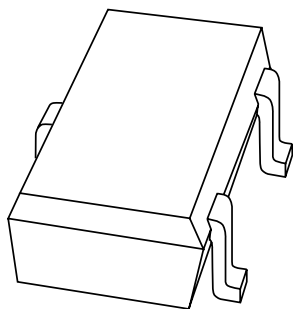


# DATA SHEET



## **BC859W; BC860W** PNP general purpose transistors

Product data sheet  
Supersedes data of 1997 Sep 03

1999 Apr 12

## PNP general purpose transistors

## BC859W; BC860W

## FEATURES

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

## APPLICATIONS

- Low noise stages in tape recorders, hi-fi amplifiers and other audio-frequency equipment.

## DESCRIPTION

PNP transistor in a SOT323 plastic package.  
NPN complements: BC849W and BC850W.

## MARKING

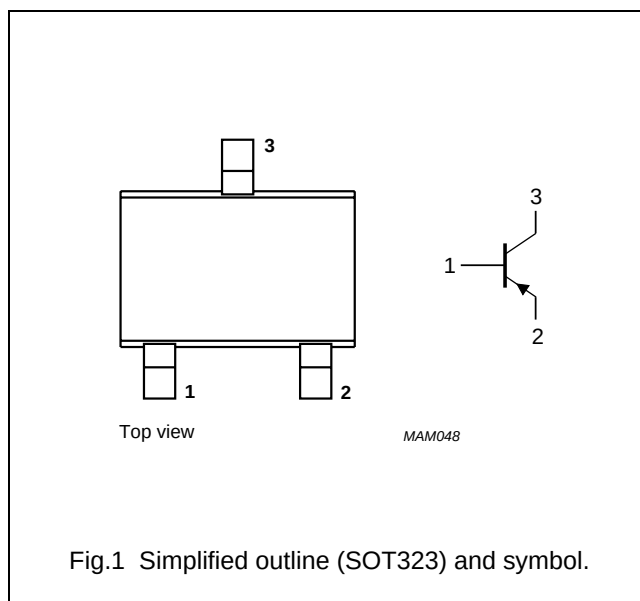
| TYPE NUMBER | MARKING CODE | TYPE NUMBER | MARKING CODE |
|-------------|--------------|-------------|--------------|
| BC859W      | 4D*          | BC860W      | 4H*          |
| BC859BW     | 4B*          | BC860BW     | 4F*          |
| BC859CW     | 4C*          | BC860CW     | 4G*          |

## Note

- \* = - : Made in Hong Kong.  
\* = t : Made in Malaysia.

## PINNING

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



## LIMITING VALUES

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

| SYMBOL    | PARAMETER                     | CONDITIONS                           | MIN. | MAX. | UNIT |
|-----------|-------------------------------|--------------------------------------|------|------|------|
| $V_{CBO}$ | collector-base voltage        | open emitter                         |      |      |      |
|           | BC859W                        |                                      | –    | –30  | V    |
|           | BC860W                        |                                      | –    | –50  | V    |
| $V_{CEO}$ | collector-emitter voltage     | open base                            |      |      |      |
|           | BC859W                        |                                      | –    | –30  | V    |
|           | BC860W                        |                                      | –    | –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       | $T_{amb} \leq 25\text{ °C}$ ; 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   |

## Note

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

## PNP general purpose transistors

## BC859W; BC860W

## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|---------------|---------------------------------------------|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | note 1     | 625   | K/W  |

