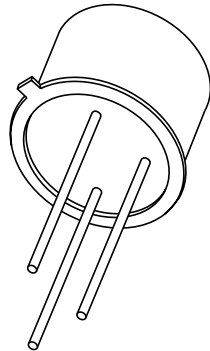


DATA SHEET



BCY58; BCY59 NPN switching transistors

Product specification
Supersedes data of September 1994
File under Discrete Semiconductors, SC04

1997 Jun 17

NPN switching transistors

BCY58; BCY59

FEATURES

- Low current (max. 100 mA)
- Low voltage (max. 45 V).

APPLICATIONS

- Switching and amplification.

DESCRIPTION

NPN switching transistor in a TO-18 metal package.
PNP complements: BCY78 and BCY79.

PINNING

| PIN | DESCRIPTION |
|-----|------------------------------|
| 1 | emitter |
| 2 | base |
| 3 | collector, connected to case |

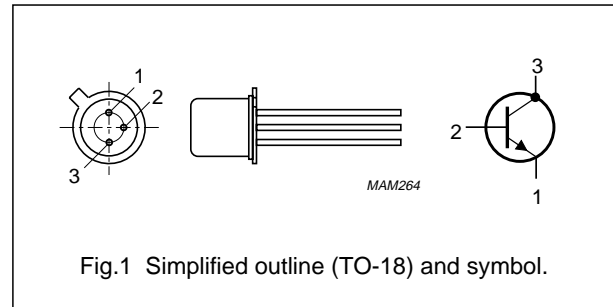


Fig.1 Simplified outline (TO-18) and symbol.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT | |
|-----------|---------------------------|---|------------------------|------|------|------|--|
| V_{CBO} | collector-base voltage | open emitter | | | | | |
| | BCY58 | | – | – | 32 | V | |
| | BCY59 | | – | – | 45 | V | |
| V_{CEO} | collector-emitter voltage | open base | | | | | |
| | BCY58 | | – | – | 32 | V | |
| | BCY59 | | – | – | 45 | V | |
| I_C | collector current (DC) | | – | – | 100 | mA | |
| P_{tot} | total power dissipation | $T_{amb} \leq 45\text{ °C}$ | – | – | 340 | mW | |
| | | $T_{case} \leq 45\text{ °C}$ | – | – | 1 | W | |
| h_{FE} | DC current gain | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$ | | | | | |
| | | | BCY58/VII; BCY59/VII | 120 | 170 | 220 | |
| | | | BCY58/VIII; BCY59/VIII | 180 | 250 | 310 | |
| | | | BCY58/IX; BCY59/IX | 250 | 350 | 460 | |
| | BCY58/X; BCY59/X | 380 | 500 | 630 | | | |
| f_T | transition frequency | $I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$ | 150 | – | – | MHz | |
| t_{off} | turn-off time | $I_{Con} = 10\text{ mA}; I_{Bon} = 1\text{ mA}; I_{Boff} = -1\text{ mA}$ | – | 480 | 800 | ns | |
| | | $I_{Con} = 100\text{ mA}; I_{Bon} = 10\text{ mA}; I_{Boff} = -10\text{ mA}$ | – | 450 | 800 | ns | |

NPN switching transistors

BCY58; BCY59

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|------------------|---|---------------------------|------|------|------|
| V _{CBO} | collector-base voltage BCY58 BCY59 | open emitter | – | 32 | V |
| | | | – | 45 | V |
| V _{CEO} | collector-emitter voltage BCY58 BCY59 | open base | – | 32 | V |
| | | | – | 45 | V |
| V _{EBO} | emitter-base voltage | open collector | – | 7 | 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} ≤ 45 °C | – | 340 | mW |
| | | T _{case} ≤ 45 °C | – | 1 | W |
| T _{stg} | storage temperature | | –65 | +150 | °C |
| T _j | junction temperature | | – | 200 | °C |
| T _{amb} | operating ambient temperature | | –65 | +150 | °C |

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------------|---|-------------|-------|------|
| R _{th j-a} | thermal resistance from junction to ambient | in free air | 450 | K/W |
| R _{th j-c} | thermal resistance from junction to case | | 150 | K/W |

