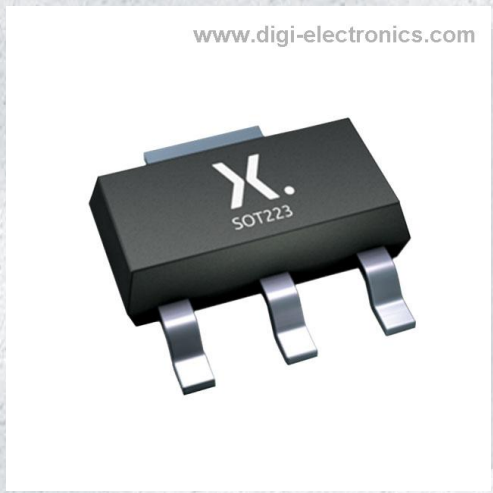
# BCP56-16,115 Datasheet




https://www.DiGi-Electronics.com

| | |
|---|---|
| DiGi Electronics Part Number | BCP56-16,115-DG |
| Manufacturer | Nexperia USA Inc. |
| Manufacturer Product Number | BCP56-16,115 |
| Description | TRANS NPN 80V 1A SOT223 |
| Detailed Description | Bipolar (BJT) Transistor NPN 80 V 1 A 180MHz 960 m W Surface Mount SOT-223 |

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| BCP56-16,115 | Nexperia USA Inc. |
| Series: | Product Status: |
| - | Active |
| Transistor Type: | Current - Collector (Ic) (Max): |
| NPN | 1 A |
| Voltage - Collector Emitter Breakdown (Max): | Vce Saturation (Max) @ Ib, Ic: |
| 80 V | 500mV @ 50mA, 500mA |
| Current - Collector Cutoff (Max): | DC Current Gain (hFE) (Min) @ Ic, Vce: |
| 100nA (ICBO) | 100 @ 150mA, 2V |
| Power - Max: | Frequency - Transition: |
| 960 mW | 180MHz |
| Operating Temperature: | Mounting Type: |
| 150°C (TJ) | Surface Mount |
| Package / Case: | Supplier Device Package: |
| TO-261-4, TO-261AA | SOT-223 |
| Base Product Number: | |
| BCP56 | |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.21.0075 | |


# BCP56 series

## 80 V, 1 A NPN medium power transistors

Rev. 11 — 1 July 2022 Product data sheet

## 1. General description

NPN medium power transistors in a medium power SOT223 (SC-73) Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- High collector current capability $I_C$ and $I_{CM}$
- Three current gain selections
- High power dissipation capability

## 3. Applications

- Linear voltage regulators
- MOSFET drivers
- Low-side switches
- Power management
- Amplifiers
- Battery-driven devices

nexperia

# 4. Quick reference data

**Table 1. Quick reference data**

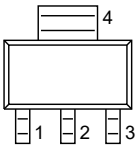
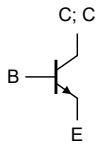
*$T_{amb}$ = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | open base | | - | - | 80 | V |
| $I_C$ | collector current | | | - | - | 1 | A |
| $I_{CM}$ | peak collector current | single pulse; $t_p \leq 1$ ms | | - | - | 2 | A |
| $h_{FE}$ | DC current gain | | | | | | |
| | BCP56 | $V_{CE}$ = 2 V; $I_C$ = 150 mA | [1] | 63 | - | 250 | |
| | BCP56-10 | | [1] | 63 | - | 160 | |
| | BCP56-16 | | [1] | 100 | - | 250 | |

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$

# 5. Pinning information

**Table 2. Pinning**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | B | base |   |   sym016 |
| 2 | C | collector | | |
| 3 | E | emitter | | |
| 4 | C | collector | | |

# 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BCP56 | SC-73 | plastic, surface-mounted package with increased heatsink; 4 leads | SOT223 |
| BCP56-10 | | | |
| BCP56-16 | | | |

# 7. Marking

**Table 4. Marking**

| Type number | Marking code |
|---|---|
| BCP56 | BCP56 |
| BCP56-10 | BCP56/10 |
| BCP56-16 | BCP56/16 |

