



# PBHV8560Z

600 V, 0.5 A NPN high-voltage low  $V_{CEsat}$  (BISS) transistor

13 March 2015

Product data sheet

## 1. General description

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

PNP complement: PBHV9560Z

## 2. Features and benefits

- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability
- High collector current gain  $h_{FE}$  at high  $I_C$
- AEC-Q101 qualified

## 3. Applications

- Electronic ballast for fluorescent lighting
- 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)

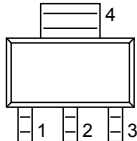
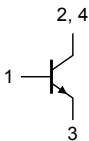
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	600	V
$I_C$	collector current		-	-	0.5	A
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}; I_C = 50\text{ mA}; T_{amb} = 25\text{ °C}$	70	135	-	

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
PBHV8560Z	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

7. Marking

Table 4. Marking codes

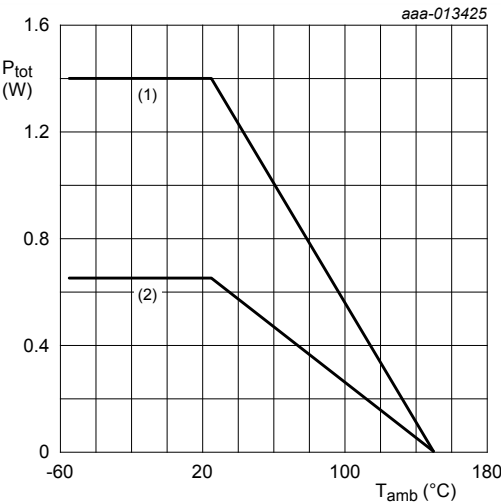
Type number	Marking code
PBHV8560Z	HV856Z

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		-	600	V
V <sub>CEO</sub>	collector-emitter voltage	open base		-	600	V
V <sub>CESM</sub>	collector-emitter peak voltage	V <sub>BE</sub> = 0 V		-	600	V
V <sub>EBO</sub>	emitter-base voltage	open collector		-	6	V
I <sub>C</sub>	collector current			-	0.5	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	0.65	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>.



- (1) FR4 PCB, mounting pad for collector 6 cm<sup>2</sup>  
(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<sup>2</sup>.

