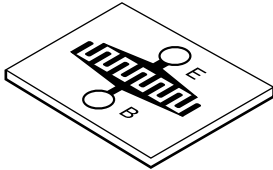
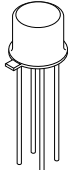
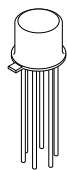
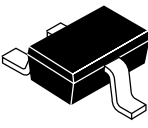
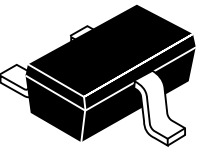
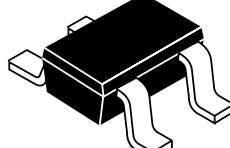
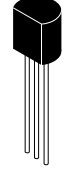
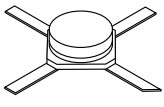


### FEATURES

- **LOW NOISE FIGURE:** < 3 dB at 500 MHz
- **HIGH GAIN:** 15 dB at 500 MHz
- **HIGH GAIN BANDWIDTH PRODUCT:** 2 GHz  
(3 GHz for the NE73435)
- **SMALL COLLECTOR CAPACITANCE:** 1 pF
- **DUAL CHIP CONFIGURATIONS**
- **HIGH RELIABILITY METALLIZATION**

### DESCRIPTION

The NE734 series of NPN silicon general purpose UHF transistors provide the designer with a wide selection of reliable transistors for high speed logic and wide-band low noise amplifier applications. The series uses NEC's highly reliable platinum-silicide, titanium, platinum, and gold metal-lization system to assure uniform performance and reliability. Besides the chip form (NE73400) several package styles are available. While the series is designed for industrial applications, the NE734 is also available in screening levels through space grade. The NE73433 is in the plastic Mini-Mold package designed for high-speed automated assembly operations for large volume hybrid ICs. For applications requiring small size and light weight the NE73430 is recommended. Forty percent smaller than the SOT 23 version, it is ideal for hand held portable designs. For hybrid MIC applications requiring more performance, the NE73435 is recommended. This device is packaged in the economical metal-ceramic, hermetic Micro-X package.

|                                                                                                               |                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|  <p>00 (CHIP)</p>           |  <p>12 (TO-72)</p>           |
|  <p>16</p>                  |  <p>30 (SOT 323 STYLE)</p>   |
|  <p>33 (SOT 23 STYLE)</p> |  <p>39 (SOT 143 STYLE)</p> |
|  <p>32 (TO-92)</p>        |  <p>35 (MICRO-X)</p>       |

## NE734 SERIES

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

| PART NUMBER<br>EIAJ <sup>1</sup> REGISTERED NUMBER<br>PACKAGE OUTLINE |                                                                                                                                                                  |            | NE73400<br>00 (CHIP) |          |     | NE73412<br>2SC1424<br>12 |         |     | NE73416<br>16 |         |     | NE73430<br>2SC4185<br>30 |     |      |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------|----------|-----|--------------------------|---------|-----|---------------|---------|-----|--------------------------|-----|------|
| SYMBOLS                                                               | PARAMETERS AND CONDITIONS                                                                                                                                        | UNITS      | MIN                  | TYP      | MAX | MIN                      | TYP     | MAX | MIN           | TYP     | MAX | MIN                      | TYP | MAX  |
| f <sub>T</sub>                                                        | Gain Bandwidth Product at<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA                                     | GHz<br>GHz | 1.5                  | 2.0      |     | 1.5                      | 2.0     |     | 1.5           | 2.0     |     |                          | 2.3 |      |
| NF <sub>MIN</sub>                                                     | Minimum Noise Figure <sup>2</sup> at<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 3 mA, f = 0.5 GHz<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA, f = 0.9 GHz | dB<br>dB   |                      | 2.1      | 3.5 |                          | 3.0     | 4.0 |               | 3.0     | 4.0 |                          | 4.0 |      |
| MAG                                                                   | Maximum Available Gain at<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA, f = 0.5 GHz<br>f = 1 GHz                                                            | dB<br>dB   |                      | 21<br>16 |     | 13                       | 15<br>8 |     |               | 15<br>9 |     |                          | 17  |      |
| S <sub>21E</sub>   <sup>2</sup>                                       | Insertion Power Gain at V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA,<br>f = 0.5 GHz<br>f = 1 GHz                                                              | dB<br>dB   | 8                    | 16<br>9  |     | 5                        | 12<br>6 |     |               | 12<br>6 |     |                          | 8   |      |
| h <sub>FE</sub>                                                       | Forward Current Gain Ratio at<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA                                 |            | 25                   | 100      | 200 | 25                       | 100     | 200 | 25            | 100     | 200 | 40                       | 100 | 180  |
| I <sub>CBO</sub>                                                      | Collector Cutoff Current at V <sub>CB</sub> = 15 V, I <sub>E</sub> = 0                                                                                           | μA         |                      |          | 0.1 |                          |         | 0.5 |               |         | 0.5 |                          |     | 0.1  |
| I <sub>EBO</sub>                                                      | Emitter Cutoff Current at V <sub>EB</sub> = 2 V, I <sub>C</sub> = 0                                                                                              | μA         |                      |          | 0.1 |                          |         | 0.5 |               |         | 0.5 |                          |     |      |
| C <sub>CB</sub>                                                       | Collector to Base Capacitance <sup>4</sup> at<br>V <sub>CB</sub> = 10 V, I <sub>C</sub> = 0 mA, f = 1 MHz                                                        | pF         |                      |          |     |                          |         | 1.1 | 1.5           |         | 1.1 | 1.5                      |     | 0.75 |
| P <sub>T</sub>                                                        | Total Power Dissipation                                                                                                                                          | mW         |                      |          |     |                          |         | 250 |               |         | 300 |                          |     | 150  |
| R <sub>TH</sub>                                                       | Thermal Resistance (Junction to Case)                                                                                                                            | °C/W       |                      |          |     |                          |         |     |               |         |     |                          |     | 833  |

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

| PART NUMBER<br>EIAJ <sup>1</sup> REGISTERED NUMBER<br>PACKAGE OUTLINE |                                                                                                                                  |            | NE73432E<br>2SC2026<br>32 |         |     | NE73433<br>2SC2759<br>33 |         |     | NE73435<br>2SC2148<br>35 |          |     | NE73439<br>2SC4090<br>39 |         |     |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------|---------|-----|--------------------------|---------|-----|--------------------------|----------|-----|--------------------------|---------|-----|
| SYMBOLS                                                               | PARAMETERS AND CONDITIONS                                                                                                        | UNITS      | MIN                       | TYP     | MAX | MIN                      | TYP     | MAX | MIN                      | TYP      | MAX | MIN                      | TYP     | MAX |
| f <sub>T</sub>                                                        | Gain Bandwidth Product at<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA     | GHz<br>GHz | 1.5                       | 2.0     |     | 1.5                      | 2.0     |     | 1.5                      | 3.0      |     | 1.5                      | 2.0     |     |
| NF <sub>MIN</sub>                                                     | Minimum Noise Figure <sup>2</sup> at<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 3 mA, f = 0.5 GHz                               | dB         |                           | 3.0     | 4.0 |                          | 3.0     | 4.0 |                          | 2.1      | 3.5 |                          | 3.0     | 4.0 |
| MAG                                                                   | Maximum Available Gain <sup>3</sup> at<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA, f = 0.5 GHz<br>f = 1 GHz               | dB<br>dB   | 13                        | 15<br>9 |     |                          | 17      |     |                          | 18<br>13 |     |                          | 17      |     |
| S <sub>21E</sub>   <sup>2</sup>                                       | Insertion Power Gain at V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA,<br>f = 0.5 GHz<br>f = 1 GHz                              | dB<br>dB   |                           | 13<br>8 |     |                          | 13<br>8 |     | 8                        | 16<br>9  |     |                          | 13<br>8 |     |
| h <sub>FE</sub>                                                       | Forward Current Gain Ratio at<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA<br>V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA |            | 25                        | 100     | 200 | 25                       | 100     | 200 | 25                       | 100      | 200 | 40                       | 100     | 180 |
| I <sub>CBO</sub>                                                      | Collector Cutoff Current at V <sub>CB</sub> = 15 V, I <sub>E</sub> = 0                                                           | μA         |                           |         | 0.1 |                          |         | 0.1 |                          |          | 0.1 |                          |         | 0.1 |
| I <sub>EBO</sub>                                                      | Emitter Cutoff Current at V <sub>EB</sub> = 2 V, I <sub>C</sub> = 0                                                              | μA         |                           |         | 0.1 |                          |         |     |                          |          | 0.1 |                          |         |     |
| C <sub>CB</sub>                                                       | Collector to Base Capacitance <sup>4</sup> at<br>V <sub>CB</sub> = 10 V, I <sub>C</sub> = 0 mA, f = 1 MHz                        | pF         |                           | 0.75    | 1.1 |                          | 1       | 1.5 |                          | .55      | 1.5 |                          |         |     |
| P <sub>T</sub>                                                        | Total Power Dissipation                                                                                                          | mW         |                           |         | 250 |                          |         | 200 |                          |          | 250 |                          |         | 150 |
| R <sub>TH</sub>                                                       | Thermal Resistance (Junction to Ambient)                                                                                         | °C/W       |                           |         |     |                          |         | 625 |                          |          | 550 |                          |         | 625 |

Notes:

- Electronic Industrial Association of Japan.
- Input and output are tuned for optimum noise figures.
- Maximum Available Gain (MAG) is calculated

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

- C<sub>CB</sub> measurement employs a three-terminal capacitance bridge incorporating a guard circuit. The emitter terminal shall be connected to the guard terminal.

