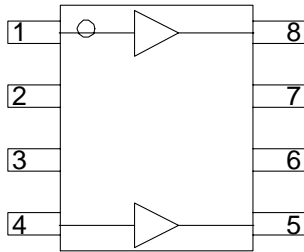




Product Description

Sirenza Microdevice's CGA-3318 is a high performance Silicon Germanium HBT MMIC Amplifier. Designed with SiGe process technology for excellent linearity at an exceptional price. A Darlington configuration is utilized for broadband performance. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. The CGA-3318 contains two amplifiers for use in wideband Push-Pull CATV amplifiers requiring excellent second order performance. The second and third order non-linearities are greatly improved in the push pull configuration.

Amplifier Configuration



ELECTRICAL SPECIFICATIONS

| Symbol | Parameter | Freq.(MHz) | Min. | Typ. | Max. | Units |
|---------------|---|------------|------|------|------|-------|
| G | Small Signal Gain | 5 | | 13.2 | | dB |
| | | 50 | | 12.5 | | |
| | | 500 | | 12.5 | | |
| | | 870 | 10.0 | 12.0 | | |
| OIP2 | Output Second Order Intercept Point Tone Spacing = 1 MHz, Pout per tone = +6 dBm | 50 | | 69.0 | | dBm |
| | | 250 | | 71.5 | | |
| | | 500 | 67.0 | 69.0 | | |
| OIP3 | Output Third Order Intercept Point Tone Spacing = 1 MHz, Pout per tone = +6 dBm | 50 | | 36.5 | | dBm |
| | | 500 | | 38.0 | | |
| | | 870 | 36.0 | 38.0 | | |
| P1dB | Output Power at 1dB Gain Compression | 50 | | 20.0 | | dBm |
| | | 500 | | 21.0 | | |
| | | 870 | 18.6 | 20.6 | | |
| IRL | Input Return Loss | 500 | | 17.0 | | dB |
| | | 50-870 | 10 | | | |
| ORL | Output Return Loss | 500 | | 12.0 | | dB |
| | | 50-870 | 10 | | | |
| NF | Noise Figure Balun Insertion Loss Included | 50 | | 4.2 | | dB |
| | | 500 | | 4.3 | | |
| | | 870 | | 5.0 | 6.0 | |
| CSO | Worst Case Over Band, 79 Ch., Flat, +34dBmV | | | 70 | | dBc |
| CTB | Worst Case Over Band, 79 Ch., Flat, +34dBmV | | | 68 | | dBc |
| XMOD | Worst Case Over Band, 79 Ch., Flat, +34dBmV | | | 63 | | dBc |
| V_D | Device Operating Voltage | | 3.9 | 4.1 | 4.3 | V |
| I_D | Device Operating Current | | 135 | 150 | 165 | mA |
| $R_{TH(J-L)}$ | Thermal Resistance (Junction to Lead) | | | 50 | | °C/W |

The information provided herein is believed to be reliable at press time. Sirenza Microdevices assumes no responsibility for inaccuracies or omissions. Sirenza Microdevices assumes no responsibility for the use of this information, and all such information shall be entirely at the user's own risk. Prices and specifications are subject to change without notice. No patent rights or licenses to any of the circuits described herein are implied or granted to any third party. Sirenza Microdevices does not authorize or warrant any Sirenza Microdevices product for use in life-support devices and/or systems. Copyright 2005 Sirenza Microdevices, Inc.. All worldwide rights reserved.

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<http://www.sirenza.com>

CGA-3318

CGA-3318Z



Dual CATV Broadband High Linearity SiGe HBT Amplifier



Product Features

- Available in Lead free, RoHS compliant, & Green packaging
- Excellent CSO/CTB/XMOD Performance at +34 dBmV Output Power per Tone
- Dual Devices in each SOIC-8 Package simplify Push-Pull configuration PC board layout
- 5 to 900 MHz operation

Applications

- CATV Head End Driver and Predriver Amplifier
- CATV Line Driver Amplifier



CGA-3318 Dual SiGe HBT Amplifier

Absolute Maximum Ratings

| Parameter | Absolute Limit |
|---------------------------------|----------------|
| Max Device Current (I_D) | 225 mA |
| Max Device Voltage (V_D) | 6 V |
| Max. RF Input Power | +18 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:

$$I_D V_D < (T_J - T_L) / R_{TH}, \text{ j-l} \quad T_L = T_{LEAD}$$

Reliability & Qualification Information

| Parameter | Rating |
|-------------------------------------|----------|
| ESD Rating - Human Body Model (HBM) | Class 1B |
| Moisture Sensitivity Level | MSL 1 |

