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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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2SC5758

Silicon NPN Epitaxial
VHF / UHF Wide band amplifier

RENESAS

ADE-208-1397D(Z)

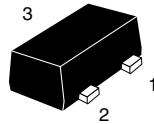
Rev.4
Jul. 2001

Features

- Super compact package: MFPAK (1.4 x 0.8 x 0.59 mm)

Outline

MFPAK



1. Emitter
2. Base
3. Collector

Note: Marking is "WF-".

Absolute Maximum Ratings

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

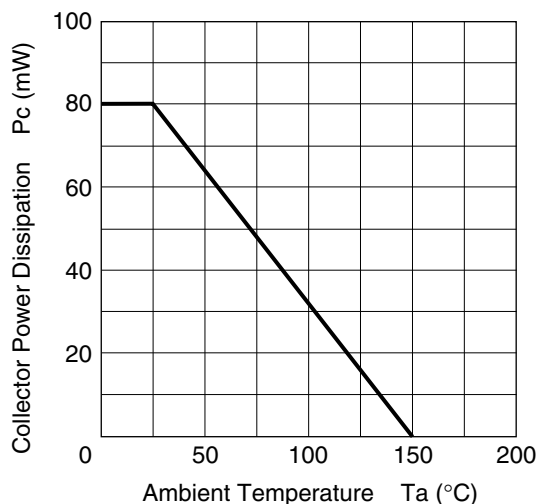
| Item | Symbol | Ratings | Unit |
|------------------------------|------------------|-------------|------------------|
| Collector to base voltage | V_{CBO} | 10 | V |
| Collector to emitter voltage | V_{CEO} | 3.5 | V |
| Emitter to base voltage | V_{EBO} | 1.5 | V |
| Collector current | I_{C} | 80 | mA |
| Collector power dissipation | P_{C} | 80 | mW |
| Junction temperature | T_{j} | 150 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -50 to +150 | $^\circ\text{C}$ |

Electrical Characteristics

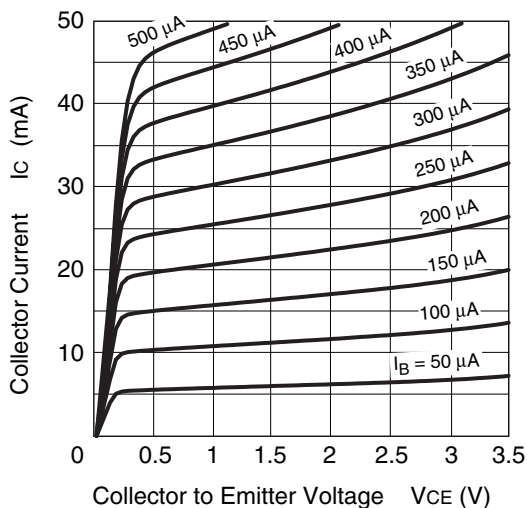
($T_a = 25^\circ\text{C}$)

| Item | Symbol | Min | Typ | Max | Unit | Test conditions |
|-------------------------------------|-----------------------------|------|------|------|------|--|
| Collector to base breakdown voltage | $V_{(\text{BR})\text{CBO}}$ | 10 | — | — | V | $I_{\text{C}} = 10 \mu\text{A}$, $I_{\text{E}} = 0$ |
| Collector cutoff current | I_{CBO} | — | — | 600 | nA | $V_{\text{CB}} = 10 \text{ V}$, $I_{\text{E}} = 0$ |
| Collector cutoff current | I_{CEO} | — | — | 200 | nA | $V_{\text{CE}} = 3.5 \text{ V}$, $R_{\text{BE}} = \text{Infinite}$ |
| Emitter cutoff current | I_{EBO} | — | — | 100 | nA | $V_{\text{EB}} = 1.5 \text{ V}$, $I_{\text{C}} = 0$ |
| DC current transfer ratio | h_{FE} | 80 | 100 | 130 | V | $V_{\text{CB}} = 1 \text{ V}$, $I_{\text{C}} = 5 \text{ mA}$ |
| Collector output capacitance | C_{ob} | 0.65 | 0.95 | 1.25 | pF | $V_{\text{CB}} = 1 \text{ V}$, $I_{\text{E}} = 0$, $f = 1 \text{ MHz}$ |
| Gain bandwidth product | f_{T} | 6 | 8 | — | GHz | $V_{\text{CE}} = 1 \text{ V}$, $I_{\text{C}} = 5 \text{ mA}$ |
| Power gain | PG | 10 | 13 | — | dB | $V_{\text{CE}} = 1 \text{ V}$, $I_{\text{C}} = 5 \text{ mA}$, $f = 900 \text{ MHz}$ |
| Noise figure | NF | — | 1.0 | 2.0 | dB | $V_{\text{CE}} = 1 \text{ V}$, $I_{\text{C}} = 5 \text{ mA}$, $f = 900 \text{ MHz}$ |

