

# PBHV8115Z

150 V, 1 A NPN high-voltage low  $V_{CEsat}$  transistor

8 October 2024

Product data sheet

## 1. General description

NPN high-voltage low  $V_{CEsat}$  in a medium power SOT223 (SC-73) Surface-Mounted Device (SMD) plastic package.

PNP complement: PBHV9115Z

## 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  $I_C$
- Medium power SMD plastic package

## 3. Applications

- LED driver for LED chain module
- LCD backlighting
- High Intensity Discharge (HID) front lighting
- Automotive motor management
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

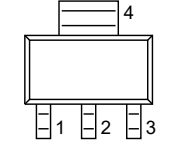
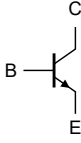
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	150	V
$I_C$	collector current		-	-	1	A
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}$ ; $I_C = 50\text{ mA}$ ; $T_{amb} = 25\text{ °C}$	100	250	-	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SC-73 (SOT223)	 sym123
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PBHV8115Z</a>	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads; 2.3 mm pitch; 6.5 mm x 3.5 mm x 1.65 mm body	<a href="#">SOT223</a>

7. Marking

Table 4. Marking codes

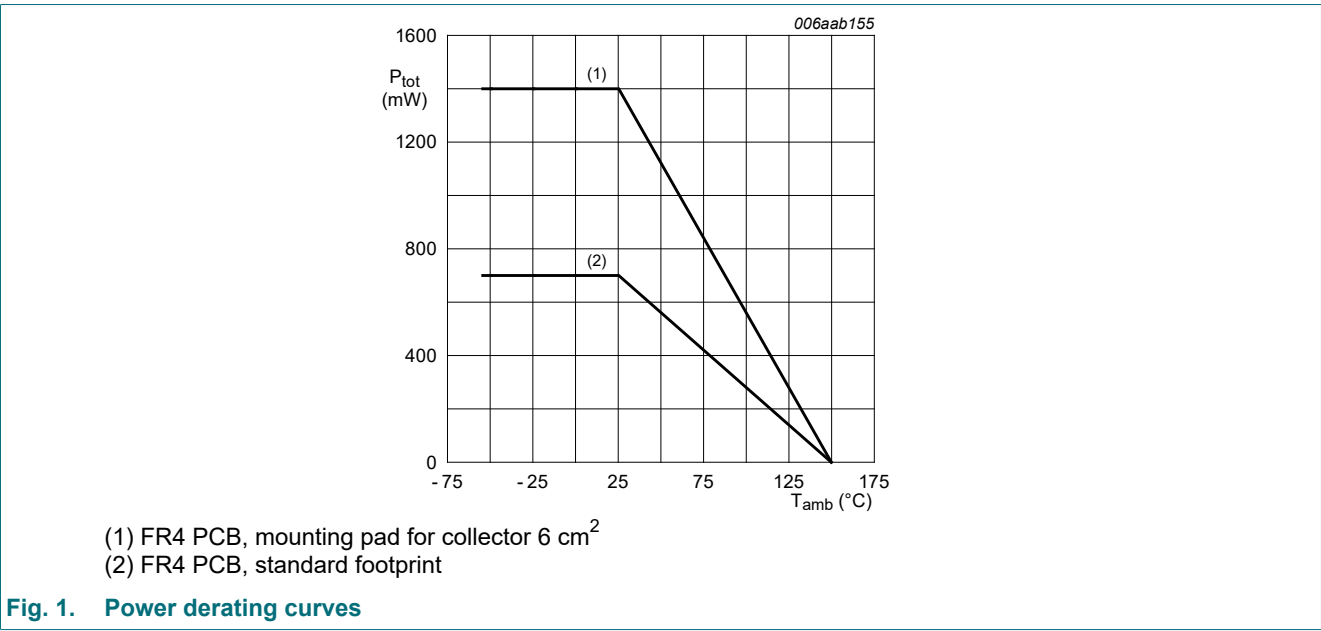
Type number	Marking code
PBHV8115Z	V8115Z

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V <sub>CBO</sub>	collector-base voltage	open emitter		-	400	V
V <sub>CEO</sub>	collector-emitter voltage	open base		-	150	V
V <sub>EBO</sub>	emitter-base voltage	open collector		-	6	V
I <sub>C</sub>	collector current			-	1	A
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms		-	2	A
I <sub>BM</sub>	peak base current			-	400	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	0.7	W
			[2]	-	1.4	W
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	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>.



