

PBHV9115X

150 V, 1 A PNP high-voltage low V_{CEsat} (BISS) transistor

Rev. 01 — 10 March 2010

Product data sheet

1. Product profile

1.1 General description

PNP high-voltage low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a SOT89 (SC-62/TO-243) small and flat Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- High voltage
- 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

1.3 Applications

- LED driver for LED chain module
- LCD backlighting
- Automotive motor management
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-150	V
I_C	collector current		-	-	-1	A
h_{FE}	DC current gain	$V_{CE} = -10$ V; $I_C = -50$ mA	100	220	-	

2. Pinning information

Table 2. Pinning

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



3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBHV9115X	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]
PBHV9115X	*4G

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

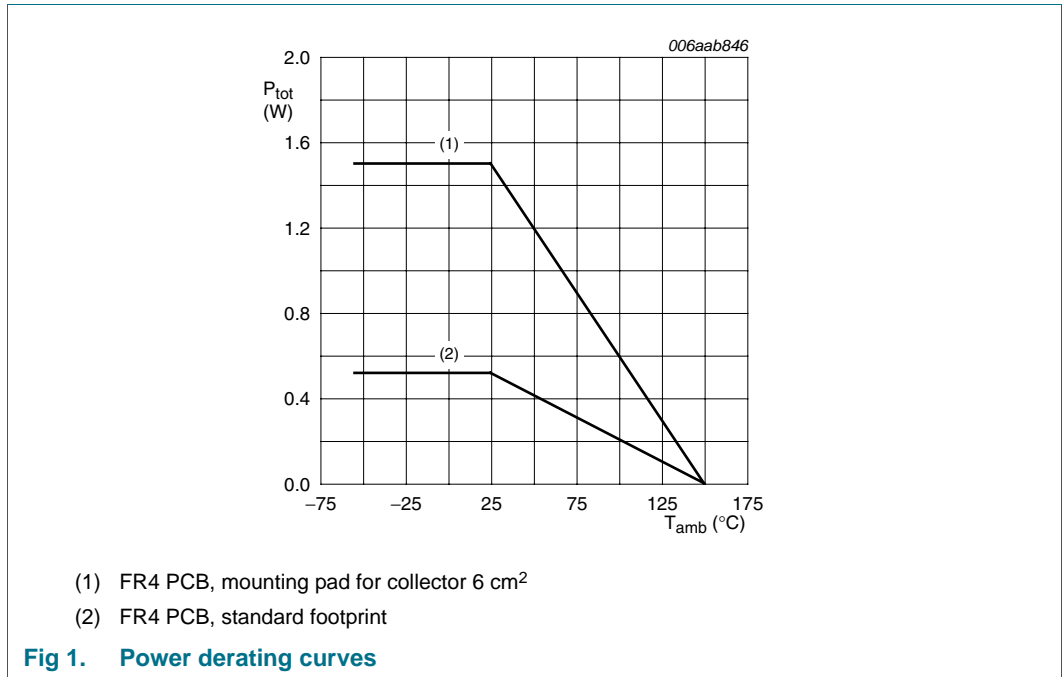
Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	-200	V
V_{CEO}	collector-emitter voltage	open base	-	-150	V
V_{CESM}	collector-emitter peak voltage	$V_{BE} = 0$ V	-	-200	V
V_{EBO}	emitter-base voltage	open collector	-	-6	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	-	-400	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	^[1]	520	mW
			^[2]	1.5	W
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	+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 and mounting pad for collector 6 cm².



