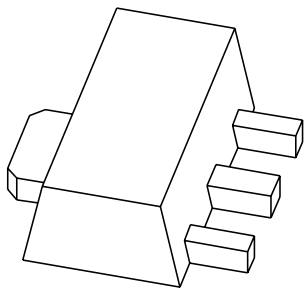


# DATA SHEET



**PBSS4250X**

**50 V, 2 A**

**NPN low  $V_{CEsat}$  (BISS) transistor**

Product specification  
Supersedes data of 2003 Jun 17

2004 Nov 08

**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 <sup>(1)</sup>
PBSS5250X	*1M

**Note**

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

**ORDERING INFORMATION**

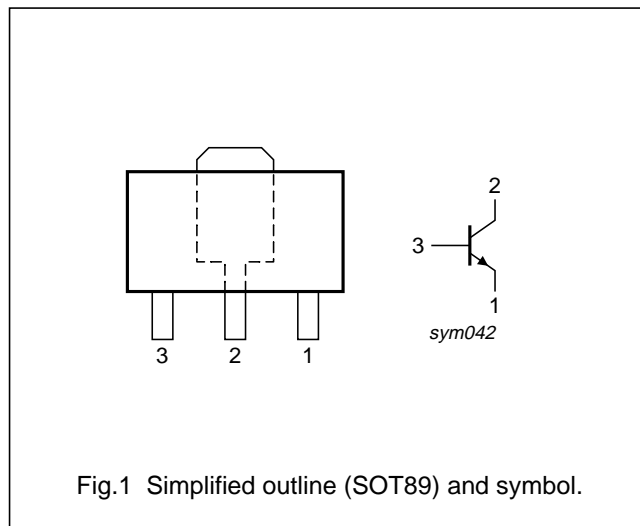
TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS4250X	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

**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



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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	$T_{amb} \leq 25\text{ °C}$ 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**

- Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
- Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.

**THERMAL CHARACTERISTICS**

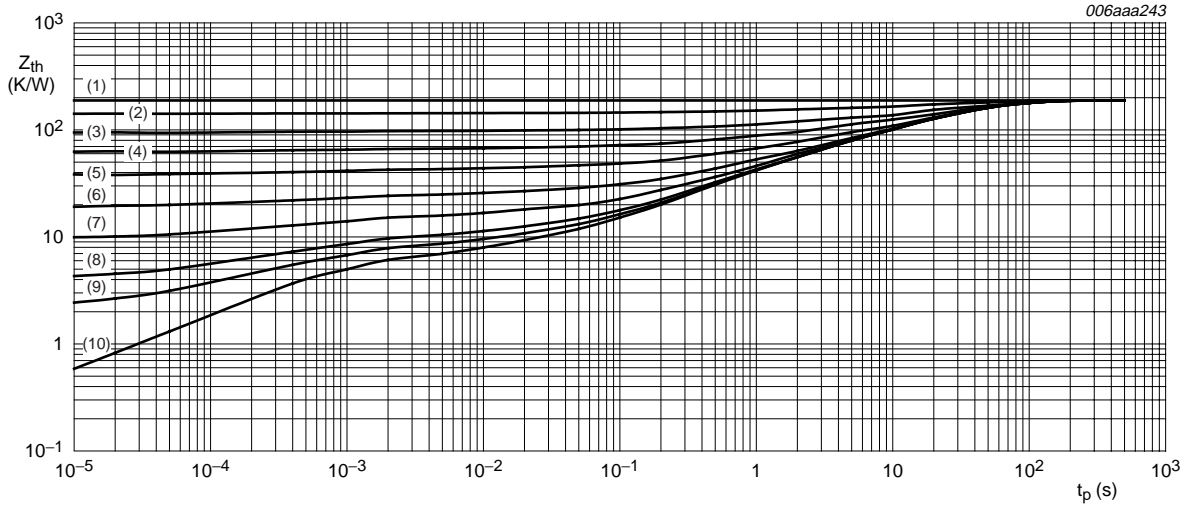
SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air note 1 note 2 note 3 note 4	225 125 90 80	K/W K/W K/W K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering point		16	K/W

**Notes**

- Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
- Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.
- Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm<sup>2</sup>.
- Device mounted on a ceramic printed-circuit board 7 cm<sup>2</sup>, single-sided copper, tin-plated.