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]	-	-	175	K/W
			[2]	-	-	89	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>.

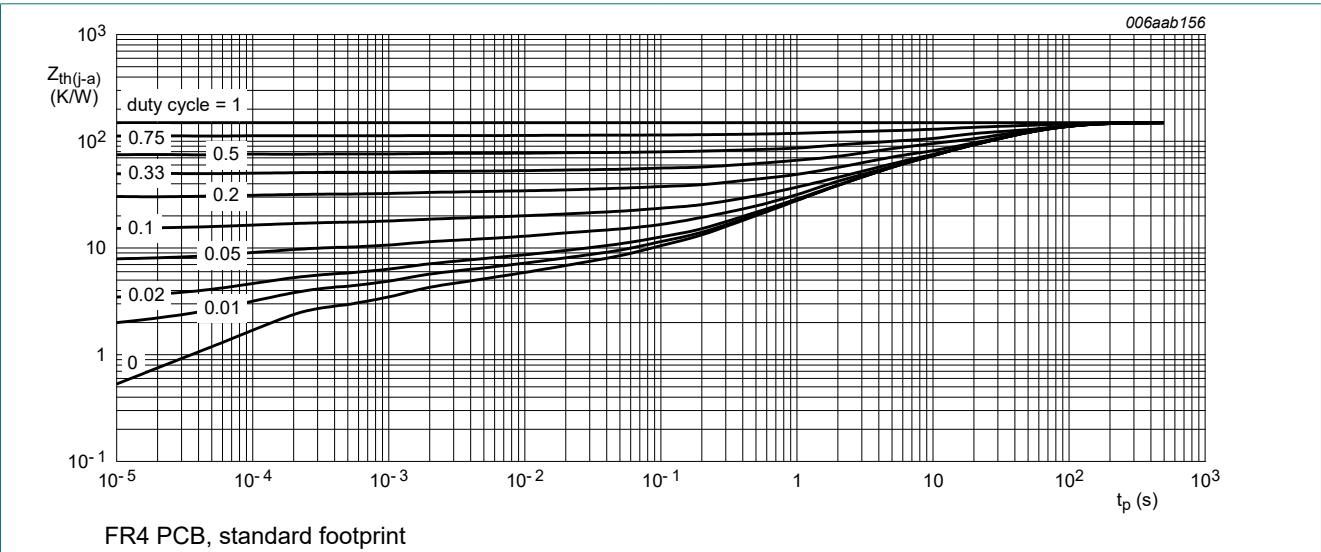


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

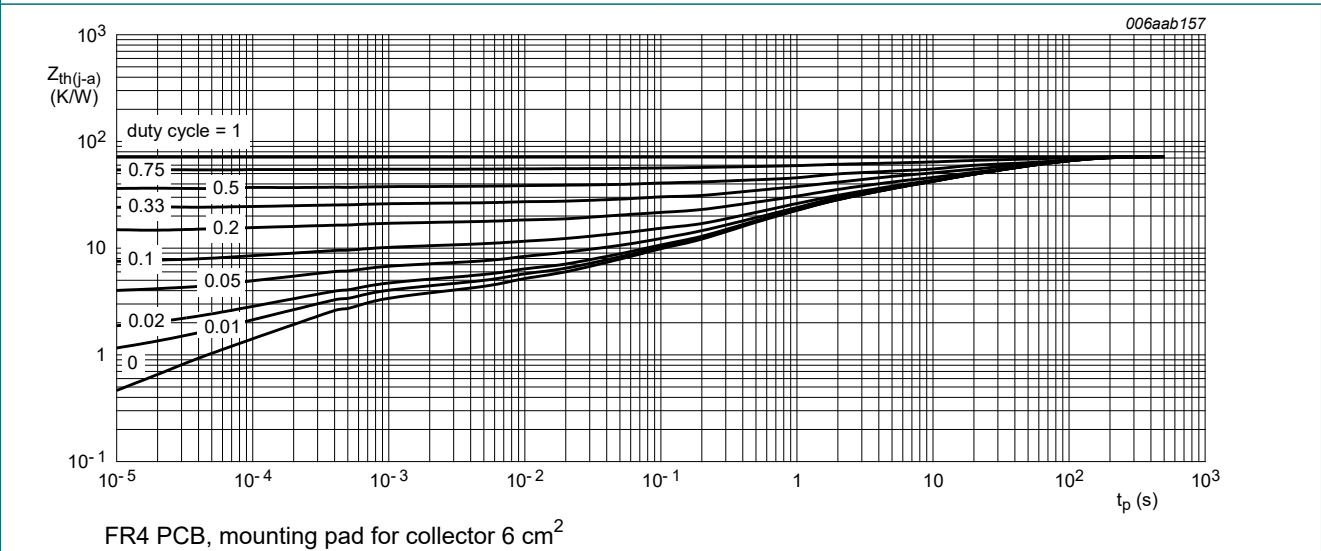


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

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	250	-	
		V <sub>CE</sub> = 10 V; I <sub>C</sub> = 100 mA; T <sub>amb</sub> = 25 °C		100	250	-	
		V <sub>CE</sub> = 10 V; I <sub>C</sub> = 0.5 A; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		50	160	-	
		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		-	40	60	mV
		I <sub>C</sub> = 100 mA; I <sub>B</sub> = 20 mA; T <sub>amb</sub> = 25 °C		-	33	50	mV
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 200 mA; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		-	225	350	mV
V <sub>BEsat</sub>	base-emitter saturation voltage			-	1.1	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		-	7	-	ns
t <sub>r</sub>	rise time			-	565	-	ns
t <sub>on</sub>	turn-on time			-	572	-	ns
t <sub>s</sub>	storage time			-	1530	-	ns
t <sub>f</sub>	fall time			-	700	-	ns
t <sub>off</sub>	turn-off time			-	2230	-	ns
f <sub>T</sub>	transition frequency			-	30	-	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		-	5.7	-	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

