

DATA SHEET

BFT92W

PNP 4 GHz wideband transistor

Product specification

May 1994



PNP 4 GHz wideband transistor

BFT92W

FEATURES

- High power gain
- Gold metallization ensures excellent reliability
- SOT323 (S-mini) package.

APPLICATION

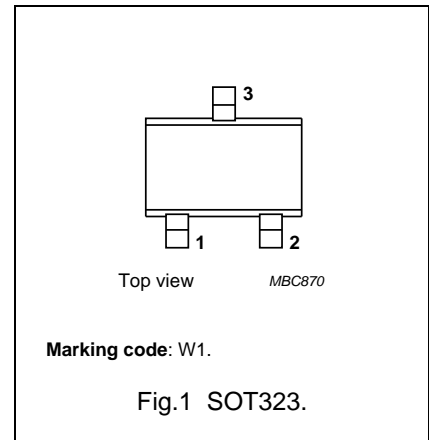
It is intended as a general purpose transistor for wideband applications up to 2 GHz.

DESCRIPTION

Silicon PNP transistor in a plastic, SOT323 (S-mini) package. The BFT92W uses the same crystal as the SOT23 version, BFT92.

PINNING

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



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 | – | – | –15 | V |
| I_C | collector current (DC) | | – | – | –35 | mA |
| P_{tot} | total power dissipation | up to $T_s = 93\text{ }^\circ\text{C}$; note 1 | – | – | 300 | mW |
| h_{FE} | DC current gain | $I_C = -15\text{ mA}$; $V_{CE} = -10\text{ V}$ | 20 | 50 | – | |
| C_{re} | feedback capacitance | $I_C = 0$; $V_{CB} = -10\text{ V}$; $f = 1\text{ MHz}$ | – | 0.5 | – | pF |
| f_T | transition frequency | $I_C = -15\text{ mA}$; $V_{CE} = -10\text{ V}$; $f = 500\text{ MHz}$ | – | 4 | – | GHz |
| G_{UM} | maximum unilateral power gain | $I_C = -15\text{ mA}$; $V_{CE} = -10\text{ V}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ }^\circ\text{C}$ | – | 17 | – | dB |
| F | noise figure | $I_C = -5\text{ mA}$; $V_{CE} = -10\text{ V}$; $f = 500\text{ MHz}$ | – | 2.5 | – | dB |
| T_j | junction temperature | | – | – | 150 | $^\circ\text{C}$ |

Note

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

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LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|------------------|---------------------------|--------------------------------------|------|------|------|
| V _{CB0} | collector-base voltage | open emitter | – | –20 | V |
| V _{CEO} | collector-emitter voltage | open base | – | –15 | V |
| V _{EBO} | emitter-base voltage | open collector | – | –2 | V |
| I _C | collector current (DC) | | – | –25 | mA |
| P _{tot} | total power dissipation | up to T _s = 93 °C; note 1 | – | 300 | mW |
| T _{stg} | storage temperature | | –65 | +150 | °C |
| T _j | junction temperature | | – | 150 | °C |

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------------|---|--------------------------------------|-------|------|
| R _{th j-s} | thermal resistance from junction to soldering point | up to T _s = 93 °C; note 1 | 190 | K/W |

Note to the “Limiting values” and “Thermal characteristics”

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

CHARACTERISTICST_j = 25 °C (unless otherwise specified).