# 8. Limiting values

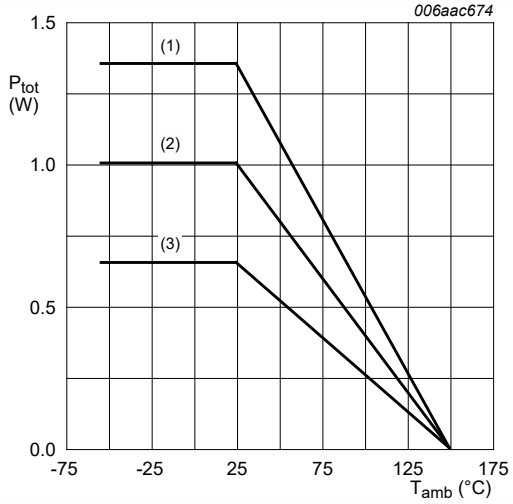
**Table 5. Limiting values**

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

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CBO}$ | collector-base voltage | open emitter | | - | 100 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | | - | 80 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | | - | 5 | V |
| $I_C$ | collector current | | | - | 1 | A |
| $I_{CM}$ | peak collector current | single pulse; $t_p \leq 1$ ms | | - | 2 | A |
| $I_B$ | base current | | | - | 0.3 | A |
| $I_{BM}$ | peak base current | single pulse; $t_p \leq 1$ ms | | - | 0.3 | A |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 0.65 | W |
| | | | [2] | - | 1.00 | 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 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 $cm^2$.
[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 6 $cm^2$.




(1) FR4 PCB, mounting pad for collector 6 $cm^2$
(2) FR4 PCB, mounting pad for collector 1 $cm^2$
(3) FR4 PCB, standard footprint

