



BC856SH

65 V, 100 mA PNP/PNP general-purpose double transistor

22 March 2021

Product data sheet

1. General description

PNP/PNP general-purpose double transistor in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: BC846SH

2. Features and benefits

- Low collector capacitance
- Low collector-emitter saturation voltage
- Closely matched current gain
- Reduces number of components and board space
- No mutual interference between the transistors
- High-temperature applications up to 175 °C

3. Applications

- General-purpose switching and amplification

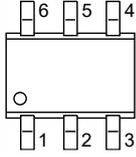
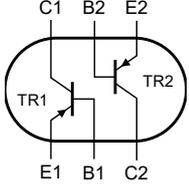
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|---------------------------|--|-----|-----|------|------|
| Per transistor | | | | | | |
| V_{CE0} | collector-emitter voltage | open base | - | - | -65 | V |
| I_C | collector current | | - | - | -100 | mA |
| h_{FE} | DC current gain | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}; T_{amb} = 25\text{ °C}$ | 110 | - | - | |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|---------------|--|---|
| 1 | E1 | emitter TR1 |  <p>TSSOP6 (SOT363)</p> |  <p>sym138</p> |
| 2 | B1 | base TR1 | | |
| 3 | C2 | collector TR2 | | |
| 4 | E2 | emitter TR2 | | |
| 5 | B2 | base TR2 | | |
| 6 | C1 | collector TR1 | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BC856SH | TSSOP6 | plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body | SOT363 |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| BC856SH | 7F% |

[1] % = placeholder for manufacturing site code

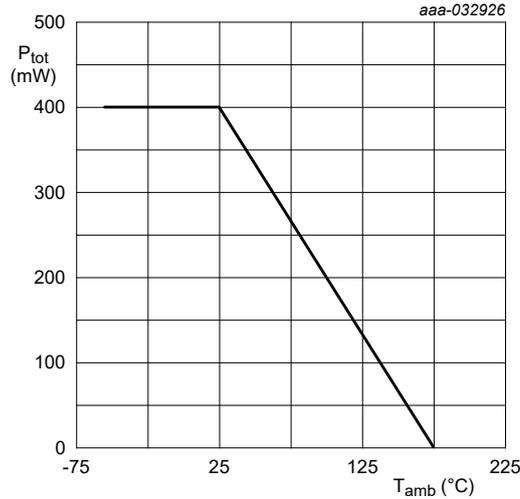
8. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------------------|---------------------------|-------------------------------|-----|------|------|
| Per transistor | | | | | |
| V_{CBO} | collector-base voltage | open emitter | - | -80 | V |
| V_{CEO} | collector-emitter voltage | open base | - | -65 | V |
| V_{EBO} | emitter-base voltage | open collector | - | -7 | V |
| I_C | collector current | | - | -100 | mA |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | - | -200 | mA |
| I_{BM} | peak base current | | - | -200 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | 270 | mW |
| Per device | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | 400 | mW |
| T_j | junction temperature | | - | 175 | °C |
| T_{amb} | ambient temperature | | -55 | 175 | °C |
| T_{stg} | storage temperature | | -65 | 175 | °C |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 μ m copper, tin-plated and standard footprint.