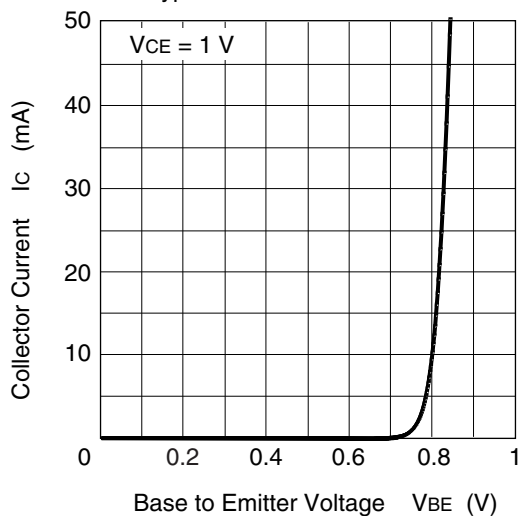
Collector Power Dissipation Curve



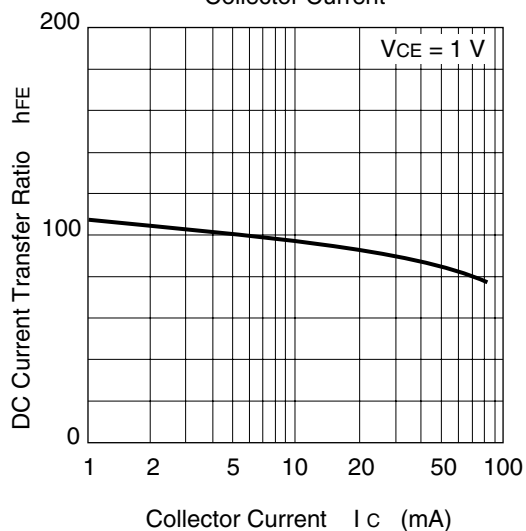
Typical Output Characteristics



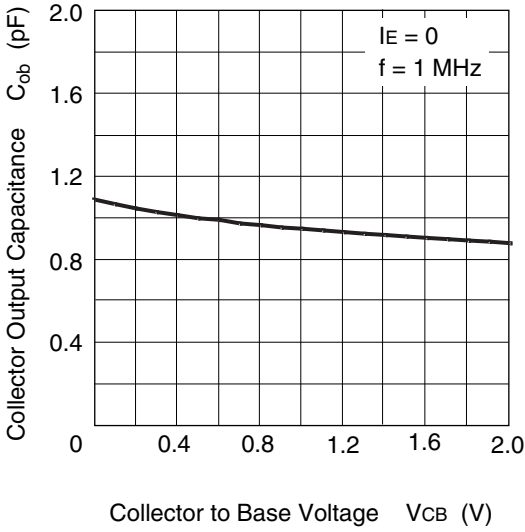
Typical Transfer Characteristics



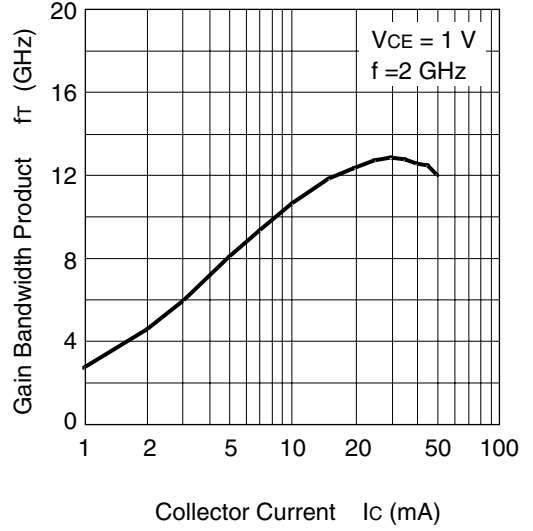
DC Current Transfer Ratio vs. Collector Current



