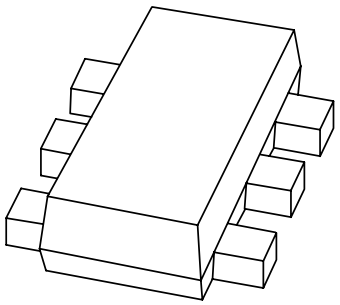
# DATA SHEET



# BC847BVN
## NPN/PNP general purpose transistor

Product specification
Supersedes data of 2001 Aug 30

2001 Nov 07

Philips
Semiconductors

PHILIPS

# NPN/PNP general purpose transistor BC847BVN

## FEATURES

- 300 mW total power dissipation
- Very small 1.6 mm x 1.2 mm ultra thin package
- Excellent coplanarity due to straight leads
- Replaces two SC-75/SC-89 packaged transistors on same PCB area
- Reduced required PCB area
- Reduced pick and place costs.

## APPLICATIONS

- General purpose switching and amplification
- Switch mode power supply complementary MOSFET driver
- Complementary driver for audio amplifiers.

## DESCRIPTION

NPN/PNP transistor pair in a SOT666 plastic package.

## MARKING

| TYPE NUMBER | MARKING CODE |
|---|---|
| BC847BVN | 13 |

## PINNING

| PIN | DESCRIPTION | |
|---|---|---|
| 1, 4 | emitter | TR1; TR2 |
| 2, 5 | base | TR1; TR2 |
| 6, 3 | collector | TR1; TR2 |

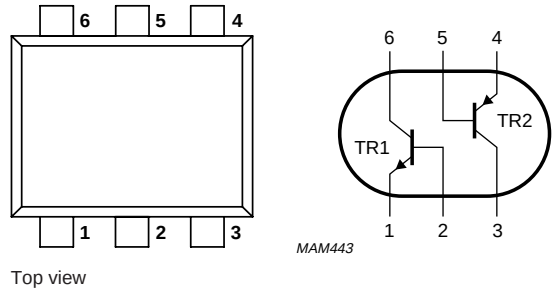



Fig.1 Simplified outline (SOT666) and symbol.

## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| **Per transistor; for the PNP transistor with negative polarity** | | | | | |
| $V_{CBO}$ | collector-base voltage | open emitter | – | 50 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | – | 45 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | – | 5 | V |
| $I_C$ | collector current (DC) | | – | 100 | mA |
| $I_{CM}$ | peak collector current | | – | 200 | mA |
| $I_{BM}$ | peak base current | | – | 200 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C; note 1 | – | 200 | mW |
| $T_{stg}$ | storage temperature | | –65 | +150 | °C |
| $T_j$ | junction temperature | | – | 150 | °C |
| $T_{amb}$ | operating ambient temperature | | –65 | +150 | °C |
| **Per device** | | | | | |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C; note 1 | – | 300 | mW |

**Note**

1. Transistor mounted on an FR4 printed-circuit board.

## THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th\ j\text{-}a}$ | thermal resistance from junction to ambient | notes 1 and 2 | 416 | K/W |

