

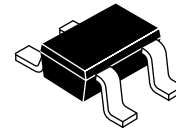
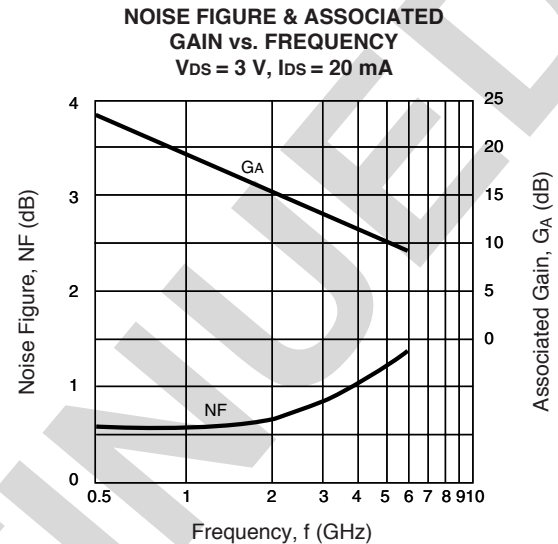
FEATURES

- **LOW COST MINIATURE PLASTIC PACKAGE (SOT-343)**
- **LOW NOISE FIGURE:**
0.6 dB typical at 2 GHz
- **HIGH ASSOCIATED GAIN:**
16.0 dB typical at 2 GHz
- **L_G = 0.6 μm, W_G = 400 μm**
- **TAPE & REEL PACKAGING**

DESCRIPTION

NEC's NE34018 is a low cost gallium arsenide Hetero-Junction FET housed in a miniature (SOT-343) plastic surface mount package. The device is fabricated using ion implantation for improved RF and DC performance, reliability, and uniformity. Its low noise figure, high gain, small size and weight make it an ideal low noise amplifier transistor in the 1-3 GHz frequency range. The NE34018 is suitable for GPS, PCS, WLAN, MMDS, and other commercial applications.

NEC's stringent quality assurance and test procedures ensure the highest reliability and performance.



18 Package

SOT-343 Style

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

| PART NUMBER PACKAGE OUTLINE | | | NE34018 18 | | |
|--------------------------------|--|------------|---------------|--------------|------|
| SYMBOL | PARAMETERS AND CONDITIONS | UNITS | MIN | TYP | MAX |
| NF | Noise Figure at V _{DS} = 2 V, I _D = 5 mA, f = 2 GHz | dB | | 0.6 | 1.0 |
| GA | Associated Gain at V _{DS} = 2 V, I _D = 5 mA, f = 2 GHz | dB | 14.0 | 16.0 | |
| P _{1dB} | Output Power at 1 dB Gain Compression Point, f = 2 GHz V _{DS} = 2 V, I _{DS} = 10 mA V _{DS} = 3 V, I _{DS} = 30 mA | dBm dBm | | 12 16.5 | |
| G _{1dB} | Gain at P _{1dB} , f = 2 GHz V _{DS} = 2 V, I _{DS} = 10 mA V _{DS} = 3 V, I _{DS} = 30 mA | dB dB | | 17.0 17.5 | |
| O/P I _{P3} | Output I _{P3} at f = 2 GHz, Δf = 1 MHz V _{DS} = 2 V, I _{DS} = 10 mA V _{DS} = 2 V, I _{DS} = 30 mA | dBm dBm | | 23 32 | |
| I _{DSS} | Saturated Drain Current at V _{DS} = 2 V, V _{GS} = 0 V | mA | 30 | 80 | 120 |
| V _P | Pinch Off Voltage at V _{DS} = 2 V, I _D = 100 μA | V | -2.0 | -0.8 | -0.2 |
| g _m | Transconductance at V _{DS} = 2 V, I _D = 5 mA | mS | 30 | | |
| I _{GSO} | Gate to Source Leakage Current at V _{GS} = -3 V | μA | | 0.5 | 10 |
| R _{TH(CH-A)} | Thermal Resistance (Channel to Ambient) | °C/W | | 833 | |

Note:

1. Typical values of noise figures and associated gain are those obtained when 50% of the devices from a large number of lots were individually measured in a circuit with the input individually tuned to obtain the minimum value. Maximum values are criteria established on the production line as a "go-no-go" screening test with the fixture tuned for the "generic" type but not for each specimen.

