PBSS2540M

40 V, 0.5 A NPN low VCEsat (BISS) transistor

22 February 2018 Product data sheet

1. General description

Low V_{CEsat} NPN transistor in a SOT883 leadless ultra small plastic package.

PNP complement: PBSS3540M.

2. Features and benefits

- 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.
- AEC-Q101 qualified

3. 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).

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	40	V
I_C	collector current		[1] [2]	-	-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	1	A
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 10 mA; T_{amb} = 25 °C		200	-	-	
R_{CEsat}	collector-emitter saturation resistance	I_C = 500 mA; I_B = 50 mA; $t_p \leq$ 300 µs; pulsed; $\delta \leq$ 0.02 ; T_{amb} = 25 °C		-	380	500	mΩ

[1] Device mounted on an FR4 Printed-Circuit Board, (PCB), single-sided copper, tinplated, standard footprint, with 60 µm copper strip line.

[2] Refer to SOT883 standard mounting conditions.

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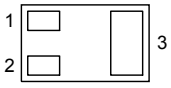
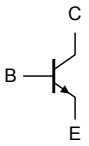
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view **DFN1006-3 (SOT883)**	 *sym123*
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS2540M	DFN1006-3	DFN1006-3: leadless ultra small plastic package; 3 solder lands	SOT883

7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS2540M	DC

8. 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		-	40	V
V_{CEO}	collector-emitter voltage	open base		-	40	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current		[1] [2]	-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	1	A
I_{BM}	peak base current			-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1] [2]	-	250	mW
			[2] [3]	-	430	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit Board, (PCB), single-sided copper, tinplated, standard footprint, with 60 µm copper strip line.
[2] Refer to SOT883 standard mounting conditions.
[3] Device mounted on an FR4 PCB, single-sided copper, tinplated, mounting pad for collector 1 cm^2.

9. Thermal characteristics

Table 6. Thermal characteristics

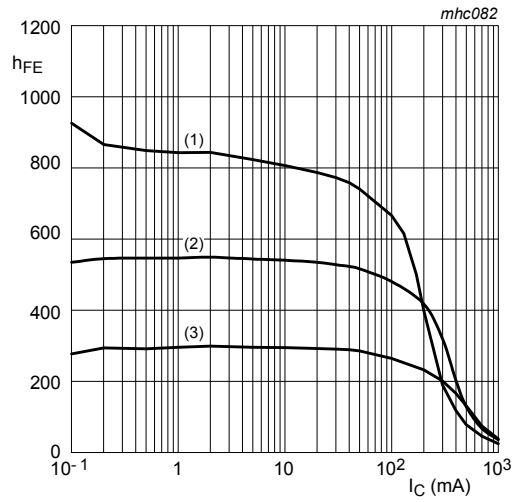
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	500	K/W
			[2] [3] [4]	-	-	290	K/W

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

10. Characteristics

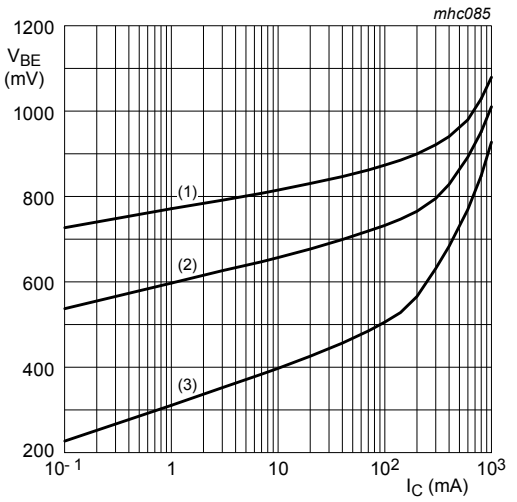
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
		V_{CB} = 30 V; I_E = 0 A; T_j = 150 °C		-	-	50	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 10 mA; T_{amb} = 25 °C		200	-	-	
		V_{CE} = 2 V; I_C = 100 mA; $t_p \leq$ 300 µs; pulsed; $\delta \leq$ 0.02 ; T_{amb} = 25 °C		150	-	-	
		V_{CE} = 2 V; I_C = 500 mA; $t_p \leq$ 300 µs; pulsed; $\delta \leq$ 0.02 ; T_{amb} = 25 °C		50	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA; T_{amb} = 25 °C		-	-	50	mV
		I_C = 100 mA; I_B = 5 mA; T_{amb} = 25 °C		-	-	100	mV
		I_C = 200 mA; I_B = 10 mA; T_{amb} = 25 °C		-	-	200	mV
		I_C = 500 mA; I_B = 50 mA; $t_p \leq$ 300 µs; pulsed; $\delta \leq$ 0.02 ; T_{amb} = 25 °C		-	-	250	mV
R_{CEsat}	collector-emitter saturation resistance			-	380	500	mΩ
V_{BEsat}	base-emitter saturation voltage			-	-	1.2	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 2 V; I_C = 100 mA; T_{amb} = 25 °C		-	-	1.1	V
f_T	transition frequency	V_{CE} = 5 V; I_C = 100 mA; f = 100 MHz; T_{amb} = 25 °C		250	450	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	6	pF



