

**2SC5490**

UHF to S Band Low-Noise Amplifier Applications

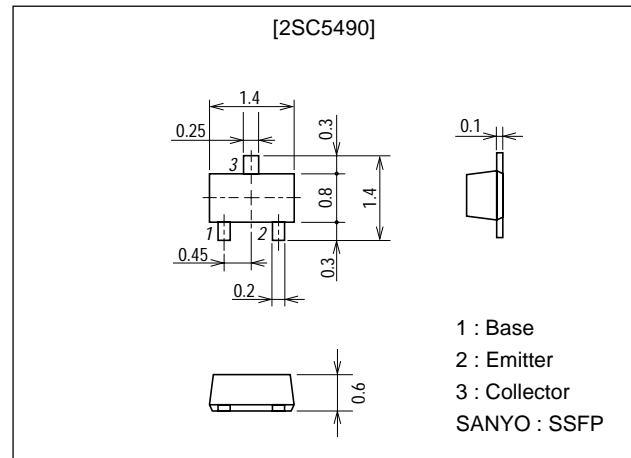
Features

- Low noise : $NF=0.9\text{dB typ (}f=1\text{GHz)}$.
: $NF=1.4\text{dB typ (}f=1.5\text{GHz)}$.
- High gain : $|S_{21e}|^2=10\text{dB typ (}f=1.5\text{GHz)}$.
- High cutoff frequency : $f_T=11\text{GHz typ}$.
- Ultrasmall, slim flat-lead package.
(1.4mm×0.8mm×0.6mm)
- Low voltage, low current operation.
($V_{CE}=1\text{V}$, $I_C=1\text{mA}$)
: $f_T=7\text{GHz typ}$.
: $|S_{21e}|^2=5.5\text{dB typ (}f=1.5\text{GHz)}$

Package Dimensions

unit:mm

2159



Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage | V_{CBO} | | 20 | V |
| Collector-to-Emitter Voltage | V_{CEO} | | 10 | V |
| Emitter-to-Base Voltage | V_{EBO} | | 1.5 | V |
| Collector Current | I_C | | 30 | mA |
| Collector Dissipation | P_C | | 100 | 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_{CBO} | $V_{CB}=10\text{V}$, $I_E=0$ | | | 1.0 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB}=1\text{V}$, $I_C=0$ | | | 10 | μA |
| DC Current Gain | h_{FE} | $V_{CE}=5\text{V}$, $I_C=10\text{mA}$ | 90 | | 200 | |
| Gain-Bandwidth Product | f_{T1} | $V_{CE}=5\text{V}$, $I_C=10\text{mA}$ | 8 | 11 | | GHz |
| | f_{T2} | $V_{CE}=1\text{V}$, $I_C=1\text{mA}$ | | 7 | | GHz |
| Output Capacitance | C_{ob} | $V_{CB}=10\text{V}$, $f=1\text{MHz}$ | | 0.45 | 0.7 | pF |
| Reverse Transfer Capacitance | C_{re} | $V_{CB}=10\text{V}$, $f=1\text{MHz}$ | | 0.3 | | pF |

