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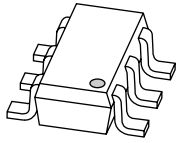Should be replaced with:
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Kind regards,

Team Nexperia

PBSS303PD

60 V, 3 A PNP low V_{CEsat} (BISS) transistor

Rev. 02 — 20 November 2009   **Product data sheet**

1. Product profile

1.1 General description

PNP low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a SOT457 (SC-74) small Surface-Mounted Device (SMD) plastic package.

NPN complement: PBSS303ND.

1.2 Features

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- High efficiency due to less heat generation
- Smaller required Printed-Circuit Board (PCB) area than for conventional transistors

1.3 Applications

- High-voltage DC-to-DC conversion
- High-voltage MOSFET gate driving
- High-voltage motor control
- High-voltage power switches (e.g. motors, fans)
- Thin Film Transistor (TFT) backlight inverter
- Automotive applications

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	−60	V
I_C	collector current		[1]	-	-	−3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	−6	A
R_{CEsat}	collector-emitter saturation resistance	$I_C = -2$ A; $I_B = -200$ mA	[2]	-	75	100	mΩ

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

[2] 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	collector		
2	collector		
3	base		
4	emitter		
5	collector		
6	collector		

3. Ordering information

Table 3. **Ordering information**

Type number	Package		
	Name	**Description**	**Version**
PBSS303PD	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457

4. Marking

Table 4. **Marking codes**

Type number	Marking code
PBSS303PD	AH

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		-	−60	V
V_{CEO}	collector-emitter voltage	open base		-	−60	V
V_{EBO}	emitter-base voltage	open collector		-	−5	V
I_C	collector current		[1]	-	−1	A
			[2]	-	−3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	−6	A
I_B	base current			-	−800	mA
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	−2	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	360	mW
			[3]	-	600	mW
			[4]	-	750	mW
			[2]	-	1.1	W
			[1][5]	-	2.5	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 PCB, single-sided copper, tin-plated and standard footprint.

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

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

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

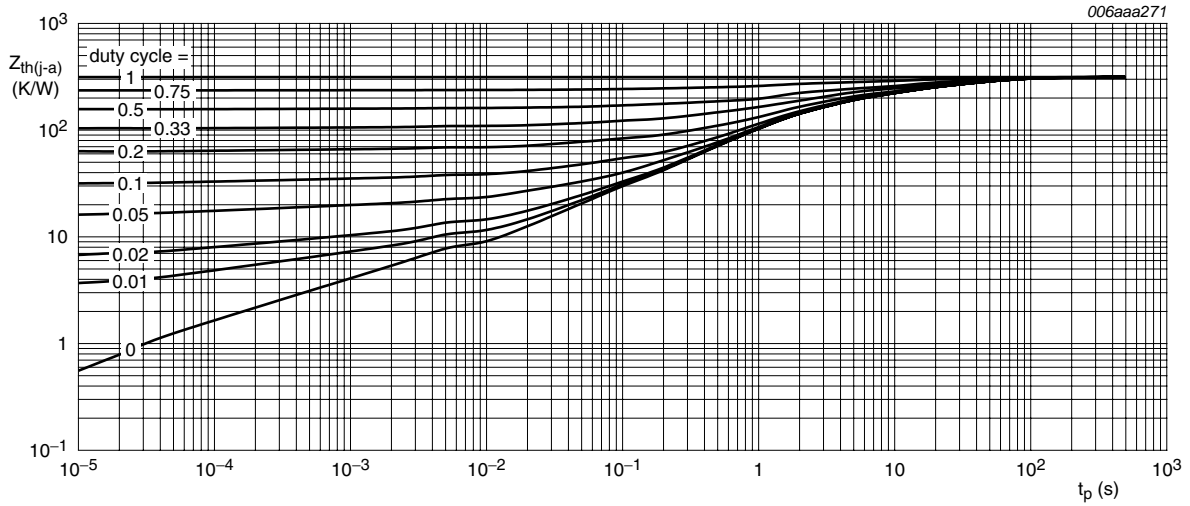[5] Pulse test: $t_p \leq 10$ ms; $\delta \leq 10$ %.

