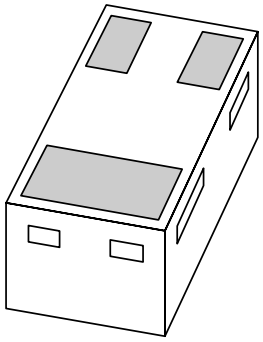
# DATA SHEET



## PBSS3515M
15 V, 0.5 A
PNP low $V_{CEsat}$ (BISS) transistor

Product data sheet

2003 Jul 22

NXP founded by Philips

# 15 V, 0.5 A PNP low $V_{CEsat}$ (BISS) transistor

# PBSS3515M

## FEATURES

- Low collector-emitter saturation voltage $V_{CEsat}$
- High collector current capability $I_C$ and $I_{CM}$
- High efficiency leading to reduced heat generation
- Reduced printed-circuit board requirements.

## APPLICATIONS

- Power management:
  - DC-DC converter
  - Supply line switching
  - Battery charger
  - LCD backlighting.
- Peripheral driver:
  - Driver in low supply voltage applications (e.g. lamps and LEDs).
  - Inductive load drivers (e.g. relays, buzzers and motors).

## DESCRIPTION

Low $V_{CEsat}$ PNP transistor in a SOT883 leadless ultra small plastic package.
NPN complement: PBSS2515M.

## MARKING

| TYPE NUMBER | MARKING CODE |
|---|---|
| PBSS3515M | DB |

## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | UNIT |
|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | −15 | V |
| $I_C$ | collector current (DC) | −500 | mA |
| $I_{CM}$ | peak collector current | −1 | A |
| $R_{CEsat}$ | equivalent on-resistance | <500 | mΩ |

## PINNING

| PIN | DESCRIPTION |
|---|---|
| 1 | base |
| 2 | emitter |
| 3 | collector |

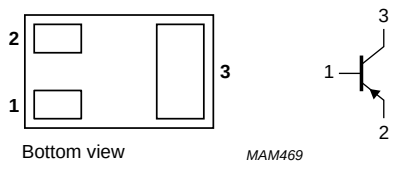



Fig.1 Simplified outline (SOT883) and symbol.

## 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 | − | −15 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | − | −15 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | − | −6 | V |
| $I_C$ | collector current (DC) | notes 1 and 2 | − | −500 | mA |
| $I_{CM}$ | peak collector current | | − | −1 | A |
| $I_{BM}$ | peak base current | | − | −100 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C; notes 1 and 2 | − | 250 | mW |
| | | $T_{amb} \leq 25$ °C; note 1 and 3 | − | 430 | mW |
| $T_{stg}$ | storage temperature | | −65 | +150 | °C |
| $T_j$ | junction temperature | | − | 150 | °C |
| $T_{amb}$ | operating ambient temperature | | −65 | +150 | °C |

**Notes**

1. Refer to SOT883 standard mounting conditions.
2. Device mounted on an FR4 printed-circuit board, single-sided copper, tinplated, standard footprint, with 60 μm copper strip line.
3. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 $cm^2$.

## THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th\ j\text{-}a}$ | thermal resistance from junction to ambient | in free air; notes 1 and 2 | 500 | K/W |
| | | in free air; notes 1, 3 and 4 | 290 | K/W |

**Notes**

1. Refer to SOT883 standard mounting conditions.
2. Device mounted on an FR4 printed-circuit board, single-sided copper, tinplated, standard footprint, with 60 μm copper strip line.
3. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 $cm^2$.
4. Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 30$ ms.

### Soldering

Reflow soldering is the only recommended soldering method.

