



PBHV9040Z

500 V, 0.25 A PNP high-voltage low V_{CEsat} transistor

17 July 2023

Product data sheet

1. General description

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

NPN complement: PBHV8540Z

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
- 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

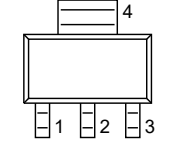
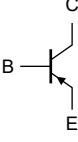
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CESM}	collector-emitter peak voltage	V _{BE} = 0 V	-	-	-500	V
V _{CEO}	collector-emitter voltage	open base	-	-	-400	V
I _C	collector current		-	-	-0.25	A
h _{FE}	DC current gain	V _{CE} = -10 V; I _C = -50 mA; T _{amb} = 25 °C	100	200	-	

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
PBHV9040Z	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
PBHV9040Z	V9040Z

8. Limiting values

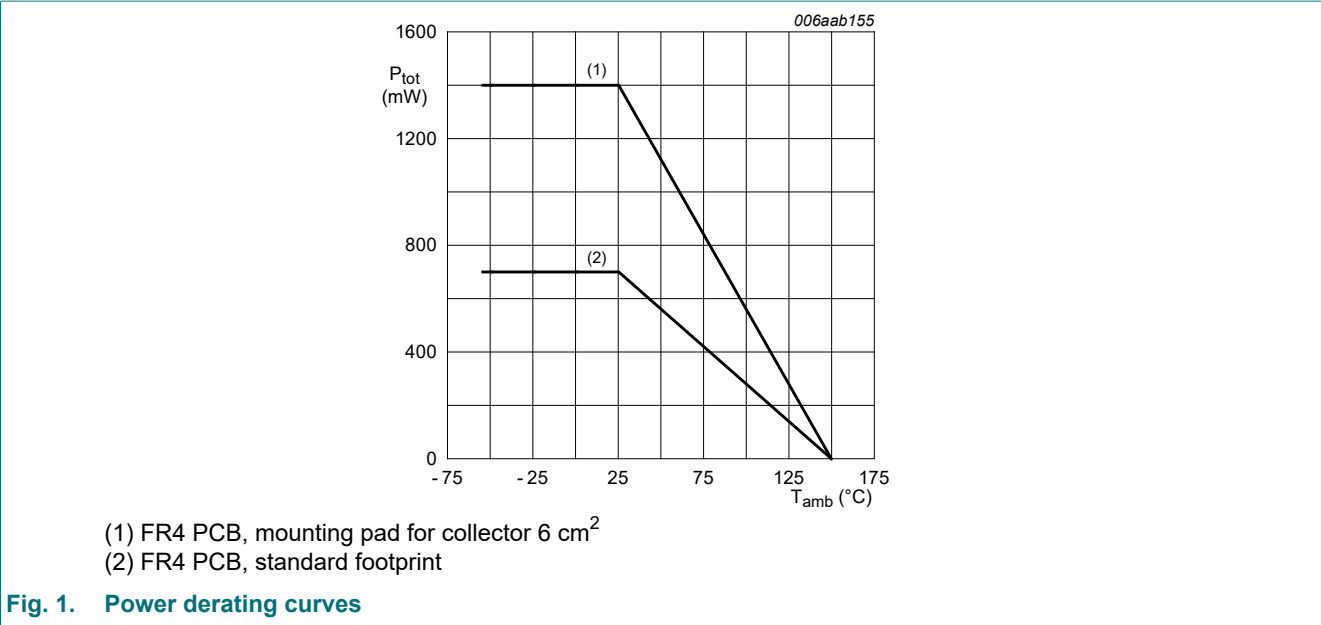
Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V _{CBO}	collector-base voltage	open emitter		-	-500	V
V _{CEO}	collector-emitter voltage	open base		-	-400	V
V _{CESM}	collector-emitter peak voltage	V _{BE} = 0 V		-	-500	V
V _{EBO}	emitter-base voltage	open collector		-	-6	V
I _C	collector current	single pulse; t _p ≤ 1 ms		-	-0.25	A
I _{CM}	peak collector current			-	-0.5	A
I _{BM}	peak base current			-	-200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	0.7	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.

