



TYN20-800T

SCR

21 March 2014

Product data sheet

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a SOT78 (TO-220AB) plastic package intended for use in applications requiring very high inrush current capability, high thermal cycling performance and high junction temperature capability ($T_{j(max)} = 150$ °C).

2. Features and benefits

- High bidirectional blocking voltage capability
- High junction operating temperature capability
- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability
- Very high current surge capability

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

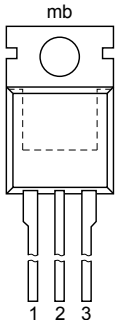

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------|--------------------------------------|---|-----|-----|-----|------|
| V_{DRM} | repetitive peak off-state voltage | | - | - | 800 | V |
| V_{RRM} | repetitive peak reverse voltage | | - | - | 800 | V |
| I_{TSM} | non-repetitive peak on-state current | half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; Fig. 4 ; Fig. 5 | - | - | 210 | A |
| | | half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms | - | - | 231 | A |
| T_j | junction temperature | | - | - | 150 | °C |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{mb} \leq 129$ °C; Fig. 2 ; Fig. 3 | - | - | 20 | A |



| 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 | - | 4.5 | 32 | mA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 536\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 300 | - | - | V/ μs |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-----------------------------------|---|---|
| 1 | K | cathode |  <p style="text-align: center;">TO-220AB (SOT78)</p> |  |
| 2 | A | anode | | |
| 3 | G | gate | | |
| mb | A | mounting base; connected to anode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|----------|--|---------|
| | Name | Description | Version |
| TYN20-800T | TO-220AB | plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB | SOT78 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| TYN20-800T | TYN20-800T |

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 | | - | 800 | V |
| V_{RRM} | repetitive peak reverse voltage | | - | 800 | V |
| $I_{T(AV)}$ | average on-state current | half sine wave; $T_{mb} \leq 129\text{ }^{\circ}\text{C}$; Fig. 1 | - | 12.7 | A |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{mb} \leq 129\text{ }^{\circ}\text{C}$; Fig. 2; Fig. 3 | - | 20 | A |
| I_{TSM} | non-repetitive peak on-state current | half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 10\text{ ms}$; Fig. 4; Fig. 5 | - | 210 | A |
| | | half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 8.3\text{ ms}$ | - | 231 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; sine-wave pulse | - | 220.5 | A^2s |
| di_T/dt | rate of rise of on-state current | $I_T = 40\text{ A}$; $I_G = 200\text{ mA}$; $di_G/dt = 200\text{ mA}/\mu\text{s}$ | - | 50 | $\text{A}/\mu\text{s}$ |
| I_{GM} | peak gate current | | - | 5 | A |
| V_{RGM} | peak reverse gate voltage | | - | 5 | V |
| P_{GM} | peak gate power | | - | 20 | W |
| $P_{G(AV)}$ | average gate power | over any 20 ms period | - | 1 | W |
| T_{stg} | storage temperature | | -40 | 150 | $^{\circ}\text{C}$ |
| T_j | junction temperature | | - | 150 | $^{\circ}\text{C}$ |

