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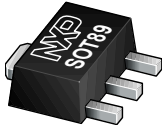
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Kind regards,

Team Nexperia



PBHV8115X

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

9 December 2013

Product data sheet

1. General description

NPN high-voltage low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a SOT89 (SC-62) medium power and flat lead Surface-Mounted Device (SMD) plastic package.

PNP complement: PBHV9115X.

2. Features and benefits

- High voltage
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- AEC-Q101 qualified
- Medium power SMD plastic package

3. Applications

- LED driver for LED chain module
- LCD backlighting
- High Intensity Discharge (HID) front lighting
- Automotive motor management
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

4. Quick reference data

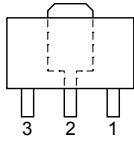
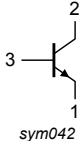
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------|--|-----|-----|-----|------|
| V_{CEO} | collector-emitter voltage | open base | - | - | 150 | V |
| I_C | collector current | | - | - | 1 | A |
| h_{FE} | DC current gain | $V_{CE} = 10\text{ V}; I_C = 50\text{ mA}; T_{amb} = 25\text{ °C}$ | 100 | 250 | - | |



5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|--|
| 1 | E | emitter |  <p style="text-align: center;">SOT89</p> |  <p style="text-align: center;"><i>sym042</i></p> |
| 2 | C | collector | | |
| 3 | B | base | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PBHV8115X | SOT89 | plastic surface-mounted package; die pad for good heat transfer; 3 leads | SOT89 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PBHV8115X | %4F |

[1] % = placeholder for manufacturing site code

8. Limiting values

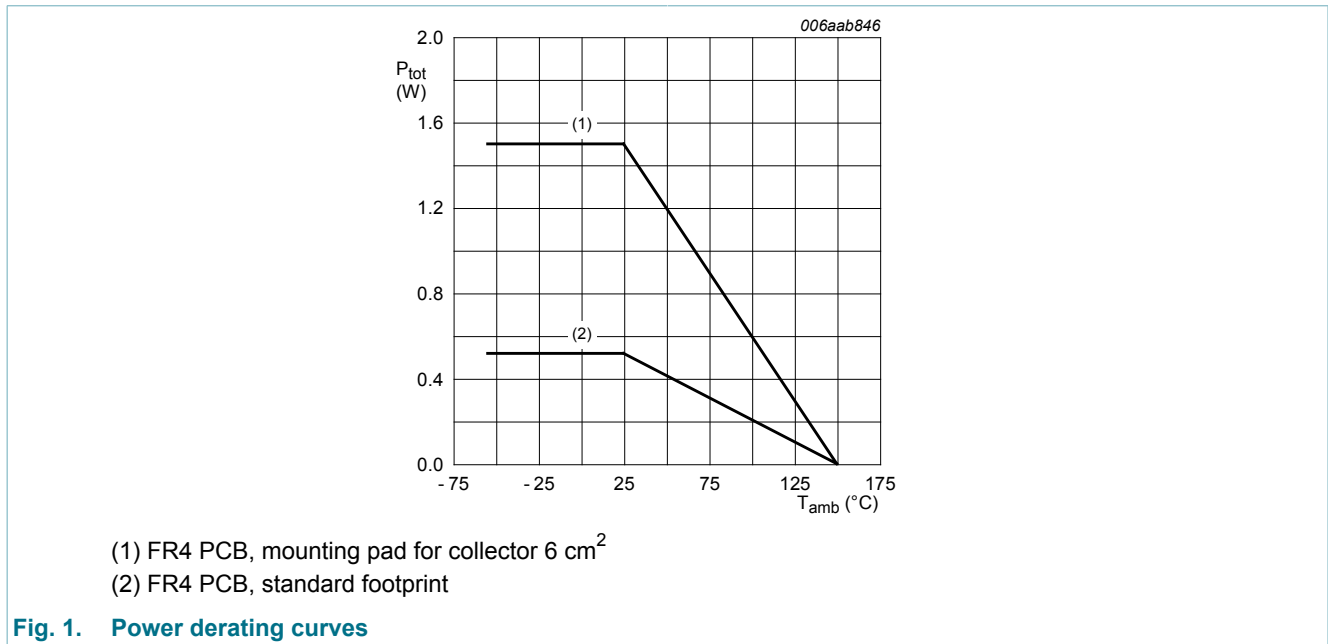
Table 5. Limiting values

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|-----------|---------------------------|-------------------------------|-----|-----|------|------|
| V_{CBO} | collector-base voltage | open emitter | | - | 400 | V |
| V_{CEO} | collector-emitter voltage | open base | | - | 150 | V |
| V_{EBO} | emitter-base voltage | open collector | | - | 6 | V |
| I_C | collector current | | | - | 1 | A |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | | - | 2 | A |
| I_{BM} | peak base current | | | - | 400 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 0.52 | W |
| | | | [2] | - | 1.5 | W |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -55 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².



