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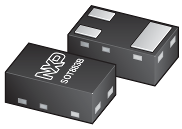


# BC847xMB series

## 45 V, 100 mA NPN general-purpose transistors

Rev. 1 — 5 March 2012 Product data sheet

# 1. Product profile

## 1.1 General description

NPN general-purpose transistors in a leadless ultra small SOT883B Surface-Mounted Device (SMD) plastic package.

**Table 1. Product overview**

| Type number | Package | | | PNP complement |
|---|---|---|---|---|
| | NXP | JEITA | JEDEC | |
| BC847AMB | SOT883B | - | - | BC857AMB |
| BC847BMB | SOT883B | - | - | BC857BMB |
| BC847CMB | SOT883B | - | - | BC857CMB |

## 1.2 Features and benefits

- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm
- Power dissipation comparable to SOT23
- AEC-Q101 qualified

## 1.3 Applications

- General-purpose switching and amplification
- Mobile applications

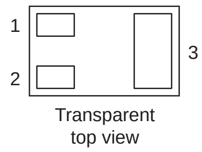
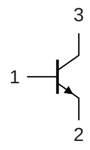
## 1.4 Quick reference data

**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 | | - | - | 100 | mA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 5 V; $I_C$ = 2 mA | | | | |
| | BC847AMB | | 110 | - | 220 | |
| | BC847BMB | | 200 | - | 450 | |
| | BC847CMB | | 420 | - | 800 | |

# 2. Pinning information

**Table 3. Pinning**

| Pin | Description | Simplified outline | Graphic symbol |
|---|---|---|---|
| 1 | base |   |   |
| 2 | emitter | | |
| 3 | collector | | |

# 3. Ordering information

**Table 4. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BC847xMB series | - | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.37 mm | SOT883B |

# 4. Marking

**Table 5. Marking codes**

| Type number | Marking code[1] |
|---|---|
| BC847AMB | 0100 0001 |
| BC847BMB | 0100 0010 |
| BC847CMB | 0100 0011 |

[1] For SOT883B binary marking code description, see Figure 1.

## 4.1 Binary marking code description

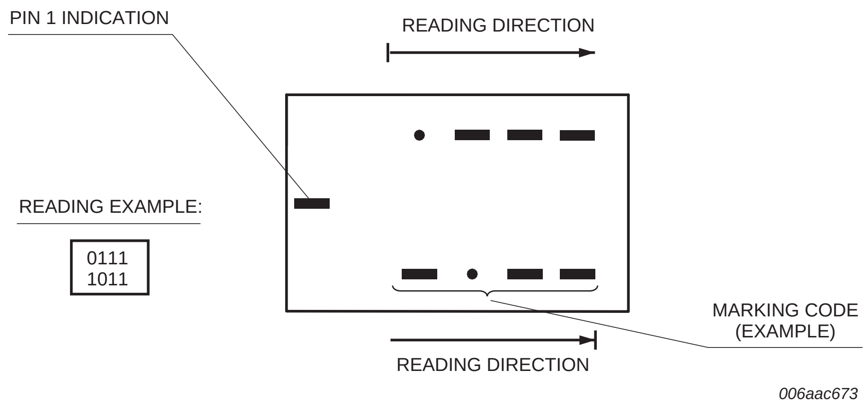



**Fig 1. SOT883B binary marking code description**

## 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 | | - | 6 | 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 | single pulse; $t_p \leq 1$ ms | | - | 100 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C | [1][2] | - | 250 | 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] Reflow soldering is the only recommended soldering method.

