

UHF TV TUNER OSC/MIXER  
NPN SILICON EPITAXIAL TRANSISTOR

DESCRIPTION

The 2SC4569 is an NPN silicon epitaxial transistor intended for use as UHF oscillator and UHF mixer in a tuner of TV receiver.

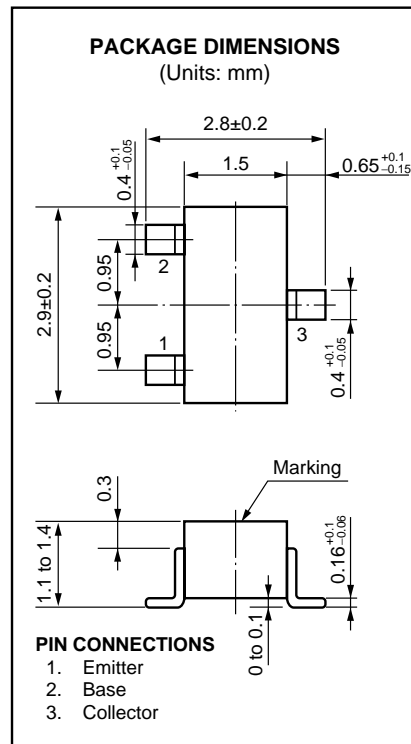
FEATURES

- High gain bandwidth product  
 $f_T = 5.0$  GHz TYP.
- Low output capacitance  
 $C_{ob} = 0.9$  pF TYP.
- Surface mount package  
 EIAJ: SC-59

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$  °C)

Maximum Voltages and Current

|                              |           |             |    |
|------------------------------|-----------|-------------|----|
| Collector to Base Voltage    | $V_{CBO}$ | 20          | V  |
| Collector to Emitter Voltage | $V_{CEO}$ | 12          | V  |
| Emitter to Base Voltage      | $V_{EBO}$ | 3.0         | V  |
| Collector Current            | $I_C$     | 60          | mA |
| Total Power Dissipation      | $P_T$     | 150         | mW |
| Junction Temperature         | $T_j$     | 125         | °C |
| Storage Temperature          | $T_{stg}$ | -55 to +125 | °C |



ELECTRICAL CHARACTERISTICS ( $T_A = 25$  °C)

