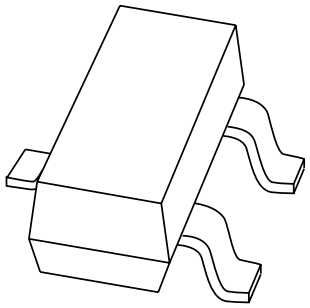
# DATA SHEET



# PBSS4240T

## 40 V low $V_{CEsat}$ NPN transistor

Product specification

2001 Jul 13

Philips
Semiconductors

PHILIPS

# 40 V low $V_{CEsat}$ NPN transistor PBSS4240T

## FEATURES

- Low collector-emitter saturation voltage
- High current capability
- Improved device reliability due to reduced heat generation
- Replacement for SOT89/SOT223 standard packaged transistors.

## APPLICATIONS

- Supply line switching circuits
- Battery management applications
- DC/DC converter applications
- Strobe flash units
- Heavy duty battery powered equipment (motor and lamp drivers).

## DESCRIPTION

NPN low $V_{CEsat}$ transistor in a SOT23 plastic package.
PNP complement: PBSS5240T.

## MARKING

| TYPE NUMBER | MARKING CODE(1) |
|---|---|
| PBSS4240T | ZE* |

**Note**

1. * = p: made in Hongkong.
   * = t: made in Malaysia.

## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | UNIT |
|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | 40 | V |
| $I_{CM}$ | peak collector current | 3 | A |
| $R_{CEsat}$ | equivalent on-resistance | <200 | mΩ |

## PINNING

| PIN | DESCRIPTION |
|---|---|
| 1 | base |
| 2 | emitter |
| 3 | collector |

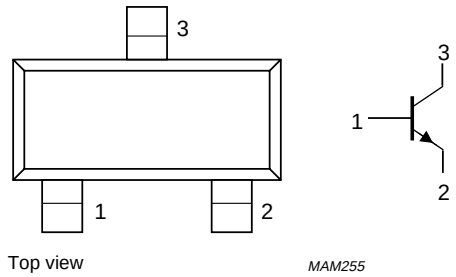



Fig.1 Simplified outline (SOT23) and symbol.

## 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) | | – | 2 | A |
| $I_{CM}$ | peak collector current | | – | 3 | A |
| $I_{BM}$ | peak base current | | – | 300 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C; note 1 | – | 300 | mW |
| | | $T_{amb} \leq 25$ °C; note 2 | – | 480 | mW |
| $T_{stg}$ | 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 side copper, tinplated and standard footprint.
2. Device mounted on a printed-circuit board, single side copper, tinplated and 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 | in free air; note 1 | 417 | K/W |
| | | in free air; note 2 | 260 | K/W |

**Notes**

1. Device mounted on a printed-circuit board, single side copper, tinplated and standard footprint.
2. Device mounted on a printed-circuit board, single side copper, tinplated and mounting pad for collector 1 $cm^2$.

