

2SC5594

Silicon NPN Epitaxial High Frequency Low Noise Amplifier

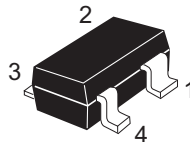
REJ03G0749-0200
(Previous ADE-208-798)
Rev.2.00
Aug.10.2005

Features

- High gain bandwidth product
 $f_T = 24 \text{ GHz typ.}$
- 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 "XP-".

Absolute Maximum Ratings

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

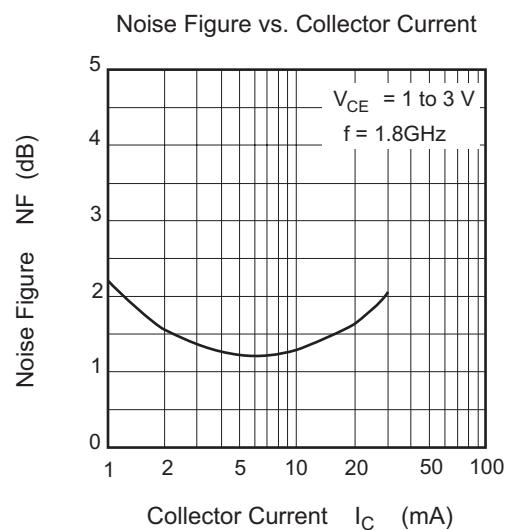
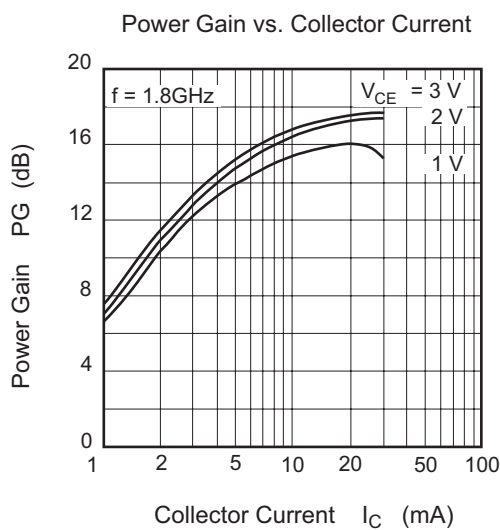
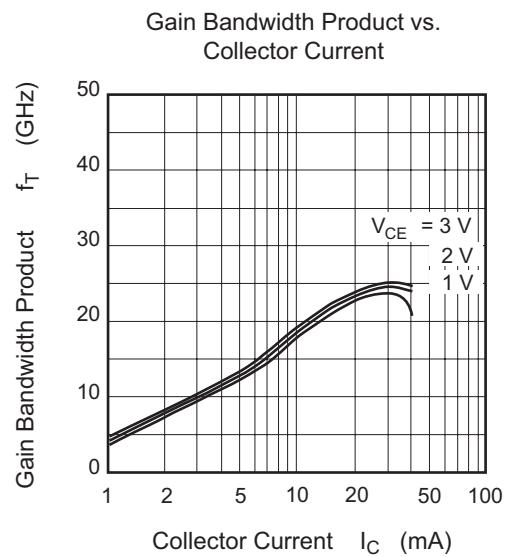
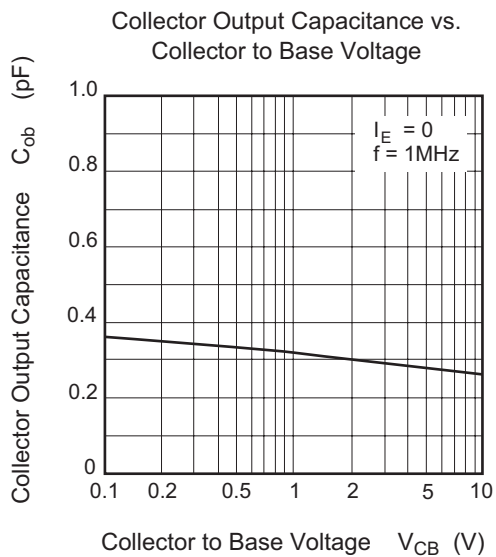
