



# PBVH9115X

150 V, 1 A PNP high-voltage low V<sub>CEsat</sub> transistor

9 October 2024

Product data sheet

## 1. General description

PNP high-voltage low  $V_{CEsat}$  transistor in a SOT89 (SC-62) small and flat Surface-Mounted Device (SMD) plastic package.

## 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  $I_C$

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CESM}$	collector-emitter peak voltage	$V_{BE} = 0 \text{ V}$	-	-	-200	V
$V_{CEO}$	collector-emitter voltage	open base	-	-	-150	V
$I_C$	collector current		-	-	-1	A
$h_{FE}$	DC current gain	$V_{CE} = -10 \text{ V}; I_C = -50 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	100	220	-	

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter		
2	C	collector		
3	B	base		

## 6. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
PBVH9115X	SOT89	plastic, surface-mounted package; 3 leads; 1.5 mm pitch; 4.5 mm x 2.5 mm x 1.5 mm body	<a href="#">SOT89</a>

## 7. Marking

**Table 4. Marking codes**

Type number	Marking code <sup>[1]</sup>
PBVH9115X	%4G

[1] % = placeholder for manufacturing site code

## 8. Limiting values

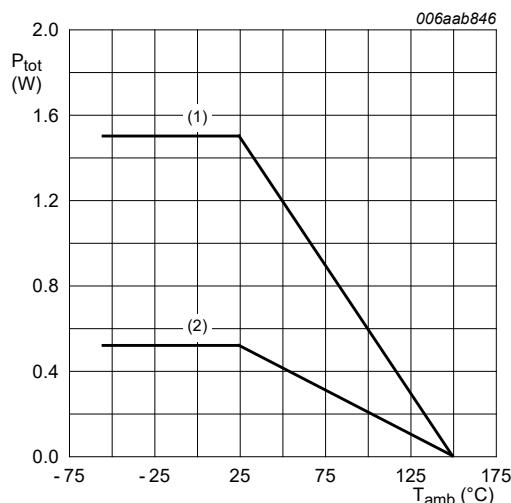
**Table 5. Limiting values**

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			-	-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 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 6 cm<sup>2</sup>.



(1) FR4 PCB, mounting pad for collector 6 cm<sup>2</sup>

(2) FR4 PCB, standard footprint

Fig. 1. Power derating curves

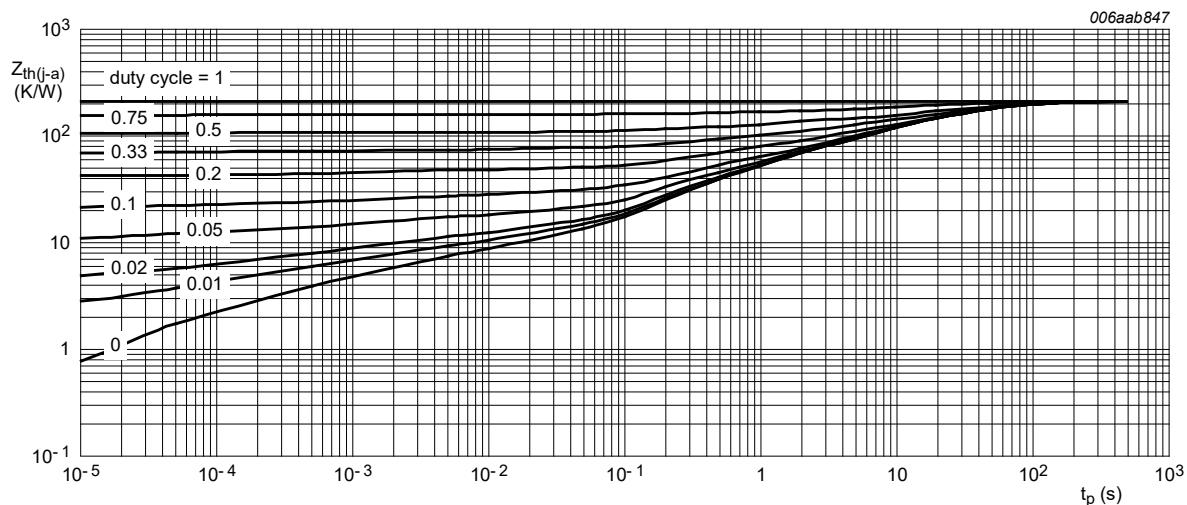
## 9. Thermal characteristics

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, mounting pad for collector 6 cm<sup>2</sup>.