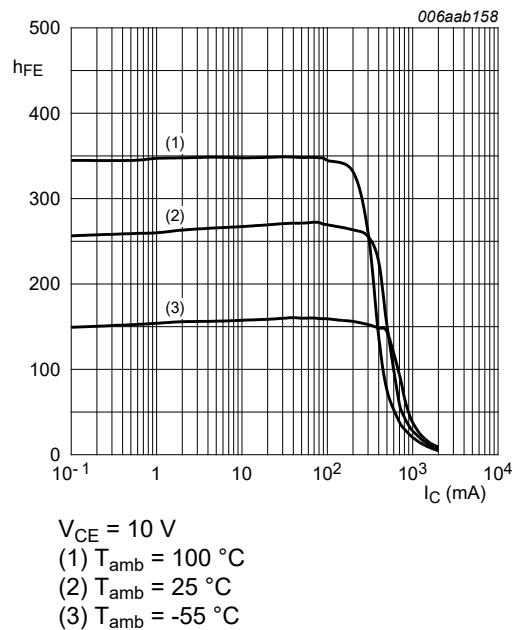


Fig. 4. DC current gain as a function of collector current; typical values

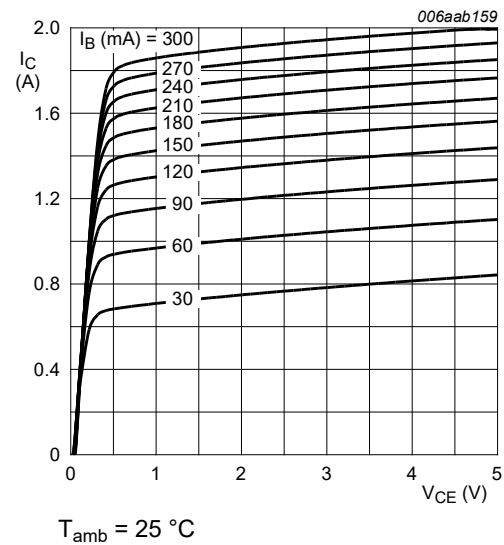


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

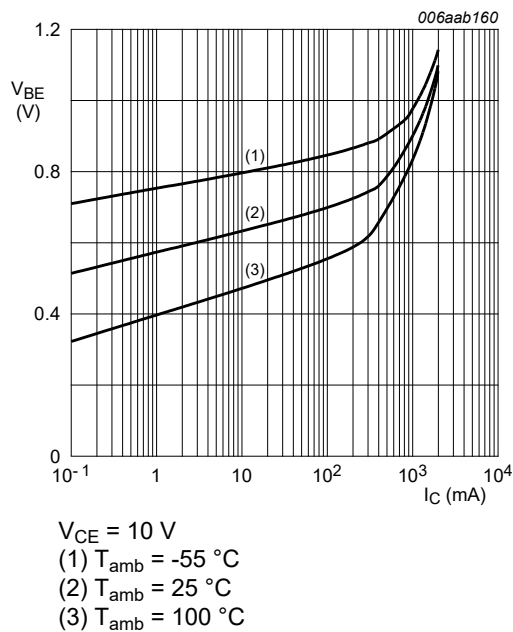


Fig. 6. Base-emitter voltage as a function of collector current; typical values

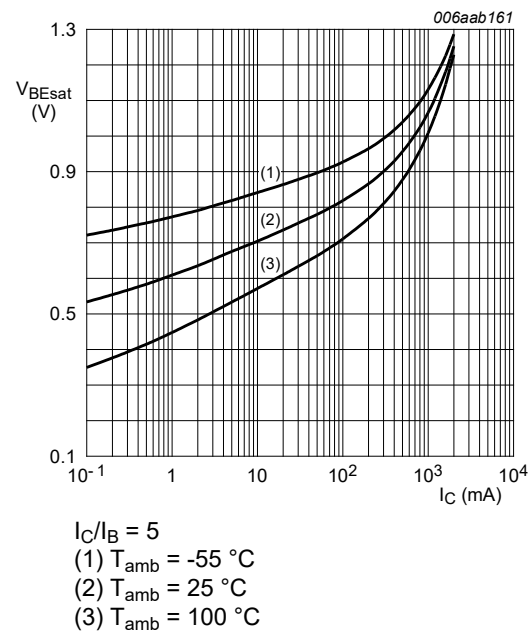


