

Application Note for WiFi PCB Antenna

Wi-Fi Triple Band Antenna

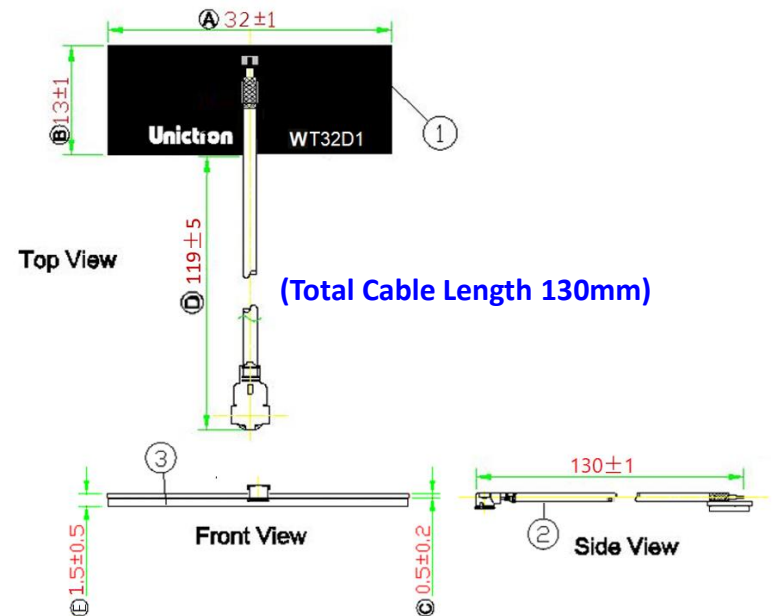
- **Model:WT32D1-KX001**

1.Specifications:

Items	Specifications		
Frequencies (MHz)	2400~2485	5150~5850	5925~7125
VSWR	<2 Typ.		
Efficiency (%)	81 Typ.	65 Typ.	73 Typ.
Average Gain (dB)	-0.9 Typ.	-1.9 Typ.	-1.2 Typ.
Peak Gain (dBi)	3 Typ.	4 Typ.	4 Typ.
Impedance (Ω)	50		
Polarization	Linear Polarization		

Mechanical Specifications	
Dimensions (mm) with Adhesive	32(L) x 13 (W) x 1.5 (H)
Material	FR4
Environmental Conditions	
Operation & Storage Temperature ($^{\circ}$ C)	-40 ~ +85
Storage Temperature ($^{\circ}$ C) (Antenna with packing sealed)	-5 ~ +40
Relative Humidity	10 ~ 70 %
UL94 rating	V-0

2.Dimensions OF Antenna with cable (unit: mm)

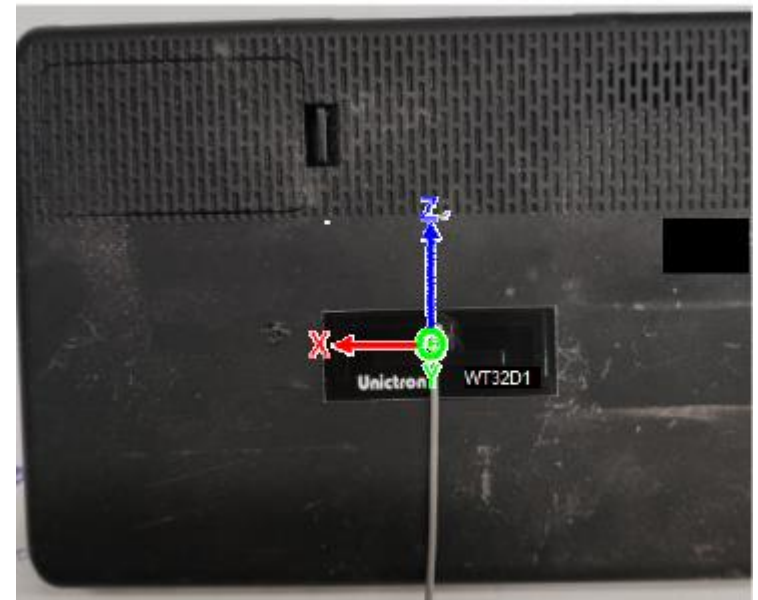


Pattern Measurement

- The antenna radiation are measured in Unictron's 3D Anechoic Chamber.
- The measurement setup is as show below.