006aaa270

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

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

(3) FR4 PCB, mounting pad for collector 1 cm^2

(4) FR4 PCB, standard footprint

Fig 1.   Power derating curves
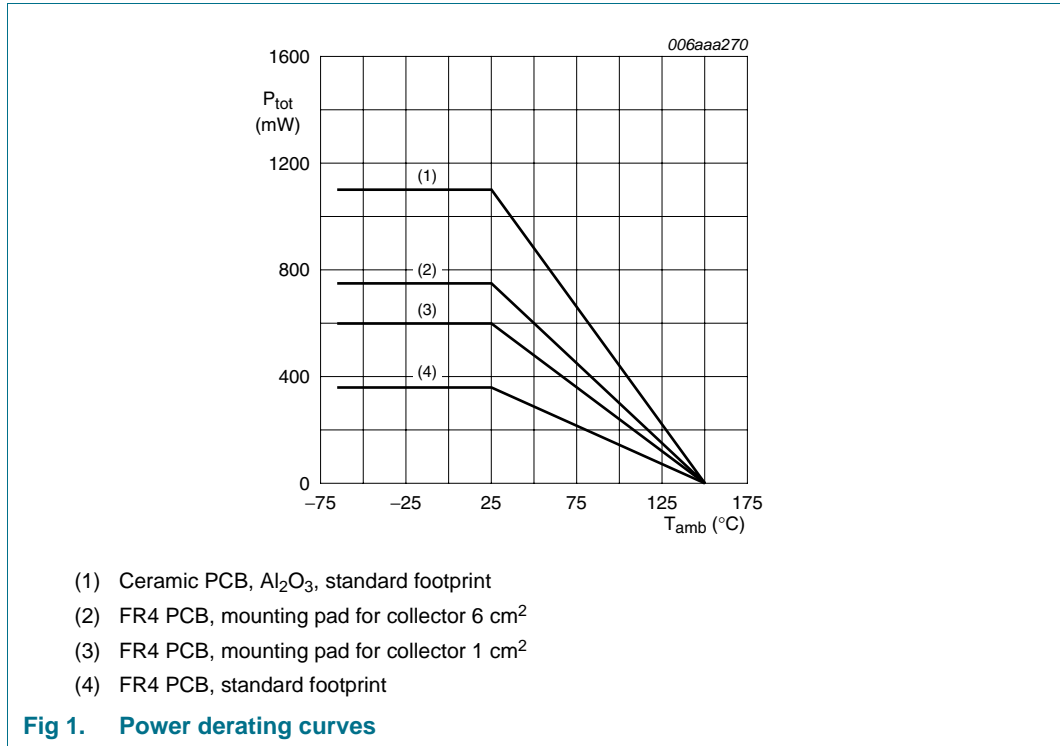
6.   Thermal characteristics

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]	-	-	350	K/W
			[2]	-	-	208	K/W
			[3]	-	-	167	K/W
			[4]	-	-	113	K/W
			[1][5]	-	-	50	K/W
R$_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	45	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 1 cm^2.

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

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

[5]   Pulse test: t$_p$ ≤ 10 ms; δ ≤ 10 %.

FR4 PCB, standard footprint

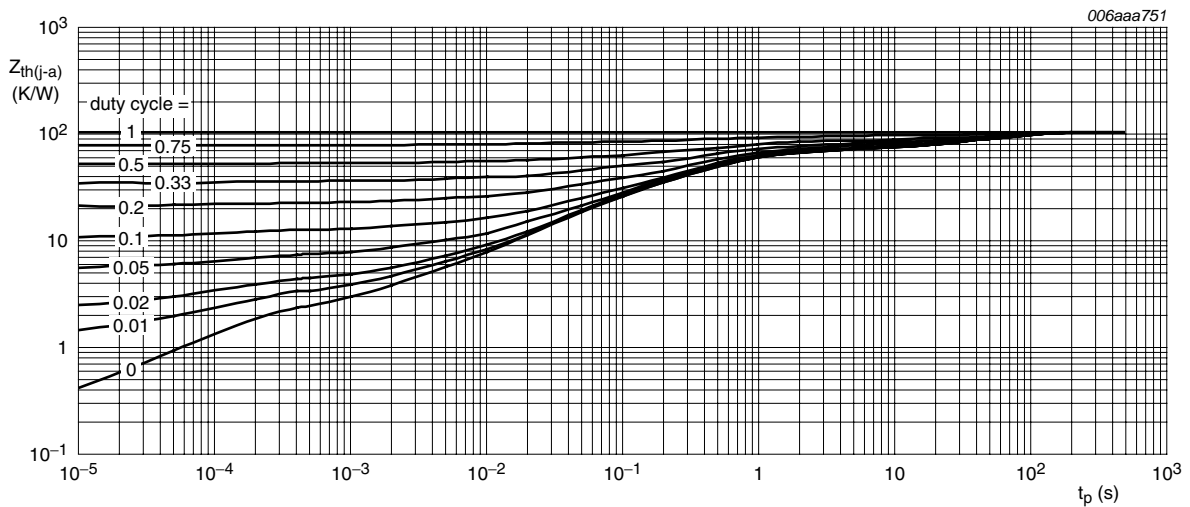**Fig 2.** Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
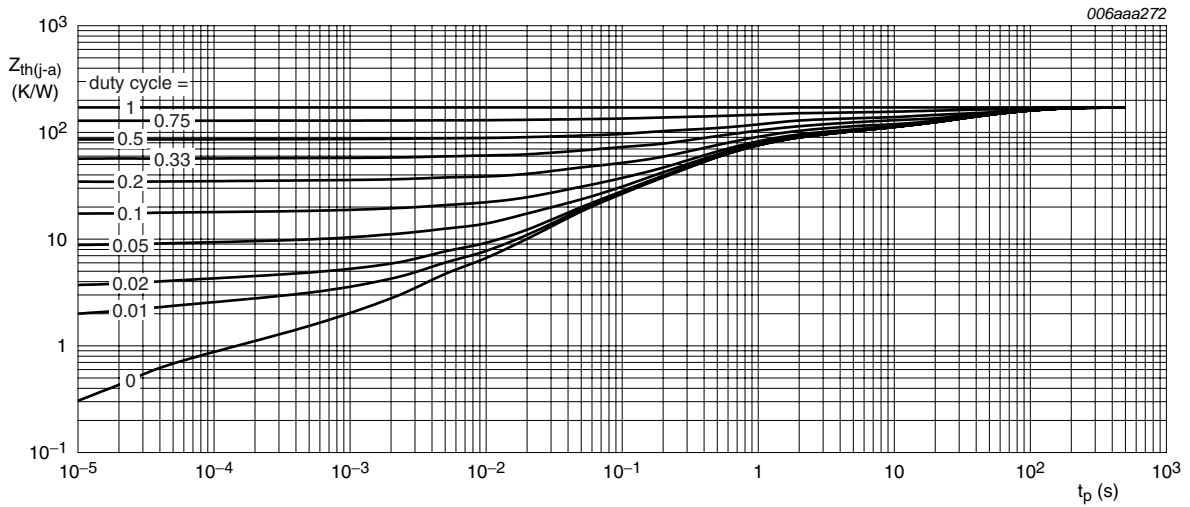
FR4 PCB, mounting pad for collector 1 cm^2

