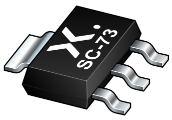

PBHV9560Z-Q

600 V, 0.5 A PNP high-voltage low VCEsat transistor

14 July 2023 — Product data sheet

1. General description

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

NPN complement: PBHV8560Z-Q

2. Features and benefits

- High voltage
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C
- High collector current gain h_{FE} at high I_C
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Electronic ballast for fluorescent lighting
- LED driver for LED chain module
- LCD backlighting
- 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_{CESM}	collector-emitter peak voltage	V_{BE} = 0 V		-	-	-600	V
V_{CEO}	collector-emitter voltage	open base		-	-	-600	V
I_C	collector current			-	-	-0.5	A
h_{FE}	DC current gain	V_{CE} = -10 V; I_C = -50 mA; T_{amb} = 25 °C		70	130	-	

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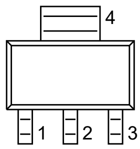
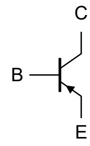
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SC-73 (SOT223)	 sym028
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBHV9560Z-Q	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
PBHV9560Z-Q	HV956Z

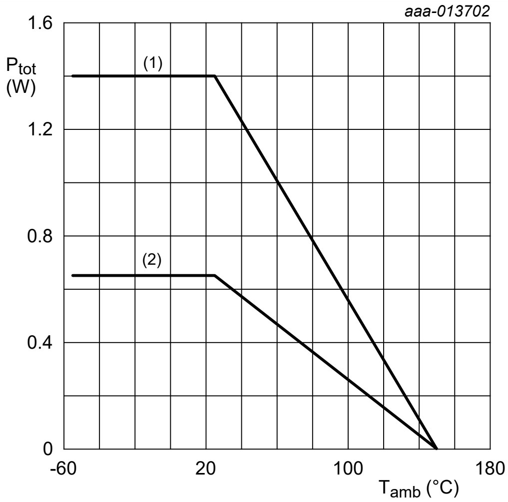
8. Limiting values

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		-	-600	V
V_{CEO}	collector-emitter voltage	open base		-	-600	V
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0 V		-	-600	V
V_{EBO}	emitter-base voltage	open collector		-	-6	V
I_C	collector current			-	-0.5	A
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	0.65	W
			[2]	-	1.4	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, mounting pad for collector 6 cm^2.