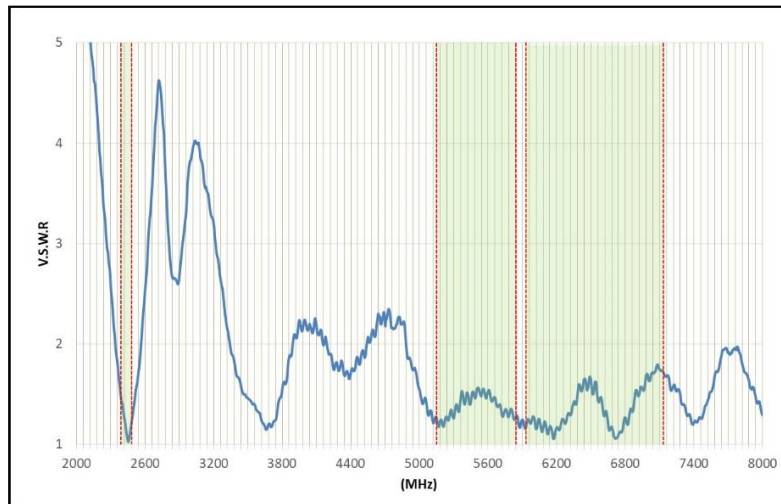


3D Radiation Gain Pattern

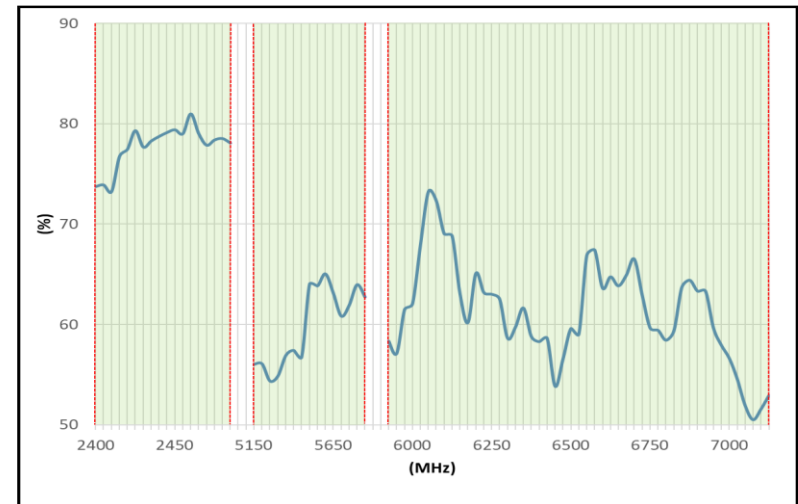


Properties

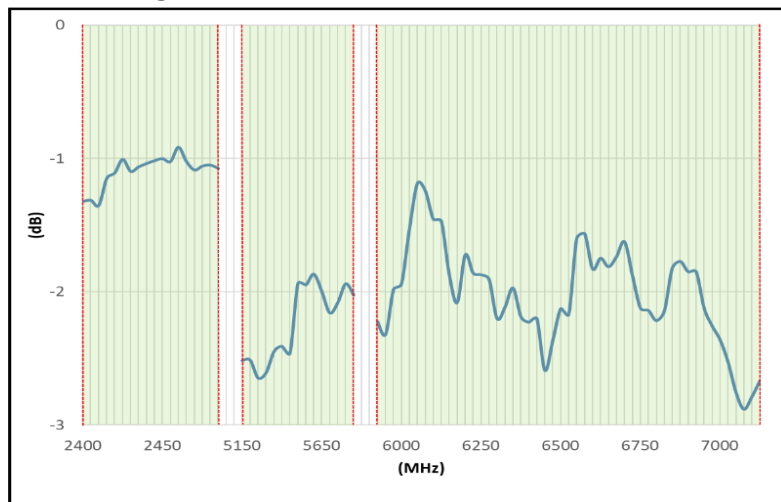
a) VSWR



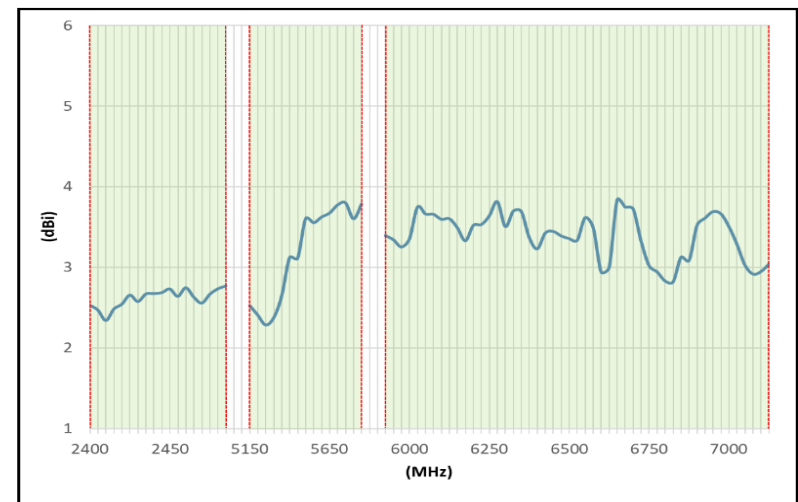
b) Efficiency (%)



c) Average Gain (dB)

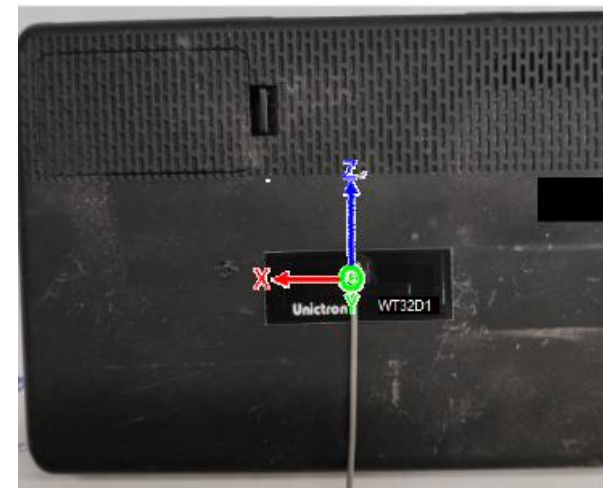
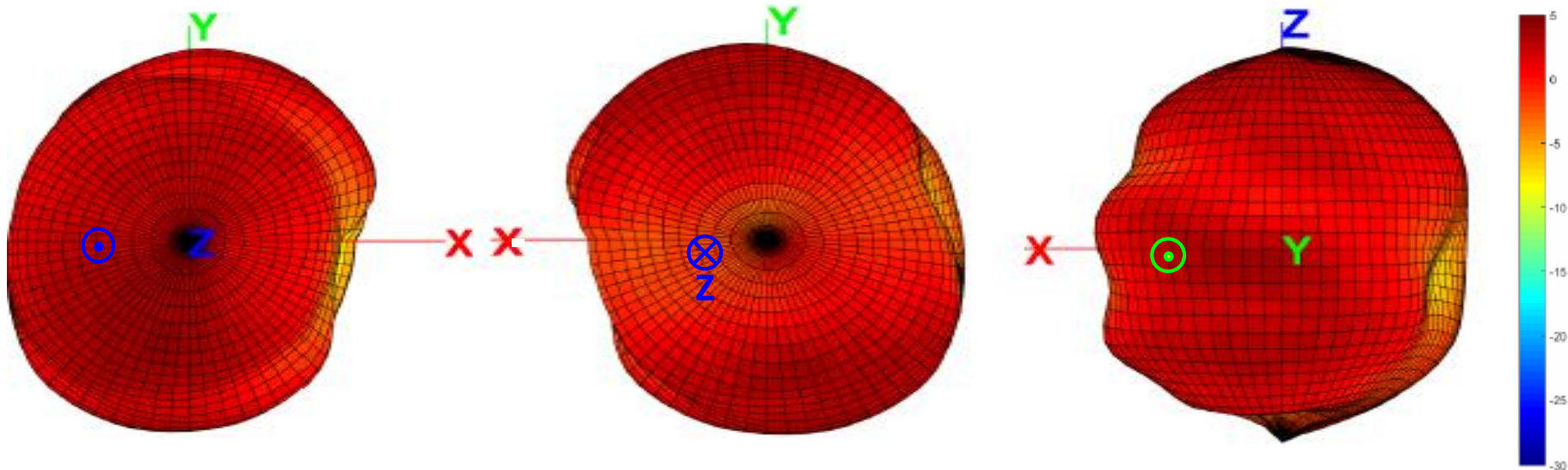


d) Peak Gain (dBi)



