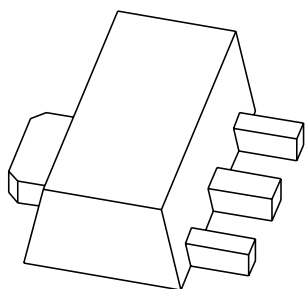


DATA SHEET



PBSS5320X

20 V, 3 A

PNP low V_{CEsat} (BISS) transistor

Product specification
Supersedes data of 2003 Nov 27

2004 Nov 04

20 V, 3 A
PNP low V_{CEsat} (BISS) transistor

PBSS5320X

FEATURES

- SOT89 (SC-62) package
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability: I_C and I_{CM}
- Higher efficiency leading to less heat generation
- Reduced printed-circuit board requirements.

APPLICATIONS

- Power management
 - DC/DC converters
 - Supply line switching
 - Battery charger
 - LCD backlighting.
- Peripheral drivers
 - 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 SOT89 plastic package.
NPN complement: PBSS4320X.

MARKING

TYPE NUMBER	MARKING CODE
PBSS5320X	S45

ORDERING INFORMATION

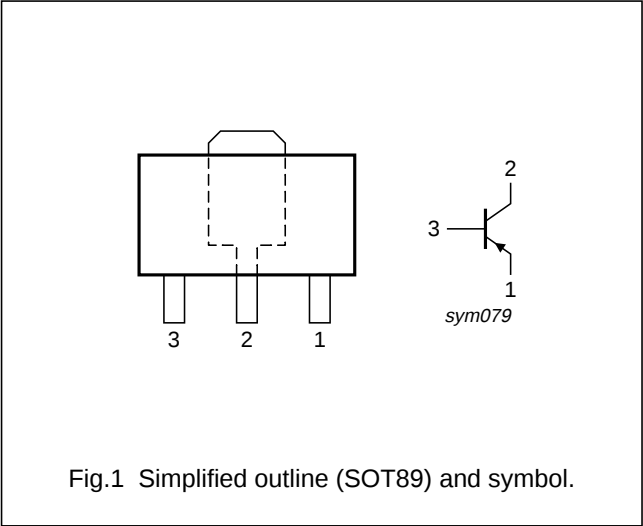
TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5320X	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CEO}	collector-emitter voltage	−20	V
I_C	collector current (DC)	−3	A
I_{CM}	peak collector current	−5	A
R_{CEsat}	equivalent on-resistance	105	mΩ

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



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LIMITING VALUES

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

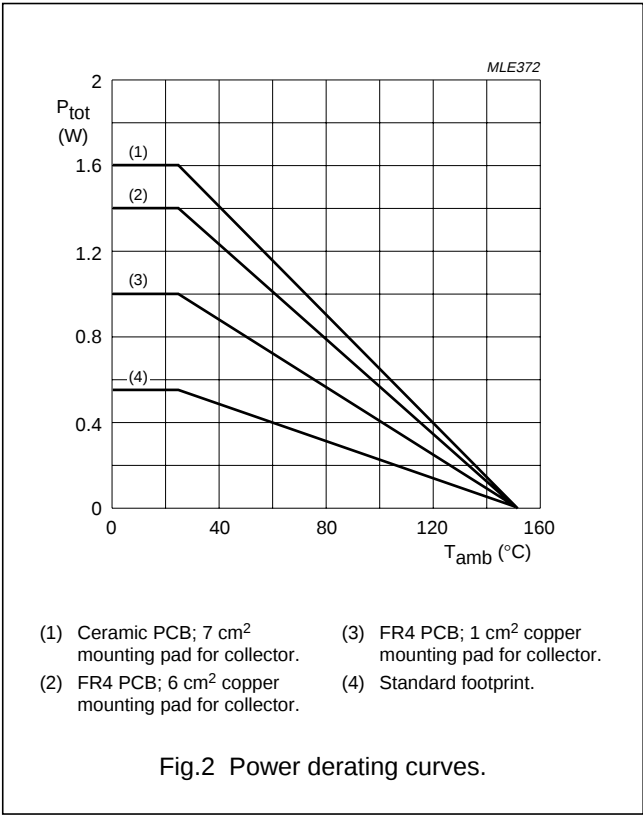
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–20	V
V_{CEO}	collector-emitter voltage	open base	–	–20	V
V_{EBO}	emitter-base voltage	open collector	–	–5	V
I_C	collector current (DC)	note 4	–	–3	A
I_{CM}	peak collector current	limited by $T_{j(max)}$	–	–5	A
I_B	base current (DC)		–	–0.5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$			
		note 1	–	550	mW
		note 2	–	1	W
		note 3	–	1.4	W
		note 4	–	1.6	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	ambient temperature		–65	+150	°C

Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm².
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm².
4. Device mounted on a ceramic printed-circuit board 7 cm², single-sided copper, tin-plated.

