

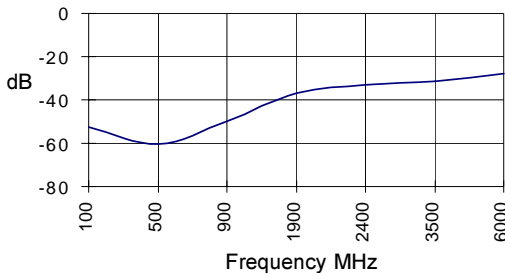
Product Description

Sirenza Microdevices' SGA-1263 is a Silicon Germanium HBT Heterostructure Bipolar Transistor (SiGe HBT) amplifier that offers excellent isolation and flat gain response for applications to 4 GHz.

This RFIC is a 2-stage design that provides high isolation of up to 40dB at 2 GHz and is fabricated using the latest SiGe HBT 50 GHz F_T process, featuring 1 micron emitters with $V_{ceo} > 7V$.

These unconditionally stable amplifiers have less than 1dB gain drift over 125°C operating range (-40C to +85C) and are ideal for use as buffer amplifiers in oscillator applications covering cellular, ISM and narrowband PCS bands.

Isolation vs. Frequency



SGA-1263

DC-4000 MHz Silicon Germanium HBT Cascadeable Gain Block



Product Features

- DC-4000 MHz Operation
- Single Supply Voltage
- Excellent Isolation, >50 dB at 900 MHz
- 50 Ohms In/Out, Broadband Match for Operation from DC-4 GHz
- Unconditionally Stable

Applications

- Buffer Amplifier for Oscillator Applications
- Broadband Gain Blocks
- IF Amp

| Symbol | Parameters: Test Conditions: $Z_0 = 50 \text{ Ohms}$, $I_d = 8 \text{ mA}$, $T = 25^\circ\text{C}$ | | Units | Min. | Typ. | Max. |
|-----------|---|--|----------------|------|----------------------|------|
| P_{1dB} | Output Power at 1dB Compression | $f = 850 \text{ MHz}$ $f = 1950 \text{ MHz}$ | dBm dBm | | -7.8 -7.4 | |
| S_{21} | Small Signal Gain | $f = \text{DC} - 1000 \text{ MHz}$ $f = 1000 - 2000 \text{ MHz}$ $f = 2000 - 4000 \text{ MHz}$ | dB dB dB | 14.3 | 15.9 15.2 12.3 | |
| S_{12} | Reverse Isolation | $f = \text{DC} - 1000 \text{ MHz}$ $f = 1000 - 2000 \text{ MHz}$ $f = 2000 - 4000 \text{ MHz}$ | dB dB dB | | 56.3 40.6 30.8 | |
| S_{11} | Input VSWR | $f = \text{DC} - 2400 \text{ MHz}$ $f = 2400 - 4000 \text{ MHz}$ | - | | 1.8:1 1.3:1 | |
| S_{22} | Output VSWR | $f = \text{DC} - 2400 \text{ MHz}$ $f = 2400 - 4000 \text{ MHz}$ | - | | 1.8:1 1.9:1 | |
| IP_3 | Third Order Intercept Point Power out per Tone = -20 dBm | $f = 850 \text{ MHz}$ $f = 1950 \text{ MHz}$ | dBm dBm | | 2.6 2.8 | |
| NF | Noise Figure | $f = \text{DC} - 1000 \text{ MHz}$ $f = 1000 - 2400 \text{ MHz}$ | dB dB | | 2.7 2.9 | |
| T_D | Group Delay | $f = 1000 \text{ MHz}$ | pS | | 82 | |
| V_D | Device Operating Voltage | | V | 2.5 | 2.8 | 3.1 |
| I_D | Device Operating Current | | mA | 6 | 8 | 10 |

