

RA641 Antenna design proposal

V0.1
Tim Chao
2022/12/29

Agenda

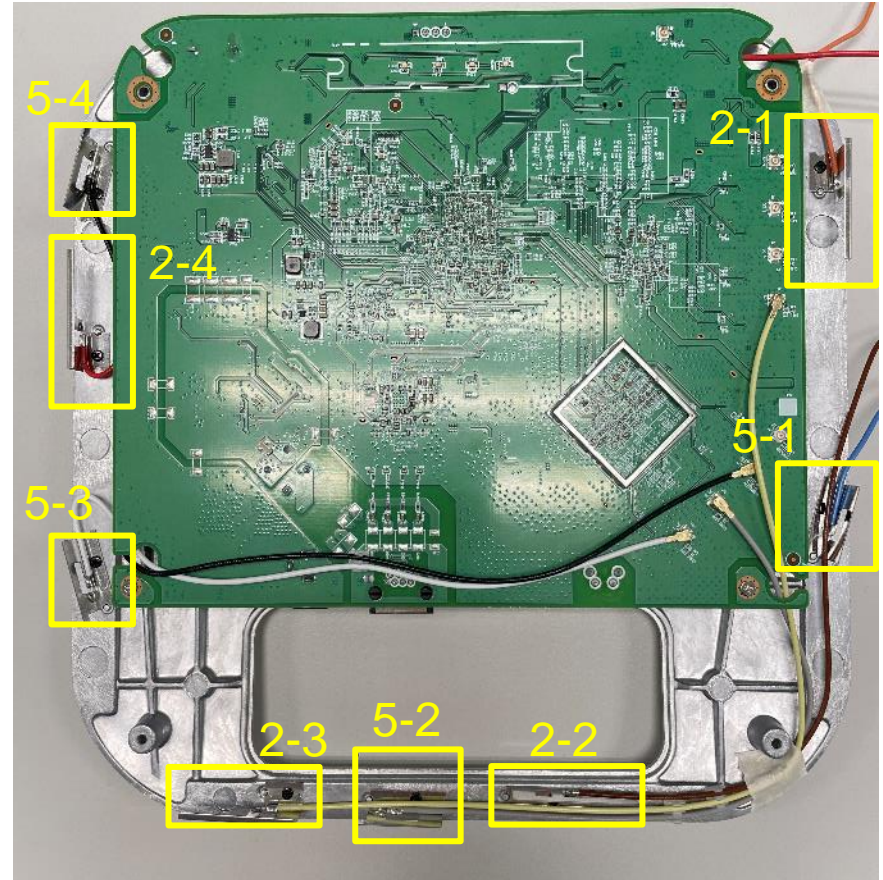
- History
- Antenna Placement
- Antenna pictures
- Return loss & Isolation
- Gain table
- 2D Radiation Pattern
- Combine Pattern

History

Date	Description	Version
2022/12/29	Copy from WAP380 ; 2.4GHz*4, 5GHz*4, BT*1	V0.1

Antenna Placement

- RA641 have total eight antennas as figure :
- 2.45GHz * 4
- 5GHz * 4



Antenna pictures

	Size(mm)	Material	PN	Type
2-1	29x10x7	Metal	7102A0581000	PIFA
2-2	31x9.9x5.3	Metal	7102A0578000	PIFA
2-3	29x10x7	Metal	7102A0582000	PIFA
2-4	29x10x7	Metal	7102A0583000	PIFA
5-1	21x10x5	Metal	7102A0584000	PIFA
5-2	21x10x5	Metal	7102A0587000	PIFA
5-3	21x10x5	Metal	7102A0585000	PIFA
5-4	21x10x5	Metal	7102A0586000	PIFA



