

# Approval Sheet

Product : WIFI PCB Anntenna

Date : June 19, 2023

Customer Applied Model			
Customer			
Customer Part No.			
Supplier	SGT		
Supplier Part No.	SGT-2400s-120		
Customer	By designed	By checked	By approved
Supplier	By Designed	By checked	By approved
			
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## ■ Revision History

Revision No	Originator	Description of changes	Date of changes
1	Lee M.S	Initial release	2023.06.19
2			
3			
4			
5			
6			
7			
8			
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12			

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## 1. General

### 1.1 The Product

Customer Model	
Antenna Type	PCB Dipole Antenna
Applications	2.4GHz WIFI

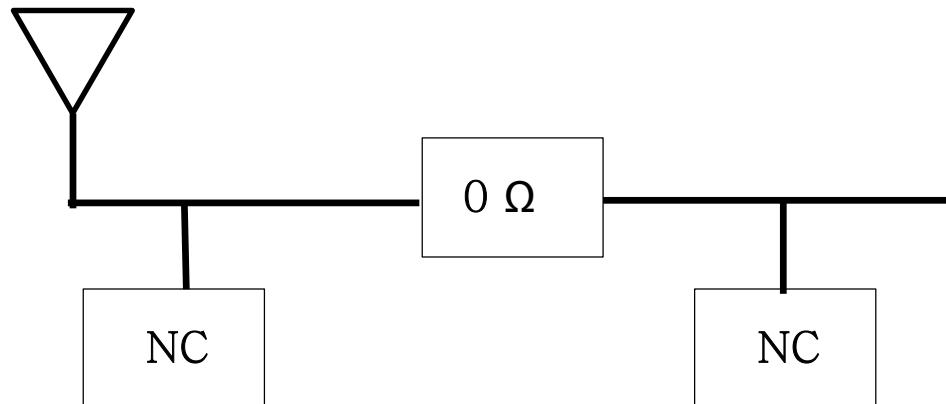
### 1.2 Electrical Properties

Frequency Range	2401~2483.5MHz
VSWR	Less than 2.5 : 1
Peak Gain	1.57 dBi
Radiation Pattern	Omni-directional
Polarization	Linear

### 1.3 Mechanical Properties

Dimension	See page 14
Operational Temperature	-30°C ~ +85°C
Connector Type	

### 1.4 Matching Value



## 2. Electrical Properties

### 2.1 Frequency Band

Band Freq'	2.4GHz WIFI Band
TX/RX	2401 ~ 2483.5MHz

### 2.2 Impedance

#### 2.2.1 Normal Value

$50\Omega \pm$  Normal

#### 2.2.1 Measuring Method

The impedance over the frequency bands shall be as close as possible to  $50\Omega$  after matching. Both free space and talk position are considered.

### 2.3 VSWR

The impedance matching should be optimized in the more critical talk position.

#### 2.3.1 Maximum values in free space

SERVICE	2401 ~ 2483.5 MHz
VSWR	Less than 2.5:1

#### 2.3.2 Measuring Method

A  $50\Omega$  coaxial cable is connected(soldered) to the  $50\Omega$  point, at the duplex-filter on the main PCB. The connection of the coaxial cable shall be done to introduce a minimum of mismatch. As much as possible the coaxial cable arrangement shall prevent influences from induced currents on the cable. In the other end, the coaxial cable is connected to a network analyzer. The measurement is performed at room temperature. The handset, including the PCB, must not in any significant way differ from the mass production, i.e. the antenna feeding network has to be equivalent to the feeding network in mass production. The specification shall be met in the entire frequency band.

### 3. Mechanical Properties

#### 3.1 Appearance

The appearance shall be according to the specification drawing on page 15.

The antenna shall have no cuts, abrasion or other mechanical damages.

