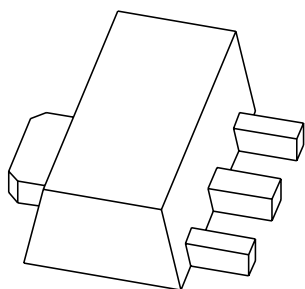


DATA SHEET



PBSS4350X

50 V, 3 A

NPN low V_{CEsat} (BISS) transistor

Product specification

2003 Jun 24

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

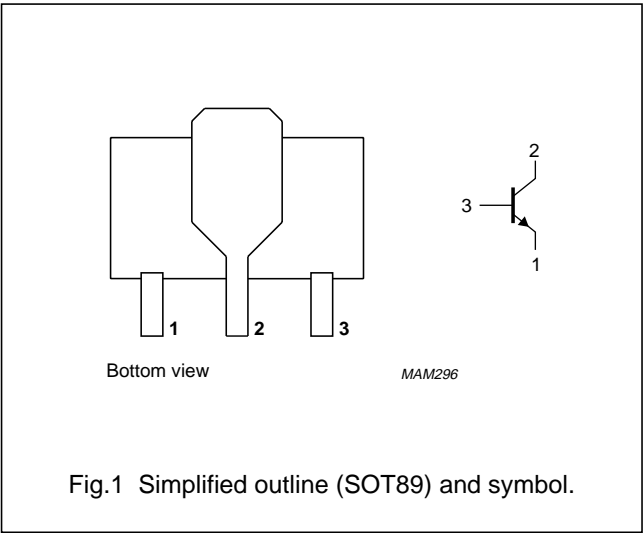
TYPE NUMBER	MARKING CODE
PBSS4350X	S43

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	m Ω

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



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LIMITING VALUES

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

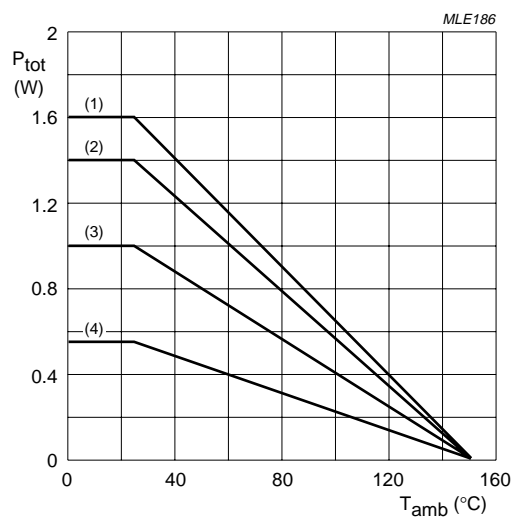
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	50	V
V_{EBO}	emitter-base voltage	open collector	–	5	V
I_C	collector current (DC)	note 4	–	3	A
I_{CM}	peak collector current	limited by $T_{j\max}$	–	5	A
I_B	base current (DC)		–	0.5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$			
		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 cm².
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 6 cm².
4. Device mounted on a ceramic printed-circuit board 5 cm², single-sided copper, tinplated.

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- (1) Ceramic PCB; 5 cm² mounting pad for collector.
 (2) FR4 PCB; 6 cm² copper mounting pad for collector.
 (3) FR4 PCB; 1 cm² copper mounting pad for collector.
 (4) Standard footprint.

Fig.2 Power derating curves.