**Notes**

1. Transistor mounted on an FR4 printed-circuit board.
2. The only recommended soldering is reflow soldering.

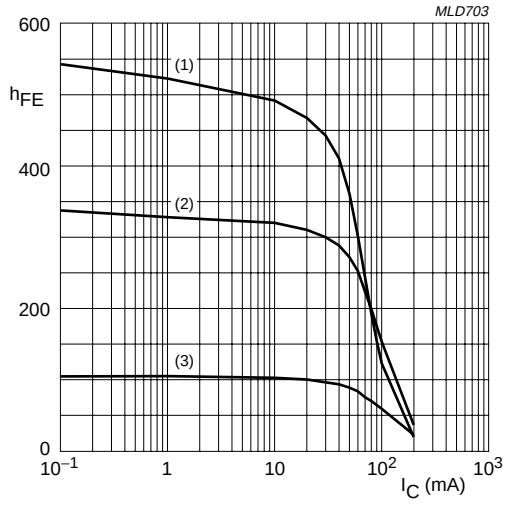
## CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| **Per transistor; for the PNP transistor with negative polarity** | | | | | | |
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 30 V; $I_E$ = 0 | – | – | 15 | nA |
| | | $V_{CB}$ = 30 V; $I_E$ = 0; $T_j$ = 150 °C | – | – | 5 | µA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = 5 V; $I_C$ = 0 | – | – | 100 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 5 V; $I_C$ = 2 mA | 200 | – | 450 | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 10 mA; $I_B$ = 0.5 mA | – | – | 100 | mV |
| | | $I_C$ = 100 mA; $I_B$ = 5 mA; note 1 | – | – | 300 | mV |
| $V_{BEsat}$ | collector-emitter saturation voltage | $I_C$ = 10 mA; $I_B$ = 0.5 mA | – | 755 | – | mV |
| $f_T$ | transition frequency | $I_C$ = 10 mA; $V_{CE}$ = 5 V; f = 100 MHz | 100 | – | – | MHz |
| **NPN transistor** | | | | | | |
| $V_{BE}$ | base-emitter turn-on voltage | $V_{CE}$ = 5 V; $I_C$ = 2 mA | 580 | 655 | 700 | mV |
| $C_c$ | collector capacitance | $V_{CB}$ = 10 V; $I_E$ = $I_e$ = 0; f = 1MHz | – | – | 1.5 | pF |
| $C_e$ | emitter capacitance | $V_{EB}$ = 500 mV; $I_C$ = $I_c$ = 0; f = 1MHz | – | 11 | – | pF |
| **PNP transistor** | | | | | | |
| $V_{BE}$ | base-emitter turn-on voltage | $V_{CE}$ = –5 V; $I_C$ = –2 mA | 600 | 655 | 750 | mV |
| $C_c$ | collector capacitance | $V_{CB}$ = –10 V; $I_C$ = $I_c$ = 0; f = 1MHz | – | – | 2.2 | pF |
| $C_e$ | emitter capacitance | $V_{EB}$ = –500 mV; $I_E$ = $I_e$ = 0; f = 1MHz | – | 10 | – | pF |

