

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a TO220 package intended for use in applications requiring good bidirectional blocking voltage and high surge current capability and high junction temperature capability ($T_{j(max)} = 150\text{ °C}$).

2. Features and benefits

- High junction operating temperature capability ($T_{j(max)} = 150\text{ °C}$)
- High bidirectional blocking voltage capability
- Very high current surge capability
- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability

3. Applications

- Capacitive Discharge Ignition (CDI)
- Crowbar protection
- Inrush protection
- Motor control
- Voltage regulation

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 | half sine wave; $T_{mb} \leq 134\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 16 | A |
| I_{TSM} | non-repetitive peak on-state current | half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5 | - | - | 188 | A |
| | | half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$ | - | - | 207 | A |
| T_j | junction temperature | | - | - | 150 | °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 | 5 | - | 10 | mA |
| I_H | holding current | $V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9 | - | - | 40 | mA |
| V_T | on-state voltage | $I_T = 16\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10 | - | - | 1.6 | V |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 402\text{ V}$; $T_j = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 400 | - | - | V/ μ s |

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 |
|--------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| TYN16-600CTF | TO220 | TYN16-600CTFQ | Tube | 50 | SOT78 | 13-Jun-2008 |

7. Marking

Table 4. Marking codes

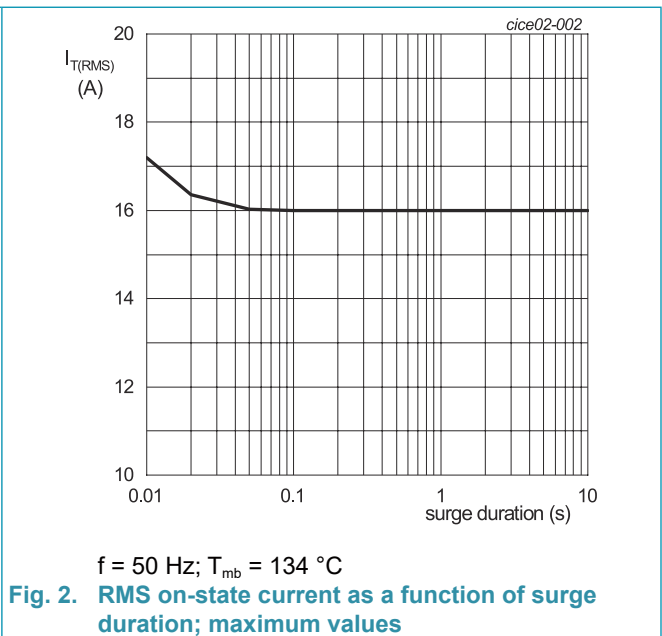
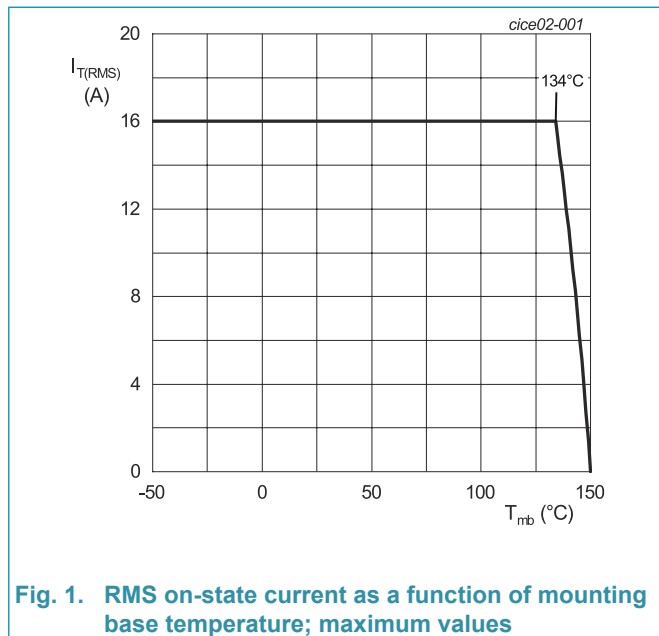
| Type number | Marking codes |
|--------------|-----------------|
| TYN16-600CTF | TYN16 600CTF |

