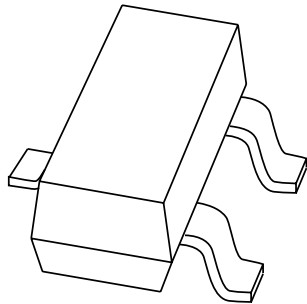


DATA SHEET



PBSS4160T

60 V, 1 A

NPN low V_{CEsat} (BISS) transistor

Product data sheet
Supersedes data of 2003 Jun 24

2004 May 12

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

PBSS4160T

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 transistor BCP55 and BCX55.

APPLICATIONS

- Major application segments:
 - Automotive 42 V power
 - 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

NPN low V_{CEsat} transistor in a SOT23 plastic package.
PNP complement: PBSS5160T.

MARKING

TYPE NUMBER	MARKING CODE ⁽¹⁾
PBSS4160T	*U5

Note

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

ORDERING INFORMATION

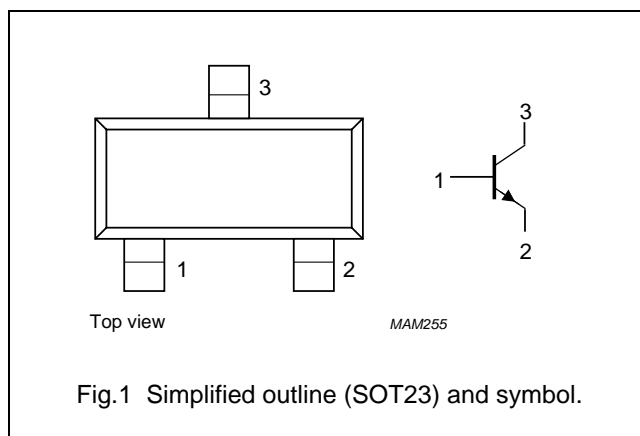
TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS4160T	–	plastic surface mounted package; 3 leads	SOT23

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	250	mΩ

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



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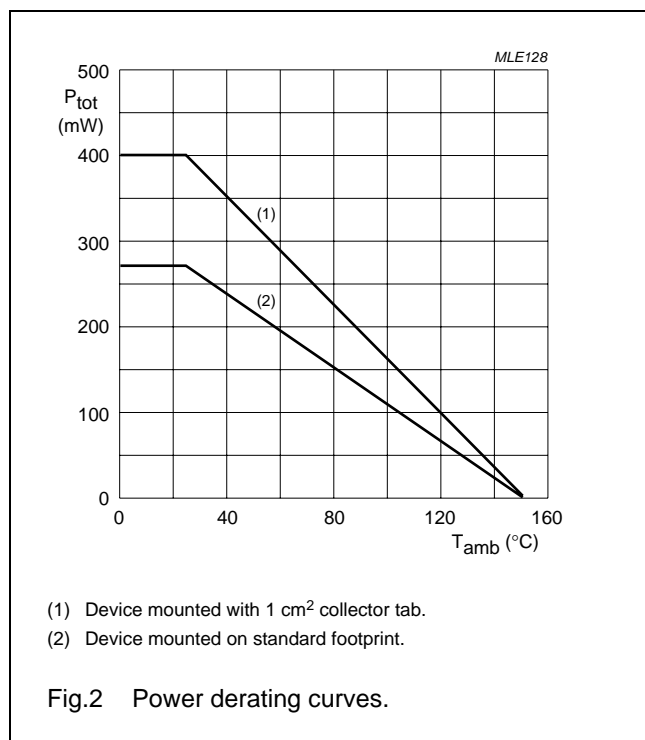
LIMITING VALUES

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	$t_p = 1$ ms or limited by $T_{j(max)}$	–	2	A
I_B	base current (DC)		–	300	mA
I_{BM}	peak base current	$t_p \leq 300$ μ s; $\delta \leq 0.02$	–	1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 1	–	270	mW
		$T_{amb} \leq 25$ °C; note 2	–	400	mW
		$T_{amb} \leq 25$ °C; 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

- Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.
- Device mounted on an FR4 printed-circuit board, single-sided copper, tin-plated, 1 cm² collector mounting pad.
- Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 10$ ms.



