



PBHV2160Z

600 V, 0.1 A NPN high-voltage low V_{CEsat} transistor

9 October 2024

Product data sheet

1. General description

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

PNP complement: PBHV3160Z

2. Features and benefits

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability
- High collector current gain h_{FE} at high I_C

3. Applications

- Electronic ballast for fluorescent lighting
- LED driver for LED chain module
- LCD backlighting
- HID front lighting
- 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	-	-	600	V
I _C	collector current		-	-	0.1	A

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	<p>SC-73 (SOT223)</p>	<p>sym016</p>
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBHV2160Z	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
PBHV2160Z	HV216Z

8. Limiting values

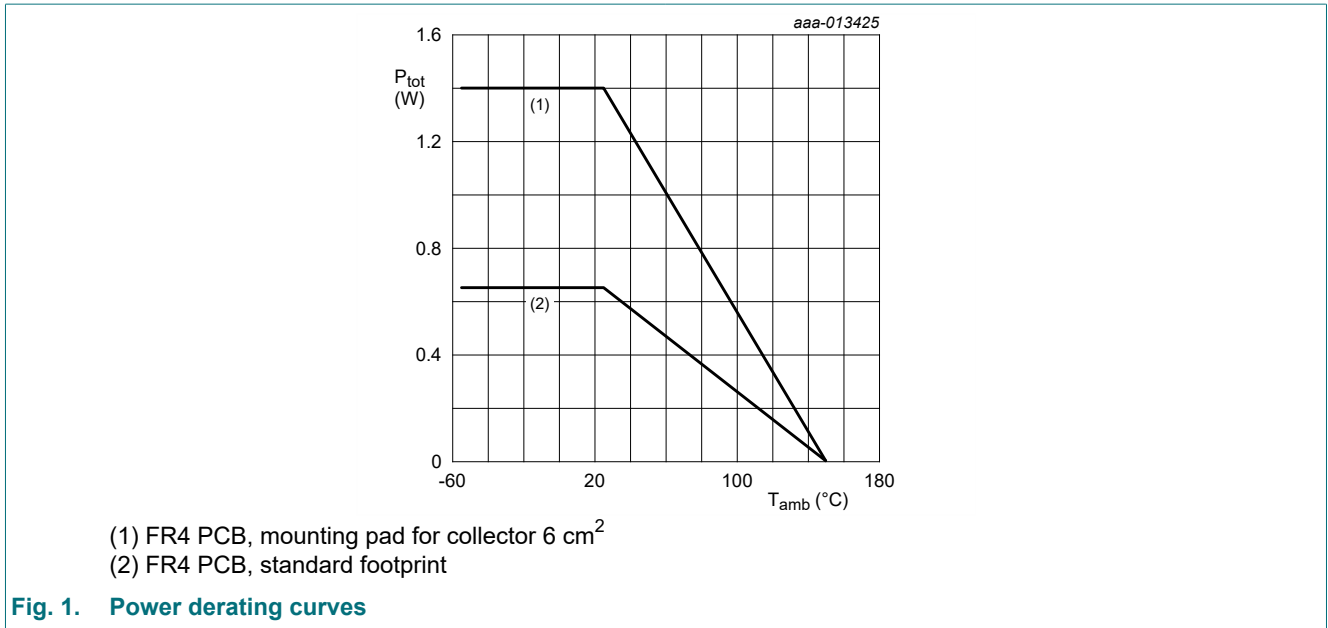
Table 5. Limiting values

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			-	0.1	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 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 cm².

