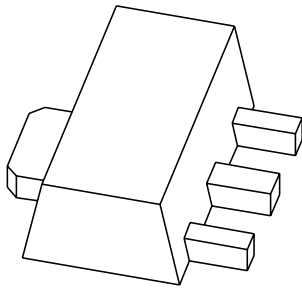


DATA SHEET



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 ⁽¹⁾
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

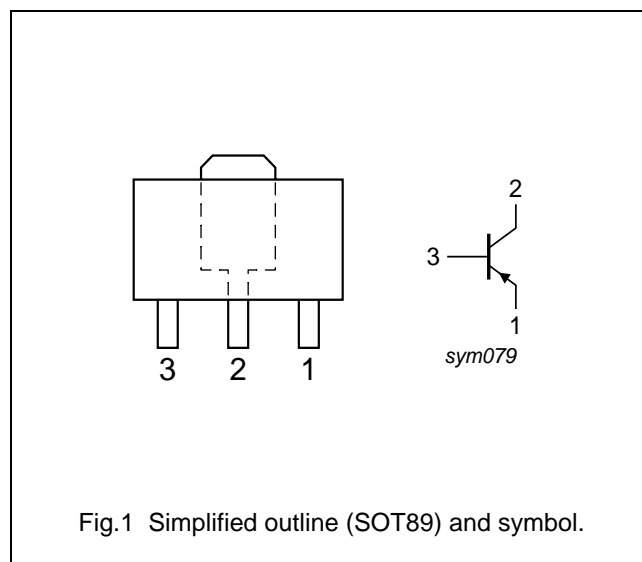


Fig.1 Simplified outline (SOT89) and symbol.

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).

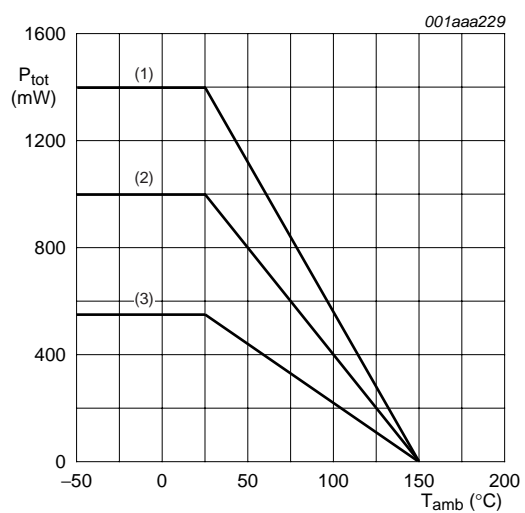
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–80	V
V_{CEO}	collector-emitter voltage	open base	–	–80	V
V_{EBO}	emitter-base voltage	open collector	–	–5	V
I_C	collector current (DC)	note 1	–	–4	A
I_{CM}	peak collector current	$t_p \leq 1$ ms or limited by $T_{j(max)}$	–	–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 cm².
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 cm².
5. Device mounted on a 7 cm² ceramic printed-circuit board, 1 cm² single-sided copper, tin-plated.

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

PBSS5480X



- (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.

