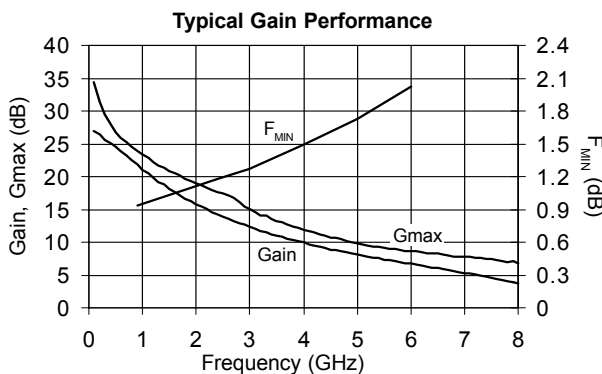


## Product Description

Stanford Microdevices' SGA-8343 is a high performance SiGe HBT amplifier designed for operation from DC to 6 GHz. This RF device uses the latest Silicon Germanium Heterostructure Bipolar Transistor (SiGe HBT) process. The SGA-8343 is optimized for 3V operation but can be biased at 2V for low-voltage battery operated systems. The device is easily matched as  $\Gamma_{OPT}$  is very close to 50 ohms. This device provides high gain, low NF, and excellent linearity at a low cost.



## SGA-8343

### Low Noise, High Gain SiGe HBT



### Product Features

- 6 GHz Useful Bandwidth
- Low  $F_{MIN}$ :
  - 0.9 dB @ 0.9 GHz
  - 1.1 dB @ 1.9 GHz
- High Gain ( $G_{max}$ ):
  - 24 dB @ 0.9 GHz
  - 19 dB @ 1.9 GHz
- Easily Matched with  $|\Gamma_{OPT}| = 0.17$  @ 1.9 GHz
- OIP3 = +28.5 dBm, P1dB = +13 dBm
- Low Cost High Performance SiGe HBT

### Applications

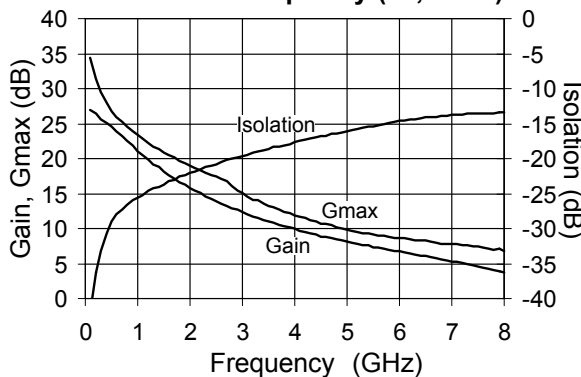
- LNA for Wireless Infrastructure
- Fixed Wireless Infrastructure
- Wireless Data
- Driver Stage for Low Power Applications
- Oscillators

| Symbol           | Device Characteristics, T = 25°C<br>$V_{CE}=3V, I_{CQ}=10mA$ (unless otherwise noted) | Units  | Min. | Typ.                 | Max. |
|------------------|---|--|------|----------------------|------|
| $G_{MAX}$        | Maximum Available Gain<br>$Z_S=Z_S^*, Z_L=Z_L^*$                                      | f = 0.9 GHz<br>f = 1.9 GHz<br>f = 2.4 GHz              | dB   | 23.9<br>19.3<br>17.7 |      |
| $S_{21}$         | Insertion Gain<br>$Z_S=Z_L=50\Omega$  | f = 0.9 GHz<br>f = 1.9 GHz<br>f = 2.4 GHz              | dB   | 21.8<br>16.3<br>14.3 |      |
| $F_{min}$        | Minimum Noise Figure<br>$Z_S=\Gamma_{OPT}, Z_L=Z_{LOPT}$                              | f = 0.9 GHz<br>f = 1.9 GHz<br>f = 2.4 GHz              | dB   | 0.9<br>1.1<br>1.2    |      |
| P1dB             | Output 1 dB compression point<br>$Z_S=Z_{SOPT}, Z_L=Z_{LOPT}$                         | $V_{CE}=2V, I_{CQ}=20 mA$<br>$V_{CE}=3V, I_{CQ}=20 mA$ | dBm  | 10.0<br>13.3         |      |
| OIP <sub>3</sub> | Output Third Order Intercept Point<br>$Z_S=Z_{SOPT}, Z_L=Z_{LOPT}$                    | $V_{CE}=2V, I_{CQ}=20 mA$<br>$V_{CE}=3V, I_{CQ}=20 mA$ | dBm  | 24.0<br>28.5         |      |
| $h_{FE}$         | DC Current Gain   |  |      | 120<br>180<br>300    |      |
| $BV_{CEO}$       | Collector - Emitter Breakdown Voltage   |  | V    | 5.7<br>6.0           |      |
| Rth              | Thermal Resistance (junction to lead)   |  | °C/W | 200                  |      |

