



BT148W-600R

SCR

26 September 2014

Product data sheet

1. General description

Planar passivated SCR with sensitive gate in a SOT223 (SC-73) surface mountable plastic package. 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
- Surface mountable package

3. Applications

- Adapters
- Battery powered applications
- Industrial automation

4. Quick reference data

Table 1. Quick reference data

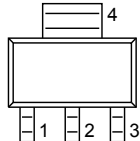

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|--------------------------------------|--|-----|-----|-----|---------------|
| V_{DRM} | repetitive peak off-state voltage | [1] | - | - | 600 | V |
| V_{RRM} | repetitive peak reverse voltage | | - | - | 600 | V |
| 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 | - | - | 10 | A |
| $I_{T(AV)}$ | average on-state current | half sine wave; $T_{sp} \leq 112\text{ °C}$; Fig. 1 | - | - | 0.6 | A |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{sp} \leq 112\text{ °C}$; Fig. 2; Fig. 3 | - | - | 1 | A |
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 9 | - | 50 | 200 | μA |

[1] Although not recommended, off-state voltages up to 800 V may be applied without damage, but the thyristor may switch to the on-state.



5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|------------------------|---|---|
| 1 | K | cathode |  <p>SC-73 (SOT223)</p> |  <p>A K G sym037</p> |
| 2 | A | anode | | |
| 3 | G | gate | | |
| 4 | mb | mb; connected to anode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BT148W-600R | SC-73 | plastic surface-mounted package with increased heatsink; 4 leads | SOT223 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BT148W-600R | BT148W 60 |

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 | | [1] | - | 600 | V |
| V_{RRM} | repetitive peak reverse voltage | | | - | 600 | V |
| $I_{T(AV)}$ | average on-state current | half sine wave; $T_{sp} \leq 112\text{ °C}$; Fig. 1 | | - | 0.6 | A |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{sp} \leq 112\text{ °C}$; Fig. 2 ; Fig. 3 | | - | 1 | 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 | | - | 10 | A |
| | | half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$ | | - | 11 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; SIN | | - | 0.5 | A^2s |
| di_T/dt | rate of rise of on-state current | $I_T = 4\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu s$ | | - | 50 | $A/\mu s$ |
| I_{GM} | peak gate current | | | - | 1 | A |
| V_{RGM} | peak reverse gate voltage | | | - | 5 | V |
| P_{GM} | peak gate power | | | - | 1.2 | W |
| $P_{G(AV)}$ | average gate power | over any 20 ms period | | - | 0.12 | W |
| T_{stg} | storage temperature | | | -40 | 150 | $^{\circ}C$ |
| T_j | junction temperature | | [2] | - | 125 | $^{\circ}C$ |

[1] Although not recommended, off-state voltages up to 800 V may be applied without damage, but the thyristor may switch to the on-state.

[2] Operation above 110 $^{\circ}C$ may require the use of a gate to cathode resistor of 1k Ω or less.