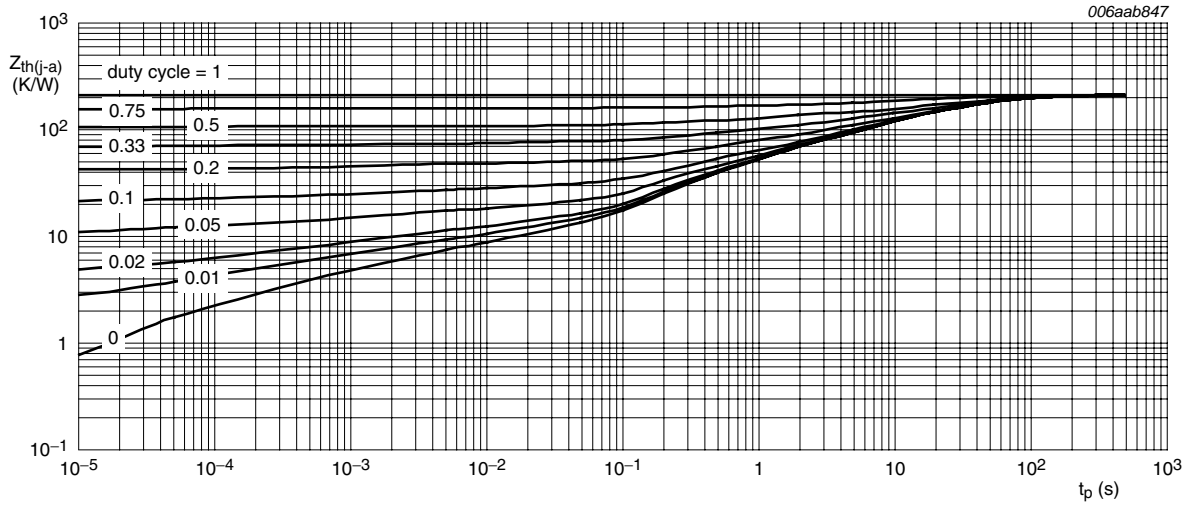
6. Thermal characteristics

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]	-	240	K/W
			[2]	-	80	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point		-	-	20	K/W

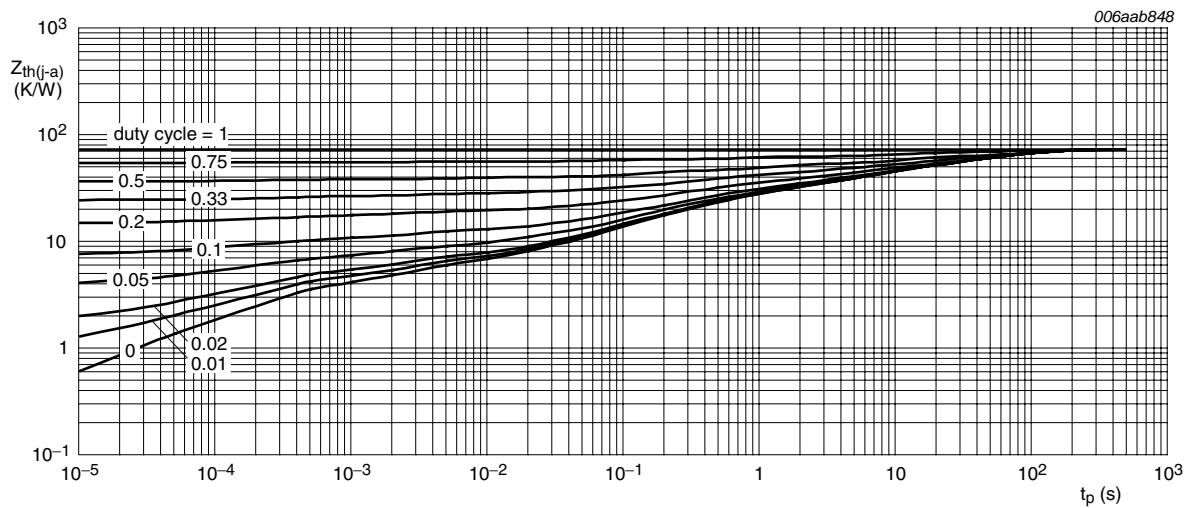
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and 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 6 cm²

