



PBSS9110D

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

Rev. 02 — 13 July 2006

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: PBSS8110D.

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)
- 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	-	-	-100	V
I_C	collector current		-	-	-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; $\delta \leq 0.02$.

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2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1, 2, 5, 6	collector		
3	base		
4	emitter		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS9110D	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457

4. Marking

Table 4. Marking codes

Type number	Marking code
PBSS9110D	A7

5. Limiting values

Table 5. Limiting values

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

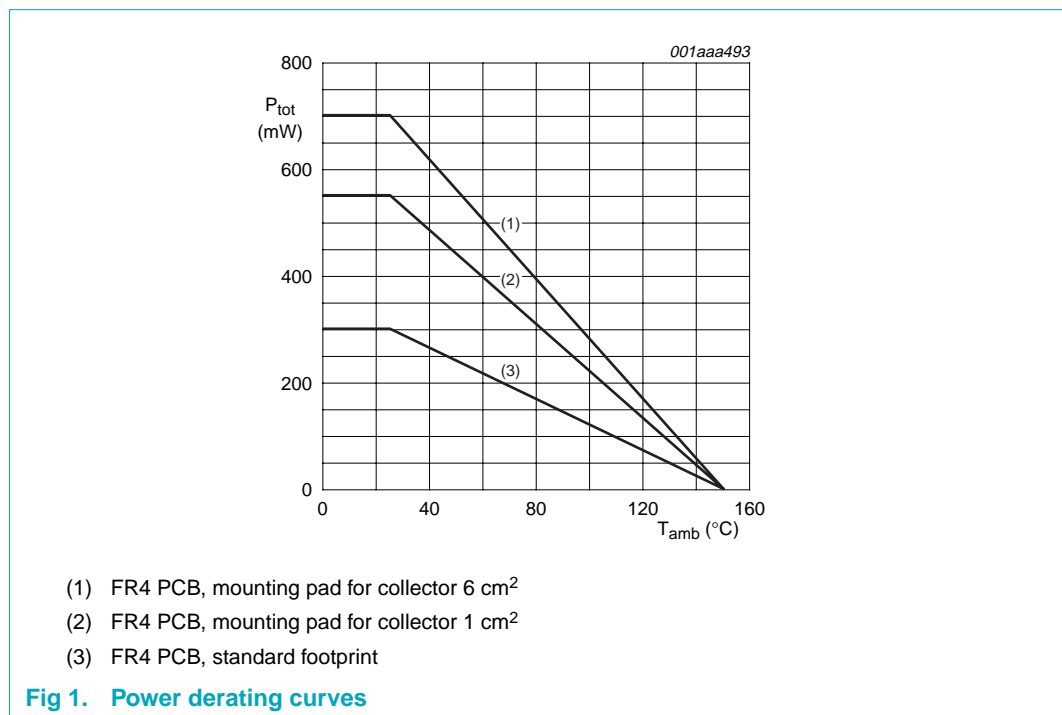
Symbol	Parameter	Conditions	Min	Max	Unit	
V_{CBO}	collector-base voltage	open emitter	-	-120	V	
V_{CEO}	collector-emitter voltage	open base	-	-100	V	
V_{EBO}	emitter-base voltage	open collector	-	-5	V	
I_C	collector current		-	-1	A	
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-3	A	
I_B	base current		-	-0.3	A	
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	300	mW
			[2]	-	550	mW
			[3]	-	700	mW

Table 5. Limiting values ...continued

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

Symbol	Parameter	Conditions	Min	Max	Unit
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 an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

