

BAS40 series; 1PSxxSB4x series

General-purpose Schottky diodes

Rev. 9 — 18 March 2015

Product data sheet

1. Product profile

1.1 General description

General-purpose Schottky diodes in small Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

| Type number | Package | | Configuration |
|-------------|----------|-------|---|
| | Nexperia | JEITA | |
| 1PS70SB40 | SOT323 | SC-70 | single diode |
| 1PS76SB40 | SOD323 | SC-76 | single diode |
| 1PS79SB40 | SOD523 | SC-79 | single diode |
| BAS40 | SOT23 | - | single diode |
| BAS40H | SOD123F | - | single diode |
| BAS40L | SOD882 | - | single diode |
| BAS40W | SOT323 | SC-70 | single diode |
| 1PS70SB44 | SOT323 | SC-70 | dual series |
| BAS40-04 | SOT23 | - | dual series |
| BAS40-04W | SOT323 | SC-70 | dual series |
| 1PS70SB45 | SOT323 | SC-70 | dual common cathode |
| 1PS75SB45 | SOT416 | SC-75 | dual common cathode |
| BAS40-05 | SOT23 | - | dual common cathode |
| BAS40-05W | SOT323 | SC-70 | dual common cathode |
| 1PS70SB46 | SOT323 | SC-70 | dual common anode |
| BAS40-06 | SOT23 | - | dual common anode |
| BAS40-06W | SOT323 | SC-70 | dual common anode |
| BAS40-07 | SOT143B | - | dual isolated |
| BAS40-07V | SOT666 | - | dual isolated |
| BAS40-05V | SOT666 | - | quadruple common cathode/ common cathode |
| 1PS88SB48 | SOT363 | SC-88 | quadruple common cathode/ common cathode |
| BAS40XY | SOT363 | SC-88 | quadruple; 2 series |

nexperia

1.2 Features and benefits

- High switching speed
- High breakdown voltage
- AEC-Q101 qualified
- Low leakage current
- Low capacitance

1.3 Applications

- Ultra high-speed switching
- Voltage clamping

1.4 Quick reference data

Table 2. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-----------------|----------------------|-----|-----|-----|------|
| Per diode | | | | | | |
| I_F | forward current | | - | - | 120 | mA |
| V_F | forward voltage | $I_F = 1 \text{ mA}$ | [1] | - | 380 | mV |
| V_R | reverse voltage | | - | - | 40 | V |

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

2. Pinning information

Table 3. Pinning



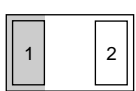

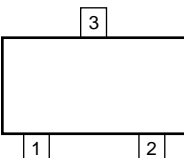
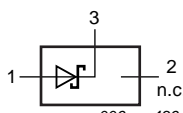
| Pin | Description | Simplified outline | Symbol |
|-------------------------------------|---------------|--|--|
| BAS40H; 1PS76SB40; 1PS79SB40 | | | |
| 1 | cathode [1] |  001aab540 |  sym001 |
| 2 | anode | | |
| BAS40L | | | |
| 1 | cathode [1] |  Transparent top view |  sym001 |
| 2 | anode | | |
| BAS40; BAS40W; 1PS70SB40 | | | |
| 1 | anode |  006aaa144 |  006aaa436 |
| 2 | not connected | | |
| 3 | cathode | | |

Table 3. Pinning ...continued

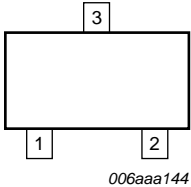
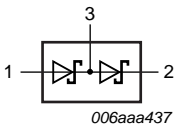
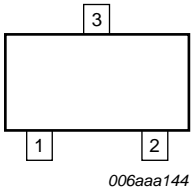
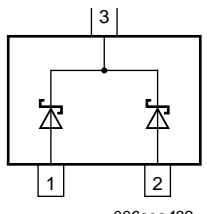
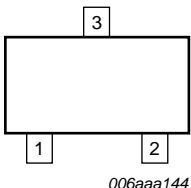
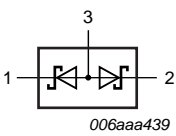
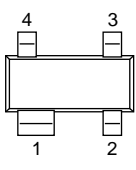
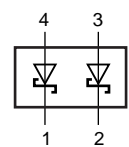
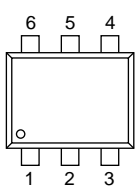
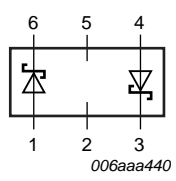
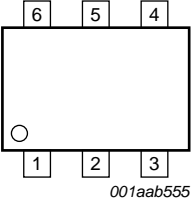
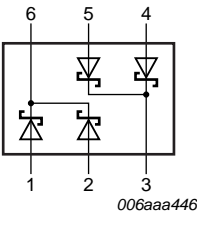
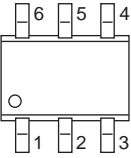
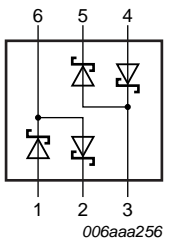
| Pin | Description | Simplified outline | Symbol |
|--|---|--|--|
| BAS40-04; BAS40-04W; 1PS70SB44 | | | |
| 1 | anode (diode 1) |  <p>006aaa144</p> |  <p>006aaa437</p> |
| 2 | cathode (diode 2) | | |
| 3 | cathode (diode 1), anode (diode 2) | | |
| BAS40-05; BAS40-05W; 1PS70SB45; 1PS75SB45 | | | |
| 1 | anode (diode 1) |  <p>006aaa144</p> |  <p>006aaa438</p> |
| 2 | anode (diode 2) | | |
| 3 | cathode (diode 1), cathode (diode 2) | | |
| BAS40-06; BAS40-06W; 1PS70SB46 | | | |
| 1 | cathode (diode 1) |  <p>006aaa144</p> |  <p>006aaa439</p> |
| 2 | cathode (diode 2) | | |
| 3 | anode (diode 1), anode (diode 2) | | |
| BAS40-07 | | | |
| 1 | cathode (diode 1) |  |  <p>006aaa434</p> |
| 2 | cathode (diode 2) | | |
| 3 | anode (diode 2) | | |
| 4 | anode (diode 1) | | |
| BAS40-07V | | | |
| 1 | anode (diode 1) |  |  <p>006aaa440</p> |
| 2 | not connected | | |
| 3 | cathode (diode 2) | | |
| 4 | anode (diode 2) | | |
| 5 | not connected | | |
| 6 | cathode (diode 1) | | |

Table 3. Pinning ...continued

| Pin | Description | Simplified outline | Symbol |
|-----------------------------|---|--|---|
| BAS40-05V; 1PS88SB48 | | | |
| 1 | anode (diode 1) |  <p>001aab555</p> |  <p>006aaa446</p> |
| 2 | anode (diode 2) | | |
| 3 | cathode (diode 3), cathode (diode 4) | | |
| 4 | anode (diode 3) | | |
| 5 | anode (diode 4) | | |
| 6 | cathode (diode 1), cathode (diode 2) | | |
| BAS40XY | | | |
| 1 | anode (diode 1) |  |  <p>006aaa256</p> |
| 2 | cathode (diode 2) | | |
| 3 | anode (diode 3), cathode (diode 4) | | |
| 4 | anode (diode 4) | | |
| 5 | cathode (diode 3) | | |
| 6 | cathode (diode 1), anode (diode 2) | | |

[1] The marking bar indicates the cathode.