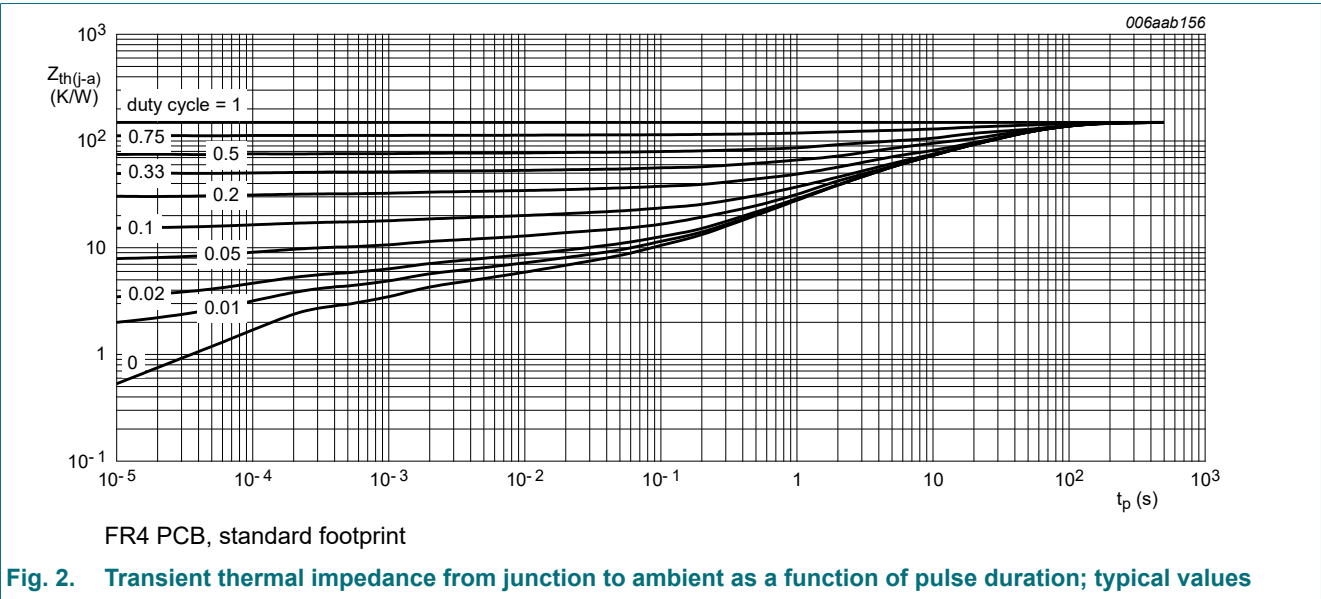


9. Thermal characteristics

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]	-	-	175	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.