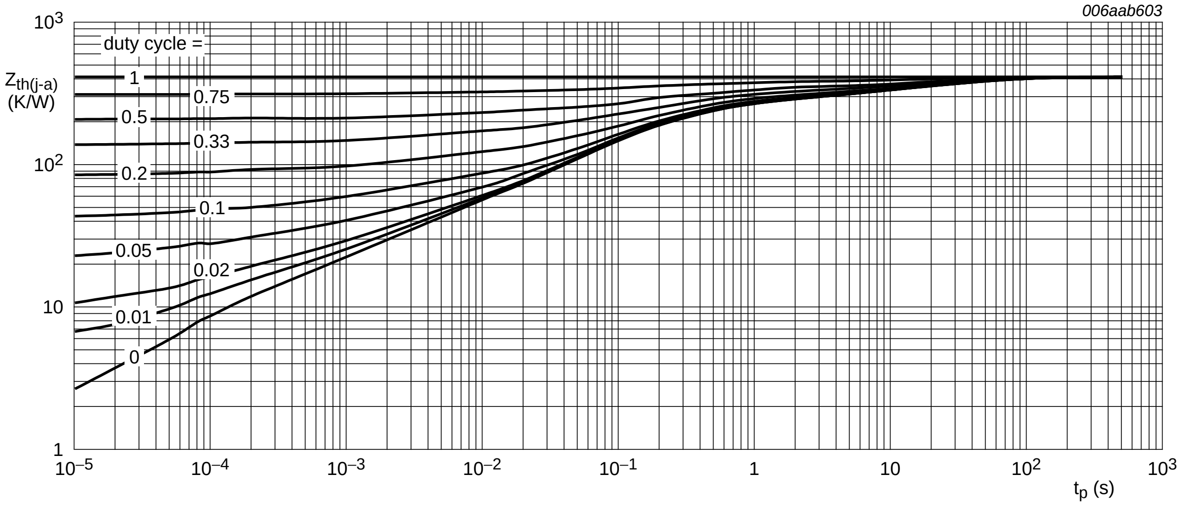
# 6. Thermal characteristics

**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][2] | - | - | 500 | K/W |

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

[2] Reflow soldering is the only recommended soldering method.




FR4 PCB, standard footprint

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

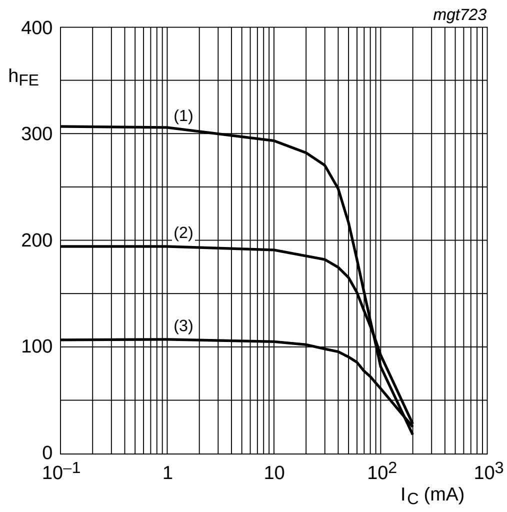
## 7. Characteristics

**Table 8. Characteristics**

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

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 30 V; $I_E$ = 0 A | | - | - | 15 | nA |
| | | $V_{CB}$ = 30 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 | $V_{CE}$ = 5 V; $I_C$ = 2 mA | | | | | |
| | BC847AMB | | | 110 | - | 220 | |
| | BC847BMB | | | 200 | - | 450 | |
| | BC847CMB | | | 420 | - | 800 | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 10 mA; $I_B$ = 0.5 mA | | - | 90 | 200 | mV |
| | | $I_C$ = 100 mA; $I_B$ = 5 mA | [1] | - | 200 | 400 | mV |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = 10 mA; $I_B$ = 0.5 mA | | - | 700 | - | mV |
| | | $I_C$ = 100 mA; $I_B$ = 5 mA | [1] | - | 900 | - | mV |
| $V_{BE}$ | base-emitter voltage | $I_C$ = 2 mA; $V_{CE}$ = 5 V | | 580 | 660 | 700 | mV |
| | | $I_C$ = 10 mA; $V_{CE}$ = 5 V | | - | - | 770 | mV |
| $f_T$ | transition frequency | $V_{CE}$ = 5 V; $I_C$ = 10 mA; f = 100 MHz | | 100 | - | - | MHz |
| $C_c$ | collector capacitance | $V_{CB}$ = 10 V; $I_E$ = $i_e$ = 0 A; f = 1 MHz | | - | - | 1.5 | pF |
| $C_e$ | emitter capacitance | $V_{EB}$ = 0.5 V; $I_C$ = $i_c$ = 0 A; f = 1 MHz | | - | 11 | - | pF |
| NF | noise figure | $I_C$ = 200 μA; $V_{CE}$ = 5 V; $R_S$ = 2 kΩ; f = 1 kHz; B = 200 Hz | | - | 2 | 10 | dB |