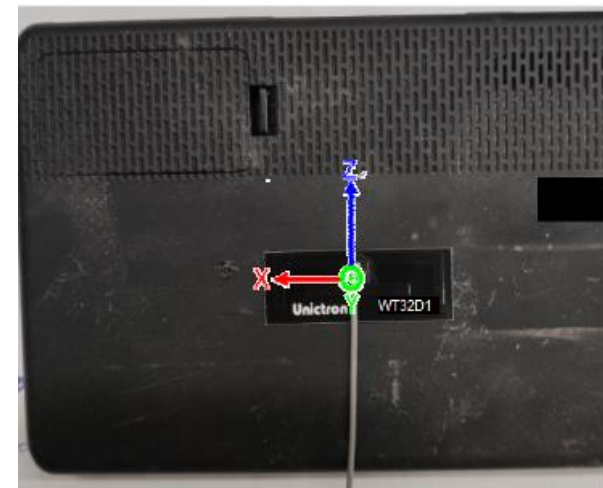
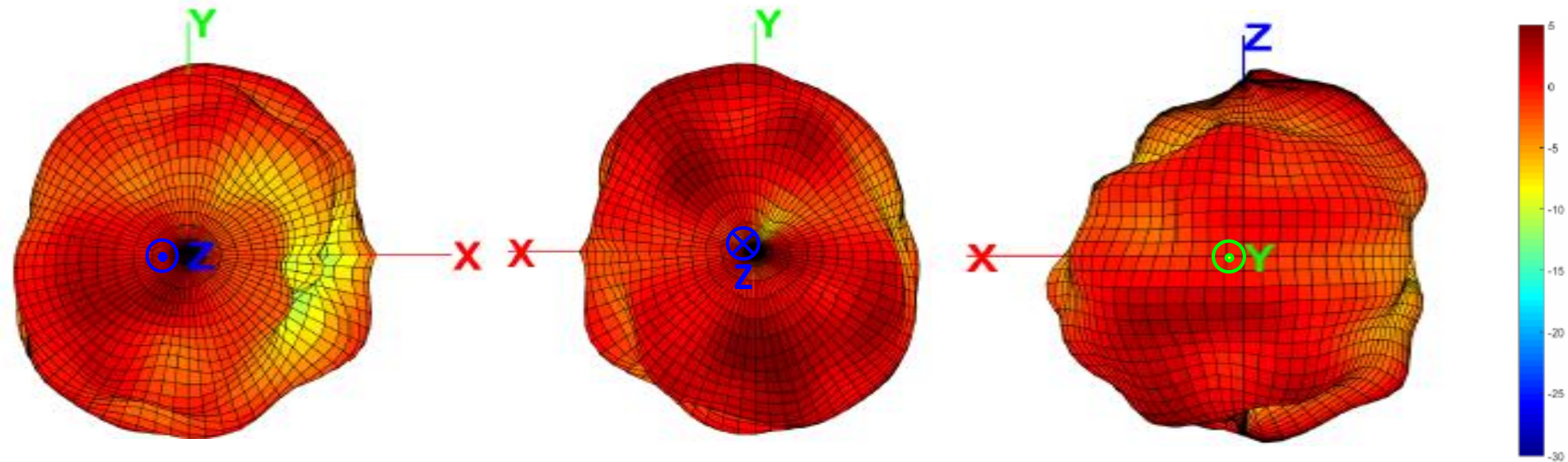
3D Gain Pattern

- 3D Gain Pattern (Radiation Pattern @ 2442 MHz) (unit: dBi)



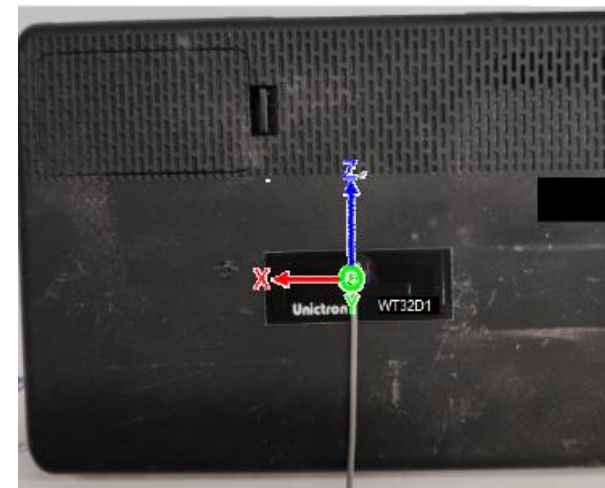
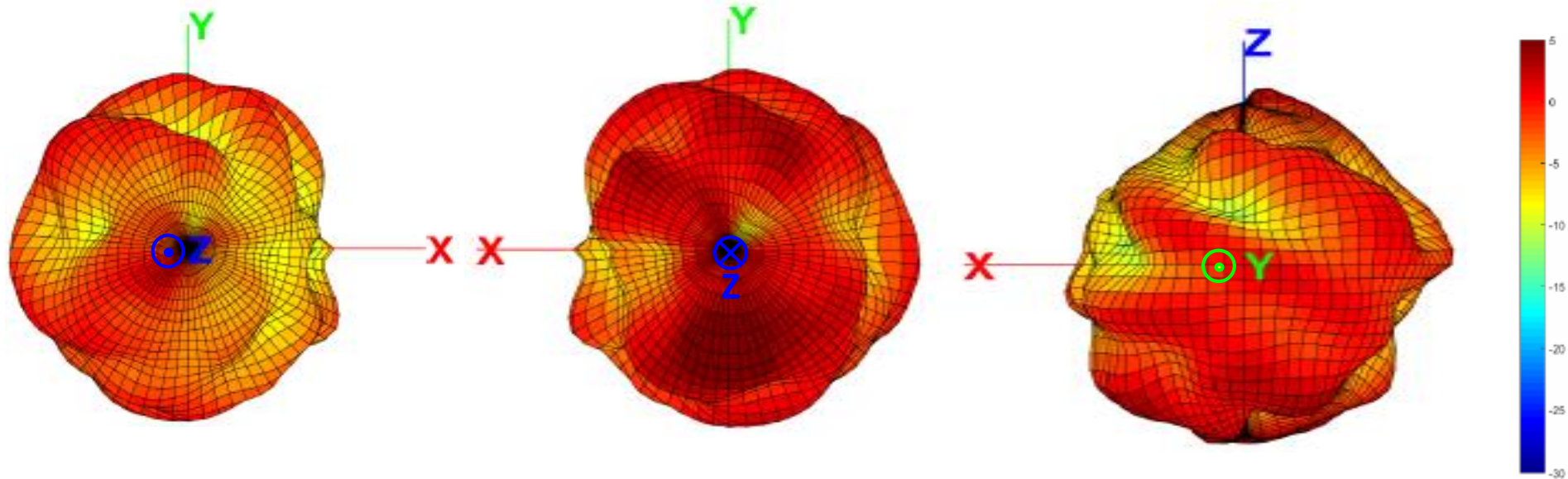
3D Gain Pattern

- 3D Gain Pattern (Radiation Pattern @ 5550 MHz) (unit: dBi)



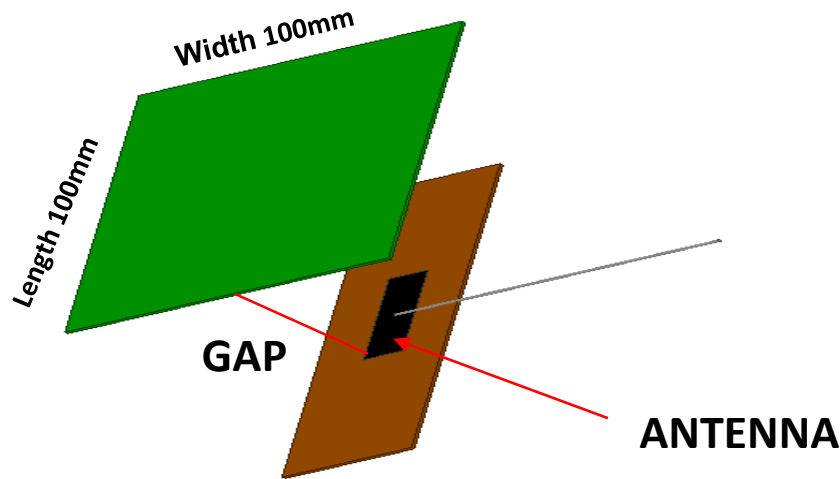
3D Gain Pattern

- 3D Gain Pattern (Radiation Pattern @ 6500 MHz) (unit: dBi)



ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT LOCATIONS WITH PARALLEL PLANE GROUND

- Four locations with parallel plane ground have been evaluated and these locations are shown in figure . The plane ground size is 100mm*100mm and we move the plane ground to four locations for each test. The antenna performance is better with larger distance between antenna and parallel plane ground. The minimum distance between antenna and plane ground is recommended to be 15mm to achieve acceptable RF performance.

