



PBSS4240Z

40 V, 2 A NPN low V_{CEsat} (BISS) transistor

16 October 2014

Product data sheet

1. General description

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

PNP complement: PBSS5240Z

2. Features and benefits

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High energy efficiency due to less heat generation
- AEC-Q101 qualified

3. Applications

- DC-to-DC conversion
- Supply line switching
- Battery charger
- LCD backlighting
- Driver in low supply voltage applications (e.g. lamps and LEDs)
- Inductive load driver (e.g. relays, buzzers and motors)

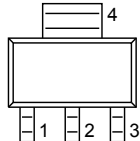
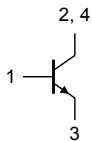
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------|---|---|-----|-----|-----|------|
| V _{CEO} | collector-emitter voltage | open base | - | - | 40 | V |
| I _C | collector current | | - | - | 2 | A |
| I _{CM} | peak collector current | t _p ≤ 1 ms; single pulse | - | - | 3 | A |
| R _{CEsat} | collector-emitter saturation resistance | I _C = 1 A; I _B = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | - | 275 | mΩ |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|---|
| 1 | B | base |  <p>SC-73 (SOT223)</p> |  <p>sym016</p> |
| 2 | C | collector | | |
| 3 | E | emitter | | |
| 4 | C | collector | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PBSS4240Z | SC-73 | plastic surface-mounted package with increased heatsink; 4 leads | SOT223 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PBSS4240Z | S4240Z |

8. Limiting values

Table 5. Limiting values

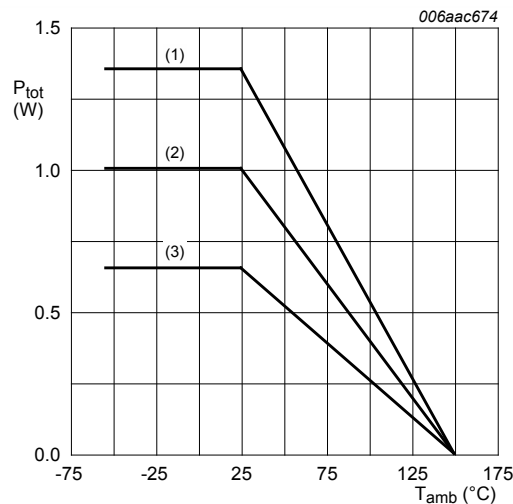
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|-----------|---------------------------|-------------------------------|-----|-----|------|------|
| V_{CBO} | collector-base voltage | open emitter | | - | 40 | V |
| V_{CEO} | collector-emitter voltage | open base | | - | 40 | V |
| V_{EBO} | emitter-base voltage | open collector | | - | 7 | V |
| I_C | collector current | | | - | 2 | A |
| I_{CM} | peak collector current | $t_p \leq 1$ ms; single pulse | | - | 3 | A |
| I_B | base current | | | - | 300 | mA |
| I_{BM} | peak base current | $t_p \leq 1$ ms; single pulse | | - | 1 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 0.65 | W |
| | | | [2] | - | 1 | W |
| | | | [3] | - | 1.35 | 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 1 cm².