FR4 PCB, standard footprint

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

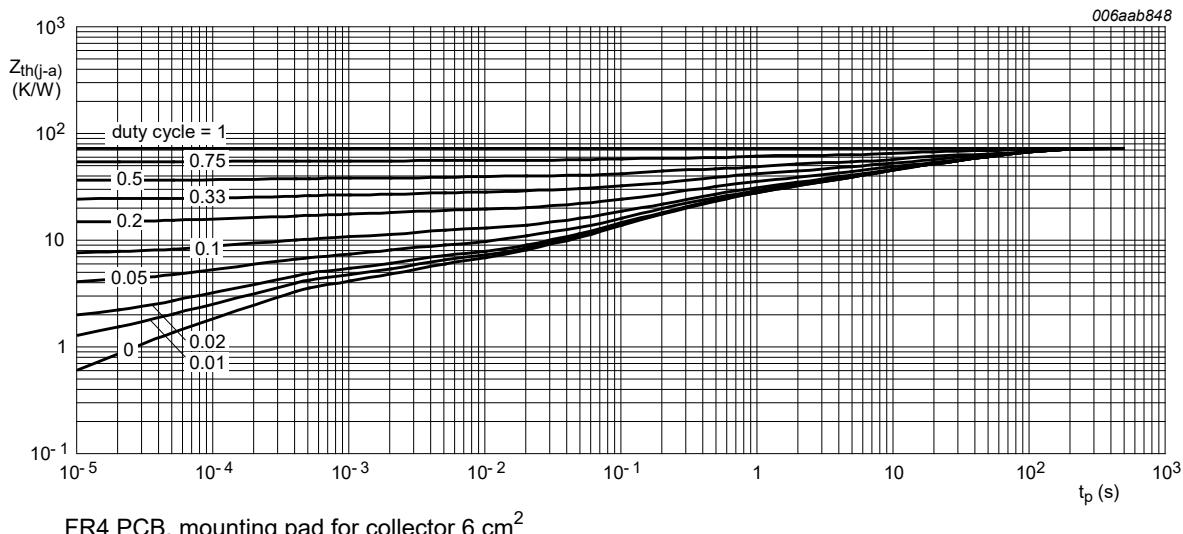
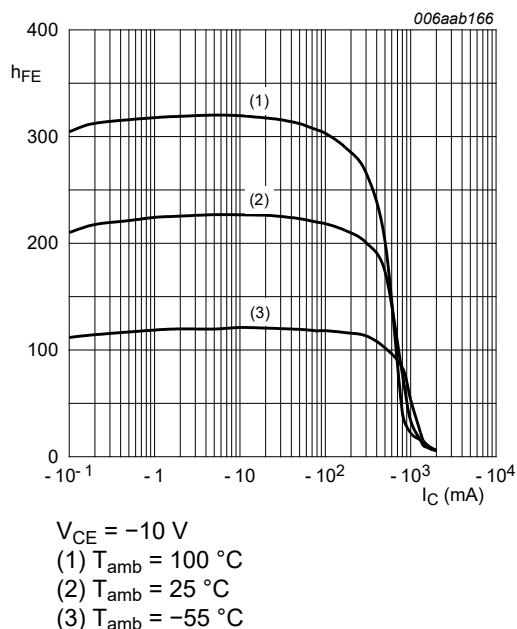