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| Parameter | Specification | | | | Test Condition |
|--|---------------|---|------|------------------------------------|----------------|
| | Min | Typ. | Max. | Unit | |
| Bandwidth Frequency Range | DC | | 4000 | MHz | T= 25C |
| Device Bias Operating Voltage Operating Current | | 2.8 8 | | V mA | T= 25C |
| 500 MHz Gain Noise Figure Output IP3 Output P1dB Input Return Loss Isolation | | 16.0 2.7 4.0 -6.9 8.5 61.6 | | dB dB dBm dBm dB dB | T= 25C |
| 850 MHz Gain Noise Figure Output IP3 Output P1dB Input Return Loss Isolation | | 15.7 2.7 2.6 -7.8 8.9 48.4 | | dB dB dBm dBm dB dB | T= 25C |
| 1950 MHz Gain Noise Figure Output IP3 Output P1dB Input Return Loss Isolation | | 14.7 3.0 2.8 -7.4 8.8 35.6 | | dB dB dBm dBm dB dB | T= 25C |
| 2400 MHz Gain Noise Figure Output IP3 Output P1dB Input Return Loss Isolation | | 14.2 2.8 0.2 -7.0 8.4 33.6 | | dB dB dBm dBm dB dB | T= 25C |

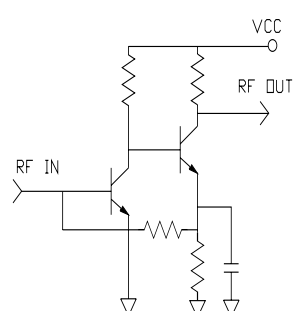
Absolute Maximum Ratings

| Parameter | Absolute Limit |
|---------------------------------|----------------|
| Max. Device Current (I_b) | 20 mA |
| Max. Device Voltage (V_D) | 5 V |
| Max. RF Input Power | -12 dBm |
| Max. Junction Temp. (T_J) | +150°C |
| Operating Temp. Range (T_L) | -40°C to +85°C |
| Max. Storage Temp. | +150°C |

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

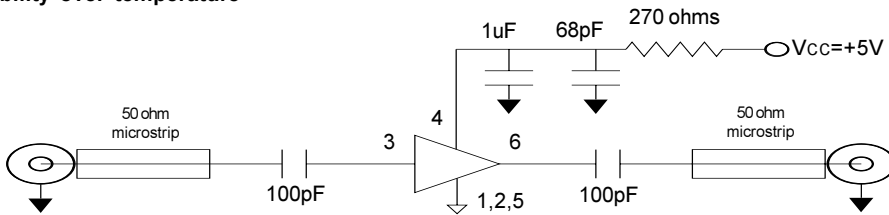
Bias conditions should also satisfy the following expression:

$$I_b V_D < (T_J - T_L) / R_{th(j-c)}$$

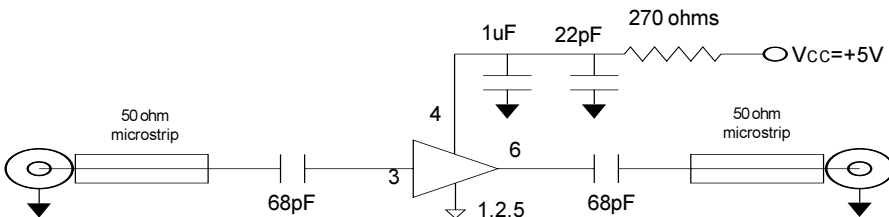
| Pin # | Function | Description | Device Schematic |
|-------|----------|---|--|
| 1 | GND | Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible. |  |
| 2 | GND | Sames as Pin 1 | |
| 3 | RF IN | RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation. | |
| 4 | Vcc | Supply Connection. This pin should be bypassed with a suitable capacitor(s). | |
| 5 | GND | Sames as Pin 1 | |
| 6 | RF OUT | RF output and bias pin. DC voltage is present on this pin, therefore a DC blocking capacitor is necessary for proper operation. | |

