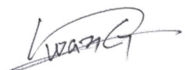


Approval Sheet

Product : 900MHz Stubby Antenna

Customer Applied Model	900MHz Stubby Antenna		
Customer			
Customer Part No.			
Supplier	SGT		
Supplier Part No.	SG-PS921		
Customer	By designed	By checked	By approved
Supplier	By Designed	By checked	By approved
			
	Lee M.S		Hwang S.G

SGT

Address : 5, Daerim-ro 17-gil, Yeongdeungpo-gu, Seoul, Republic of Korea

■ Revision History

Revision No	Originator	Description of changes	Date of changes
1	Lee M.S	Initial release	2022.4.11
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

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1. General

1.1 The Product

Customer Model	900MHz Stubby Antenna
Antenna Type	Helical Antenna
Applications	LoRa

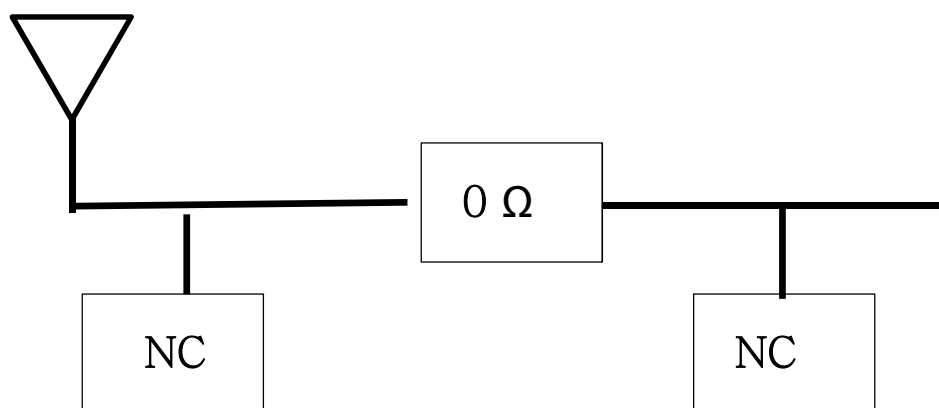
1.2 Electrical Properties

Frequency Range	900~945MHz
VSWR	Less than 2.5 : 1
Peak Gain	0.91 dBi
Radiation Pattern	Omni-directional
Polarization	Linear

1.3 Mechanical Properties

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

1.4 Matching Value



2. Electrical Properties

2.1 Frequency Band

Band Freq'	LoRa
TX/RX	900 ~945 MHz

2.2 Impedance

2.2.1 Normal Value

50Ω ± Normal

2.2.1 Measuring Method

The impedance over the frequency bands shall be as close as possible to 50Ω 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	900 ~ 945 MHz
VSWR	Less than 2.5:1

2.3.2 Measuring Method

A 50Ω coaxial cable is connected(soldered) to the 50Ω 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.

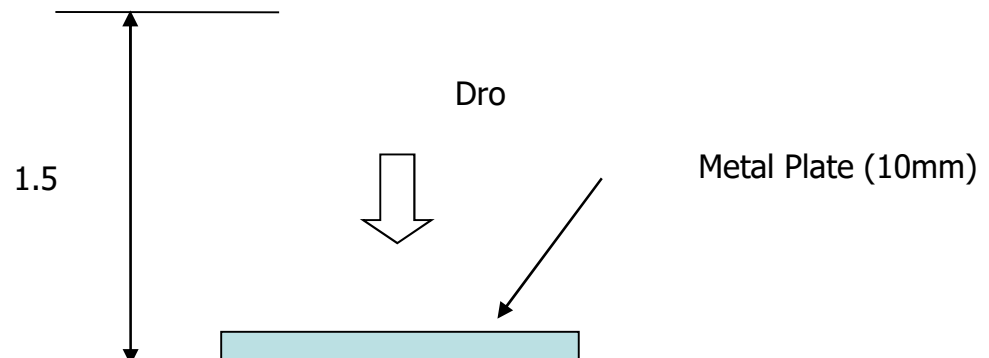


Figure3. Drop Test

4. Environment Resistance Properties

4.1 Operational Temperature

4.1.1. Low Operational Temperature

TLO = -30°C

4.1.2 High Operational Temperature

THO = +80°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 TLO.

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

The antenna is placed in a climatic chamber at temperature THO.