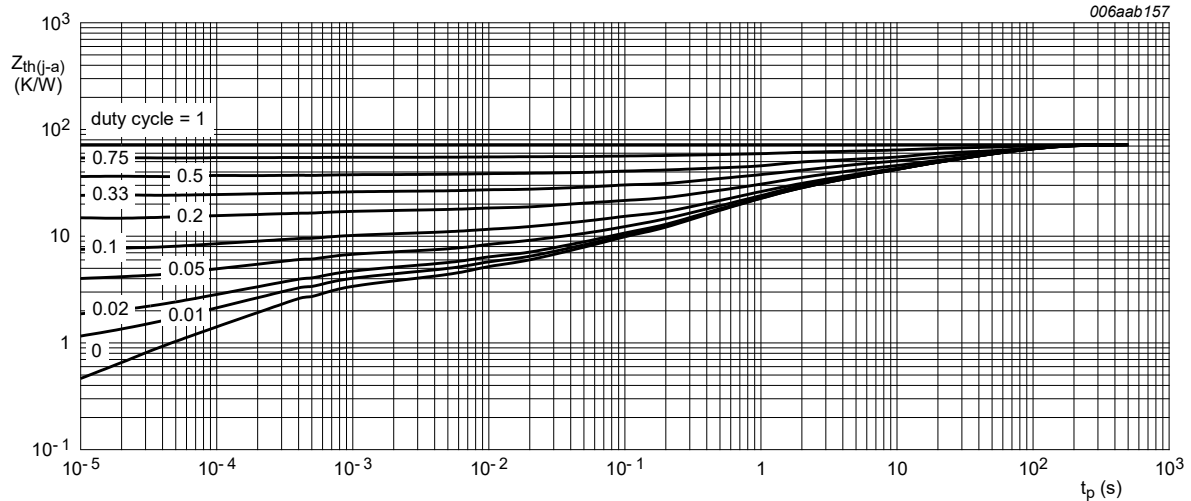


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -320\text{ V}$; $I_E = 0\text{ A}$; $T_{amb} = 25\text{ °C}$	-	-	-100	nA
		$V_{CB} = -320\text{ V}$; $I_E = 0\text{ A}$; $T_j = 150\text{ °C}$	-	-	-10	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -4\text{ V}$; $I_C = 0\text{ A}$; $T_{amb} = 25\text{ °C}$	-	-	-100	nA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -320\text{ V}$; $V_{BE} = 0\text{ V}$; $T_{amb} = 25\text{ °C}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -10\text{ V}$; $I_C = -50\text{ mA}$; $T_{amb} = 25\text{ °C}$	100	200	-	
		$V_{CE} = -10\text{ V}$; $I_C = -100\text{ mA}$; $T_{amb} = 25\text{ °C}$	80	200	-	
		$V_{CE} = -10\text{ V}$; $I_C = -250\text{ mA}$; pulsed; $t_p \leq 300\text{ μs}$; $\delta \leq 0.02$; $T_{amb} = 25\text{ °C}$	10	25	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -100\text{ mA}$; $I_B = -20\text{ mA}$; $T_{amb} = 25\text{ °C}$	-	-110	-200	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = -100\text{ mA}$; $I_B = -20\text{ mA}$; pulsed; $t_p \leq 300\text{ μs}$; $\delta \leq 0.02$; $T_{amb} = 25\text{ °C}$	-	-1	-1.1	V
t_d	delay time	$V_{CC} = -2\text{ V}$; $I_C = -0.15\text{ A}$; $I_{B(on)} = -0.03\text{ A}$; $I_{B(off)} = 0.03\text{ A}$; $T_{amb} = 25\text{ °C}$	-	9	-	ns
t_r	rise time		-	1810	-	ns
t_{on}	turn-on time		-	1819	-	ns
t_s	storage time		-	715	-	ns
t_f	fall time		-	1085	-	ns
t_{off}	turn-off time		-	1800	-	ns
f_T	transition frequency	$V_{CE} = -10\text{ V}$; $I_C = -10\text{ mA}$; $f = 100\text{ MHz}$; $T_{amb} = 25\text{ °C}$	-	55	-	MHz
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	-	pF
C_e	emitter capacitance	$V_{EB} = -0.5\text{ V}$; $I_C = 0\text{ A}$; $i_c = 0\text{ A}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ °C}$	-	150	-	pF

