PBSS2515MB

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

Rev. 1 — 26 January 2012 Product data sheet

1. Product profile

1.1 General description

NPN low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a leadless ultra small SOT883B Surface-Mounted Device (SMD) plastic package.

PNP complement: PBSS3515MB.

1.2 Features and benefits

- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High efficiency due to less heat generation
- AEC-Q101 qualified
- Reduced Printed-Circuit Board (PCB) requirements

1.3 Applications

- DC-to-DC conversion
- Supply line switching
- Battery charger
- LCD backlighting
- Driver in low supply voltage applications (e.g. lamps and LEDs)

1.4 Quick reference data

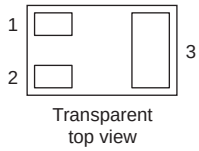
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	15	V
I_C	collector current		-	-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	1	A
R_{CEsat}	collector-emitter saturation resistance	I_C = 500 mA; I_B = 50 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C	-	360	500	mΩ

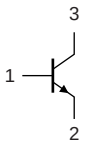
2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		
2	E	emitter		
3	C	collector		



SOT883B



sym021

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS2515MB	-	Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm	SOT883B

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PBSS2515MB	0001 0001

[1] For SOT883B binary marking code description, see Figure 1.

4.1 Binary marking code description

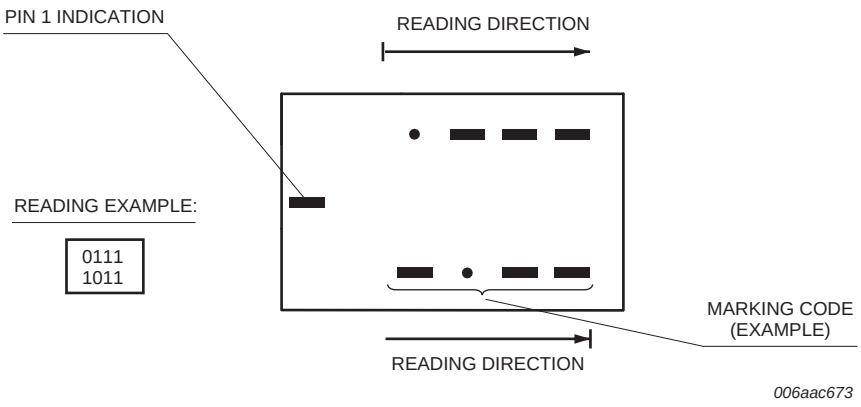


Fig 1. SOD883B binary marking code decription

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		-	15	V
V_{CEO}	collector-emitter voltage	open base		-	15	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	1	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1][2]	-	250	mW
			[3][2]	-	590	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

6. Thermal characteristics

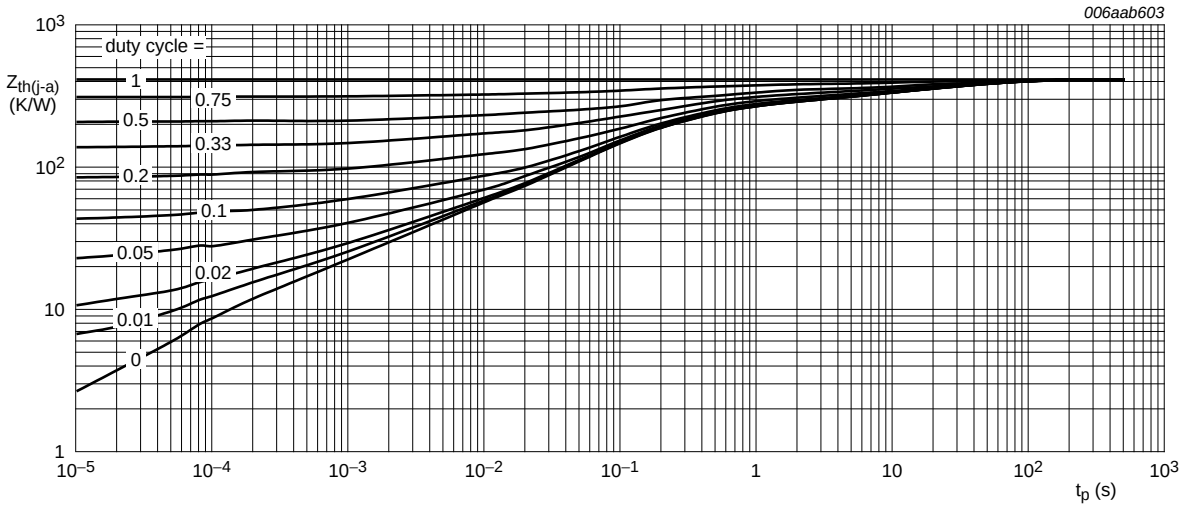
Table 6. Thermal characteristics

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
			[3][2]	-	-	212	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

