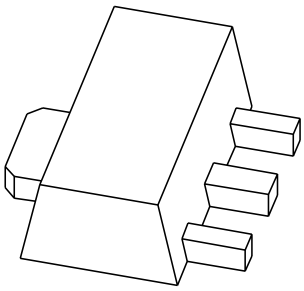
DATA SHEET



PBSS5480X
80 V, 4 A
PNP low V_{CEsat} (BISS) transistor

Product specification
Supersedes data of 2004 Jun 8

2004 Nov 08

Philips Semiconductors

PHILIPS

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

1. * = 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

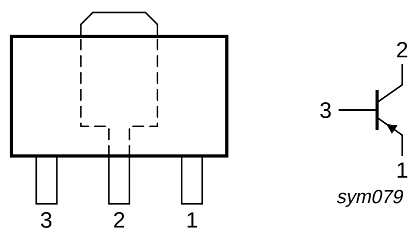


Fig.1 Simplified outline (SOT89) and symbol.

ORDERING INFORMATION

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

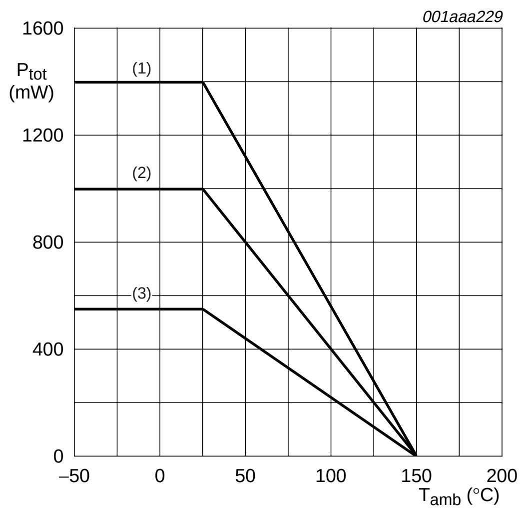
LIMITING VALUES

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^2.
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^2.
5. Device mounted on a 7 cm^2 ceramic printed-circuit board, 1 cm^2 single-sided copper, tin-plated.



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

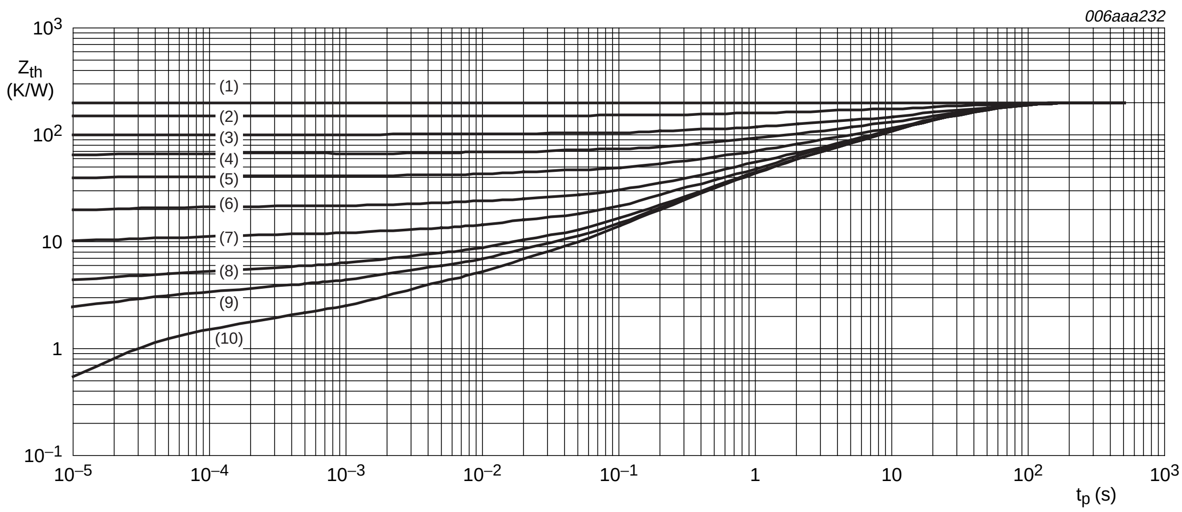
Fig.2 Power derating curves.

