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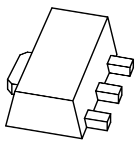


PBHV9115X

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)

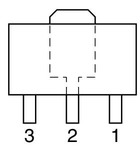
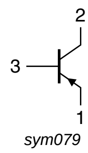
1.4 Quick reference data

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		

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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 cm^2.

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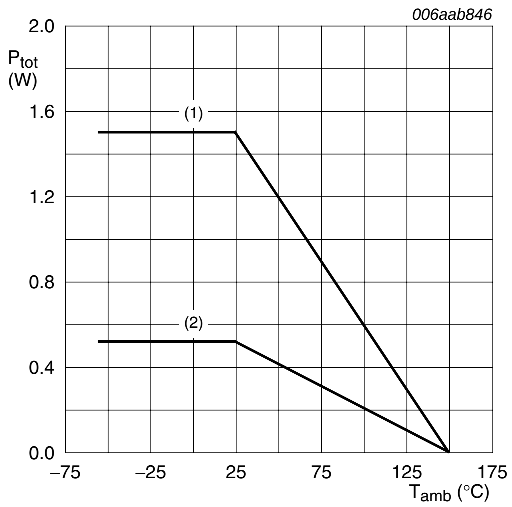

(1) FR4 PCB, mounting pad for collector 6 cm^2

(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]	-	-	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 cm^2.

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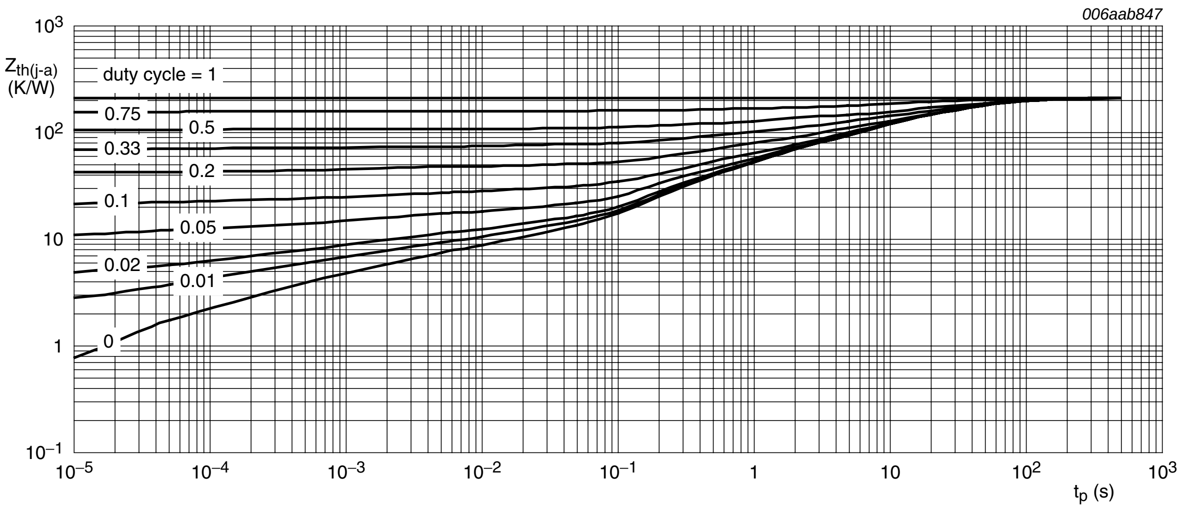
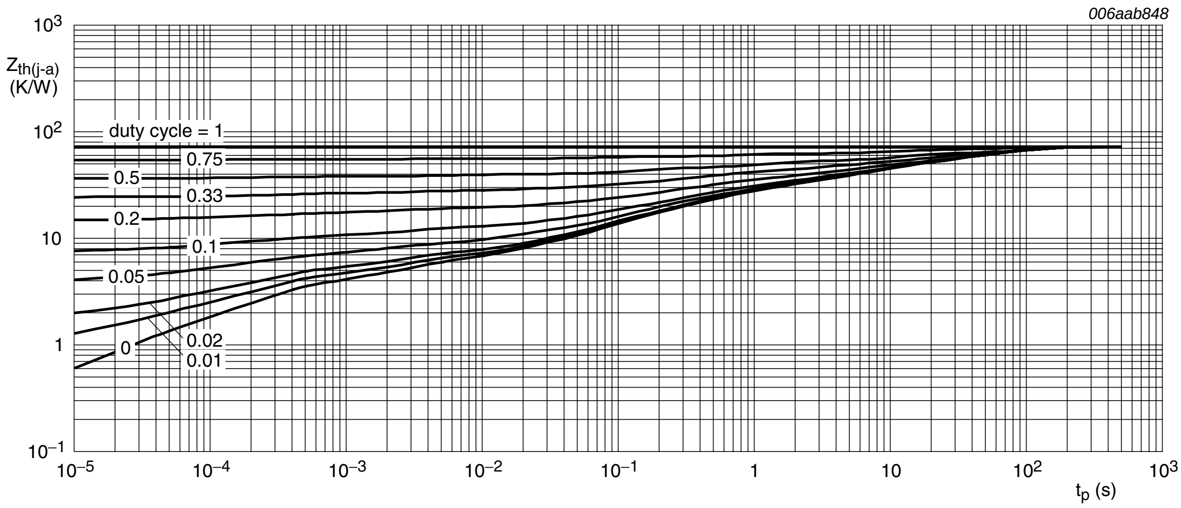


FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for collector 6 cm^2

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

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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} = −120 V; I_E = 0 A		-	-	−100	nA
		V_{CB} = −120 V; I_E = 0 A; T_j = 150 °C		-	-	−10	μA
I_{CES}	collector-emitter cut-off current	V_{CE} = −120 V; V_{BE} = 0 V		-	-	−100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = −4 V; I_C = 0 A		-	-	−100	nA
h_{FE}	DC current gain	V_{CE} = −10 V					
		I_C = −50 mA		100	220	-	
		I_C = −100 mA	[1]	100	220	-	
		I_C = −1 A	[1]	10	30	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = −100 mA; I_B = −10 mA	[1]	-	−60	−120	mV
		I_C = −100 mA; I_B = −20 mA	[1]	-	−50	−100	mV
		I_C = −500 mA; I_B = −50 mA	[1]	-	−200	−300	mV
V_{BEsat}	base-emitter saturation voltage	I_C = −1 A; I_B = −100 mA	[1]	-	−1	−1.2	V
t_d	delay time	V_{CC} = −6 V; I_C = −0.5 A; I_{Bon} = −0.1 A; I_{Boff} = 0.1 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 V; I_C = −10 mA; f = 100 MHz		-	115	-	MHz
C_c	collector capacitance	V_{CB} = −20 V; $I_E = i_e$ = 0 A; f = 1 MHz		-	10	-	pF
C_e	emitter capacitance	V_{EB} = −0.5 V; $I_C = i_c$ = 0 A; f = 1 MHz		-	150	-	pF

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

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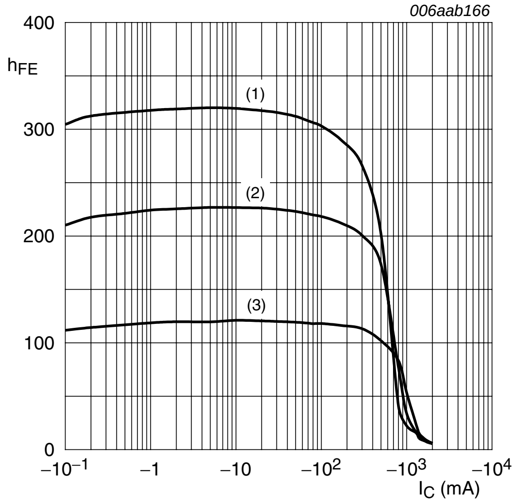


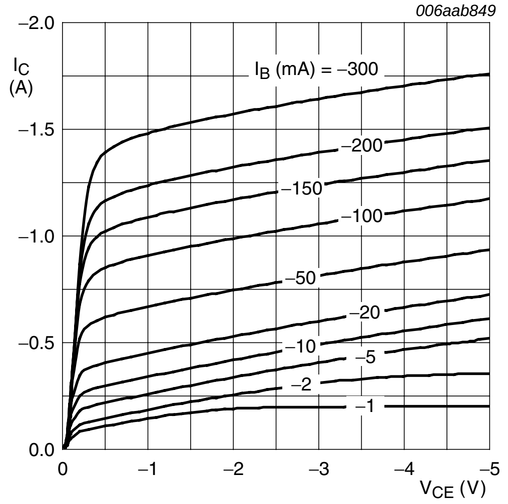
V_{CE} = −10 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

