



# PBHV9540Z

500 V, 0.5 A PNP high-voltage low VCEsat transistor

9 October 2024

Product data sheet

## 1. General description

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

NPN complement: PBHV8140Z

## 2. Features and benefits

- High voltage
- Low collector-emitter saturation voltage VCEsat
- High collector current capability IC and ICM
- High collector current gain (hFE) at high IC
- Medium power SMD plastic package

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VCESM	collector-emitter peak voltage	VBE = 0 V	-	-	-500	V
VCEO	collector-emitter voltage	open base	-	-	-400	V
IC	collector current		-	-	-0.5	A
hFE	DC current gain	VCE = -10 V; IC = -50 mA; pulsed; tp ≤ 300 μs; δ ≤ 0.02; Tamb = 25 °C	100	155	-	

## 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
PBHV9540Z	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
PBHV9540Z	V9540Z

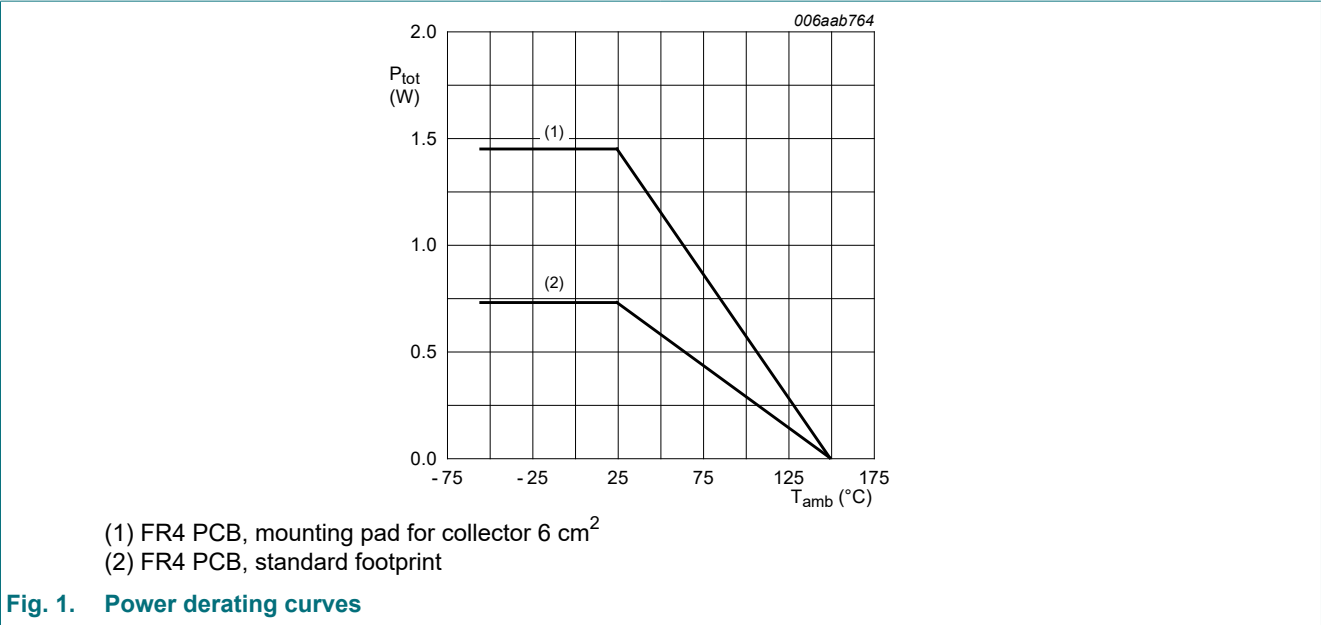
8. Limiting values

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		-	-500	V
V <sub>CEO</sub>	collector-emitter voltage	open base		-	-400	V
V <sub>CESM</sub>	collector-emitter peak voltage	V <sub>BE</sub> = 0 V		-	-500	V
V <sub>EBO</sub>	emitter-base voltage	open collector		-	-6	V
I <sub>C</sub>	collector current			-	-0.5	A
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms		-	-1	A
I <sub>BM</sub>	peak base current			-	-200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	1.45	W
			[2]	-	0.73	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, mounting pad for collector 6 cm<sup>2</sup>.  
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

