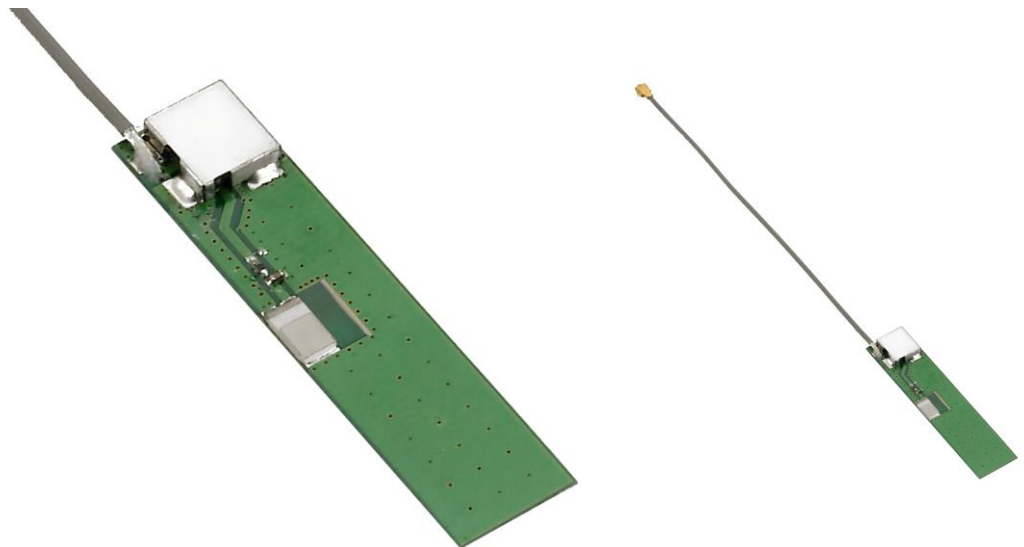


## SPECIFICATION

Part No. : **ALA.01.07.0095A**

Product Name : 1575MHz GPS-GALILEO Ceramic Active Loop Module

Features : 16dB One Stage  
GPS/GALILEO  
PCB Dims: 45\*10\*2.3mmmm  
RoHS Compliant



## 1. Introduction

The active loop antenna ALA.01 is best suited for applications where omni-directionality is important. The average gain is similar to an 18mm active patch antenna but in a much narrower profile, only 2.3mm at its highest point, allowing this antenna to be used perpendicular to the device main-board, or placed adjacent to the top or bottom of device main board. A one stage LNA combined with a SAW filter boosts the S/N (C/N) of the GPS/GALILEO system and helps to overcome some noise effects from today's crowded device boards that passive antennas cannot resolve.

The antenna can be placed in a plastic slot in the device housing. Alternatively, adhesive foam, hot-melt, or non-conductive screws could be used to mount the antenna. The core antenna design principle of loop current flow tends to "lock-out" a lot of surface noise from close circuitry from entering the antenna.