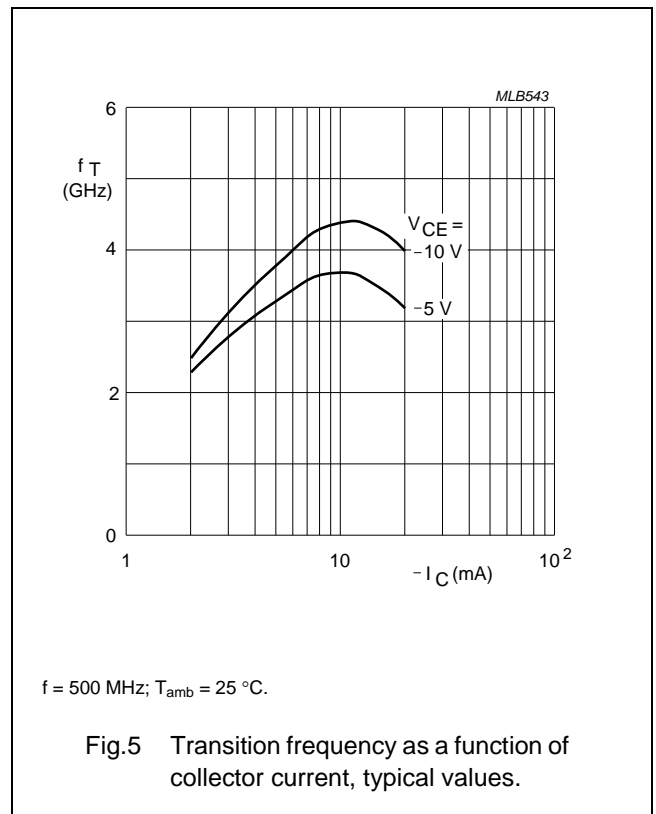
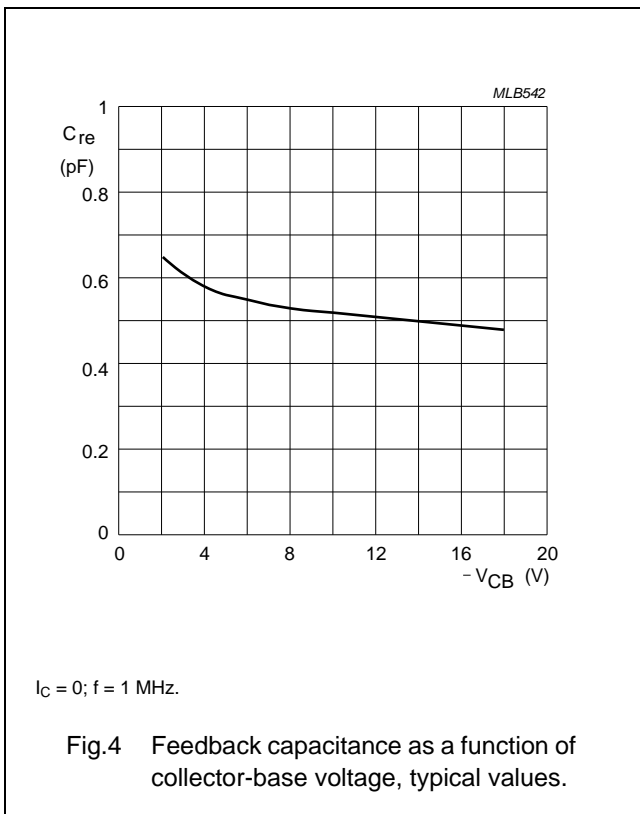
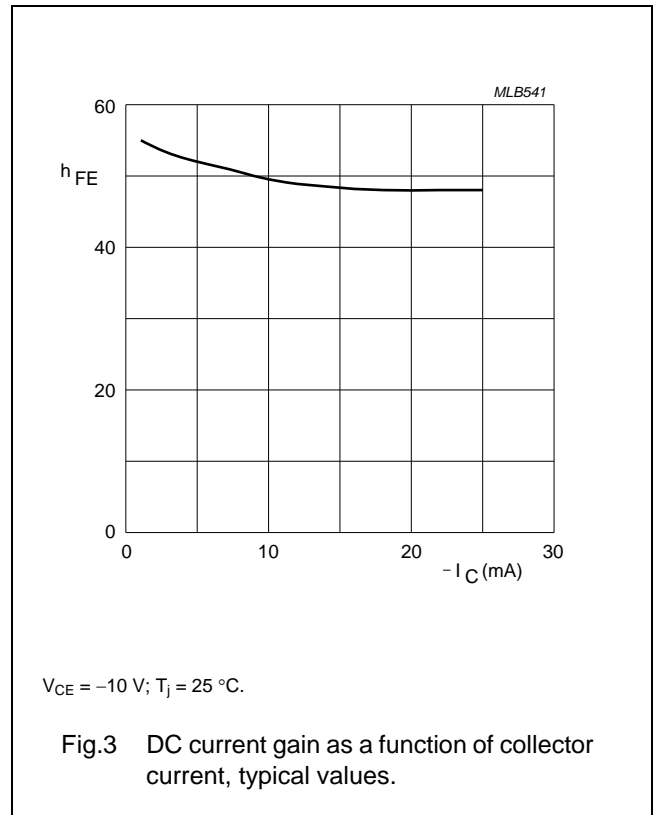
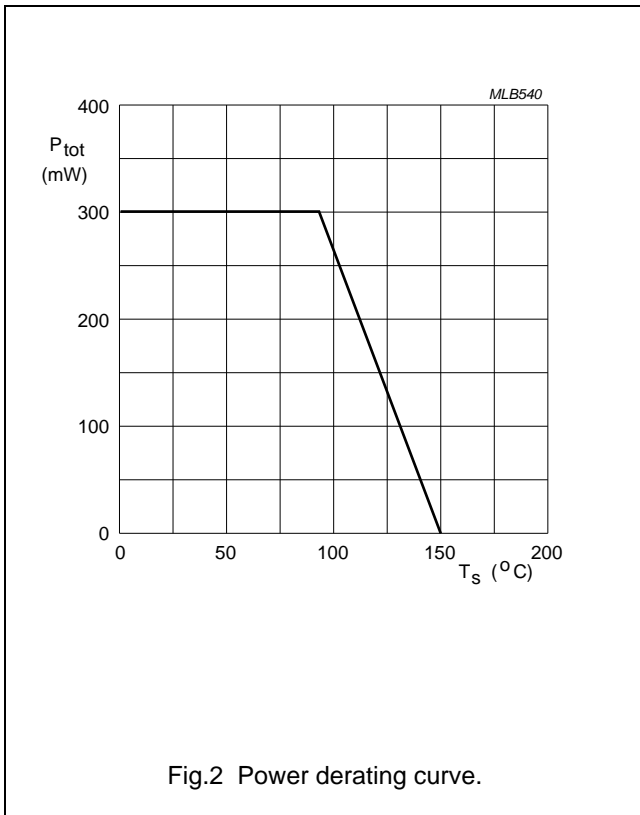
| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|------------------|--|---|------|------|------|------|
| I _{CBO} | collector cut-off current | I _E = 0; V _{CB} = –10 V | – | – | –50 | nA |
| h _{FE} | DC current gain | I _C = –15 mA; V _{CE} = –10 V | 20 | 50 | – | |
| f _T | transition frequency | I _C = –15 mA; V _{CE} = –10 V; f = 500 MHz; T _{amb} = 25 °C | – | 4 | – | GHz |
| C _c | collector capacitance | I _E = i _e = 0; V _{CB} = –10 V; f = 1 MHz | – | 0.65 | – | pF |
| C _e | emitter capacitance | I _C = i _c = 0; V _{EB} = –0.5 V; f = 1 MHz | – | 0.75 | – | pF |
| C _{re} | feedback capacitance | I _C = 0; V _{CB} = –10 V; f = 1 MHz | – | 0.5 | – | pF |
| G _{UM} | maximum unilateral power gain; note 1 | I _C = –15 mA; V _{CE} = –10 V; f = 500 MHz; T _{amb} = 25 °C | – | 17 | – | dB |
| | | I _C = –15 mA; V _{CE} = –10 V; f = 1 GHz; T _{amb} = 25 °C | – | 11 | – | dB |
| F | noise figure | Γ _s = Γ _{opt} ; I _C = –5 mA; V _{CE} = –10 V; f = 500 MHz | – | 2.5 | – | dB |
| | | Γ _s = Γ _{opt} ; I _C = –5 mA; V _{CE} = –10 V; f = 1 GHz | – | 3 | – | dB |

Note

1. G_{UM} is the maximum unilateral power gain, assuming s₁₂ is zero. $G_{UM} = 10 \log \frac{|s_{21}|^2}{(1 - |s_{11}|^2)(1 - |s_{22}|^2)}$ dB.

