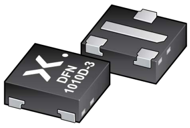



# BC817-25QA; BC817-40QA

45 V, 500 mA NPN general-purpose transistors

Rev. 1 — 3 September 2013 | Product data sheet

## 1. Product profile

### 1.1 General description

500 mA NPN general-purpose transistors in a leadless ultra small DFN1010D-3 (SOT1215) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

**Table 1. Product overview**

| Type number | Package | | PNP complement |
|---|---|---|---|
| | Nexperia | JEITA | |
| BC817-25QA | DFN1010D-3 (SOT1215) | - | BC807-25QA |
| BC817-40QA | | | BC807-40QA |

### 1.2 Features and benefits

- General-purpose transistor
- Two current gain selections
- Low package height of 0.37 mm
- AEC-Q101 qualified

### 1.3 Applications

- General-purpose switching and amplification
- Mobile applications

### 1.4 Quick reference data

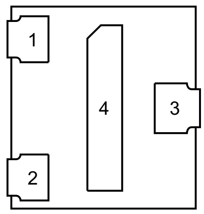
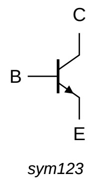
**Table 2. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | open base | | - | - | 45 | V |
| $I_C$ | collector current | | | - | - | 500 | mA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 1 V; $I_C$ = 100 mA | [1] | | | | |
| | BC817-25QA | | | 160 | - | 400 | |
| | BC817-40QA | | | 250 | - | 600 | |

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.

## 2. Pinning information

**Table 3. Pinning**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | B | base |  1 2 3 4 Transparent top view |  C B E sym123 |
| 2 | E | emitter | | |
| 3 | C | collector | | |
| 4 | C | collector | | |

## 3. Ordering information

**Table 4. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BC817-25QA | DFN1010D-3 | plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.1 × 1.0 × 0.37 mm | SOT1215 |
| BC817-40QA | | | |

## 4. Marking

**Table 5. Marking codes**

| Type number | Marking code |
|---|---|
| BC817-25QA | 11 01 00 |
| BC817-40QA | 10 11 00 |

