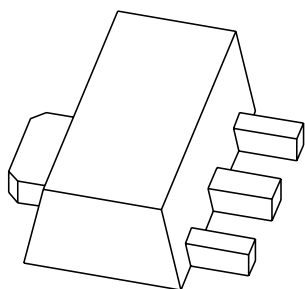


DATA SHEET



PBSS5520X

20 V, 5 A

PNP low V_{CEsat} (BISS) transistor

Product specification
Supersedes data of 2004 Jun 23

2004 Nov 08

20 V, 5 A PNP low V_{CEsat} (BISS) transistor

PBSS5520X

FEATURES

- High h_{FE} and low V_{CEsat} at high current operation
- High collector current I_C : 5 A
- High efficiency leading to less heat generation.

APPLICATIONS

- Medium power peripheral drivers (e.g. fans and motors)
- Strobe flash units for digital still cameras and mobile phones
- Power switch for LAN and ADSL systems
- Medium power DC-to-DC conversion
- Battery chargers
- Supply line switching.

DESCRIPTION

PNP low V_{CEsat} (BISS) transistor in a SOT89 (SC-62) plastic package.
NPN complement: PBSS4520X.

MARKING

TYPE NUMBER	MARKING CODE ⁽¹⁾
PBSS5520X	*1K

Note

- * = 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	-20	V
I_C	collector current (DC)	-5	A
I_{CM}	peak collector current	-10	A
R_{CEsat}	equivalent on-resistance	54	mΩ

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base

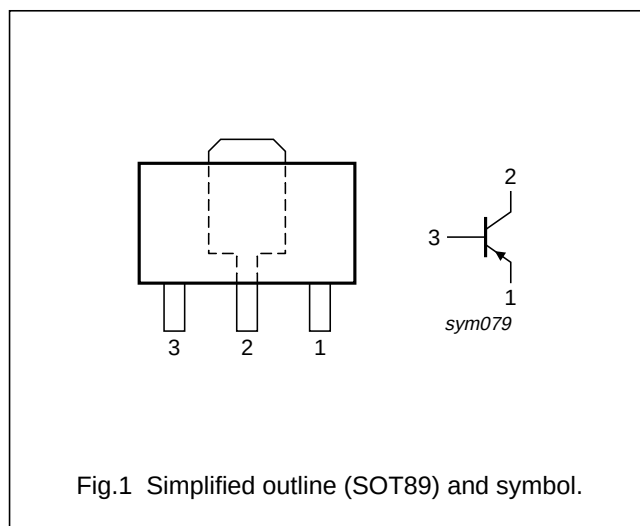


Fig.1 Simplified outline (SOT89) and symbol.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5520X	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

20 V, 5 A
PNP low V_{CEsat} (BISS) transistor

PBSS5520X

LIMITING VALUES

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

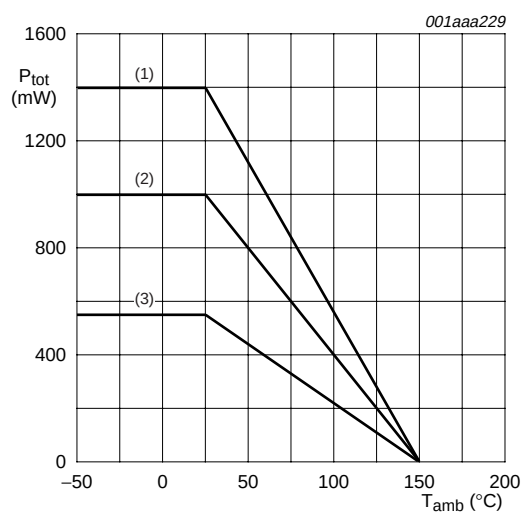
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–20	V
V_{CEO}	collector-emitter voltage	open base	–	–20	V
V_{EBO}	emitter-base voltage	open collector	–	–5	V
I_C	collector current (DC)		–	–5	A
I_{CM}	peak collector current	$t_p \leq 1$ ms	–	–10	A
I_{CRP}	repetitive peak collector current	notes 1 and 2	–	–6.5	A
I_B	base current (DC)		–	–1	A
I_{BM}	peak base current	$t_p \leq 1$ ms	–	–2	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C			
		notes 1 and 2	–	2.5	W
		note 2	–	0.55	W
		note 3	–	1	W
		note 4	–	1.4	W
		note 5	–	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. Operated under pulsed conditions; pulse width $t_p \leq 10$ ms; duty cycle $\delta \leq 0.2$.
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated, standard footprint.
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 1 cm².
4. Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 6 cm².
5. Device mounted on a 7 cm² ceramic printed-circuit board, 1 cm² single-sided copper, tin-plated.

