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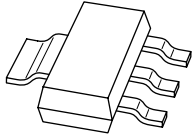
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Kind regards,

Team Nexperia



PBHV8215Z

150 V, 2 A NPN high-voltage low V_{CEsat} (BISS) transistor

Rev. 01 — 11 November 2009

Product data sheet

1. Product profile

1.1 General description

NPN high-voltage low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a medium power SOT223 (SC-73) Surface-Mounted Device (SMD) plastic package.

PNP complement: PBHV9215Z.

1.2 Features

- 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

1.3 Applications

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

1.4 Quick reference data

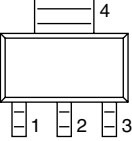
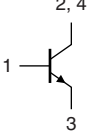
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------|--|---------|-----|-----|------|
| V_{CEO} | collector-emitter voltage | open base | - | - | 150 | V |
| I_C | collector current | | - | - | 2 | A |
| h_{FE} | DC current gain | $V_{CE} = 10\text{ V};$ $I_C = 100\text{ mA}$ | [1] 100 | 240 | - | |

[1] Pulse test: $t_p \leq 300\ \mu\text{s}; \delta \leq 0.02$.

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|---|---|
| 1 | base |  |  |
| 2 | collector | | |
| 3 | emitter | | |
| 4 | collector | | |

sym016

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PBHV8215Z | SC-73 | plastic surface-mounted package with increased heatsink; 4 leads | SOT223 |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PBHV8215Z | V8215Z |

5. Limiting values

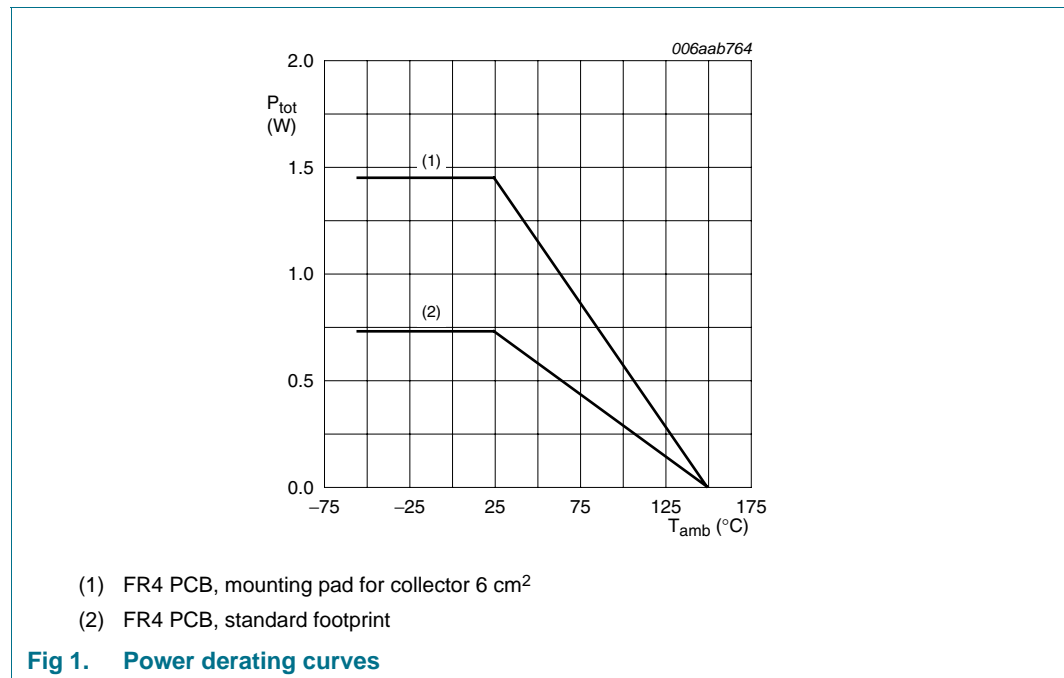
Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|-----------|---------------------------|----------------------------------|-----|------|------|---|
| V_{CBO} | collector-base voltage | open emitter | - | 350 | V | |
| V_{CEO} | collector-emitter voltage | open base | - | 150 | V | |
| V_{EBO} | emitter-base voltage | open collector | - | 6 | V | |
| I_C | collector current | | - | 2 | A | |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | - | 4 | A | |
| I_{BM} | peak base current | single pulse; $t_p \leq 1$ ms | - | 500 | mA | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 0.73 | W |
| | | | [2] | - | 1.45 | 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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

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



6. 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] | - | - | 170 | K/W |
| | | | [2] | - | - | 85 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | - | - | 15 | 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 and mounting pad for collector 6 cm².