80 V, 4 A

PNP low V_{CEsat} (BISS) transistor

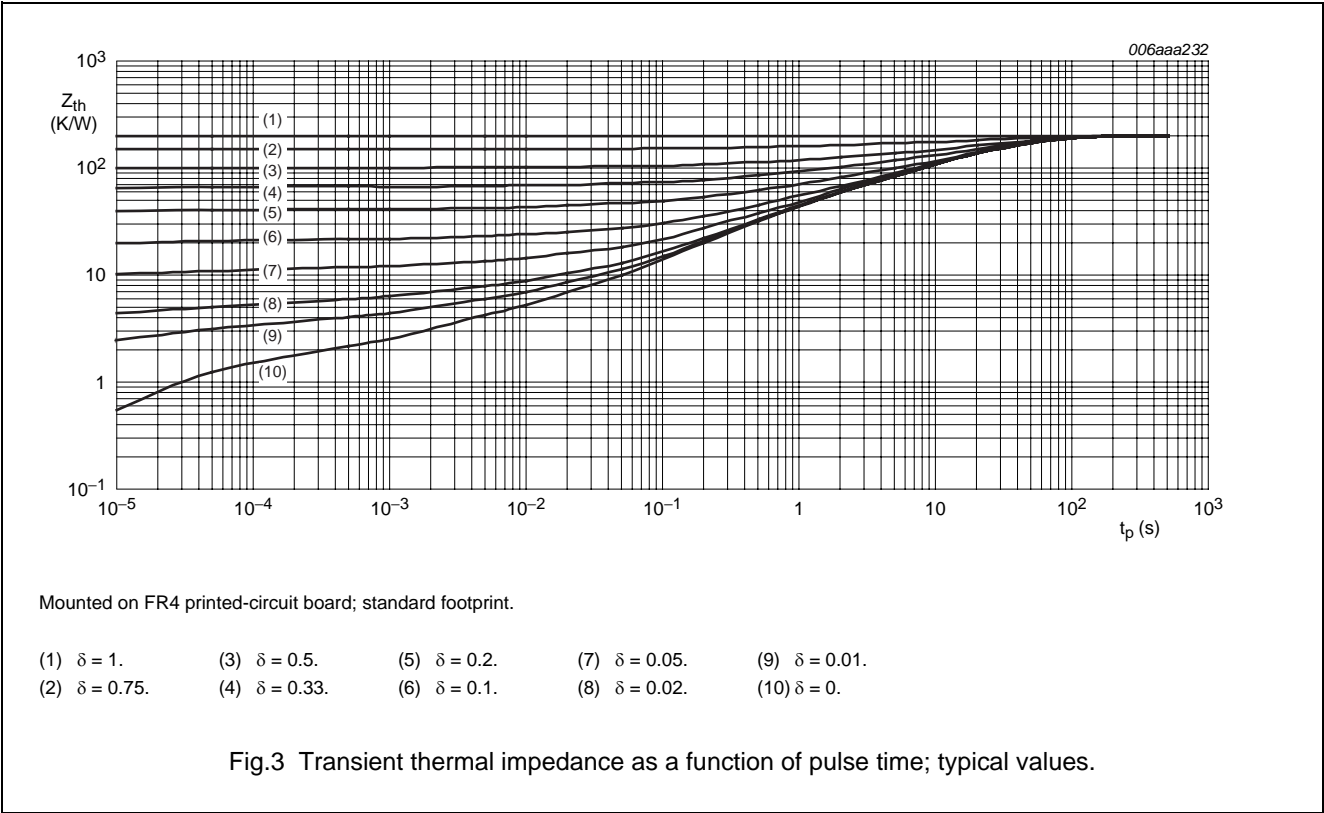
PBSS5480X

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

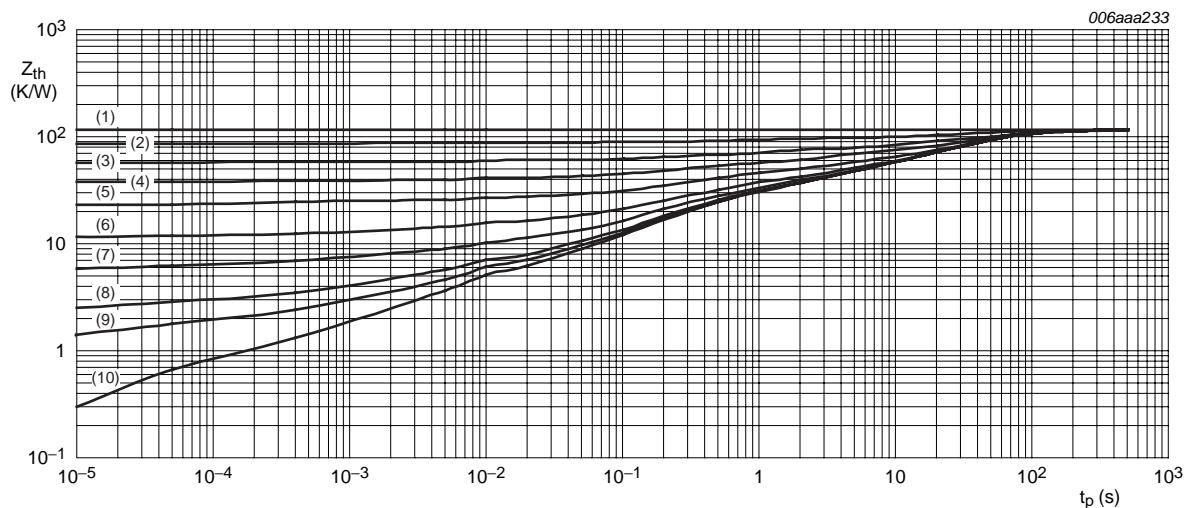
Notes

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 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.



