

DATA SHEET

BFQ67W

NPN 8 GHz wideband transistor

Product specification

September 1995



NPN 8 GHz wideband transistor

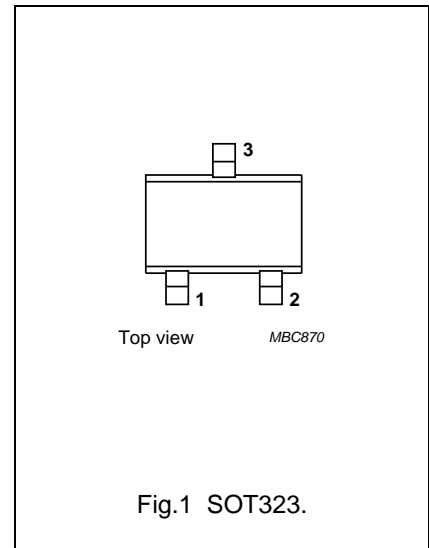
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FEATURES

- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability
- SOT323 envelope.

PINNING

| PIN | DESCRIPTION |
|----------|-------------|
| Code: V2 | |
| 1 | base |
| 2 | emitter |
| 3 | collector |



DESCRIPTION

NPN transistor in a plastic SOT323 envelope.

It is designed for wideband applications such as satellite TV tuners and RF portable communications equipment up to 2 GHz.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------|-------------------------------|--|------|------|------|------|
| V_{CBO} | collector-base voltage | open emitter | – | – | 20 | V |
| V_{CEO} | collector-emitter voltage | open base | – | – | 10 | V |
| I_C | DC collector current | | – | – | 50 | mA |
| P_{tot} | total power dissipation | up to $T_s = 118\text{ °C}$; note 1 | – | – | 300 | mW |
| h_{FE} | DC current gain | $I_C = 15\text{ mA}$; $V_{CE} = 5\text{ V}$; $T_j = 25\text{ °C}$ | 60 | 100 | – | |
| f_T | transition frequency | $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$ | – | 8 | – | GHz |
| G_{UM} | maximum unilateral power gain | $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$ | – | 13 | – | dB |
| F | noise figure | $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$ | – | 1.3 | – | dB |

LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------|---------------------------|--------------------------------------|------|------|------|
| V_{CBO} | collector-base voltage | open emitter | – | 20 | V |
| V_{CEO} | collector-emitter voltage | open base | – | 10 | V |
| V_{EBO} | emitter-base voltage | open collector | – | 2.5 | V |
| I_C | DC collector current | | – | 50 | mA |
| P_{tot} | total power dissipation | up to $T_s = 118\text{ °C}$; note 1 | – | 300 | mW |
| T_{stg} | storage temperature | | –65 | 150 | °C |
| T_j | junction temperature | | – | 175 | °C |

Note

1. T_s is the temperature at the soldering point of the collector tab.

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THERMAL RESISTANCE

| SYMBOL | PARAMETER | CONDITIONS | THERMAL RESISTANCE |
|---------------|---|--------------------------------------|--------------------|
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point | up to $T_s = 118\text{ °C}$; note 1 | 190 K/W |

Note

- T_s is the temperature at the soldering point of the collector tab.

CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------|--|--|------|------|------|------|
| I_{CBO} | collector cut-off current | $I_E = 0$; $V_{CB} = 5\text{ V}$ | – | – | 50 | nA |
| h_{FE} | DC current gain | $I_C = 15\text{ mA}$; $V_{CE} = 5\text{ V}$ | 60 | 100 | – | |
| C_c | collector capacitance | $I_E = i_e = 0$; $V_{CB} = 8\text{ V}$; $f = 1\text{ MHz}$ | – | 0.7 | – | pF |
| C_e | emitter capacitance | $I_C = i_c = 0$; $V_{EB} = 0.5\text{ V}$; $f = 1\text{ MHz}$ | – | 1.3 | – | pF |
| C_{re} | feedback capacitance | $I_C = 0$; $V_{CB} = 8\text{ V}$; $f = 1\text{ MHz}$ | – | 0.5 | – | pF |
| f_T | transition frequency | $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$ | – | 8 | – | GHz |
| G_{UM} | maximum unilateral power gain (note 1) | $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$ | – | 13 | – | dB |
| | | $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$ | – | 8 | – | dB |
| F | noise figure | $\Gamma_s = \Gamma_{opt}$; $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$ | – | 1.3 | – | dB |
| | | $\Gamma_s = \Gamma_{opt}$; $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$ | – | 2 | – | dB |
| | | $\Gamma_s = \Gamma_{opt}$; $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$ | – | 2.2 | – | dB |
| | | $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $Z_s = 60\ \Omega$ | – | 2.5 | – | dB |
| | | $\Gamma_s = \Gamma_{opt}$; $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$ | – | 2.7 | – | dB |
| | | $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $Z_s = 60\ \Omega$ | – | 3 | – | dB |

