PBSS5240V

40 V low VCEsat PNP transistor

28 December 2022 **Product data sheet**

1. General description

PNP transistor providing low V_{CEsat} and high current capability in a SOT666 ultra small Surface-Mounted Device (SMD) plastic package.

NPN complement: PBSS4240V

2. Features and benefits

- 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

3. Applications

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

4. Quick reference data

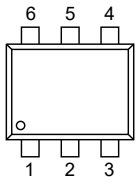
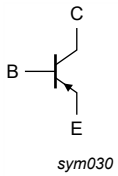
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	-40	V
I_C	collector current		[1]	-	-	-1.8	A
I_{CRM}	repetitive peak collector current	Operated under pulsed conditions; $t_p \leq$ 30 ms		-	-	-2	A
R_{CEsat}	collector-emitter saturation resistance	I_C = -1 A; I_B = -100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	180	250	mΩ

[1] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	C	collector	 SOT666	 sym030
2	C	collector		
3	B	base		
4	E	emitter		
5	C	collector		
6	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5240V	SOT666	plastic, surface-mounted package; 6 leads; 0.5 mm pitch; 1.6 mm x 1.2 mm x 0.55 mm body	SOT666

7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS5240V	52

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		-	-5	V
I_C	collector current		[1]	-	-1.8	A
I_{CRM}	repetitive peak collector current	Operated under pulsed conditions; $t_p \leq$ 30 ms		-	-2	A
I_{CM}	peak collector current			-	-3	A
I_B	base current			-	-300	mA
I_{BM}	peak base current	single pulse; $t_p \leq$ 1 ms		-	-1	A
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[2]	-	300	mW
			[3]	-	500	mW
			[1]	-	900	mW
			[2] [4]	-	1.2	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 a ceramic PCB, Al_2O_3, standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.
[4] Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 30$ ms.

9. Thermal characteristics

Table 6. Thermal characteristics

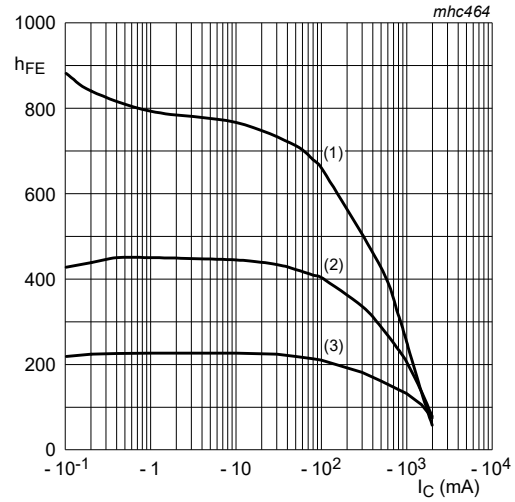
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	410	K/W
			[2]	-	-	215	K/W
			[3]	-	-	140	K/W
			[1] [4]	-	-	110	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.
[3] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.
[4] Operated under pulsed conditions: duty cycle $\delta \leq 20\%$, pulse width $t_p \leq 30$ ms.

10. Characteristics

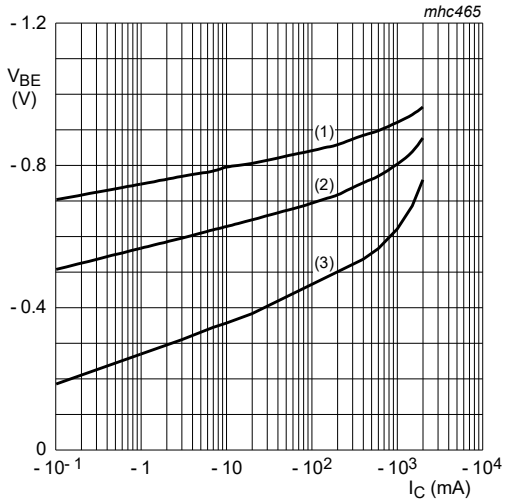
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = -40 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-100	nA
		V_{CB} = -40 V; I_E = 0 A; T_j = 150 °C		-	-	-50	µA
I_{CEO}	collector-emitter cut-off current (base open)	I_B = 0 A; V_{CE} = -30 V; T_{amb} = 25 °C		-	-	-100	nA
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} = -5 V; I_C = -1 mA; T_{amb} = 25 °C		300	-	-	
		V_{CE} = -5 V; I_C = -100 mA; T_{amb} = 25 °C		300	-	800	
		V_{CE} = -5 V; I_C = -500 mA; T_{amb} = 25 °C		250	-	-	
		V_{CE} = -5 V; I_C = -1 A; T_{amb} = 25 °C		160	-	-	
		V_{CE} = -5 V; I_C = -2 A; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		50	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -100 mA; I_B = -1 mA; T_{amb} = 25 °C		-	-80	-120	mV
		I_C = -500 mA; I_B = -50 mA; T_{amb} = 25 °C		-	-100	-145	mV
		I_C = -1 A; I_B = -100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-180	-250	mV
		I_C = -2 A; I_B = -200 mA; T_{amb} = 25 °C		-	-370	-530	mV
R_{CEsat}	collector-emitter saturation resistance	I_C = -1 A; I_B = -100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	180	250	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = -1 A; I_B = -100 mA; T_{amb} = 25 °C		-	-	-1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = -5 V; I_C = -1 A; T_{amb} = 25 °C		-	-	-1	V
f_T	transition frequency	V_{CE} = -10 V; I_C = -50 mA; f = 100 MHz; T_{amb} = 25 °C		150	-	-	MHz
C_c	collector capacitance	V_{CB} = -10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	12	pF



