Antenna Test Report

The gain of each antenna is measured in a fully anechoic chamber certified by CTIA OTA. The individual gains of all antennas are then mathematically summed at the same spatial position (azimuth and elevation) across all points in a spherical antenna pattern, following the FCC KDB 662911 D01 guidelines to compute the directional antenna gain.

1. General Information of Equipment Under Test

Equipment	Wireless Router
Brand Name	eero
Model Name	ME10001
Applicant	eero LLC
Manufacturer	eero LLC

2. Test Location

Test Site	Sporton International Inc. (Kunshan)
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL: +86-0512-5790-0158
Test Site No.	**Sporton Site No.**
	OTA04-KS

Test Method	Test Engineer	Environment (℃ / %)	Test Date
Radiated	Emma Zhou	24~25 / 42~50	Jul. 26, 2024~Aug. 28, 2024

3. Test Frequency

Band (MHz)	Test Frequency (MHz)
2400-2480	2400, 2437, 2480
5150-5250	5150, 5220, 5250
5250-5350	5250, 5300, 5350
5470-5725	5470, 5580, 5725
5725-5850	5725, 5785, 5850
5925-6425	5925, 6200, 6425
6425-6525	6425, 6500, 6525
6525-6875	6525, 6700, 6750, 6875
6875-7125	6875, 7000, 7050, 7125

4. Antenna Information

Ant. Position	Brand Name	Model Name	Ant. Type	Connector
Antenna #1 (WLAN 2.4GHz/5GHz)	Luxshare-ICT	833-01811	DIPOLE	IPEX
Antenna #3 (WLAN 2.4GHz/5GHz)	Luxshare-ICT	833-01813	DIPOLE	IPEX
Antenna #2 (WLAN 6GHz)	Luxshare-ICT	833-01812	DIPOLE	IPEX
Antenna #4 (WLAN 6GHz)	Luxshare-ICT	833-01814	DIPOLE	IPEX
Antenna #5 (Bluetooth & ZigBee/Thread)	Luxshare-ICT	833-01815	DIPOLE	IPEX

5. Test Results:

5.1 Individual Antenna Gain

Maximum Antenna Gains of Individual Antennas				
Antenna	**Frequency (MHz)**	**Antenna gain (dBi)**	**Theta**	**Phi**
#1	2400MHz	1.16	125	45
#1	2437MHz	2.27	125	30
#1	2480MHz	3.4	140	355
#1	5150MHz	3.3	85	45
#1	5220MHz	2.98	85	40
#1	5250MHz	3	85	40
#1	5300MHz	2.55	90	70
#1	5350MHz	2.82	90	30
#1	5470MHz	3.31	90	25
#1	5580MHz	3.28	90	20
#1	5725MHz	3.77	95	35
#1	5785MHz	3.96	95	35
#1	5850MHz	4.13	95	30
#3	2400MHz	2.47	70	305
#3	2437MHz	2.86	85	50
#3	2480MHz	2.68	85	335
#3	5150MHz	1.91	75	225
#3	5220MHz	2.52	75	220
#3	5250MHz	2.77	75	220
#3	5300MHz	3.17	80	260
#3	5350MHz	3.42	80	250
#3	5470MHz	3.49	75	255
#3	5580MHz	3.73	75	245
#3	5725MHz	4.15	75	265
#3	5785MHz	4.3	75	260
#3	5850MHz	4.27	80	230

Maximum Antenna Gains of Individual Antennas				
Antenna	**Frequency (MHz)**	**Antenna gain (dBi)**	**Theta**	**Phi**
#2	5925MHz	2.56	0	155
#2	6200MHz	1.86	20	345
#2	6425MHz	4	20	140
#2	6500MHz	4.14	20	145
#2	6525MHz	4.37	20	145
#2	6700MHz	4.69	0	155
#2	6750MHz	4.16	0	155
#2	6875MHz	3.58	0	150
#2	7000MHz	2.99	0	160
#2	7050MHz	2.91	45	265
#2	7125MHz	3.26	45	265
#4	5925MHz	3.51	70	115
#4	6200MHz	2.38	75	130
#4	6425MHz	3.22	35	130
#4	6500MHz	3.08	40	125
#4	6525MHz	2.73	25	115
#4	6700MHz	4.12	35	100
#4	6750MHz	4	65	110
#4	6875MHz	4.29	60	100
#4	7000MHz	3.23	70	100
#4	7050MHz	2.37	70	95
#4	7125MHz	2.69	70	100

Maximum Antenna Gains of Individual Antennas				
Antenna	**Frequency (MHz)**	**Antenna gain (dBi)**	**Theta**	**Phi**
#5	2400MHz	2.77	145	0
#5	2437MHz	3.56	145	0
#5	2480MHz	4.57	145	0

Maximum Antenna Gains of Individual Antennas for Elevation Angle above 30 Degrees				
Antenna	**Frequency (MHz)**	**Antenna gain (dBi)**	**Theta**	**Phi**
#1	5150MHz	3.3	85	45
#1	5220MHz	2.98	85	40
#1	5250MHz	3	85	40
#3	5150MHz	1.91	75	225
#3	5220MHz	2.52	75	220
#3	5250MHz	2.77	75	220

5.2 Directional Antenna Gain

Directional gains						
Frequency (MHz)	2400	2437	2480			
Ant. #1 Gain (dBi)	-0.68	-0.57	-1.2			
Ant. #3 Gain (dBi)	1.59	2.86	2.2			
(Theta, Phi)	80,35	85,50	85,350			
Directional Gain - Correlated (dBi)	3.54	4.32	3.68			
Ant. #1 Gain (dBi)	-1.31	-0.57	-1.2			
Ant. #3 Gain (dBi)	1.93	2.86	2.2			
(Theta, Phi)	85,50	85,50	85,350			
Directional Gain - Uncorrelated (dBi)	0.61	1.48	0.82			
Frequency (MHz)	5150	5220	5250	5300	5350	5470
Ant. #1 Gain (dBi)	-0.37	-0.18	-0.21	-0.6	-1.37	-1.18
Ant. #3 Gain (dBi)	1.91	2.26	2.71	2.6	2.58	3.14
(Theta, Phi)	75,225	80,205	80,205	80,205	80,205	75,245
Directional Gain - Correlated (dBi)	3.85	4.14	4.38	4.16	3.84	4.26
Ant. #1 Gain (dBi)	3.13	2.86	-0.21	-0.6	-3.32	-1.18
Ant. #3 Gain (dBi)	-3.63	-1.04	2.71	2.6	3.3	3.14
(Theta, Phi)	90,25	95,40	80,205	80,205	85,270	75,245
Directional Gain - Uncorrelated (dBi)	0.95	1.33	1.49	1.29	1.15	1.5
Frequency (MHz)	5580	5725	5785	5850		
Ant. #1 Gain (dBi)	-1.4	-0.42	-0.7	-1.09		
Ant. #3 Gain (dBi)	3.73	3.75	3.89	4.21		
(Theta, Phi)	75,245	80,225	80,225	80,225		
Directional Gain - Correlated (dBi)	4.55	4.92	4.91	4.97		
Ant. #1 Gain (dBi)	-1.4	-0.42	-0.7	-1.09		
Ant. #3 Gain (dBi)	3.73	3.75	3.89	4.21		
(Theta, Phi)	75,245	80,225	80,225	80,225		
Directional Gain - Uncorrelated (dBi)	1.88	2.15	2.18	2.32		

Directional gains for Elevation Angle above 30 Degrees						
Frequency (MHz)	5150	5220	5250			
Ant. #1 Gain (dBi)	-0.37	-0.18	-0.21			
Ant. #3 Gain (dBi)	1.91	2.26	2.71			
(Theta, Phi)	75,225	80,205	80,205			
Directional Gain - Correlated (dBi)	3.85	4.14	4.38			
Ant. #1 Gain (dBi)	3.13	2.86	-0.21			
Ant. #3 Gain (dBi)	-3.63	-1.04	2.71			
(Theta, Phi)	90,25	95,40	80,205			
Directional Gain - Uncorrelated (dBi)	0.95	1.33	1.49			

Frequency (MHz)	5925	6200	6425	6500	6525	6700
Ant.#2 Gain (dBi)	2.56	0.96	3.72	3.94	4	3.65
Ant.#4 Gain (dBi)	-1.12	1.22	1.24	1.3	1.38	1.5
(Theta, Phi)	0,340	30,145	15,170	15,170	15,175	15,185
Directional Gain - Correlated (dBi)	3.92	4.1	5.58	5.73	5.8	5.65
Ant.#2 Gain (dBi)	2.56	0.96	3.95	3.94	4	4.54
Ant.#4 Gain (dBi)	-1.12	1.22	0.83	1.3	1.38	-0.18
(Theta, Phi)	0,160	30,145	20,150	15,170	15,175	10,165
Directional Gain - Uncorrelated (dBi)	1.1	1.09	2.66	2.82	2.88	2.79
Frequency (MHz)	6750	6875	7000	7050	7125	
Ant. #2 Gain (dBi)	2.91	3.39	1.09	1.13	1.33	
Ant. #4 Gain (dBi)	0.38	-0.08	1.92	0.85	0.32	
(Theta, Phi)	15,185	30,145	35,355	35,355	30,95	
Directional Gain - Correlated (dBi)	4.75	4.84	4.53	4	3.85	
Ant. #2 Gain (dBi)	4.15	-1.17	1.09	1.13	3.26	
Ant. #4 Gain (dBi)	-2.9	3.84	1.92	0.85	-4.82	
(Theta, Phi)	0,340	40,95	35,355	35,355	45,265	
Directional Gain - Uncorrelated (dBi)	1.92	2.02	1.52	0.99	0.88	

The composite gain of the antenna is calculated using the formula in clause F)2)d)i) of KDB 662911 D01 v02r01, which determines the measured directional gain at the same spatial position (Theta, Phi) after measuring each individual antenna.

The F)2)d)i)and F)2)d)ii) of KDB 662911 D01 v02r01:
d) *Unequal antenna gains, with equal transmit powers.* For antenna gains given by G_1, G_2, …, G_N dBi (i) If transmit signals are *correlated*, then Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.] (ii) If all transmit signals are *completely uncorrelated*, then Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10})/N_{ANT}]$ dBi

6. Radiated Measurement Method and Environment:

The directional gain is measured using a gain-comparison method, with the antenna under test positioned inside an anechoic chamber that meets the following specifications:

- Overall dimensions (L x W x H) : 7.5m x 3.9m x 3.9m (rectangular chamber)
- Antenna measured frequency range: 700MHz to 10GHz
- Quiet zone (cylindrical volume): diameter: 50cm, height: 36cm

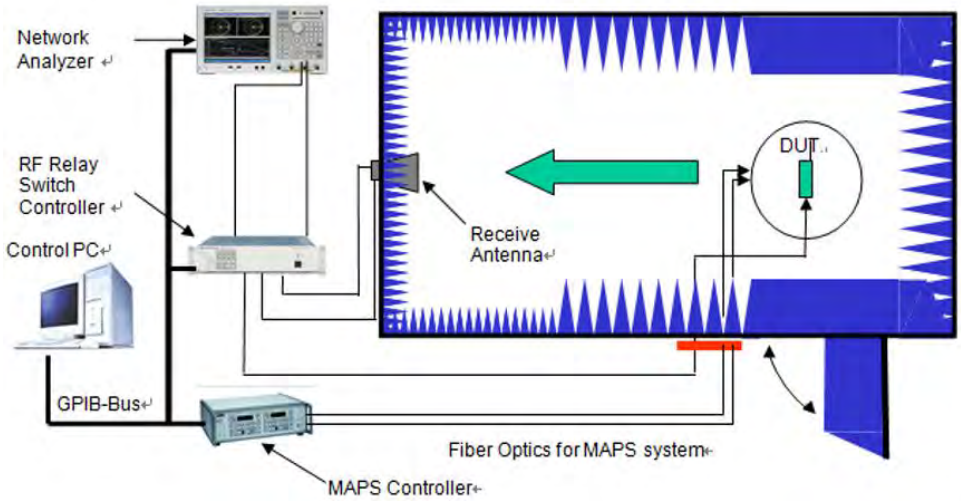


Fig.1 Anechoic Chamber: ETS-Lindgren AMS-8500 (Qualified for CTIA OTA measurement)

6.1 Radiated Test Procedure:

i. This test procedure primarily adheres to Section 3 of the CTIA Test Plan [1], which outlines the scope of measurement. The total range loss—comprising air loss, receiving antenna loss, and cable loss—has been pre-calibrated by comparing it with a calibrated antenna (ETS-Lindgren Sleeve dipole and horn antenna 3117). While conducting the radiated test on the Device Under Test (DUT), the total range loss has been taken into account for final results.

ii. The Device Under Test (DUT) is positioned on a three-dimensional (3D) fixture constructed from low-dielectric material. One of the DUT's antennas is connected to the network analyzer, while the input port of the other antenna is properly terminated.

iii. A three-dimensional characterization of the antenna performance of the DUT is pieced together by analyzing the data from the spatially distributed measurements. Data points taken every 5 degrees in the theta and in the phi axes are deemed sufficient to fully characterize the DUT's Far-Field radiation pattern and total radiated power.

iv. The antenna gain is reported in Section 5.1 of this document and antenna patterns in Appendix A, respectively.

v. Repeatedly test the other antenna by following the step iii to step v.

vi. Once the individual antenna gains have been measured, the directional antenna gain is calculated using clauses F)2)d)i) and F)2)d)ii) of FCC KDB 662911 D01. In this process, the gains of all antennas are mathematically summed at the same azimuth and elevation position. The resulting superposition of the measured directional gains is reported in Section 5.2 of this document, while the antenna patterns can be found in Appendix A.

Fig.2 Test Chamber – Network Analyzer

6.2 Test Equipment:

OTA04-KS					
Instrument	**Brand Name**	**Type/Model**	**Serial Number**	**Last Cal.**	**Due Date**
Network Analyzer	Agilent	E5071C	MY46317418	2024/01/04	2025/01/03
Switch Control	ETS-Lindgren	EMCenter	00160100	NCR	NCR
Diagonal Dual Polarized Horn	ETS-Lindgren	3164-08	00099205	NCR	NCR
Multi-Devices Controller	ETS-Lindgren	2090-OPT1	00066604	NCR	NCR
Medium Duty Holder	ETS-Lindgren	2015	N/A	NCR	NCR

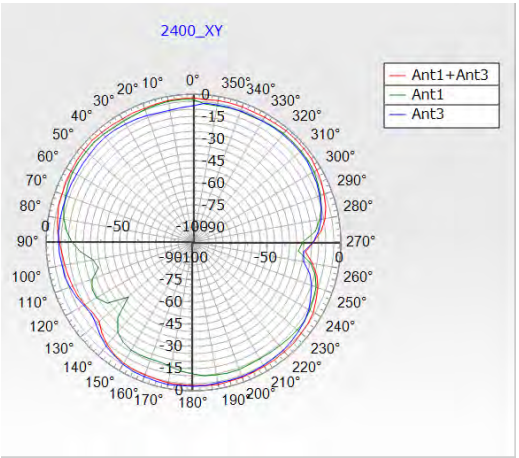
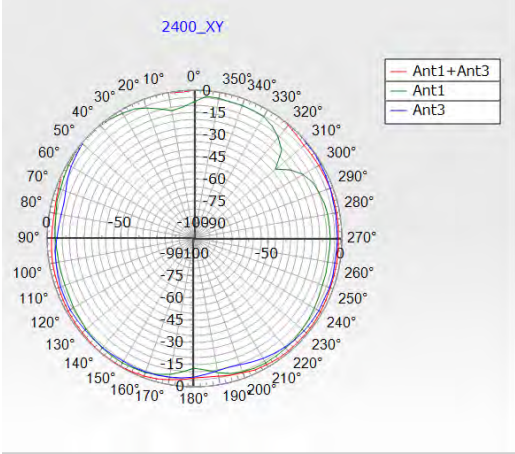
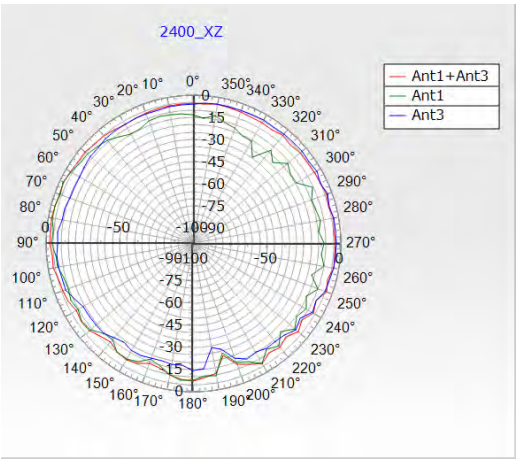
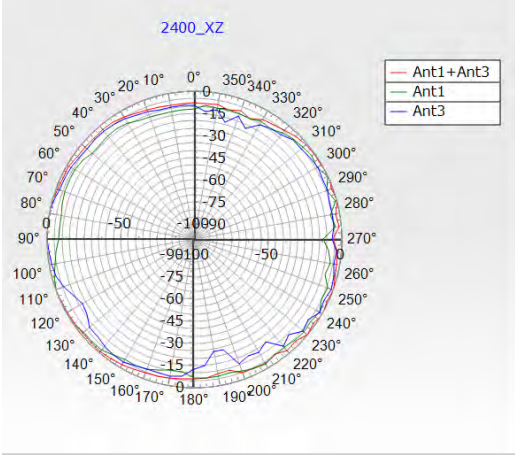
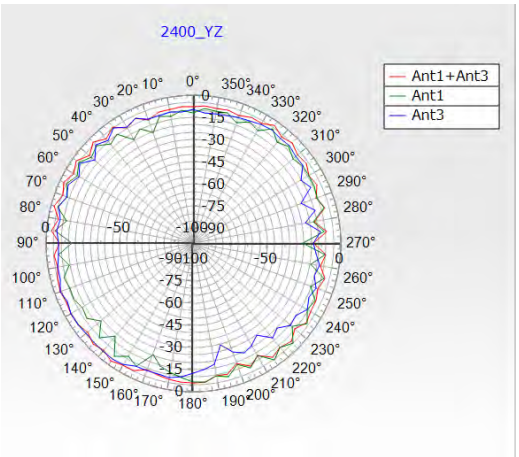
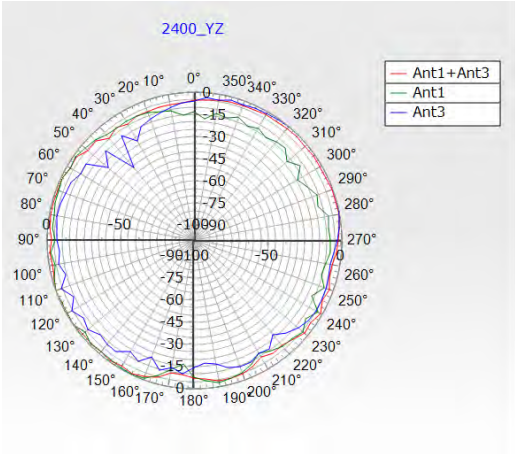
Note: NCR means No Calibration Required.