This product qualification report can be downloaded at www.sirenza.com

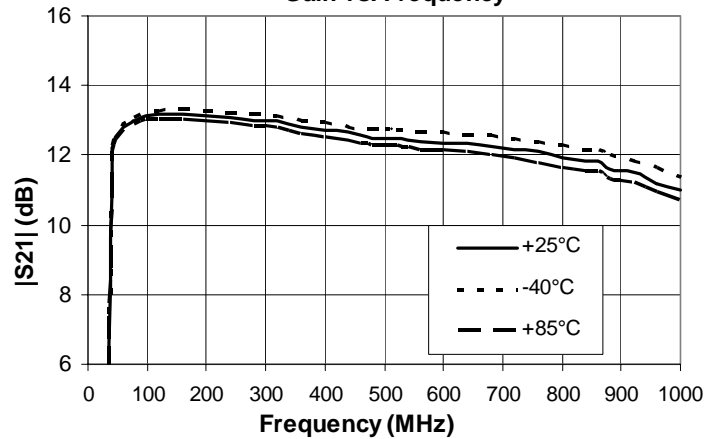


Caution: ESD sensitive

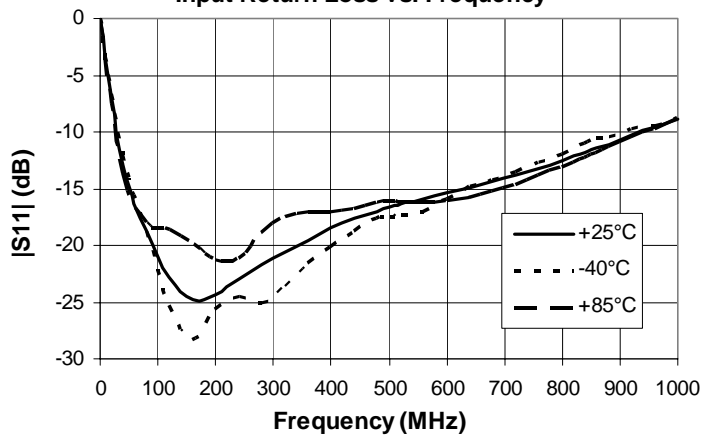
Appropriate precautions in handling, packaging and testing devices must be observed.

Typical RF Performance: $V_S=8V$, $I_D=150mA$ @ $T_L=+25^\circ C$, $R_{BIAS}=51$ Ohms, Push-Pull Configuration

