



# IMPORTANT NOTICE

10 December 2015

## 1. Global joint venture starts operations as WeEn Semiconductors

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As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

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# BT148-600R

## SCR

13 March 2014

Product data sheet

## 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

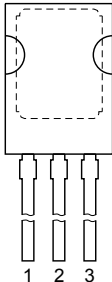
| Symbol                        | Parameter                            | Conditions                                                                                                          |     | Min | Typ | Max | Unit          |
|-------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|---------------|
| $V_{\text{DRM}}$              | repetitive peak off-state voltage    |                                                                                                                     | [1] | -   | -   | 600 | V             |
| $V_{\text{RRM}}$              | repetitive peak reverse voltage      |                                                                                                                     |     | -   | -   | 600 | V             |
| $I_{\text{TSM}}$              | non-repetitive peak on-state current | half sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$ ; $t_{\text{p}} = 10\text{ ms}$ ; Fig. 4; Fig. 5  |     | -   | -   | 35  | A             |
| $I_{\text{T(RMS)}}$           | RMS on-state current                 | half sine wave; $T_{\text{mb}} \leq 113\text{ }^{\circ}\text{C}$ ; Fig. 2; Fig. 3                                   |     | -   | -   | 4   | A             |
| <b>Static characteristics</b> |                                      |                                                                                                                     |     |     |     |     |               |
| $I_{\text{GT}}$               | gate trigger current                 | $V_{\text{D}} = 12\text{ V}$ ; $I_{\text{T}} = 0.1\text{ A}$ ; $T_{\text{j}} = 25\text{ }^{\circ}\text{C}$ ; Fig. 7 |     | -   | 15  | 200 | $\mu\text{A}$ |

[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/ $\mu\text{s}$ .



## 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; $T_{\text{mb}} \leq 113\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a>                                                           |     | -   | 2.5 | A                      |
| $I_{\text{T(RMS)}}$ | RMS on-state current                 | half sine wave; $T_{\text{mb}} \leq 113\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>                                  |     | -   | 4   | A                      |
| $I_{\text{TSM}}$    | non-repetitive peak on-state current | half sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$ ; $t_{\text{p}} = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a> |     | -   | 35  | A                      |
|                     |                                      | half sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$ ; $t_{\text{p}} = 8.3\text{ ms}$                                                  |     | -   | 38  | A                      |
| $I^2t$              | $I^2t$ for fusing                    | $t_{\text{p}} = 10\text{ ms}$ ; SIN                                                                                                                 |     | -   | 6.1 | $\text{A}^2\text{s}$   |
| $di_{\text{T}}/dt$  | 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  | $\text{A}/\mu\text{s}$ |
| $I_{\text{GM}}$     | 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 | $^{\circ}\text{C}$     |
| $T_{\text{j}}$      | junction temperature                 |                                                                                                                                                     | [2] | -   | 125 | $^{\circ}\text{C}$     |

[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 $^{\circ}\text{C}$  may require the use of a gate to cathode resistor of 1k $\Omega$  or less.

