

2SC5624

Silicon NPN Epitaxial High Frequency Low Noise Amplifier

REJ03G0129-0300

Rev.3.00

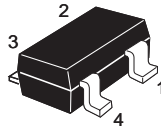
Feb.21.2005

Features

- High gain bandwidth product
 $f_T = 28 \text{ GHz typ.}$
- High power gain and low noise figure;
 $PG = 18 \text{ dB typ.}, NF = 1.2 \text{ dB typ. at } f = 1.8 \text{ GHz}$

Outline

RENESAS Package code: PTSP0004ZA-A
(Package name: CMPAK-4)



1. Emitter
2. Collector
3. Emitter
4. Base

Note: Marking is "VH-".

Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$)

| Item | Symbol | Ratings | Unit |
|------------------------------|-----------|-------------|------------------|
| Collector to base voltage | V_{CB0} | 10 | V |
| Collector to emitter voltage | V_{CE0} | 3.5 | V |
| Emitter to base voltage | V_{EB0} | 0.8 | V |
| Collector current | I_c | 35 | mA |
| Collector power dissipation | P_c | 100 | mW |
| Junction temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 to +150 | $^\circ\text{C}$ |

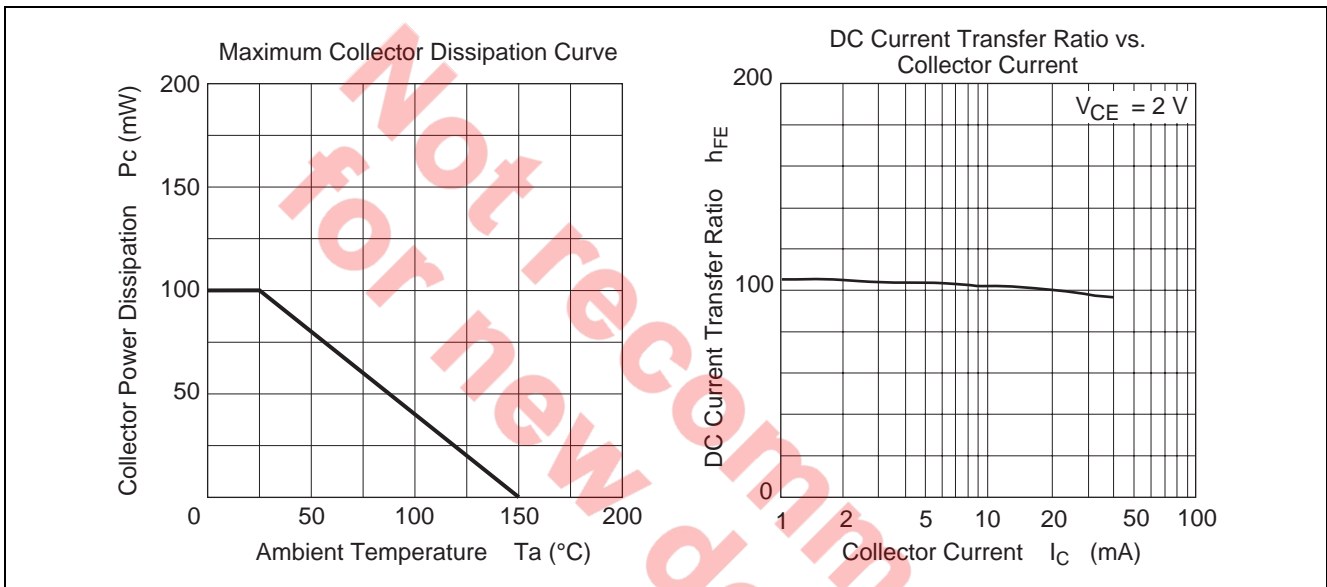
Note: Value on PCB (40 x 40 x 1.0mm)

