



WAP388

Antenna design proposal

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V2.3
Tim Chao
2022/12/08

Agenda

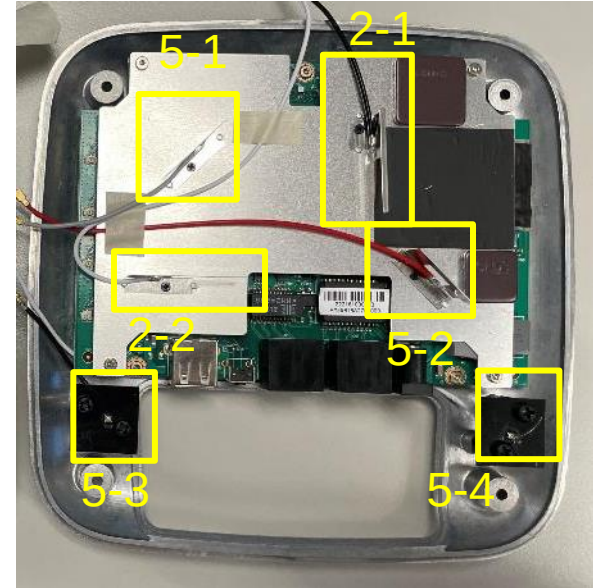
- History
- Antenna Placement
- Antenna pictures
- Return loss & Isolation
- Gain table
- 2D Radiation Pattern
- Combine Pattern

History

Date	Description	Version
2021/07/12	2.4GHz*2, 5GHz*4, BT*1	V0.1
2021/11/16	Change to PCB BT antenna	V0.2
2021/12/27	Modify PIFA location for 1mm clearance to TOP cover	V0.3
2022/03/17	Mockup sample measurement	V1.0
2022/11/17	S3 housing, new BT location, thermal solution	V2.0
2022/11/21	Add antenna PN and picture	V2.1
2022/12/01	Add antenna size and remove BT for certification	V2.2
2022/12/08	Fix typo of gain table	V2.3

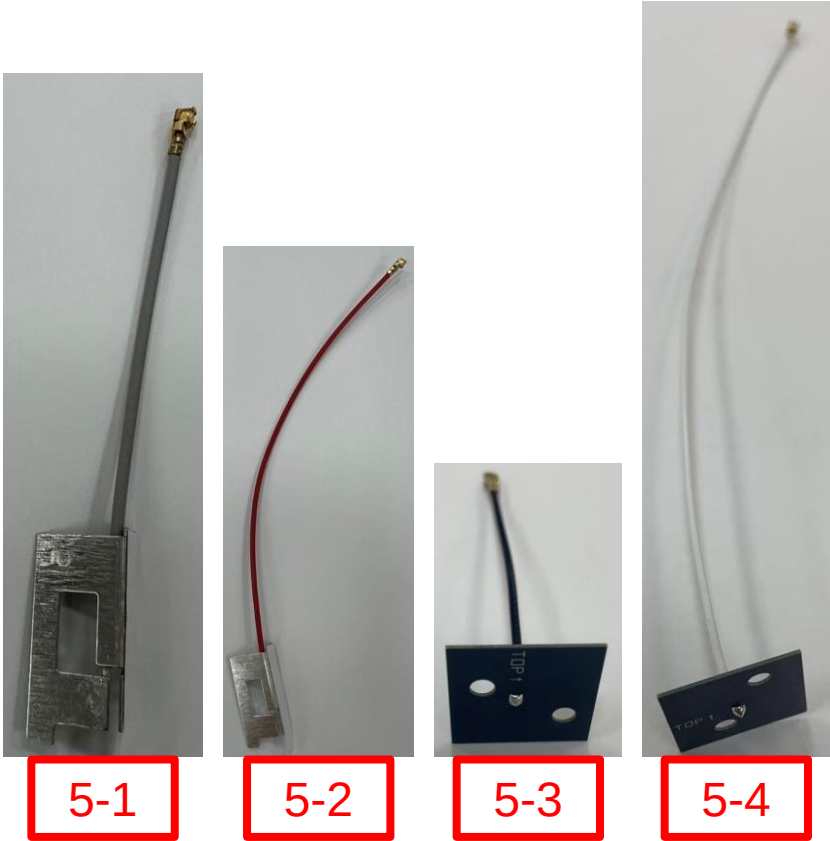
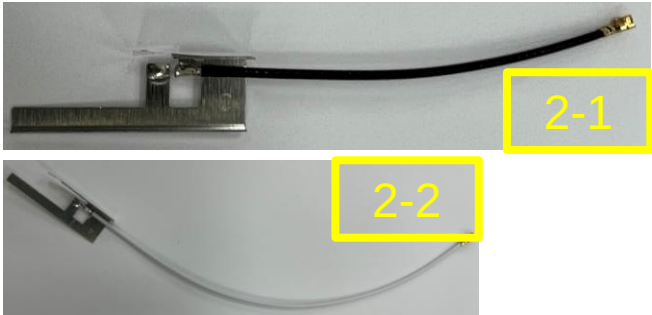
Antenna Placement

- WAP388 have total six antennas as figure :
 - 2.45GHz * 2
 - 5GHz * 4
-
- Design criteria :
 - Installation: Indoor/Wall mount
 - Peak Gain: 2.4G:4.6 dBi, 5G: 5.9dBi
 - Return loss: $\leq -10\text{dB}$
 - Isolation: $\leq -20\text{dB}$
 - Efficiency: $\geq 60\%$