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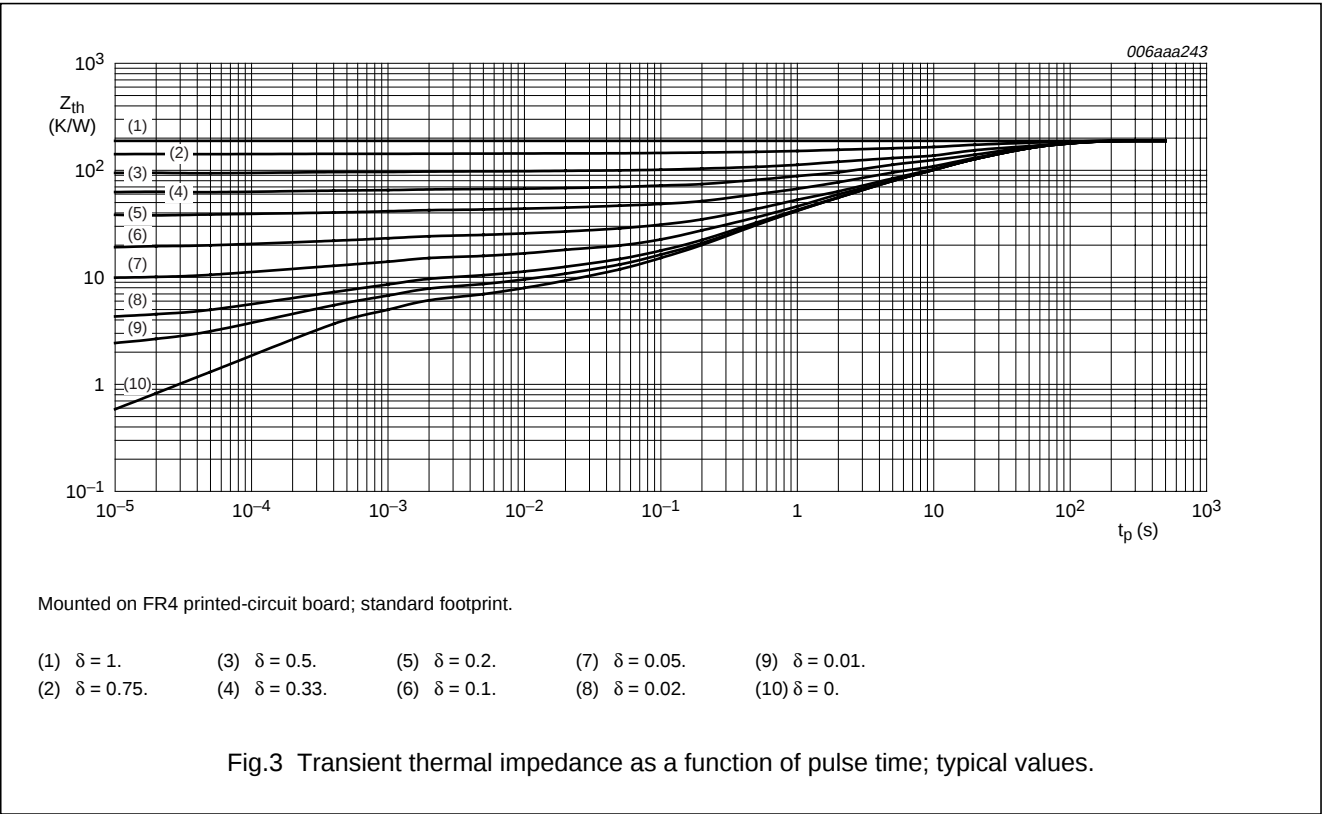
PBSS5320X