2-1
ANT4



2-2
ANT2



2-3
ANT1



2-4
ANT3



5-1
ANT4



5-2
ANT3

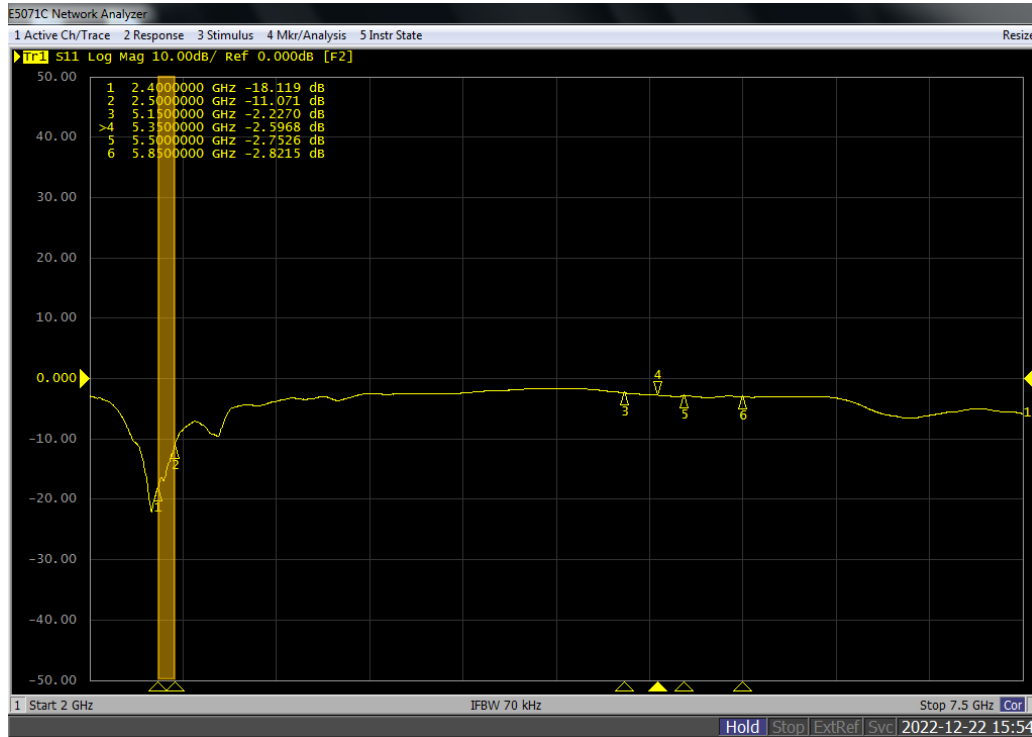


5-3
ANT1



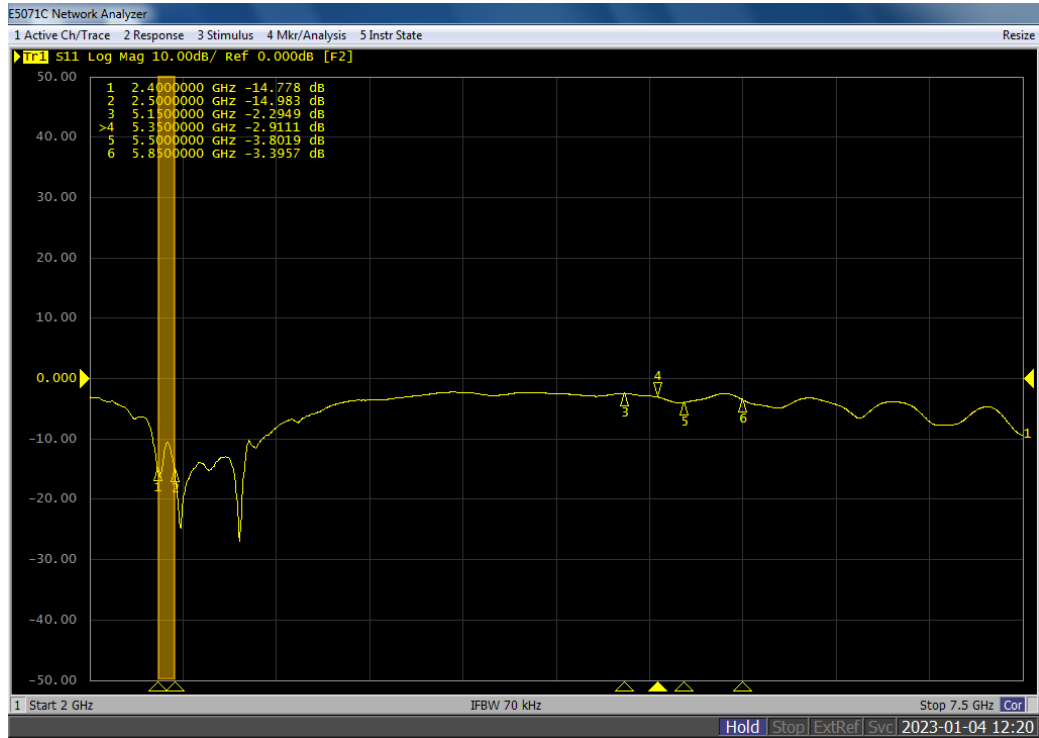
5-4
ANT2

Return Loss : 2-1



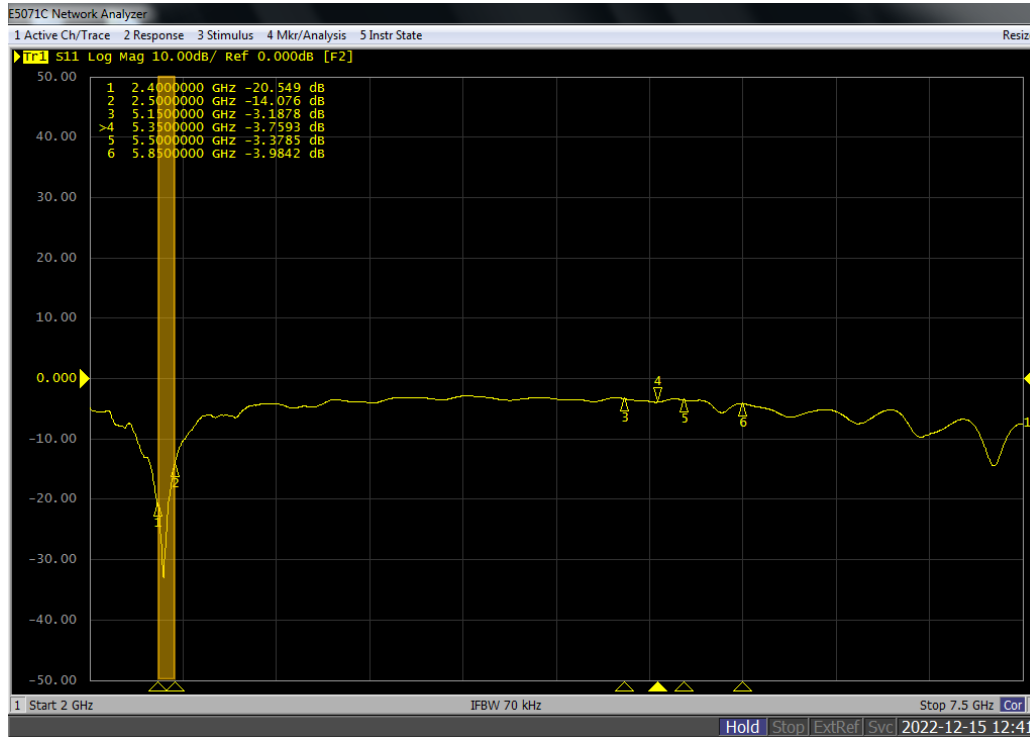
Criteria : $\leq -10\text{dB}$