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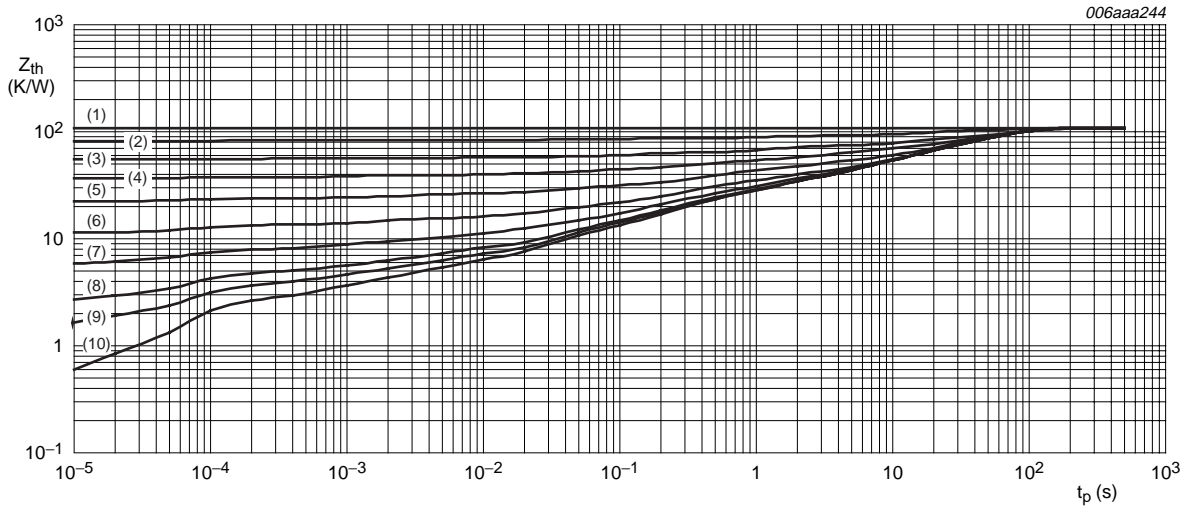
PBSS4250X



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.



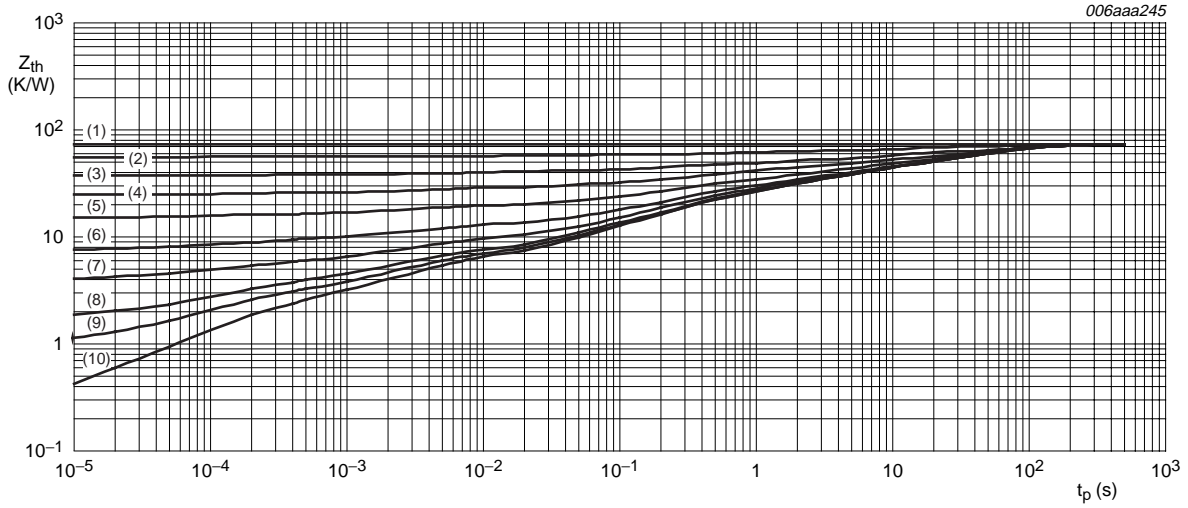
Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm<sup>2</sup>.