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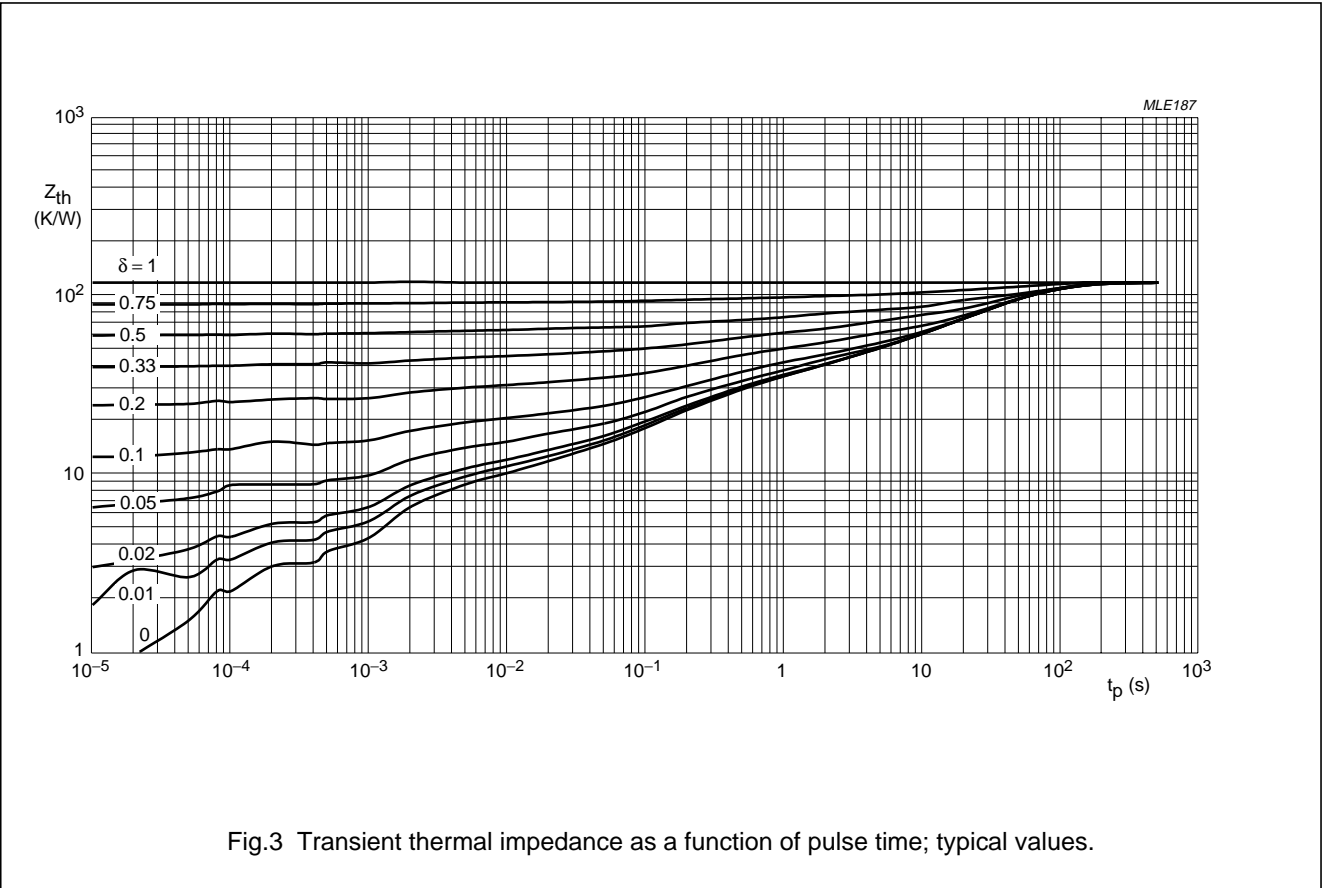
PBSS4350X

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	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
$R_{th\ j-s}$	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 cm².
- 3. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 6 cm².
- 4. Device mounted on a ceramic printed-circuit board 5 cm², single-sided copper, tinplated.



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CHARACTERISTICS

$T_j = 25\text{ }^{\circ}\text{C}$; unless otherwise specified.

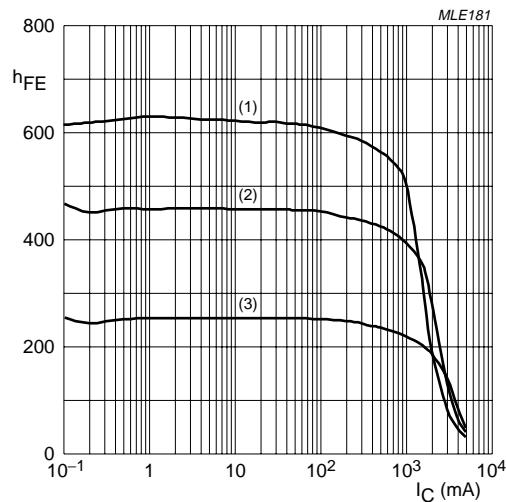
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 50\text{ V}; I_E = 0$	–	–	100	nA
		$V_{CB} = 50\text{ V}; I_E = 0; T_j = 150\text{ }^{\circ}\text{C}$	–	–	50	μA
I_{CES}	collector cut-off current	$V_{CE} = 50\text{ V}; V_{BE} = 0$	–	–	100	nA
I_{EBO}	emitter cut-off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