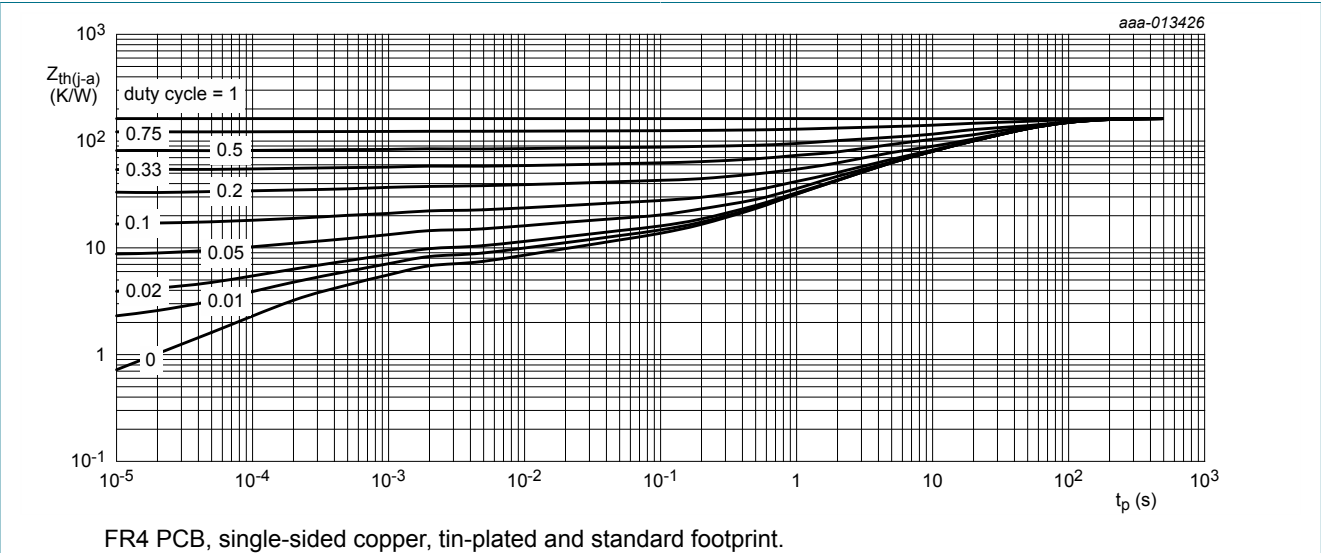


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

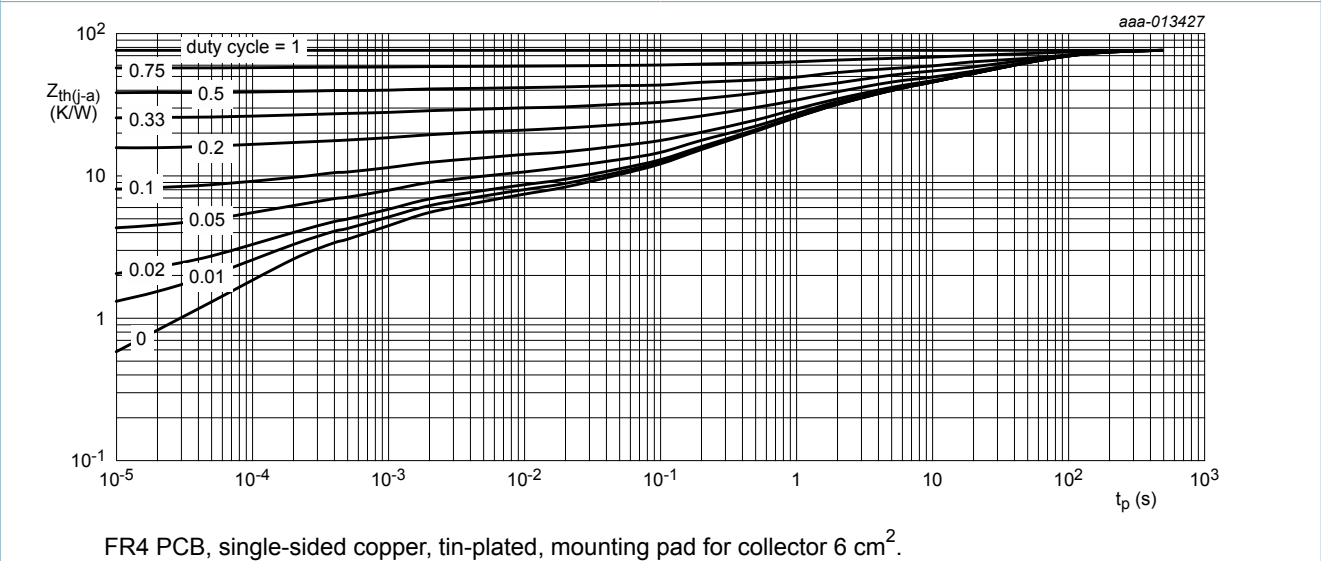


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 400\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ °C}$		-	-	100	nA
		$V_{CB} = 400\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ °C}$		-	-	10	μA
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = 400\text{ V}; V_{BE} = 0\text{ V}; T_{amb} = 25\text{ °C}$		-	-	100	nA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 4\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ °C}$		-	-	100	nA
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}; I_C = 50\text{ mA}; T_{amb} = 25\text{ °C}$		70	135	-	
		$V_{CE} = 10\text{ V}; I_C = 100\text{ mA}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		70	135	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 50\text{ mA}; I_B = 5\text{ mA}; T_{amb} = 25\text{ °C}$		-	50	100	mV
		$I_C = 100\text{ mA}; I_B = 20\text{ mA}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		-	50	100	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 50\text{ mA}; I_B = 5\text{ mA}; \text{pulsed}; t_p \leq 300\text{ μs}; \delta \leq 0.02; T_{amb} = 25\text{ °C}$		-	-	950	mV
$C_c$	collector capacitance	$V_{CB} = 20\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$		-	7.5	-	pF
$C_e$	emitter capacitance	$V_{EB} = 0.5\text{ V}; I_C = 0\text{ A}; i_c = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$		-	710	-	pF