FR4 PCB, single-sided, 35 μm copper, tin-plated and standard footprint

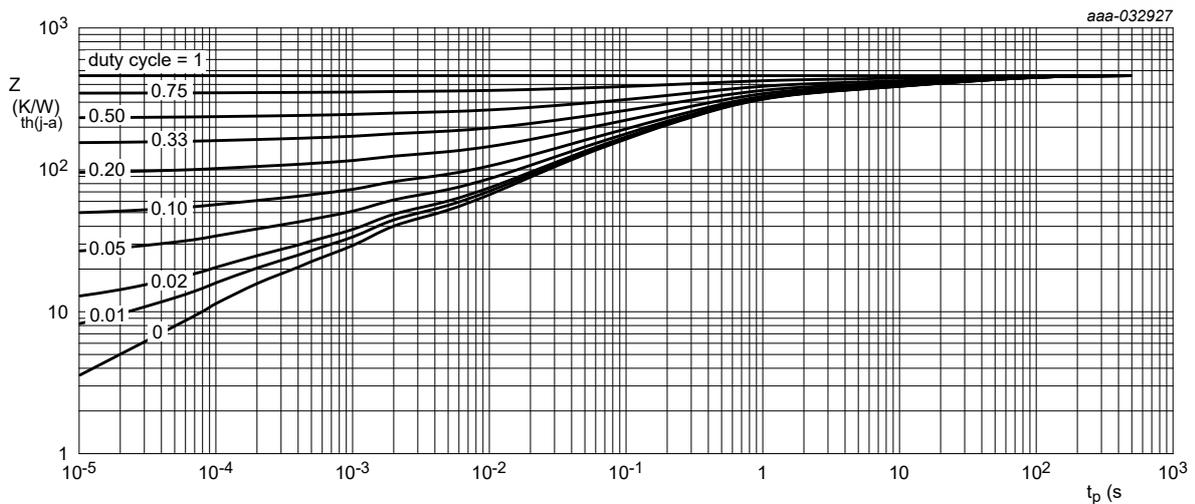
Fig. 1. Per device: Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-----------------------|--|-------------|-----|-----|-----|-----|------|
| Per transistor | | | | | | | |
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | [1] | - | - | 556 | K/W |
| R _{th(j-sp)} | thermal resistance from junction to solder point | | | - | - | 170 | K/W |
| Per device | | | | | | | |
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | [1] | - | - | 375 | K/W |

[1] Device mounted on an FR4 PCB, single-sided, 35 μm copper, tin-plated and standard footprint.



FR4 PCB, single-sided, 35 μm copper, tin-plated and standard footprint

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

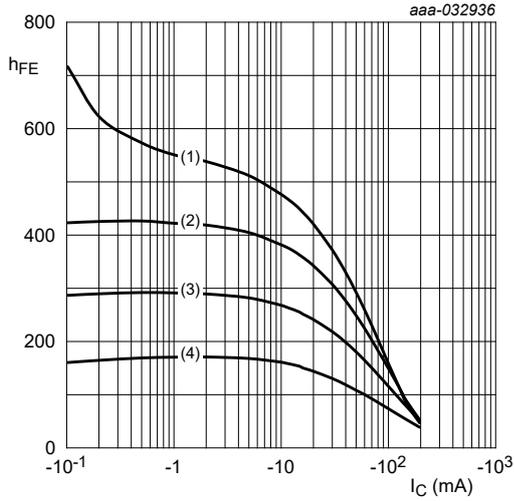
10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-----------------------|--------------------------------------|---|-----|------|------|---------------|----|
| Per transistor | | | | | | | |
| $V_{(BR)CBO}$ | collector-base breakdown voltage | $I_C = -100 \mu\text{A}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | -80 | - | - | V | |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage | $I_C = -2 \text{ mA}; I_B = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | -65 | - | - | V | |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage | $I_C = 0 \text{ A}; I_E = -100 \mu\text{A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | -7 | - | - | V | |
| I_{CBO} | collector-base cut-off current | $V_{CB} = -30 \text{ V}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -15 | nA | |
| | | $V_{CB} = -30 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$ | - | - | -5 | μA | |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = -7 \text{ V}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -100 | nA | |
| h_{FE} | DC current gain | $V_{CE} = -5 \text{ V}; I_C = -2 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 110 | - | - | | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = -10 \text{ mA}; I_B = -0.5 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | -50 | -100 | mV | |
| | | $I_C = -100 \text{ mA}; I_B = -5 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | -200 | -300 | mV | |
| V_{BEsat} | base-emitter saturation voltage | $I_C = -10 \text{ mA}; I_B = -0.5 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [1] | - | -750 | mV | |
| | | $I_C = -100 \text{ mA}; I_B = -5 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | -875 | - | mV | |
| V_{BE} | base-emitter voltage | $V_{CE} = -5 \text{ V}; I_C = -2 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [2] | -600 | -655 | -700 | mV |
| | | $V_{CE} = -5 \text{ V}; I_C = -10 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [2] | - | -705 | -770 | mV |
| C_c | collector capacitance | $V_{CB} = -10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | 1.8 | - | pF | |
| f_T | transition frequency | $V_{CE} = -5 \text{ V}; I_C = -10 \text{ mA}; f = 100 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 100 | - | - | MHz | |