60 V, 1 A

NPN low V_{CEsat} (BISS) transistor

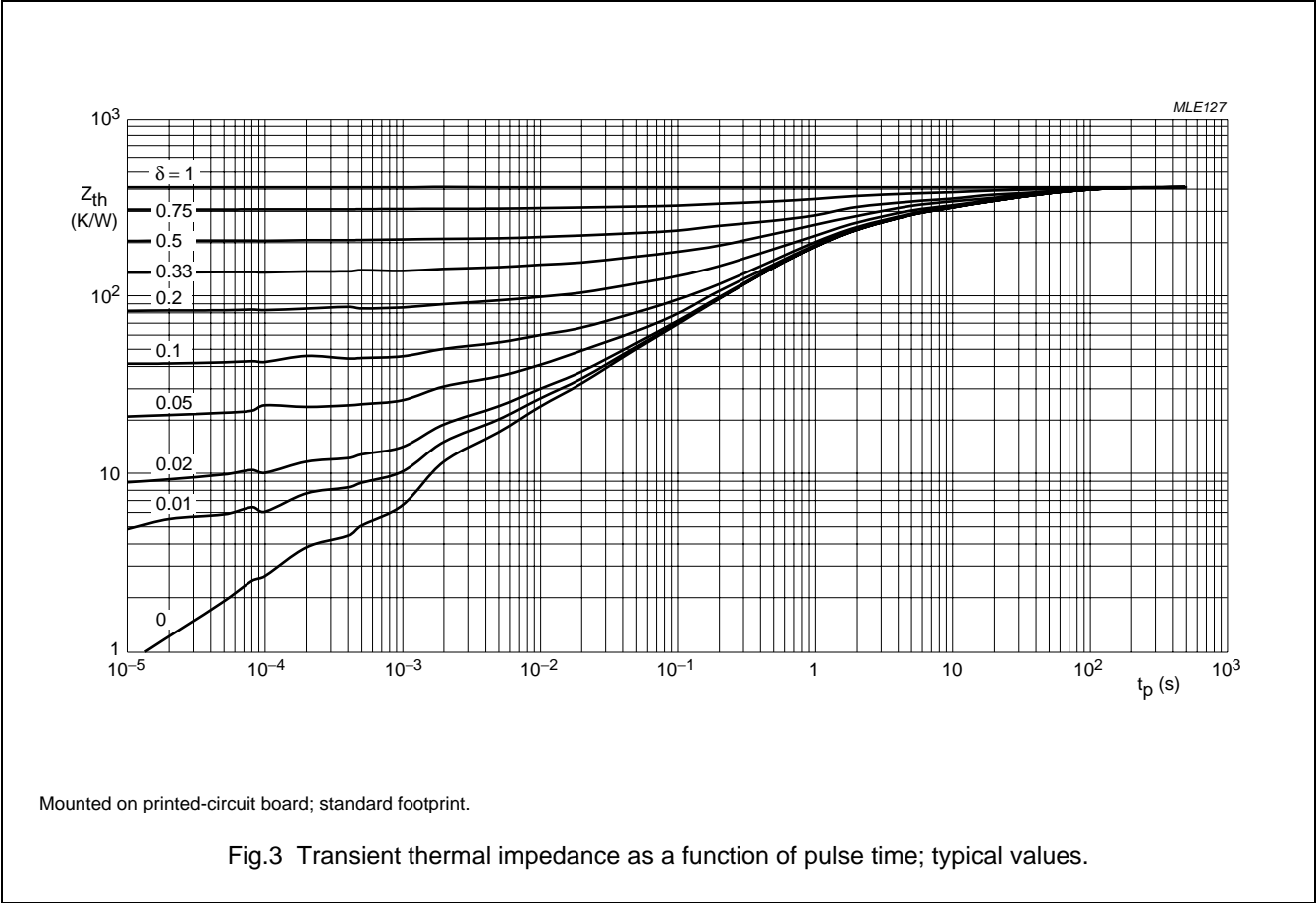
PBSS4160T

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 cm² collector mounting pad.
3. Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 10$ ms.