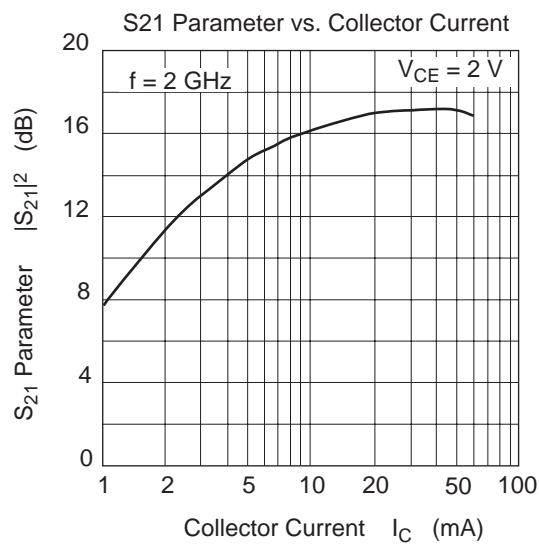
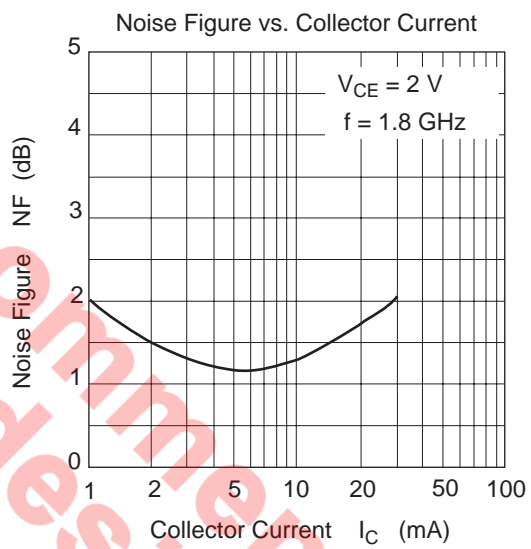
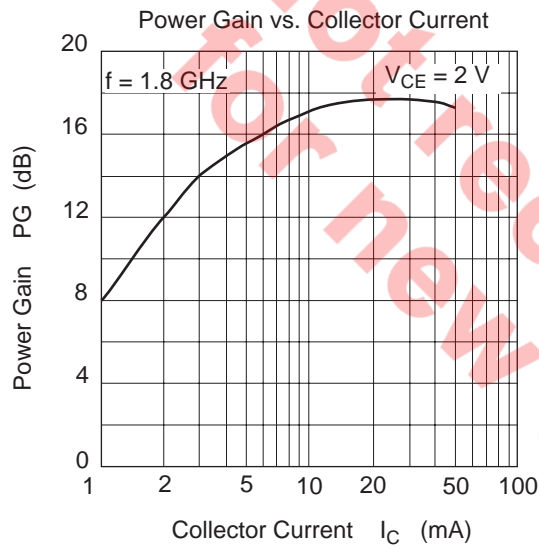
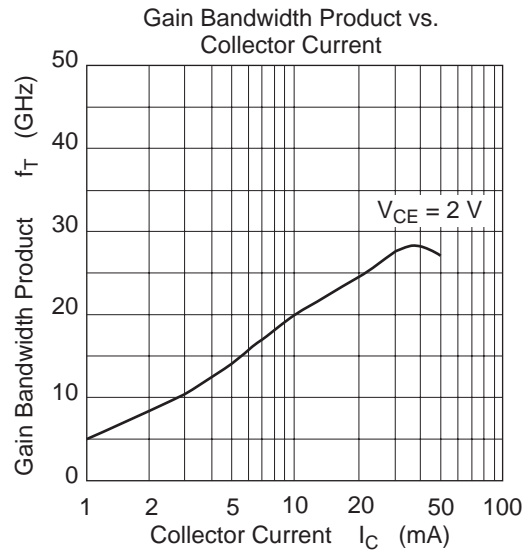
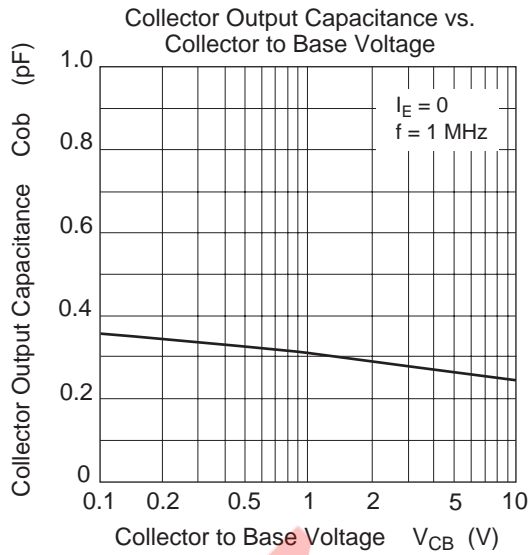
Electrical Characteristics

(Ta = 25°C)