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		
		note 1	225	K/W
		note 2	125	K/W
		note 3	90	K/W
		note 4	80	K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering point		16	K/W

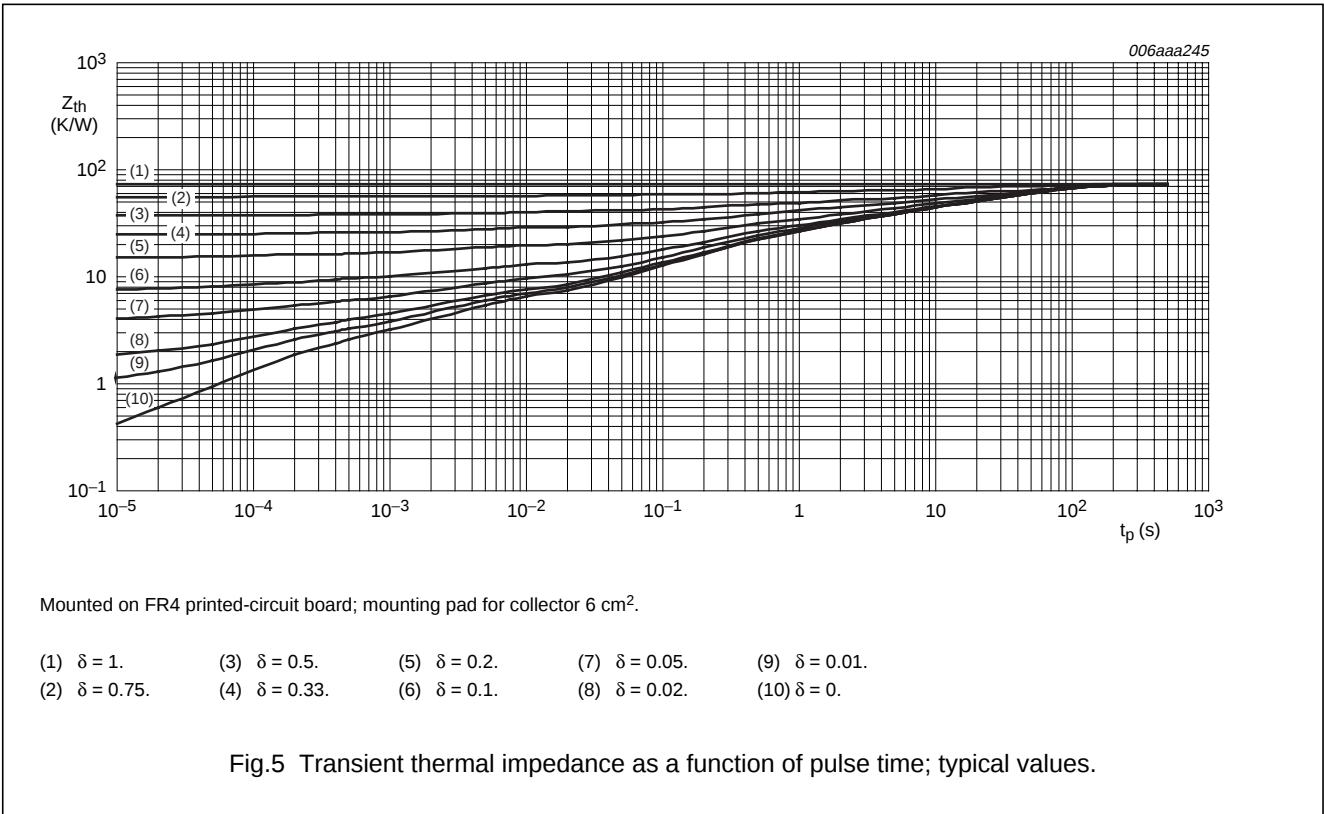
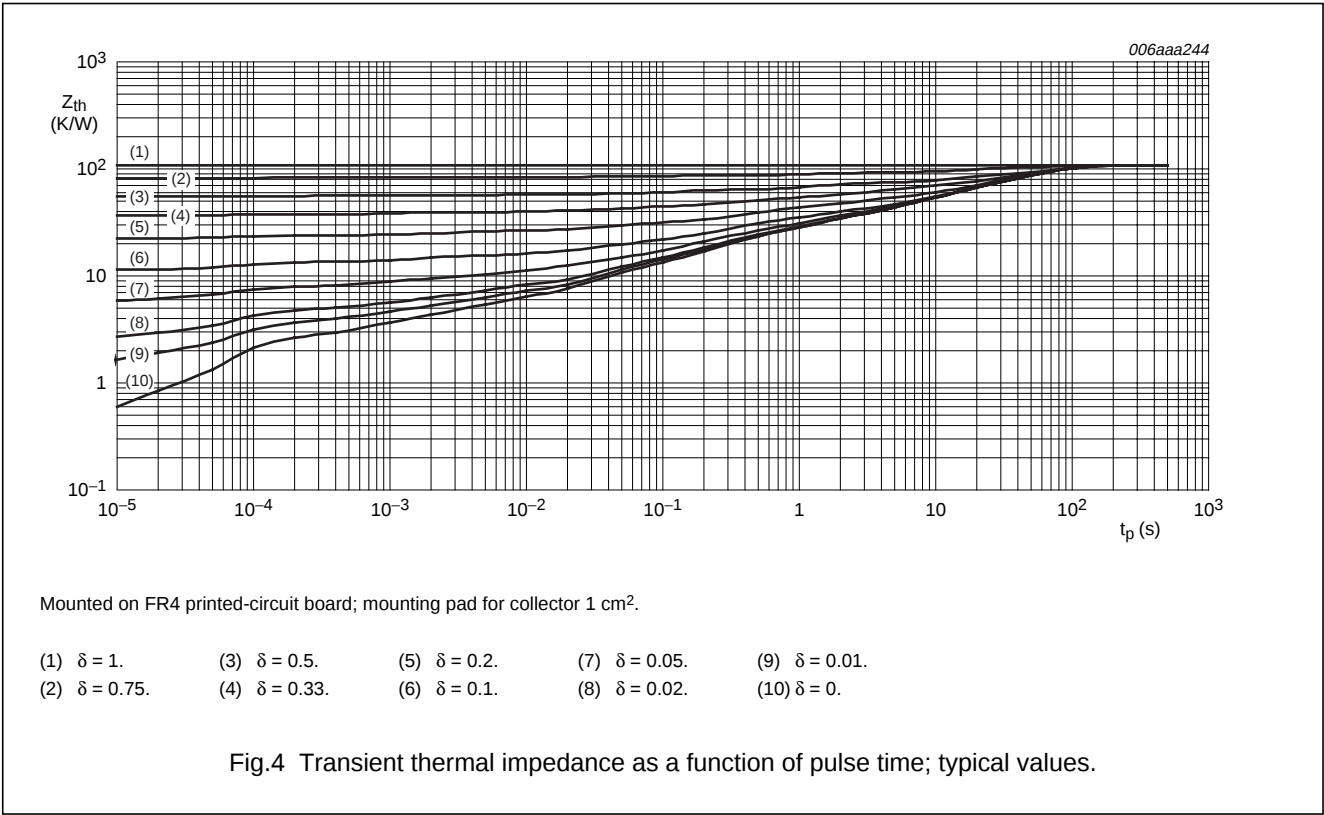
Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm².
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm².
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CHARACTERISTICS $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