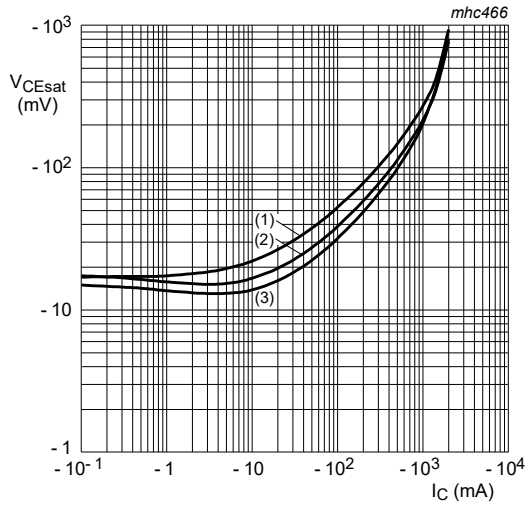
V_{CE} = −5 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 1. TR2 (PNP): DC current gain as a function of collector current; typical values



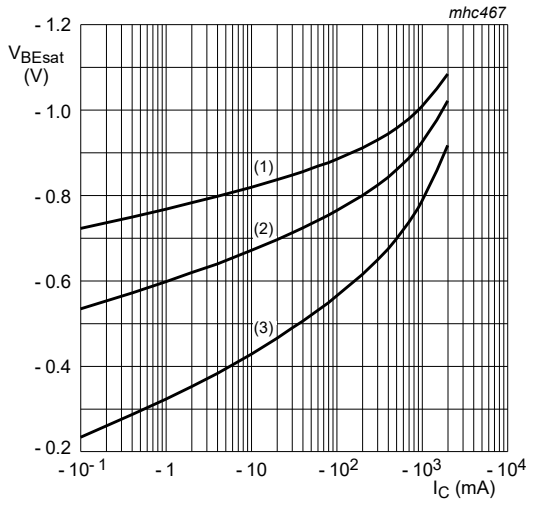
V_{CE} = −5 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 2. TR2 (PNP): Base-emitter voltage as a function of collector current; typical values



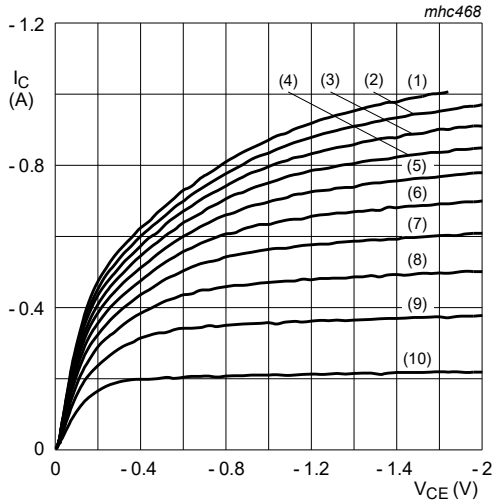
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 3. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values



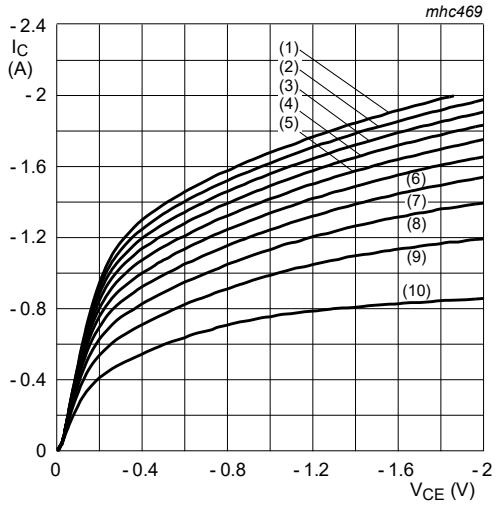
I_C/I_B = 20
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 4. TR2 (PNP): Base-emitter saturation voltage as a function of collector current; typical values