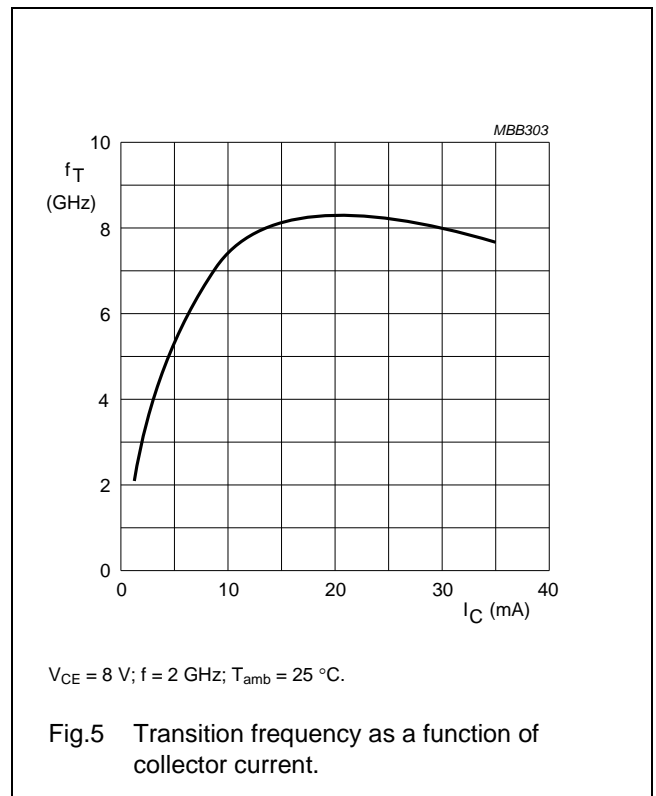
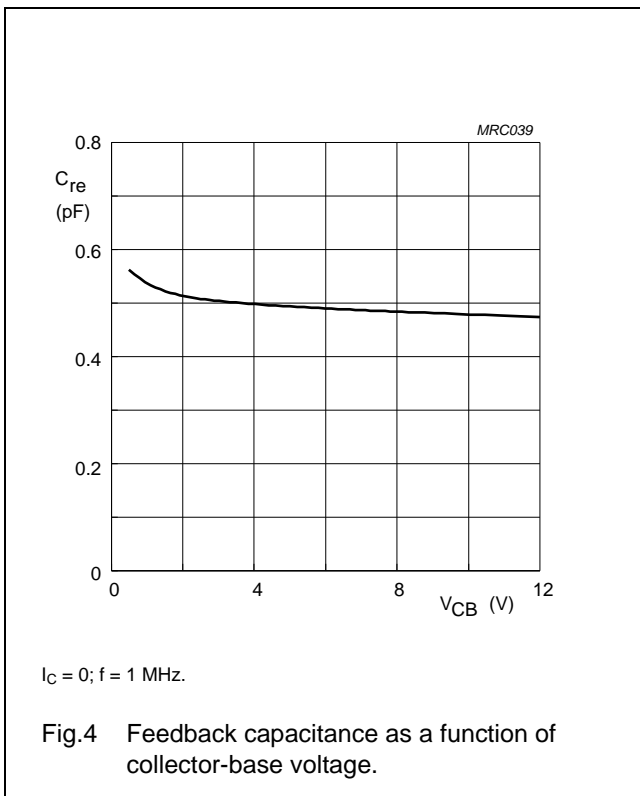
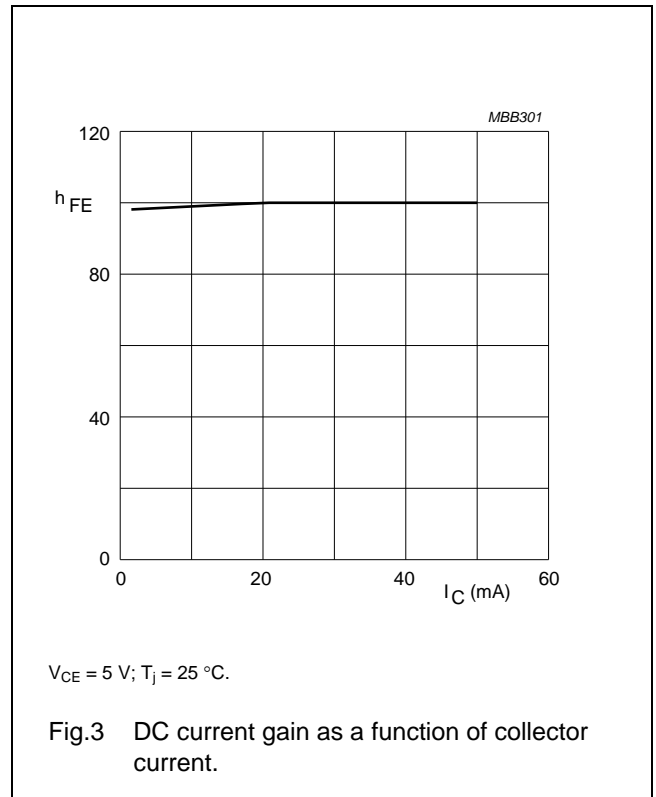
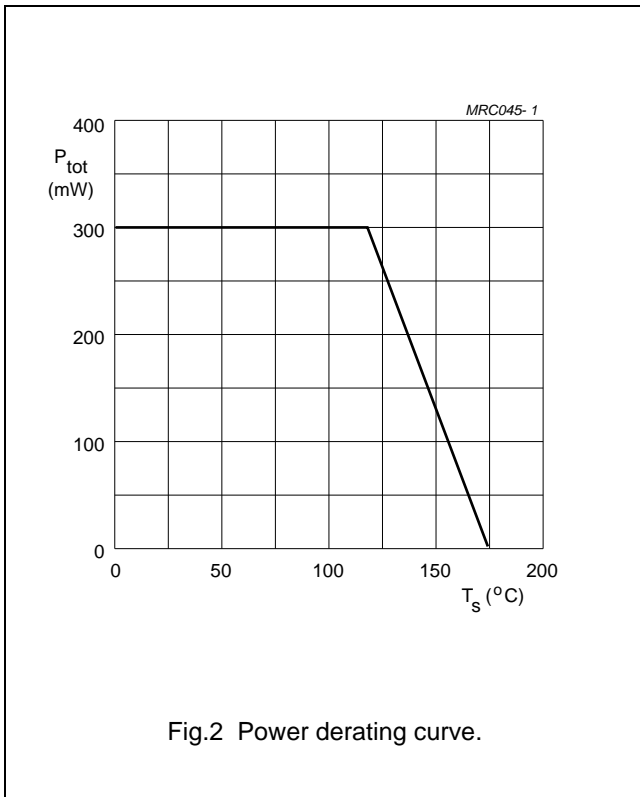
Note

