



PBHV8118T

180 V, 1 A NPN high-voltage low V_{CEsat} transistor

12 July 2023

Product data sheet

1. General description

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

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
- Small SMD plastic package

3. Applications

- LED driver for LED chain module
- LCD backlighting
- Automotive power management
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

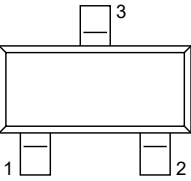
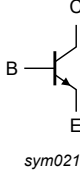
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---------------------------|---|-----|-----|-----|------|
| V _{CEO} | collector-emitter voltage | open base | - | - | 180 | V |
| I _C | collector current | | - | - | 1 | A |
| h _{FE} | DC current gain | V _{CE} = 10 V; I _C = 50 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | 100 | 250 | - | |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|---|
| 1 | B | base |  <p style="text-align: center;">SOT23</p> |  <p style="text-align: center;">sym021</p> |
| 2 | E | emitter | | |
| 3 | C | collector | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------------------|---------|--|-----------------------|
| | Name | Description | Version |
| PBHV8118T | SOT23 | plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body | SOT23 |

7. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PBHV8118T | LZ% |

[1] % = placeholder for manufacturing site code

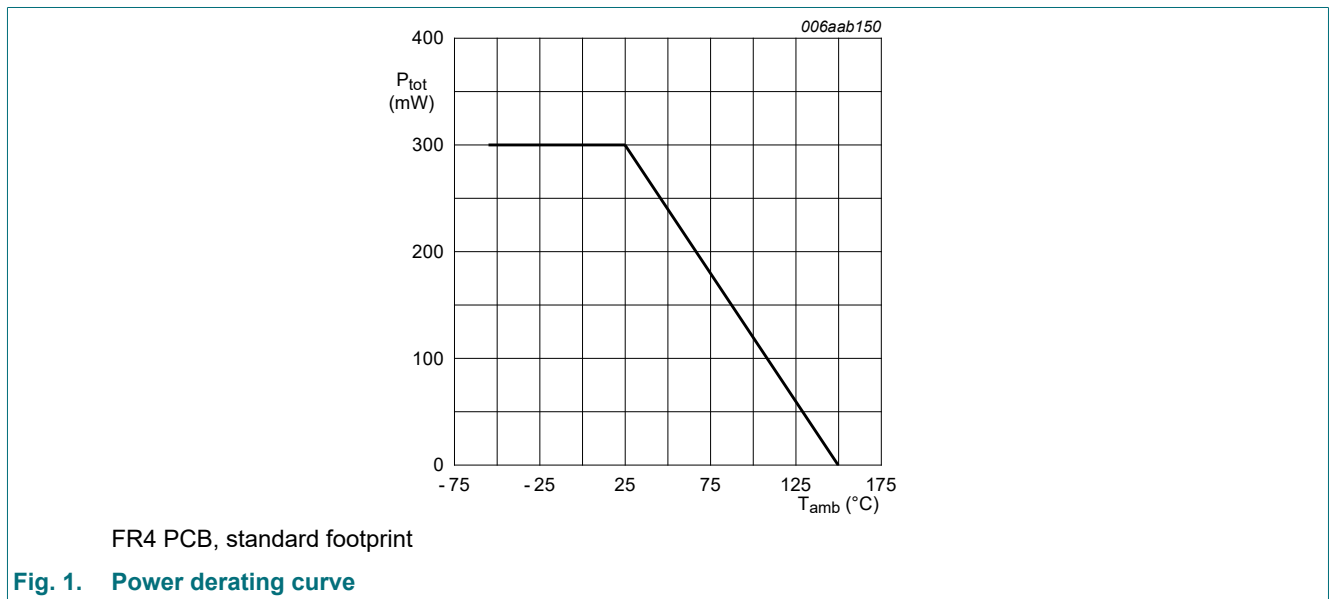
8. Limiting values

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 | - | 180 | 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] | 300 | mW |
| 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.



