PBSS4350Z

50 V low VCEsat NPN transistor

26 June 2018 **Product data sheet**

1. General description

NPN low V_{CEsat} transistor in a SOT223 plastic package. PNP complement: PBSS5350Z.

2. Features and benefits

- Low collector-emitter saturation voltage
- High collector current capability: I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- Higher efficiency leading to less heat generation
- Reduced PCB area requirements compared to DPAK.
- AEC-Q101 qualified

3. Applications

- Power management
  - DC/DC converters
  - Supply line switching
  - Battery charger
  - Linear voltage regulation (LDO).
- Peripheral drivers
  - Driver in low supply voltage applications, e.g. lamps, LEDs
  - Inductive load driver, e.g. relays, buzzers, motors.

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	50	V
I_C	collector current			-	-	3	A
I_{CM}	peak collector current	single pulse; $t_p \leq$ 1 ms		-	-	5	A
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 500 mA; T_{amb} = 25 °C	[1]	200	-	-	
R_{CEsat}	collector-emitter saturation resistance	I_C = 2 A; I_B = 200 mA; T_{amb} = 25 °C	[1]	-	110	145	mΩ

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$

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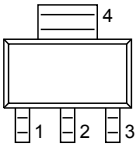
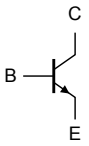
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SC-73 (SOT223)	 sym123
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS4350Z	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS4350Z	PB4350

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		-	60	V
V_{CEO}	collector-emitter voltage	open base		-	50	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	5	A
I_{BM}	peak base current			-	1	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]	-	-	62.5	K/W

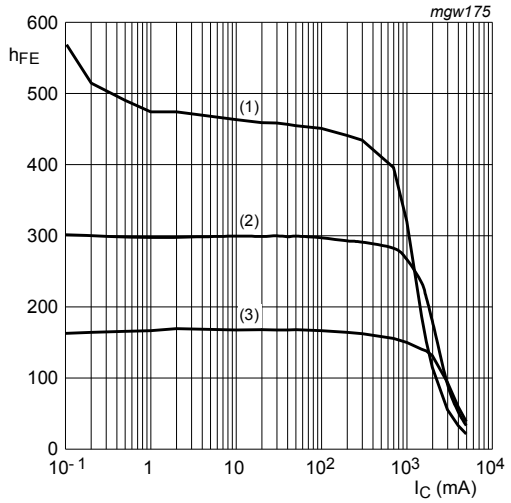
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

10. Characteristics

Table 7. Characteristics

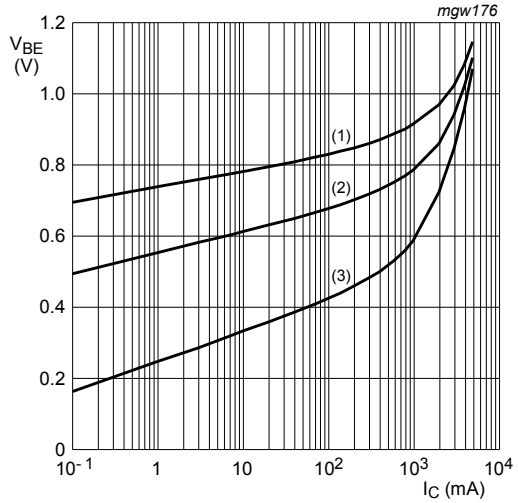
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 50 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
		V_{CB} = 50 V; I_E = 0 A; T_j = 150 °C		-	-	50	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 500 mA; T_{amb} = 25 °C	[1]	200	-	-	
		V_{CE} = 2 V; I_C = 1 A; T_{amb} = 25 °C	[1]	200	-	-	
		V_{CE} = 2 V; I_C = 2 A; T_{amb} = 25 °C	[1]	100	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA; T_{amb} = 25 °C	[1]	-	-	90	mV
		I_C = 1 A; I_B = 50 mA; T_{amb} = 25 °C	[1]	-	-	170	mV
		I_C = 2 A; I_B = 200 mA; T_{amb} = 25 °C	[1]	-	-	290	mV
R_{CEsat}	collector-emitter saturation resistance		[1]	-	110	145	mΩ
V_{BEsat}	base-emitter saturation voltage		[1]	-	-	1.2	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 2 V; I_C = 1 A; T_{amb} = 25 °C	[1]	-	-	1.1	V
f_T	transition frequency	V_{CE} = 5 V; I_C = 100 mA; f = 100 MHz; T_{amb} = 25 °C		100	-	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	30	pF

