

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.

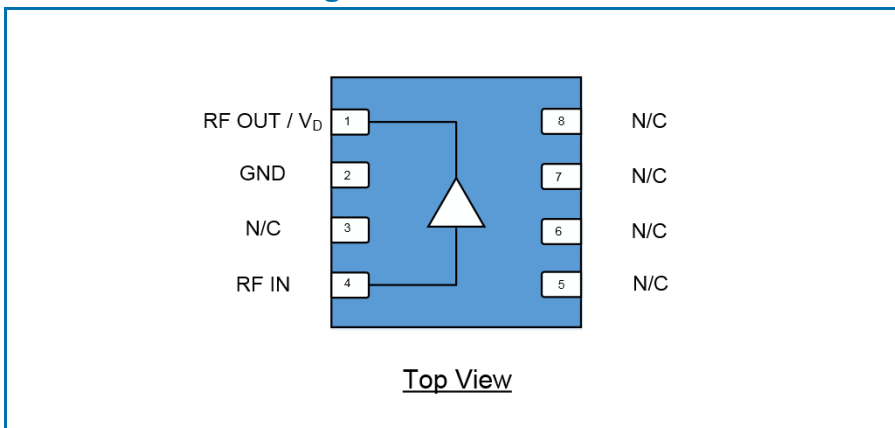


8 Pin, 2.0 mm x 2.0 mm DFN Package

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, S_{21} | 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, S_{11} | 12.0 | 18.7 | | dB | 1.575 GHz |
| | | 18.3 | | dB | 2.44 GHz |
| | | 17.6 | | dB | 3.50 GHz |
| Output Return Loss, S_{22} | 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

