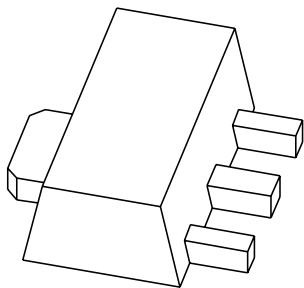


# DATA SHEET



**PBSS5540X**

40 V, 5 A

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

Product specification  
Supersedes data of 2004 Jan 15

2004 Nov 04

**40 V, 5 A**  
**PNP low  $V_{CEsat}$  (BISS) transistor**

**PBSS5540X**

**FEATURES**

- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability:  $I_C$  and  $I_{CM}$
- High efficiency leading to less heat generation.

**APPLICATIONS**

- Supply line switching circuits
- Battery management applications
- DC/DC converter applications
- Strobe flash units
- Medium power driver (e.g. relays, buzzers and motors).

**DESCRIPTION**

PNP low  $V_{CEsat}$  transistor in a medium power SOT89 (SC-62) package.

NPN complement: PBSS4540X.

**MARKING**

TYPE NUMBER	MARKING CODE <sup>(1)</sup>
PBSS5540X	*1G

**Note**

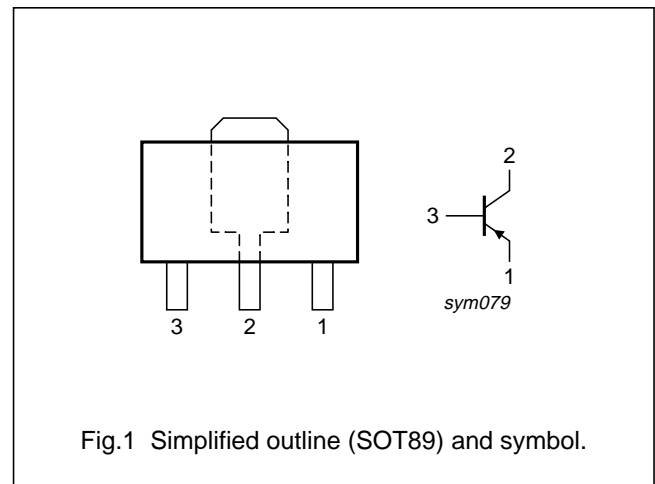
- \* = p: Made in Hong Kong.  
 \* = t: Made in Malaysia.  
 \* = W: Made in China.

**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	MAX.	UNIT
$V_{CEO}$	collector-emitter voltage	-40	V
$I_C$	collector current (DC)	-4	A
$I_{CRP}$	repetitive peak collector current	-5	A
$R_{CEsat}$	equivalent on-resistance	75	m $\Omega$

**PINNING**

PIN	DESCRIPTION
1	emitter
2	collector
3	base



**ORDERING INFORMATION**

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5540X	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

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PBSS5540X

**LIMITING VALUES**

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

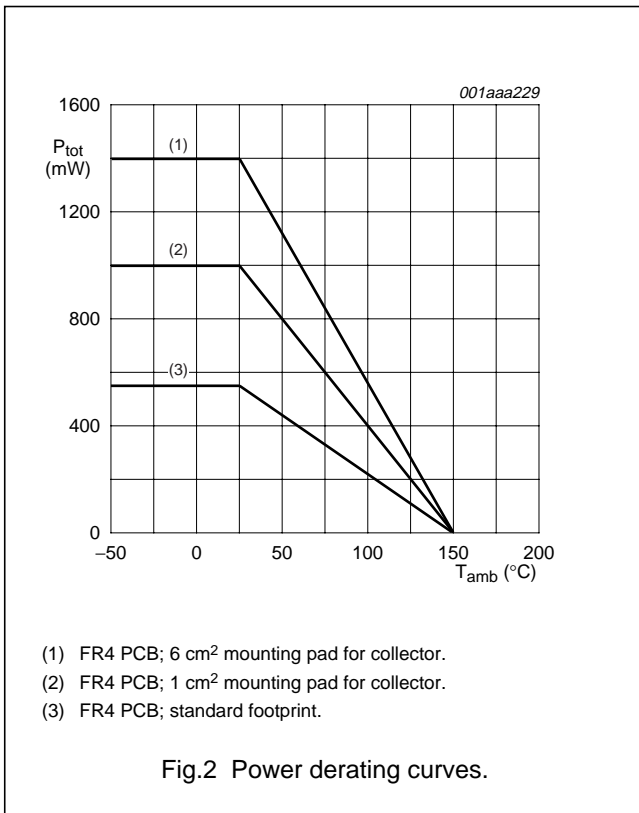
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–40	V
$V_{CEO}$	collector-emitter voltage	open base	–	–40	V
$V_{EBO}$	emitter-base voltage	open collector	–	–6	V
$I_{CM}$	peak collector current	$t_p \leq 1$ ms	–	–10	A
$I_{CRP}$	repetitive peak collector current	$t_p \leq 10$ ms; $\delta \leq 0.2$	–	–5	A
$I_C$	collector current (DC)		–	–4	A
$I_{BM}$	peak base current	$t_p \leq 1$ ms	–	–2	A
$I_B$	base current (DC)		–	–1	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C			
		$t_p \leq 10$ ms; $\delta \leq 0.2$ ; note 1	–	2.5	W
		note 1	–	0.55	W
		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 printed-circuit board, single-sided copper, tin-plated and standard footprint.
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>.
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.
4. Device mounted on a 7 cm<sup>2</sup> ceramic printed-circuit board, 1 cm<sup>2</sup> single-sided copper and tin-plated.

