

PBSS9110X

100 V, 1 A PNP low V_{CEsat} (BISS) transistor

Rev. 01 — 2 May 2005

Product data sheet

1. Product profile

1.1 General description

PNP low V_{CEsat} Breakthrough in Small Signal (BISS) transistor in a SOT89 (SC-62/TO-243) SMD plastic package.

NPN complement: PBSS8110X.

1.2 Features

- SOT89 package
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High efficiency leading to less heat generation

1.3 Applications

- Major application segments:
 - ◆ Automotive 42 V power
 - ◆ Telecom infrastructure
 - ◆ Industrial
- Peripheral driver:
 - ◆ Driver in low supply voltage applications (e.g. lamps and LEDs)
 - ◆ Inductive load driver (e.g. relays, buzzers and motors)
- DC-to-DC conversion

1.4 Quick reference data

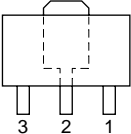
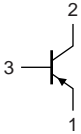
Table 1: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-100	V
I_C	collector current (DC)		-	-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	-3	A
R_{CEsat}	collector-emitter saturation resistance	$I_C = -1$ A; $I_B = -100$ mA	[1] -	170	320	m Ω

[1] Pulse test: $t_p \leq 300$ μ s; $\delta \leq 0.02$.

2. Pinning information

Table 2: Pinning

Pin	Description	Simplified outline	Symbol
1	emitter		
2	collector		
3	base		

006aaa231

3. Ordering information

Table 3: Ordering information

Type number	Package		
	Name	Description	Version
PBSS9110X	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

4. Marking

Table 4: Marking codes

Type number	Marking code ^[1]
PBSS9110X	*4C

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

Table 5: Limiting values

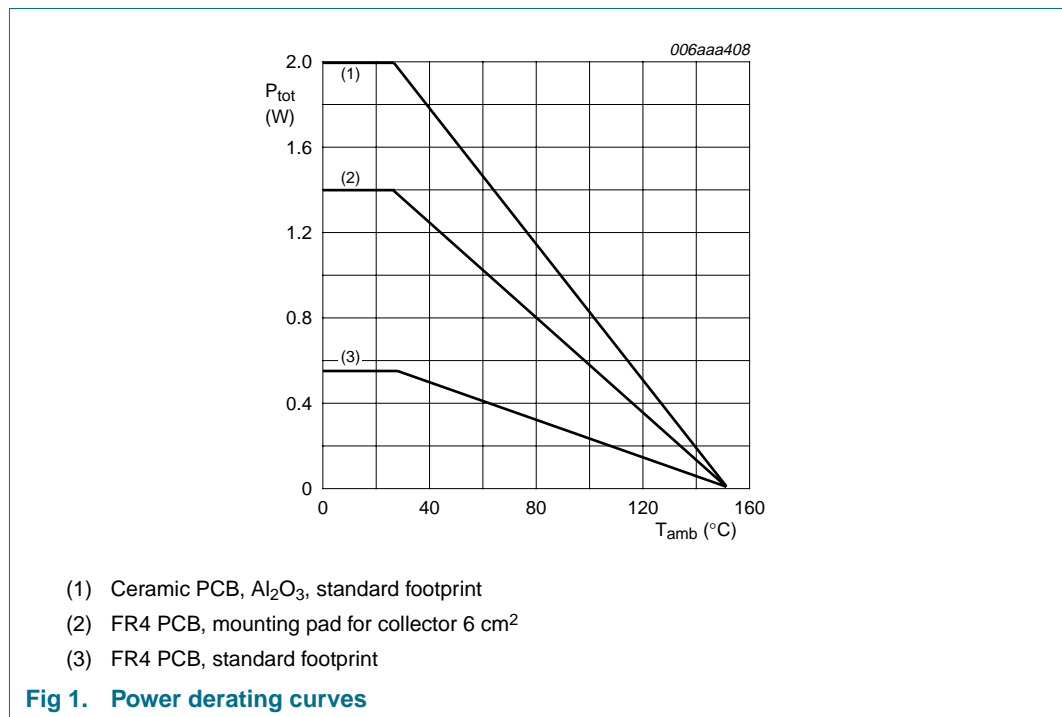
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit	
V_{CBO}	collector-base voltage	open emitter	-	-120	V	
V_{CEO}	collector-emitter voltage	open base	-	-100	V	
V_{EBO}	emitter-base voltage	open collector	-	-5	V	
I_C	collector current (DC)		-	-1	A	
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-3	A	
I_B	base current (DC)		-	-0.3	A	
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	0.55	W
			[2]	-	1.4	W
			[3]	-	2.0	W
T_j	junction temperature		-	150	°C	
T_{amb}	ambient temperature		-65	+150	°C	
T_{stg}	storage temperature		-65	+150	°C	

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, 6 cm² collector mounting pad.

