



PBHV8215Z

150 V, 2 A NPN high-voltage low VCEsat transistor

8 October 2024

Product data sheet

1. General description

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

PNP complement: PBHV9215Z

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
- Automotive motor management
- Switch Mode Power Supply (SMPS)

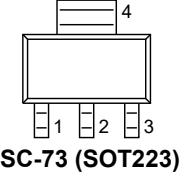
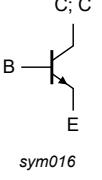
4. Quick reference data

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			-	-	2	A
h_{FE}	DC current gain	$V_{CE} = 10 \text{ V}$; $I_C = 100 \text{ mA}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{amb} = 25^\circ\text{C}$		100	240	-	

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package			Version
	Name	Description		
PBHV8215Z	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		SOT223

7. Marking

Table 4. Marking codes

Type number	Marking code
PBHV8215Z	V8215Z

8. Limiting values

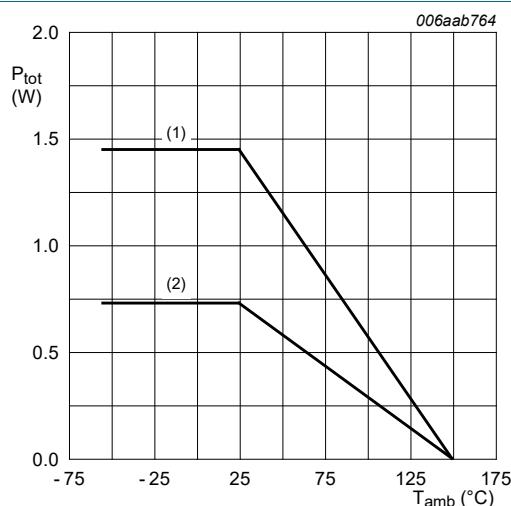
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	350	V
V_{CEO}	collector-emitter voltage	open base		-	150	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	2	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	4	A
I_{BM}	peak base current			-	500	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	1.45	W
			[2]	-	0.73	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 mounting pad for collector 6 cm².

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



(1) FR4 PCB, mounting pad for collector 6 cm²

(2) FR4 PCB, standard footprint

Fig. 1. Power derating curves

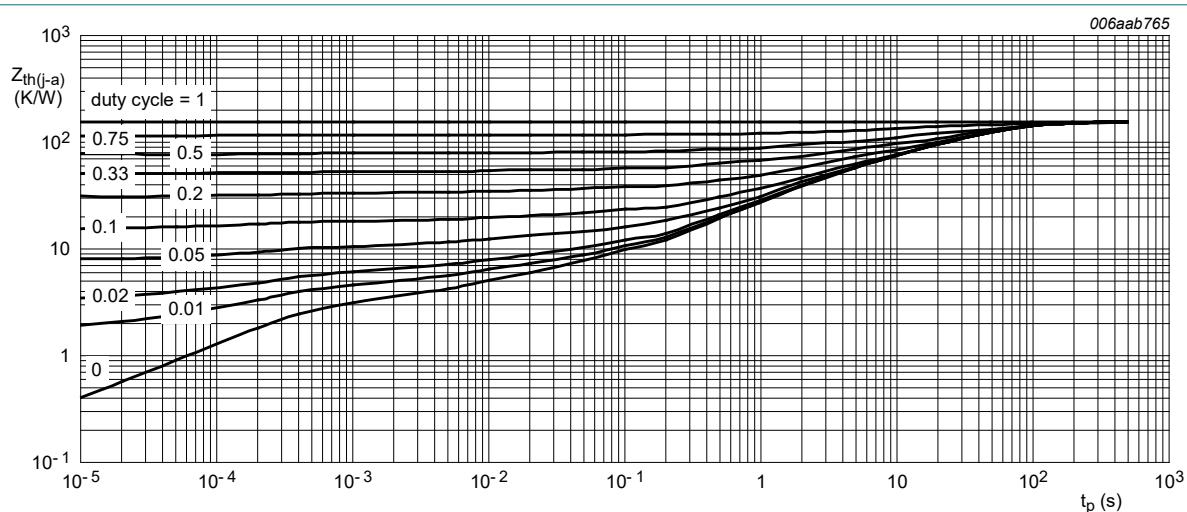
9. Thermal characteristics

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]	-	-	85	K/W
			[2]	-	-	170	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	15	K/W

