



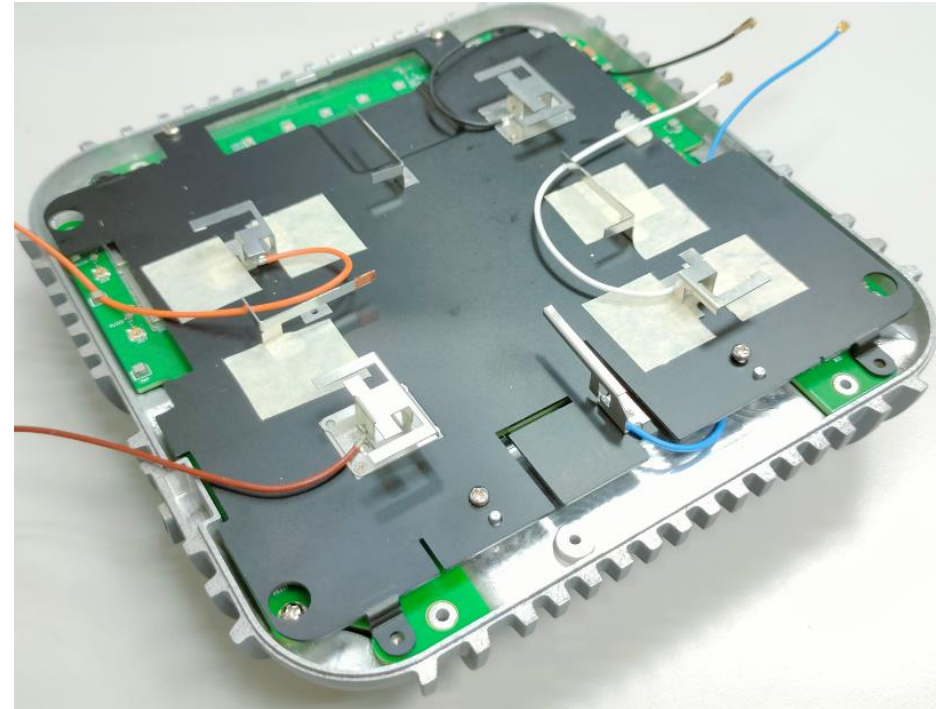
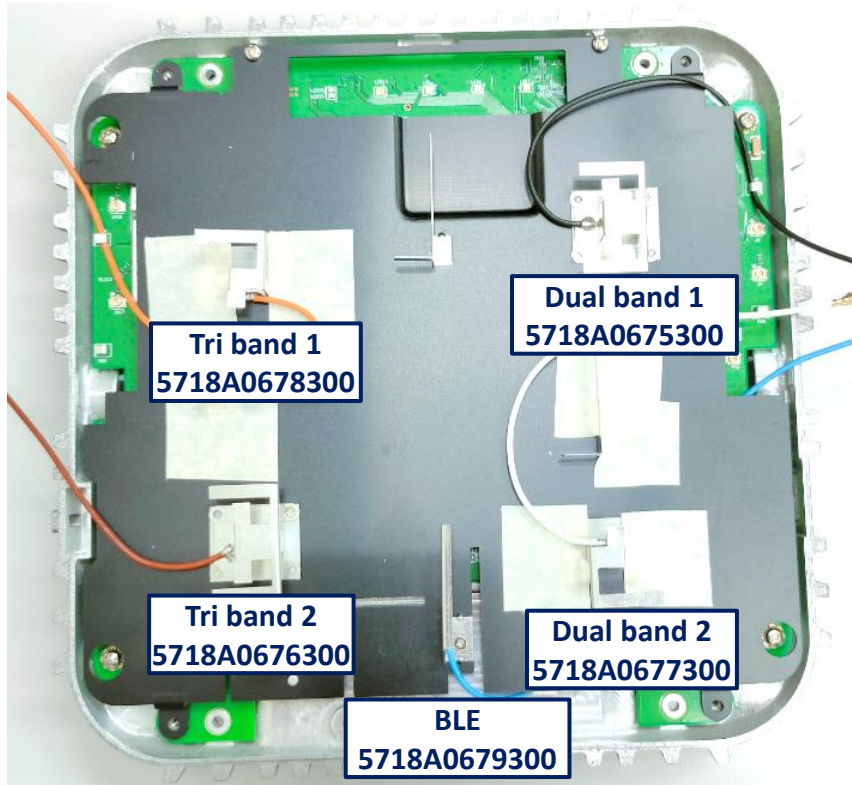
# FAP-231G

## Antenna Test Report

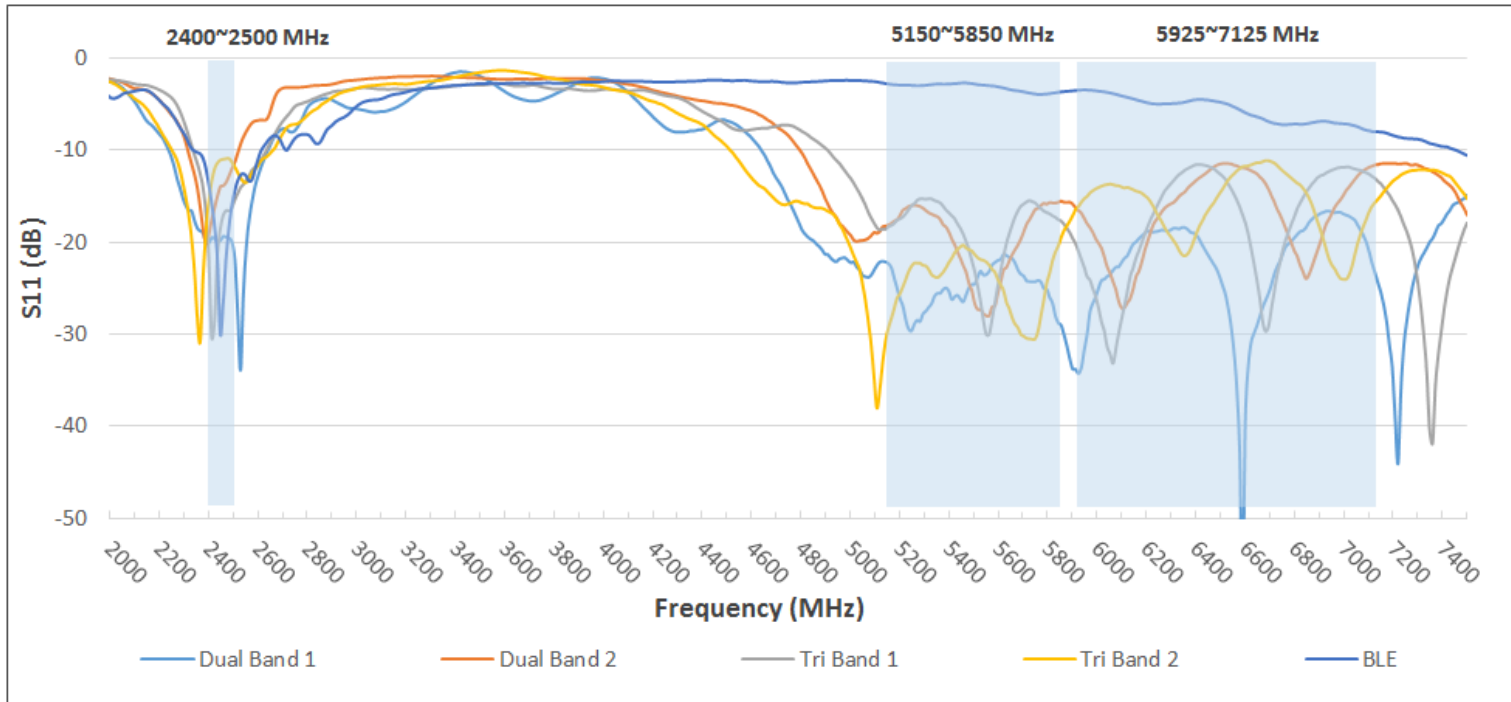
Senao Networks, Inc.

Customer	Fortinet
Project	FAP-231G
Project Description	Dual antenna*2 Tri antenna*2 BLE antenna*1
Date	2021/06/29
Prepared by	Tony
Report Version	A01

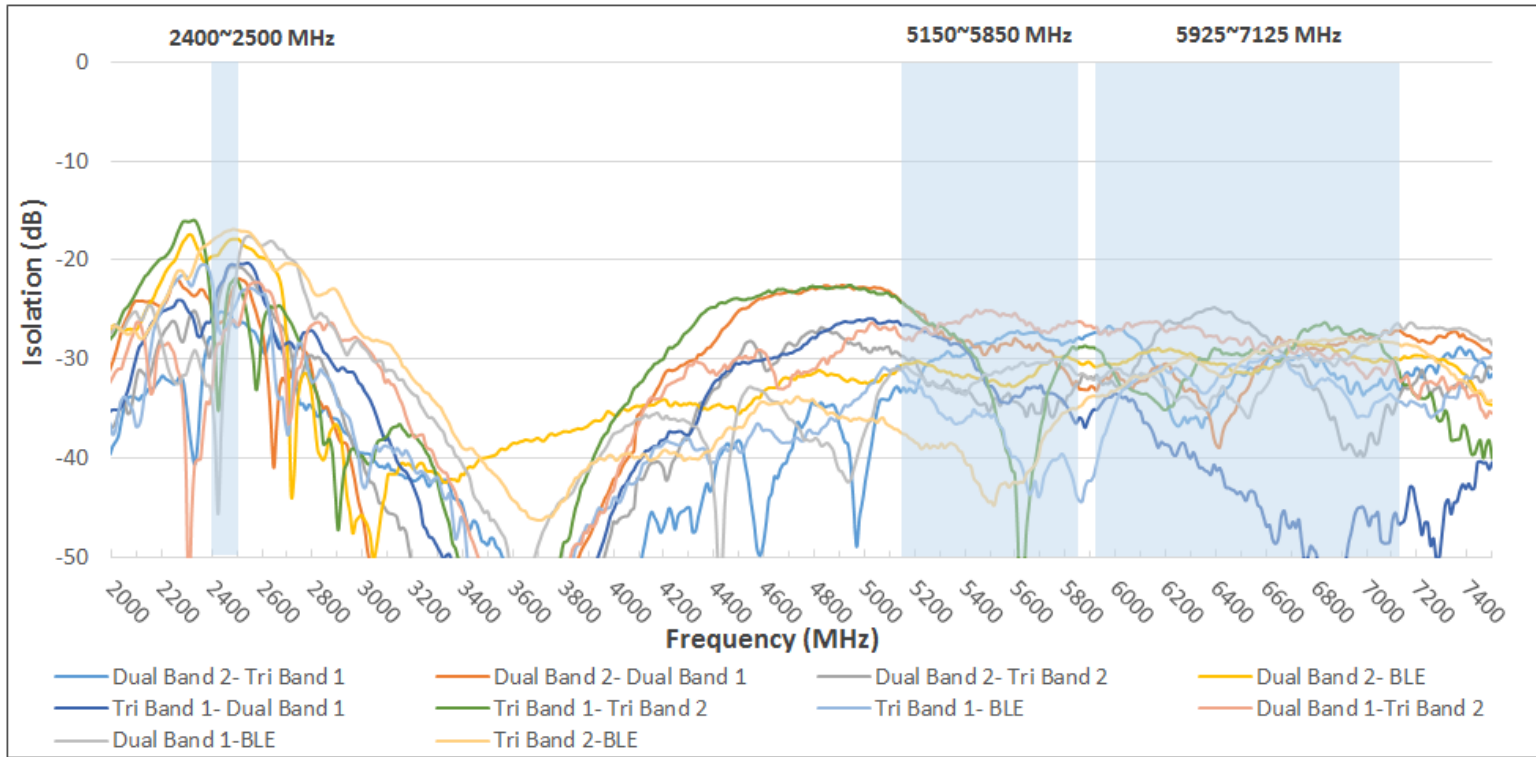
- **Agenda**
  - Placement and Specification
  - S11 & Isolation
  - Radiation Pattern
  - Combine Pattern
  - Efficiency and Gain



Ant No.	Operating Band	Gain (dBi)	Efficiency (%)	Ant Type	Material	Feeding
Dual Band 1~2	2400MHz ~ 2500 MHz	4.5@2G	67.6@2G	PIFA	Metal	Cable
	5150MHz ~ 5850 MHz	5.3@5G	67.0@5G			
Tri Band 1~2	2400MHz ~ 2500 MHz	4.4@2G	64.6@2G	PIFA	Metal	Cable
	5150MHz ~ 5850 MHz	5.3@5G	66.5@5G			
	5925MHz ~ 7125 MHz	5.3@6G	66.8@6G			
BLE	2400MHz ~ 2500 MHz	5.1	65.0	PIFA	Metal	Cable

