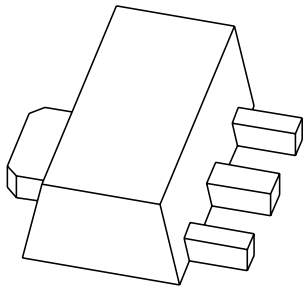


# DATA SHEET



**PBSS5480X**

80 V, 4 A

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

Product data sheet  
Supersedes data of 2004 Jun 8

2004 Nov 08

# 80 V, 4 A PNP low $V_{CEsat}$ (BISS) transistor

PBSS5480X

## FEATURES

- High  $h_{FE}$  and low  $V_{CEsat}$  at high current operation
- High collector current  $I_C$ : 4 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
- Inverter applications (e.g. TFT displays)
- Power switch for LAN and ADSL systems
- Medium power DC-to-DC conversion
- Battery chargers.

## DESCRIPTION

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

NPN complement: PBSS4480X.

## MARKING

TYPE NUMBER	MARKING CODE <sup>(1)</sup>
PBSS5480X	*1Z

## 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	-80	V
$I_C$	collector current (DC)	-4	A
$I_{CM}$	peak collector current	-10	A
$R_{CEsat}$	equivalent on-resistance	75	mΩ

## PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base

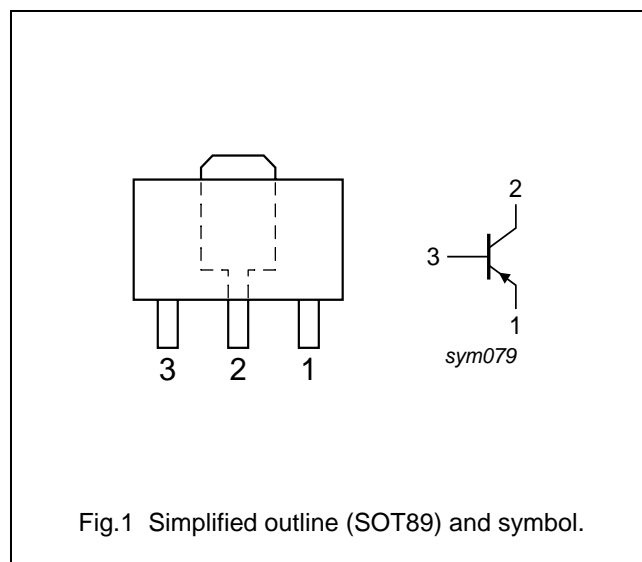


Fig.1 Simplified outline (SOT89) and symbol.

## ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5480X	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

# 80 V, 4 A PNP low $V_{CEsat}$ (BISS) transistor

PBSS5480X

## LIMITING VALUES

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

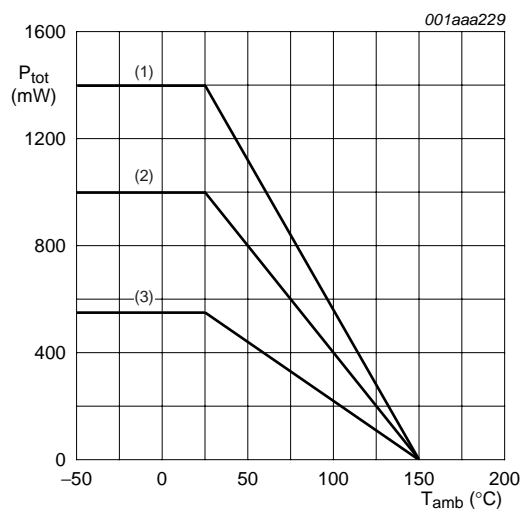
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–80	V
$V_{CEO}$	collector-emitter voltage	open base	–	–80	V
$V_{EBO}$	emitter-base voltage	open collector	–	–5	V
$I_C$	collector current (DC)	note 1	–	–4	A
$I_{CM}$	peak collector current	$t_p \leq 1$ ms or limited by $T_{j(max)}$	–	–10	A
$I_{CRP}$	repetitive peak collector current	$t_p \leq 10$ ms; $\delta \leq 0.1$	–	–6	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 2 and 3	–	2.5	W
		note 3	–	0.55	W
		note 4	–	1	W
		note 1	–	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. Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.
2. Operated under pulsed conditions; pulse width  $t_p \leq 10$  ms; duty cycle  $\delta \leq 0.1$ .
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated, standard footprint.
4. Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 1 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, tin-plated.