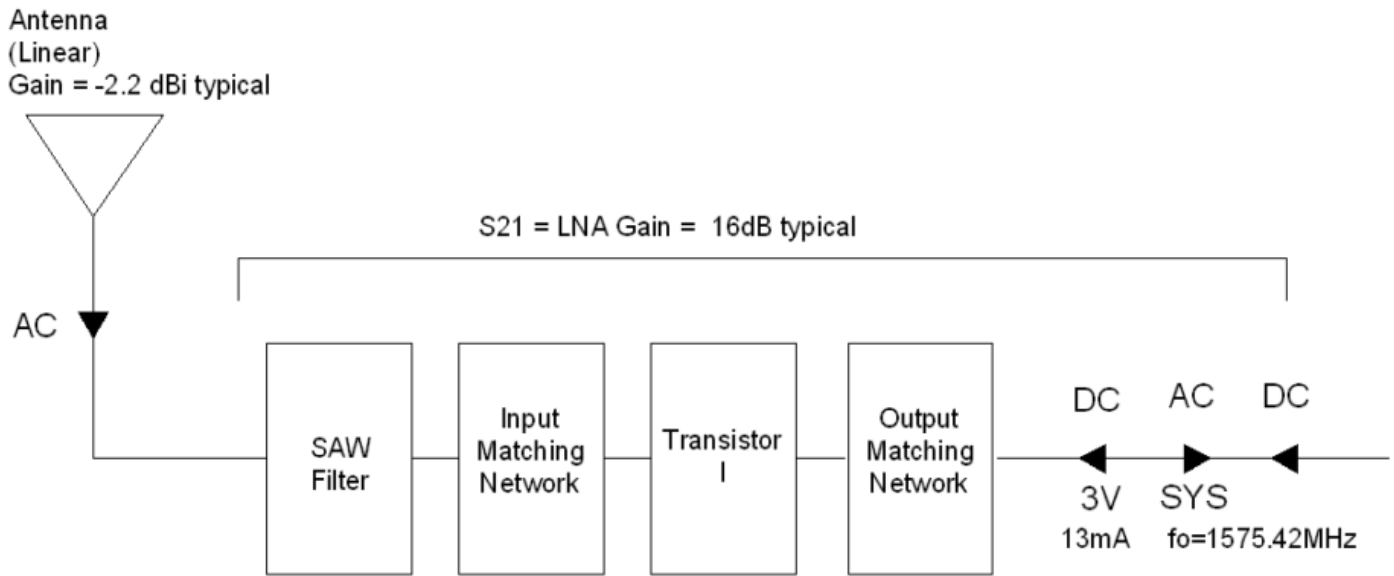
## 2. Specification

ELECTRICAL	
Frequency	1575.42 ± 1.023MHz
Bandwidth (10dB return loss)	70MHz typical
Peak Gain	Typ. 3.1dBi
Avg. Gain	-2.2dBI
Polarization	Linear
VSWR	2 max (depends on the special environment)
Dimension	5*3*0.5mm
Gain (with LNA)	16 ± 4dB @ 90°
Output Impedance	50Ω
Polarization	Linear
Input Voltage	Min. 2.6V, Typ. 3.0V, Max. 5.0V
LNA	
Frequency	1575.42 ± 1.023MHz
Gain	Typ. 16dB @ 3V Typ. 17.8dB @ 5V
Noise Figure	Typ. 1.3dB @ 3V
Filter (out of band attenuation)	Saw Filter (fo=1575.42MHz) 40dB typ. fo±50MHz 45dB min. fo±100Mhz
Output VSWR	< 2.0
Input Voltage	DC = 2.6~5.0V
Current	DC = 13mA at 3.0V

MECHANICAL	
RF Cable	95±5mm 1.13 Coaxial Cable
Connector	IPEX MHF(U.FL)
Dimensions	45*10*2.3mm
Weight	1.35±0.5g (typical)
ENVIRONMENTAL	
Operation Temperature	-40°C to + 85°C
Storage Temperature	-40°C to + 90°C
Humidity	10 to 95%

### 3. Performance Measurement

#### 3.1. Block Diagram



The structure of GPS antenna module

## 4. Measurement Method

### 4.1. Chip

#### a) Reflection Co-efficient Measurement

- a. Equipment: Network Analyzer (Agilent E5071A)(Fig.1)
- b. Item  $S_{11}$  Log Chart(Return Loss)  $S_{11}$  Smith Chart (impedance)

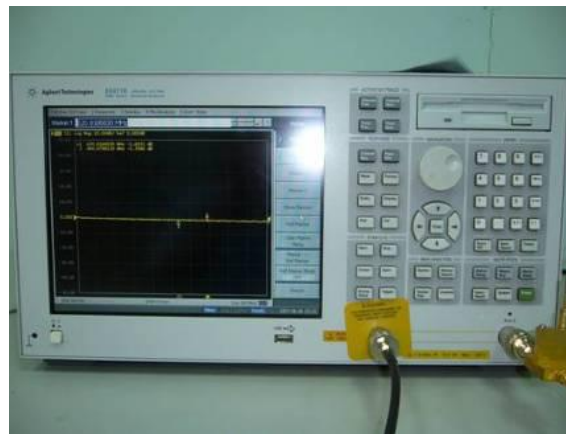


Figure 1. Network Analyzer

#### a) Pattern Measurement

- a. Equipment: Anechoic Chamber (Fig. 2), Network Analyzer (Agilent E8753ES)
- b. Item: Gain Pattern, Axial ratio