[3] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.



6. Thermal characteristics

Table 6: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	227	K/W
			[2]	-	-	89	K/W
			[3]	-	-	63	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	16	K/W	

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².
- [3] Device mounted on a ceramic PCB, AL₂O₃, standard footprint.

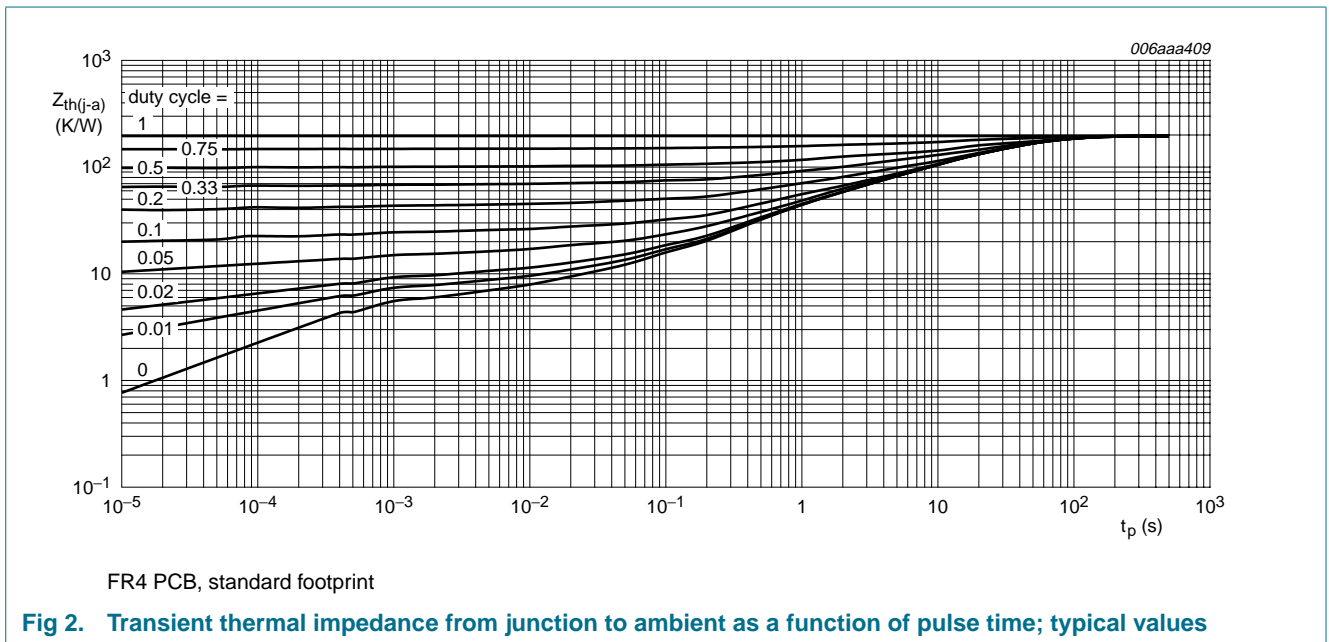


Fig 2. Transient thermal impedance from junction to ambient as a function of pulse time; typical values