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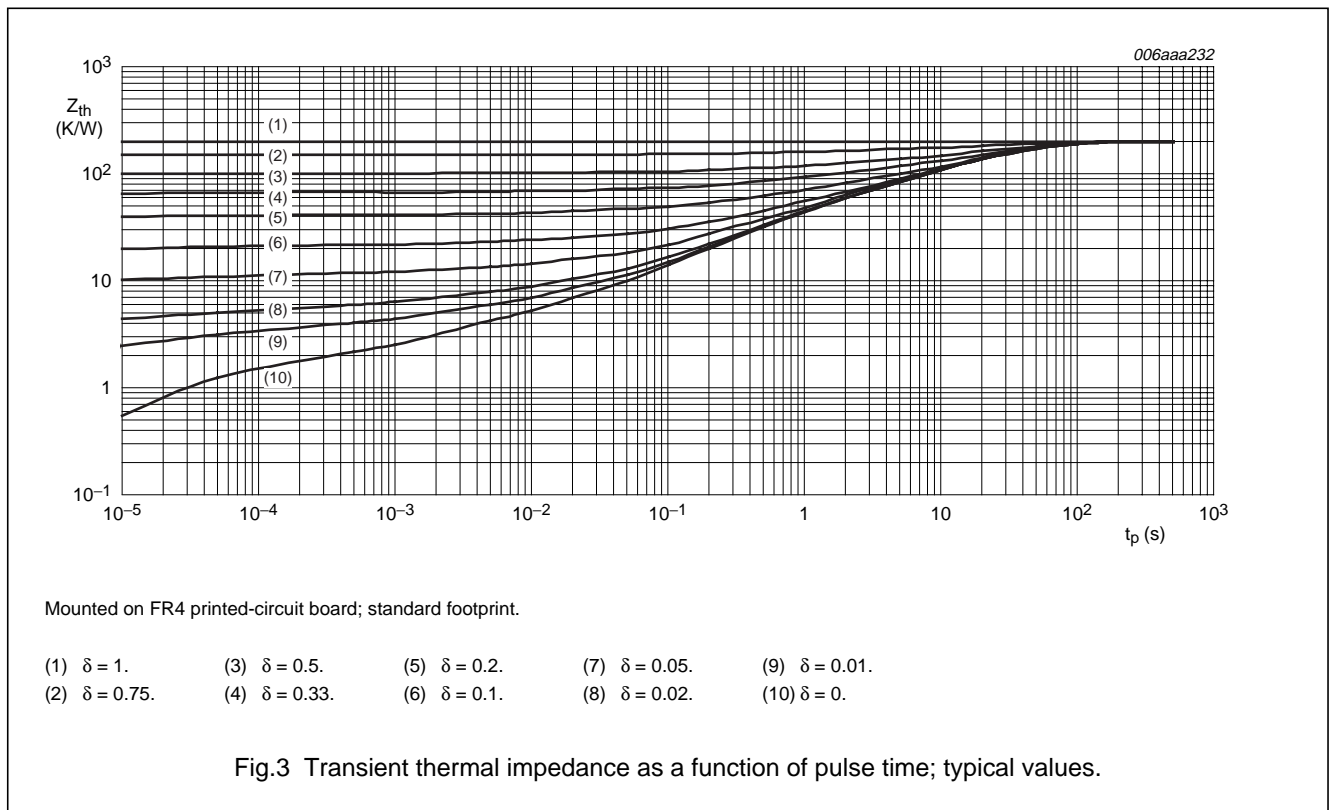
PBSS5540X

