



# 2SC5226

## VHF to UHF Wide-Band Low-Noise Amplifier Applications

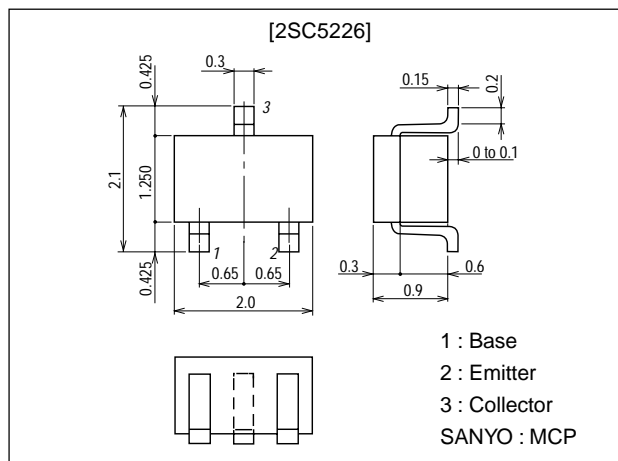
### Features

- Low noise : NF=1.0dB typ (f=1GHz).
- High gain :  $|S_{21e}|^2=12\text{dB}$  typ (f=1GHz).
- High cutoff frequency :  $f_T=7\text{GHz}$  typ.

### Package Dimensions

unit:mm

2059B



### Specifications

#### Absolute Maximum Ratings at Ta = 25°C

| Parameter                    | Symbol    | Conditions | Ratings     | Unit |
|------------------------------|-----------|------------|-------------|------|
| Collector-to-Base Voltage    | $V_{CBO}$ |            | 20          | V    |
| Collector-to-Emitter Voltage | $V_{CEO}$ |            | 10          | V    |
| Emitter-to-Base Voltage      | $V_{EBO}$ |            | 2           | V    |
| Collector Current            | $I_C$     |            | 70          | mA   |
| Collector Dissipation        | $P_C$     |            | 150         | mW   |
| Junction Temperature         | $T_J$     |            | 150         | °C   |
| Storage Temperature          | $T_{stg}$ |            | -55 to +150 | °C   |

#### Electrical Characteristics at Ta = 25°C

| Parameter                    | Symbol           | Conditions   | Ratings |      |      | Unit          |
|------------------------------|------------------|--|---------|------|------|---------------|
|                              |                  |  | min     | typ  | max  |               |
| Collector Cutoff Current     | $I_{CBO}$        | $V_{CB}=10\text{V}, I_E=0$                         |         |      | 1.0  | $\mu\text{A}$ |
| Emitter Cutoff Current       | $I_{EBO}$        | $V_{EB}=1\text{V}, I_C=0$                          |         |      | 10   | $\mu\text{A}$ |
| DC Current Gain              | $h_{FE}$         | $V_{CE}=5\text{V}, I_C=20\text{mA}$                | 60*     |      | 270* |               |
| Gain-Bandwidth Product       | $f_T$            | $V_{CE}=5\text{V}, I_C=20\text{mA}$                | 5       | 7    |      | GHz           |
| Output Capacitance           | $C_{ob}$         | $V_{CB}=10\text{V}, f=1\text{MHz}$                 |         | 0.75 | 1.2  | pF            |
| Reverse Transfer Capacitance | $C_{re}$         | $V_{CB}=10\text{V}, f=1\text{MHz}$                 |         | 0.5  |      | pF            |
| Forward Transfer Gain        | $ S_{21e} ^2(1)$ | $V_{CE}=5\text{V}, I_C=20\text{mA}, f=1\text{GHz}$ | 9       | 12   |      | dB            |
|                              | $ S_{21e} ^2(2)$ | $V_{CE}=2\text{V}, I_C=3\text{mA}, f=1\text{GHz}$  |         | 8    |      | dB            |
| Noise Figure                 | NF               | $V_{CE}=5\text{V}, I_C=7\text{mA}, f=1\text{GHz}$  |         | 1.0  | 1.8  | dB            |

