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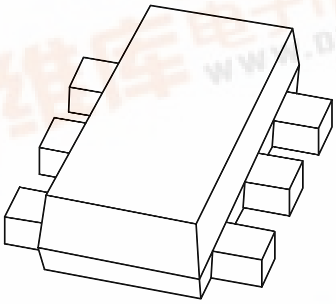
DISCRETE SEMICONDUCTORS

DATA SHEET



PBSS4240V

40 V low V_{CEsat} NPN transistor

Product specification 2003 Jan 30

Philips Semiconductors

PHILIPS

40 V low V_{CEsat} NPN transistor PBSS4240V

FEATURES

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- High efficiency leading to reduced heat generation
- Reduced printed-circuit board area requirements.

APPLICATIONS

- Power management:
  - DC-DC converter
  - Supply line switching
  - Battery charger
  - LCD back lighting.
- Peripheral driver:
  - Driver in low supply voltage applications (e.g. lamps and LEDs)
  - Inductive load drivers (e.g. relay, buzzers and motors).

DESCRIPTION

NPN transistor providing low V_{CEsat} and high current capability in a SOT666 plastic package.
PNP complement: PBSS5240V.

MARKING

TYPE NUMBER	MARKING CODE
PBSS4240V	42

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CEO}	collector-emitter voltage	40	V
I_C	collector current (DC)	2	A
I_{CRP}	peak collector current	2	A
R_{CEsat}	equivalent on-resistance	<190	mΩ

PINNING

PIN	DESCRIPTION
1	collector
2	collector
3	base
4	emitter
5	collector
6	collector

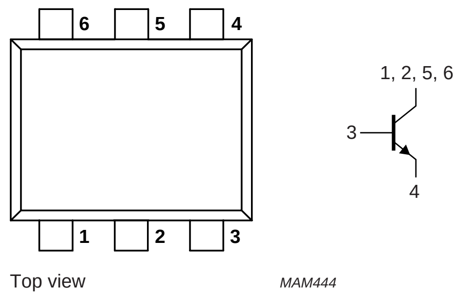


Fig.1 Simplified outline (SOT666) and symbol.

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	–	5	V
I_C	collector current (DC)	note 1	–	2	A
I_{CRP}	repetitive peak collector current	note 2	–	2	A
I_{CM}	peak collector current		–	3	A
I_B	base current (DC)		–	300	mA
I_{BM}	peak base current		–	1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 3	–	300	mW
		$T_{amb} \leq 25$ °C; note 4	–	500	mW
		$T_{amb} \leq 25$ °C; note 1	–	900	mW
		$T_{amb} \leq 25$ °C; notes 2 and 3	–	1.2	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 ceramic circuit board, Al_2O_3, standard footprint.
2. Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 30$ ms.
3. Device mounted on a printed-circuit board, single-sided copper, tinplated, standard footprint.
4. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm^2.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	410	K/W
		note 2	215	K/W
		note 3	140	K/W
		notes 1 and 4	110	K/W

Notes

1. Device mounted on a printed-circuit board, single-sided copper, tinplated, standard footprint.
2. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm^2.
3. Device mounted on a ceramic circuit board, Al_2O_3, standard footprint.
4. Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 30$ ms.

Soldering

The only recommended soldering method is reflow soldering.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	V_{CB} = 40 V; I_E = 0	–	–	100	nA
		V_{CB} = 40 V; I_E = 0; T_{amb} = 150 °C	–	–	50	μA
I_{CEO}	collector-emitter cut-off current	V_{CE} = 30 V; I_B = 0	–	–	100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0	–	–	100	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 1 mA	300	–	–	
		V_{CE} = 5 V; I_C = 500 mA	300	–	900	
		V_{CE} = 5 V; I_C = 1 A	200	–	–	
		V_{CE} = 5 V; I_C = 2 A; note 1	75	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 100 mA; I_B = 1 mA	–	50	75	mV
		I_C = 500 mA; I_B = 50 mA	–	70	100	mV
		I_C = 1 A; I_B = 100 mA; note 1	–	150	190	mV
		I_C = 2 A; I_B = 200 mA; note 1	–	300	400	mV
R_{CEsat}	equivalent on-resistance	I_C = 1 A; I_B = 100 mA; note 1	–	150	<190	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 100 mA	–	–	1.2	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 5 V; I_C = 1 A	–	–	1.1	V
f_T	transition frequency	I_C = 50 mA; V_{CE} = 10 V; f = 100 MHz	150	–	–	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = I_e = 0; f = 1 MHz	–	–	10	pF