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



(1) FR4 PCB, mounting pad for collector 6 cm²

(2) FR4 PCB, mounting pad for collector 1 cm²

(3) FR4 PCB, standard footprint

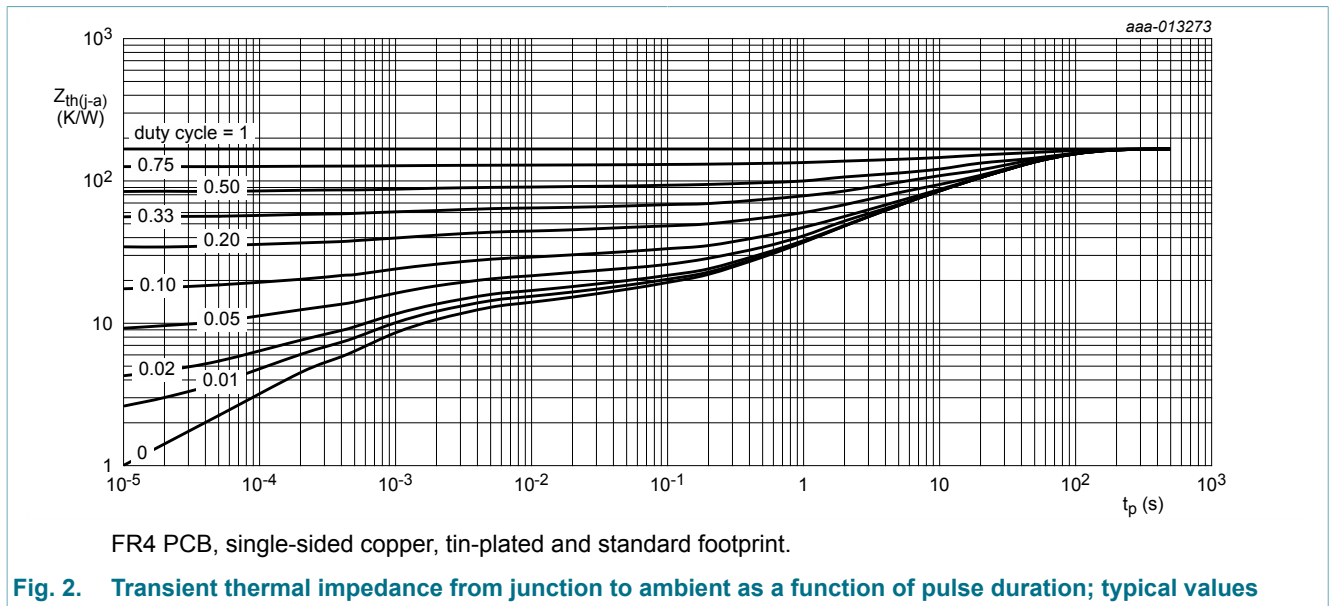
Fig. 1. Power derating curves

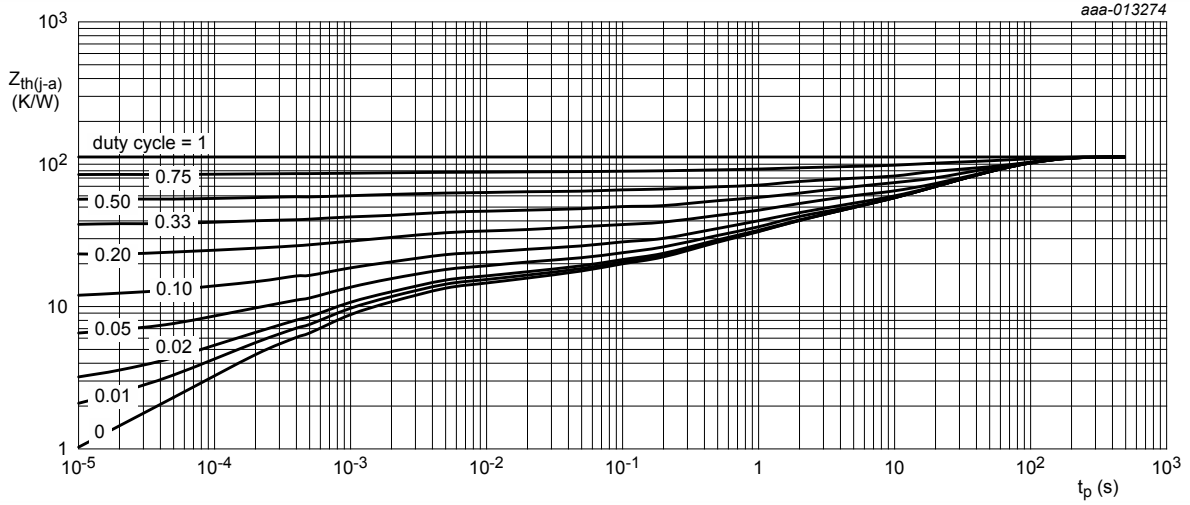
9. Thermal characteristics

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] | - | - | 192 | K/W |
| | | | [2] | - | - | 125 | K/W |
| | | | [3] | - | - | 93 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | - | - | 16 | K/W |

