

1. General description

Planar passivated SCR with sensitive gate in a SOT223 surface mountable plastic package. This SCR is designed 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

- Ground Fault Circuit Interrupters (GFCI)
- General purpose switching and phase control
- Ignition circuits, CDI for 2- and 3-wheelers
- Motor control - e.g. small kitchen appliances

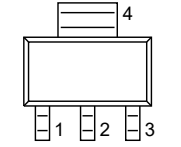


4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|--------------------------------------|--|-----|-----|------|---------------|
| V_{DRM} | repetitive peak off-state voltage | | - | - | 1000 | V |
| V_{RRM} | repetitive peak reverse voltage | | - | - | 1000 | V |
| $I_{T(AV)}$ | average on-state current | half sine wave; $T_{sp} \leq 100\text{ }^{\circ}\text{C}$ | - | - | 0.8 | A |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{sp} \leq 100\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 1.1 | 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 | - | - | 11 | A |
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7 | 1 | - | 100 | μA |

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 | A | mb; connected to anode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| NCR100W-12M | SC-73 | plastic surface-mounted package with increased heatsink; 4 leads | SOT223 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| NCR100W-12M | 10012M |

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 | | - | 1000 | V |
| V_{RRM} | repetitive peak reverse voltage | | - | 1000 | V |
| $I_{T(AV)}$ | average on-state current | half sine wave; $T_{sp} \leq 100\text{ °C}$ | - | 0.8 | A |
| $I_{T(RMS)}$ | RMS on-state current | half sine wave; $T_{sp} \leq 100\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 1.1 | 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 | - | 11 | A |
| | | half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$ | - | 12.1 | A |
| I^2t | I^2t for fusing | $t_p = 10\text{ ms}$; SIN | - | 0.605 | A ² s |
| di_T/dt | rate of rise of on-state current | $I_G = 0.1\text{ mA}$ | - | 50 | A/ μ s |
| I_{GM} | peak gate current | | - | 1 | A |
| V_{RGM} | peak reverse gate voltage | | - | 5 | V |
| P_{GM} | peak gate power | | - | 2 | W |
| $P_{G(AV)}$ | average gate power | over any 20 ms period | - | 0.1 | W |
| T_{stg} | storage temperature | | -40 | 150 | °C |
| T_j | junction temperature | | - | 125 | °C |

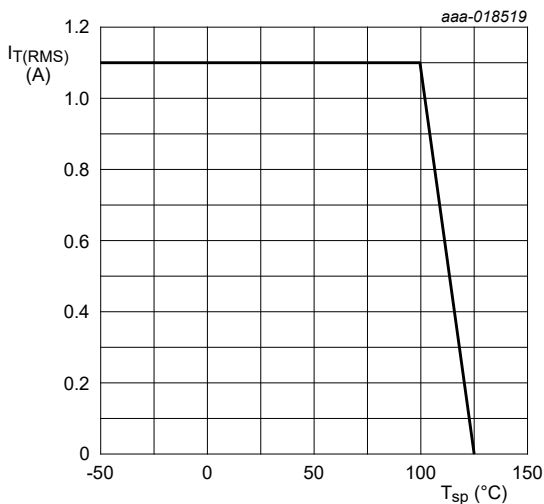


Fig. 1. RMS on-state current as a function of solder point temperature; maximum values