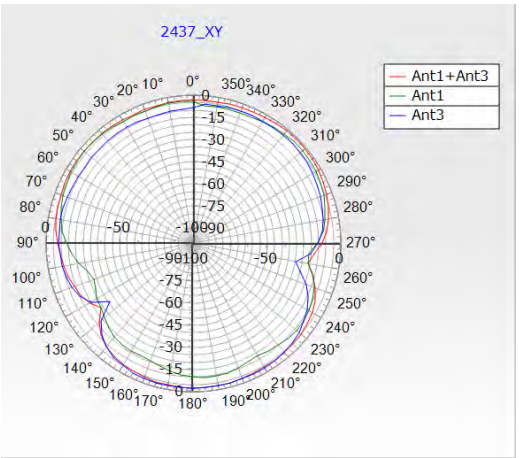
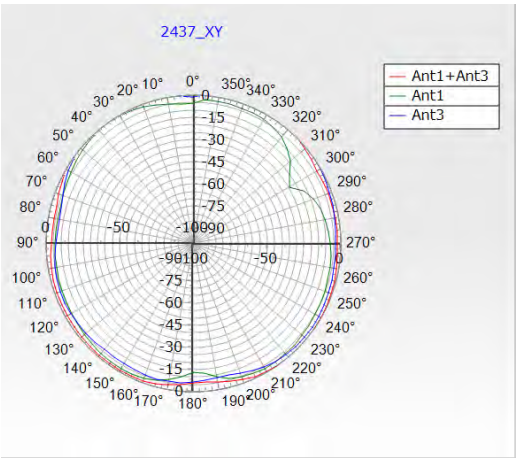
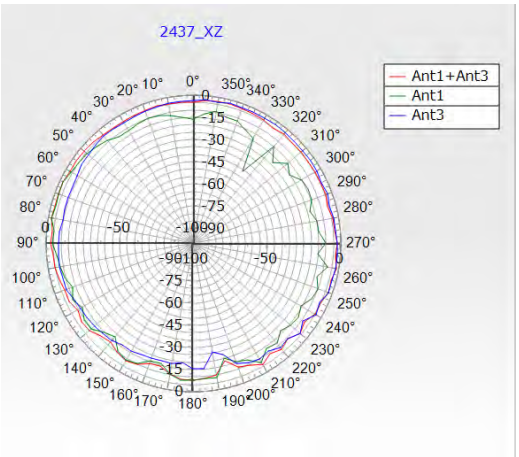
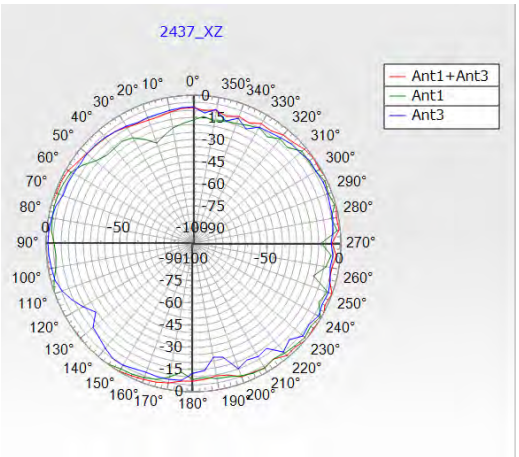
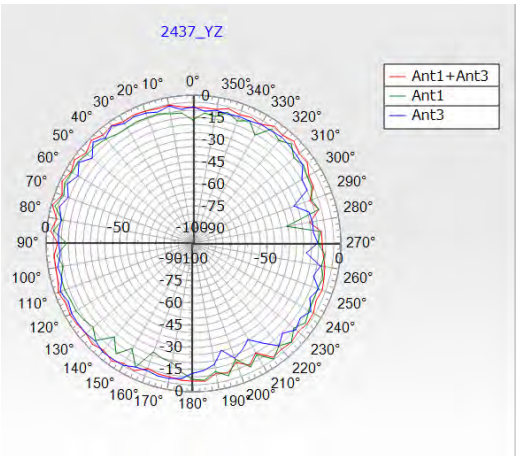
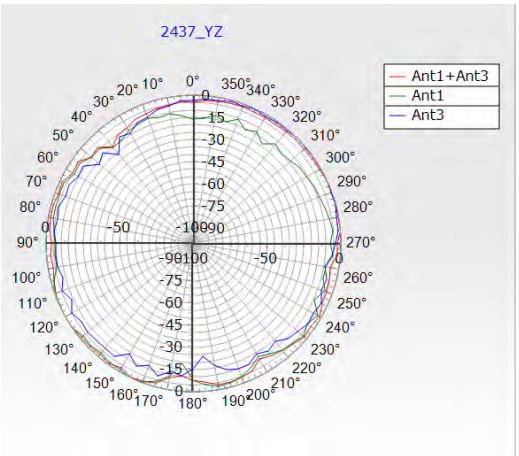
7. References

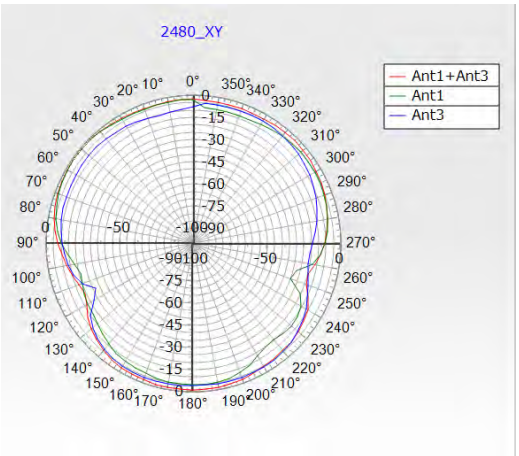
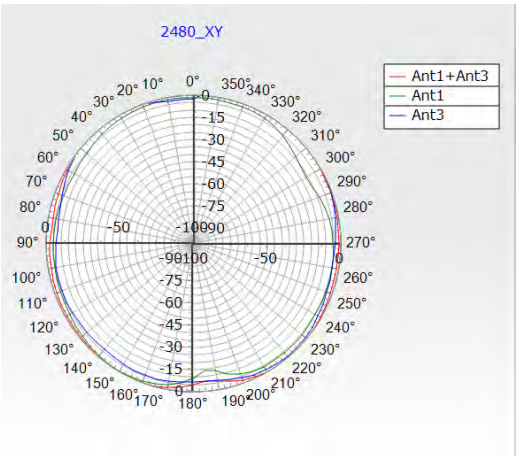
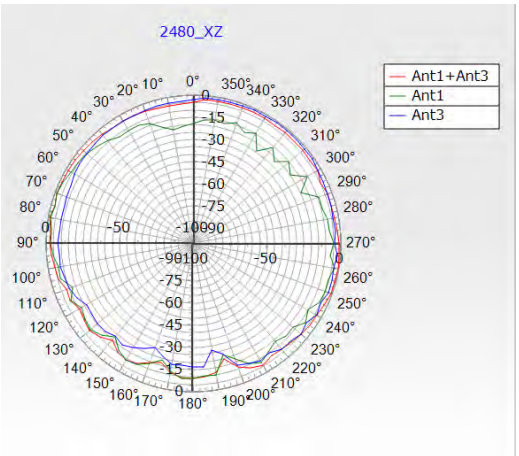
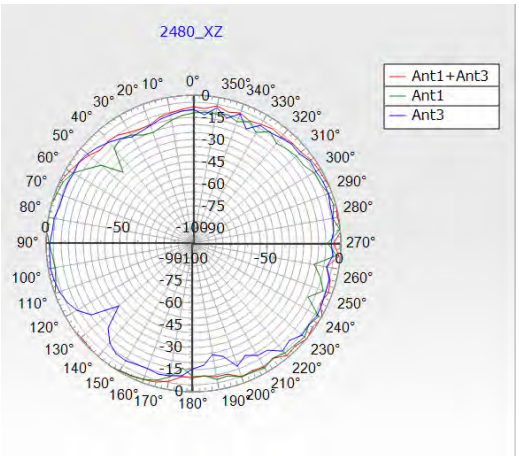
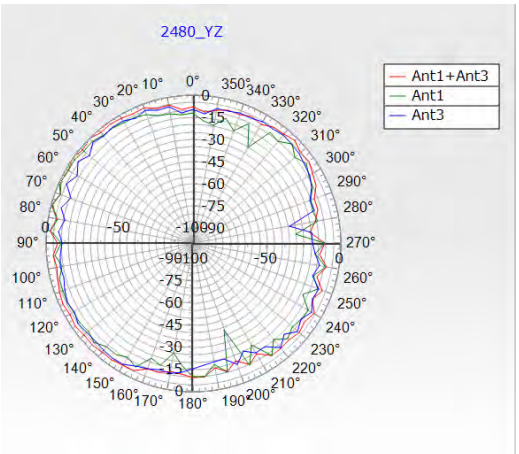
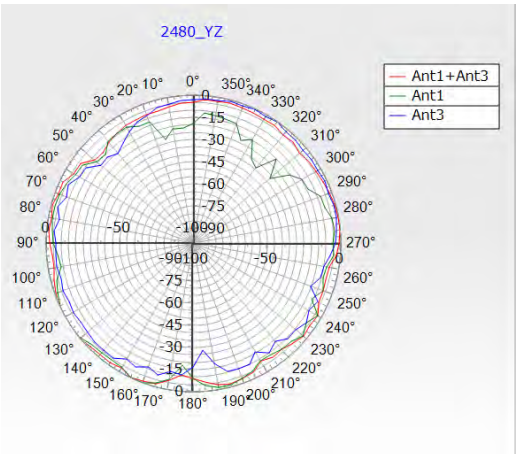
1. CTIA Test Plan for Wireless Device Over-the-Air Performance Version 3.7
2. FCC KDB 662911 D01 MIMO Antenna Gain Measurement

Appendix A. 2D Patterns

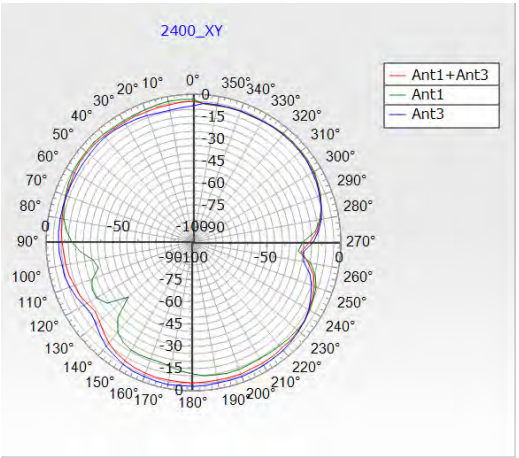
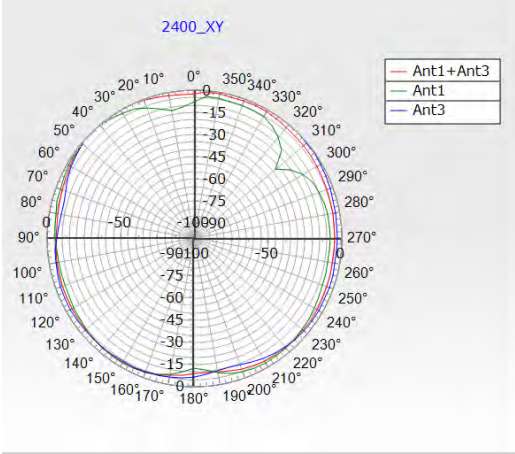
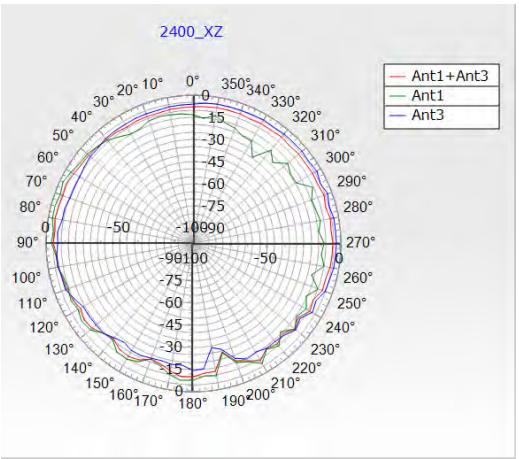
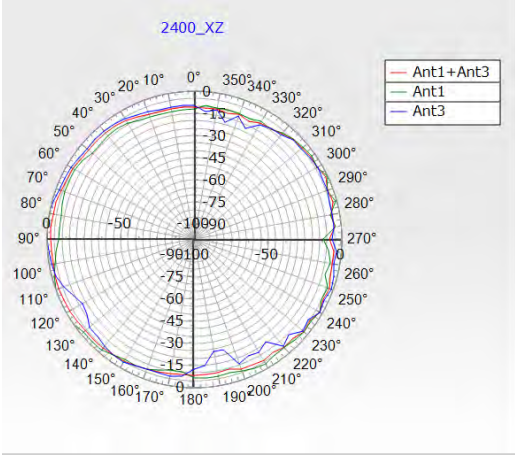
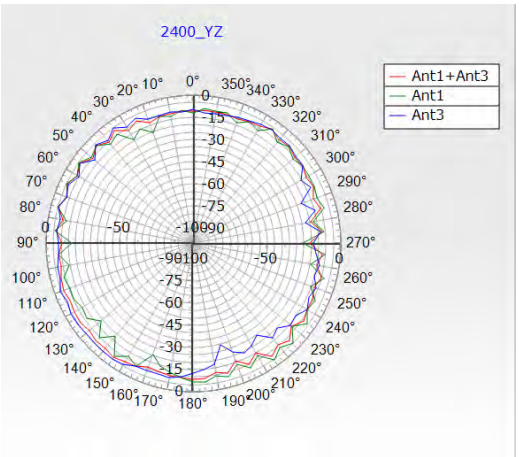
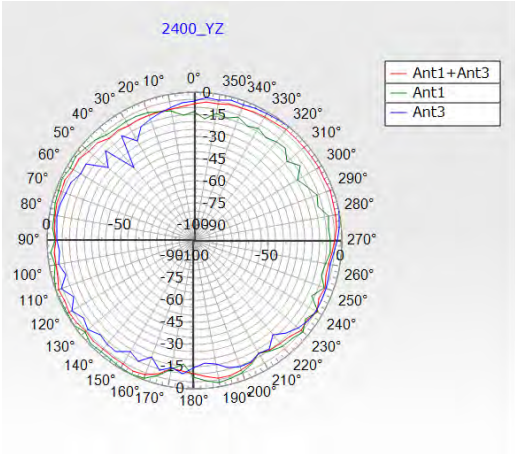
2.4GHz Ant #1, Ant #3 and Ant (#1 + #3)_Corr. DG:

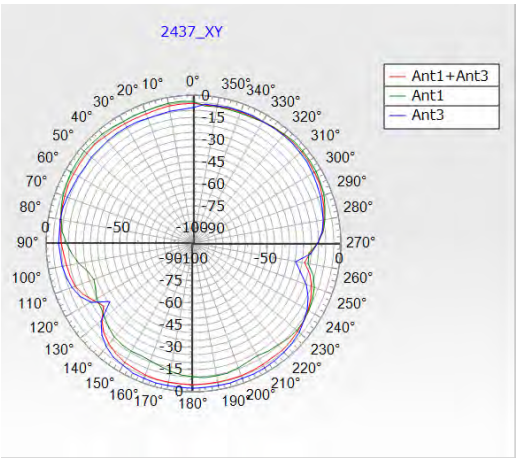
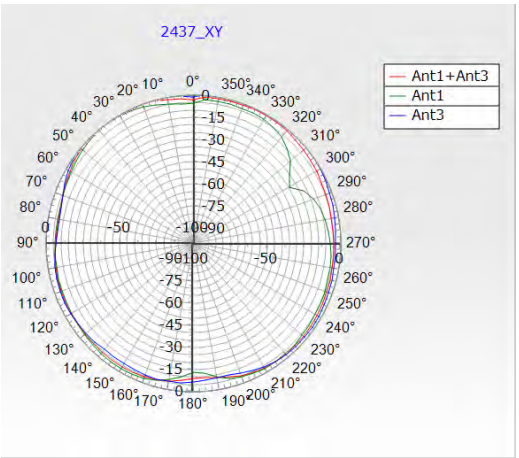
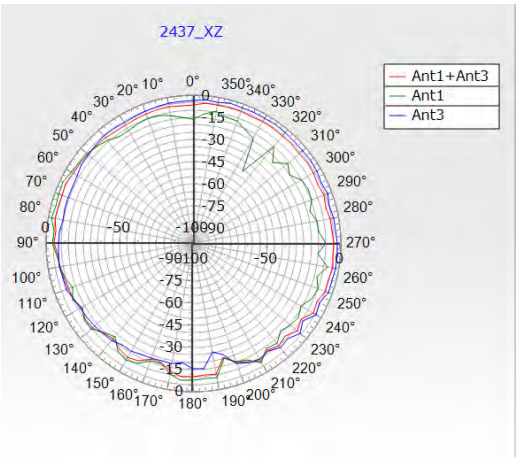
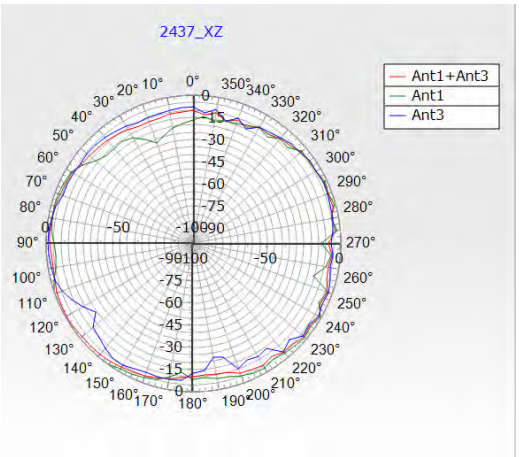
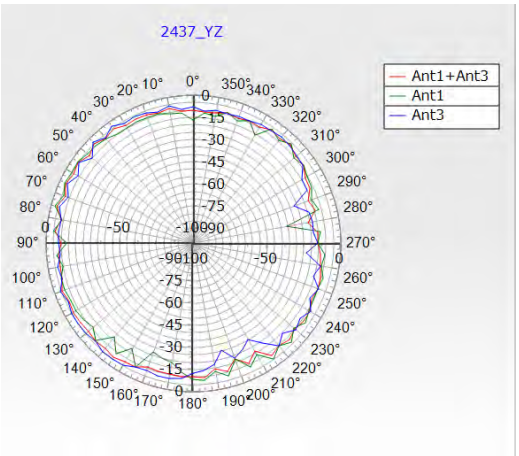
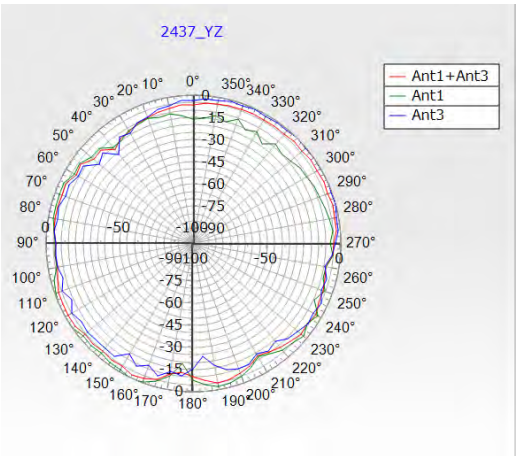
Phi_2400MHz	Theta _2400MHz
	
	
	

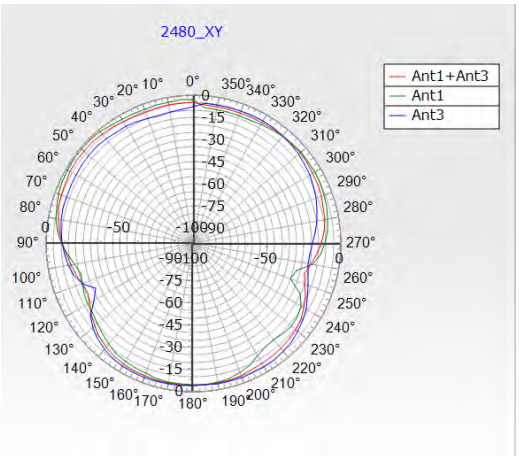
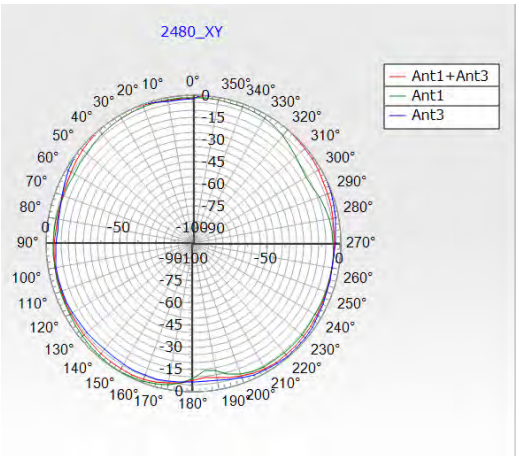
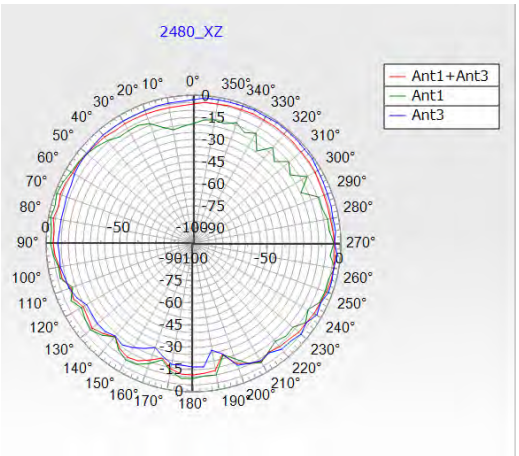
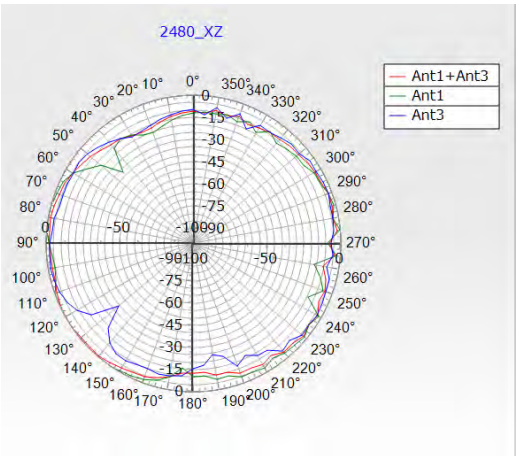
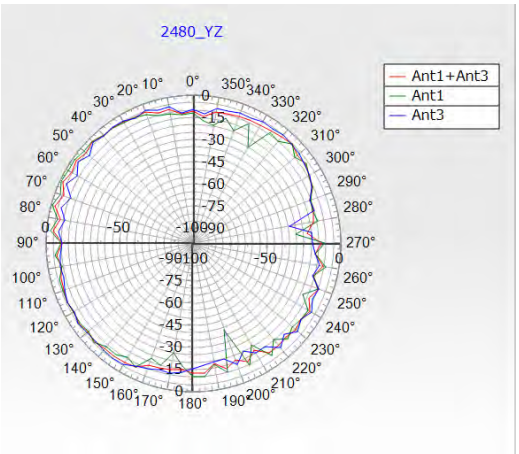
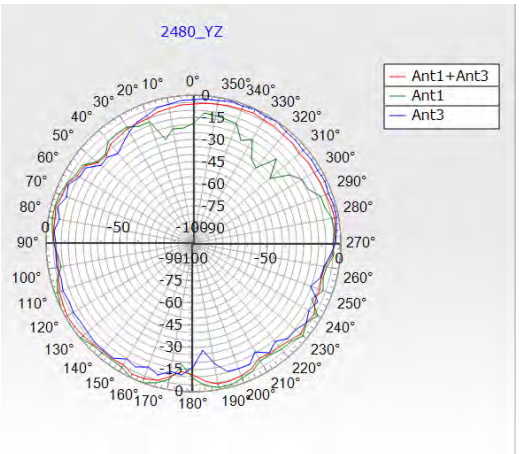
Phi_2437MHz	Theta _2437MHz
	
	
	

Phi_2480MHz	Theta _2480MHz
	
	
	

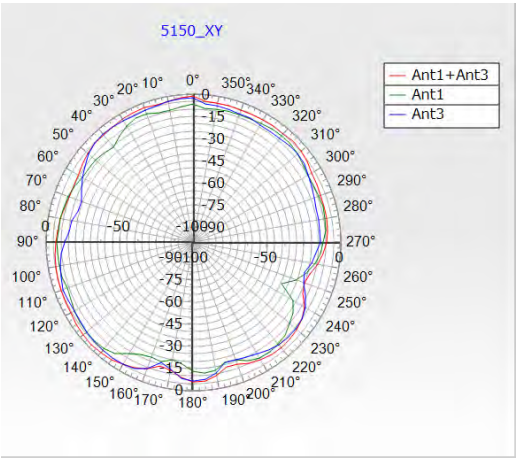
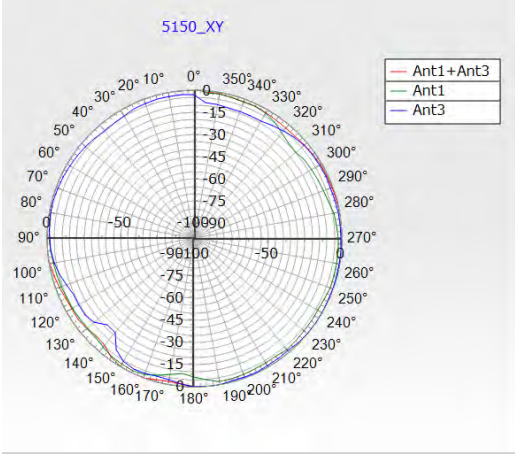
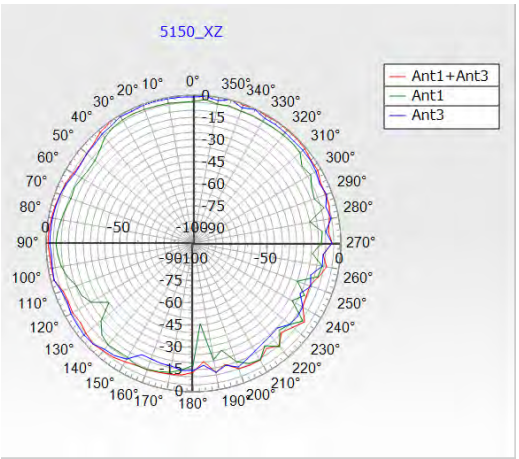
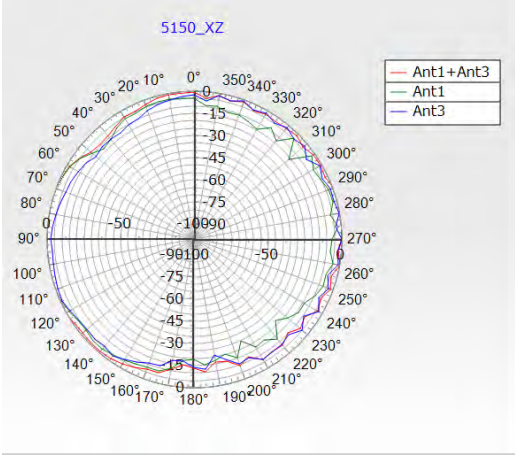
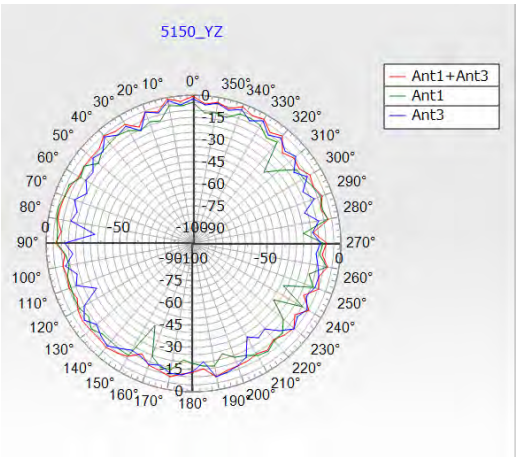
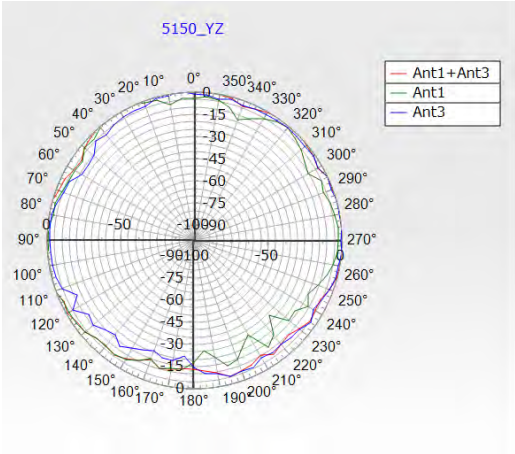
2.4GHz Ant #1, Ant #3 and Ant (#1 + #3)_Uncorr. DG:

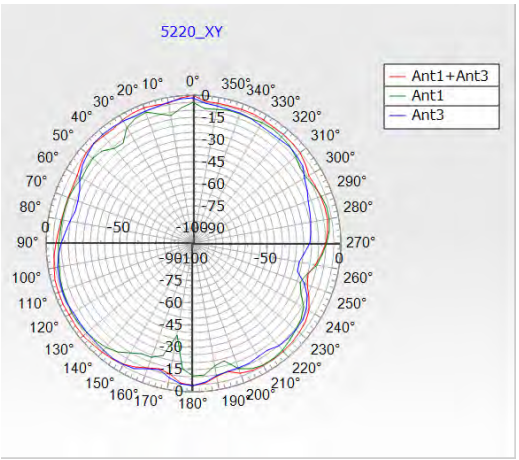
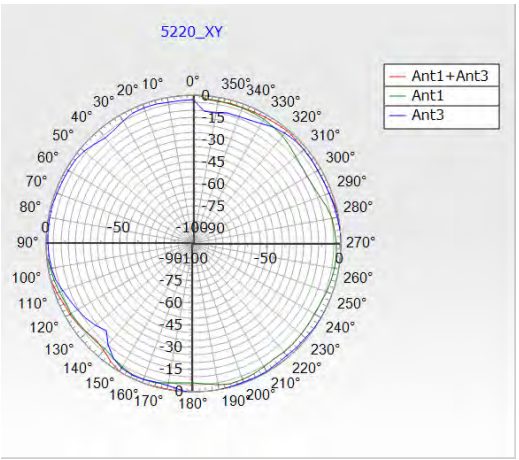
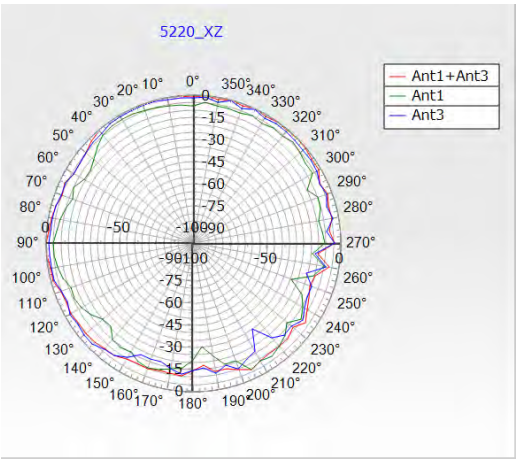
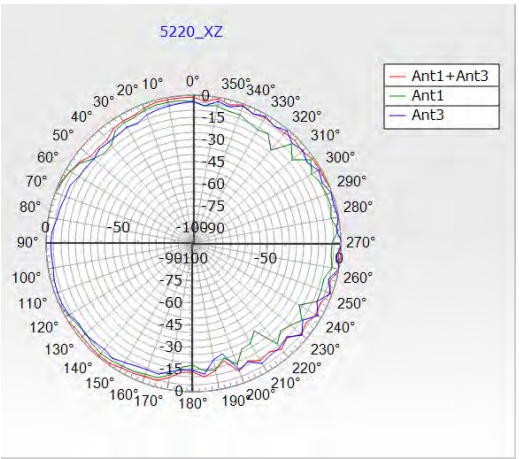
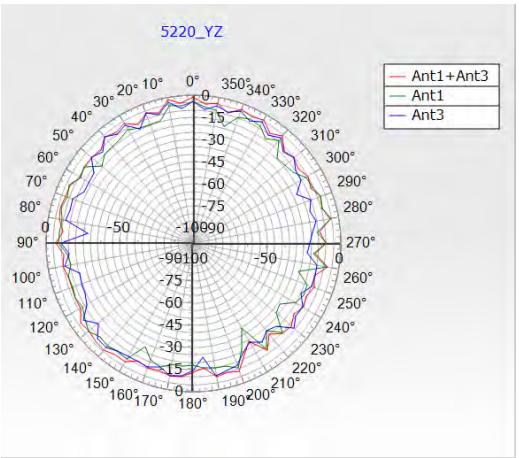
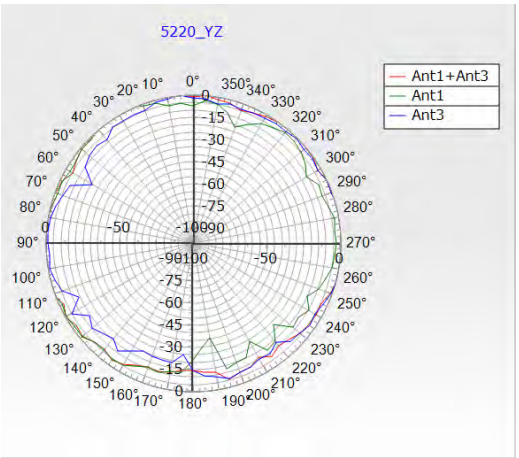
Phi_2400MHz	Theta _2400MHz
	