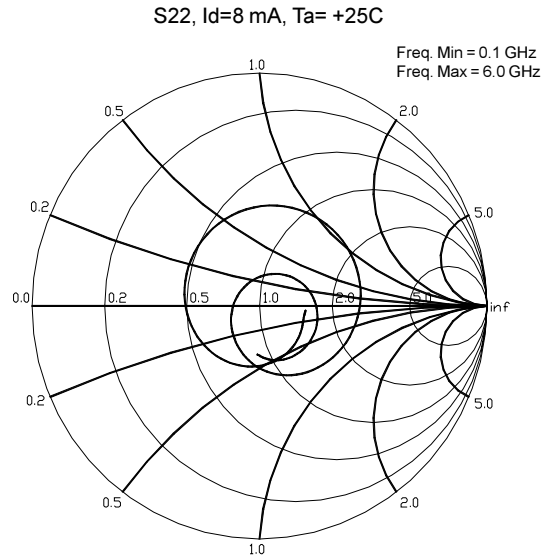
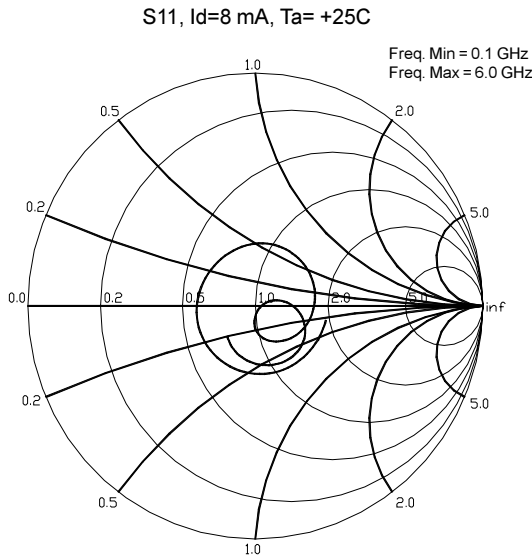
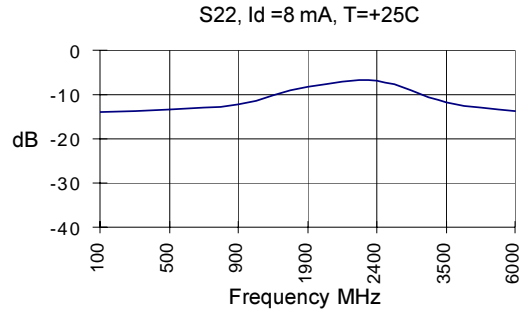
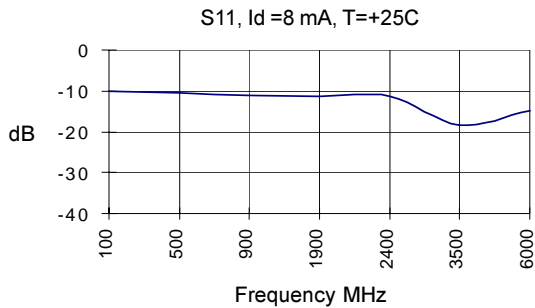
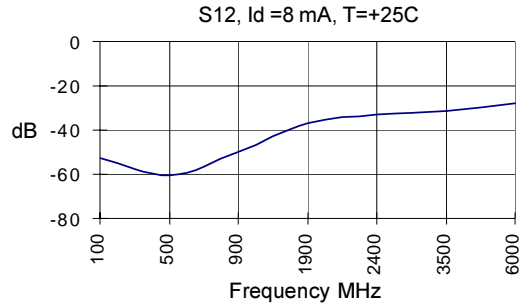
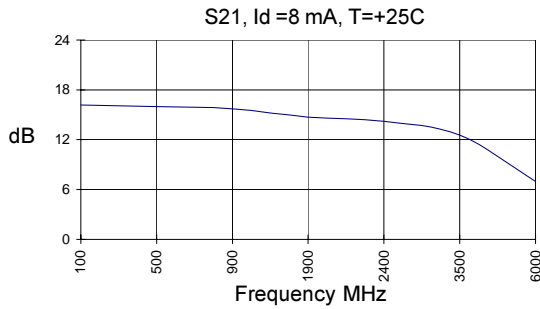
Application Schematic for +5V Operation at 900 MHz