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



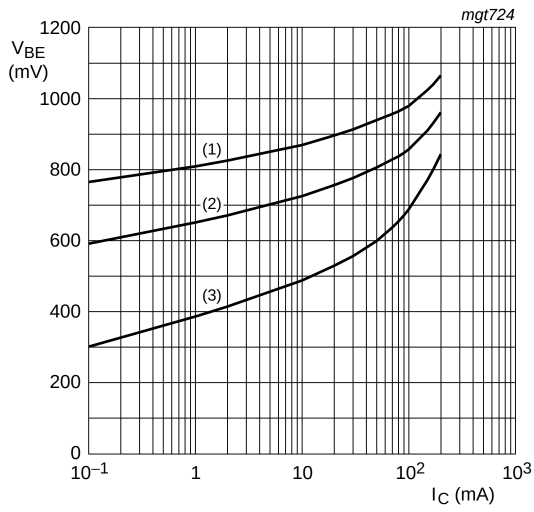

$V_{CE}$ = 5 V

(1) $T_{amb}$ = 150 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −55 °C

**Fig 3. BC847AMB: DC current gain as a function of collector current; typical values**



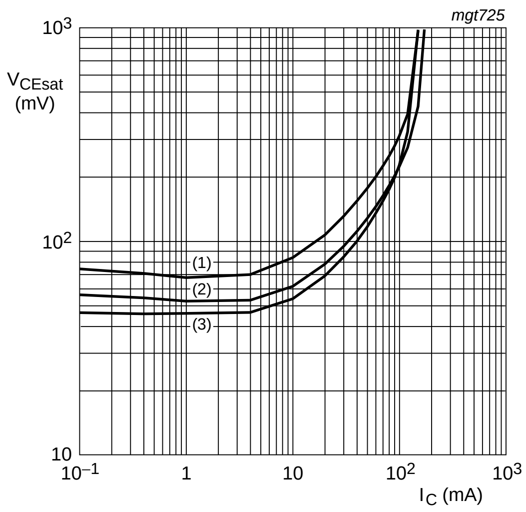

$V_{CE}$ = 5 V

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 150 °C

**Fig 4. BC847AMB: Base-emitter voltage as a function of collector current; typical values**



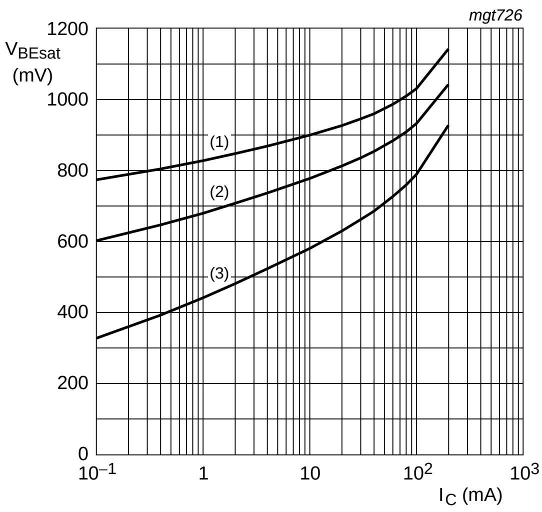

$I_C/I_B$ = 20

(1) $T_{amb}$ = 150 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −55 °C

**Fig 5. BC847AMB: Collector-emitter saturation voltage as a function of collector current; typical values**



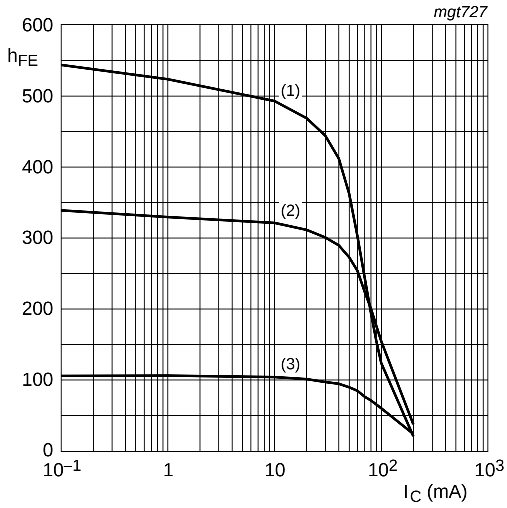

$I_C/I_B$ = 10

