



Antenna Composite Gain Test Report

FCC ID	MSQ-RTAX6800
Equipment	AX6000 Dual Band Wi-Fi Router
Brand Name	ASUS
Model Name	RT-AX88U Pro
Applicant	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou, Taipei City 112, Taiwan
Manufacturer (1)	Compal Networking(KunShan) CO., LTD No.520,Nan Bang RD., Economic & Technical Development Zone, KunShan,JiangSu,China
Manufacturer (2)	Datamax Electronics (DongGuan) Co., Ltd. Niu Shan Foreign Economic Industrial Park, Dong Cheng District, Dong Guan City, Guang Dong, China
Manufacturer (3)	ARCADYAN TECHNOLOGY (VIETNAM) CO., LTD. Land plot No. D4-5-6, Thang Long Industrial Park (Vinh Phuc), Thien Ke Commune, Binh Xuyen District, Vinh Phuc Province, Vietnam
Manufacturer (4)	Lih Rong Electronic Enterprise Co.,Ltd. No. 486, Sec. 1, Wanshou Road, Guishan District, , Taoyuan City, Taiwan
Sample Received	Sep. 07, 2022
Start Test Date	Sep. 13, 2022
Final Test Date	Sep. 13, 2022



Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory
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1. Operation Mode and Antenna Information

Antenna Position	RF Port		Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
	2G	5G					
2G 5GAnt1	2	1	PSA	RFDPA171300SBLB820	Dipole	Reversed-SMA	2.4GHz, 5GHz UNII 1~3
2G 5GAnt2	3	4	PSA	RFDPA171300SBLB820	Dipole	Reversed-SMA	2.4GHz, 5GHz UNII 1~3
2G 5GAnt3	1	2	PSA	RFDPA171300SBLB820	Dipole	Reversed-SMA	2.4GHz, 5GHz UNII 1~3
2G 5GAnt4	4	3	PSA	RFDPA171300SBLB820	Dipole	Reversed-SMA	2.4GHz, 5GHz UNII 1~3

Note:

2.4GHz and 5GHz Operation Mode (4TX/4RX)

2G 5GAnt1~4 can be used as transmitting/receiving antenna.

2G 5GAnt1~4 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		
Sporton International Inc. Hsinhua Laboratory		
<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	23.5-24.5 / 40-50	Sep. 13, 2022

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

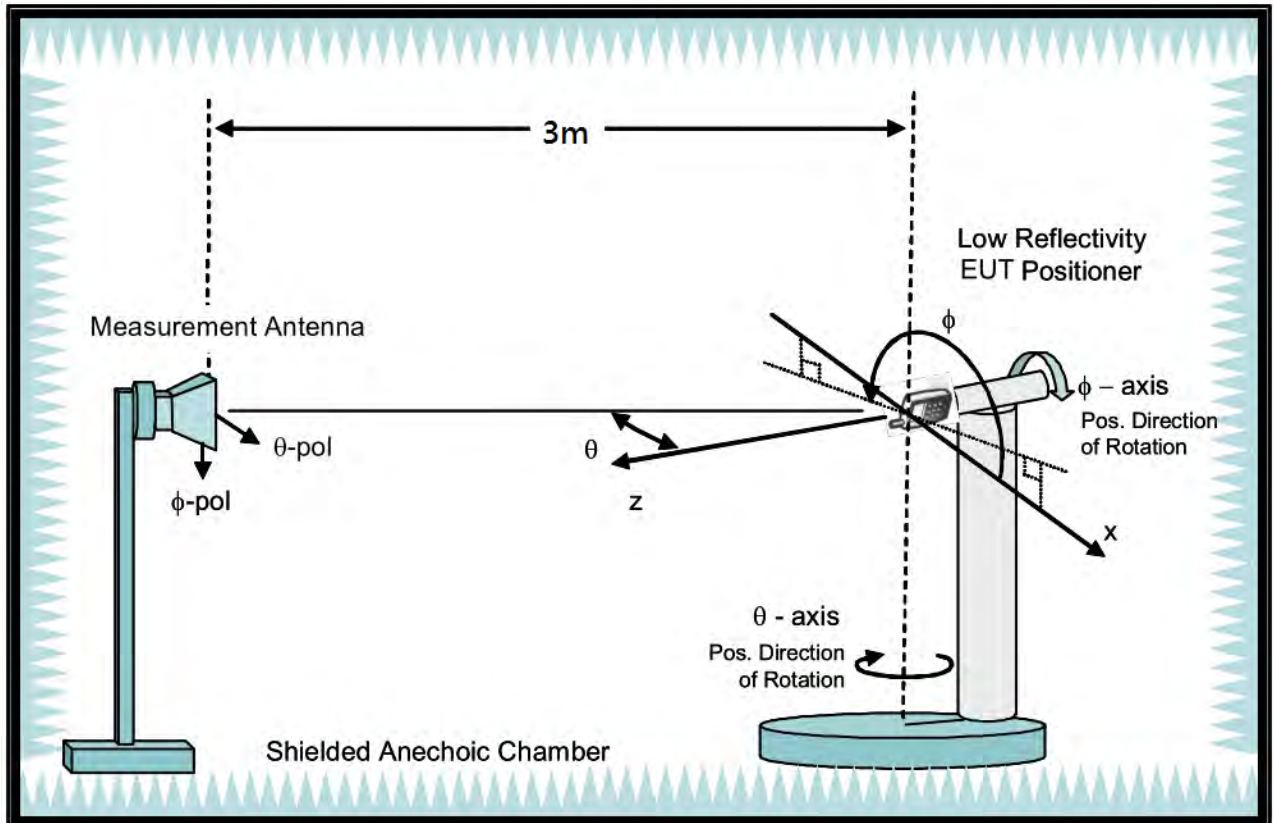
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

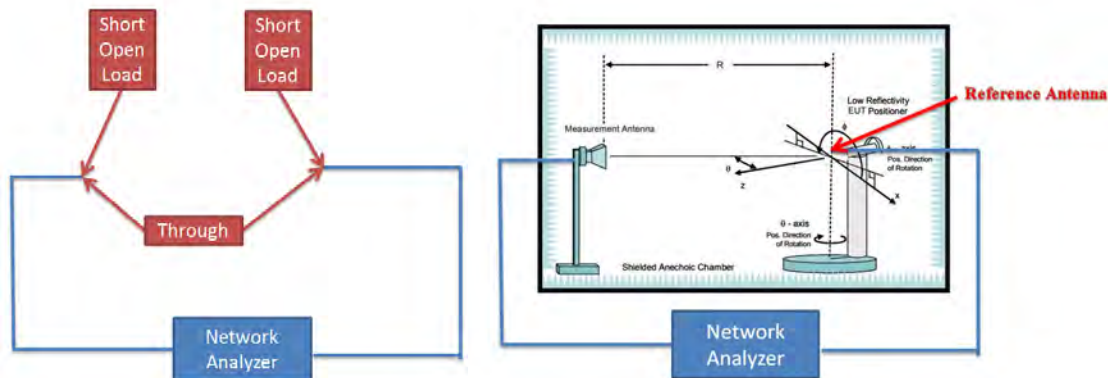
#Reference to CTIA "ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1"



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	7200
G(theta) reading (dB)	-33.55	-33.27	-32.92	-32.91	-32.73	-32.02	-32.67	-32.82	-32.98	-33.18	-32.8	-33.92	-34.62	-35.57
G(phi) reading (dB)	-33.15	-32.7	-32.41	-32.61	-32.43	-31.72	-32.37	-32.51	-32.52	-32.66	-32.5	-33.62	-34.32	-35.48
Reference gain (dBi)	10.1	10.4	10.7	12.5	12.7	13.5	13.4	13.3	13.3	13.2	13.4	12.5	12.1	11.4
Factor(theta) (dB)	43.65	43.67	43.62	45.41	45.43	45.52	46.07	46.12	46.28	46.38	46.2	46.42	46.72	46.97
Factor(phi) (dB)	43.25	43.1	43.11	45.11	45.13	45.22	45.77	45.81	45.82	45.86	45.9	46.12	46.42	46.88

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 7.5 degree from 0 to 352.5 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

DG_1SS max value position

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	-0.56	-1.92	0.2	0.29	-0.23
Ant. 2 (dBi)	1.13	0.23	-0.6	1.39	2.6
Ant. 3 (dBi)	0.99	-0.23	-0.04	-0.11	1.6
Ant. 4 (dBi)	-0.39	2.7	-0.05	-0.73	0.2
DG [1SS] (dBi)	6.35	6.38	5.9	6.27	7.14
Polarization	Theta	Theta	Theta	Theta	Theta
Θ (°)	90	90	67.5	75	75
Φ (°)	90	45	97.5	67.5	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)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 [10^(G/20)]	10^(-0.56/20)	10^(-1.92/20)	10^(0.2/20)	10^(0.29/20)	10^(-0.23/20)
Ant. 2 [10^(G/20)]	10^(1.13/20)	10^(0.23/20)	10^(-0.6/20)	10^(1.39/20)	10^(2.6/20)
Ant. 3 [10^(G/20)]	10^(0.99/20)	10^(-0.23/20)	10^(-0.04/20)	10^(-0.11/20)	10^(1.6/20)
Ant. 4 [10^(G/20)]	10^(-0.39/20)	10^(2.7/20)	10^(-0.05/20)	10^(-0.73/20)	10^(0.2/20)
Ant. 1 [10^(G/20)] value	0.938	0.802	1.023	1.034	0.974
Ant. 2 [10^(G/20)] value	1.139	1.027	0.933	1.174	1.349
Ant. 3 [10^(G/20)] value	1.121	0.974	0.995	0.987	1.202
Ant. 4 [10^(G/20)] value	0.956	1.365	0.994	0.919	1.023
Sum All Antenna [Amax]	4.153	4.167	3.946	4.114	4.548
DG [10*log(Amax^2/Nant)]	6.35	6.38	5.9	6.27	7.14

Note:

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

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

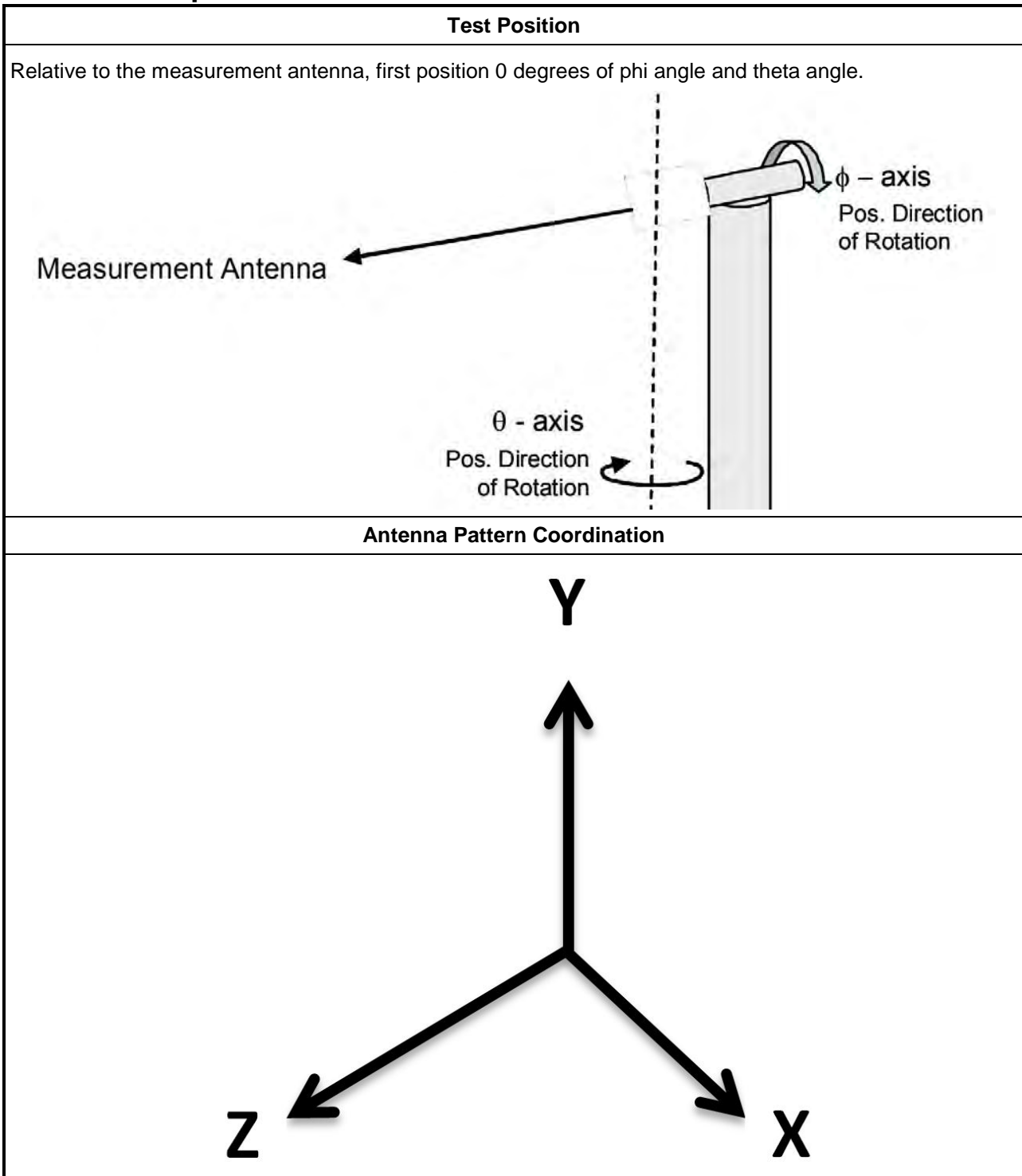
8. Summary of Test Result

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.01	2.66	2.74	3.53	3.93
Ant. 2 Max Gain (dBi)	1.25	1.8	1.59	2.37	2.6
Ant. 3 Max Gain (dBi)	1.61	2.05	1.47	2.32	2.49
Ant. 4 Max Gain (dBi)	1.81	2.7	1.47	3.17	3.83
Ant. 1 Polarization/ Θ ($^{\circ}$)/ Φ ($^{\circ}$)	Theta/60/180	Theta/90/217.5	Theta/90/135	Theta/97.5/217.5	Theta/97.5/217.5
Ant. 2 Polarization/ Θ ($^{\circ}$)/ Φ ($^{\circ}$)	Theta/90/82.5	Theta/90/75	Theta/97.5/225	Theta/75/60	Theta/75/90
Ant. 3 Polarization/ Θ ($^{\circ}$)/ Φ ($^{\circ}$)	Theta/60/112.5	Theta/90/105	Theta/97.5/37.5	Theta/75/105	Theta/67.5/37.5
Ant. 4 Polarization/ Θ ($^{\circ}$)/ Φ ($^{\circ}$)	Theta/97.5/37.5	Theta/90/45	Theta/97.5/352.5	Theta/97.5/330	Theta/97.5/322.5
Max Gain (dBi)	2.01	2.7	2.74	3.53	3.93
DG [1SS] (dBi)	6.35	6.38	5.9	6.27	7.14
DG [2SS] (dBi)	3.35	3.38	2.9	3.53	4.14
DG [4SS] (dBi)	2.01	2.7	2.74	3.53	3.93

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 (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-1543	1GHz~18GHz	May. 31, 2022	May. 30, 2023
Dual Polarization Horn Antenna	Sporton	S0209DP	S0209DP-001	2GHz~9GHz	N.C.R.	N.C.R.
ENA Series Network Analyzer	AGILENT	E5071C	MY46419201	100kHz~8.5GHz	Feb. 21, 2022	Feb. 20, 2023
VNA Calibration Kit	TS RF	TS85033E-F	-	DC~9GHz	N.C.R.	N.C.R.
Multi-axis positioner	Sporton	MAPS01	MAPS01-001	Theta / Phi axis	N.C.R.	N.C.R.
Test Software	SPORTON	SENSE-RDG	V1.0.8	-	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 and 5GHz U-NII 1~U-NII 3.....	Page 13
Appendix B – Antenna Pattern of 2.4GHz and 5GHz U-NII 1~U-NII 3.....	Page 27
Appendix C – Test Photos.....	Page 34



Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.01	2.66	2.74	3.53	3.93
Ant. 2 Max Gain (dBi)	1.25	1.8	1.59	2.37	2.6
Ant. 3 Max Gain (dBi)	1.61	2.05	1.47	2.32	2.49
Ant. 4 Max Gain (dBi)	1.81	2.7	1.47	3.17	3.83
Ant. 1 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$	Theta/60/180	Theta/90/217.5	Theta/90/135	Theta/97.5/217.5	Theta/97.5/217.5
Ant. 2 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$	Theta/90/82.5	Theta/90/75	Theta/97.5/225	Theta/75/60	Theta/75/90
Ant. 3 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$	Theta/60/112.5	Theta/90/105	Theta/97.5/37.5	Theta/75/105	Theta/67.5/37.5
Ant. 4 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$	Theta/97.5/37.5	Theta/90/45	Theta/97.5/352.5	Theta/97.5/330	Theta/97.5/322.5
Max Gain (dBi)	2.01	2.7	2.74	3.53	3.93
DG [1SS] (dBi)	6.35	6.38	5.9	6.27	7.14
DG [2SS] (dBi)	3.35	3.38	2.9	3.53	4.14
DG [4SS] (dBi)	2.01	2.7	2.74	3.53	3.93



Radiated Composite Gain Data (2.4GHz and 5GHz UNII 1~UNII 3)

Appendix A

Theta	-10.45/-9.65	-9.65/-10.46	-8.92/-9.69	-11.74/-10.11	-11.6/-9.33	-9.23/-9.84	-8.42/-9.51	-9.07/-11.34	-11.96/-11	-11.63/-10	-11.03/-10.42	-6.93/-7.93	-9.52/-9.9	-7.48/-7.81	-9.29/-9.66	-9.27/-8.36	-10.76/-12.52	-11.38/-11.34	-11.53/-9.16	-9.43/-11.77	-12.59/-8.4	-9.91/-9.85	-10.69/-9.25	-7.36/-10.98																	
Phi	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(172.5°)	Phi(180°)	Phi(195°)	Phi(202.5°)	Phi(210°)	Phi(217.5°)	Phi(225°)	Phi(232.5°)	Phi(240°)	Phi(247.5°)	Phi(255°)	Phi(262.5°)	Phi(270°)	Phi(277.5°)	Phi(285°)	Phi(292.5°)	Phi(300°)	Phi(307.5°)	Phi(315°)	Phi(322.5°)	Phi(330°)	Phi(337.5°)	Phi(345°)	Phi(352.5°)
Theta(82.5°)	-9.27/-7.47	-9/-9.78	-8.61/-8.51	-12.14/-10.02	-10.87/-11.16	-11.83/-10.66	-8.79/-10.29	-10.6/-7.47	-9.95/-10.93	-10.07/-9.07	-11.21/-10.62	-9.54/-10.81	-10.32/-8.16	-8.88/-8.73	-8.08/-6	-8.49/-7.92	-9.92/-9.64	-10.44/-10.98	-10.12/-11.82	-8.79/-6.96	-8.56/-6.48	-8.53/-5.42	-4.88/-7.66	-8.82/-10.72																	
Theta(90°)	-10.81/-10.51	-10.25/-11.97	-11.02/-10.95	-8.35/-8.73	-9.39/-8.69	-12.29/-10.82	-12.22/-9.42	-10.14/-9.99	-9.92/-8.36	-10.76/-11.29	-11.49/-9.85	-9.85/-9.14	-9.53/-7.09	-10.44/-9.41	-7.77/-6.76	-10.07/-7.38	-8.64/-11.92	-10.24/-10.69	-11.45/-10.64	-9.28/-9.8	-9.12/-6.85	-9.75/-9.51	-8.88/-7.57	-7.26/-8.95																	
Theta(97.5°)	-8.12/-7.95	-6.65/-8.43	-9.99/-11.3	-9.61/-7.62	-7.94/-8.97	-11.62/-8.56	-11.09/-9.28	-9.11/-8.07	-9.66/-10.71	-9.04/-9.95	-9.55/-9.24	-7.23/-6.64	-7.82/-8.36	-8.51/-6.07	-6.76/-5.83	-6.61/-9.18	-11.91/-10.97	-10.49/-9.76	-10.79/-10.27	-8.67/-8.11	-7.36/-6.67	-7.45/-7.09	-5.71/-7.44	-6.87/-7.79																	
Theta(105°)	-9.77/-10.55	-7.6/-7.5	-7.42/-9.97	-10.01/-7.49	-11.49/-11.31	-9.59/-12.03	-11.53/-8.61	-11.4/-7.97	-8.02/-6.72	-6.57/-8.56	-11.27/-12.62	-9.98/-8.69	-7.61/-9.61	-9.39/-9.23	-8.18/-6.79	-9.34/-9.4	-11.85/-10.78	-11.79/-12.32	-12.14/-11.3	-8.56/-10.21	-10.14/-7.13	-8.4/-8.07	-7.54/-8.51	-8.07/-9.48																	
Theta(112.5°)	-7.41/-9.72	-7.89/-8.89	-9.15/-7.26	-5.35/-7.29	-8.97/-10.58	-10.87/-10.85	-8.18/-11.89	-8.63/-6.15	-6.5/-7.05	-10.49/-12.43	-9.65/-8.28	-6.68/-6.68	-8.81/-7.7	-8.48/-10.84	-10.05/-8.14	-10.62/-8.8	-8.19/-9.23	-6.87/-11.39	-10.23/-11.19	-6.05/-8.73	-5.61/-5.1	-6.52/-8.34	-8.01/-7.46	-7.06/-10.69																	
Theta(120°)	-9.96/-9.02	-7.6/-7.89	-6.81/-7.57	-3.42/-6.62	-11.62/-8.04	-7.9/-10.96	-10.56/-9.95	-6.86/-6.09	-8.71/-6.7	-5.34/-9	-10.03/-7.89	-9.54/-11.4	-9.21/-8.16	-8.98/-7.61	-8.94/-9.89	-8.66/-8.23	-9.65/-12.39	-11.33/-11.37	-10.51/-12.34	-8.71/-9.67	-6.4/-6.9	-7.83/-9.26	-7.78/-8.46	-8.48/-7.34																	
Theta(127.5°)	-6.8/-8.36	-10.93/-8.39	-7.74/-6.2	-5.24/-5.09	-6.84/-7.09	-8.77/-7.58	-8.27/-11.09	-6.42/-4.34	-6.2/-5.21	-5.73/-7.44	-7.56/-8.57	-11.73/-10.09	-8.46/-9.96	-10.26/-8.85	-10.34/-10.71	-10.76/-11.87	-11.42/-9.43	-11.95/-10.68	-12.12/-11.06	-8.43/-8.7	-10.09/-10.55	-11.37/-9.88	-6.77/-7.79	-6.92/-6.98																	
Theta(135°)	-7.15/-8.49	-7.97/-7.78	-9.23/-6.95	-7.59/-8.42	-7.11/-8.47	-8.44/-6.4	-5.7/-6.42	-10.45/-9.52	-6.25/-6.99	-9.99/-8.79	-7.09/-9.34	-8.67/-9.79	-11.24/-10.3	-11.24/-8.78	-8.19/-8.24	-8.51/-8.58	-9.66/-6.27	-9.73/-7.13	-7.69/-10.85	-10.04/-6.71	-7.8/-10.19	-10.06/-6.47	-4.54/-6.9	-7.19/-7.31																	
Theta(142.5°)	-9.49/-10.13	-7.23/-7.94	-8.62/-5.18	-5.17/-5.54	-6.16/-4.67	-4.07/-7.95	-12.31/-6.46	-6.27/-6.97	-6.09/-8.32	-9.21/-7.93	-6.51/-9.1	-9.5/-12.11	-12.33/-8.85	-7.36/-6.69	-6.93/-6.29	-7.01/-9.76	-8.55/-8.53	-8.4/-7.5	-10.17/-12.2	-7.38/-4.37	-6.64/-9.14	-7.11/-5.62	-5.31/-5.48	-7.5/-10.79																	
Theta(150°)	-10.12/-9.7	-7.44/-5.48	-6.89/-6.64	-5.05/-2.03	-3.14/-4.88	-5.53/-8.91	-9.94/-5.8	-5.22/-6.44	-7.18/-6.94	-7.11/-8.08	-9.32/-8.56	-8.27/-6.56	-6.48/-7.14	-5.55/-4.98	-4.44/-3.73	-4.26/-3.9	-6.45/-8.11	-8.35/-9.2	-10.51/-7.79	-6.85/-7.29	-7.53/-9.12	-10.15/-10.38	-10.88/-11.68	-10.57/-10.25																	
Theta(157.5°)	-8.54/-7.85	-6.96/-5.39	-4.17/-3.2	-3.74/-4.32	-5.88/-6.49	-7.09/-7.45	-9.27/-7.47	-7.45/-10.06	-10.42/-9.64	-9.16/-10.01	-8.75/-8.81	-9.08/-9.4	-10.13/-9.93	-8.97/-8.54	-8.55/-5.85	-6.69/-7.75	-7.5/-5.29	-5.47/-6.86	-8.33/-7.26	-6.22/-6.13	-7.44/-7.48	-7.86/-8.51	-7.71/-8.84	-8.95/-9.01																	
Theta(165°)	-9.32/-9.77	-9.67/-9.25	-8.65/-8.15	-6.87/-5.32	-5.1/-5.71	-5.86/-6.05	-6.05/-6.29	-7.45/-9.91	-11.4/-10.01	-10.97/-10.92	-11.02/-11.5	-12.14/-11.33	-10.16/-9.6	-8.25/-6.01	-4.43/-5.57	-7.52/-8.3	-7.55/-6.46	-6.35/-7.73	-7.55/-7.02	-6.77/-7.61	-7.19/-6.92	-7.28/-6.67	-7.23/-6.46	-7.09/-8.06																	
Theta(172.5°)	-11.64/-11.02	-9.29/-7.6	-6.65/-5.52	-5.55/-6.43	-7.17/-7.66	-6.96/-6.24	-6.5/-6.31	-6.76/-6.55	-6.75/-6.78	-7.24/-7.63	-7.56/-7.79	-8.33/-7.88	-8.4/-7.84	-7.58/-8.7	-10.98/-9.59	-8.42/-6.44	-5.09/-4.98	-5.45/-6.02	-5.94/-6.08	-5.84/-5.25	-4.69/-4.97	-5.74/-6.99	-9.2/-9.93	-12.39/-11.99																	
Theta(180°)	-9.94/-9.98	-7.46/-7.21	-6.81/-7.05	-6.65/-6.77	-6.99/-6.92	-7.8/-8.51	-8.84/-8.54	-9.22/-9	-8.75/-8.39	-8.69/-8.24	-7.62/-7.8	-8.07/-7.85	-7.54/-8.53	-7.77/-7.7	-7.28/-6.86	-6.12/-5.65	-5.84/-6.38	-6.88/-7.62	-7.52/-7.95	-7.62/-7.09	-7.43/-7.66	-8.4/-9.33	-10.47/-11.99	-10.42/-10.78																	
Freq(Hz)	5.785GPol.	Theta	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi	Phi																	
DG(dB)	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(172.5°)	Phi(180°)	Phi(195°)	Phi(202.5°)	Phi(210°)	Phi(217.5°)	Phi(225°)	Phi(232.5°)	Phi(240°)	Phi(247.5°)	Phi(255°)	Phi(262.5°)	Phi(270°)	Phi(277.5°)	Phi(285°)	Phi(292.5°)	Phi(300°)	Phi(307.5°)	Phi(315°)	Phi(322.5°)	Phi(330°)	Phi(337.5°)	Phi(345°)	Phi(352.5°)
Theta(7.5°)	-7.57/-8.25	-8.82/-8.57	-7.96/-7.72	-8.21/-7.26	-7.39/-7.39	-7.58/-8.28	-8.24/-8.72	-9.38/-9.93	-9.05/-8.75	-8.21/-8.42	-7.94/-7.98	-8.65/-8.86	-8.31/-8.3	-6.8/-6.5	-5.9/-5.63	-4.54/-4.87	-4.94/-4.55	-4.39/-4.51	-4.68/-4.4	-4/-4.41	-4.62/-4.21	-3.9/-3.93	-4.47/-4.82	-5.41/-7.35																	
Theta(15°)	-3.01/-3.65	-3.93/-4.96	-5.51/-5.68	-6.46/-7.81	-5.99/-5.7	-6.68/-6.63	-5.02/-4.62	-4.99/-5.69	-6.21/-5.46	-4.99/-4.56	-4.22/-4.99	-5.3/-5.47	-5.42/-5.71	-5/-3.64	-2.88/-2.91	-2.29/-2.08	-3.01/-3.36	-3.39/-3.34	-3.88/-3.78	-4/-3.97	-3.49/-3.12	-2.42/-1.55	-1.58/-1.76	-1.88/-2.27																	
Theta(22.5°)	-2.15/-2.84	-2.41/-3.52	-5.38/-8.63	-8.81/-5.3	-7.06/-6.53	-3.88/-2.73	-2.44/-3.41	-4.63/-4.97	-4.73/-4.99	-4.88/-6.1	-5.86/-4.43	-3.81/-3.32	-4.09/-3.53	-4.01/-2.71	-2.63/-2.94	-1.35/-0.77	-1.21/-1.68	-3.11/-4.03	-3.94/-4.5	-5.61/-3.12	-2.11/-1.95	-3.16/-3.99	-4.23/-3.73	-3.18/-2.56																	
Theta(30°)	-3.49/-5.42	-6.6/-7.04	-5.21/-6.39	-7.56/-7.83	-4.48/-4.45	-4.16/-3.1	-3.3/-2.79	-3.74/-3.51	-4.53/-6.48	-7.75/-7.06	-7.62/-9.12	-11.15/-6.18	-3.28/-2.99	-3.41/-2.7	-2.88/-4.91	-3/-2.44	-2.44/-2.42	-4/-5.68	-5.33/-5	-4.62/-4.09	-4.72/-5.87	-7.57/-7.5	-6.25/-3.16	-3.3/-3.51																	
Theta(37.5°)	-6.94/-5.37	-4.51/-5.33	-6.25/-4.31	-3.25/-2.01	-2.18/-4.71	-4.73/-4.73	-5.05/-4.66	-4.65/-3.26	-2.37/-1.81	-3.94/-6.16	-6.5/-4.46	-3.86/-5.61	-7.05/-7.04	-6.9/-6.39	-6.24/-3.31	-3.68/-2.96	-2.26/-5.01	-3.57/-2.39	-4.71/-3.54	-4.8/-5.02	-4.31/-3.5	-2.59/-4.66	-9.52/-10.16	-9.52/-8.89																	
Theta(45°)	1.282/2.5	2.332/8.2	2.852/8.2	0.90/7.8	1.11/1.39	-3/-2.28	-2.45/-1.22	-2.58/-2.17	-0.90/2.3	2.58/3.15	2.982/0.7	1.942/0.4	2.010/3.1	-0.22/-1.41	-0.53/-1.2	-1.96/-0.39	-2.35/-1.32	-0.490/3.7	0.571/1.03	-1.38/-2.54	-1.550/2.8	-0.45/-0.2	0.820/5.9	-0.33/-0.29																	
Theta(52.5°)	3.553/4.7	3.362/5.1	1.070/1.9	-0.78/1.86	0.080/3.8	2.173/5.3	3.634/0.8	0.640/7.2	0.330/9.2	-1.680/7.3	2.573/5.2	3.012/6.8	3.444/4.2	3.322/6.4	3.093/4.9	3.043/4.5	1.58/-0.35	1.32/3.6	2.751/9.3	1.09/1.06	1.572/1.4	1.512/7.8	3.353/1.9	3.974/4.1																	
Theta(60°)	0.63/-0.13	0.03/-0.76	0.78/3.48	2.742/6.8	2.562/7.7	1.813/0.6	3.072/5.4	2.853/7.3	2.142/1.6	2.45/1.83	-1.04/-0.53	-0.140/7.5	1.591/4.9	1.41/1.2	0.2/0.33	-0.08/1.65	-0.460/1.3	-0.620/9.6	0.451/7.9	-0.871/4.7	0.070/2	0.26/1.75	1.11/1.42	0.59/-0.02																	
Theta(67.5°)	3.923/5.3	3.773/6.4	5.194/7.5	2.742/5.6	0.830/6.7	1.2/-0.19	-0.03/1.65	3.691/9.7	2.883/9.9	3.952/5.3	2.982/4	2.632/3.8	1.142/2.3	1.670/8.7	-1.69/-0.17	0.61/1.6	2.092/6.5	1.572/6.9	2.021/7.4	1.090/6	0.520/4.7	1.532/1.4	2.833/1.7																		
Theta(75°)	4.674/6	5.784/7.8	3.944/7.8	4.174/3.4	5.545/9.3	5.986/4.6	7.146/7.2	5.975/9.3	4.693/3.4	2.793/4.2	4.936/2.5	5.094/1	3.985/2.8	3.463/6.1	5.245/3.9	3.582/4.6	4.624/4.9	4.415/6.9	3.935/1.8	4.674/8.3	4.392/7.3	3.694/0.7	3.844/6.5	5.274/8.8																	
Theta(82.5°)	4.535/0.1	3.443/4.1	4.955/8.7	4.945/0.9	6.434/9.2	4.54/8.9	5.335/0.7	4.735/5.4	5.994/6.9	5.254/4.8	2.983/7	4.275/1.5	4.014/4.9	3.651/6.7	2.414/3.5	4.163/4.6	4.643/6.1	3.973/3.9	2.823/1.4	2.444/9.3	4.63/1.2	4.032/5.5	2.893/1.9	5.045/5.7																	
Theta(90°)	0.33/1.89	3.573/8.1	0.923/8	2.012/9.1	3.823/6.8	3.443/2.8	3.83/2.6	3.293/3	2.731/2.3	2.333/6	2.440/8.4	2.392/5.1	2.392/6.5	1.891/5.9	1.763/3.7	3.273/7	3.273/7	3.534/7	3.273/7	1.155/4.9	2.772/4.6	4.153/8.2	3.123/1.7	3.861/3.7																	
Theta(97.5°)	2.34	4.765/1.5	6.036/2.9	5.425/6.9	5.995/8.9	5.025/0.6	5.865/1.4	5.215/7.5	5.525/3.6	4.886/0.7	5.125/2.1	3.663/4.1	2.964/7.4	3.533/3	5.876/2.2	3.962/5.8	5.965/2.2	5.74/5.3	2.673/5.8	5.346/2.9	5.223/5.5	4.25/3.4	4.573/9.7	3.624/0.7																	
Theta(105°)	-0.030/9.3	-0.98/-1.76	0.410/5.9	0.610/9.8	1.891/6.1	-2.13/-3.21	-6.07/-2.8	-1.21/1.05	0.71/1.62	0.912/4.2	0.56/-1.25	-0.5/-1.17	-1.3/-1.05	-0.67/-2.22	-2.330/5.1	-1.42/-0.88	0.431/7.9	-0.61/-2.89	-4.32/-4.55	-1.271/9.2	1.09/-2.54	0.750/5.6	-1																		



