

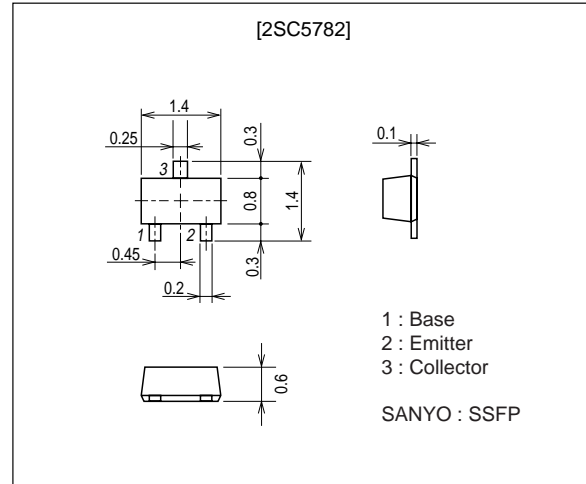
**2SC5782**

UHF to S Band Low-Noise Amplifier and OSC Applications

Features

- Low noise : NF=1.3dB typ (f=2GHz).
- High cutoff frequency : $f_T=8.5\text{GHz typ (V}_{CE}=1\text{V})$.
: $f_T=12.5\text{GHz typ (V}_{CE}=3\text{V})$.
- Low operating voltage.
- High gain : $|S_{21e}|^2=10.5\text{dB typ (f=2GHz)}$.
- Ultraminiature and thin flat lead package.
(1.4mm×0.8mm×0.6mm)

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} | | 9 | V |
| Collector-to-Emitter Voltage | V_{CEO} | | 4 | V |
| Emitter-to-Base Voltage | V_{EBO} | | 2 | V |
| Collector Current | I_C | | 40 | mA |
| Collector Dissipation | P_C | | 100 | mW |
| Junction Temperature | T_j | | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | | -55 to +150 | $^\circ\text{C}$ |