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$



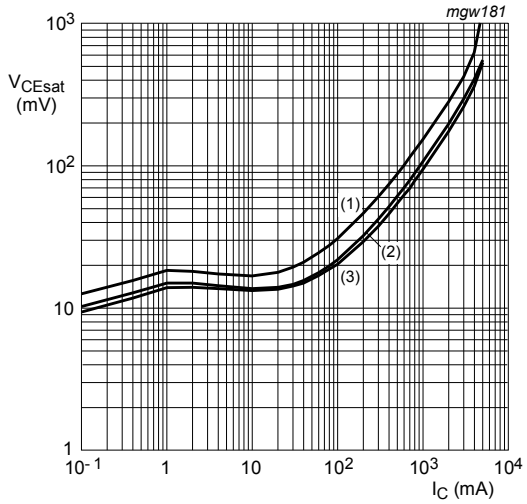
V_{CE} = 2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 1. DC current gain; typical values



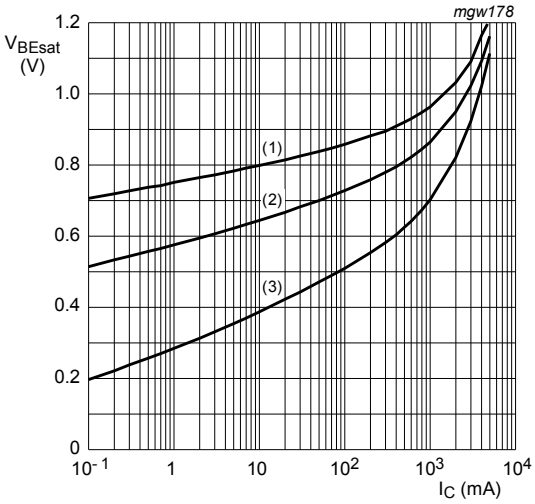
V_{CE} = 2 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 C
(3) T_{amb} = 150 °C

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



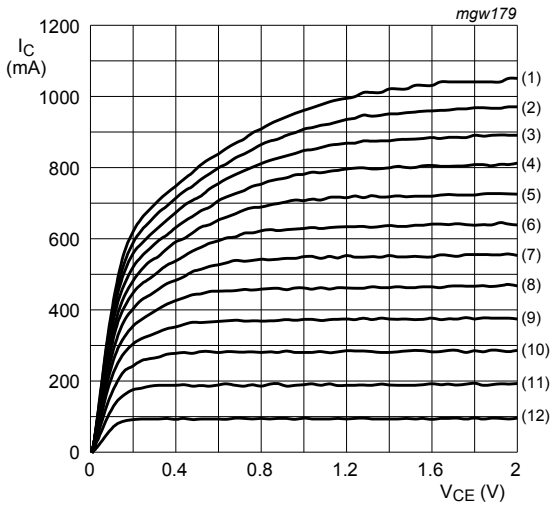
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



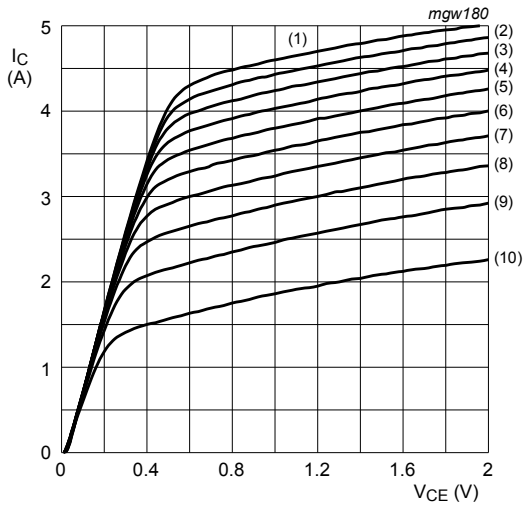
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



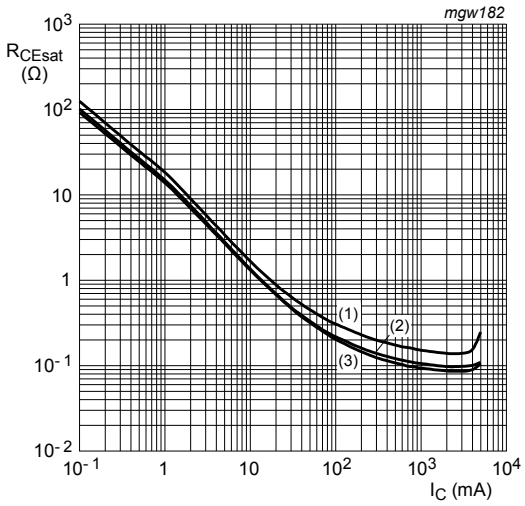
T_{amb} = 25 °C
(1) I_B = 3.96 mA
(2) I_B = 3.63 mA
(3) I_B = 3.30 mA
(4) I_B = 2.97 mA
(5) I_B = 2.64 mA
(6) I_B = 2.31 mA
(7) I_B = 1.98 mA
(8) I_B = 1.65 mA
(9) I_B = 1.32 mA
(10) I_B = 0.99 mA
(11) I_B = 0.66 mA
(12) I_B = 0.33 mA

Fig. 5. Collector current as a function of collector-emitter voltage; 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. 6. Collector current as a function of collector-emitter voltage; typical values.