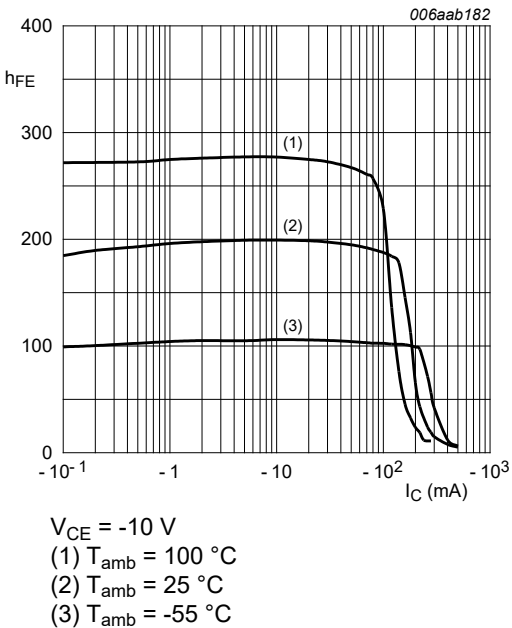


Fig. 4. DC current gain as a function of collector current; typical values

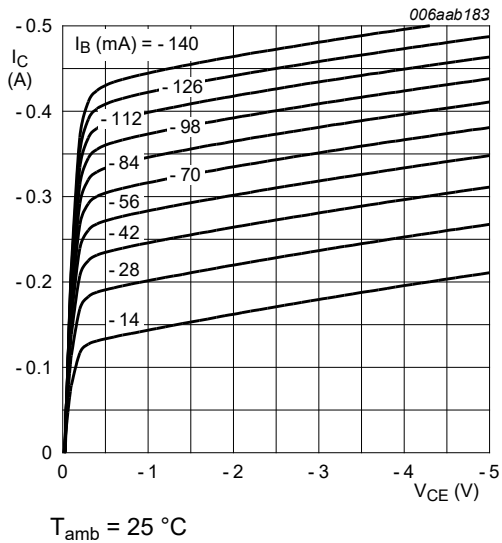


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

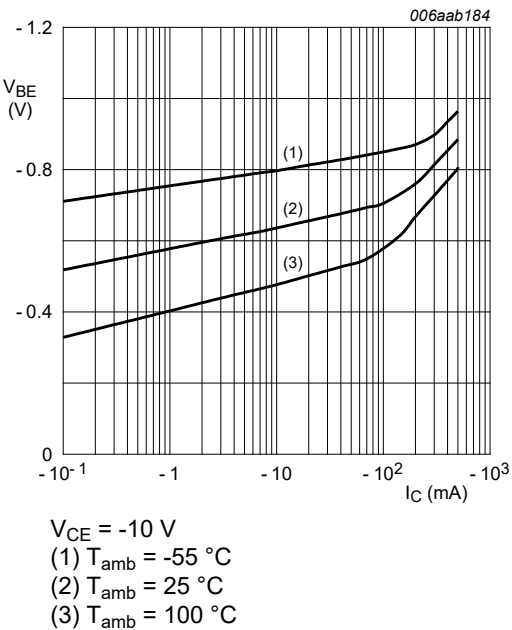


Fig. 6. Base-emitter voltage as a function of collector current; typical values

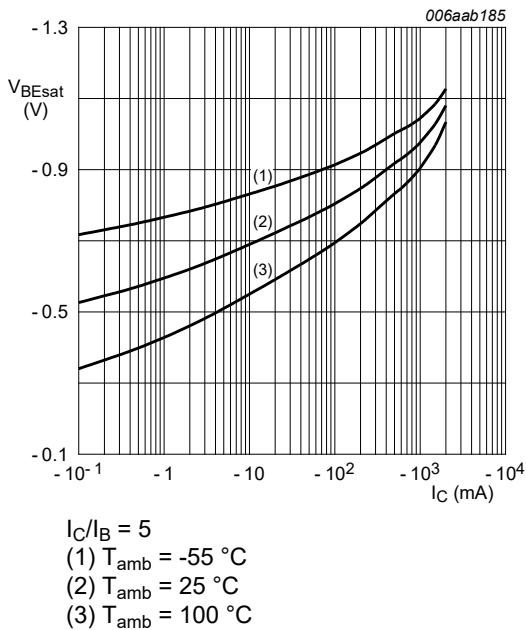