3. Ordering information

Table 4. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| 1PS70SB40 | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |
| 1PS76SB40 | SC-76 | plastic surface-mounted package; 2 leads | SOD323 |
| 1PS79SB40 | SC-79 | plastic surface-mounted package; 2 leads | SOD523 |
| BAS40 | - | plastic surface-mounted package; 3 leads | SOT23 |
| BAS40H | - | plastic surface-mounted package; 2 leads | SOD123F |
| BAS40L | - | leadless ultra small plastic package; 2 terminals; body 1.0 × 0.6 × 0.5 mm | SOD882 |
| BAS40W | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |
| 1PS70SB44 | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |
| BAS40-04 | - | plastic surface-mounted package; 3 leads | SOT23 |
| BAS40-04W | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |
| 1PS70SB45 | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |
| 1PS75SB45 | SC-75 | plastic surface-mounted package; 3 leads | SOT416 |
| BAS40-05 | - | plastic surface-mounted package; 3 leads | SOT23 |
| BAS40-05W | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |
| 1PS70SB46 | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |
| BAS40-06 | - | plastic surface-mounted package; 3 leads | SOT23 |
| BAS40-06W | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |
| BAS40-07 | - | plastic surface-mounted package; 4 leads | SOT143B |
| BAS40-07V | - | plastic surface-mounted package; 6 leads | SOT666 |
| BAS40-05V | - | plastic surface-mounted package; 6 leads | SOT666 |
| 1PS88SB48 | SC-88 | plastic surface-mounted package; 6 leads | SOT363 |
| BAS40XY | SC-88 | plastic surface-mounted package; 6 leads | SOT363 |

4. Marking

Table 5. Marking codes

| Type number | Marking code ^[1] | Type number | Marking code ^[1] |
|-------------|-----------------------------|-------------|-----------------------------|
| 1PS70SB40 | 6*3 | 1PS75SB45 | 45 |
| 1PS76SB40 | S4 | BAS40-05 | 45* |
| 1PS79SB40 | T | BAS40-05W | 65* |
| BAS40 | 43* | 1PS70SB46 | 6*6 |
| BAS40H | AJ | BAS40-06 | 46* |
| BAS40L | S6 | BAS40-06W | 66* |
| BAS40W | 63* | BAS40-07 | 47* |
| 1PS70SB44 | 6*4 | BAS40-07V | 67 |
| BAS40-04 | 44* | BAS40-05V | 65 |
| BAS40-04W | 64* | 1PS88SB48 | 8*5 |
| 1PS70SB45 | 6*5 | BAS40XY | 40* |

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

Table 6. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|-------------------------------------|--|-----|------|------|
| Per diode | | | | | |
| V_R | reverse voltage | | - | 40 | V |
| I_F | forward current | | - | 120 | mA |
| I_{FRM} | repetitive peak forward current | $t_p \leq 1 \text{ s}$; $\delta \leq 0.5$ | - | 120 | mA |
| I_{FSM} | non-repetitive peak forward current | $t_p \leq 10 \text{ ms}$ ^[1] | - | 200 | mA |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -65 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

- [1] $T_j = 25 \text{ °C}$ prior to surge.

6. Thermal characteristics

Table 7. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------|--|-----------------|-----|-----|-----|------|
| Per device | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air [1] | | | | |
| | SOT23 | | - | - | 500 | K/W |
| | SOT143B | | - | - | 500 | K/W |
| | SOT363 (1PS88SB48) | | - | - | 416 | K/W |
| | SOT416 | | - | - | 833 | K/W |
| | SOT666 (BAS40-05V) | [2] | - | - | 225 | K/W |
| | SOT666 (BAS40-07V) | [2] | - | - | 416 | K/W |
| | SOD123F | [2] | - | - | 330 | K/W |
| | SOD323 | | - | - | 450 | K/W |
| | SOD523 | [2] | - | - | 450 | K/W |
| | SOD882 | [2] | - | - | 500 | K/W |
| | SOT323 | | - | - | 625 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | | | |
| | SOT363 (BAS40XY) | [3] | - | - | 260 | K/W |

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

[2] Reflow soldering is the only recommended soldering method.

[3] Soldering point at pins 2, 3, 5 and 6.

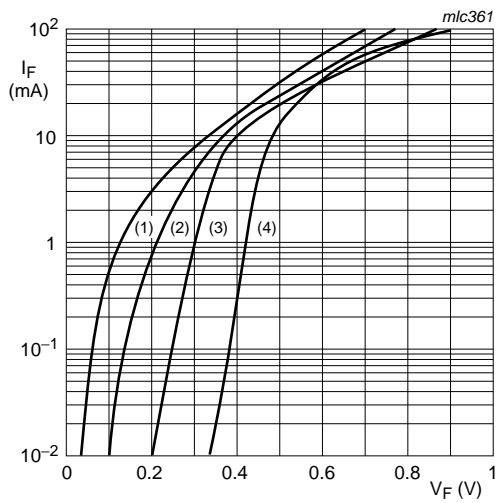
7. Characteristics

Table 8. Characteristics

$T_{amb} = 25\text{ °C}$ unless otherwise specified.

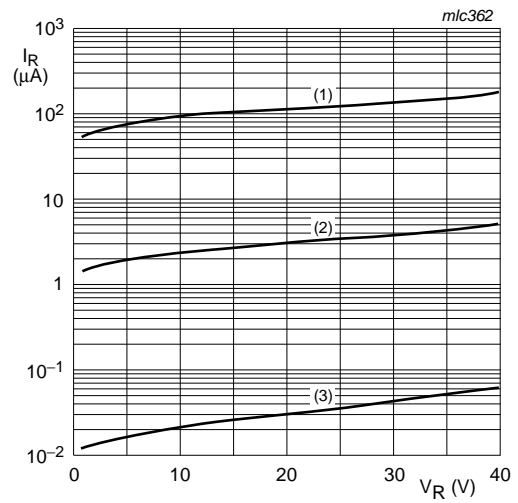
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------|--------------------------------------|-----|-----|-----|---------------|
| Per diode | | | | | | |
| V_F | forward voltage | [1] | | | | |
| | | $I_F = 1\text{ mA}$ | - | - | 380 | mV |
| | | $I_F = 10\text{ mA}$ | - | - | 500 | mV |
| | | $I_F = 40\text{ mA}$ | - | - | 1 | V |
| I_R | reverse current | $V_R = 30\text{ V}$ | - | - | 1 | μA |
| | | $V_R = 40\text{ V}$ | - | - | 10 | μA |
| C_d | diode capacitance | $V_R = 0\text{ V}; f = 1\text{ MHz}$ | - | - | 5 | pF |