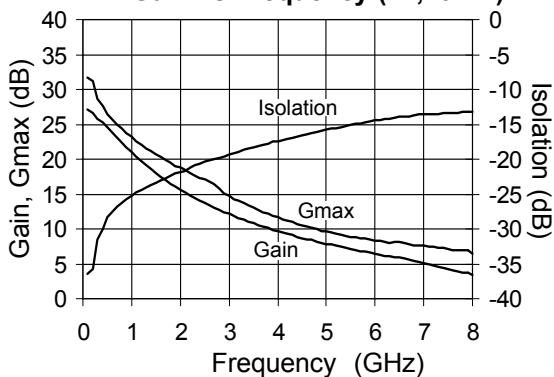
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### Typical Performance - Deembedded S-Parameters

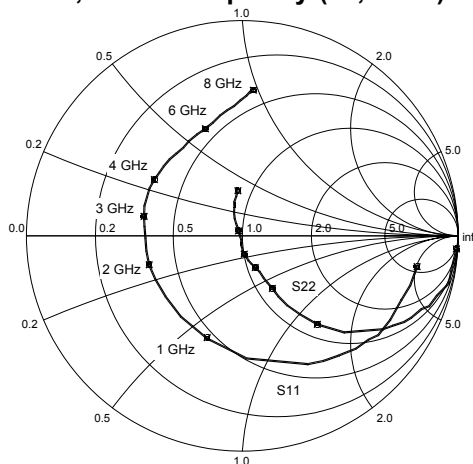
Gain vs Frequency (3V,10mA)



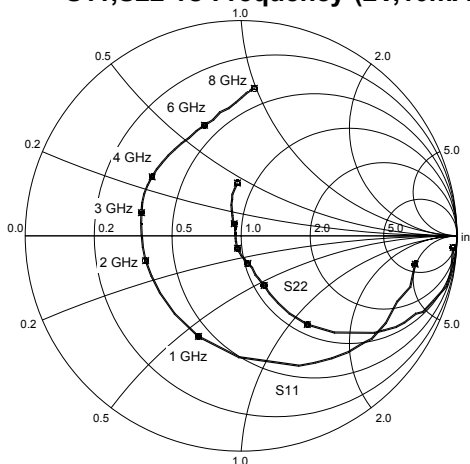
Gain vs Frequency (2V,10mA)



S11,S22 vs Frequency (3V,10mA)



S11,S22 vs Frequency (2V,10mA)

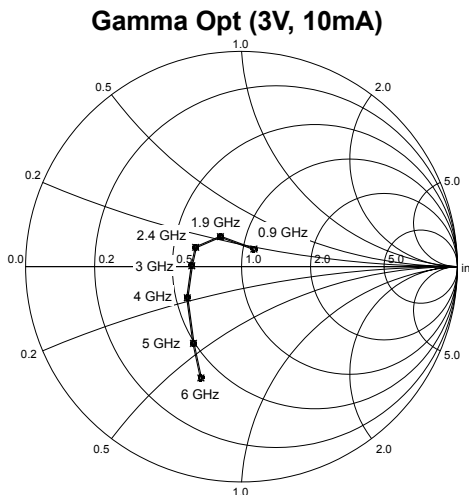
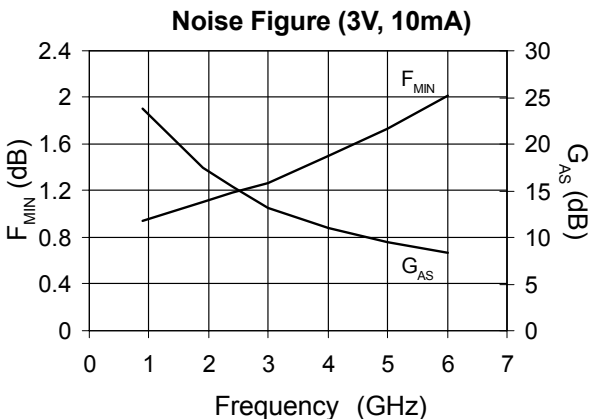


