



BAS20-Q

High-voltage switching diode

4 August 2021

Product data sheet

1. General description

High-voltage switching diode encapsulated in a small SOT23 Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High switching speed: $t_{tr} \leq 50$ ns
- Low leakage current
- Reverse voltage $V_R \leq 150$ V
- Low capacitance: $C_d \leq 5$ pF
- Small SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- High-speed switching at high voltage
- High-voltage general-purpose switching
- Voltage clamping
- Reverse polarity protection

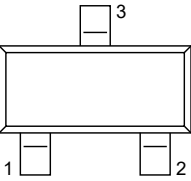
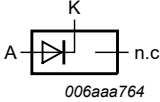
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------------|-------------------------------|-----|-----|------|------|
| V_{RRM} | repetitive peak reverse voltage | | - | - | 200 | V |
| V_R | reverse voltage | | - | - | 150 | V |
| V_F | forward voltage | $I_F = 100$ mA; $T_j = 25$ °C | - | - | 1 | V |
| | | $I_F = 200$ mA; $T_j = 25$ °C | - | - | 1.25 | V |
| I_R | reverse current | $V_R = 150$ V; $T_j = 25$ °C | - | - | 100 | nA |
| | | $V_R = 150$ V; $T_j = 150$ °C | - | - | 100 | μA |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|---------------|---|---|
| 1 | A | anode |  <p style="text-align: center;">SOT23</p> |  |
| 2 | n.c. | not connected | | |
| 3 | K | cathode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BAS20-Q | 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] |
|-------------|-----------------------------|
| BAS20-Q | JR% |

[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_{RRM} | repetitive peak reverse voltage | | | - | 200 | V |
| V_R | reverse voltage | | | - | 150 | V |
| I_F | forward current | continuous | | - | 200 | mA |
| I_{FSM} | non-repetitive peak forward current | $t_p = 1 \mu\text{s}$; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ | | - | 9 | A |
| | | $t_p = 100 \mu\text{s}$; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ | | - | 3 | A |
| | | $t_p = 10 \text{ ms}$; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ | | - | 1.7 | A |
| I_{FRM} | repetitive peak forward current | | | - | 625 | mA |
| P_{tot} | total power dissipation | $T_{\text{amb}} \leq 25 \text{ }^\circ\text{C}$ | [1] | - | 250 | mW |
| T_j | junction temperature | | | - | 150 | $^\circ\text{C}$ |
| T_{amb} | ambient temperature | | | -55 | 150 | $^\circ\text{C}$ |
| T_{stg} | storage temperature | | | -65 | 150 | $^\circ\text{C}$ |

[1] Device mounted on an FR4 printed-circuit board.

