



NEC's NPN SILICON EPITAXIAL TRANSISTOR 3 PINS ULTRA SUPER MINI MOLD

NE58219

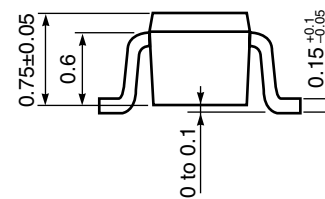
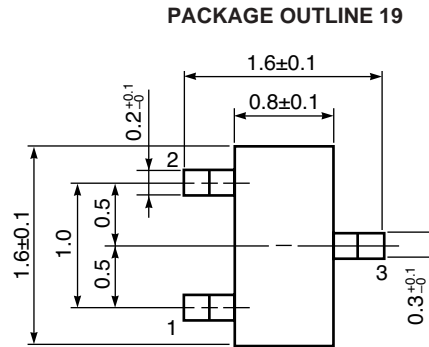
FEATURES

- **HIGH** f_T : 5 GHz TYP at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $f = 1\text{ GHz}$
- **LOW** C_{re} : 0.9 pF TYP at $V_{CB} = 5\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$
- **ULTRA SUPER MINI MOLD PACKAGE**: 1.6 x 0.8 mm

DESCRIPTION

NEC's NE58219 is a low supply voltage transistor designed for UHF Mixer and oscillator applications. The 3 pin ultra super mini mold package makes this device ideally suited for high density surface mount assembly.

OUTLINE DIMENSIONS (Units in mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

| PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE | | NE58219 2SC5004 19 | | | |
|---|--|--------------------------|-----|-----|-----|
| SYMBOLS | PARAMETERS AND CONDITIONS | UNITS | MIN | TYP | MAX |
| I_{CBO} | Collector Cutoff Current at $V_{CB} = 15\text{ V}$, $I_E = 0$ | μA | | | 0.1 |
| I_{EBO} | Emitter Cutoff Current at $V_{EB} = 1\text{ V}$, $I_C = 0$ | μA | | | 0.1 |
| $V_{CE(sat)}$ | Collector Saturation Voltage at $h_{FE} = 10$, $I_C = 5\text{ mA}$ | V | | | 0.5 |
| h_{FE} | DC Current Gain at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}^2$ | | 60 | | 120 |
| f_T | Gain Bandwidth at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$ | GHz | 3.0 | 5.0 | |
| C_{RE} | Feedback Capacitance at $V_{CB} = 5\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}^3$ | pF | | 0.9 | 1.2 |
| $ S_{21E} ^2$ | Insertion Power Gain at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $f = 1\text{ GHz}$ | dB | 5.0 | | |

Notes:

1. Electronic Industrial Association of Japan
2. Pulsed measurement, pulse width $\leq 350\ \mu\text{s}$, Duty Cycle $\leq 2\%$.
3. The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

ABSOLUTE MAXIMUM RATINGS¹ ($T_A = 25^\circ\text{C}$)

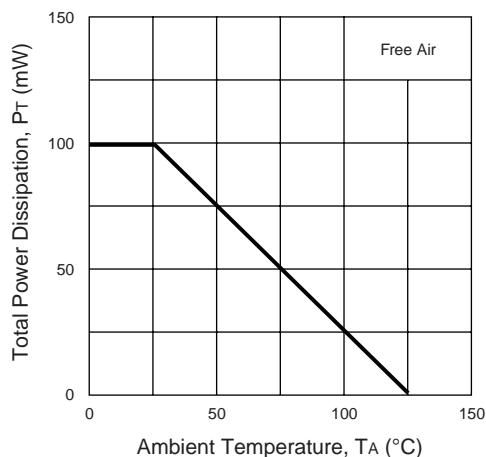
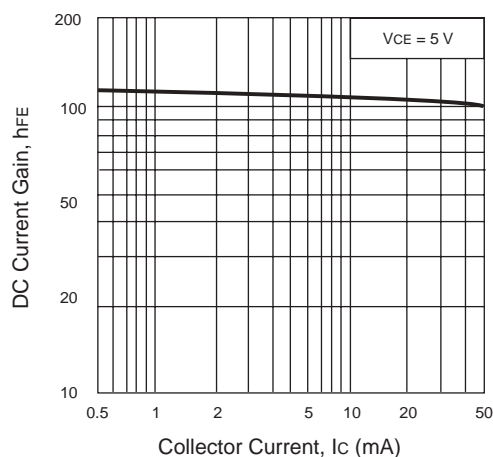
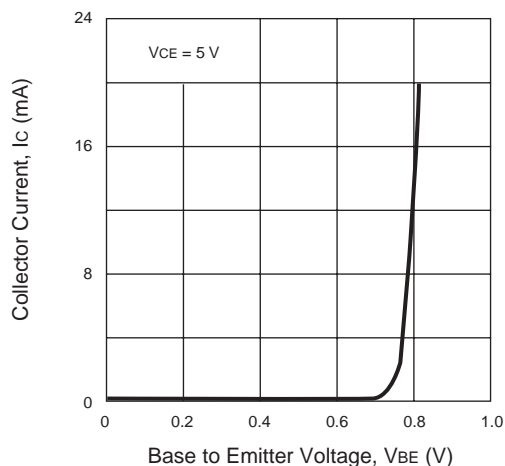
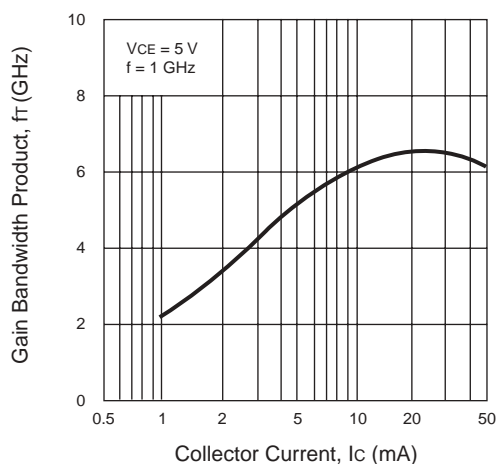
| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|------------------|------------------------------|-------|-------------|
| V _{CBO} | Collector to Base Voltage | V | 20 |
| V _{CEO} | Collector to Emitter Voltage | V | 12 |
| V _{EBO} | Emitter to Base Voltage | V | 3 |
| I _C | Collector Current | mA | 60 |
| P _T | Total Power Dissipation | mW | 100 |
| T _J | Junction Temperature | °C | 125 |
| T _{STG} | Storage Temperature | °C | -55 to +125 |