Radiated Composite Gain Data (2.4GHz and 5GHz UNII 1~UNII 3)

Appendix A

Gain Result

Freq(Hz)	2.45GPol.	PhiAnt.1	PhiAnt.2	PhiAnt.3	PhiAnt.4	PhiAnt.5	PhiAnt.6	PhiAnt.7	PhiAnt.8	PhiAnt.9	PhiAnt.10	PhiAnt.11	PhiAnt.12	PhiAnt.13	PhiAnt.14	PhiAnt.15	PhiAnt.16	PhiAnt.17	PhiAnt.18	PhiAnt.19	PhiAnt.20	PhiAnt.21	PhiAnt.22	PhiAnt.23	PhiAnt.24	PhiAnt.25	PhiAnt.26	PhiAnt.27	PhiAnt.28	PhiAnt.29	PhiAnt.30	PhiAnt.31	PhiAnt.32	PhiAnt.33	PhiAnt.34	PhiAnt.35
Gain	Phi(0°)Phi(7.5°)	Phi(15°)Phi(22.5°)	Phi(30°)Phi(37.5°)	Phi(45°)Phi(52.5°)	Phi(60°)Phi(67.5°)	Phi(75°)Phi(82.5°)	Phi(90°)Phi(97.5°)	Phi(105°)Phi(112.5°)	Phi(120°)Phi(127.5°)	Phi(135°)Phi(142.5°)	Phi(150°)Phi(157.5°)	Phi(165°)Phi(172.5°)	Phi(180°)Phi(187.5°)	Phi(195°)Phi(202.5°)	Phi(210°)Phi(217.5°)	Phi(225°)Phi(232.5°)	Phi(240°)Phi(247.5°)	Phi(255°)Phi(262.5°)	Phi(270°)Phi(277.5°)	Phi(285°)Phi(292.5°)	Phi(300°)Phi(307.5°)	Phi(315°)Phi(322.5°)	Phi(330°)Phi(337.5°)	Phi(345°)Phi(352.5°)												
Theta(0°)	-9.52/-10.67	-13.35/-18.49	-17.79/-18.35	-19.17/17.37	-13.38/-10.43	-8.81/-7.77	-7.17/-6.71	-6.18/-5.74	-5.49/-5.66	-5.65/-6.27	-7.68/-8.63	-8.55/-8.5	-9.66/-12.15	-15.31/-18.32	-18.46/-18.42	-19.13/-13.94	-10.84/-8.63	-8.62/-8.38	-7.71/-7.87	-7.44/-7.1	-6.43/-6.95	-5.48/-5.31	-5.56/-6.69	-7.66/-9.12												
Theta(7.5°)	9.05/9.8	-12.34/-16.34	-19.64/-18.68	-17.93/-17.24	-15.04/-11.9	-10.6/9.53	-8.77/-9.09	-7.54/-7.14	-7.14/-7.36	-7.6/8.41	-10.44/-12.04	-12.17/-11.45	-12.82/-17.72	-18.97/-18.76	-18.65/-17.38	-17.23/-12.57	-10.13/-9.24	-8.61/-8.28	-8.08/-8.07	-7.65/-7	-6.28/-8.67	-5.62/-5.59	-6.13/-7.25	-7.99/-8.52												
Theta(15°)	-11.34/-10.85	-12.07/-14.78	-19.01/-18.35	-18.11/-19.18	-18.41/-13.5	-11.49/-10.59	-9.38/-9.26	-9.65/-10.23	-10.97/-11.49	-11.67/-12.15	-13.87/-12.07	-19.17/-17.88	-18.15/-18.39	-18.68/-18.74	-18.58/-19.35	-17.22/-13.41	-10.95/-9.66	-8.79/-8.49	-8.32/-9.01	-9.09/-8.99	-8.92/-8.66	-8.46/-8.66	-9.06/-10.5	-11.31/-12.3												
Theta(22.5°)	-16.29/-16.13	-16.01/-18.34	-17.94/-18.41	-18.25/-18.63	-18.75/-14.75	-11.85/-10.22	-9.92/-10.68	-12.22/-14.36	-15.88/-15.31	-13.41/-12.06	-12.11/-12.5	-14.32/-17.3	-18.73/-19.12	-18.06/-16.93	-16.27/-14.86	-13.28/-11.82	-10.98/-10.12	-9.42/-8.97	-9.13/-9.77	-10.28/-11.7	-12.72/-14.12	-14.54/-14.16	-13.21/-13.62	-14.52/-15.78												
Theta(30°)	-18.51/-18.42	-18.22/-19	-18.74/-19.3	-18.51/-17.96	-18.06/-17.37	-12.23/9.4	-8.48/-9.39	-12.11/-14.48	-14.74/-13.8	-12.68/-11.65	-10.81/9.77	-9.87/-11.3	-13.75/-14.89	-14.89/-14.85	-16.76/-16.62	-13.49/-11.05	-10.9/8	-10.11/-9.44	-9.47/-9.81	-11.19/-13.53	-17.17/-18.74	-18.2/-17.5	-17.11/-18.98	-18.28/-18.33												
Theta(37.5°)	-16.93/-15.02	-15.65/-18.41	-18.61/-18.42	-15.86/-18.89	-18.21/-17.38	-11.69/9.05	-8.07/-8.84	-10.11/-10	-10.17/-10.84	-11.63/-11.87	-11.37/-9.82	-9.6/9.6	-10.95/-11.98	-12.67/-12.81	-14.98/-18.74	-18.97/-14.13	-12.19/-12.52	-12.39/-10.85	-9.53/-8.82	-9.41/-7.05	-12.66/-14.63	-16.5/-18.39	-17.53/-19.19	-16.36/-17.71												
Theta(45°)	-16.58/-16.56	-16.47/-19.15	-18.84/-17.81	-14.61/-17.13	-19.12/-16.62	-10.96/-8.73	-8.15/-8.49	-8.13/-7.35	-7.92/-9.21	-11.44/-13.74	-14.45/-13.92	-12.01/-10.77	-10.07/-10.34	-11.71/-13.88	-14.97/-16.14	-16.61/-12.97	-10.61/-11.49	-15.28/-15.16	-10.37/-8.15	-7.88/-8.39	-9.26/-10.89	-12.65/-13.98	-14.47/-13.47	-12.54/-14.29												
Theta(52.5°)	-16.29/-18.17	-17.83/-16.95	-16.82/-15.47	-13.88/-15.37	-18.12/-19.07	-11.37/-8.48	-8.72/-8.11	-7.27/7.27	-8.93/-10.98	-14.21/-17.45	-17.68/-18.2	-16.65/-13.89	-12.33/-10.9	-10.44/-11.79	-15.22/-17.83	-15.85/-11.07	-8.1/8.04	-11.25/-17.53	-12.16/-9.59	-9.36/-8.08	-7.44/-9.07	-10.91/-11.61	-11.59/-11.16	-11.41/-13.39												
Theta(60°)	-18.67/-18.86	-16.64/-14.04	-12.53/-12.65	-13.07/-14.74	-18.28/-18.36	-10.28/-8.77	-7.66/-9.94	-12.77/-11.94	-13.42/-17.39	-18.65/-18.7	-18.91/-12.27	-12.89/-10.31	-8.7/11	-8.31/-12.22	-18.91/-15.93	-10.49/-8.68	-9.11/-11.45	-10.03/-9.16	-11.1/10.1	-8.61/8.93	-9.75/-9.35	-9.31/10.13	-12.83/-12.76													
Theta(67.5°)	-18.04/-18.33	-14.03/-10.96	-9.51/-10.1	-11.49/-16.48	-19.1/12.99	-8.4/6.88	-8.24/9.31	-8.18/-9.95	-11.23/9.92	-11.01/-15.26	-18.85/-18.66	-14.61/-11.56	-6.71/-5.62	-6.11/7.9	-10.95/-12.98	-10.43/-9.68	-10.19/-13.4	-9.36/-7.74	-9.29/-10.02	-10.45/-13.2	-12.6/9.2	-8.79/-8.17	-11.02/-17.36													
Theta(75°)	-17.06/-16.18	-11.05/-9.25	9.38/-10.85	-13.87/-18.64	-16.15/-10.1	-9.39/-9.13	-9.71/-8.64	-6.48/-6.82	-9.05/-11.36	-13.15/-13.21	-15.42/-17.4	-14.25/-10.4	-9.54/-8.65	-7.2/6.19	-6.51/-8.1	-9.68/-9.9	-11.99/-8.13	-7.18/-10.03	-11.29/-8.62	-8.93/-8.69	-9.41/-13.3	-18.63/-13.52	-9.29/-8.76	-10.27/-14.59												
Theta(82.5°)	-19.23/-15.72	-11.59/-10.08	-11.24/-13.4	-16.37/-17.97	-12.79/-10.55	-13.61/-11.53	-7.59/-5.65	-6.62/-6.59	-10.86/-9.96	-12.56/-17.65	-14.82/-10.75	-10.04/-9.15	-7.56/-6.59	-7.02/-8.41	-8.64/-8.85	-15.14/-9.6	-5.93/-6.79	-7.59/-8.96	-12.46/-11.67	-9.78/-11.99	-16.24/-18.26	-14.94/-13.83	-15.88/-18.56													
Theta(90°)	-19.12/-15.75	-12.25/-10.88	-10.29/-11.5	-13.95/-16.07	-16.71/-13.7	-11.51/-7.76	-6.66/-7.44	-6.35/7.48	-9.82/-10	-11.32/9.75	-10.58/-10.77	-9.81/8.81	-8.96/9.66	-8.7/7.26	-10.61/-11.99	-7.09/-5.57	-4.26/-4.95	-9.04/-17.75	-7.88/-12.71	-12.72/-12.58	-10.12/-13.78	-15.28/-18.69	-17.99/-18.13													
Theta(97.5°)	-18.25/-15.17	-11.84/-10.26	-10.45/-12.32	-16.92/-17.33	-16.27/-9.83	-7.52/-7.72	-9.8/8.39	-4.93/-5.97	-9.38/-10.1	-9.51/10.37	-13.99/-16.66	-11.17/-9.82	-12.03/-14.92	-14.58/-13.47	-13.41/-12.95	-10.45/-8.94	-9.96/-8.52	-7.71/-6.66	-4.76/-5.12	-8.41/-12.77	-13.21/-12.24	-10.84/-11.27	-12.82/-15.65	-19.22/-19.17												
Theta(105°)	-17.46/-17.12	-12.63/-10.87	-11.24/-14.06	-16.17/-17.67	-15.19/6.7	-8.18/2.27	-9.64/7.69	-6.02/-8.25	-10.98/-9.72	-7.62/-10.33	-14.61/-11.99	-12.97/-12.84	-14.99/-16.72	-11.97/-13.1	-12.33/-11.22	-11.86/-9.21	-6.11/-4.44	-3.97/-5.22	-8.94/-13.68	-11.13/-9.61	-10.2/9.39	-10.05/-11.89	-16.18/15.1													
Theta(112.5°)	-19.19/-13.46	-10.41/-8.95	-10.02/-12.58	-16.91/-17.36	-18.13/9.33	-6.24/6.16	-8.99/-13.43	-9.24/7.32	-6.24/5.97	-10.87/-12.37	-17.58/-13.71	-9.41/10.75	-14.33/-15.35	-13.68/-11.69	-12.06/-14.03	-11.53/-11.68	-10.49/-9.24	-7.59/-5.66	-4.17/-4.45	-7.88/-12.71	-12.72/-12.58	-10.12/9.31	-8.07/8.88	-11.59/-17.52												
Theta(120°)	-18.22/-19.39	-15.8/-12.1	-13.67/-18.89	-13.06/-10.22	-10.13/-7.05	-5.24/-7.06	-18.68/-11.73	-5.38/-4.59	-6.28/-8.98	-12.44/-15.07	-12.46/-9.4	-8.03/-8.58	-10.04/-11.93	-12.18/-11.6	-12.44/-15.6	-18.01/-15.83	-9.52/-6.2	-5.52/-6.2	-5.53/-4.85	-6.8/-10.7	-11.55/-12.37	-12.29/-11.11	-10.31/-10.03	-10.94/-15.41												
Theta(127.5°)	-18.21/-14.95	-13.78/-14.51	-14.74/-10.27	-7.17/-7.27	-9.58/-9.19	-8.91/-11.6	-10.55/-14.4	-5.68/-17.2	-10.78/-14.56	-16.81/-15.56	-12.35/-9.57	-8.27/-8.64	-9.26/7.77	-9.63/-10.1	-13.01/-16.74	-17.91/-17.75	-9.35/-5.38	-4.75/-6.6	-4.91/-4.76	-7.41/-10.56	-11.33/-11.95	-10.81/-9.55	-10.66/-11.2	-13.59/-18.1												
Theta(135°)	-19.08/-18.78	-16.81/-14.76	-11.56/-9.88	-9.91/-11.35	-10.93/-8.77	-7.02/5.71	-5.87/8.27	-11.81/-11.2	-11.81/11.2	-10.96/-11.57	-11.78/-11.85	-11.77/-13.02	-15.74/-18.95	-18.36/-16.4	-9.94/5.91	-5.08/4.69	-3.88/3.88	-5.76/-5.84	-11.43/-15.08	-13.12/-11.10	-9.29/-10.39	-12.91/-18.54														
Theta(142.5°)	-19.25/-18.4	-17.72/-14.54	-12.76/-11.96	-9.71/8.04	-7.64/7.53	-6.01/5.5	-7.16/-4.63	-16.05/-9.09	-6.71/8.89	-8.31/-10.63	-12.86/-15.22	-14.62/-13.2	-16.38/-18.77	-11.77/-13.99	-13.79/-16.41	-14.74/-9.49	-6.98/6.66	-6.66/-5.39	-4.01/-3.84	-4.81/-7.06	-9.48/-12.58	-16.51/-16.27	-14.08/-14.03	-15.34/-17.57												
Theta(150°)	-17.91/-13.5	-11.12/-9.58	-8.58/-11	-8.07/-10.13	-12.63/-9.24	-6.74/-7.02	-9.95/-5.96	-12.13/-7.9	-6.32/-6.62	-8.91/-11.89	-14.81/-14.84	-12.61/-11.91	-13.74/-17.42	-18.44/-16.29	-15.94/-14.89	-9.43/-6.32	-5.38/-5.79	-6.15/-6.65	-4.97/-4.57	-5.01/-6.51	-8.63/-10.42	-11.86/-13.9	-15.71/-18.22	-17.73/-17.63												
Theta(157.5°)	-14.32/-12.09	-11.44/-9.62	-9.22/-10.86	-17.02/-13.54	-7.84/-5.35	-5.04/-6.42	-8.96/-11.56	-11.81/-10.4	-9.16/-8.84	-8.61/9	-8.92/-10	-12.19/-13.7	-18.34/-15.93	-12.84/-9.97	-7.46/-5.73	-5.33/-5.99	-6.81/5.52	-5.73/-4.53	-5.42/-6.36	-7.6/9	-9.99/-11.47	-14.94/-19.08	-17.98/-17.28													
Theta(165°)	-14.26/-16.32	-16.53/-12.67	-12.22/-13.75	-9.46/5.73	-4.16/-4.24	-5.44/-7.33	-9.52/-11.2	-12.85/-14.7	-14.43/-11.59	-9.7/7.6	-7.15/7.7	-8.39/-9.72	-12.06/-15.59	-17.02/-14.73	-11.53/-9.82	-6.83/-7.32	-7.06/6.93	-6.59/-6.52	-6.63/-7.08	-7.74/-9.19	-10.45/-12.07	-15.29/-17.8	-13.92/-12.59													
Theta(172.5°)	-18.36/-18.32	-16.69/-12.32	-10.92/-8.29	-5.72/-4.72	-5.29/7.04	-9.01/-10.65	-11.18/-11.71	-13.11/-14.25	-15.39/-14.19	-12.34/-11.07	-10.81/-11.67	-13.11/-13.77	-14.23/-15.44	-17.31/-16.09	-15.37/-13.4	-11.75/9.53	-9.03/-8.75	-8.22/-7.68	-7.61/-7.79	-7.75/-8.27	-8.67/-9.19	-10.08/-11.48	-12.45/-12.46	-12.24/-14.08												
Theta(180°)	-17.91/-15.06	-11.56/-10.33	-9.41/-8.03	-7.12/-7.28	-8.94/-11.54	-13.72/-13.32	-10.51/-9.47	-9.46/-10.05	-11.53/-14.07	-17.68/-17.93	-18.96/-18.54	-18.45/-17.57	-18.99/-17.88	-17.98/-18.46	-16.69/-12.65	-10.4/9.51	-9.21/9.4	-9.19/9.32	-9.15/9.62	-10.11/10.55	-11.17/11.57	-12.48/-13.3	-13.27/-13.91	-15.39/-18.59												
Theta(187.5°)	-18.39/8.25	-7.79/6.33	-5.81/6.19	-7.37/9.18	-9.84/9.84	-9.49/10.14	-11.08/-13.13	-15.42/-19.4	-19.21/18.55	-17.52/-18.39	-14.07/10.39	-8.89/9.25	-9.65/9	-6.41/6.22	-7.15/7.79	-7.71/7.22	-7.58/5.88	-9.36/9.89	-11.26/13.18	-17.33/17.55	-18.82/18.5	-17.74/18.11	-16.07/13.77	-10.98/8.77												
Theta(195°)	-8.71/7.87	-7.63/6.96	-5.93/5.69	-6.18/7.26	-8.46/8.26	-8.42/8.66	-9.63/11.34	-13.51/16.03	-18.35/18.27	-17.81/17.94	-16.31/11.84	-10.91/12.34	-14.01/11.29	-8.71/8.22	-9.43/11.05	-10.78/9.95	-10.26/11.73	-13.29/14.09	-15.35/17.84	-19.32/18.49	-19.18/18.7	-17.88/15.27	-14.11/14.27	-12.53/10.25												
Theta(202.5°)	-16.45/-15.07	-13.24/-12.3	-11.28/9.81	-9.01/8.69	-8.31/8.53	-8.72/8.76	-9.02/10	-12.22/-14.82	-15.4/15.97	-17.01/17.9	-16.23/13.71	-14.21/12.72	-18.31/16.95	-12.66/11.75	-13.92/13.07	-14.69/13.21	-13.78/15.99	-18.82/18.43	-17.37/18.01	-16.31/15.64	-17.54/16.51	-15.69/13.96	-13.64/14.11	-14.88/15.93												
Theta(210°)	-8.18/-9.2	-10.89/-11.4	-11.56/11.12	-12.58/13.28	-10																															