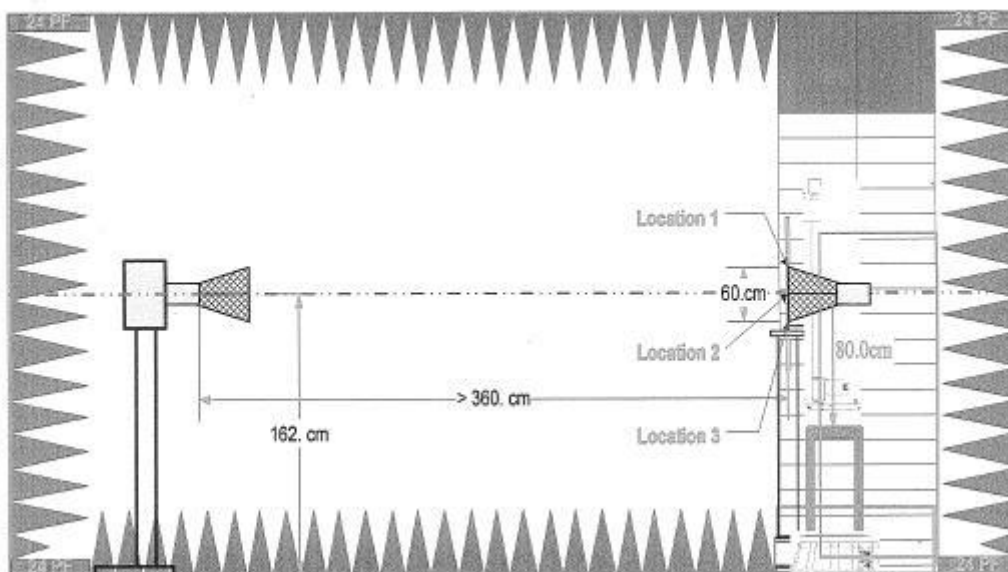


Figure 2. Quiet Room

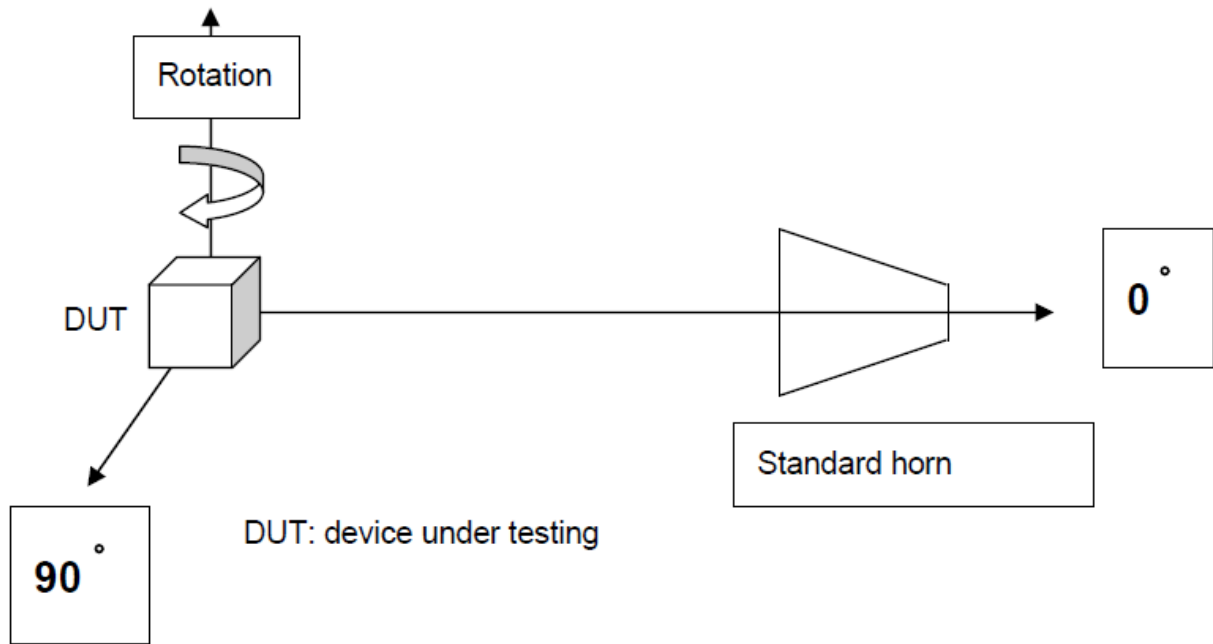


Figure 3. Schematic of measurement set-up

## 4.2. LNA

### a) Parameter Measurement

- a. Equipment: Network Analyzer (Agilent E5071B)(Fig.4)
- b.  $S_{11}$ ,  $S_{12}$ ,  $S_{21}$ ,  $S_{22}$

