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Kind regards,

Team Nexperia



# PBHV8115TLH

150 V, 1 A NPN high-voltage low  $V_{CEsat}$  BISS transistor

10 January 2017

Product data sheet

## 1. General description

NPN high-voltage low  $V_{CEsat}$  Breakthrough In Small Signal (BISS) transistor in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

PNP complement: PBHV9115TLH

## 2. Features and benefits

- High voltage
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability  $I_C$  and  $I_{CM}$
- Small SMD plastic package
- AEC-Q101 qualified

## 3. Applications

- Power management
- LCD backlighting
- LED driver for LED chain module
- Switch Mode Power Supply (SMPS)

## 4. Quick reference data

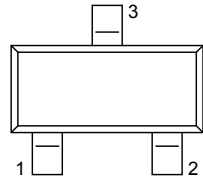
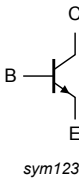
Table 1. Quick reference data

| Symbol    | Parameter                 | Conditions                                        | Min | Typ | Max | Unit |
|-----------|---------------------------|---------------------------------------------------|-----|-----|-----|------|
| $V_{CEO}$ | collector-emitter voltage | open base                                         | -   | -   | 150 | V    |
| $I_C$     | collector current         |                                                   | -   | -   | 1   | A    |
| $I_{CM}$  | peak collector current    | single pulse; $t_p \leq 1$ ms                     | -   | -   | 2   | A    |
| $h_{FE}$  | DC current gain           | $V_{CE} = 10$ V; $I_C = 50$ mA; $T_{amb} = 25$ °C | 70  | -   | 300 |      |



## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline                                                                                    | Graphic symbol                                                                                |
|-----|--------|-------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 1   | B      | base        | <br>TO-236AB (SOT23) | <br>sym123 |
| 2   | E      | emitter     |                                                                                                       |                                                                                               |
| 3   | C      | collector   |                                                                                                       |                                                                                               |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package  |                                          |         |
|-------------|----------|------------------------------------------|---------|
|             | Name     | Description                              | Version |
| PBHV8115TLH | TO-236AB | plastic surface-mounted package; 3 leads | SOT23   |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| PBHV8115TLH | FB%                         |

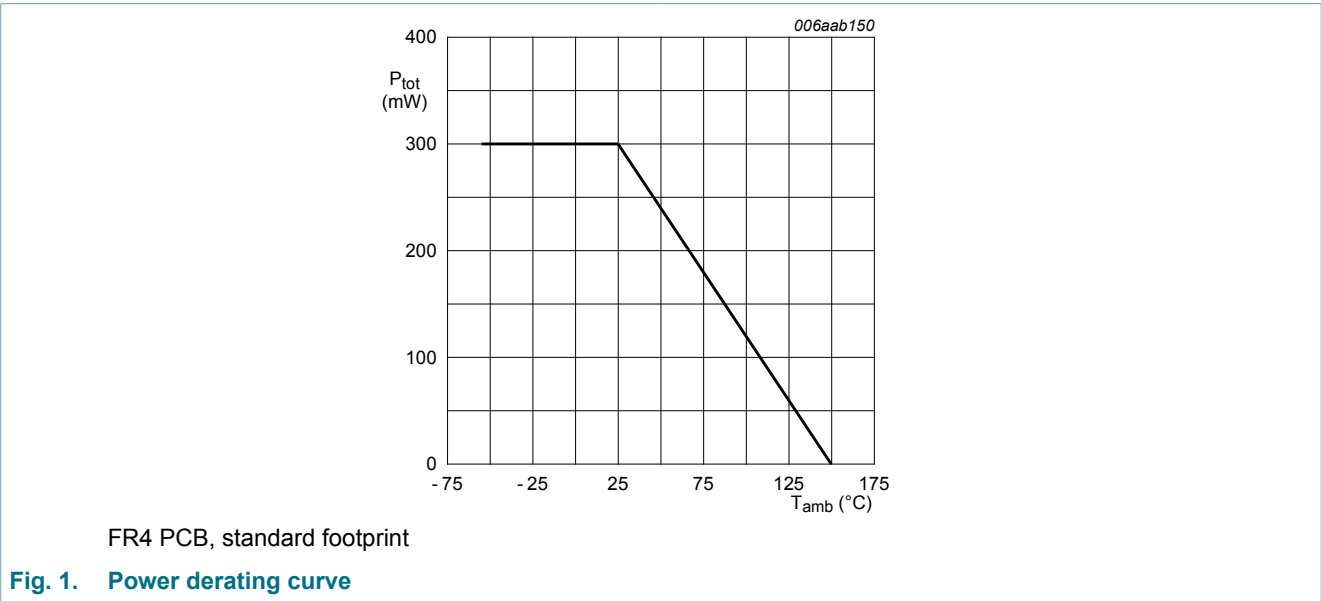
[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol            | Parameter                      | Conditions                          |     | Min | Max | Unit |
|-------------------|--------------------------------|-------------------------------------|-----|-----|-----|------|
| V <sub>CBO</sub>  | collector-base voltage         | open emitter                        |     | -   | 400 | V    |
| V <sub>CEO</sub>  | collector-emitter voltage      | open base                           |     | -   | 150 | V    |
| V <sub>CESM</sub> | collector-emitter peak voltage | V <sub>BE</sub> = 0 V               |     | -   | 200 | V    |
| V <sub>EBO</sub>  | emitter-base voltage           | open collector                      |     | -   | 6   | V    |
| I <sub>C</sub>    | collector current              |                                     |     | -   | 1   | A    |
| I <sub>CM</sub>   | peak collector current         | single pulse; t <sub>p</sub> ≤ 1 ms |     | -   | 2   | A    |
| I <sub>BM</sub>   | peak base current              |                                     |     | -   | 400 | mA   |
| P <sub>tot</sub>  | total power dissipation        | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 300 | mW   |
| T <sub>j</sub>    | junction temperature           |                                     |     | -   | 150 | °C   |
| T <sub>amb</sub>  | ambient temperature            |                                     |     | -55 | 150 | °C   |
| T <sub>stg</sub>  | storage temperature            |                                     |     | -65 | 150 | °C   |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

