

# ANTREX Electronics

Electronic Components Sourcing Information

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## Product Reference Information

**Part Number:** BC847AW-QF  
**Manufacturer:** Nexperia USA Inc.  
**Package:** SC-70, SOT-323  
**Availability:** Please confirm with sales

### Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/bc847aw-qf.html>

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### Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

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# BC847xW-Q series

45 V, 100 mA NPN general-purpose transistors

Rev. 2 — 24 June 2021

Product data sheet

## 1. General description

NPN general-purpose transistors in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

| Type number[1] | Package  |       | PNP complement |
|----------------|----------|-------|----------------|
|                | Nexperia | JEITA |                |
| BC847W-Q       | SOT323   | SC-70 | BC857W-Q       |
| BC847AW-Q      |          |       | BC857AW-Q      |
| BC847BW-Q      |          |       | BC857BW-Q      |
| BC847CW-Q      |          |       | BC857CW-Q      |

[1] Valid for all available selection groups.

## 2. Features and benefits

- General-purpose transistors
- SMD plastic packages
- Three different gain selections
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- General-purpose switching and amplification

## 4. Quick reference data

Table 2. Quick reference data

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

| Symbol    | Parameter                 | Conditions                                    | Min | Typ | Max | Unit |
|-----------|---------------------------|-----------------------------------------------|-----|-----|-----|------|
| $V_{CEO}$ | collector-emitter voltage | open base                                     | -   | -   | 45  | V    |
| $I_C$     | collector current         |                                               | -   | -   | 100 | mA   |
| $h_{FE}$  | DC current gain           |                                               |     |     |     |      |
|           | BC847W-Q                  | $V_{CE} = 5\text{ V};$<br>$I_C = 2\text{ mA}$ | 110 | -   | 800 |      |
|           | BC847AW-Q                 |                                               | 110 | 180 | 220 |      |
|           | BC847BW-Q                 |                                               | 200 | 290 | 450 |      |
|           | BC847CW-Q                 |                                               | 420 | 520 | 800 |      |

## 5. Pinning information

Table 3. Pinning information

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

## 6. Ordering information

Table 4. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| BC847W-Q    | SC-70   | plastic surface-mounted package; 3 leads | SOT323  |
| BC847AW-Q   |         |                                          |         |
| BC847BW-Q   |         |                                          |         |
| BC847CW-Q   |         |                                          |         |

## 7. Marking

Table 5. Marking codes

| Type number |     | Marking code |
|-------------|-----|--------------|
| BC847W-Q    | [1] | 1H%          |
| BC847AW-Q   | [1] | 1E%          |
| BC847BW-Q   | [1] | 1F%          |
| BC847CW-Q   | [1] | 1G%          |

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 6. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol           | Parameter                 | Conditions                          | Min   | Max | Unit |
|------------------|---------------------------|-------------------------------------|-------|-----|------|
| V <sub>CBO</sub> | collector-base voltage    | open emitter                        | -     | 50  | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                           | -     | 45  | V    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector                      | -     | 6   | V    |
| I <sub>C</sub>   | collector current         |                                     | -     | 100 | mA   |
| I <sub>CM</sub>  | peak collector current    | single pulse; t <sub>p</sub> ≤ 1 ms | -     | 200 | mA   |
| I <sub>BM</sub>  | peak base current         | single pulse; t <sub>p</sub> ≤ 1 ms | -     | 100 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] - | 200 | mW   |
| T <sub>j</sub>   | junction temperature      |                                     | -     | 150 | °C   |
| T <sub>amb</sub> | ambient temperature       |                                     | -65   | 150 | °C   |
| T <sub>stg</sub> | storage temperature       |                                     | -65   | 150 | °C   |

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

9. Thermal characteristics

Table 7. Thermal characteristics

| Symbol               | Parameter                                   | Conditions  | Min   | Typ | Max | Unit |
|----------------------|---------------------------------------------|-------------|-------|-----|-----|------|
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] - | -   | 625 | K/W  |

