

**2SC5227**

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

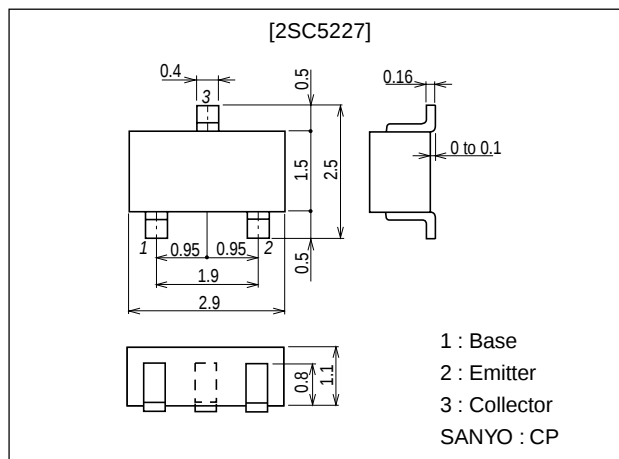
### Features

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

### Package Dimensions

unit:mm

2018B



### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

| 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        | $P_C$     |            | 200         | mW               |
| Junction Temperature         | $T_J$     |            | 150         | $^\circ\text{C}$ |
| Storage Temperature          | $T_{stg}$ |            | -55 to +150 | $^\circ\text{C}$ |

#### Electrical Characteristics at $T_a = 25^\circ\text{C}$

| 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 2SC5227 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

