

NPN Epitaxial Planar Silicon Transistor



2SC4402

VHF/UHF Mixer, Local Oscillator, Low-Voltage Amplifier Applications

Applications

- VHF/UHF MIX/OSC, low-voltage high-frequency amplifiers.

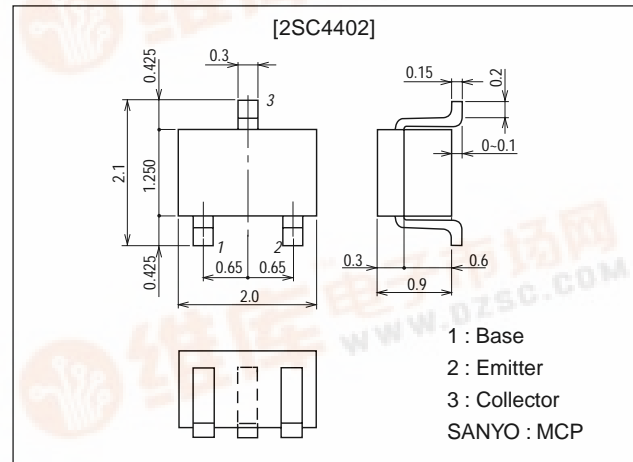
Features

- Low-voltage operation
 - : $f_T=3.0\text{GHz}$ typ ($V_{CE}=3\text{V}$)
 - : $\text{MAG}=12\text{dB}$ typ ($V_{CE}=3\text{V}$, $I_C=10\text{mA}$)
 - : $\text{NF}=1.5\text{dB}$ typ ($V_{CE}=3\text{V}$, $I_C=5\text{mA}$)
- Very small-sized package permitting 2SC4402-applied sets to be made smaller and slimmer.

Package Dimensions

unit:mm

2059B



Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage | V_{CB0} | | 25 | V |
| Collector-to-Emitter Voltage | V_{CE0} | | 15 | V |
| Emitter-to-Base Voltage | V_{EB0} | | 3 | V |
| Collector Current | I_C | | 50 | mA |
| Collector Dissipation | P_C | | 150 | mW |
| Junction Temperature | T_j | | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics at $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|------------------------------|-----------|--|---------|------|------|---------------|
| | | | min | typ | max | |
| Collector Cutoff Current | I_{CB0} | $V_{CB}=15\text{V}$, $I_E=0$ | | | 1.0 | μA |
| Emitter Cutoff Current | I_{EB0} | $V_{EB}=1\text{V}$, $I_C=0$ | | | 1.0 | μA |
| DC Current Gain | h_{FE} | $V_{CE}=3\text{V}$, $I_C=10\text{mA}$ | 40* | | 200* | |
| Gain-Bandwidth Product | f_T | $V_{CE}=3\text{V}$, $I_C=10\text{mA}$ | | 3.0 | | GHz |
| Output Capacitance | C_{ob} | $V_{CB}=3\text{V}$, $f=1\text{MHz}$ | | 0.85 | 1.5 | pF |
| Reverse Transfer Capacitance | C_{re} | $V_{CB}=3\text{V}$, $f=1\text{MHz}$ | | 0.8 | | pF |

* : The 2SC4402 is classified by 10mA h_{FE} as follows :

| | | | | | | | | |
|----|---|----|----|---|-----|-----|---|-----|
| 40 | 2 | 80 | 60 | 3 | 120 | 100 | 4 | 200 |
|----|---|----|----|---|-----|-----|---|-----|

(Note) Marking : PT

h_{FE} rank : 2, 3, 4

• For CP package version, use the 2SC4365.