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] | - | - | 240 | K/W |
| | | | [2] | - | - | 83 | K/W |
| R _{th(j-sp)} | thermal resistance from junction to solder point | | | - | - | 20 | K/W |

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

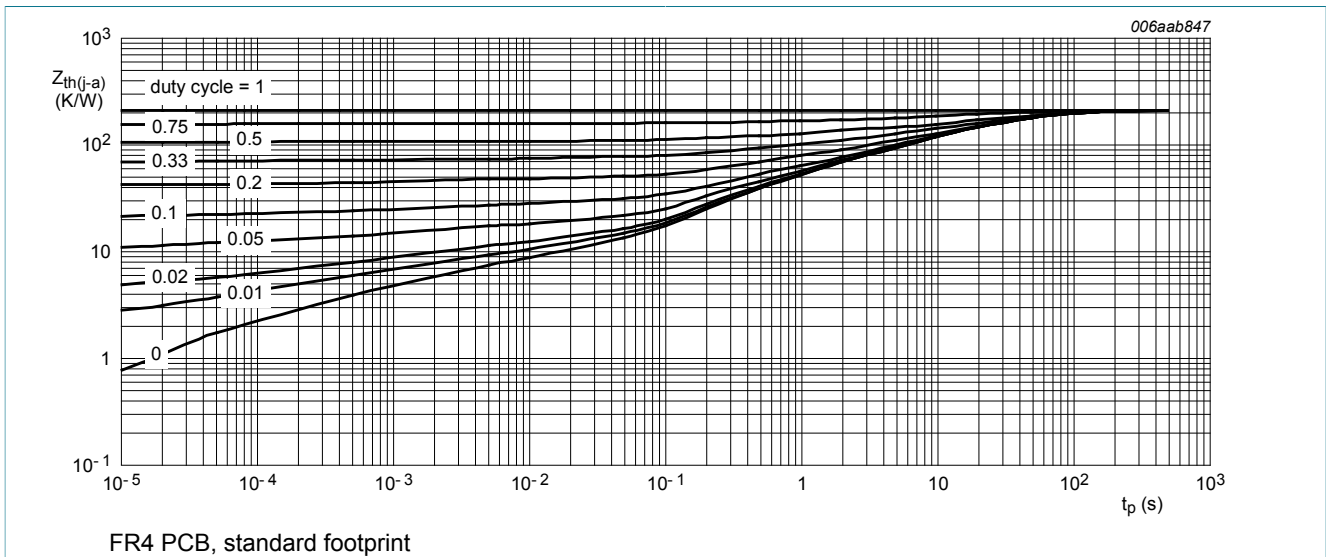


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

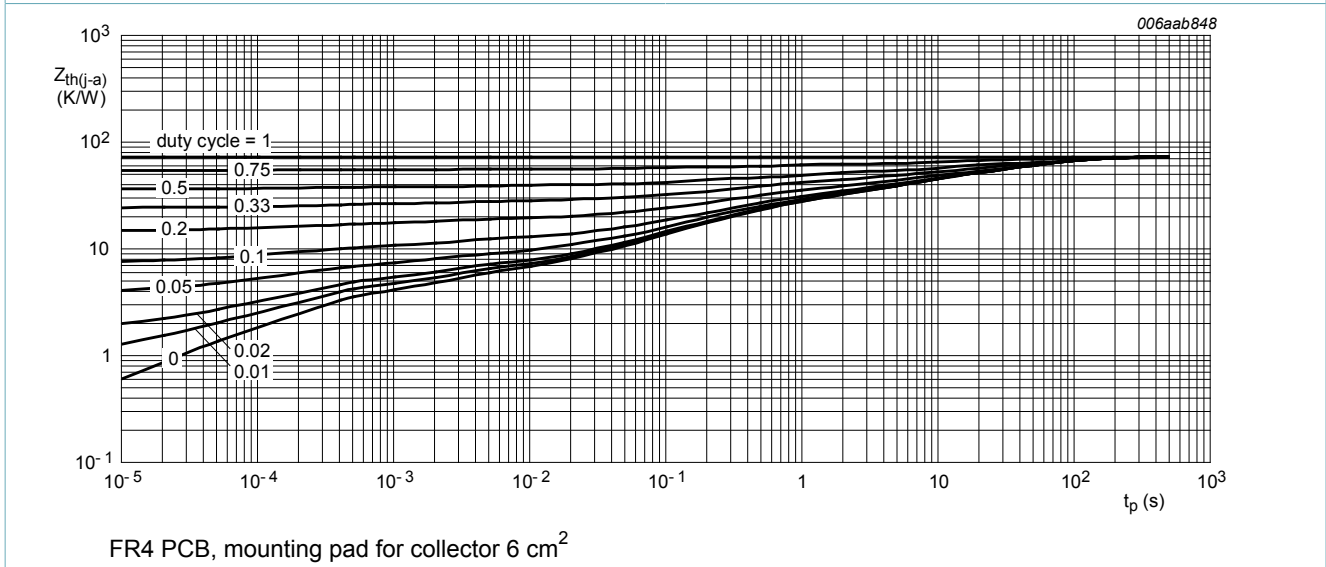


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------|--------------------------------------|--|--|------|-----|------|
| I _{CBO} | collector-base cut-off current | V _{CB} = 120 V; I _E = 0 A; T _{amb} = 25 °C | - | - | 100 | nA |
| | | V _{CB} = 120 V; I _E = 0 A; T _J = 150 °C | - | - | 10 | μA |
| I _{CES} | collector-emitter cut-off current | V _{CE} = 120 V; V _{BE} = 0 V; T _{amb} = 25 °C | - | - | 100 | nA |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 4 V; I _C = 0 A; T _{amb} = 25 °C | - | - | 100 | nA |
| h _{FE} | DC current gain | V _{CE} = 10 V; I _C = 50 mA; T _{amb} = 25 °C | 100 | 250 | - | |
| | | V _{CE} = 10 V; I _C = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | 100 | 250 | - | |
