DATA SHEET

PBSS3540M

40 V, 0.5 A

PNP low V$_{CEsat}$ (BISS) transistor

Product specification

2003 Aug 12

Philips
Semiconductors

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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: PBSS2540M.

MARKING

TYPE NUMBER	MARKING CODE
PBSS3540M	DA

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V$_{CEO}$	collector-emitter voltage	−40	V
I$_C$	collector current (DC)	−500	mA
I$_{CM}$	peak collector current	−1	A
R$_{CEsat}$	equivalent on-resistance	<700	mΩ

PINNING

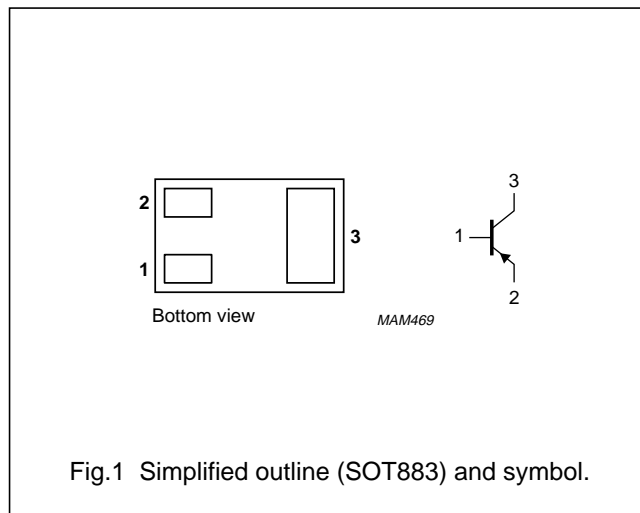| PIN	DESCRIPTION
1	base
2	emitter
3	collector

Bottom view   *MAM469*

Fig.1 Simplified outline (SOT883) and symbol.

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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	–	–40	V
V_{CEO}	collector-emitter voltage	open base	–	–40	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
$R_{th\ j-a}$	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.