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

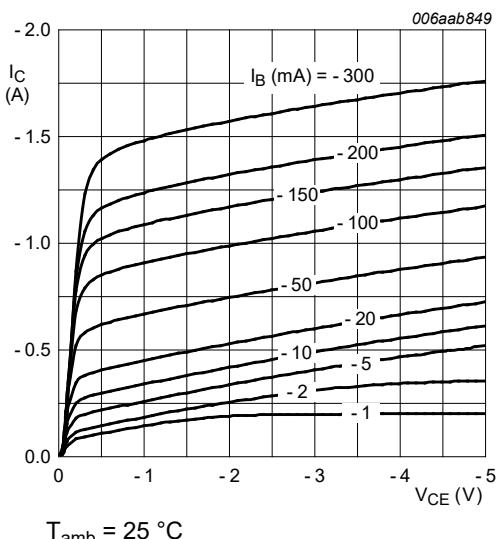
## 10. Characteristics

Table 7. Characteristics

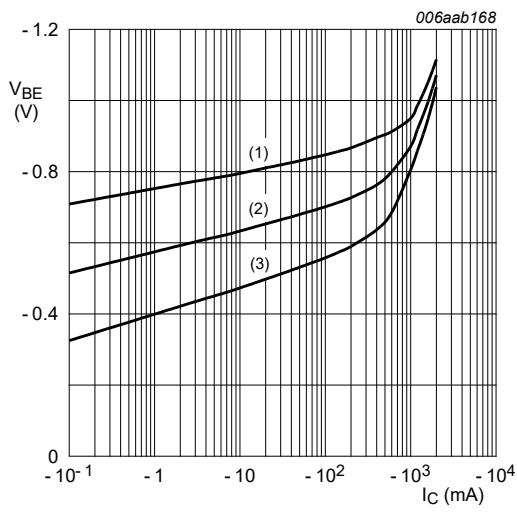
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -120 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	-100	nA
		V <sub>CB</sub> = -120 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C	-	-	-10	µA
I <sub>CES</sub>	collector-emitter cut-off current	V <sub>CE</sub> = -120 V; V <sub>BE</sub> = 0 V; T <sub>amb</sub> = 25 °C	-	-	-100	nA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -4 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	-100	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -10 V; I <sub>C</sub> = -50 mA; T <sub>amb</sub> = 25 °C	100	220	-	
		V <sub>CE</sub> = -10 V; I <sub>C</sub> = -100 mA; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	100	220	-	
		V <sub>CE</sub> = -10 V; I <sub>C</sub> = -1 A; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	10	30	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -100 mA; I <sub>B</sub> = -10 mA; T <sub>amb</sub> = 25 °C	-	-60	-120	mV
		I <sub>C</sub> = -100 mA; I <sub>B</sub> = -20 mA; T <sub>amb</sub> = 25 °C	-	-50	-100	mV
		I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA; T <sub>amb</sub> = 25 °C	-	-200	-300	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -1 A; I <sub>B</sub> = -100 mA; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-1	-1.2	V
t <sub>d</sub>	delay time	V <sub>CC</sub> = -6 V; I <sub>C</sub> = -0.5 A; I <sub>Bon</sub> = -0.1 A; I <sub>Boff</sub> = 0.1 A; T <sub>amb</sub> = 25 °C	-	8	-	ns
t <sub>r</sub>	rise time		-	282	-	ns
t <sub>on</sub>	turn-on time		-	290	-	ns
t <sub>s</sub>	storage time		-	430	-	ns
t <sub>f</sub>	fall time		-	300	-	ns
t <sub>off</sub>	turn-off time		-	730	-	ns
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -10 V; I <sub>C</sub> = -10 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C	-	115	-	MHz
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = -20 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	10	-	pF
C <sub>e</sub>	emitter capacitance	V <sub>EB</sub> = -0.5 V; I <sub>C</sub> = 0 A; i <sub>c</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	150	-	pF