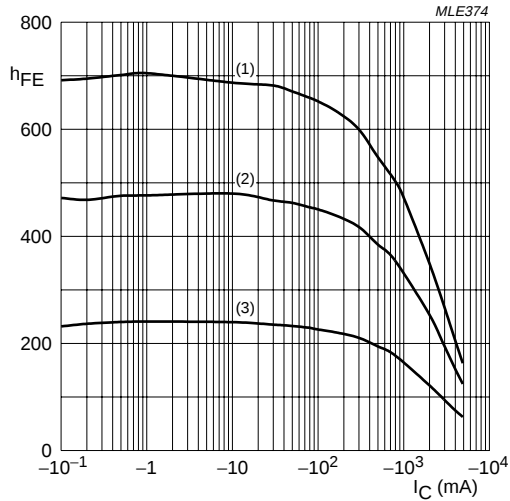
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	$V_{CB} = -20\text{ V}; I_E = 0\text{ A}$	–	–	–100	nA
		$V_{CB} = -20\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ }^{\circ}\text{C}$	–	–	–50	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -20\text{ V}; V_{BE} = 0\text{ V}$	–	–	–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	$V_{CE} = -2\text{ V}$				
		$I_C = -0.1\text{ A}$	220	–	–	
		$I_C = -0.5\text{ A}$	220	–	–	
		$I_C = -1\text{ A}; \text{note 1}$	200	–	–	
		$I_C = -2\text{ A}; \text{note 1}$	150	–	–	
		$I_C = -3\text{ A}; \text{note 1}$	100	–	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -0.5\text{ A}; I_B = -50\text{ mA}$	–	–	–70	mV
		$I_C = -1\text{ A}; I_B = -50\text{ mA}$	–	–	–130	mV
		$I_C = -2\text{ A}; I_B = -100\text{ mA}$	–	–	–230	mV
		$I_C = -3\text{ A}; I_B = -300\text{ mA}; \text{note 1}$	–	–	–300	mV
R_{CEsat}	equivalent on-resistance	$I_C = -3\text{ A}; I_B = -300\text{ mA}; \text{note 1}$	–	90	105	$\text{m}\Omega$
V_{BEsat}	base-emitter saturation voltage	$I_C = -2\text{ A}; I_B = -100\text{ mA}$	–	–1.1	–	V
		$I_C = -3\text{ A}; I_B = -300\text{ mA}; \text{note 1}$	–	–	–1.2	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = -2\text{ V}; I_C = -1\text{ A}$	–1.1	–	–	V
f_T	transition frequency	$I_C = -100\text{ mA}; V_{CE} = -5\text{ V};$ $f = 100\text{ MHz}$	100	–	–	MHz
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_E = 0\text{ A}; f = 1\text{ MHz}$	–	–	50	pF