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

4.2 Temperature Cycling

4.2.1 Low Cycling Temperature

TLC = -30°C

4.2.2 High Cycling Temperature

THC = +80°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 TLC for 1 hour, increased to THC during 1 hour, kept constantly at THC for 1 hour, and then decreased to TLC during 1 hour.

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

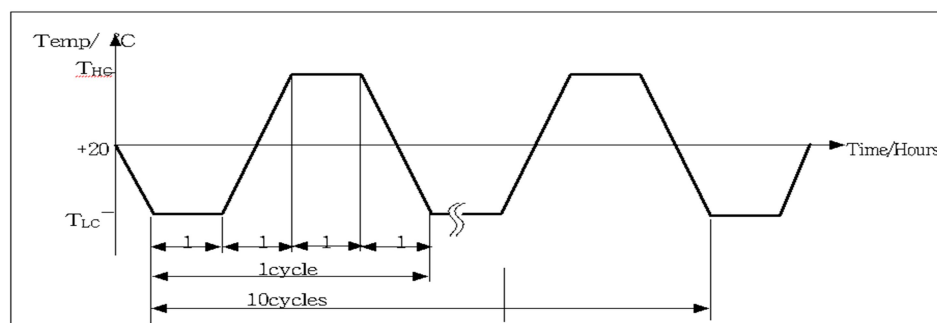


Figure 4. Temperature Cycling

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.

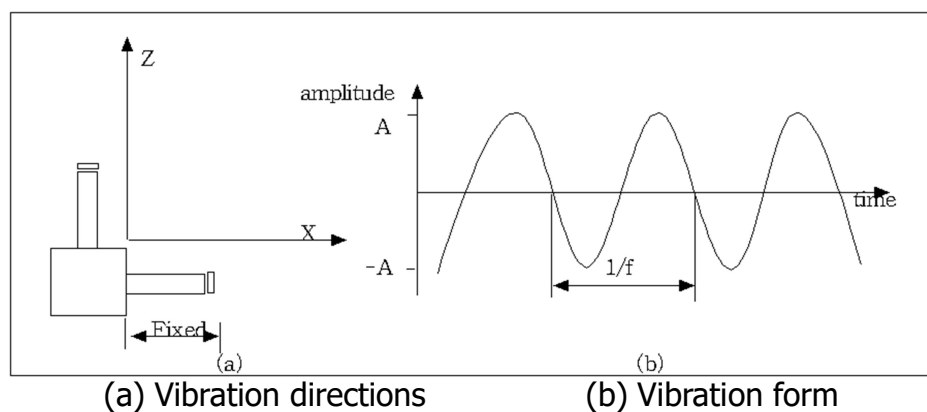
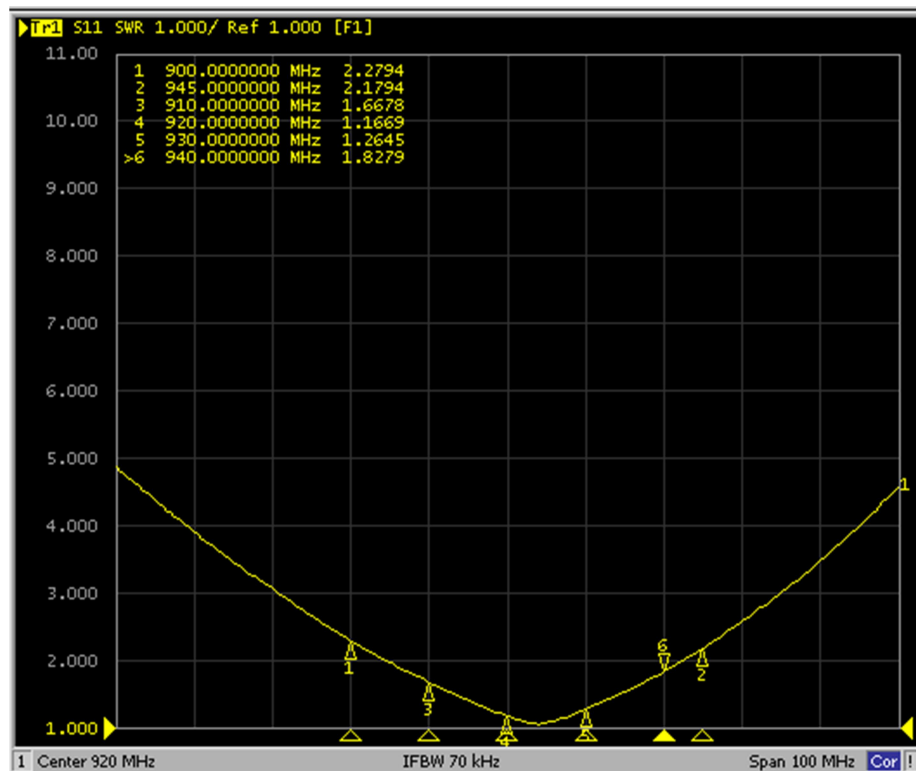


