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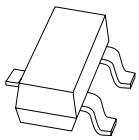


PBSS5140T

40 V, 1 A PNP low V_{CEsat} BISS transistor

Rev. 04 — 29 July 2008 **Product data sheet**

1. Product profile

1.1 General description

PNP low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a SOT23 (TO-236AB) small Surface-Mounted Device (SMD) plastic package.

NPN complement: PBSS4140T.

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

1.3 Applications

- General-purpose switching and muting
- LCD backlighting
- Supply line switching circuits
- Battery-driven equipment (mobile phones, video cameras and handheld devices)

1.4 Quick reference data

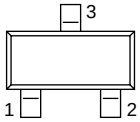
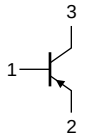
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	–40	V
I_C	collector current			-	-	–1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	–2	A
R_{CEsat}	collector-emitter saturation resistance	I_C = –500 mA; I_B = –50 mA	[1]	-	300	< 500	mΩ

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

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base		
2	emitter		
3	collector		

006aab259

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5140T	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PBSS5140T	*2H

[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	-	–40	V
V_{CEO}	collector-emitter voltage	open base	-	–40	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	-	–2	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms	-	–1	A

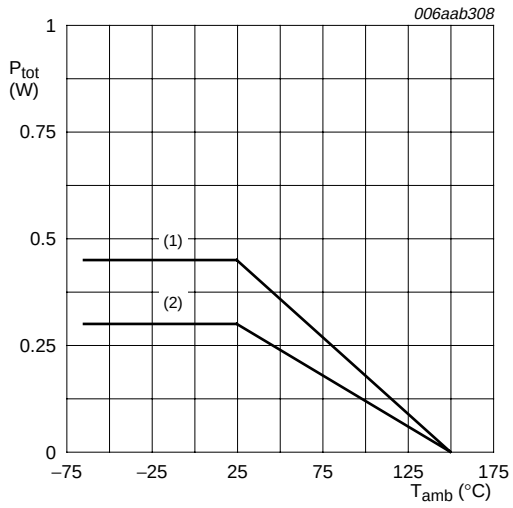
Table 5. Limiting values *…continued*

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

Symbol	Parameter	Conditions		Min	Max	Unit
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C				
			[1]	-	300	mW
			[2]	-	450	mW
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 1 cm^2.



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

(2) FR4 PCB, standard footprint

Fig 1. Power derating curves

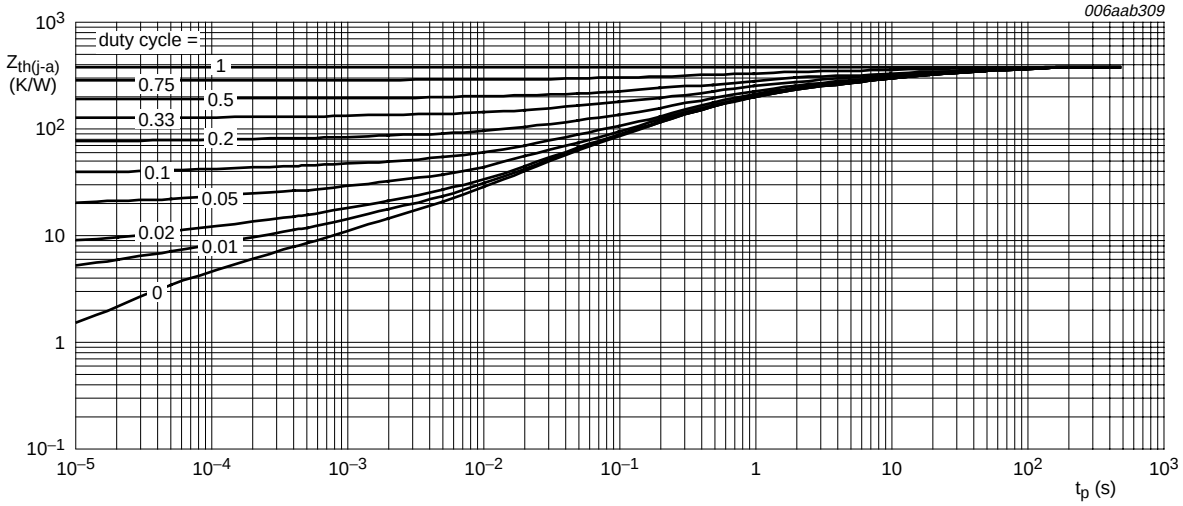
6. Thermal characteristics

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]	-	-	417	K/W
			[2]	-	-	278	K/W

