



# IAP-9356AG

## Antenna Test Report



**Senao Networks, Inc.**

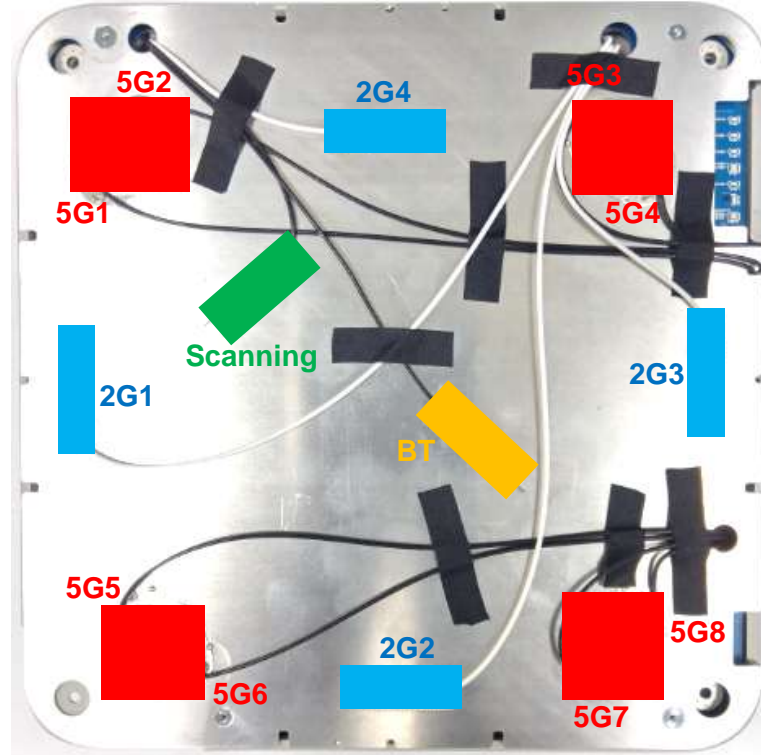
Customer	SonicWall
Project	IAP-9356AG
Project Description	2.4G antenna *4 2.4/5G antenna *1 5G antenna *8 BT antenna *1
Date	2019/08/02
Prepared by	Tony
Checked	Tony
Report Version	A01

- **Purpose**

Antenna verification for **IAP-9356AG** device, result as following.

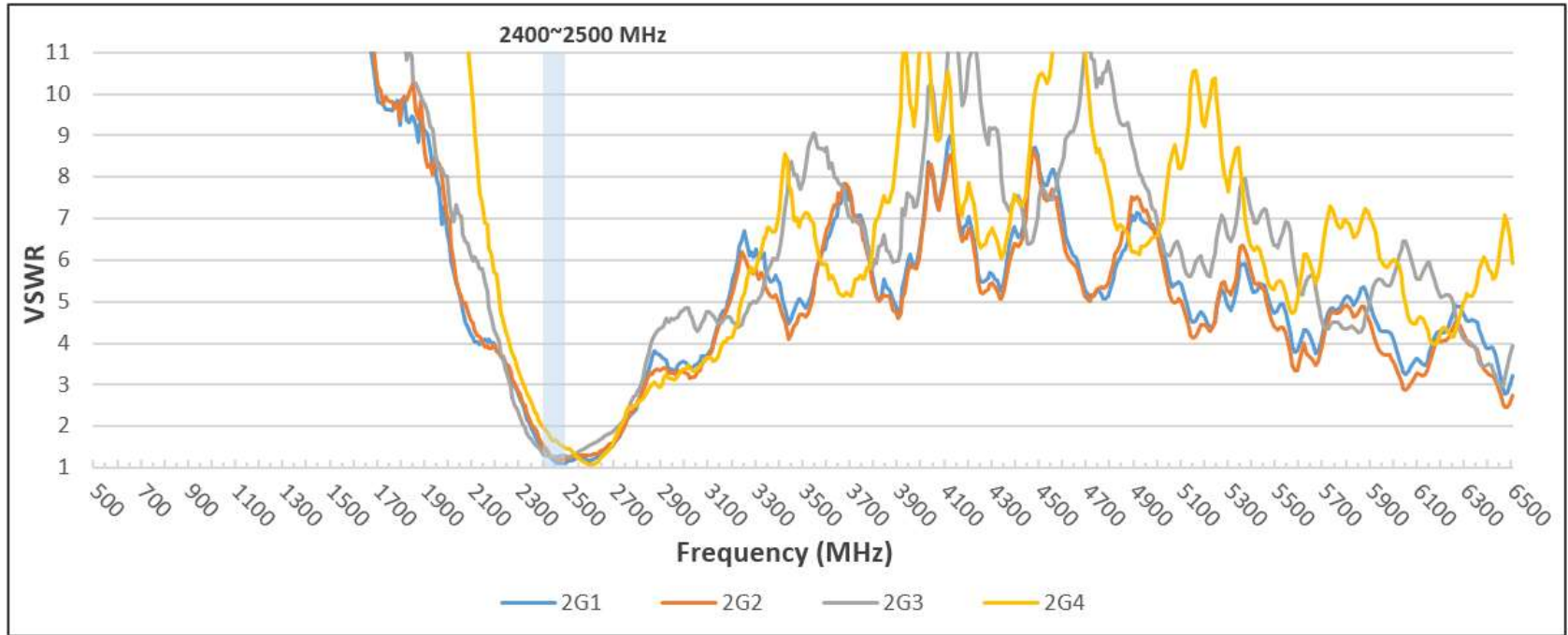
- **Agenda**

- Placement and Specification
- VSWR & Isolation
- Radiation Pattern
- Combine Pattern
- Efficiency and Gain



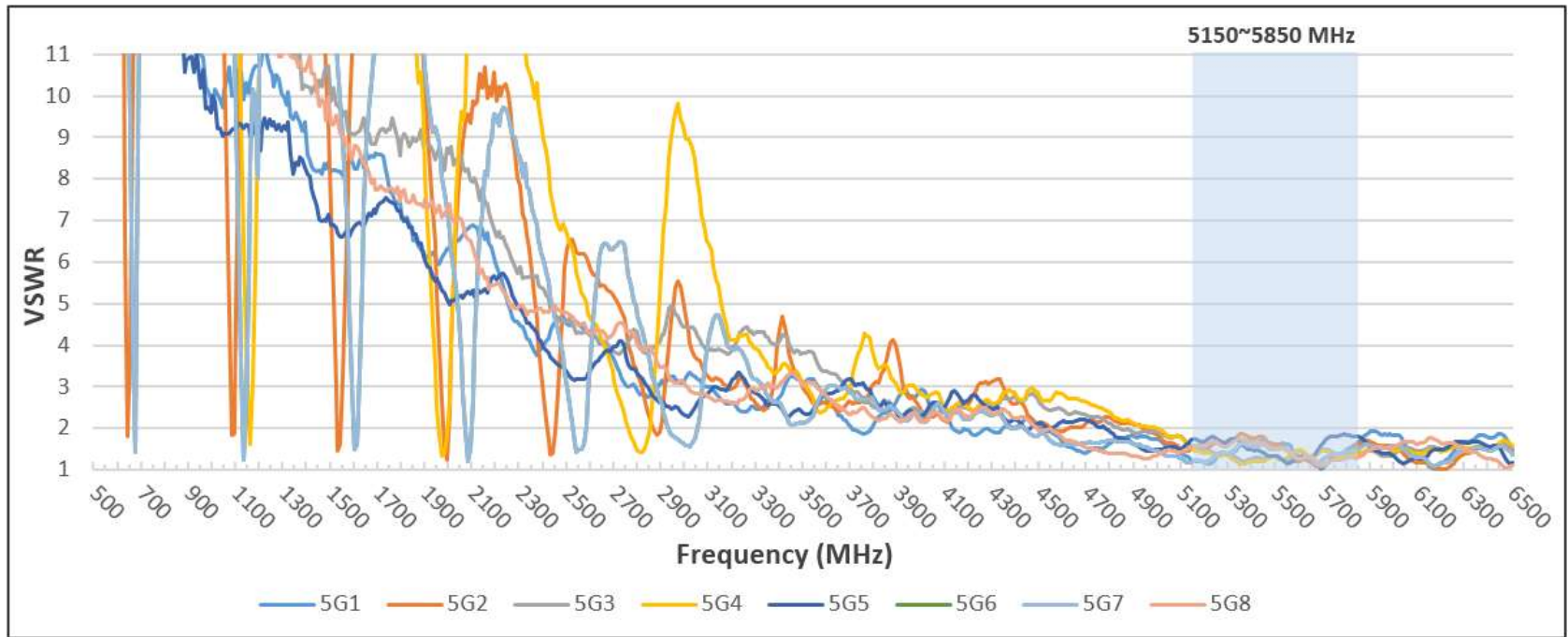
Ant No.	Operating Band	Gain (dBi)	Efficiency (%)	Ant Gain	Material	Feeding	Dimension
2G1~2G4	2400MHz ~ 2500 MHz	2.8~4.9	61~72	PIFA	Metal	Cable	206*206*10 mm <sup>3</sup>
5G1~5G8	5150MHz ~ 5850 MHz	3.6~5.2	57~69	PIFA	Metal	Cable	
BT	2400MHz ~ 2500 MHz	3.1~4.0	62~72	PIFA	Metal	Cable	
Scanning	2400MHz ~ 2500 MHz 5150MHz ~ 5850 MHz	3.9~4.9 4.8~5.2	57~67 61~64	PIFA	Metal	Cable	

## WiFi 2G Antennas



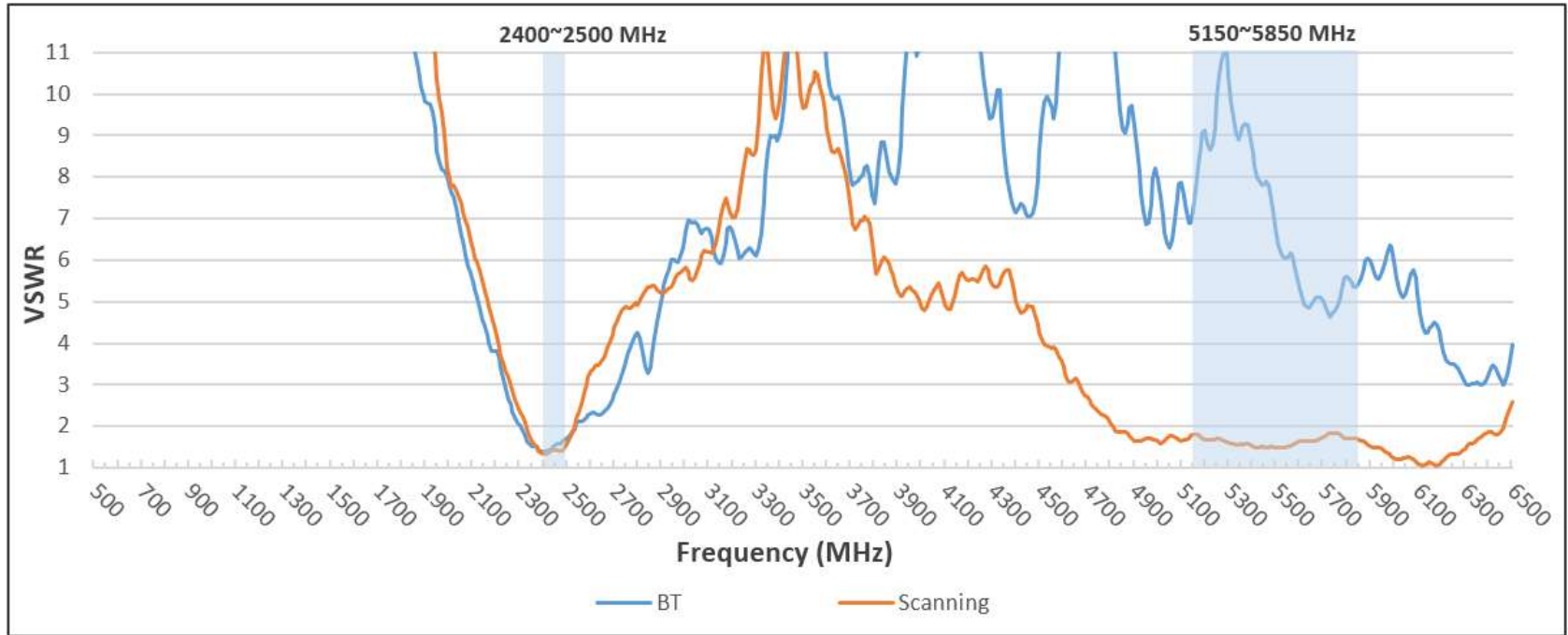
Freq. (MHz)	VSWR			
	2G1	2G2	2G3	2G4
2400	1.48	1.54	1.32	1.98
2450	1.14	1.23	1.28	1.67
2500	1.15	1.23	1.26	1.46