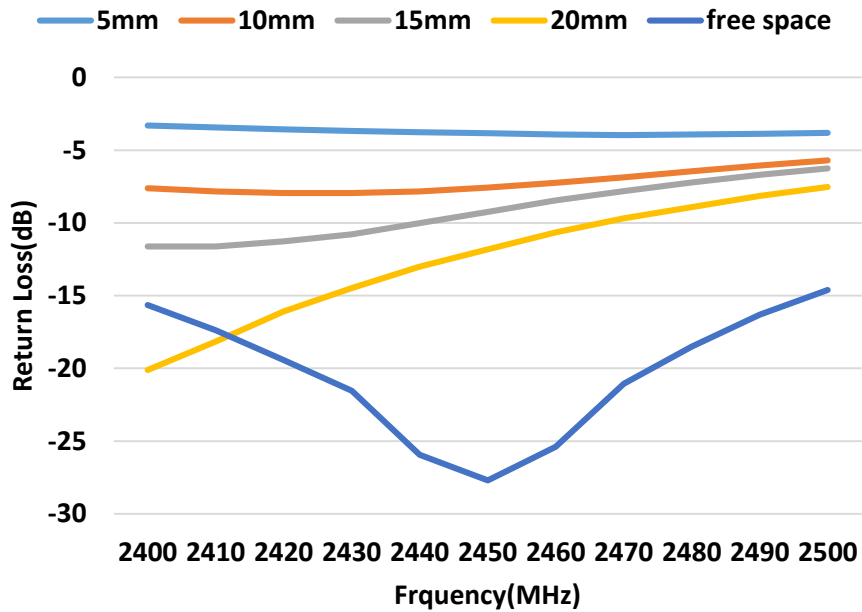


Ground Size:100mm*100mm;

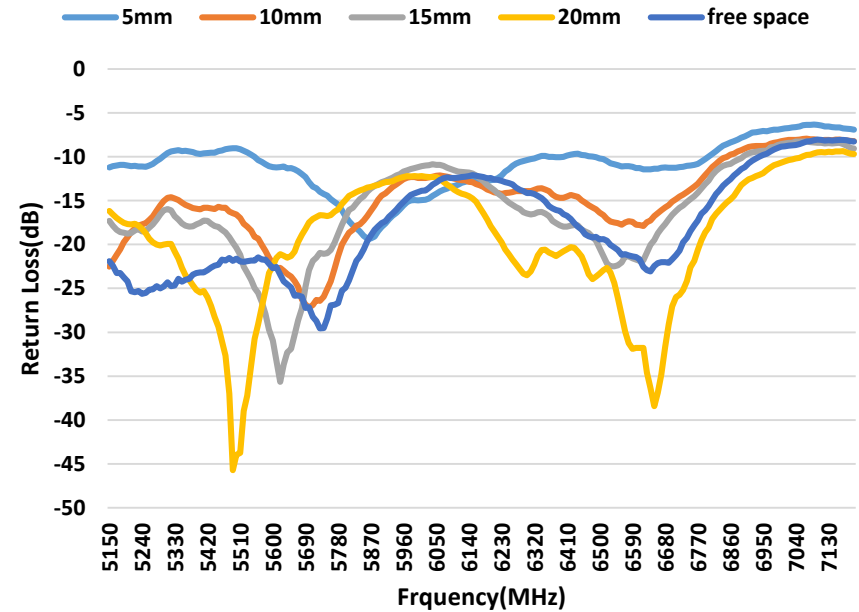
- Location 1: Distance between antenna and plane (GAP) ground is about 5mm;
- Location 2: Distance between antenna and plane (GAP) ground is about 10mm;
- Location 3: Distance between antenna and plane (GAP) ground is about 15mm;
- Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