Note

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

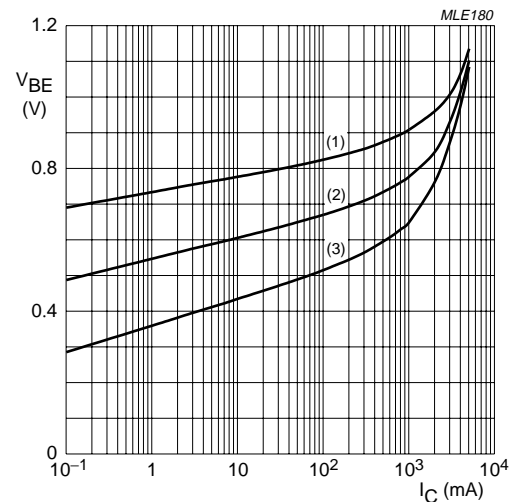
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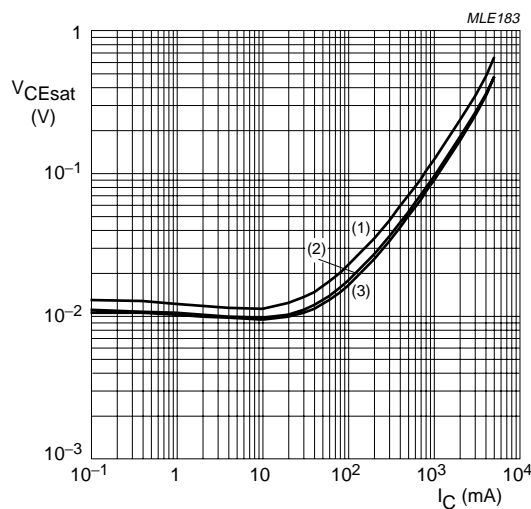
$V_{CE} = 2\text{ V}$.
(1) $T_{amb} = 100^\circ\text{C}$.
(2) $T_{amb} = 25^\circ\text{C}$.
(3) $T_{amb} = -55^\circ\text{C}$.

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



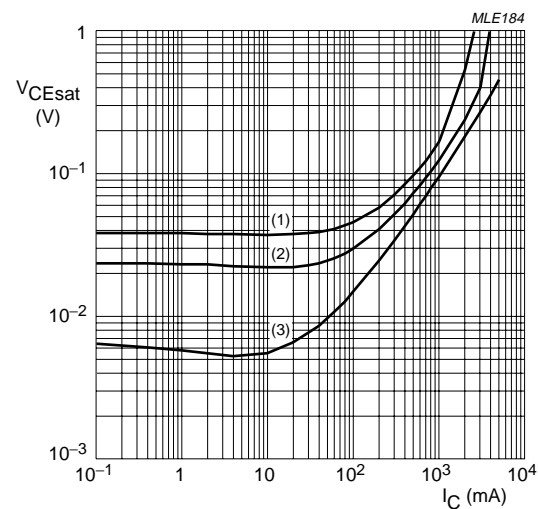
$V_{CE} = 2\text{ V}$.
(1) $T_{amb} = -55^\circ\text{C}$.
(2) $T_{amb} = 25^\circ\text{C}$.
(3) $T_{amb} = 100^\circ\text{C}$.

