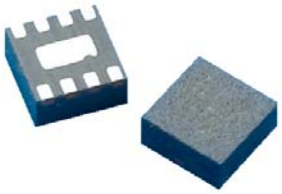
SGL-0622Z

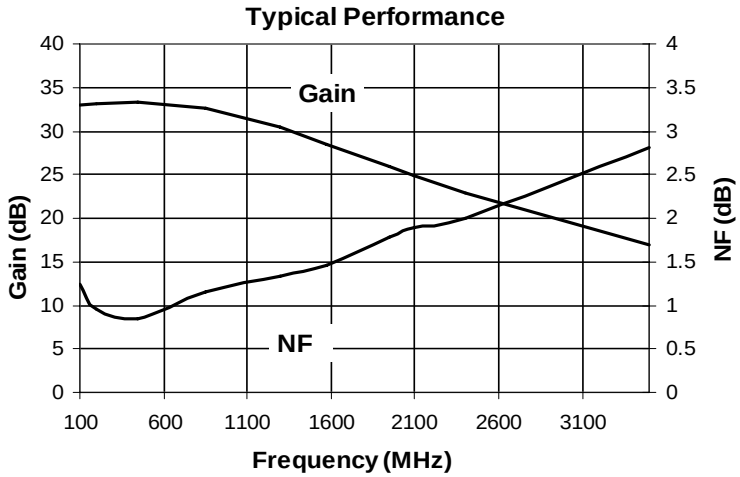
5 - 4000 MHz Low Noise MMIC Amplifier Silicon Germanium



RoHS Compliant & Green Package

Product Description

The SGL-0622Z is a low noise, high gain MMIC LNA designed for low power single-supply operation from 2.7-3.6V. Its Class-1C ESD protection and high input overdrive capability ensures rugged performance, while its integrated active bias circuit maintains robust stable bias over temperature and process beta variation. The SGL-0622Z is internally matched from 5-4000 MHz and requires only 4-5 external biasing components (DC blocks, bypass caps, inductive choke). The SGL-0622Z is fabricated using highly repeatable Silicon Germanium technology and is housed in a cost-effective RoHS/ WEEE compliant QFN 2x2 miniature package.



Product Features

- **High Gain = 28dB @ 1575MHz**
- **Low Noise Figure = 1.5dB @ 1575MHz**
- **Low Power Consumption, 10.5mA @ 3.3V**
- **Battery Operation: 2.7-3.6V (Active Biased)**
- **Fully Integrated Matching**
- **Class-1C ESD Protection (>1000V HBM)**
- **High input overdrive capability, +18dBm**
- **RoHS/WEEE Compliant Miniature 2x2 QFN Package**

Applications

- **High Gain GPS Receivers**
- **ISM & WiMAX LNAs**

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
S_{21}	Small Signal Gain	dB	1.575 GHz 2.44 GHz 3.5 GHz	25 14.5	28 23 16.5	31 18.5
NF	Noise Figure	dB	1.575 GHz 2.44 GHz 3.5 GHz		1.5 2 2.8	1.9
P_{1dB}	Output Power at 1dB Compression	dBm	1.575 GHz 2.44 GHz 3.5 GHz	3.3	5.3 1.5 -1.4	
IIP_3	Input Third Order Intercept Point	dBm	1.575 GHz 2.44 GHz 3.5 GHz	-16	-13 -12 -8.5	
IRL	Input Return Loss	dB	1.575 GHz 2.44 GHz 3.5 GHz	12	14.3 12.0 10.0	
ORL	Output Return Loss	dB	1.575 GHz 2.44 GHz 3.5 GHz	6	9.5 14.0 22.0	
S12	Reverse Isolation	dB	0.05 - 4 GHz		-28	
I_D	Operating Current	mA		7.5	10.5	12.5
R_{TH}, j-l	Thermal Resistance (junction - lead)	°C/W			150	

Test Conditions: V_{CC} = 3.3V, I_D = 10.5mA Typ., IIP_3 Tone Spacing = 1MHz, Pout per tone = -15 dBm
T_L = 25°C, $Z_S = Z_L$ = 50 Ohms