	
	

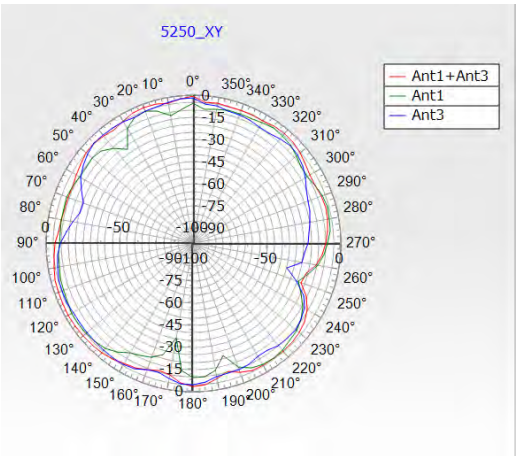
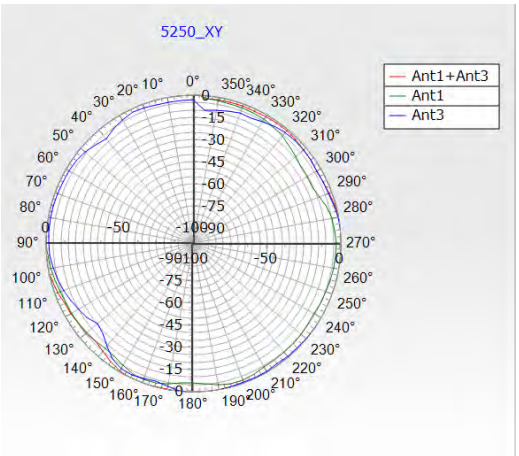
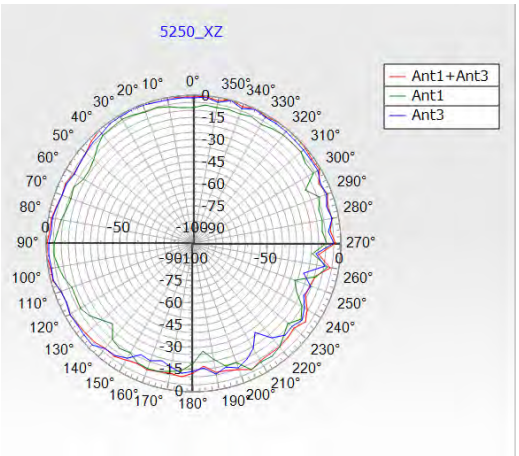
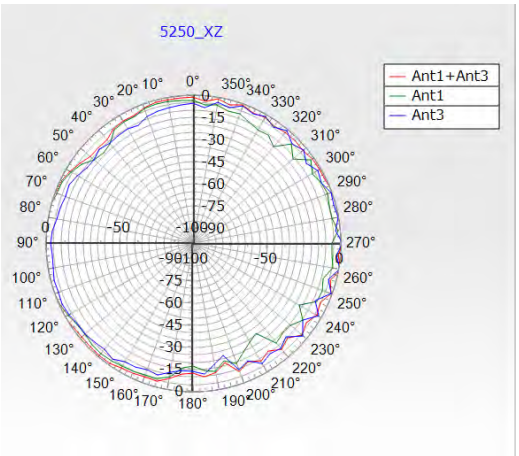
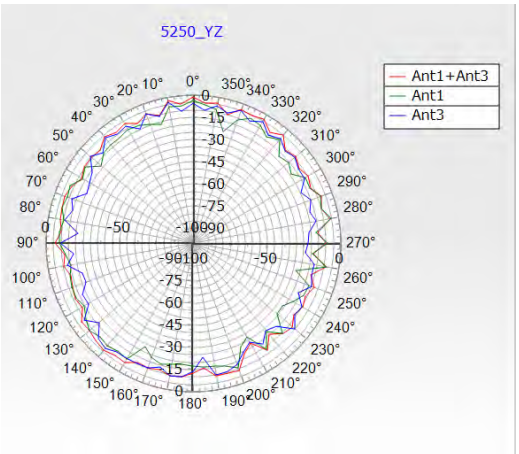
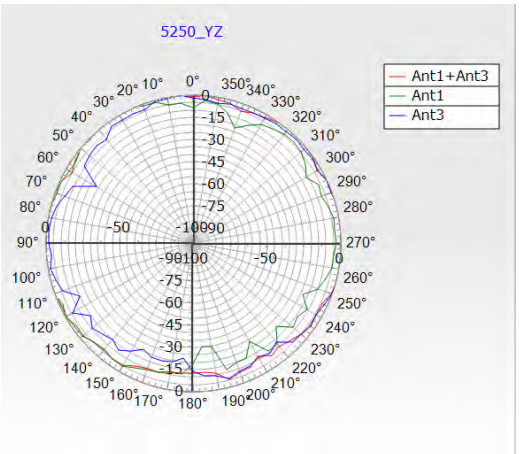
Phi_2437MHz	Theta _2437MHz
	
	
	

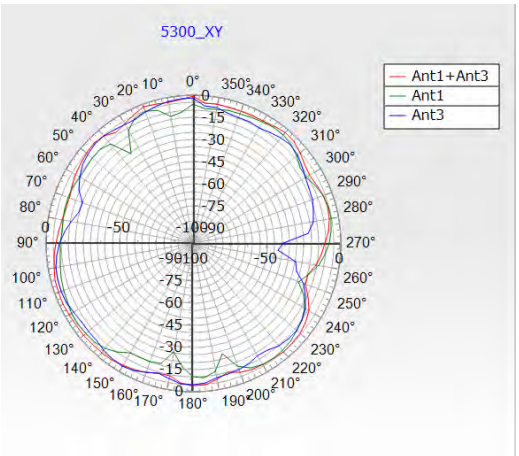
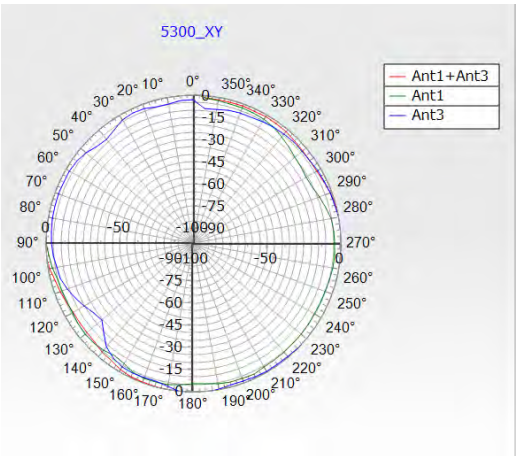
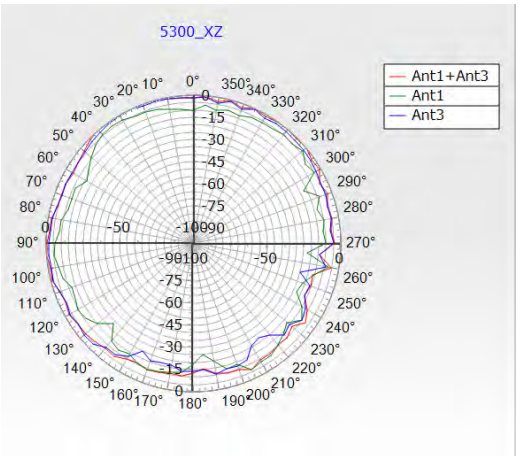
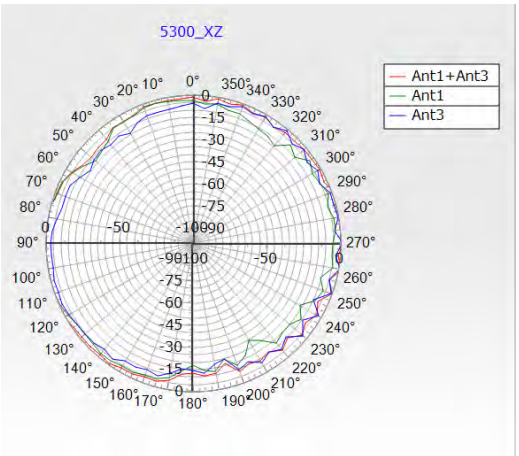
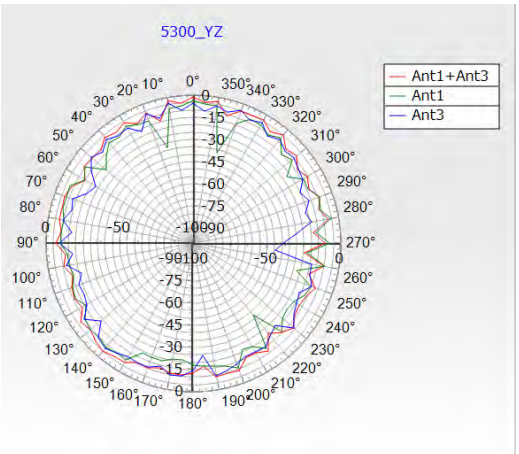
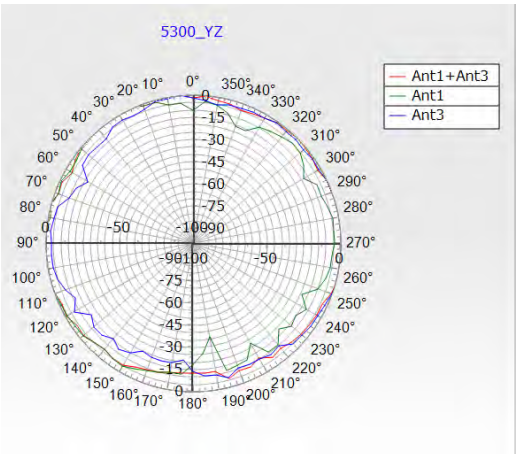
Phi_2480MHz	Theta _2480MHz
	
	
	

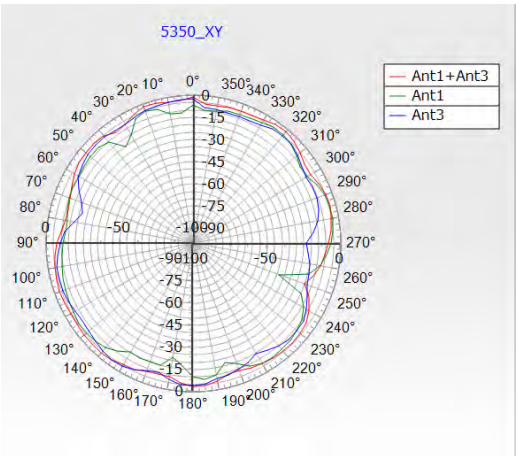
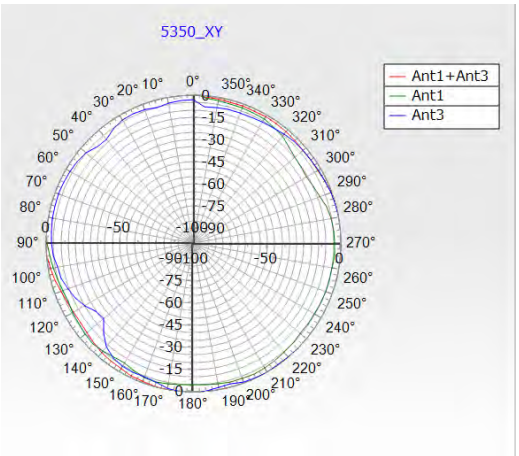
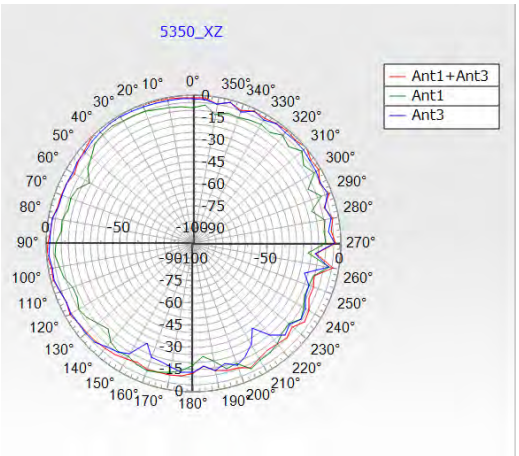
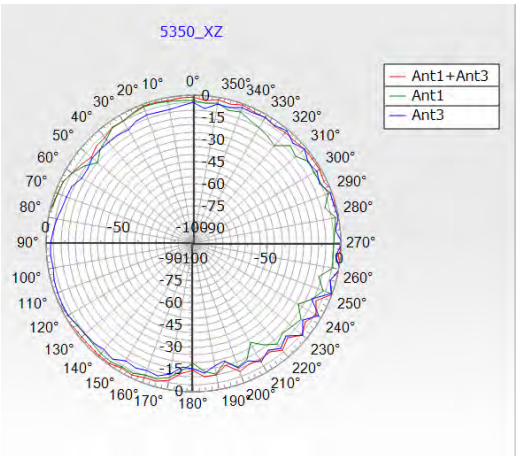
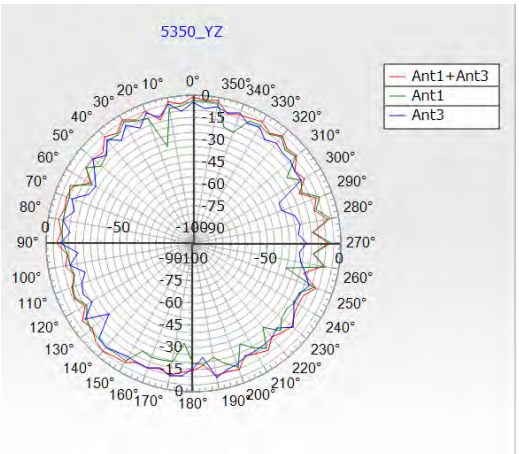
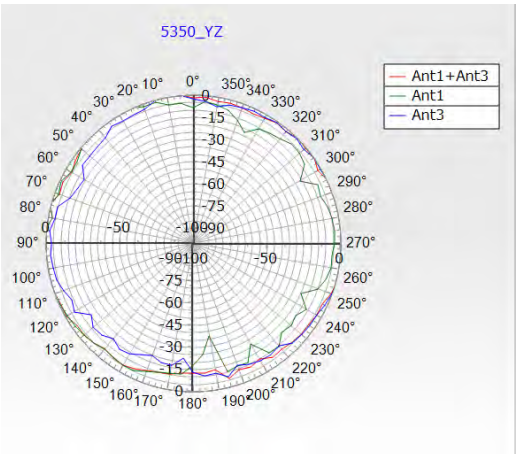
5GHz Ant #1, Ant #3 and Ant (#1 + #3)_Corr. DG:

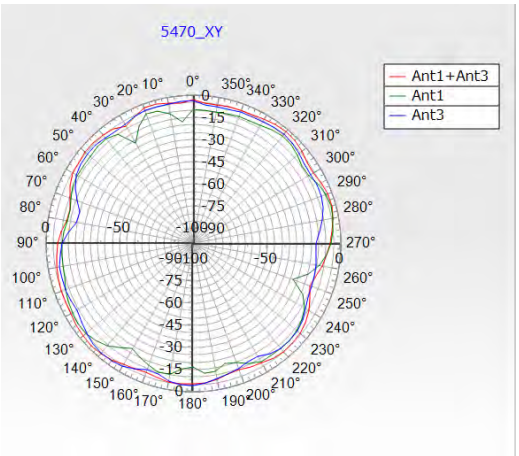
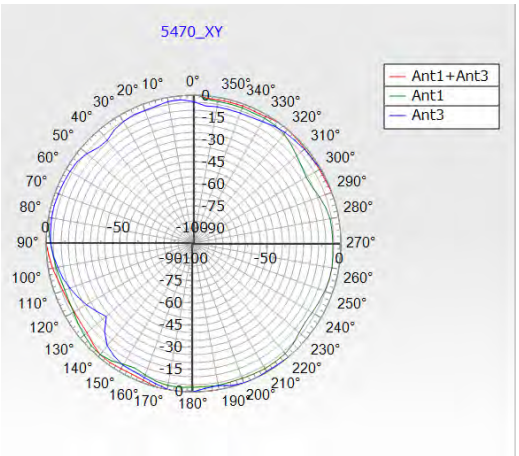
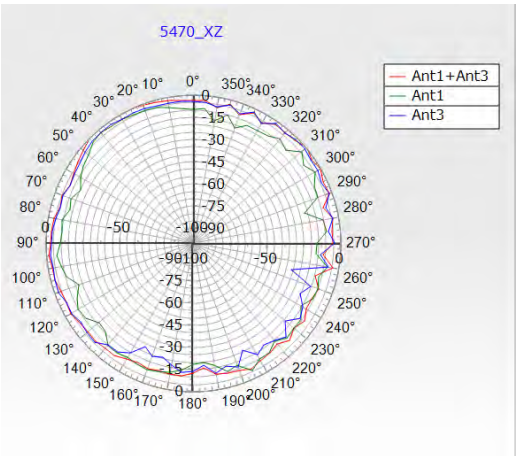
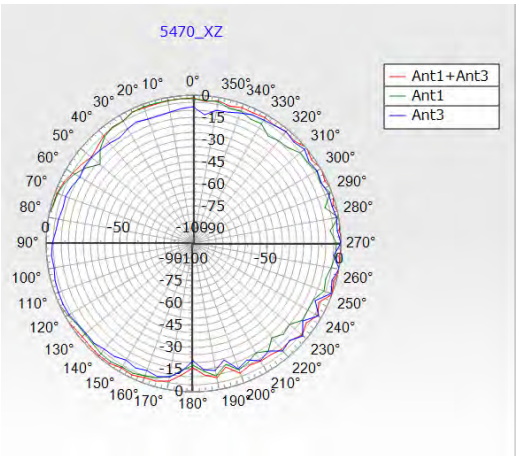
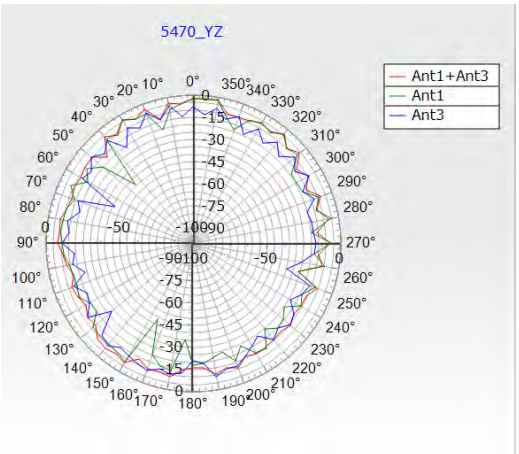
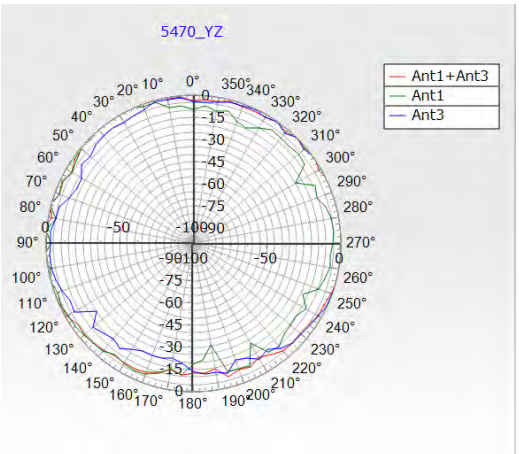
Phi_5150MHz	Theta _5150MHz
	
