

SGL0622Z

5 MHz to 4000 MHz, Low-Noise SiGe HBT MMIC Amplifier

The SGL0622Z is a low noise, high gain MMIC LNA designed for low power single-supply operation from +2.7 V to +3.6 V. It's Class-2 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 5 MHz 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 2 x 2 mm DFN package.

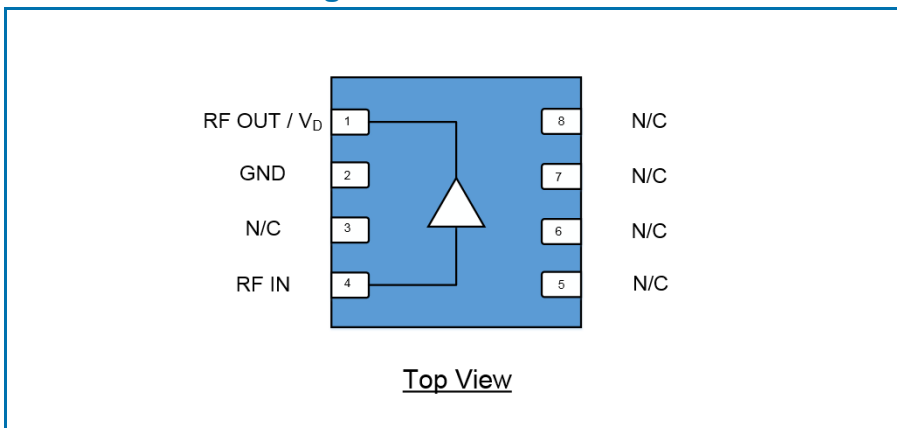


8 Pin, 2.0 mm x 2.0 mm DFN Package

Features

- High Gain, 28.6 dB at 1575 MHz
- Low Noise Figure, 1.4 dB at 1575 MHz
- Low Power Consumption 10.5 mA at +3.3 V
- Battery Operation: +2.7 V to +3.6 V (Active Bias)
- Fully Integrated Matching
- Class 2 ESD Protection (>2000 V HBM)

Functional Block Diagram



Applications

- High Gain GPS Receivers
- ISM and WiMAX LNAs

Ordering Information

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

SGL0622Z

Absolute Maximum Ratings

Parameter	Rating	Units
Device Voltage (V_D)	+4.0	V
Device Current (I_D)	30	mA
RF Input Power	-10	dBm
Storage Temperature	-55 to +150	°C
ESD Rating (HBM)	+2000 (Class 2)	V
Moisture Sensitivity Level	MSL1	-

Notes:

1. Load Condition 1: $Z_L = 50 \Omega$
2. Load Condition 2: $Z_L = 10:1$ VSWR
3. Input Power may be driven above -10 dBm provided device current does not exceed the absolute maximum. Device current can be limited by means of a dropping resistor (typically 27Ω) between V_S and Pin 1. Device current in an overdrive scenario will vary according to the operation frequency.
4. 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 this table.
5. Bias Conditions should also satisfy the following expression: $I_D V_D < (T_J - T_L) / R_{TH}$, and $T_L = T_{LEAD}$.



Caution! ESD sensitive device.



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

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.

Recommended Operating Conditions

Parameter	Rating			Units
	Min	Typ	Max	
Operating Temperature Range	-40		+105	°C
Junction Temperature (T_J)			+125	°C
Operating Voltage	+2.7	+3.3	+3.6	V

Electrical Specifications – General

Parameter	Specification			Units	Conditions
	Min	Typ	Max		
Small Signal Gain, S21	25.0	28.6	31.0	dB	1.575 GHz
		24.0		dB	2.44 GHz
		18.0		dB	3.50 GHz
Output Power at 1 dB Compression	+3.3	+6.0		dBm	1.575 GHz
		+1.0		dBm	2.44 GHz
		-1.0		dBm	3.50 GHz
Input Third Order Intercept Point	-19.0	-16.0		dBm	1.575 GHz
		-15.0		dBm	2.44 GHz
		-10.0		dBm	3.50 GHz
Input Return Loss, S11	12.0	18.7		dB	1.575 GHz
		18.3		dB	2.44 GHz
		17.6		dB	3.50 GHz
Output Return Loss, S22	6.0	12.3		dB	1.575 GHz
		10.3		dB	2.44 GHz
		7.0		dB	3.50 GHz