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



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

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

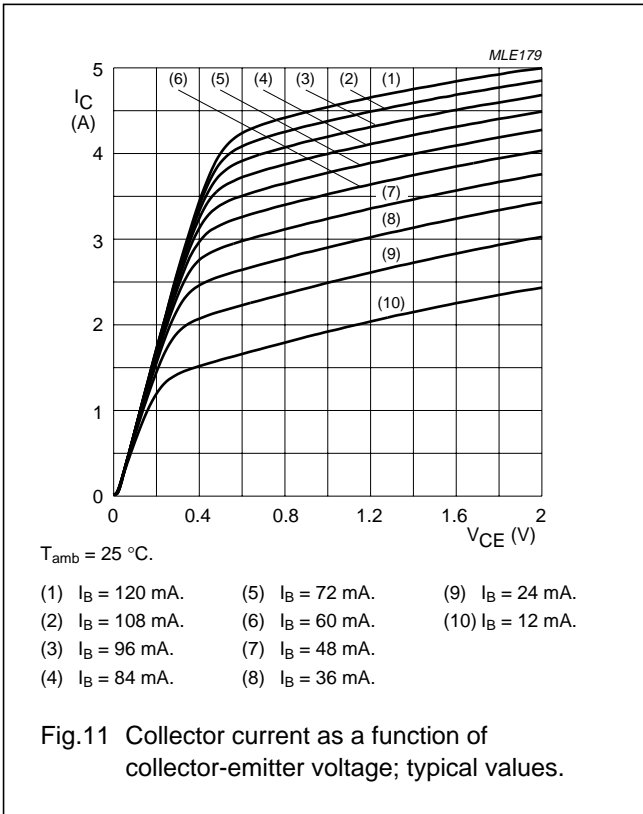
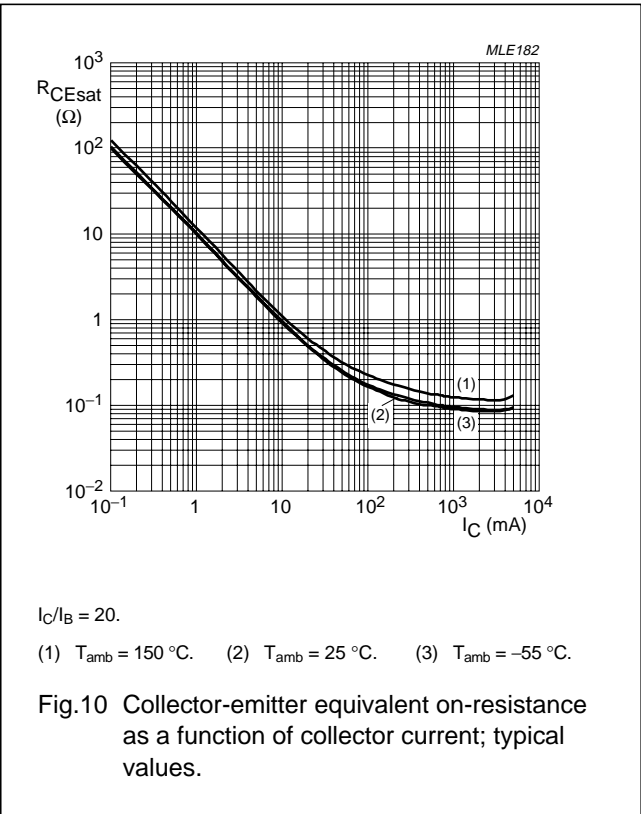
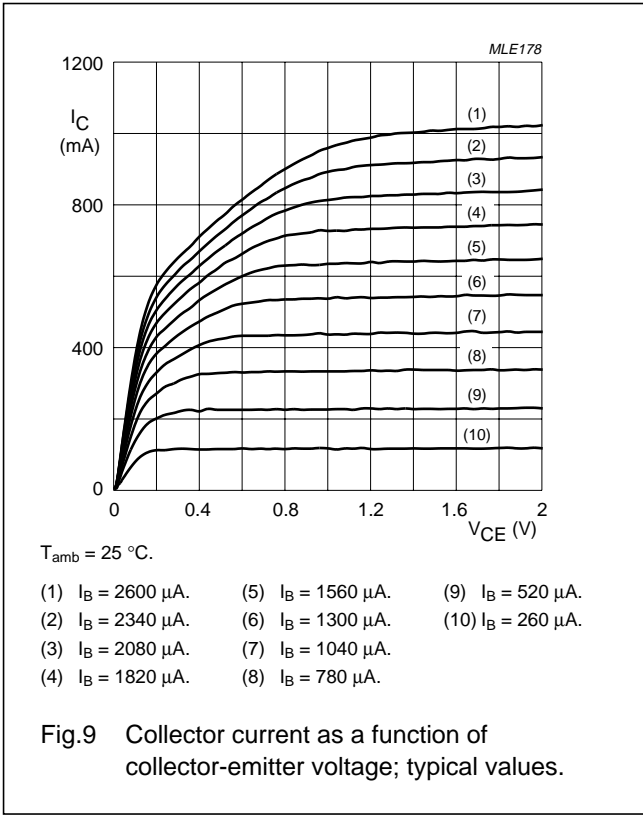
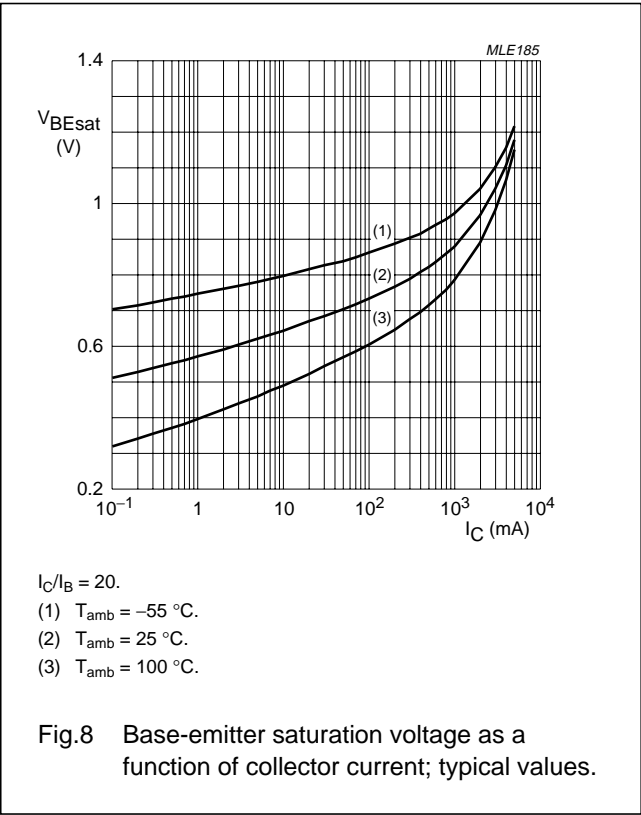


