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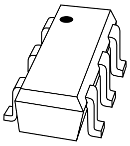


# PBSS8110Y

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

Rev. 02 — 21 November 2009 Product data sheet

## 1. Product profile

### 1.1 General description

NPN 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 reduces 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

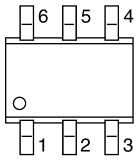
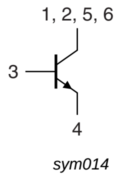
**Table 1. Quick reference data**

| 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 | | - | - | 200 | 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 |
| PBSS8110Y | - | plastic surface mounted package; 6 leads | SOT363 |

## 4. Marking

**Table 4. Marking**

| Type number | Marking code[1] |
|---|---|
| PPBSS8110Y | 81* |

[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 |
| $I_C$ | continuous collector current | | | - | 1 | A |
| $I_B$ | continuous base current | | | - | 0.3 | A |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 290 | mW |
| | | | [2] | - | 480 | mW |
| | | | [3] | - | 625 | mW |

**Table 5. Limiting values** *...continued*

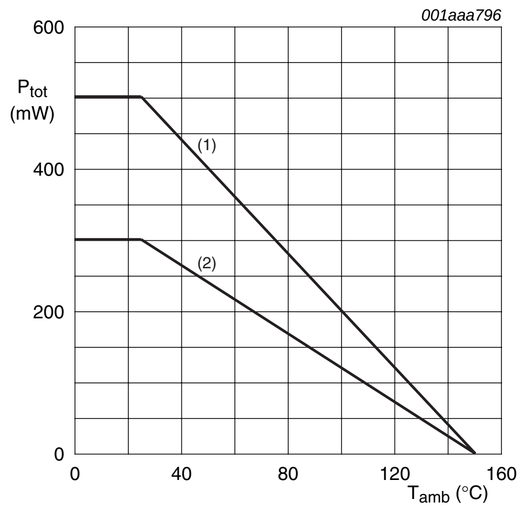
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $T_j$ | junction temperature | | - | 150 | °C |
| $T_{amb}$ | operating ambient temperature | | −65 | +150 | °C |
| $T_{stg}$ | storage temperature | | | +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, 1cm² collector mounting pad.

[3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6cm² collector mounting pad.




(1) 1cm² collector mounting pad

(2) Standard footprint

**Fig 1. Power derating curves**

## 6. Thermal characteristics

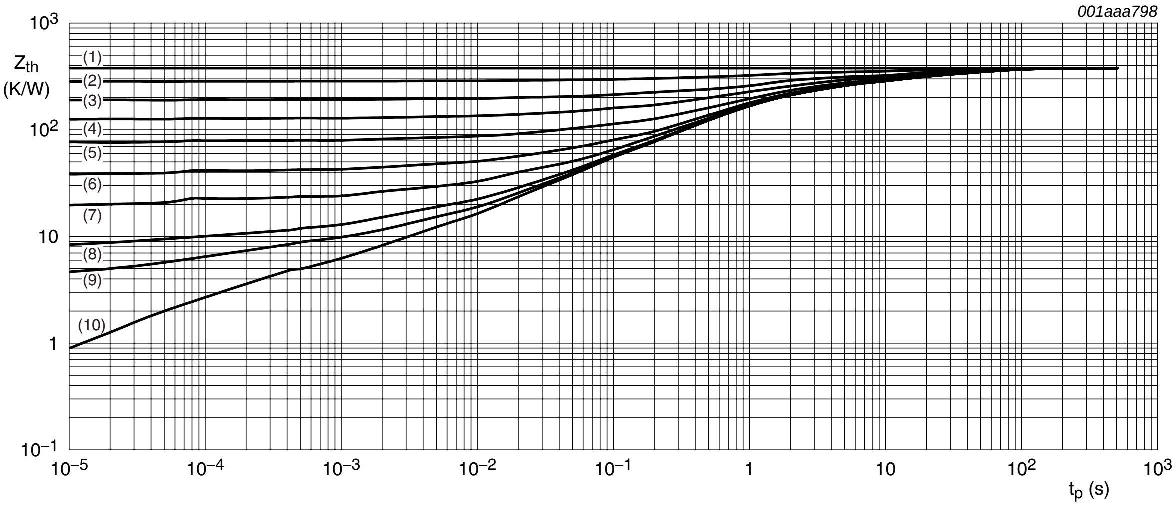
**Table 6. Thermal characteristics**

| 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 point | 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, 1cm² collector mounting pad.

