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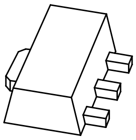


PBSS9110X

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

Rev. 02 — 22 November 2009 **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

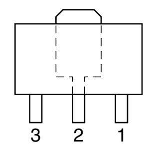
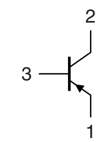
Table 1. Quick reference data

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	mΩ

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

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	emitter		 006aaa231
2	collector		
3	base		

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

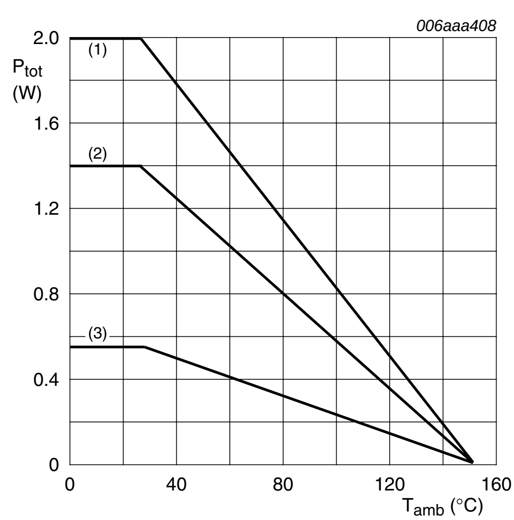
In accordance with the Absolute Maximum Rating System (IEC 60134).

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, 6cm^2 collector mounting pad.

[3] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



(1) Ceramic PCB, Al_2O_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

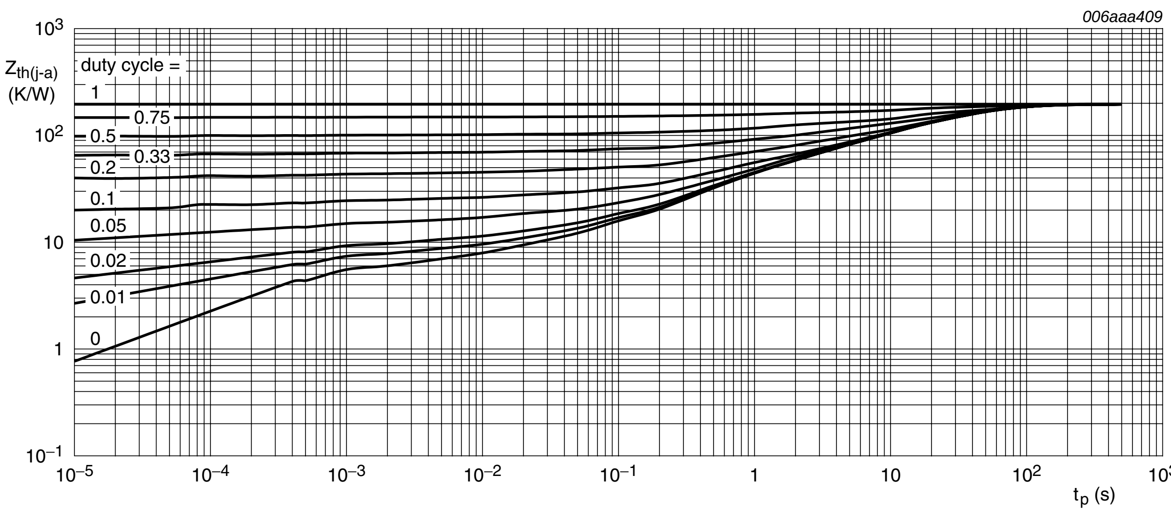
Table 6. Thermal characteristics

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.