$T_{amb} = 25^\circ\text{C}$.
(1) $I_C/I_B = 100$.
(2) $I_C/I_B = 50$.
(3) $I_C/I_B = 10$.

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

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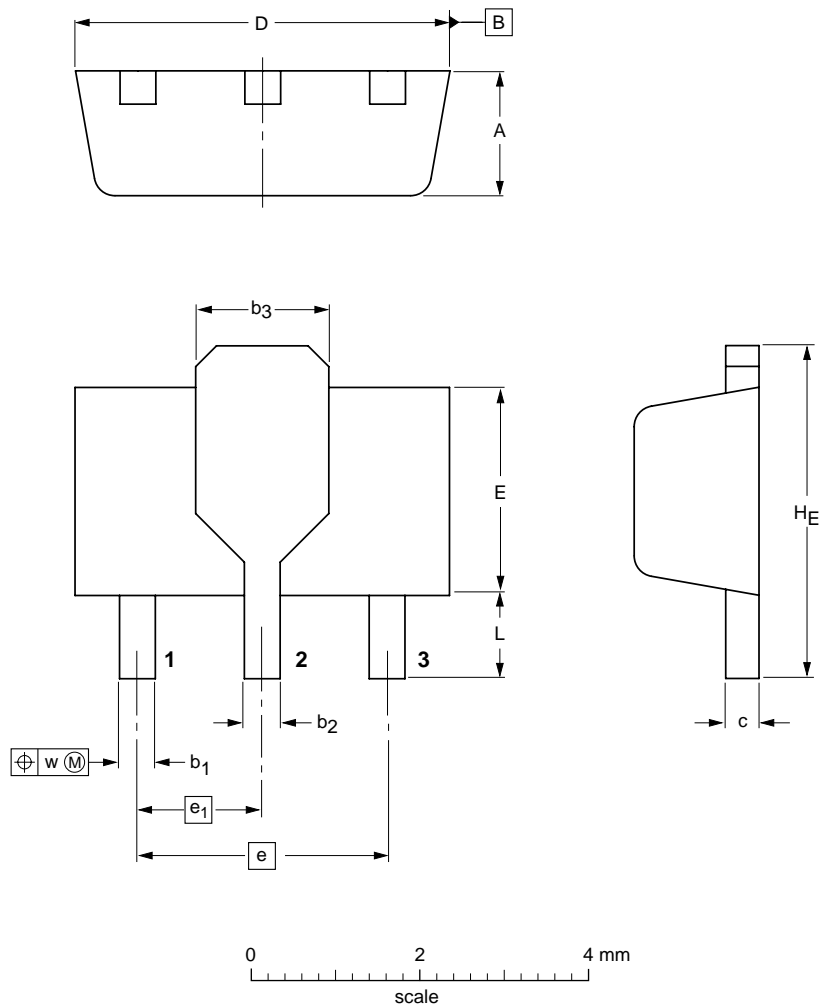
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PACKAGE OUTLINE

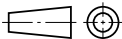
Plastic surface mounted package; collector pad for good heat transfer; 3 leads

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

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

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DATA SHEET STATUS

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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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NOTES

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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**.

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