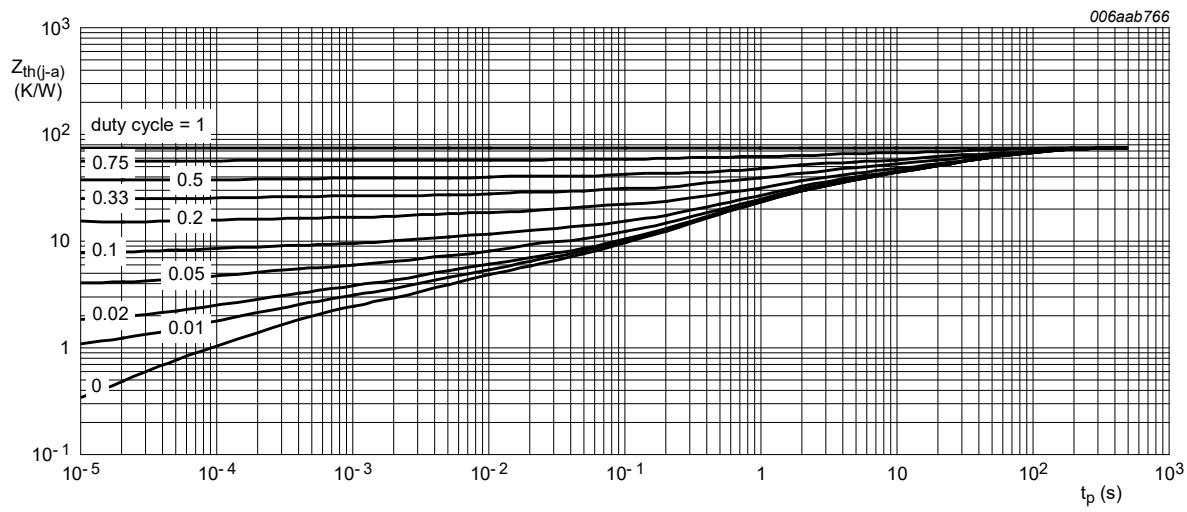
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

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



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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = 120 \text{ V}; I_E = 0 \text{ A}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	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	$V_{CE} = 120 \text{ V}; V_{BE} = 0 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	100	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 4 \text{ V}; I_C = 0 \text{ A}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 10 \text{ V}; I_C = 100 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	100	240	-	
		$V_{CE} = 10 \text{ V}; I_C = 1 \text{ A}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	100	230	-	
		$V_{CE} = 10 \text{ V}; I_C = 1.5 \text{ A}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	90	210	-	
		$V_{CE} = 10 \text{ V}; I_C = 2 \text{ A}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	55	130	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 100 \text{ mA}; I_B = 20 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	15	30	mV
		$I_C = 1 \text{ A}; I_B = 200 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	90	170	mV
		$I_C = 1.5 \text{ A}; I_B = 300 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	130	220	mV
		$I_C = 2 \text{ A}; I_B = 400 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	170	280	mV
R_{CEsat}	collector-emitter saturation resistance		-	85	140	mΩ
V_{BEsat}	base-emitter saturation voltage		-	1	1.2	V
t_d	delay time	$V_{CC} = 6 \text{ V}; I_C = 0.5 \text{ A}; I_{Bon} = 0.1 \text{ A}; I_{Boff} = -0.1 \text{ A}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	20	-	ns
t_r	rise time		-	280	-	ns
t_{on}	turn-on time		-	300	-	ns
t_s	storage time		-	2165	-	ns
t_f	fall time		-	275	-	ns
t_{off}	turn-off time		-	2440	-	ns
f_T	transition frequency	$V_{CE} = 10 \text{ V}; I_C = 10 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	33	-	MHz
C_c	collector capacitance	$V_{CB} = 20 \text{ V}; I_E = 10 \text{ mA}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	17	-	pF
C_e	emitter capacitance	$V_{EB} = 0.5 \text{ V}; I_C = 0 \text{ A}; i_c = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	500	-	pF

