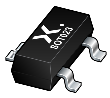


# BC807K series

## 45 V, 500 mA PNP general-purpose transistors

Rev. 2 — 24 April 2018 Product data sheet

## 1 Product profile

### 1.1 General description

PNP general-purpose transistors in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

**Table 1. Product overview**

| Type number | Package | | NPN complement |
|---|---|---|---|
| | Nexperia | JEDEC | |
| BC807K-16 | SOT23 | TO-236AB | BC817K-16 |
| BC807K-25 | | | BC817K-25 |
| BC807K-40 | | | BC817K-40 |

### 1.2 Features and benefits

- Three current gain selections
- High power dissipation capability
- AEC-Q101 qualified

### 1.3 Applications

- General-purpose switching and amplification

nexperia

### 1.4 Quick reference data

**Table 2. Quick reference data**

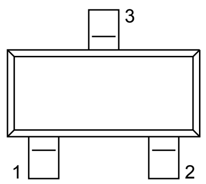
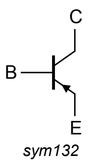
*$T_{amb}$ = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | open base | | - | - | -45 | V |
| $I_C$ | collector current | | | - | - | -500 | mA |
| $I_{CM}$ | peak collector current | single pulse; $t_p \leq 1$ ms | | - | - | -1 | A |
| $h_{FE}$ | DC current gain | $V_{CE}$ = -1 V; $I_C$ = -100 mA | | | | | |
| | BC807K-16 | | [1] | 100 | - | 250 | - |
| | BC807K-25 | | [1] | 160 | - | 400 | - |
| | BC807K-40 | | [1] | 250 | - | 600 | - |

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

## 2 Pinning information

**Table 3. Pinning**

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

## 3 Ordering information

**Table 4. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BC807K-16 | TO-236AB | Plastic surface-mounted package; 3 leads | SOT23 |
| BC807K-25 | | | |
| BC807K-40 | | | |

# 4 Marking

**Table 5. Marking**

| Type number | | Marking code |
|---|---|---|
| BC807K-16 | [1] | HA% |
| BC807K-25 | [1] | HB% |
| BC807K-40 | [1] | HC% |

[1] % = placeholder for manufacturing site code

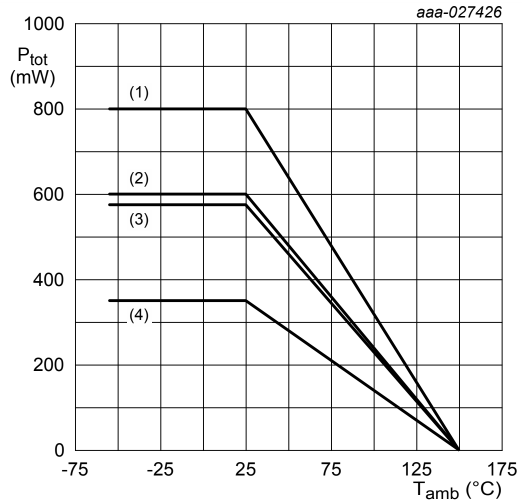
# 5 Limiting values

**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; $t_p \le 1$ ms | | - | -1 | A |
| $I_{BM}$ | peak base current | single pulse; $t_p \le 1$ ms | | - | -200 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \le 25$ °C | [1] | - | 350 | mW |
| | | | [2] | - | 575 | mW |
| | | | [3] | - | 600 | mW |
| | | | [4] | - | 800 | 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 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); 4-layer copper; tin-plated and standard footprint.
[4] Device mounted on an FR4 Printed-Circuit-Board (PCB); 4-layer copper; tin-plated; mounting pad for collector 1 $cm^2$.



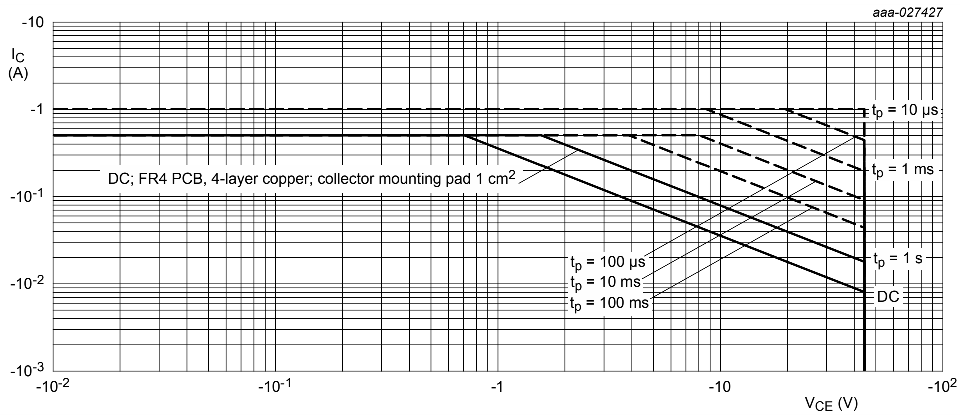

(1) FR4 PCB, 4-layer copper; 1 $cm^2$

(2) FR4 PCB, 4-layer copper; standard footprint

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

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

**Figure 1. Power derating curves**




FR4 PCB, single-sided copper; standard footprint; single pulse;

$T_{amb}$ = 25 °C

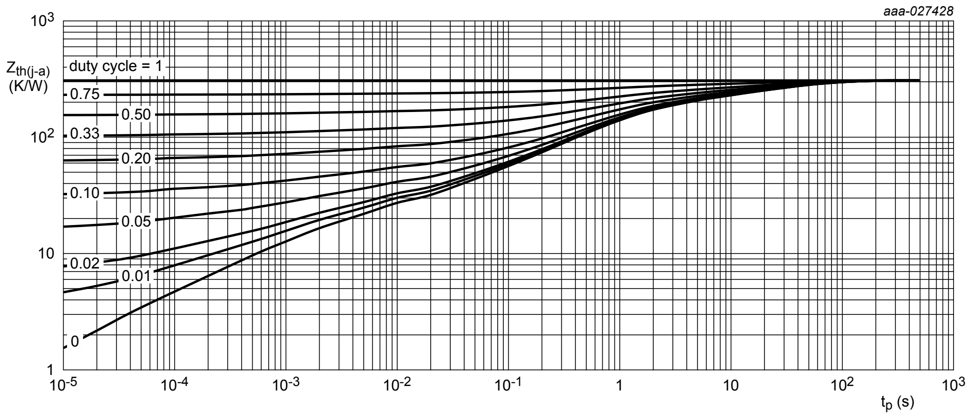
**Figure 2. Safe operating area; junction to ambient; continous and peak collector currents as a function of collector-emitter voltage**

# 6 Thermal characteristics

**Table 7. Thermal characteristics**

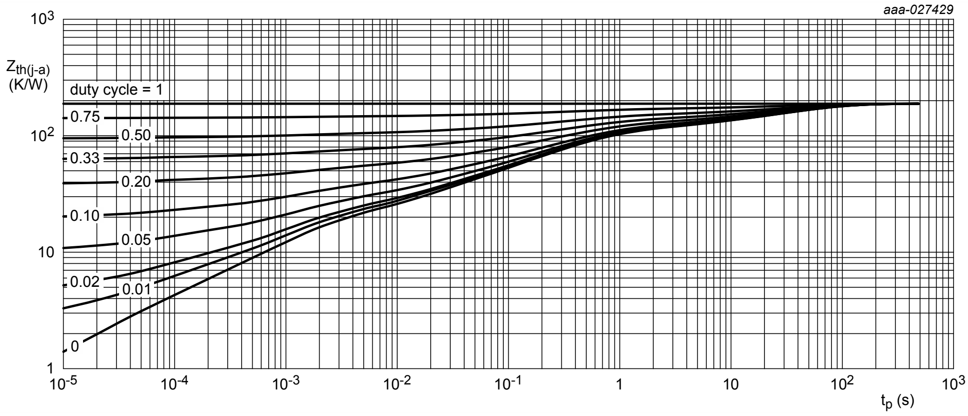
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | - | 358 | K/W |
| | | | [2] | - | - | 218 | K/W |
| | | | [3] | - | - | 209 | K/W |
| | | | [4] | - | - | 157 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | - | - | 60 | K/W |

[1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm$^2$.
[3] Device mounted on an FR4 PCB; 4-layer copper; tin-plated and standard footprint.
[4] Device mounted on an FR4 PCB; 4-layer copper; tin-plated; mounting pad for collector 1 cm$^2$.