#### 3.2 Drop

##### 3.2.1 Drops

1 drop in retracted mode (3cycles)

##### 3.2.2 Drop Height

1.5m

##### 3.2.3 Drop Angle

180°

##### 3.2.4 Actual handset applied

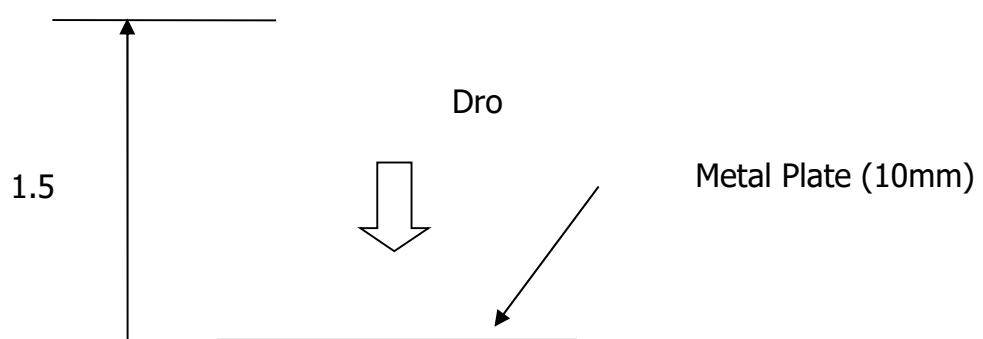
##### 3.2.5 Demands

The original shape shall be possible to restore. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

##### 3.2.6 Measuring Method

The antenna is placed in the handset or an equivalent test fixture.

The handset is dropped with the antenna downwards onto a metal plate.



**Figure3. Drop Test**

## 4. Environment Resistance Properties

### 4.1 Operational Temperature

#### 4.1.1. Low Operational Temperature

$T_{LO} = -30^{\circ}\text{C}$

#### 4.1.2 High Operational Temperature

$T_{HO} = +80^{\circ}\text{C}$

#### 4.1.3 Demands

No visual deterioration shall occur, and the antenna shall satisfy the electrical demands, according to 2.4.1, during the test.

#### 4.1.4 Measuring Method

The antenna is placed in a climatic chamber at temperature  $T_{LO}$ .

The antenna is taken out after 1 hour, and VSWR is immediately measured.

The antenna is placed in a climatic chamber at temperature  $T_{HO}$ .

The antenna is taken out after 1 hour, and VSWR is immediately measured.

### 4.2 Temperature Cycling

#### 4.2.1 Low Cycling Temperature

$T_{LC} = -30^{\circ}\text{C}$

#### 4.2.2 High Cycling Temperature

$T_{HC} = +80^{\circ}\text{C}$

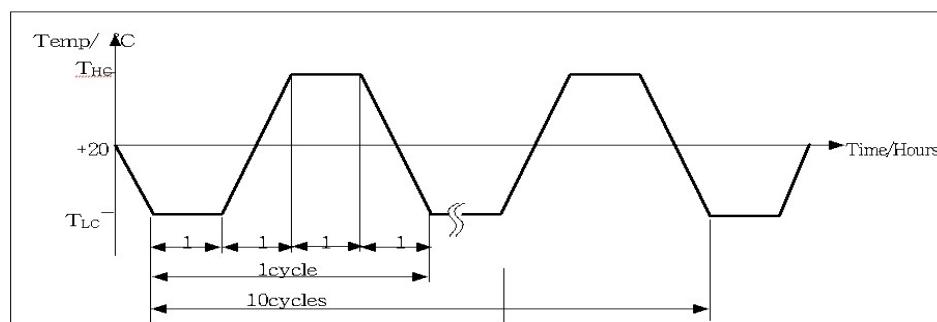
#### 4.2.3 Demands

No visual deterioration shall occur during the test. The antenna shall satisfy the electrical demands, according to 2.4.1.

#### 4.2.4 Measuring Method

The antenna is placed in a climatic chamber. The temperature is cycled as follows: The temperature is kept constantly at  $T_{LC}$  for 1 hour, increased to  $T_{HC}$  during 1 hour, kept constantly at  $T_{HC}$  for 1 hour, and then decreased to  $T_{LC}$  during 1 hour.

This procedure is repeated 10 times, ending at room temperature according to Figure 4 below.