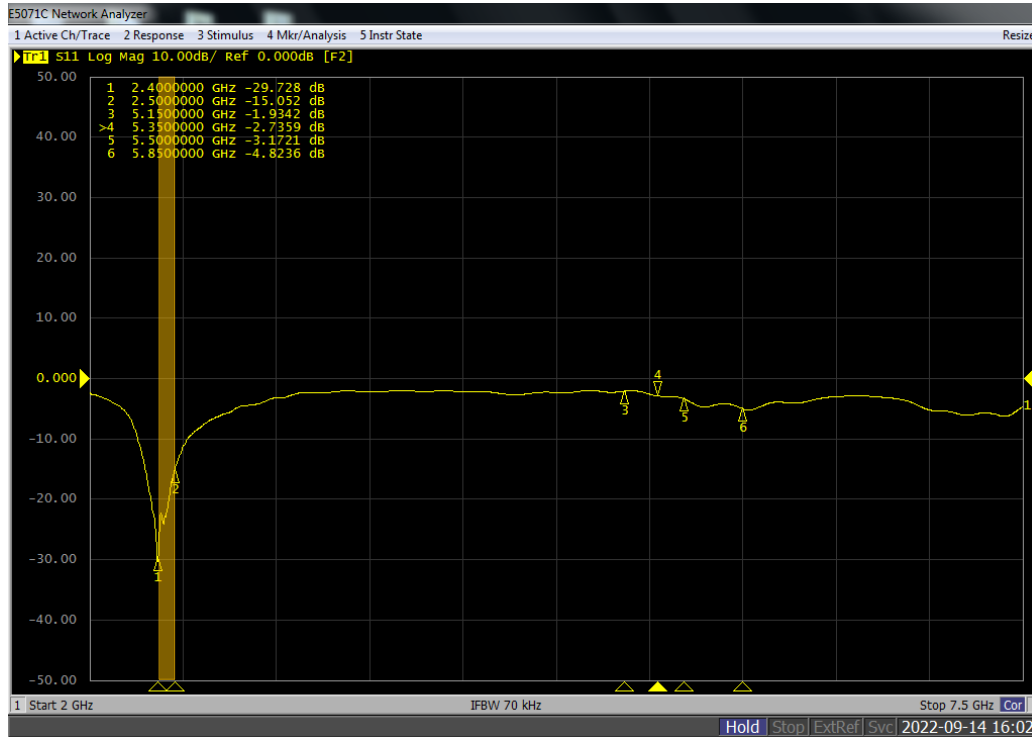


Antenna pictures

	Size(mm)	Material	PN	Type
2-1	29x10x7	Metal	7102A0515000	PIFA
2-2	33.5x9.9x5.3	Metal	7102A0516000	PIFA
5-1	22x9.9x5.3	Metal	7102A0517000	PIFA
5-2	22x9.9x5.3	Metal	7102A0518000	PIFA
5-3	19.32x19.32x0.6	FR4	7102A0519000	Dipole
5-4	19.32x19.32x0.6	FR4	7102A0520000	Dipole