**Fig. 1. Power derating curves**

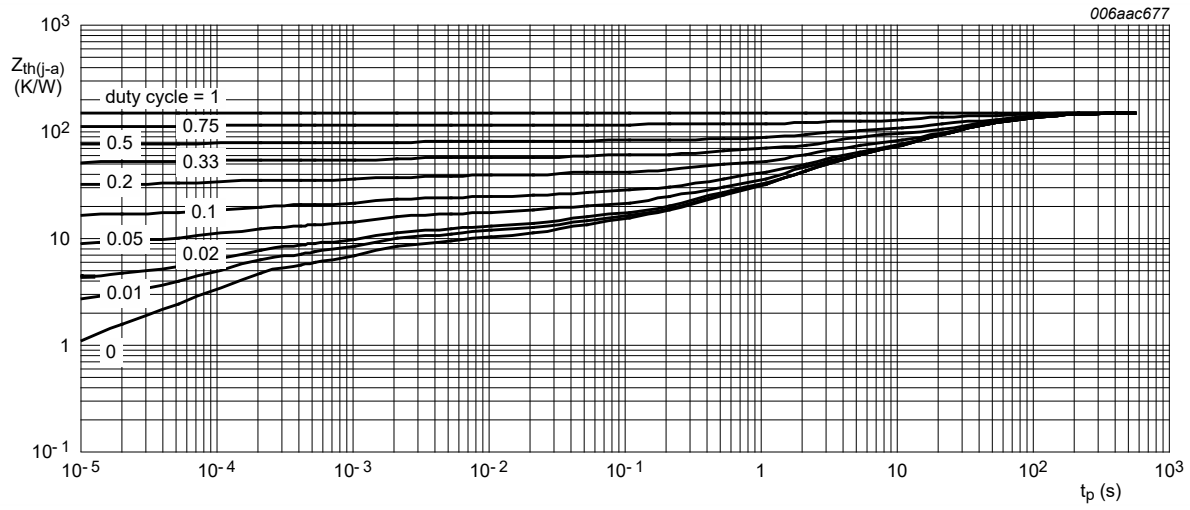
# 9. Thermal characteristics

**Table 6. Thermal characteristics**

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

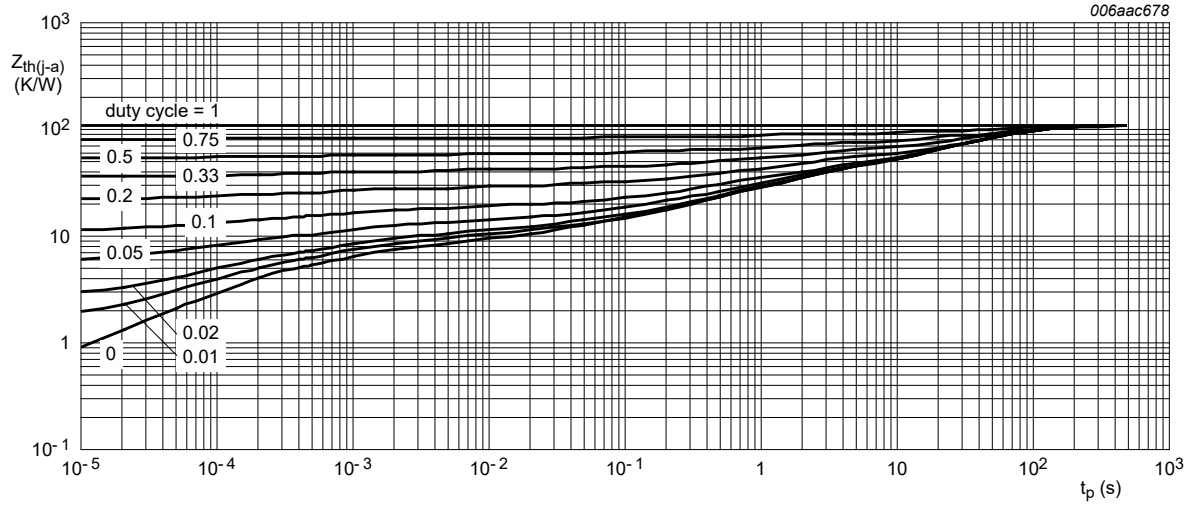
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | - | 192 | K/W |
| | | | [2] | | | 125 | K/W |
| | | | [3] | | | 93 | K/W |
| $R_{(j-sp)}$ | thermal resistance from junction to solder point | | | - | - | 16 | K/W |

[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 $cm^2$.
[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 6 $cm^2$.