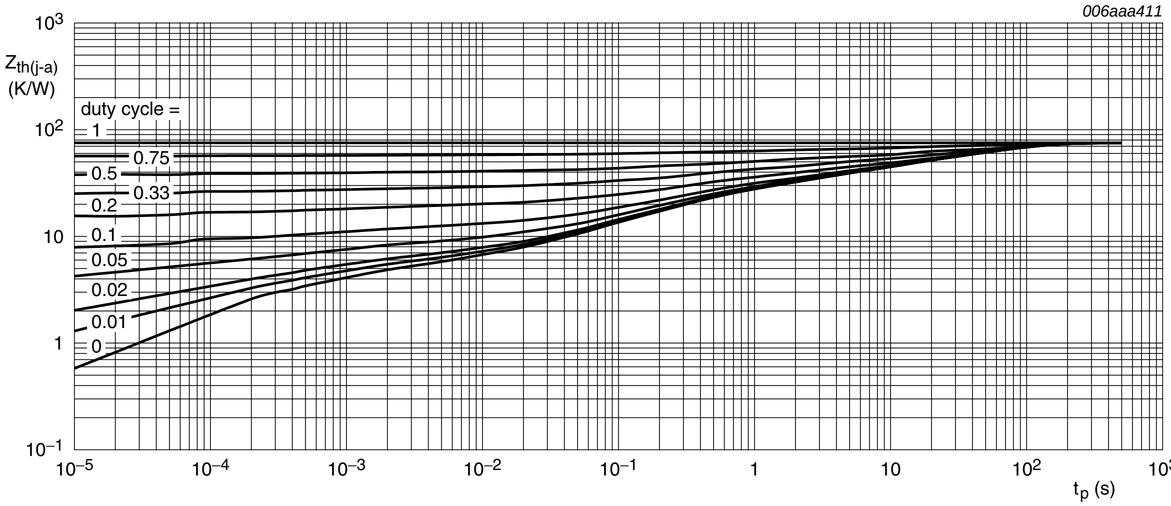
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector $6 cm^2$.

[3] Device mounted on a ceramic PCB, AL_2O_3, standard footprint.