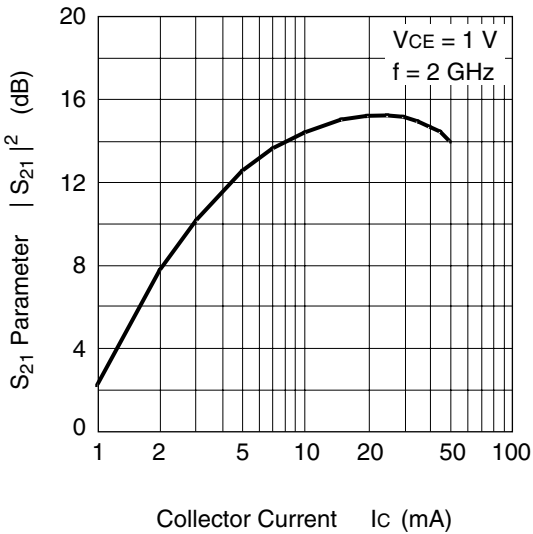
Collector Output Capacitance vs. Collector to Base Voltage



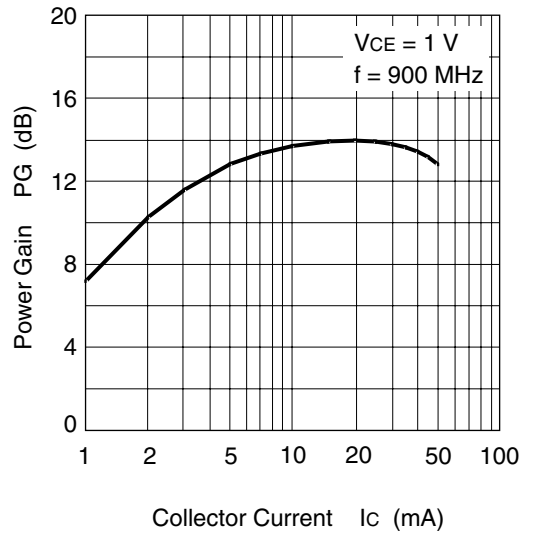
Gain Bandwidth Product vs. Collector Current