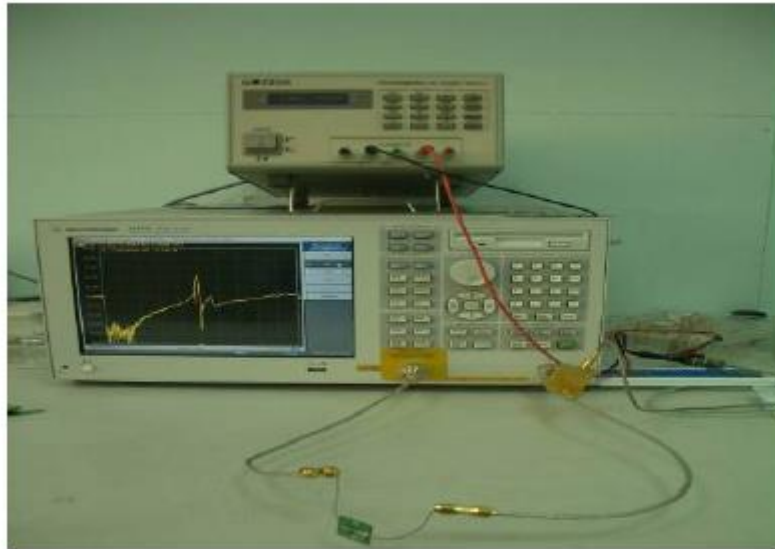


Figure 4. Network Analyzer

### a) Noise Figure Measurement

- a. Equipment: Noise Meter (Agilent E4407B)(Fig.5)
- b. Environment: Shielding Room (Fig. 6)
- c. Item: N.F (Noise Figure)