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
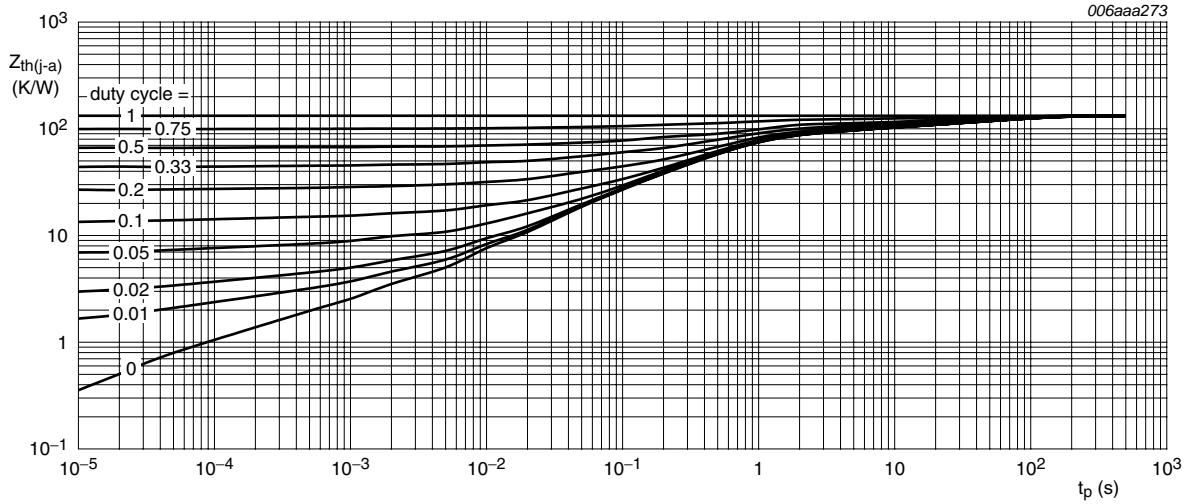
FR4 PCB, mounting pad for collector 6 cm^2