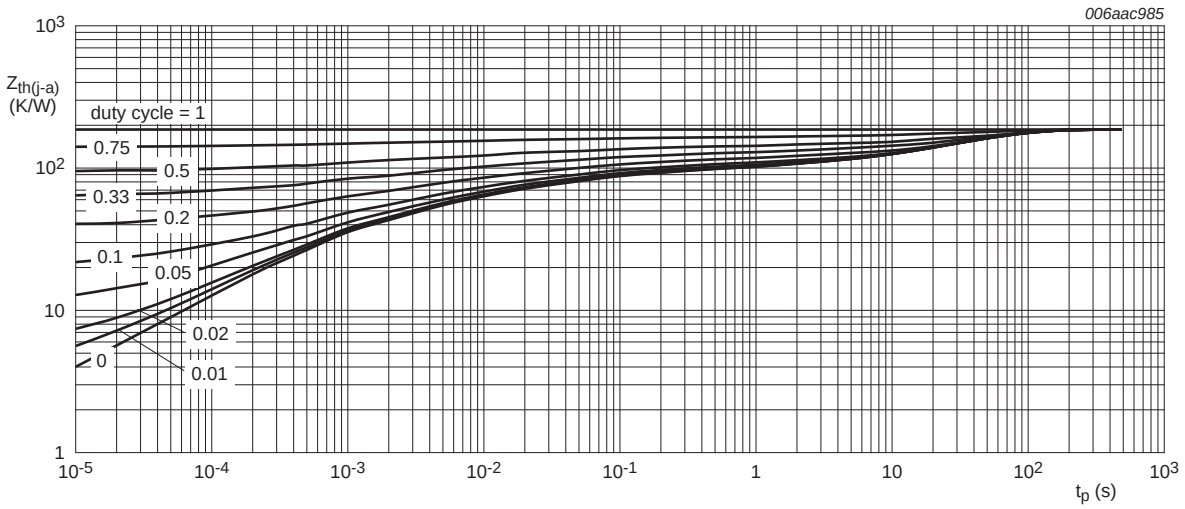
[2] Reflow soldering is the only recommented soldering method.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.



FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



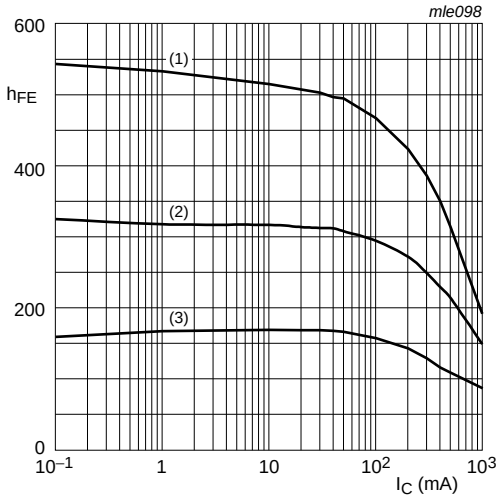
FR4 PCB, mounting pad for collector 1 cm^2

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 15 V; I_E = 0 A; T_{amb} = 25 °C	-	-	100	nA
		V_{CB} = 15 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; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C	150	-	-	
		V_{CE} = 2 V; I_C = 500 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C	90	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA; T_{amb} = 25 °C	-	-	25	mV
		I_C = 200 mA; I_B = 10 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C	-	-	150	mV
		I_C = 500 mA; I_B = 50 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C	-	-	250	mV
R_{CEsat}	collector-emitter saturation resistance	I_C = 500 mA; I_B = 50 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C	-	360	500	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C	-	-	1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 2 V; I_C = 100 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C	-	-	0.9	V
f_T	transition frequency	V_{CE} = 5 V; I_C = 100 mA; f = 100 MHz; T_{amb} = 25 °C	250	420	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C	-	4.4	6	pF