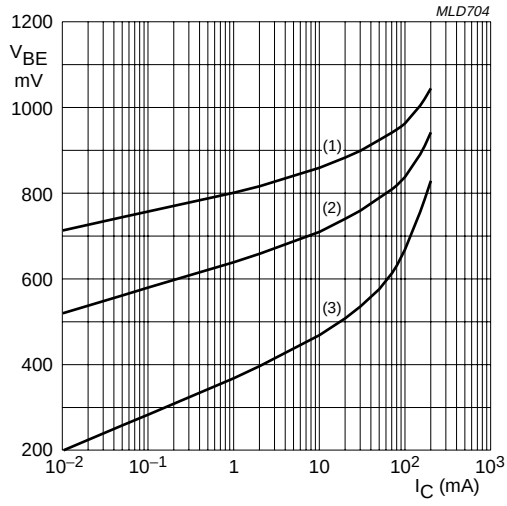
**Note**

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



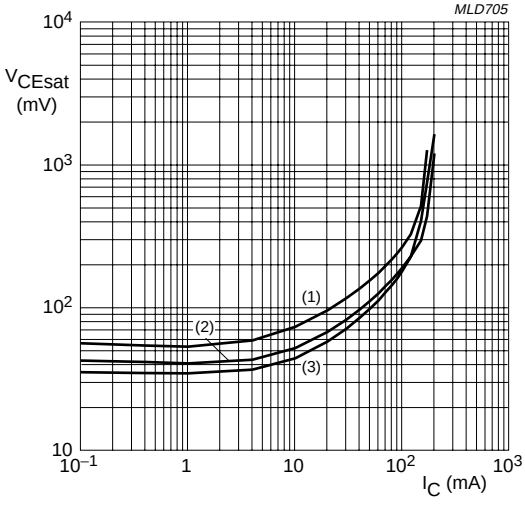

**TR1 (NPN)**; $V_{CE}$ = 5 V.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = –55 °C.

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



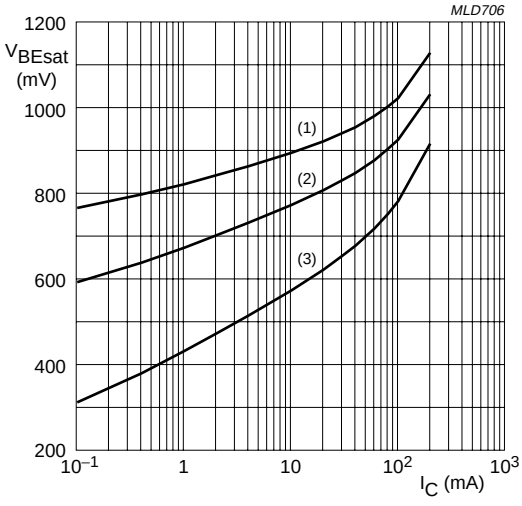

**TR1 (NPN)**; $V_{CE}$ = 5 V.
(1) $T_{amb}$ = –55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

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



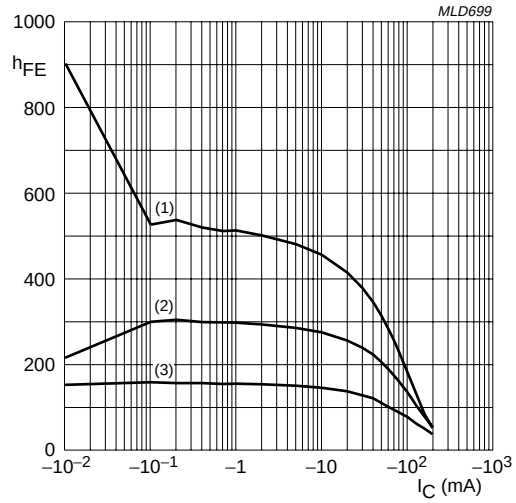

**TR1 (NPN)**; $I_C/I_B$ = 20.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = –55 °C.

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



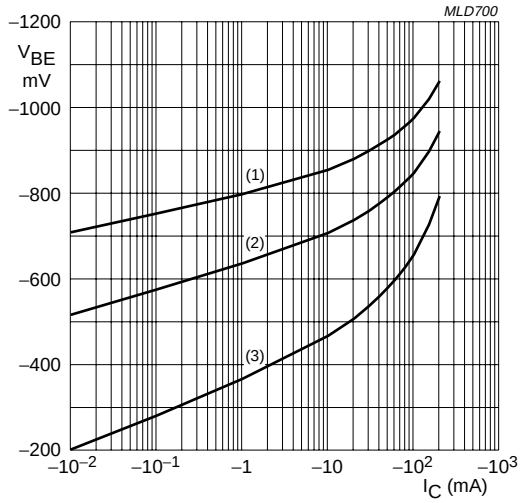

**TR1 (NPN)**; $I_C/I_B$ = 20.
(1) $T_{amb}$ = –55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

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



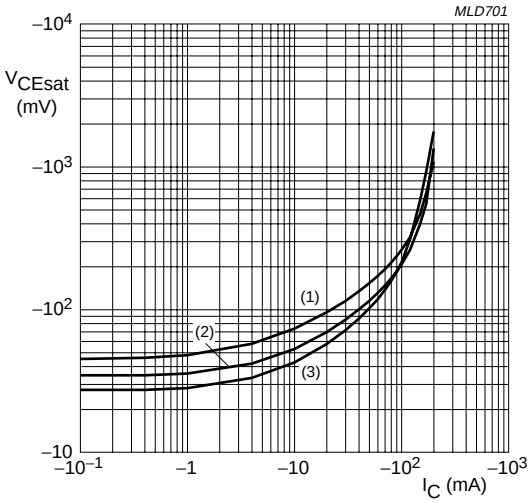

**TR2 (PNP)**; $V_{CE}$ = −5 V.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

Fig.6 DC current gain as a function of collector current: typical values.