**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

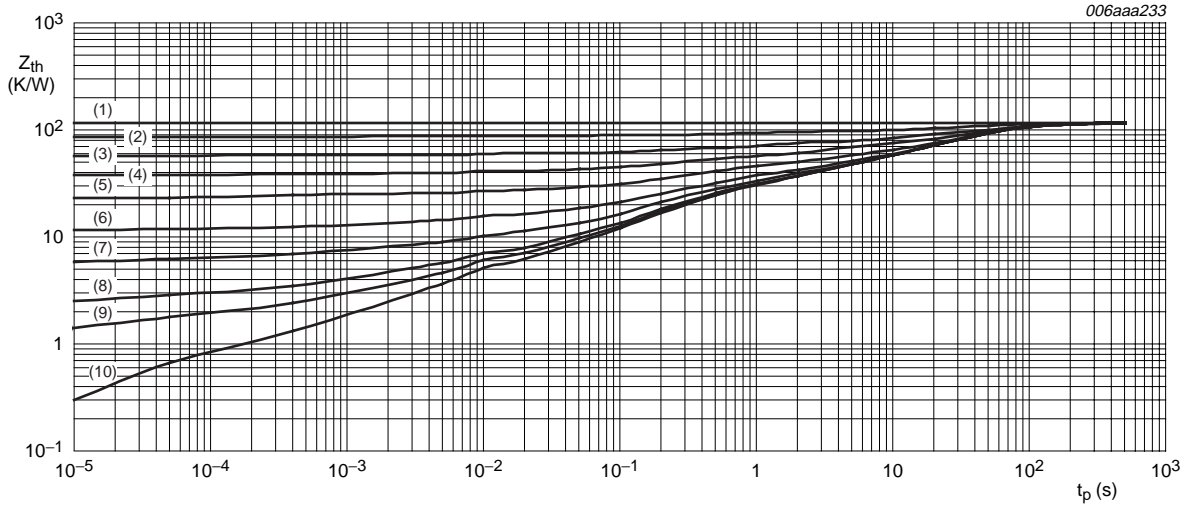
**Notes**

1. Pulse test:  $t_p \leq 10$  ms;  $\delta \leq 0.2$ .
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated and standard footprint.
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>.
4. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.
5. Device mounted on a 7 cm<sup>2</sup> ceramic printed-circuit board, 1 cm<sup>2</sup> single-sided copper and tin-plated.



40 V, 5 A  
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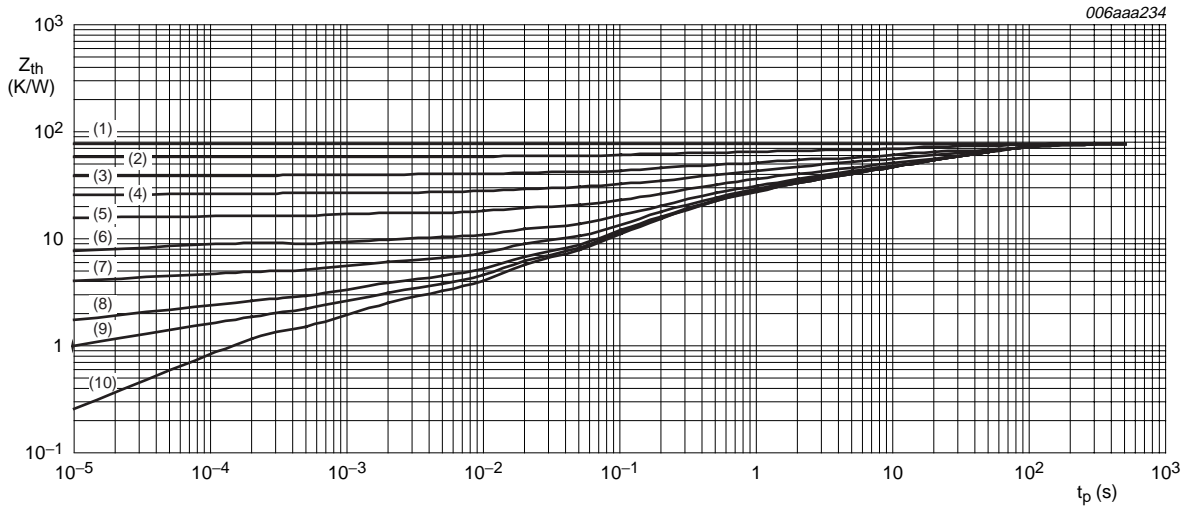
PBSS5540X



Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm<sup>2</sup>.

- |                      |                      |                     |                      |                      |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| (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 cm<sup>2</sup>.

- |                      |                      |                     |                      |                      |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| (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.