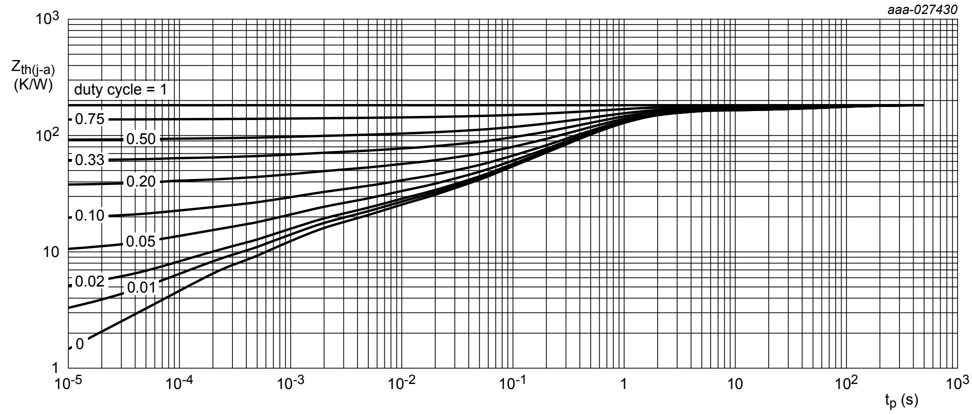

FR4 PCB; single-sided copper; tin-plated and standard footprint

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



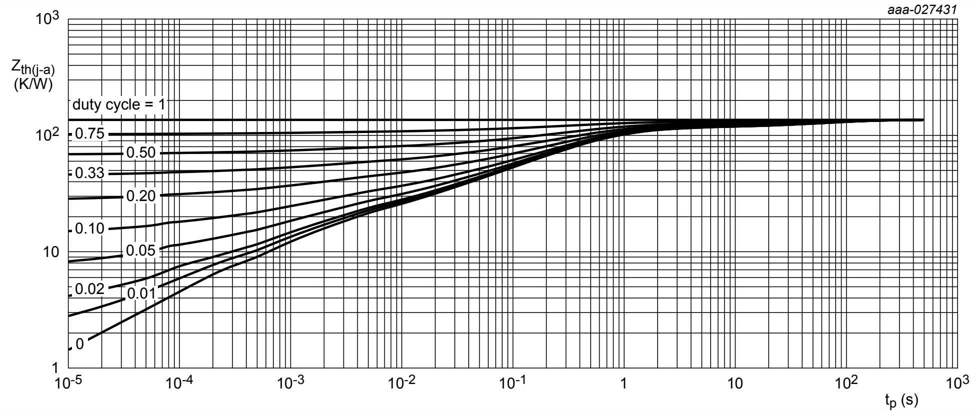

FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm$^2$

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




FR4 PCB; 4-layer copper; tin plated and standard footprint

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




FR4 PCB; 4-layer copper; tin plated; mounting pad for collector 1 $cm^2$

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

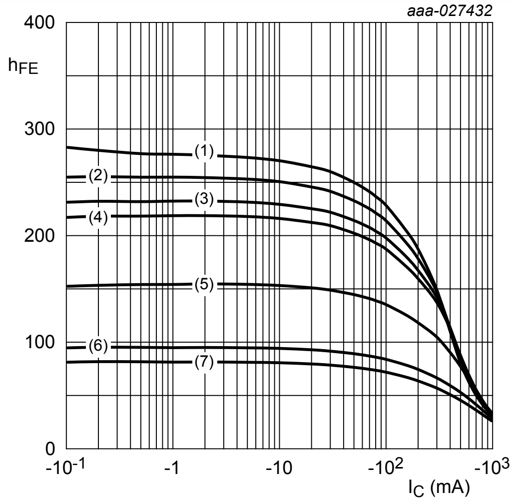
# 7 Characteristics

**Table 8. Characteristics**

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

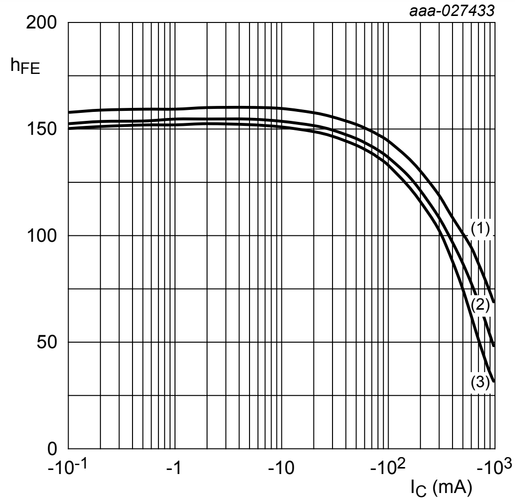
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | $I_C$ = -100 μA; $I_E$ = 0 A | | -50 | - | - | V |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage | $I_C$ = -10 mA; $I_B$ = 0 A | | -45 | - | - | 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 | $V_{CB}$ = -25 V; $I_E$ = 0 A | | - | - | -100 | nA |
| | | $V_{CB}$ = -25 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 | | | | | | |
| | BC807K-16 | $V_{CE}$ = -1 V; $I_C$ = -100 mA | [1] | 100 | - | 250 | |
| | BC807K-25 | $V_{CE}$ = -1 V; $I_C$ = -100 mA | [1] | 160 | - | 400 | |
| | BC807K-40 | $V_{CE}$ = -1 V; $I_C$ = -100 mA | [1] | 250 | - | 600 | |
| | BC807K-16, -25, -40 | $V_{CE}$ = -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 |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = -500 mA; $I_B$ = -50 mA | [1] | - | - | -1.2 | V |
| $V_{BE}$ | base-emitter voltage | $V_{CE}$ = -1 V; $I_C$ = -500 mA | [1] | - | - | -1.2 | V |
| $f_T$ | transition frequency | $V_{CE}$ = -5 V; $I_C$ = -10 mA; f = 100 MHz | | 80 | - | - | MHz |
| $C_c$ | collector capacitance | $V_{CB}$ = -10 V; $I_E$ = $i_e$ = 0 A; f = 1 MHz | | - | 7 | - | pF |
| $C_e$ | emitter capacitance | $V_{EB}$ = -0.5 V; $I_C$ = $i_c$ = 0 A; f = 1 MHz | | | | | |
| | BC807K-16 | | | - | 50 | - | pF |
| | BC807K-25 | | | - | 45 | - | pF |
| | BC807K-40 | | | - | 37 | - | pF |