Radiated Composite Gain Data (2.4GHz and 5GHz UNII 1~UNII 3)

Appendix A

Theta	Phi	Gain	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(97.5°)	Phi(105°)	Phi(112.5°)	Phi(120°)	Phi(127.5°)	Phi(135°)	Phi(142.5°)	Phi(150°)	Phi(157.5°)	Phi(165°)	Phi(172.5°)	Phi(180°)	Phi(187.5°)	Phi(195°)	Phi(202.5°)	Phi(210°)	Phi(217.5°)	Phi(225°)	Phi(232.5°)	Phi(240°)	Phi(247.5°)	Phi(255°)	Phi(262.5°)	Phi(270°)	Phi(277.5°)	Phi(285°)	Phi(292.5°)	Phi(300°)	Phi(307.5°)	Phi(315°)	Phi(322.5°)	Phi(330°)	Phi(337.5°)	Phi(345°)	Phi(352.5°)	
Theta(22.5°)	Phi(0°)	-10.65-8.86	-8.26-8.08	-8.65-8.1	-9.18-10.3	-11.79-14.8	-12.67-13.08	-14.19-18.33	-18.09-17.86	-17.8-17.45	-18.86-18.34	-17.09-18.96	-14.64-11.74	-10.83-9.68	-9.79-10.12	-10.69-15.74	-14.14-11.12	-13.87-18.95	-14.72-13.19	-12.32-14.15	-18.37-19.15	-15.4-16.36	-17.11-18.85	-17.49-13.35	-13.15-19.24	-18.29-16.2	-12.51-10.44	-9.95-9.67	-9.81-8.93	-12.57-16.3	-10.79-11.93	-15.1-12.75	-10.76-11.12	-15.41-13.57	-11.86-14.33	-14.9-17.37	-17.52-18.88	-18.76-19.04	-15.37-17.12	-15.88-18.56	-19.73-15.26	-14.01-12.88	-11.33-10.78	-11.5-15.07	-16.54-19.41	-17.95-19.46	-18.73-17.91	-17.86-13.34	-14.58-14.4
Theta(30°)	Phi(0°)	-18.29-16.2	-12.51-10.44	-9.95-9.67	-9.81-8.93	-12.57-16.3	-10.79-11.93	-15.1-12.75	-10.76-11.12	-15.41-13.57	-11.86-14.33	-14.9-17.37	-17.52-18.88	-18.76-19.04	-15.37-17.12	-15.88-18.56	-19.73-15.26	-14.01-12.88	-11.33-10.78	-11.5-15.07	-16.54-19.41	-17.95-19.46	-18.73-17.91	-17.86-13.34	-14.58-14.4	-18.29-16.2	-12.51-10.44	-9.95-9.67	-9.81-8.93	-12.57-16.3	-10.79-11.93	-15.1-12.75	-10.76-11.12	-15.41-13.57	-11.86-14.33	-14.9-17.37	-17.52-18.88	-18.76-19.04	-15.37-17.12	-15.88-18.56	-19.73-15.26	-14.01-12.88	-11.33-10.78	-11.5-15.07	-16.54-19.41	-17.95-19.46	-18.73-17.91	-17.86-13.34	-14.58-14.4
Theta(37.5°)	Phi(0°)	-18.29-16.2	-12.51-10.44	-9.95-9.67	-9.81-8.93	-12.57-16.3	-10.79-11.93	-15.1-12.75	-10.76-11.12	-15.41-13.57	-11.86-14.33	-14.9-17.37	-17.52-18.88	-18.76-19.04	-15.37-17.12	-15.88-18.56	-19.73-15.26	-14.01-12.88	-11.33-10.78	-11.5-15.07	-16.54-19.41	-17.95-19.46	-18.73-17.91	-17.86-13.34	-14.58-14.4	-18.29-16.2	-12.51-10.44	-9.95-9.67	-9.81-8.93	-12.57-16.3	-10.79-11.93	-15.1-12.75	-10.76-11.12	-15.41-13.57	-11.86-14.33	-14.9-17.37	-17.52-18.88	-18.76-19.04	-15.37-17.12	-15.88-18.56	-19.73-15.26	-14.01-12.88	-11.33-10.78	-11.5-15.07	-16.54-19.41	-17.95-19.46	-18.73-17.91	-17.86-13.34	-14.58-14.4
Theta(45°)	Phi(0°)	-17.58-15.42	-16.64-15.65	-12.61-10.65	-9.15-9.1	-7.08-10.3	-12.17-11.35	-15.28-11.5	-15.99-17.97	-13.96-16.55	-18.26-18.98	-17.01-18.15	-17.61-17.92	-18.33-14.63	-10.11-10.63	-15.84-16.07	-17.82-18.38	-19.14-18.53	-11.11-12.63	-12.84-17.72	-13.99-11.63	-14.51-16.17	-14.22-10.36	-12.46-11.41	-11.76-16.11	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(52.5°)	Phi(0°)	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(60°)	Phi(0°)	-15.21-13.78	-15.96-18.13	-14.91-18.43	-14.44-11.66	-11.93-8.84	-10.29-10.66	-17.53-18.72	-19.15-18.4	-17.16-17.96	-18.12-13.65	-17.89-13.13	-15.24-13.89	-19.08-18.71	-10.29-12.27	-17.88-11.3	-18.29-14.45	-18.95-12.54	-17.38-14.66	-18.45-15.05	-12.95-16.52	-18.39-18.7	-19.16-16.11	-15.44-14.34	-17.19-14.74	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(67.5°)	Phi(0°)	-16.71-17.82	-17.91-18.42	-17.79-18.86	-18.92-14.17	-9.43-10.49	-12.2-12.33	-18.99-16.37	-18.25-19.07	-15.6-16.52	-18.62-15.34	-17.05-19.17	-19.12-12.27	-17.6-16.19	-19.6-11.83	-10.83-10.13	-14.18-9.64	-11.86-10.78	-17.96-16.6	-14.86-18.99	-11.69-12.53	-14.02-17.49	-15.64-18.65	-18.65-18.5	-18.65-14.85	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(75°)	Phi(0°)	-18.61-17.72	-14.35-17.16	-12.27-9.44	-10.04-9.73	-17.79-18.16	-13.79-12.81	-19.34-18.48	-12.81-13.93	-17.9-18.84	-14.99-18.39	-18.3-11.92	-15.71-14.99	-10.43-8.05	-15.52-13.1	-16.28-14.69	-13.57-11.08	-19.11-16.68	-12.99-18.11	-16.27-14.3	-10.96-18.18	-15.11-16.62	-16.27-14.3	-18.1-16.2	-17.35-17.91	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(90°)	Phi(0°)	-17.82-18.05	-16.81-14.34	-19.25-17.8	-18.15-18.95	-13.11-8.26	-10.51-13.8	-11.17-15.82	-14.63-18.34	-11.78-18.51	-18.56-14.34	-18.24-11.13	-10.96-18.28	-11.51-8.79	-16.14-17.42	-15.19-9.61	-12.47-14.58	-16.67-18.75	-19.11-18.92	-18.12-15.68	-18.17-14.53	-19.24-15.01	-11.36-16.67	-14.11-13.44	-15.3-15.19	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(97.5°)	Phi(0°)	-18.31-16.32	-19.12-17.58	-17.73-11.99	-11.71-9.19	-11.83-11.2	-12.54-14.43	-18.99-14.62	-17.74-19.08	-16.77-17.74	-18.77-18.42	-16.97-11.4	-10.6-13.71	-8.45-10.61	-13.09-11.36	-6.9-7.82	-9.46-14.29	-11.73-11.83	-14.46-17.88	-11.15-16.2	-14.02-17.49	-15.64-18.65	-18.65-18.5	-18.65-14.85	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59	
Theta(105°)	Phi(0°)	-18.24-18.13	-17.86-17.38	-17.29-15.83	-18.35-12.65	-14.78-17.89	-15.19-16.99	-14.24-16.92	-18.62-16.51	-14.38-15.93	-12.92-15.84	-15.77-18.44	-12.67-10.44	-8.6-8.75	-15.05-14.3	-9.77-8.26	-14.72-10.06	-8.89-14.37	-16.24-13.92	-17.62-17.67	-18.91-19.04	-15.79-16.09	-17.21-19.04	-17.33-16.98	-16.24-15.49	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(112.5°)	Phi(0°)	-17.41-18.05	-18.29-18.59	-17.29-18.82	-18.15-17.47	-18.37-18.82	-14.58-14.19	-19.19-13.63	-11.58-7.21	-9.66-19.15	-13.48-13.78	-13.75-12.68	-9-12.79	-10.9-11.3	-18.06-15.71	-11.78-12.13	-12.64-9.96	-16.96-15.13	-11.39-11.74	-18.94-18.7	-18.05-16.81	-16.3-16.12	-18.55-15	-15.51-15.28	-13.98-12.67	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(120°)	Phi(0°)	-15.75-17.98	-16.83-15.6	-13.62-17.73	-16.6-19.29	-17.61-17.85	-14.45-14.83	-14.48-17.03	-10.3-11.73	-15.04-8.97	-14.81-9.93	-9.81-9.03	-10.59-16.19	-14.14-16.61	-17.36-13.4	-12.44-18.74	-18.87-14.54	-18.65-17.54	-12.12-13.98	-14.37-18.22	-18.66-13.87	-18.48-10.53	-11.69-12.91	-11.69-12.91	-17.22-18.42	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59	
Theta(127.5°)	Phi(0°)	-18.18-19.3	-18.05-18.38	-18.65-17.13	-13.23-11.9	-13.78-18.06	-18.96-17.27	-14.2-18.32	-15.15-11.83	-9.25-7.52	-12.38-9.96	-8.34-16.98	-15.68-16.71	-12.47-18.3	-18.91-15.77	-12.64-19.66	-13.89-16.55	-17.31-12.61	-8.66-18.24	-17.6-13.21	-18.15-19.21	-15.98-18.85	-15.93-13.81	-16.18-15.93	-14.21-18.23	-17.47-19.07	-19.18-17.45	-15.96-12.22	-13.26-11.2	-12.35-9.58	-9.09-12.63	-18.42-17.8	-18.59-16.29	-18.05-19.26	-17.76-14.57	-15.6-16.13	-17.22-18.42	-14.79-13.75	-11.31-11.24	-14.3-14.73	-18.05-19.32	-18.55-18.06	-14.01-12.24	-19.18-19.42	-18.06-18.96	-19.06-15.53	-15.51-10.06	-10.11-12.7	-13.05-17.59
Theta(135°)	Phi(0°)																																																



Radiated Composite Gain Data (2.4GHz and 5GHz UNII 1~UNII 3)