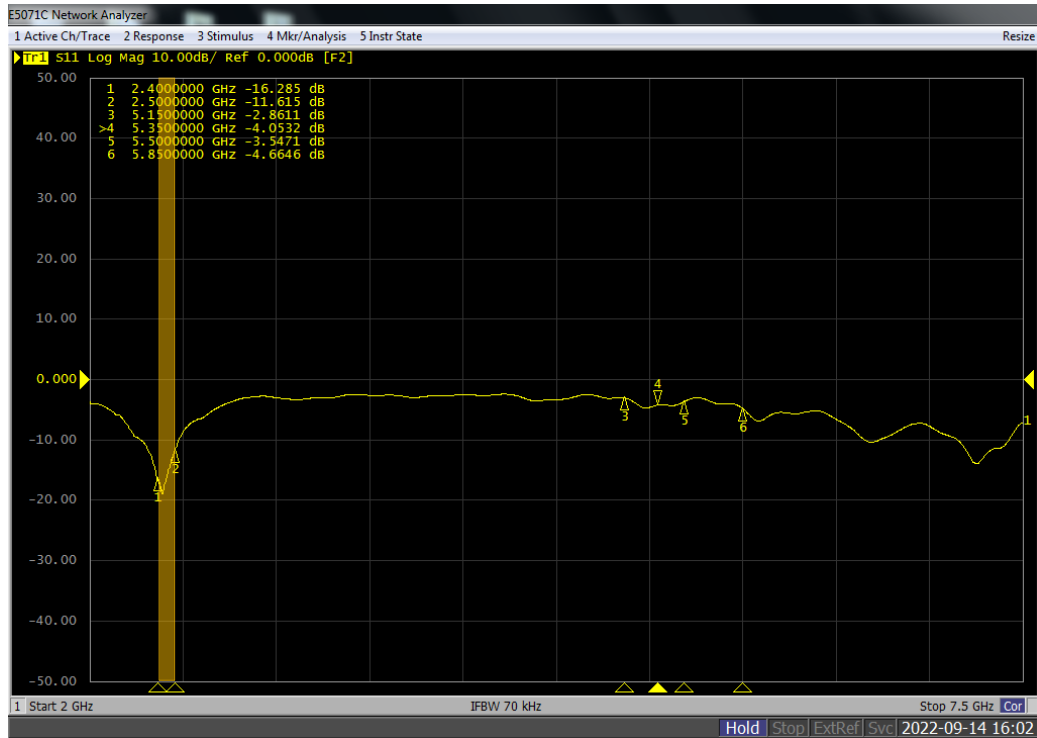


Return Loss : 2-1



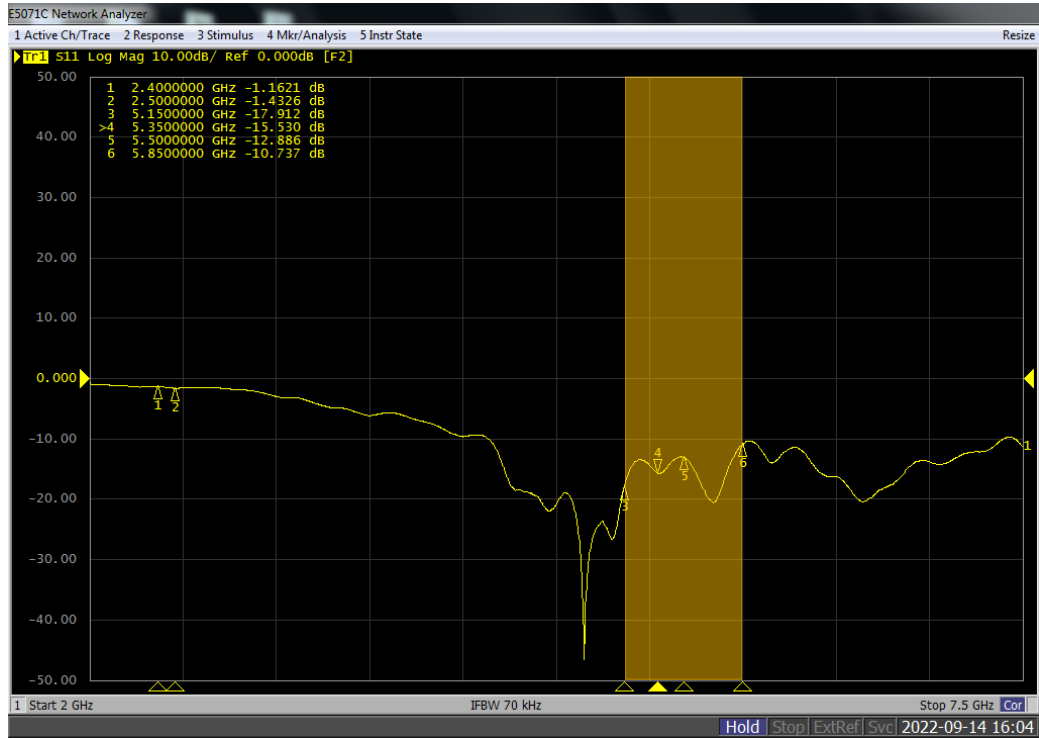
Criteria : $\leq -10\text{dB}$

Return Loss : 2-2



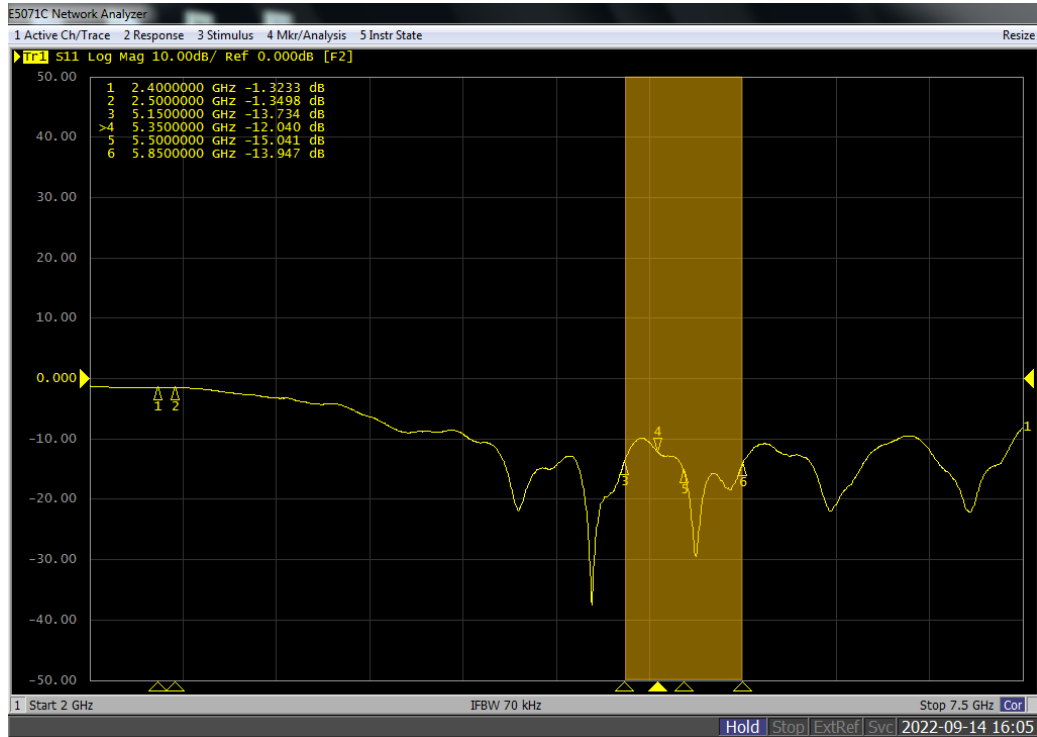
Criteria : $\leq -10\text{dB}$

Return Loss : 5-1



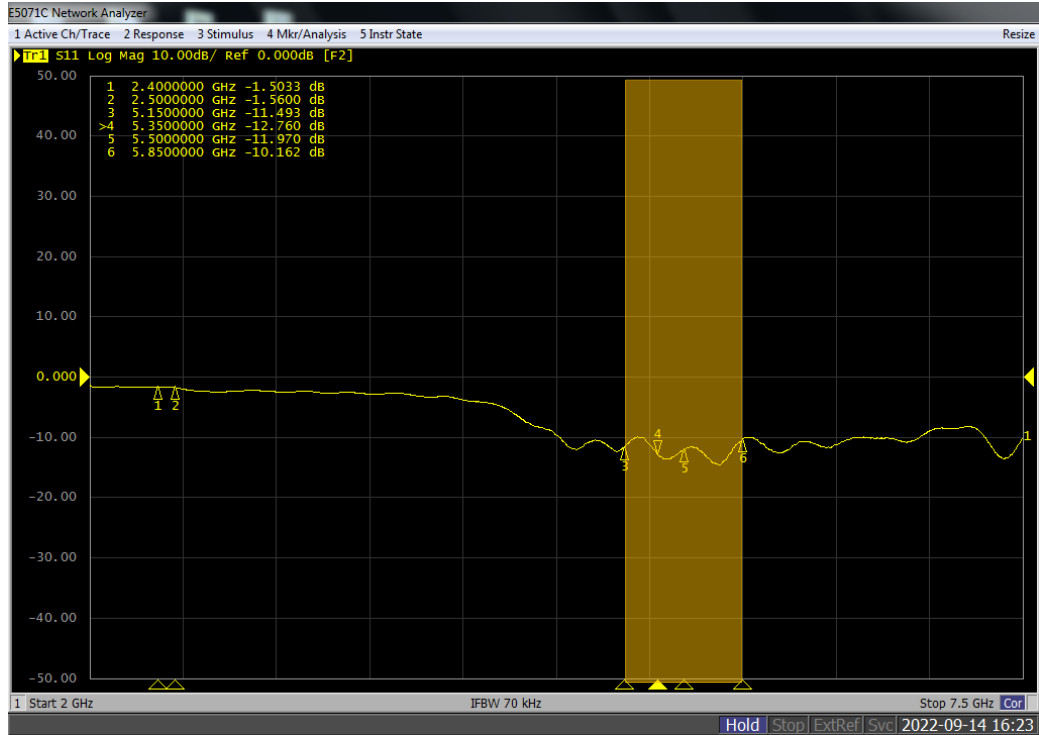
