

PBSS3515E

15 V, 0.5 A PNP low V_{CEsat} (BISS) transistor

Rev. 01 — 18 April 2005

Product data sheet

1. Product profile

1.1 General description

PNP low V_{CEsat} Breakthrough in Small Signal (BISS) transistor in a SOT416 (SC-75) SMD plastic package.

NPN complement: PBSS2515E.

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

- DC-to-DC conversion
- MOSFET gate driving
- Motor control
- Charging circuits
- Low power switches (e.g. motors, fans)
- Portable applications

1.4 Quick reference data

Table 1: Quick reference data

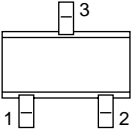
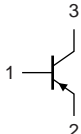
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-15	V
I_C	collector current (DC)		-	-	-0.5	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	-1	A
R_{CEsat}	collector-emitter saturation resistance	$I_C = -500$ mA; $I_B = -50$ mA	[1] -	300	500	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	base		
2	emitter		
3	collector		

sym013

3. Ordering information

Table 3: Ordering information

Type number	Package		
	Name	Description	Version
PBSS3515E	SC-75	plastic surface mounted package; 3 leads	SOT416

4. Marking

Table 4: Marking codes

Type number	Marking code
PBSS3515E	1R

5. Limiting values

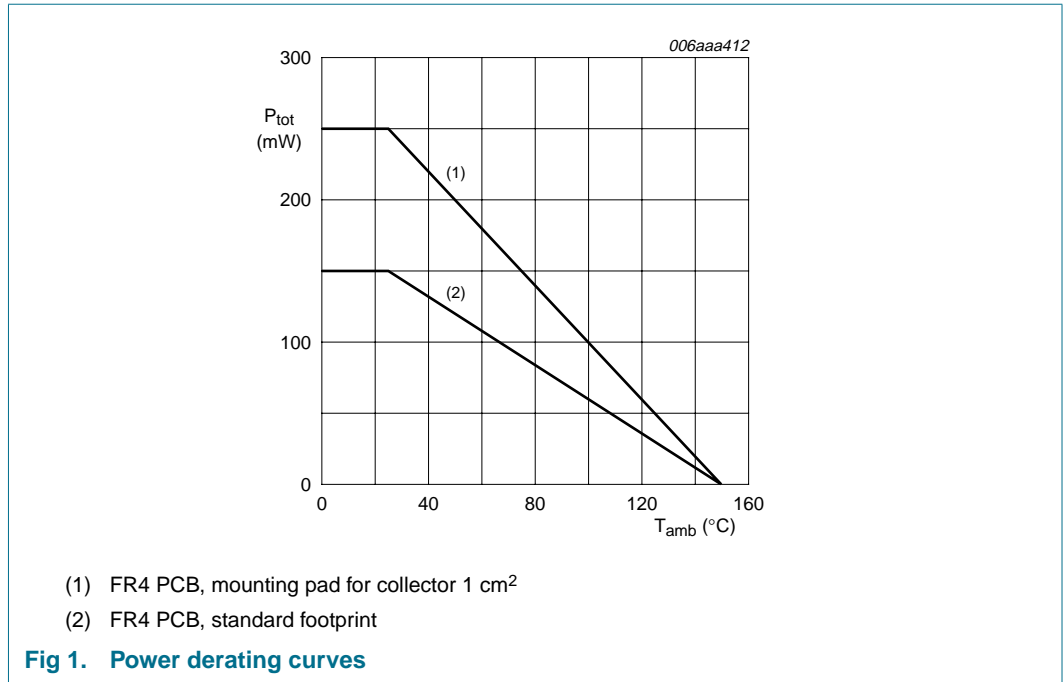
Table 5: Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	-15	V
V_{CEO}	collector-emitter voltage	open base	-	-15	V
V_{EBO}	emitter-base voltage	open collector	-	-6	V
I_C	collector current (DC)		-	-0.5	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-1	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms	-	-100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	150	mW
			[2]	250	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 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.



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]	-	-	833	K/W
			[2]	-	-	500	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.

