

## 1. General description

Planar passivated SCR with sensitive gate in a SIP3 (SOT82) plastic package intended for use in general purpose switching and phase control applications. These devices are intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

## 2. Features and benefits

- Sensitive gate
- Planar passivated for voltage ruggedness and reliability
- Direct triggering from low power drivers and logic ICs

## 3. Applications

- Adapters
- Battery powered applications
- Industrial automation

## 4. Quick reference data

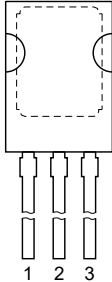
Table 1. Quick reference data

| Symbol                         | Parameter                            | Conditions                                                                                                                                                  | Min | Typ | Max | Unit |
|--------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| $V_{RRM}$                      | repetitive peak reverse voltage      |                                                                                                                                                             | -   | -   | 500 | V    |
| $I_{T(AV)}$                    | average on-state current             | half sine wave; $T_{mb} \leq 113\text{ °C}$ ; <a href="#">Fig. 1</a>                                                                                        | -   | -   | 2.5 | A    |
| $I_{T(RMS)}$                   | RMS on-state current                 | half sine wave; $T_{mb} \leq 113\text{ °C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>                                                               | -   | -   | 4   | A    |
| $I_{TSM}$                      | non-repetitive peak on-state current | half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>                                       | -   | -   | 35  | A    |
|                                |                                      | half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$                                                                                        | -   | -   | 38  | A    |
| $T_j$                          | junction temperature                 | <a href="#">[1]</a>                                                                                                                                         | -   | -   | 125 | °C   |
| <b>Static characteristics</b>  |                                      |                                                                                                                                                             |     |     |     |      |
| $I_{GT}$                       | gate trigger current                 | $V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>                                                                  | -   | 15  | 200 | μA   |
| <b>Dynamic characteristics</b> |                                      |                                                                                                                                                             |     |     |     |      |
| $dV_D/dt$                      | rate of rise of off-state voltage    | $V_{DM} = 268\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 100\text{ Ω}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; <a href="#">Fig. 12</a> | -   | 50  | -   | V/μs |

[1] Operation above 110°C may require the use of a gate to cathode resistor of 1kΩ or less.

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                       | Simplified outline                                                                                       | Graphic symbol                                                                                       |
|-----|--------|-----------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 1   | K      | cathode                           | <br><b>SIP3 (SOT82)</b> | <br><i>sym037</i> |
| 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 |
| BT148-600R  | SIP3    | plastic single-ended package; 3 leads (in-line) | SOT82   |

## 7. Limiting values

**Table 4. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol              | Parameter                            | Conditions                                                                                                                            |     | Min | Max | Unit             |
|---------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|------------------|
| $V_{\text{DRM}}$    | repetitive peak off-state voltage    |                                                                                                                                       | [1] | -   | 600 | V                |
| $V_{\text{RRM}}$    | repetitive peak reverse voltage      |                                                                                                                                       |     | -   | 600 | V                |
| $I_{\text{T(AV)}}$  | average on-state current             | half sine wave; $T_{\text{mb}} \leq 113\text{ °C}$ ; <a href="#">Fig. 1</a>                                                           |     | -   | 2.5 | A                |
| $I_{\text{T(RMS)}}$ | RMS on-state current                 | half sine wave; $T_{\text{mb}} \leq 113\text{ °C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>                                  |     | -   | 4   | A                |
| $I_{\text{TSM}}$    | non-repetitive peak on-state current | half sine wave; $T_{\text{j(init)}} = 25\text{ °C}$ ; $t_{\text{p}} = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a> |     | -   | 35  | A                |
|                     |                                      | half sine wave; $T_{\text{j(init)}} = 25\text{ °C}$ ; $t_{\text{p}} = 8.3\text{ ms}$                                                  |     | -   | 38  | A                |
| $I^2t$              | $I^2t$ for fusing                    | $t_{\text{p}} = 10\text{ ms}$ ; SIN                                                                                                   |     | -   | 6.1 | A <sup>2</sup> s |
| $di_{\text{T}}/dt$  | rate of rise of on-state current     | $I_{\text{T}} = 10\text{ A}$ ; $I_{\text{G}} = 50\text{ mA}$ ; $di_{\text{G}}/dt = 50\text{ mA}/\mu\text{s}$                          |     | -   | 50  | A/ $\mu\text{s}$ |
| $I_{\text{GM}}$     | peak gate current                    |                                                                                                                                       |     | -   | 2   | A                |
| $V_{\text{RGM}}$    | peak reverse gate voltage            |                                                                                                                                       |     | -   | 5   | V                |
| $P_{\text{GM}}$     | peak gate power                      |                                                                                                                                       |     | -   | 5   | W                |
| $P_{\text{G(AV)}}$  | average gate power                   | over any 20 ms period                                                                                                                 |     | -   | 0.5 | W                |
| $T_{\text{stg}}$    | storage temperature                  |                                                                                                                                       |     | -40 | 150 | °C               |
| $T_{\text{j}}$      | junction temperature                 |                                                                                                                                       | [2] | -   | 125 | °C               |