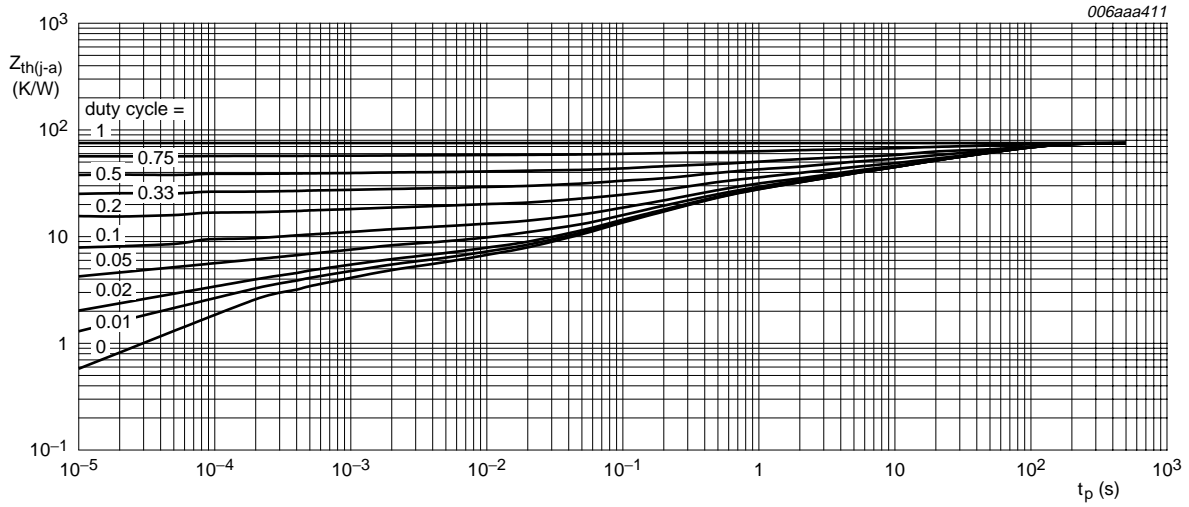


Fig 3. Transient thermal impedance from junction to ambient as a function of pulse time; typical values

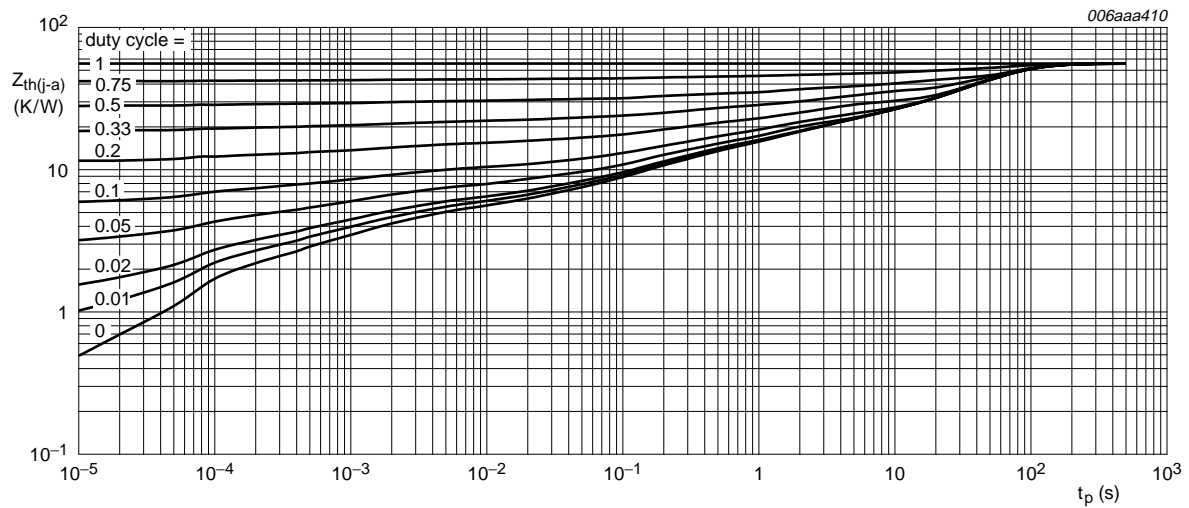


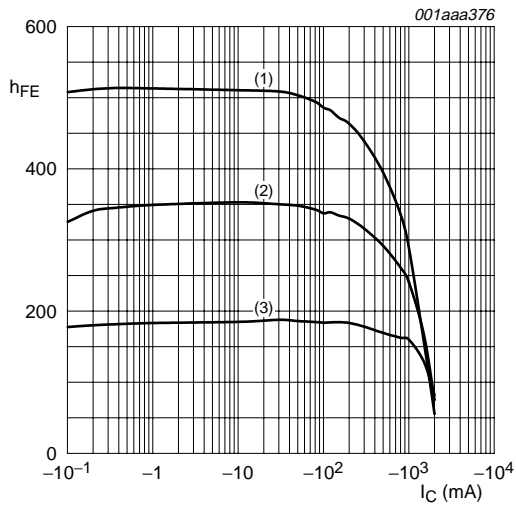
Fig 4. Transient thermal impedance from junction to ambient as a function of pulse time; typical values

7. Characteristics

Table 7: Characteristics
 $T_{amb} = 25^\circ\text{C}$ unless otherwise specified.