Note: S-parameters are de-embedded to the device leads with  $Z_s=Z_L=50\Omega$ . The data represents typical performance of the device. De-embedded s-parameters can be downloaded from our website ([www.stanfordmicro.com](http://www.stanfordmicro.com)).

### Typical Performance - P1dB, OIP3, Gain

| Freq (MHz) | V <sub>CE</sub> (V) | I <sub>CO</sub> (mA) | P1dB (dBm) | OIP3 (dBm) | Gain (dB) | Z <sub>L,OPT</sub> Mag ∠ Ang |
|------------|---------------------|----------------------|------------|------------|-----------|------------------------------|
| 900        | 2                   | 10                   | 10.0       | 22.0       | 25.0      | 0.50 ∠ 143.3                 |
|            |                     | 20                   | 10.2       | 24.0       | 24.0      | 0.24 ∠ 16.6                  |
|            | 3                   | 10                   | 13.0       | 24.5       | 24.4      | 0.36 ∠ 16.2                  |
|            |                     | 20                   | 13.3       | 28.0       | 24.4      | 0.36 ∠ 16.2                  |
| 1900       | 2                   | 10                   | 10.0       | 23.0       | 16.7      | 0.43 ∠ 91.2                  |
|            |                     | 20                   | 10.2       | 26.0       | 16.4      | 0.32 ∠ 24.1                  |
|            | 3                   | 10                   | 13.0       | 26.0       | 18.0      | 0.54 ∠ 15.2                  |
|            |                     | 20                   | 13.3       | 28.5       | 18.0      | 0.38 ∠ 14.0                  |
| 2400       | 2                   | 10                   | 10.0       | 23.0       | 15.0      | 0.31 ∠ 45.0                  |
|            |                     | 20                   | 10.2       | 24.0       | 15.0      | 0.29 ∠ 33.3                  |
|            | 3                   | 10                   | 13.0       | 27.5       | 15.3      | 0.44 ∠ 9.2                   |
|            |                     | 20                   | 13.3       | 29.0       | 15.3      | 0.36 ∠ 13.3                  |

Typical Performance - Noise Parameters



Noise Parameters -  $V_{CE}=3V, I_C=10mA$

| Freq (MHz) | $F_{MIN}$ (dB) | Gamma Opt Mag $\angle$ Ang | $r_n$ | $G_{AS}$ (dB) | Gmax (dB) |
|------------|----------------|----------------------------|-------|---------------|-----------|
| 0.9        | 0.94           | 0.10 $\angle$ 55           | 0.11  | 23.8          | 23.88     |
| 1.9        | 1.1            | 0.17 $\angle$ 125          | 0.10  | 17.5          | 19.33     |
| 2.4        | 1.18           | 0.23 $\angle$ 157          | 0.09  | 15.4          | 17.66     |
| 3          | 1.27           | 0.23 $\angle$ 179          | 0.09  | 13.2          | 15.01     |
| 4          | 1.5            | 0.29 $\angle$ -150         | 0.12  | 11.0          | 11.94     |
| 5          | 1.73           | 0.42 $\angle$ -122         | 0.18  | 9.5           | 9.84      |
| 6          | 2.02           | 0.55 $\angle$ -110         | 0.24  | 8.4           | 8.62      |