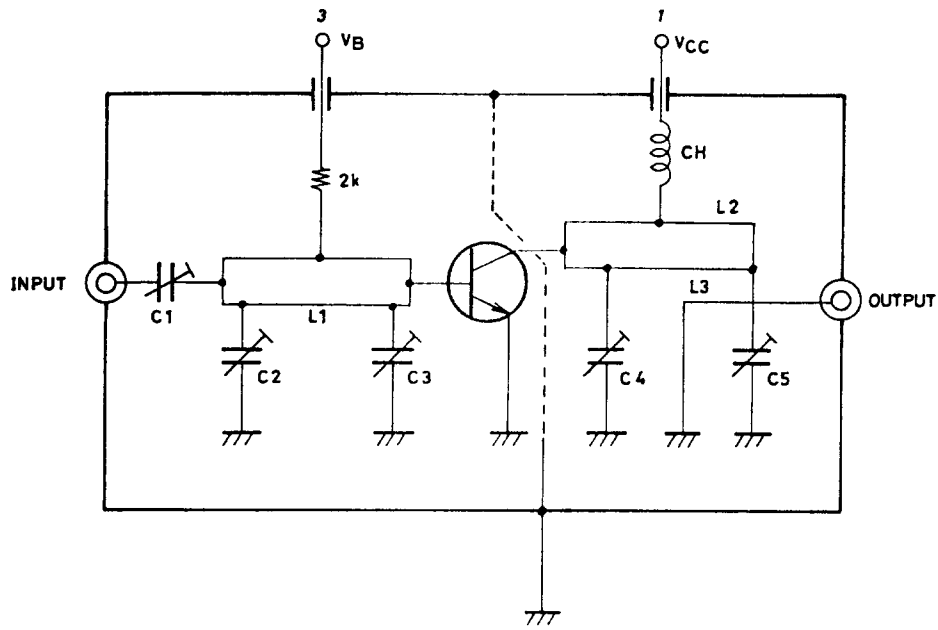
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| Parameter | Symbol | Conditions | Ratings | | | Unit |
|------------------------------|---------------|---|---------|-----|-----|------|
| | | | min | typ | max | |
| Forward Transfer Gain | $ S_{21e} ^2$ | $V_{CE}=3V, I_C=10mA, f=0.9GHz$ | | 7 | | dB |
| Maximum Available Power Gain | MAG | $V_{CE}=3V, I_C=10mA, f=0.9GHz$ | | 12 | | dB |
| Noise Figure | NF | $V_{CE}=3V, I_C=5mA, f=0.9GHz$ See specified Test Circuit. | | 1.5 | 3.0 | dB |