[1] pulsed; $t_p$ ≤ 300 μs; δ ≤ 0.02



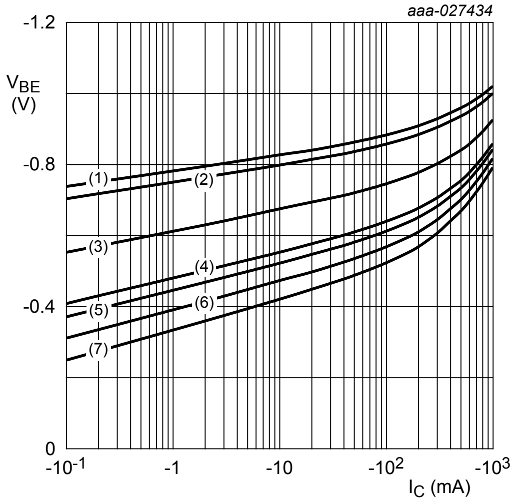

$V_{CE}$ = -1 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 125 °C
(3) $T_{amb}$ = 100 °C
(4) $T_{amb}$ = 85 °C
(5) $T_{amb}$ = 25 °C
(6) $T_{amb}$ = -40 °C
(7) $T_{amb}$ = -55 °C

**Figure 7. BC807K-16: DC current gain as a function of collector current; typical values**




$T_{amb}$ = 25 °C
(1) $V_{CE}$ = -5 V
(2) $V_{CE}$ = -2 V
(3) $V_{CE}$ = -1 V

**Figure 8. BC807K-16: DC current gain as a function of collector current; typical values**




$V_{CE}$ = -1 V

(1) $T_{amb}$ = -55 °C

(2) $T_{amb}$ = -40°C

(3) $T_{amb}$ = 25 °C

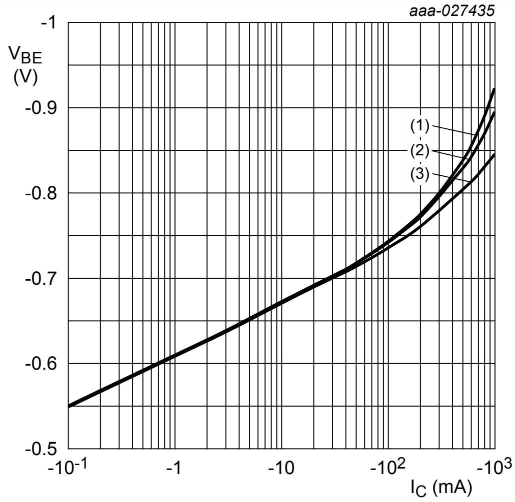
(4) $T_{amb}$ = 85 °C

(5) $T_{amb}$ = 100 °C

(6) $T_{amb}$ = 125 °C

(7) $T_{amb}$ = 150 °C

**Figure 9. BC807K-16: Base-emitter voltage as a function of collector current; typical values**



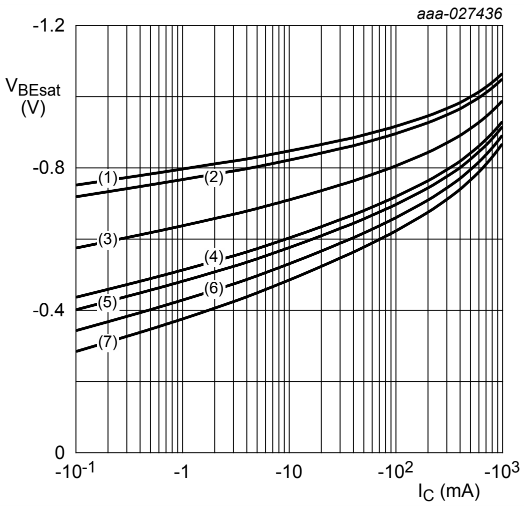

$T_{amb}$ = 25 °C

(1) $V_{CE}$ = -1 V

(2) $V_{CE}$ = -2 V

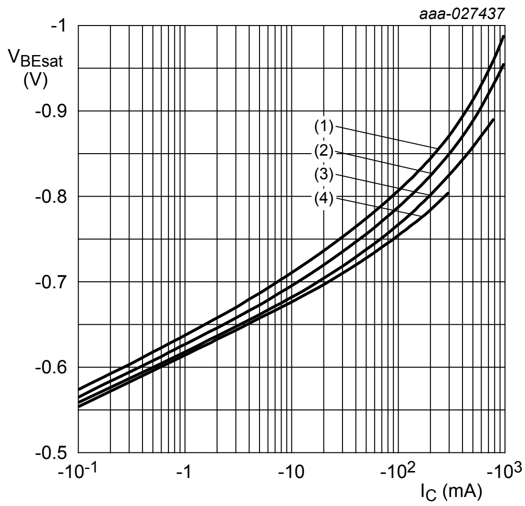
(3) $V_{CE}$ = -5 V

**Figure 10. BC807K-16: Base-emitter voltage as a function of collector current; typical values**



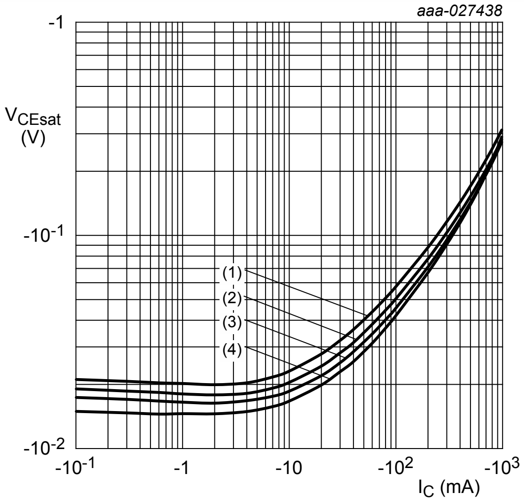

$I_C/I_B$ = 10
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = -40°C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = 85 °C
(5) $T_{amb}$ = 100 °C
(6) $T_{amb}$ = 125 °C
(7) $T_{amb}$ = 150 °C