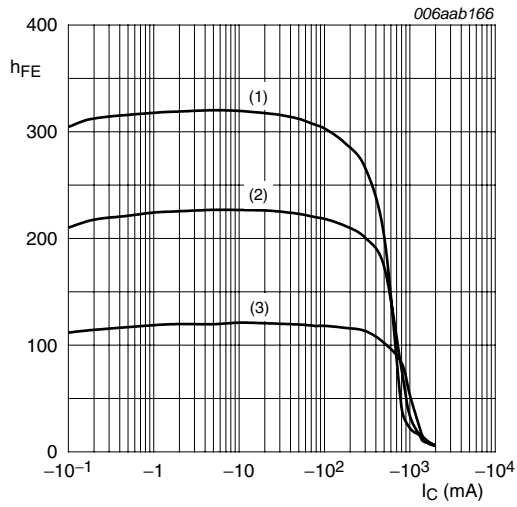
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

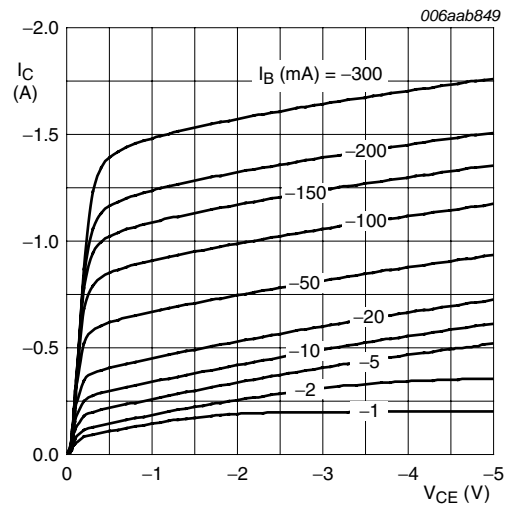
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
I_{CBO}	collector-base cut-off current	$V_{CB} = -120\text{ V};$ $I_E = 0\text{ A}$	-	-	-100	nA	
		$V_{CB} = -120\text{ V};$ $I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	-10	μA	
I_{CES}	collector-emitter cut-off current	$V_{CE} = -120\text{ V};$ $V_{BE} = 0\text{ V}$	-	-	-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	$V_{CE} = -10\text{ V}$					
		$I_C = -50\text{ mA}$	100	220	-		
		$I_C = -100\text{ mA}$	[1]	100	220	-	
		$I_C = -1\text{ A}$	[1]	10	30	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -100\text{ mA};$ $I_B = -10\text{ mA}$	[1]	-	-60	-120	mV
		$I_C = -100\text{ mA};$ $I_B = -20\text{ mA}$	[1]	-	-50	-100	mV
		$I_C = -500\text{ mA};$ $I_B = -50\text{ mA}$	[1]	-	-200	-300	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = -1\text{ A};$ $I_B = -100\text{ mA}$	[1]	-	-1	-1.2	V
t_d	delay time	$V_{CC} = -6\text{ V};$ $I_C = -0.5\text{ A};$ $I_{Bon} = -0.1\text{ A};$ $I_{Boff} = 0.1\text{ A}$	-	8	-	ns	
t_r	rise time		-	282	-	ns	
t_{on}	turn-on time		-	290	-	ns	
t_s	storage time		-	430	-	ns	
t_f	fall time		-	300	-	ns	
t_{off}	turn-off time		-	730	-	ns	
f_T	transition frequency	$V_{CE} = -10\text{ V};$ $I_C = -10\text{ mA};$ $f = 100\text{ MHz}$	-	115	-	MHz	
C_c	collector capacitance	$V_{CB} = -20\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	10	-	pF	
C_e	emitter capacitance	$V_{EB} = -0.5\text{ V};$ $I_C = i_c = 0\text{ A};$ $f = 1\text{ MHz}$	-	150	-	pF	