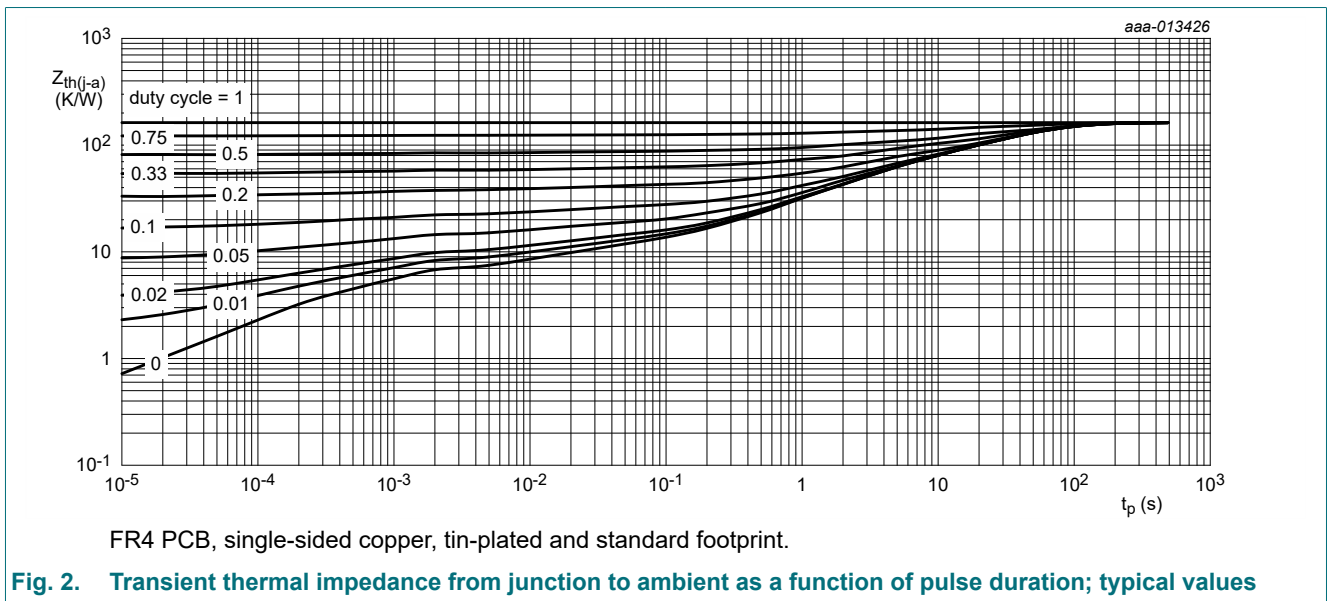


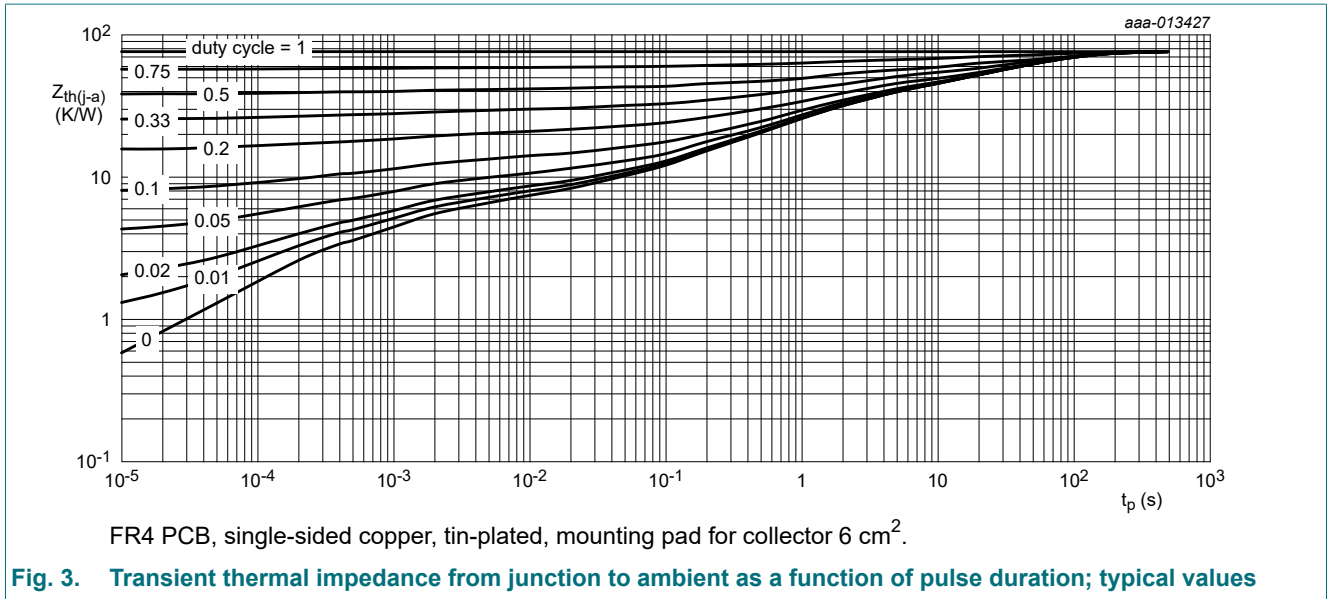
9. Thermal characteristics

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 cm².