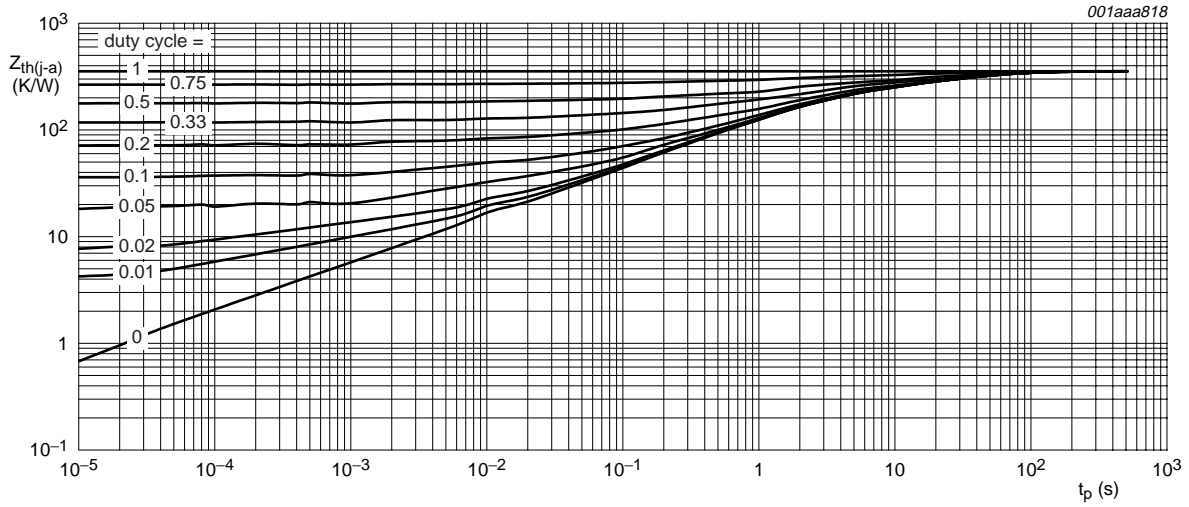


6. Thermal characteristics

Table 6. Thermal characteristics

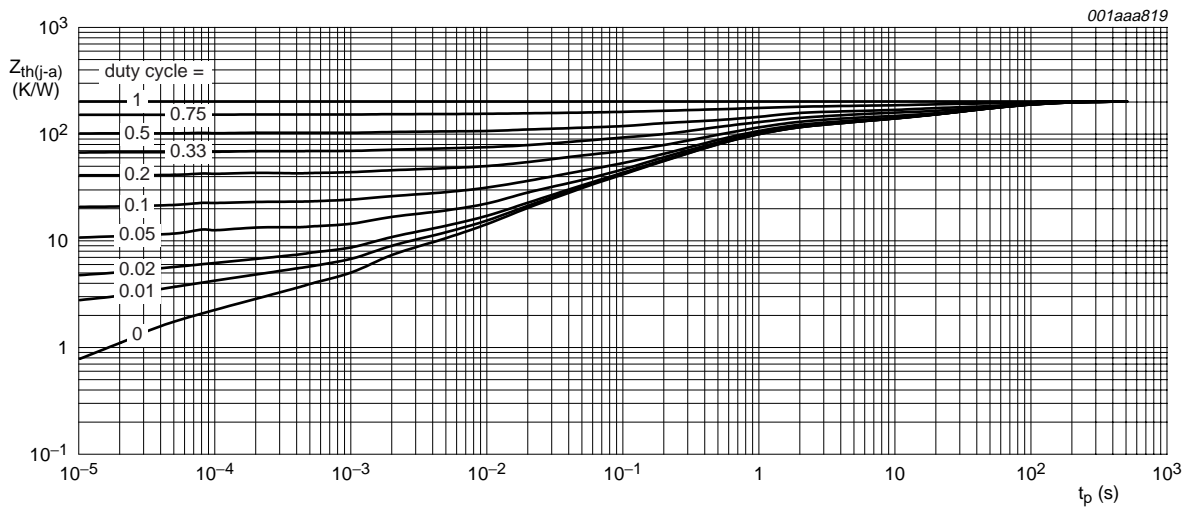
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	416	K/W
			[2]	-	-	227	K/W
			[3]	-	-	178	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	83	K/W	