Return Loss : 2-2



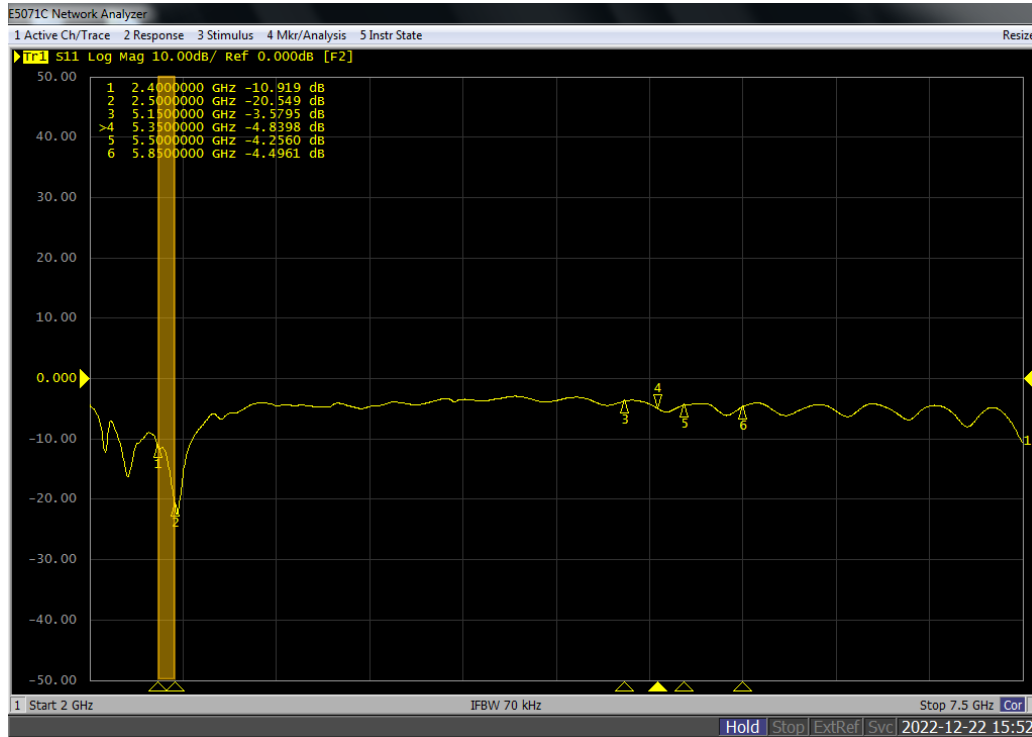
Criteria : $\leq -10\text{dB}$

Return Loss : 2-3



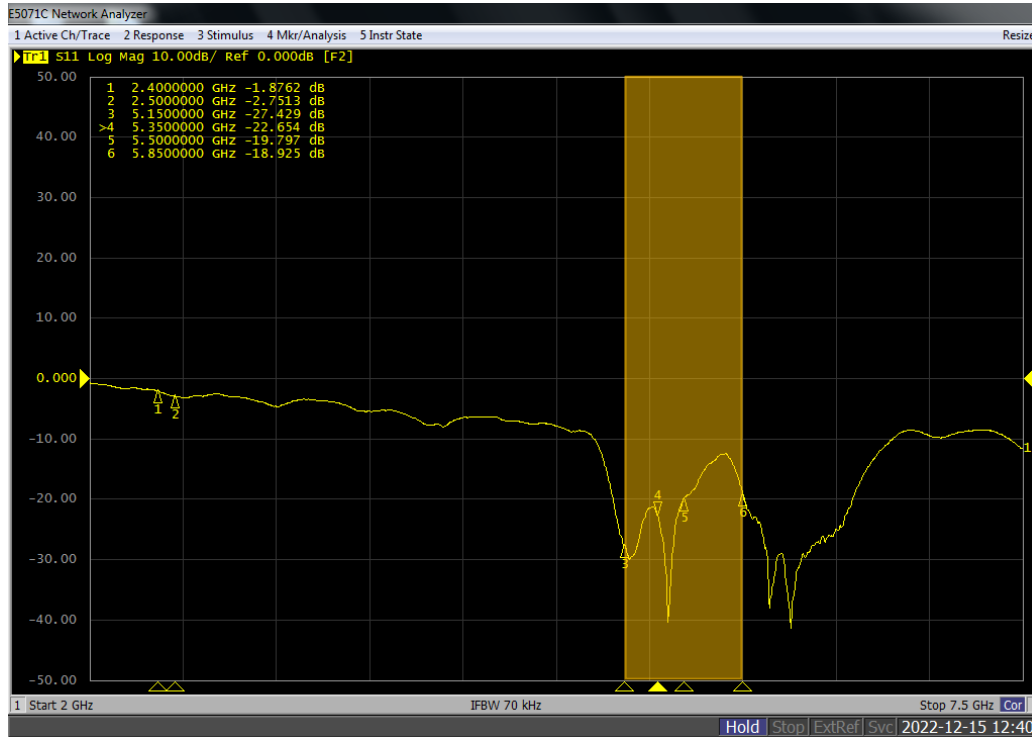
Criteria : $\leq -10\text{dB}$

Return Loss : 2-4



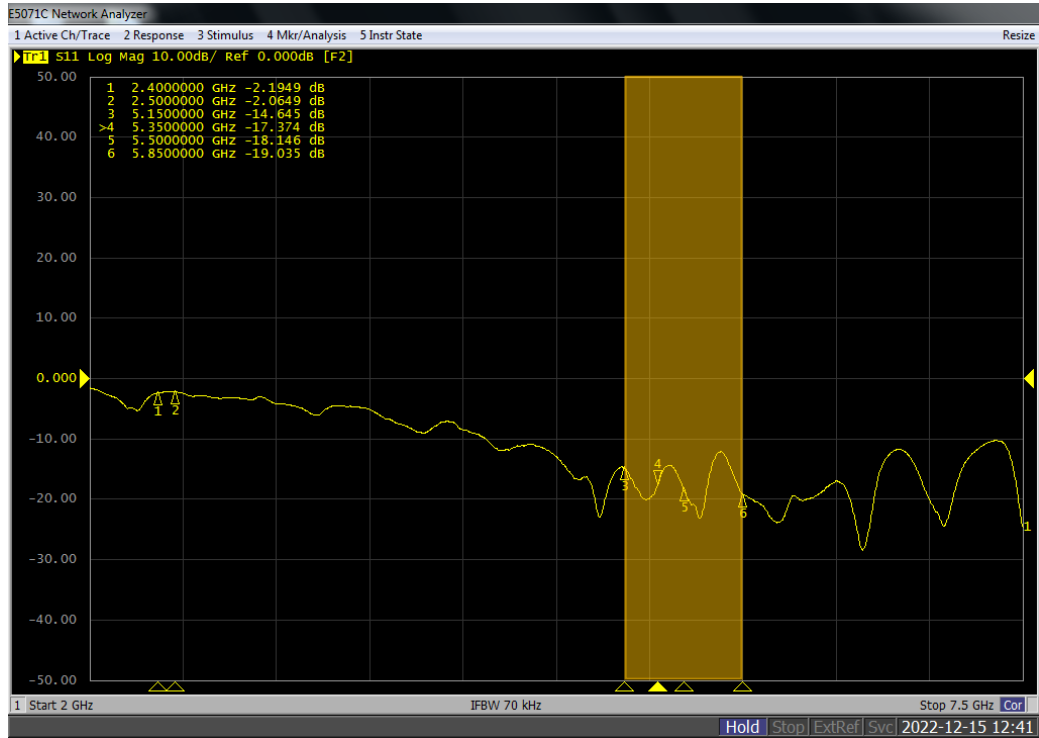
Criteria : $\leq -10\text{dB}$