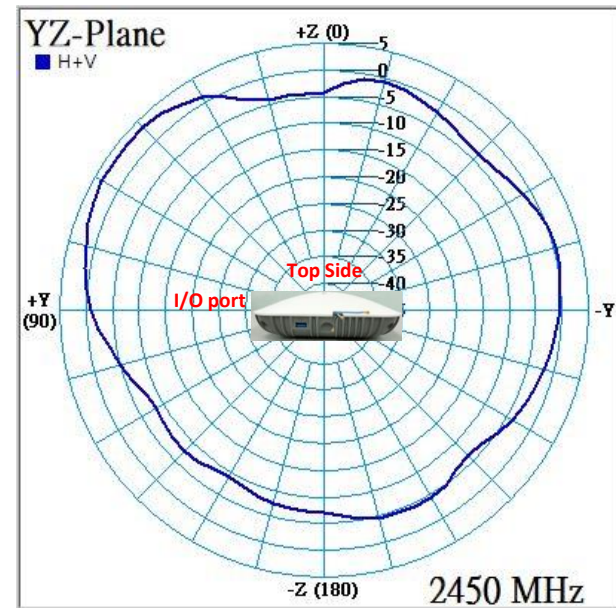
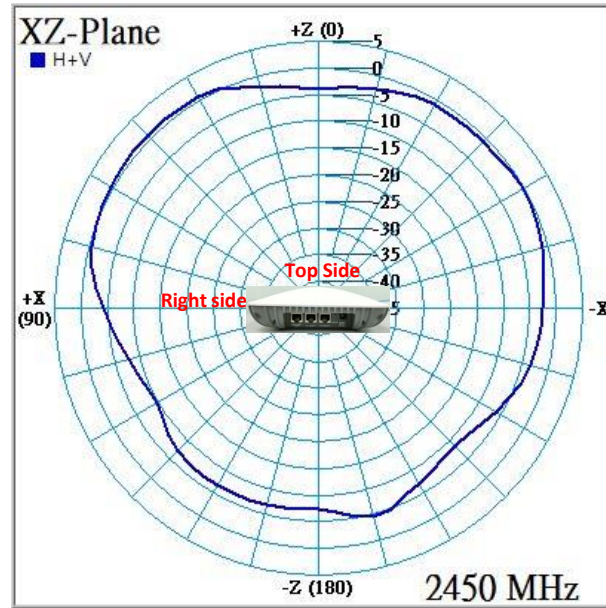
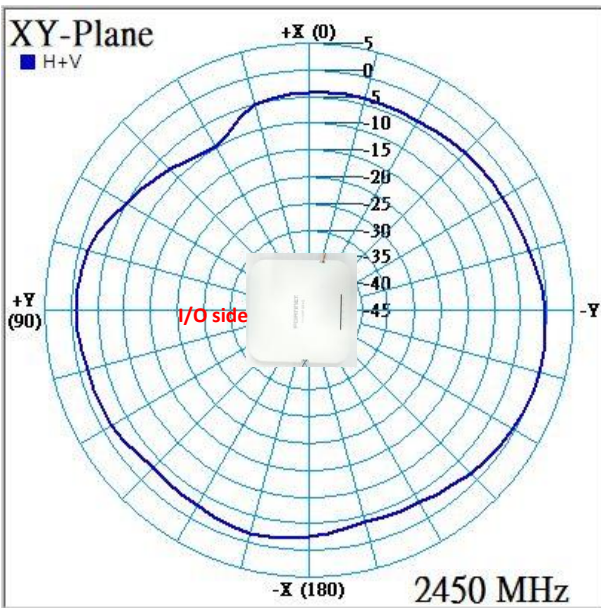
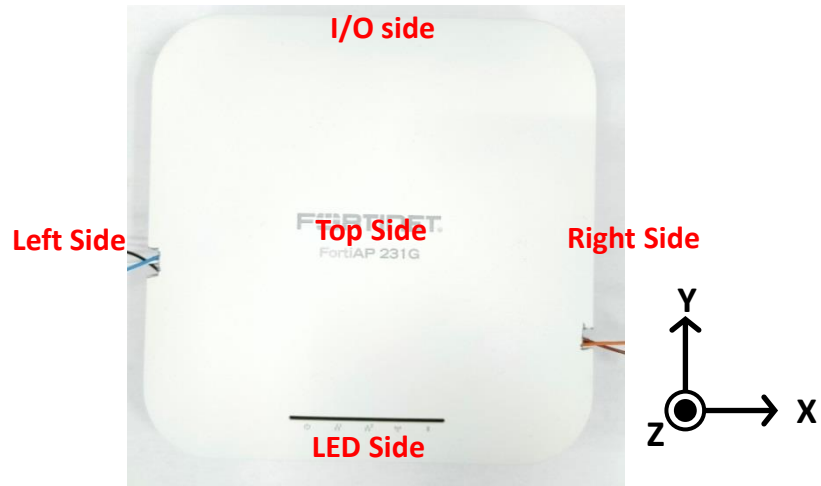
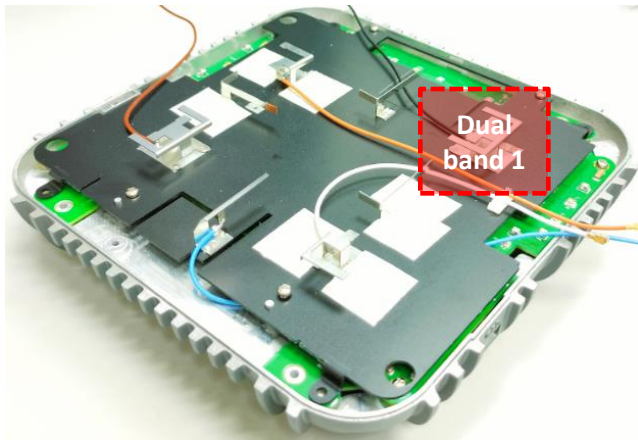


S11					
Freq. (MHz)	Dual Band 1	Dual Band 2	Tri Band 1	Tri Band 2	BLE
2400	-20.09	-19.17	-21.77	-15.55	-13.79
2450	-19.84	-13.99	-18.53	-11.09	-30.04
2500	-19.97	-12.04	-16.29	-11.31	-15.98
5150	-22.33	-18.14	-18.33	-29.34	-2.82
5500	-24.57	-26.69	-23.20	-21.35	-2.82
5850	-29.04	-15.55	-17.71	-19.48	-3.68
5925	-34.29	-16.56	-20.99	-16.15	-3.50
6500	-23.71	-11.54	-12.56	-14.73	-4.79
7125	-23.34	-11.61	-13.07	-15.69	-8.03

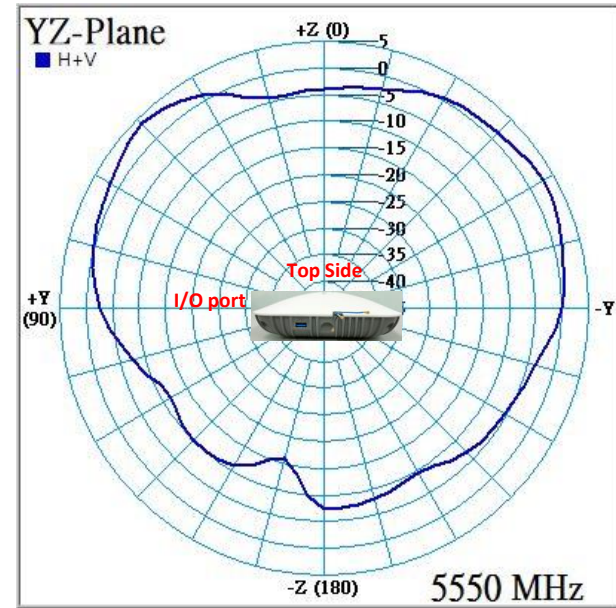
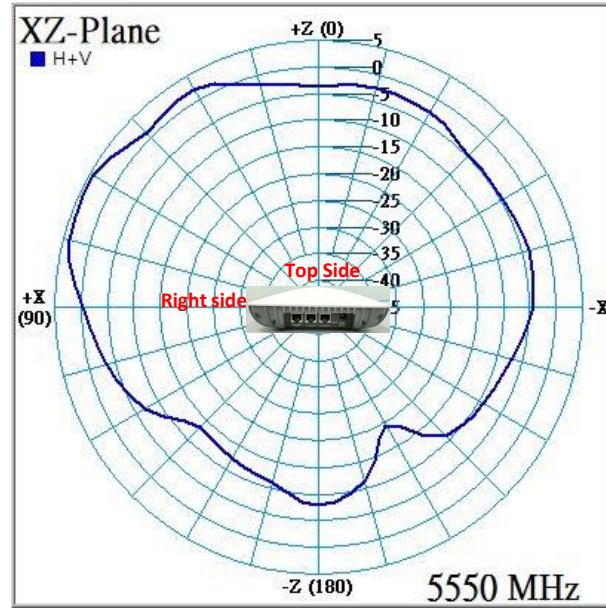
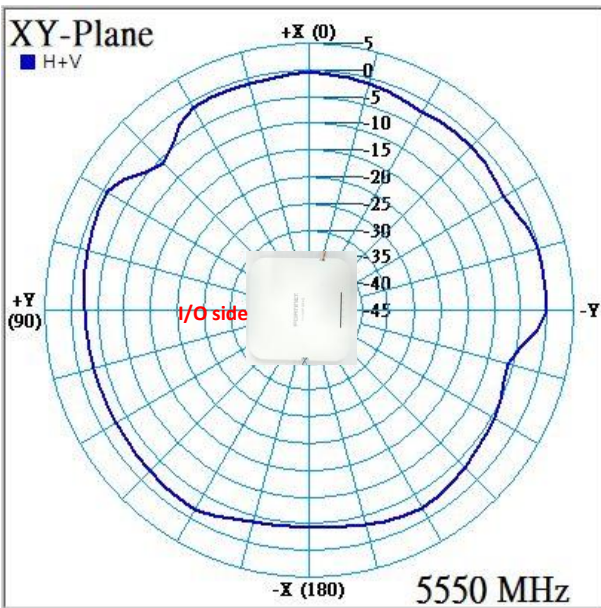
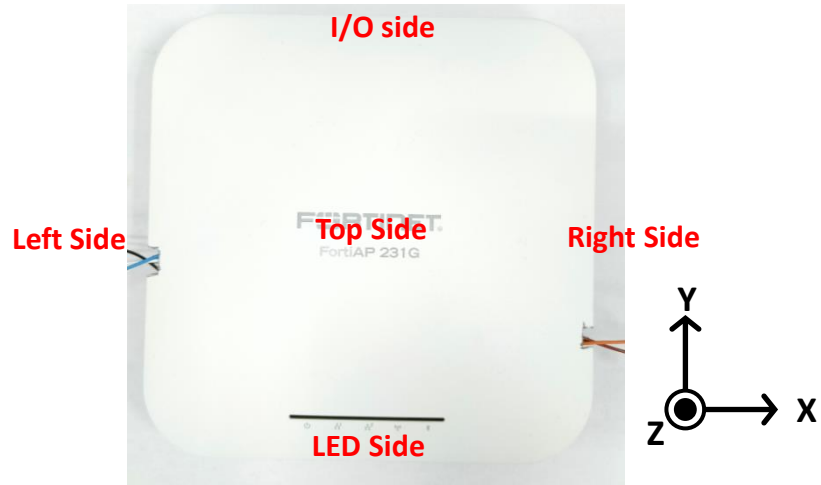
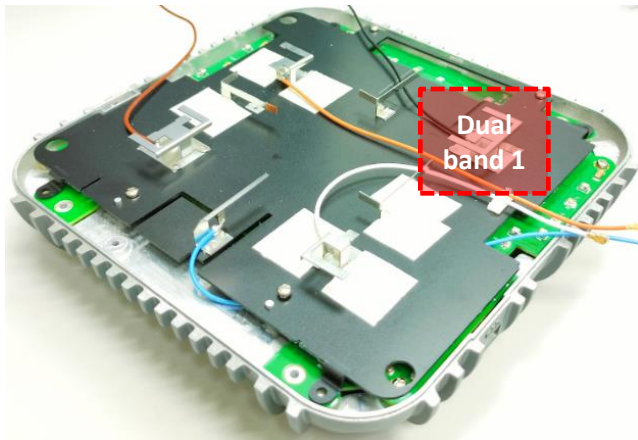


Freq. (MHz)	Isolation									
	Dual Band 2- Tri Band 1	Dual Band 2- Dual Band 1	Dual Band 2- Tri Band 2	Dual Band 2- BLE	Tri Band 1- Dual Band 1	Tri Band 1- Tri Band 2	Tri Band 1- BLE	Dual Band 1- Tri Band 2	Dual Band 1- BLE	Tri Band 2- BLE
2400	-27.92	-24.85	-28.79	-19.61	-25.85	-25.78	-22.19	-32.95	-34.25	-18.04
2450	-25.34	-26.11	-22.05	-18.61	-21.96	-26.81	-27.24	-27.17	-31.81	-17.20
2500	-26.78	-22.33	-20.73	-17.90	-20.55	-21.82	-24.53	-26.30	-21.90	-16.93
5150	-32.89	-24.35	-29.72	-30.56	-26.62	-24.39	-31.30	-27.92	-30.92	-37.58
5500	-28.45	-28.69	-34.91	-32.16	-32.72	-33.61	-35.91	-25.10	-31.57	-44.39
5850	-27.84	-32.99	-32.48	-30.37	-35.94	-28.80	-44.28	-26.21	-31.61	-34.80
5925	-27.30	-33.18	-31.61	-30.78	-35.15	-29.03	-40.52	-26.77	-31.93	-33.80
6500	-31.43	-33.74	-26.11	-31.34	-43.40	-29.58	-30.72	-28.56	-34.82	-30.35
7125	-32.99	-27.12	-33.96	-30.09	-46.67	-31.06	-34.28	-32.02	-26.42	-28.44