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



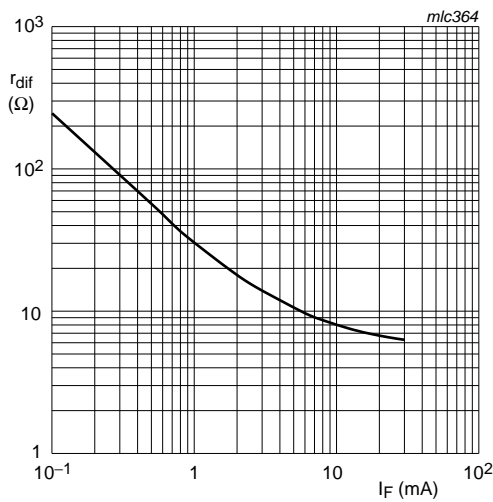
- (1) $T_{amb} = 125\text{ °C}$
- (2) $T_{amb} = 85\text{ °C}$
- (3) $T_{amb} = 25\text{ °C}$
- (4) $T_{amb} = -40\text{ °C}$

Fig 1. Forward current as a function of forward voltage; typical values



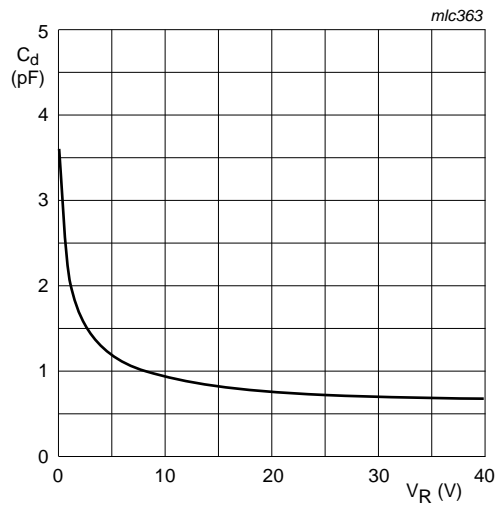
- (1) $T_{amb} = 125\text{ °C}$
- (2) $T_{amb} = 85\text{ °C}$
- (3) $T_{amb} = 25\text{ °C}$

Fig 2. Reverse current as a function of reverse voltage; typical values



$f = 10\text{ kHz}$

Fig 3. Differential resistance as a function of forward current; typical values



$T_{amb} = 25\text{ °C}; f = 1\text{ MHz}$

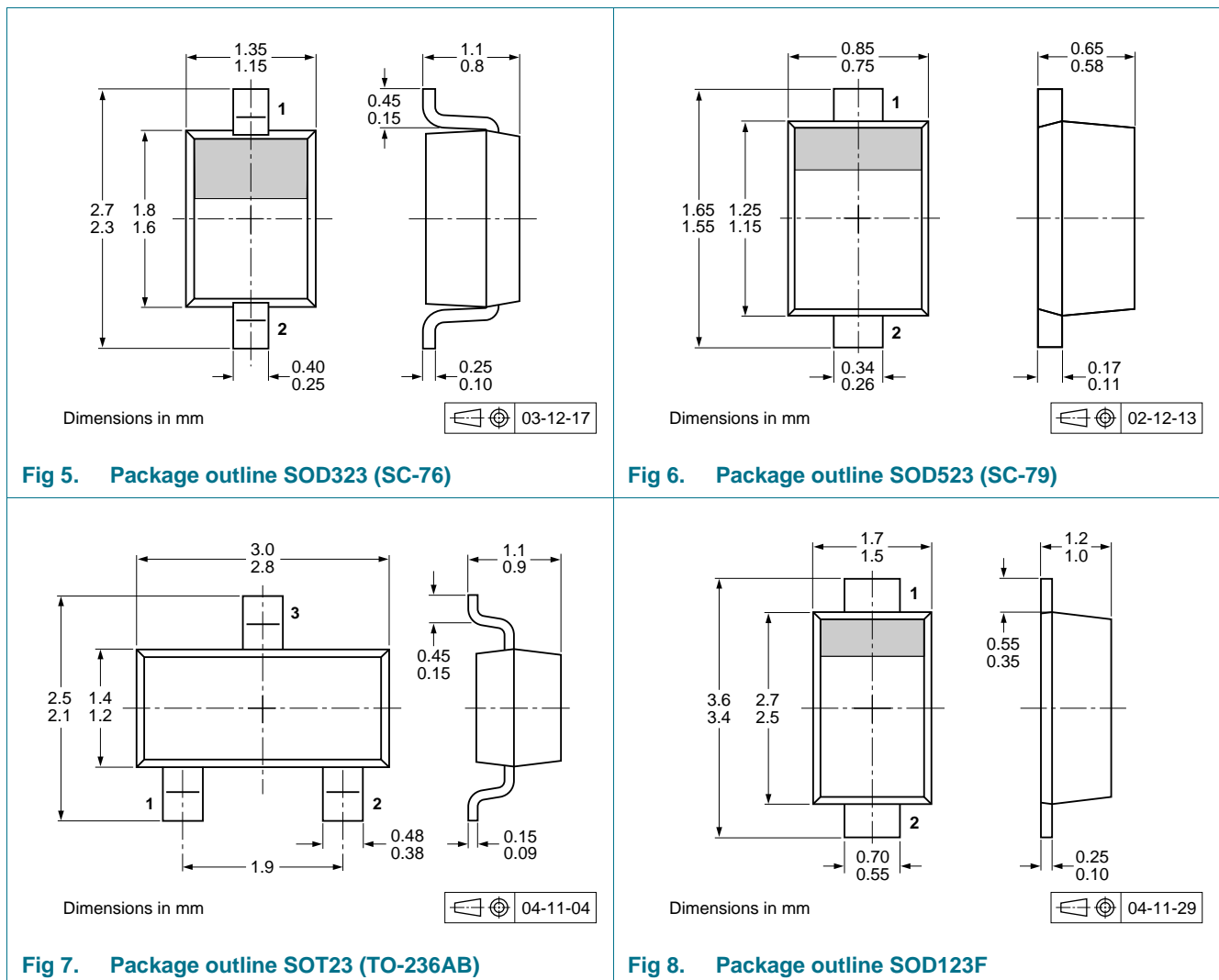
Fig 4. Diode capacitance as a function of reverse voltage; typical values