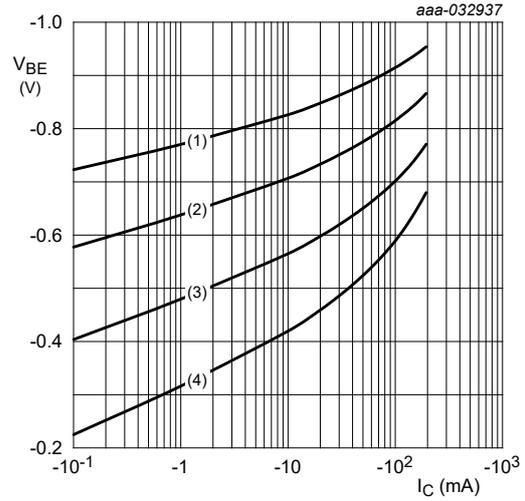
[1] V_{BEsat} decreases by about 1.7 mV/K with increasing temperature.

[2] V_{BE} decreases by about 2 mV/K with increasing temperature.



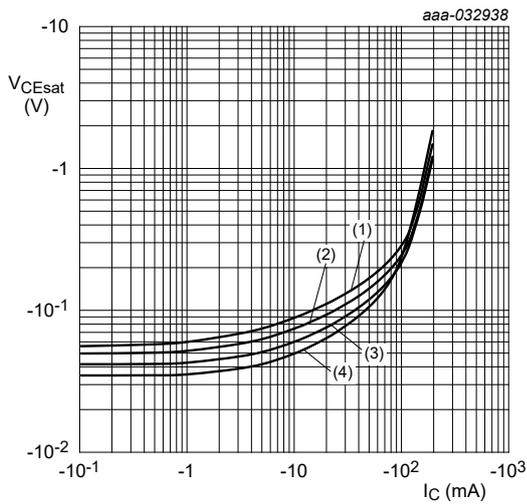
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 175\text{ °C}$
 (2) $T_{amb} = 100\text{ °C}$
 (3) $T_{amb} = 25\text{ °C}$
 (4) $T_{amb} = -40\text{ °C}$

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



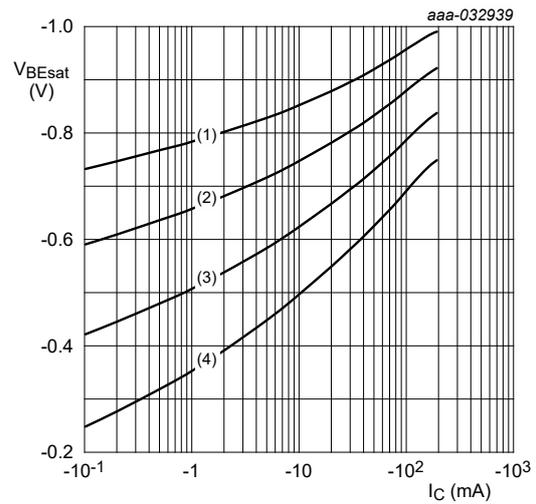
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = -40\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$
 (4) $T_{amb} = 175\text{ °C}$

Fig. 4. Base-emitter voltage as a function of collector current; typical value



$I_C/I_B = 20$
 (1) $T_{amb} = 175\text{ °C}$
 (2) $T_{amb} = 100\text{ °C}$
 (3) $T_{amb} = 25\text{ °C}$
 (4) $T_{amb} = -40\text{ °C}$

