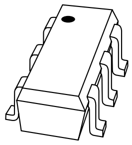


# PBSS9110Y

100 V, 1 A PNP low $V_{CEsat}$ (BISS) transistor

Rev. 02 — 22 November 2009 Product data sheet

## 1. Product profile

### 1.1 General description

PNP low $V_{CEsat}$ transistor in a SOT363 (SC-88) plastic package.

### 1.2 Features

- SOT363 package
- Low collector-emitter saturation voltage $V_{CEsat}$
- High collector current capability $I_C$ and $I_{CM}$
- High efficiency leading to less heat generation

### 1.3 Applications

- Major application segments:
  - Automotive 42 V power
  - Telecom infrastructure
  - Industrial
- Peripheral driver:
  - Driver in low supply voltage applications (e.g. lamps and LEDs)
  - Inductive load driver (e.g. relays, buzzers and motors)
- DC-to-DC converter

### 1.4 Quick reference data

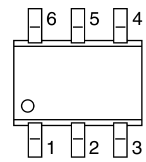
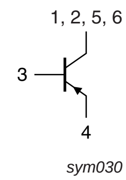
**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | | - | - | –100 | V |
| $I_C$ | collector current (DC) | | - | - | –1 | A |
| $I_{CM}$ | peak collector current | | - | - | –3 | A |
| $R_{CEsat}$ | equivalent on-resistance | | - | - | 320 | mΩ |

founded by Philips

## 2. Pinning information

**Table 2. Discrete pinning**

| Pin | Description | Simplified outline | Symbol |
|---|---|---|---|
| 1, 2, 5, 6 | collector |   |   |
| 3 | base | | |
| 4 | emitter | | |

## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PBSS9110Y | - | plastic surface mounted package; 6 leads | SOT363 |

## 4. Marking

**Table 4. Marking**

| Type number | Marking code |
|---|---|
| PBSS9110Y | 91*[1] |

[1] * = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

## 5. Limiting values

**Table 5. Limiting values**

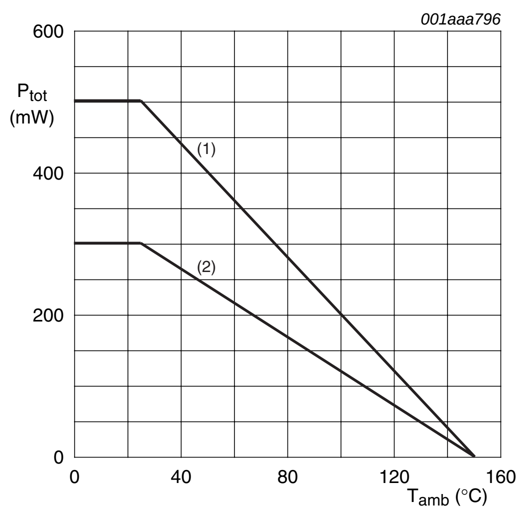
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CBO}$ | collector-base voltage | open emitter | | - | –120 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | | - | –100 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | | - | –5 | V |
| $I_{CM}$ | peak collector current | $T_{j(max)}$ | | - | –3 | A |
| $I_C$ | collector current (DC) | | | - | –1 | A |
| $I_B$ | base current (DC) | | | - | –0.3 | A |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 290 | mW |
| | | | [2] | | 480 | mW |
| | | | [3] | | 625 | mW |
| $T_j$ | junction temperature | | | - | 150 | °C |
| $T_{amb}$ | operating ambient temperature | | | –65 | +150 | °C |
| $T_{stg}$ | storage temperature | | | –65 | +150 | °C |

[1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.

[2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 1cm$^2$ collector mounting pad.

[3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6cm$^2$ collector mounting pad.