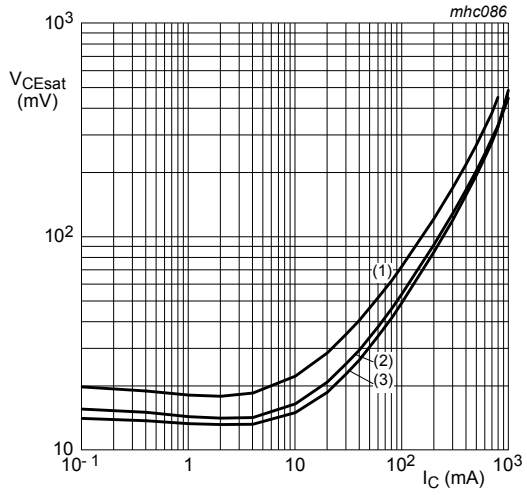
V_{CE} = 2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 1. DC current gain as a function of collector current; typical values



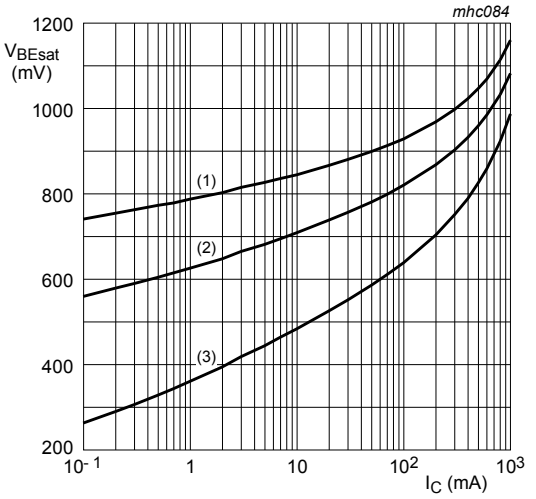
V_{CE} = 2 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 2. Base-emitter voltage as a function of collector current; typical values



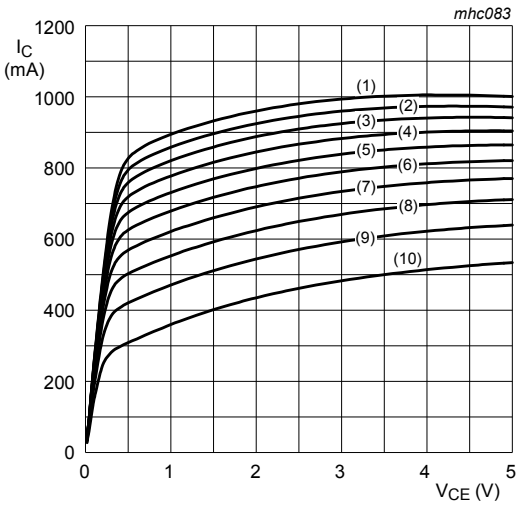
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



