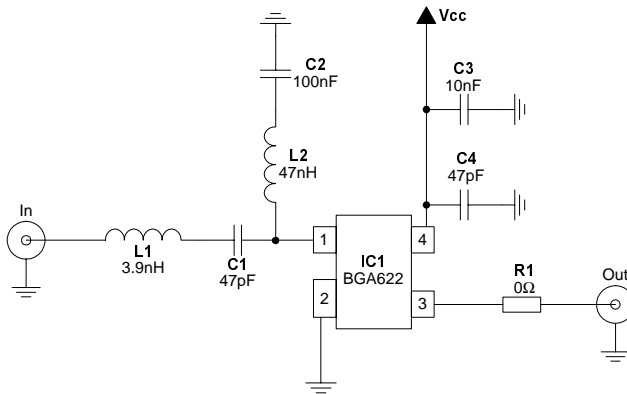


## GPS Low Noise Amplifier using BGA622



**Figure 1 Application Circuit Diagram**

**Table 1 Measured Performance Data at 1575 MHz and  $V_{CC} = 3$  V.**

| Parameter                                       | Symbol       | Value | Unit |
|---|--------------|-------|------|
| Supply current                                  | $I_{CC}$     | 5.8   | mA   |
| Insertion power gain                            | $ S_{21} ^2$ | 15.4  | dB   |
| Noise figure                                    | NF           | 1.3   | dB   |
| Input return loss                               | $ S_{11} ^2$ | 13.7  | dB   |
| Output return loss                              | $ S_{22} ^2$ | 14.5  | dB   |
| Reverse isolation                               | $ S_{12} ^2$ | 27.5  | dB   |
| Input 1 dB-compression point                    | $IP_{1dB}$   | -16   | dBm  |
| Input third order intercept point <sup>1)</sup> | $IIP_3$      | 1     | dBm  |

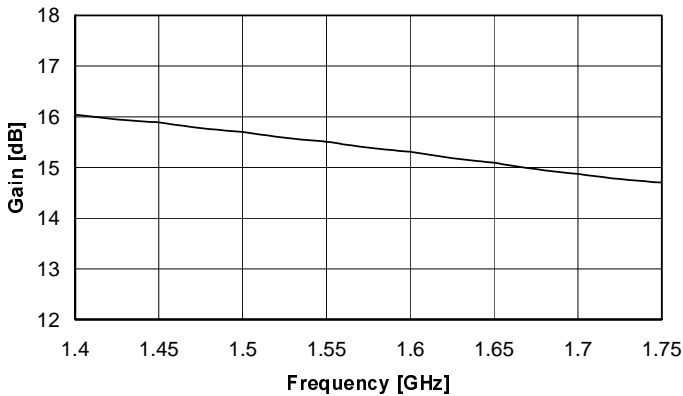
<sup>1)</sup>  $\Delta f = 1$  MHz;  $P_{in} = -25$  dBm

**Table 2 Bill of Materials**

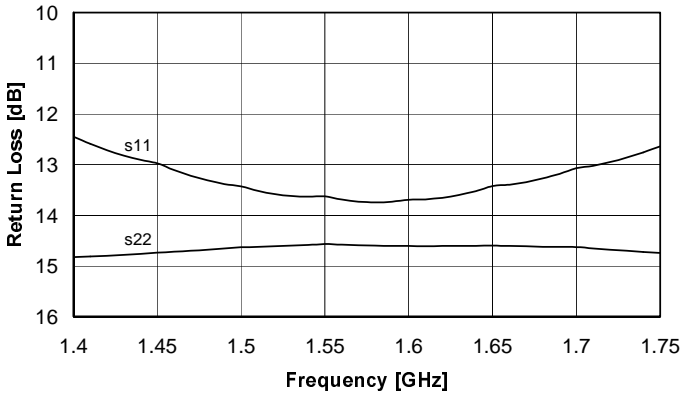
| Name | Value      | Package | Manufacturer          | Function          |
|------|------------|---------|-----------------------|-------------------|
| C1   | 47 pF      | 0402    | various               | DC block          |
| C2   | 100 nF     | 0603    | various               | Improve linearity |
| C3   | 10 nF      | 0402    | various               | RF bypass         |
| C4   | 47 pF      | 0402    | various               | RF bypass         |
| IC1  | BGA622     | SOT343  | Infineon Technologies | SiGe MMIC         |
| L1   | 3.9 nH     | 0402    | Toko LL 1005-FH       | Input matching    |
| L2   | 47 nH      | 0402    | Toko LL 1005-FH       | RF choke          |
| R1   | 0 $\Omega$ | 0402    | various               | Jumper            |