Typical RF Performance at Key Operating Frequencies (With Application Circuit)

Symbol	Parameter	Unit	Frequency (MHz) 100	200	450	850	1575	1950	2440	3500
S_{21}	Small Signal Gain	dB	34.6	34.9	34.4	32.8	28.5	26.1	23.0	17.0
IIP_3	Input Third Order Intercept Point	dBm					-13.0		-12.0	-8.5
P_{1dB}	Output at 1dB Compression	dBm					5.3		1.5	-1.4
S_{11}	Input Return Loss	dB	15.1	20.0	12.6	16.0	14.3	12.8	12.0	10.0
S_{22}	Output Return Loss	dB	9.2	12.2	11.8	10.4	9.5	12.1	14.0	22.0
S_{12}	Reverse Isolation	dB	38.8	39.8	38.7	39.9	35.6	34.8	32.0	29.0
NF	Noise Figure	dB	1.25	0.96	0.84	1.16	1.50	1.78	2.01	2.81

Test Conditions: V_{CC} = 3.3V I_D = 10.5 mA Typ. IIP_3 Tone Spacing = 1MHz, Pout per tone = -15 dBm
T_L = 25°C $Z_S = Z_L$ = 50 Ohms

Reliability & Qualification Information	
Parameter	**Rating**
ESD Rating - Human Body Model (HBM)	Class 1C
Moisture Sensitivity Level	MSL 1

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

Absolute Maximum Ratings

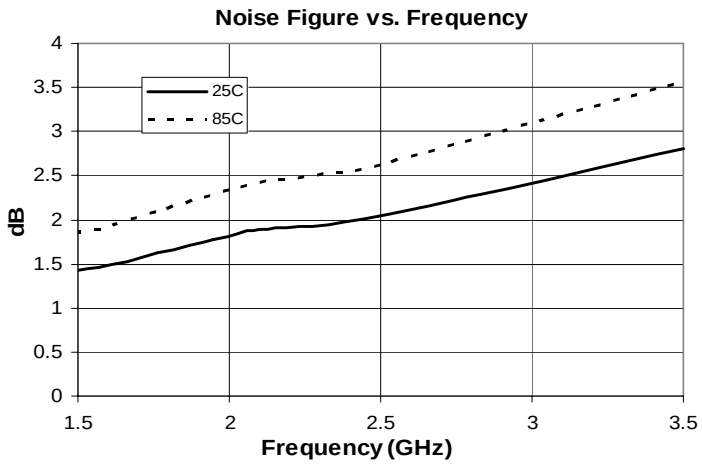
Parameter	Absolute Limit
Max Device Current (I_D)	20mA
Max Device Voltage (V_D)	4 V
Max. RF Input Power* (See Note)	+18 dBm
Max. Junction Temp. (T_J)	+150°C
Operating Temp. Range (T_L)	-40°C to +85°C
Max. Storage Temp.	+150°C

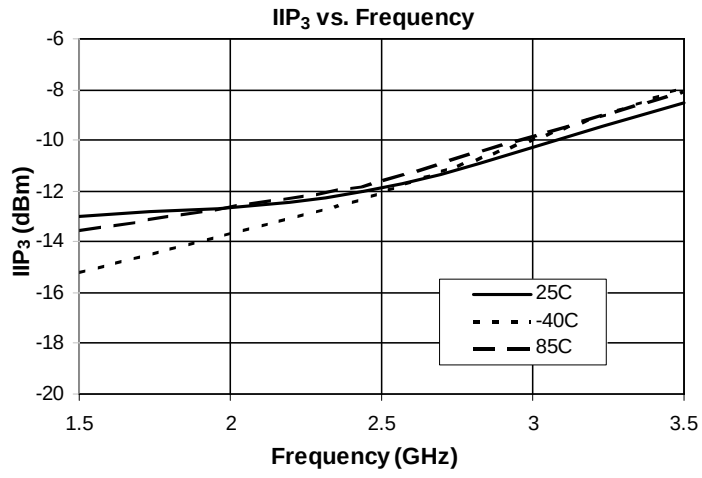
***Note:** Load condition 1, Z_L = 50 Ohms
Load condition 2, ZL = 10:1 VSWR