## Note

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

## CHARACTERISTICS

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

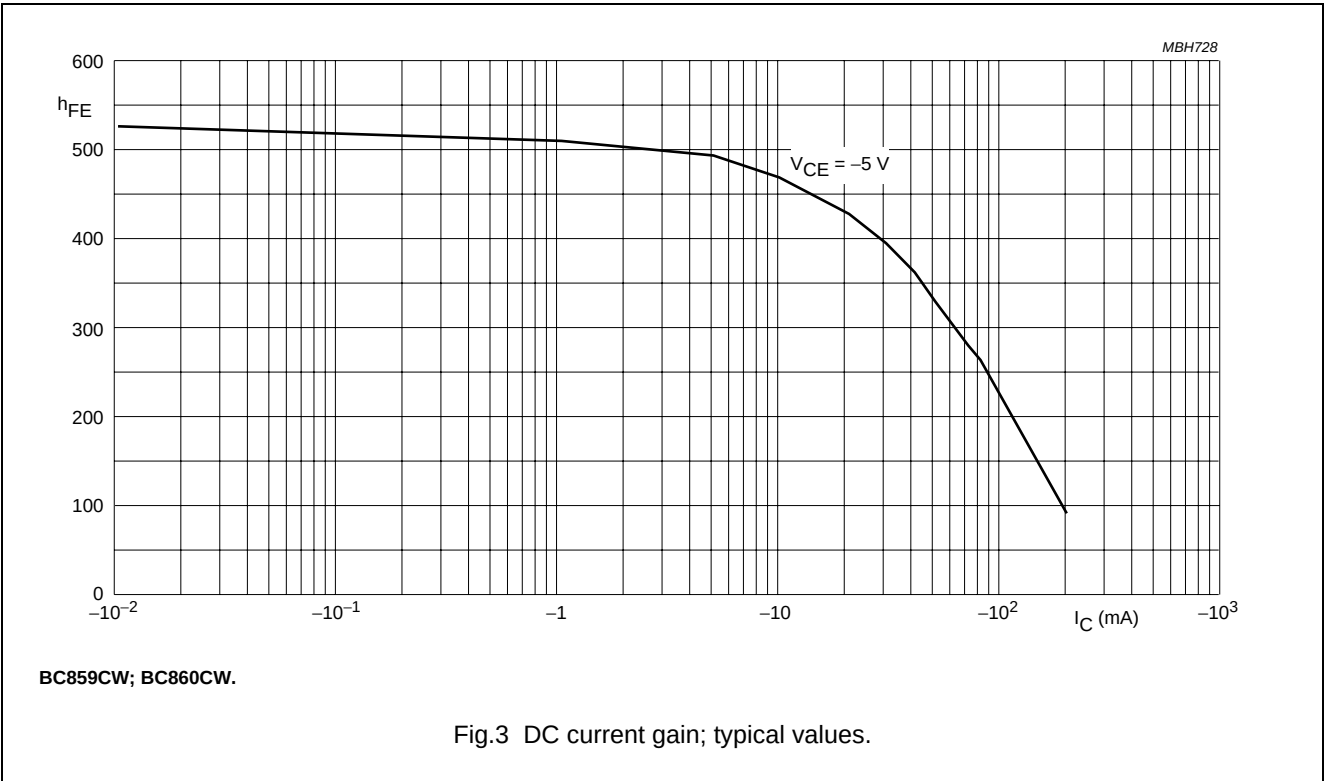
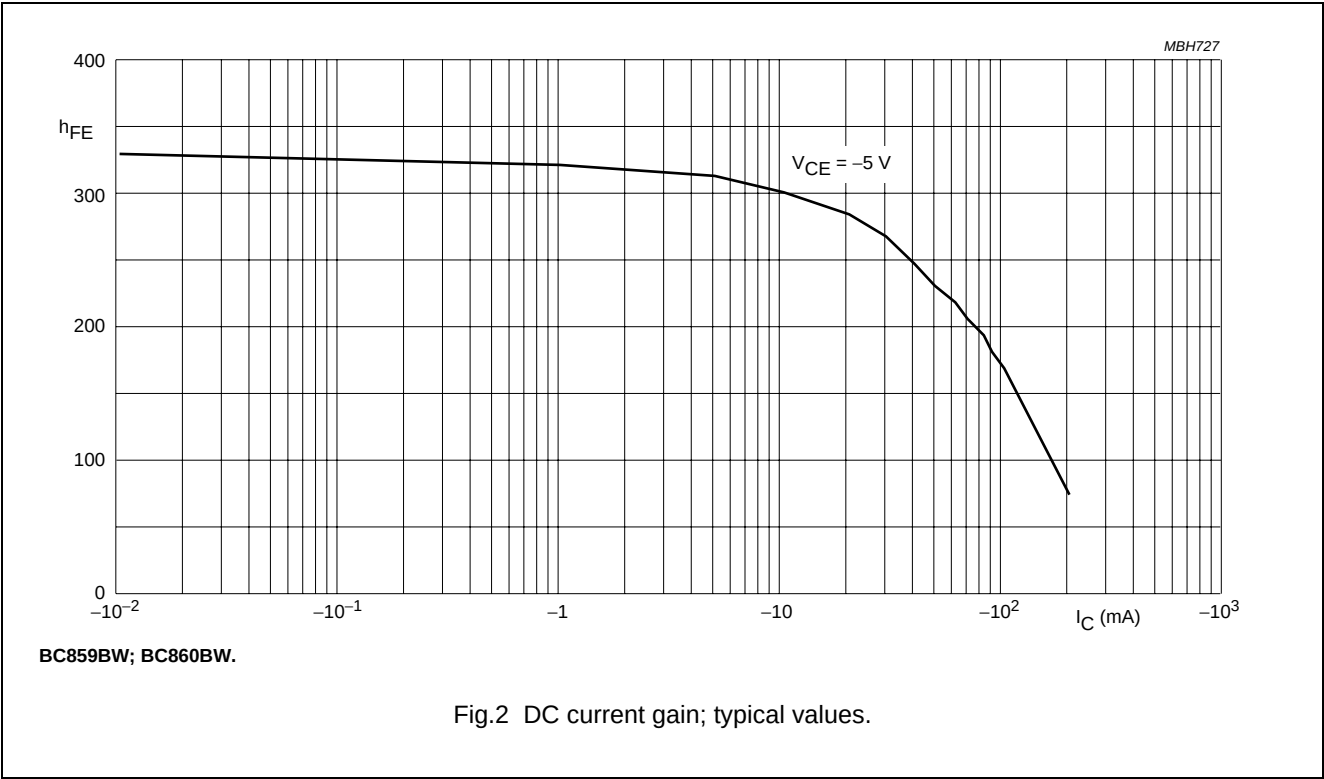
| SYMBOL      | PARAMETER                                                                 | CONDITIONS                                                                                                              | MIN. | TYP. | MAX. | UNIT          |
|-------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $I_{CBO}$   | collector cut-off current                                                 | $I_E = 0; V_{CB} = -30\text{ V}$                                                                                        | –    | –    | –15  | nA            |
|             |                                                                           | $I_E = 0; V_{CB} = -30\text{ V}; T_j = 150\text{ °C}$                                                                   | –    | –    | –4   | $\mu\text{A}$ |
| $I_{EBO}$   | emitter cut-off current                                                   | $I_C = 0; V_{EB} = -5\text{ V}$                                                                                         | –    | –    | –100 | nA            |
| $h_{FE}$    | DC current gain<br>BC859W; BC860W<br>BC859BW; BC860BW<br>BC859CW; BC860CW | $I_C = -2\text{ mA}; V_{CE} = -5\text{ V};$<br>see Figs 2 and 3                                                         | 220  | –    | 800  |               |
|             |                                                                           |                                                                                                                         | 220  | –    | 475  |               |
|             |                                                                           |                                                                                                                         | 420  | –    | 800  |               |
