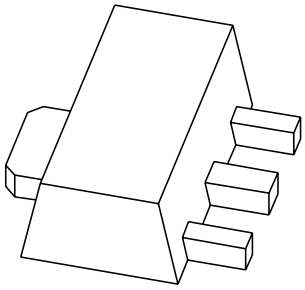
DATA SHEET



PBSS5350X
50 V, 3 A
PNP low V_{CEsat} (BISS) transistor

Product specification
Supersedes data of 2003 Jun 24

2003 Nov 21

Philips
Semiconductors

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

PBSS5350X

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

PNP low V_{CEsat} transistor in a SOT89 plastic package.
NPN complement: PBSS4350X.

MARKING

TYPE NUMBER	MARKING CODE
PBSS5350X	S46

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	135	mΩ

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base

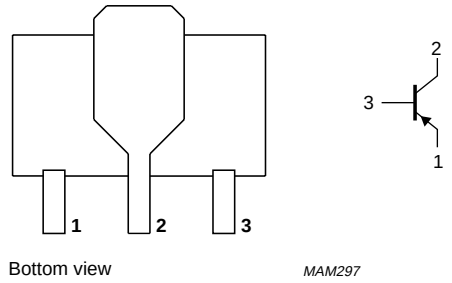


Fig.1 Simplified outline (SOT89) and symbol.

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

PBSS5350X

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5350X	–	plastic surface mounted package; collector pad for good heat transfer; 6 leads	SOT89

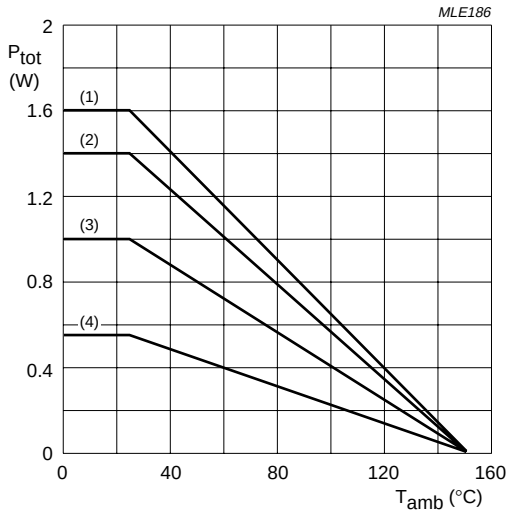
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–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 7 cm^2, single-sided copper, tinplated.



(1) Ceramic PCB; 7 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.

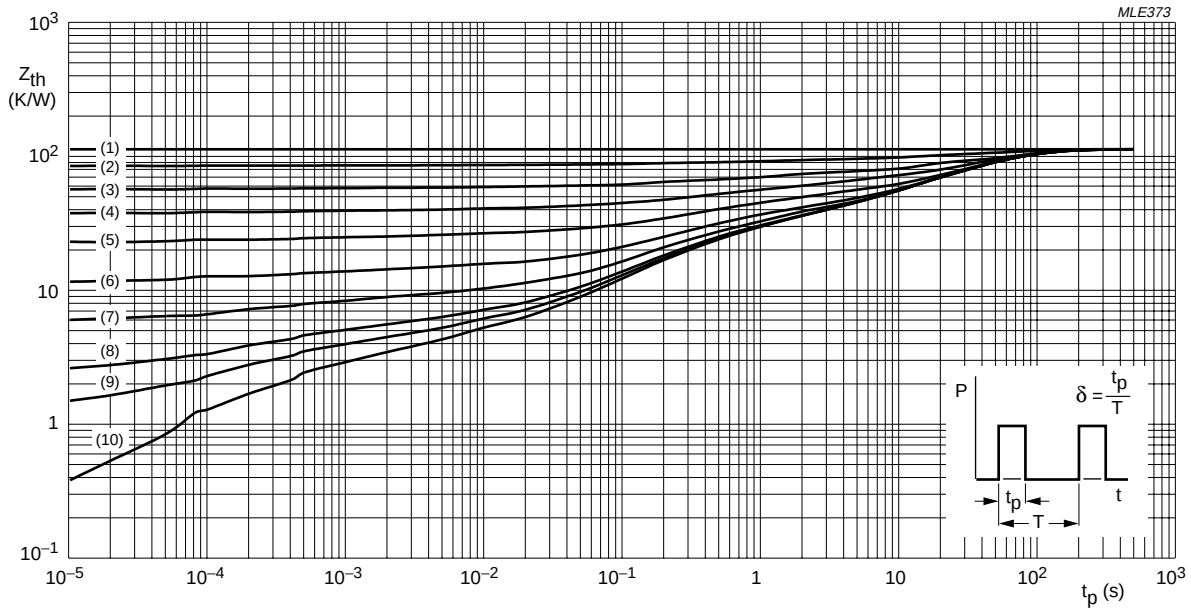
Fig.2 Power derating curves.