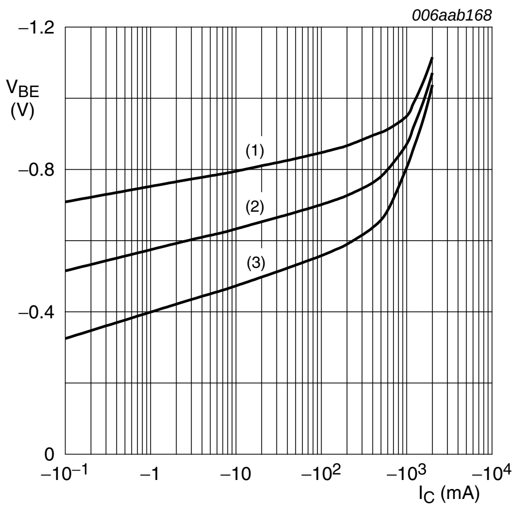
(3) T_{amb} = −55 °C

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



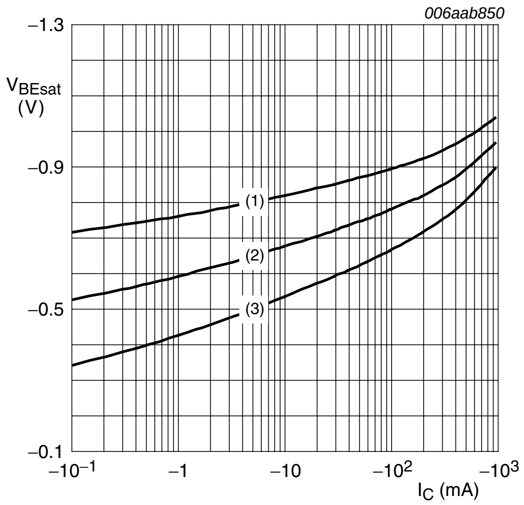
V_{CE} = −10 V

(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 = 10

(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

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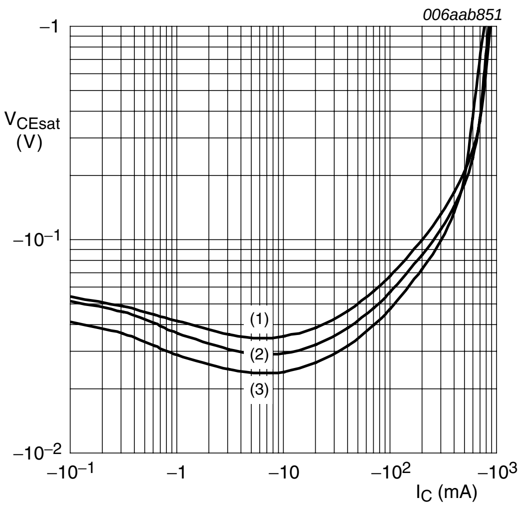