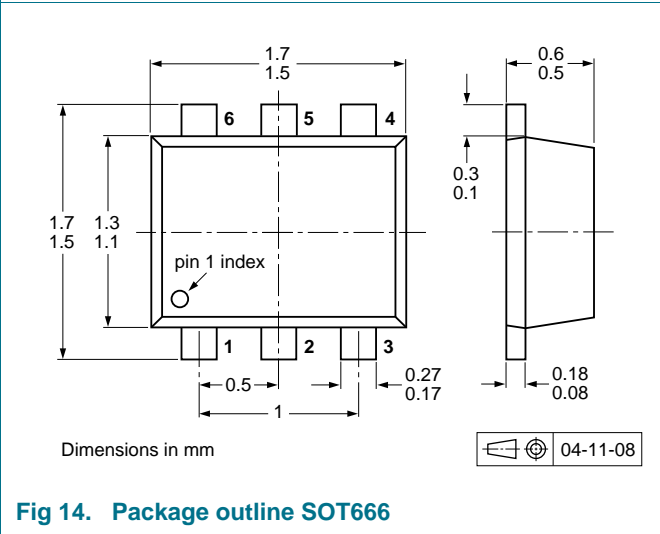
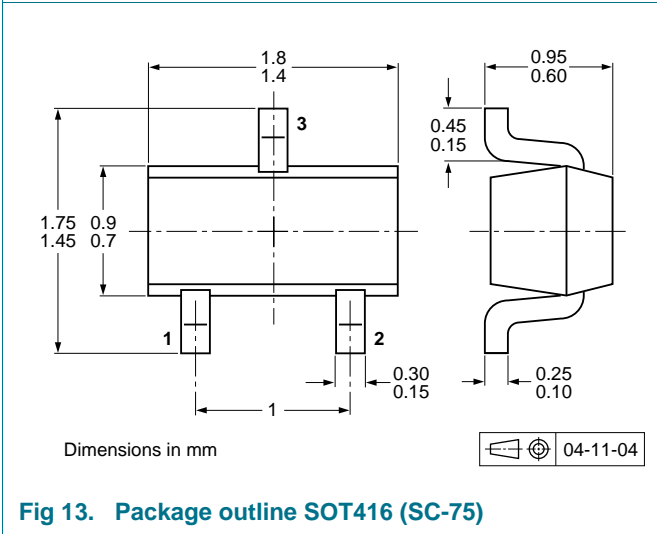
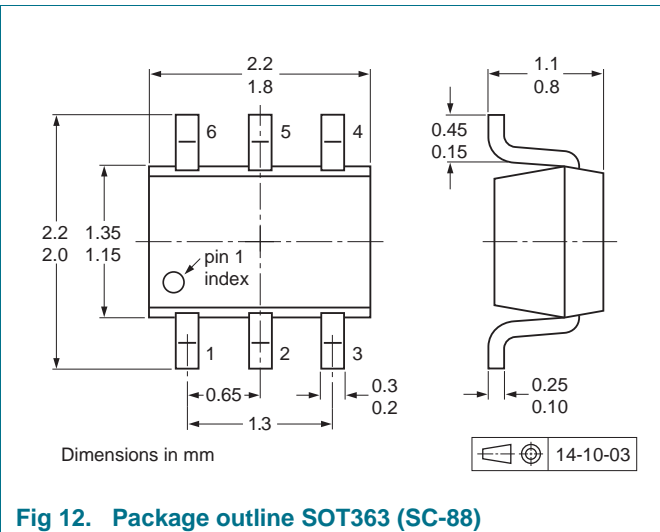
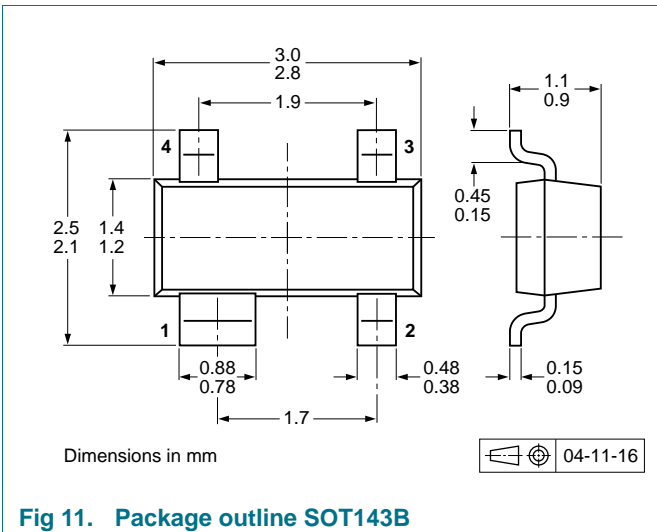
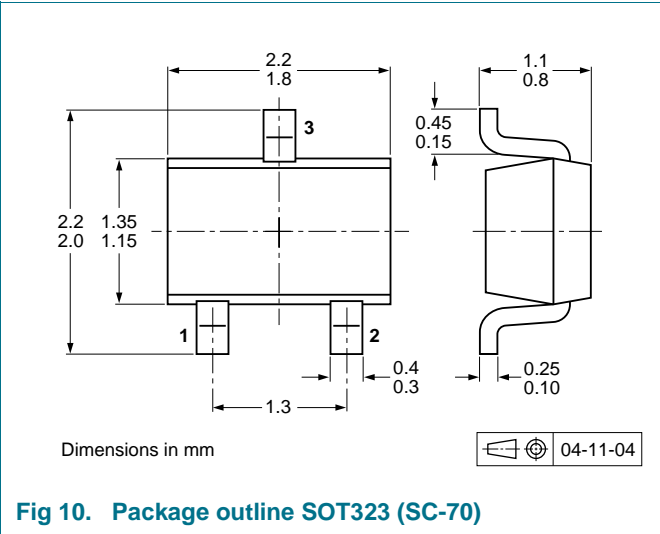
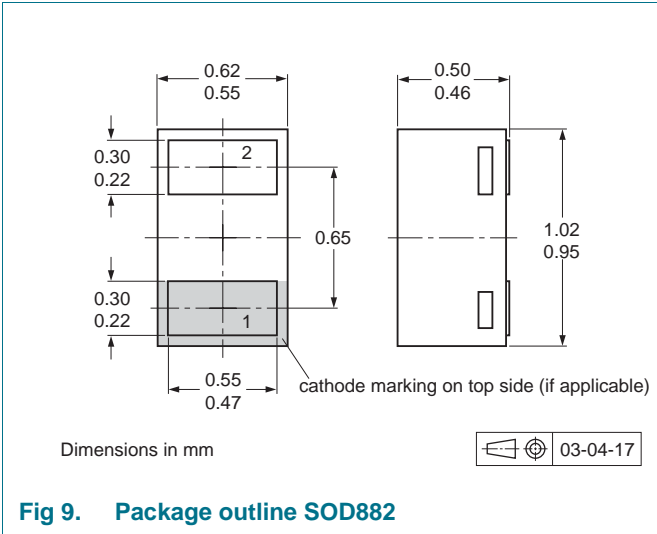
8. Test information

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 9. Packing methods

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

| Type number | Package | Description | Packing quantity | | | |
|-------------|---------|---|------------------|------|------|-------|
| | | | 3000 | 4000 | 8000 | 10000 |
| 1PS70SB40 | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| 1PS76SB40 | SOD323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| 1PS79SB40 | SOD523 | 2 mm pitch, 8 mm tape and reel | - | - | -315 | - |
| | | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| BAS40 | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | - | - | -235 |
| BAS40H | SOD123F | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| BAS40L | SOD882 | 2 mm pitch, 8 mm tape and reel | - | - | - | -315 |
| BAS40W | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| 1PS70SB44 | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| BAS40-04 | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | - | - | -235 |
| BAS40-04W | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| 1PS70SB45 | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| 1PS75SB45 | SOT416 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| BAS40-05 | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | - | - | -235 |
| BAS40-05W | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| 1PS70SB46 | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| BAS40-06 | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | - | - | -235 |
| BAS40-06W | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | - | - | -135 |
| BAS40-07 | SOT143B | 4 mm pitch, 8 mm tape and reel | -215 | - | - | -235 |
| BAS40-07V | SOT666 | 2 mm pitch, 8 mm tape and reel | - | - | -315 | - |
| | | 4 mm pitch, 8 mm tape and reel | - | -115 | - | - |
| BAS40-05V | SOT666 | 2 mm pitch, 8 mm tape and reel | - | - | -315 | - |
| | | 4 mm pitch, 8 mm tape and reel | - | -115 | - | - |
| 1PS88SB48 | SOT363 | 4 mm pitch, 8 mm tape and reel; T1 ^[2] | -115 | - | - | -135 |
| | | 4 mm pitch, 8 mm tape and reel; T2 ^[3] | -125 | - | - | -165 |
| BAS40XY | SOT363 | 4 mm pitch, 8 mm tape and reel; T1 ^[2] | -115 | - | - | -135 |
| | | 4 mm pitch, 8 mm tape and reel; T2 ^[3] | -125 | - | - | -165 |