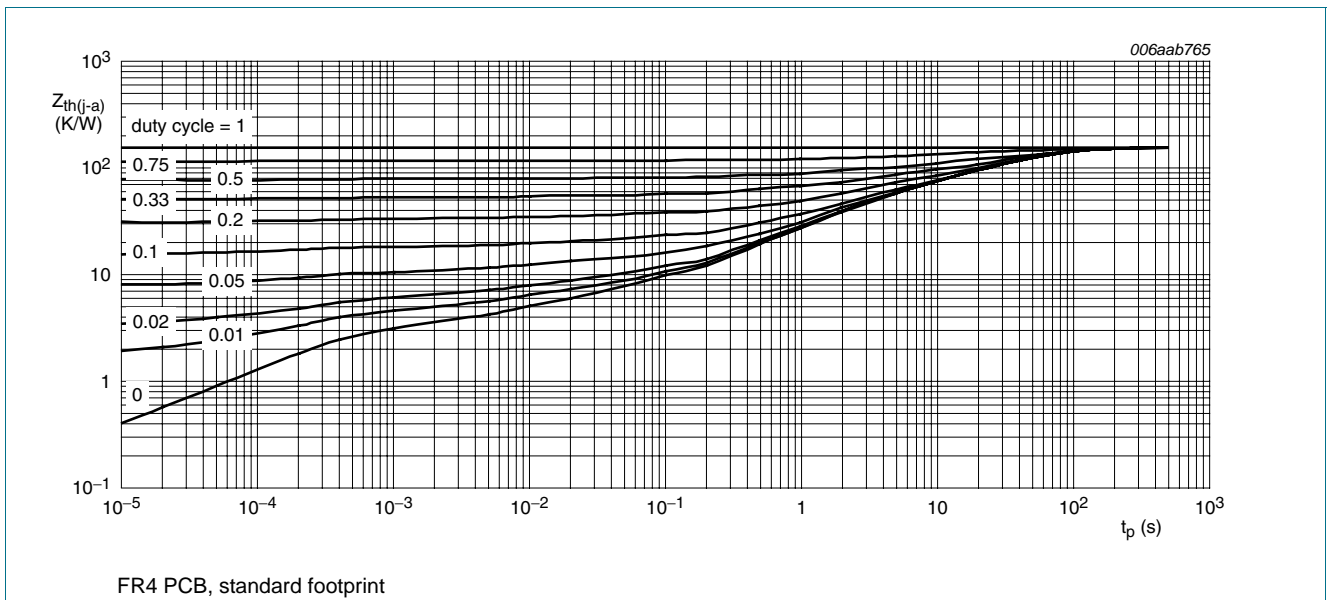


Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

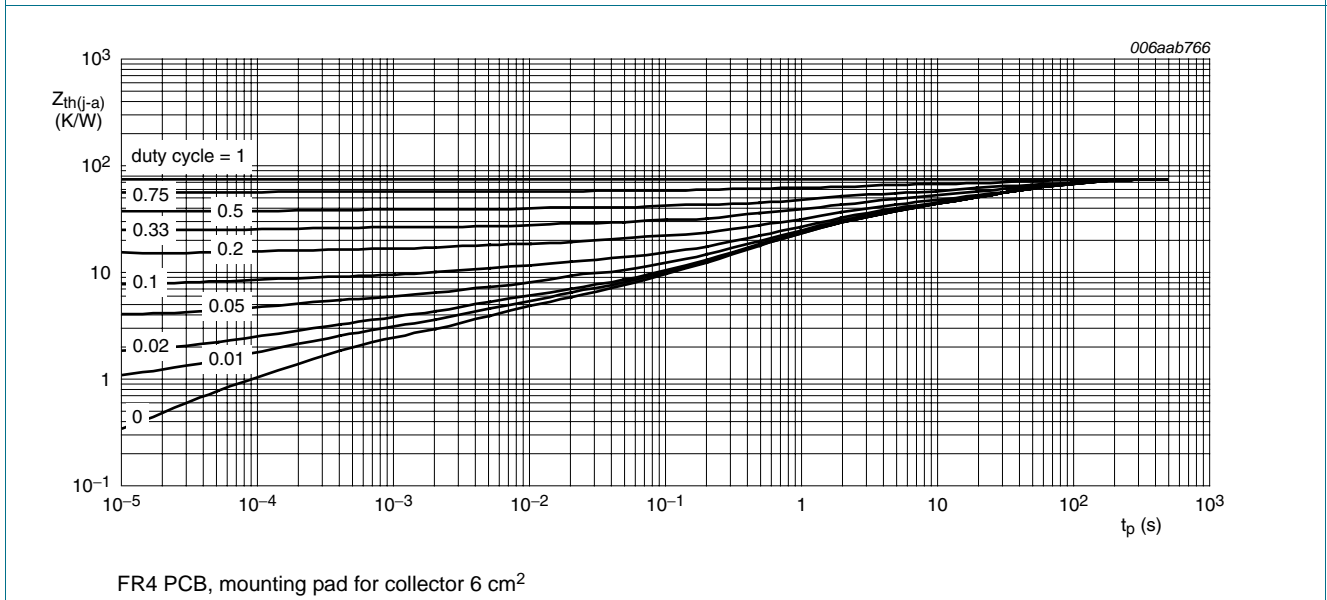


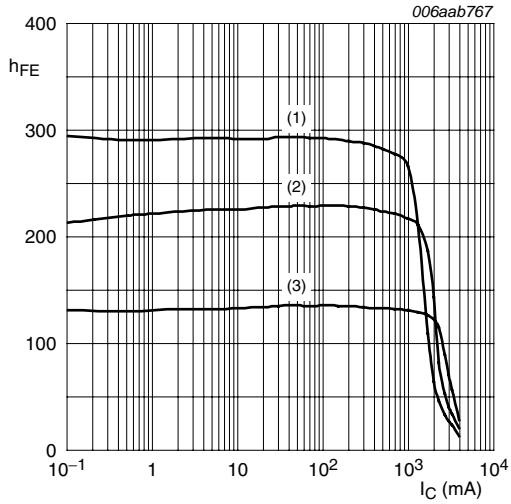
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

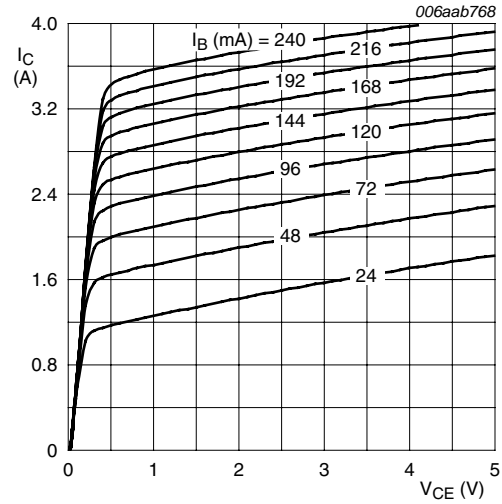
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-------------|---|---|-----|------|-----|---------------|------------------|
| I_{CBO} | collector-base cut-off current | $V_{CB} = 120\text{ V}; I_E = 0\text{ A}$ | - | - | 100 | nA | |
| | | $V_{CB} = 120\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$ | - | - | 10 | μA | |
| I_{CES} | collector-emitter cut-off current | $V_{CE} = 120\text{ V}; V_{BE} = 0\text{ V}$ | - | - | 100 | nA | |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = 4\text{ V}; I_C = 0\text{ A}$ | - | - | 100 | nA | |
| h_{FE} | DC current gain | $V_{CE} = 10\text{ V}$ | | | | | |
| | | $I_C = 100\text{ mA}$ | [1] | 100 | 240 | - | |
| | | $I_C = 1\text{ A}$ | [1] | 100 | 230 | - | |
| | | $I_C = 1.5\text{ A}$ | [1] | 90 | 210 | - | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 100\text{ mA}; I_B = 20\text{ mA}$ | [1] | - | 15 | 30 | mV |