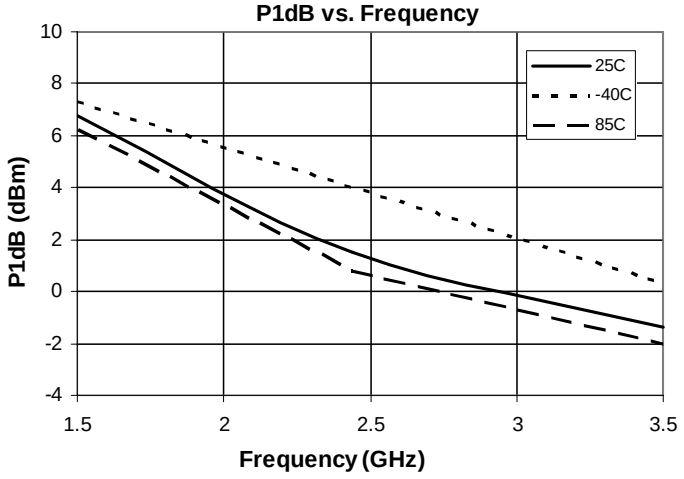
Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:
$I_D V_D < (T_J - T_L) / R_{TH, j-l}$ $T_L = T_{LEAD}$

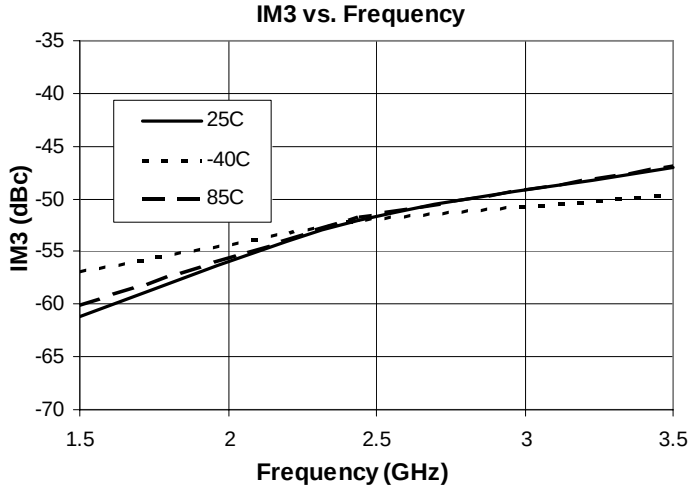
Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.