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

[2] T1: normal taping

[3] T2: reverse taping

11. Soldering

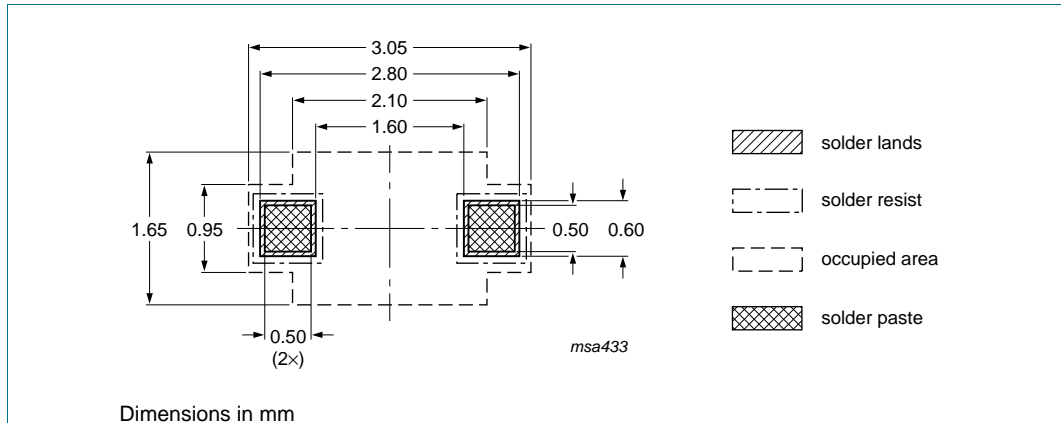


Fig 15. Reflow soldering footprint SOD323 (SC-76)

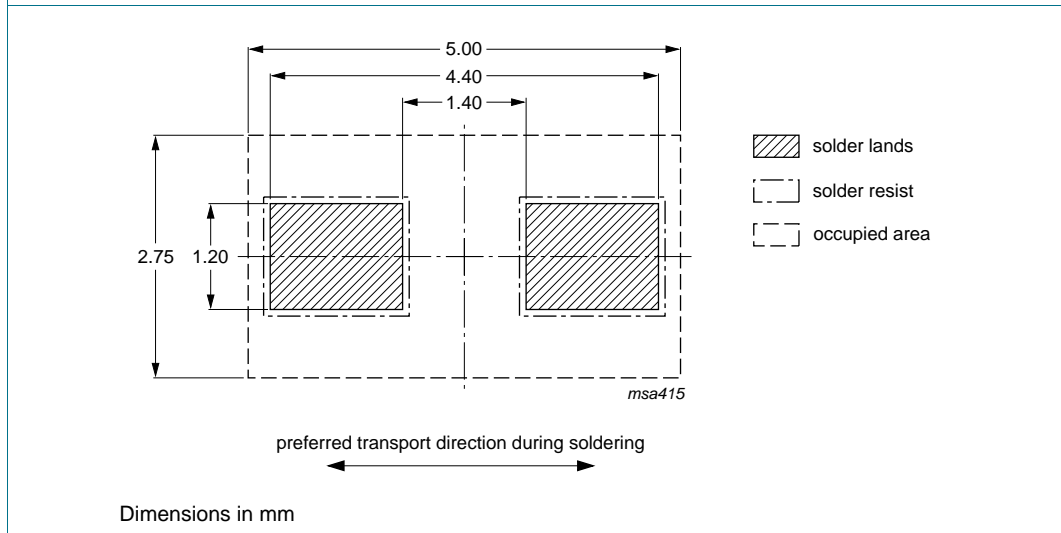


Fig 16. Wave soldering footprint SOD323 (SC-76)

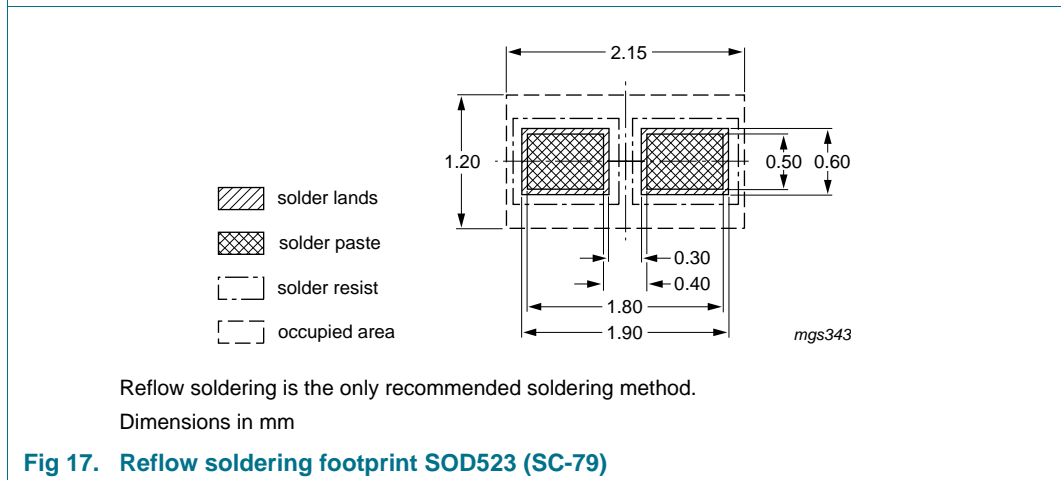


Fig 17. Reflow soldering footprint SOD523 (SC-79)

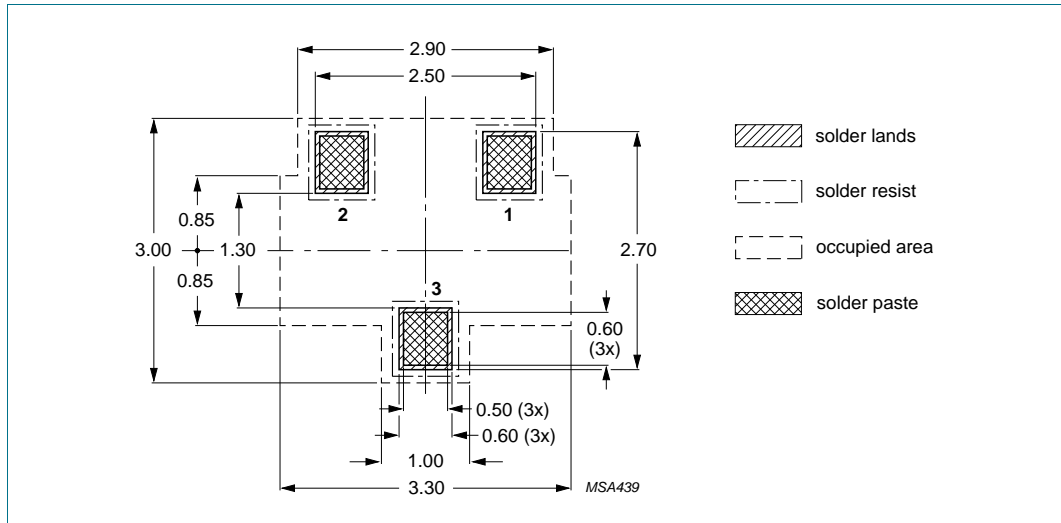


Fig 18. Reflow soldering footprint SOT23 (TO-236AB)

