

# WiFi Antenna Test Report Prepared For Sensys Mag2 Project

**Author** Steven

**Date** 09<sup>th</sup> Jun 2022

### Client Information

Client	Sensys
Engineer of Client	
Project Name	Mag2
Project Stage	<input type="checkbox"/> 2D Drawing <input checked="" type="checkbox"/> PCB <input type="checkbox"/> Housing <input type="checkbox"/> CNC(EVT) <input type="checkbox"/> Soft Tooling <input type="checkbox"/> Hot Tooling(DVT) <input type="checkbox"/> PVT
Antenna Type	Right Hand Polarization
Antenna Band	WIFI
Antenna Engineer	Steven

### Tuning Note

Version	Date	Revision Description	Designer
01	2021.01.18	Antenna Design	Steven
02	2021.02.02	Antenna Design PCB 28x28mm	Steven
03	2022.06.09	25x4.0 SMD type · 25x4.0 PIN type 天線環境特性評估	Steven
04			
05			
06			
07			

### Antenna Information

Material	Dimension	Feed-In Location	PIN Length
K9	25x25x4.0	X:0.00 Y:-2.50	6.0mm
K9	25x25x4.0		

**1. Test content :**

Patch Antenna on PCB pattern measurement

**2. Test project :**

S11 Return Loss 、 Impedance 、 Antenna GAIN 、  
Radiation Pattern 、 Efficiency 、 Average Gain

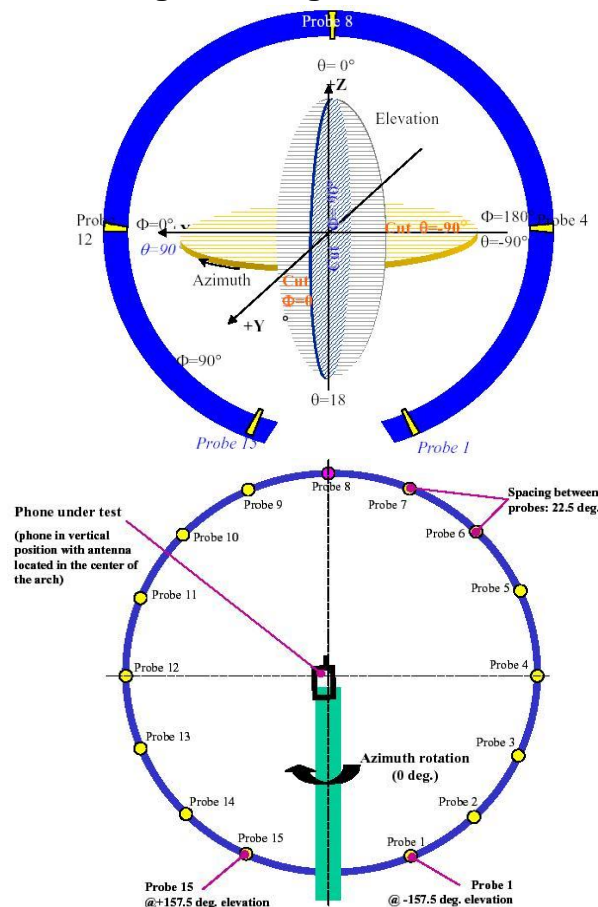
**3. Test setting :**

Network Analyzer : Agilent E5071C  
Source Antenna : SATIMO  
Test Frequency : 2400MHz 、 2450MHz 、 2500MHz

**4. Test environment :**

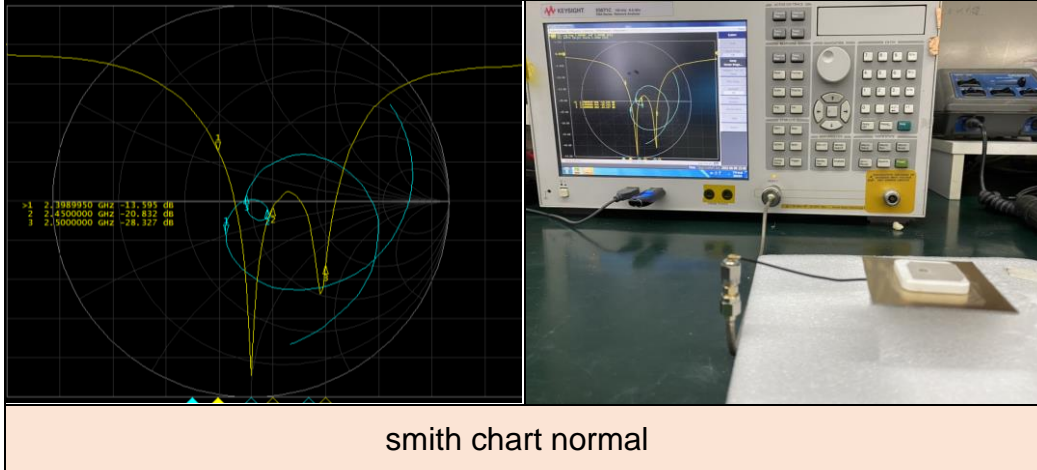
Room temperature : 26°C Humidity : 55%

**5. Test schematic drawing of setting :**



6. 25x4.0 PIN type S11 Smith Chart Frequency Test:

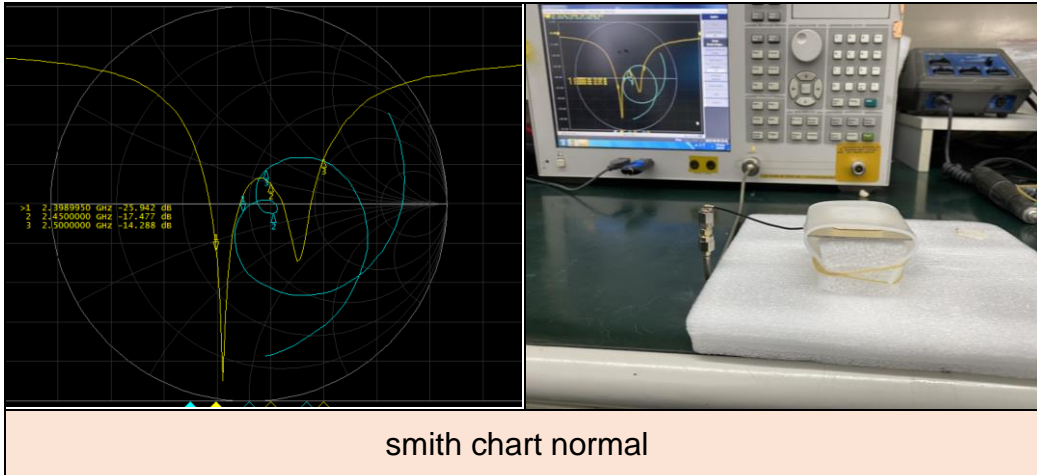
a. Antenna on PCB NO Housing



1) Antenna on PCB



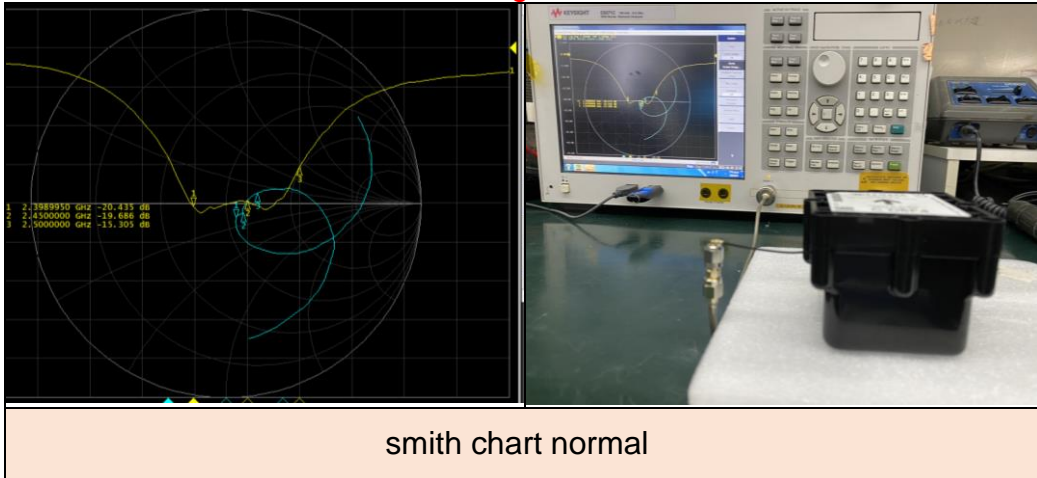
b. Antenna on PCB + Silicone



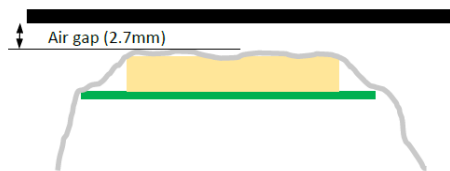
2) Antenna with PCBA and Silicone sheet (flat against antenna surface and draped over sides)