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



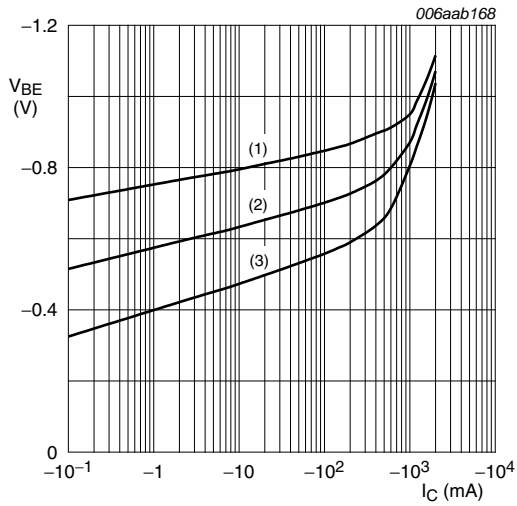
$V_{CE} = -10$ V
 (1) $T_{amb} = 100^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = -55^\circ C$

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



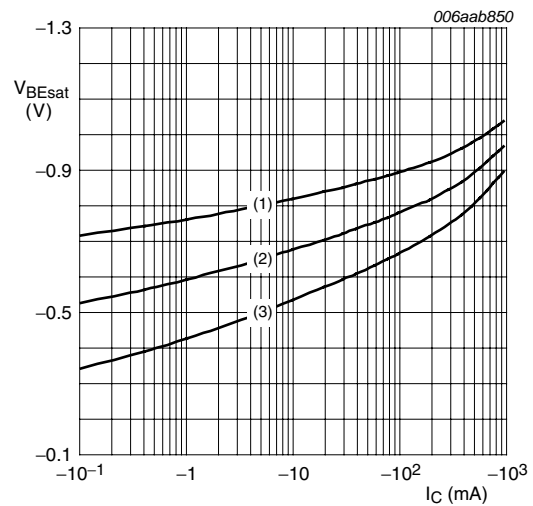
$T_{amb} = 25^\circ C$

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



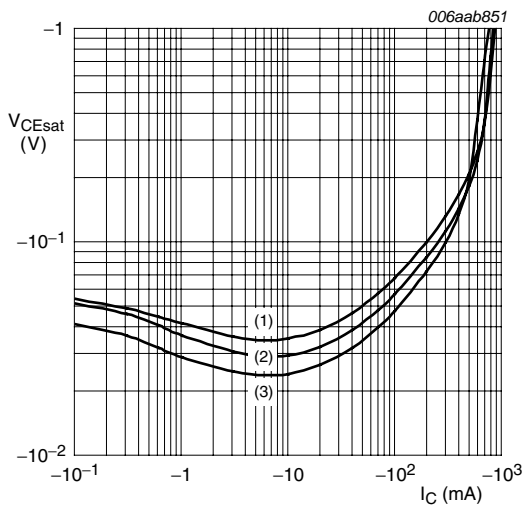
$V_{CE} = -10$ V
 (1) $T_{amb} = -55^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = 100^\circ C$

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



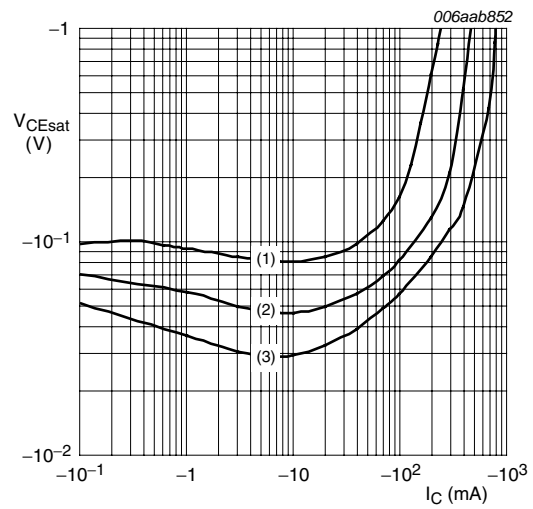
$I_C/I_B = 10$
 (1) $T_{amb} = -55^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = 100^\circ C$