Criteria : $\leq -10\text{dB}$

Return Loss : 5-2



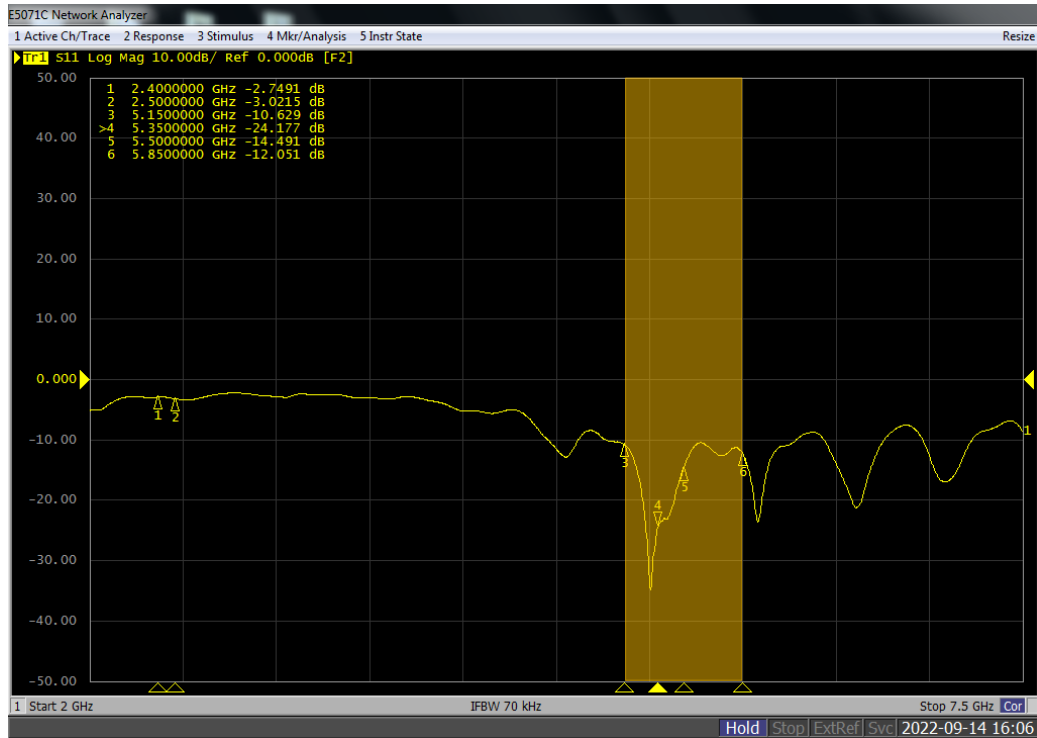
Criteria : $\leq -10\text{dB}$

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	-29	-15				
2-2	-16	-11				
5-1			-17	-15	-12	-10
5-2			-13	-12	-15	-13
5-3			-11	-12	-11	-10
5-4			-10	-24	-14	-12