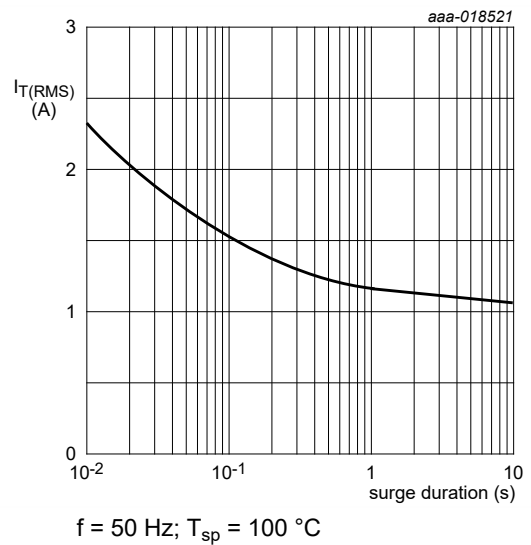


Fig. 2. RMS on-state current as a function of surge duration; maximum values

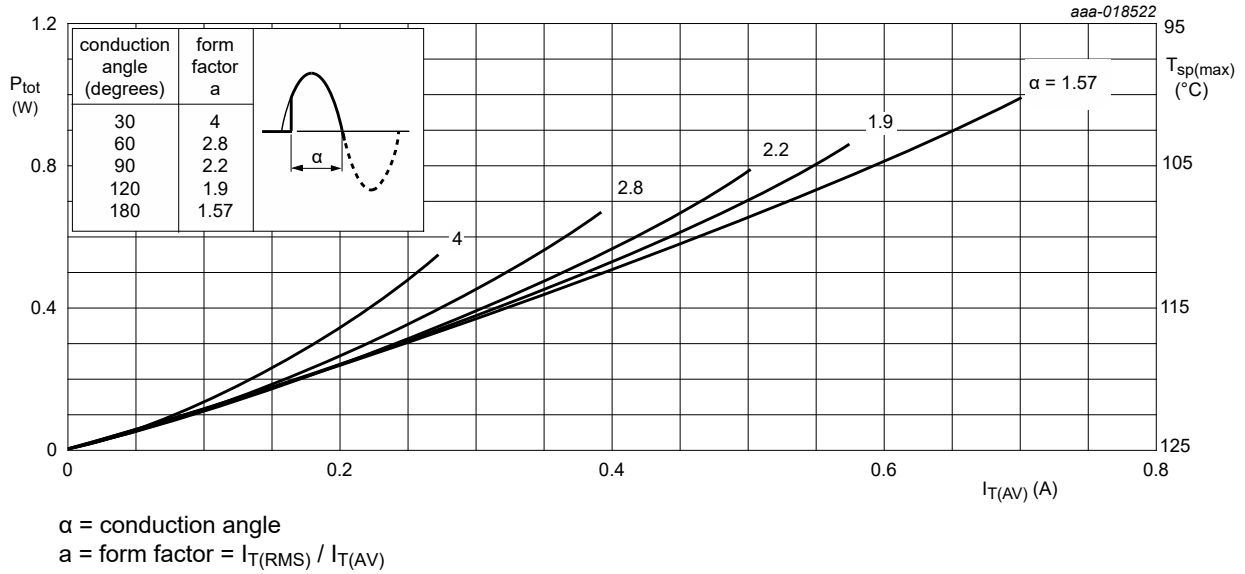


Fig. 3. Total power dissipation as a function of average on-state current; maximum values