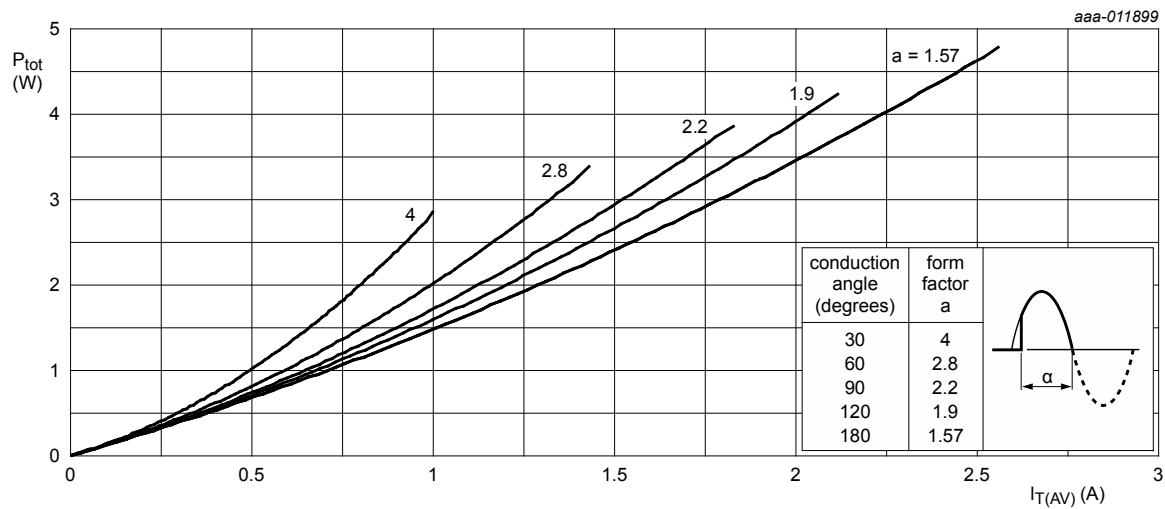


Fig. 1. Total power dissipation as a function of average on-state current; maximum values

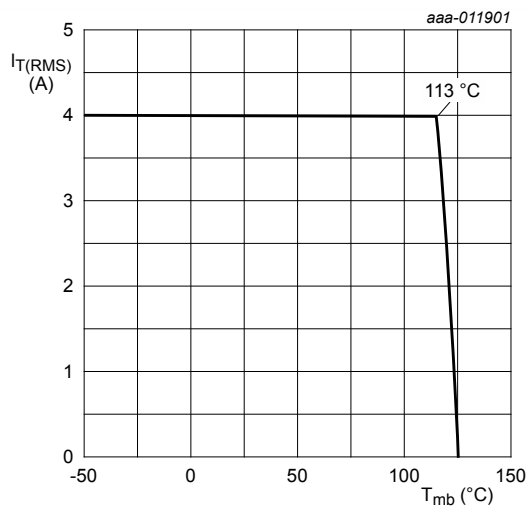
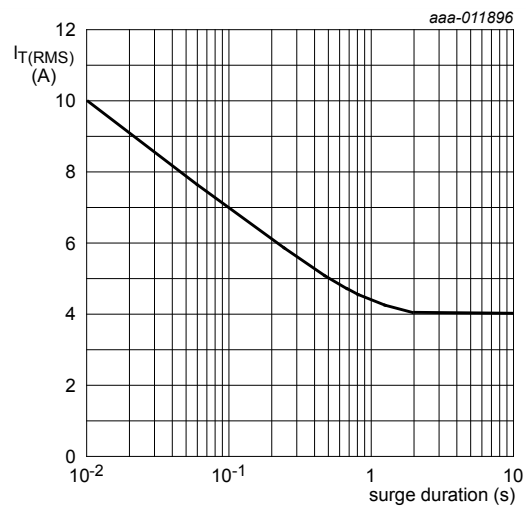
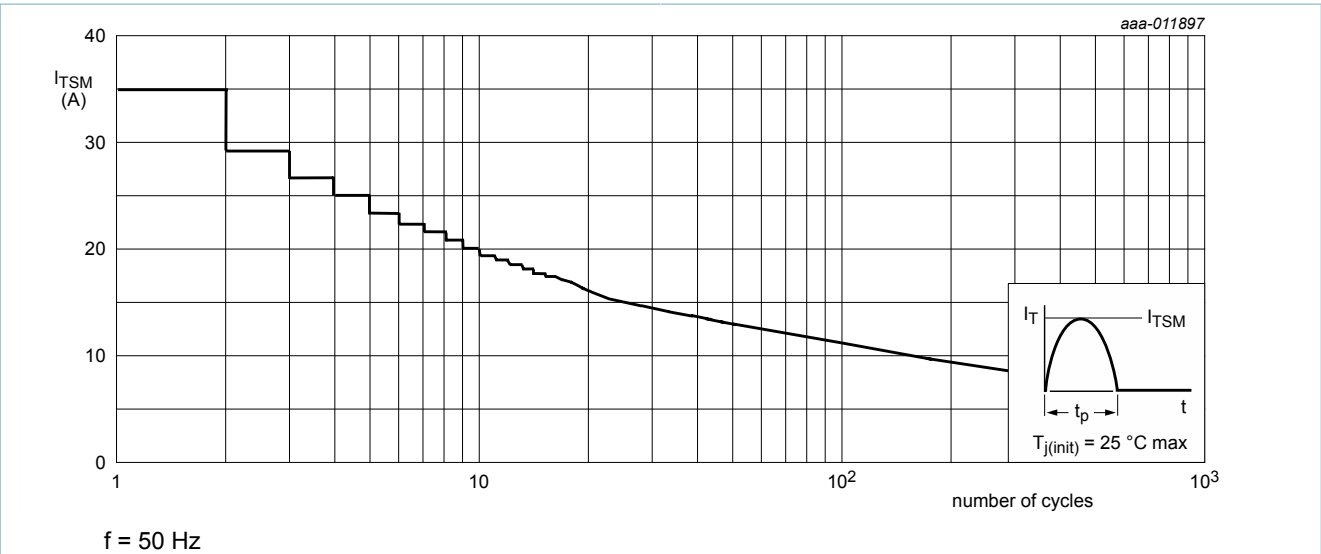