**Figure 11. BC807K-16: Base-emitter saturation voltage as a function of collector current; typical values**



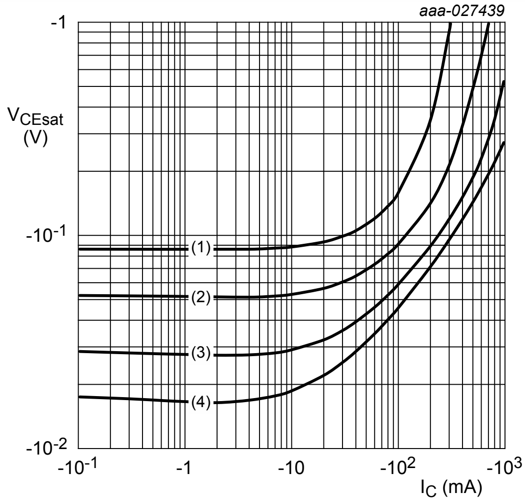

$T_{amb}$ = 25 °C
(1) $I_C/I_B$ = 10
(2) $I_C/I_B$ = 20
(3) $I_C/I_B$ = 50
(4) $I_C/I_B$ = 100

**Figure 12. BC807K-16: Base-emitter saturation voltage as a function of collector current; typical values**



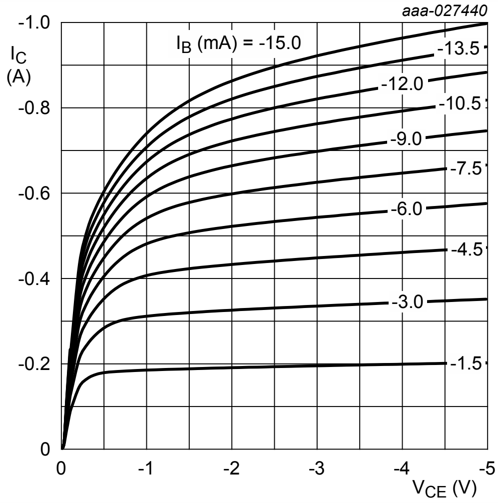

$I_C/I_B$ = 10
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = -40 °C

**Figure 13. BC807K-16: Collector-emitter saturation voltage as a function of collector current; typical values**



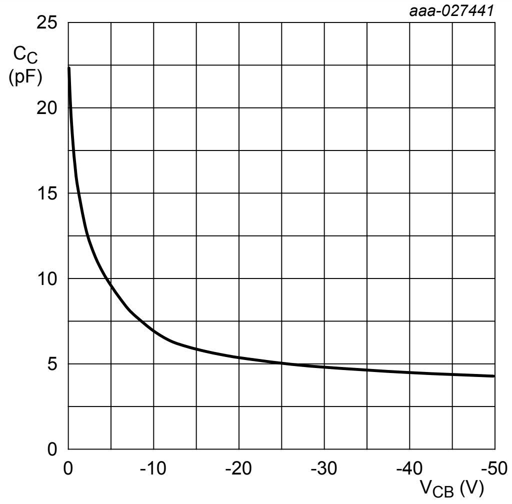

$T_{amb}$ = 25 °C
(1) $I_C/I_B$ = 100
(2) $I_C/I_B$ = 50
(3) $I_C/I_B$ = 20
(4) $I_C/I_B$ = 10

**Figure 14. BC807K-16: Collector-emitter saturation voltage as a function of collector current; typical values**



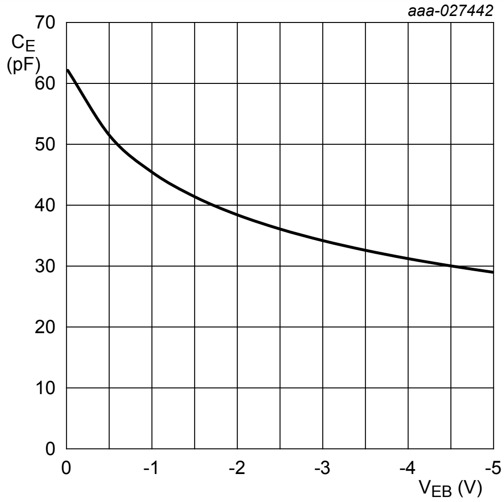

$T_{amb}$ = 25 °C

**Figure 15. BC807K-16: Collector current as a function of collector-emitter voltage; typical values**



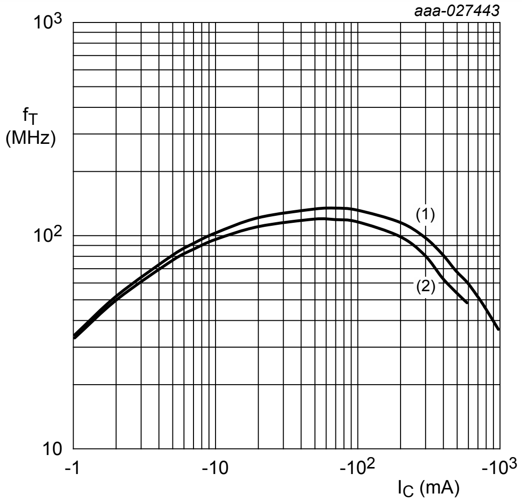

f = 1 MHz; $T_{amb}$ = 25 °C

**Figure 16. BC807K-16: Collector capacitance as a function of collector-base voltage; typical values**




f = 1 MHz; $T_{amb}$ = 25 °C

**Figure 17. BC807K-16: Emitter capacitance as a function of emitter-base voltage; typical values**

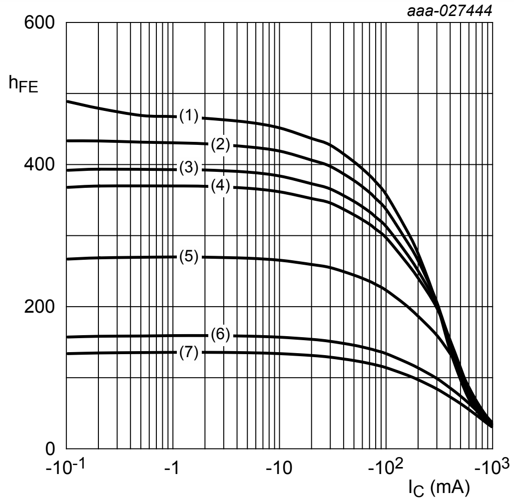



f = 100 MHz; $T_{amb}$ = 25 °C

(1) $V_{CE}$ = -5 V

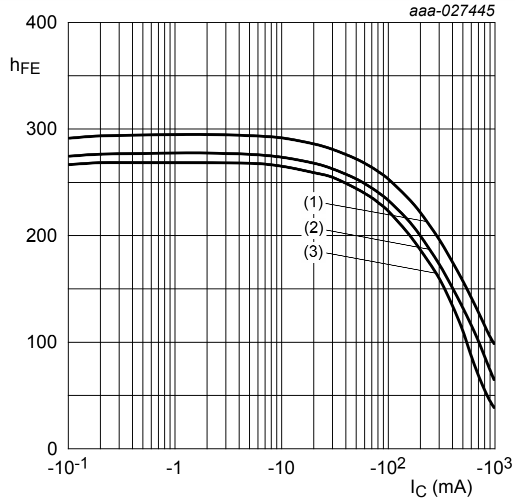
(2) $V_{CE}$ = -1 V

**Figure 18. BC807K-16: Transition frequency as a function of collector current voltage; typical values**



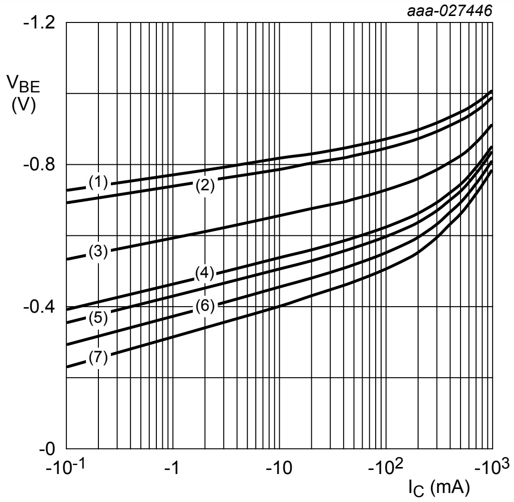

$V_{CE}$ = -1 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 125 °C
(3) $T_{amb}$ = 100 °C
(4) $T_{amb}$ = 85 °C
(5) $T_{amb}$ = 25 °C
(6) $T_{amb}$ = -40 °C
(7) $T_{amb}$ = -55 °C