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PNP low V_{CEsat} (BISS) transistor

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- (1) FR4 PCB; 6 cm² mounting pad for collector.
- (2) FR4 PCB; 1 cm² mounting pad for collector.
- (3) FR4 PCB; standard footprint.

Fig.2 Power derating curves.

20 V, 5 A

PNP low V_{CEsat} (BISS) transistor

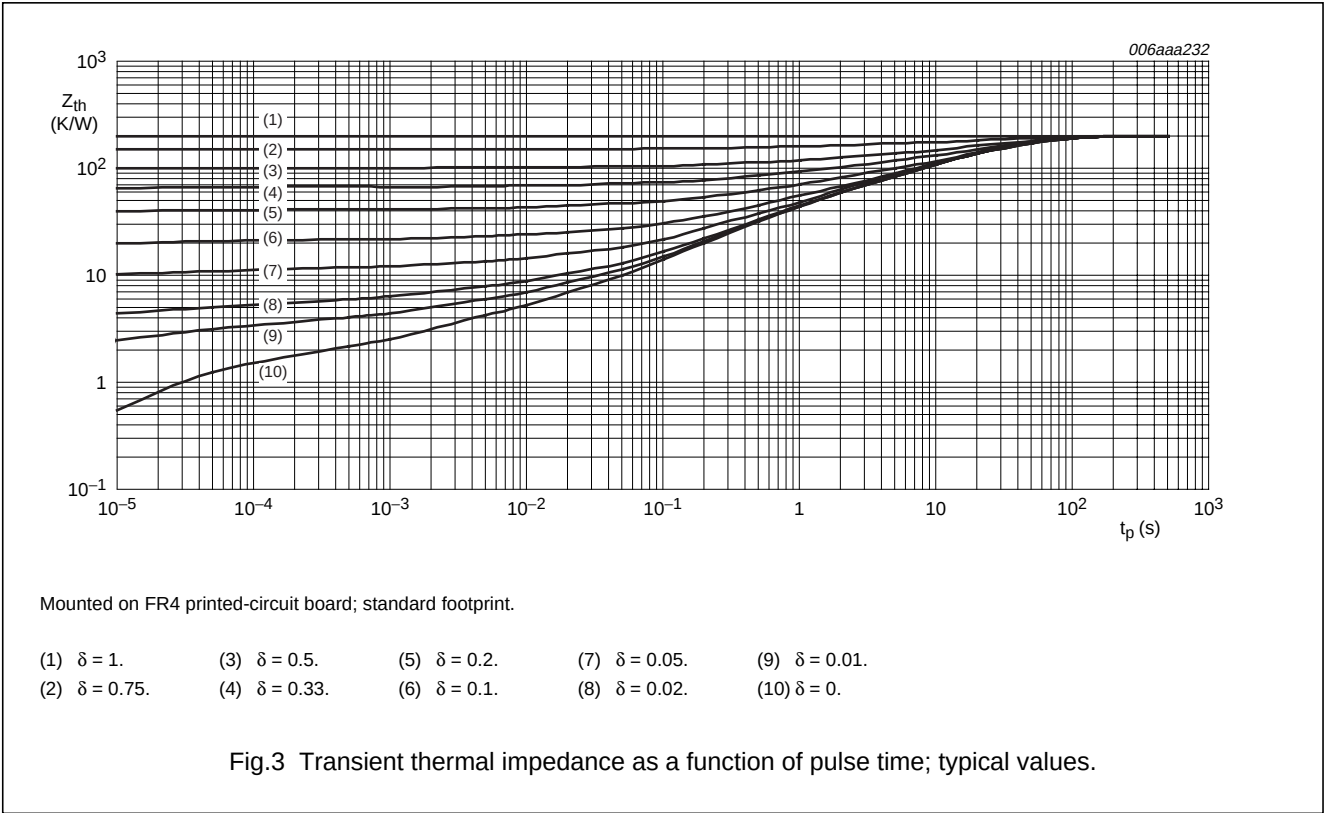
PBSS5520X

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		
		notes 1 and 2	50	K/W
		note 2	225	K/W
		note 3	125	K/W
		note 4	90	K/W
		note 5	80	K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering point		16	K/W