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

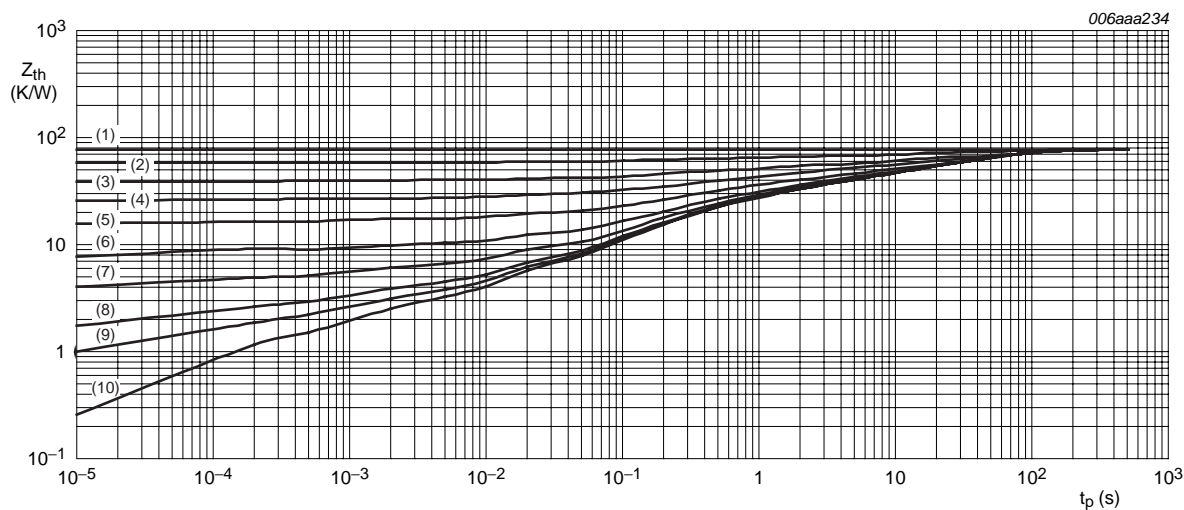
PBSS5480X



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.

80 V, 4 A

PNP low V_{CEsat} (BISS) transistor

PBSS5480X

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	$V_{CB} = -80\text{ V}; I_E = 0\text{ A}$	–	–	–100	nA
		$V_{CB} = -80\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ °C}$	–	–	–50	μA
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

