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# 2SC5137

Silicon NPN Epitaxial

# HITACHI

ADE-208-224  
1st. Edition

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## Application

VHF / UHF wide band amplifier

## Features

- High gain bandwidth product  
 $f_T = 10 \text{ GHz typ}$
- High gain, low noise figure  
 $PG = 16.5 \text{ dB typ, NF} = 1.5 \text{ dB typ at } f = 900 \text{ MHz}$

## Outline

SMPAK



- 1. Emitter
- 2. Base
- 3. Collector

**Absolute Maximum Ratings** ( $T_a = 25^\circ\text{C}$ )

| Item                         | Symbol    | Ratings     | Unit             |
|------------------------------|-----------|-------------|------------------|
| Collector to base voltage    | $V_{CBO}$ | 15          | V                |
| Collector to emitter voltage | $V_{CEO}$ | 8           | V                |
| Emitter to base voltage      | $V_{EBO}$ | 1.5         | V                |
| Collector current            | $I_C$     | 20          | mA               |
| Collector power dissipation  | $P_C$     | 80          | mW               |
| Junction temperature         | $T_j$     | 150         | $^\circ\text{C}$ |
| Storage temperature          | $T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |

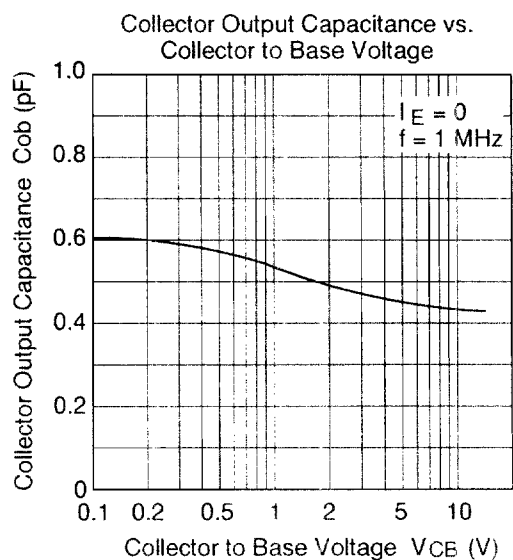
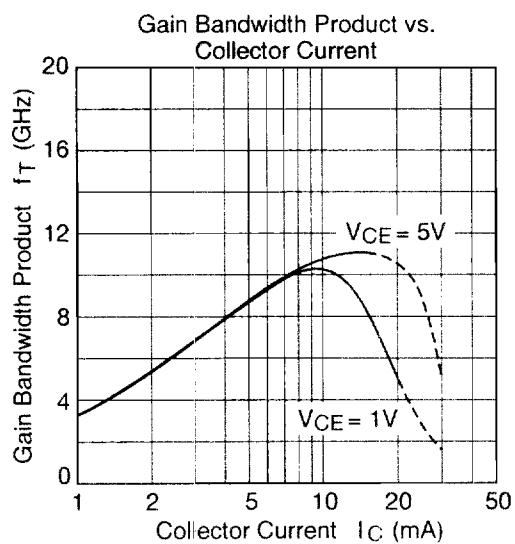
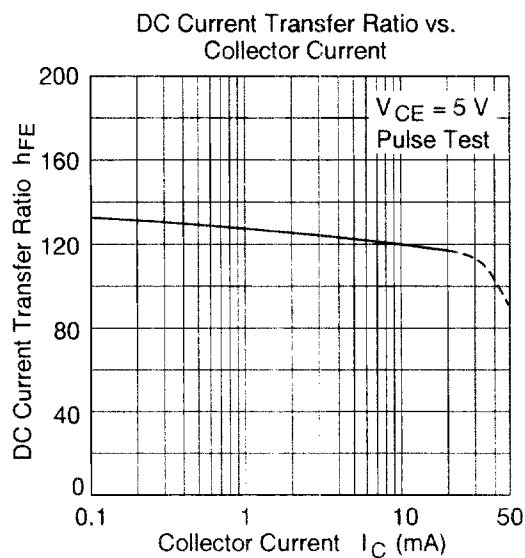
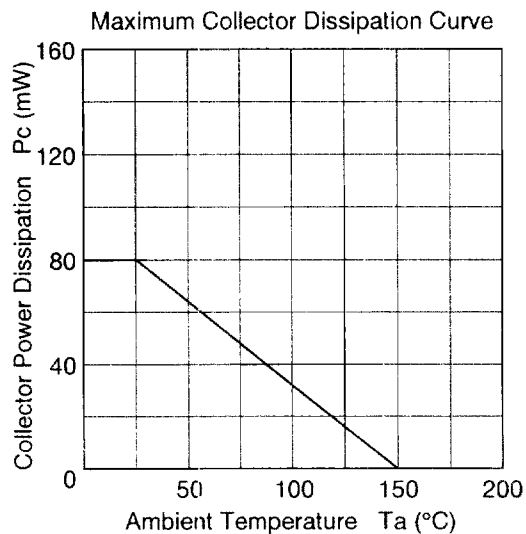
Note: Marking is "YA—".

