

1. General description

Planar passivated high commutation three quadrant triac in a TO263 (D2PAK) 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 blocking voltage capability
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- 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

- Heating controls
- High power motor control
- High power switching

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 |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 91\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 25 | 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 | - | - | 190 | A |
| | | full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$ | - | - | 209 | A |
| T_j | junction temperature | | - | - | 125 | °C |
| 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 |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|--|------|------|------|------------|
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ \text{ G-}; T_j = 25\text{ }^\circ\text{C};$ Fig. 7 | 2 | 21 | 50 | mA |
| | | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- \text{ G-}; T_j = 25\text{ }^\circ\text{C};$ Fig. 7 | 2 | 34 | 50 | mA |
| I_H | holding current | $V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 9 | - | 31 | 60 | mA |
| V_T | on-state voltage | $I_T = 30\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 10 | - | 1,3 | 1.55 | V |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 402\text{ V}; T_j = 125\text{ }^\circ\text{C}; (V_{DM} = 67\% \text{ of } V_{DRM});$ exponential waveform; gate open circuit | 1000 | 4000 | - | V/ μ s |
| dI_{com}/dt | rate of change of commutating current | $V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 25\text{ A}; dV_{com}/dt = 20\text{ V}/\mu\text{s};$ gate open circuit; Fig. 12 | - | 44 | - | A/ms |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------------------|--------------------|----------------|
| 1 | T1 | main terminal 1 | | |
| 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 | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|--------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| BTA225B-600B | TO263 | BTA225B-600B,118 | Reel | 800 | TO263E (E) | 26-May-2017 |
| | | | | | TO263N (N) | 26-Sep-2016 |

7. Marking

Table 4. Marking codes

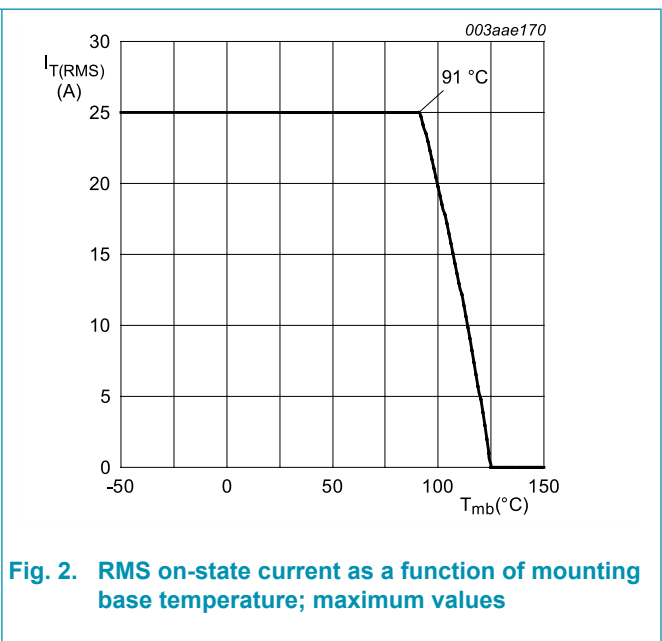
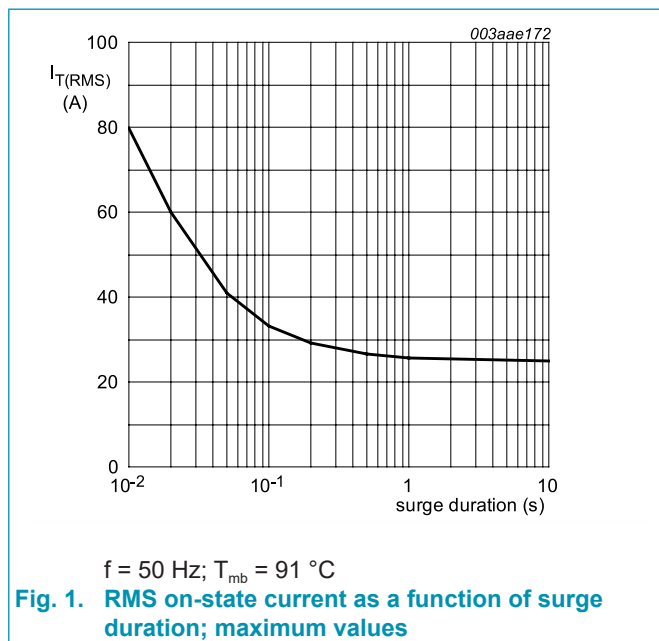
| Type number | Marking codes | |
|--------------|-------------------------------|-------------------------------|
| | Assembly factory: E | Assembly factory: N |
| BTA225B-600B | BTA225B 600B PJExxxx xx | BTA225B 600B PJNxxxx xx |