**Figure 19. BC807K-25: DC current gain as a function of collector current; typical values**



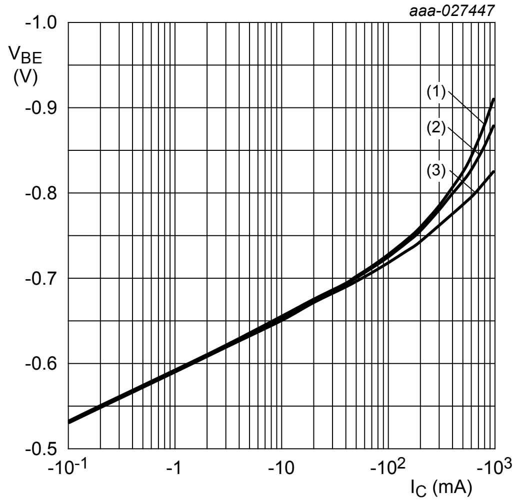

$T_{amb}$ = 25 °C
(1) $V_{CE}$ = -5 V
(2) $V_{CE}$ = -2 V
(3) $V_{CE}$ = -1 V

**Figure 20. BC807K-25: DC current gain as a function of collector current; typical values**



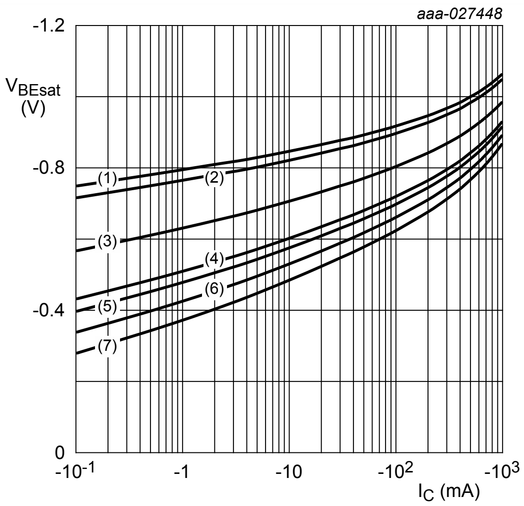

$V_{CE}$ = -1 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = -40°C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = 85 °C
(5) $T_{amb}$ = 100 °C
(6) $T_{amb}$ = 125 °C
(7) $T_{amb}$ = 150 °C

**Figure 21. BC807K-25: Base-emitter voltage as a function of collector current; typical values**



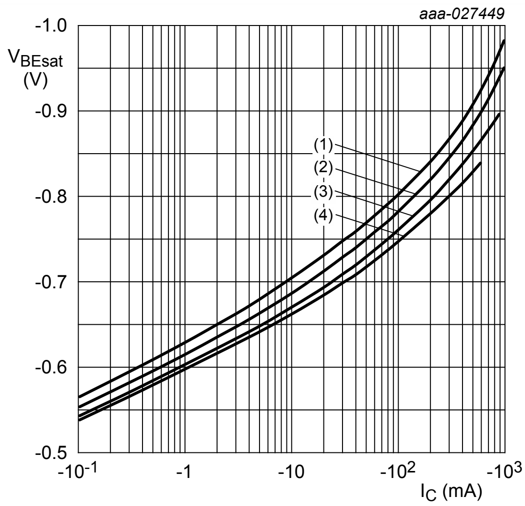

$T_{amb}$ = 25 °C
(1) $V_{CE}$ = -1 V
(2) $V_{CE}$ = -2 V
(3) $V_{CE}$ = -5 V

**Figure 22. BC807K-25: Base-emitter voltage as a function of collector current; typical values**



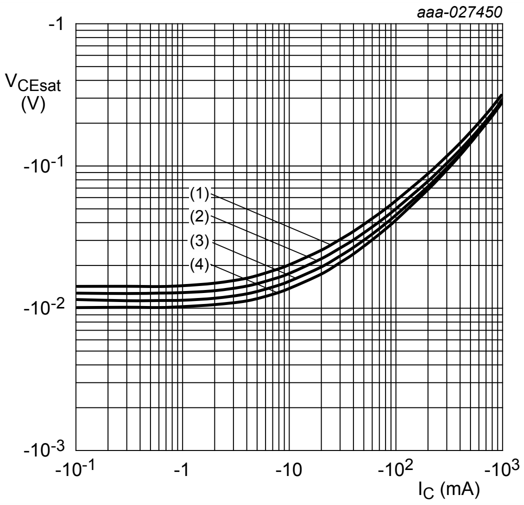

$I_C/I_B = 10$
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = -40°C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = 85 °C
(5) $T_{amb}$ = 100 °C
(6) $T_{amb}$ = 125 °C
(7) $T_{amb}$ = 150 °C

