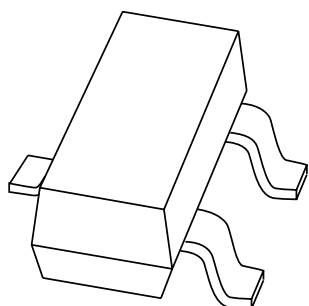


# DATA SHEET



## **BC859; BC860** PNP general purpose transistors

Product specification  
Supersedes data of 1998 Jul 16

1999 May 28

## PNP general purpose transistors

## BC859; BC860

## FEATURES

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

## APPLICATIONS

- Low noise input stages of audio frequency equipment.

## DESCRIPTION

PNP transistor in a SOT23 plastic package.  
NPN complements: BC849 and BC850.

## MARKING

| TYPE NUMBER | MARKING CODE <sup>(1)</sup> | TYPE NUMBER | MARKING CODE <sup>(1)</sup> |
|-------------|-----------------------------|-------------|-----------------------------|
| BC859B      | 4B*                         | BC860B      | 4F*                         |
| BC859C      | 4C*                         | BC860C      | 4G*                         |

## Note

1. \* = p : Made in Hong Kong.  
\* = t : Made in Malaysia.

## PINNING

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

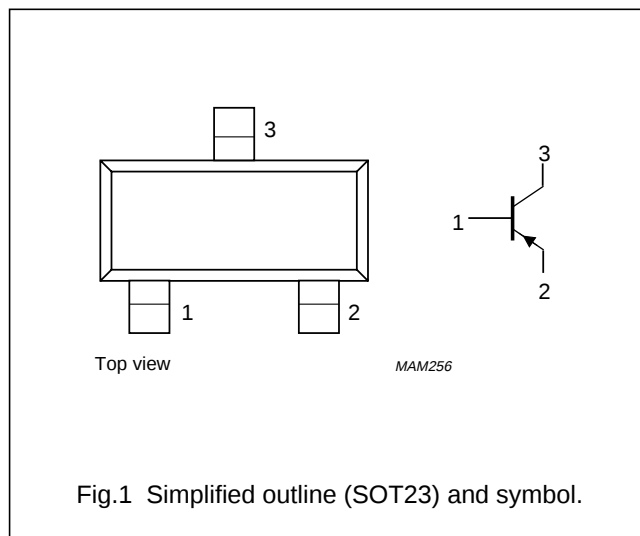


Fig.1 Simplified outline (SOT23) and symbol.

## LIMITING VALUES

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

| SYMBOL    | PARAMETER                     | CONDITIONS                           | MIN. | MAX. | UNIT |
|-----------|-------------------------------|--------------------------------------|------|------|------|
| $V_{CBO}$ | collector-base voltage        | open emitter                         |      |      |      |
|           | BC859                         |                                      | –    | –30  | V    |
|           | BC860                         |                                      | –    | –50  | V    |
| $V_{CEO}$ | collector-emitter voltage     | open base                            |      |      |      |
|           | BC859                         |                                      | –    | –30  | V    |
|           | BC860                         |                                      | –    | –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 | –    | 250  | 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

## BC859; BC860

## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|---------------|---------------------------------------------|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | note 1     | 500   | K/W  |