APPLICATION SPECIFICATION

Return Loss at 2.4GHz Band at Four Locations with Parallel Plane Ground

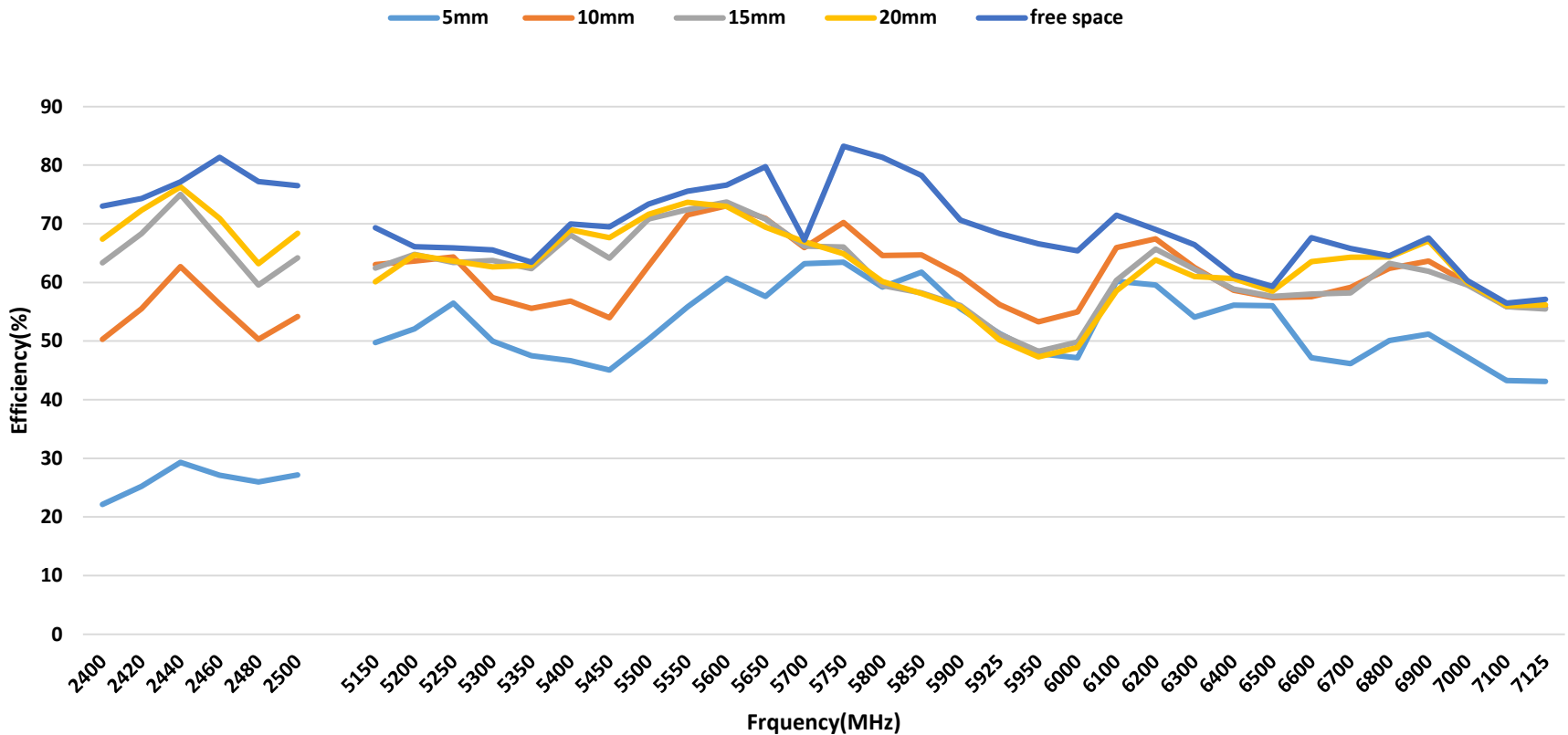


Return Loss at 5GHz and 6GHz Band at Four Locations with Parallel Plane Ground



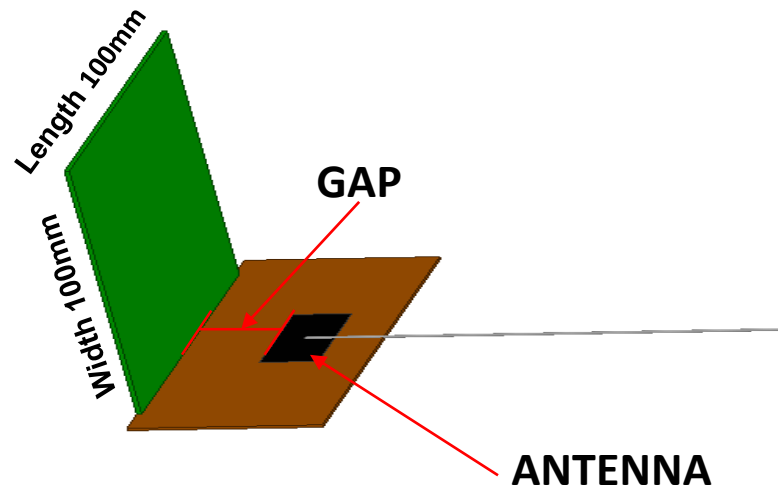
APPLICATION SPECIFICATION

- Efficiency for Antenna 2.4GHz, 5GHz and 6GHz Band at Four Locations with Parallel Plane Ground



ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT LOCATIO VERTICAL PLANE GROUND

- Four locations with vertical plane ground have been evaluated and these locations are shown in figure. The plane ground size is 100mm*100mm and we move the plane ground to four locations for each test. The antenna performance is better with larger distance between antenna and vertical plane ground. The minimum distance between antenna and plane recommended to be 5mm to achieve acceptable RF performance.

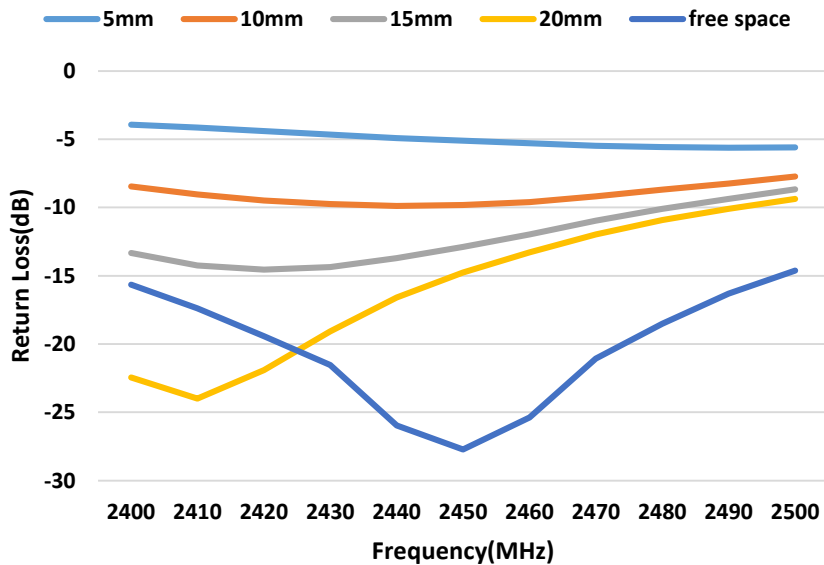


Ground Size:100mm*100mm;

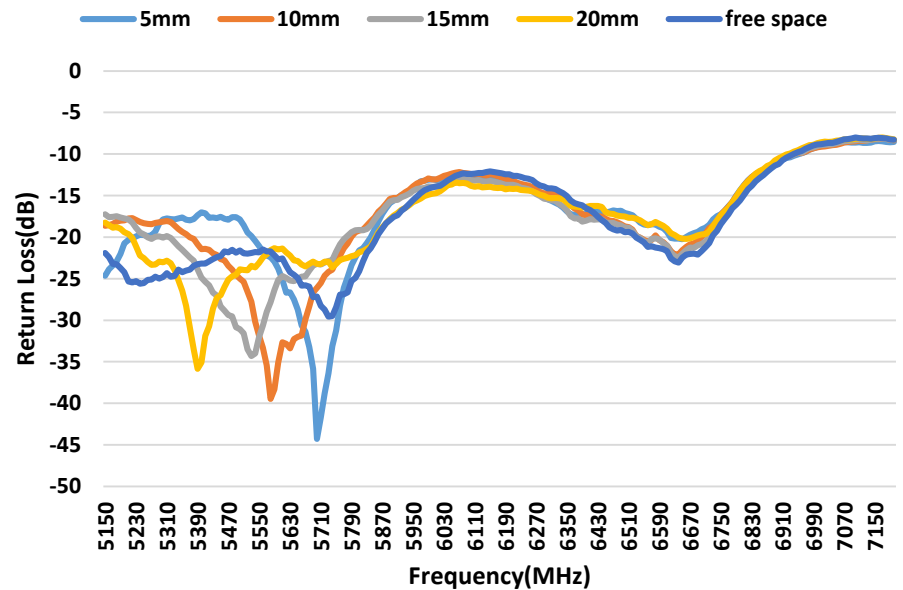
- Location 1: Distance between antenna and plane (GAP) ground is about 5mm;
- Location 2: Distance between antenna and plane (GAP) ground is about 10mm;
- Location 3: Distance between antenna and plane (GAP) ground is about 15mm;
- Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