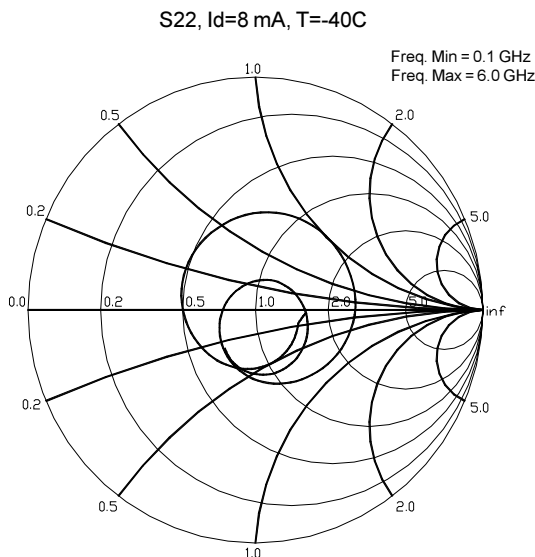
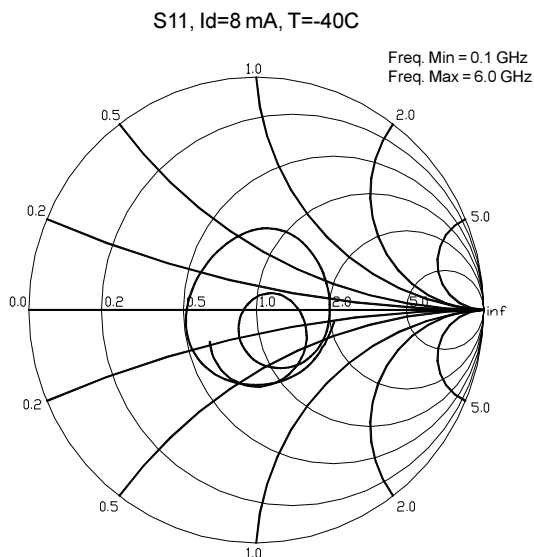
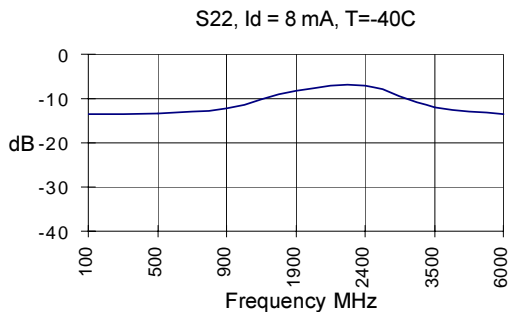
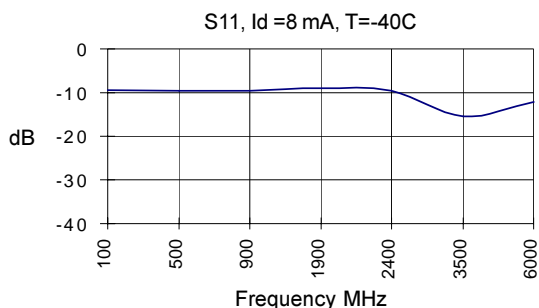
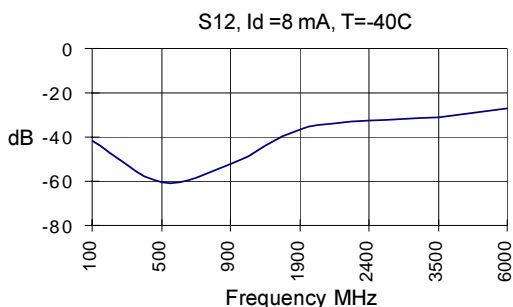
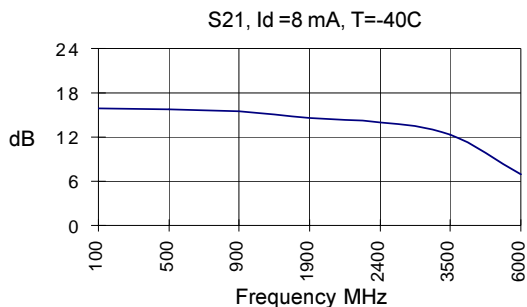
Note: A bias resistor is needed for stability over temperature