**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** ( $T_A = 25^\circ\text{C}$ )

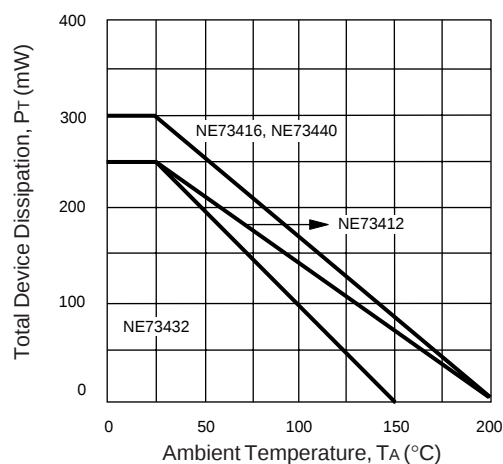
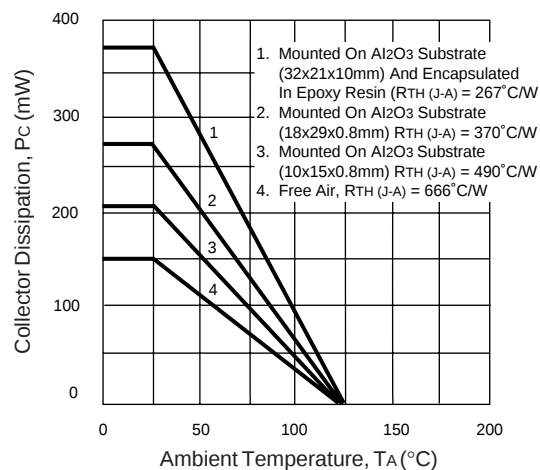
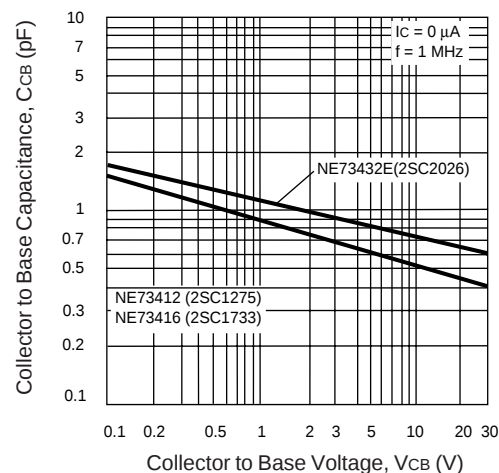
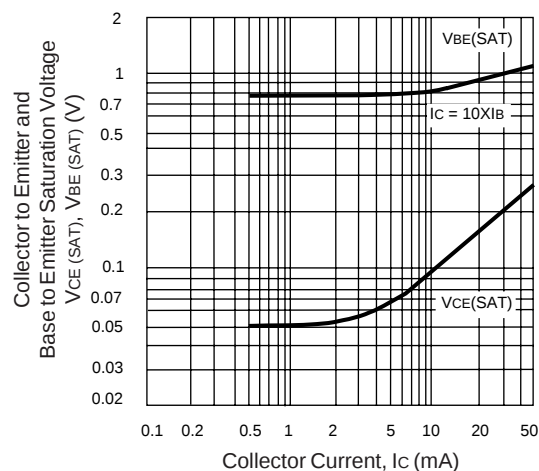
| SYMBOLS          | PARAMETERS                   | UNITS | RATINGS                  |
|------------------|------------------------------|-------|--------------------------|
| V <sub>CBO</sub> | Collector to Base Voltage    | V     | 30                       |
| V <sub>CEO</sub> | Collector to Emitter Voltage | V     | 14                       |
| V <sub>EBO</sub> | Emitter to Base Voltage      | V     | 3                        |
| I <sub>C</sub>   | Collector Current            | mA    | 50                       |
| T <sub>J</sub>   | Junction Temperature         | °C    | 200 <sup>2</sup>         |
| T <sub>STG</sub> | Storage Temperature          | °C    | -65 to +200 <sup>3</sup> |

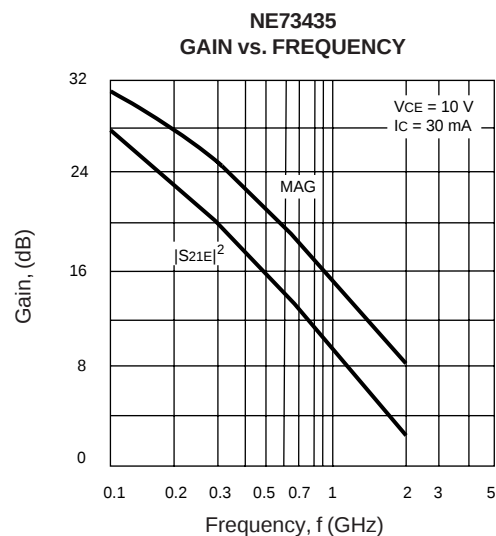
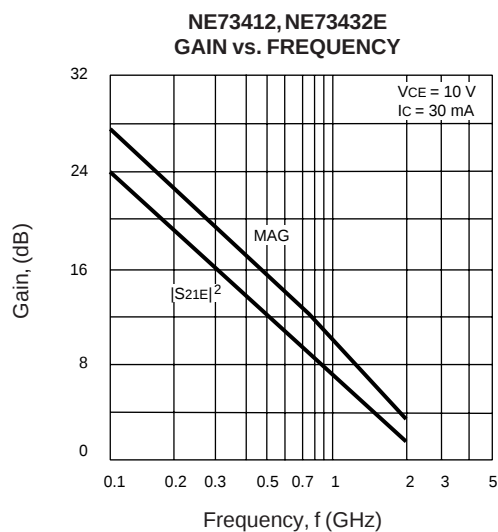
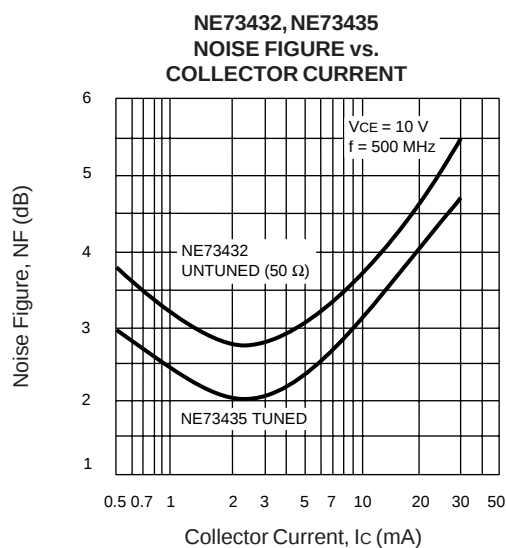
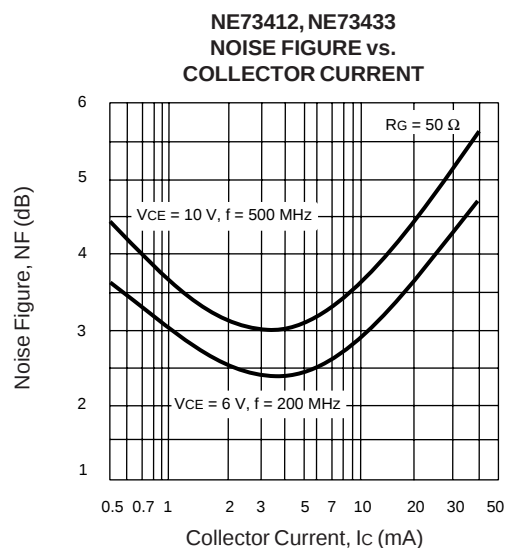
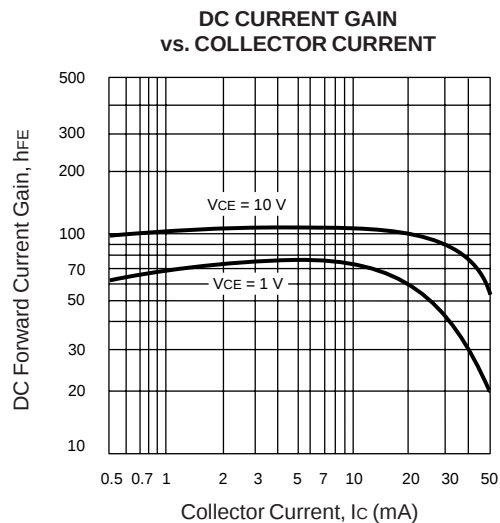
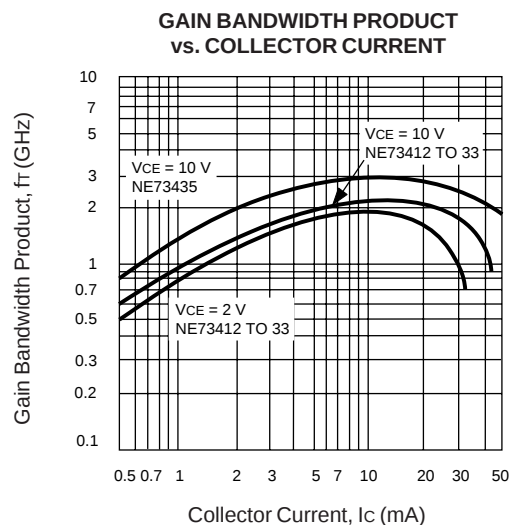
Notes:

- Operation in excess of any one of these parameters may result in permanent damage.
- Maximum Junction Temperature for the NE73430, NE73432, NE73433 and NE73439 is 150°C.
- Maximum Storage Temperature for the NE73430, NE73432, NE73433, NE73435 Grade D and the NE73439 is 150°C.

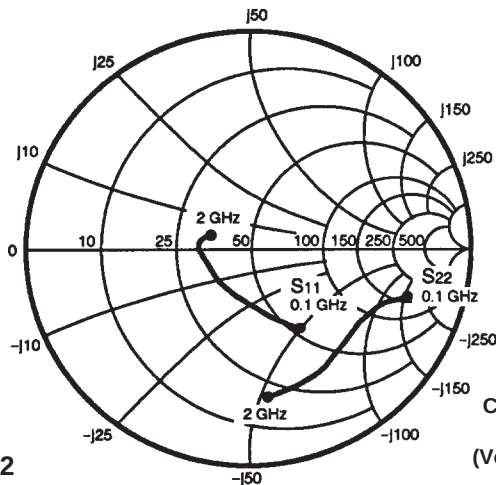
**NE73435****TYPICAL NOISE PARAMETERS** ( $T_A = 25^\circ\text{C}$ )

| FREQ.<br>(MHz)                                 | NF <sub>OPT</sub><br>(dB) | G <sub>A</sub><br>(dB) | Γ <sub>OPT</sub> |      | Rn/50 |
|------------------------------------------------|---------------------------|------------------------|------------------|------|-------|
|                                                |                           |                        | MAG              | ANG  |       |
| V <sub>CE</sub> = 10 V, I <sub>C</sub> = 3 mA  |                           |                        |                  |      |       |
| 500                                            | 2.0                       | 16.1                   | 0.30             | 80   | 0.63  |
| 1000                                           | 3.1                       | 11.2                   | 0.43             | 126  | 0.33  |
| 1500                                           | 4.2                       | 9.2                    | 0.54             | 168  | 0.19  |
| 2000                                           | 5.1                       | 7.1                    | 0.56             | 178  | 0.20  |
| V <sub>CE</sub> = 10 V, I <sub>C</sub> = 15 mA |                           |                        |                  |      |       |
| 500                                            | 3.3                       | 17.5                   | 0.34             | 120  | 0.36  |
| 1000                                           | 4.7                       | 13.5                   | 0.47             | 168  | 0.27  |
| 1500                                           | 6.5                       | 10.8                   | 0.67             | -174 | 0.13  |
| 2000                                           | 7.4                       | 9.2                    | 0.64             | -163 | 0.46  |

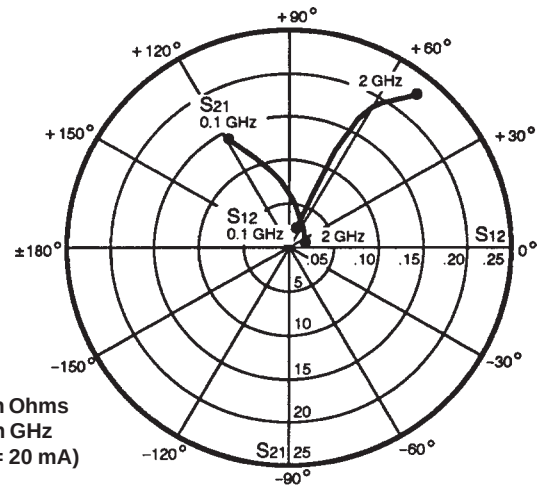
**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )**DC POWER DERATING CURVES****NE73433**  
**DC POWER DERATING CURVES****COLLECTOR TO BASE CAPACITANCE****SATURATION VOLTAGE vs. COLLECTOR CURRENT**

TYPICAL PERFORMANCE CURVES ( $T_A = 25^\circ\text{C}$ )

## TYPICAL COMMON EMITTER SCATTERING PARAMETERS



Coordinates in Ohms  
Frequency in GHz  
(VCE = 10 V, IC = 20 mA)



NE73412

VCE = 10 V, IC = 5 mA

| FREQUENCY<br>(MHz) | S11   |        | S21    |       | S12   |      | S22   |       | K    | MAG <sup>1</sup><br>(dB) |
|--------------------|-------|--------|--------|-------|-------|------|-------|-------|------|--------------------------|
|                    | MAG   | ANG    | MAG    | ANG   | MAG   | ANG  | MAG   | ANG   |      |                          |
| 50                 | 0.843 | -18.0  | 11.367 | 160.6 | 0.013 | 77.7 | 0.961 | -9.0  | 0.22 | 29.4                     |
| 100                | 0.762 | -36.2  | 10.158 | 145.0 | 0.025 | 71.0 | 0.904 | -14.9 | 0.31 | 26.1                     |
| 200                | 0.576 | -65.5  | 7.898  | 122.0 | 0.042 | 64.1 | 0.776 | -21.6 | 0.54 | 22.7                     |
| 400                | 0.377 | -99.1  | 4.802  | 97.1  | 0.063 | 65.4 | 0.682 | -27.2 | 0.83 | 18.8                     |
| 600                | 0.310 | -121.1 | 3.358  | 82.4  | 0.086 | 65.7 | 0.648 | -33.7 | 0.94 | 15.9                     |
| 800                | 0.280 | -135.4 | 2.578  | 71.8  | 0.106 | 67.6 | 0.641 | -40.7 | 1.00 | 13.9                     |
| 1000               | 0.269 | -147.3 | 2.074  | 62.5  | 0.125 | 68.2 | 0.640 | -48.8 | 1.04 | 11.0                     |
| 1200               | 0.254 | -158.4 | 1.721  | 54.5  | 0.144 | 67.9 | 0.641 | -57.8 | 1.08 | 9.0                      |
| 1400               | 0.247 | -167.1 | 1.439  | 46.6  | 0.158 | 67.4 | 0.636 | -67.8 | 1.19 | 7.0                      |
| 1600               | 0.237 | -176.2 | 1.181  | 41.5  | 0.168 | 68.4 | 0.617 | -79.1 | 1.43 | 4.6                      |

VCE = 10 V, IC = 10 mA

|      |       |        |        |       |       |      |       |       |      |      |
|------|-------|--------|--------|-------|-------|------|-------|-------|------|------|
| 50   | 0.726 | -25.1  | 18.263 | 153.3 | 0.012 | 76.9 | 0.925 | -11.5 | 0.30 | 31.8 |
| 100  | 0.599 | -48.1  | 14.893 | 133.9 | 0.022 | 69.7 | 0.831 | -17.2 | 0.48 | 28.3 |
| 200  | 0.404 | -76.9  | 9.749  | 111.3 | 0.037 | 67.3 | 0.700 | -21.3 | 0.74 | 24.2 |
| 400  | 0.272 | -105.4 | 5.340  | 91.2  | 0.060 | 71.7 | 0.637 | -25.1 | 0.95 | 19.5 |
| 600  | 0.241 | -125.6 | 3.661  | 78.7  | 0.086 | 70.8 | 0.612 | -31.7 | 1.00 | 16.3 |
| 800  | 0.230 | -138.7 | 2.781  | 69.2  | 0.110 | 71.1 | 0.612 | -38.6 | 1.02 | 13.2 |
| 1000 | 0.231 | -149.8 | 2.229  | 60.3  | 0.131 | 70.3 | 0.615 | -46.7 | 1.03 | 11.2 |
| 1200 | 0.224 | -159.9 | 1.845  | 52.6  | 0.150 | 69.2 | 0.617 | -55.8 | 1.07 | 9.3  |
| 1400 | 0.220 | -168.3 | 1.539  | 44.8  | 0.165 | 67.8 | 0.614 | -65.7 | 1.16 | 7.3  |
| 1600 | 0.210 | -177.1 | 1.264  | 40.2  | 0.176 | 67.3 | 0.602 | -76.9 | 1.35 | 5.0  |

