

DATA SHEET

NEC**NPN SILICON RF TRANSISTOR
2SC5801****NPN SILICON RF TRANSISTOR FOR
HIGH-FREQUENCY LOW NOISE
3-PIN LEAD-LESS MINIMOLD****FEATURES**

- Low phase distortion, low voltage operation
- Ideal for OSC applications
- 3-pin lead-less minimold package

ORDERING INFORMATION

| Part Number | Quantity | Supplying Form |
|-------------|-------------------|--|
| 2SC5801 | 50 pcs (Non reel) | • 8 mm wide embossed taping |
| 2SC5801-T3 | 10 kpcs/reel | • Pin 2 (Base) face the perforation side of the tape |

Remark To order evaluation samples, consult your NEC sales representative.
Unit sample quantity is 50 pcs.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

| Parameter | Symbol | Ratings | Unit |
|------------------------------|----------------------------------|-------------|------|
| Collector to Base Voltage | V _{CBO} | 9.0 | V |
| Collector to Emitter Voltage | V _{CEO} | 5.5 | V |
| Emitter to Base Voltage | V _{EBO} | 1.5 | V |
| Collector Current | I _c | 100 | mA |
| Total Power Dissipation | P _{tot} ^{Note} | 140 | mW |
| Junction Temperature | T _j | 150 | °C |
| Storage Temperature | T _{stg} | -65 to +150 | °C |

Note Mounted on 1.08 cm² × 1.0 mm (t) glass epoxy PCB

Because this product uses high-frequency technology, avoid excessive static electricity, etc.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------------|-----------------------------------|--|------|------|------|------|
| DC Characteristics | | | | | | |
| Collector Cut-off Current | I _{CBO} | V _{CB} = 5 V, I _E = 0 mA | – | – | 600 | nA |
| Emitter Cut-off Current | I _{EBO} | V _{BE} = 1 V, I _C = 0 mA | – | – | 600 | nA |
| DC Current Gain | h _{FE} ^{Note 1} | V _{CE} = 1 V, I _C = 5 mA | 100 | 120 | 145 | – |
| RF Characteristics | | | | | | |
| Gain Bandwidth Product (1) | f _T | V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz | 3.0 | 4.5 | – | GHz |
| Gain Bandwidth Product (2) | f _T | V _{CE} = 1 V, I _C = 15 mA, f = 2 GHz | 5.0 | 6.5 | – | GHz |
| Insertion Power Gain (1) | S _{21e} ² | V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz | 3.0 | 4.0 | – | dB |
| Insertion Power Gain (2) | S _{21e} ² | V _{CE} = 1 V, I _C = 15 mA, f = 2 GHz | 4.5 | 5.5 | – | dB |
| Noise Figure | NF | V _{CE} = 1 V, I _C = 10 mA, f = 2 GHz, Z _S = Z _{opt} | – | 1.9 | 2.5 | dB |
| Reverse Transfer Capacitance | C _{re} ^{Note 2} | V _{CB} = 0.5 V, I _E = 0 mA, f = 1 MHz | – | 0.6 | 0.8 | pF |

Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

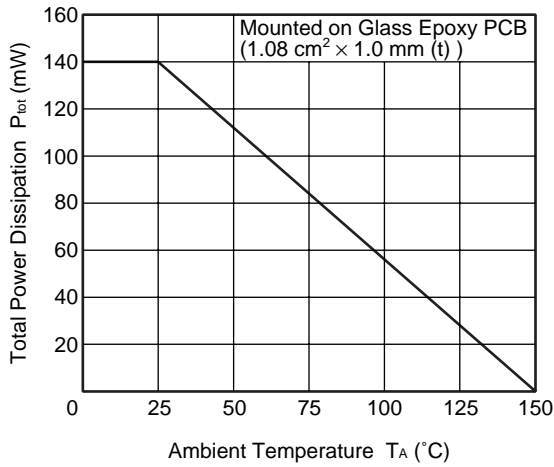
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

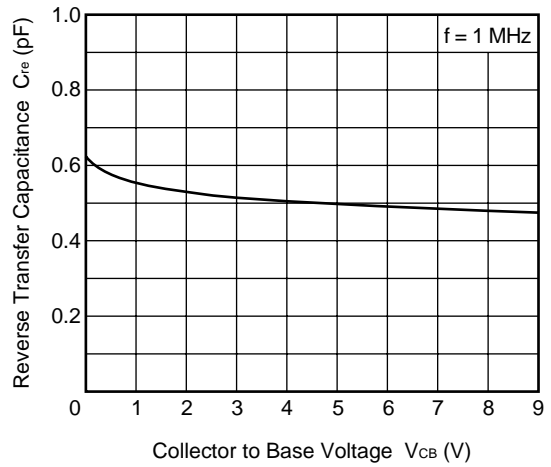
| | |
|-----------------------|------------|
| Rank | FB |
| Marking | E7 |
| h _{FE} Value | 100 to 145 |

TYPICAL CHARACTERISTICS (Unless otherwise specified, $T_A = +25^\circ\text{C}$)

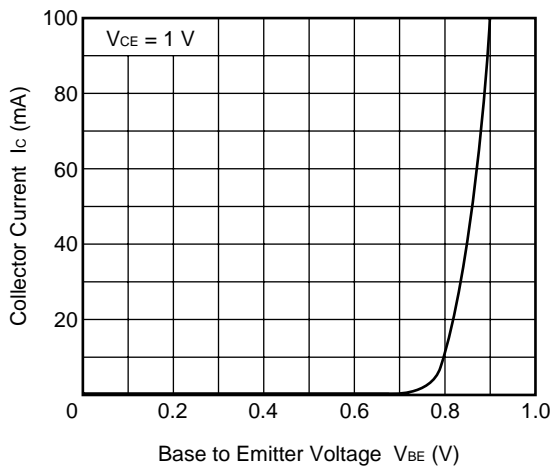
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



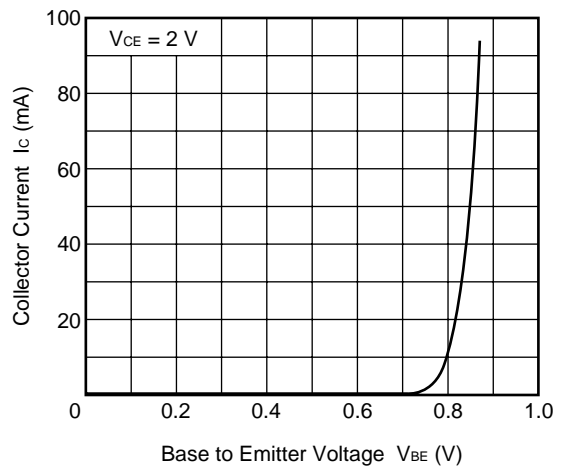
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



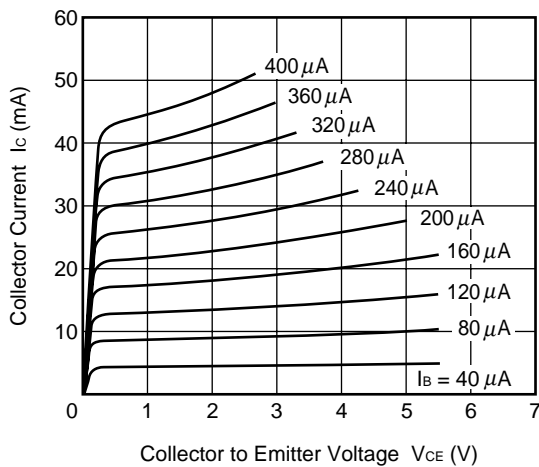
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



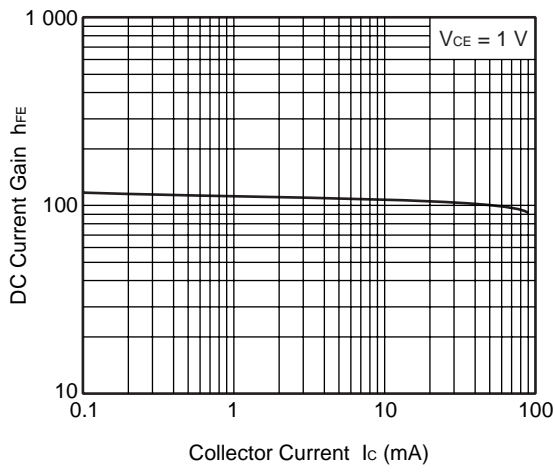
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



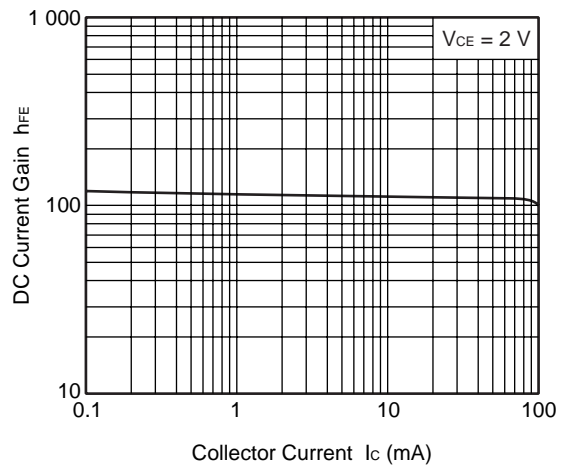
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



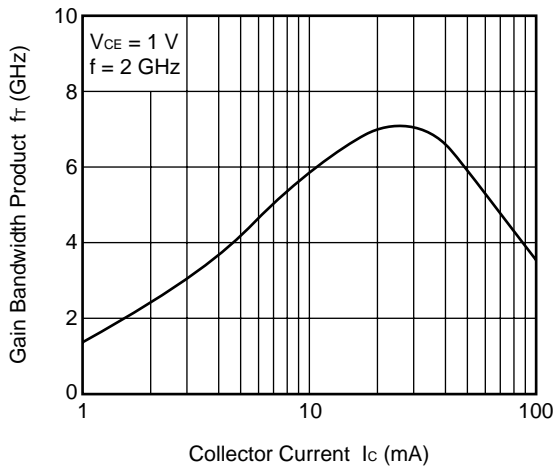
DC CURRENT GAIN vs.
COLLECTOR CURRENT



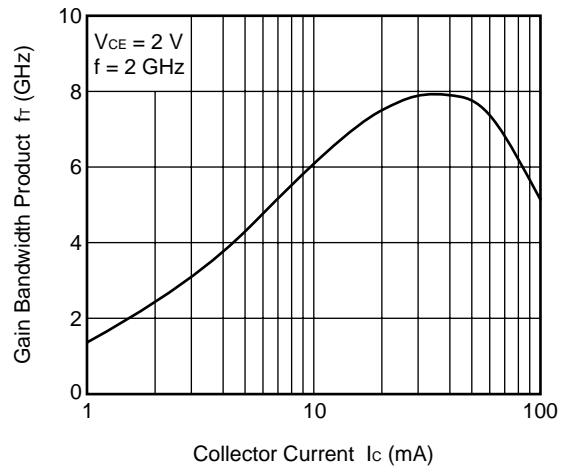
DC CURRENT GAIN vs.
COLLECTOR CURRENT



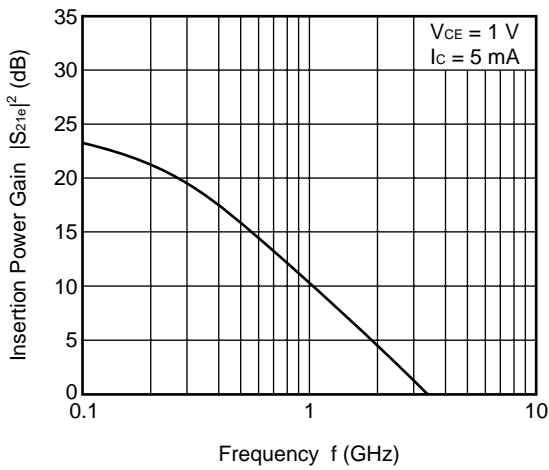
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