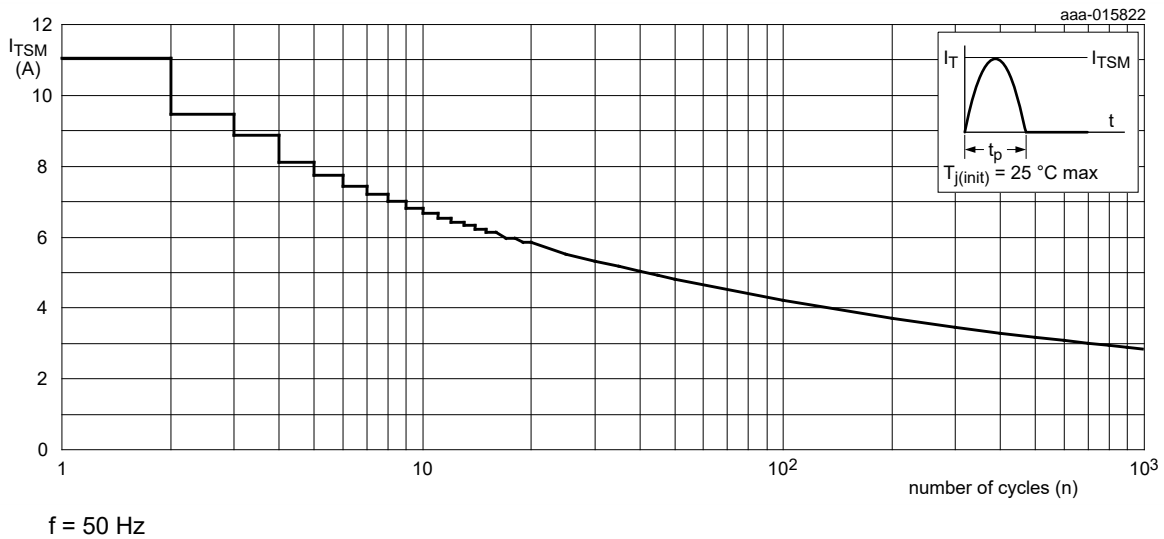
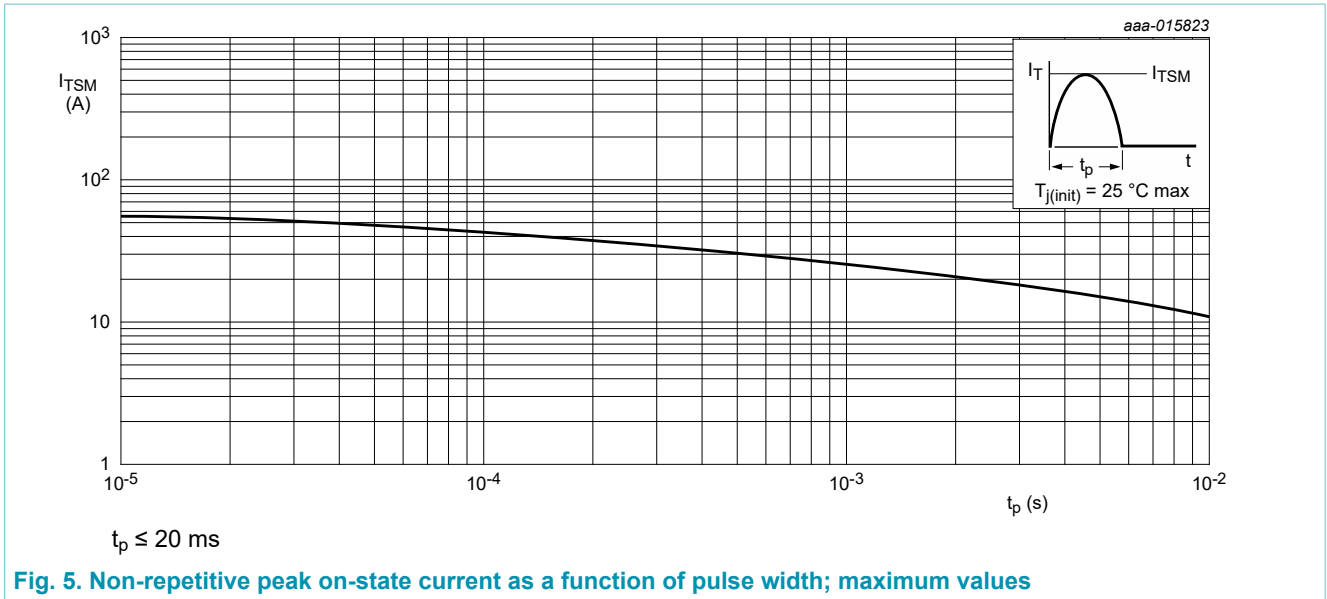


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



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 | half cycle; Fig. 6 | - | - | 25 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | printed circuit board mounted; minimum footprint; in free air | - | 130 | - | K/W |