# 80 V, 4 A PNP low $V_{CEsat}$ (BISS) transistor

PBSS5480X



- (1) FR4 PCB; 6 cm<sup>2</sup> mounting pad for collector.  
(2) FR4 PCB; 1 cm<sup>2</sup> mounting pad for collector.  
(3) FR4 PCB; standard footprint.

Fig.2 Power derating curves.

80 V, 4 A  
PNP low  $V_{CEsat}$  (BISS) transistor

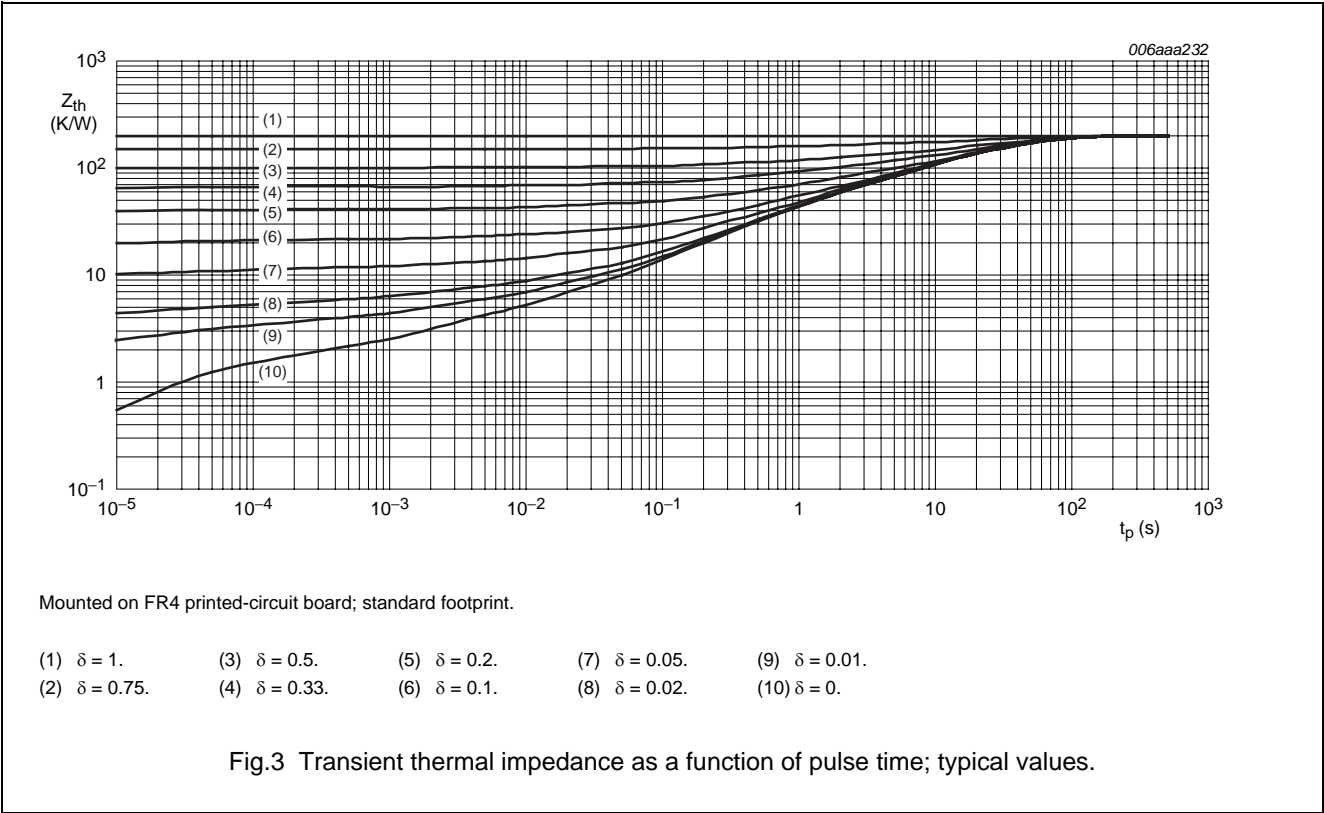