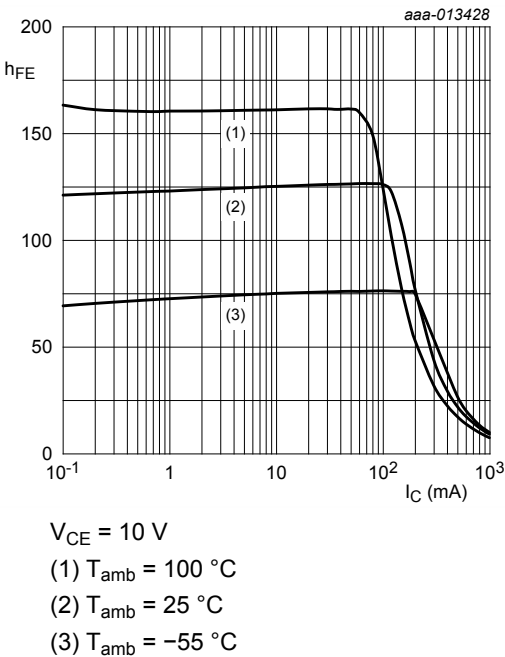


Fig. 4. DC current gain as a function of collector current; typical values

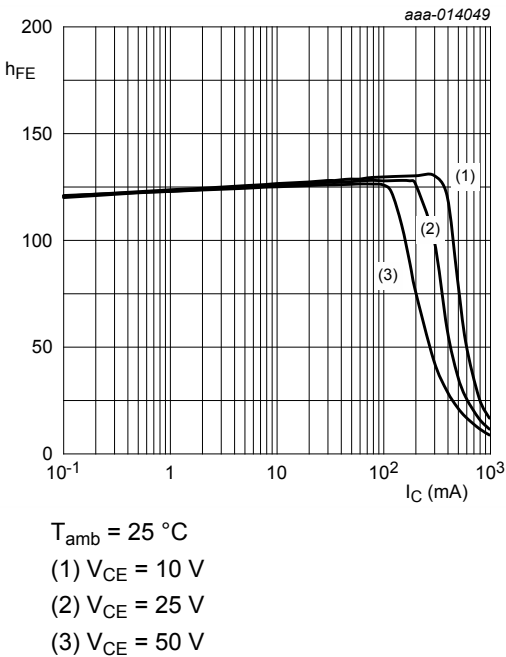


Fig. 5. DC current gain as a function of collector current; typical values

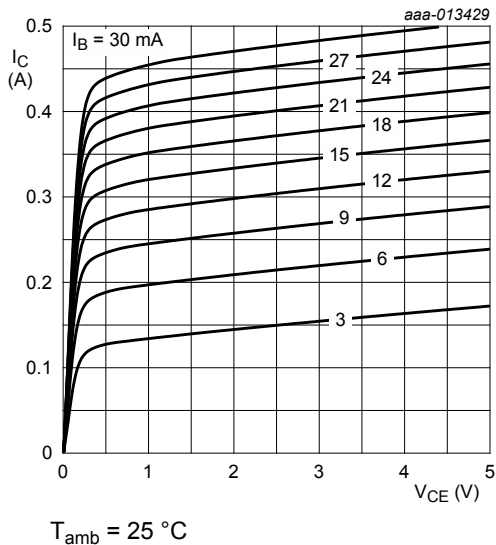


Fig. 6. Collector current as a function of collector-emitter voltage; typical values