**Figure 4. Temperature Cycling**

#### 4.3 humidity

##### 4.3.1 Relative Humidity

95%

##### 4.3.2 Temperature

+55°C

##### 4.3.3 Demands

No visual deterioration shall occur during the test. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

##### 4.3.4 Measuring Method

The antenna is placed in a climatic chamber for 24 hours. The antenna is taken out from the chamber and measured after another 24 hours in room temperature.

#### 4.4 Sinusoidal Vibration

##### 4.4.1 Vibration Frequencies

10-55-10Hz (1cycle)

##### 4.4.2 Sweep Rate

1 octave/min (logarithmic)

##### 4.4.3 Maximum Amplitude

$A = 1.52\text{mm}$

##### 4.4.4 Maxim Acceleration

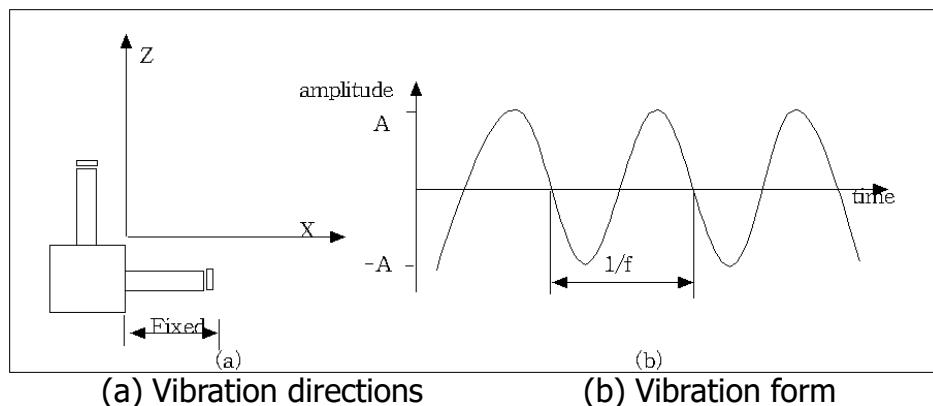
$2g$

##### 4.4.5 Crossover Frequency

18.2Hz

##### 4.4.7 Measuring Method

The fixed antenna is assembled in the test equipment. The vibration is done both in x-and z-directions, according to Figure 5(a), with a duration of 1 hour in each direction.