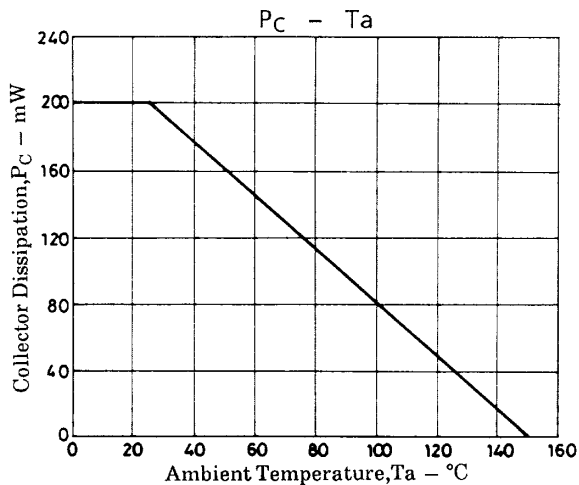
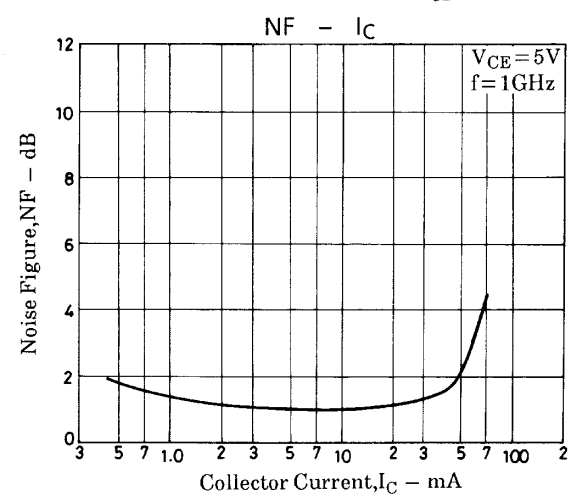
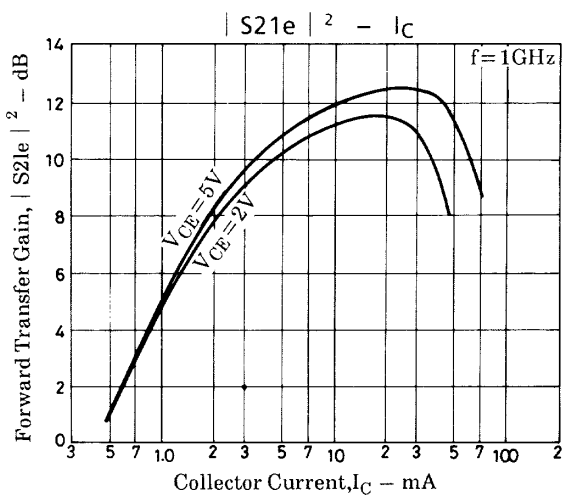
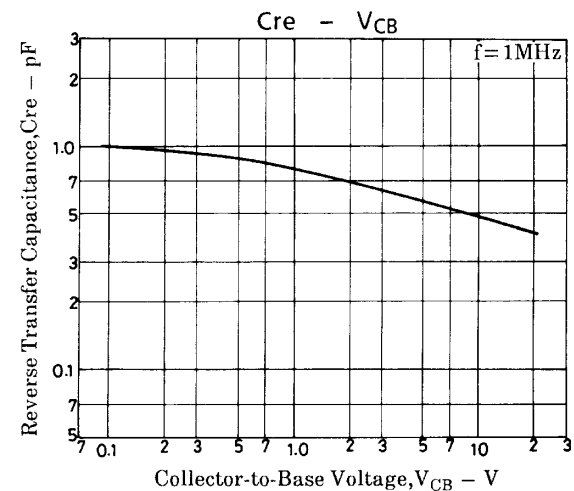
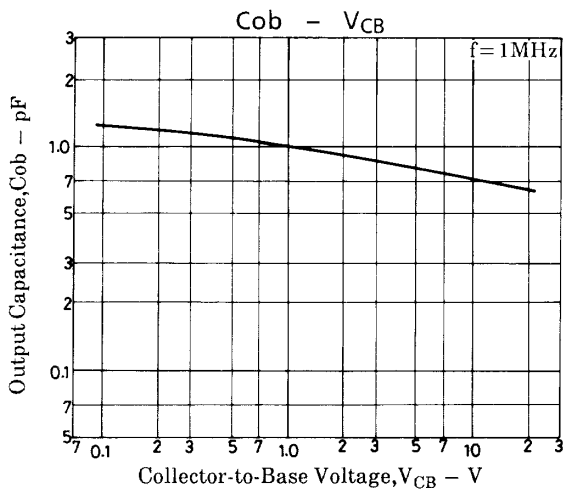
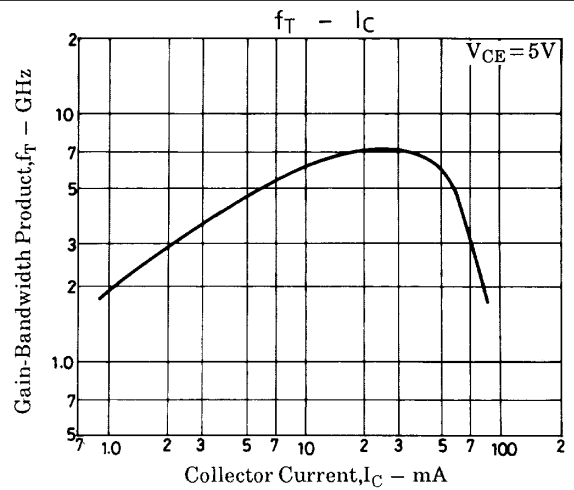
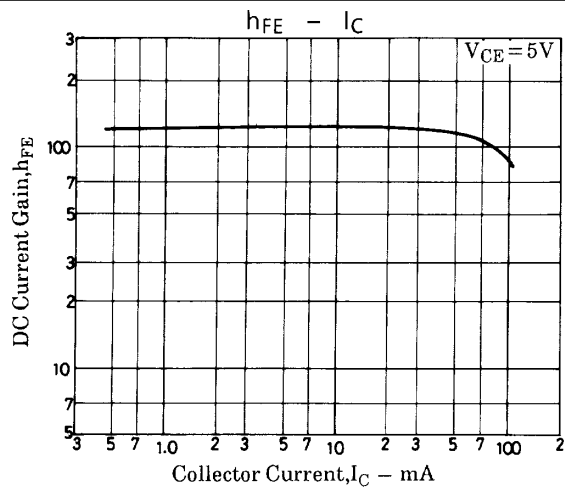
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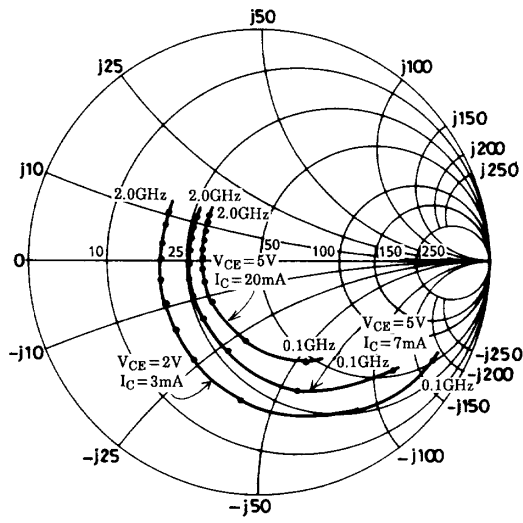
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20599HA (KT)/31395YK (KOTO) TA-0158 No.5034-1/5