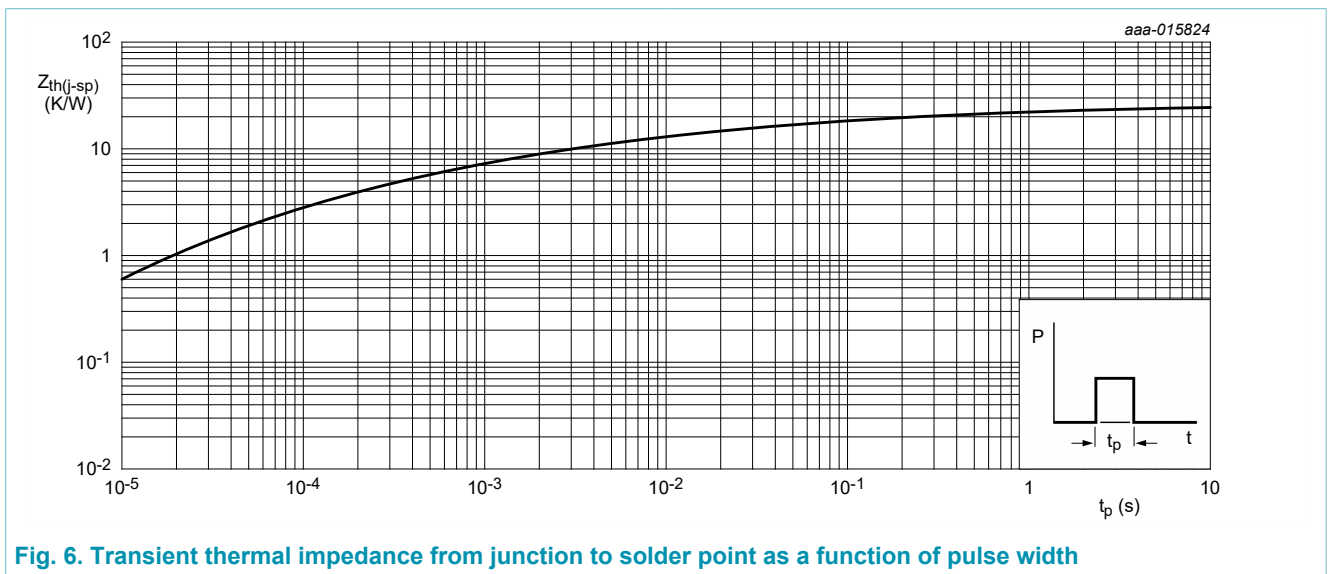


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-----------------------------------|--|-----|------|-----|------------------------|
| Static characteristics | | | | | | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ °C}$; Fig. 7 | 1 | - | 100 | μA |
| I_L | latching current | $V_D = 12\text{ V}$; $I_G = 0.5\text{ mA}$; $T_j = 25\text{ °C}$; $R_{GK(\text{ext})} = 1\text{ k}\Omega$; Fig. 8 | - | - | 6 | mA |
| I_H | holding current | $V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; $R_{GK(\text{ext})} = 1\text{ k}\Omega$; Fig. 9 | - | - | 3 | mA |
| V_T | on-state voltage | $I_T = 1.2\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10 | - | 1.25 | 1.7 | V |
| V_{GT} | gate trigger voltage | $V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ °C}$; Fig. 11 | - | 0.5 | 0.8 | V |
| | | $V_D = 1000\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$; Fig. 11 | 0.3 | 0.5 | - | V |
| I_D | off-state current | $V_D = 1000\text{ V}$; $R_{GK(\text{ext})} = 1\text{ k}\Omega$; $T_j = 125\text{ °C}$ | - | 0.05 | 1 | mA |
| I_R | reverse current | $V_R = 1000\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK(\text{ext})} = 1\text{ k}\Omega$ | - | 0.05 | 1 | mA |
| Dynamic characteristics | | | | | | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 670\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$; exponential waveform; ($V_{DM} = 67\%$ of V_{DRM}) | 100 | - | - | $\text{V}/\mu\text{s}$ |
| t_{gt} | gate-controlled turn-on time | $I_{TM} = 2\text{ A}$; $V_D = 1000\text{ V}$; $I_G = 10\text{ mA}$; $dI_G/dt = 0.1\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$ | - | 2 | - | μs |
| t_q | commutated turn-off time | $V_{DM} = 670\text{ V}$; $T_j = 125\text{ °C}$; $I_{TM} = 1.6\text{ A}$; $V_R = 35\text{ V}$; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$; $dV_D/dt = 2\text{ V}/\mu\text{s}$; $R_{GK(\text{ext})} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM}) | - | 100 | - | μs |