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; $T_{mb} \leq 134\text{ °C}$; | - | 10.2 | A |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{mb} \leq 134\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 16 | 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 | - | 188 | A |
| | | half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$ | - | 207 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; sine-wave pulse | - | 177 | A ² s |
| di_T/dt | rate of rise of on-state current | $I_G = 20\text{ mA}$ | - | 100 | A/ μ s |
| I_{GM} | peak gate current | | - | 4 | A |
| V_{GM} | peak gate voltage | | - | 5 | V |
| P_{GM} | peak gate power | | - | 10 | W |
| $P_{G(AV)}$ | average gate power | over any 20 ms period | - | 1 | W |
| T_{stg} | storage temperature | | -40 | 150 | °C |
| T_j | junction temperature | | - | 150 | °C |



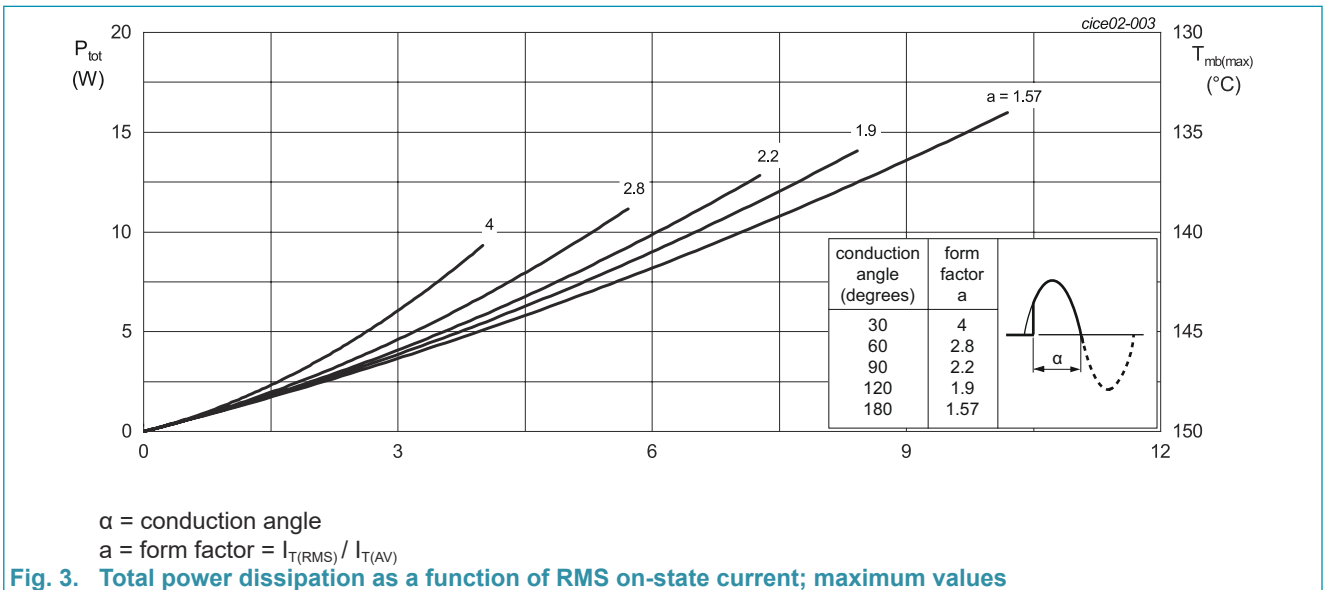
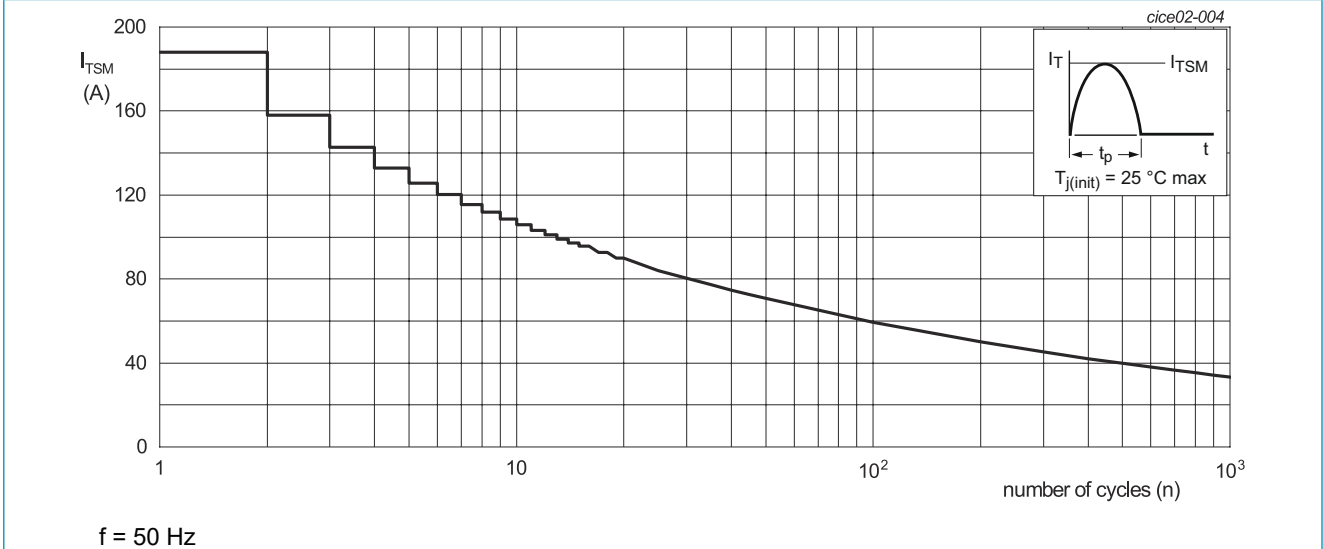
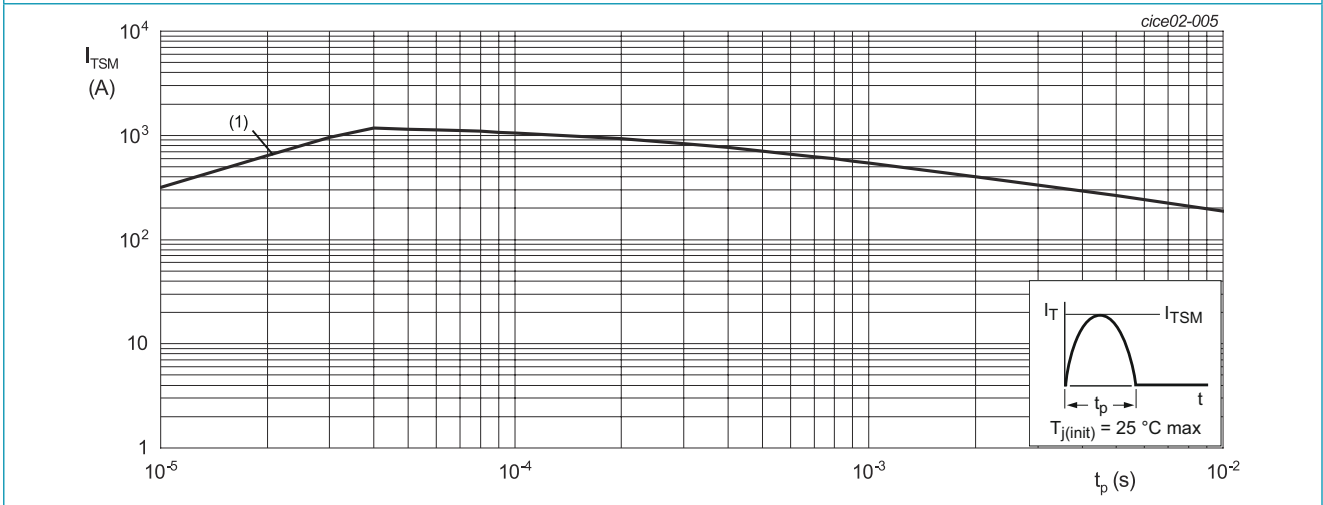