Marking : NJ

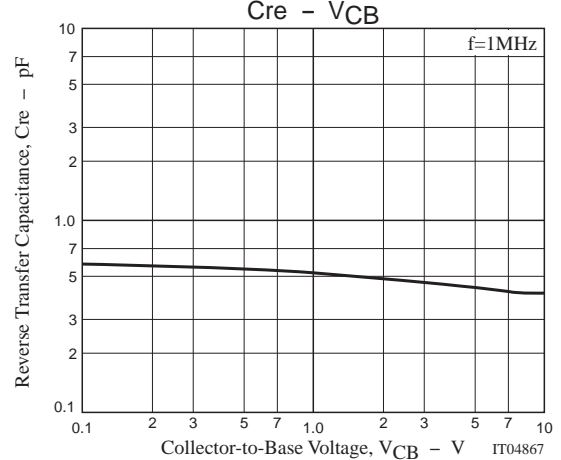
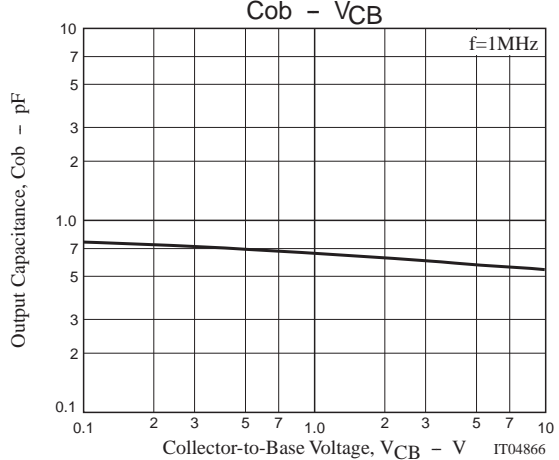
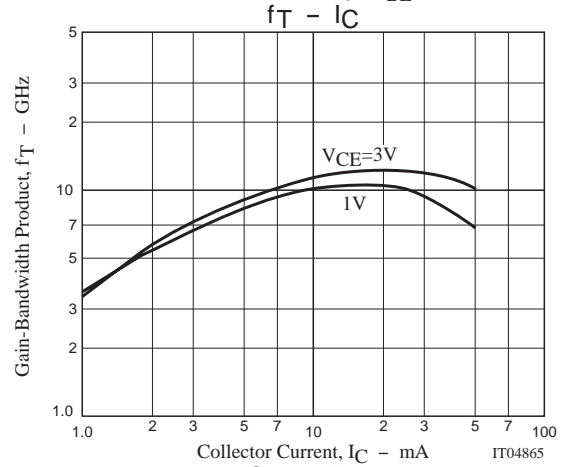
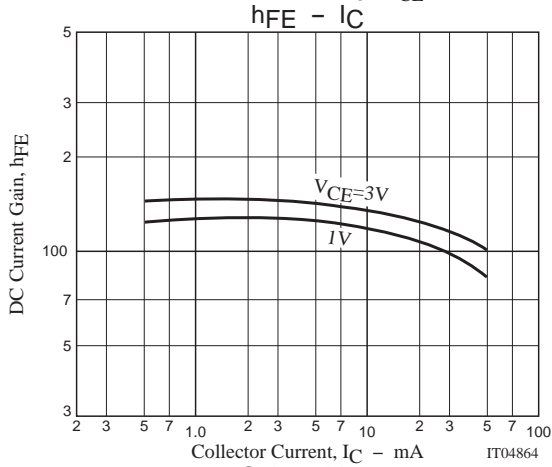
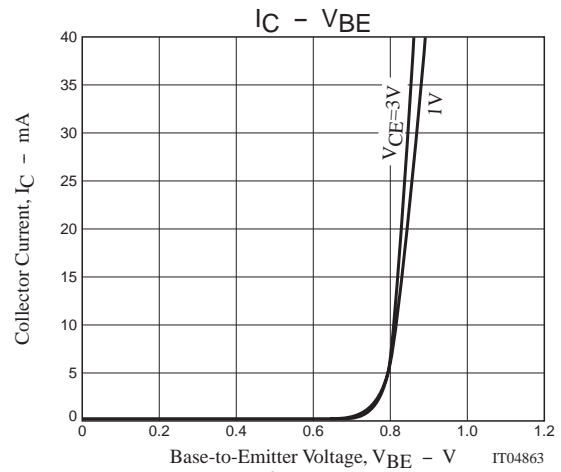
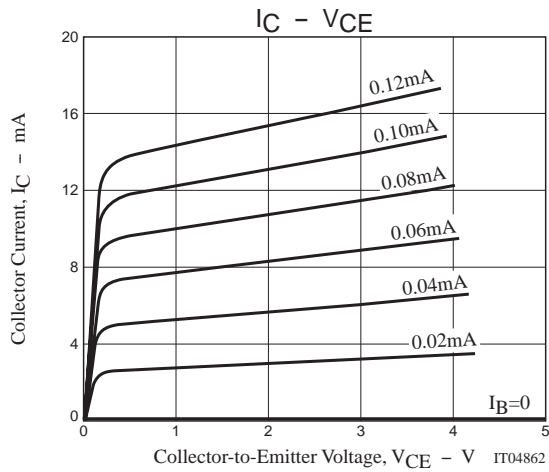
This product adopts a high-frequency process. Please be careful when handling it because it is susceptible to static electricity.

- Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.
- SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

