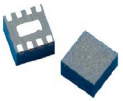
SGL0622Z

5MHz to 4000MHz LOW NOISE MMIC AMPLIFIER SILICON GERMANIUM

Package: QFN, 2x2



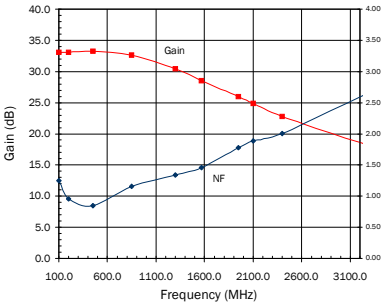
Product Description

The SGL0622Z is a low noise, high gain MMIC LNA designed for low power single-supply operation from 2.7V to 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 SGL0622Z is internally matched from 5MHz to 4000 MHz and requires only 4 to 5 external biasing components (DC blocks, bypass caps, inductive choke). The SGL0622Z is fabricated using highly repeatable Silicon Germanium technology and is housed in a cost-effective RoHS/WEEE compliant QFN 2x2 miniature package.

Optimum Technology Matching® Applied

- ☐ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ✓ SiGe HBT
- ☐ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ RF MEMS

Typical Performance



Features

- High Gain=28dB at 1575MHz
- Low Noise Figure=1.5dB at 1575MHz
- Low Power Consumption, 10.5mA @ 3.3V
- Battery Operation: 2.7V to 3.6V (Active Biased)
- Fully Integrated Matching
- Class-1C ESD Protection (>1000V HBM)
- High input overdrive capability, +18dBm

Applications

- High Gain GPS Receivers
- ISM and WiMAX LNAs

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Small Signal Gain	25.0	28.0	31.0	dB	1.575GHz
		23.0		dB	2.44GHz
	14.5	16.5	18.5	dB	3.50GHz
Output Power at 1dB Compression	3.3	5.3		dBm	1.575GHz
		1.5		dBm	2.44GHz
		-1.4		dBm	3.50GHz
Input Third Order Intercept Point	-16.0	-13.0		dBm	1.575GHz
		-12.0		dBm	2.44GHz
		-8.5		dBm	3.50GHz
Input Return Loss	12.0	14.0		dB	1.575GHz
		12.0		dB	2.44GHz
		10.0		dB	3.50GHz
Output Return Loss	6.0	9.5		dB	1.575GHz
		14.0		dB	2.44GHz
		22.0		dB	3.50GHz
Noise Figure		1.5	1.9	dB	1.575GHz
		2.0		dB	2.44GHz
		2.8		dB	3.50GHz
Reverse Isolation		-28.0		dB	0.05GHz to 4.0GHz
Thermal Resistance		150		°C/W	junction - lead
Device Operating Current	7.5	10.5	14.5	mA	

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

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Absolute Maximum Ratings

Parameter	Rating	Unit
Device Current (I_D)	30	mA
Device Voltage (V_D)	4	V
RF Input Power* (See Note)	-10	dBm
Junction Temp (T_J)	+150	°C
Operating Temp Range (T_L)	-40 to +85	°C
Storage Temp	+150	°C
ESD Rating - Human Body Model (HBM)	Class 1C	
Moisture Sensitivity Level	MSL 1	

*Note: Load condition1, ZL=50Ω. Load condition2, Z_L=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 and $T_L = T_{LEAD}$

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2011/65/EU (at time of this document revision).