PBSS5480X

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

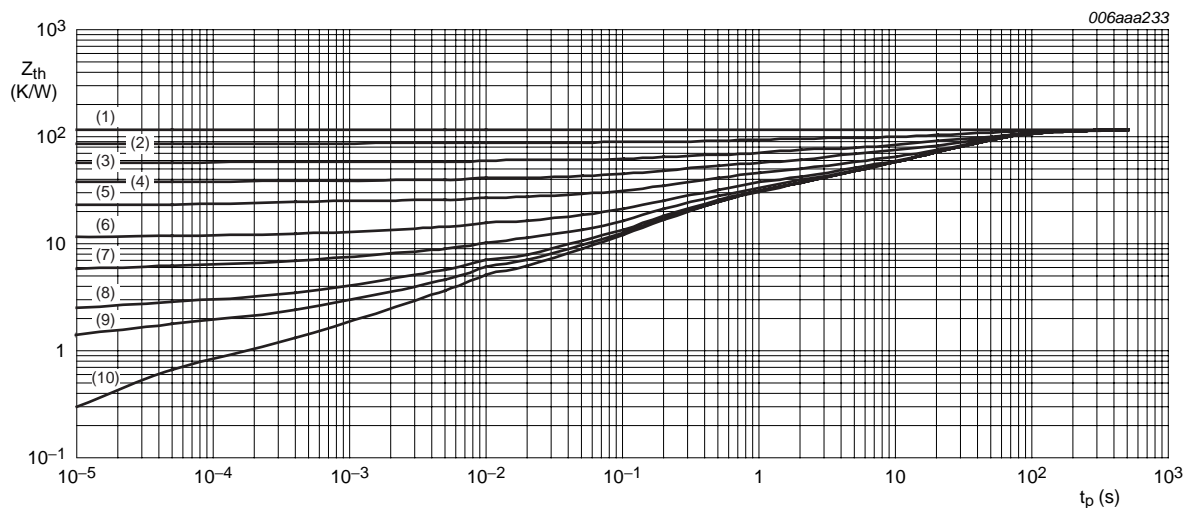
Notes

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 cm<sup>2</sup>.
4. Device mounted on a printed-circuit board, single-sided copper, tin-plated, 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, tin-plated.