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

Ceramic PCB, Al$_2$O$_3$, standard footprint

Fig 5.   **Transient thermal impedance from junction to ambient as a function of pulse duration; 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	$V_{CB} = -60$ V; $I_E = 0$ A		-	-	−100	nA
		$V_{CB} = -60$ V; $I_E = 0$ A; $T_j = 150$ °C		-	-	−50	µA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -48$ V; $V_{BE} = 0$ V		-	-	−100	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5$ V; $I_C = 0$ A		-	-	−100	nA
h_{FE}	DC current gain	$V_{CE} = -2$ V; $I_C = -500$ mA		180	265	-	
		$V_{CE} = -2$ V; $I_C = -1$ A	[1]	160	235	-	
		$V_{CE} = -2$ V; $I_C = -2$ A	[1]	130	185	-	
		$V_{CE} = -2$ V; $I_C = -3$ A	[1]	95	135	-	
		$V_{CE} = -2$ V; $I_C = -4$ A	[1]	60	80	-	
		$V_{CE} = -2$ V; $I_C = -5$ A	[1]	35	50	-	
		$V_{CE} = -2$ V; $I_C = -6$ A	[1]	20	30	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -500$ mA; $I_B = -50$ mA		-	−55	−70	mV
		$I_C = -1$ A; $I_B = -50$ mA		-	−100	−135	mV
		$I_C = -2$ A; $I_B = -200$ mA	[1]	-	−150	−200	mV
		$I_C = -3$ A; $I_B = -150$ mA	[1]	-	−275	−365	mV
		$I_C = -3$ A; $I_B = -300$ mA	[1]	-	−210	−290	mV
		$I_C = -4$ A; $I_B = -400$ mA	[1]	-	−285	−385	mV
		$I_C = -5$ A; $I_B = -500$ mA	[1]	-	−375	−495	mV
		$I_C = -6$ A; $I_B = -600$ mA	[1]	-	−515	−675	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = -2$ A; $I_B = -200$ mA	[1]	-	75	100	mΩ
V_{BEsat}	base-emitter saturation voltage	$I_C = -500$ mA; $I_B = -50$ mA		-	−0.78	−0.87	V
		$I_C = -1$ A; $I_B = -50$ mA		-	−0.80	−0.89	V
		$I_C = -1$ A; $I_B = -100$ mA	[1]	-	−0.83	−0.92	V
		$I_C = -3$ A; $I_B = -150$ mA	[1]	-	−0.92	−0.99	V
		$I_C = -3$ A; $I_B = -300$ mA	[1]	-	−0.94	−1.02	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = -2$ V; $I_C = -2$ A		-	−0.80	−1.00	V

Table 7.   Characteristics *…continued*

T$_{amb}$ = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t$_d$	delay time	V$_{CC}$ = −9.2 V; I$_C$ = −2 A; I$_{Bon}$ = −0.1 A; I$_{Boff}$ = 0.1 A	-	13	-	ns
t$_r$	rise time		-	53	-	ns
t$_{on}$	turn-on time		-	66	-	ns
t$_s$	storage time		-	230	-	ns
t$_f$	fall time		-	76	-	ns
t$_{off}$	turn-off time		-	306	-	ns
f$_T$	transition frequency	V$_{CE}$ = −10 V; I$_C$ = −100 mA; f = 100 MHz	-	110	-	MHz
C$_c$	collector capacitance	V$_{CB}$ = −10 V; I$_E$ = i$_e$ = 0 A; f = 1 MHz	-	58	-	pF

[1]   Pulse test: t$_p$ ≤ 300 μs; δ ≤ 0.02.
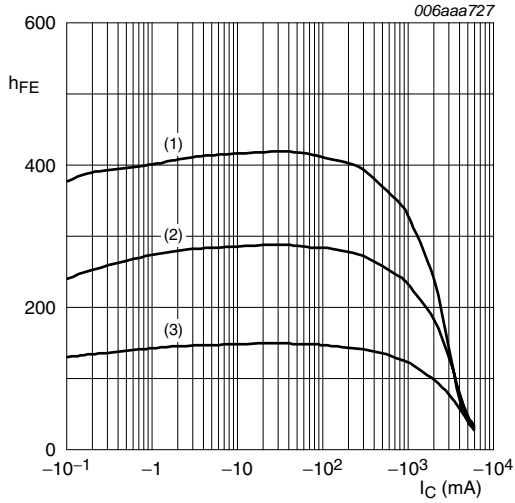
$V_{CE} = -2$ V

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = -55$ °C

Fig 6. DC current gain as a function of collector current; typical values
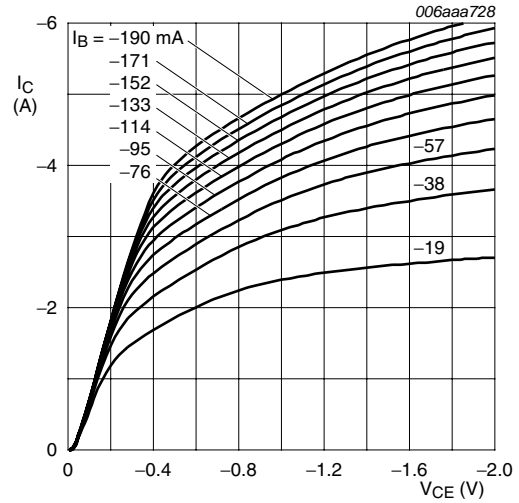
$T_{amb} = 25$ °C

