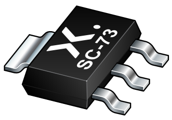


PBSS5540Z-Q

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.

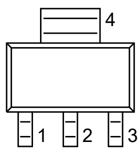
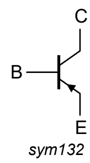
4. Quick reference data

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)**	
2	C	collector		
3	E	emitter		
4	C	collector		

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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.

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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

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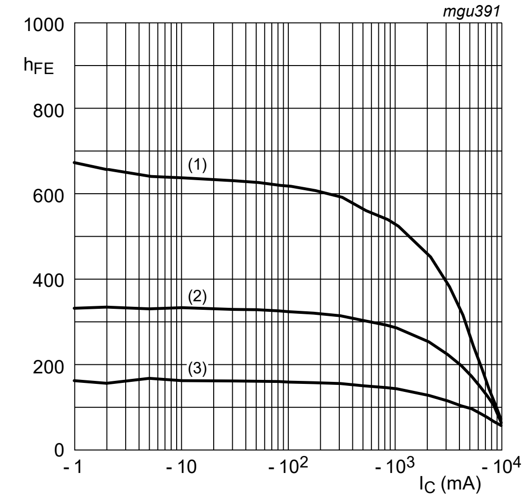
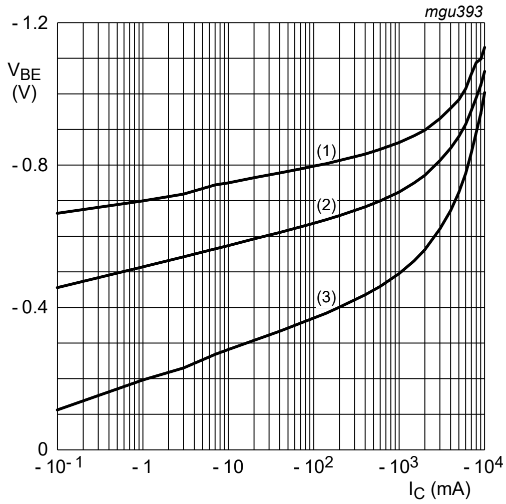


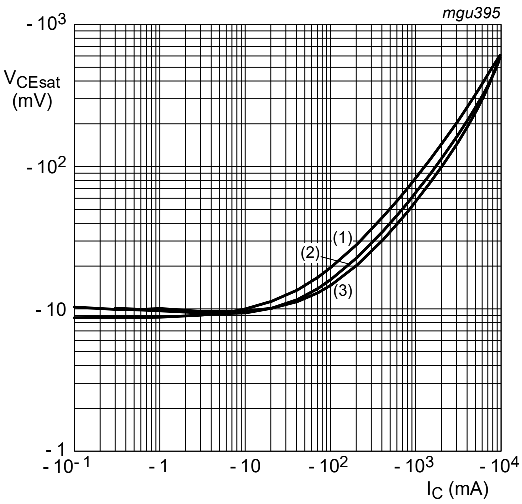
V_{CE} = −2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



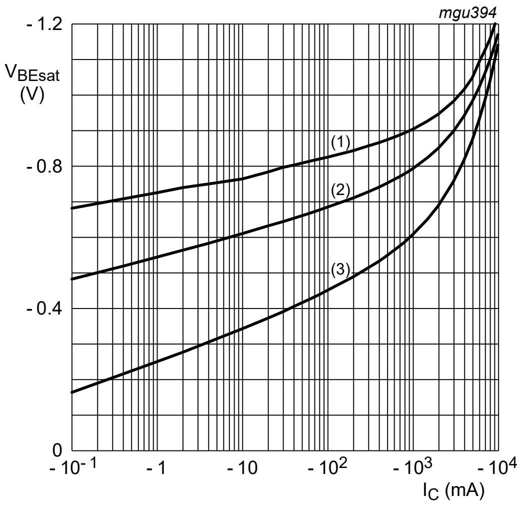
V_{CE} = −2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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