\* : The 2SC5226 is classified by 20mA  $h_{FE}$  as follows :

|    |   |     |    |   |     |     |   |     |
|----|---|-----|----|---|-----|-----|---|-----|
| 60 | 3 | 120 | 90 | 4 | 180 | 135 | 5 | 270 |
|----|---|-----|----|---|-----|-----|---|-----|

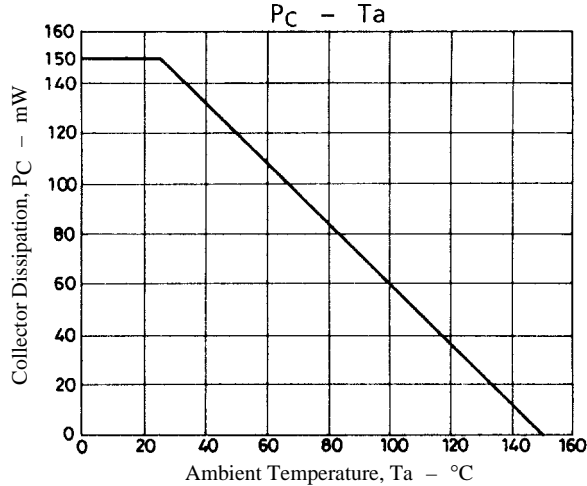
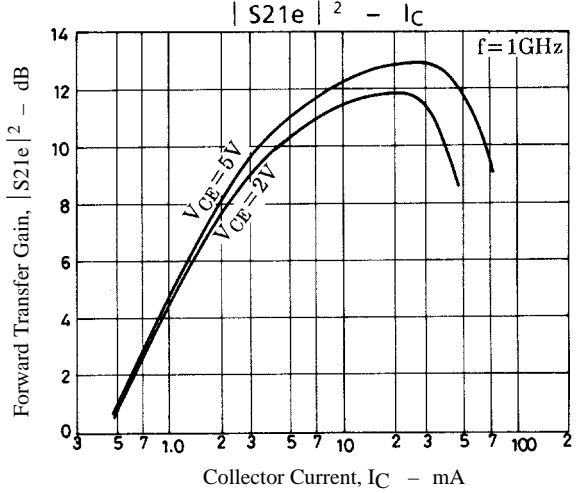
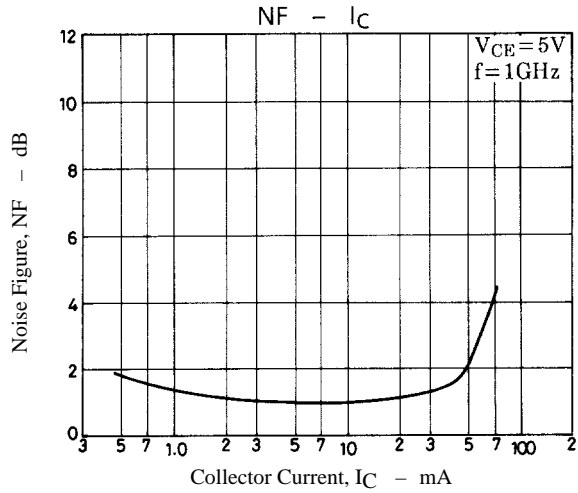
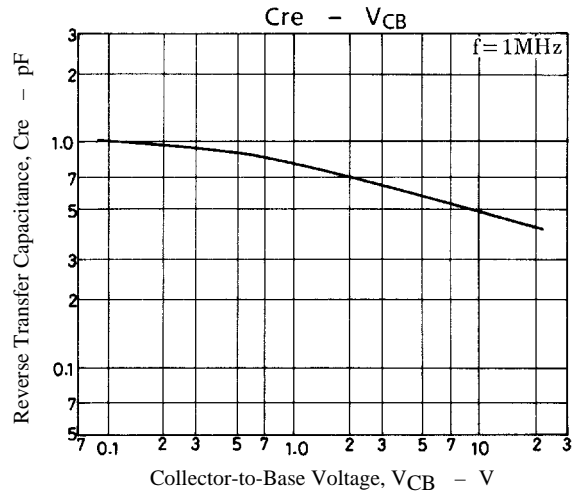
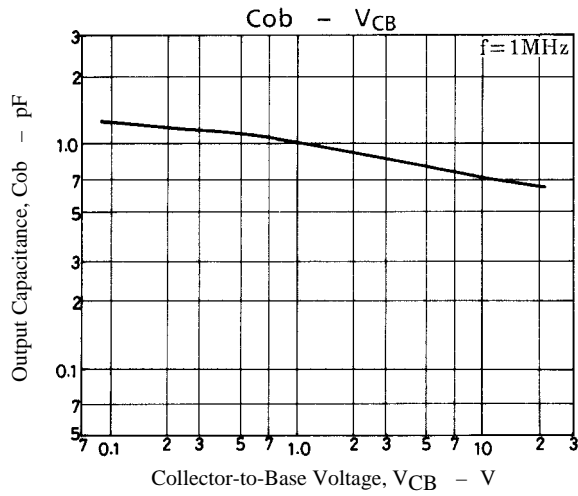
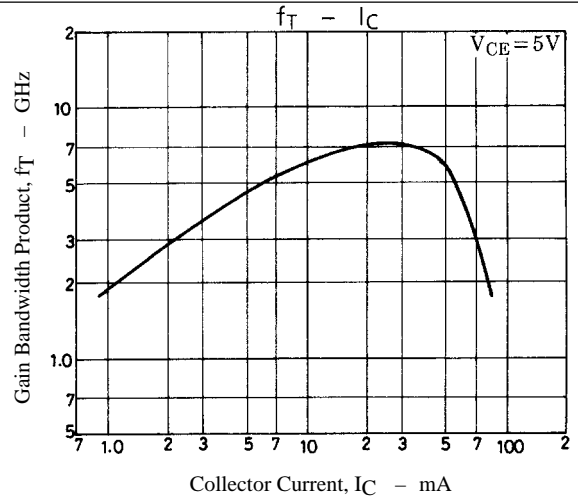
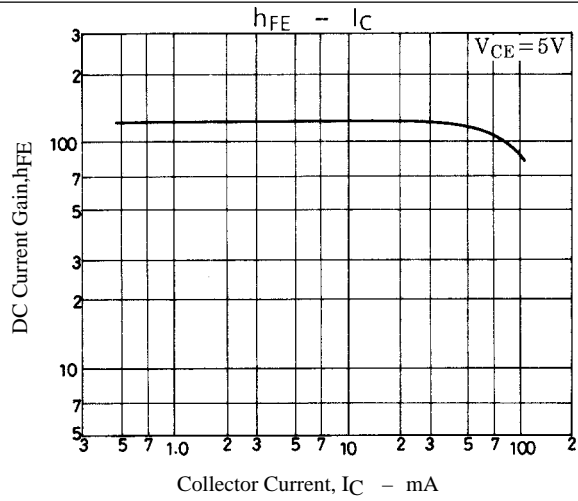
Marking : LN  
 $h_{FE}$  rank : 3, 4, 5