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

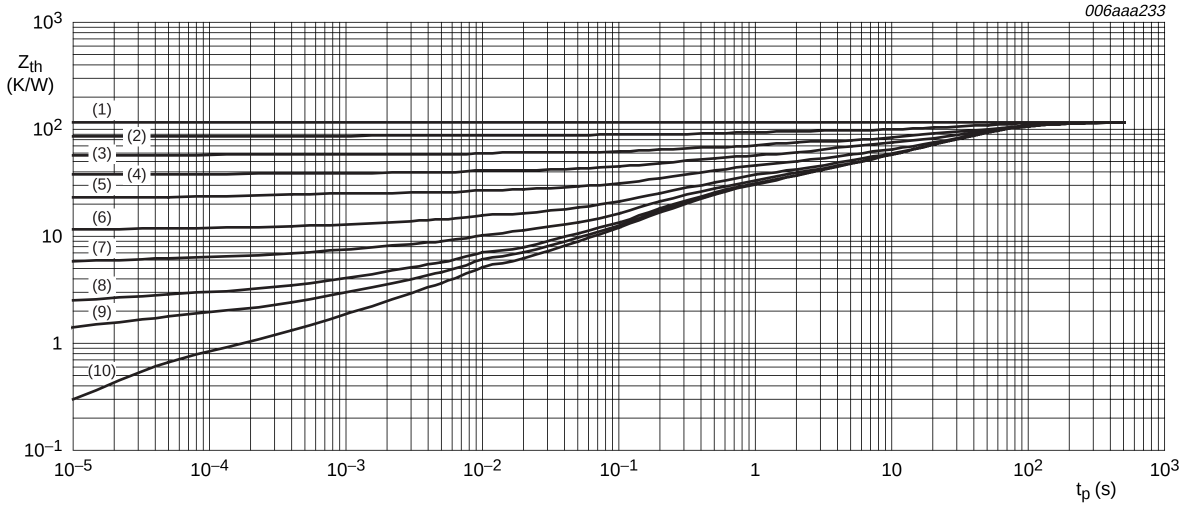
1. Operated under pulsed conditions; pulse width $t_p \leq 10$ ms; duty cycle $\delta \leq 0.2$.
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated, standard footprint.
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector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



Mounted on FR4 printed-circuit board; standard footprint.

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

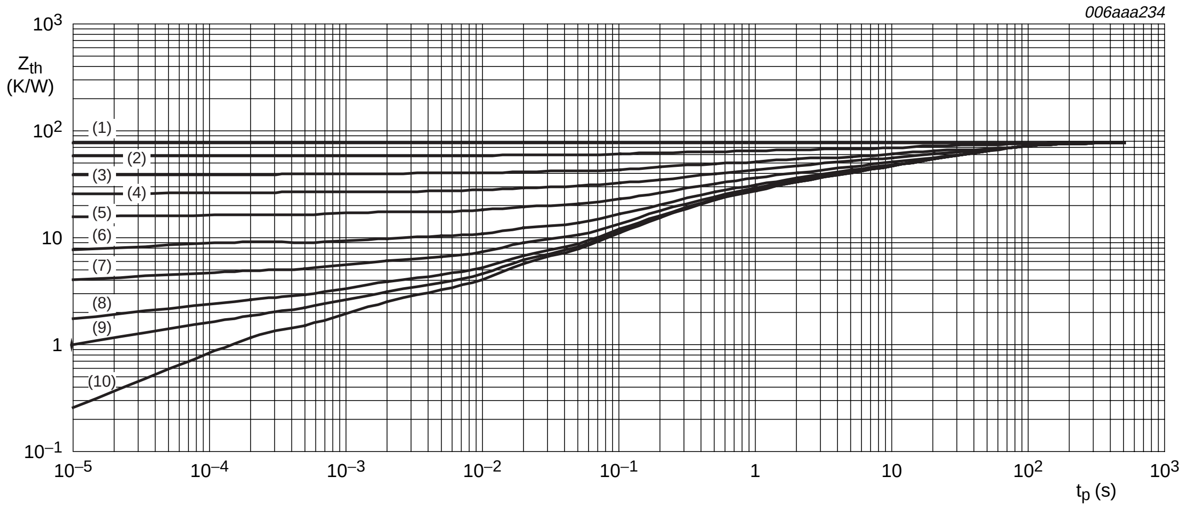
Fig.3 Transient thermal impedance as a function of pulse time; typical values.



Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm^2.

(1) δ = 1.
(2) δ = 0.75.
(3) δ = 0.5.
(4) δ = 0.33.
(5) δ = 0.2.
(6) δ = 0.1.
(7) δ = 0.05.
(8) δ = 0.02.
(9) δ = 0.01.
(10) δ = 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^2.

(1) δ = 1.
(2) δ = 0.75.
(3) δ = 0.5.
(4) δ = 0.33.
(5) δ = 0.2.
(6) δ = 0.1.
(7) δ = 0.05.
(8) δ = 0.02.
(9) δ = 0.01.
(10) δ = 0.

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

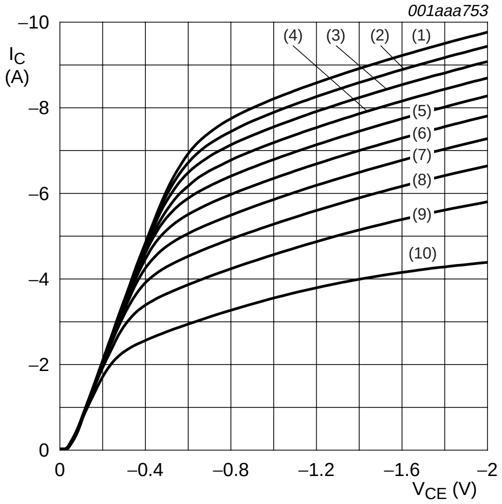
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	V_{CB} = –80 V; I_E = 0 A	–	–	–100	nA
		V_{CB} = –80 V; I_E = 0 A; T_j = 150 °C	–	–	–50	μA
I_{CES}	collector-emitter cut-off current	V_{CE} = –60 V; V_{BE} = 0 V	–	–	–100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A	–	–	–100	nA
h_{FE}	DC current gain	V_{CE} = –2 V; I_C = –0.5 A	200	300	–	
		V_{CE} = –2 V; I_C = –1 A; note 1	180	280	–	
		V_{CE} = –2 V; I_C = –2 A; note 1	150	240	–	
		V_{CE} = –2 V; I_C = –4 A; note 1	80	150	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = –0.5 A; I_B = –50 mA	–	–35	–55	mV
		I_C = –1 A; I_B = –50 mA	–	–70	–105	mV
		I_C = –2 A; I_B = –40 mA	–	–170	–250	mV
		I_C = –4 A; I_B = –200 mA; note 1	–	–220	–340	mV
		I_C = –5 A; I_B = –500 mA; note 1	–	–250	–380	mV
R_{CEsat}	equivalent on-resistance	I_C = –5 A; I_B = –500 mA; note 1	–	50	75	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = –0.5 A; I_B = –50 mA	–	–770	–850	mV
		I_C = –1 A; I_B = –50 mA	–	–810	–900	mV
		I_C = –1 A; I_B = –100 mA; note 1	–	–810	–900	mV
		I_C = –4 A; I_B = –400 mA; note 1	–	–930	–1000	mV
V_{BEon}	base-emitter turn-on voltage	V_{CE} = –2 V; I_C = –2 A	–	–760	–850	mV
f_T	transition frequency	I_C = –0.1 A; V_{CE} = –10 V; f = 100 MHz	100	125	–	MHz
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz	–	60	90	pF

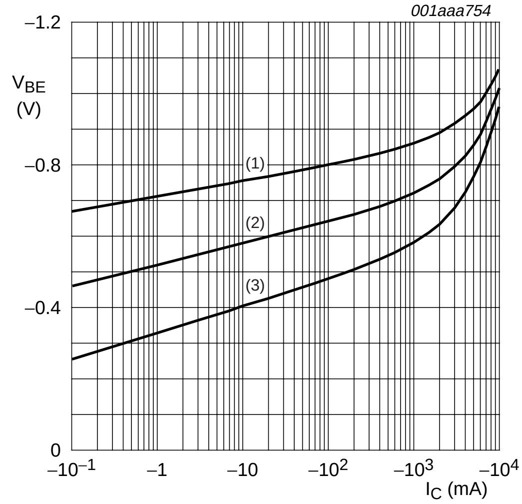
Note

1. Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.