## Note

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

## CHARACTERISTICS

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

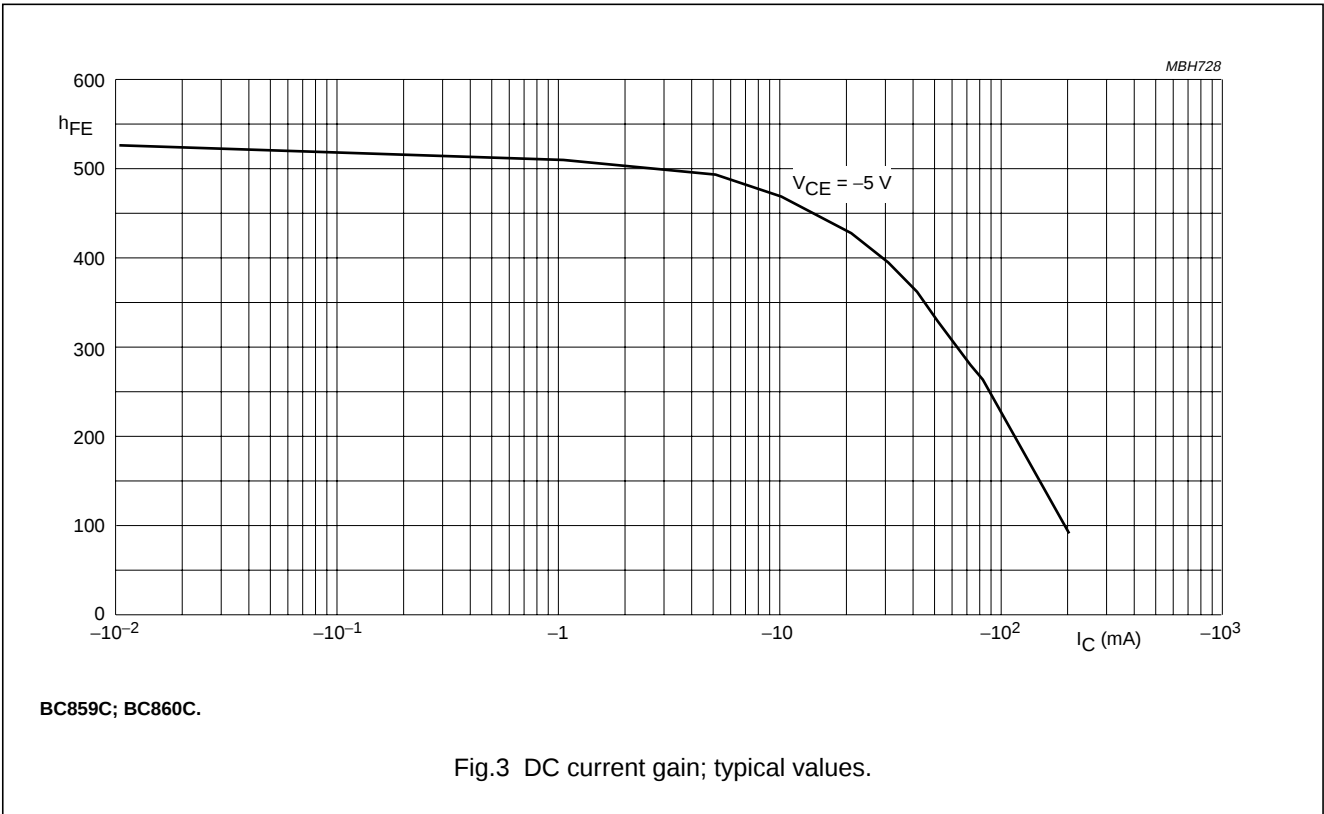
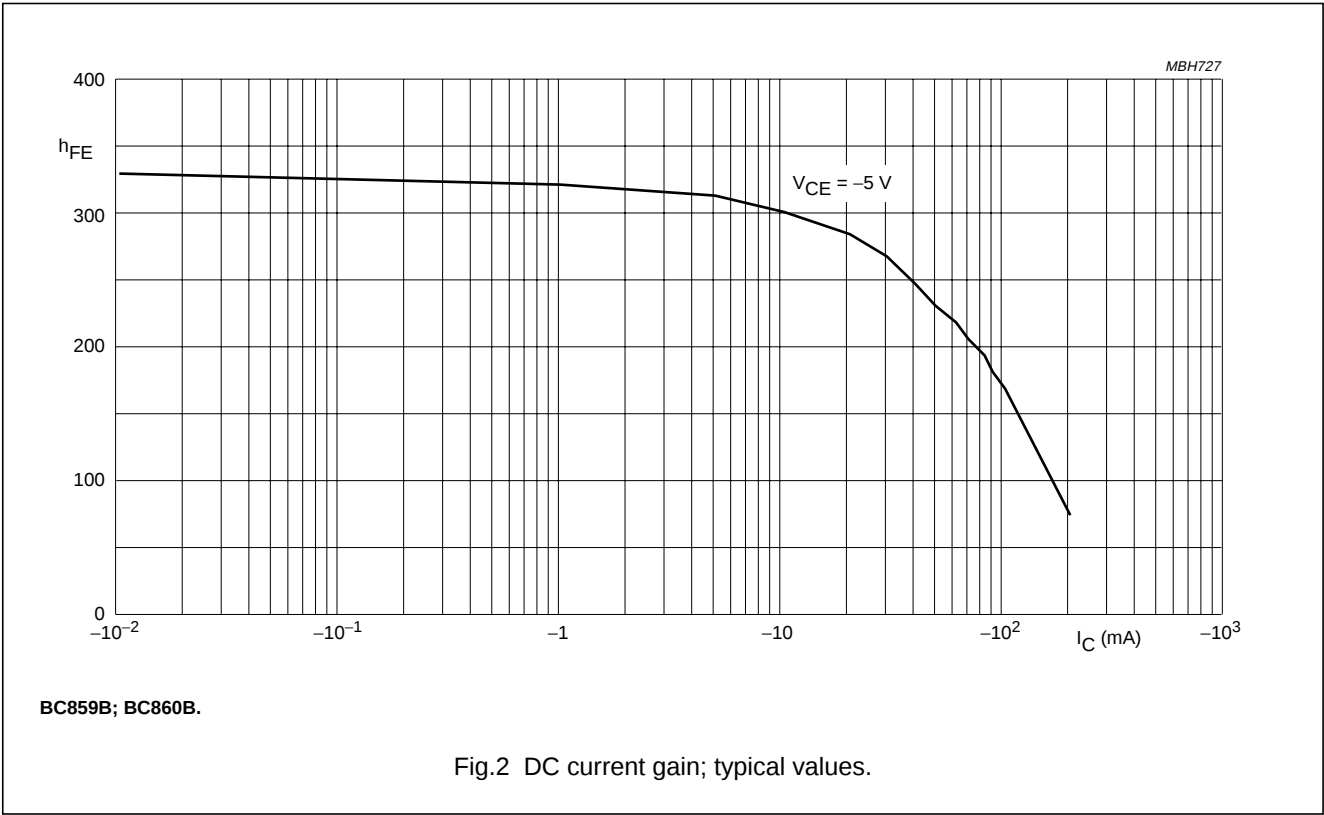
| SYMBOL      | PARAMETER                                           | CONDITIONS                                                                                                              | MIN.       | TYP.   | MAX.       | UNIT          |
|-------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|------------|--------|------------|---------------|
| $I_{CBO}$   | collector cut-off current                           | $I_E = 0; V_{CB} = -30\text{ V}$                                                                                        | –          | –1     | –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>BC859B; BC860B<br>BC859C; BC860C | $I_C = -2\text{ mA}; V_{CE} = -5\text{ V};$<br>see Figs 2 and 3                                                         | 220<br>420 | –<br>– | 475<br>800 |               |
|             |                                                     |                                                                                                                         |            |        |            |               |
| $V_{CEsat}$ | collector-emitter saturation voltage                | $I_C = -10\text{ mA}; I_B = -0.5\text{ mA}$                                                                             | –          | –75    | –300       | mV            |
|             |                                                     | $I_C = -100\text{ mA}; I_B = -5\text{ mA}$                                                                              | –          | –250   | –650       | mV            |
| $V_{BEsat}$ | base-emitter saturation voltage                     | $I_C = -10\text{ mA}; I_B = -0.5\text{ mA};$ note 1                                                                     | –          | –700   | –          | mV            |
|             |                                                     | $I_C = -100\text{ mA}; I_B = -5\text{ mA};$ note 1                                                                      | –          | –850   | –          | mV            |
| $V_{BE}$    | base-emitter voltage                                | $I_C = -2\text{ mA}; V_{CE} = -5\text{ V};$ note 2                                                                      | –600       | –650   | –750       | mV            |
|             |                                                     | $I_C = -10\text{ mA}; V_{CE} = -5\text{ V};$ note 2                                                                     | –          | –      | –820       | mV            |