Appendix A

Theta (112.5°)	-18.41-18.7	-18.721-15.62	-14.371-9.05	-10.951-9.97	-11.141-13.19	-15.241-18.12	-17.971-18.13	-18.051-18.89	-12.711-10.46	-13.921-17.81	-17.551-18.02	-18.081-18.16	-17.411-18.76	-13.691-13.62	-15.171-6.99	-11.971-11.62	-12.151-18.72	-19.731-18.88	-19.191-19.01	-18.511-17.25	-17.541-18.01	-11.651-13.49	-14.351-19.24	-18.231-17.26	
Theta (120°)	-17.741-16.04	-16.341-17.52	-18.221-12.86	-15.151-12.81	-14.281-16.47	-16.081-16.04	-12.671-17.15	-19.031-18.76	-12.311-7.18	-8.841-9.16	-7.041-7.35	-7.431-8.43	-10.361-13.19	-17.621-18.12	-18.981-17.7	-17.641-18.5	-17.411-19.05	-18.521-18.49	-19.191-19.93	-15.491-13.79	-15.811-16.8	-15.651-18.27	-16.841-19.15	-18.391-18.69	
Theta (127.5°)	-12.941-11.95	-17.251-18.92	-18.621-18.09	-15.171-13.79	-13.721-17.21	-17.721-19.07	-14.151-13.89	-17.831-17.23	-15.861-11.69	-11.151-10.7	-11.531-12.9	-15.621-18.06	-11.611-15.11	-16.611-14.09	-9.621-5.51	-12.411-10.7	-12.451-10.82	-12.451-18.41	-18.691-18.91	-19.191-19.04	-18.021-11.75	-19.321-19.26	-11.111-12.2	-13.571-10.22	-8.611-10.43
Theta (135°)	-18.771-17.66	-12.541-10.67	-13.141-12.55	-12.921-15.74	-15.141-11.92	-11.771-13.75	-15.561-15.23	-11.991-7.27	-6.111-9.33	-12.931-14.97	-19.231-18.69	-16.771-17.78	-10.341-15	-11.761-19.09	-18.531-18.63	-13.851-12.72	-13.211-14.09	-17.861-18.65	-15.661-12.74	-13.431-15.8	-19.241-16.3	-18.221-18.28	-18.231-14.04	-13.951-18.22	
Theta (142.5°)	-12.211-9.83	-11.261-13.89	-14.511-19.41	-14.951-11.2	-10.061-10.42	-12.431-13.75	-17.761-13.79	-11.011-9.46	-9.481-14.68	-17.581-14.58	-15.751-18.46	-15.631-13.96	-18.581-18.51	-16.611-18.03	-15.811-7.15	-6.311-12.12	-19.241-18.16	-18.281-17.13	-18.611-19.32	-13.371-14.58	-18.591-14.21	-16.671-16.13	-12.131-9.58	-9.741-12.42	
Theta (150°)	-18.921-17.59	-10.141-6.33	-4.671-3.5	-2.871-3.35	-4.721-6.22	-7.551-10.34	-16.311-17.74	-16.581-14.84	-11.151-10.7	-11.531-12.9	-16.121-18.06	-13.631-10.72	-11.611-15.11	-16.611-14.09	-9.621-5.51	-12.411-10.7	-12.451-10.82	-12.451-18.41	-18.691-18.91	-19.191-19.04	-18.021-11.75	-19.321-19.26	-11.111-12.2	-13.571-10.22	-8.611-10.43
Theta (157.5°)	-11.611-8.63	-6.311-5.33	-4.531-4.6	-5.941-8.08	-10.411-12.85	-16.381-18.2	-18.321-17.66	-13.181-9.5	-7.511-7.52	-8.031-8.2	-8.131-7.99	-8.331-8.64	-8.721-9.42	-10.611-11.2	-9.171-8.26	-9.651-13.73	-18.831-16.38	-12.541-9.98	-10.641-14.45	-19.151-19.15	-19.331-18.75	-18.681-17.7	-15.441-15.18	-13.831-13.7	
Theta (165°)	-11.881-9.82	-9.191-8.37	-9.281-11.13	-13.551-14.68	-16.941-19.14	-18.111-18.22	-17.981-15.62	-14.121-12.21	-10.861-10.76	-11.321-11.55	-12.121-9.9	-13.741-17.23	-17.881-16.46	-14.191-13.35	-14.141-16.72	-17.761-17.96	-18.711-17.25	-16.931-13.54	-13.561-15.18	-14.541-14.34	-12.741-11.41	-10.621-10.03	-10.281-11.62	-12.051-11.86	
Theta (172.5°)	-13.751-14.52	-14.611-14.09	-17.381-18.52	-19.311-18.78	-17.431-18.47	-16.641-15	-13.881-12.82	-14.021-16.63	-18.281-17.71	-14.991-13.7	-13.611-15.98	-19.281-18.39	-18.171-15.77	-13.561-12.98	-13.691-15.23	-16.991-17.14	-17.511-18.16	-14.121-12.65	-11.891-12.24	-11.541-11.62	-10.721-10.38	-10.021-9.61	-9.411-9.87	-10.961-12.26	
Theta (180°)	-10.191-9.48	-9.811-9.58	-9.651-9.53	-9.451-10.07	-11.171-12.81	-15.631-16.89	-17.621-18.73	-18.721-14.68	-12.091-9.74	-8.861-8.71	-9.111-10.54	-11.871-13.2	-15.251-15.95	-15.281-13.89	-12.651-12.32	-13.181-14.06	-15.841-17.67	-17.941-19.12	-17.611-17.76	-17.421-17.59	-16.911-15.58	-14.921-14.43	-13.871-12.43	-11.821-10.85	
Gain	Phi(0°)	Phi(15°)	Phi(30°)	Phi(45°)	Phi(60°)	Phi(75°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)	
Gain	-18.621-18.96	-18.551-17.04	-14.911-12.94	-11.581-11.37	-11.061-10.12	-10.691-9.59	-8.151-7.86	-7.991-8.76	-9.171-9.97	-10.011-11.11	-10.341-11.98	-14.291-17.47	-18.391-18.47	-18.421-19.35	-18.041-18.57	-17.661-15.56	-13.741-12.15	-11.271-10.47	-9.971-10.81	-11.411-12.98	-14.491-16.42	-17.791-18.37	-18.091-18.67	-19.131-18.62	
Theta (7.5°)	-13.481-14.3	-17.071-18.5	-17.361-14.1	-12.411-13.7	-9.841-9.09	-9.351-10.03	-11.251-11.95	-13.141-14.04	-15.441-16.58	-17.891-17.55	-17.481-17.07	-14.561-13.63	-14.031-14.23	-14.951-16.39	-15.141-14.5	-13.591-12.3	-12.041-10.74	-9.681-9.05	-8.611-7.7	-7.621-7.6	-8.051-8.31	-8.731-9.58	-9.851-10.56	-11.361-12.76	
Theta (15°)	-4.871-4.74	-7.661-7.97	-8.571-8.53	-8.371-7.29	-6.071-6.3	-6.561-6.5	-6.321-6.46	-6.181-5.55	-4.881-4.68	-5.041-6.14	-7.711-10.27	-12.831-13.88	-16.121-10.99	-9.711-9.17	-9.241-8.69	-8.611-8.61	-7.641-7.06	-6.911-7.2	-7.41-8.96	-9.161-9.75	-10.261-10.96	-11.341-11.29	-11.361-10.25		
Theta (22.5°)	-6.751-4.59	-3.861-3.99	-4.731-5.04	-4.991-4.68	-5.481-7.11	-9.831-12.12	-13.581-13.95	-11.591-8.61	-6.361-5.17	-4.721-4.38	-4.211-4.02	-4.921-6.13	-7.851-9.04	-9.091-9.17	-8.341-6.95	-6.711-5.32	-4.671-4.43	-4.481-4.92	-5.21-4.44	-5.211-6.72	-7.791-7.96	-8.241-8.01	-8.221-8.59	-8.231-6.88	
Theta (30°)	-4.121-7.47	-5.41-6.53	-9.221-12.11	-12.971-10.81	-12.841-18.86	-12.221-22.91	-11.251-13.62	-14.751-14.84	-15.831-16.67	-18.061-18.96	-15.511-8.13	-4.951-4.2	-4.181-4.05	-4.341-5.13	-5.561-4.99	-3.611-3.04	-2.931-3.05	-3.431-5.01	-5.231-3.79	-3.61-5.02	-6.721-6.2	-5.51-4.47	-4.511-4.41	-3.811-3.94	
Theta (37.5°)	-1.711-7.69	-10.031-13.92	-15.041-11.16	-9.091-8.54	-5.991-3.78	-3.211-4.9	-4.081-3.6	-2.971-4.75	-1.261-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	-0.711-3.4	
Theta (45°)	-15.211-10.12	-5.741-5.3	-4.451-2.45	-1.861-2.26	-1.61-2.19	-2.91-2.51	-1.081-1.46	-2.741-4.02	-4.151-3.61	-4.141-5.96	-6.641-5.35	-5.061-7.33	-11.571-14.49	-7.611-3.99	-2.491-1.74	-1.361-3.97	-5.331-3.42	-2.171-2.32	-2.681-2	-1.491-2.05	-3.771-5.45	-4.871-2.91	-2.131-4.48	-9.961-13.85	
Theta (52.5°)	-4.021-1.53	-0.331-7.05	-0.991-0.8	-2.261-4.21	-6.771-9.07	-7.61-6.99	-9.871-10.02	-7.521-6	-5.361-3.53	-5.391-3.49	-4.081-3.74	-5.051-5.07	-4.11-4.53	-7.091-8.51	-7.231-9.53	-4.721-5.1	-2.541-3.1	-5.31-6.25	-5.591-7.12	-6.811-4.4	-5.411-3.92	-4.411-6.5	-7.761-6.34		
Theta (60°)	0.611-2.4	0.131-1.98	-3.411-4.73	-5.591-4.9	-6.731-14	-2.341-4.04	-5.931-4.98	-4.981-2.8	-6.751-4.06	-4.071-3.74	-1.881-2.6	-3.521-2.28	-1.011-1.7	-5.331-4.21	-8.991-6.45	-3.771-5.92	-11.221-6.72	-3.691-4.27	-6.71-6.29	-3.571-5.33	-6.671-4.52	-4.451-2.74	-0.811-3.0		
Theta (67.5°)	-2.641-4.95	-6.381-4.47	-2.010	0.930-2.2	-0.891-1.17	1.530-3.9	-0.111-6.9	1.741-0.47	-3.051-3.11	-3.61-9.57	-6.671-2.85	-2.351-3.02	-2.551-2.03	-1.411-2.5	-2.921-4.83	-2.051-2.37	-8.351-5.82	-2.121-3.57	-5.161-4.29	-1.441-2.31	-3.231-0.84	-1.021-1.19	-0.851-1.4	1.011-0.52	
Theta (75°)	-4.341-6.22	-3.811-2.1	-1.0201-5.3	0.021-1.13	-0.9201-5.3	0.9601-3.8	-0.8201-14	1.0801-9	0.2901-5.2	1.3101-16	-2.891-4.2	-1.211-2.81	-2.061-2.96	-2.911-2.57	-1.561-2.09	-3.221-3.31	-9.261-2.78	0.671-4.02	-1.811-8.2	0.021-5.1	-3.261-2.44	-4.821-3.02	-4.821-3.02	-11.831-1.84	
Theta (82.5°)	-3.411-3.28	-1.641-2.99	-4.221-6.69	-4.531-5.82	-6.491-5.21	-3.841-5.53	-7.461-3.27	-5.741-3.66	-6.341-4.74	-1.6801-67	-2.271-1.6	-3.821-83	-4.281-4.02	-3.741-4.1	-5.311-5.3	-3.961-2.1	0.751-1.73	-4.581-2.62	-0.411-3.48	-5.771-4.21	-3.171-3.22	-5.681-2.09	-1.231-0.25		
Theta (90°)	-3.981-2.98	-2.261-3.03	-4.11-5.3	0.2301-1.4	0.5111-4.5	1.801-0.2	-1.491-0.33	0.5401-3	-0.611-3	-1.021-4	-3.511-0.55	-3.551-2	-1.871-2.33	-2.851-2.54	-2.421-0.64	-0.311-2.71	-6.191-3.01	0.181-3.03	-3.711-4.19	-1.651-3.79	-3.051-0.19	-1.241-5.86	-3.781-1.39	-0.991-1.5	
Theta (97.5°)	-6.331-7.1	-7.861-8.31	-8.41-12.2	-3.451-3.21	-0.931-4.5	-3.021-8.85	-3.451-1.6	-4.691-2.81	-1.641-2.89	-0.721-0.33	-4.911-124	-5.461-1.28	-1.391-2.73	-11.071-8.37	-6.531-3.31	0.311-1.3	-3.991-6.71	-4.291-3.74	-5.21-2.99	-2.971-3.66	-5.341-2.29	-4.931-3.2	-10.331-6.65	-5.111-4.1	
Theta (105°)	-7.861-14.96	-13.331-10.36	9.941-10.06	-10.681-15.2	-15.431-10.08	-7.281-11.17	-18.361-6.98	-6.811-11.24	-17.811-11.05	-14.781-11.57	-14.641-5.81	-6.141-9	-3.041-4.82	-7.291-6.33	-6.331-8.4	-7.341-4.04	-5.971-3.9	-3.811-8.15	-11.211-7.26	-2.971-3.66	-9.271-7.77	-5.111-11.2	-9.711-6.56	-4.651-5.84	
Theta (112.5°)	-7.721-10.92	-9.841-8.91	-7.281-3.98	-2.191-2.3	-1.511-0.99	-0.911-2.07	-0.991-0.8	0.571-1.15	-3.981-4.86	-4.711-11.05	-14.341-18.81	-11.641-18.79	-6.541-5.83	-7.981-9.09	-5.951-3.14	-6.141-11.95	-12.241-6.65	-3.641-10.78	-12.711-18.42	-5.481-11.93	-7.711-4.55	-7.11-9.36	-8.811-5.08	-5.471-6.41	
Theta (120°)	-14.561-13.22	-10.791-9.59	-7.581-5.2	-4.111-15.9	-4.241-6.5	-7.721-6.1	-3.681-4.51	-4.551-5.1	-6.471-12.52	-12.361-9.02	-5.211-6.04	-13.221-18.75	-8.721-3.44	-4.391-3.86	-3.351-8.4	-8.141-15.95	-18.761-8.6	-6.391-10.2	-14.351-13.14	-13.271-14.8	-9.561-9.7	-9.21-8.91	-10.621-18.9		
Theta (127.5°)	-8.711-7.19	-7.11-5.13	-4.211-5.04	-6.591-10.59	-8.741-8.48	-5.471-8.5	-10.031-6.28	-5.761-6.6	-7.811-8.55	-7.211-11.42	-17.331-15.92	-18.391-17.87	-10.271-11.57	-8.391-11.79	-10.021-7.29	-9.781-14.86	-15.411-15.07	-17.921-17.53	-13.771-11.02	-10.711-16.02	-12.131-18.11	-17.111-17.6	-16.651-18.48	-18.671-14.15	
Theta (135°)	-14.191-11.31	-11.431-11.85	-11.581-9.98	-8.831-8.05	-6.451-5.94	-6.251-5.28	-5.281-4.44	-5.951-9.34	-11.191-8.55	-8.861-10.88	-13.141-13.32	-18.631-11.6	-9.421-19.07	-16.151-14.45	-18.921-17.37	-12.231-10.29	-9.951-14.15	-15.431-10.3	-13.441-16.87	-9.351-9.8	-14.761-11.01	-9.451-12.57	-12.521-15.58	-11.071-9.58	
Theta (142.5°)	-17.371-17.21	-13.641-9.73	-7.51-6.67	-4.631-4.45	-5.181-5.93	-6.951-6.82	-10.691-8.74	-6.941-7.89	-10.641-8.43	-7.271-7.26	-6.821-6.03	-6.831-8.94	-9.211-8.52	-11.311-9.14	-15.771-14.51	-11.361-6.77	-5.791-15	-8.961-10.35	-14.941-13.57	-10.441-8.27	-8.711-7.64	-6.421-7.41	-8.791-9.99	-10.011-11.36	
Theta (150°)	-8.911-12.02	-11.341-8.02	-5.951-5.23	-5.741-6.66	-8.41-9.1	-7.721-7.3	-7.521-6.99	-5.541-5.48	-5.011-6.11	-8.981-12.55	-14.751-9.93	-5.561-4.96	-6.												