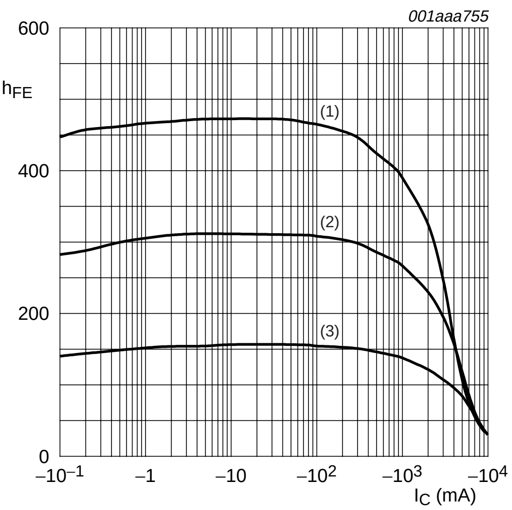
(1) I_B = −300 mA.
(2) I_B = −270 mA.
(3) I_B = −240 mA.
(4) I_B = −210 mA.
(5) I_B = −180 mA.
(6) I_B = −150 mA.
(7) I_B = −120 mA.
(8) I_B = −90 mA.
(9) I_B = −60 mA.
(10) I_B = −30 mA.

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



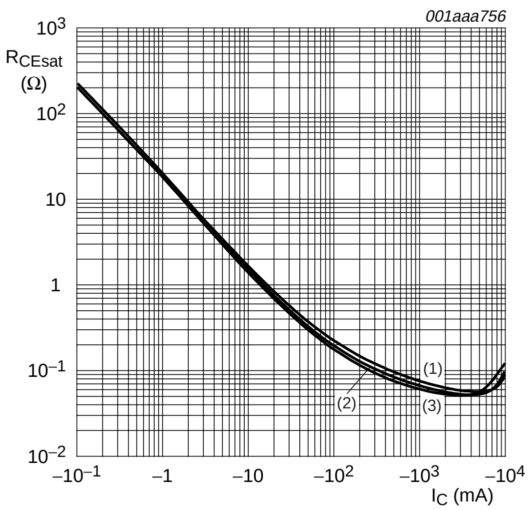
V_{CE} = −2 V.
(1) T_{amb} = −55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

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



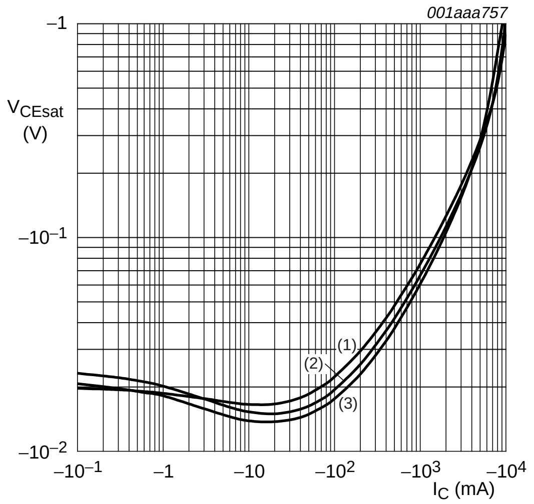
V_{CE} = −2 V.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = −55 °C.

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



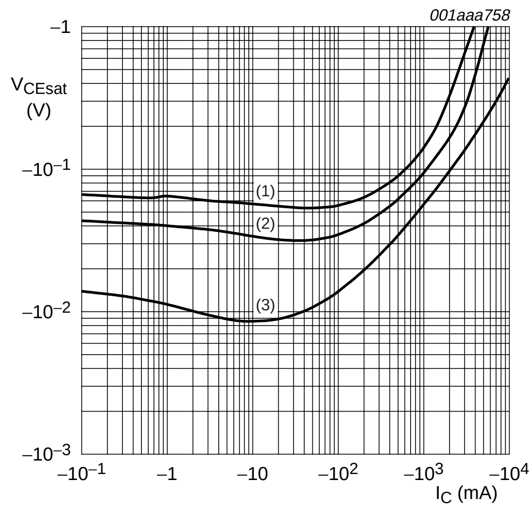
I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = −55 °C.