- G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and

$$G_{UM} = 10 \log \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)} \text{ dB.}$$

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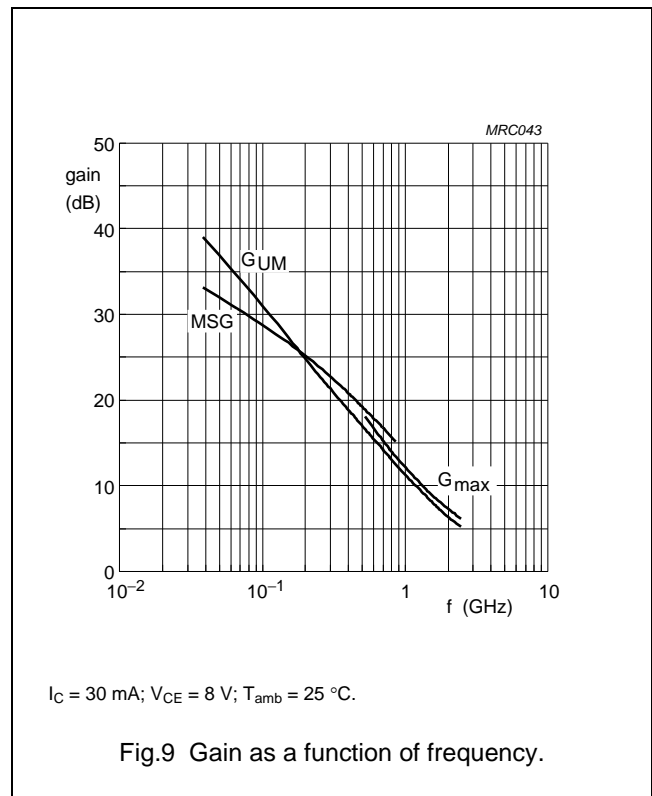