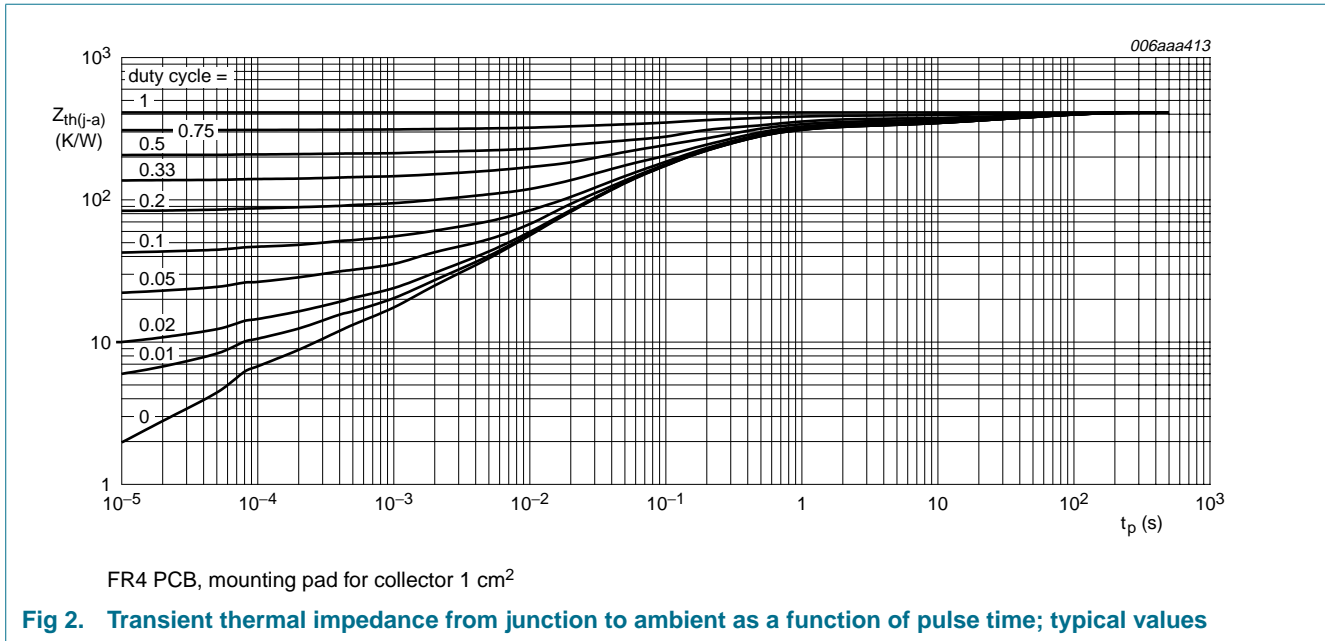


Fig 2. Transient thermal impedance from junction to ambient as a function of pulse time; typical values