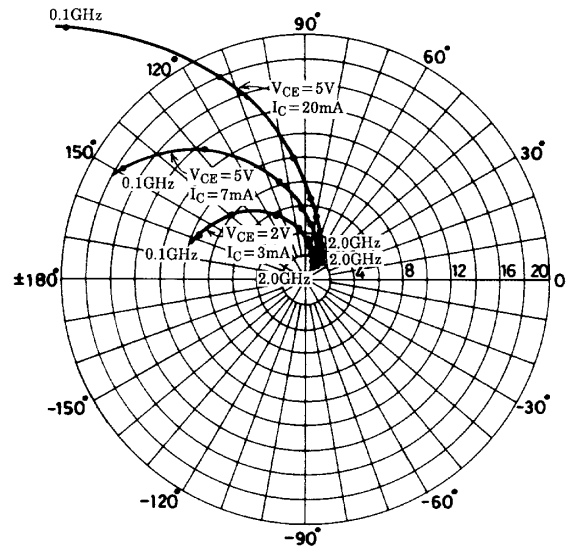


# S Parameters

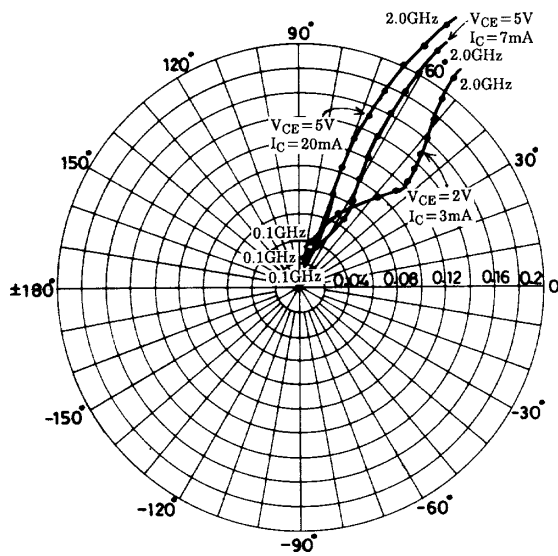
f = 100MHz, 200 to 2000MHz (200MHz step)



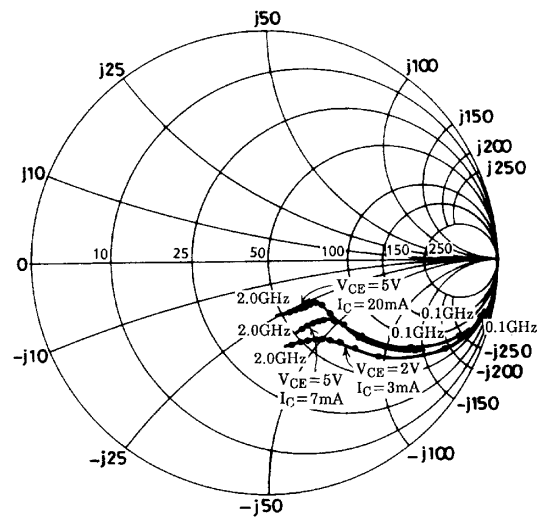
f = 100MHz, 200 to 2000MHz (200MHz step)



f = 100MHz, 200 to 2000MHz (200MHz step)



f = 100MHz, 200 to 2000MHz (200MHz step)