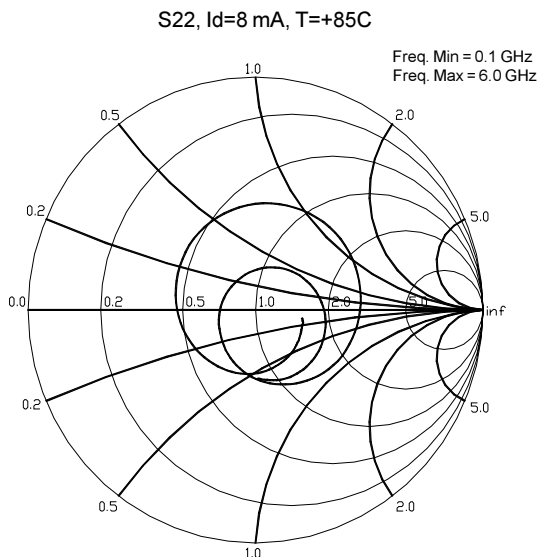
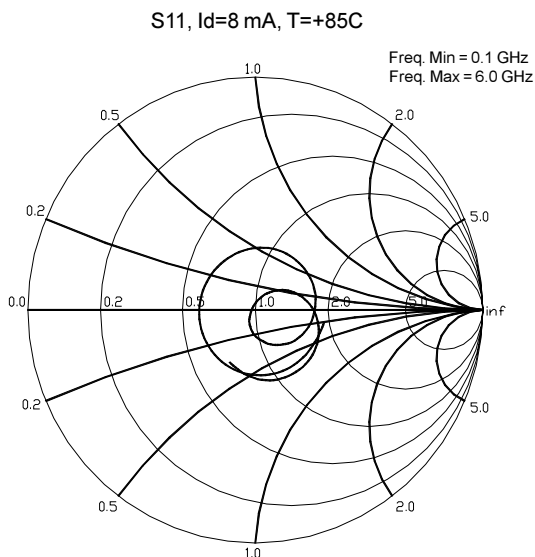
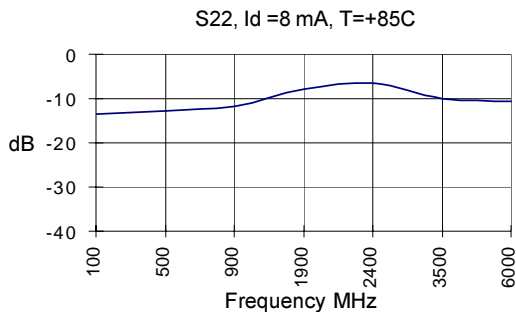
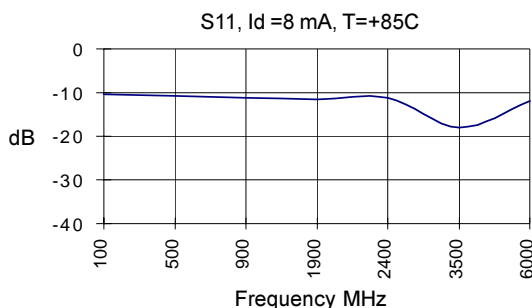
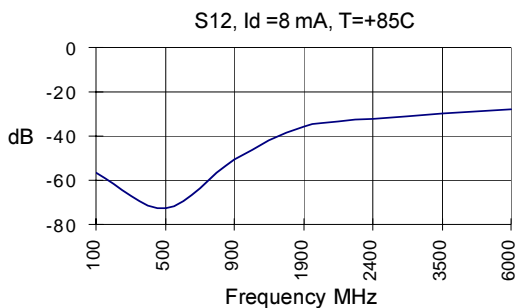
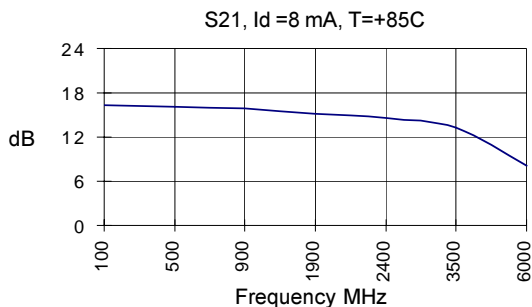


Application Schematic for +5V Operation at 1900 MHz









Absolute Maximum Ratings

Caution:



Operation of this device above any one of these parameters may cause permanent damage. Appropriate precautions in handling, packaging and testing devices must be observed.