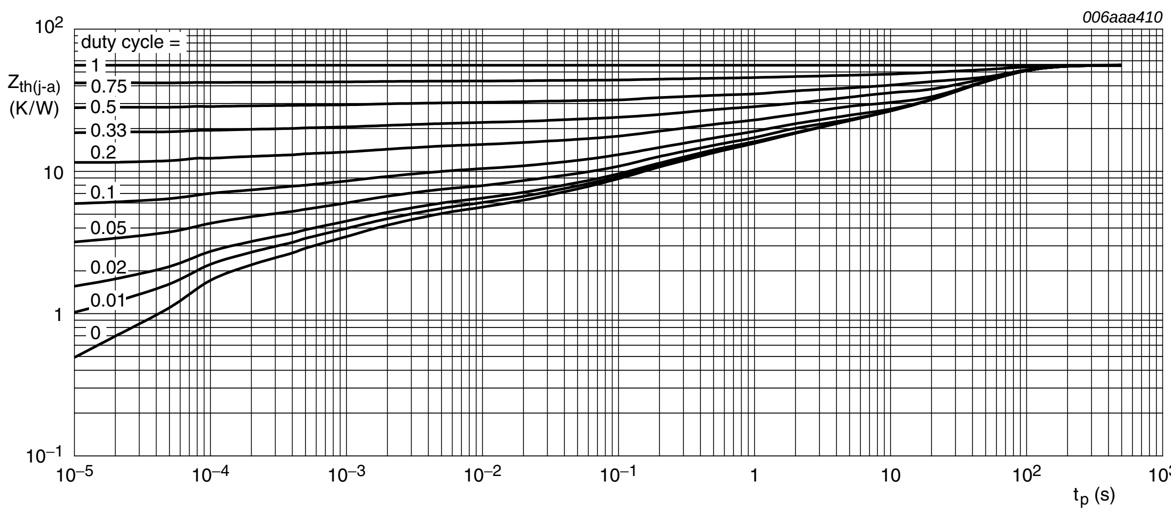
FR4 PCB, standard footprint

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_2O_3, standard footprint

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

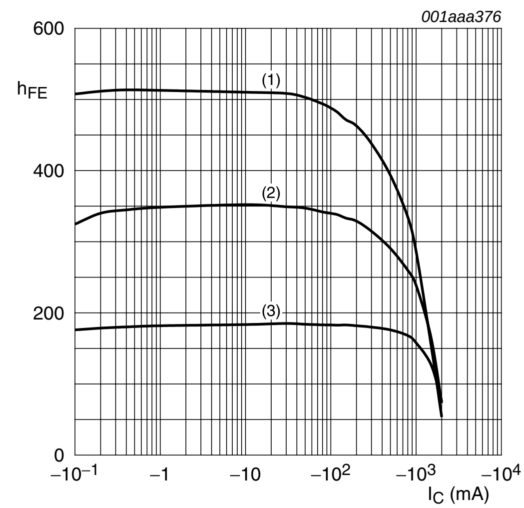
7. Characteristics

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} = –5 V; I_C = –1 mA		150	-	-	
		V_{CE} = –5 V; I_C = –250 mA		150	-	-	
		V_{CE} = –5 V; I_C = –0.5 A	[1]	150	-	450	
		V_{CE} = –5 V; I_C = –1 A	[1]	125	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = –250 mA; I_B = –25 mA		-	-	–120	mV
		I_C = –500 mA; I_B = –50 mA		-	-	–180	mV
		I_C = –1 A; I_B = –100 mA	[1]	-	-	–320	mV
R_{CEsat}	collector-emitter saturation resistance	I_C = –1 A; I_B = –100 mA	[1]	-	170	320	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = –1 A; I_B = –100 mA		-	-	–1.1	V
V_{BEon}	base-emitter turn-on voltage	I_C = –1 A; V_{CE} = –5 V		-	-	–1.0	V
t_d	delay time	V_{CC} = –10 V; I_C = –0.5 A; I_{Bon} = –0.025 A; I_{Boff} = 0.025 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 mA; V_{CE} = –10 V; f = 100 MHz		100	-	-	MHz
C_c	collector capacitance	I_E = i_e = 0 A; V_{CB} = –10 V; f = 1 MHz		-	-	17	pF

[1] Pulse test: $t_p \le 300$ μs; $\delta \le 0.02$.