## WiFi 5G Antennas

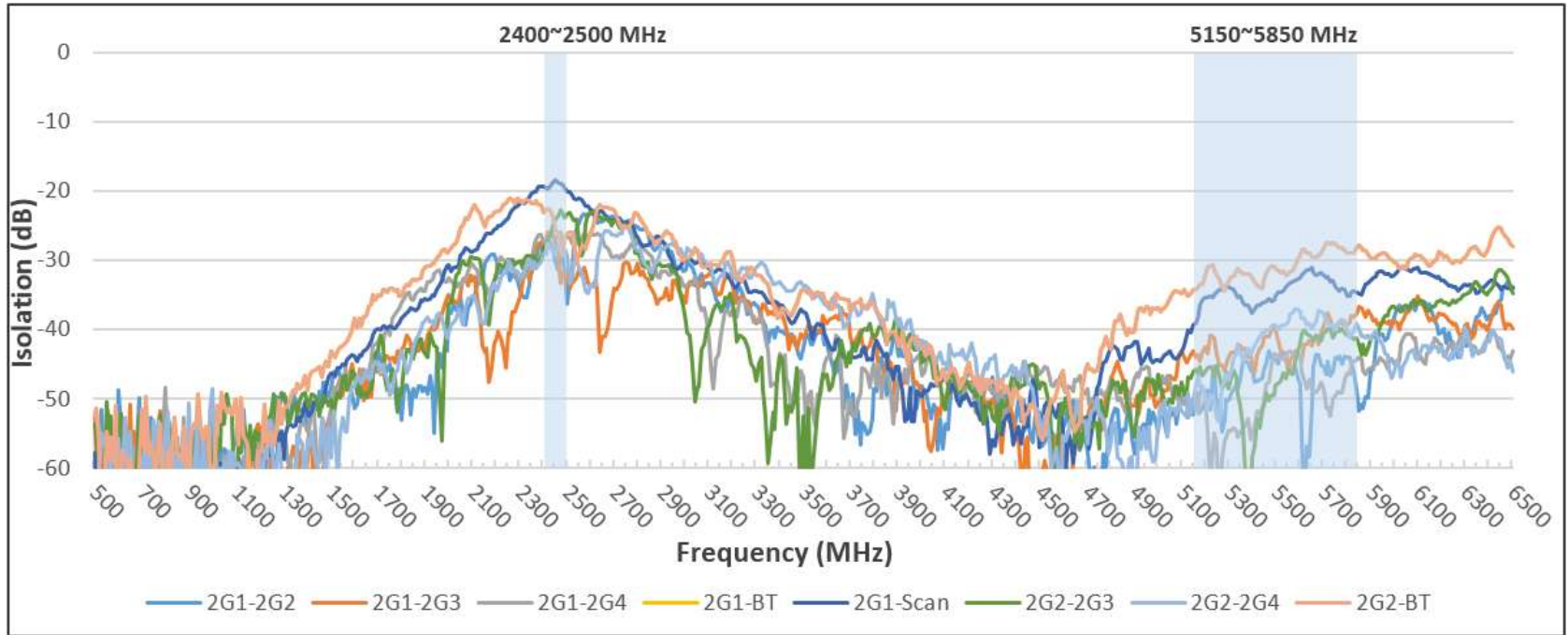


Freq. (MHz)	VSWR							
	5G1	5G2	5G3	5G4	5G5	5G6	5G7	5G8
5150	1.22	1.53	1.54	1.48	1.75	1.21	1.33	1.48
5500	1.61	1.60	1.25	1.31	1.34	1.49	1.57	1.64
5850	1.68	1.61	1.38	1.39	1.80	1.51	1.39	1.25

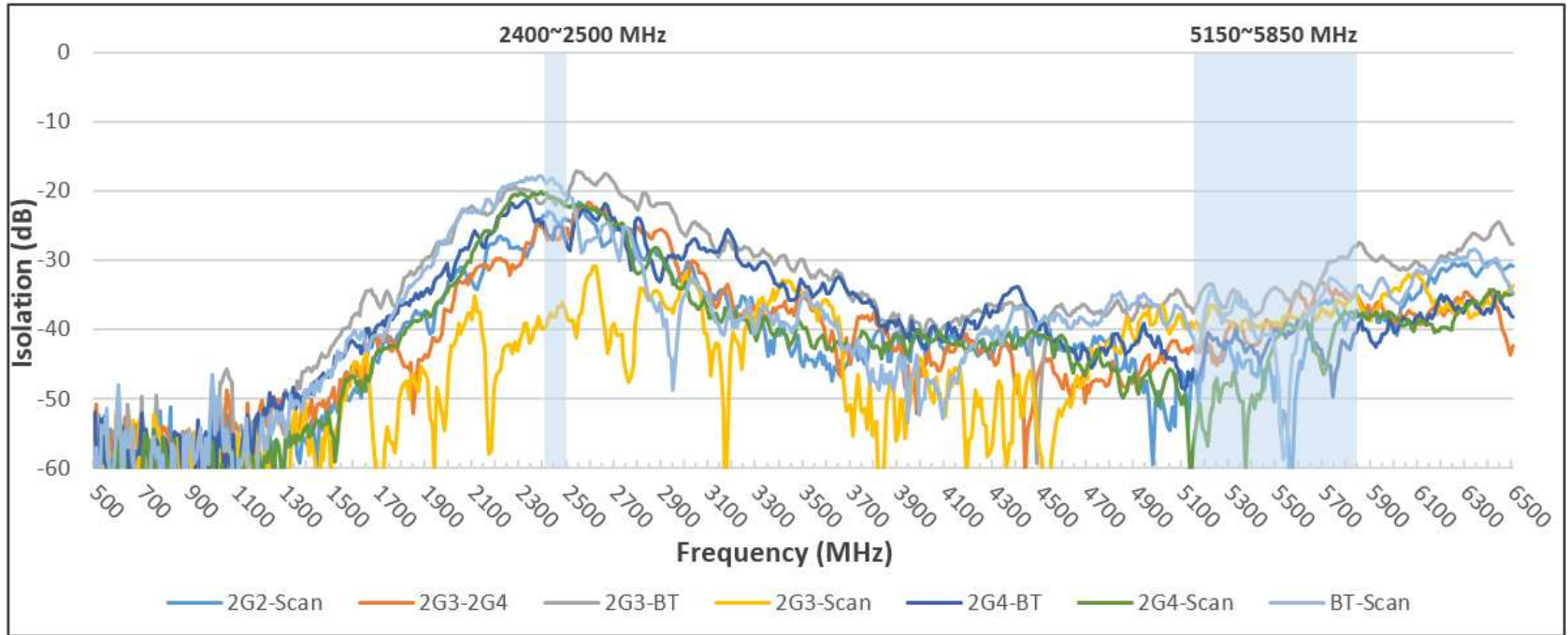
## BT & Scanning Antennas



Freq. (MHz)	VSWR	
	BT	Scanning
2400	1.40	1.32
2450	1.55	1.43
2500	1.70	1.60
5150	1.81	1.49
5500	1.49	1.49
5850	1.68	1.68

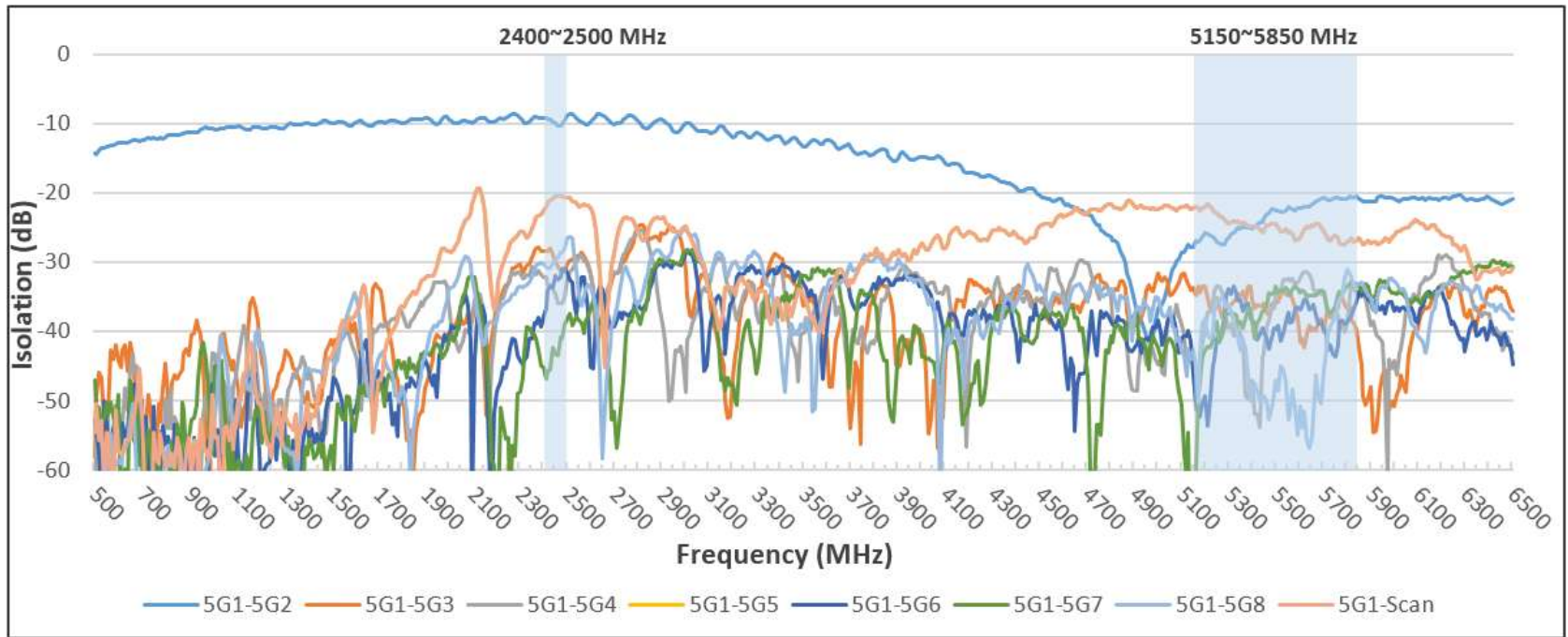


Isolation								
Freq. (MHz)	2G1-2G2	2G1-2G3	2G1-2G4	2G1-BT	2G1-Scan	2G2-2G3	2G2-2G4	2G2-BT
2400	-28.98	-28.28	-27.38	-25.74	-19.32	-28.07	-28.88	-23.10
2450	-30.35	-27.35	-26.61	-22.79	-18.39	-24.13	-29.28	-25.83
2500	-36.33	-31.56	-26.72	-30.65	-20.14	-23.26	-29.23	-26.04
5150	-52.37	-43.04	-50.03	-56.40	-39.26	-46.05	-50.44	-34.25
5500	-44.22	-39.97	-44.02	-52.81	-35.11	-47.89	-39.32	-31.13
5850	-51.73	-36.69	-44.01	-43.68	-34.85	-42.05	-39.92	-27.84

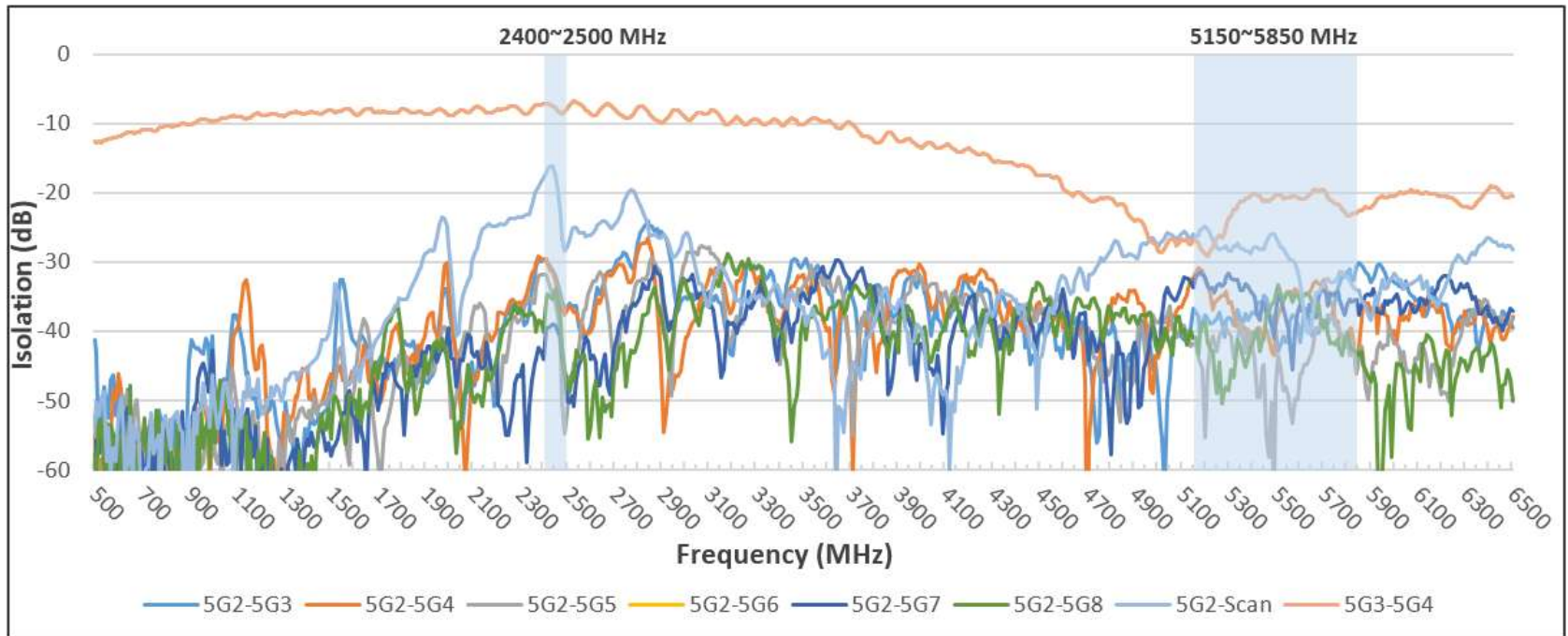


Isolation							
Freq. (MHz)	2G2-Scan	2G3-2G4	2G3-BT	2G3-Scan	2G4-BT	2G4-Scan	BT-Scan
2400	-23.49	-25.30	-21.60	-37.18	-24.42	-20.47	-18.16
2450	-24.29	-26.62	-21.94	-29.86	-25.24	-21.01	-18.91
2500	-24.24	-25.32	-21.24	-28.57	-27.97	-22.10	-20.82
5150	-45.64	-42.37	-37.57	-40.75	-45.81	-57.02	-41.27
5500	-46.81	-39.04	-33.76	-38.04	-39.89	-41.27	-43.60
5850	-38.05	-35.57	-27.44	-32.01	-39.06	-37.77	-33.60