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values

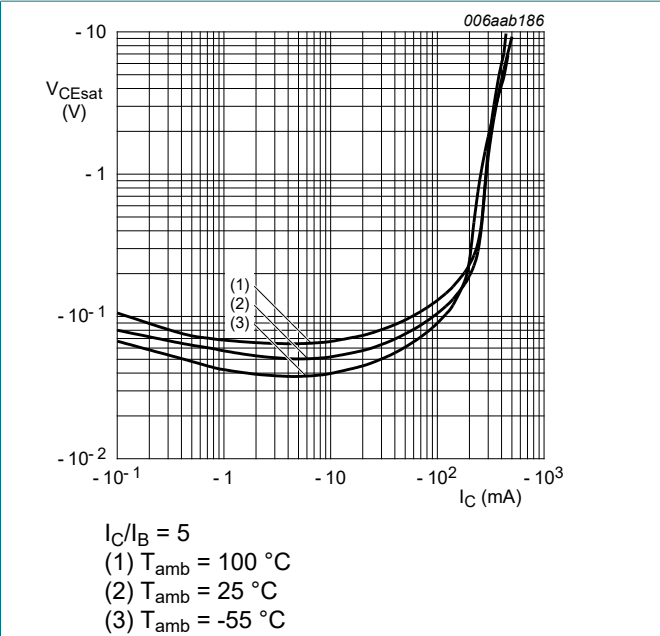


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

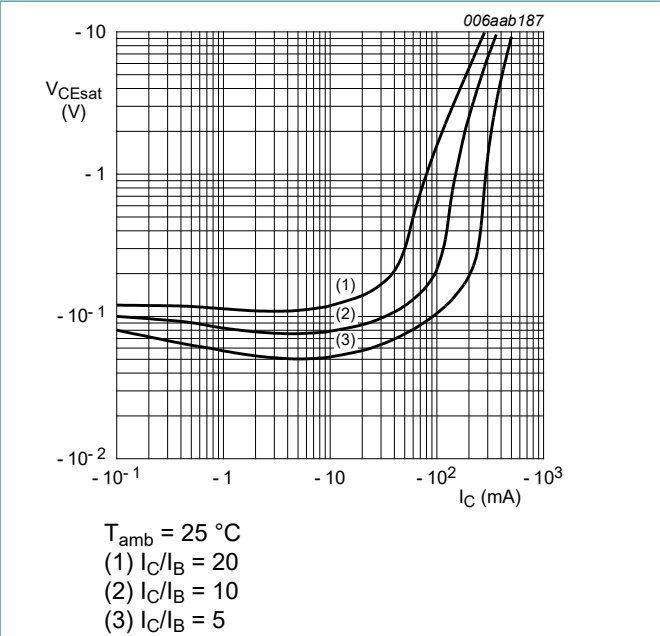


Fig. 9. Collector-emitter saturation voltage as a function of collector current; typical values

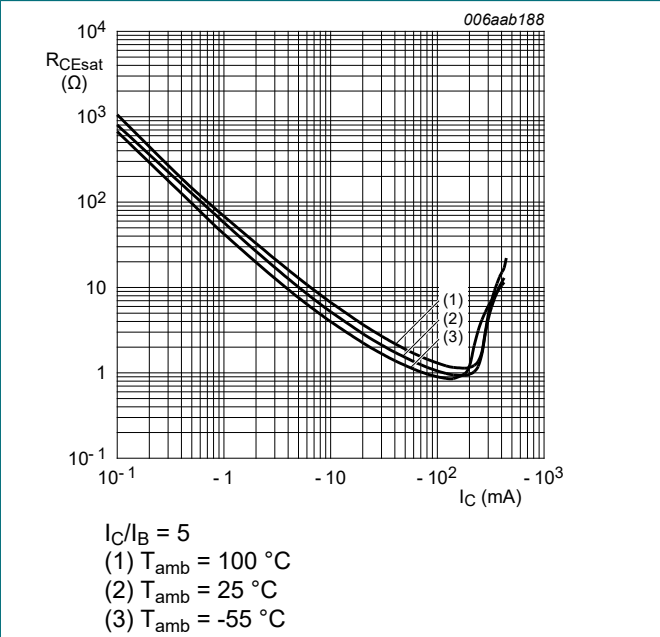


Fig. 10. Collector-emitter saturation resistance as a function of collector current; typical values