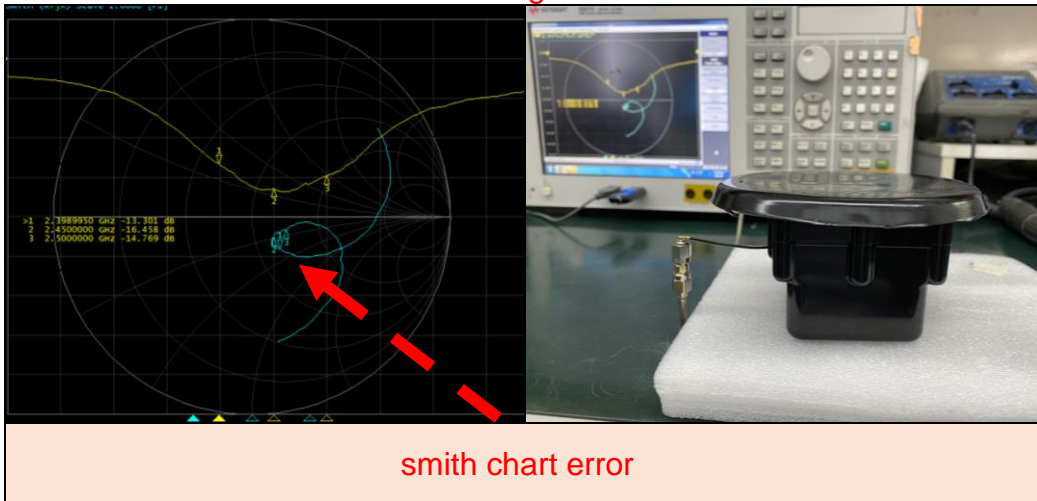
c. Antenna on PCB+ Silicone+Housing



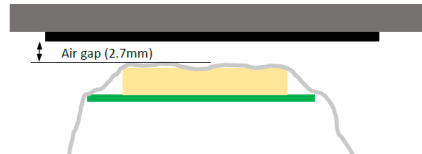
3) Antenna with PCBA and Silicone sheet and Xenoy (enclosure material)



d. Antenna on PCB+ Silicone + Housing+7mm cover



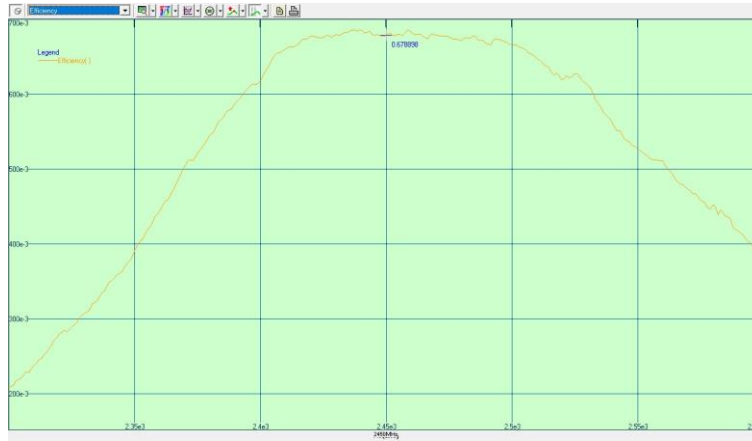
4) Antenna with PCBA and Silicone sheet and Xenoy and Urethane sealant



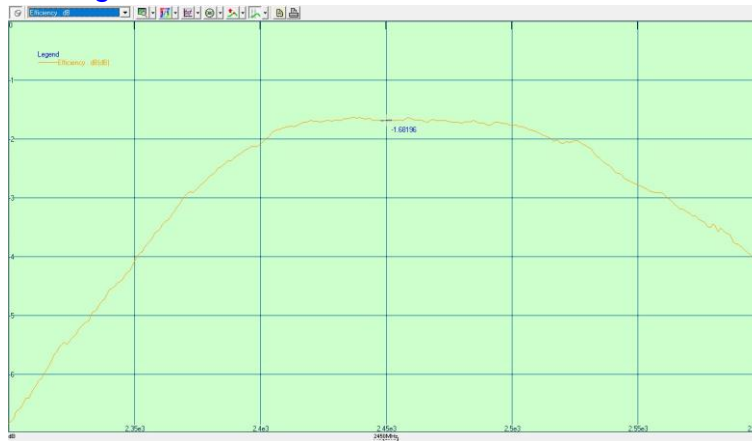
7. Patch in Housing Antenna Gain measurement :

a. **Antenna on PCB NO Housing:** (Impedance as item 6.aphoto)

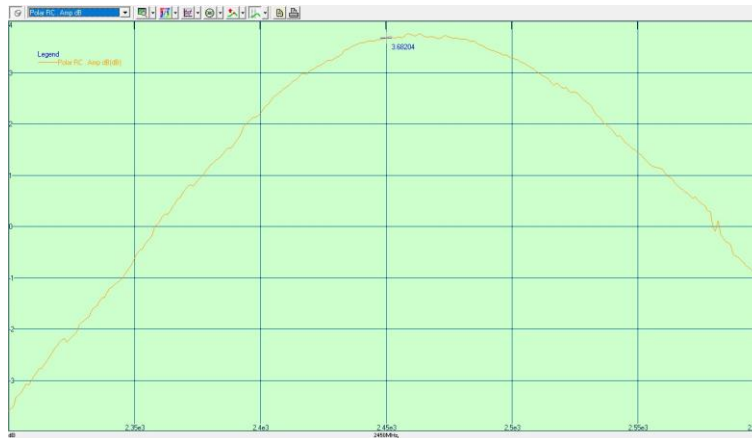
Efficiency :



Average Gain :