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.

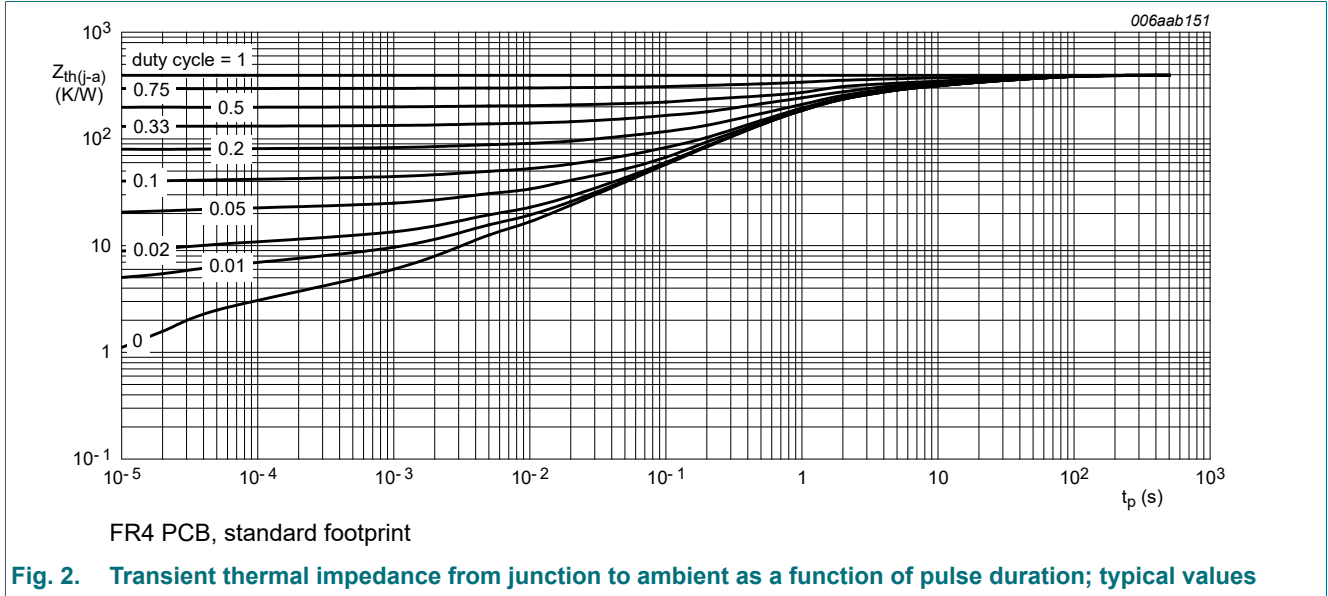
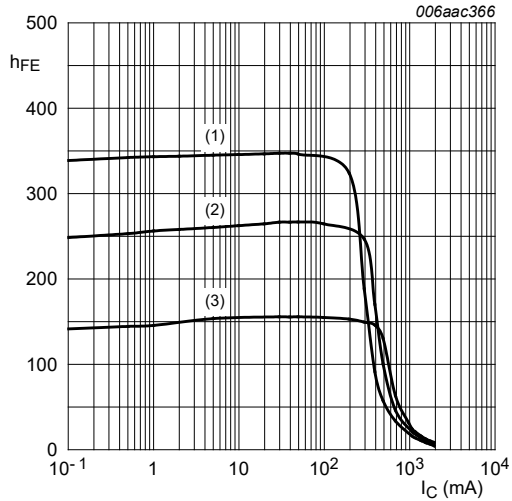