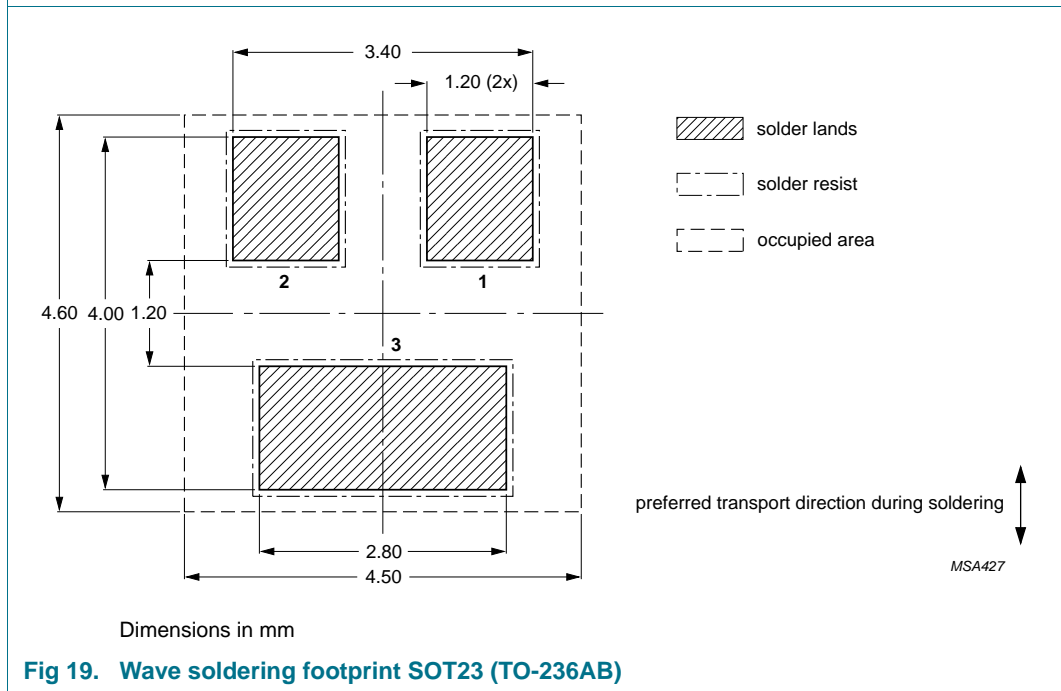
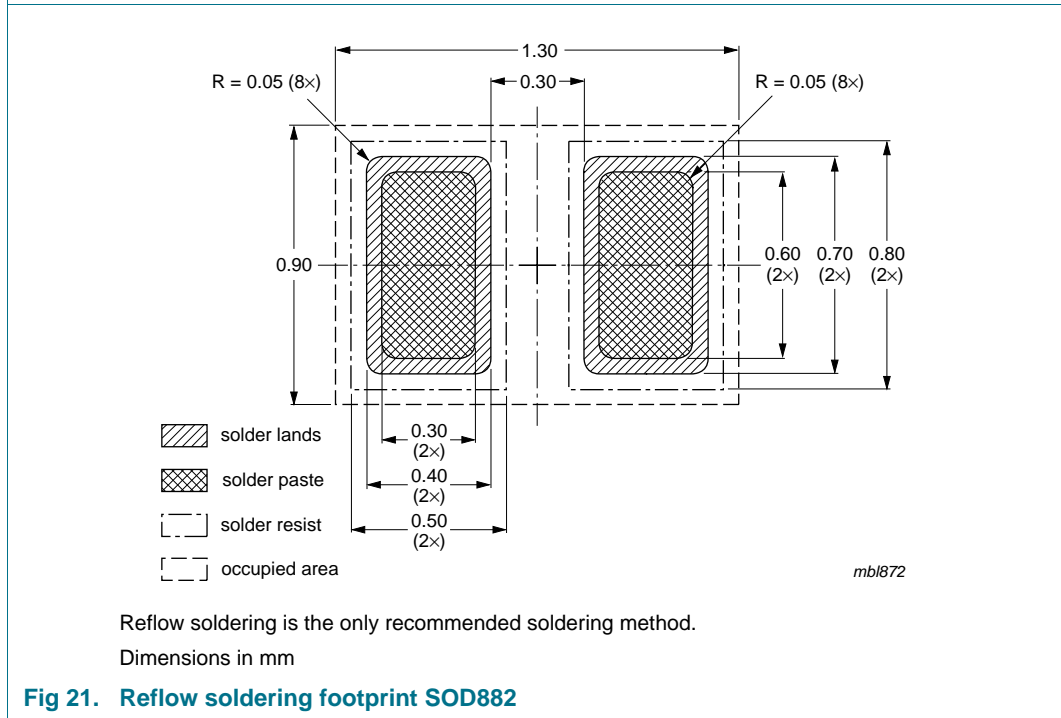
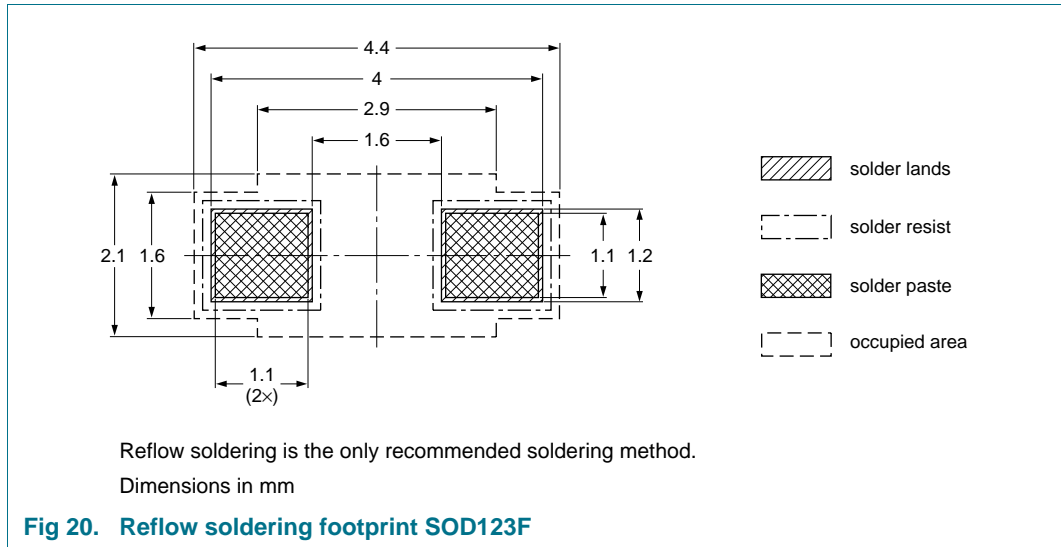
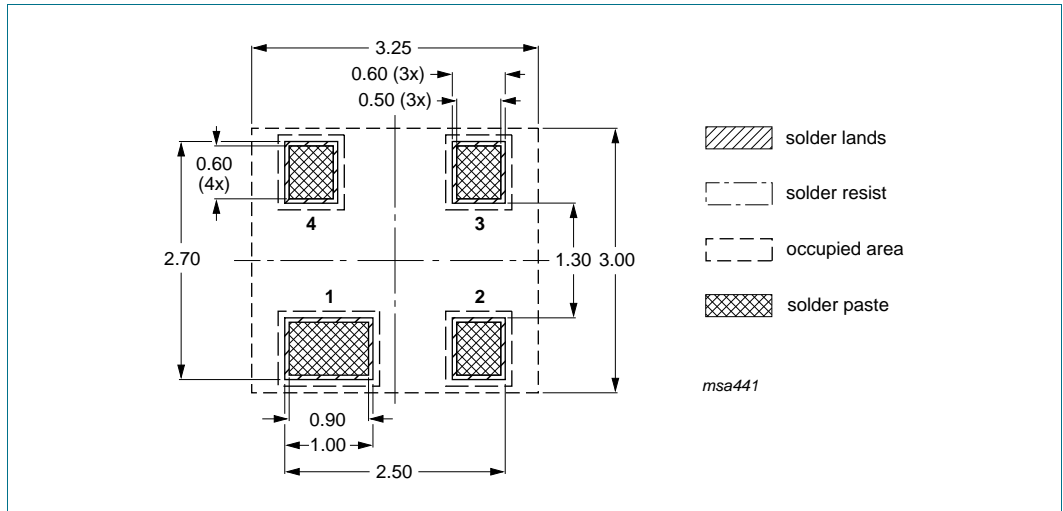