Radiated Composite Gain Data (2.4GHz and 5GHz UNII 1~UNII 3)

Appendix A

Theta (°)	18.32-19.17	14.86-13.03	-11.43-12.47	-12.53-11.72	-11.81-11.39	-12.61-14.16	-14.47-13.85	-16.38-17.84	-18.71-16.76	-12.34-10.65	-12.36-19.21	-18.96-14.34	-19.05-18.81	-17.84-17.21	-18.51-18.01	-17.67-18.65	-18.32-17.74	-14.95-16.11	-16.31-17.18	-17.69-15.21	-14.41-17.26	-18.59-18.18	-18.05-17.51	-18.39-17.63
Theta (°)	17.32-18.52	-18.27-14.88	-12.47-11.79	-10.84-10.08	-10.72-11.11	-12.76-15.28	-16.11-16.63	-14.97-12.71	-9.44-8.54	-7.75-8.46	-9.3-9.21	-9.71-10.36	-12.54-12.46	-12.18-13.76	-17.64-17.63	-19.35-14.97	-10.49-9.24	-8.12-7.85	-8.63-8.58	-9.22-9.22	-8.44-8.64	-9.1-9.1	-10.91-11.1	-19.58-18.1
Theta (°)	-18.25-15.62	-15.05-13.12	-11.67-11.92	-12.41-12.95	-16.67-19.42	-19.1-18.92	-18.36-19.19	-16.33-13.78	-11.23-10.35	-9.58-9.15	-9.03-8.73	-9.4-10.95	-11.96-12.93	-13.28-11.89	-10.72-10.04	-9.37-8.73	-8.2-7.67	-8.63-7.59	-8.44-8.92	-9.63-10.26	-10.71-11.53	-10.81-10.4	-10.91-18.4	-10.91-18.4
Freq(Hz)	5.65GPol	ThetaAnt 2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Gain	Phi(°)Phi(7.5°)	Phi(15°)Phi(22.5°)	Phi(30°)Phi(37.5°)	Phi(45°)Phi(52.5°)	Phi(60°)Phi(67.5°)	Phi(75°)Phi(82.5°)	Phi(90°)Phi(97.5°)	Phi(105°)Phi(112.5°)	Phi(120°)Phi(127.5°)	Phi(135°)Phi(142.5°)	Phi(150°)Phi(157.5°)	Phi(165°)Phi(172.5°)	Phi(180°)Phi(187.5°)	Phi(195°)Phi(202.5°)	Phi(210°)Phi(217.5°)	Phi(225°)Phi(232.5°)	Phi(240°)Phi(247.5°)	Phi(255°)Phi(262.5°)	Phi(270°)Phi(277.5°)	Phi(285°)Phi(292.5°)	Phi(300°)Phi(307.5°)	Phi(315°)Phi(322.5°)	Phi(330°)Phi(337.5°)	Phi(345°)Phi(352.5°)
Theta (0°)	-17.52-18.75	-18.89-18.35	-15.76-14.22	-12.51-12.34	-11.79-11.13	-10.69-11.41	-12.31-12.34	-12.19-12.7	-12.89-12.31	-14.15-16.44	-17.96-18.06	-18.43-18.55	-18.29-19.24	-17.08-17.21	-13.27-12.39	-12.22-12.39	-12.96-12.62	-12.96-12.62	-12.96-12.62	-12.96-12.62	-12.96-12.62	-12.96-12.62	-12.96-12.62	-12.96-12.62
Theta (7.5°)	-18.04-19.3	-17.98-17.71	-16.16-15.23	-14.87-13.81	-12.88-13.98	-13.37-12.43	-11.67-12.53	-12.41-12.67	-11.89-11.77	-11.47-11.3	-14.56-17.02	-18.52-17.15	-14.65-13.99	-13.02-12.21	-11.18-10.77	-10.31-9.55	-8.91-7.83	-8.73-8.84	-8.71-9.24	-9.57-10.42	-11.57-12.22	-14.02-13.37	-14.17-14.76	
Theta (15°)	-11.16-12.36	-13.44-13.64	-13.99-12.97	-14.95-17.97	-17.1-13.37	-10.7-9.94	-9.54-10.79	-12.8-12.63	-11.81-8.85	-8.03-7.72	-7.66-9.75	-11.86-15.58	-17.76-17.81	-14.71-13.13	-11.35-10.62	-10.9-10.14	-11.57-12.37	-12.92-12.01	-12.83-12.68	-13.33-13.53	-14.16-13.26	-12.54-11.35	-12.04-10.71	
Theta (22.5°)	-10.61-11.8	-13.06-13.06	-14.42-16.86	-17.66-15.55	-10.43-7.5	-5.27-4.52	-5.57-6.64	-5.81-4.92	-4.97-4.88	-4.83-5.23	-6.2-8.06	-9.59-9.65	-11.09-11.25	-16.73-14.47	-11.06-9.89	-9.51-10.77	-11.1-10.13	-9.71-9.77	-11.09-11.77	-11.09-11.77	-11.41-12.13	-14.75-16.84	-14.36-10.99	
Theta (30°)	-10.48-7.67	-8.06-10.62	-10.74-9.07	-9.17-8.42	-9.96-11.4	-11.99-15.82	-18.23-16.85	-15.66-18.21	-17.31-14.5	-7.65-4.2	-2.93-3.18	-4.37-4.61	-6.01-7.46	-9.56-12.57	-18.66-18.03	-17.39-16.61	-18.88-17.83	-18.12-18.99	-18.39-18.87	-18.09-16.27	-15.54-13.37	-16.94-17.33	-17.73-17.2	
Theta (37.5°)	-3.67-3.34	-5.67-7.75	-6.73-5.9	-7.37-10.28	-16.26-15.4	-12.17-12.8	-11.33-8.55	-8.47-6.24	-5.35-6.65	-6.5-7.47	-10.74-11.82	-7.65-6.89	-3.87-4.51	-5.72-9.11	-14.47-18	-16.88-12.04	-11.41-13.72	-19.31-17.98	-13.26-14.2	-15.41-13.13	-12.54-11.35	-12.04-10.71		
Theta (45°)	-1.45-3.13	-6.3-6	-4.99-7.06	-10.24-7.94	-9.83-6.68	-5.33-7.43	-5.87-10.36	-4.27-8.6	-9.3-12.4	-8.81-10.3	-3.04-4.75	-6.7-9.98	-4.13-2.69	-2.42-3.96	-8.1-8.32	-3.48-5.66	-10.14-15.66	-10.14-15.66	-4.85-7.5	-7.55-9.24	-6.48-4.21	-4.48-5.09		
Theta (52.5°)	-5.72-9.76	-10.03-10.15	-11.22-5.84	-3.4-4.6	-5.42-6.85	-5.67-4.51	-2.97-2.32	-2.62-4.35	-6.92-7.06	-6.97-12.06	-9.76-6.27	-3.87-3.91	-4.95-3.41	-2.01-2.23	-3.89-6.02	-3.25-4.59	-5.63-6.16	-6.34-6.14	-7.47-8.59	-5.52-4.86	-4.62-6.52	-4.41-1.74		
Theta (60°)	-7.96-4.44	-3.09-1.67	-1.26-2.05	-2.88-2.99	-1.91-2.99	-3.3-4.74	-2.52-1.57	-4.01-1.2	-0.21-3.21	-3.2	-2.36-6.56	-7.16-9.47	-11.62-10.02	-4.38-3.68	-5.49-8.51	-8.59-6.85	-9.18-16.05	-11.41-11.05	-7.85-6.27	-6.65-6.08	-5.78-8.15	-4.95-3.46		
Theta (67.5°)	0.050-4.9	-0.76-1.58	-2.44-6.16	-4.7-9.63	-5.77-5.95	-4.7-9.63	-9.33-8.52	-6.71-5.75	-7.03-7.4	-4.89-7.99	-4.68-9.1	-3.44-4.6	-2.19-2.2	-3.77-6.96	-5.24-3.76	-6.17-6.15	-3.04-6.42	-5.82-4.74	-1.43-2.7	-2.83-2.11	-1.58-1.72	-3.61-1.89		
Theta (75°)	-1.31-2.61	-4.39-5.06	-2.31-2.72	-0.83-0.28	2.37-1.39	1.75-0.6	-0.25-0.7	0.21-0.96	-0.45-1.46	-2.02-2.9	-6.76-4.68	-2.66-3.65	0.03-0.29	-1.57-4.85	-8.2-3.23	0.24-1.66	-1.18-2.26	4.47-5.44	-0.97-1.6	-2.37-1.03	0.27-0.18	-0.04-3.29		
Theta (82.5°)	-2.87-3.64	-1.69-2.46	-1.27-3.61	-3.28-2.05	-0.61-7.23	-2.46-2.58	-0.58-1.3	-3.37-0.24	0.53-5.06	-0.58-0.17	-4.74-4.09	-5.05-3.94	-1.94-4.85	-6.75-5.12	-5.74-9.3	-1.55-1.94	-1.99-1.36	-5.12-8.26	-4.93-2.81	-4.24-1.26	-2.63-2.02	-2.78-4.47		
Theta (90°)	-4.28-3.01	0.01-1.8	-1.85-3.9	-2.66-1.45	-0.15-4.49	-0.19-0.63	-1.71-0.95	-1.96-2.29	-4.82-3.44	-3.67-0.47	-5.67-3.44	-3.66-2.73	-1.95-1.37	-3.84-4.99	-6.32-3.42	-4.16-9.32	-1.23-0.24	-0.51-3.97	-1.93-0.46	-1.93-0.34	-0.9-3.6	-3.82-4.2		
Theta (97.5°)	-6.86-2.11	0.12-2.35	-0.86-2.39	-1.71-0.52	1.9-0.74	0.76-0.94	-0.89-1.12	0.06-0.76	-2.15-0.15	-1.11-6.8	-2.12-2.8	-4.7-1.3	-3.71-2.27	-4.22-4.06	-3.89-0.9	-1.05-1.69	-3.65-0.67	0.96-5.07	-1.57-1.53	-1.32-0.43	0.67-1.52	-1.57-6.45		
Theta (105°)	-4.2-5.36	-5.68-7.95	-10.09-17.86	-10.85-6.52	-6.6-10.76	-18.89-13.68	-11.12-13.83	-8.59-5.73	-7.83-3.96	-1.99-2.11	-5.41-5.4	-2.72-5.65	-3.88-7.54	-15-12.22	-8.7-2.86	-3.93-4.85	-17.14-5.44	-6.85-15.77	-7.47-8.68	-9.19-7.3	-3.66-9.04	-8.7-10.4		
Theta (112.5°)	-7.55-12.01	-9.06-9.82	-7.28-6.1	-6.35-5.78	-6.64-6.63	-3.41-6.66	-3.25-0.44	-2.06-4.77	-6.38-15.32	-19.23-11.02	-6.11-6.33	-5.12-6.06	-4.39-5.09	-9.75-12.76	-18.51-18.48	-5.91-9.79	-4.56-9.19	-9.3-9.9	-9.45-10.1	-9.95-18.66	-6.98-4.87			
Theta (120°)	-9.91-14.36	-12.49-7.82	-4.03-2.67	-1.49-1.24	-0.69-3.52	-2.95-3.15	-1.35-1.75	-1.44-1.96	-4.28-10.48	-6.83-4.26	-7.32-7.72	-8.71-6.77	-3.33-5.01	-6.87-7.18	-7.7-6.68	-3.12-8.99	-10.75-5.29	-5.51-16.99	-8.78-6.7	-9.67-7.09	-8.62-8.35			
Theta (127.5°)	-14.66-13.06	-7.2-6.44	-6.31-4.57	-3.74-4.23	-5.64-6.47	-8.18-13.65	-14.24-8.98	-6.59-9.33	-17.26-17.41	-10.15-9.21	-8.05-5.66	-11.61-12.31	-17.57-6.64	-7.13-10.15	-9.38-6.3	-9.74-16.69	-10.64-0.33	-5.91-7.51	-18.17-8.6	-10.53-5.38	-6.83-19.4			
Theta (135°)	-17.67-10.67	-7.7-8.02	-5.93-5.56	-5.56-6.5	-7.73-7.99	-6.87-5.68	-4.71-11.1	-3.42-4.56	-6.38-5.67	-7.56-14.44	-12.73-9.15	-10.98-18.55	-3.76-10.19	-9.51-8.76	-17.15-14.82	-17.74-9.81	-8.19-11.22	-18.36-15.6	-14.52-17.64	-11.58-12.67	-13.03-9.69			
Theta (142.5°)	-16.43-17.66	-11.77-17.51	-15.5-11.72	-11.04-6.91	-5.84-5.98	-5.75-5.35	-6.45-8.22	-6.7-8.2	-11.6-11.26	-12.81-18.4	-18.26-15.82	-11.57-5.9	-5.42-8.26	-14.08-10.83	-18.06-17.35	-18.17-10.16	-8.35-6.9	-7.2-13.69	-18.56-13.16	-7.25-8.03	-12.08-16.59			
Theta (150°)	-6.37-7.32	-8-7.76	-6.18-3.76	-1.96-6.05	-0.7-2.02	-4.5-8.99	-6.67-6.08	-6.86-6.66	-9.16-14.75	-13.31-16.43	-18.47-19.29	-18.07-10.08	-9.01-7.72	-6.44-6.51	-5.8-8.24	-9.17-7.35	-5.72-5.6	-10.85-10.5	-7.81-6.73	-8.4-6.77	-4.94-8.43			
Theta (157.5°)	-6.57-6.87	-8.05-6.89	-9.02-8.85	-10.18-10.52	-8.11-7.68	-7.41-6.63	-6.76-6.99	-11.78-11.78	-11.42-11.15	-10.56-11.17	-11.11-11.23	-8.87-6.29	-4.84-5.49	-5.56-8.21	-10.33-13.13	-12.78-11.64	-10.81-11.63	-12.36-14.38	-18.8-18.09	-16.88-16.73	-14.39-12.65			
Theta (165°)	-9.78-10.84	-11.41-10.99	-9.8-8.43	-7.14-5.43	-4.69-5.87	-4.86-12.17	-18.85-19.53	-18.34-17.88	-13.44-9.89	-9.41-9.72	-11.73-12.16	-11.78-9.63	-9.04-9.27	-8.78-8.58	-8.34-8.34	-14.78-7.04	-6.81-7.17	-7.33-8.27	-8.87-8.42	-8.08-7.92	-7.87-7.85			
Theta (172.5°)	-4.73-14.8	-4.6-4.93	-5.17-5.66	-6.46-7.77	-10.82-14.9	-16.48-15.06	-13.25-14	-18.31-18.6	-18.95-18.02	-18.42-19.07	-14.48-11.45	-9.35-7.66	-7.42-7.03	-6.25-5.84	-5.28-8.42	-4.71-5.02	-6.67-9.98	-10.45-13.38	-15.31-16.62	-15.17-17.73	-18.95-17.84			
Theta (180°)	-8.49-9.18	-11.55-14.58	-17.34-17.39	-18.88-17.44	-17.78-15.82	-12.86-11.23	-10.33-12.04	-14.29-15.77	-16.03-15.15	-11.14-10.58	-10-10.3	-10.41-11.19	-11.86-12.12	-11.47-11.24	-11.92-12.08	-11.79-12.69	-13.44-16.34	-16.62-17.76	-17.89-16.5	-13.24-10.8	-9.42-8.6			
Freq(Hz)	5.785GPol	ThetaAnt 2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	
Gain	Phi(°)Phi(7.5°)	Phi(15°)Phi(22.5°)	Phi(30°)Phi(37.5°)	Phi(45°)Phi(52.5°)	Phi(60°)Phi(67.5°)	Phi(75°)Phi(82.5°)	Phi(90°)Phi(97.5°)	Phi(105°)Phi(112.5°)	Phi(120°)Phi(127.5°)	Phi(135°)Phi(142.5°)	Phi(150°)Phi(157.5°)	Phi(165°)Phi(172.5°)	Phi(180°)Phi(187.5°)	Phi(195°)Phi(202.5°)	Phi(210°)Phi(217.5°)	Phi(225°)Phi(232.5°)	Phi(240°)Phi(247.5°)	Phi(255°)Phi(262.5°)	Phi(270°)Phi(277.5°)	Phi(285°)Phi(292.5°)	Phi(300°)Phi(307.5°)	Phi(315°)Phi(322.5°)	Phi(330°)Phi(337.5°)	Phi(345°)Phi(352.5°)
Theta (0°)	-10.25-11.18	-11.36-11.44	-11.84-12.56	-13.98-17.04	-18.32-18.06	-17.72-18.24	-18.38-13.97	-13.12-11.89	-10.73-10.61	-10.94-10.84	-10.2-10.25	-10.87-9.66	-10.28-10.78	-11.24-13.3	-13.18-13.96	-15.91-16.86	-18.95-18.5	-18.52-18.39	-18.47-18.71	-18.98-18.48	-18.04-18.99	-17.87-13.22		
Theta (7.5°)	-13.33-15.53	-14.97-15.93	-18.05-19.16	-18.63-17.56	-19.04-17.33	-18.29-19.32	-18.49-18.26	-19.07-18.04	-18.95-18.43	-17.65-18	-17.12-11.35	-9.43-8.17	-7.96-8.67	-7.81-7.91	-9.17-10.91	-17.39-16.92	-15.41-17.43							