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



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 cm²

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

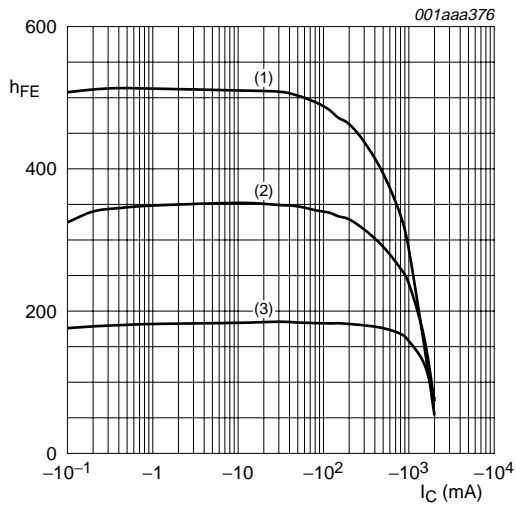
7. Characteristics

Table 7. Characteristics

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

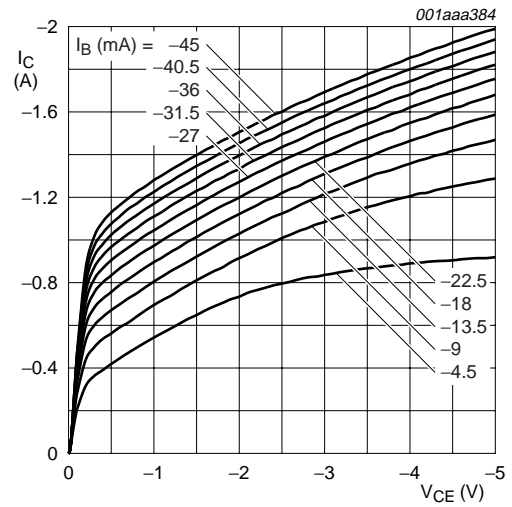
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -80\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -80\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	-50	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -80\text{ V}; V_{BE} = 0\text{ V}$	-	-	-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
		$I_C = -0.5\text{ A}; I_B = -50\text{ mA}$	[1] -	-	-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] -	-	-1.1	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = -5\text{ V}; I_C = -1\text{ A}$	-	-	-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	$V_{CE} = -10\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}$	100	-	-	MHz
C_C	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	17	pF

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



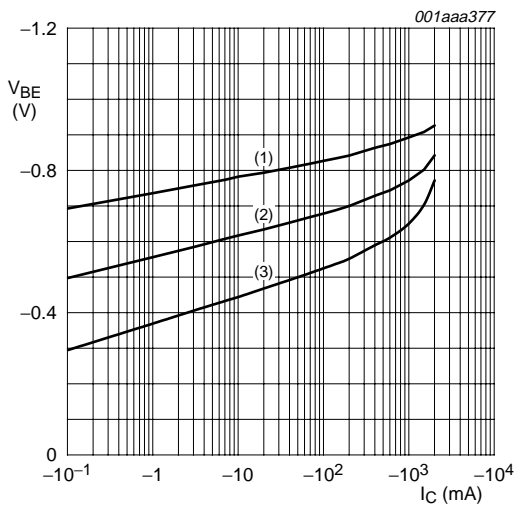
$V_{CE} = -10\text{ V}$
 (1) $T_{amb} = 100\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = -55\text{ }^\circ\text{C}$

Fig 4. DC current gain as a function of collector current; typical values



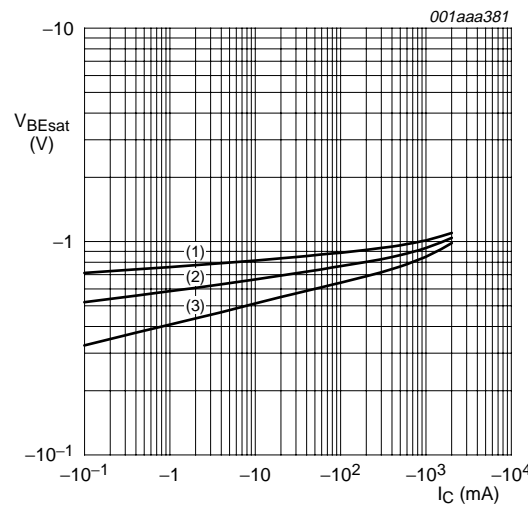
$T_{amb} = 25\text{ }^\circ\text{C}$

Fig 5. Collector current as a function of collector-emitter voltage; typical values