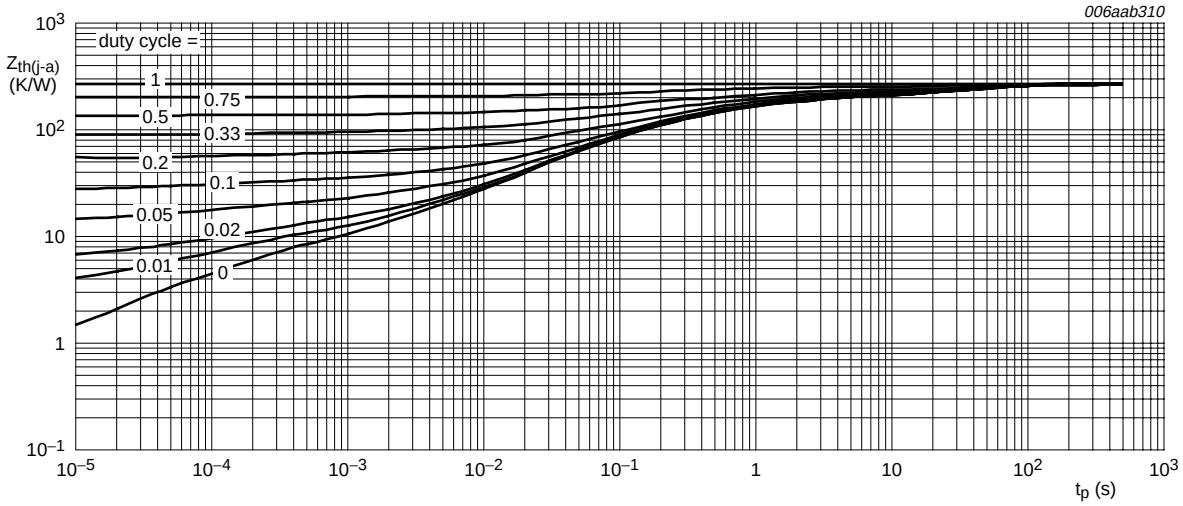
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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



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

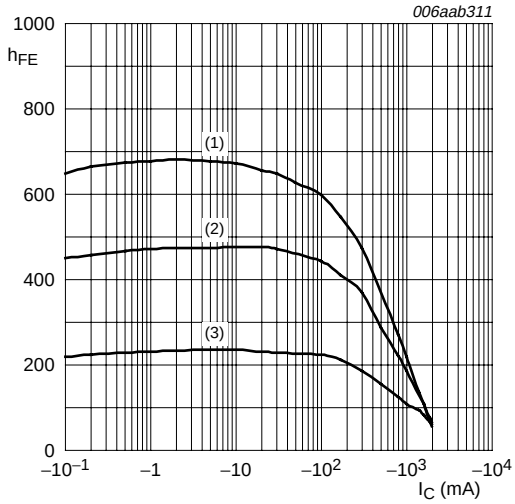
7. Characteristics

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} = –40 V; I_E = 0 A		-	-	–100	nA
		V_{CB} = –40 V; I_E = 0 A; T_j = 150 °C		-	-	–50	µA
I_{CEO}	collector-emitter cut-off current	V_{CE} = –30 V; I_B = 0 A		-	-	–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} = –5 V; I_C = –1 mA		300	-	-	
		V_{CE} = –5 V; I_C = –100 mA		300	-	800	
		V_{CE} = –5 V; I_C = –500 mA	[1]	250	-	-	
		V_{CE} = –5 V; I_C = –1 A	[1]	160	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = –100 mA; I_B = –1 mA		-	-	–200	mV
		I_C = –500 mA; I_B = –50 mA	[1]	-	-	–250	mV
		I_C = –1 A; I_B = –100 mA	[1]	-	-	–500	mV
R_{CEsat}	collector-emitter saturation resistance	I_C = –500 mA; I_B = –50 mA	[1]	-	300	< 500	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = –1 A; I_B = –50 mA	[1]	-	-	–1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = –5 V; I_C = –1 A		-	-	–1	V
t_d	delay time	V_{CC} = –10 V; I_C = –0.5 A; I_{Bon} = –25 mA; I_{Boff} = 25 mA		-	10	-	ns
t_r	rise time			-	31	-	ns
t_{on}	turn-on time			-	41	-	ns
t_s	storage time			-	195	-	ns
t_f	fall time			-	65	-	ns
t_{off}	turn-off time			-	260	-	ns
f_T	transition frequency	V_{CE} = –10 V; I_C = –50 mA; f = 100 MHz		150	-	-	MHz
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz		-	-	12	pF