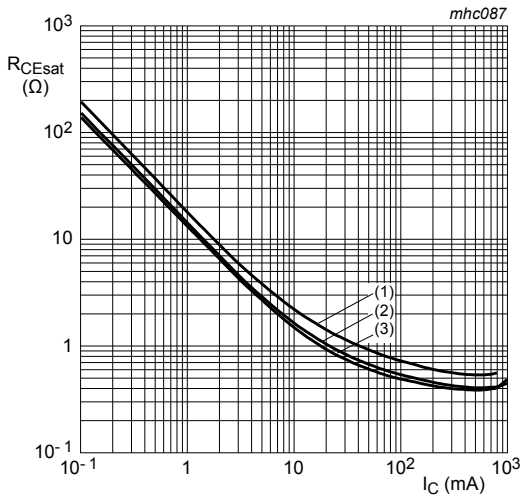
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



T_{amb} = 25 °C
(1) I_B = 25 mA
(2) I_B = 22.5 mA
(3) I_B = 20 mA
(4) I_B = 17.5 mA
(5) I_B = 15 mA
(6) I_B = 12.5 mA
(7) I_B = 10 mA
(8) I_B = 7.5 mA
(9) I_B = 5 mA
(10) I_B = 2.5 mA

Fig. 5. 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. 6. Collector-emitter saturation resistance as a function of collector current; typical values

11. Package outline

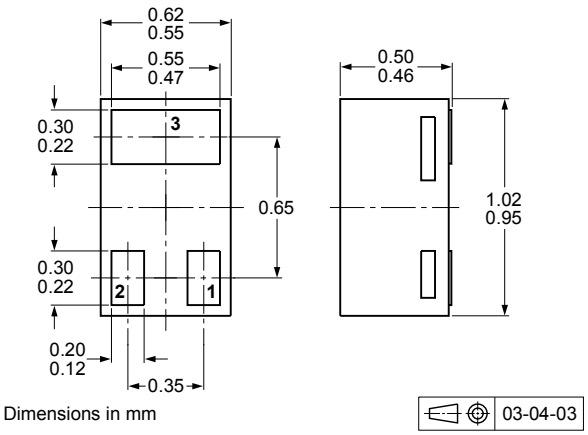


Fig. 7. Package outline DFN1006-3 (SOT883)

12. Soldering

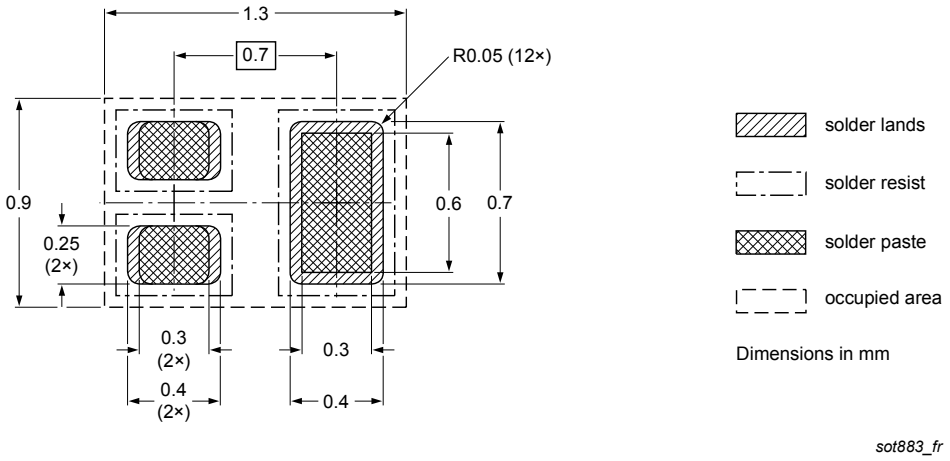


Fig. 8. Reflow soldering footprint for DFN1006-3 (SOT883)

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS2540M v.2	20180222	Product data sheet	-	PBSS2540M v.1
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate.			
PBSS2540M v.1	20030722	Product data sheet	-	-

14. Legal information

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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