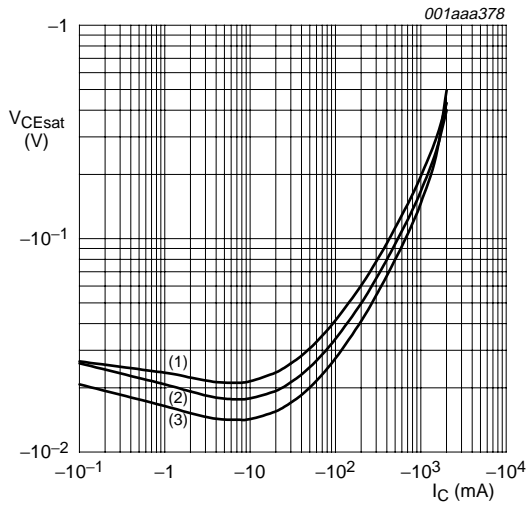
$V_{CE} = -10\text{ V}$
 (1) $T_{amb} = -55\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = 100\text{ }^\circ\text{C}$

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



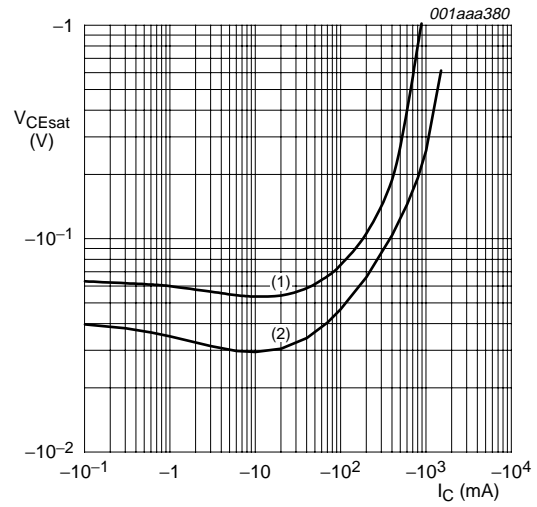
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = 100\text{ }^\circ\text{C}$

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



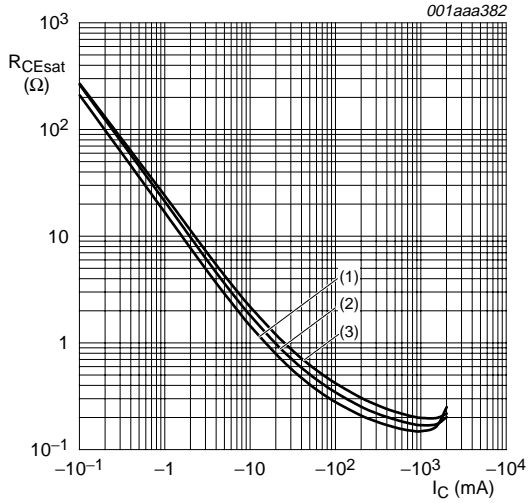
$I_C/I_B = 10$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



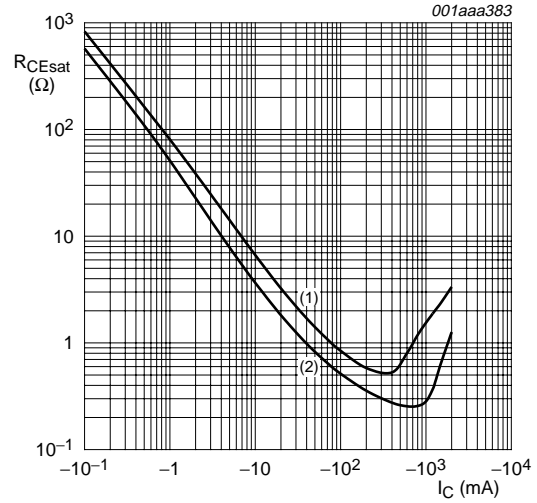
$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 50$
 (2) $I_C/I_B = 20$

Fig 9. 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 10. 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 11. Collector-emitter saturation resistance as a function of collector current; typical values