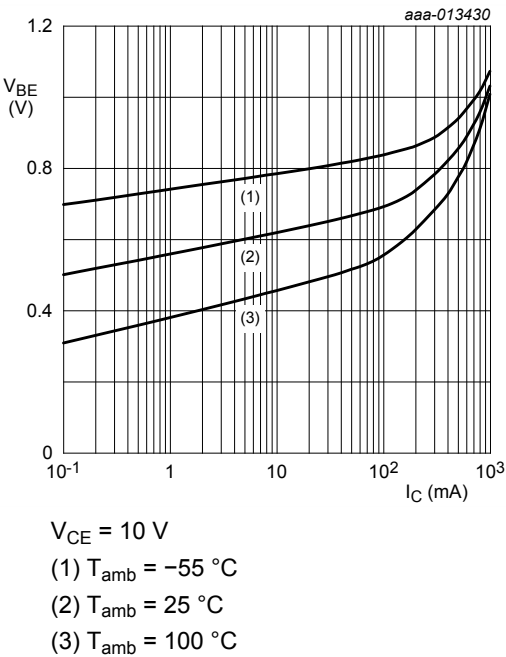
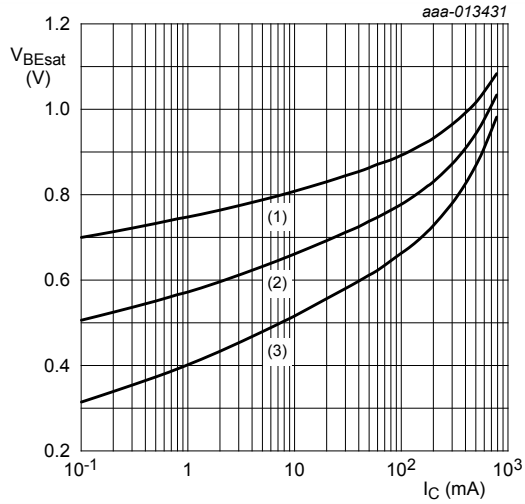
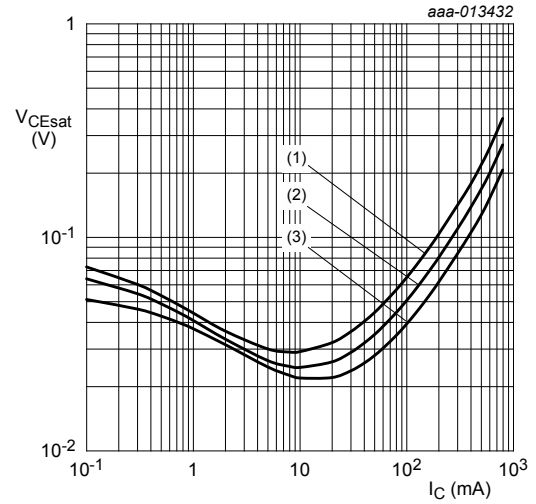


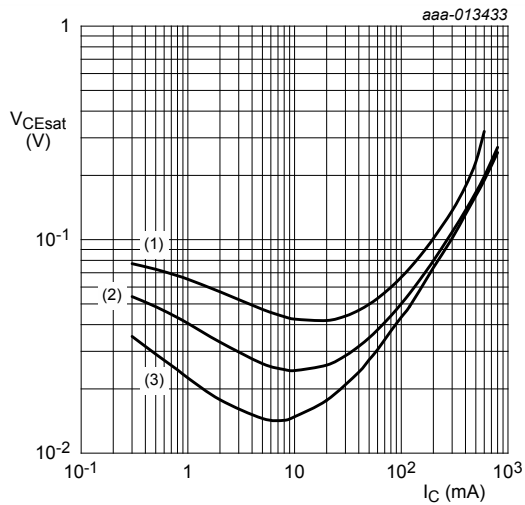
Fig. 7. Base-emitter voltage as a function of collector current; typical values



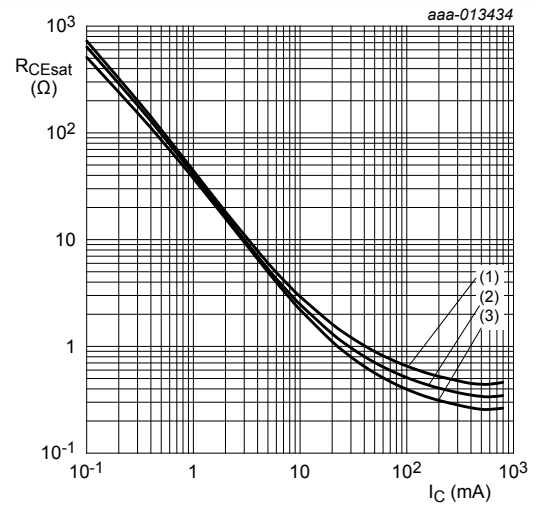
**Fig. 8.** Base-emitter saturation voltage as a function of collector current; typical values