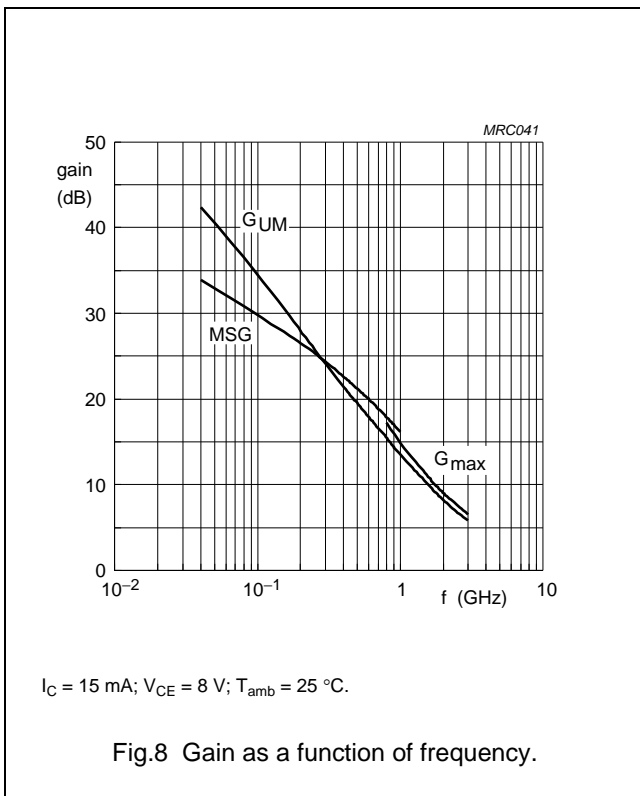
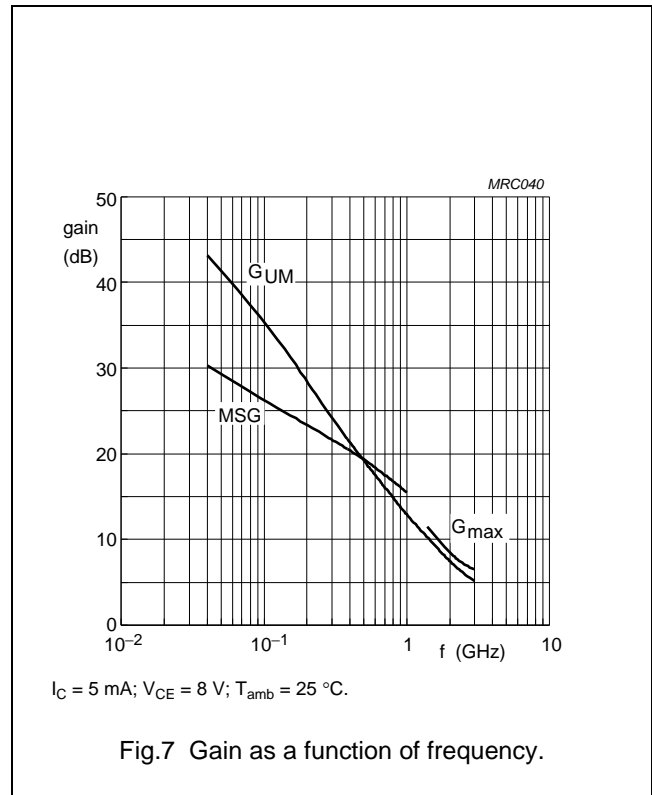
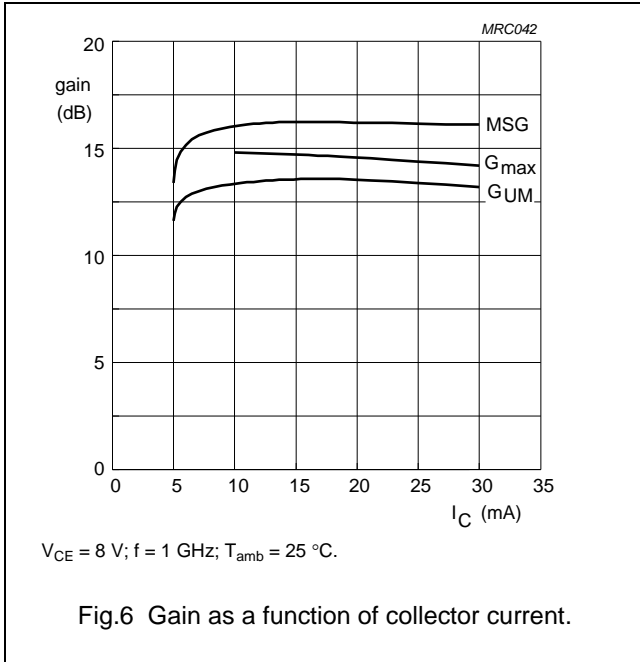
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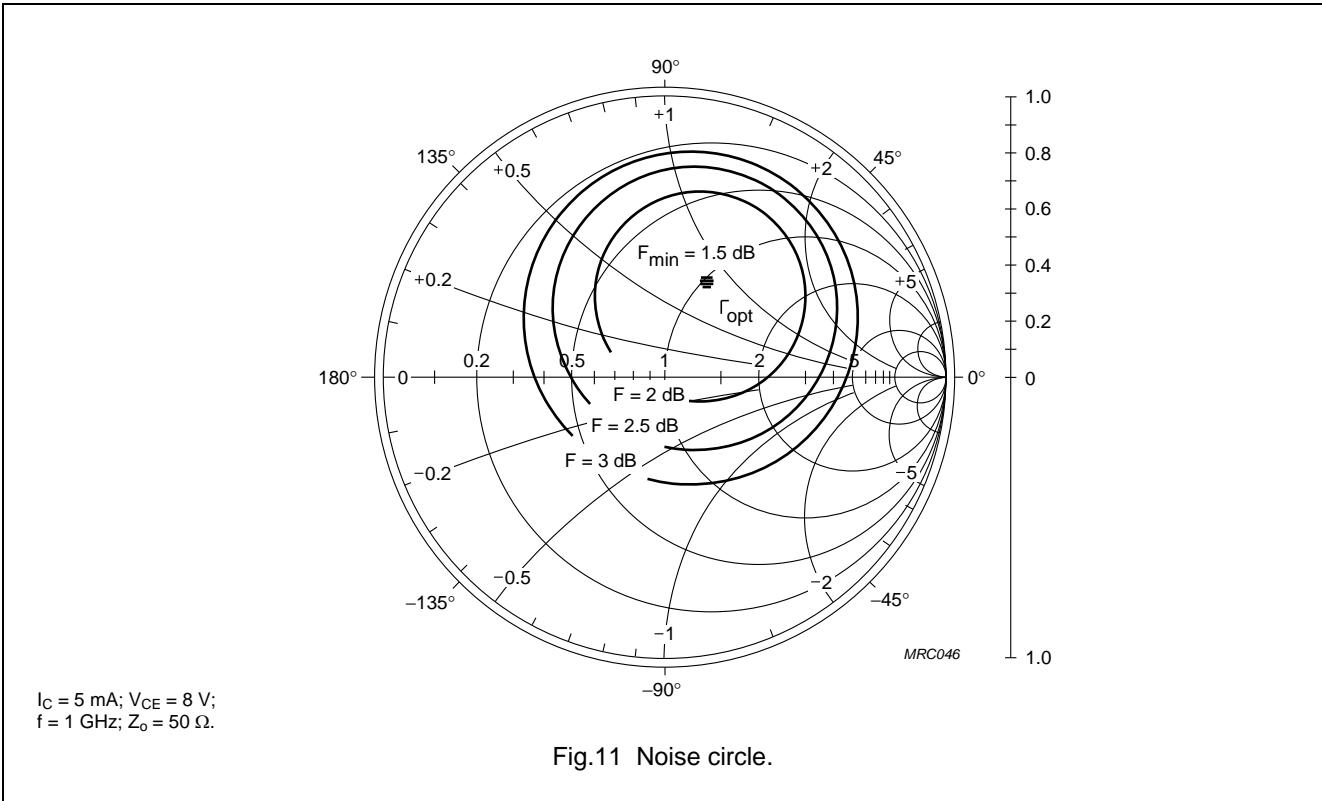