	
	

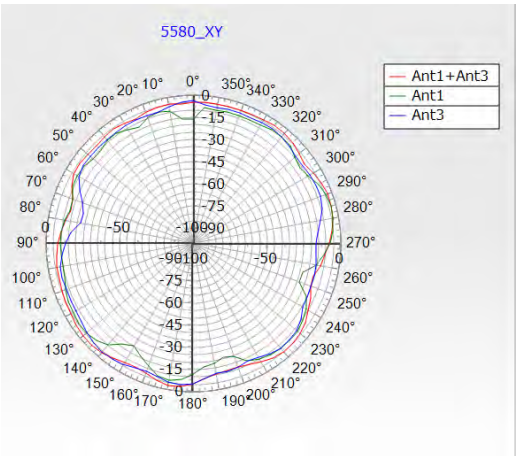
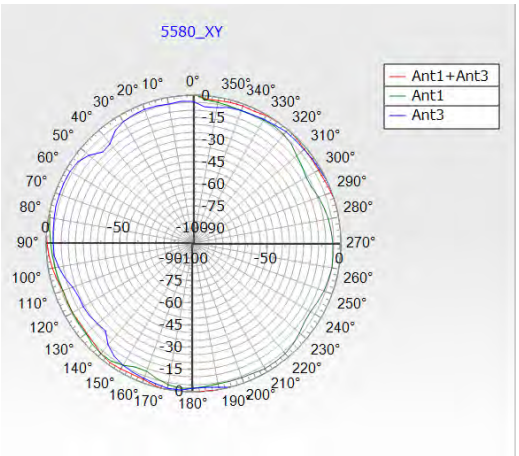
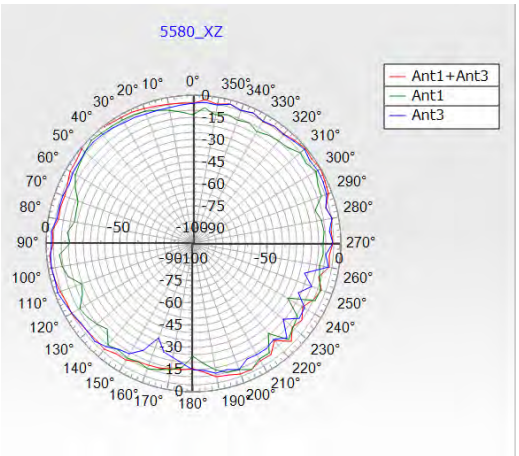
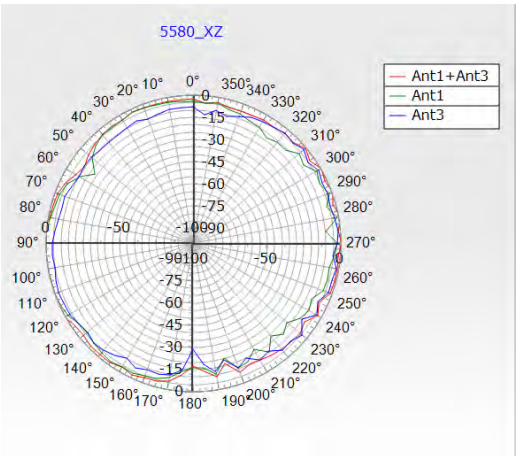
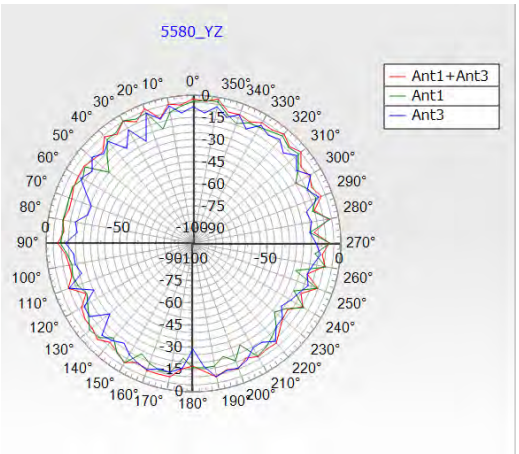
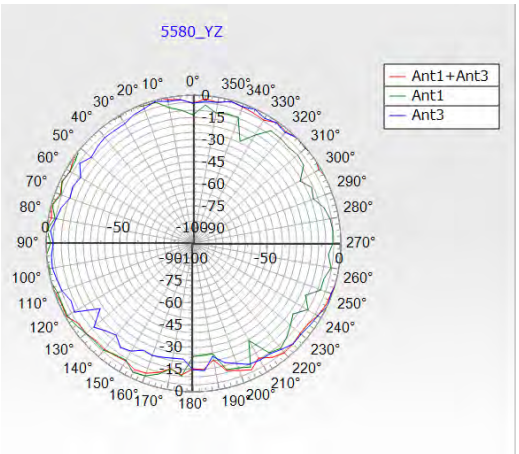
Phi_5220MHz	Theta _5220MHz
	
	
	

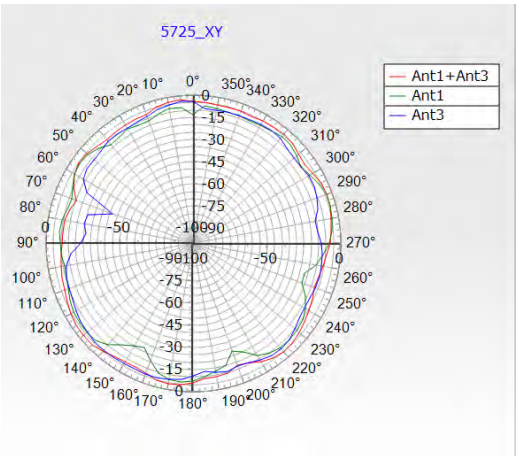
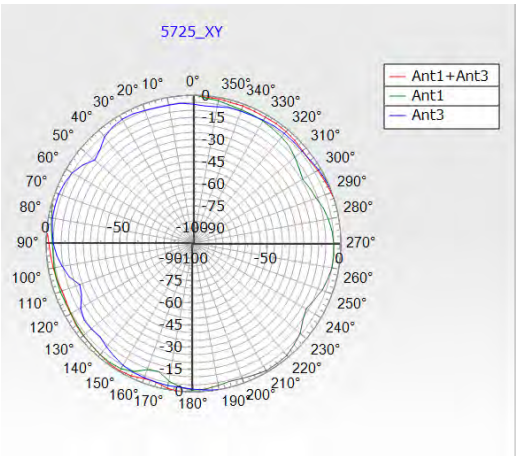
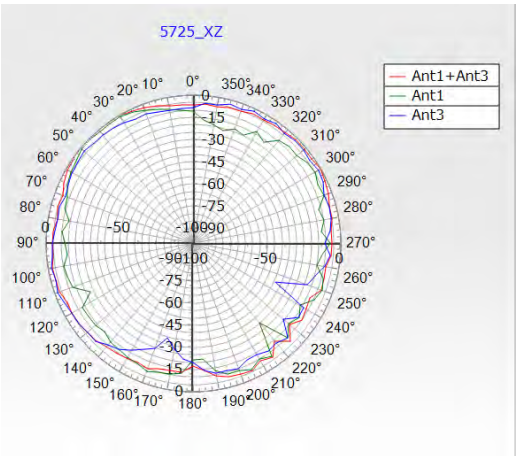
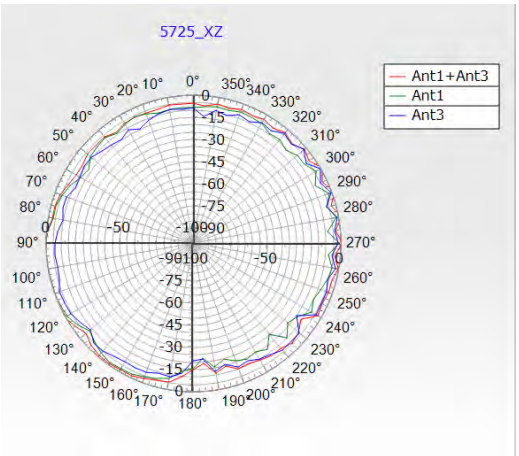
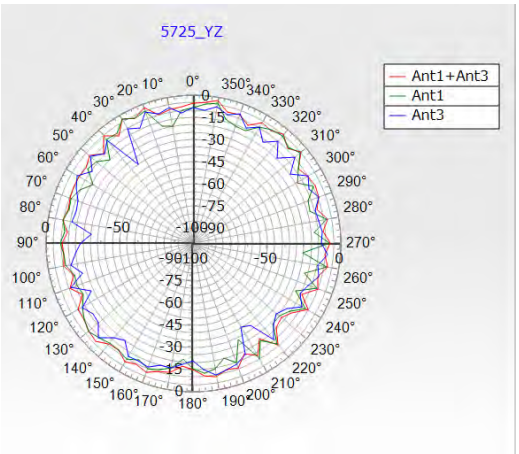
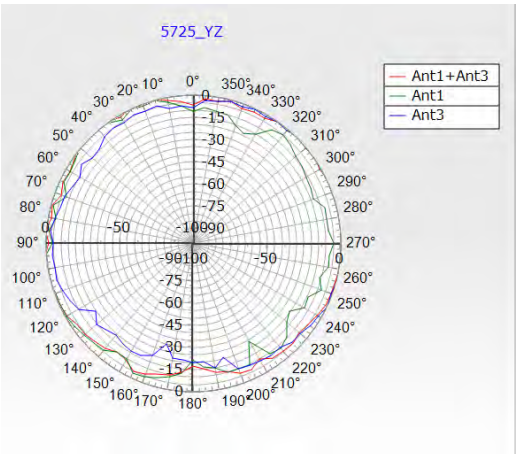
Phi_5250MHz	Theta _5250MHz
	
	
	

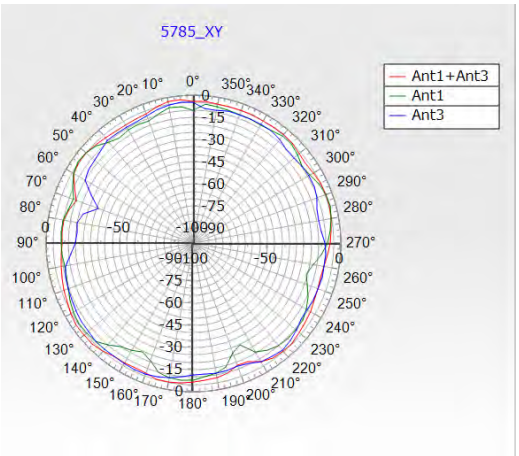
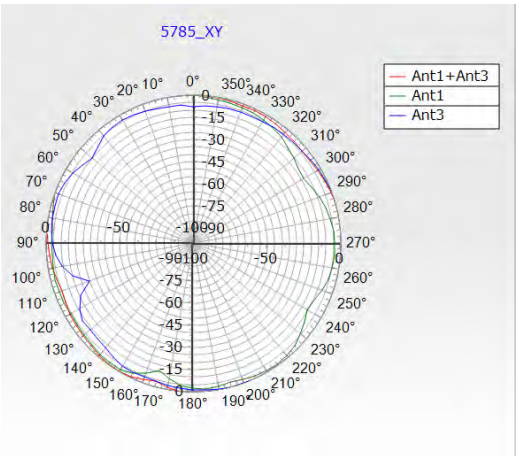
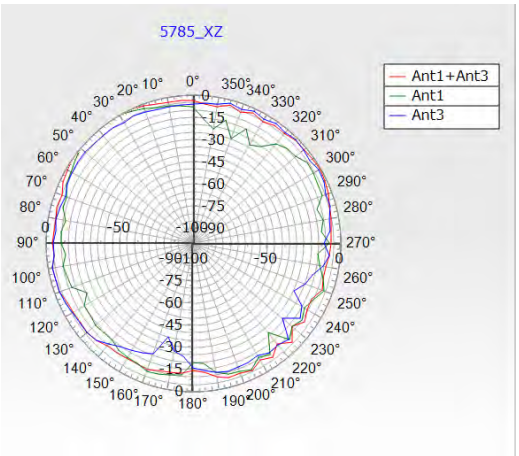
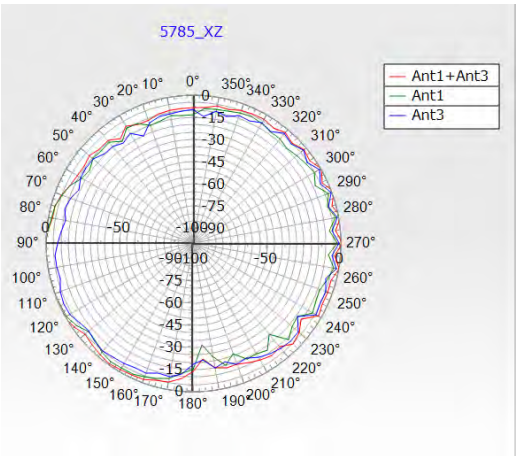
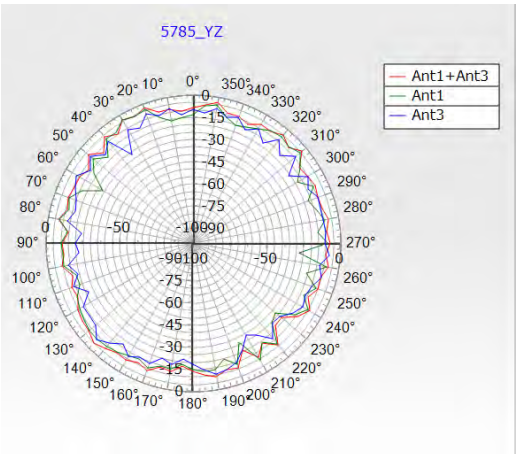
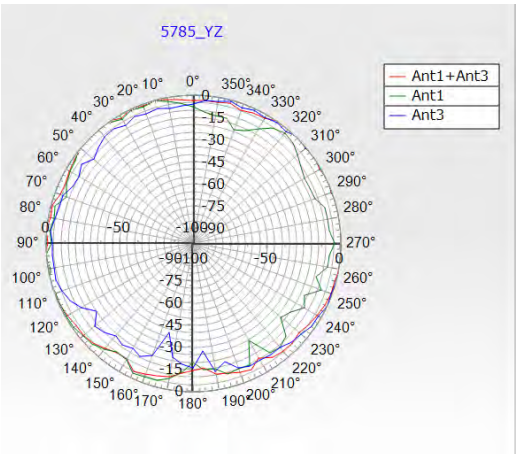
Phi_5300MHz	Theta _5300MHz
	
	
	