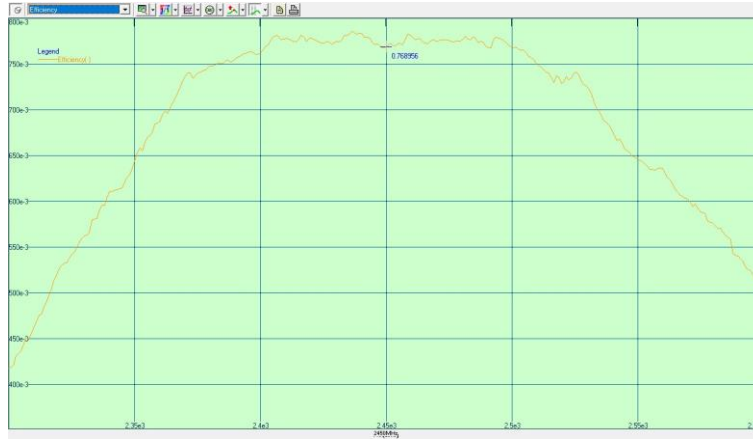
Peak Gain



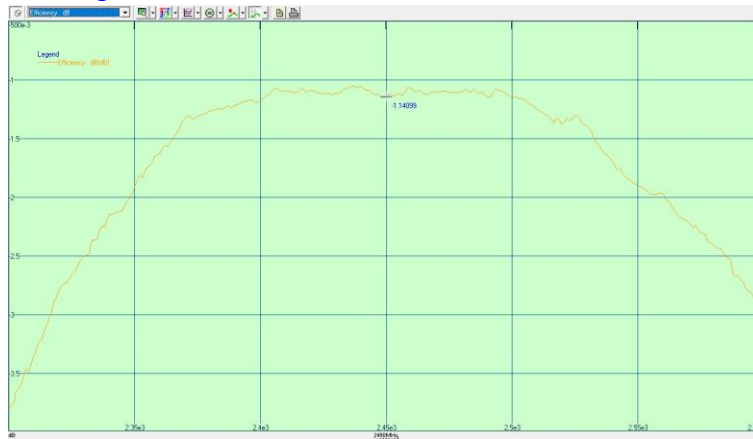
Frequency	Efficiency	AVG Gain	Peak Gain
2400 MHz	61.81%	-2.08 dBi	2.21 dBic
2450 MHz	67.88%	-1.68 dBi	3.68 dBic
2500 MHz	66.60%	-1.76 dBi	3.28 dBic

b. Antenna on PCB+ Silicone+Housing: (Impedance as item 6.c photo)

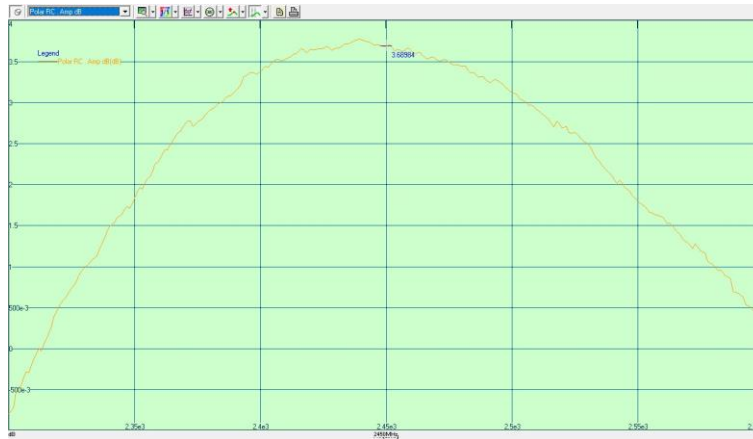
Efficiency :



Average Gain :



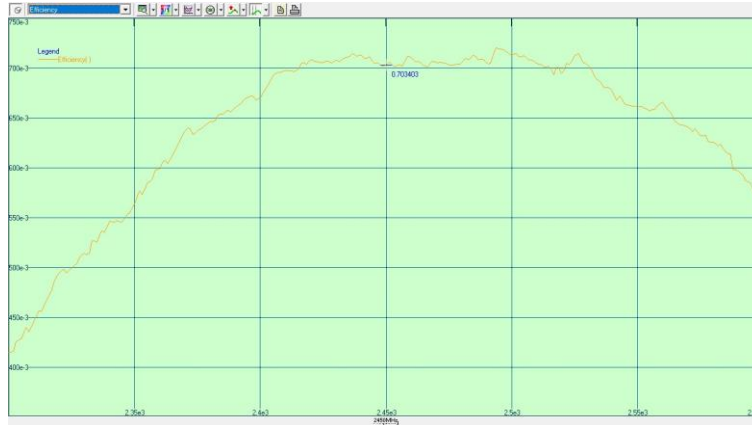
Peak Gain



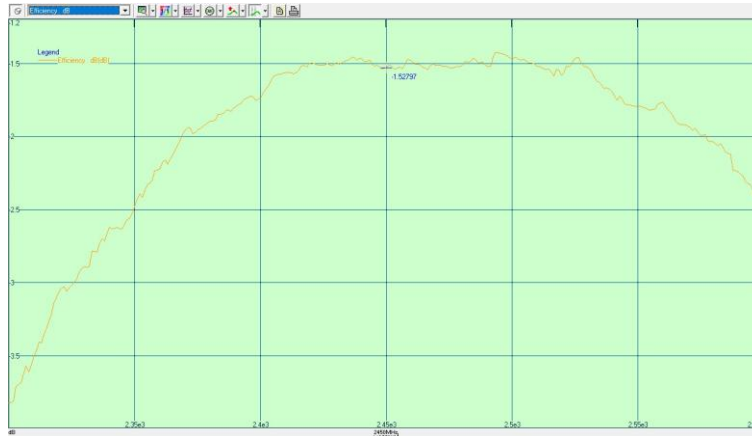
Frequency	Efficiency	AVG Gain	Peak Gain
2400 MHz	76.20%	-1.18 dBi	3.37 dBic
2450 MHz	76.89%	-1.14 dBi	3.12 dBic
2500 MHz	76.89%	-1.14 dBi	3.68 dBic

c. **Antenna on PCB+ Silicone + Housing+7mm cover**  
 (Impedance as item 6.d photo)