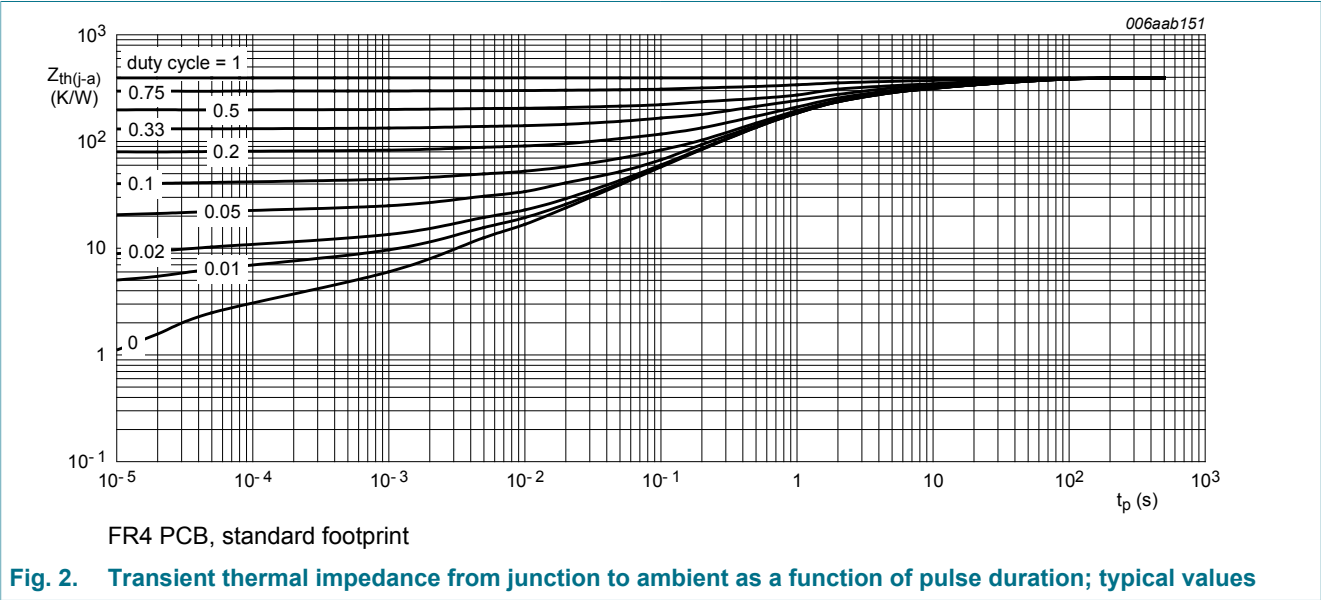


9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol         | Parameter                                        | Conditions  |     | Min | Typ | Max | Unit |
|----------------|--------------------------------------------------|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$  | thermal resistance from junction to ambient      | in free air | [1] | -   | -   | 417 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             |     | -   | -   | 70  | K/W  |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