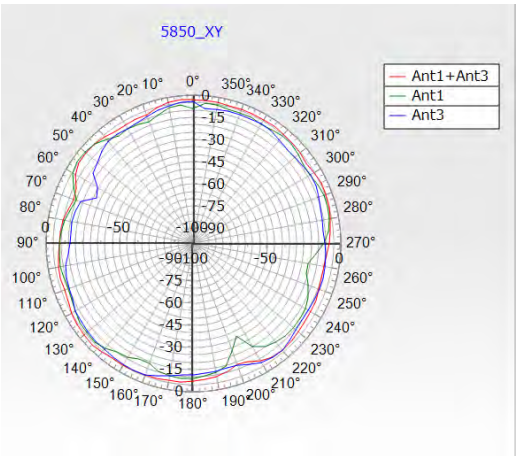
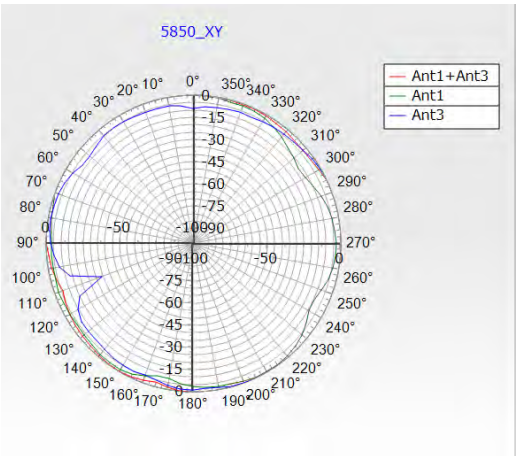
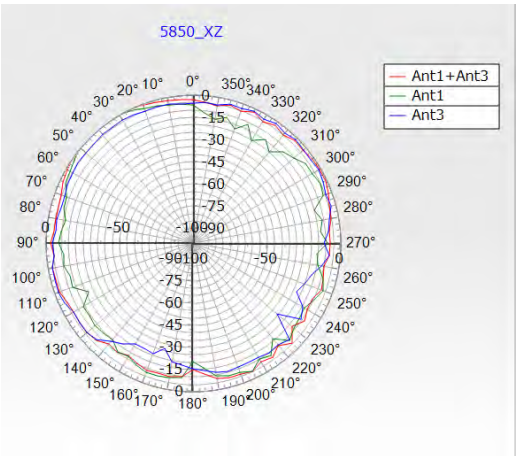
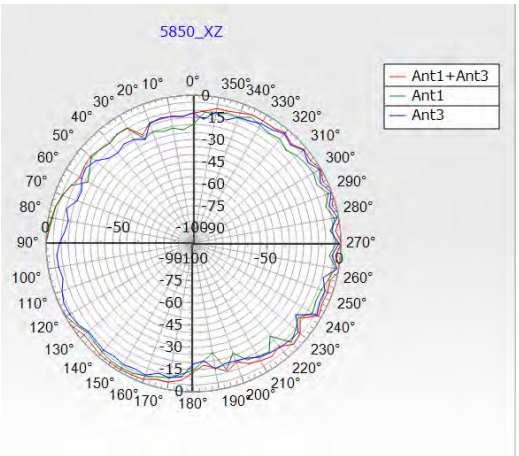
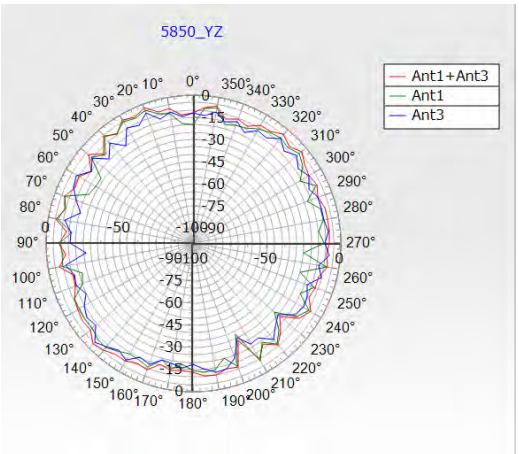
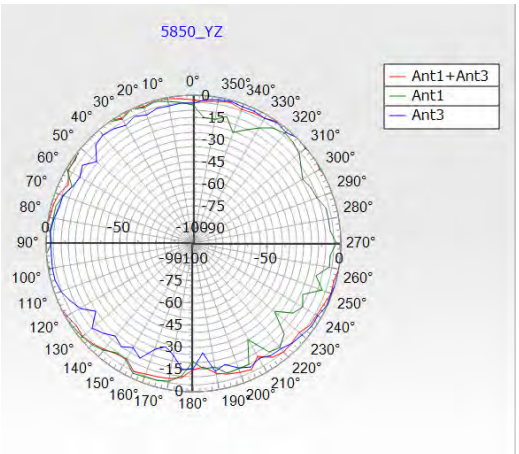
Phi_5350MHz	Theta _5350MHz
	
	
	

Phi_5470MHz	Theta _5470MHz
	
	
	

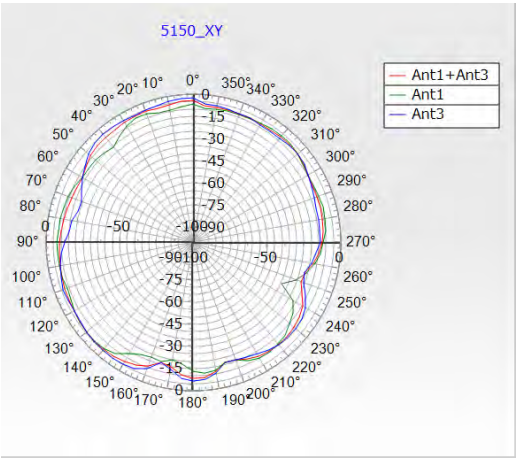
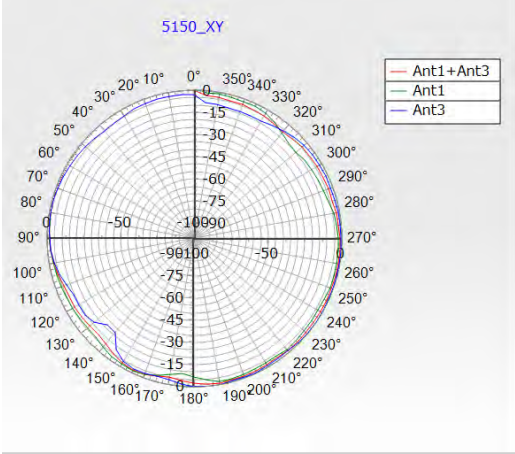
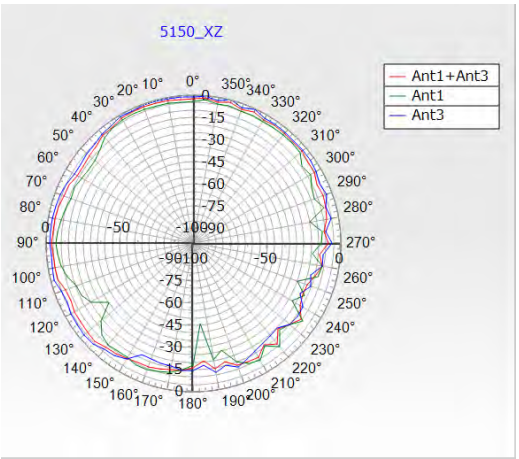
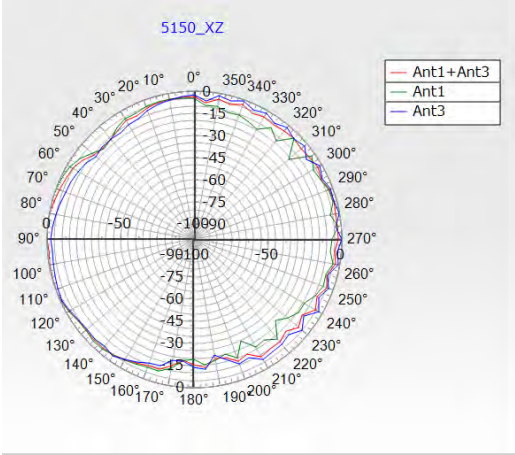
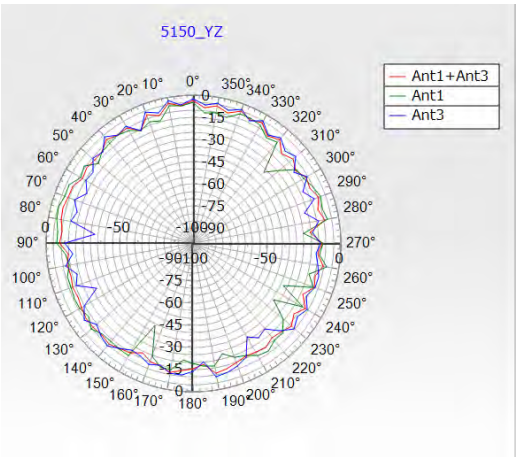
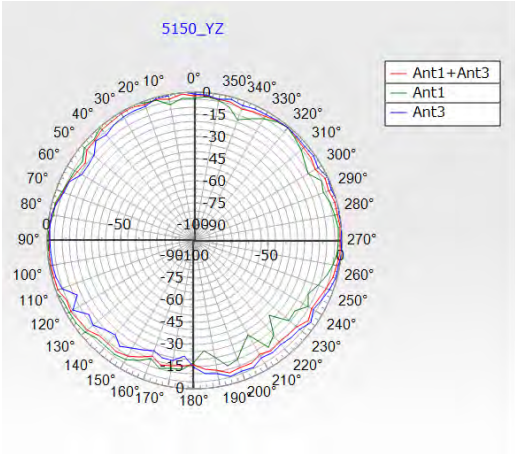
Phi_5580MHz	Theta _5580MHz
	
	
	

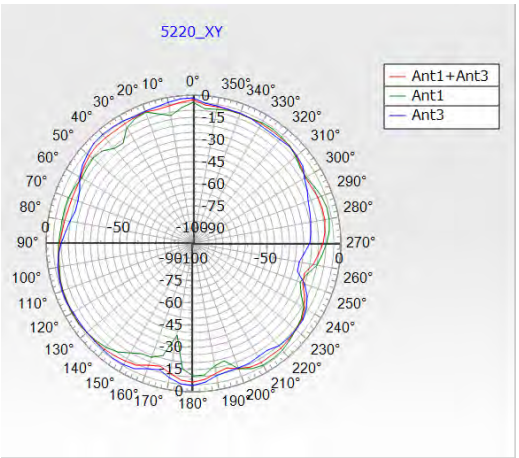
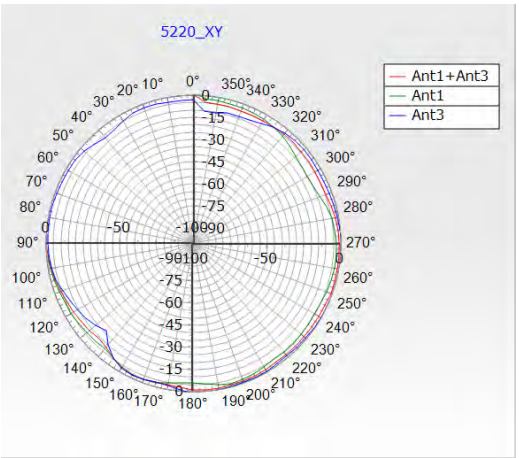
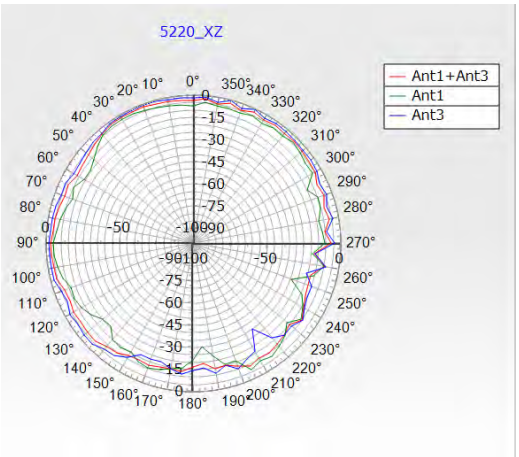
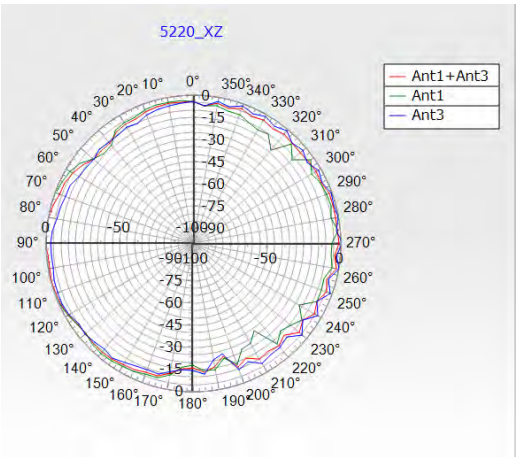
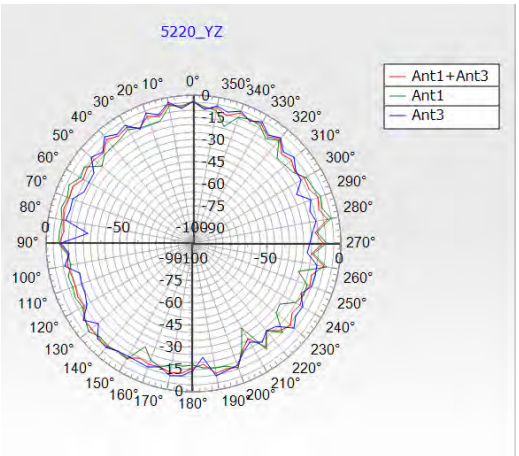
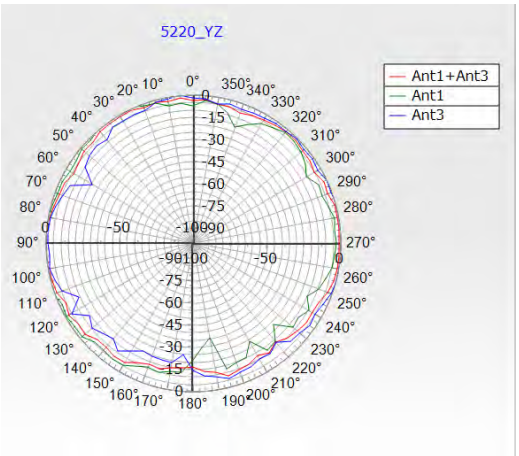
Phi_5725MHz	Theta _5725MHz
	
	
	

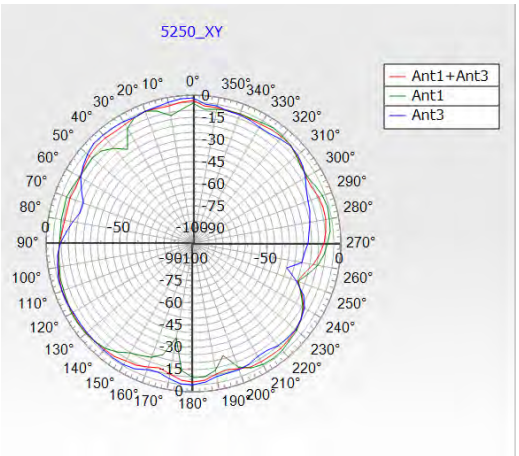
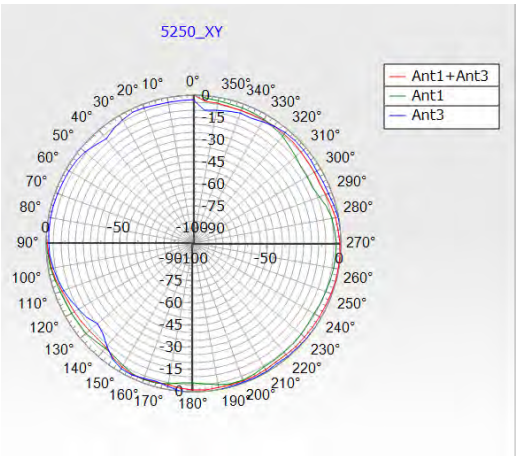
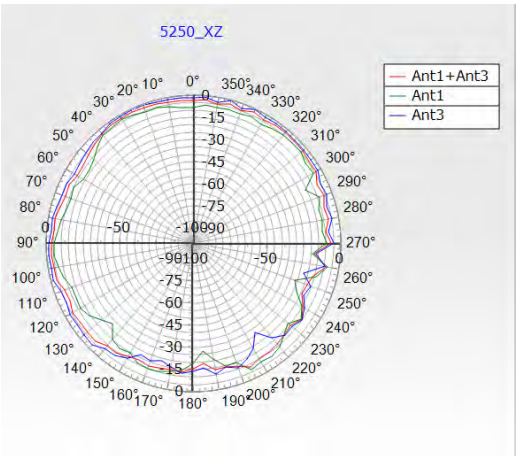
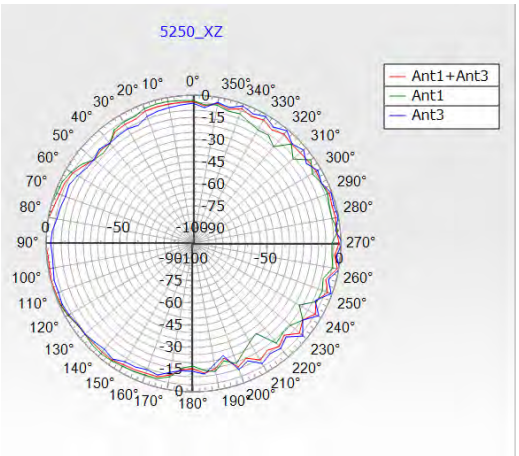
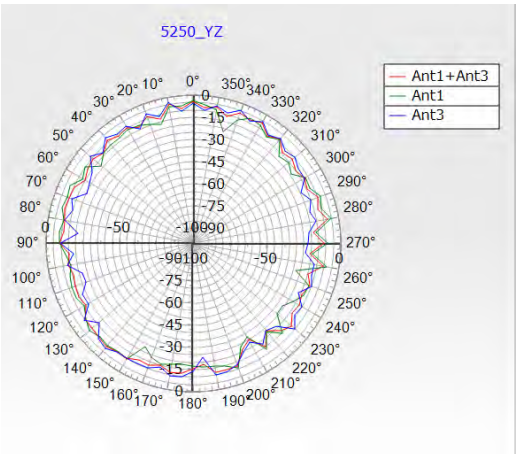
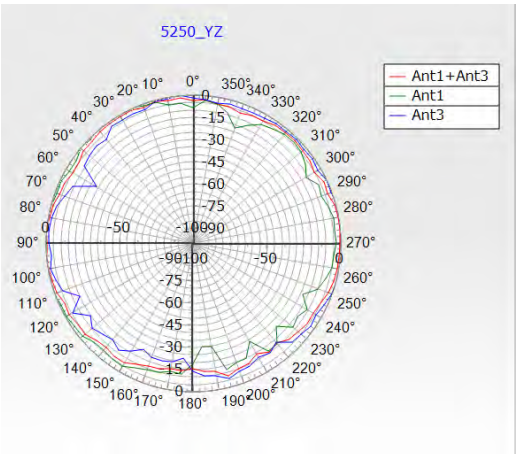
Phi_5785MHz	Theta _5785MHz
	