APPLICATION SPECIFICATION

Return Loss at 2.4GHz Band at Four Locations with Vertical Plane Ground

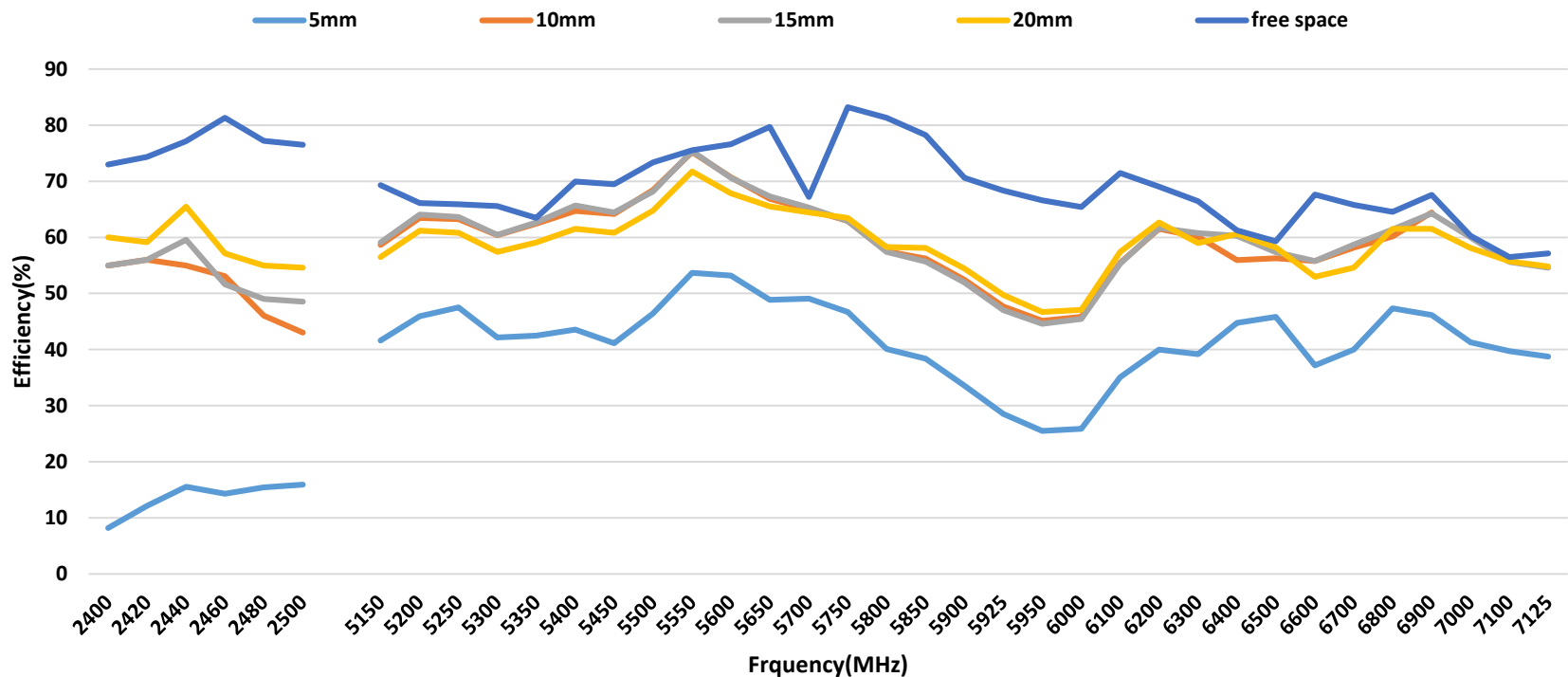


Return Loss at 5GHz and 6GHz Band at Four Locations with Vertical Plane Ground



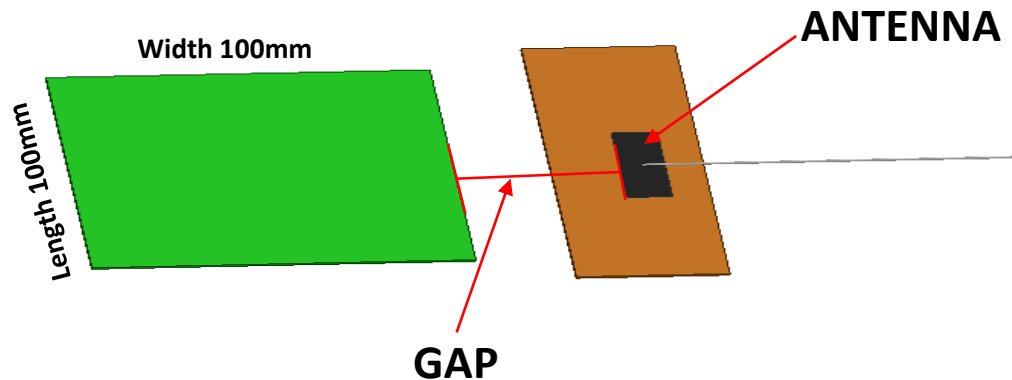
APPLICATION SPECIFICATION

- Efficiency for Antenna at 2.4GHz, 5GHz and 6GHz Band at Four Locations with Vertical Plane Ground



ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT DISTANCES PARALLEL PLANE GROUND

- Four locations with the parallel plane ground have been evaluated and these locations are shown in figure. The plane ground size is 100mm*100mm and we move the plane ground to four locations for each test. The antenna performance is better with larger distance between the antenna and the parallel plane ground. The minimum distance between the antenna ground is recommended to be 5mm to achieve acceptable RF performance.

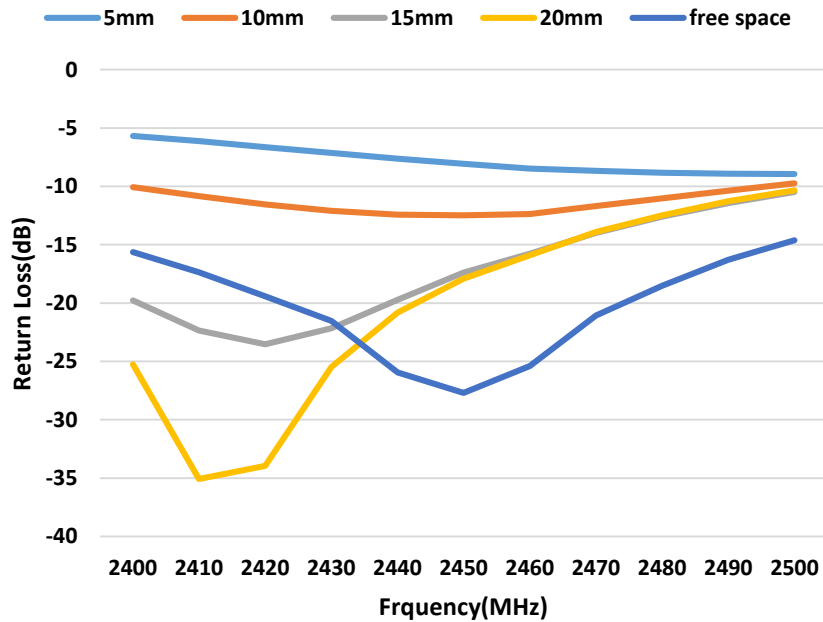


Ground Size:100mm*100mm;