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values

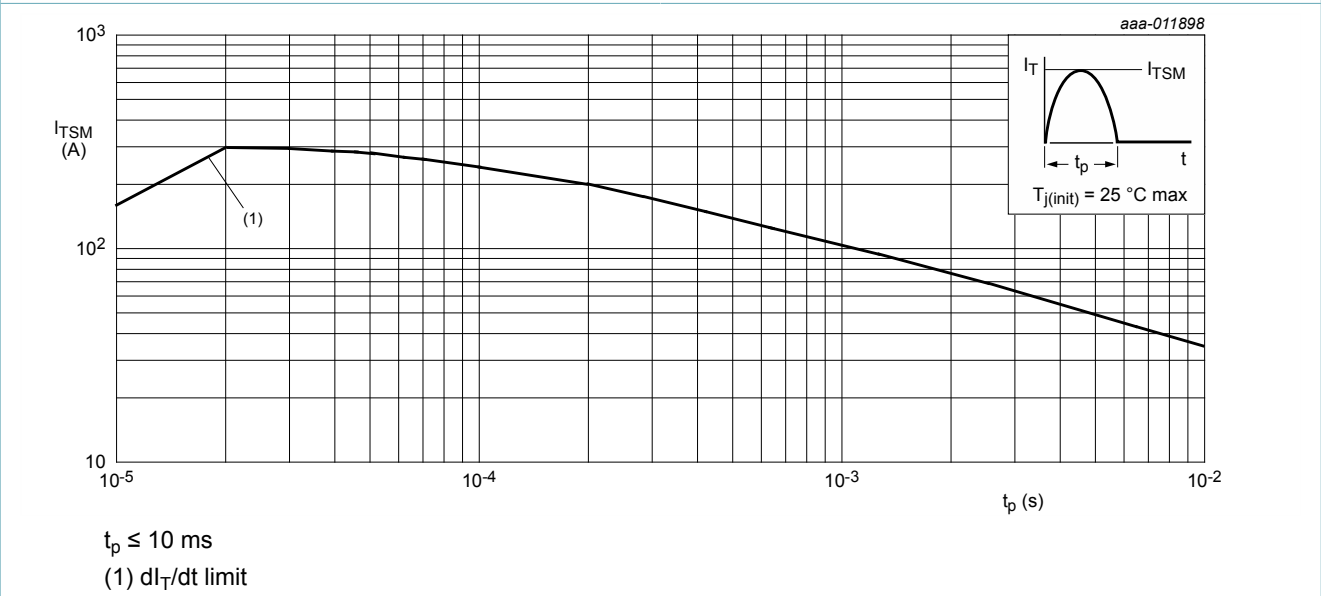


f = 50 Hz; T<sub>mb</sub> = 113 °C

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**

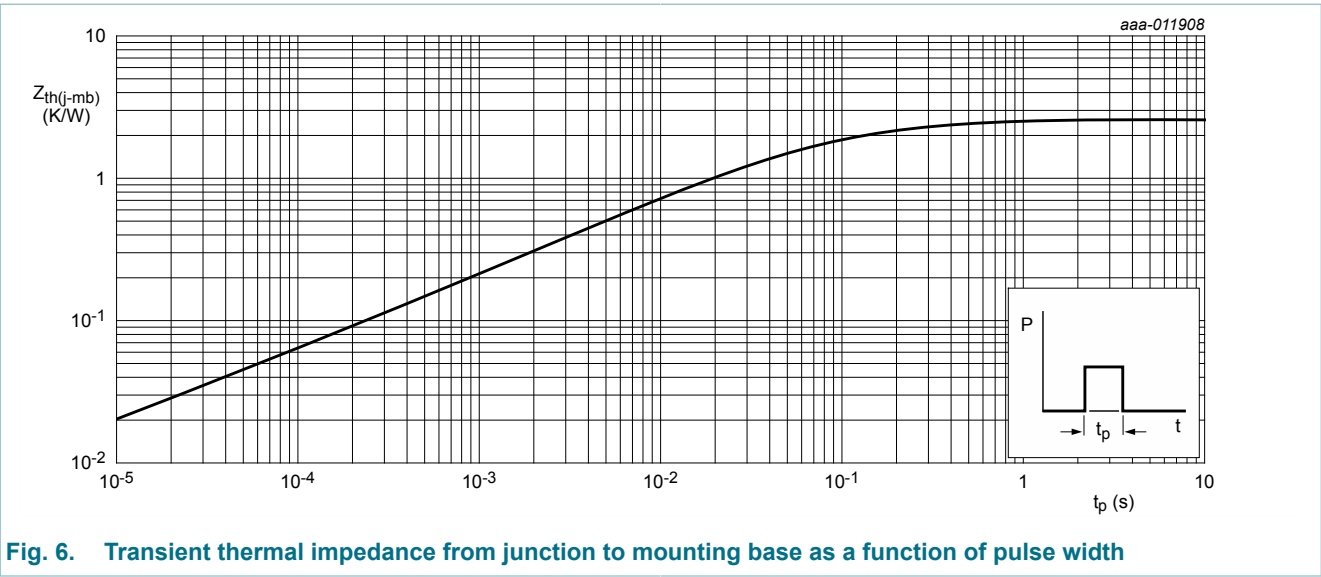


**Fig. 5. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values**

8. Thermal characteristics