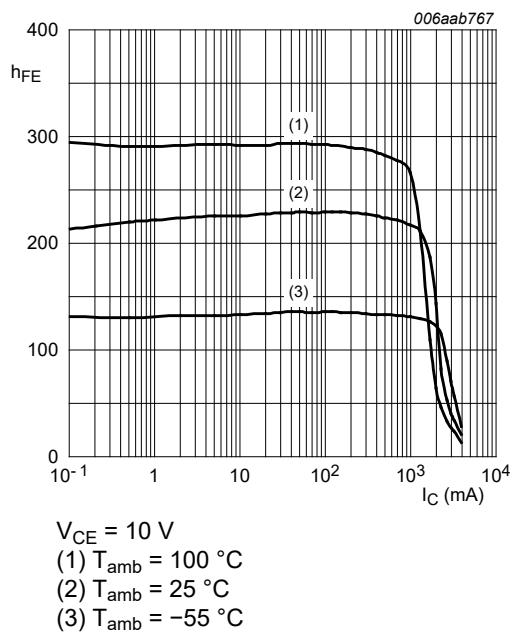


Fig. 4. DC current gain as a function of collector current; typical values

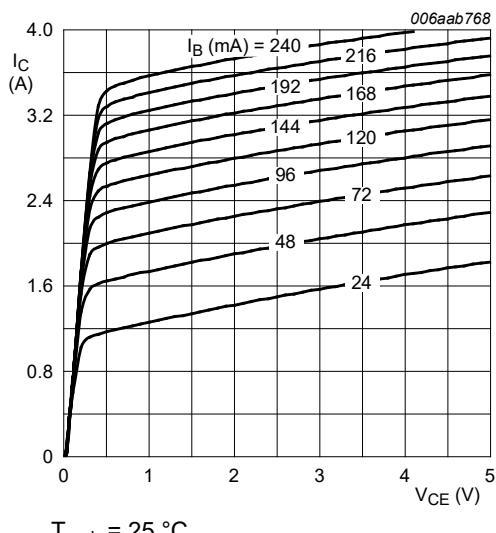


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

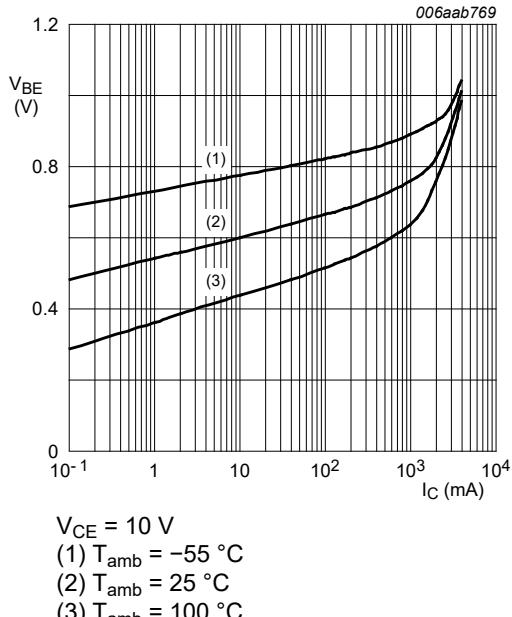


Fig. 6. Base-emitter voltage as a function of collector current; typical values