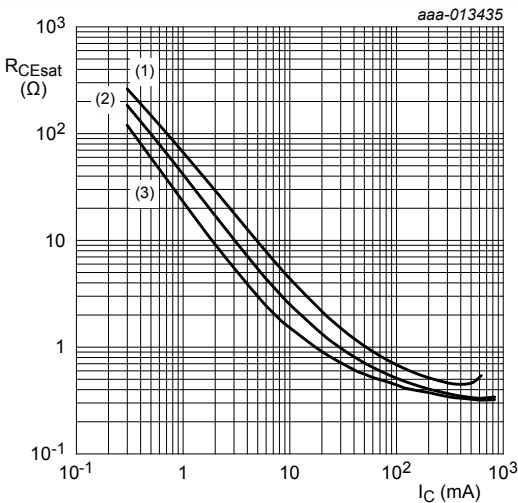
**Fig. 9.** Collector-emitter saturation voltage as a function of collector current; typical values



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



**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. Test information

11.1 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

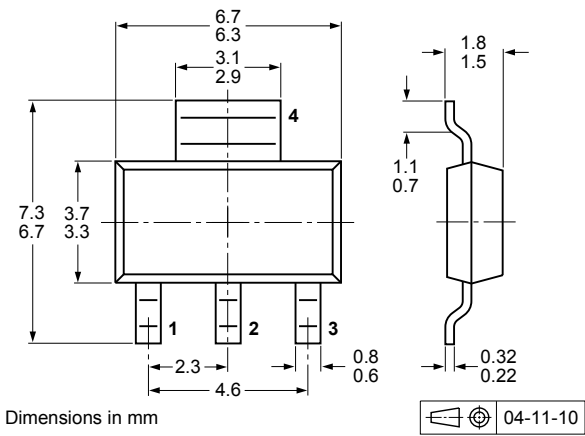


Fig. 13. Package outline SC-73 (SOT223)