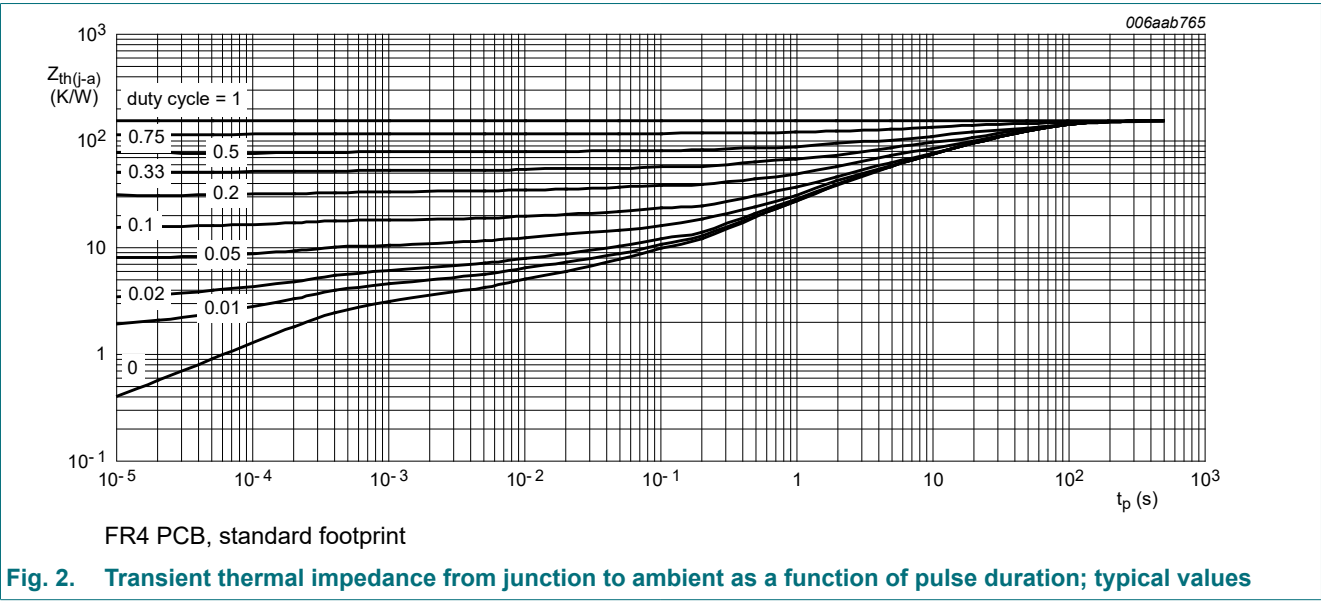


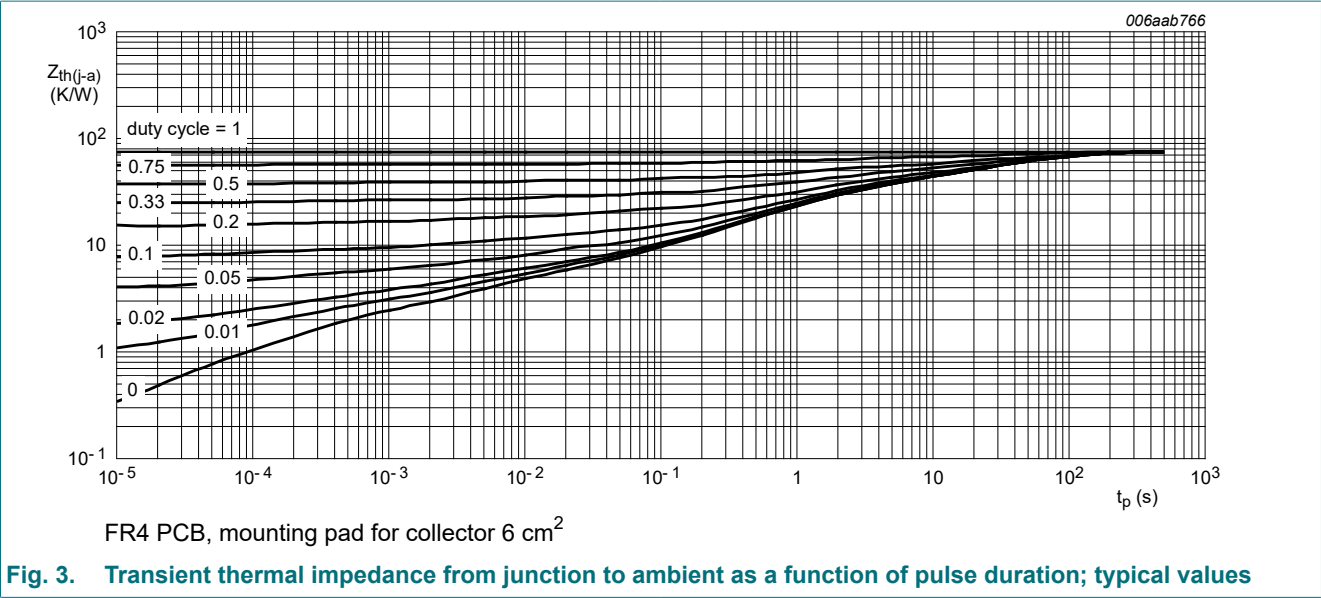
9. Thermal characteristics

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]	-	-	170	K/W
			[2]	-	-	85	