| $C_c$       | collector capacitance                               | $I_E = i_e = 0; V_{CB} = -10\text{ V}; f = 1\text{ MHz}$                                                                | –          | 4.5    | –          | 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>BC859B; BC860B;<br>BC859C; BC860C   | $I_C = -200\text{ }\mu\text{A}; V_{CE} = -5\text{ V}; R_S = 2\text{ k}\Omega;$<br>$f = 30\text{ Hz to }15\text{ kHz}$   | –          | –      | 4          | dB            |
|             | noise figure<br>BC859B; BC860B;<br>BC859C; BC860C   | $I_C = -200\text{ }\mu\text{A}; V_{CE} = -5\text{ V}; R_S = 2\text{ k}\Omega;$<br>$f = 1\text{ kHz}; B = 200\text{ Hz}$ | –          | –      | 4          | dB            |

## Notes

1.  $V_{BEsat}$  decreases by about  $-1.7\text{ mV/K}$  with increasing temperature.
2.  $V_{BE}$  decreases by about  $-2\text{ mV/K}$  with increasing temperature.

PNP general purpose transistors

BC859; BC860



PNP general purpose transistors

BC859; BC860

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



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PNP general purpose transistors

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BC859; BC860

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**DEFINITIONS**

| <b>Data Sheet Status</b>                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 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.                                |
| <b>Limiting values</b>                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                       |
| 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. |                                                                                       |
| <b>Application information</b>                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
| Where application information is given, it is advisory and does not form part of the specification.                                                                                                                                                                                                                                                                                                                                                       |                                                                                       |

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PNP general purpose transistors

BC859; BC860

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