Criteria :
S11 < -10dB

Result : PASS

Isolation at 2.45GHz

	2-1	2-2
2-1	NA	-20.1
2-2	NA	NA

Criteria : $\leq -20\text{dB}$

Result : PASS

Isolation at 5.5GHz

	5-1	5-2	5-3	5-4
5-1	NA	-23.3	-38.5	-33.4
5-2	NA	NA	-40.5	-34.1
5-3	NA	NA	NA	-36.2
5-4	NA	NA	NA	NA

Criteria : $\leq -20\text{dB}$

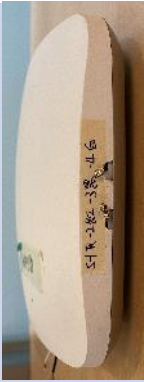
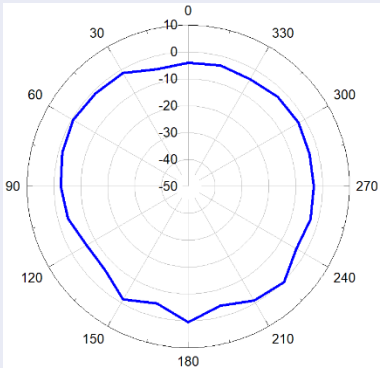
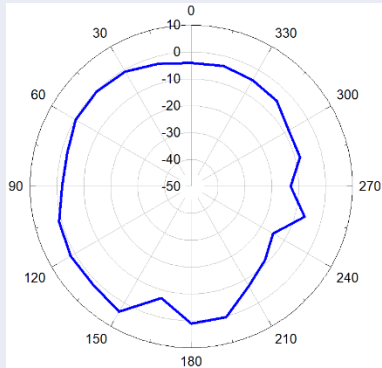
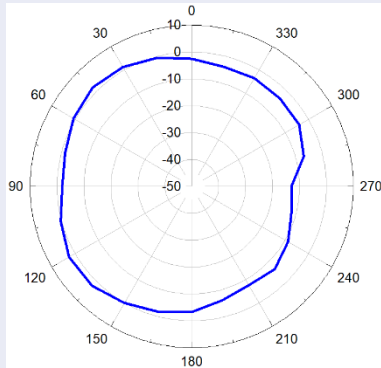
Result : PASS

Gain table

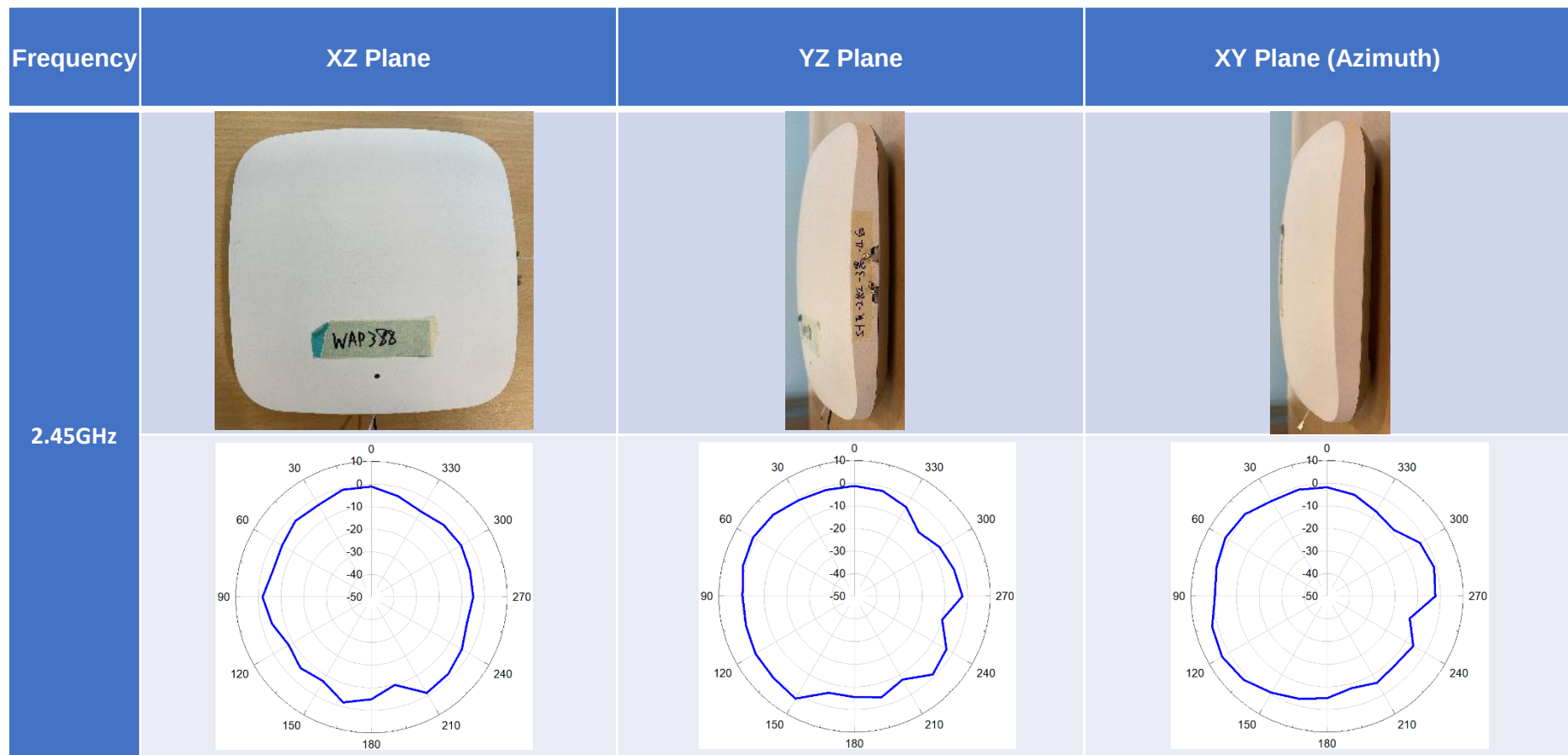
Criteria : 2.45GHz > 4dBi Criteria : Result : PASS
5.5GHz > 5dBi Efficiency > 60%