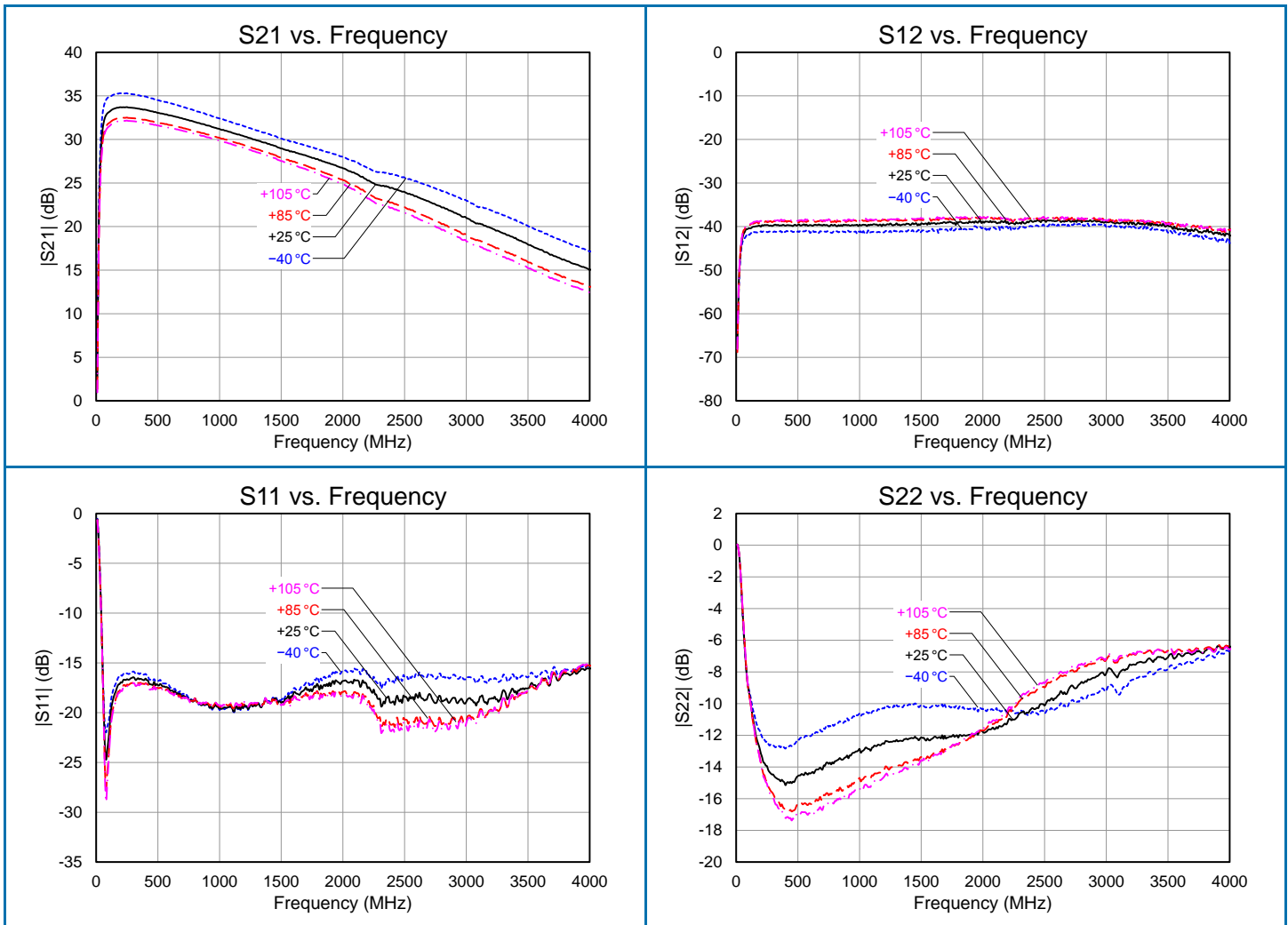
SGL0622Z

Electrical Specifications – General (Continued)

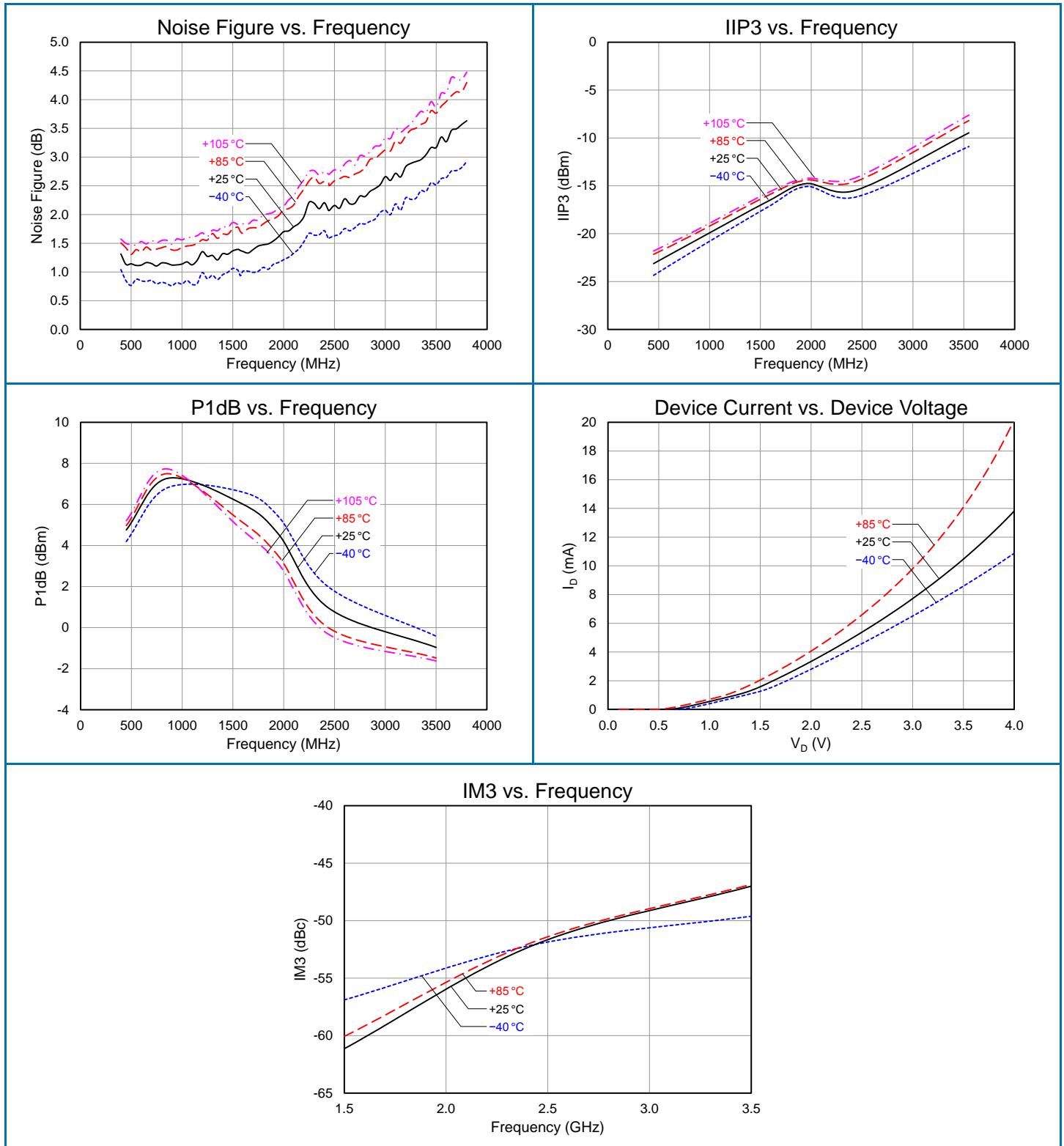
| Parameter | Specification | | | Units | Conditions |
|--------------------------|---------------|-------|-------|-------|------------|
| | Min | Typ | Max | | |
| Reverse Isolation, S12 | | 39.0 | | dB | 1.575 GHz |
| | | 38.5 | | dB | 2.44 GHz |
| | | 39.8 | | dB | 3.50 GHz |
| Noise Figure | | 1.4 | 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