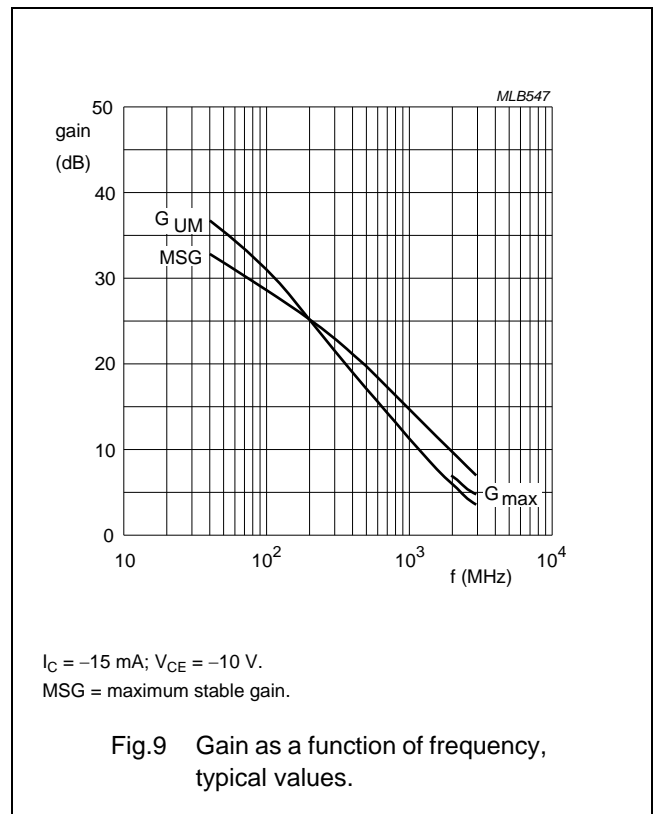
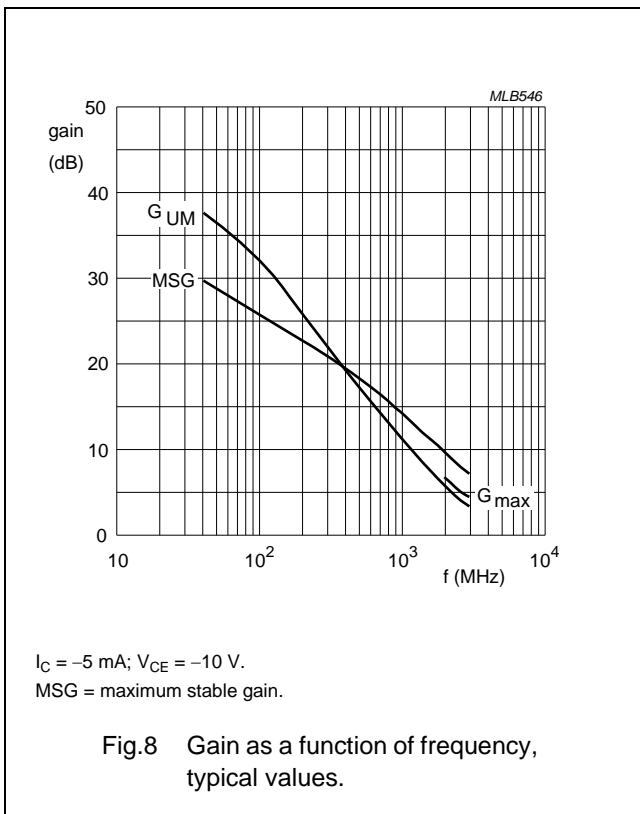
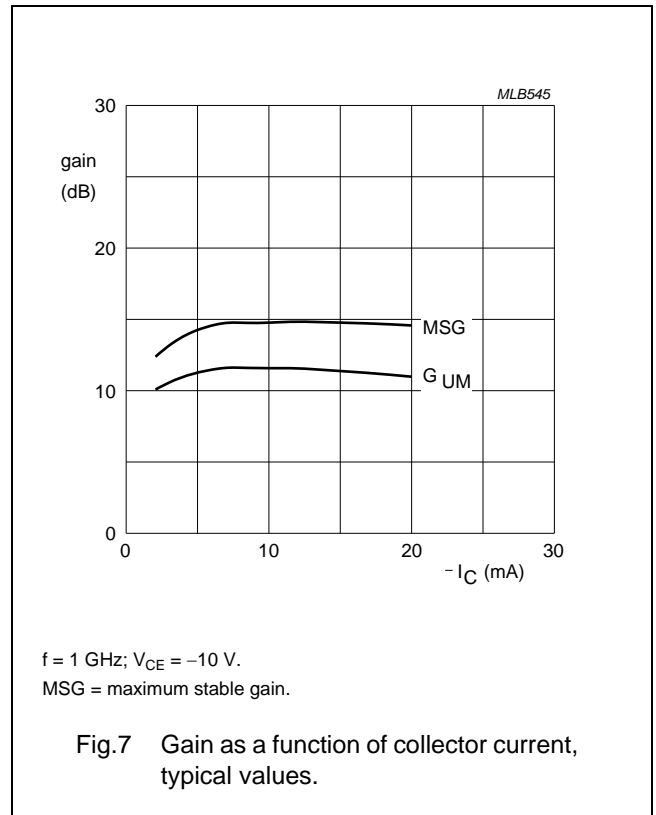
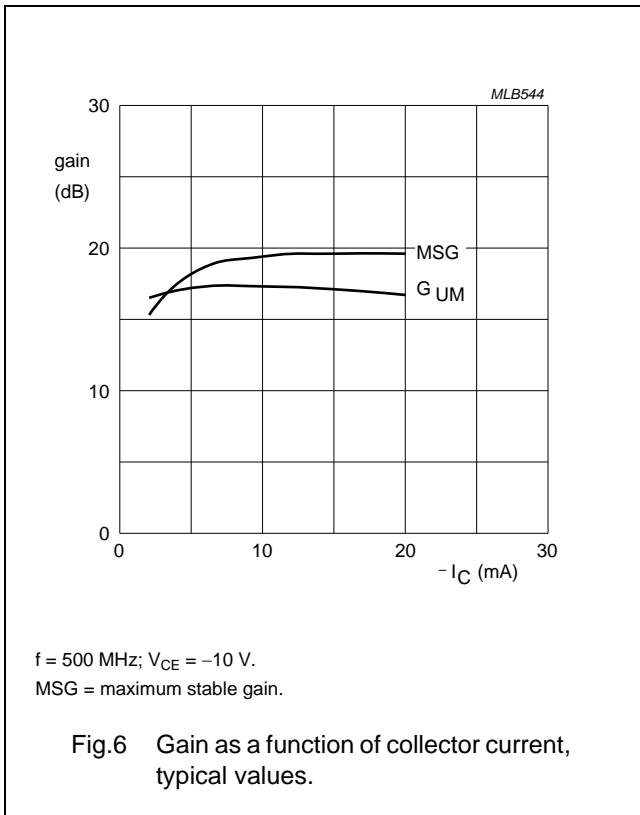
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