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values

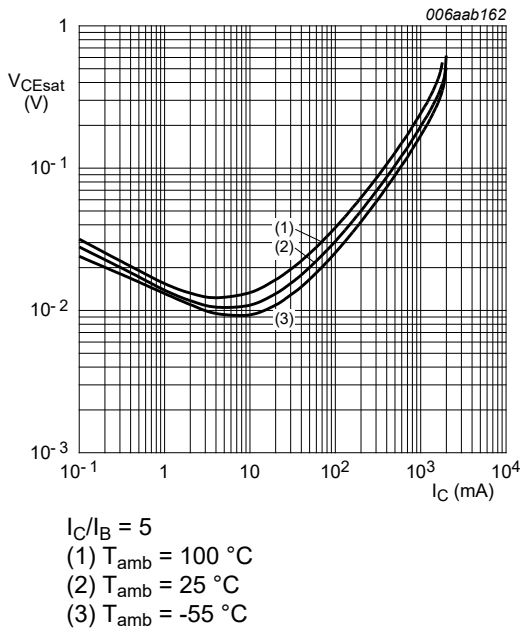


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

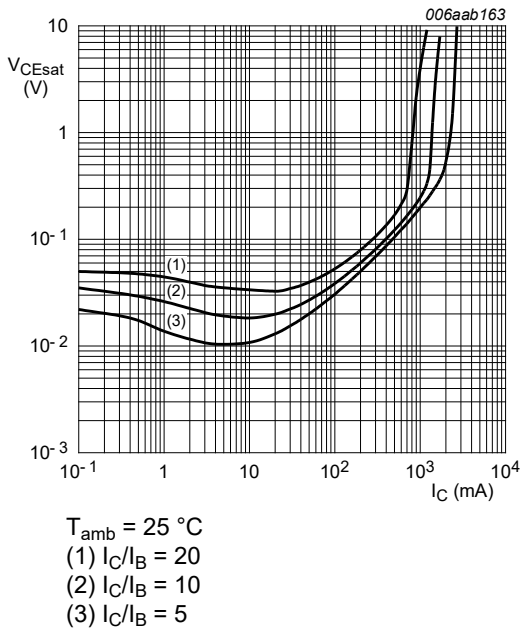


Fig. 9. Collector-emitter saturation voltage as a function of collector current; typical values

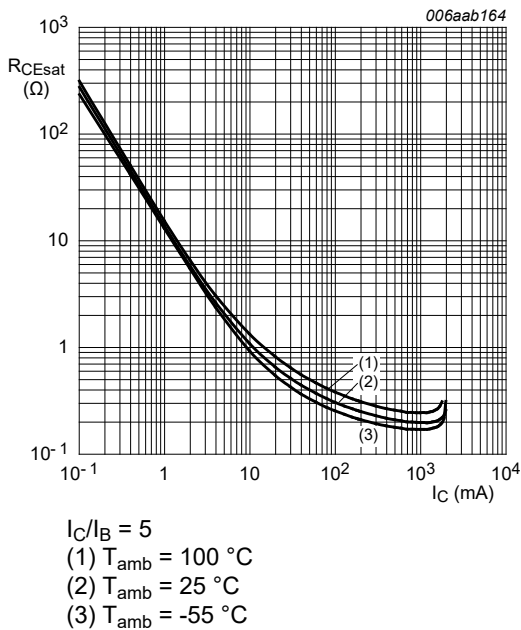


Fig. 10. Collector-emitter saturation resistance as a function of collector current; typical values

