



PBSS5160T

60 V, 1 A PNP low V_{CEsat} (BISS) transistor

Rev. 04 — 15 January 2010

Product data sheet

1. Product profile

1.1 General description

PNP low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PBSS4160T.

1.2 Features

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High efficiency due to less heat generation
- Reduces Printed-Circuit Board (PCB) area required
- Cost-effective replacement for medium power transistors BCP52 and BCX52

1.3 Applications

- Major application segments:
 - ◆ Automotive
 - ◆ Telecom infrastructure
 - ◆ Industrial
- Power management:
 - ◆ DC-to-DC conversion
 - ◆ Supply line switching
- Peripheral driver:
 - ◆ Driver in low supply voltage applications (e.g. lamps and LEDs)
 - ◆ Inductive load drivers (e.g. relays, buzzers and motors)

1.4 Quick reference data

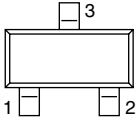
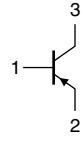
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-60	V
I_C	collector current		-	-	-1	A
I_{CM}	peak collector current	$t = 1$ ms or limited by $T_{j(max)}$	-	-	-2	A
R_{CEsat}	collector-emitter saturation resistance	$I_C = -1$ A; $I_B = -100$ mA	[1] -	220	330	m Ω

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

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base		
2	emitter		
3	collector		

006aab256

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5160T	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PBSS5160T	*U6

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

Table 5. Limiting values

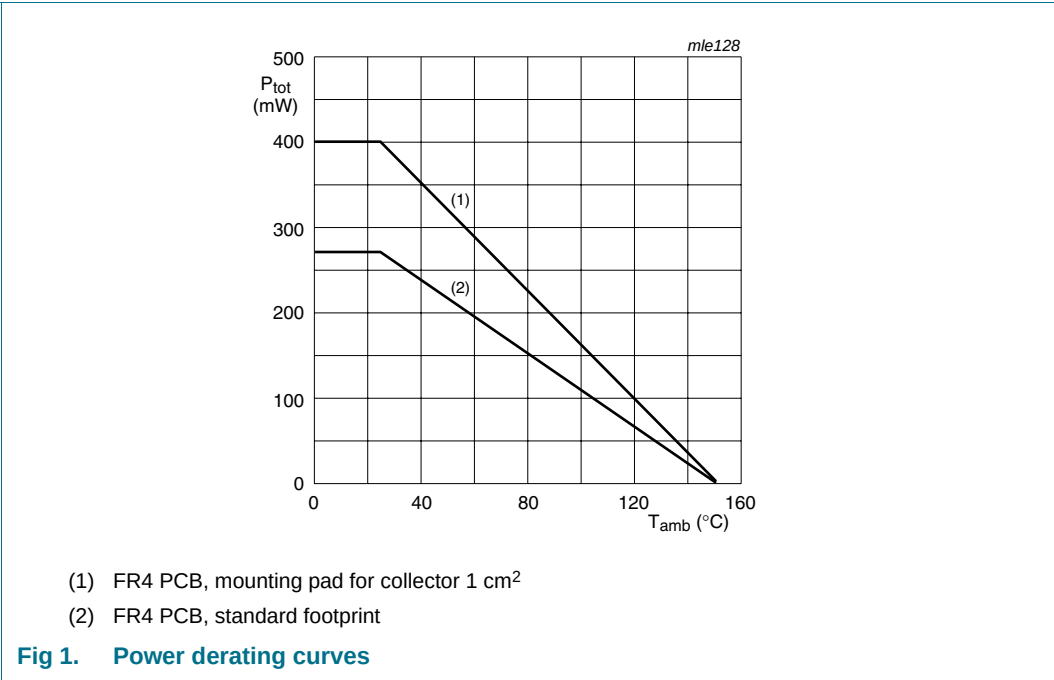
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	-80	V
V_{CEO}	collector-emitter voltage	open base	-	-60	V
V_{EBO}	emitter-base voltage	open collector	-	-5	V
I_C	collector current		^[1] -	-0.9	A
			^[2] -	-1	A
I_{CM}	peak collector current	$t = 1$ ms or limited by $T_{j(max)}$	-	-2	A
I_B	base current		-	-300	mA
I_{BM}	peak base current	$t_p \leq 300 \mu s$; $\delta \leq 0.02$	-	-1	A

Table 5. Limiting values ...continued
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	[1]	-	270 mW
			[2]	-	400 mW
			[1][3]	-	1.25 W
T_j	junction temperature		-	150	$^{\circ}\text{C}$
T_{amb}	ambient temperature		-65	+150	$^{\circ}\text{C}$
T_{stg}	storage temperature		-65	+150	$^{\circ}\text{C}$

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
[3] Operated under pulse conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 10\text{ ms}$.