## 10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                            | Conditions                                                                                                                                               | Min | Typ  | Max | Unit          |
|-------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|---------------|
| $I_{CBO}$   | collector-base cut-off current       | $V_{CB} = 120 \text{ V}; I_E = 0 \text{ A}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                       | -   | -    | 100 | nA            |
|             |                                      | $V_{CB} = 120 \text{ V}; I_E = 0 \text{ A}; T_J = 150 \text{ }^{\circ}\text{C}$                                                                          | -   | -    | 10  | $\mu\text{A}$ |
| $I_{CES}$   | collector-emitter cut-off current    | $V_{CE} = 120 \text{ V}; V_{BE} = 0 \text{ V}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                    | -   | -    | 100 | nA            |
| $I_{EBO}$   | emitter-base cut-off current         | $V_{EB} = 4 \text{ V}; I_C = 0 \text{ A}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                         | -   | -    | 100 | nA            |
| $h_{FE}$    | DC current gain                      | $V_{CE} = 10 \text{ V}; I_C = 50 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                      | 70  | -    | 300 |               |
|             |                                      | $V_{CE} = 10 \text{ V}; I_C = 100 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                     | 60  | -    | 300 |               |
|             |                                      | $V_{CE} = 10 \text{ V}; I_C = 500 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$ | 50  | -    | 300 |               |
|             |                                      | $V_{CE} = 10 \text{ V}; I_C = 1 \text{ A}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$    | 10  | -    | -   |               |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = 100 \text{ mA}; I_B = 10 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                       | -   | -    | 60  | mV            |
|             |                                      | $I_C = 100 \text{ mA}; I_B = 20 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                       | -   | -    | 50  | mV            |
|             |                                      | $I_C = 1 \text{ A}; I_B = 200 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^{\circ}\text{C}$     | -   | -    | 350 | mV            |
| $V_{BEsat}$ | base-emitter saturation voltage      |                                                                                                                                                          | -   | -    | 1.2 | V             |
| $t_d$       | delay time                           | $V_{CC} = 6 \text{ V}; I_C = 0.5 \text{ A}; I_{Bon} = 0.1 \text{ mA}; I_{Boff} = -0.1 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                 | -   | 10   | -   | ns            |
| $t_r$       | rise time                            |                                                                                                                                                          | -   | 565  | -   | ns            |
| $t_{on}$    | turn-on time                         |                                                                                                                                                          | -   | 575  | -   | ns            |
| $t_s$       | storage time                         |                                                                                                                                                          | -   | 1530 | -   | ns            |
| $t_f$       | fall time                            |                                                                                                                                                          | -   | 700  | -   | ns            |
| $t_{off}$   | turn-off time                        |                                                                                                                                                          | -   | 2230 | -   | ns            |
| $f_T$       | transition frequency                 | $V_{CE} = 10 \text{ V}; I_C = 10 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                 | -   | 30   | -   | MHz           |
| $C_c$       | collector capacitance                | $V_{CB} = 20 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                  | -   | 6    | -   | pF            |
| $C_e$       | emitter capacitance                  | $V_{EB} = 0.5 \text{ V}; I_C = 0 \text{ A}; i_c = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                 | -   | 150  | -   | pF            |