Test Conditions unless otherwise specified: $V_{CC} = +3.3$ V, $I_D = +10.5$ mA Typ., $T_L = +25^\circ\text{C}$, $Z_S = Z_L = 50 \Omega$
 IIP3 Tone Spacing=1 MHz, P_{OUT} per tone = -15 dBm

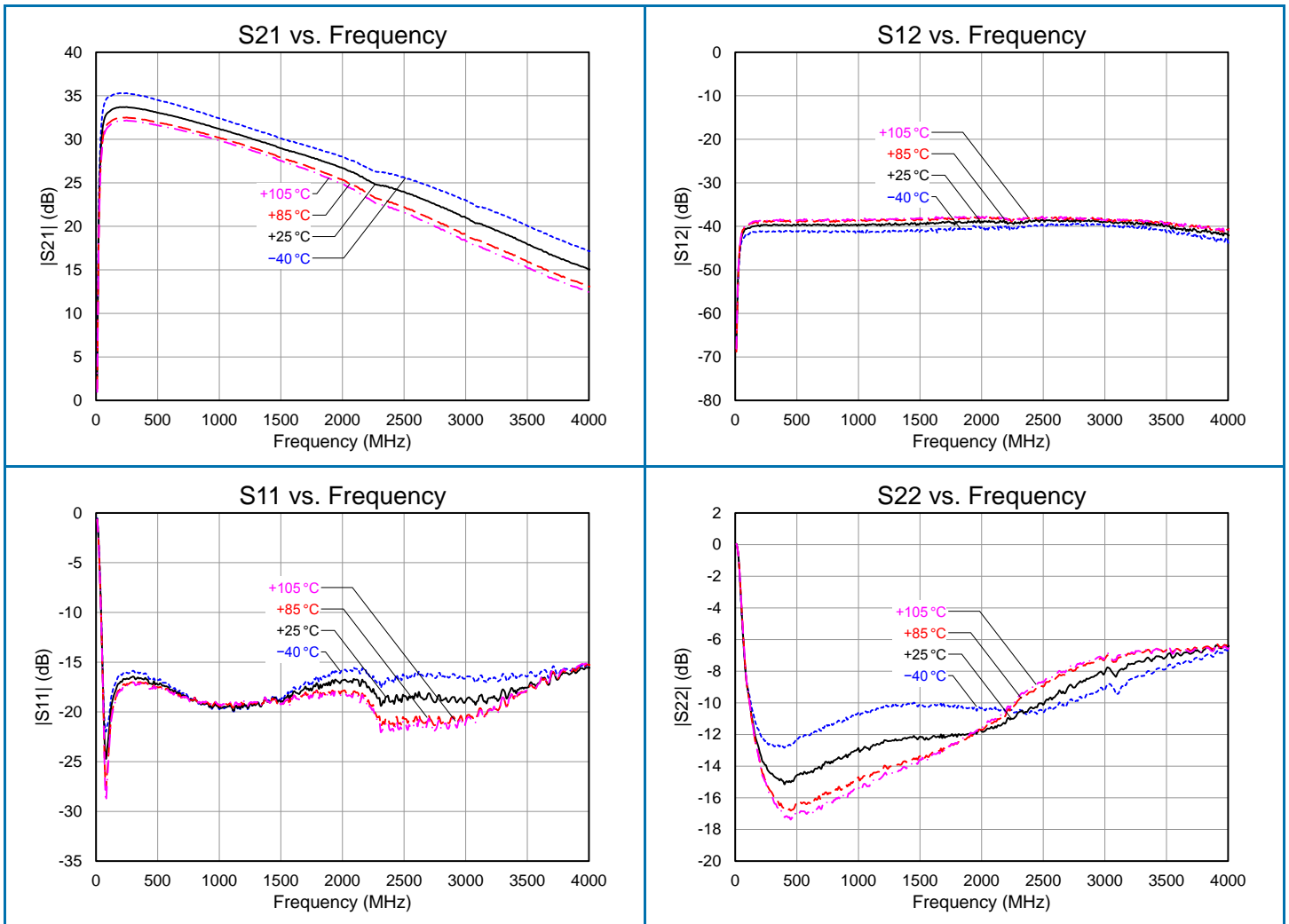
SGL0622Z

Electrical Specifications – General (Continued)