Efficiency :



Average Gain :



Peak Gain

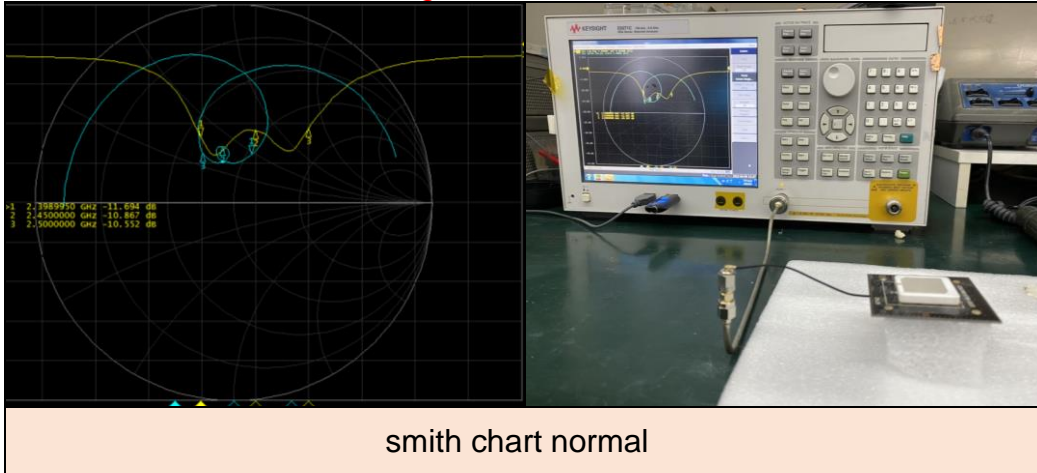


Frequency	Efficiency	AVG Gain	Peak Gain
2500 MHz	67.07%	-1.73 dBi	2.51 dBic
2550 MHz	70.34%	-1.52 dBi	3.21 dBic
2600 MHz	71.36%	-1.46 dBi	3.19 dBic



8. 25x4.0 SMD type S11 Smith Chart Frequency Test:

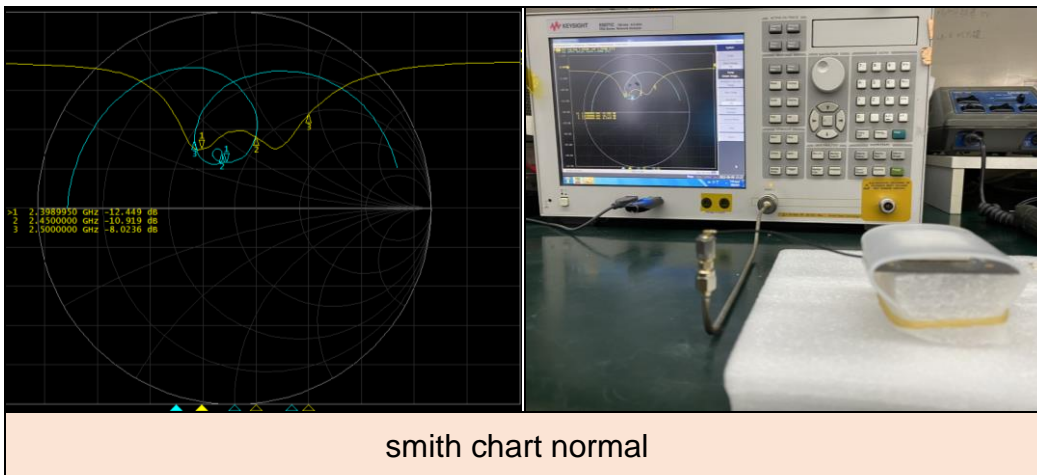
a. Antenna on PCB NO Housing



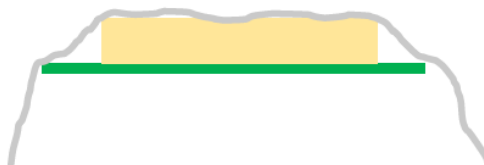
1) Antenna on PCB



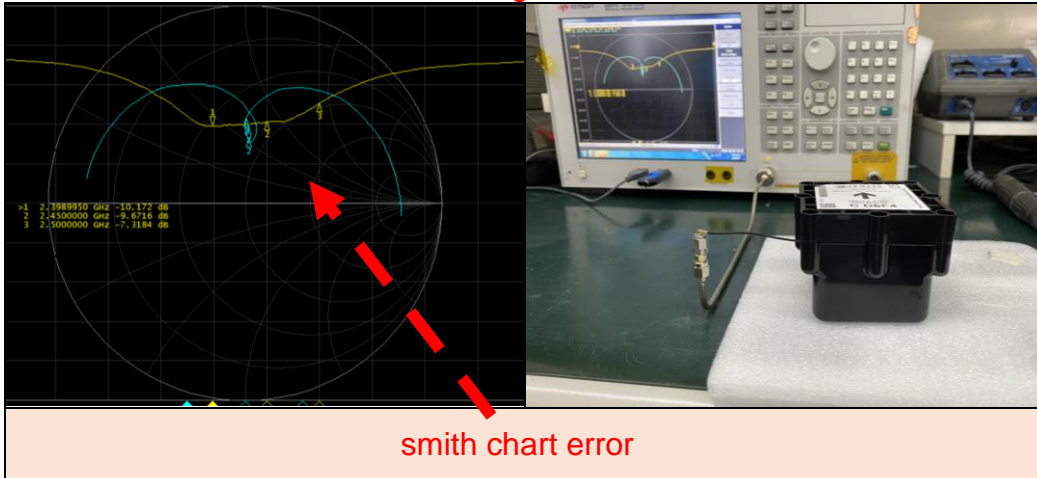
b. Antenna on PCB + Silicone



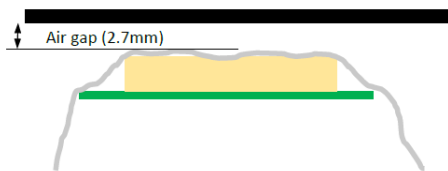
2) Antenna with PCBA and Silicone sheet (flat against antenna surface and draped over sides)



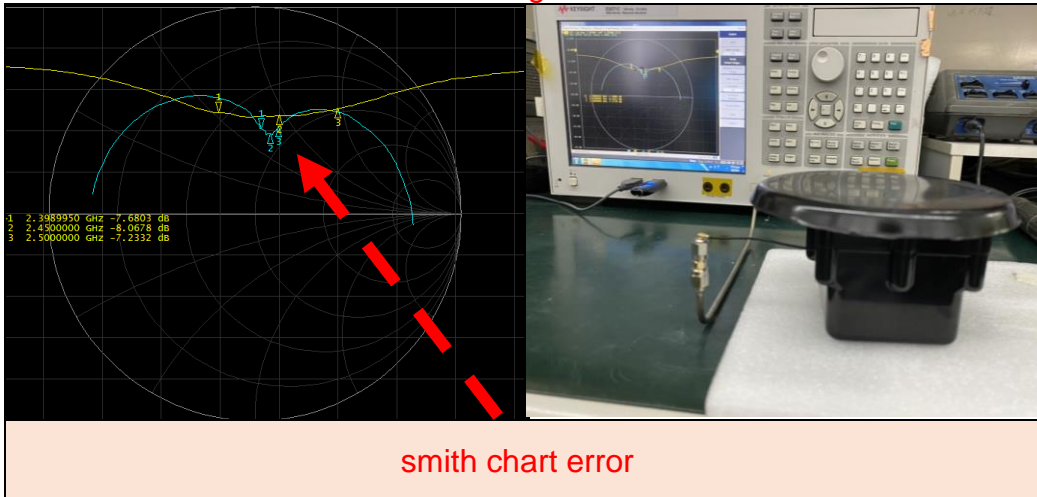
c. Antenna on PCB+ Silicone+Housing



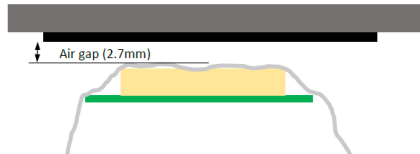
3) Antenna with PCBA and Silicone sheet and Xenoy (enclosure material)



d. Antenna on PCB+ Silicone + Housing+7mm cover



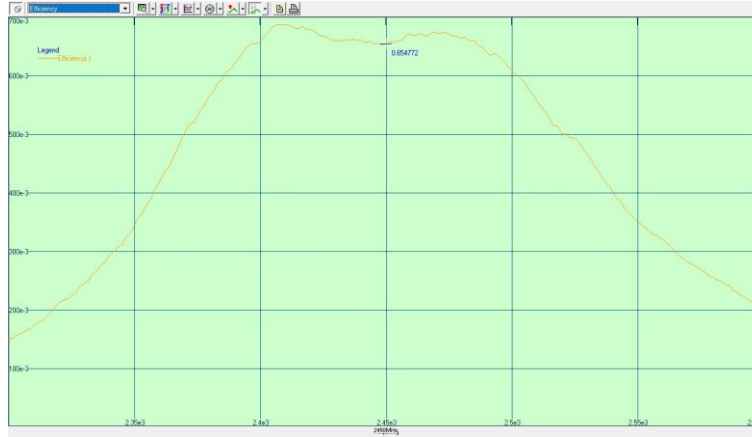
4) Antenna with PCBA and Silicone sheet and Xenoy and Urethane sealant