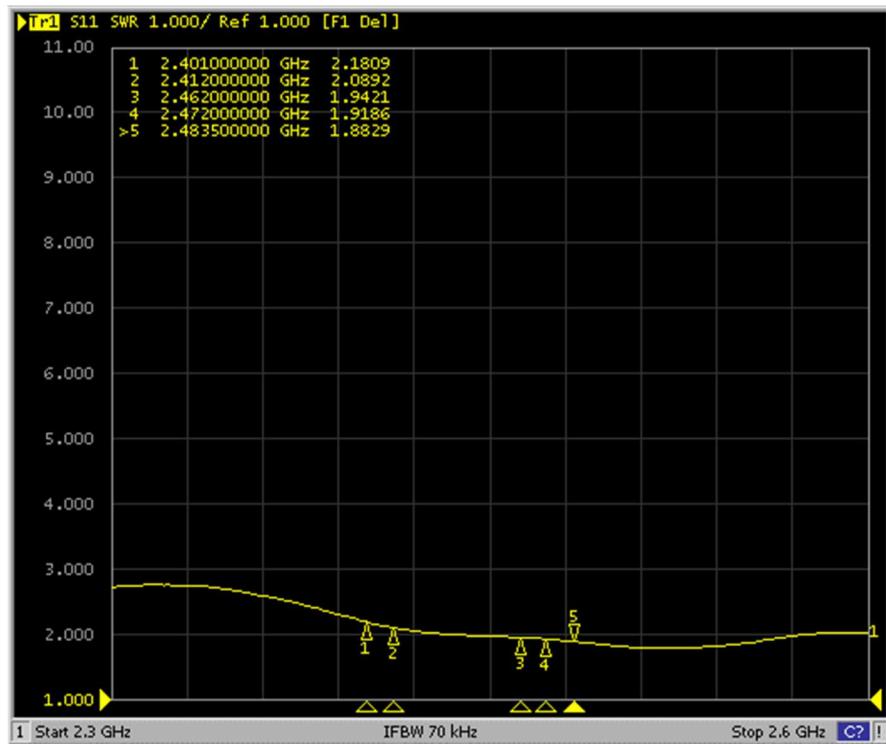


**Figure 5. Sinusoidal Vibrator**

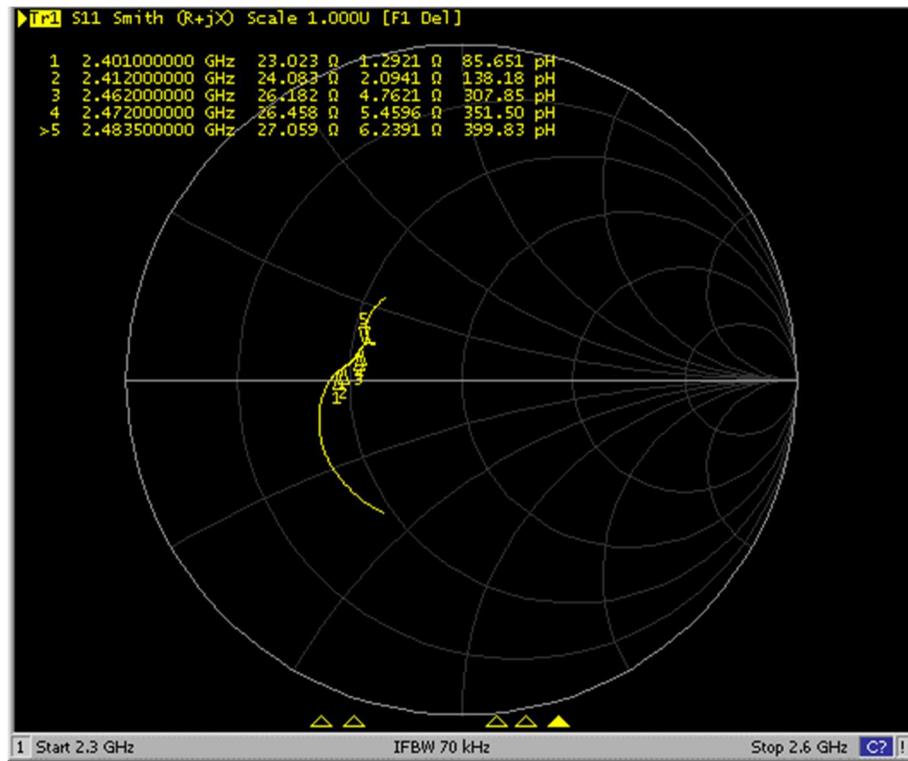
## 5. Test Data

### 5.1 Network Data

#### - VSWR

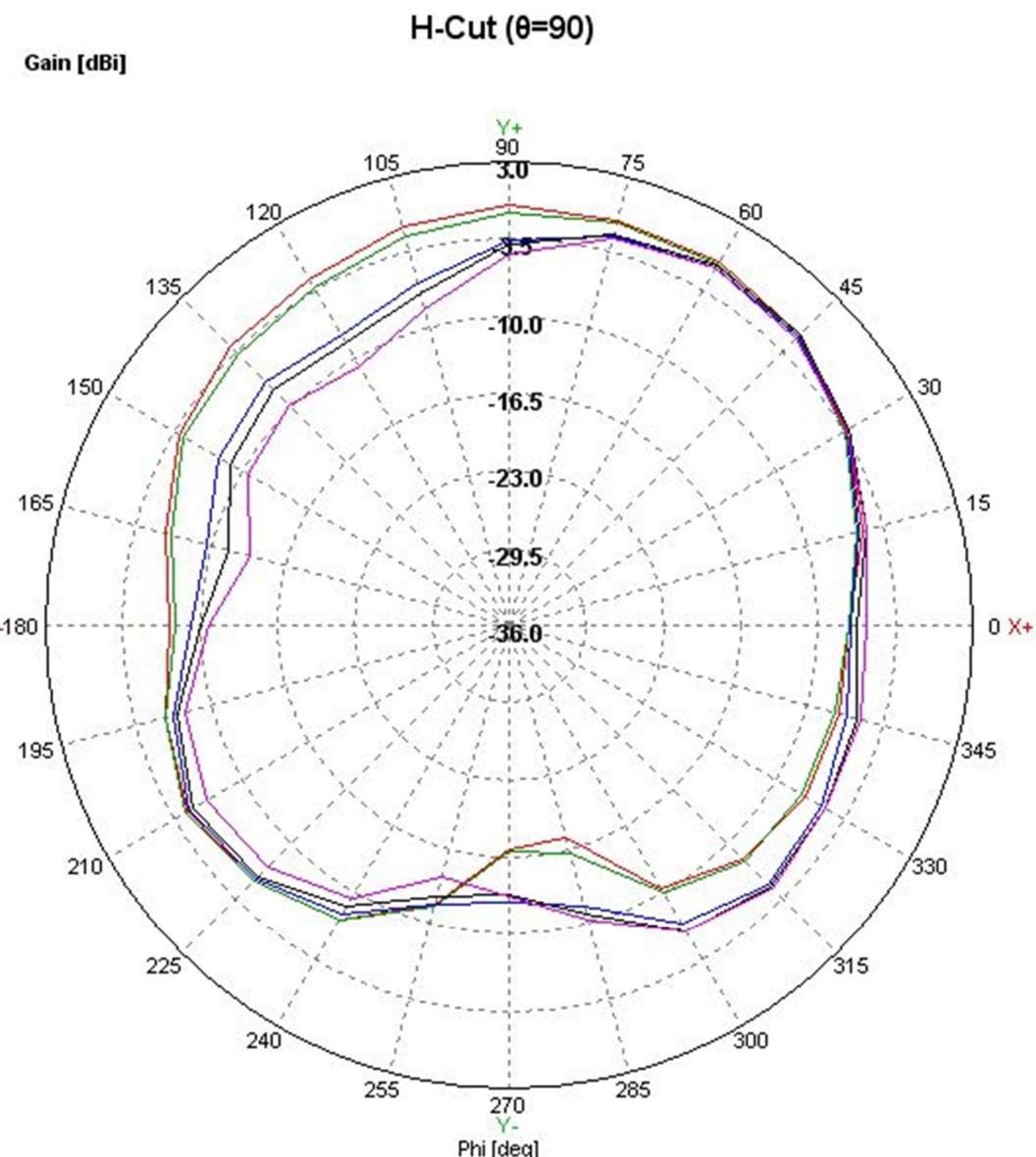


