



Antenna Composite Gain Test Report

Equipment	DOCSIS 3.1 WiFi Emta
Brand Name	Hitron
Model Name	CODA-4589, CODA-4582
Applicant	Hitron Technologies Inc. No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park, Hsinchu 30078, Taiwan
Manufacturer	Hitron Technologies Inc. No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park, Hsinchu 30078, Taiwan
Sample Received	Nov. 26, 2021
Start Test Date	Dec. 23, 2021
Final Test Date	Dec. 23, 2021



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History of this test report

Report No.	Version	Description	Issued Date
AP1N2619AA	01	Initial issue of report	Jun. 02, 2022
AP1N2619AA	02	Revising section 5&6 and Appendix C&D	Jun. 10, 2022
AP1N2619AA	03	Revising gain method on page 7 and 8	Jun. 17, 2022



1. Operation Mode and Antenna Information

Antenna Position	RF Port	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
2G Ant1	1	Airgain	M2420SLO-T10-B50U	PCB	I-PEX	2.4GHz
2G Ant2	2	Airgain	M2410CM-T6-B115UR1	PCB	I-PEX	2.4GHz
2G Ant3	3	Airgain	M2420SLO-T6-B85U	PCB	I-PEX	2.4GHz
5G Ant1	1	Airgain	M5X05C-T6-G120UR2	PCB	I-PEX	5GHz UNII 1~3
5G Ant2	2	Airgain	M5X05C-T6-G110UR3	PCB	I-PEX	5GHz UNII 1~3
5G Ant3	3	Airgain	M5X05C-T6-G40UR2	PCB	I-PEX	5GHz UNII 1~3
5G Ant4	4	Airgain	M5X05C-T6-G60UR1	PCB	I-PEX	5GHz UNII 1~3

Note:

2.4GHz Operation Mode (3TX/3RX)

2G Ant1~3 can be used as transmitting/receiving antenna.

2G Ant1~3 could transmit/receive simultaneously.

5GHz Operation Mode (4TX/4RX)

5G Ant1~4 can be used as transmitting/receiving antenna.

5G Ant1~4 could transmit/receive simultaneously.

2. Test Frequency

The listed frequency of each bands are selected to represent each frequency bands

Band [MHz]	Test Frequency [MHz]
2400-2483.5	2450
5150-5250	5200
5250-5350	5300
5470-5725	5600
5725-5850	5785



3. Testing Location

Testing Location		
<input checked="" type="checkbox"/>	HWA YA	ADD : No.13-1 & 14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333, Taiwan R.O.C.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	05CH03-HY	Rex Liao	20.5-21.5 / 45-55	Dec. 23, 2021

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

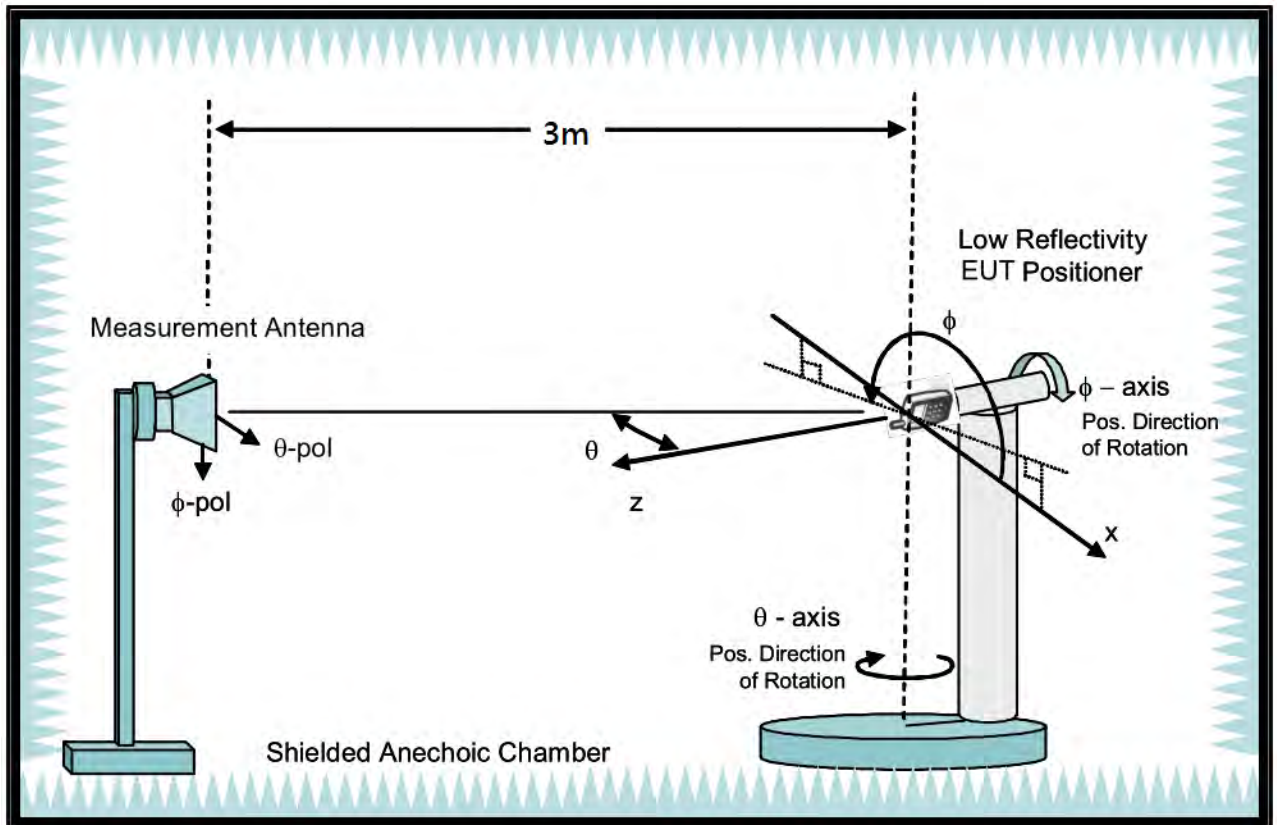
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Single Polarization Horn antenna calibrated according to ANSI C63.5.

Turntable: Multi-axis positioner (Theta and Phi angle).

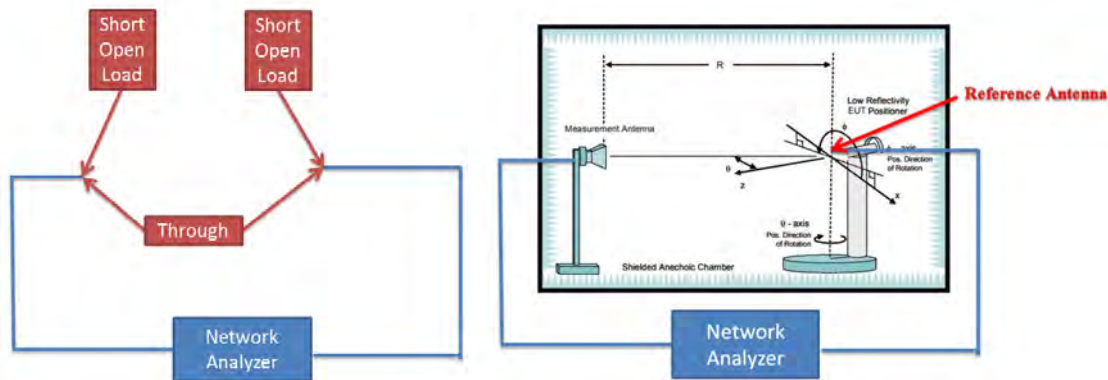
#Reference to CTIA “ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1”



5. Reference Calibration

Connected cables to VNA calibration kit and use network analyzer internal function to do calibration. Do short, open and load to each side. Then connect through to both side and calibrate G values. The cable loss is calibrated and set inside the network analyzer.