8. Test information

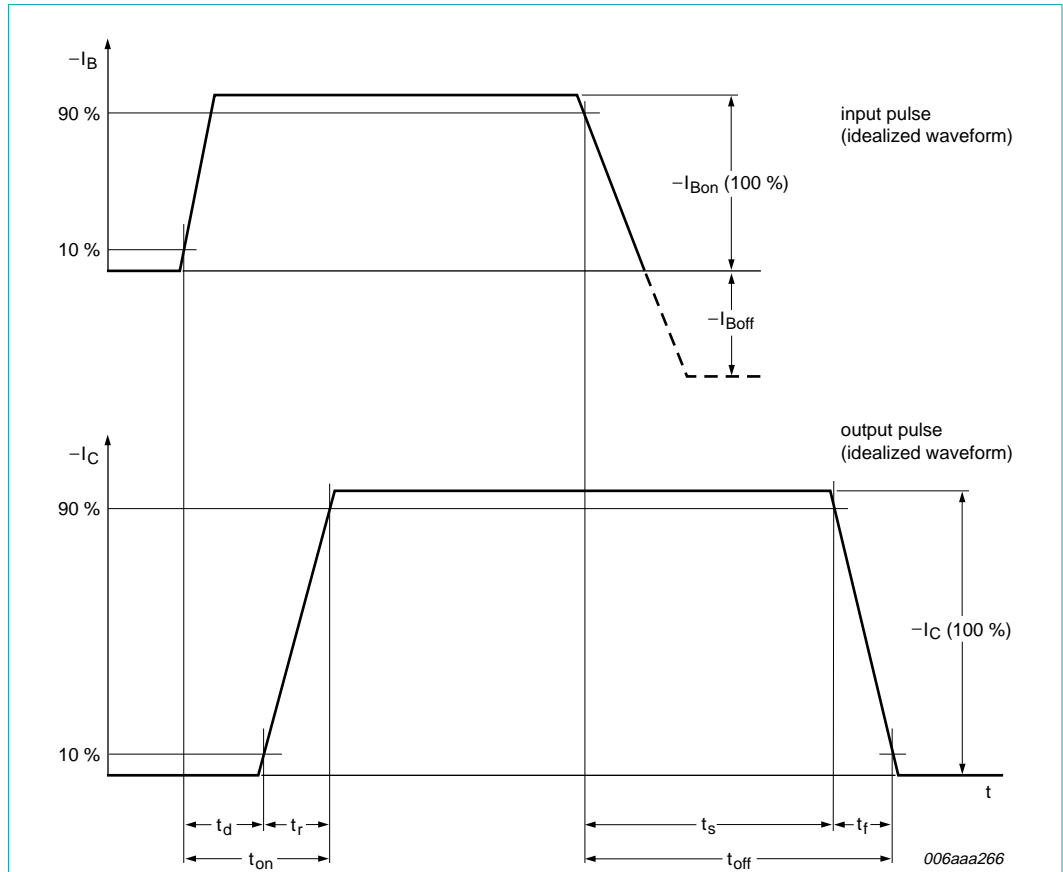


Fig 12. BISS transistor switching time definition

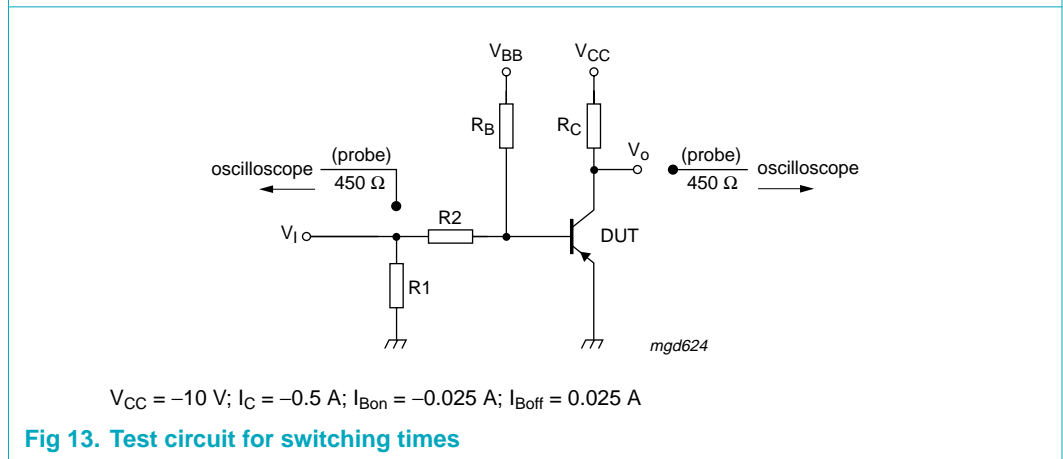
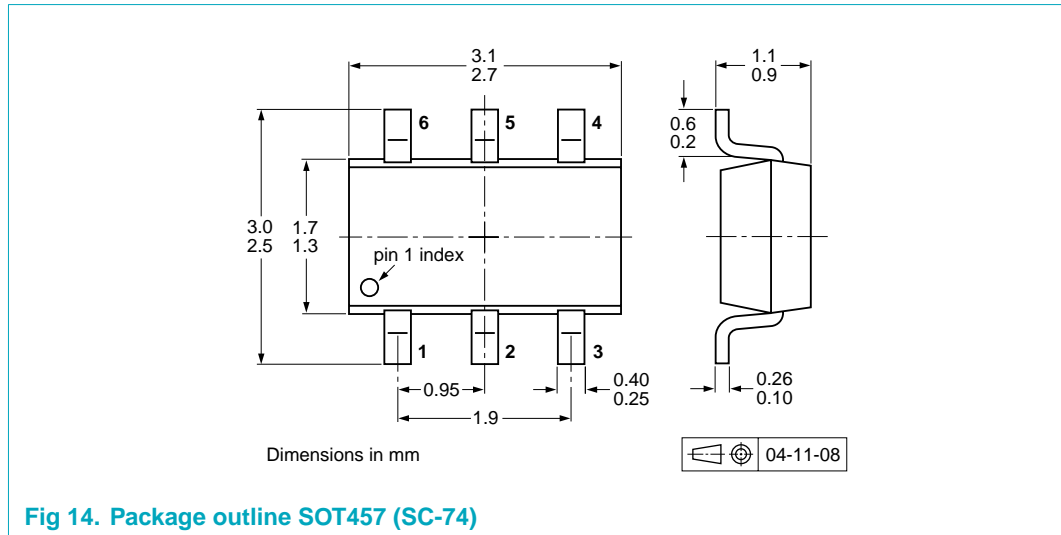


Fig 13. Test circuit for switching times