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 |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{mb} \leq 91\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 25 | 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 | - | 190 | A |
| | | full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 16.7\text{ ms}$ | - | 209 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; SIN | - | 180 | A^2s |
| di_T/dt | rate of rise of on-state current | $I_G = 100\text{ mA}$ | - | 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 | $^{\circ}\text{C}$ |



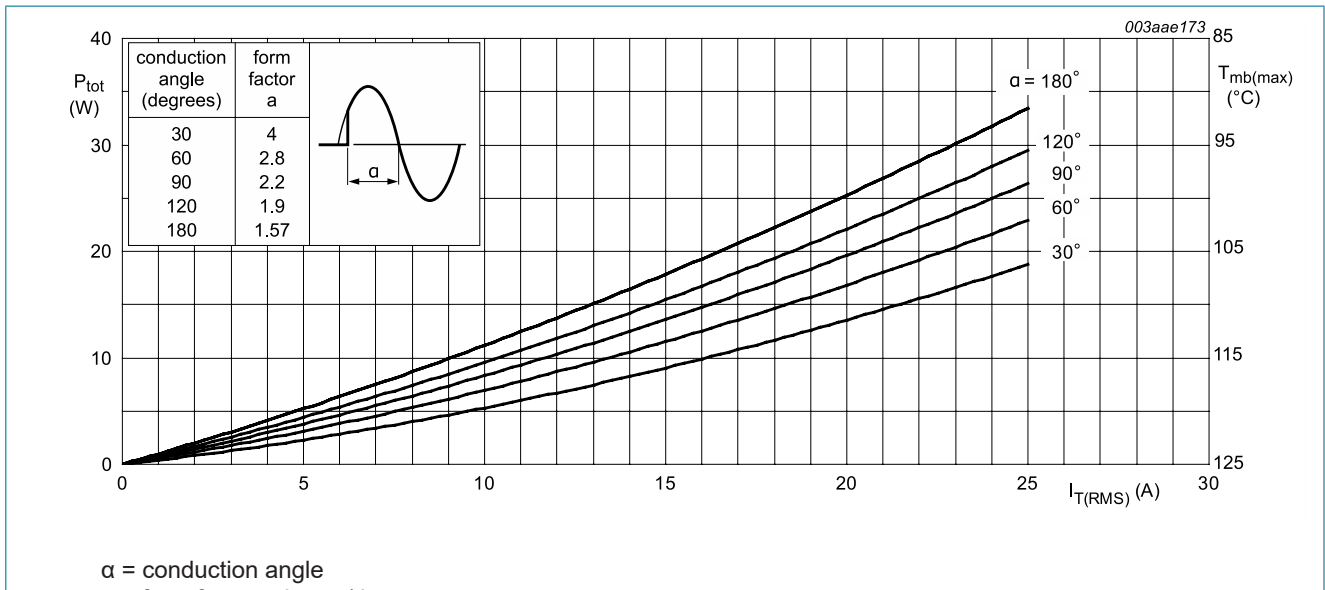


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

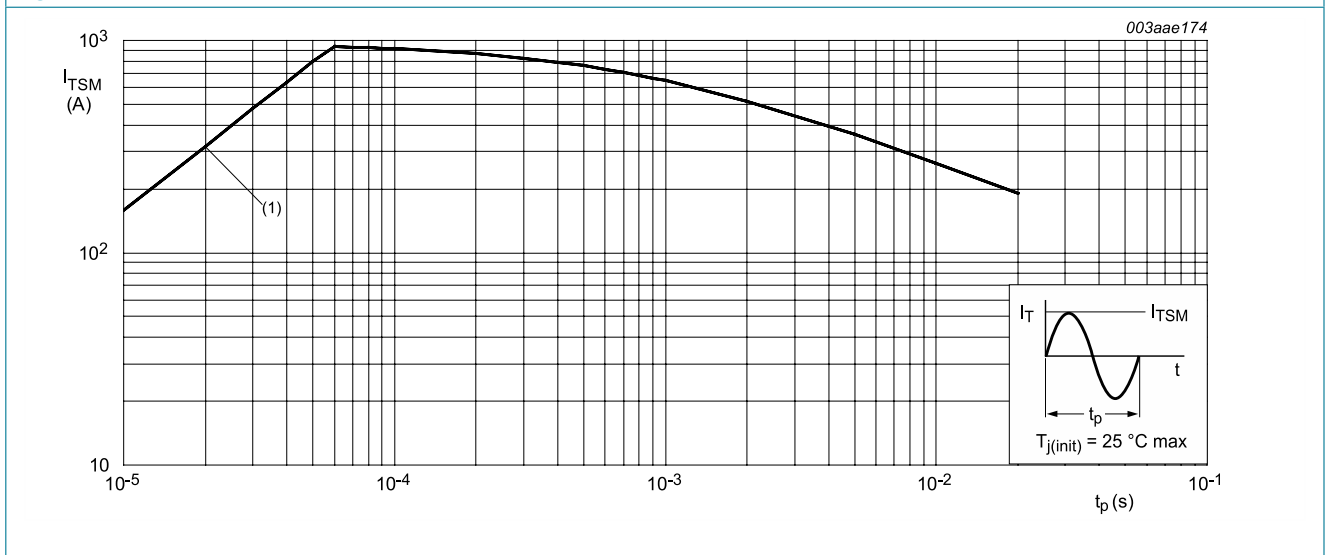
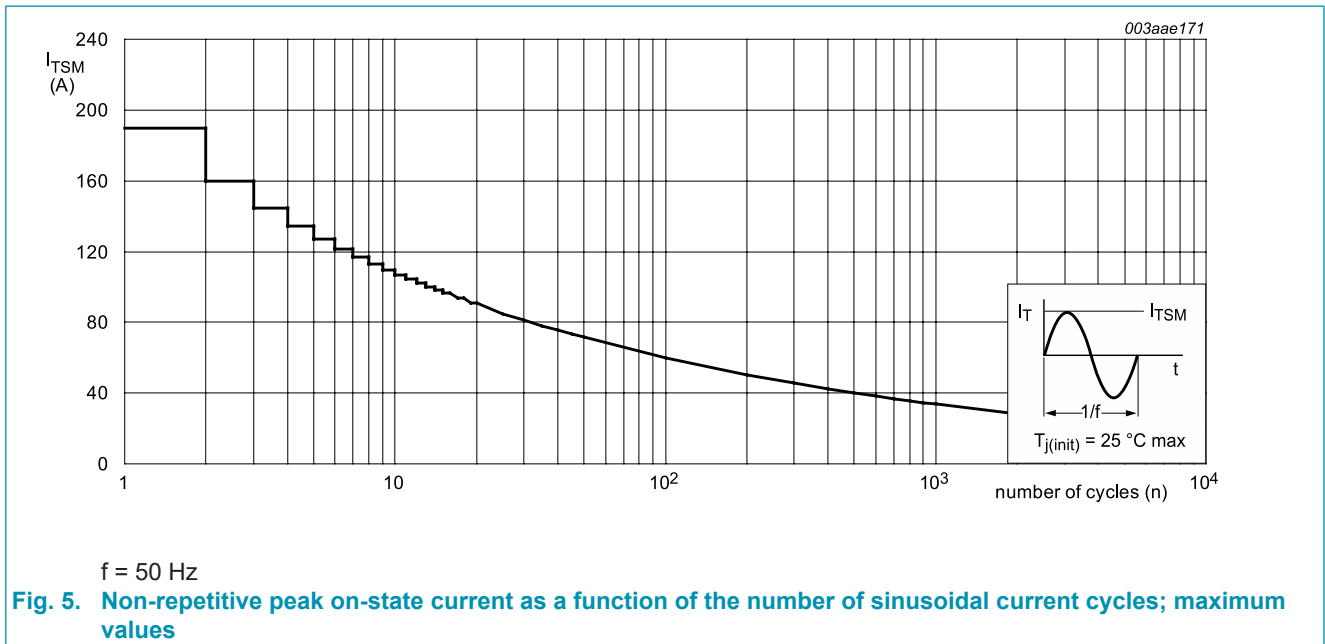