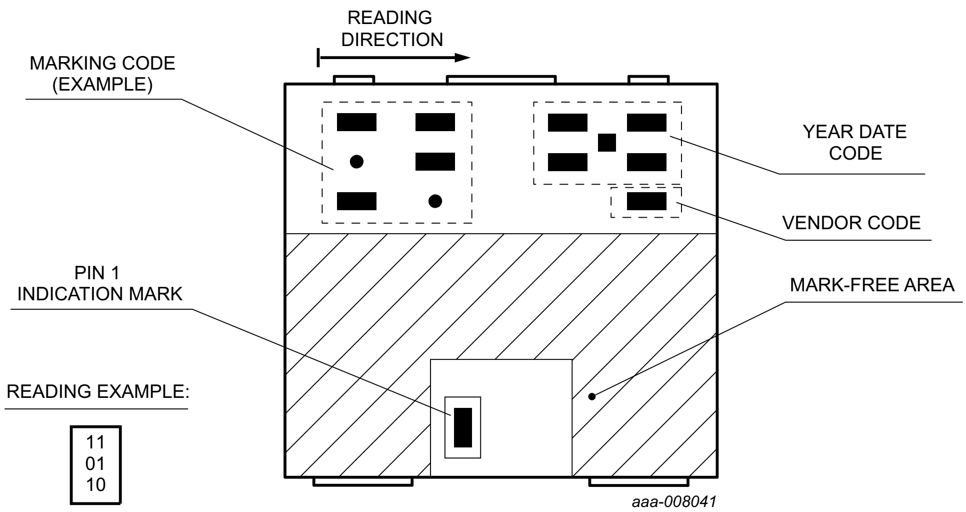



**Fig 1. DFN1010D-3 (SOT1215) binary marking code description**

## 5. Limiting values

**Table 6. Limiting values**

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

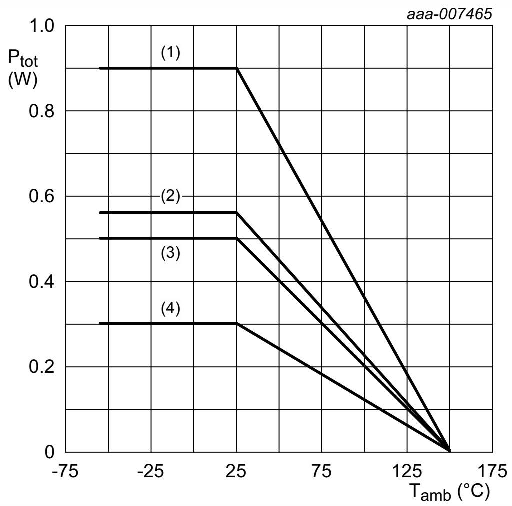
| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CBO}$ | collector-base voltage | open emitter | | - | 50 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | | - | 45 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | | - | 5 | V |
| $I_C$ | collector current | | | - | 500 | mA |
| $I_{CM}$ | peak collector current | single pulse; $t_p \leq 1$ ms | | - | 1 | A |
| $I_{BM}$ | peak base current | single pulse; $t_p \leq 1$ ms | | - | 200 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C | | | | |
| | | | [1] | - | 300 | mW |
| | | | [2] | - | 500 | mW |
| | | | [3] | - | 560 | mW |
| | | | [4] | | 900 | mW |
| $T_j$ | 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 PCB, 4-layer copper, tin-plated and standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for collector 1 $cm^2$.

[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated mounting pad for collector 1 $cm^2$.




(1) FR4 PCB, 4-layer copper, 1 $cm^2$

(2) FR4 PCB, single-sided copper, 1 $cm^2$

(3) FR4 PCB, 4-layer copper, standard footprint

(4) FR4 PCB, single-sided copper, standard footprint

**Fig 2. Power derating curves**

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

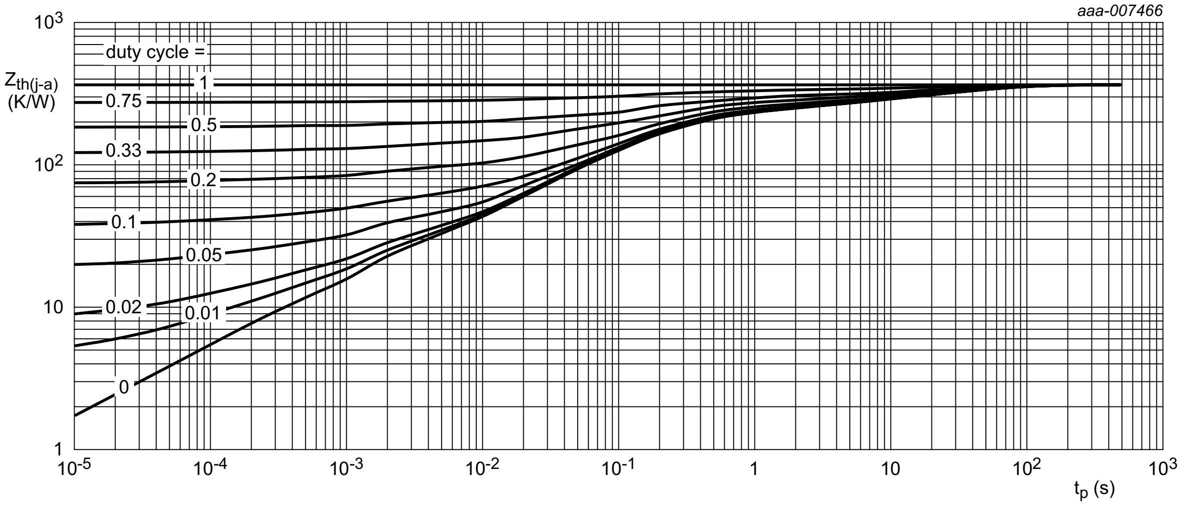
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | | | | | |
| | | | [1] | - | - | 417 | K/W |
| | | | [2] | - | - | 250 | K/W |
| | | | [3] | - | - | 223 | K/W |
| | | | [4] | - | - | 139 | K/W |