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



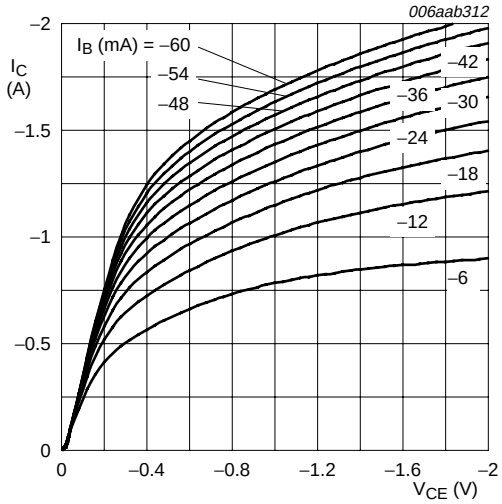
V_{CE} = −5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

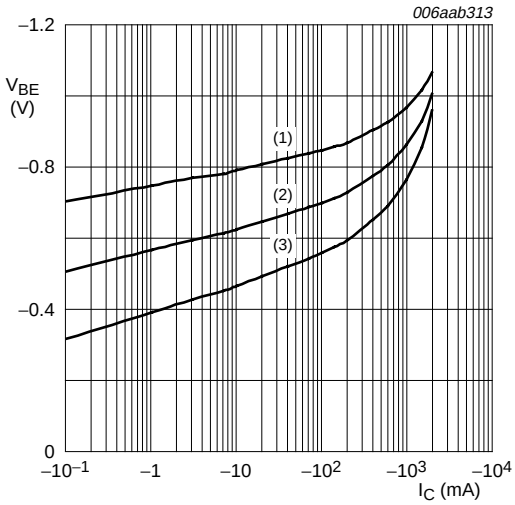
(3) T_{amb} = −55 °C

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



T_{amb} = 25 °C

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



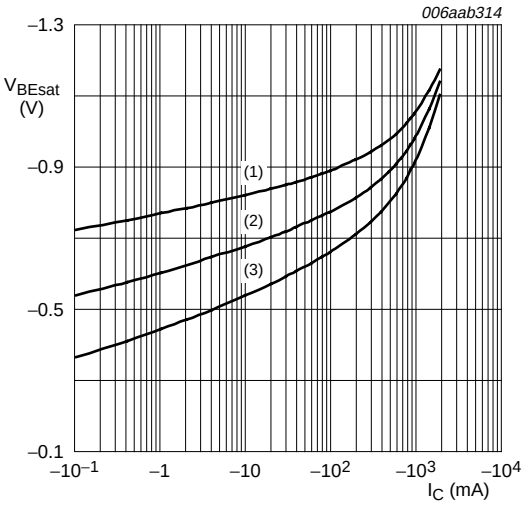
V_{CE} = −5 V

(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



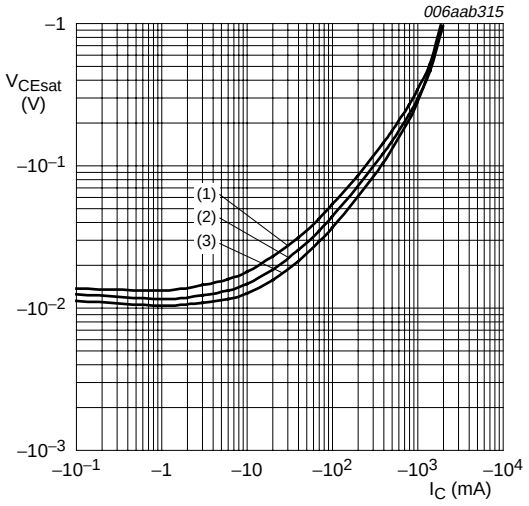
I_C/I_B = 20