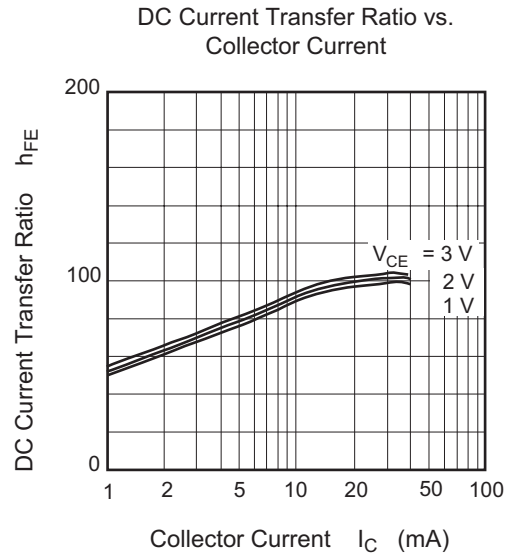
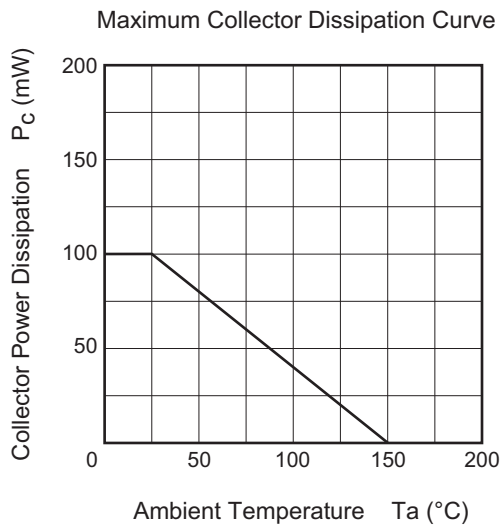
| Item | Symbol | Ratings | Unit |
|------------------------------|-----------|-------------|------------------|
| Collector to base voltage | V_{CBO} | 12 | V |
| Collector to emitter voltage | V_{CEO} | 4.5 | V |
| Emitter to base voltage | V_{EBO} | 0.8 | V |
| Collector current | I_C | 35 | mA |
| Collector power dissipation | P_C | 100 | mW |
| Junction temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 to +150 | $^\circ\text{C}$ |