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 and standard footprint.  
 [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.





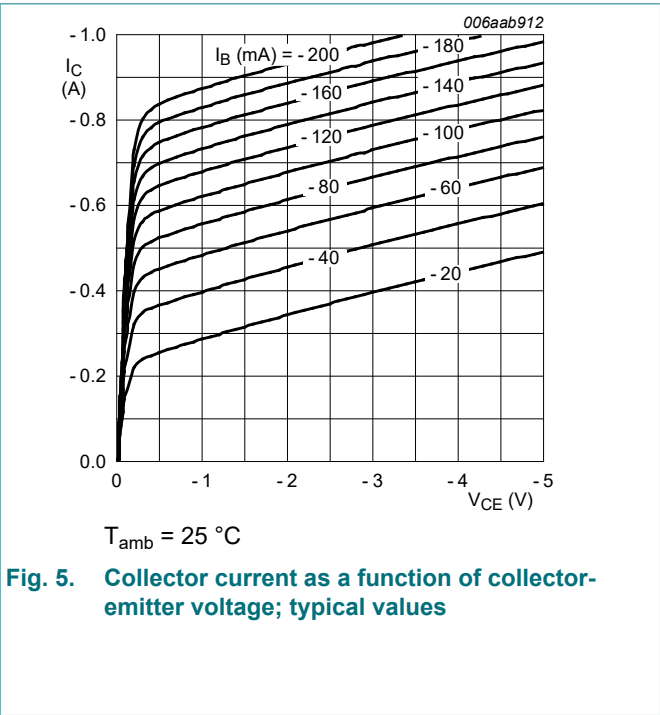
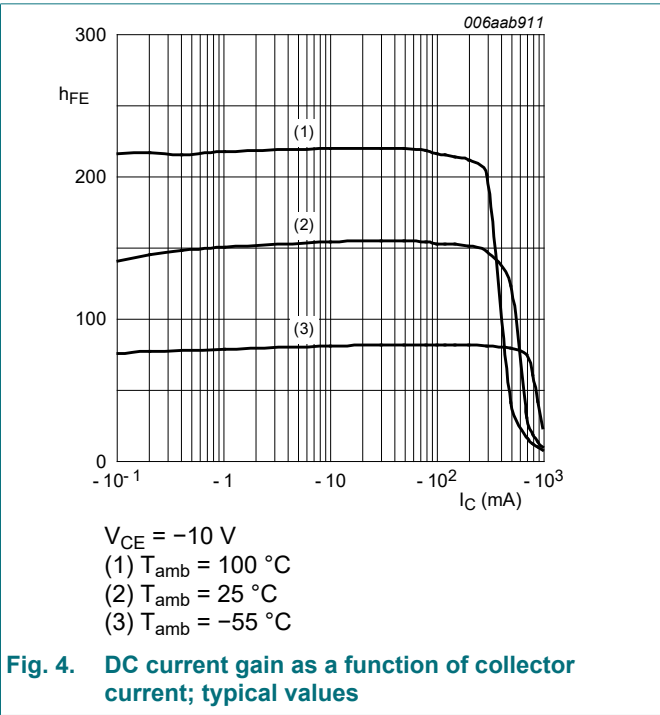
10. Characteristics