Note

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

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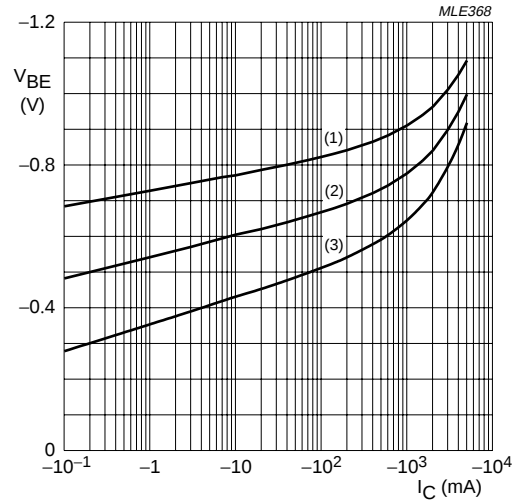
PBSS5320X



$V_{CE} = -2$ V.

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

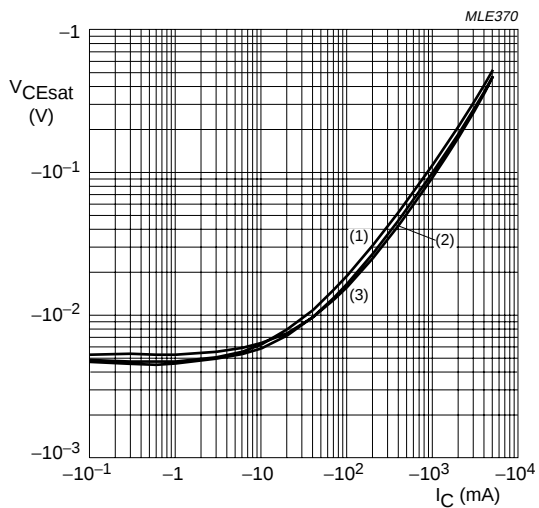
Fig.6 DC current gain as a function of collector current; typical values.



$V_{CE} = -2$ V.