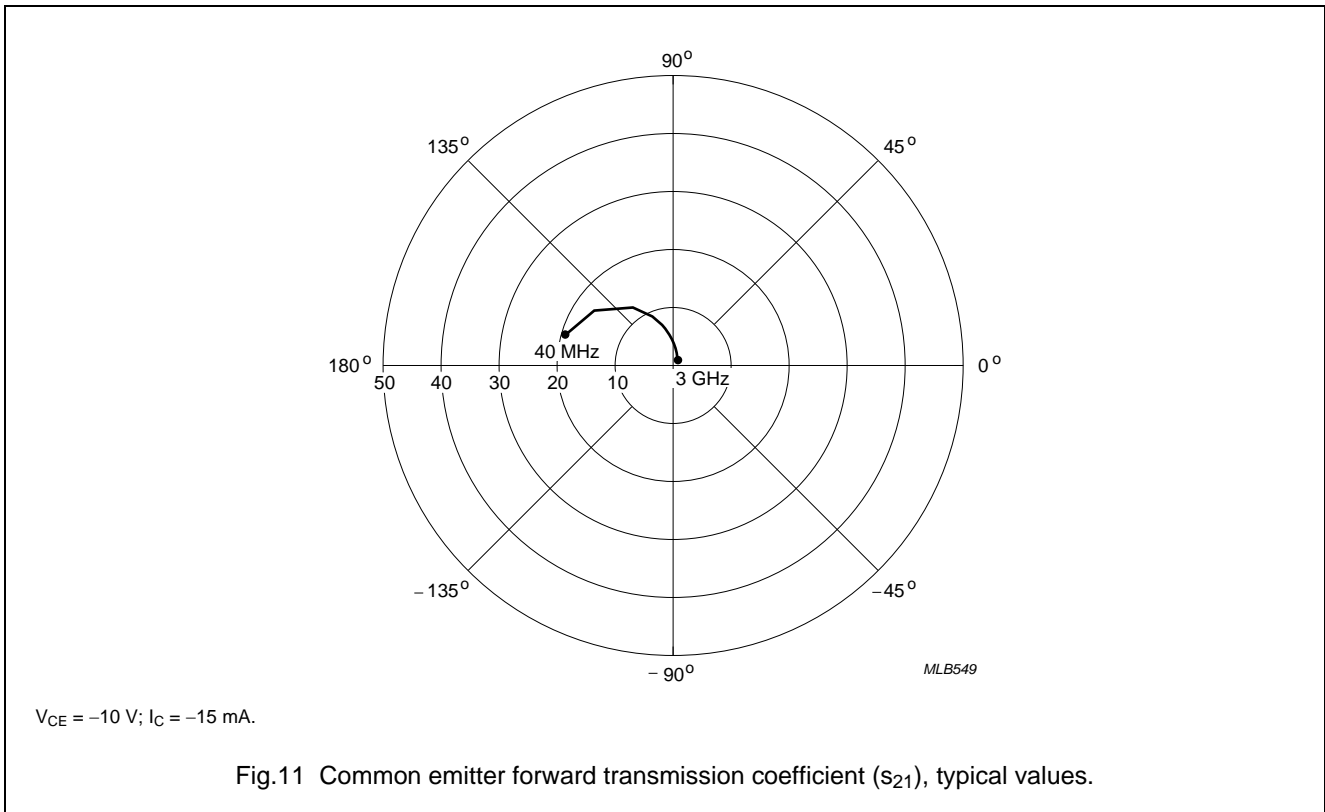
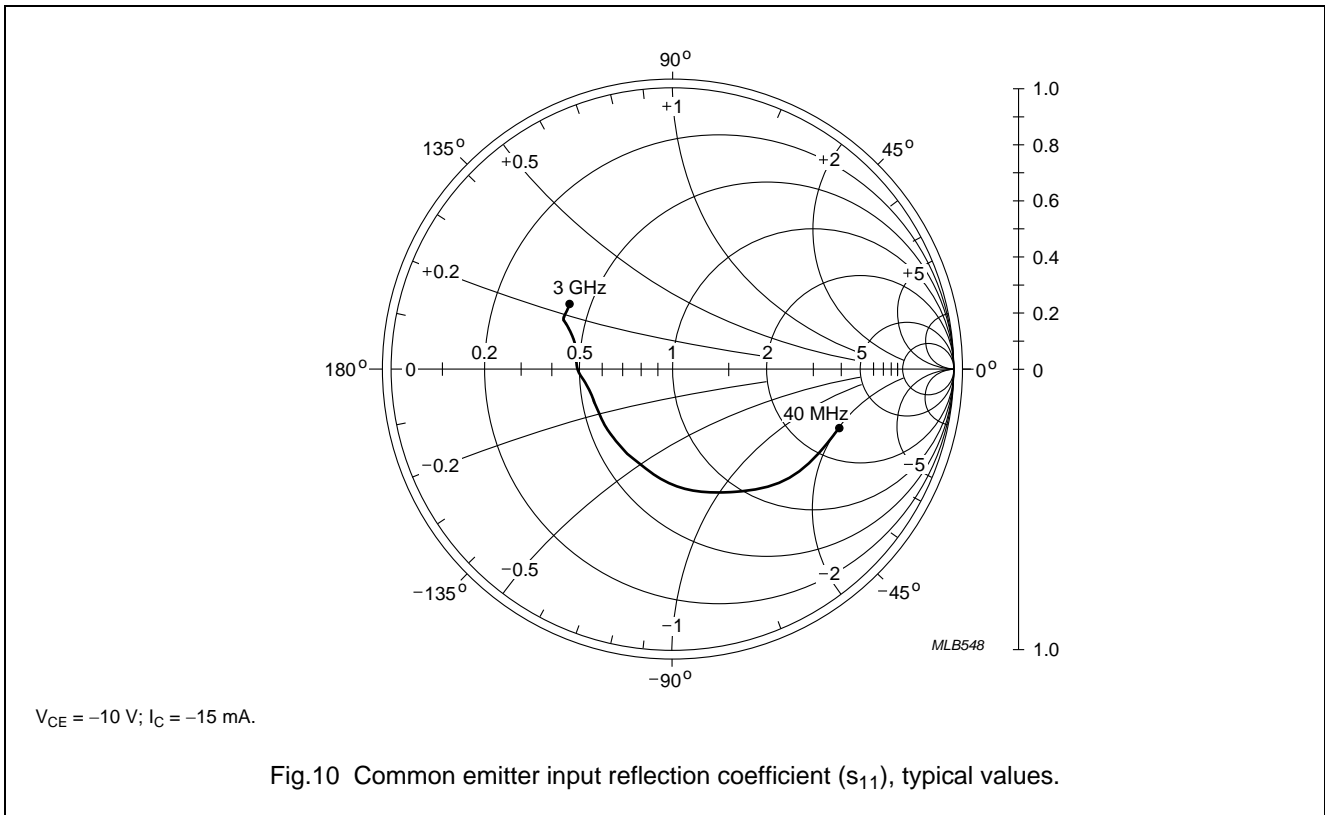
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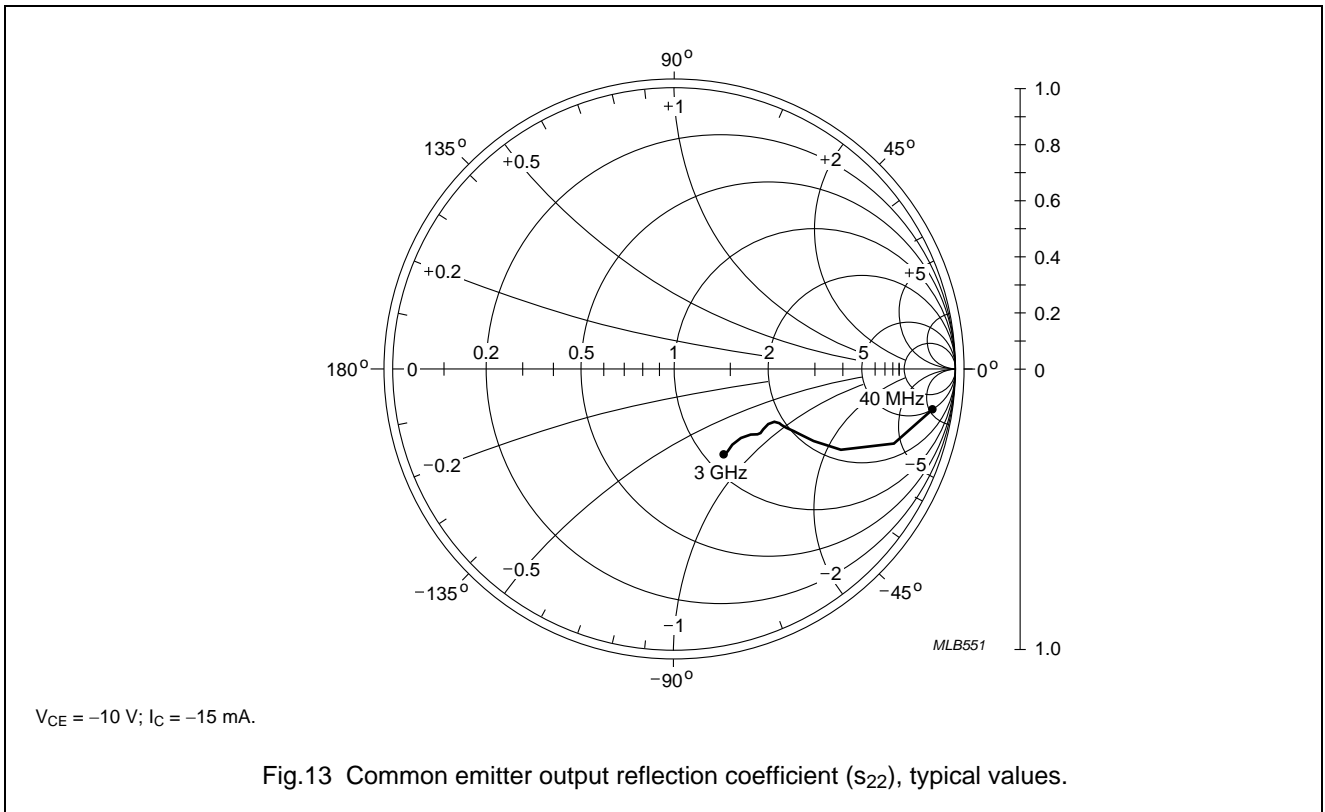
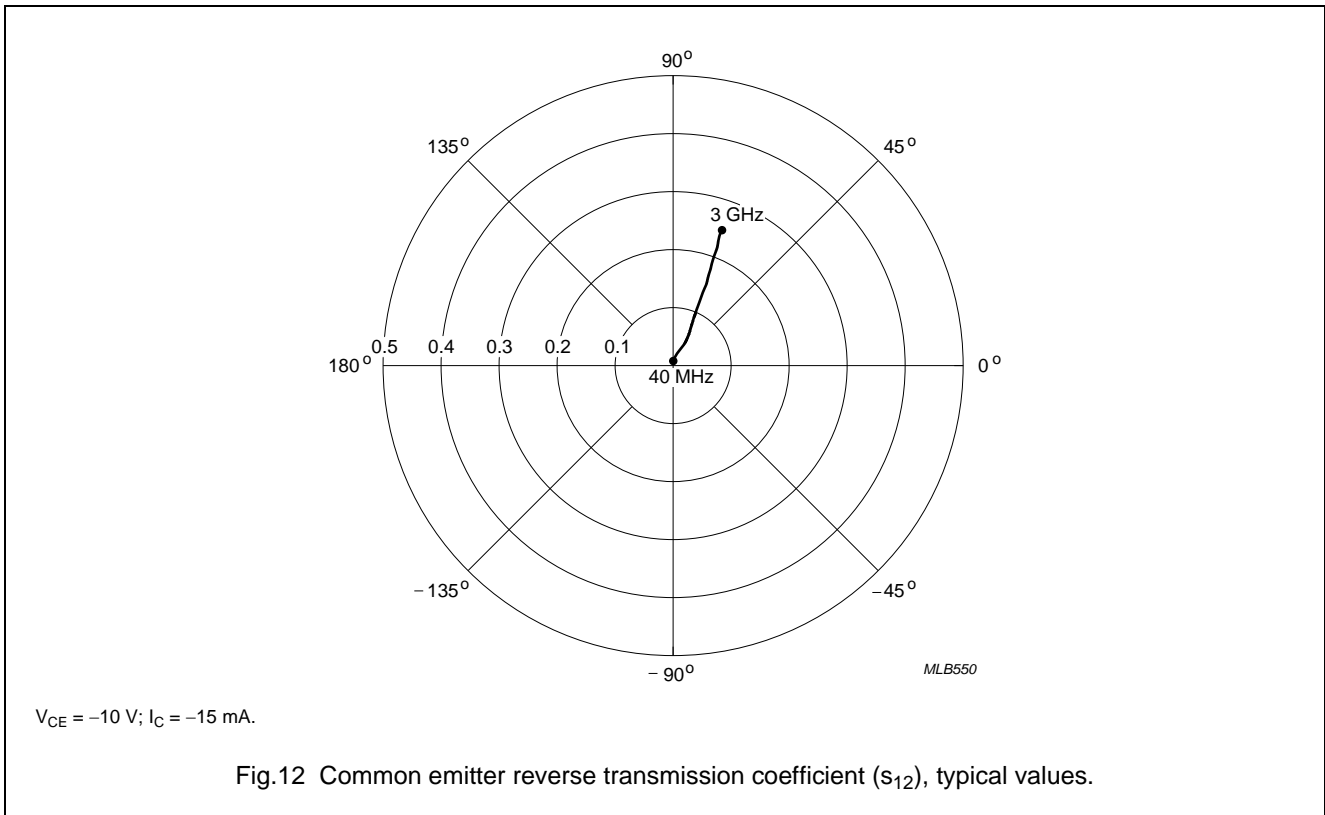