#### - Smith Chart



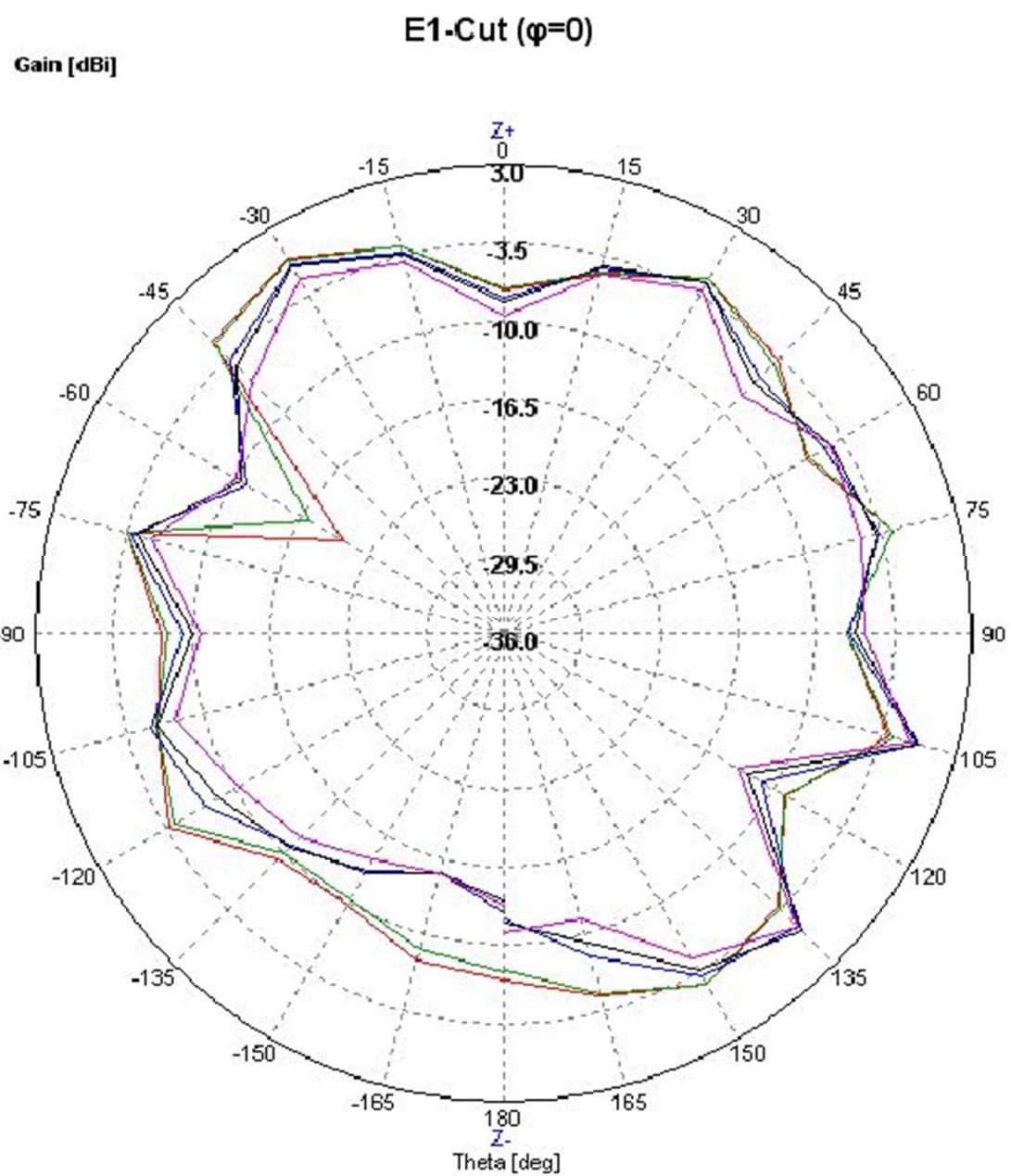
## 5.2 Radiation Pattern

### 5.2.1 H Plane



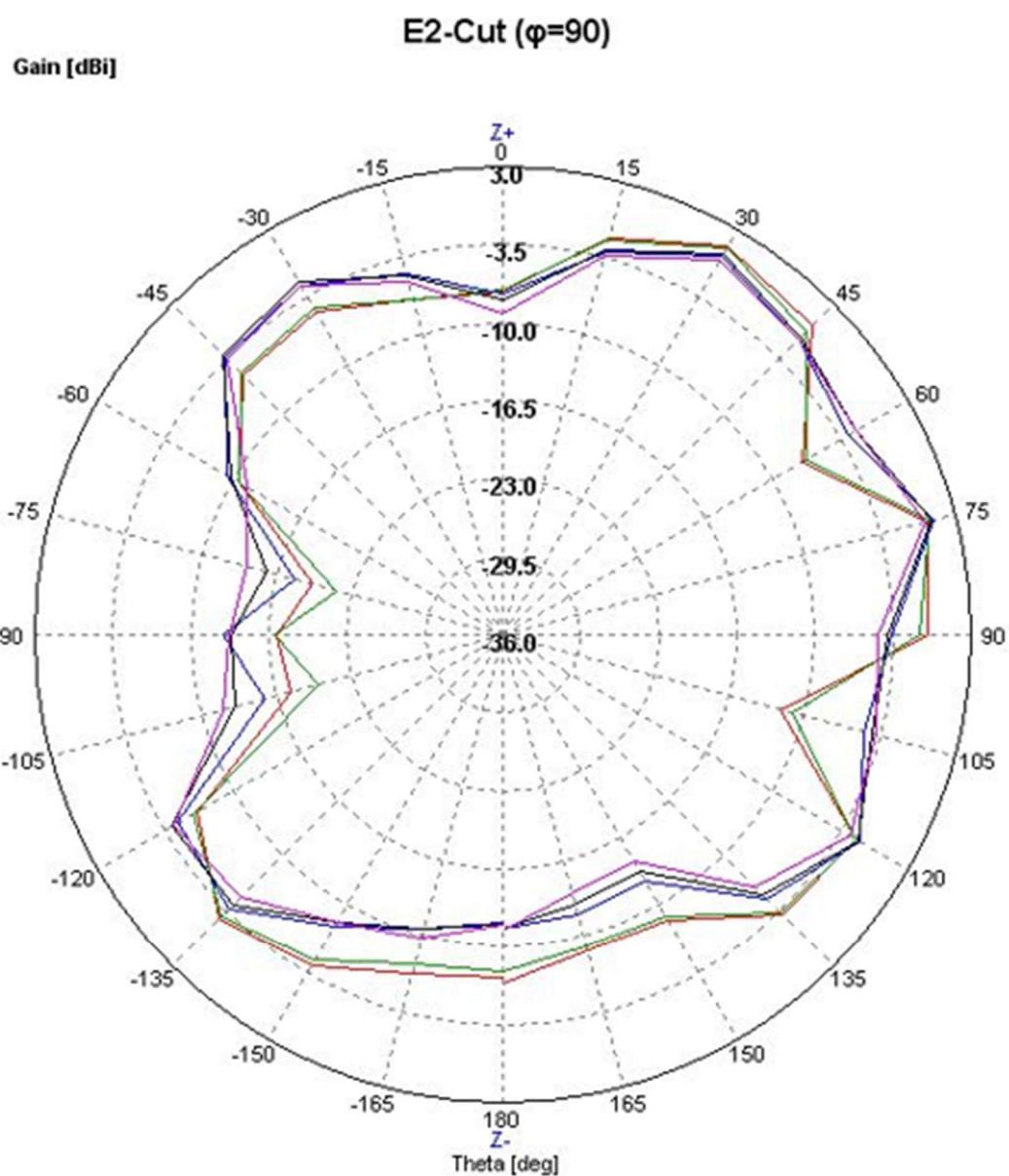
No.	Freq.	PwrSurf					H( $\theta=90$ )			
No.	Freq.	Eff. [%]	Avg. [dBi]	Peak [dBi]	$\theta$ [deg]	$\phi$ [deg]	Avg. [dBi]	Peak [dBi]	$\phi$ [deg]	BW [deg]
1	2401.0000	39.33	-4.05	1.57	75.00	105.00	-4.41	-0.57	90.00	118.23
2	2412.0000	38.54	-4.14	1.51	75.00	105.00	-4.76	-0.92	75.00	113.79
3	2462.0000	38.10	-4.19	1.43	75.00	105.00	-5.63	-1.25	60.00	70.00
4	2472.0000	37.94	-4.21	1.28	75.00	105.00	-5.62	-1.07	60.00	68.85
5	2483.5000	32.77	-4.85	0.40	75.00	105.00	-6.05	-1.35	60.00	68.87

