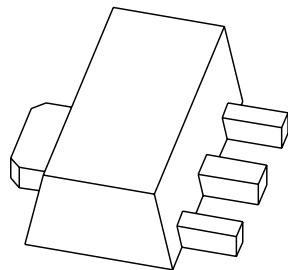


DATA SHEET



PBSS4250X
50 V, 2 A
NPN low V_{CEsat} (BISS) transistor

Product specification
Supersedes data of 2003 Jun 17

2004 Nov 08

Philips
Semiconductors



PHILIPS

50 V, 2 A

NPN low V_{CEsat} (BISS) transistor

PBSS4250X

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: PBSS5250X.

MARKING

TYPE NUMBER	MARKING CODE ⁽¹⁾
PBSS5250X	*1M

Note

1. * = p: Made in Hong Kong
- * = t: Made in Malaysia
- * = W: Made in China.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS4250X	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CEO}	collector-emitter voltage	50	V
I_C	collector current (DC)	2	A
I_{CM}	peak collector current	5	A
R_{CEsat}	equivalent on-resistance	160	$m\Omega$

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base

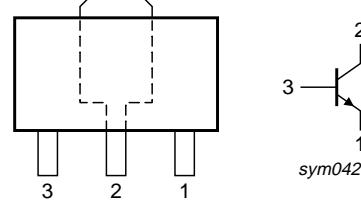


Fig.1 Simplified outline (SOT89) and symbol.

50 V, 2 A

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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)		–	2	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	$T_{amb} \leq 25^\circ\text{C}$ note 1 note 2	–	550 1	mW 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 FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm².

THERMAL CHARACTERISTICS

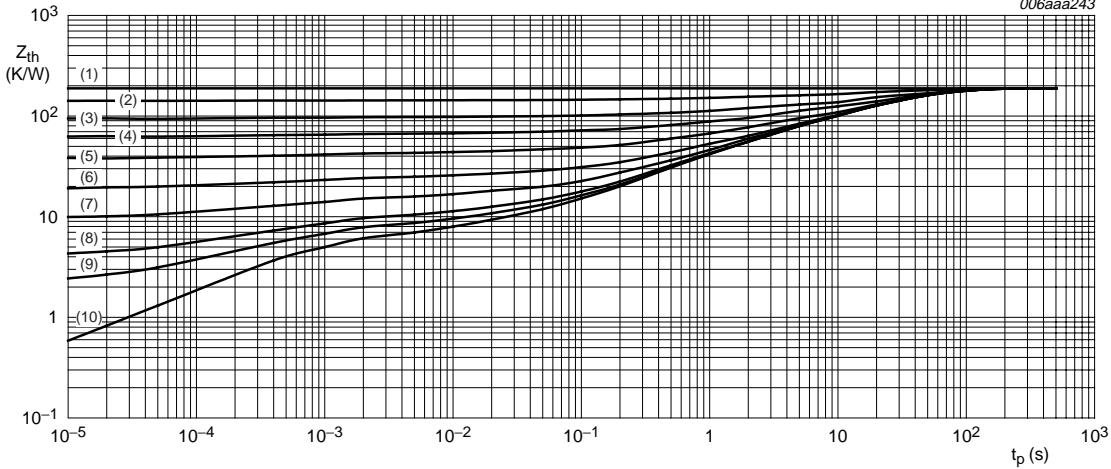
SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air note 1 note 2 note 3 note 4	225 125 90 80	K/W K/W K/W K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering point		16	K/W

Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm².
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm².
4. Device mounted on a ceramic printed-circuit board 7 cm², single-sided copper, tin-plated.

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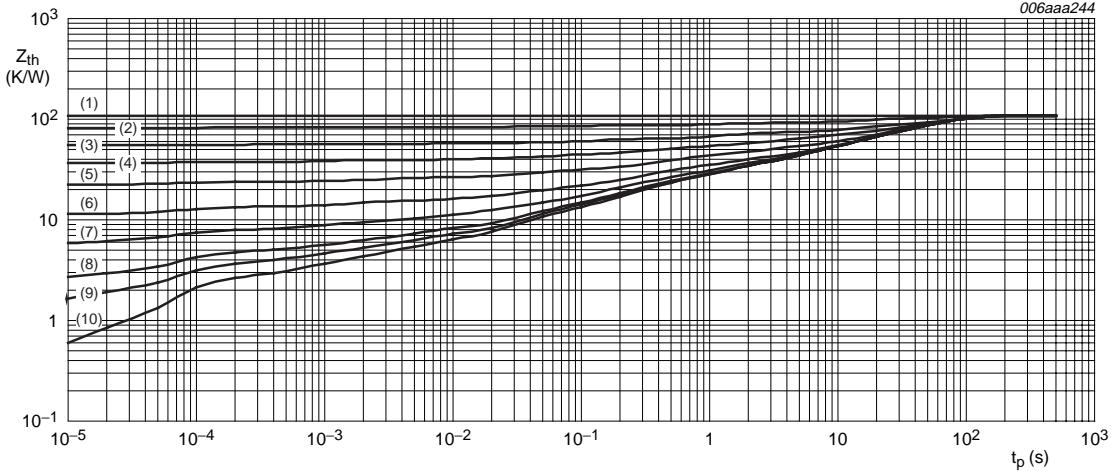
PBSS4250X



Mounted on FR4 printed-circuit board; standard footprint.

(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.2 Transient thermal impedance as a function of pulse time; typical values.