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	
			3000	10000
PBSS9110D	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

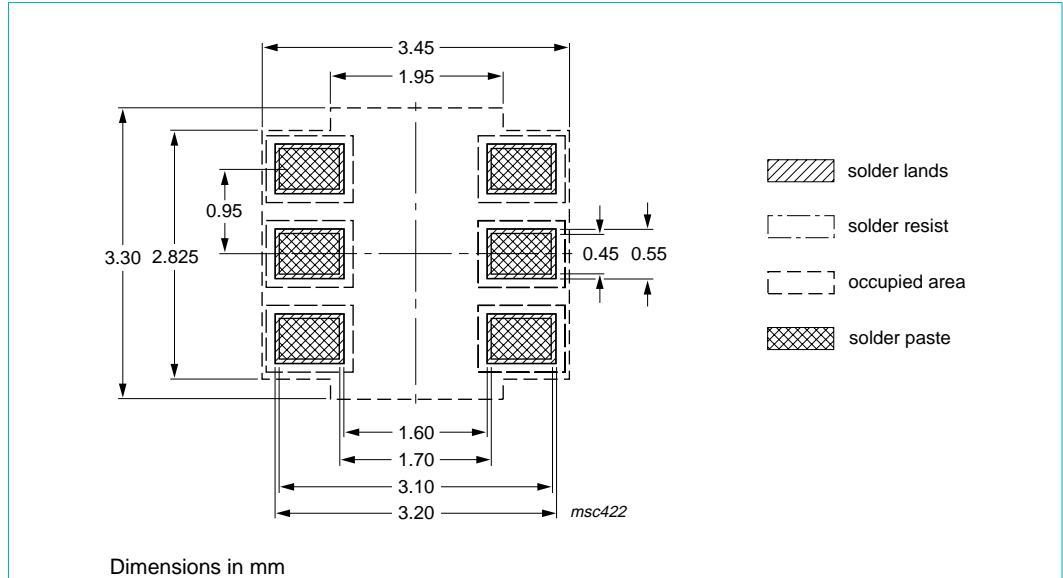


Fig 15. Reflow soldering footprint SOT457 (SC-74)