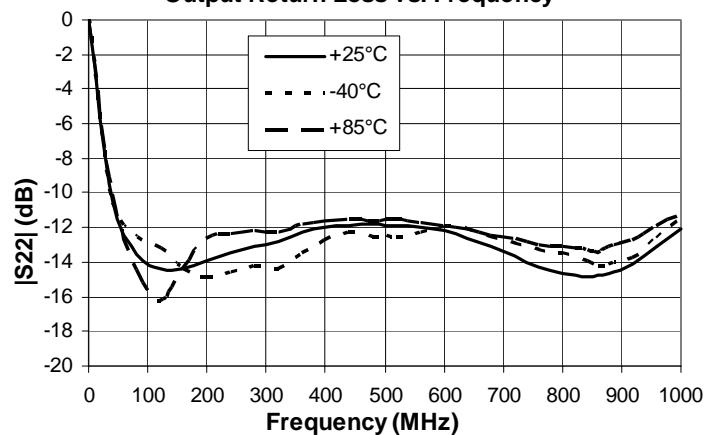
Gain vs. Frequency



Input Return Loss vs. Frequency



Output Return Loss vs. Frequency

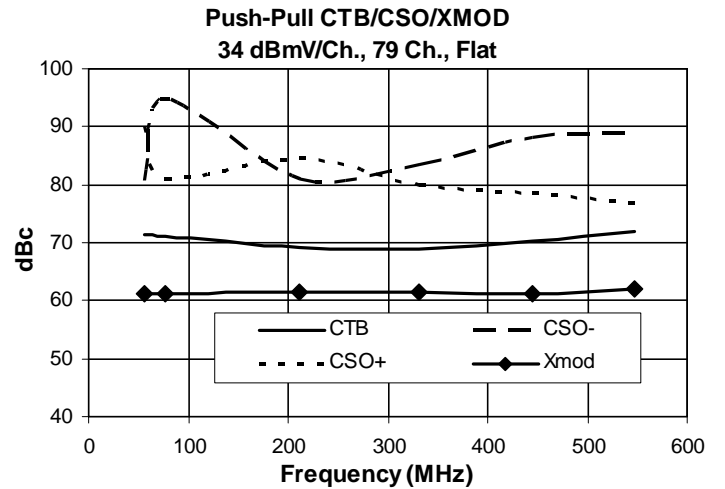
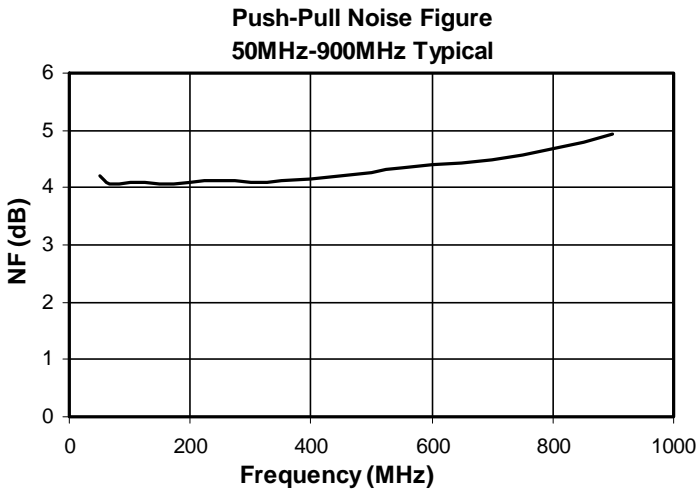
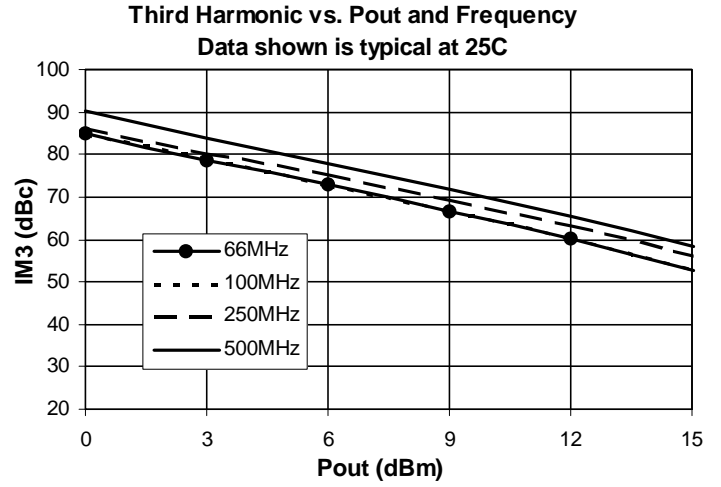
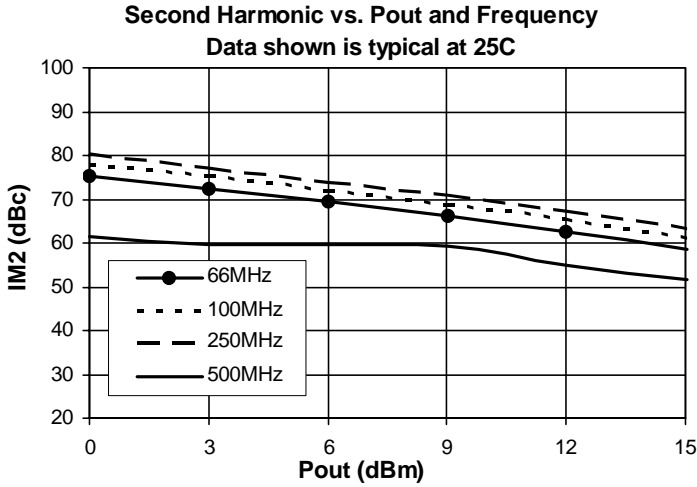
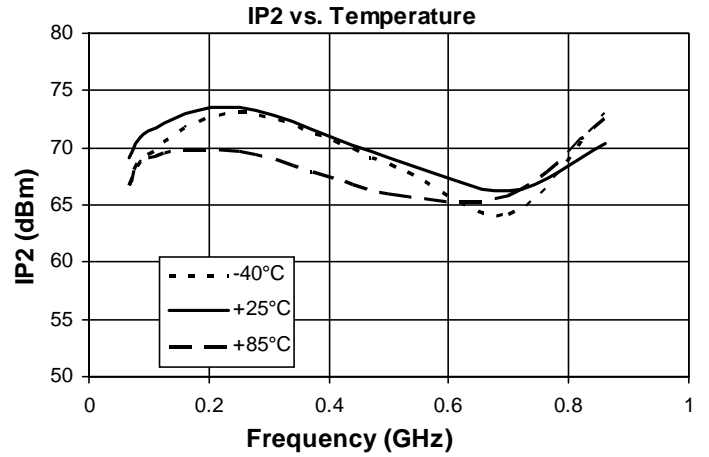
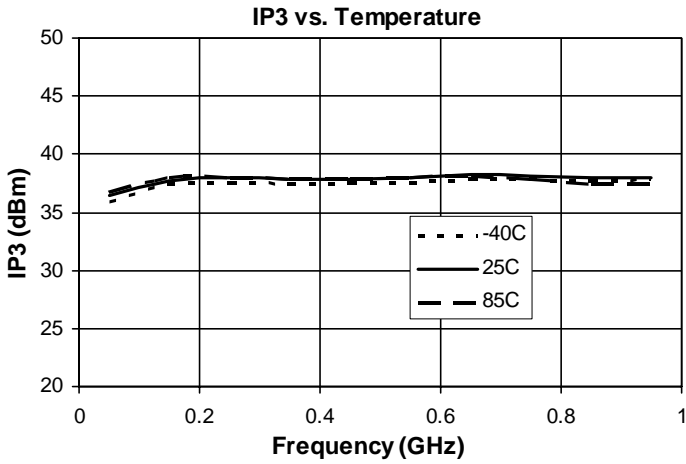


75 Ohm Push Pull S-parameters are available for download at www.sirenza.com



CGA-3318 Dual SiGe HBT Amplifier

Typical RF Performance: $V_s=8V$, $I_D=150mA$ @ $T_L=+25^\circ C$, $R_{BIAS}=51$ Ohms, Push-Pull Configuration