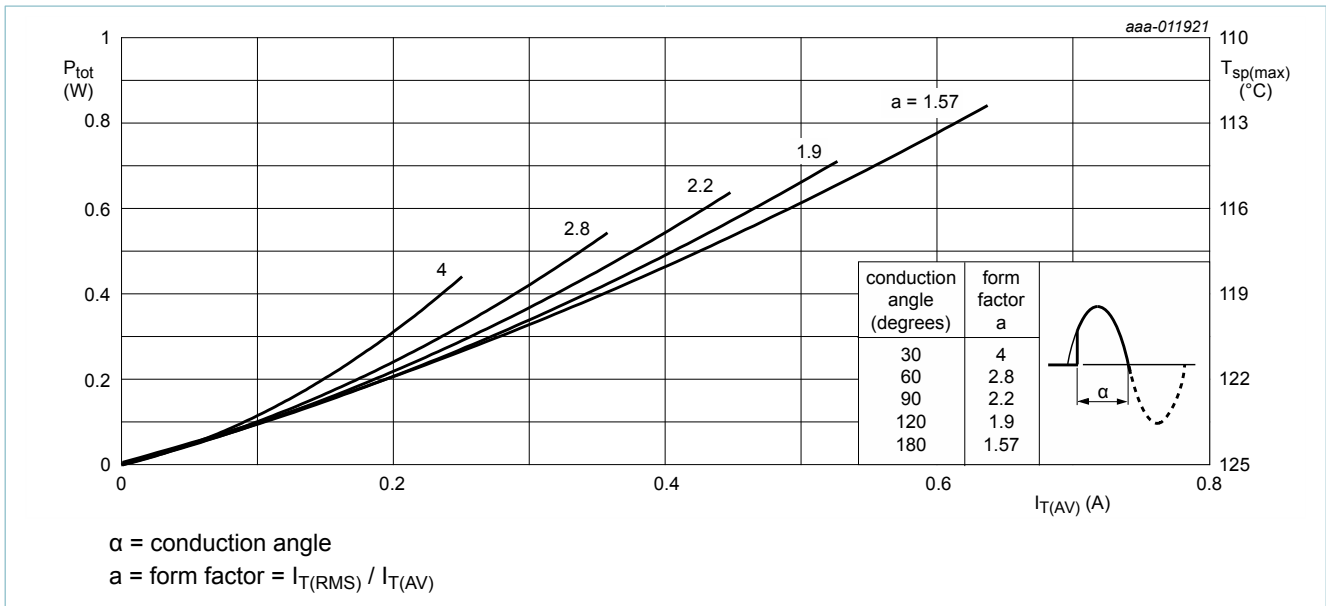


Fig. 1. Total power dissipation as a function of average on-state current; maximum values