Return Loss : 5-1



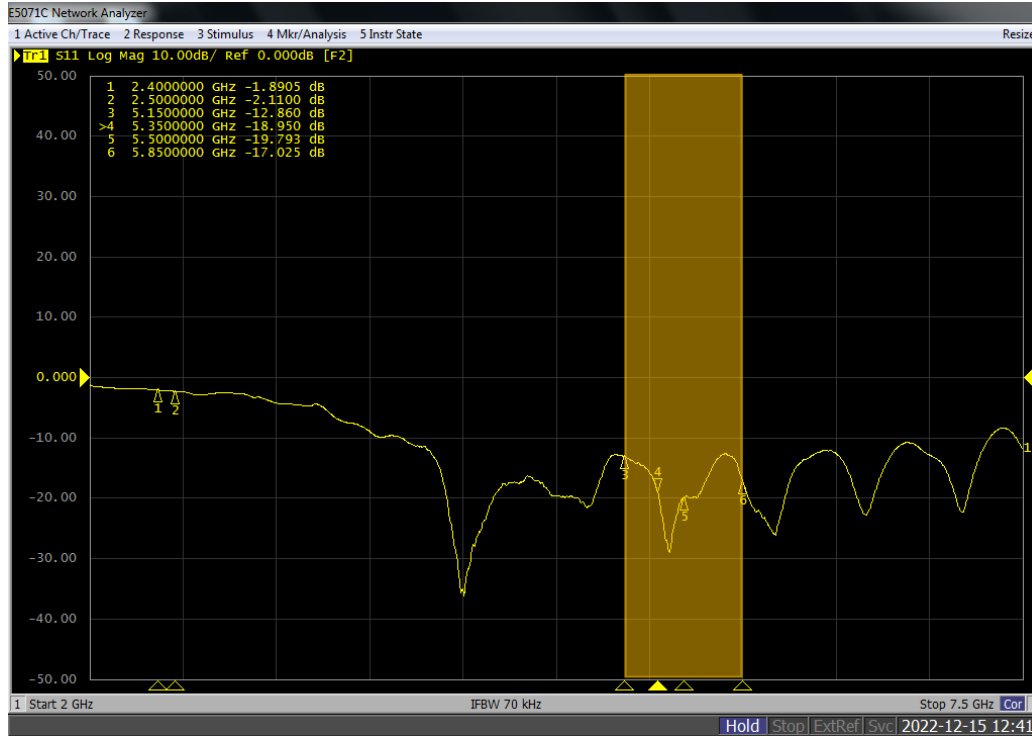
Criteria : $\leq -10\text{dB}$

Return Loss : 5-2



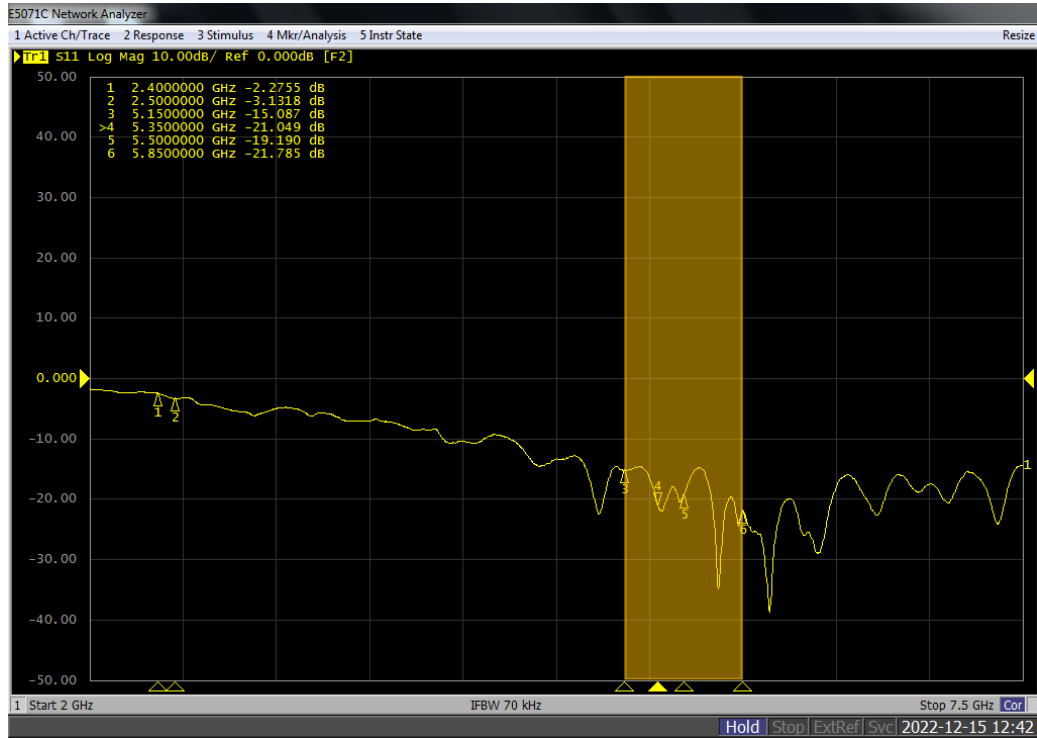
Criteria : $\leq -10\text{dB}$

Return Loss : 5-3



Criteria : $\leq -10\text{dB}$

Return Loss : 5-4



Criteria : $\leq -10\text{dB}$

Return loss table

S11(dB)	2.4GHz	2.5GHz	5.15GHz	5.35GHz	5.5GHz	5.85GHz
2-1	-18.1	-11				
2-2	-14.7	-14.9				
2-3	-20.5	-14				
2-4	-10.9	-20.5				
5-1			-27	-22	-19	-18
5-2			-14	-17	-18	-19
5-3			-12	-18	-19	-17
5-4			-15	-21	-19	-21