Figure 5. Sinusoidal Vibrator

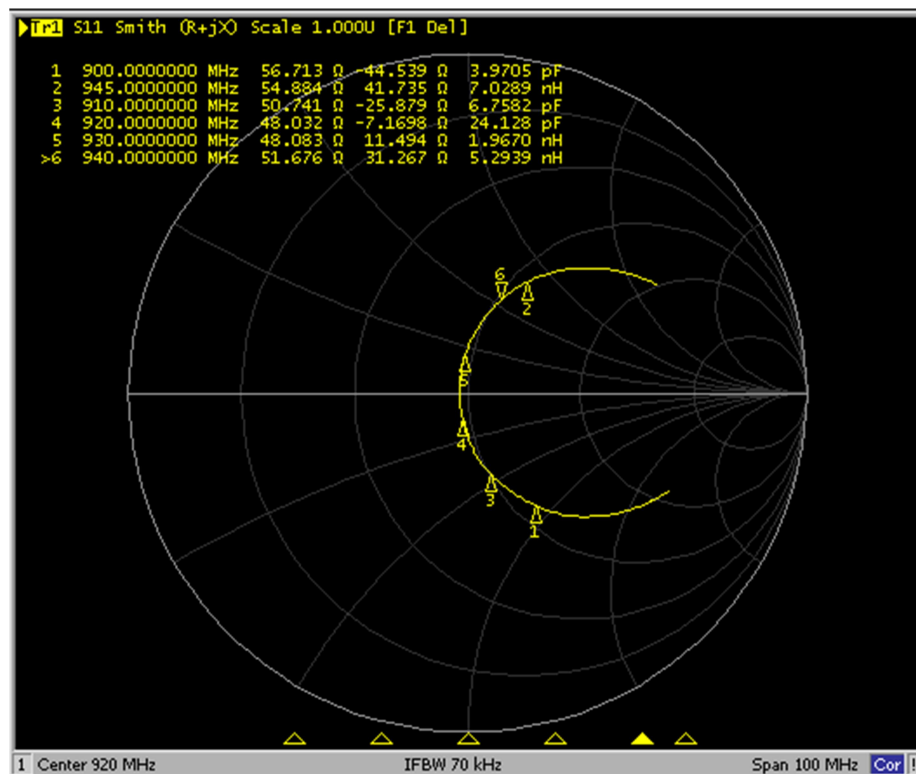
5. Test Data

5.1 Network Data

- VSWR

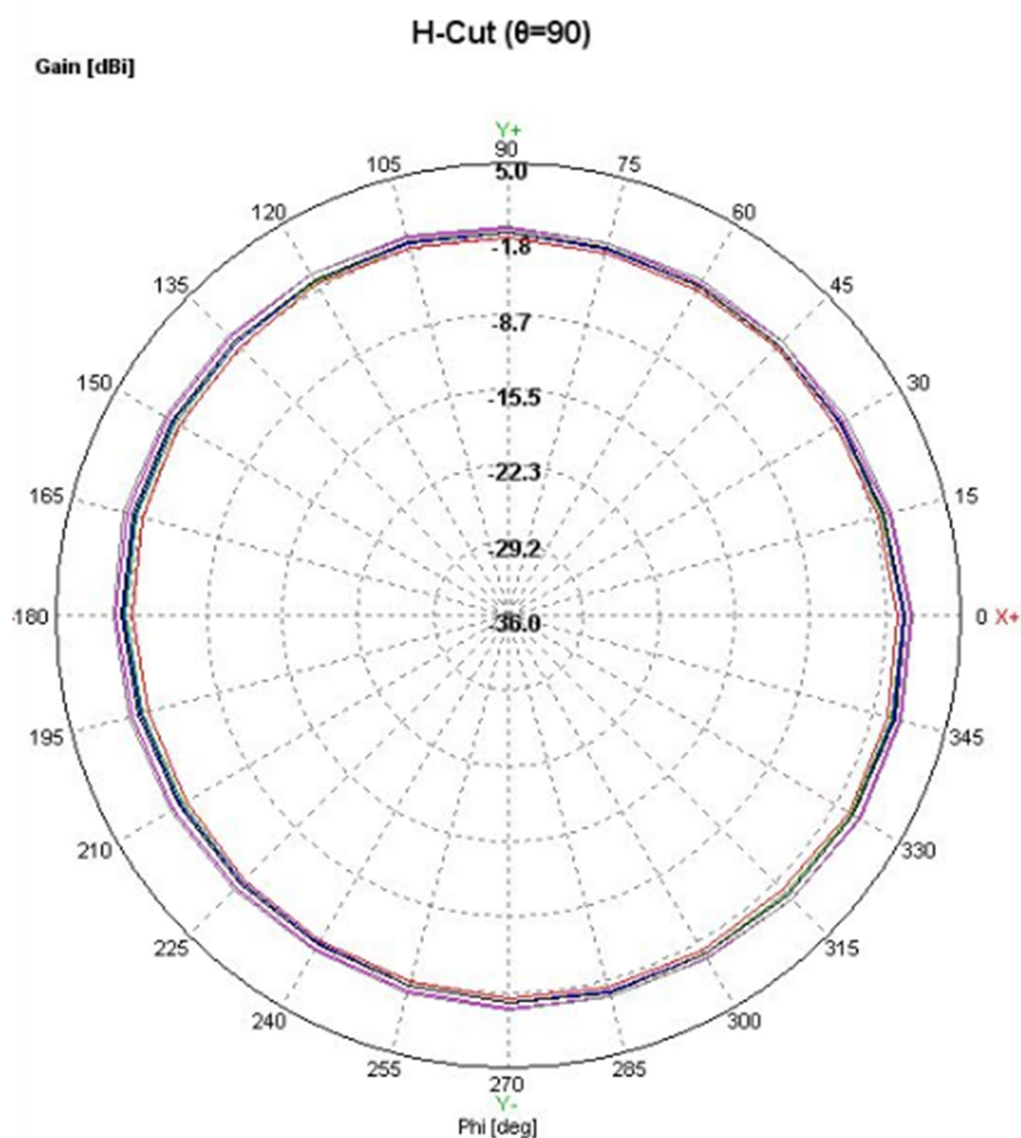


- Smith Chart



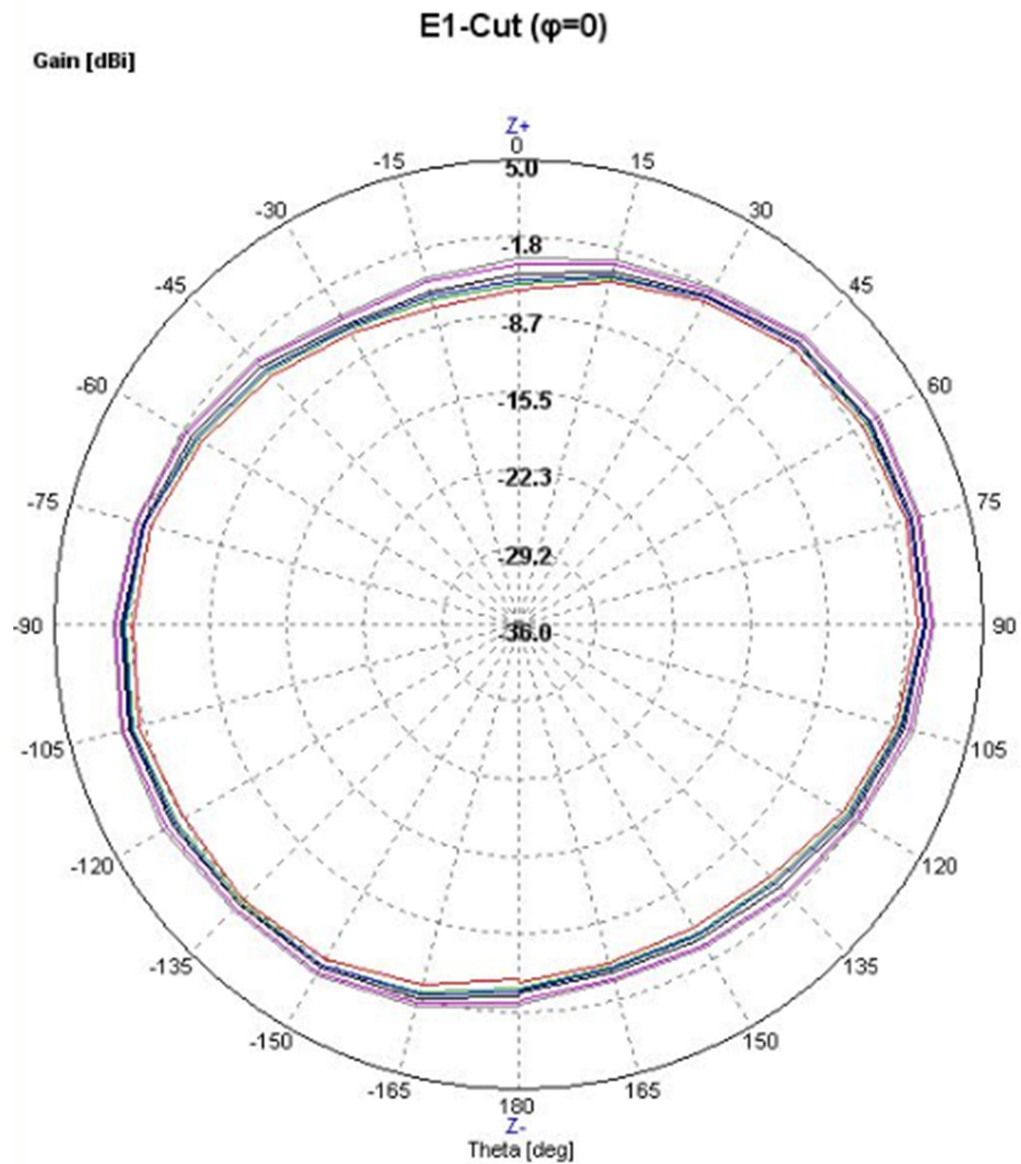
