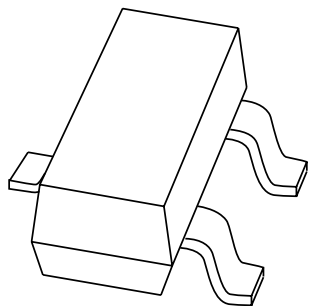


# DATA SHEET



**PBSS5160T**

**60 V, 1 A**

**PNP low  $V_{CEsat}$  (BISS) transistor**

Product specification  
Supersedes data of 2003 Jun 23

2004 May 27

# 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 <sup>(1)</sup>
PBSS5160T	U6*

#### Note

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

### ORDERING INFORMATION

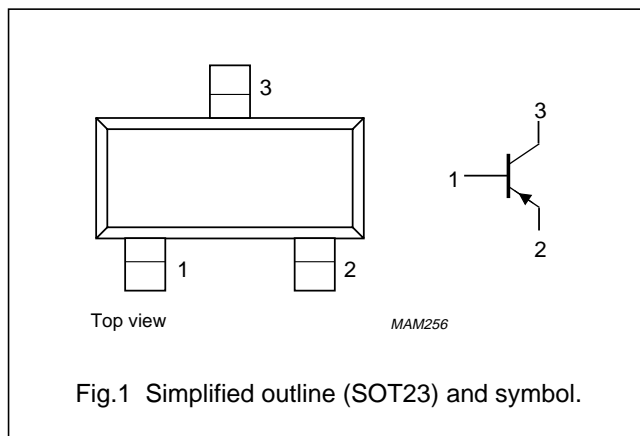
TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5160T	–	plastic surface mounted package; 3 leads	SOT23

### 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



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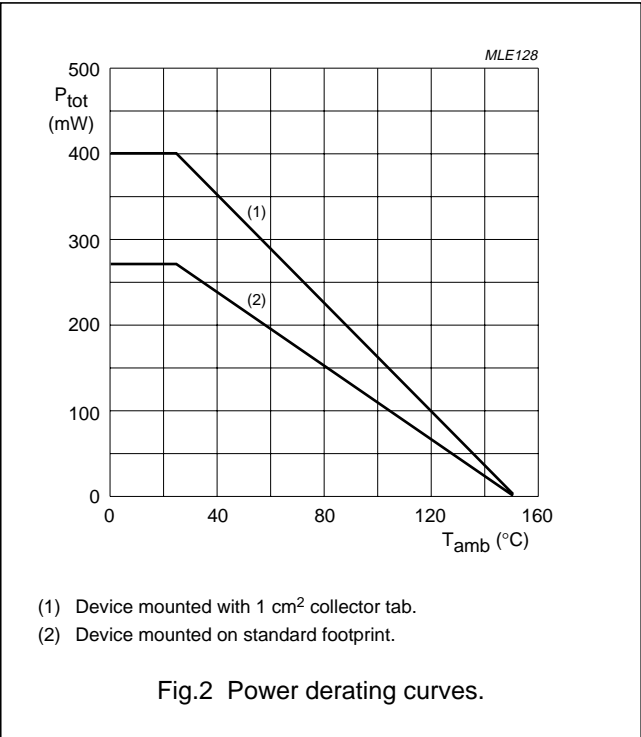
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–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	$t = 1\text{ ms}$ or limited by $T_{j(max)}$	–	–2	A
$I_B$	base current (DC)		–	–300	mA
$I_{BM}$	peak base current	$t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$	–	–1	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$ ;			
		note 1	–	270	mW
		note 2	–	400	mW
		notes 1 and 3	–	1.25	W
$T_{stg}$	storage temperature		–65	+150	$^\circ\text{C}$
$T_j$	junction temperature		–	150	$^\circ\text{C}$
$T_{amb}$	operating ambient temperature		–65	+150	$^\circ\text{C}$

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<sup>2</sup> collector mounting pad.
- 3. Operated under pulsed conditions: duty cycle  $\delta \leq 20\%$ , pulse width  $t_p \leq 10\text{ ms}$ .