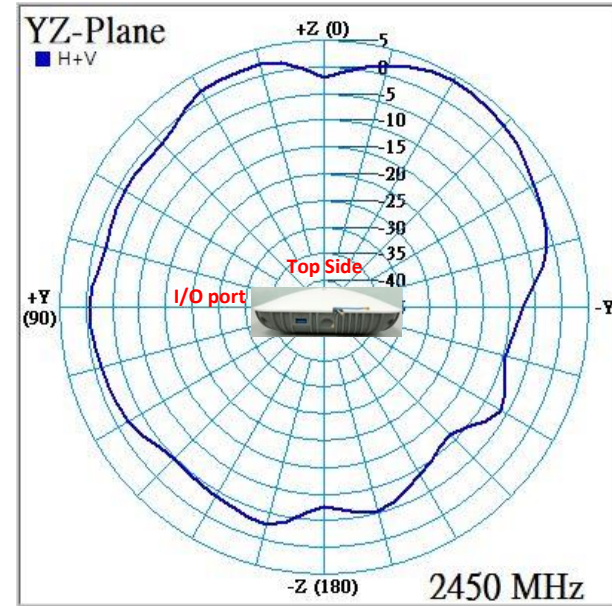
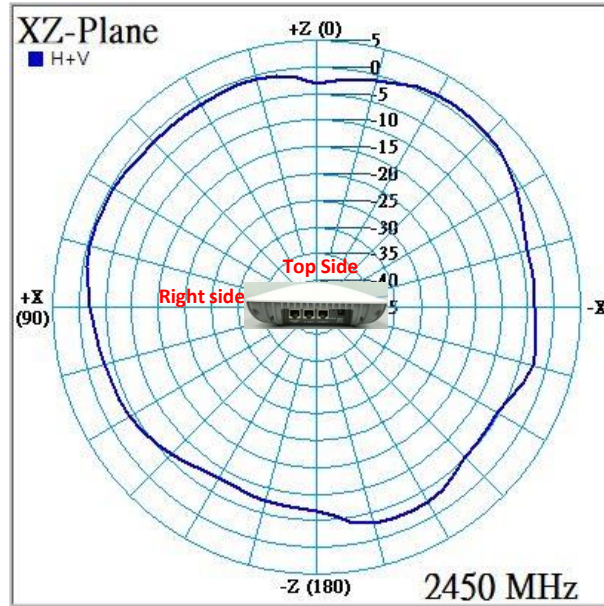
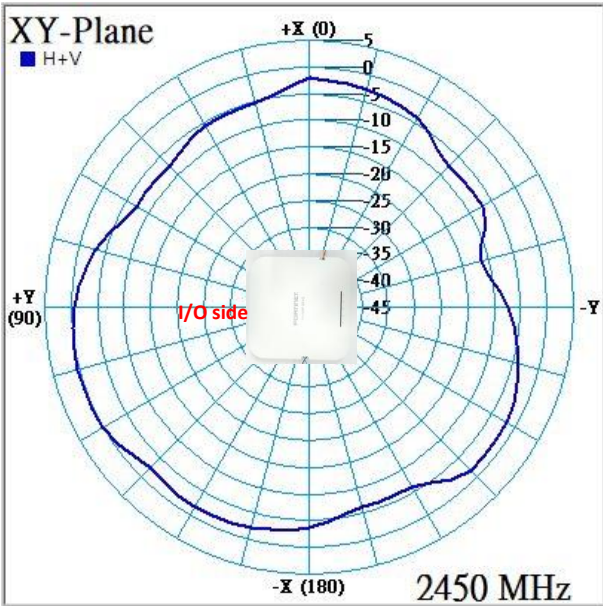
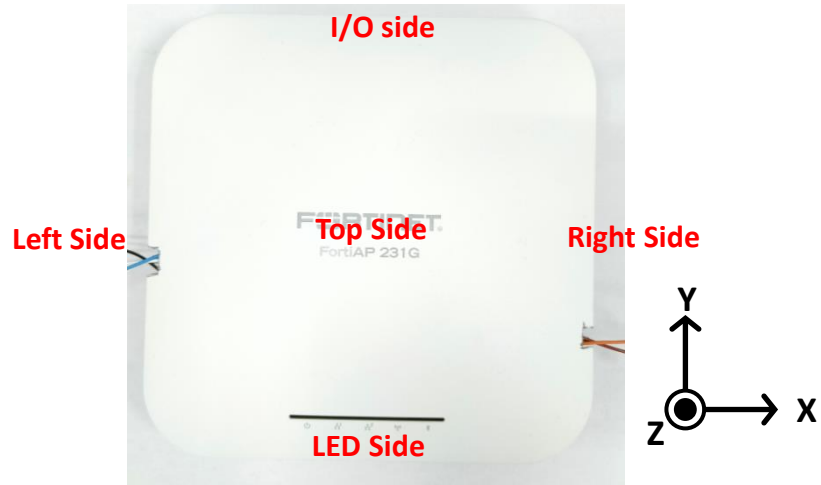
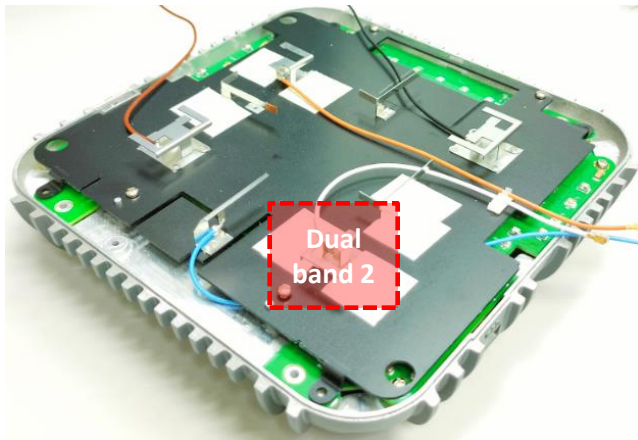
# 2D Radiation Pattern – Dual band 1 @ 2.45GHz



# 2D Radiation Pattern – Dual band 1 @ 5.55GHz

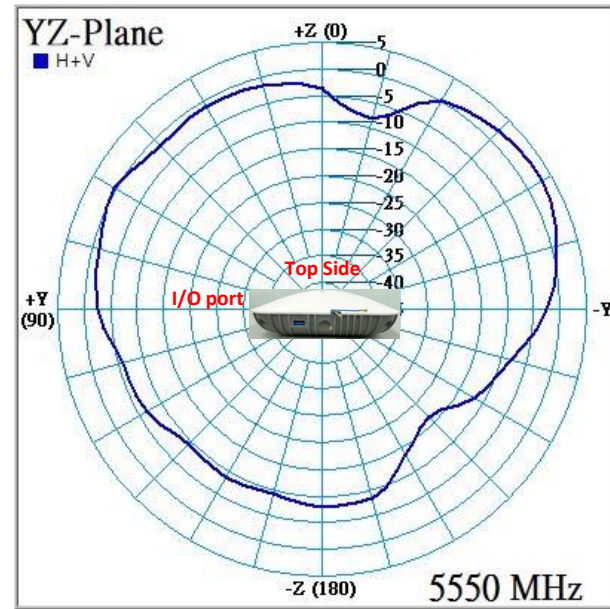
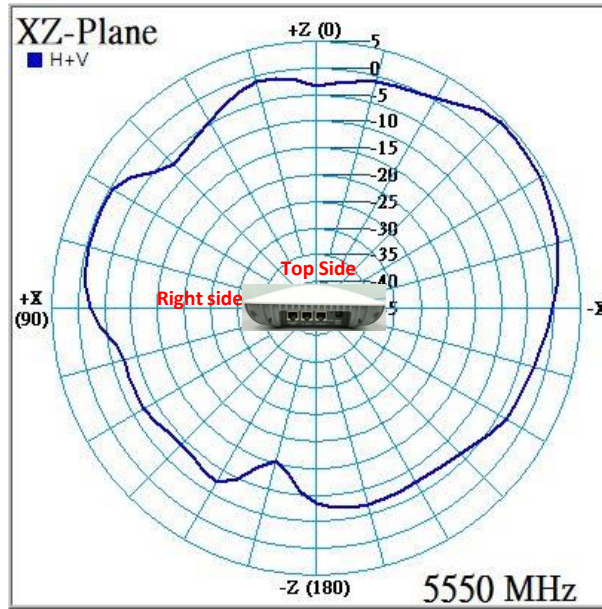
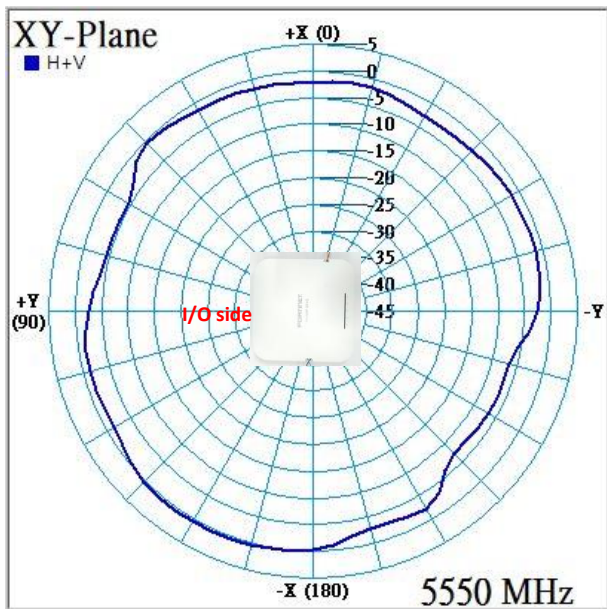
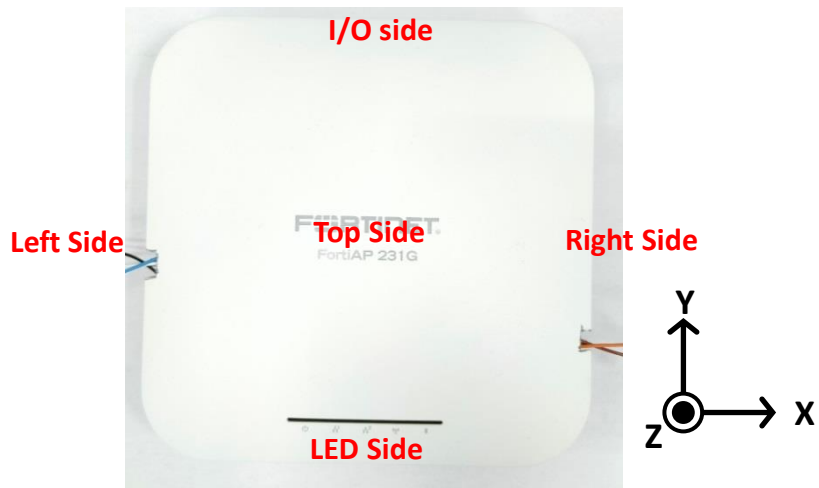
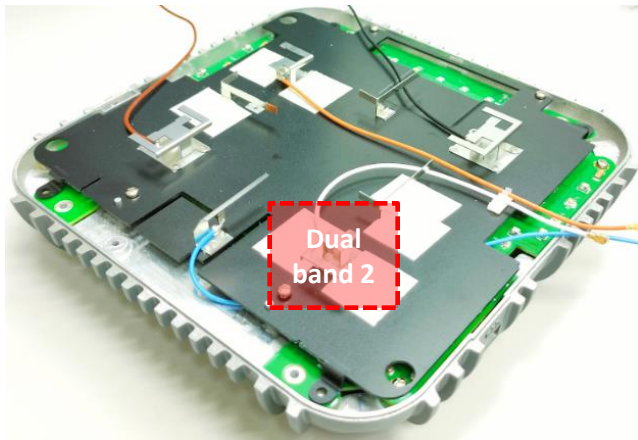