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values



f = 50 Hz

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



$t_p \leq 10$ ms
 (1) di_T/dt limit

Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; 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 | Fig. 6 | - | - | 1 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | - | 60 | - | K/W |

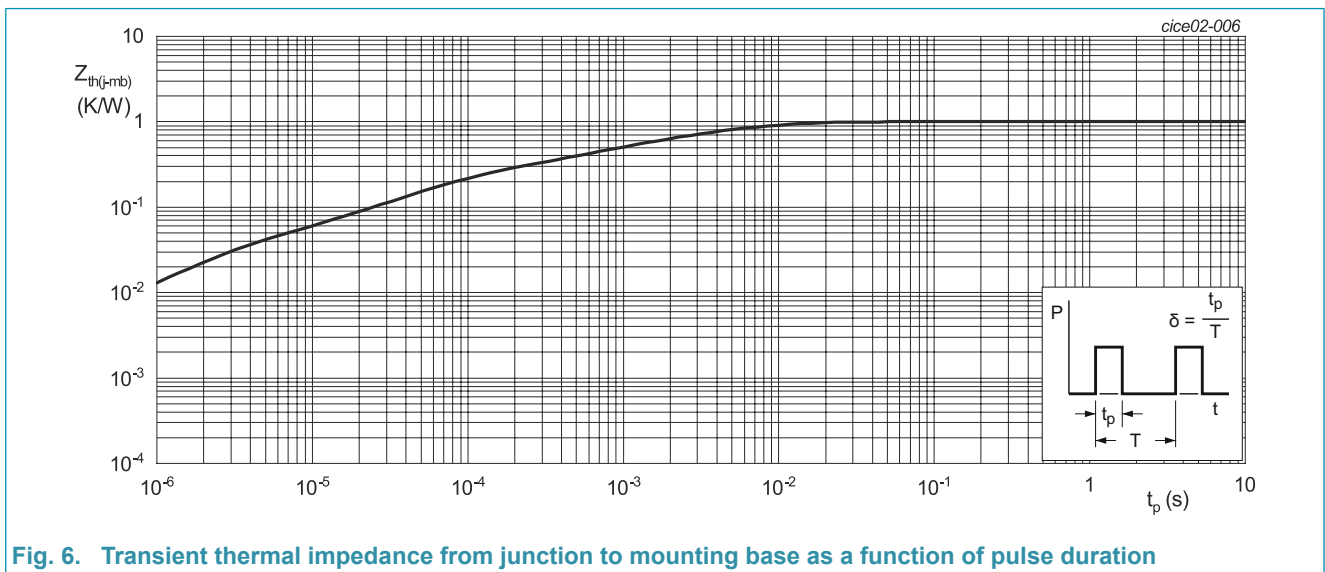
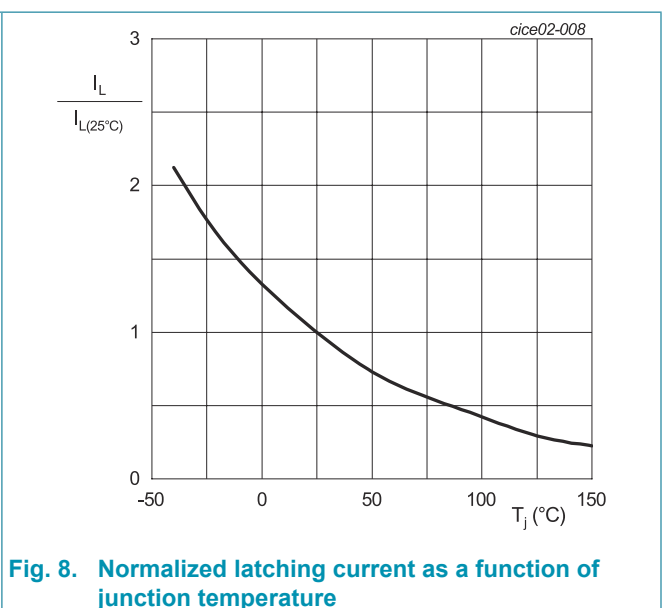
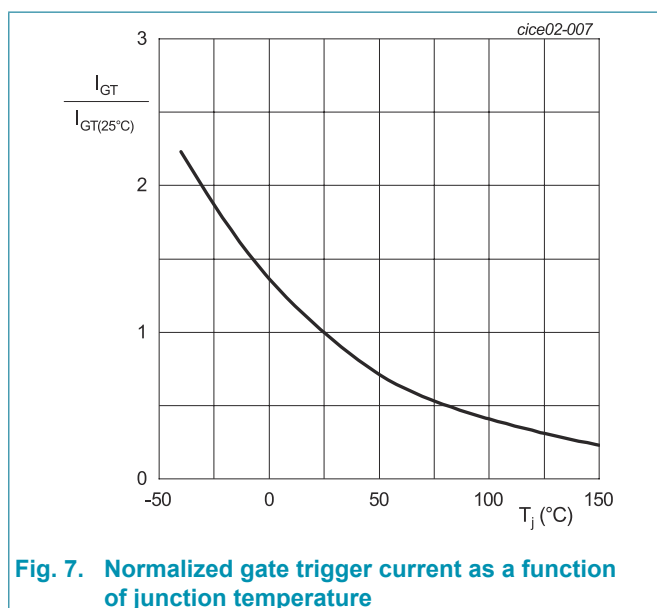