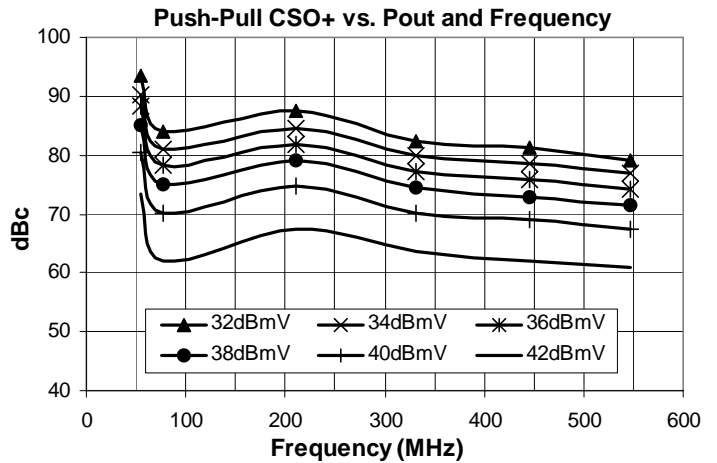
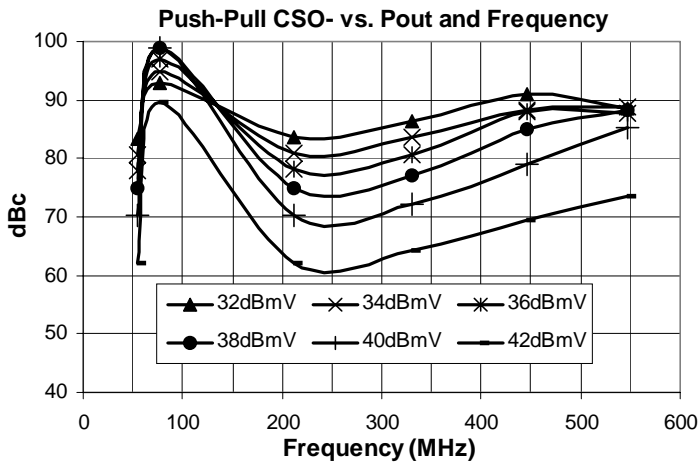
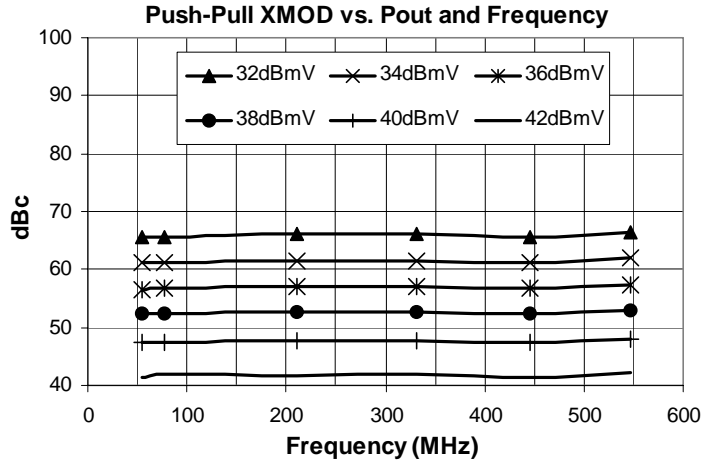
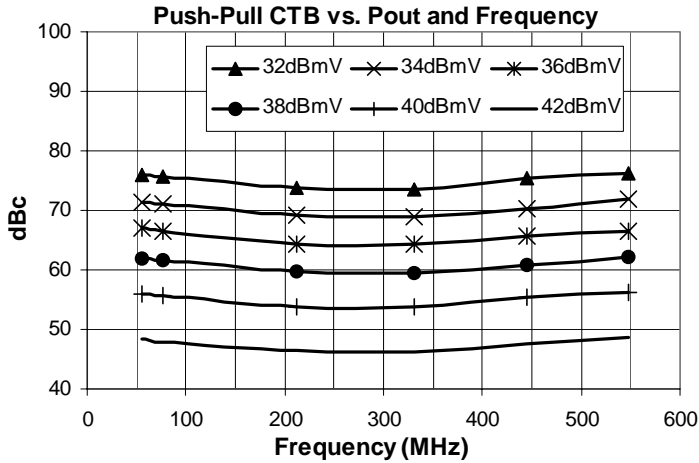




CGA-3318 Dual SiGe HBT Amplifier

CSO/CTB/XMOD Performance:

$V_S=8V$, $I_D=150mA$ @ $T_L=+25^\circ C$, $R_{BIAS}=51$ Ohms, Push-Pull Config, 79 Ch. Flat Analog, No Digital Channels.