| | | V _{CE} = 10 V; I _C = 0.5 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | 50 | 160 | - | |
| | | V _{CE} = 10 V; I _C = 1 A; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | 10 | 30 | - | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 100 mA; I _B = 20 mA; T _{amb} = 25 °C | - | 33 | 50 | mV |
| | | I _C = 100 mA; I _B = 10 mA; T _{amb} = 25 °C | - | 40 | 60 | mV |
| | | I _C = 1 A; I _B = 0.2 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | 225 | 350 | mV |
| V _{BEsat} | base-emitter saturation voltage | I _C = 1 A; I _B = 200 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | 1.1 | 1.2 | V |
| t _d | delay time | V _{CC} = 6 V; I _C = 0.5 A; I _{Bon} = 0.1 A; I _{Boff} = -0.1 A; T _{amb} = 25 °C | - | 7 | - | ns |
| t _r | rise time | | - | 565 | - | ns |
| t _{on} | turn-on time | | - | 572 | - | 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 V; I _C = 10 mA; f = 100 MHz; T _{amb} = 25 °C | - | 30 | - |
| C _c | collector capacitance | V _{CB} = 20 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C | - | 5.7 | - | pF |
| C _e | emitter capacitance | V _{EB} = 0.5 V; I _C = 0 A; i _c = 0 A; f = 1 MHz; T _{amb} = 25 °C | - | 150 | - | pF |

