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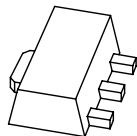Should be replaced with:
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Kind regards,

Team Nexperia

PBSS8110X

100 V, 1 A NPN low V$_{CEsat}$ (BISS) transistor

Rev. 02 — 11 December 2009   **Product data sheet**

1. Product profile

1.1 General description

NPN low V$_{CEsat}$ Breakthrough In Small Signal (BISS) transistor in a SOT89 (SC-62/TO-243) SMD plastic package.

PNP complement: PBSS9110X.

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)
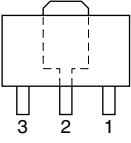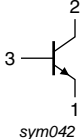- DC-to-DC converter

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] -	165	200	mΩ

[1]   Pulse test: t$_p \leq$ 300 μs; $\delta \leq$ 0.02.

founded by Philips

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	emitter		
2	collector		
3	base		

3 2 1

sym042

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	**Description**	**Version**
PBSS8110X	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]
PBSS8110X	*4B

[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)			-	300	mA
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 and standard footprint.

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

[3] Device mounted on a ceramic PCB, Al$_2$O$_3$, standard footprint.

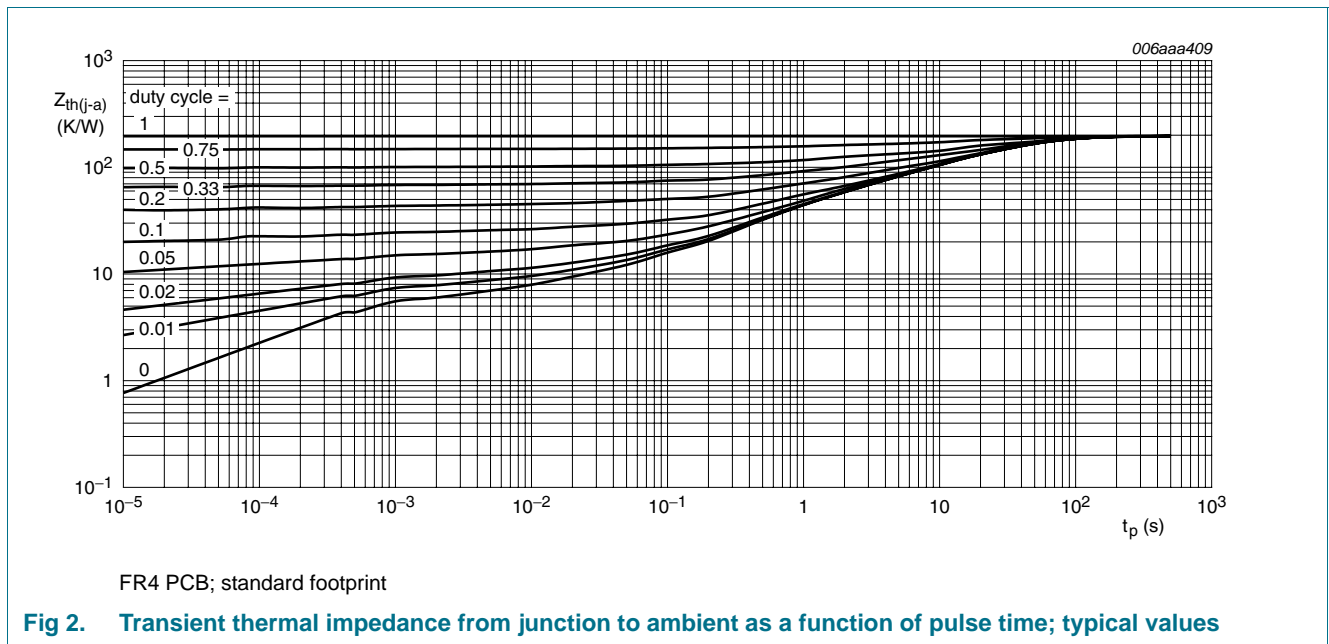(1) Ceramic PCB, Al$_2$O$_3$, standard footprint

