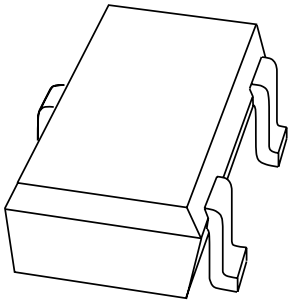
# DATA SHEET



# BC856W; BC857W; BC858W
## PNP general purpose transistors

Product data sheet
Supersedes data of 1999 Apr 12

2002 Feb 04

NXP founded by Philips

# PNP general purpose transistors

# BC856W; BC857W; BC858W

## FEATURES

- Low current (max. 100 mA)
- Low voltage (max. 65 V).

## APPLICATIONS

- General purpose switching and amplification.

## DESCRIPTION

PNP transistor in a SOT323 plastic package.
NPN complements: BC846W, BC847W and BC848W.

## MARKING

| TYPE NUMBER | MARKING CODE(1) |
|---|---|
| BC856W | 3D* |
| BC856AW | 3A* |
| BC856BW | 3B* |
| BC857W | 3H* |
| BC857AW | 3E* |
| BC857BW | 3F* |
| BC857CW | 3G* |
| BC858W | 3M* |

**Note**

1. * = -: made in Hong Kong.
   * = t: made in Malaysia.

## PINNING

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

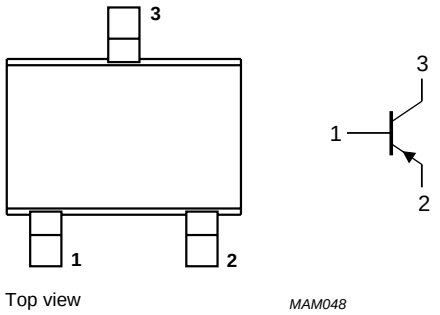



Fig.1 Simplified outline (SOT323; SC70) and symbol.

## LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{CBO}$ | collector-base voltage | open emitter | | | |
| | BC856W | | − | −80 | V |
| | BC857W | | − | −50 | V |
| | BC858W | | − | −30 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | | | |
| | BC856W | | − | −65 | V |
| | BC857W | | − | −45 | V |
| | BC858W | | − | −30 | 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 |