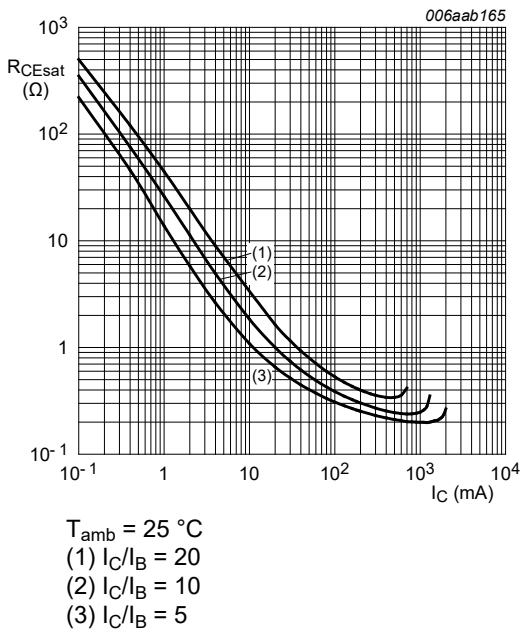


Fig. 11. Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

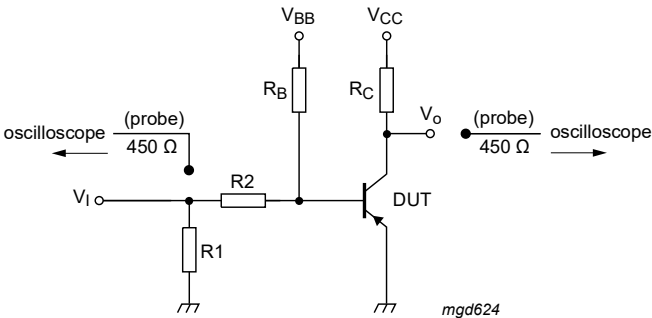


Fig. 12. Test circuit for switching times

12. Package outline

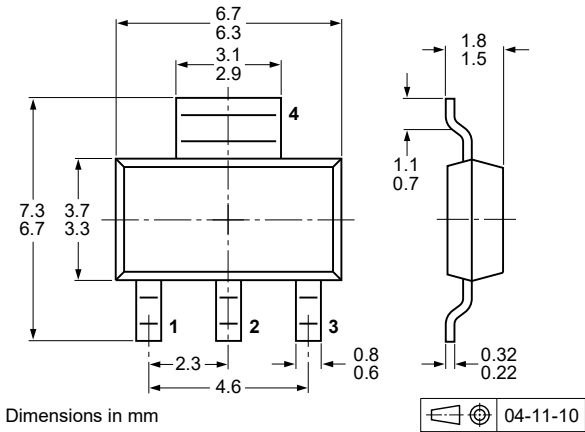


Fig. 13. Package outline SC-73 (SOT223)