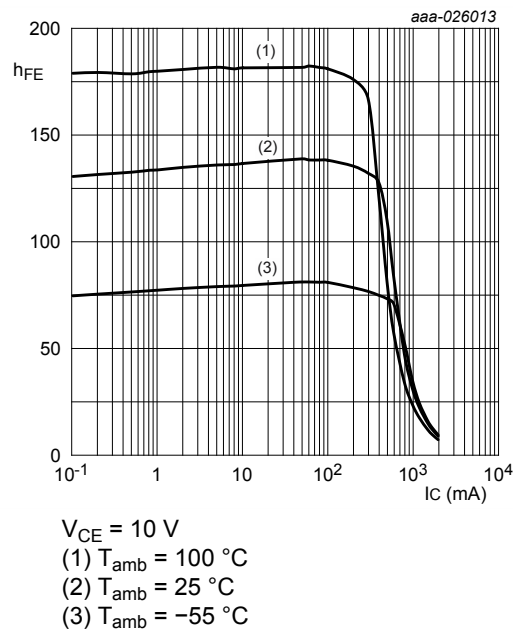


Fig. 3. DC current gain as a function of collector current; typical values

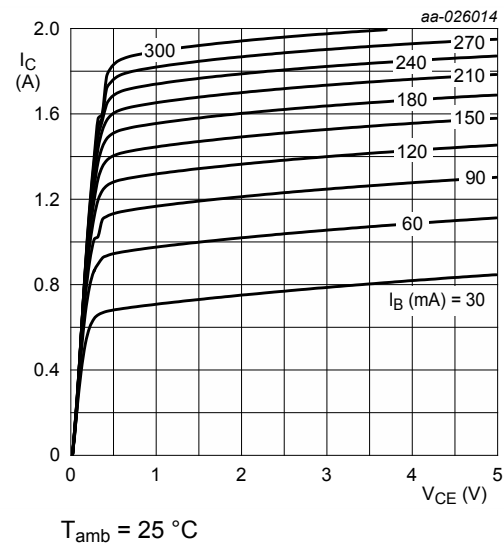


Fig. 4. Collector current as a function of collector-emitter voltage; typical values