- [1] Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ $\mu\text{s}$ .
- [2] Operation above 110°C may require the use of a gate to cathode resistor of 1k $\Omega$  or less.

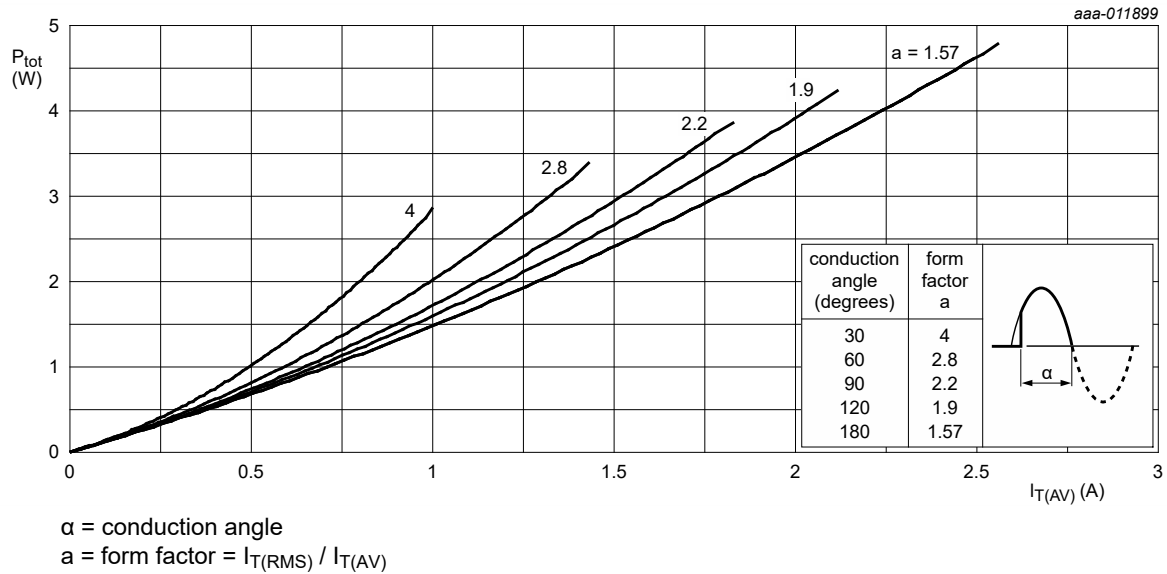


Fig. 1. Total power dissipation as a function of average on-state current; maximum values