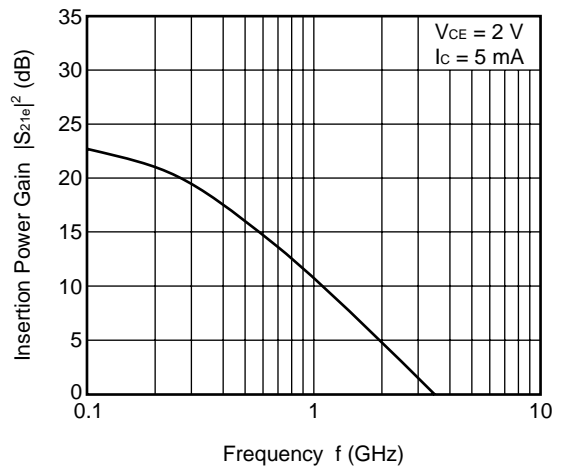
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



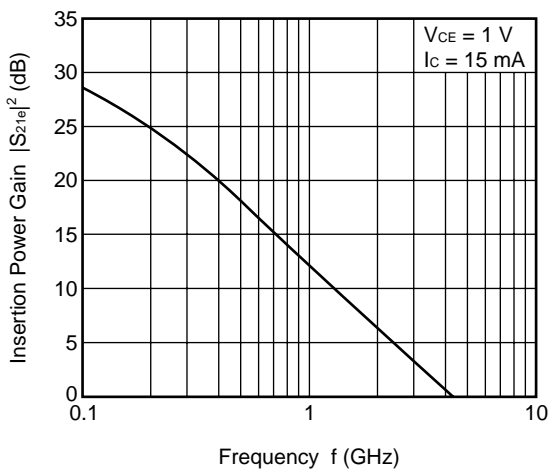
INSERTION POWER GAIN vs. FREQUENCY



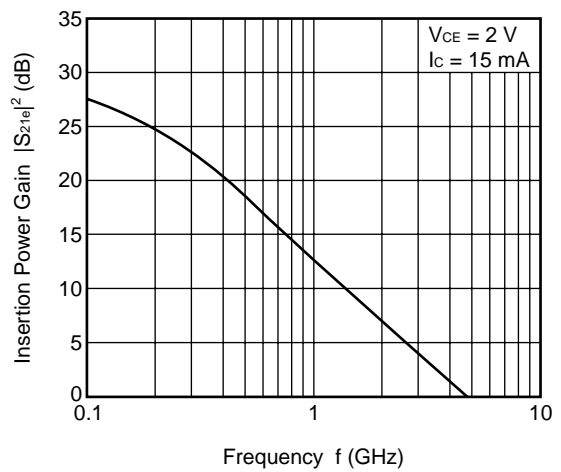
INSERTION POWER GAIN vs. FREQUENCY



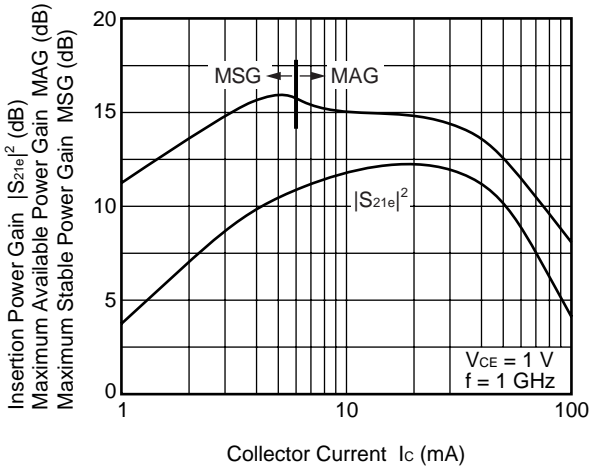
INSERTION POWER GAIN vs. FREQUENCY



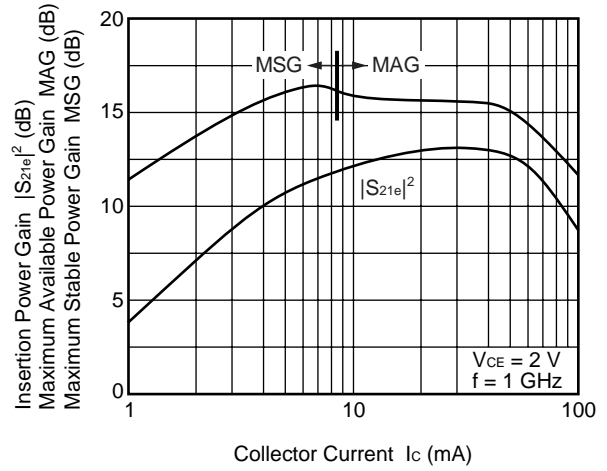
INSERTION POWER GAIN vs. FREQUENCY



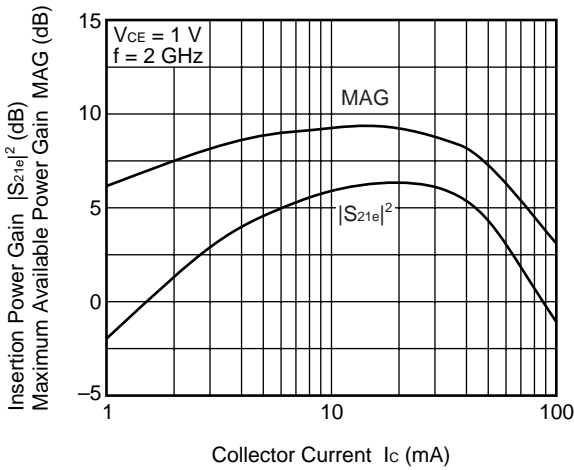
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



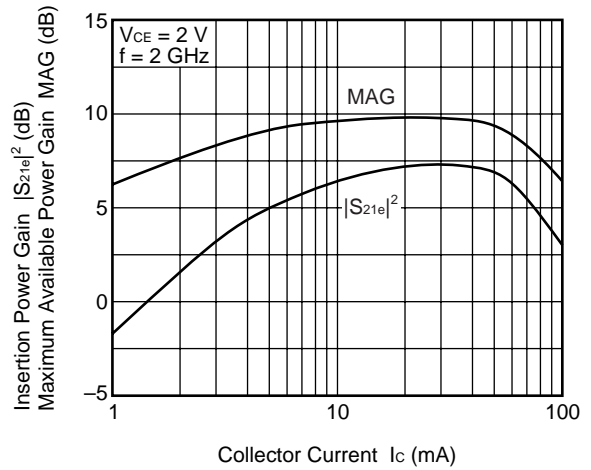
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



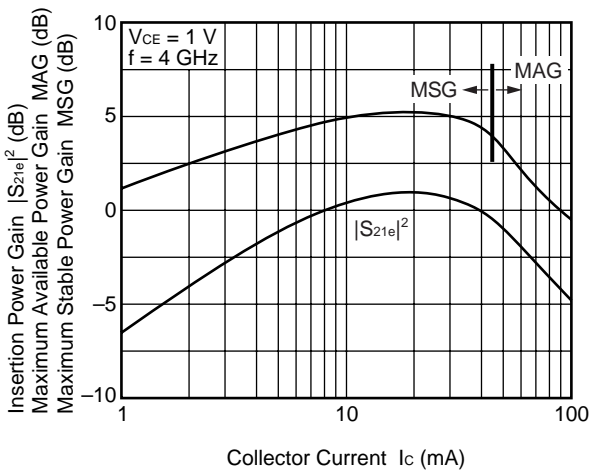
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



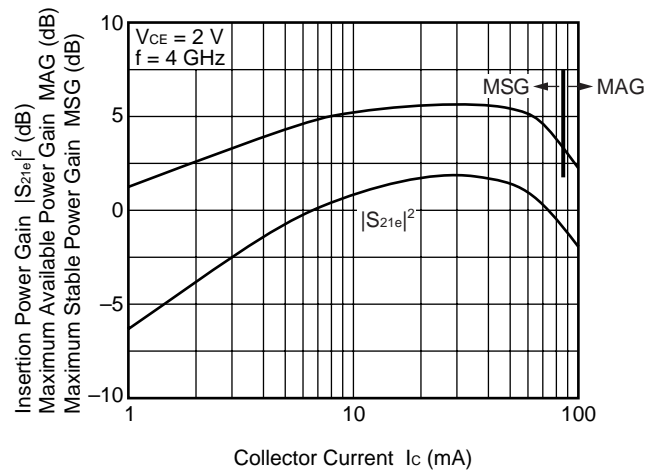
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



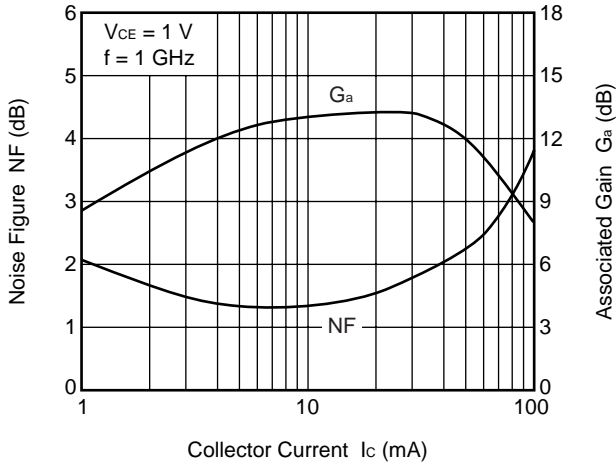
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



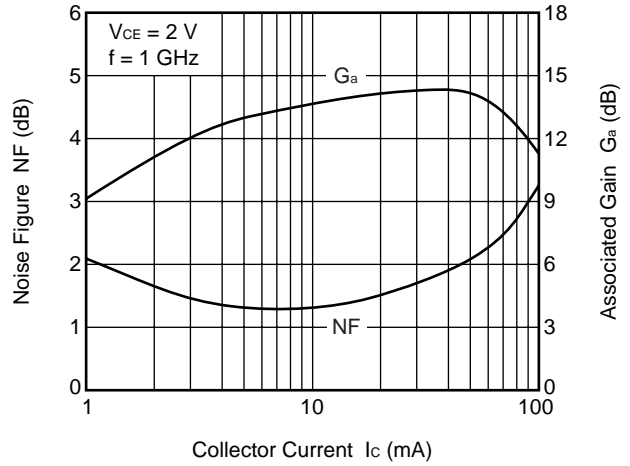
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



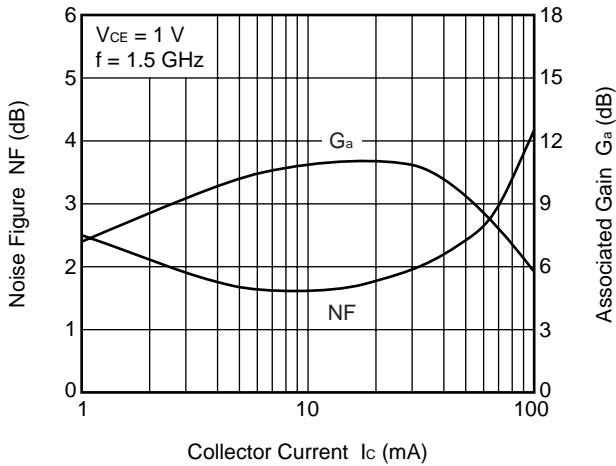
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



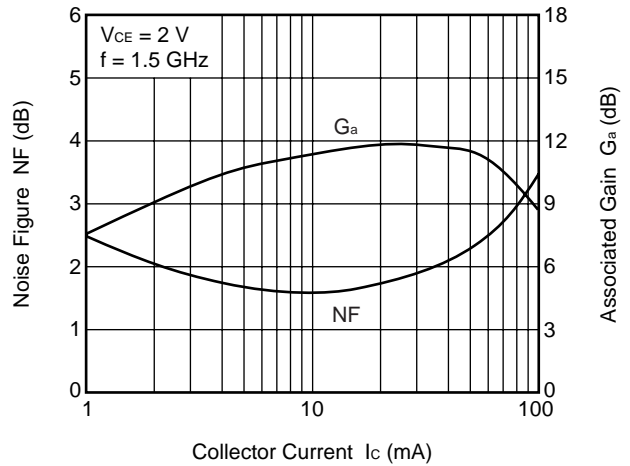
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