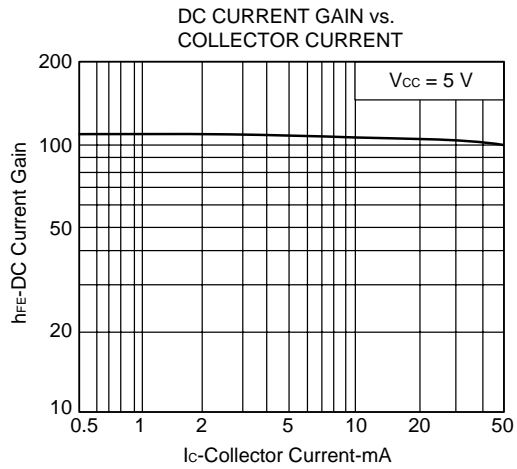
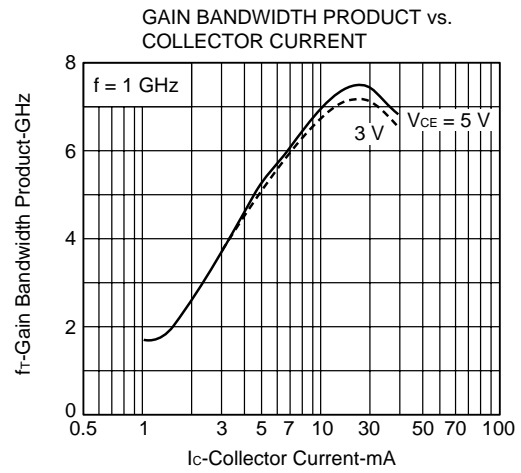
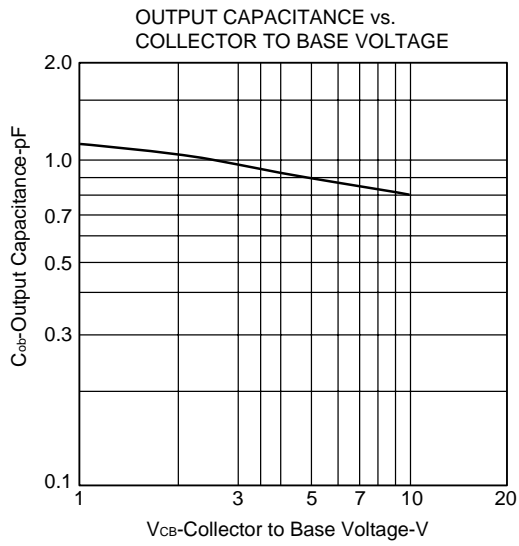
| CHARACTERISTIC               | SYMBOL        | MIN. | TYP. | MAX. | UNIT    | TEST CONDITIONS                             |
|------------------------------|---------------|------|------|------|---------|---|
| Collector Cutoff Current     | $I_{CBO}$     |      |      | 0.1  | $\mu A$ | $V_{CB} = 15$ V, $I_E = 0$                  |
| Emitter Cutoff Current       | $I_{EBO}$     |      |      | 0.1  | $\mu A$ | $V_{EB} = 1$ V, $I_C = 0$                   |
| Collector Saturation Voltage | $V_{CE(sat)}$ |      |      | 0.5  | V       | $h_{FE} = 10$ , $I_C = 5$ mA                |
| DC Current Gain              | $h_{FE}$      | 40   | 100  | 200  |         | $V_{CE} = 5$ V, $I_C = 5$ mA *1             |
| Gain Bandwidth Product       | $f_T$         |      | 5.0  |      | GHz     | $V_{CE} = 5$ V, $I_C = 5$ mA $f = 1.0$ GHz  |
| Output Capacitance           | $C_{ob}$      |      | 0.9  | 1.2  | pF      | $V_{CB} = 5$ V, $I_E = 0$ , $f = 1.0$ MHz   |
| Insertion Gain               | $ S_{21e} ^2$ | 5.0  |      |      | dB      | $V_{CE} = 5$ V, $I_C = 5$ mA, $f = 1.0$ MHz |

\*1 Pulsed:  $PW \leq 35$   $\mu S$ , Dyty Cycle  $\leq 2$  %

$h_{FE}$  Classification

|          |          |           |            |
|----------|----------|-----------|------------|
| Class    | T75      | T76       | T77        |
| Marking  | T75      | T76       | T77        |
| $h_{FE}$ | 40 to 80 | 60 to 120 | 100 to 200 |

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



**S-PARAMETER**

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 1 mA

| FREQUENCY<br>MHz | S <sub>11</sub> |        | S <sub>21</sub> |       | S <sub>12</sub> |      | S <sub>22</sub> |       |
|------------------|-----------------|--------|-----------------|-------|-----------------|------|-----------------|-------|
|                  | MAG             | ANG    | MAG             | ANG   | MAG             | ANG  | MAG             | ANG   |
| 100.00           | 0.958           | -18.7  | 3.299           | 164.6 | 0.038           | 77.8 | 0.973           | -7.8  |
| 200.00           | 0.917           | -36.4  | 3.151           | 150.4 | 0.072           | 68.2 | 0.944           | -14.5 |
| 300.00           | 0.855           | -53.0  | 2.926           | 137.5 | 0.100           | 59.7 | 0.899           | -20.6 |
| 400.00           | 0.799           | -67.5  | 2.685           | 126.2 | 0.118           | 51.7 | 0.850           | -25.9 |
| 500.00           | 0.739           | -81.5  | 2.462           | 116.1 | 0.134           | 45.8 | 0.806           | -29.7 |
| 600.00           | 0.693           | -93.5  | 2.256           | 107.3 | 0.142           | 41.1 | 0.778           | -33.0 |
| 700.00           | 0.647           | -104.2 | 2.072           | 99.9  | 0.148           | 37.6 | 0.743           | -35.9 |
| 800.00           | 0.607           | -113.9 | 1.889           | 92.4  | 0.152           | 35.2 | 0.716           | -39.0 |
| 900.00           | 0.583           | -123.7 | 1.760           | 86.5  | 0.154           | 33.4 | 0.702           | -40.6 |
| 1000.00          | 0.559           | -132.5 | 1.615           | 79.8  | 0.155           | 31.7 | 0.688           | -43.4 |