# 2D Radiation Pattern – Dual band 2 @ 2.45GHz

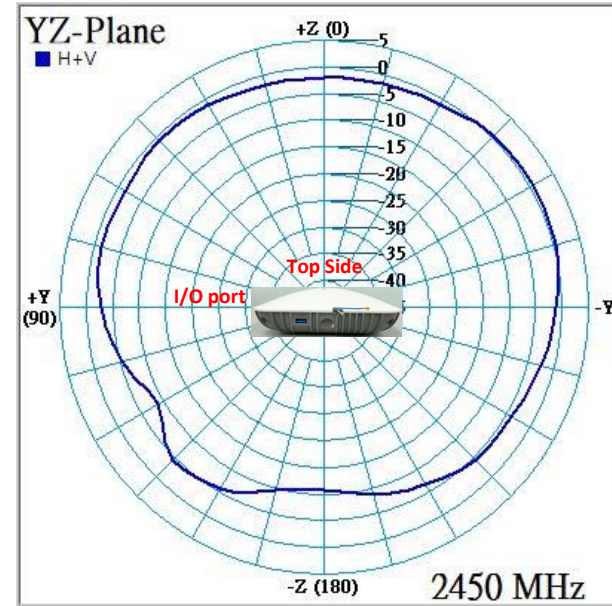
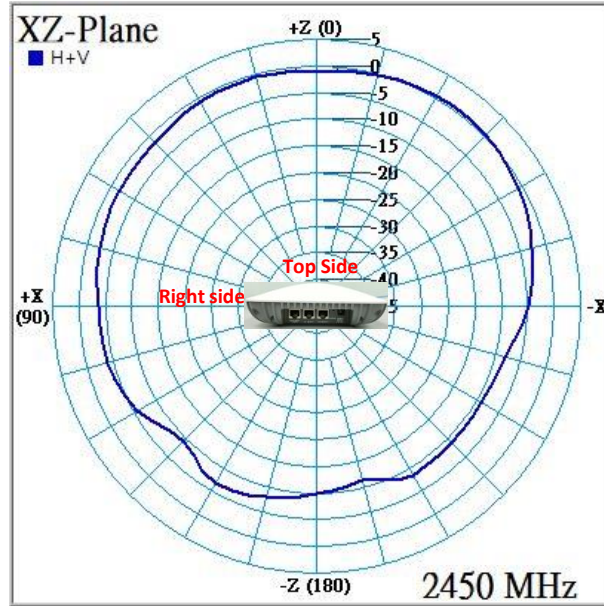
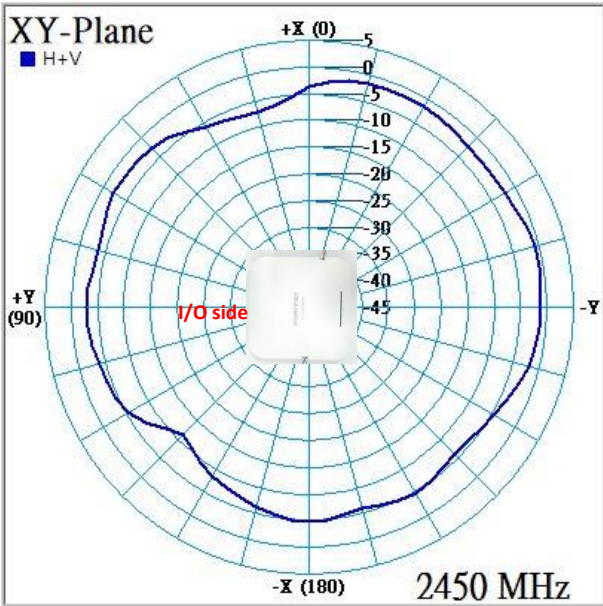
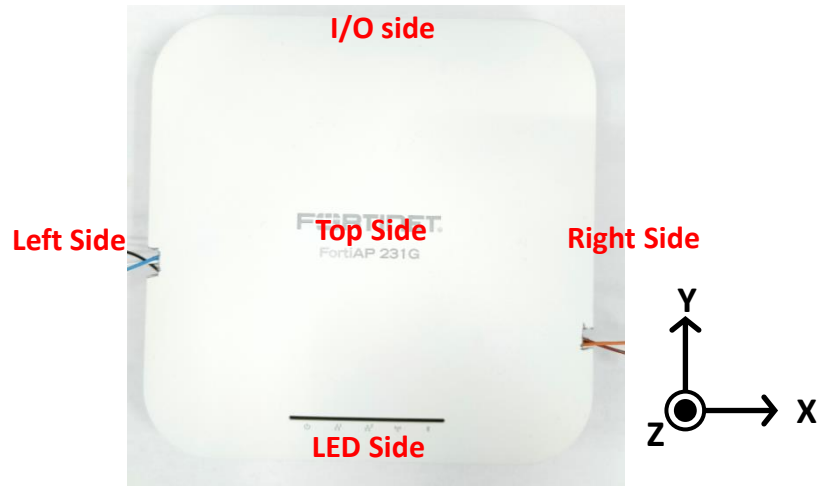
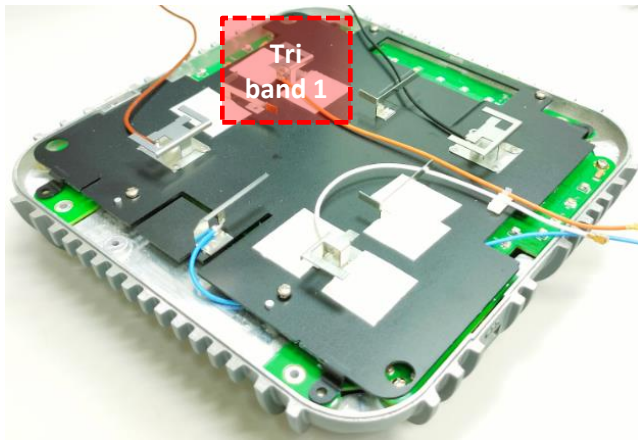




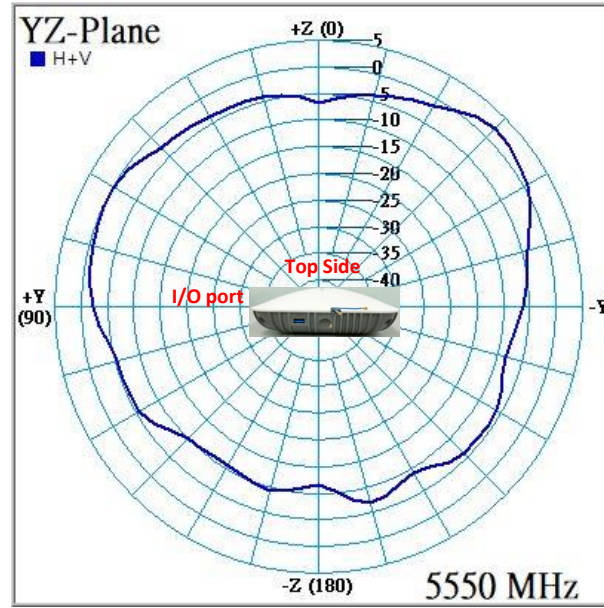
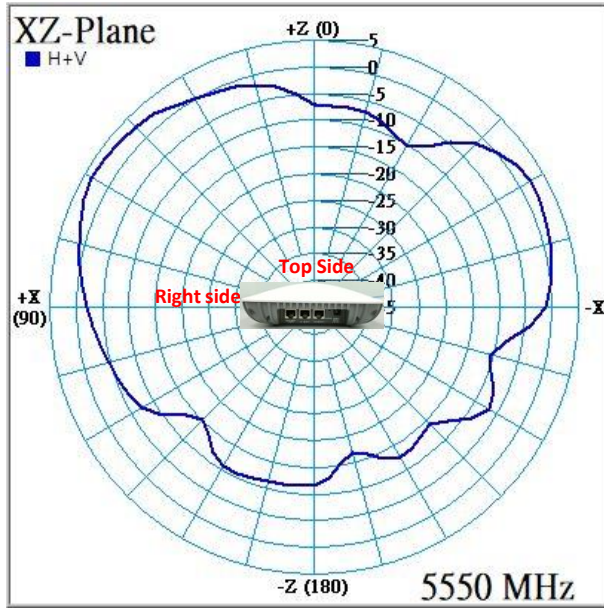
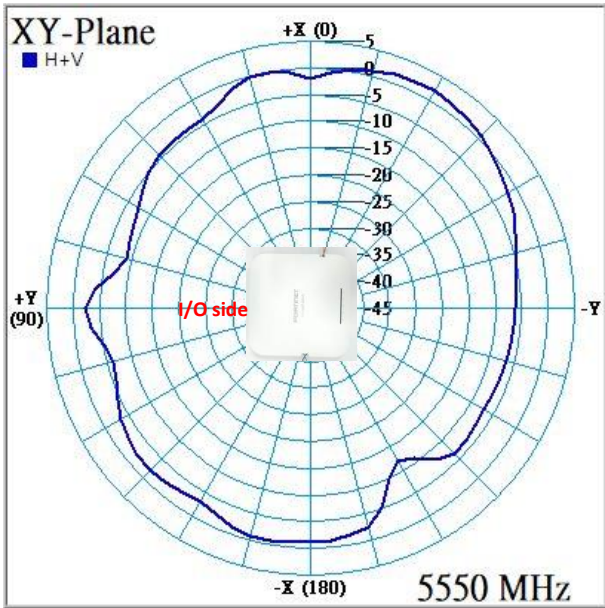
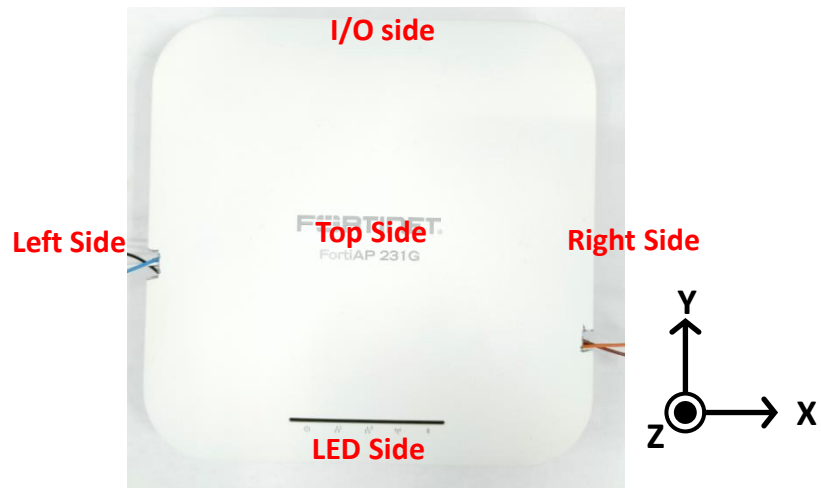
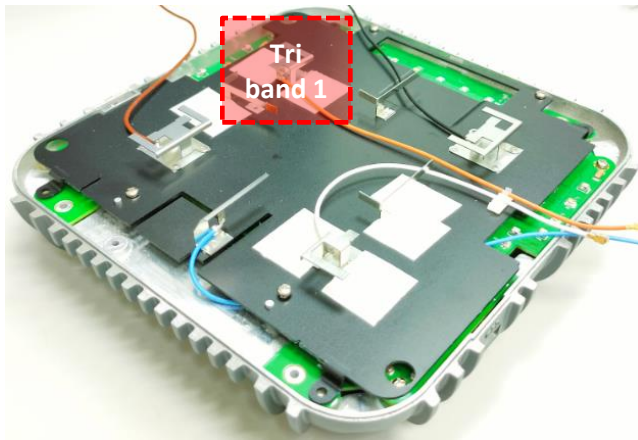
# 2D Radiation Pattern – Dual band 2 @ 5.55GHz