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
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = -320\text{ V}$ ; $V_{BE} = 0\text{ V}$ ; $T_{amb} = 25\text{ °C}$		-	-	-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	$V_{CE} = -10\text{ V}$ ; $I_C = -50\text{ mA}$ ; pulsed; $t_p \leq 300\text{ μs}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ °C}$		100	155	-	
		$V_{CE} = -10\text{ V}$ ; $I_C = -100\text{ mA}$ ; pulsed; $t_p \leq 300\text{ μs}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ °C}$		100	155	-	
		$V_{CE} = -10\text{ V}$ ; $I_C = -300\text{ mA}$ ; pulsed; $t_p \leq 300\text{ μs}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ °C}$		80	145	-	
		$V_{CE} = -10\text{ V}$ ; $I_C = -500\text{ mA}$ ; pulsed; $t_p \leq 300\text{ μs}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ °C}$		65	130	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -100\text{ mA}$ ; $I_B = -10\text{ mA}$ ; $T_{amb} = 25\text{ °C}$		-	-100	-190	mV
		$I_C = -100\text{ mA}$ ; $I_B = -20\text{ mA}$ ; pulsed; $t_p \leq 300\text{ μs}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ °C}$		-	-65	-110	mV
		$I_C = -300\text{ mA}$ ; $I_B = -60\text{ mA}$ ; pulsed; $t_p \leq 300\text{ μs}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ °C}$		-	-110	-210	mV
		$I_C = -500\text{ mA}$ ; $I_B = -100\text{ mA}$ ; pulsed; $t_p \leq 300\text{ μs}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ °C}$		-	-180	-320	mV
$R_{CEsat}$	collector-emitter saturation resistance			-	360	640	mΩ
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -100\text{ mA}$ ; $I_B = -20\text{ mA}$ ; pulsed; $t_p \leq 300\text{ μs}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ °C}$		-	-0.75	-0.9	V

500 V, 0.5 A PNP high-voltage low VCEsat transistor

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
t <sub>d</sub>	delay time	V <sub>CC</sub> = -2 V; I <sub>C</sub> = -0.15 A; I <sub>Bon</sub> = -0.03 A; I <sub>Boff</sub> = 0.03 A; T <sub>amb</sub> = 25 °C		-	55	-	ns
t <sub>r</sub>	rise time			-	1775	-	ns
t <sub>on</sub>	turn-on time			-	1830	-	ns
t <sub>s</sub>	storage time			-	1545	-	ns
t <sub>f</sub>	fall time			-	920	-	ns
t <sub>off</sub>	turn-off time			-	2465	-	ns
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -10 V; I <sub>C</sub> = -10 mA; f = 100 MHz		-	30	-	MHz
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = -20 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C		-	20	-	pF
C <sub>e</sub>	emitter capacitance	V <sub>EB</sub> = -0.5 V; I <sub>C</sub> = 0 A; i <sub>c</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C		-	540	-	pF



