

**2SC5540**

## UHF to S Band Low-Noise Amplifier and OSC Applications

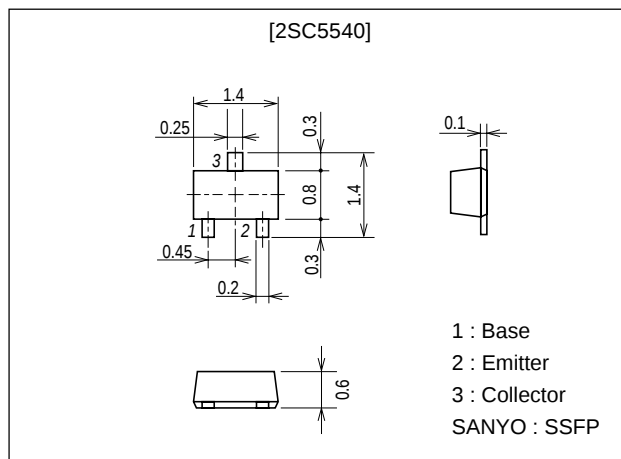
### Features

- High cutoff frequency :  $f_T=10\text{GHz}$  typ.
- High gain :  $|S_{21e}|^2=13\text{dB}$  typ ( $f=1\text{GHz}$ ).
- Low noise :  $\text{NF}=1.3\text{dB}$  typ ( $f=1\text{GHz}$ ).
- Small Cob :  $\text{Cob}=0.4\text{pF}$  typ.
- Ultrasmall, slim flat-lead package.  
(1.4mm × 0.8mm × 0.6mm)

### Package Dimensions

unit:mm

2159



### Specifications

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

| Parameter                    | Symbol    | Conditions | Ratings     | Unit             |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |            | 16          | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |            | 8           | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |            | 1.5         | V                |
| Collector Current            | $I_C$     |            | 20          | mA               |
| Collector Dissipation        | $P_C$     |            | 100         | 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          | $h_{FE}$      | $V_{CE}=5\text{V}, I_C=4\text{mA}$                | 90      |     | 200 |               |
| Gain-Bandwidth Product   | $f_T$         | $V_{CE}=5\text{V}, I_C=4\text{mA}$                |         | 10  |     | GHz           |
| Output Capacitance       | Cob           | $V_{CB}=10\text{V}, f=1\text{MHz}$                |         | 0.4 | 0.7 | pF            |
| Forward Transfer Gain    | $ S_{21e} ^2$ | $V_{CE}=5\text{V}, I_C=7\text{mA}, f=1\text{GHz}$ | 10      | 13  |     | dB            |
| Noise Figure             | NF            | $V_{CE}=5\text{V}, I_C=4\text{mA}, f=1\text{GHz}$ |         | 1.3 | 2.8 | dB            |