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

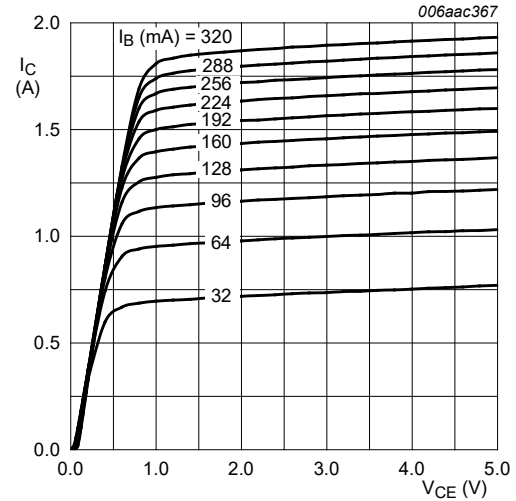
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------|--------------------------------------|---|---|------|-----|------|
| I _{CBO} | collector-base cut-off current | V _{CB} = 144 V; I _E = 0 A; T _{amb} = 25 °C | - | - | 100 | nA |
| | | V _{CB} = 144 V; I _E = 0 A; T _j = 150 °C | - | - | 10 | μA |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 4 V; I _C = 0 A; T _{amb} = 25 °C | - | - | 100 | nA |
| I _{CES} | collector-emitter cut-off current | V _{CE} = 144 V; V _{BE} = 0 V; T _{amb} = 25 °C | - | - | 100 | nA |
| h _{FE} | DC current gain | V _{CE} = 10 V; I _C = 50 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; 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 | 100 | - | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 100 mA; I _B = 10 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | 40 | 60 | mV |
| | | I _C = 100 mA; I _B = 20 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | 33 | 50 | mV |
| V _{BEsat} | base-emitter saturation voltage | I _C = 0.5 A; I _B = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | 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 | | - | 1320 | - | ns |
| t _f | fall time | | - | 740 | - | ns |
| t _{off} | turn-off time | | - | 2060 | - | 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 |



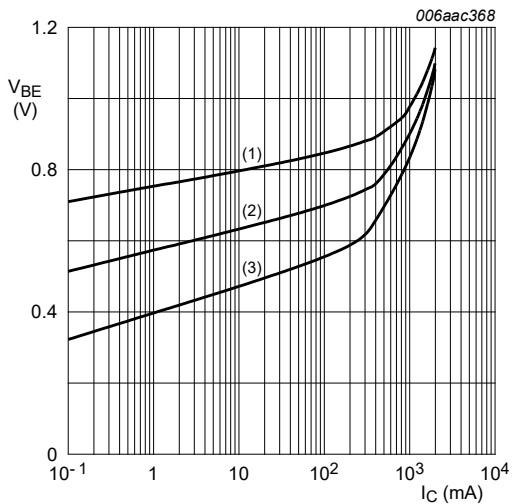
$V_{CE} = 10\text{ V}$
 (1) $T_{amb} = 100^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = -55^\circ C$