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



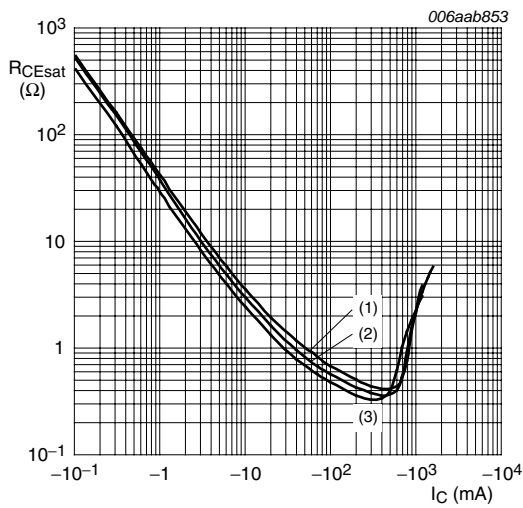
- $I_C/I_B = 10$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

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



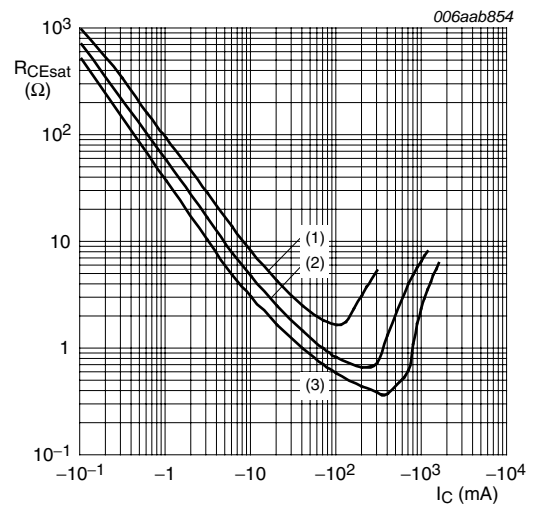
- $T_{amb} = 25\text{ °C}$
- (1) $I_C/I_B = 50$
 - (2) $I_C/I_B = 20$
 - (3) $I_C/I_B = 10$

Fig 9. Collector-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 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) $I_C/I_B = 20$
 - (3) $I_C/I_B = 10$