| | | $I_C = 1\text{ A}; I_B = 200\text{ mA}$ | [1] | - | 90 | 170 | mV |
| | | $I_C = 1.5\text{ A}; I_B = 300\text{ mA}$ | [1] | - | 130 | 220 | mV |
| | | $I_C = 2\text{ A}; I_B = 400\text{ mA}$ | [1] | - | 170 | 280 | mV |
| R_{CEsat} | collector-emitter saturation resistance | $I_C = 2\text{ A}; I_B = 400\text{ mA}$ | [1] | - | 85 | 140 | $\text{m}\Omega$ |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 2\text{ A}; I_B = 400\text{ mA}$ | [1] | - | 1.0 | 1.2 | V |
| t_d | delay time | $V_{CC} = 6\text{ V}; I_C = 0.5\text{ A}; I_{Bon} = 0.1\text{ A}; I_{Boff} = -0.1\text{ A}$ | - | 20 | - | ns | |
| t_r | rise time | | - | 280 | - | ns | |
| t_{on} | turn-on time | | - | 300 | - | ns | |
| t_s | storage time | | - | 2165 | - | ns | |
| t_f | fall time | | - | 275 | - | ns | |
| t_{off} | turn-off time | | - | 2440 | - | ns | |
| f_T | transition frequency | $V_{CE} = 10\text{ V}; I_E = 10\text{ mA}; f = 100\text{ MHz}$ | - | 33 | - | MHz | |
| C_c | collector capacitance | $V_{CB} = 20\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$ | - | 17 | - | pF | |
| C_e | emitter capacitance | $V_{EB} = 0.5\text{ V}; I_C = i_c = 0\text{ A}; f = 1\text{ MHz}$ | - | 500 | - | pF | |