Fig 19. Wave soldering footprint SOT23 (TO-236AB)





Dimensions in mm

Fig 24. Reflow soldering footprint SOT143B

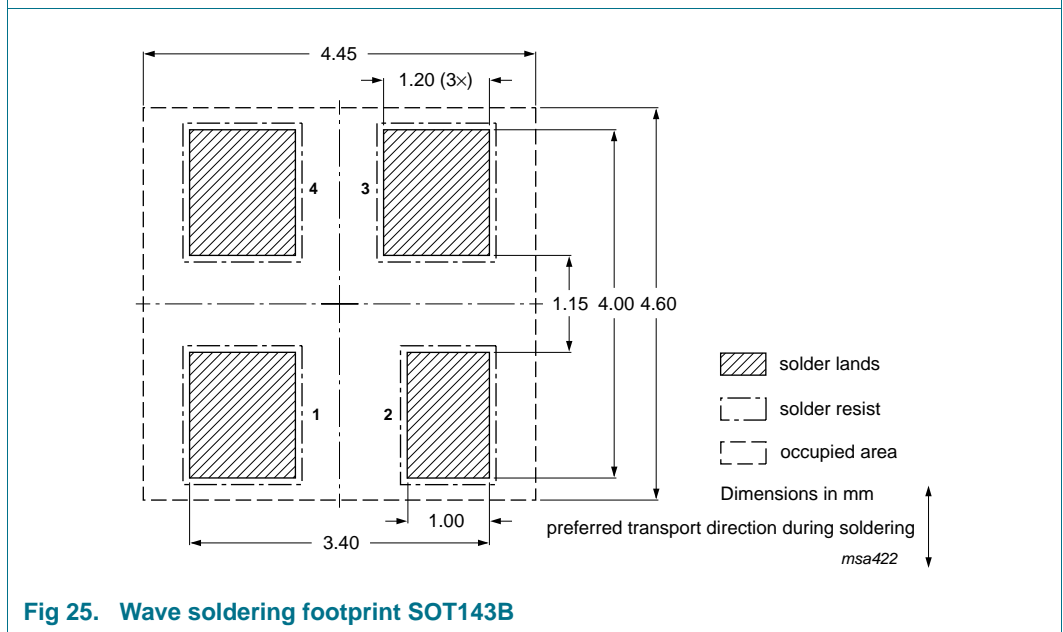


Fig 25. Wave soldering footprint SOT143B

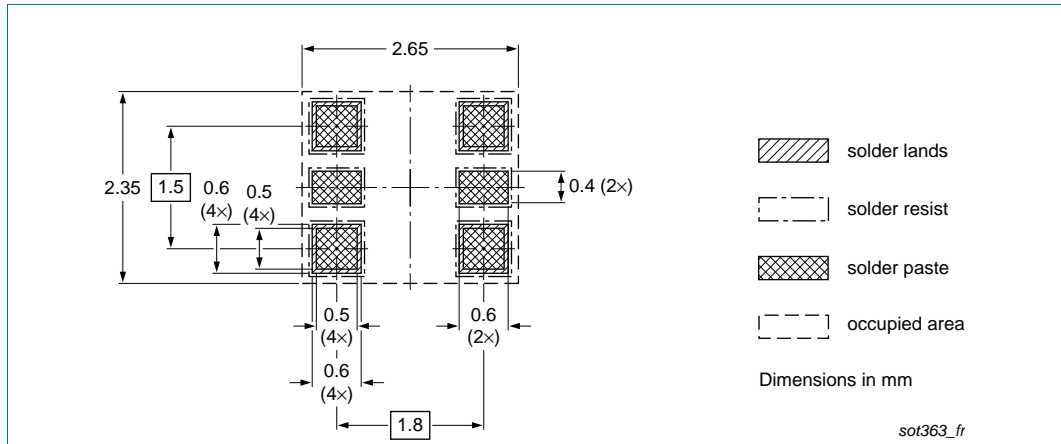


Fig 26. Reflow soldering footprint SOT363 (SC-88)

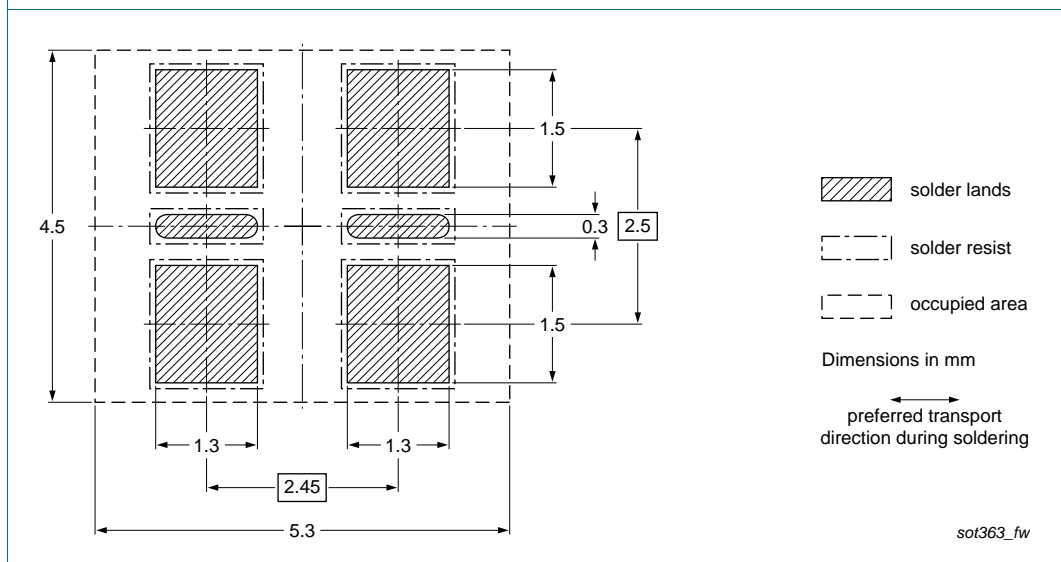


Fig 27. Wave soldering footprint SOT363 (SC-88)