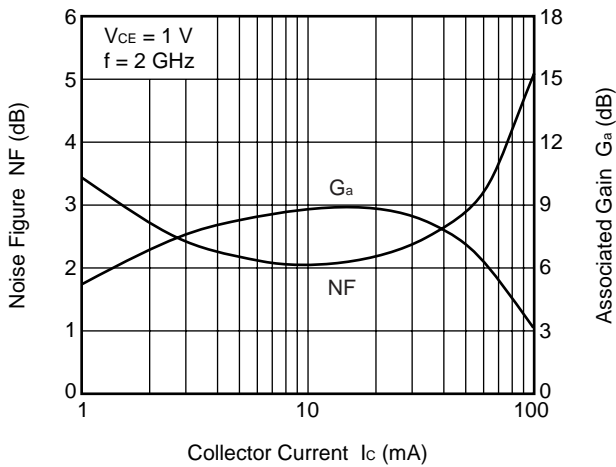
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



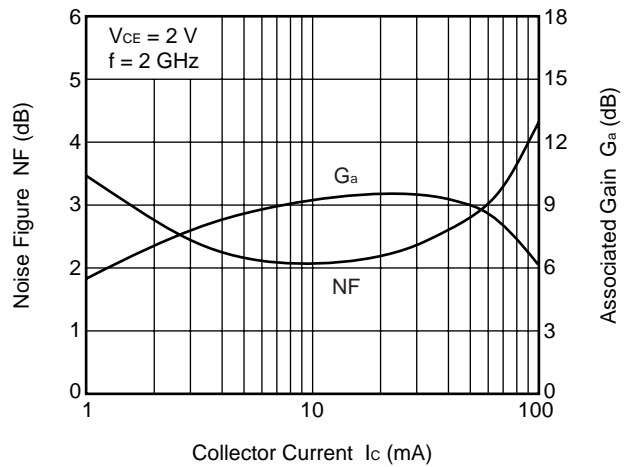
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



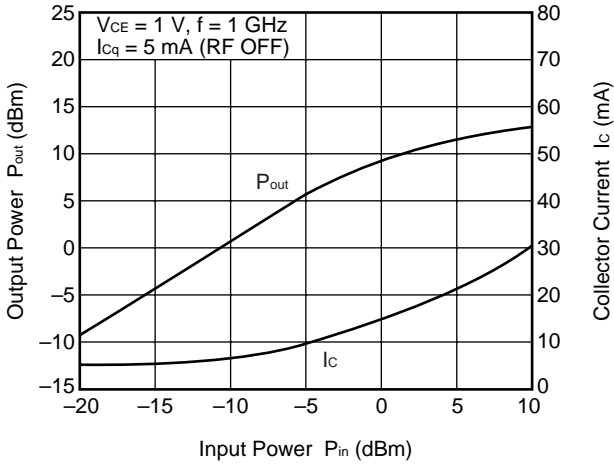
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



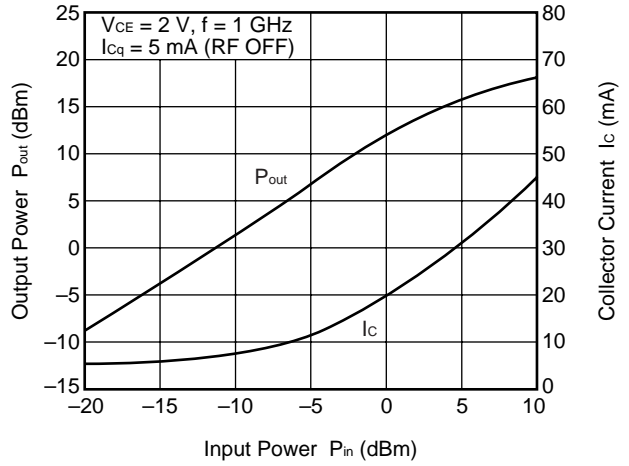
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



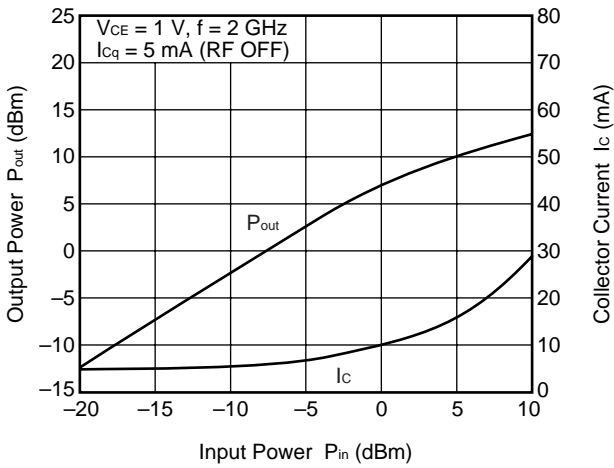
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



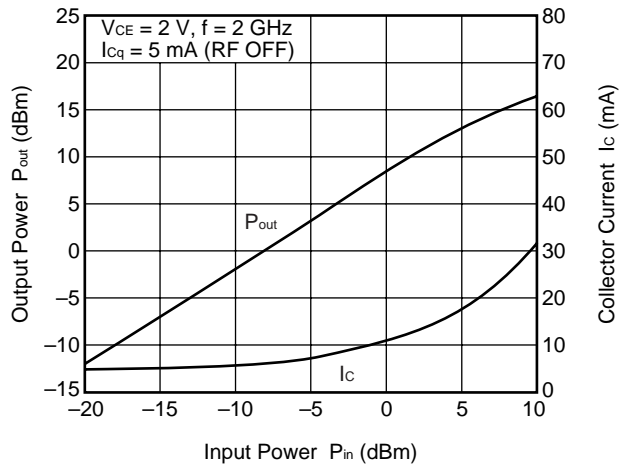
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

Note When $K \geq 1$, the MAG (Maximum Available Power Gain) is used.
$$\text{MAG} = \left| \frac{S_{21}}{S_{12}} \right| (K - \sqrt{K^2 - 1})$$

When $K < 1$, the MSG (Maximum Stable Power Gain) is used.
$$\text{MSG} = \left| \frac{S_{21}}{S_{12}} \right|$$

$V_{CE} = 1 \text{ V}$, $I_C = 1 \text{ mA}$, $Z_0 = 50 \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.960 | -24.8 | 3.647 | 164.0 | 0.037 | 77.4 | 0.985 | -7.1 | 0.021 | 19.93 |
| 0.2 | 0.935 | -46.8 | 3.442 | 149.0 | 0.068 | 63.8 | 0.948 | -13.7 | 0.094 | 17.02 |
| 0.3 | 0.895 | -66.5 | 3.123 | 136.4 | 0.092 | 52.5 | 0.901 | -19.2 | 0.144 | 15.30 |
| 0.4 | 0.856 | -84.6 | 2.817 | 124.2 | 0.108 | 43.5 | 0.851 | -23.6 | 0.198 | 14.14 |
| 0.5 | 0.823 | -99.7 | 2.518 | 114.5 | 0.119 | 35.8 | 0.809 | -27.1 | 0.253 | 13.26 |
| 0.6 | 0.798 | -112.9 | 2.255 | 106.1 | 0.124 | 30.0 | 0.772 | -30.3 | 0.304 | 12.61 |
| 0.7 | 0.782 | -124.0 | 2.031 | 98.7 | 0.125 | 25.0 | 0.743 | -33.1 | 0.360 | 12.10 |
| 0.8 | 0.768 | -133.5 | 1.848 | 92.0 | 0.124 | 21.1 | 0.717 | -36.0 | 0.428 | 11.73 |
| 0.9 | 0.762 | -141.9 | 1.680 | 86.1 | 0.121 | 17.9 | 0.699 | -38.8 | 0.493 | 11.42 |
| 1.0 | 0.755 | -149.4 | 1.544 | 80.5 | 0.116 | 16.0 | 0.685 | -41.7 | 0.570 | 11.23 |
| 1.1 | 0.751 | -155.9 | 1.419 | 75.7 | 0.110 | 14.6 | 0.676 | -44.8 | 0.653 | 11.10 |
| 1.2 | 0.746 | -162.1 | 1.312 | 70.9 | 0.104 | 14.1 | 0.668 | -48.0 | 0.760 | 11.02 |
| 1.3 | 0.749 | -167.2 | 1.219 | 67.0 | 0.097 | 14.6 | 0.665 | -51.0 | 0.851 | 11.01 |
| 1.4 | 0.750 | -172.3 | 1.139 | 63.0 | 0.090 | 16.3 | 0.661 | -54.3 | 0.967 | 11.05 |
| 1.5 | 0.759 | -176.7 | 1.069 | 59.3 | 0.083 | 19.5 | 0.661 | -57.4 | 1.051 | 9.72 |
| 1.6 | 0.759 | 179.5 | 1.004 | 56.0 | 0.077 | 24.1 | 0.658 | -60.7 | 1.210 | 8.40 |
| 1.7 | 0.762 | 175.6 | 0.945 | 52.8 | 0.072 | 30.8 | 0.657 | -64.0 | 1.339 | 7.69 |
| 1.8 | 0.763 | 171.9 | 0.891 | 49.9 | 0.070 | 39.4 | 0.655 | -67.1 | 1.461 | 7.02 |
| 1.9 | 0.769 | 168.7 | 0.846 | 47.5 | 0.071 | 48.5 | 0.654 | -70.5 | 1.485 | 6.66 |
| 2.0 | 0.771 | 165.3 | 0.801 | 44.8 | 0.075 | 57.5 | 0.653 | -74.0 | 1.482 | 6.20 |
| 2.1 | 0.774 | 162.5 | 0.765 | 42.9 | 0.081 | 65.5 | 0.654 | -77.5 | 1.422 | 5.91 |
| 2.2 | 0.781 | 159.9 | 0.731 | 40.5 | 0.090 | 71.8 | 0.656 | -81.1 | 1.288 | 5.87 |
| 2.3 | 0.781 | 157.3 | 0.706 | 39.0 | 0.101 | 76.4 | 0.656 | -84.6 | 1.217 | 5.63 |
| 2.4 | 0.785 | 154.6 | 0.678 | 37.8 | 0.114 | 79.2 | 0.656 | -88.3 | 1.124 | 5.60 |
| 2.5 | 0.787 | 152.2 | 0.650 | 36.2 | 0.128 | 81.1 | 0.657 | -92.2 | 1.059 | 5.56 |
| 2.6 | 0.787 | 149.6 | 0.629 | 35.5 | 0.142 | 82.4 | 0.659 | -96.2 | 1.026 | 5.46 |
| 2.7 | 0.790 | 147.3 | 0.606 | 34.7 | 0.158 | 82.4 | 0.660 | -100.2 | 0.974 | 5.84 |
| 2.8 | 0.798 | 145.1 | 0.586 | 33.9 | 0.173 | 82.1 | 0.664 | -103.7 | 0.910 | 5.29 |
| 2.9 | 0.793 | 143.1 | 0.564 | 33.9 | 0.189 | 81.2 | 0.662 | -107.4 | 0.934 | 4.74 |
| 3.0 | 0.791 | 140.6 | 0.538 | 33.1 | 0.206 | 80.1 | 0.657 | -111.3 | 0.962 | 4.16 |
| 4.0 | 0.789 | 119.6 | 0.474 | 30.6 | 0.364 | 66.0 | 0.674 | -145.9 | 0.972 | 1.15 |
| 5.0 | 0.786 | 106.8 | 0.491 | 26.8 | 0.467 | 44.6 | 0.662 | 177.0 | 1.022 | -0.70 |