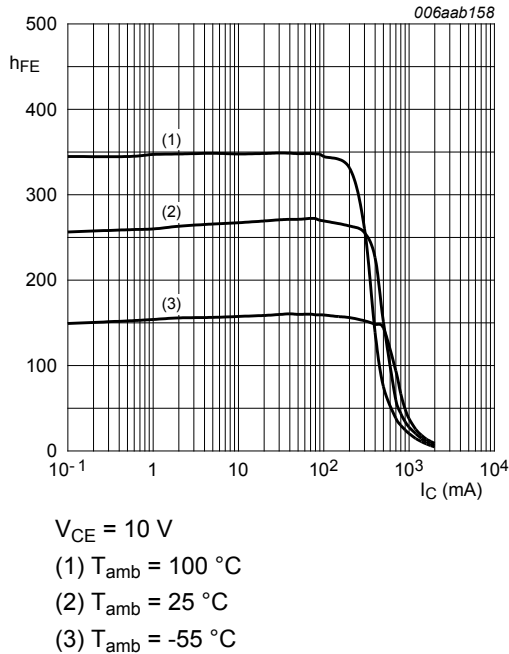


Fig. 4. DC current gain as a function of collector current; typical values

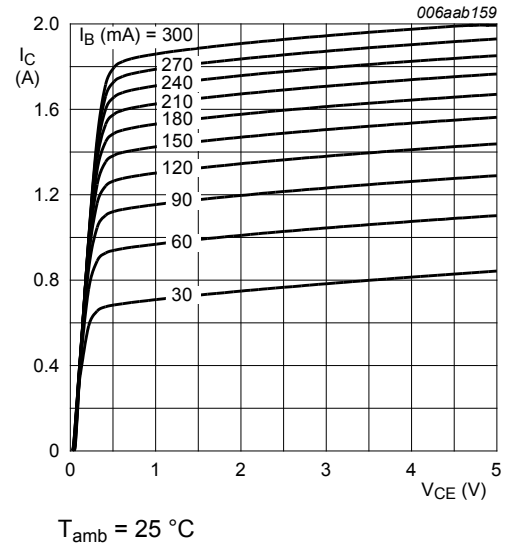


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

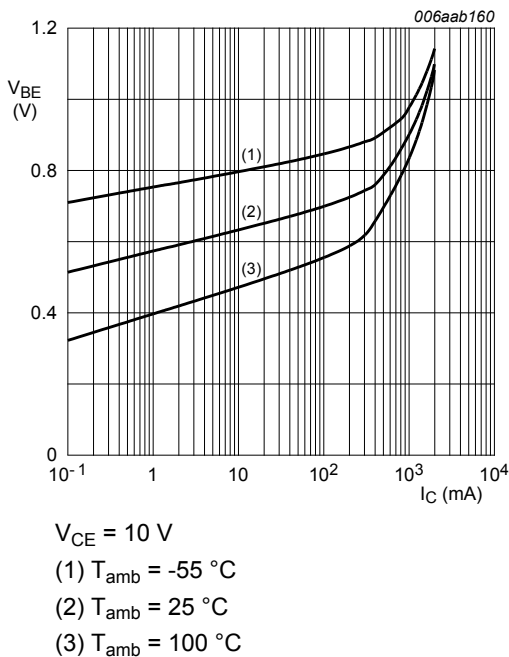


Fig. 6. Base-emitter voltage as a function of collector current; typical values

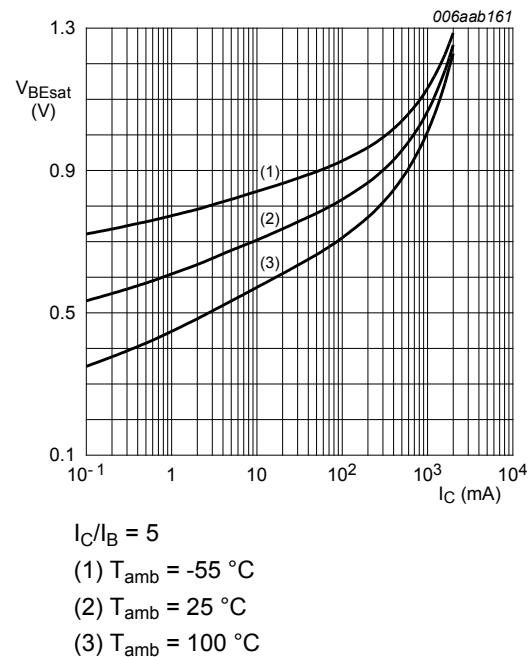
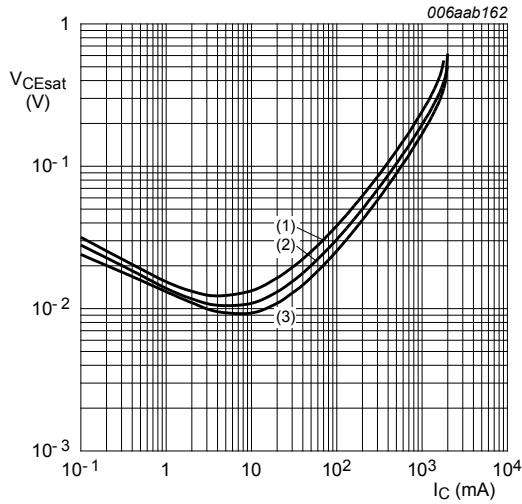
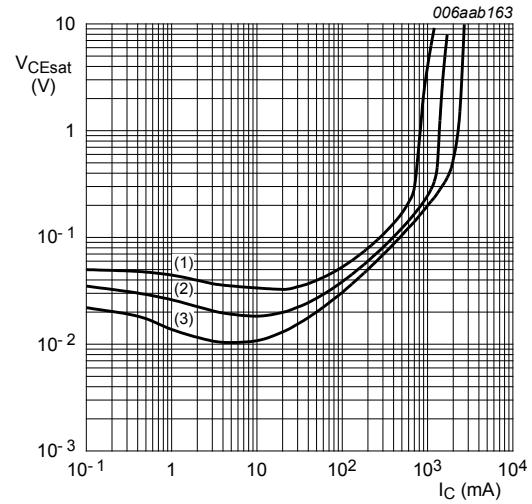