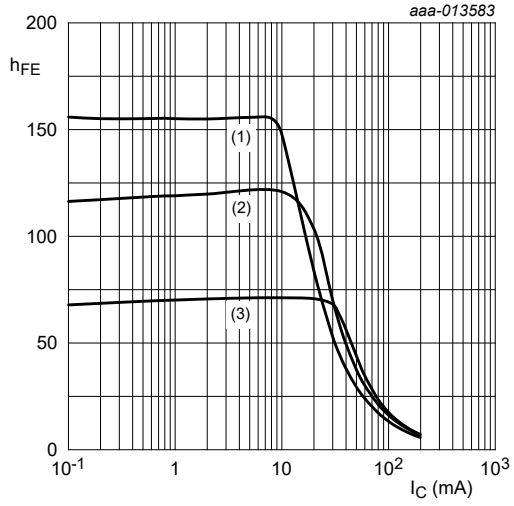




10. Characteristics

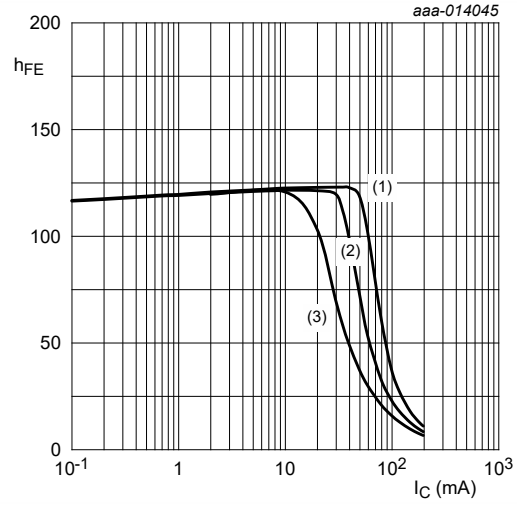
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{CB0}	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 _{CES}	collector-emitter cut-off current	V _{CE} = 400 V; V _{BE} = 0 V; T _{amb} = 25 °C	-	-	100	nA
I _{EBO}	emitter-base cut-off current	V _{EB} = 4.8 V; I _C = 0 A; T _{amb} = 25 °C	-	-	100	nA
h _{FE}	DC current gain	V _{CE} = 10 V; I _C = 10 mA; T _{amb} = 25 °C	70	125	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = 30 mA; I _B = 6 mA; T _{amb} = 25 °C	-	65	125	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	-	-	950	mV
C _c	collector capacitance	V _{CB} = 20 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C	-	1.7	-	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	-	81	-	pF



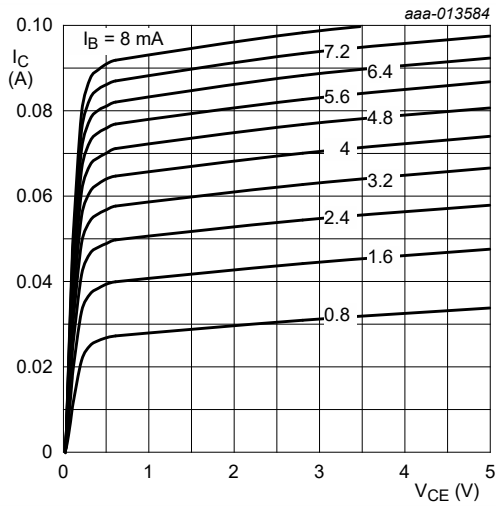
$V_{CE} = 10$ V
 (1) $T_{amb} = 100$ °C
 (2) $T_{amb} = 25$ °C
 (3) $T_{amb} = -55$ °C

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



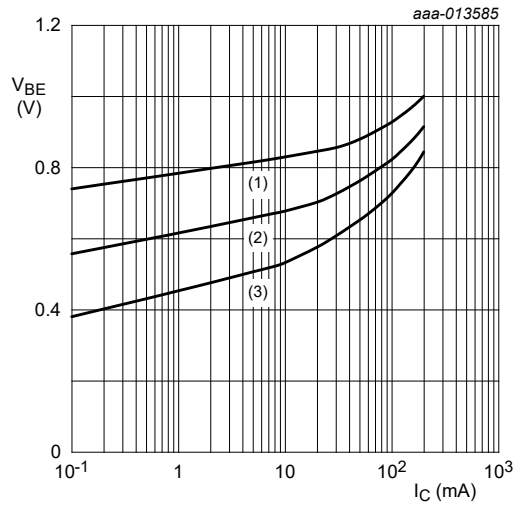
$T_{amb} = 25$ °C
 (1) $V_{CE} = 50$ V
 (2) $V_{CE} = 25$ V
 (3) $V_{CE} = 10$ V