**Measured Circuit Performance**

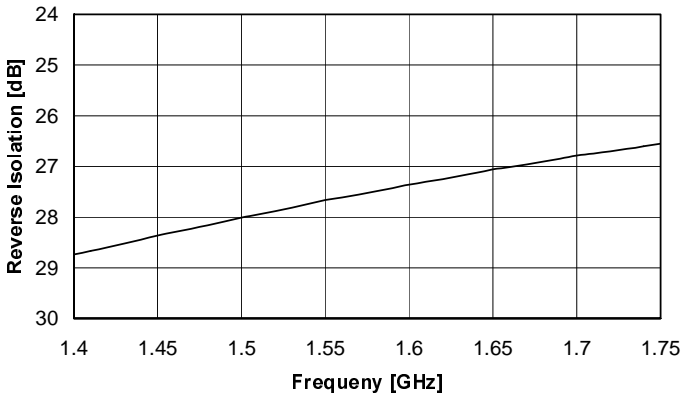
All presented measurement values include losses of both PCB and connectors - in other words, the reference planes used for measurements are the PCB's RF SMA connectors. Noise figure and gain results shown do not have any PCB loss extracted from them.



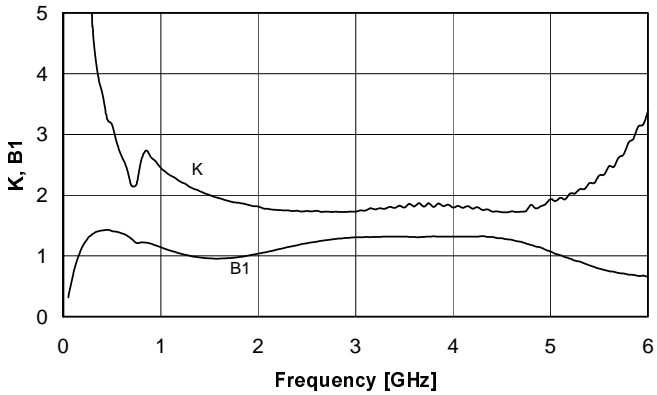
**Figure 2 Insertion Gain**



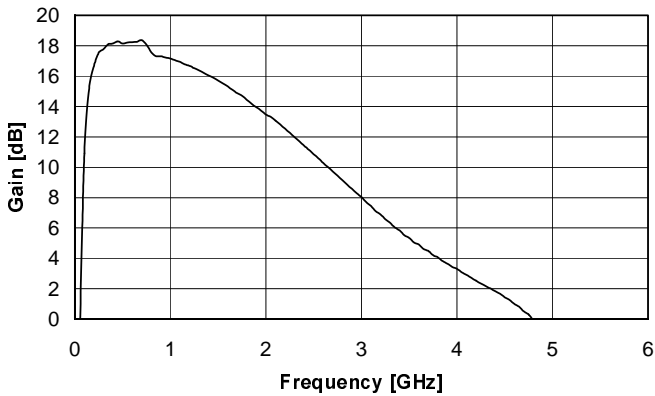
**Figure 3 Input and Output Return Loss**