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values



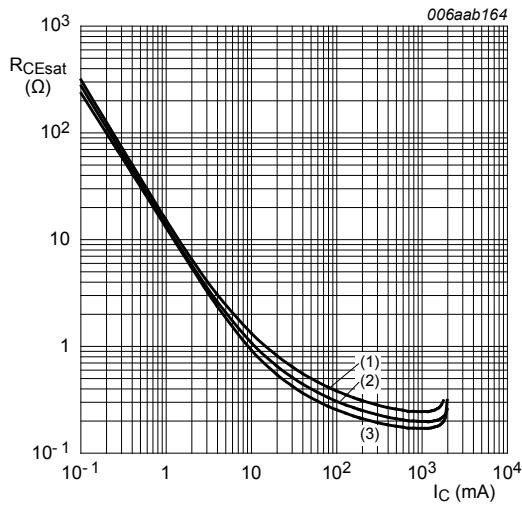
$I_C/I_B = 5$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



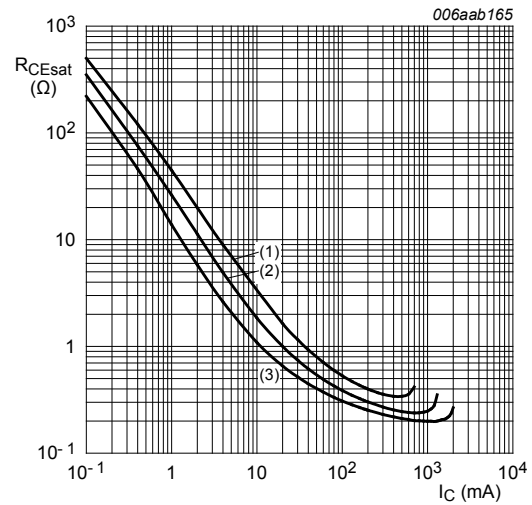
$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 20$
 (2) $I_C/I_B = 10$
 (3) $I_C/I_B = 5$

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



$I_C/I_B = 5$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 20$
 (2) $I_C/I_B = 10$
 (3) $I_C/I_B = 5$