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 7 cm^2, single-sided copper, tinplated.



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

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

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

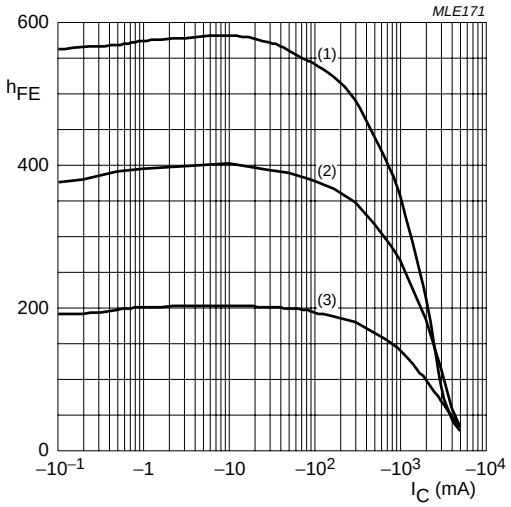
CHARACTERISTICS

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	200	–	–	
		I_C = –0.5 A	200	–	–	
		I_C = –1 A; note 1	200	–	450	
		I_C = –2 A; note 1	130	–	–	
		I_C = –3 A; note 1	80	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = –0.5 A; I_B = –50 mA	–	–	–90	mV
		I_C = –1 A; I_B = –50 mA	–	–	–180	mV
		I_C = –2 A; I_B = –100 mA	–	–	–320	mV
		I_C = –2 A; I_B = –200 mA; note 1	–	–	–270	mV
		I_C = –3 A; I_B = –300 mA; note 1	–	–	–390	mV
R_{CEsat}	equivalent on-resistance	I_C = –2 A; I_B = –200 mA; note 1	–	90	135	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	–	–	35	pF

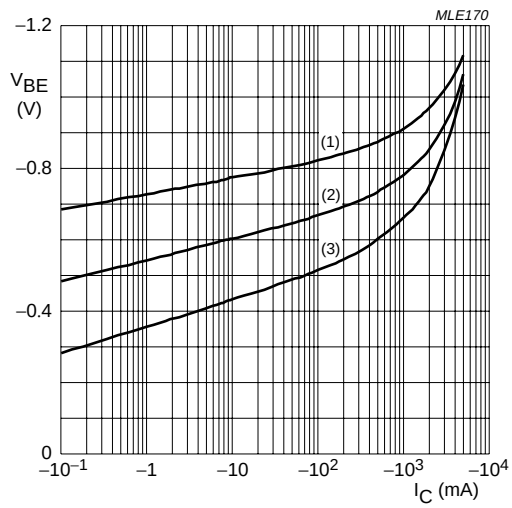
Note

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



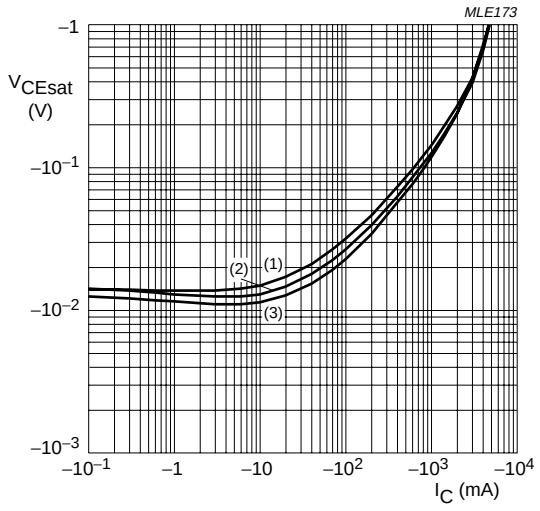
V_{CE} = –2 V.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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