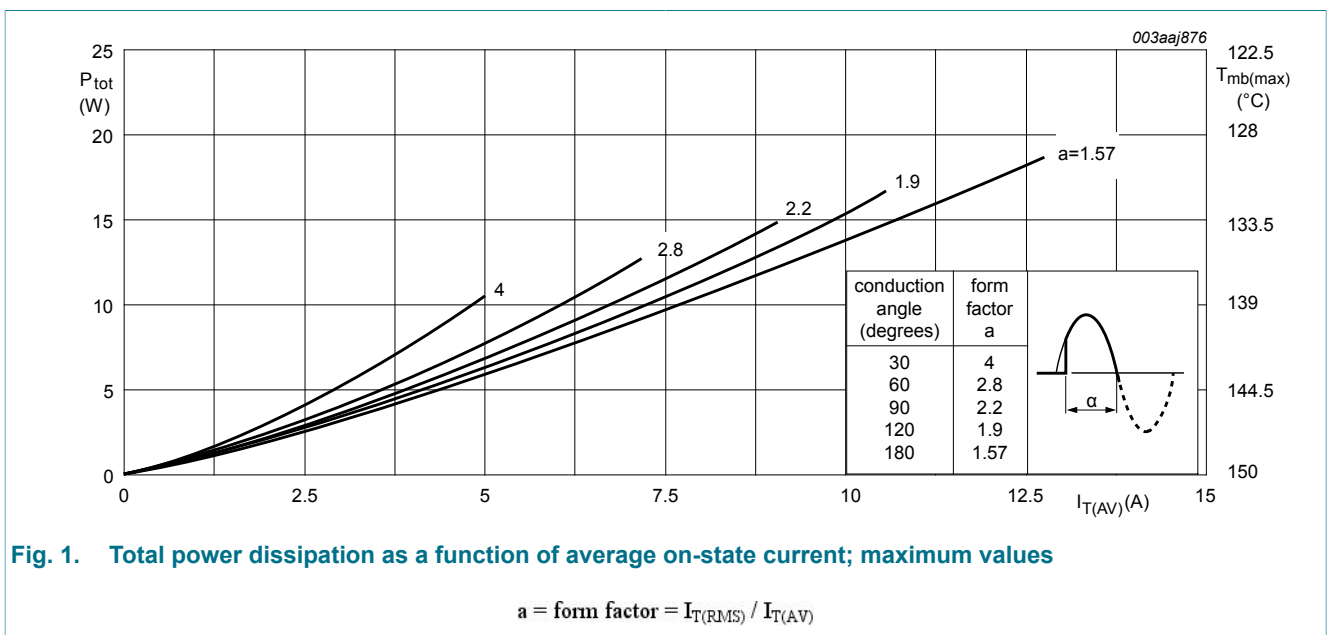


Fig. 1. Total power dissipation as a function of average on-state current; maximum values