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|------------------|-------------------------|-------|------------------|
| V _{DS} | Drain to Source Voltage | V | 4 |
| V _{GDO} | Gate to Drain Voltage | V | -3 |
| V _{GSO} | Gate to Source Voltage | V | -3 |
| I _{DS} | Drain Current | mA | I _{DSS} |
| T _{CH} | Channel Temperature | °C | 125 |
| T _{STG} | Storage Temperature | °C | -65 to +125 |
| P _T | Total Power Dissipation | mW | 150 |

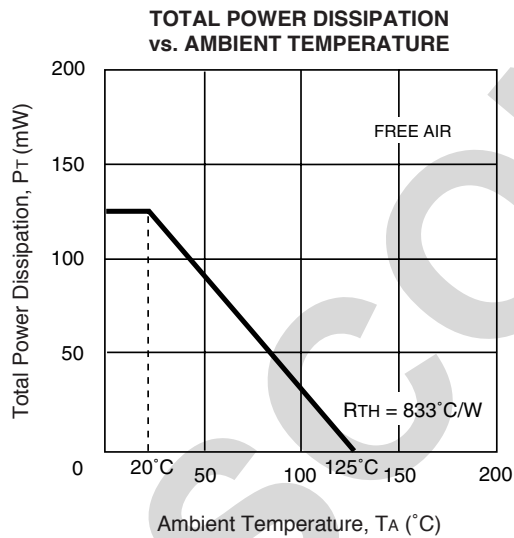
Note:

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

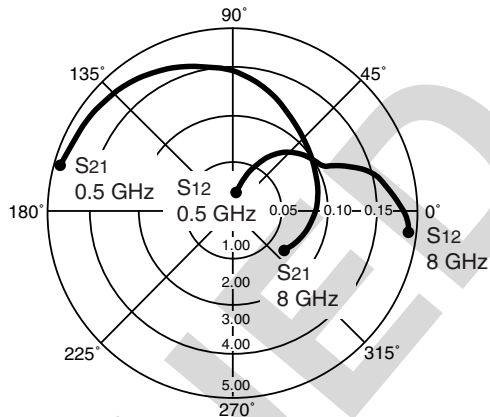
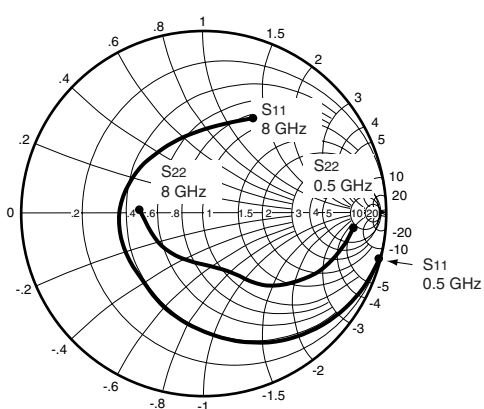
TYPICAL NOISE PARAMETERS (T_A = 25°C)

| FREQ. (MHz) | NF _{OPT} (dB) | G _A (dB) | Γ _{OPT} | | R _n /50 |
|---|---------------------------|------------------------|------------------|-----|--------------------|
| | | | MAG | ANG | |
| V_{DS} = 2 V, I_{DS} = 10 mA | | | | | |
| 900 | .56 | 20.5 | .76 | 30 | .45 |
| 2000 | .63 | 16.3 | .61 | 41 | .28 |
| 2500 | .68 | 14.1 | .49 | 51 | .18 |
| 3000 | .70 | 13.6 | .39 | 49 | .16 |
| 3500 | .76 | 12.3 | .28 | 71 | .12 |
| 4000 | .82 | 11.6 | .20 | 80 | .10 |
| V_{DS} = 2 V, I_{DS} = 30 mA | | | | | |
| 2000 | .60 | 17.0 | .56 | 39 | .23 |
| 2500 | .70 | 15.3 | .43 | 46 | .15 |
| 3000 | .76 | 14.2 | .32 | 50 | .26 |
| V_{DS} = 3 V, I_{DS} = 20 mA | | | | | |
| 900 | .56 | 20.2 | .74 | 26 | 1.54 |
| 2000 | .62 | 16.8 | .62 | 42 | .43 |
| 2500 | .66 | 14.9 | .56 | 50 | .31 |
| 3000 | .70 | 14.0 | .45 | 65 | .24 |
| 3500 | .80 | 13.2 | .36 | 76 | .14 |
| 4000 | .84 | 12.8 | .29 | 85 | .10 |
| 4500 | .90 | 11.0 | .20 | 98 | .08 |

TYPICAL PERFORMANCE CURVES (T_A = 25°C)



TYPICAL SCATTERING PARAMETERS (TA = 25°C)