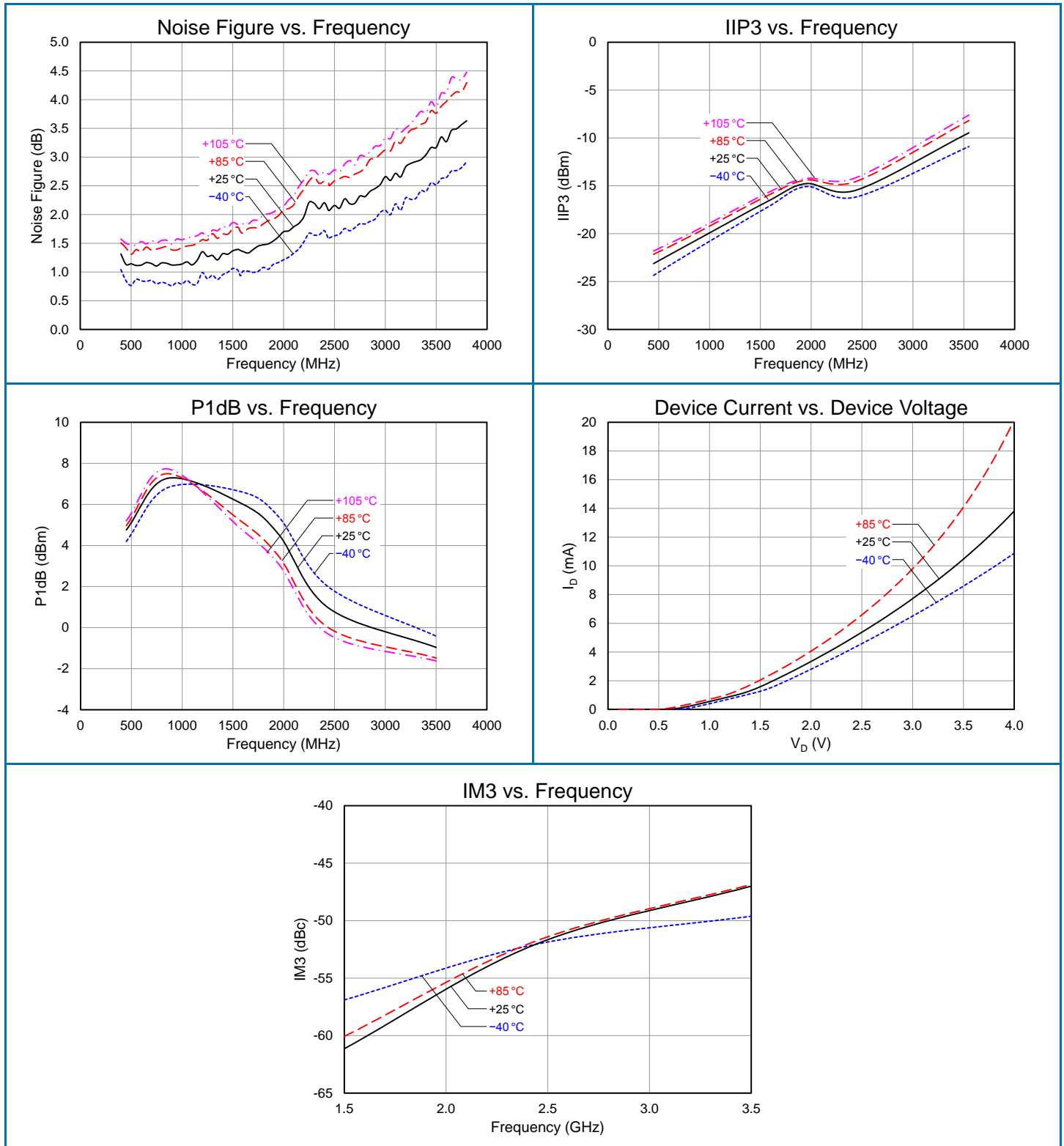
Parameter	Specification			Units	Conditions
	Min	Typ	Max		
Reverse Isolation, S12		39.0		dB	1.575 GHz
		38.5		dB	2.44 GHz
		39.8		dB	3.50 GHz
Noise Figure		1.4	1.9	dB	1.575 GHz
		2.0		dB	2.44 GHz
		3.2		dB	3.50 GHz
Thermal Resistance		110		°C/W	
Device Operating Current	+7.5	+10.5	+14.5	mA	