Measurement Antenna is connected to port1 of Network analyzer and reference antenna connected to port 2 of Network Analyzer. Record G values and used with reference antenna gain to calculate gain factor.



Frequency (MHz)	2400	2450	2500	5150	5200	5300	5600	5750	5800	5900	6000	6500	7000	7500
G reading (dB)	-31.4	-31.4	-31.3	-31.3	-31	-30.7	-30.1	-30.5	-30.5	-30.8	-31.3	-32.8	-34.4	-35.4
Reference gain (dBi)	10.2	10.4	10.6	12.4	12.8	13.4	13.4	13.3	13.3	13.1	13.2	12.3	11.7	11.1
Factor (dB)	41.34	41.55	41.68	43.24	43.56	43.68	43.79	43.91	43.99	44.43	44.49	45.24	46.12	46.31

Note:

$$G \text{ reading (dB)} = 20 \cdot \log(V2/V1) = 10 \cdot \log(P2/P1)$$

V2 is the voltage of VNA port2 is measured, V1 is the voltage of VNA port1 is the reference source.

P2 is the power of VNA port2 is measured, P1 is the power of VNA port1 is the reference source.

$$\text{Factor} = \text{gain factor} + \text{power gain conversion} = (\text{Reference antenna gain}) - (G \text{ reading})$$



6. Test Method

EUT set on multi-axis positioner and adjust EUT's physical center to measurement reference center. Measurement antenna set at phi polarization and 1.5 meter height. Port 1 of Network analyzer connect to antenna 1 of EUT. Record G value every 15 degree from 0 to 345 degree on Phi angle and 0 to 180 on theta angle of multi-axis positioner. Then set measurement antenna to theta polarization and repeat process. Repeat process to each antenna of EUT.

DG steps:

1. Each Phi and Theta polarization antenna gain are measured for all test angles.
2. Composite Phi and Theta antenna gain are computed, using formula in KDB662911 D01 d) (i) and e) (ii), for all angles.
3. Composite antenna gain are examined for all angles to determine max gain and Phi/Theta position. Max gain and phi/theta position are listed in section 7 tables.

Note: Antenna gain = G reading + factor, The factor of chapter five includes reference antenna gain factor and power gain conversion.



7. Measured Values and Calculation of Maximum Gain Positions

For 2.4GHz

DG_1SS Max Value Position

Frequency (Hz)	2.4G	2.45G	2.4835G
Ant. 1 (dBi)	-5.26	-5.15	-5.98
Ant. 2 (dBi)	3.6	3.42	3.24
Ant. 3 (dBi)	1.56	2.22	1.78
DG [1SS] (dBi)	5.48	5.67	5.28
Polarization	Theta	Theta	Theta
Θ (°)	60	60	60
Φ (°)	90	90	90

Note: The DG 1SS max value position is the maximum value of section 11 table DG 1SS Result.

DG_1SS Max Value Position Calculation

Frequency (Hz)	2.4G	2.45G	2.4835G
Ant. 1 [10 ^{^(G/20)}]	10 ^{^(-5.26/20)}	10 ^{^(-5.15/20)}	10 ^{^(-5.98/20)}
Ant. 2 [10 ^{^(G/20)}]	10 ^{^(3.6/20)}	10 ^{^(3.42/20)}	10 ^{^(3.24/20)}
Ant. 3 [10 ^{^(G/20)}]	10 ^{^(1.56/20)}	10 ^{^(2.22/20)}	10 ^{^(1.78/20)}
Ant. 1 [10 ^{^(G/20)}] value	0.546	0.553	0.502
Ant. 2 [10 ^{^(G/20)}] value	1.514	1.483	1.452
Ant. 3 [10 ^{^(G/20)}] value	1.197	1.291	1.227
Sum All Antenna [Amax]	3.256	3.326	3.182
DG [10*log(Amax ² /Nant)]	5.48	5.67	5.28

Note:

Directional Gain (1SS) is the max value of every look angle. Each position value is calculated by KDB662911 D01 d) (i).

$$\text{Directional gain (1SS)} = 10 * \log(10^{(G_{ant1}/20)} + 10^{(G_{ant2}/20)} + 10^{(G_{ant3}/20)} + 10^{(G_{ant4}/20)} + \dots)^{2/N_{ant}}$$



For 5GHz

DG_1SS Max Value Position

Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	-2.34	2.42	-7.34	0.33
Ant. 2 (dBi)	3.11	-4.43	2.19	0.55
Ant. 3 (dBi)	-1.83	0.53	2.82	0.39
Ant. 4 (dBi)	1.49	2.03	-2.56	-1.6
DG [1SS] (dBi)	6.43	6.54	5.68	5.98
Polarization	Theta	Theta	Theta	Theta
Θ (°)	105	75	90	120
Φ (°)	30	150	255	30

Note: The DG 1SS max value position is the maximum value of section 11 table DG 1SS Result.

DG_1SS Max Value Position Calculation

Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 [10 ^{^(G/20)}]	10 ^{^(-2.34/20)}	10 ^{^(2.42/20)}	10 ^{^(-7.34/20)}	10 ^{^(0.33/20)}
Ant. 2 [10 ^{^(G/20)}]	10 ^{^(3.11/20)}	10 ^{^(-4.43/20)}	10 ^{^(2.19/20)}	10 ^{^(0.55/20)}
Ant. 3 [10 ^{^(G/20)}]	10 ^{^(-1.83/20)}	10 ^{^(0.53/20)}	10 ^{^(2.82/20)}	10 ^{^(0.39/20)}
Ant. 4 [10 ^{^(G/20)}]	10 ^{^(1.49/20)}	10 ^{^(2.03/20)}	10 ^{^(-2.56/20)}	10 ^{^(-1.6/20)}
Ant. 1 [10 ^{^(G/20)}] value	0.764	1.321	0.43	1.039
Ant. 2 [10 ^{^(G/20)}] value	1.431	0.6	1.287	1.065
Ant. 3 [10 ^{^(G/20)}] value	0.81	1.063	1.384	1.046
Ant. 4 [10 ^{^(G/20)}] value	1.187	1.263	0.745	0.832
Sum All Antenna [Amax]	4.192	4.248	3.845	3.982
DG [10*log(Amax ² /Nant)]	6.43	6.54	5.68	5.98

Note:

Directional Gain (1SS) is the max value of every look angle. Each position value is calculated by KDB662911 D01 d) (i).

$$\text{Directional gain (1SS)} = 10 * \log(10^{(G_{ant1}/20)} + 10^{(G_{ant2}/20)} + 10^{(G_{ant3}/20)} + 10^{(G_{ant4}/20)} + \dots)^{2/N_{ant}}$$



8. Summary of Test Result

Frequency (Hz)	2.4G	2.45G	2.4835G
Ant. 1 Max Gain (dBi)	3.8	4.29	4.5
Ant. 2 Max Gain (dBi)	3.98	3.94	3.74
Ant. 3 Max Gain (dBi)	3.68	4.3	4.25
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/75/120	Phi/30/105	Phi/30/105
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/90/75	Theta/90/75	Theta/90/90
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/75/195	Theta/75/195	Theta/75/195
Max Gain (dBi)	3.98	4.3	4.5
DG [1SS] (dBi)	5.48	5.67	5.28
DG [3SS] (dBi)	3.98	4.3	4.5

Note:

1. Antenna max gain is the max value of each individual antenna through all measurement angles.
2. The max gain is the max value of all antennas.
3. Directional Gain (2SS) = Directional Gain (1SS) – 3dB. If directional gain is less than max gain, use max gain as directional gain.
4. Directional Gain (3SS) = Directional Gain (1SS) – 4.77dB. If directional gain is less than max gain, use max gain as directional gain.