Vds = 2 V, Ids = 5 mA

| FREQUENCY (GHz) | S11 | | S21 | | S12 | | S22 | | K | MAG ¹ (dB) |
|--------------------|-------|--------|-------|-------|-------|------|-------|--------|-------|--------------------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | | |
| 0.50 | 0.984 | -15.1 | 4.945 | 165.0 | 0.020 | 80.6 | 0.807 | -7.2 | 0.135 | 23.931 |
| 0.60 | 0.979 | -18.0 | 4.908 | 162.3 | 0.023 | 78.9 | 0.803 | -8.6 | 0.152 | 23.292 |
| 0.70 | 0.973 | -21.0 | 4.899 | 159.4 | 0.027 | 77.0 | 0.798 | -10.0 | 0.174 | 22.587 |
| 0.80 | 0.965 | -23.9 | 4.871 | 156.7 | 0.031 | 75.3 | 0.793 | -11.5 | 0.195 | 21.963 |
| 0.90 | 0.958 | -26.8 | 4.843 | 153.9 | 0.034 | 73.7 | 0.788 | -12.9 | 0.213 | 21.536 |
| 1.00 | 0.949 | -29.8 | 4.825 | 151.1 | 0.038 | 72.1 | 0.781 | -14.4 | 0.231 | 21.037 |
| 1.20 | 0.930 | -35.7 | 4.783 | 145.6 | 0.045 | 68.7 | 0.767 | -17.3 | 0.270 | 20.265 |
| 1.40 | 0.906 | -41.5 | 4.723 | 140.2 | 0.052 | 65.4 | 0.751 | -20.2 | 0.314 | 19.582 |
| 1.60 | 0.881 | -47.5 | 4.660 | 134.7 | 0.058 | 62.2 | 0.734 | -23.1 | 0.354 | 19.050 |
| 1.80 | 0.853 | -53.6 | 4.605 | 129.3 | 0.064 | 59.1 | 0.715 | -26.0 | 0.395 | 18.570 |
| 2.00 | 0.821 | -59.8 | 4.531 | 123.8 | 0.070 | 56.0 | 0.696 | -28.9 | 0.438 | 18.111 |
| 2.50 | 0.737 | -76.3 | 4.332 | 110.5 | 0.082 | 48.2 | 0.648 | -36.0 | 0.542 | 17.229 |
| 3.00 | 0.648 | -94.2 | 4.092 | 97.6 | 0.092 | 41.4 | 0.600 | -42.4 | 0.643 | 16.481 |
| 3.50 | 0.569 | -113.6 | 3.805 | 85.3 | 0.098 | 35.3 | 0.556 | -47.7 | 0.748 | 15.891 |
| 4.00 | 0.512 | -133.0 | 3.516 | 73.9 | 0.102 | 30.5 | 0.518 | -51.8 | 0.845 | 15.374 |
| 4.50 | 0.482 | -150.9 | 3.248 | 63.8 | 0.105 | 27.2 | 0.480 | -54.9 | 0.932 | 14.904 |
| 5.00 | 0.472 | -165.2 | 3.025 | 54.7 | 0.108 | 25.3 | 0.444 | -57.8 | 1.004 | 14.074 |
| 5.50 | 0.468 | -175.7 | 2.846 | 46.4 | 0.112 | 24.5 | 0.405 | -61.0 | 1.068 | 12.459 |
| 6.00 | 0.464 | 176.0 | 2.714 | 38.4 | 0.118 | 23.7 | 0.367 | -65.4 | 1.107 | 11.622 |
| 6.50 | 0.456 | 167.9 | 2.601 | 30.5 | 0.126 | 22.4 | 0.331 | -71.6 | 1.130 | 10.955 |
| 7.00 | 0.441 | 158.2 | 2.505 | 22.1 | 0.134 | 20.2 | 0.302 | -80.8 | 1.149 | 10.372 |
| 7.50 | 0.422 | 144.3 | 2.417 | 13.3 | 0.142 | 18.0 | 0.283 | -92.2 | 1.161 | 9.874 |
| 8.00 | 0.411 | 127.5 | 2.321 | 4.0 | 0.151 | 15.0 | 0.281 | -105.9 | 1.152 | 9.503 |

Note:

1. Gain Calculations:

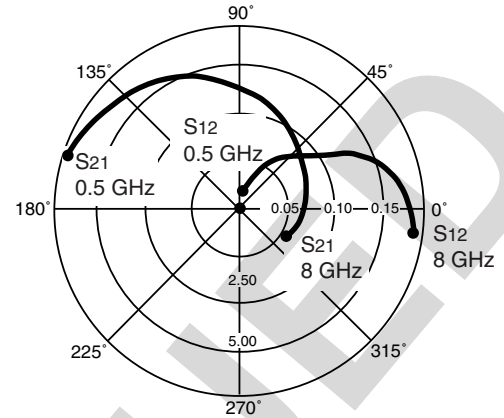
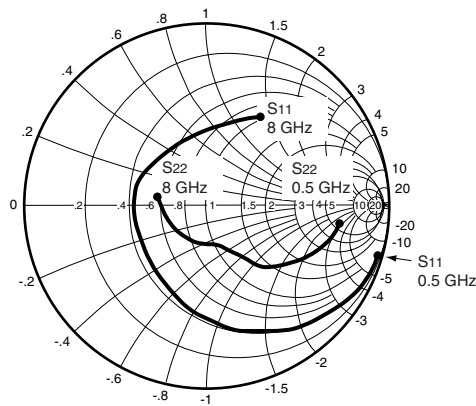
$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1})$$

When $K \leq 1$, MAG is undefined and MSG values are used. $MSG = \frac{|S_{21}|}{|S_{12}|}$, $K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}$, $\Delta = S_{11} S_{22} - S_{21} S_{12}$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