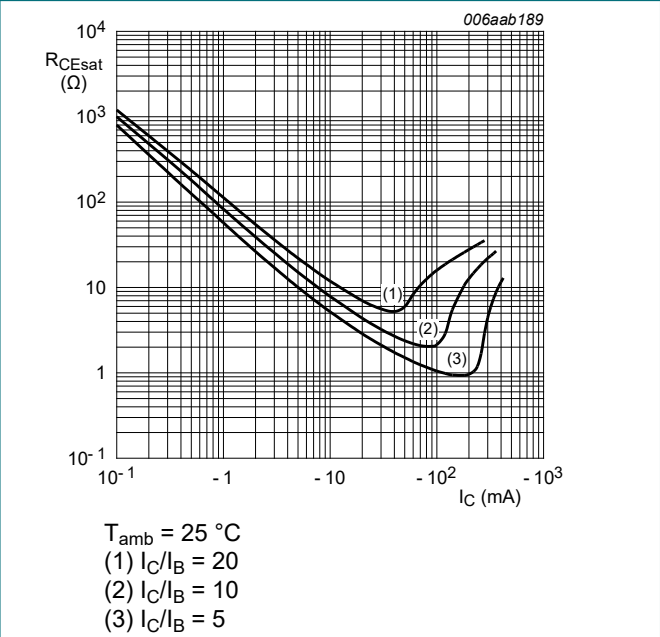


Fig. 11. Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

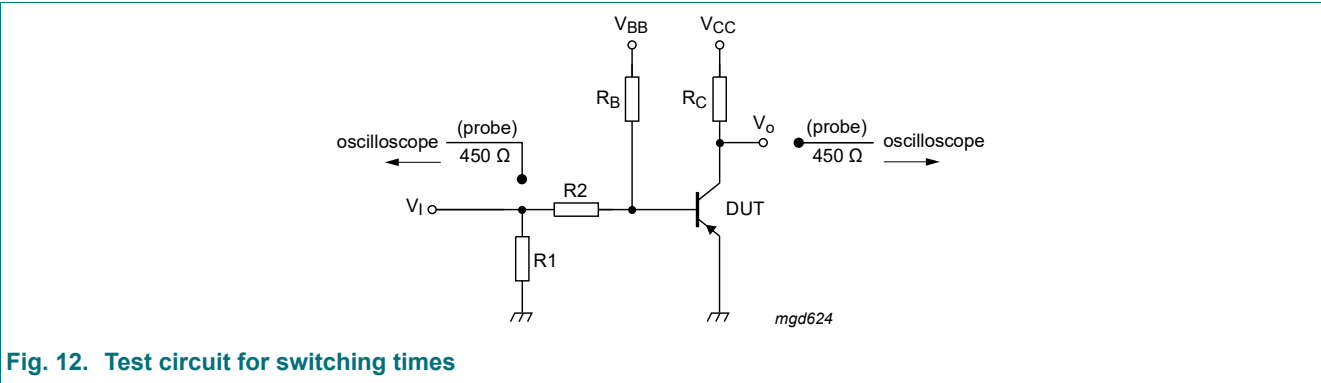


Fig. 12. Test circuit for switching times

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

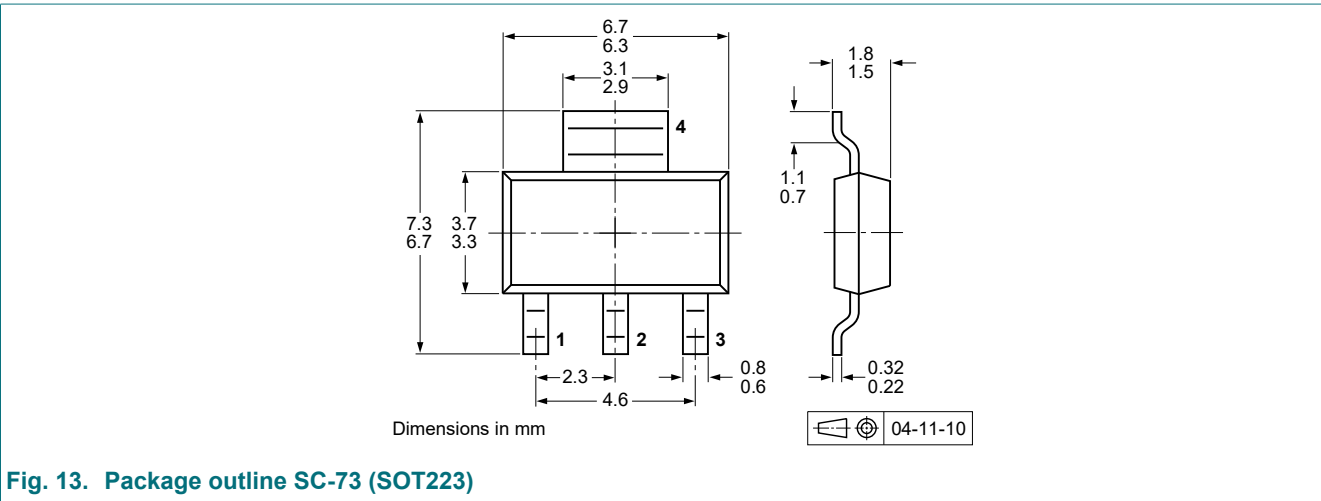


Fig. 13. Package outline SC-73 (SOT223)