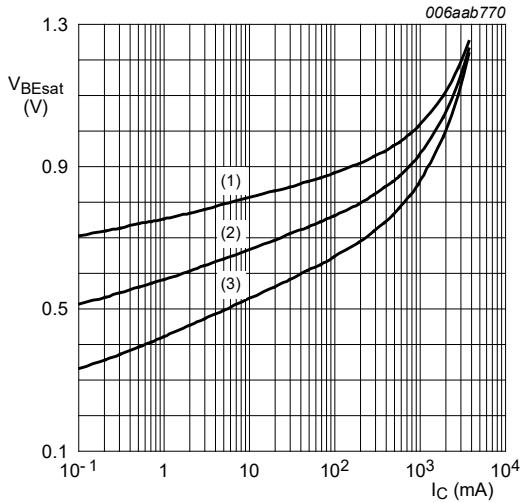
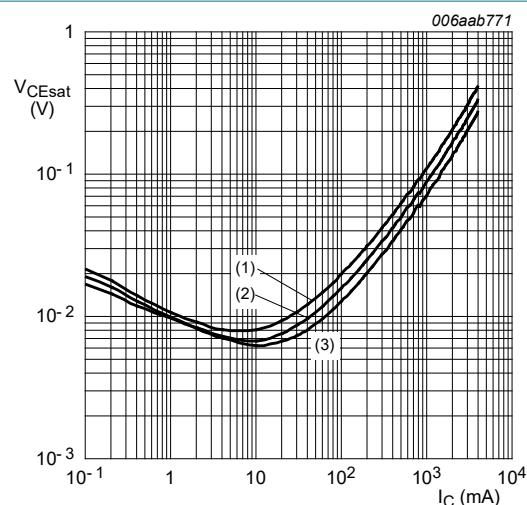
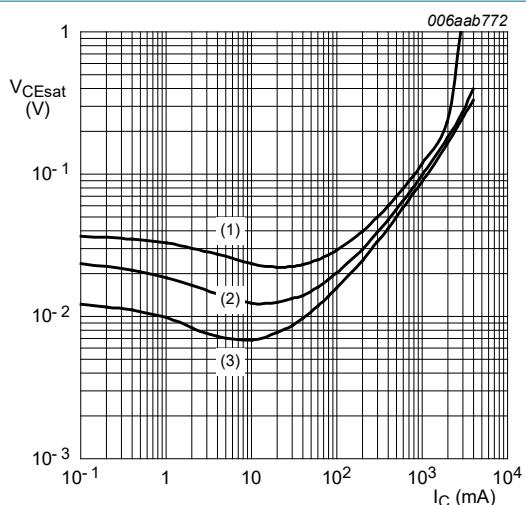


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values



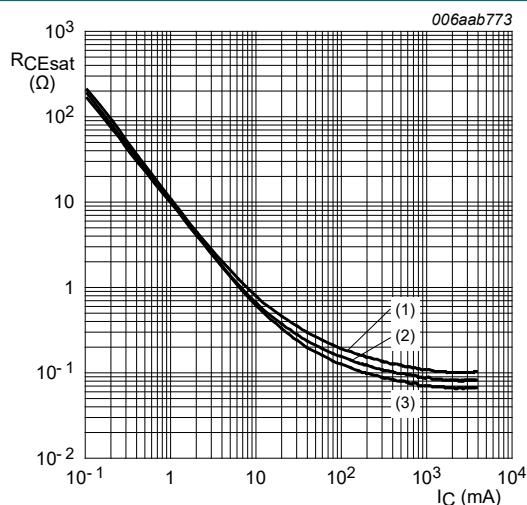
$I_C/I_B = 5$
 (1) $T_{amb} = 100 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