Notes:

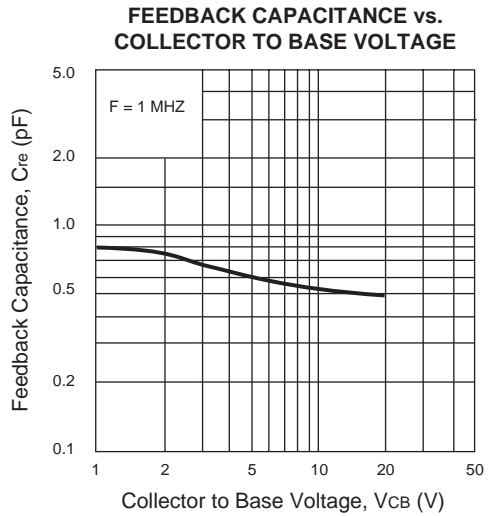
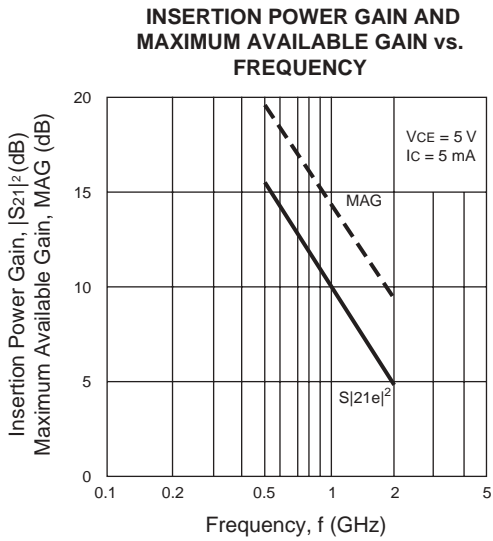
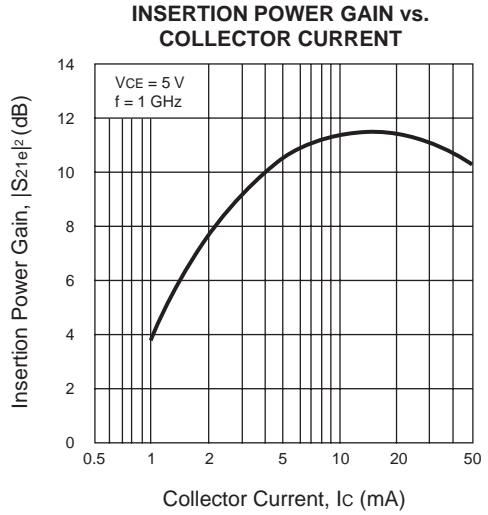
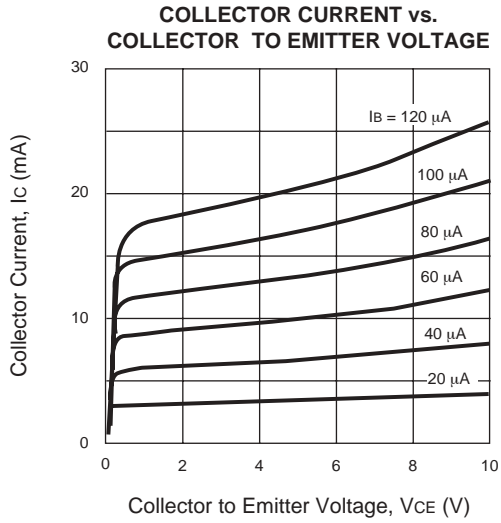
1. Operation in excess of any one of these parameters may result in permanent damage.

