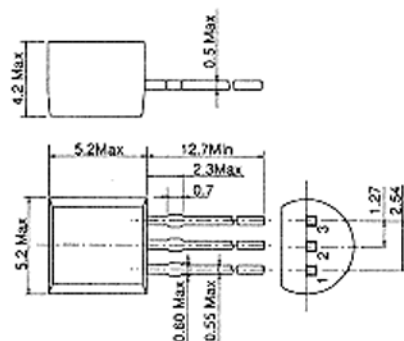


## 2SC3337

SILICON NPN EPITAXIAL  
UHF/VHF WIDE BAND AMPLIFIER



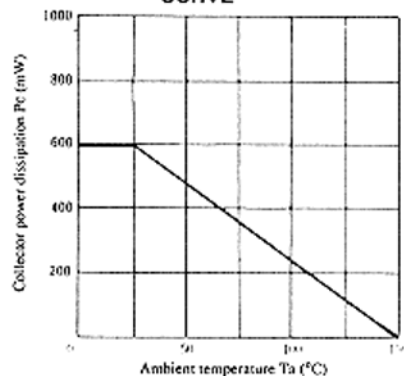
1. Base
  2. Emitter
  3. Collector
- (Dimensions in mm)

(JEDEC TO-92)

### ■ ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ )

| Item                         | Symbol    | 2SC3337     | Unit             |
|------------------------------|-----------|-------------|------------------|
| Collector to base voltage    | $V_{CB0}$ | 20          | V                |
| Collector to emitter voltage | $V_{CE0}$ | 15          | V                |
| Emitter to base voltage      | $V_{EB0}$ | 3           | V                |
| Collector current            | $I_C$     | 100         | mA               |
| Collector power dissipation  | $P_C$     | 600         | mW               |
| Junction temperature         | $T_j$     | 150         | $^\circ\text{C}$ |
| Storage temperature          | $T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |

### MAXIMUM COLLECTOR DISSIPATION CURVE

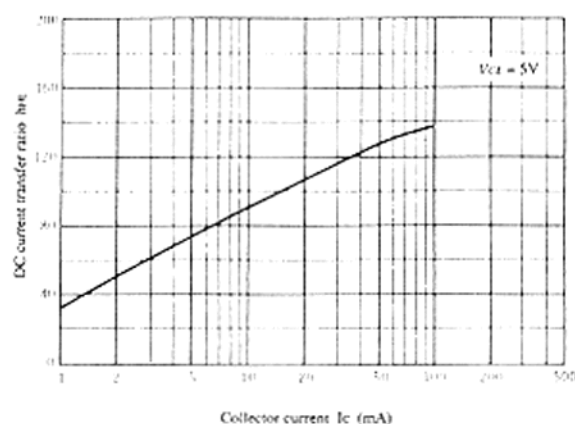


### ■ ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ )

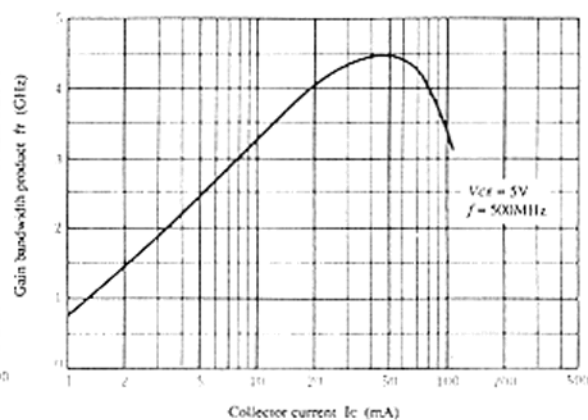
| Item                                   | Symbol        | Test Condition                                                   | min. | typ. | max. | Unit          |
|----------------------------------------|---------------|------------------------------------------------------------------|------|------|------|---------------|
| Collector to base breakdown voltage    | $V_{(BR)CBO}$ | $I_C = 10\mu\text{A}$ , $I_E = 0$                                | 20   | —    | —    | V             |
| Collector to emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C = 1\text{mA}$ , $R_{BE} = \infty$                           | 15   | —    | —    | V             |
| Emitter cutoff current                 | $I_{EB0}$     | $V_{EB} = 3\text{V}$ , $I_C = 0$                                 | —    | —    | 10   | $\mu\text{A}$ |
| Collector cutoff current               | $I_{CB0}$     | $V_{CB} = 15\text{V}$ , $I_E = 0$                                | —    | —    | 0.5  | $\mu\text{A}$ |
| DC current transfer ratio              | $h_{FE}$      | $V_{CE} = 5\text{V}$ , $I_C = 50\text{mA}$                       | 30   | 100  | 200  |               |
| Collector output capacitance           | $C_{ob}$      | $V_{CB} = 5\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$             | —    | 1.5  | 2.3  | pF            |
| Gain bandwidth product                 | $f_r$         | $V_{CE} = 5\text{V}$ , $I_C = 50\text{mA}$                       | 3.0  | 4.4  | —    | GHz           |
| Power gain                             | $PG$          | $V_{CE} = 5\text{V}$ , $I_C = 50\text{mA}$ , $f = 900\text{MHz}$ | —    | 8.6  | —    | dB            |
| Noise figure                           | $NF$          | $V_{CE} = 5\text{V}$ , $I_C = 10\text{mA}$ , $f = 900\text{MHz}$ | —    | 2.9  | —    | dB            |