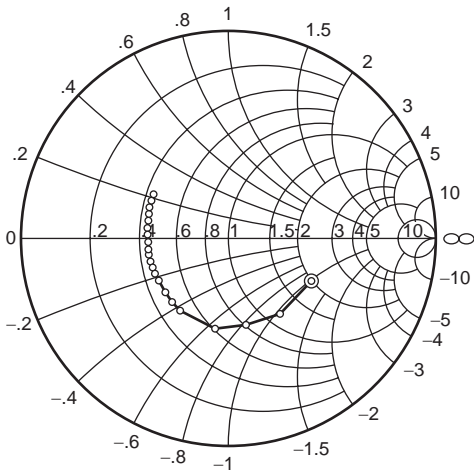
| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|------------------------------|-----------|-----|-----|-----|---------------|---|
| Collector cutoff current | I_{CBO} | — | — | 1 | μA | $V_{CB} = 8\text{ V}, I_E = 0$ |
| Collector cutoff current | I_{CEO} | — | — | 1 | μA | $V_{CE} = 3\text{ V}, R_{BE} = \infty$ |
| Emitter cutoff current | I_{EBO} | — | — | 10 | μA | $V_{EB} = 0.8\text{ V}, I_C = 0$ |
| DC current transfer ratio | h_{FE} | 80 | 120 | 160 | | $V_{CE} = 2\text{ V}, I_C = 20\text{ mA}$ |
| Collector output capacitance | C_{ob} | — | 0.3 | 0.6 | pF | $V_{CB} = 2\text{ V}, I_E = 0, f = 1\text{ MHz}$ |
| Gain bandwidth product | f_T | 25 | 28 | — | GHz | $V_{CE} = 2\text{ V}, I_C = 30\text{ mA}, f = 2\text{ GHz}$ |
| Power gain | PG | 14 | 18 | — | dB | $V_{CE} = 2\text{ V}, I_C = 30\text{ mA}, f = 1.8\text{ GHz}$ |
| Noise figure | NF | — | 1.2 | 1.6 | dB | $V_{CE} = 2\text{ V}, I_C = 5\text{ mA}, f = 1.8\text{ GHz}$ |

Main Characteristics



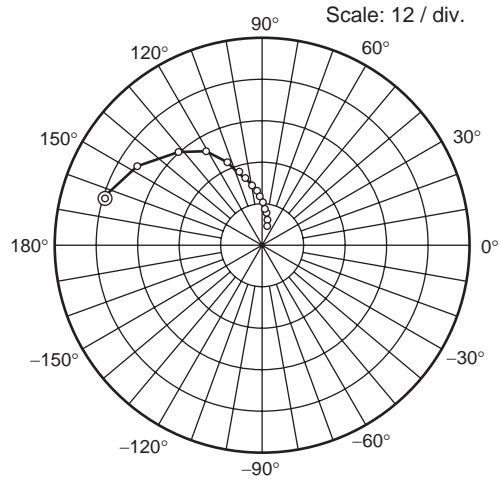


S11 Parameter vs. Frequency



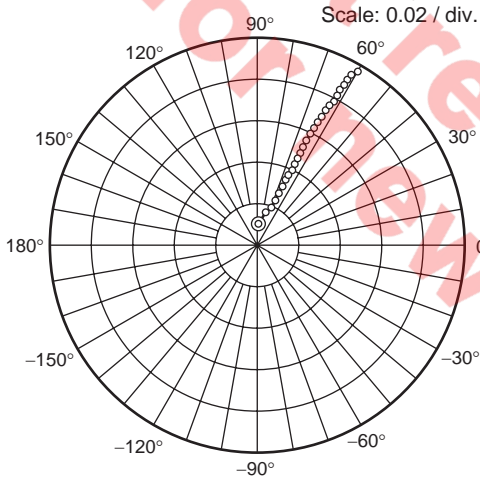
Condition ; $V_{CE} = 2\text{ V}$, $I_C = 30\text{ mA}$
 100 to 3000 MHz (100 MHz step)
 ◎—○

S21 Parameter vs. Frequency



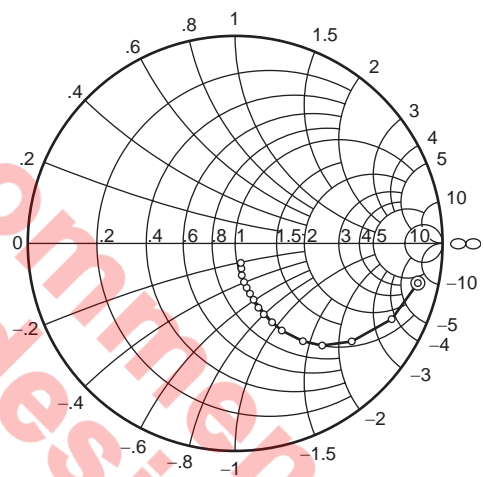
Condition ; $V_{CE} = 2\text{ V}$, $I_C = 30\text{ mA}$
 100 to 3000 MHz (100 MHz step)
 ◎—○