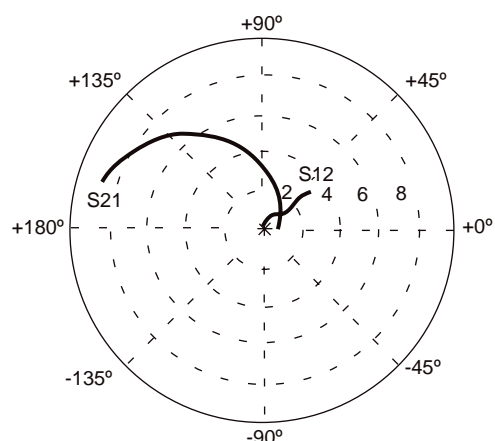
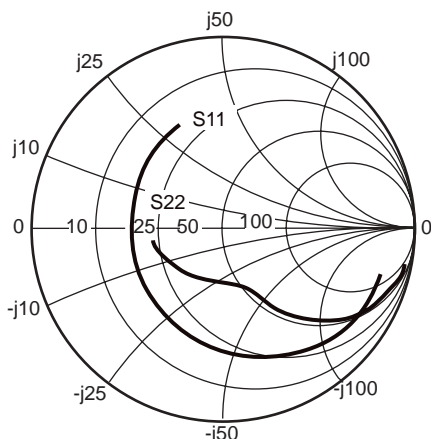
ORDERING INFORMATION

| PART NUMBER | QUANTITY | PACKAGING |
|-------------|----------------|--|
| NE58219-T1 | 3000 pcs./reel | Embossed tape 8mm wide. Pin 3 (collector) face to perforation side of tape. |

TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$)**TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE****DC CURRENT GAIN vs. COLLECTOR CURRENT****COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE****GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT**

TYPICAL PERFORMANCE CURVES (TA = 25°C)



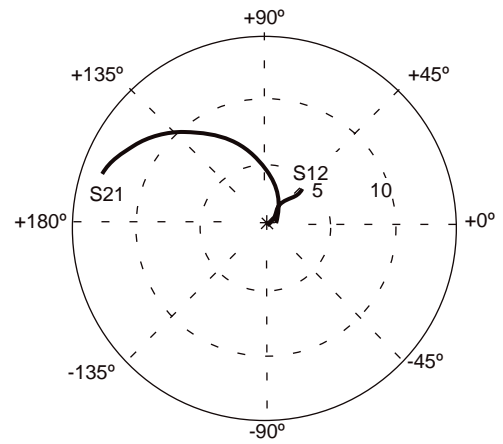
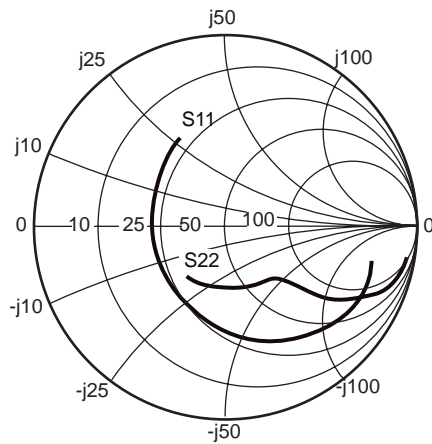
SCATTERING PARAMETERS (T_A = 25°C)