Fig. 11. Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

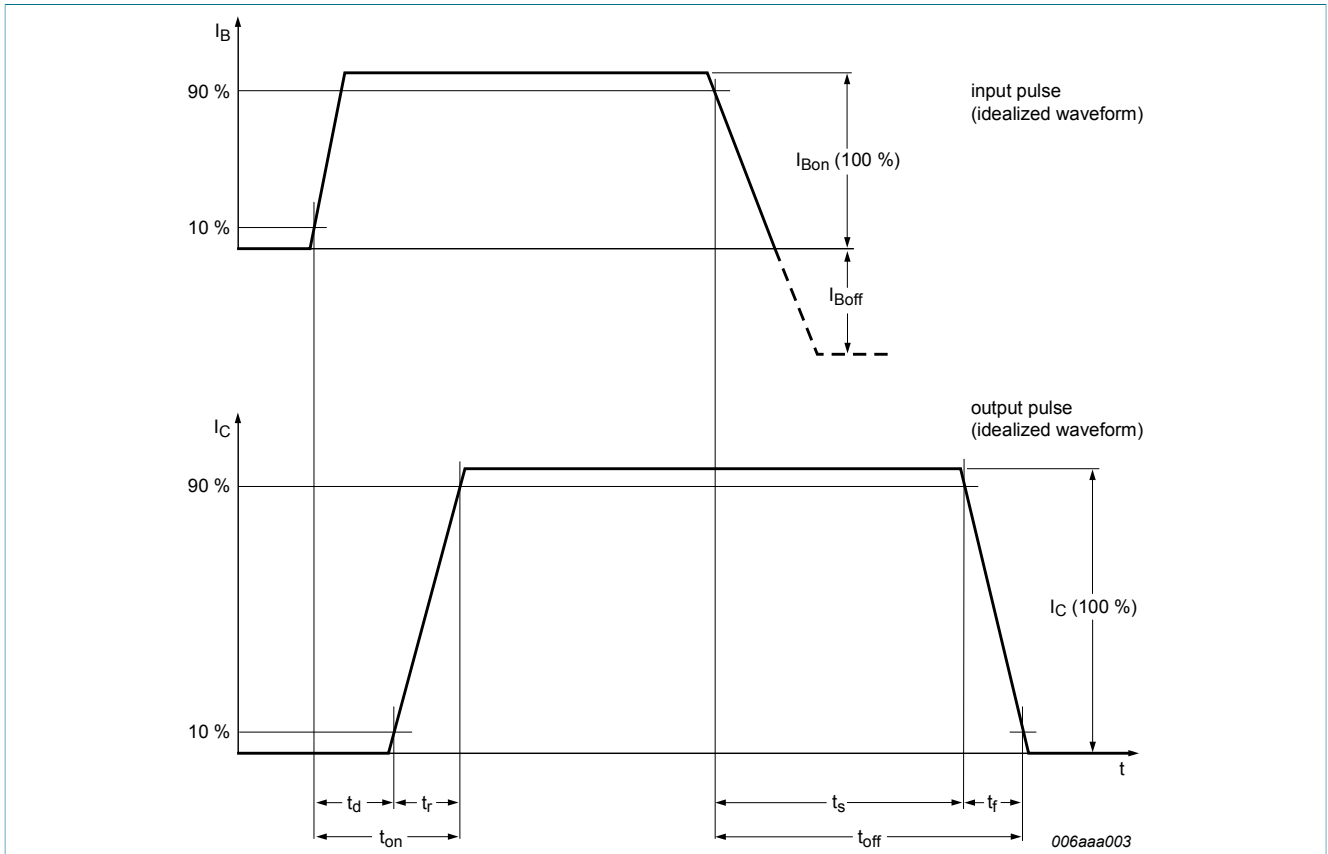


Fig. 12. BISS transistor switching time definition

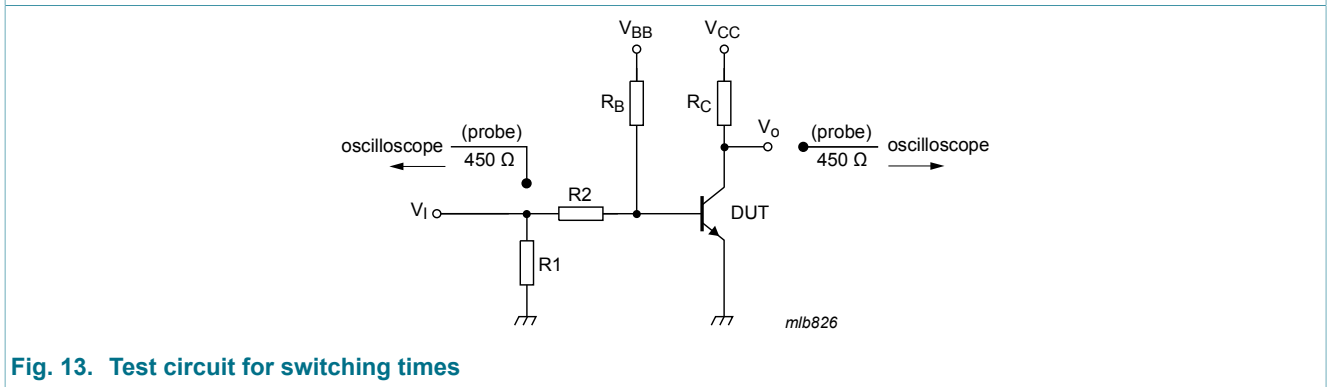


Fig. 13. Test circuit for switching times