Antenna		2400~2483.5MHz	5150~5250MHz	5250~5350MHz	5470~5725MHz	5725~5850MHz
2-1	Peak Gain (dBi)	4.5				
	Effi.(%)	75.5				
2-2	Peak Gain (dBi)	4.6				
	Effi.(%)	63				
5-1	Peak Gain (dBi)		5.8	5.0	5.4	5.4
	Effi.(%)		70.6	72	73.8	73.5
5-2	Peak Gain (dBi)		4.6	5.0	5.2	5.2
	Effi.(%)		62.4	66	71.2	68.1
5-3	Peak Gain (dBi)		5.9	5.8	5.3	5.3
	Effi.(%)		62.5	67.8	76.6	76.6
5-4	Peak Gain (dBi)		5.3	5.6	5.8	5.8
	Effi.(%)		64	72.8	72.7	69.4

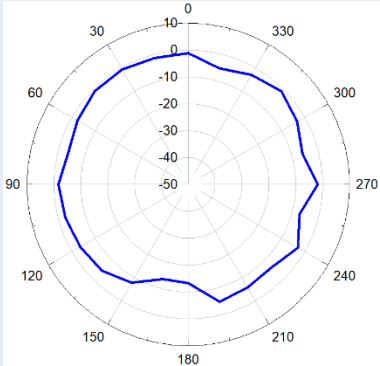
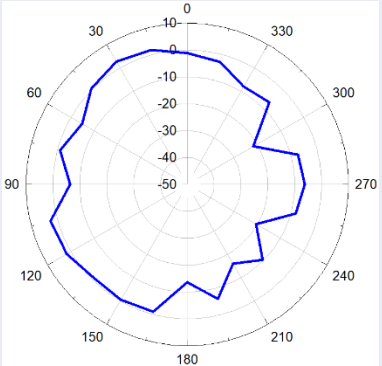
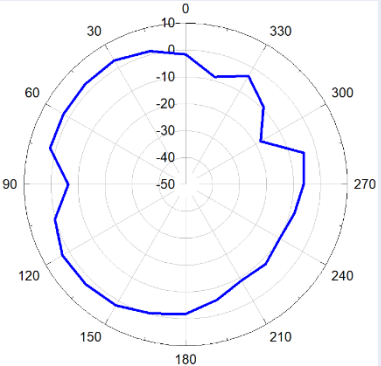
2D pattern : 2-1