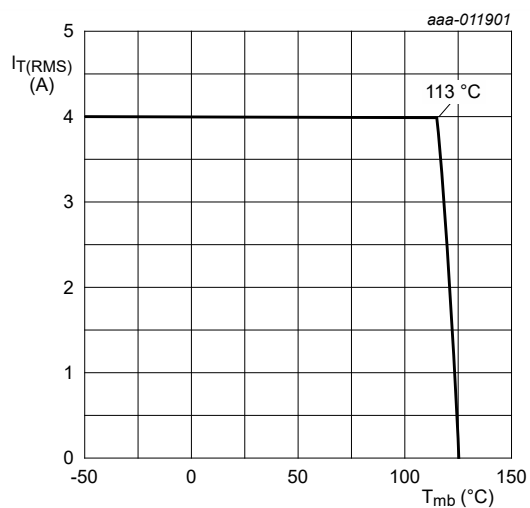


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values

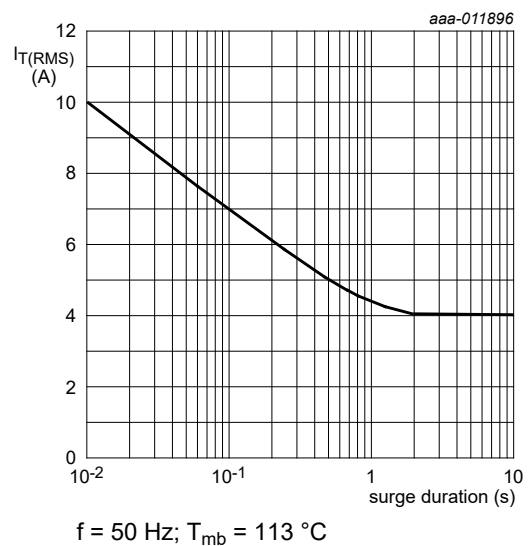
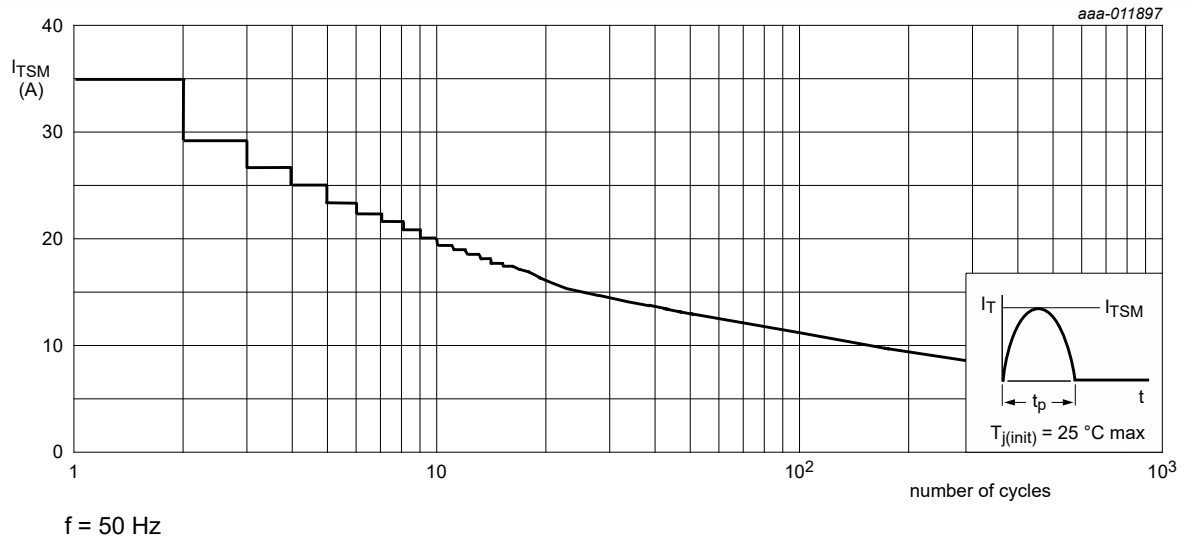
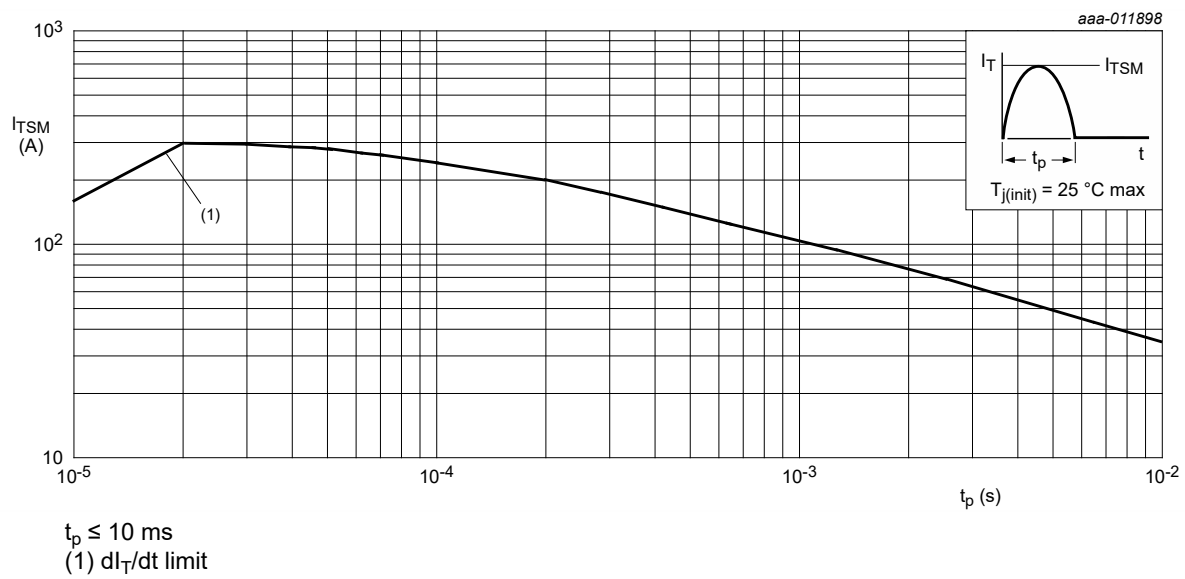