TYPICAL SCATTERING PARAMETERS (TA = 25°C)



Vds = 2 V, Ids = 10 mA

| FREQUENCY (GHz) | S11 | | S21 | | S12 | | S22 | | K | MAG ¹ (dB) |
|--------------------|-------|--------|-------|-------|-------|------|-------|-------|-------|--------------------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | | |
| 0.50 | 0.978 | -17.0 | 6.806 | 162.8 | 0.018 | 80.1 | 0.723 | -7.5 | 0.178 | 25.776 |
| 0.60 | 0.969 | -20.3 | 6.731 | 159.7 | 0.022 | 78.7 | 0.719 | -9.1 | 0.200 | 24.857 |
| 0.70 | 0.960 | -23.6 | 6.691 | 156.5 | 0.025 | 77.3 | 0.712 | -10.5 | 0.224 | 24.276 |
| 0.80 | 0.949 | -26.9 | 6.624 | 153.4 | 0.028 | 75.5 | 0.706 | -12.0 | 0.253 | 23.740 |
| 0.90 | 0.938 | -30.1 | 6.559 | 150.3 | 0.032 | 73.6 | 0.698 | -13.4 | 0.281 | 23.117 |
| 1.00 | 0.924 | -33.3 | 6.502 | 147.2 | 0.035 | 72.4 | 0.690 | -14.9 | 0.307 | 22.690 |
| 1.20 | 0.897 | -39.8 | 6.371 | 141.2 | 0.041 | 69.2 | 0.673 | -17.8 | 0.356 | 21.914 |
| 1.40 | 0.865 | -46.0 | 6.217 | 135.3 | 0.047 | 66.3 | 0.655 | -20.6 | 0.410 | 21.215 |
| 1.60 | 0.831 | -52.4 | 6.065 | 129.5 | 0.053 | 63.4 | 0.635 | -23.4 | 0.460 | 20.586 |
| 1.80 | 0.796 | -58.7 | 5.912 | 123.9 | 0.058 | 60.7 | 0.614 | -26.1 | 0.509 | 20.083 |
| 2.00 | 0.757 | -65.1 | 5.750 | 118.3 | 0.063 | 58.1 | 0.594 | -28.8 | 0.560 | 19.603 |
| 2.50 | 0.658 | -81.9 | 5.336 | 105.0 | 0.074 | 51.7 | 0.546 | -35.3 | 0.677 | 18.580 |
| 3.00 | 0.563 | -100.1 | 4.909 | 92.4 | 0.083 | 46.5 | 0.501 | -41.2 | 0.782 | 17.719 |
| 3.50 | 0.483 | -119.7 | 4.478 | 80.8 | 0.091 | 41.8 | 0.463 | -45.9 | 0.873 | 16.920 |
| 4.00 | 0.432 | -139.4 | 4.080 | 70.2 | 0.097 | 38.1 | 0.429 | -49.5 | 0.952 | 16.239 |
| 4.50 | 0.409 | -157.2 | 3.733 | 60.8 | 0.103 | 35.1 | 0.388 | -53.3 | 1.018 | 14.771 |
| 5.00 | 0.406 | -171.0 | 3.448 | 52.3 | 0.109 | 33.2 | 0.363 | -53.8 | 1.057 | 13.538 |
| 5.50 | 0.408 | 179.2 | 3.223 | 44.5 | 0.117 | 31.6 | 0.327 | -55.6 | 1.085 | 12.618 |
| 6.00 | 0.411 | 171.4 | 3.050 | 37.0 | 0.126 | 29.9 | 0.293 | -58.3 | 1.097 | 11.939 |
| 6.50 | 0.408 | 163.8 | 2.906 | 29.4 | 0.136 | 27.5 | 0.259 | -62.8 | 1.106 | 11.320 |
| 7.00 | 0.397 | 154.5 | 2.782 | 21.5 | 0.145 | 24.1 | 0.232 | -71.3 | 1.117 | 10.752 |
| 7.50 | 0.383 | 140.6 | 2.672 | 13.2 | 0.156 | 20.8 | 0.211 | -83.2 | 1.112 | 10.298 |
| 8.00 | 0.376 | 123.6 | 2.560 | 4.4 | 0.166 | 16.5 | 0.204 | -99.5 | 1.104 | 9.917 |

Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1}). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } MSG = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