Isolation at 2.45GHz

	2-1	2-2	2-3	2-4	BT
2-1	NA	-24.4	-23.6	-21.5	-21.3
2-2	NA	NA	-16	-28.3	-20
2-3	NA	NA	NA	-23.3	-31.5
2-4	NA	NA	NA	NA	-26.1

Isolation at 5.5GHz

	5-1	5-2	5-3	5-4
5-1	NA	-24.3	-32.6	-43.6
5-2	NA	NA	-31.2	-32.1
5-3	NA	NA	NA	-25.5
5-4	NA	NA	NA	NA

Gain table

Antenna		2400~2483.5MHz	5150~5250MHz	5250~5350MHz	5470~5725MHz	5725~5850MHz
2-1	Peak Gain (dBi)	3.2				
	Effi.(%)	67.8				
2-2	Peak Gain (dBi)	2.3				
	Effi.(%)	56.9				
2-3	Peak Gain (dBi)	3.7				
	Effi.(%)	70.6				
2-4	Peak Gain (dBi)	1.9				
	Effi.(%)	52.5				
5-1	Peak Gain (dBi)		4.6	5.6	5.2	5.4
	Effi.(%)		73.8	76.3	75	75.2
5-2	Peak Gain (dBi)		3.7	4.1	3.5	4.2
	Effi.(%)		60.3	56.7	61.8	62.4
5-3	Peak Gain (dBi)		4.7	5.9	5.1	5.2
	Effi.(%)		69.7	74.8	72.8	75.2
5-4	Peak Gain (dBi)		4.4	5.2	4.6	4.3
	Effi.(%)		59.7	65.3	60	63

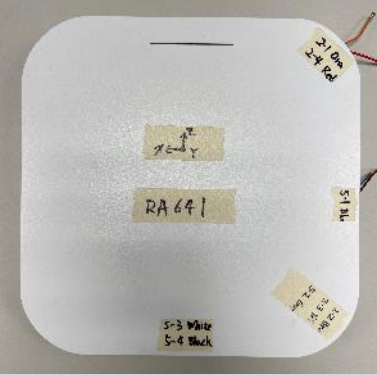

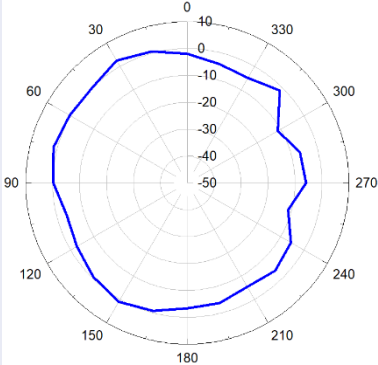
2D pattern : 2-1

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
2.45GHz			

2D pattern : 2-2

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
2.45GHz	 	 	 


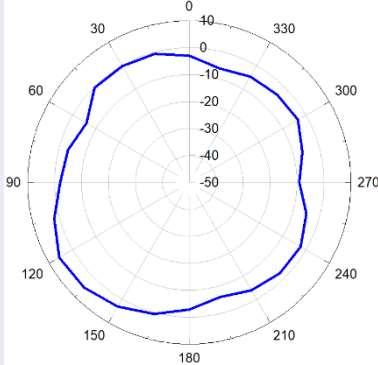
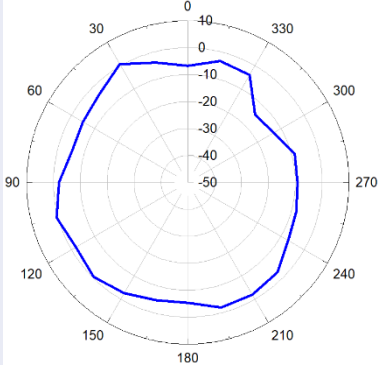
2D pattern : 2-3

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
2.45GHz	 	 	 

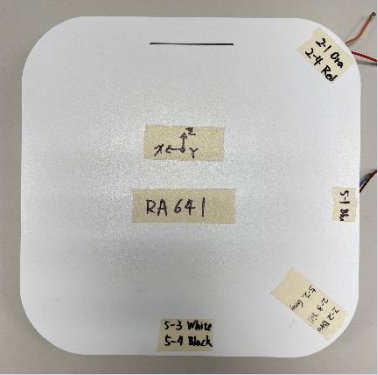


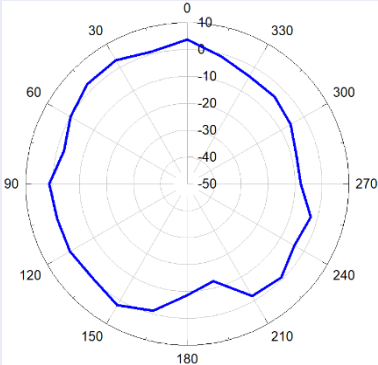
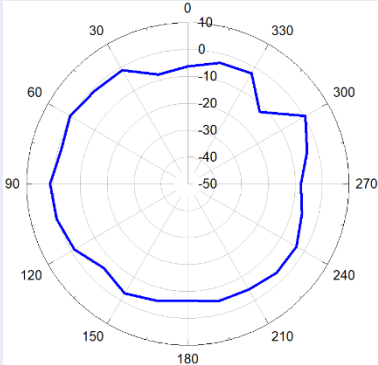
2D pattern : 2-4