Fig. 3. RMS on-state current as a function of surge duration; maximum values



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

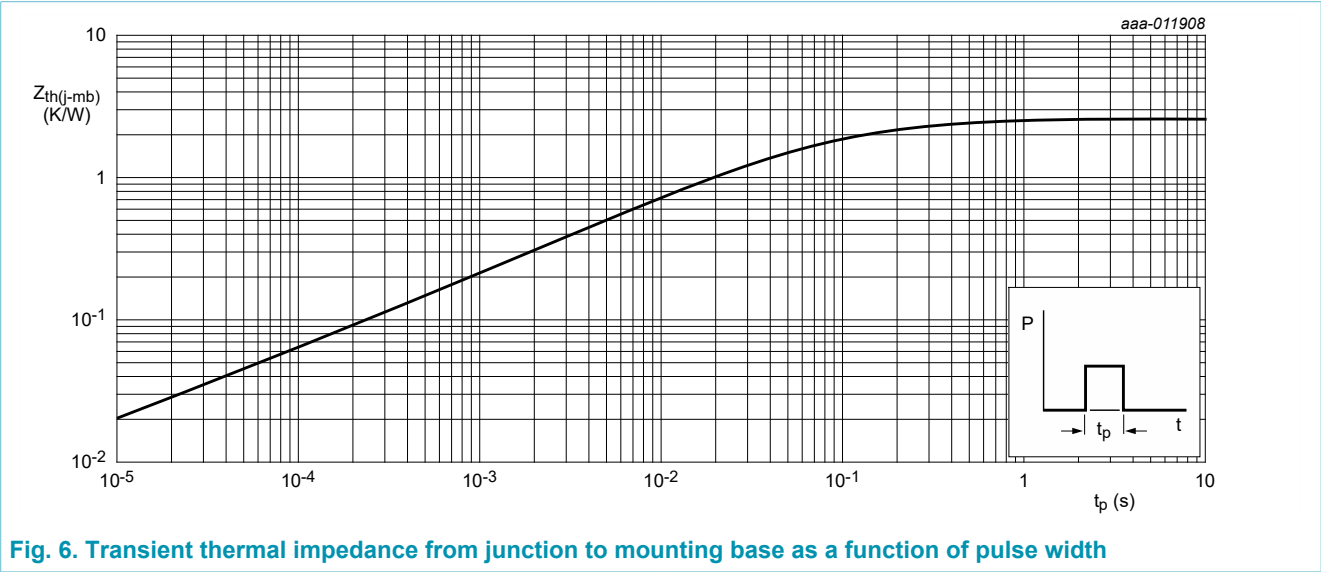


**Fig. 5. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values**

## 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    | <a href="#">Fig. 6</a> |  | -   | -   | 2.5 | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient free air | in free air            |  | -   | 95  | -   | K/W  |