Marking : MN

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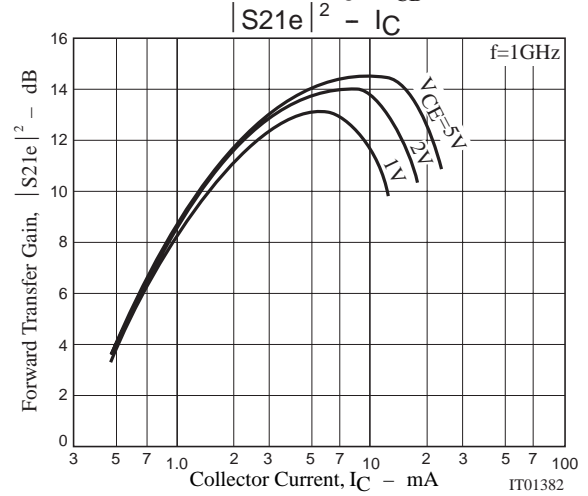
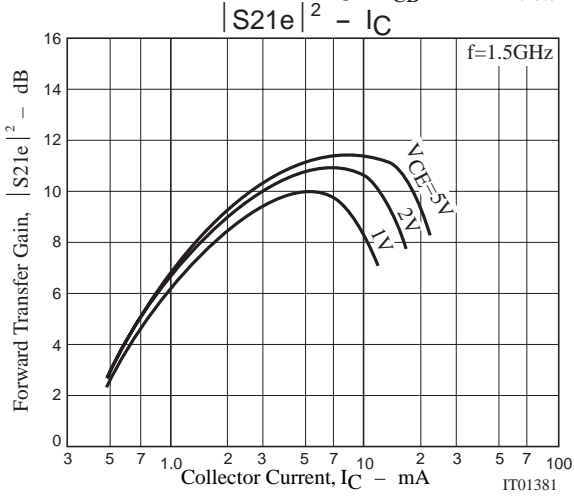
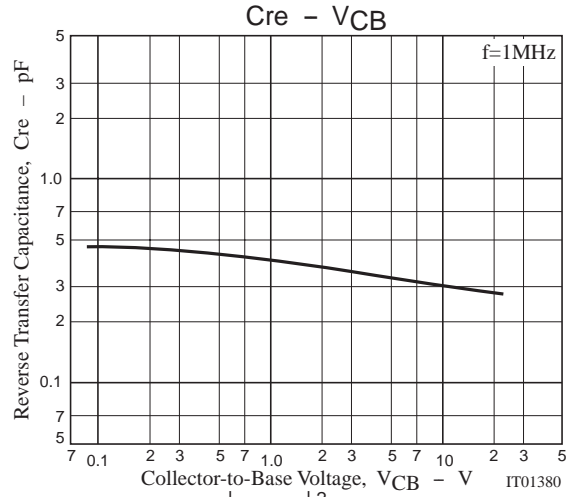
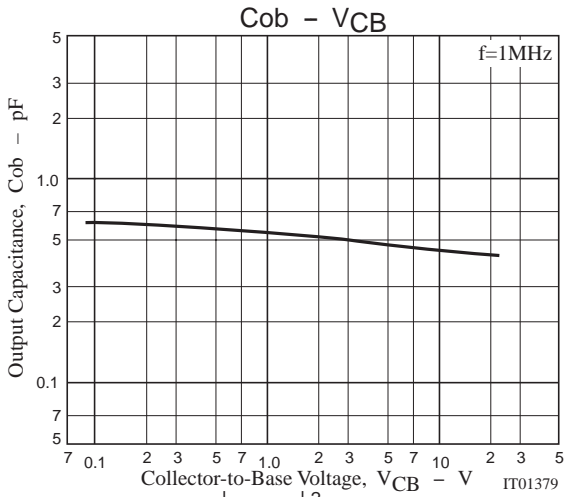
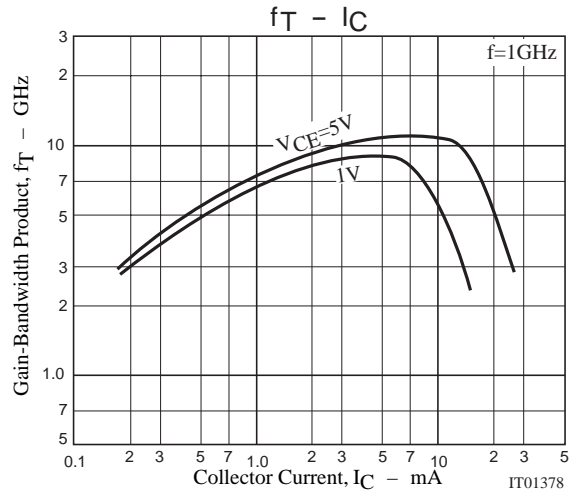
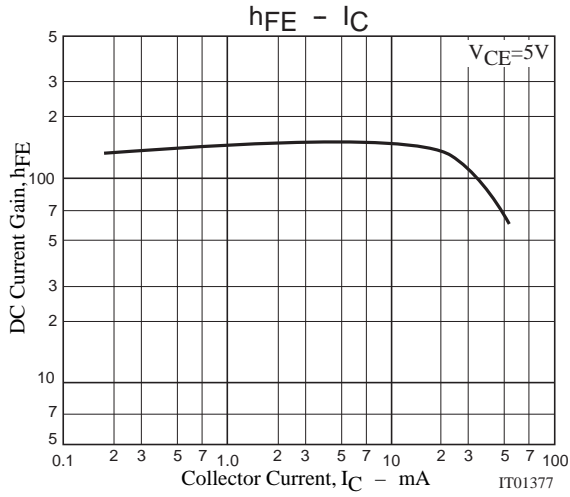
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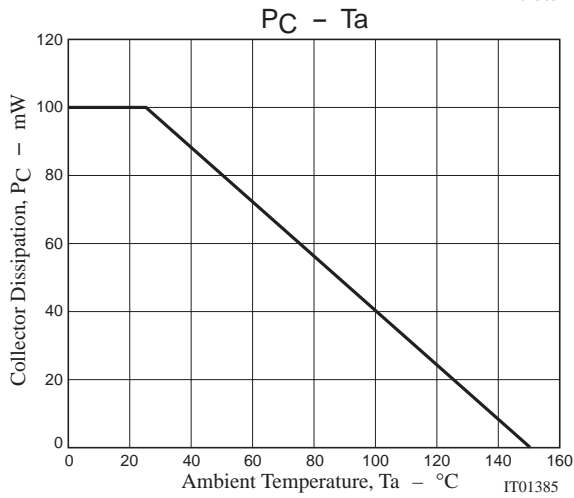
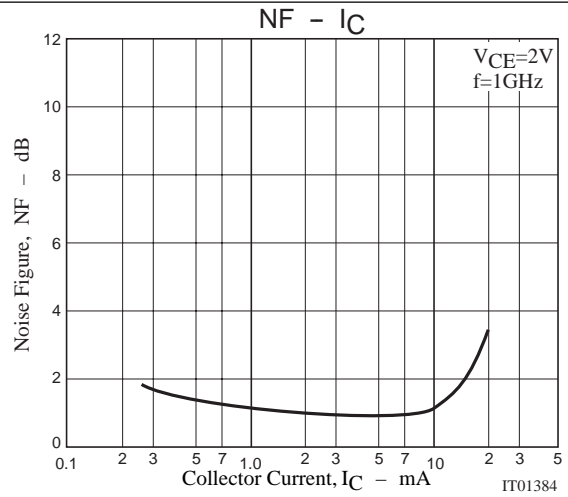
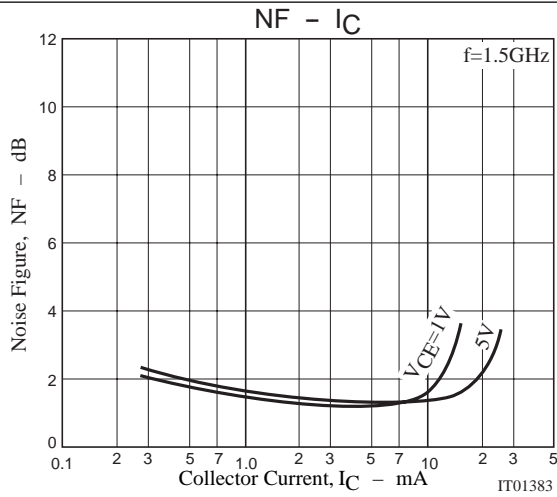
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| Parameter | Symbol | Conditions | Ratings | | | Unit |
|-----------------------|-----------------|---------------------------------|---------|-----|-----|------|
| | | | min | typ | max | |
| Forward Transfer Gain | $ S_{21e} ^2$ 1 | $V_{CE}=5V, I_C=10mA, f=1.5GHz$ | 8 | 10 | | dB |
| | $ S_{21e} ^2$ 2 | $V_{CE}=1V, I_C=1mA, f=1.5GHz$ | | 5.5 | | dB |
| Noise Figure | NF1 | $V_{CE}=5V, I_C=5mA, f=1.5GHz$ | | 1.4 | 3.0 | dB |
| | NF2 | $V_{CE}=2V, I_C=3mA, f=1GHz$ | | 0.9 | | dB |



