PBSS5540Z-Q

40 V low VCEsat PNP transistor

30 November 2021 **Product data sheet**

1. General description

PNP low V_{CEsat} transistor in a SOT223 plastic package.

NPN complement: PBSS4540Z-Q

2. Features and benefits

- Low collector-emitter saturation voltage
- High current capability
- Improved device reliability due to reduced heat generation
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Supply line switching circuits
- Battery management applications
- DC/DC converter applications
- Strobe flash units
- Heavy duty battery powered equipment (motor and lamp drivers)
- MOSFET driver applications.

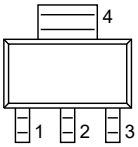
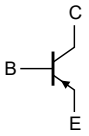
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	-40	V
I_C	collector current			-	-	-5	A
I_{CM}	peak collector current	single pulse; $t_p \leq$ 1 ms		-	-	-10	A
R_{CEsat}	collector-emitter saturation resistance	I_C = -2 A; I_B = -200 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	55	80	mΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SC-73 (SOT223)	 sym132
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5540Z-Q	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
PBSS5540Z-Q	PB5540

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		-	-40	V
V_{CEO}	collector-emitter voltage	open base		-	-40	V
V_{EBO}	emitter-base voltage	open collector		-	-6	V
I_C	collector current			-	-5	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-10	A
I_{BM}	peak base current			-	-2	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	1.35	W
			[2]	-	2	W
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

9. Thermal characteristics

Table 6. Thermal characteristics

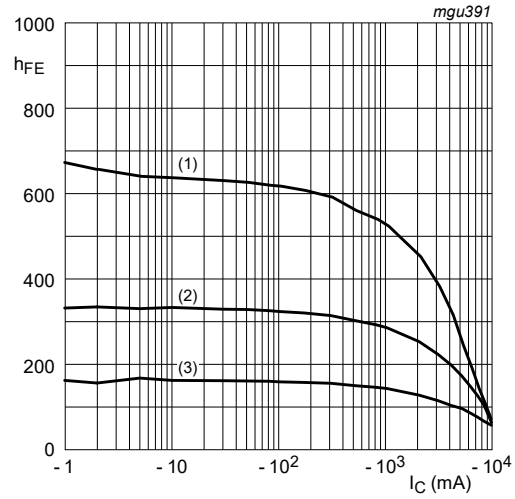
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	92	K/W
			[2]	-	-	62	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

10. Characteristics

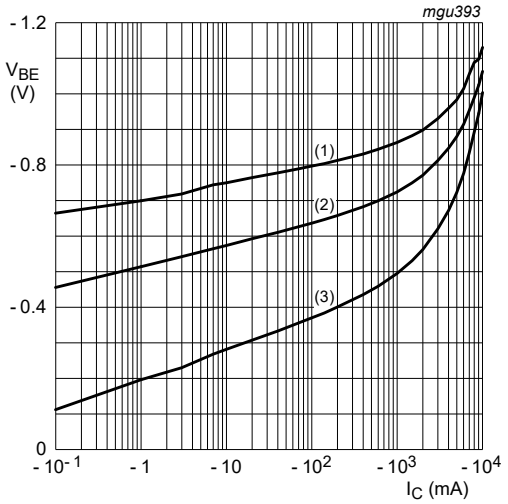
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; I_E = 0 A		-40	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = -10 mA; I_B = 0 A; T_{amb} = 25 °C		-40	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage (collector open)	I_E = -100 µA; I_B = 0 mA; T_{amb} = 25 °C		-6	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = -30 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-100	nA
		V_{CB} = -30 V; I_E = 0 A; T_j = 150 °C		-	-	-50	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = -5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	-100	nA
h_{FE}	DC current gain	V_{CE} = -2 V; I_C = -500 mA; T_{amb} = 25 °C		250	350	-	
		V_{CE} = -2 V; I_C = -1 A; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		200	300	-	
		V_{CE} = -2 V; I_C = -2 A; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		150	250	-	
		V_{CE} = -2 V; I_C = -5 A; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		50	150	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -500 mA; I_B = -5 mA; T_{amb} = 25 °C		-	-80	-120	mV
		I_C = -1 A; I_B = -10 mA; T_{amb} = 25 °C		-	-120	-170	mV
		I_C = -2 A; I_B = -200 mA; T_{amb} = 25 °C		-	-110	-160	mV
		I_C = -5 A; I_B = -500 mA; T_{amb} = 25 °C		-	-250	-375	mV
R_{CEsat}	collector-emitter saturation resistance	I_C = -2 A; I_B = -200 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	55	80	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = -5 A; I_B = -500 mA; T_{amb} = 25 °C		-	-	-1.3	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = -2 V; I_C = -2 A; T_{amb} = 25 °C		-	-0.8	-1.25	V
f_T	transition frequency	V_{CE} = -10 V; I_C = -100 mA; f = 100 MHz; T_{amb} = 25 °C		60	120	-	MHz
C_c	collector capacitance	V_{CB} = -10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	90	105	pF



