text{s}$; gate open circuit | 8 | - | - | A/ms |

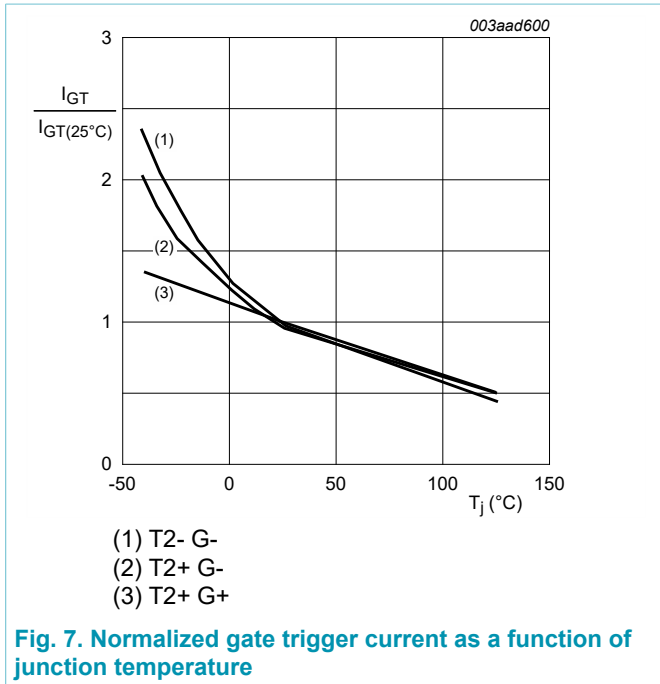


Fig. 7. Normalized gate trigger current as a function of junction temperature

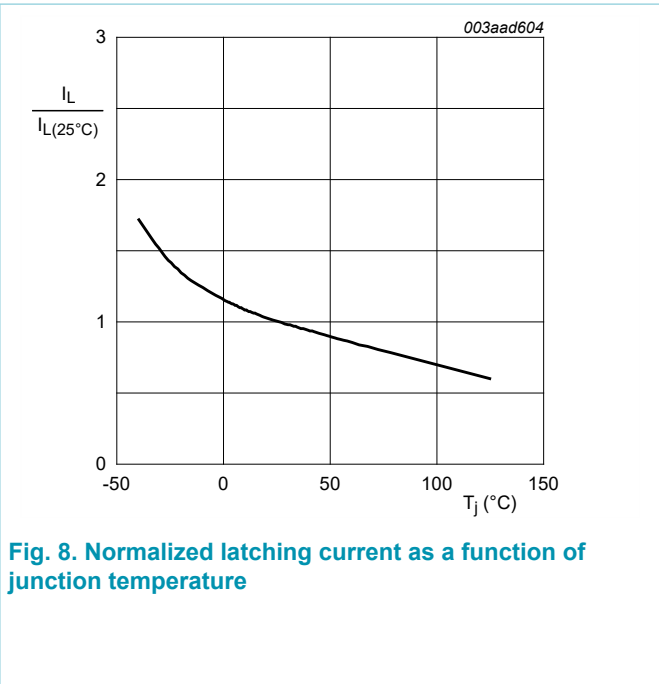


Fig. 8. Normalized latching current as a function of junction temperature

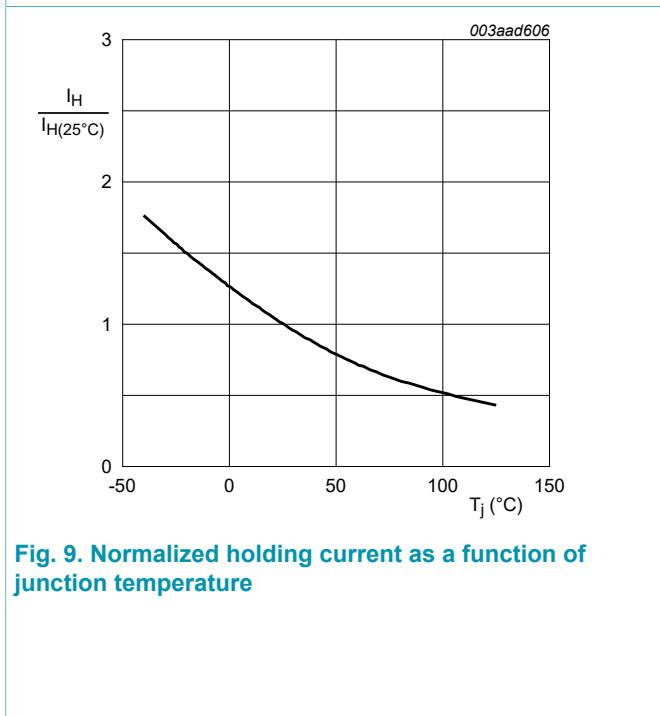


Fig. 9. Normalized holding current as a function of junction temperature