80 V, 4 A  
PNP low  $V_{CEsat}$  (BISS) transistor

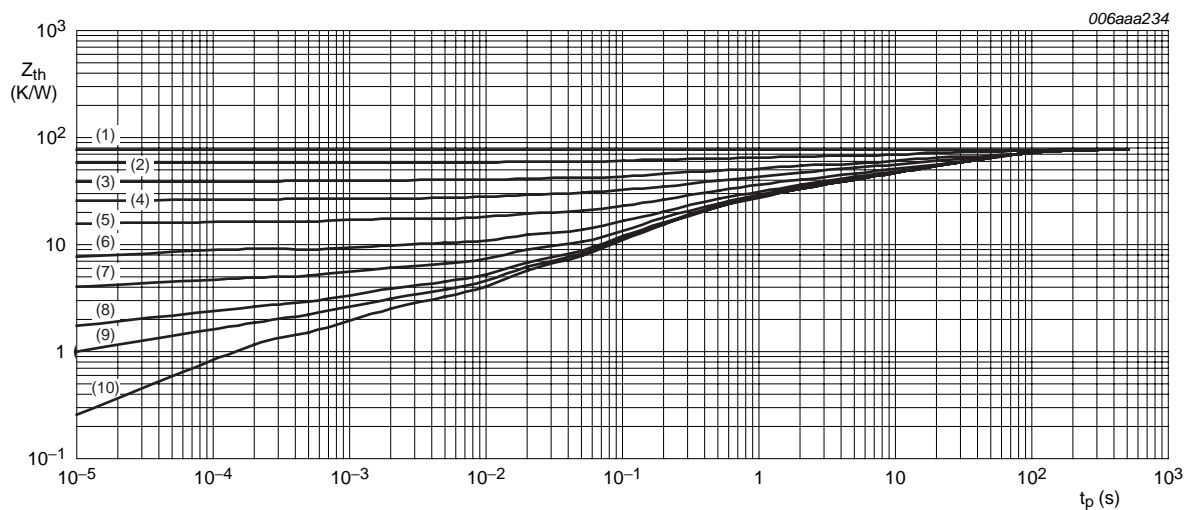
PBSS5480X



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.

# 80 V, 4 A

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

PBSS5480X

**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	$V_{CB} = -80\text{ V}; I_E = 0\text{ A}$	–	–	–100	nA
		$V_{CB} = -80\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ }^{\circ}\text{C}$	–	–	–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	$V_{CE} = -2\text{ V}; I_C = -0.5\text{ A}$	200	300	–	
		$V_{CE} = -2\text{ V}; I_C = -1\text{ A}; \text{note 1}$	180	280	–	
		$V_{CE} = -2\text{ V}; I_C = -2\text{ A}; \text{note 1}$	150	240	–	
		$V_{CE} = -2\text{ V}; I_C = -4\text{ A}; \text{note 1}$	80	150	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -0.5\text{ A}; I_B = -50\text{ mA}$	–	–35	–55	mV
		$I_C = -1\text{ A}; I_B = -50\text{ mA}$	–	–70	–105	mV
		$I_C = -2\text{ A}; I_B = -40\text{ mA}$	–	–170	–250	mV
		$I_C = -4\text{ A}; I_B = -200\text{ mA}; \text{note 1}$	–	–220	–340	mV
		$I_C = -5\text{ A}; I_B = -500\text{ mA}; \text{note 1}$	–	–250	–380	mV
$R_{CEsat}$	equivalent on-resistance	$I_C = -5\text{ A}; I_B = -500\text{ mA}; \text{note 1}$	–	50	75	$\text{m}\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -0.5\text{ A}; I_B = -50\text{ mA}$	–	–770	–850	mV
		$I_C = -1\text{ A}; I_B = -50\text{ mA}$	–	–810	–900	mV
		$I_C = -1\text{ A}; I_B = -100\text{ mA}; \text{note 1}$	–	–810	–900	mV
		$I_C = -4\text{ A}; I_B = -400\text{ mA}; \text{note 1}$	–	–930	–1000	mV
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = -2\text{ V}; I_C = -2\text{ A}$	–	–760	–850	mV
$f_T$	transition frequency	$I_C = -0.1\text{ A}; V_{CE} = -10\text{ V};$ $f = 100\text{ MHz}$	100	125	–	MHz
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_C = 0\text{ A};$ $f = 1\text{ MHz}$	–	60	90	pF