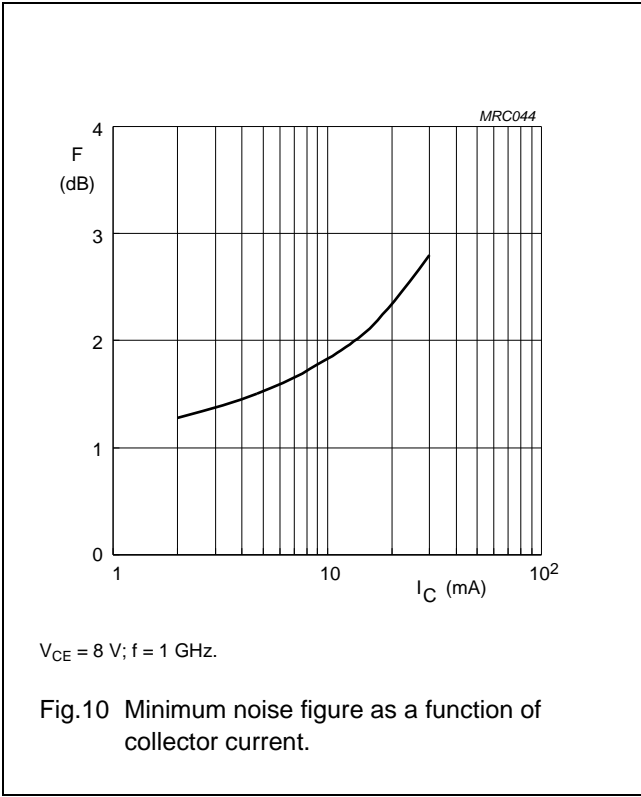
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In Figs 6 to 9, G_{UM} = maximum unilateral power gain; MSG = maximum stable gain; G_{max} = maximum available gain.