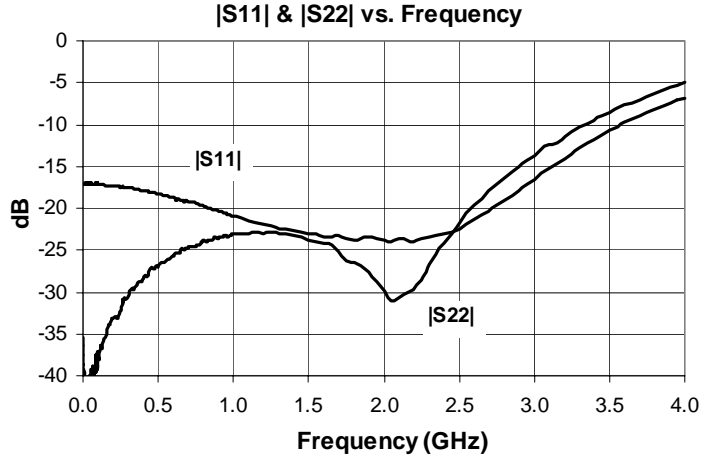
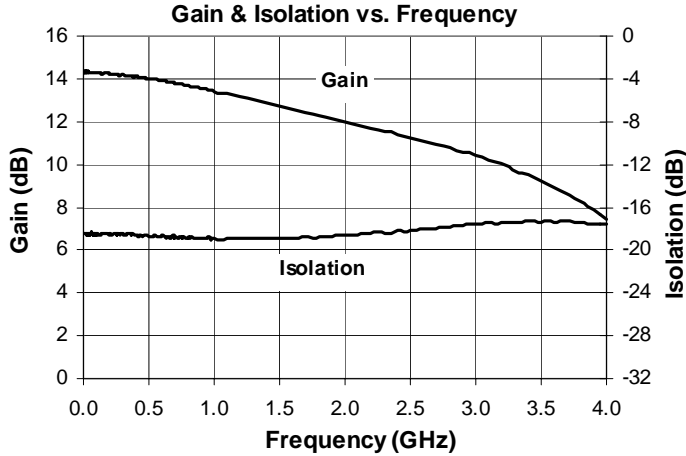


Note: CSO measurements > 85 dBc can be limited by system noise.



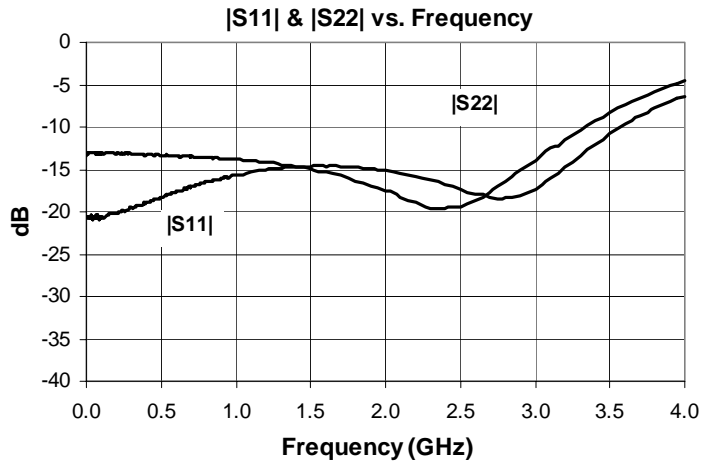
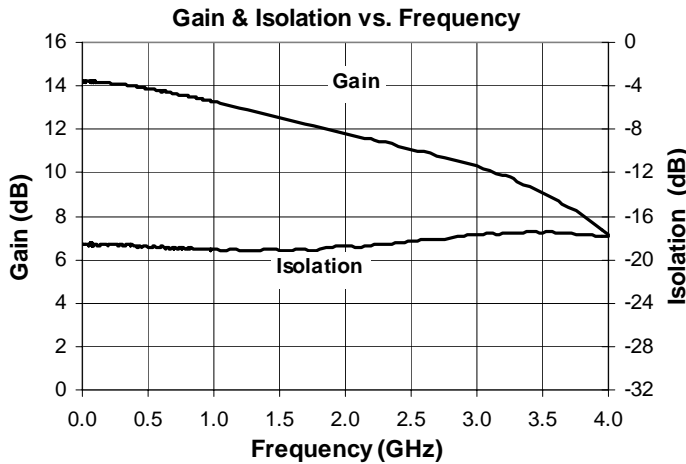
Typical RF Performance - Single Ended - 50 Ohm System

