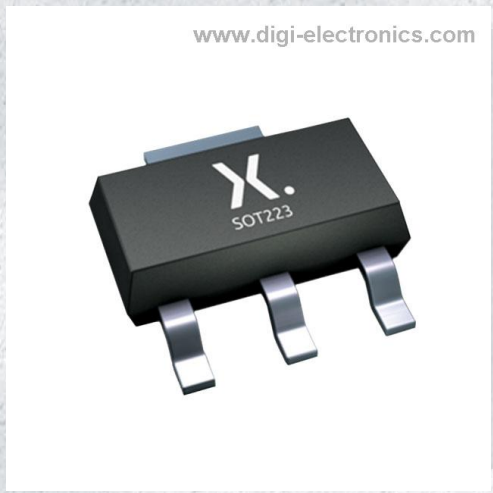
PBHV2160ZX Datasheet



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DiGi Electronics Part Number	PBHV2160ZX-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	PBHV2160ZX
Description	TRANS NPN 600V 0.1A SOT223
Detailed Description	Bipolar (BJT) Transistor NPN 600 V 100 mA 650 mW Surface Mount SOT-223

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
PBHV2160ZX	Nexperia USA Inc.
Series:	Product Status:
-	Active
Transistor Type:	Current - Collector (Ic) (Max):
NPN	100 mA
Voltage - Collector Emitter Breakdown (Max):	Vce Saturation (Max) @ Ib, Ic:
600 V	125mV @ 6mA, 30mA
Current - Collector Cutoff (Max):	DC Current Gain (hFE) (Min) @ Ic, Vce:
100nA	70 @ 10mA, 10V
Power - Max:	Frequency - Transition:
650 mW	-
Operating Temperature:	Mounting Type:
150°C (TJ)	Surface Mount
Package / Case:	Supplier Device Package:
TO-261-4, TO-261AA	SOT-223
Base Product Number:	
PBHV2160	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.21.0095	

PBHV2160Z

600 V, 0.1 A NPN high-voltage low VCEsat 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 fluorecent lighting
- LED driver for LED chain module
- LCD backlighting
- HID front lighting
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

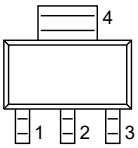
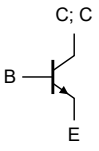
4. Quick reference data

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	 SC-73 (SOT223)	 sym016
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

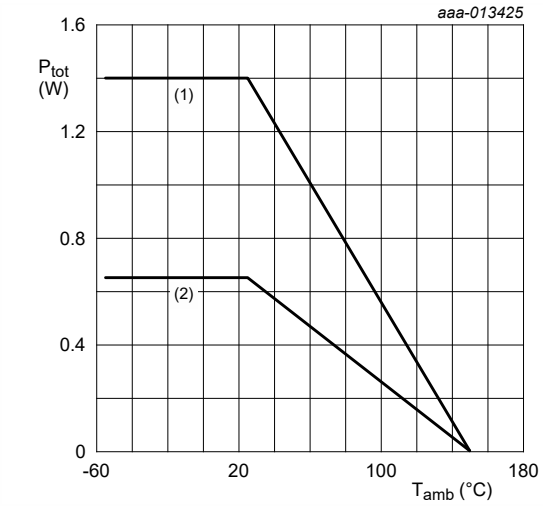
8. Limiting values

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 cm^2.