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

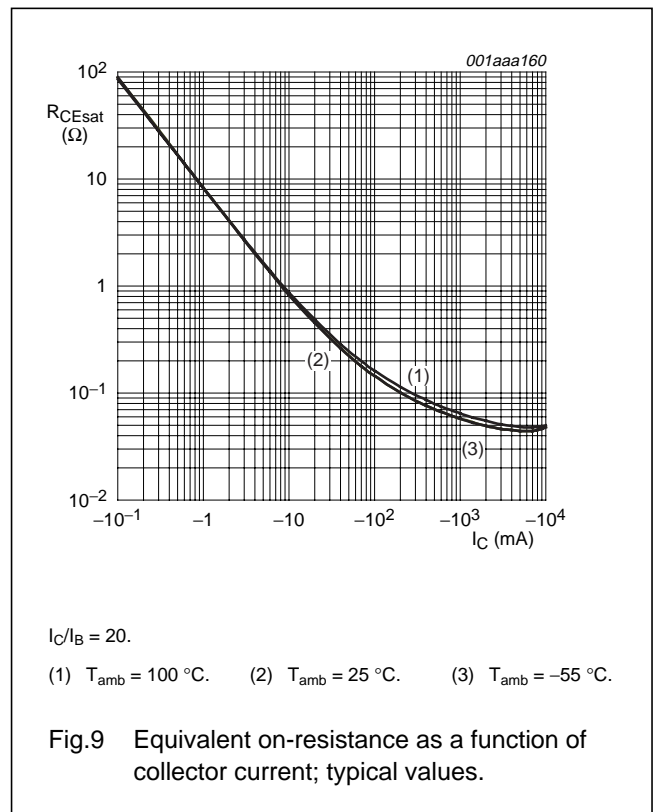
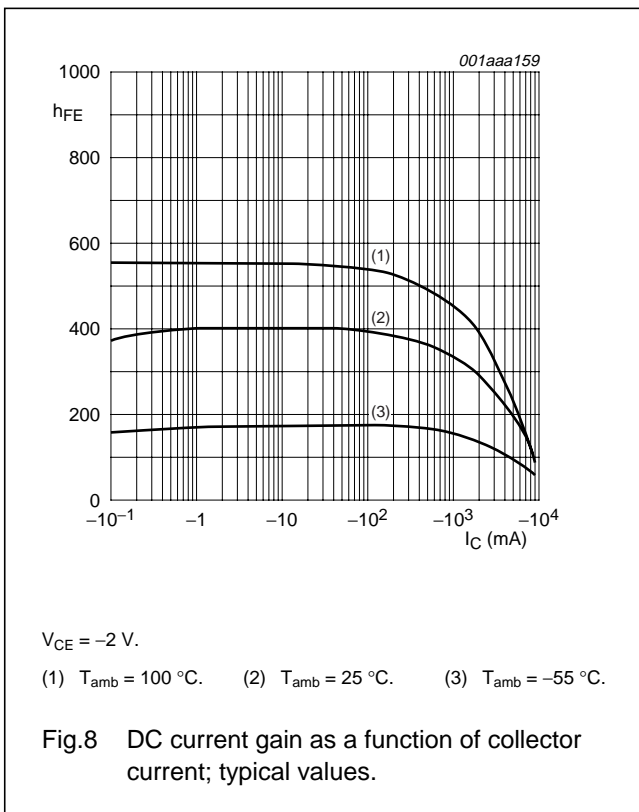
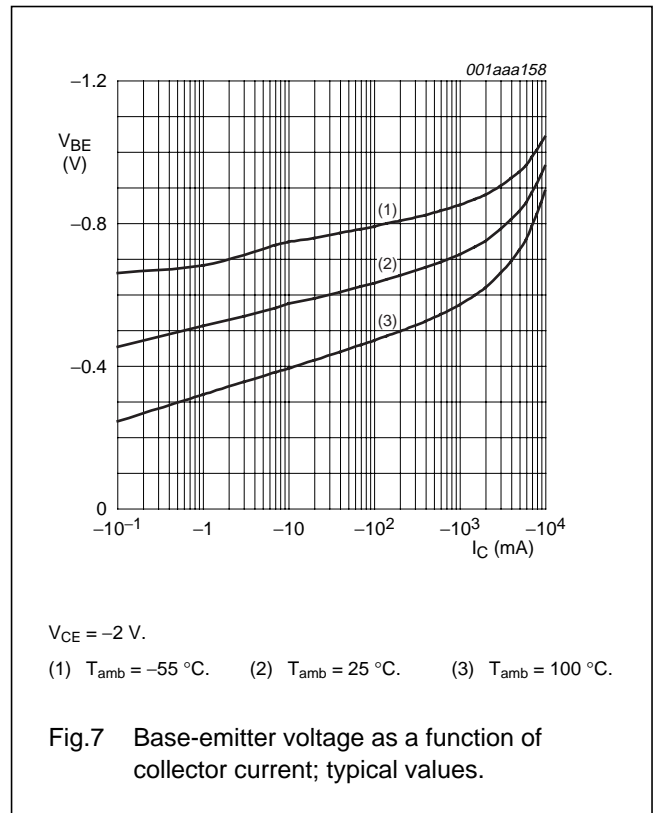
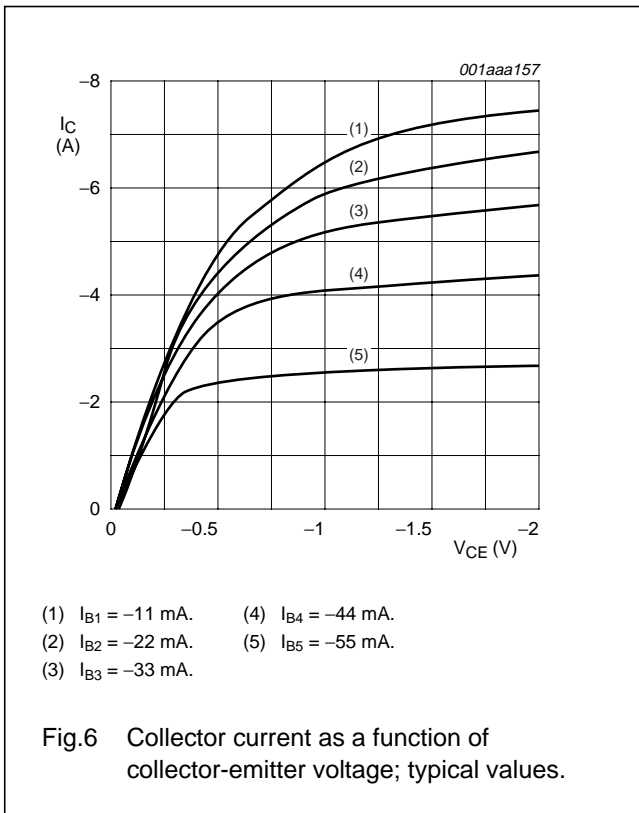
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30\text{ V}; I_E = 0\text{ A}$	–	–	–100	nA
		$V_{CB} = -30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	–	–	–50	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	–	–	–100	nA
$h_{FE}$	DC current gain	$V_{CE} = -2\text{ V}; I_C = -0.5\text{ A}$	250	–	–	
		$V_{CE} = -2\text{ V}; I_C = -1\text{ A};$ note 1	200	–	–	
		$V_{CE} = -2\text{ V}; I_C = -2\text{ A};$ note 1	150	–	–	
		$V_{CE} = -2\text{ V}; I_C = -5\text{ A};$ note 1	50	–	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -0.5\text{ A}; I_B = -5\text{ mA}$	–	–	120	mV
		$I_C = -1\text{ A}; I_B = -10\text{ mA}$	–	–	170	mV
		$I_C = -2\text{ A}; I_B = -200\text{ mA}$	–	–	160	mV
		$I_C = -4\text{ A}; I_B = -200\text{ mA};$ note 1	–	–	340	mV
		$I_C = -5\text{ A}; I_B = -500\text{ mA};$ note 1	–	–	375	mV
$R_{CEsat}$	equivalent on-resistance	$I_C = -5\text{ A}; I_B = -500\text{ mA};$ note 1	–	45	75	$\text{m}\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -4\text{ A}; I_B = -200\text{ mA};$ note 1	–	–	–1.1	V
		$I_C = -5\text{ A}; I_B = -500\text{ mA};$ note 1	–	–	–1.2	V
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = -2\text{ V}; I_C = -2\text{ A}$	–	–	–1.0	V
$f_T$	transition frequency	$V_{CE} = -10\text{ V}; I_C = -0.1\text{ A};$ $f = 100\text{ MHz}$	60	–	–	MHz
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_e = 0\text{ A};$ $f = 1\text{ MHz}$	–	–	105	pF