$V_{CE} = 1 \text{ V}, I_c = 3 \text{ mA}, Z_o = 50 \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.893 | -35.5 | 9.572 | 157.0 | 0.034 | 72.9 | 0.947 | -13.9 | 0.058 | 24.48 |
| 0.2 | 0.812 | -65.6 | 8.351 | 138.3 | 0.060 | 57.1 | 0.838 | -24.8 | 0.166 | 21.47 |
| 0.3 | 0.757 | -88.9 | 7.005 | 124.8 | 0.075 | 46.7 | 0.735 | -31.6 | 0.242 | 19.72 |
| 0.4 | 0.713 | -107.5 | 5.893 | 113.4 | 0.083 | 40.2 | 0.649 | -35.8 | 0.326 | 18.53 |
| 0.5 | 0.678 | -122.4 | 5.003 | 105.0 | 0.087 | 36.0 | 0.588 | -38.4 | 0.413 | 17.58 |
| 0.6 | 0.659 | -134.2 | 4.333 | 98.2 | 0.089 | 33.7 | 0.541 | -40.6 | 0.497 | 16.86 |
| 0.7 | 0.648 | -143.5 | 3.801 | 92.4 | 0.090 | 32.3 | 0.507 | -42.4 | 0.586 | 16.25 |
| 0.8 | 0.641 | -151.5 | 3.385 | 87.1 | 0.090 | 32.4 | 0.480 | -44.3 | 0.675 | 15.73 |
| 0.9 | 0.639 | -158.2 | 3.038 | 82.7 | 0.090 | 32.5 | 0.461 | -46.5 | 0.761 | 15.27 |
| 1.0 | 0.637 | -164.3 | 2.763 | 78.3 | 0.090 | 33.9 | 0.447 | -48.9 | 0.845 | 14.86 |
| 1.1 | 0.634 | -169.4 | 2.525 | 74.6 | 0.090 | 36.0 | 0.438 | -51.4 | 0.937 | 14.50 |
| 1.2 | 0.635 | -174.3 | 2.319 | 70.8 | 0.090 | 38.1 | 0.430 | -54.1 | 1.017 | 13.31 |
| 1.3 | 0.640 | -178.3 | 2.148 | 67.7 | 0.090 | 40.8 | 0.426 | -56.6 | 1.080 | 12.03 |
| 1.4 | 0.642 | 177.8 | 2.005 | 64.4 | 0.092 | 44.0 | 0.424 | -59.4 | 1.137 | 11.16 |
| 1.5 | 0.649 | 174.4 | 1.879 | 61.3 | 0.093 | 47.2 | 0.422 | -62.1 | 1.168 | 10.55 |
| 1.6 | 0.654 | 171.4 | 1.762 | 58.3 | 0.097 | 50.5 | 0.421 | -65.0 | 1.195 | 9.95 |
| 1.7 | 0.658 | 168.5 | 1.662 | 55.5 | 0.100 | 53.8 | 0.422 | -67.8 | 1.208 | 9.45 |
| 1.8 | 0.663 | 165.7 | 1.568 | 52.8 | 0.105 | 57.4 | 0.421 | -70.6 | 1.215 | 8.95 |
| 1.9 | 0.668 | 163.1 | 1.489 | 50.6 | 0.110 | 60.1 | 0.421 | -73.5 | 1.207 | 8.55 |
| 2.0 | 0.673 | 160.5 | 1.419 | 47.9 | 0.117 | 62.9 | 0.421 | -76.7 | 1.185 | 8.23 |
| 2.1 | 0.679 | 158.4 | 1.354 | 45.8 | 0.124 | 65.2 | 0.422 | -80.1 | 1.161 | 7.95 |
| 2.2 | 0.686 | 156.1 | 1.298 | 43.1 | 0.132 | 67.1 | 0.424 | -83.4 | 1.122 | 7.80 |
| 2.3 | 0.687 | 154.1 | 1.254 | 41.3 | 0.141 | 68.6 | 0.426 | -86.7 | 1.093 | 7.63 |
| 2.4 | 0.693 | 152.1 | 1.203 | 39.7 | 0.151 | 69.6 | 0.428 | -90.2 | 1.061 | 7.51 |
| 2.5 | 0.698 | 150.0 | 1.155 | 37.5 | 0.161 | 70.5 | 0.431 | -93.9 | 1.030 | 7.49 |
| 2.6 | 0.700 | 148.0 | 1.118 | 36.0 | 0.171 | 71.1 | 0.434 | -97.5 | 1.008 | 7.58 |
| 2.7 | 0.707 | 146.1 | 1.079 | 34.4 | 0.182 | 71.2 | 0.438 | -101.2 | 0.972 | 7.72 |
| 2.8 | 0.715 | 144.2 | 1.040 | 32.7 | 0.194 | 71.0 | 0.443 | -104.6 | 0.937 | 7.30 |
| 2.9 | 0.711 | 142.8 | 1.001 | 31.6 | 0.205 | 70.5 | 0.446 | -108.2 | 0.947 | 6.88 |
| 3.0 | 0.712 | 140.4 | 0.955 | 30.0 | 0.218 | 70.0 | 0.449 | -111.9 | 0.949 | 6.41 |
| 4.0 | 0.744 | 122.0 | 0.726 | 17.2 | 0.345 | 61.5 | 0.511 | -144.6 | 0.858 | 3.22 |
| 5.0 | 0.776 | 109.4 | 0.605 | 11.5 | 0.446 | 44.0 | 0.547 | 178.4 | 0.912 | 1.33 |

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

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.810 | -44.0 | 14.367 | 151.3 | 0.031 | 68.3 | 0.903 | -19.7 | 0.126 | 26.60 |
| 0.2 | 0.731 | -79.5 | 11.617 | 130.9 | 0.053 | 54.0 | 0.743 | -32.7 | 0.229 | 23.39 |
| 0.3 | 0.670 | -103.5 | 9.232 | 117.6 | 0.063 | 44.9 | 0.615 | -39.5 | 0.346 | 21.68 |
| 0.4 | 0.629 | -121.5 | 7.487 | 107.3 | 0.069 | 41.5 | 0.524 | -43.1 | 0.457 | 20.38 |
| 0.5 | 0.607 | -135.3 | 6.227 | 99.9 | 0.072 | 40.0 | 0.462 | -45.2 | 0.559 | 19.35 |
| 0.6 | 0.593 | -145.7 | 5.314 | 94.0 | 0.075 | 39.8 | 0.419 | -46.7 | 0.661 | 18.48 |
| 0.7 | 0.589 | -154.1 | 4.631 | 89.0 | 0.078 | 40.5 | 0.388 | -48.1 | 0.751 | 17.75 |
| 0.8 | 0.584 | -160.9 | 4.093 | 84.5 | 0.080 | 41.9 | 0.363 | -49.9 | 0.839 | 17.08 |
| 0.9 | 0.587 | -166.4 | 3.660 | 80.7 | 0.083 | 43.4 | 0.347 | -51.9 | 0.906 | 16.44 |
| 1.0 | 0.589 | -171.8 | 3.314 | 76.9 | 0.086 | 45.6 | 0.334 | -54.2 | 0.970 | 15.87 |
| 1.1 | 0.590 | -176.3 | 3.023 | 73.7 | 0.089 | 47.8 | 0.326 | -56.7 | 1.030 | 14.27 |
| 1.2 | 0.588 | 179.5 | 2.774 | 70.4 | 0.092 | 49.8 | 0.320 | -59.3 | 1.087 | 12.98 |
| 1.3 | 0.598 | 176.3 | 2.569 | 67.5 | 0.096 | 52.1 | 0.317 | -61.8 | 1.106 | 12.30 |
| 1.4 | 0.600 | 172.8 | 2.394 | 64.6 | 0.100 | 54.2 | 0.314 | -64.5 | 1.135 | 11.55 |
| 1.5 | 0.611 | 169.9 | 2.242 | 61.8 | 0.105 | 56.1 | 0.315 | -67.1 | 1.130 | 11.10 |
| 1.6 | 0.612 | 167.4 | 2.104 | 59.1 | 0.110 | 57.9 | 0.313 | -69.9 | 1.150 | 10.45 |
| 1.7 | 0.618 | 164.6 | 1.985 | 56.5 | 0.116 | 59.6 | 0.314 | -72.7 | 1.145 | 10.01 |
| 1.8 | 0.623 | 162.3 | 1.875 | 54.0 | 0.123 | 61.4 | 0.312 | -75.5 | 1.144 | 9.54 |
| 1.9 | 0.626 | 160.1 | 1.780 | 51.9 | 0.129 | 62.8 | 0.313 | -78.3 | 1.143 | 9.09 |
| 2.0 | 0.632 | 157.6 | 1.696 | 49.4 | 0.137 | 64.0 | 0.313 | -81.6 | 1.126 | 8.78 |
| 2.1 | 0.637 | 156.0 | 1.618 | 47.3 | 0.144 | 65.1 | 0.315 | -84.9 | 1.114 | 8.45 |
| 2.2 | 0.645 | 154.1 | 1.554 | 44.9 | 0.152 | 65.9 | 0.316 | -88.2 | 1.084 | 8.32 |
| 2.3 | 0.649 | 152.0 | 1.501 | 43.1 | 0.160 | 66.4 | 0.319 | -91.5 | 1.065 | 8.16 |
| 2.4 | 0.653 | 150.4 | 1.440 | 41.3 | 0.169 | 66.8 | 0.321 | -94.9 | 1.048 | 7.95 |
| 2.5 | 0.657 | 148.6 | 1.387 | 39.3 | 0.179 | 67.1 | 0.325 | -98.5 | 1.030 | 7.84 |
| 2.6 | 0.661 | 146.8 | 1.341 | 37.7 | 0.187 | 67.2 | 0.329 | -102.1 | 1.017 | 7.74 |
| 2.7 | 0.667 | 145.0 | 1.299 | 36.0 | 0.198 | 67.0 | 0.333 | -105.8 | 0.989 | 8.17 |
| 2.8 | 0.676 | 143.5 | 1.253 | 34.3 | 0.207 | 66.7 | 0.339 | -109.1 | 0.964 | 7.81 |
| 2.9 | 0.672 | 142.3 | 1.206 | 33.1 | 0.217 | 66.1 | 0.343 | -112.7 | 0.972 | 7.44 |
| 3.0 | 0.674 | 139.8 | 1.158 | 31.4 | 0.228 | 65.6 | 0.347 | -116.3 | 0.973 | 7.05 |
| 4.0 | 0.717 | 123.0 | 0.879 | 16.2 | 0.340 | 58.5 | 0.423 | -147.3 | 0.863 | 4.12 |
| 5.0 | 0.764 | 110.8 | 0.707 | 7.5 | 0.433 | 43.0 | 0.477 | 176.5 | 0.878 | 2.14 |