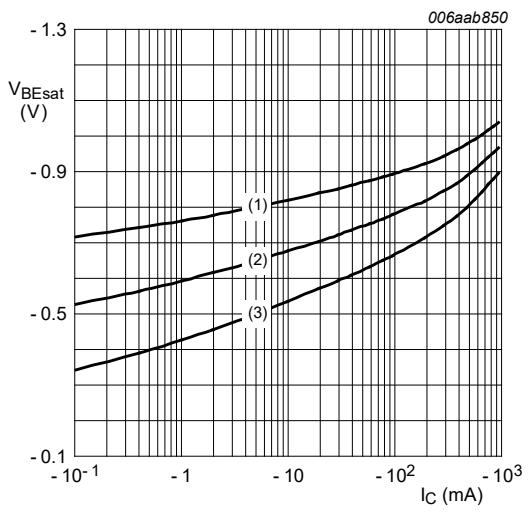
**Fig. 4. DC current gain as a function of collector current; typical values**



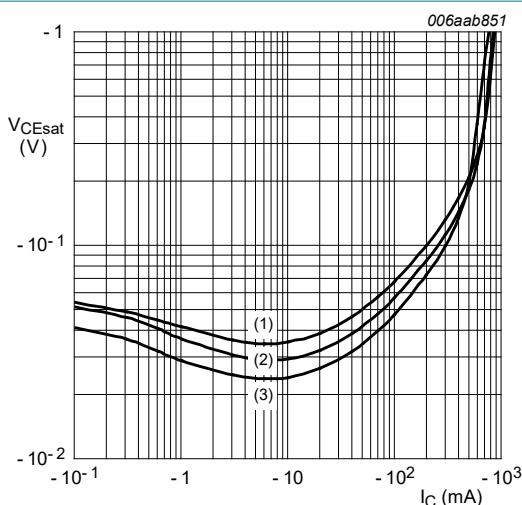
**Fig. 5. Collector current as a function of collector-emitter voltage; typical values**



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

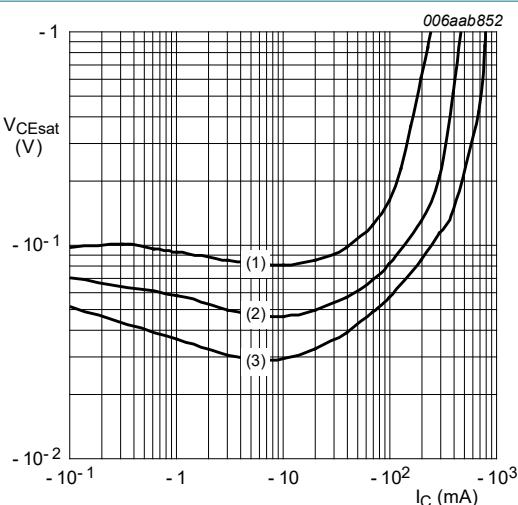


**Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values**



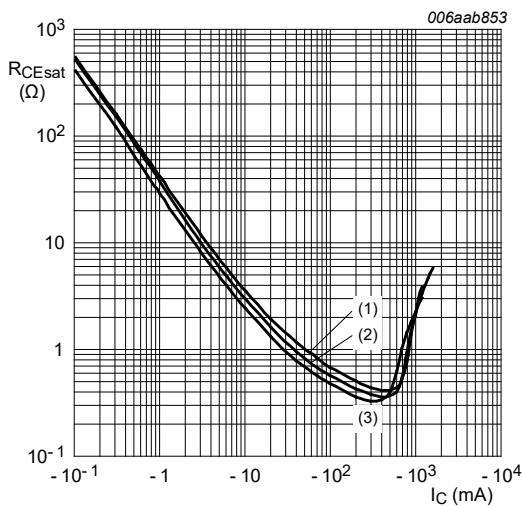
$I_C/I_B = 10$   
 (1)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55 \text{ }^{\circ}\text{C}$

