# 2SC4900

Silicon NPN Epitaxial

HITACHI

## Application

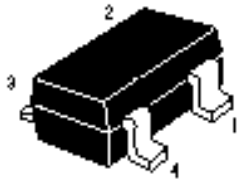
VHF / UHF wide band amplifier

## Features

- High gain bandwidth product
  $f_T$ = 9 GHz Typ
- High gain, low noise figure
  PG = 13.0 dB Typ, NF = 1.2 dB Typ at f = 900 MHz

## Outline

MPAK-4




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

Hitachi semiconductor

## Absolute Maximum Ratings (Ta = 25°C)

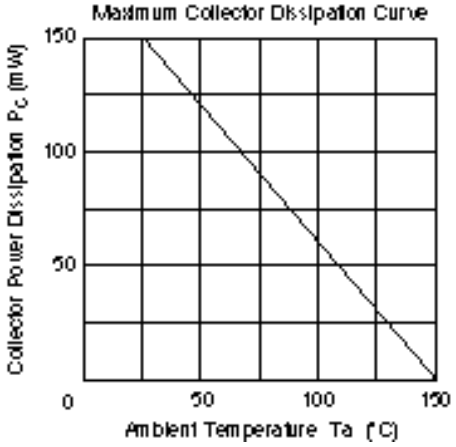
| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Collector to base voltage | $V_{CBO}$ | 15 | V |
| Collector to emitter voltage | $V_{CEO}$ | 9 | V |
| Emitter to base voltage | $V_{EBO}$ | 1.5 | V |
| Collector current | $I_C$ | 50 | mA |
| Collector power dissipation | $P_C$ | 150 | mW |
| Junction temperature | Tj | 150 | °C |
| Storage temperature | Tstg | –55 to +150 | °C |

## Electrical Characteristics (Ta = 25°C)

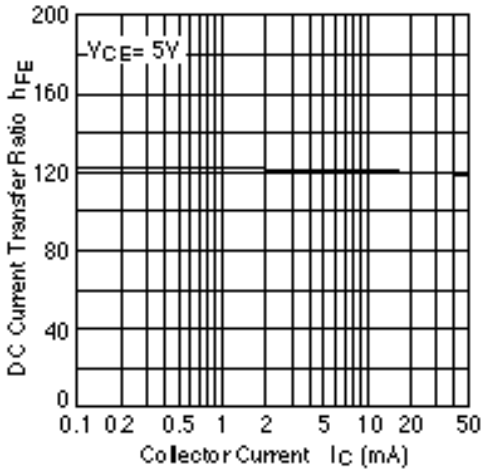
| Item | Symbol | Min | Typ | Max | Unit | Test conditions |
|---|---|---|---|---|---|---|
| Collector to base breakdown voltage | $V_{(BR)CBO}$ | 15 | — | — | V | $I_C$ = 10 µA, $I_E$ = 0 |
| Collector cutoff current | $I_{CBO}$ | — | — | 10 | µA | $V_{CB}$ = 12 V, $I_E$ = 0 |
| | $I_{CEO}$ | — | — | 1 | mA | $V_{CE}$ = 9 V, $R_{BE}$ = ∞ |
| Emitter cutoff current | $I_{EBO}$ | — | — | 10 | µA | $V_{EB}$ = 1.5 V, $I_C$ = 0 |
| DC current transfer ratio | $h_{FE}$ | 50 | 120 | 250 | | $V_{CE}$ = 5 V, $I_C$ = 20 mA |
| Collector output capacitance | Cob | — | 0.8 | 1.3 | pF | $V_{CB}$ = 5 V, $I_E$ = 0, f = 1 MHz |
| Gain bandwidth product | $f_T$ | 6.0 | 9.0 | — | GHz | $V_{CE}$ = 5 V, $I_C$ = 20 mA |
| Power gain | PG | 10.5 | 13.5 | — | dB | $V_{CE}$ = 5 V, $I_C$ = 20 mA, f = 900 MHz |
| Noise figure | NF | — | 1.2 | 2.5 | dB | $V_{CE}$ = 5 V, $I_C$ = 5 mA, f = 900 MHz |

Note: Marking is “YJ–”.