$V_s=8V$, $I_D=75mA$ (one amp biased), $T_L=+25^\circ C$, $R_{BIAS}=51$ Ohms



Typical RF Performance - Single Ended - 37.5 Ohm System

$V_s=8V$, $I_D=75mA$ (one amp biased), $T_L=+25^\circ C$, $R_{BIAS}=51$ Ohms



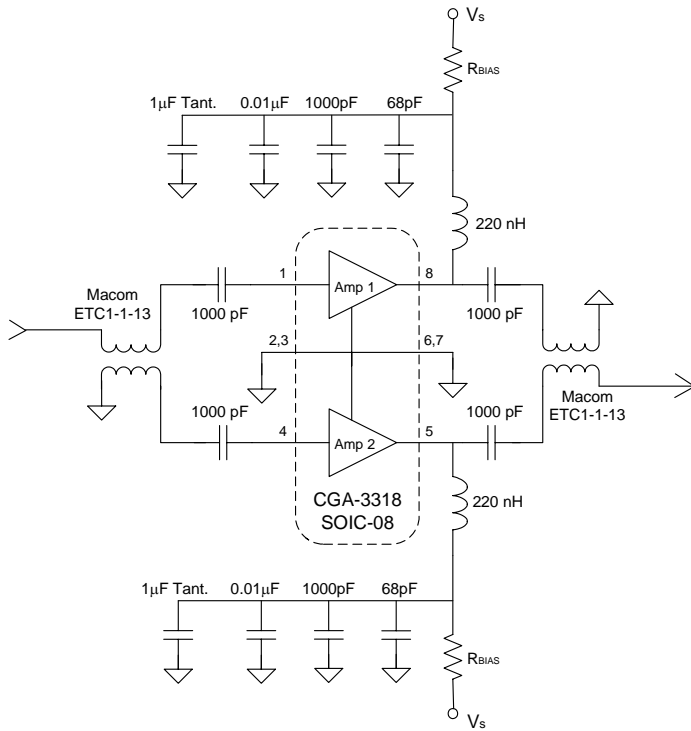
50 Ohm and 37.5 Ohm Single Ended S-parameter files are available for download at www.sirenza.com



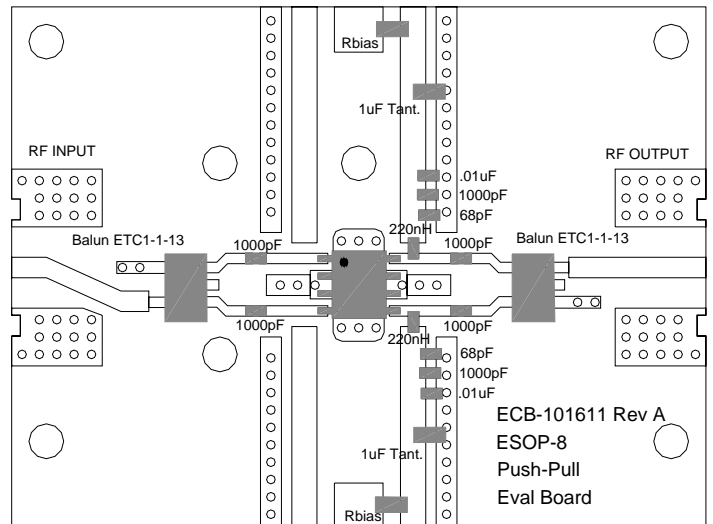
CGA-3318 Dual SiGe HBT Amplifier

| Pin # | Function | Description | Device Pin Out |
|-------|-----------------------|---|----------------|
| 1 | RF IN Device 1 | RF input pin. This pin requires the use of an external DC blocking capacitor as shown in the schematic. | |
| 2,3 | Ground | Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible. | |
| 4 | RF IN Device 2 | Same as pin 1 | |
| 5 | RF OUT / Vcc Device 2 | RF output and bias pin. Bias should be supplied to this pin through an external series resistor and RF choke inductor. Because DC biasing is present on this pin, a DC blocking capacitor should be used in most applications (see application schematic). The supply side of the bias network should be well bypassed. | |
| 6,7 | Ground | Same as pins 2 and 3 | |
| 8 | RF OUT / Vcc Device 1 | Same as pin 5 | |
| EPAD | Ground | Exposed area on the bottom side of the package must be soldered to the ground plane of the board for optimum thermal and RF performance. Several vias should be located under the EPAD as shown in the recommended land pattern on page 5. | |

50-870 MHz Application Schematic



50-870 MHz Evaluation Board Layout



Recommended Bias Resistor Values for ID= 150mA

| Supply Voltage (V _s) | 8V | 9V | 12V | 15V |
|----------------------------------|------|------|------|------|
| R _{BIAS} | 51Ω | 62Ω | 100Ω | 150Ω |
| R _{BIAS} Power Rating | 1/2W | 1/2W | 1W | 1W |