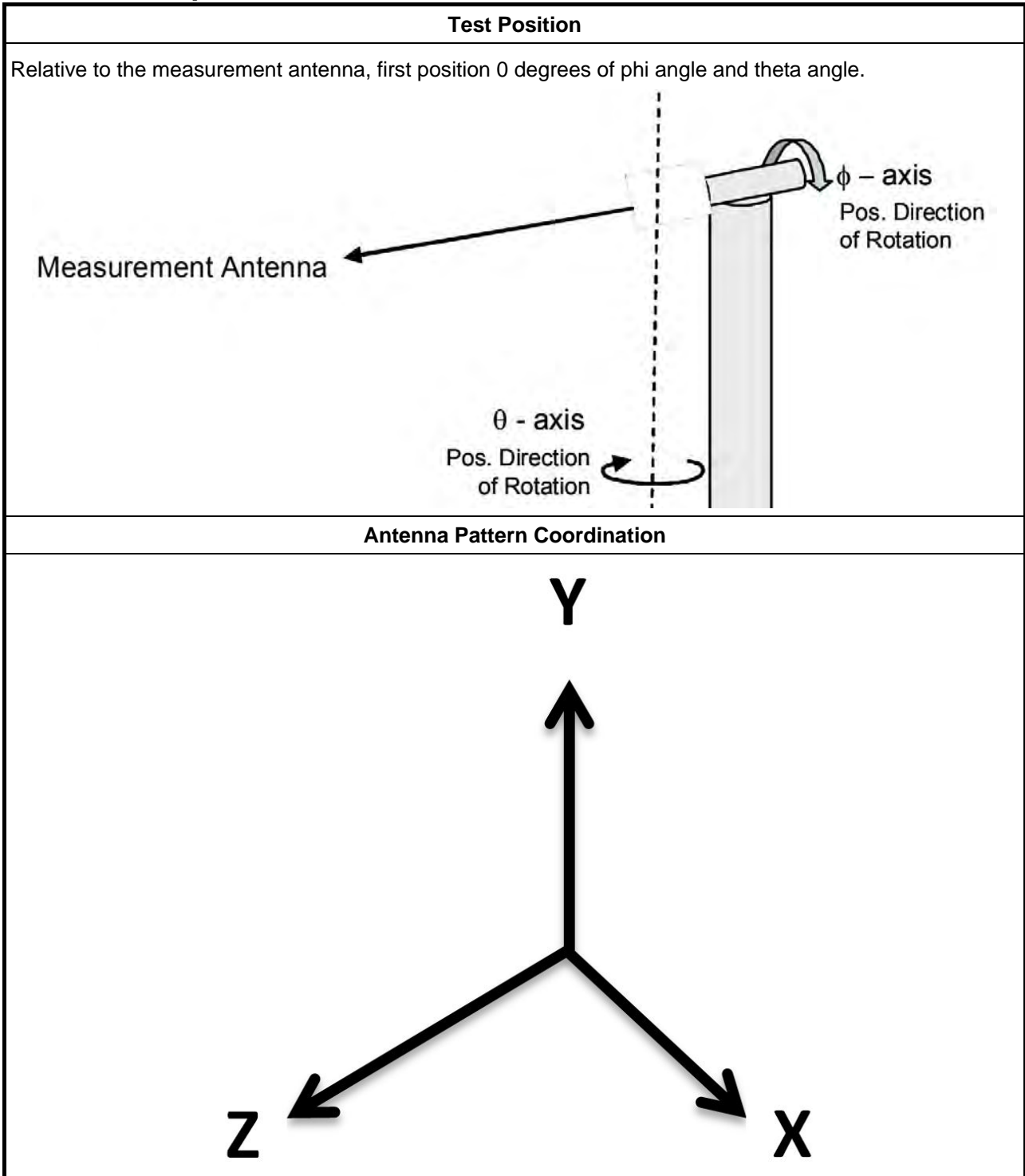


Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.47	3.22	1.61	1.58
Ant. 2 Max Gain (dBi)	3.29	3.13	2.57	2.6
Ant. 3 Max Gain (dBi)	5.07	5.49	2.82	4.28
Ant. 4 Max Gain (dBi)	2.2	3.08	1.2	1.19
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/90/135	Theta/90/135	Theta/135/120	Theta/135/120
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/90/285	Theta/90/285	Theta/105/255	Theta/105/255
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/90/315	Theta/90/315	Theta/90/255	Theta/105/270
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/90/150	Theta/90/150	Theta/90/135	Theta/90/105
Max Gain (dBi)	5.07	5.49	2.82	4.28
DG [1SS] (dBi)	6.43	6.54	5.68	5.98
DG [2SS] (dBi)	5.07	5.49	2.82	4.28
DG [4SS] (dBi)	5.07	5.49	2.82	4.28

Note:

1. Antenna max gain is the max value of each individual antenna through all measurement angles.
2. The max gain is the max value of all antennas.
3. Directional Gain (2SS) = Directional Gain (1SS) – 3dB. If directional gain is less than max gain, use max gain as directional gain.
4. Directional Gain (3SS) = Directional Gain (1SS) – 4.77dB. If directional gain is less than max gain, use max gain as directional gain.
5. Directional Gain (4SS) = Directional Gain (1SS) – 6dB. If directional gain is less than max gain, use max gain as directional gain.

9. Test Setup



Note:

Photos of Test Position: Please refer to the test photos in the appendix.



10. Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA 9120D-1292	1GHz~18GHz	Aug. 04, 2021	Aug. 03, 2022
Test Software	SPORTON	SENSE-RDG	V1.0.6	-	N.C.R.	N.C.R.

Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.



11. Test Results

Please refer to the appendix.

Appendix A – Radiated Composite Gain of 2.4GHz.....	Page 16
Appendix B – Radiated Composite Gain of 5GHz U-NII 1~U-NII 3.....	Page 22
Appendix C – Antenna Pattern of 2.4GHz.....	Page 30
Appendix D – Antenna Pattern of 5GHz U-NII 1~U-NII 3.....	Page 34
Appendix E – Test Photos.....	Page 39



Freq(Hz)	2.4G	2.45G	2.4835G
Ant. 1 Max Gain (dBi)	3.8	4.29	4.5
Ant. 2 Max Gain (dBi)	3.98	3.94	3.74
Ant. 3 Max Gain (dBi)	3.68	4.3	4.25
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/75/120	Phi/30/105	Phi/30/105
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/90/75	Theta/90/75	Theta/90/90
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/75/195	Theta/75/195	Theta/75/195
Max Gain (dBi)	3.98	4.3	4.5
DG [1SS] (dBi)	5.48	5.67	5.28
DG [3SS] (dBi)	3.98	4.3	4.5



DG 1SS Result

Table with columns for Freq(Hz), DG(dB), and various Phi and Theta angles (0 to 345 degrees) for 2.4G and 2.45G frequencies. The table contains multiple rows of data for each frequency, showing gain values in dB.



Θ(180°)	-9.18	-10.28	-10.59	-10.65	-10.76	-11.46	-11.71	-12.57	-13.45	-12.62	-9.66	-8.04	-8.01	-8.09	-8.36	-9.08	-11.22	-13.53	-12.42	-10.72	-9.7	-8.15	-7.54	-7.83
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Gain Result

Table with columns: Freq(Hz), Pol., Phi, Ant. 1, and Gain for various angles (Theta) and frequencies (2.4G, 2.45G, 2.4835G). Rows include Gain, Theta(0), Theta(15), Theta(30), Theta(45), Theta(60), Theta(75), Theta(90), Theta(105), Theta(120), Theta(135), Theta(150), Theta(165), Theta(180).