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



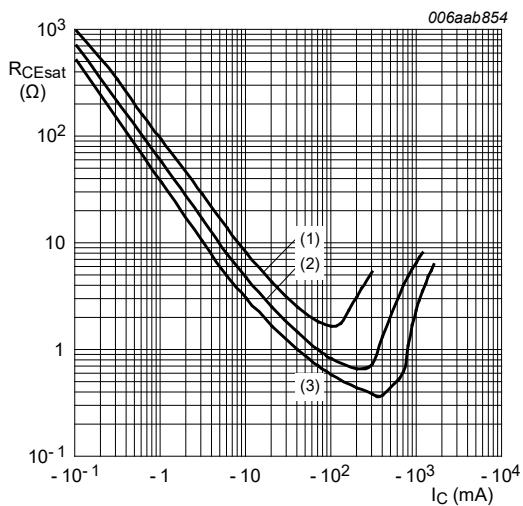
$T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (1)  $I_C/I_B = 50$   
 (2)  $I_C/I_B = 20$   
 (3)  $I_C/I_B = 10$

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



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

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



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

## 11. Test information

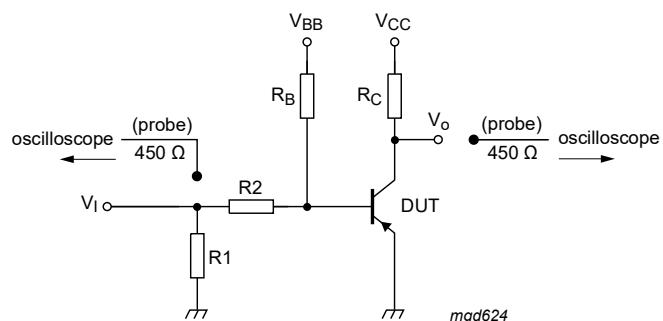


Fig. 12. Test circuit for switching times

## 12. Package outline

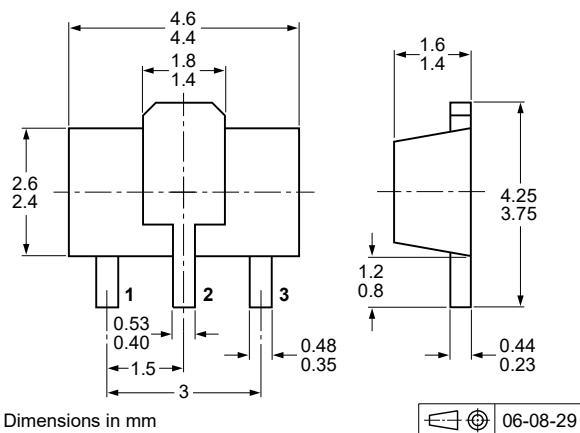


Fig. 13. Package outline SOT89

## 13. Soldering

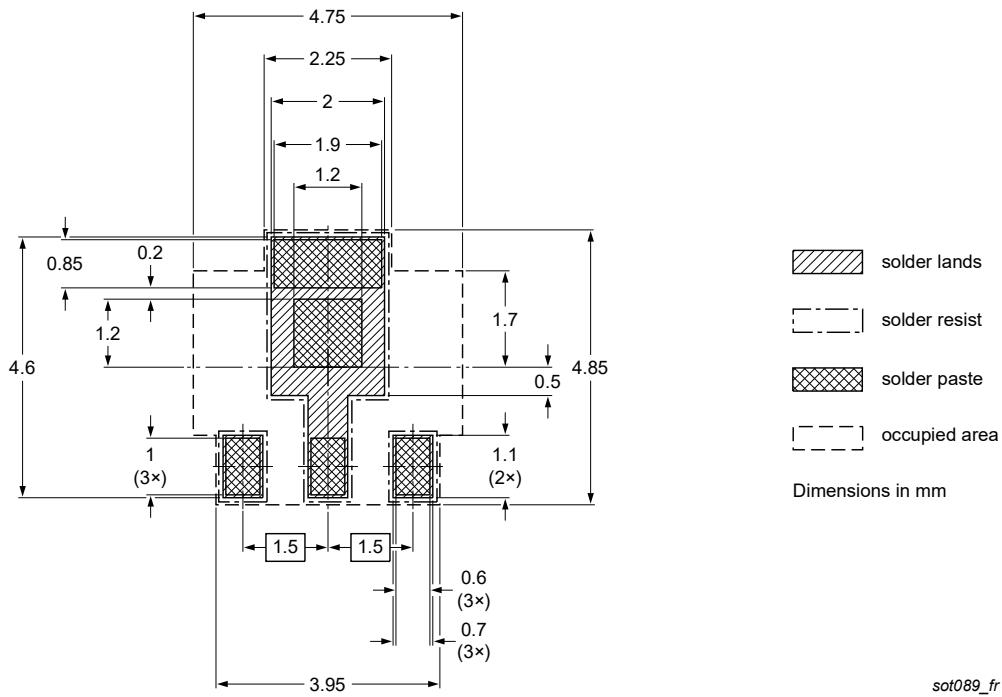


