



PBHV8215Z

150 V, 2 A NPN high-voltage low V_{CEsat} transistor

12 July 2023

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
- AEC-Q101 qualified

3. Applications

- LED driver for LED chain module
- LCD backlighting
- Automotive motor management
- Switch Mode Power Supply (SMPS)

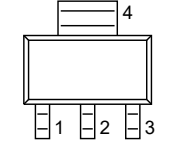
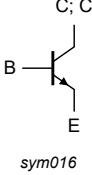
4. Quick reference data

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 V; I _C = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	100	240	-	

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
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 ≤ 1 ms		-	4	A
I _{BM}	peak base current			-	500	mA
P _{tot}	total power dissipation	T _{amb} ≤ 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.

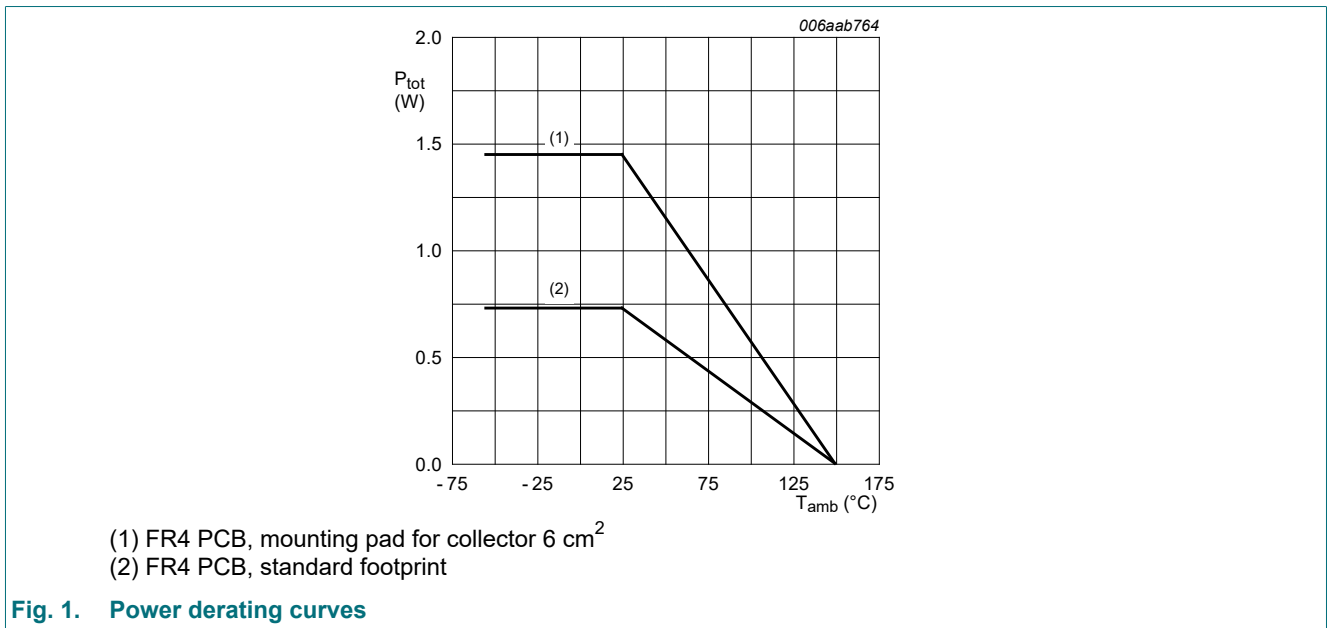


Fig. 1. Power derating curves

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.