9. Thermal characteristics

Table 6. Thermal characteristics

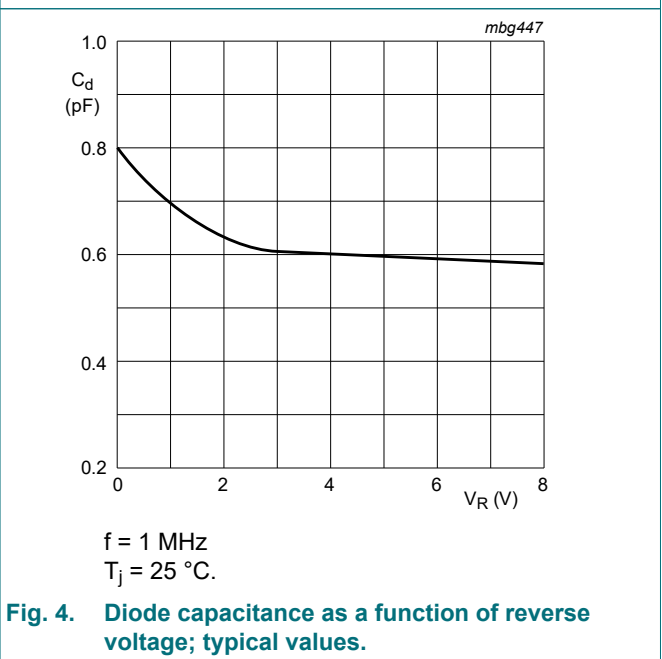
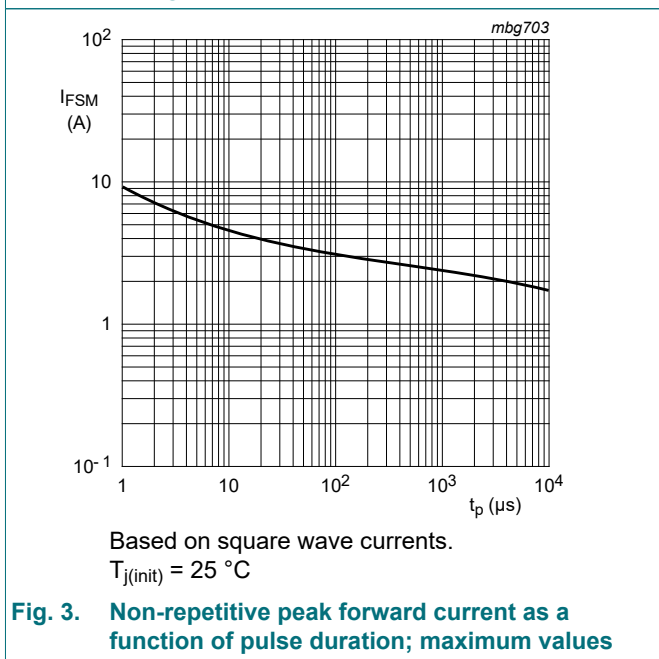
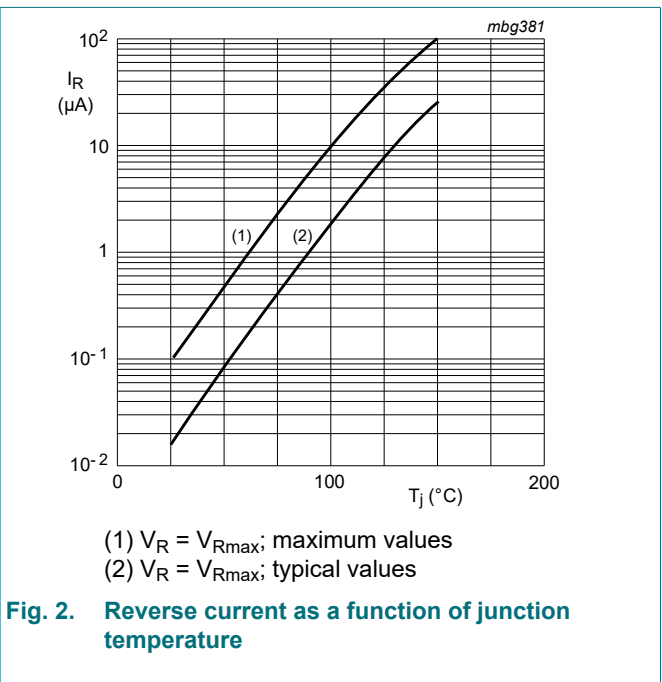
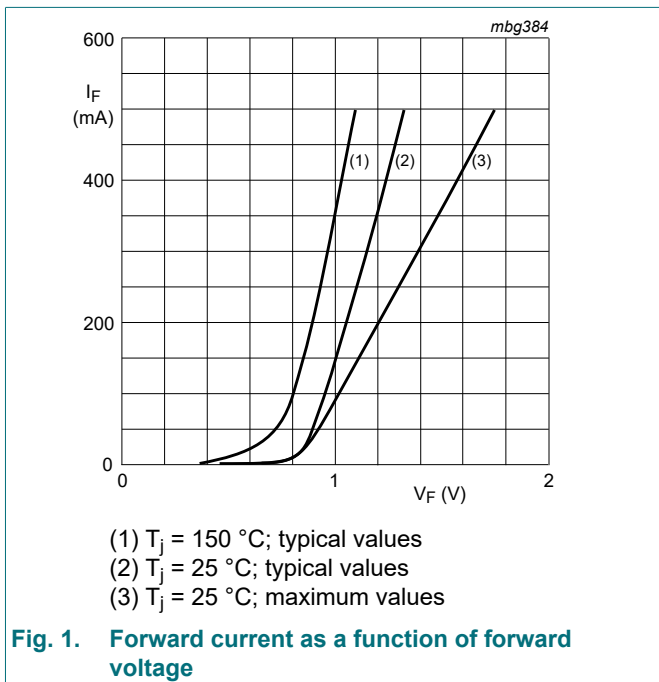
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-----------------------|--|------------|-----|-----|-----|-----|------|
| $R_{\text{th}(j-a)}$ | thermal resistance from junction to ambient | | [1] | - | - | 500 | K/W |
| $R_{\text{th}(j-sp)}$ | thermal resistance from junction to solder point | | | - | - | 330 | K/W |

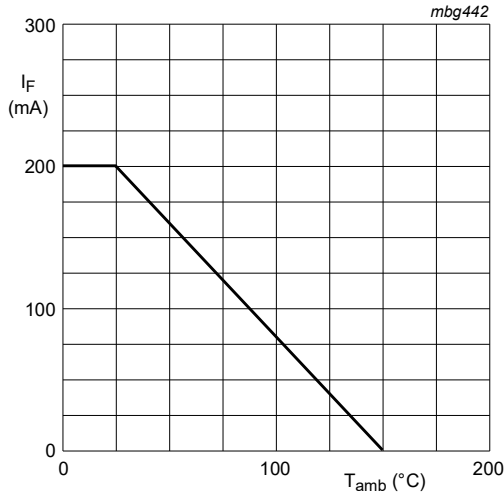
[1] Device mounted on an FR4 printed-circuit board.