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

[2] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

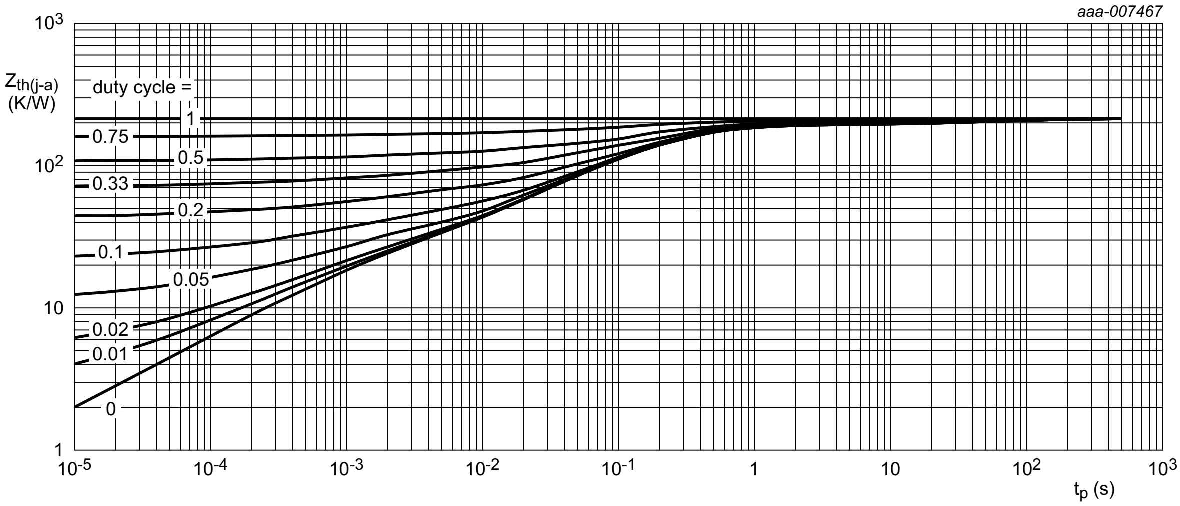
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for collector 1 $cm^2$.

[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated mounting pad for collector 1 $cm^2$.