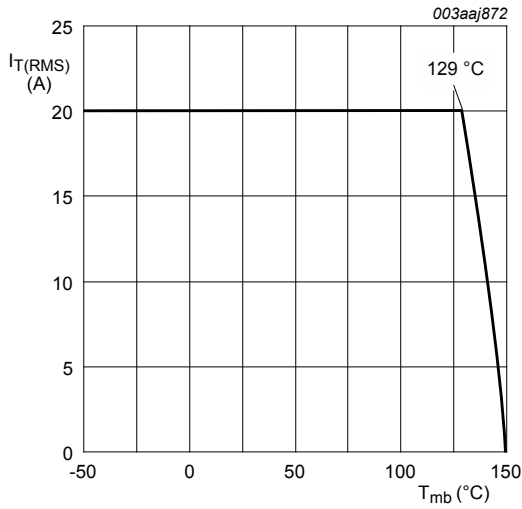


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values

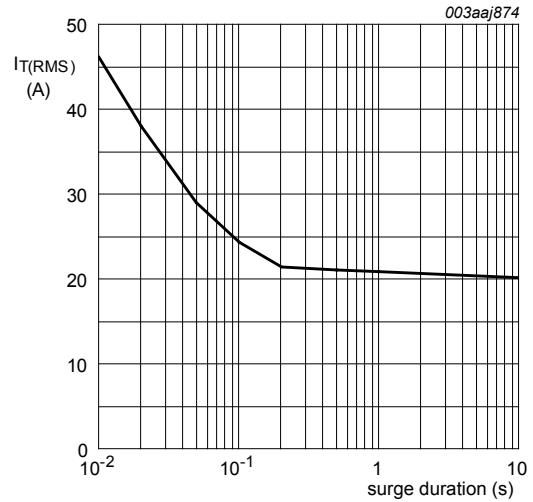


Fig. 3. RMS on-state current as a function of surge duration; maximum values

f = 50 Hz; T_{mb} = 129 °C

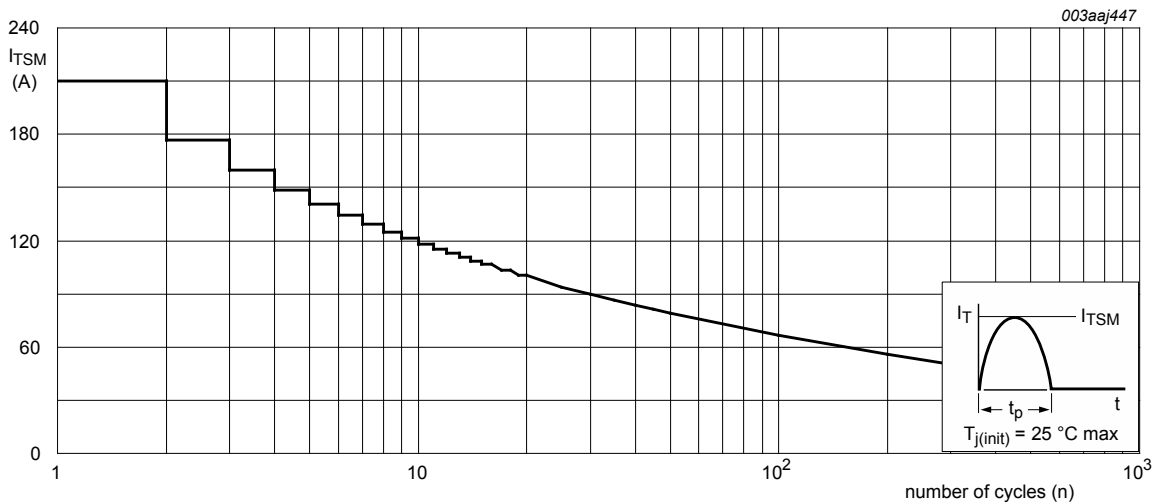
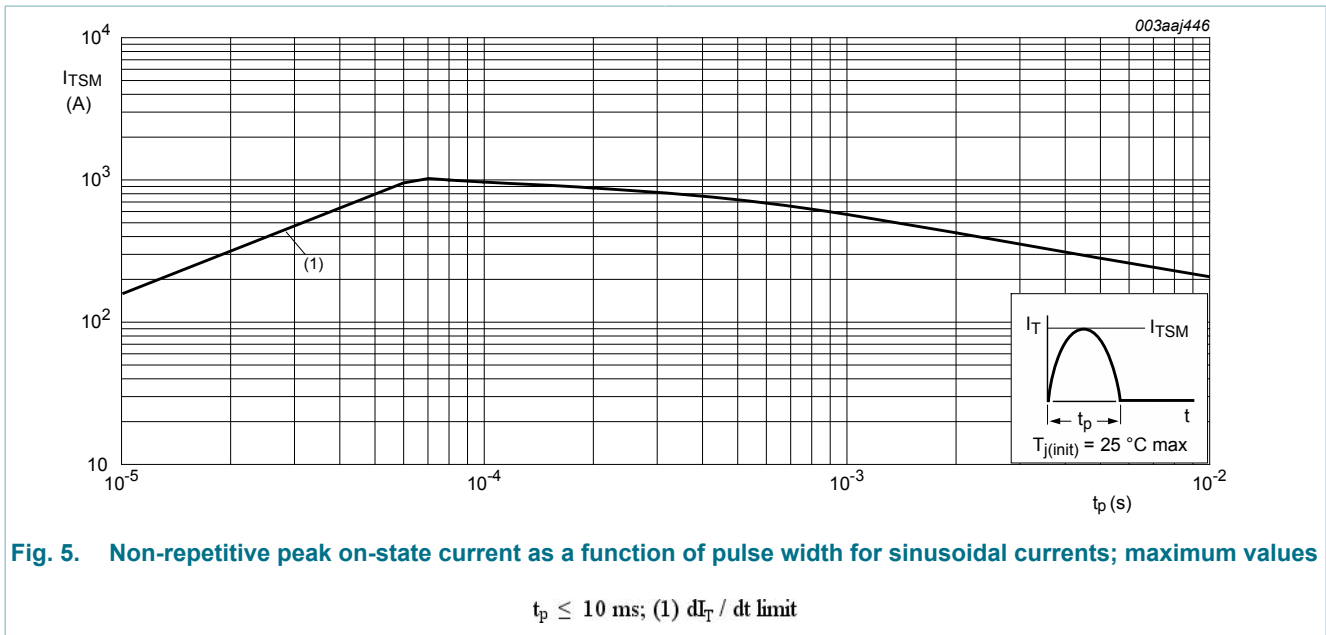