**Figure 23. BC807K-25: Base-emitter saturation voltage as a function of collector current; typical values**



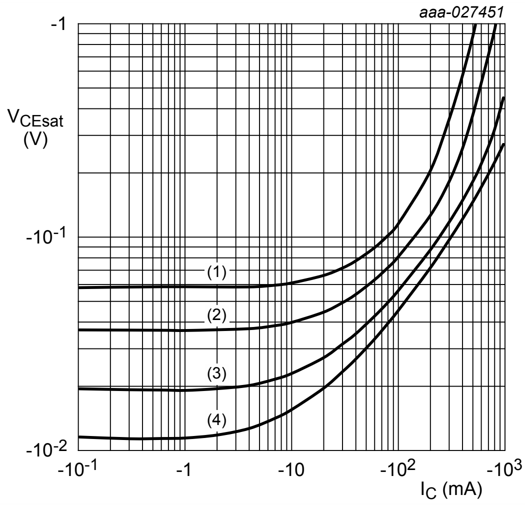

$T_{amb}$ = 25 °C
(1) $I_C/I_B = 10$
(2) $I_C/I_B = 20$
(3) $I_C/I_B = 50$
(4) $I_C/I_B = 100$

**Figure 24. BC807K-25: Base-emitter saturation voltage as a function of collector current; typical values**



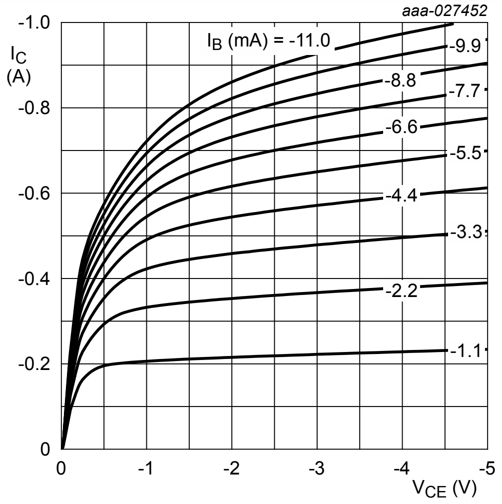

$I_C/I_B = 10$
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = -40 °C

**Figure 25. BC807K-25: Collector-emitter saturation voltage as a function of collector current; typical values**



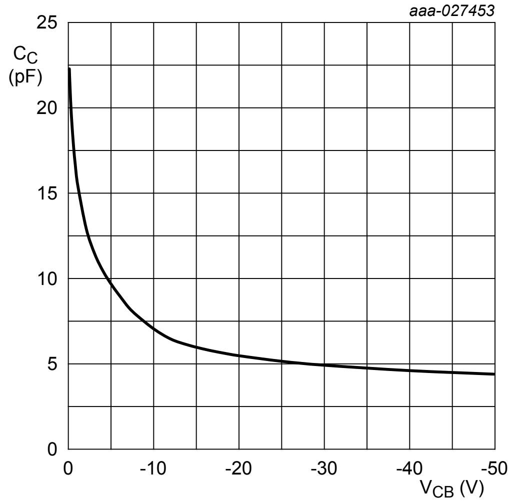

$T_{amb}$ = 25 °C
(1) $I_C/I_B = 100$
(2) $I_C/I_B = 50$
(3) $I_C/I_B = 20$
(4) $I_C/I_B = 10$

**Figure 26. BC807K-25: Collector-emitter saturation voltage as a function of collector current; typical values**



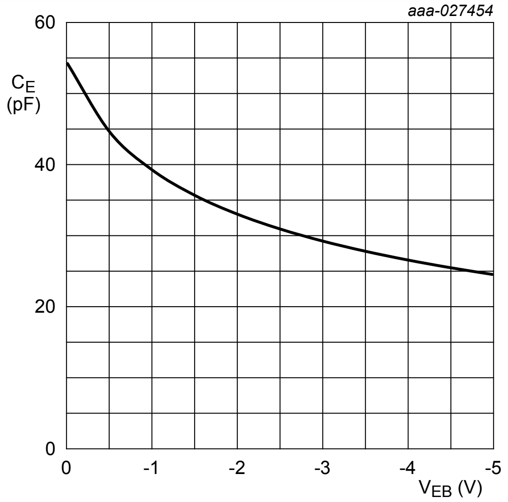

$T_{amb}$ = 25 °C

**Figure 27. BC807K-25: Collector current as a function of collector-emitter voltage; typical values**



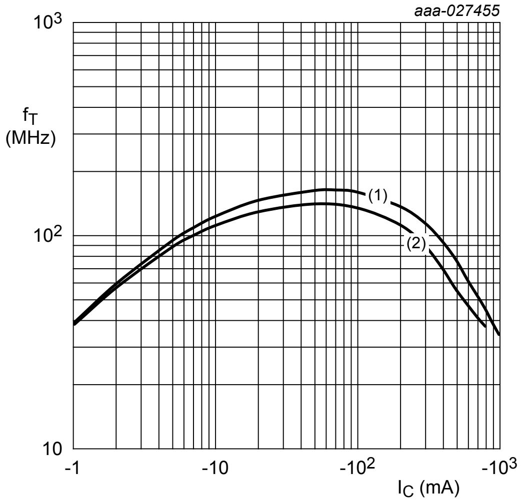

f = 1 MHz; $T_{amb}$ = 25 °C

**Figure 28. BC807K-25: Collector capacitance as a function of collector-base voltage; typical values**




f = 1 MHz; $T_{amb}$ = 25 °C

**Figure 29. BC807K-25: Emitter capacitance as a function of emitter-base voltage; typical values**

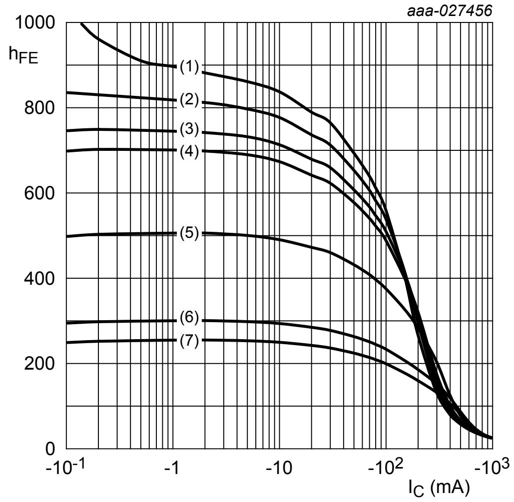



f = 100 MHz; $T_{amb}$ = 25 °C

(1) $V_{CE}$ = -5 V

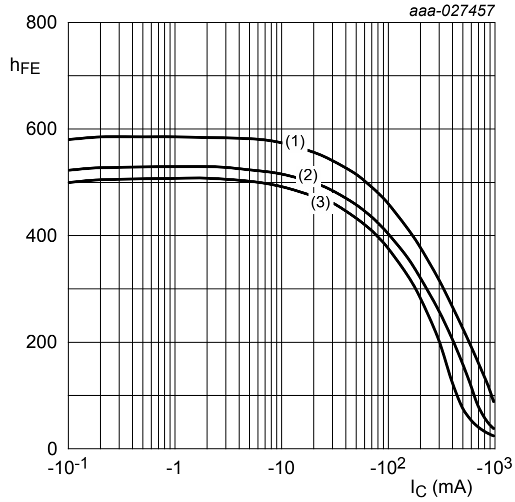
(2) $V_{CE}$ = -1 V

**Figure 30. BC807K-25: Transition frequency as a function of collector current voltage; typical values**



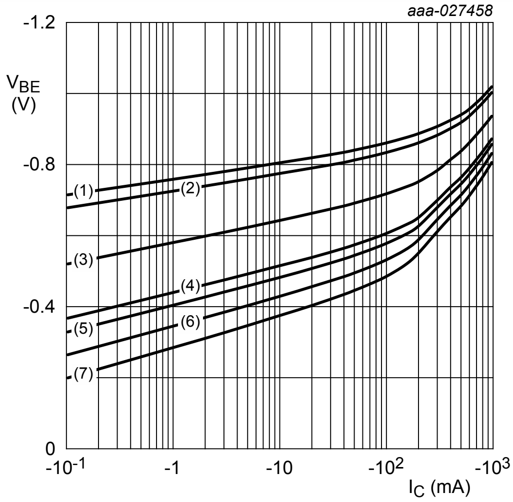

$V_{CE}$ = -1 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 125 °C
(3) $T_{amb}$ = 100 °C
(4) $T_{amb}$ = 85 °C
(5) $T_{amb}$ = 25 °C
(6) $T_{amb}$ = -40 °C
(7) $T_{amb}$ = -55 °C

**Figure 31. BC807K-40: DC current gain as a function of collector current; typical values**



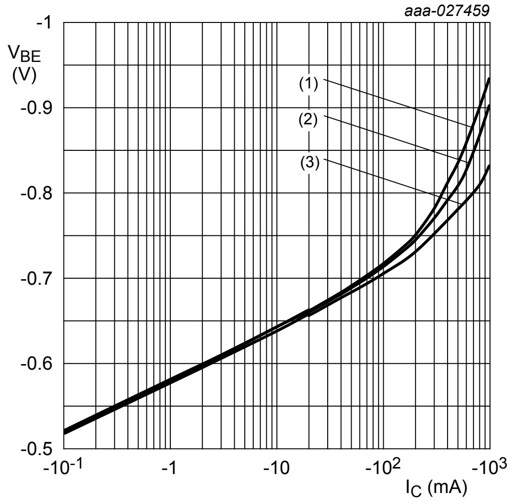

$T_{amb}$ = 25 °C
(1) $V_{CE}$ = -5 V
(2) $V_{CE}$ = -2 V
(3) $V_{CE}$ = -1 V

**Figure 32. BC807K-40: DC current gain as a function of collector current; typical values**



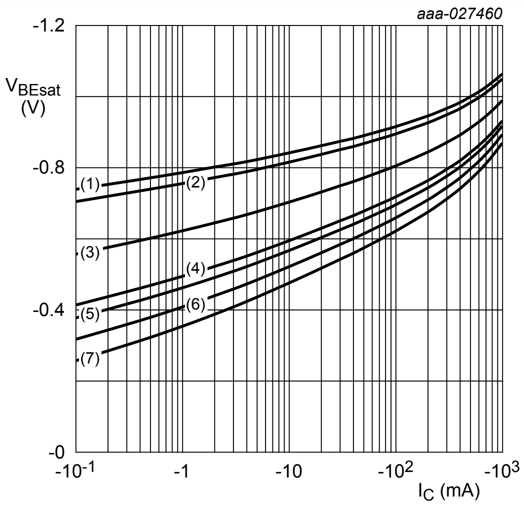

$V_{CE}$ = -1 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = -40°C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = 85 °C
(5) $T_{amb}$ = 100 °C
(6) $T_{amb}$ = 125 °C
(7) $T_{amb}$ = 150 °C