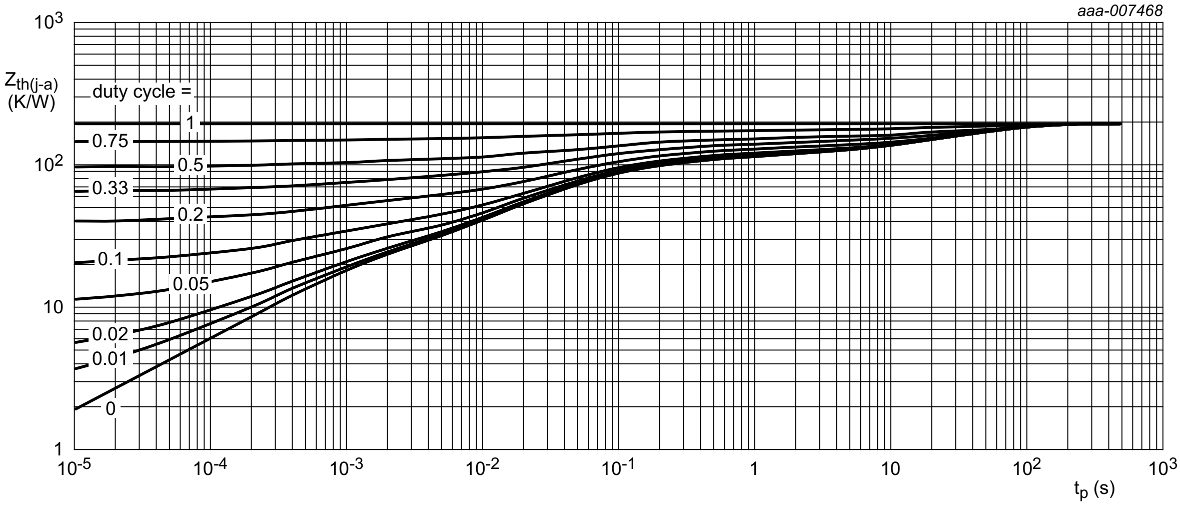

FR4 PCB, single-sided copper, standard footprint

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



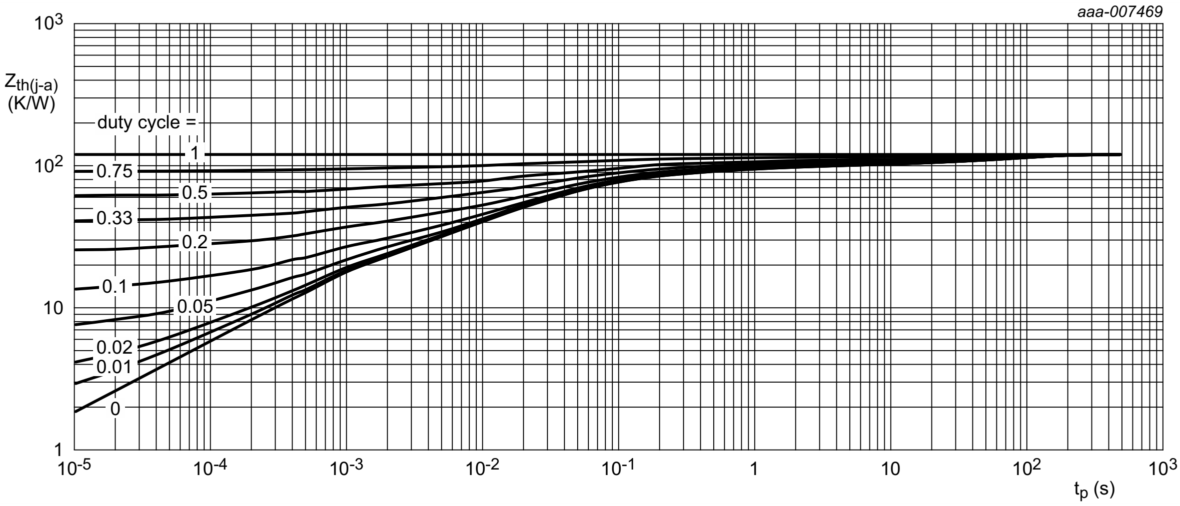

FR4 PCB, 4-layer copper, standard footprint

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




FR4 PCB, single-sided copper, 1 $cm^2$

**Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**




FR4 PCB, 4-layer copper, 1 $cm^2$

**Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

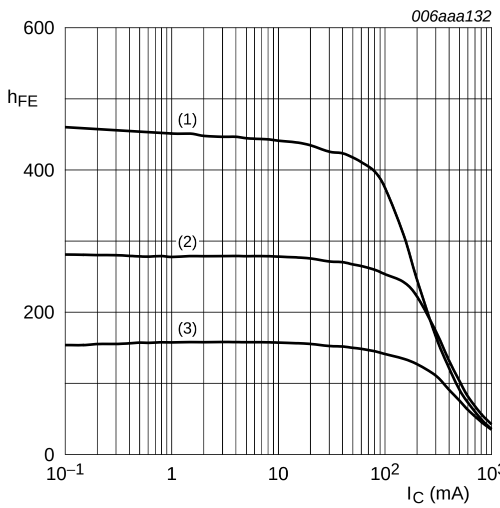
# 7. Characteristics

**Table 8. Characteristics**

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

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 20 V; $I_E$ = 0 A | | - | - | 100 | nA |
| | | $V_{CB}$ = 20 V; $I_E$ = 0 A; $T_j$ = 150 °C | | - | - | 5 | μA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = 5 V; $I_C$ = 0 A | | - | - | 100 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 1 V; $I_C$ = 100 mA | [1] | | | | |
| | BC817-25QA | | | 160 | - | 400 | |
| | BC817-40QA | | | 250 | - | 600 | |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 1 V; $I_C$ = 500 mA | [1] | 40 | - | - | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 500 mA; $I_B$ = 50 mA | [1] | - | - | 700 | mV |
| $V_{BE}$ | base-emitter voltage | $I_C$ = 500 mA; $V_{CE}$ = 1 V | [1] | - | - | 1.2 | V |
| $C_c$ | collector capacitance | $V_{CB}$ = 10 V; $I_E$ = $i_e$ = 0 A; f = 1 MHz | | - | 3 | - | pF |
| $f_T$ | transition frequency | $V_{CE}$ = 5 V; $I_C$ = 10 mA; f = 100 MHz | | 100 | - | - | MHz |

[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.