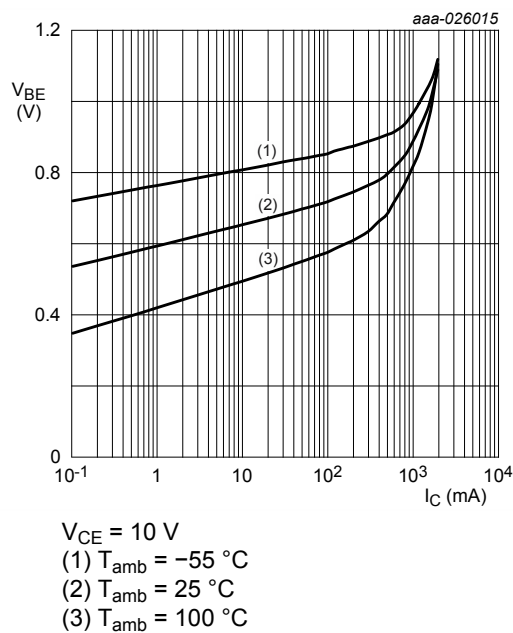


Fig. 5. Base-emitter voltage as a function of collector current; typical values

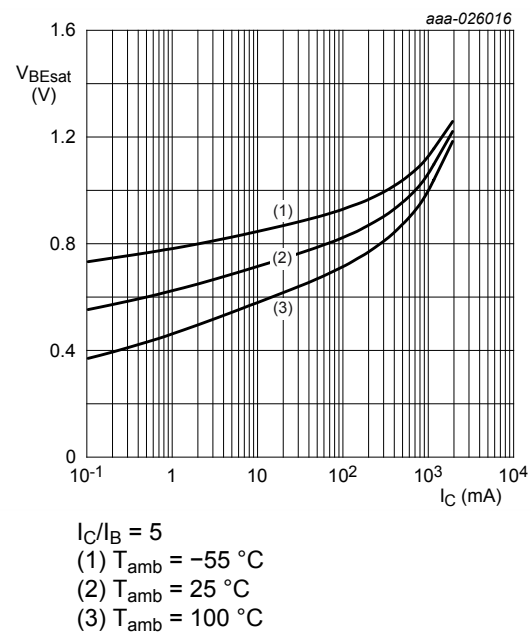


Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values

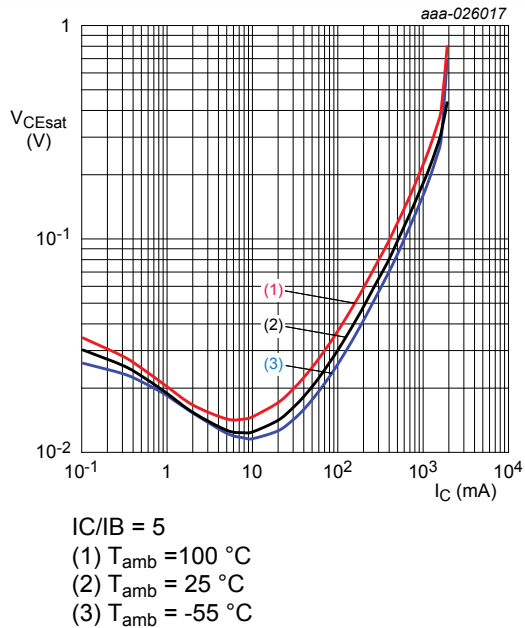


Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values

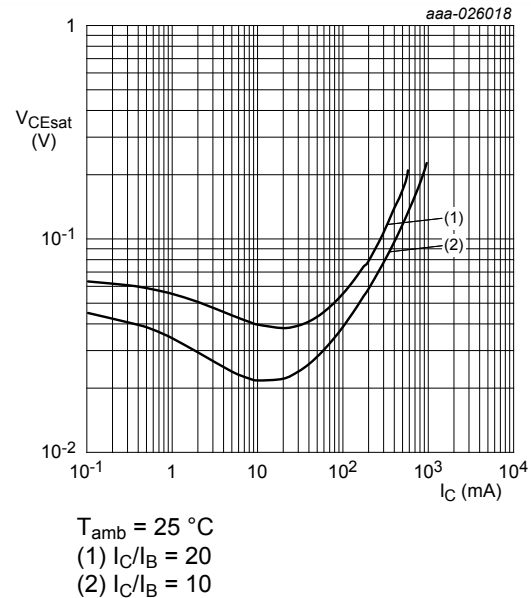


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

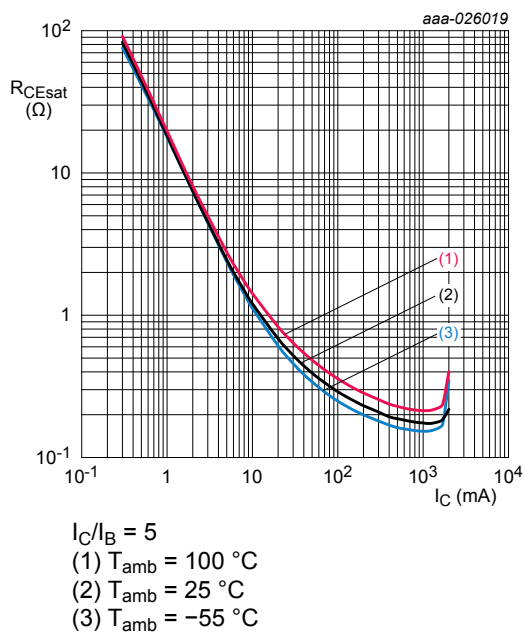


Fig. 9. Collector-emitter saturation resistance as a function of collector current; typical values

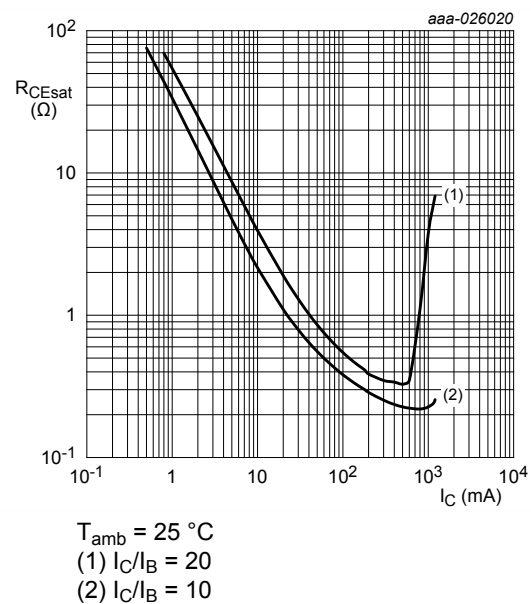


Fig. 10. Collector-emitter saturation resistance as a function of collector current; typical values



