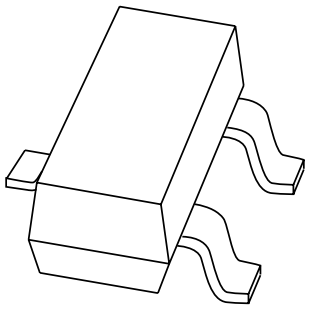
DATA SHEET



PBSS5160T

60 V, 1 A

PNP low V_{CEsat} (BISS) transistor

Product specification
Supersedes data of 2003 Jun 23

2004 May 27

Philips
Semiconductors

PHILIPS

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

PBSS5160T

FEATURES

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability: I_C and I_{CM}
- High efficiency, reduces heat generation
- Reduces printed-circuit board area required
- Cost effective replacement for medium power transistors BCP52 and BCX52.

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 driver (e.g. relays, buzzers and motors).

DESCRIPTION

PNP low V_{CEsat} transistor in a SOT23 plastic package.
NPN complement: PBSS4160T.

MARKING

TYPE NUMBER	MARKING CODE(1)
PBSS5160T	U6*

Note

1. * = p: made in Hong Kong
   * = t: made in Malaysia
   * = W: made in China.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CEO}	collector-emitter voltage	–60	V
I_C	collector current (DC)	–1	A
I_{CM}	peak collector current	–2	A
R_{CEsat}	equivalent on-resistance	330	mΩ

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector

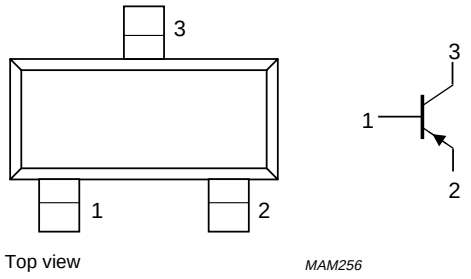


Fig.1 Simplified outline (SOT23) and symbol.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5160T	–	plastic surface mounted package; 3 leads	SOT23

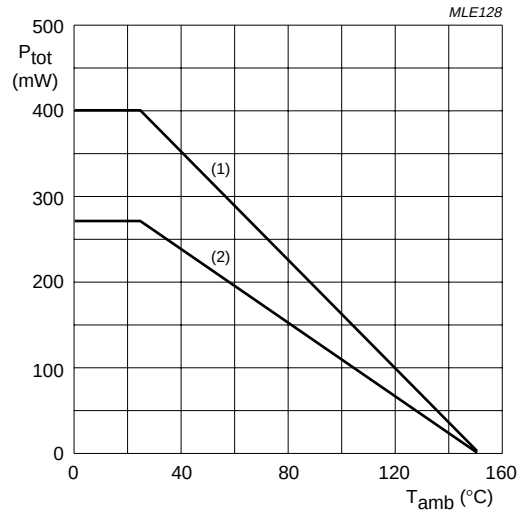
LIMITING VALUES

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 (DC)	note 1	–	–0.9	A
		note 2	–	–1	A
I_{CM}	peak collector current	t = 1 ms or limited by $T_{j(max)}$	–	–2	A
I_B	base current (DC)		–	–300	mA
I_{BM}	peak base current	$t_p \leq 300$ μs; $\delta \leq 0.02$	–	–1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C;			
		note 1	–	270	mW
		note 2	–	400	mW
		notes 1 and 3	–	1.25	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint.
2. Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and 1 cm^2 collector mounting pad.
3. Operated under pulsed conditions: duty cycle $\delta \leq 20$ %, pulse width $t_p \leq 10$ ms.



(1) Device mounted with 1 cm^2 collector tab.
(2) Device mounted on standard footprint.