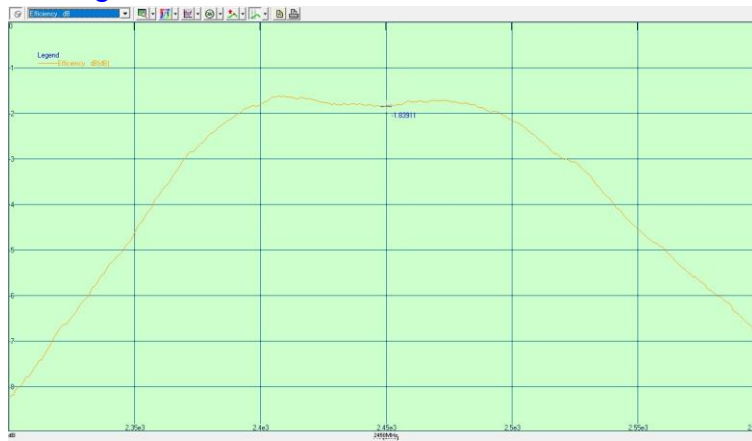
7. Patch in Housing Antenna Gain measurement :

a. **Antenna on PCB NO Housing:** (Impedance as item 8.aphoto)

Efficiency :



Average Gain :



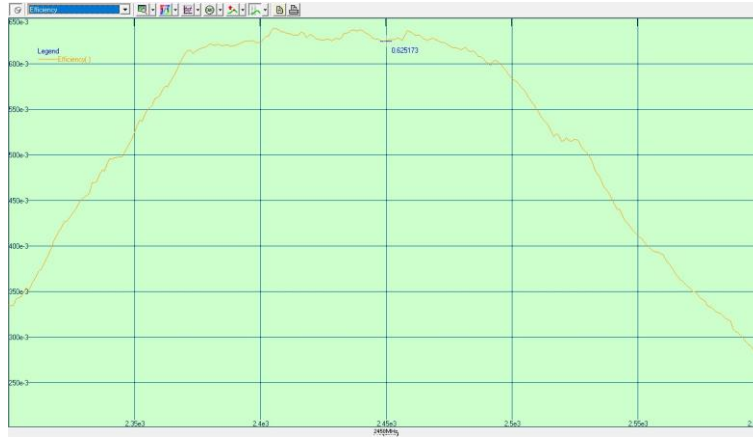
Peak Gain



Frequency	Efficiency	AVG Gain	Peak Gain
2400 MHz	65.93%	-1.80 dBi	2.75 dBic
2450 MHz	65.47%	-1.83 dBi	3.30 dBic
2500 MHz	60.88%	-2.15 dBi	2.03 dBic

b. Antenna on PCB+ Silicone+Housing: (Impedance as item 8.c photo)

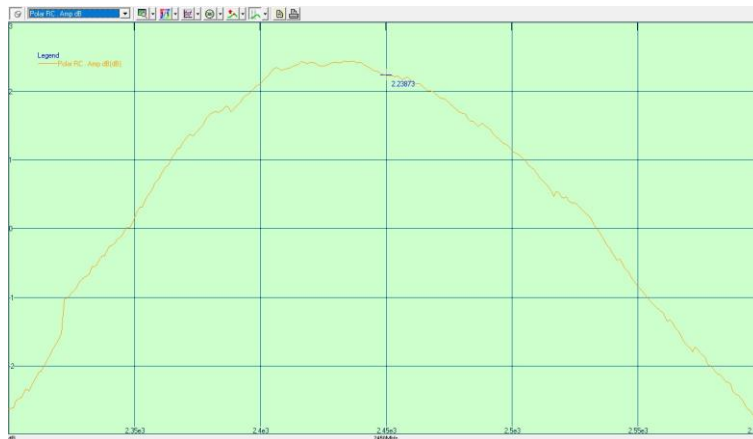
Efficiency :



Average Gain :



Peak Gain



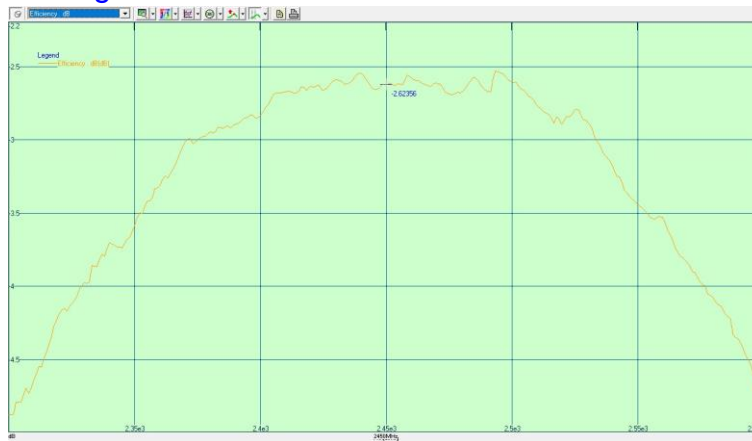
Frequency	Efficiency	AVG Gain	Peak Gain
2400 MHz	62.41%	-2.04 dBi	2.11 dBic
2450 MHz	62.51%	-2.04 dBi	2.23 dBic
2500 MHz	58.43%	-2.33 dBi	1.14 dBic

c. Antenna on PCB+ Silicone + Housing+7mm cover  
(Impedance as item 8.d photo)