**Note**

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

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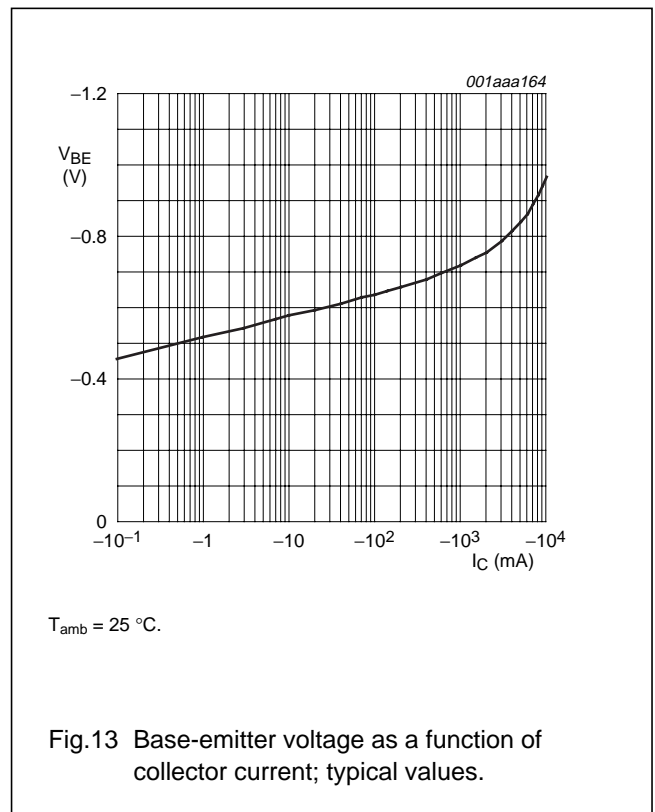
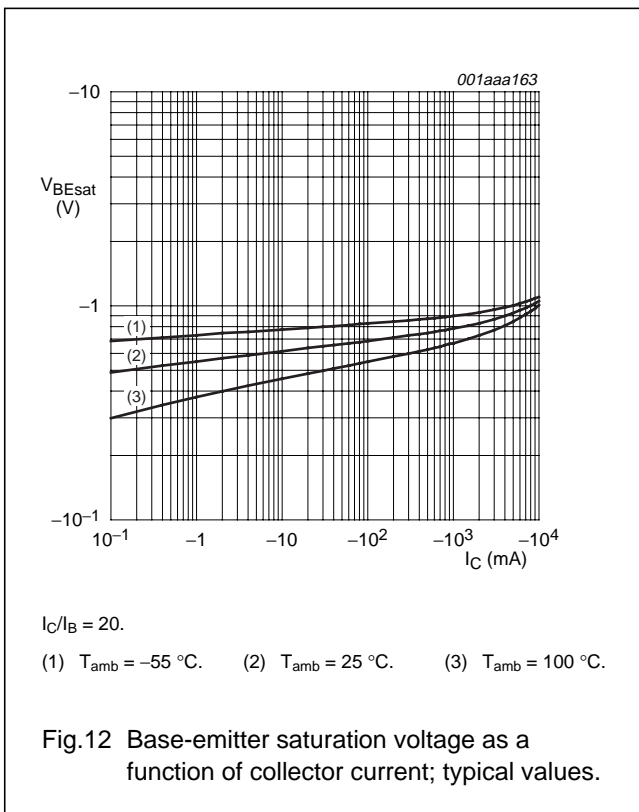
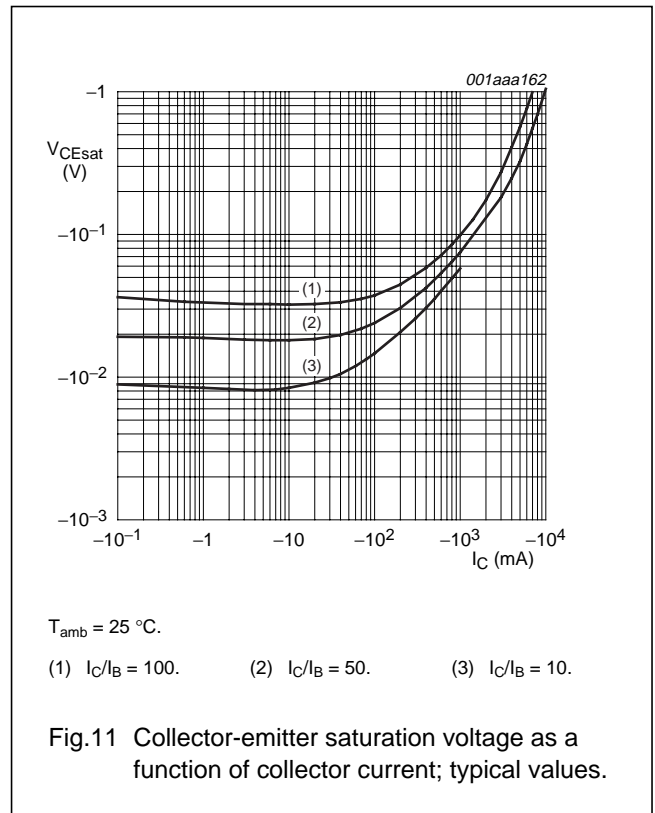
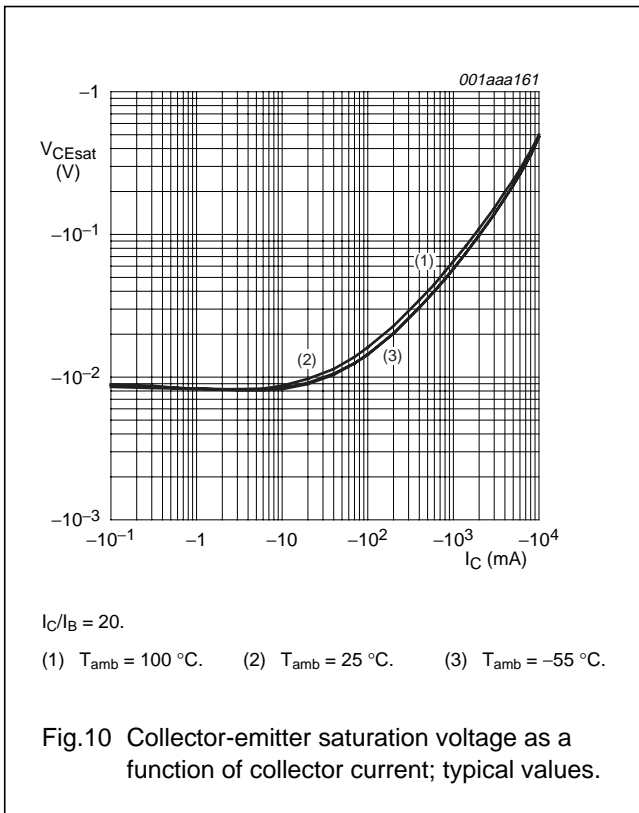