TYPICAL SCATTERING PARAMETERS ($T_A = 25^\circ\text{C}$)**V_{DS} = 2 V, I_{DS} = 20 mA**

| FREQUENCY (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG ¹ (dB) |
|--------------------|-----------------|--------|-----------------|-------|-----------------|------|-----------------|-------|-------|--------------------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | | |
| 0.50 | 0.969 | -18.6 | 8.533 | 160.8 | 0.017 | 81.2 | 0.635 | -7.3 | 0.221 | 27.007 |
| 0.60 | 0.958 | -22.1 | 8.416 | 157.3 | 0.020 | 79.4 | 0.631 | -8.8 | 0.256 | 26.241 |
| 0.70 | 0.946 | -25.7 | 8.331 | 153.8 | 0.023 | 77.8 | 0.624 | -10.2 | 0.289 | 25.590 |
| 0.80 | 0.931 | -29.2 | 8.211 | 150.4 | 0.026 | 76.4 | 0.617 | -11.6 | 0.324 | 24.994 |
| 0.90 | 0.916 | -32.7 | 8.092 | 147.1 | 0.029 | 75.1 | 0.610 | -12.9 | 0.354 | 24.457 |
| 1.00 | 0.899 | -36.1 | 7.982 | 143.7 | 0.032 | 73.8 | 0.601 | -14.3 | 0.387 | 23.970 |
| 1.20 | 0.864 | -42.9 | 7.737 | 137.3 | 0.037 | 71.1 | 0.584 | -16.9 | 0.451 | 23.204 |
| 1.40 | 0.825 | -49.3 | 7.469 | 131.1 | 0.043 | 68.5 | 0.566 | -19.4 | 0.512 | 22.398 |
| 1.60 | 0.785 | -55.8 | 7.205 | 125.2 | 0.048 | 66.1 | 0.547 | -21.8 | 0.570 | 21.764 |
| 1.80 | 0.745 | -62.1 | 6.948 | 119.5 | 0.053 | 63.8 | 0.527 | -24.2 | 0.623 | 21.176 |
| 2.00 | 0.701 | -68.6 | 6.692 | 113.9 | 0.058 | 61.7 | 0.509 | -26.5 | 0.675 | 20.621 |
| 2.50 | 0.596 | -85.3 | 6.075 | 100.9 | 0.069 | 56.6 | 0.467 | -32.4 | 0.786 | 19.447 |
| 3.00 | 0.499 | -103.3 | 5.495 | 88.9 | 0.079 | 52.0 | 0.428 | -37.8 | 0.879 | 18.423 |
| 3.50 | 0.422 | -123.1 | 4.953 | 77.8 | 0.088 | 47.9 | 0.397 | -42.4 | 0.952 | 17.504 |
| 4.00 | 0.374 | -142.9 | 4.477 | 67.8 | 0.096 | 44.3 | 0.369 | -45.8 | 1.009 | 16.118 |
| 4.50 | 0.357 | -160.6 | 4.073 | 58.9 | 0.104 | 41.1 | 0.340 | -47.7 | 1.047 | 14.596 |
| 5.00 | 0.359 | -174.1 | 3.745 | 50.9 | 0.112 | 38.6 | 0.310 | -48.8 | 1.073 | 13.589 |
| 5.50 | 0.366 | 176.6 | 3.487 | 43.4 | 0.122 | 36.2 | 0.278 | -49.1 | 1.084 | 12.796 |
| 6.00 | 0.372 | 169.3 | 3.285 | 36.2 | 0.133 | 33.6 | 0.248 | -50.0 | 1.084 | 12.160 |
| 6.50 | 0.372 | 162.1 | 3.118 | 29.0 | 0.144 | 30.4 | 0.219 | -52.7 | 1.086 | 11.571 |
| 7.00 | 0.365 | 153.0 | 2.975 | 21.4 | 0.154 | 26.4 | 0.193 | -60.2 | 1.090 | 11.031 |
| 7.50 | 0.353 | 139.1 | 2.852 | 13.4 | 0.165 | 22.2 | 0.169 | -72.2 | 1.088 | 10.569 |
| 8.00 | 0.348 | 122.0 | 2.729 | 5.0 | 0.176 | 17.4 | 0.156 | -91.3 | 1.079 | 10.189 |

Note:

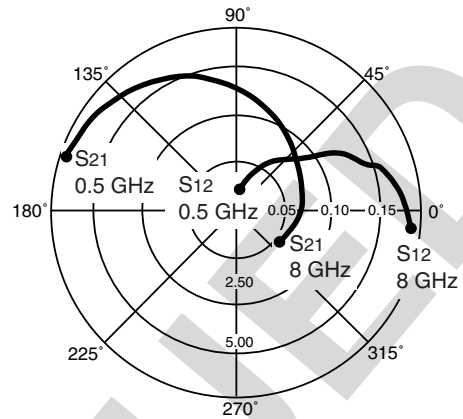
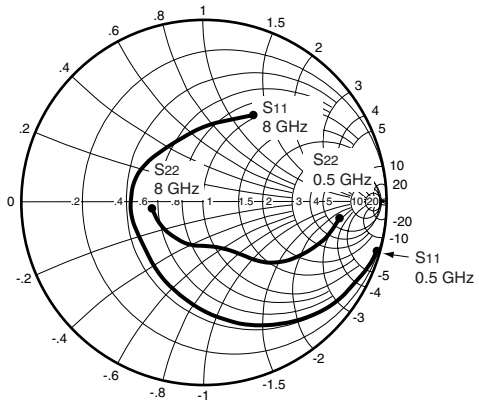
1. Gain Calculations:

$$\text{MAG} = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1}). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } \text{MSG} = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