## 9. Characteristics

Table 6. Characteristics

| Symbol                         | Parameter                         | Conditions                                                                                                                                                                                                                                         | Min | Typ  | Max | Unit                   |
|--------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|------------------------|
| <b>Static characteristics</b>  |                                   |                                                                                                                                                                                                                                                    |     |      |     |                        |
| $I_{GT}$                       | gate trigger current              | $V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>                                                                                                                                                         | -   | 15   | 200 | $\mu\text{A}$          |
| $I_L$                          | latching current                  | $V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 8</a>                                                                                                                                                         | -   | 0.17 | 10  | $\text{mA}$            |
| $I_H$                          | holding current                   | $V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>                                                                                                                                                                                | -   | 0.1  | 6   | $\text{mA}$            |
| $V_T$                          | on-state voltage                  | $I_T = 5\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>                                                                                                                                                                                | -   | 1.23 | 1.8 | $\text{V}$             |
| $V_{GT}$                       | gate trigger voltage              | $V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 11</a>                                                                                                                                                        | -   | 0.4  | 1   | $\text{V}$             |
|                                |                                   | $V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 110\text{ °C}$ ; <a href="#">Fig. 11</a>                                                                                                                                                      | 0.1 | 0.2  | -   | $\text{V}$             |
| $I_D$                          | off-state current                 | $V_D = 400\text{ V}$ ; $T_j = 125\text{ °C}$                                                                                                                                                                                                       | -   | 0.1  | 0.5 | $\text{mA}$            |
| $I_R$                          | reverse current                   | $V_R = 400\text{ V}$ ; $T_j = 125\text{ °C}$                                                                                                                                                                                                       | -   | 0.1  | 0.5 | $\text{mA}$            |
| <b>Dynamic characteristics</b> |                                   |                                                                                                                                                                                                                                                    |     |      |     |                        |
| $dV_D/dt$                      | rate of rise of off-state voltage | $V_{DM} = 268\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 100\text{ }\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; <a href="#">Fig. 12</a>                                                                                   | -   | 50   | -   | $\text{V}/\mu\text{s}$ |
| $t_{gt}$                       | gate-controlled turn-on time      | $I_{TM} = 10\text{ A}$ ; $V_D = 400\text{ V}$ ; $I_G = 5\text{ mA}$ ; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$                                                                                                                  | -   | 2    | -   | $\mu\text{s}$          |
| $t_q$                          | commutated turn-off time          | $V_{DM} = 268\text{ V}$ ; $T_j = 125\text{ °C}$ ; $I_{TM} = 8\text{ A}$ ; $V_R = 10\text{ V}$ ; $(dI_T/dt)_M = 10\text{ A}/\mu\text{s}$ ; $dV_D/dt = 2\text{ V}/\mu\text{s}$ ; $R_{GK(ext)} = 1\text{ k}\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ) | -   | 100  | -   | $\mu\text{s}$          |