$V_{CE} = 1 \text{ V}$, $I_C = 7 \text{ mA}$, $Z_o = 50 \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.765 | -52.5 | 18.026 | 147.1 | 0.030 | 66.5 | 0.864 | -24.4 | 0.134 | 27.85 |
| 0.2 | 0.670 | -90.6 | 13.741 | 125.7 | 0.047 | 51.9 | 0.669 | -38.5 | 0.292 | 24.62 |
| 0.3 | 0.614 | -113.9 | 10.555 | 113.0 | 0.055 | 45.6 | 0.533 | -45.0 | 0.432 | 22.79 |
| 0.4 | 0.585 | -131.2 | 8.386 | 103.5 | 0.061 | 43.9 | 0.445 | -48.2 | 0.556 | 21.41 |
| 0.5 | 0.569 | -143.6 | 6.904 | 96.9 | 0.065 | 44.0 | 0.387 | -49.8 | 0.666 | 20.26 |
| 0.6 | 0.561 | -153.0 | 5.861 | 91.7 | 0.069 | 45.2 | 0.346 | -51.1 | 0.763 | 19.28 |
| 0.7 | 0.558 | -160.5 | 5.069 | 87.1 | 0.073 | 46.8 | 0.319 | -52.5 | 0.850 | 18.43 |
| 0.8 | 0.560 | -166.7 | 4.468 | 83.1 | 0.077 | 48.7 | 0.297 | -54.2 | 0.916 | 17.63 |
| 0.9 | 0.563 | -171.6 | 3.993 | 79.7 | 0.081 | 50.3 | 0.282 | -56.3 | 0.971 | 16.90 |
| 1.0 | 0.565 | -176.2 | 3.614 | 76.1 | 0.086 | 52.2 | 0.270 | -58.8 | 1.021 | 15.36 |
| 1.1 | 0.566 | 179.7 | 3.293 | 73.1 | 0.090 | 54.0 | 0.263 | -61.4 | 1.065 | 14.06 |
| 1.2 | 0.567 | 175.8 | 3.024 | 70.0 | 0.096 | 55.8 | 0.258 | -64.2 | 1.098 | 13.09 |
| 1.3 | 0.576 | 172.9 | 2.797 | 67.4 | 0.101 | 57.3 | 0.256 | -66.9 | 1.108 | 12.43 |
| 1.4 | 0.577 | 169.7 | 2.607 | 64.7 | 0.107 | 58.8 | 0.254 | -69.6 | 1.125 | 11.73 |
| 1.5 | 0.586 | 167.1 | 2.437 | 62.1 | 0.113 | 60.0 | 0.254 | -72.3 | 1.119 | 11.24 |
| 1.6 | 0.592 | 164.9 | 2.290 | 59.5 | 0.119 | 61.1 | 0.253 | -75.1 | 1.120 | 10.73 |
| 1.7 | 0.595 | 162.3 | 2.159 | 57.0 | 0.126 | 62.1 | 0.254 | -78.0 | 1.121 | 10.22 |
| 1.8 | 0.600 | 160.2 | 2.043 | 54.6 | 0.133 | 63.2 | 0.253 | -80.8 | 1.122 | 9.75 |
| 1.9 | 0.606 | 158.1 | 1.937 | 52.6 | 0.140 | 63.9 | 0.253 | -83.7 | 1.111 | 9.37 |
| 2.0 | 0.613 | 155.9 | 1.846 | 50.2 | 0.148 | 64.5 | 0.254 | -87.0 | 1.097 | 9.06 |
| 2.1 | 0.618 | 154.5 | 1.760 | 48.3 | 0.155 | 65.0 | 0.256 | -90.3 | 1.089 | 8.72 |
| 2.2 | 0.623 | 152.6 | 1.691 | 45.8 | 0.164 | 65.4 | 0.258 | -93.7 | 1.072 | 8.50 |
| 2.3 | 0.626 | 151.0 | 1.636 | 44.1 | 0.172 | 65.5 | 0.261 | -97.1 | 1.057 | 8.33 |
| 2.4 | 0.632 | 149.2 | 1.569 | 42.4 | 0.180 | 65.5 | 0.263 | -100.5 | 1.044 | 8.10 |
| 2.5 | 0.638 | 147.6 | 1.513 | 40.4 | 0.189 | 65.4 | 0.267 | -104.1 | 1.025 | 8.05 |
| 2.6 | 0.641 | 145.8 | 1.465 | 38.8 | 0.198 | 65.5 | 0.272 | -107.6 | 1.015 | 7.94 |
| 2.7 | 0.647 | 144.3 | 1.415 | 37.2 | 0.207 | 65.0 | 0.276 | -111.3 | 0.997 | 8.34 |
| 2.8 | 0.654 | 142.8 | 1.370 | 35.5 | 0.216 | 64.7 | 0.282 | -114.6 | 0.979 | 8.01 |
| 2.9 | 0.653 | 141.5 | 1.320 | 34.2 | 0.225 | 64.0 | 0.287 | -118.2 | 0.984 | 7.68 |
| 3.0 | 0.655 | 139.6 | 1.267 | 32.5 | 0.236 | 63.3 | 0.293 | -121.7 | 0.982 | 7.30 |
| 4.0 | 0.699 | 123.2 | 0.964 | 16.5 | 0.339 | 56.4 | 0.373 | -150.9 | 0.885 | 4.54 |
| 5.0 | 0.757 | 111.7 | 0.775 | 6.6 | 0.426 | 42.0 | 0.437 | 174.0 | 0.869 | 2.60 |

$V_{CE} = 1 \text{ V}$, $I_C = 10 \text{ mA}$, $Z_0 = 50 \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.677 | -63.6 | 22.358 | 141.5 | 0.028 | 63.8 | 0.805 | -30.3 | 0.202 | 28.96 |
| 0.2 | 0.598 | -103.1 | 15.866 | 120.0 | 0.042 | 51.4 | 0.581 | -45.2 | 0.387 | 25.80 |
| 0.3 | 0.560 | -125.7 | 11.779 | 108.2 | 0.049 | 47.4 | 0.446 | -51.1 | 0.545 | 23.85 |
| 0.4 | 0.547 | -141.4 | 9.186 | 99.8 | 0.054 | 48.3 | 0.365 | -54.0 | 0.669 | 22.30 |
| 0.5 | 0.538 | -152.5 | 7.505 | 94.1 | 0.059 | 49.7 | 0.313 | -55.2 | 0.777 | 21.03 |
| 0.6 | 0.534 | -160.4 | 6.324 | 89.3 | 0.065 | 51.5 | 0.277 | -56.7 | 0.864 | 19.90 |
| 0.7 | 0.536 | -166.7 | 5.454 | 85.3 | 0.070 | 53.4 | 0.253 | -58.2 | 0.931 | 18.92 |
| 0.8 | 0.538 | -172.5 | 4.818 | 81.5 | 0.076 | 55.3 | 0.233 | -60.3 | 0.980 | 18.04 |
| 0.9 | 0.542 | -176.7 | 4.281 | 78.4 | 0.081 | 56.7 | 0.220 | -62.8 | 1.026 | 16.24 |
| 1.0 | 0.546 | 179.3 | 3.867 | 75.3 | 0.088 | 58.2 | 0.211 | -65.7 | 1.051 | 15.06 |
| 1.1 | 0.547 | 175.6 | 3.526 | 72.5 | 0.094 | 59.6 | 0.205 | -68.7 | 1.079 | 14.04 |
| 1.2 | 0.551 | 172.2 | 3.238 | 69.7 | 0.100 | 60.6 | 0.202 | -71.8 | 1.095 | 13.21 |
| 1.3 | 0.559 | 169.6 | 2.996 | 67.2 | 0.107 | 61.6 | 0.200 | -74.8 | 1.098 | 12.58 |
| 1.4 | 0.563 | 166.6 | 2.789 | 64.7 | 0.114 | 62.4 | 0.199 | -77.8 | 1.105 | 11.93 |
| 1.5 | 0.570 | 164.3 | 2.612 | 62.2 | 0.120 | 63.1 | 0.200 | -80.5 | 1.102 | 11.42 |
| 1.6 | 0.577 | 162.3 | 2.449 | 59.7 | 0.128 | 63.5 | 0.199 | -83.5 | 1.097 | 10.92 |
| 1.7 | 0.579 | 159.9 | 2.311 | 57.4 | 0.135 | 63.9 | 0.201 | -86.5 | 1.100 | 10.40 |
| 1.8 | 0.585 | 158.0 | 2.186 | 55.1 | 0.143 | 64.6 | 0.200 | -89.5 | 1.095 | 9.97 |
| 1.9 | 0.590 | 156.4 | 2.074 | 53.2 | 0.150 | 64.8 | 0.201 | -92.5 | 1.089 | 9.57 |
| 2.0 | 0.596 | 154.4 | 1.977 | 51.0 | 0.158 | 64.9 | 0.202 | -95.9 | 1.080 | 9.24 |
| 2.1 | 0.602 | 152.9 | 1.890 | 49.0 | 0.166 | 65.0 | 0.205 | -99.4 | 1.069 | 8.95 |
| 2.2 | 0.607 | 151.1 | 1.815 | 46.6 | 0.174 | 64.9 | 0.207 | -102.9 | 1.058 | 8.71 |
| 2.3 | 0.610 | 149.6 | 1.752 | 45.0 | 0.183 | 64.8 | 0.211 | -106.3 | 1.046 | 8.50 |
| 2.4 | 0.615 | 147.9 | 1.682 | 43.4 | 0.191 | 64.4 | 0.214 | -109.7 | 1.037 | 8.26 |
| 2.5 | 0.621 | 146.5 | 1.622 | 41.4 | 0.200 | 64.2 | 0.219 | -113.4 | 1.023 | 8.15 |
| 2.6 | 0.624 | 144.8 | 1.570 | 39.9 | 0.208 | 63.9 | 0.224 | -116.8 | 1.017 | 7.98 |
| 2.7 | 0.629 | 143.4 | 1.521 | 38.3 | 0.217 | 63.4 | 0.229 | -120.4 | 1.004 | 8.06 |
| 2.8 | 0.639 | 141.9 | 1.469 | 36.5 | 0.226 | 62.8 | 0.235 | -123.5 | 0.985 | 8.13 |
| 2.9 | 0.634 | 140.8 | 1.419 | 35.3 | 0.234 | 62.0 | 0.241 | -127.1 | 0.996 | 7.82 |
| 3.0 | 0.638 | 138.9 | 1.363 | 33.7 | 0.244 | 61.3 | 0.247 | -130.2 | 0.993 | 7.47 |
| 4.0 | 0.683 | 123.5 | 1.046 | 17.3 | 0.339 | 54.3 | 0.332 | -156.8 | 0.904 | 4.89 |
| 5.0 | 0.745 | 112.4 | 0.836 | 6.5 | 0.419 | 40.9 | 0.401 | 169.7 | 0.880 | 3.00 |

$V_{CE} = 1\text{ V}$, $I_C = 20\text{ mA}$, $Z_O = 50\ \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.548 | -90.3 | 29.336 | 130.4 | 0.023 | 61.8 | 0.661 | -43.3 | 0.330 | 31.11 |
| 0.2 | 0.521 | -128.7 | 18.420 | 110.6 | 0.033 | 54.3 | 0.419 | -58.5 | 0.579 | 27.41 |
| 0.3 | 0.512 | -146.7 | 13.042 | 100.9 | 0.040 | 55.2 | 0.305 | -64.2 | 0.746 | 25.12 |
| 0.4 | 0.512 | -158.1 | 9.968 | 94.3 | 0.047 | 57.6 | 0.241 | -67.5 | 0.855 | 23.23 |
| 0.5 | 0.513 | -166.4 | 8.032 | 89.5 | 0.054 | 60.1 | 0.202 | -69.8 | 0.935 | 21.70 |
| 0.6 | 0.515 | -172.3 | 6.765 | 85.6 | 0.062 | 61.8 | 0.175 | -72.7 | 0.986 | 20.40 |
| 0.7 | 0.521 | -176.9 | 5.799 | 82.3 | 0.069 | 63.4 | 0.157 | -75.6 | 1.020 | 18.35 |
| 0.8 | 0.523 | 178.9 | 5.092 | 79.1 | 0.077 | 64.6 | 0.144 | -79.8 | 1.047 | 16.86 |
| 0.9 | 0.530 | 175.5 | 4.540 | 76.5 | 0.085 | 65.1 | 0.137 | -84.1 | 1.061 | 15.76 |
| 1.0 | 0.535 | 172.0 | 4.094 | 73.6 | 0.093 | 65.7 | 0.132 | -89.0 | 1.072 | 14.80 |
| 1.1 | 0.537 | 169.3 | 3.720 | 71.2 | 0.101 | 66.2 | 0.131 | -93.4 | 1.085 | 13.89 |
| 1.2 | 0.541 | 166.5 | 3.418 | 68.8 | 0.109 | 66.3 | 0.131 | -97.4 | 1.090 | 13.13 |
| 1.3 | 0.549 | 164.6 | 3.162 | 66.5 | 0.117 | 66.3 | 0.133 | -101.1 | 1.086 | 12.52 |
| 1.4 | 0.553 | 161.7 | 2.943 | 64.2 | 0.125 | 66.5 | 0.134 | -104.4 | 1.089 | 11.90 |
| 1.5 | 0.561 | 159.9 | 2.754 | 61.8 | 0.133 | 66.4 | 0.137 | -107.4 | 1.080 | 11.42 |
| 1.6 | 0.565 | 158.1 | 2.590 | 59.6 | 0.142 | 66.3 | 0.138 | -110.6 | 1.078 | 10.92 |
| 1.7 | 0.570 | 156.4 | 2.439 | 57.5 | 0.150 | 66.0 | 0.142 | -113.5 | 1.076 | 10.44 |
| 1.8 | 0.574 | 154.6 | 2.311 | 55.4 | 0.158 | 65.8 | 0.143 | -117.2 | 1.073 | 10.00 |
| 1.9 | 0.579 | 152.7 | 2.192 | 53.5 | 0.166 | 65.6 | 0.146 | -120.1 | 1.069 | 9.59 |
| 2.0 | 0.582 | 151.1 | 2.088 | 51.4 | 0.175 | 65.2 | 0.149 | -123.5 | 1.067 | 9.19 |
| 2.1 | 0.592 | 149.7 | 1.994 | 49.7 | 0.183 | 64.7 | 0.154 | -126.9 | 1.055 | 8.95 |
| 2.2 | 0.595 | 148.6 | 1.916 | 47.4 | 0.191 | 64.2 | 0.158 | -130.2 | 1.047 | 8.68 |
| 2.3 | 0.600 | 147.0 | 1.853 | 45.7 | 0.200 | 63.7 | 0.163 | -133.1 | 1.037 | 8.49 |
| 2.4 | 0.604 | 145.8 | 1.779 | 44.2 | 0.208 | 63.1 | 0.168 | -136.2 | 1.033 | 8.20 |
| 2.5 | 0.608 | 144.2 | 1.715 | 42.3 | 0.217 | 62.5 | 0.174 | -139.2 | 1.026 | 7.99 |
| 2.6 | 0.612 | 143.0 | 1.661 | 40.8 | 0.225 | 61.9 | 0.180 | -141.9 | 1.019 | 7.84 |
| 2.7 | 0.620 | 141.3 | 1.609 | 39.2 | 0.233 | 61.2 | 0.187 | -145.0 | 1.007 | 7.86 |
| 2.8 | 0.624 | 140.3 | 1.553 | 37.6 | 0.242 | 60.4 | 0.195 | -147.5 | 1.002 | 7.80 |
| 2.9 | 0.622 | 139.1 | 1.507 | 36.5 | 0.250 | 59.4 | 0.203 | -150.2 | 1.005 | 7.37 |
| 3.0 | 0.625 | 137.0 | 1.447 | 34.7 | 0.259 | 58.6 | 0.209 | -152.4 | 1.008 | 6.93 |
| 4.0 | 0.671 | 123.0 | 1.118 | 18.5 | 0.345 | 50.9 | 0.294 | -171.6 | 0.937 | 5.11 |
| 5.0 | 0.736 | 112.6 | 0.901 | 6.8 | 0.413 | 38.4 | 0.370 | 159.0 | 0.905 | 3.39 |