Table 5. Thermal characteristics

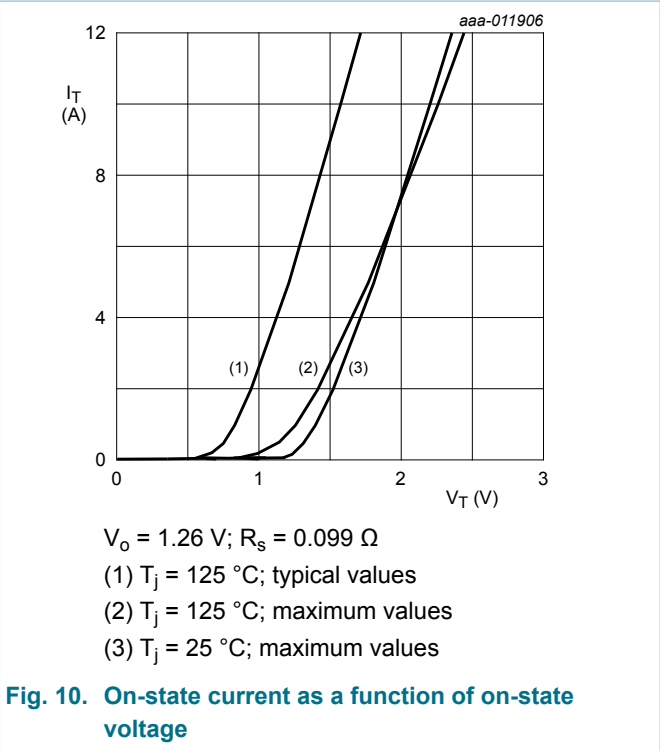
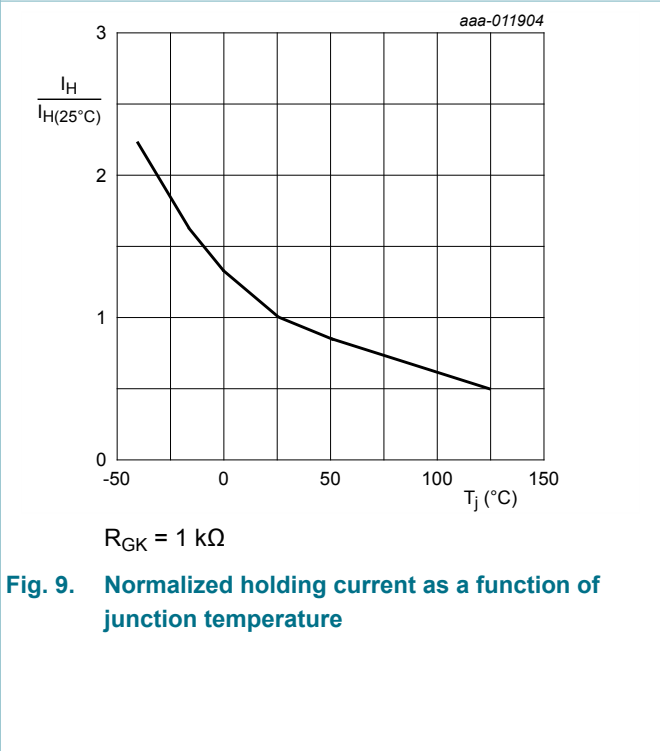
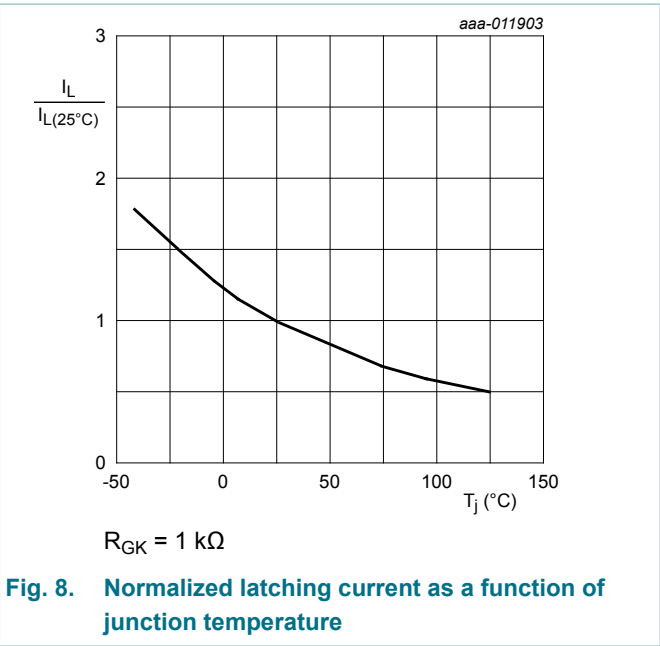
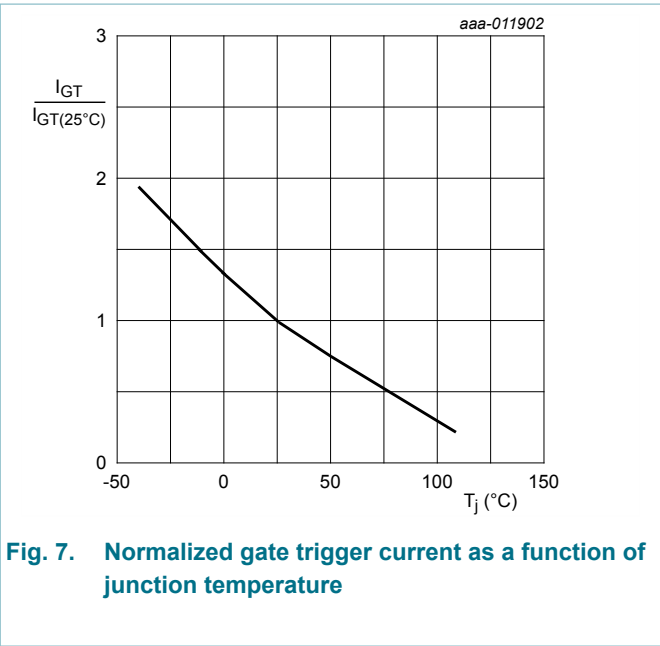
| Symbol         | Parameter                                         | Conditions             |  | Min | Typ | Max | Unit |
|----------------|---------------------------------------------------|------------------------|--|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | <a href="#">Fig. 6</a> |  | -   | -   | 2.5 | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient       | in free air            |  | -   | 95  | -   | K/W  |