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



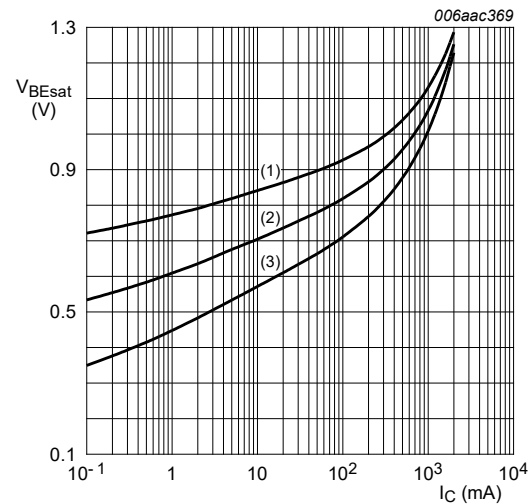
$T_{amb} = 25^\circ C$

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



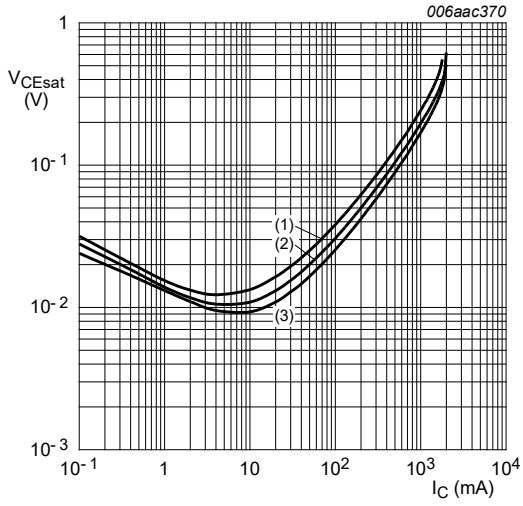
$V_{CE} = 10\text{ V}$
 (1) $T_{amb} = -55^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = 100^\circ C$

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



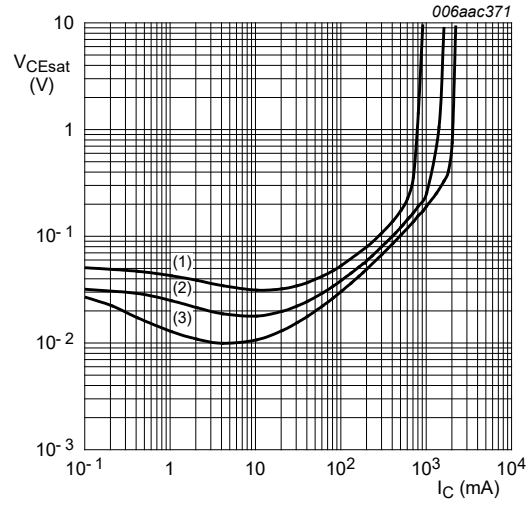
$I_C/I_B = 5$
 (1) $T_{amb} = -55^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = 100^\circ C$

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



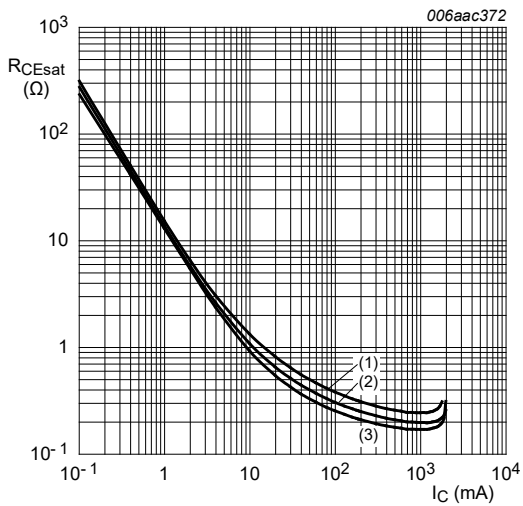
$I_C/I_B = 5$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



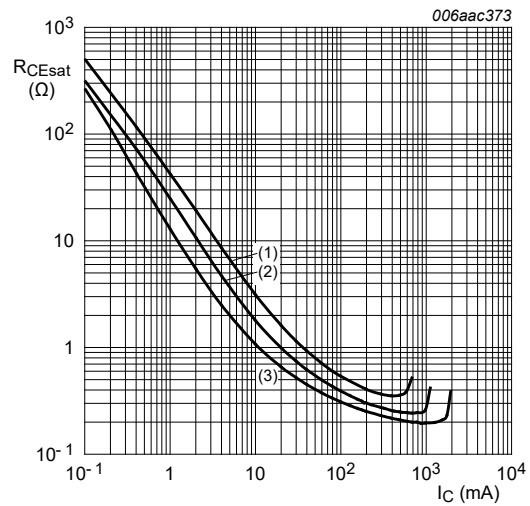
$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 20$
 (2) $I_C/I_B = 10$
 (3) $I_C/I_B = 5$

Fig. 8. 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. 9. 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. 10. Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