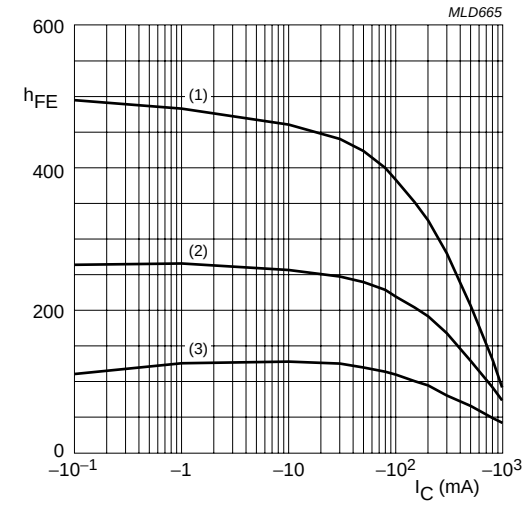
## CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = −15 V; $I_E$ = 0 | − | − | −100 | nA |
| | | $V_{CB}$ = −15 V; $I_E$ = 0; $T_j$ = 150 °C | − | − | −50 | μA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = −5 V; $I_C$ = 0 | − | − | −100 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = −2 V; $I_C$ = −10 mA | 200 | − | − | |
| | | $V_{CE}$ = −2 V; $I_C$ = −100 mA; note 1 | 150 | − | − | |
| | | $V_{CE}$ = −2 V; $I_C$ = −500 mA; note 1 | 90 | − | − | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = −10 mA; $I_B$ = −0.5 mA | − | − | −25 | mV |
| | | $I_C$ = −200 mA; $I_B$ = −10 mA; note 1 | − | − | −150 | mV |
| | | $I_C$ = −500 mA; $I_B$ = −50 mA; note 1 | − | − | −250 | mV |
| $R_{CEsat}$ | equivalent on-resistance | $I_C$ = −500 mA; $I_B$ = −50 mA; note 1 | − | 300 | <500 | mΩ |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = −500 mA; $I_B$ = −50 mA; note 1 | − | − | −1.1 | V |
| $V_{BEon}$ | base-emitter turn-on voltage | $V_{CE}$ = −2 V; $I_C$ = −100 mA; note 1 | − | − | −0.9 | V |
| $f_T$ | transition frequency | $I_C$ = −100 mA; $V_{CE}$ = −5 V; f = 100 MHz | 100 | 280 | − | MHz |
| $C_c$ | collector capacitance | $V_{CB}$ = −10 V; $I_E$ = $I_e$ = 0; f = 1 MHz | − | − | 10 | pF |

**Note**

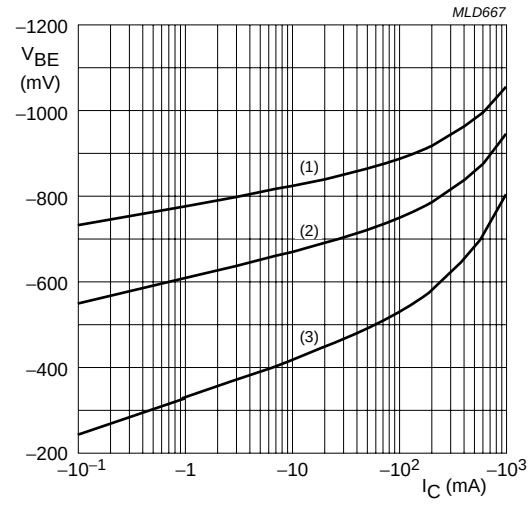
1. Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.




$V_{CE}$ = −2 V.

(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

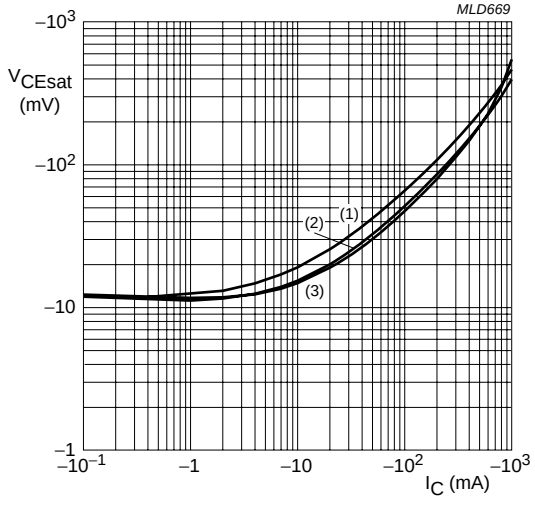
Fig.2 DC current gain as a function of collector current; typical values.




$V_{CE}$ = −2 V.