5.2 Radiation Pattern

5.2.1 H Plane



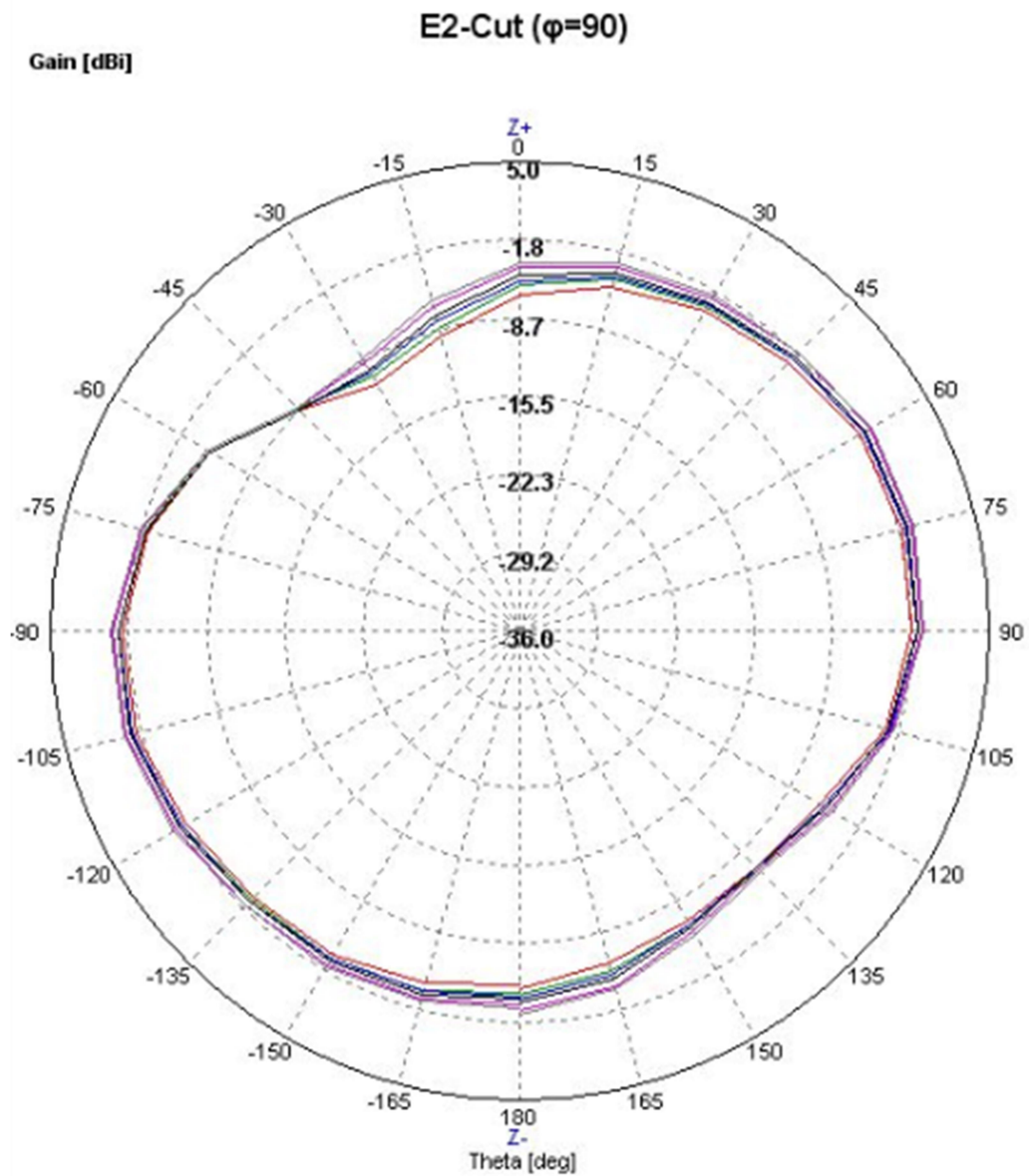
		PwrSum					H(θ=90)			
No.	Freq.	Eff.[%]	Avg.[dBi]	Peak[dBi]	θ[deg]	φ[deg]	Avg.[dBi]	Peak[dBi]	φ[deg]	BW[deg]
1	900.0000	52.55	-2.79	-0.33	90.00	330.00	-1.46	-0.33	330.00	999.00
2	910.0000	58.45	-2.33	-0.01	90.00	345.00	-1.03	-0.01	345.00	999.00
3	920.0000	59.36	-2.26	0.07	90.00	330.00	-0.99	0.07	330.00	999.00
4	930.0000	61.48	-2.11	0.24	90.00	345.00	-0.85	0.24	345.00	999.00
5	940.0000	68.46	-1.65	0.72	90.00	345.00	-0.42	0.72	345.00	999.00
6	945.0000	71.97	-1.43	0.91	90.00	345.00	-0.23	0.91	345.00	999.00