Note

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

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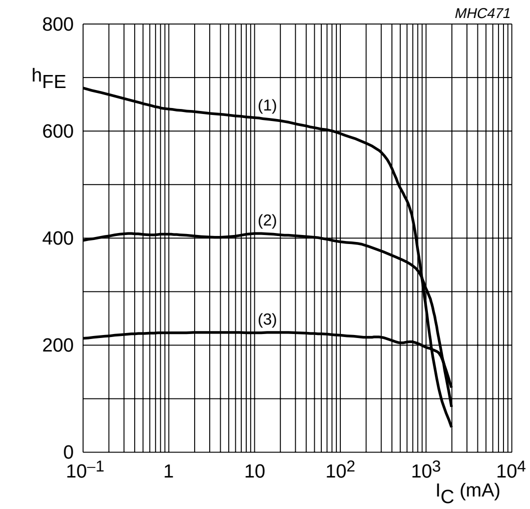


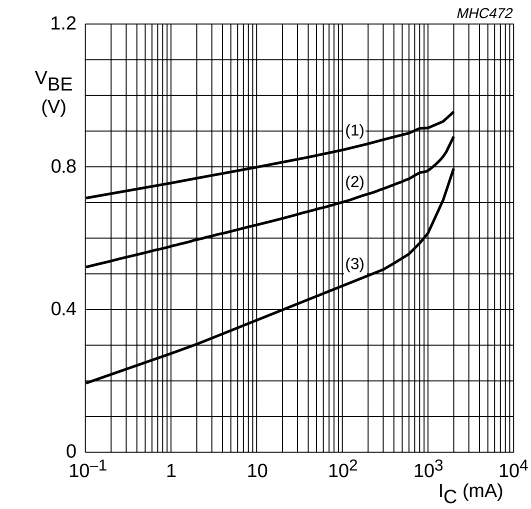
V_{CE} = 5 V.

(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.



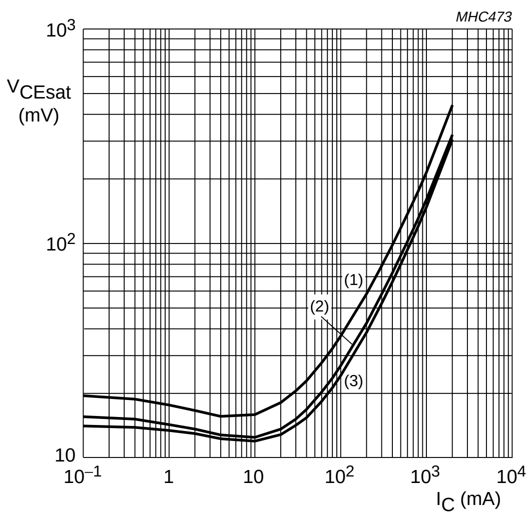
V_{CE} = 5 V.

(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.



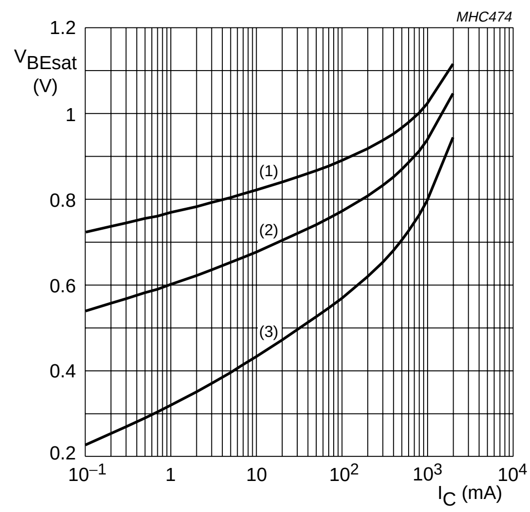
I_C/I_B = 20.

(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.



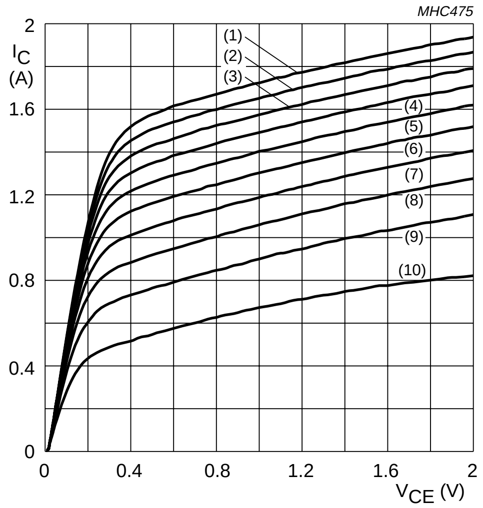
I_C/I_B = 20.

(1) T_{amb} = –55 °C.

(2) T_{amb} = 25 °C.

(3) T_{amb} = 150 °C.

