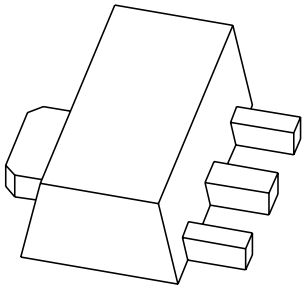
DATA SHEET



PBSS4350X

50 V, 3 A

NPN low V_{CEsat} (BISS) transistor

Product specification

2003 Jun 24

Philips
Semiconductors

PHILIPS

50 V, 3 A NPN low V_{CEsat} (BISS) transistor

PBSS4350X

FEATURES

- SOT89 (SC-62) package
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability: I_C and I_{CM}
- Higher efficiency leading to less heat generation
- Reduced printed-circuit board requirements.

APPLICATIONS

- Power management
  - DC/DC converters
  - Supply line switching
  - Battery charger
  - LCD backlighting.
- Peripheral drivers
  - Driver in low supply voltage applications (e.g. lamps and LEDs).
  - Inductive load driver (e.g. relays, buzzers and motors).

DESCRIPTION

NPN low V_{CEsat} transistor in a SOT89 plastic package.
PNP complement: PBSS5350X.

MARKING

TYPE NUMBER	MARKING CODE
PBSS4350X	S43

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CEO}	collector-emitter voltage	50	V
I_C	collector current (DC)	3	A
I_{CM}	peak collector current	5	A
R_{CEsat}	equivalent on-resistance	130	mΩ

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base

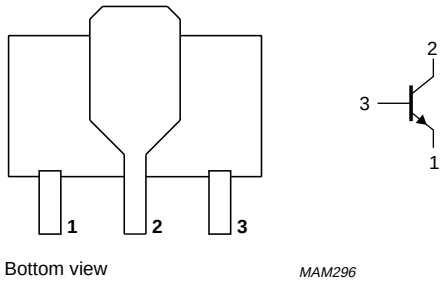


Fig.1 Simplified outline (SOT89) and symbol.

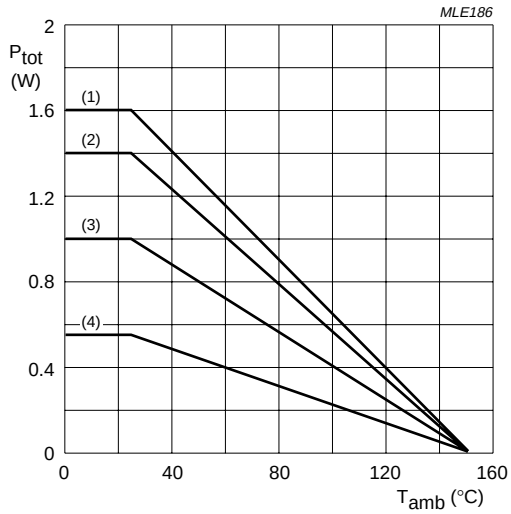
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	50	V
V_{EBO}	emitter-base voltage	open collector	–	5	V
I_C	collector current (DC)	note 4	–	3	A
I_{CM}	peak collector current	limited by $T_{j\,max}$	–	5	A
I_B	base current (DC)		–	0.5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C			
		note 1	–	550	mW
		note 2	–	1	W
		note 3	–	1.4	W
		note 4	–	1.6	W
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C
T_{stg}	storage temperature		–65	+150	°C

Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 1 cm^2.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 6 cm^2.
4. Device mounted on a ceramic printed-circuit board 5 cm^2, single-sided copper, tinplated.



(1) Ceramic PCB; 5 cm^2 mounting pad for collector.
(2) FR4 PCB; 6 cm^2 copper mounting pad for collector.
(3) FR4 PCB; 1 cm^2 copper mounting pad for collector.
(4) Standard footprint.

Fig.2 Power derating curves.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air		
		note 1	225	K/W
		note 2	125	K/W
		note 3	90	K/W
		note 4	80	K/W
$R_{th\text{-}js}$	thermal resistance from junction to soldering point		16	K/W

Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 1 cm^2.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 6 cm^2.
4. Device mounted on a ceramic printed-circuit board 5 cm^2, single-sided copper, tinplated.