| $V_{CEsat}$ | collector-emitter saturation voltage                                      | $I_C = -10\text{ mA}; I_B = -0.5\text{ mA}$                                                                             | –    | –    | –300 | mV            |
|             |                                                                           | $I_C = -100\text{ mA}; I_B = -5\text{ mA};$ note 1                                                                      | –    | –    | –650 | mV            |
| $V_{BE}$    | base-emitter voltage                                                      | $I_C = -2\text{ mA}; V_{CE} = -5\text{ V}$                                                                              | 600  | –    | 750  | mV            |
|             |                                                                           | $I_C = -10\text{ mA}; V_{CE} = -5\text{ V}$                                                                             | –    | –    | 820  | 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                                                       | $I_C = i_c = 0; V_{EB} = -500\text{ mV}; f = 1\text{ MHz}$                                                              | –    | 10   | –    | pF            |
| $f_T$       | transition frequency                                                      | $I_C = -10\text{ mA}; V_{CE} = -5\text{ V}; f = 100\text{ MHz}$                                                         | 100  | –    | –    | MHz           |
| F           | noise figure;<br>BC859W; BC860W;<br>BC859BW; BC860BW;<br>BC859CW; BC860CW | $I_C = -200\text{ }\mu\text{A}; V_{CE} = -5\text{ V}; R_S = 2\text{ k}\Omega;$<br>$f = 10\text{ Hz to }15.7\text{ kHz}$ | –    | –    | 4    | dB            |
|             |                                                                           | $I_C = -200\text{ }\mu\text{A}; V_{CE} = -5\text{ V}; R_S = 2\text{ k}\Omega;$<br>$f = 1\text{ kHz}; B = 200\text{ Hz}$ | –    | –    | 4    | dB            |