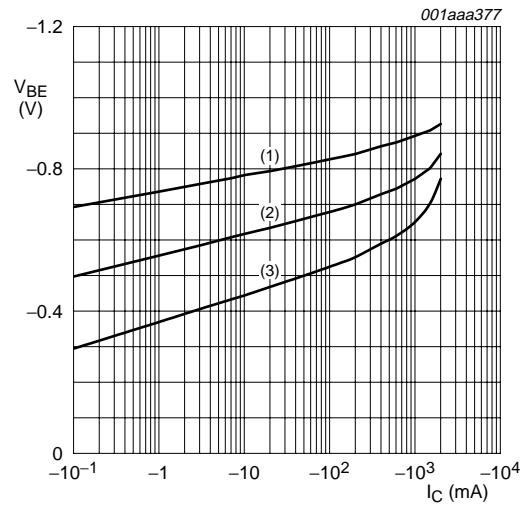
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -80\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -80\text{ V}; I_E = 0\text{ A}; T_j = 150^\circ\text{C}$	-	-	-50	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -80\text{ V}; V_{BE} = 0\text{ V}$	-	-	-100	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -4\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}; I_C = -1\text{ mA}$	150	-	-	
		$V_{CE} = -5\text{ V}; I_C = -250\text{ mA}$	150	-	-	
		$V_{CE} = -5\text{ V}; I_C = -0.5\text{ A}$	[1] 150	-	450	
		$V_{CE} = -5\text{ V}; I_C = -1\text{ A}$	[1] 125	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -250\text{ mA}; I_B = -25\text{ mA}$	-	-	-120	mV
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	-	-	-180	mV
		$I_C = -1\text{ A}; I_B = -100\text{ mA}$	[1] -	-	-320	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = -1\text{ A}; I_B = -100\text{ mA}$	[1] -	170	320	$\text{m}\Omega$
V_{BEsat}	base-emitter saturation voltage	$I_C = -1\text{ A}; I_B = -100\text{ mA}$	-	-	-1.1	V
V_{BEon}	base-emitter turn-on voltage	$I_C = -1\text{ A}; V_{CE} = -5\text{ V}$	-	-	-1.0	V
t_d	delay time	$V_{CC} = -10\text{ V}; I_C = -0.5\text{ A}; I_{Bon} = -0.025\text{ A}; I_{Boff} = 0.025\text{ A}$	-	20	-	ns
t_r	rise time		-	60	-	ns
t_{on}	turn-on time		-	80	-	ns
t_s	storage time		-	290	-	ns
t_f	fall time		-	120	-	ns
t_{off}	turn-off time		-	410	-	ns
f_T	transition frequency	$I_C = -50\text{ mA}; V_{CE} = -10\text{ V}; f = 100\text{ MHz}$	100	-	-	MHz
C_C	collector capacitance	$I_E = i_e = 0\text{ A}; V_{CB} = -10\text{ V}; f = 1\text{ MHz}$	-	-	17	pF

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



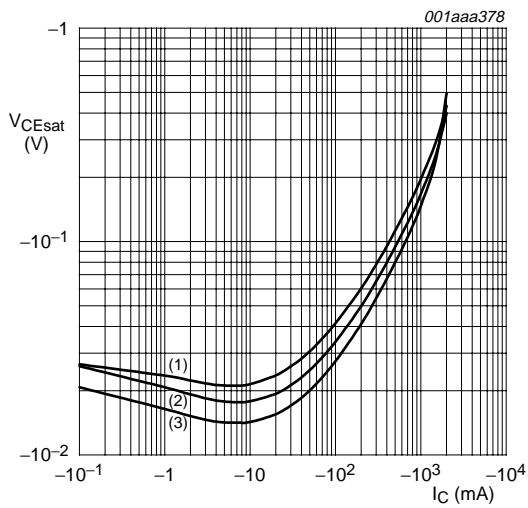
$V_{CE} = -10 V$
 (1) $T_{amb} = 100^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = -55^\circ C$

Fig 5. DC current gain as a function of collector current; typical values



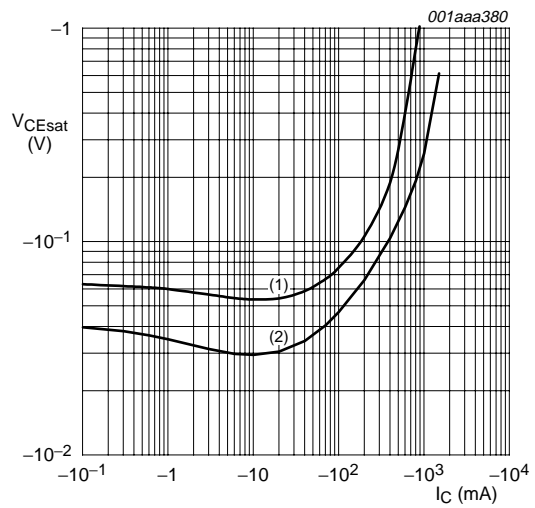
$V_{CE} = -10 V$
 (1) $T_{amb} = -55^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = 100^\circ C$