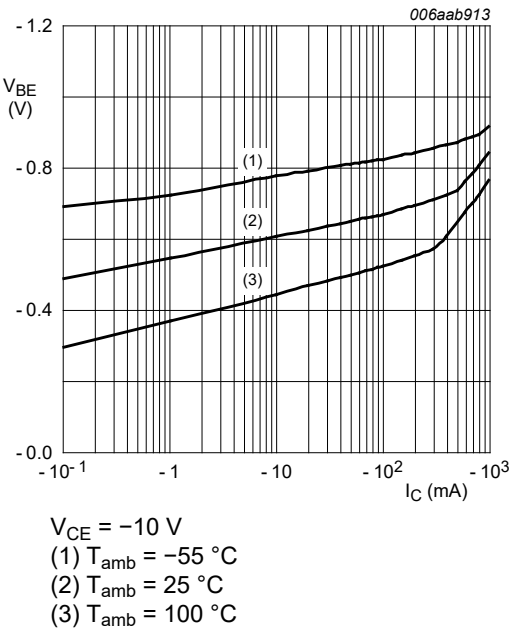


Fig. 6. Base-emitter voltage as a function of collector current; typical values

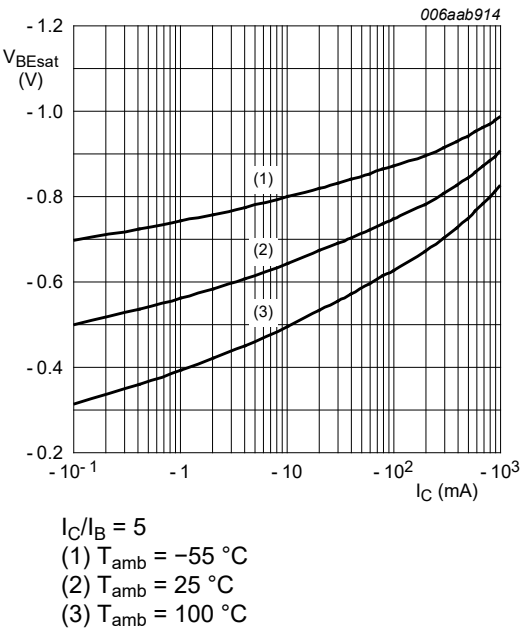


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values