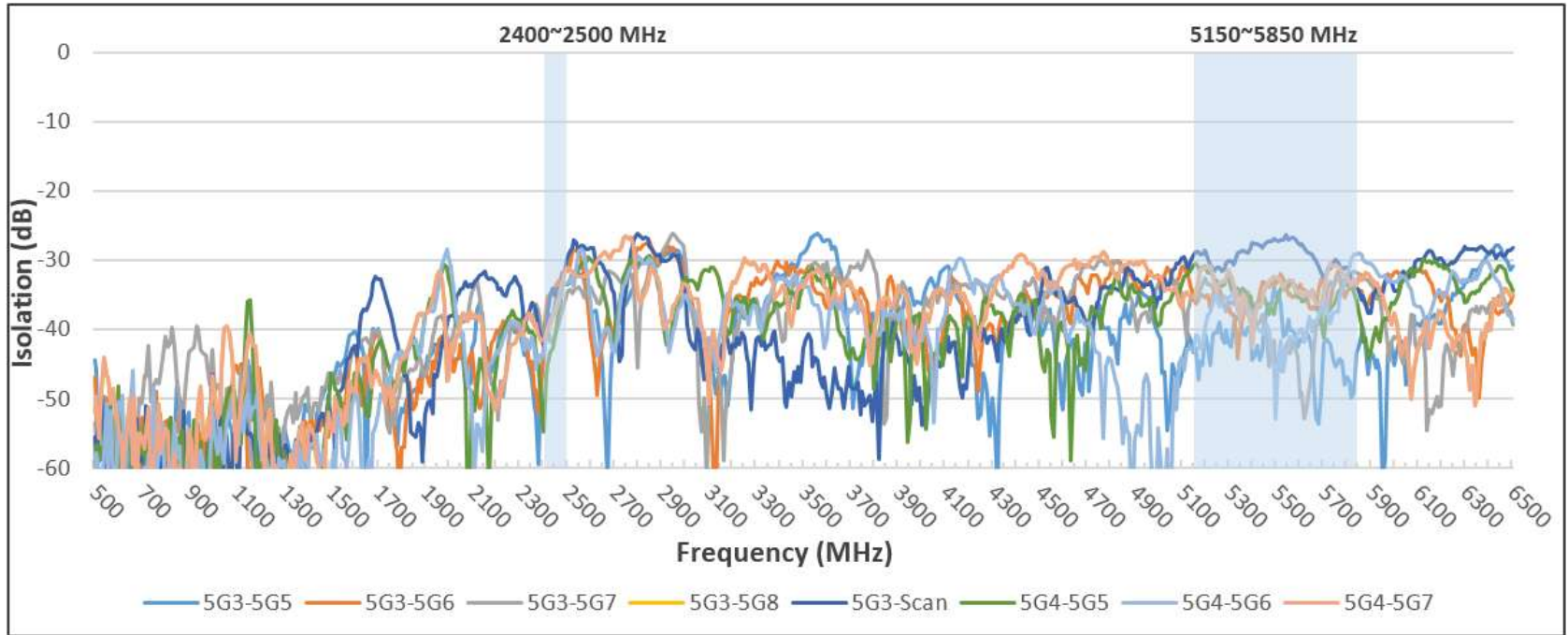




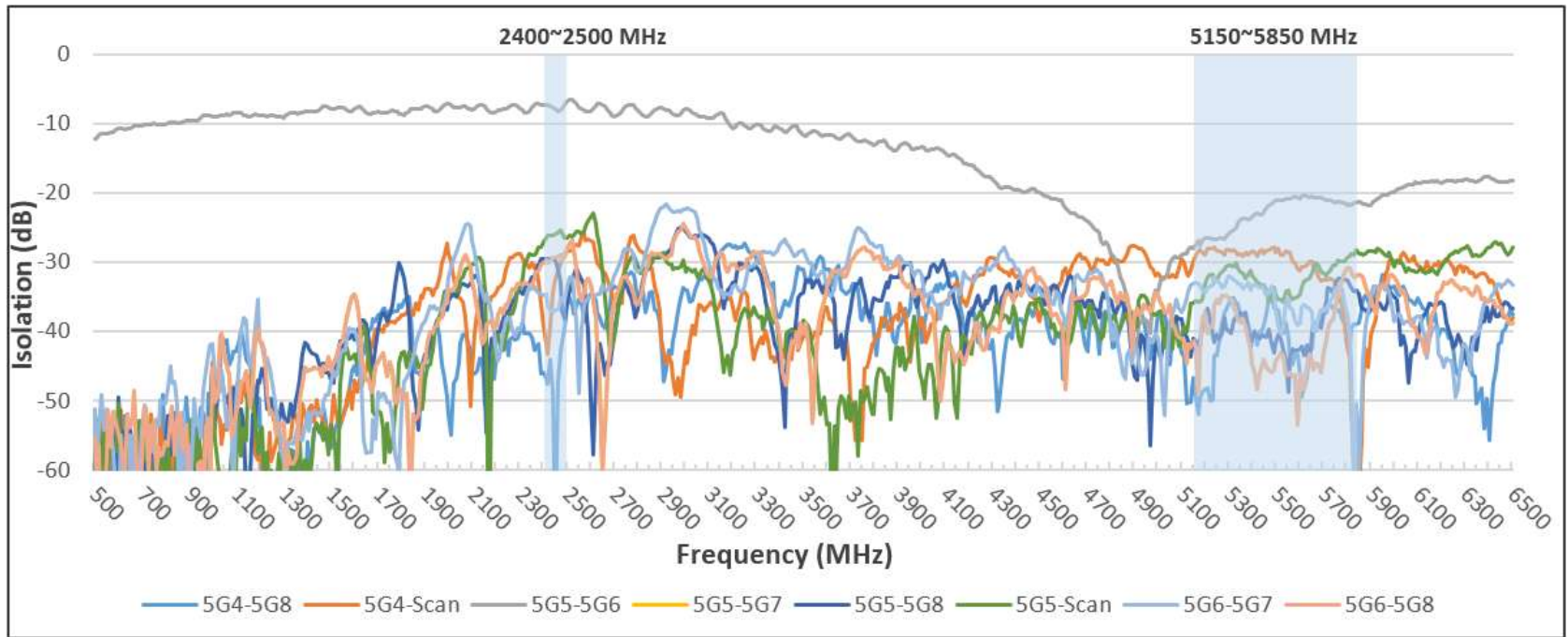
Isolation								
Freq. (MHz)	5G1-5G2	5G1-5G3	5G1-5G4	5G1-5G5	5G1-5G6	5G1-5G7	5G1-5G8	5G1-Scan
2400	-9.16	-28.36	-32.08	-38.64	-37.78	-45.04	-30.20	-22.55
2450	-9.98	-29.79	-34.54	-33.50	-32.01	-43.34	-29.59	-20.53
2500	-8.84	-30.35	-32.41	-31.33	-31.61	-38.18	-26.55	-20.56
5150	-27.75	-33.60	-43.29	-51.55	-45.98	-64.36	-42.60	-22.23
5500	-22.57	-35.88	-35.01	-43.93	-39.72	-33.38	-47.07	-24.45
5850	-20.87	-42.39	-34.74	-33.87	-34.13	-33.37	-33.01	-26.49



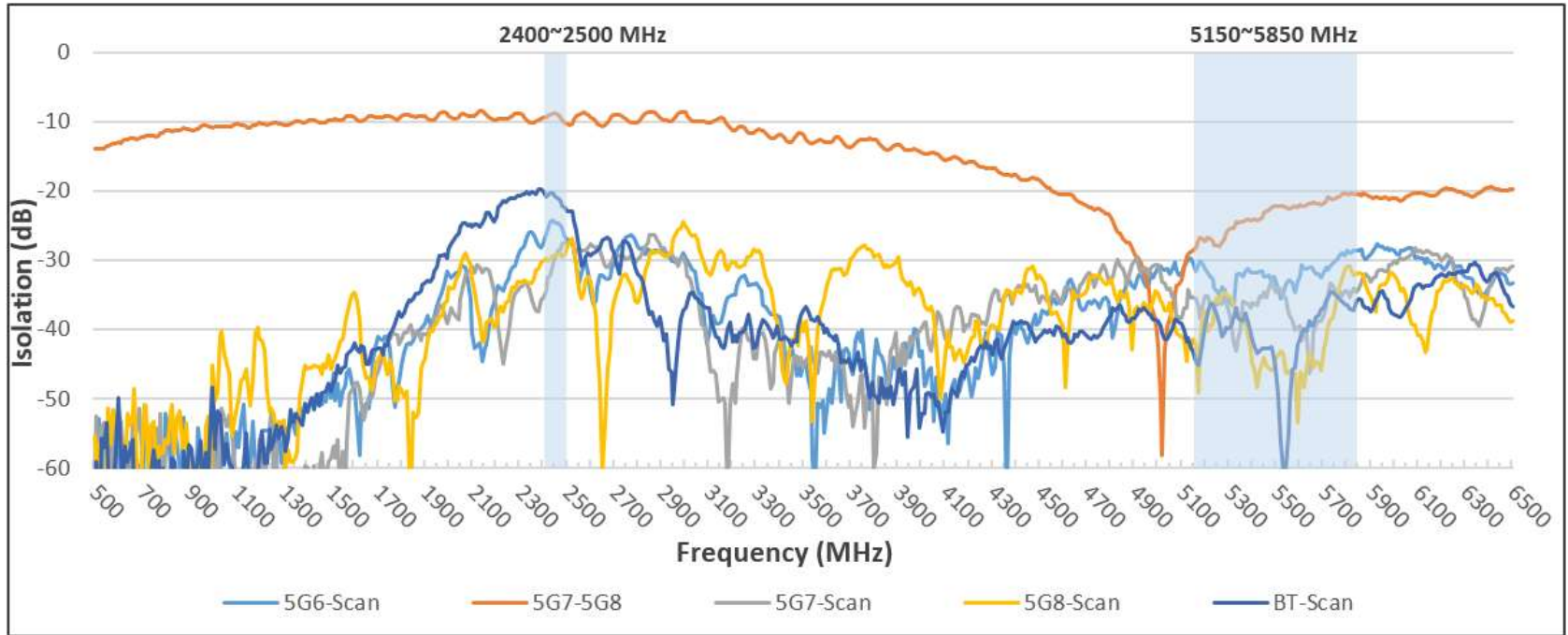
Isolation								
Freq. (MHz)	5G2-5G3	5G2-5G4	5G2-5G5	5G2-5G6	5G2-5G7	5G2-5G8	5G2-Scan	5G3-5G4
2400	-29.47	-29.69	-31.73	-27.69	-44.08	-39.98	-17.75	-7.14
2450	-31.96	-32.65	-35.81	-32.72	-39.11	-33.82	-17.43	-7.73
2500	-36.53	-36.80	-51.67	-52.04	-50.08	-47.71	-27.78	-7.83
5150	-36.63	-32.26	-41.81	-38.79	-33.58	-41.08	-25.94	-26.61
5500	-39.43	-39.24	-48.10	-45.85	-37.60	-34.86	-26.24	-20.34
5850	-30.09	-42.22	-43.90	-43.38	-37.67	-43.38	-34.06	-22.58



Isolation								
Freq. (MHz)	5G3-5G5	5G3-5G6	5G3-5G7	5G3-5G8	5G3-Scan	5G4-5G5	5G4-5G6	5G4-5G7
2400	-44.44	-42.29	-40.27	-44.40	-42.28	-54.83	-43.29	-41.59
2450	-35.91	-33.74	-40.54	-39.92	-35.13	-40.57	-36.88	-37.49
2500	-33.38	-31.62	-34.63	-29.59	-29.62	-33.46	-33.26	-31.02
5150	-43.29	-34.97	-35.18	-35.73	-29.25	-30.86	-43.09	-35.43
5500	-35.23	-33.48	-44.67	-41.76	-27.13	-36.38	-52.82	-32.58
5850	-42.32	-34.35	-32.01	-32.55	-34.39	-37.52	-28.91	-32.41