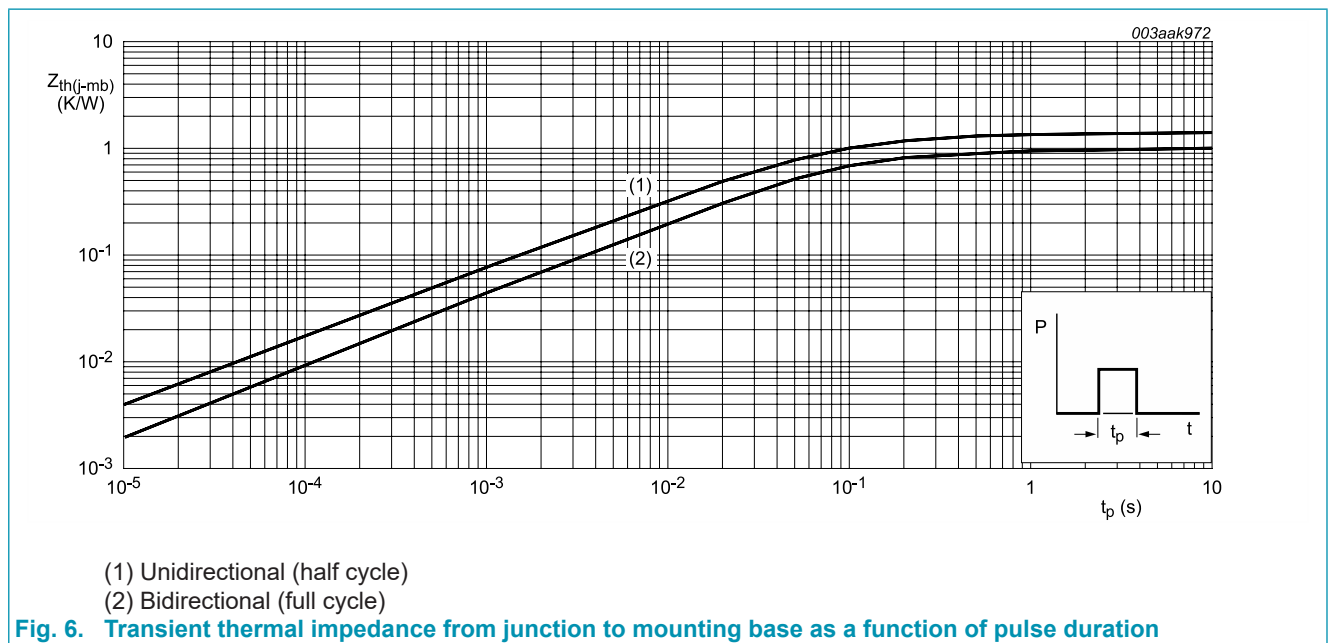
Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values