(1) 1cm$^2$ collector mounting pad

(2) Standard footprint

**Fig 1. Power derating curves**

## 6. Thermal characteristics

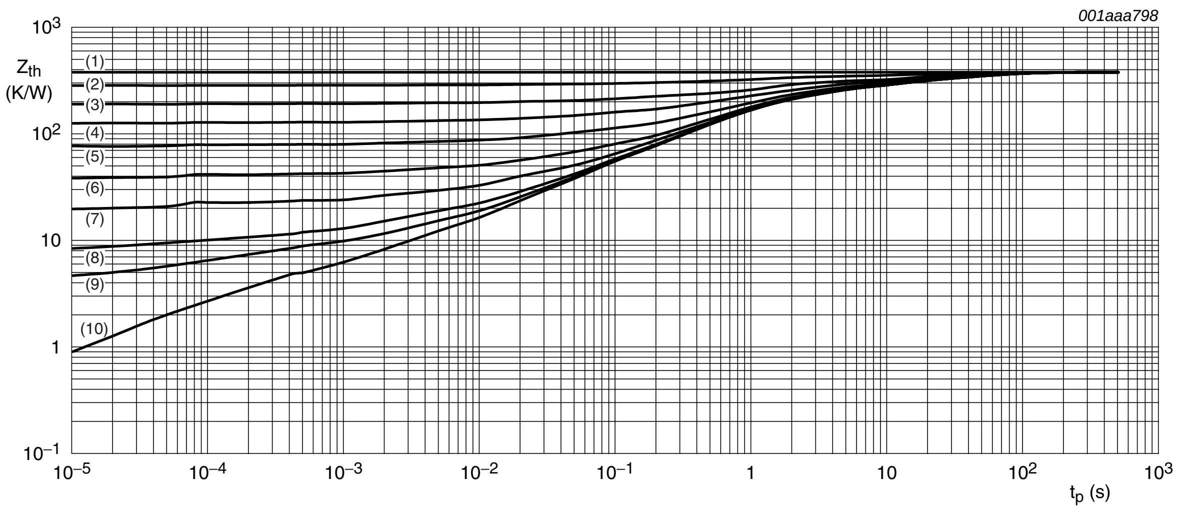
**Table 6. Thermal characteristics**

| Symbol | Parameter | Conditions | | Typ | Unit |
|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | 431 | K/W |
| | | | [2] | 260 | K/W |
| | | | [3] | 200 | K/W |
| $R_{th(j-s)}$ | thermal resistance from junction to soldering | in free air | [1] | 85 | K/W |

[1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint

[2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 1cm$^2$ collector mounting pad.

[3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6cm$^2$ collector mounting pad.