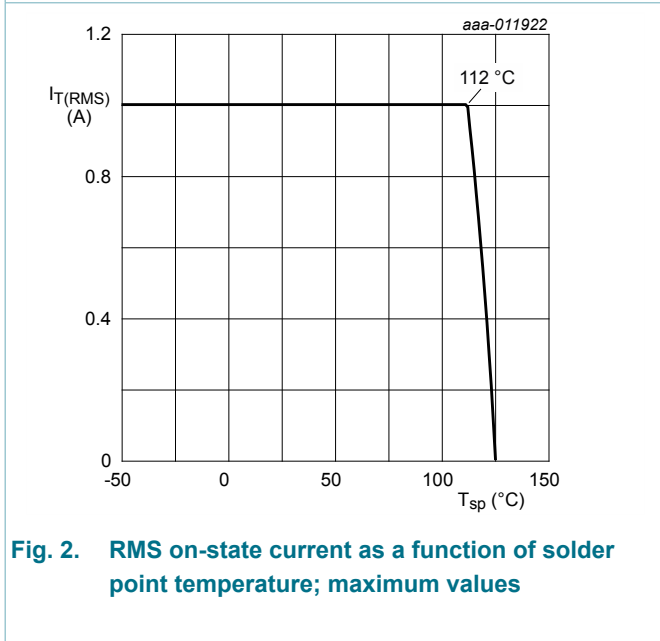


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

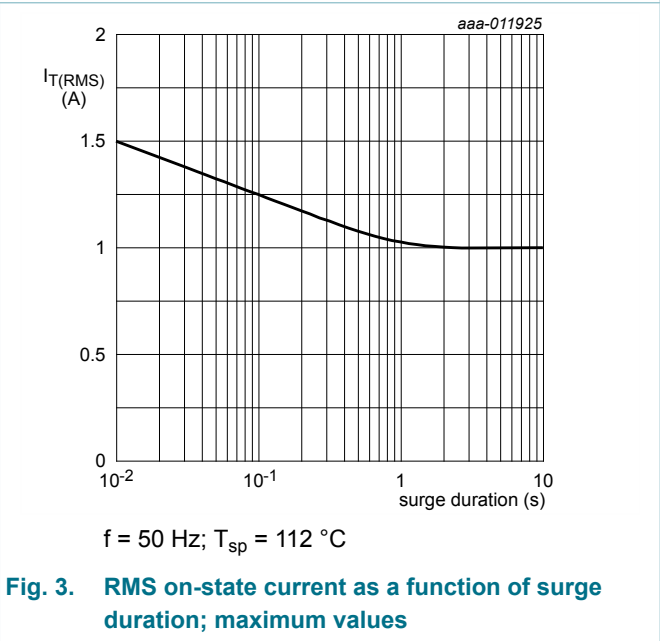


Fig. 3. RMS on-state current as a function of surge duration; maximum values

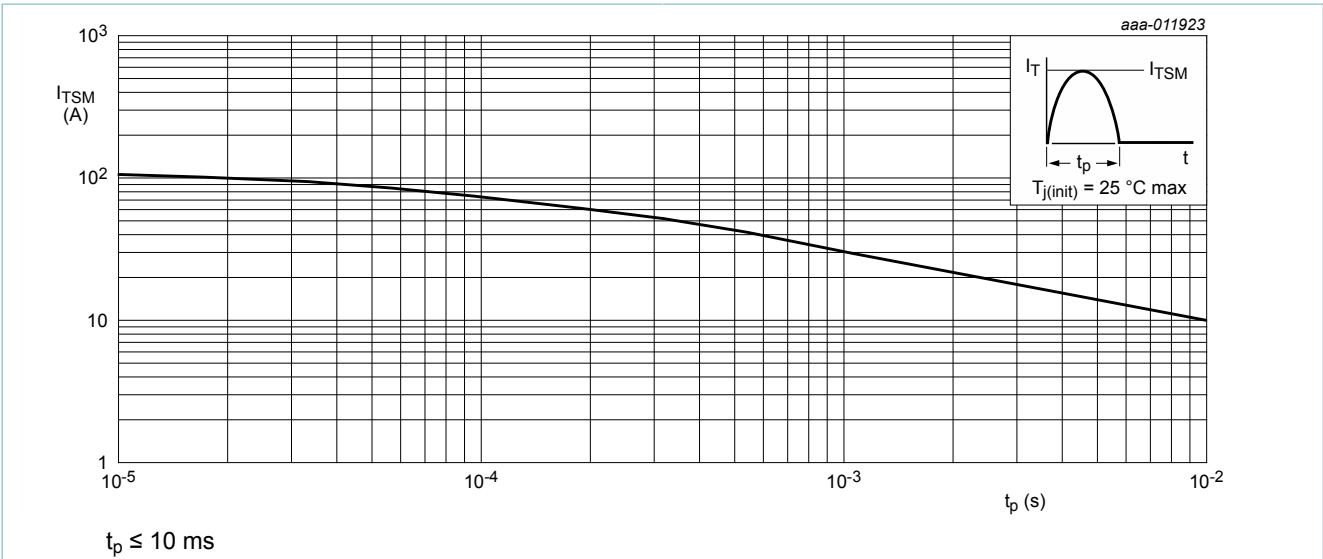


Fig. 4. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values

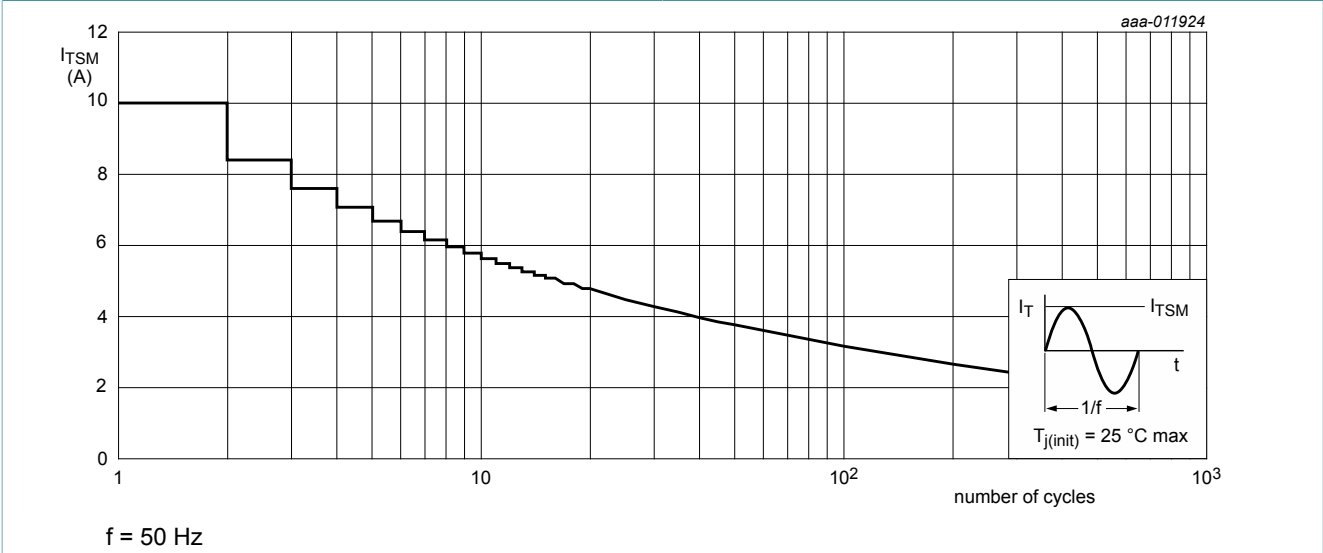


Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|--|-----|-----|-----|------|
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | Fig. 6 | - | - | 15 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | printed circuit board mounted; pad area; Fig. 7 | - | 70 | - | K/W |
| | | printed circuit board mounted; minimum footprint; Fig. 8 | - | 156 | - | K/W |