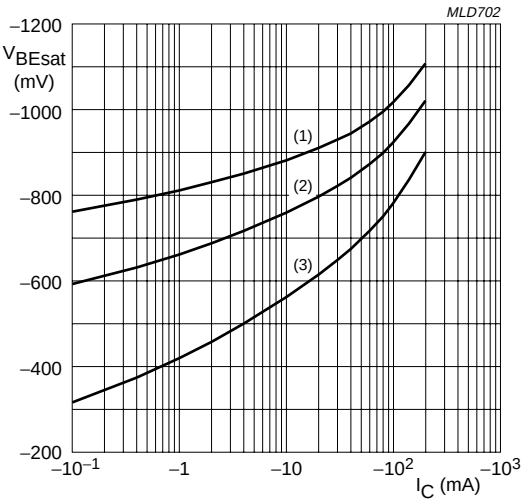

**TR2 (PNP)**; $V_{CE}$ = −5 V.
(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

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




**TR2 (PNP)**; $I_C/I_B$ = 20.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

Fig.8 Collector-emitter saturation voltage as a function of collector current: typical values.

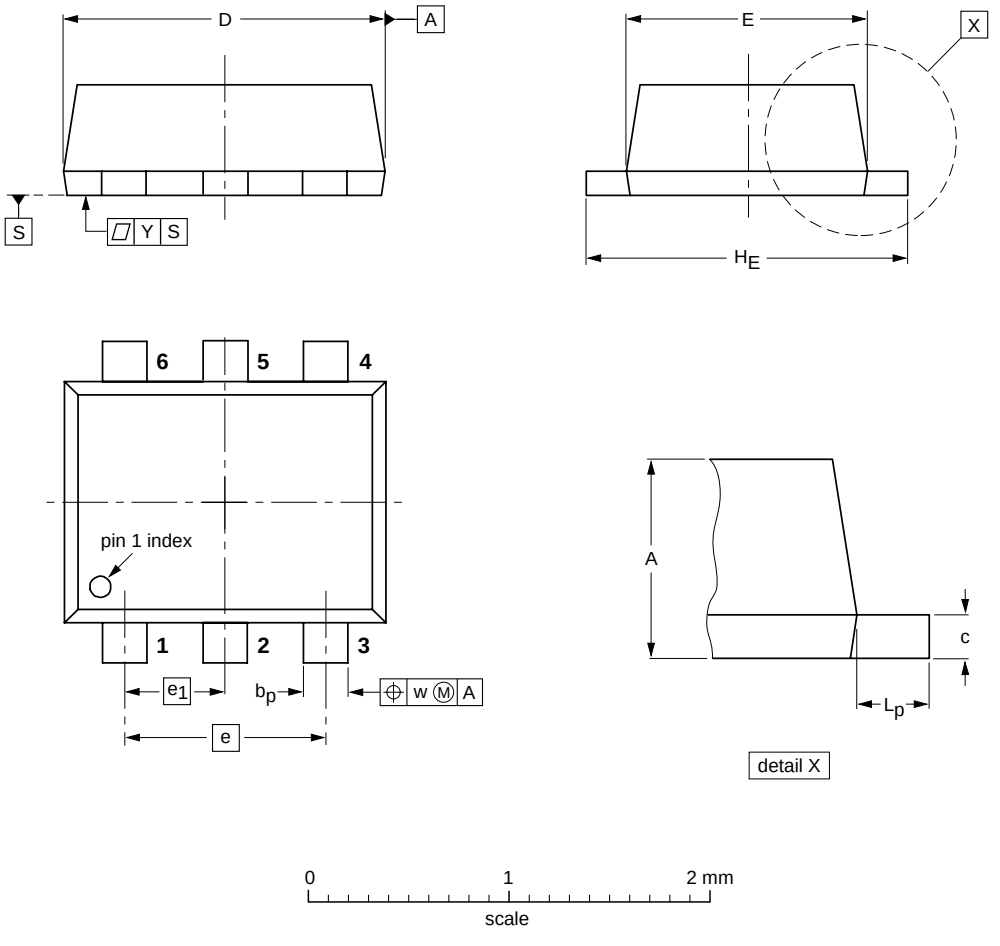



**TR2 (PNP)**; $I_C/I_B$ = 20.
(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

Fig.9 Base-emitter saturation voltage as a function of collector current.

## 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<br>0.5 | 0.27<br>0.17 | 0.18<br>0.08 | 1.7<br>1.5 | 1.3<br>1.1 | 1.0 | 0.5 | 1.7<br>1.5 | 0.3<br>0.1 | 0.1 | 0.1 |

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

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