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|------------------|---|---|------|------|------|------|
| I _{CBO} | collector cut-off current BCY58 | I _E = 0; V _{CB} = 32 V | – | – | 10 | nA |
| | | I _E = 0; V _{CB} = 32 V; T _j = 150 °C | – | – | 10 | μA |
| I _{CBO} | collector cut-off current BCY59 | I _E = 0; V _{CB} = 45 V | – | – | 10 | nA |
| | | I _E = 0; V _{CB} = 45 V; T _j = 150 °C | – | – | 10 | μA |
| I _{EBO} | emitter cut-off current | I _C = 0; V _{EB} = 5 V | – | – | 10 | nA |
| h _{FE} | DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X | I _C = 10 μA; V _{CE} = 5 V | – | 20 | – | |
| | | | 20 | 95 | – | |
| | | | 40 | 190 | – | |
| | | | 100 | 300 | – | |

NPN switching transistors

BCY58; BCY59

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|--|------|------|------|------|
| h_{FE} | DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X | $I_C = 2 \text{ mA}; V_{CE} = 5 \text{ V}$ | 120 | 170 | 220 | |
| | | | 180 | 250 | 310 | |
| | | | 250 | 350 | 460 | |
| | | | 380 | 500 | 630 | |
| h_{FE} | DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X | $I_C = 10 \text{ mA}; V_{CE} = 1 \text{ V}$ | 80 | 250 | – | |
| | | | 120 | 300 | 400 | |
| | | | 160 | 390 | 630 | |
| | | | 240 | 550 | 1000 | |
| h_{FE} | DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X | $I_C = 100 \text{ mA}; V_{CE} = 1 \text{ V}$ | 40 | – | – | |
| | | | 45 | – | – | |
| | | | 60 | – | – | |
| | | | 60 | – | – | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 10 \text{ mA}; I_B = 0.25 \text{ mA}$ | 50 | 100 | 350 | mV |
| | | $I_C = 100 \text{ mA}; I_B = 2.5 \text{ mA}$ | 150 | 250 | 700 | mV |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 10 \text{ mA}; I_B = 0.25 \text{ mA}$ | 600 | 700 | 850 | mV |
| | | $I_C = 100 \text{ mA}; I_B = 2.5 \text{ mA}$ | 750 | 875 | 1200 | mV |
| C_c | collector capacitance | $I_E = i_e = 0; V_{CB} = 10 \text{ V}; f = 1 \text{ MHz}$ | – | – | 5 | pF |
| C_e | emitter capacitance | $I_C = i_c = 0; V_{EB} = 500 \text{ mV}; f = 1 \text{ MHz}$ | – | – | 15 | pF |
| f_T | transition frequency | $I_C = 10 \text{ mA}; V_{CE} = 5 \text{ V}; f = 100 \text{ MHz}$ | 150 | – | – | MHz |
| F | noise figure | $I_C = 200 \mu\text{A}; V_{CE} = 5 \text{ V}; R_S = 2 \text{ k}\Omega;$ $f = 1 \text{ kHz}; B = 200 \text{ Hz}$ | – | – | 10 | dB |
| Switching times (between 10% and 90% levels) | | | | | | |
| t_{on} | turn-on time | $I_{Con} = 10 \text{ mA}; I_{Bon} = 1 \text{ mA};$ $I_{Boff} = -1 \text{ mA}$ | – | 85 | 150 | ns |
| t_d | delay time | | – | 35 | – | ns |
| t_r | rise time | | – | 50 | – | ns |
| t_{off} | turn-off time | | – | 480 | 800 | ns |
| t_s | storage time | | – | 400 | – | ns |
| t_f | fall time | | – | 80 | – | ns |
| t_{on} | turn-on time | $I_{Con} = 100 \text{ mA}; I_{Bon} = 10 \text{ mA};$ $I_{Boff} = -10 \text{ mA}$ | – | 55 | 150 | ns |
| t_d | delay time | | – | 5 | – | ns |
| t_r | rise time | | – | 50 | – | ns |
| t_{off} | turn-off time | | – | 450 | 800 | ns |
| t_s | storage time | | – | 250 | – | ns |
| t_f | fall time | | – | 200 | – | ns |