60 V, 1 A  
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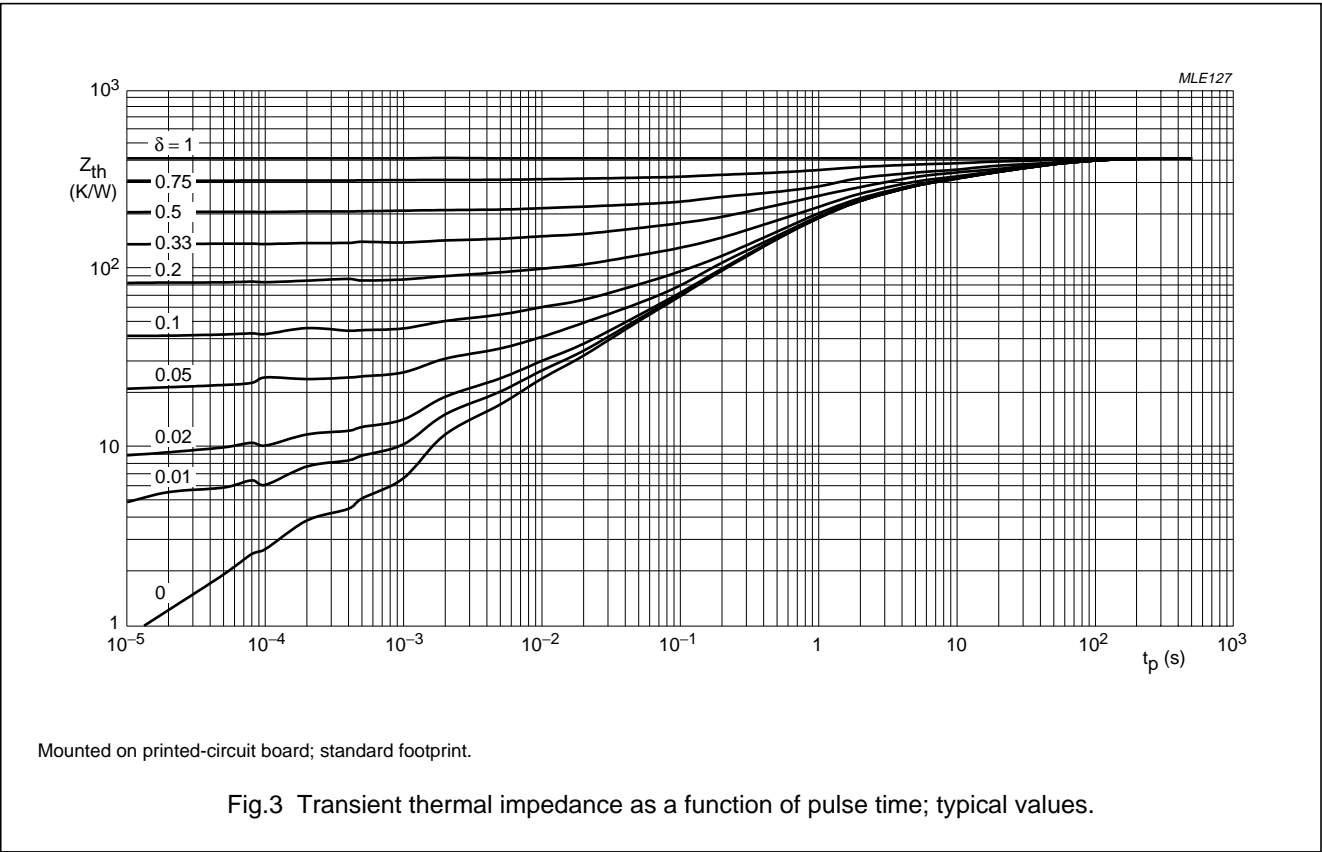
PBSS5160T

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<sup>2</sup> collector mounting pad.
- 3. Operated under pulsed conditions: duty cycle  $\delta \leq 20\%$ , pulse width  $t_p \leq 10\text{ ms}$ .