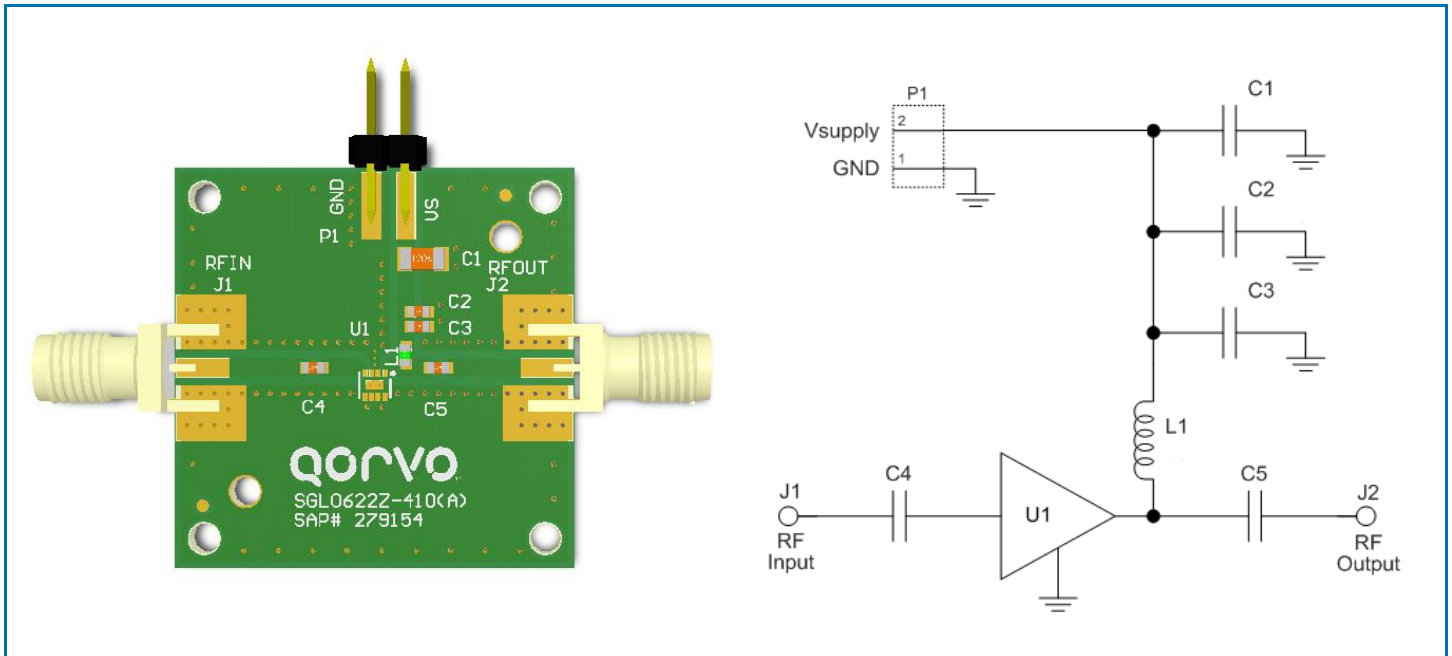


Typical Performance Using 850MHz Application Board



SGL0622Z

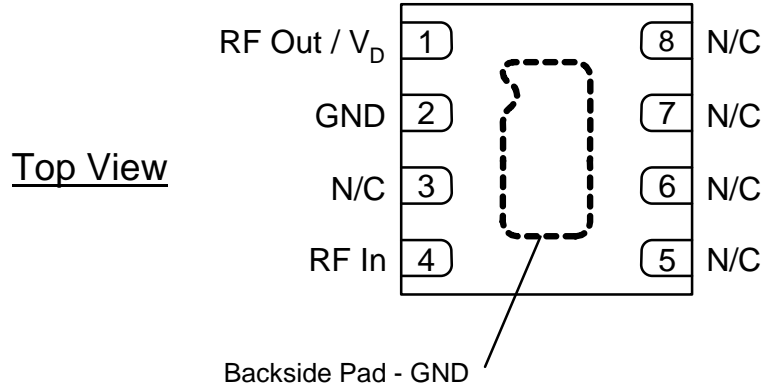
Evaluation Board and Schematic



Evaluation Board Bill of Materials For 850MHz Application Circuit

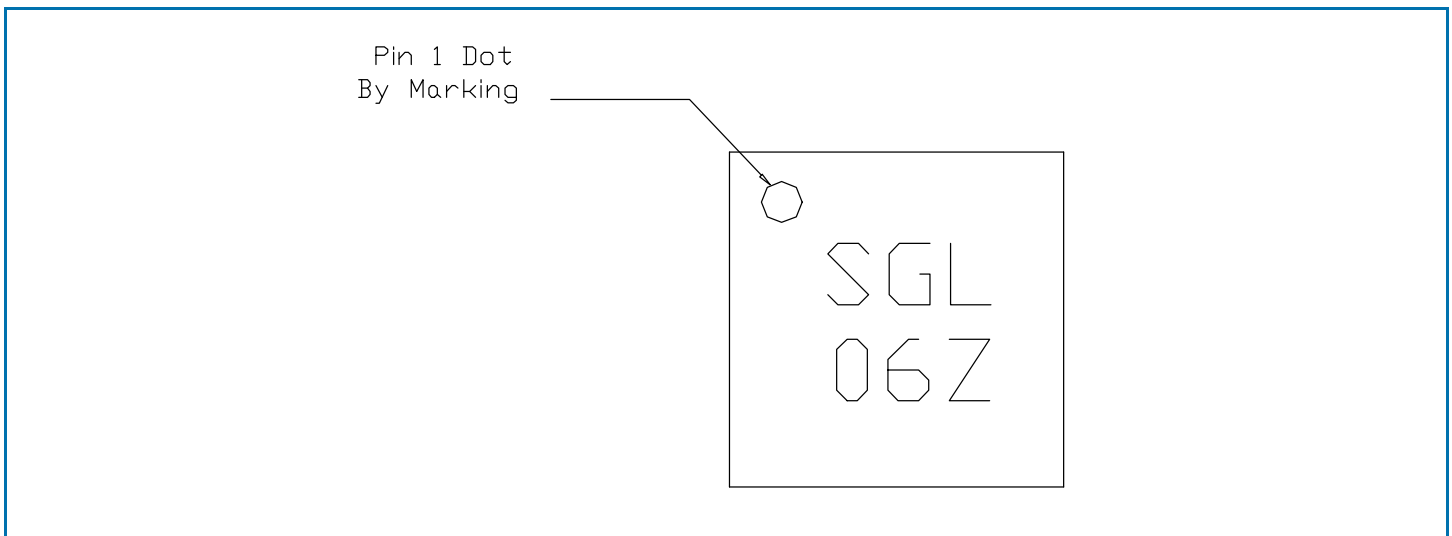
| Description | Reference Designator | Manufacturer | Manufacturer's P/N |
|--|----------------------|-------------------------------|--------------------|
| MMIC LNA | U1 | QORVO | SGL0622Z |
| PCB, SGL0622Z | NA | Viasystems Technologies Corp. | SGL0622Z-410(A) |
| CAP, 1uF, 10%, 25V, X7R, 1206 | C1 | 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