9. Thermal characteristics

Table 6. Thermal characteristics

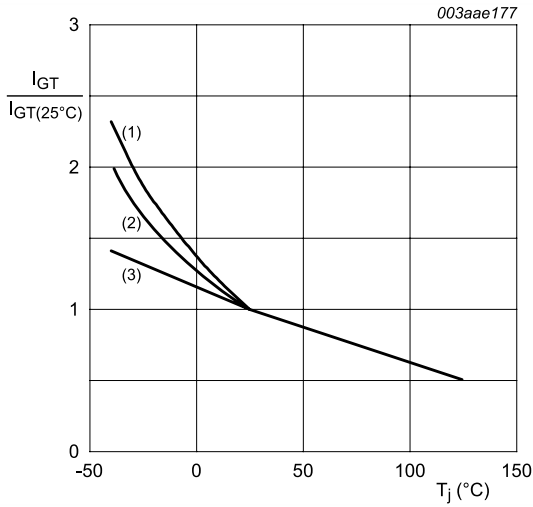
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|-------------------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | full cycle; Fig. 6 | - | - | 1 | K/W |
| | | half cycle; Fig. 6 | - | - | 1.4 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | printed circuit board (FR4) mounted | - | 55 | - | K/W |



10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------------|---|------|------|------|------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; 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 | $I_T = 30\text{ A}$; $T_J = 25\text{ °C}$; Fig. 10 | - | 1,3 | 1.55 | 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/ μ s |
| dI_{com}/dt | rate of change of commutating current | $V_D = 400\text{ V}$; $T_J = 125\text{ °C}$; $I_{T(RMS)} = 25\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu$ s; gate open circuit; Fig. 12 | - | 44 | - | A/ms |