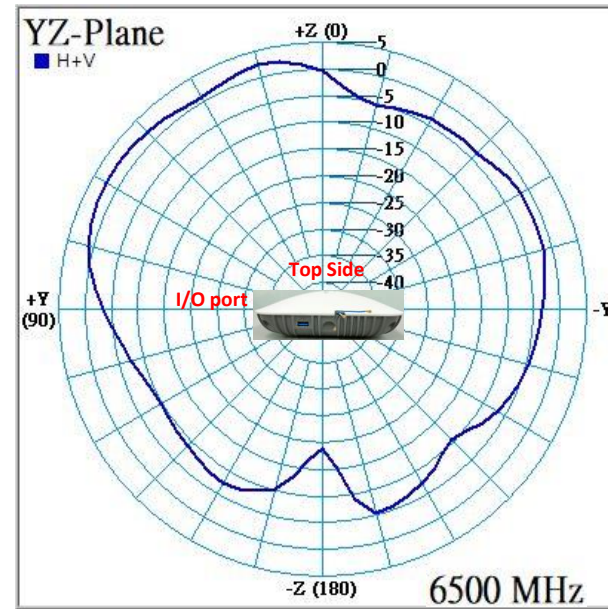
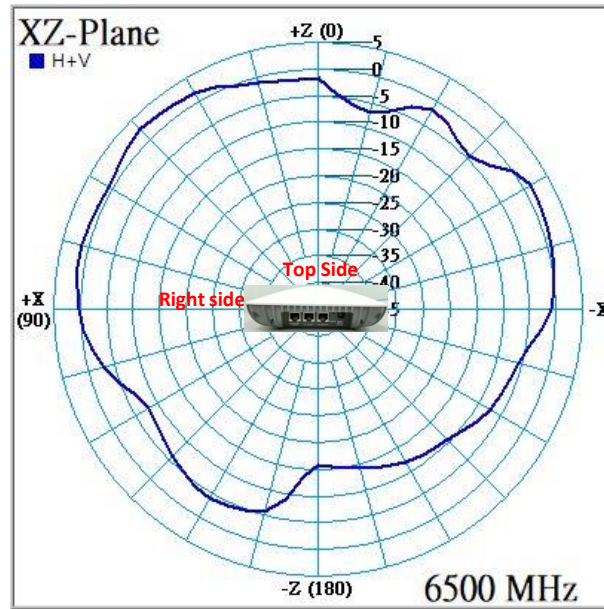
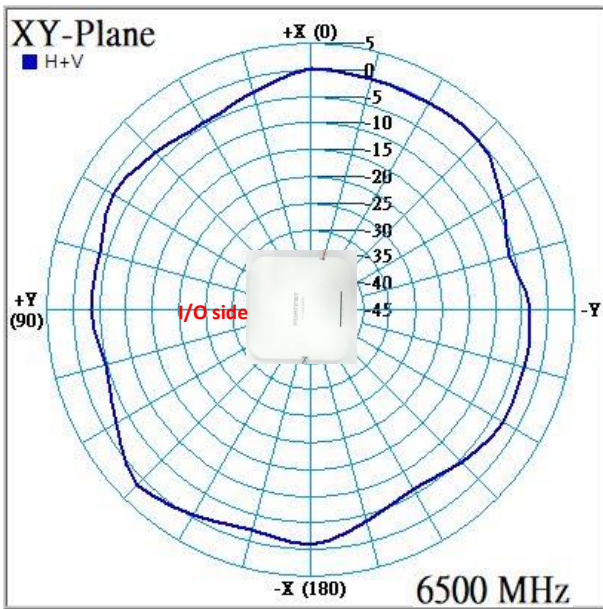
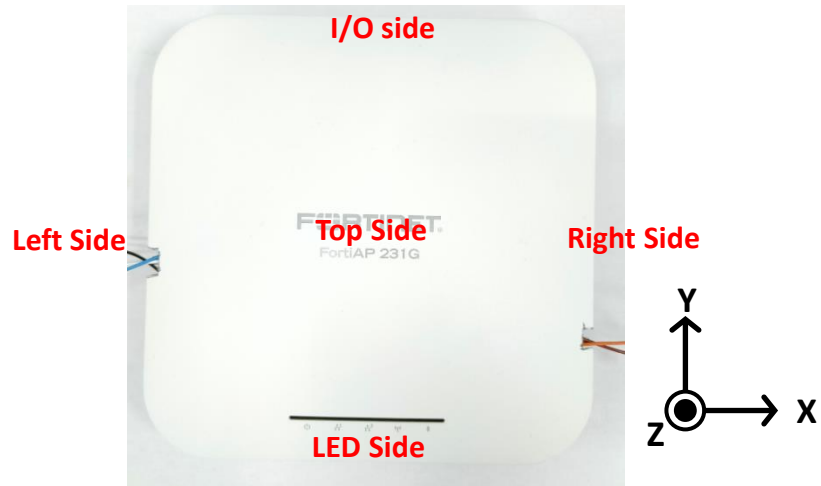
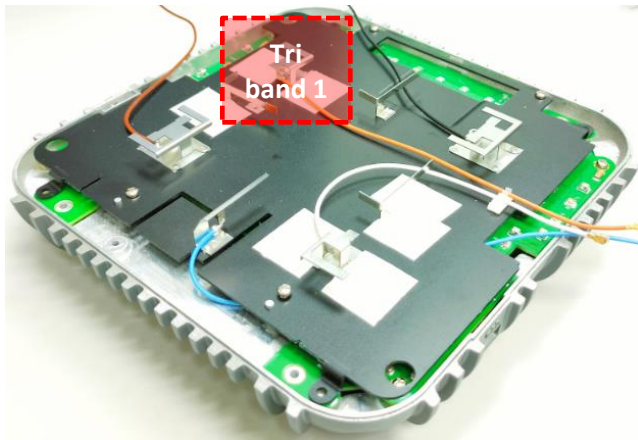
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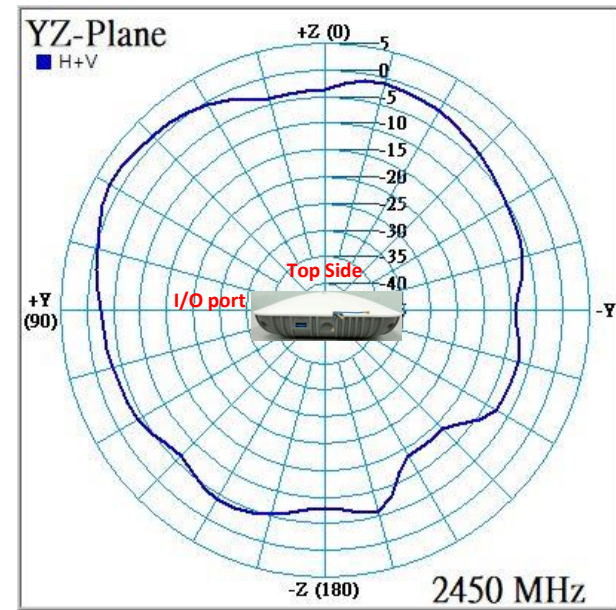
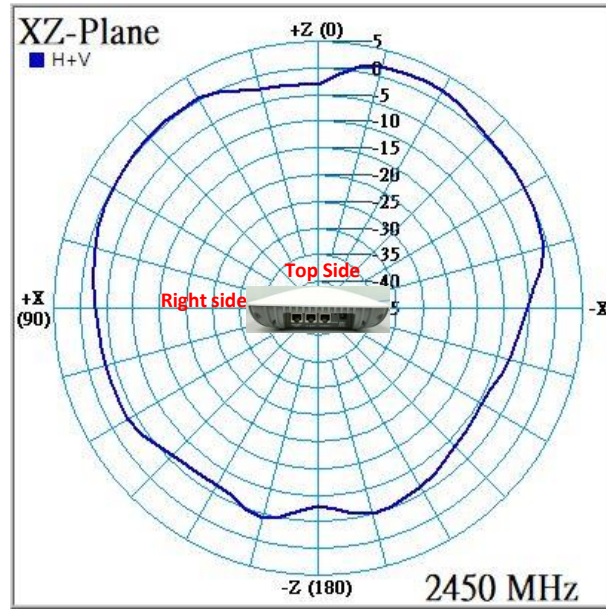
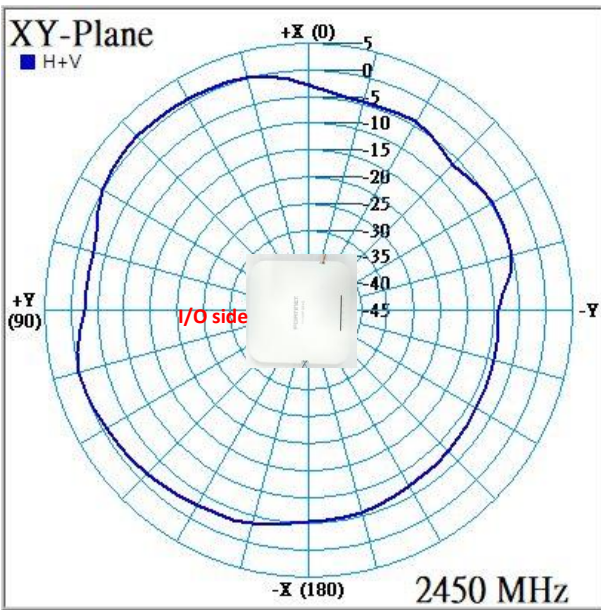
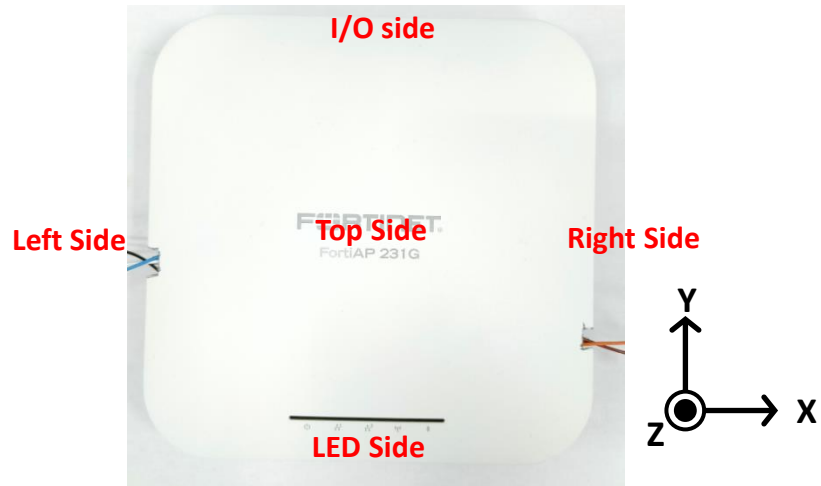
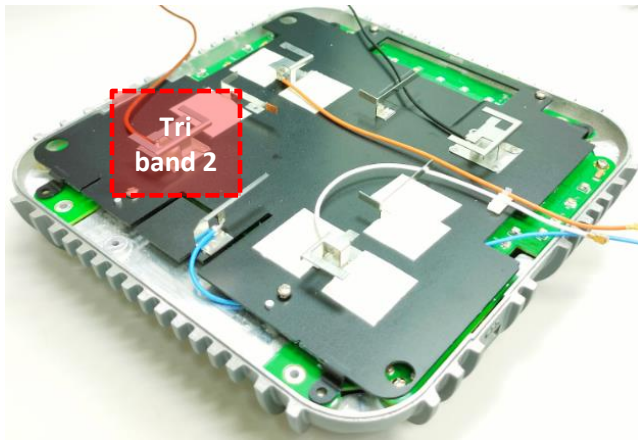
# 2D Radiation Pattern – Tri band 1 @ 5.55GHz