## 2SC3337

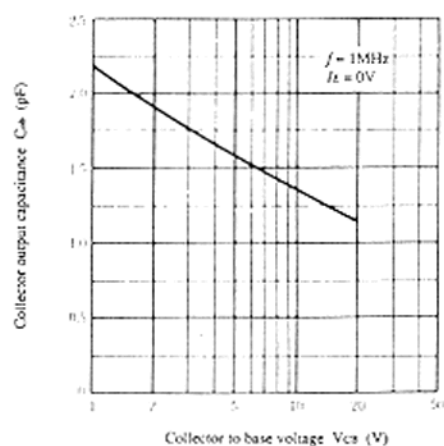
DC CURRENT TRANSFER RATIO  
VS. COLLECTOR CURRENT



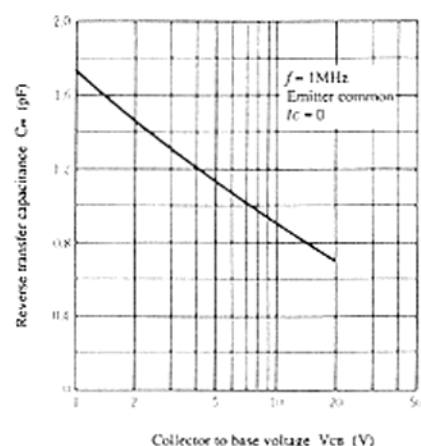
GAIN BANDWIDTH PRODUCT  
VS. COLLECTOR CURRENT



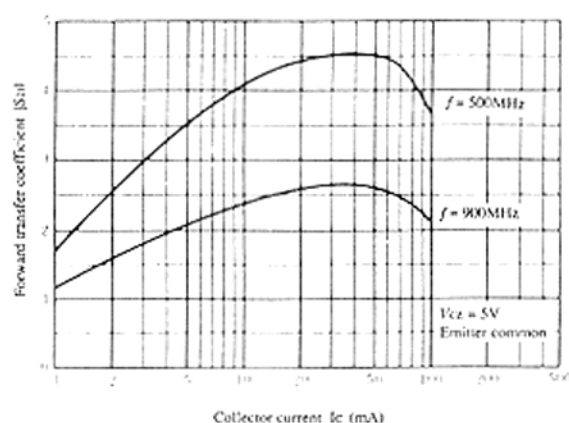
COLLECTOR OUTPUT CAPACITANCE  
VS. COLLECTOR TO BASE VOLTAGE



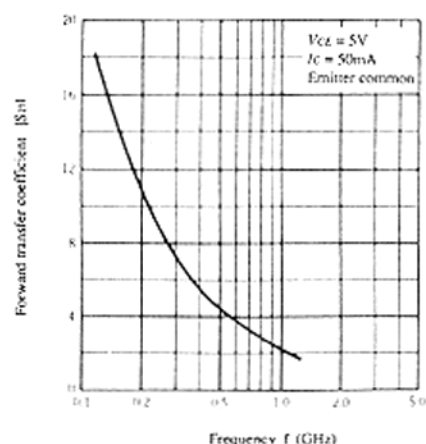
REVERSE TRANSFER CAPACITANCE  
VS. COLLECTOR TO BASE VOLTAGE

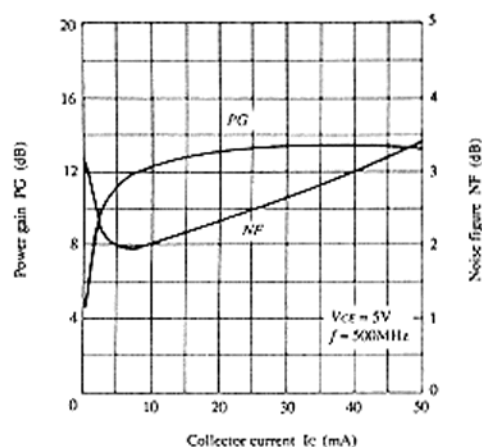
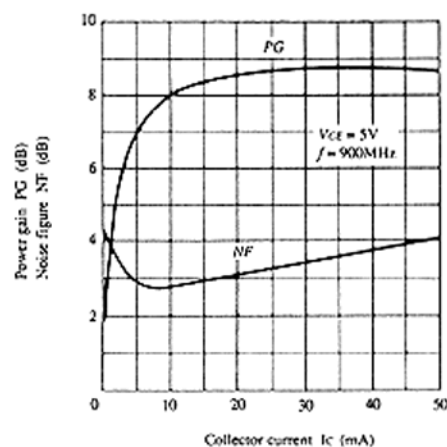
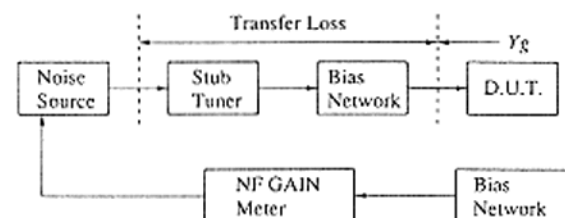