Radiated Composite Gain Data (2.4GHz and 5GHz UNII 1~UNII 3)

Appendix A

Theta	Phi	Gain	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(45°)	Phi(60°)	Phi(75°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta(15°)	Phi(7.5°)	-9.27/-9.09	-9.19/-9.09	-8.81/-8.65	-8.38/-8.12	-7.59/-7.61	-7.56/-8.17	-8.69/-9.11	-9.21/-9.4	-10.03/-11.22	-11.71/-11.85	-12.28/-14.18	-16.18/-17.4	-17.15/-15.55	-14.91/-14.04	-12.72/-12.5	-12.11/-11.34	-10.91/-10	-9.12/-8.05	-7.43/-7.74	-6.84/-6.94	-10.66/-11.95	-13.49/-15.63	-15.79/-14.5	-12.08/-10.38	
Theta(22.5°)	Phi(15°)	-7.2/-7.99	-9.52/-10.17	-10.75/-10.85	-11.68/-11.32	-10.61/-10.14	-10.02/-10.15	-10.46/-11.13	-10.83/-11.37	-11.61/-11.98	-11.2/-10.78	-11.13/-11.27	-11.23/-10.95	-10.49/-10.19	-10.03/-10.05	-9.99/-10.01	-10.63/-11.43	-11.67/-10.97	-10.24/-8.93	-8.28/-8.79	-8.67/-8.94	-9.13/-9.22	-9.12/-9.63	-9.26/-8.97	-8.15/-7.42	
Theta(30°)	Phi(22.5°)	-7.62/-9.66	-13.16/-17.49	-17.92/-19.91	-18.03/-19.05	-18.42/-15.21	-12.91/-11.66	-11.56/-11.38	-13.12/-14.43	-15.01/-14.47	-12.75/-11.63	-10.65/-9.81	-8.73/-8.25	-8.18/-8.46	-8.86/-8.94	-8.38/-8.66	-9.91/-11.1	-11.83/-12.09	-11.64/-10.52	-9.24/-8.8	-8.22/-7.58	-6.85/-6.86	-5.93/-6.42	-6.76/-6.75	-6.67/-6.77	
Theta(37.5°)	Phi(30°)	-11.12/-14.35	-14.26/-11.4	-8.71/-12.91	-6.66/-6.72	-6.9/-7.32	-7.12/-6.61	-6.38/-6.91	-7.83/-8.38	-9.55/-11.25	-12.81/-13.25	-12.21/-9.94	-8.63/-7.74	-8.18/-8.62	-8.43/-7.9	-7.59/-7.63	-8.11/-9.03	-10.03/-10.58	-10.33/-9.88	-9.08/-8.69	-7.72/-6.21	-5.4/-5.56	-4.94/-5.77	-6.82/-7.51	-8.24/-9.14	
Theta(45°)	Phi(45°)	-9.99/-7.47	-4.89/-3.16	-2.27/-1.81	-1.79/-1.67	-1.91/-2.2	-2.11/-1.78	-1.61/-1.52	-1.81/-1.25	-2.52/-3.69	-5.36/-7.45	-7.84/-6.78	-5.58/-5.58	-6.4/-6.74	-7.83/-7.04	-6.32/-6.54	-6.23/-6.91	-7.57/-8.13	-8.71/-9.06	-9.68/-9.4	-8.91/-7.39	-5.84/-4.78	-4.97/-6.14	-7.91/-9.24	-10.35/-10.95	
Theta(52.5°)	Phi(60°)	-5.71/-3.25	-1.39/-0.47	-0.24/-0.44	-0.68/-0.67	-0.87/-1.1	-0.71/-0.09	0.36/0.73	0.91/0.87	0.45/-0.46	-0.21/-3.24	-3.71/-3	-2.19/-2.08	-3.31/-5.28	-6.41/-6.03	-5.39/-5.2	-6.12/-7.03	-7.73/-7.86	-7.31/-6.89	-6.06/-4.17	-2.96/-2.61	-2.92/-5.89	-9.06/-11.21	-10.52/-10.8		
Theta(60°)	Phi(75°)	-2.84/-1.31	-0.17/0.43	0.43/-0.2	-0.84/-1.19	-1.55/-1.91	-1.8/-0.6	0.22/0.73	1.24/1.61	1.25/0.18	-0.91/-1.68	-2.12/-1.53	-0.67/-0.55	-1.72/-3.55	-4.92/-5.23	-5.15/-5.04	-5.04/-5.08	-4.95/-4.92	-4.71/-4.37	-4.43/-4.86	-4.52/-3.19	-2.25/-2.47	-4.42/-8.25	-11.01/-8.09	-6.21/-4.76	
Theta(67.5°)	Phi(90°)	-1.89/-1.25	-0.54/-0.15	-0.42/-0.95	-1.14/-1.48	-2.06/-2.87	-2.58/-1.07	-0.14/0.07	0.49/0.76	0.071/-1.24	-2.15/-2.53	-2.6/-2.34	-1.48/-1.02	-1.72/-2.93	-3.61/-3.56	-3.7/-3.27	-3.29/-3.28	-2.69/-2.2	-1.98/-2.01	-2.43/-3.86	-3.91/-3.21	-1.57/-3.28	-4.87/-6.2	-4.44/-2.81	-2.17/-2.29	
Theta(75°)	Phi(105°)	-4.37/-4.18	-2.29/-2.1	-2.28/-3.05	-2.58/-2.05	-2.58/-3.57	-3.51/-1.66	-0.04/0.1	0.23/0.08	-0.92/-2.67	-3.77/-3.9	-3.93/-3.86	-3.23/-2.26	-2.09/-2.33	-2.36/-2.38	-2.01/-1.58	-1.24/-0.59	-1.11/-1.43	-1.86/-3.12	-2.54/-0.82	-0.39/-1.1	-2.77/-2.87	-1.71/-1.34	-1.89/-3.35		
Theta(82.5°)	Phi(120°)	-8.18/-6.19	-3.04/-1.27	-1.06/-2.65	-2.69/-1.45	-1.28/-1.68	-1.94/-1.09	0.29/0.22	0.18/0.2	-0.69/-2.07	-3.04/-3.14	-3.18/-3.44	-3.55/-3.22	-3.12/-3.19	-3.02/-2.22	-1.61/-1.39	-1.36/-1.28	-0.68/-0.41	-1.01/-0.67	-0.64/-1.93	-1.49/-0.16	0.29/0.83	-1.92/-1.2	-0.58/-1.57	-3.81/-6.72	
Theta(90°)	Phi(135°)	-12.87/-8.39	-3.92/-1.37	-0.86/-2.31	-2.66/-0.91	-0.28/-0.33	-0.57/-0.03	0.90/0.99	0.77/0.72	-0.42/-1.81	-2.42/-2.13	-1.14/-2.24	-2.78/-3.42	-3.81/-3.72	-2.72/-1.43	-1.21/-1.26	-1.21/-1.18	-1.03/-0.86	-1.31/-0.64	-0.69/-1.95	-1.84/-0.51	-0.24/-1.26	-1.84/-0.69	-1.77/-3.12	-7.25/-12.03	
Theta(97.5°)	Phi(150°)	-10.75/-7.65	-3.97/-1.93	-1.32/-2.99	-4.07/-2.43	-1.91/-2.12	-2.21/-1.34	0.02/0.63	0.96/0.86	-0.24/-1.74	-2.05/-1.83	-1.89/-2.13	-2.54/-3.14	-3.3/-3.07	-2.58/-2.39	-3.15/-3.09	-3.09/-2.69	-1.74/-0.52	-0.52/-1.46	-1.54/-1.11	-1.75/-3.46	-1.71/-2.35	-2.89/-5.87	-10.56/-12.65		
Theta(105°)	Phi(165°)	-11.81/-8.84	-5.73/-3.98	-3.8/-5.04	-5.53/-4.55	-4.63/-4.68	-4.76/-4.23	-2.771/-1.95	-1.03/-0.6	-1.62/-3.26	-3.3/-2.97	-2.84/-2.76	-2.34/-1.89	-1.88/-2.24	-2.94/-4.03	-5.43/-4.94	-4.13/-2.94	-2.65/-2.09	-1.71/-1.37	-1.44/-2.4	-3.42/-4.33	-6.18/-7.07	-4.49/-2.7	-3.46/-6.71	-11.59/-14.56	
Theta(112.5°)	Phi(180°)	-18.59/-16.16	-10.79/-8.27	-8.46/-11.92	-13.28/-11.81	-9.01/-7.02	-6.94/-7.5	-6.42/-5.51	-3.9/-3.14	-4.18/-6.41	-7.1/-6.65	-5.09/-4.45	-4.03/-6.69	-6.19/-8.04	-7.89/-5.68	-3.87/-3.11	-3.46/-3.86	-3.97/-2.89	-2.05/-2.59	-4.26/-5.97	-7.41/-6.67	-4.53/-3.52	-4.76/-8.28	-13.84/-18.45		
Theta(120°)	Phi(195°)	-16.81/-12.49	-8.83/-6.76	-7.8/-6.5	-11.39/-11.31	-7.92/-5.75	-6.54/-7.41	-9.44/-11.08	-10.19/-9.4	-11.32/-13.94	-13.66/-11.79	-9.55/-7.93	-7.35/-7.65	-7.89/-5.57	-8.34/-6.89	-4.96/-3.2	-2.23/-4.28	-3.59/-4.89	-4.67/-2.97	-2.55/-4.18	-5.81/-6.03	-4.41/-3.57	-4.11/-6.37	-10.43/-17.29		
Theta(127.5°)	Phi(210°)	-18.41/-14.93	-13.85/-12.02	-10.25/-9.58	-9.5/-9.04	-7.74/-6.47	-6.56/-8.02	-9.74/-12.05	-13.46/-14.91	-16.03/-16.96	-18.98/-18.16	-12.74/-9.17	-8.25/-8.73	-8.51/-8.35	-7.89/-7.57	-6.28/-4.64	-4.13/-4.97	-6.71/-7.22	-5.94/-4.75	-4.85/-6.02	-5.03/-4.13	-4.37/-5.15	-5.43/-5.44	-6.16/-8.47	-13.83/-19.2	
Theta(135°)	Phi(225°)	-17.75/-12.25	-17.23/-11.51	-7.77/-6.07	-5.43/-5.31	-5.22/-4.98	-5.37/-6.38	-8.36/-11.4	-13.71/-12.9	-10.68/-10.46	-10.97/-11.04	-8.62/-8.23	-8.04/-8.35	-10.56/-11.45	-9.69/-10.48	-5.29/-4.18	-4.41/-5.59	-7.08/-6.88	-6.98/-5.57	-5.61/-5.29	-5.95/-6.65	-6.72/-5.68	-6.96/-7.4	-10.77/-12.53		
Theta(142.5°)	Phi(240°)	-14.56/-13.35	-11.09/-9.01	-7.15/-6	-5.53/-5.59	-5.73/-5.81	-5.96/-6.06	-6.77/-7.87	-9.16/-9.17	-10.16/-10.41	-10.16/-9.44	-9.21/-9.25	-10.91/-10.41	-8.25/-8.44	-6.34/-6.96	-4.31/-4.96	-11.22/-12.77	-13.14/-12.01	-10.71/-8.55	-7.34/-6.55	-6.56/-6.94	-5.46/-5.44	-6.25/-7.89	-10.59/-12.83		
Theta(150°)	Phi(255°)	-15.11/-14.14	-12.79/-12.23	-11.18/-11.09	-11.5/-12.19	-12.32/-12.23	-12.17/-11.11	-10.14/-10.27	-10.56/-10.86	-11.1/-11.08	-10.11/-10.89	-11.99/-13.16	-14.3/-13.67	-12.02/-10.29	-8.43/-8.33	-9.44/-11.74	-6.84/-17.5	-16.24/-13.49	-12.11/-11	-10.22/-10.08	-8.82/-9.28	-8.79/-7.85	-6.87/-7.11	-7.8/-9.75	-12.08/-14.35	
Theta(157.5°)	Phi(270°)	-16.11/-14.99	-15.37/-15.14	-15.43/-15.77	-18.78/-17.04	-18.54/-18.74	-18.86/-18.08	-18.34/-17.6	-16.12/-15.56	-16.01/-14.2	-12.82/-11.8	-12.31/-13.88	-17.09/-17.83	-17.08/-18.63	-18.57/-17.52	-18.3/-18.66	-13.4/-10.25	-8.15/-4.75	-7.51/-4.4	-9.8/-11.19	-11.96/-12.09	-11.21/-10.26	-9.74/-10.43	-11.71/-13.57	-14.55/-16.9	
Theta(165°)	Phi(285°)	-17.38/-16.17	-16.27/-15.61	-14.95/-16.76	-15.31/-16.01	-15.56/-14.95	-15.39/-15.02	-15.7/-16.41	-15.65/-15.17	-14.17/-13.27	-12.15/-11.8	-10.59/-10.5	-11.18/-13.27	-13.22/-14.21	-14.8/-14.12	-12.96/-11.1	-9.54/-8.28	-7.51/-7.45	-7.89/-9.15	-11.16/-13.31	-16.22/-17.27	-18.78/-17.85	-16.98/-17.21	-18.18/-18.87	-19.41/-18.5	
Theta(172.5°)	Phi(300°)	-17.74/-18.94	-17.65/-18.77	-17.02/-16.68	-16.15/-16.11	-15.4/-15.03	-14.66/-14.37	-13.07/-13.11	-12.54/-12.76	-12.61/-11.85	-11.58/-11.01	-10.65/-10.39	-10.34/-11.06	-11.88/-12.18	-12.02/-11.53	-11.41/-11.07	-11.02/-10.76	-10.81/-11.56	-12.61/-14.63	-18.28/-18.93	-17.83/-16.65	-18.07/-19.43	-18.87/-18.71	-17.87/-18.79	-18.79/-19.3	
Theta(180°)	Phi(315°)	-18.82/-18.18	-17.14/-18.68	-18.09/-18.72	-17.9/-19.3	-19.3/-17.89	-18.75/-18.75	-18.5/-17.6	-16.04/-15.95	-15.14/-14.18	-13.75/-12.86	-12.49/-12.09	-11.75/-12.59	-13.58/-13.81	-14.82/-15.06	-15.4/-16.21	-16.13/-17.44	-18.48/-18.76	-18.81/-17.34	-15.49/-14.37	-13.41/-13.01	-12.92/-12.43	-12.93/-13.32	-14.08/-15.48	-16.62/-16.62	
Theta(187.5°)	Phi(330°)	5.20/Pol	PhiAnt 3																							
Theta(195°)	Phi(345°)	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(45°)	Phi(60°)	Phi(75°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta(202.5°)	Phi(0°)	-15.31/-13.26	-12.67/-14.84	-16.78/-17.65	-15.54/-13.4	-15.28/-18.12	-18.18/-18.42	-19.05/-17.41	-18.29/-14.11	-11.74/-10.54	-9.79/-10.26	-12.02/-11.87	-10.91/-8.8	-8.54/-9.39	-12.48/-16.82	-15.89/-13.39	-12.84/-14.36	-19.38/-17.96	-19.26/-17.5	-17.81/-18.18	-18.91/-18	-19.11/-17.83	-18.11/-16.39	-15.3/-15.1	-16.81/-16.5	
Theta(210°)	Phi(7.5°)	-11.67/-10.29	-10.08/-9.85	-11.81/-13.17	-13.98/-12.71	-13.75/-14.97	-16.06/-9.06	-15.88/-19.23	-17.17/-11.81	-18.57/-16.74	-16.36/-15.91	-17.12/-11.09	-15.71/-14.16	-13.82/-15.07	-16.57/-17.12	-17.54/-17.33	-12.66/-18.27	-17.91/-16.83	-18.29/-16.56	-18.57/-17.32	-19.37/-17.25	-15.93/-14.68	-13.11/-11.63	-10.61/-10.29	-9.54/-10.12	
Theta(217.5°)	Phi(15°)	-11.76/-12.37	-11.58/-11.48	-12.71/-16.74	-18.85/-18.03	-18.3/-18.06	-18.71/-19.16	-18.52/-18.98	-18.82/-18.23	-19.13/-18.38	-18.46/-19.02	-18.54/-17.89	-15.38/-14.27	-14.41/-13.4	-12.22/-11.89	-10.76/-11.44	-12.93/-15.52	-18.97/-18.82	-18.79/-18.23	-17.79/-15.72	-14.13/-13.89	-14.37/-15.26	-18.48/-18.57	-17.77/-18.52	-14.73/-12.09	
Theta(225°)	Phi(22.5°)	-9.1/-11.11	-13.44/-15.25	-18.18/-42	-16.21/-14.38	-15.71/-17.2	-19.14/-18.2	-19.23/-18.69	-19.1/-18.11	-18.64/-18.23	-14.68/-13.73	-12.89/-11.93	-12.09/-13.86	-16.85/-16.78	-13.52/-10.57	-8.81/-6.75	-8.02/-10.73	-13.72/-14.84	-14.47/-18.19	-18.23/-14.07	-11.53/-12.32	-11.82/-13.54	-18.46/-18.41	-17.41/-16.66	-12.03/-9.66	
Theta(232.5°)	Phi(30°)	-12.59/-12.75	-13.47/-16.55	-14.95/-12.78	-12.84/-14.11	-15.61/-15.9	-14.61/-13.75	-14.41/-16.26	-18.78/-17.45	-15.09/-11.44	-10.88/-10.95	-13.02/-15.04	-17.13/-18.97	-18.87/-17.36	-18.83/-16.02	-12.57/-10.14	-8.59/-9.14	-11.82/-17.14	-18.33/-16.67	-13.92/-13.98	-13.62/-17.18	-19.19/-19.08	-11.74/-11.67			
Theta(240°)	Phi(37.5°)	-17.22/-12.73	-12.27/-13.52	-11.05/-10.97																						