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

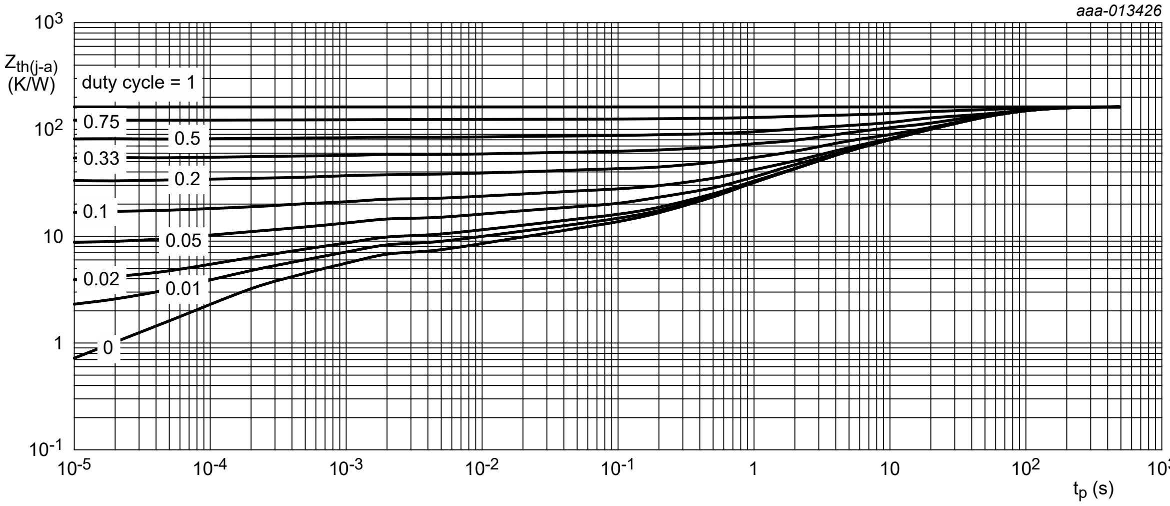
Fig. 1. Power derating curves

9. Thermal characteristics

Table 6. Thermal characteristics

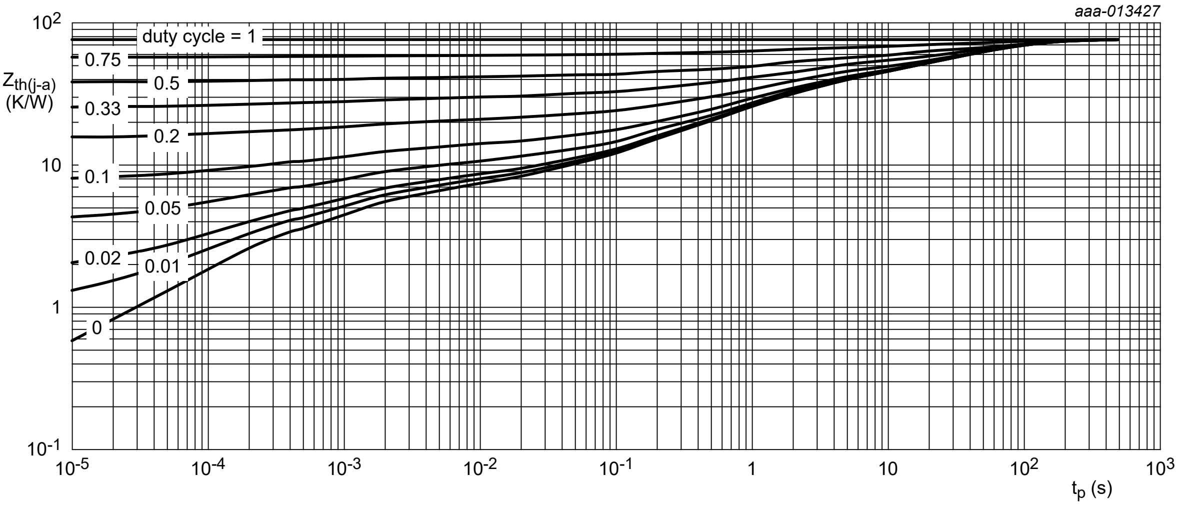
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	190	K/W
			[2]	-	-	89	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	20	K/W

[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^2.



FR4 PCB, single-sided copper, tin-plated and standard footprint.

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



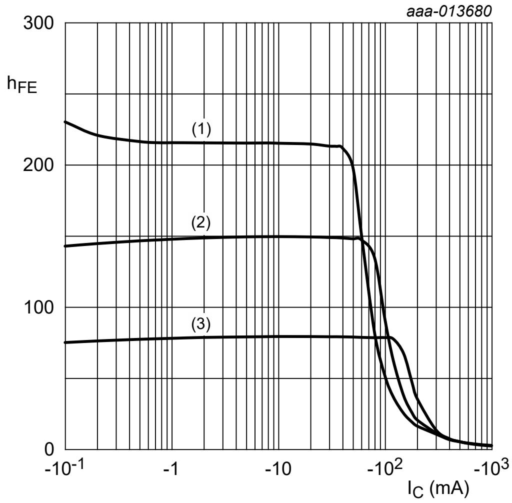
FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

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

10. Characteristics

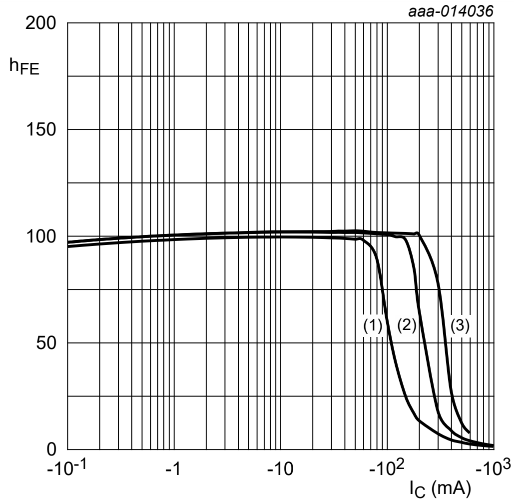
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = -400 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-100	nA
		V_{CB} = -400 V; I_E = 0 A; T_j = 150 °C		-	-	-10	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = -5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	-100	nA
I_{CES}	collector-emitter cut-off current	V_{CE} = -400 V; V_{BE} = 0 V; T_{amb} = 25 °C		-	-	-100	nA
h_{FE}	DC current gain	V_{CE} = -10 V; I_C = -50 mA; T_{amb} = 25 °C		70	130	-	
		V_{CE} = -10 V; I_C = -100 mA; pulsed; t_p ≤ 300 µs; δ ≤ 0.02; T_{amb} = 25 °C		50	90	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -50 mA; I_B = -5 mA; T_{amb} = 25 °C		-	-150	-250	mV
		I_C = -100 mA; I_B = -20 mA; pulsed; t_p ≤ 300 µs; δ ≤ 0.02; T_{amb} = 25 °C		-	-140	-250	mV
V_{BEsat}	base-emitter saturation voltage	I_C = -50 mA; I_B = -5 mA; pulsed; t_p ≤ 300 µs; δ ≤ 0.02; T_{amb} = 25 °C		-	-	-900	mV
f_T	transition frequency	V_{CE} = -10 V; I_C = -30 mA; f = 100 MHz		-	38	-	MHz
C_c	collector capacitance	V_{CB} = -20 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	12	-	pF
C_e	emitter capacitance	V_{EB} = -0.5 V; I_C = 0 A; i_c = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	390	-	pF