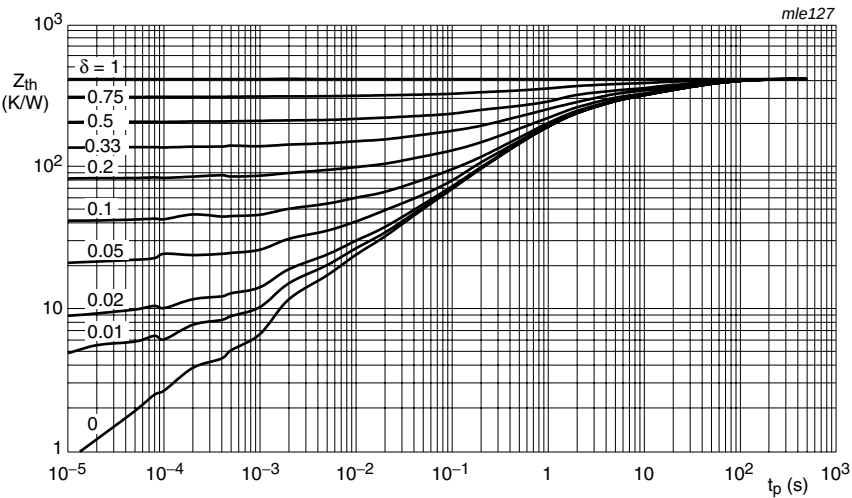


6. Thermal characteristics

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] -	-	465	K/W
			[2] -	-	312	K/W
			[1][3] -	-	100	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
[3] Operated under pulse conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 10$ ms.



FR4 PCB, standard footprint

Fig 2. Transient thermal impedance as a function of pulse duration; typical values

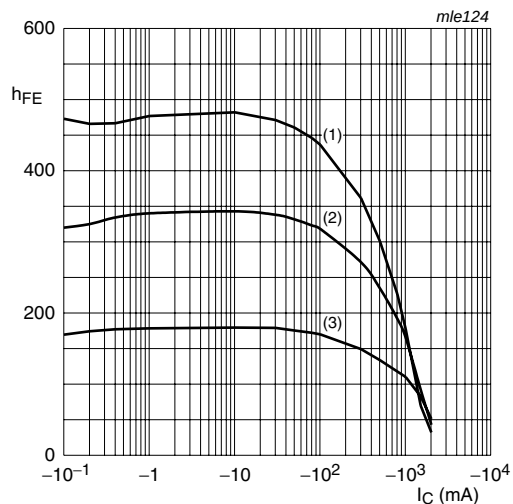
7. Characteristics

Table 7. Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -60\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -60\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	-50	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -60\text{ V}; V_{BE} = 0\text{ V}$	-	-	-100	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}$				
		$I_C = -1\text{ mA}$	200	350	-	
		$I_C = -500\text{ mA}$	[1] 150	250	-	
		$I_C = -1\text{ A}$	[1] 100	160	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -100\text{ mA}; I_B = -1\text{ mA}$	-	-110	-160	mV
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	-	-120	-175	mV
		$I_C = -1\text{ A}; I_B = -100\text{ mA}$	[1] -	-220	-330	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = -1\text{ A}; I_B = -100\text{ mA}$	[1] -	220	330	$\text{m}\Omega$
V_{BEsat}	base-emitter saturation voltage	$I_C = -1\text{ A}; I_B = -50\text{ mA}$	-	-0.95	-1.1	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = -5\text{ V}; I_C = -1\text{ A}$	-	-0.82	-0.9	V
f_T	transition frequency	$V_{CE} = -10\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}$	150	220	-	MHz
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_C = 0\text{ A}; f = 1\text{ MHz}$	-	9	15	pF

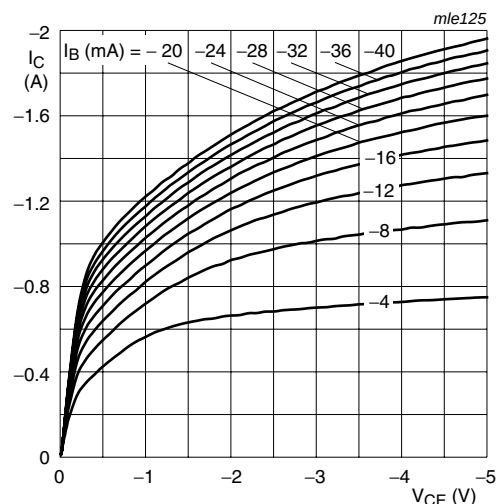
[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.