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------|-----------------------|---|-----|-----|------|---------------|
| V_F | forward voltage | $I_F = 100 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$ | - | - | 1 | V |
| | | $I_F = 200 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$ | - | - | 1.25 | V |
| I_R | reverse current | $V_R = 150 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | - | 100 | nA |
| | | $V_R = 150 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$ | - | - | 100 | μA |
| C_d | diode capacitance | $V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 5 | pF |
| t_{rr} | reverse recovery time | $I_F = 30 \text{ mA}; I_R = 30 \text{ mA}; R_L = 100 \text{ }^\Omega;$ $I_{R(\text{meas})} = 3 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 50 | ns |





FR4 PCB, standard footprint

Fig. 5. Maximum forward current as a function of ambient temperature; derating curve

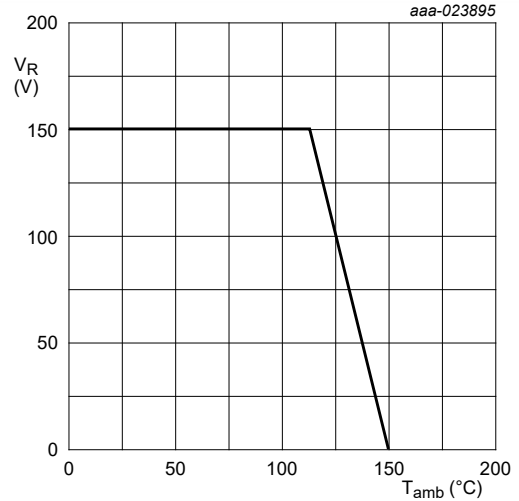


Fig. 6. Maximum continuous reverse voltage as a function of the ambient temperature