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

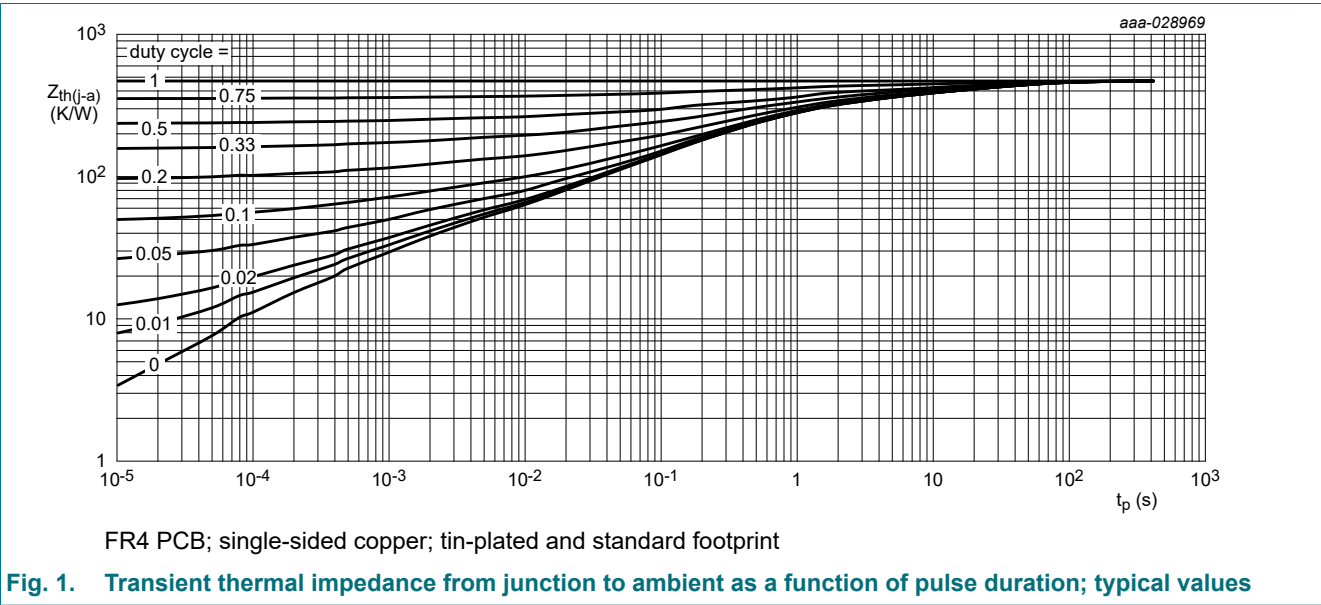


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

**Table 8. Characteristics**

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

| Symbol               | Parameter                            | Conditions                                                                                  |     | Min | Typ | Max | Unit |
|----------------------|--------------------------------------|---------------------------------------------------------------------------------------------|-----|-----|-----|-----|------|
| V <sub>(BR)CBO</sub> | collector-base breakdown voltage     | I <sub>C</sub> = 100 μA; I <sub>E</sub> = 0 A                                               |     | 50  | -   | -   | V    |
| V <sub>(BR)CES</sub> | collector-emitter breakdown voltage  | I <sub>C</sub> = 2 mA; V <sub>BE</sub> = 0 A                                                |     | 45  | -   | -   | V    |
| V <sub>(BR)EBO</sub> | emitter-base breakdown voltage       | I <sub>C</sub> = 0 A; I <sub>E</sub> = 100 μA                                               |     | 6   | -   | -   | V    |
| I <sub>CBO</sub>     | collector-base cut-off current       | V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A                                                |     | -   | -   | 15  | nA   |
|                      |                                      | V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A; T <sub>J</sub> = 150 °C                       |     | -   | -   | 5   | μA   |
| I <sub>EBO</sub>     | emitter-base cut-off current         | V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A                                                 |     | -   | -   | 100 | nA   |
| h <sub>FE</sub>      | DC current gain                      |                                                                                             |     |     |     |     |      |
|                      | BC847AW-Q                            | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 10 μA                                               |     | -   | 170 | -   |      |
|                      | BC847BW-Q                            |                                                                                             |     | -   | 280 | -   |      |
|                      | BC847CW-Q                            |                                                                                             |     | -   | 420 | -   |      |
|                      | BC847W-Q                             | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 2 mA                                                |     | 110 | -   | 800 |      |