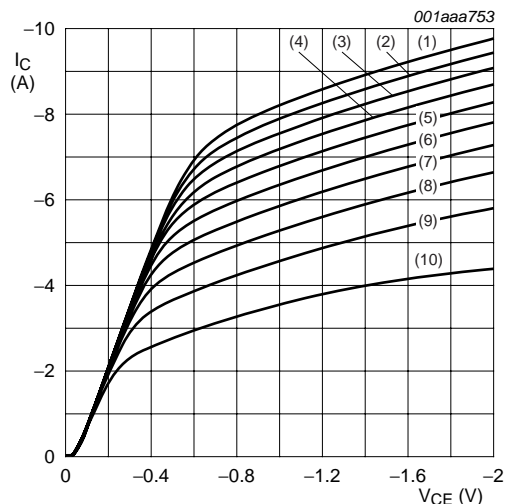
**Note**

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

# 80 V, 4 A

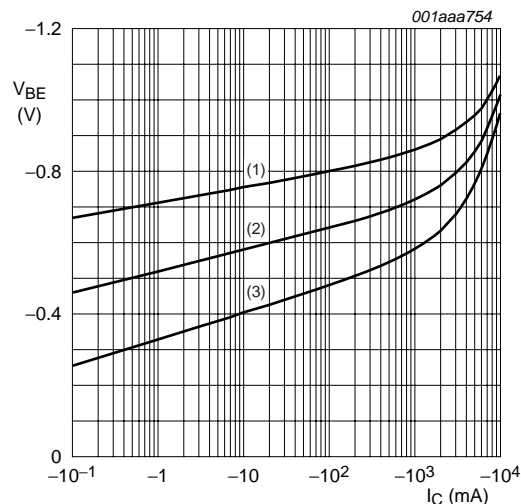
## PNP low $V_{CEsat}$ (BISS) transistor

PBSS5480X



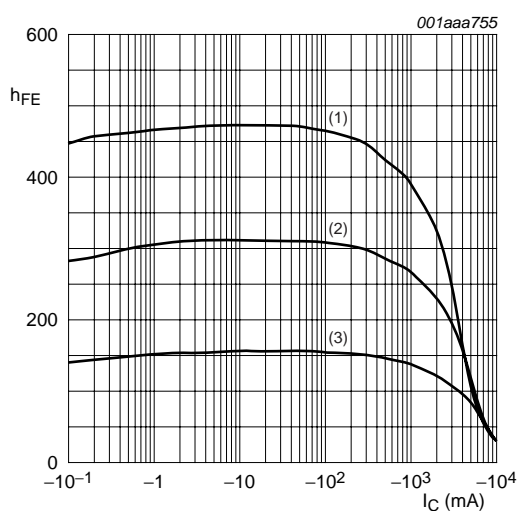
- (1)  $I_B = -300$  mA. (5)  $I_B = -180$  mA. (8)  $I_B = -90$  mA.  
 (2)  $I_B = -270$  mA. (6)  $I_B = -150$  mA. (9)  $I_B = -60$  mA.  
 (3)  $I_B = -240$  mA. (7)  $I_B = -120$  mA. (10)  $I_B = -30$  mA.  
 (4)  $I_B = -210$  mA.

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



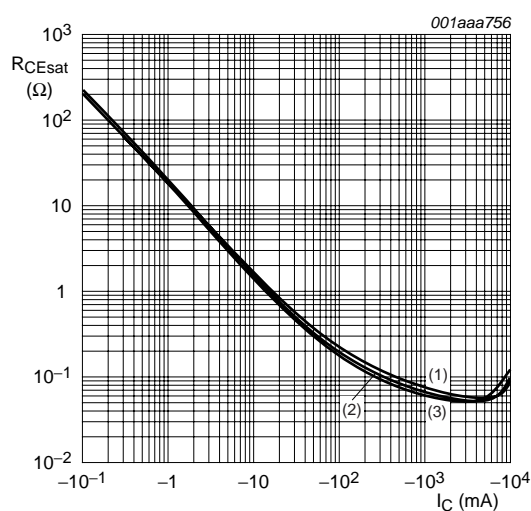
- $V_{CE} = -2$  V.  
 (1)  $T_{amb} = -55$  °C.  
 (2)  $T_{amb} = 25$  °C.  
 (3)  $T_{amb} = 100$  °C.

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.



# 80 V, 4 A

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

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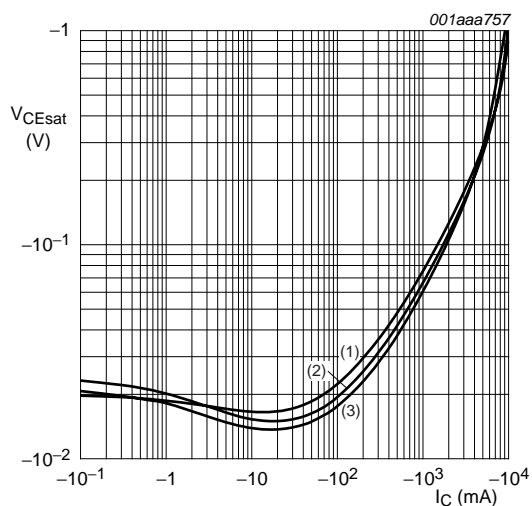
 $I_C/I_B = 20$ .(1)  $T_{amb} = 100\text{ °C}$ .(2)  $T_{amb} = 25\text{ °C}$ .(3)  $T_{amb} = -55\text{ °C}$ .