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



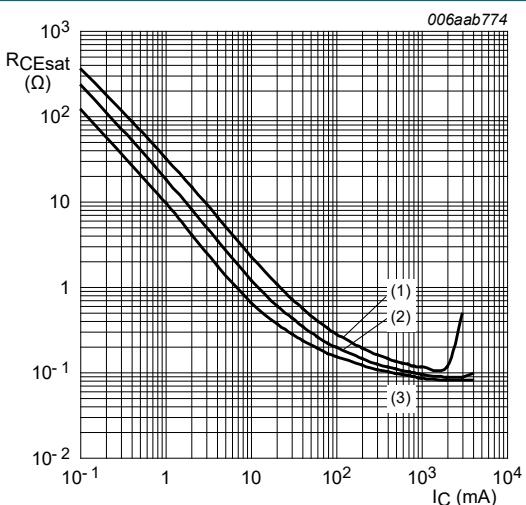
$T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (1) $I_C/I_B = 20$
 (2) $I_C/I_B = 10$
 (3) $I_C/I_B = 5$

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



$I_C/I_B = 5$
 (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) $I_C/I_B = 20$
 (2) $I_C/I_B = 10$
 (3) $I_C/I_B = 5$

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

11. Test information

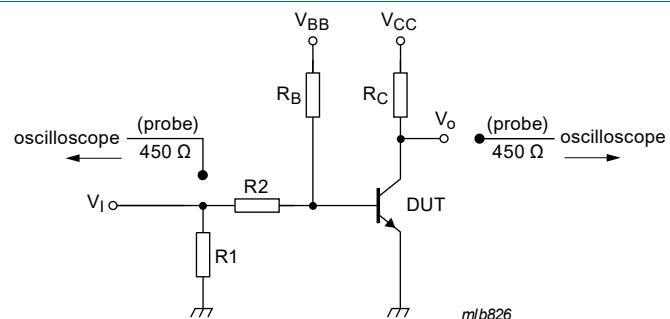


Fig. 12. Test circuit for switching times

12. Package outline

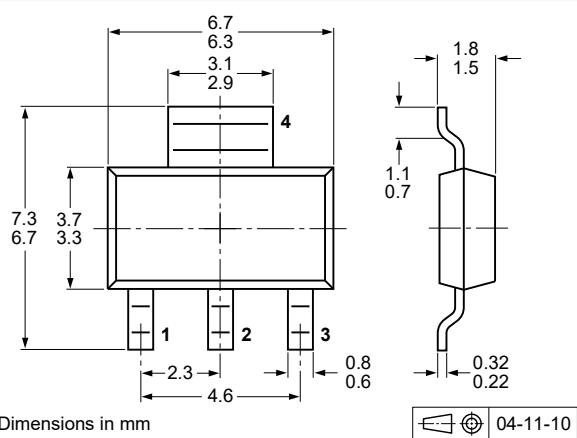


Fig. 13. Package outline SC-73 (SOT223)