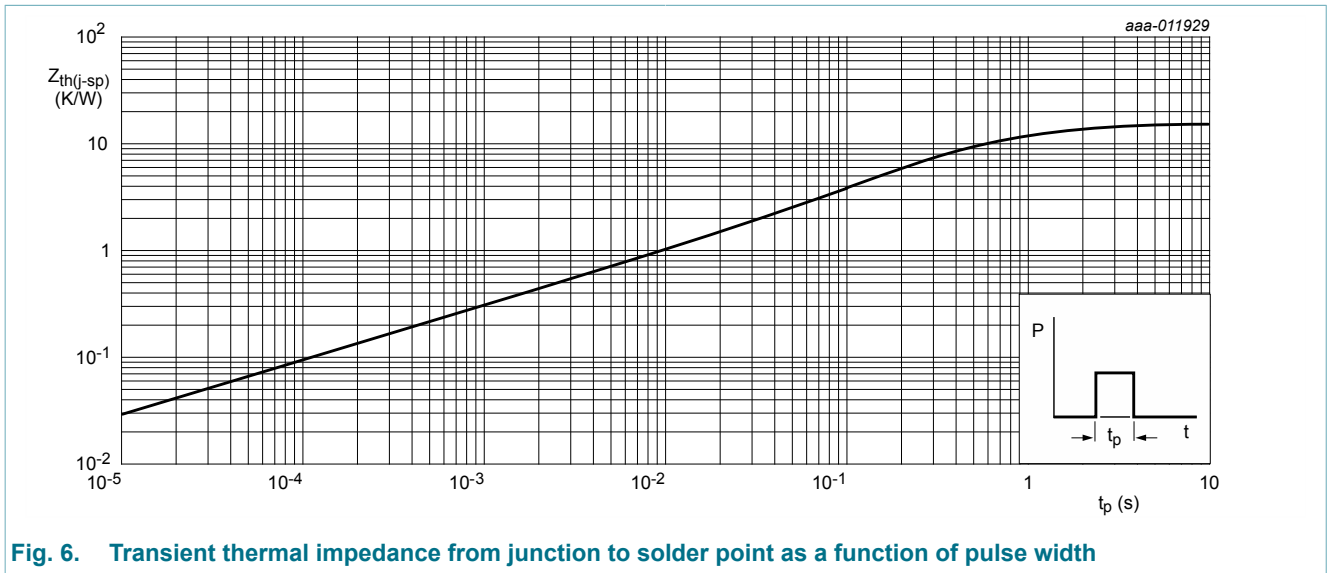
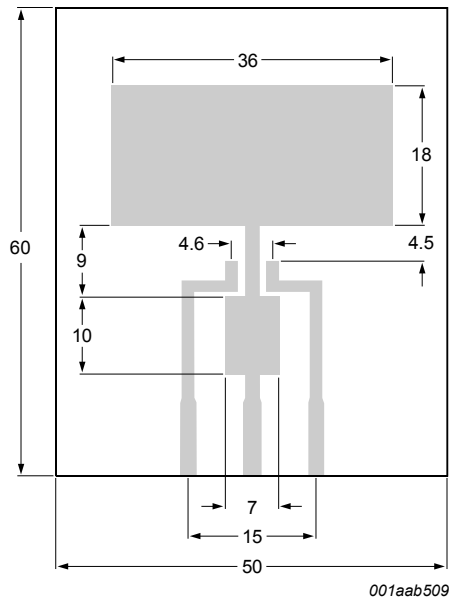
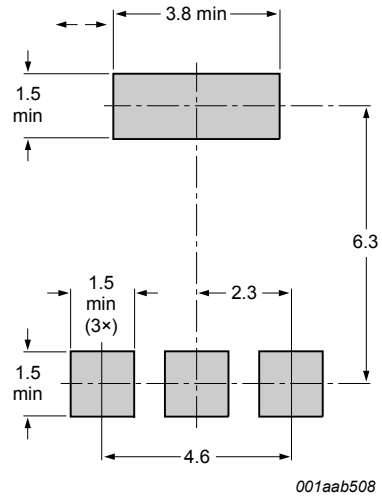


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width



All dimensions are in mm
 Printed circuit board:
 FR4 epoxy glass (1.6 mm thick), copper laminate
 (35 μ m thick)