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

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

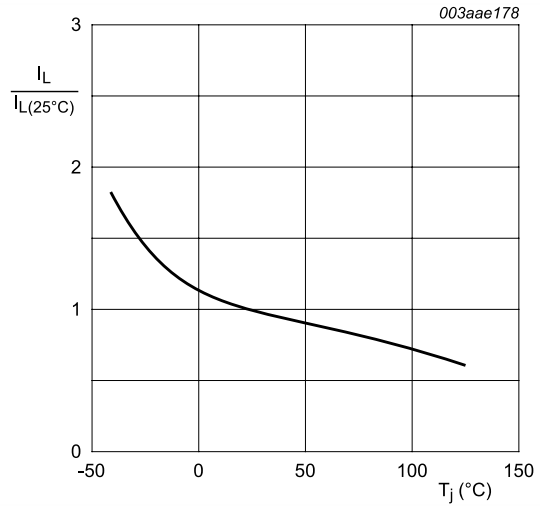


Fig. 8. Normalized holding current as a function of junction temperature

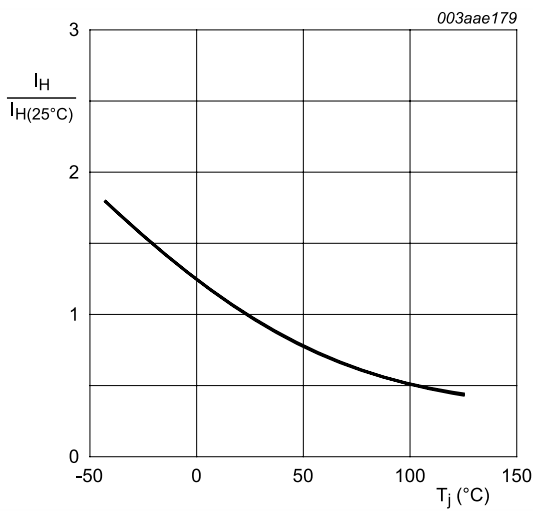
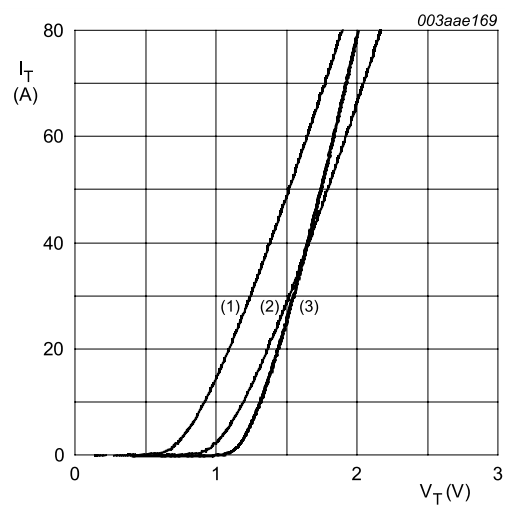
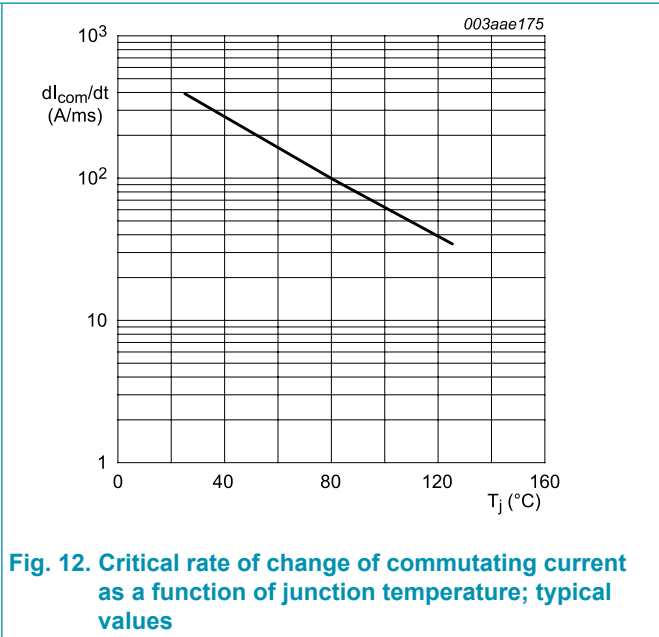
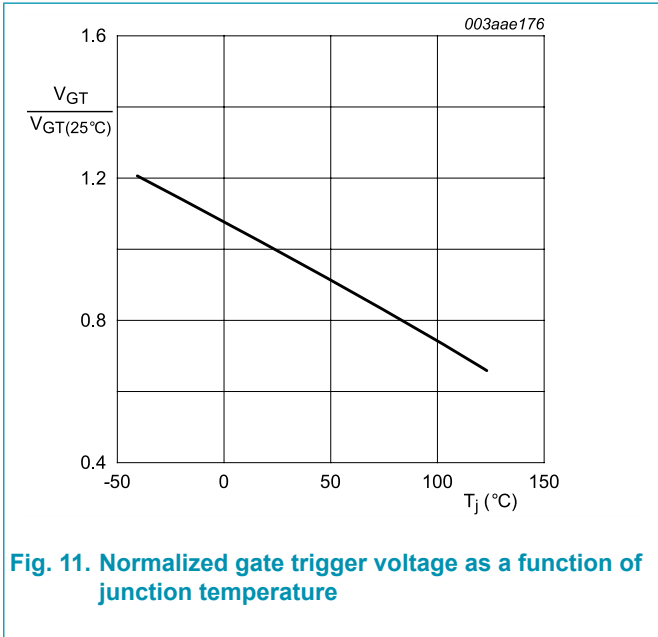