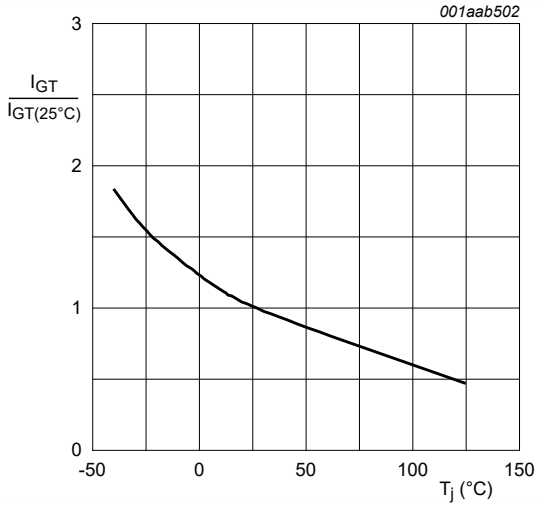


Fig. 7. Normalized gate trigger current as a function of junction temperature

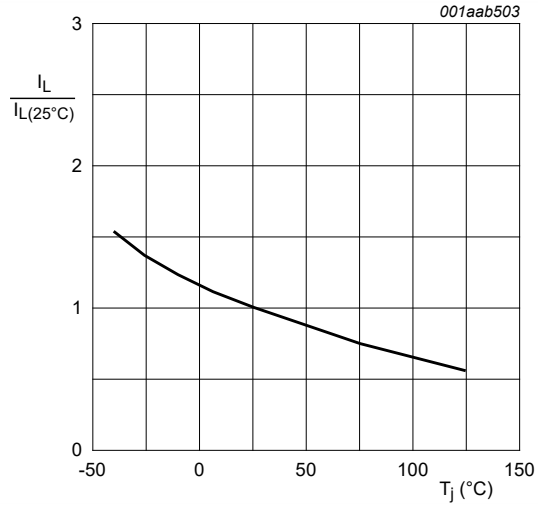


Fig. 8. Normalized latching current as a function of junction temperature
 $R_{GK} = 1 \text{ k}\Omega$

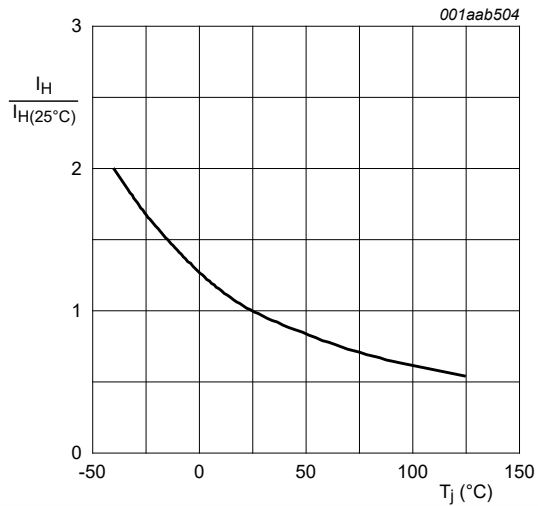


Fig. 9. Normalized holding current as a function of junction temperature
 $R_{GK} = 1 \text{ k}\Omega$

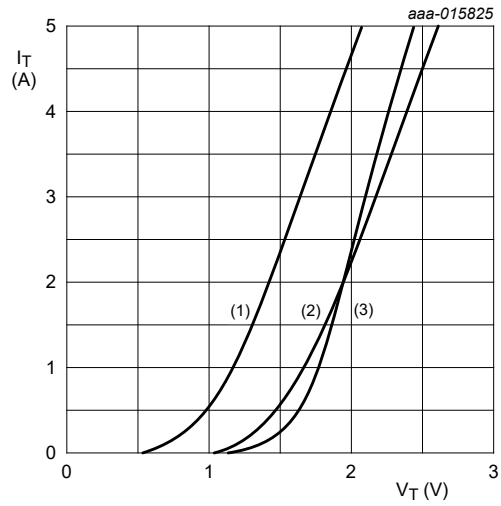


Fig. 10. On-state current as a function of on-state voltage
 $V_o = 1.289 \text{ V}; R_s = 0.292 \Omega$
 (1) $T_j = 125 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 125 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