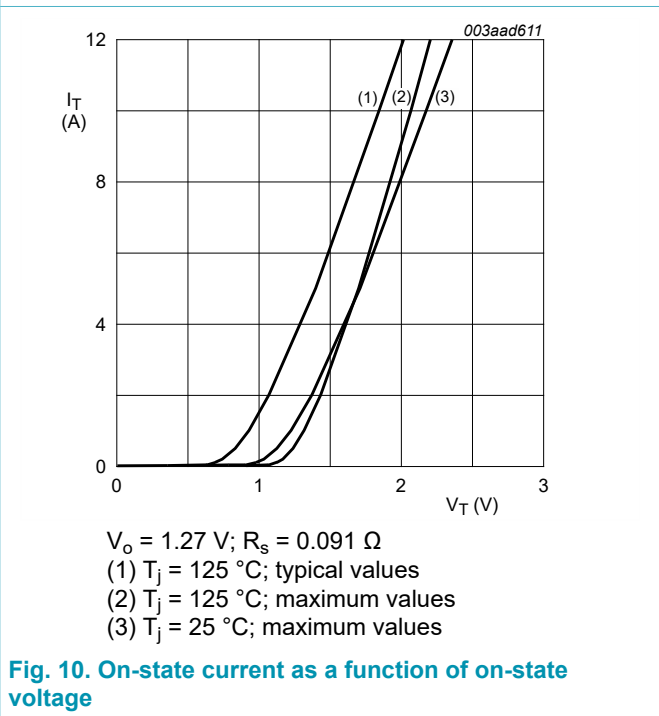


Fig. 10. On-state current as a function of on-state voltage

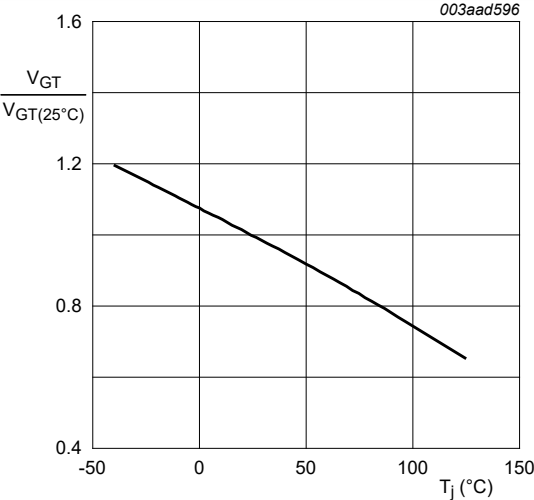


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

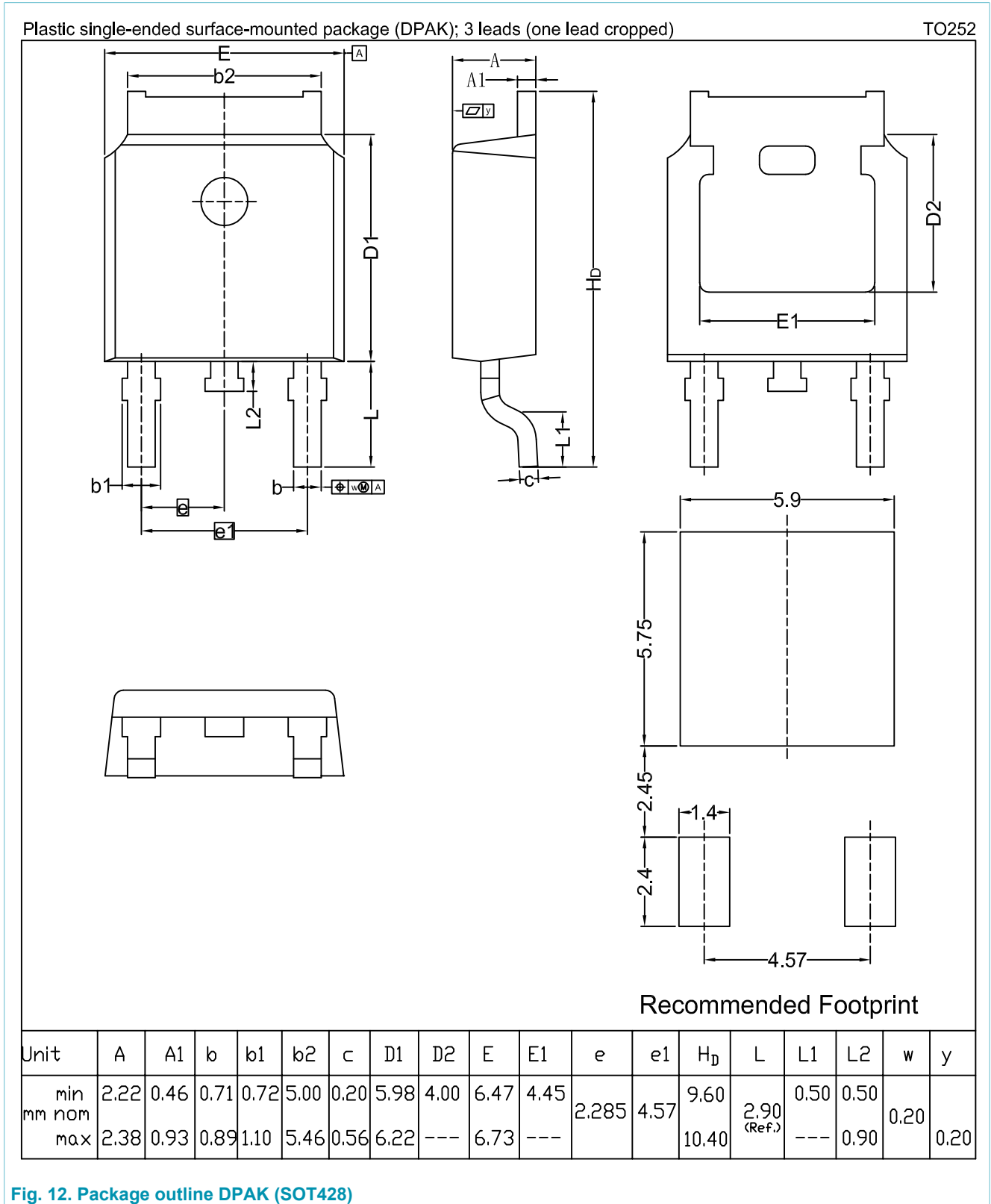


Fig. 12. Package outline DPAK (SOT428)

11. Legal information

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