Fig 7. Collector current as a function of collector-emitter voltage; typical values
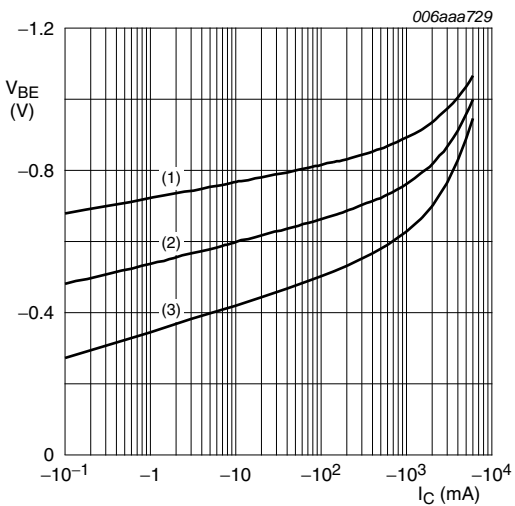
$V_{CE} = -2$ V

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = 100$ °C

Fig 8. Base-emitter voltage as a function of collector current; typical values
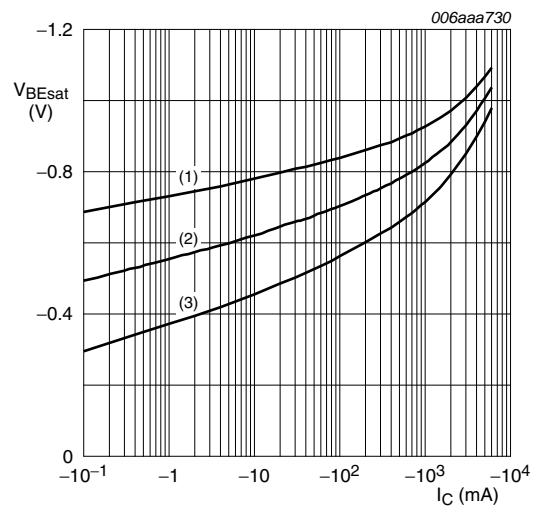
$I_C/I_B = 20$

(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
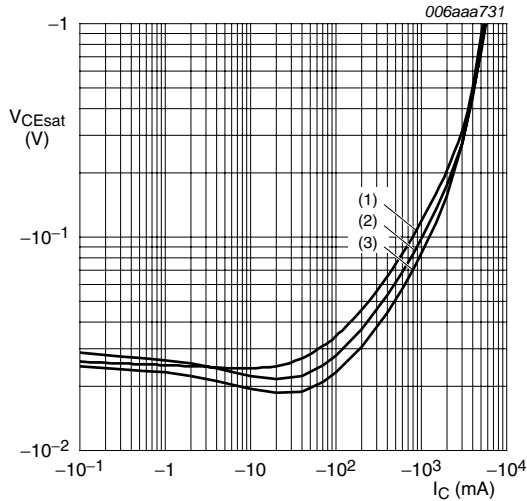
I$_C$/I$_B$ = 20
(1) T$_{amb}$ = 100 °C
(2) T$_{amb}$ = 25 °C
(3) T$_{amb}$ = −55 °C

Fig 10. Collector-emitter saturation voltage as a function of collector current; typical values
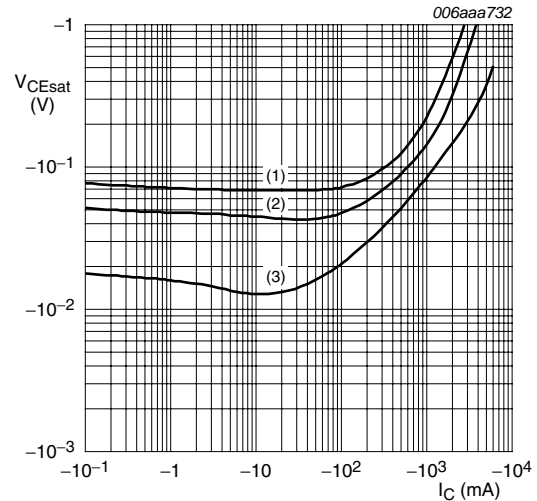
T$_{amb}$ = 25 °C
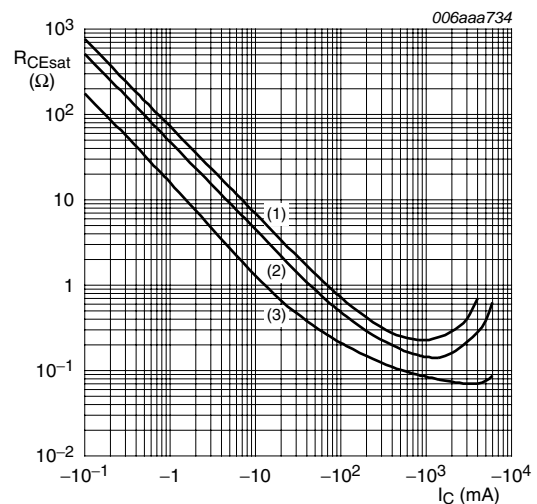(1) I$_C$/I$_B$ = 100
(2) I$_C$/I$_B$ = 50
(3) I$_C$/I$_B$ = 10