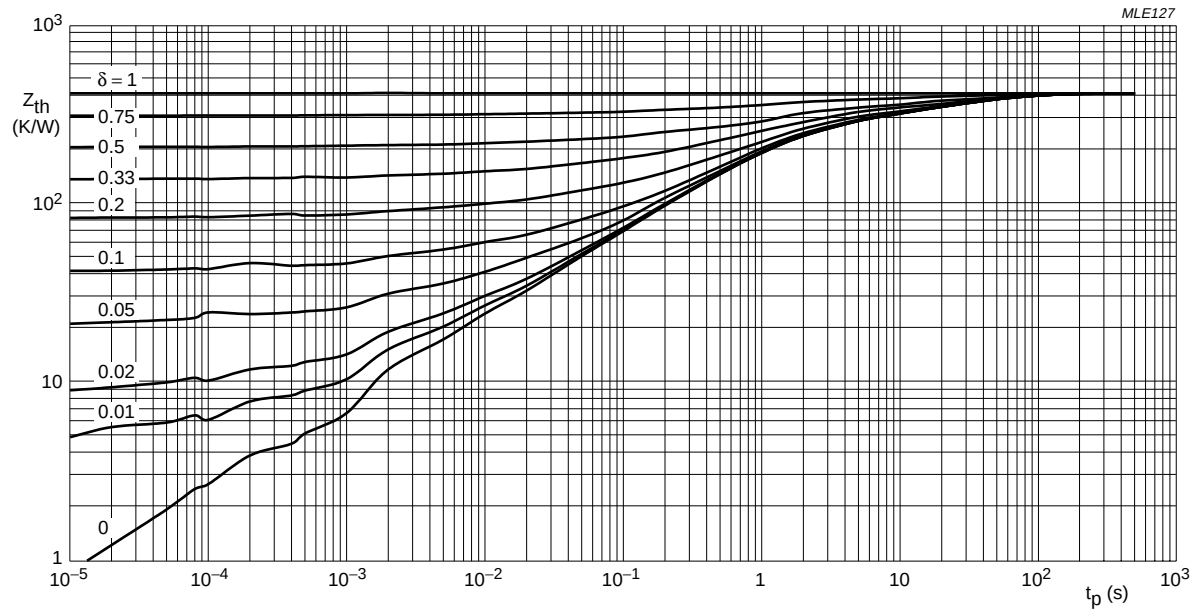
Fig.2 Power derating curves.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air; note 1	465	K/W
		in free air; note 2	312	K/W
		in free air; notes 1 and 3	100	K/W

Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint.
2. Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and 1 cm^2 collector mounting pad.
3. Operated under pulsed conditions: duty cycle $\delta \leq 20$ %, pulse width $t_p \leq 10$ ms.



Mounted on printed-circuit board; standard footprint.

Fig.3 Transient thermal impedance as a function of pulse time; typical values.

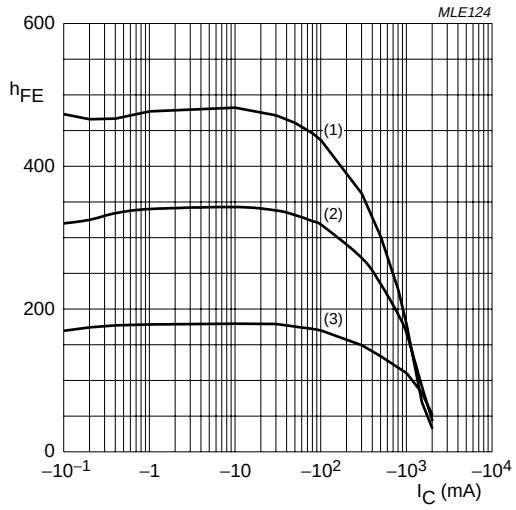
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	V_{CB} = –60 V; I_E = 0 A	–	–	–100	nA
		V_{CB} = –60 V; I_E = 0 A; T_j = 150 °C	–	–	–50	µA
I_{CES}	collector-emitter cut-off current	V_{CE} = –60 V; V_{BE} = 0 V	–	–	–100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A	–	–	–100	nA
h_{FE}	DC current gain	V_{CE} = –5 V; I_C = –1 mA	200	350	–	
		V_{CE} = –5 V; I_C = –500 mA; note 1	150	250	–	
		V_{CE} = –5 V; I_C = –1 A; note 1	100	160	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = –100 mA; I_B = –1 mA	–	–110	–160	mV
		I_C = –500 mA; I_B = –50 mA	–	–120	–175	mV
		I_C = –1 A; I_B = –100 mA; note 1	–	–220	–330	mV
V_{BEsat}	base-emitter saturation voltage	I_C = –1 A; I_B = –50 mA	–	–0.95	–1.1	V
R_{CEsat}	equivalent on-resistance	I_C = –1 A; I_B = –100 mA; note 1	–	220	330	mΩ
V_{BEon}	base-emitter turn-on voltage	V_{CE} = –5 V; I_C = –1 A	–	–0.82	–0.9	V
f_T	transition frequency	I_C = –50 mA; V_{CE} = –10 V; f = 100 MHz	150	220	–	MHz
C_c	collector capacitance	V_{CB} = –10 V; I_E = I_e = 0 A; f = 1 MHz	–	9	15	pF