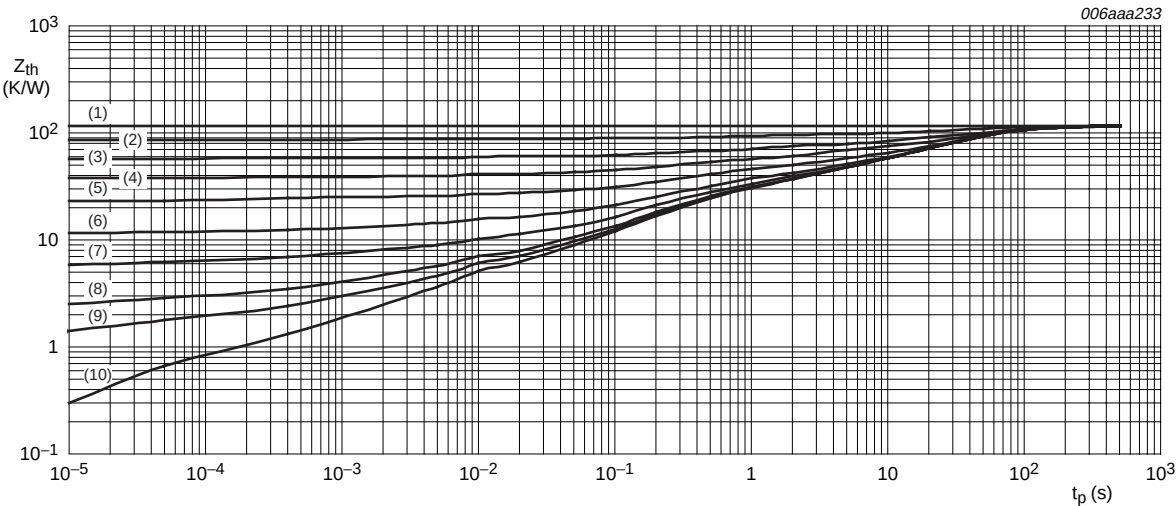
Notes

1. Operated under pulsed conditions; pulse width $t_p \leq 10$ ms; duty cycle $\delta \leq 0.2$.
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated, standard footprint.
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 1 cm².
4. Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 6 cm².
5. Device mounted on a 7 cm² ceramic printed-circuit board, 1 cm² single-sided copper, tin-plated.



20 V, 5 A
PNP low V_{CEsat} (BISS) transistor

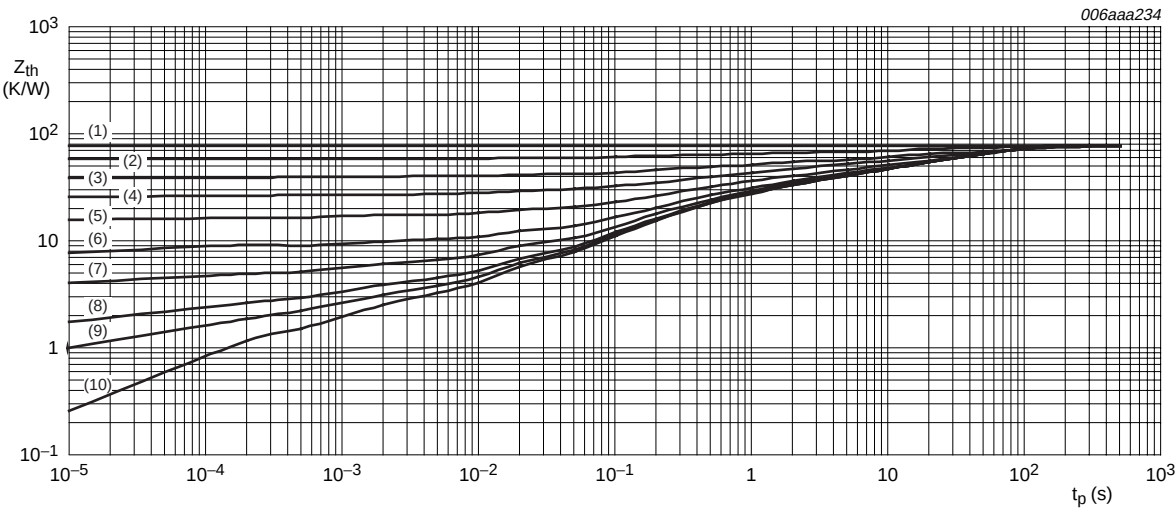
PBSS5520X



Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm².