VCE = 10 V, IC = 20 mA

|      |       |        |        |       |       |      |       |       |      |      |
|------|-------|--------|--------|-------|-------|------|-------|-------|------|------|
| 50   | 0.585 | -34.3  | 24.773 | 145.0 | 0.011 | 74.1 | 0.882 | -13.5 | 0.43 | 33.5 |
| 100  | 0.441 | -60.7  | 17.843 | 124.0 | 0.020 | 70.4 | 0.767 | -17.7 | 0.63 | 29.5 |
| 200  | 0.296 | -89.3  | 10.384 | 104.4 | 0.033 | 71.1 | 0.656 | -19.7 | 0.88 | 25.0 |
| 400  | 0.225 | -116.9 | 5.447  | 87.2  | 0.059 | 74.9 | 0.618 | -23.5 | 1.00 | 19.7 |
| 600  | 0.220 | -136.0 | 3.685  | 75.7  | 0.085 | 73.0 | 0.602 | -30.0 | 1.03 | 15.3 |
| 800  | 0.225 | -148.0 | 2.792  | 66.6  | 0.109 | 73.3 | 0.600 | -37.2 | 1.04 | 12.9 |
| 1000 | 0.234 | -159.1 | 2.239  | 58.3  | 0.129 | 72.4 | 0.605 | -45.8 | 1.05 | 11.0 |
| 1200 | 0.230 | -170.2 | 1.838  | 50.9  | 0.150 | 71.0 | 0.614 | -55.1 | 1.07 | 9.3  |
| 1400 | 0.228 | -178.4 | 1.540  | 43.5  | 0.165 | 69.7 | 0.612 | -64.8 | 1.15 | 7.4  |
| 1600 | 0.219 | -172.3 | 1.261  | 38.7  | 0.179 | 69.1 | 0.597 | -76.4 | 1.34 | 5.0  |

VCE = 10 V, IC = 30 mA

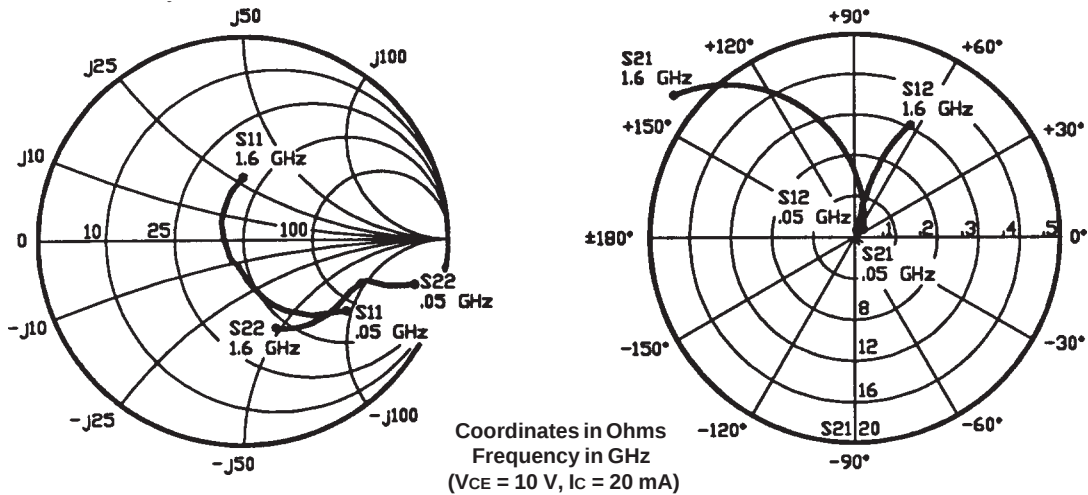
|      |       |        |        |       |       |      |       |       |      |      |
|------|-------|--------|--------|-------|-------|------|-------|-------|------|------|
| 50   | 0.500 | -42.1  | 26.236 | 139.8 | 0.010 | 75.0 | 0.859 | -13.8 | 0.50 | 34.2 |
| 100  | 0.369 | -71.1  | 17.626 | 119.0 | 0.018 | 70.2 | 0.747 | -16.3 | 0.73 | 29.9 |
| 200  | 0.261 | -101.5 | 9.845  | 101.1 | 0.032 | 72.2 | 0.658 | -17.7 | 0.93 | 24.9 |
| 400  | 0.226 | -129.0 | 5.088  | 85.0  | 0.057 | 76.0 | 0.633 | -22.1 | 1.03 | 18.4 |
| 600  | 0.236 | -147.0 | 3.447  | 73.9  | 0.082 | 74.4 | 0.619 | -29.1 | 1.05 | 14.9 |
| 800  | 0.248 | -158.7 | 2.596  | 65.2  | 0.105 | 74.8 | 0.623 | -37.2 | 1.05 | 12.6 |
| 1000 | 0.260 | -169.1 | 2.079  | 56.7  | 0.126 | 74.4 | 0.629 | -46.1 | 1.05 | 10.8 |
| 1200 | 0.258 | -179.8 | 1.705  | 49.5  | 0.148 | 73.8 | 0.632 | -55.3 | 1.07 | 9.0  |
| 1400 | 0.257 | -170.8 | 1.423  | 42.1  | 0.165 | 72.7 | 0.627 | -65.9 | 1.17 | 6.9  |
| 1600 | 0.252 | -160.5 | 1.177  | 38.0  | 0.181 | 72.7 | 0.609 | -77.6 | 1.35 | 4.6  |

Note:

1. Gain Calculations:

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

## TYPICAL COMMON EMITTER SCATTERING PARAMETERS



## NE73416

VCE = 10 V, IC = 3 mA

| FREQUENCY<br>(MHz) | S11   |        | S21   |       | S12   |      | S22   |       | K    | MAG <sup>1</sup><br>(dB) |
|--------------------|-------|--------|-------|-------|-------|------|-------|-------|------|--------------------------|
|                    | MAG   | ANG    | MAG   | ANG   | MAG   | ANG  | MAG   | ANG   |      |                          |
| 50                 | 0.910 | -14.1  | 7.512 | 163.5 | 0.017 | 80.2 | 0.971 | -7.9  | 0.17 | 26.5                     |
| 100                | 0.842 | -28.4  | 6.878 | 149.0 | 0.035 | 73.8 | 0.928 | -13.8 | 0.27 | 22.9                     |
| 200                | 0.661 | -53.7  | 5.767 | 126.9 | 0.059 | 65.3 | 0.806 | -21.8 | 0.48 | 19.9                     |
| 400                | 0.372 | -87.8  | 3.842 | 98.7  | 0.090 | 64.4 | 0.687 | -27.7 | 0.79 | 16.3                     |
| 600                | 0.238 | -116.8 | 2.778 | 81.5  | 0.121 | 64.0 | 0.634 | -33.7 | 0.94 | 13.6                     |
| 800                | 0.165 | -147.4 | 2.179 | 69.6  | 0.152 | 65.8 | 0.607 | -39.9 | 1.01 | 11.0                     |
| 1000               | 0.150 | 175.6  | 1.794 | 59.1  | 0.185 | 65.9 | 0.586 | -47.4 | 1.05 | 8.5                      |
| 1200               | 0.168 | 141.9  | 1.528 | 50.8  | 0.220 | 65.3 | 0.563 | -55.3 | 1.07 | 6.8                      |
| 1400               | 0.215 | 118.4  | 1.324 | 43.3  | 0.255 | 64.0 | 0.533 | -64.7 | 1.11 | 5.1                      |
| 1600               | 0.277 | 99.8   | 1.154 | 38.4  | 0.296 | 62.0 | 0.496 | -74.5 | 1.15 | 3.6                      |

VCE = 10 V, IC = 10 mA

|      |       |        |        |       |       |      |       |       |      |      |
|------|-------|--------|--------|-------|-------|------|-------|-------|------|------|
| 50   | 0.744 | -25.8  | 17.660 | 150.7 | 0.016 | 77.3 | 0.908 | -12.8 | 0.32 | 30.4 |
| 100  | 0.573 | -47.3  | 13.874 | 129.5 | 0.028 | 71.2 | 0.795 | -18.2 | 0.54 | 27.0 |
| 200  | 0.340 | -70.1  | 8.609  | 106.8 | 0.048 | 71.0 | 0.663 | -21.0 | 0.81 | 22.5 |
| 400  | 0.172 | -91.9  | 4.621  | 87.5  | 0.084 | 74.4 | 0.602 | -23.9 | 0.98 | 17.4 |
| 600  | 0.107 | -123.4 | 3.193  | 75.0  | 0.123 | 72.0 | 0.568 | -29.7 | 1.02 | 13.3 |
| 800  | 0.083 | -166.9 | 2.459  | 65.5  | 0.160 | 71.1 | 0.552 | -36.1 | 1.03 | 10.8 |
| 1000 | 0.104 | 151.8  | 2.012  | 56.5  | 0.197 | 69.3 | 0.535 | -43.9 | 1.04 | 8.9  |
| 1200 | 0.148 | 123.3  | 1.711  | 49.1  | 0.235 | 67.2 | 0.514 | -51.6 | 1.04 | 7.4  |
| 1400 | 0.204 | 106.2  | 1.487  | 42.2  | 0.271 | 64.7 | 0.486 | -60.6 | 1.06 | 5.9  |
| 1600 | 0.266 | 90.7   | 1.298  | 36.8  | 0.314 | 61.8 | 0.451 | -69.9 | 1.09 | 4.3  |