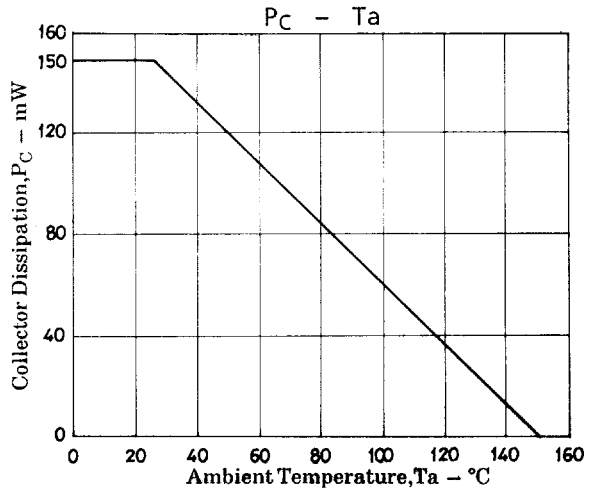
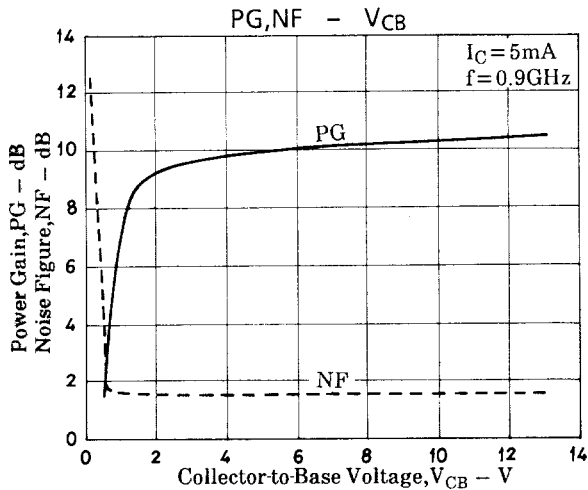
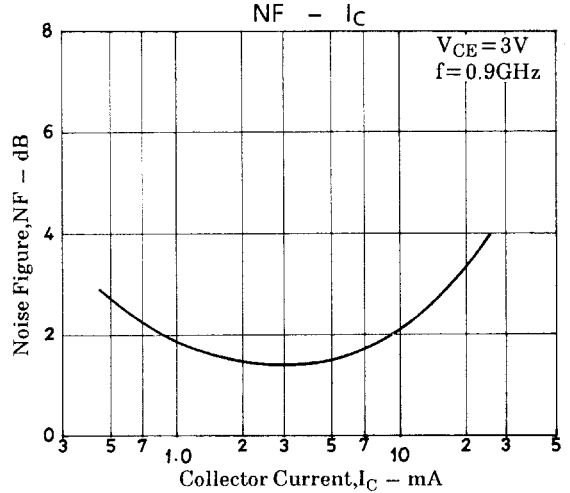
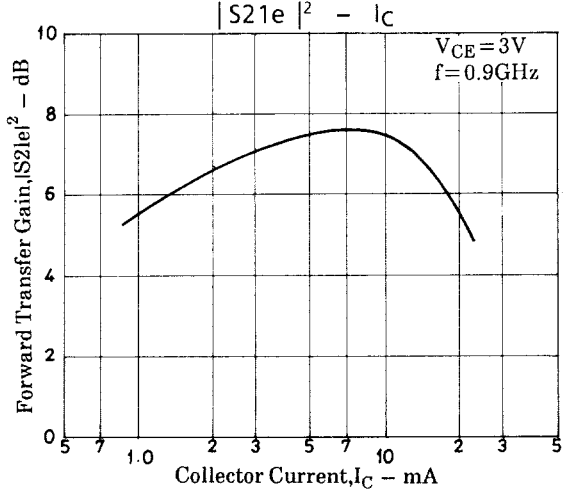
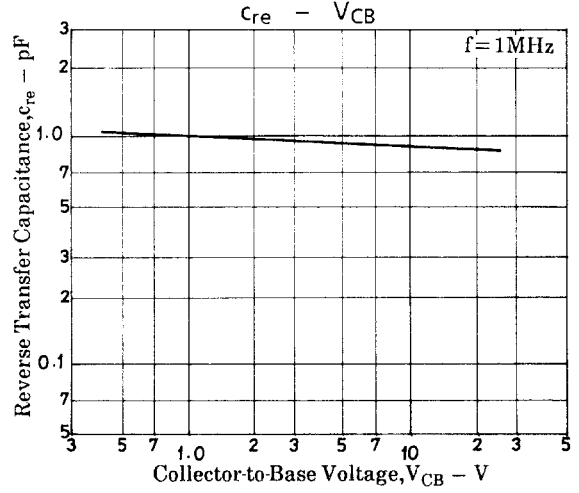
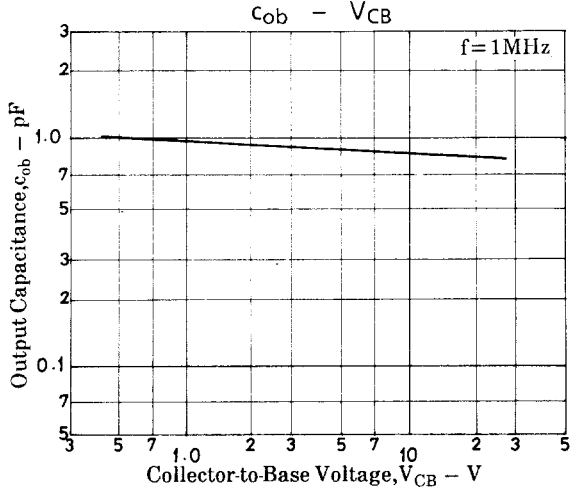
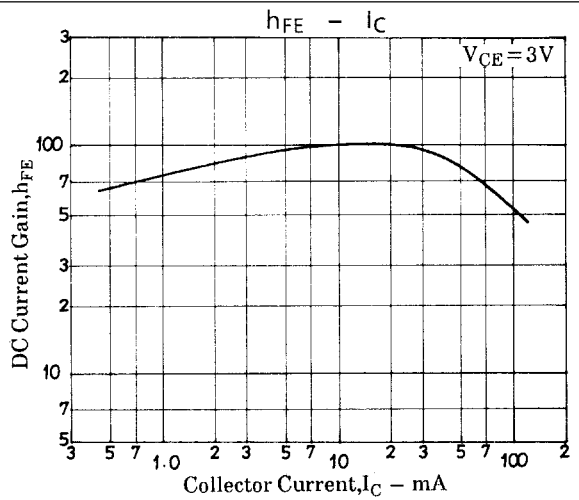
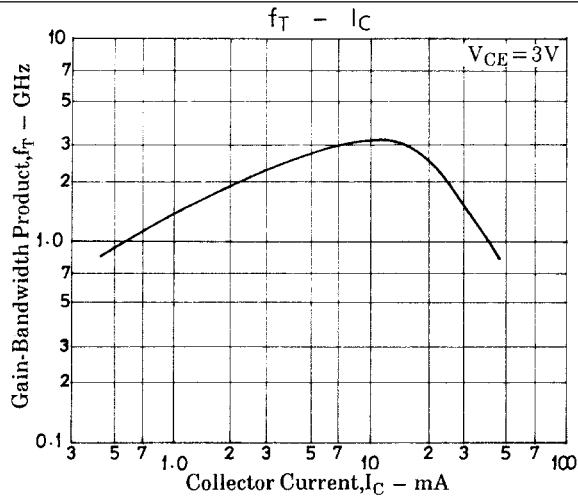
NF Test Circuit



Unit (resistance : Ω)