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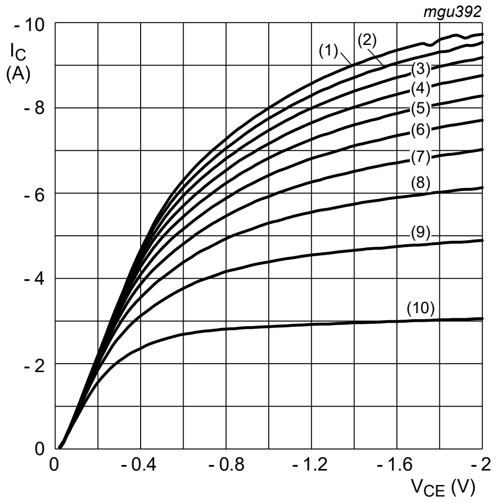
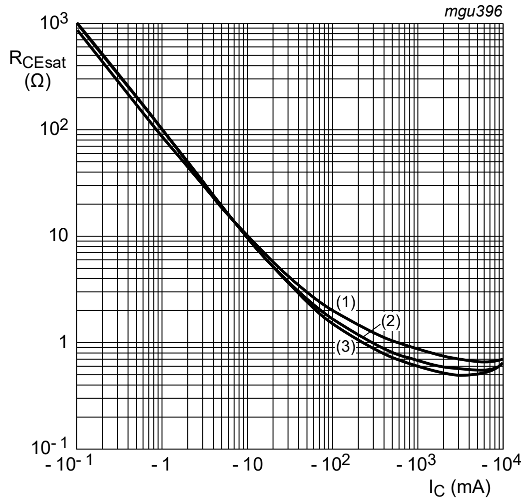


T_{amb} = 25 °C
(1) I_B = −150 mA
(2) I_B = −135 mA
(3) I_B = −120 mA
(4) I_B = −105 mA
(5) I_B = −90 mA
(6) I_B = −75 mA
(7) I_B = −60 mA
(8) I_B = −45 mA
(9) I_B = −30 mA
(10) I_B = −15 mA

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.

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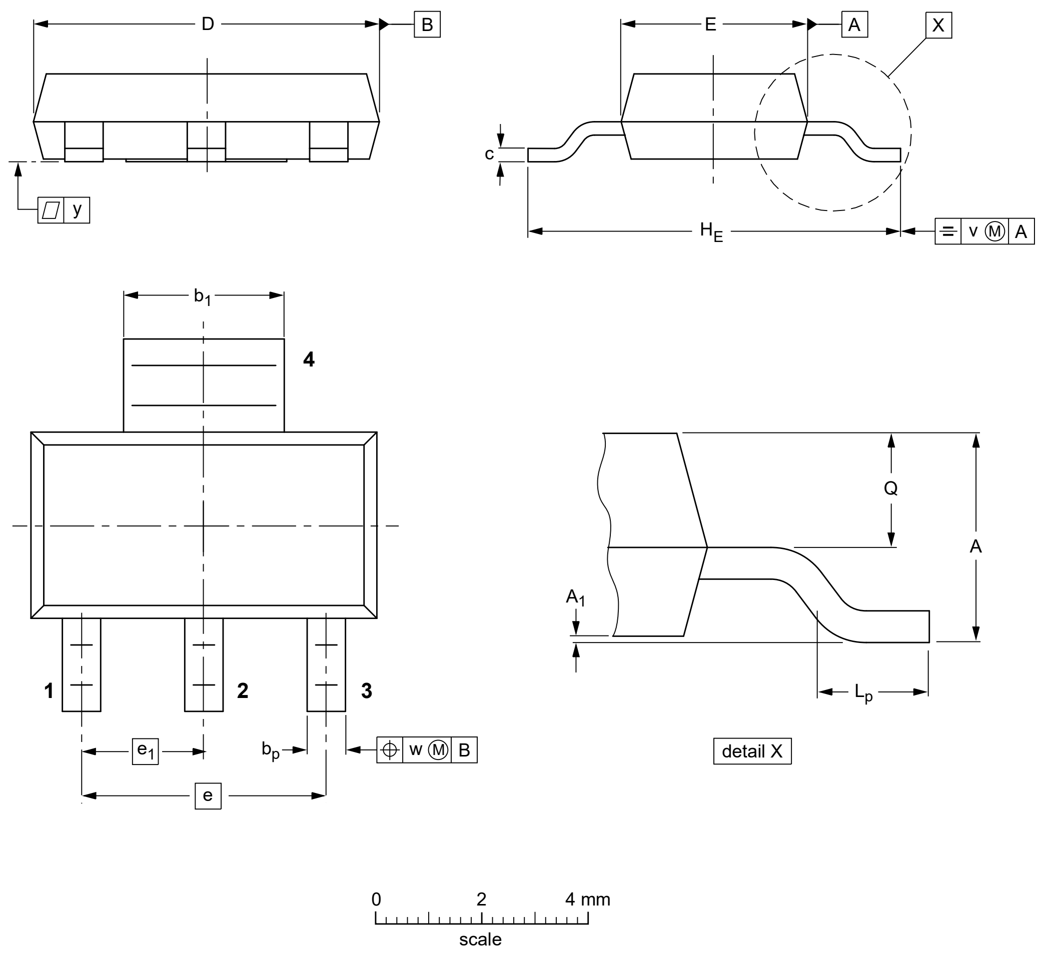
12. Package outline

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)