$V_{CE} = -5 \text{ V}$

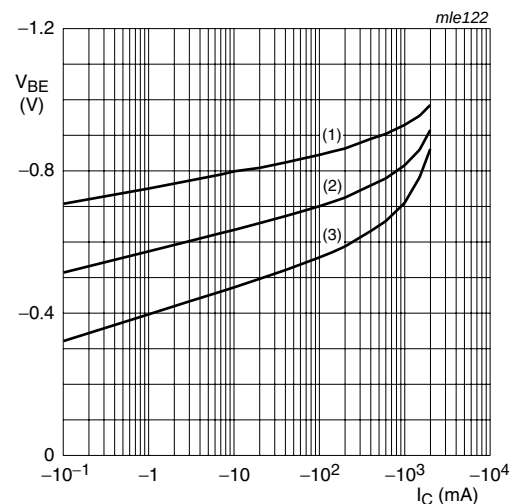
- (1) $T_{amb} = 100 \text{ }^{\circ}\text{C}$
- (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
- (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig 3. DC current gain as a function of collector current; typical values



$T_{amb} = 25 \text{ }^{\circ}\text{C}$

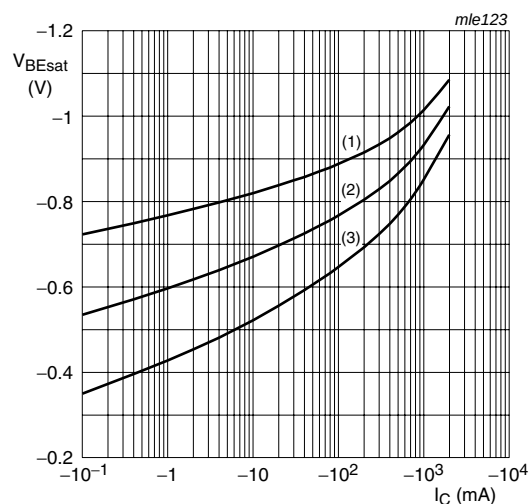
Fig 4. Collector current as a function of collector-emitter voltage; typical values



$V_{CE} = -5 \text{ V}$

- (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
- (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
- (3) $T_{amb} = 100 \text{ }^{\circ}\text{C}$

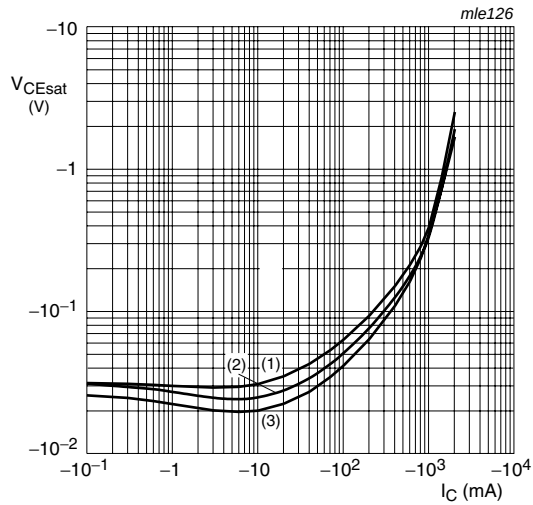
Fig 5. Base-emitter voltage as a function of collector current; typical values



$I_C/I_B = 20$

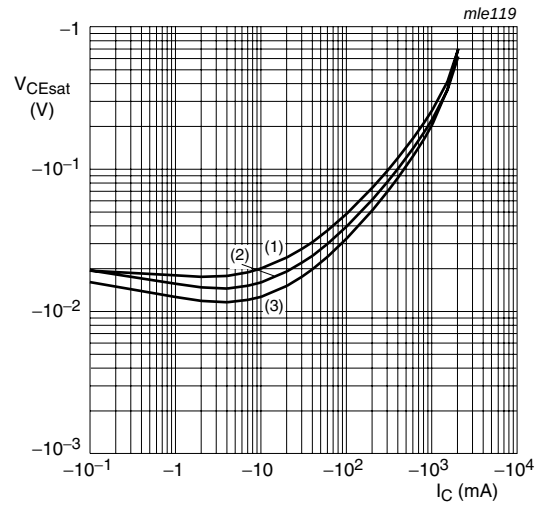
- (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
- (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
- (3) $T_{amb} = 100 \text{ }^{\circ}\text{C}$

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



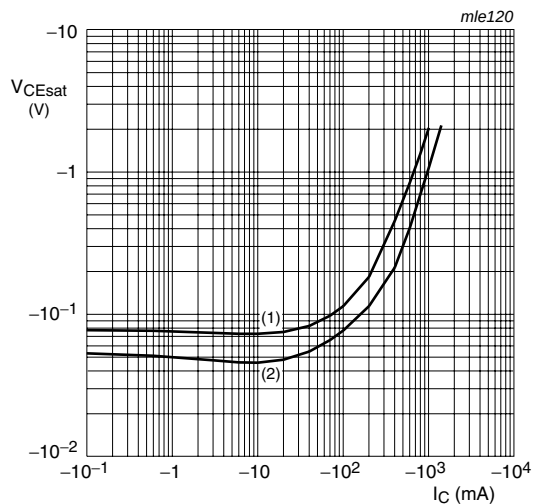
- $I_C/I_B = 20$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