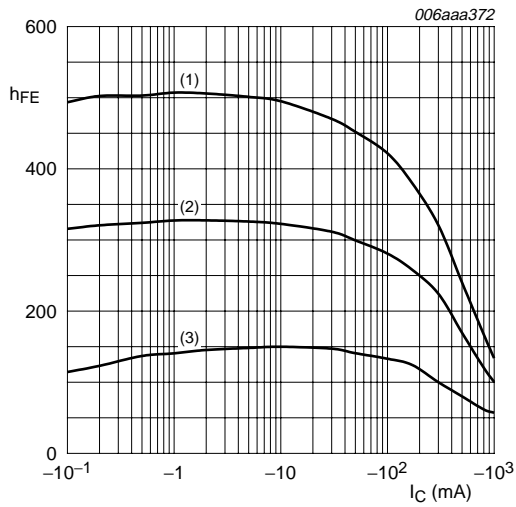
7. Characteristics

Table 7: Characteristics

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

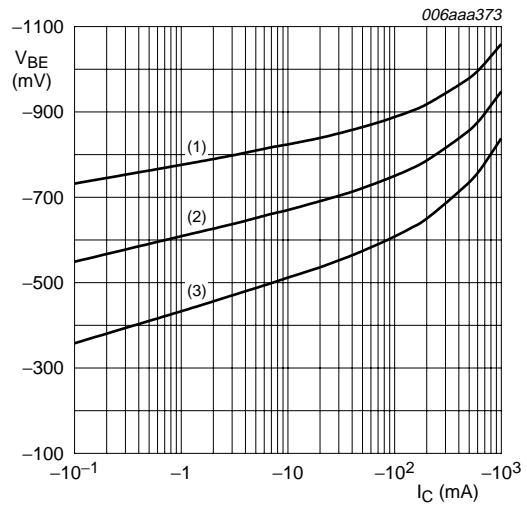
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -15\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -15\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	-50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -2\text{ V}; I_C = -10\text{ mA}$	200	-	-	
		$V_{CE} = -2\text{ V}; I_C = -100\text{ mA}$	[1] 150	-	-	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$	[1] 90	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -10\text{ mA}; I_B = -0.5\text{ mA}$	-	-	-25	mV
		$I_C = -200\text{ mA}; I_B = -10\text{ mA}$	-	-	-150	mV
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	[1] -	-	-250	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	[1] -	300	500	m Ω
V_{BEsat}	base-emitter saturation voltage	$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	[1] -	-	-1.1	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = -2\text{ V}; I_C = -100\text{ mA}$	[1] -	-	-0.9	V
f_T	transition frequency	$V_{CE} = -5\text{ V}; I_C = -100\text{ mA}; f = 100\text{ MHz}$	100	280	-	MHz
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	10	pF

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



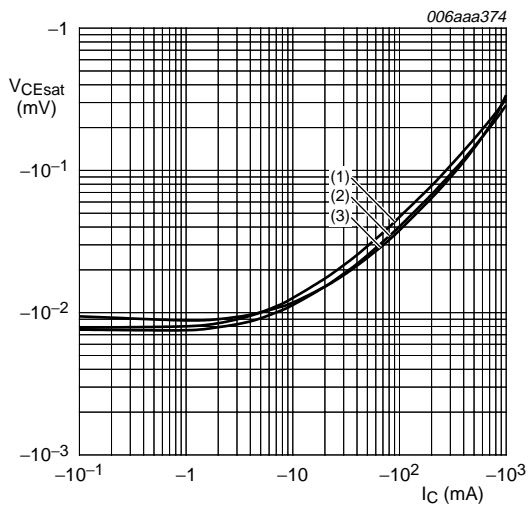
$V_{CE} = -2\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

Fig 3. DC current gain as a function of collector current; typical values



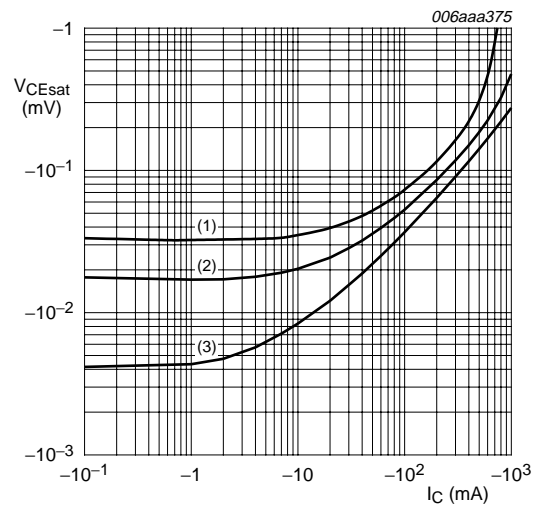
$V_{CE} = -2\text{ V}$
 (1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

Fig 4. Base-emitter voltage as a function of collector current; typical values



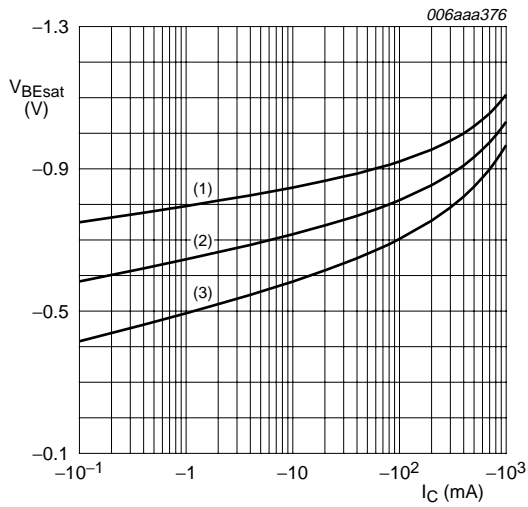
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



$T_{amb} = 25\text{ }^{\circ}\text{C}$
 (1) $I_C/I_B = 100$
 (2) $I_C/I_B = 50$
 (3) $I_C/I_B = 10$