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NPN low V_{CEsat} (BISS) transistor

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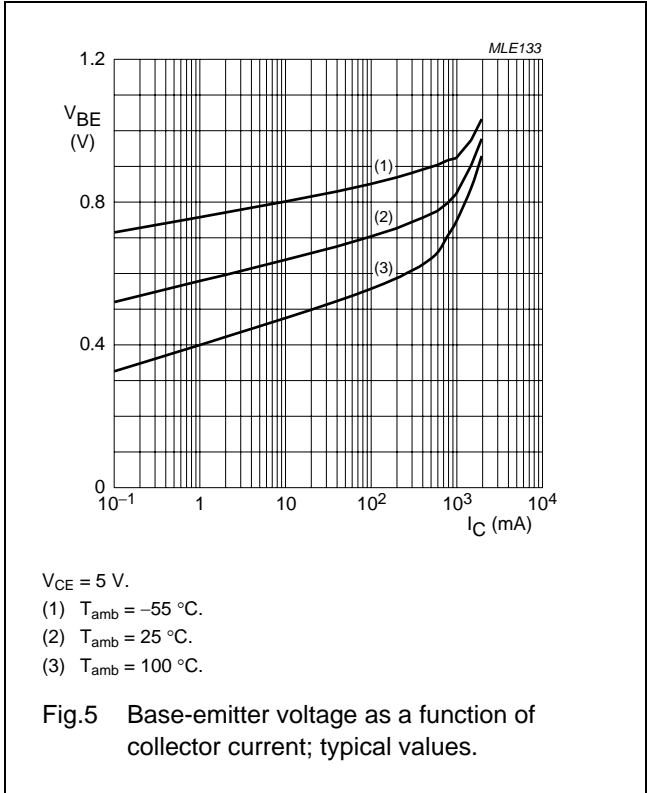
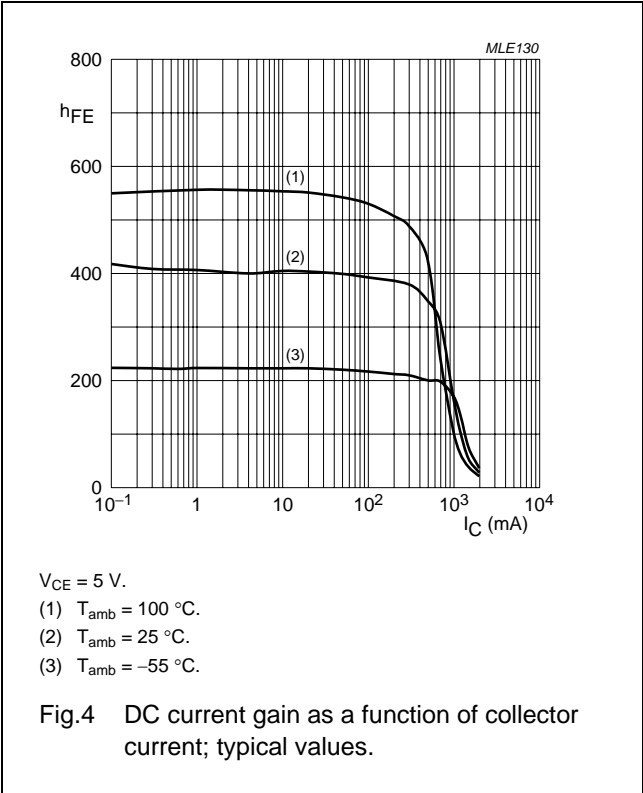
CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$ 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	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = 60\text{ V}; V_{BE} = 0\text{ A}$	–	–	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	$V_{CE} = 5\text{ V}; I_C = 1\text{ mA}$	250	400	–	
		$V_{CE} = 5\text{ V}; I_C = 500\text{ mA}; \text{note 1}$	200	350	–	
		$V_{CE} = 5\text{ V}; I_C = 1\text{ A}; \text{note 1}$	100	150	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 1\text{ mA}$	–	90	110	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	–	110	140	mV
		$I_C = 1\text{ A}; I_B = 100\text{ mA}; \text{note 1}$	–	200	250	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	$I_C = 1\text{ A}; I_B = 100\text{ mA}; \text{note 1}$	–	200	250	$\text{m}\Omega$
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	$V_{CB} = 10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$	–	5.5	10	pF