Fig. 5 Noise Meter



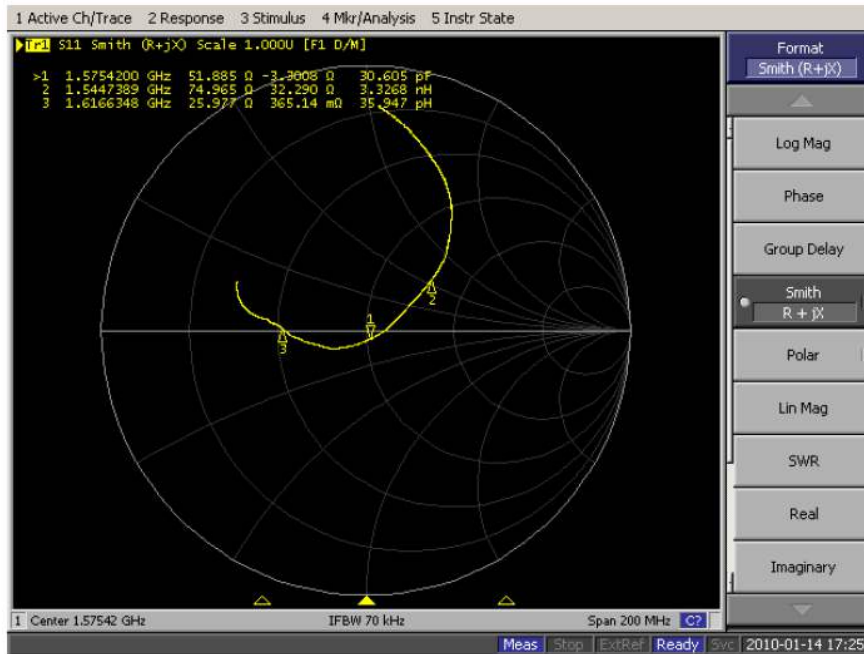
Fig.6 Shielding Room



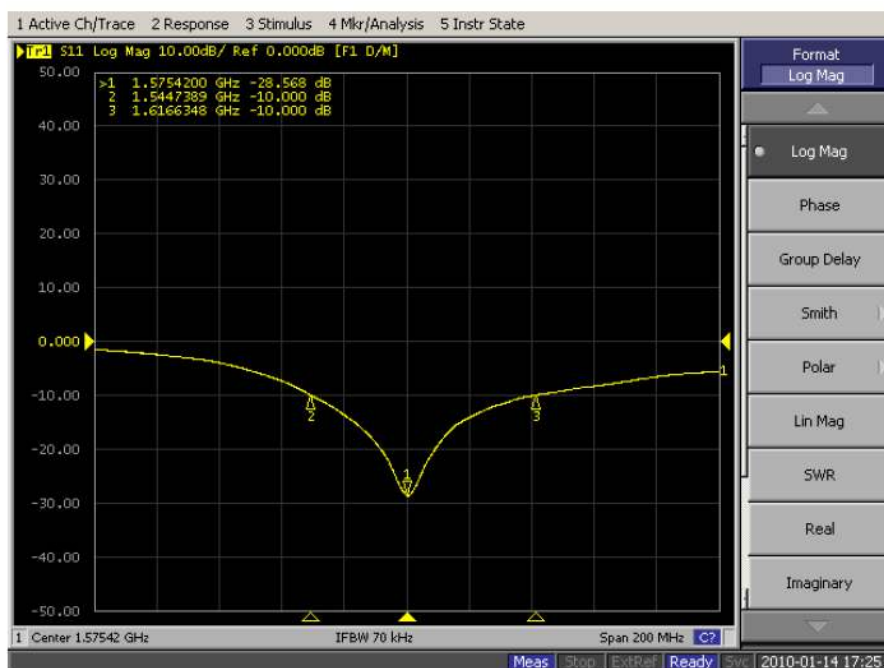
## 5. Measured Values

### 5.1. Chip

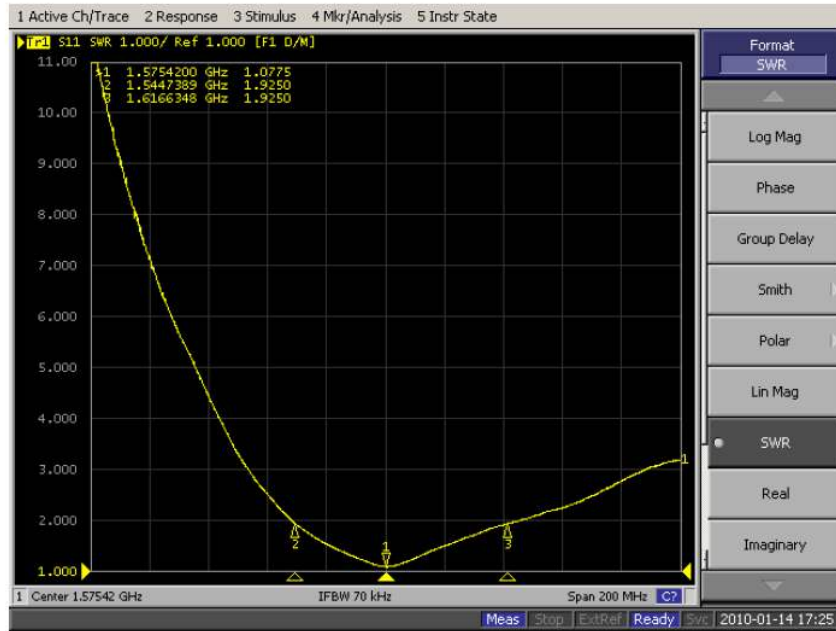
#### 5.1.1. $S_{11}$ Smith Chart (Impedance)



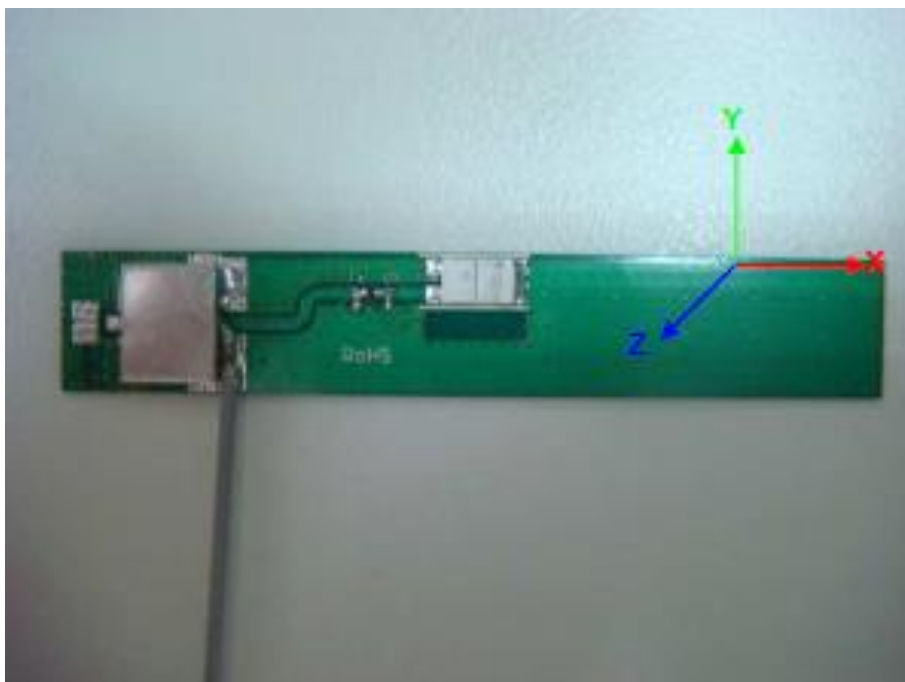
#### 5.1.2. $S_{11}$ Log Chart (Return Loss): Bandwidth $S_{11} < -10$ dB