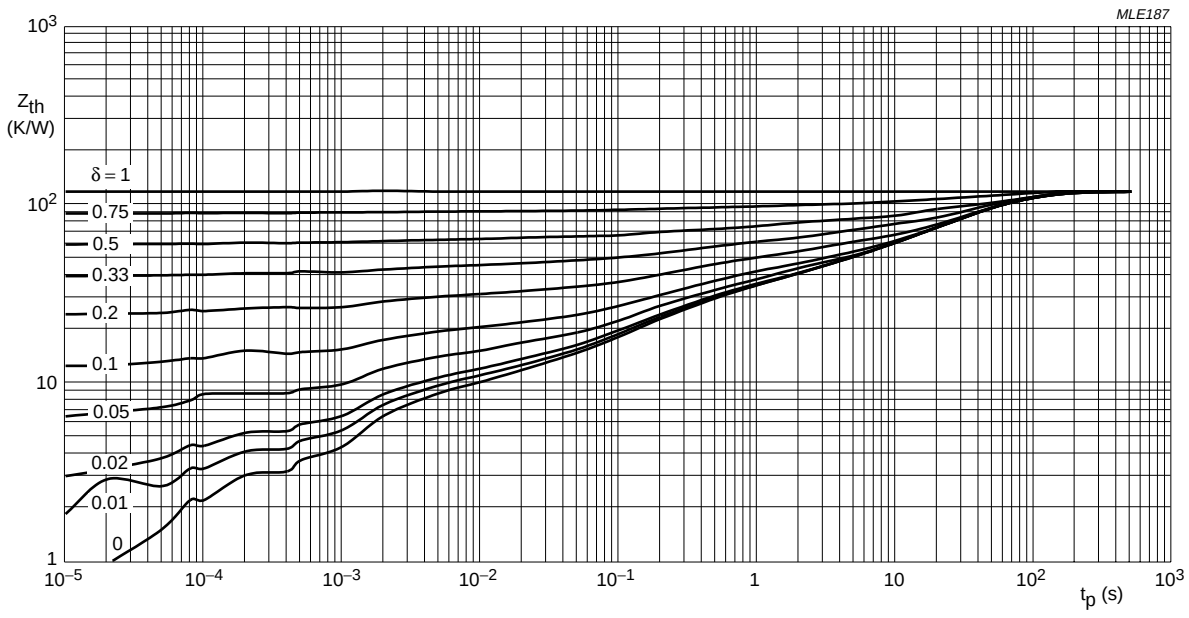


Fig.3 Transient thermal impedance as a function of pulse time; typical values.

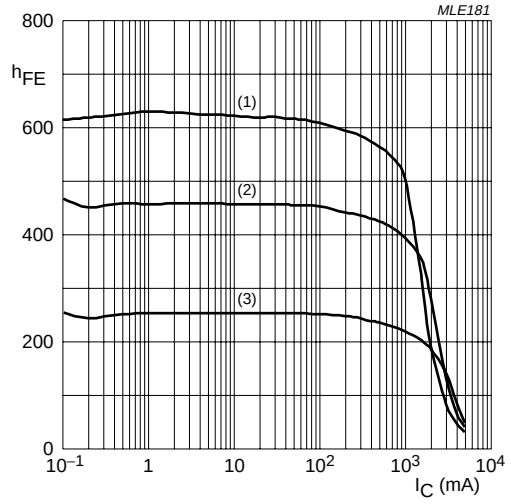
CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 50 V; I_E = 0	–	–	100	nA
		V_{CB} = 50 V; I_E = 0; T_j = 150 °C	–	–	50	μA
I_{CES}	collector cut-off current	V_{CE} = 50 V; V_{BE} = 0	–	–	100	nA
I_{EBO}	emitter cut-off current	V_{EB} = 5 V; I_C = 0	–	–	100	nA
h_{FE}	DC current gain	V_{CE} = 2 V				
		I_C = 0.1 A	300	–	–	
		I_C = 0.5 A	300	–	–	
		I_C = 1 A; note 1	300	–	700	
		I_C = 2 A; note 1	200	–	–	
		I_C = 3 A; note 1	100	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 0.5 A; I_B = 50 mA	–	–	80	mV
		I_C = 1 A; I_B = 50 mA	–	–	160	mV
		I_C = 2 A; I_B = 100 mA	–	–	280	mV
		I_C = 2 A; I_B = 200 mA; note 1	–	–	260	mV
		I_C = 3 A; I_B = 300 mA; note 1	–	–	370	mV
R_{CEsat}	equivalent on-resistance	I_C = 2 A; I_B = 200 mA; note 1	–	100	130	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = 2 A; I_B = 100 mA	–	–	1.1	V
		I_C = 3 A; I_B = 300 mA; note 1	–	–	1.2	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 2 V; I_C = 1 A	1.1	–	–	V
f_T	transition frequency	I_C = 100 mA; V_{CE} = 5 V; f = 100 MHz	100	–	–	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = I_e = 0; f = 1 MHz	–	–	25	pF