## 5.2.2 E1 Plane



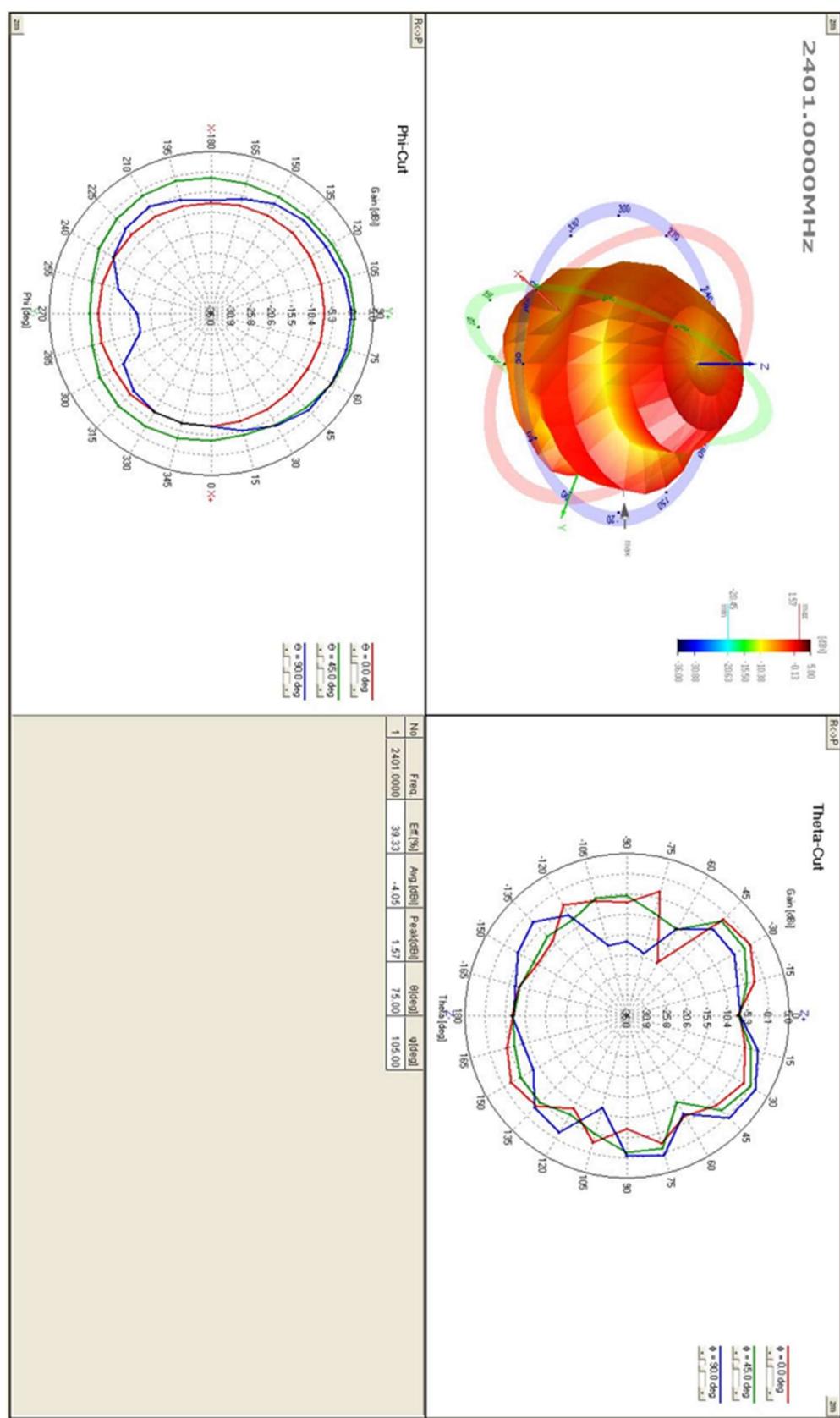
No.	Freq.	E1( $\phi=0$ )			
		Avg.[dBi]	Peak[dBi]	$\theta$ [deg]	BW[deg]
1	2401.0000	-4.43	0.07	-30.00	31.97
2	2412.0000	-4.51	-0.05	-30.00	32.49
3	2462.0000	-4.91	-0.34	105.00	10.62
4	2472.0000	-5.05	-0.22	105.00	10.53
5	2483.5000	-5.90	-0.93	105.00	12.61

### 5.2.3 E2 Plane



No.	Freq.	E2( $\phi=90$ )		
		Avg.[dBi]	Peak[dBi]	$\theta$ [deg]
1	2401.0000	-4.02	1.48	30.00
2	2412.0000	-4.20	1.27	30.00
3	2462.0000	-4.31	1.12	75.00
4	2472.0000	-4.21	0.95	75.00
5	2483.5000	-4.65	0.36	75.00

## 5.2.4 3D Pattern



## 6. Mechanical Drawing