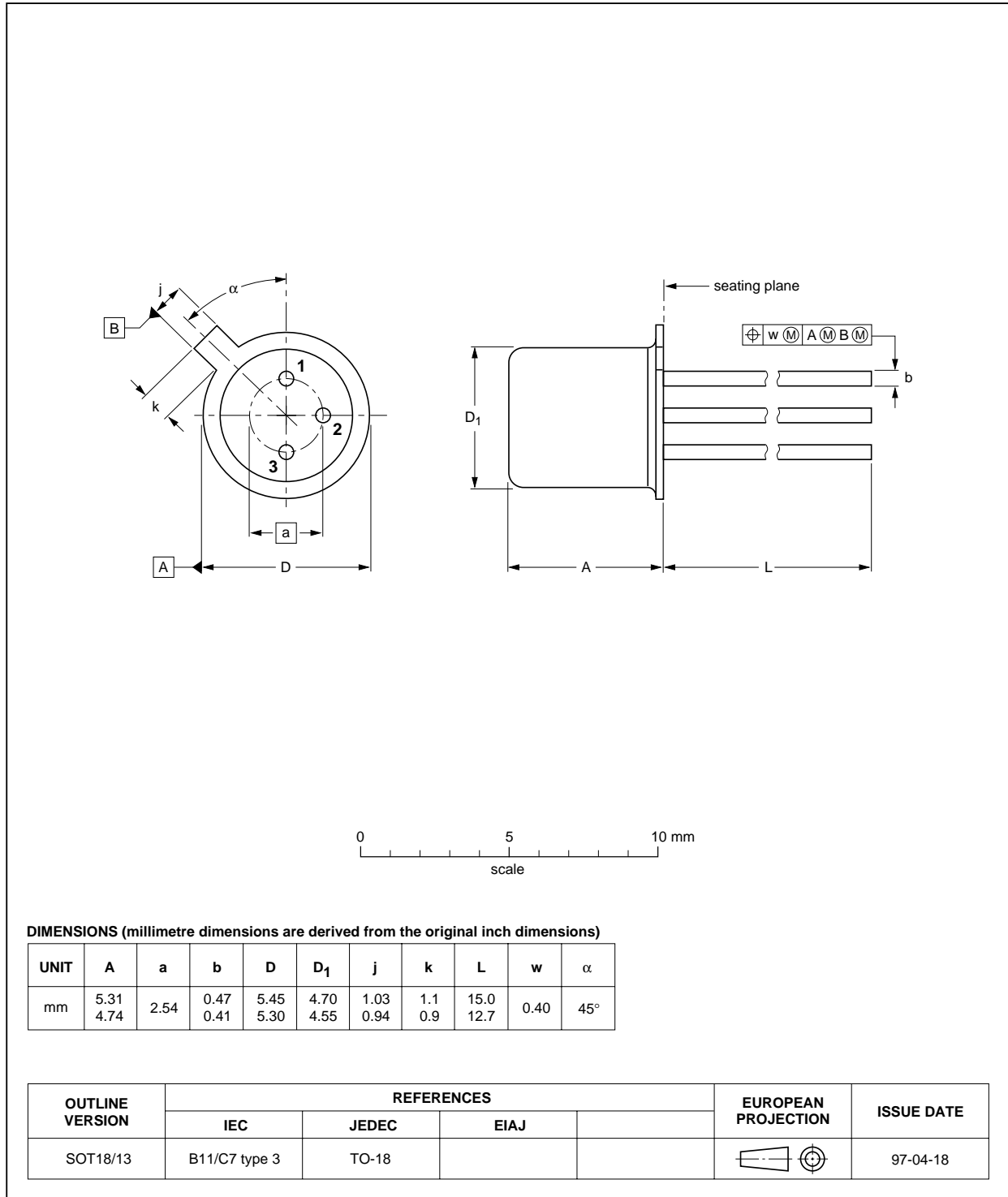
NPN switching transistors

BCY58; BCY59

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT18/13



NPN switching transistors

BCY58; BCY59

DEFINITIONS

| | |
|---|---|
| Data sheet status | |
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| Limiting values | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

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NPN switching transistors

BCY58; BCY59

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Printed in The Netherlands

117047/00/02/pp8

Date of release: 1997 Jun 17

Document order number: 9397 750 02162

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