NE58219

V_c = 1 V, I_c = 3 mA

| FREQUENCY (GHz) | S ₁₁ | | S ₂₁ | | S ₂₂ | | S ₁₂ | | K (unitless) | MAG (dB) |
|--------------------|-----------------|---------|-----------------|--------|-----------------|---------|-----------------|-------|-----------------|-------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | | |
| 0.050 | 0.84 | -16.28 | 8.69 | 162.16 | 0.95 | -11.12 | 0.03 | 71.19 | 0.31 | 25.05 |
| 0.100 | 0.84 | -33.14 | 8.22 | 155.75 | 0.93 | -20.33 | 0.05 | 70.75 | 0.12 | 22.03 |
| 0.200 | 0.74 | -61.59 | 7.05 | 136.55 | 0.79 | -34.69 | 0.09 | 57.41 | 0.24 | 19.10 |
| 0.300 | 0.65 | -84.29 | 5.92 | 122.15 | 0.66 | -44.45 | 0.11 | 48.65 | 0.36 | 17.38 |
| 0.400 | 0.59 | -102.61 | 5.00 | 111.38 | 0.57 | -51.15 | 0.12 | 43.53 | 0.45 | 16.14 |
| 0.500 | 0.55 | -117.08 | 4.28 | 102.97 | 0.50 | -55.78 | 0.13 | 40.52 | 0.55 | 15.15 |
| 0.600 | 0.53 | -129.02 | 3.72 | 96.03 | 0.44 | -59.22 | 0.14 | 38.95 | 0.64 | 14.29 |
| 0.700 | 0.51 | -138.97 | 3.29 | 90.09 | 0.40 | -62.35 | 0.14 | 38.03 | 0.72 | 13.57 |
| 0.800 | 0.49 | -147.58 | 2.94 | 84.92 | 0.37 | -64.76 | 0.15 | 37.73 | 0.79 | 12.91 |
| 0.900 | 0.49 | -155.03 | 2.66 | 80.24 | 0.35 | -67.47 | 0.16 | 37.81 | 0.85 | 12.33 |
| 1.000 | 0.48 | -161.81 | 2.44 | 75.92 | 0.33 | -70.19 | 0.16 | 37.99 | 0.91 | 11.78 |
| 1.100 | 0.48 | -167.71 | 2.25 | 71.90 | 0.32 | -72.91 | 0.17 | 38.27 | 0.96 | 11.28 |
| 1.200 | 0.48 | -173.05 | 2.09 | 68.18 | 0.31 | -75.58 | 0.17 | 38.83 | 1.00 | 10.69 |
| 1.300 | 0.48 | -177.95 | 1.95 | 64.62 | 0.30 | -78.51 | 0.18 | 39.27 | 1.04 | 9.20 |
| 1.400 | 0.48 | 177.41 | 1.83 | 61.29 | 0.29 | -81.48 | 0.19 | 39.74 | 1.07 | 8.34 |
| 1.500 | 0.48 | 173.15 | 1.73 | 58.09 | 0.28 | -84.48 | 0.19 | 40.16 | 1.10 | 7.66 |
| 1.600 | 0.48 | 168.99 | 1.64 | 55.02 | 0.28 | -87.73 | 0.20 | 40.55 | 1.12 | 7.10 |
| 1.700 | 0.49 | 165.21 | 1.56 | 52.11 | 0.28 | -91.11 | 0.21 | 40.82 | 1.13 | 6.60 |
| 1.800 | 0.49 | 161.56 | 1.49 | 49.31 | 0.27 | -94.65 | 0.21 | 41.19 | 1.14 | 6.16 |
| 1.900 | 0.49 | 158.14 | 1.43 | 46.56 | 0.27 | -98.18 | 0.22 | 41.44 | 1.15 | 5.77 |
| 2.000 | 0.50 | 154.96 | 1.37 | 43.96 | 0.27 | -101.84 | 0.23 | 41.49 | 1.16 | 5.41 |
| 2.100 | 0.50 | 152.01 | 1.32 | 41.45 | 0.27 | -105.68 | 0.24 | 41.65 | 1.16 | 5.10 |
| 2.200 | 0.51 | 149.18 | 1.27 | 38.97 | 0.28 | -109.36 | 0.24 | 41.72 | 1.15 | 4.81 |
| 2.300 | 0.51 | 146.47 | 1.23 | 36.71 | 0.28 | -113.26 | 0.25 | 41.69 | 1.15 | 4.56 |
| 2.400 | 0.52 | 143.90 | 1.19 | 34.45 | 0.28 | -117.01 | 0.26 | 41.63 | 1.15 | 4.30 |
| 2.500 | 0.52 | 141.49 | 1.16 | 32.27 | 0.29 | -120.76 | 0.27 | 41.48 | 1.14 | 4.06 |
| 2.600 | 0.53 | 139.05 | 1.12 | 30.21 | 0.29 | -124.41 | 0.28 | 41.14 | 1.14 | 3.83 |
| 2.700 | 0.53 | 136.85 | 1.09 | 28.21 | 0.29 | -128.09 | 0.29 | 40.97 | 1.13 | 3.64 |
| 2.800 | 0.54 | 134.56 | 1.06 | 26.30 | 0.30 | -131.59 | 0.29 | 40.70 | 1.12 | 3.47 |
| 2.900 | 0.54 | 132.43 | 1.03 | 24.45 | 0.31 | -135.17 | 0.30 | 40.33 | 1.11 | 3.28 |
| 3.000 | 0.55 | 130.33 | 1.01 | 22.68 | 0.31 | -138.54 | 0.31 | 39.92 | 1.11 | 3.11 |
| 3.100 | 0.55 | 128.52 | 0.98 | 20.96 | 0.32 | -141.89 | 0.32 | 39.46 | 1.10 | 2.98 |
| 3.200 | 0.56 | 126.66 | 0.96 | 19.34 | 0.32 | -145.28 | 0.33 | 38.97 | 1.09 | 2.84 |
| 3.300 | 0.56 | 124.92 | 0.94 | 17.77 | 0.33 | -148.51 | 0.34 | 38.44 | 1.08 | 2.72 |
| 3.400 | 0.57 | 123.18 | 0.92 | 16.22 | 0.34 | -151.84 | 0.35 | 37.80 | 1.07 | 2.59 |
| 3.500 | 0.57 | 121.66 | 0.90 | 14.75 | 0.34 | -154.93 | 0.36 | 37.19 | 1.06 | 2.52 |
| 3.600 | 0.58 | 120.12 | 0.88 | 13.34 | 0.35 | -158.22 | 0.37 | 36.50 | 1.05 | 2.39 |
| 3.700 | 0.58 | 118.56 | 0.87 | 12.03 | 0.36 | -161.09 | 0.38 | 35.74 | 1.05 | 2.30 |
| 3.800 | 0.58 | 117.13 | 0.85 | 10.73 | 0.36 | -164.14 | 0.39 | 35.00 | 1.04 | 2.19 |
| 3.900 | 0.59 | 115.69 | 0.84 | 9.51 | 0.37 | -166.91 | 0.40 | 34.23 | 1.03 | 2.11 |
| 4.000 | 0.59 | 114.19 | 0.83 | 8.33 | 0.38 | -169.73 | 0.41 | 33.42 | 1.03 | 2.03 |