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



$I_C/I_B = 20$
 (1) $T_{amb} = -40\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$
 (4) $T_{amb} = 175\text{ °C}$

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

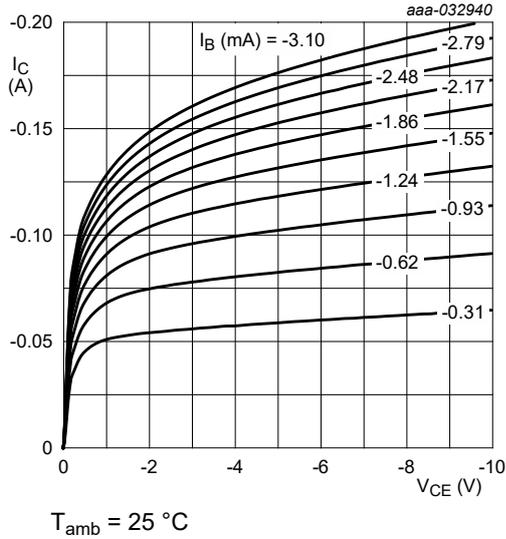


Fig. 7. Collector current as a function of collector-emitter voltage; typical values

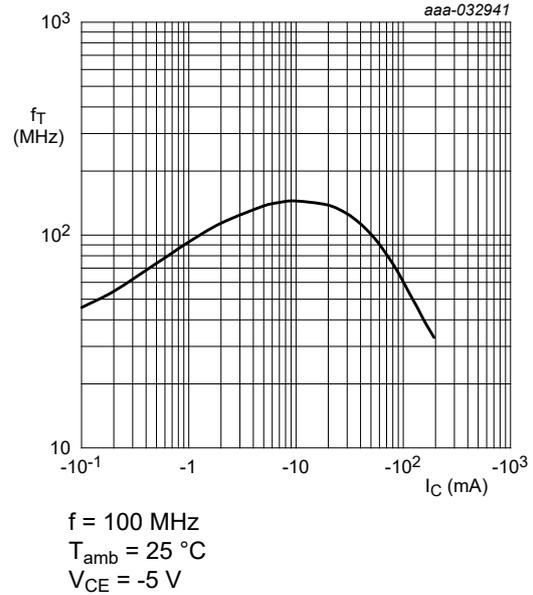


Fig. 8. Transition frequency as a function of collector current; typical values

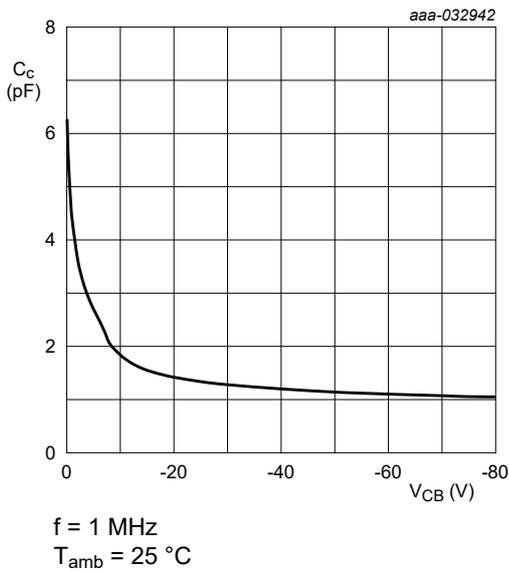


Fig. 9. Collector capacitance as a function of collector-base voltage; typical values