Radiated Composite Gain_2.4GHz

Appendix A

Table with columns for frequency (2.4G, 2.45G, 2.4835G), antenna type (Theta, Phi), and gain values for various angles (0 to 180 degrees).



Radiated Composite Gain_2.4GHz

Appendix A

Table with columns for Gain, Theta, Phi, and various frequency/angle combinations. Includes data for 2.45G and 2.4835G frequencies across multiple angles (Theta and Phi).



Freq(Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.47	3.22	1.61	1.58
Ant. 2 Max Gain (dBi)	3.29	3.13	2.57	2.6
Ant. 3 Max Gain (dBi)	5.07	5.49	2.82	4.28
Ant. 4 Max Gain (dBi)	2.2	3.08	1.2	1.19
Ant. 1 Polarization/ Θ (°)/ Φ (°)	Theta/90/135	Theta/90/135	Theta/135/120	Theta/135/120
Ant. 2 Polarization/ Θ (°)/ Φ (°)	Theta/90/285	Theta/90/285	Theta/105/255	Theta/105/255
Ant. 3 Polarization/ Θ (°)/ Φ (°)	Theta/90/315	Theta/90/315	Theta/90/255	Theta/105/270
Ant. 4 Polarization/ Θ (°)/ Φ (°)	Theta/90/150	Theta/90/150	Theta/90/135	Theta/90/105
Max Gain (dBi)	5.07	5.49	2.82	4.28
DG [1SS] (dBi)	6.43	6.54	5.68	5.98
DG [2SS] (dBi)	5.07	5.49	2.82	4.28
DG [4SS] (dBi)	5.07	5.49	2.82	4.28



DG 1SS Result

Table with columns for Freq(Hz), DG(dB), and various Phi angles (0 to 345 degrees) for frequencies 5.2G, 5.3G, and 5.6G. The table contains multiple rows of data for each frequency, showing gain values in dB across different angles.



Radiated Composite Gain_ 5GHz U-NII 1~U-NII 3

Appendix B

Θ(180°)	-11.55	-11.99	-10.58	-10.42	-12.75	-12.13	-12.13	-12.81	-11.1	-11.32	-10.8	-11	-10.77	-11.6	-11.28	-11.52	-12.56	-11.18	-9.83	-9.75	-9.18	-10.15	-11.95	-12.6
Freq(Hz)	5.785G	Pol.	Phi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG(dB)	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-5.7	-4.23	-5.35	-4.87	-6.03	-7.98	-9.24	-9.38	-8.1	-7.3	-5.85	-4.63	-3.17	-3.52	-3.63	-4.26	-4.95	-6.12	-9.51	-9.65	-9.2	-6.99	-7.07	-8.26
Θ(15°)	-3.8	-3.13	-4.41	-5.49	-5.63	-7.01	-8.12	-9.38	-10.07	-8.05	-5.73	-5.19	-4.26	-4.2	-5.13	-5.6	-5.94	-6.38	-6.96	-8.23	-7.72	-7.02	-5.75	-4.57
Θ(30°)	-3.76	-5.01	-5.07	-7.86	-11.28	-9.22	-7.87	-6.35	-7.18	-7.41	-5.69	-6.26	-8.79	-8.49	-5.3	-5.58	-5.27	-7.31	-6.82	-8.57	-8.69	-6.34	-5.53	-4.37
Θ(45°)	-6.81	-8.41	-7.78	-8.36	-11.05	-8.07	-4.31	-2.82	-3.23	-4.04	-5.8	-6.98	-8.74	-6.49	-8.36	-7.68	-6.64	-10.02	-8.31	-9.19	-9.83	-6.93	-4.57	-5.94
Θ(60°)	-4.92	-7.94	-5.11	-6.2	-8.5	-8.9	-6.64	-6.37	-4.63	-2.76	-3.57	-4.05	-7.9	-6.24	-6.7	-8.75	-5.97	-6.79	-7.43	-5.89	-7.29	-6.32	-4.23	-2.86
Θ(75°)	-6.83	-8.81	-10.18	-9.42	-9.93	-9.92	-9.18	-7.23	-9.59	-7.26	-8.54	-7.1	-10.28	-10.16	-7.19	-6.43	-7.82	-6.7	-3.83	-4.41	-7.03	-9.91	-7.34	-5.03
Θ(90°)	-9.33	-9.73	-8.02	-6.15	-5.62	-7.76	-11.51	-12.8	-12.79	-7.57	-10.64	-7.99	-9.83	-7.62	-7.61	-7.63	-6.05	-4.57	-3.07	-3.91	-5.21	-4.42	-7.9	-9.11
Θ(105°)	-5.89	-11.2	-6.95	-6.19	-6.53	-8.7	-6.7	-8.98	-11.64	-3.98	-6.73	-7.67	-8.46	-7.89	-8.45	-9.23	-7.24	-10.75	-9.79	-6.13	-5.57	-4.74	-4.4	-7.79
Θ(120°)	-5.32	-5.88	-5.51	-8.96	-7.55	-8.35	-6.21	-5.79	-9.21	-4.35	-7.09	-8.14	-6.65	-5.78	-9.71	-4.45	-9.42	-4.64	-10.63	-6.27	-8.92	-6.77	-2.53	-6.68
Θ(135°)	-6.41	-5.53	-5.74	-7.14	-6.29	-8.18	-10.5	-7.96	-6.29	-7.84	-7.93	-5.92	-7.91	-7.59	-8.71	-7.56	-4.05	-6.05	-7.89	-1.32	-6.96	-4.25	-5.38	-7.96
Θ(150°)	-7.09	-5.13	-5.65	-4.51	-7.5	-7.92	-8.27	-5.67	-7.89	-8.72	-4.87	-4.1	-4.32	-7.26	-7.81	-4.51	-6.33	-8.63	-7.44	-11.32	-5.47	-4.13	-6.65	-11.22
Θ(165°)	-8.86	-7.83	-6.62	-4.38	-5.6	-8.66	-10.81	-8.4	-6.25	-6.68	-6.97	-7.75	-7.42	-6.89	-6.19	-8.52	-9.42	-7.88	-6.39	-7.48	-6.32	-5.76	-7.37	-9.53
Θ(180°)	-9.07	-9.93	-10.94	-9.52	-10.78	-11.15	-11.23	-10.75	-12.34	-12.39	-11.94	-11.17	-10.27	-10.05	-9.93	-9.87	-9.83	-11.37	-12.42	-12.57	-11.76	-10.42	-11.15	-10.71
Freq(Hz)	5.785G	Pol.	Theta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG(dB)	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-8.07	-8.03	-9.74	-8.93	-7.27	-5.72	-4.82	-4.58	-4.66	-4.42	-5.9	-7.13	-8.64	-10.64	-9.4	-9.35	-7.32	-4.86	-5.44	-4.43	-4.76	-4.32	-5.98	-7.25
Θ(15°)	-7.64	-7.41	-6.3	-5.15	-4.87	-5.75	-7.74	-8.8	-9.17	-8.13	-7.16	-4.58	-3.62	-2.78	-3.55	-4.1	-4.1	-5.01	-5.41	-3.9	-2.6	-4.05	-4.83	-7.12
Θ(30°)	-4.33	-3.9	-5.13	-3.3	-2.31	-1.28	-2.07	-5.38	-4.82	-3.78	-2.98	-4.07	-3.04	-3.12	-5.7	-5.02	-1.86	0.37	-0.63	-2.93	-5.08	-6.19	-6.15	-4.79
Θ(45°)	-3.57	-4.03	-1.07	0.54	-0.43	1.49	1.12	-0.54	0.77	1.21	-0.72	-2.53	-1.79	-1.84	-0.42	0.75	1.83	2.06	-0.03	-2.69	0.06	0.81	-1.31	-2.77
Θ(60°)	0.36	1.4	2.09	2.5	1.11	2.22	1.43	-0.23	-2.06	-0.28	-1.49	0.49	-1.56	0.48	1.26	1.53	2.62	2.49	2.52	1.21	2.15	2.09	0.71	1.89
Θ(75°)	2.71	3.32	2.46	1.99	2.68	4.13	3.64	2.06	0.59	2.18	3.14	3.12	2.27	3.76	3.35	2.9	2.86	2.23	1.51	2.5	0.97	1.25	1.87	2.65
Θ(90°)	2.46	3.55	2.32	2.36	2.35	3.63	2.19	2.52	1.09	2.67	3.11	2.66	1.57	2.78	1.9	2.27	4.38	5.21	3.06	3.01	2.88	2	2.54	2.55
Θ(105°)	2.2	3.75	4.65	3.68	2.78	0.89	-0.44	1.61	2.69	3.01	3.28	3.02	0.87	2.41	1.13	2.68	2.58	5.03	4.55	3.58	4.57	2.25	2.53	0.47
Θ(120°)	0.78	4.38	5.98	3.48	-0.49	-0.75	-3.05	-0.02	1.22	-0.13	-0.79	2.58	0.93	2.32	-1.51	0.81	-4.82	-2.88	-4.01	-1.36	-0.67	-0.13	-0.9	-2.04
Θ(135°)	-0.15	1.8	3.93	1.44	-4.82	-3.2	-1.86	-0.95	1.29	0.88	-1.39	-0.65	-2.83	-3.83	-4	-2.38	-1.34	-0.17	-0.52	-0.1	-1.7	-2.54	-1.97	-1.13
Θ(150°)	-4.86	-4.8	-5	-5.41	-5.89	-4.56	-3.4	-3.06	-3.86	-2.52	-2.94	-6.02	-7	-5.33	-5.7	-5.59	-5.19	-4.81	-5.54	-4.99	-7.07	-3.84	-3.33	-5.71
Θ(165°)	-4.55	-4.13	-3.73	-4.96	-6.11	-6.48	-4.01	-4.03	-5.31	-5.27	-5.36	-6.93	-10.09	-10.8	-11.48	-10.15	-7.92	-7.69	-7.28	-9.15	-9.94	-8	-6.58	-5.15
Θ(180°)	-12.13	-12.42	-11.59	-11.38	-12.64	-12	-12.11	-10.89	-9.99	-10.17	-10.68	-11.18	-12.29	-12.3	-12.21	-11.25	-10.39	-9.75	-9.77	-8.93	-9.06	-9.41	-10.67	-11.72