VCE = 10 V, IC = 20 mA

|      |       |        |        |       |       |      |       |       |      |      |
|------|-------|--------|--------|-------|-------|------|-------|-------|------|------|
| 50   | 0.606 | -34.9  | 22.847 | 141.5 | 0.014 | 76.1 | 0.860 | -14.8 | 0.44 | 32.1 |
| 100  | 0.417 | -57.2  | 15.640 | 119.7 | 0.026 | 72.3 | 0.736 | -17.7 | 0.69 | 27.8 |
| 200  | 0.237 | -77.7  | 8.746  | 100.6 | 0.045 | 74.1 | 0.634 | -18.3 | 0.91 | 22.9 |
| 400  | 0.125 | -102.5 | 4.545  | 84.0  | 0.083 | 76.9 | 0.597 | -21.6 | 1.01 | 16.8 |
| 600  | 0.091 | -145.7 | 3.129  | 72.4  | 0.121 | 73.8 | 0.570 | -27.9 | 1.03 | 13.1 |
| 800  | 0.098 | 171.3  | 2.397  | 63.1  | 0.159 | 72.8 | 0.558 | -34.9 | 1.03 | 10.7 |
| 1000 | 0.136 | 141.6  | 1.949  | 54.5  | 0.195 | 70.9 | 0.542 | -42.8 | 1.04 | 8.8  |
| 1200 | 0.185 | 118.3  | 1.662  | 47.0  | 0.234 | 68.8 | 0.522 | -51.1 | 1.03 | 7.5  |
| 1400 | 0.242 | 104.0  | 1.436  | 40.5  | 0.272 | 66.5 | 0.493 | -60.2 | 1.05 | 5.9  |
| 1600 | 0.309 | 89.8   | 1.248  | 36.1  | 0.317 | 63.3 | 0.457 | -69.7 | 1.08 | 4.2  |

Note:

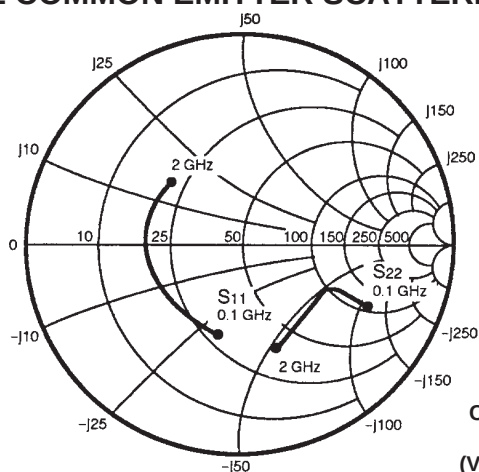
1. Gain Calculations:

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

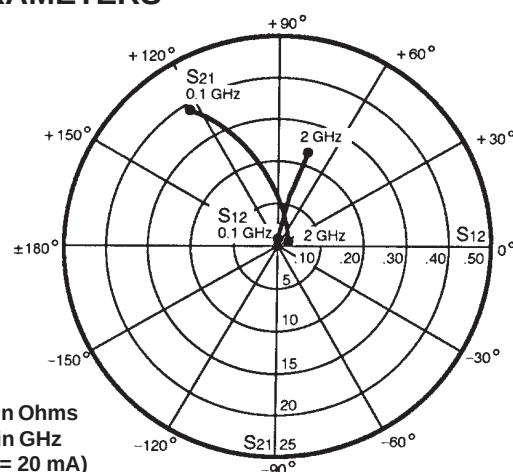
MAG = Maximum Available Gain

MSG = Maximum Stable Gain

## TYPICAL COMMON EMITTER SCATTERING PARAMETERS



Coordinates in Ohms  
Frequency in GHz  
( $V_{CE} = 10\text{ V}$ ,  $I_C = 20\text{ mA}$ )



## NE73432E

$V_{CE} = 10\text{ V}$ ,  $I_C = 5\text{ mA}$

| FREQUENCY | S <sub>11</sub> |      | S <sub>21</sub> |     | S <sub>12</sub> |     | S <sub>22</sub> |     |
|-----------|-----------------|------|-----------------|-----|-----------------|-----|-----------------|-----|
| (MHz)     | MAG             | ANG  | MAG             | ANG | MAG             | ANG | MAG             | ANG |
| 100       | .73             | -51  | 12.00           | 143 | .03             | 71  | .86             | -20 |
| 200       | .57             | -87  | 8.36            | 119 | .04             | 56  | .69             | -29 |
| 500       | .41             | -141 | 4.13            | 89  | .09             | 58  | .51             | -36 |
| 1000      | .37             | -178 | 2.20            | 61  | .13             | 59  | .50             | -48 |
| 1500      | .36             | 157  | 1.56            | 42  | .19             | 65  | .49             | -63 |
| 2000      | .36             | 133  | 1.21            | 26  | .25             | 61  | .51             | -77 |

$V_{CE} = 10\text{ V}$ ,  $I_C = 10\text{ mA}$

|      |     |      |       |     |     |    |     |     |
|------|-----|------|-------|-----|-----|----|-----|-----|
| 100  | .58 | -75  | 16.56 | 132 | .03 | 71 | .74 | -25 |
| 200  | .46 | -112 | 10.15 | 109 | .03 | 54 | .57 | -30 |
| 500  | .40 | -157 | 4.57  | 84  | .07 | 67 | .45 | -32 |
| 1000 | .38 | 179  | 2.37  | 60  | .13 | 66 | .47 | -43 |
| 1500 | .38 | 161  | 1.68  | 43  | .18 | 73 | .48 | -57 |
| 2000 | .36 | 140  | 1.28  | 28  | .25 | 67 | .52 | -72 |

$V_{CE} = 10\text{ V}$ ,  $I_C = 20\text{ mA}$

|      |     |      |       |     |     |    |     |     |
|------|-----|------|-------|-----|-----|----|-----|-----|
| 100  | .44 | -101 | 19.27 | 122 | .03 | 65 | .66 | -26 |
| 200  | .39 | -136 | 10.79 | 102 | .03 | 64 | .52 | -26 |
| 500  | .40 | -169 | 4.62  | 81  | .07 | 72 | .44 | -27 |
| 1000 | .40 | 172  | 2.36  | 57  | .13 | 72 | .47 | -40 |
| 1500 | .41 | 153  | 1.65  | 41  | .19 | 75 | .49 | -57 |
| 2000 | .40 | 134  | 1.25  | 26  | .25 | 71 | .53 | -71 |

$V_{CE} = 10\text{ V}$ ,  $I_C = 30\text{ mA}$

|      |     |      |       |     |     |    |     |     |
|------|-----|------|-------|-----|-----|----|-----|-----|
| 100  | .42 | -120 | 19.34 | 117 | .03 | 69 | .62 | -24 |
| 200  | .40 | -150 | 10.48 | 99  | .03 | 68 | .51 | -23 |
| 500  | .42 | -174 | 4.41  | 78  | .06 | 77 | .46 | -25 |
| 1000 | .43 | 167  | 2.25  | 55  | .12 | 75 | .49 | -40 |
| 1500 | .44 | 150  | 1.54  | 39  | .18 | 79 | .52 | -56 |
| 2000 | .44 | 129  | 1.17  | 25  | .26 | 75 | .54 | -72 |

Note:

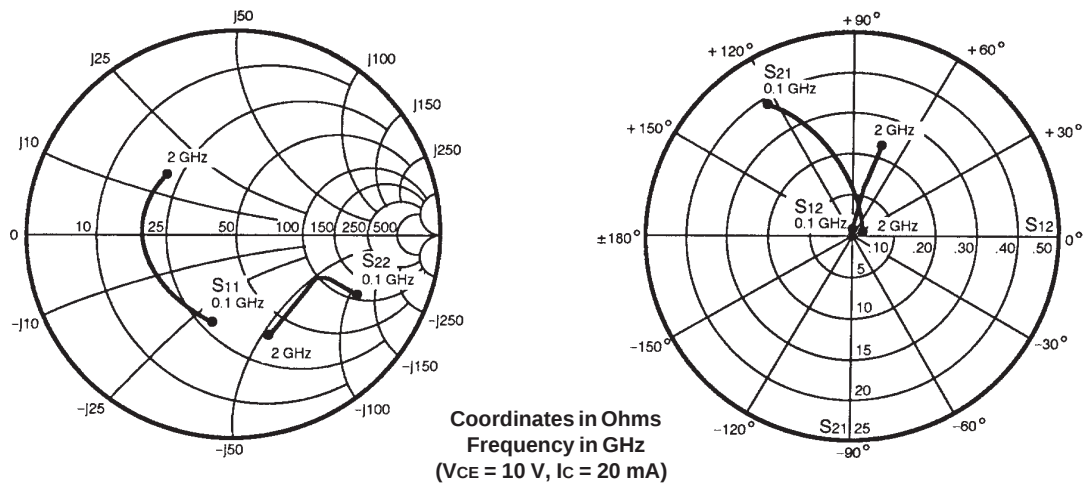
1. Gain Calculation:

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

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

## TYPICAL COMMON EMITTER SCATTERING PARAMETERS



## NE73433

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 5 mA

| FREQUENCY<br>(MHz) | S <sub>11</sub> |      | S <sub>21</sub> |     | S <sub>12</sub> |     | S <sub>22</sub> |     | K    | MAG <sup>1</sup><br>(dB) |
|--------------------|-----------------|------|-----------------|-----|-----------------|-----|-----------------|-----|------|--------------------------|
|                    | MAG             | ANG  | MAG             | ANG | MAG             | ANG | MAG             | ANG |      |                          |
| 100                | 0.72            | -53  | 11.71           | 143 | 0.02            | 68  | 0.89            | -17 | 0.21 | 27.7                     |
| 200                | 0.57            | -88  | 8.26            | 120 | 0.03            | 57  | 0.72            | -22 | 0.66 | 24.4                     |
| 500                | 0.43            | -144 | 4.04            | 90  | 0.07            | 59  | 0.57            | -25 | 0.93 | 17.6                     |
| 1000               | 0.42            | -178 | 2.17            | 65  | 0.11            | 62  | 0.55            | -33 | 1.11 | 10.9                     |
| 1500               | 0.44            | 159  | 1.55            | 50  | 0.17            | 67  | 0.52            | -45 | 1.02 | 8.7                      |
| 2000               | 0.49            | 142  | 1.23            | 35  | 0.22            | 67  | 0.51            | -60 | 0.94 | 7.5                      |

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 10 mA

|      |      |      |       |     |      |    |      |     |      |      |
|------|------|------|-------|-----|------|----|------|-----|------|------|
| 100  | 0.57 | -71  | 15.59 | 132 | 0.02 | 66 | 0.80 | -20 | 0.40 | 28.9 |
| 200  | 0.44 | -109 | 9.93  | 110 | 0.02 | 57 | 0.62 | -21 | 1.23 | 24.1 |
| 500  | 0.39 | -157 | 4.42  | 86  | 0.07 | 68 | 0.53 | -23 | 0.95 | 18.0 |
| 1000 | 0.40 | 175  | 2.31  | 63  | 0.11 | 67 | 0.52 | -31 | 1.13 | 11.0 |
| 1500 | 0.44 | 156  | 1.65  | 48  | 0.17 | 70 | 0.49 | -43 | 1.02 | 9.0  |
| 2000 | 0.49 | 138  | 1.30  | 33  | 0.22 | 69 | 0.49 | -59 | 0.93 | 7.7  |

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 20 mA

|      |      |      |       |     |      |    |      |     |      |      |
|------|------|------|-------|-----|------|----|------|-----|------|------|
| 100  | 0.47 | -93  | 18.06 | 122 | 0.02 | 69 | 0.72 | -20 | 0.51 | 29.6 |
| 200  | 0.38 | -130 | 10.35 | 103 | 0.02 | 56 | 0.58 | -19 | 1.34 | 23.7 |
| 500  | 0.38 | -167 | 4.39  | 82  | 0.06 | 75 | 0.51 | -18 | 1.15 | 16.3 |
| 1000 | 0.42 | 171  | 2.27  | 60  | 0.12 | 69 | 0.52 | -28 | 1.03 | 11.7 |
| 1500 | 0.46 | 153  | 1.61  | 46  | 0.17 | 72 | 0.51 | -41 | 0.97 | 9.8  |
| 2000 | 0.52 | 137  | 1.26  | 31  | 0.23 | 70 | 0.49 | -58 | 0.87 | 7.4  |

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 30 mA

|      |      |      |       |     |      |    |      |     |      |      |
|------|------|------|-------|-----|------|----|------|-----|------|------|
| 100  | 0.43 | -111 | 16.72 | 116 | 0.02 | 82 | 0.70 | -19 | 0.53 | 29.2 |
| 200  | 0.39 | -144 | 9.20  | 99  | 0.02 | 54 | 0.60 | -16 | 1.41 | 22.8 |
| 500  | 0.41 | -173 | 3.85  | 79  | 0.06 | 73 | 0.56 | -17 | 1.13 | 15.9 |
| 1000 | 0.46 | 167  | 1.99  | 58  | 0.11 | 72 | 0.57 | -28 | 1.07 | 11.0 |
| 1500 | 0.51 | 149  | 1.41  | 43  | 0.17 | 77 | 0.55 | -42 | 0.92 | 9.2  |
| 2000 | 0.57 | 133  | 1.10  | 29  | 0.23 | 73 | 0.53 | -60 | 0.82 | 6.8  |

Note:

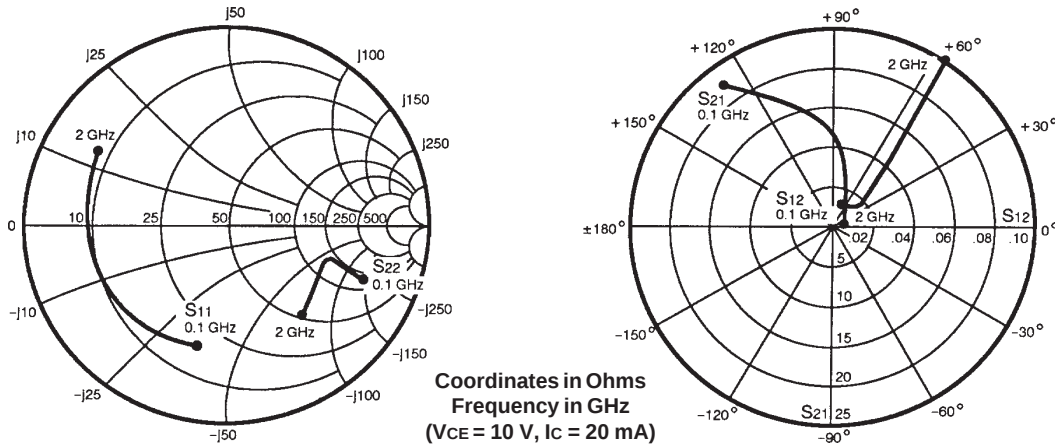
1. Gain Calculation:

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

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

## TYPICAL COMMON EMITTER SCATTERING PARAMETERS



## NE73435

VCE = 10 V, IC = 3 mA

| FREQUENCY<br>(MHz) | S11   |        | S21   |       | S12   |      | S22   |        | K    | MAG <sup>1</sup><br>(dB) |
|--------------------|-------|--------|-------|-------|-------|------|-------|--------|------|--------------------------|
| 100                | 0.861 | -28.4  | 6.880 | 157.0 | 0.026 | 70.5 | 0.960 | -11.1  | 0.19 | 24.2                     |
| 200                | 0.810 | -55.0  | 6.206 | 139.8 | 0.047 | 56.9 | 0.865 | -19.2  | 0.28 | 21.2                     |
| 500                | 0.676 | -115.5 | 4.323 | 104.1 | 0.070 | 37.3 | 0.689 | -29.0  | 0.50 | 17.9                     |
| 1000               | 0.616 | -156.0 | 2.494 | 74.4  | 0.085 | 30.5 | 0.612 | -38.3  | 0.84 | 14.7                     |
| 1500               | 0.607 | -175.1 | 1.709 | 55.6  | 0.095 | 32.2 | 0.612 | -49.8  | 1.05 | 11.2                     |
| 2000               | 0.610 | 171.3  | 1.317 | 39.0  | 0.107 | 32.2 | 0.616 | -62.2  | 1.16 | 8.5                      |
| 2500               | 0.613 | 160.0  | 1.071 | 25.3  | 0.118 | 33.9 | 0.632 | -74.0  | 1.20 | 6.9                      |
| 3000               | 0.618 | 149.5  | 0.896 | 13.0  | 0.132 | 33.5 | 0.649 | -87.3  | 1.19 | 5.7                      |
| 4000               | 0.630 | 128.9  | 0.647 | -8.4  | 0.170 | 33.7 | 0.657 | -112.9 | 1.20 | 3.1                      |