[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$.



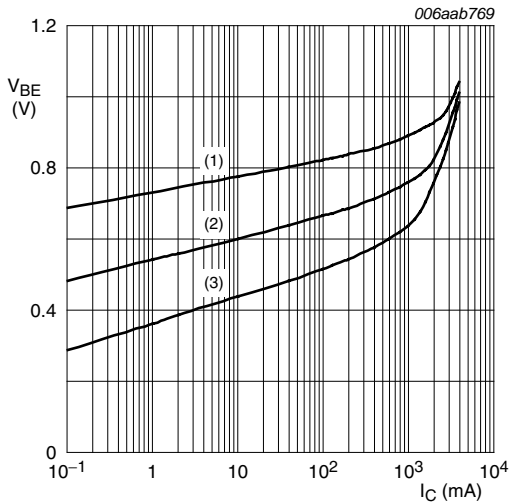
$V_{CE} = 10\text{ V}$
 (1) $T_{amb} = 100^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = -55^\circ C$

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



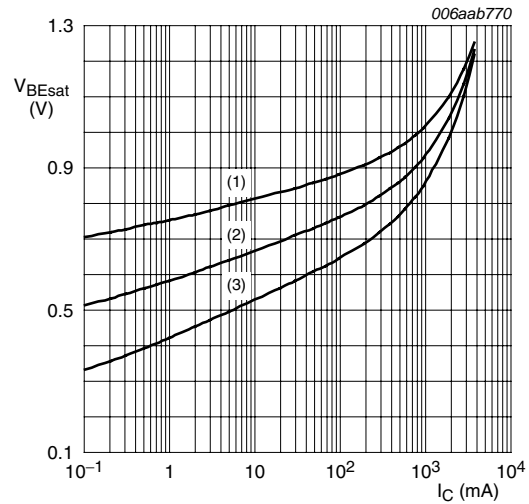
$T_{amb} = 25^\circ C$

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



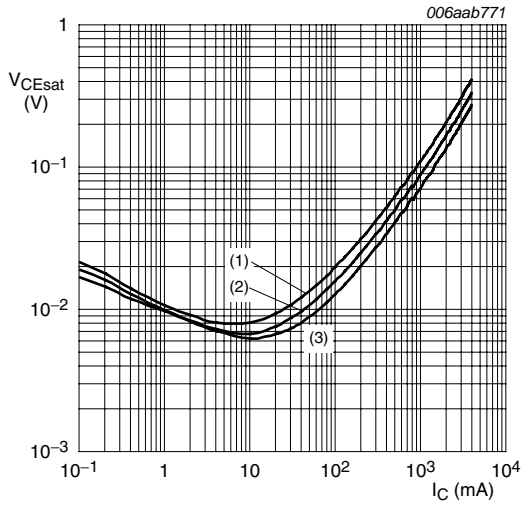
$V_{CE} = 10\text{ V}$
 (1) $T_{amb} = -55^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = 100^\circ C$