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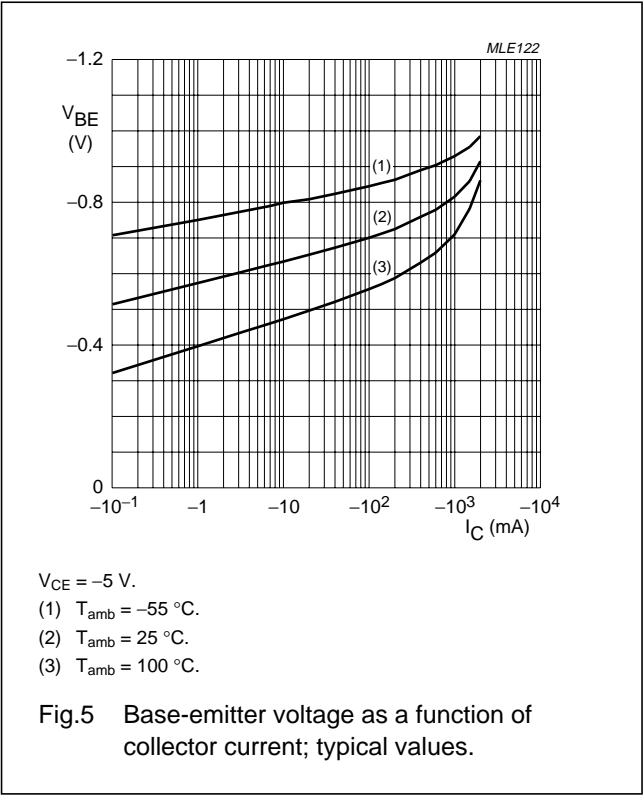
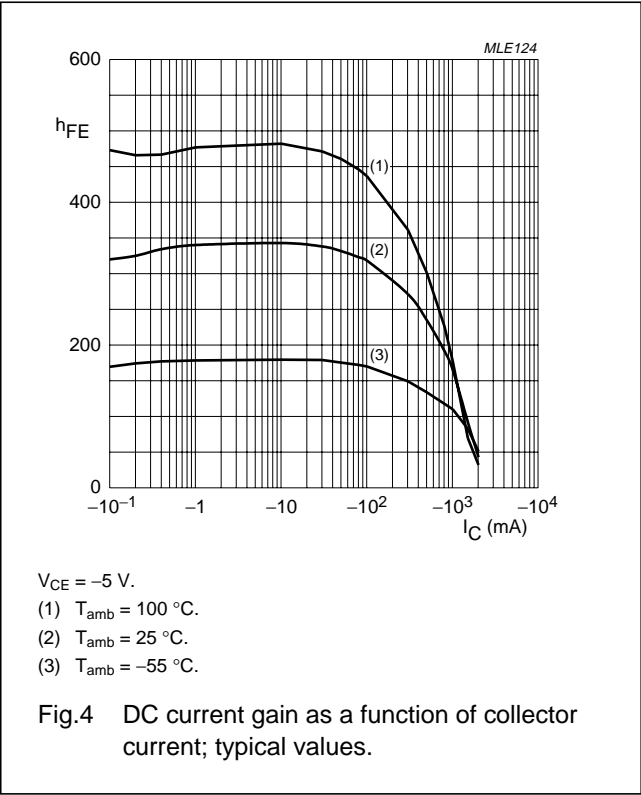
CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$  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	$\mu\text{A}$
$I_{CES}$	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	–	
		$V_{CE} = -5\text{ V}; I_C = -500\text{ mA}; \text{note 1}$	150	250	–	
		$V_{CE} = -5\text{ V}; I_C = -1\text{ A}; \text{note 1}$	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
		$I_C = -1\text{ A}; I_B = -100\text{ mA}; \text{note 1}$	–	–220	–330	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -1\text{ A}; I_B = -50\text{ mA}$	–	–0.95	–1.1	V
$R_{CEsat}$	equivalent on-resistance	$I_C = -1\text{ A}; I_B = -100\text{ mA}; \text{note 1}$	–	220	330	$\text{m}\Omega$
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = -5\text{ V}; I_C = -1\text{ A}$	–	–0.82	–0.9	V
$f_T$	transition frequency	$I_C = -50\text{ mA}; V_{CE} = -10\text{ V}; f = 100\text{ MHz}$	150	220	–	MHz
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$	–	9	15	pF

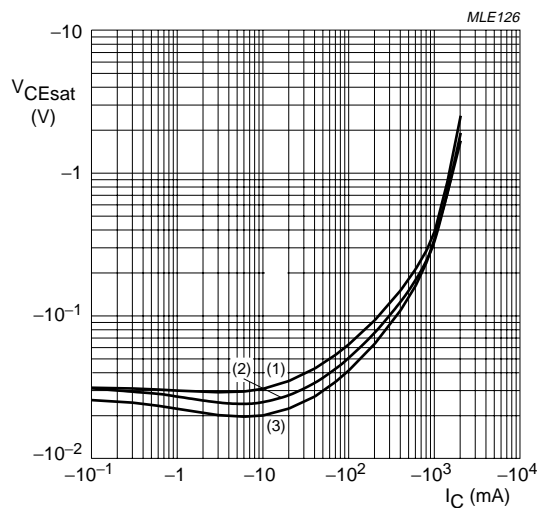
Note

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



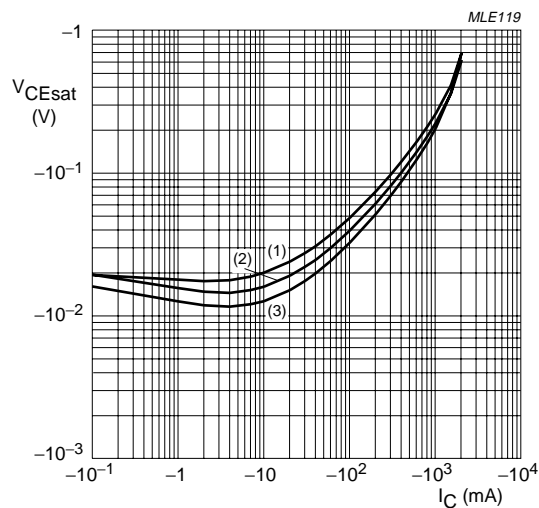
# 60 V, 1 A PNP low $V_{CEsat}$ (BISS) transistor