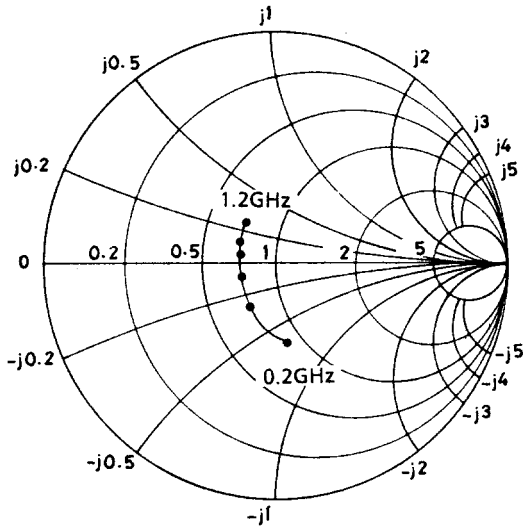
| | 900MHz |
|----|-----------------------------------|
| C1 | ~5pF |
| C2 | ~10pF |
| C3 | ~10pF |
| C4 | ~10pF |
| C5 | ~10pF |
| L1 | W ≈ 1.5mm, l ≈ 25mm Strip line |
| L2 | W ≈ 4mm, l ≈ 25mm Strip line |
| L3 | 0.5φ, l ≈ 40mm |
| CH | 2t+bead core |

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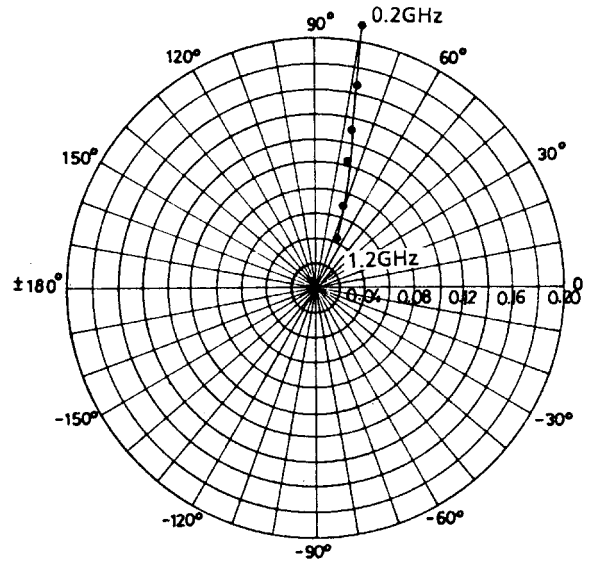


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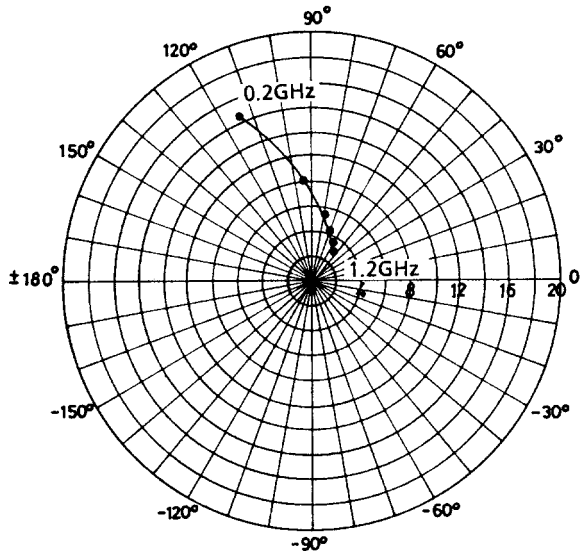
S11e: $V_{CE} = 3V$
 $I_C = 5mA$
 $f = 0.2GHz$ step



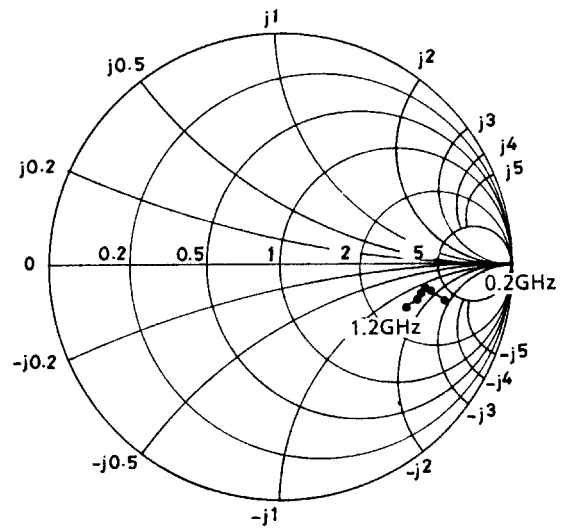
S12e: $V_{CE} = 3V$
 $I_C = 5mA$
 $f = 0.2GHz$ step



S21e: $V_{CE} = 3V$
 $I_C = 5mA$
 $f = 0.2GHz$ step



S22e: $V_{CE} = 3V$
 $I_C = 5mA$
 $f = 0.2GHz$ step



2SC4402

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