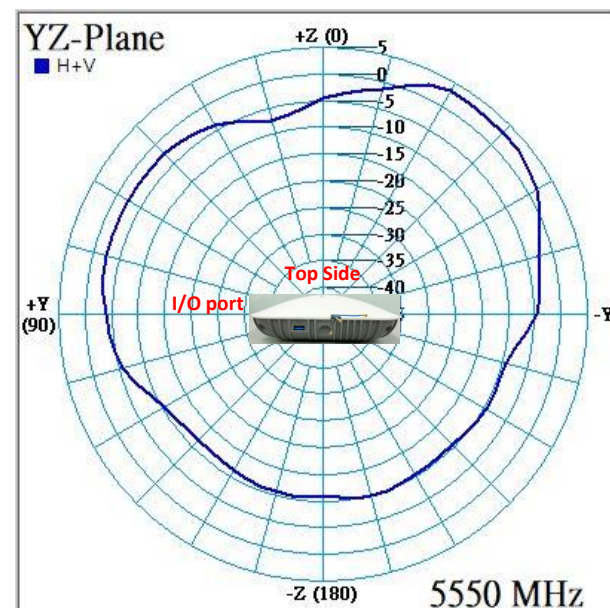
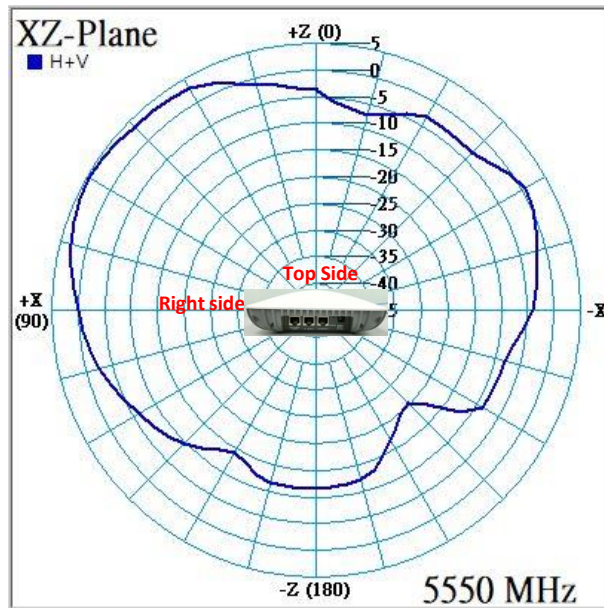
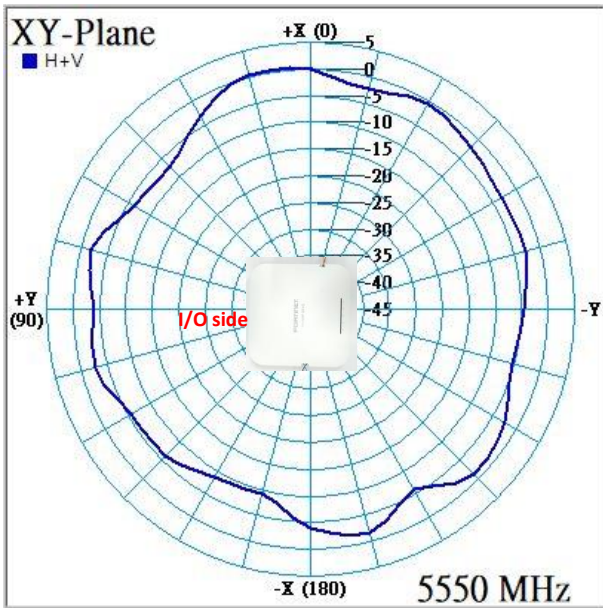
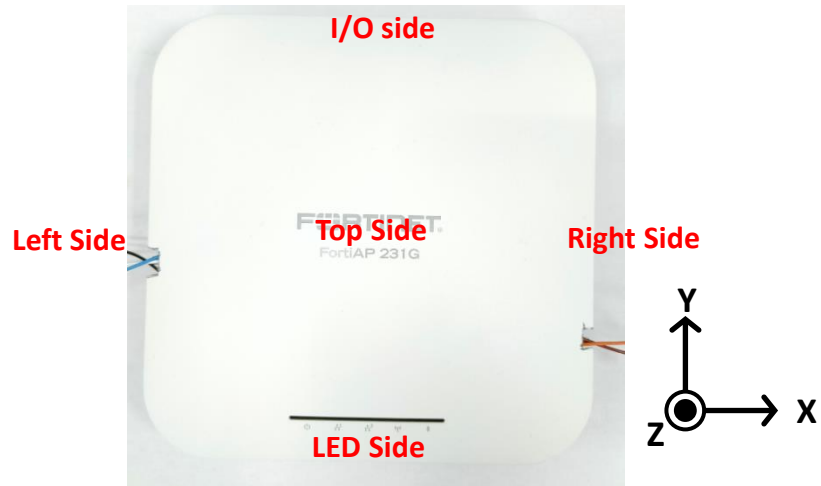
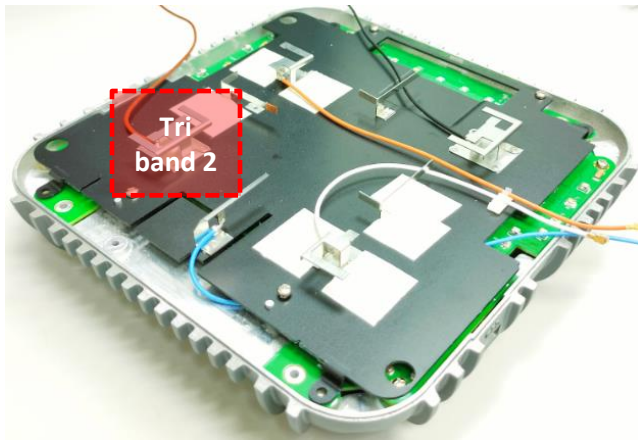
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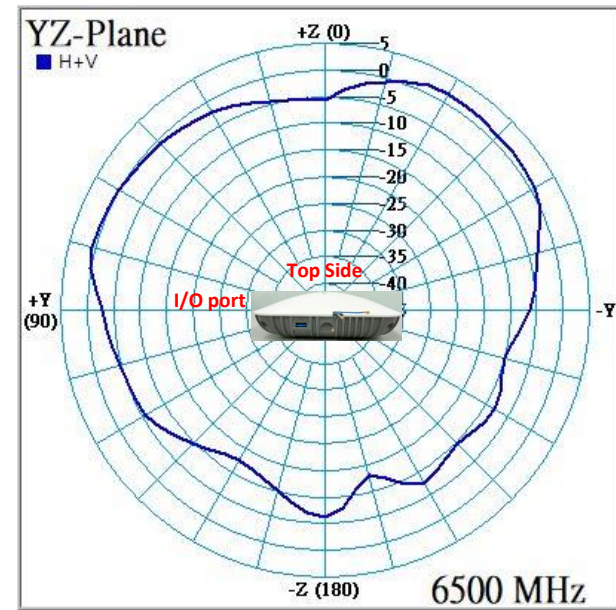
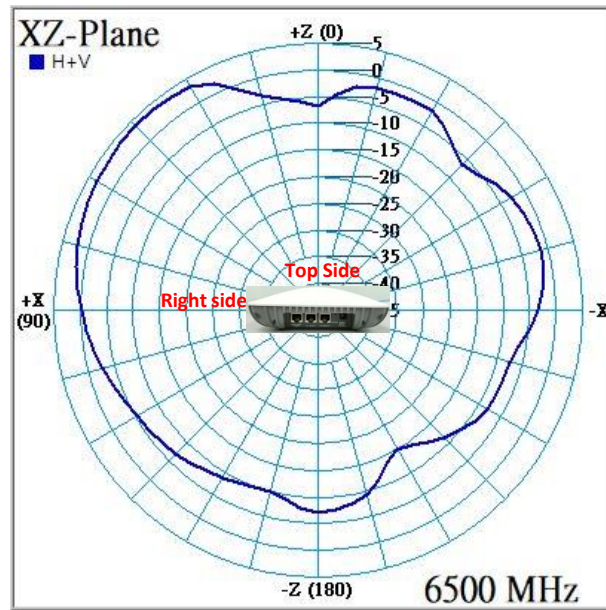
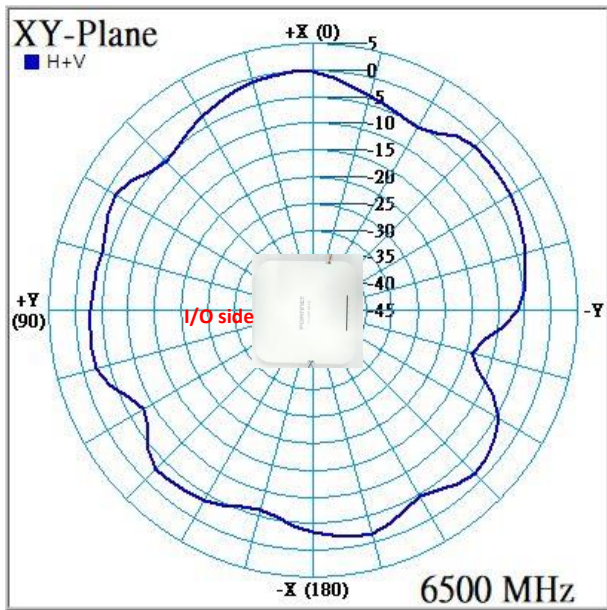
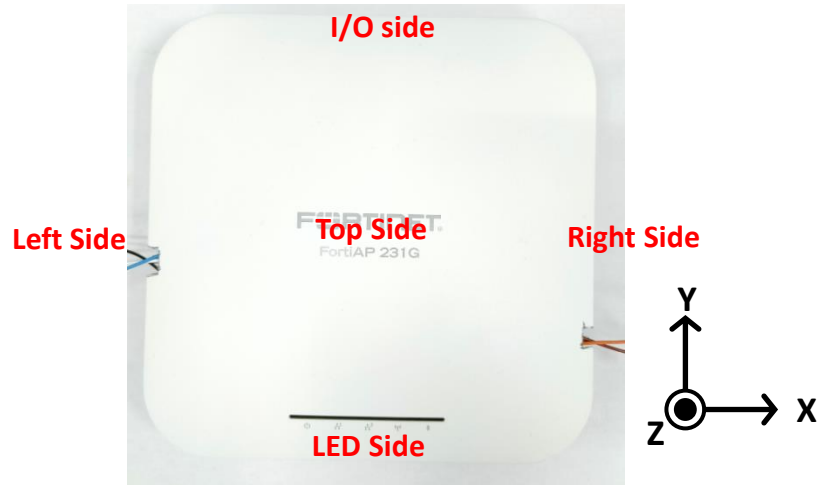
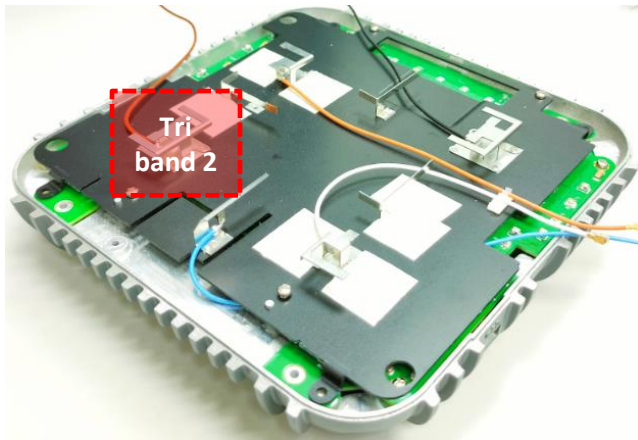
# 2D Radiation Pattern – Tri band 2 @ 2.45GHz



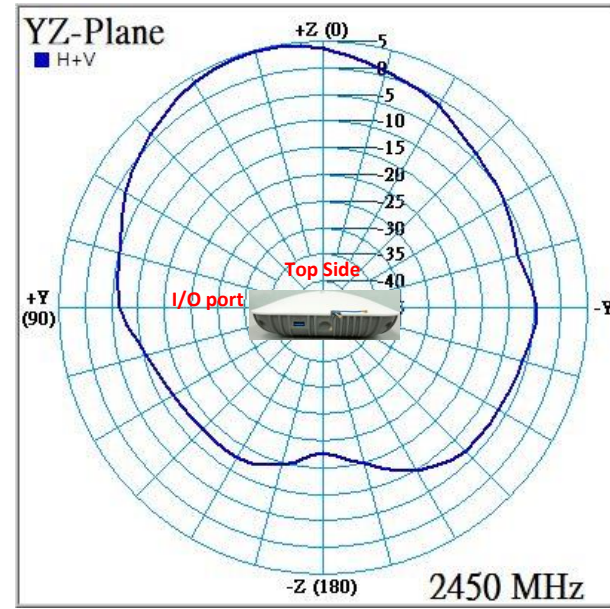
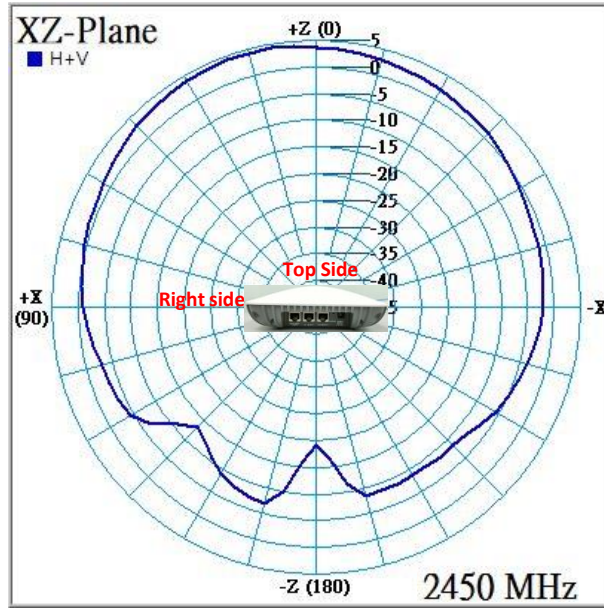
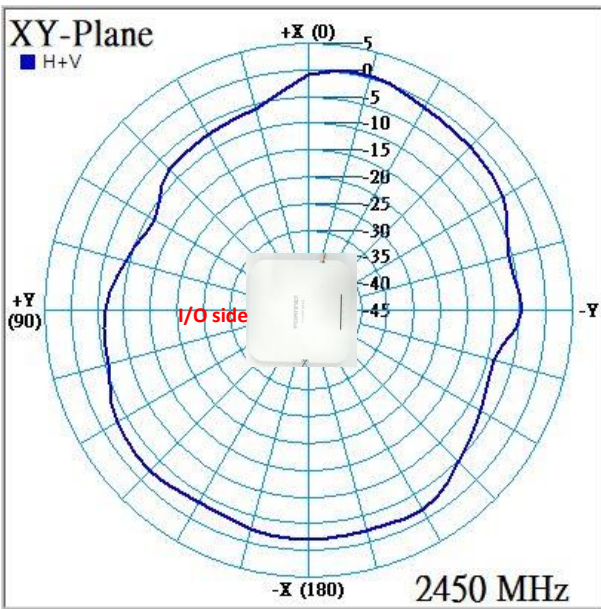
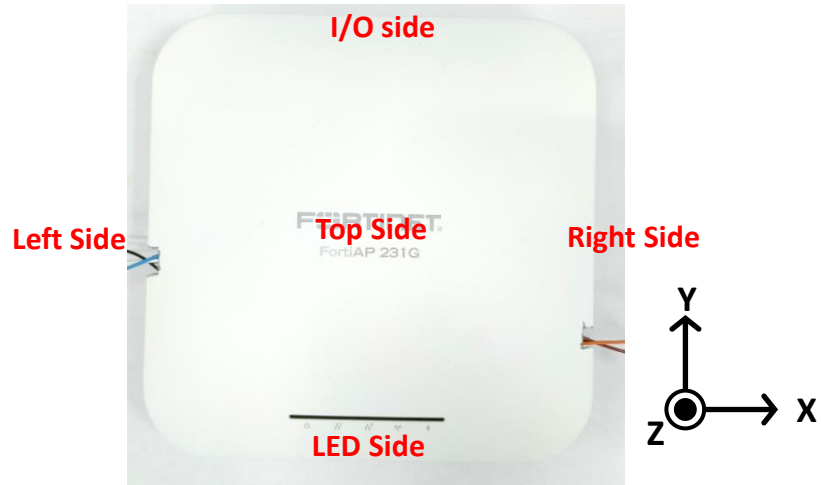
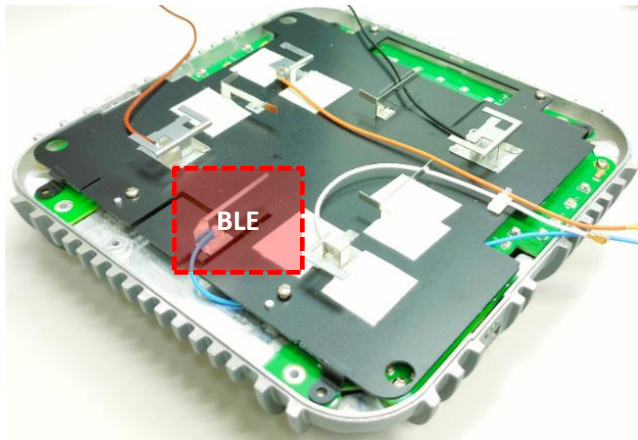
# 2D Radiation Pattern – Tri band 2 @ 5.55GHz