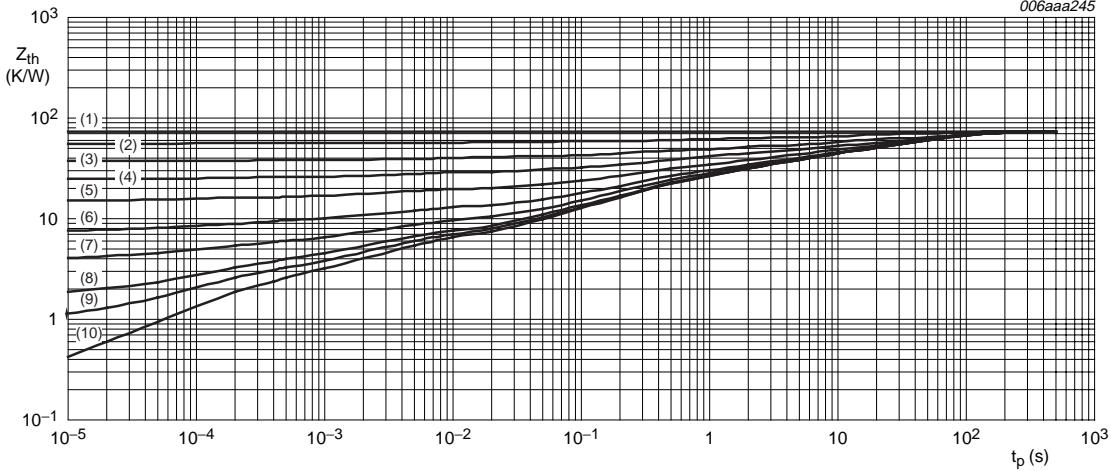
Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm^2 .

(1) $\delta = 1$. (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.3 Transient thermal impedance as a function of pulse time; typical values.

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

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NPN low V_{CEsat} (BISS) transistor

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	$V_{CB} = 50\text{ V}; I_E = 0\text{ A}$	–	100	nA
		$V_{CB} = 50\text{ V}; I_E = 0\text{ A}; T_j = 150^\circ\text{C}$	–	50	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = 50\text{ V}; V_{BE} = 0\text{ V}$	–	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	$V_{CE} = 2\text{ V}$			
		$I_C = 0.1\text{ A}$	300	–	
		$I_C = 0.5\text{ A}$	300	–	
		$I_C = 1\text{ A}; \text{note 1}$	300	–	
		$I_C = 2\text{ A}; \text{note 1}$	150	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 0.5\text{ A}; I_B = 50\text{ mA}$	–	90	mV
		$I_C = 1\text{ A}; I_B = 50\text{ mA}$	–	250	mV
		$I_C = 2\text{ A}; I_B = 100\text{ mA}$	–	380	mV
		$I_C = 2\text{ A}; I_B = 200\text{ mA}; \text{note 1}$	–	320	mV
R_{CEsat}	equivalent on-resistance	$I_C = 2\text{ A}; I_B = 200\text{ mA}; \text{note 1}$	–	160	$\text{m}\Omega$
V_{BEsat}	base-emitter saturation voltage	$I_C = 2\text{ A}; I_B = 100\text{ mA}$	–	1.1	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	$V_{CB} = 10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	–	25	pF

Note

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

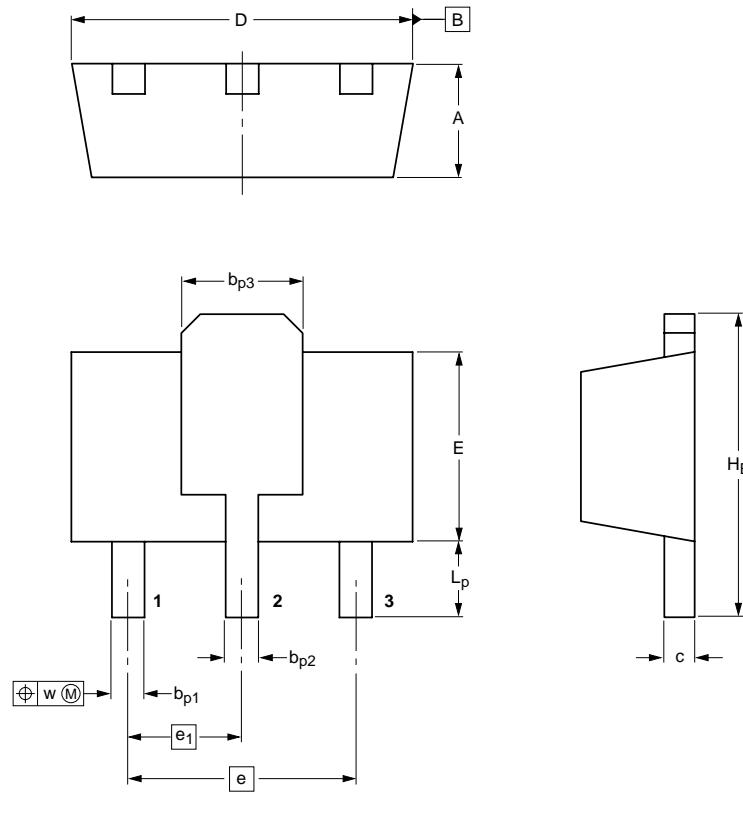
50 V, 2 A
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PACKAGE OUTLINE

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

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	b_{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	1.5 1.25	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

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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

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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.

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