13. Soldering

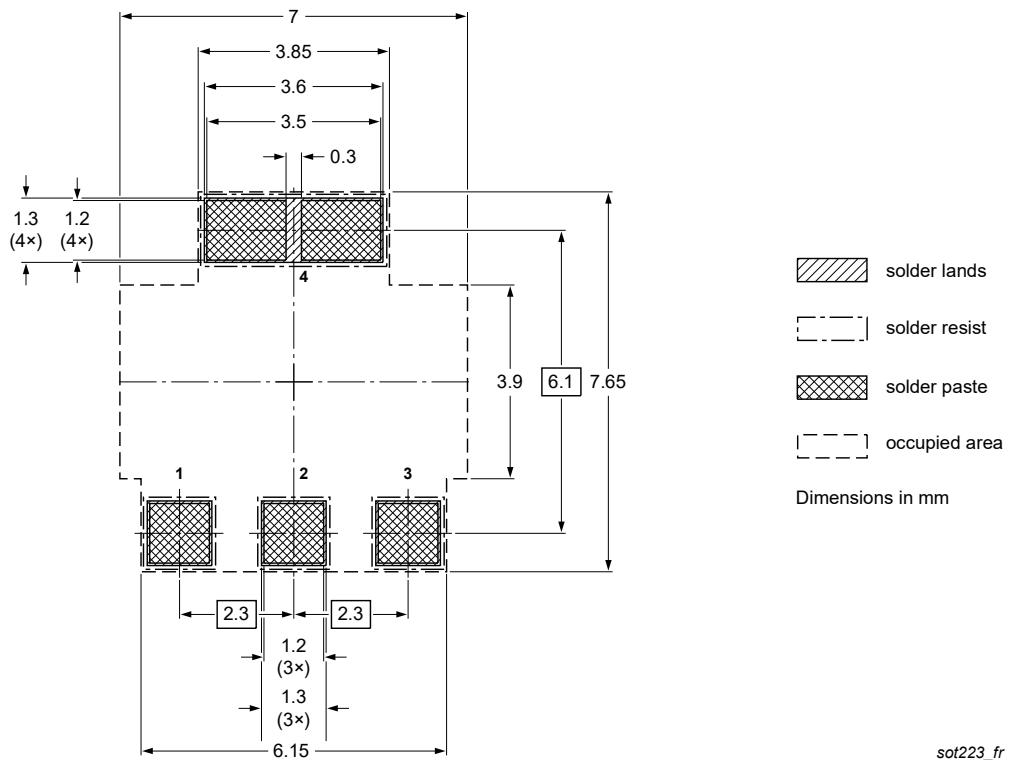


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

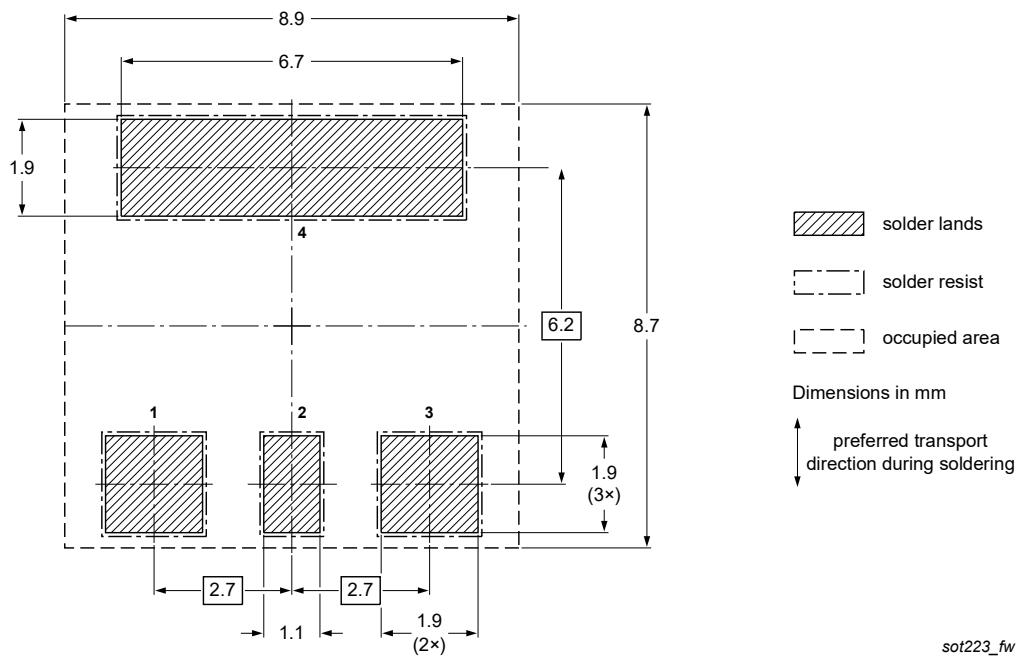


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV8215Z v.3	20241008	Product data sheet	-	PBHV8215Z v.2
Modifications:	<ul style="list-style-type: none">Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
PBHV8215Z v.2	20230712	Product data sheet	-	PBHV8215Z_1
PBHV8215Z_1	20091111	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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