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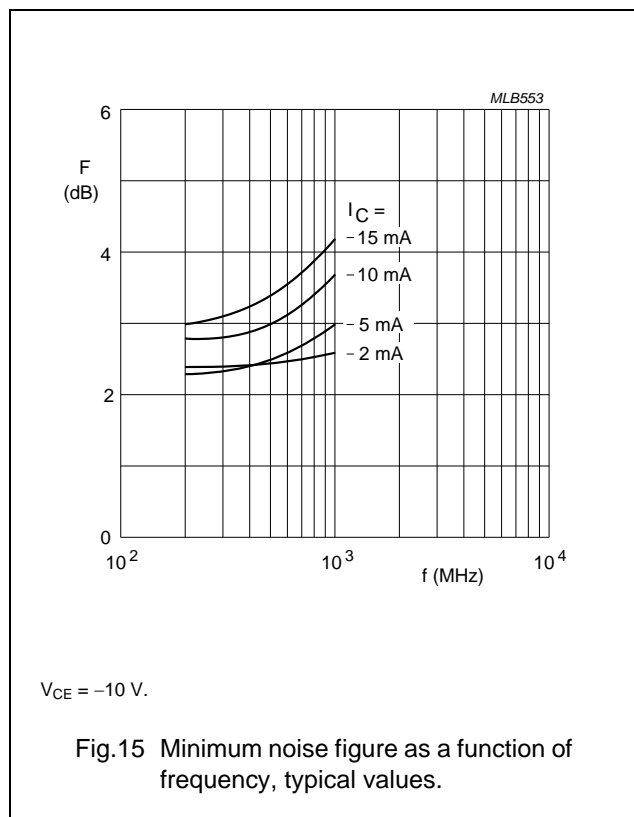
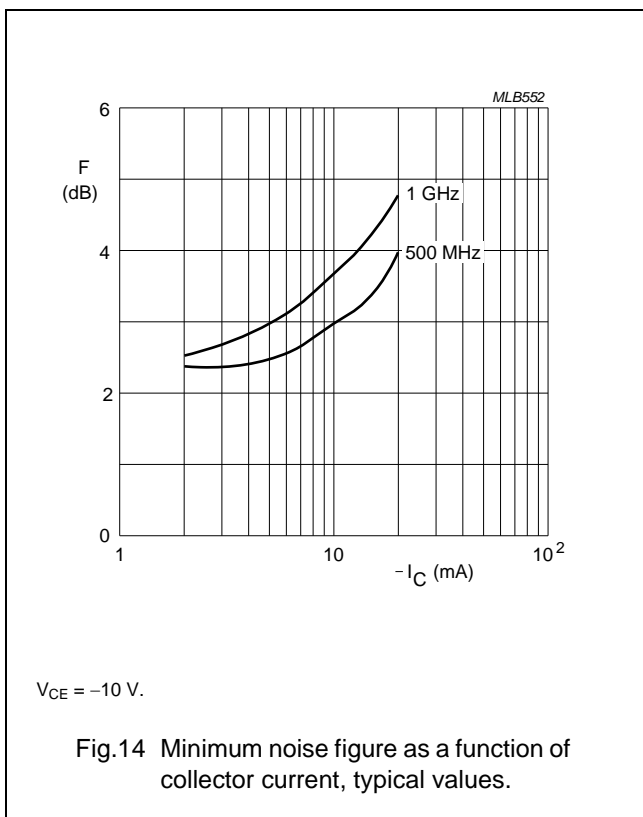
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