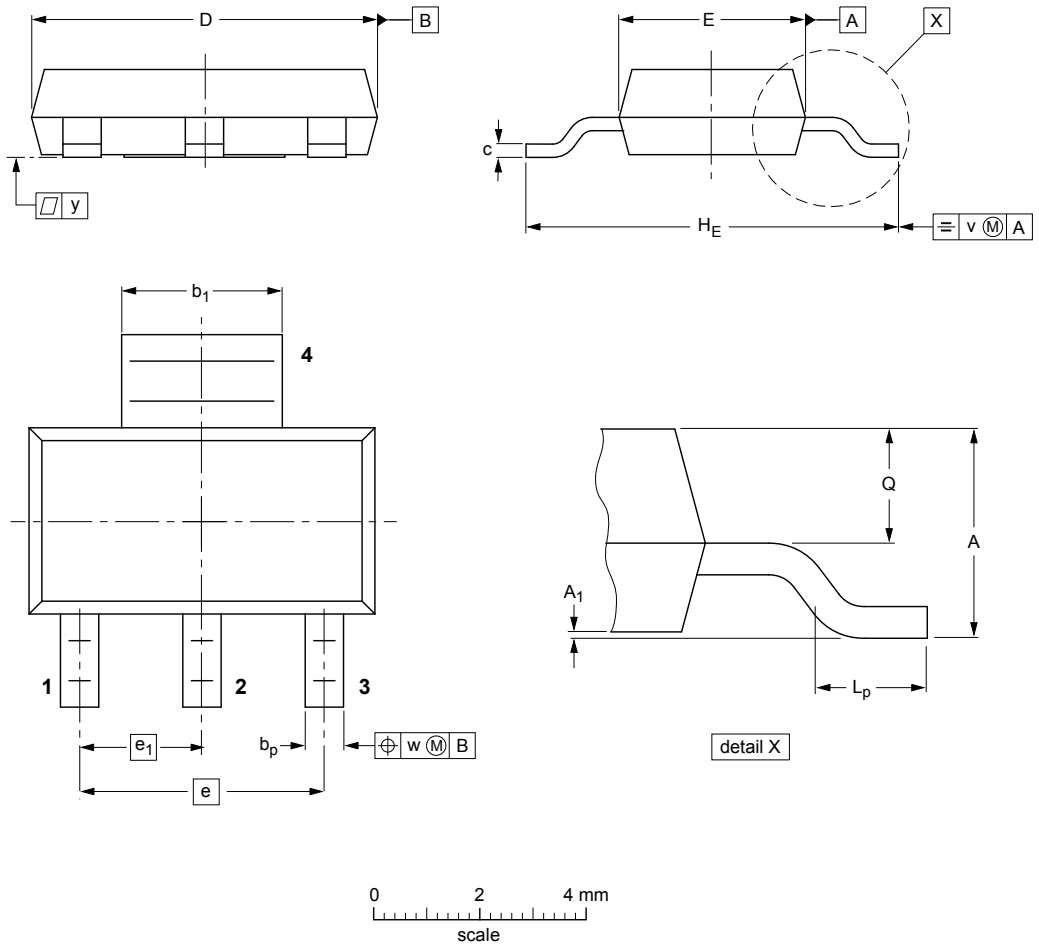


I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 7. Collector-emitter equivalent on-resistance as a function of collector current; typical values

11. 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. 8. Package outline SC-73 (SOT223)