RFMD Green: RoHS compliant per EU Directive 2011/65/EU, halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

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

Parameter	Unit	100 MHz	200 MHz	450 MHz	850 MHz	1575 MHz	1950 MHz	2440 MHz	3550 MHz
Small Signal Gain, S21	dB	34.6	34.9	34.4	32.8	28.5	26.1	23.0	17.0
Input Third Order Intercept Point, IIP3	dBm					-13.0		-12.0	-8.5
Output at 1dB Compression, P1dB	dBm	2.7				5.3		1.5	-1.4
Input Return Loss	dB	15.1	20.0	12.6	16.0	14.3	12.8	12.0	10.0
Output Return Loss	dB	9.2	12.2	11.8	10.4	9.5	12.1	14.0	22.0
Reverse Isolation	dB	38.8	39.8	38.7	39.9	35.6	34.8	32.0	29.0
Noise Figure, NF	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=10.5mA Typ. IIP_3 Tone Spacing=1MHz, P_{OUT} per tone=-15dBm
T_L=25°C $Z_S = Z_L$=50Ω

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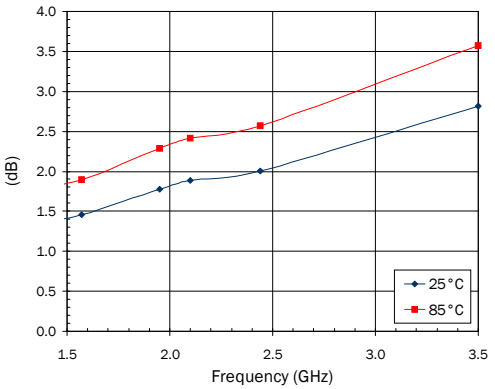
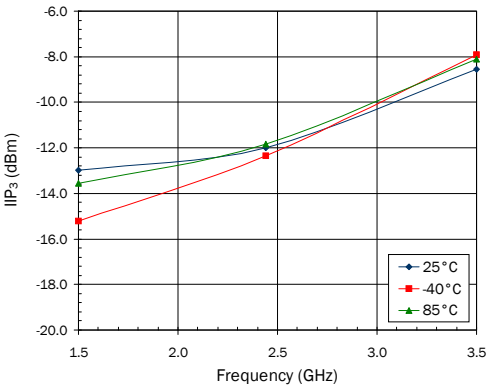
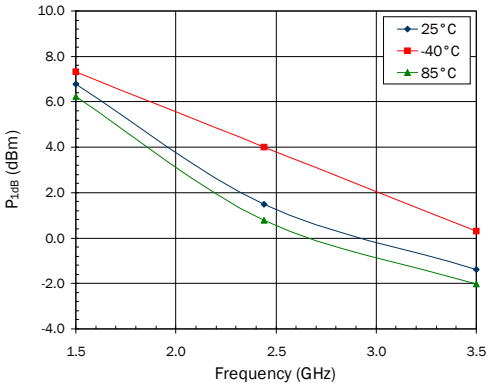
Noise Figure versus Frequency