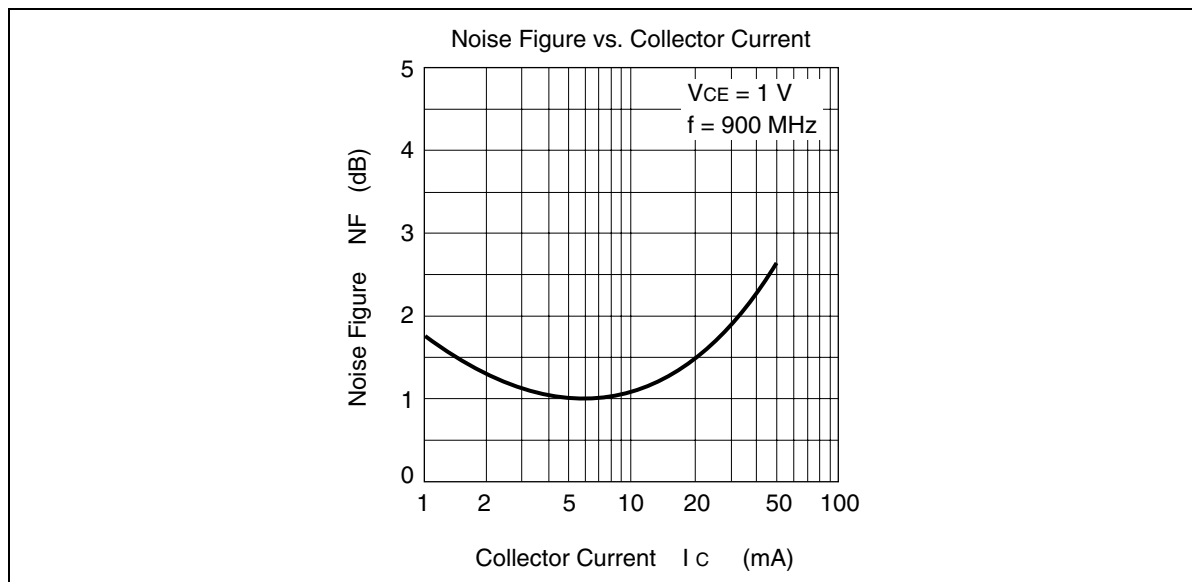


S_{21} Parameter vs. Collector Current

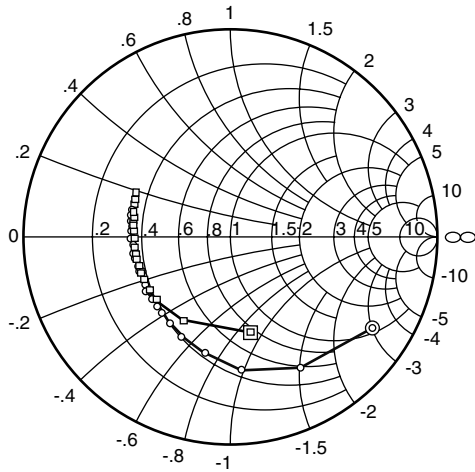


Power Gain vs. Collector Current



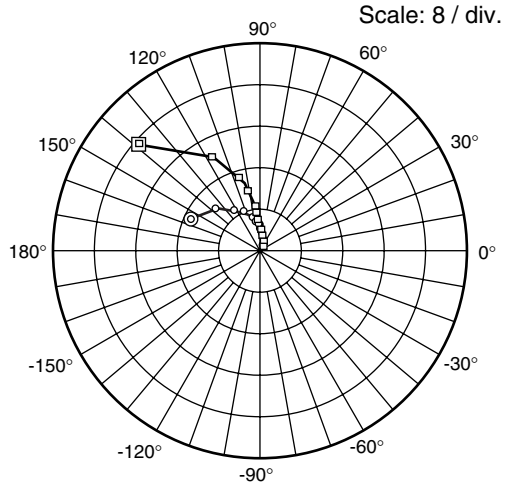


S₁₁ Parameter vs. Frequency



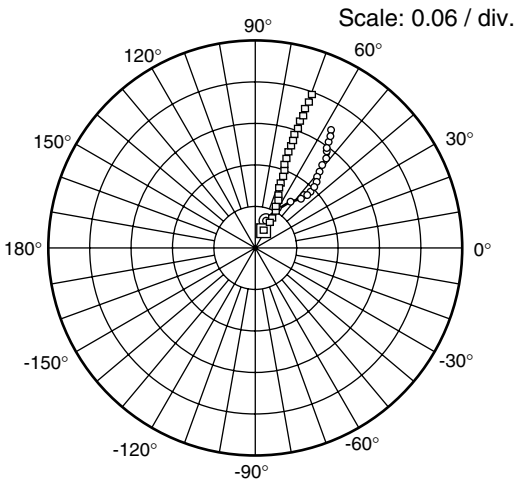
Condition: V_{CE} = 1 V , Z₀ = 50 Ω
 100 to 2000 MHz (100 MHz Step)
 ⊙—○ (I_c = 5 mA)
 ⊠—□ (I_c = 20 mA)