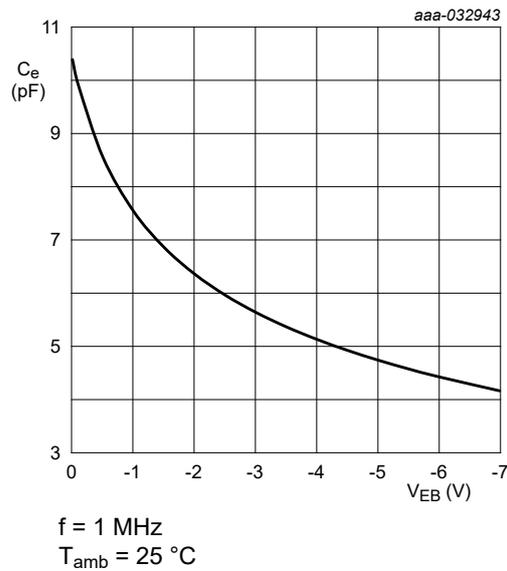


Fig. 10. Emitter capacitance as a function of emitter-base voltage; typical values

11. Package outline

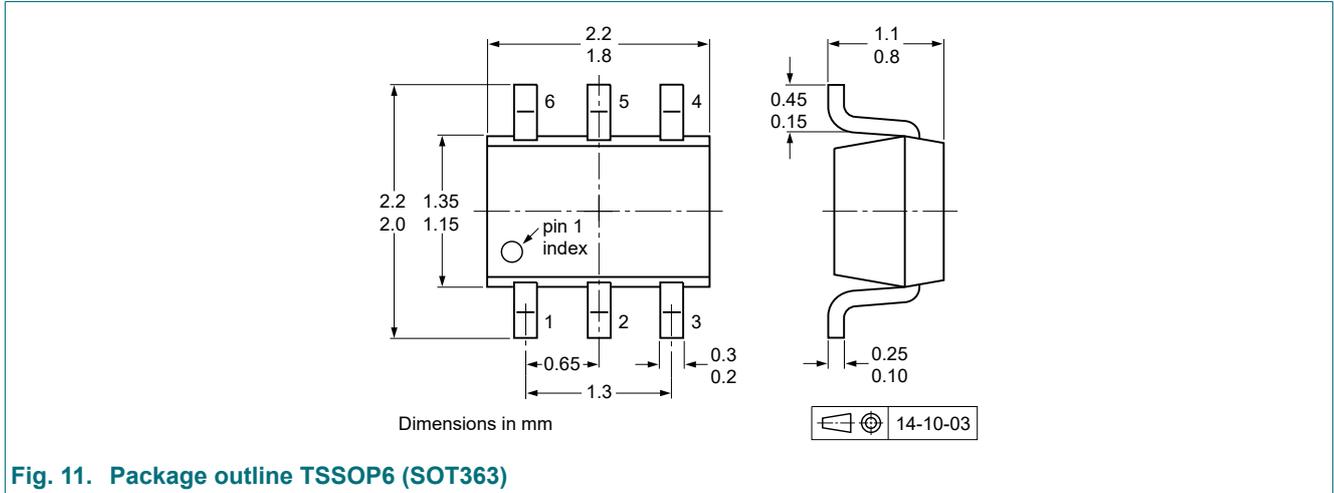


Fig. 11. Package outline TSSOP6 (SOT363)