[3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6cm² 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) $\delta = 0.1$

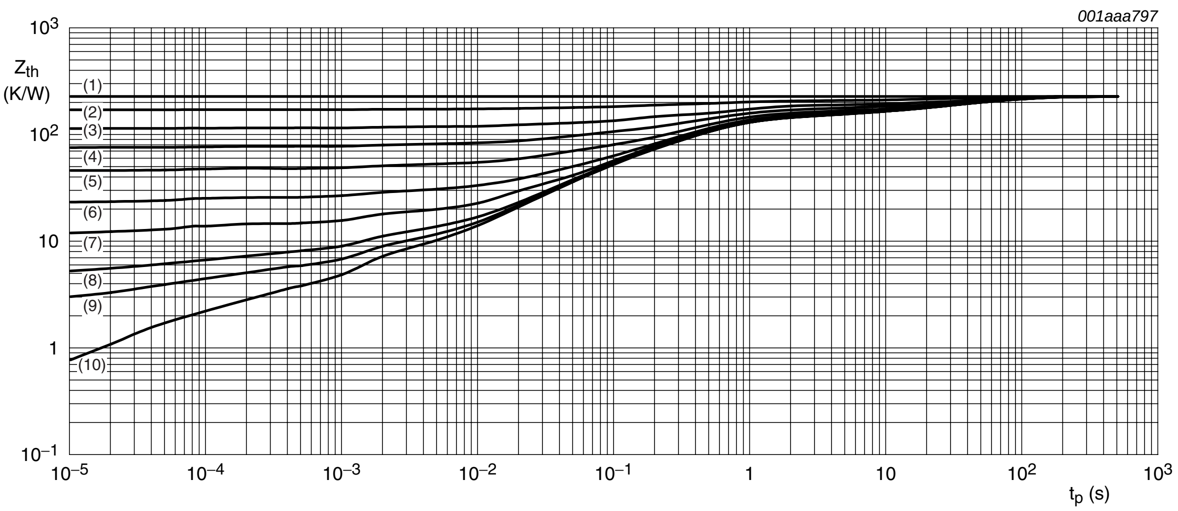
(7) $\delta = 0.05$

(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 = 1cm$^2$

(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**

*$T_j$ = 25 °C unless otherwise specified.*

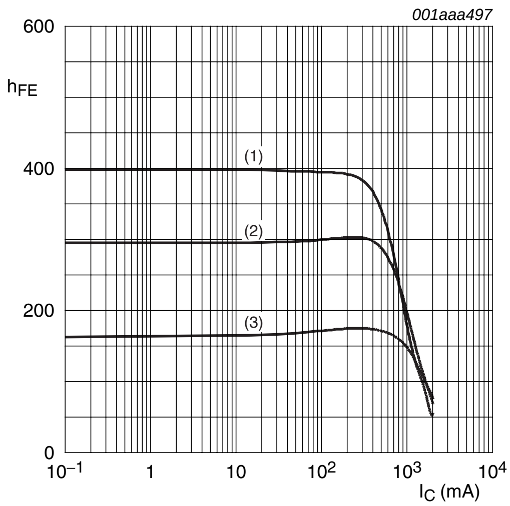
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 80 V; $I_E$ = 0 A | - | - | 100 | nA |
| | | $V_{CB}$ = 80 V; $I_E$ = 0 A; $T_j$ = 150 °C | - | - | 50 | µA |
| $I_{CES}$ | collector-emitter cut-off current | $V_{CE}$ = 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 | $V_{CE}$ = 10 V; $I_C$ = 1 mA | 150 | - | - | |
| | | $V_{CE}$ = 10 V; $I_C$ = 250 mA | 150 | - | 500 | |
| | | $V_{CE}$ = 10 V; $I_C$ = 0.5 A [1] | 100 | - | - | |
| | | $V_{CE}$ = 10 V; $I_C$ = 1 A [1] | 80 | - | - | |