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



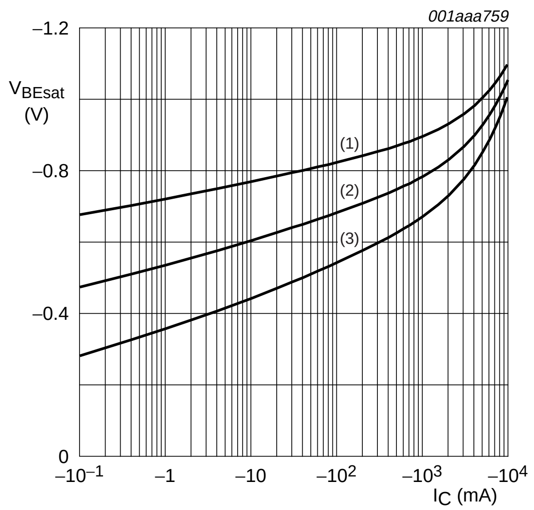
I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = −55 °C.

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



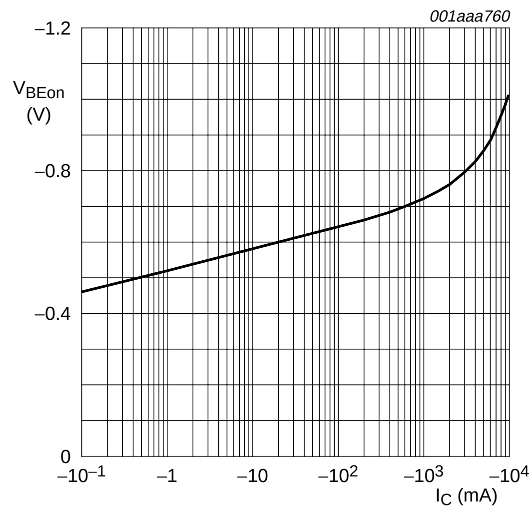
T_{amb} = 25 °C.
(1) I_C/I_B = 100.
(2) I_C/I_B = 50.
(3) I_C/I_B = 10.

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



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

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



T_{amb} = 25 °C; V_{CE} = −2 V.

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

Reference mounting conditions

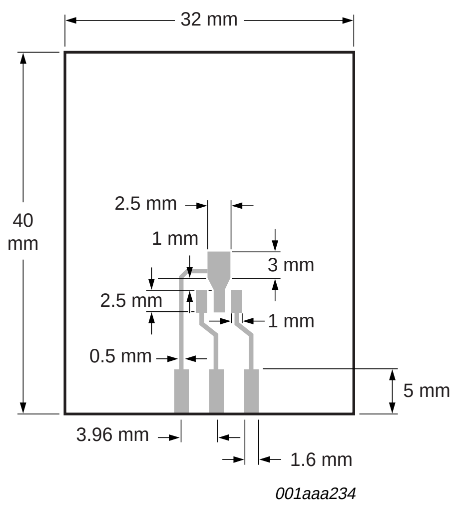


Fig.14 FR4, standard footprint.

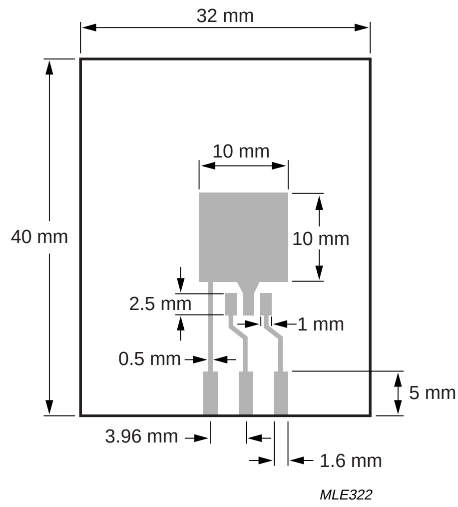


Fig.15 FR4, mounting pad for collector 1 cm^2.