(2) FR4 PCB; mounting pad for collector 6cm^2

(3) FR4 PCB; standard footprint

Fig 1. Power derating curves
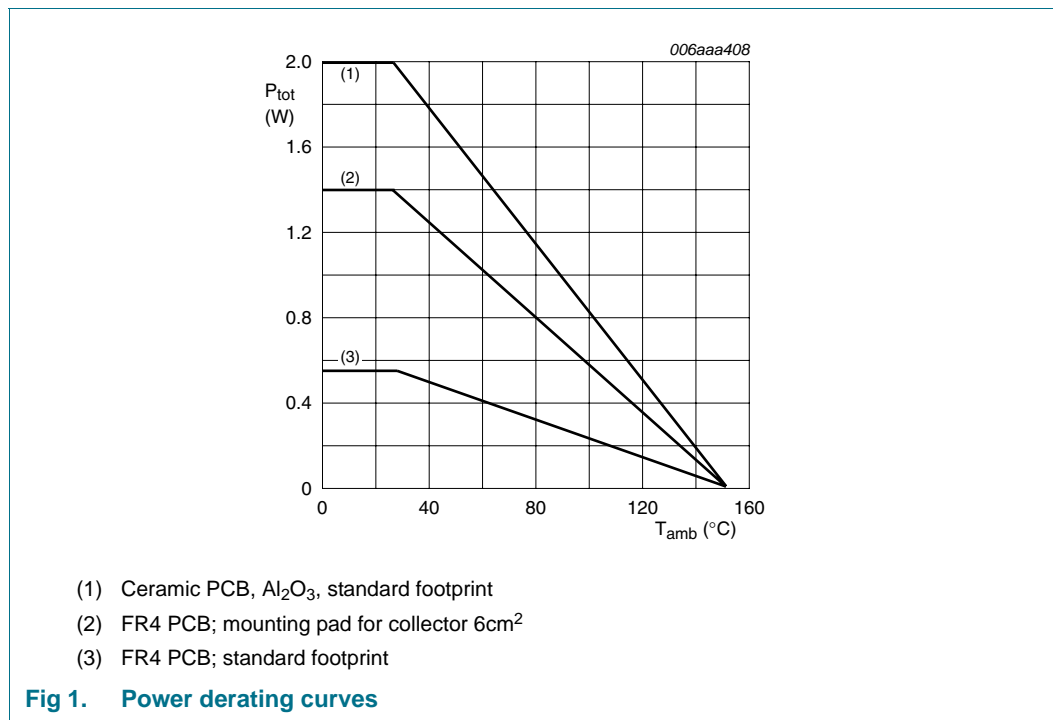
6. Thermal characteristics

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 6cm^2.

[3]   Device mounted on a ceramic PCB, Al$_2$O$_3$, standard footprint.

FR4 PCB; standard footprint

Fig 2.   Transient thermal impedance from junction to ambient as a function of pulse time; typical values
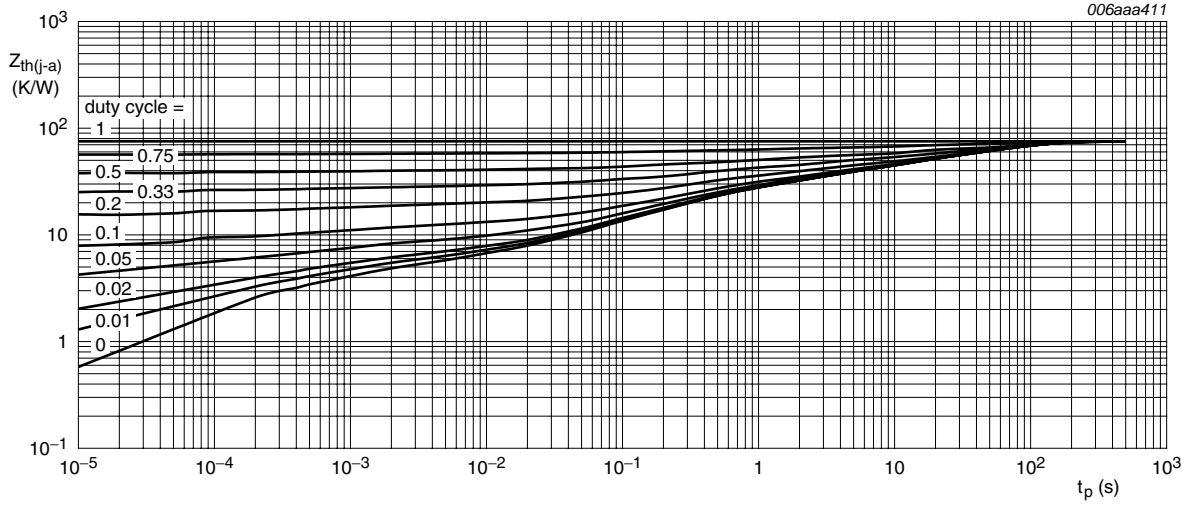
FR4 PCB; mounting pad for collector 6cm^2