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-----------------------------------|--|------|------|-----|------------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | 5 | - | 10 | mA |
| I_L | latching current | $V_D = 12\text{ V}; I_G = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C}$; Fig. 8 | - | - | 60 | mA |
| I_H | holding current | $V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C}$; Fig. 9 | - | - | 40 | mA |
| V_T | on-state voltage | $I_T = 16\text{ A}; T_j = 25\text{ }^\circ\text{C}$; Fig. 10 | - | - | 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 | - | 0.8 | 1 | V |
| | | $V_D = 400\text{ V}; I_T = 0.1\text{ A}; T_j = 125\text{ }^\circ\text{C}$ | 0.25 | 0.45 | - | V |
| V_{GR} | gate reverse voltage | $I_{RG} = 100\text{ mA}$ | 10 | - | - | V |
| I_D | off-state current | $V_D = 600\text{ V}; T_j = 25\text{ }^\circ\text{C}$ | - | - | 10 | μA |
| | | $V_D = 600\text{ V}; T_j = 150\text{ }^\circ\text{C}$ | - | - | 2 | mA |
| I_R | reverse current | $V_D = 600\text{ V}; T_j = 25\text{ }^\circ\text{C}$ | - | - | 10 | μA |
| | | $V_D = 600\text{ V}; T_j = 150\text{ }^\circ\text{C}$ | - | - | 2 | mA |
| 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 | 400 | - | - | V/ μs |
| t_{gt} | gate-controlled turn-on time | $I_{TM} = 16\text{ A}; V_D = 600\text{ V}; I_G = 20\text{ mA}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$ | - | 2 | - | μs |
| t_q | commutated turn-off time | $I_{TM} = 2\text{ A}; t_p = 50\text{ } \mu\text{s}$; $dV/dt = 5\text{ V}/\mu\text{s}$; $dI/dt = 30\text{ A}/\mu\text{s}$ | - | - | 12 | μs |