Fig. 7. Printed circuit board pad area: SOT223



All dimensions are in mm

Fig. 8. Minimum footprint SOT223

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-----------------------------------|---|-----|------|-----|------------------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 9 | - | 50 | 200 | μA |
| I_L | latching current | $V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10 | - | 0.17 | 10 | mA |
| I_H | holding current | $V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 11 | - | 0.1 | 6 | mA |
| V_T | on-state voltage | $I_T = 2\text{ A}$; $T_j = 25\text{ °C}$; Fig. 12 | - | 1.3 | 1.5 | V |
| V_{GT} | gate trigger voltage | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 13 | - | 0.4 | 1 | V |
| | | $V_D = 600\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$; Fig. 13 | 0.1 | 0.2 | - | V |
| I_D | off-state current | $V_D = 600\text{ V}$; $T_j = 125\text{ °C}$ | - | 0.1 | 0.5 | mA |
| I_R | reverse current | $V_R = 600\text{ V}$; $T_j = 125\text{ °C}$ | - | 0.1 | 0.5 | mA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 100\ \Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; Fig. 14 | - | 50 | - | $\text{V}/\mu\text{s}$ |
| t_{gt} | gate-controlled turn-on time | $I_{TM} = 4\text{ A}$; $V_D = 600\text{ V}$; $I_G = 5\text{ mA}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$ | - | 2 | - | μs |
| t_q | commutated turn-off time | $V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; $I_{TM} = 4\text{ A}$; $V_R = 35\text{ V}$; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$; $dV_D/dt = 2\text{ V}/\mu\text{s}$; $R_{GK} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM}) | - | 100 | - | μs |

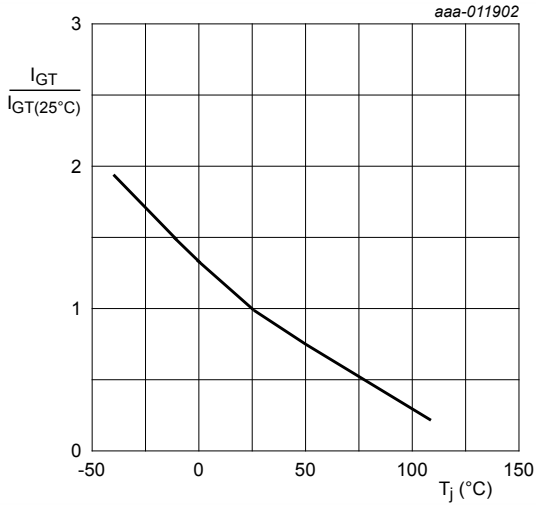
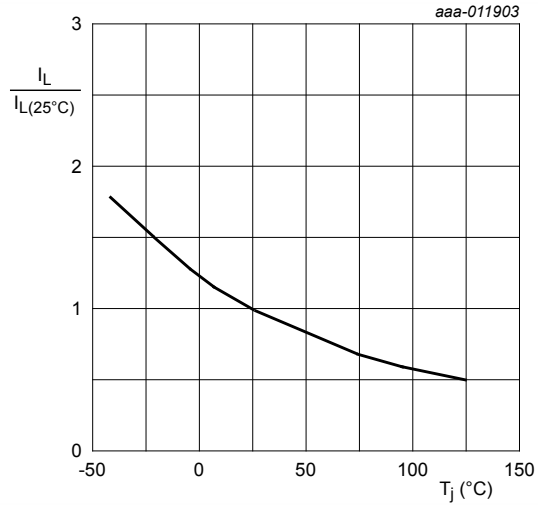
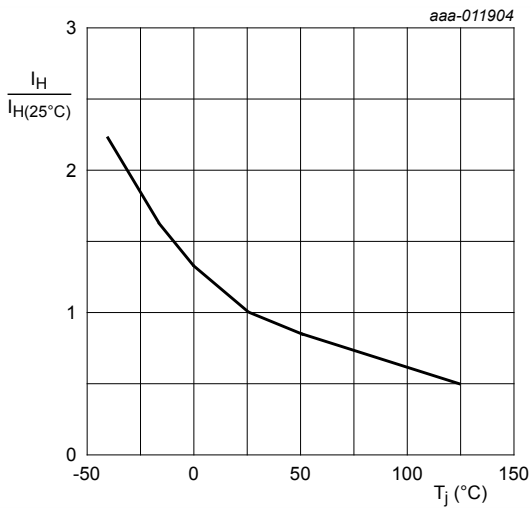