Fig. 9. Normalized holding current as a function of junction temperature



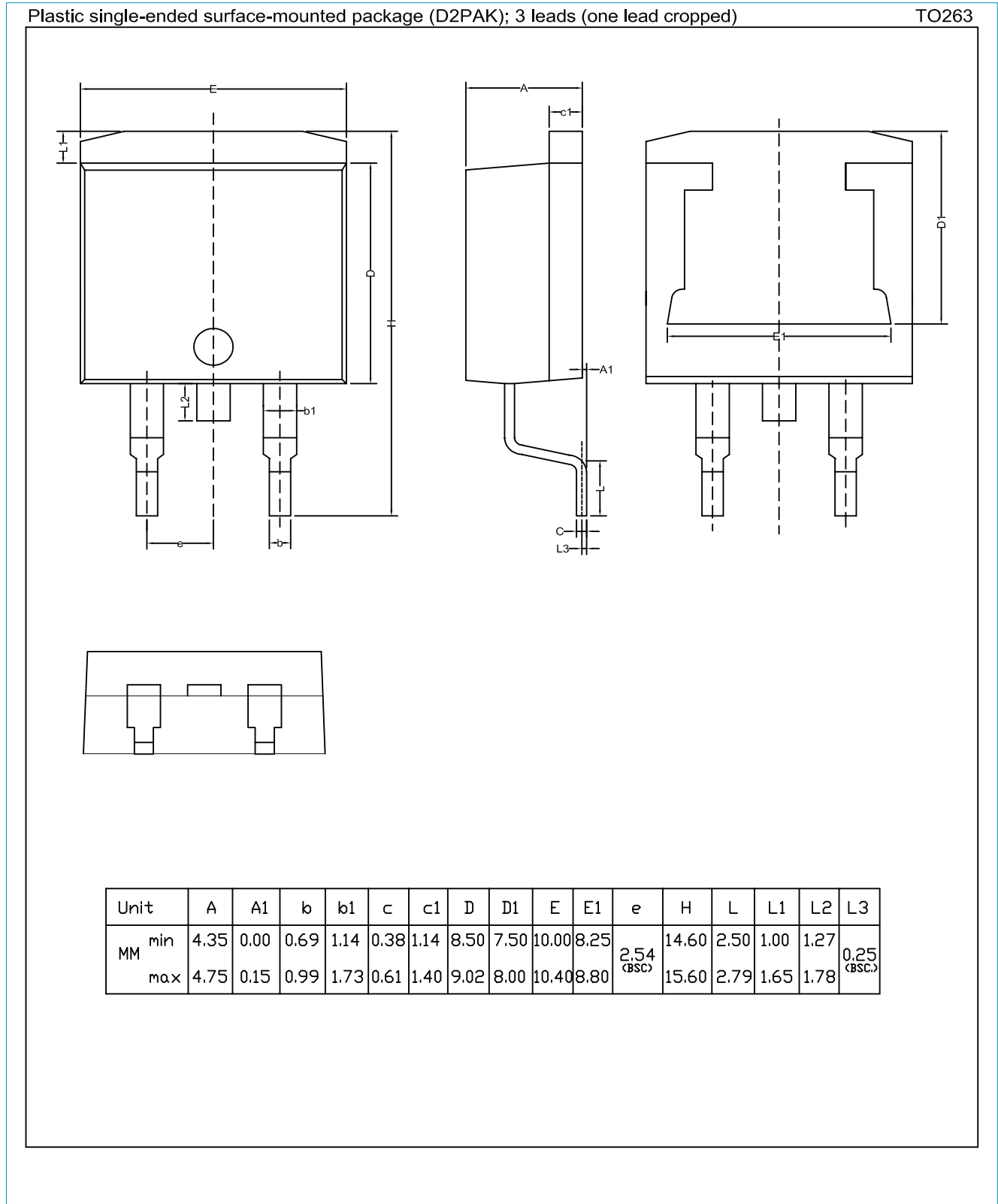
- $V_o = 1.073 \text{ V}; R_s = 0.015 \Omega$
- (1) $T_j = 125 \text{ }^\circ\text{C}$; typical values
 - (2) $T_j = 125 \text{ }^\circ\text{C}$; maximum values
 - (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