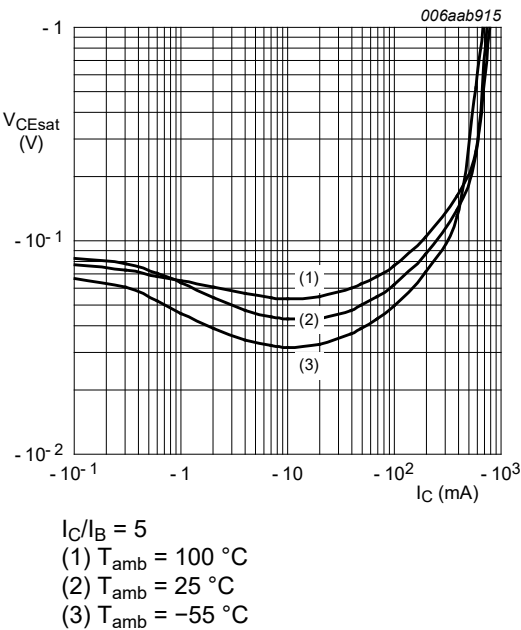


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

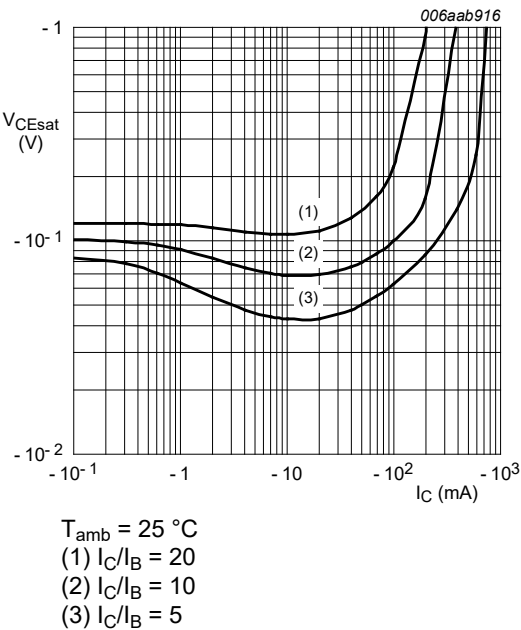
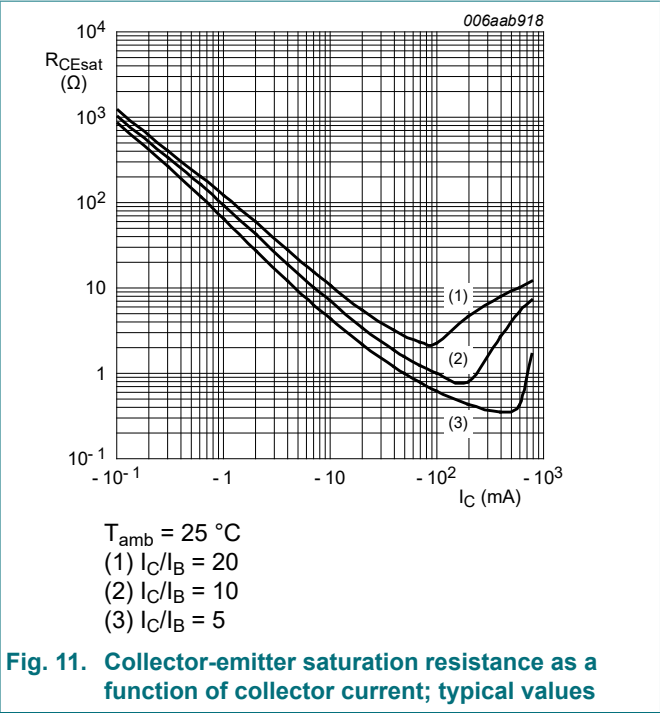
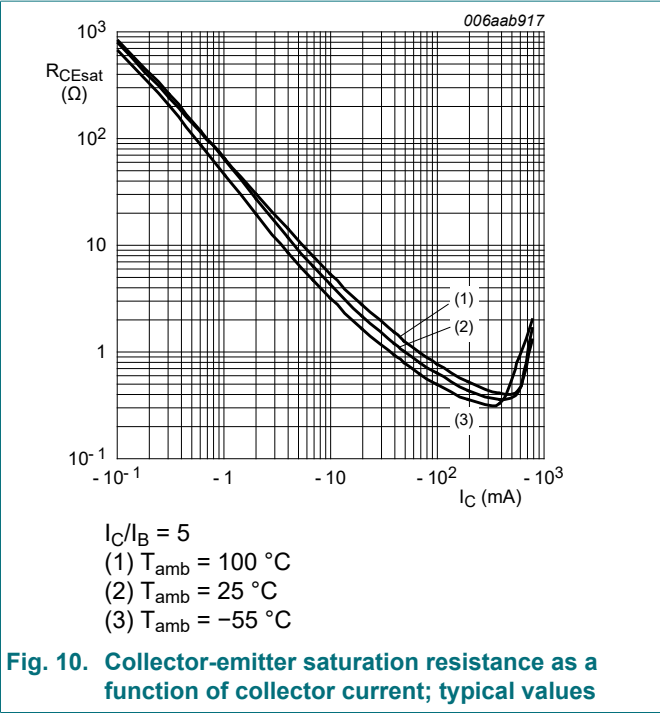
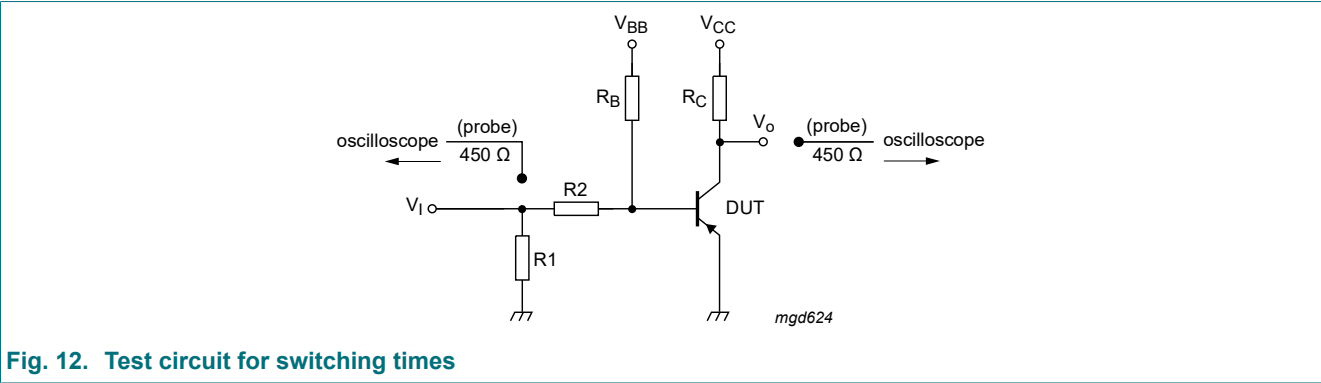