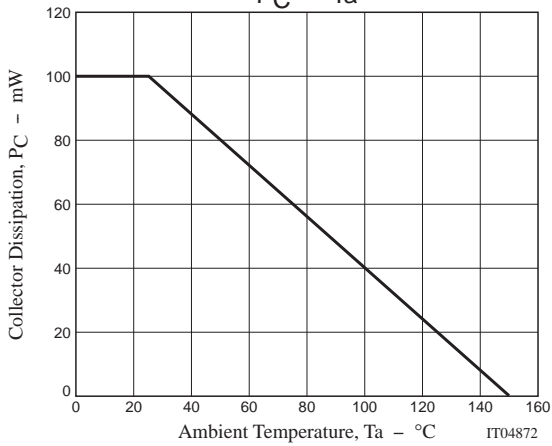
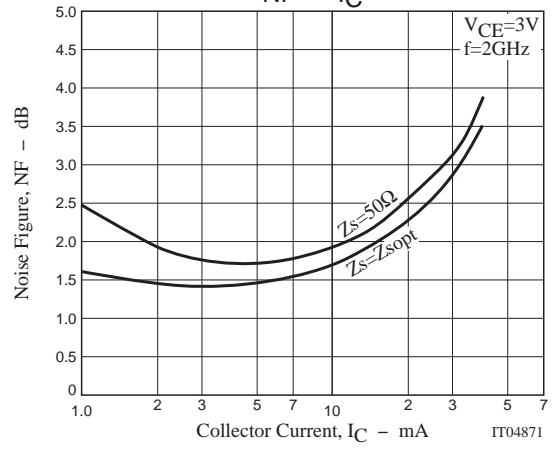
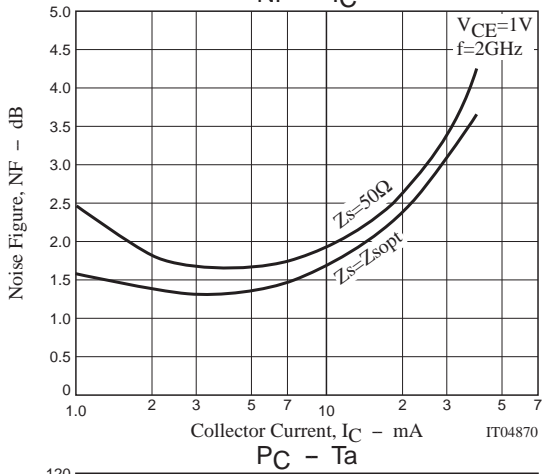
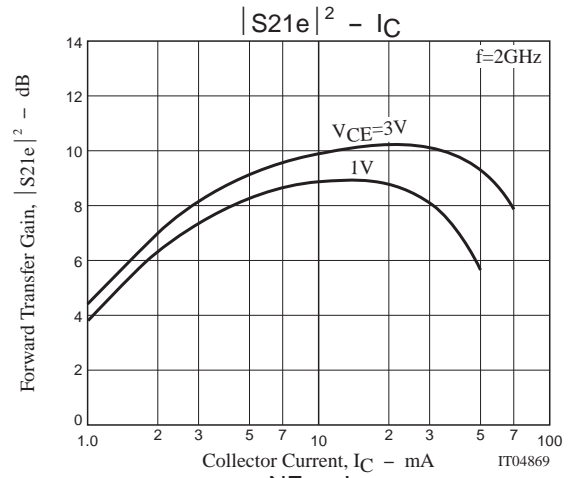
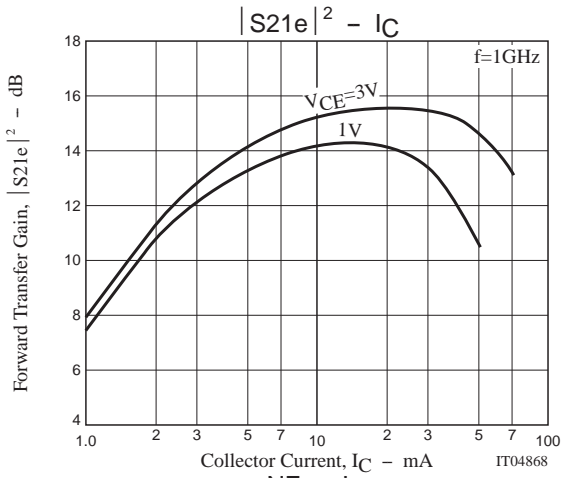
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Electrical Characteristics at $T_a=25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|------------------------------|---------------------|--|---------|------|-----|---------------|
| | | | min | typ | max | |
| Collector Cutoff Current | I_{CBO} | $V_{CB}=5\text{V}, I_E=0$ | | | 1.0 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB}=1\text{V}, I_C=0$ | | | 10 | μA |
| DC Current Gain | h_{FE} | $V_{CE}=1\text{V}, I_C=5\text{mA}$ | 100 | | 160 | |
| Gain-Bandwidth Product | f_T1 | $V_{CE}=1\text{V}, I_C=5\text{mA}$ | 7.0 | 8.5 | | GHz |
| | f_T2 | $V_{CE}=3\text{V}, I_C=20\text{mA}$ | 10.5 | 12.5 | | GHz |
| Output Capacitance | C_{ob} | $V_{CB}=1\text{V}, f=1\text{MHz}$ | | 0.65 | 0.8 | pF |
| Reverse Transfer Capacitance | C_{re} | $V_{CB}=1\text{V}, f=1\text{MHz}$ | | 0.5 | 0.7 | pF |
| Forward Transfer Gain | S21e ²¹ | $V_{CE}=1\text{V}, I_C=5\text{mA}, f=2\text{GHz}$ | 7.0 | 8.5 | | dB |
| | S21e ²² | $V_{CE}=3\text{V}, I_C=20\text{mA}, f=2\text{GHz}$ | 9.0 | 10.5 | | dB |
| Noise Figure | NF | $V_{CE}=1\text{V}, I_C=3\text{mA}, f=2\text{GHz}$ | | 1.3 | 2.0 | dB |