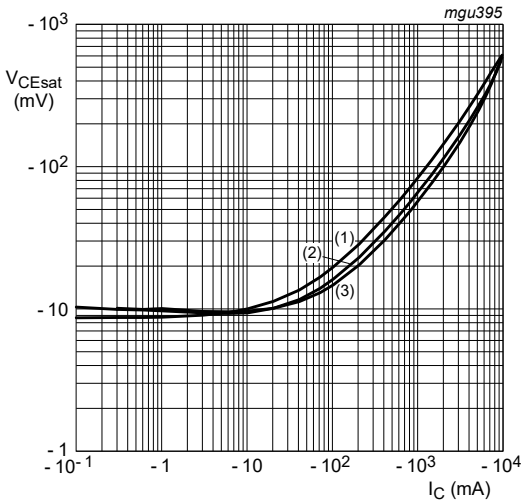
V_{CE} = −2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 1. DC current gain as a function of collector current; typical values



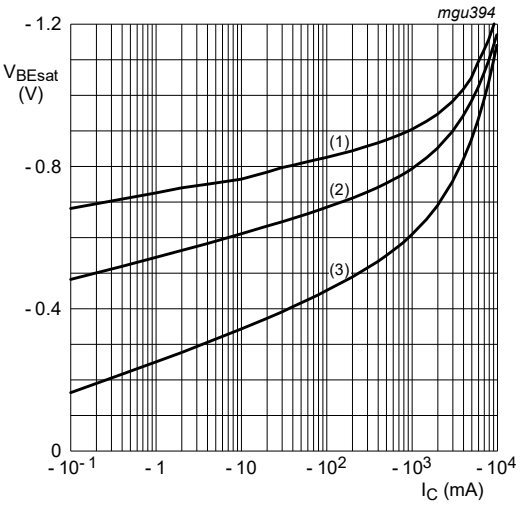
V_{CE} = −2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 2. Base-emitter voltage as a function of collector current; typical values



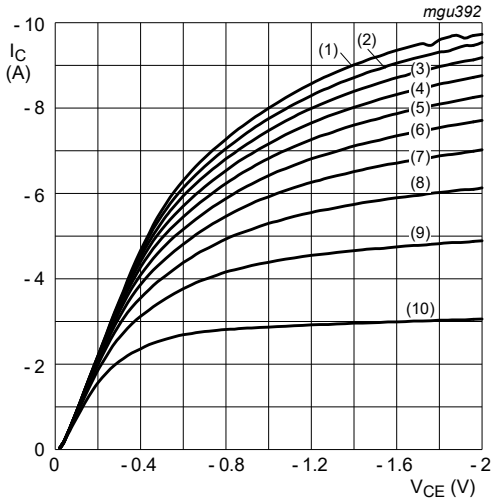
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 3. Collector-emitter saturation voltage as a function of collector current; typical values



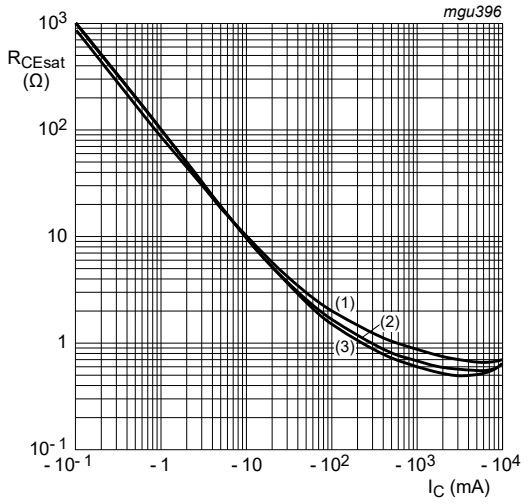
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values