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



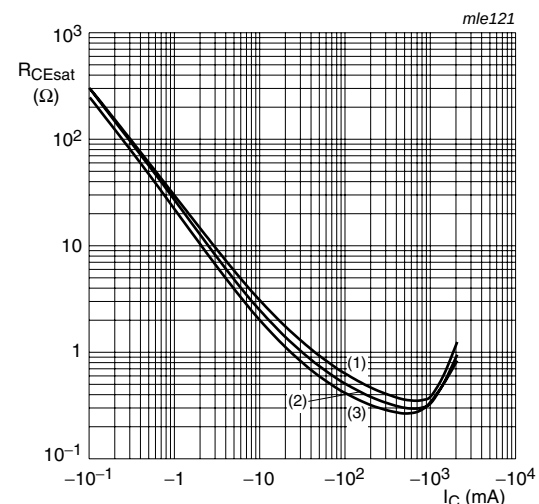
- $I_C/I_B = 10$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

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



- $T_{amb} = 25\text{ °C}$
- (1) $I_C/I_B = 100$
 - (2) $I_C/I_B = 50$

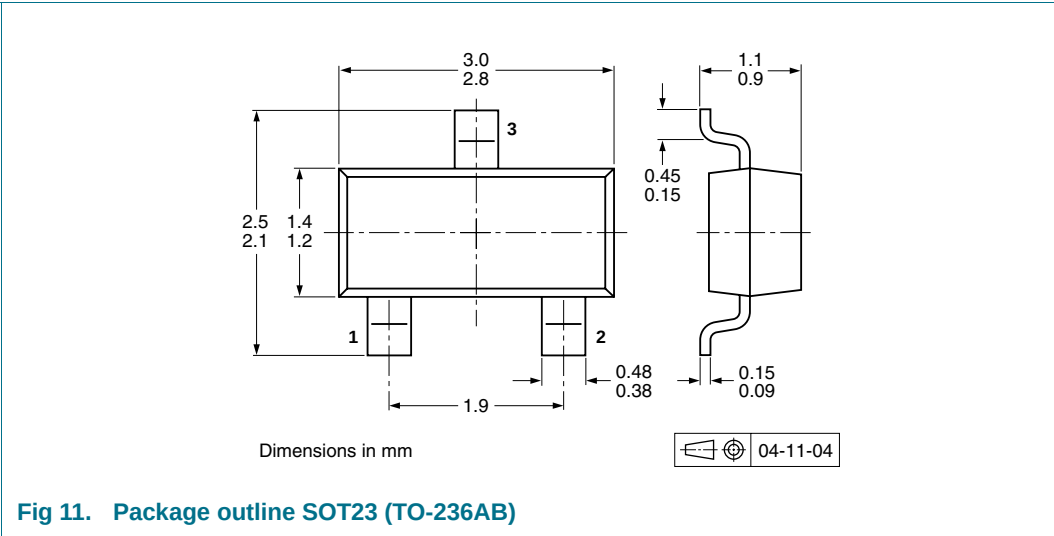
Fig 9. Collector-emitter saturation voltage as a function of collector current; typical values



- $I_C/I_B = 20$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

Fig 10. Collector-emitter saturation resistance as a function of collector current; typical values

8. Package outline



9. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
PBSS5160T	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

[1] For further information and the availability of packing methods, see [Section 12](#).

10. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5160T_4	20100115	Product data sheet	-	PBSS5160T_N_3
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Table 1 "Quick reference data": amended • Section 4 "Marking": amended • Figure 4: updated • Figure 11: superseded by minimized package outline drawing • Section 9 "Packing information": added • Section 11 "Legal information": updated			
PBSS5160T_N_3	20080718	Product data sheet	-	PBSS5160T_2
PBSS5160T_2	20040527	Product specification	-	PBSS5160T_1
PBSS5160T_1	20030623	Product specification	-	-

11. Legal information

11.1 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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13. Contents

1	Product profile	1
1.1	General description	1
1.2	Features	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Marking	2
5	Limiting values	2
6	Thermal characteristics	4
7	Characteristics	5
8	Package outline	8
9	Packing information	8
10	Revision history	9
11	Legal information	10
11.1	Data sheet status	10
11.2	Definitions	10
11.3	Disclaimers	10
11.4	Trademarks	10
12	Contact information	10
13	Contents	11

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