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S Parameters (Common emitter)

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

| Freq(MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|-----------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 100 | 0.972 | -9.50 | 3.324 | 171.60 | 0.032 | 82.87 | 0.985 | -6.84 |
| 200 | 0.962 | -18.52 | 3.264 | 163.75 | 0.064 | 76.84 | 0.975 | -13.64 |
| 400 | 0.928 | -36.08 | 3.112 | 148.65 | 0.119 | 64.51 | 0.930 | -26.12 |
| 600 | 0.889 | -52.39 | 2.888 | 134.98 | 0.163 | 53.46 | 0.872 | -37.37 |
| 800 | 0.837 | -66.26 | 2.648 | 122.57 | 0.193 | 44.87 | 0.810 | -46.61 |
| 1000 | 0.809 | -79.08 | 2.483 | 111.70 | 0.218 | 37.46 | 0.764 | -54.56 |
| 1200 | 0.763 | -90.61 | 2.275 | 101.43 | 0.231 | 30.91 | 0.719 | -61.92 |
| 1400 | 0.726 | -100.35 | 2.073 | 91.95 | 0.239 | 25.83 | 0.685 | -67.13 |
| 1600 | 0.691 | -109.24 | 1.934 | 83.55 | 0.248 | 21.58 | 0.658 | -72.68 |
| 1800 | 0.654 | -117.33 | 1.797 | 76.03 | 0.247 | 17.83 | 0.637 | -76.93 |
| 2000 | 0.626 | -124.10 | 1.677 | 69.00 | 0.247 | 14.84 | 0.625 | -81.06 |
| 2200 | 0.601 | -130.16 | 1.565 | 62.27 | 0.246 | 11.92 | 0.612 | -84.63 |
| 2400 | 0.580 | -135.57 | 1.448 | 56.66 | 0.240 | 9.07 | 0.602 | -86.88 |
| 2600 | 0.560 | -141.25 | 1.383 | 51.43 | 0.235 | 8.12 | 0.599 | -90.79 |
| 2800 | 0.548 | -146.06 | 1.296 | 46.36 | 0.227 | 7.30 | 0.596 | -93.36 |
| 3000 | 0.540 | -151.31 | 1.249 | 41.73 | 0.225 | 7.79 | 0.601 | -96.39 |