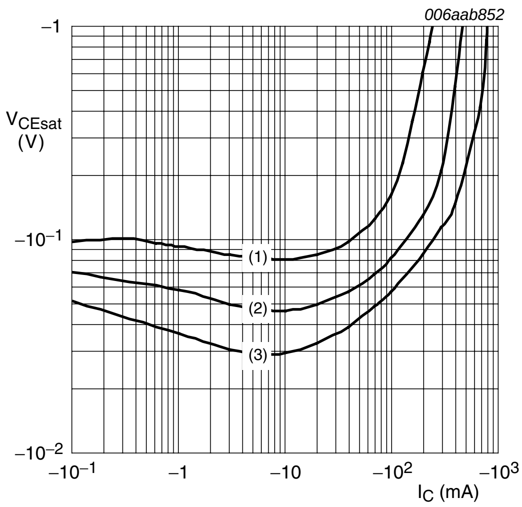
$I_C/I_B = 10$

(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



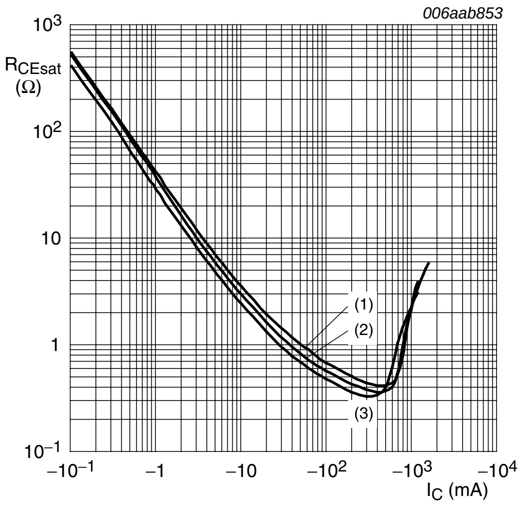
$T_{amb} = 25$ °C

(1) $I_C/I_B = 50$

(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



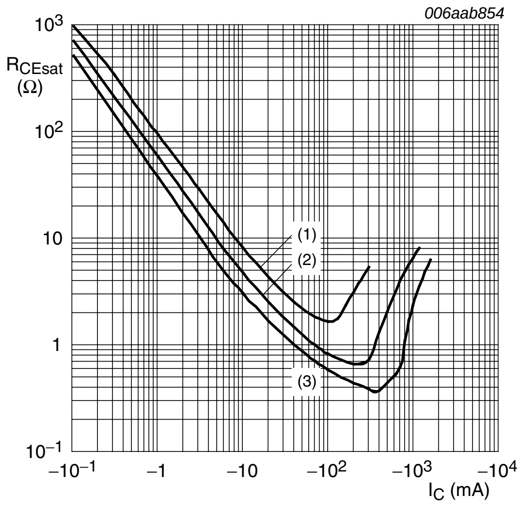
$I_C/I_B = 10$

(1) $T_{amb} = 100$ °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) $I_C/I_B = 50$

(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

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8. Test information

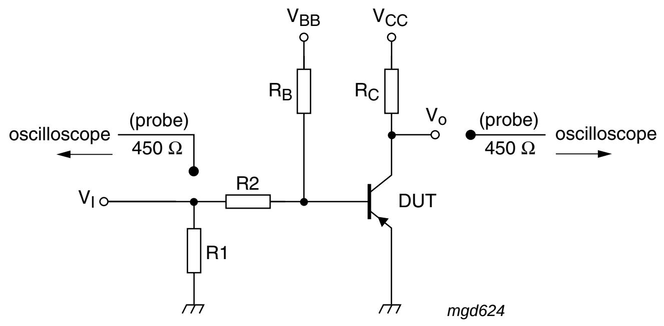

Fig 12. Test circuit for switching times

9. Package outline

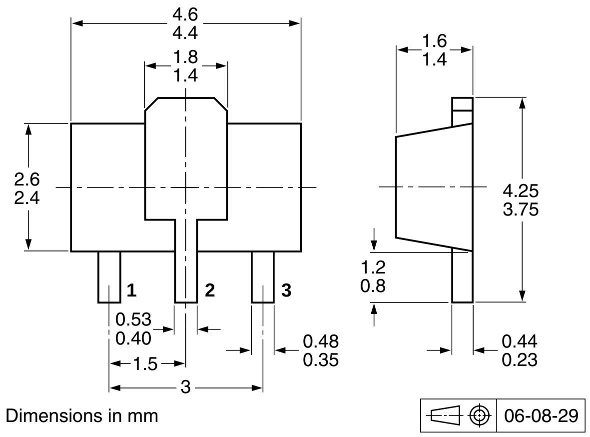

Fig 13. Package outline SOT89 (SC-62/TO-243)