**Figure 33. BC807K-40: Base-emitter voltage as a function of collector current; typical values**



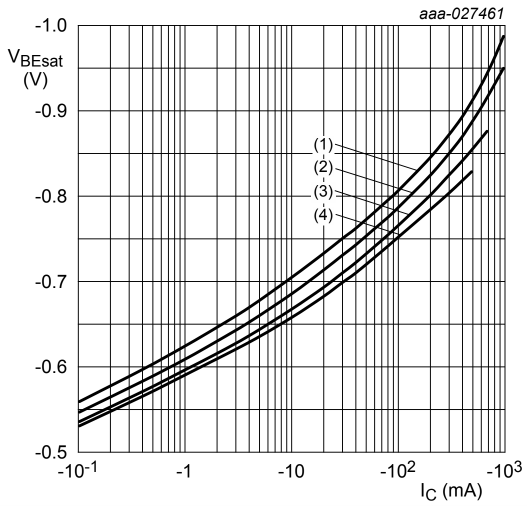

$T_{amb}$ = 25 °C
(1) $V_{CE}$ = -1 V
(2) $V_{CE}$ = -2 V
(3) $V_{CE}$ = -5 V

**Figure 34. BC807K-40: Base-emitter voltage as a function of collector current; typical values**



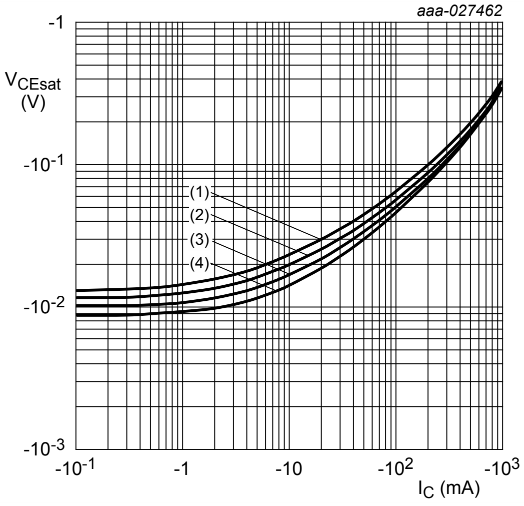

$I_C/I_B$ = 10
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = -40°C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = 85 °C
(5) $T_{amb}$ = 100 °C
(6) $T_{amb}$ = 125 °C
(7) $T_{amb}$ = 150 °C