Mounted on FR4 PCB; standard footprint

(1) $\delta = 1$

(2) $\delta = 0.75$

(3) $\delta = 0.5$

(4) $\delta = 0.33$

(5) $\delta = 0.2$

(6) $\delta = 0.1$

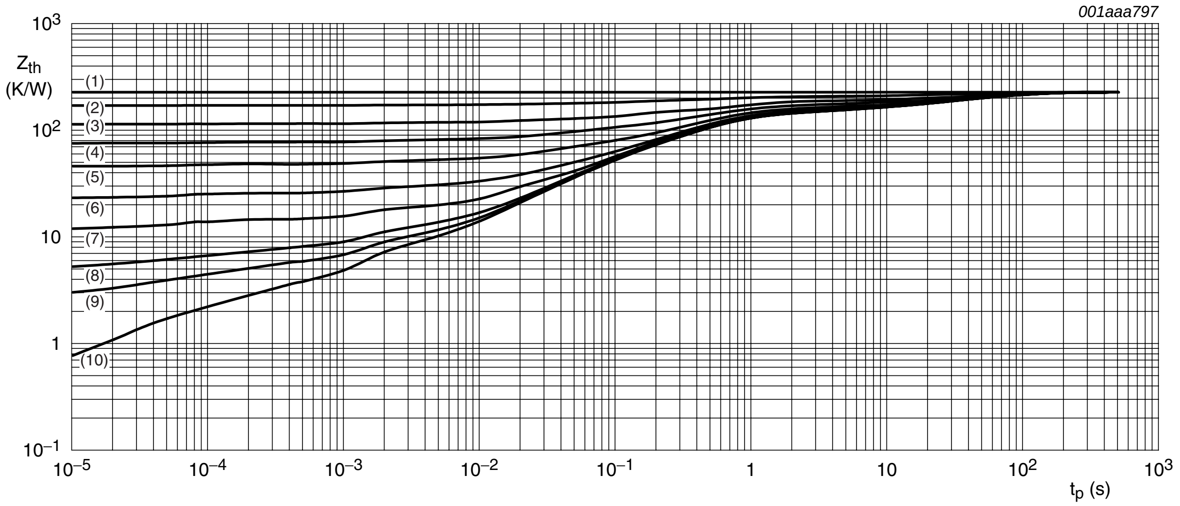
(7) $\delta = 0.05$

(8) $\delta = 0.02$

(9) $\delta = 0.01$

(10) $\delta = 0$

**Fig 2. Transient thermal impedance as a function of pulse time; typical values**




Mounted on FR4 PCB; mounting pad for collector = 1cm²

(1) $\delta = 1$

(2) $\delta = 0.75$

(3) $\delta = 0.5$

(4) $\delta = 0.33$

(5) $\delta = 0.2$

(6) $\delta = 0.1$

(7) $\delta = 0.05$

(8) $\delta = 0.02$

(9) $\delta = 0.01$

(10) $\delta = 0$

**Fig 3. Transient thermal impedance as a function of pulse time; typical values**

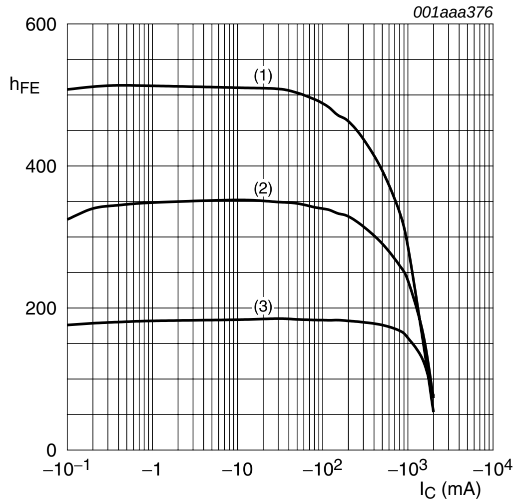
# 7. Characteristics

**Table 7. Characteristics**

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

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = –80 V; $I_E$ = 0 A | | - | - | –100 | nA |
| | | $V_{CB}$ = –80 V; $I_E$ = 0 A; $T_j$ = 150 °C | | - | - | –50 | µA |
| $I_{CES}$ | collector-emitter cut-off current | $V_{CE}$ = –80 V; $V_{BE}$ = 0 V | | - | - | –100 | nA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = –4 V; $I_C$ = 0 A | | - | - | –100 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = –5 V; $I_C$ = –1 mA | | 150 | - | - | |
| | | $V_{CE}$ = –5 V; $I_C$ = –250 mA | | 150 | - | - | |
| | | $V_{CE}$ = –5 V; $I_C$ = –0.5 A | [1] | 150 | - | 450 | |
| | | $V_{CE}$ = –5 V; $I_C$ = –1 A | [1] | 125 | - | - | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = –250 mA; $I_B$ = –25 mA | | - | - | –120 | mV |
| | | $I_C$ = –500 mA; $I_B$ = –50 mA | | - | - | –180 | mV |
| | | $I_C$ = –1 A; $I_B$ = –100 mA | | - | - | –320 | mV |
| $R_{CEsat}$ | equivalent on-resistance | $I_C$ = –1 A; $I_B$ = –100 mA | [1] | - | 170 | 320 | mΩ |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = –1 A; $I_B$ = –100 mA | | - | - | –1.1 | V |
| $V_{BEon}$ | base-emitter turn-on voltage | $I_C$ = –1 A; $V_{CE}$ = –5 V | | - | - | –1.0 | V |
| $f_T$ | transition frequency | $I_C$ = –50 mA; $V_{CE}$ = –10 V; f = 100 MHz | | 100 | - | - | MHz |
| $C_c$ | collector capacitance | $I_E$ = $I_e$ = 0 A; $V_{CB}$ = –10 V; f = 1 MHz | | - | - | 17 | pF |