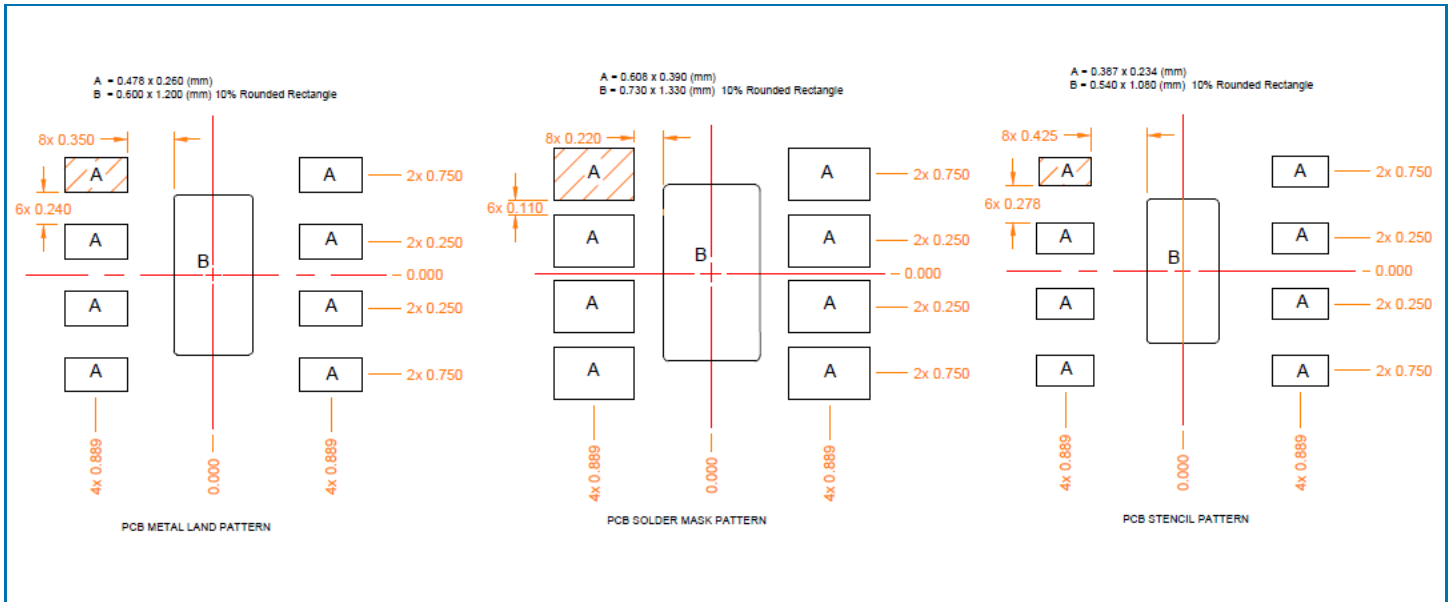
| Pin | Label | Description |
|---------------|---------------|--|
| 1 | RF OUT/ V_D | RF output and bias pin. Bias should be supplied to this pin through an external RF choke. (See application circuit) |
| 2 | GND | Connect to ground per application circuit drawing. |
| 3, 5, 6, 7, 8 | N/C | No internal 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