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 150 °C

**Fig 6. BC847AMB: Base-emitter saturation voltage as a function of collector current; typical values**



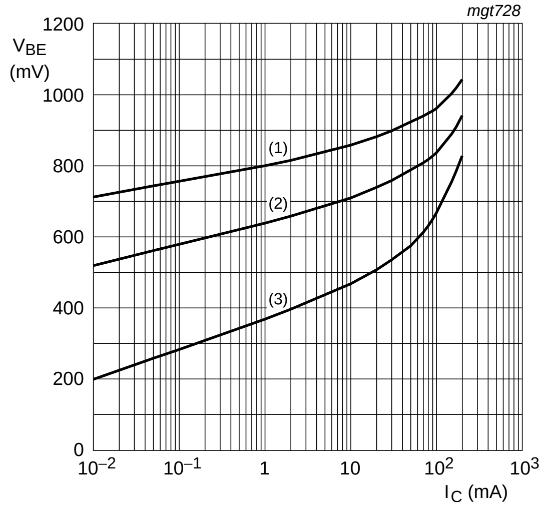

$V_{CE}$ = 5 V

(1) $T_{amb}$ = 150 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −55 °C

**Fig 7. BC847BMB: DC current gain as a function of collector current; typical values**



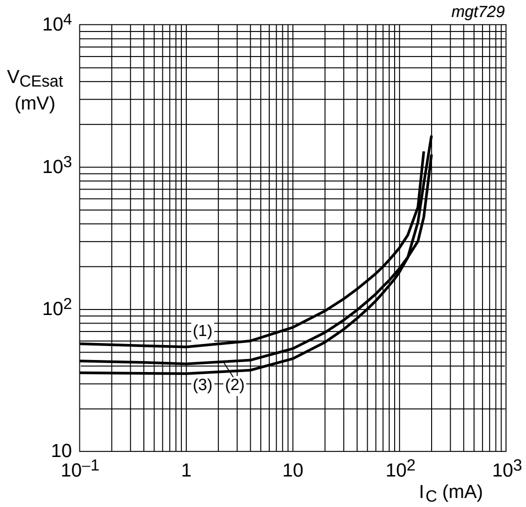

$V_{CE}$ = 5 V

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 150 °C

**Fig 8. BC847BMB: Base-emitter voltage as a function of collector current; typical values**



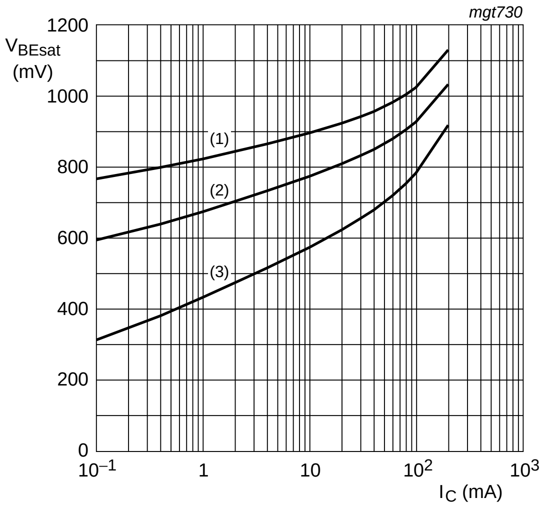

$I_C/I_B$ = 20

(1) $T_{amb}$ = 150 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −55 °C

**Fig 9. BC847BMB: Collector-emitter saturation voltage as a function of collector current; typical values**



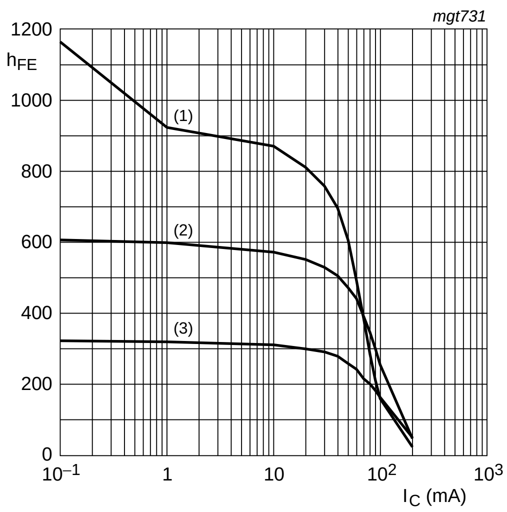