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

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



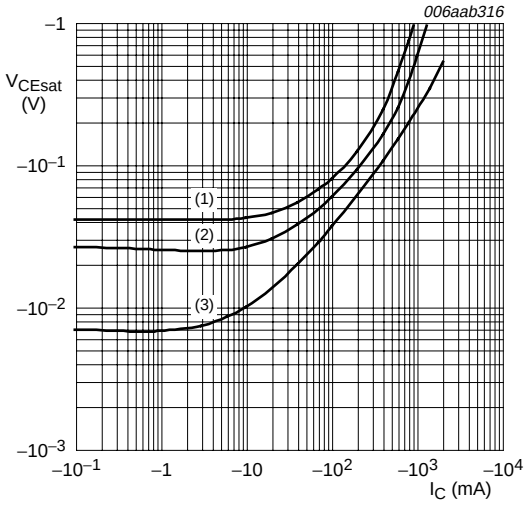
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

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



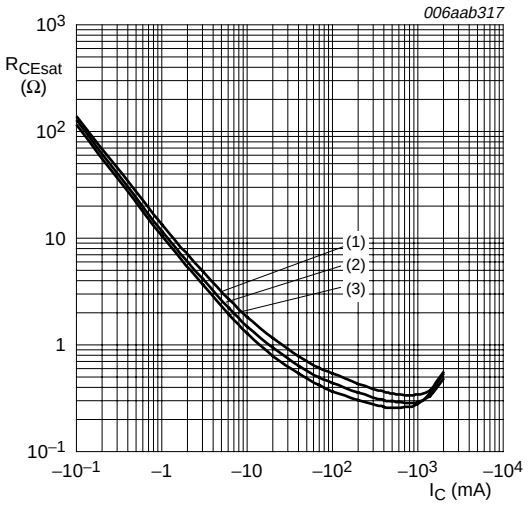
T_{amb} = 25 °C

(1) I_C/I_B = 100

(2) I_C/I_B = 50

(3) I_C/I_B = 10

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



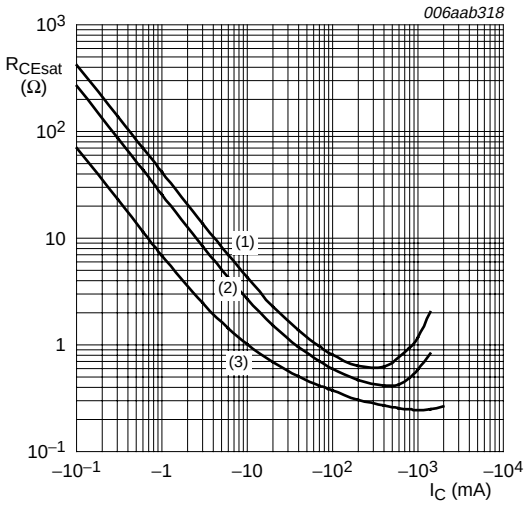
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