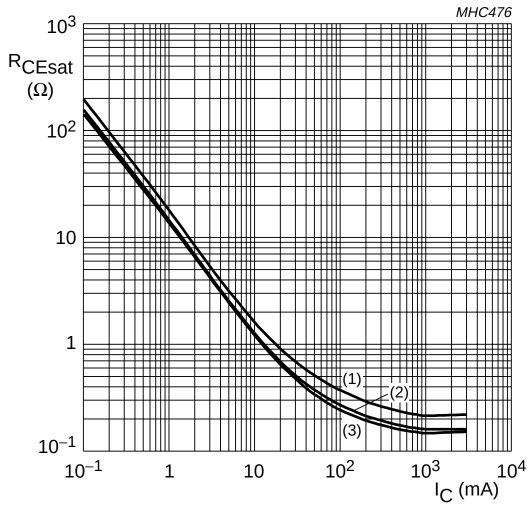
Fig.5 Base-emitter saturation voltage as a function of collector current; typical values.



T_{amb} = 25 °C.

(1) I_B = 3 mA.
(2) I_B = 2.7 mA.
(3) I_B = 2.4 mA.
(4) I_B = 2.1 mA.
(5) I_B = 1.8 mA.
(6) I_B = 1.5 mA.
(7) I_B = 1.2 mA.
(8) I_B = 0.9 mA.
(9) I_B = 0.6 mA.
(10) I_B = 0.3 mA.

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



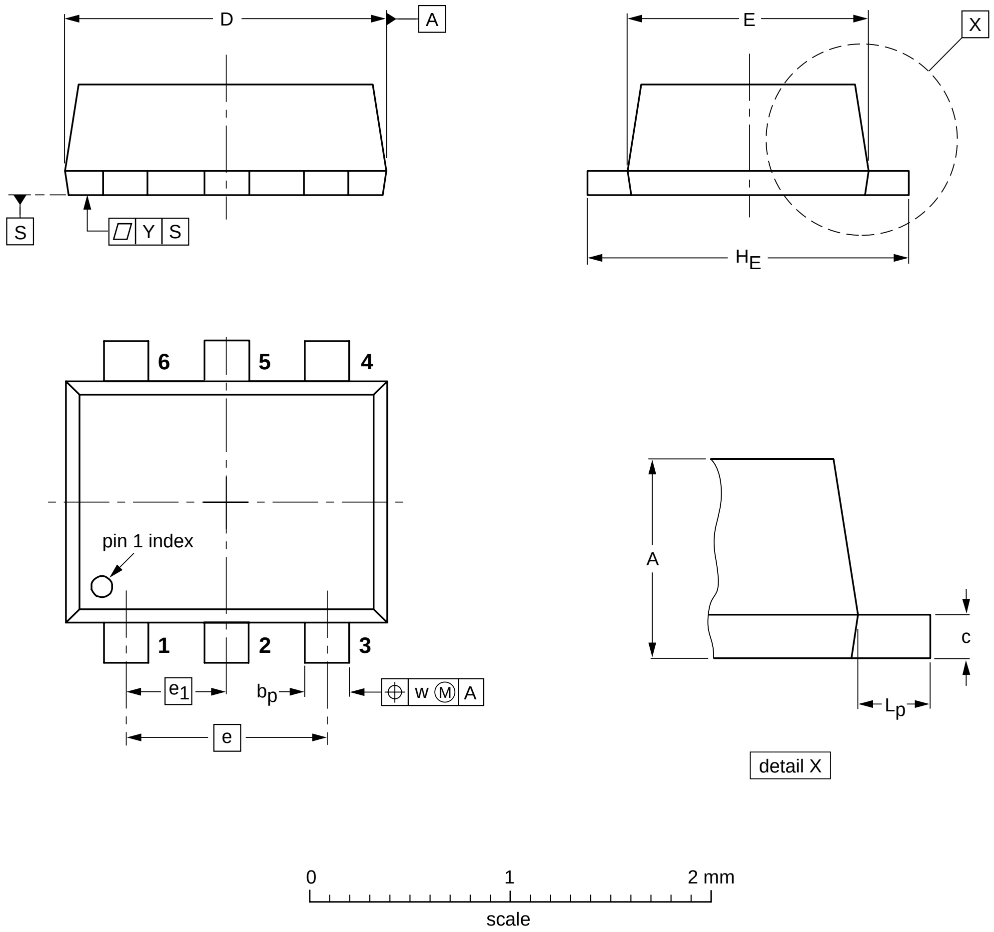
I_C/I_B = 20.

(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.

PACKAGE OUTLINE

Plastic surface mounted package; 6 leads **SOT666**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b_p	c	D	E	e	e_1	H_E	L_p	w	y
mm	0.6 0.5	0.27 0.17	0.18 0.08	1.7 1.5	1.3 1.1	1.0	0.5	1.7 1.5	0.3 0.1	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT666						~~01-01-04~~ 01-08-27

DATA SHEET STATUS

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