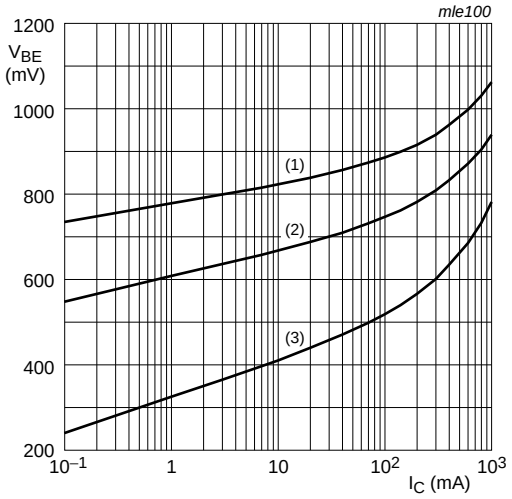
V_{CE} = 2 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

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



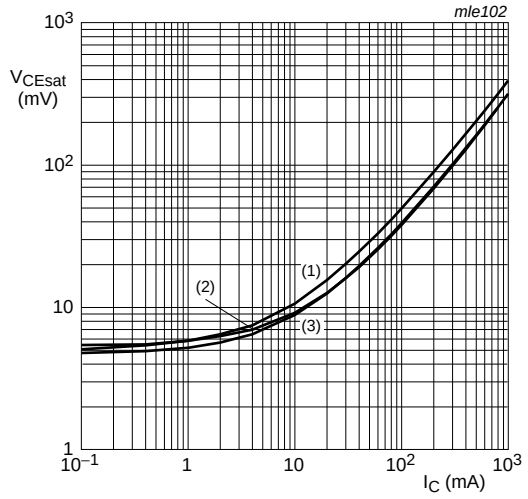
V_{CE} = 2 V

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

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



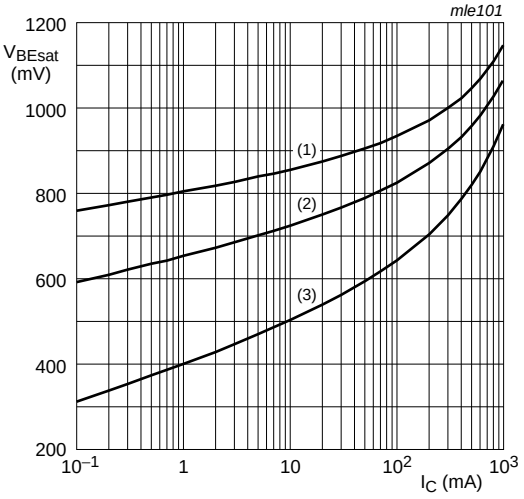
I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

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



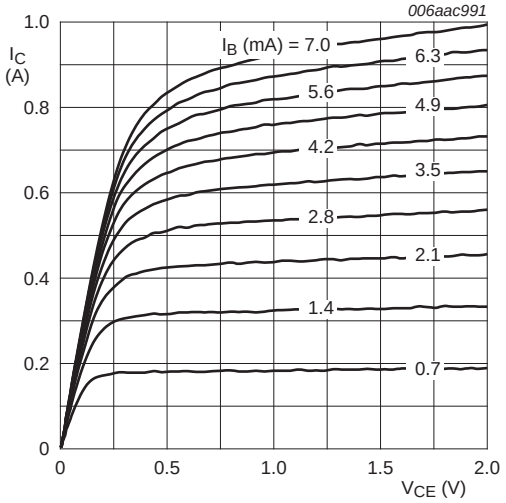
I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

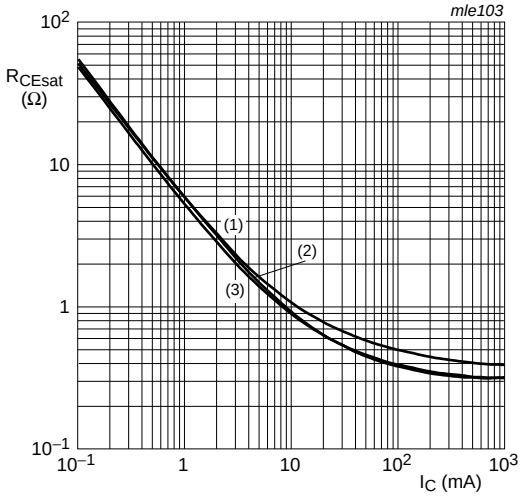
(3) T_{amb} = -55 °C

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



T_{amb} = 25 °C

Fig 8. 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 9. Collector-emitter equivalent on-resistance as a function of collector current; typical values

8. Test information

8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors and is suitable for use in automotive applications.