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

8. Test information

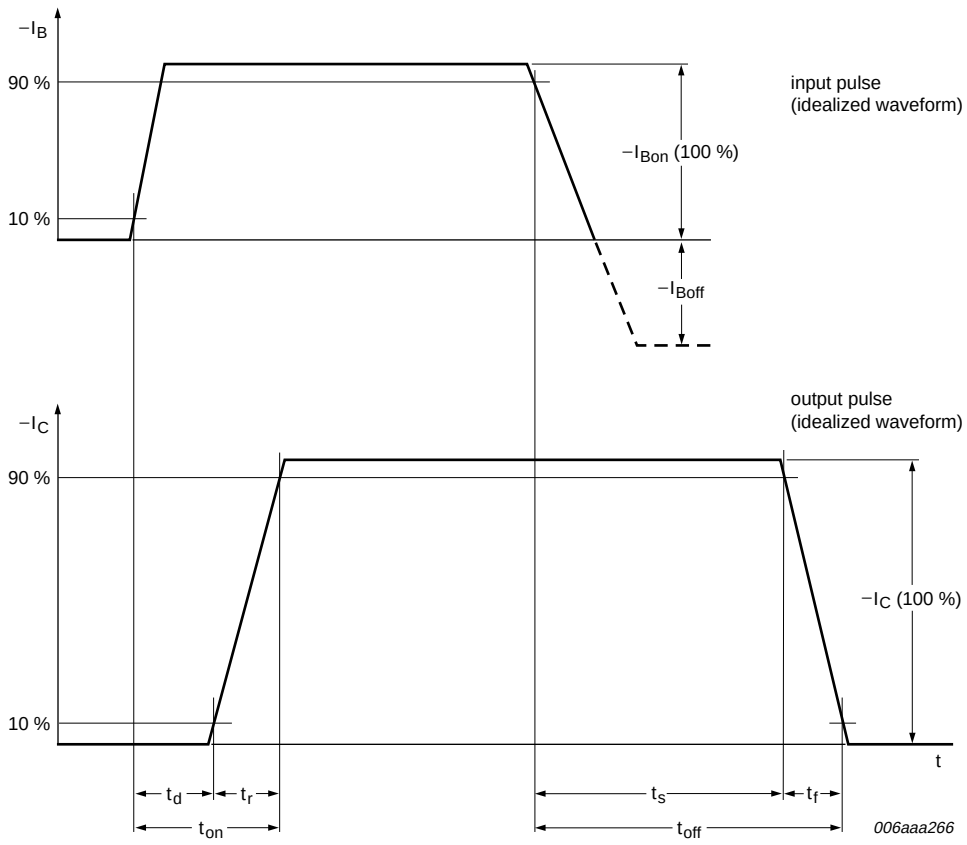
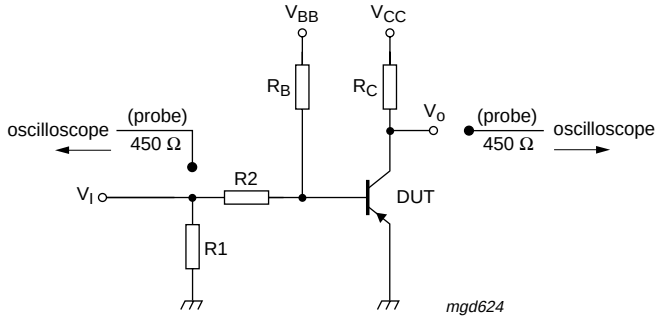


Fig 12. BISS transistor switching time definition



V_{CC} = −10 V; I_C = −0.5 A; I_{Bon} = −25 mA; I_{Boff} = 25 mA

Fig 13. Test circuit for switching times

9. Package outline

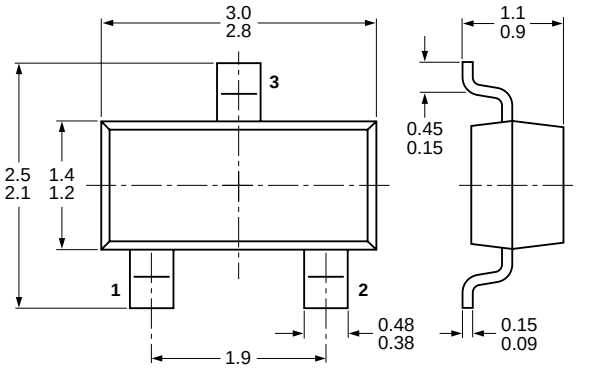


Fig 14. Package outline SOT23 (TO-236AB)

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
PBSS5140T	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