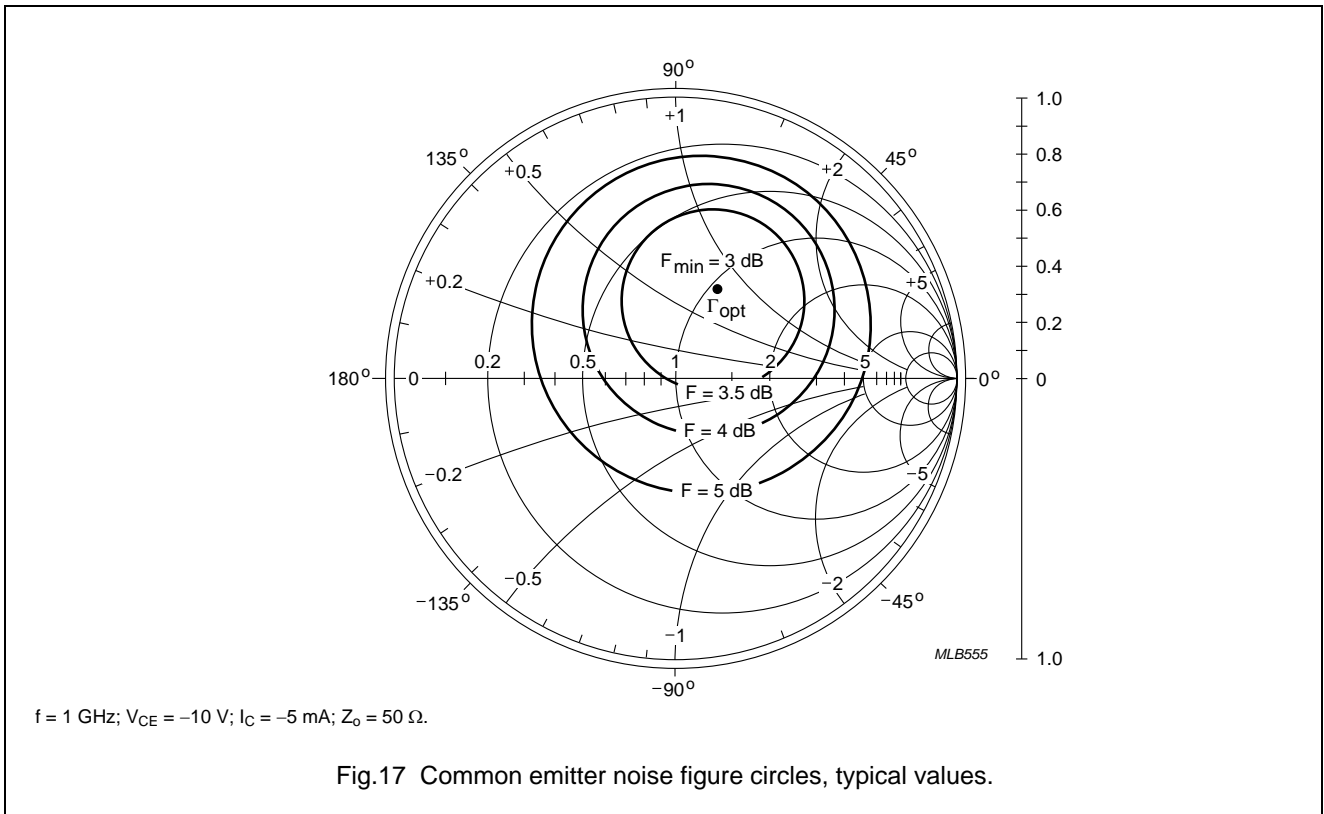
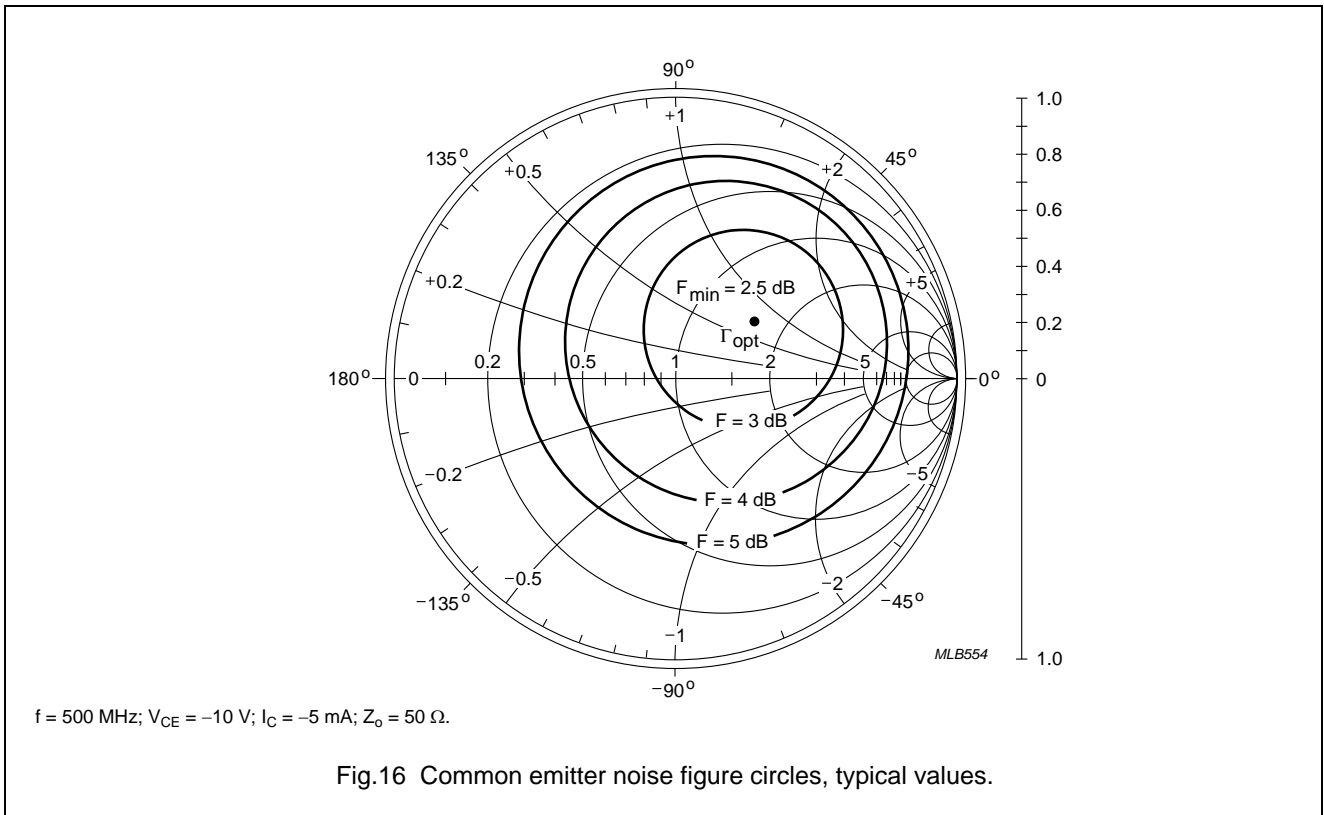
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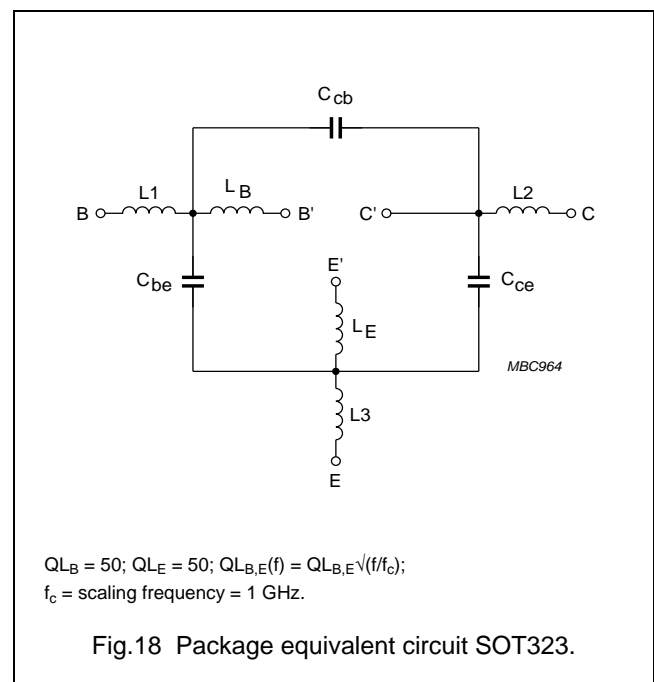
SPICE parameters for the BFT92W crystal