11. Test information

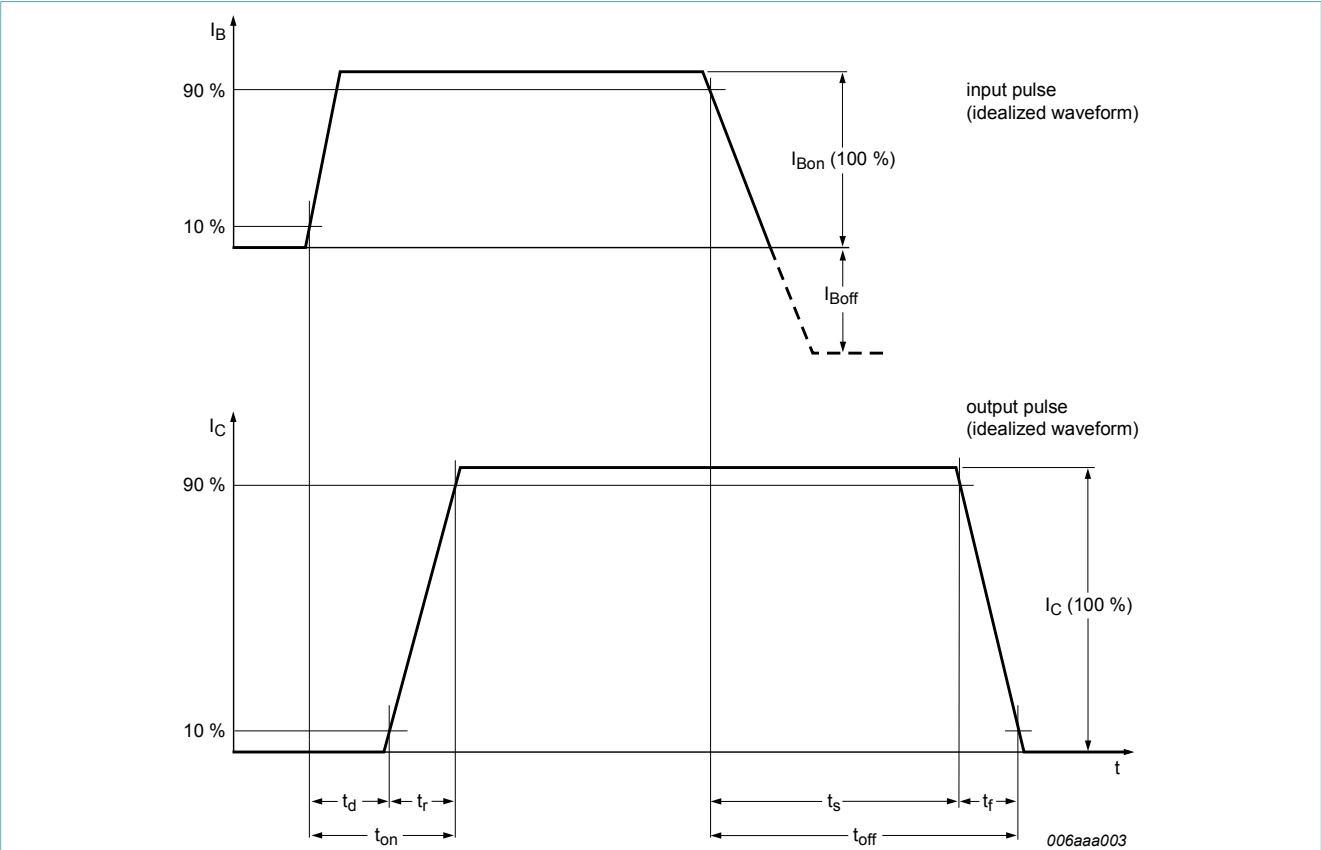


Fig. 11. BISS transistor switching time definition

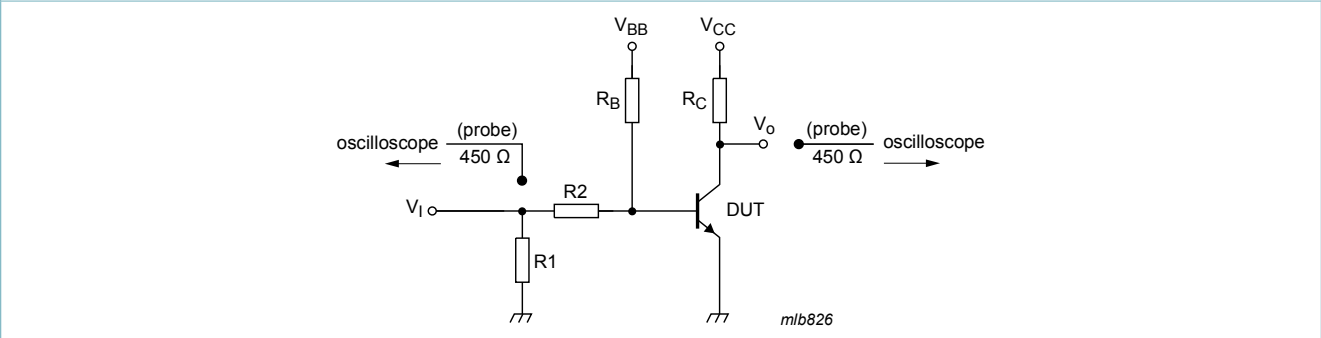