# 2D Radiation Pattern – Tri band 2 @ 6.5GHz

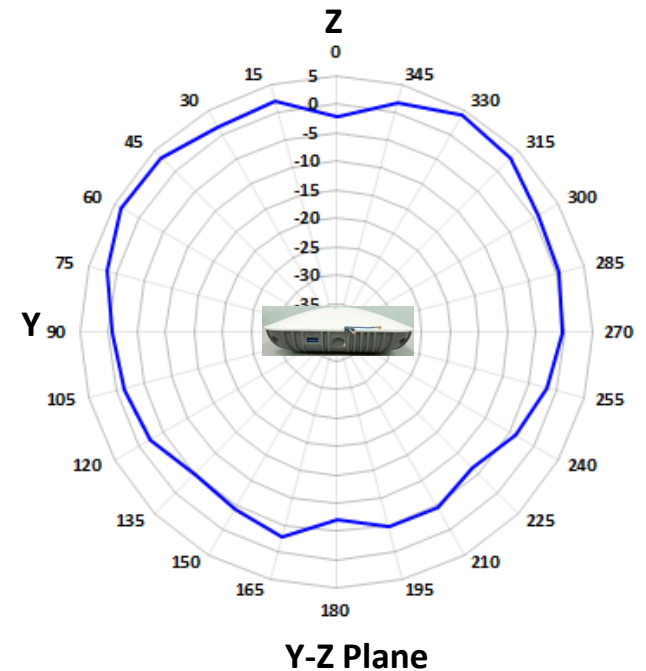
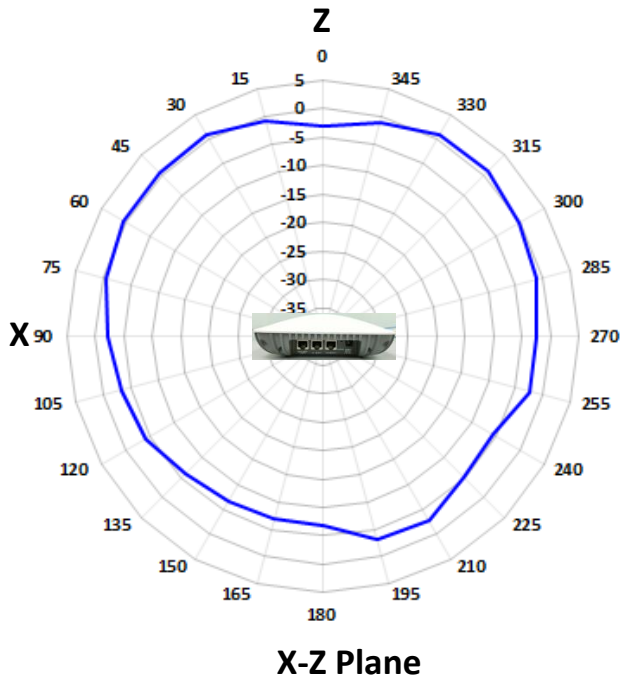
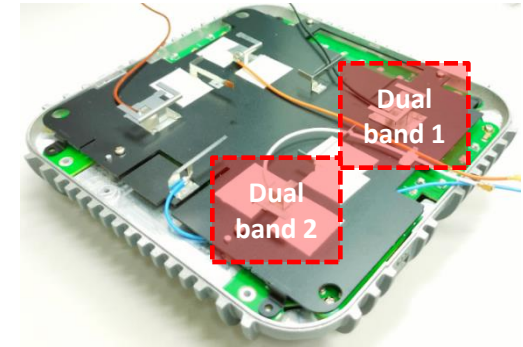
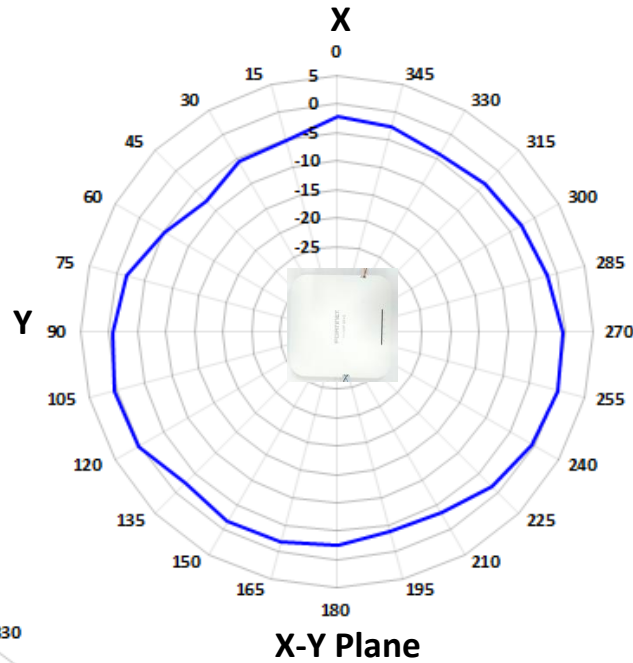


# 2D Radiation Pattern – BLE @ 2.45GHz

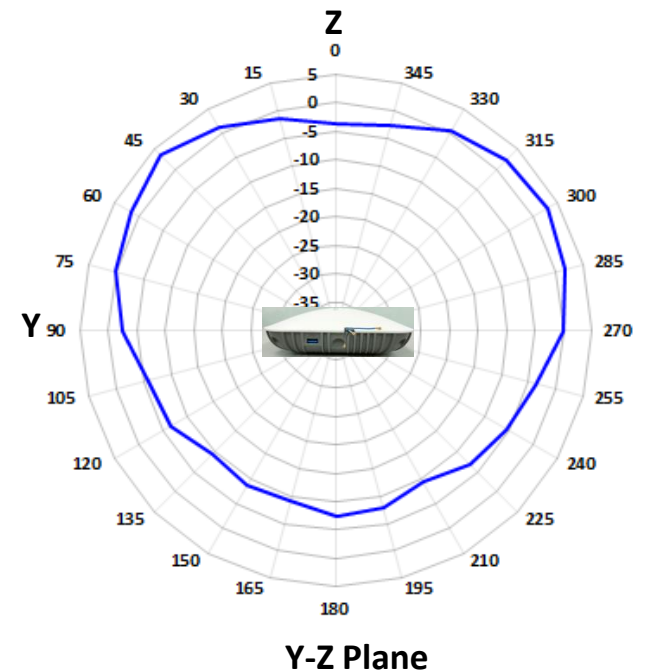
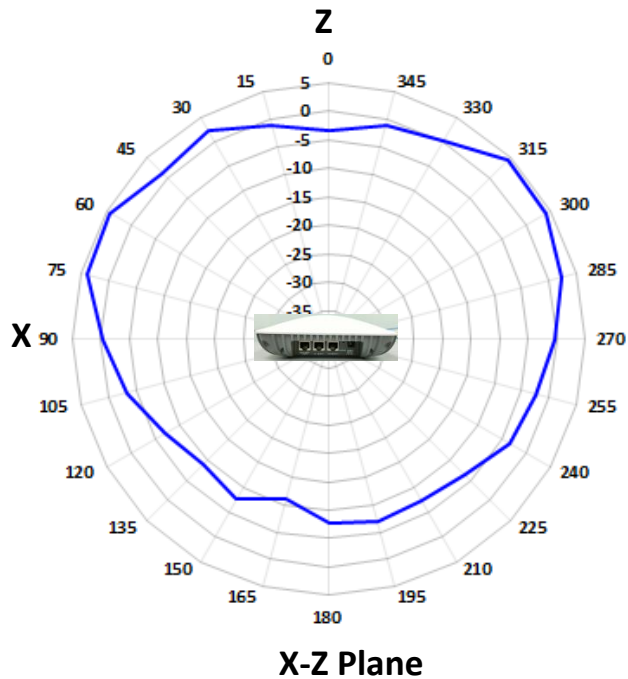
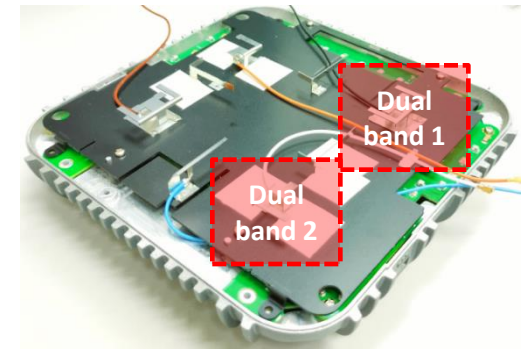
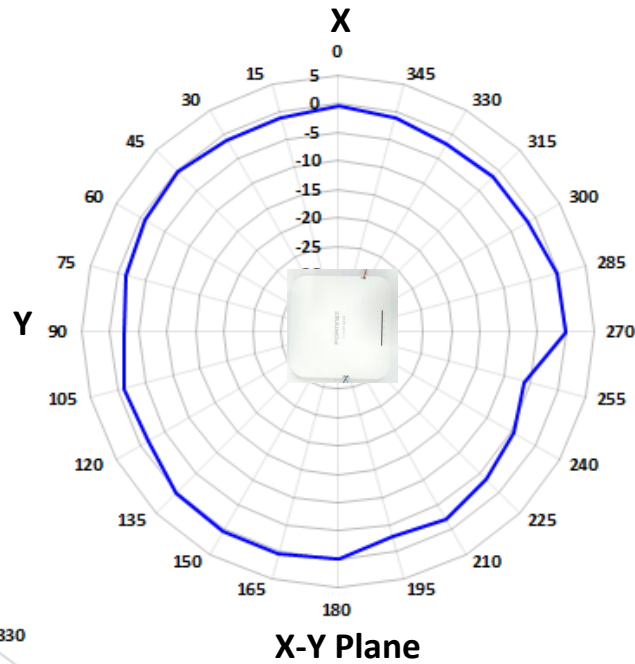




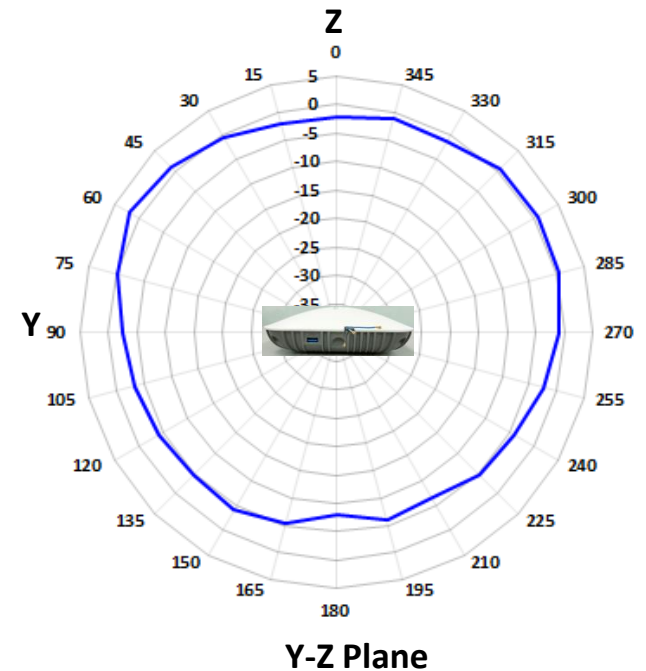
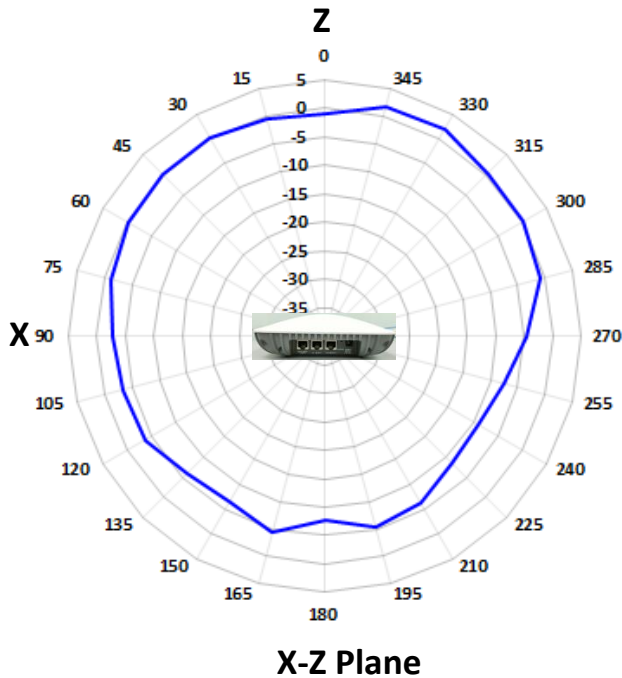
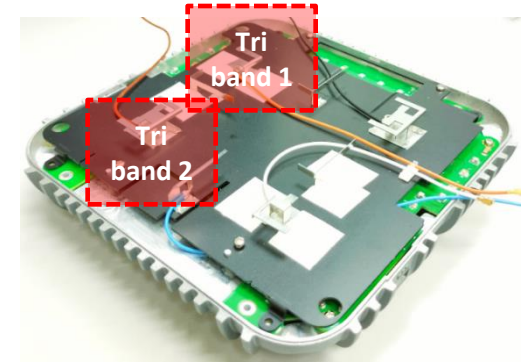
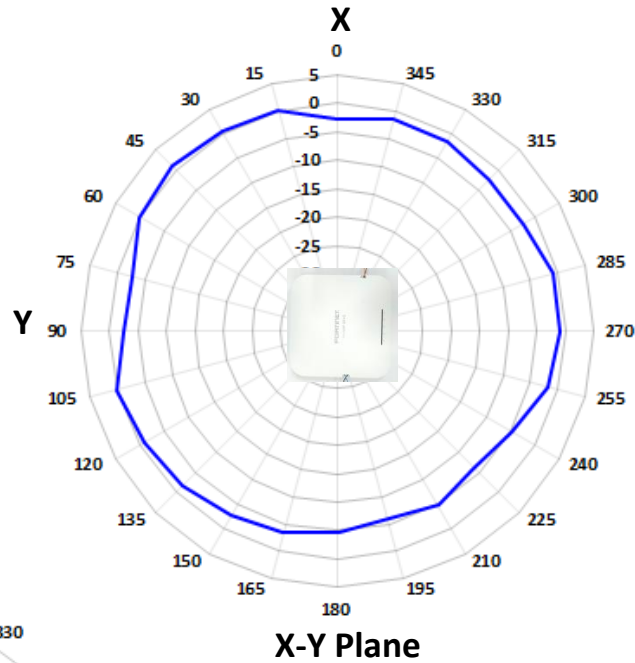
# Combine pattern – Dual1+Dual2 @2.45 GHz