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



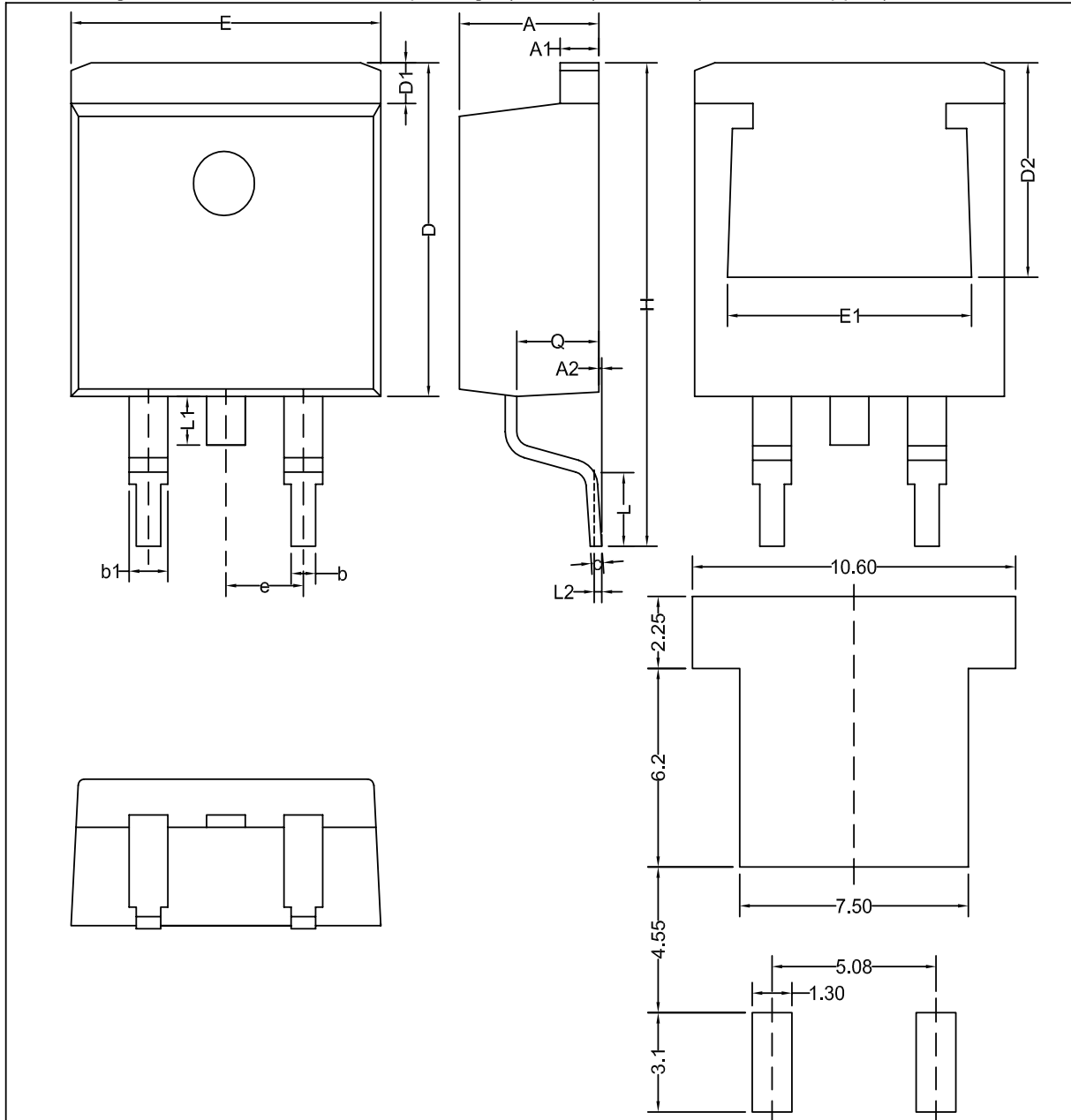
11. Package outline

Assembly factory: E



Assembly factory: N

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263



Recommended Footprint

| Unit | A | A1 | A2 | b | b1 | c | D | D1 | D2 | e | E | E1 | H | L | L1 | L2 | Q |
|------|------|------|------|------|------|------|-------|------|------|---------------|-------|------|-------|------|------|---------------|------|
| min | 4.10 | 1.22 | 0.00 | 0.60 | 1.05 | 0.34 | --- | 1.20 | 6.60 | 2.54 (BSC) | 9.70 | 7.80 | 14.80 | 2.10 | --- | 0.25 (BSC) | 2.20 |
| max | 4.70 | 1.40 | 0.25 | 0.90 | 1.45 | 0.64 | 11.00 | 1.60 | --- | --- | 10.30 | --- | 15.80 | 2.90 | 1.75 | --- | 2.79 |

12. 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. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 30 July 2021