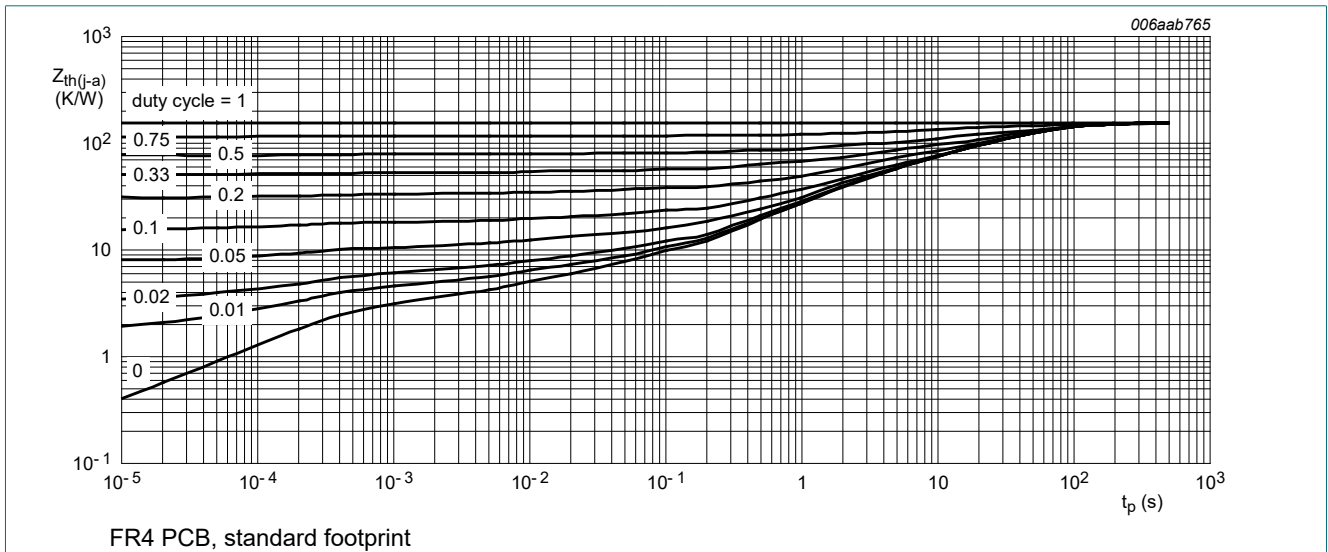


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

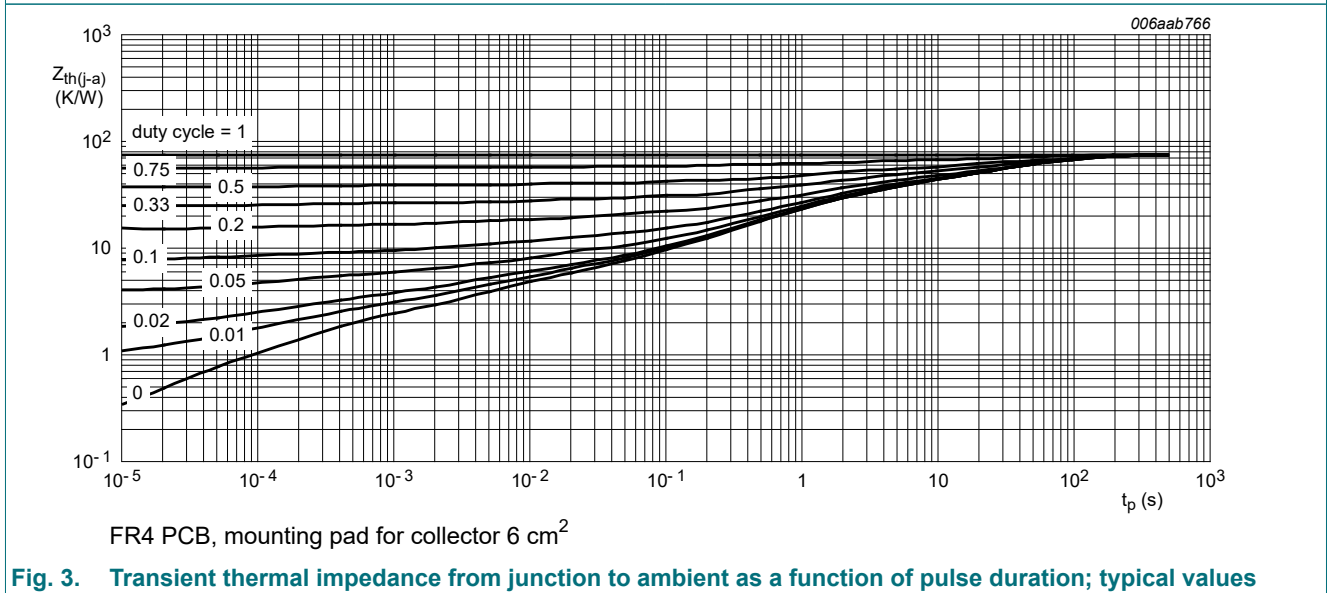
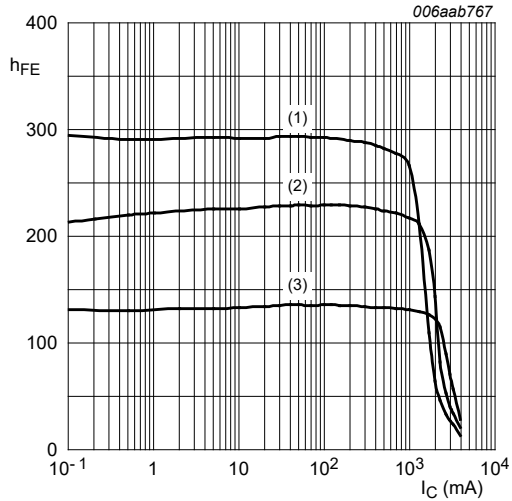