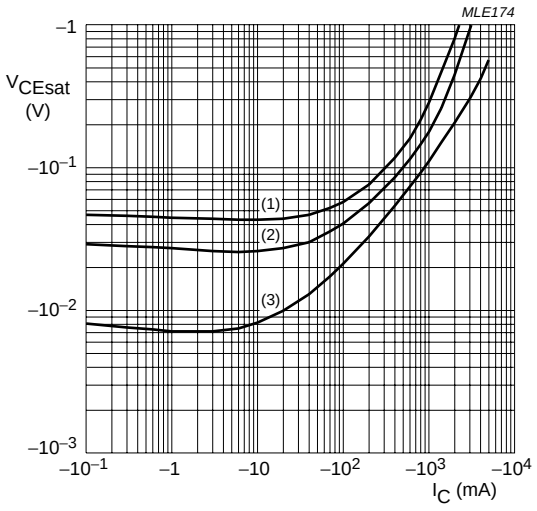
V_{CE} = –2 V.
(1) T_{amb} = –55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

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



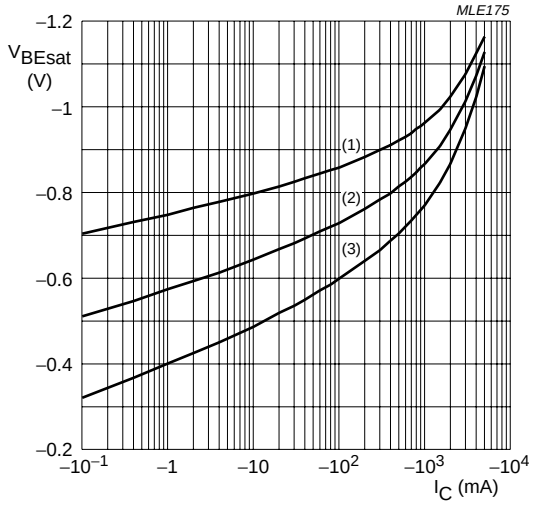
I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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.

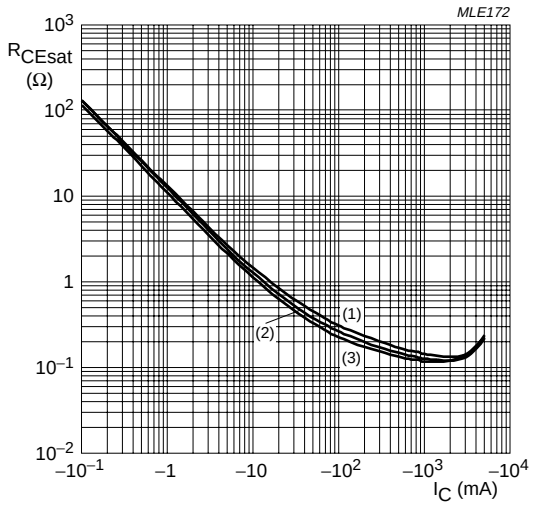
Fig.7 Collector-emitter saturation voltage as a function of collector current; typical values.



I_C/I_B = 20.

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

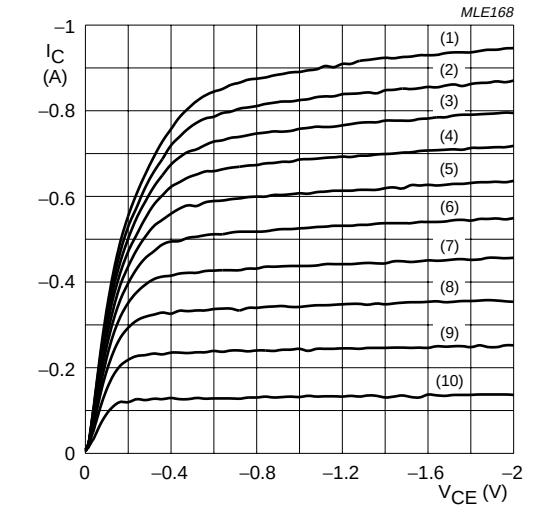
Fig.8 Base-emitter saturation voltage as a function of collector current; typical values.



I_C/I_B = 20.