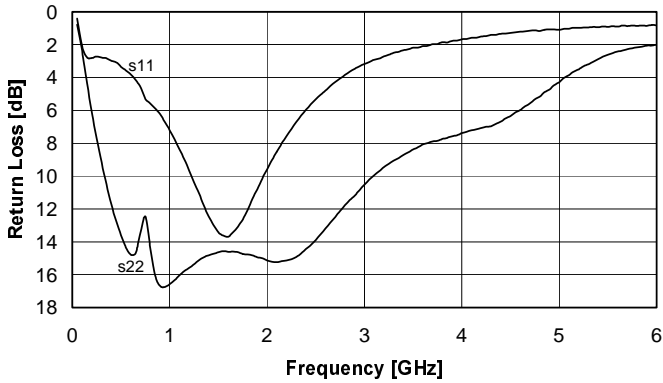
**Figure 4 Reverse Isolation**



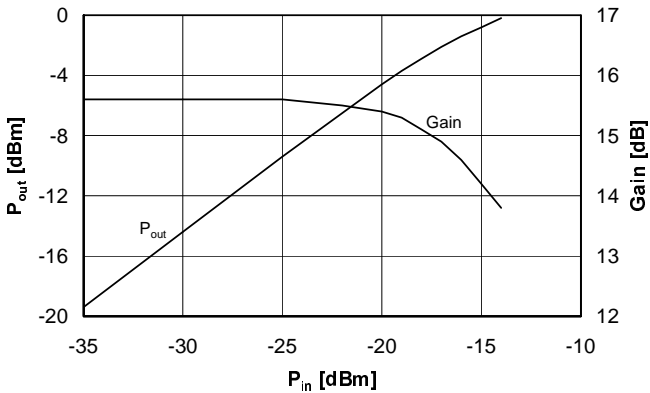
**Figure 5 Stability Factor K and Stability Measure B1**



**Figure 6 Wide Span Gain**



**Figure 7 Wide Span Return Loss**

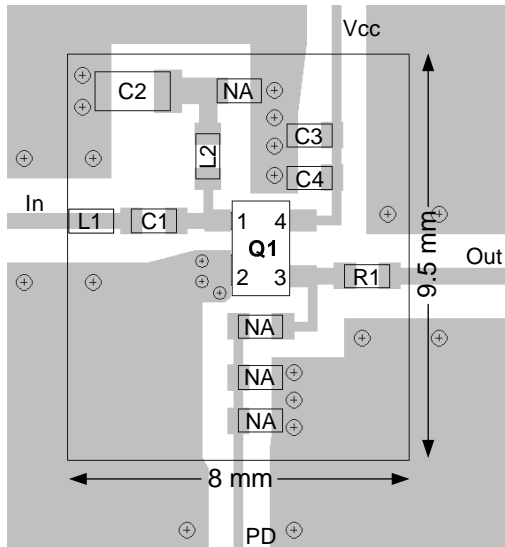


**Figure 8 Gain Compression @ 1.575 GHz**

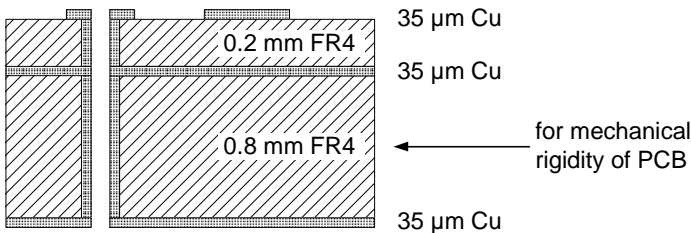
**Application board and component placement**

Figure 9 shows the placement of the specific components on the application PCB.

Figure 10 displays the cross section of the application board. The actually used microstrip structure is the one with the 0.2 mm FR4 dielectric. The 0.8 mm FR4 are for mechanical rigidity purposes only.



**Figure 9 Component Placement on the Application PCB**



**Figure 10 PCB Cross Section**