**Note**

1. Refer to SOT323 standard mounting conditions.

## THERMAL CHARACTERISTICS

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

**Note**

1. Refer to SOT323 standard mounting conditions.

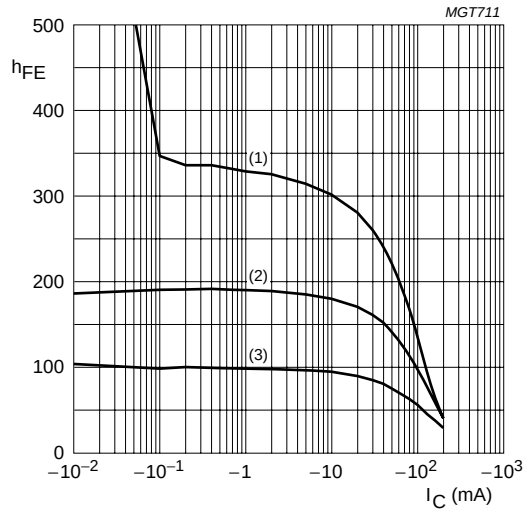
## CHARACTERISTICS

$T_{amb}$ = 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 | – | –1 | –15 | nA |
| | | $V_{CB}$ = –30 V; $I_E$ = 0; $T_j$ = 150 °C | – | – | –4 | μA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = –5 V; $I_C$ = 0 | – | – | –100 | nA |
| $h_{FE}$ | DC current gain | $I_C$ = –2 mA; $V_{CE}$ = –5 V | | | | |
| | BC856W | | 125 | – | 475 | |
| | BC857W; BC858W | | 125 | – | 800 | |
| | BC856AW; BC857AW | | 125 | – | 250 | |
| | BC856BW; BC857BW | | 220 | – | 475 | |
| | BC857CW | | 420 | – | 800 | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = –10 mA; $I_B$ = –0.5 mA | – | –75 | –300 | mV |
| | | $I_C$ = –100 mA; $I_B$ = –5 mA; note 1 | – | –250 | –600 | mV |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = –10 mA; $I_B$ = –0.5 mA | – | –700 | – | mV |
| | | $I_C$ = –100 mA; $I_B$ = –5 mA; note 1 | – | –850 | – | mV |
| $V_{BE}$ | base-emitter voltage | $I_C$ = –2 mA; $V_{CE}$ = –5 V | –600 | –650 | –750 | mV |
| | | $I_C$ = –10 mA; $V_{CE}$ = –5 V | – | – | –820 | mV |
| $C_c$ | collector capacitance | $V_{CB}$ = –10 V; $I_E$ = $I_e$ = 0; f = 1 MHz | – | – | 3 | pF |
| $C_e$ | emitter capacitance | $V_{EB}$ = –0.5 V; $I_C$ = $I_c$ = 0; f = 1 MHz | – | – | 12 | pF |
| $f_T$ | transition frequency | $V_{CE}$ = –5 V; $I_C$ = –10 mA; f = 100 MHz | 100 | – | – | MHz |
| F | noise figure | $I_C$ = –200 μA; $V_{CE}$ = –5 V; $R_S$ = 2 kΩ; f = 1 kHz; B = 200 Hz | – | – | 10 | dB |