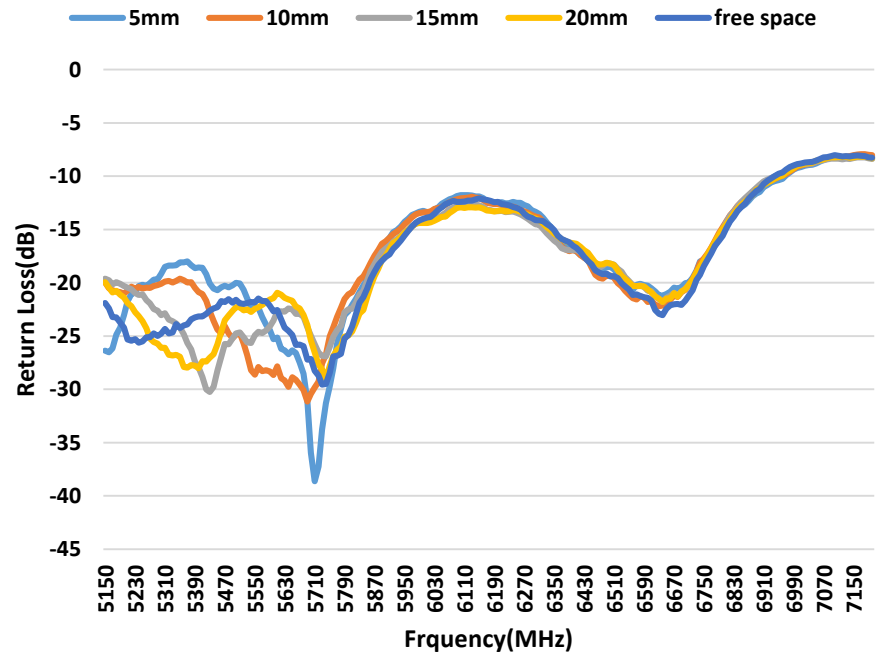
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- Location 3: Distance between antenna and plane (GAP) ground is about 15mm;
- Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

APPLICATION SPECIFICATION

Return Loss at 2.4GHz Band at Four Locations with Parallel Plane Ground

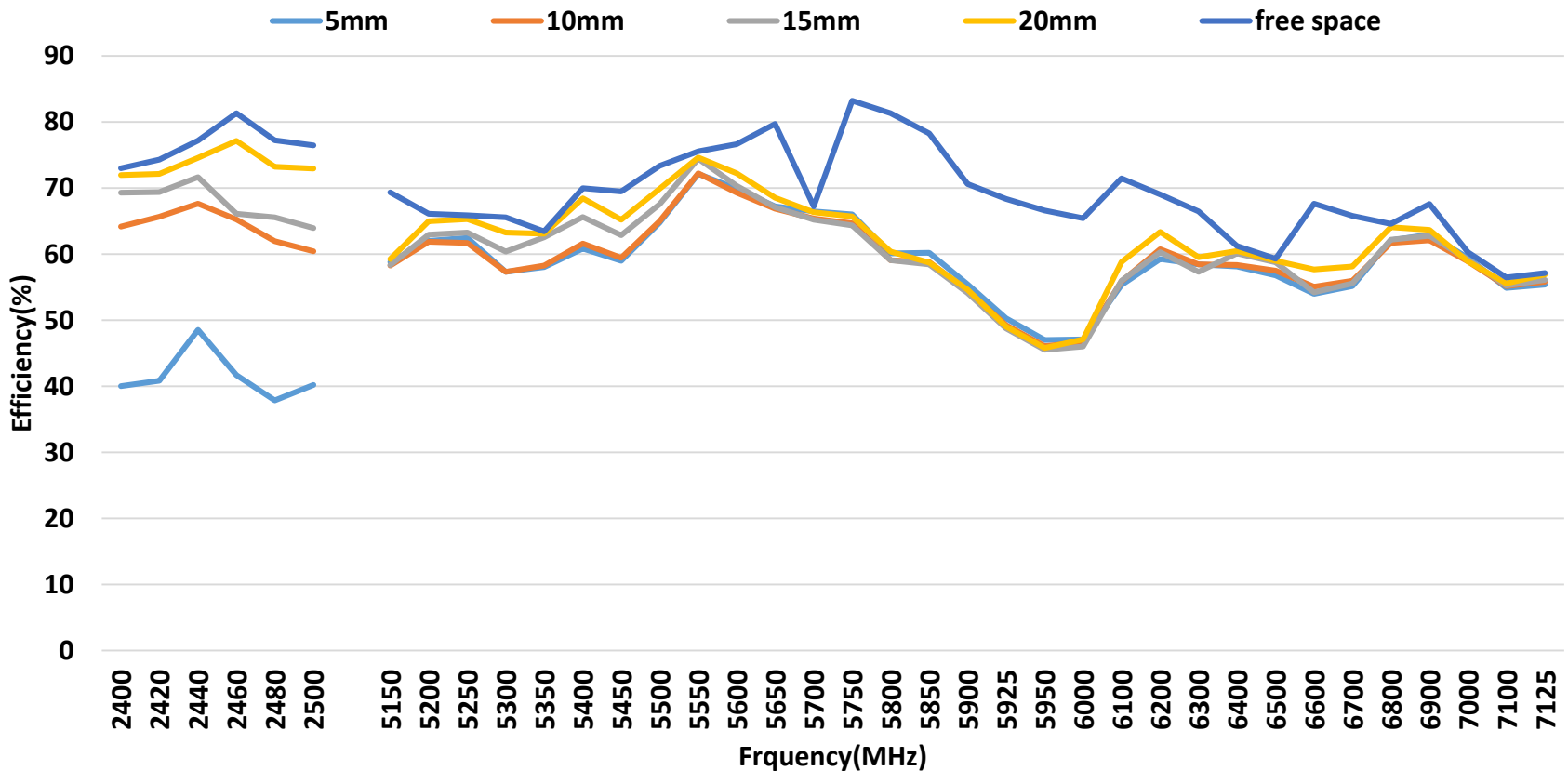


Return Loss 5GHz and 6GHz Band at Four Locations with Parallel Plane Ground



APPLICATION SPECIFICATION

Efficiency for Antenna 2.4GHz, 5GHz and 6GHz Band at Four Locations with Parallel Plane Ground