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



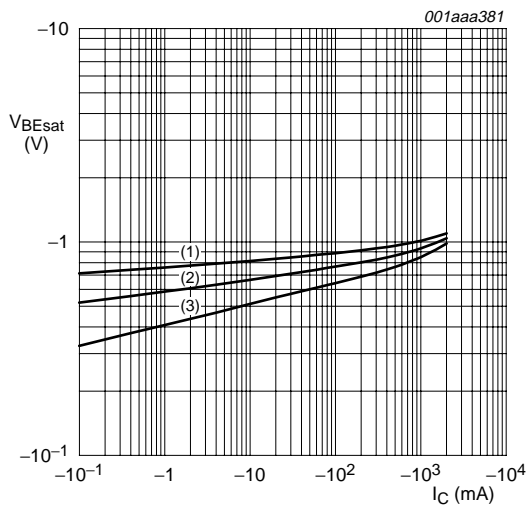
$I_C/I_B = 10$
 (1) $T_{amb} = 100^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = -55^\circ C$

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



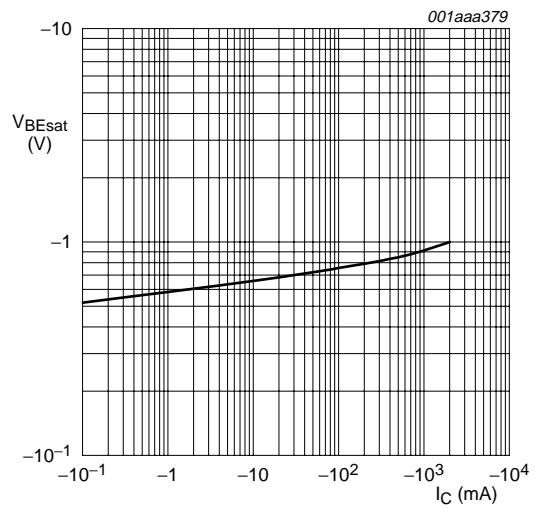
$T_{amb} = 25^\circ C$
 (1) $I_C/I_B = 50$
 (2) $I_C/I_B = 20$

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



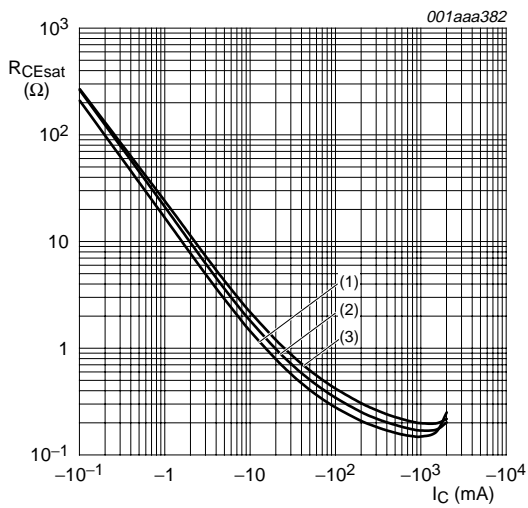
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$

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



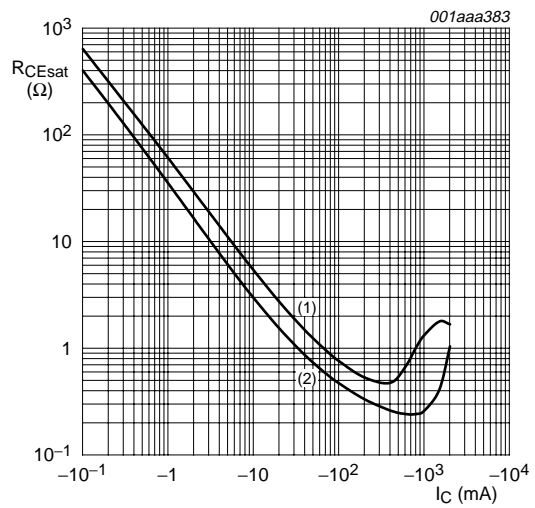
$I_C/I_B = 20$
 $T_{amb} = 25\text{ °C}$