|                      | BC847AW-Q                            |                                                                                             |     | 110 | 180 | 220 |      |
|                      | BC847BW-Q                            |                                                                                             |     | 200 | 290 | 450 |      |
|                      | BC847CW-Q                            |                                                                                             |     | 420 | 520 | 800 |      |
| V <sub>CEsat</sub>   | collector-emitter saturation voltage | I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA                                             |     | -   | 90  | 200 | mV   |
|                      |                                      | I <sub>C</sub> = 100 mA; I <sub>B</sub> = 5 mA                                              | [1] | -   | 200 | 400 | mV   |
| V <sub>BEsat</sub>   | base-emitter saturation voltage      | I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA                                             | [2] | -   | 700 | -   | mV   |
|                      |                                      | I <sub>C</sub> = 100 mA; I <sub>B</sub> = 5 mA                                              | [2] | -   | 900 | -   | mV   |
| V <sub>BE</sub>      | base-emitter voltage                 | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 2 mA                                                | [2] | 580 | 660 | 700 | mV   |
|                      |                                      | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 10 mA                                               |     | -   | -   | 770 | mV   |
| f <sub>T</sub>       | transition frequency                 | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 10 mA; f = 100 MHz                                  |     | 100 | -   | -   | MHz  |
| C <sub>c</sub>       | collector capacitance                | V <sub>CB</sub> = 10 V; I <sub>E</sub> = i <sub>e</sub> = 0 A; f = 1 MHz                    |     | -   | -   | 1.5 | pF   |
| C <sub>e</sub>       | emitter capacitance                  | V <sub>EB</sub> = 0.5 V; I <sub>C</sub> = i <sub>c</sub> = 0 A; f = 1 MHz                   |     | -   | 11  | -   | pF   |
| NF                   | noise figure                         | I <sub>C</sub> = 200 μA; V <sub>CE</sub> = 5 V; R <sub>S</sub> = 2 kΩ; f = 1 kHz; B = 200Hz |     | -   | 2   | 10  | dB   |

[1] pulsed;  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$

[2]  $V_{BE}$  decreases by approximately 2 mV/K with increasing temperature

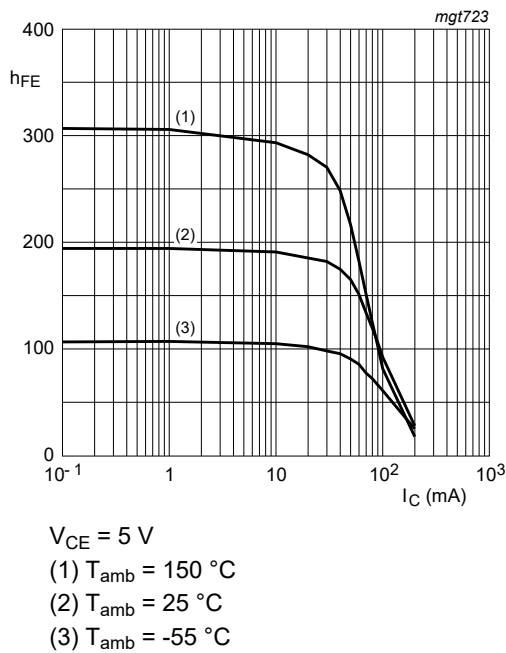


Fig. 2. BC847AW-Q: DC current gain as a function of collector current; typical values



Fig. 3. BC847AW-Q: Base-emitter voltage as a function of collector current; typical values