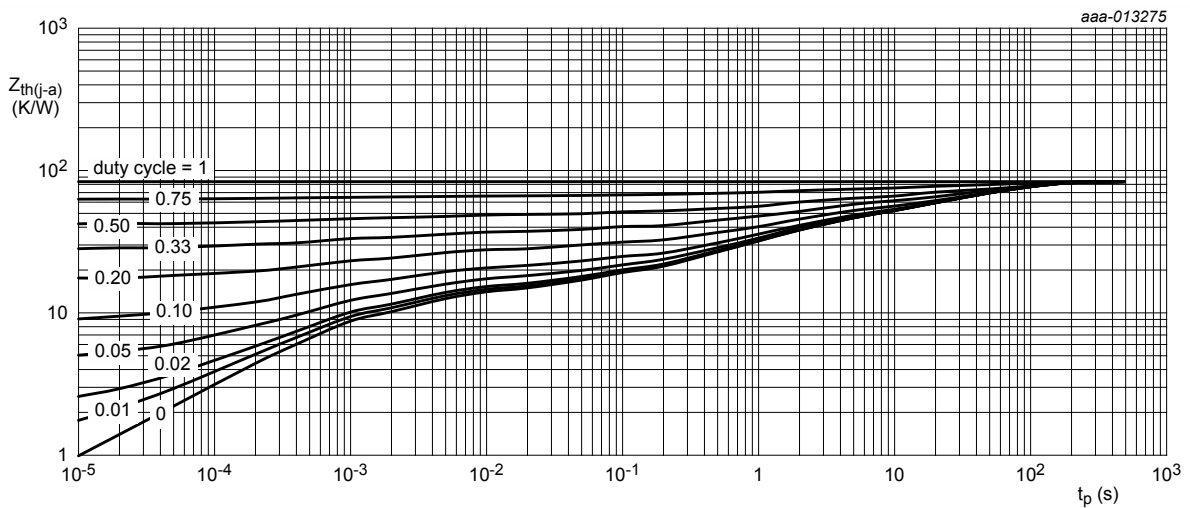
- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².





FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

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



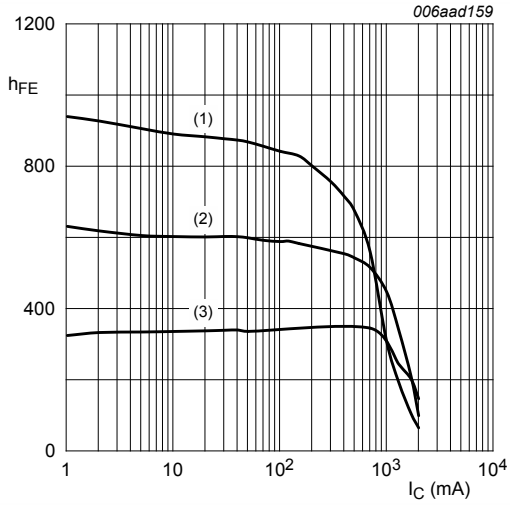
FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

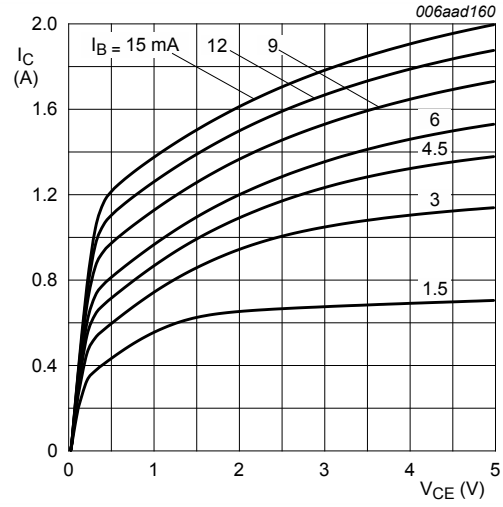
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------|---|--|-----|-----|-----|------|
| I _{CBO} | collector-base cut-off current | V _{CB} = 32 V; I _E = 0 A; T _{amb} = 25 °C | - | - | 100 | nA |
| | | V _{CB} = 32 V; I _E = 0 A; T _j = 150 °C | - | - | 50 | μA |
| I _{CES} | collector-emitter cut-off current | V _{CE} = 32 V; V _{BE} = 0 V; T _{amb} = 25 °C | - | - | 100 | nA |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 5 V; I _C = 0 A; T _{amb} = 25 °C | - | - | 100 | nA |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 1 mA; T _{amb} = 25 °C | 300 | - | - | |
| | | V _{CE} = 5 V; I _C = 500 mA; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | 300 | - | - | |
| | | V _{CE} = 5 V; I _C = 1 A; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | 200 | - | - | |
| | | V _{CE} = 5 V; I _C = 2 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | 75 | - | - | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 100 mA; I _B = 1 mA; T _{amb} = 25 °C | - | - | 80 | mV |
| | | I _C = 500 mA; I _B = 50 mA; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | - | 150 | mV |
| | | I _C = 1 A; I _B = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | - | 275 | mV |
| | | I _C = 2 A; I _B = 200 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | - | 550 | mV |
| R _{CEsat} | collector-emitter saturation resistance | I _C = 1 A; I _B = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | - | 275 | mΩ |
| V _{BEsat} | base-emitter saturation voltage | I _C = 1 A; I _B = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | - | 1.2 | V |
| V _{BEon} | base-emitter turn-on voltage | V _{CE} = 5 V; I _C = 1 A; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | - | 1.1 | V |
| f _T | transition frequency | V _{CE} = 10 V; I _C = 50 mA; f = 100 MHz; T _{amb} = 25 °C | 150 | - | - | MHz |
| C _c | collector capacitance | V _{CB} = 10 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C | - | - | 10 | pF |