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
2.45GHz	 	 	 

2D pattern : 5-1

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
5.5GHz			
			

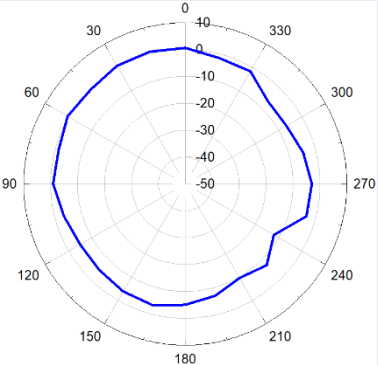
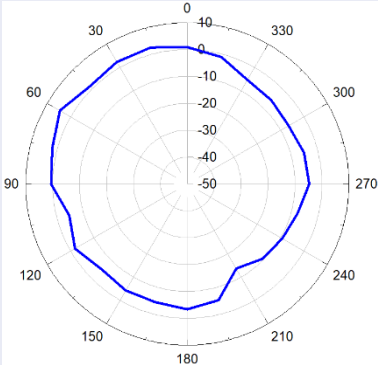

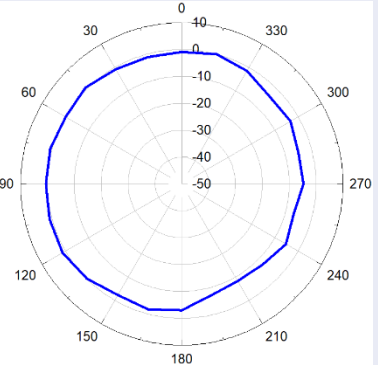
2D pattern : 5-2

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
5.5GHz			
			

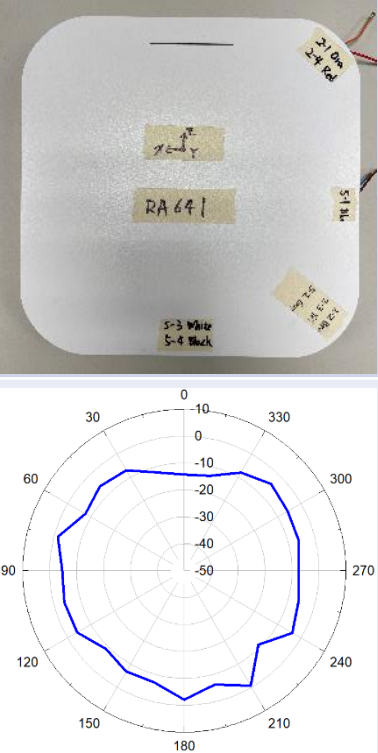
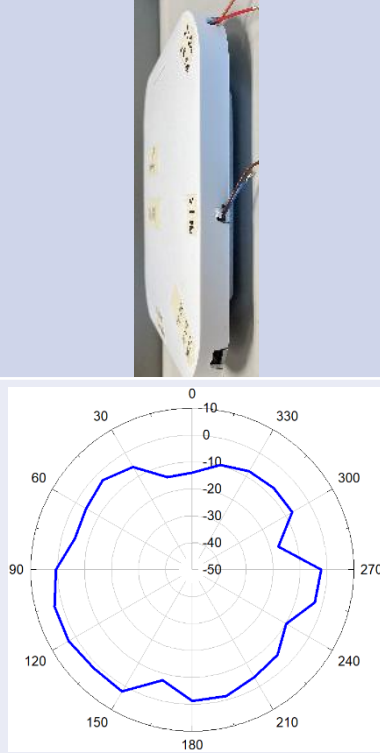
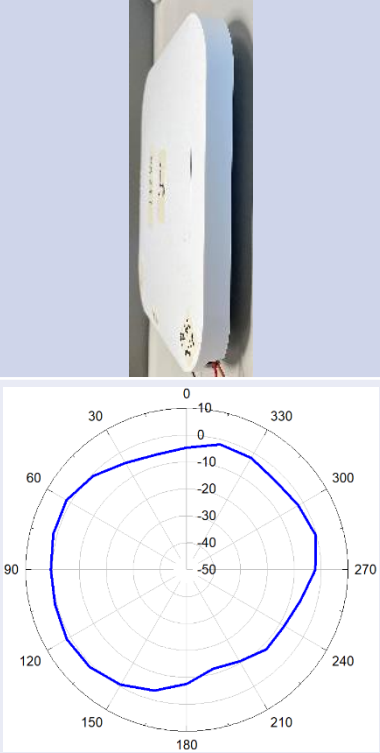
2D pattern : 5-3