$V_{CE} = 2 \text{ V}$, $I_C = 1 \text{ mA}$, $Z_o = 50 \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.963 | -23.1 | 3.555 | 164.3 | 0.034 | 78.5 | 0.988 | -6.3 | 0.029 | 20.26 |
| 0.2 | 0.933 | -44.8 | 3.386 | 150.1 | 0.064 | 64.9 | 0.954 | -12.6 | 0.098 | 17.26 |
| 0.3 | 0.896 | -63.8 | 3.082 | 137.9 | 0.086 | 54.3 | 0.913 | -17.7 | 0.142 | 15.55 |
| 0.4 | 0.859 | -81.6 | 2.796 | 125.9 | 0.102 | 45.3 | 0.866 | -21.9 | 0.196 | 14.39 |
| 0.5 | 0.819 | -96.6 | 2.509 | 116.2 | 0.112 | 38.0 | 0.827 | -25.3 | 0.253 | 13.51 |
| 0.6 | 0.791 | -109.8 | 2.258 | 107.8 | 0.117 | 32.2 | 0.792 | -28.3 | 0.310 | 12.86 |
| 0.7 | 0.769 | -120.9 | 2.038 | 100.5 | 0.119 | 27.2 | 0.763 | -31.2 | 0.374 | 12.35 |
| 0.8 | 0.756 | -130.7 | 1.860 | 93.6 | 0.118 | 23.6 | 0.740 | -33.9 | 0.437 | 11.98 |
| 0.9 | 0.747 | -139.3 | 1.692 | 87.8 | 0.115 | 20.7 | 0.722 | -36.6 | 0.506 | 11.67 |
| 1.0 | 0.739 | -147.1 | 1.559 | 82.3 | 0.111 | 18.9 | 0.706 | -39.6 | 0.584 | 11.47 |
| 1.1 | 0.735 | -153.8 | 1.437 | 77.4 | 0.106 | 17.8 | 0.696 | -42.4 | 0.671 | 11.34 |
| 1.2 | 0.729 | -160.1 | 1.328 | 72.5 | 0.100 | 17.6 | 0.689 | -45.6 | 0.775 | 11.24 |
| 1.3 | 0.731 | -165.4 | 1.234 | 68.8 | 0.093 | 18.4 | 0.686 | -48.5 | 0.868 | 11.21 |
| 1.4 | 0.732 | -170.7 | 1.155 | 64.7 | 0.087 | 20.4 | 0.680 | -51.6 | 0.985 | 11.22 |
| 1.5 | 0.736 | -175.2 | 1.084 | 61.1 | 0.081 | 24.0 | 0.680 | -54.7 | 1.086 | 9.45 |
| 1.6 | 0.740 | -179.4 | 1.019 | 57.7 | 0.077 | 28.8 | 0.677 | -57.8 | 1.205 | 8.50 |
| 1.7 | 0.740 | 176.8 | 0.960 | 54.6 | 0.073 | 35.5 | 0.676 | -61.0 | 1.328 | 7.74 |
| 1.8 | 0.743 | 172.9 | 0.904 | 51.6 | 0.072 | 43.6 | 0.673 | -64.2 | 1.432 | 7.09 |
| 1.9 | 0.746 | 169.5 | 0.860 | 49.3 | 0.074 | 52.0 | 0.670 | -67.3 | 1.458 | 6.66 |
| 2.0 | 0.750 | 166.2 | 0.818 | 46.7 | 0.078 | 60.1 | 0.669 | -70.7 | 1.430 | 6.30 |
| 2.1 | 0.754 | 163.3 | 0.778 | 44.6 | 0.085 | 67.1 | 0.668 | -74.1 | 1.380 | 5.95 |
| 2.2 | 0.758 | 160.6 | 0.744 | 42.3 | 0.094 | 72.6 | 0.668 | -77.6 | 1.290 | 5.76 |
| 2.3 | 0.761 | 157.8 | 0.721 | 40.7 | 0.105 | 76.7 | 0.669 | -81.1 | 1.193 | 5.72 |
| 2.4 | 0.764 | 155.3 | 0.691 | 39.5 | 0.118 | 79.3 | 0.668 | -84.8 | 1.122 | 5.57 |
| 2.5 | 0.766 | 152.6 | 0.665 | 37.7 | 0.131 | 81.1 | 0.668 | -88.6 | 1.063 | 5.52 |
| 2.6 | 0.767 | 150.3 | 0.640 | 37.1 | 0.145 | 82.2 | 0.669 | -92.2 | 1.025 | 5.49 |
| 2.7 | 0.771 | 147.7 | 0.623 | 36.4 | 0.160 | 82.2 | 0.670 | -96.2 | 0.969 | 5.91 |
| 2.8 | 0.776 | 145.6 | 0.598 | 35.3 | 0.175 | 82.0 | 0.672 | -99.8 | 0.931 | 5.34 |
| 2.9 | 0.770 | 143.5 | 0.577 | 35.3 | 0.191 | 81.1 | 0.668 | -103.4 | 0.958 | 4.81 |
| 3.0 | 0.769 | 140.8 | 0.552 | 34.5 | 0.207 | 80.0 | 0.662 | -107.2 | 0.982 | 4.26 |
| 4.0 | 0.771 | 120.0 | 0.484 | 31.0 | 0.362 | 66.4 | 0.671 | -141.6 | 0.976 | 1.26 |
| 5.0 | 0.770 | 106.9 | 0.497 | 27.0 | 0.468 | 45.2 | 0.652 | -179.2 | 1.028 | -0.76 |

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

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.891 | -32.4 | 9.143 | 158.8 | 0.032 | 73.9 | 0.956 | -12.2 | 0.068 | 24.56 |
| 0.2 | 0.826 | -60.1 | 8.119 | 141.0 | 0.057 | 60.0 | 0.864 | -22.2 | 0.155 | 21.54 |
| 0.3 | 0.766 | -82.6 | 6.925 | 127.7 | 0.072 | 49.0 | 0.769 | -28.7 | 0.236 | 19.86 |
| 0.4 | 0.714 | -101.1 | 5.899 | 116.1 | 0.081 | 42.4 | 0.687 | -33.0 | 0.322 | 18.65 |
| 0.5 | 0.674 | -116.1 | 5.051 | 107.7 | 0.085 | 38.3 | 0.624 | -35.7 | 0.407 | 17.73 |
| 0.6 | 0.651 | -128.4 | 4.399 | 100.6 | 0.088 | 35.6 | 0.578 | -37.9 | 0.486 | 16.98 |
| 0.7 | 0.635 | -138.2 | 3.876 | 94.7 | 0.090 | 34.2 | 0.543 | -39.6 | 0.573 | 16.36 |
| 0.8 | 0.626 | -146.8 | 3.464 | 89.2 | 0.090 | 33.9 | 0.517 | -41.7 | 0.656 | 15.85 |
| 0.9 | 0.620 | -153.8 | 3.112 | 84.7 | 0.090 | 34.0 | 0.497 | -43.6 | 0.746 | 15.38 |
| 1.0 | 0.619 | -160.5 | 2.830 | 80.3 | 0.090 | 35.2 | 0.480 | -46.0 | 0.826 | 14.98 |
| 1.1 | 0.615 | -166.0 | 2.588 | 76.4 | 0.090 | 37.0 | 0.470 | -48.2 | 0.915 | 14.60 |
| 1.2 | 0.615 | -171.1 | 2.384 | 72.7 | 0.090 | 39.0 | 0.461 | -50.8 | 0.995 | 14.23 |
| 1.3 | 0.621 | -175.2 | 2.211 | 69.4 | 0.090 | 41.7 | 0.457 | -53.3 | 1.050 | 12.52 |
| 1.4 | 0.623 | -179.5 | 2.064 | 66.1 | 0.092 | 44.6 | 0.454 | -55.8 | 1.103 | 11.57 |
| 1.5 | 0.629 | 176.8 | 1.931 | 63.0 | 0.094 | 47.7 | 0.452 | -58.4 | 1.135 | 10.90 |
| 1.6 | 0.632 | 173.8 | 1.813 | 60.0 | 0.097 | 50.9 | 0.449 | -61.0 | 1.172 | 10.23 |
| 1.7 | 0.635 | 170.5 | 1.712 | 57.1 | 0.100 | 54.2 | 0.449 | -63.8 | 1.189 | 9.70 |
| 1.8 | 0.642 | 167.5 | 1.617 | 54.4 | 0.105 | 57.6 | 0.447 | -66.5 | 1.192 | 9.24 |
| 1.9 | 0.643 | 164.7 | 1.532 | 52.1 | 0.110 | 60.4 | 0.446 | -69.3 | 1.202 | 8.72 |
| 2.0 | 0.649 | 162.3 | 1.458 | 49.4 | 0.117 | 63.1 | 0.445 | -72.3 | 1.179 | 8.40 |
| 2.1 | 0.656 | 160.0 | 1.393 | 47.4 | 0.123 | 65.4 | 0.445 | -75.5 | 1.159 | 8.11 |
| 2.2 | 0.663 | 157.7 | 1.338 | 44.7 | 0.131 | 67.2 | 0.446 | -78.8 | 1.115 | 8.01 |
| 2.3 | 0.665 | 155.4 | 1.292 | 42.8 | 0.140 | 68.7 | 0.448 | -81.9 | 1.092 | 7.81 |
| 2.4 | 0.671 | 153.3 | 1.239 | 41.1 | 0.149 | 69.8 | 0.448 | -85.3 | 1.061 | 7.68 |
| 2.5 | 0.675 | 151.2 | 1.192 | 39.1 | 0.159 | 70.6 | 0.450 | -88.8 | 1.032 | 7.64 |
| 2.6 | 0.678 | 149.2 | 1.152 | 37.5 | 0.169 | 71.3 | 0.452 | -92.3 | 1.012 | 7.67 |
| 2.7 | 0.684 | 147.1 | 1.115 | 35.8 | 0.180 | 71.4 | 0.454 | -96.0 | 0.979 | 7.91 |
| 2.8 | 0.690 | 145.3 | 1.074 | 34.1 | 0.191 | 71.4 | 0.459 | -99.3 | 0.948 | 7.49 |
| 2.9 | 0.689 | 143.7 | 1.033 | 33.1 | 0.203 | 70.8 | 0.460 | -102.9 | 0.950 | 7.07 |
| 3.0 | 0.691 | 141.4 | 0.987 | 31.3 | 0.215 | 70.4 | 0.461 | -106.7 | 0.951 | 6.61 |
| 4.0 | 0.724 | 122.4 | 0.753 | 17.9 | 0.343 | 62.2 | 0.511 | -139.4 | 0.857 | 3.42 |
| 5.0 | 0.759 | 109.9 | 0.625 | 11.9 | 0.445 | 44.8 | 0.538 | -177.3 | 0.909 | 1.47 |