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse time; typical values
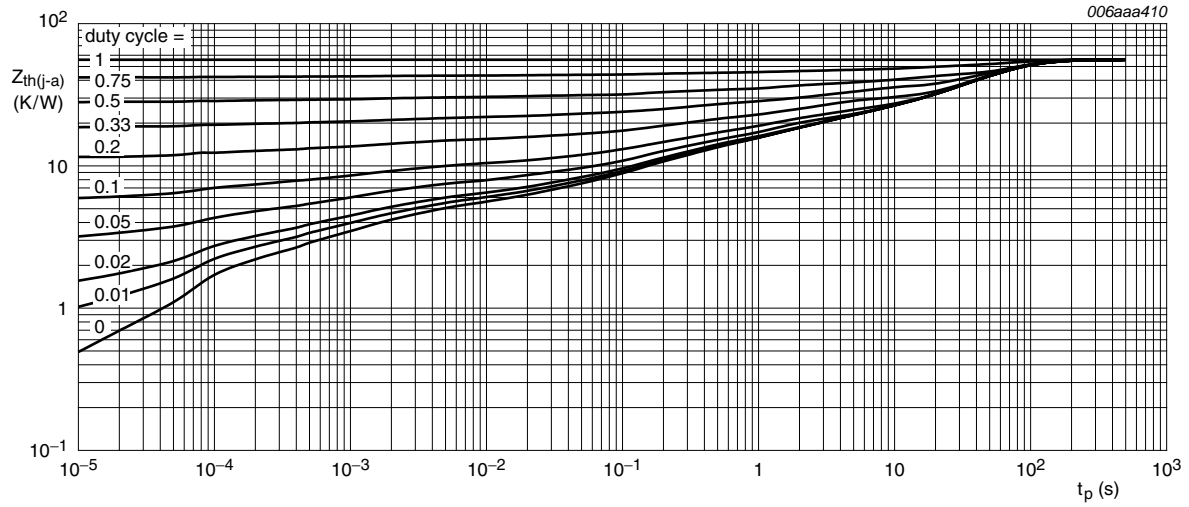
Ceramic PCB, Al$_2$O$_3$, standard footprint

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 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 80 V; I_E = 0 A	-	-	100	nA
		V_{CB} = 80 V; I_E = 0 A; T_j = 150 °C	-	-	50	µA
I_{CES}	collector-emitter cut-off current	V_{CE} = 80 V; V_{BE} = 0 V	-	-	100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 4 V; I_C = 0 A	-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 1 mA	150	-	-	
		V_{CE} = 10 V; I_C = 250 mA	150	-	500	
		V_{CE} = 10 V; I_C = 500 mA	[1] 100	-	-	
		V_{CE} = 10 V; I_C = 1 A	[1] 80	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 100 mA; I_B = 10 mA	-	-	40	mV
		I_C = 500 mA; I_B = 50 mA	-	-	120	mV
		I_C = 1 A; I_B = 100 mA	[1] -	-	200	mV
R_{CEsat}	collector-emitter saturation resistance	I_C = 1 A; I_B = 100 mA	[1] -	165	200	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 100 mA	-	-	1.05	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 10 V; I_C = 1 A	-	-	0.9	V
t_d	delay time	V_{CC} = 10 V; I_C = 0.5 A; I_{Bon} = 0.025 A; I_{Boff} = −0.025 A	-	25	-	ns
t_r	rise time		-	220	-	ns
t_{on}	turn-on time		-	245	-	ns
t_s	storage time		-	365	-	ns
t_f	fall time		-	185	-	ns
t_{off}	turn-off time		-	550	-	ns
f_T	transition frequency	V_{CE} = 10 V; I_C = 50 mA; f = 100 MHz	100	-	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz	-	-	7.5	pF

[1]   Pulse test: $t_p \leq$ 300 µs; $\delta \leq$ 0.02.
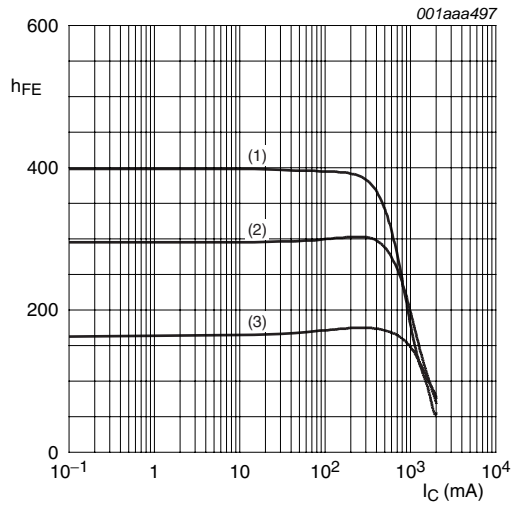
V$_{CE}$ = 10 V