Fig. 9. Normalized gate trigger current as a function of junction temperature



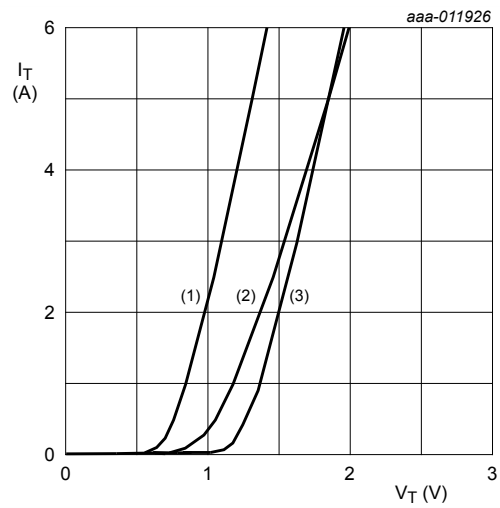
$R_{GK} = 1 \text{ k}\Omega$

Fig. 10. Normalized latching current as a function of junction temperature



$R_{GK} = 1 \text{ k}\Omega$

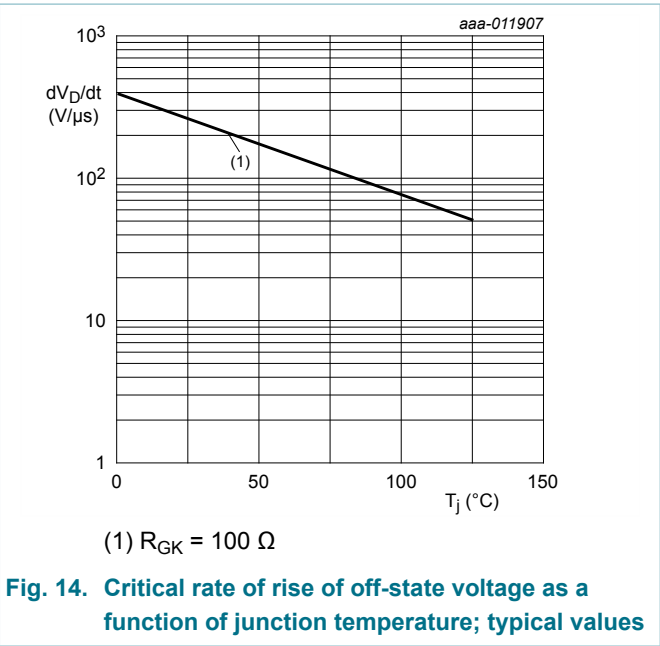
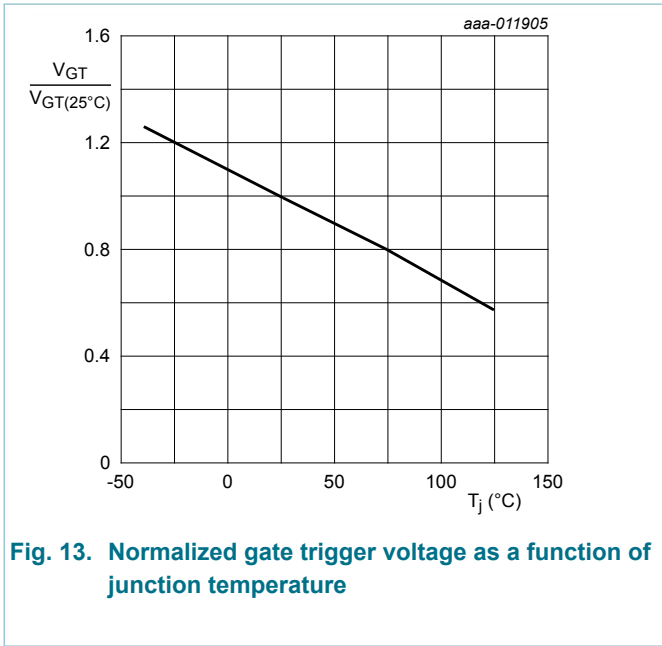
Fig. 11. Normalized holding current as a function of junction temperature



$V_o = 1.107 \text{ V}; R_s = 0.14 \Omega$

- (1) $T_j = 125^\circ\text{C}$; typical values
- (2) $T_j = 125^\circ\text{C}$; maximum values
- (3) $T_j = 25^\circ\text{C}$; maximum values

Fig. 12. On-state current as a function of on-state voltage



11. Package outline



Fig. 15. Package outline SC-73 (SOT223)

12. Legal information

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