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

8. Test information

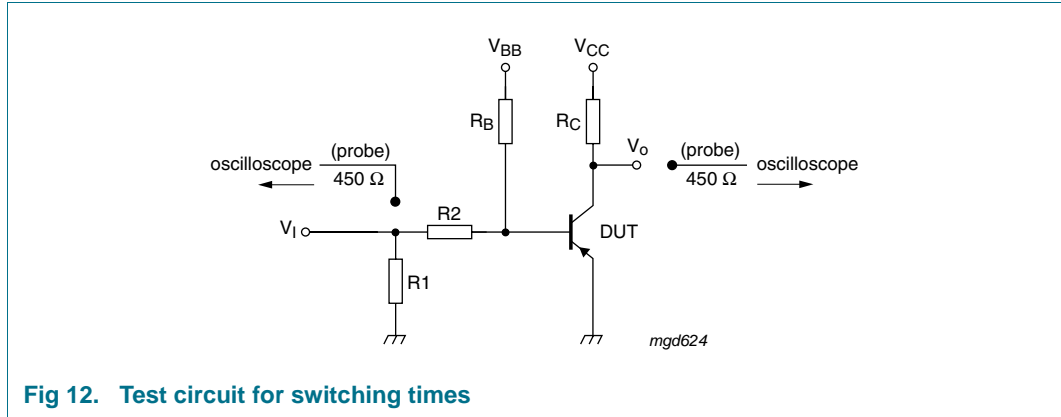


Fig 12. Test circuit for switching times

9. Package outline

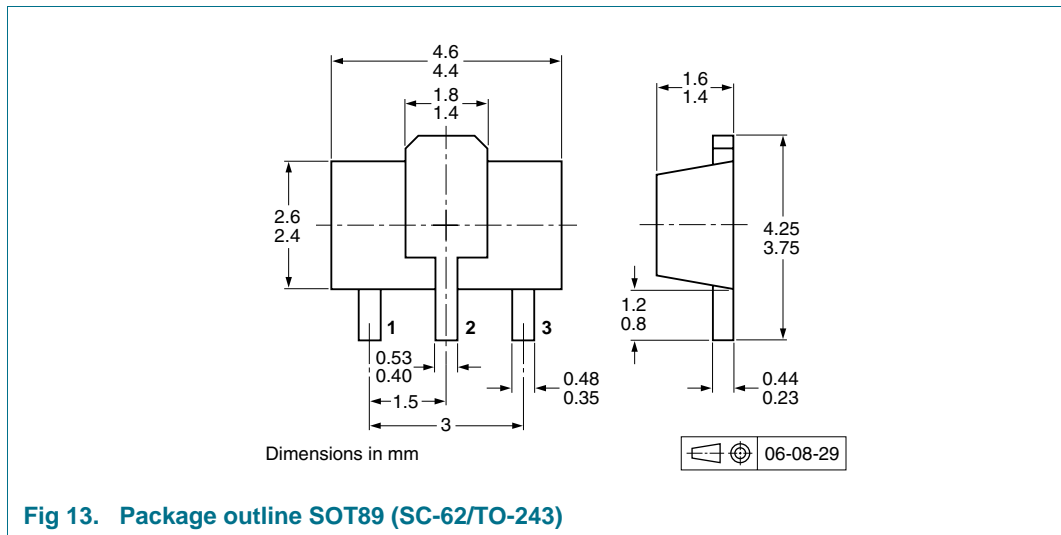


Fig 13. Package outline SOT89 (SC-62/TO-243)

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
PBHV9115X	SOT89	8 mm pitch, 12 mm tape and reel; T1	^[2] -115	-135
		8 mm pitch, 12 mm tape and reel; T3	^[3] -120	-