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



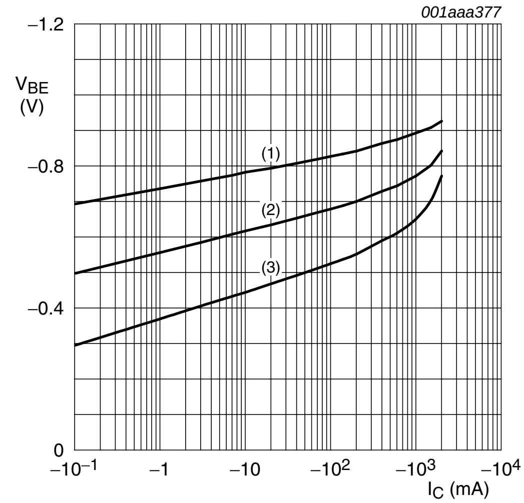

$V_{CE}$ = −10 V

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −55 °C

**Fig 4. DC current gain as a function of collector current; typical values**



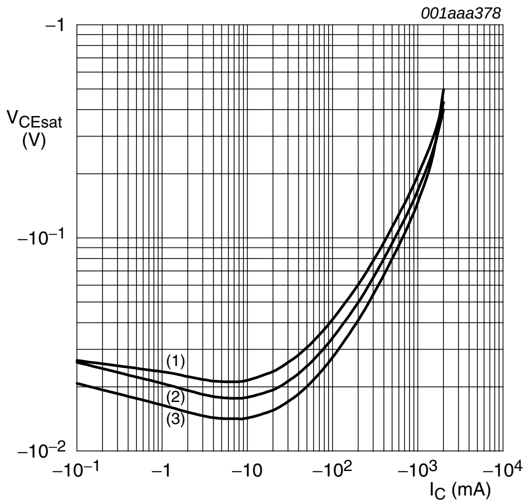

$V_{CE}$ = −10 V

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

**Fig 5. Base-emitter voltage as a function of collector current; typical values**



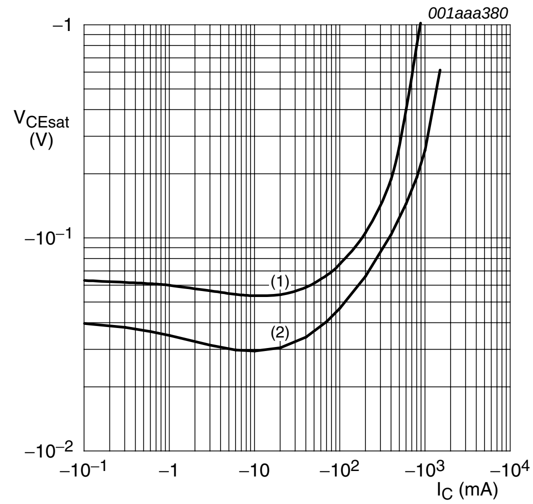

$I_C/I_B$ = 10

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −55 °C

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

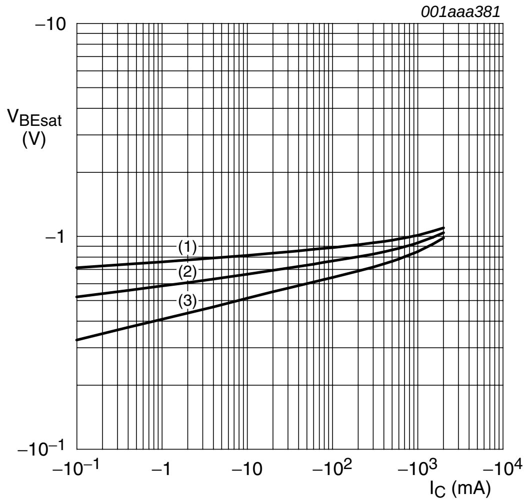



$T_{amb}$ = 25 °C

(1) $I_C/I_B$ = 50

(2) $I_C/I_B$ = 20

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



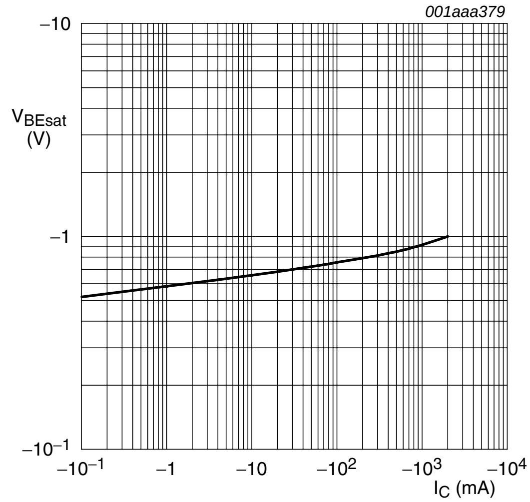

$I_C/I_B = 10$

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = 100$ °C

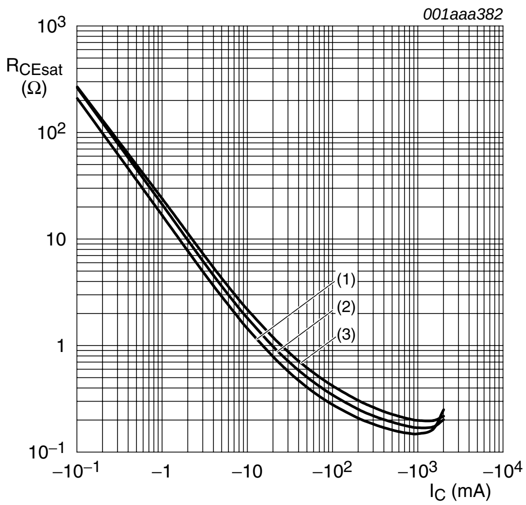
**Fig 8. Base-emitter saturation voltage as a function of collector current; typical values**