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

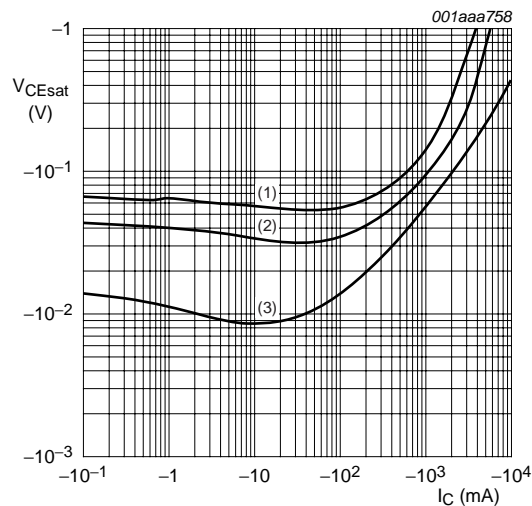
 $T_{amb} = 25\text{ °C}$ .(1)  $I_C/I_B = 100$ .(2)  $I_C/I_B = 50$ .(3)  $I_C/I_B = 10$ .

Fig.11 Collector-emitter saturation voltage as a function of collector current; typical values.

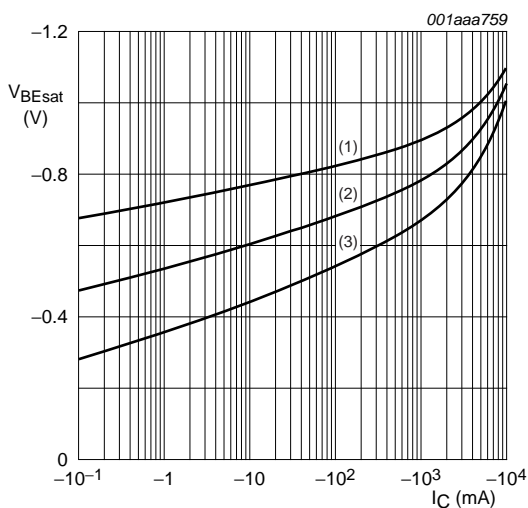
 $I_C/I_B = 20$ .(1)  $T_{amb} = -55\text{ °C}$ .(2)  $T_{amb} = 25\text{ °C}$ .(3)  $T_{amb} = 100\text{ °C}$ .

Fig.12 Base-emitter saturation voltage as a function of collector current; typical values.