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

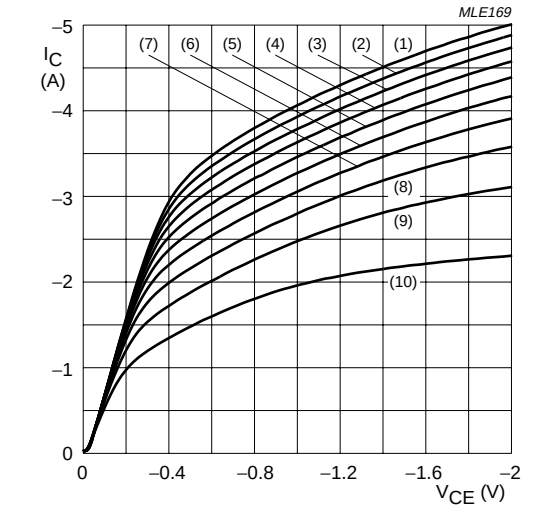
Fig.9 Collector-emitter equivalent on-resistance as a function of collector current; typical values.



T_{amb} = 25 °C.

(1) I_B = −3500 μA.
(2) I_B = −3150 μA.
(3) I_B = −2800 μA.
(4) I_B = −2450 μA.
(5) I_B = −2100 μA.
(6) I_B = −1750 μA.
(7) I_B = −1400 μA.
(8) I_B = −1050 μA.
(9) I_B = −700 μA.
(10) I_B = −350 μA.

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



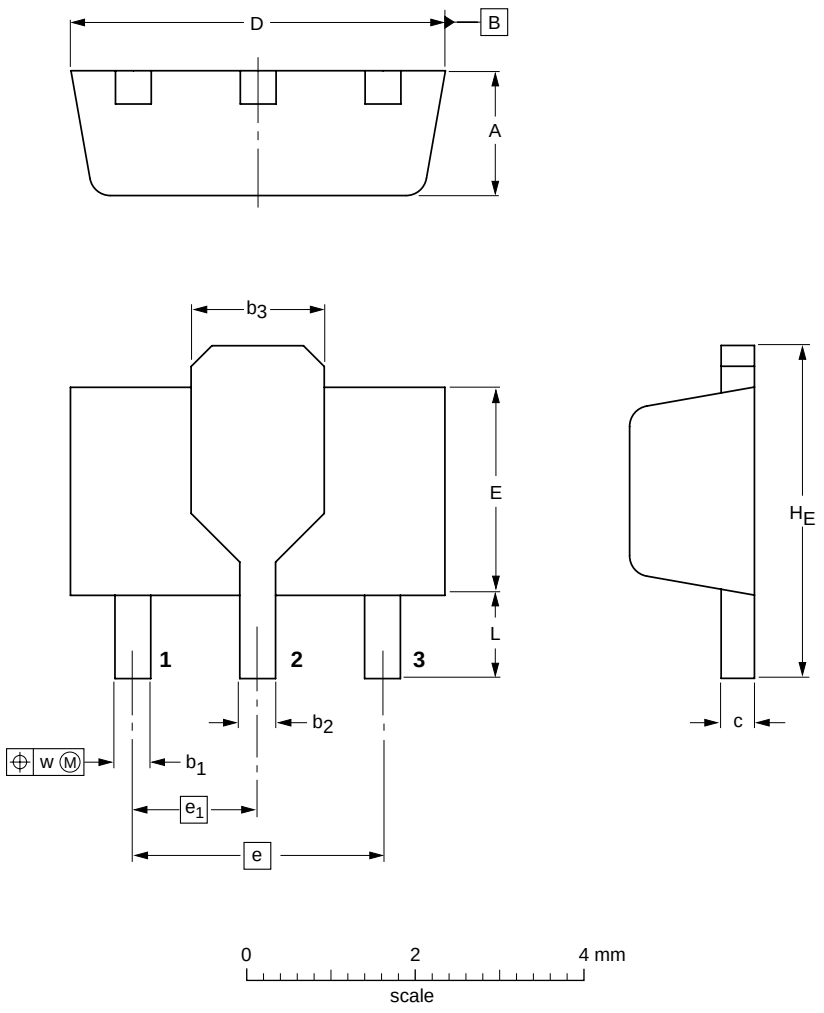
T_{amb} = 25 °C.

(1) I_B = −140 mA.
(2) I_B = −126 mA.
(3) I_B = −112 mA.
(4) I_B = −98 mA.
(5) I_B = −84 mA.
(6) I_B = −70 mA.
(7) I_B = −56 mA.
(8) I_B = −42 mA.
(9) I_B = −28 mA.
(10) I_B = −14 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
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