- (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.

50 V, 2 A  
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Mounted on FR4 printed-circuit board; mounting pad for collector 6 cm<sup>2</sup>.

- |                      |                      |                     |                      |                      |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| (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.

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

PBSS4250X

**CHARACTERISTICS** $T_{amb} = 25\text{ °C}$  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
		$V_{CB} = 50\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	–	50	$\mu\text{A}$
$I_{CES}$	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:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

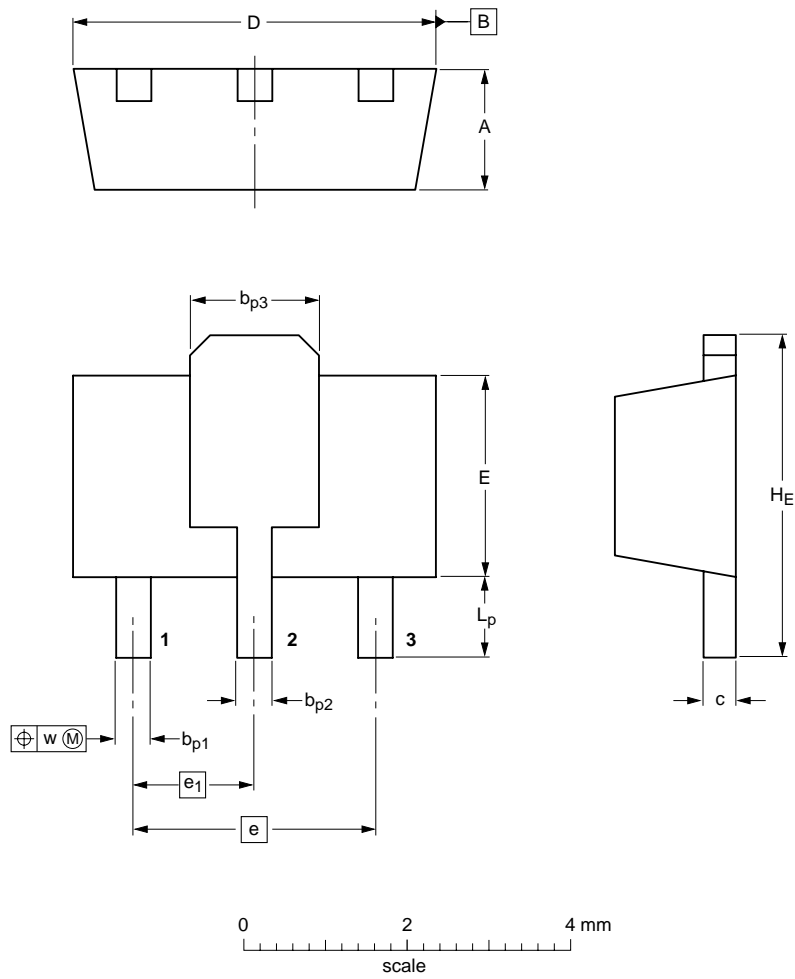
50 V, 2 A  
NPN low  $V_{CEsat}$  (BISS) transistor

PBSS4250X

PACKAGE OUTLINE

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

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	bp1	bp2	bp3	c	D	E	e	e1	HE	Lp	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

50 V, 2 A  
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## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	DEFINITION
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