- | | | | | |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| (1) $\delta = 1.$ | (3) $\delta = 0.5.$ | (5) $\delta = 0.2.$ | (7) $\delta = 0.05.$ | (9) $\delta = 0.01.$ |
| (2) $\delta = 0.75.$ | (4) $\delta = 0.33.$ | (6) $\delta = 0.1.$ | (8) $\delta = 0.02.$ | (10) $\delta = 0.$ |

Fig.4 Transient thermal impedance as a function of pulse time; typical values.



Mounted on FR4 printed-circuit board; mounting pad for collector 6 cm².

- | | | | | |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| (1) $\delta = 1.$ | (3) $\delta = 0.5.$ | (5) $\delta = 0.2.$ | (7) $\delta = 0.05.$ | (9) $\delta = 0.01.$ |
| (2) $\delta = 0.75.$ | (4) $\delta = 0.33.$ | (6) $\delta = 0.1.$ | (8) $\delta = 0.02.$ | (10) $\delta = 0.$ |

Fig.5 Transient thermal impedance as a function of pulse time; typical values.

20 V, 5 A

PNP low V_{CEsat} (BISS) transistor

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CHARACTERISTICS

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

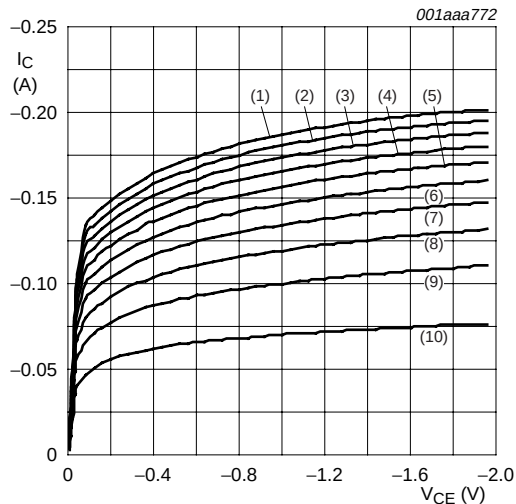
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	$V_{CB} = -20\text{ V}; I_E = 0\text{ A}$	–	–	–100	nA
		$V_{CB} = -20\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ °C}$	–	–	–50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	–	–	–100	nA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -20\text{ V}; V_{BE} = 0\text{ V}$	–	–	–100	nA
h_{FE}	DC current gain	$V_{CE} = -2\text{ V}$				
		$I_C = -0.5\text{ A}; \text{note 1}$	300	430	–	
		$I_C = -1\text{ A}; \text{note 1}$	275	400	–	
		$I_C = -2\text{ A}; \text{note 1}$	250	360	–	
		$I_C = -5\text{ A}; \text{note 1}$	150	260	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -0.5\text{ A}; I_B = -5\text{ mA}$	–	–45	–70	mV
		$I_C = -1\text{ A}; I_B = -10\text{ mA}$	–	–70	–110	mV
		$I_C = -2.5\text{ A}; I_B = -125\text{ mA}; \text{note 1}$	–	–100	–150	mV
		$I_C = -4\text{ A}; I_B = -200\text{ mA}; \text{note 1}$	–	–150	–230	mV
		$I_C = -5\text{ A}; I_B = -500\text{ mA}; \text{note 1}$	–	–170	–270	mV
R_{CEsat}	equivalent on-resistance	$I_C = -5\text{ A}; I_B = -500\text{ mA}; \text{note 1}$	–	34	54	$\text{m}\Omega$
V_{BEsat}	base-emitter saturation voltage	$I_C = -4\text{ A}; I_B = -200\text{ mA}; \text{note 1}$	–	–0.9	–1.05	V
		$I_C = -5\text{ A}; I_B = -500\text{ mA}; \text{note 1}$	–	–0.96	–1.1	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = -2\text{ V}; I_C = -2\text{ A}$	–	–0.74	–0.85	V
f_T	transition frequency	$I_C = -100\text{ mA}; V_{CE} = -10\text{ V};$ $f = 100\text{ MHz}$	80	100	–	MHz
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_C = 0\text{ A};$ $f = 1\text{ MHz}$	–	130	150	pF