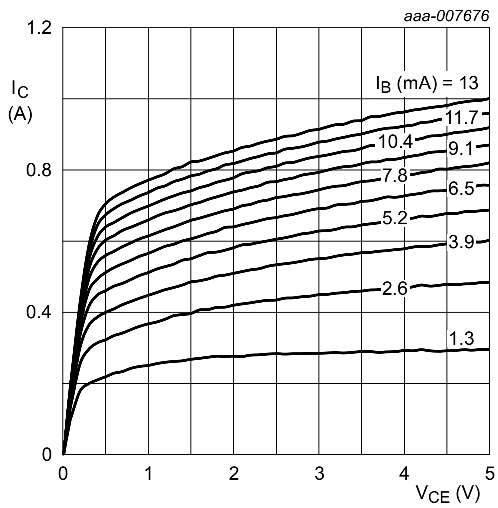

$V_{CE}$ = 1 V

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

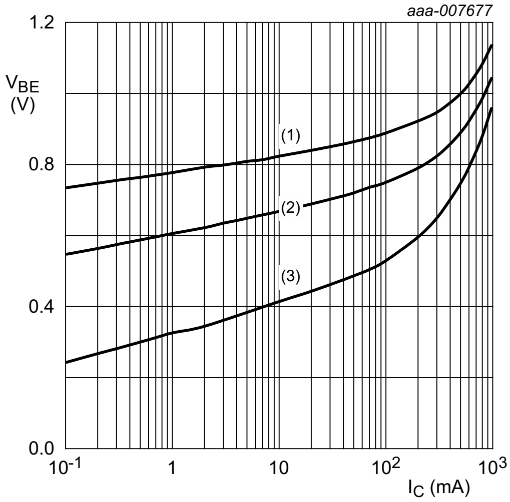
(3) $T_{amb}$ = −55 °C

**Fig 7. BC817-25QA: DC current gain as a function of collector current; typical values**




$T_{amb}$ = 25 °C

**Fig 8. BC817-25QA: Collector current as a function of collector-emitter voltage; typical values**



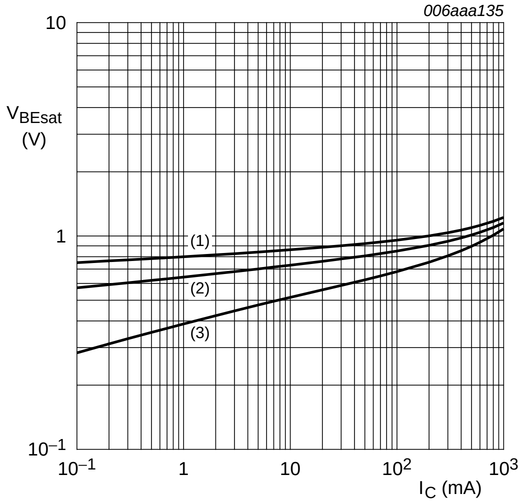

$V_{CE}$ = 1 V

(1) $T_{amb}$ = −55°C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

**Fig 9. BC817-25QA: Base-emitter voltage as a function of collector current; typical values**



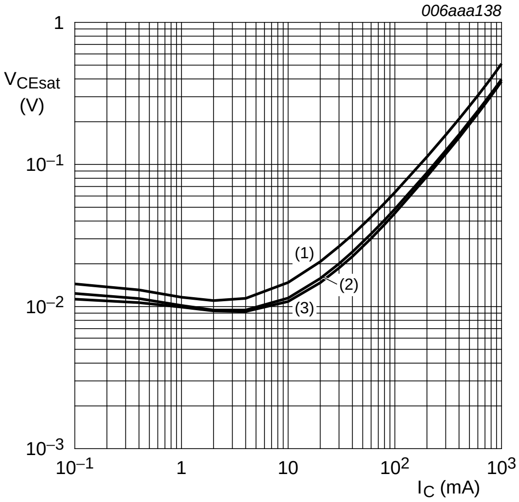

$I_C/I_B$ = 10

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

**Fig 10. BC817-25QA: Base-emitter saturation voltage as a function of collector current; typical values**



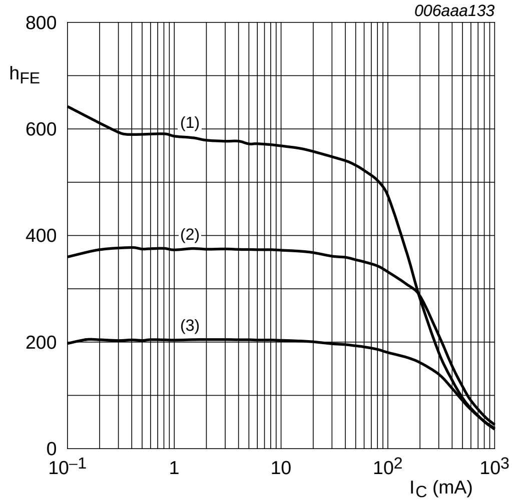

$I_C/I_B$ = 10

(1) $T_{amb}$ = −55°C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

**Fig 11. BC817-25QA: Collector-emitter saturation voltage as a function of collector current; typical values**



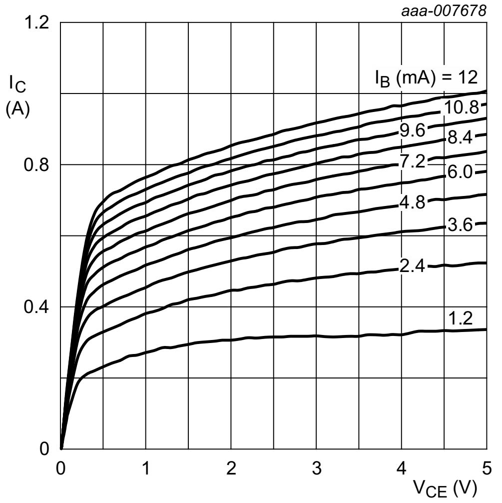