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13. Soldering

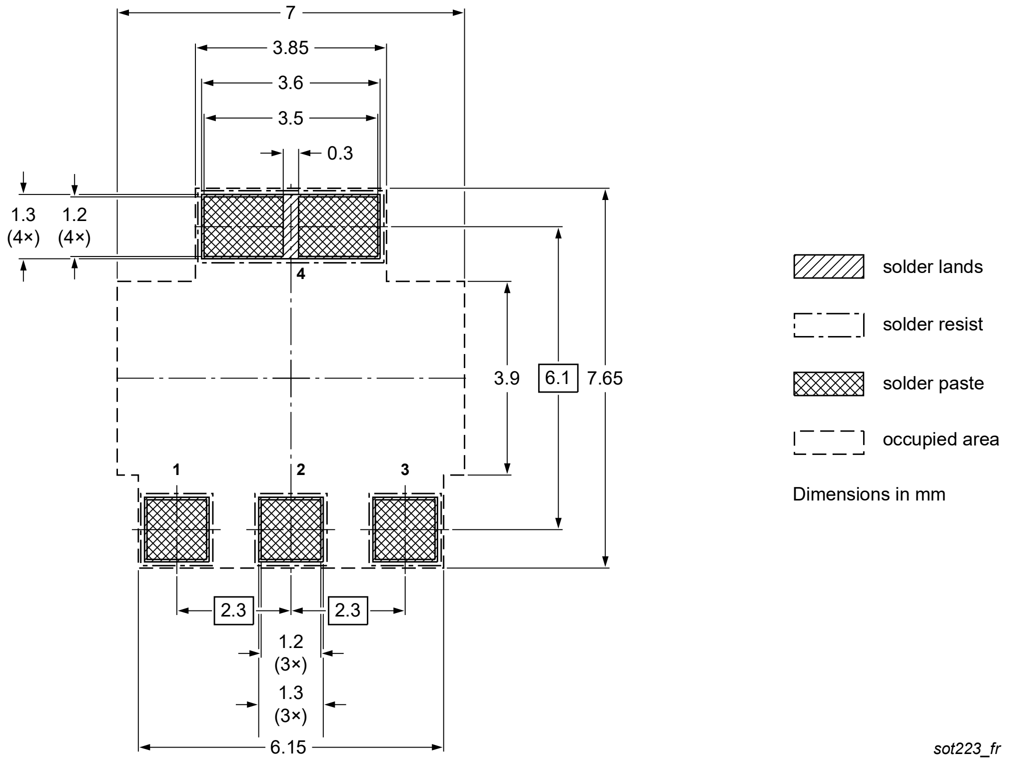

Fig. 8. Reflow soldering footprint for SC-73 (SOT223)

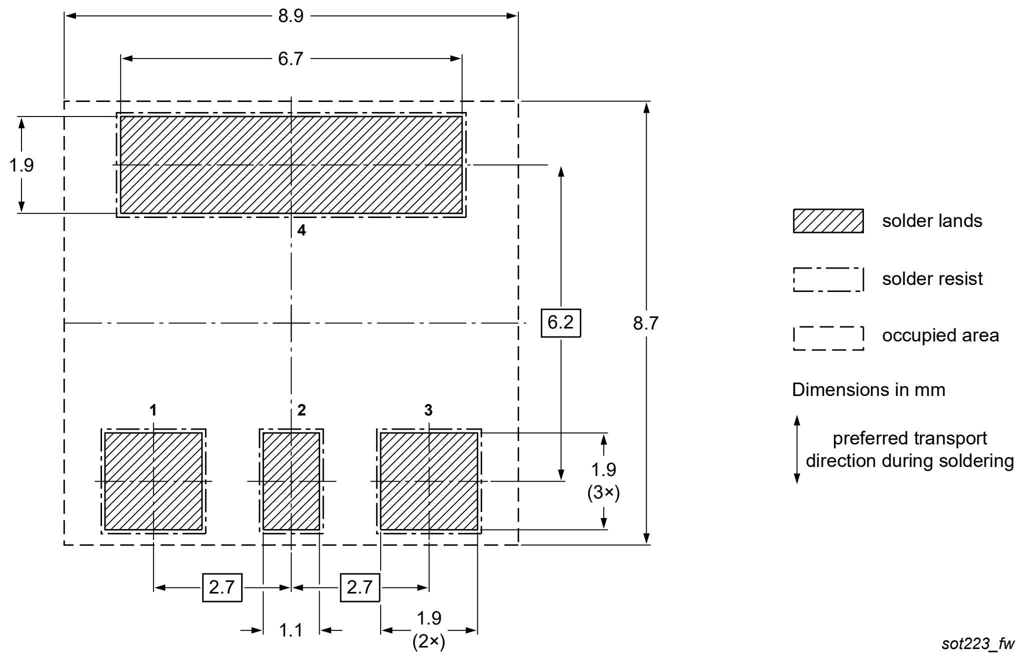

Fig. 9. Wave soldering footprint for SC-73 (SOT223)

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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	-	-

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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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