$$R_{BIAS} = \frac{2(V_S - V_D)}{I_D}$$

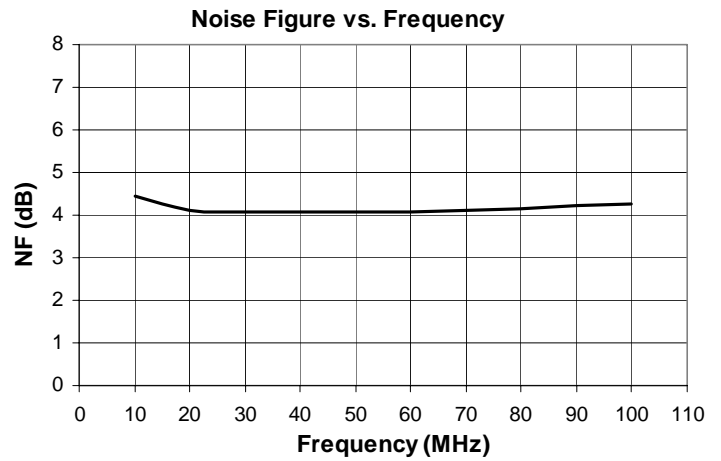
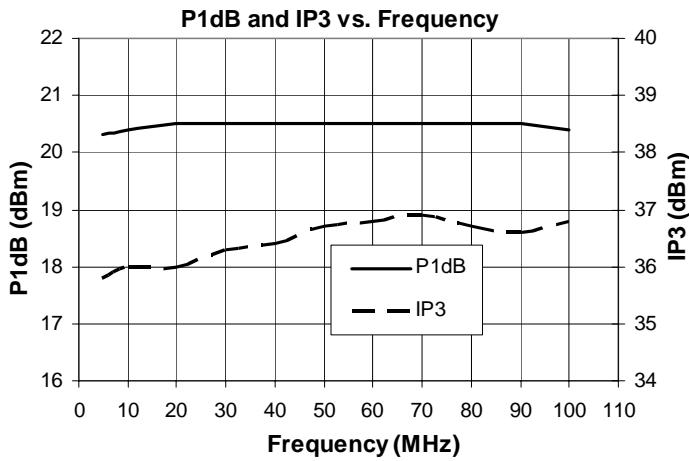
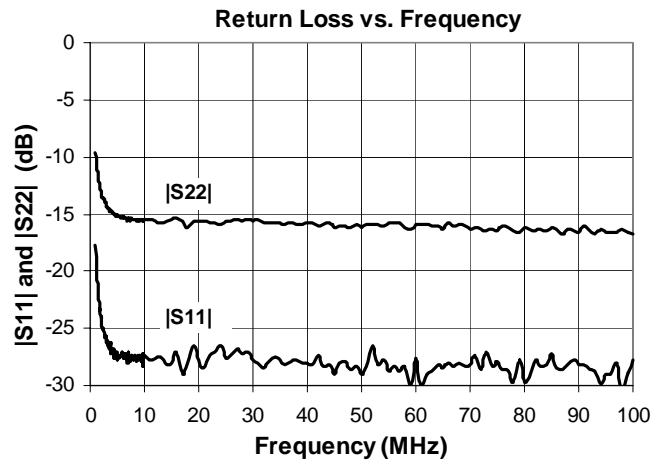
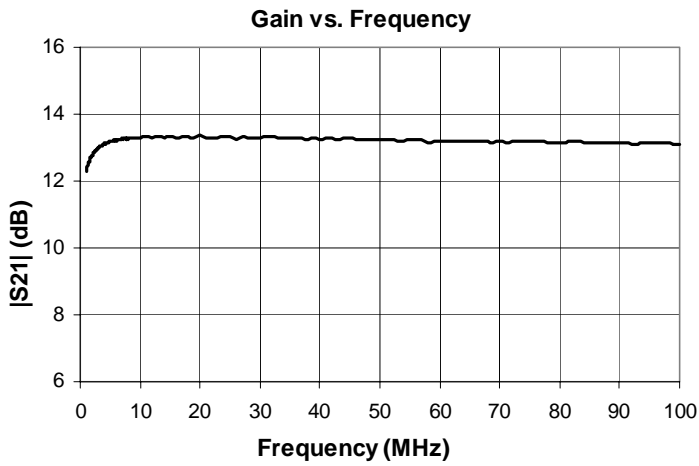
Part Number Ordering Information

| Part Number | Reel Size | Devices / Reel |
|-------------|-----------|----------------|
| CGA-3318 | 7" | 500 |
| CGA-3318Z | 7" | 500 |

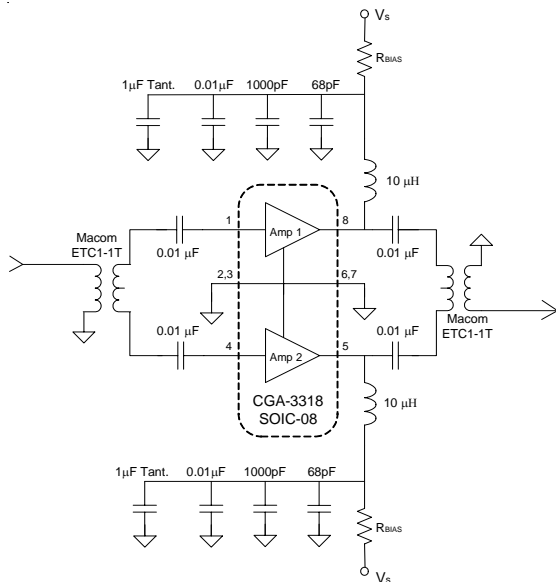


CGA-3318 Dual SiGe HBT Amplifier

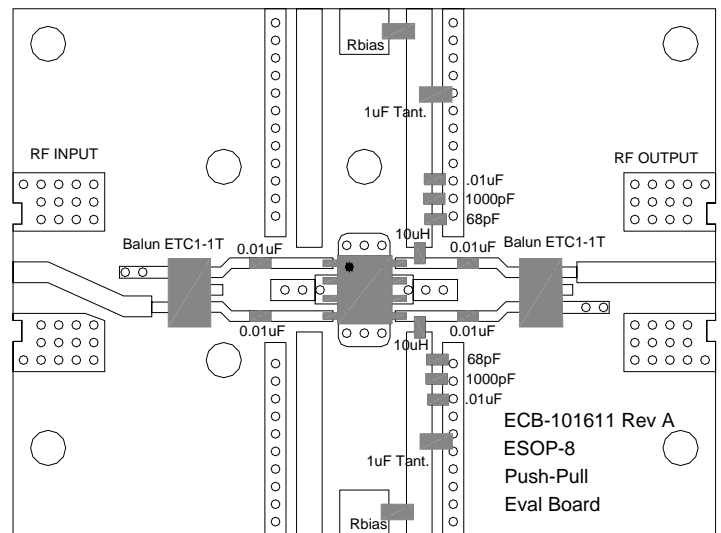
Typical 5-100 MHz RF Performance: $V_s=8V$, $I_D=150mA$ @ $T_L=+25^\circ C$, Push-Pull Configuration