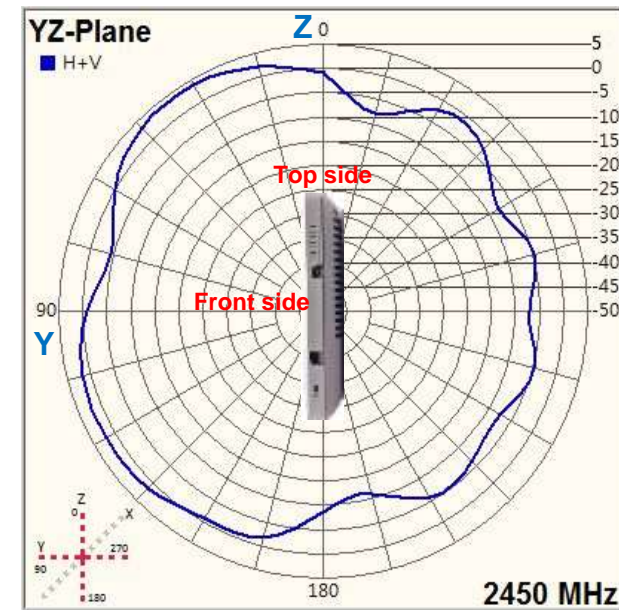
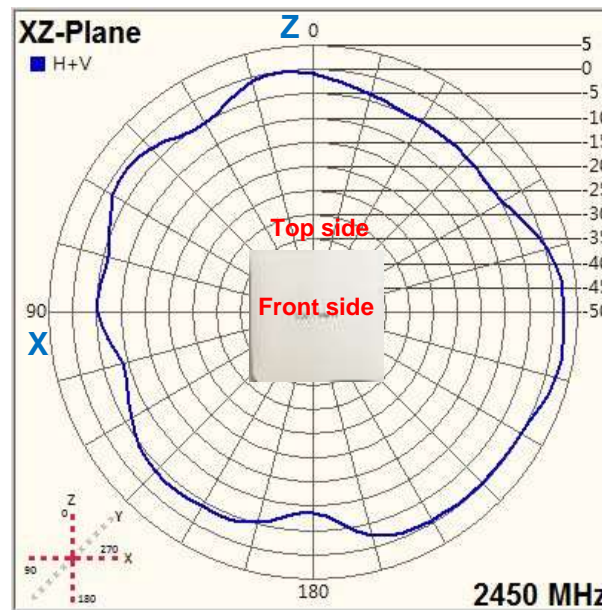
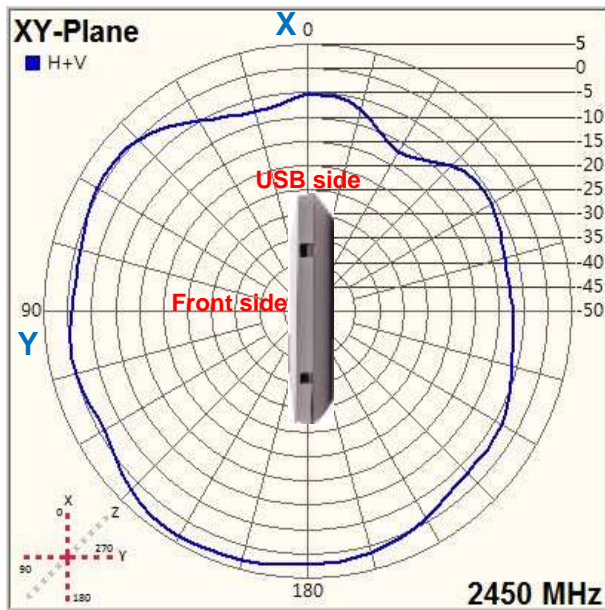
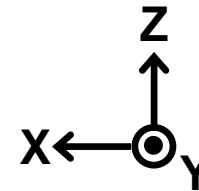
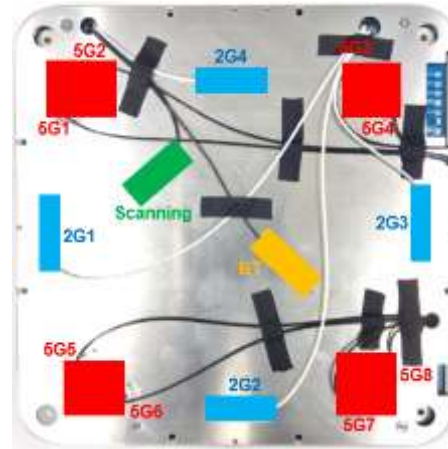


Isolation								
Freq. (MHz)	5G4-5G8	5G4-Scan	5G5-5G6	5G5-5G7	5G5-5G8	5G5-Scan	5G6-5G7	5G6-5G8
2400	-45.95	-39.22	-7.23	-45.14	-29.42	-27.03	-34.68	-30.04
2450	-70.04	-32.39	-7.88	-40.14	-29.76	-25.93	-36.85	-29.27
2500	-36.17	-28.38	-6.75	-38.97	-35.46	-26.47	-33.37	-27.94
5150	-46.55	-29.90	-27.93	-34.45	-41.01	-35.89	-33.08	-41.28
5500	-36.73	-28.47	-21.04	-35.13	-41.82	-34.64	-36.61	-44.23
5850	-38.68	-63.04	-21.15	-41.10	-34.60	-28.69	-60.07	-31.71

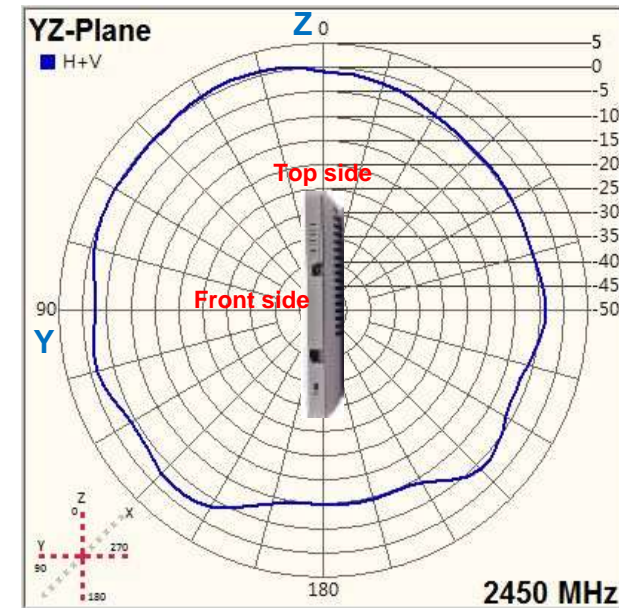
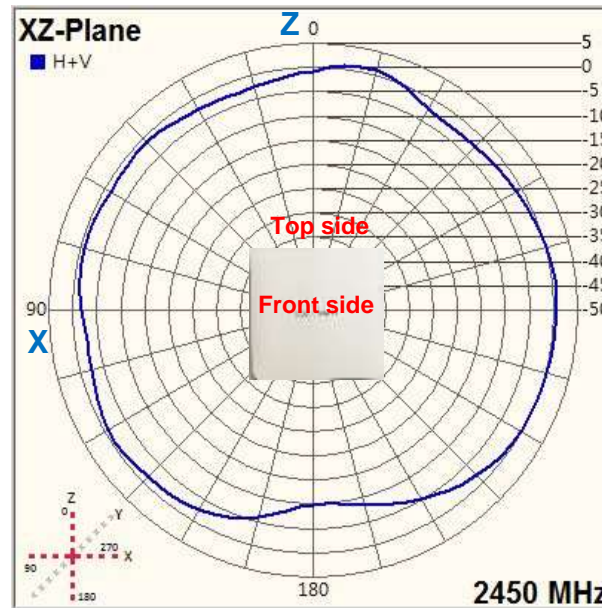
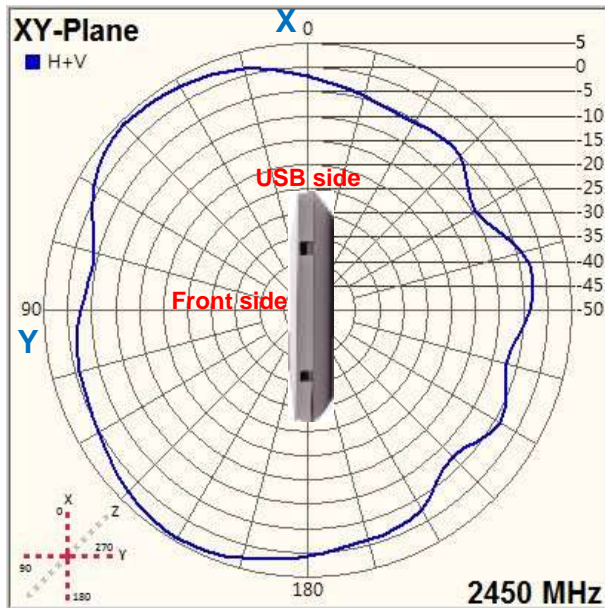
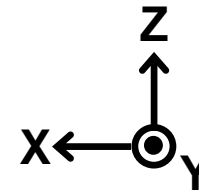
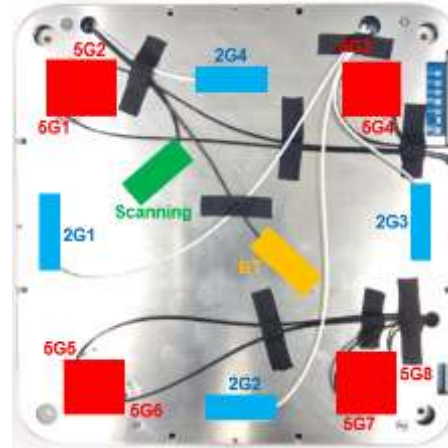


Isolation					
Freq. (MHz)	5G6-Scan	5G7-5G8	5G7-Scan	5G8-Scan	BT-Scan
2400	-27.36	-9.41	-35.30	-28.24	-20.16
2450	-24.65	-8.84	-29.56	-24.59	-20.91
2500	-27.06	-10.36	-27.39	-23.17	-22.82
5150	-30.45	-28.49	-35.31	-41.74	-43.27
5500	-32.85	-22.08	-34.55	-62.52	-45.60
5850	-28.65	-20.55	-34.11	-47.79	-35.60

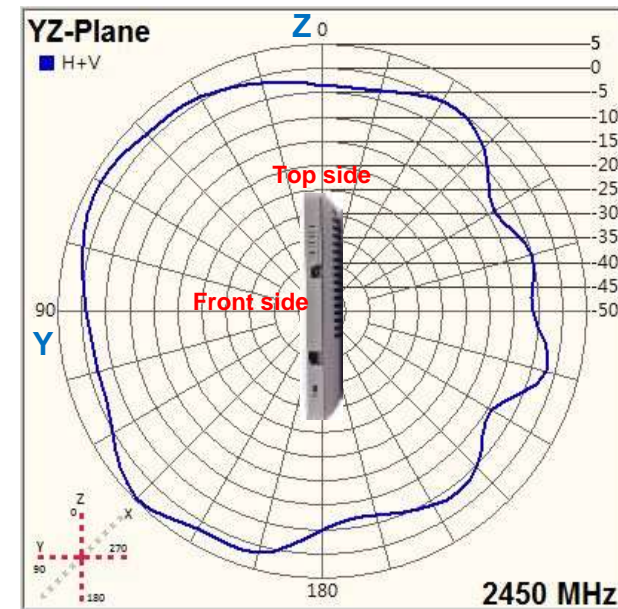
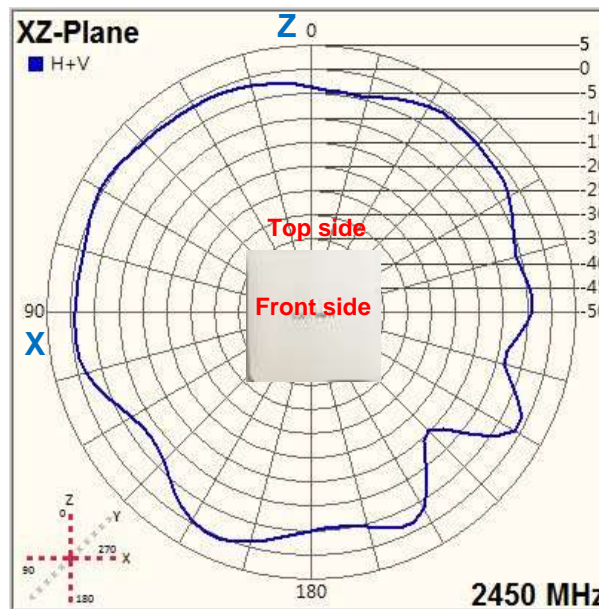
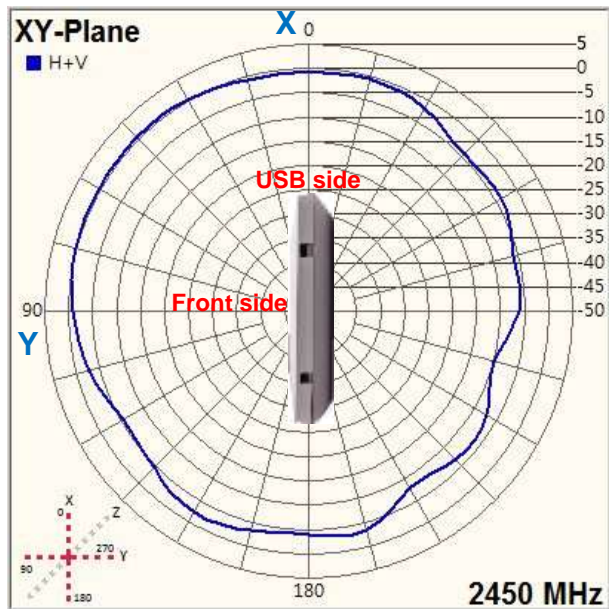
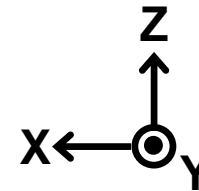
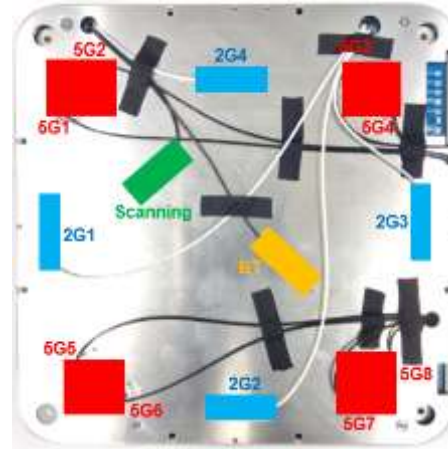
# 2D Radiation Pattern – 2G1 @ 2.45GHz