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

11. Soldering

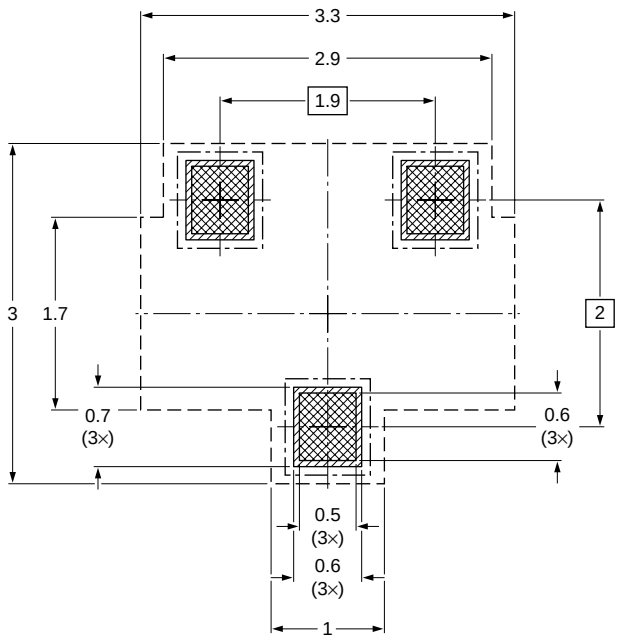


Fig 15. Reflow soldering footprint SOT23 (TO-236AB)

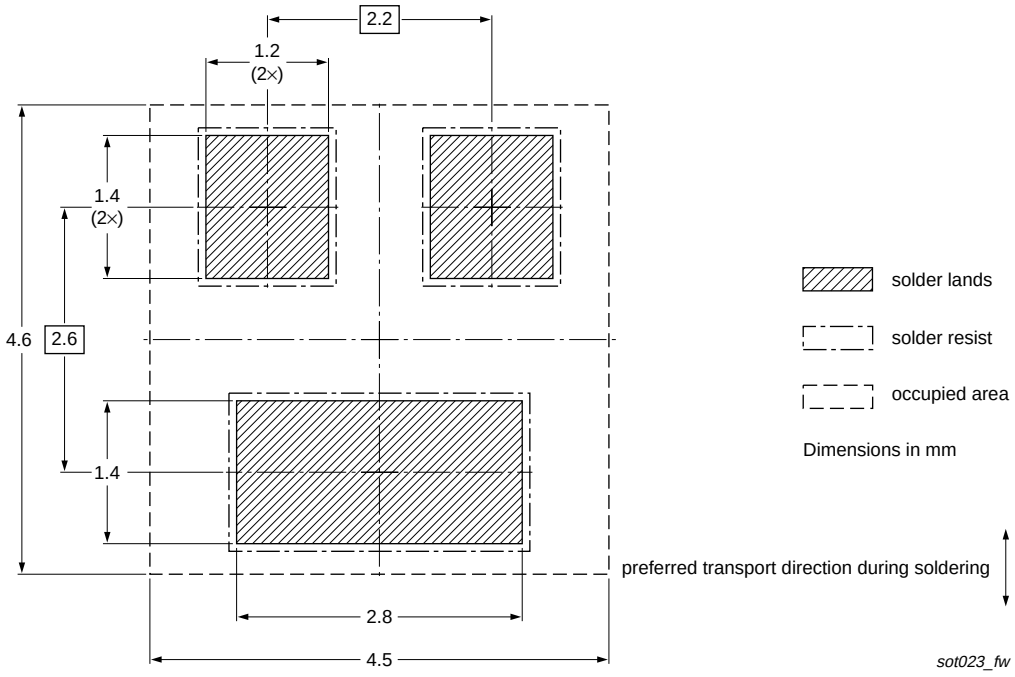


Fig 16. Wave soldering footprint SOT23 (TO-236AB)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5140T_4	20080729	Product data sheet	-	PBSS5140T_3
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Table 4 “Marking codes”: marking code corrected • Table 5 “Limiting values”: conditions added for I_{CM} and I_{BM} • Figure 1, 2 and 3: added • Table 7: R_{CEsat} redefined to collector-emitter saturation resistance • Figure 4, 6, 8 and 10: updated • Figure 5, 7, 9 and 11: added • Section 8 “Test information”: added • Figure 14: superseded by minimized package outline drawing • Section 11 “Soldering”: added • Section 13 “Legal information”: updated			
PBSS5140T_3	20040107	Product specification	-	PBSS5140T_2
PBSS5140T_2	20010720	Product specification	-	PBSS5140T_1
PBSS5140T_1	20001116	Product specification	-	-

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.

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

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15. Contents

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Date of release: 29 July 2008
Document identifier: PBSS5140T_4

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