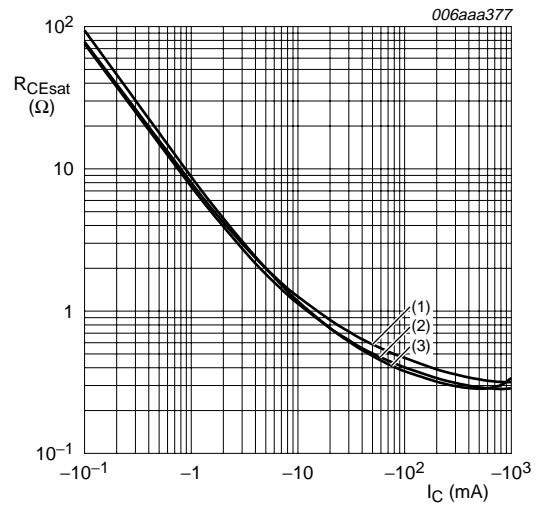
Fig 6. Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$

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

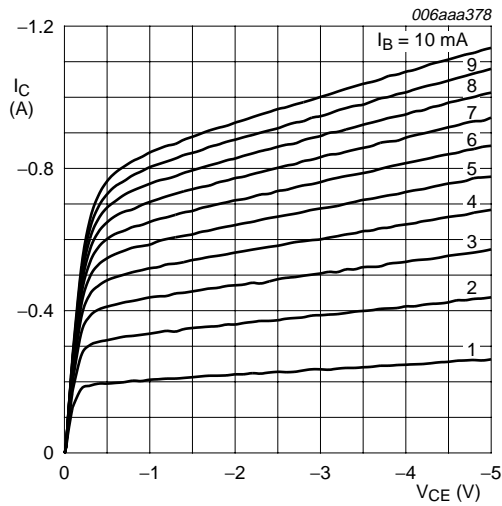
Fig 7. Base-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$

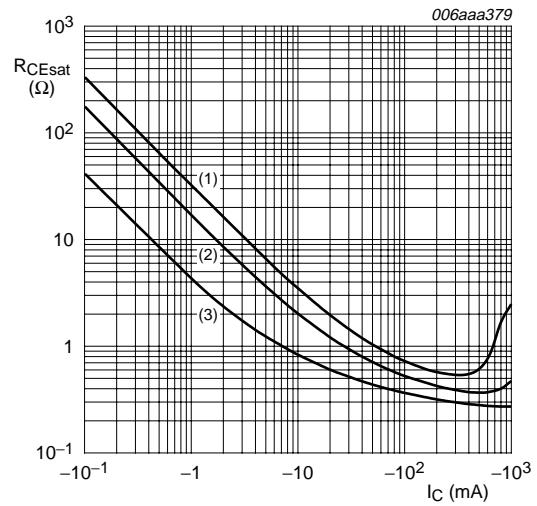
- (1) $T_{amb} = 100\text{ °C}$
- (2) $T_{amb} = 25\text{ °C}$
- (3) $T_{amb} = -55\text{ °C}$