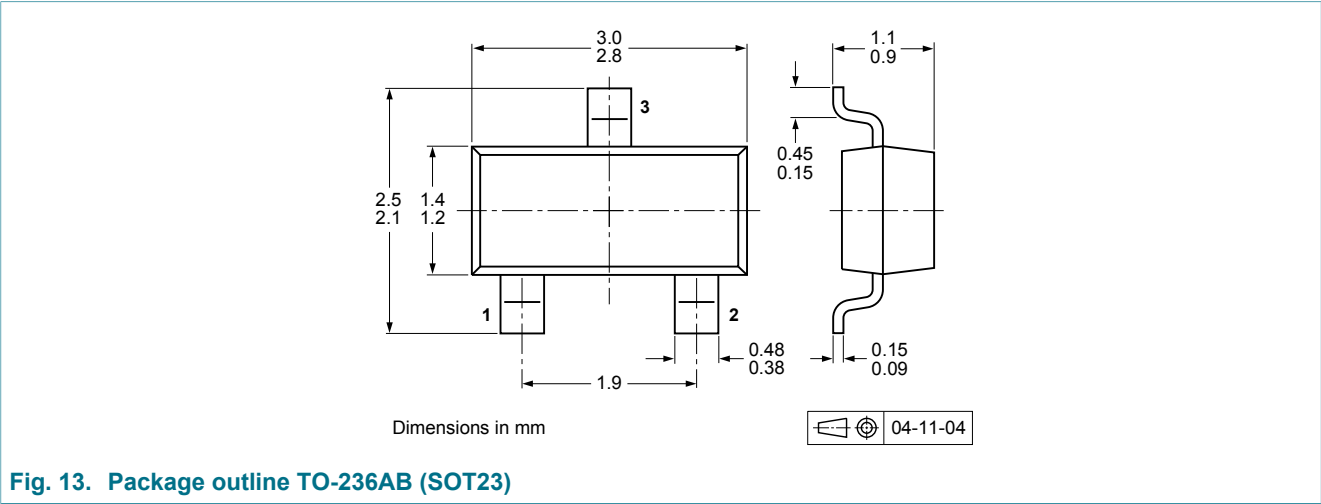


Fig. 12. Test circuit for switching times

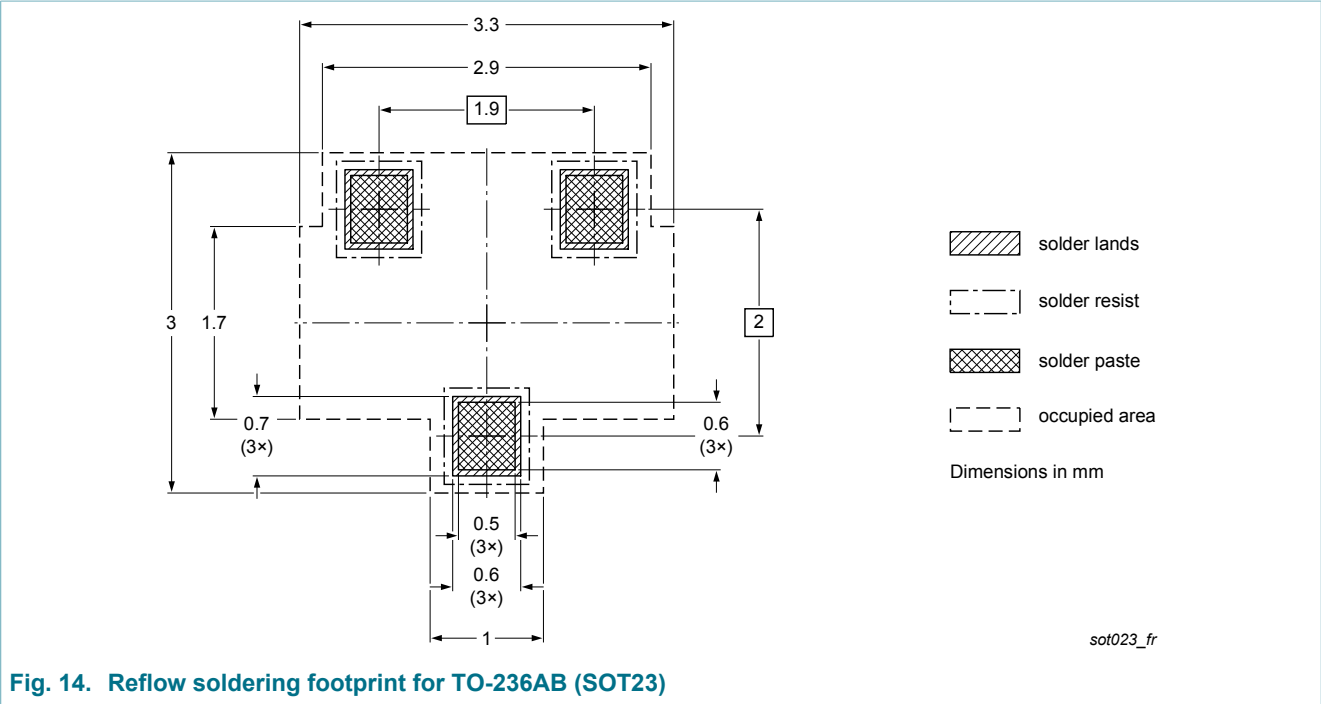
Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