Fig 11. Collector-emitter saturation voltage as a function of collector current; typical values
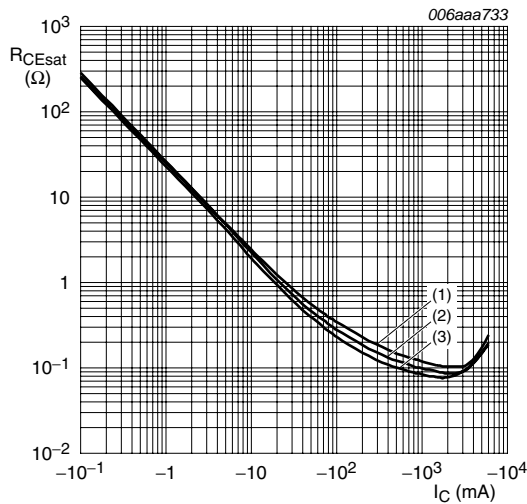
I$_C$/I$_B$ = 20
(1) T$_{amb}$ = 100 °C
(2) T$_{amb}$ = 25 °C
(3) T$_{amb}$ = −55 °C

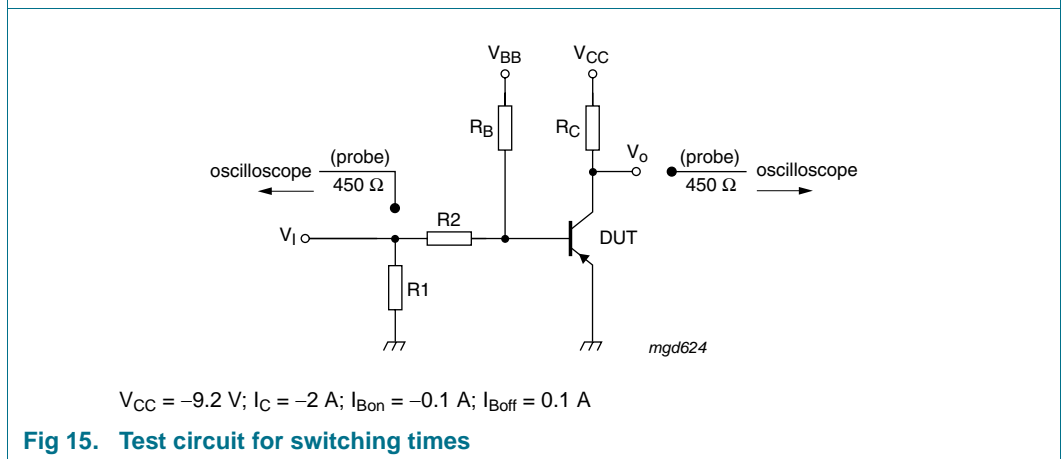**Fig 12. Collector-emitter saturation resistance as a function of collector current; typical values**