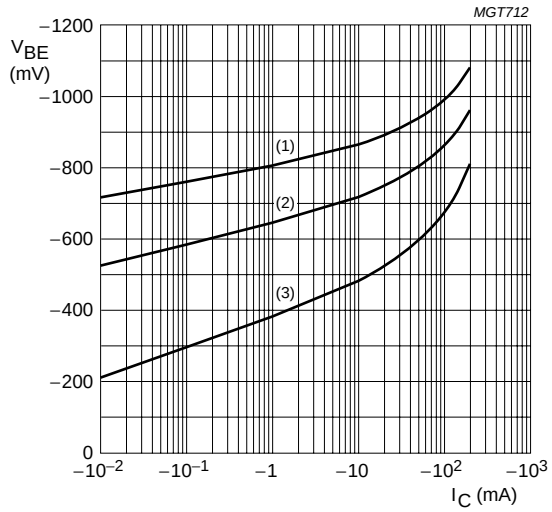
**Note**

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



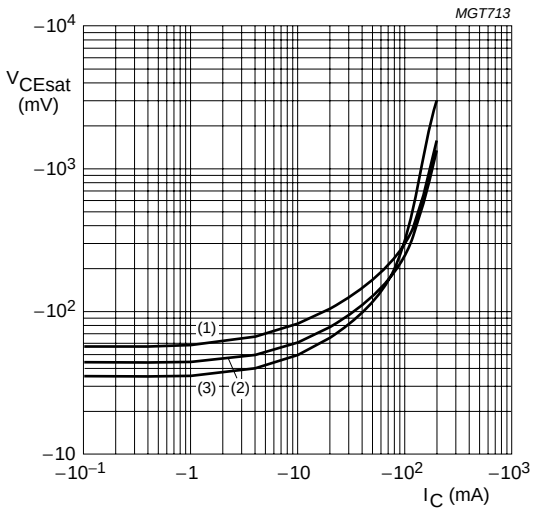

**BC857AW;** $V_{CE}$ = −5 V.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

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



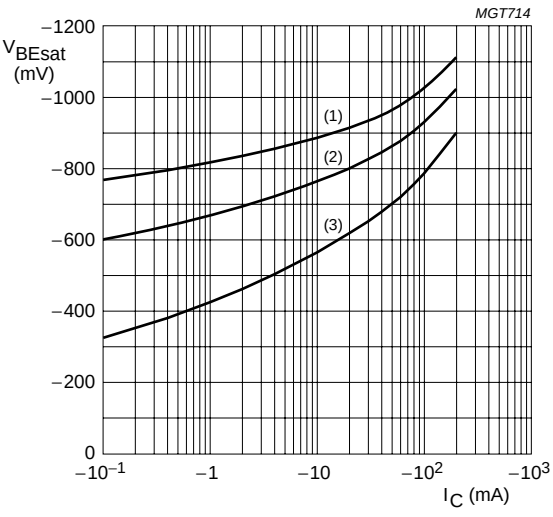

**BC857AW;** $V_{CE}$ = −5 V.
(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

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



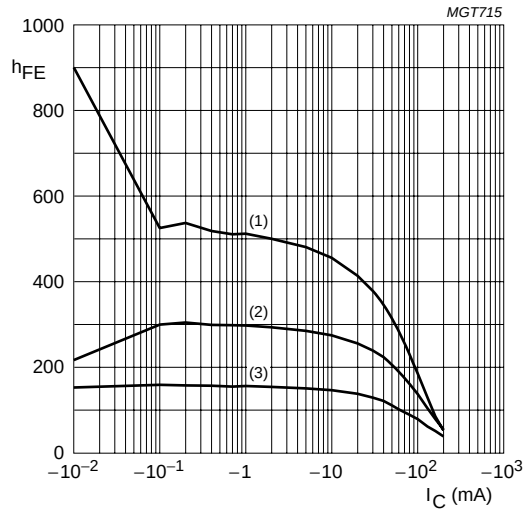

**BC857AW;** $I_C/I_B$ = 20.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

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



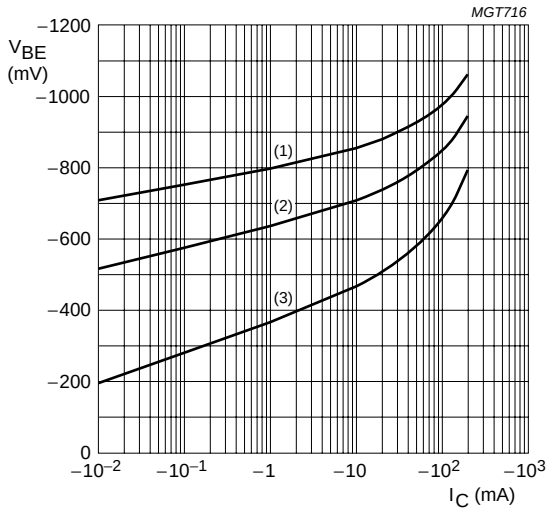

**BC857AW;** $I_C/I_B$ = 20.
(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

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



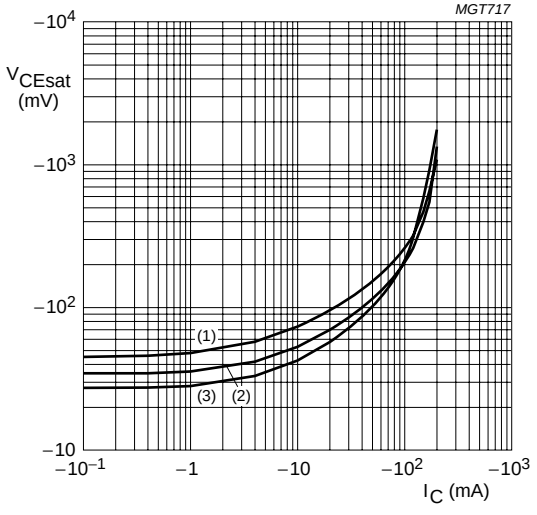

**BC857BW;** $V_{CE}$ = −5 V.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

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