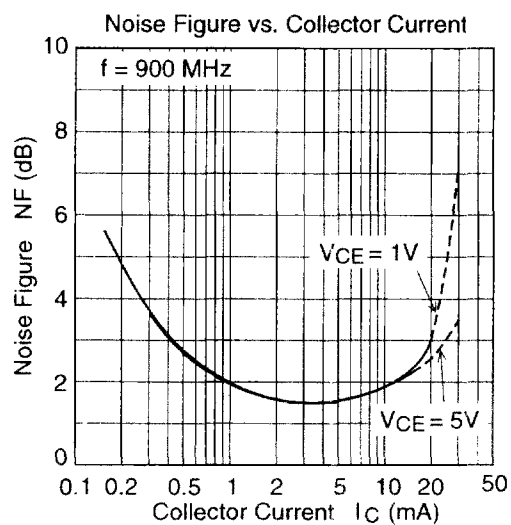
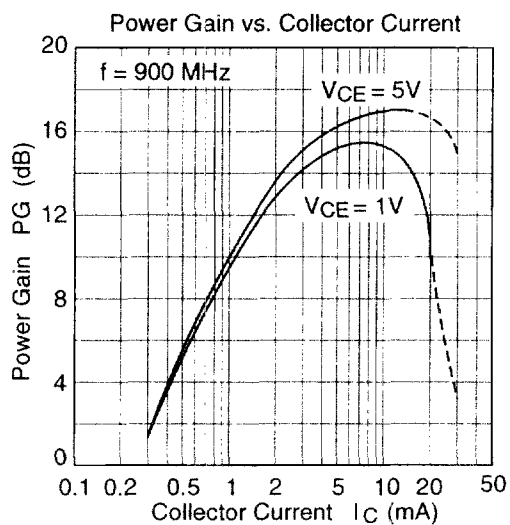
Attention: This device is very sensitive to electro static discharge.

It is recommended to adopt appropriate cautions when handling this transistor.

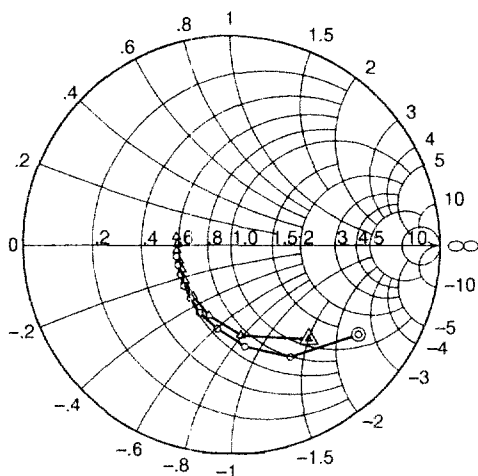
**Electrical Characteristics** ( $T_a = 25^\circ\text{C}$ )

| Item                         | Symbol    | Min | Typ  | Max | Unit          | Test conditions                                                    |
|------------------------------|-----------|-----|------|-----|---------------|--------------------------------------------------------------------|
| Collector cutoff current     | $I_{CBO}$ | —   | —    | 10  | $\mu\text{A}$ | $V_{CB} = 15\text{ V}, I_E = 0$                                    |
|                              | $I_{CEO}$ | —   | —    | 1   | mA            | $V_{CE} = 8\text{ V}, R_{BE} = \infty$                             |
| Emitter cutoff current       | $I_{EBO}$ | —   | —    | 10  | $\mu\text{A}$ | $V_{EB} = 1.5\text{ V}, I_C = 0$                                   |
| DC current transfer ratio    | $h_{FE}$  | 50  | 120  | 250 |               | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$                          |
| Collector output capacitance | $C_{ob}$  | —   | 0.45 | 0.8 | pF            | $V_{CB} = 5\text{ V}, I_E = 0,$<br>$f = 1\text{ MHz}$              |
| Gain bandwidth product       | $f_T$     | 7   | 10   | —   | GHz           | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$                          |
| Power gain                   | PG        | 12  | 16.5 | —   | dB            | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA},$<br>$f = 900\text{ MHz}$ |
| Noise figure                 | NF        | —   | 1.5  | 2.5 | dB            | $V_{CE} = 5\text{ V}, I_C = 5\text{ mA},$<br>$f = 900\text{ MHz}$  |