Fig. 14. Reflow soldering footprint for SOT89

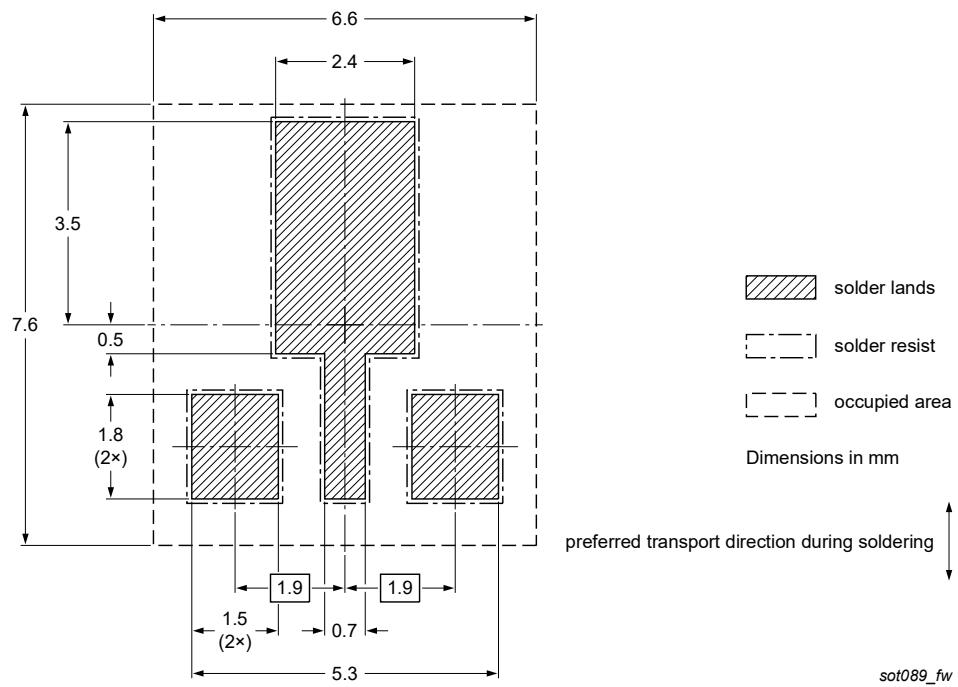


Fig. 15. Wave soldering footprint for SOT89

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV9115X v.3	20241009	Product data sheet	-	PBHV9115X v.2
Modifications:	<ul style="list-style-type: none"><li>Product(s) changed to non-automotive qualification. Please refer to <a href="http://nexperia.com">nexperia.com</a> for automotive (-Q) product alternative(s).</li></ul>			
PBHV9115X v.2	20230717	Product data sheet	-	PBHV9115X_1
PBHV9115X_1	20100310	Product data sheet	-	-

## 15. Legal information

### 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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