$V_{CE} = 2 \text{ V}$, $I_C = 5 \text{ mA}$, $Z_o = 50 \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.829 | -38.6 | 13.522 | 154.1 | 0.030 | 68.9 | 0.925 | -17.0 | 0.142 | 26.61 |
| 0.2 | 0.747 | -71.2 | 11.312 | 134.6 | 0.051 | 56.9 | 0.787 | -29.1 | 0.216 | 23.44 |
| 0.3 | 0.680 | -94.1 | 9.211 | 121.4 | 0.062 | 47.7 | 0.666 | -35.8 | 0.328 | 21.69 |
| 0.4 | 0.632 | -113.2 | 7.570 | 110.6 | 0.069 | 43.3 | 0.576 | -39.7 | 0.428 | 20.40 |
| 0.5 | 0.601 | -127.2 | 6.341 | 103.0 | 0.074 | 41.3 | 0.512 | -41.8 | 0.528 | 19.36 |
| 0.6 | 0.582 | -138.7 | 5.453 | 96.8 | 0.077 | 40.9 | 0.465 | -43.4 | 0.622 | 18.52 |
| 0.7 | 0.572 | -147.6 | 4.764 | 91.5 | 0.079 | 40.9 | 0.432 | -44.9 | 0.714 | 17.81 |
| 0.8 | 0.570 | -155.4 | 4.231 | 86.9 | 0.081 | 42.1 | 0.405 | -46.5 | 0.789 | 17.16 |
| 0.9 | 0.564 | -161.5 | 3.787 | 82.9 | 0.084 | 43.4 | 0.386 | -48.4 | 0.873 | 16.55 |
| 1.0 | 0.564 | -167.3 | 3.433 | 79.1 | 0.087 | 45.3 | 0.372 | -50.5 | 0.936 | 15.98 |
| 1.1 | 0.565 | -172.0 | 3.134 | 75.6 | 0.089 | 47.3 | 0.362 | -52.7 | 0.999 | 15.46 |
| 1.2 | 0.564 | -176.7 | 2.880 | 72.3 | 0.093 | 49.3 | 0.355 | -55.0 | 1.052 | 13.54 |
| 1.3 | 0.573 | 179.8 | 2.669 | 69.4 | 0.096 | 51.4 | 0.351 | -57.4 | 1.078 | 12.74 |
| 1.4 | 0.574 | 176.0 | 2.488 | 66.4 | 0.100 | 53.5 | 0.347 | -59.9 | 1.111 | 11.93 |
| 1.5 | 0.582 | 172.8 | 2.330 | 63.7 | 0.105 | 55.4 | 0.346 | -62.3 | 1.117 | 11.40 |
| 1.6 | 0.587 | 170.0 | 2.186 | 60.9 | 0.109 | 57.3 | 0.343 | -64.8 | 1.132 | 10.80 |
| 1.7 | 0.592 | 167.2 | 2.063 | 58.2 | 0.115 | 59.0 | 0.343 | -67.5 | 1.134 | 10.31 |
| 1.8 | 0.596 | 164.6 | 1.950 | 55.8 | 0.121 | 60.9 | 0.340 | -70.0 | 1.137 | 9.82 |
| 1.9 | 0.602 | 162.1 | 1.851 | 53.6 | 0.128 | 62.3 | 0.340 | -72.7 | 1.130 | 9.43 |
| 2.0 | 0.607 | 160.0 | 1.763 | 51.1 | 0.135 | 63.5 | 0.338 | -75.7 | 1.119 | 9.07 |
| 2.1 | 0.611 | 157.8 | 1.686 | 48.9 | 0.141 | 64.8 | 0.339 | -78.8 | 1.111 | 8.74 |
| 2.2 | 0.616 | 155.9 | 1.614 | 46.4 | 0.150 | 65.6 | 0.340 | -82.0 | 1.092 | 8.48 |
| 2.3 | 0.622 | 154.0 | 1.563 | 44.7 | 0.158 | 66.3 | 0.341 | -85.2 | 1.067 | 8.39 |
| 2.4 | 0.628 | 152.0 | 1.497 | 42.8 | 0.166 | 66.8 | 0.342 | -88.4 | 1.051 | 8.16 |
| 2.5 | 0.632 | 150.2 | 1.442 | 40.9 | 0.175 | 67.1 | 0.344 | -92.0 | 1.035 | 8.01 |
| 2.6 | 0.636 | 148.4 | 1.396 | 39.3 | 0.184 | 67.3 | 0.347 | -95.3 | 1.015 | 8.05 |
| 2.7 | 0.641 | 146.6 | 1.348 | 37.6 | 0.194 | 67.2 | 0.350 | -99.0 | 0.999 | 8.42 |
| 2.8 | 0.651 | 144.8 | 1.303 | 35.7 | 0.203 | 66.9 | 0.354 | -102.4 | 0.969 | 8.07 |
| 2.9 | 0.649 | 143.4 | 1.257 | 34.4 | 0.214 | 66.4 | 0.356 | -105.9 | 0.972 | 7.70 |
| 3.0 | 0.650 | 141.3 | 1.201 | 32.7 | 0.224 | 66.0 | 0.360 | -109.5 | 0.975 | 7.29 |
| 4.0 | 0.696 | 123.7 | 0.915 | 17.2 | 0.336 | 59.2 | 0.424 | -141.1 | 0.861 | 4.35 |
| 5.0 | 0.748 | 111.5 | 0.734 | 8.0 | 0.432 | 43.9 | 0.468 | -178.3 | 0.870 | 2.31 |

$V_{CE} = 2 \text{ V}$, $I_C = 7 \text{ mA}$, $Z_o = 50 \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.792 | -45.0 | 16.829 | 150.9 | 0.029 | 71.3 | 0.896 | -20.6 | 0.102 | 27.64 |
| 0.2 | 0.692 | -79.1 | 13.451 | 130.2 | 0.047 | 55.3 | 0.728 | -34.0 | 0.269 | 24.57 |
| 0.3 | 0.627 | -103.2 | 10.627 | 117.2 | 0.056 | 48.2 | 0.596 | -40.7 | 0.389 | 22.77 |
| 0.4 | 0.583 | -120.9 | 8.572 | 107.2 | 0.062 | 45.3 | 0.504 | -44.3 | 0.510 | 21.37 |
| 0.5 | 0.559 | -134.6 | 7.111 | 100.2 | 0.067 | 44.6 | 0.442 | -46.1 | 0.616 | 20.26 |
| 0.6 | 0.543 | -145.1 | 6.071 | 94.5 | 0.071 | 45.3 | 0.397 | -47.5 | 0.713 | 19.32 |
| 0.7 | 0.539 | -153.1 | 5.266 | 89.8 | 0.075 | 46.1 | 0.366 | -48.7 | 0.795 | 18.48 |
| 0.8 | 0.535 | -160.4 | 4.662 | 85.3 | 0.078 | 47.9 | 0.340 | -50.2 | 0.871 | 17.74 |
| 0.9 | 0.536 | -166.0 | 4.161 | 81.9 | 0.082 | 49.3 | 0.323 | -52.1 | 0.931 | 17.03 |
| 1.0 | 0.536 | -171.3 | 3.772 | 78.3 | 0.086 | 51.1 | 0.309 | -54.2 | 0.986 | 16.40 |
| 1.1 | 0.538 | -175.8 | 3.439 | 75.2 | 0.091 | 53.0 | 0.301 | -56.5 | 1.028 | 14.75 |
| 1.2 | 0.541 | -180.0 | 3.162 | 72.1 | 0.096 | 54.4 | 0.294 | -58.9 | 1.061 | 13.68 |
| 1.3 | 0.546 | 176.5 | 2.929 | 69.4 | 0.101 | 56.1 | 0.290 | -61.4 | 1.084 | 12.88 |
| 1.4 | 0.551 | 173.1 | 2.725 | 66.6 | 0.106 | 57.6 | 0.287 | -63.8 | 1.101 | 12.18 |
| 1.5 | 0.556 | 170.3 | 2.553 | 63.9 | 0.112 | 58.9 | 0.285 | -66.3 | 1.106 | 11.61 |
| 1.6 | 0.562 | 167.8 | 2.395 | 61.3 | 0.118 | 60.0 | 0.283 | -68.7 | 1.111 | 11.05 |
| 1.7 | 0.568 | 165.2 | 2.264 | 58.9 | 0.124 | 61.1 | 0.282 | -71.3 | 1.106 | 10.63 |
| 1.8 | 0.573 | 162.8 | 2.141 | 56.4 | 0.131 | 62.3 | 0.280 | -73.9 | 1.108 | 10.14 |
| 1.9 | 0.576 | 160.5 | 2.029 | 54.4 | 0.137 | 63.3 | 0.279 | -76.6 | 1.110 | 9.68 |
| 2.0 | 0.586 | 158.3 | 1.936 | 52.0 | 0.145 | 63.9 | 0.278 | -79.6 | 1.091 | 9.42 |
| 2.1 | 0.587 | 156.5 | 1.848 | 49.9 | 0.152 | 64.5 | 0.279 | -82.8 | 1.093 | 9.00 |
| 2.2 | 0.595 | 154.8 | 1.772 | 47.6 | 0.160 | 65.0 | 0.279 | -86.0 | 1.071 | 8.82 |
| 2.3 | 0.598 | 152.9 | 1.716 | 45.9 | 0.168 | 65.3 | 0.281 | -89.1 | 1.059 | 8.62 |
| 2.4 | 0.603 | 151.1 | 1.646 | 44.2 | 0.176 | 65.4 | 0.282 | -92.5 | 1.047 | 8.37 |
| 2.5 | 0.610 | 149.5 | 1.586 | 42.1 | 0.185 | 65.4 | 0.284 | -96.0 | 1.029 | 8.29 |
| 2.6 | 0.613 | 147.8 | 1.533 | 40.5 | 0.193 | 65.4 | 0.288 | -99.4 | 1.019 | 8.15 |
| 2.7 | 0.620 | 146.0 | 1.485 | 38.8 | 0.203 | 65.1 | 0.291 | -103.0 | 0.999 | 8.65 |
| 2.8 | 0.628 | 144.4 | 1.436 | 37.1 | 0.211 | 64.7 | 0.295 | -106.3 | 0.980 | 8.32 |
| 2.9 | 0.623 | 143.1 | 1.383 | 35.8 | 0.221 | 64.1 | 0.299 | -109.9 | 0.990 | 7.97 |
| 3.0 | 0.627 | 141.1 | 1.326 | 33.9 | 0.231 | 63.6 | 0.302 | -113.5 | 0.988 | 7.59 |
| 4.0 | 0.675 | 124.6 | 1.015 | 17.9 | 0.334 | 57.2 | 0.372 | -143.9 | 0.881 | 4.82 |
| 5.0 | 0.736 | 112.6 | 0.813 | 7.2 | 0.424 | 43.1 | 0.425 | 179.5 | 0.865 | 2.83 |