IIP_3 versus Frequency

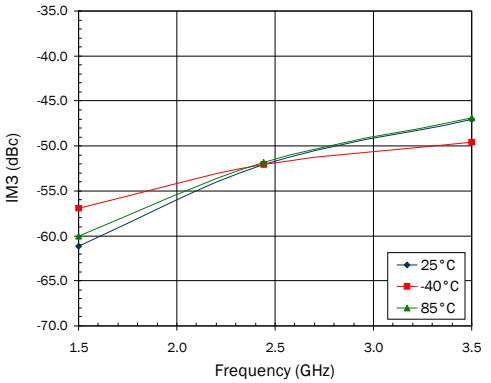


P_{1dB} versus Frequency

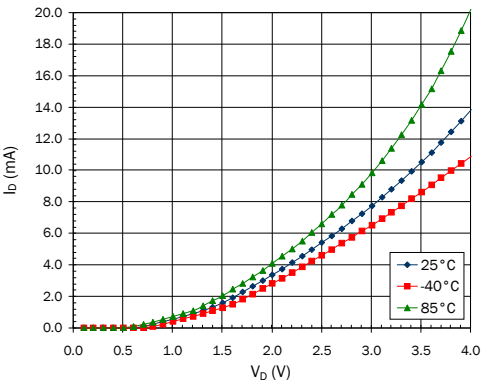


Application Circuit Data, V_{CC}= 3.3V, I_D= 9mA

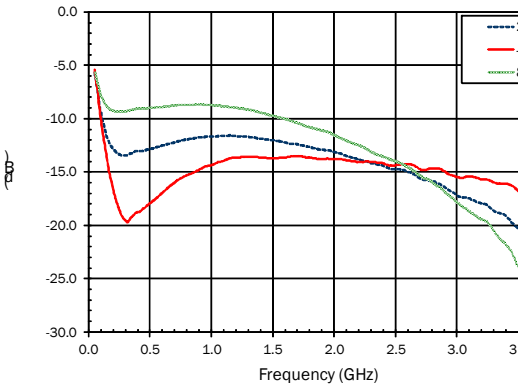
IM3 versus Frequency



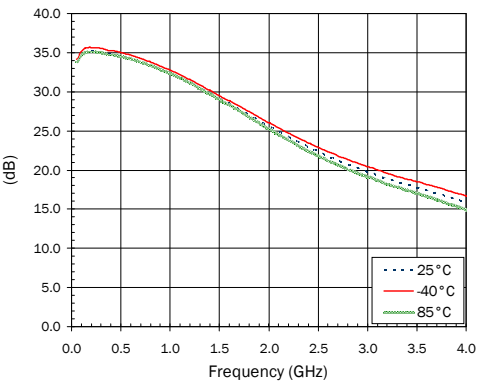
DCIV over Temperature



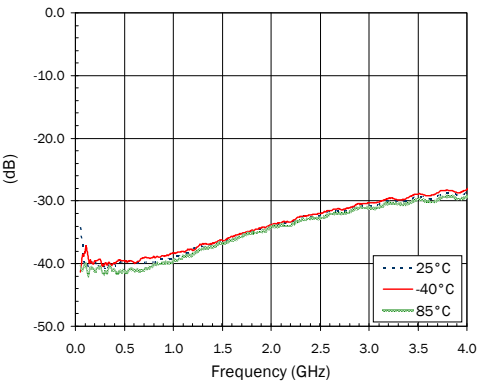
S22 versus Frequency



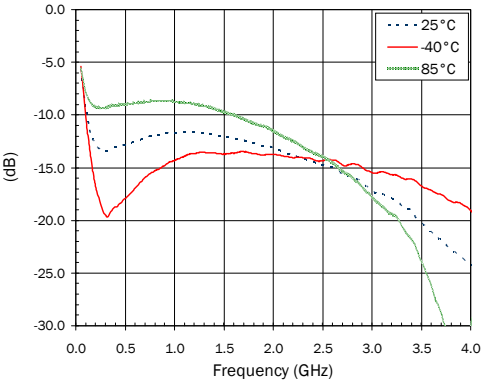
S21 versus Frequency



S12 versus Frequency



S22 versus Frequency



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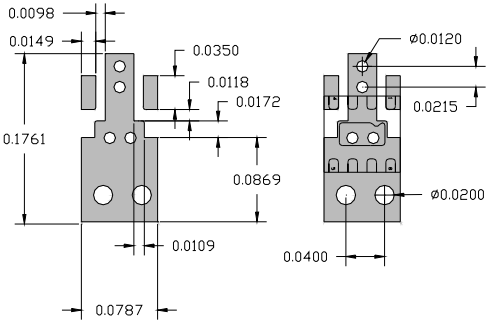
Pin	Function	Description
1	RF OUT/VD	RF output and bias pin. Bias should be supplied to this pin through an external RF choke. (See application circuit)
2	GND	Connect to ground per application circuit drawing.
3, 5, 6, 7, 8	N/A	Not Used
4	RF IN	RF input pin. This pin requires the use of an external DC 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.