(1) T$_{amb}$ = 100 °C
(2) T$_{amb}$ = 25 °C
(3) T$_{amb}$ = −55 °C

Fig 5. **DC current gain as a function of collector current; typical values**
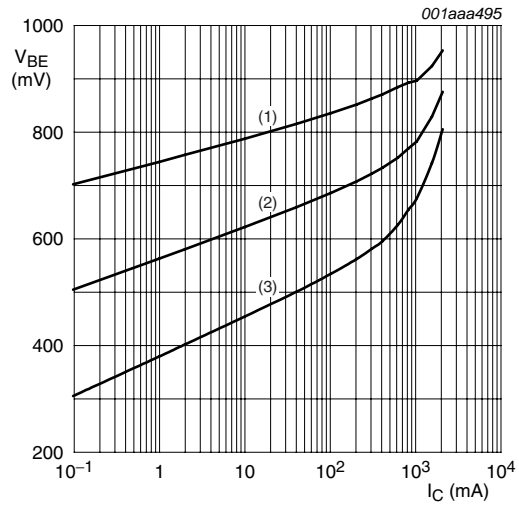
V$_{CE}$ = 10 V

(1) T$_{amb}$ = −55 °C
(2) T$_{amb}$ = 25 °C
(3) T$_{amb}$ = 100 °C

Fig 6. **Base-emitter voltage as a function of collector current; typical values**
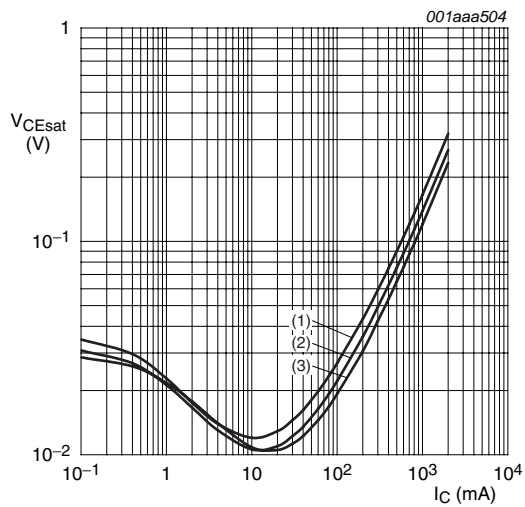
I$_C$/I$_B$ = 10

(1) T$_{amb}$ = 100 °C
(2) T$_{amb}$ = 25 °C
(3) T$_{amb}$ = −55 °C

Fig 7. **Collector-emitter saturation voltage as a function of collector current; typical values**
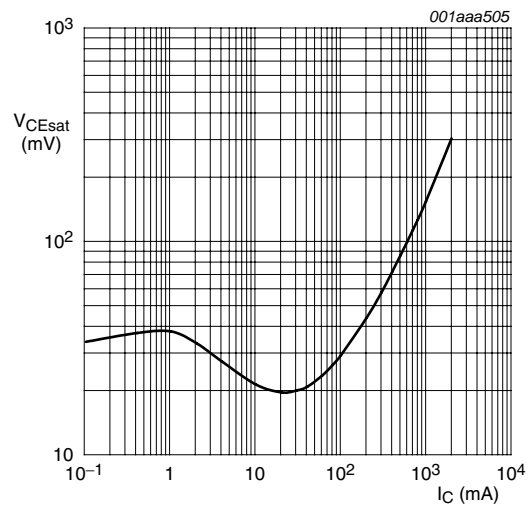
I$_C$/I$_B$ = 20; T$_{amb}$ = 25 °C