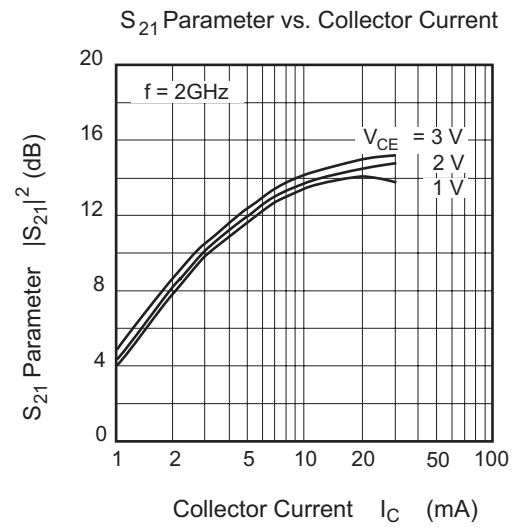
Electrical Characteristics

(Ta = 25°C)

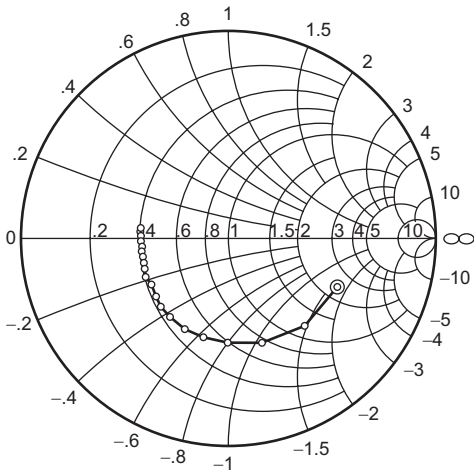
| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|-------------------------------------|---------------|-----|-----|-----|---------|--|
| Collector to base breakdown voltage | $V_{(BR)CBO}$ | 12 | — | — | V | $I_C = 10 \mu A, I_E = 0$ |
| Collector cutoff current | I_{CBO} | — | — | 1 | μA | $V_{CB} = 10 V, I_E = 0$ |
| Collector cutoff current | I_{CEO} | — | — | 1 | μA | $V_{CE} = 4 V, R_{BE} = \infty$ |
| Emitter cutoff current | I_{EBO} | — | — | 12 | μA | $V_{EB} = 0.8 V, I_C = 0$ |
| DC current transfer ratio | h_{FE} | 60 | 100 | 140 | | $V_{CE} = 2 V, I_C = 20 mA$ |
| Collector output capacitance | Cob | — | 0.3 | 0.6 | pF | $V_{CB} = 2 V, I_E = 0$ $f = 1 MHz$ |
| Gain bandwidth product | f_T | 21 | 24 | — | GHz | $V_{CE} = 2 V, I_C = 30 mA$ $f = 2 GHz$ |
| Power gain | PG | 14 | 18 | — | dB | $V_{CE} = 2 V, I_C = 30 mA$ $f = 1.8 GHz$ |
| Noise figure | NF | — | 1.2 | 1.6 | dB | $V_{CE} = 2 V, I_C = 5 mA$ $f = 1.8 GHz$ |

Main Characteristics



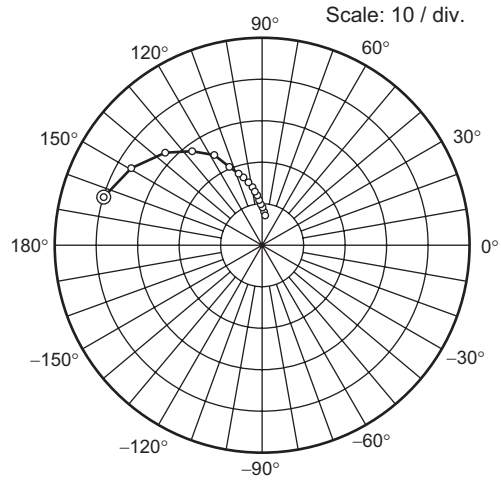


S11 Parameter vs. Frequency



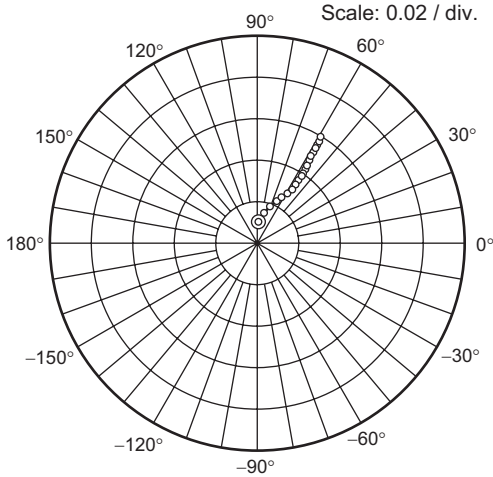
Condition ; $V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$
 100 to 2000 MHz (100 MHz step)
 ◎—○