TYPICAL SCATTERING PARAMETERS (TA = 25 °C)



V_{DS} = 3 V, I_{DS} = 10 mA

| FREQUENCY (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG ¹ (dB) |
|--------------------|-----------------|--------|-----------------|-------|-----------------|------|-----------------|-------|-------|--------------------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | | |
| 0.50 | 0.977 | -17.0 | 6.912 | 162.9 | 0.018 | 80.5 | 0.744 | -7.5 | 0.170 | 25.843 |
| 0.60 | 0.969 | -20.2 | 6.836 | 159.7 | 0.021 | 79.0 | 0.740 | -9.0 | 0.194 | 25.126 |
| 0.70 | 0.959 | -23.5 | 6.795 | 156.5 | 0.024 | 77.1 | 0.733 | -10.4 | 0.226 | 24.520 |
| 0.80 | 0.948 | -26.8 | 6.728 | 153.4 | 0.027 | 75.4 | 0.727 | -11.9 | 0.252 | 23.965 |
| 0.90 | 0.937 | -30.0 | 6.659 | 150.3 | 0.031 | 73.7 | 0.719 | -13.3 | 0.278 | 23.320 |
| 1.00 | 0.923 | -33.2 | 6.602 | 147.2 | 0.034 | 72.4 | 0.712 | -14.8 | 0.302 | 22.882 |
| 1.20 | 0.895 | -39.6 | 6.467 | 141.2 | 0.040 | 69.1 | 0.695 | -17.6 | 0.355 | 22.086 |
| 1.40 | 0.863 | -45.8 | 6.310 | 135.3 | 0.045 | 66.2 | 0.676 | -20.3 | 0.410 | 21.468 |
| 1.60 | 0.829 | -52.1 | 6.152 | 129.5 | 0.051 | 63.5 | 0.656 | -23.0 | 0.459 | 20.814 |
| 1.80 | 0.793 | -58.4 | 5.996 | 123.9 | 0.056 | 60.8 | 0.636 | -25.7 | 0.508 | 20.297 |
| 2.00 | 0.754 | -64.8 | 5.830 | 118.3 | 0.061 | 58.0 | 0.616 | -28.3 | 0.559 | 19.803 |
| 2.50 | 0.656 | -81.4 | 5.407 | 105.1 | 0.071 | 52.1 | 0.568 | -34.6 | 0.674 | 18.817 |
| 3.00 | 0.559 | -99.2 | 4.973 | 92.7 | 0.080 | 46.7 | 0.524 | -40.1 | 0.781 | 17.935 |
| 3.50 | 0.479 | -118.5 | 4.538 | 81.1 | 0.087 | 42.3 | 0.486 | -44.7 | 0.876 | 17.173 |
| 4.00 | 0.426 | -138.0 | 4.138 | 70.6 | 0.093 | 38.9 | 0.454 | -48.2 | 0.953 | 16.483 |
| 4.50 | 0.402 | -155.8 | 3.788 | 61.2 | 0.099 | 36.4 | 0.422 | -50.6 | 1.011 | 15.173 |
| 5.00 | 0.397 | -169.6 | 3.500 | 52.8 | 0.105 | 34.6 | 0.389 | -52.6 | 1.058 | 13.757 |
| 5.50 | 0.399 | -179.6 | 3.274 | 45.0 | 0.112 | 33.3 | 0.355 | -54.6 | 1.090 | 12.833 |
| 6.00 | 0.401 | 172.6 | 3.101 | 37.6 | 0.121 | 31.8 | 0.322 | -57.5 | 1.100 | 12.163 |
| 6.50 | 0.399 | 165.2 | 2.956 | 30.1 | 0.131 | 29.6 | 0.290 | -62.2 | 1.104 | 11.573 |
| 7.00 | 0.389 | 156.1 | 2.832 | 22.3 | 0.140 | 26.6 | 0.264 | -70.4 | 1.112 | 11.026 |
| 7.50 | 0.387 | 144.7 | 2.798 | 15.4 | 0.153 | 20.4 | 0.245 | -81.6 | 1.063 | 11.085 |
| 8.00 | 0.365 | 125.8 | 2.614 | 5.4 | 0.161 | 19.3 | 0.240 | -96.5 | 1.094 | 10.240 |

Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1})$$

When $K \leq 1$, MAG is undefined and MSG values are used. $MSG = \frac{|S_{21}|}{|S_{12}|}$, $K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}$, $\Delta = S_{11} S_{22} - S_{21} S_{12}$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

TYPICAL SCATTERING PARAMETERS (T_A = 25 °C)