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



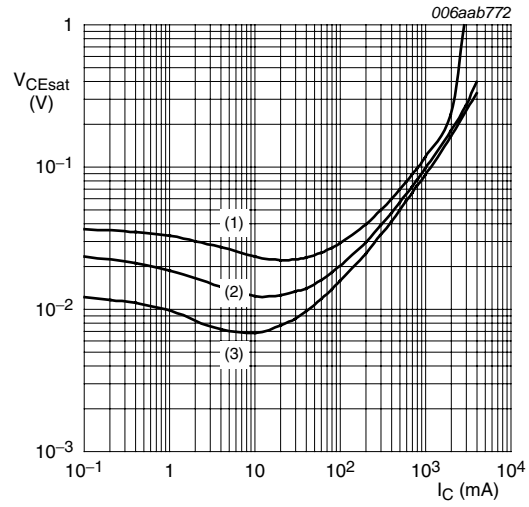
$I_C/I_B = 5$
 (1) $T_{amb} = -55^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = 100^\circ C$

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



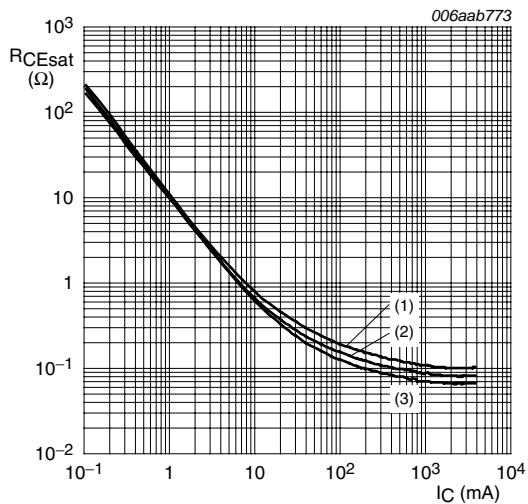
- $I_C/I_B = 5$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

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



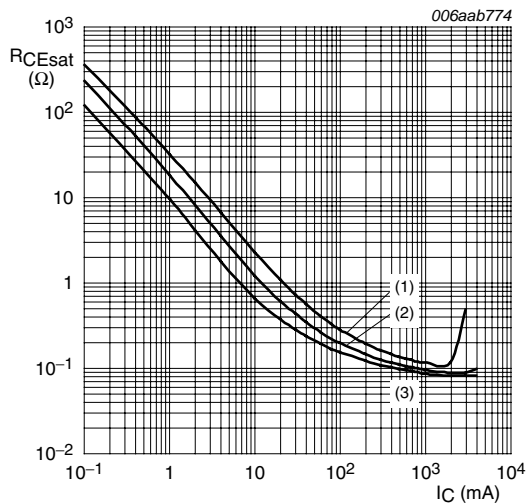
- $T_{amb} = 25\text{ °C}$
- (1) $I_C/I_B = 20$
 - (2) $I_C/I_B = 10$
 - (3) $I_C/I_B = 5$

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) $T_{amb} = -55\text{ °C}$

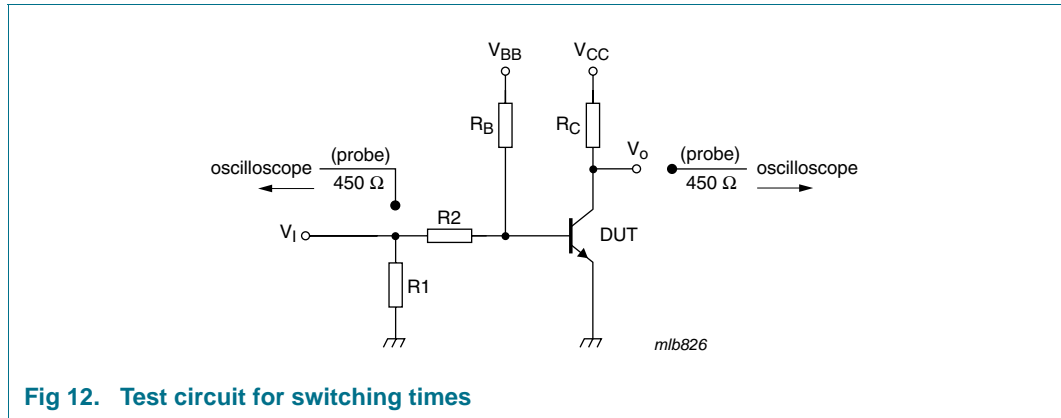
Fig 10. Collector-emitter saturation resistance as a function of collector current; typical values