13. Soldering

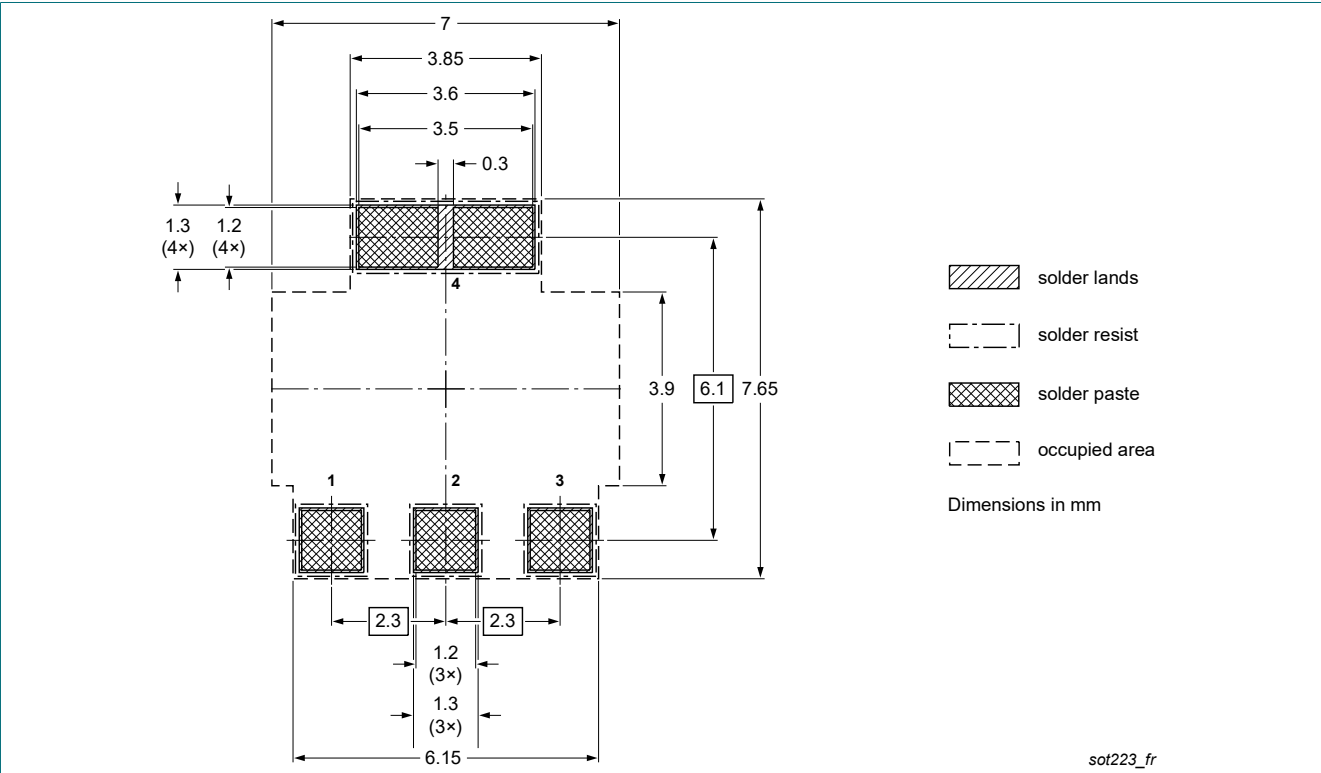


Fig. 14. Reflow soldering footprint for SC-73 (SOT223)

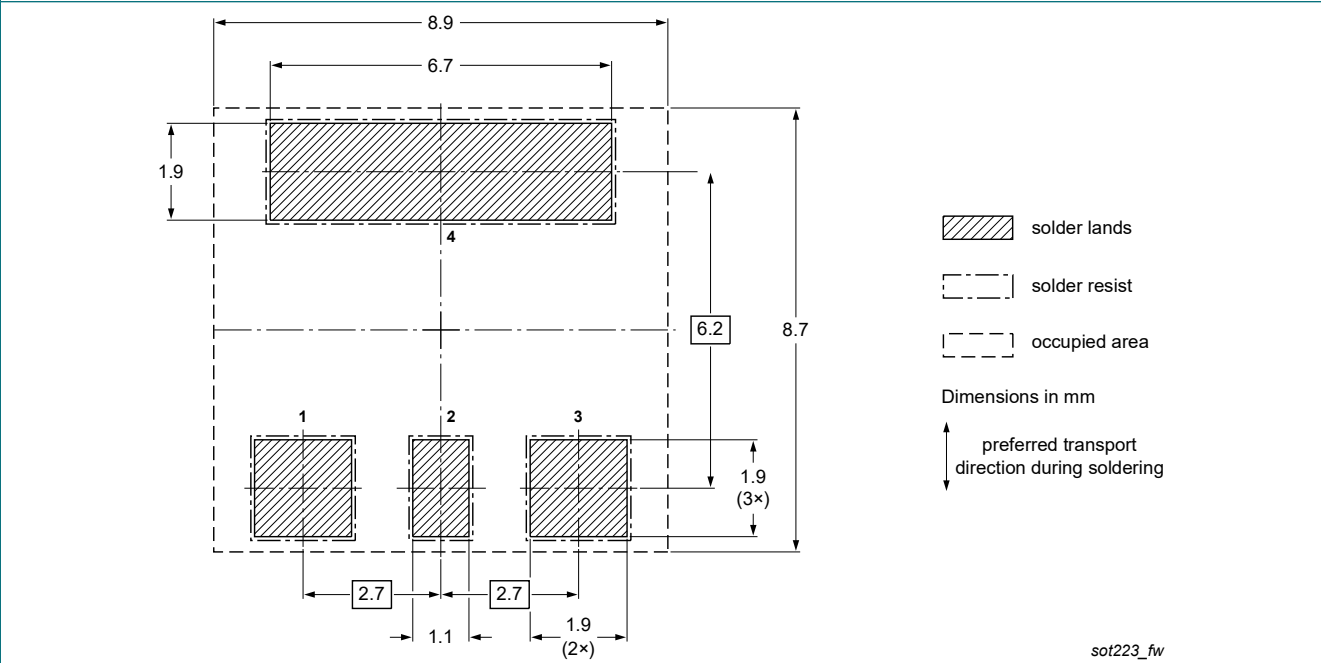


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV9040Z v.3	20230717	Product data sheet	-	PBHV9040Z_2
Modifications:	- 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.			
PBHV9040Z_2	20090115	Product data sheet	-	PBHV9040Z_1
PBHV9040Z_1	20080219	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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