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

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11. Soldering

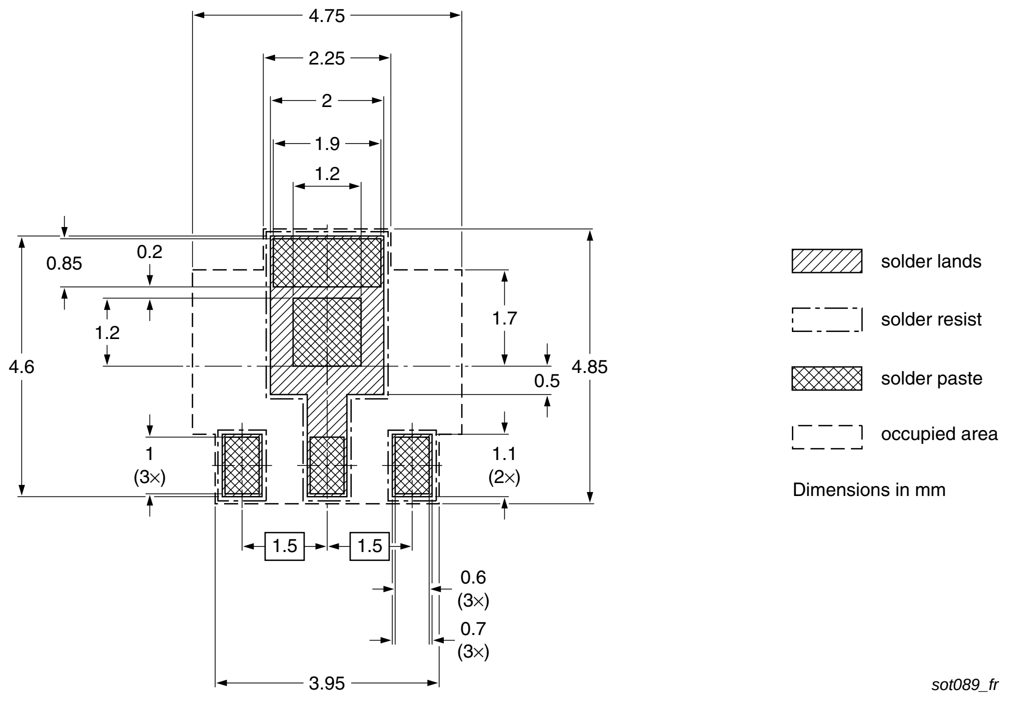

Fig 14. Reflow soldering footprint SOT89 (SC-62/TO-243)

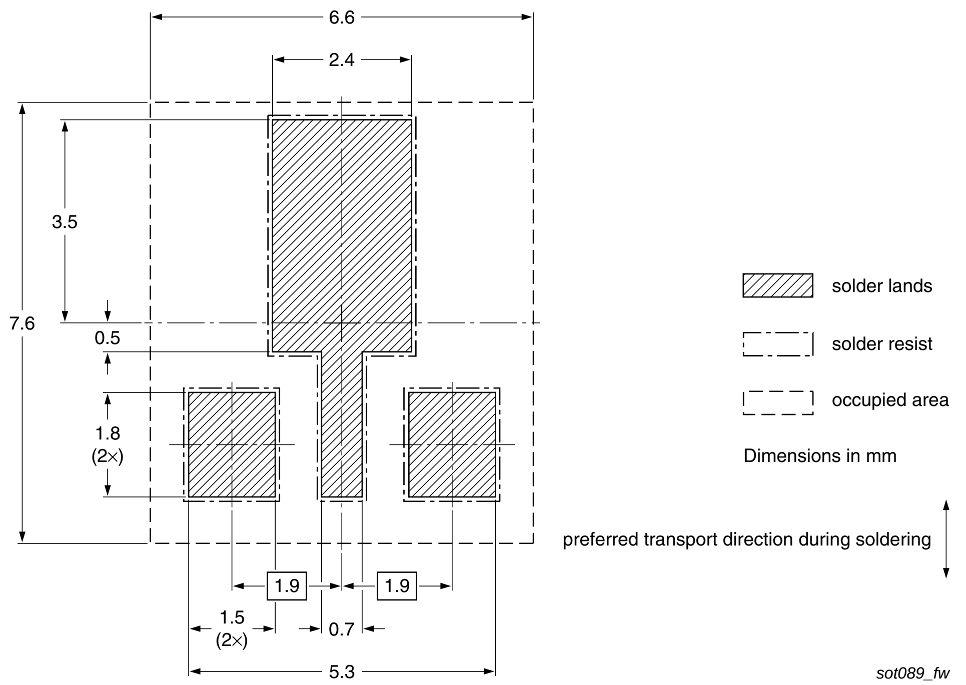

Fig 15. Wave soldering footprint SOT89 (SC-62/TO-243)

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12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBHV9115X_1	20100310	Product data sheet	-	-

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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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