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



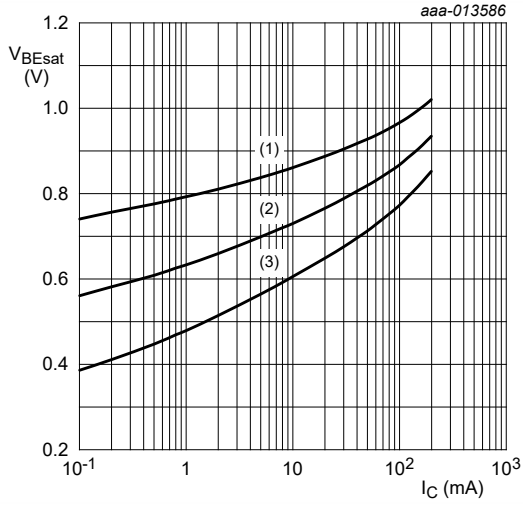
$T_{amb} = 25$ °C

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



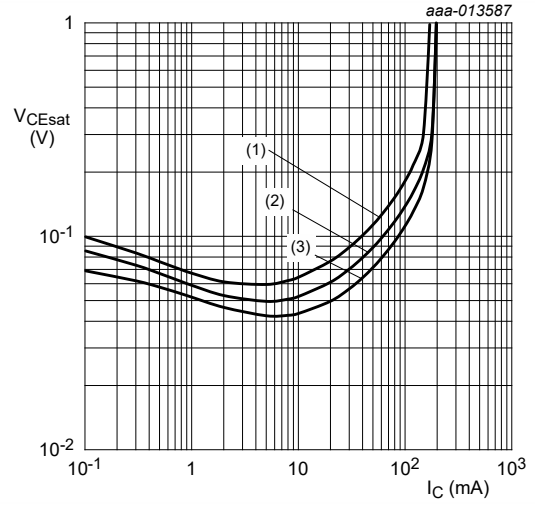
$V_{CE} = 10$ V
 (1) $T_{amb} = -55$ °C
 (2) $T_{amb} = 25$ °C
 (3) $T_{amb} = 100$ °C

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



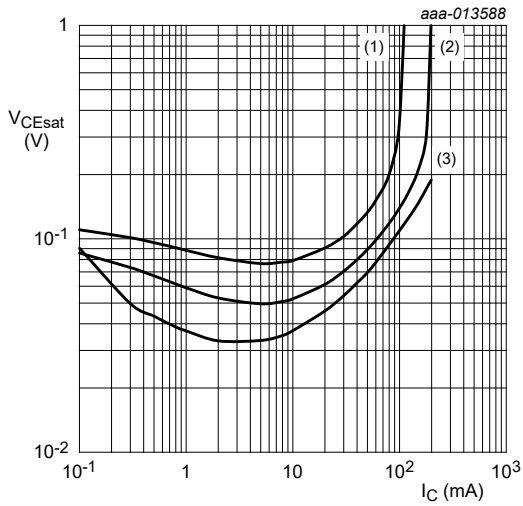
$I_C/I_B = 5$
 (1) $T_{amb} = -55^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = 100^\circ C$

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



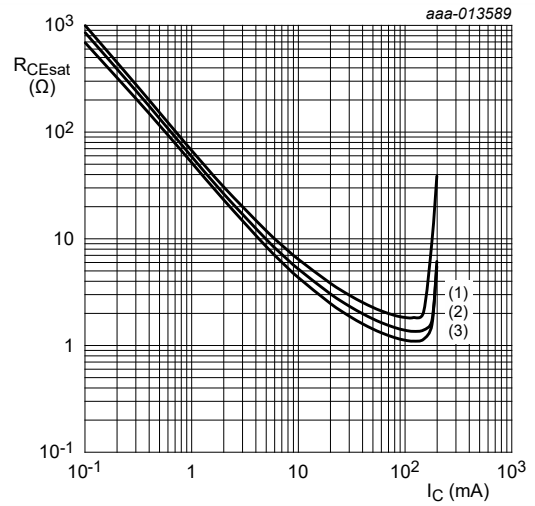
$I_C/I_B = 5$
 (1) $T_{amb} = 100^\circ C$
 (2) $T_{amb} = 25^\circ C$
 (3) $T_{amb} = -55^\circ C$