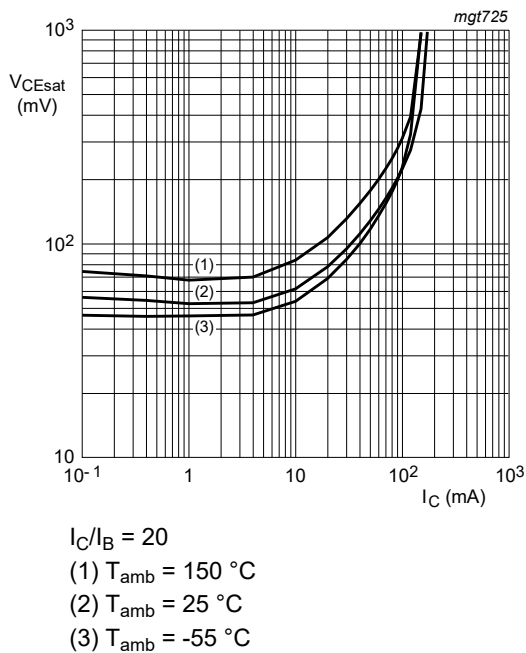


Fig. 4. BC847AW-Q: Collector-emitter saturation voltage as a function of collector current; typical values

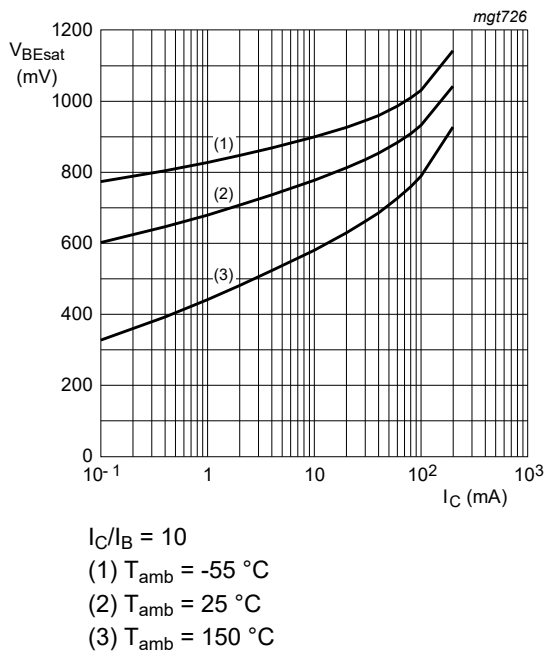


Fig. 5. BC847AW-Q: Base-emitter saturation voltage as a function of collector current; typical values

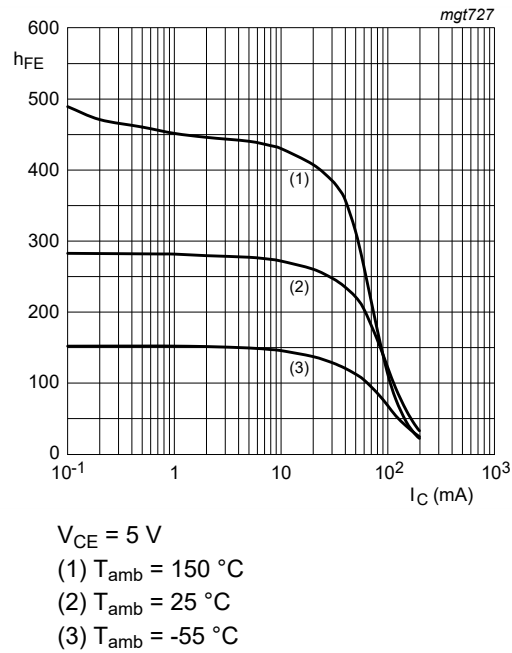


Fig. 6. BC847BW-Q: DC current gain as a function of collector current; typical values