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

2D pattern : 2-2



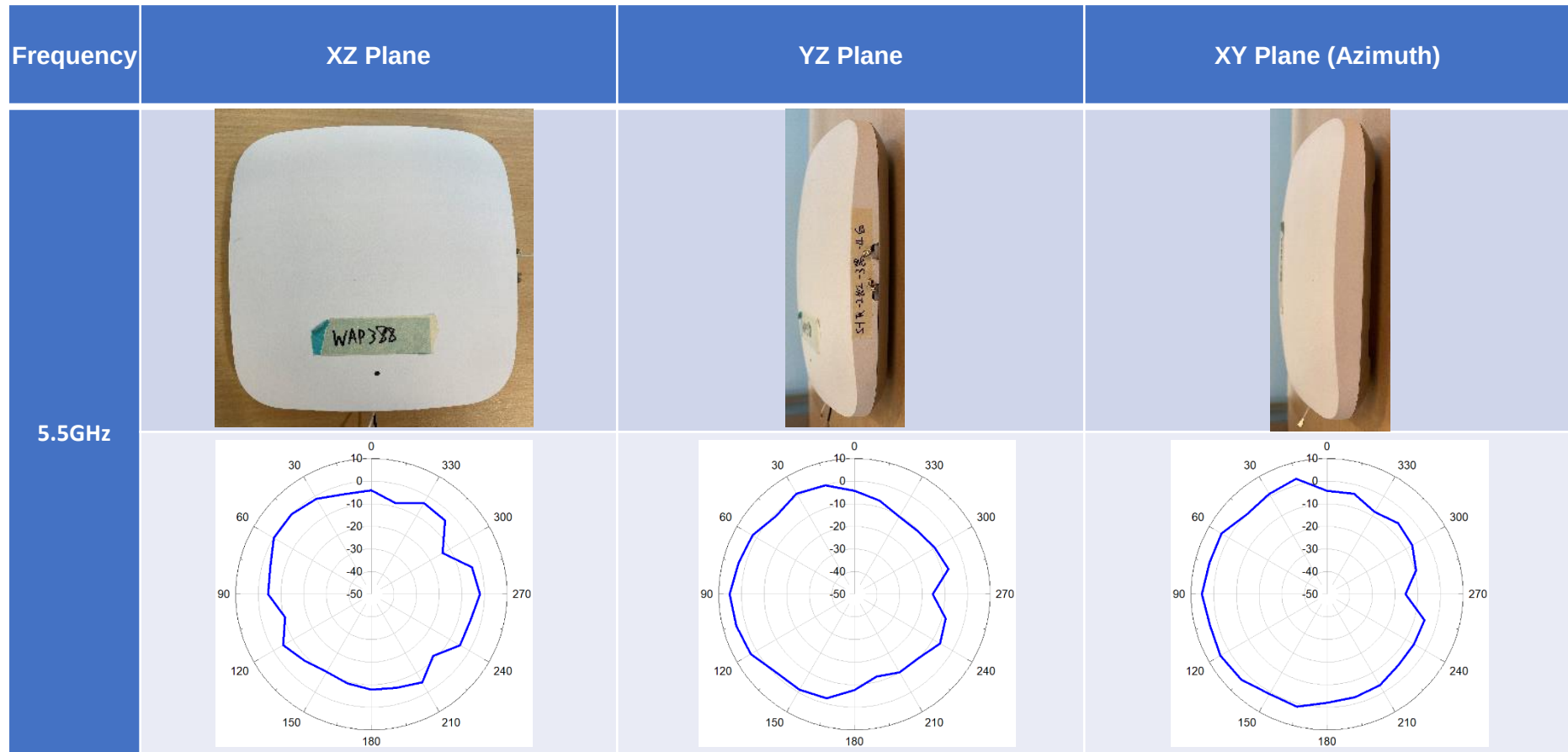
2D pattern : 5-1

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

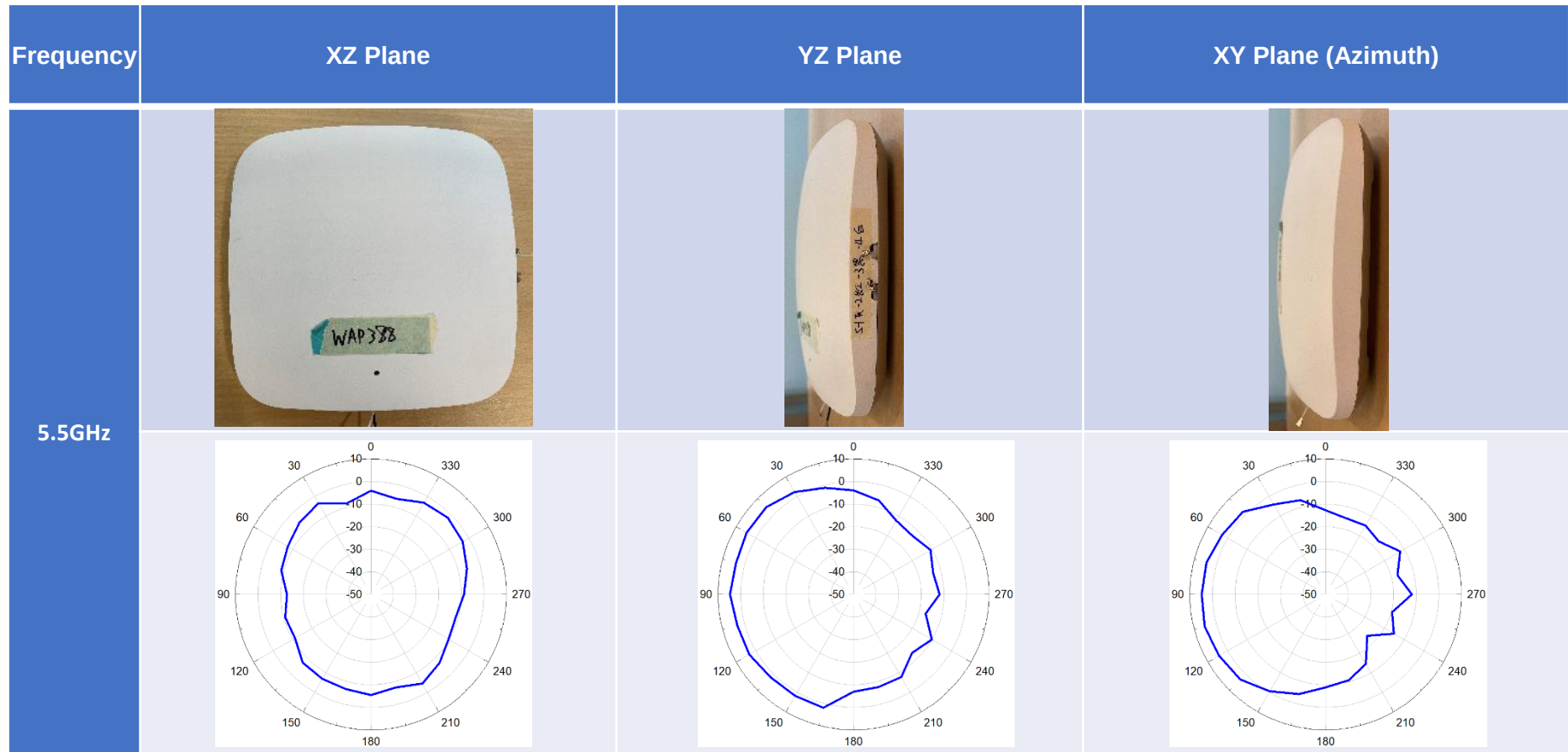
2D pattern : 5-2



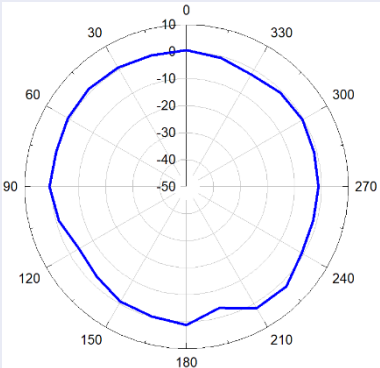