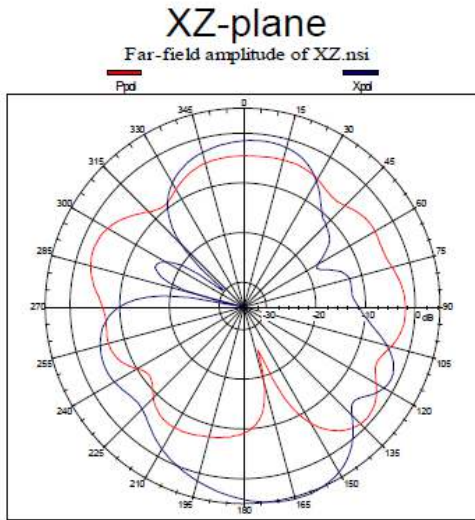


### 5.1.3. $S_{11}$ VSR

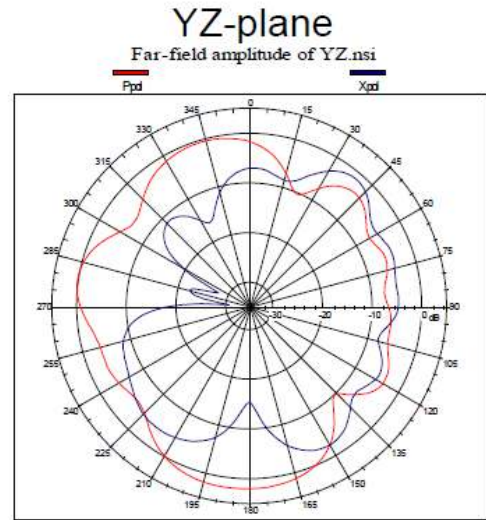


### 5.1.4. Radiation Patterns (Excluding LNA)

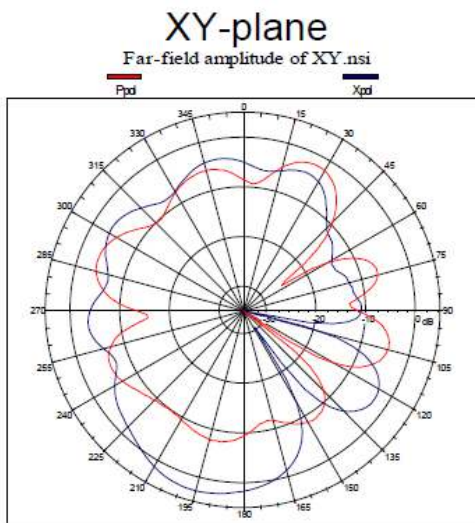




(Peak Gain = 4.92 dBi, Average Gain = -1.62 dBi )



(Peak Gain = 1.89dBi, Average Gain = -1.57dBi )



(Peak Gain = 2.75dBi, Average Gain = -3.44 dBi )

Plane	XZ	YZ	XY
Average Gain	-1.62	-1.57	-3.44
Peak Gain	4.92	1.89	2.75

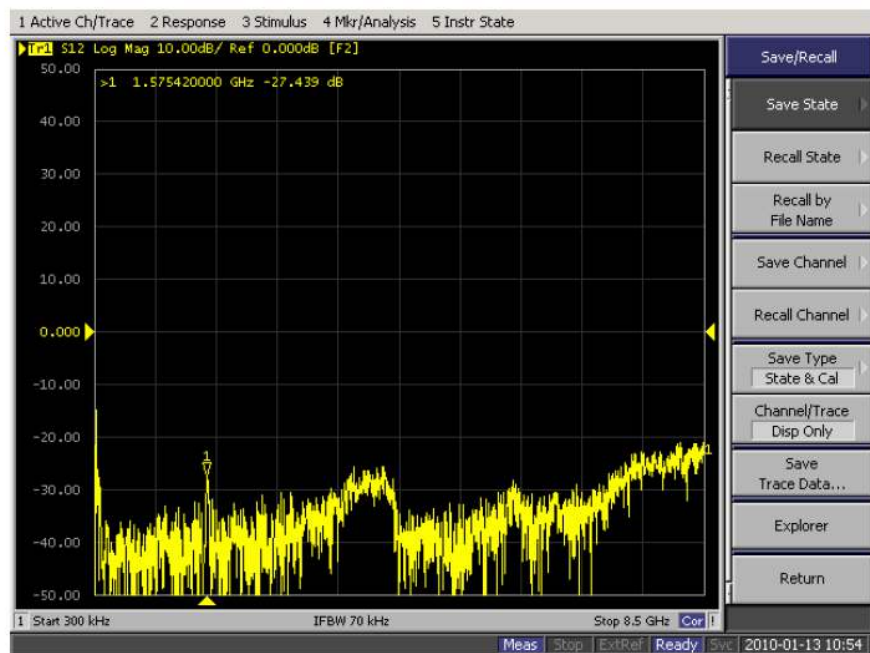
Note: Total Gain = The total power of radiation pattern (exclude LNA Gain from GP8) + LNA Gain - cable loss (1.1dB/m)