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S Parameters (Common emitter)

V_{CE}=5V, I_C=5mA, Z_O=50Ω

| Freq (MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 200 | 0.782 | -37.1 | 12.043 | 148.4 | 0.038 | 69.7 | 0.889 | -19.5 |
| 400 | 0.623 | -65.4 | 9.431 | 126.6 | 0.057 | 60.8 | 0.758 | -28.3 |
| 600 | 0.502 | -85.6 | 7.415 | 112.2 | 0.072 | 56.5 | 0.646 | -33.3 |
| 800 | 0.420 | -102.4 | 6.000 | 101.5 | 0.083 | 55.2 | 0.577 | -35.9 |
| 1000 | 0.369 | -114.7 | 5.025 | 93.6 | 0.094 | 55.1 | 0.538 | -37.6 |
| 1200 | 0.339 | -127.2 | 4.323 | 86.7 | 0.105 | 55.6 | 0.513 | -38.7 |
| 1400 | 0.311 | -137.2 | 3.785 | 80.6 | 0.115 | 55.6 | 0.490 | -39.7 |
| 1600 | 0.296 | -144.9 | 3.391 | 75.3 | 0.127 | 56.7 | 0.480 | -41.3 |
| 1800 | 0.285 | -156.5 | 3.018 | 70.1 | 0.139 | 56.4 | 0.466 | -43.5 |
| 2000 | 0.277 | -164.2 | 2.767 | 65.7 | 0.150 | 56.7 | 0.460 | -45.5 |