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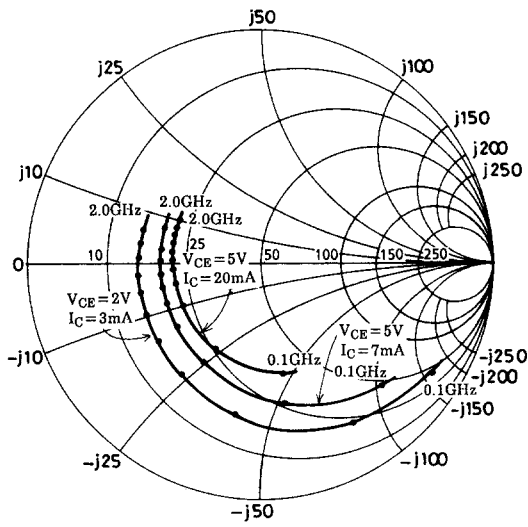
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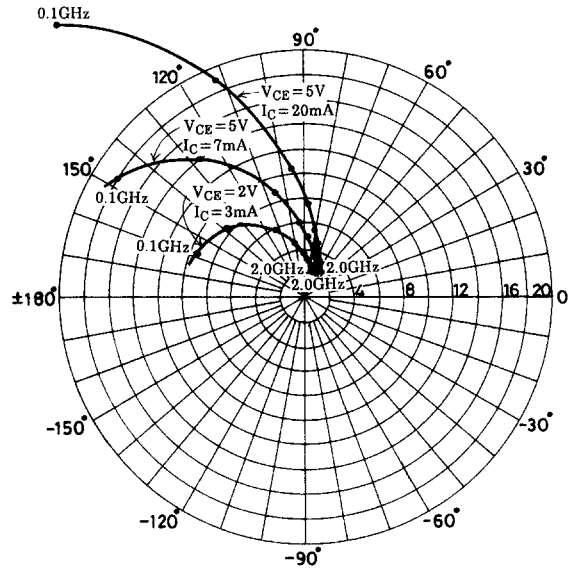
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## S Parameters