12. Soldering

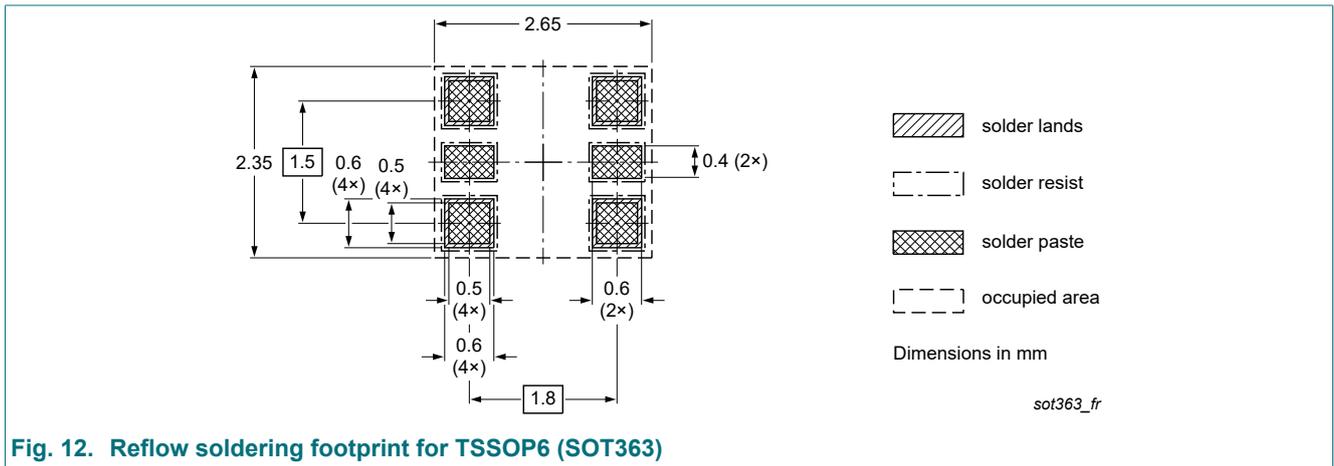


Fig. 12. Reflow soldering footprint for TSSOP6 (SOT363)

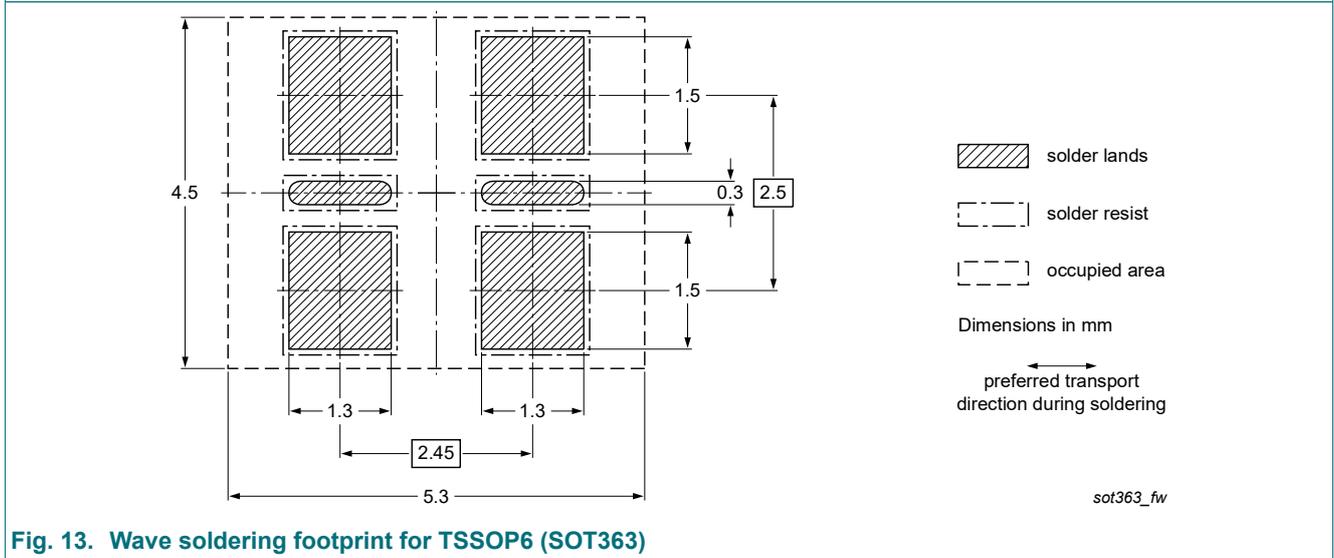


Fig. 13. Wave soldering footprint for TSSOP6 (SOT363)

13. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BC856SH v.1 | 20210322 | Product data sheet | - | - |

14. 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. |
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| Product [short] data sheet | Production | This document contains the product specification. |

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