S21 Parameter vs. Frequency



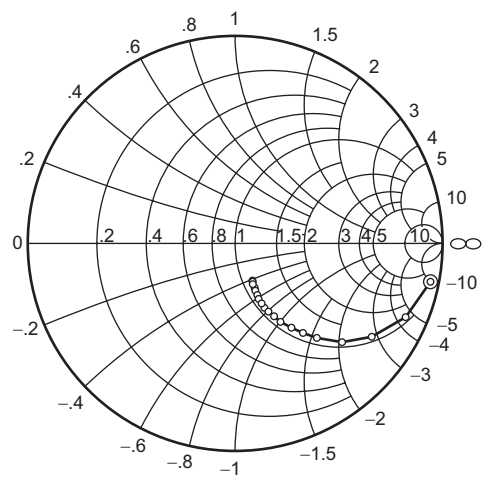
Condition ; $V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$
 100 to 2000 MHz (100 MHz step)
 ◎—○

S12 Parameter vs. Frequency



Condition ; $V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$
 100 to 2000 MHz (100 MHz step)
 ◎—○

S22 Parameter vs. Frequency



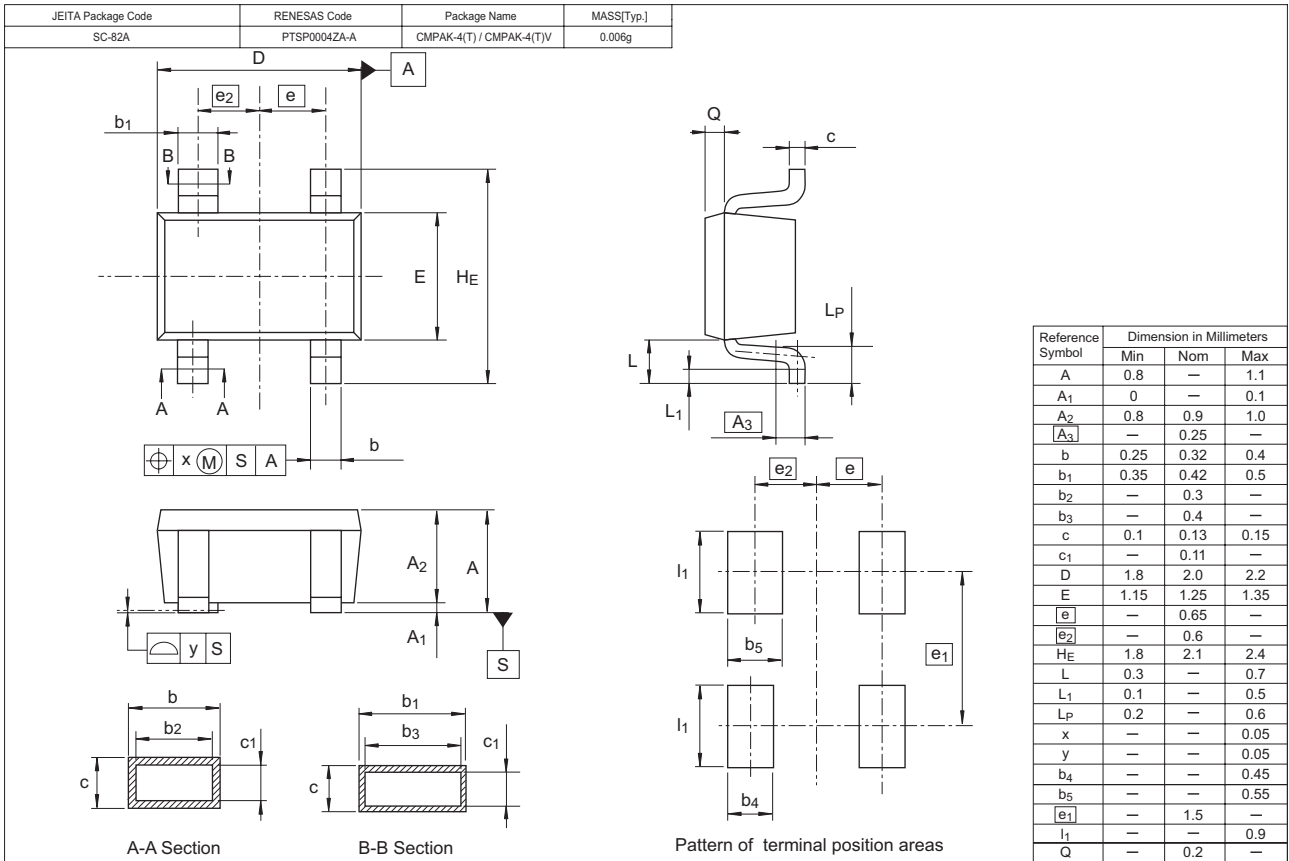
Condition ; $V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$
 100 to 2000 MHz (100 MHz step)
 ◎—○