| SEQUENCE No. | PARAMETER | VALUE | UNIT |
|-------------------|-----------|-------|------|
| 1 | IS | 437.5 | aA |
| 2 | BF | 33.58 | – |
| 3 | NF | 1.009 | – |
| 4 | VAF | 23.39 | V |
| 5 | IKF | 99.53 | mA |
| 6 | ISE | 87.05 | fA |
| 7 | NE | 1.943 | – |
| 8 | BR | 4.947 | – |
| 9 | NR | 1.002 | – |
| 10 | VAR | 3.903 | V |
| 11 | IKR | 5.281 | mA |
| 12 | ISC | 35.88 | fA |
| 13 | NC | 1.393 | – |
| 14 | RB | 5.000 | Ω |
| 15 | IRB | 1.000 | μA |
| 16 | RBM | 5.000 | Ω |
| 17 | RE | 1.000 | Ω |
| 18 | RC | 10.00 | Ω |
| 19 ⁽¹⁾ | XTB | 0.000 | – |
| 20 ⁽¹⁾ | EG | 1.110 | eV |
| 21 ⁽¹⁾ | XTI | 3.000 | – |
| 22 | CJE | 746.6 | fF |
| 23 | VJE | 600.0 | mV |
| 24 | MJE | 0.357 | – |
| 25 | TF | 17.49 | ps |
| 26 | XTF | 1.354 | – |
| 27 | VTF | 155.6 | mV |
| 28 | ITF | 1.000 | mA |
| 29 | PTF | 45.00 | deg |
| 30 | CJC | 937.1 | fF |
| 31 | VJC | 396.4 | mV |
| 32 | MJC | 0.200 | – |
| 33 | XCJC | 0.106 | – |
| 34 | TR | 8.422 | ns |
| 35 ⁽¹⁾ | CJS | 0.000 | F |