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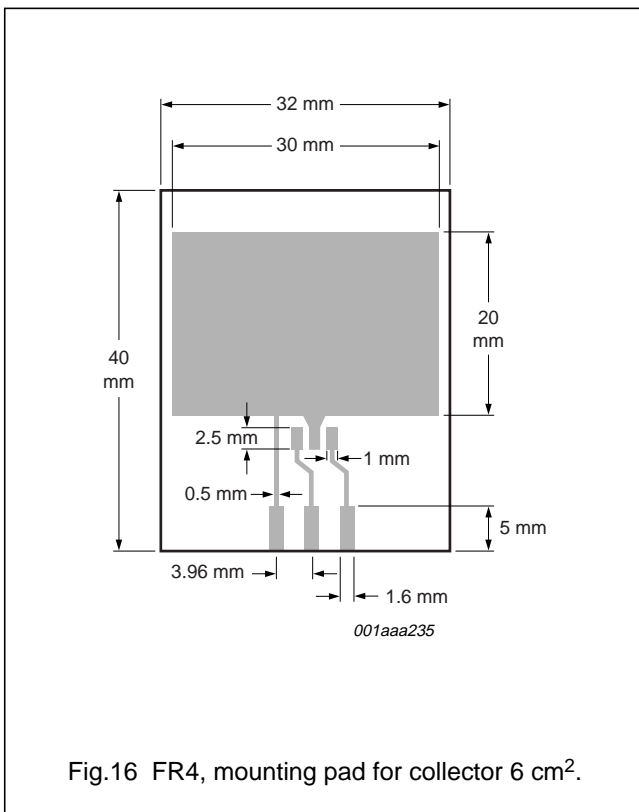
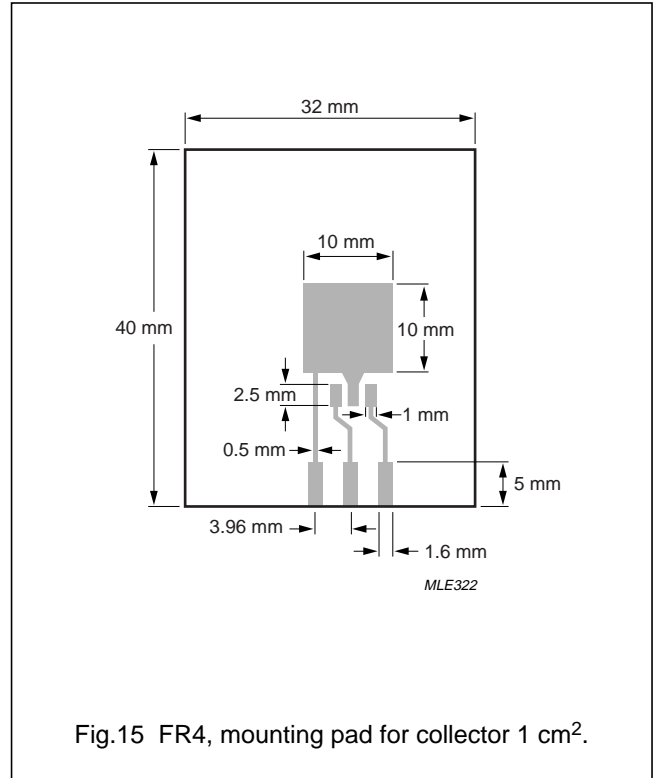
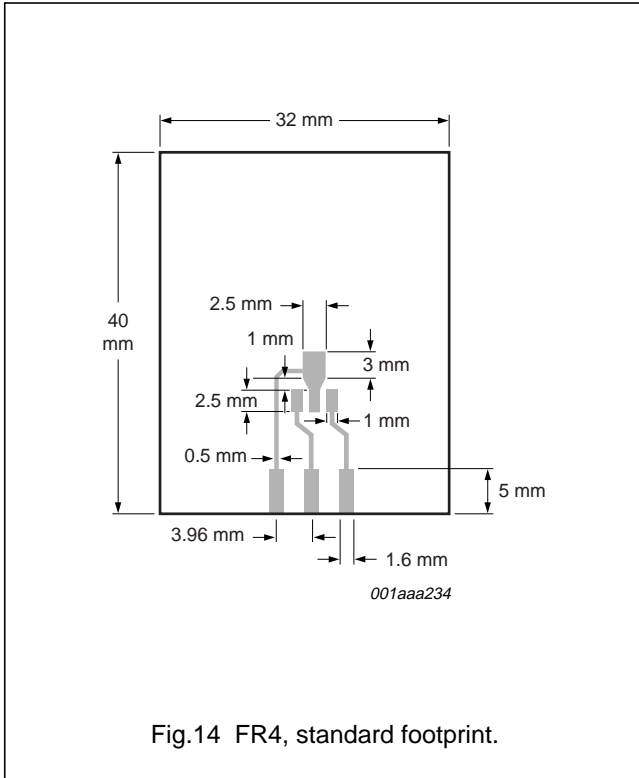
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40 V, 5 A  
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Reference mounting conditions