**Table 7. Characteristics** *...continued*

*$T_j$ = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 100 mA; $I_B$ = 10 mA | | - | - | 40 | mV |
| | | $I_C$ = 500 mA; $I_B$ = 50 mA | | - | - | 120 | mV |
| | | $I_C$ = 1 A; $I_B$ = 100 mA | | - | - | 200 | mV |
| $R_{CEsat}$ | equivalent on-resistance | $I_C$ = 1 A; $I_B$ = 100 mA | [1] | - | 160 | 200 | mΩ |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = 1 A; $I_B$ = 100 mA | | - | - | 1.05 | V |
| $V_{BEon}$ | base-emitter turn-on voltage | $V_{CE}$ = 10 V; $I_C$ = 1 A | | - | - | 0.9 | V |
| $f_T$ | transition frequency | $V_{CE}$ = 10 V; $I_C$ = 50 mA; f = 100 MHz | | 100 | - | - | MHz |
| $C_c$ | collector capacitance | $V_{CB}$ = 10 V; $I_E$ = $I_e$ = 0 A; f = 1 MHz | | - | - | 7.5 | pF |

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



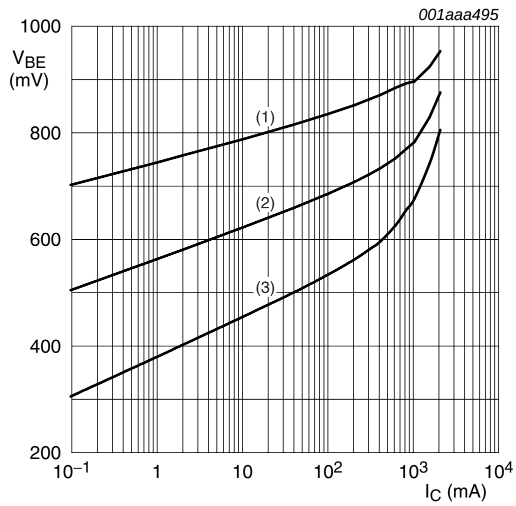

$V_{CE}$ = 10 V