- $T_{amb} = 25\text{ °C}$
- (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

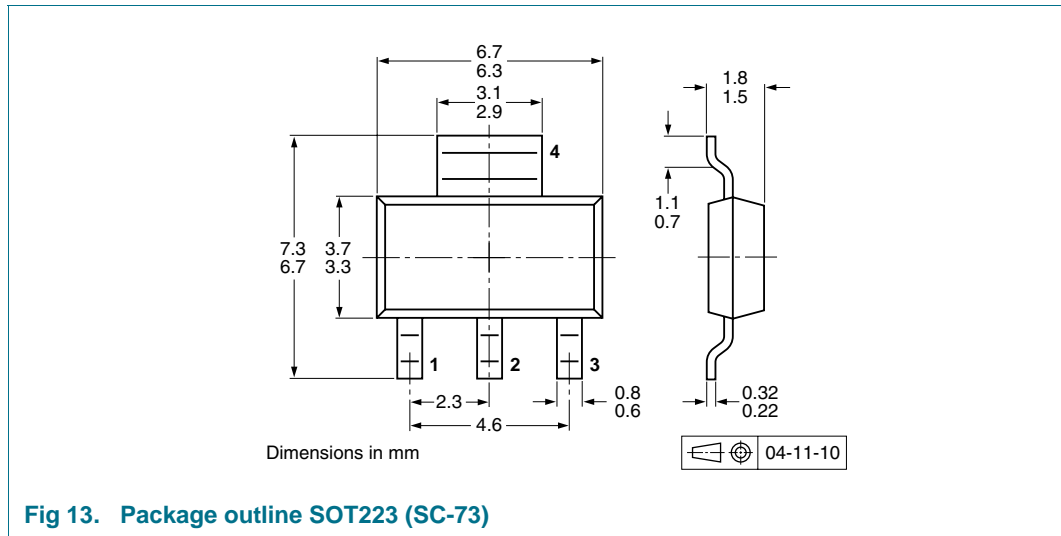
8. Test information



8.1 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.

9. Package outline



10. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity | |
|-------------|---------|---------------------------------|------------------|------|
| | | | 1000 | 4000 |
| PBHV8215Z | SOT223 | 8 mm pitch, 12 mm tape and reel | -115 | -135 |