VCE = 10 V, IC = 5 mA

|      |       |        |        |       |       |      |       |        |      |      |
|------|-------|--------|--------|-------|-------|------|-------|--------|------|------|
| 100  | 0.798 | -39.0  | 10.428 | 151.6 | 0.025 | 66.2 | 0.923 | -14.4  | 0.22 | 26.2 |
| 200  | 0.733 | -74.2  | 8.974  | 131.4 | 0.040 | 52.9 | 0.788 | -22.4  | 0.31 | 23.5 |
| 500  | 0.628 | -134.4 | 5.214  | 96.8  | 0.056 | 37.4 | 0.613 | -28.4  | 0.62 | 19.7 |
| 1000 | 0.603 | -166.4 | 2.797  | 70.8  | 0.073 | 37.1 | 0.563 | -36.6  | 0.94 | 15.8 |
| 1500 | 0.605 | 178.1  | 1.893  | 53.1  | 0.088 | 39.9 | 0.572 | -47.9  | 1.09 | 11.5 |
| 2000 | 0.613 | 166.2  | 1.442  | 37.6  | 0.102 | 39.9 | 0.582 | -60.5  | 1.16 | 9.1  |
| 2500 | 0.621 | 155.9  | 1.161  | 24.2  | 0.117 | 41.0 | 0.604 | -72.5  | 1.15 | 7.6  |
| 3000 | 0.628 | 146.0  | 0.967  | 12.0  | 0.133 | 40.6 | 0.628 | -85.9  | 1.10 | 6.7  |
| 4000 | 0.644 | 126.0  | 0.690  | -9.3  | 0.176 | 39.2 | 0.639 | -111.8 | 1.09 | 4.1  |

VCE = 10 V, IC = 10 mA

|      |       |        |        |       |       |      |       |        |      |      |
|------|-------|--------|--------|-------|-------|------|-------|--------|------|------|
| 100  | 0.687 | -62.0  | 16.892 | 142.1 | 0.020 | 59.4 | 0.846 | -19.1  | 0.26 | 29.3 |
| 200  | 0.635 | -106.6 | 12.598 | 118.5 | 0.031 | 48.8 | 0.677 | -24.6  | 0.40 | 26.1 |
| 500  | 0.603 | -153.4 | 5.959  | 89.6  | 0.042 | 42.9 | 0.541 | -25.9  | 0.81 | 21.5 |
| 1000 | 0.607 | -175.8 | 3.063  | 67.1  | 0.061 | 47.2 | 0.521 | -33.7  | 1.07 | 15.4 |
| 1500 | 0.621 | 171.8  | 2.039  | 50.5  | 0.080 | 48.7 | 0.541 | -45.3  | 1.12 | 12.0 |
| 2000 | 0.633 | 161.4  | 1.532  | 35.2  | 0.096 | 48.3 | 0.559 | -58.0  | 1.14 | 9.8  |
| 2500 | 0.646 | 151.8  | 1.220  | 22.4  | 0.112 | 48.3 | 0.586 | -70.7  | 1.10 | 8.4  |
| 3000 | 0.652 | 142.4  | 1.009  | 10.4  | 0.132 | 47.9 | 0.612 | -84.2  | 1.02 | 8.0  |
| 4000 | 0.672 | 122.6  | 0.712  | -10.1 | 0.182 | 44.2 | 0.627 | -111.0 | 0.96 | 5.9  |

VCE = 10 V, IC = 20 mA

|      |       |        |        |       |       |      |       |        |      |      |
|------|-------|--------|--------|-------|-------|------|-------|--------|------|------|
| 100  | 0.584 | -94.8  | 22.708 | 130.8 | 0.015 | 57.7 | 0.761 | -21.6  | 0.32 | 31.8 |
| 200  | 0.594 | -134.2 | 14.233 | 108.5 | 0.023 | 48.1 | 0.599 | -23.0  | 0.55 | 27.9 |
| 500  | 0.613 | -165.6 | 6.118  | 84.3  | 0.034 | 51.7 | 0.515 | -22.0  | 0.95 | 22.6 |
| 1000 | 0.632 | 178.2  | 3.061  | 63.8  | 0.054 | 53.6 | 0.517 | -30.8  | 1.13 | 15.3 |
| 1500 | 0.650 | 167.5  | 2.014  | 47.5  | 0.072 | 55.5 | 0.545 | -43.4  | 1.14 | 12.2 |
| 2000 | 0.666 | 157.8  | 1.506  | 32.9  | 0.089 | 55.1 | 0.564 | -56.8  | 1.12 | 10.2 |
| 2500 | 0.678 | 148.5  | 1.190  | 20.3  | 0.108 | 56.1 | 0.594 | -69.8  | 1.02 | 9.6  |
| 3000 | 0.686 | 139.0  | 0.976  | 8.7   | 0.132 | 55.3 | 0.621 | -83.9  | 0.91 | 8.7  |
| 4000 | 0.699 | 119.3  | 0.682  | -11.2 | 0.190 | 49.2 | 0.634 | -111.2 | 0.86 | 5.6  |

Note:

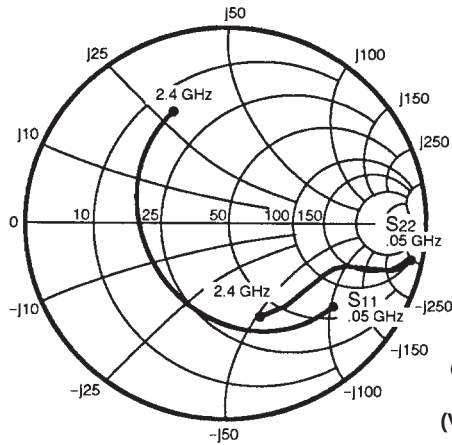
1. Gain Calculation:

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

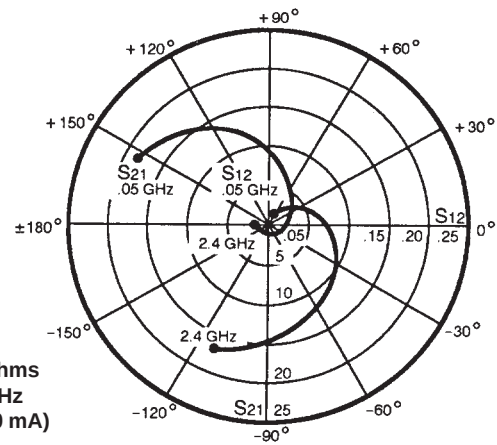
MAG = Maximum Available Gain

MSG = Maximum Stable Gain

## TYPICAL COMMON EMITTER SCATTERING PARAMETERS



Coordinates in Ohms  
Frequency in GHz  
(VCE = 10 V, IC = 10 mA)



NE73439

VCE = 10 V, IC = 5 mA

| FREQUENCY | S11  |      | S21   |      | S12   |      | S22  |     | K    | MAG <sup>1</sup> |
|-----------|------|------|-------|------|-------|------|------|-----|------|------------------|
| (MHz)     | MAG  | ANG  | MAG   | ANG  | MAG   | ANG  | MAG  | ANG |      | (dB)             |
| 50        | 0.81 | -23  | 10.89 | 158  | 0.014 | 73   | 0.96 | -8  | 0.27 | 28.9             |
| 100       | 0.75 | -44  | 10.08 | 140  | 0.025 | 59   | 0.91 | -14 | 0.43 | 26.1             |
| 200       | 0.63 | -83  | 8.36  | 111  | 0.038 | 40   | 0.78 | -20 | 0.67 | 23.4             |
| 300       | 0.55 | -111 | 6.51  | 88   | 0.046 | 28   | 0.70 | -21 | 0.89 | 21.5             |
| 400       | 0.50 | -132 | 5.35  | 71   | 0.052 | 20   | 0.66 | -22 | 1.04 | 18.9             |
| 500       | 0.48 | -147 | 4.44  | 56   | 0.057 | 13   | 0.63 | -23 | 1.20 | 16.2             |
| 600       | 0.47 | -158 | 3.77  | 42   | 0.062 | 7    | 0.62 | -24 | 1.33 | 14.4             |
| 700       | 0.47 | -167 | 3.29  | 29   | 0.067 | 1    | 0.61 | -26 | 1.43 | 13.0             |
| 800       | 0.47 | -176 | 2.90  | 17   | 0.072 | -5   | 0.60 | -27 | 1.53 | 11.8             |
| 900       | 0.47 | 177  | 2.60  | 5    | 0.078 | -11  | 0.59 | -29 | 1.60 | 10.7             |
| 1000      | 0.48 | 171  | 2.35  | -6   | 0.083 | -18  | 0.59 | -31 | 1.66 | 9.8              |
| 1200      | 0.50 | 160  | 1.99  | -29  | 0.094 | -31  | 0.58 | -35 | 1.71 | 8.3              |
| 1400      | 0.51 | 151  | 1.72  | -50  | 0.105 | -44  | 0.57 | -40 | 1.74 | 7.1              |
| 1600      | 0.54 | 143  | 1.51  | -71  | 0.117 | -58  | 0.56 | -46 | 1.67 | 6.3              |
| 1800      | 0.56 | 136  | 1.35  | -92  | 0.130 | -71  | 0.55 | -62 | 1.62 | 5.5              |
| 2000      | 0.58 | 129  | 1.22  | -112 | 0.143 | -86  | 0.55 | -58 | 1.42 | 5.5              |
| 2200      | 0.60 | 123  | 1.11  | -132 | 0.157 | -100 | 0.54 | -66 | 1.28 | 5.3              |
| 2400      | 0.62 | 118  | 1.02  | -152 | 0.172 | -115 | 0.53 | -73 | 1.13 | 5.5              |