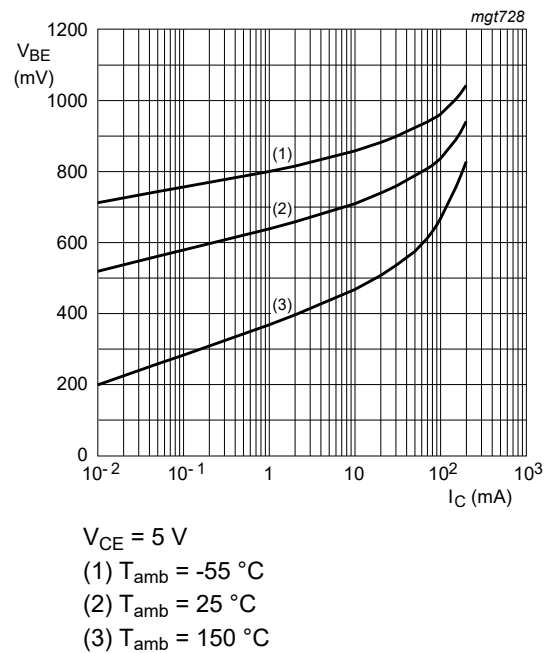


Fig. 7. BC847BW-Q: Base-emitter voltage as a function of collector current; typical values

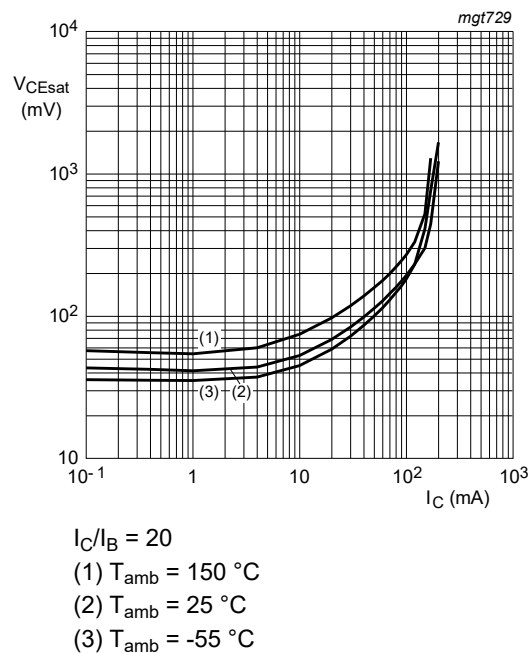


Fig. 8. BC847BW-Q: Collector-emitter saturation voltage as a function of collector current; typical values

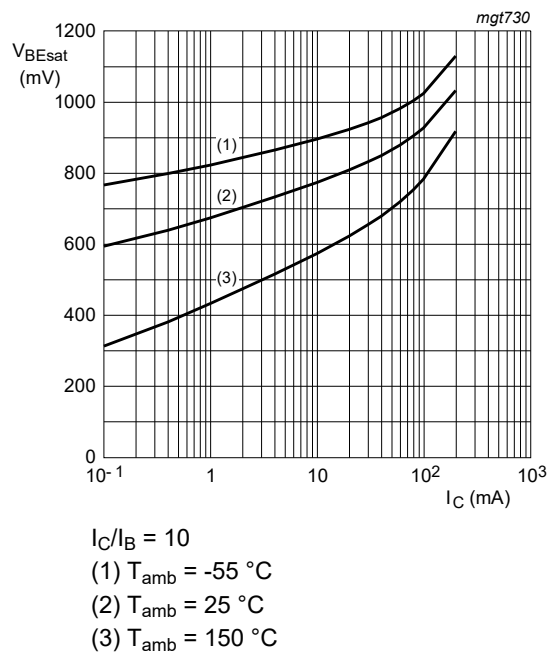


Fig. 9. BC847BW-Q: Base-emitter saturation voltage as a function of collector current; typical values

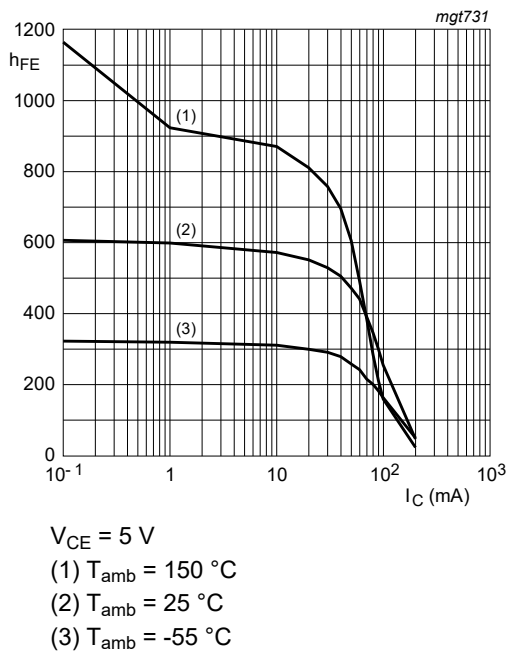


Fig. 10. BC847CW-Q: DC current gain as a function of collector current; typical values