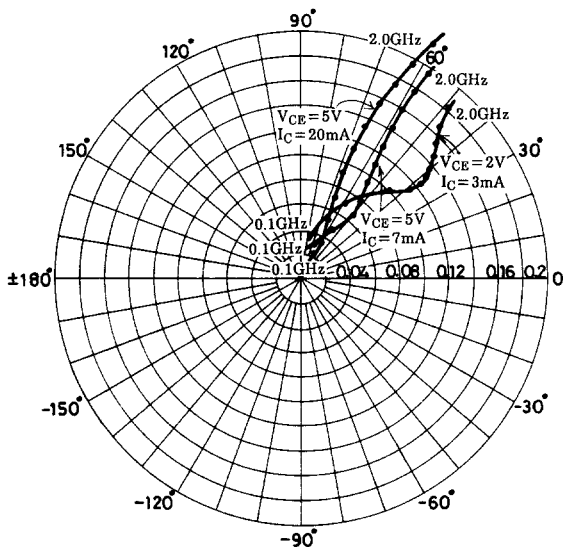
$f = 100\text{MHz}$ , 200 to 2000MHz (200MHz step)



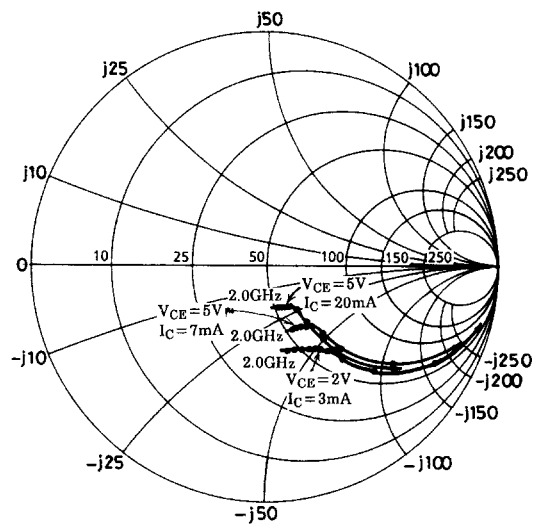
$f = 100\text{MHz}$ , 200 to 2000MHz (200MHz step)



$f = 100\text{MHz}$ , 200 to 2000MHz (200MHz step)



$f = 100\text{MHz}$ , 200 to 2000MHz (200MHz step)