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

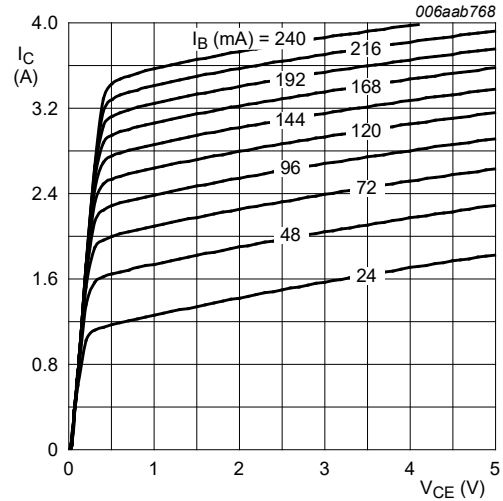
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{CBO}	collector-base cut-off current	V _{CB} = 120 V; I _E = 0 A; T _{amb} = 25 °C	-	-	100	nA
		V _{CB} = 120 V; I _E = 0 A; T _j = 150 °C	-	-	10	μA
I _{EBO}	emitter-base cut-off current	V _{EB} = 4 V; I _C = 0 A; T _{amb} = 25 °C	-	-	100	nA
I _{CES}	collector-emitter cut-off current	V _{CE} = 120 V; V _{BE} = 0 V; T _{amb} = 25 °C	-	-	100	nA
h _{FE}	DC current gain	V _{CE} = 10 V; I _C = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	100	240	-	
		V _{CE} = 10 V; I _C = 1 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	100	230	-	
		V _{CE} = 10 V; I _C = 1.5 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	90	210	-	
		V _{CE} = 10 V; I _C = 2 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	55	130	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = 100 mA; I _B = 20 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	15	30	mV
		I _C = 1 A; I _B = 200 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	90	170	mV
		I _C = 1.5 A; I _B = 300 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	130	220	mV
		I _C = 2 A; I _B = 400 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °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 V; I _C = 0.5 A; I _{Bon} = 0.1 A; I _{Boff} = -0.1 A; T _{amb} = 25 °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 V; I _C = 10 mA; f = 100 MHz; T _{amb} = 25 °C	-	33	-
C _c	collector capacitance	V _{CB} = 20 V; I _E = 10 mA; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C	-	17	-	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	-	500	-	pF