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



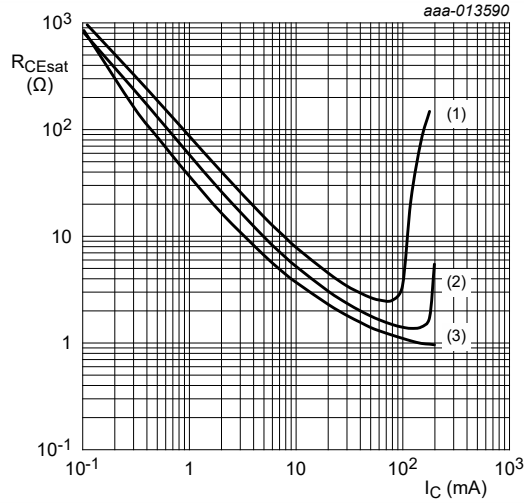
$T_{amb} = 25^\circ C$
 (1) $I_C/I_B = 10$
 (2) $I_C/I_B = 5$
 (3) $I_C/I_B = 2.5$

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



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

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



$T_{amb} = 25\text{ }^{\circ}\text{C}$
 (1) $I_C/I_B = 10$
 (2) $I_C/I_B = 5$
 (3) $I_C/I_B = 2.5$

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

11. Package outline

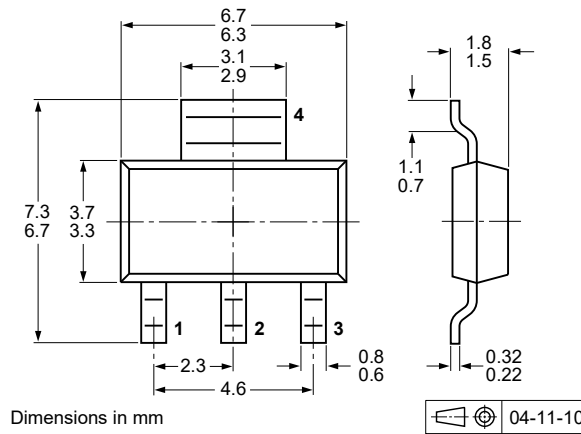


Fig. 13. Package outline SC-73 (SOT223)