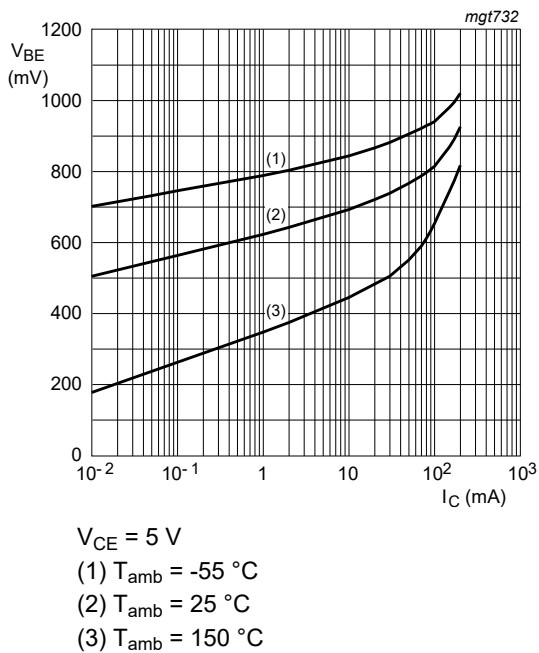


Fig. 11. BC847CW-Q: Base-emitter voltage as a function of collector current; typical values

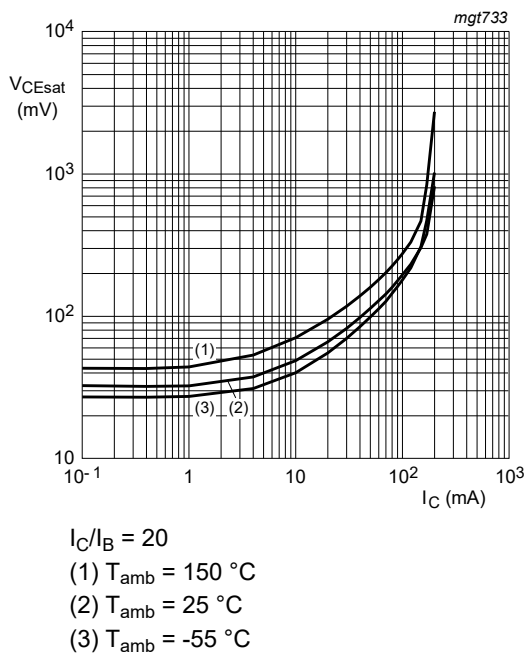


Fig. 12. BC847CW-Q: Collector-emitter saturation voltage as a function of collector current; typical values

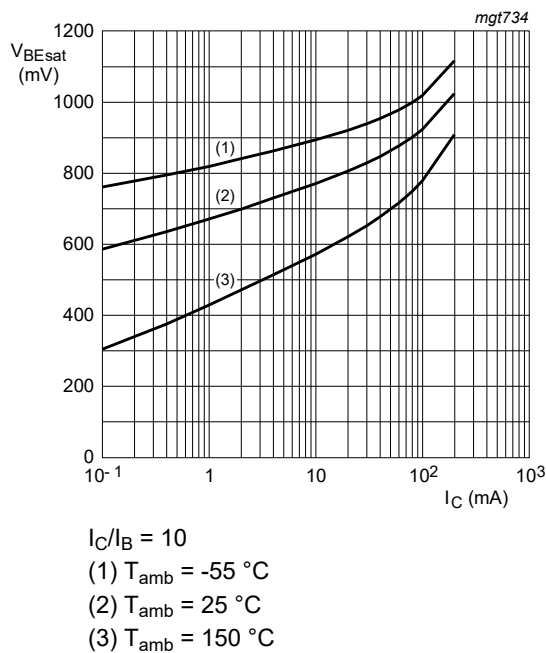


Fig. 13. BC847CW-Q: Base-emitter saturation voltage as a function of collector current; typical values