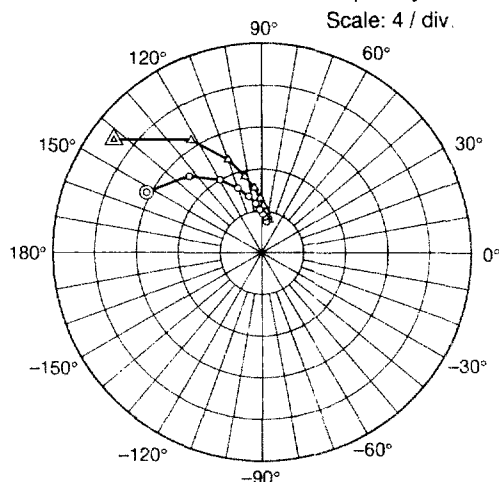
S11 Parameter vs. Frequency



Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
200 to 2000 MHz (200 MHz step)

○ — ○ ( $I_C = 5\text{ mA}$ )  
△ — △ ( $I_C = 10\text{ mA}$ )

S21 Parameter vs. Frequency

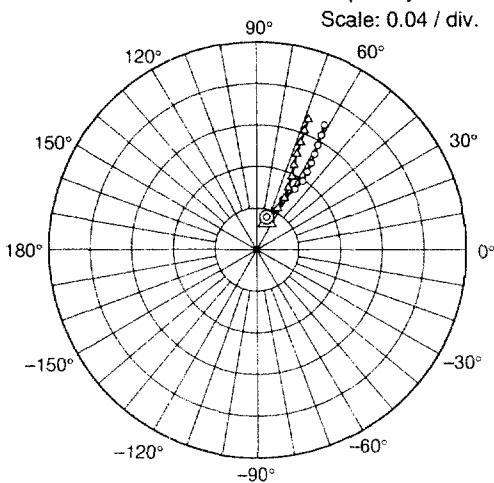


Scale: 4 / div.

Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
200 to 2000 MHz (200 MHz step)

○ — ○ ( $I_C = 5\text{ mA}$ )  
△ — △ ( $I_C = 10\text{ mA}$ )

S12 Parameter vs. Frequency

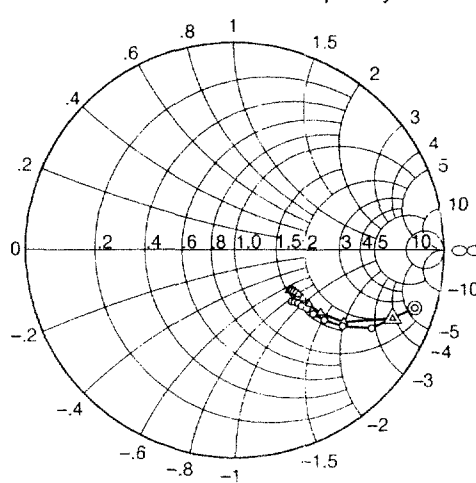


Scale: 0.04 / div.

Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
200 to 2000 MHz (200 MHz step)

○ — ○ ( $I_C = 5\text{ mA}$ )  
△ — △ ( $I_C = 10\text{ mA}$ )

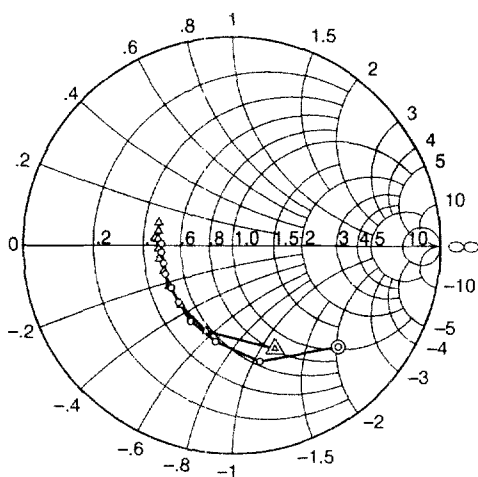
S22 Parameter vs. Frequency



Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
200 to 2000 MHz (200 MHz step)