Sparameter

(V_{CE} = 2 V, I_C = 20 mA, Z_o = 50 Ω)

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|---------|-------|--------|-------|-------|---------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 0.577 | -24.5 | 40.31 | 164.2 | 0.00674 | 82.9 | 0.963 | -11.5 |
| 200 | 0.560 | -49.8 | 36.64 | 149.3 | 0.0130 | 74.5 | 0.897 | -23.7 |
| 300 | 0.541 | -72.2 | 32.05 | 136.3 | 0.0182 | 68.8 | 0.803 | -34.4 |
| 400 | 0.504 | -90.2 | 27.56 | 126.5 | 0.0225 | 63.6 | 0.708 | -42.4 |
| 500 | 0.495 | -104.5 | 23.84 | 118.8 | 0.0256 | 61.3 | 0.622 | -48.4 |
| 600 | 0.477 | -116.9 | 20.64 | 113.1 | 0.0285 | 58.9 | 0.548 | -53.1 |
| 700 | 0.458 | -126.4 | 18.11 | 108.4 | 0.0311 | 57.7 | 0.487 | -56.2 |
| 800 | 0.456 | -134.5 | 16.13 | 105.1 | 0.0336 | 57.3 | 0.437 | -58.7 |
| 900 | 0.448 | -142.5 | 14.46 | 101.6 | 0.0355 | 57.8 | 0.394 | -60.4 |
| 1000 | 0.435 | -147.9 | 13.15 | 99.2 | 0.0382 | 56.8 | 0.360 | -61.9 |
| 1100 | 0.438 | -153.6 | 12.01 | 96.6 | 0.0399 | 57.4 | 0.331 | -63.0 |
| 1200 | 0.430 | -158.5 | 11.06 | 94.4 | 0.0422 | 57.0 | 0.306 | -63.3 |
| 1300 | 0.425 | -162.6 | 10.24 | 93.0 | 0.0443 | 58.1 | 0.288 | -63.5 |
| 1400 | 0.426 | -166.9 | 9.56 | 91.1 | 0.0462 | 58.3 | 0.269 | -64.0 |
| 1500 | 0.424 | -171.1 | 8.99 | 89.6 | 0.0488 | 58.3 | 0.253 | -64.1 |
| 1600 | 0.425 | -174.1 | 8.45 | 88.0 | 0.0508 | 58.5 | 0.241 | -64.1 |
| 1700 | 0.428 | -177.4 | 7.98 | 86.6 | 0.0527 | 58.8 | 0.230 | -64.0 |
| 1800 | 0.424 | 179.7 | 7.59 | 85.0 | 0.0556 | 58.8 | 0.220 | -64.0 |
| 1900 | 0.426 | 176.6 | 7.19 | 83.8 | 0.0578 | 59.0 | 0.212 | -63.9 |
| 2000 | 0.428 | 174.7 | 6.84 | 82.4 | 0.0595 | 58.8 | 0.204 | -63.7 |

Package Dimensions



Ordering Information

| Part Name | Quantity | Shipping Container |
|----------------|----------|-----------------------------------|
| 2SC5594XP-TL-E | 3000 | φ 178 mm Reel, 8 mm Emboss Taping |

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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