11. Test information

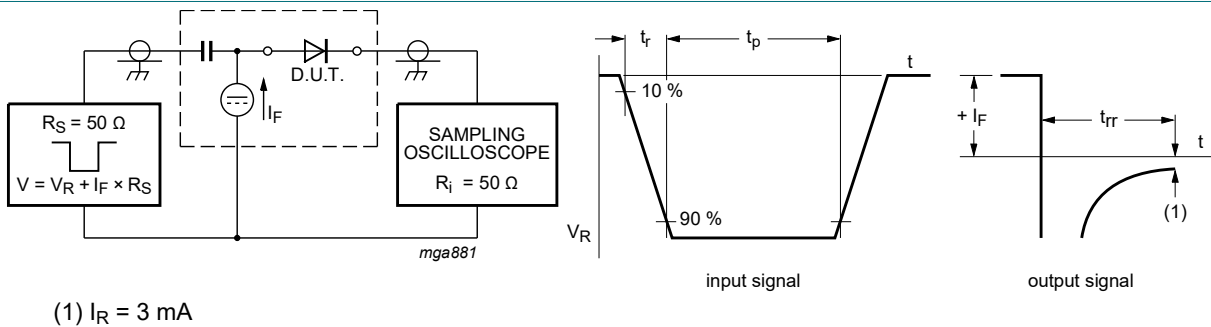


Fig. 7. Reverse recovery time test circuit and waveforms

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

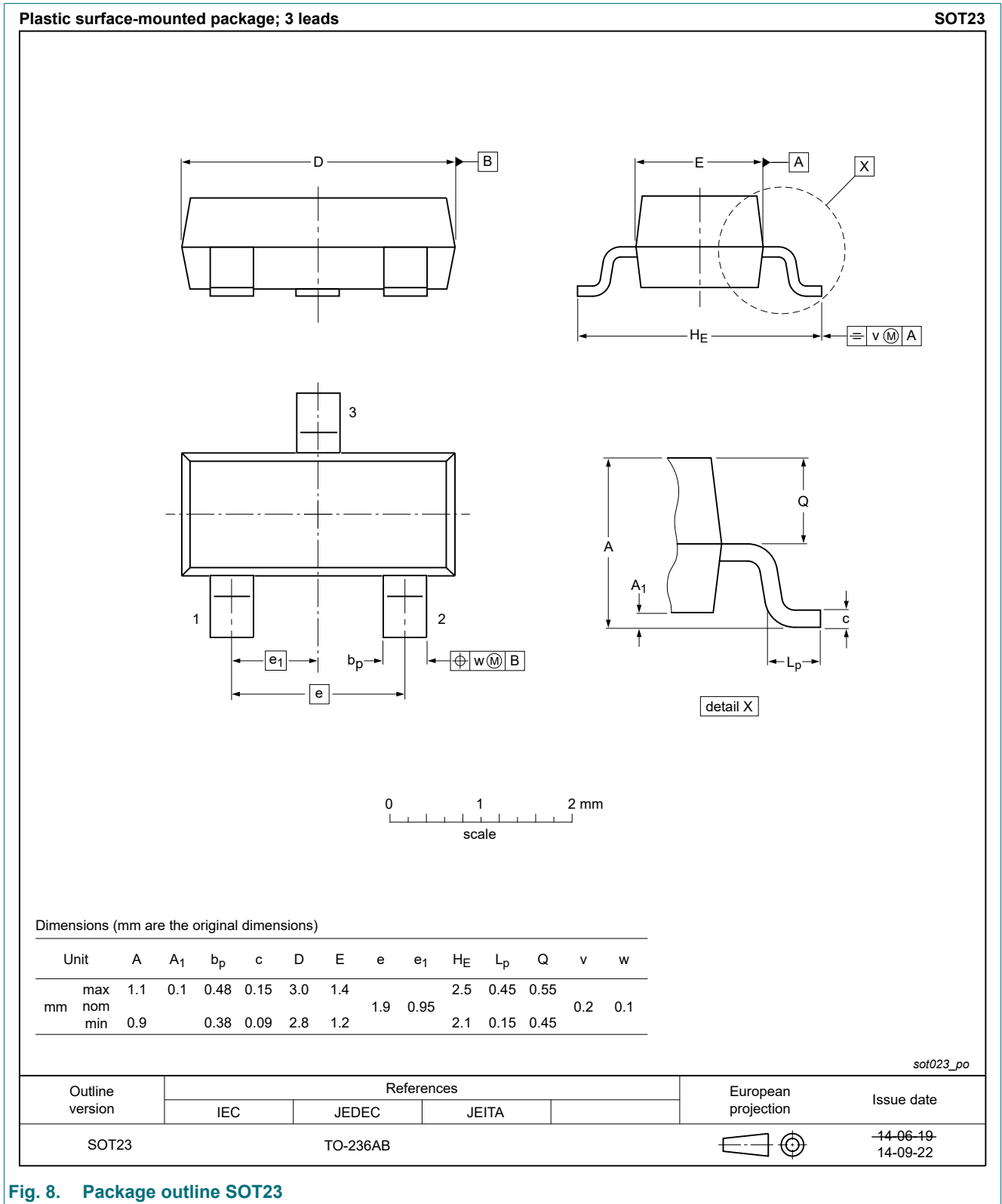


Fig. 8. Package outline SOT23

13. Soldering

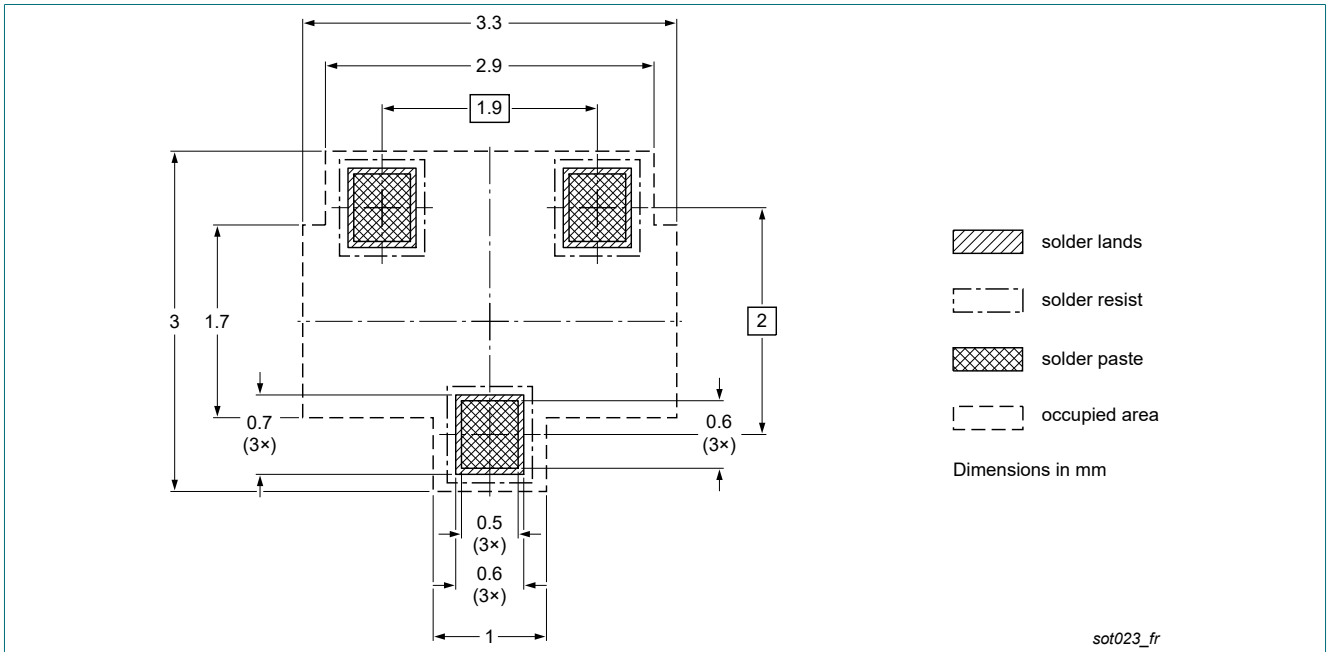