$V_{CE}$ = 1 V

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

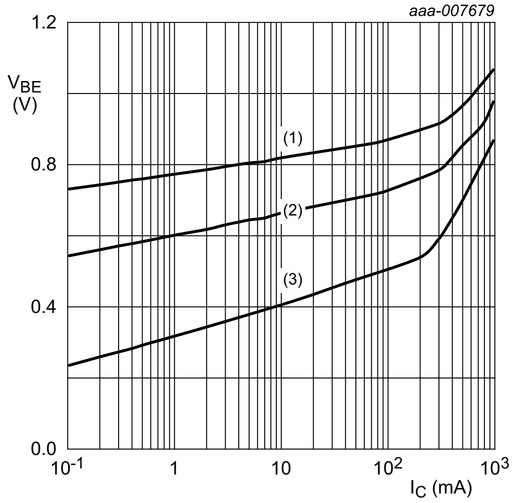
(3) $T_{amb}$ = −55 °C

**Fig 12. BC817-40QA: DC current gain as a function of collector current; typical values**




$T_{amb}$ = 25 °C

**Fig 13. BC817-40QA: Collector current as a function of collector-emitter voltage; typical values**



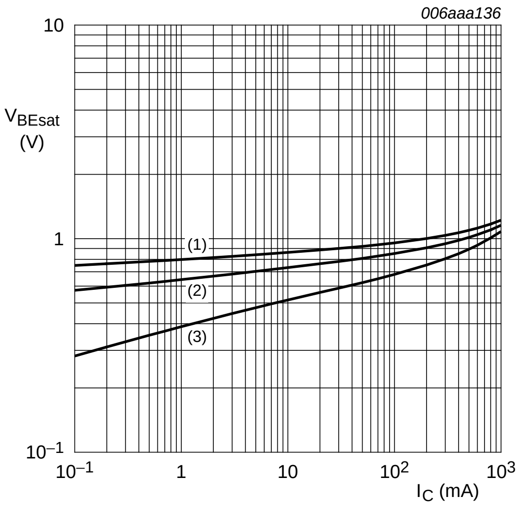

$V_{CE}$ = 1 V

(1) $T_{amb}$ = –55°C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

**Fig 14. BC817-40QA: Base-emitter voltage as a function of collector current; typical values**



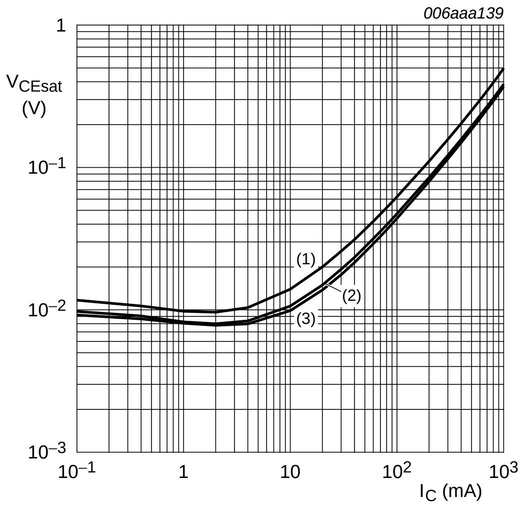

$I_C/I_B$ = 10

(1) $T_{amb}$ = –55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

**Fig 15. BC817-40QA: Base-emitter saturation voltage as a function of collector current; typical values**




$I_C/I_B$ = 10

(1) $T_{amb}$ = –55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

**Fig 16. BC817-40QA: Collector-emitter saturation voltage as a function of collector current; 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