T$_{amb}$ = 25 °C
(1) I$_C$/I$_B$ = 100
(2) I$_C$/I$_B$ = 50
(3) I$_C$/I$_B$ = 10

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

8. Test information
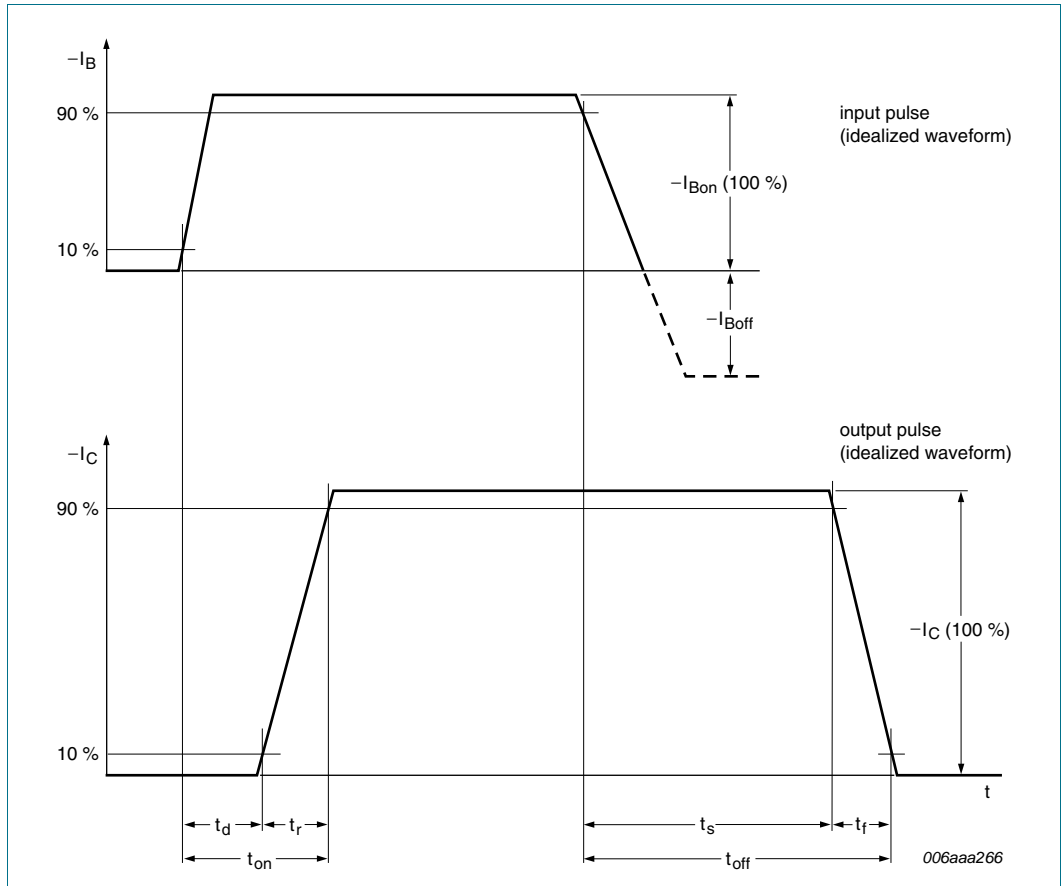
Fig 14. BISS transistor switching time definition

$V_{CC} = -9.2$ V; $I_C = -2$ A; $I_{Bon} = -0.1$ A; $I_{Boff} = 0.1$ A

Fig 15. Test circuit for switching times

9. Package outline

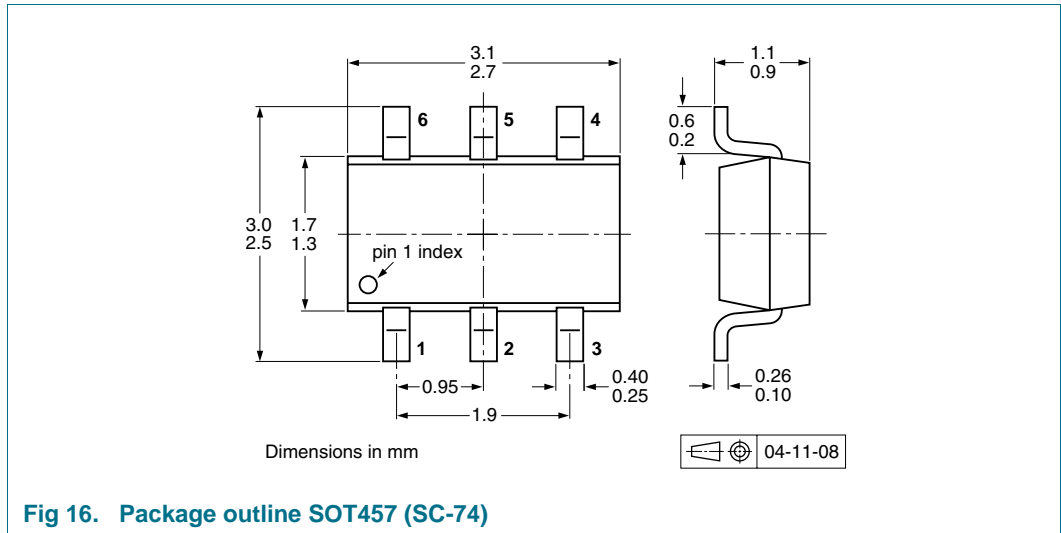Dimensions in mm

Fig 16.   Package outline SOT457 (SC-74)

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	
				3000	**10000**
PBSS303PD	SOT457	4 mm pitch, 8 mm tape and reel; T1	[2]	-115	-135
		4 mm pitch, 8 mm tape and reel; T2	[3]	-125	-165