	
	

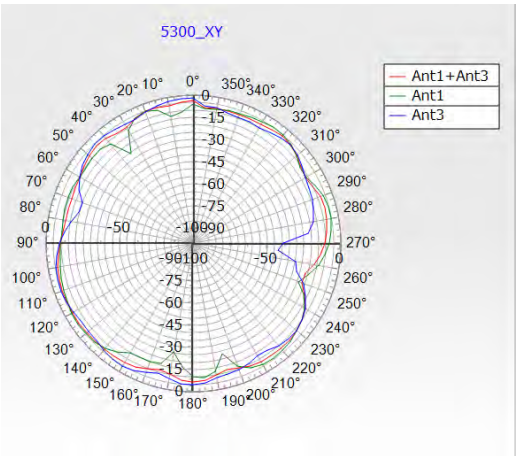
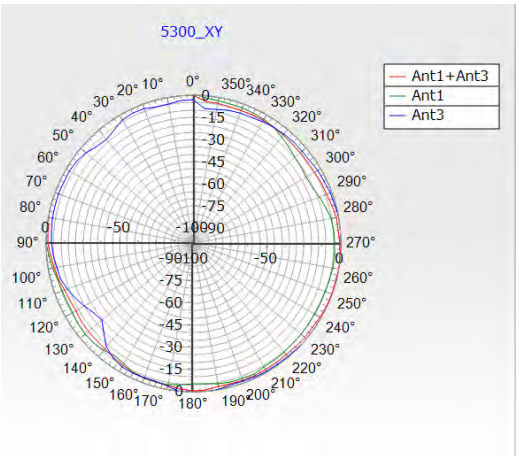
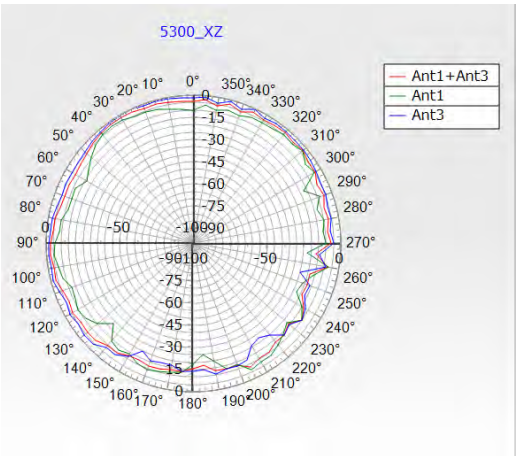
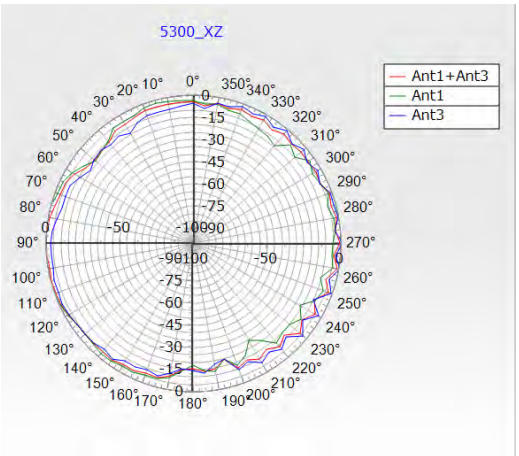
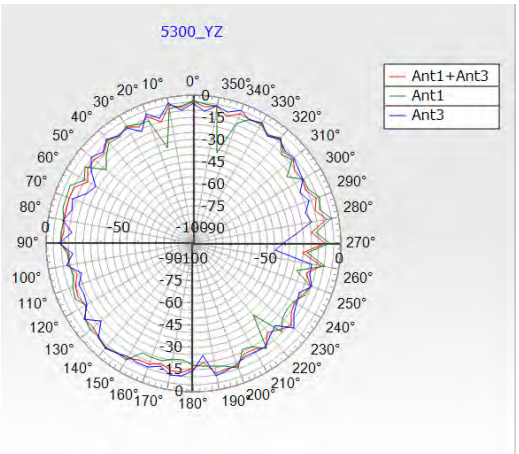
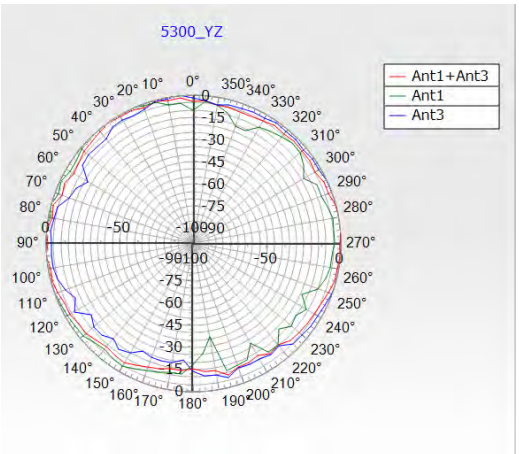
Phi_5850MHz	Theta _5850MHz
	
	
	

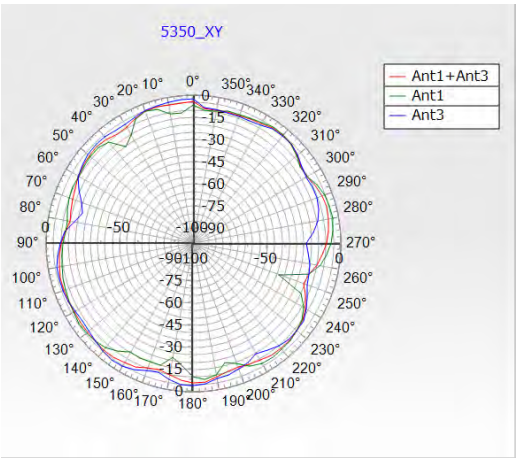
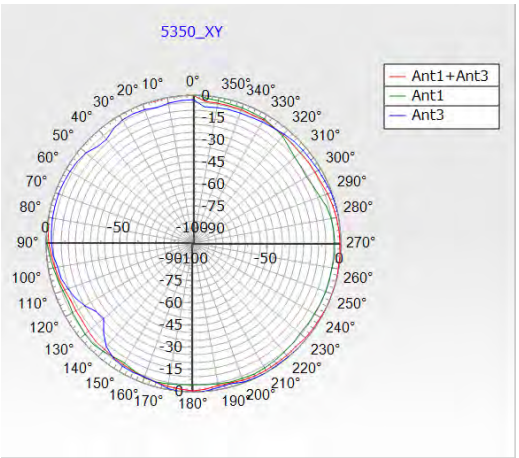
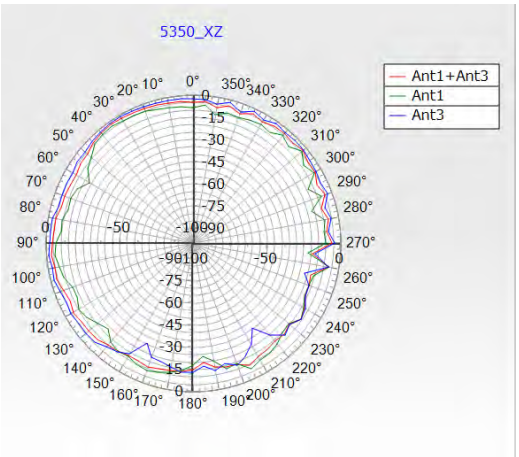
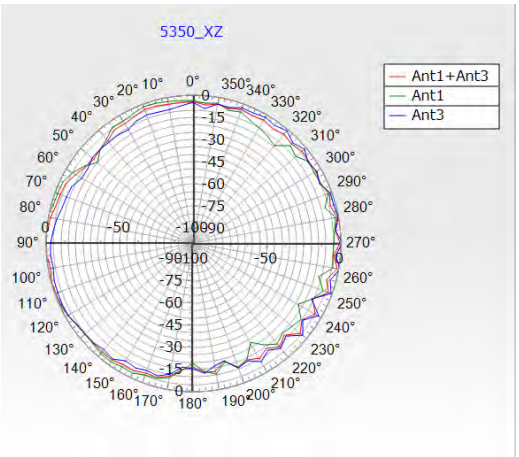
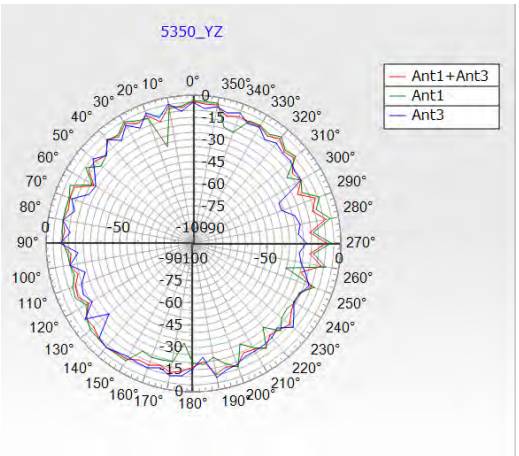
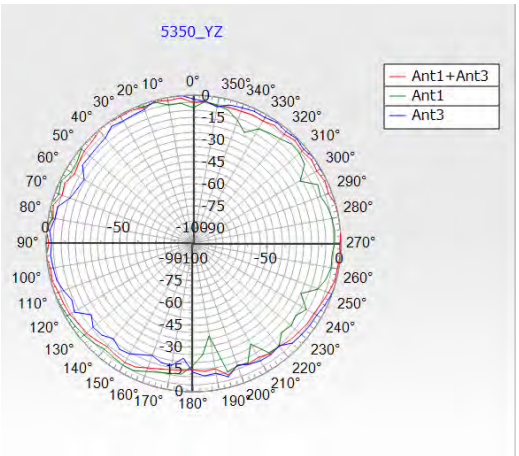
5GHz Ant #1, Ant #3 and Ant (#1 + #3)_Uncorr. DG:

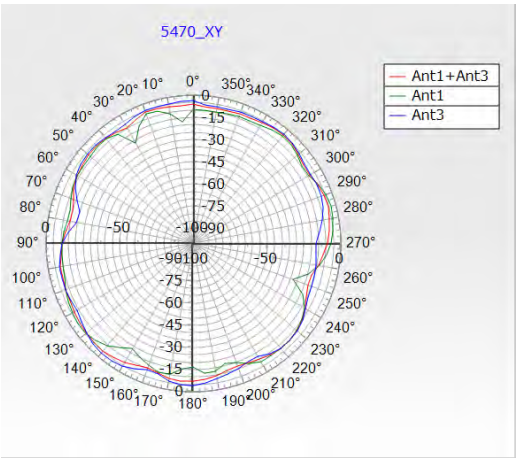
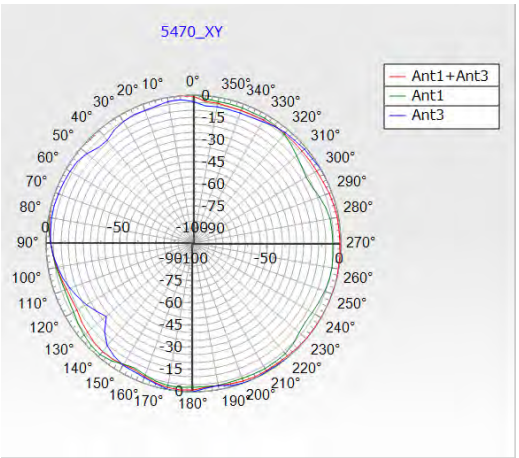
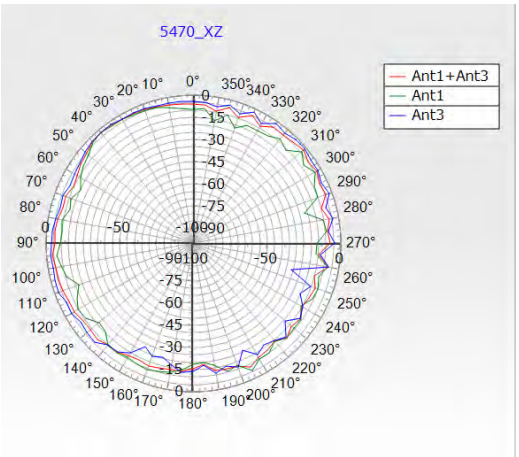
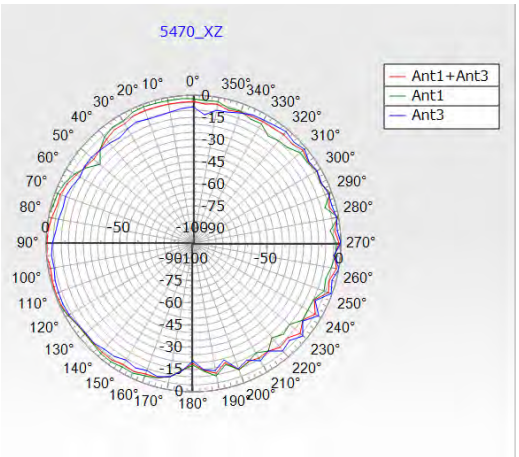
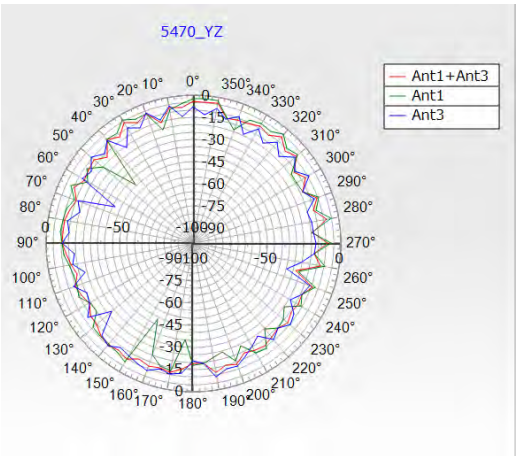
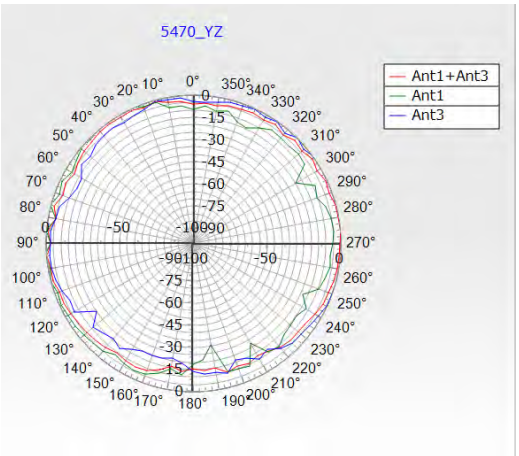
Phi_5150MHz	Theta _5150MHz
	
	
	