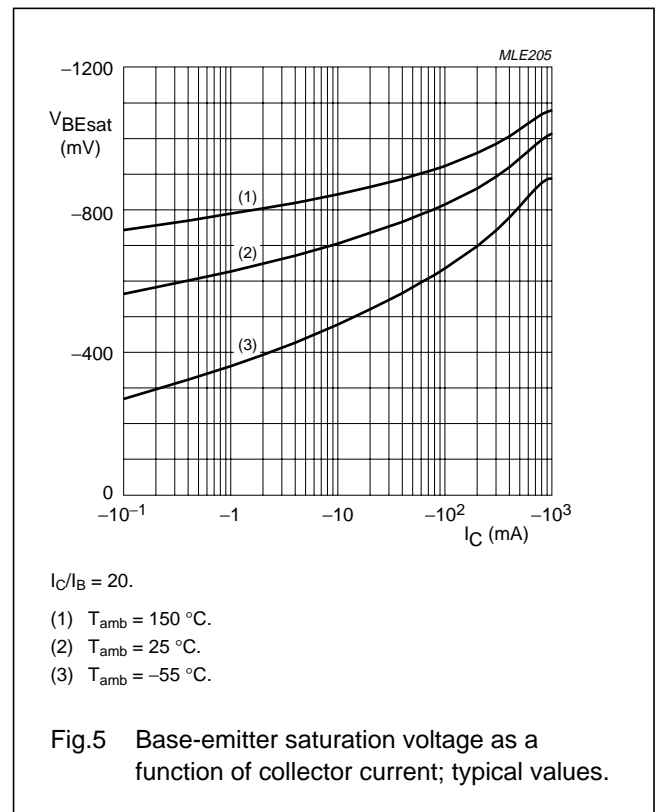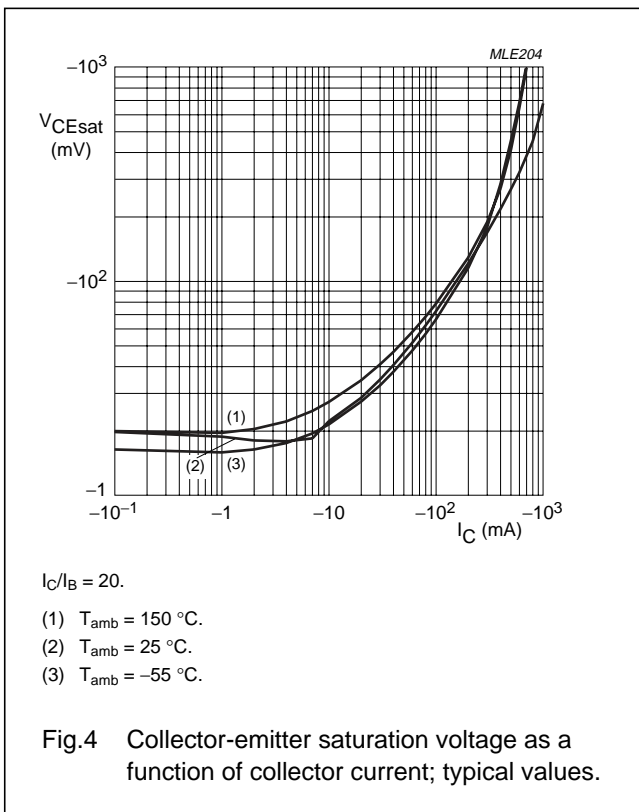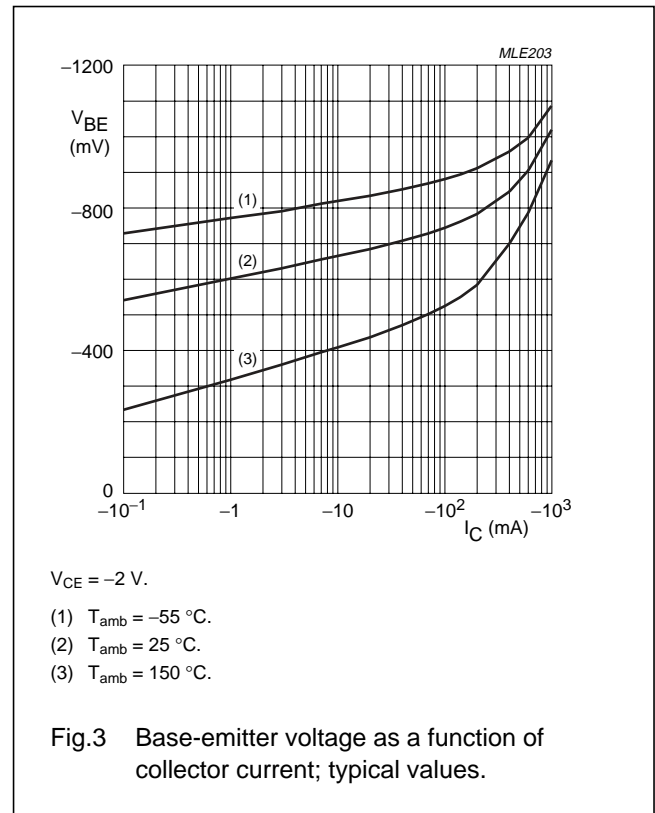## 40 V, 0.5 A
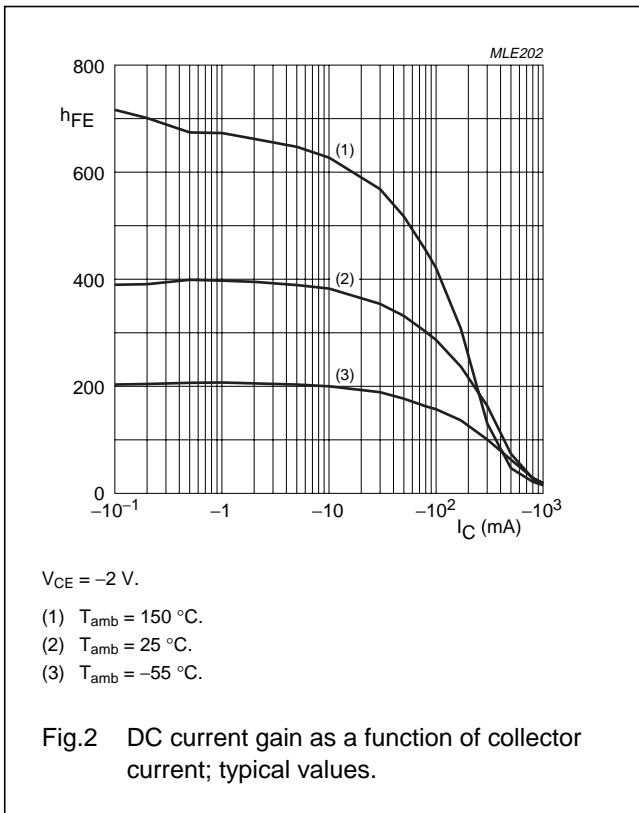## PNP low V_{CEsat} (BISS) transistor