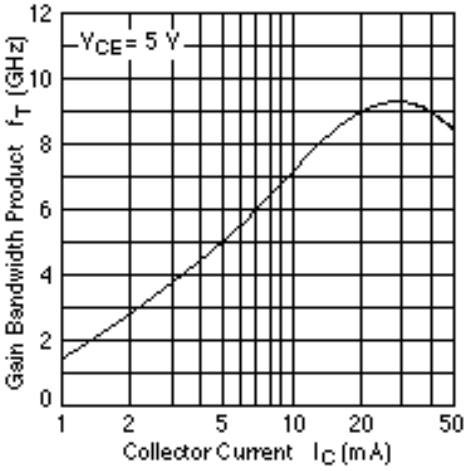
Maximum Collector Dissipation Curve



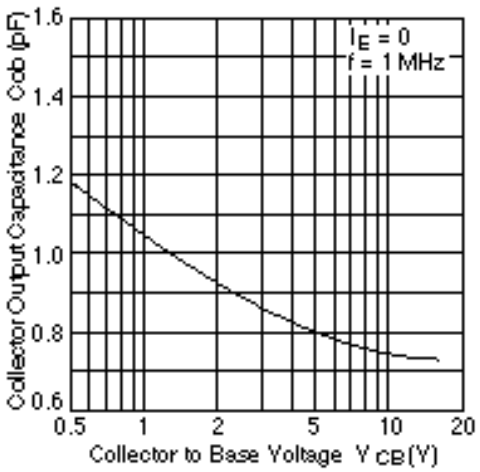

DC Current Transfer Ratio vs. Collector Current



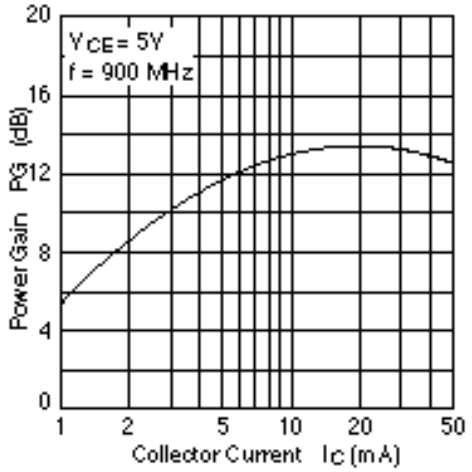

Gain Bandwidth Product vs. Collector Current



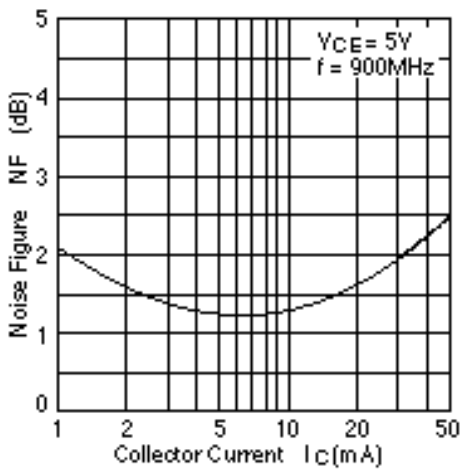

Collector Output Capacitance vs. Collector to Base Voltage



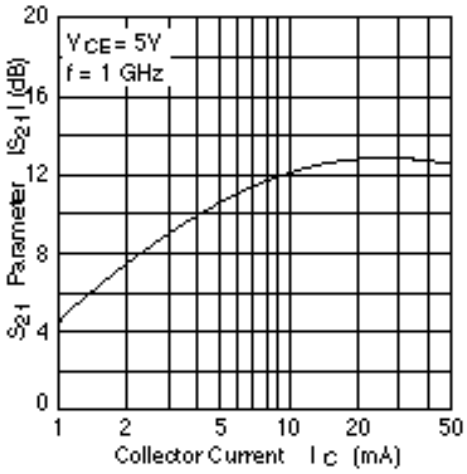
Power Gain vs. Collector Current



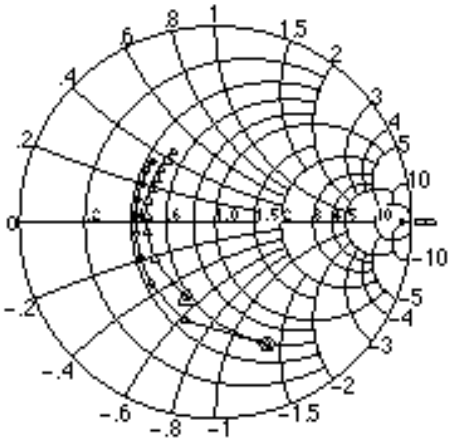

Noise Figure vs. Collector Current




S21 Parameter vs. Collector Current

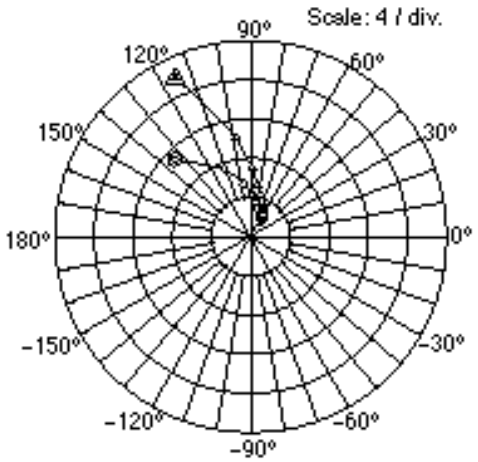


S11 Parameter vs. Frequency



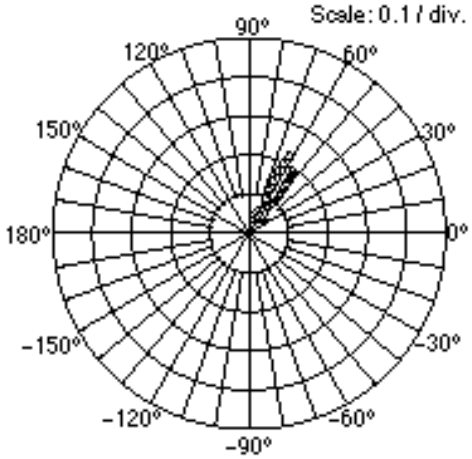
Condition: $V_{CE}$ = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(Ic = 5 mA)
(Ic = 20 mA)