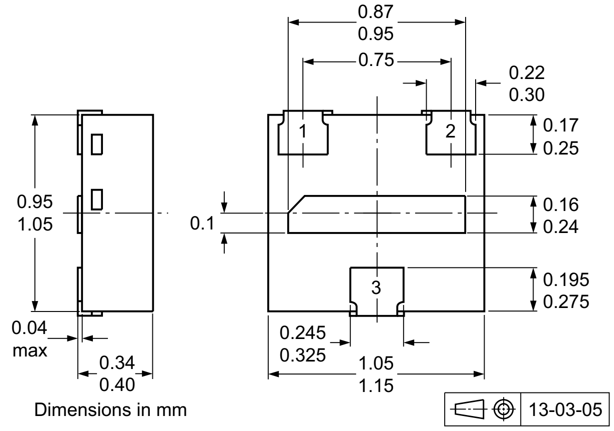



**Fig 17. Package outline DFN1010D-3 (SOT1215)**

# 10. Soldering

**Footprint information for reflow soldering of DFN1010D-3 package** **SOT1215**

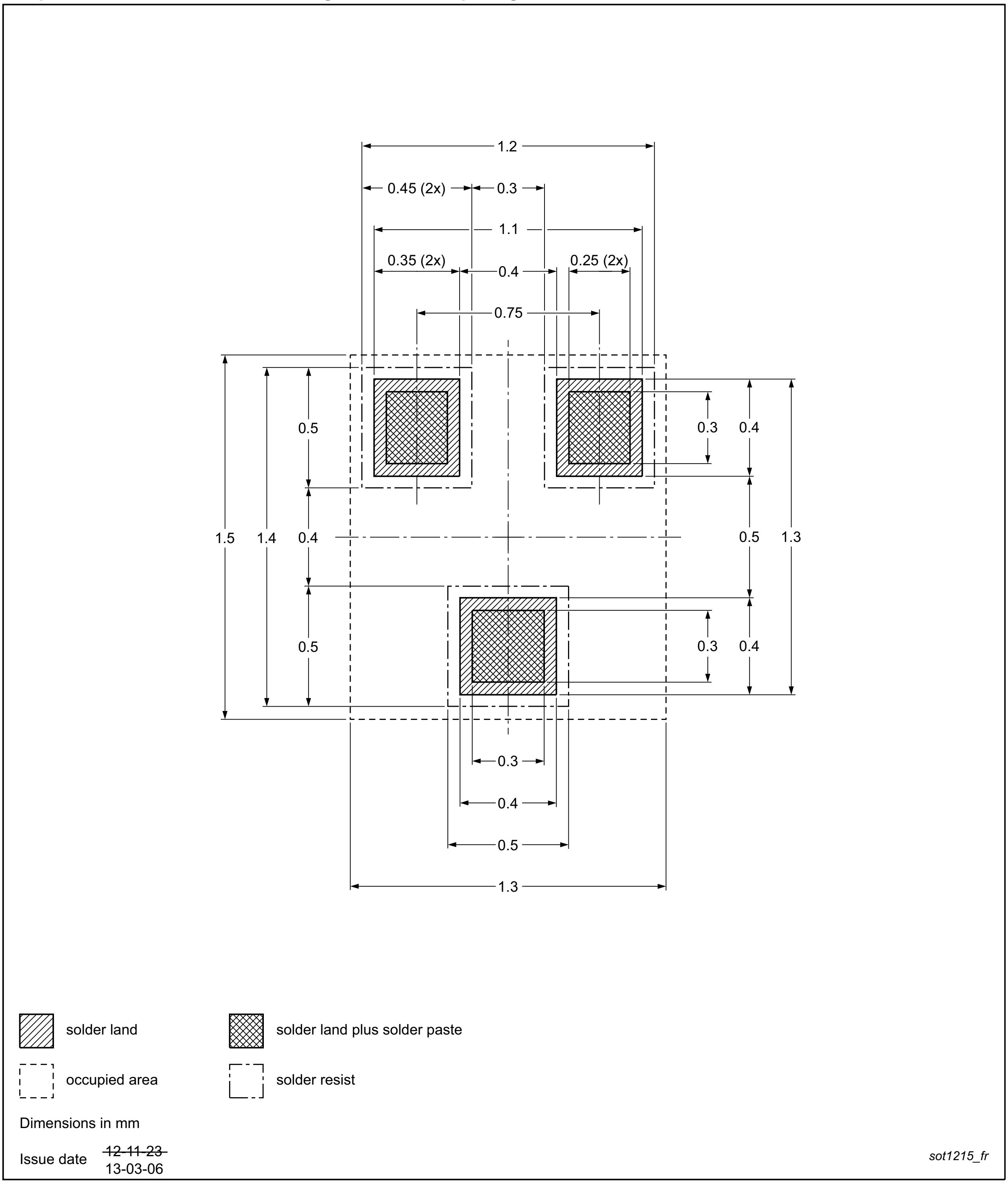



Fig 18. Reflow soldering footprint for DFN1010D-3 (SOT1215)

## 11. Revision history

**Table 9. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BC817-25QA_40QA v.1 | 20130903 | Product data sheet | - | - |

# 12. Legal information

## 12.1 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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## 13. Contact information

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

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

## 14. Contents




**Date of release: 03 September 2013**