Gain Result

Table with columns: Freq(Hz), Pol., Phi, Ant. 1, and Gain for various angles (0 to 120 degrees) across frequencies 5.2G, 5.3G, 5.6G, and 5.785G.



Radiated Composite Gain_ 5GHz U-NII 1~U-NII 3

Appendix B

Table with columns for Frequency (5.785G, 5.2G, 5.3G, 5.6G), Gain, and various Phi angles (0 to 345 degrees). Each cell contains a numerical value representing the gain at that specific frequency and angle.



Radiated Composite Gain_ 5GHz U-NII 1~U-NII 3

Appendix B

Table with columns for Gain, Theta, and various Phi angles (Phi(0) to Phi(345)). Rows represent different frequency bands (5.785G, 5.2G, 5.3G) and antenna configurations (Ant. 2, Ant. 3).



Radiated Composite Gain_ 5GHz U-NII 1~U-NII 3

Appendix B

Table with columns for Gain, Theta, Phi, and various frequency/angle combinations. Includes sub-sections for 5.6G, 5.785G, and 5.2G frequencies.



Radiated Composite Gain_ 5GHz U-NII 1~U-NII 3

Appendix B

Table with columns for Theta (0 to 180 degrees) and Gain (Phi 0 to Phi 345 degrees) for Freq(Hz) 5.6G and 5.785G. The table contains numerical values for gain in dB across various angles.