## 5.2. Low Noise Amplifier (LNA)

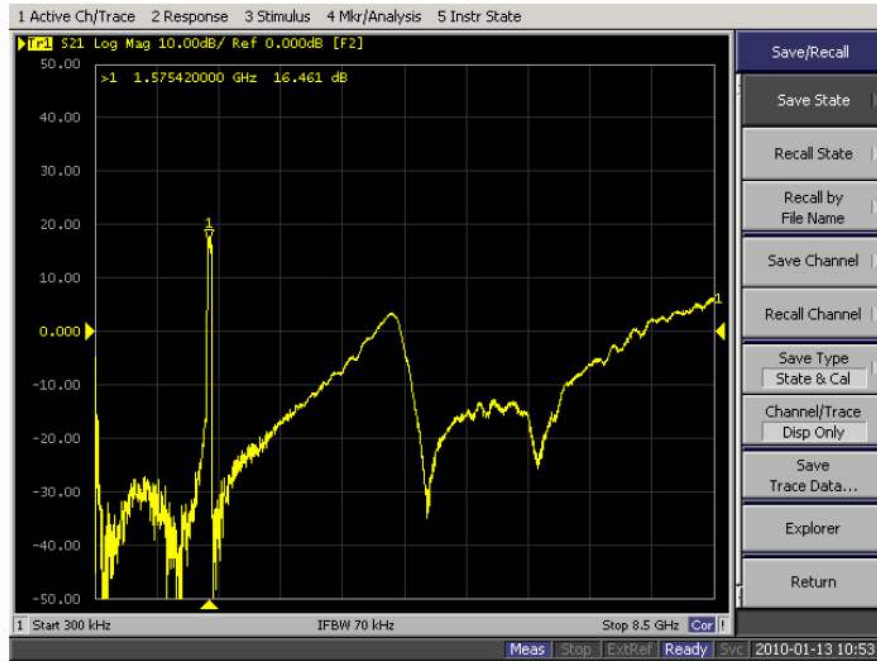
### 5.2.1. $S_{11}$ (network analyzer input power -40dB)