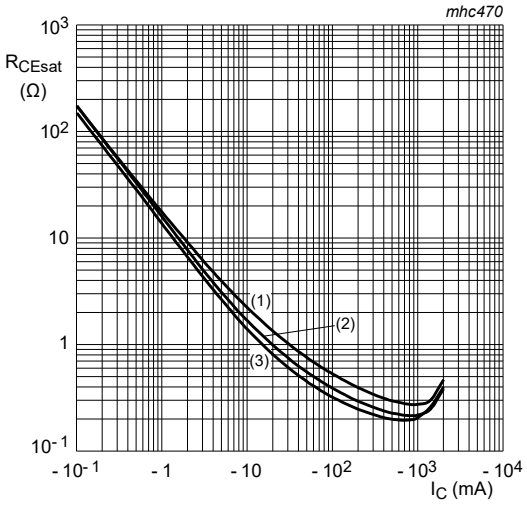
T_{amb} = 25 °C
(1) I_B = −7 mA
(2) I_B = −6.3 mA
(3) I_B = −5.6 mA
(4) I_B = −4.9 mA
(5) I_B = −4.2 mA
(6) I_B = −3.5 mA
(7) I_B = −2.8 mA
(8) I_B = −2.1 mA
(9) I_B = −1.4 mA
(10) I_B = −0.7 mA

Fig. 5. TR2 (PNP): Collector current as a function of collector-emitter voltage; typical values



T_{amb} = 25 °C
(1) I_B = −50 mA
(2) I_B = −45 mA
(3) I_B = −40 mA
(4) I_B = −35 mA
(5) I_B = −30 mA
(6) I_B = −25 mA
(7) I_B = −20 mA
(8) I_B = −15 mA
(9) I_B = −10 mA
(10) I_B = −5 mA

Fig. 6. TR2 (PNP): 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. TR2 (PNP): Collector-emitter equivalent on-resistance as a function of collector current; typical values

11. Package outline

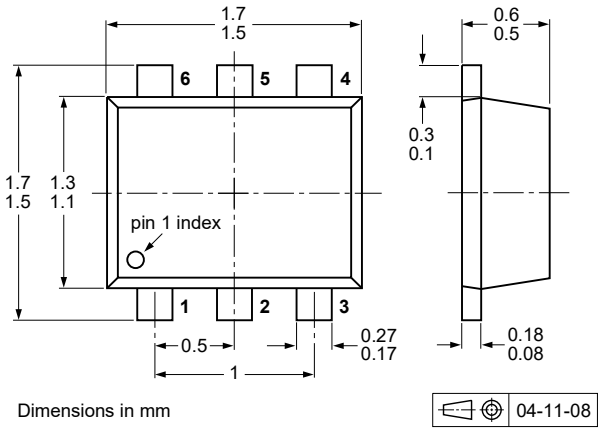


Fig. 8. Package outline SOT666

12. Soldering

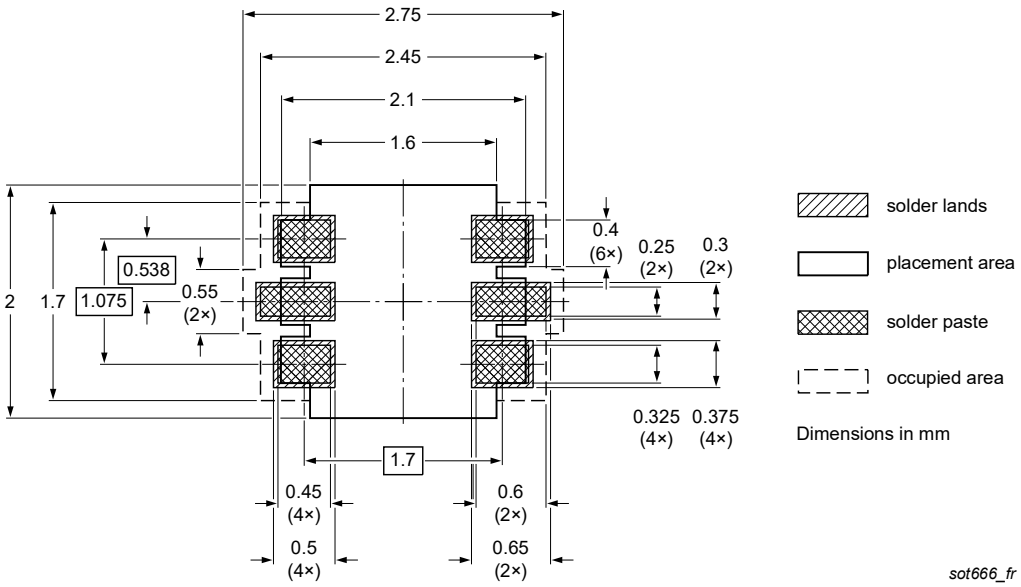


Fig. 9. Reflow soldering footprint for SOT666

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS4240V v.2	20221228	Product data sheet	-	PBSS4240V v.1
Modifications:	• 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. • Product(s) changed to non-automotive qualification.			
PBSS4240V v.1	20030130	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: 28 December 2022

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