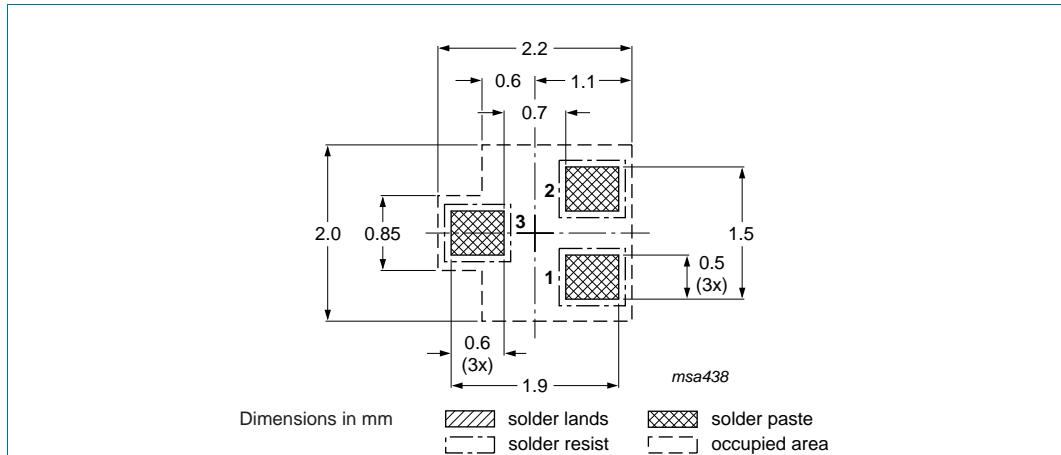


Fig 28. Reflow soldering footprint SOT416

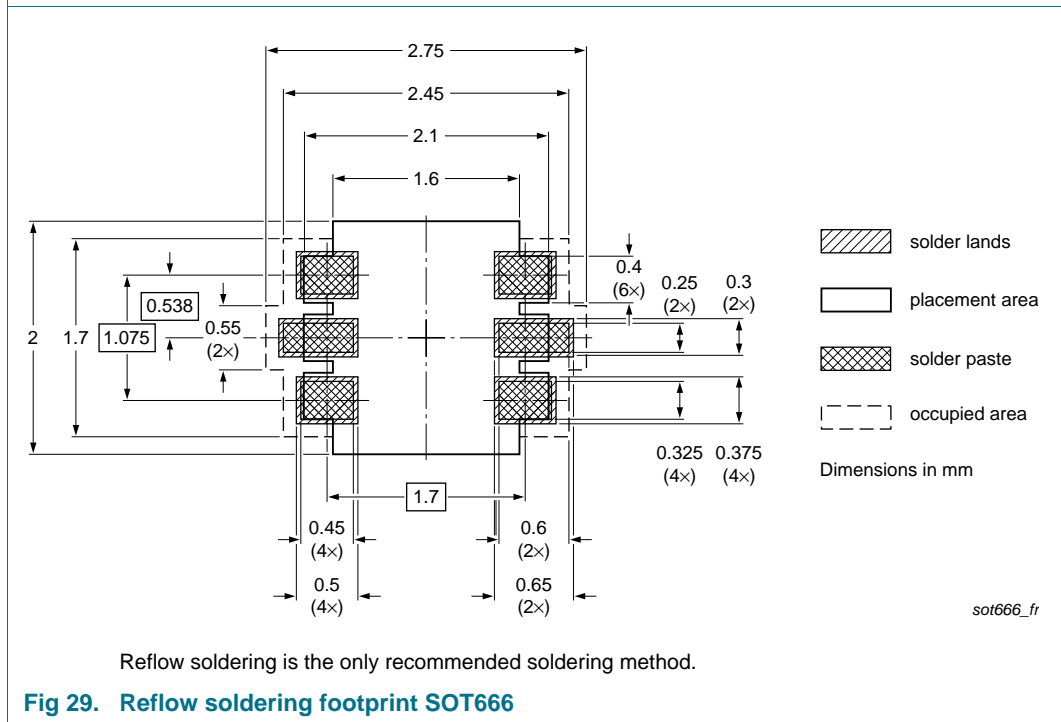


Fig 29. Reflow soldering footprint SOT666

12. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------------|---|-----------------------|---------------|---|
| BAS40_1PSXXSB4X_SER v.9 | 20150318 | Product data sheet | - | BAS40_1PSXXSB4X_SER_8 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. Legal texts have been adapted to the new company name where appropriate. | | | |
| BAS40_1PSXXSB4X_SER_8 | 20100113 | Product data sheet | - | BAS40_1PSXXSB4X_SER_7 |
| BAS40_1PSXXSB4X_SER_7 | 20060512 | Product data sheet | - | BAS40_1PSXXSB4X_SER_6 |
| BAS40_1PSXXSB4X_SER_6 | 20050809 | Product data sheet | - | 1PS70SB40_3 1PS75SB45_2 1PS76SB40_3 1PS79SB40_2 1PS88SB48_3 BAS40H_1 BAS40L_1 BAS40-05V_1 BAS40-07V_1 BAS40W_3 BAS40_SERIES_5 |
| 1PS70SB40_3 | 19990426 | Product specification | - | 1PS70SB40_2 |
| 1PS75SB45_2 | 19990426 | Product specification | - | 1PS75SB45_1 |
| 1PS76SB40_3 | 20040126 | Product specification | - | 1PS76SB40_2 |
| 1PS79SB40_2 | 19990426 | Product specification | - | 1PS79SB40_1 |
| 1PS88SB48_3 | 20021107 | Product specification | - | 1PS88SB48_2 |
| BAS40H_1 | 20050425 | Product data sheet | - | - |
| BAS40L_1 | 20030520 | Product specification | - | - |
| BAS40-05V_1 | 20021121 | Product specification | - | - |
| BAS40-07V_1 | 20020327 | Product specification | - | - |
| BAS40W_3 | 19990426 | Product specification | - | BAS40W_2 |
| BAS40_SERIES_5 | 20011010 | Product specification | - | BAS40_4 |

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. |
| Product [short] data sheet | Production | This document contains the product specification. |

[1] Please consult the most recently issued document before initiating or completing a design.

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

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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14. Contact information

For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: salesaddresses@nexperia.com

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