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

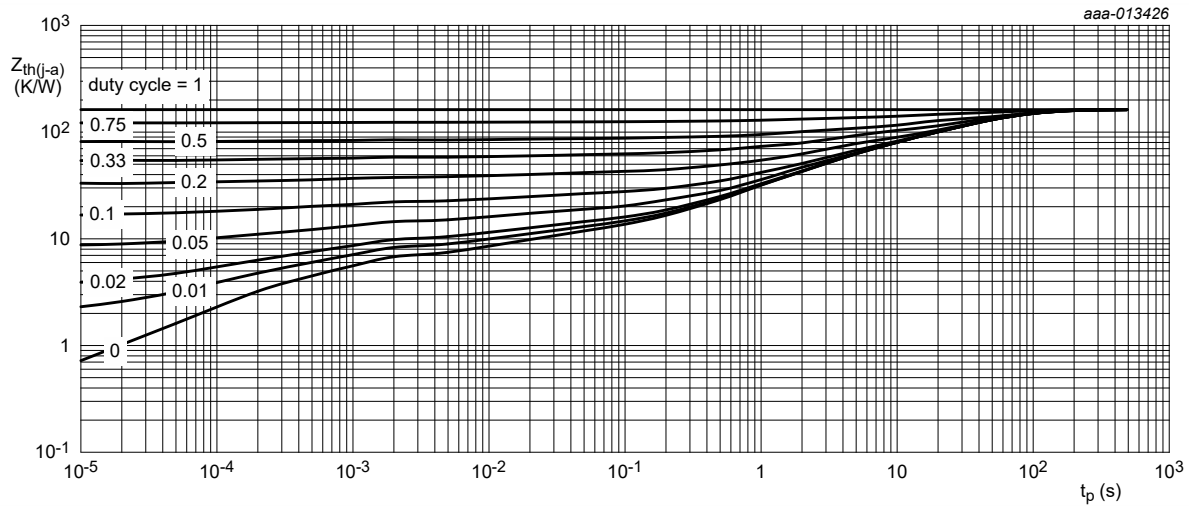
Fig. 1. Power derating curves

9. Thermal characteristics

Table 6. Thermal characteristics

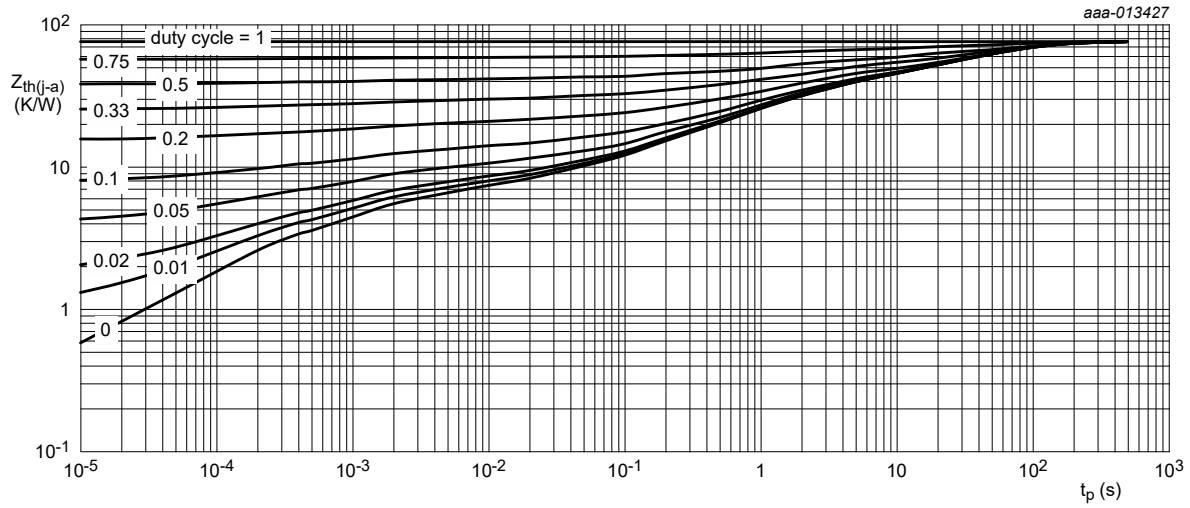
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	190	K/W
			[2]	-	-	89	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	20	K/W

[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



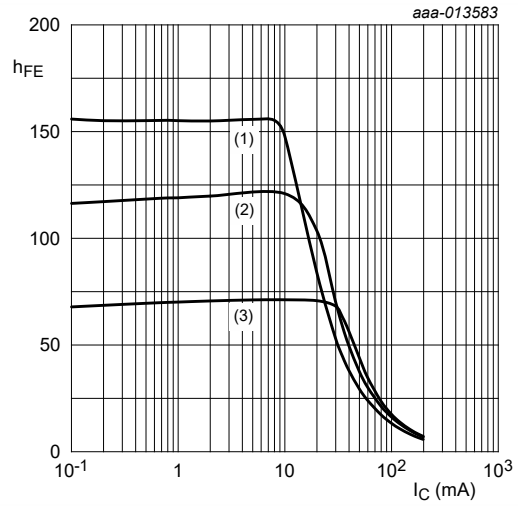
FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