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 3 mA

| FREQUENCY<br>MHz | S <sub>11</sub> |        | S <sub>21</sub> |       | S <sub>12</sub> |      | S <sub>22</sub> |       |
|------------------|-----------------|--------|-----------------|-------|-----------------|------|-----------------|-------|
|                  | MAG             | ANG    | MAG             | ANG   | MAG             | ANG  | MAG             | ANG   |
| 100.00           | 0.860           | -29.5  | 9.203           | 156.2 | 0.035           | 74.7 | 0.932           | -14.9 |
| 200.00           | 0.754           | -55.1  | 7.982           | 137.3 | 0.062           | 61.5 | 0.826           | -25.6 |
| 300.00           | 0.648           | -75.6  | 6.693           | 122.6 | 0.078           | 55.1 | 0.723           | -32.3 |
| 400.00           | 0.562           | -91.9  | 5.623           | 111.9 | 0.090           | 51.0 | 0.641           | -36.7 |
| 500.00           | 0.506           | -106.5 | 4.796           | 103.1 | 0.099           | 48.9 | 0.583           | -39.1 |
| 600.00           | 0.462           | -118.1 | 4.188           | 95.9  | 0.106           | 48.2 | 0.547           | -41.0 |
| 700.00           | 0.429           | -127.8 | 3.695           | 90.3  | 0.112           | 48.7 | 0.514           | -42.2 |
| 800.00           | 0.400           | -137.4 | 3.278           | 84.5  | 0.119           | 48.1 | 0.492           | -44.3 |
| 900.00           | 0.390           | -144.7 | 2.984           | 79.9  | 0.127           | 49.2 | 0.478           | -45.2 |
| 1000.00          | 0.378           | -153.3 | 2.711           | 75.0  | 0.133           | 49.8 | 0.467           | -47.2 |

V<sub>CE</sub> = 5 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> |       |
|------------------|-----------------|--------|-----------------|-------|-----------------|------|-----------------|-------|
|                  | MAG             | ANG    | MAG             | ANG   | MAG             | ANG  | MAG             | ANG   |
| 100.00           | 0.769           | -38.2  | 13.666          | 149.3 | 0.032           | 70.4 | 0.885           | -20.1 |
| 200.00           | 0.630           | -68.1  | 10.889          | 128.6 | 0.054           | 60.9 | 0.728           | -32.1 |
| 300.00           | 0.513           | -89.7  | 8.545           | 114.5 | 0.067           | 55.6 | 0.606           | -37.7 |
| 400.00           | 0.442           | -106.3 | 6.888           | 104.9 | 0.076           | 54.2 | 0.528           | -40.6 |
| 500.00           | 0.399           | -120.6 | 5.752           | 97.1  | 0.086           | 54.8 | 0.495           | -42.0 |
| 600.00           | 0.368           | -131.7 | 4.940           | 91.0  | 0.094           | 54.5 | 0.446           | -42.9 |
| 700.00           | 0.345           | -140.4 | 4.300           | 86.2  | 0.104           | 55.8 | 0.420           | -43.9 |
| 800.00           | 0.329           | -149.4 | 3.801           | 81.3  | 0.113           | 56.3 | 0.401           | -45.3 |
| 900.00           | 0.323           | -156.7 | 3.434           | 77.3  | 0.123           | 56.7 | 0.390           | -45.8 |
| 1000.00          | 0.316           | -163.7 | 3.112           | 72.8  | 0.133           | 56.8 | 0.384           | -47.4 |