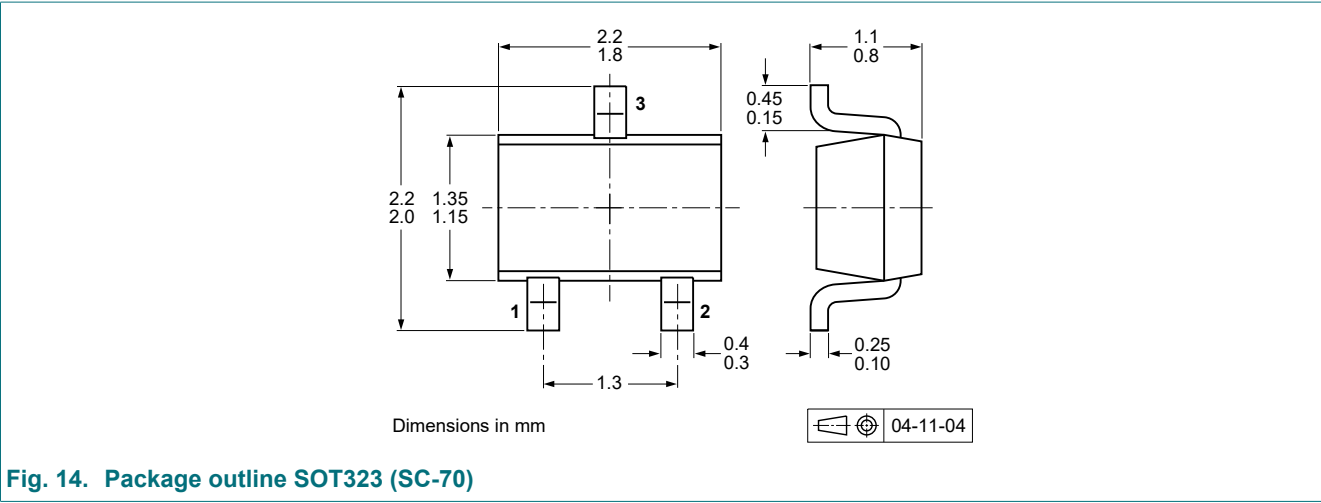
11. Test information

11.1. 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.