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

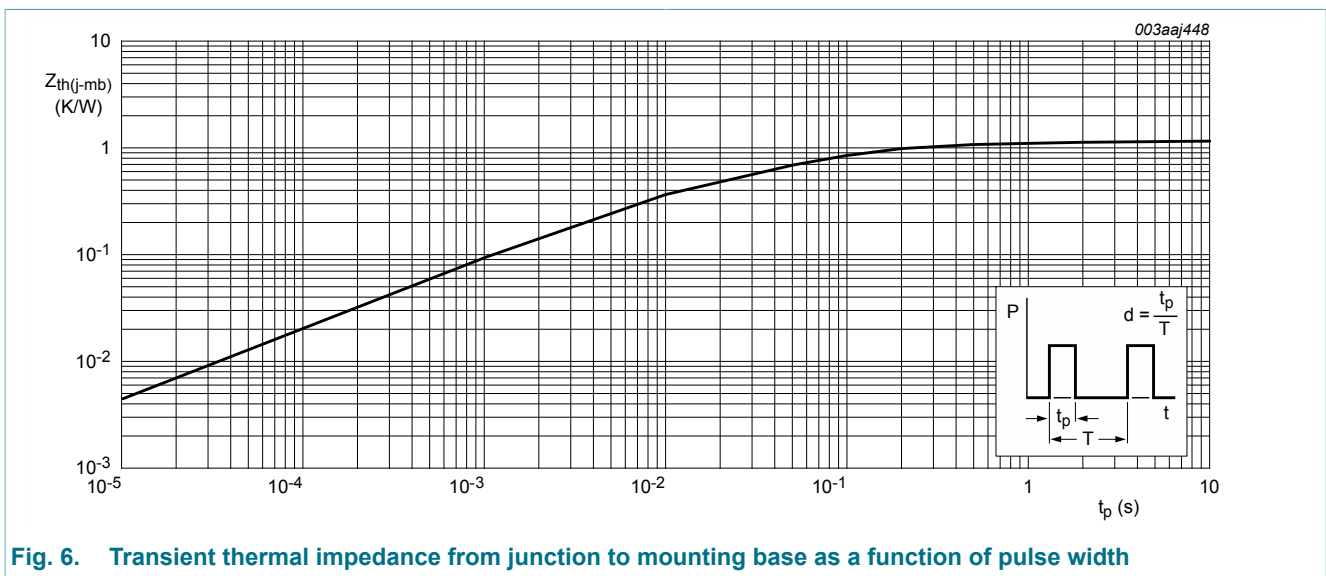
f = 50 Hz



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 | - | - | 1.1 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | - | 60 | - | K/W |



10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-----------------------------------|---|-----|-----|-----|------------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 | - | 4.5 | 32 | 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 | - | 21 | 60 | mA |
| I_H | holding current | $V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9 | - | 16 | 40 | mA |
| V_T | on-state voltage | $I_T = 32\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10 | - | 1.2 | 1.5 | 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 | 1.3 | V |
| | | $V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 150\text{ }^\circ\text{C}$; Fig. 11 | 0.2 | 0.4 | - | V |
| I_D | off-state current | $V_D = 800\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$ | - | 0.2 | 1 | mA |
| I_R | reverse current | $V_R = 800\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$ | - | 0.2 | 1 | mA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 536\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit | 300 | - | - | V/ μs |