Marking : HN

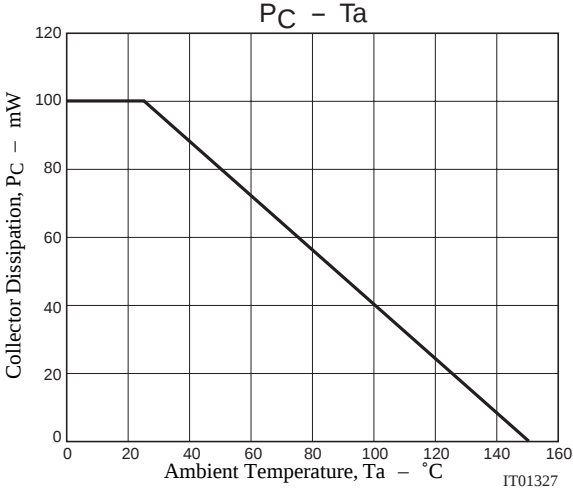
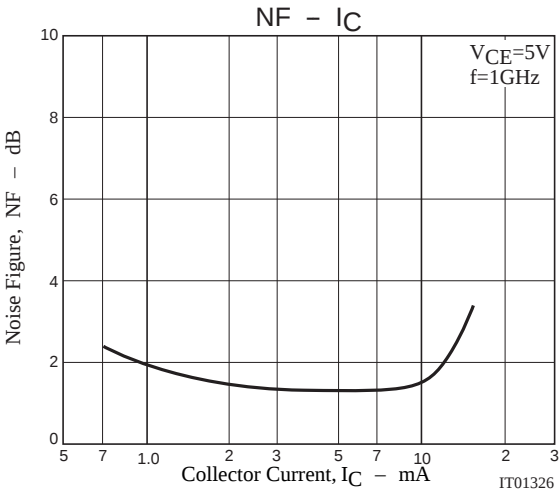
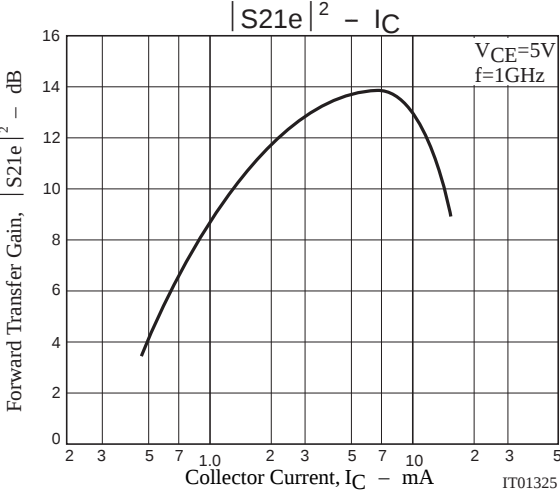
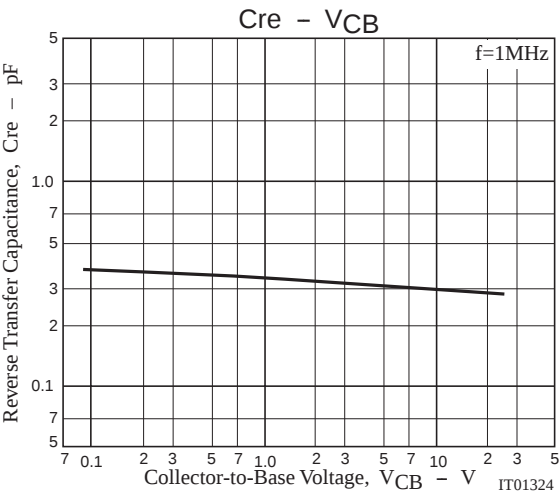
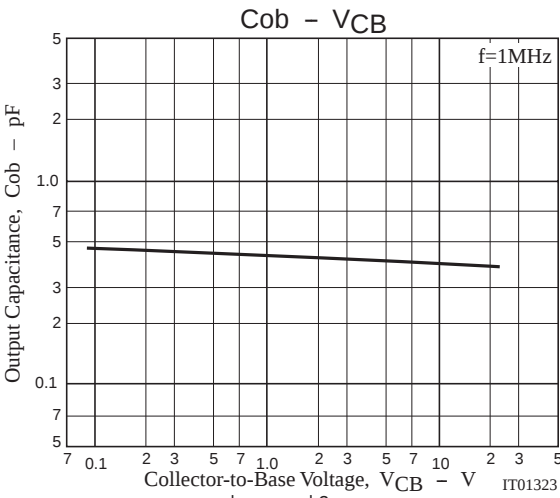
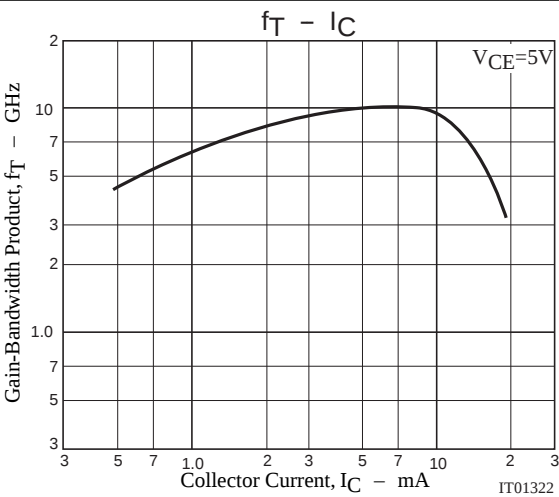
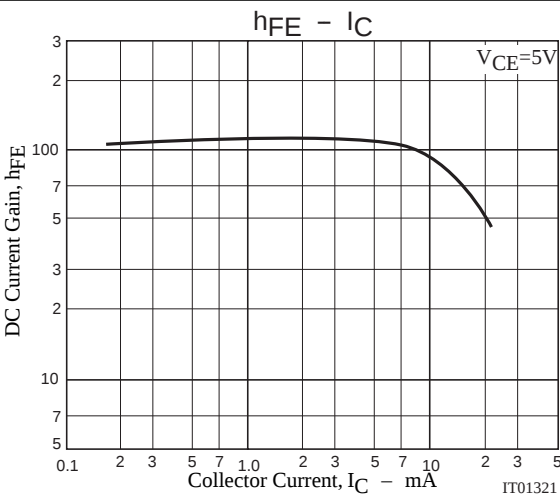
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**SANYO Electric Co.,Ltd. Semiconductor Company**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