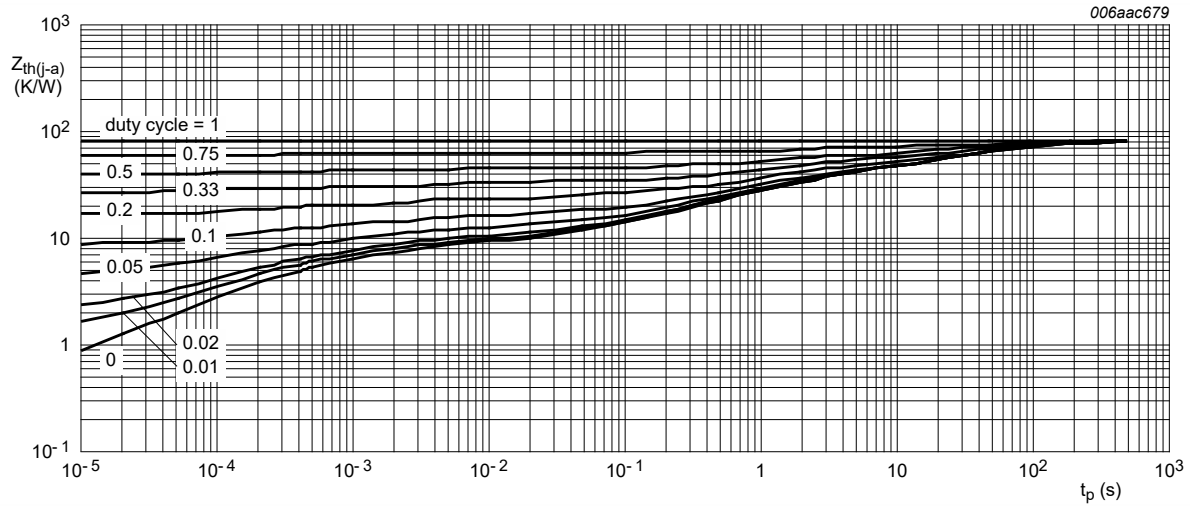

FR4 PCB, standard footprint

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




FR4 PCB, mounting pad for collector 1 $cm^2$

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




FR4 PCB, mounting pad for collector 6 $cm^2$

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

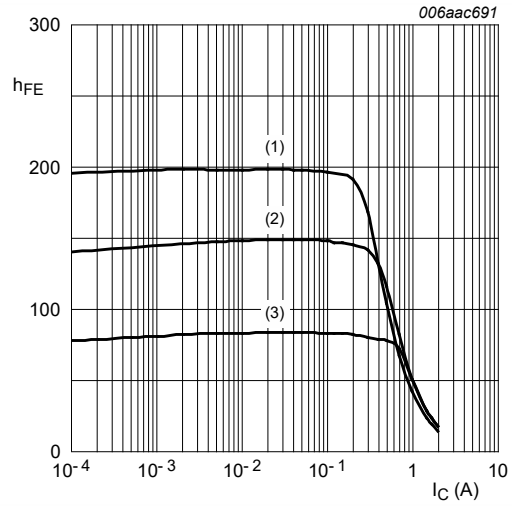
# 10. Characteristics

**Table 7. Characteristics**

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

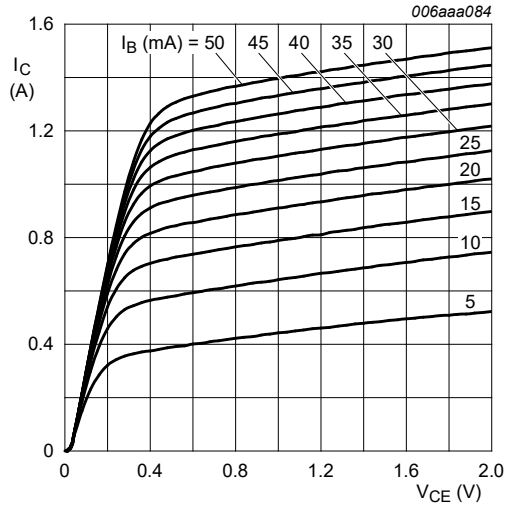
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | $I_C$ = 100 µA; $I_E$ = 0 A | | 100 | - | - | V |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage | $I_C$ = 2 mA; $I_B$ = 0 A | | 80 | - | - | V |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage | $I_E$ = 100 µA; $I_C$ = 0 A | | 5 | - | - | V |
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 30 V; $I_E$ = 0 A | | - | - | 100 | nA |
| | | $V_{CB}$ = 30 V; $I_E$ = 0 A; $T_j$ = 150 °C | | - | - | 10 | µA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = 5 V; $I_C$ = 0 A | | - | - | 100 | nA |
| $h_{FE}$ | DC current gain | | | | | | |
| | BCP56 | $V_{CE}$ = 2 V; $I_C$ = 5 mA | [1] | 63 | - | - | |
| | | $V_{CE}$ = 2 V; $I_C$ = 150 mA | [1] | 63 | - | 250 | |
| | | $V_{CE}$ = 2 V; $I_C$ = 500 mA | [1] | 40 | - | - | |
| | BCP56-10 | $V_{CE}$ = 2 V; $I_C$ = 5 mA | [1] | 63 | - | - | |
| | | $V_{CE}$ = 2 V; $I_C$ = 150 mA | [1] | 63 | - | 160 | |
| | | $V_{CE}$ = 2 V; $I_C$ = 500 mA | [1] | 40 | - | - | |
| | BCP56-16 | $V_{CE}$ = 2 V; $I_C$ = 5 mA | [1] | 63 | - | - | |
| | | $V_{CE}$ = 2 V; $I_C$ = 150 mA | | 100 | - | 250 | |
| | | $V_{CE}$ = 2 V; $I_C$ = 500 mA | | 40 | - | - | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 500 mA; $I_B$ = 50 mA | [1] | - | - | 500 | mV |
| $V_{BE}$ | base-emitter voltage | $V_{CE}$ = 2 V; $I_C$ = 500 mA | [1] | - | - | 1 | V |
| $C_c$ | collector capacitance | $V_{CB}$ = 10 V; $I_E$ = $i_e$ = 0 A; f = 1 MHz | | - | 6 | - | pF |
| $f_T$ | transition frequency | $V_{CE}$ = 5 V; $I_C$ = 50 mA; f = 100 MHz | | 100 | 180 | - | MHz |

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$



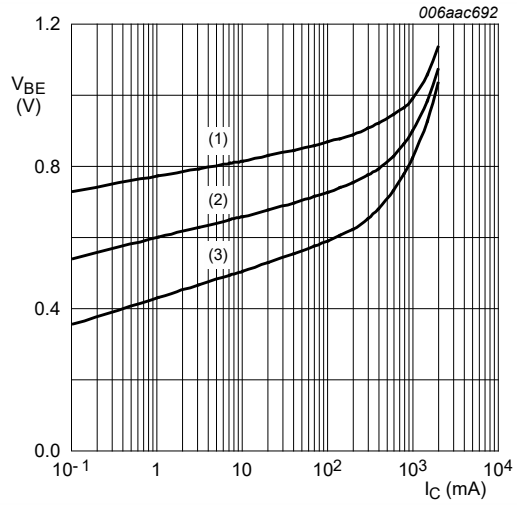

$V_{CE}$ = 2 V
(1) $T_{amb}$ = 100 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