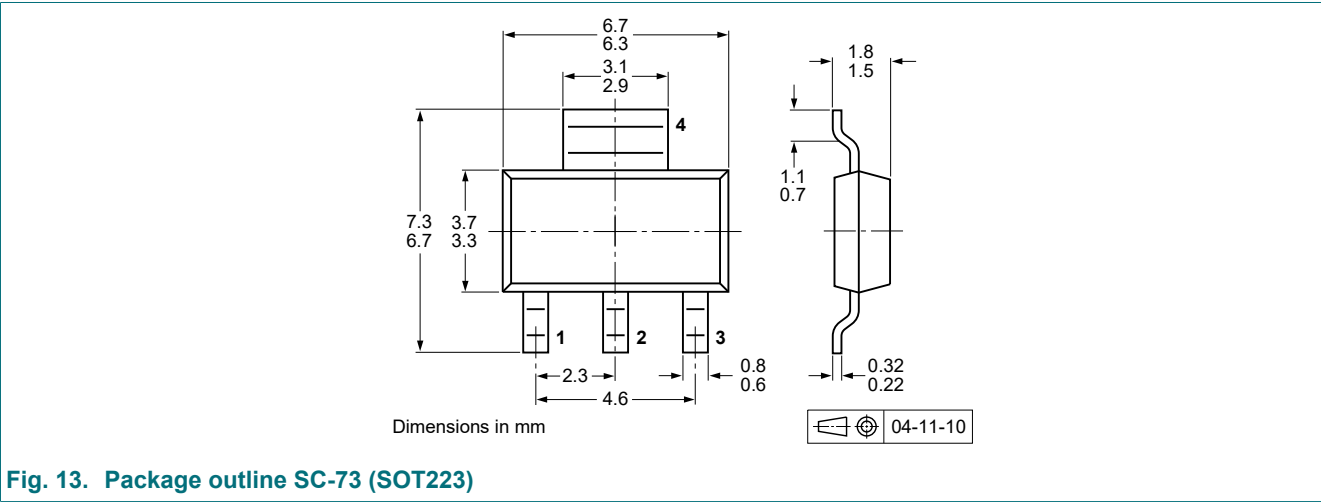
Fig. 9. Collector-emitter saturation voltage as a function of collector current; typical values