S₂₁ Parameter vs. Frequency



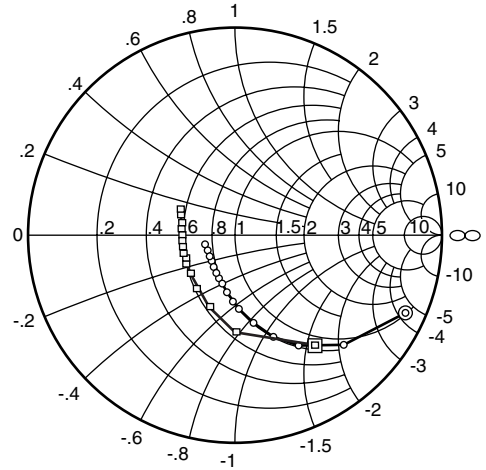
Condition: V_{CE} = 1 V , Z₀ = 50 Ω
 100 to 2000 MHz (100 MHz Step)
 ⊙—○ (I_c = 5 mA)
 ⊠—□ (I_c = 20 mA)

S₁₂ Parameter vs. Frequency



Condition: V_{CE} = 1 V , Z₀ = 50 Ω
 100 to 2000 MHz (100 MHz Step)
 ⊙—○ (I_c = 5 mA)
 ⊠—□ (I_c = 20 mA)

S₂₂ Parameter vs. Frequency



Condition: V_{CE} = 1 V , Z₀ = 50 Ω
 100 to 2000 MHz (100 MHz Step)
 ⊙—○ (I_c = 5 mA)
 ⊠—□ (I_c = 20 mA)

S Parameter

($V_{CE} = 1\text{ V}$, $I_C = 5\text{ mA}$, $Z_0 = 50\ \Omega$)

| f(MHz) | S11 | | S21 | | S12 | | S22 | |
|--------|-------|--------|-------|-------|-------|------|-------|--------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 0.806 | -31.9 | 14.60 | 157.6 | 0.038 | 72.8 | 0.901 | -24.3 |
| 200 | 0.713 | -61.5 | 12.31 | 138.9 | 0.067 | 59.5 | 0.757 | -44.8 |
| 300 | 0.635 | -85.3 | 10.02 | 125.3 | 0.085 | 51.3 | 0.610 | -60.1 |
| 400 | 0.560 | -102.7 | 8.22 | 115.4 | 0.096 | 47.2 | 0.501 | -70.9 |
| 500 | 0.529 | -117.1 | 6.94 | 108.4 | 0.104 | 45.5 | 0.421 | -79.8 |
| 600 | 0.500 | -127.8 | 5.97 | 103.1 | 0.111 | 44.6 | 0.360 | -87.2 |
| 700 | 0.486 | -137.2 | 5.20 | 98.6 | 0.117 | 44.8 | 0.314 | -93.1 |
| 800 | 0.474 | -144.1 | 4.65 | 94.6 | 0.123 | 45.7 | 0.278 | -99.7 |
| 900 | 0.467 | -151.1 | 4.14 | 91.7 | 0.129 | 46.7 | 0.249 | -105.1 |
| 1000 | 0.466 | -157.1 | 3.77 | 88.4 | 0.135 | 47.7 | 0.226 | -110.9 |
| 1100 | 0.461 | -162.4 | 3.45 | 85.9 | 0.141 | 48.6 | 0.208 | -116.0 |
| 1200 | 0.464 | -166.1 | 3.19 | 83.4 | 0.147 | 49.7 | 0.194 | -121.4 |
| 1300 | 0.464 | -169.9 | 2.99 | 81.3 | 0.153 | 51.0 | 0.181 | -127.1 |
| 1400 | 0.467 | -173.8 | 2.78 | 79.1 | 0.159 | 51.8 | 0.172 | -131.7 |
| 1500 | 0.465 | -177.2 | 2.62 | 77.3 | 0.166 | 53.0 | 0.165 | -137.5 |
| 1600 | 0.476 | 179.9 | 2.46 | 75.2 | 0.174 | 53.8 | 0.159 | -141.6 |
| 1700 | 0.480 | 177.4 | 2.36 | 73.4 | 0.180 | 54.7 | 0.155 | -147.4 |
| 1800 | 0.480 | 173.4 | 2.24 | 71.8 | 0.187 | 55.6 | 0.154 | -152.9 |
| 1900 | 0.490 | 172.0 | 2.14 | 70.2 | 0.195 | 56.5 | 0.154 | -157.6 |
| 2000 | 0.487 | 169.3 | 2.06 | 68.6 | 0.202 | 57.0 | 0.153 | -162.5 |