# 2D Radiation Pattern – 2G2 @ 2.45GHz

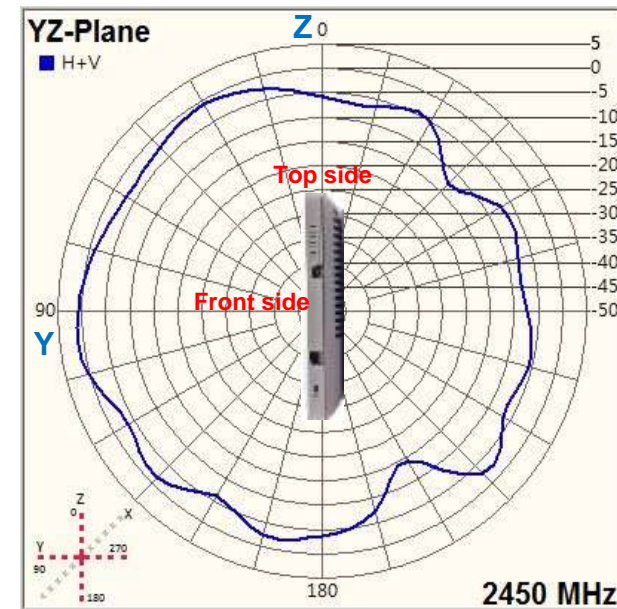
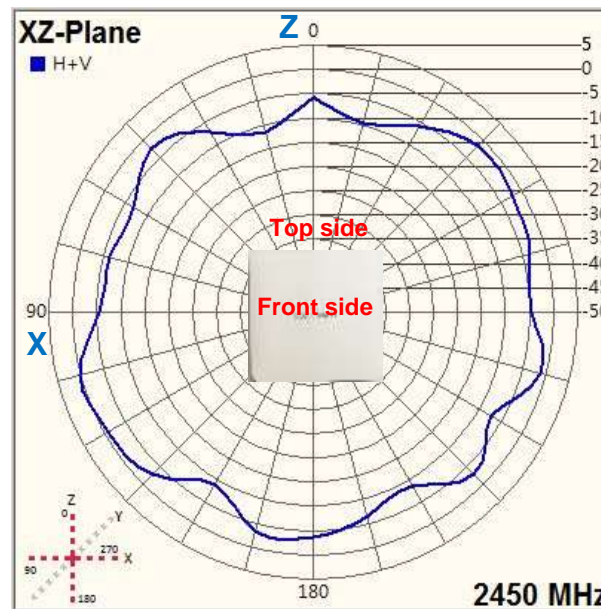
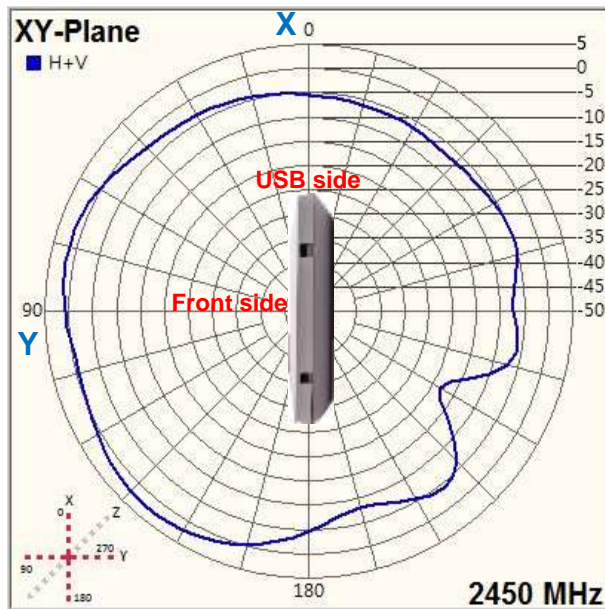
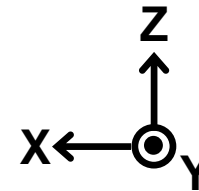
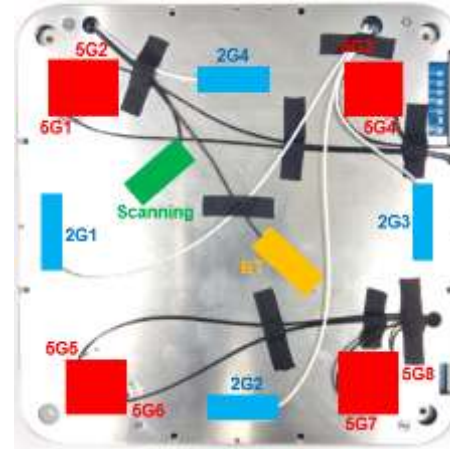


# 2D Radiation Pattern – 2G3 @ 2.45GHz

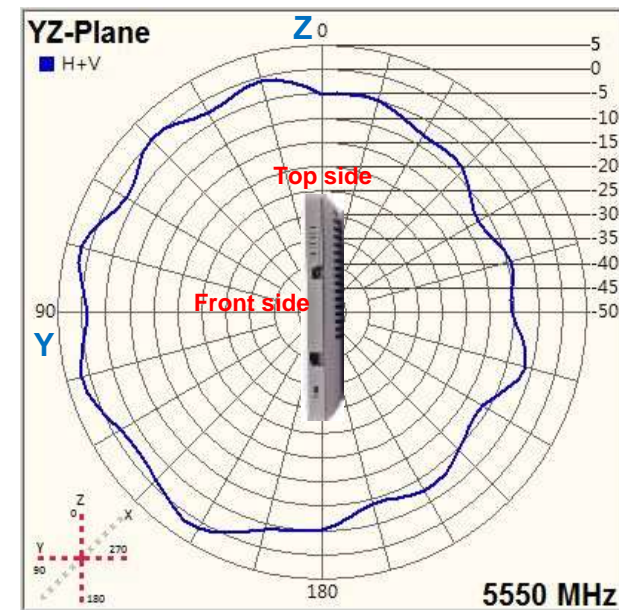
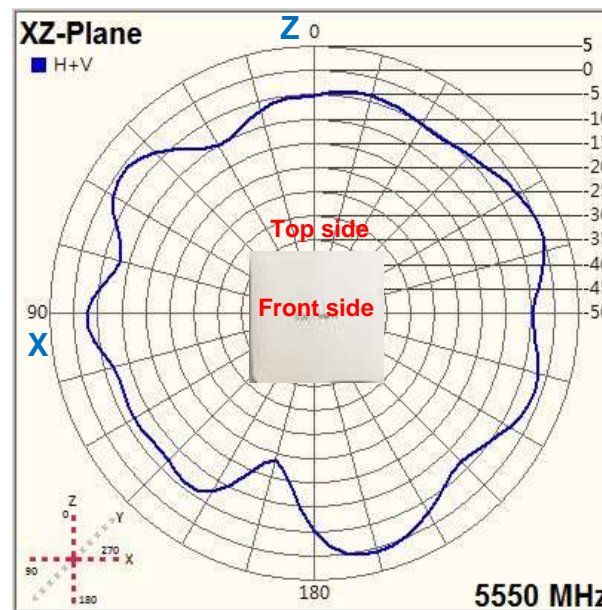
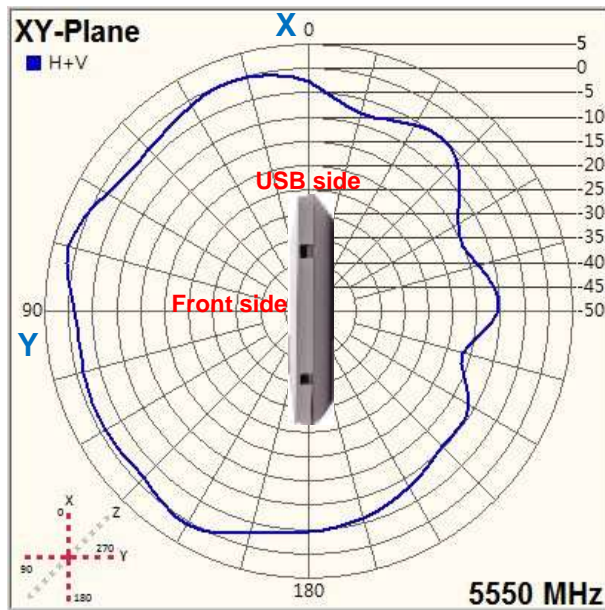
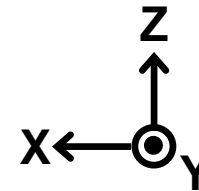
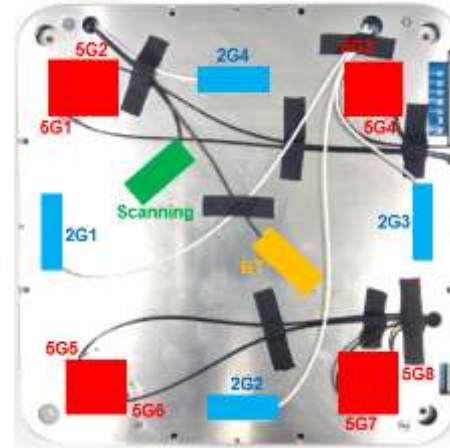


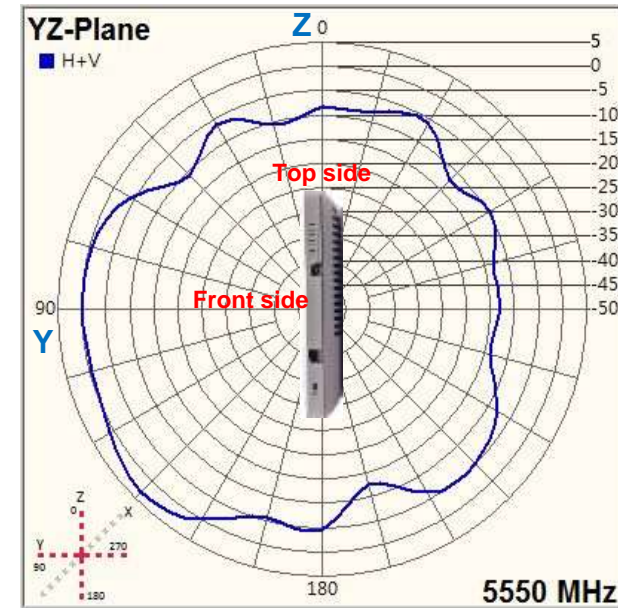
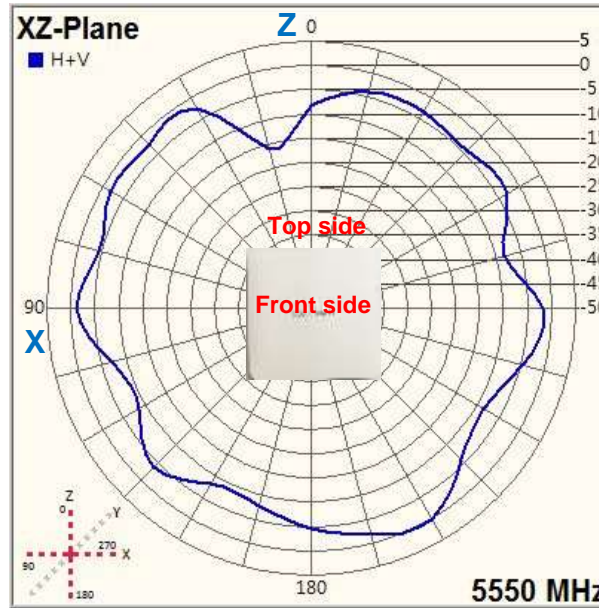
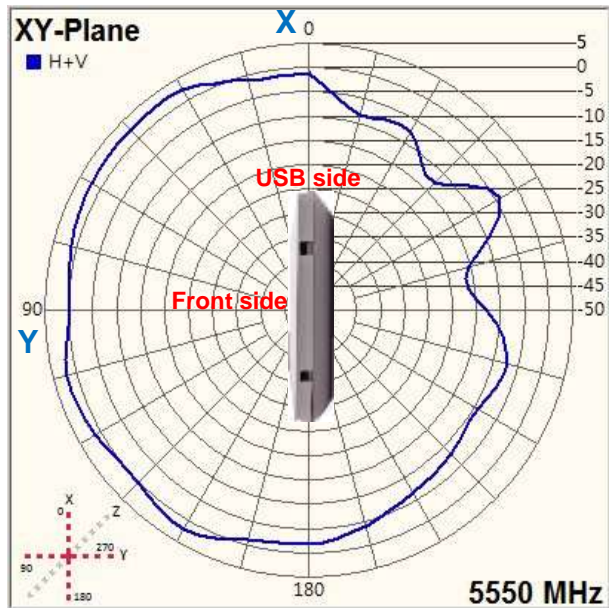
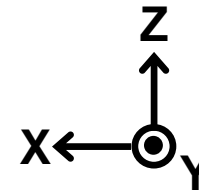
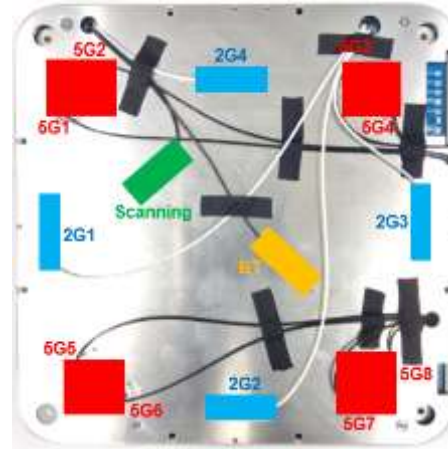