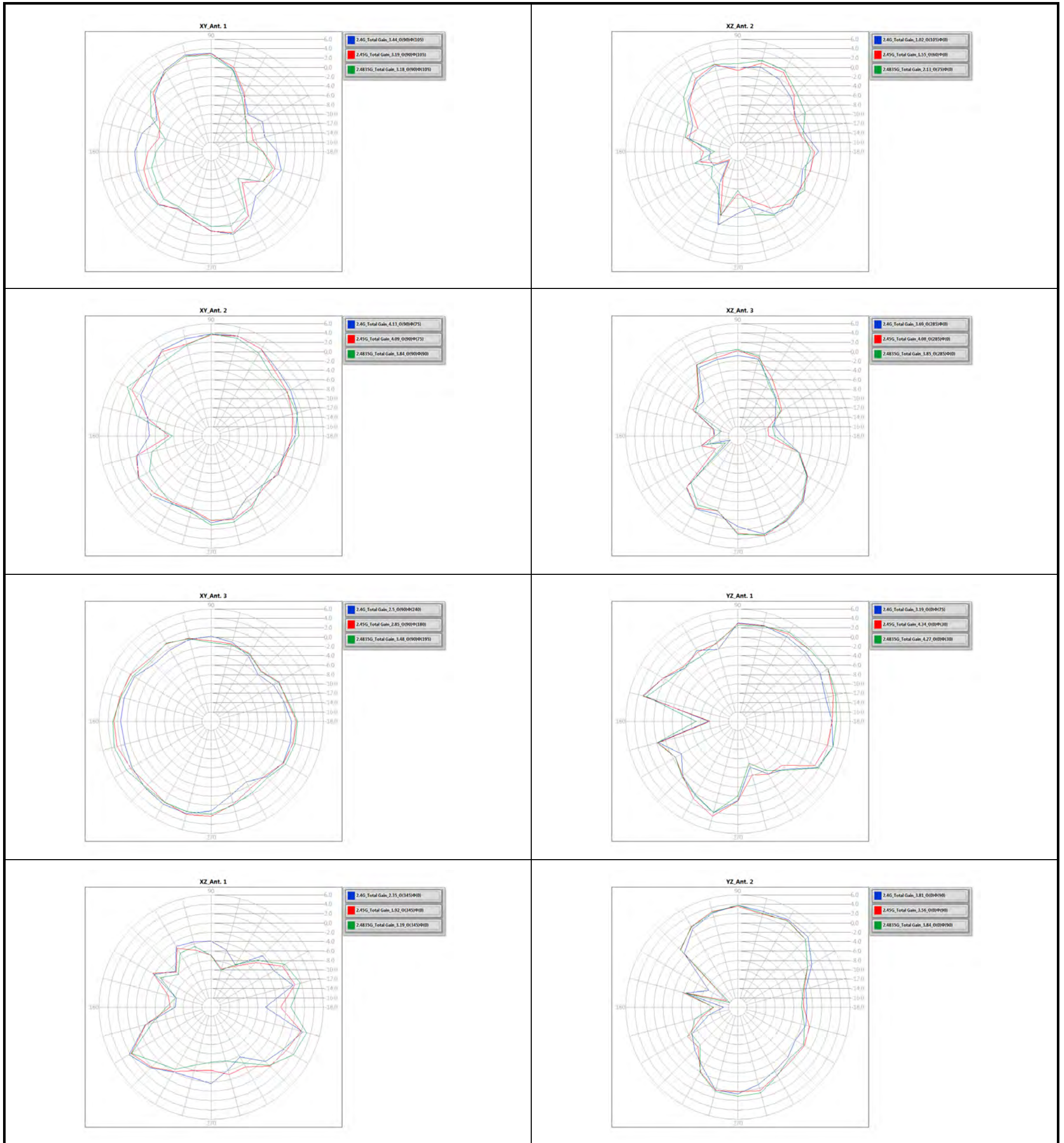
Total Gain Data

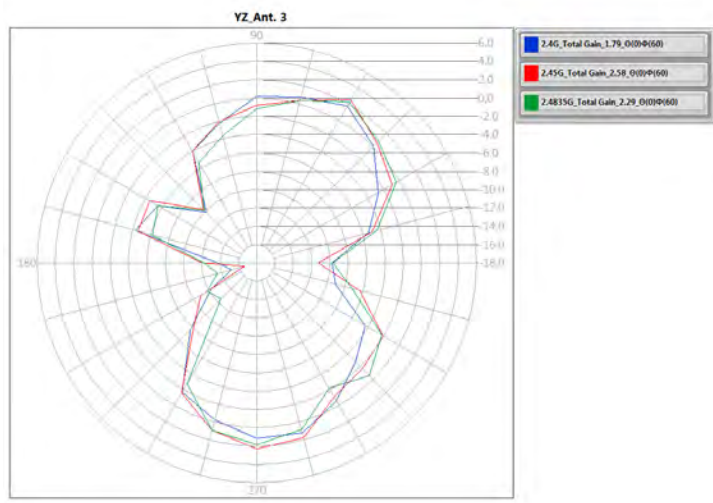
Table with columns for Freq(Hz), Gain, Pol., Total, and Antennas 1-3. Rows include gain data for 2.4G and 2.4835G frequencies at various angles (0 to 180 degrees).



Θ(135°)	-7.68	-5.36	-4.73	-4.05	-3.99	-5.73	-10.21	-15.89	-12.19	-5.35	-2.98	-3.39	-2.42	-2.10	-2.84	-2.43	-4.02	-5.20	-7.76	-12.37	-15.37	-11.40	-7.53	-7.25
Θ(150°)	-6.94	-7.42	-5.81	-4.24	-3.36	-4.02	-5.51	-7.87	-9.63	-9.43	-10.92	-13.91	-16.19	-14.14	-9.80	-7.46	-7.44	-7.84	-12.22	-15.50	-11.36	-8.10	-7.00	-6.48
Θ(165°)	-12.73	-12.33	-9.11	-6.29	-4.74	-4.23	-4.22	-4.39	-5.19	-6.32	-8.33	-10.20	-10.00	-9.20	-8.73	-8.91	-10.64	-12.40	-15.14	-16.08	-15.75	-13.78	-13.24	-13.56
Θ(180°)	-12.96	-12.53	-12.44	-12.84	-13.20	-13.50	-13.69	-13.82	-13.10	-12.86	-12.23	-12.08	-12.88	-13.74	-15.87	-15.53	-14.29	-13.42	-13.73	-12.69	-10.90	-10.35	-11.34	-12.35
Freq(Hz)	2.45G	Pol.	Total	Ant. 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-11.43	-11.33	-11.54	-10.46	-10.76	-10.87	-11.26	-10.77	-11.43	-11.32	-11.15	-9.91	-9.55	-9.48	-9.89	-9.99	-9.92	-8.92	-8.00	-7.44	-8.68	-9.95	-10.96	-11.70
Θ(15°)	-11.31	-9.48	-8.01	-6.48	-5.59	-5.13	-4.92	-4.99	-5.69	-5.92	-5.88	-4.81	-4.31	-4.47	-4.77	-5.64	-6.19	-6.65	-6.39	-6.81	-7.72	-8.98	-11.23	-12.06
Θ(30°)	-7.14	-6.36	-4.84	-3.65	-2.16	-1.28	-0.88	-0.83	-1.37	-1.55	-1.12	-0.69	-0.72	-0.97	-0.91	-1.37	-1.59	-1.70	-2.03	-2.99	4.47	-5.28	-6.11	-6.87
Θ(45°)	-5.87	-4.71	-3.22	-2.64	-1.02	0.38	0.61	0.50	0.05	0.39	1.51	1.93	1.62	1.84	1.33	0.67	0.06	-0.70	-1.63	-3.13	-4.98	-5.72	-5.29	-5.04
Θ(60°)	-3.55	-4.65	-4.28	-4.18	-0.23	1.96	2.58	2.38	1.38	0.43	1.75	2.60	2.83	3.26	2.54	1.34	0.15	-0.59	-1.05	-2.00	-2.19	-2.15	-2.21	-2.59
Θ(75°)	-0.69	-1.28	-1.95	-3.27	-1.51	-0.22	0.33	1.11	1.79	2.32	3.49	4.04	4.08	4.53	3.53	2.29	1.72	1.83	1.75	0.78	-1.57	-3.45	-2.29	-0.82
Θ(90°)	0.23	-1.23	-1.19	-2.80	-1.39	-0.87	-0.81	0.36	1.19	0.82	1.93	2.20	2.85	2.84	1.99	1.26	1.93	2.61	2.31	0.36	-1.33	-1.54	-0.13	0.21
Θ(105°)	-0.68	-1.53	-1.59	-1.53	-1.50	-1.73	-2.07	-1.06	0.18	-0.72	-0.82	-0.87	-1.40	0.83	0.62	1.60	2.31	2.68	0.92	-1.33	-1.63	-1.43	-2.74	-0.70
Θ(120°)	-0.40	-2.16	-5.94	-2.28	-1.93	-1.46	-3.90	-6.56	-4.71	-3.24	0.21	0.04	-0.16	0.49	-2.00	-1.06	-0.24	0.23	-1.62	-5.82	-7.29	-3.13	-1.94	-1.98
Θ(135°)	-6.14	-5.13	-4.77	-3.41	-2.70	-4.35	-9.75	-14.97	-11.18	-5.35	-3.08	-3.40	-2.57	-1.52	-2.24	-1.90	-3.65	-5.55	-8.25	-10.10	-11.82	-10.27	-6.62	-5.73