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
5.5GHz			
			

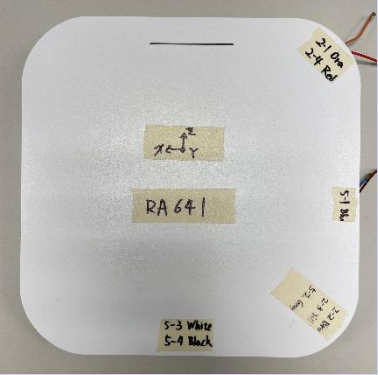
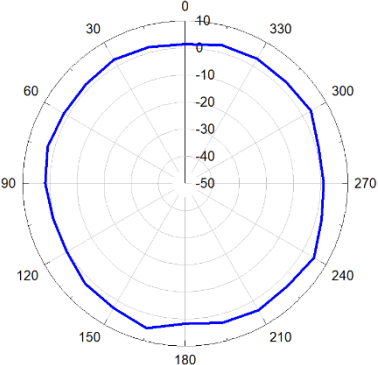

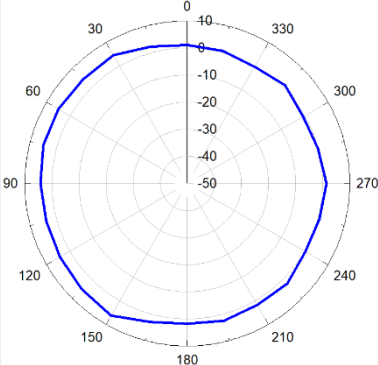

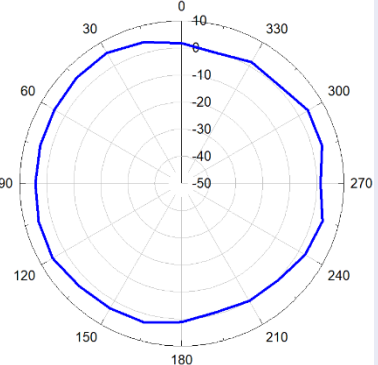
2D pattern : 5-4

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
5.5GHz	 	 	 

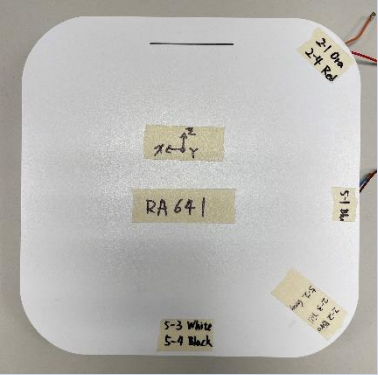

2D pattern : BT

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
2.45GHz	 <p>The photograph shows the antenna in the XZ plane, which is a top-down view. It is a white, square-shaped antenna with rounded corners. Several labels are attached to it: a central label with a handwritten '70-84', a label 'RA 641', and a label '116 115'. There are also some smaller labels with handwritten text like 'S-3 White', 'S-4 Black', '2.45 GHz', and '2.45 GHz'. The radiation pattern plot below it is a polar plot with a blue line showing the radiation pattern. The plot has concentric circles at -10, -20, -30, -40, and -50 dB. The angular scale is from 0 to 330 degrees in 30-degree increments.</p>	 <p>The photograph shows the antenna in the YZ plane, which is a side view. It shows the antenna's profile and the mounting structure. The radiation pattern plot below it is a polar plot with a blue line showing the radiation pattern. The plot has concentric circles at -10, -20, -30, -40, and -50 dB. The angular scale is from 0 to 330 degrees in 30-degree increments.</p>	 <p>The photograph shows the antenna in the XY plane (Azimuth), which is a side view from a different angle. It shows the antenna's profile and the mounting structure. The radiation pattern plot below it is a polar plot with a blue line showing the radiation pattern. The plot has concentric circles at -10, -20, -30, -40, and -50 dB. The angular scale is from 0 to 330 degrees in 30-degree increments.</p>

Combine pattern : 2.45GHz

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
2.45GHz	 	 	 

Combine pattern : 5.5GHz

Frequency	XZ Plane	YZ Plane	XY Plane (Azimuth)
5.5GHz	 <p>The photograph shows the antenna in the XZ plane. It is a white, rounded rectangular device with a central antenna element. A coordinate system is drawn on the surface with 'x' and 'z' axes. Labels include 'RA 641', 'PM 1.5', and 'S-3 White S-4 Black'. Below the photograph is a radiation pattern plot for the XZ plane, showing a circular pattern with a radius of approximately 40 dBm, indicating omnidirectional radiation.</p>	 <p>The photograph shows the antenna in the YZ plane, viewed from the side. It is a white, rounded rectangular device with a central antenna element. Labels include 'PM 1.5'. Below the photograph is a radiation pattern plot for the YZ plane, showing a circular pattern with a radius of approximately 40 dBm, indicating omnidirectional radiation.</p>	 <p>The photograph shows the antenna in the XY plane, viewed from the side. It is a white, rounded rectangular device with a central antenna element. Labels include 'PM 1.5'. Below the photograph is a radiation pattern plot for the XY plane, showing a circular pattern with a radius of approximately 40 dBm, indicating omnidirectional radiation.</p>



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