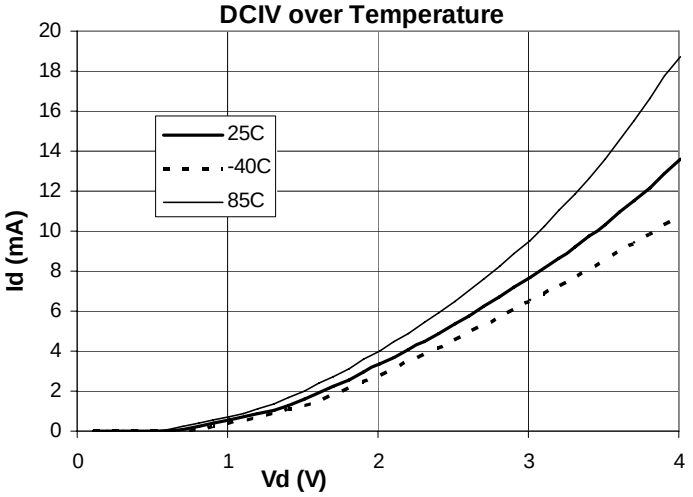


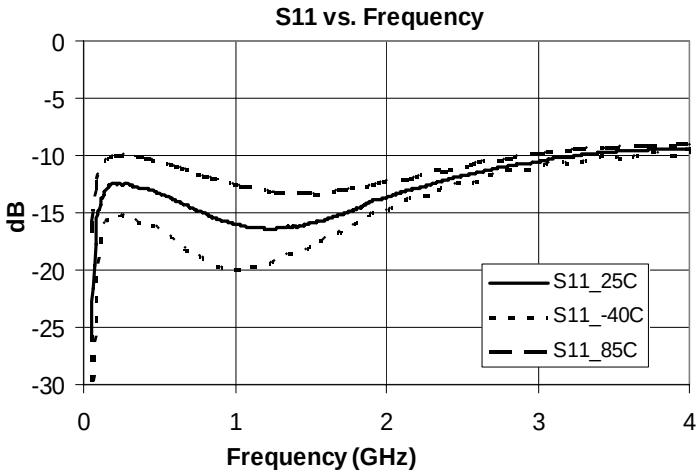


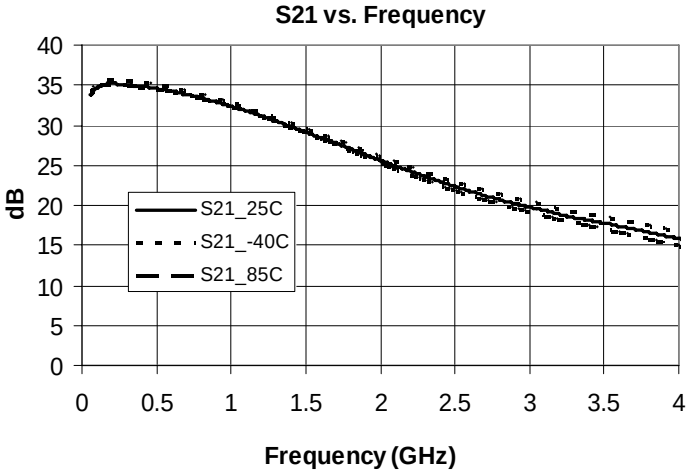


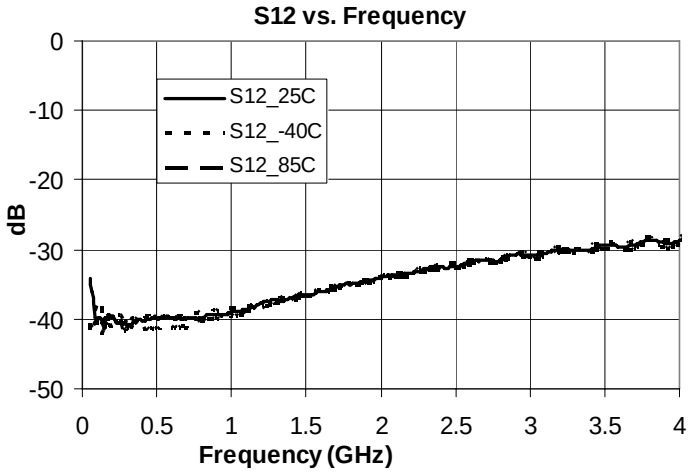
Application Circuit Data, V_{CC}= 3.3V, I_D= 9mA