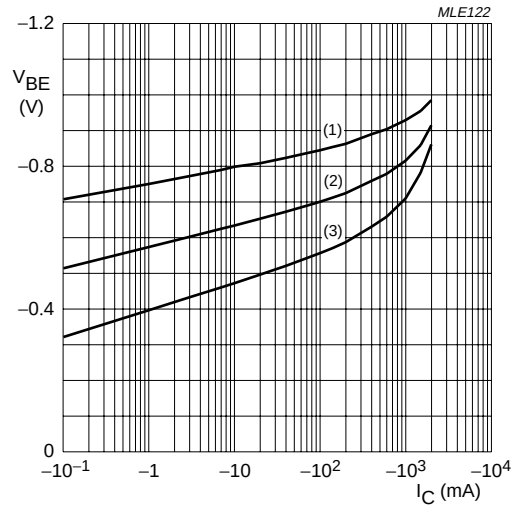
Note

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



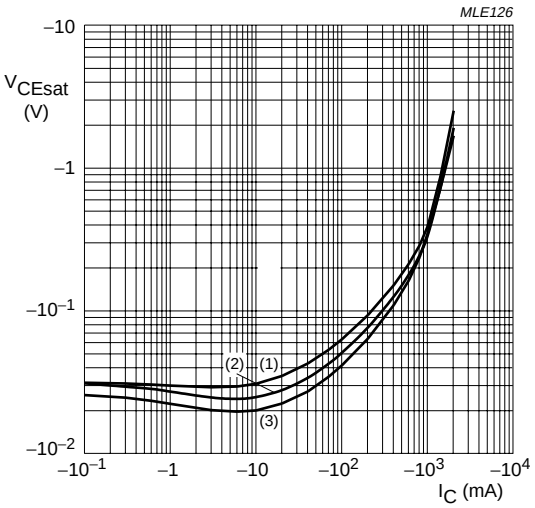
V_{CE} = –5 V.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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



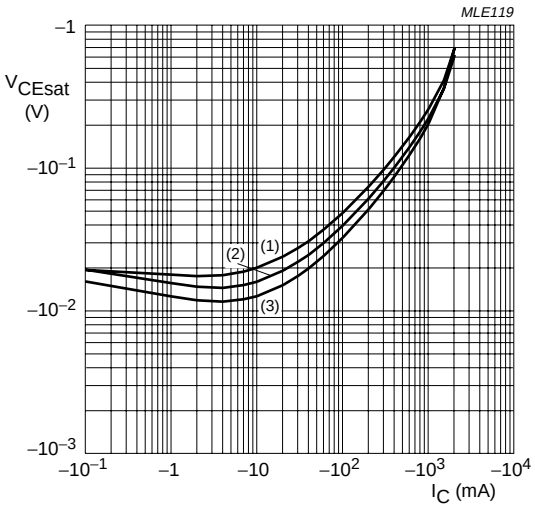
V_{CE} = –5 V.
(1) T_{amb} = –55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