V_{CE}=5V, I_C=10mA, Z_O=50Ω

| Freq (MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 200 | 0.641 | -52.7 | 16.527 | 137.8 | 0.031 | 67.4 | 0.820 | -22.9 |
| 400 | 0.468 | -85.4 | 11.299 | 115.7 | 0.048 | 60.5 | 0.643 | -30.2 |
| 600 | 0.377 | -106.6 | 8.303 | 103.1 | 0.060 | 60.0 | 0.549 | -32.2 |
| 800 | 0.321 | -124.1 | 6.502 | 94.0 | 0.072 | 60.9 | 0.499 | -33.2 |
| 1000 | 0.293 | -136.1 | 5.342 | 87.4 | 0.084 | 61.9 | 0.477 | -33.9 |
| 1200 | 0.280 | -146.7 | 4.546 | 81.4 | 0.097 | 62.7 | 0.462 | -35.0 |
| 1400 | 0.266 | -156.6 | 3.947 | 76.4 | 0.108 | 63.0 | 0.449 | -36.2 |
| 1600 | 0.263 | -163.2 | 3.527 | 71.4 | 0.123 | 63.7 | 0.444 | -37.8 |
| 1800 | 0.263 | -173.5 | 3.121 | 67.0 | 0.136 | 62.8 | 0.435 | -39.9 |
| 2000 | 0.264 | -179.8 | 2.864 | 62.8 | 0.150 | 62.4 | 0.434 | -42.4 |

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$V_{CE}=2V, I_C=3mA, Z_O=50\Omega$

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 200 | 0.851 | -30.4 | 8.644 | 154.1 | 0.042 | 73.0 | 0.937 | -16.4 |
| 400 | 0.724 | -55.7 | 7.310 | 133.8 | 0.073 | 61.3 | 0.820 | -27.9 |
| 600 | 0.612 | -76.1 | 6.083 | 118.6 | 0.093 | 54.2 | 0.709 | -35.7 |
| 800 | 0.521 | -93.0 | 5.085 | 106.9 | 0.107 | 50.4 | 0.628 | -40.4 |
| 1000 | 0.461 | -106.1 | 4.343 | 98.1 | 0.118 | 48.3 | 0.572 | -43.7 |
| 1200 | 0.423 | -118.6 | 3.806 | 90.0 | 0.128 | 47.5 | 0.536 | -45.8 |
| 1400 | 0.382 | -129.4 | 3.349 | 83.3 | 0.137 | 46.9 | 0.506 | -47.3 |
| 1600 | 0.366 | -138.0 | 3.036 | 77.5 | 0.147 | 47.4 | 0.485 | -49.5 |
| 1800 | 0.341 | -148.8 | 2.685 | 71.7 | 0.157 | 47.2 | 0.462 | -51.9 |
| 2000 | 0.333 | -157.7 | 2.479 | 66.7 | 0.167 | 47.6 | 0.453 | -54.1 |

$V_{CE}=1V, I_C=1mA, Z_O=50\Omega$

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 200 | 0.945 | -18.7 | 3.431 | 162.9 | 0.053 | 78.1 | 0.982 | -10.3 |
| 400 | 0.892 | -36.9 | 3.263 | 147.1 | 0.099 | 66.9 | 0.939 | -19.7 |
| 600 | 0.826 | -52.9 | 3.004 | 133.2 | 0.136 | 57.5 | 0.879 | -27.7 |
| 800 | 0.754 | -67.9 | 2.765 | 120.4 | 0.164 | 49.7 | 0.815 | -34.8 |
| 1000 | 0.691 | -81.1 | 2.539 | 109.9 | 0.184 | 43.4 | 0.758 | -40.0 |
| 1200 | 0.639 | -94.3 | 2.366 | 99.8 | 0.199 | 38.4 | 0.727 | -44.3 |
| 1400 | 0.589 | -104.9 | 2.143 | 91.2 | 0.207 | 34.1 | 0.683 | -47.8 |
| 1600 | 0.558 | -114.1 | 1.969 | 83.6 | 0.213 | 31.7 | 0.653 | -51.4 |
| 1800 | 0.522 | -124.4 | 1.797 | 76.2 | 0.218 | 28.7 | 0.621 | -54.9 |
| 2000 | 0.490 | -134.9 | 1.701 | 69.7 | 0.219 | 27.0 | 0.601 | -58.1 |

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