$V_{CE}=1V, I_C=5mA, Z_O=50\Omega$

| Freq(MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|-----------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 100 | 0.872 | -21.68 | 12.424 | 163.67 | 0.030 | 77.47 | 0.937 | -15.86 |
| 200 | 0.826 | -41.24 | 11.523 | 149.85 | 0.056 | 67.08 | 0.868 | -29.71 |
| 400 | 0.723 | -73.67 | 9.250 | 128.43 | 0.091 | 52.54 | 0.709 | -50.70 |
| 600 | 0.646 | -98.00 | 7.400 | 113.04 | 0.107 | 44.46 | 0.582 | -65.09 |
| 800 | 0.588 | -113.87 | 5.977 | 102.50 | 0.119 | 40.46 | 0.498 | -74.79 |
| 1000 | 0.568 | -127.08 | 5.082 | 93.56 | 0.130 | 38.70 | 0.448 | -81.90 |
| 1200 | 0.541 | -137.25 | 4.353 | 86.36 | 0.136 | 37.62 | 0.409 | -89.26 |
| 1400 | 0.521 | -145.89 | 3.779 | 79.99 | 0.144 | 37.47 | 0.386 | -93.45 |
| 1600 | 0.508 | -152.60 | 3.369 | 74.29 | 0.151 | 37.93 | 0.374 | -97.90 |
| 1800 | 0.494 | -158.57 | 3.041 | 69.09 | 0.159 | 37.54 | 0.366 | -101.22 |
| 2000 | 0.479 | -164.53 | 2.754 | 64.22 | 0.165 | 37.88 | 0.362 | -104.12 |
| 2200 | 0.470 | -169.56 | 2.541 | 59.57 | 0.174 | 38.32 | 0.356 | -107.88 |
| 2400 | 0.450 | -173.39 | 2.325 | 55.66 | 0.180 | 38.11 | 0.346 | -109.32 |
| 2600 | 0.448 | -177.87 | 2.184 | 52.18 | 0.188 | 38.95 | 0.355 | -112.14 |
| 2800 | 0.435 | 178.40 | 2.038 | 47.80 | 0.196 | 38.61 | 0.354 | -114.46 |
| 3000 | 0.435 | 174.57 | 1.942 | 44.45 | 0.206 | 39.00 | 0.356 | -116.77 |

$V_{CE}=1V, I_C=10mA, Z_O=50\Omega$

| Freq(MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|-----------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 100 | 0.767 | -32.72 | 19.369 | 157.20 | 0.028 | 73.89 | 0.884 | -22.79 |
| 200 | 0.702 | -60.20 | 16.622 | 139.80 | 0.050 | 61.86 | 0.764 | -40.71 |
| 400 | 0.600 | -98.47 | 11.711 | 117.56 | 0.073 | 50.38 | 0.562 | -63.93 |
| 600 | 0.555 | -121.75 | 8.693 | 103.81 | 0.084 | 46.35 | 0.444 | -78.10 |
| 800 | 0.522 | -135.28 | 6.774 | 95.19 | 0.094 | 45.68 | 0.377 | -87.30 |
| 1000 | 0.519 | -146.32 | 5.626 | 87.43 | 0.107 | 45.55 | 0.344 | -94.09 |
| 1200 | 0.505 | -154.32 | 4.763 | 81.47 | 0.115 | 47.16 | 0.321 | -101.46 |
| 1400 | 0.497 | -161.23 | 4.095 | 76.00 | 0.126 | 47.73 | 0.307 | -104.91 |
| 1600 | 0.491 | -166.53 | 3.641 | 71.09 | 0.137 | 47.78 | 0.302 | -109.07 |
| 1800 | 0.482 | -171.39 | 3.277 | 66.41 | 0.148 | 47.81 | 0.300 | -112.30 |
| 2000 | 0.474 | -176.01 | 2.953 | 62.13 | 0.157 | 47.96 | 0.304 | -114.55 |
| 2200 | 0.467 | 179.16 | 2.716 | 57.99 | 0.171 | 48.25 | 0.302 | -117.84 |
| 2400 | 0.449 | 175.64 | 2.486 | 54.42 | 0.180 | 46.94 | 0.294 | -119.01 |
| 2600 | 0.451 | 171.55 | 2.335 | 51.37 | 0.190 | 47.57 | 0.305 | -121.57 |
| 2800 | 0.439 | 168.24 | 2.169 | 47.30 | 0.201 | 46.53 | 0.303 | -124.11 |
| 3000 | 0.441 | 165.15 | 2.060 | 43.97 | 0.213 | 46.46 | 0.311 | -125.83 |