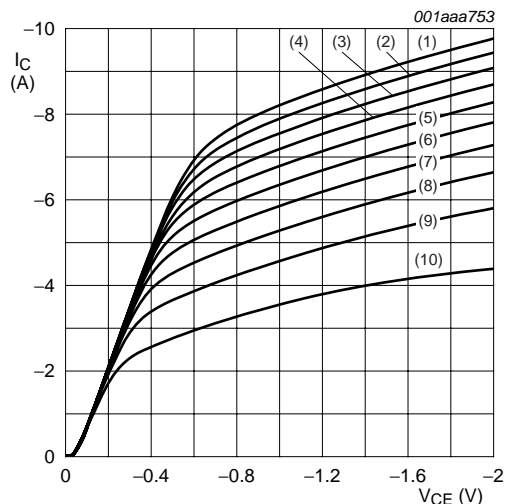
Note

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

80 V, 4 A

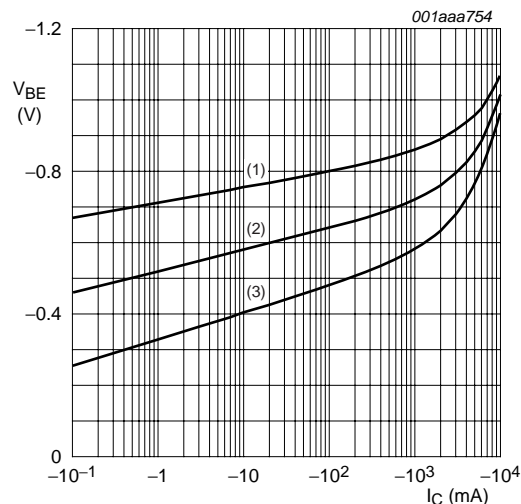
PNP low V_{CEsat} (BISS) transistor

PBSS5480X



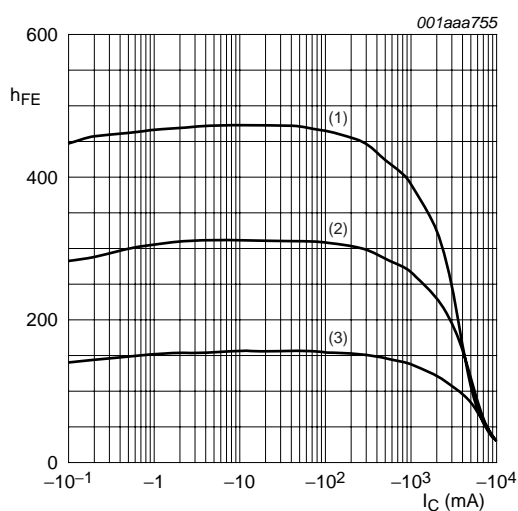
- (1) $I_B = -300$ mA. (5) $I_B = -180$ mA. (8) $I_B = -90$ mA.
 (2) $I_B = -270$ mA. (6) $I_B = -150$ mA. (9) $I_B = -60$ mA.
 (3) $I_B = -240$ mA. (7) $I_B = -120$ mA. (10) $I_B = -30$ mA.
 (4) $I_B = -210$ mA.

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



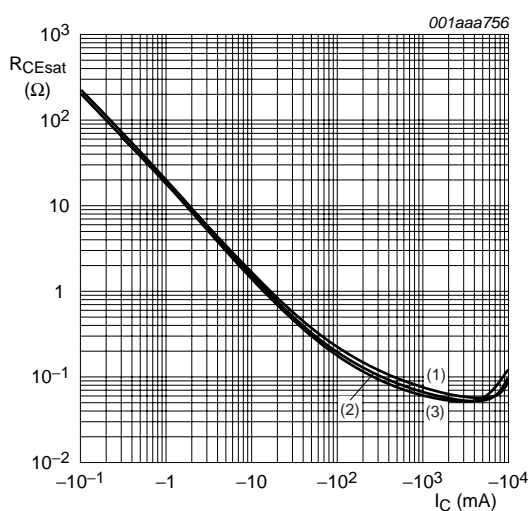
- $V_{CE} = -2$ V.
 (1) $T_{amb} = -55$ °C.
 (2) $T_{amb} = 25$ °C.
 (3) $T_{amb} = 100$ °C.

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

PBSS5480X

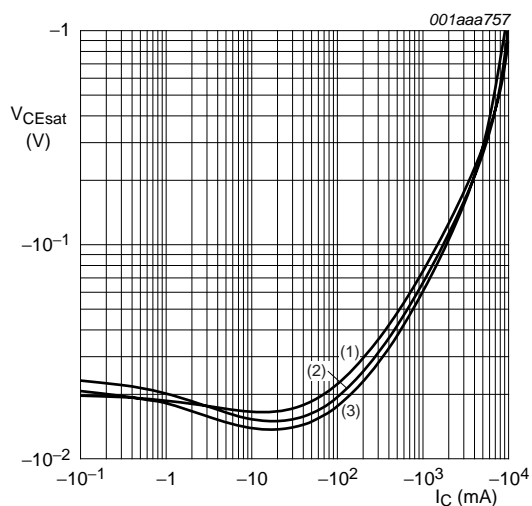
 $I_C/I_B = 20$.(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$.(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$.(3) $T_{amb} = -55\text{ }^{\circ}\text{C}$.