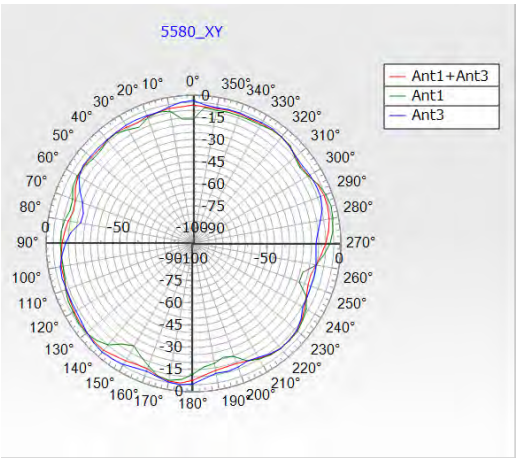
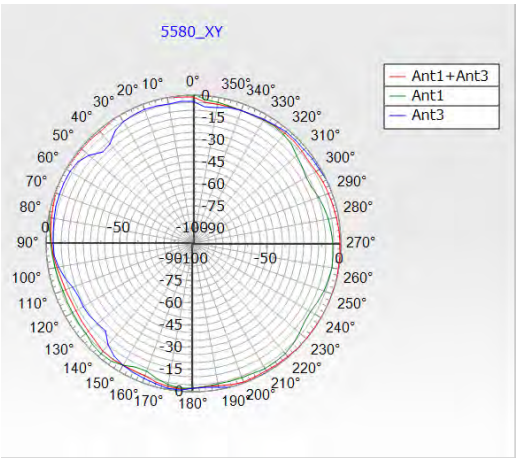
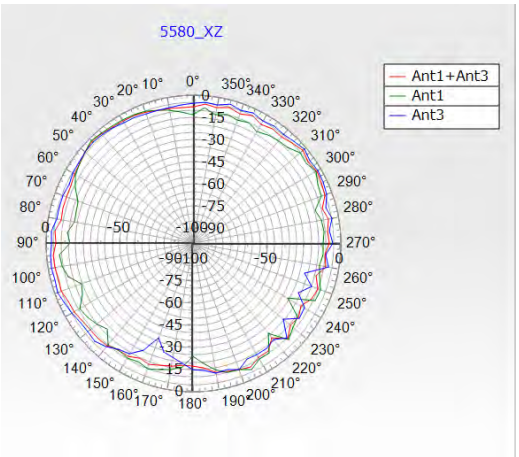
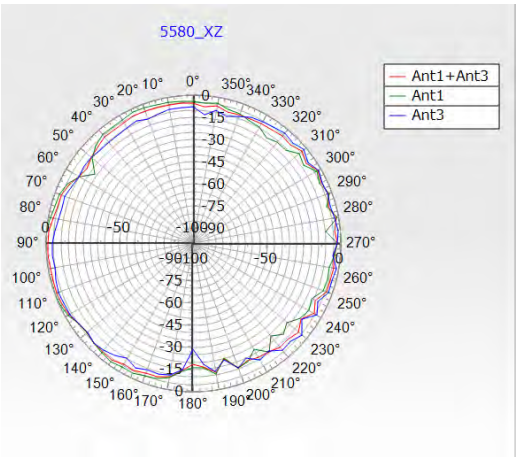
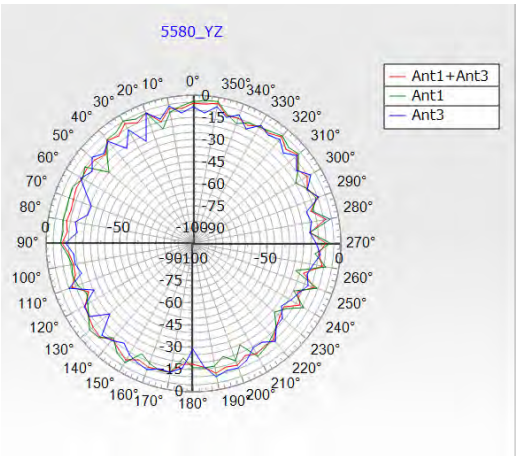
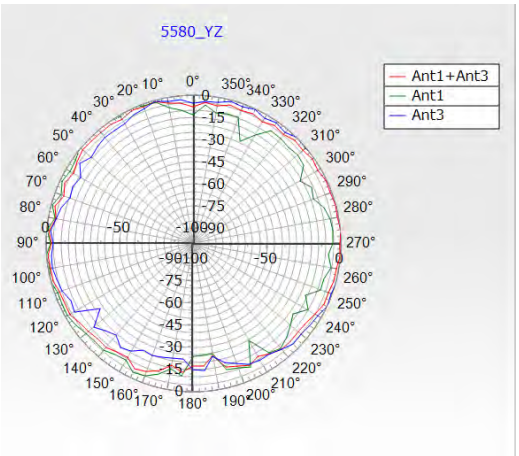
Phi_5220MHz	Theta _5220MHz
	
	
	

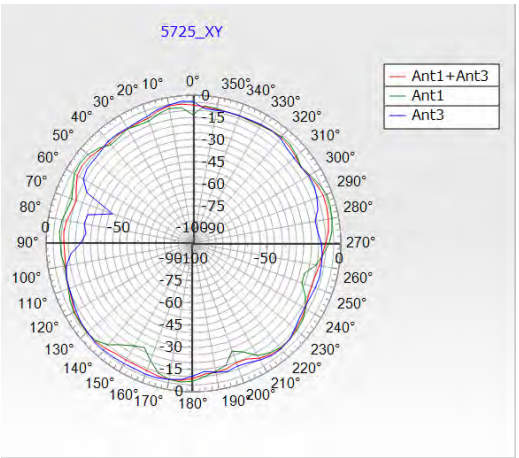
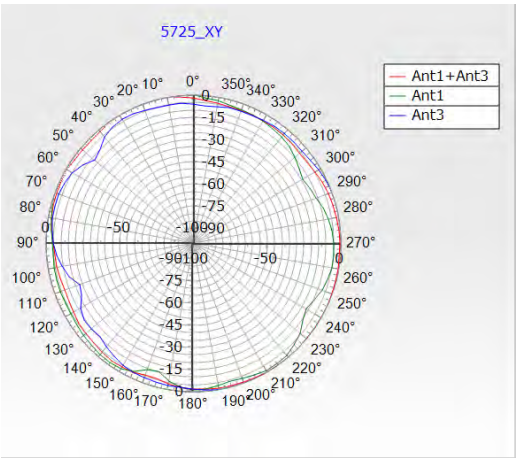
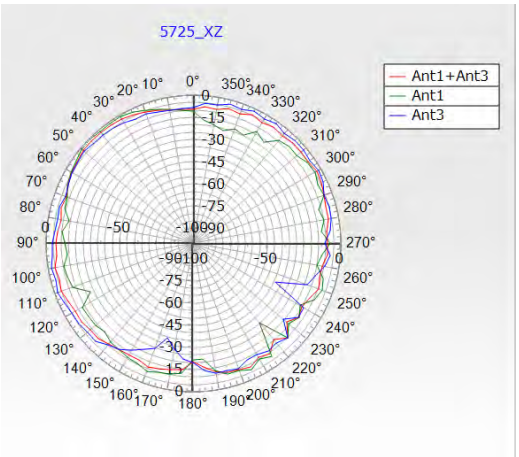
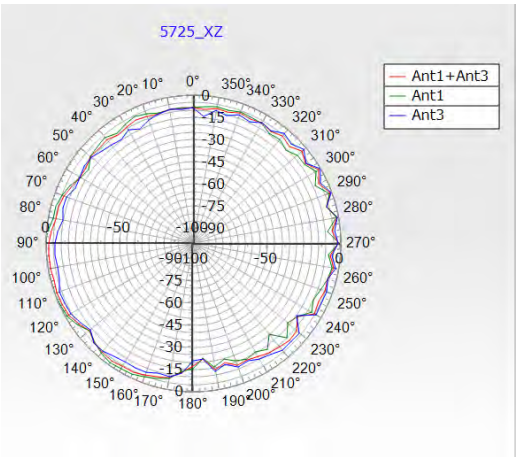
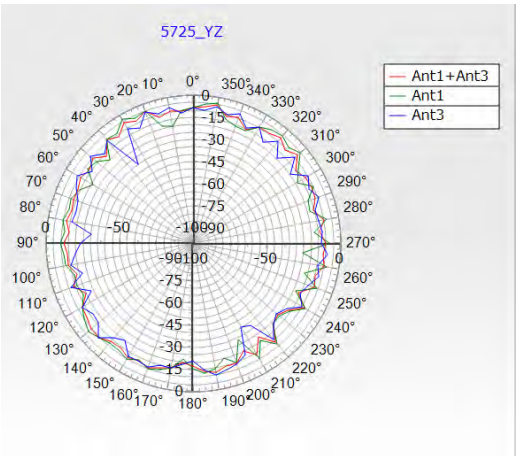
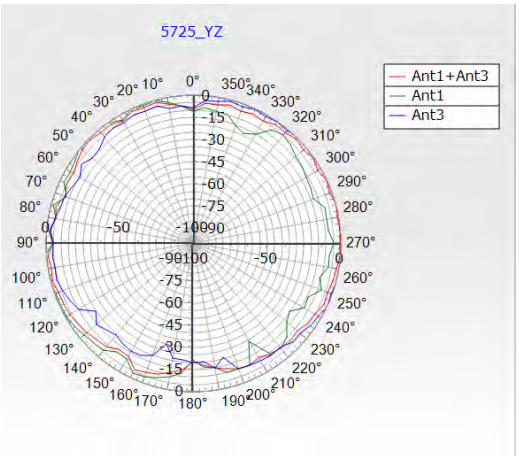
Phi_5250MHz	Theta _5250MHz
	
	
	

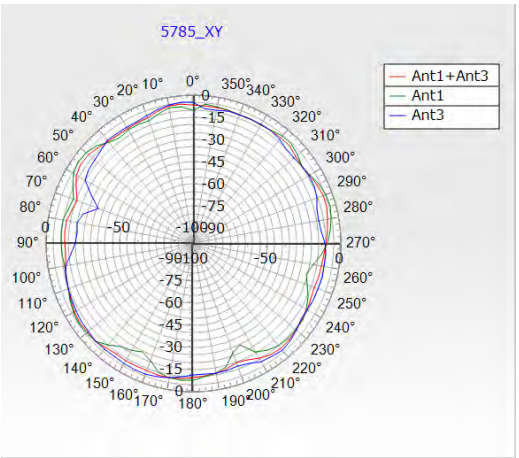
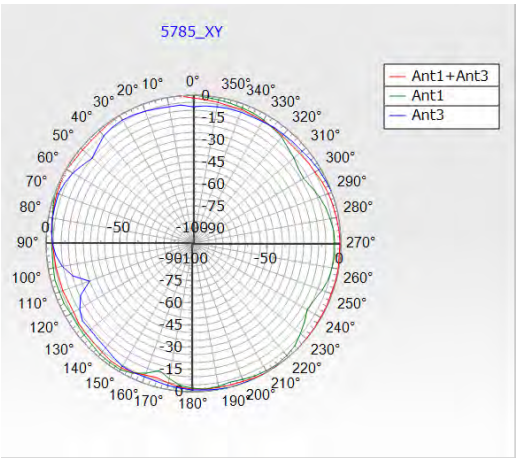
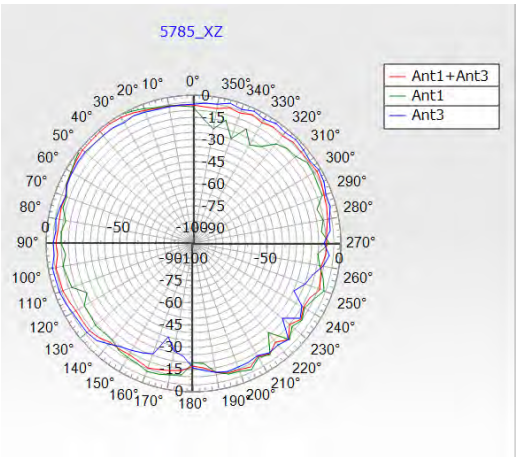
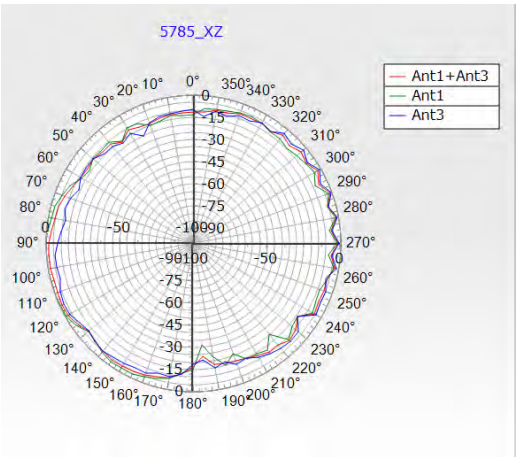
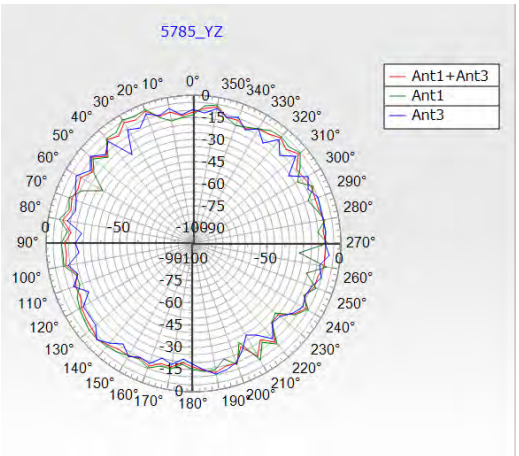
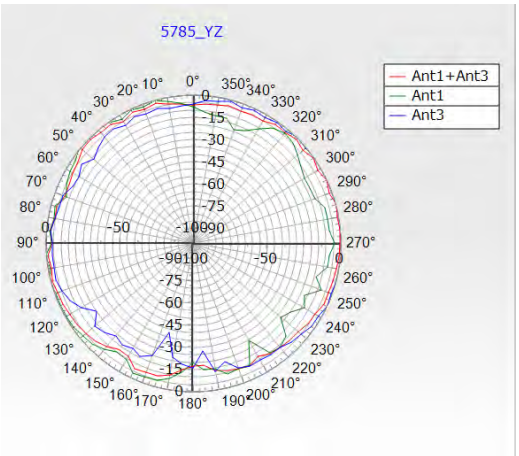
Phi_5300MHz	Theta _5300MHz
	
	
	

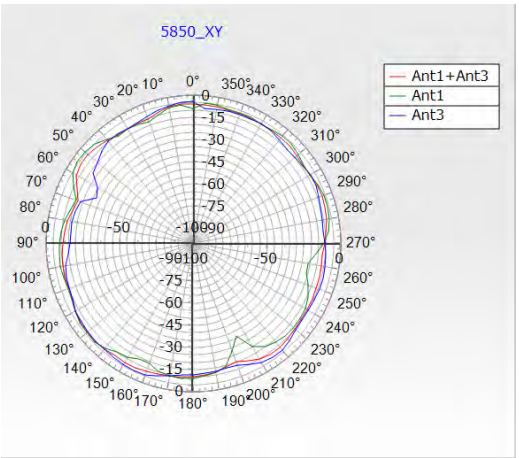
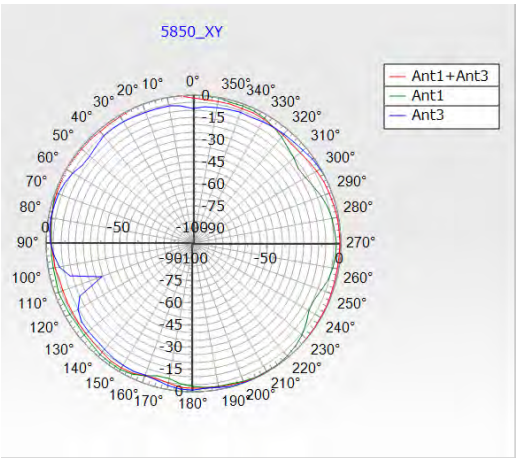
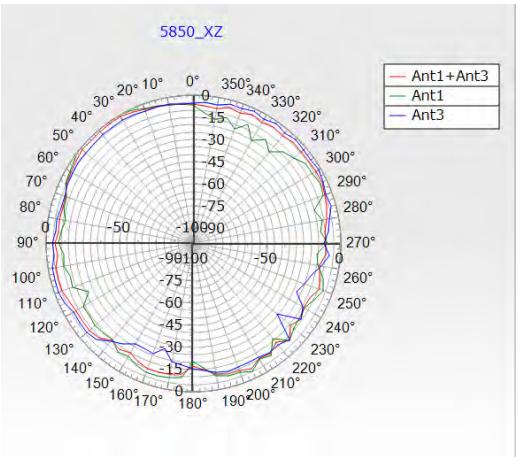
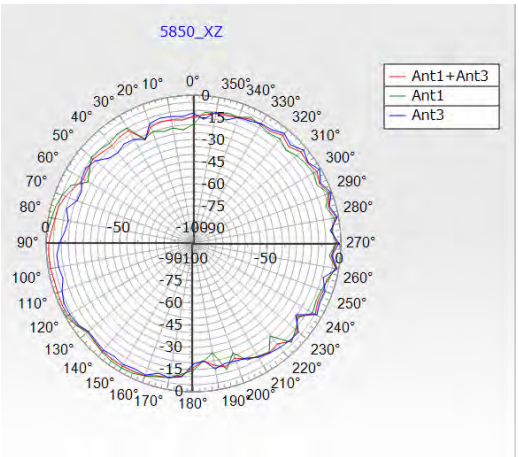
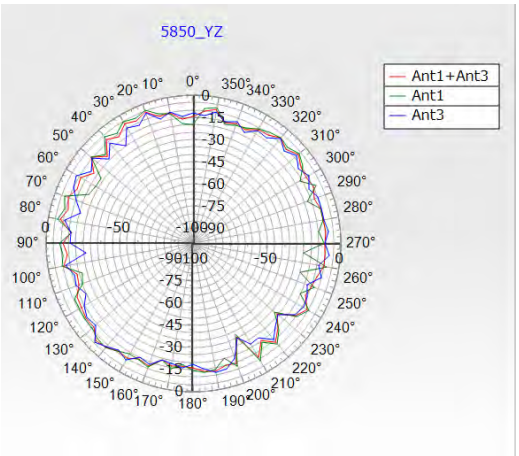
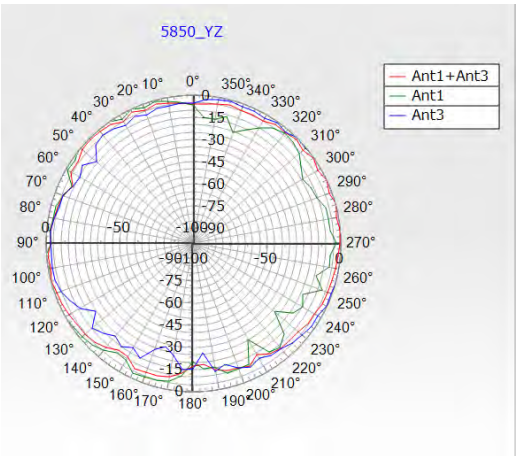
Phi_5350MHz	Theta _5350MHz
	
	
	

Phi_5470MHz	Theta _5470MHz
	
	
	

Phi_5580MHz	Theta _5580MHz
	
	
	

Phi_5725MHz	Theta _5725MHz
	
	
	

Phi_5785MHz	Theta _5785MHz
	
	
	

Phi_5850MHz	Theta _5850MHz
	
	
	

6GHz Ant #2, Ant #4 and Ant (#2 + #4)_Corr. DG:

Phi_5925MHz	Theta _5925MHz