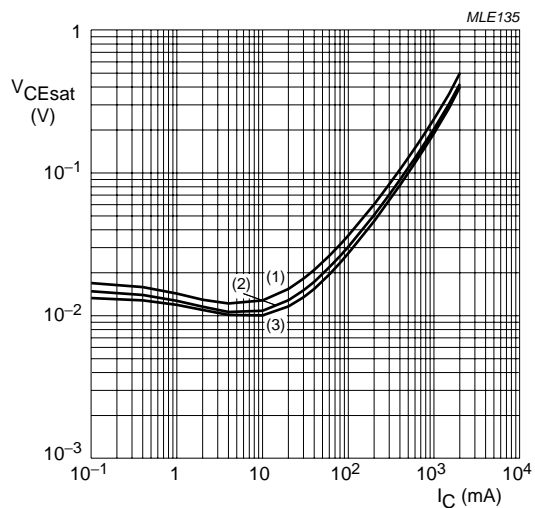
Note

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



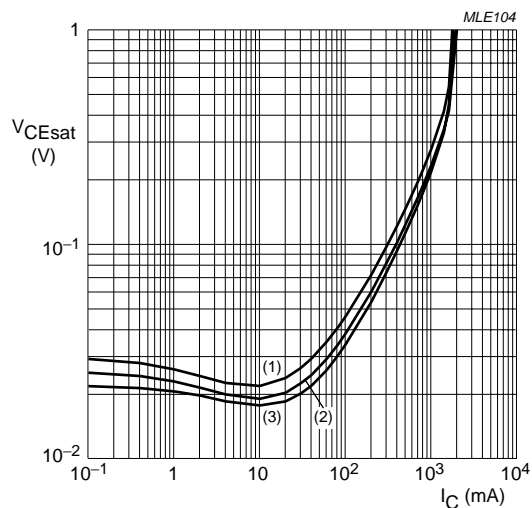
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 $I_C/I_B = 10$.

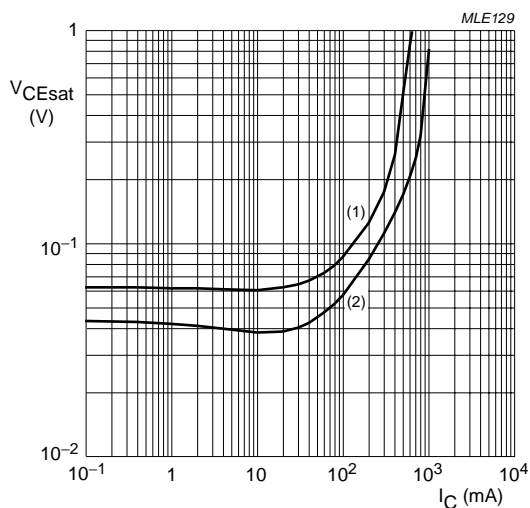
- (1) $T_{amb} = 100\text{ °C}$.
- (2) $T_{amb} = 25\text{ °C}$.
- (3) $T_{amb} = -55\text{ °C}$.