Fig 8. **Collector-emitter saturation voltage as a function of collector current; typical values**
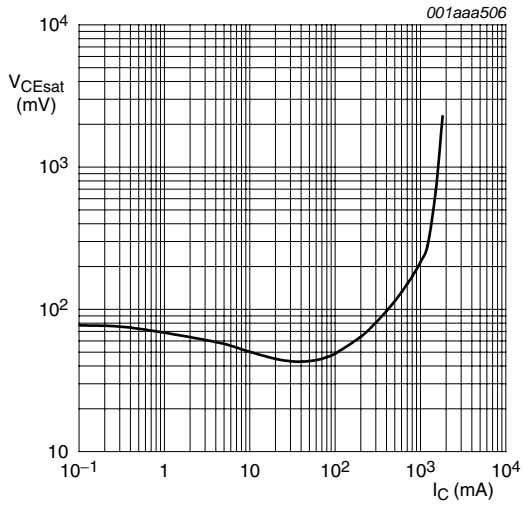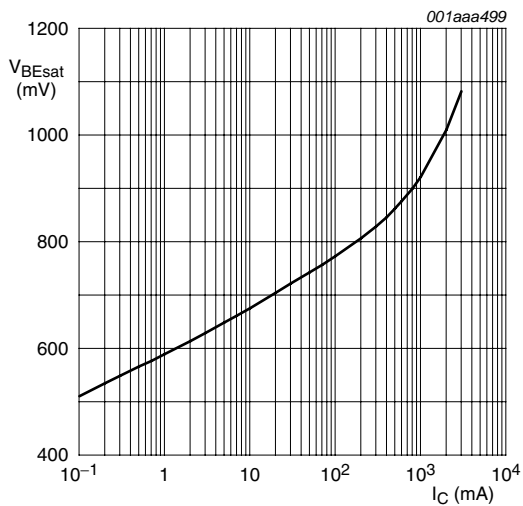
$I_C/I_B = 50$; $T_{amb} = 25$ °C

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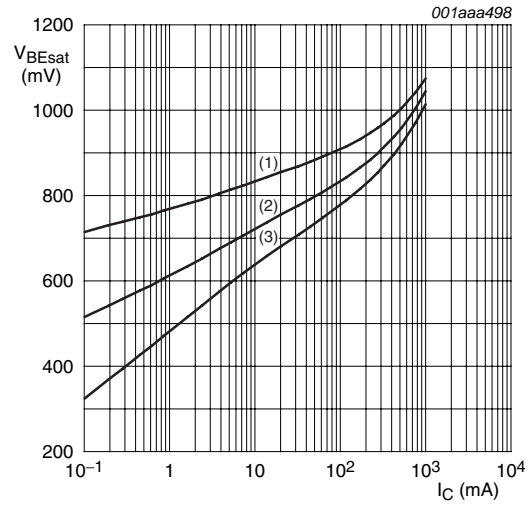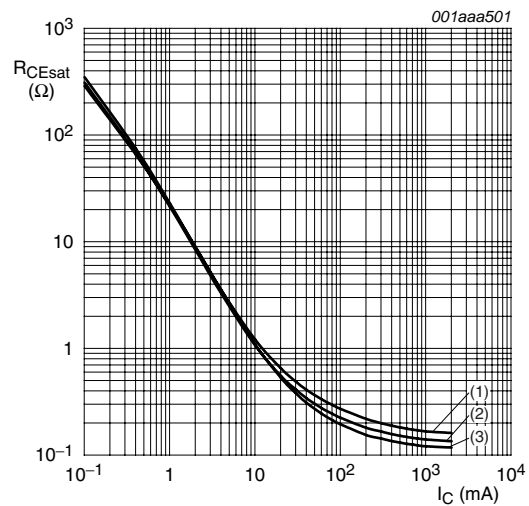

$I_C/I_B = 10$

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = 100$ °C

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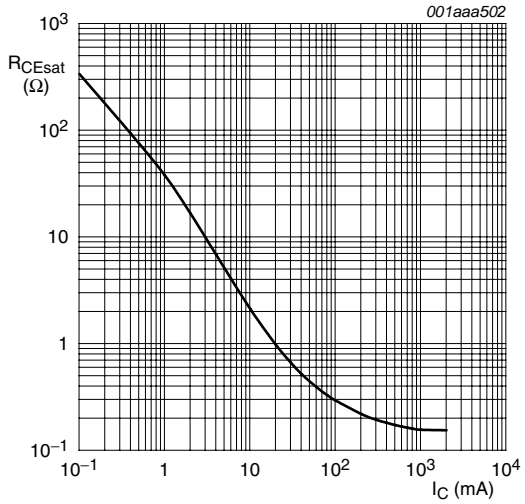

$I_C/I_B = 20$; $T_{amb} = 25$ °C

Fig 11. Base-emitter saturation voltage as a function of collector current; typical values
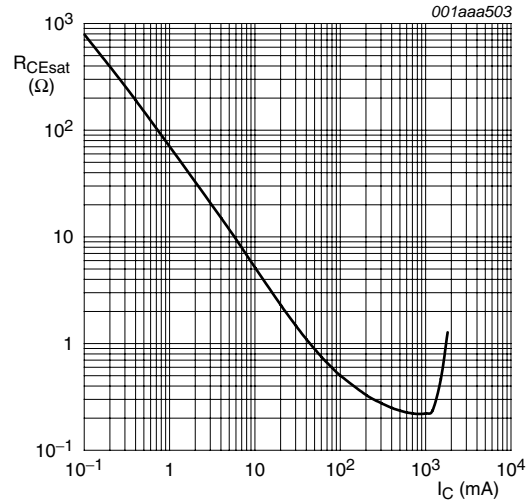