$V_{CE} = 2 \text{ V}$, $I_C = 10 \text{ mA}$, $Z_O = 50 \Omega$

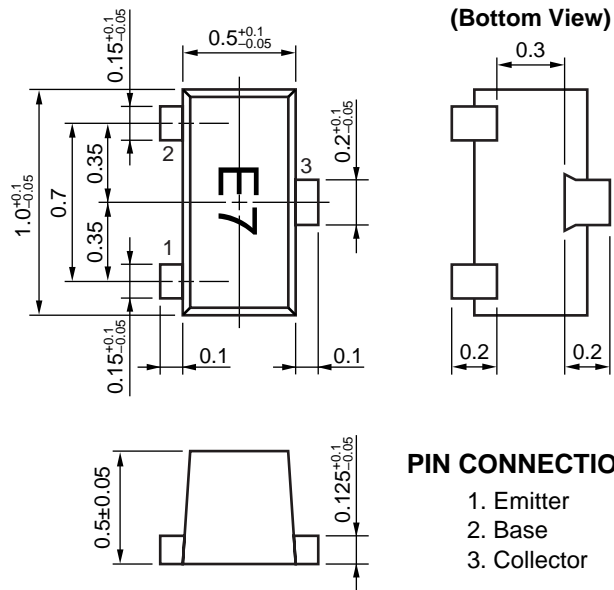
| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.724 | -51.4 | 20.657 | 146.8 | 0.026 | 69.3 | 0.857 | -25.0 | 0.150 | 28.96 |
| 0.2 | 0.630 | -88.3 | 15.613 | 125.7 | 0.043 | 54.5 | 0.660 | -39.3 | 0.335 | 25.57 |
| 0.3 | 0.573 | -111.7 | 11.959 | 113.2 | 0.051 | 49.2 | 0.523 | -46.0 | 0.475 | 23.68 |
| 0.4 | 0.538 | -129.2 | 9.485 | 104.0 | 0.057 | 47.9 | 0.433 | -49.2 | 0.602 | 22.22 |
| 0.5 | 0.520 | -141.6 | 7.783 | 97.7 | 0.062 | 48.7 | 0.374 | -50.8 | 0.710 | 20.98 |
| 0.6 | 0.513 | -151.5 | 6.608 | 92.4 | 0.067 | 50.1 | 0.332 | -52.1 | 0.798 | 19.95 |
| 0.7 | 0.508 | -159.0 | 5.732 | 88.2 | 0.072 | 51.5 | 0.303 | -53.3 | 0.874 | 19.03 |
| 0.8 | 0.509 | -165.5 | 5.050 | 84.2 | 0.077 | 53.4 | 0.281 | -55.0 | 0.930 | 18.17 |
| 0.9 | 0.512 | -170.5 | 4.496 | 80.9 | 0.082 | 54.7 | 0.265 | -56.9 | 0.980 | 17.39 |
| 1.0 | 0.512 | -175.4 | 4.080 | 77.7 | 0.088 | 56.2 | 0.252 | -59.3 | 1.016 | 15.89 |
| 1.1 | 0.514 | -179.4 | 3.716 | 74.8 | 0.093 | 57.8 | 0.244 | -61.8 | 1.048 | 14.66 |
| 1.2 | 0.517 | 176.5 | 3.414 | 71.9 | 0.099 | 58.9 | 0.238 | -64.4 | 1.073 | 13.71 |
| 1.3 | 0.524 | 173.7 | 3.162 | 69.3 | 0.105 | 59.9 | 0.234 | -66.9 | 1.080 | 13.04 |
| 1.4 | 0.529 | 170.4 | 2.943 | 66.7 | 0.112 | 60.8 | 0.232 | -69.4 | 1.090 | 12.37 |
| 1.5 | 0.536 | 167.9 | 2.752 | 64.2 | 0.119 | 61.7 | 0.231 | -72.0 | 1.090 | 11.83 |
| 1.6 | 0.541 | 165.6 | 2.584 | 61.7 | 0.125 | 62.3 | 0.228 | -74.5 | 1.094 | 11.28 |
| 1.7 | 0.547 | 162.9 | 2.443 | 59.4 | 0.132 | 62.8 | 0.228 | -77.2 | 1.089 | 10.85 |
| 1.8 | 0.551 | 161.0 | 2.306 | 57.0 | 0.140 | 63.5 | 0.226 | -79.8 | 1.091 | 10.34 |
| 1.9 | 0.555 | 158.8 | 2.192 | 55.1 | 0.147 | 63.9 | 0.226 | -82.7 | 1.090 | 9.91 |
| 2.0 | 0.559 | 156.6 | 2.087 | 52.8 | 0.154 | 64.1 | 0.225 | -85.8 | 1.087 | 9.51 |
| 2.1 | 0.567 | 155.1 | 1.994 | 50.8 | 0.162 | 64.4 | 0.226 | -89.1 | 1.076 | 9.22 |
| 2.2 | 0.573 | 153.5 | 1.915 | 48.6 | 0.170 | 64.4 | 0.226 | -92.3 | 1.061 | 9.01 |
| 2.3 | 0.579 | 151.8 | 1.854 | 46.9 | 0.178 | 64.3 | 0.228 | -95.6 | 1.045 | 8.88 |
| 2.4 | 0.581 | 150.1 | 1.778 | 45.2 | 0.186 | 64.2 | 0.230 | -98.9 | 1.044 | 8.52 |
| 2.5 | 0.587 | 148.6 | 1.711 | 43.2 | 0.194 | 64.0 | 0.233 | -102.6 | 1.032 | 8.35 |
| 2.6 | 0.591 | 146.9 | 1.657 | 41.6 | 0.202 | 63.9 | 0.236 | -106.0 | 1.024 | 8.19 |
| 2.7 | 0.597 | 145.4 | 1.605 | 40.0 | 0.211 | 63.4 | 0.239 | -109.7 | 1.010 | 8.20 |
| 2.8 | 0.606 | 143.9 | 1.552 | 38.3 | 0.220 | 62.9 | 0.244 | -112.9 | 0.992 | 8.49 |
| 2.9 | 0.603 | 142.7 | 1.498 | 36.9 | 0.229 | 62.2 | 0.248 | -116.6 | 1.000 | 8.16 |
| 3.0 | 0.607 | 140.7 | 1.438 | 35.2 | 0.238 | 61.6 | 0.253 | -119.9 | 0.998 | 7.82 |
| 4.0 | 0.660 | 124.9 | 1.106 | 18.6 | 0.333 | 55.1 | 0.326 | -148.6 | 0.897 | 5.21 |
| 5.0 | 0.726 | 113.5 | 0.885 | 7.1 | 0.416 | 42.0 | 0.386 | 175.8 | 0.869 | 3.27 |

$V_{CE} = 2 \text{ V}$, $I_C = 20 \text{ mA}$, $Z_O = 50 \Omega$

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG/MSG (dB) |
|--------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-------|-----------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | | |
| 0.1 | 0.645 | -63.9 | 26.760 | 140.2 | 0.025 | 65.1 | 0.781 | -32.9 | 0.237 | 30.30 |
| 0.2 | 0.542 | -103.8 | 18.622 | 119.0 | 0.037 | 54.7 | 0.551 | -48.9 | 0.453 | 27.00 |
| 0.3 | 0.501 | -125.9 | 13.713 | 107.7 | 0.045 | 52.9 | 0.415 | -55.5 | 0.615 | 24.87 |
| 0.4 | 0.484 | -141.4 | 10.643 | 99.7 | 0.051 | 53.6 | 0.333 | -59.0 | 0.736 | 23.16 |
| 0.5 | 0.477 | -152.5 | 8.670 | 94.3 | 0.058 | 55.6 | 0.281 | -60.8 | 0.828 | 21.77 |
| 0.6 | 0.476 | -160.4 | 7.318 | 89.8 | 0.065 | 57.6 | 0.244 | -62.7 | 0.892 | 20.55 |
| 0.7 | 0.477 | -166.7 | 6.299 | 86.1 | 0.071 | 59.0 | 0.219 | -64.6 | 0.945 | 19.47 |
| 0.8 | 0.478 | -172.5 | 5.545 | 82.5 | 0.078 | 60.4 | 0.199 | -67.2 | 0.985 | 18.52 |
| 0.9 | 0.482 | -176.8 | 4.936 | 79.7 | 0.085 | 61.2 | 0.186 | -70.1 | 1.014 | 16.91 |
| 1.0 | 0.487 | 179.0 | 4.462 | 76.7 | 0.092 | 62.1 | 0.175 | -73.3 | 1.030 | 15.77 |
| 1.1 | 0.489 | 175.5 | 4.060 | 74.0 | 0.099 | 62.9 | 0.170 | -76.7 | 1.051 | 14.72 |
| 1.2 | 0.492 | 172.0 | 3.730 | 71.5 | 0.107 | 63.3 | 0.165 | -80.0 | 1.065 | 13.88 |
| 1.3 | 0.500 | 169.7 | 3.452 | 69.1 | 0.114 | 63.6 | 0.163 | -83.2 | 1.065 | 13.24 |
| 1.4 | 0.506 | 166.6 | 3.215 | 66.9 | 0.122 | 64.0 | 0.162 | -86.0 | 1.069 | 12.62 |
| 1.5 | 0.513 | 164.5 | 3.009 | 64.5 | 0.130 | 64.1 | 0.161 | -88.7 | 1.066 | 12.09 |
| 1.6 | 0.517 | 162.5 | 2.823 | 62.1 | 0.137 | 64.1 | 0.160 | -91.7 | 1.068 | 11.54 |
| 1.7 | 0.520 | 160.3 | 2.664 | 60.1 | 0.145 | 64.2 | 0.160 | -94.6 | 1.068 | 11.04 |
| 1.8 | 0.528 | 158.2 | 2.520 | 57.9 | 0.153 | 64.3 | 0.159 | -97.8 | 1.066 | 10.60 |
| 1.9 | 0.530 | 156.6 | 2.394 | 56.1 | 0.160 | 64.1 | 0.159 | -100.8 | 1.067 | 10.16 |
| 2.0 | 0.538 | 154.5 | 2.283 | 53.9 | 0.169 | 63.7 | 0.160 | -104.4 | 1.059 | 9.83 |
| 2.1 | 0.543 | 153.1 | 2.178 | 52.1 | 0.176 | 63.6 | 0.162 | -107.9 | 1.058 | 9.45 |
| 2.2 | 0.551 | 151.6 | 2.090 | 49.9 | 0.184 | 63.2 | 0.163 | -111.4 | 1.046 | 9.23 |
| 2.3 | 0.552 | 150.0 | 2.024 | 48.3 | 0.192 | 62.8 | 0.166 | -114.7 | 1.040 | 8.99 |
| 2.4 | 0.556 | 148.5 | 1.941 | 46.6 | 0.201 | 62.4 | 0.168 | -118.1 | 1.038 | 8.67 |
| 2.5 | 0.564 | 147.2 | 1.869 | 44.8 | 0.209 | 61.9 | 0.173 | -121.8 | 1.028 | 8.49 |
| 2.6 | 0.569 | 145.9 | 1.813 | 43.3 | 0.216 | 61.5 | 0.177 | -124.8 | 1.020 | 8.36 |
| 2.7 | 0.575 | 144.2 | 1.756 | 41.7 | 0.225 | 60.8 | 0.182 | -128.5 | 1.010 | 8.30 |
| 2.8 | 0.580 | 142.9 | 1.694 | 40.0 | 0.233 | 60.1 | 0.187 | -131.4 | 1.006 | 8.14 |
| 2.9 | 0.579 | 141.8 | 1.641 | 38.7 | 0.241 | 59.3 | 0.193 | -134.8 | 1.009 | 7.74 |
| 3.0 | 0.582 | 139.9 | 1.576 | 37.0 | 0.250 | 58.5 | 0.199 | -137.8 | 1.010 | 7.38 |
| 4.0 | 0.635 | 125.2 | 1.221 | 20.5 | 0.336 | 51.7 | 0.274 | -161.0 | 0.933 | 5.61 |
| 5.0 | 0.708 | 114.5 | 0.984 | 8.1 | 0.407 | 39.6 | 0.342 | 166.2 | 0.895 | 3.83 |

PACKAGE DIMENSIONS

3-PIN LEAD-LESS MINIMOLD (UNIT: mm)



[MEMO]

[MEMO]

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