13. Soldering

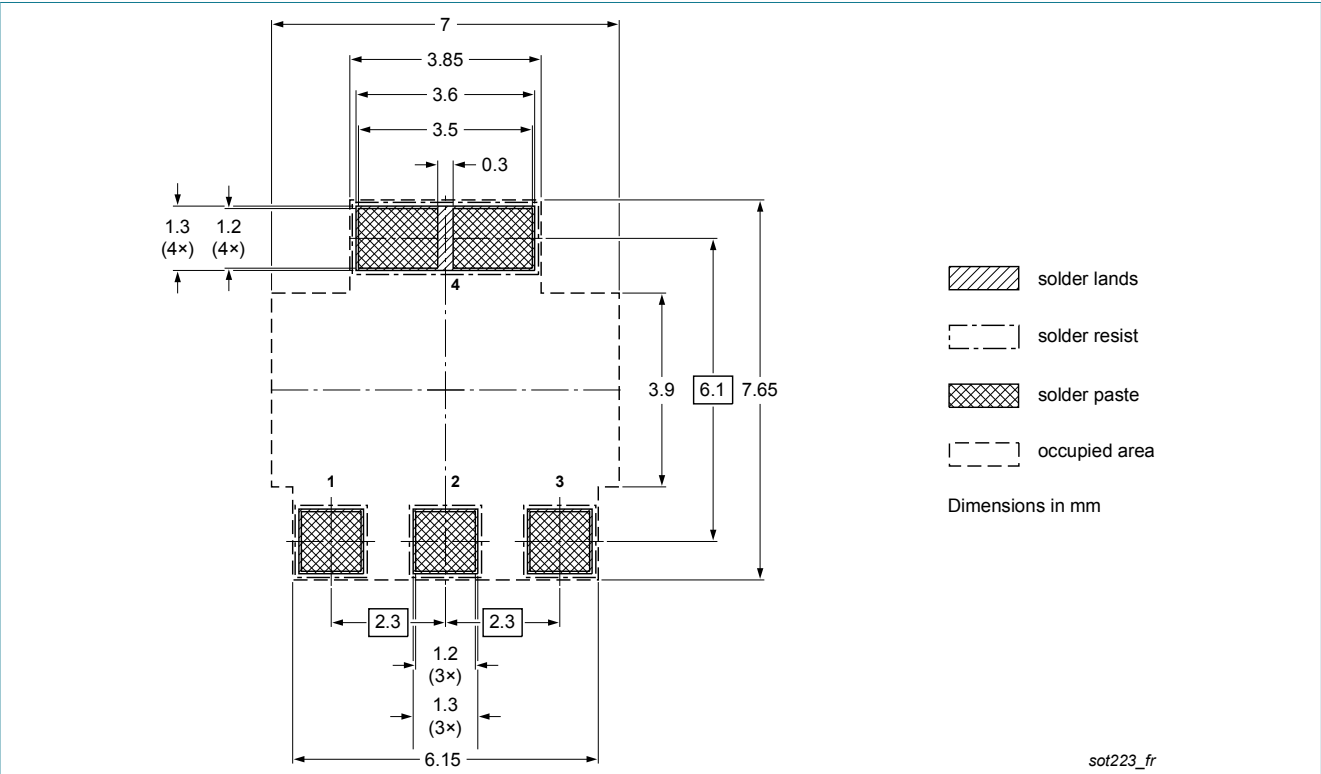


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

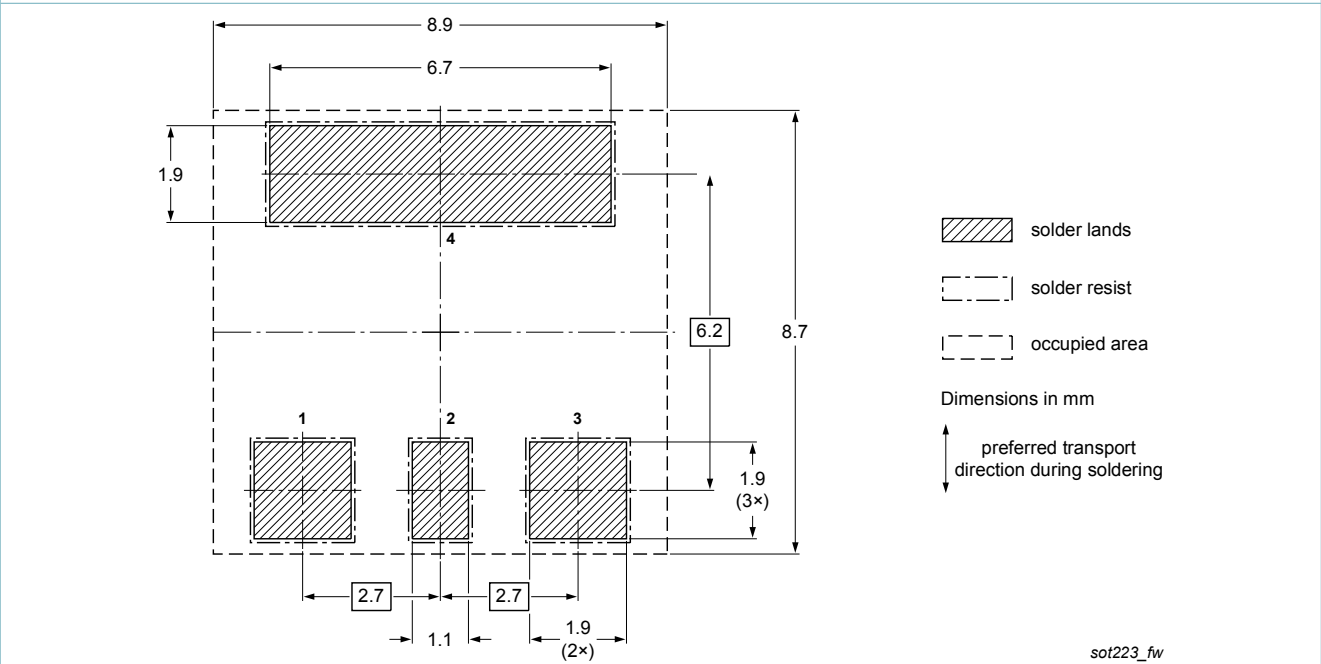


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV8560Z v.1	20150313	Product data sheet	-	-

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Document status [1][2]	Product status [3]	Definition
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Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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Date of release: 13 March 2015



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