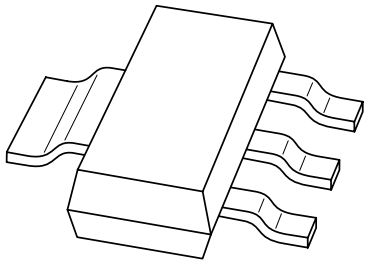
DATA SHEET



PBSS4540Z

40 V low V_{CEsat} NPN transistor

Product specification
Supersedes data of 2001 Jul 24

2001 Nov 14

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40 V low V_{CEsat} NPN transistor PBSS4540Z

FEATURES

- Low collector-emitter saturation voltage
- High current capabilities
- Improved device reliability due to reduced heat generation.

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.

DESCRIPTION

NPN low V_{CEsat} transistor in a SOT223 plastic package.
PNP complement: PBSS5540Z.

MARKING

TYPE NUMBER	MARKING CODE
PBSS4540Z	PB4540

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX	UNIT
V_{CEO}	emitter-collector voltage	40	V
I_C	collector current (DC)	5	A
I_{CM}	peak collector current	10	A
R_{CEsat}	equivalent on-resistance	<71	mΩ

PINNING

PIN	DESCRIPTION
1	base
2	collector
3	emitter
4	collector

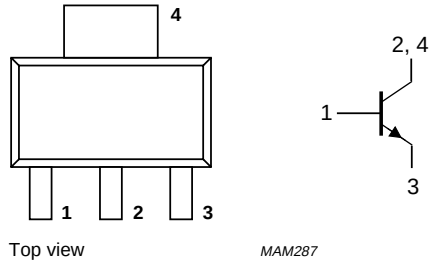


Fig.1 Simplified outline (SOT223) and symbol.

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 (DC)		–	5	A
I_{CM}	peak collector current		–	10	A
I_{BM}	peak base current		–	2	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; notes 1 and 3	–	1.35	W
		$T_{amb} \leq 25$ °C; notes 2 and 3	–	2	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

Notes

1. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm^2.
2. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 6 cm^2.
3. For other mounting conditions, see *"Thermal considerations for SOT223 in the General Part of associated Handbook"*.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	92	K/W
		note 2	62.5	K/W

Notes

1. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm^2.
2. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 6 cm^2.

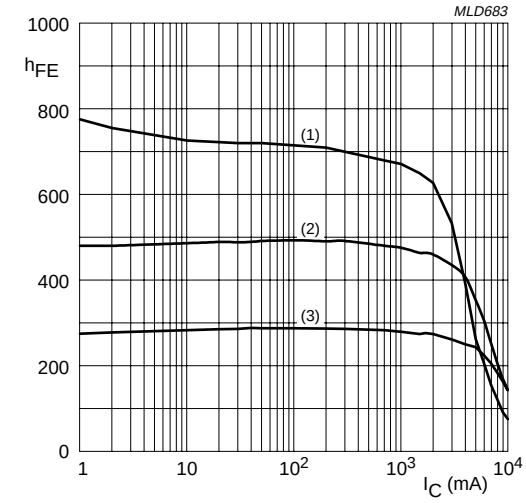
CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0	–	–	100	nA
		V_{CB} = 30 V; I_E = 0; T_j = 150 °C	–	–	50	μA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0	–	–	100	nA
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 500 mA	300	500	–	
		V_{CE} = 2 V; I_C = 1 A; note 1	300	500	–	
		V_{CE} = 2 V; I_C = 2 A; note 1	250	450	–	
		V_{CE} = 2 V; I_C = 5 A; note 1	100	300	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 5 mA	–	50	90	mV
		I_C = 1 A; I_B = 10 mA	–	75	120	mV
		I_C = 2 A; I_B = 200 mA	–	90	150	mV
		I_C = 5 A; I_B = 500 mA	–	210	355	mV
R_{CEsat}	equivalent on-resistance	I_C = 5 A; I_B = 500 mA; note 1	–	42	71	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = 5 A; I_B = 500 mA	–	1.1	1.3	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 2 V; I_C =2 A	–	0.8	1.1	V
f_T	transition frequency	I_C = 100 mA; V_{CE} = 10 V; f = 100 MHz	70	130	–	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = I_e = 0; f = 1 MHz	–	60	75	pF