12. Soldering

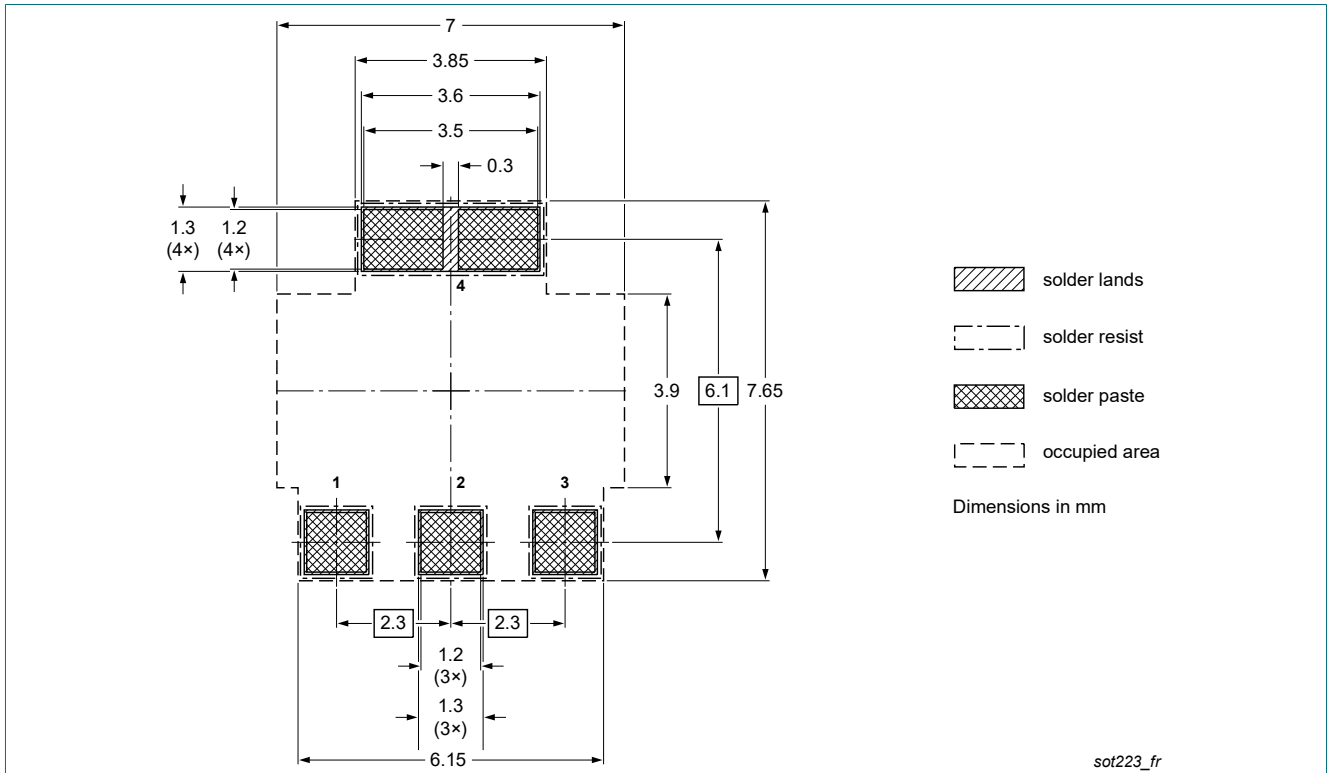


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

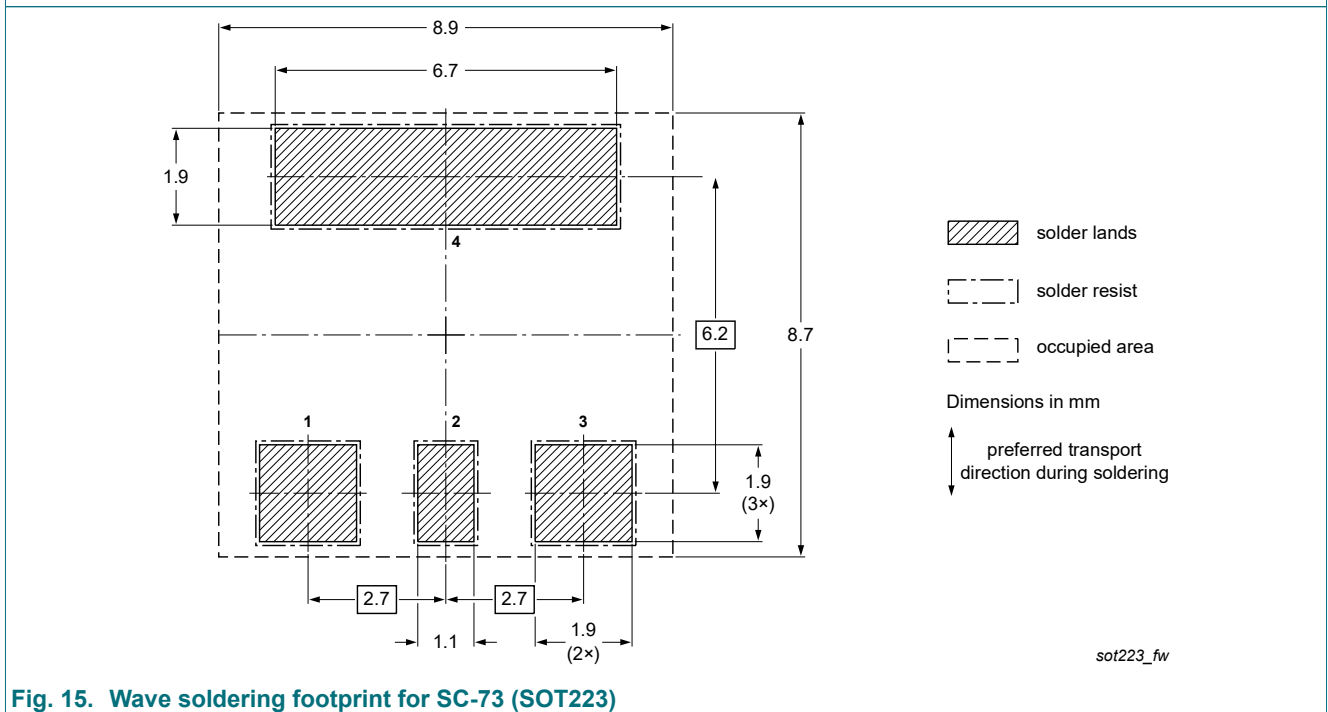


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV2160Z v.2	20241009	Product data sheet	-	PBHV2160Z v.1
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).			
PBHV2160Z v.1	20150624	Product data sheet	-	-

14. 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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