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



$T_{amb} = 25\text{ °C}$

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

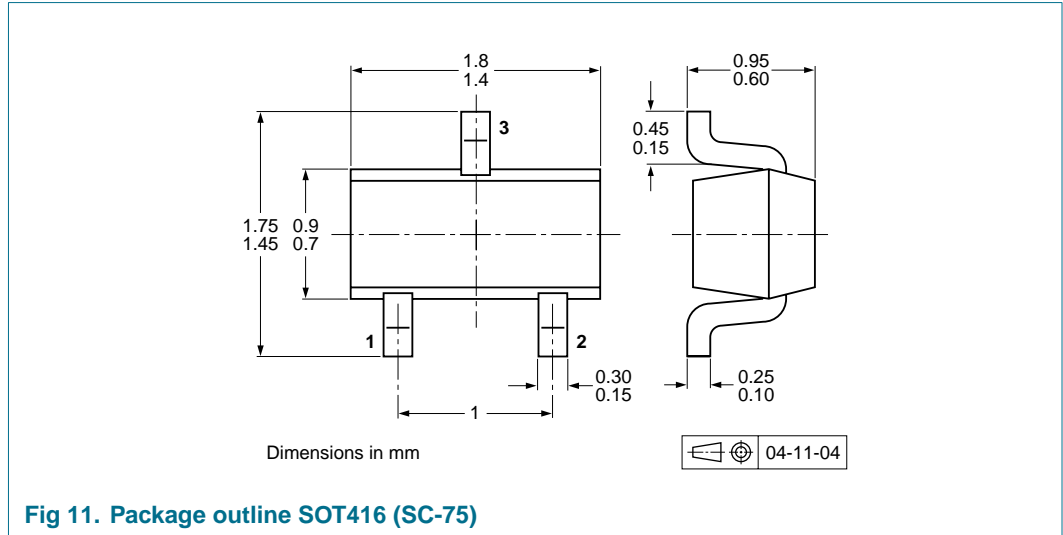


$T_{amb} = 25\text{ °C}$

- (1) $I_C/I_B = 100$
- (2) $I_C/I_B = 50$
- (3) $I_C/I_B = 10$

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

8. Package outline



9. Packing information

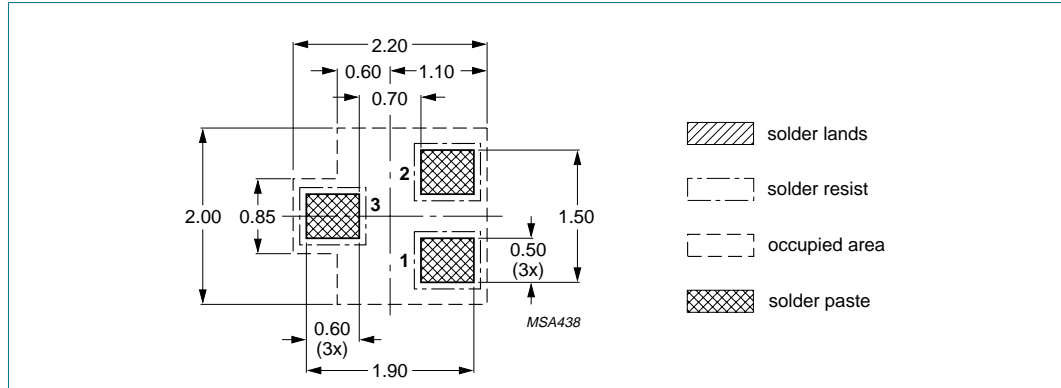
Table 8: Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
PBSS3515E	SOT416	4 mm pitch, 8 mm tape and reel	-115	-135

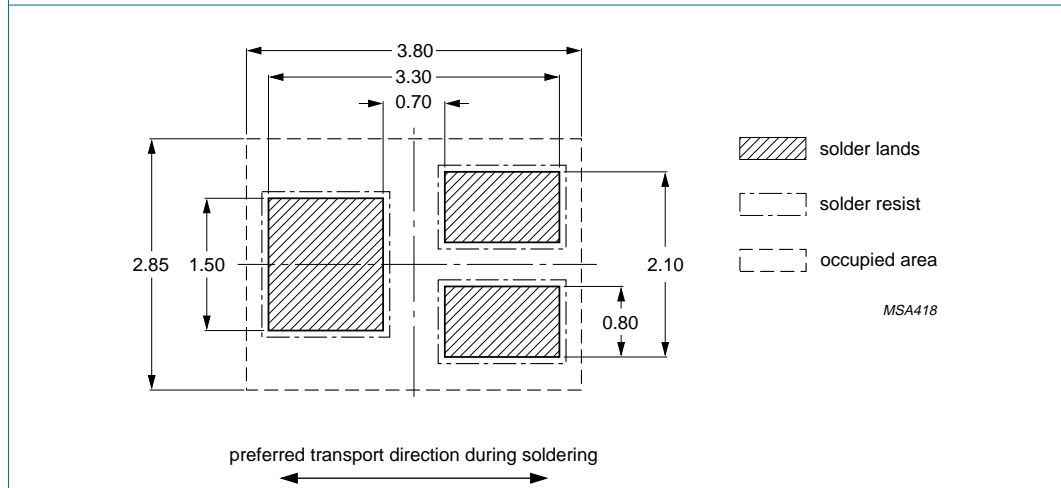
[1] For further information and the availability of packing methods, see [Section 15](#).

10. Soldering



Dimensions in mm

Fig 12. Reflow soldering footprint



Dimensions in mm

Fig 13. Wave soldering footprint

11. Revision history

Table 9: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PBSS3515E_1	20050418	Product data sheet	-	9397 750 14878	-

12. Data sheet status

Level	Data sheet status ^[1]	Product status ^[2] ^[3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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