T_{amb} = 25 °C
(1) I_B = −150 mA
(2) I_B = −135 mA
(3) I_B = −120 mA
(4) I_B = −105 mA
(5) I_B = −90 mA
(6) I_B = −75 mA
(7) I_B = −60 mA
(8) I_B = −45 mA
(9) I_B = −30 mA
(10) I_B = −15 mA

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



I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 6. Collector-emitter equivalent on-resistance as a function of collector current; typical values

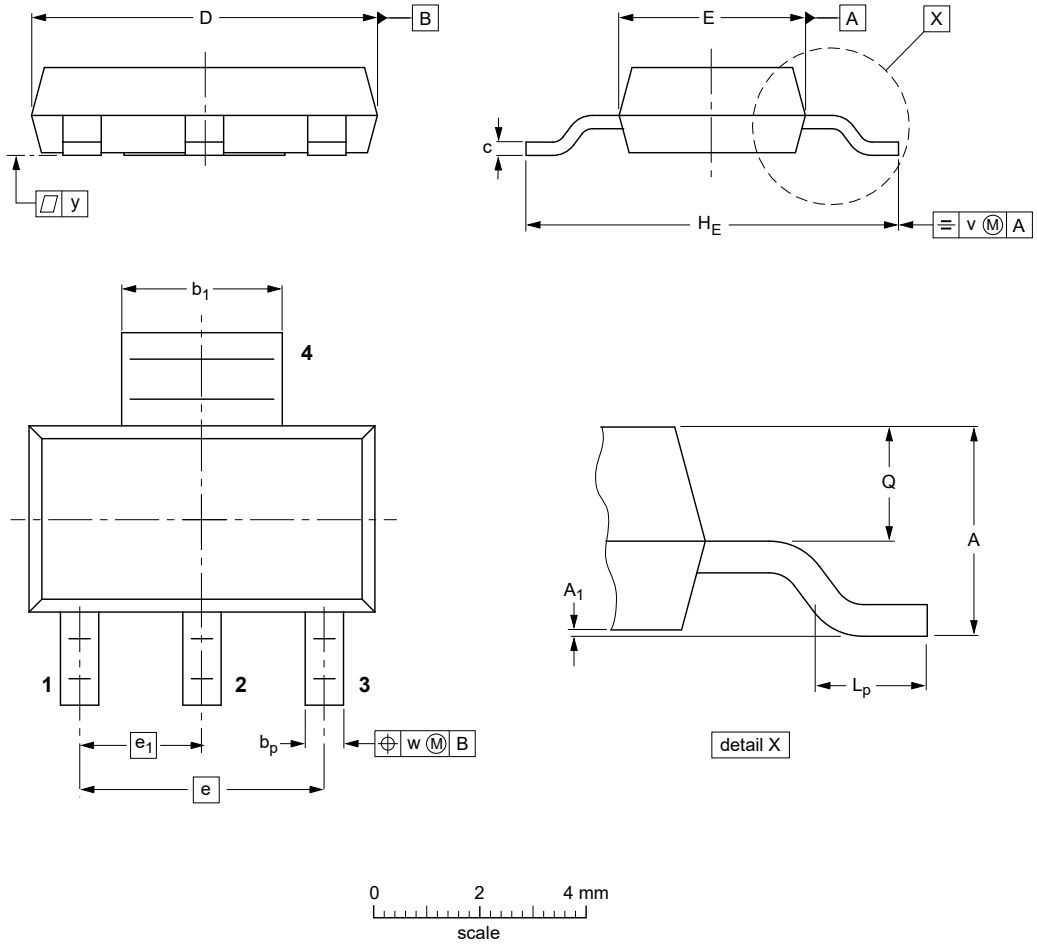
11. Test information

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

Plastic surface-mounted package with increased heatsink; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT223			SC-73			~~04-11-10~~ 06-03-16

Fig. 7. Package outline SC-73 (SOT223)