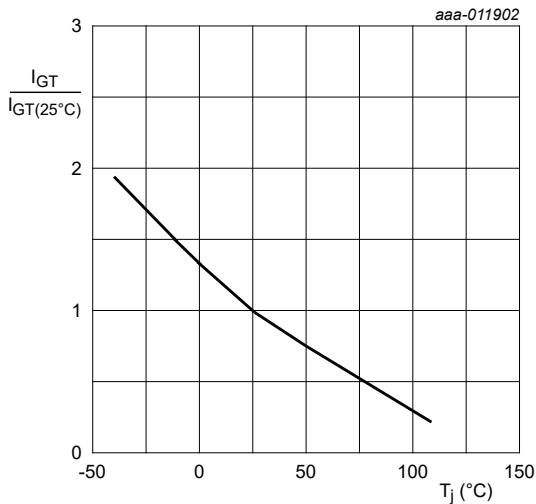


Fig. 7. Normalized gate trigger current as a function of junction temperature

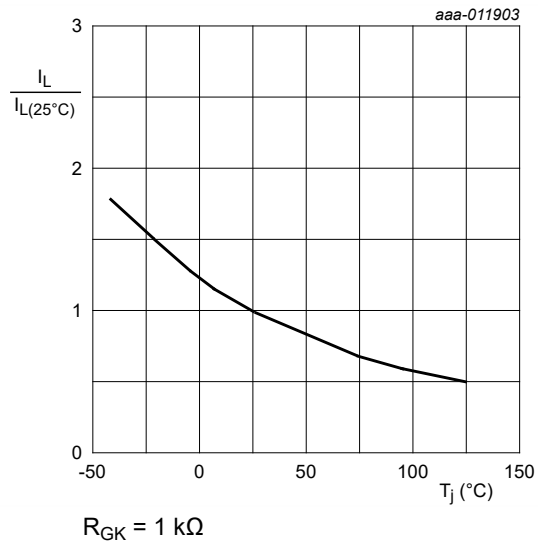
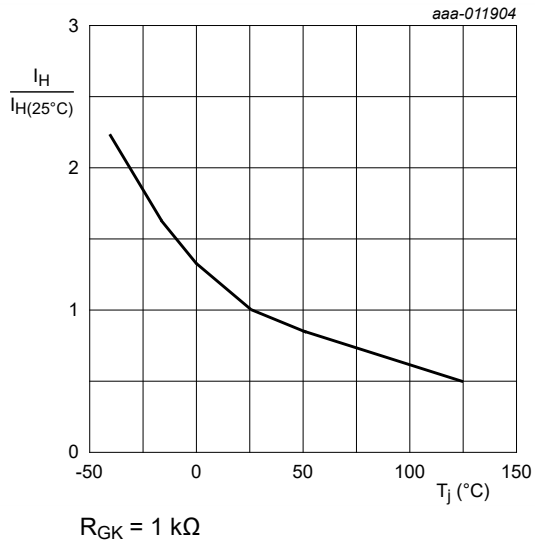
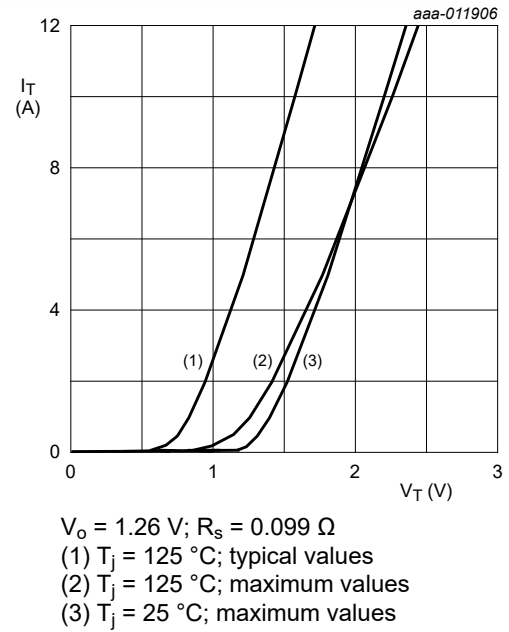


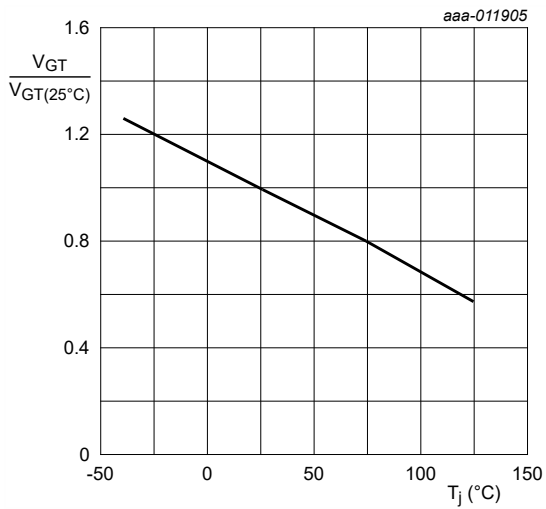
Fig. 8. Normalized latching current as a function of junction temperature



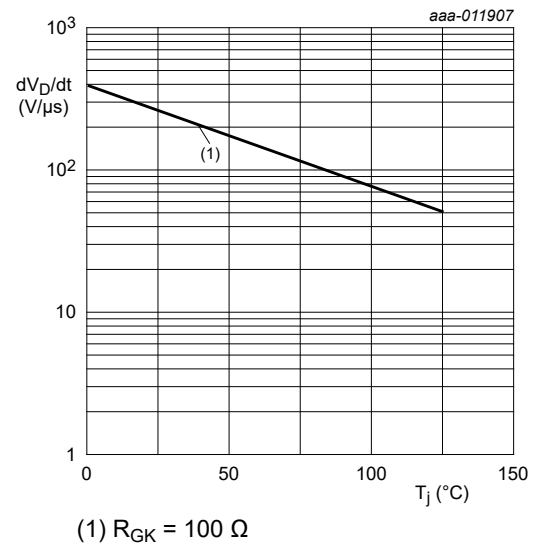
**Fig. 9. Normalized holding current as a function of junction temperature**