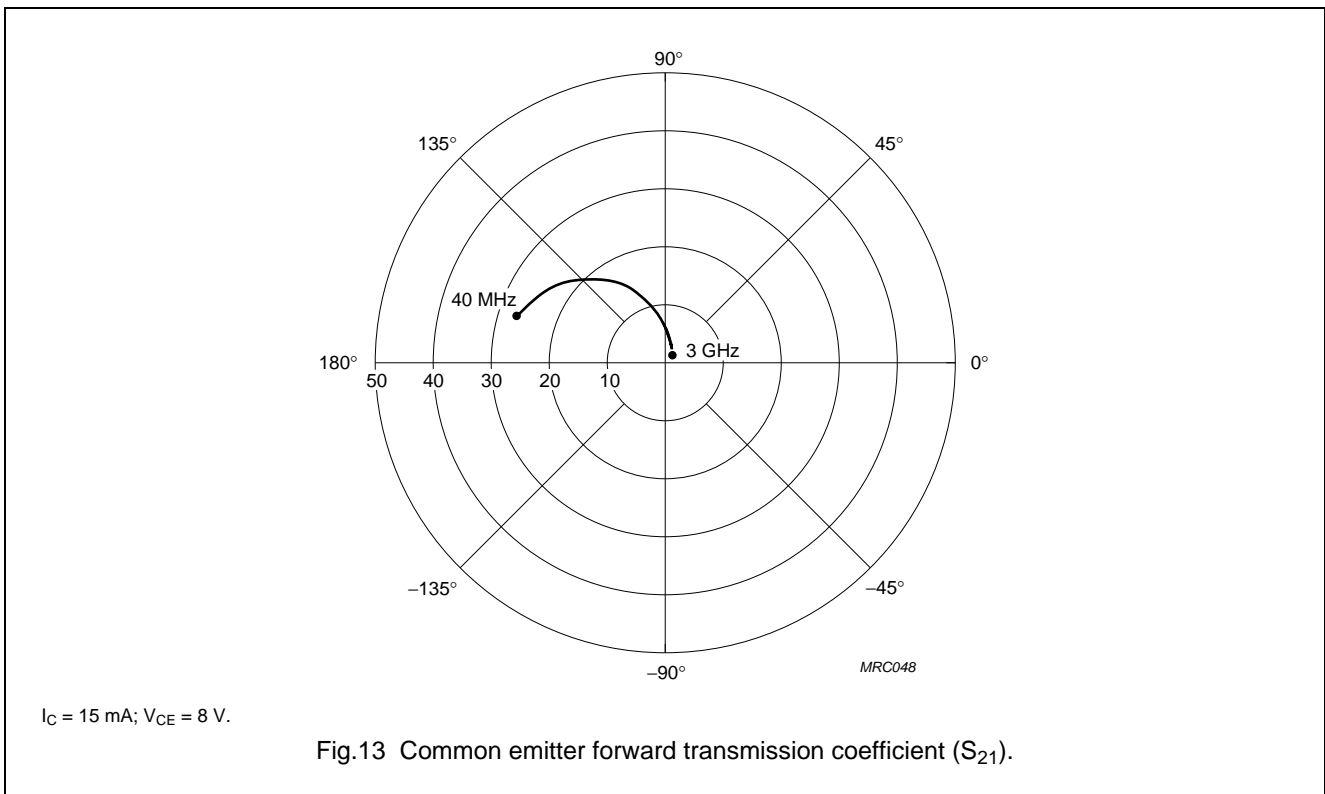
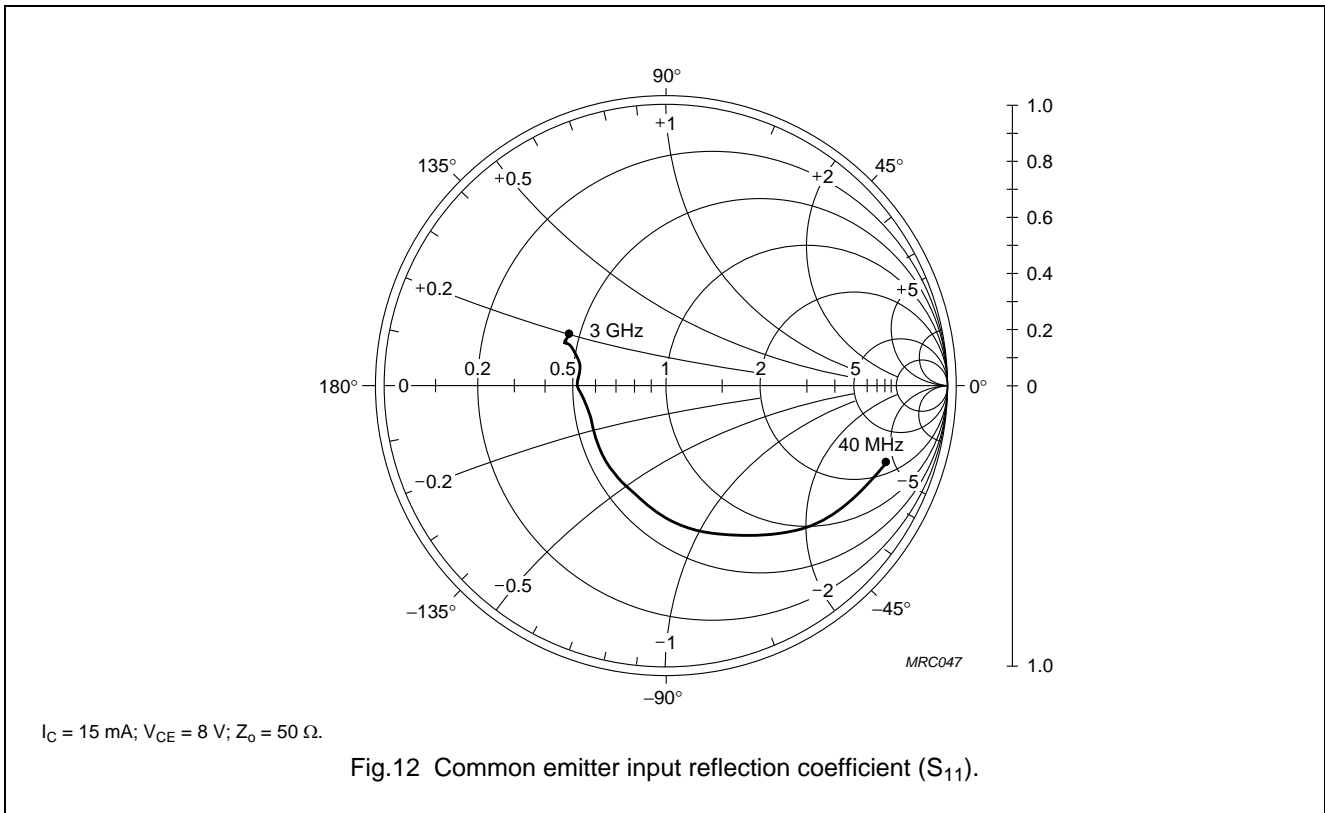
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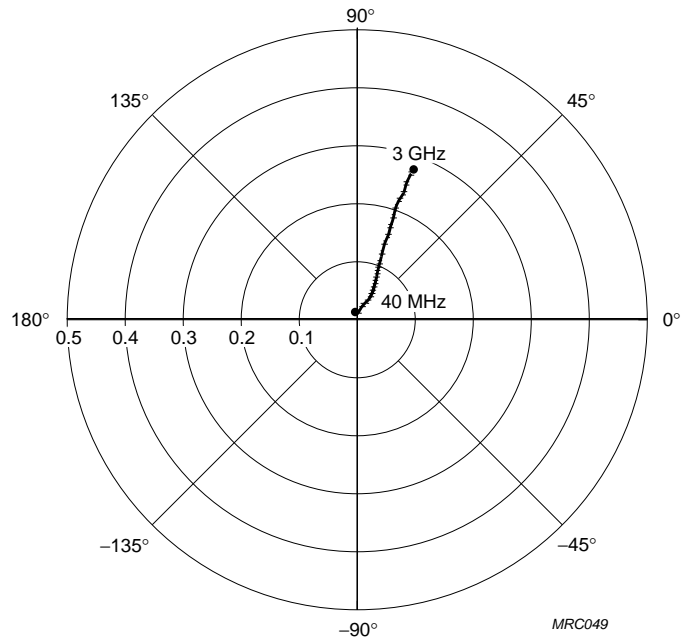