$I_C/I_B = 10$

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = -55$ °C

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

001aaa502

$I_C/I_B = 20$; $T_{amb} = 25$ °C

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

001aaa503

$I_C/I_B = 50$; $T_{amb} = 25$ °C

Fig 14. Collector-emitter saturation resistance as a function of collector current; typical values

001aaa496
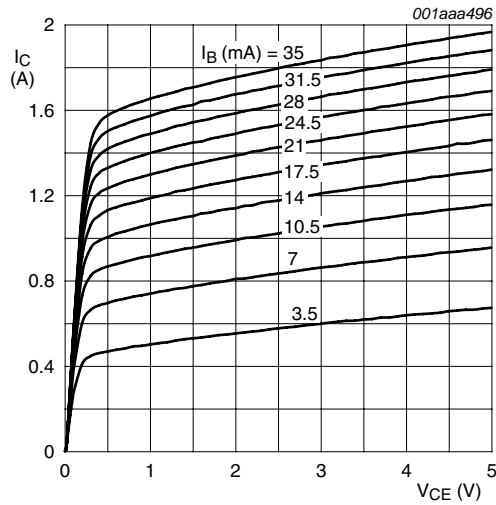
$T_{amb} = 25$ °C

Fig 15. Collector current as a function of collector-emitter voltage; typical values
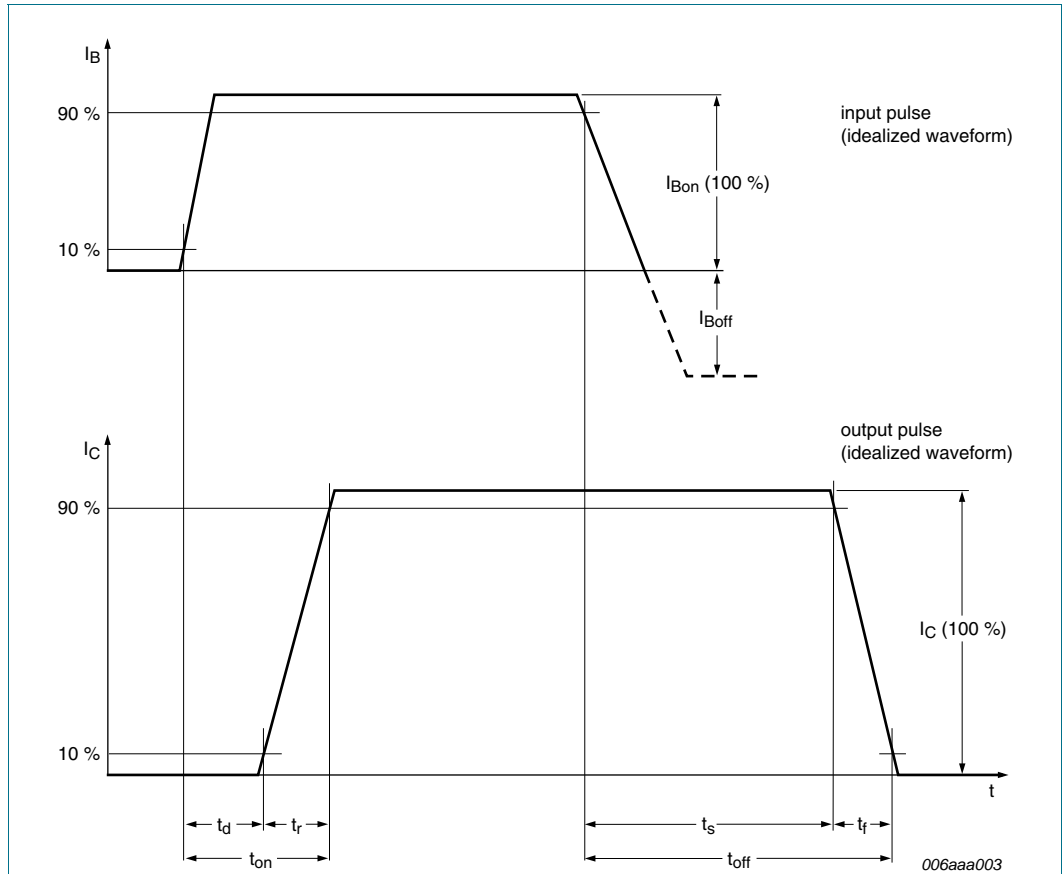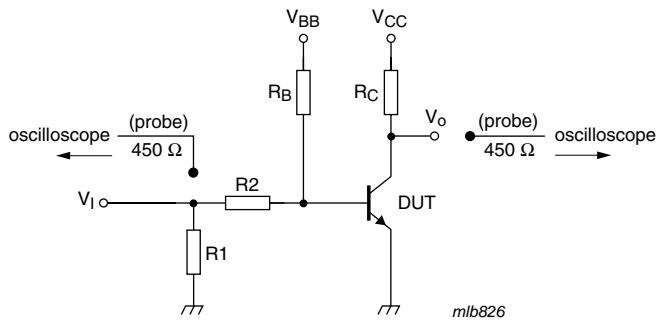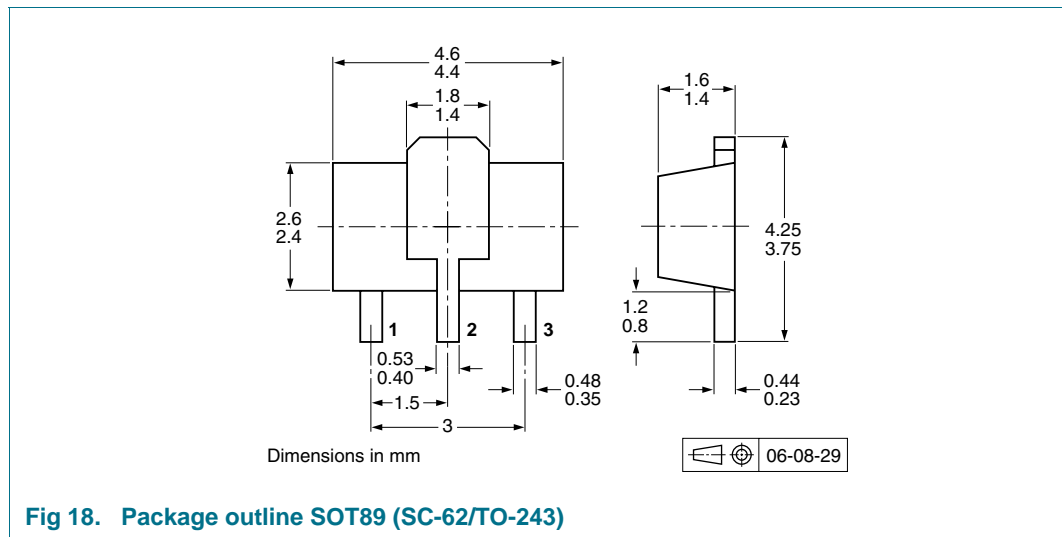
8. Test information