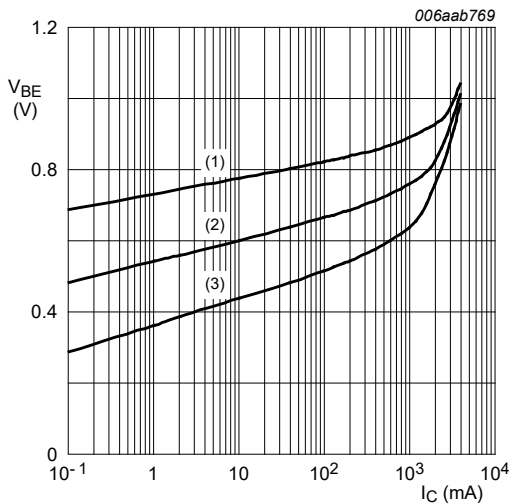
$V_{CE} = 10\text{ V}$
 (1) $T_{amb} = 100^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = -55^\circ\text{C}$

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



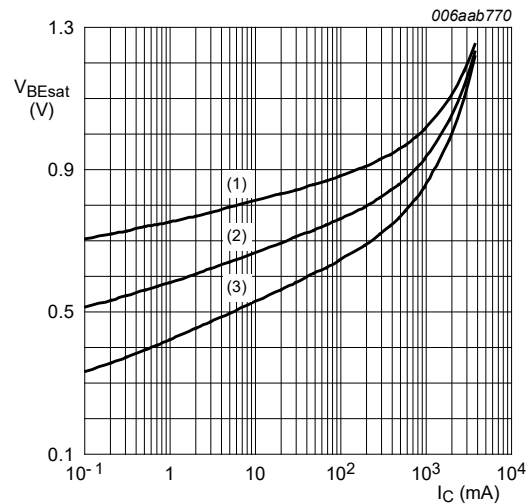
$T_{amb} = 25^\circ\text{C}$

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



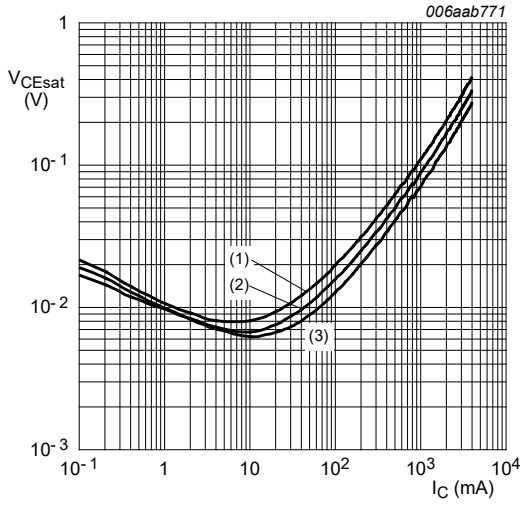
$V_{CE} = 10\text{ V}$
 (1) $T_{amb} = -55^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = 100^\circ\text{C}$

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



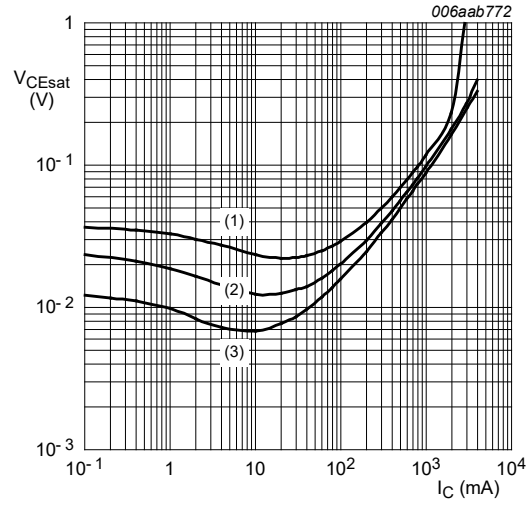
$I_C/I_B = 5$
 (1) $T_{amb} = -55^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = 100^\circ\text{C}$

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



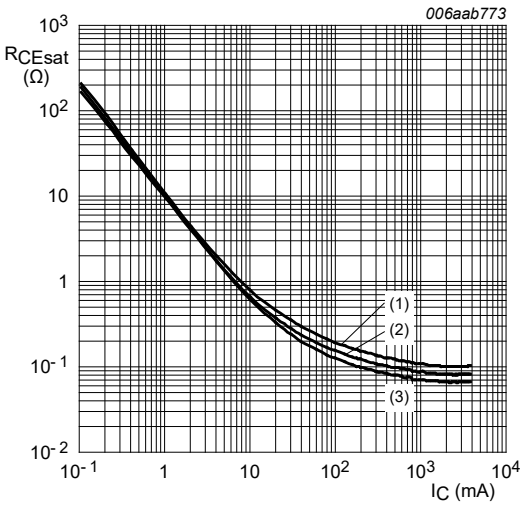
$I_C/I_B = 5$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