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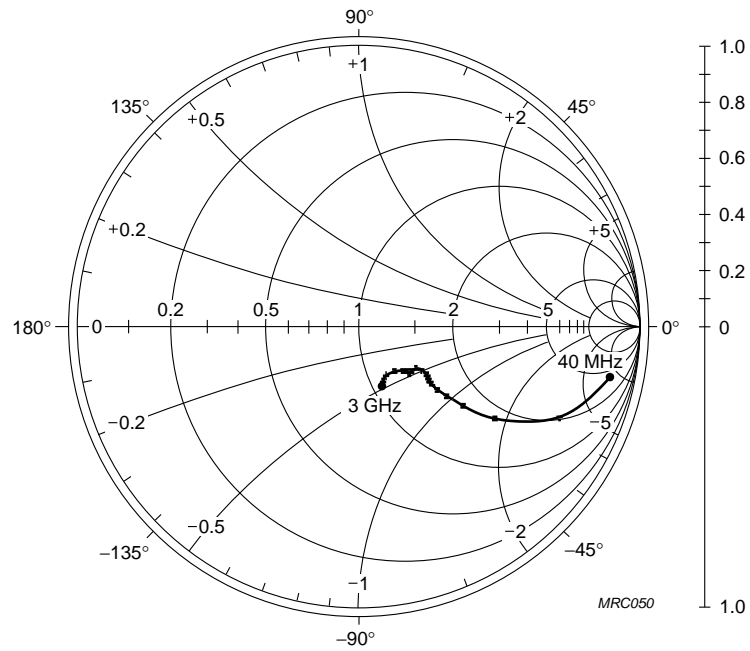
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$I_C = 15 \text{ mA}; V_{CE} = 8 \text{ V}.$