# 2D Radiation Pattern – 2G4 @ 2.45GHz

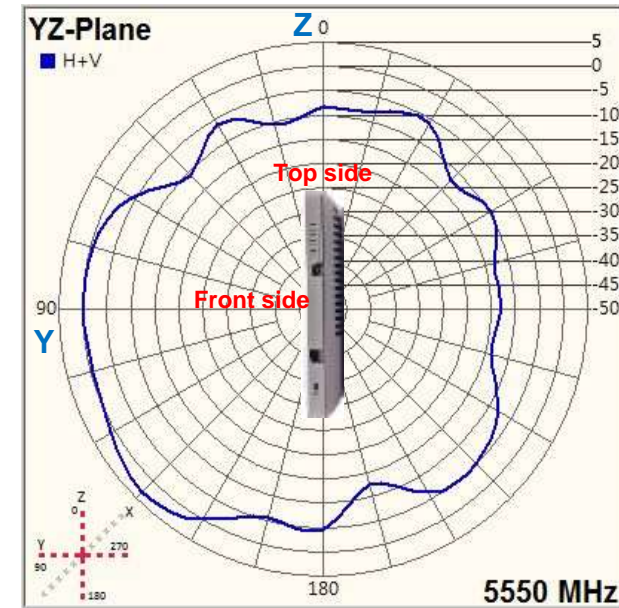
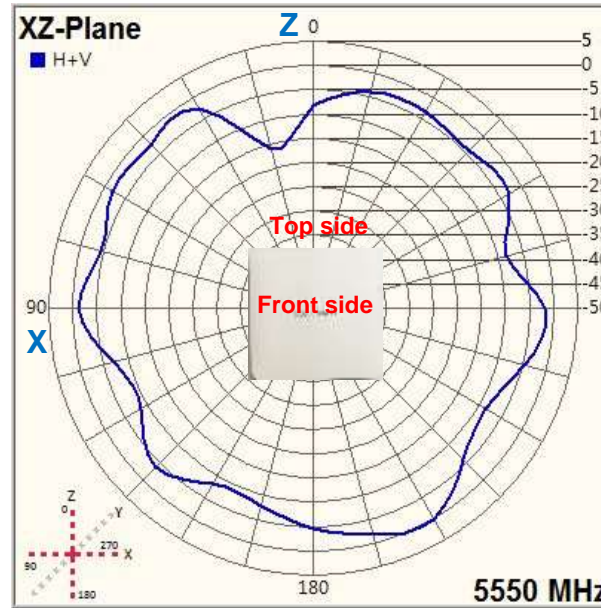
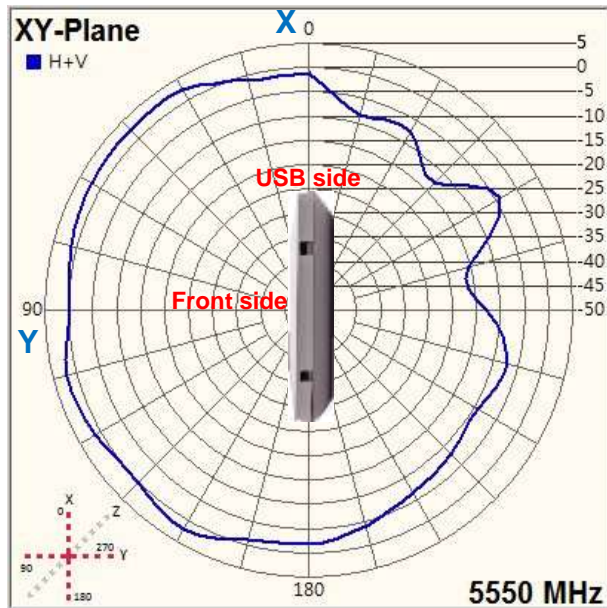
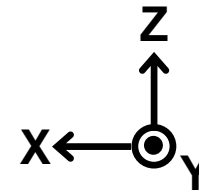
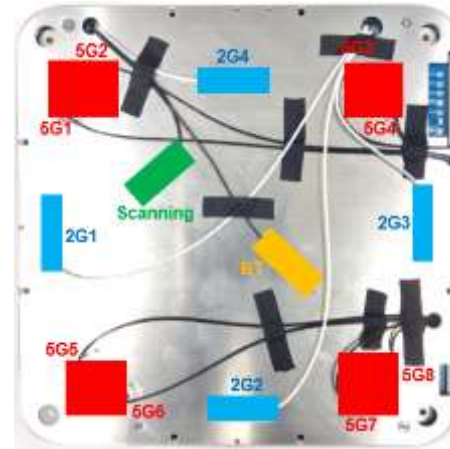


# 2D Radiation Pattern – 5G1 @ 5.55GHz

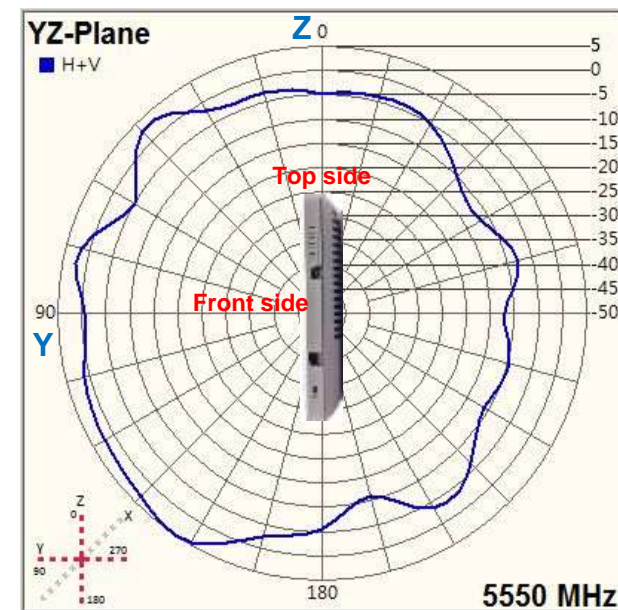
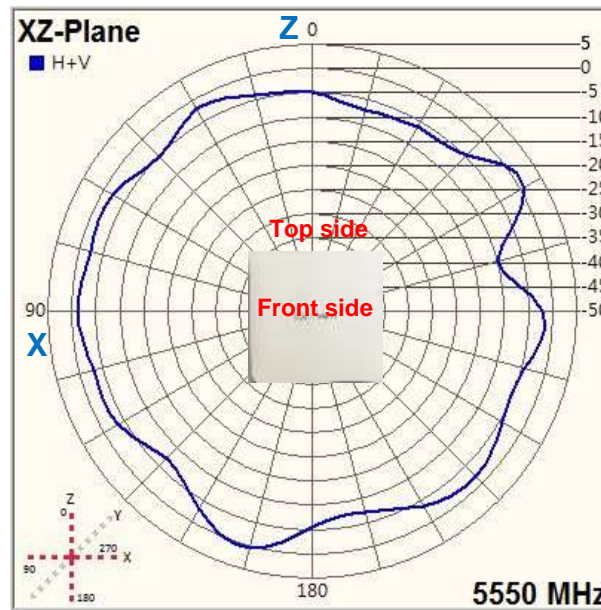
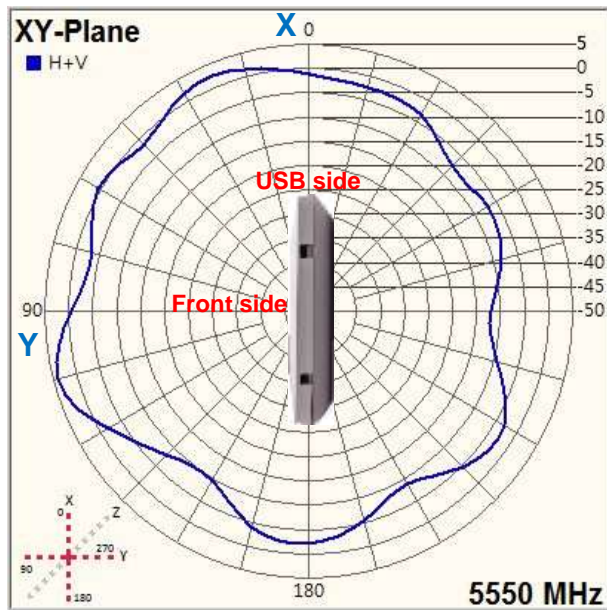
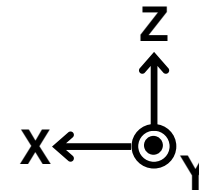
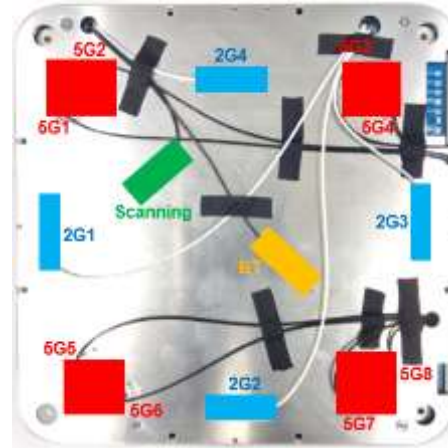




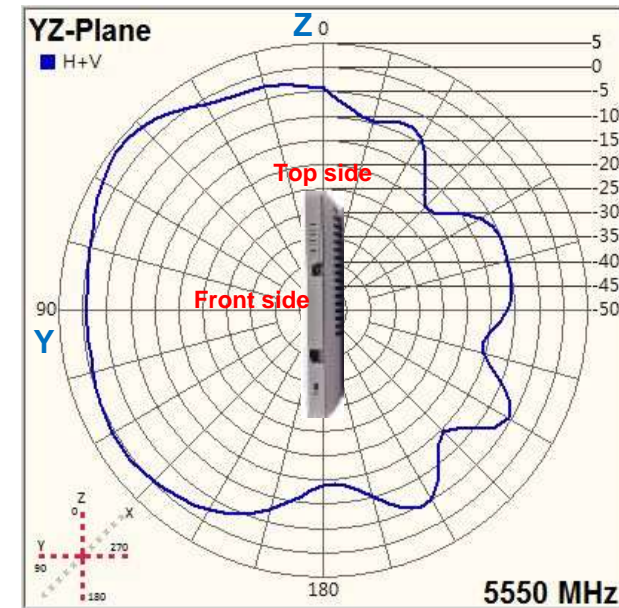
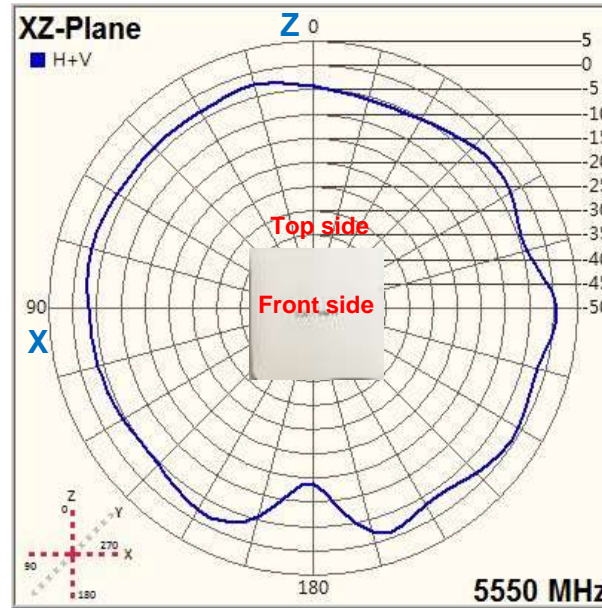
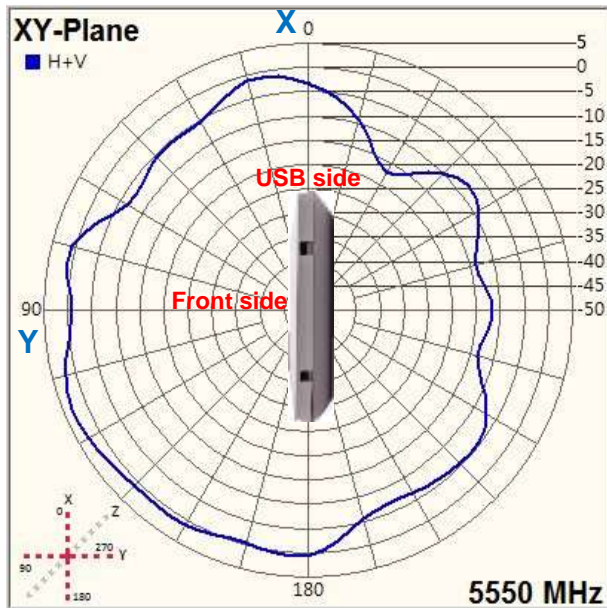
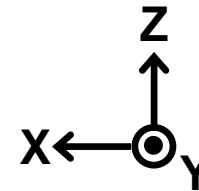
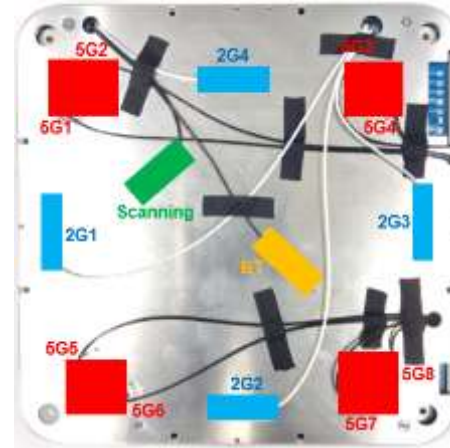
# 2D Radiation Pattern – 5G3 @ 5.55GHz