12. Package outline

Table 9. Package outline



13. Soldering

Table 10. Soldering

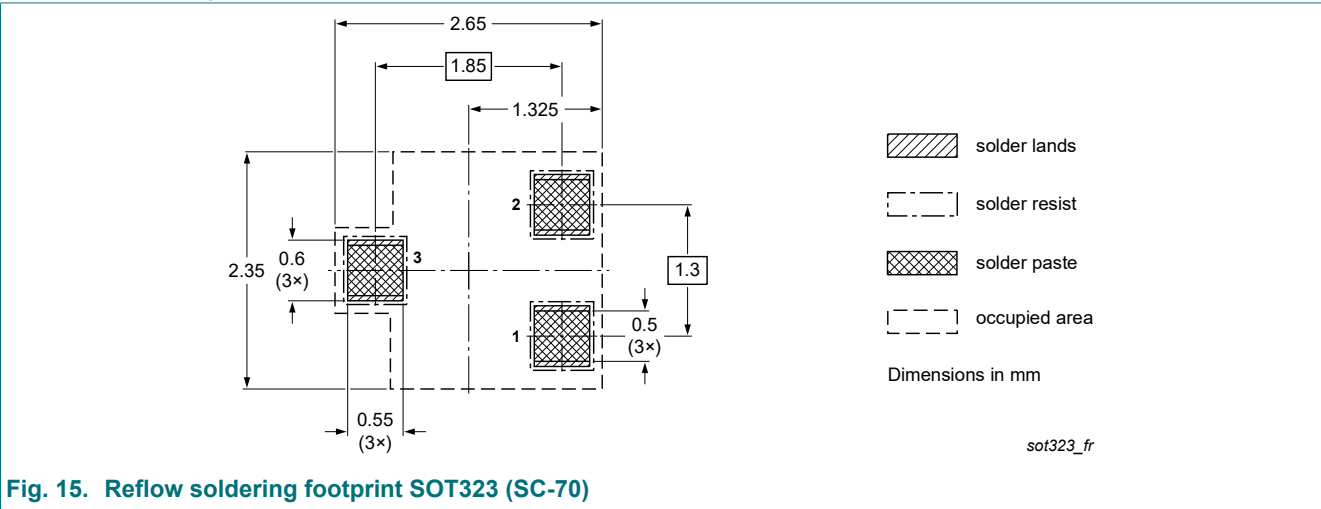


Fig. 15. Reflow soldering footprint SOT323 (SC-70)

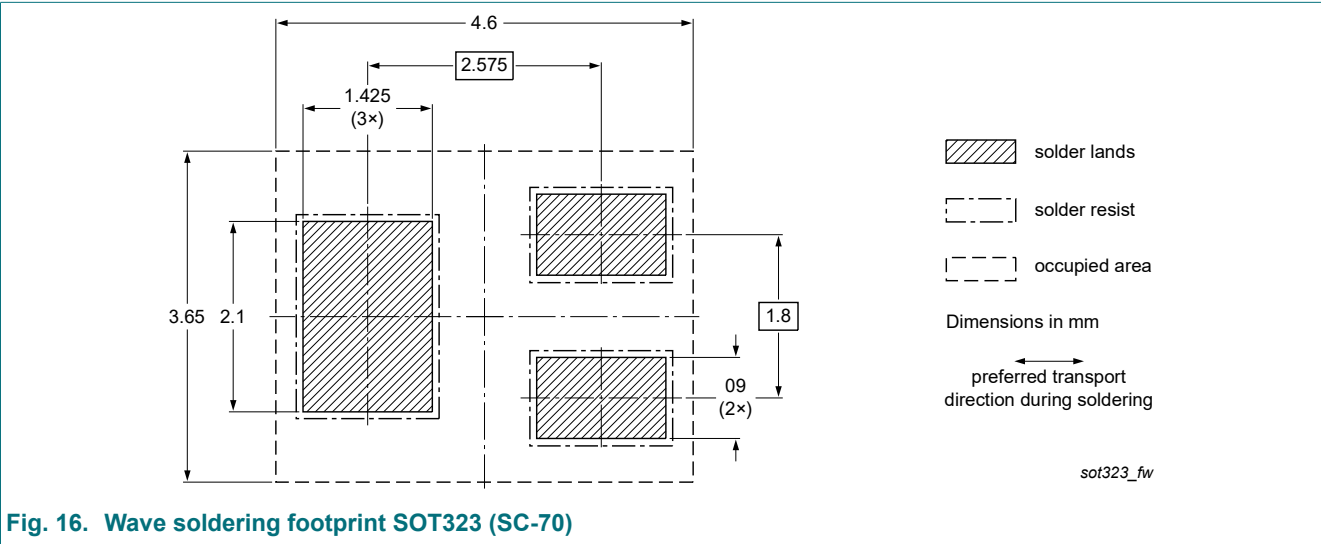


Fig. 16. Wave soldering footprint SOT323 (SC-70)

## 14. Revision history

**Table 11. Revision history**

| Document ID       | Release date                                             | Data sheet status  | Change notice | Supersedes      |
|-------------------|----------------------------------------------------------|--------------------|---------------|-----------------|
| BC847XW-Q_SER v.2 | 20210624                                                 | Product data sheet | -             | BC847-Q_SER v.1 |
| Modifications:    | • Series data sheet reduced to 3 data sheets per package |                    |               |                 |
| BC847-Q_SER v.1   | 20210617                                                 | Product data sheet | -             | -               |

## 15. Legal information

### Data sheet status

| Document status<br>[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 <https://www.nexperia.com>.

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