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

10. Characteristics

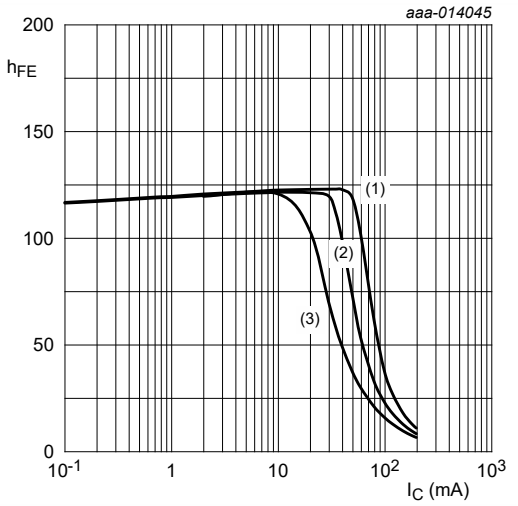
Table 7. Characteristics

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_{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; $t_p \leq$ 300 µs; $\delta \leq$ 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



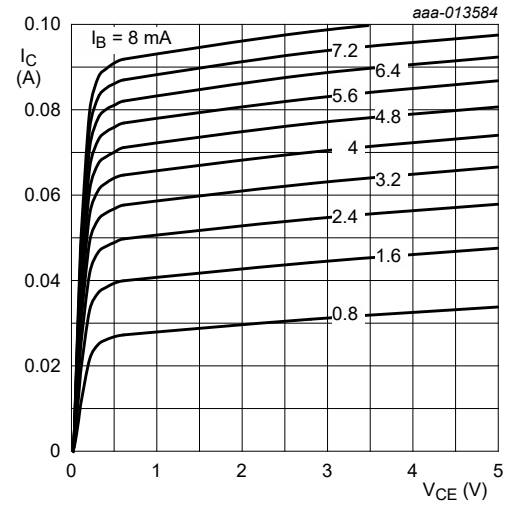
V_{CE} = 10 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



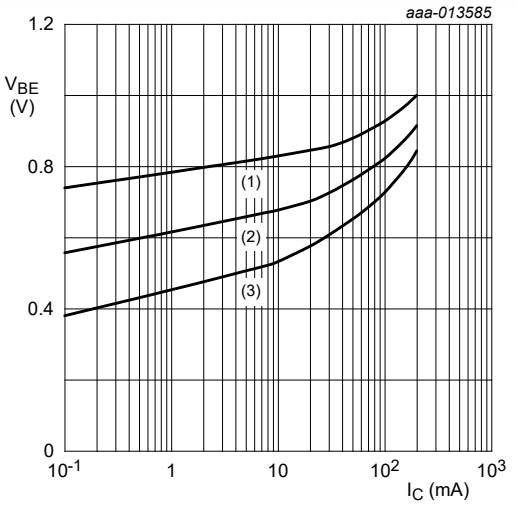
T_{amb} = 25 °C
(1) V_{CE} = 50 V
(2) V_{CE} = 25 V
(3) V_{CE} = 10 V

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



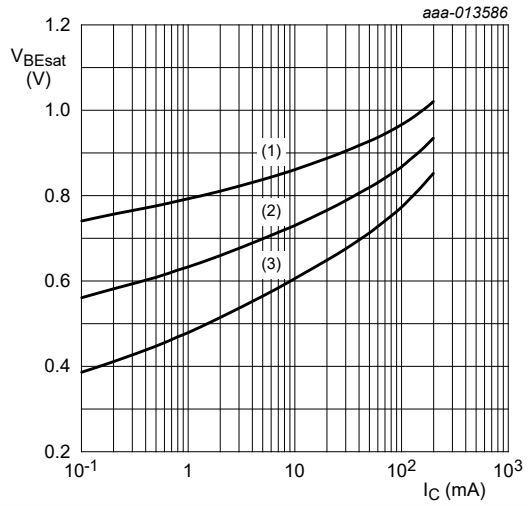
T_{amb} = 25 °C

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



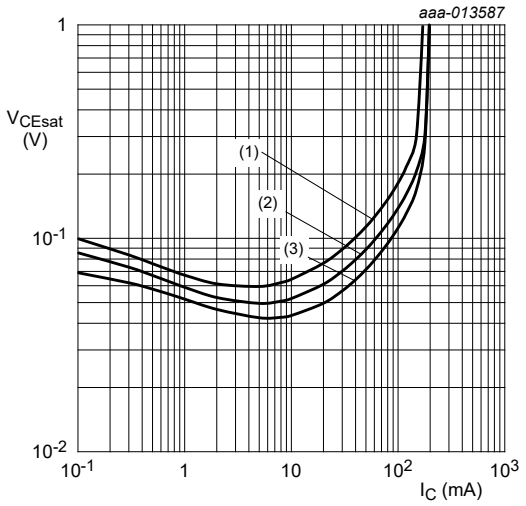
V_{CE} = 10 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