Note

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

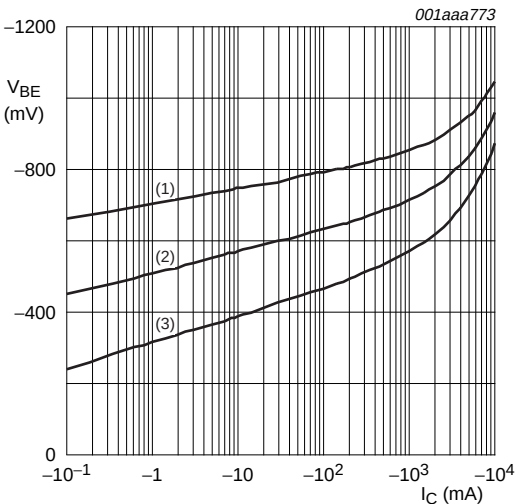
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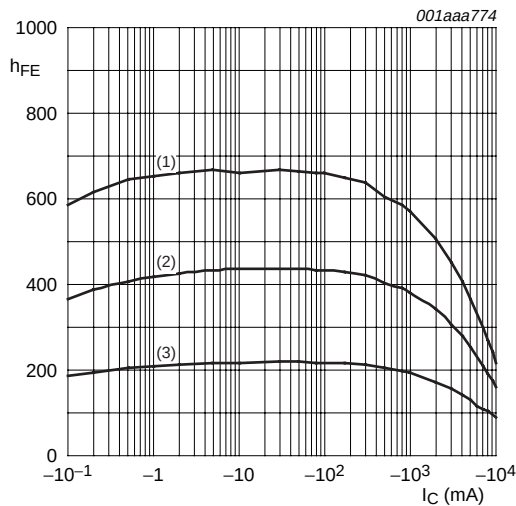
- (1) $I_B = -64$ mA. (5) $I_B = -38.4$ mA. (8) $I_B = -19.2$ mA.
(2) $I_B = -57.6$ mA. (6) $I_B = -32$ mA. (9) $I_B = -12.8$ mA.
(3) $I_B = -51.2$ mA. (7) $I_B = -25.6$ mA. (10) $I_B = -6.4$ mA.
(4) $I_B = -44.8$ mA.

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



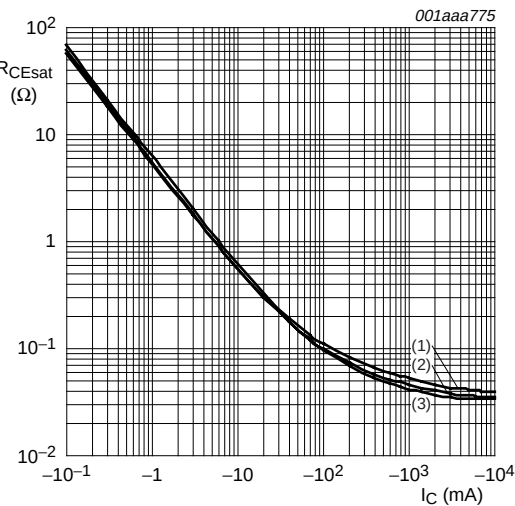
- $V_{CE} = -2$ V.
(1) $T_{amb} = -55$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = 100$ °C.

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



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

Fig.8 DC current gain as a function of collector current; typical values.