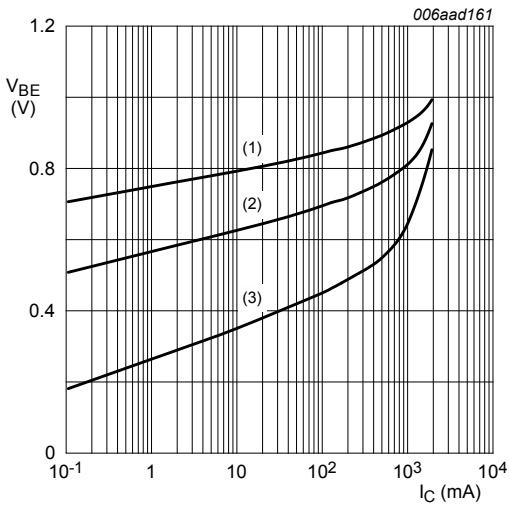
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 5. DC current gain as a function of collector current; typical values



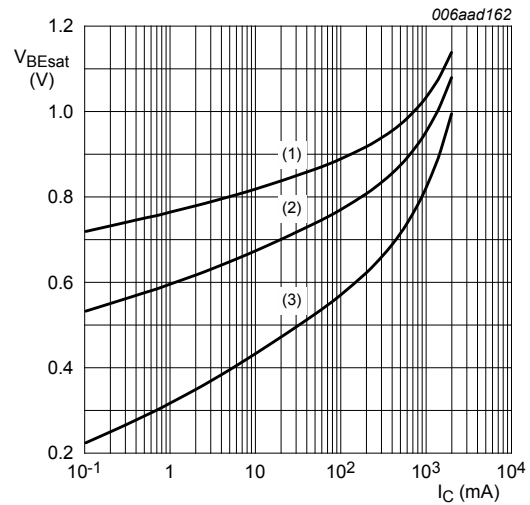
$T_{amb} = 25\text{ °C}$

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



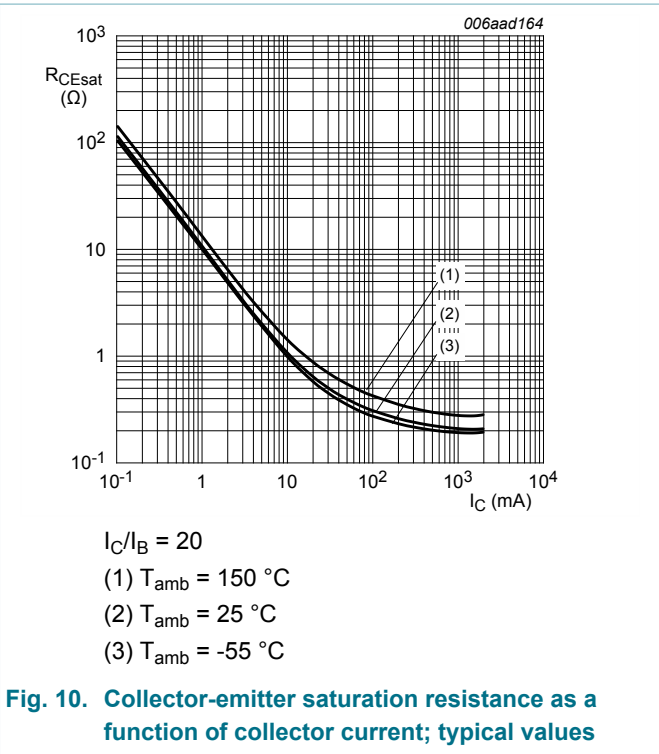
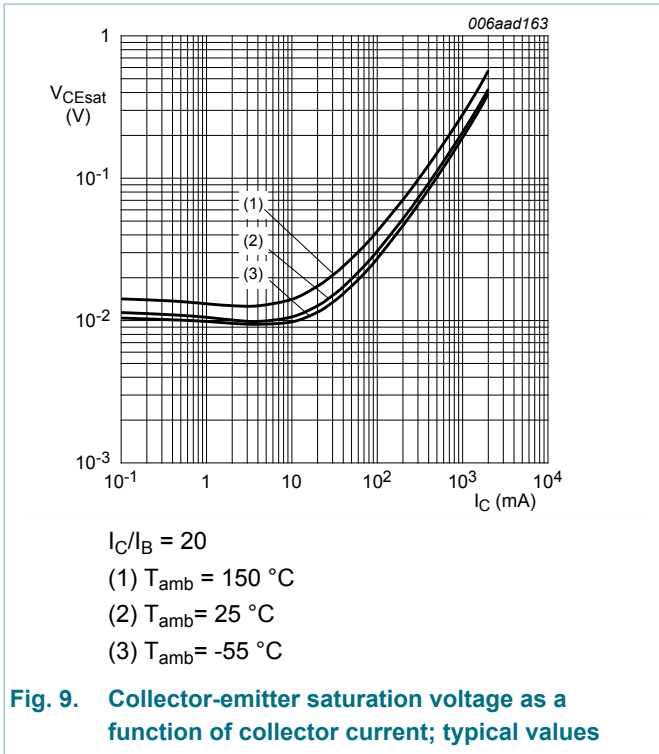
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