12. Soldering

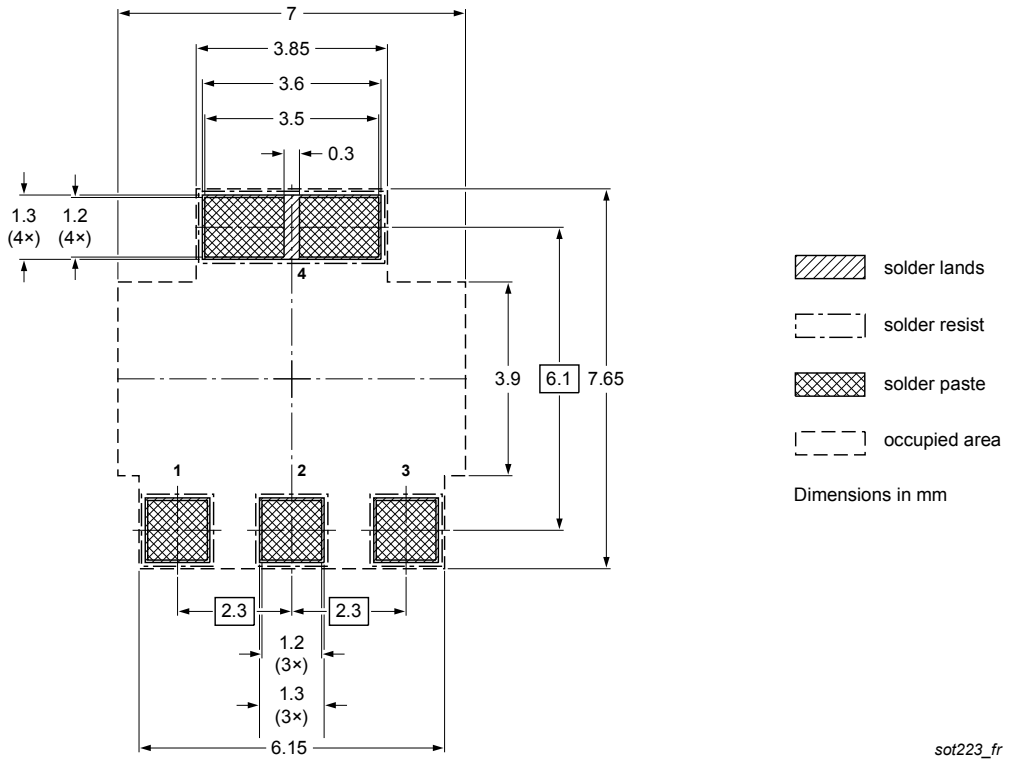


Fig. 9. Reflow soldering footprint for SC-73 (SOT223)

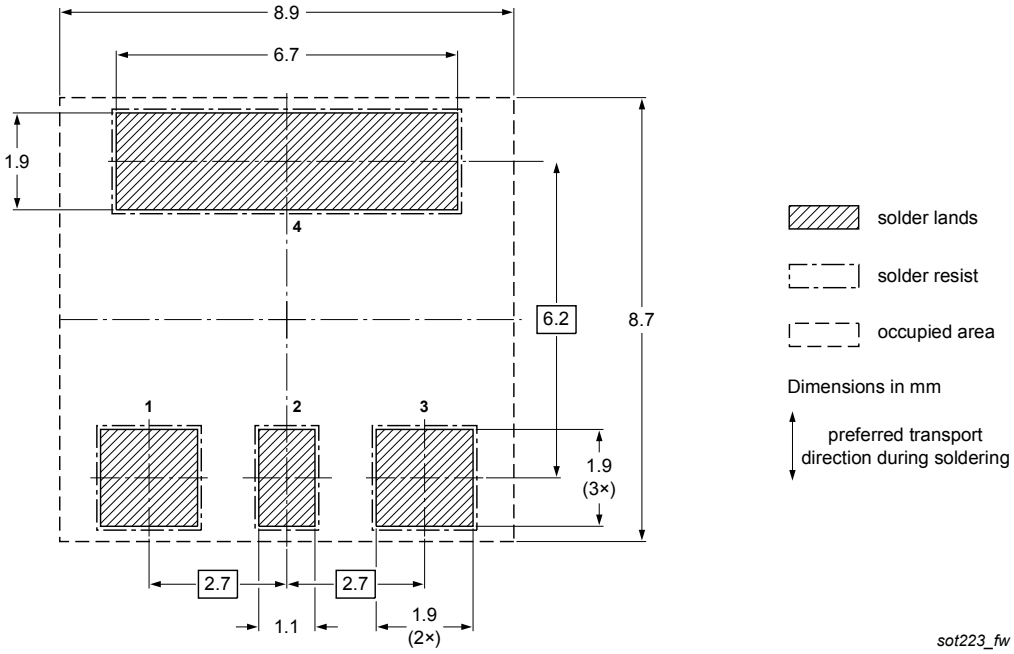


Fig. 10. Wave soldering footprint for SC-73 (SOT223)

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS4350Z v.3	20180626	Product data sheet	-	PBSS4350Z v.2
Modifications:	• Figures 6 and 7 corrected • 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.			
PBSS4350Z v.2	20030513	Product data sheet	-	PBSS4350Z v.1
PBSS4350Z v.1	20030120	Product data sheet	-	-

14. 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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Date of release: 26 June 2018

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