V_{DS} = 3 V, I_{DS} = 20 mA

| FREQUENCY (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MAG ¹ (dB) |
|--------------------|-----------------|--------|-----------------|-------|-----------------|------|-----------------|-------|-------|--------------------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | | |
| 0.500 | 0.969 | -18.7 | 8.662 | 160.8 | 0.016 | 81.1 | 0.667 | -7.3 | 0.215 | 27.335 |
| 0.600 | 0.957 | -22.2 | 8.541 | 157.3 | 0.019 | 79.1 | 0.663 | -8.8 | 0.255 | 26.528 |
| 0.700 | 0.945 | -25.8 | 8.454 | 153.7 | 0.022 | 78.0 | 0.655 | -10.2 | 0.282 | 25.846 |
| 0.800 | 0.930 | -29.3 | 8.332 | 150.3 | 0.025 | 76.3 | 0.649 | -11.6 | 0.318 | 25.228 |
| 0.900 | 0.915 | -32.7 | 8.209 | 147.0 | 0.028 | 74.8 | 0.641 | -12.9 | 0.350 | 24.671 |
| 1.000 | 0.898 | -36.1 | 8.096 | 143.6 | 0.031 | 73.3 | 0.632 | -14.3 | 0.384 | 24.169 |
| 1.200 | 0.862 | -42.8 | 7.844 | 137.2 | 0.036 | 70.6 | 0.615 | -16.9 | 0.447 | 23.382 |
| 1.400 | 0.823 | -49.3 | 7.571 | 131.1 | 0.041 | 68.1 | 0.596 | -19.3 | 0.509 | 22.664 |
| 1.600 | 0.781 | -55.7 | 7.299 | 125.1 | 0.046 | 65.7 | 0.577 | -21.7 | 0.569 | 22.005 |
| 1.800 | 0.741 | -62.0 | 7.036 | 119.4 | 0.051 | 63.5 | 0.557 | -24.0 | 0.621 | 21.398 |
| 2.000 | 0.697 | -68.4 | 6.775 | 113.9 | 0.056 | 61.4 | 0.539 | -26.4 | 0.670 | 20.827 |
| 2.250 | 0.644 | -76.6 | 6.458 | 107.2 | 0.061 | 58.7 | 0.517 | -29.3 | 0.731 | 20.248 |
| 2.500 | 0.591 | -84.9 | 6.144 | 100.9 | 0.066 | 56.5 | 0.496 | -32.0 | 0.786 | 19.689 |
| 2.750 | 0.541 | -93.7 | 5.848 | 94.8 | 0.071 | 54.3 | 0.476 | -34.7 | 0.833 | 19.157 |
| 3.000 | 0.493 | -102.7 | 5.553 | 88.9 | 0.075 | 52.1 | 0.458 | -37.1 | 0.884 | 18.695 |
| 3.500 | 0.415 | -122.2 | 5.007 | 78.0 | 0.084 | 48.2 | 0.426 | -41.5 | 0.956 | 17.753 |
| 4.000 | 0.368 | -141.9 | 4.526 | 68.0 | 0.091 | 44.9 | 0.399 | -44.7 | 1.016 | 16.188 |
| 4.500 | 0.349 | -159.7 | 4.119 | 59.2 | 0.099 | 42.2 | 0.372 | -46.8 | 1.052 | 14.798 |
| 5.000 | 0.349 | -173.2 | 3.790 | 51.2 | 0.107 | 39.9 | 0.343 | -48.1 | 1.077 | 13.794 |
| 5.500 | 0.357 | 177.4 | 3.532 | 43.8 | 0.116 | 37.9 | 0.313 | -49.1 | 1.089 | 13.021 |
| 6.000 | 0.362 | 170.2 | 3.332 | 36.7 | 0.127 | 35.6 | 0.284 | -50.8 | 1.086 | 12.405 |
| 6.500 | 0.363 | 163.3 | 3.166 | 29.5 | 0.138 | 32.7 | 0.255 | -54.2 | 1.084 | 11.836 |
| 7.000 | 0.356 | 154.4 | 3.024 | 22.0 | 0.148 | 28.8 | 0.230 | -61.8 | 1.087 | 11.307 |
| 7.500 | 0.343 | 140.7 | 2.902 | 14.1 | 0.160 | 25.0 | 0.208 | -73.1 | 1.079 | 10.876 |
| 8.000 | 0.336 | 123.7 | 2.782 | 5.7 | 0.171 | 20.3 | 0.199 | -89.6 | 1.067 | 10.531 |

Note:

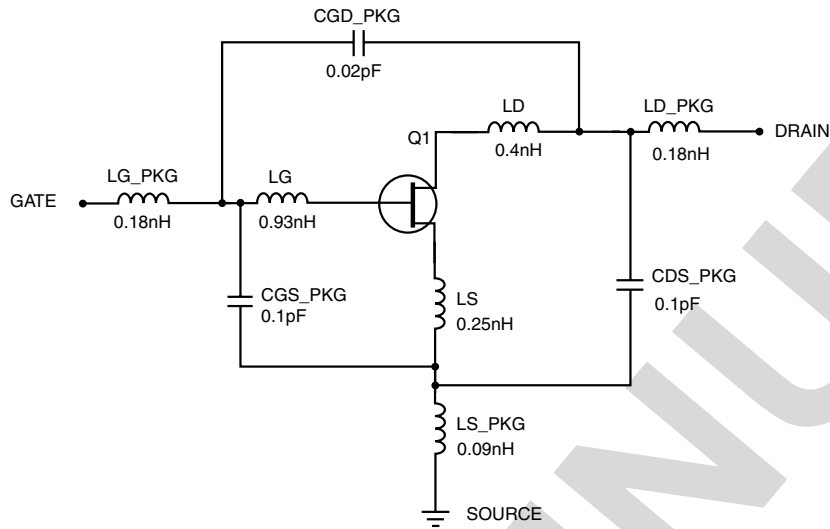
1. Gain Calculations:

$$\text{MAG} = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1}). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } \text{MSG} = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

SCHEMATIC



FET NONLINEAR MODEL PARAMETERS (1)

UNITS

| Parameters | Q1 | Parameters | Q1 |
|------------|----------|------------|------|
| VTO | -0.6885 | RG | 4 |
| VTOSC | 0 | RD | 1.5 |
| ALPHA | 5 | RS | 2 |
| BETA | 0.1838 | RGMET | 0 |
| GAMMA | 0.038 | KF | 0 |
| GAMMADC | 0.03 | AF | 1 |
| Q | 1.8 | TNOM | 27 |
| DELTA | 0.25 | XTI | 3 |
| VBI | 0.7 | EG | 1.43 |
| IS | 3e-13 | VTOTC | 0 |
| N | 1 | BETATCE | 0 |
| RIS | 0 | FFE | 1 |
| RID | 0 | | |
| TAU | 4e-12 | | |
| CDS | 0.1e-12 | | |
| RDB | 5000 | | |
| CBS | 1e-11 | | |
| CGSO | 0.95e-12 | | |
| CGDO | 0.04e-12 | | |
| DELTA1 | 0.3 | | |
| DELTA2 | 0.05 | | |
| FC | 0.5 | | |
| VBR | Infinity | | |

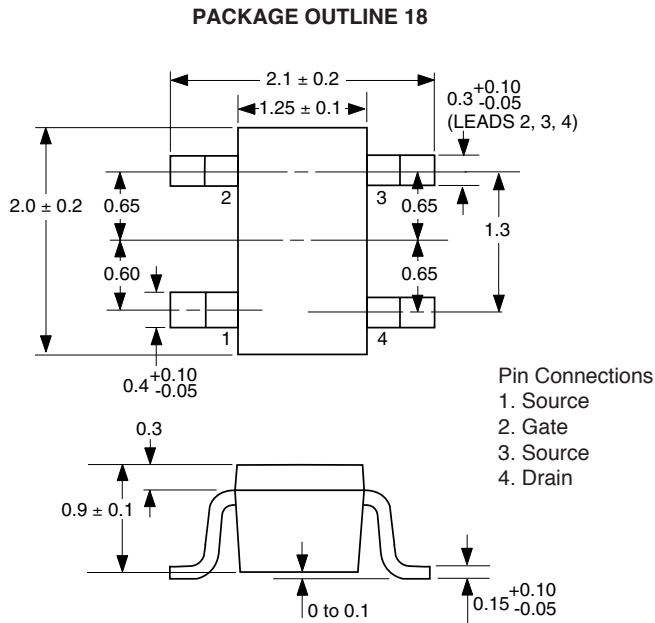
| Parameter | Units |
|-------------|---------|
| time | seconds |
| capacitance | farads |
| inductance | henries |
| resistance | ohms |
| voltage | volts |
| current | amps |

MODEL RANGE

Frequency: 0.5 to 6 GHz
 Bias: $V_{DS} = 1\text{ V to }3\text{ V}$, $I_D = 5\text{ mA to }40\text{ mA}$
 Date: 6/97

(1) Series IV Libra TOM Model

OUTLINE DIMENSIONS (Units in mm)



ORDERING INFORMATION

| PART NUMBER | QTY | I _{DSS} RANGE (mA) | MARKING |
|-----------------|----------------|-----------------------------|------------|
| NE34018-A | Bulk up to 3 K | 30-120 | V63 or V64 |
| NE34018-TI-63-A | 3 K/Reel | 30-65 | V63 |
| NE34018-TI-64-A | 3 K/Reel | 60-120 | V64 |

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.

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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance per RoHS | Concentration Limit per RoHS (values are not yet fixed) | Concentration contained in CEL devices | |
|-------------------------------|---|--|-----|
| | | -A | -AZ |
| Lead (Pb) | < 1000 PPM | Not Detected | (*) |
| Mercury | < 1000 PPM | Not Detected | |
| Cadmium | < 100 PPM | Not Detected | |
| Hexavalent Chromium | < 1000 PPM | Not Detected | |
| PBB | < 1000 PPM | Not Detected | |
| PBDE | < 1000 PPM | Not Detected | |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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