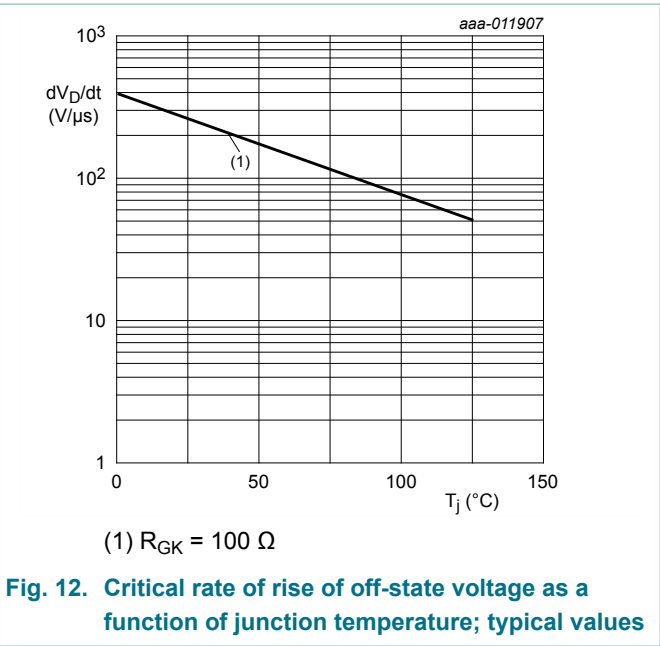
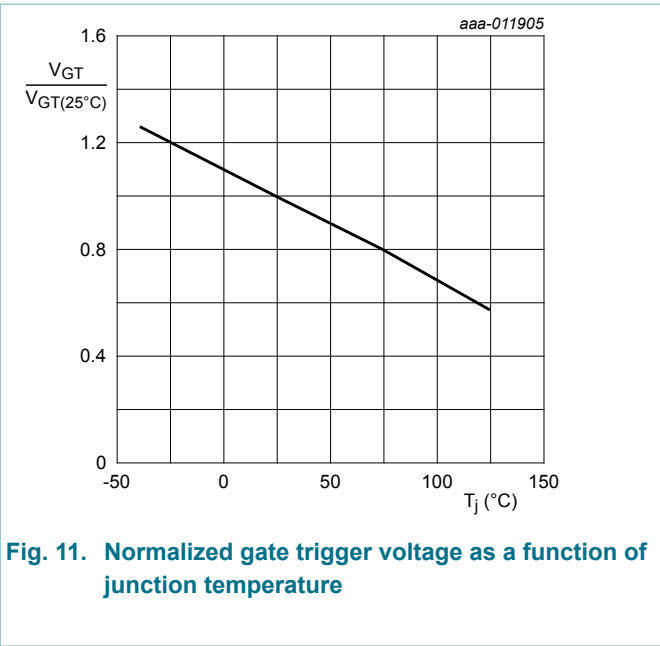


## 9. Characteristics

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  | mA               |
| $I_H$                          | holding current                   | $V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>                                                                                                                                                                           |  | -   | 0.1  | 6   | 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 | 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   | V                |
|                                |                                   | $V_D = 600\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 110\text{ °C}$ ; <a href="#">Fig. 11</a>                                                                                                                                                 |  | 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               |
| <b>Dynamic characteristics</b> |                                   |                                                                                                                                                                                                                                               |  |     |      |     |                  |
| $dV_D/dt$                      | rate of rise of off-state voltage | $V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 100\text{ }\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; <a href="#">Fig. 12</a>                                                                              |  | -   | 50   | -   | V/ $\mu\text{s}$ |
| $t_{gt}$                       | gate-controlled turn-on time      | $I_{TM} = 10\text{ A}$ ; $V_D = 600\text{ V}$ ; $I_G = 5\text{ mA}$ ; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$                                                                                                             |  | -   | 2    | -   | $\mu\text{s}$    |
| $t_q$                          | commutated turn-off time          | $V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ °C}$ ; $I_{TM} = 8\text{ A}$ ; $V_R = 10\text{ V}$ ; $(dI_T/dt)_M = 10\text{ A}/\mu\text{s}$ ; $dV_D/dt = 2\text{ V}/\mu\text{s}$ ; $R_{GK} = 1\text{ k}\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ) |  | -   | 100  | -   | $\mu\text{s}$    |