**SGA-8343 Low Noise SiGe HBT**

**Absolute Maximum Ratings**

| Parameter                      | Symbol     | Value       | Unit |
|--------------------------------|------------|-------------|------|
| Collector Current              | $I_C$      | 72          | mA   |
| Base Current                   | $I_B$      | 1           | mA   |
| Collector - Emitter Voltage    | $V_{CEO}$  | 5           | V    |
| Collector - Base Voltage       | $V_{CBO}$  | 12          | V    |
| Emitter - Base Voltage         | $V_{EBO}$  | 4.5         | V    |
| Operating Temperature          | $T_{OP}$   | -40 to +85  | C    |
| Storage Temperature Range      | $T_{stor}$ | -40 to +150 | C    |
| Power Dissipation              | $P_{DIS}$  | 325         | mW   |
| Operating Junction Temperature | $T_J$      | +150        | C    |

**Part Number Ordering Information**

| Part Number | Reel Size | Devices/Reel |
|-------------|-----------|--------------|
| SGA-8343    | 7"        | 3000         |

**Part Symbolization**

The part will be symbolized with an "A83" and a Pin 1 indicator on the top surface of the package.

**Pin Description**

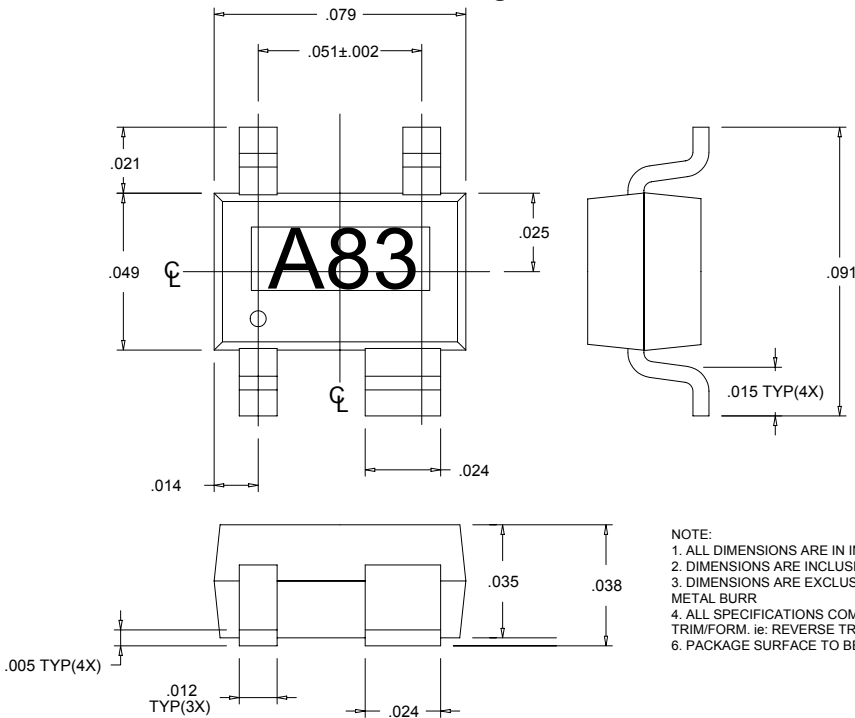
| Pin # | Function  | Description  |
|-------|-----------|--|
| 1     | Base      | RF Input   |
| 2     | Emitter   | Connection to ground. Use via holes to reduce lead inductance. Place vias as close to emitter leads as possible. |
| 3     | Collector | RF Output  |
| 4     | Emitter   | Same as Pin 2  |



**Caution: ESD sensitive**

Appropriate precautions in handling, packaging and testing devices must be observed.

**Package Dimensions**



- NOTE:
1. ALL DIMENSIONS ARE IN INCHES
  2. DIMENSIONS ARE INCLUSIVE OF PLATING
  3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR
  4. ALL SPECIFICATIONS COMPLY TO EIAJ SC70 FOR TRIM/FORM, ie: REVERSE TRIM/FORM
  6. PACKAGE SURFACE TO BE MIRROR FINISH

A fully dimensioned package outline is available on our website.

Use multiple plated-through vias holes located close to the package pins to ensure a good RF ground connection to a continuous groundplane on the backside of the board.