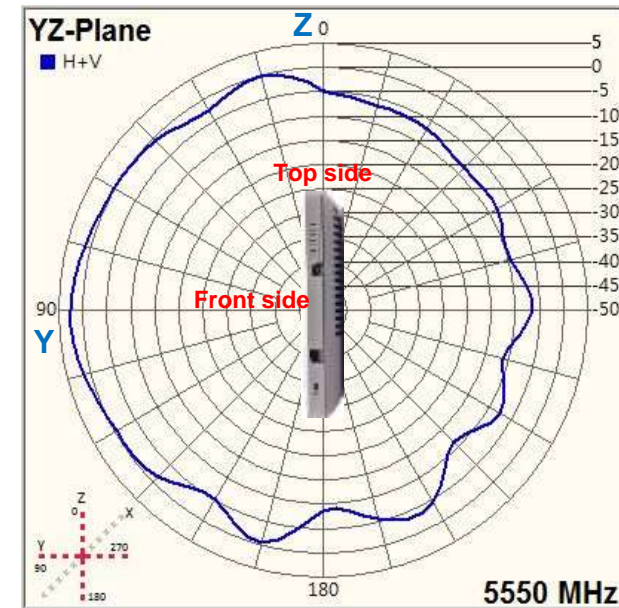
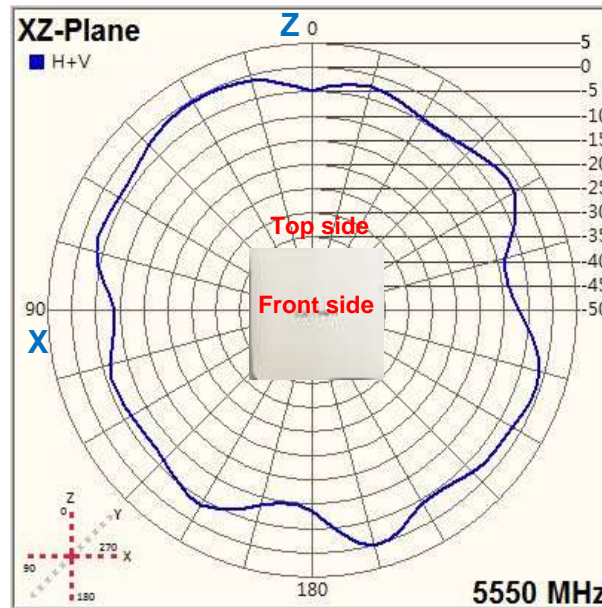
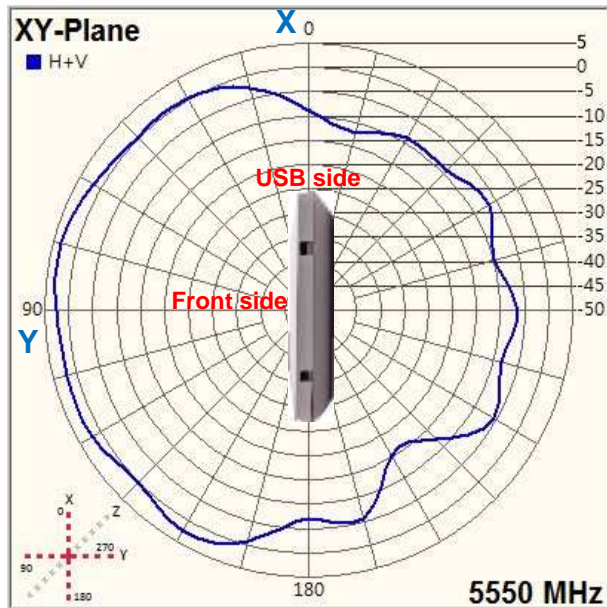
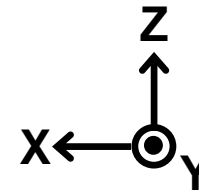
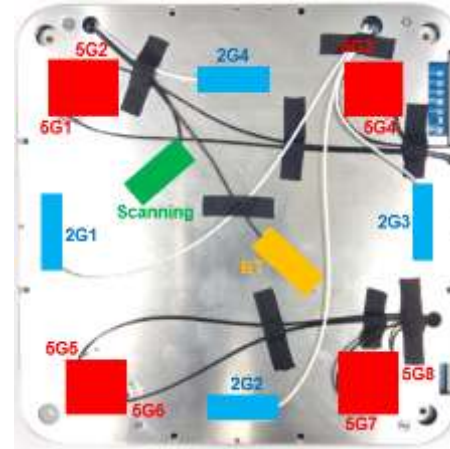
# 2D Radiation Pattern – 5G4 @ 5.55GHz



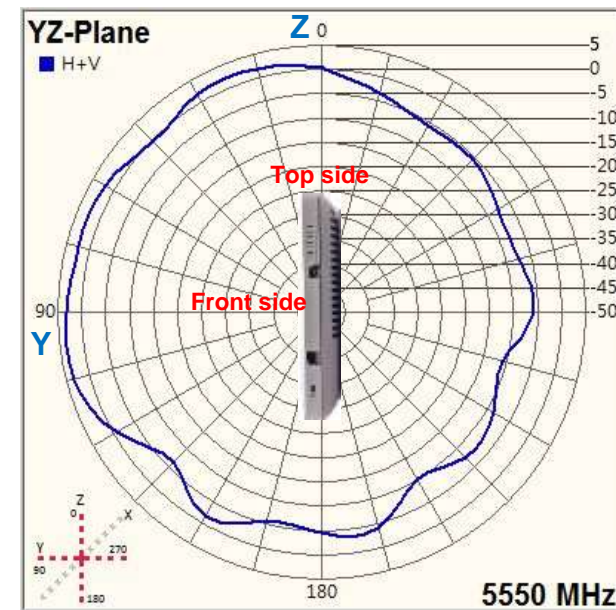
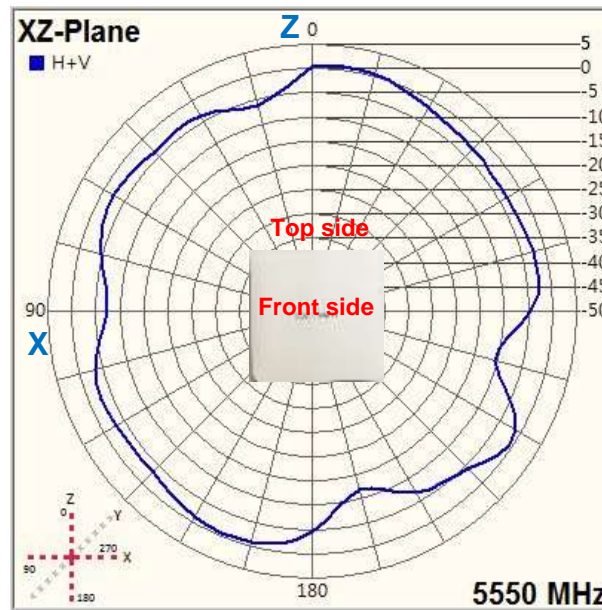
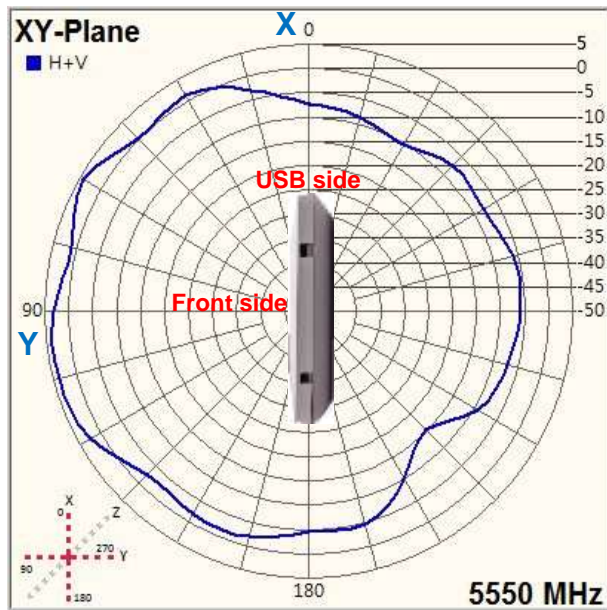
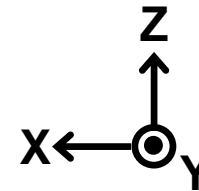
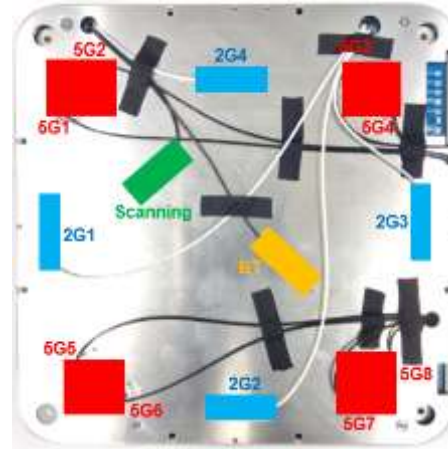
# 2D Radiation Pattern – 5G5 @ 5.55GHz



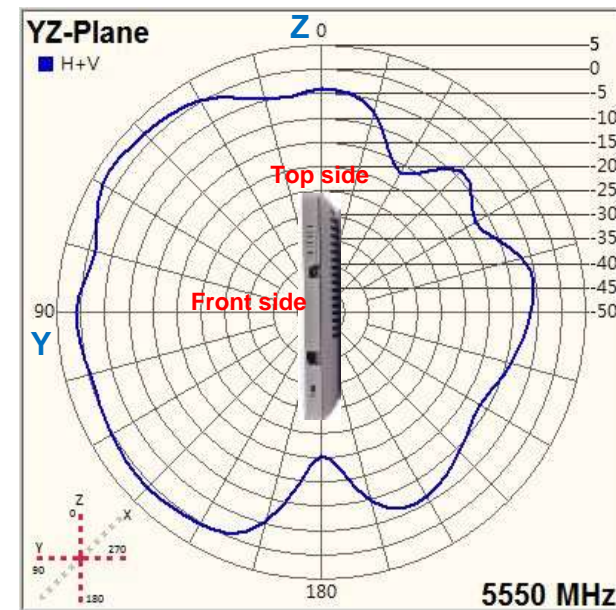
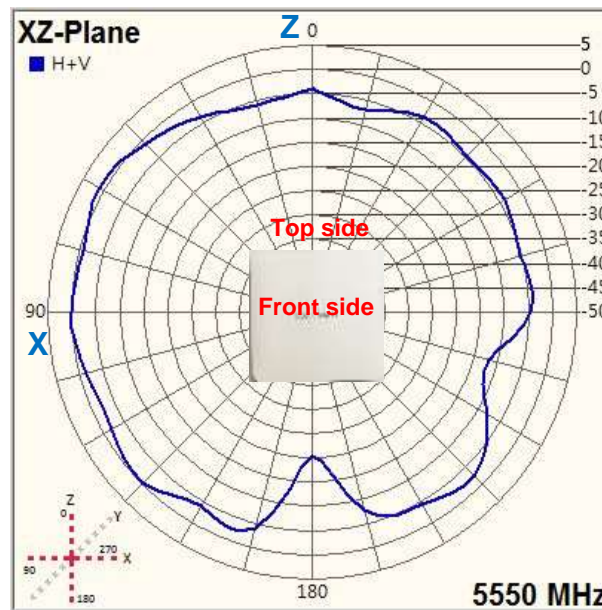
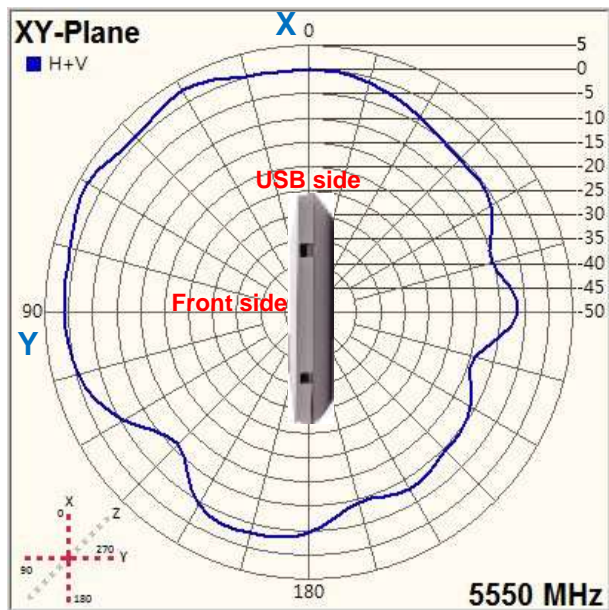
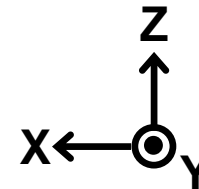
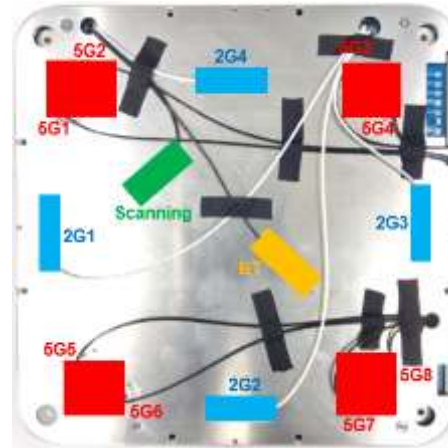
# 2D Radiation Pattern – 5G6 @ 5.55GHz