(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

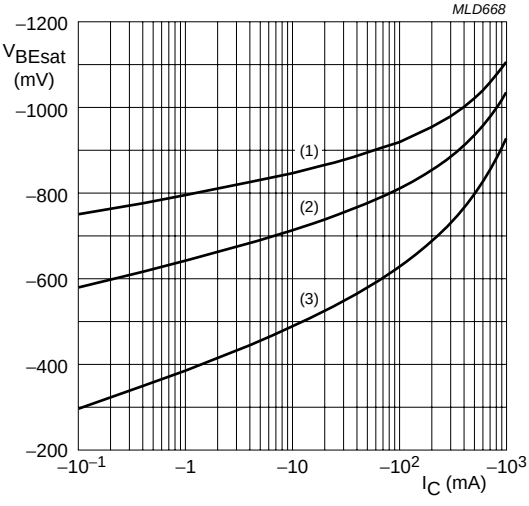
Fig.3 Base-emitter voltage as a function of collector current; typical values.




$I_C/I_B$ = 20.

(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

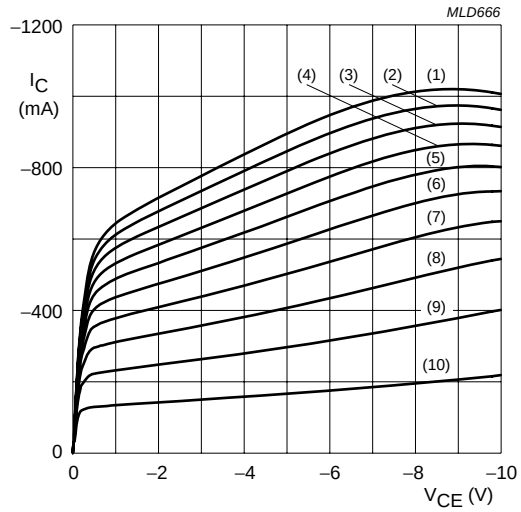
Fig.4 Collector-emitter saturation voltage as a function of collector current; typical values.




$I_C/I_B$ = 20.

(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

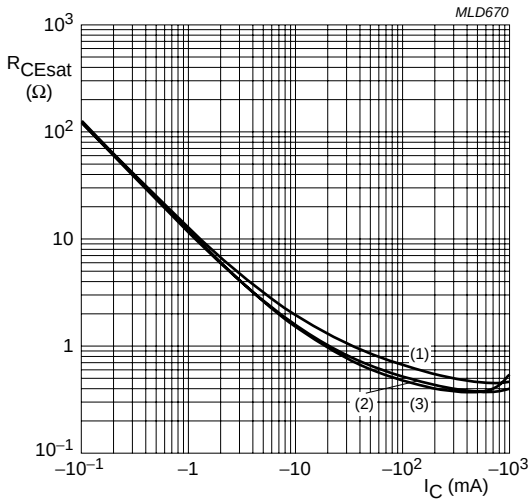
Fig.5 Base-emitter saturation voltage as a function of collector current; typical values.




$T_{amb}$ = 25 °C.

(1) $I_B$ = −7 mA.
(2) $I_B$ = −6.3 mA.
(3) $I_B$ = −5.6 mA.
(4) $I_B$ = −4.9 mA.
(5) $I_B$ = −4.2 mA.
(6) $I_B$ = −3.5 mA.
(7) $I_B$ = −2.8 mA.
(8) $I_B$ = −2.1 mA.
(9) $I_B$ = −1.4 mA.
(10) $I_B$ = −0.7 mA.