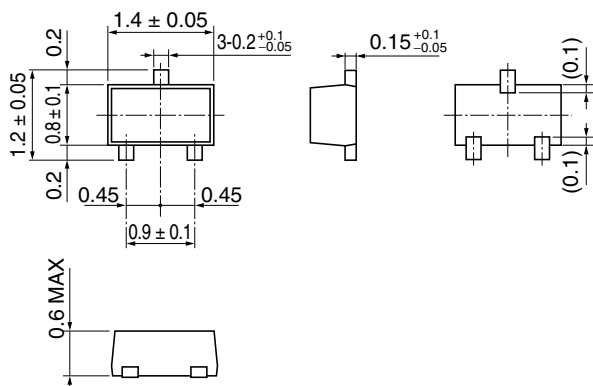
2SC5758

($V_{CE} = 1 \text{ V}$, $I_C = 20 \text{ mA}$, $Z_0 = 50 \Omega$)

| f(MHz) | S11 | | S21 | | S12 | | S22 | |
|--------|-------|--------|-------|-------|-------|------|-------|--------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 0.487 | -78.2 | 31.25 | 138.4 | 0.026 | 64.0 | 0.679 | -53.9 |
| 200 | 0.466 | -120.9 | 20.22 | 117.0 | 0.040 | 57.9 | 0.469 | -87.5 |
| 300 | 0.465 | -141.6 | 14.16 | 106.4 | 0.050 | 58.9 | 0.362 | -109.1 |
| 400 | 0.459 | -154.5 | 10.81 | 100.4 | 0.060 | 61.5 | 0.311 | -124.4 |
| 500 | 0.461 | -161.8 | 8.74 | 96.1 | 0.070 | 63.7 | 0.283 | -135.8 |
| 600 | 0.462 | -168.1 | 7.34 | 92.9 | 0.080 | 65.8 | 0.268 | -145.4 |
| 700 | 0.468 | -172.8 | 6.30 | 90.2 | 0.091 | 67.1 | 0.258 | -153.2 |
| 800 | 0.468 | -176.5 | 5.56 | 87.7 | 0.101 | 68.3 | 0.253 | -159.6 |
| 900 | 0.474 | 179.1 | 4.93 | 85.7 | 0.113 | 69.0 | 0.249 | -165.5 |
| 1000 | 0.473 | 176.8 | 4.46 | 83.7 | 0.124 | 69.5 | 0.249 | -170.7 |
| 1100 | 0.478 | 173.5 | 4.07 | 82.2 | 0.135 | 69.8 | 0.249 | -175.1 |
| 1200 | 0.486 | 170.7 | 3.75 | 80.3 | 0.145 | 70.2 | 0.251 | -179.3 |
| 1300 | 0.477 | 168.8 | 3.51 | 78.8 | 0.156 | 70.2 | 0.251 | 176.9 |
| 1400 | 0.493 | 166.3 | 3.26 | 77.2 | 0.167 | 70.1 | 0.254 | 173.5 |
| 1500 | 0.493 | 163.6 | 3.07 | 75.9 | 0.179 | 70.4 | 0.256 | 170.4 |
| 1600 | 0.502 | 161.7 | 2.88 | 74.5 | 0.189 | 70.4 | 0.260 | 167.6 |
| 1700 | 0.506 | 160.8 | 2.74 | 73.2 | 0.201 | 70.2 | 0.263 | 164.8 |
| 1800 | 0.511 | 157.7 | 2.62 | 72.0 | 0.211 | 69.8 | 0.268 | 162.1 |
| 1900 | 0.517 | 156.4 | 2.49 | 70.7 | 0.222 | 69.9 | 0.275 | 159.6 |
| 2000 | 0.523 | 154.5 | 2.40 | 69.5 | 0.232 | 69.4 | 0.280 | 157.1 |

Package Dimensions

As of January, 2001
Unit: mm



| | |
|------------------------|----------|
| Hitachi Code | MFPAK |
| JEDEC | — |
| EIAJ | — |
| Mass (reference value) | 0.0016 g |

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