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



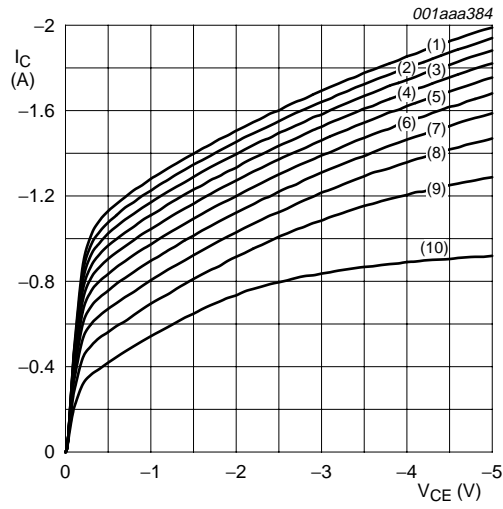
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$

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



$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 50$
 (2) $I_C/I_B = 20$

Fig 12. Collector-emitter saturation resistance as a function of collector current; typical values



- (1) $I_B = -45 \text{ mA}$
- (2) $I_B = -40.5 \text{ mA}$
- (3) $I_B = -36 \text{ mA}$
- (4) $I_B = -31.5 \text{ mA}$
- (5) $I_B = -27 \text{ mA}$
- (6) $I_B = -22.5 \text{ mA}$
- (7) $I_B = -18 \text{ mA}$
- (8) $I_B = -13.5 \text{ mA}$
- (9) $I_B = -9 \text{ mA}$
- (10) $I_B = -4.5 \text{ mA}$

Fig 13. Collector current as a function of collector-emitter voltage; typical values