## 2SC5226

### S parameters (Common emitter)

$V_{CE}=5V, I_C=7mA, Z_O=50\Omega$

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 100        | 0.720      | -46.0           | 17.973     | 148.5           | 0.030      | 68.5            | 0.880      | -23.6           |
| 200        | 0.612      | -80.9           | 13.927     | 127.3           | 0.047      | 57.1            | 0.697      | -37.6           |
| 400        | 0.497      | -121.3          | 8.656      | 105.0           | 0.066      | 51.3            | 0.479      | -47.6           |
| 600        | 0.456      | -143.5          | 6.080      | 92.8            | 0.079      | 52.9            | 0.382      | -50.5           |
| 800        | 0.440      | -157.6          | 4.725      | 84.3            | 0.094      | 55.4            | 0.339      | -51.8           |
| 1000       | 0.436      | -167.5          | 3.864      | 77.0            | 0.110      | 56.8            | 0.323      | -53.4           |
| 1200       | 0.434      | -176.1          | 3.258      | 70.3            | 0.126      | 57.9            | 0.312      | -55.8           |
| 1400       | 0.433      | 176.6           | 2.847      | 64.5            | 0.143      | 58.4            | 0.304      | -58.3           |
| 1600       | 0.433      | 170.9           | 2.329      | 57.4            | 0.160      | 58.9            | 0.296      | -62.0           |
| 1800       | 0.434      | 165.0           | 2.252      | 54.2            | 0.178      | 58.6            | 0.293      | -65.0           |
| 2000       | 0.439      | 159.6           | 2.057      | 49.2            | 0.197      | 58.1            | 0.294      | -68.1           |

$V_{CE}=5V, I_C=20mA, Z_O=50\Omega$

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 100        | 0.481      | -78.8           | 29.795     | 132.9           | 0.022      | 63.9            | 0.707      | -38.2           |
| 200        | 0.420      | -119.2          | 19.008     | 112.2           | 0.033      | 60.8            | 0.470      | -51.1           |
| 400        | 0.391      | -151.6          | 10.416     | 95.4            | 0.052      | 64.7            | 0.296      | -55.3           |
| 600        | 0.386      | -166.4          | 7.084      | 86.6            | 0.071      | 67.2            | 0.236      | -56.1           |
| 800        | 0.381      | -175.9          | 5.407      | 80.1            | 0.092      | 68.4            | 0.213      | -56.6           |
| 1000       | 0.382      | 178.2           | 4.401      | 74.1            | 0.114      | 67.8            | 0.208      | -57.9           |
| 1200       | 0.385      | 172.1           | 3.701      | 68.5            | 0.134      | 66.8            | 0.204      | -60.7           |
| 1400       | 0.388      | 166.7           | 3.217      | 63.6            | 0.156      | 65.6            | 0.202      | -63.5           |
| 1600       | 0.390      | 162.1           | 2.839      | 58.8            | 0.176      | 64.0            | 0.199      | -67.9           |
| 1800       | 0.391      | 156.7           | 2.534      | 54.3            | 0.197      | 62.4            | 0.197      | -71.2           |
| 2000       | 0.394      | 152.1           | 2.319      | 50.1            | 0.219      | 60.6            | 0.197      | -74.2           |

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

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 100        | 0.858      | -32.4           | 9.413      | 157.2           | 0.040      | 72.6            | 0.945      | -16.5           |
| 200        | 0.782      | -60.7           | 8.187      | 138.5           | 0.070      | 59.2            | 0.833      | -29.3           |
| 400        | 0.653      | -101.1          | 5.855      | 113.8           | 0.101      | 44.5            | 0.637      | -43.2           |
| 600        | 0.588      | -126.5          | 4.337      | 98.4            | 0.114      | 39.1            | 0.515      | -50.0           |
| 800        | 0.557      | -143.7          | 3.444      | 87.7            | 0.122      | 38.0            | 0.454      | -53.8           |
| 1000       | 0.543      | -156.3          | 2.871      | 78.5            | 0.130      | 38.6            | 0.426      | -57.1           |
| 1200       | 0.536      | -166.8          | 2.446      | 70.5            | 0.137      | 40.3            | 0.407      | -60.3           |
| 1400       | 0.533      | -175.5          | 2.145      | 63.5            | 0.146      | 42.5            | 0.393      | -63.8           |
| 1600       | 0.527      | 177.0           | 1.904      | 57.1            | 0.155      | 45.0            | 0.382      | -68.0           |
| 1800       | 0.525      | 170.3           | 1.714      | 51.7            | 0.168      | 47.3            | 0.379      | -72.0           |
| 2000       | 0.528      | 163.8           | 1.564      | 45.9            | 0.183      | 49.2            | 0.378      | -75.8           |

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