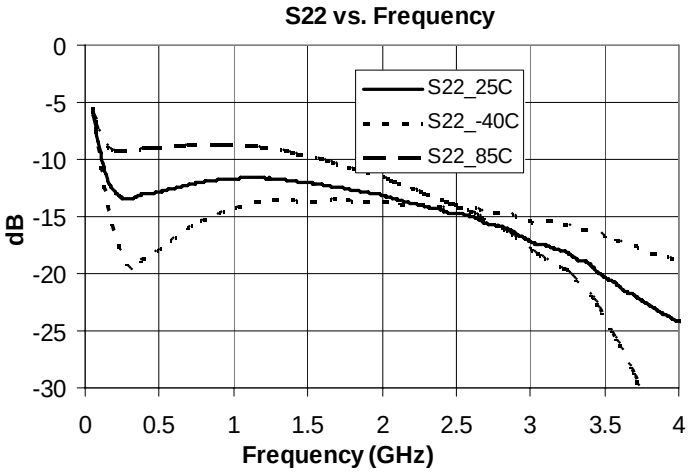




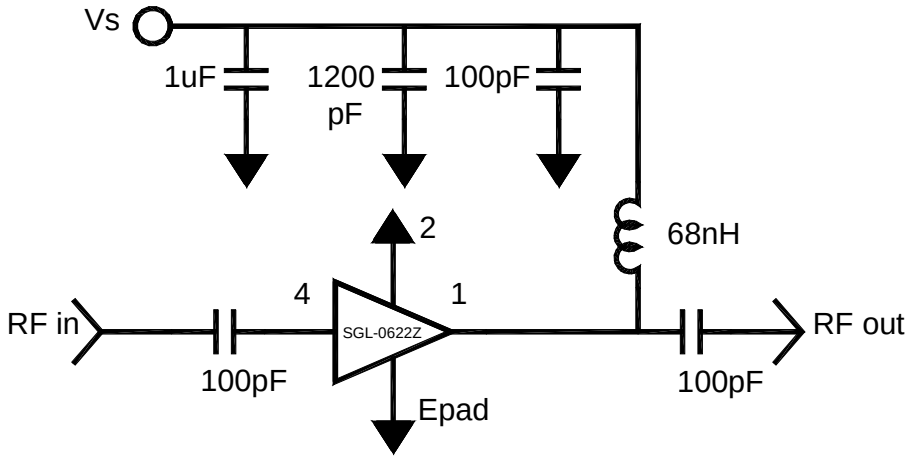




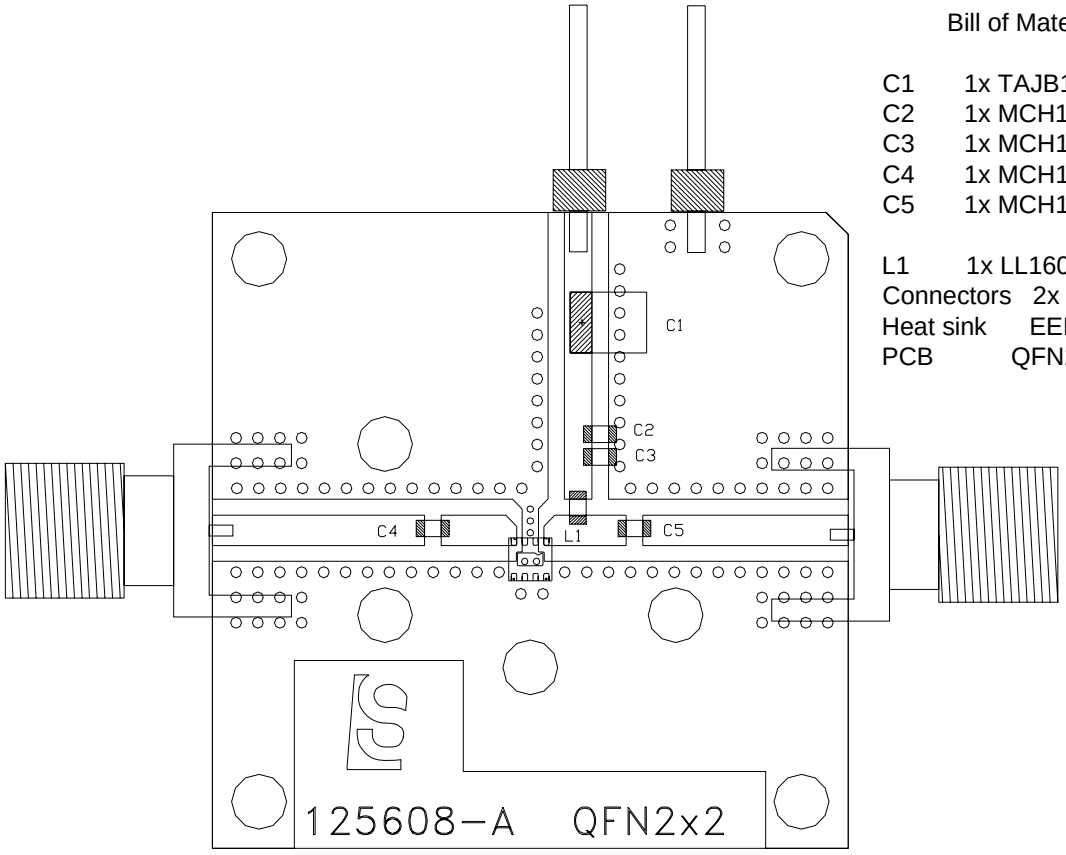




Application Schematic



Evaluation Board Layout



Bill of Materials

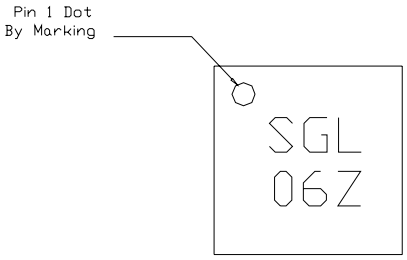
C1	1x TAJB105KLRH Rohm 1.0uF
C2	1x MCH185C122KK Rohm 1200pF
C3	1x MCH185A101JK Rohm 100pF
C4	1x MCH185A101JK Rohm 100pF
C5	1x MCH185A101JK Rohm 100pF
L1	1x LL1608-FS56NJ Toko 68nH
Connectors	2x PSF-S01-1mm GigaLane Co.
Heat sink	EEF-102059
PCB	QFN2x2

Pin #	Function	Description
1	RF OUT/V_D	RF output and bias pin. Bias should be supplied to this pin through an external RF choke. (See application circuit)
2	GND	Connect to ground per application circuit drawing.