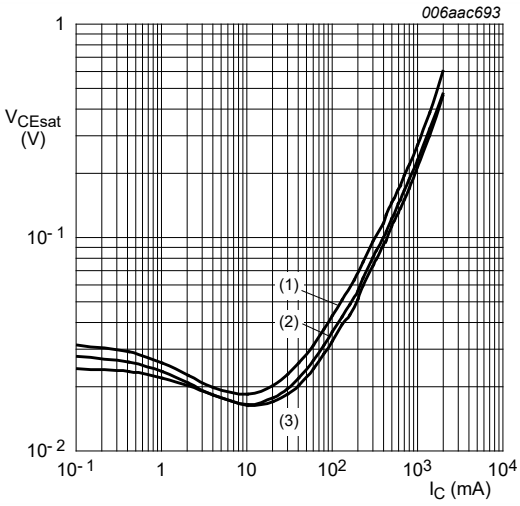

$T_{amb}$ = 25 °C

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




$V_{CE}$ = 2 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 100 °C

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




$V_{CE}$ = 2 V
(1) $T_{amb}$ = 100 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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

## 11. Package outline

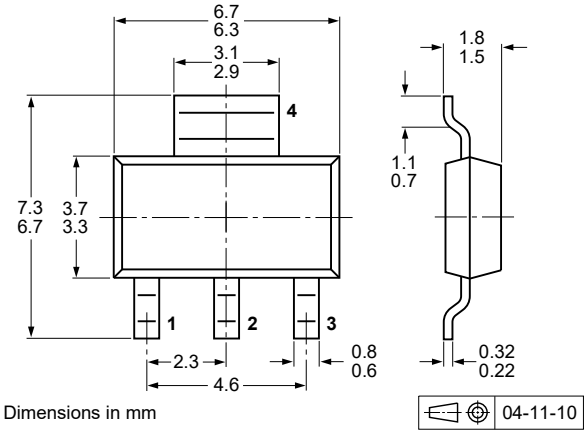



**Fig. 9. Package outline SOT223 (SC-73)**

## 12. Soldering

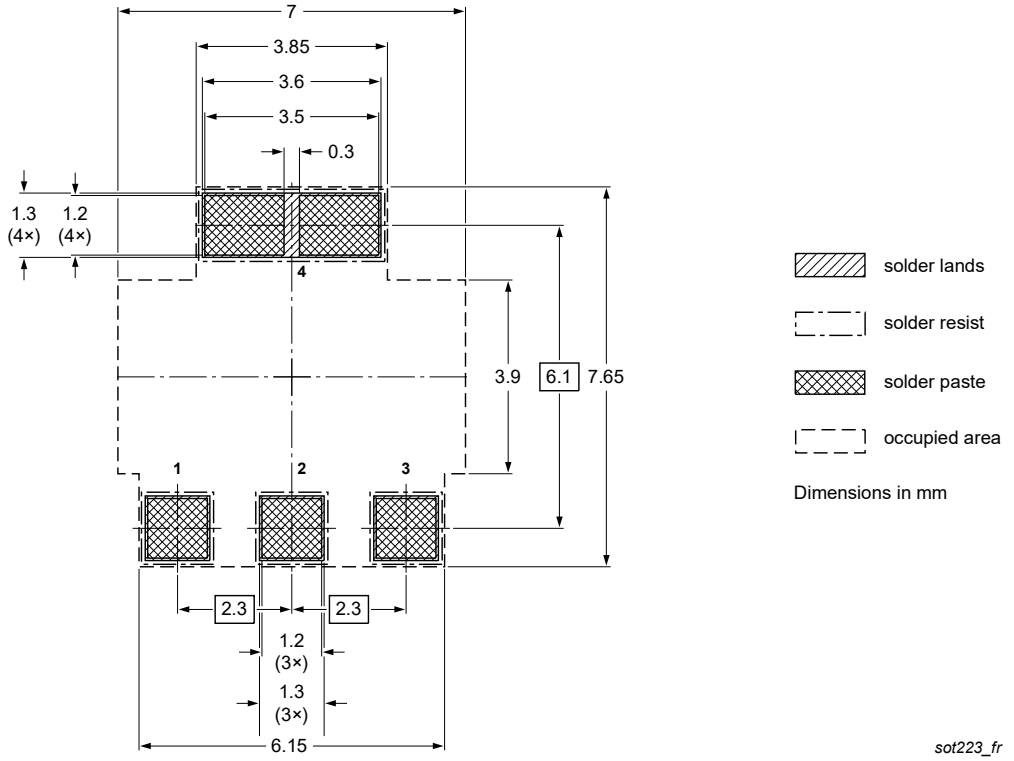



**Fig. 10. Reflow soldering footprint for SOT223 (SC-73)**

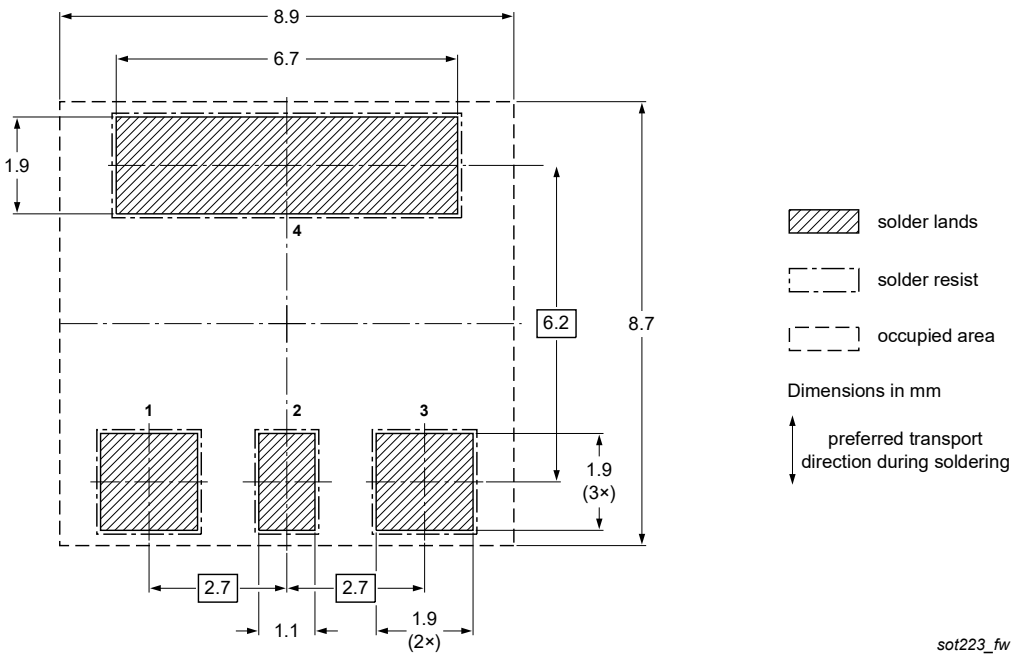



**Fig. 11. Wave soldering footprint for SOT223 (SC-73)**

# 13. Revision history

**Table 8. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BCP56_SER v.11 | 20220701 | Product data sheet | - | BCP56_SER v.10 |
| Modifications: | • Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). | | | |
| BCP56_SER v.10 | 20220624 | Product data sheet | - | BCP56_BCX56_BC56PA v.9 |
| BCP56_BCX56_BC56PA v.9 | 20111025 | Product data sheet | - | BC639_BCP56_BCX56 v.8 |
| BC639_BCP56_BCX56 v.8 | 20070622 | Product data sheet | - | BC639_BCP56_BCX56 v.7 |
| BC639_BCP56_BCX56 v.7 | 20050308 | Product data sheet | | BC639_BCP56_BCX56 v.6 |
| BC639_BCP56_BCX56 v.6 | 20050303 | Product data sheet | CPCN200405029 | BC635_637_639 v.4<br>BCP54_55_56 v.5<br>BCX54_55_56 v.4 |
| BC635_637_639 v.4 | 20011010 | Product specification | - | BC635_637_639 v.3 |
| BCX54_55_56 v.5 | 20030206 | Product specification | - | BCX54_55_56 v.4 |
| BCX54_55_56 v.4 | 20011010 | Product specification | - | BCX54_55_56 v.3 |

# 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. |
| 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".
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# Contents





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**Date of release: 1 July 2022**

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