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V_{CE}=1V, I_C=20mA, Z_O=50Ω

| Freq(MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|-----------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 100 | 0.624 | -48.93 | 25.263 | 149.69 | 0.026 | 68.05 | 0.798 | -30.65 |
| 200 | 0.573 | -83.86 | 19.625 | 130.01 | 0.042 | 57.52 | 0.635 | -51.44 |
| 400 | 0.534 | -122.60 | 12.438 | 109.06 | 0.060 | 50.66 | 0.435 | -74.81 |
| 600 | 0.522 | -141.81 | 8.844 | 97.32 | 0.071 | 50.88 | 0.340 | -88.70 |
| 800 | 0.510 | -152.47 | 6.781 | 89.82 | 0.082 | 51.50 | 0.294 | -97.53 |
| 1000 | 0.513 | -160.65 | 5.576 | 83.02 | 0.094 | 53.06 | 0.276 | -103.58 |
| 1200 | 0.510 | -167.04 | 4.699 | 77.81 | 0.106 | 54.44 | 0.265 | -110.10 |
| 1400 | 0.504 | -171.93 | 4.022 | 72.79 | 0.118 | 55.03 | 0.259 | -113.13 |
| 1600 | 0.502 | -176.18 | 3.569 | 68.25 | 0.132 | 54.71 | 0.263 | -116.54 |
| 1800 | 0.498 | -179.48 | 3.198 | 63.88 | 0.144 | 54.38 | 0.266 | -119.43 |
| 2000 | 0.490 | -175.62 | 2.885 | 59.85 | 0.155 | 54.69 | 0.271 | -121.43 |
| 2200 | 0.485 | -171.39 | 2.657 | 55.73 | 0.169 | 53.58 | 0.275 | -124.43 |
| 2400 | 0.470 | -168.21 | 2.428 | 52.46 | 0.180 | 52.54 | 0.269 | -125.54 |
| 2600 | 0.472 | -165.02 | 2.275 | 49.30 | 0.193 | 52.53 | 0.282 | -127.34 |
| 2800 | 0.462 | -161.86 | 2.125 | 45.18 | 0.204 | 51.72 | 0.283 | -129.73 |
| 3000 | 0.463 | -158.77 | 2.015 | 42.21 | 0.217 | 50.75 | 0.293 | -131.71 |

V_{CE}=3V, I_C=1mA, Z_O=50Ω

| Freq(MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|-----------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 100 | 0.975 | -8.66 | 3.445 | 172.15 | 0.028 | 81.31 | 0.985 | -6.17 |
| 200 | 0.967 | -16.98 | 3.433 | 164.80 | 0.055 | 76.44 | 0.976 | -12.30 |
| 400 | 0.936 | -33.23 | 3.246 | 150.82 | 0.103 | 66.22 | 0.938 | -23.51 |
| 600 | 0.902 | -48.25 | 3.077 | 137.92 | 0.143 | 56.46 | 0.887 | -34.03 |
| 800 | 0.852 | -61.32 | 2.808 | 126.00 | 0.169 | 47.64 | 0.831 | -42.68 |
| 1000 | 0.823 | -73.92 | 2.665 | 115.50 | 0.192 | 40.56 | 0.790 | -50.10 |
| 1200 | 0.778 | -84.76 | 2.457 | 105.44 | 0.206 | 34.32 | 0.743 | -57.30 |
| 1400 | 0.738 | -94.63 | 2.253 | 96.16 | 0.215 | 29.67 | 0.706 | -62.54 |
| 1600 | 0.702 | -103.47 | 2.112 | 87.81 | 0.223 | 25.08 | 0.683 | -67.67 |
| 1800 | 0.666 | -111.22 | 1.980 | 80.41 | 0.225 | 21.94 | 0.661 | -71.83 |
| 2000 | 0.637 | -118.10 | 1.836 | 73.35 | 0.225 | 19.29 | 0.648 | -75.76 |
| 2200 | 0.608 | -124.15 | 1.720 | 66.40 | 0.224 | 16.85 | 0.632 | -79.73 |
| 2400 | 0.582 | -130.15 | 1.586 | 60.88 | 0.221 | 13.39 | 0.622 | -81.91 |
| 2600 | 0.565 | -135.55 | 1.527 | 55.77 | 0.216 | 12.71 | 0.621 | -85.36 |
| 2800 | 0.546 | -140.09 | 1.425 | 50.29 | 0.212 | 12.10 | 0.616 | -87.99 |
| 3000 | 0.537 | -145.90 | 1.374 | 45.93 | 0.207 | 12.28 | 0.616 | -91.19 |