VCE = 10 V, IC = 10 mA

|      |      |      |       |      |       |      |      |     |      |      |
|------|------|------|-------|------|-------|------|------|-----|------|------|
| 50   | 0.68 | -35  | 17.95 | 152  | 0.012 | 69   | 0.93 | -12 | 0.30 | 31.7 |
| 100  | 0.61 | -66  | 15.51 | 130  | 0.021 | 54   | 0.83 | -18 | 0.48 | 28.7 |
| 200  | 0.50 | -112 | 10.91 | 99   | 0.030 | 40   | 0.68 | -20 | 0.77 | 25.6 |
| 300  | 0.46 | -137 | 7.91  | 79   | 0.037 | 33   | 0.62 | -20 | 0.98 | 23.3 |
| 400  | 0.45 | -152 | 6.14  | 63   | 0.043 | 28   | 0.59 | -20 | 1.15 | 19.2 |
| 500  | 0.44 | -164 | 4.99  | 50   | 0.049 | 22   | 0.58 | -21 | 1.27 | 17.0 |
| 600  | 0.45 | -172 | 4.20  | 37   | 0.056 | 22   | 0.58 | -22 | 1.32 | 15.4 |
| 700  | 0.45 | -180 | 3.63  | 25   | 0.062 | 10   | 0.56 | -23 | 1.46 | 13.7 |
| 800  | 0.46 | 174  | 3.19  | 14   | 0.068 | 3    | 0.56 | -25 | 1.53 | 12.4 |
| 900  | 0.47 | 169  | 2.85  | 2    | 0.075 | -4   | 0.55 | -27 | 1.59 | 11.3 |
| 1000 | 0.48 | 164  | 2.57  | -9   | 0.081 | -11  | 0.55 | -29 | 1.63 | 10.4 |
| 1200 | 0.50 | 155  | 2.16  | -31  | 0.094 | -25  | 0.54 | -33 | 1.68 | 8.8  |
| 1400 | 0.52 | 147  | 1.85  | -52  | 0.106 | -39  | 0.54 | -38 | 1.68 | 7.6  |
| 1600 | 0.54 | 140  | 1.63  | -73  | 0.119 | -53  | 0.53 | -44 | 1.62 | 6.8  |
| 1800 | 0.57 | 133  | 1.45  | -94  | 0.132 | -68  | 0.52 | -50 | 1.51 | 6.2  |
| 2000 | 0.59 | 127  | 1.31  | -114 | 0.145 | -82  | 0.51 | -56 | 1.38 | 5.9  |
| 2200 | 0.61 | 121  | 1.19  | -134 | 0.160 | -97  | 0.51 | -64 | 1.22 | 5.9  |
| 2400 | 0.64 | 116  | 1.08  | -153 | 0.176 | -112 | 0.5  | -72 | 1.06 | 6.4  |

Note:

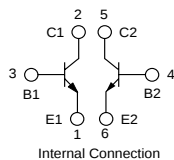
1. Gain Calculation:

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

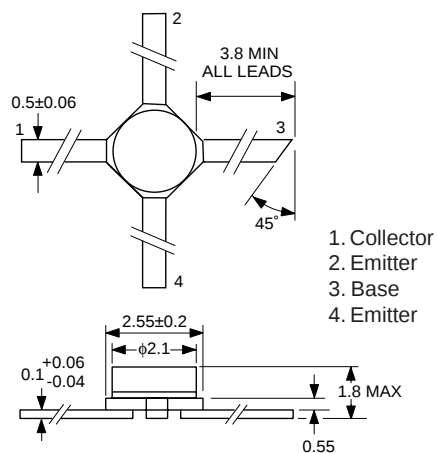
MAG = Maximum Available Gain

MSG = Maximum Stable Gain

Chip Thickness: 160  $\mu\text{m}$  TYP

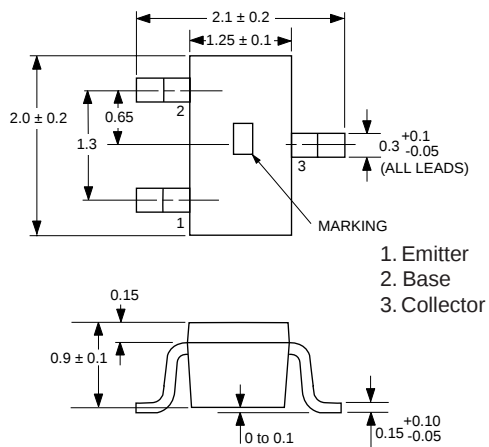


**OUTLINE 32**  
(TO-92)

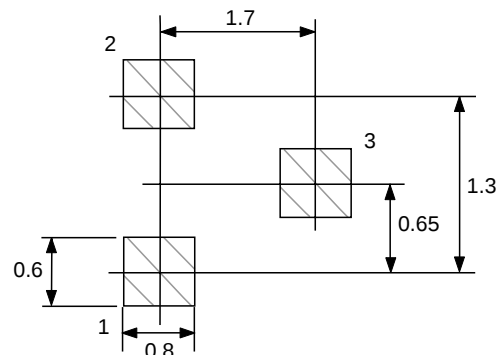


# OUTLINE DIMENSIONS (Units in mm)

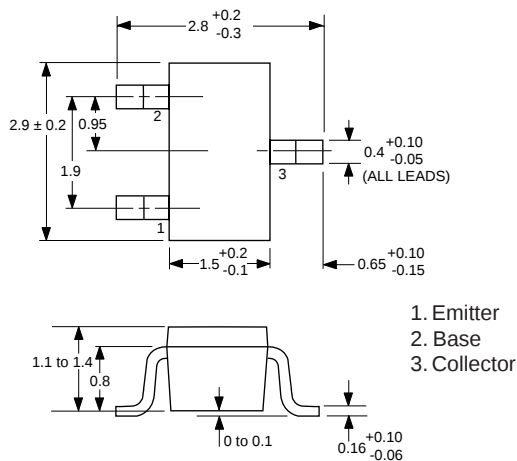
OUTLINE 30  
(SOT-323)



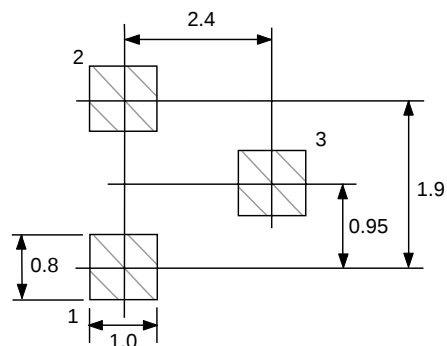
PACKAGE OUTLINE 30  
RECOMMENDED P.C.B. LAYOUT



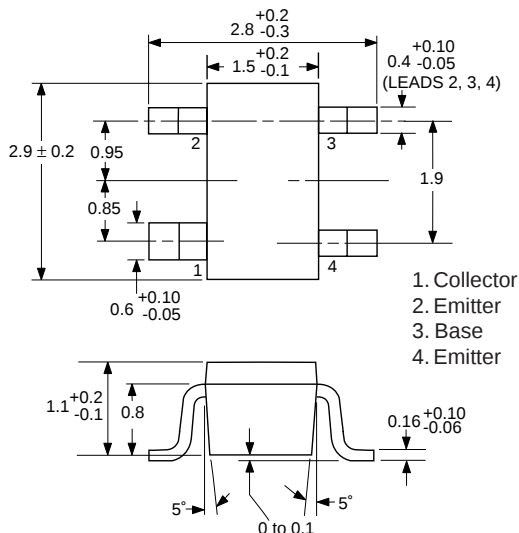
PACKAGE OUTLINE 33  
(SOT-23)



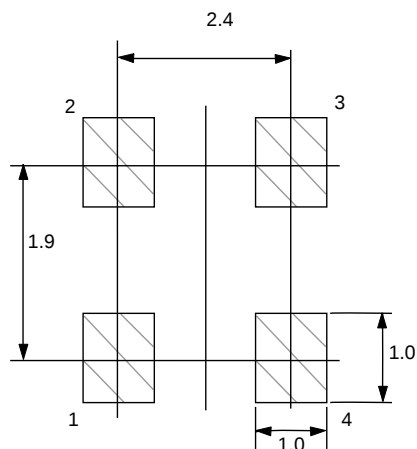
PACKAGE OUTLINE 33  
RECOMMENDED P.C.B. LAYOUT



PACKAGE OUTLINE 39  
(SOT-143)



PACKAGE OUTLINE 39  
RECOMMENDED P.C.B. LAYOUT



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