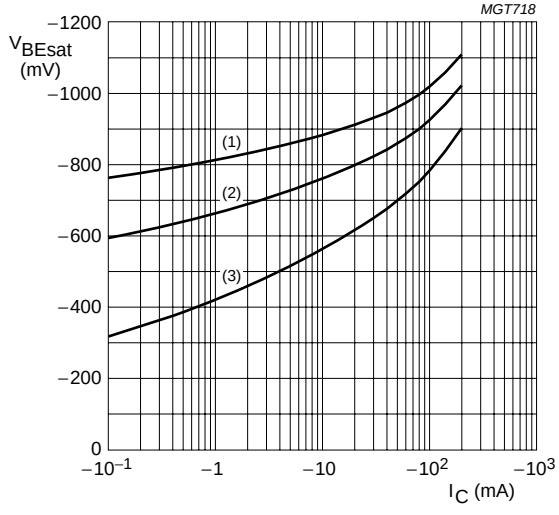

**BC857BW;** $V_{CE}$ = −5 V.
(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

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



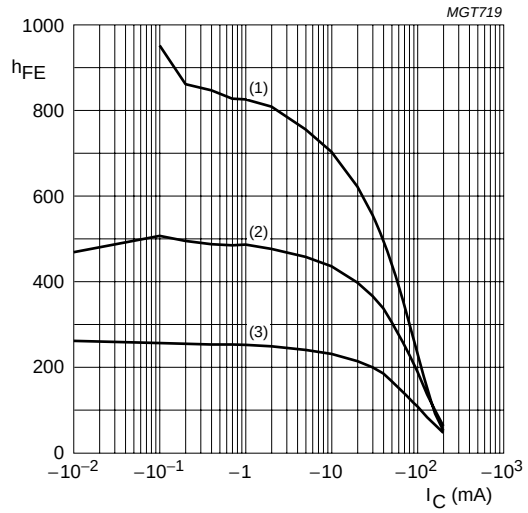

**BC857BW;** $I_C/I_B$ = 20.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

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



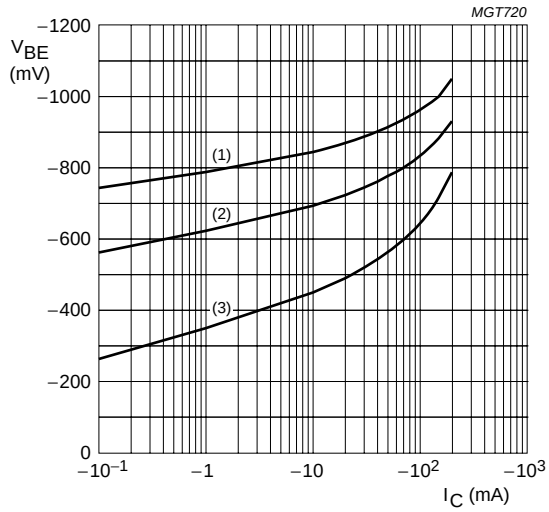

**BC857BW;** $I_C/I_B$ = 20.
(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

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



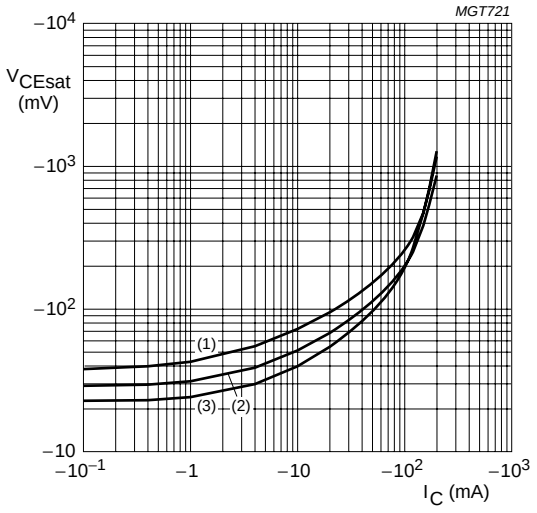

**BC857CW;** $V_{CE}$ = −5 V.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

Fig.10 DC current gain as a function of collector current; typical values.



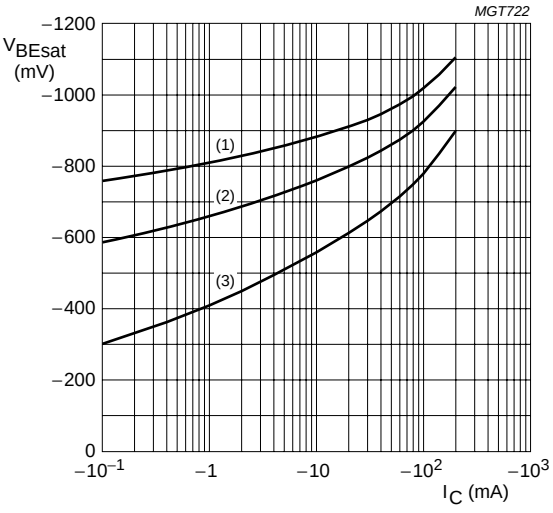

**BC857CW;** $V_{CE}$ = −5 V.
(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

Fig.11 Base-emitter voltage as a function of collector current; typical values.