Fig. 9. Reflow soldering footprint for SOT23

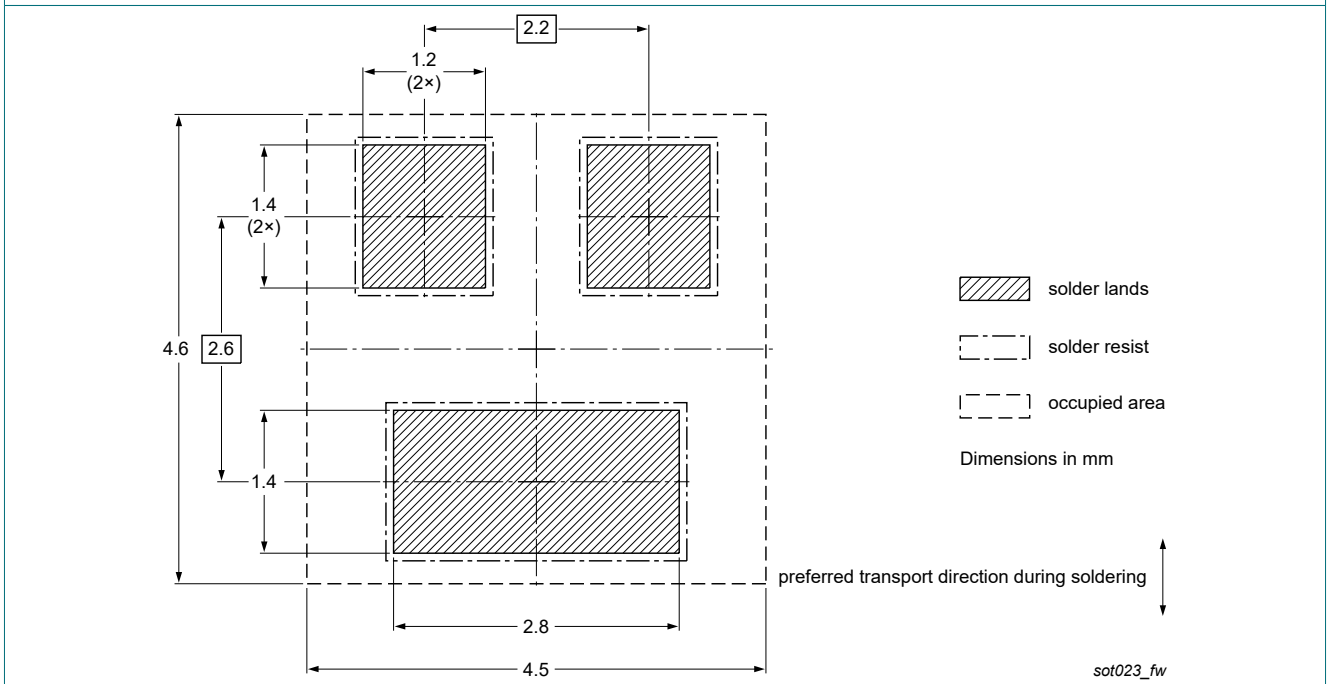


Fig. 10. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BAS20-Q v.1 | 20210804 | 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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