$I_C/I_B = 20$

$T_{amb} = 25$ °C

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



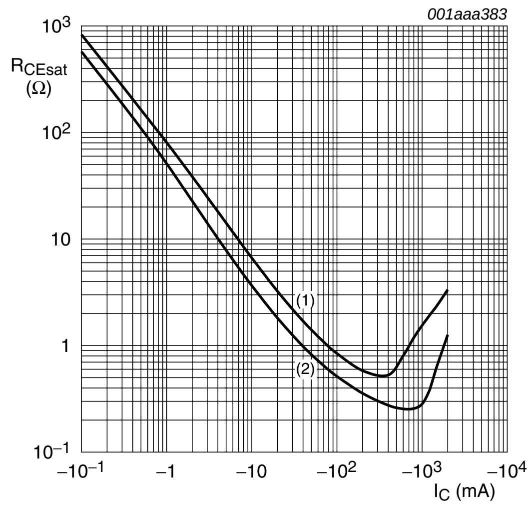

$I_C/I_B = 10$

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = 100$ °C

**Fig 10. Equivalent on-resistance as a function of collector current; typical values**




$T_{amb} = 25$ °C

(1) $I_C/I_B = 50$

(2) $I_C/I_B = 20$

**Fig 11. Equivalent on-resistance as a function of collector current; typical values**

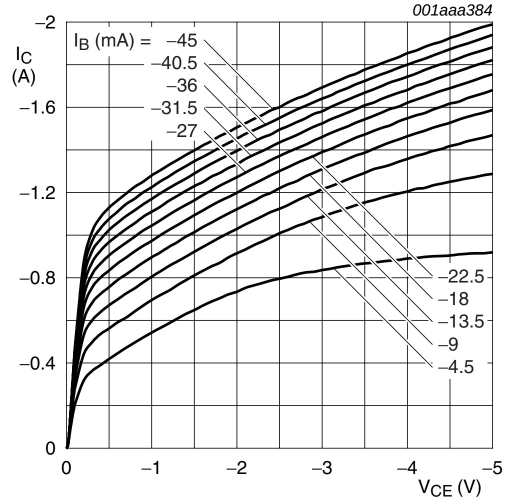
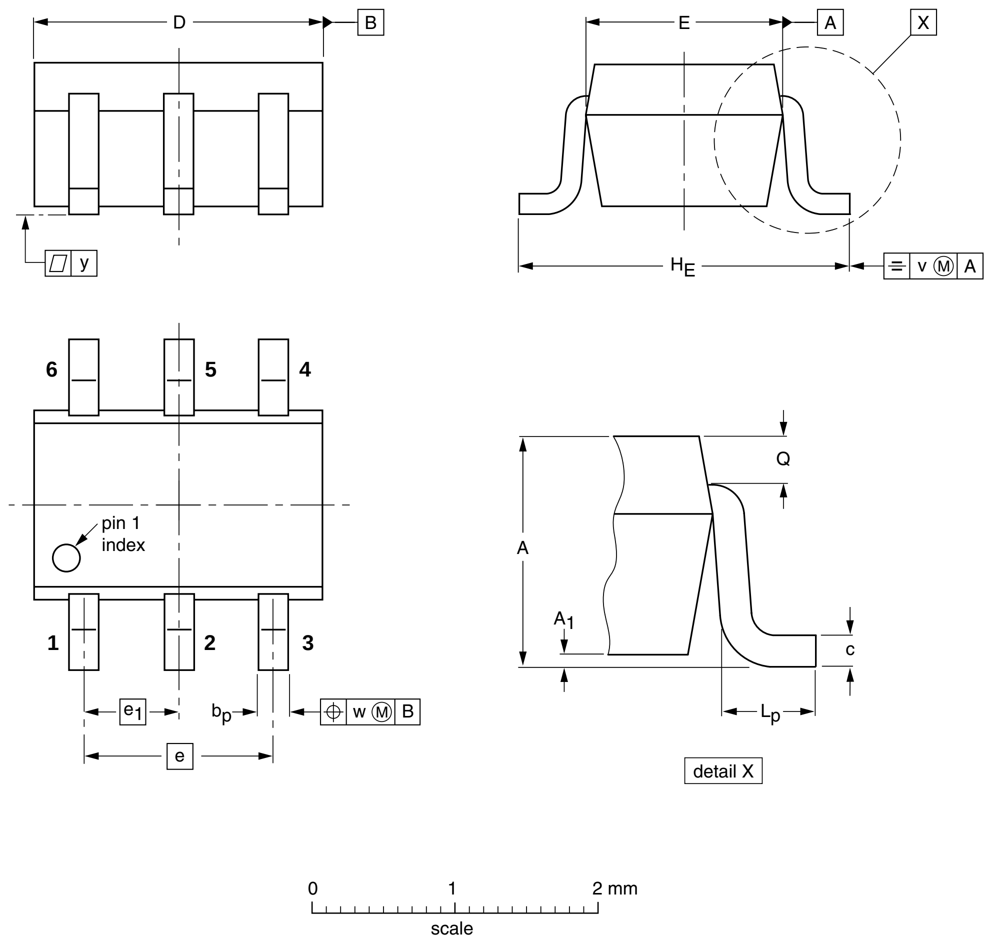



**Fig 12. Collector current as a function of collector-emitter voltage; typical values**

## 8. Package outline

**Plastic surface-mounted package; 6 leads** **SOT363**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.8 | 0.1 | 0.30<br>0.20 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.25<br>0.15 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT363 | | | SC-88 | | | ~~04-11-08~~<br>06-03-16 |

**Fig 13. Package outline**

## 9. Revision history

**Table 8. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PBSS9110Y_2 | 20091122 | Product data | - | PBSS9110Y_1 |
| Modifications: | • This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content.<br>• Table 2 “Discrete pinning”: amended<br>• Figure 10 “Equivalent on-resistance as a function of collector current; typical values”: updated<br>• Figure 11 “Equivalent on-resistance as a function of collector current; typical values”: updated<br>• Figure 12 “Collector current as a function of collector-emitter voltage; typical values”: updated<br>• Figure 13 “Package outline”: updated | | | |
| PBSS9110Y_1 | 20040609 | Product data | - | - |

# 10. Legal information

## 10.1 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.nxp.com.

## 10.2 Definitions

**Draft —** The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet —** A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

## 10.3 Disclaimers

**General —** Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

**Right to make changes —** NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use —** NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer’s own risk.

**Applications —** Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

**Limiting values —** Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Terms and conditions of sale —** NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

**No offer to sell or license —** Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control —** This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.

**Quick reference data —** The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

## 10.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

# 11. Contact information

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

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

## 12. Contents





For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com

**Date of release: 22 November 2009**

**Document identifier: PBSS9110Y_2**