**BC857CW;** $I_C/I_B$ = 20.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = −55 °C.

Fig.12 Collector-emitter saturation voltage as a function of collector current; typical values.

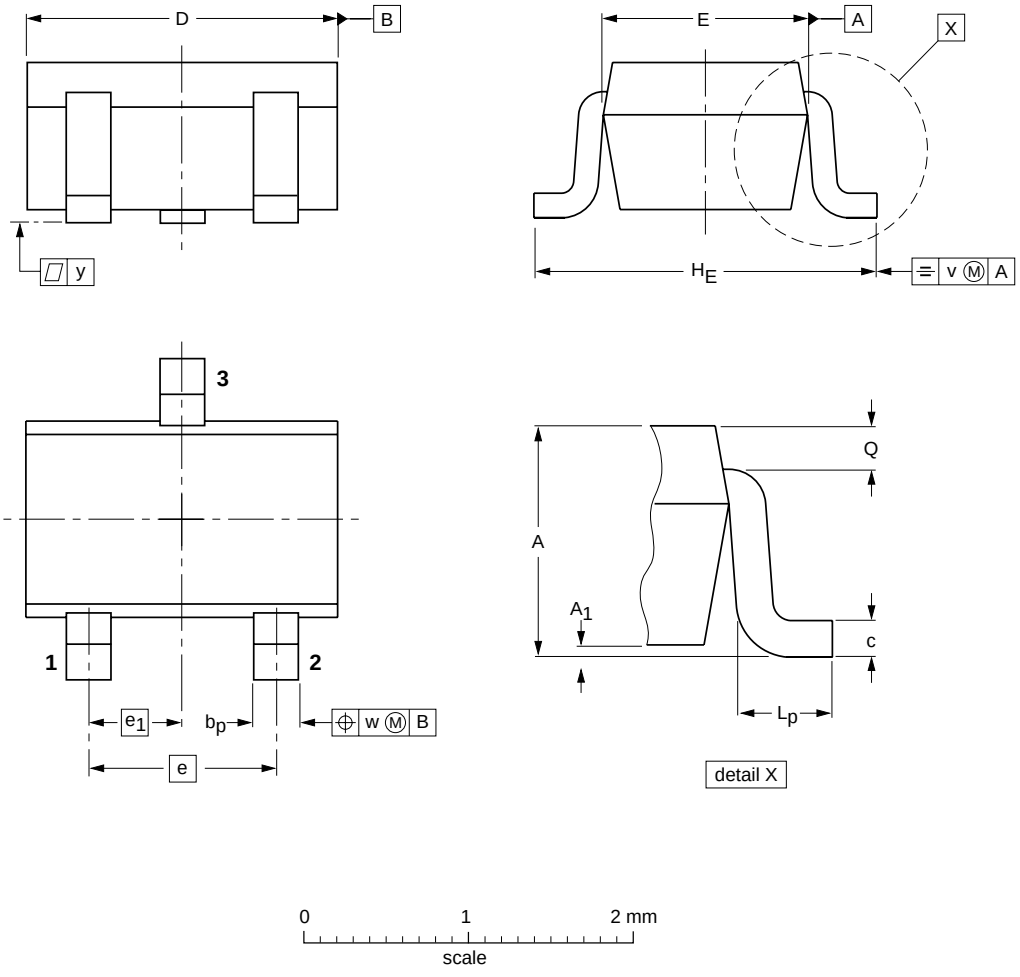



**BC857CW;** $I_C/I_B$ = 20.
(1) $T_{amb}$ = −55 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

Fig.13 Base-emitter saturation voltage as a function of collector current; typical values.

## PACKAGE OUTLINE

**Plastic surface mounted package; 3 leads** **SOT323**




**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>0.8 | 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 VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | EIAJ | | | |
| SOT323 | | | SC-70 | | | 97-02-28 |

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| DOCUMENT STATUS[1] | PRODUCT STATUS[2] | 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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