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

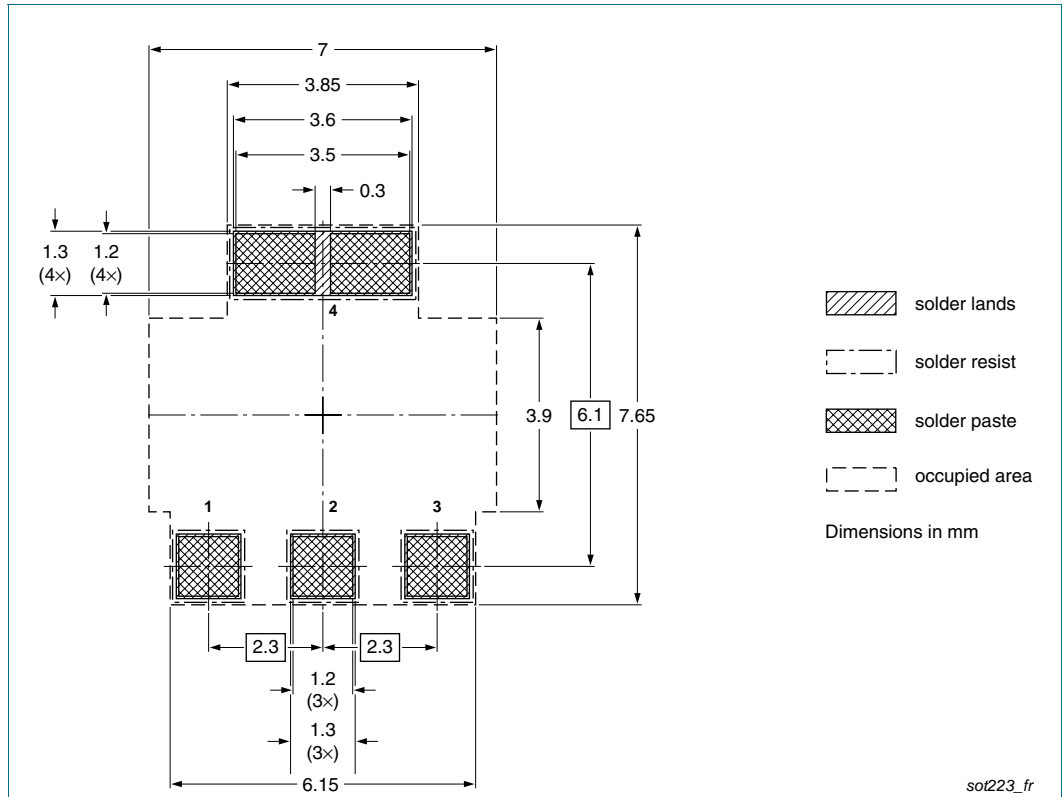


Fig 14. Reflow soldering footprint SOT223 (SC-73)

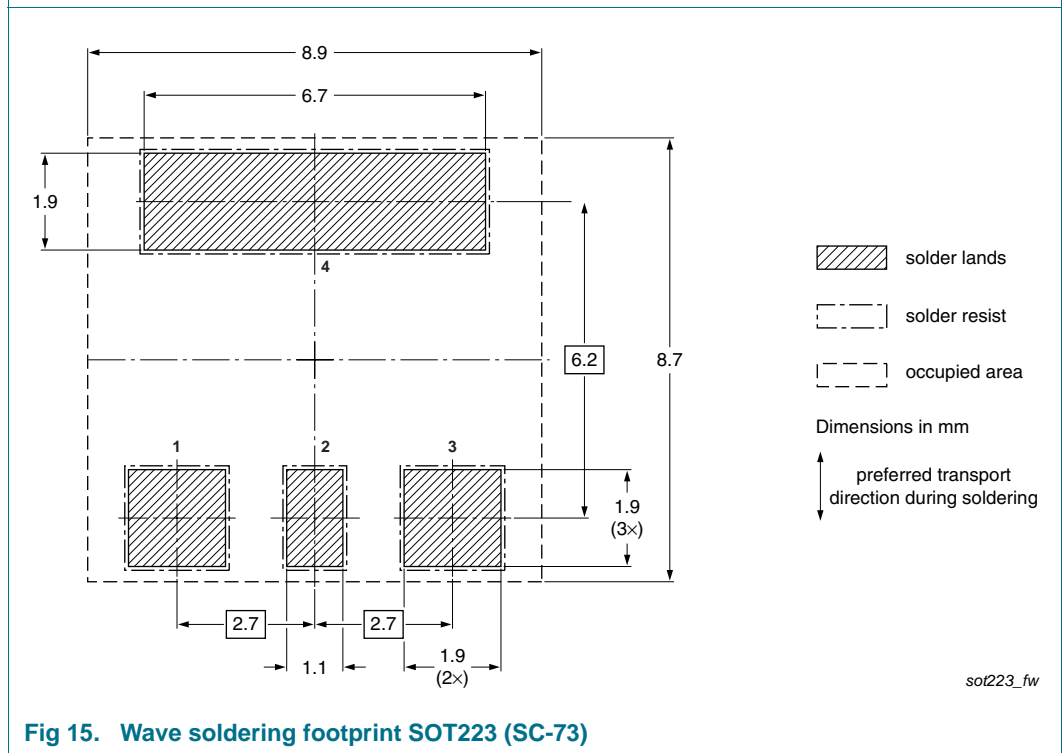


Fig 15. Wave soldering footprint SOT223 (SC-73)

12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------|--------------|--------------------|---------------|------------|
| PBHV8215Z_1 | 20091111 | Product data sheet | - | - |

13. Legal information

13.1 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. |
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[2] The term 'short data sheet' is explained in section "Definitions".

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Date of release: 11 November 2009

Document identifier: PBHV8215Z_1

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