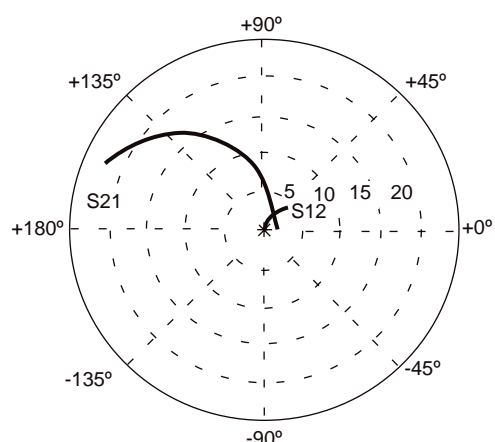
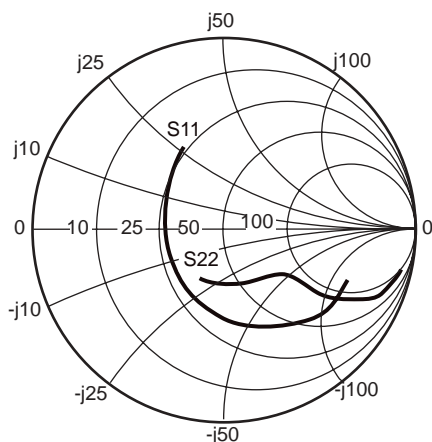
SCATTERING PARAMETERS (T_A = 25°C)