10. Package outline

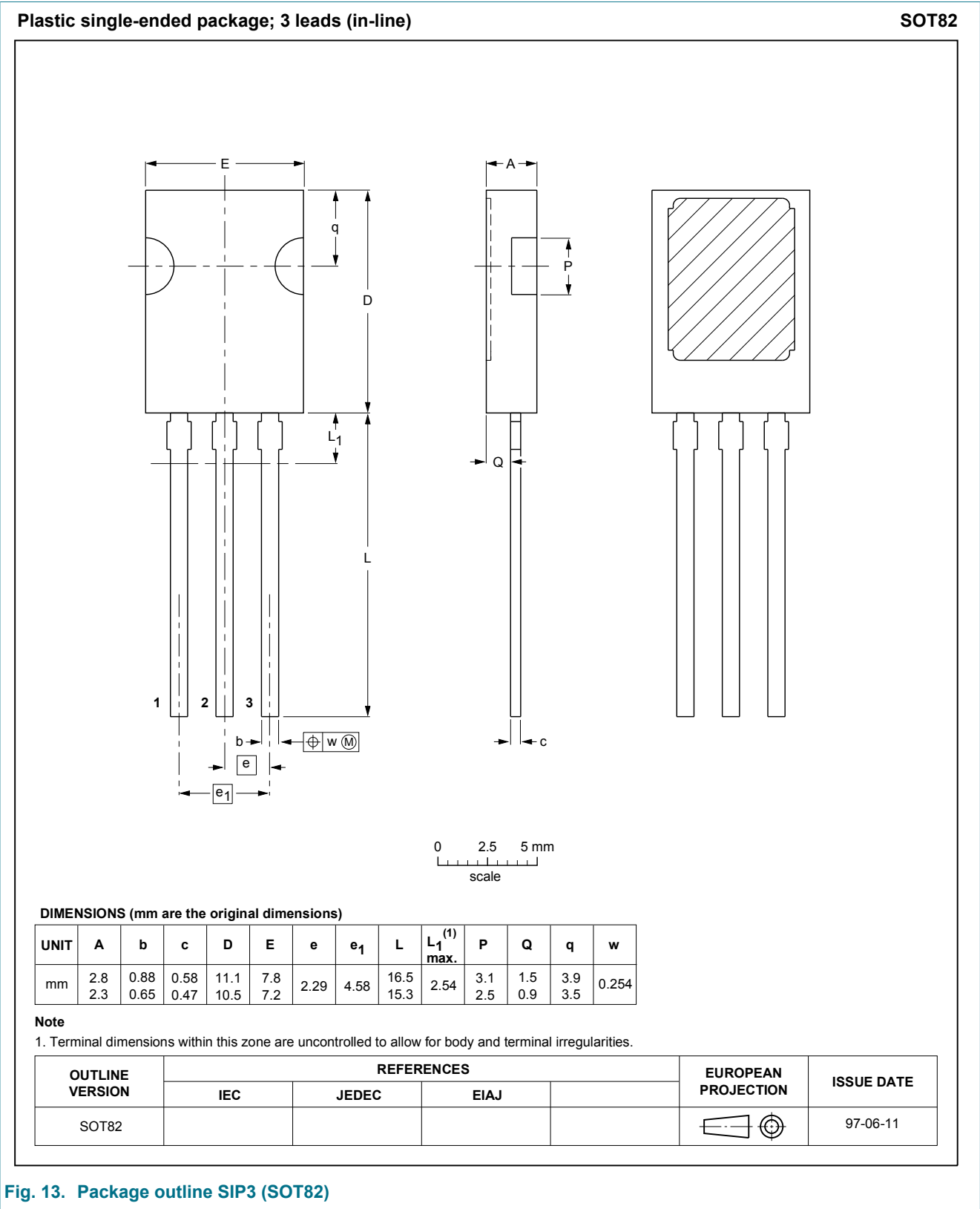


Fig. 13. Package outline SIP3 (SOT82)

## 11. Legal information

### 11.1 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.                       |
| Product [short] data sheet     | Production         | This document contains the product specification.                                     |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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