Θ(150°)	-6.87	-8.41	-7.01	-4.45	-3.32	-4.49	-7.14	-10.69	-12.31	-11.16	-12.70	-12.60	-11.03	-10.07	-8.30	-8.04	-7.92	-10.95	-15.59	-13.41	-10.28	-8.25	-6.39	-
Θ(165°)	-12.52	-11.51	-8.90	-6.67	-5.25	-4.63	-4.57	-4.96	-5.66	-7.38	-9.50	-10.70	-9.88	-8.89	-8.21	-9.14	-11.52	-15.12	-16.57	-14.79	-12.51	-10.90	-11.55	-12.60
Θ(180°)	-12.93	-13.49	-12.39	-12.60	-12.82	-12.20	-11.93	-11.84	-12.64	-13.83	-13.17	-14.41	-14.55	-15.41	-16.12	-13.83	-13.53	-13.13	-13.78	-13.85	-13.09	-12.35	-12.62	-11.91
Freq(Hz)	2.4835G	Pol.	Total	Ant. 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-10.08	-10.59	-11.44	-11.28	-11.16	-10.58	-9.71	-9.32	-9.77	-10.75	-11.19	-11.12	-9.38	-8.35	-8.58	-8.19	-8.23	-8.06	-8.27	-9.48	-11.53	-12.09	-11.30	-9.97
Θ(15°)	-10.35	-8.81	-8.09	-6.88	-6.25	-4.94	-4.41	-3.83	-4.10	-4.69	-4.92	-5.09	-4.60	-4.40	-4.30	-4.73	-5.58	-6.39	-7.25	-8.56	-10.94	-13.05	-12.87	-11.51
Θ(30°)	-7.42	-5.44	-3.77	-2.96	-1.85	-1.03	-0.38	-0.19	-0.68	-1.08	-0.98	-1.04	-1.03	-1.02	-0.87	-1.07	-1.19	-1.48	-2.25	-3.27	-4.78	-6.19	-7.53	-8.17
Θ(45°)	-6.53	-5.23	-3.77	-2.95	-1.20	0.14	0.77	1.44	1.81	1.61	2.05	2.04	1.40	1.29	1.05	0.89	0.60	-0.00	-0.56	-1.45	-3.07	-4.15	-4.76	-5.62
Θ(60°)	-5.04	-6.83	-5.61	-4.29	0.30	1.87	2.29	2.11	1.60	0.94	2.11	2.60	2.69	2.78	1.94	1.37	0.09	-0.92	-2.22	-3.20	-3.87	-3.73	-3.62	-3.74
Θ(75°)	-0.32	-1.06	-2.21	-4.60	-1.77	-0.38	0.39	1.48	2.37	2.47	3.32	3.89	3.85	4.43	3.52	2.51	1.31	0.97	0.86	0.43	-1.48	-3.28	-2.69	-1.03
Θ(90°)	0.47	-0.95	-1.33	-2.94	-1.51	-1.15	-1.19	0.32	1.29	0.31	1.33	1.99	3.04	3.48	2.93	1.88	1.98	1.99	1.84	0.52	-0.36	-0.94	0.42	0.62
Θ(105°)	0.33	-0.46	-0.13	-0.73	-1.36	-2.50	-3.64	-1.47	0.85	-0.13	-0.87	-1.17	-1.43	0.34	-0.11	0.92	1.99	2.63	0.93	-1.20	-1.23	-1.75	-2.01	-0.13
Θ(120°)	-0.49	-2.63	-5.18	-1.39	-2.06	-2.09	-5.34	-7.29	-3.47	-2.56	0.27	-0.02	-0.90	-0.08	-2.30	-1.17	-0.41	-0.08	-2.71	-6.89	-8.39	-3.85	-1.94	-2.21
Θ(135°)	-6.33	-5.32	-5.15	-3.38	-2.38	-4.50	-9.94	-12.89	-8.86	-5.34	-3.50	-3.90	-3.84	-2.43	-2.24	-1.35	-3.19	-6.57	-12.43	-12.07	-11.22	-9.54	-6.05	-6.11
Θ(150°)	-7.54	-11.16	-9.15	-5.52	-4.08	-4.16	-5.53	-8.60	-11.95	-12.14	-11.14	-13.46	-14.96	-11.55	-8.22	-7.24	-7.57	-8.04	-11.74	-15.30	-11.88	-8.32	-6.26	-5.65
Θ(165°)	-14.33	-12.54	-11.20	-8.61	-6.61	-6.18	-6.20	-6.37	-7.07	-8.65	-9.77	-11.43	-11.21	-8.96	-7.29	-7.79	-9.34	-12.32	-13.54	-12.60	-11.32	-11.35	-12.92	-13.37
Θ(180°)	-13.15	-13.46	-13.02	-14.11	-13.20	-12.61	-12.22	-12.92	-14.63	-16.66	-16.31	-16.71	-16.81	-16.43	-16.47	-14.49	-13.45	-13.16	-12.56	-11.62	-11.27	-11.08	-11.74	-12.35