### 5.2.2. $S_{12}$ (network analyzer input power -40dB)



### 5.2.3. $S_{21}$ (Gain) (network analyzer input power -40dB)

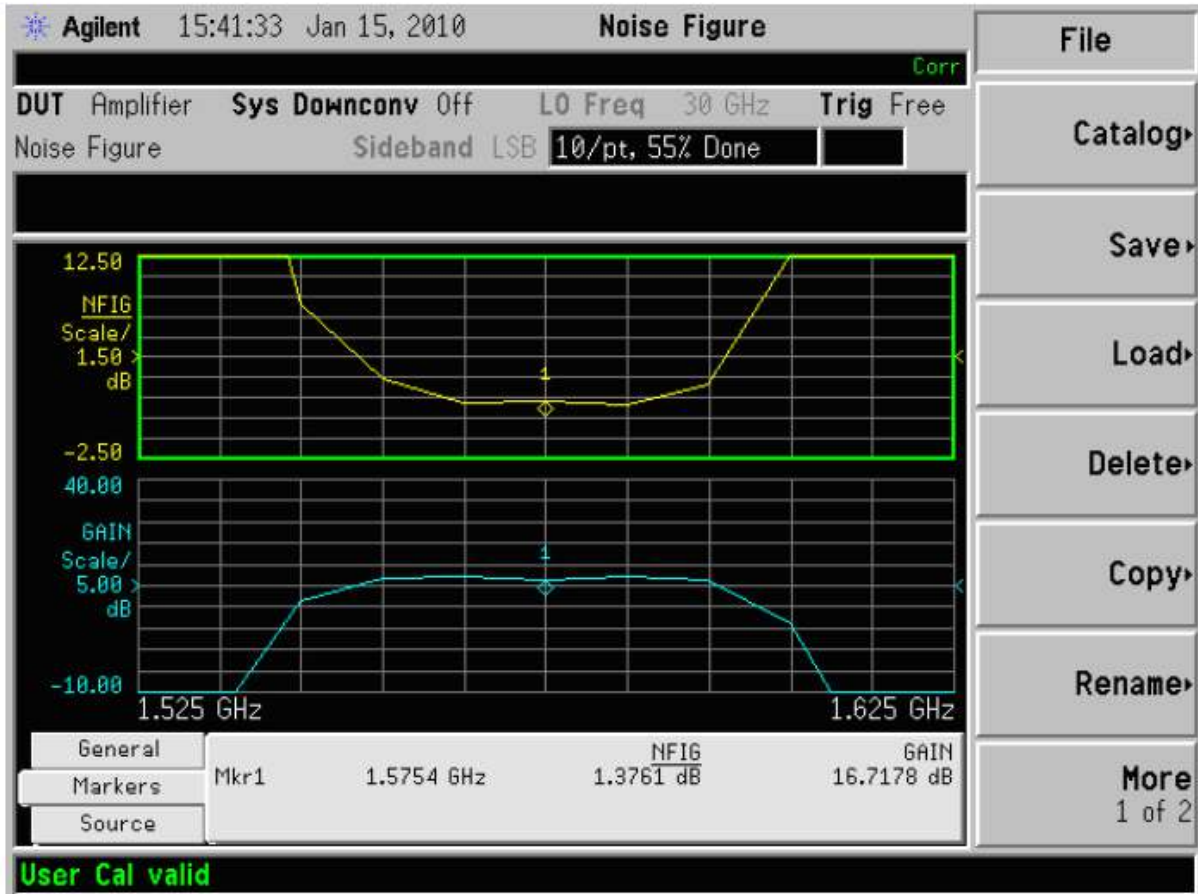


### 5.2.4. $S_{22}$ (Gain) (network analyzer input power -40dB)



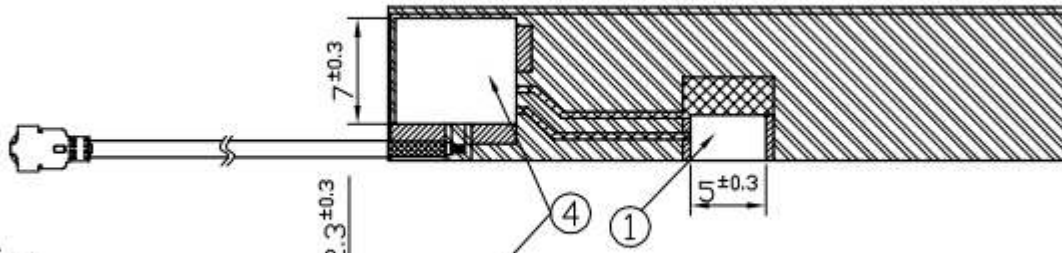


### 5.3. Noise Figure

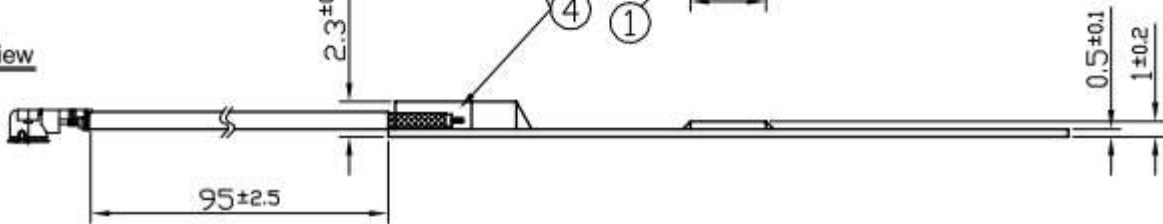


## 6. Drawing

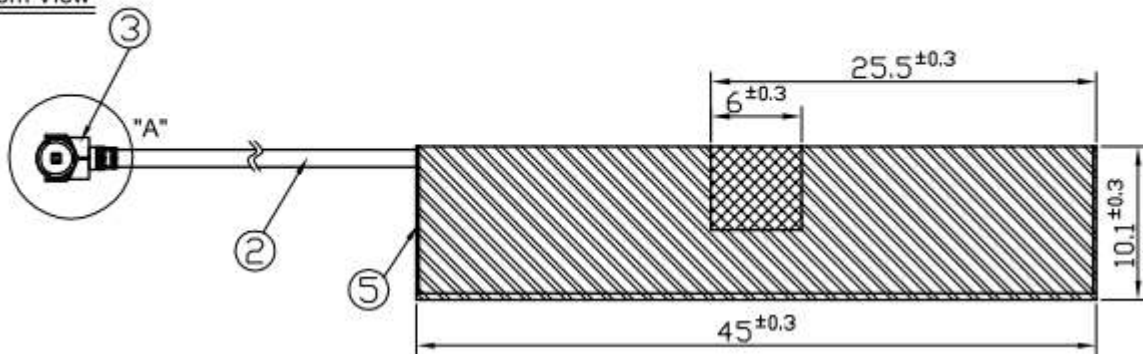
### Top View



### Side View



### Bottom View



1	Chip Antenna: 5*3*0.5mm
2	Cable Ø1.13 L=95±5mm
3	IPEX MHFI(U.FL)
4	Shielding Case
5	PCB

#### Note:

- 1.Soldered Area 
- 2.Solder Mask Area(Green) 
- 3.Ground Clearance 

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