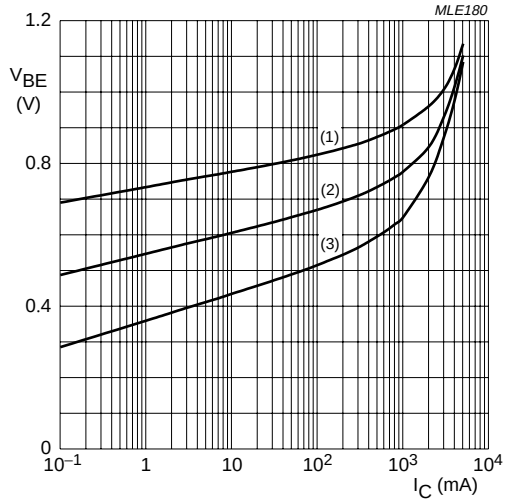
Note

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



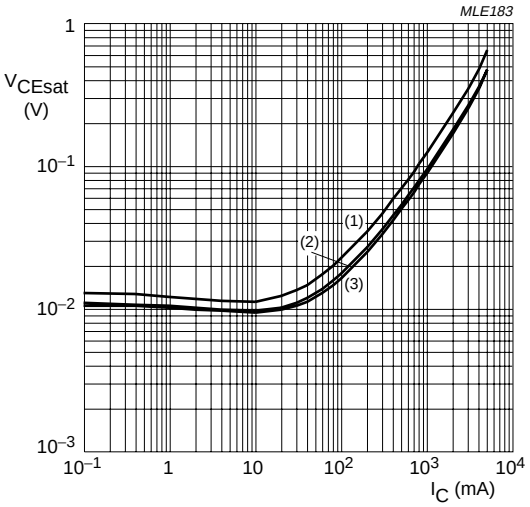
V_{CE} = 2 V.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

Fig.4 DC current gain as a function of collector current; typical values.



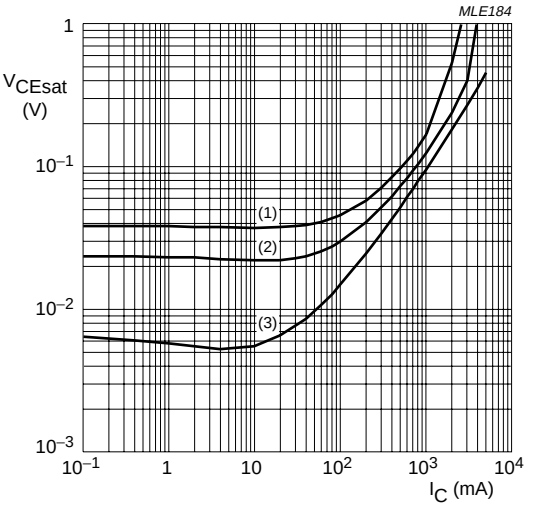
V_{CE} = 2 V.
(1) T_{amb} = –55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

Fig.5 Base-emitter voltage as a function of collector current; typical values.