NE58219

V_c = 5 V, I_c = 5 mA

| FREQUENCY (GHz) | S ₁₁ | | S ₂₁ | | S ₂₂ | | S ₁₂ | | K (unitless) | MAG (dB) |
|--------------------|-----------------|---------|-----------------|--------|-----------------|---------|-----------------|-------|-----------------|-------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | | |
| 0.050 | 0.78 | -15.97 | 13.43 | 162.03 | 0.95 | -9.31 | 0.01 | 80.11 | 0.23 | 29.98 |
| 0.100 | 0.78 | -32.63 | 12.68 | 155.23 | 0.93 | -16.92 | 0.03 | 71.25 | 0.18 | 26.35 |
| 0.200 | 0.67 | -60.08 | 10.68 | 136.09 | 0.79 | -27.63 | 0.05 | 61.51 | 0.32 | 23.37 |
| 0.300 | 0.57 | -81.72 | 8.83 | 122.20 | 0.68 | -33.64 | 0.06 | 55.73 | 0.45 | 21.52 |
| 0.400 | 0.51 | -99.23 | 7.37 | 112.16 | 0.59 | -36.97 | 0.07 | 52.31 | 0.57 | 20.14 |
| 0.500 | 0.46 | -113.17 | 6.27 | 104.46 | 0.53 | -38.75 | 0.08 | 51.51 | 0.67 | 19.02 |
| 0.600 | 0.43 | -125.01 | 5.42 | 98.23 | 0.49 | -39.79 | 0.09 | 51.49 | 0.75 | 18.03 |
| 0.700 | 0.41 | -134.99 | 4.76 | 92.93 | 0.46 | -40.85 | 0.09 | 51.76 | 0.83 | 17.15 |
| 0.800 | 0.39 | -143.77 | 4.24 | 88.36 | 0.44 | -41.52 | 0.10 | 52.53 | 0.89 | 16.35 |
| 0.900 | 0.38 | -151.46 | 3.83 | 84.26 | 0.42 | -42.56 | 0.11 | 53.26 | 0.93 | 15.61 |
| 1.000 | 0.38 | -158.46 | 3.49 | 80.48 | 0.40 | -43.81 | 0.11 | 53.98 | 0.97 | 14.94 |
| 1.100 | 0.38 | -164.56 | 3.21 | 76.95 | 0.39 | -45.13 | 0.12 | 54.45 | 1.00 | 13.91 |
| 1.200 | 0.37 | -170.14 | 2.97 | 73.66 | 0.38 | -46.52 | 0.13 | 55.14 | 1.03 | 12.72 |
| 1.300 | 0.37 | -175.24 | 2.77 | 70.53 | 0.37 | -48.11 | 0.13 | 55.52 | 1.05 | 11.85 |
| 1.400 | 0.37 | -180.00 | 2.60 | 67.57 | 0.37 | -49.82 | 0.14 | 55.92 | 1.06 | 11.14 |
| 1.500 | 0.38 | 175.58 | 2.44 | 64.71 | 0.36 | -51.66 | 0.15 | 56.20 | 1.07 | 10.50 |
| 1.600 | 0.38 | 171.25 | 2.31 | 61.94 | 0.35 | -53.64 | 0.16 | 56.38 | 1.08 | 9.95 |
| 1.700 | 0.38 | 167.32 | 2.19 | 59.30 | 0.35 | -55.69 | 0.17 | 56.44 | 1.08 | 9.46 |
| 1.800 | 0.39 | 163.57 | 2.09 | 56.73 | 0.34 | -58.05 | 0.17 | 56.48 | 1.09 | 9.03 |
| 1.900 | 0.39 | 160.04 | 2.00 | 54.20 | 0.34 | -60.48 | 0.18 | 56.51 | 1.09 | 8.62 |
| 2.000 | 0.40 | 156.80 | 1.91 | 51.76 | 0.33 | -63.18 | 0.19 | 56.29 | 1.08 | 8.27 |
| 2.100 | 0.40 | 153.84 | 1.84 | 49.40 | 0.33 | -65.85 | 0.20 | 56.10 | 1.08 | 7.96 |
| 2.200 | 0.41 | 151.04 | 1.77 | 47.03 | 0.33 | -68.79 | 0.21 | 55.83 | 1.08 | 7.64 |
| 2.300 | 0.42 | 148.44 | 1.71 | 44.86 | 0.32 | -71.69 | 0.22 | 55.65 | 1.07 | 7.41 |
| 2.400 | 0.42 | 145.82 | 1.65 | 42.67 | 0.32 | -74.76 | 0.22 | 55.31 | 1.06 | 7.15 |
| 2.500 | 0.43 | 143.48 | 1.59 | 40.50 | 0.32 | -77.76 | 0.23 | 54.82 | 1.05 | 6.96 |
| 2.600 | 0.43 | 141.09 | 1.54 | 38.43 | 0.32 | -80.98 | 0.24 | 54.43 | 1.05 | 6.74 |
| 2.700 | 0.44 | 138.92 | 1.50 | 36.38 | 0.32 | -84.11 | 0.25 | 54.02 | 1.04 | 6.56 |
| 2.800 | 0.45 | 136.72 | 1.46 | 34.42 | 0.32 | -87.35 | 0.26 | 53.50 | 1.03 | 6.42 |
| 2.900 | 0.45 | 134.69 | 1.42 | 32.47 | 0.31 | -90.64 | 0.27 | 52.95 | 1.02 | 6.31 |
| 3.000 | 0.46 | 132.66 | 1.38 | 30.58 | 0.31 | -93.92 | 0.28 | 52.41 | 1.01 | 6.24 |
| 3.100 | 0.47 | 130.89 | 1.35 | 28.73 | 0.31 | -97.19 | 0.29 | 51.85 | 1.00 | 6.35 |
| 3.200 | 0.47 | 129.12 | 1.31 | 26.92 | 0.32 | -100.72 | 0.30 | 51.17 | 0.99 | 6.45 |
| 3.300 | 0.48 | 127.48 | 1.28 | 25.16 | 0.32 | -103.97 | 0.31 | 50.59 | 0.98 | 6.21 |
| 3.400 | 0.48 | 125.87 | 1.25 | 23.43 | 0.32 | -107.52 | 0.32 | 49.80 | 0.98 | 5.98 |
| 3.500 | 0.49 | 124.41 | 1.23 | 21.73 | 0.32 | -110.78 | 0.33 | 49.17 | 0.96 | 5.75 |
| 3.600 | 0.50 | 122.98 | 1.20 | 20.08 | 0.32 | -114.26 | 0.34 | 48.41 | 0.96 | 5.53 |
| 3.700 | 0.50 | 121.52 | 1.18 | 18.49 | 0.32 | -117.44 | 0.35 | 47.56 | 0.95 | 5.31 |
| 3.800 | 0.51 | 120.14 | 1.15 | 16.93 | 0.33 | -120.69 | 0.36 | 46.79 | 0.94 | 5.11 |
| 3.900 | 0.51 | 118.81 | 1.13 | 15.44 | 0.33 | -123.76 | 0.37 | 46.00 | 0.93 | 4.90 |
| 4.000 | 0.52 | 117.39 | 1.11 | 13.94 | 0.33 | -126.88 | 0.38 | 45.16 | 0.93 | 4.70 |

SCATTERING PARAMETERS (T_A = 25°C)