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

 $I_C/I_B = 20$.

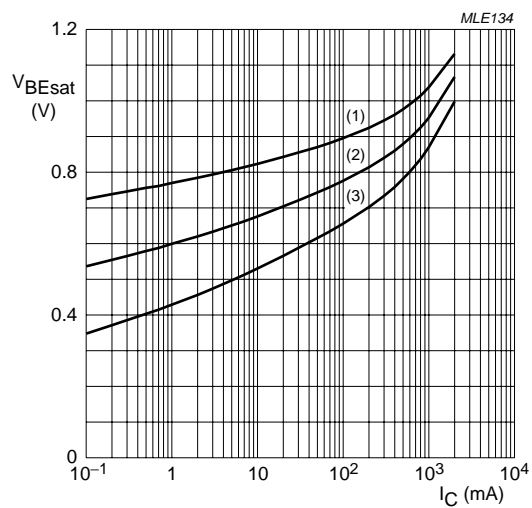
- (1) $T_{amb} = 100\text{ °C}$.
- (2) $T_{amb} = 25\text{ °C}$.
- (3) $T_{amb} = -55\text{ °C}$.

Fig.7 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.8 Collector-emitter saturation voltage as a function of collector current; typical values.

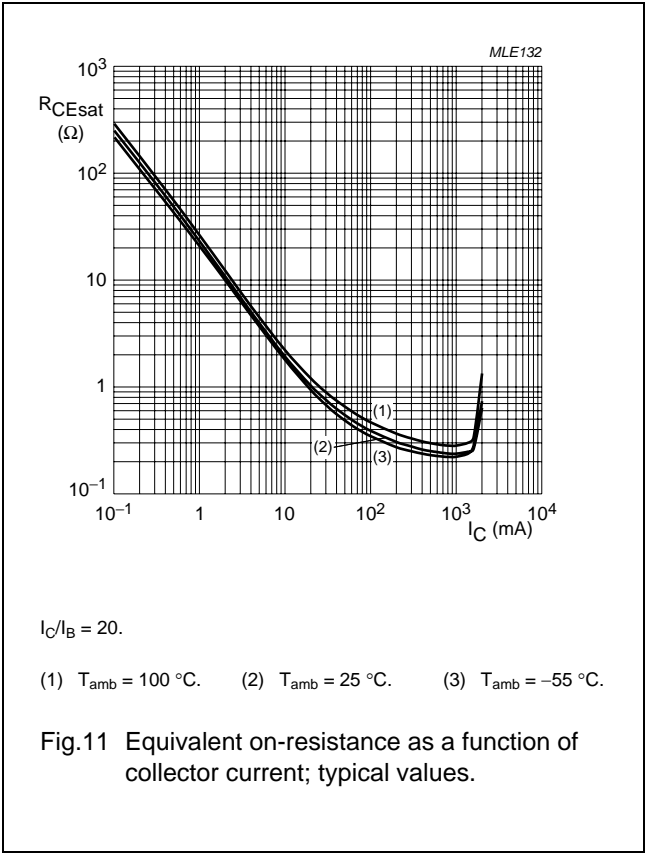
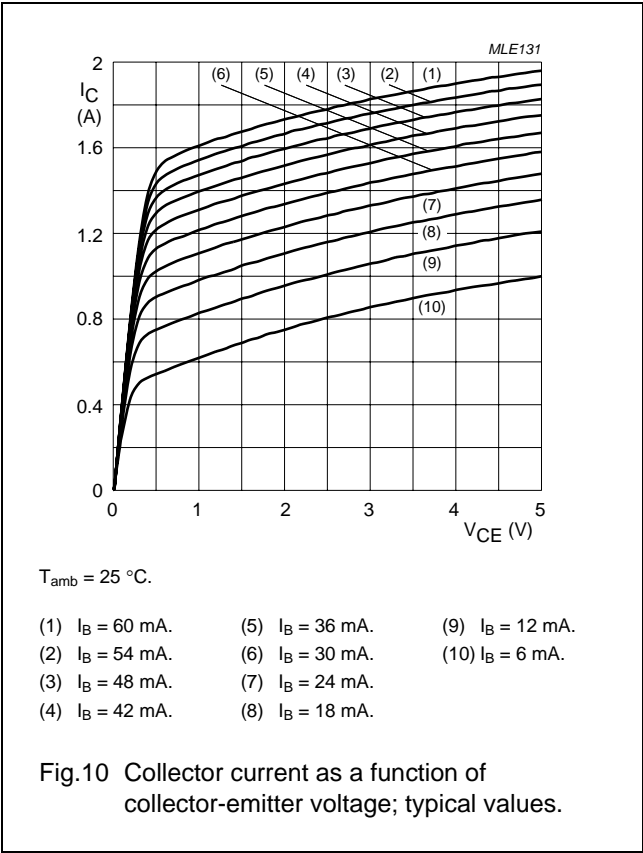
 $I_C/I_B = 20$.