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



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

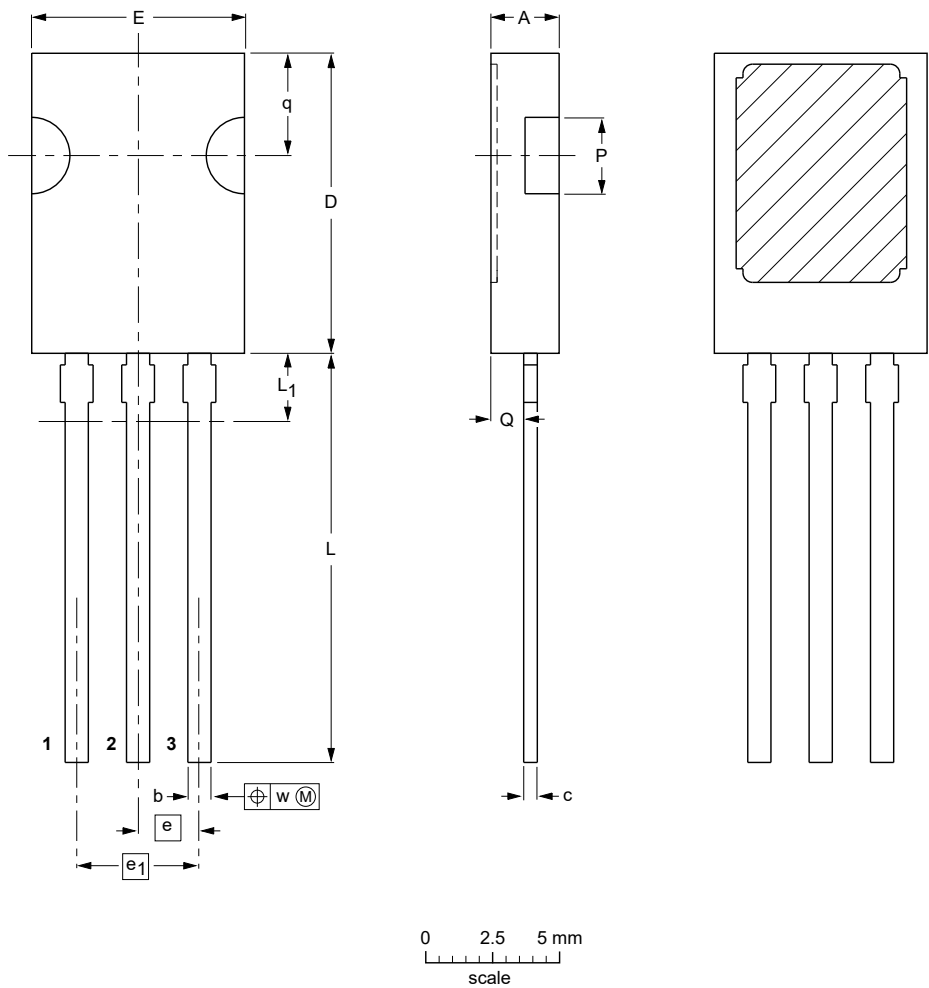


**Fig. 12. Critical rate of rise of off-state voltage as a function of junction temperature; typical values**

# 10. Package outline

Plastic single-ended package; 3 leads (in-line)

SOT82



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | b            | c            | D            | E          | e    | e <sub>1</sub> | L            | L <sub>1</sub> <sup>(1)</sup><br>max. | P          | Q          | q          | w     |
|------|------------|--------------|--------------|--------------|------------|------|----------------|--------------|---------------------------------------|------------|------------|------------|-------|
| mm   | 2.8<br>2.3 | 0.88<br>0.65 | 0.58<br>0.47 | 11.1<br>10.5 | 7.8<br>7.2 | 2.29 | 4.58           | 16.5<br>15.3 | 2.54                                  | 3.1<br>2.5 | 1.5<br>0.9 | 3.9<br>3.5 | 0.254 |

**Note**

1. Terminal dimensions within this zone are uncontrolled to allow for body and terminal irregularities.

| OUTLINE<br>VERSION | REFERENCES |       |      |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE |
|--------------------|------------|-------|------|--|---------------------------------------------------------------------------------------|------------|
|                    | IEC        | JEDEC | EIAJ |  |                                                                                       |            |
| SOT82              |            |       |      |  |  | 97-06-11   |

Fig. 13. Package outline SIP3 (SOT82)