FORWARD TRANSFER COEFFICIENT  
VS. COLLECTOR CURRENT



FORWARD TRANSFER COEFFICIENT  
VS. FREQUENCY



POWER GAIN AND NOISE FIGURE  
VS. COLLECTOR CURRENTPOWER GAIN AND NOISE FIGURE  
VS. COLLECTOR CURRENTNOISE FIGURE AND POWER GAIN  
MEASUREMENT BLOCK DIAGRAM

| Item               | $f = 500MHz$     | $f = 900MHz$      |
|--------------------|------------------|-------------------|
| Transfer Loss (dB) | 0.4              | 0.65              |
| $Y_g$ (mS)         | $9.785 + j67.25$ | $46.32 + j129.77$ |

S PARAMETERS ( $V_{CE}=5V$ ,  $I_c=50mA$ ,  $Z_0=50\Omega$  Emitter common)

| f    | Return Loss |              | Transfer Loss |              | Transfer Loss |              | Return Loss |              |
|------|-------------|--------------|---------------|--------------|---------------|--------------|-------------|--------------|
|      | Input       | ( $S_{11}$ ) | Forward       | ( $S_{21}$ ) | Reverse       | ( $S_{12}$ ) | Output      | ( $S_{22}$ ) |
| MHz  | Ratio       | Angle        | Ratio         | Angle        | Ratio         | Angle        | Ratio       | Angle        |
| 100  | 0.3115      | -144.2       | 21.195        | 104.6        | 0.018         | 60.8         | 0.2946      | -54.7        |
| 200  | 0.3024      | -169.7       | 11.089        | 91.9         | 0.038         | 64.0         | 0.1731      | -51.7        |
| 300  | 0.3039      | 173.6        | 7.484         | 85.2         | 0.058         | 66.4         | 0.1267      | -48.4        |
| 400  | 0.3189      | 163.4        | 5.728         | 79.4         | 0.080         | 67.8         | 0.0994      | -48.9        |
| 500  | 0.3255      | 152.5        | 4.639         | 74.3         | 0.100         | 65.6         | 0.0844      | -36.9        |
| 600  | 0.3608      | 143.2        | 3.894         | 69.4         | 0.117         | 63.3         | 0.0424      | -10.8        |
| 700  | 0.3841      | 138.3        | 3.376         | 64.6         | 0.140         | 60.7         | 0.0248      | -17.9        |
| 800  | 0.3960      | 133.7        | 2.956         | 59.8         | 0.159         | 59.0         | 0.0165      | -115.7       |
| 900  | 0.4079      | 125.7        | 2.680         | 55.1         | 0.177         | 55.6         | 0.0099      | 68.5         |
| 1000 | 0.4342      | 120.5        | 2.419         | 50.9         | 0.198         | 54.0         | 0.0188      | 86.4         |

## 2SC3337

Y PARAMETERS ( $V_{CE}=5V$ ,  $I_C=50mA$ ) (Emitter common)

| f    | y <sub>ie</sub> |           | y <sub>fe</sub> |        | y <sub>re</sub> |        | y <sub>oe</sub> |           |
|------|-----------------|-----------|-----------------|--------|-----------------|--------|-----------------|-----------|
|      | Real            | Imaginary | Absolute        | Angle  | Absolute        | Angle  | Real            | Imaginary |
| MHz  | mS              | mS        | mS              | deg    | mS              | deg    | mS              | mS        |
| 100  | 16.143          | 6.729     | 652.332         | -53.3  | 0.560           | -97.1  | 3.418           | 3.485     |
| 200  | 16.784          | 5.698     | 369.998         | -72.3  | 1.262           | -100.2 | 3.044           | 4.648     |
| 300  | 17.084          | 4.358     | 256.758         | -83.1  | 1.991           | -101.9 | 3.214           | 5.993     |
| 400  | 17.022          | 3.968     | 199.714         | -90.5  | 2.773           | -102.1 | 3.274           | 7.393     |
| 500  | 17.449          | 3.980     | 163.471         | -96.9  | 3.519           | -105.6 | 3.966           | 9.070     |
| 600  | 19.122          | 4.018     | 147.018         | -104.3 | 4.435           | -110.4 | 5.794           | 11.063    |
| 700  | 20.167          | 4.860     | 133.442         | -108.1 | 5.518           | -112.0 | 6.671           | 13.609    |
| 800  | 20.965          | 5.270     | 122.967         | -112.0 | 6.596           | -112.8 | 8.217           | 16.101    |
| 900  | 22.620          | 5.217     | 114.655         | -118.5 | 7.584           | -118.0 | 10.804          | 17.752    |
| 1000 | 24.300          | 4.492     | 107.585         | -124.4 | 8.805           | -121.3 | 13.171          | 19.422    |