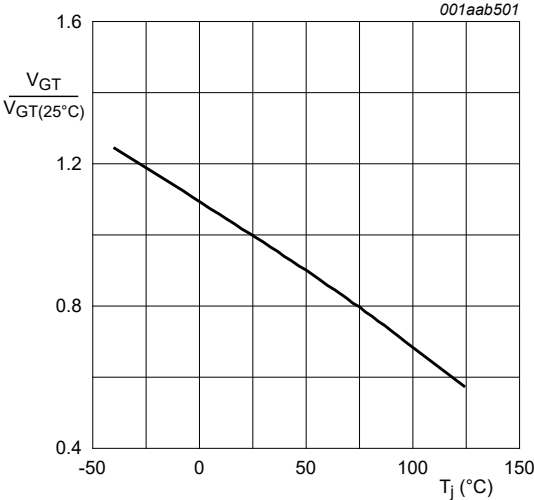


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

11. Package outline

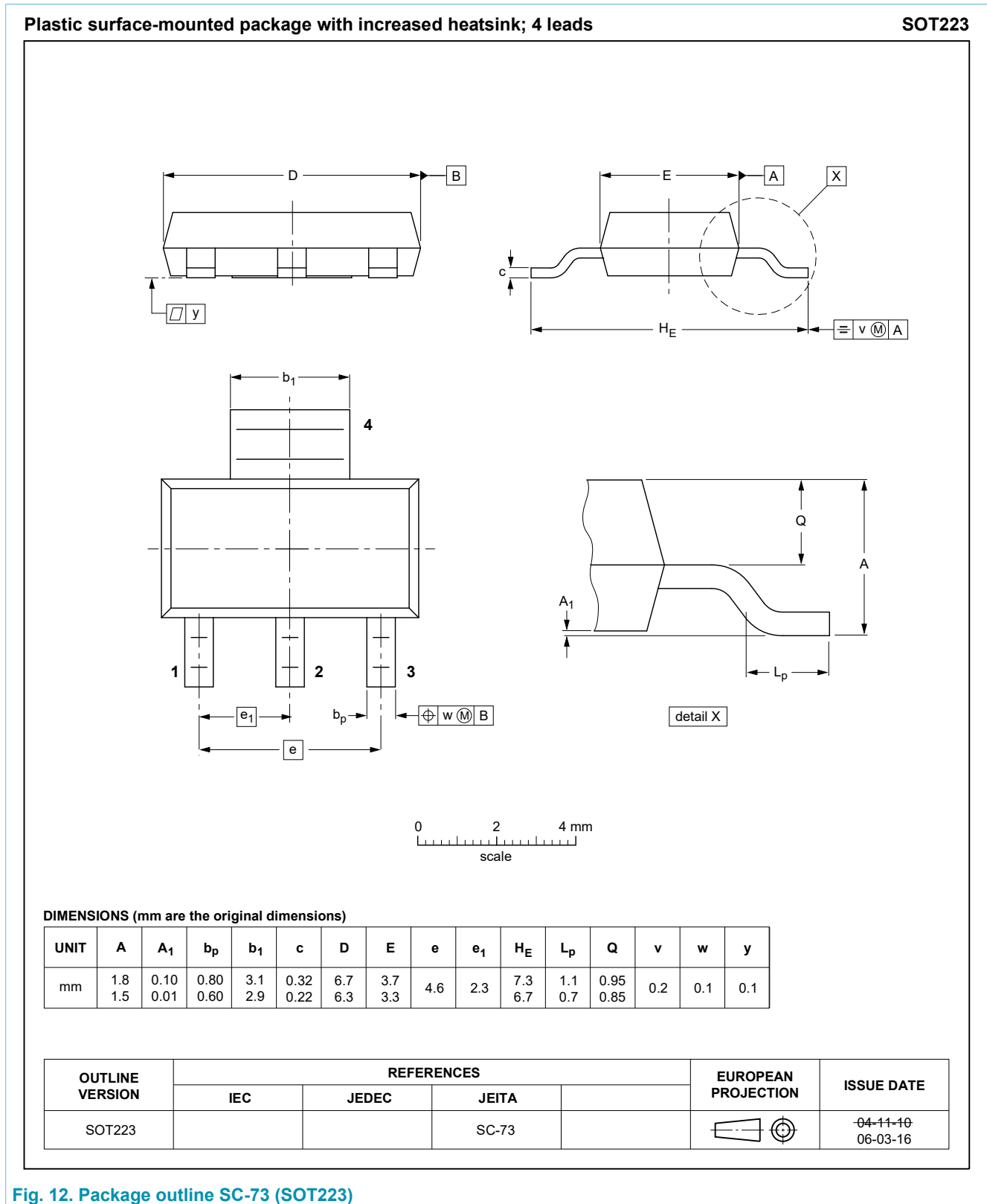


Fig. 12. Package outline SC-73 (SOT223)