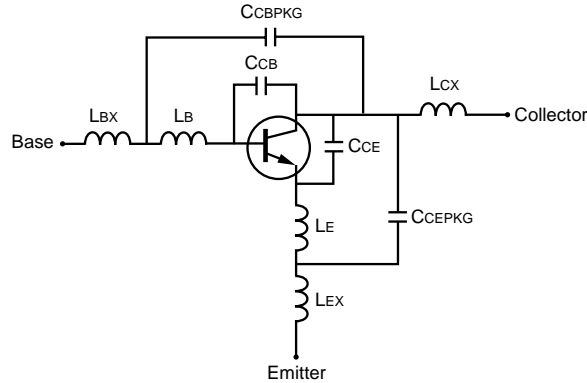
NE58219

V_c = 8 V, I_c = 10 mA

| FREQUENCY (GHz) | S ₁₁ | | S ₂₁ | | S ₂₂ | | S ₁₂ | | K (unitless) | MAG (dB) |
|--------------------|-----------------|---------|-----------------|--------|-----------------|---------|-----------------|-------|-----------------|-------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | | |
| 0.050 | 0.67 | -21.79 | 22.12 | 157.69 | 0.91 | -12.56 | 0.01 | 73.96 | 0.35 | 32.88 |
| 0.100 | 0.66 | -44.79 | 20.12 | 147.32 | 0.87 | -21.76 | 0.02 | 70.10 | 0.26 | 29.06 |
| 0.200 | 0.51 | -77.37 | 15.18 | 126.02 | 0.69 | -31.47 | 0.04 | 60.88 | 0.47 | 26.10 |
| 0.300 | 0.42 | -100.22 | 11.62 | 113.06 | 0.56 | -34.70 | 0.05 | 58.80 | 0.65 | 24.07 |
| 0.400 | 0.38 | -117.42 | 9.27 | 104.45 | 0.50 | -35.60 | 0.05 | 59.12 | 0.76 | 22.36 |
| 0.500 | 0.35 | -130.39 | 7.68 | 98.13 | 0.45 | -35.57 | 0.06 | 60.14 | 0.85 | 20.95 |
| 0.600 | 0.33 | -141.10 | 6.54 | 93.02 | 0.42 | -35.42 | 0.07 | 61.41 | 0.91 | 19.73 |
| 0.700 | 0.32 | -149.97 | 5.69 | 88.66 | 0.40 | -35.64 | 0.08 | 62.39 | 0.95 | 18.64 |
| 0.800 | 0.32 | -157.65 | 5.03 | 84.86 | 0.38 | -35.80 | 0.09 | 63.19 | 0.99 | 17.68 |
| 0.900 | 0.31 | -164.24 | 4.52 | 81.42 | 0.37 | -36.49 | 0.09 | 63.82 | 1.01 | 16.11 |
| 1.000 | 0.31 | -170.13 | 4.10 | 78.23 | 0.36 | -37.57 | 0.10 | 64.03 | 1.03 | 15.00 |
| 1.100 | 0.31 | -175.32 | 3.76 | 75.21 | 0.35 | -38.79 | 0.11 | 64.23 | 1.04 | 14.04 |
| 1.200 | 0.32 | 179.93 | 3.47 | 72.37 | 0.35 | -40.04 | 0.12 | 64.39 | 1.05 | 13.28 |
| 1.300 | 0.32 | 175.70 | 3.23 | 69.64 | 0.34 | -41.54 | 0.13 | 64.33 | 1.05 | 12.60 |
| 1.400 | 0.32 | 171.61 | 3.02 | 67.04 | 0.34 | -43.13 | 0.14 | 64.13 | 1.06 | 11.95 |
| 1.500 | 0.33 | 167.86 | 2.84 | 64.50 | 0.33 | -44.89 | 0.15 | 63.73 | 1.06 | 11.37 |
| 1.600 | 0.33 | 164.10 | 2.68 | 62.04 | 0.32 | -46.84 | 0.16 | 63.50 | 1.06 | 10.86 |
| 1.700 | 0.34 | 160.72 | 2.54 | 59.66 | 0.32 | -48.78 | 0.16 | 63.15 | 1.06 | 10.41 |
| 1.800 | 0.34 | 157.44 | 2.42 | 57.31 | 0.31 | -51.02 | 0.17 | 62.67 | 1.06 | 10.00 |
| 1.900 | 0.35 | 154.45 | 2.31 | 55.02 | 0.31 | -53.26 | 0.18 | 62.20 | 1.05 | 9.61 |
| 2.000 | 0.35 | 151.60 | 2.21 | 52.78 | 0.31 | -55.77 | 0.19 | 61.72 | 1.05 | 9.27 |
| 2.100 | 0.36 | 149.09 | 2.12 | 50.62 | 0.30 | -58.30 | 0.20 | 61.09 | 1.04 | 8.96 |
| 2.200 | 0.37 | 146.67 | 2.03 | 48.40 | 0.30 | -61.15 | 0.21 | 60.51 | 1.04 | 8.67 |
| 2.300 | 0.37 | 144.44 | 1.96 | 46.40 | 0.30 | -63.92 | 0.22 | 59.93 | 1.03 | 8.45 |
| 2.400 | 0.38 | 142.19 | 1.90 | 44.33 | 0.29 | -66.93 | 0.23 | 59.21 | 1.03 | 8.23 |
| 2.500 | 0.39 | 140.17 | 1.83 | 42.27 | 0.29 | -69.77 | 0.24 | 58.48 | 1.02 | 8.03 |
| 2.600 | 0.39 | 138.05 | 1.78 | 40.31 | 0.29 | -72.71 | 0.24 | 57.78 | 1.02 | 7.83 |
| 2.700 | 0.40 | 136.26 | 1.72 | 38.37 | 0.28 | -75.76 | 0.25 | 57.18 | 1.01 | 7.77 |
| 2.800 | 0.41 | 134.26 | 1.67 | 36.47 | 0.28 | -78.87 | 0.26 | 56.42 | 1.00 | 7.79 |
| 2.900 | 0.41 | 132.45 | 1.63 | 34.60 | 0.28 | -82.00 | 0.27 | 55.66 | 1.00 | 7.78 |
| 3.000 | 0.42 | 130.63 | 1.59 | 32.76 | 0.28 | -85.10 | 0.28 | 54.91 | 0.99 | 7.52 |
| 3.100 | 0.43 | 129.18 | 1.55 | 30.95 | 0.28 | -88.23 | 0.29 | 54.16 | 0.98 | 7.27 |
| 3.200 | 0.43 | 127.63 | 1.51 | 29.18 | 0.28 | -91.56 | 0.30 | 53.38 | 0.97 | 7.03 |
| 3.300 | 0.44 | 126.18 | 1.47 | 27.44 | 0.28 | -94.82 | 0.31 | 52.59 | 0.96 | 6.80 |
| 3.400 | 0.45 | 124.79 | 1.44 | 25.71 | 0.28 | -98.34 | 0.32 | 51.79 | 0.96 | 6.57 |
| 3.500 | 0.45 | 123.57 | 1.41 | 24.03 | 0.28 | -101.39 | 0.33 | 50.96 | 0.95 | 6.34 |
| 3.600 | 0.46 | 122.30 | 1.38 | 22.35 | 0.28 | -104.84 | 0.34 | 50.13 | 0.94 | 6.14 |
| 3.700 | 0.47 | 121.00 | 1.35 | 20.74 | 0.28 | -107.86 | 0.35 | 49.29 | 0.93 | 5.93 |
| 3.800 | 0.47 | 119.87 | 1.33 | 19.15 | 0.28 | -111.10 | 0.35 | 48.43 | 0.93 | 5.73 |
| 3.900 | 0.48 | 118.69 | 1.30 | 17.61 | 0.28 | -113.87 | 0.36 | 47.61 | 0.92 | 5.54 |
| 4.000 | 0.48 | 117.43 | 1.28 | 16.07 | 0.29 | -117.00 | 0.37 | 46.74 | 0.91 | 5.35 |