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



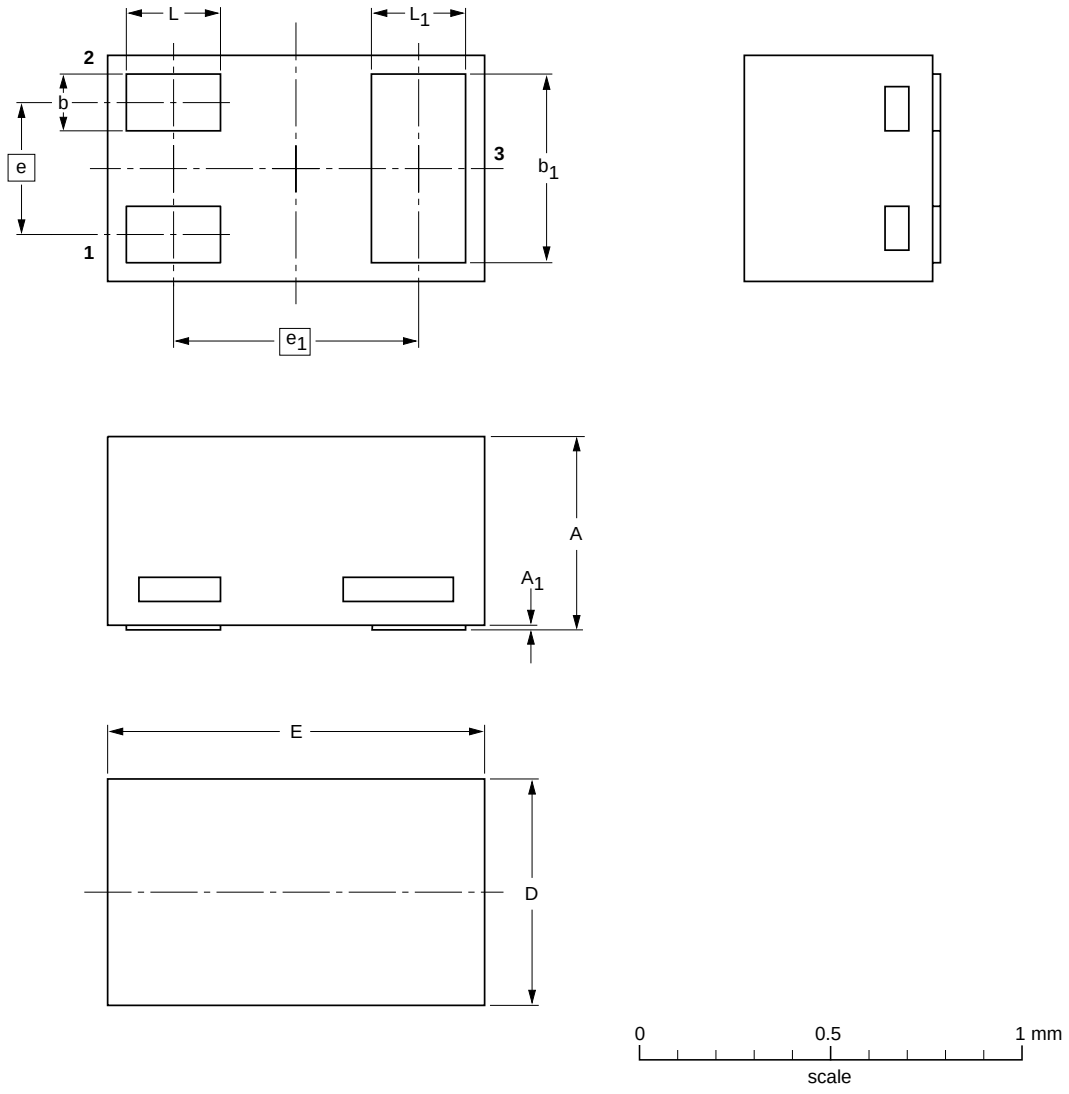

$I_C/I_B$ = 20.

(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

Fig.7 Collector-emitter equivalent on-resistance as a function of collector current; typical values.

## PACKAGE OUTLINE

**Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm** **SOT883**




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

| UNIT | A(1) | $A_1$ max. | b | $b_1$ | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.50<br>0.46 | 0.03 | 0.20<br>0.12 | 0.55<br>0.47 | 0.62<br>0.55 | 1.02<br>0.95 | 0.35 | 0.65 | 0.30<br>0.22 | 0.30<br>0.22 |

**Note**

1. Including plating thickness

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT883 | | | SC-101 | | | ~~03-02-05~~<br>03-04-03 |

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| DOCUMENT STATUS[1] | PRODUCT STATUS[2] | DEFINITION |
|---|---|---|
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| Preliminary data sheet | Qualification | This document contains data from the preliminary specification. |
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