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

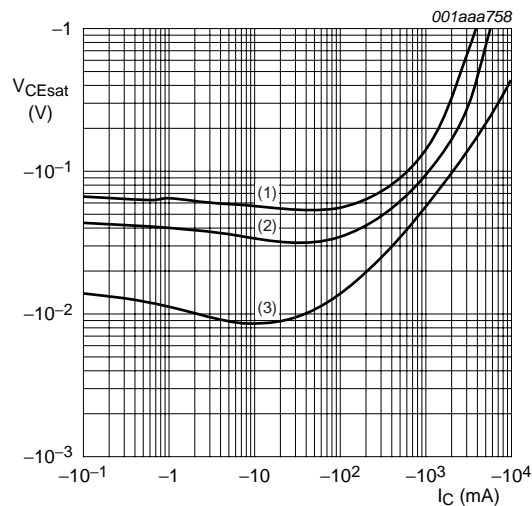
 $T_{amb} = 25\text{ }^{\circ}\text{C}$.(1) $I_C/I_B = 100$.(2) $I_C/I_B = 50$.(3) $I_C/I_B = 10$.

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

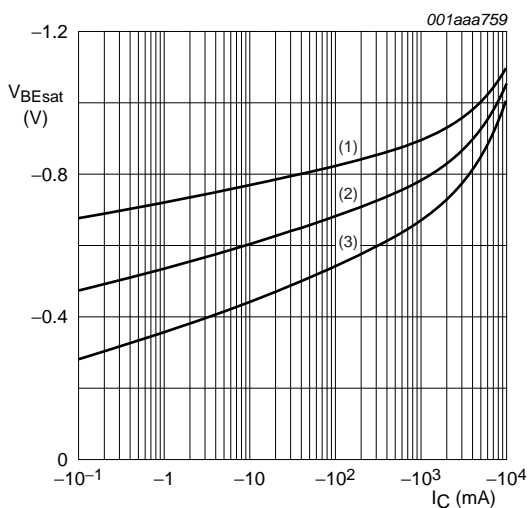
 $I_C/I_B = 20$.(1) $T_{amb} = -55\text{ }^{\circ}\text{C}$.(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$.(3) $T_{amb} = 100\text{ }^{\circ}\text{C}$.

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

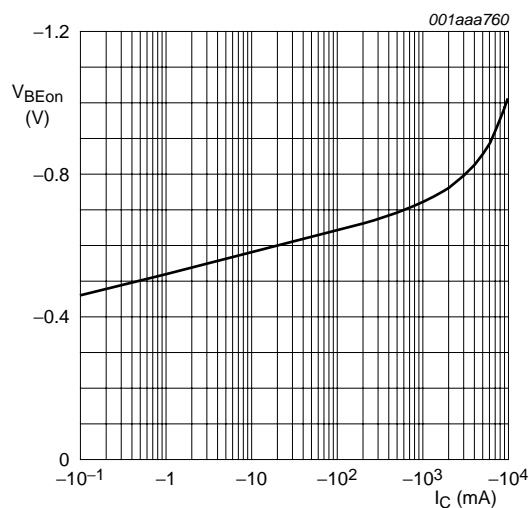
 $T_{amb} = 25\text{ }^{\circ}\text{C}$; $V_{CE} = -2\text{ V}$.

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

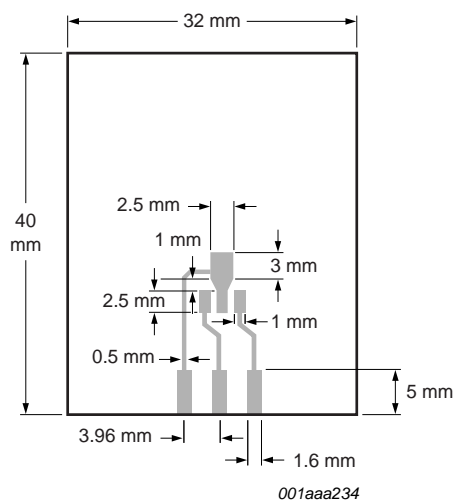


Fig.14 FR4, standard footprint.