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 $I_C/I_B = 20$ .

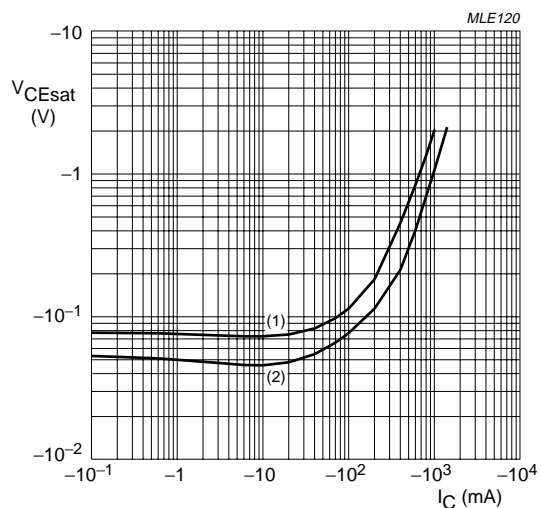
- (1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$ .

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

 $I_C/I_B = 10$ .

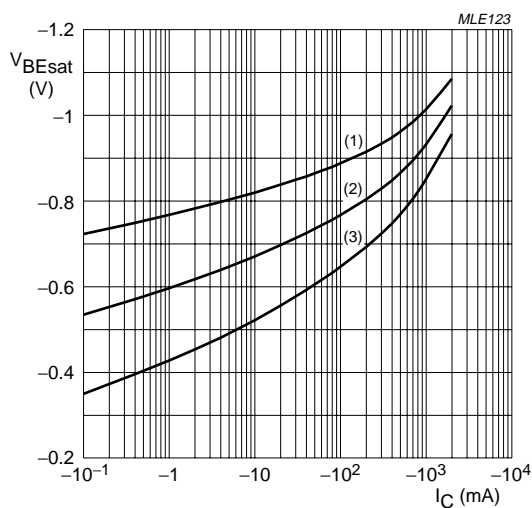
- (1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$ .

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

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

- (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.

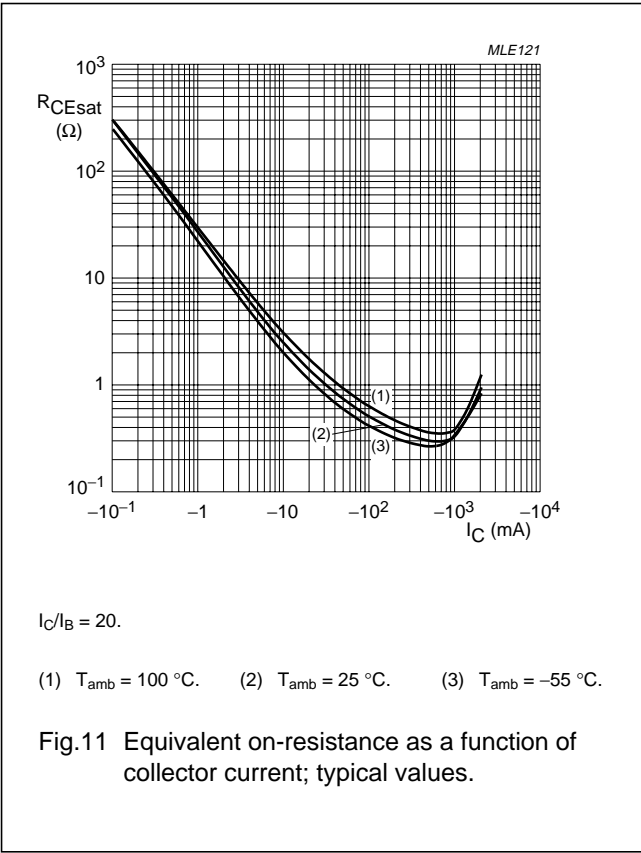
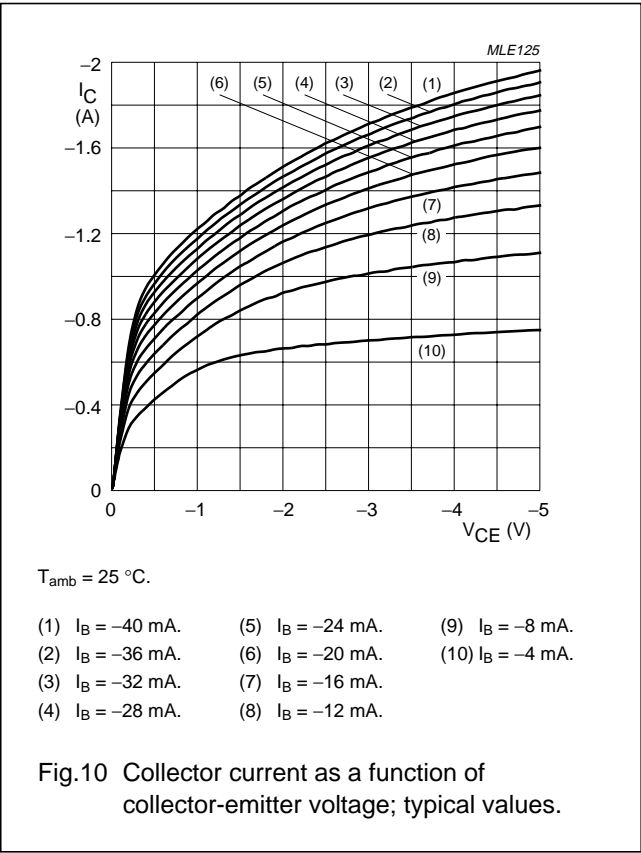
 $I_C/I_B = 20$ .