| SEQUENCE No. | PARAMETER | VALUE | UNIT |
|-------------------|-----------|-------|------|
| 36 ⁽¹⁾ | VJS | 750.0 | mV |
| 37 ⁽¹⁾ | MJS | 0.000 | – |
| 38 | FC | 0.768 | – |

Note

1. These parameters have not been extracted, the default values are shown.



List of components (see Fig.18)

| DESIGNATION | VALUE | UNIT |
|-------------|-------|------|
| C_{be} | 2 | fF |
| C_{cb} | 100 | fF |
| C_{ce} | 100 | fF |
| L1 | 0.34 | nH |
| L2 | 0.10 | nH |
| L3 | 0.34 | nH |
| L_B | 0.60 | nH |
| L_E | 0.60 | nH |

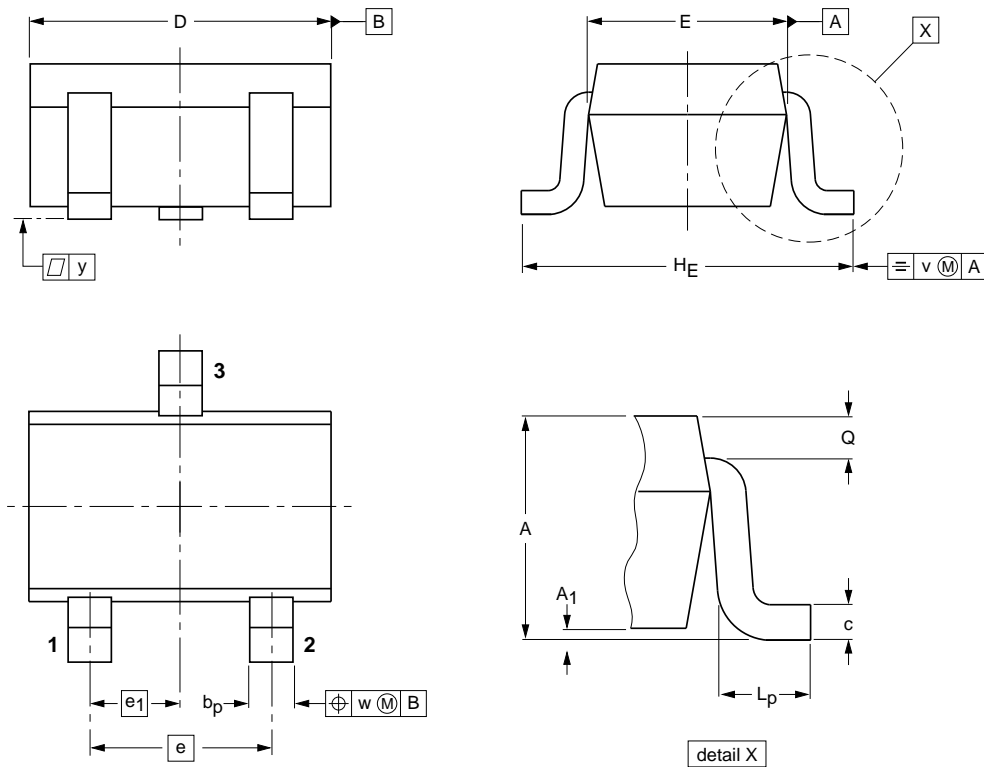
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PACKAGE OUTLINE

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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DATA SHEET STATUS

| 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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Printed in The Netherlands

R77/01/pp14

Date of release: May 1994

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