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

[2] T1: normal taping

[3] T3: 90° taping

11. Soldering

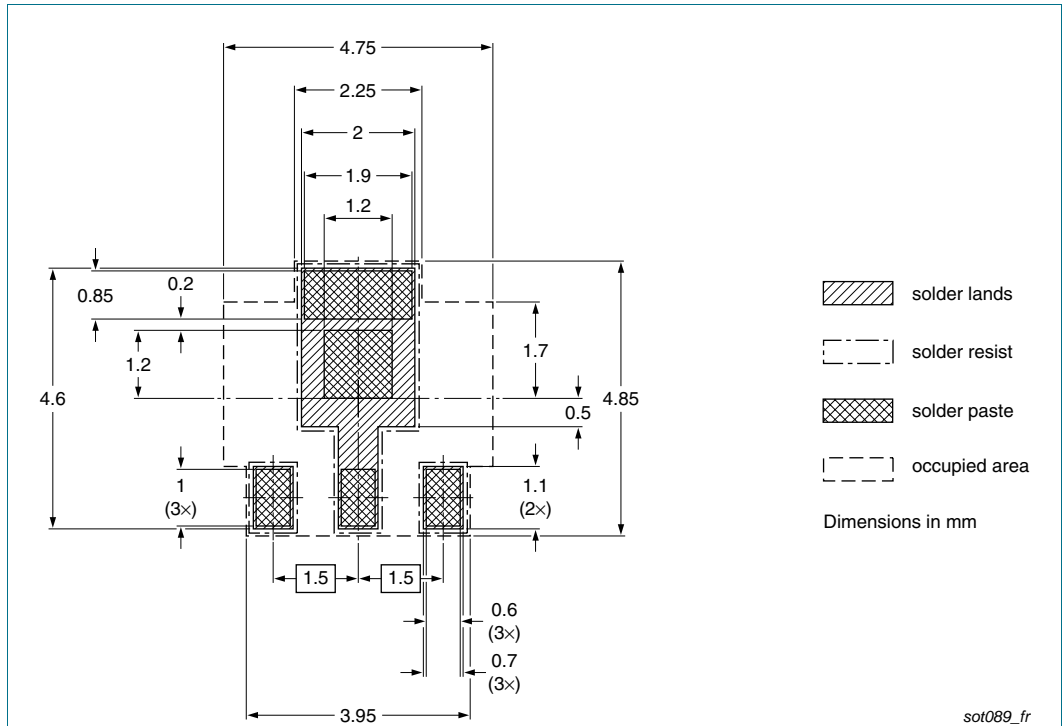


Fig 14. Reflow soldering footprint SOT89 (SC-62/TO-243)

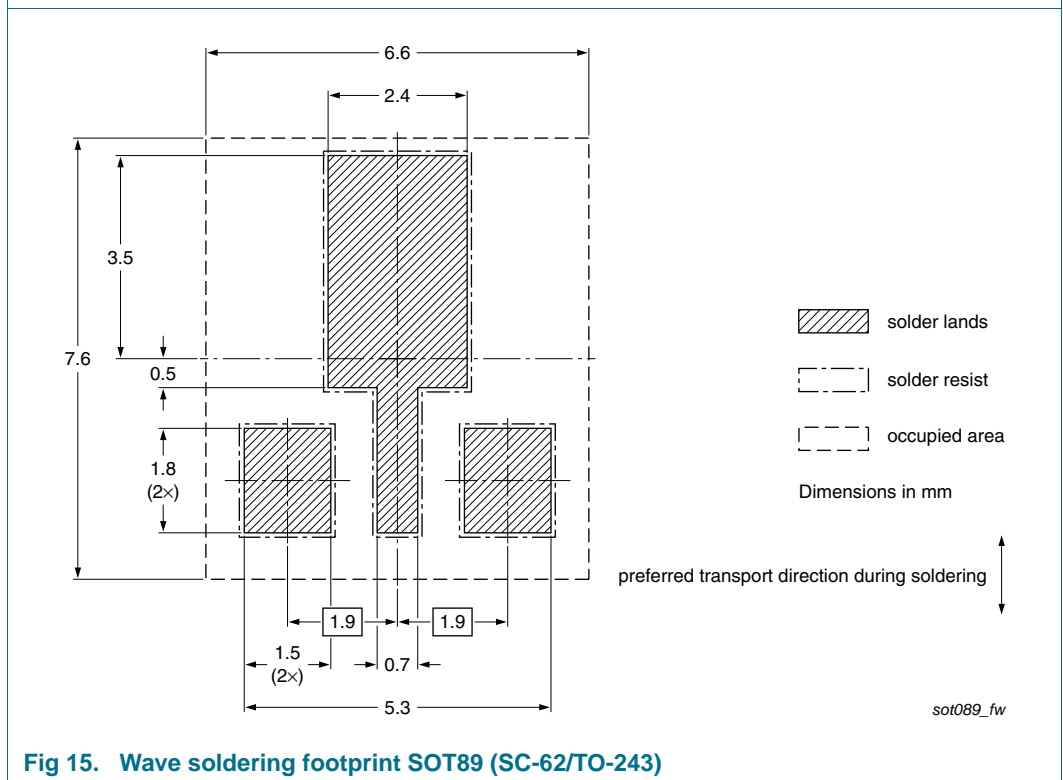


Fig 15. Wave soldering footprint SOT89 (SC-62/TO-243)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBHV9115X_1	20100310	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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Date of release: 10 March 2010

Document identifier: PBHV9115X_1