$I_C/I_B = 20$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



11. Test information

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

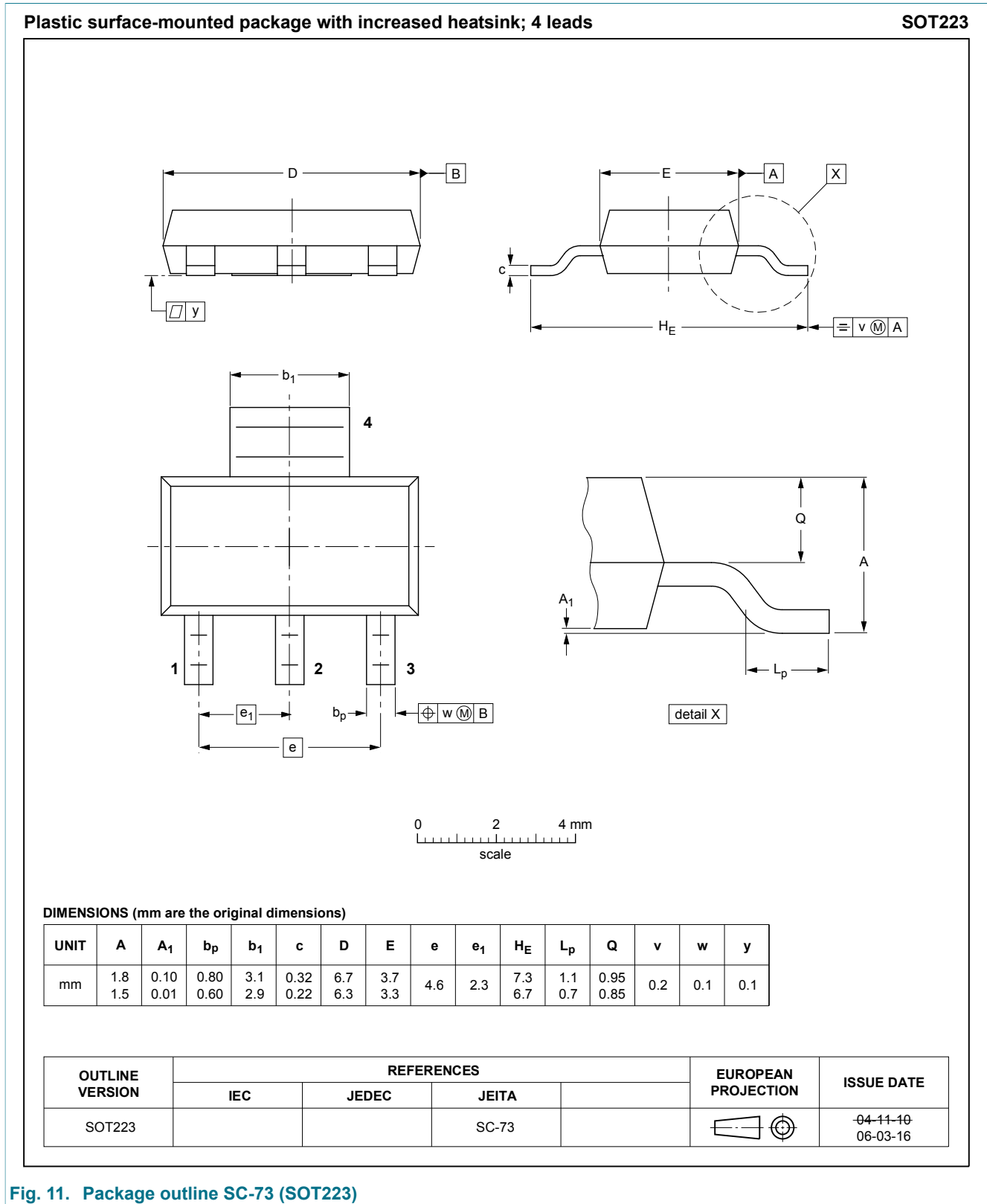


Fig. 11. Package outline SC-73 (SOT223)