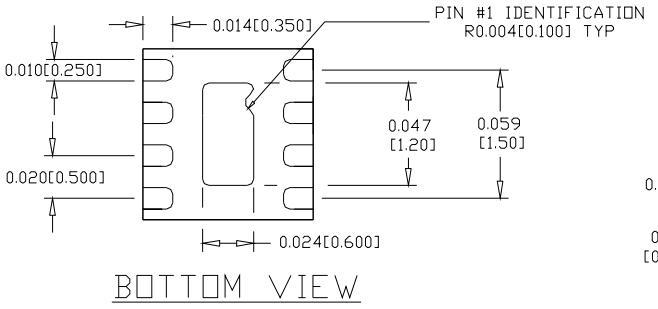
Suggested Pad Layout

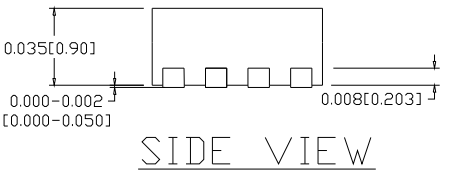


Nominal Package Dimensions

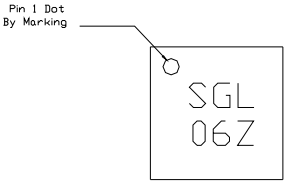
Dimensions in inches (millimeters)
Refer to drawing posted at www.rfmd.com for tolerances.

Package Type:
2 x 2 QFN

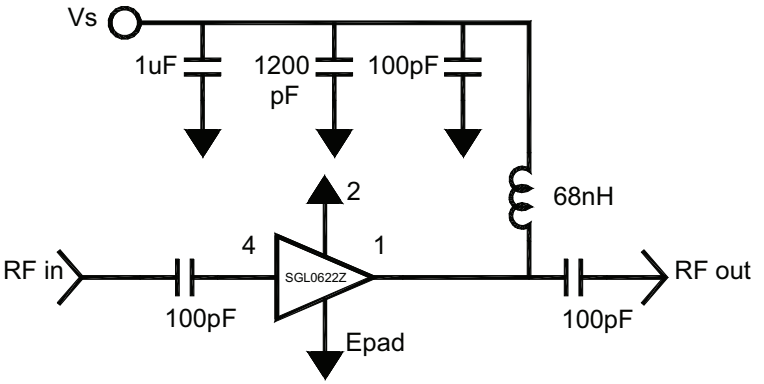




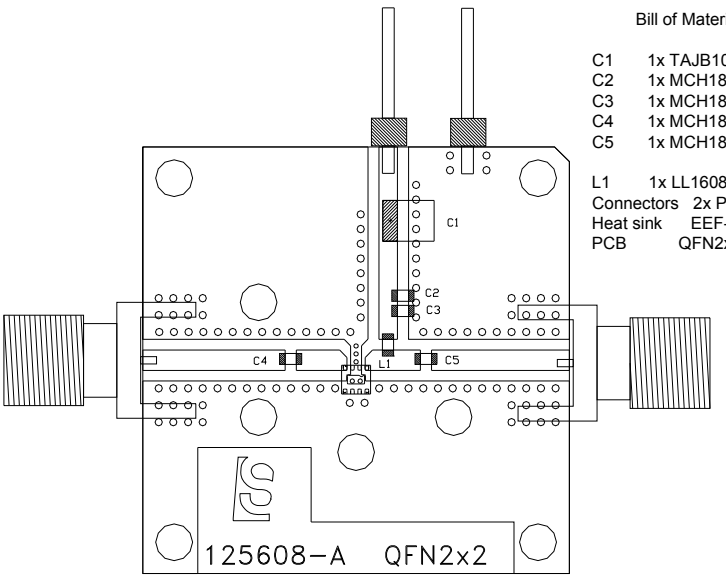
Part Identification



Application Schematic



Evaluation Board Layout and Bill of Materials



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

Ordering Information

Part Number	Description
SGL0622Z	7" Reel with 3000 pieces
SGL0622ZSQ	Sample Bag with 25 pieces
SGL0622ZSR	7" Reel with 100 pieces
SGL0622ZPCK1	100MHz to 3500MHz PCBA with 5-piece Sample Bag

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