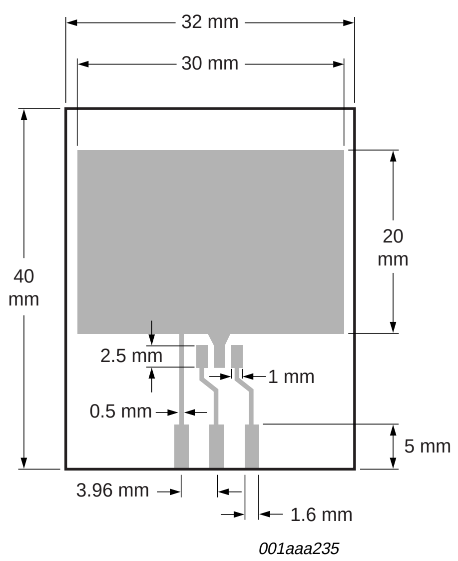
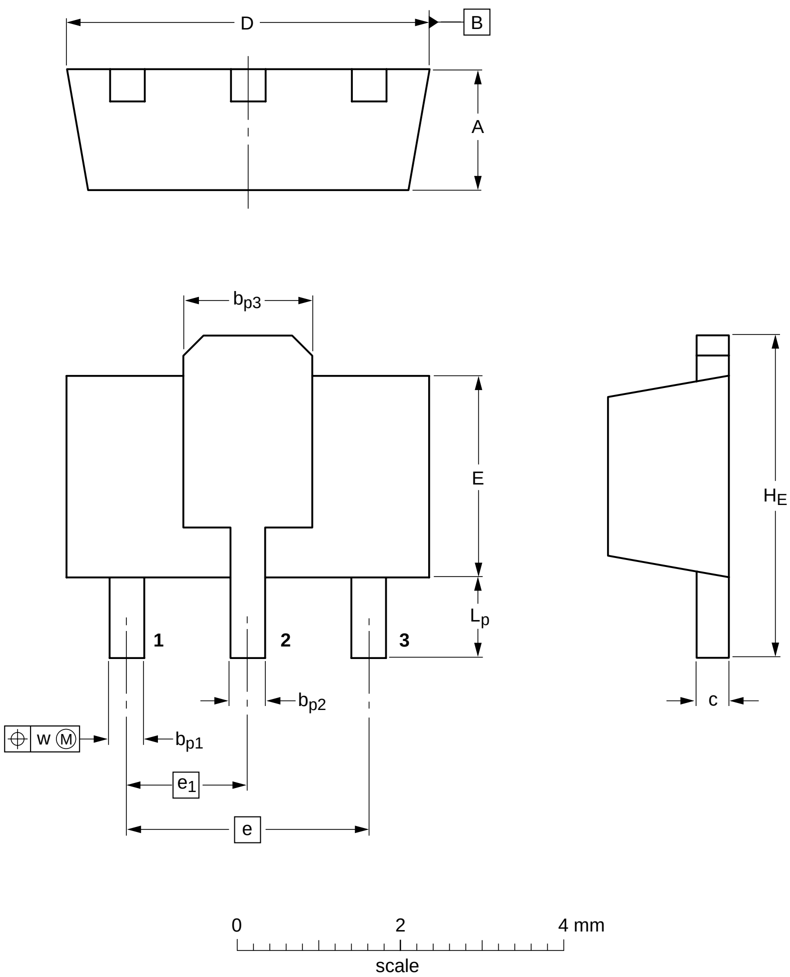


Fig.16 FR4, mounting pad for collector 6 cm^2.

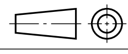
PACKAGE OUTLINE

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

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.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

Notes

1. Please consult the most recently issued data sheet before initiating or completing a design.
2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.
3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

DEFINITIONS

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

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.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

DISCLAIMERS

Life support applications — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in full production (status ‘Production’), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no licence or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

Philips Semiconductors – a worldwide company

Contact information

For additional information please visit **http://www.semiconductors.philips.com**. Fax: **+31 40 27 24825**
For sales offices addresses send e-mail to: **sales.addresses@www.semiconductors.philips.com**.

SCA76

Printed in The Netherlands R75/02/pp13 Date of release: 2004 Nov 08 Document order number: 9397 750 13891