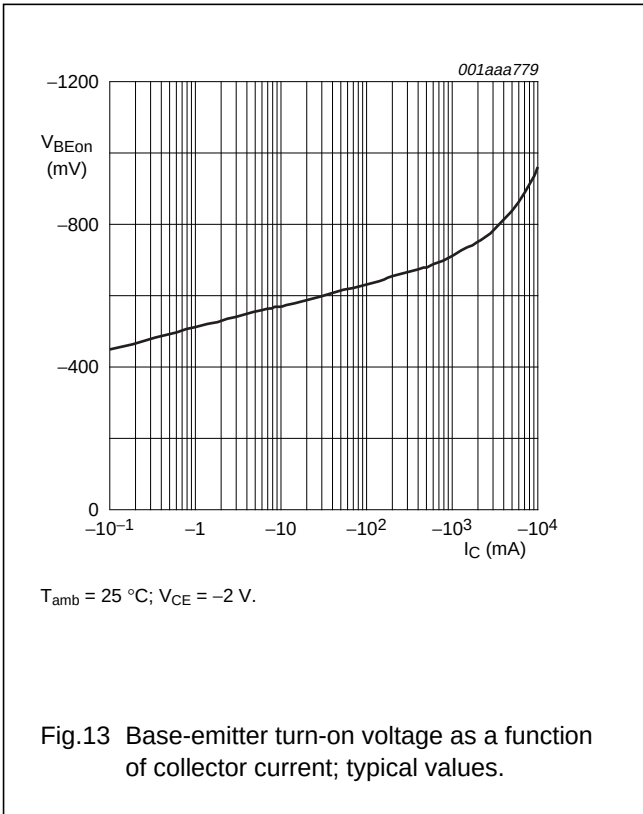
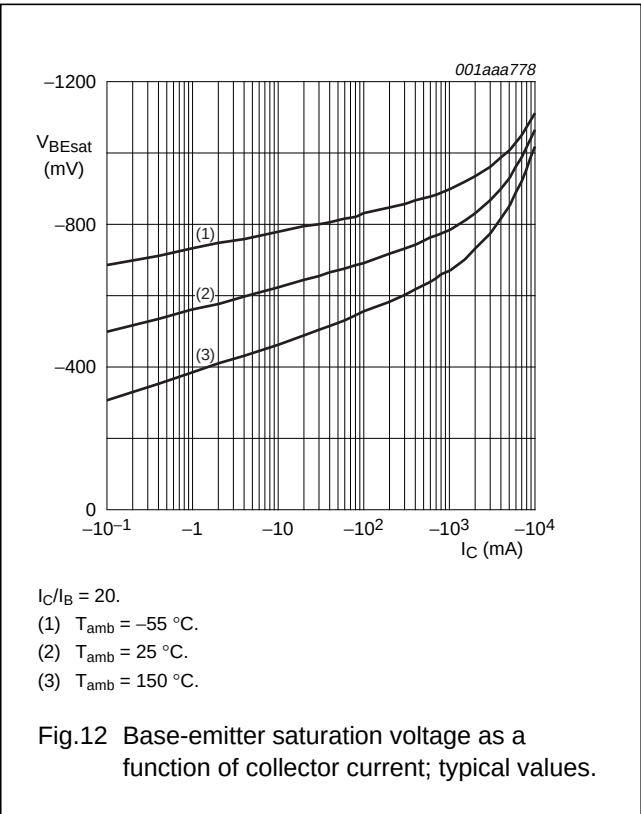
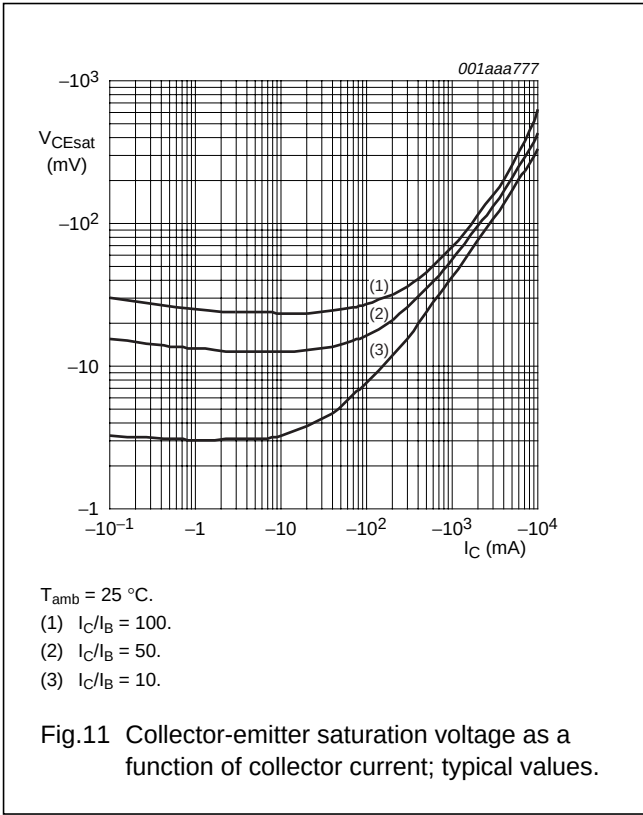
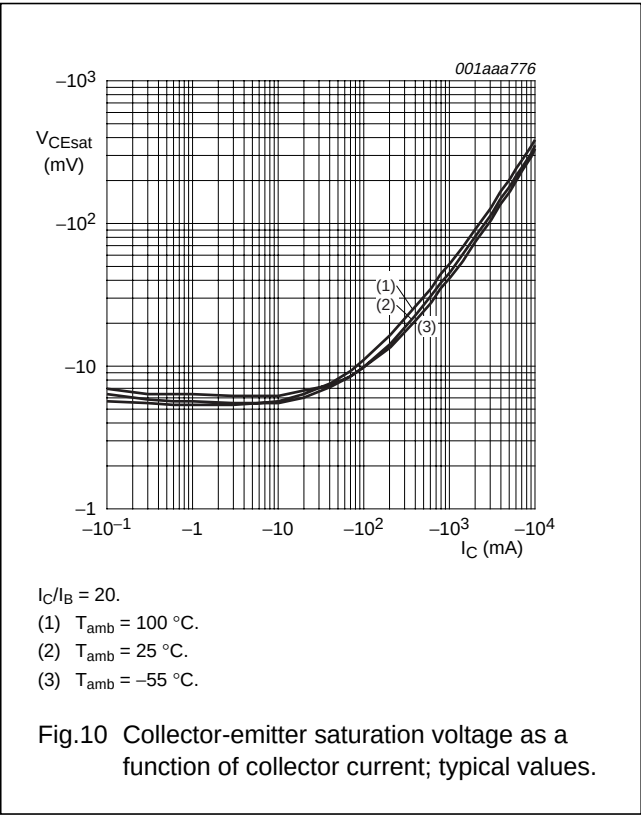