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

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

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

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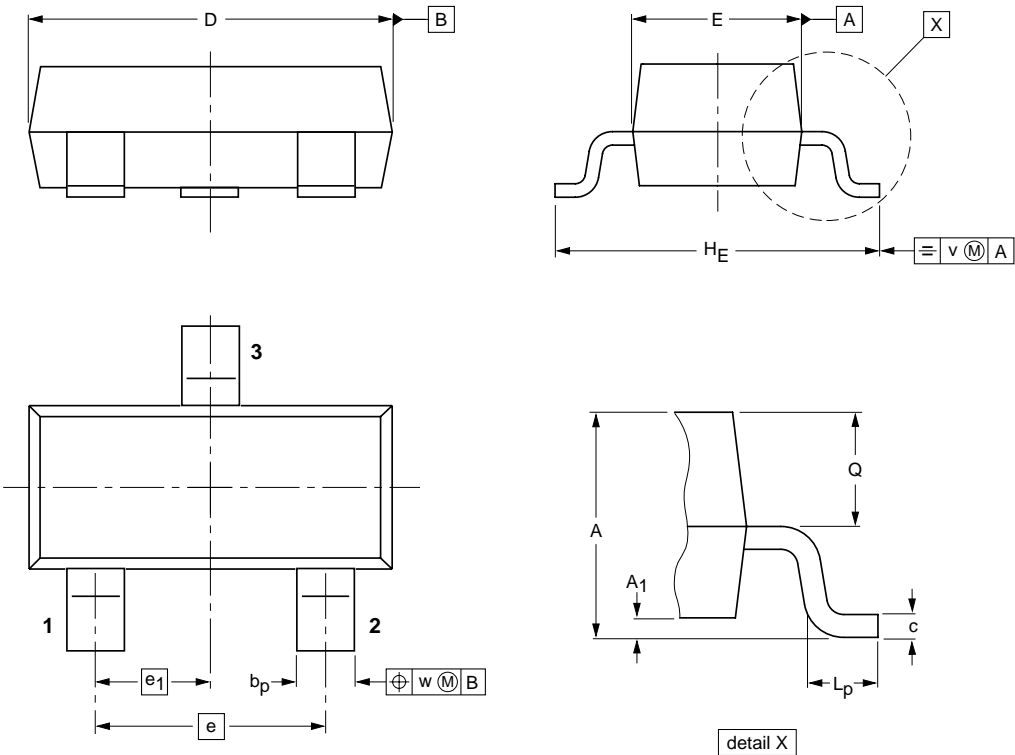
60 V, 1 A  
PNP low  $V_{CEsat}$  (BISS) transistor

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PACKAGE OUTLINE

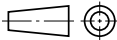
Plastic surface mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max.	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	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

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

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Printed in The Netherlands

R75/02/pp10

Date of release: 2004 May 27

Document order number: 9397 750 13284

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