## CHARACTERISTICS

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

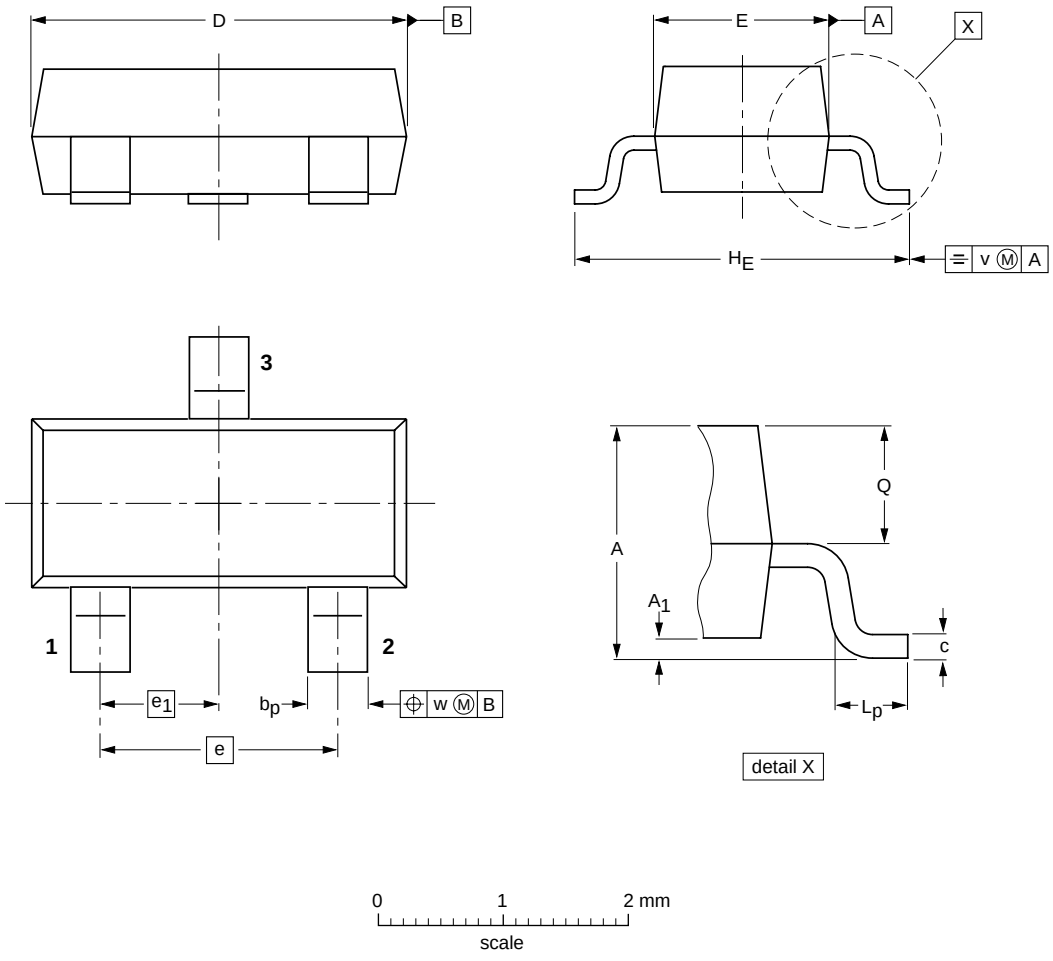
| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 30 V; $I_E$ = 0 | – | – | 100 | nA |
| | | $V_{CB}$ = 30 V; $I_E$ = 0; $T_j$ = 150 °C | – | – | 50 | µA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = 4 V; $I_C$ = 0 | – | – | 100 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 2 V; $I_C$ = 100 mA | 350 | 470 | – | |
| | | $V_{CE}$ = 2 V; $I_C$ = 500 mA | 300 | 450 | – | |
| | | $V_{CE}$ = 2 V; $I_C$ = 1 A | 300 | 420 | – | |
| | | $V_{CE}$ = 2 V; $I_C$ = 2 A | 150 | 250 | – | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 100 mA; $I_B$ = 1 mA | – | 45 | 70 | mV |
| | | $I_C$ = 500 mA; $I_B$ = 50 mA | – | 70 | 100 | mV |
| | | $I_C$ = 750 mA; $I_B$ = 15 mA | – | 120 | 180 | mV |
| | | $I_C$ = 1 A; $I_B$ = 50 mA; note 1 | – | 130 | 180 | mV |
| | | $I_C$ = 2 A; $I_B$ = 200 mA; note 1 | – | 240 | 320 | mV |
| $R_{CEsat}$ | equivalent on-resistance | $I_C$ = 500 mA; $I_B$ = 50 mA; note 1 | – | 140 | <200 | mΩ |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = 2 A; $I_B$ = 200 mA; note 1 | – | – | 1.1 | V |
| $V_{BEon}$ | base-emitter turn on voltage | $V_{CE}$ = 2 V; $I_C$ = 100 mA | – | – | 0.75 | V |
| $C_c$ | collector capacitance | $V_{CB}$ = 10 V; $I_E$ = $I_e$ = 0; f = 1 MHz | – | 15 | 20 | pF |
| $f_T$ | transition frequency | $I_C$ = 100 mA; $V_{CE}$ = 10 V; f = 100 MHz | 100 | 230 | – | MHz |

**Note**

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

**PACKAGE OUTLINE**

**Plastic surface mounted package; 3 leads** **SOT23**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max. | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.9 | 0.1 | 0.48<br>0.38 | 0.15<br>0.09 | 3.0<br>2.8 | 1.4<br>1.2 | 1.9 | 0.95 | 2.5<br>2.1 | 0.45<br>0.15 | 0.55<br>0.45 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | EIAJ | | | |
| SOT23 | | TO-236AB | | | | ~~97-02-28~~<br>99-09-13 |

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