**Figure 35. BC807K-40: Base-emitter saturation voltage as a function of collector current; typical values**



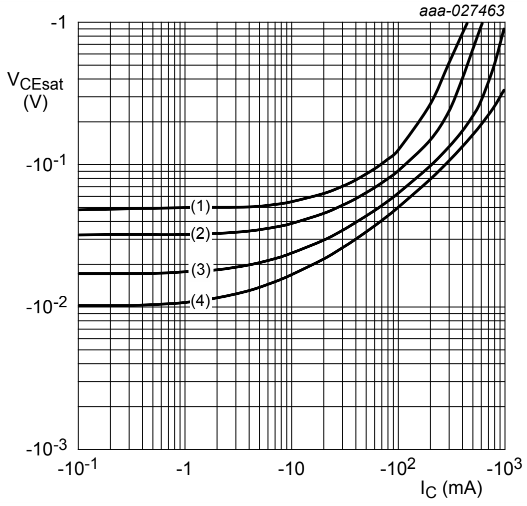

$T_{amb}$ = 25 °C
(1) $I_C/I_B$ = 10
(2) $I_C/I_B$ = 20
(3) $I_C/I_B$ = 50
(4) $I_C/I_B$ = 100

**Figure 36. BC807K-40: Base-emitter saturation voltage as a function of collector current; typical values**



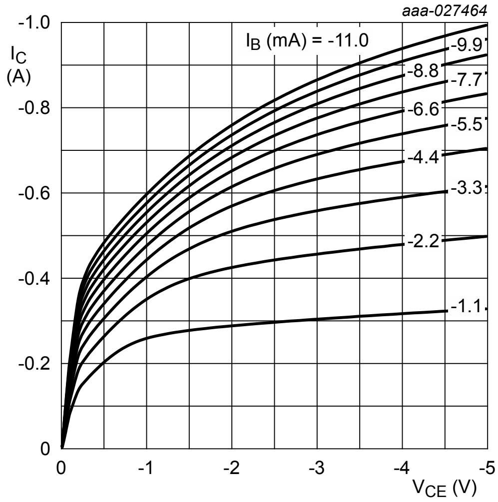

$I_C/I_B$ = 10
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = -40 °C

**Figure 37. BC807K-40: Collector-emitter saturation voltage as a function of collector current; typical values**



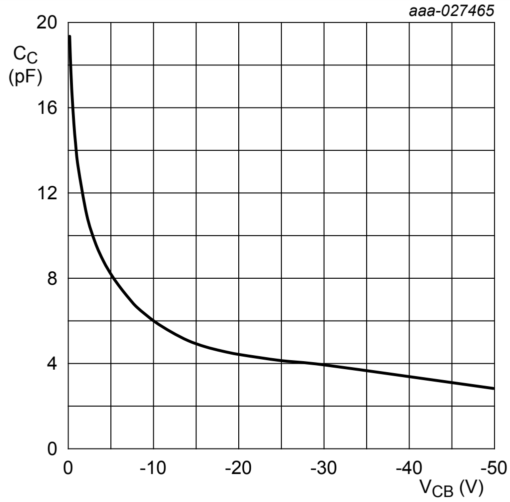

$T_{amb}$ = 25 °C
(1) $I_C/I_B$ = 100
(2) $I_C/I_B$ = 50
(3) $I_C/I_B$ = 20
(4) $I_C/I_B$ = 10

**Figure 38. BC807K-40: Collector-emitter saturation voltage as a function of collector current; typical values**



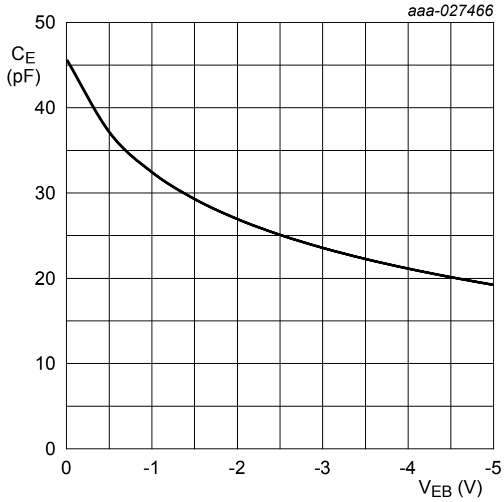

$T_{amb}$ = 25 °C

**Figure 39. BC807K-40: Collector current as a function of collector-emitter voltage; typical values**



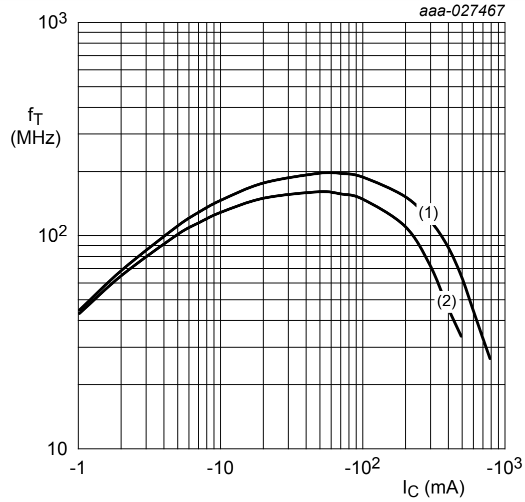

f = 1 MHz; $T_{amb}$ = 25 °C

**Figure 40. BC807K-40: Collector capacitance as a function of collector-base voltage; typical values**




f = 1 MHz; $T_{amb}$ = 25 °C

**Figure 41. BC807K-40: Emitter capacitance as a function of emitter-base voltage; typical values**




f = 100 MHz; $T_{amb}$ = 25 °C

(1) $V_{CE}$ = -5 V

(2) $V_{CE}$ = -1 V

**Figure 42. BC807K-40: Transition frequency as a function of collector current 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

**Table 9. Package outline**

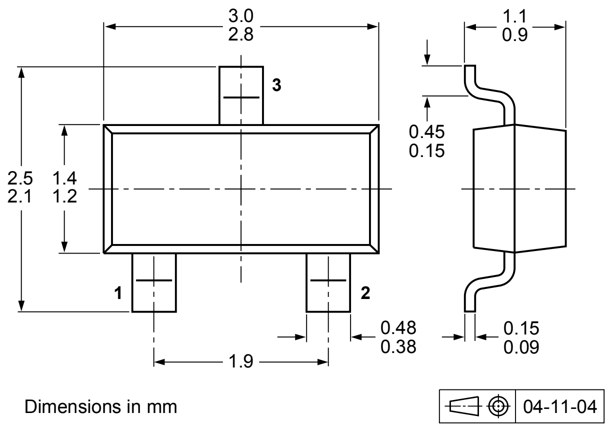



**Figure 43. Package outline SOT23 (TO-236)**

## 10 Soldering

**Table 10. Soldering**

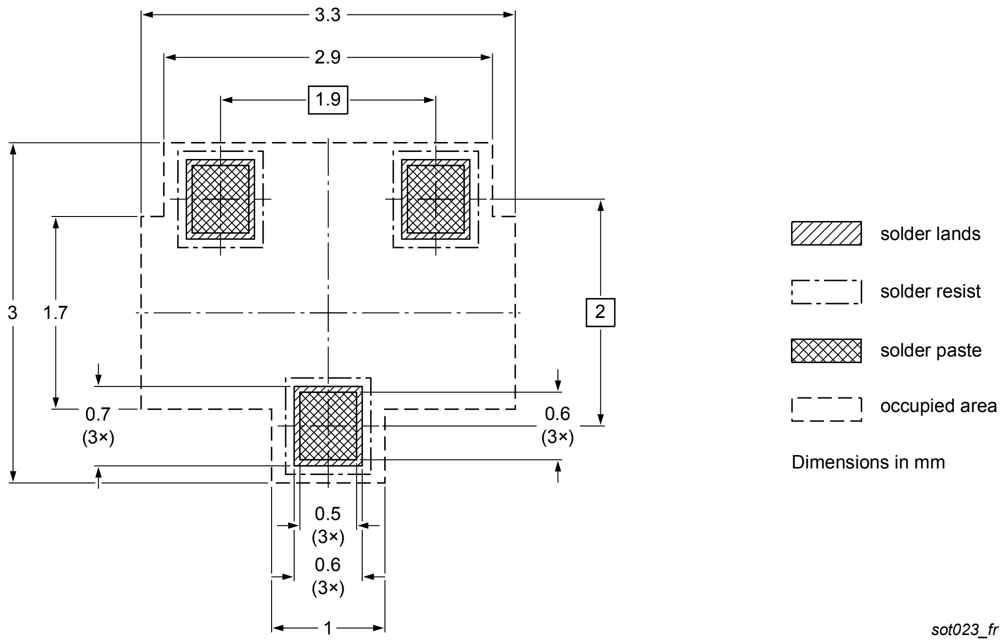



**Figure 44. Reflow soldering footprint for SOT23 (TO-236AB)**

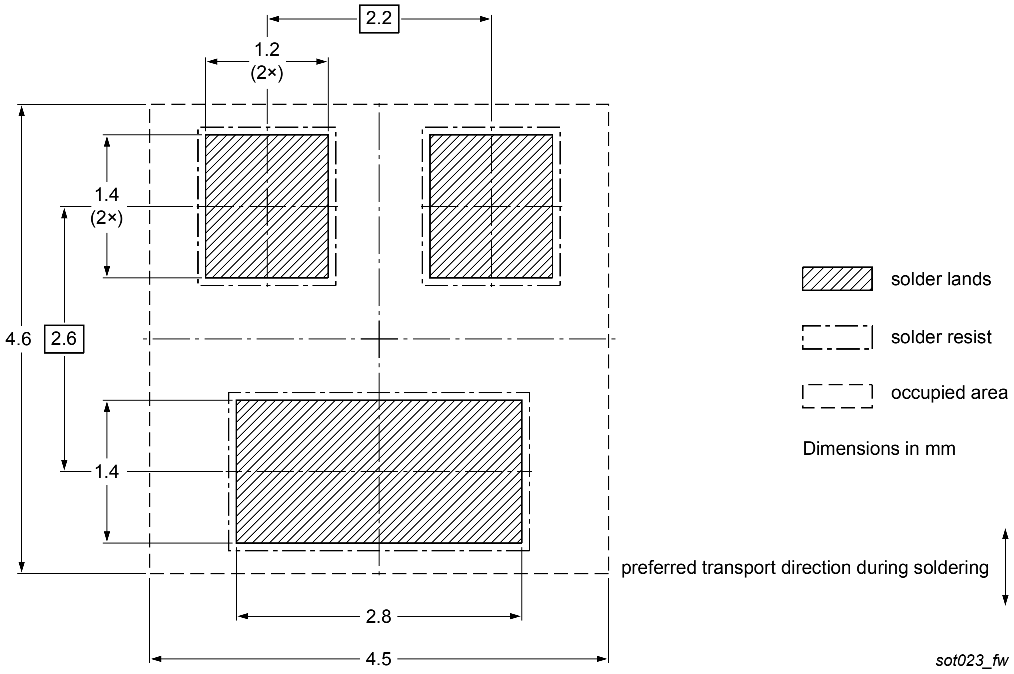



**Figure 45. Wave soldering footprint for SOT23 (TO-236AB)**

## 11 Revision history

**Table 11. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BC807K_SER v.2 | 20180424 | Product data sheet | - | BC807_SER v.1 |
| Modifications: | • Characteristics: Figures are updated | | | |
| BC807_SER v.1 | 20171108 | 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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## Contents





**Date of release: 24 April 2018**
**Document identifier: BC807K_SER**

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