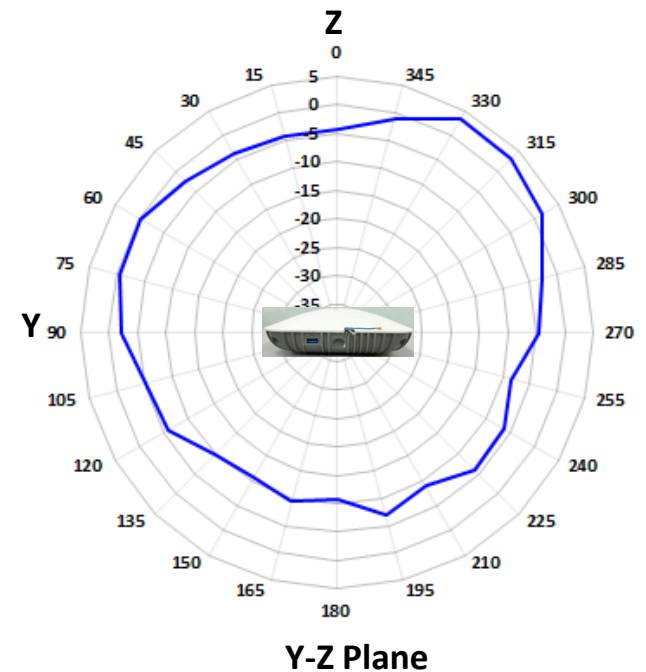
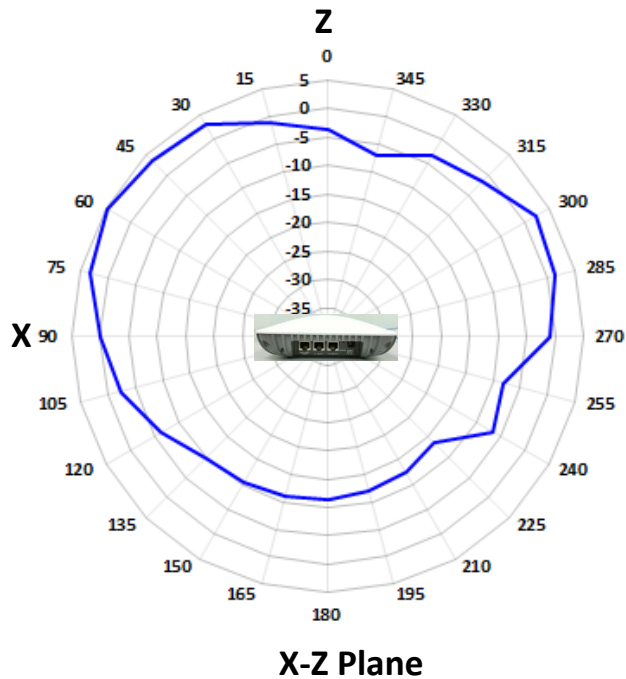
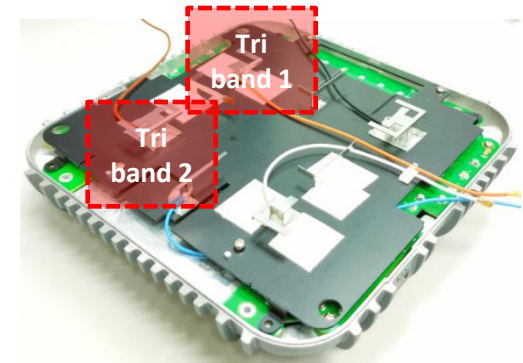
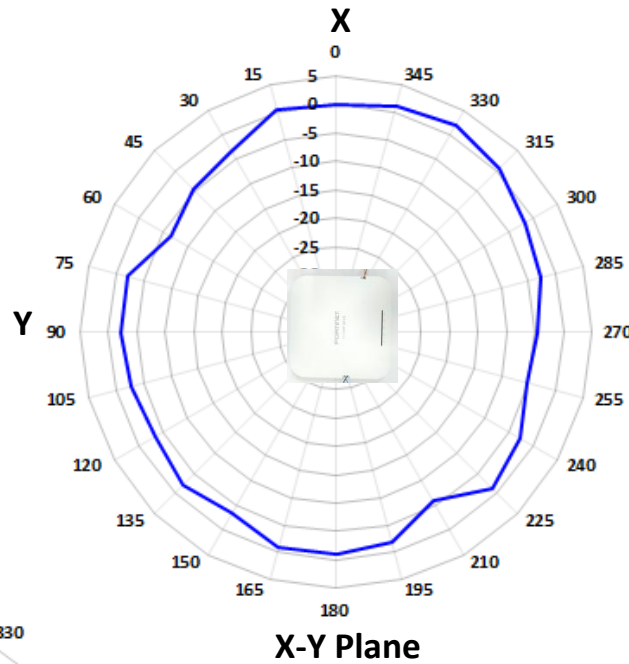
# Combine pattern – Dual1+Dual2 @5.55 GHz



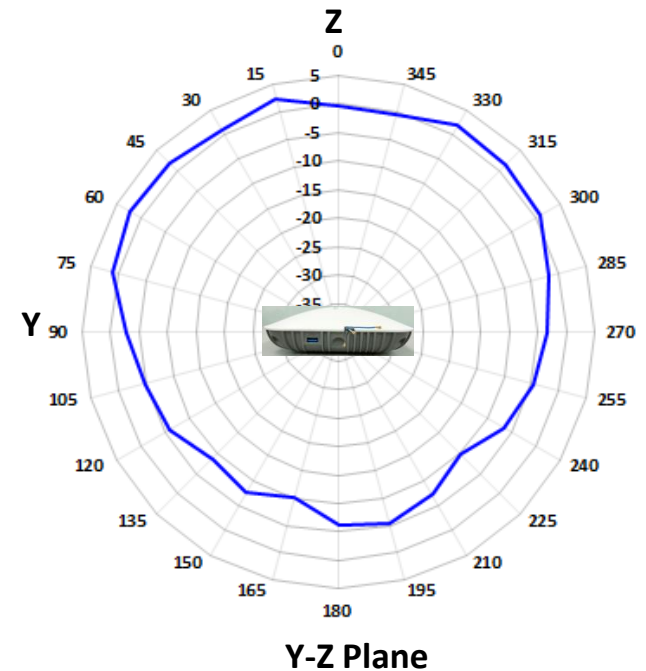
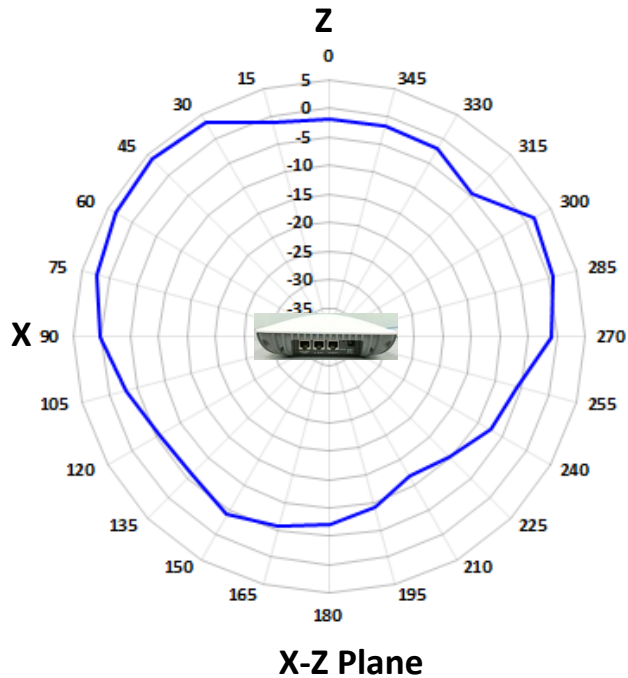
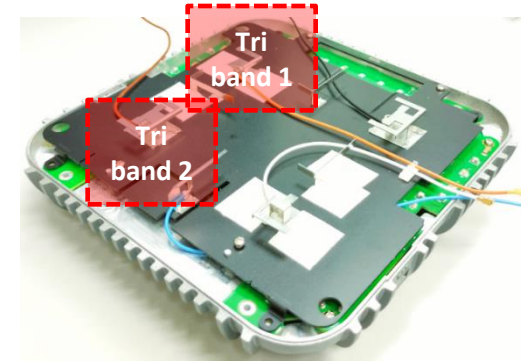
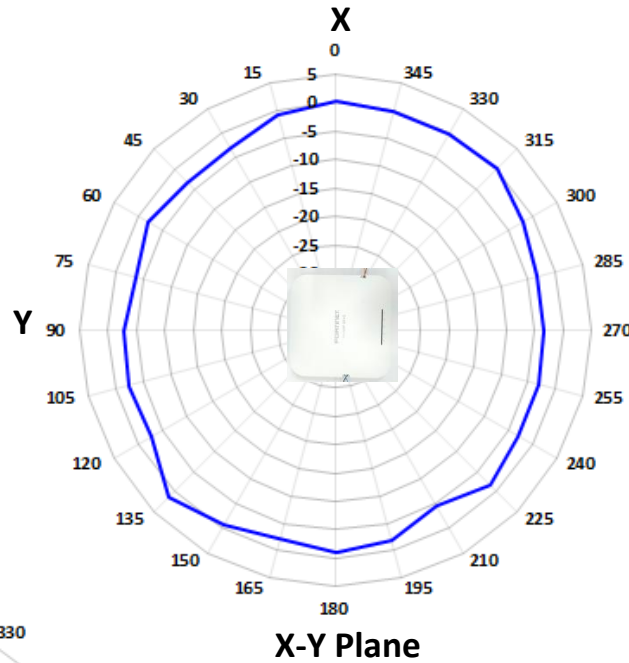
# Combine pattern – Tri 1+Tri 2 @2.45 GHz



# Combine pattern – Tri 1+Tri 2 @5.55 GHz



# Combine pattern – Tri 1+Tri 2 @6.5 GHz



Antenna Performance				
Freq. (MHz)	Dual band Ant 1		Dual band Ant 2	
	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)
2400	62.6	4.0	65.3	3.9
2450	67.6	4.5	66.9	4.1
2500	65.6	4.3	63.0	4.3
5150	65.4	5.3	63.8	4.3
5500	62.3	5.0	61.4	4.6
5850	65.7	5.3	67.0	5.3

Antenna Performance				
Freq. (MHz)	Tri band Ant 1		Tri band Ant 2	
	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)
2400	64.0	3.3	60.7	3.2
2450	62.7	4.3	64.4	4.4
2500	55.9	2.5	64.6	3.9
5150	60.3	5.2	66.5	4.4
5500	60.0	4.6	65.0	5.3
5850	62.0	4.6	66.3	5.0
5925	64.9	4.5	66.8	5.2
6500	67.6	5.3	61.5	4.5
7125	62.5	4.4	62.8	4.2

Antenna Performance		
Freq. (MHz)	BLE	
	Efficiency (%)	Peak Gain (dBi)
2400	59.4	4.9
2450	65.0	5.1
2500	57.9	3.3