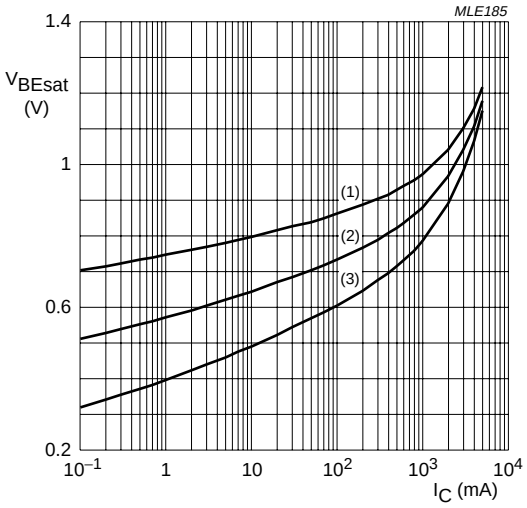
I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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



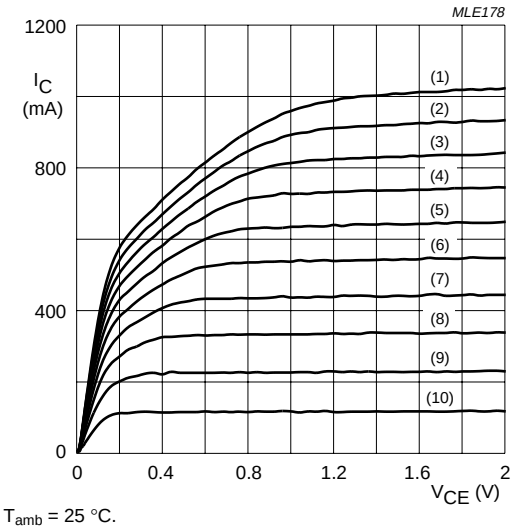
T_{amb} = 25 °C.
(1) I_C/I_B = 100.
(2) I_C/I_B = 50.
(3) I_C/I_B = 10.

Fig.7 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.

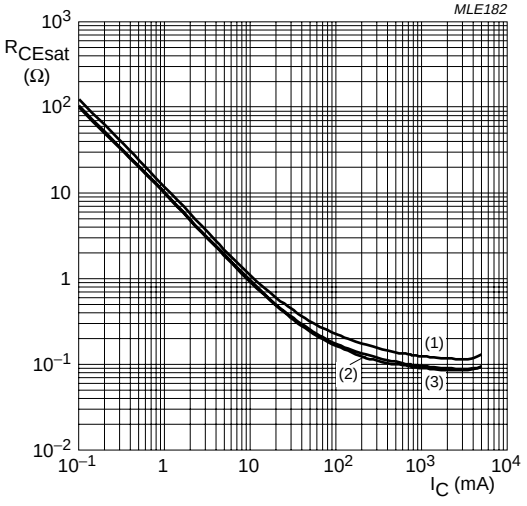
Fig.8 Base-emitter saturation voltage as a function of collector current; typical values.



T_{amb} = 25 °C.

(1) I_B = 2600 μA.
(2) I_B = 2340 μA.
(3) I_B = 2080 μA.
(4) I_B = 1820 μA.
(5) I_B = 1560 μA.
(6) I_B = 1300 μA.
(7) I_B = 1040 μA.
(8) I_B = 780 μA.
(9) I_B = 520 μA.
(10) I_B = 260 μA.

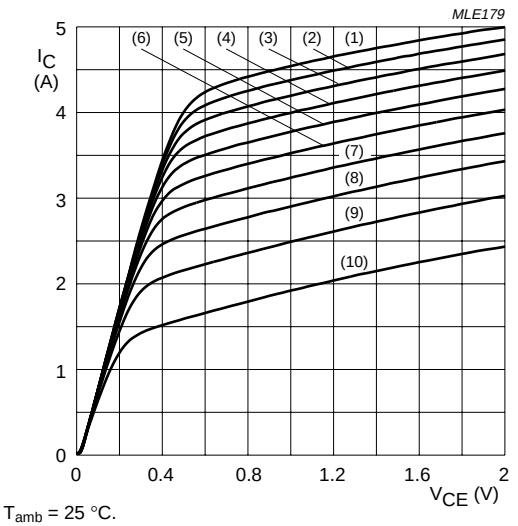
Fig.9 Collector current as a function of collector-emitter voltage; typical values.