13. Soldering

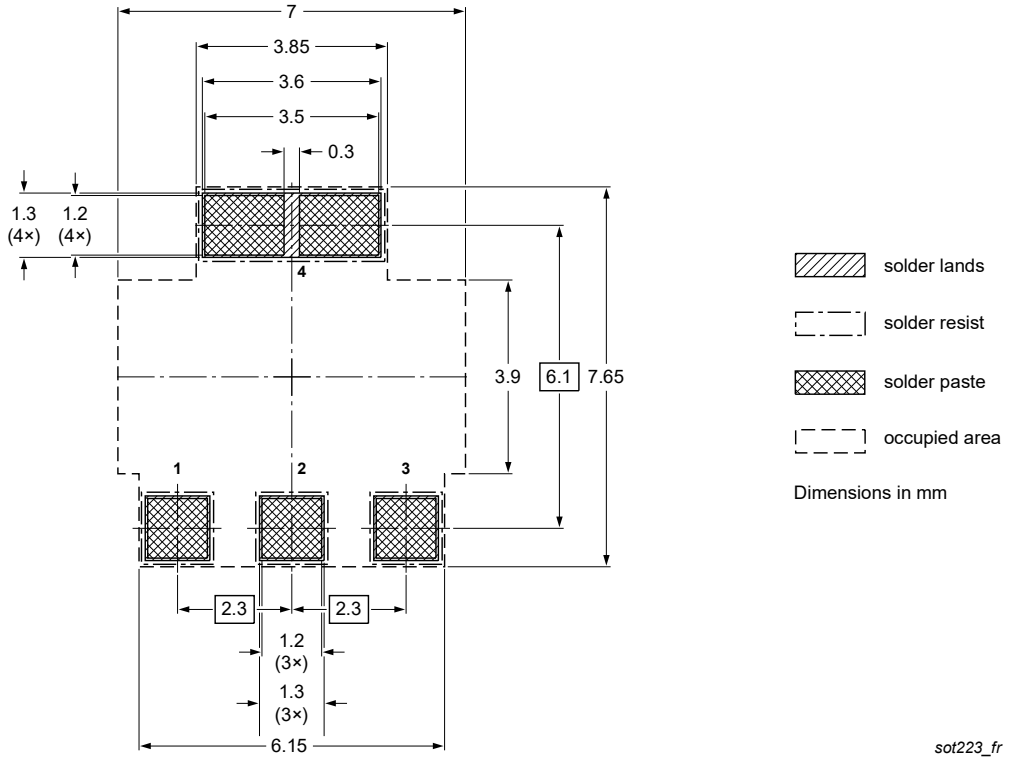


Fig. 8. Reflow soldering footprint for SC-73 (SOT223)

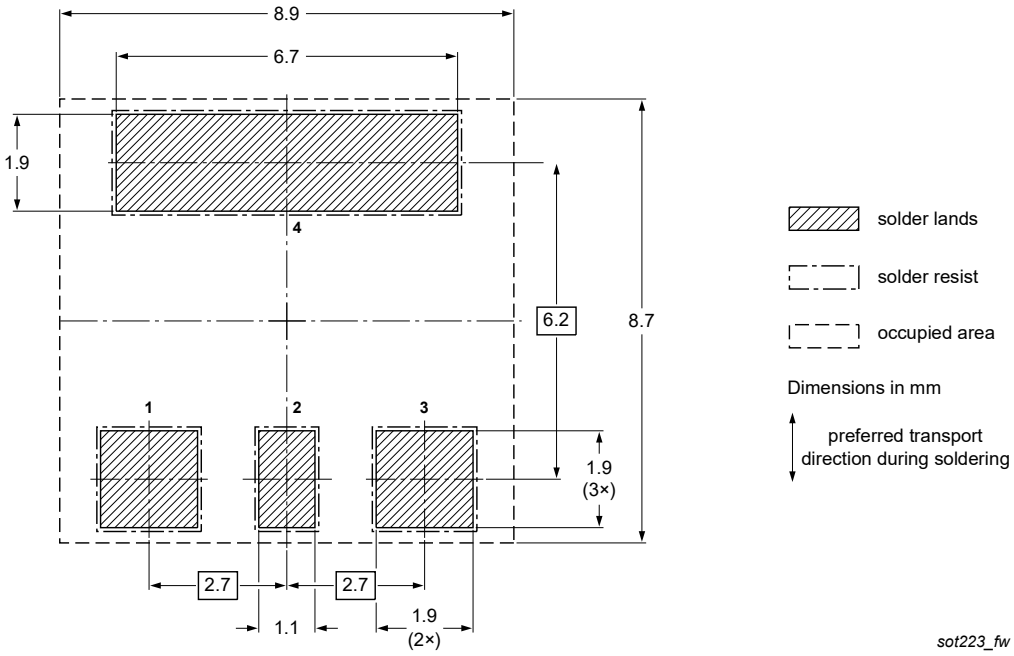


Fig. 9. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5540Z-Q v.1	20211130	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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