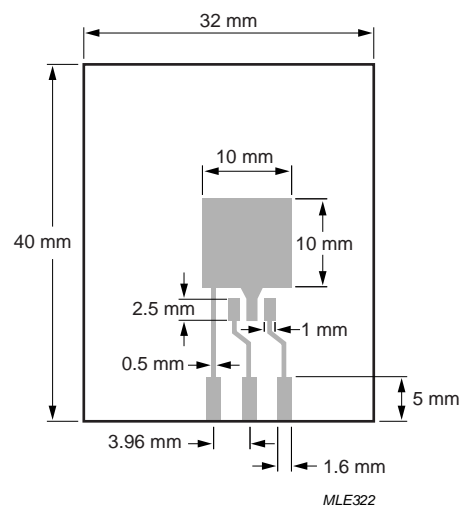


Fig.15 FR4, mounting pad for collector 1 cm².

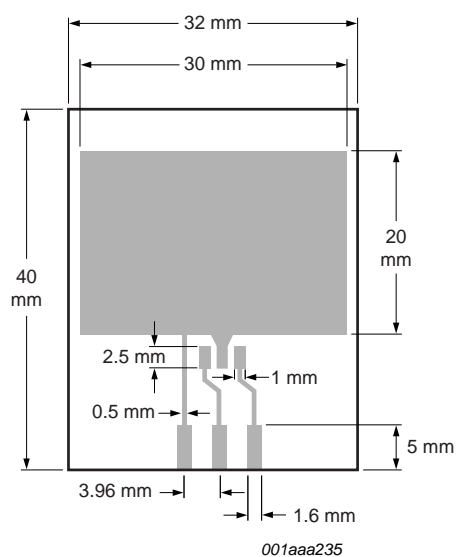


Fig.16 FR4, mounting pad for collector 6 cm².

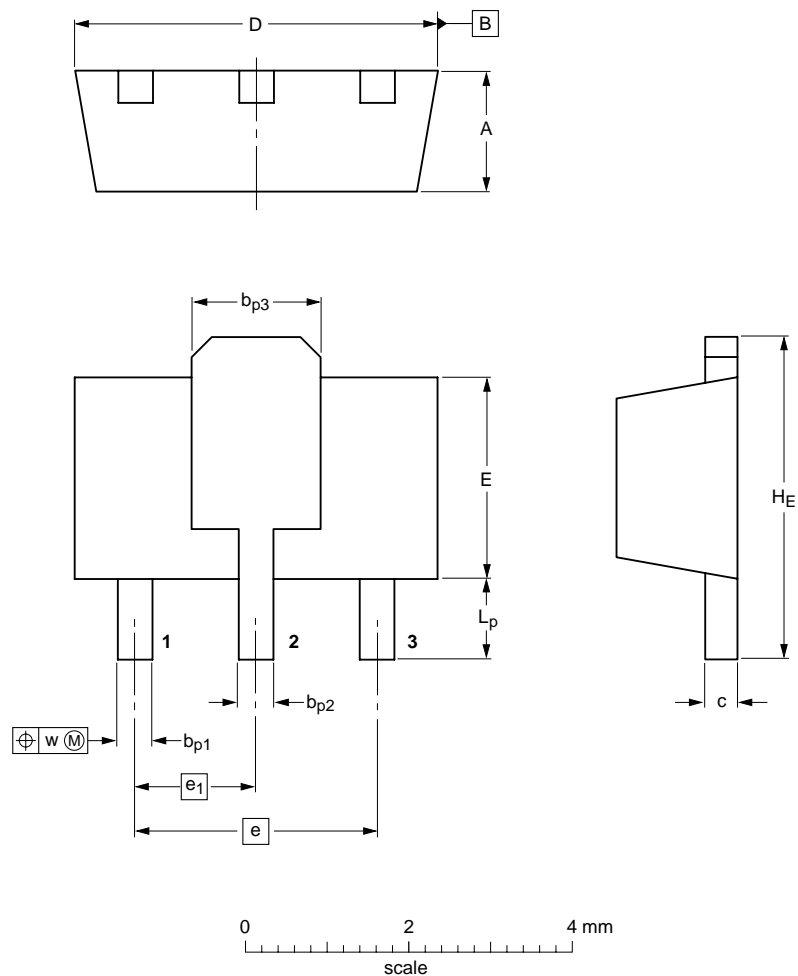
80 V, 4 A
PNP low V_{CEsat} (BISS) transistor

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 ⁽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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Contact information

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