12. Package outline (minimized)

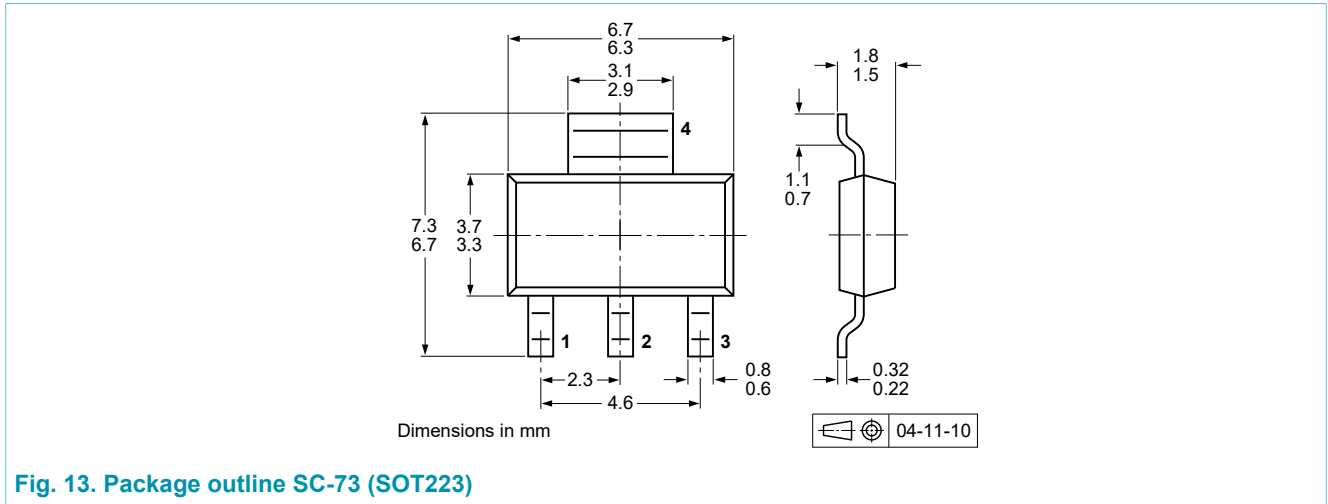


Fig. 13. Package outline SC-73 (SOT223)