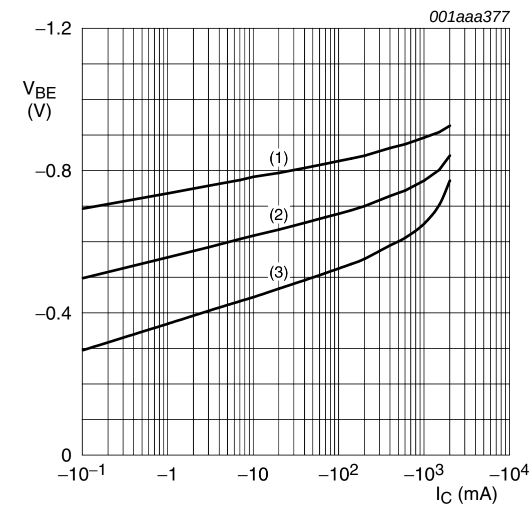
$V_{CE} = -10$ V

(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



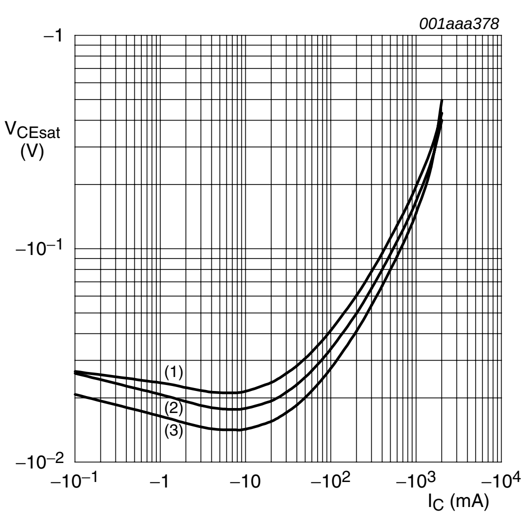
$V_{CE} = -10$ V

(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



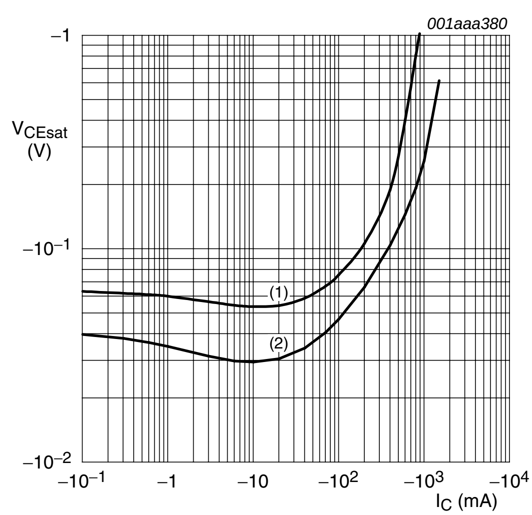
$I_C/I_B = 10$

(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

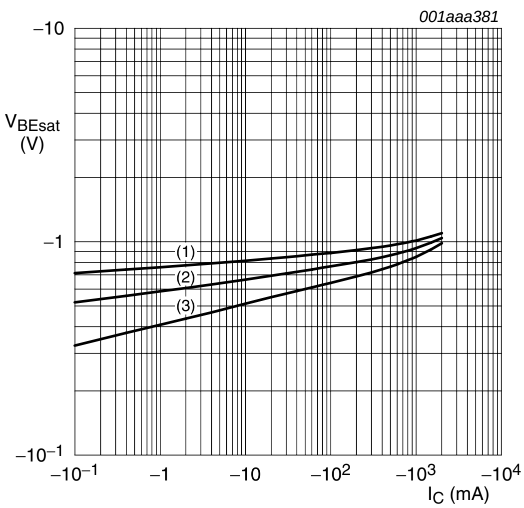


$T_{amb} = 25$ °C

(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



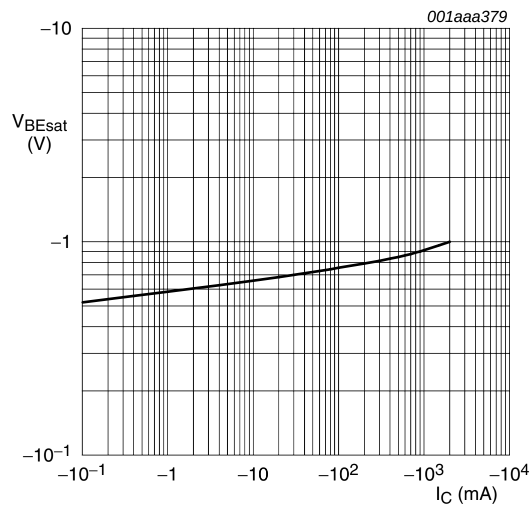
$I_C/I_B = 10$

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = 100$ °C

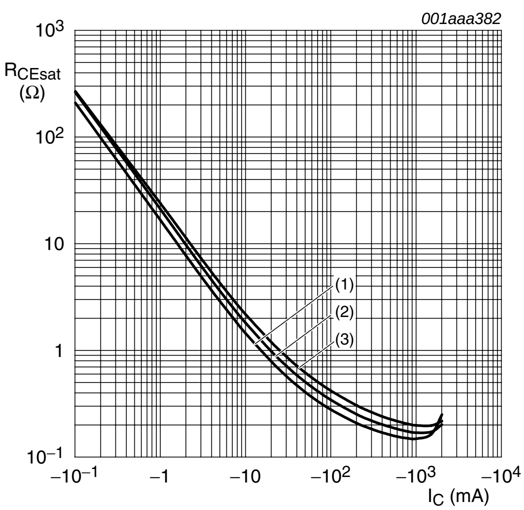
Fig 9. Base-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$