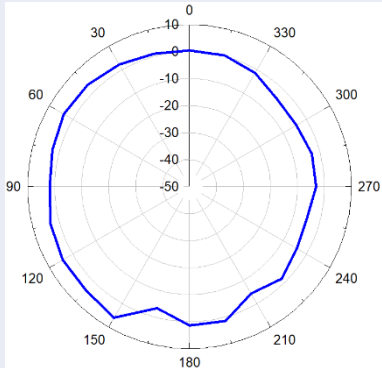
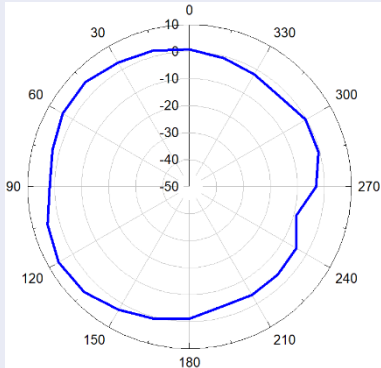
2D pattern : 5-3



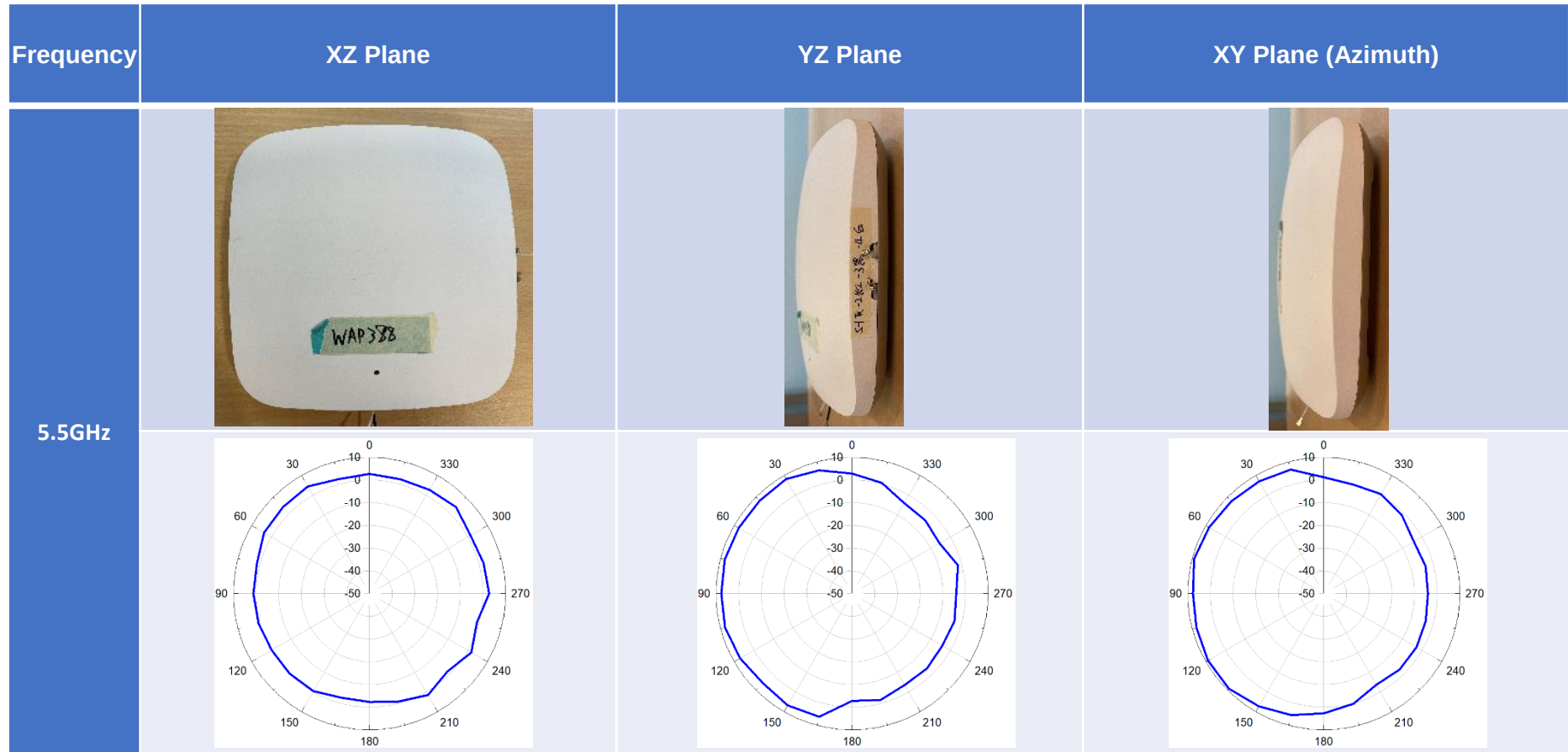
2D pattern : 5-4



Combine pattern : 2.45GHz

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

Combine pattern : 5.5GHz





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