Test Conditions unless otherwise specified: $V_{CC} = +3.3\text{ V}$, $I_D = +10.5\text{ mA Typ.}$, $T_L = +25^\circ\text{C}$, $Z_S = Z_L = 50\ \Omega$
 IIP3 Tone Spacing=1 MHz, P_{OUT} per tone = -15 dBm

Typical Performance Using 850MHz Application Board

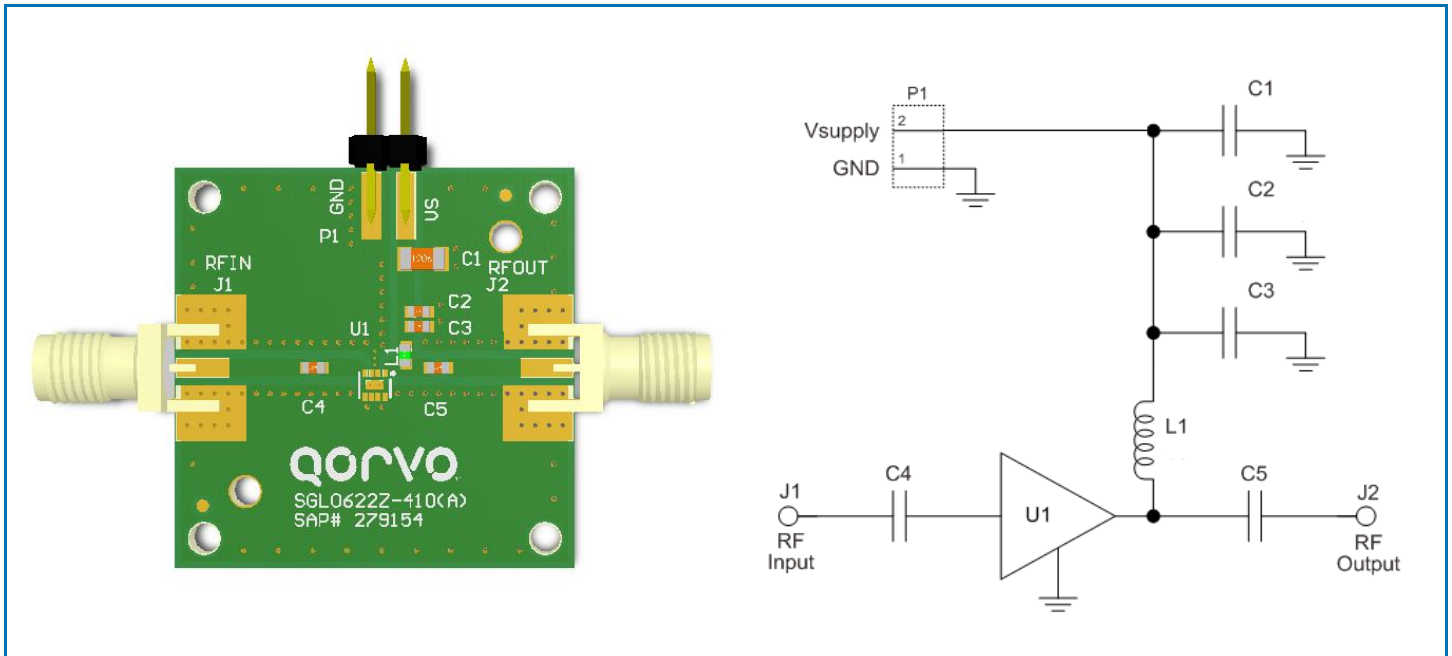


Typical Performance Using 850MHz Application Board



SGL0622Z

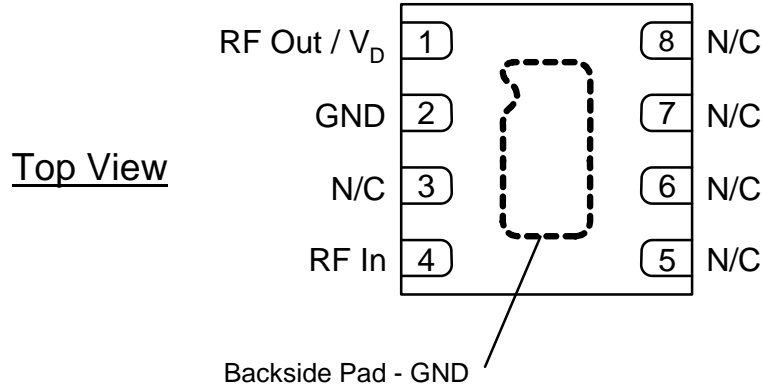
Evaluation Board and Schematic



Evaluation Board Bill of Materials For 850MHz Application Circuit

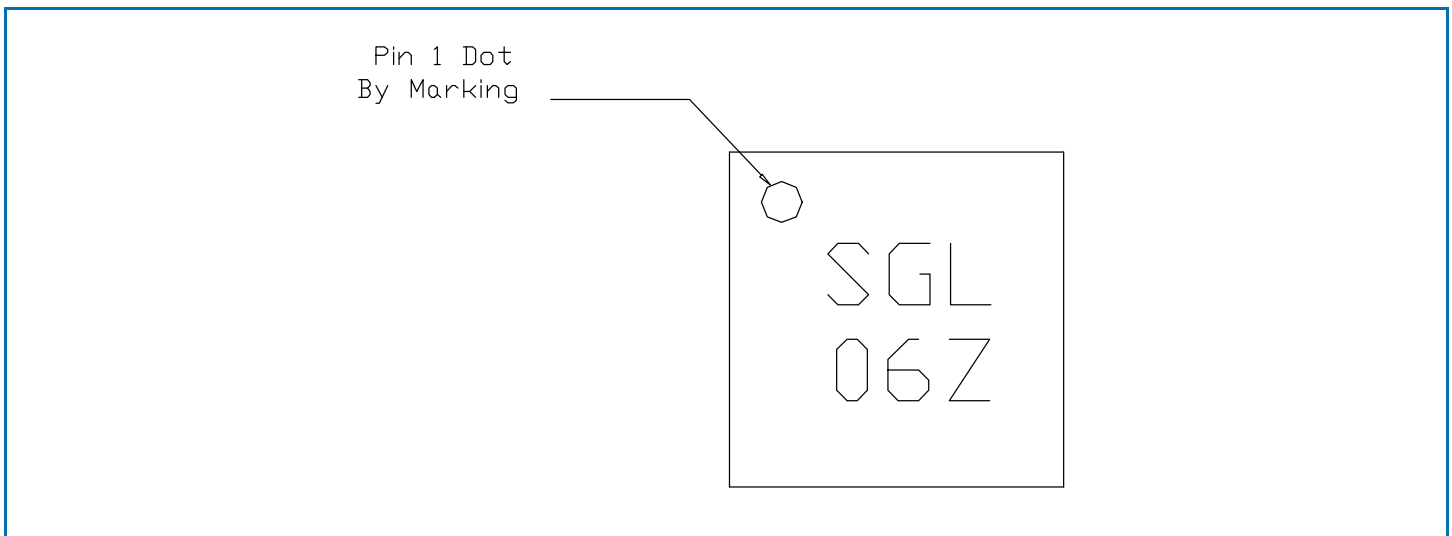
Description	Reference Designator	Manufacturer	Manufacturer's P/N
MMIC LNA	U1	QORVO	SGL0622Z
PCB, SGL0622Z	NA	Viasystems Technologies Corp.	SGL0622Z-410(A)
CAP, 1uF, 10%, 25V, X7R, 1206	C1	Murata Electronics	GRM31MR71E105KA01L
CAP, 1200 pF, 5%, 50V, NPO, 0603	C2	Murata Electronics	GRM1885C1H122JA01D
CAP, 100pF, 5%, 50V, C0G, 0603	C3, C4, C5	Murata Electronics	GRM1885C1H101JA01D
IND, 68nH, 5%, M/L, 0603	L1	Murata Electronics	LL1608-FSL68NJ
CONN, SMA, EL, FLT, 0.068" SPE-000318	J1, J2	Amphenol RF Asia Corp	901-10426
CONN, HDR, ST, 1x2, 0.100", HI-TEMP, T/H	P1	Samtec Inc.	HTSW-102-07-G-S