11.1 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

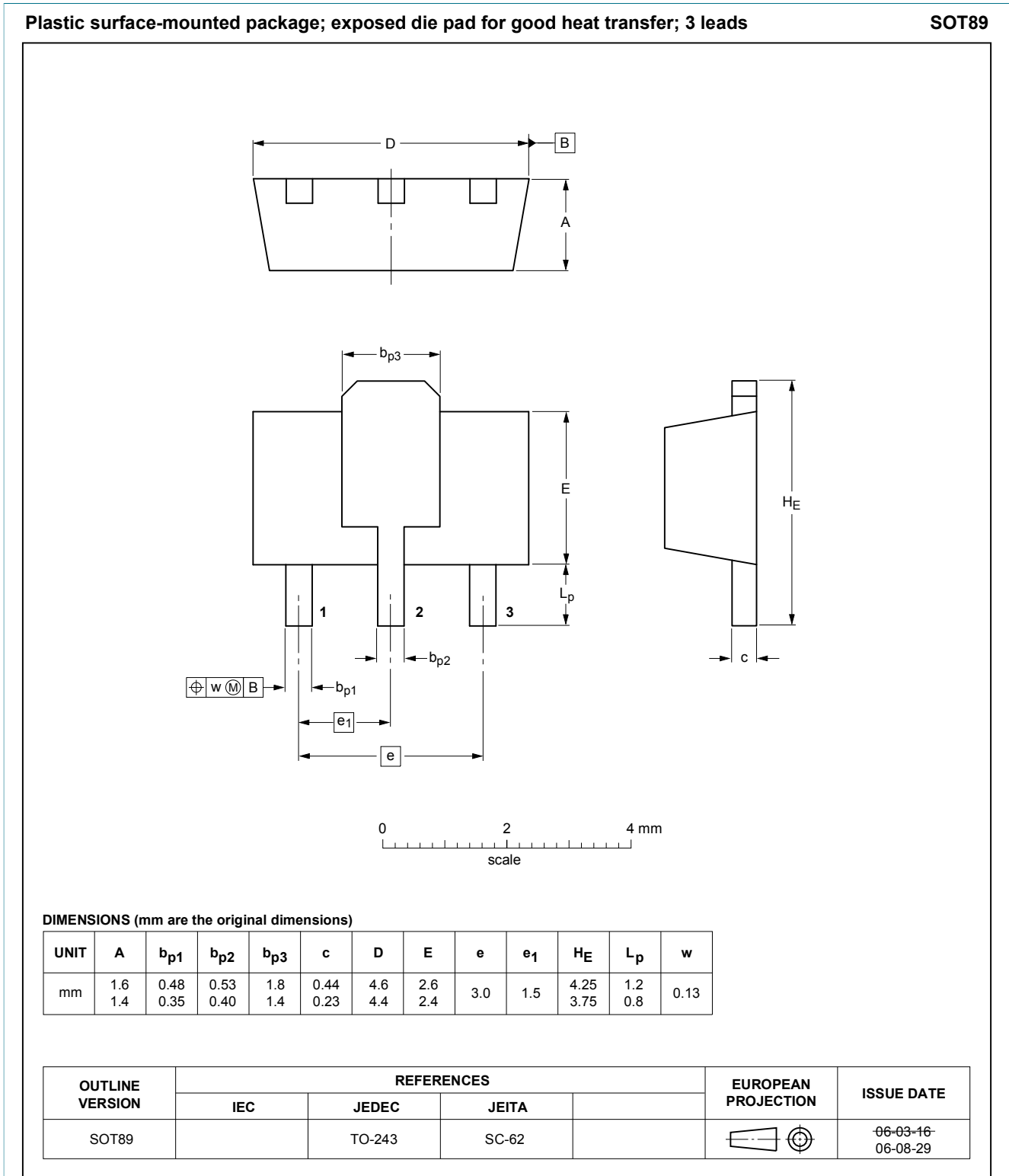


Fig. 14. Package outline SOT89

13. Soldering

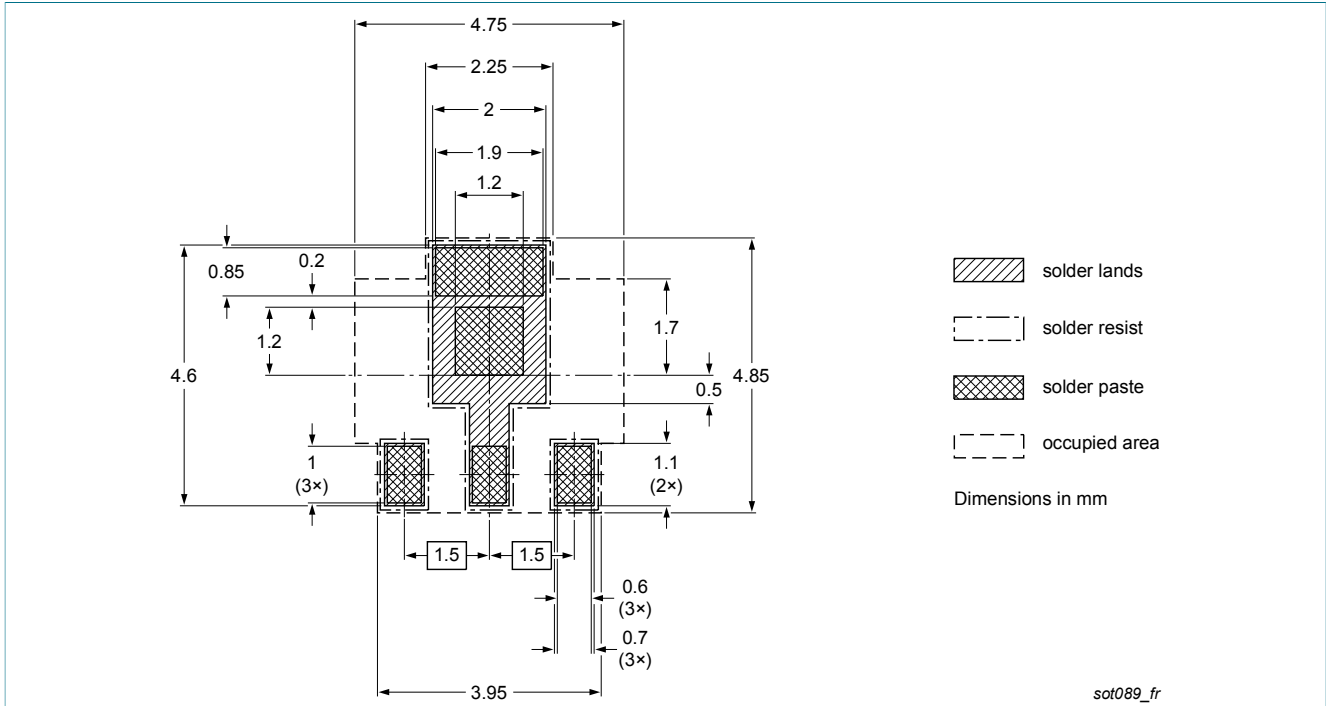


Fig. 15. Reflow soldering footprint for SOT89

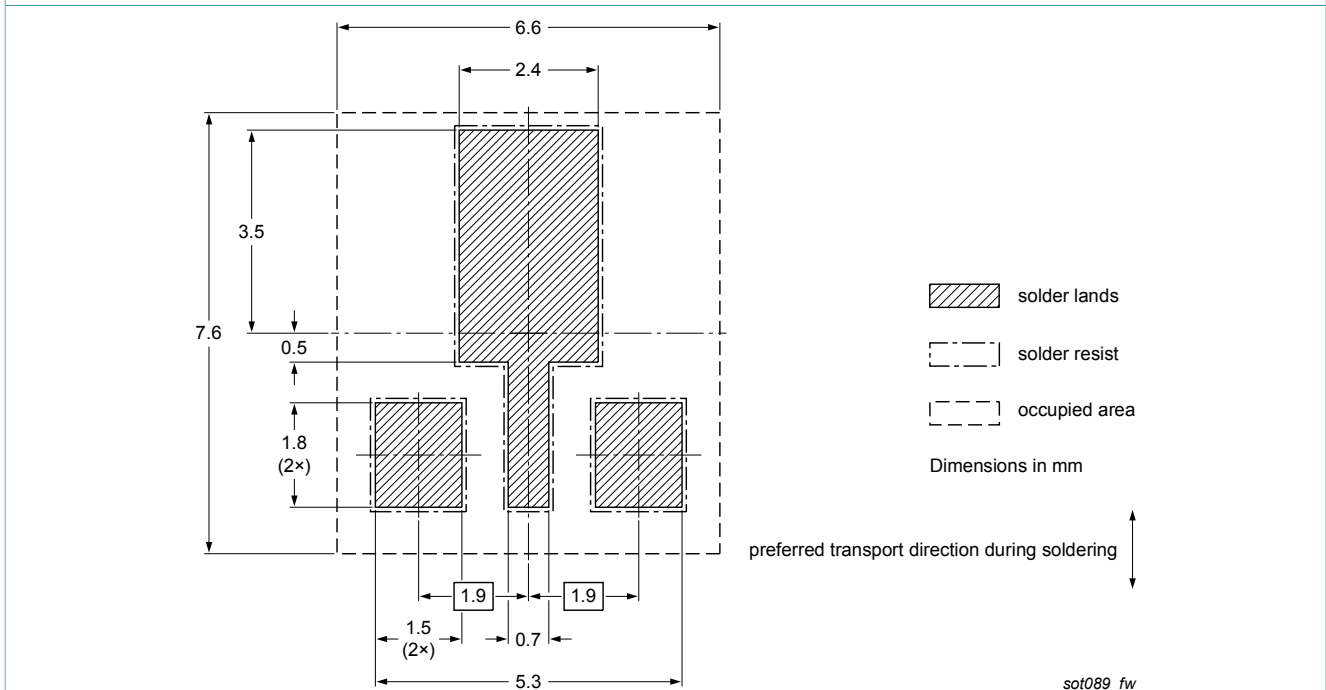


Fig. 16. Wave soldering footprint for SOT89

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| PBHV8115X v.1 | 20131209 | Product data sheet | - | - |

15. Legal information

15.1 Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
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