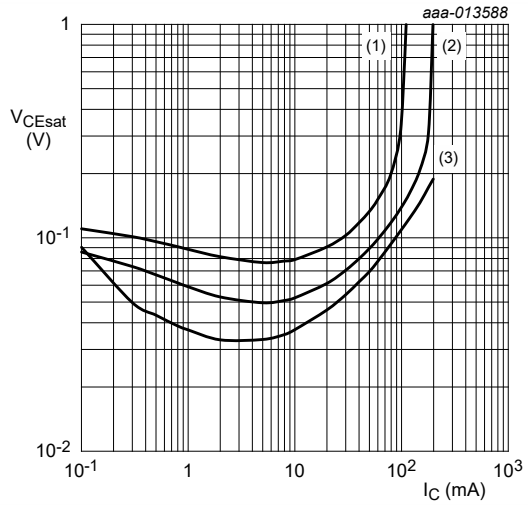
I_C/I_B = 5
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb}= 100 °C

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



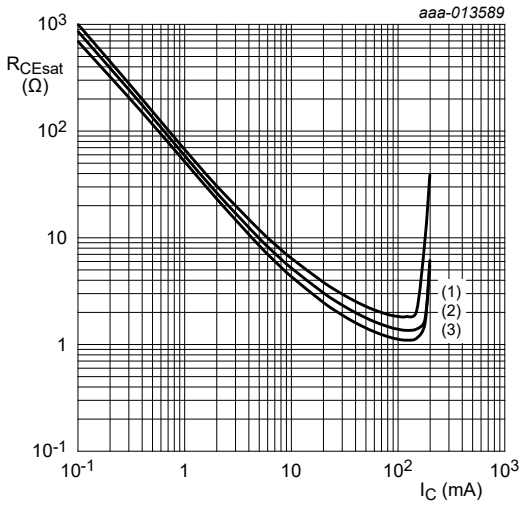
I_C/I_B = 5
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



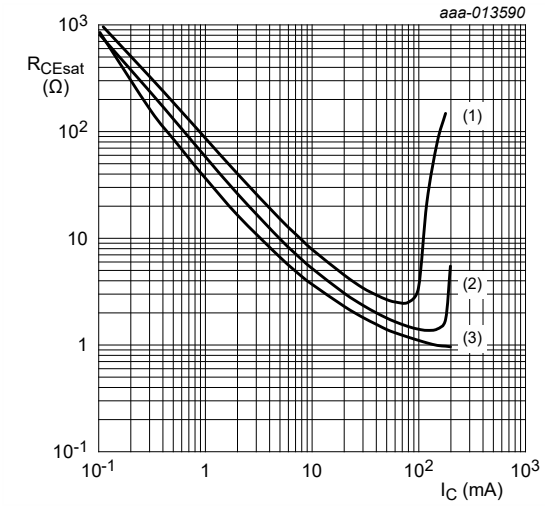
T_{amb} = 25 °C
(1) I_C/I_B = 10
(2) I_C/I_B = 5
(3) I_C/I_B = 2.5

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



I_C/I_B = 5
(1) T_{amb} = 100 °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
(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

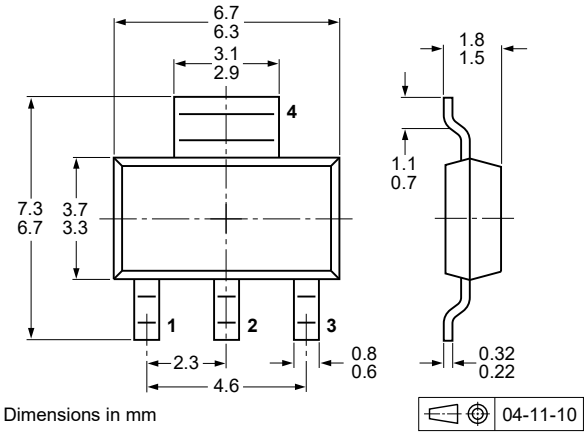


Fig. 13. Package outline SC-73 (SOT223)