(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**



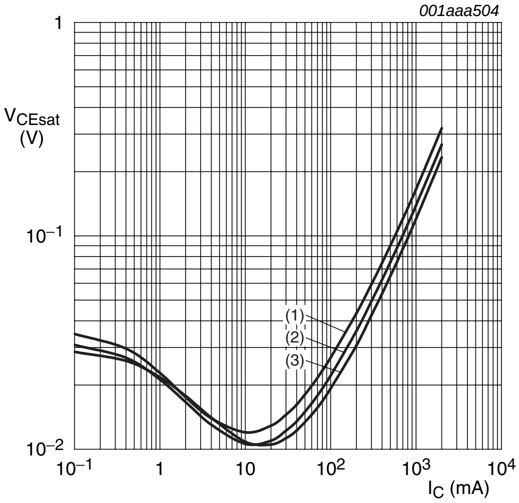

$V_{CE}$ = 10 V

(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**



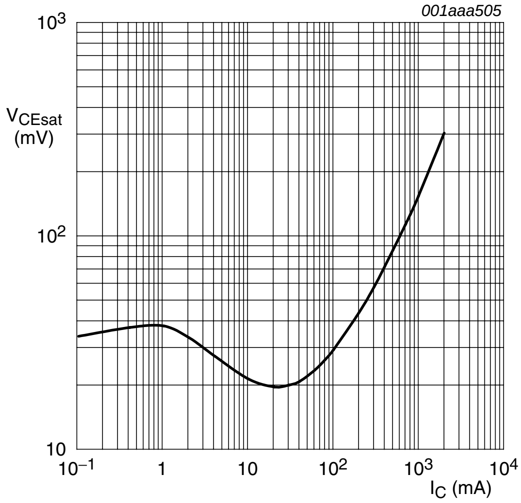

$I_C/I_B = 10$

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

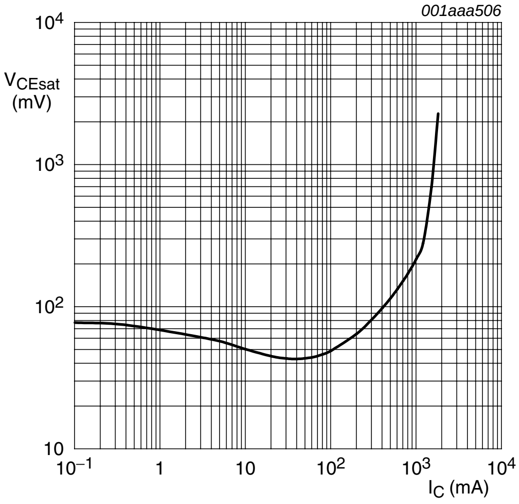
(3) $T_{amb} = -55$ °C

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



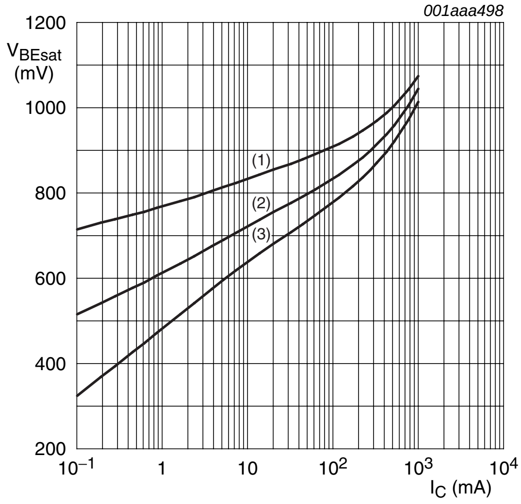

$I_C/I_B = 20$; $T_{amb} = 25$ °C

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




$I_C/I_B = 50$; $T_{amb} = 25$ °C

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



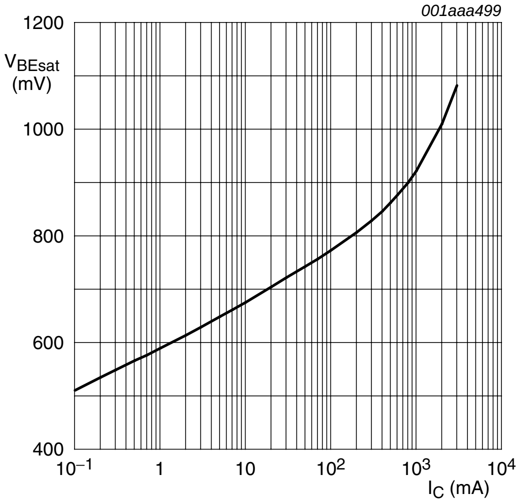

$I_C/I_B = 10$

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = 25$ °C

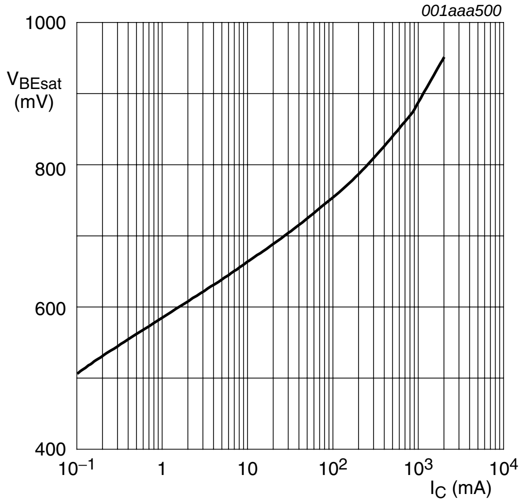
(3) $T_{amb} = 100$ °C

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