12. Package outline



13. Soldering



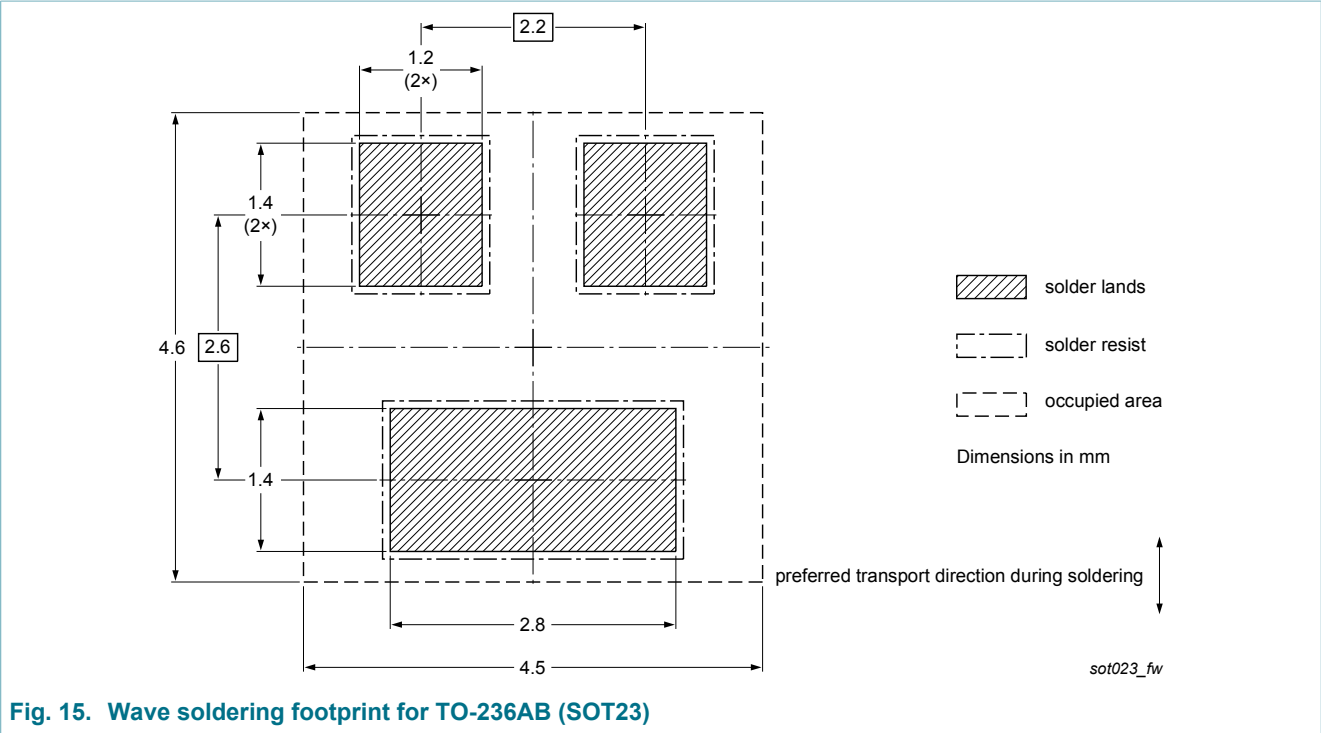


Fig. 15. Wave soldering footprint for TO-236AB (SOT23)

## 14. Revision history

Table 8. Revision history

| Data sheet ID   | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PBHV8115TLH v.1 | 2017010      | Product data sheet | -             | -          |

## 15. Legal information

### Data sheet status

| Document status <sup>[1] [2]</sup> | Product status <sup>[3]</sup> | 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.                                     |

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