- $I_C/I_B = 20$.
(1) $T_{amb} = 100$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = -55$ °C.

Fig.9 Equivalent on-resistance as a function of collector current; typical values.

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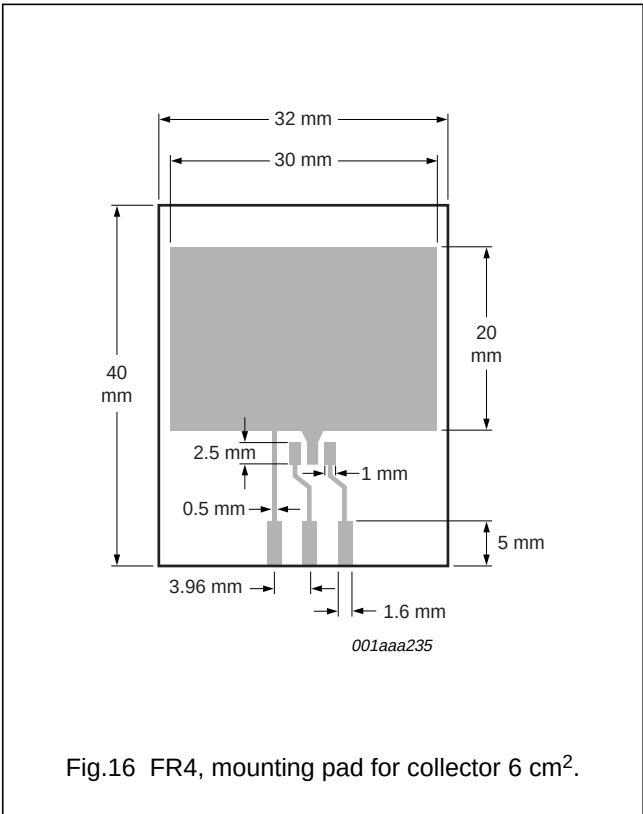
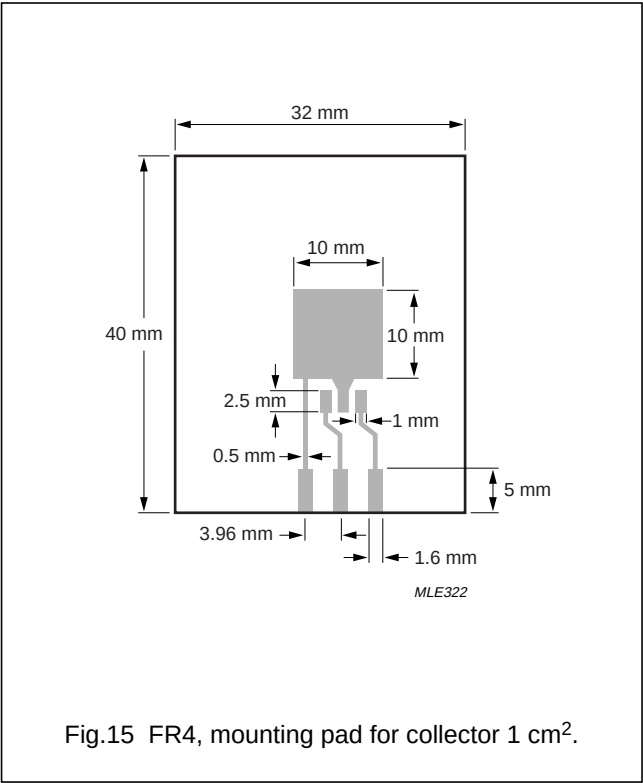
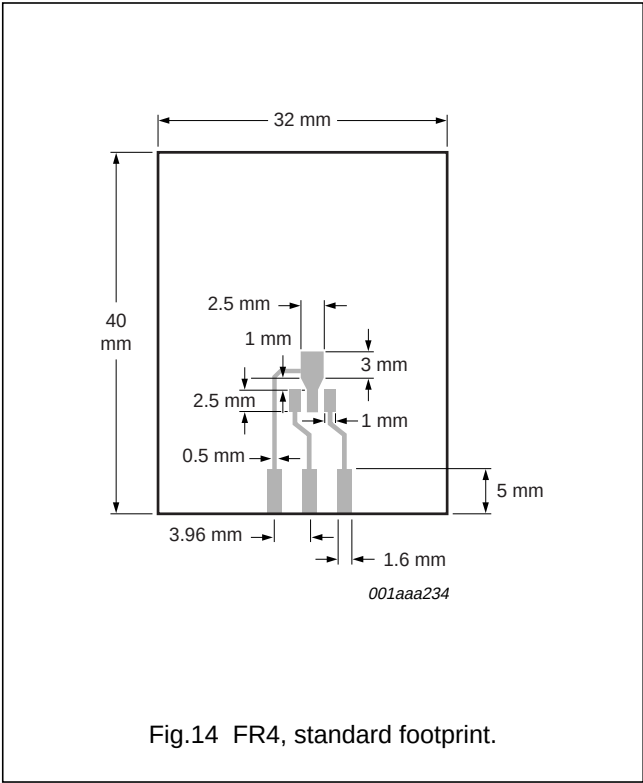
PBSS5520X