9. Package outline

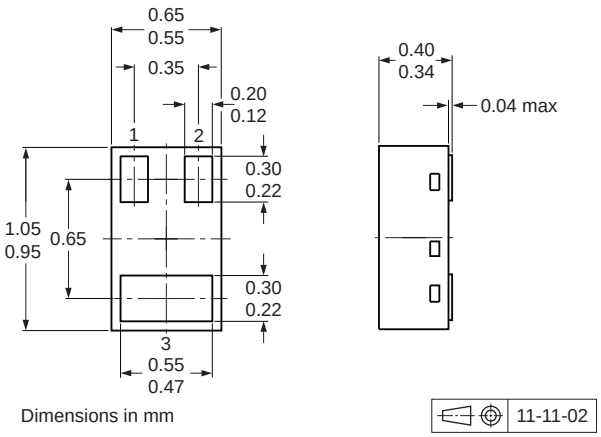


Fig 10. Package outline SOT883B

10. Soldering

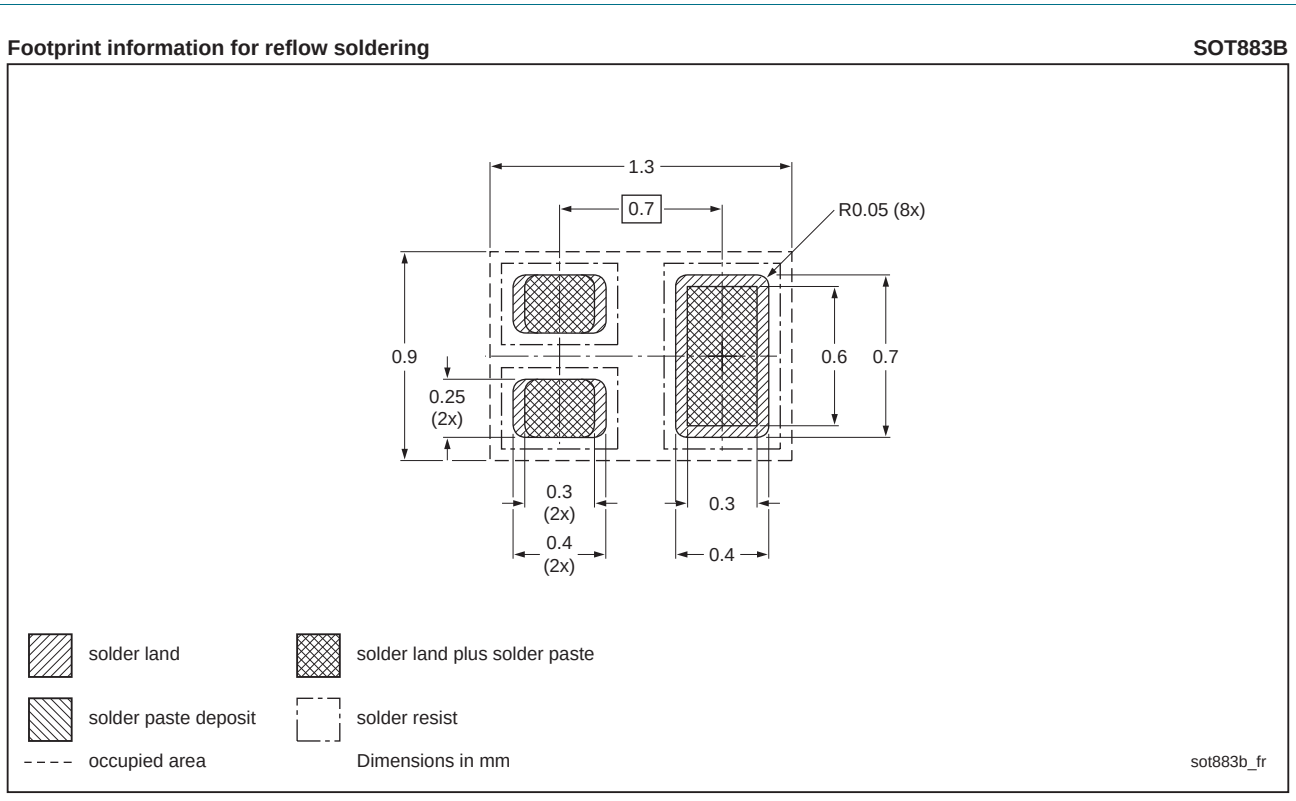


Fig 11. Reflow soldering footprint for SOT883B

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS2515MB v.1	20120126	Product data sheet	-	-

12. Legal information

12.1 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.

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14. Contents

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