13. Soldering

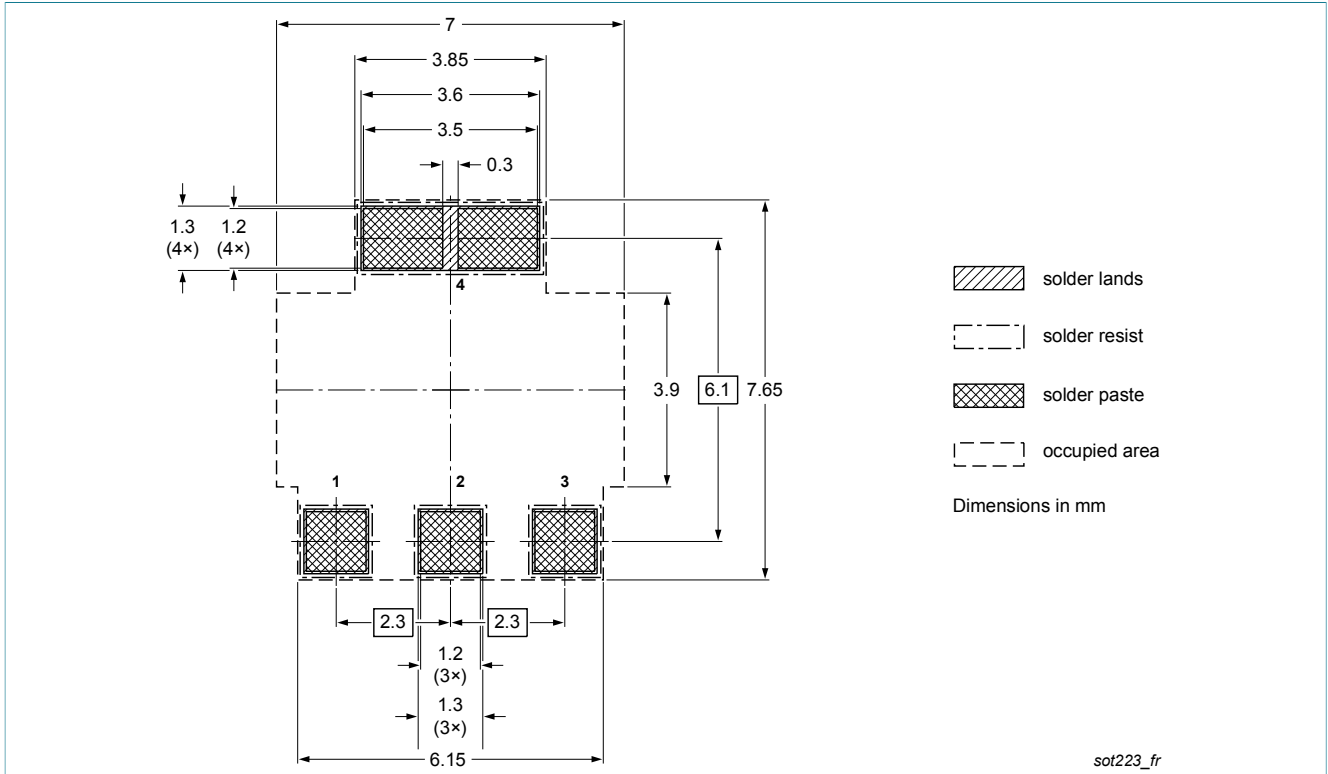


Fig. 12. Reflow soldering footprint for SC-73 (SOT223)

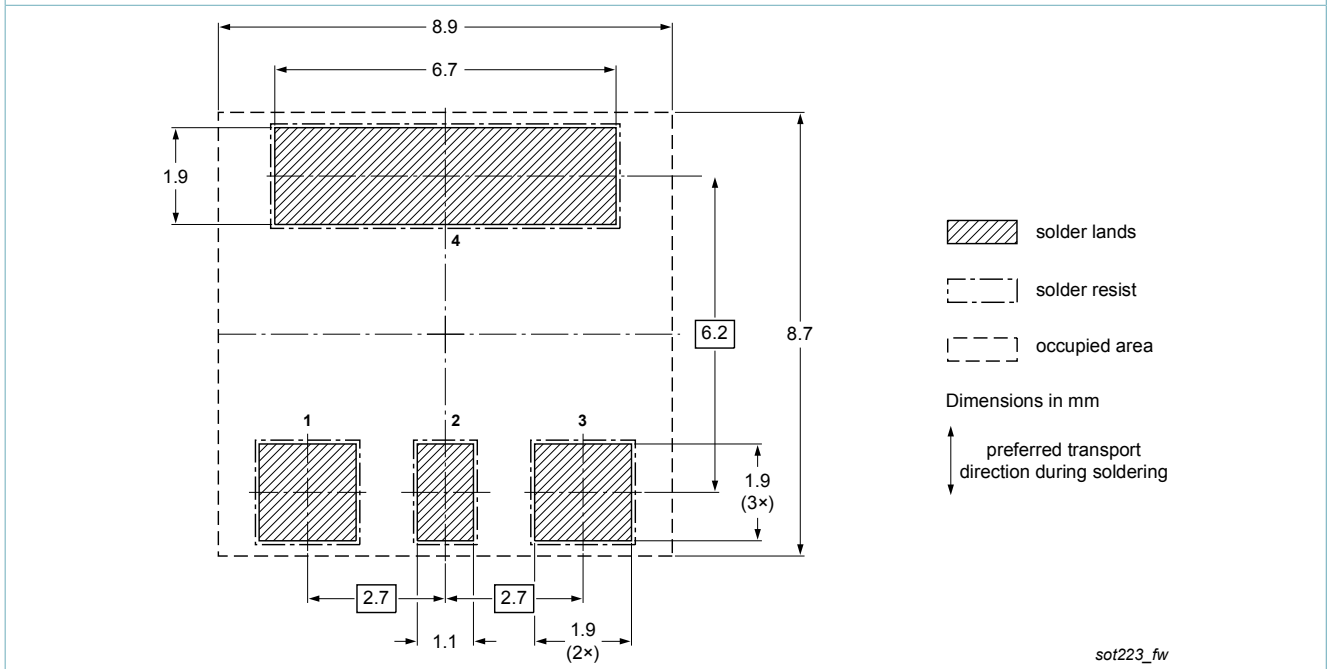


Fig. 13. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PBSS4240Z v. 1 | 20141016 | Product data sheet | - | - |

15. Legal information

15.1 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. |

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