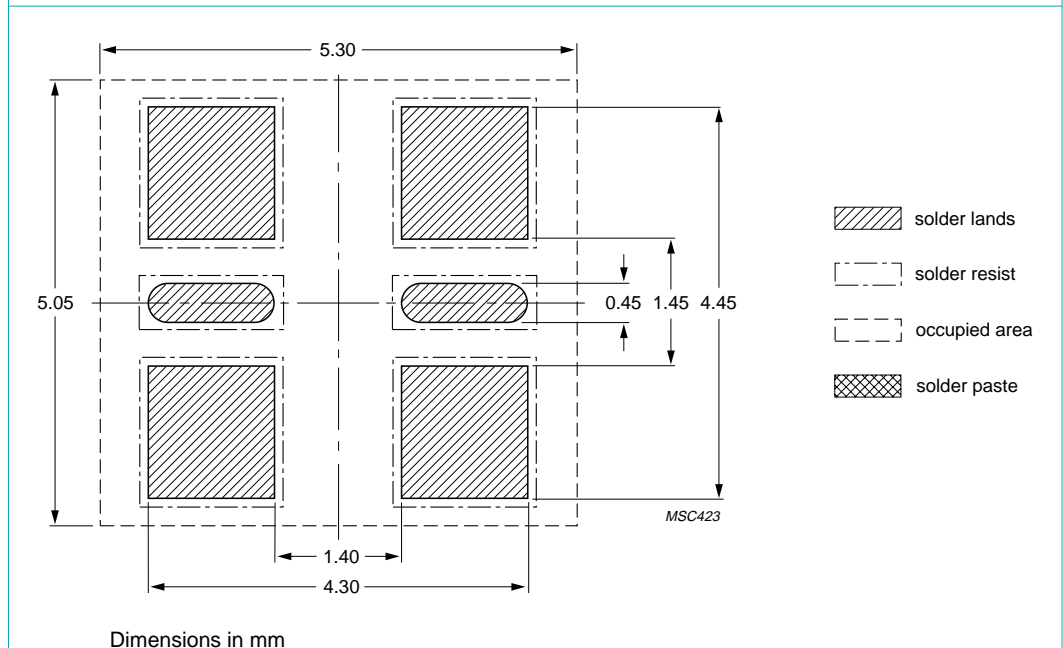


Fig 16. Wave soldering footprint SOT457 (SC-74)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS9110D_2	20060713	Product data sheet	-	PBSS9110D_1
Modifications:				
		<ul style="list-style-type: none"> • Section 1.1 “General description”: amended • Section 1.2 “Features”: amended • Table 1: R_{CEsat} equivalent on-resistance redefined to collector-emitter saturation resistance • Table 3 “Ordering information”: amended • Table 5: T_{amb} operating ambient temperature redefined to ambient temperature • Table 6 “Thermal characteristics”: amended • Table 6: $R_{th(j-s)}$ thermal resistance from junction to soldering redefined to $R_{th(j-sp)}$ thermal resistance from junction to solder point • Figure 2: amended • Figure 2: Z_{th} transient thermal impedance redefined to $Z_{th(j-a)}$ transient thermal impedance from junction to ambient • Figure 2: t_p pulse time redefined to pulse duration • Figure 3: amended • Figure 3: Z_{th} transient thermal impedance redefined to $Z_{th(j-a)}$ transient thermal impedance from junction to ambient • Figure 3: t_p pulse time redefined to pulse duration • Table 7: R_{CEsat} equivalent on-resistance redefined to collector-emitter saturation resistance • Figure 4, 5 and 11: amended • Section 8 “Test information”: added • Figure 14: superseded by minimized package outline drawing • Section 10 “Packing information” added • Section 11 “Soldering”: added • Section 13 “Legal information”: updated 		
PBSS9110D_1	20040611	Objective 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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15. Contents

1	Product profile	1
1.1	General description.	1
1.2	Features	1
1.3	Applications	1
1.4	Quick reference data.	1
2	Pinning information	2
3	Ordering information	2
4	Marking	2
5	Limiting values	2
6	Thermal characteristics	3
7	Characteristics	5
8	Test information	8
9	Package outline	9
10	Packing information	9
11	Soldering	10
12	Revision history	11
13	Legal information	12
13.1	Data sheet status	12
13.2	Definitions.	12
13.3	Disclaimers	12
13.4	Trademarks.	12
14	Contact information	12
15	Contents	13



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