Fig 16. BISS transistor switching time definition

V$_{CC}$ = 10 V; I$_C$ = 0.5 A; I$_{Bon}$ = 0.025 A; I$_{Boff}$ = −0.025 A

Fig 17. Test circuit for switching times

9. Package outline

Fig 18. Package outline SOT89 (SC-62/TO-243)

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**
PBSS8110X	SOT89	8 mm pitch, 12 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see Section 15.

PBSS8110X_2

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11. Soldering

Reflow soldering is the only recommended soldering method

Fig 19. Reflow soldering footprint SOT89 (SC-62/TO-243)

12. Mounting

Fig 20. FR4 PCB, standard footprint

Fig 21. FR4 PCB, mounting pad for collector 6cm^2
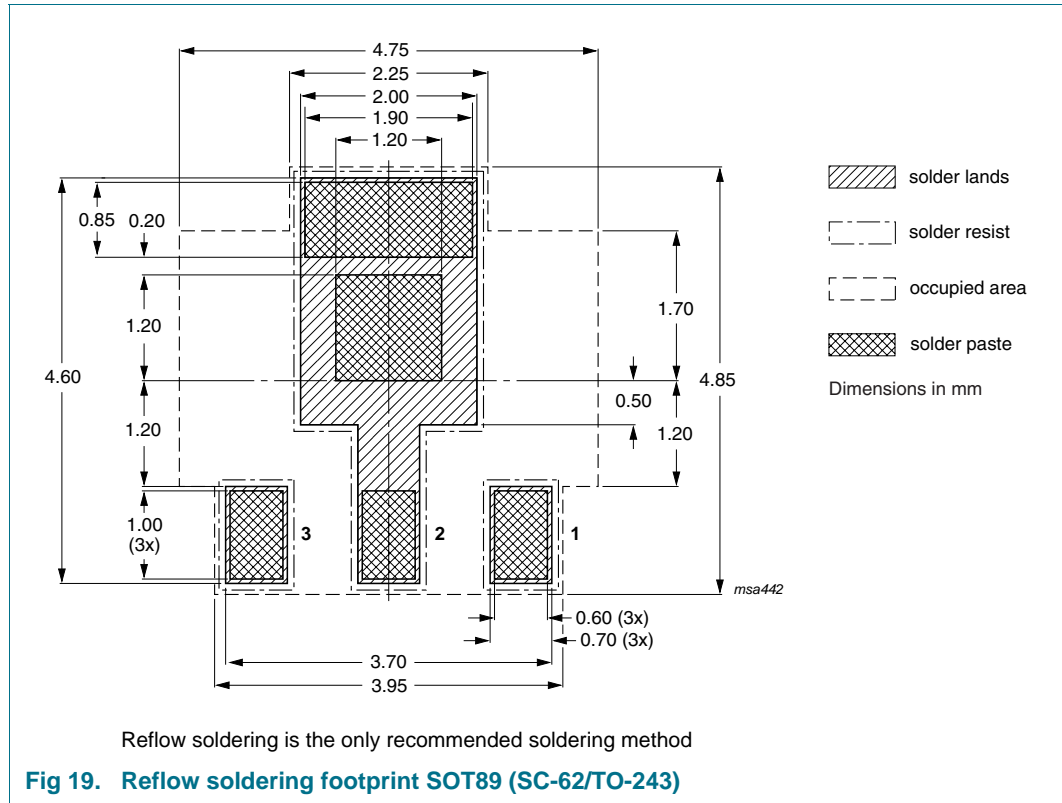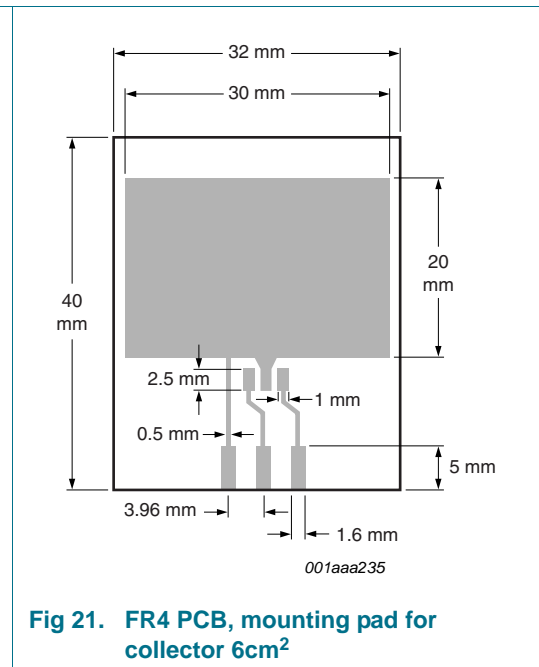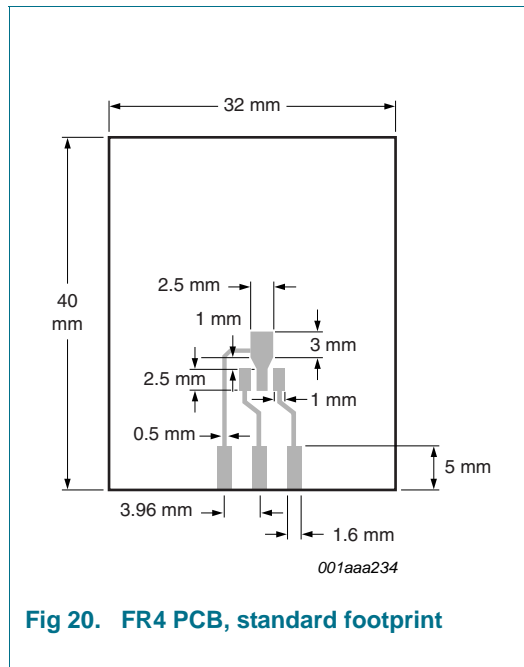
13. Revision history

Table 9.   Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS8110X_2	20091211	Product data sheet	-	PBSS8110X_1
Modifications:	• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. • Figure 5: updated • Figure 7: V_{CEsat} axis unit amended from mV to V • Figure 15: updated • Figure 18 "Package outline SOT89 (SC-62/TO-243)": updated • Figure 19 "Reflow soldering footprint SOT89 (SC-62/TO-243)": updated			
PBSS8110X_1	20050511	Product data sheet	-	-

14. Legal information

14.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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