S21 Parameter vs. Frequency



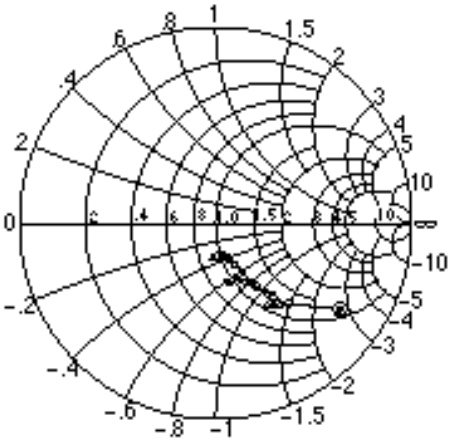

Condition: $V_{CE}$ = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(Ic = 5 mA)
(Ic = 20 mA)

S12 Parameter vs. Frequency




Condition: $V_{CE}$ = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(Ic = 5 mA)
(Ic = 20 mA)

S22 Parameter vs. Frequency



Condition: $V_{CE}$ = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(Ic = 5 mA)
(Ic = 20 mA)

**S Parameter** ($V_{CE}$ = 5 V, $I_C$ = 5 mA, $Z_O$ = 50 Ω, Emitter Common)

| Freq. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. |
| 200 | 0.678 | –67.0 | 11.09 | 134.6 | 0.0572 | 59.2 | 0.772 | –34.7 |
| 400 | 0.523 | –107.6 | 7.49 | 111.6 | 0.0802 | 48.8 | 0.556 | –47.8 |
| 600 | 0.453 | –135.8 | 5.43 | 98.3 | 0.0933 | 47.1 | 0.443 | –53.7 |
| 800 | 0.423 | –155.2 | 4.24 | 89.0 | 0.105 | 47.8 | 0.382 | –57.2 |
| 1000 | 0.407 | –172.1 | 3.47 | 81.6 | 0.118 | 49.7 | 0.348 | –60.2 |
| 1200 | 0.412 | 174.7 | 2.94 | 75.0 | 0.130 | 50.7 | 0.330 | –62.9 |
| 1400 | 0.414 | 163.5 | 2.54 | 69.2 | 0.145 | 51.9 | 0.318 | –66.5 |
| 1600 | 0.423 | 152.3 | 2.26 | 64.3 | 0.158 | 52.7 | 0.312 | –70.3 |
| 1800 | 0.438 | 143.2 | 2.05 | 59.2 | 0.174 | 53.3 | 0.307 | –74.4 |
| 2000 | 0.446 | 135.7 | 1.87 | 55.0 | 0.189 | 53.4 | 0.305 | –78.4 |

**S Parameter** ($V_{CE}$ = 5 V, $I_C$ = 20 mA, $Z_O$ = 50 Ω, Emitter Common)

| Freq. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. |
| 200 | 0.420 | –110.3 | 17.91 | 115.5 | 0.0381 | 59.7 | 0.502 | –54.1 |
| 400 | 0.362 | –148.9 | 10.13 | 98.4 | 0.0572 | 62.2 | 0.311 | –62.8 |
| 600 | 0.351 | –170.5 | 6.94 | 89.2 | 0.0766 | 64.7 | 0.240 | –66.1 |
| 800 | 0.352 | 175.2 | 5.29 | 82.9 | 0.0966 | 65.7 | 0.207 | –69.1 |
| 1000 | 0.361 | 162.7 | 4.27 | 77.1 | 0.117 | 65.8 | 0.189 | –71.6 |
| 1200 | 0.364 | 153.1 | 3.60 | 72.3 | 0.138 | 65.1 | 0.181 | –75.1 |
| 1400 | 0.373 | 143.9 | 3.12 | 67.9 | 0.158 | 64.0 | 0.178 | –79.3 |
| 1600 | 0.386 | 136.2 | 2.76 | 63.6 | 0.178 | 62.5 | 0.176 | –83.3 |
| 1800 | 0.396 | 128.2 | 2.49 | 59.4 | 0.199 | 61.3 | 0.177 | –87.5 |
| 2000 | 0.414 | 121.3 | 2.27 | 55.5 | 0.218 | 59.8 | 0.178 | –91.9 |

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