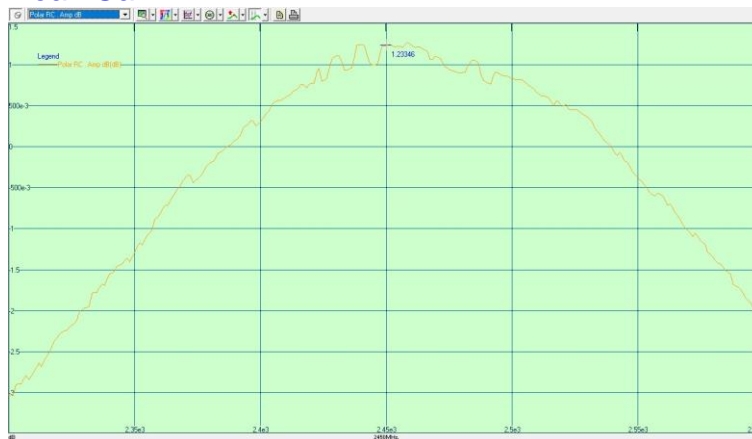
Efficiency :



Average Gain :

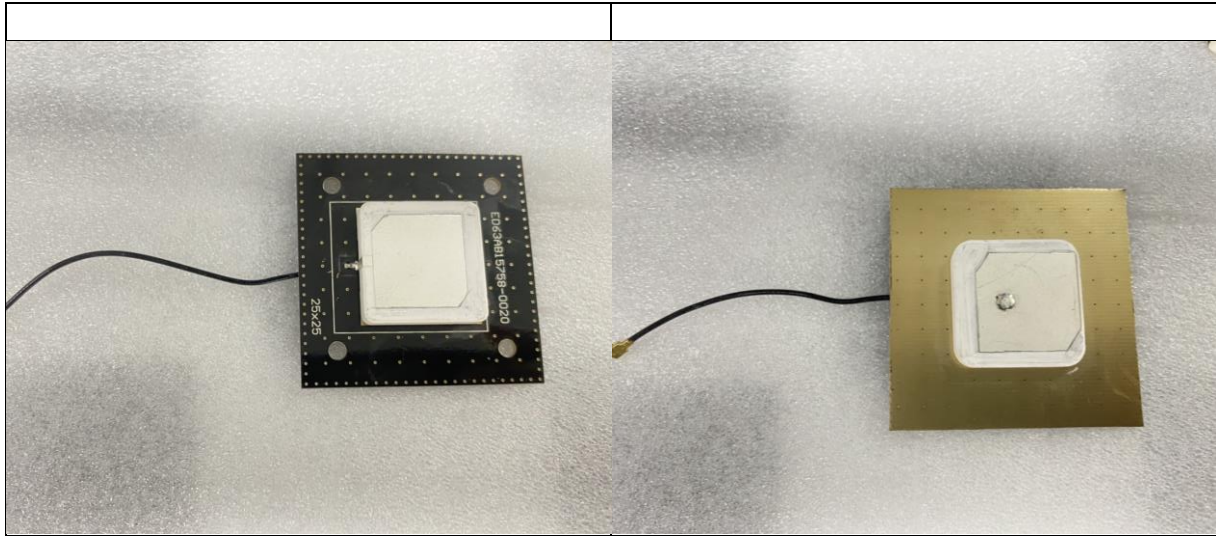


Peak Gain



Frequency	Efficiency	AVG Gain	Peak Gain
2500 MHz	52.07%	-2.83 dBi	0.30 dBic
2550 MHz	54.65%	-2.62 dBi	1.23 dBic
2600 MHz	54.90%	-2.60 dBi	0.83 dBic

Photo



Gain Comparison Table	Frequency	Efficiency (%)	AVG Gain (dBi)	Peak Gain (dBic)
<b>PIN type</b>				
Antenna on PCB No Housing	2400 MHz	61.81	-2.08	2.21
	2450 MHz	67.88	-1.68	3.68
	2500 MHz	66.6	-1.76	3.28
Antenna on PCB+ Silicone+Housing	2400 MHz	76.2	-1.18	3.37
	2450 MHz	76.89	-1.14	3.12
	2500 MHz	76.89	-1.14	3.68
Antenna on PCB+ Silicone + Housing+7mm cover	2500 MHz	67.07	-1.73	2.51
	2550 MHz	70.34	-1.52	3.21
	2600 MHz	71.36	-1.46	3.19
<b>SMD type</b>				
Antenna on PCB No Housing	2450 MHz	65.93	-1.80	2.75
	2500 MHz	65.47	-1.83	3.30
	2400 MHz	60.88	-2.15	2.03
Antenna on PCB+ Silicone+Housing	2450 MHz	62.41	-2.04	2.11
	2500 MHz	62.51	-2.04	2.23
	2500 MHz	58.43	-2.33	1.14
Antenna on PCB+ Silicone + Housing+7mm cover	2550 MHz	52.07	-2.83	0.30
	2600 MHz	54.65	-2.62	1.23
	2400 MHz	54.90	-2.60	0.83