5-100 MHz Application Schematic



5-100 MHz Evaluation Board Layout

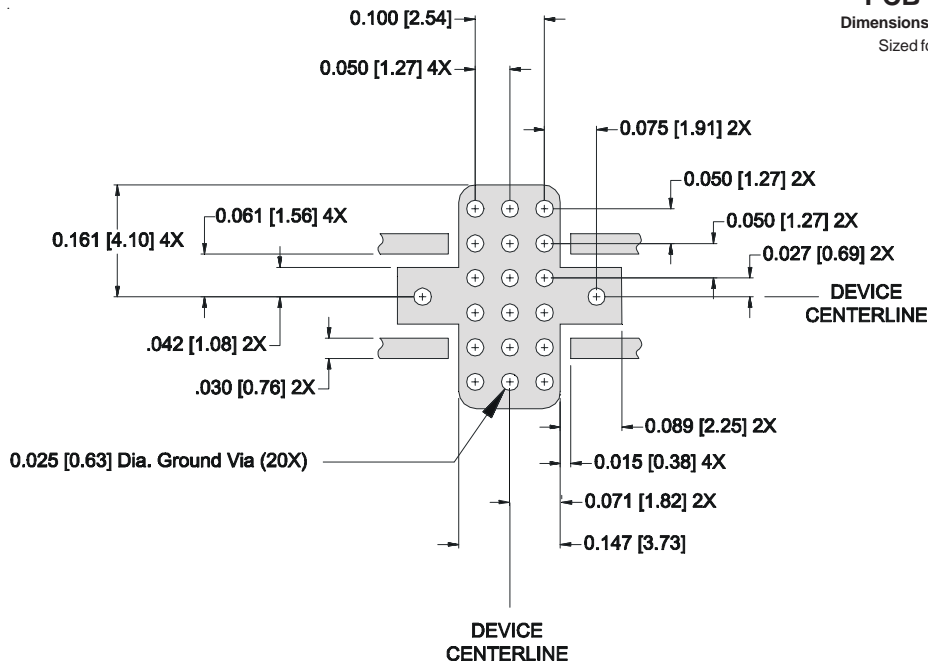




CGA-3318 Dual SiGe HBT Amplifier

PCB Pad Layout

Dimensions in inches [millimeters]
Sized for 31 mil thick FR-4

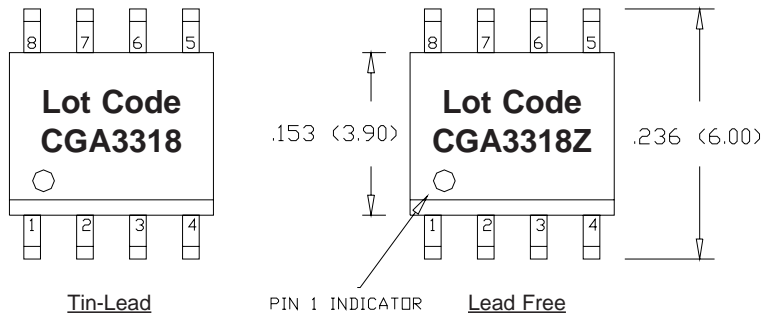


Nominal Package Dimensions & Package Marking

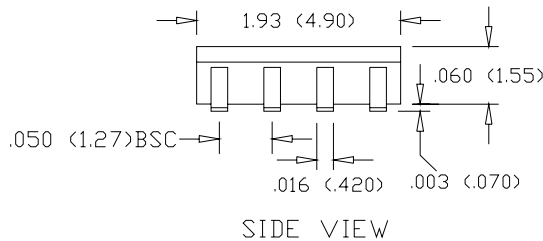
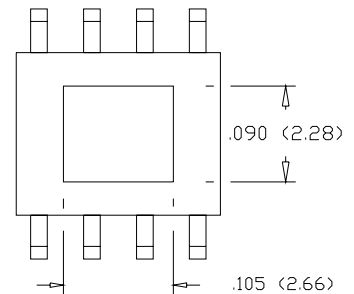
Dimensions in inches [millimeters]

Refer to package drawing posted at www.sirenza.com for tolerances.

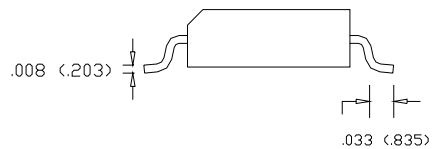
TOP VIEW



BOTTOM VIEW



SIDE VIEW



END VIEW

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