$T_{amb} = 25$ °C

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



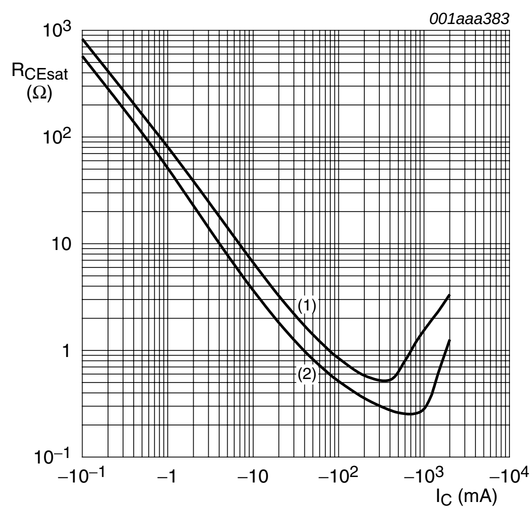
$I_C/I_B = 10$

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = 100$ °C

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



$T_{amb} = 25$ °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

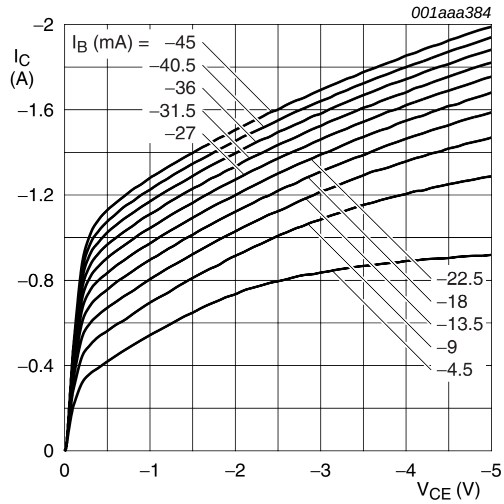


Fig 13. Collector current as a function of collector-emitter voltage; typical values