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 7 mA

| FREQUENCY<br>MHz | S <sub>11</sub> |        | S <sub>21</sub> |       | S <sub>12</sub> |      | S <sub>22</sub> |       |
|------------------|-----------------|--------|-----------------|-------|-----------------|------|-----------------|-------|
|                  | MAG             | ANG    | MAG             | ANG   | MAG             | ANG  | MAG             | ANG   |
| 100.00           | 0.698           | -45.4  | 17.070          | 144.7 | 0.031           | 68.1 | 0.839           | -24.3 |
| 200.00           | 0.540           | -77.6  | 12.682          | 122.8 | 0.049           | 58.9 | 0.655           | -35.9 |
| 300.00           | 0.435           | -99.9  | 9.583           | 109.5 | 0.061           | 58.2 | 0.533           | -40.4 |
| 400.00           | 0.372           | -116.7 | 7.566           | 100.8 | 0.071           | 58.1 | 0.461           | -43.1 |
| 500.00           | 0.343           | -129.7 | 6.238           | 93.8  | 0.080           | 59.3 | 0.415           | -42.9 |
| 600.00           | 0.321           | -139.8 | 5.324           | 88.4  | 0.090           | 59.9 | 0.390           | -43.1 |
| 700.00           | 0.306           | -148.4 | 4.613           | 84.0  | 0.100           | 60.7 | 0.370           | -44.0 |
| 800.00           | 0.297           | -157.5 | 4.066           | 79.4  | 0.113           | 60.7 | 0.354           | -45.3 |
| 900.00           | 0.291           | -162.9 | 3.669           | 75.7  | 0.124           | 61.2 | 0.344           | -45.7 |
| 1000.00          | 0.286           | -170.4 | 3.319           | 71.6  | 0.135           | 61.0 | 0.340           | -47.6 |

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 9 mA

| FREQUENCY<br>MHz | S <sub>11</sub> |        | S <sub>21</sub> |       | S <sub>12</sub> |      | S <sub>22</sub> |       |
|------------------|-----------------|--------|-----------------|-------|-----------------|------|-----------------|-------|
|                  | MAG             | ANG    | MAG             | ANG   | MAG             | ANG  | MAG             | ANG   |
| 100.00           | 0.629           | -51.3  | 19.656          | 140.7 | 0.029           | 66.7 | 0.800           | -27.2 |
| 200.00           | 0.474           | -85.3  | 13.850          | 118.7 | 0.045           | 61.4 | 0.598           | -38.3 |
| 300.00           | 0.381           | -107.7 | 10.219          | 106.2 | 0.056           | 59.8 | 0.481           | -41.5 |
| 400.00           | 0.334           | -123.4 | 7.978           | 98.1  | 0.067           | 61.1 | 0.170           | -42.4 |
| 500.00           | 0.310           | -137.2 | 6.530           | 91.8  | 0.079           | 61.8 | 0.375           | -43.0 |
| 600.00           | 0.295           | -146.9 | 5.550           | 86.7  | 0.089           | 63.4 | 0.356           | -43.0 |
| 700.00           | 0.286           | -154.5 | 4.805           | 82.5  | 0.101           | 63.6 | 0.339           | -43.4 |
| 800.00           | 0.274           | -162.4 | 4.228           | 78.3  | 0.112           | 63.5 | 0.325           | -44.8 |
| 900.00           | 0.275           | -168.2 | 3.793           | 74.8  | 0.125           | 63.7 | 0.317           | -45.5 |
| 1000.00          | 0.274           | -175.1 | 3.442           | 71.0  | 0.136           | 63.2 | 0.310           | -47.2 |

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