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



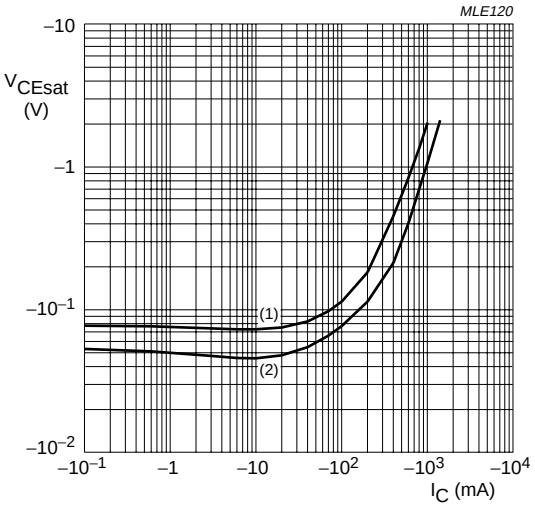
I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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



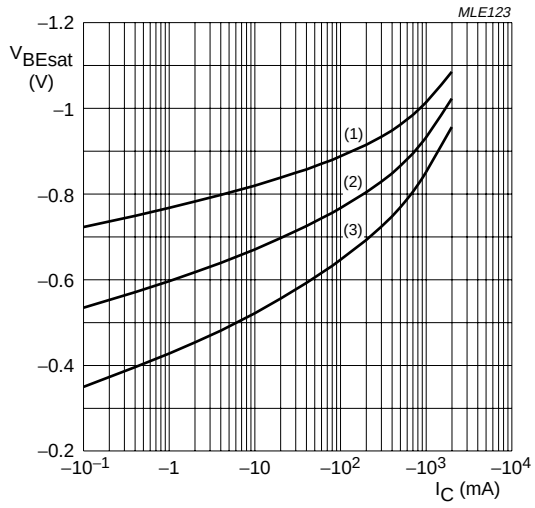
I_C/I_B = 10.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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



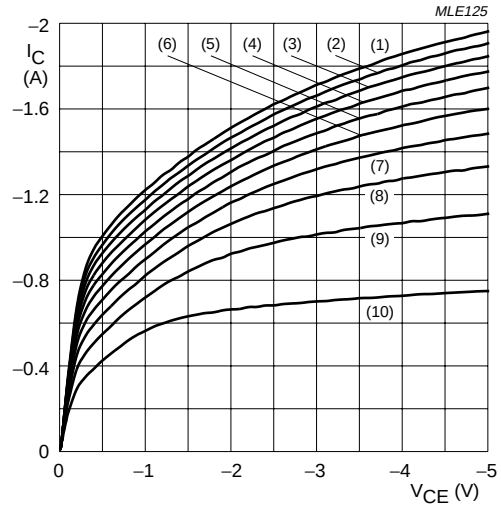
T_{amb} = 25 °C.
(1) I_C/I_B = 100.
(2) I_C/I_B = 50.

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



I_C/I_B = 20.
(1) T_{amb} = –55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

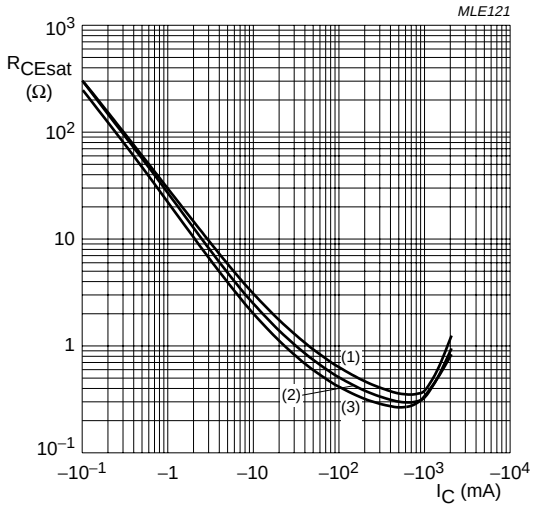
Fig.9 Base-emitter saturation voltage as a function of collector current; typical values.