12. Soldering

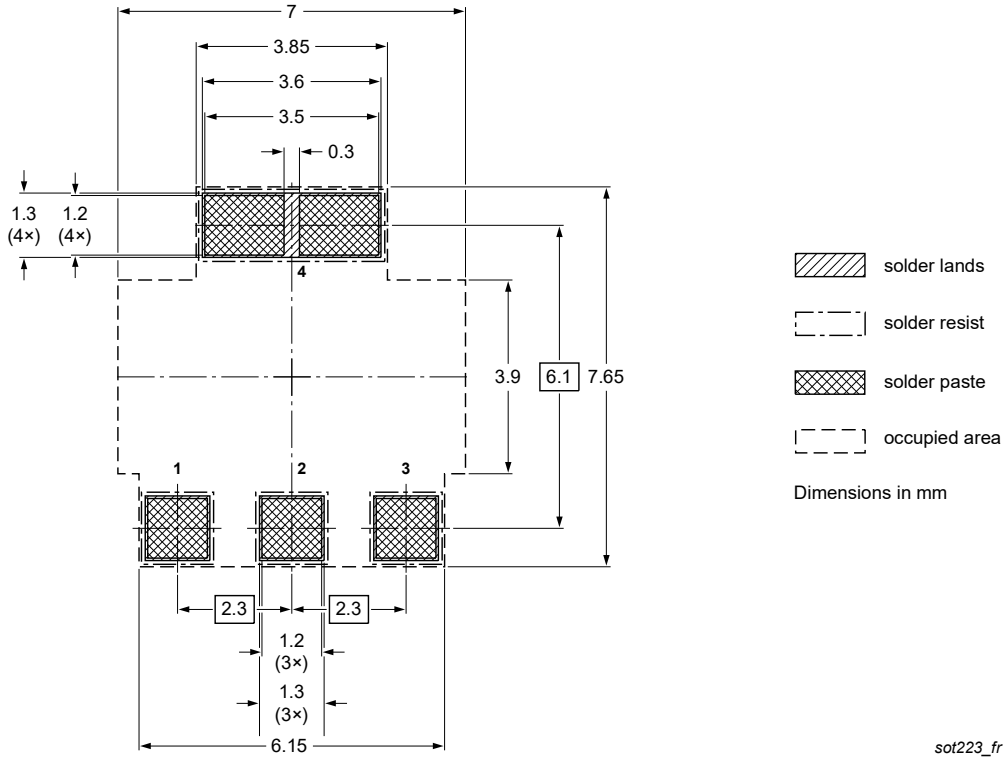


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

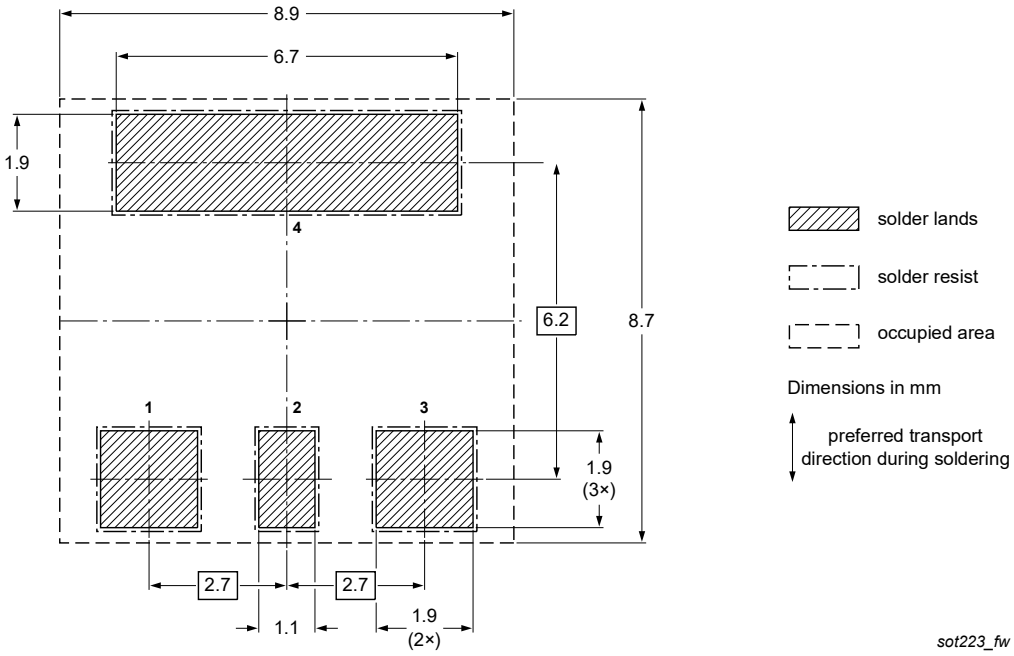


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

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:	• 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".
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Date of release: 9 October 2024

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