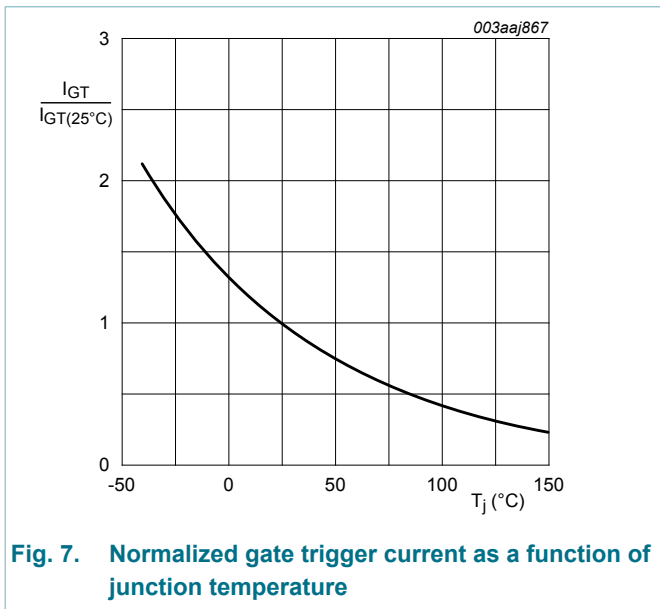


Fig. 7. Normalized gate trigger current as a function of junction temperature

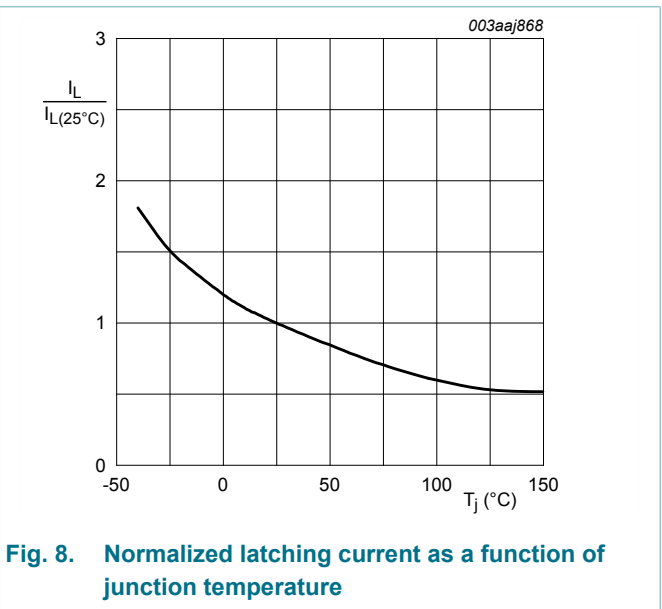


Fig. 8. Normalized latching current as a function of junction temperature

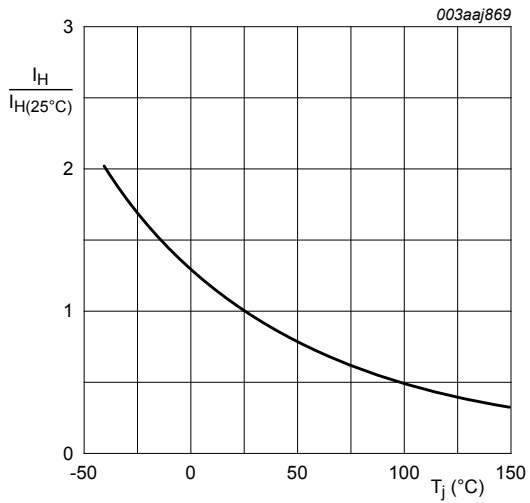
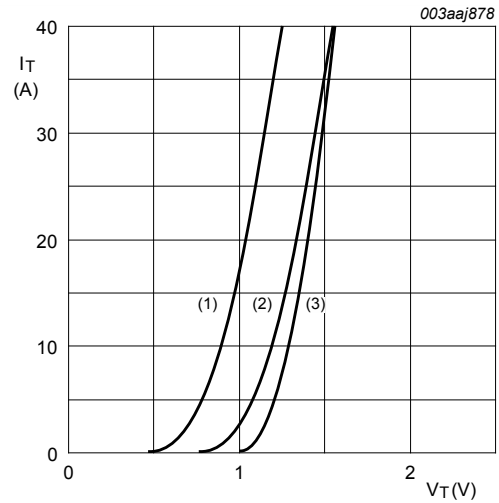


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.0485 \text{ V}$; $R_s = 0.0133 \Omega$

(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

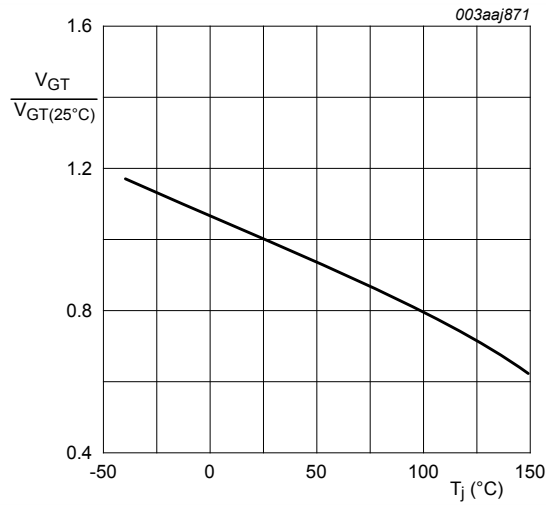
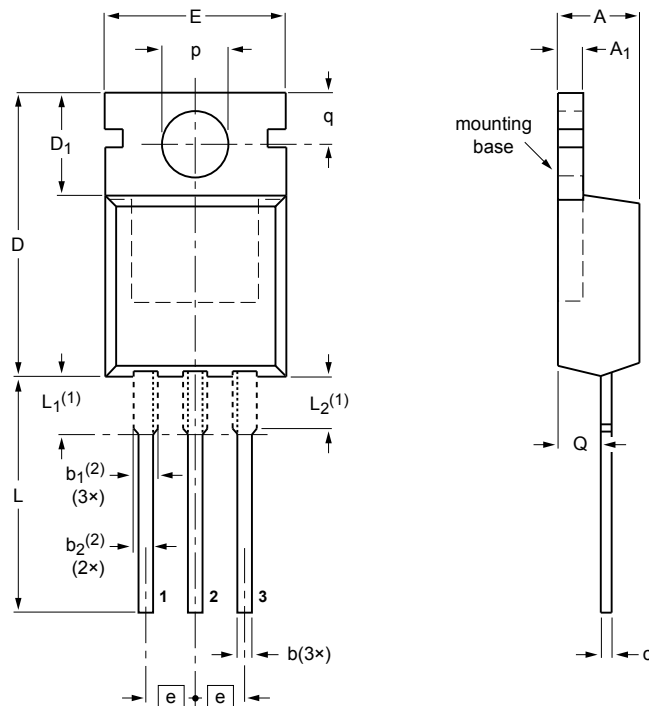


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

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 |

Fig. 12. Package outline TO-220AB (SOT78)

12. Legal information

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| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
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