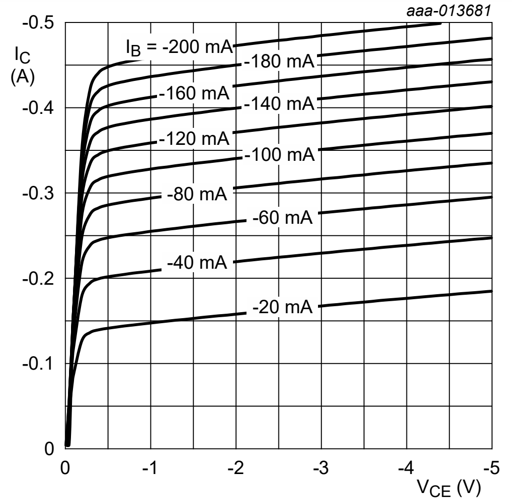
V_{CE} = −10 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



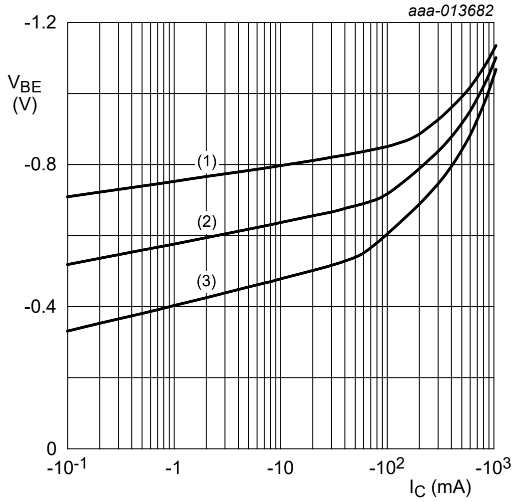
$h_{FE} = f_{(IC)}$
T_{amb} = 25 °C
(1) V_{CE} = -10 V
(2) V_{CE} = -25 V
(3) V_{CE} = -50 V

Fig. 5. DC current gain as a function of collector current; typical values



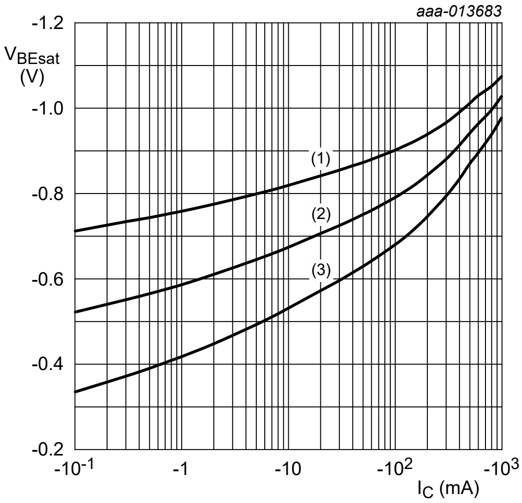
T_{amb} = 25 °C

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



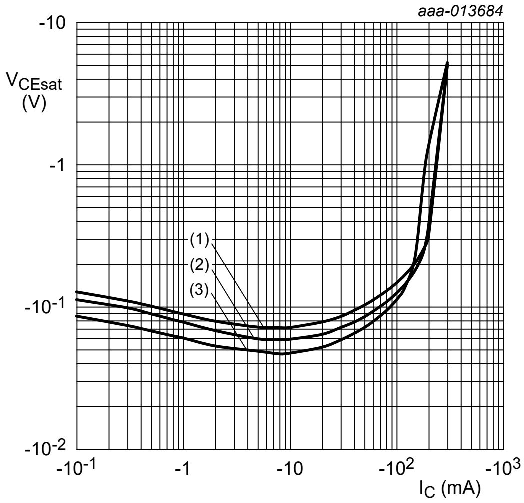
V_{CE} = −5 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