Fig.14 Common emitter reverse transmission coefficient (S_{12}).



$I_C = 15 \text{ mA}; V_{CE} = 8 \text{ V}; Z_0 = 50 \Omega.$

Fig.15 Common emitter output reflection coefficient (S_{22}).

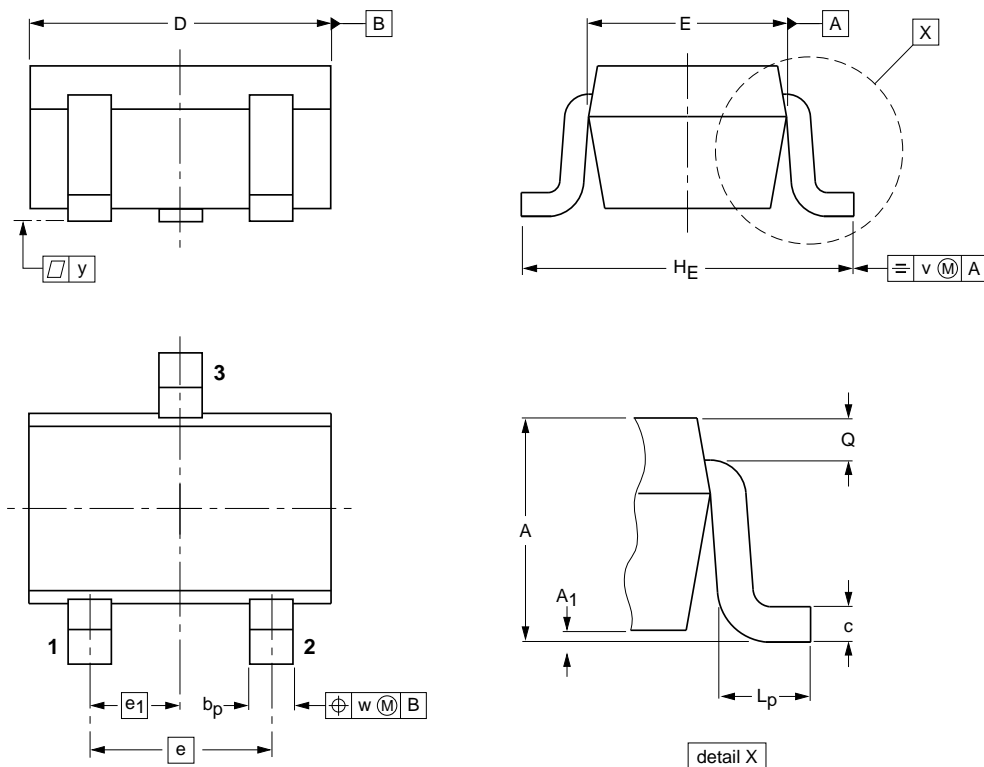
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PACKAGE OUTLINE

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 0.8 | 0.1 | 0.4 0.3 | 0.25 0.10 | 2.2 1.8 | 1.35 1.15 | 1.3 | 0.65 | 2.2 2.0 | 0.45 0.15 | 0.23 0.13 | 0.2 | 0.2 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|--|------------------------|---------------------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT323 | | | SC-70 | | | 04-11-04 06-03-16 |

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|--------------------------------|-------------------------------|---|
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| 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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Printed in The Netherlands

R77/03/pp12

Date of release: September 1995

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