T_{amb} = 25 °C.

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

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



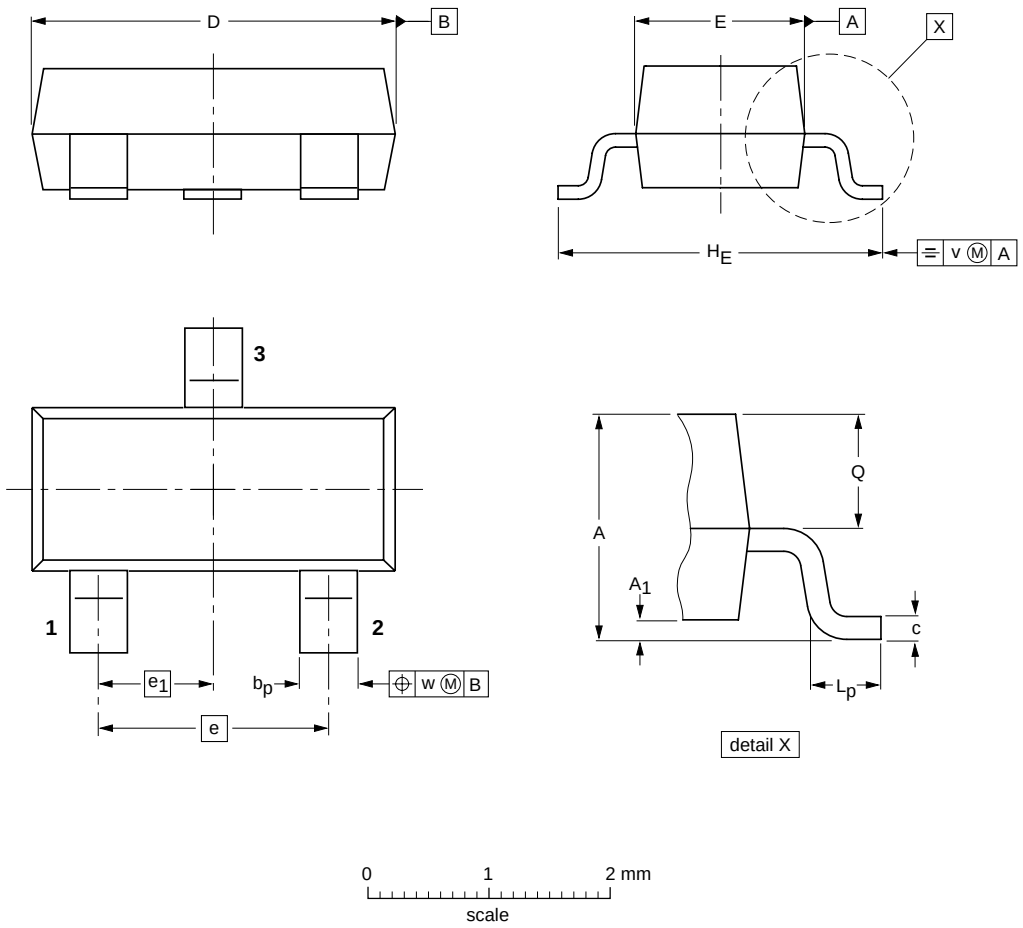
I_C/I_B = 20.

(1) T_{amb} = 100 °C. (2) T_{amb} = 25 °C. (3) T_{amb} = −55 °C.

Fig.11 Equivalent on-resistance as a function of collector current; typical values.

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads **SOT23**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT23		TO-236AB				~~97-02-28~~ 99-09-13

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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III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

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2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.
3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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