$I_C/I_B$ = 10

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 150 °C

**Fig 10. BC847BMB: Base-emitter saturation voltage as a function of collector current; typical values**



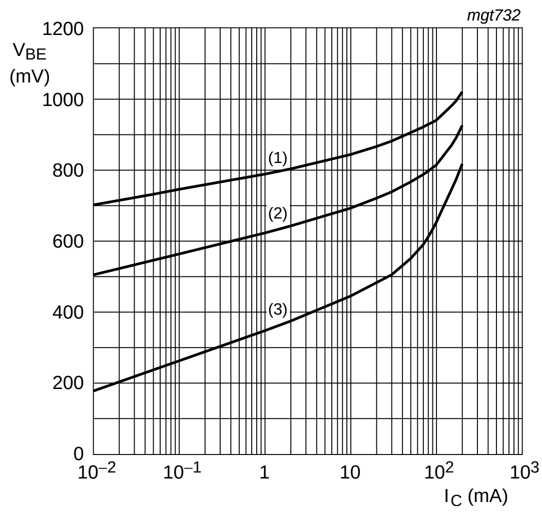

$V_{CE}$ = 5 V

(1) $T_{amb}$ = 150 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = –55 °C

**Fig 11. BC847CMB: DC current gain as a function of collector current; typical values**



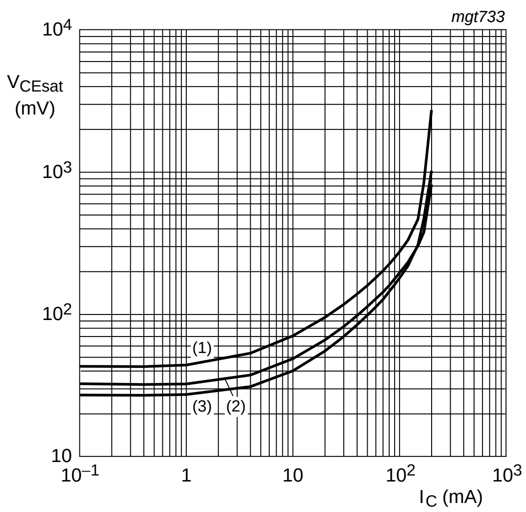

$V_{CE}$ = 5 V

(1) $T_{amb}$ = –55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 150 °C

**Fig 12. BC847CMB: Base-emitter voltage as a function of collector current; typical values**



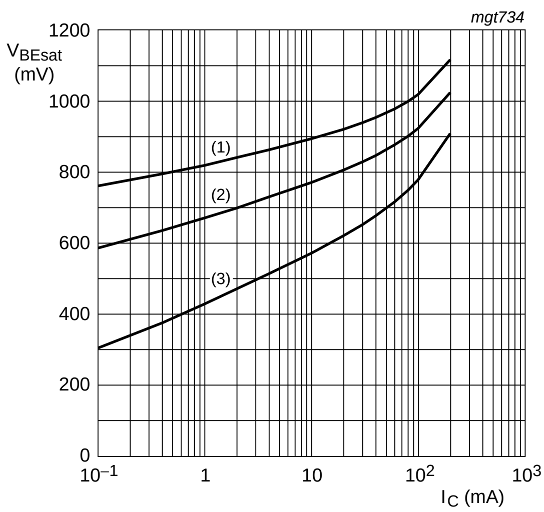

$I_C/I_B$ = 20

(1) $T_{amb}$ = 150 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = –55 °C