E1(XY plane) – $\Theta(90)\Phi(0-360)$
 E2(XZ plane) – $\Theta(0-180)\Phi(0)$ and $\Theta(0-180)\Phi(180)$
 E3(YZ plane) – $\Theta(0-180)\Phi(90)$ and $\Theta(0-180)\Phi(270)$







Total Gain Data

Table with columns: Freq(Hz), Pol., Total, Ant. 1, Ant. 2, and 24 directional gain columns (Phi(0) to Phi(345)). Rows are grouped by frequency (5.2G, 5.3G, 5.4G, 5.5G, 5.6G, 5.7G, 5.8G, 5.9G) and elevation angle (Theta(0) to Theta(180)).



Antenna Pattern_ 5GHz U-NII 1~U-NII 3

Appendix D

Table with columns for frequency (5.785G, 5.2G, 5.3G, 5.6G, 5.785G, 5.2G, 5.3G) and various gain angles (0 to 180 degrees) for Antennas 2, 3, 4. Each cell contains a numerical gain value.



Antenna Pattern_ 5GHz U-NII 1~U-NII 3

Appendix D

Θ(90°)	-3.51	0.40	-0.62	-0.49	-4.15	0.72	-1.71	-1.91	-0.53	1.17	3.15	1.16	-3.21	-0.81	-0.36	1.28	0.24	-4.14	-8.03	-6.42	-4.37	-7.40	-12.39	-12.66
Θ(105°)	-1.49	0.79	1.37	-3.67	-5.40	-1.25	0.44	-2.55	-0.20	0.86	1.51	-1.22	-3.42	1.71	3.15	-0.27	-4.80	-7.93	-4.12	-3.85	-2.50	-11.59	-11.38	-5.41
Θ(120°)	-5.69	-0.80	-0.67	-2.99	-6.91	-3.70	-2.77	-8.58	-5.86	-3.26	-4.93	-6.13	-8.99	-4.75	-4.42	-3.52	-7.90	-6.97	-12.51	-14.03	-7.94	-10.42	-9.90	-7.22
Θ(135°)	-9.96	-6.36	-4.81	-4.58	-8.24	-7.43	-2.02	-5.26	-11.12	-10.69	-9.21	-4.57	-3.64	-2.81	-5.30	-6.66	-3.15	-3.80	-8.93	-2.99	-11.42	-15.02	-14.48	-10.19
Θ(150°)	-9.63	-10.63	-8.25	-6.70	-9.76	-12.09	-11.17	-12.61	-8.96	-4.97	-4.43	-3.28	-2.12	-2.49	-2.11	-0.31	-2.05	-5.52	-8.31	-5.89	-3.92	-11.19	-14.57	-9.95
Θ(165°)	-12.44	-13.63	-14.62	-14.86	-14.68	-15.18	-12.24	-11.06	-10.29	-9.15	-12.05	-9.03	-6.70	-4.97	-4.43	-5.53	-11.94	-15.74	-10.69	-7.68	-7.60	-10.03	-10.68	-12.66
Θ(180°)	-14.91	-15.29	-15.55	-15.33	-16.06	-14.91	-15.33	-14.98	-15.24	-15.57	-14.81	-15.40	-15.36	-14.73	-15.55	-15.02	-14.66	-16.08	-15.13	-15.50	-14.47	-15.72	-14.79	-15.21
Freq(Hz)	5.6G	Pol.	Total	Ant. 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-7.35	-7.02	-6.48	-6.28	-5.65	-5.93	-6.99	-6.73	-6.38	-6.06	-6.26	-7.31	-7.04	-7.19	-7.49	-6.98	-6.45	-5.86	-6.93	-7.16	-7.18	-6.92	-6.52	-7.43
Θ(15°)	-11.12	-8.79	-6.50	-6.19	-6.40	-5.00	-4.78	-6.07	-5.89	-7.14	-8.19	-6.42	-6.06	-6.48	-9.13	-10.00	-8.28	-7.78	-8.34	-7.75	-9.48	-12.86	-10.17	-11.16
Θ(30°)	-8.54	-8.90	-6.95	-5.55	-7.41	-11.64	-7.37	-5.15	-6.13	-5.12	-3.96	-4.55	-5.83	-5.14	-7.16	-8.67	-10.78	-7.77	-8.24	-10.25	-14.11	-15.76	-14.18	-12.35
Θ(45°)	-6.25	-4.67	-4.01	-2.15	-4.21	-8.85	-2.97	-2.08	-2.40	-0.10	-1.15	-3.40	-6.23	-5.48	-4.86	-2.84	-2.31	-4.27	-5.49	-7.83	-5.69	-7.46	-8.22	-6.28
Θ(60°)	-4.94	-2.72	-1.57	-1.32	-1.34	-4.54	-2.23	-1.88	-3.30	-0.94	-2.45	-2.65	-1.70	-1.27	-1.45	-1.14	-1.12	-2.60	-3.70	-3.34	-3.99	-6.06	-7.77	-6.92
Θ(75°)	-4.43	-0.66	-0.99	-2.10	-0.85	-2.08	-2.56	0.85	-0.46	-0.43	-1.22	-0.40	-0.11	0.53	-0.22	0.37	0.31	-2.35	-8.11	-3.98	-5.48	-6.27	-5.36	-8.37
Θ(90°)	-9.72	-2.80	-1.70	-2.55	-1.83	-0.68	-5.12	-0.33	-0.63	1.29	0.10	0.60	-0.49	-3.34	-1.61	-0.54	0.40	-2.44	-7.45	-3.76	-4.52	-6.24	-3.46	-14.02
Θ(105°)	-6.74	-2.49	-2.71	-4.88	-4.28	-2.36	-5.40	-5.57	-0.90	0.74	1.14	1.17	-2.43	-2.68	0.99	0.40	-2.11	-4.86	-6.99	-5.13	-4.85	-7.27	-12.38	-10.76
Θ(120°)	-8.16	-3.48	-3.35	-3.38	-6.38	-4.64	-4.87	-11.18	-2.53	-1.34	-5.64	-3.45	-4.59	-5.69	-2.48	-0.15	-8.03	-6.59	-15.61	-12.26	-8.26	-14.00	-10.73	-11.03
Θ(135°)	-7.94	-6.85	-5.65	-5.65	-9.06	-6.53	-3.31	-6.69	-8.41	-4.14	-7.15	-8.06	-6.22	-7.49	-6.81	-6.60	-4.77	-3.72	-10.76	-2.80	-12.37	-14.72	-8.98	-10.78
Θ(150°)	-8.98	-9.02	-7.91	-8.26	-10.59	-10.02	-5.77	-5.98	-8.41	-7.93	-6.55	-7.60	-6.71	-6.12	-5.68	-4.25	-4.35	-8.24	-12.19	-7.73	-5.49	-10.84	-9.63	-10.80
Θ(165°)	-14.85	-14.29	-14.39	-15.03	-14.48	-12.69	-8.49	-7.23	-8.43	-8.21	-9.66	-7.41	-6.13	-6.14	-7.38	-8.53	-11.71	-12.61	-11.76	-10.88	-11.09	-11.63	-15.30	-13.94
Θ(180°)	-15.08	-14.31	-15.31	-15.96	-15.52	-14.56	-14.70	-15.76	-15.10	-15.67	-14.95	-15.79	-15.51	-15.72	-14.99	-15.54	-15.75	-15.60	-15.28	-15.24	-14.47	-14.78	-15.08	-15.40
Freq(Hz)	5.785G	Pol.	Total	Ant. 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-8.88	-7.18	-7.99	-7.81	-8.23	-7.81	-8.73	-7.80	-8.72	-7.89	-8.89	-9.03	-8.11	-8.69	-8.55	-7.79	-7.10	-6.11	-9.08	-10.06	-9.06	-8.66	-8.88	-9.05
Θ(15°)	-10.71	-8.00	-7.74	-6.15	-6.43	-6.83	-7.36	-9.92	-9.50	-9.18	-7.97	-8.00	-8.66	-8.30	-9.61	-11.15	-10.20	-10.27	-9.91	-9.44	-9.06	-11.65	-10.30	-12.45
Θ(30°)	-10.71	-10.67	-7.86	-8.42	-9.45	-8.07	-5.73	-5.89	-5.16	-4.47	-3.70	-5.41	-8.39	-7.34	-7.45	-9.55	-11.44	-10.85	-7.98	-8.63	-15.54	-14.84	-13.43	-10.61
Θ(45°)	-8.33	-7.40	-3.73	-2.47	-8.43	-5.56	-1.94	-1.68	-1.07	-0.49	-1.57	-4.94	-7.52	-7.80	-7.69	-2.99	-2.37	-4.23	-8.24	-10.47	-7.31	-8.77	-12.99	-13.37
Θ(60°)	-7.17	-3.87	-3.57	-2.37	-5.74	-5.58	-1.83	-3.06	-2.65	-1.19	-2.71	-2.70	-2.36	-3.18	-1.18	-2.31	-1.99	-2.87	-4.59	-3.05	-3.01	-5.06	-6.11	-6.08
Θ(75°)	-3.86	-1.71	-2.60	-3.51	-2.72	-3.18	-1.43	0.01	-1.21	-1.64	-2.30	-0.40	-0.24	-2.28	-0.69	-0.18	-0.46	-2.13	-6.34	-3.62	-5.16	-10.65	-5.89	-6.82
Θ(90°)	-6.81	-2.18	-1.83	-3.25	-2.16	-3.76	-2.38	1.22	-1.61	-0.54	-1.13	-0.35	-0.63	-4.18	-4.53	-0.61	-0.29	-0.33	-6.34	-3.39	-4.53	-6.49	-2.47	-7.10
Θ(105°)	-7.56	-3.04	-2.93	-7.07	-5.44	-3.50	-7.14	-2.45	-1.43	-1.73	0.82	0.96	-1.46	-5.87	-1.08	-0.72	-2.95	-4.21	-8.33	-3.24	-2.85	-7.57	-10.29	-15.00
Θ(120°)	-7.39	-4.71	-1.03	-6.35	-7.74	-4.50	-8.29	-7.20	-1.41	-4.52	-4.69	-1.26	-2.20	-5.52	-7.86	-0.28	-7.57	-5.95	-15.53	-11.06	-10.36	-12.26	-11.70	-10.85
Θ(135°)	-7.98	-6.34	-3.41	-5.13	-9.78	-4.69	-4.08	-10.15	-4.00	-3.31	-9.21	-8.05	-6.75	-8.24	-7.86	-6.93	-4.22	-2.46	-10.17	-2.68	-10.33	-13.57	-5.98	-11.10
Θ(150°)	-11.37	-8.99	-10.16	-12.80	-10.23	-7.28	-5.91	-7.49	-10.77	-7.89	-5.64	-6.54	-7.04	-8.08	-7.79	-4.00	-5.41	-9.23	-13.80	-6.84	-7.67	-10.74	-10.30	-14.58
Θ(165°)	-14.94	-15.06	-14.77	-11.53	-10.20	-9.69	-8.16	-6.09	-7.61	-8.24	-8.47	-7.75	-6.23	-6.99	-7.59	-11.07	-14.34	-12.69	-11.32	-12.64	-12.97	-14.16	-14.73	-15.33
Θ(180°)	-13.96	-14.84	-15.50	-15.56	-15.88	-14.40	-15.15	-15.80	-15.47	-15.28	-14.66	-15.52	-15.56	-15.40	-14.73	-15.44	-15.46	-15.18	-15.90	-14.17	-15.32	-15.15	-15.07	-14.00

E1(XY plane) – $\Theta(90)\Phi(0-360)$
 E2(XZ plane) – $\Theta(0-180)\Phi(0)$ and $\Theta(0-180)\Phi(180)$
 E3(YZ plane) – $\Theta(0-180)\Phi(90)$ and $\Theta(0-180)\Phi(270)$