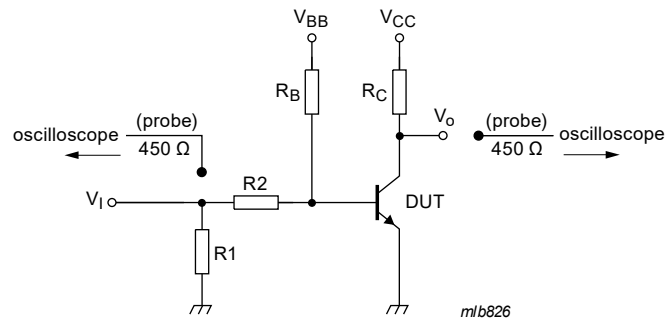


Fig. 11. Test circuit for switching times

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

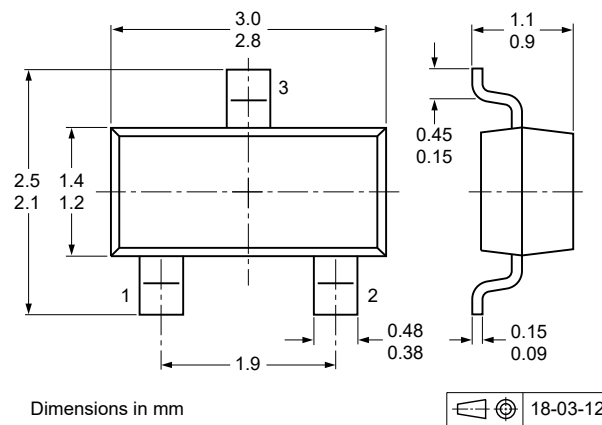


Fig. 12. Package outline SOT23

13. Soldering

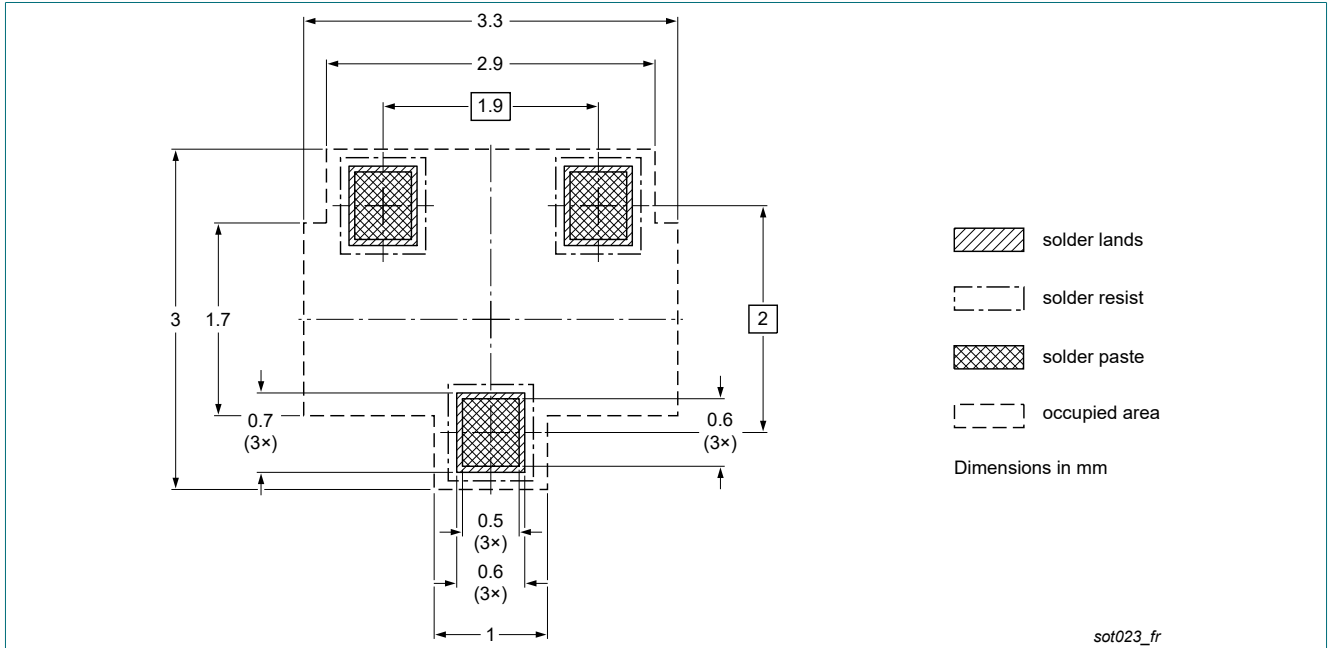


Fig. 13. Reflow soldering footprint for SOT23

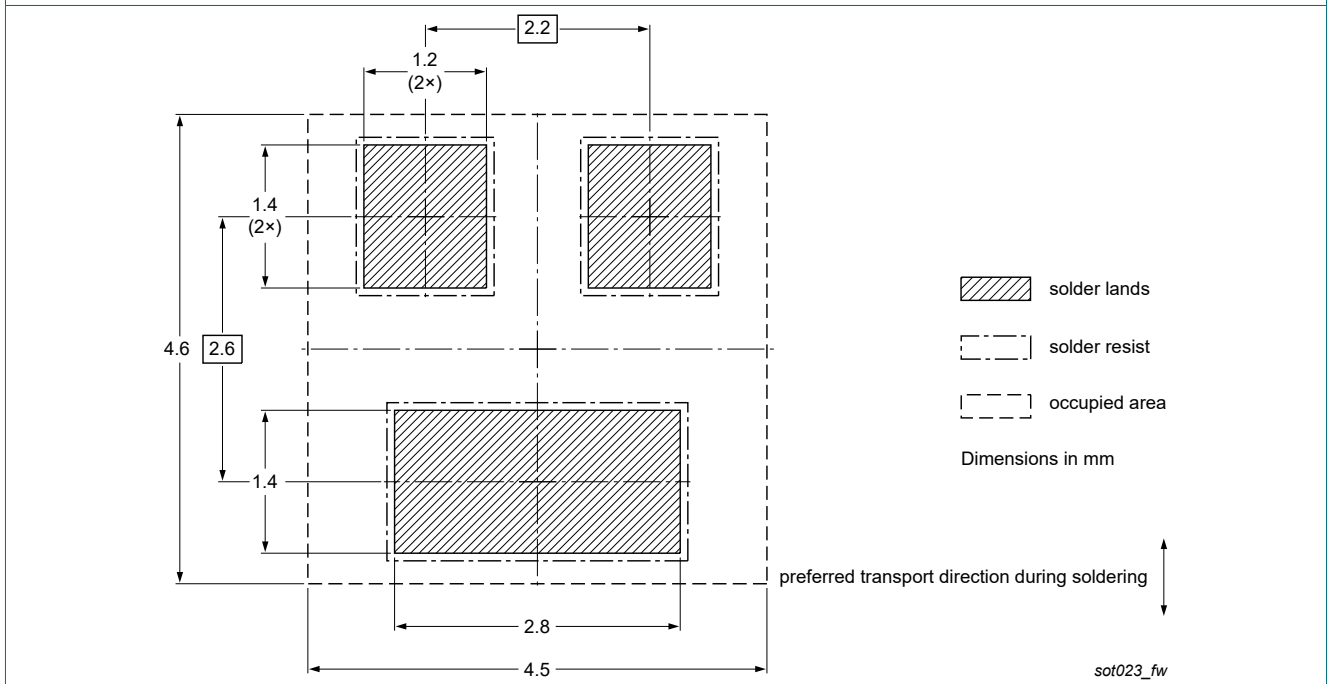


Fig. 14. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|--------------------|---------------|---------------|
| PBHV8118T v.2 | 20230712 | Product data sheet | - | PBHV8118T v.1 |
| Modifications: | <ul style="list-style-type: none">The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.Legal texts have been adapted to the new company name where appropriate. | | | |
| PBHV8118T v.1 | 20100507 | Product data sheet | - | - |

15. Legal information

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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