○ — ○ ( $I_C = 5\text{ mA}$ )  
△ — △ ( $I_C = 10\text{ mA}$ )

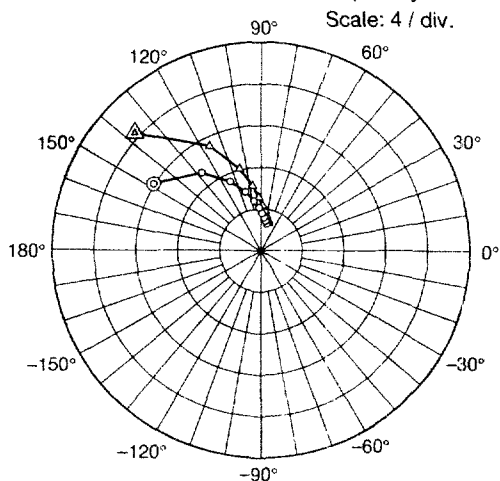
S11 Parameter vs. Frequency



Condition:  $V_{CE} = 1\text{ V}$ ,  $Z_o = 50\ \Omega$   
200 to 2000 MHz (200 MHz step)

○ — ○ ( $I_C = 5\text{ mA}$ )  
△ — △ ( $I_C = 10\text{ mA}$ )

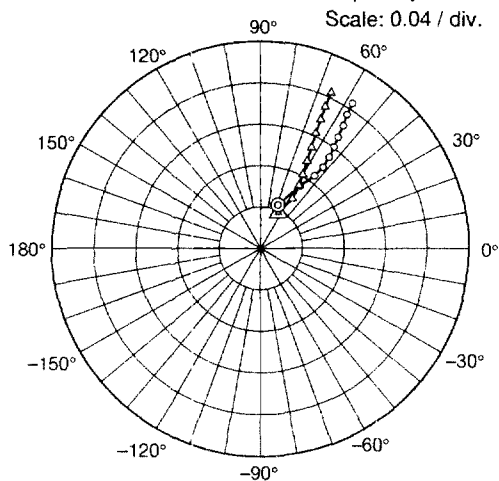
S21 Parameter vs. Frequency



Condition:  $V_{CE} = 1\text{ V}$ ,  $Z_o = 50\ \Omega$   
200 to 2000 MHz (200 MHz step)

○ — ○ ( $I_C = 5\text{ mA}$ )  
△ — △ ( $I_C = 10\text{ mA}$ )

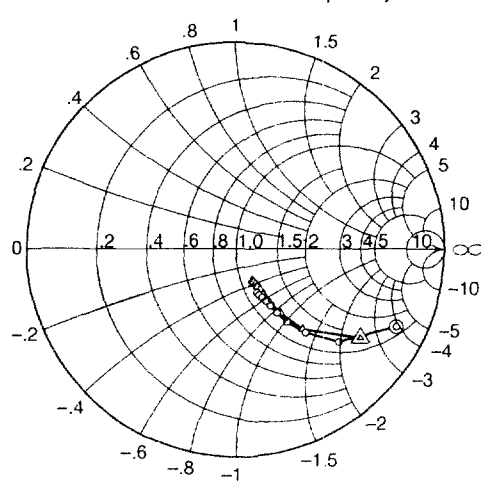
S12 Parameter vs. Frequency



Condition:  $V_{CE} = 1\text{ V}$ ,  $Z_o = 50\ \Omega$   
200 to 2000 MHz (200 MHz step)

○ — ○ ( $I_C = 5\text{ mA}$ )  
△ — △ ( $I_C = 10\text{ mA}$ )

S22 Parameter vs. Frequency



Condition:  $V_{CE} = 1\text{ V}$ ,  $Z_o = 50\ \Omega$   
200 to 2000 MHz (200 MHz step)

○ — ○ ( $I_C = 5\text{ mA}$ )  
△ — △ ( $I_C = 10\text{ mA}$ )