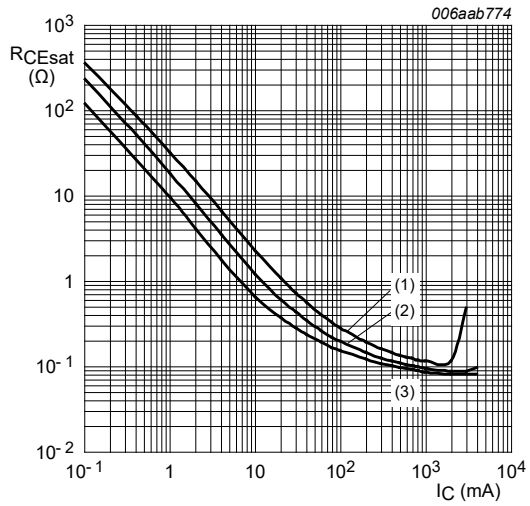
$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 20$
 (2) $I_C/I_B = 10$
 (3) $I_C/I_B = 5$

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



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

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



$T_{amb} = 25\text{ °C}$
 (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

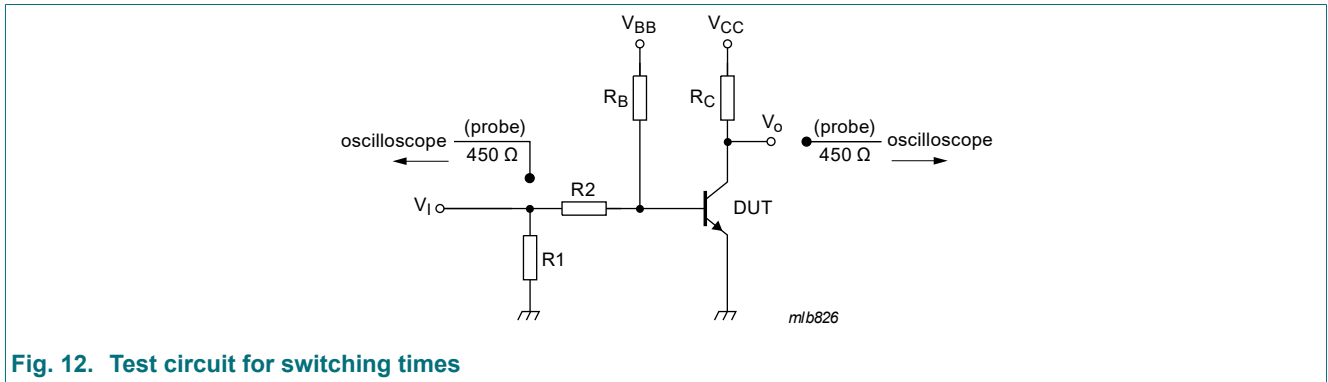


Fig. 12. Test circuit for switching times

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

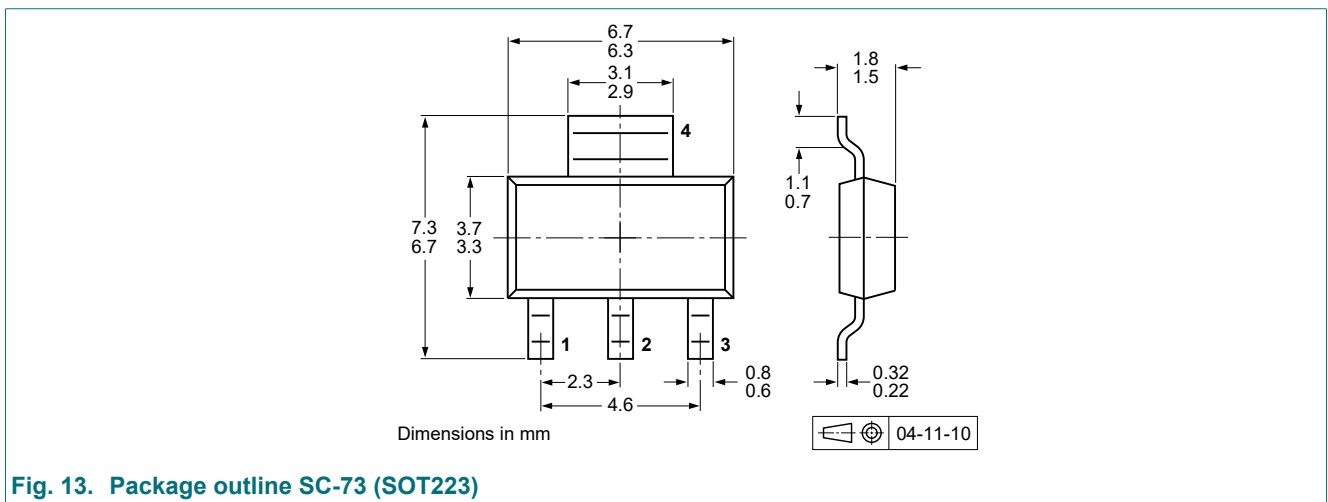


Fig. 13. Package outline SC-73 (SOT223)