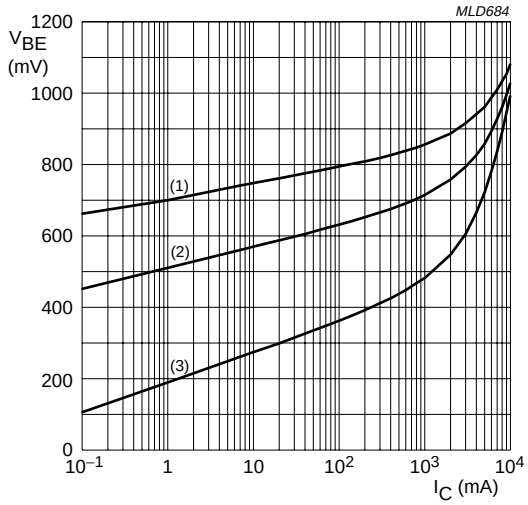
Note

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



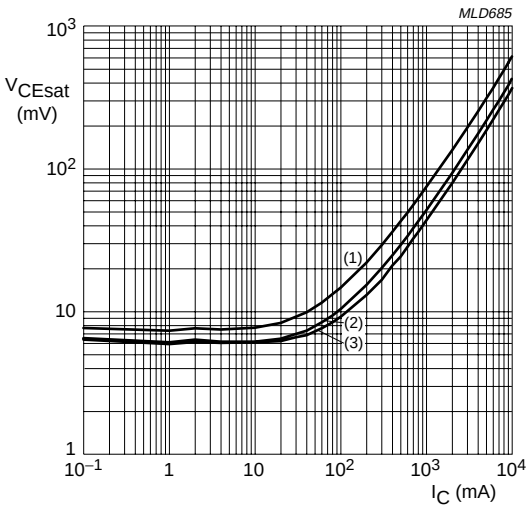
V_{CE} = 2 V.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

Fig.2 DC current gain as a function of collector current; typical values.



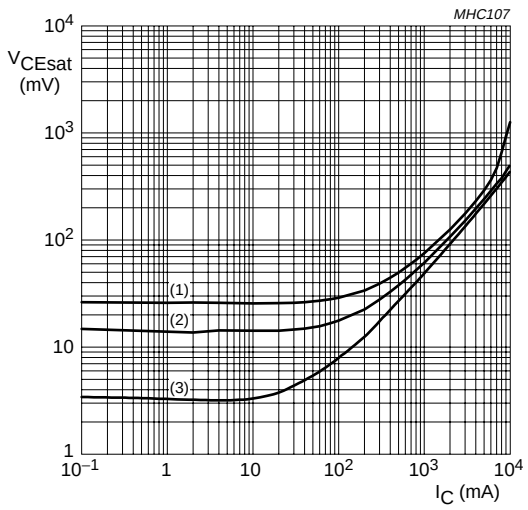
V_{CE} = 2 V.
(1) T_{amb} = –55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 150 °C.

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



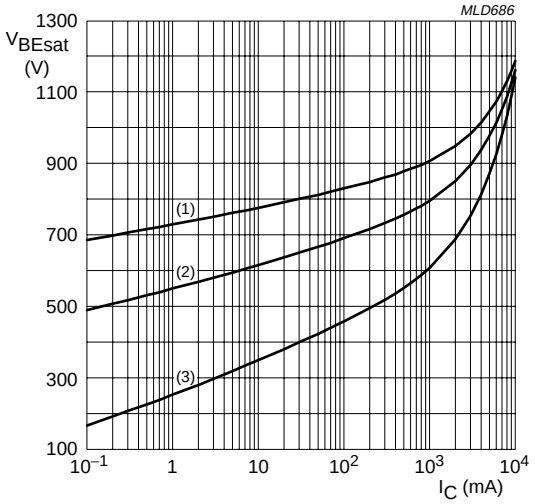
I_C/I_B = 20.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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



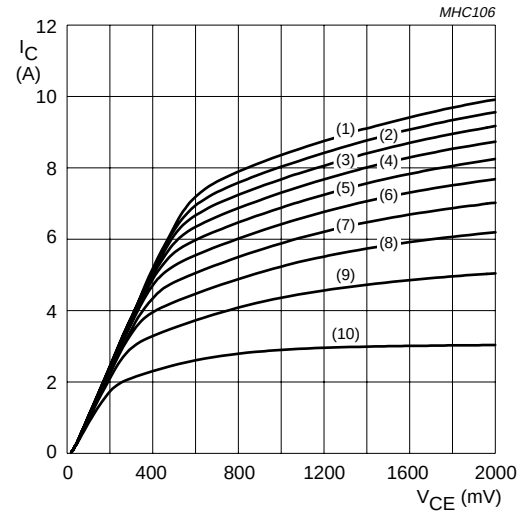
T_{amb} = 25 °C.
(1) I_C/I_B = 100.
(2) I_C/I_B = 50.
(3) I_C/I_B = 10.