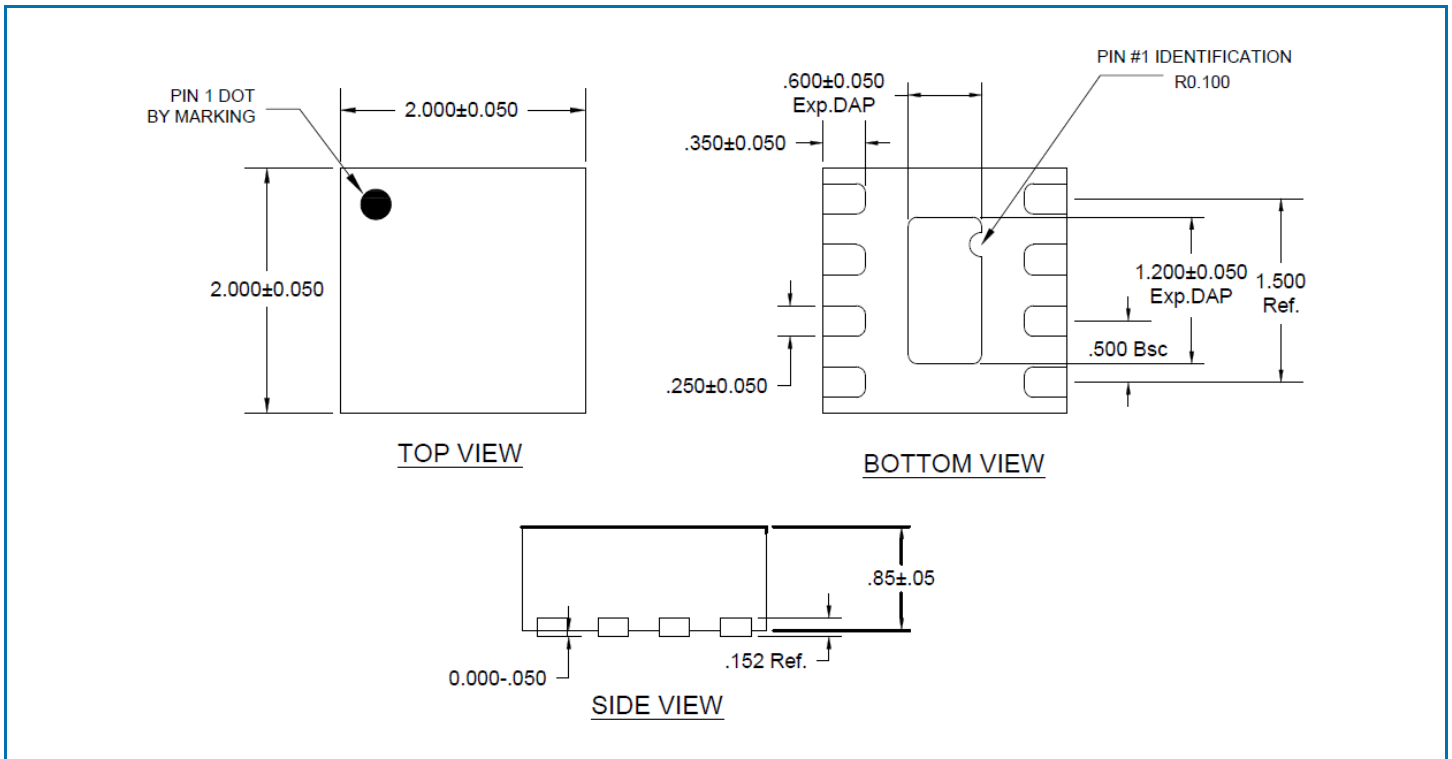


SGL0622Z

Suggested Pad Layout (Dimensions in millimeters)



Package Outline (Dimensions in millimeters)



SGL0622Z



Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.rfmd.com **Tel:** 1-844-890-8163
Email: customer.support@qorvo.com

For information about the merger of RFMD and TriQuint as Qorvo:

Web: www.qorvo.com

Important Notice

The information contained herein is believed to be reliable. RFMD makes no warranties regarding the information contained herein. RFMD assumes no responsibility or liability whatsoever for any of the information contained herein. RFMD assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for RFMD products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

RFMD products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.