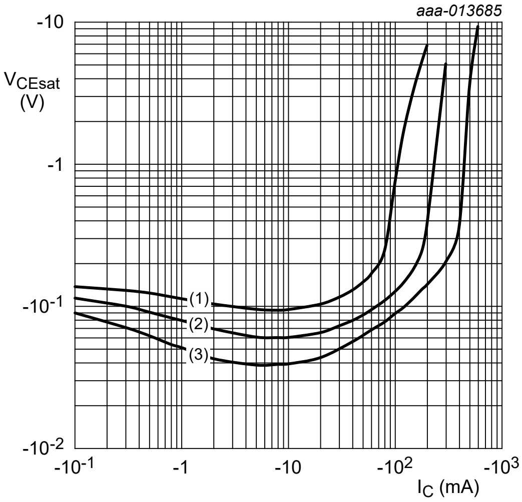
I_C/I_B = 10
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



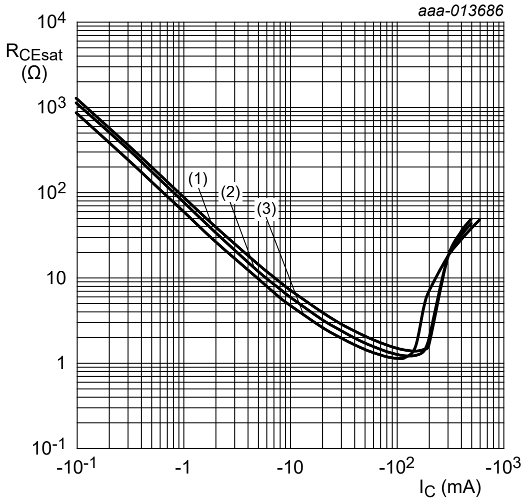
I_C/I_B = 5
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



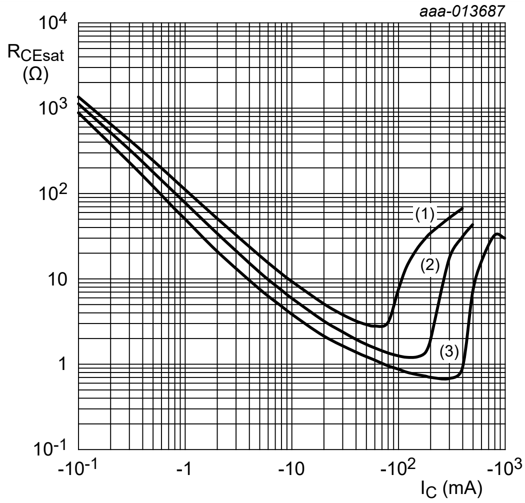
T_{amb} = 25 °C
(1) I_C/I_B = 10.0
(2) I_C/I_B = 5.0
(3) I_C/I_B = 2.5

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



I_C/I_B = 5
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



T_{amb} = 25 °C
(1) I_C/I_B = 10.0
(2) I_C/I_B = 5.0
(3) I_C/I_B = 2.5

Fig. 12. Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

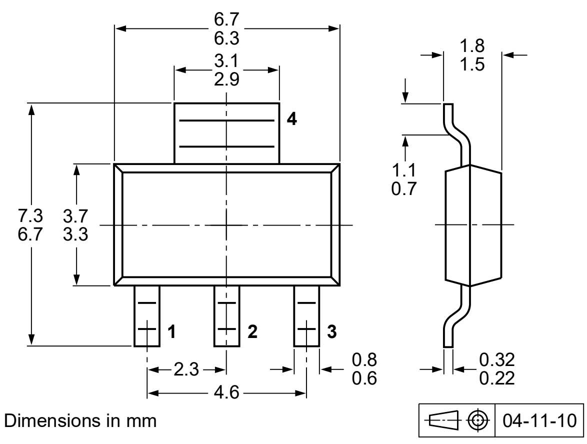


Fig. 13. Package outline SC-73 (SOT223)