13. Soldering

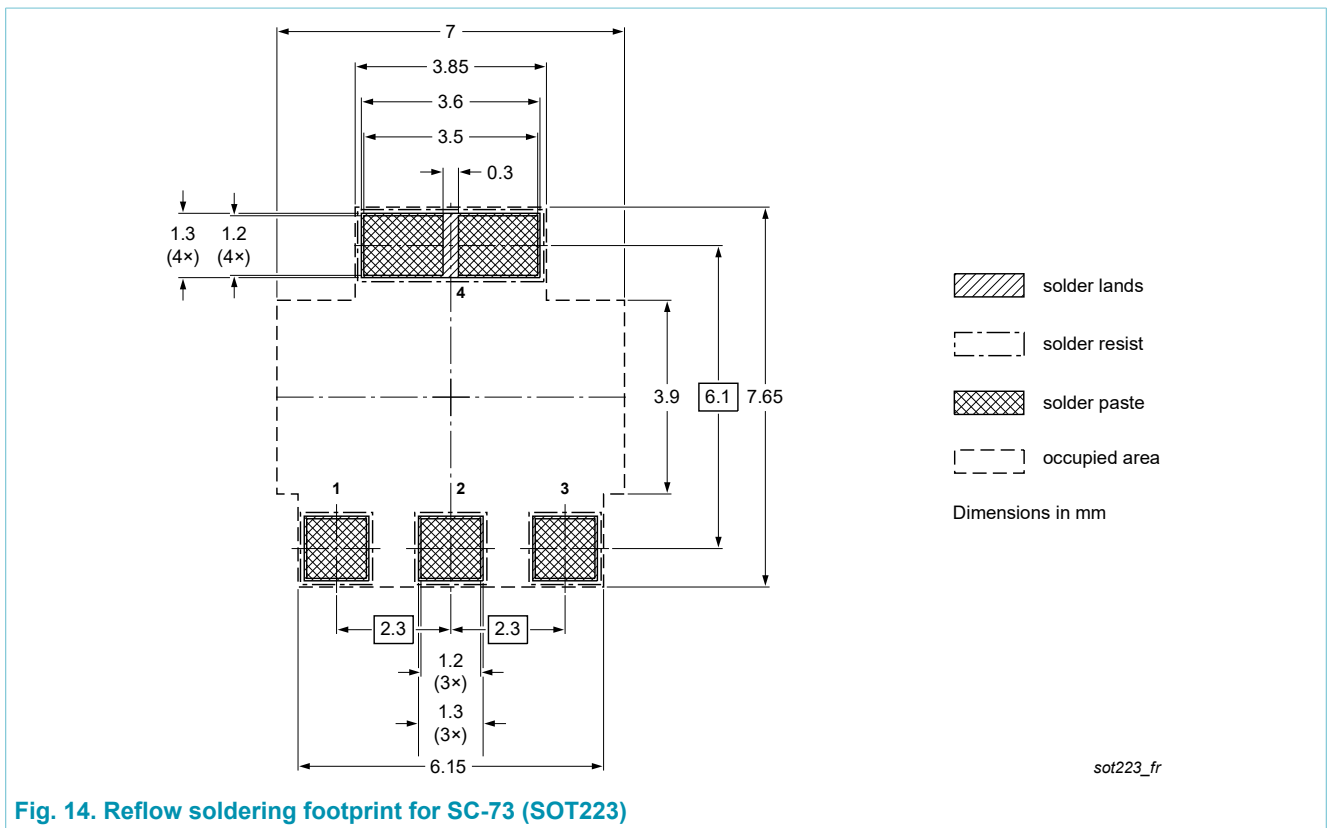


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

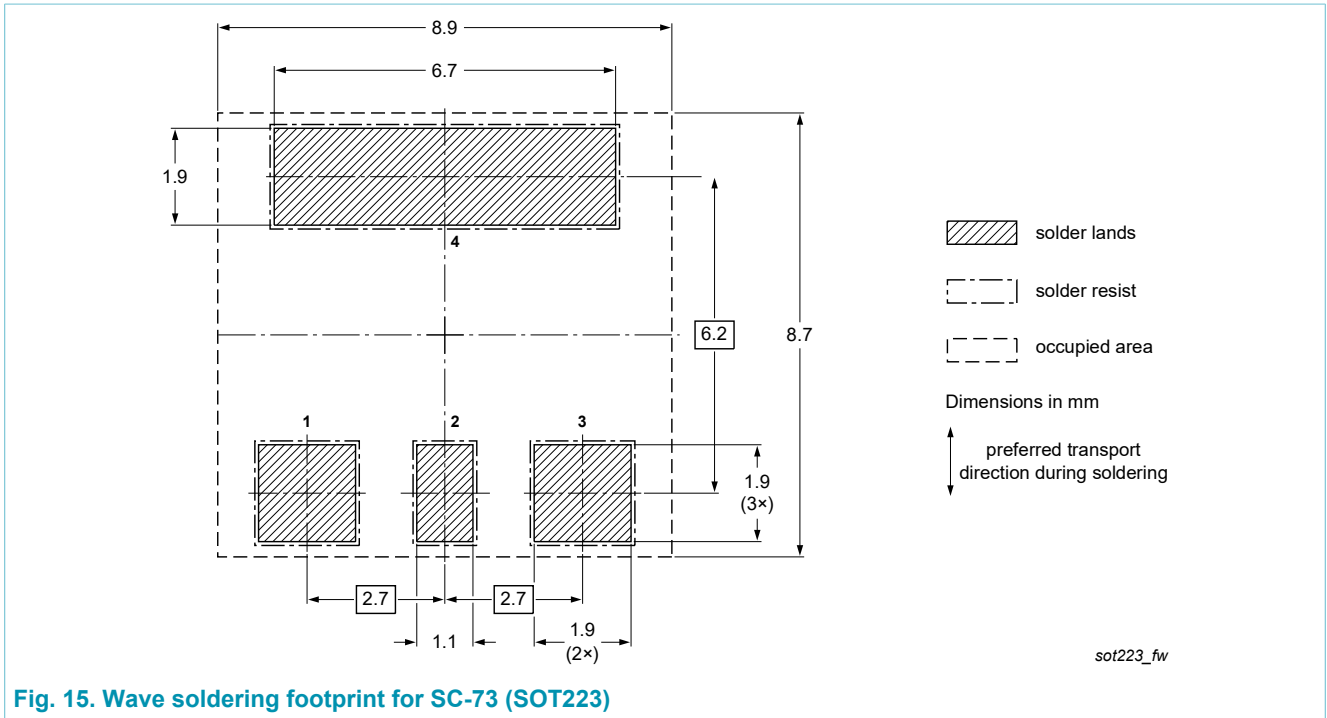


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

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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. |
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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 27 June 2016