THE ANTENNA PERFORMANCE VARIATION WITH CABLE LENGTH

Frequency(MHz)	130mm cable			300mm cable	
	Efficiency(dB)	Efficiency(%)	cable loss	Efficiency(dB)	Efficiency(%)
	X		X-LOSS=Y	Y	
2400	-1.4	73	0.7	-2.1	62
2420	-1.3	74.32	0.7	-2.0	63
2440	-1.1	77.16	0.7	-1.8	66
2460	-0.9	81.34	0.7	-1.6	69
2460	-1.1	77.21	0.7	-1.8	66
2500	-1.2	76.48	0.7	-1.9	65
5150	-1.6	69.33	1.1	-2.7	54
5200	-1.8	66.1	1.1	-2.9	51
5250	-1.8	65.88	1.1	-2.9	51
5300	-1.8	65.55	1.1	-2.9	51
5350	-2.0	63.44	1.1	-3.1	49
5400	-1.6	69.96	1.1	-2.7	54
5450	-1.6	69.46	1.1	-2.7	54
5500	-1.3	73.35	1.1	-2.4	58
5550	-1.2	75.55	1.1	-2.3	59
5600	-1.2	76.62	1.1	-2.3	59
5650	-1.0	79.72	1.1	-2.1	62
5700	-1.7	67.21	1.1	-2.8	53
5750	-0.8	83.22	1.1	-1.9	64
5800	-0.9	81.33	1.1	-2.0	63
5850	-1.1	78.25	1.1	-2.2	60
5900	-1.5	70.61	1.1	-2.6	55
5925	-1.7	68.34	1.1	-2.8	53
5950	-1.8	66.59	1.1	-2.9	51
6000	-1.8	65.41	1.3	-3.1	49
6100	-1.5	71.47	1.3	-2.8	52
6200	-1.6	69.02	1.3	-2.9	51
6300	-1.8	66.44	1.3	-3.1	49
6400	-2.1	61.24	1.3	-3.4	46
6500	-2.3	59.31	1.3	-3.6	44
6600	-1.7	67.63	1.3	-3.0	50
6700	-1.8	65.8	1.3	-3.1	49
6800	-1.9	64.55	1.3	-3.2	48
6900	-1.7	67.58	1.3	-3.0	50
7000	-2.2	60.29	1.3	-3.5	45
7100	-2.5	56.48	1.3	-3.8	42
7125	-2.4	57.14	1.3	-3.7	43

130mm and 300mm (Total Cable Length) are our standard sizes, and other cable length can be customized based on customer requirements.

MHF Connector Instruction Manual

1.How to hold a cable connector

Hold the both ends of cable connector as show in Fig 3.

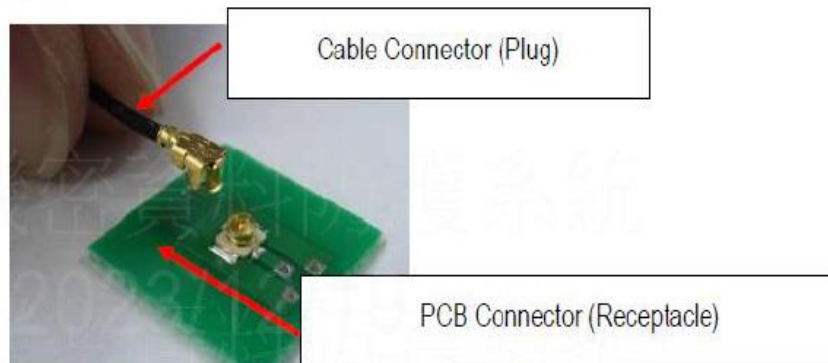
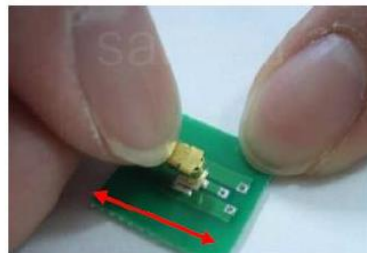


Fig.3

2.Which direction to mate

Set connectors of the board side and of the cable side as shown in Fig 4.
Please check they are set firmly by moving back and forth slightly.



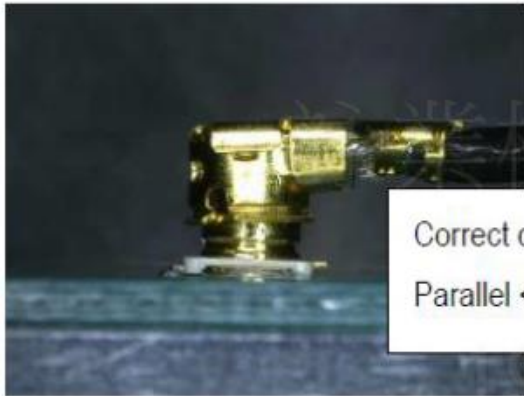
Move back and forth slightly. They should not move.

Fig. 4

MHF Connector Instruction Manual

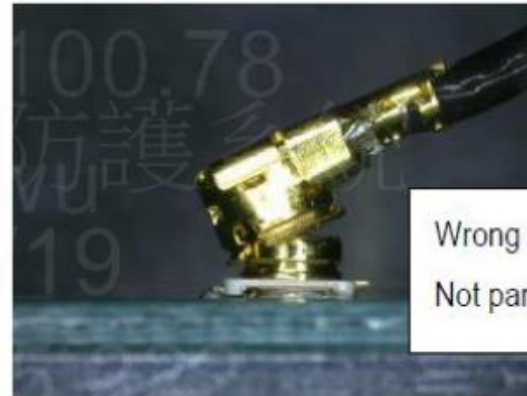
CAUTION

Please make sure to set the cable side connector parallel to the board as shown in Fig 5. If you mate in not parallel condition as shown in Fig 6, connector will be damaged.



Correct connector mating
Parallel <OK>

Fig. 5

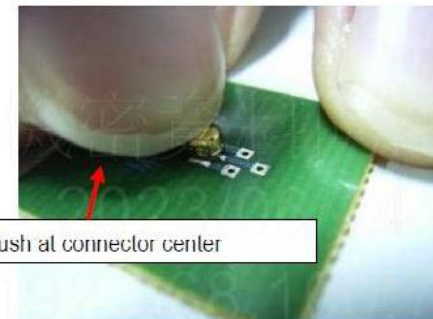


Wrong connector mating
Not parallel <NG>

Fig. 6

3.How to mate

Push cable connector at its center location vertically as shown in Fig 7. When click sound can be heard "the connector mating action is complete.



Push at connector center

Fig. 7

MHF Connector Instruction Manual

CAUTION IN CABLE CONNECTOR HANDLING

In the case of Fig 9, it has possibility to damage to the housing and come off from receptacle connector. Especially when operator give continuous force to the direction (black allow),the tendency become higher. So please take care of handling of harness.

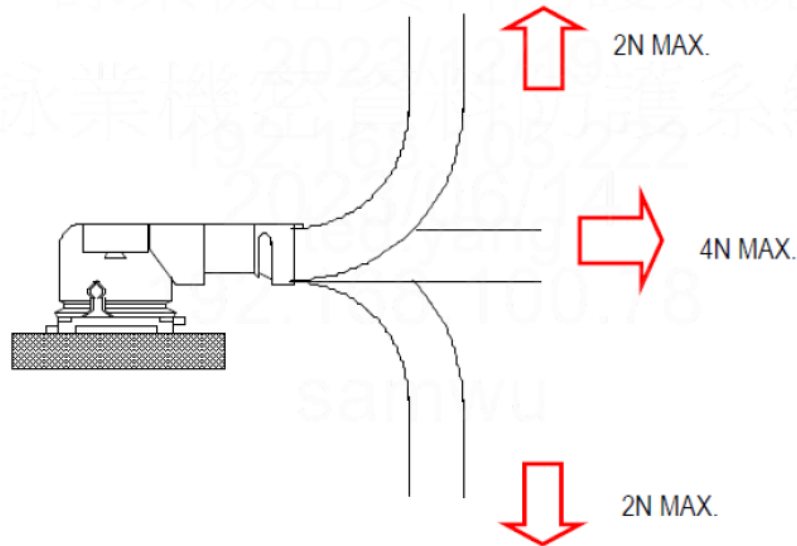


Fig. 9