3,5,6,7,8	N/A	Not Used
4	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor as shown in the application schematics.
EPAD	GND	Exposed area on the bottom side of the package needs to be soldered to the ground plane of the board for thermal and RF performance. Vias should be located under the EPAD as shown in the recommended land pattern.

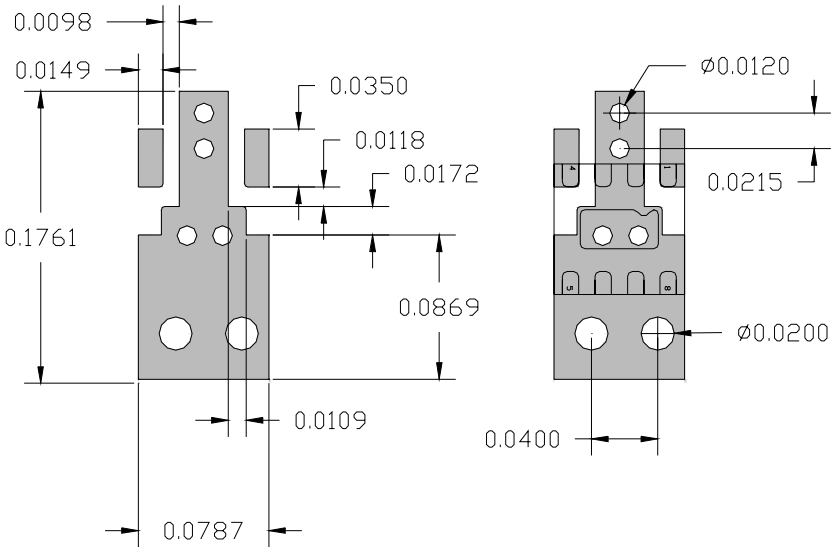
Part Number Ordering Information

Part Number	Reel Size	Devices / Reel
SGL-0622Z	7"	3000

Part Identification



Suggested Pad Layout



Nominal Package Dimensions

Dimensions in inches [millimeters]
Refer to drawing posted at *www.sirenza.com* for tolerances.

Package Type:
2 x 2 QFN