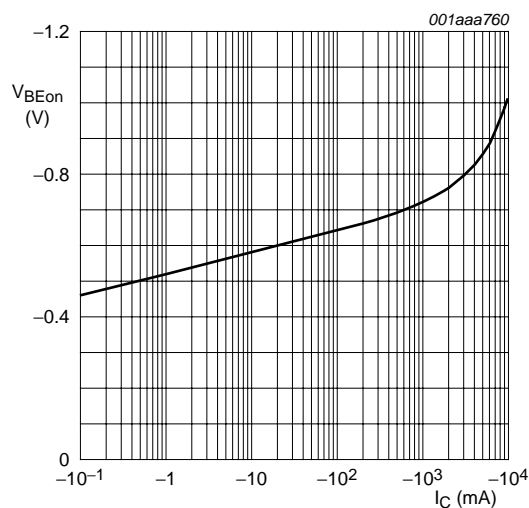
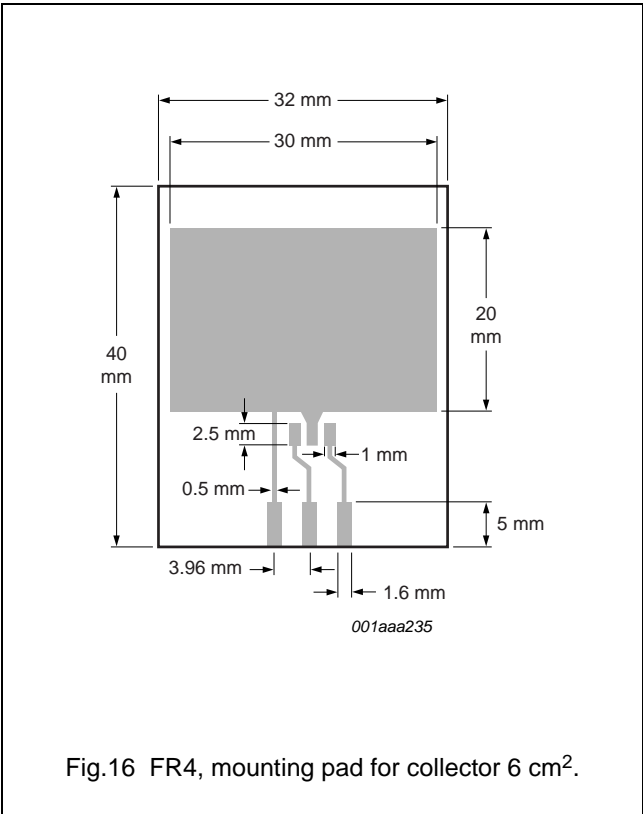
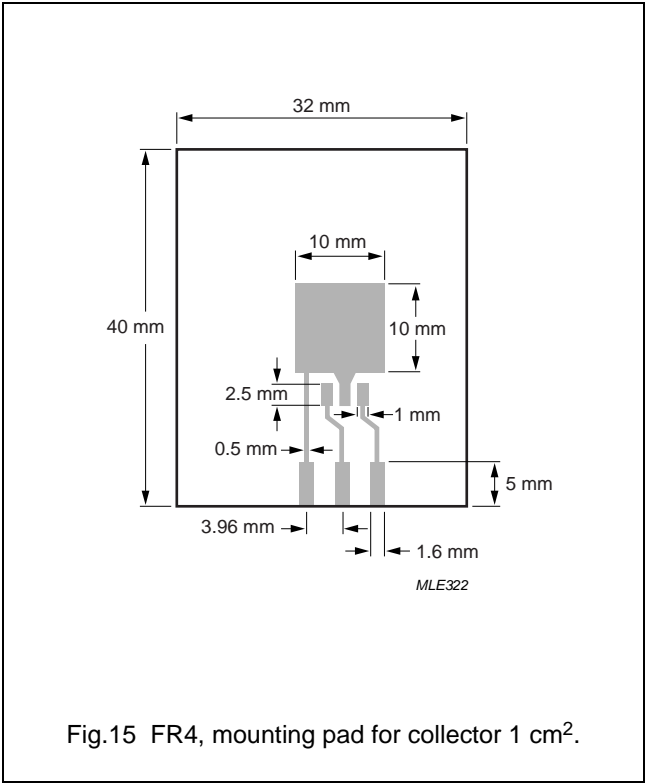
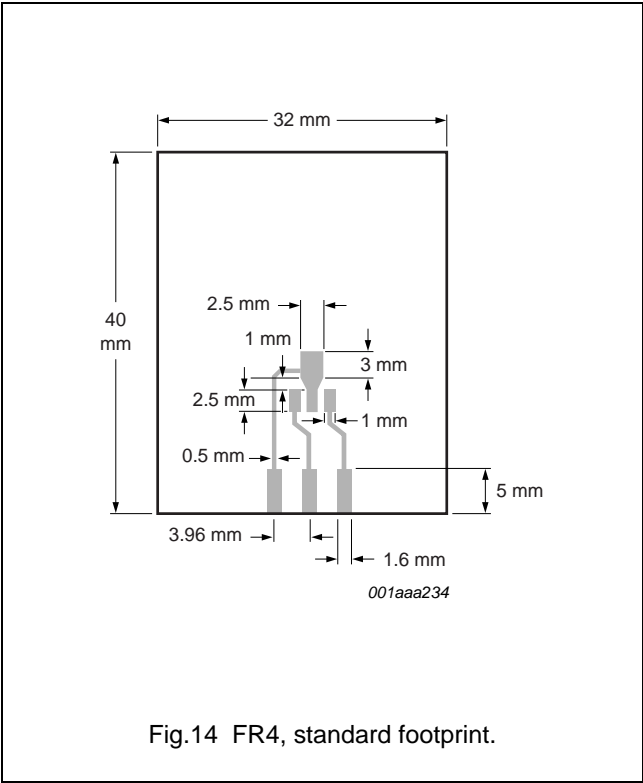
 $T_{amb} = 25\text{ °C}; V_{CE} = -2\text{ V}$ .