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PNP low V_{CEsat} (BISS) transistor

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Reference mounting conditions



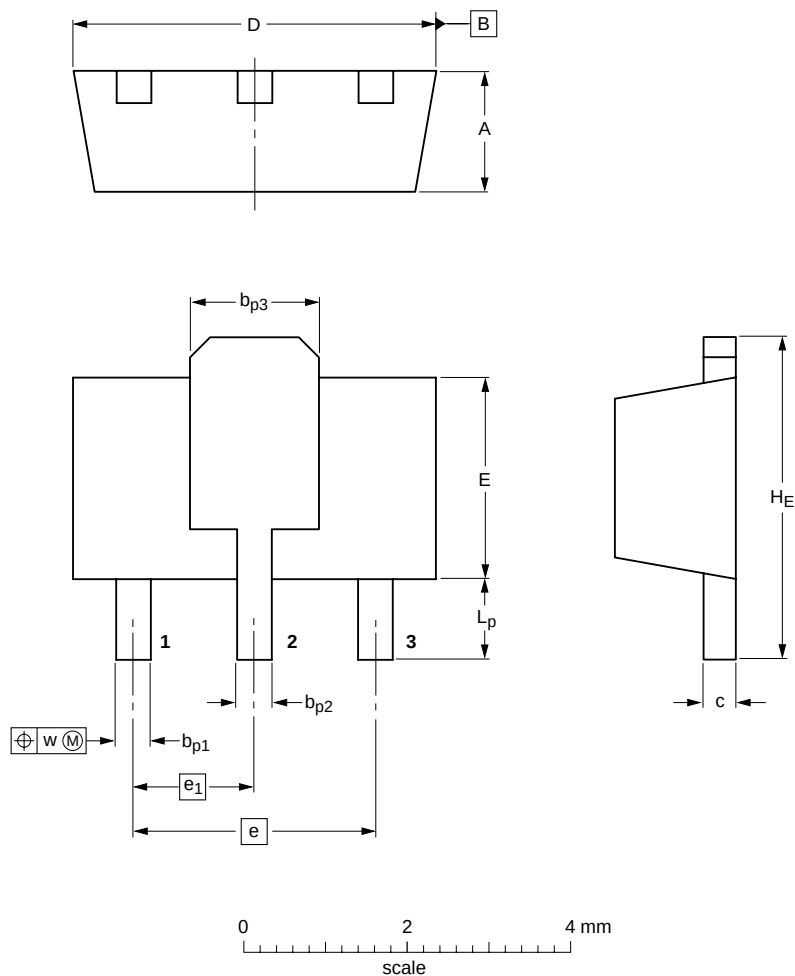
20 V, 5 A
PNP low V_{CEsat} (BISS) transistor

PBSS5520X

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

20 V, 5 A
PNP low V_{CEsat} (BISS) transistor

PBSS5520X

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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Printed in The Netherlands

R75/02/pp13

Date of release: 2004 Nov 08

Document order number: 9397 750 13892

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