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



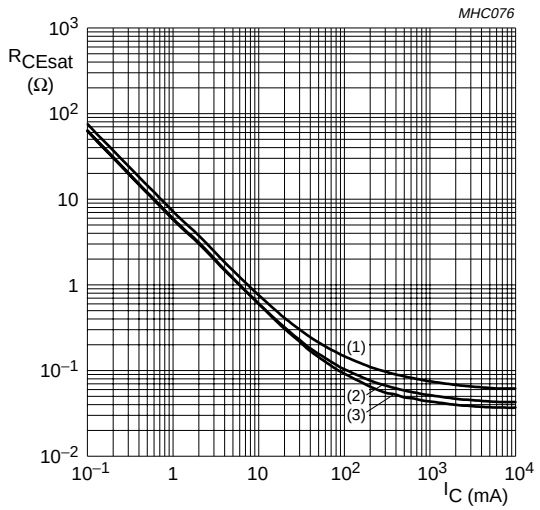
I_C/I_B = 20.
(1) T_{amb} = –55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 150 °C.

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



(1) I_B = 70 mA.
(2) I_B = 63 mA.
(3) I_B = 56 mA.
(4) I_B = 49 mA.
(5) I_B = 42 mA.
(6) I_B = 35 mA.
(7) I_B = 28 mA.
(8) I_B = 21 mA.
(9) I_B = 14 mA.
(10) I_B = 7 mA.

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

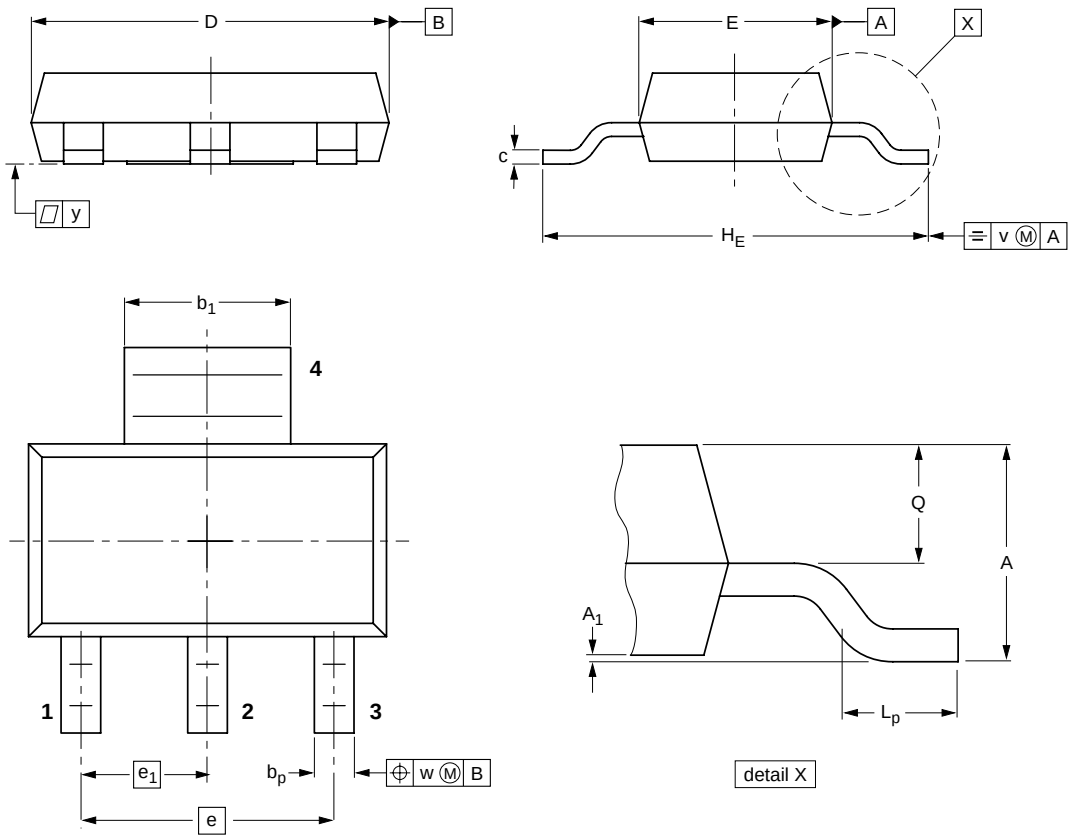


I_C/I_B = 20.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

Fig.8 Collector-emitter equivalent on-resistance as a function of collector current; typical values.

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 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	EIAJ			
SOT223			SC-73			~~97-02-28~~ 99-09-13

DATA SHEET STATUS

DATA SHEET STATUS[1]	PRODUCT STATUS[2]	DEFINITIONS
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