8. Test information

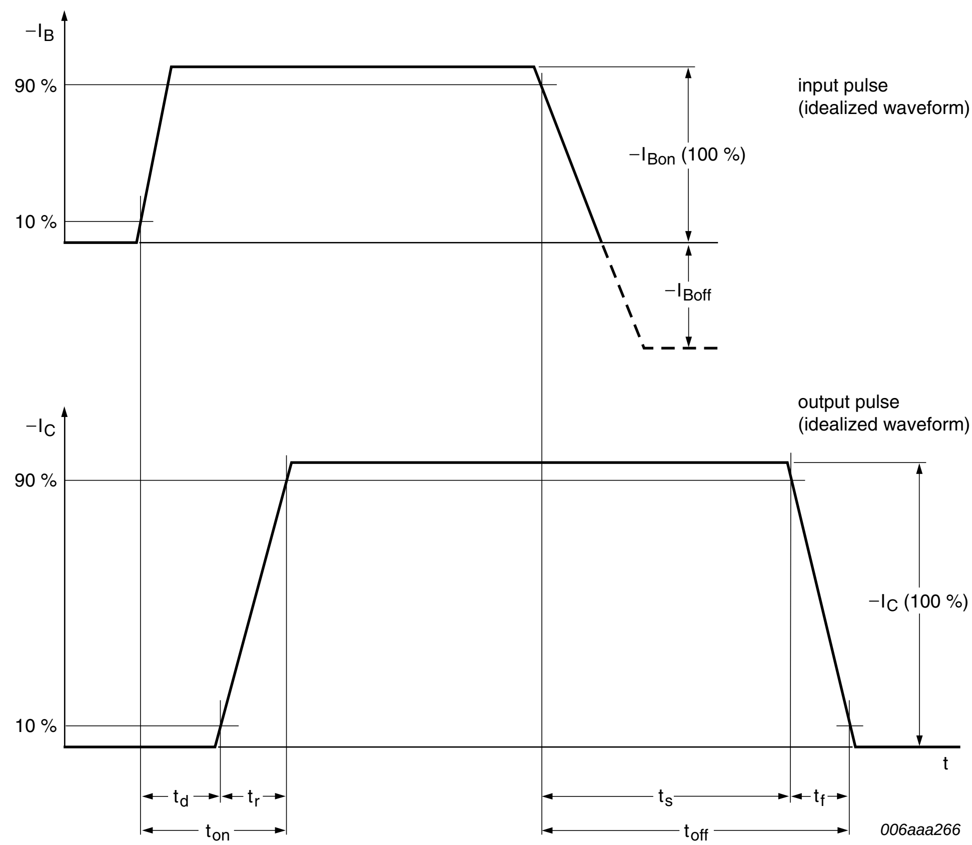
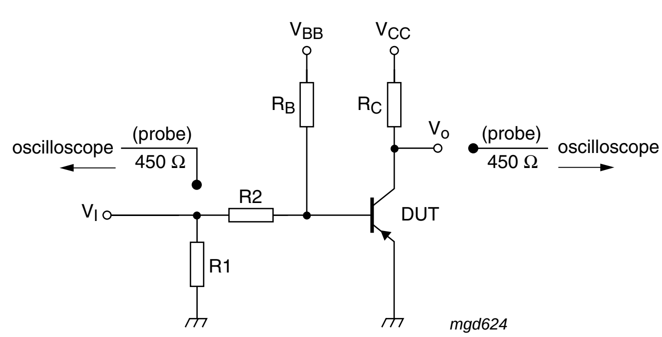


Fig 14. BISS transistor switching time definition



$V_{CC} = -10$ V; $I_C = -0.5$ A; $I_{Bon} = -0.025$ A; $I_{Boff} = 0.025$ A

Fig 15. Test circuit for switching times

9. Package outline

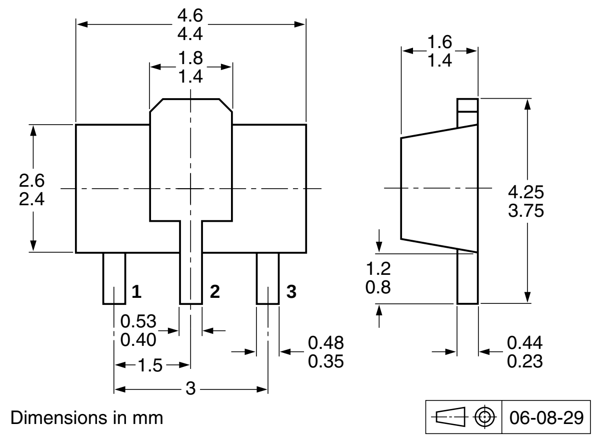


Fig 16. Package outline SOT89 (SC-62/TO-243)