## 2SC5227

### S parameters (Common emitter)

$V_{CE}=5V$ ,  $I_C=7mA$ ,  $Z_0=50\Omega$

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 100        | 0.722      | -41.6           | 17.352     | 148.7           | 0.029      | 70.9            | 0.883      | -21.3           |
| 200        | 0.587      | -73.2           | 13.419     | 127.6           | 0.046      | 60.8            | 0.710      | -33.1           |
| 400        | 0.426      | -113.0          | 8.371      | 105.1           | 0.067      | 56.9            | 0.507      | -40.7           |
| 600        | 0.369      | -136.6          | 5.914      | 92.7            | 0.084      | 58.4            | 0.423      | -42.5           |
| 800        | 0.344      | -152.9          | 4.593      | 83.9            | 0.102      | 60.3            | 0.382      | -43.9           |
| 1000       | 0.334      | -165.7          | 3.750      | 76.7            | 0.121      | 61.5            | 0.360      | -46.3           |
| 1200       | 0.326      | -177.9          | 3.178      | 70.3            | 0.141      | 62.0            | 0.350      | -49.1           |
| 1400       | 0.324      | 172.3           | 2.784      | 64.9            | 0.162      | 61.8            | 0.341      | -52.2           |
| 1600       | 0.328      | 163.4           | 2.476      | 59.5            | 0.183      | 61.2            | 0.334      | -56.4           |
| 1800       | 0.335      | 154.5           | 2.246      | 54.6            | 0.204      | 60.5            | 0.328      | -60.8           |
| 2000       | 0.346      | 147.5           | 3.073      | 50.0            | 0.226      | 59.6            | 0.328      | -65.4           |

$V_{CE}=5V$ ,  $I_C=20mA$ ,  $Z_0=50\Omega$

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 100        | 0.477      | -66.8           | 28.090     | 133.6           | 0.022      | 67.7            | 0.726      | -32.7           |
| 200        | 0.358      | -104.1          | 17.995     | 112.9           | 0.035      | 65.3            | 0.506      | -41.6           |
| 400        | 0.288      | -142.2          | 9.903      | 95.9            | 0.057      | 68.3            | 0.350      | -42.4           |
| 600        | 0.273      | -159.8          | 6.777      | 86.7            | 0.081      | 69.9            | 0.299      | -41.8           |
| 800        | 0.270      | -171.7          | 5.181      | 79.9            | 0.104      | 70.2            | 0.278      | -43.2           |
| 1000       | 0.271      | 178.7           | 4.209      | 73.9            | 0.129      | 69.1            | 0.269      | -45.9           |
| 1200       | 0.273      | 169.4           | 3.554      | 68.5            | 0.153      | 67.9            | 0.264      | -49.6           |
| 1400       | 0.275      | 161.1           | 3.085      | 63.6            | 0.177      | 66.2            | 0.258      | -53.3           |
| 1600       | 0.284      | 153.4           | 2.749      | 59.1            | 0.202      | 64.3            | 0.253      | -58.3           |
| 1800       | 0.294      | 145.6           | 2.479      | 54.6            | 0.224      | 62.5            | 0.249      | -63.4           |
| 2000       | 0.302      | 140.8           | 2.295      | 50.6            | 0.248      | 60.4            | 0.248      | -68.7           |

$V_{CE}=2V$ ,  $I_C=3mA$ ,  $Z_0=50\Omega$

| 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      | -30.5           | 9.283      | 157.3           | 0.039      | 73.6            | 0.944      | -15.6           |
| 200        | 0.769      | -57.4           | 8.036      | 138.7           | 0.068      | 61.4            | 0.834      | -27.5           |
| 400        | 0.607      | -97.1           | 5.756      | 113.9           | 0.099      | 48.4            | 0.641      | -40.5           |
| 600        | 0.528      | -123.2          | 4.302      | 98.1            | 0.114      | 44.4            | 0.525      | -46.5           |
| 800        | 0.486      | -141.6          | 3.414      | 87.0            | 0.125      | 43.9            | 0.465      | -50.2           |
| 1000       | 0.460      | -156.4          | 2.834      | 78.0            | 0.137      | 45.4            | 0.429      | -53.7           |
| 1200       | 0.453      | -169.4          | 2.429      | 70.3            | 0.149      | 47.5            | 0.408      | -57.3           |
| 1400       | 0.440      | 179.8           | 2.143      | 63.6            | 0.163      | 49.2            | 0.395      | -60.9           |
| 1600       | 0.441      | 170.1           | 1.919      | 57.4            | 0.179      | 50.8            | 0.385      | -65.4           |
| 1800       | 0.447      | 160.4           | 1.739      | 51.7            | 0.196      | 52.3            | 0.381      | -70.1           |
| 2000       | 0.454      | 152.5           | 1.621      | 46.4            | 0.215      | 53.3            | 0.379      | -75.2           |

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