S12 Parameter vs. Frequency



Condition ; $V_{CE} = 2\text{ V}$, $I_C = 30\text{ mA}$
 100 to 3000 MHz (100 MHz step)
 ◎—○

S22 Parameter vs. Frequency



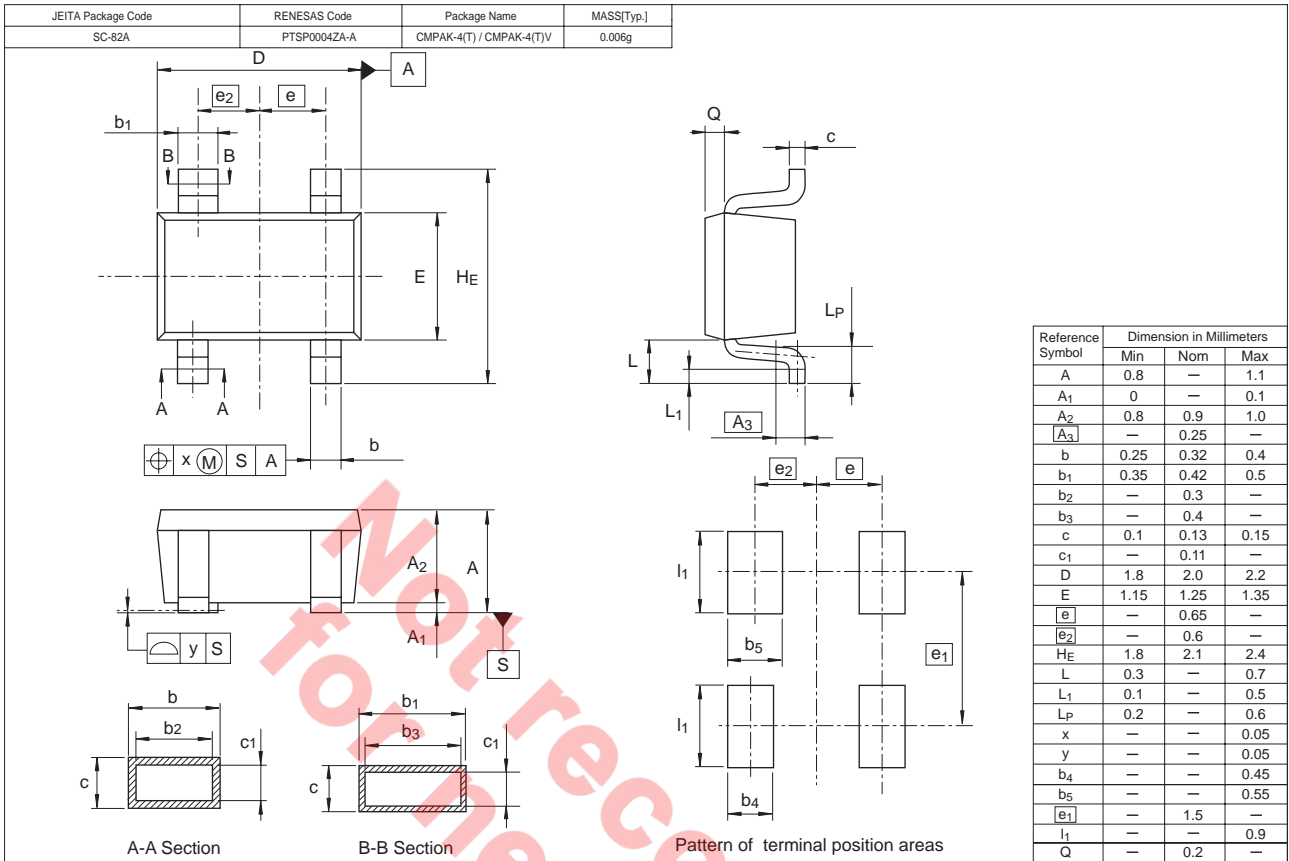
Condition ; $V_{CE} = 2\text{ V}$, $I_C = 30\text{ mA}$
 100 to 3000 MHz (100 MHz step)
 ◎—○