V_{CE}=3V, I_C=5mA, Z_O=50Ω

| Freq(MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|-----------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 100 | 0.892 | -18.34 | 12.380 | 165.31 | 0.025 | 79.51 | 0.944 | -13.38 |
| 200 | 0.847 | -35.62 | 11.581 | 152.73 | 0.049 | 69.85 | 0.886 | -25.65 |
| 400 | 0.749 | -64.64 | 9.619 | 132.37 | 0.081 | 57.01 | 0.746 | -44.10 |
| 600 | 0.661 | -87.51 | 7.903 | 117.21 | 0.100 | 47.28 | 0.625 | -57.12 |
| 800 | 0.593 | -103.50 | 6.509 | 106.16 | 0.111 | 44.19 | 0.536 | -66.29 |
| 1000 | 0.565 | -117.10 | 5.568 | 97.29 | 0.122 | 41.61 | 0.482 | -72.86 |
| 1200 | 0.529 | -127.82 | 4.808 | 89.67 | 0.128 | 40.03 | 0.440 | -79.72 |
| 1400 | 0.505 | -136.27 | 4.175 | 83.22 | 0.135 | 39.91 | 0.413 | -83.40 |
| 1600 | 0.489 | -143.82 | 3.738 | 77.50 | 0.143 | 39.55 | 0.396 | -87.67 |
| 1800 | 0.472 | -150.40 | 3.380 | 72.06 | 0.151 | 40.01 | 0.387 | -90.90 |
| 2000 | 0.456 | -156.03 | 3.071 | 67.21 | 0.156 | 40.31 | 0.380 | -93.96 |
| 2200 | 0.442 | -161.65 | 2.832 | 62.45 | 0.167 | 40.39 | 0.374 | -97.28 |
| 2400 | 0.423 | -166.05 | 2.581 | 58.45 | 0.171 | 39.88 | 0.362 | -98.53 |
| 2600 | 0.417 | -170.82 | 2.435 | 54.91 | 0.179 | 40.34 | 0.367 | -101.52 |
| 2800 | 0.406 | -174.62 | 2.274 | 50.37 | 0.188 | 40.16 | 0.365 | -104.01 |
| 3000 | 0.407 | -178.72 | 2.156 | 47.23 | 0.194 | 41.30 | 0.369 | -106.34 |

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V_{CE}=3V, I_C=10mA, Z_O=50Ω