13. Soldering

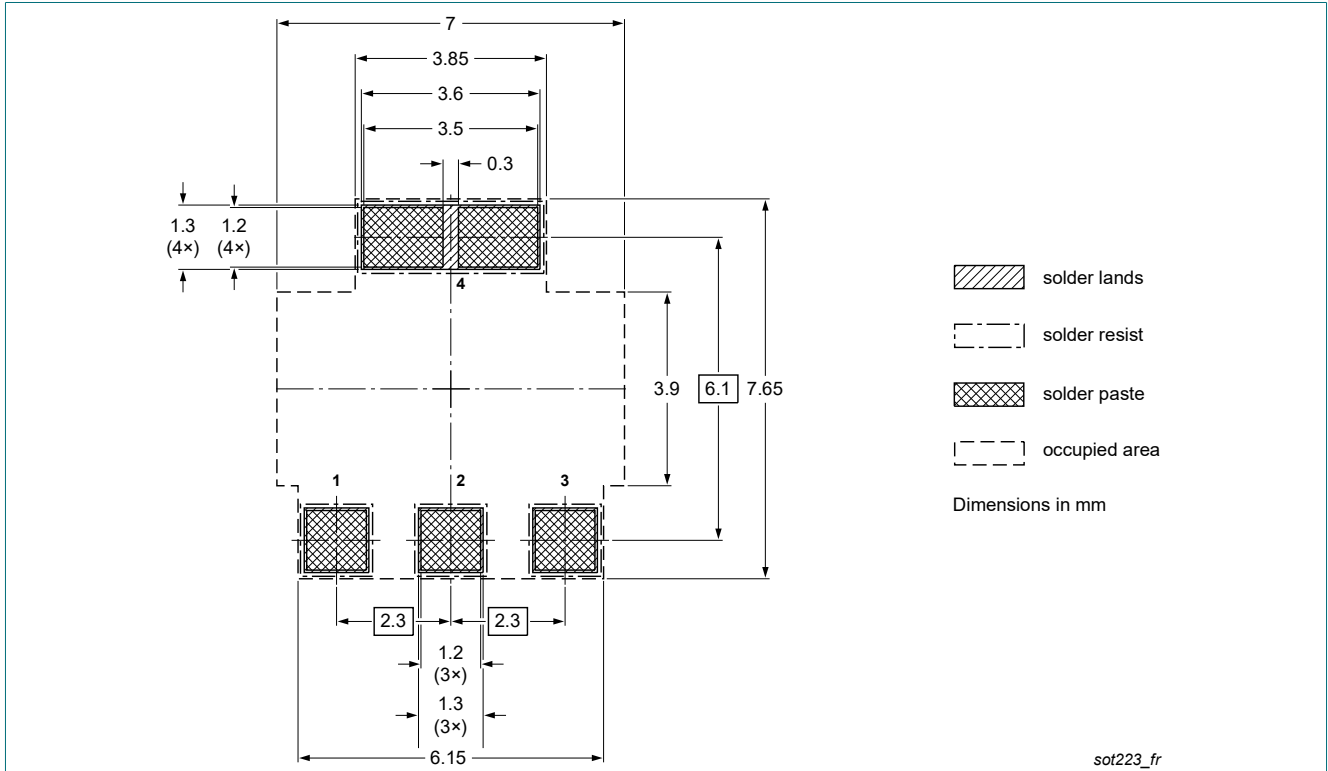


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

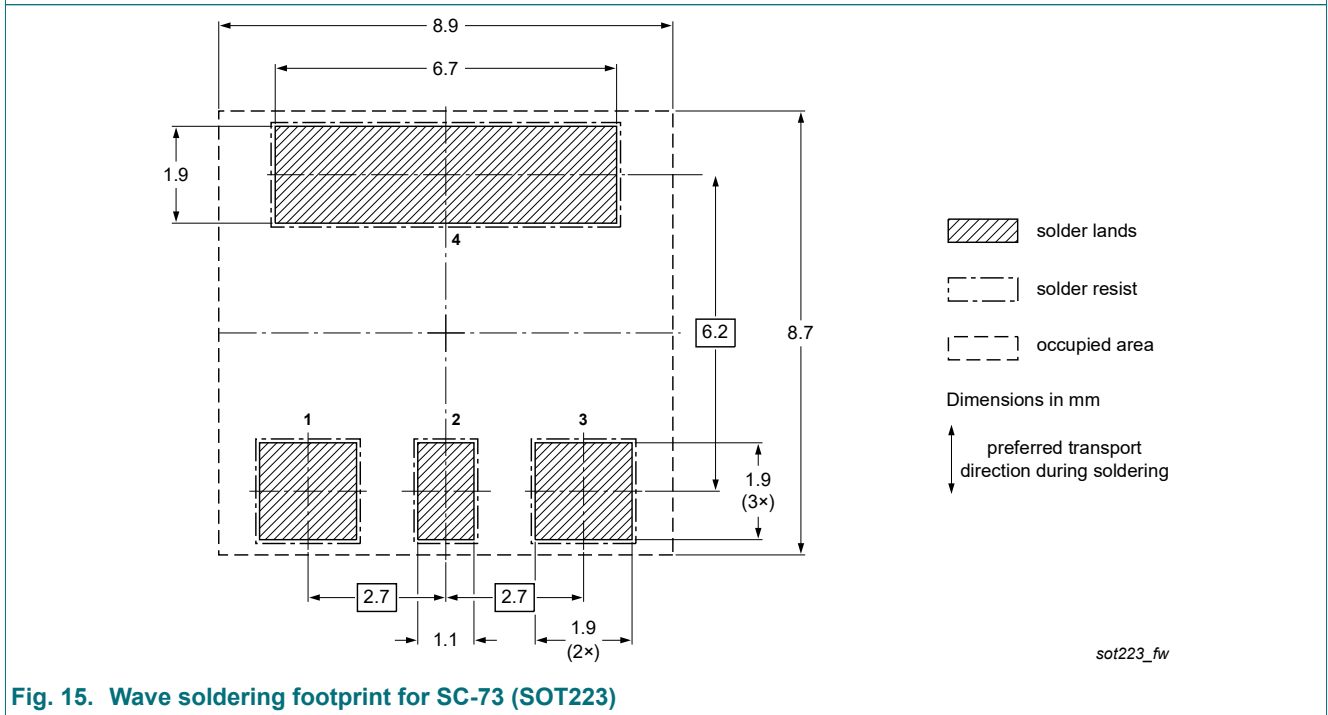


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV8215Z v.2	20230712	Product data sheet	-	PBHV8215Z_1
Modifications:	<ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.• Legal texts have been adapted to the new company name where appropriate.• Section "Packing information" removed.			
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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