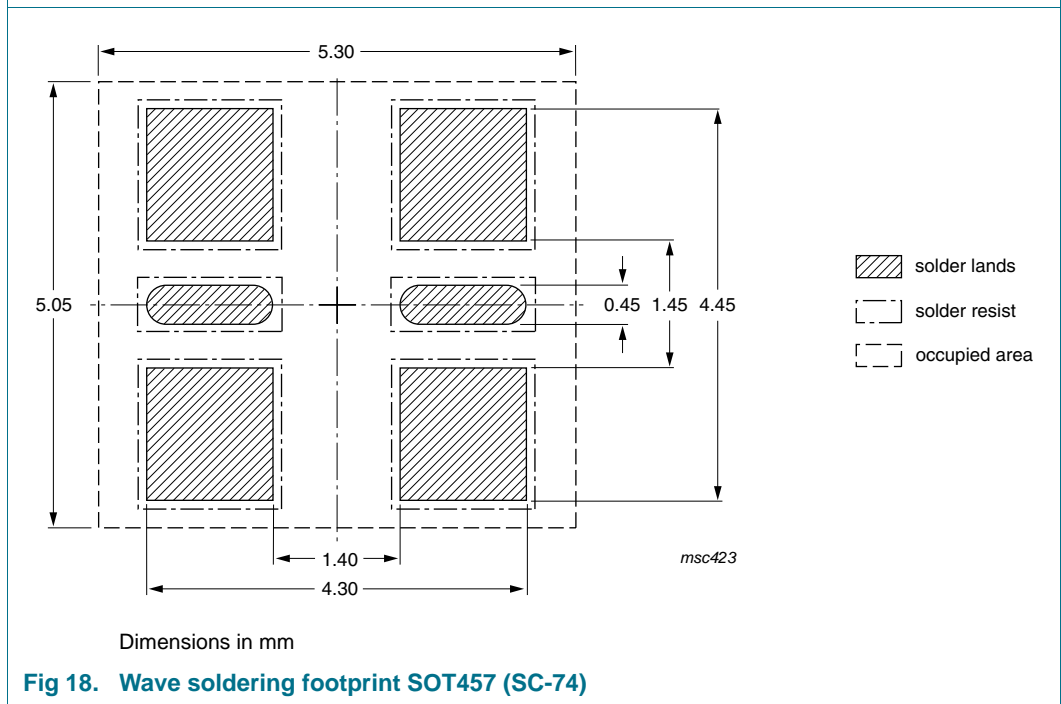[1]   For further information and the availability of packing methods, see Section 14.

[2]   T1: normal taping

[3]   T2: reverse taping

11. Soldering

Dimensions in mm
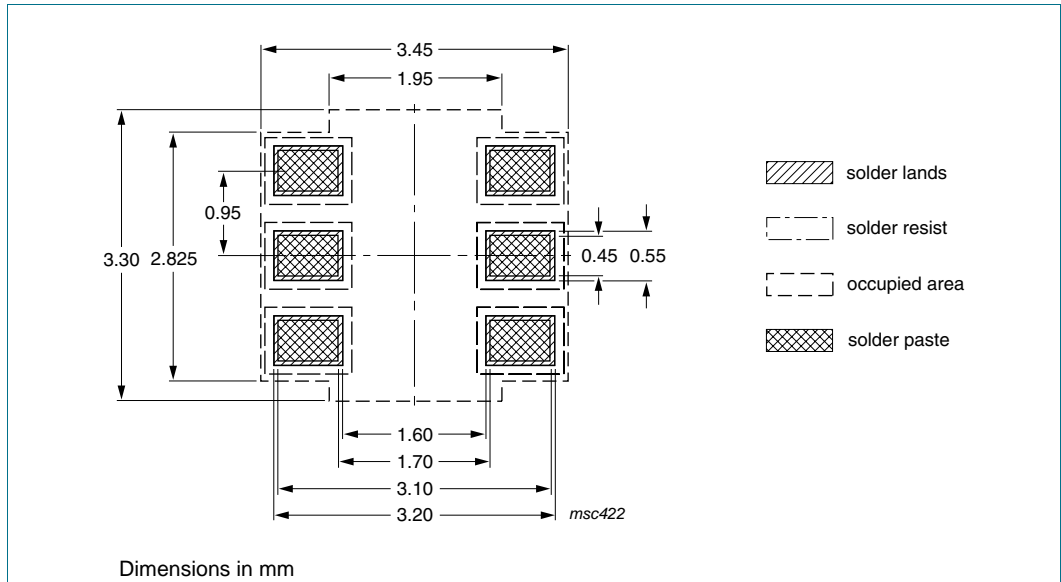
Fig 17. Reflow soldering footprint SOT457 (SC-74)

Dimensions in mm

Fig 18. Wave soldering footprint SOT457 (SC-74)

12. Revision history

Table 9. **Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS303PD_2	20091120	Product data sheet	-	PBSS303PD_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.			
PBSS303PD_1	20060531	Product data sheet	-	-

13. Legal information

13.1 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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