| Freq(MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|-----------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 100 | 0.802 | -26.99 | 19.371 | 159.74 | 0.026 | 74.65 | 0.905 | -18.69 |
| 200 | 0.739 | -50.17 | 17.050 | 143.85 | 0.044 | 63.96 | 0.802 | -34.40 |
| 400 | 0.619 | -85.36 | 12.605 | 122.03 | 0.067 | 53.64 | 0.613 | -54.88 |
| 600 | 0.551 | -108.81 | 9.584 | 107.91 | 0.082 | 49.65 | 0.490 | -67.55 |
| 800 | 0.507 | -123.64 | 7.571 | 98.69 | 0.091 | 47.84 | 0.412 | -75.99 |
| 1000 | 0.493 | -135.48 | 6.328 | 90.89 | 0.101 | 48.72 | 0.371 | -82.01 |
| 1200 | 0.476 | -144.54 | 5.375 | 84.54 | 0.110 | 48.18 | 0.342 | -88.43 |
| 1400 | 0.460 | -152.33 | 4.640 | 79.00 | 0.120 | 49.17 | 0.323 | -91.82 |
| 1600 | 0.451 | -158.14 | 4.128 | 74.06 | 0.130 | 48.99 | 0.317 | -95.73 |
| 1800 | 0.444 | -163.53 | 3.708 | 69.38 | 0.140 | 49.61 | 0.309 | -98.72 |
| 2000 | 0.435 | -168.64 | 3.362 | 65.10 | 0.149 | 49.59 | 0.310 | -101.80 |
| 2200 | 0.428 | -173.80 | 3.088 | 60.84 | 0.161 | 49.19 | 0.308 | -105.18 |
| 2400 | 0.408 | -177.50 | 2.815 | 57.15 | 0.171 | 48.23 | 0.298 | -106.20 |
| 2600 | 0.407 | 178.38 | 2.646 | 53.94 | 0.181 | 49.10 | 0.308 | -108.71 |
| 2800 | 0.397 | 174.27 | 2.464 | 50.04 | 0.191 | 48.09 | 0.306 | -111.72 |
| 3000 | 0.400 | 171.20 | 2.336 | 46.78 | 0.203 | 48.31 | 0.312 | -113.88 |

V_{CE}=3V, I_C=20mA, Z_O=50Ω

| Freq(MHz) | S ₁₁ | ∠S ₁₁ | S ₂₁ | ∠S ₂₁ | S ₁₂ | ∠S ₁₂ | S ₂₂ | ∠S ₂₂ |
|-----------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| 100 | 0.681 | -38.13 | 26.466 | 153.51 | 0.022 | 70.92 | 0.847 | -24.70 |
| 200 | 0.606 | -67.79 | 21.551 | 134.97 | 0.038 | 59.90 | 0.702 | -42.79 |
| 400 | 0.519 | -106.19 | 14.298 | 113.61 | 0.054 | 54.68 | 0.497 | -63.18 |
| 600 | 0.485 | -127.90 | 10.362 | 101.29 | 0.068 | 52.45 | 0.387 | -74.58 |
| 800 | 0.462 | -140.45 | 8.010 | 93.52 | 0.078 | 54.39 | 0.325 | -82.24 |
| 1000 | 0.462 | -150.06 | 6.613 | 86.54 | 0.091 | 54.96 | 0.298 | -87.57 |
| 1200 | 0.454 | -157.53 | 5.586 | 81.00 | 0.101 | 55.31 | 0.278 | -94.11 |
| 1400 | 0.448 | -163.38 | 4.798 | 76.11 | 0.111 | 56.28 | 0.267 | -96.85 |
| 1600 | 0.444 | -168.29 | 4.257 | 71.65 | 0.125 | 56.18 | 0.268 | -100.57 |
| 1800 | 0.437 | -173.02 | 3.824 | 67.28 | 0.138 | 55.37 | 0.265 | -103.27 |
| 2000 | 0.432 | -177.44 | 3.449 | 63.40 | 0.149 | 55.72 | 0.271 | -105.82 |
| 2200 | 0.430 | 177.96 | 3.177 | 59.25 | 0.164 | 54.84 | 0.271 | -110.06 |
| 2400 | 0.412 | 174.56 | 2.890 | 55.78 | 0.171 | 53.07 | 0.262 | -110.91 |
| 2600 | 0.414 | 171.18 | 2.722 | 52.85 | 0.183 | 53.37 | 0.273 | -113.29 |
| 2800 | 0.403 | 167.51 | 2.530 | 48.88 | 0.194 | 53.09 | 0.273 | -115.69 |
| 3000 | 0.407 | 164.62 | 2.396 | 45.77 | 0.208 | 52.49 | 0.282 | -118.20 |

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