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

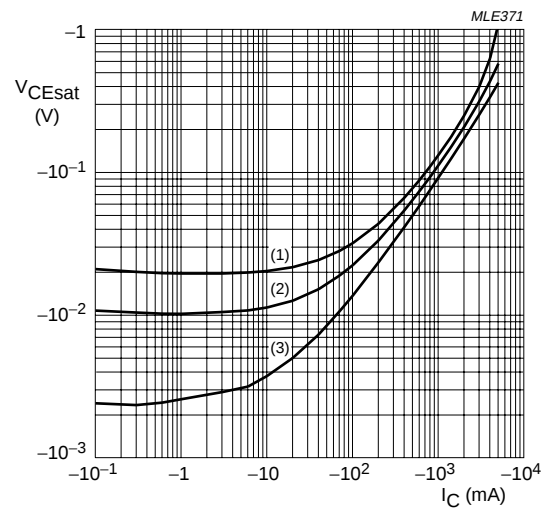
Fig.7 Base-emitter voltage as a function of collector current; typical values.



$I_C/I_B = 20$.

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

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



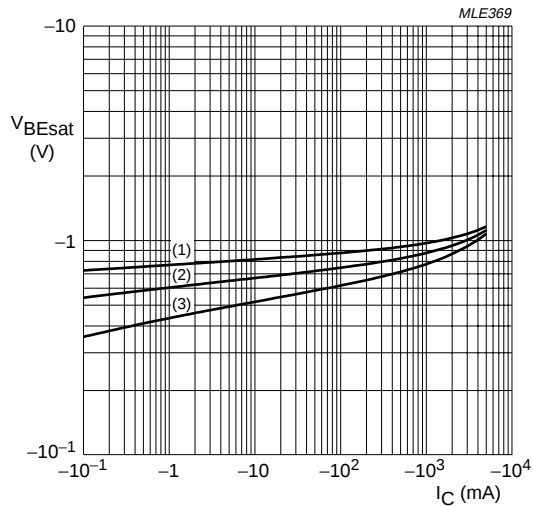
$T_{amb} = 25$ °C.

- (1) $I_C/I_B = 100$.
- (2) $I_C/I_B = 50$.
- (3) $I_C/I_B = 10$.

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

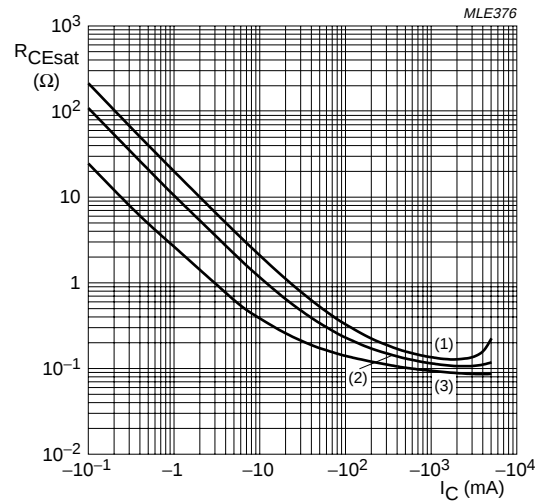
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 $I_C/I_B = 20$.

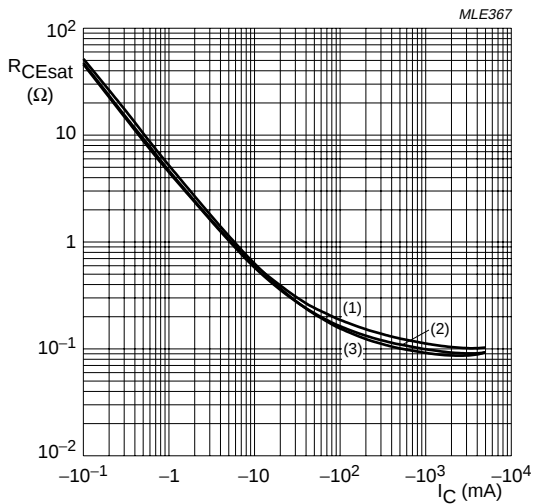
- (1) $T_{amb} = -55\text{ °C}$.
(2) $T_{amb} = 25\text{ °C}$.
(3) $T_{amb} = 100\text{ °C}$.

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

 $T_{amb} = 25\text{ °C}$.