S Parameter

 $(V_{CE} = 2 \text{ V}, I_C = 30 \text{ mA}, Z_o = 50 \Omega)$

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|---------|-------|--------|-------|-------|--------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 0.445 | -27.3 | 46.66 | 163.5 | 0.0055 | 83.8 | 0.904 | -12.9 |
| 200 | 0.447 | -54.4 | 42.27 | 147.1 | 0.0115 | 78.6 | 0.846 | -26.8 |
| 300 | 0.439 | -78.7 | 36.16 | 133.0 | 0.0165 | 73.6 | 0.750 | -39.3 |
| 400 | 0.432 | -98.8 | 30.59 | 122.2 | 0.0207 | 68.8 | 0.650 | -48.8 |
| 500 | 0.424 | -112.8 | 25.84 | 114.5 | 0.0246 | 67.1 | 0.561 | -55.9 |
| 600 | 0.414 | -124.3 | 22.15 | 108.9 | 0.0277 | 66.1 | 0.487 | -61.4 |
| 700 | 0.407 | -133.4 | 19.22 | 104.4 | 0.0307 | 65.0 | 0.426 | -65.3 |
| 800 | 0.398 | -141.5 | 16.94 | 100.8 | 0.0335 | 65.3 | 0.376 | -68.6 |
| 900 | 0.390 | -147.9 | 15.05 | 97.7 | 0.0372 | 64.4 | 0.335 | -70.7 |
| 1000 | 0.386 | -154.1 | 13.63 | 95.3 | 0.0398 | 65.1 | 0.301 | -72.5 |
| 1100 | 0.381 | -159.0 | 12.45 | 93.3 | 0.0420 | 65.2 | 0.273 | -73.7 |
| 1200 | 0.377 | -164.0 | 11.48 | 91.3 | 0.0452 | 65.0 | 0.250 | -74.5 |
| 1300 | 0.371 | -167.8 | 10.60 | 89.6 | 0.0480 | 64.5 | 0.229 | -74.9 |
| 1400 | 0.370 | -171.8 | 9.84 | 87.7 | 0.0509 | 64.7 | 0.213 | -75.1 |
| 1500 | 0.367 | -175.7 | 9.23 | 86.1 | 0.0535 | 64.3 | 0.197 | -75.2 |
| 1600 | 0.368 | -178.8 | 8.66 | 84.7 | 0.0567 | 64.1 | 0.186 | -74.7 |
| 1700 | 0.370 | -178.0 | 8.16 | 83.4 | 0.0595 | 64.4 | 0.173 | -74.7 |
| 1800 | 0.360 | -174.7 | 7.72 | 82.2 | 0.0623 | 64.3 | 0.164 | -74.0 |
| 1900 | 0.365 | -172.0 | 7.33 | 80.8 | 0.0651 | 64.0 | 0.156 | -73.6 |
| 2000 | 0.365 | -168.9 | 6.95 | 79.4 | 0.0682 | 63.8 | 0.148 | -72.7 |
| 2100 | 0.362 | -166.8 | 6.66 | 78.2 | 0.0709 | 63.1 | 0.142 | -72.0 |
| 2200 | 0.372 | -164.1 | 6.35 | 77.0 | 0.0737 | 63.0 | 0.135 | -71.3 |
| 2300 | 0.370 | -160.9 | 6.08 | 75.6 | 0.0764 | 62.3 | 0.130 | -70.8 |
| 2400 | 0.372 | -159.0 | 5.86 | 74.6 | 0.0795 | 62.3 | 0.125 | -69.9 |
| 2500 | 0.378 | -156.6 | 5.64 | 73.5 | 0.0824 | 62.0 | 0.121 | -68.7 |
| 2600 | 0.370 | -154.5 | 5.42 | 72.3 | 0.0848 | 61.6 | 0.117 | -68.5 |
| 2700 | 0.382 | -152.2 | 5.24 | 71.3 | 0.0874 | 61.7 | 0.113 | -67.1 |
| 2800 | 0.388 | -150.7 | 5.03 | 70.3 | 0.0906 | 60.7 | 0.109 | -66.8 |
| 2900 | 0.387 | -147.6 | 4.86 | 69.0 | 0.0928 | 61.0 | 0.105 | -65.7 |
| 3000 | 0.388 | -146.9 | 4.72 | 67.9 | 0.0964 | 59.7 | 0.102 | -65.5 |

Package Dimensions



Ordering Information

| Part Name | Quantity | Shipping Container |
|----------------|-----------|------------------------|
| 2SC5624VH-TL-E | 3000 pcs. | φ178 Reel, 8 mm Taping |

Note: Therefore especially small contact area of terminal, miss contact may occur if inadequate soldering condition is applied.

Contact Renesas sales office for any question regarding recommended soldering condition of Renesas.

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