Fig.13 Base-emitter turn-on voltage as a function of collector current; typical values.

80 V, 4 A  
PNP low  $V_{CEsat}$  (BISS) transistor

PBSS5480X

Reference mounting conditions



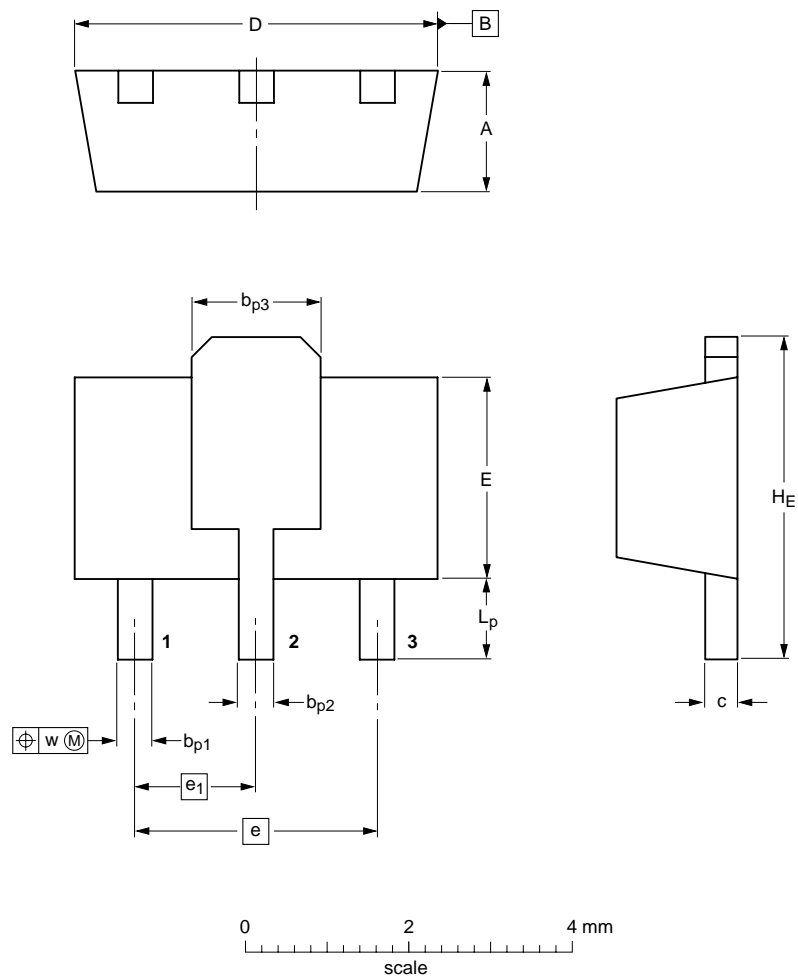
80 V, 4 A  
PNP low  $V_{CEsat}$  (BISS) transistor

PBSS5480X

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			04-08-03 06-03-16

# 80 V, 4 A PNP low $V_{CEsat}$ (BISS) transistor

PBSS5480X

## DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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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For additional information please visit: **<http://www.nxp.com>**

For sales offices addresses send e-mail to: **[salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)**

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