13. Soldering

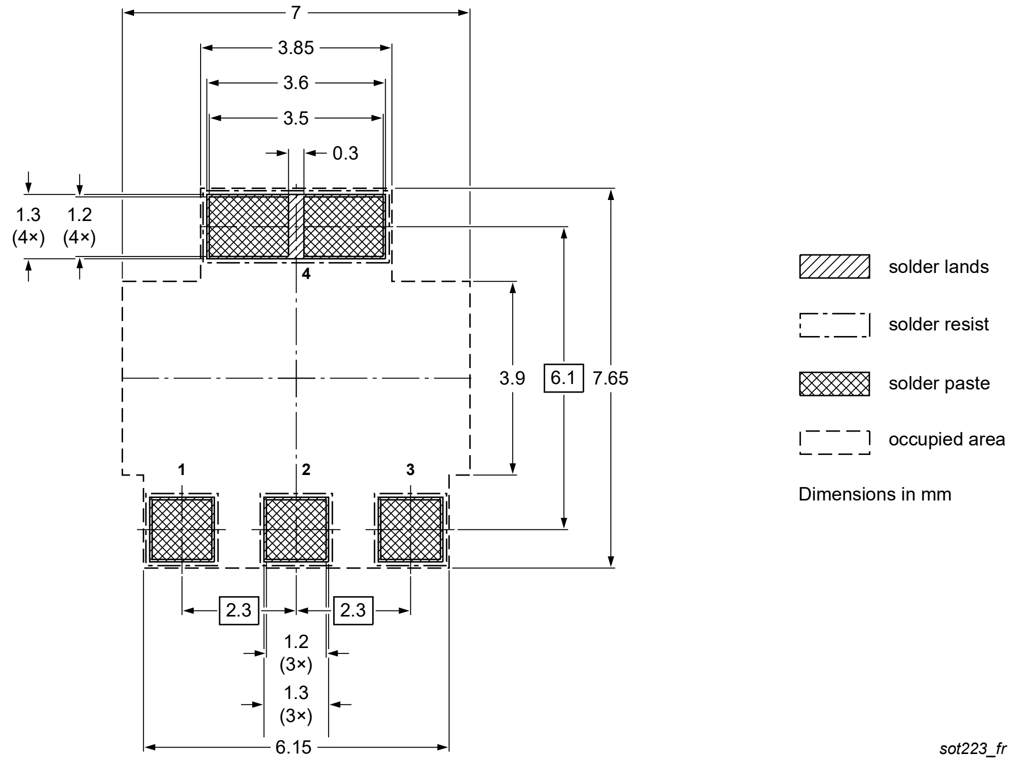


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

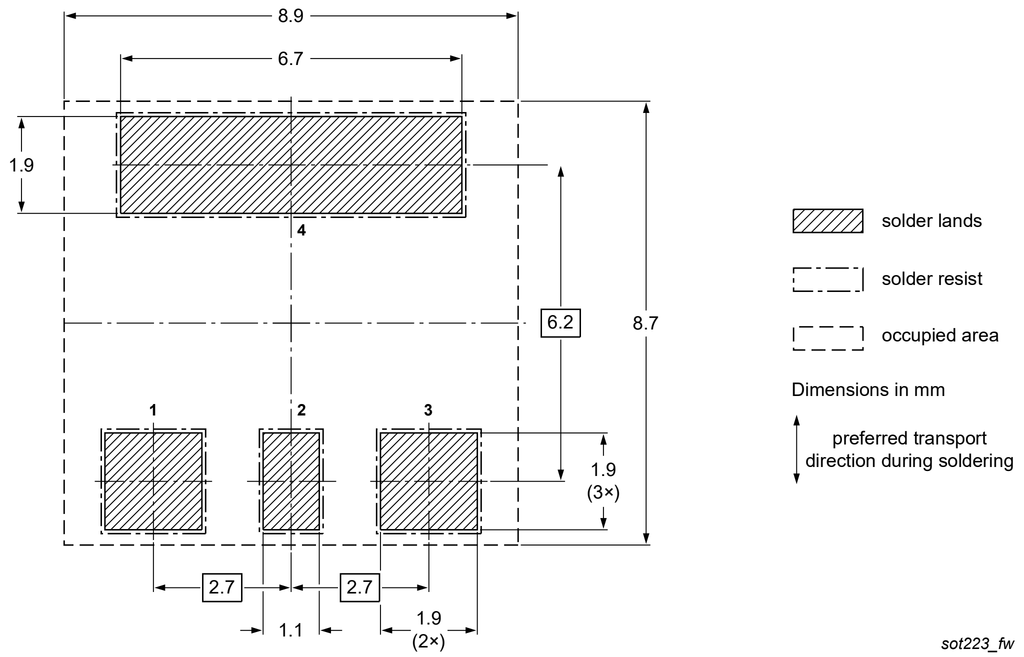


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV9560Z-Q v.1	20230714	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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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