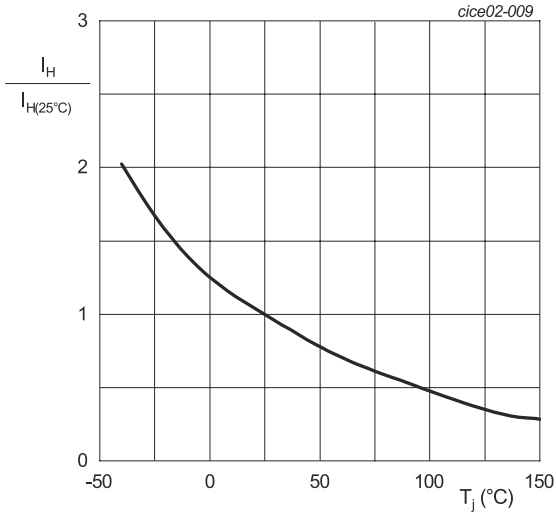
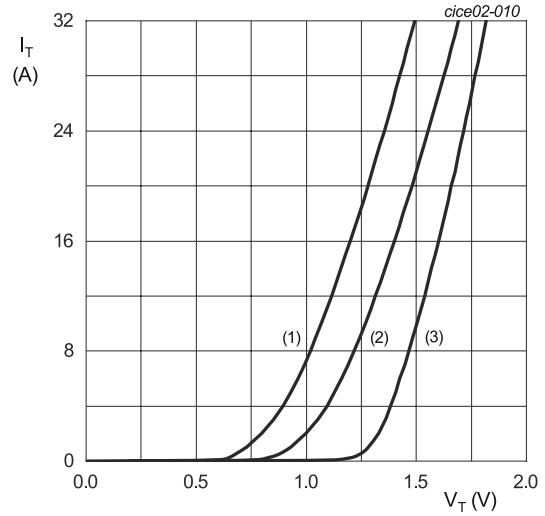


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.075 \text{ V}; R_s = 0.0196 \Omega$
 (1) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

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

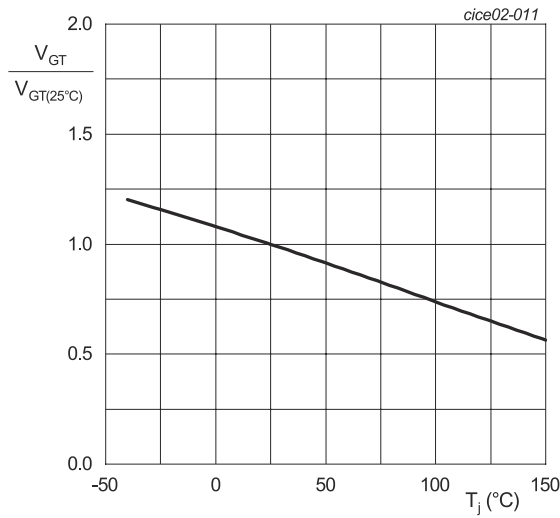
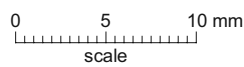
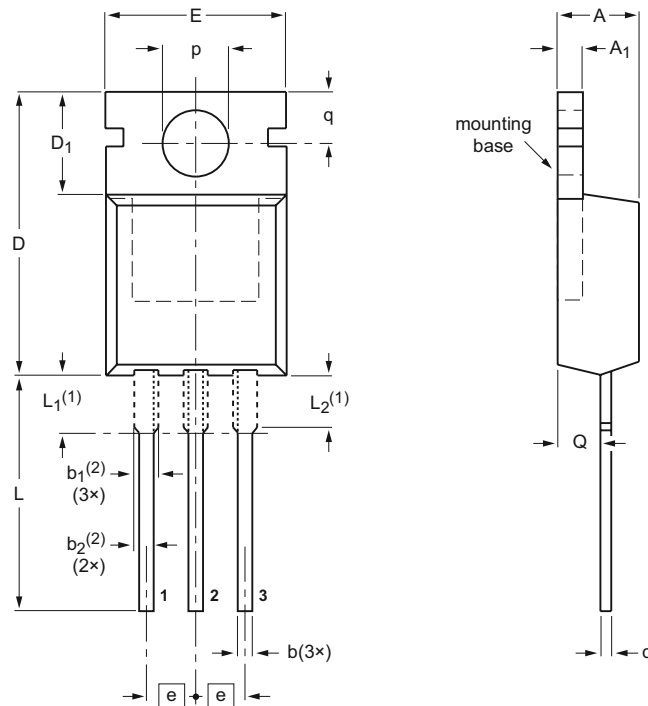


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

11. Package outline

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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