8. Test information

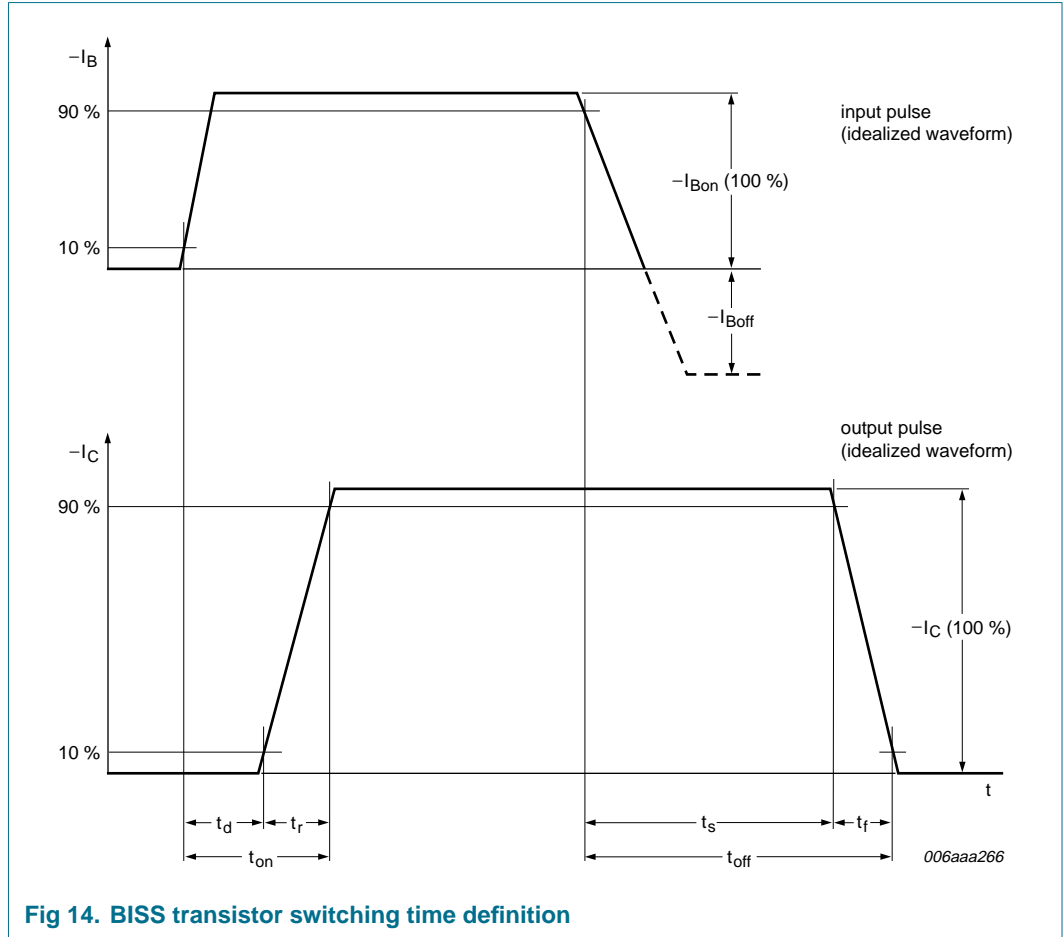


Fig 14. BISS transistor switching time definition

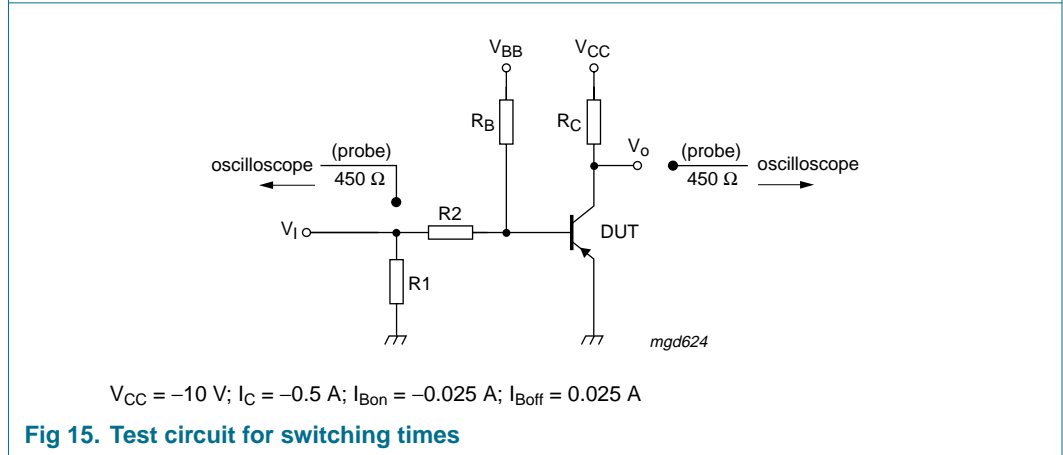
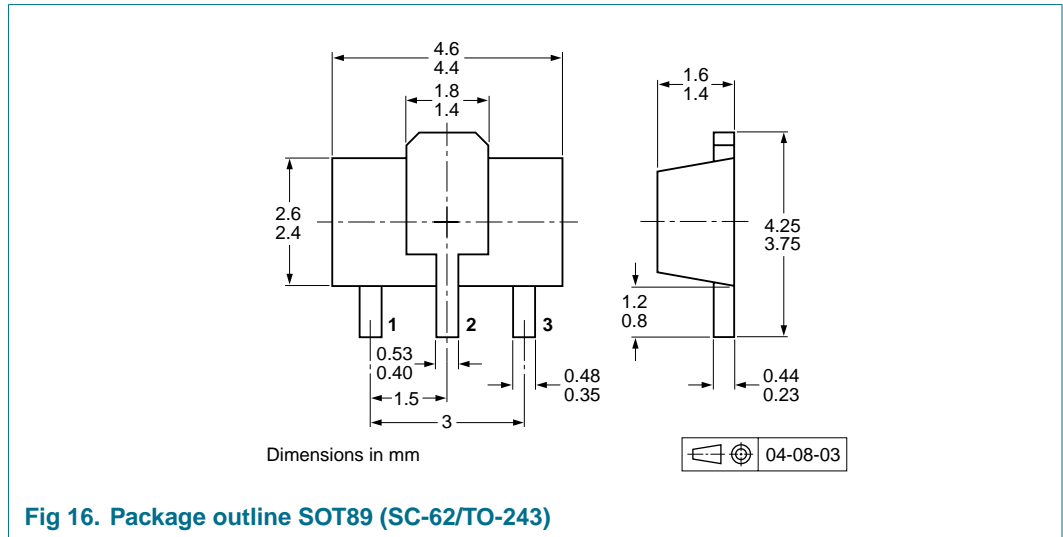