2SC5540



# S Parameters (Common emitter)

$V_{CE}=5V$ ,  $I_C=2mA$ ,  $Z_O=50\Omega$

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 200        | 0.918      | -17.4           | 5.729      | 162.1           | 0.038      | 78.2            | 0.965      | -11.1           |
| 400        | 0.854      | -33.9           | 5.503      | 146.5           | 0.069      | 68.8            | 0.908      | -19.6           |
| 600        | 0.758      | -48.8           | 4.667      | 133.9           | 0.091      | 61.3            | 0.825      | -27.2           |
| 800        | 0.674      | -60.6           | 4.171      | 122.8           | 0.109      | 56.7            | 0.754      | -32.3           |
| 1000       | 0.622      | -68.1           | 3.839      | 113.0           | 0.125      | 53.8            | 0.703      | -35.8           |
| 1200       | 0.561      | -76.3           | 3.443      | 104.9           | 0.136      | 51.6            | 0.660      | -38.4           |
| 1400       | 0.510      | -83.5           | 3.104      | 97.9            | 0.146      | 50.2            | 0.627      | -40.8           |
| 1600       | 0.465      | -89.9           | 2.844      | 92.0            | 0.155      | 49.7            | 0.602      | -42.6           |
| 1800       | 0.411      | -97.7           | 2.589      | 86.6            | 0.161      | 49.7            | 0.579      | -44.3           |
| 2000       | 0.375      | -103.0          | 2.390      | 81.6            | 0.169      | 49.6            | 0.565      | -45.7           |

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

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 200        | 0.745      | -37.3           | 12.779     | 147.8           | 0.032      | 70.2            | 0.881      | -18.6           |
| 400        | 0.592      | -64.0           | 9.874      | 126.1           | 0.053      | 61.9            | 0.730      | -27.9           |
| 600        | 0.471      | -83.5           | 7.650      | 112.6           | 0.066      | 59.6            | 0.621      | -31.5           |
| 800        | 0.395      | -97.1           | 6.143      | 102.8           | 0.078      | 59.7            | 0.559      | -32.7           |
| 1000       | 0.348      | -106.6          | 5.115      | 95.2            | 0.089      | 60.3            | 0.523      | -33.5           |
| 1200       | 0.311      | -115.0          | 4.361      | 89.2            | 0.100      | 61.3            | 0.501      | -34.3           |
| 1400       | 0.284      | -122.2          | 3.792      | 84.1            | 0.111      | 62.2            | 0.486      | -35.4           |
| 1600       | 0.263      | -128.8          | 3.382      | 79.8            | 0.123      | 63.0            | 0.478      | -36.4           |
| 1800       | 0.245      | -135.6          | 3.065      | 75.8            | 0.135      | 63.7            | 0.474      | -37.5           |
| 2000       | 0.229      | -141.4          | 2.791      | 72.0            | 0.146      | 64.2            | 0.473      | -38.8           |

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