I_C/I_B = 20.

(1) T_{amb} = 150 °C. (2) T_{amb} = 25 °C. (3) T_{amb} = –55 °C.

Fig.10 Collector-emitter equivalent on-resistance as a function of collector current; typical values.



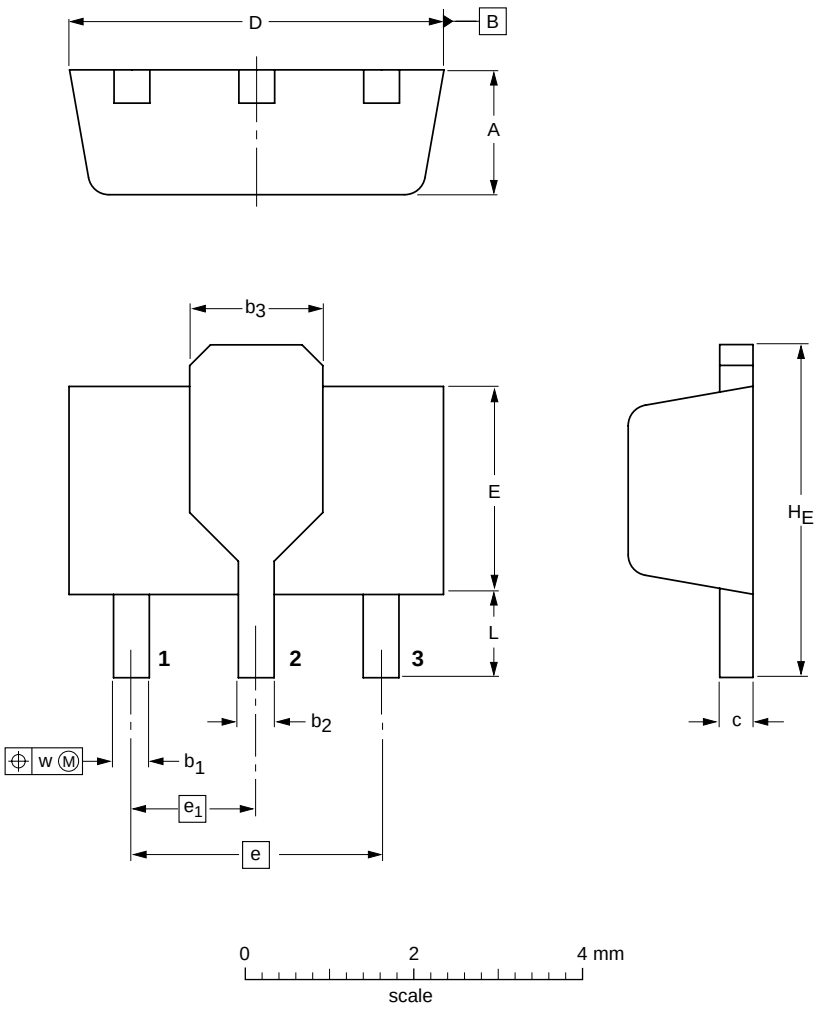
T_{amb} = 25 °C.

(1) I_B = 120 mA.
(2) I_B = 108 mA.
(3) I_B = 96 mA.
(4) I_B = 84 mA.
(5) I_B = 72 mA.
(6) I_B = 60 mA.
(7) I_B = 48 mA.
(8) I_B = 36 mA.
(9) I_B = 24 mA.
(10) I_B = 12 mA.

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

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 3 leads **SOT89**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b_1	b_2	b_3	c	D	E	e	e_1	H_E	L min.	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.37	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	0.8	0.13

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT89		TO-243	SC-62			~~97-02-28~~ 99-09-13

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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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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.

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Printed in The Netherlands 613514/01/pp12 Date of release: 2003 Jun 24 Document order number: 9397 750 11512

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