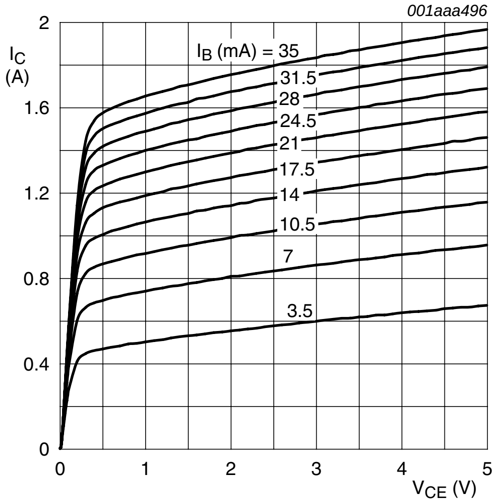

$I_C/I_B = 20$; $T_{amb} = 25\ °C$

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



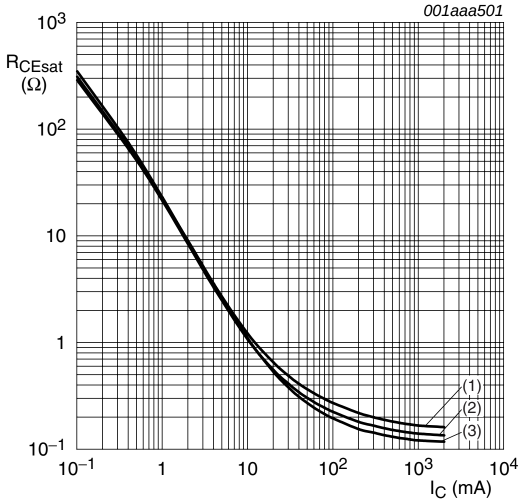

$I_C/I_B = 50$; $T_{amb} = 25\ °C$

**Fig 11. Base-emitter saturation voltage as a function of collector current; typical values**




$T_{amb} = 25\ °C$

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



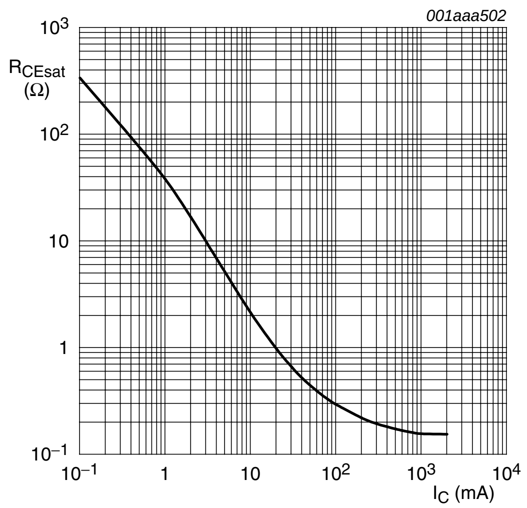

$I_C/I_B = 10$

(1) $T_{amb} = 100\ °C$

(2) $T_{amb} = 25\ °C$

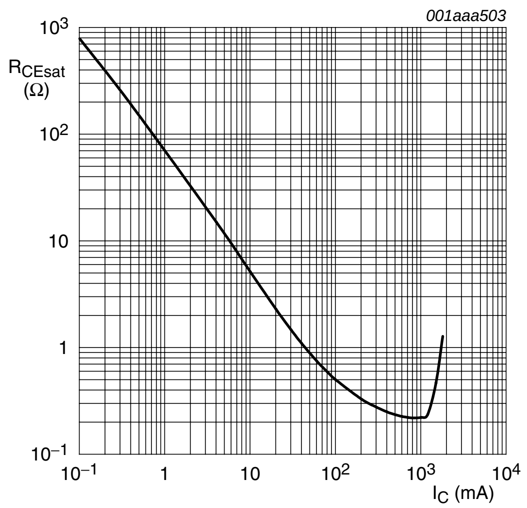
(3) $T_{amb} = -55\ °C$

**Fig 13. Equivalent on-resistance as a function of collector current; typical values**




$I_C/I_B = 20$; $T_{amb} = 25$ °C

**Fig 14. Equivalent on-resistance as a function of collector current; typical values**

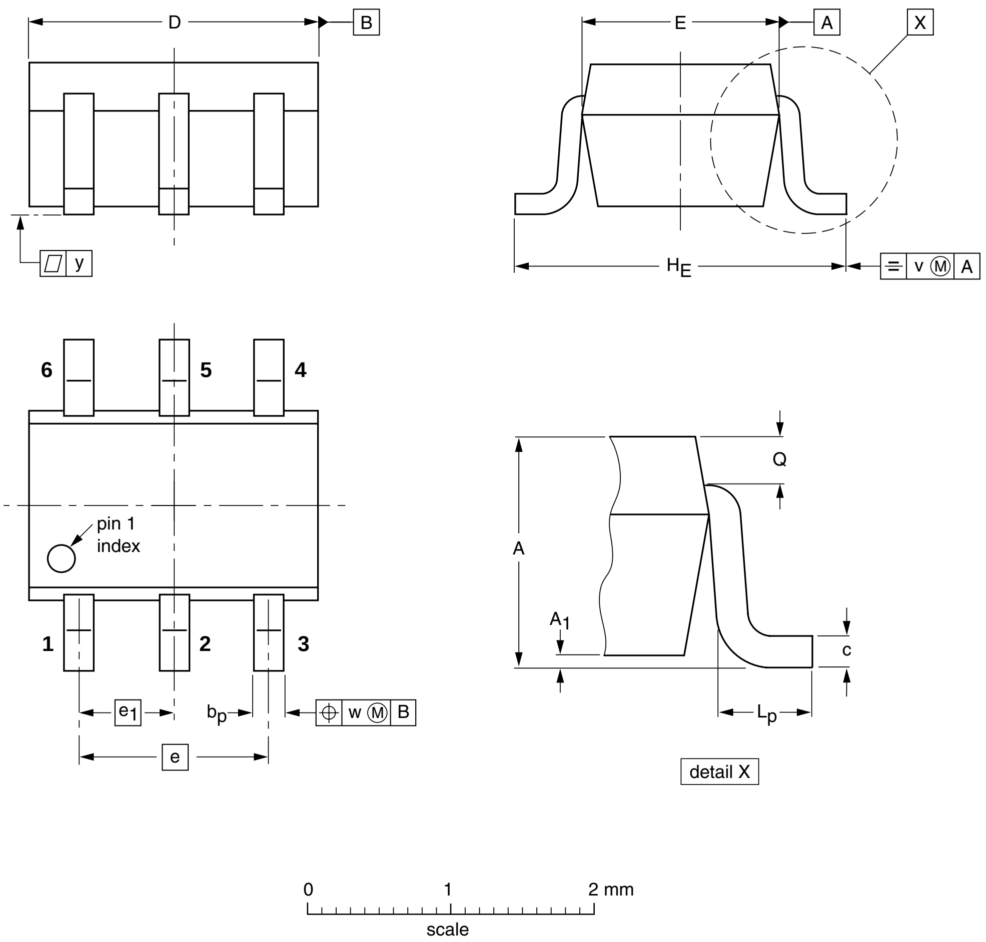



$I_C/I_B = 50$; $T_{amb} = 25$ °C

**Fig 15. Equivalent on-resistance as a function of collector current; 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 16. Package outline**

# 9. Revision history

**Table 8. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PBSS8110Y_2 | 20091121 | Product data | - | PBSS8110Y_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 4 “DC current gain as a function of collector current; typical values”: updated<br>• Figure 6 “Collector-emitter saturation voltage as a function of collector current; typical values”: VCEsat unit amended from mV to V<br>• Figure 12 “Collector current as a function of collector-emitter voltage; typical values”: updated<br>• Figure 16 “Package outline”: updated | | | |
| PBSS8110Y_1 | 20040602 | 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”.

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**Date of release: 21 November 2009**

**Document identifier: PBSS8110Y_2**