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	–	–	−100	nA
		V_{CB} = −30 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	40	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = −10 mA; I_B = −0.5 mA	–	–	−50	mV
		I_C = −100 mA; I_B = −5 mA	–	–	−130	mV
		I_C = −200 mA; I_B = −10 mA	–	–	−200	mV
		I_C = −500 mA; I_B = −50 mA; note 1	–	–	−350	mV
R_{CEsat}	equivalent on-resistance	I_C = −500 mA; I_B = −50 mA; note 1	–	440	<700	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = −500 mA; I_B = −50 mA; note 1	–	–	−1.2	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = −2 V; I_C = −100 mA; note 1	–	–	−1.1	V
f_T	transition frequency	I_C = −100 mA; V_{CE} = −5 V; f = 100 MHz	100	300	–	MHz
C_c	collector capacitance	V_{CB} = −10 V; I_E = I_e = 0; f = 1 MHz	–	–	10	pF

Note

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

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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.

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MLE200

I_C
(mA)

−1200

−800

−400

0

0   −1   −2   −3   −4   −5
                                        V_{CE} (V)

(1)
(2)
(3)   (4)
(5)   (6)
(7)   (8)
(9)
(10)

T_{amb} = 25 °C.

(1) I_B = −40 mA.   (5) I_B = −24 mA.   (9) I_B = −8 mA.
(2) I_B = −36 mA.   (6) I_B = −20 mA.   (10) I_B = −4 mA.
(3) I_B = −32 mA.   (7) I_B = −16 mA.
(4) I_B = −28 mA.   (8) I_B = −12 mA.

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

MLE201

R_{CEsat}
(Ω)

10^3

10^2

10

1

10^{-1}

-10^{-1} −1   −10 -10^2 -10^3
                                        I_C (mA)

(1)
(2)   (3)

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
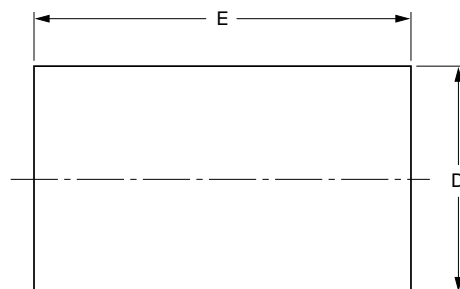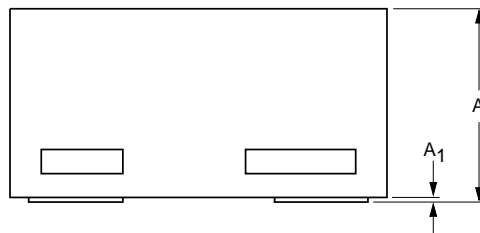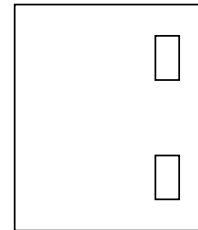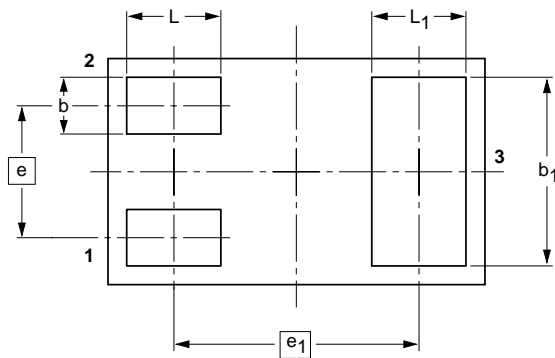   values.

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PACKAGE OUTLINE

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

SOT883

0   0.5   1 mm
scale
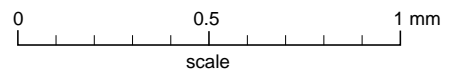
DIMENSIONS (mm are the original dimensions)

UNIT	A$^{(1)}$	A$_1$ max.	b	b$_1$	D	E	e	e$_1$	L	L$_1$
mm	0.50 0.46	0.03	0.20 0.12	0.55 0.47	0.62 0.55	1.02 0.95	0.35	0.65	0.30 0.22	0.30 0.22

Note

1. Including plating thickness

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT883			SC-101			03-02-05 03-04-03

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DATA SHEET STATUS

LEVEL	DATA SHEET STATUS[1]	PRODUCT STATUS[2][3]	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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