**Fig 13. BC847CMB: Collector-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) $T_{amb}$ = 150 °C

**Fig 14. BC847CMB: Base-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

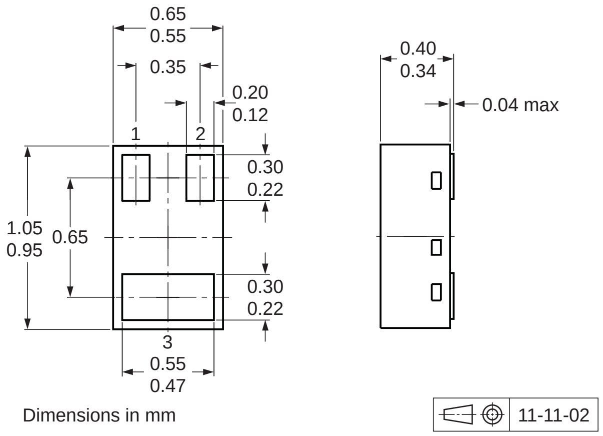



**Fig 15. Package outline SOT883B**

# 10. Packing information

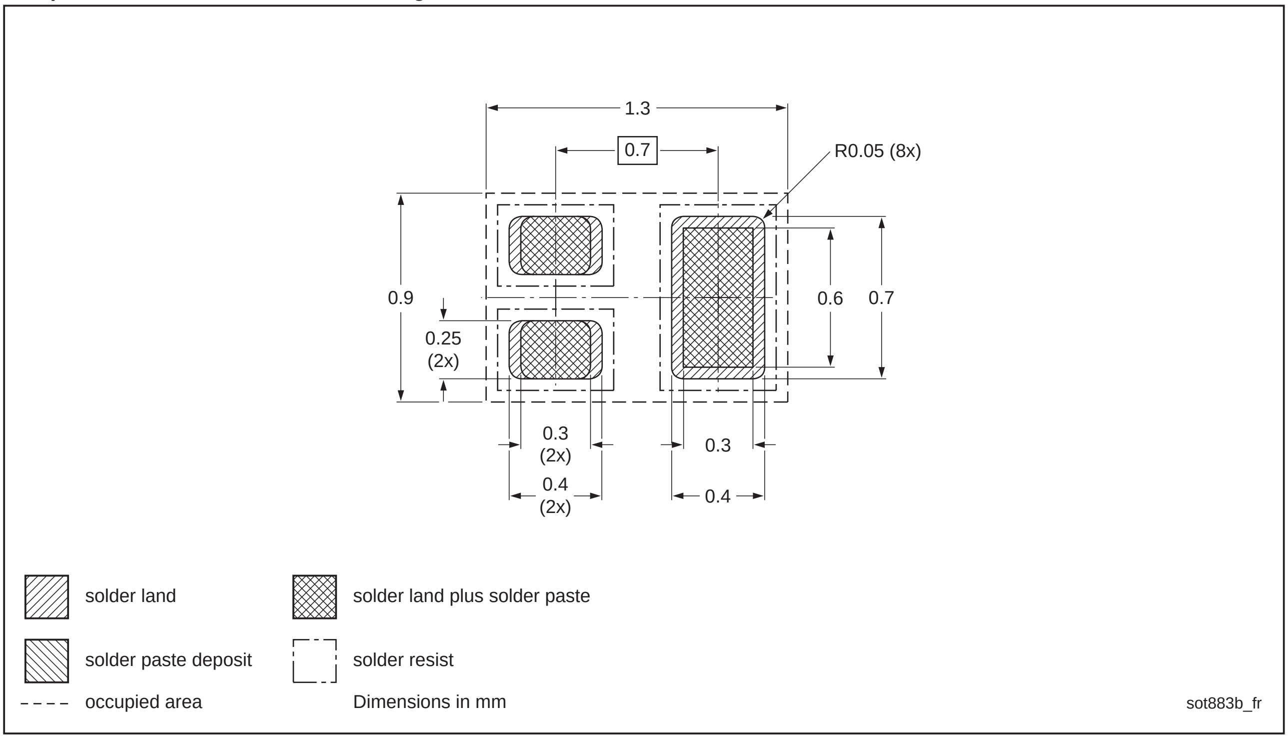
**Table 9. Packing methods**
*The indicated -xxx are the last three digits of the 12NC ordering code.*[1]

| Type number | Package | Description | Packing quantity |
|---|---|---|---|
| | | | 10000 |
| BC847xMB series | SOT883B | 2 mm pitch, 8 mm tape and reel | -315 |

[1] For further information and the availability of packing methods, see Section 14.

# 11. Soldering

**Footprint information for reflow soldering** **SOT883B**




Reflow soldering is the only recommended soldering method.

**Fig 16. Reflow soldering footprint SOT883B**

## 12. Revision history

**Table 10. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BC847XMB_SER v.1 | 20120305 | Product data sheet | - | - |

# 13. Legal information

## 13.1 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".

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## 15. Contents





**Date of release: 5 March 2012**

**Document identifier: BC847XMB_SER**