Fig 15. Test circuit for switching times

9. Package outline



10. Packing information

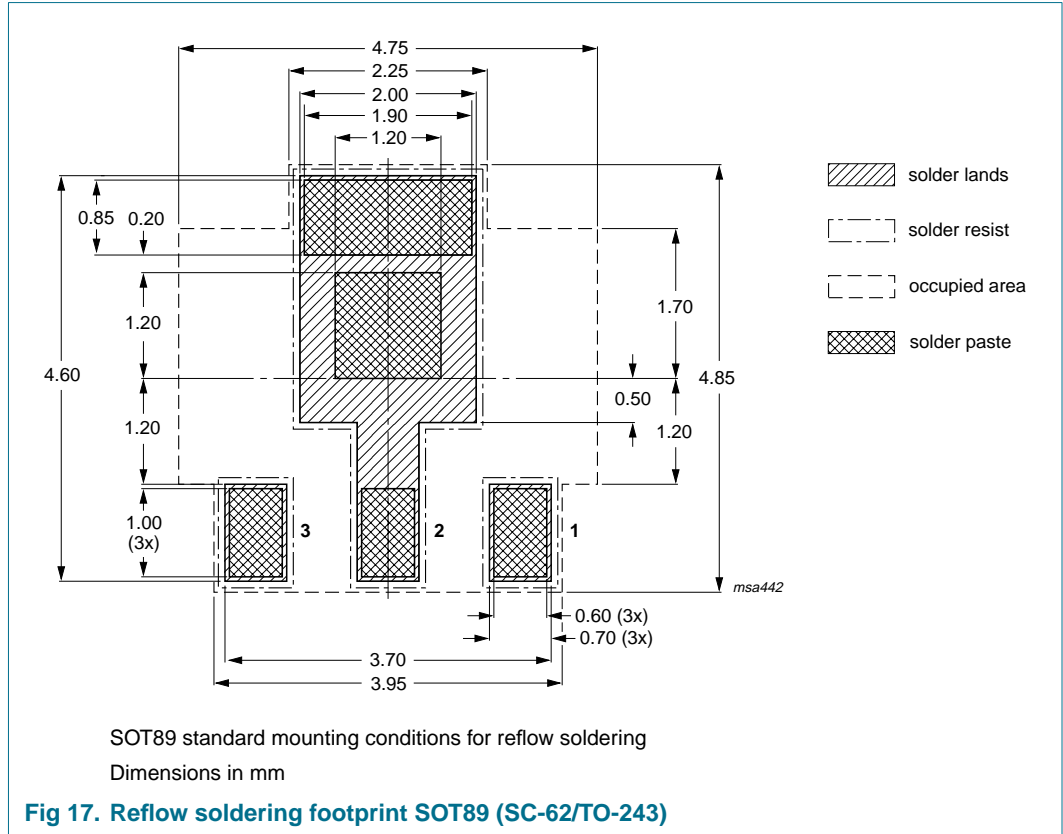
Table 8: Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code. [1]

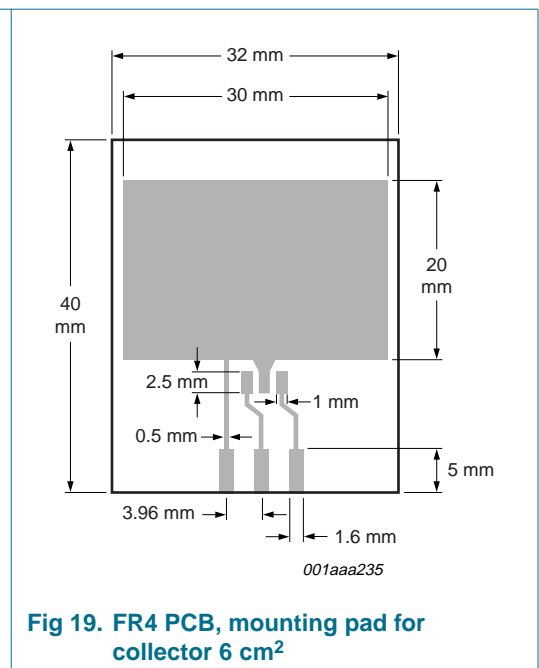
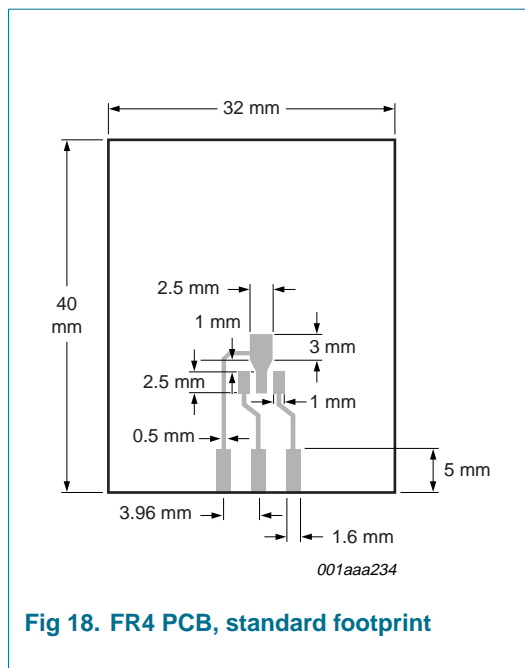
Type number	Package	Description	Packing quantity	
			1000	4000
PBSS9110X	SOT89	8 mm pitch, 12 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see [Section 18](#).

11. Soldering



12. Mounting



13. Revision history

Table 9: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PBSS9110X_1	20050502	Product data sheet	-	9397 750 14765	-

14. 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.
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