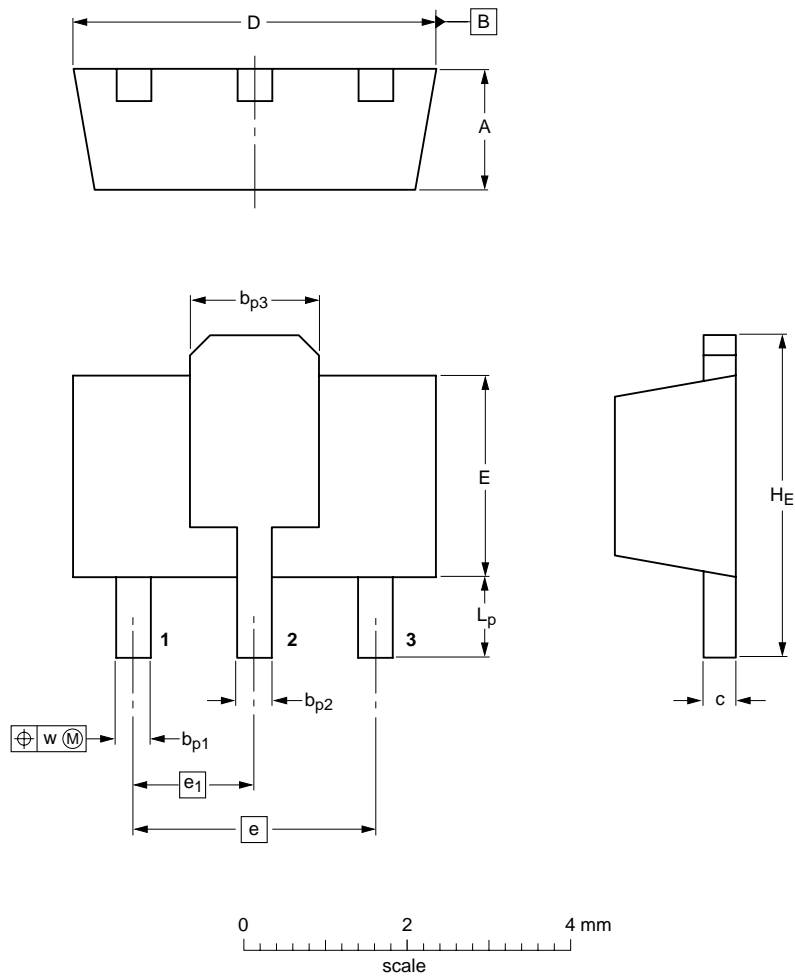
40 V, 5 A  
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PBSS5540X

PACKAGE OUTLINE

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

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	bp1	bp2	bp3	c	D	E	e	e1	HE	Lp	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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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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