5.2.2 E1 Plane



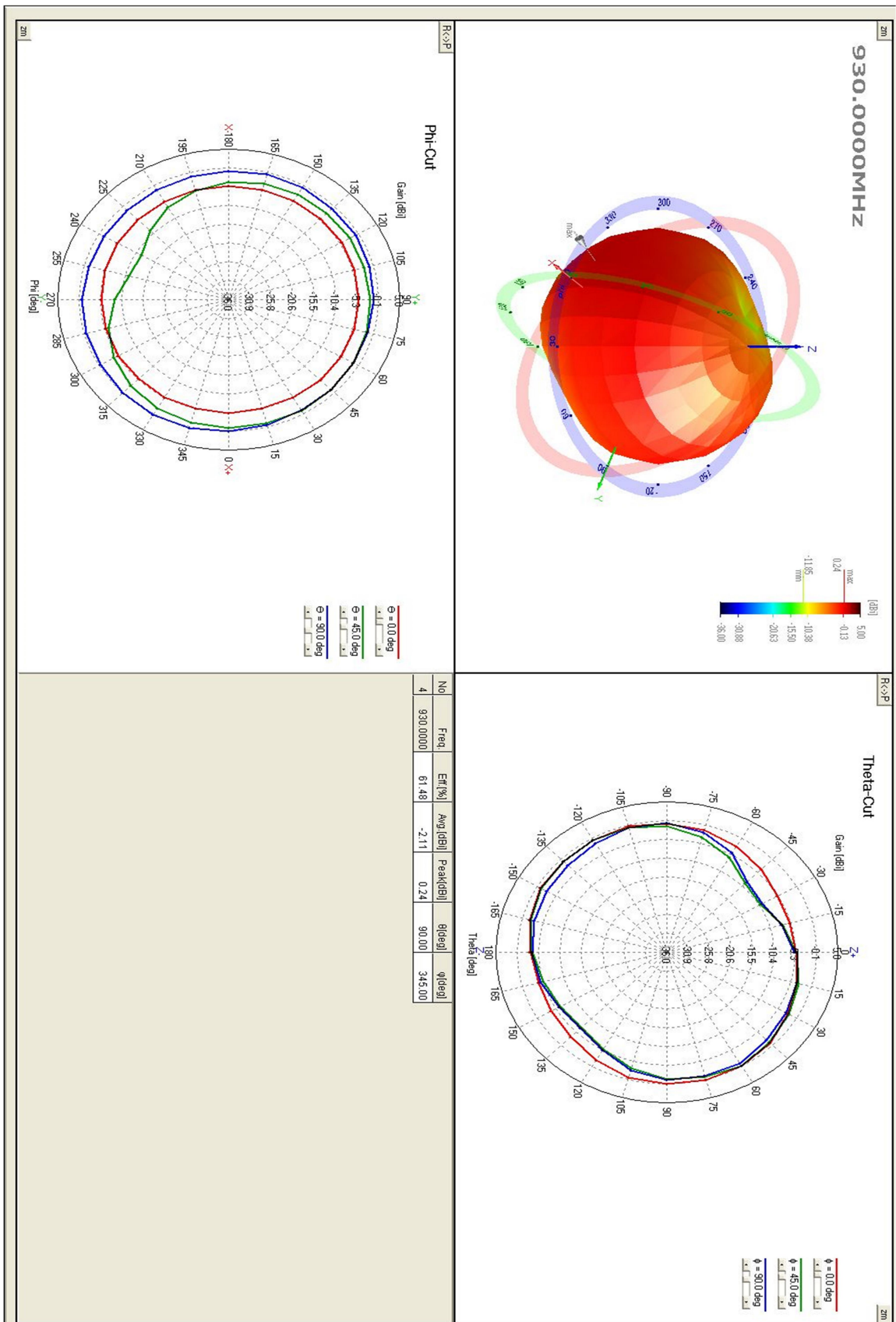
Frequency (MHz)	Average (dBi)	Peak (dBi)
900	-2.85	-0.53
910	-2.37	-0.18
920	-2.21	-0.15
930	-1.97	-0.01
940	-1.40	0.53
945	-1.15	0.74

5.2.3 E2 Plane

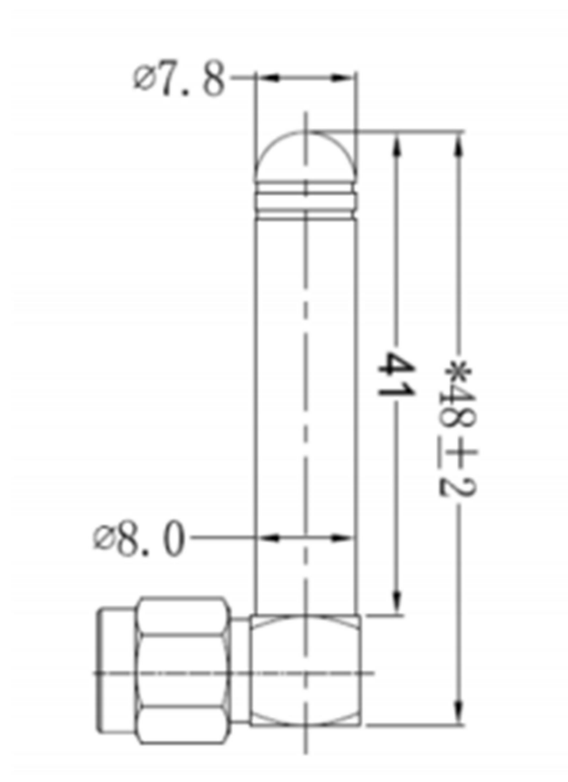


Frequency (MHz)	Average (dBi)	Peak (dBi)
900	-3.82	-1.22
910	-3.38	-0.90
920	-3.32	-0.91
930	-3.19	-0.80
940	-2.73	-0.30
945	-2.53	-1.12

5.2.4 3D Pattern



6. Mechanical Drawing



2	SMA Plug 90°	Cu		1
1	Body1	TPE	black	1
No.	Description	Material	Finish	Q'ty