10. Packing information

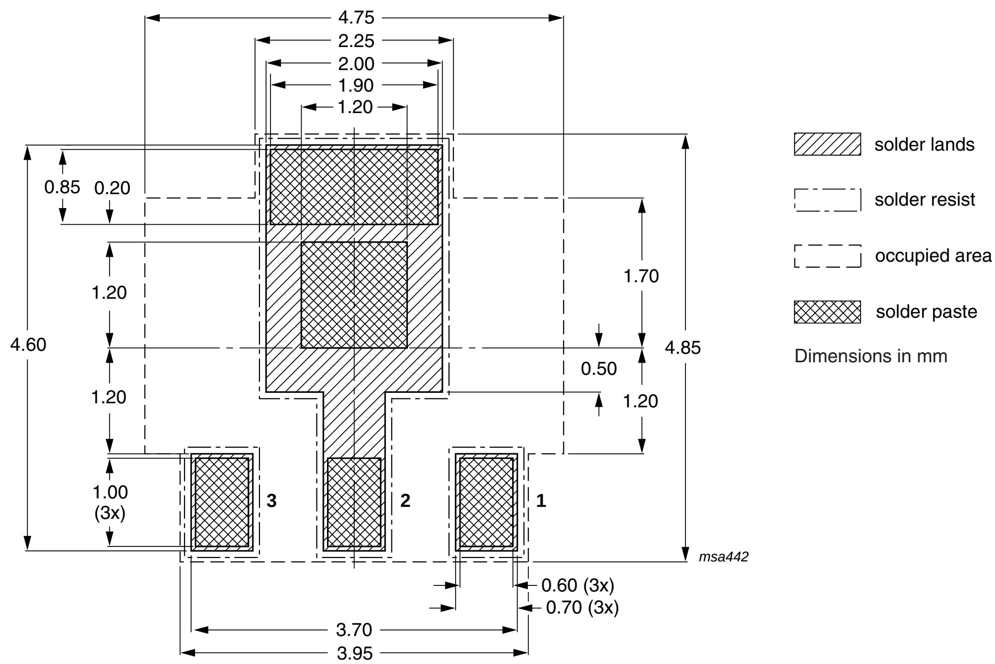
Table 8. Packing methods

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

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

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

11. Soldering



SOT89 standard mounting conditions for reflow soldering

Dimensions in mm

Fig 17. Reflow soldering footprint SOT89 (SC-62/TO-243)

12. Mounting

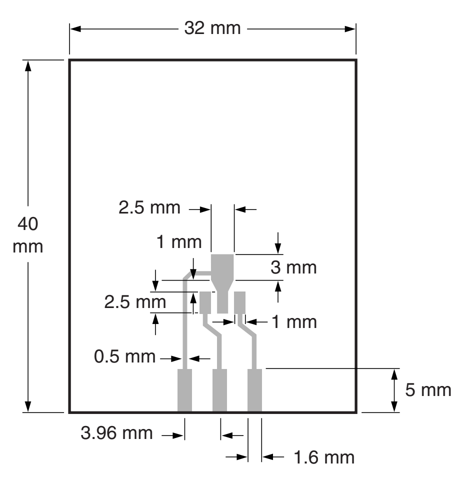


Fig 18. FR4 PCB, standard footprint

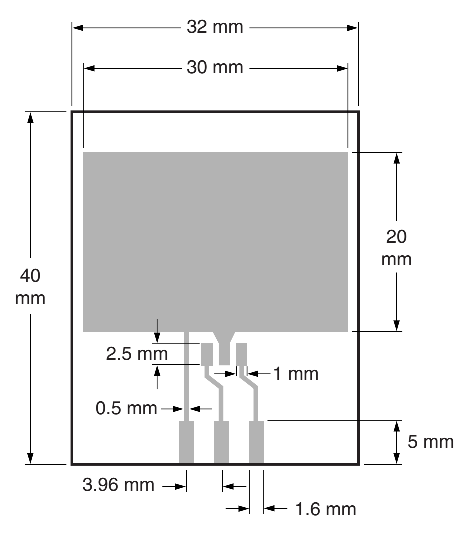


Fig 19. FR4 PCB, mounting pad for collector 6cm²

13. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS9110X_2	20091122	Product data sheet	-	PBSS9110X_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 12 "Collector-emitter saturation resistance as a function of collector current; typical values": updated • Figure 13 "Collector current as a function of collector-emitter voltage; typical values": updated			
PBSS9110X_1	20050502	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.
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[2] The term 'short data sheet' is explained in section "Definitions".

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16. Contents

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