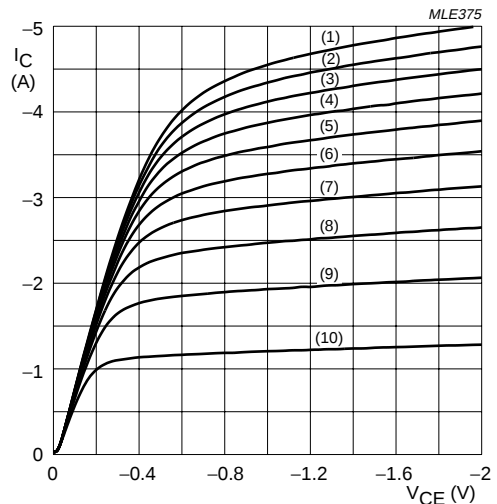
- (1) $I_C/I_B = 100$. (2) $I_C/I_B = 50$. (3) $I_C/I_B = 10$.

Fig.11 Equivalent on-resistance 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.12 Equivalent on-resistance as a function of collector current; typical values.

 $T_{amb} = 25\text{ °C}$.

- (1) $I_B = -25\text{ mA}$. (5) $I_B = -15\text{ mA}$. (9) $I_B = -5\text{ mA}$.
(2) $I_B = -22.5\text{ mA}$. (6) $I_B = -12.5\text{ mA}$. (10) $I_B = -2.5\text{ mA}$.
(3) $I_B = -20\text{ mA}$. (7) $I_B = -10\text{ mA}$.
(4) $I_B = -17.5\text{ mA}$. (8) $I_B = -7.5\text{ mA}$.

Fig.13 Collector current as a function of collector-emitter voltage; typical values.

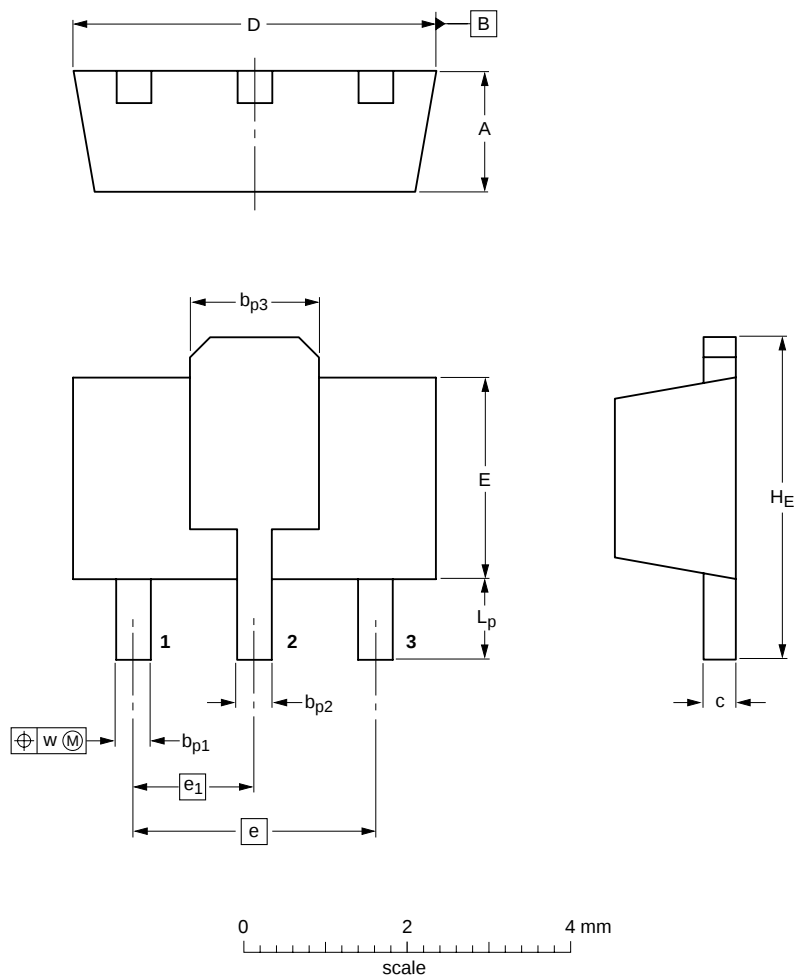
20 V, 3 A
PNP low V_{CEsat} (BISS) transistor

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PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	b_{p1}	b_{p2}	b_{p3}	c	D	E	e	e_1	H_E	L_p	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.23	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	1.2 0.8	0.13

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT89		TO-243	SC-62			99-09-13 04-08-03

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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.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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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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