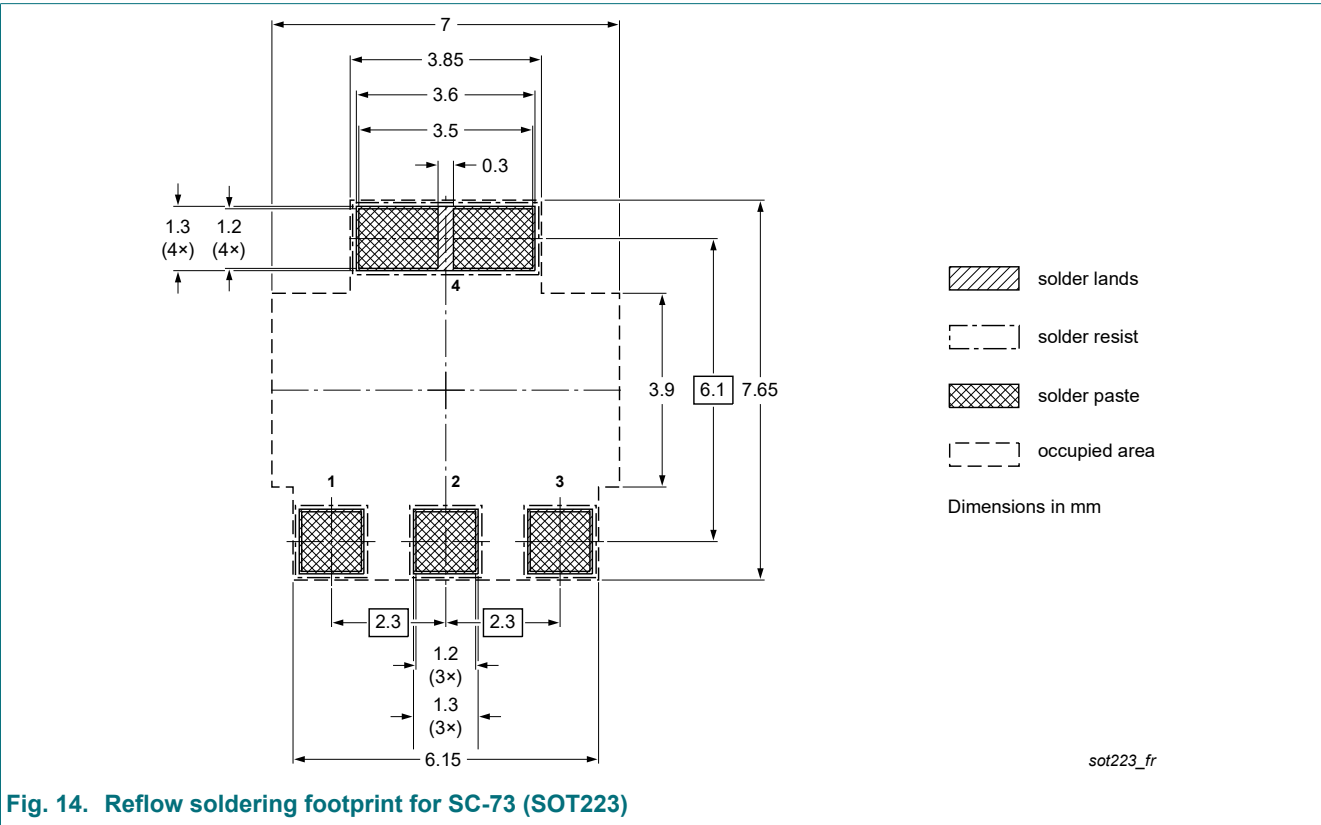
11. Test information



12. Package outline



13. Soldering





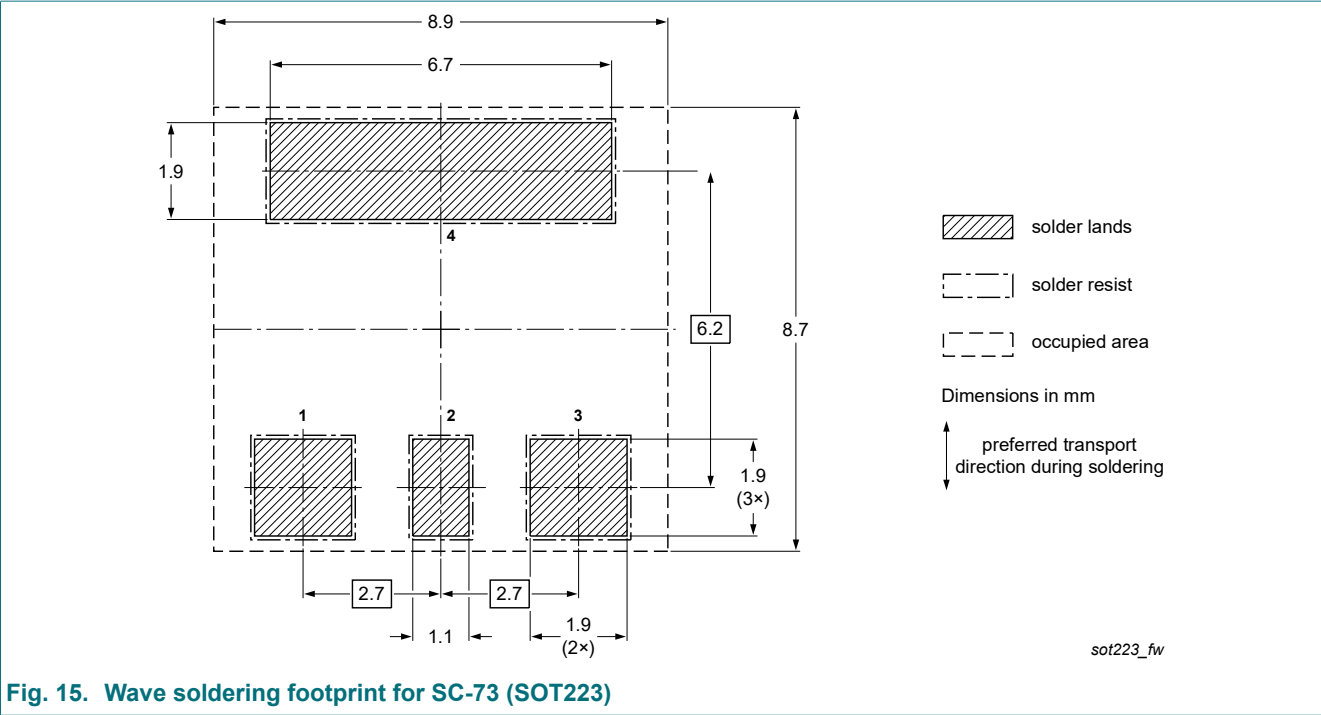


Fig. 15. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV9540Z v.3	20241009	Product data sheet	-	PBHV9540Z v.2
Modifications:	<ul style="list-style-type: none"><li>Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li></ul>			
PBHV9540Z v.2	20230717	Product data sheet	-	PBHV9540Z_1
PBHV9540Z_1	20091211	Product data sheet	-	-

## 15. Legal information

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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.

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