Pin Configuration and Description



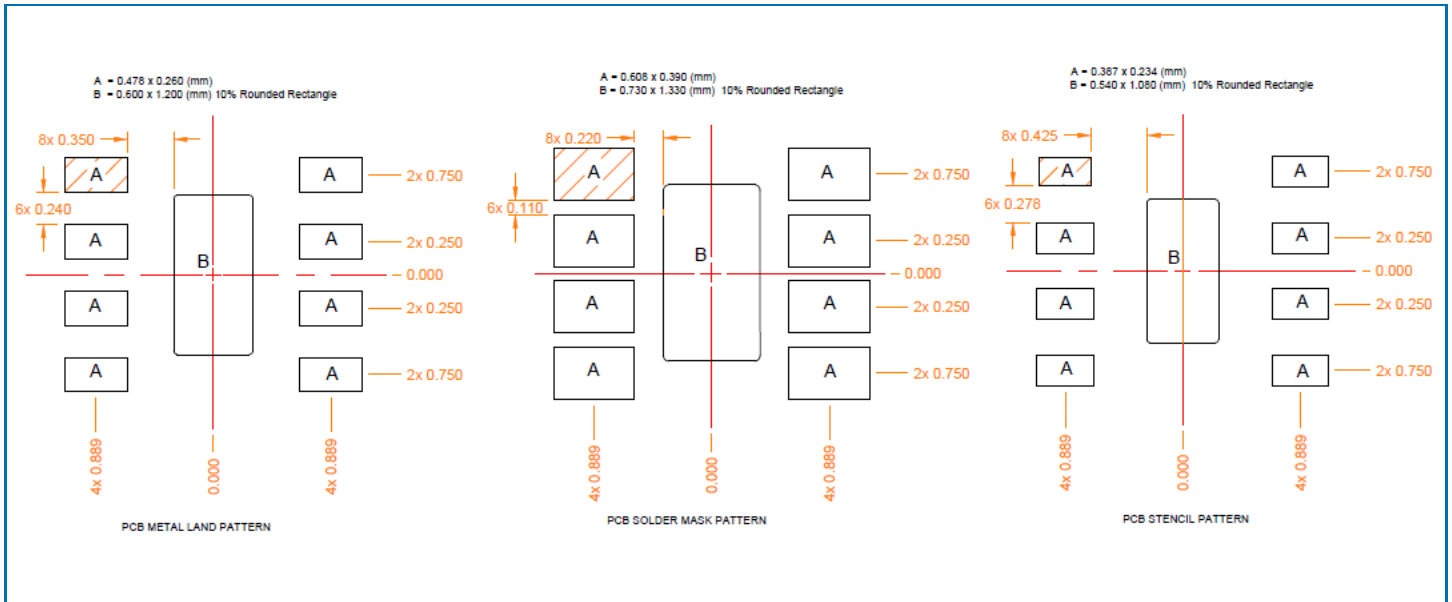
Pin	Label	Description
1	RF OUT/V _D	RF output and bias pin. Bias should be supplied to this pin through an external RF choke. (See application circuit)
2	GND	Connect to ground per application circuit drawing.
3, 5, 6, 7, 8	N/C	No internal connection. Provide a grounded land pad for mounting integrity.
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.

Package Marking



SGL0622Z

Suggested Pad Layout (Dimensions in millimeters)



Package Outline (Dimensions in millimeters)