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

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

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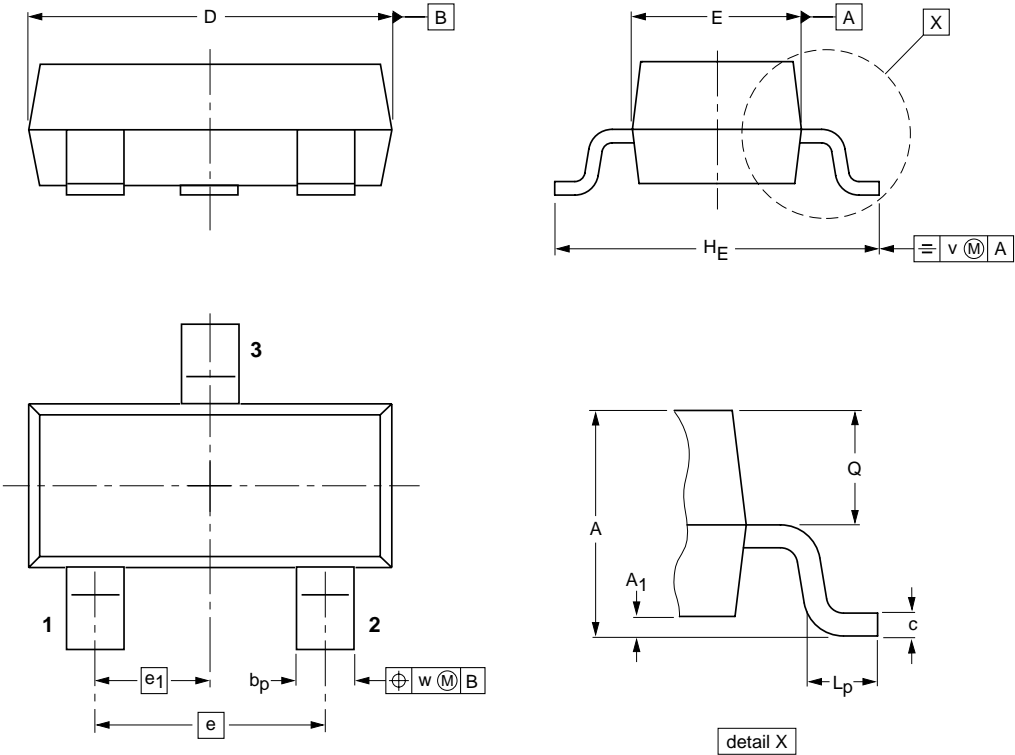
60 V, 1 A
NPN low V_{CEsat} (BISS) transistor

PBSS4160T

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	JEITA			
SOT23		TO-236AB				04-11-04 06-03-16

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

PBSS4160T

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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2. The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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