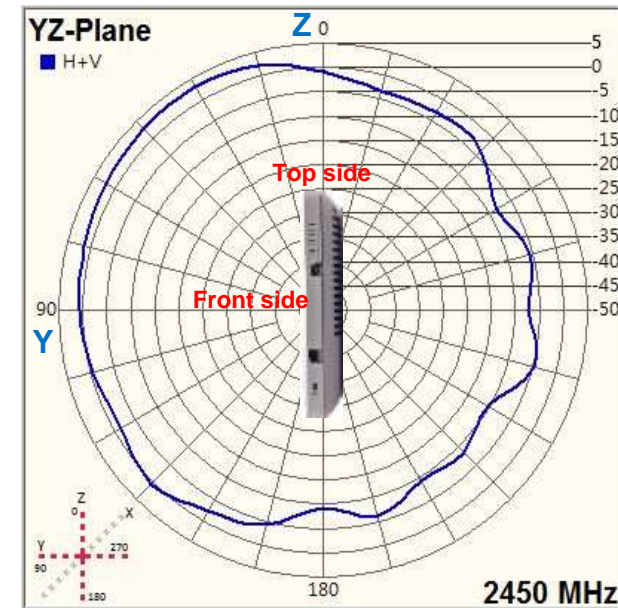
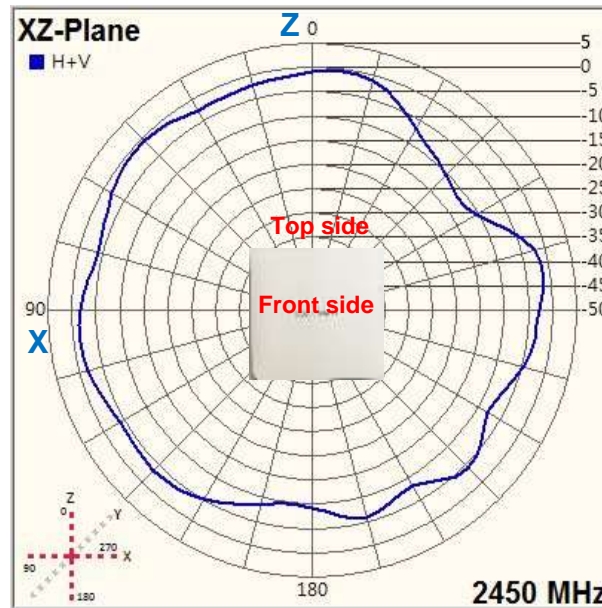
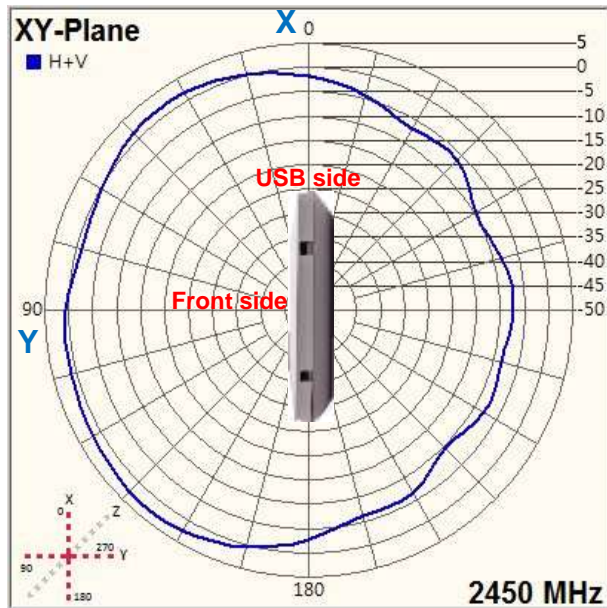
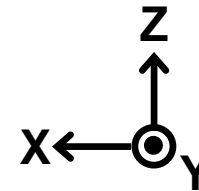
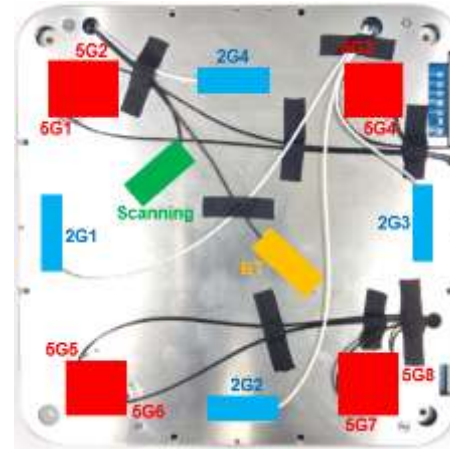


# 2D Radiation Pattern – 5G7 @ 5.55GHz

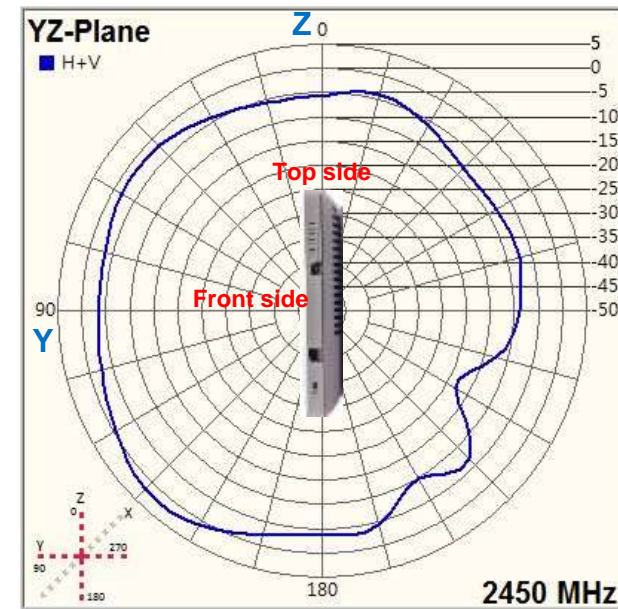
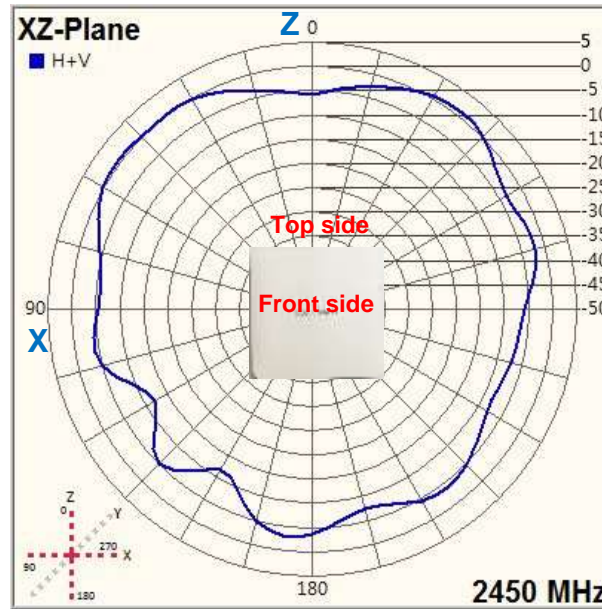
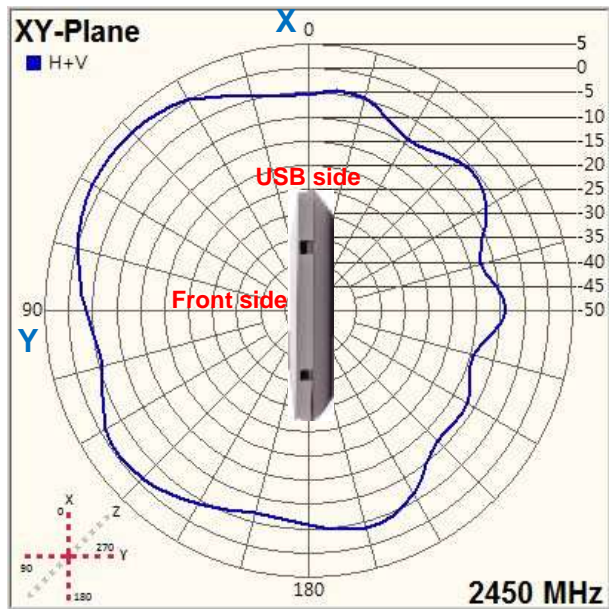
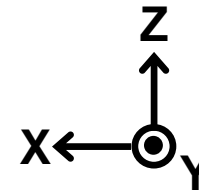
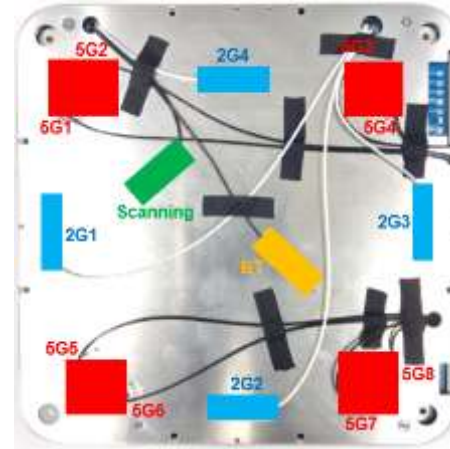




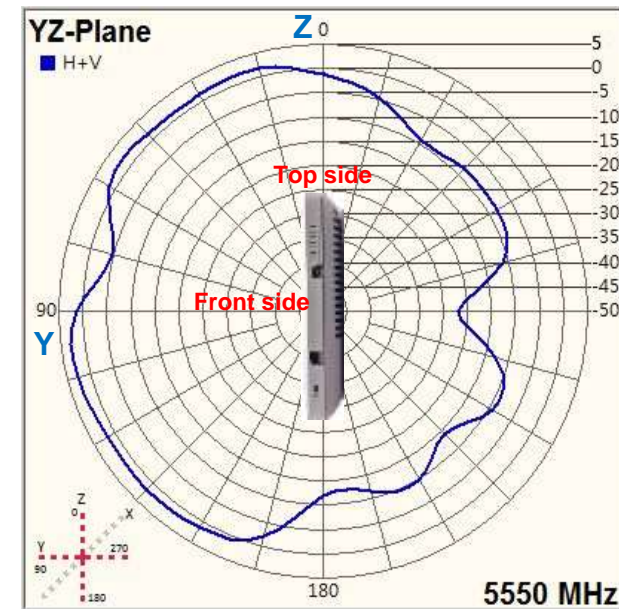
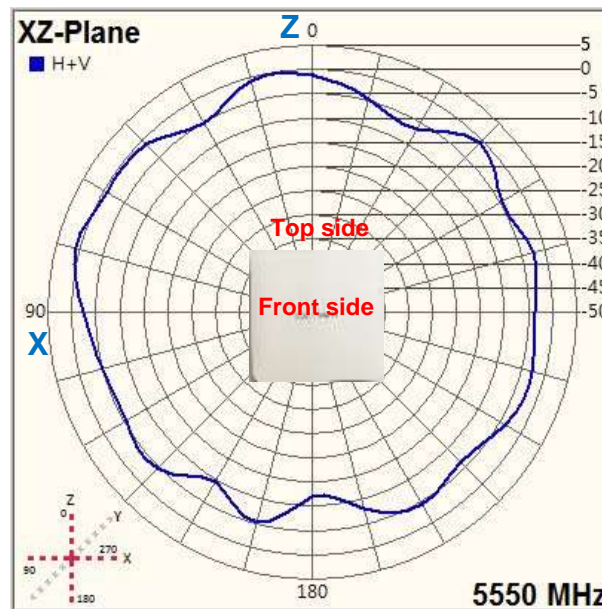
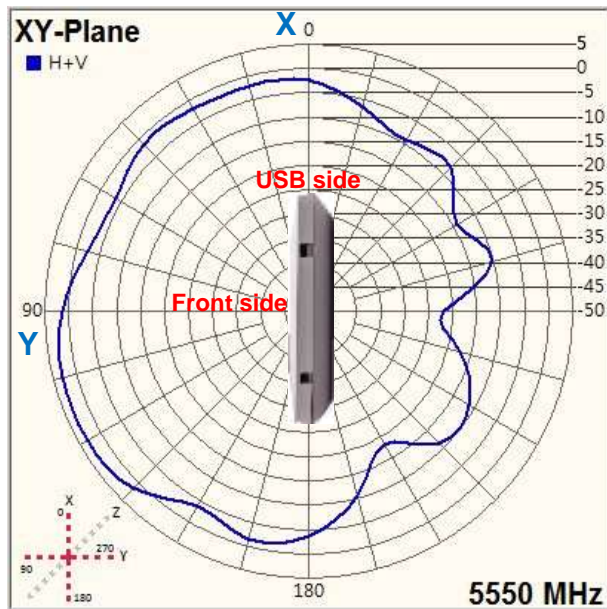
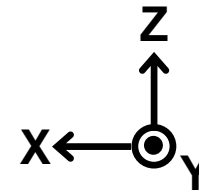
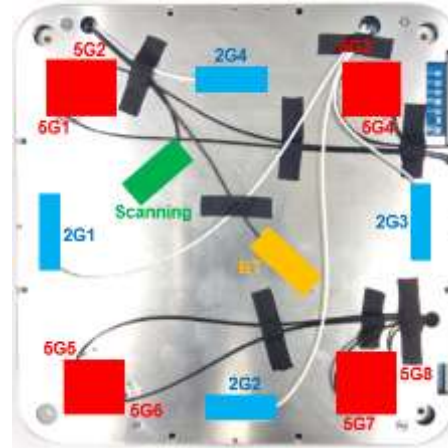




# 2D Radiation Pattern – Scan @ 2.45GHz



# 2D Radiation Pattern – Scan @ 5.55GHz



# Antenna Efficiency and Gain

Antenna Performance								
Freq. (MHz)	2G1		2G2		2G3		2G4	
	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)
2400	64.82	3.30	66.50	2.89	69.97	4.08	64.37	4.89
2450	69.61	3.87	70.82	4.21	69.35	4.54	67.09	4.66
2500	72.55	3.32	70.22	4.24	70.66	4.39	61.80	4.06

Antenna Performance								
Freq. (MHz)	5G1		5G2		5G3		5G4	
	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)
5150	59.03	4.29	63.57	4.54	65.28	5.27	59.23	3.75
5500	63.61	4.65	60.34	4.28	67.11	5.25	68.77	4.93
5850	68.41	4.37	58.45	4.63	61.32	4.87	62.93	4.55

Antenna Performance								
Freq. (MHz)	5G5		5G6		5G7		5G8	
	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)
5150	57.18	3.94	69.86	4.44	63.54	4.74	61.22	4.63
5500	61.66	4.15	62.75	3.91	62.86	4.31	65.64	4.12
5850	66.56	4.30	61.93	3.68	63.70	4.67	63.25	3.74

Antenna Performance				
Freq. (MHz)	BT		Scanning	
	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)
2400	62.64	3.14	57.42	3.96
2450	68.71	4.05	58.63	4.91
2500	72.63	3.80	67.69	4.84
5150			61.59	4.85
5500			64.63	5.23
5850			63.67	5.23