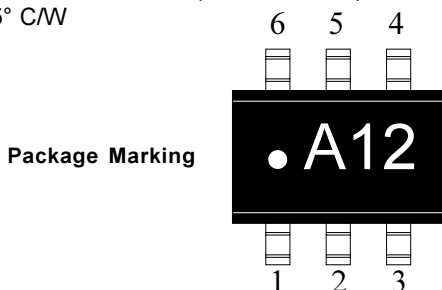
Part Number Ordering Information

| Part Number | Reel Size | Devices/Reel |
|--------------|-----------|--------------|
| SGA-1263-TR1 | 7" | 3000 |

Recommended Bias Resistor Values

| Supply Voltage(Vs) | 3.6V | 5V | 7.5V | 9V | 12V |
|--------------------|------|-----|------|-----|------|
| Rbias (Ohms) | 100 | 275 | 588 | 775 | 1150 |

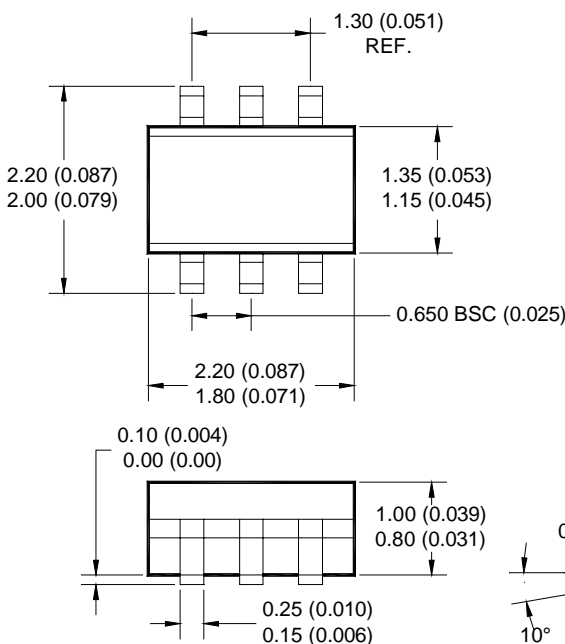
Thermal Resistance (Lead-Junction):
255° C/W



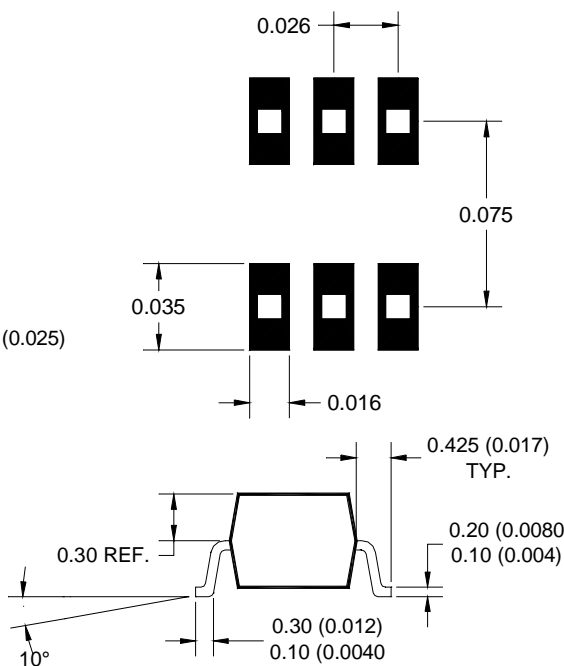
| Pin Designation | |
|-----------------|--------|
| 1 | GND |
| 2 | GND |
| 3 | RF in |
| 4 | Vcc |
| 5 | GND |
| 6 | RF out |

Note: Pin 1 is on lower left when you can read package marking

Package Dimensions



Pad Layout



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