NONLINEAR MODEL

SCHEMATIC



BJT NONLINEAR MODEL PARAMETERS (1)

| Parameters | Q1 | Parameters | Q1 |
|------------|----------|------------|--------|
| IS | 2.3e-16 | MJC | 0.28 |
| BF | 100.3 | XCJC | 0.2 |
| NF | 0.9917 | CJS | 0 |
| VAF | 31.6 | VJS | 0.75 |
| IKF | 2.2 | MJS | 0 |
| ISE | 3.5e-11 | FC | 0.7 |
| NE | 30 | TF | 12e-12 |
| BR | 13.5 | XTF | 4 |
| NR | 0.9899 | VTF | 4 |
| VAR | 3.9 | ITF | 0.01 |
| IKR | 0.05 | PTF | 50 |
| ISC | 15.4e-12 | TR | 1.0e-9 |
| NC | 30 | EG | 1.11 |
| RE | 1.4 | XTB | 0 |
| RB | 14 | XTI | 3 |
| RBM | 9 | KF | 0 |
| IRB | 0.003 | AF | 1 |
| RC | 1.6 | | |
| CJE | 1.3e-12 | | |
| VJE | 0.87 | | |
| MJE | 0.36 | | |
| CJC | 0.6e-12 | | |
| VJC | 0.59 | | |

(1) Gummel-Poon Model

ADDITIONAL PARAMETERS

| Parameters | NE58219 |
|------------|----------|
| CcB | 0.03e-12 |
| CcE | 0.2e-12 |
| Lb | 0.75e-9 |
| Le | 0.65e-9 |
| CcBPKG | 0.17e-12 |
| CcEPKG | 0.15e-12 |
| LbX | 0.19e-9 |
| LcX | 0.7e-9 |
| LEx | 0.19e-9 |

MODEL RANGE

Frequency: 0.05 to 4 GHz
 Bias: $V_{CE} = 1\text{ V to }8\text{ V}$, $I_c = 3\text{ mA to }10\text{ mA}$
 Date: 2/2002

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

CEL California Eastern Laboratories, Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.

4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • www.cel.com

DATA SUBJECT TO CHANGE WITHOUT NOTICE

03/03/03