13. Soldering

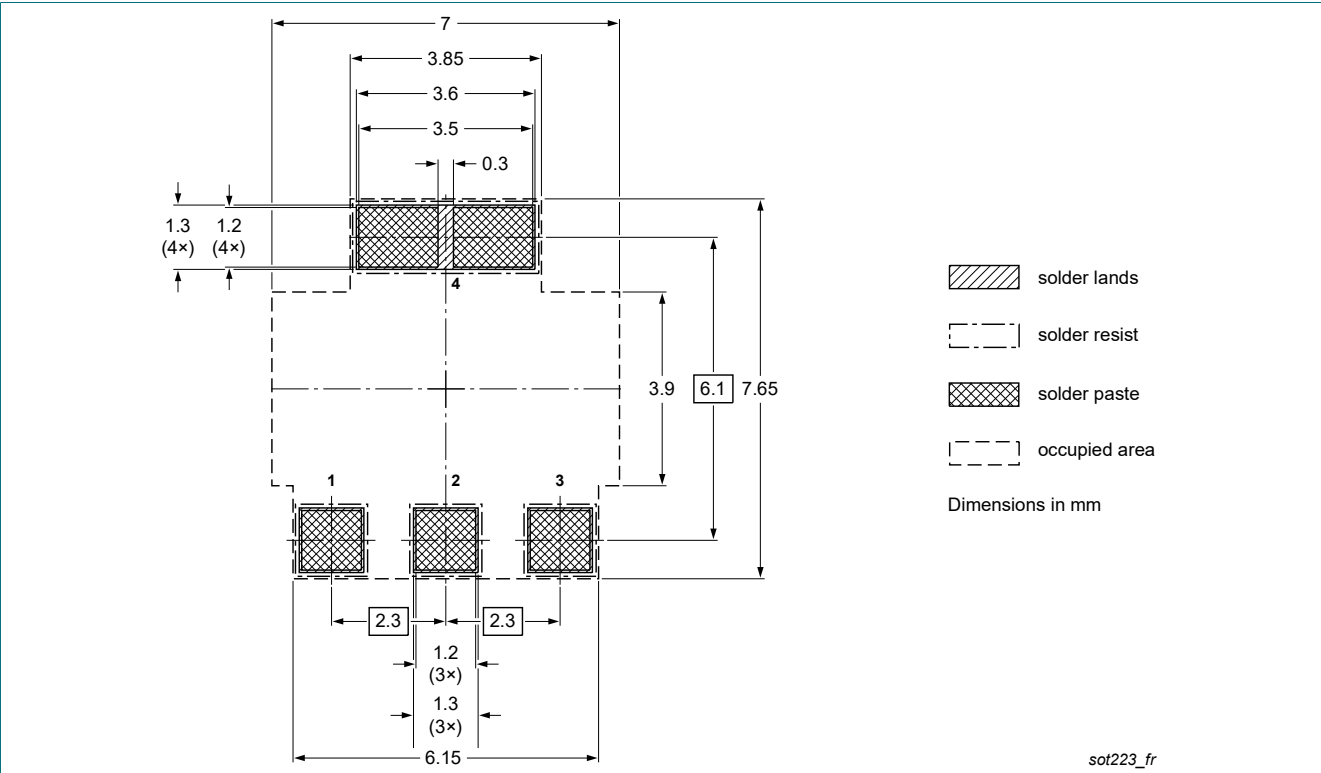


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

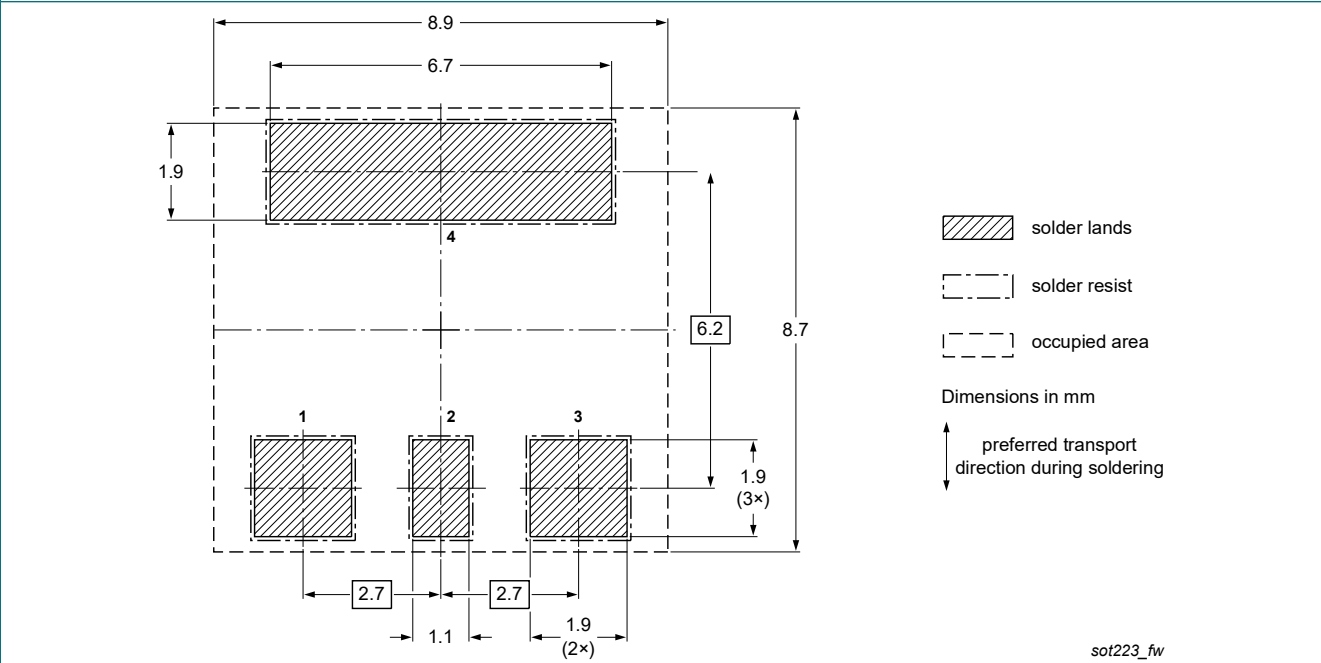


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV8115Z v.4	20241008	Product data sheet	-	PBHV8115Z v.3
Modifications:	<ul style="list-style-type: none"><li>Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li></ul>			
PBHV8115Z v.3	20230721	Product data sheet	-	PBHV8115Z_2
PBHV8115Z_2	20081209	Product data sheet	-	PBHV8115Z_1
PBHV8115Z_1	20080205	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.
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