## Note

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

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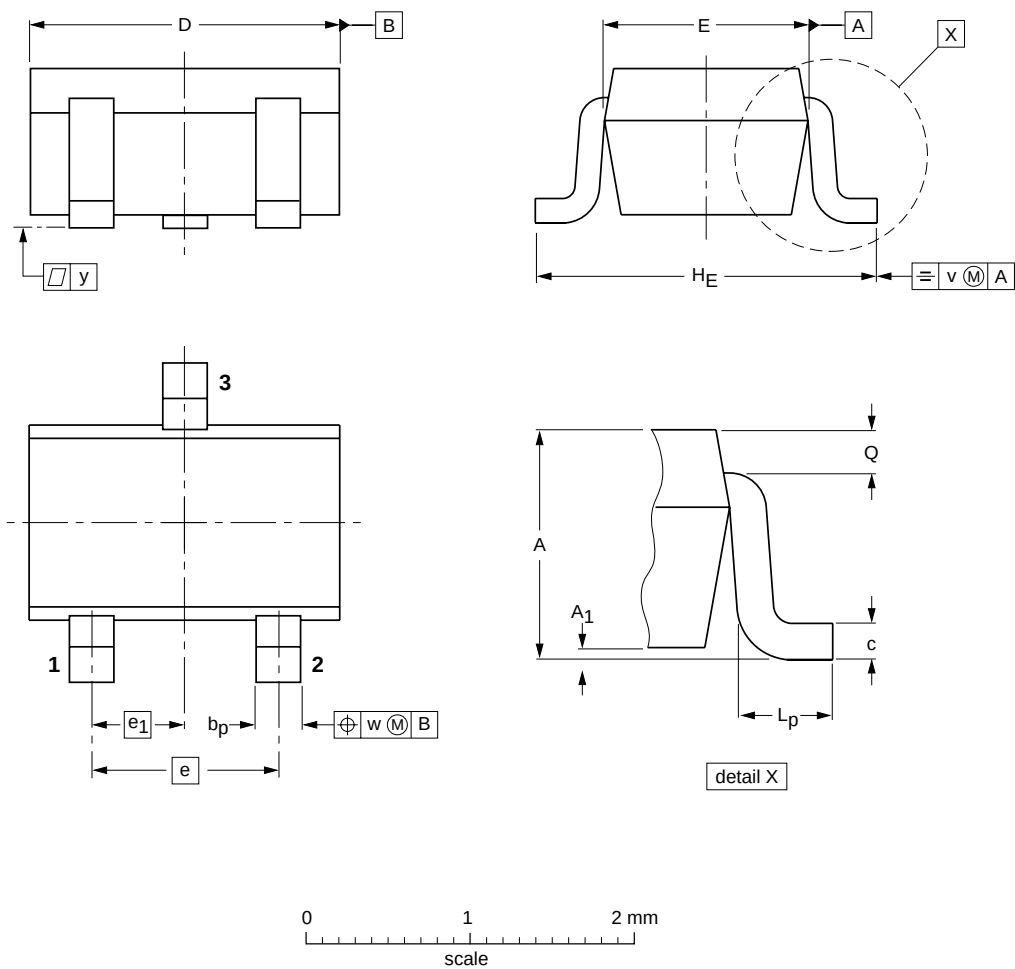
PNP general purpose transistors

BC859W; BC860W

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT323



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A1<br>max | bp         | c            | D          | E            | e   | e1   | HE         | Lp           | Q            | v   | w   |
|------|------------|-----------|------------|--------------|------------|--------------|-----|------|------------|--------------|--------------|-----|-----|
| mm   | 1.1<br>0.8 | 0.1       | 0.4<br>0.3 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.23<br>0.13 | 0.2 | 0.2 |

| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE |
|--------------------|------------|-------|-------|--|---------------------------------------------------------------------------------------|------------|
|                    | IEC        | JEDEC | EIAJ  |  |                                                                                       |            |
| SOT323             |            |       | SC-70 |  |  | 97-02-28   |

## PNP general purpose transistors

BC859W; BC860W

## DATA SHEET STATUS

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | DEFINITION                                                                            |
|--------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective data sheet           | Development                   | This document contains data from the objective specification for product development. |
| Preliminary data sheet         | Qualification                 | This document contains data from the preliminary specification.                       |
| Product data sheet             | Production                    | This document contains the product specification.                                     |

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