Radiated Composite Gain Data (2.4GHz and 5GHz UNII 1~UNII 3)

Appendix A

Theta (°)	-9.18/-9.87	-10.19/-11.08	-9.28/-9.09	-11.41/-11.17	-11.12/-11.25	-12.31/-11.89	-13.16/-11.6	-11.18/-11.09	-12.67/-12.02	-10.51/-11.56	-11.73/-14.01	-13.03/-15.62	-15.79/-18.08	-19.04/-17.98	-19.48/-14.04	-13.55/-13.34	-11.42/-11.22	-9.68/-9.67	-10.35/-11.18	-12/-11.99	-14.14/-17.83	-14.96/-15.68	-18.3/-16.66	-15.54/-13.7	
Theta (15°)	-10.58/-10.59	-10.48/-9.93	-10.89/-10.5	-8.46/-8.74	-8.86/-7.83	-8.67/-8.78	-9.55/-10.8	-12.87/-13.49	-11.36/-11.97	-11.24/-11.12	-14.2/-13.12	-14.98/-16.04	-18.42/-18.82	-19.05/-14.47	-18.42/-16.97	-18.94/-18.04	-17.75/-13.59	-9.4/-8.81	-8.61/-9.28	-9.94/-10.61	-12.66/-16.28	-18.65/-19.15	-19.19/-17.27	-14.64/-14.46	
Theta (22.5°)	-15.99/-18.13	-18.52/-18.81	-16.3/-15.06	-12.19/-11.43	-11.03/-10.36	-10.12/-8.27	-8.69/-9.3	-13.45/-13.47	-10.68/-10.87	-17.62/-18.88	-14.22/-18.14	-12.48/-16.33	-15.63/-18.72	-18.23/-17.83	-17.33/-13.38	-15.79/-11.64	-12.49/-10.54	-11.07/-12.85	-11.82/-10.36	-11.17/-14.56	-12.08/-13.73	-16.29/-18.86	-17.93/-17.64	-15.99/-16.11	
Theta (30°)	-15.28/-18.25	-18.41/-17.38	-17.94/-19.08	-17.59/-13.58	-9.87/-10.79	-11.62/-11.73	-10.41/-10.01	-9.82/-10.54	-11.3/-13.66	-14.75/-15.38	-16.68/-16.67	-19.26/-17.74	-11.85/-14.53	-14.36/-18.05	-17.67/-18.26	-12.91/-10.68	-11.85/-12.5	-10.42/-13.35	-15.62/-11	-14.52/-18.77	-13.17/-13.19	-18.07/-17.46	-18.28/-17.81	-18.79/-18.27	
Theta (37.5°)	-17.86/-18.95	-18.83/-17.85	-18.06/-11.93	-16.44/-18.76	-16.77/-16.11	-13.04/-17.14	-13.19/-11.6	-11.81/-14.88	-13.29/-15.6	-19.4/-17.7	-18.7/-19.23	-17.28/-18.22	-18.02/-15.39	-18/-18.07	-13.1/-17.87	-19.14/-15	-13.24/-16.37	-14.88/-14.37	-17.22/-11.9	-18.37/-13.53	-15.01/-18.61	-17.01/-19.11	-19.28/-16.54	-13.86/-11.89	
Theta (45°)	-14.28/-18.66	-17.39/-18.43	-16.21/-14.69	-11.71/-12.3	-13.04/-17.18	-15.33/-13.69	-13.88/-11.37	-9.87/-10.94	-11.24/-19.31	-19.04/-17.43	-19.03/-18.6	-18.47/-18.06	-18.5/-18.17	-18.91/-18.11	-16.2/-17.32	-15.85/-18.53	-18.92/-18.77	-13.26/-10.38	-14.75/-12.59	-13.81/-10.96	-13.79/-13.58	-13.65/-17.13	-16.63/-16.2	-10.61/-13.52	
Theta (52.5°)	-18.81/-17.67	-18.49/-17.15	-18.02/-18.22	-16.22/-16.82	-17.54/-14.93	-17.86/-11.82	-12.77/-10.38	-8.24/-10.23	-12.89/-16.54	-17.75/-15.35	-18.39/-15.42	-18.17/-17.92	-18.31/-18.76	-16.09/-18.79	-14.38/-15.82	-11.49/-17.65	-17.48/-18.5	-11.66/-14.16	-13.5/-8	-11.28/-18.26	-18.49/-18.69	-18.74/-18.44	-18.46/-12.44	-9.97/-10.99	
Theta (60°)	-18.09/-18.73	-13.87/-15.95	-16.83/-19.22	-13.41/-13.46	-17.96/-17.84	-14.01/-17.67	-18.44/-12.08	-9.67/-10.21	-13.74/-18.51	-18.71/-16.56	-14.72/-17.13	-18.21/-17.98	-18.14/-16.24	-16.63/-14.8	-15.82/-18.6	-15.81/-16.87	-17.32/-17.16	-12.56/-12.59	-11.49/-10.26	-11.6/-17.77	-17.21/-18.94	-18.3/-14.77	-17.85/-10.36	-7.54/-10.93	
Theta (67.5°)	-13.47/-18.66	-14.77/-18.39	-10.09/-15.27	-13.51/-17.17	-19.05/-16.18	-17.87/-18.7	-18.37/-15.64	-16.26/-17.72	-18.05/-18.95	-17.04/-16.99	-17.79/-18.74	-18.89/-17.71	-18.79/-18.38	-17.35/-13.75	-15.37/-19.06	-17.71/-18.03	-15.93/-18.94	-17.56/-15.34	-12.97/-14.11	-17.91/-16.6	-18.42/-17.68	-18.02/-18.34	-17.41/-10.91	-8.95/-12.21	
Theta (75°)	-13.53/-14.06	-18.85/-17.21	-11.01/-18.1	-18.83/-15.63	-17.44/-15.28	-14.38/-13.46	-12.05/-10.35	-13.58/-17.55	-19.14/-18.34	-16.9/-19.37	-19.02/-15.53	-14.79/-14.62	-18.31/-17.99	-10.2/-9.66	-11.2/-14.9	-19/-13.81	-15.15/-18.79	-18.23/-17.65	-17.9/-18.95	-12.87/-18.75	-18.99/-15.43	-18.95/-17.98	-19.09/-14.61	-10.38/-18.16	
Theta (82.5°)	-13.81/-8.66	-12.04/-13.52	-14.82/-10.59	-17.58/-18.28	-19.44/-17.89	-18.9/-19.23	-14.81/-11.59	-13.62/-9.34	-19.13/-18.28	-17.53/-13.21	-19.31/-18.33	-17.81/-18.98	-18.77/-17.86	-11.94/-12.6	-15.48/-11.67	-18.27/-12.45	-17.71/-18.27	-14.1/-19.39	-11.72/-16.98	-17.3/-10.2	-13.14/-8.01	-12.55/-11.75	-19.04/-18.65	-12.73/-19.2	
Theta (90°)	-7.36/-15.45	-15.88/-19.72	-18.19/-18.04	-18.75/-12.96	-19.26/-15.12	-17.47/-13.89	-18.87/-14.5	-12.12/-14.7	-18.77/-18.61	-17.31/-15.59	-15.11/-17.88	-18.85/-15.03	-18.39/-18.14	-18.65/-13.61	-10.39/-13.67	-17.94/-15.57	-15.77/-19.12	-18.59/-18.09	-18.38/-18.12	-17.77/-12.93	-17.51/-15.13	-17.72/-14.97	-18.46/-14.91	-10.84/-8.9	
Theta (97.5°)	-8.83/-9.78	-8.74/-17.37	-18.78/-17.95	-14.63/-10.58	-15.22/-13.44	-18.02/-13.15	-18.23/-9.72	-15.15/-18.28	-19.05/-16.45	-15.23/-13.92	-14.19/-14.76	-12.74/-12.15	-14.62/-19.02	-12.59/-9.05	-8.68/-17.32	-15.28/-15.42	-19.23/-18.85	-12.43/-12.41	-18.8/-16.66	-15.28/-11.36	-9.36/-7.93	-14.21/-16.61	-12.32/-8.23	-8.98/-7.61	
Theta (105°)	-10.98/-16.33	-10.81/-18.96	-18.12/-18.01	-19.04/-13.14	-18.52/-18.26	-17.56/-18.09	-16.54/-11.35	-19.19/-12.48	-12.99/-13.33	-17.16/-18.72	-18.78/-18.67	-18.66/-19.06	-18.05/-19.23	-13.22/-11.31	-15.57/-15.33	-19.02/-14.77	-18.82/-19.19	-15.52/-19.1	-17.86/-19.22	-18.16/-15.5	-16.46/-14.61	-15.07/-11.06	-17.59/-15.99	-15.75/-14.11	
Theta (112.5°)	-13.47/-16.66	-10.37/-11.05	-19.08/-15.71	-11.34/-17.68	-13.95/-17.9	-18.91/-19.66	-12.04/-17.25	-15.85/-10.61	-19.13/-18.7	-17.77/-18.64	-12.76/-12.61	-12.21/-14.21	-17.29/-17.61	-10.98/-13.61	-18.52/-13.82	-18.18/-18.7	-18.67/-19.08	-19.03/-13.37	-8.18/-17.38	-17.72/-12.93	-13.25/-8.07	-10.03/-10.57	-16.45/-18.83	-12.92/-13.93	
Theta (120°)	-14.75/-13.65	-10.89/-10.68	-11.49/-18.82	-6.96/-10.24	-17.09/-11.91	-16.08/-18.29	-15.43/-19.23	-14/-18.2	-18.67/-17.98	-19.05/-18.83	-18.43/-14	-16.31/-18.35	-17.39/-15.46	-15.97/-12.73	-18.6/-10.8	-17.71/-17.97	-13.59/-19.34	-18.56/-18.83	-14.41/-17.36	-9.77/-17.58	-11.06/-12.1	-17.93/-18.32	-18.48/-16.15	-14.13/-14.21	
Theta (127.5°)	-15.54/-17.31	-19.02/-13.17	-11.47/-10.59	-8.84/-10.79	-16.61/-10.21	-15.26/-13.89	-15.51/-18.14	-15.31/-11.37	-11.1/-18.31	-15.14/-14.46	-19.07/-18.13	-17.62/-17.83	-17.76/-12.15	-14.96/-18.77	-16.16/-18.52	-17.74/-13.53	-18.63/-15.29	-12.14/-15.47	-11.76/-17.19	-18.76/-18.43	-14.61/-18.84	-15.81/-11.64	-11.58/-11.61		
Theta (135°)	-18.94/-18.23	-13.21/-15.41	-14.85/-12.25	-9.88/-12.63	-14.89/-12.87	-11.58/-12.65	-11.95/-10.77	-17.84/-16.62	-13.84/-15.42	-14.79/-12.24	-9.41/-15.48	-14.61/-16.57	-18.72/-19.18	-18.75/-13.54	-11.15/-10.32	-18.28/-10.78	-14.21/-11.96	-16.66/-11.93	-13.14/-17.44	-13.29/-7.46	-11.54/-16.99	-18.56/-14.14	-12.38/-13.34	-18.68/-15.53	
Theta (142.5°)	-16.07/-19.51	-16.12/-16.9	-16.62/-9.62	-8.92/-11.59	-12.11/-11.82	-13.11/-15.7	-19.15/-8.1	-8.93/-17.79	-15.56/-15.72	-13.91/-17.53	-14.12/-18.39	-13.81/-17.87	-18.05/-12.24	-10.26/-8.01	-9.98/-16.02	-11.31/-16.01	-11.57/-16.67	-11.84/-8.88	-17.88/-18.7	-10.47/-8.27	-15.86/-17.35	-18.72/-17.96	-16.59/-18.99	-18.88/-18.3	
Theta (150°)	-18.73/-18.28	-17.66/-13.69	-16.42/-12.51	-11.03/-6.61	-12.06/-14.08	-10.76/-14.45	-17.11/-11.1	-9.05/-11.48	-13.03/-14.33	-17.92/-18.47	-19.28/-17.68	-18.55/-18.48	-18.27/-17.28	-14.05/-12.4	-13.78/-18.54	-12.42/-7.79	-12.14/-14.8	-10.29/-11.62	-17.72/-17.21	-15.58/-10.42	-14.75/-19.28	-19.18/-18.59	-16.13/-18.12	-17.87/-18.2	
Theta (157.5°)	-13.39/-18.21	-17.93/-18.46	-18.48/-12.3	-9.79/-7.7	-8.72/-13.53	-12.58/-9.59	-13.84/-12.78	-11.03/-12.76	-15.65/-17.77	-17.38/-17.94	-17.96/-19.19	-19.04/-17.44	-18.21/-17.53	-19.02/-15.47	-9.23/-11.61	-9.16/-9.55	-11.81/-14.88	-18.02/-13.33	-14.72/-16.41	-15.48/-14.54	-18.87/-18.31	-15.62/-19.32	-18.54/-17.82		
Theta (165°)	-12.73/-12.87	-13.68/-14.04	-12.01/-11.4	-8.6/-8.7	-10.16/-13.47	-13.19/-11.09	-10.44/-10.26	-10.71/-12.77	-14.29/-13.68	-18.09/-18.92	-17.9/-18.2	-17.81/-17.59	-15.24/-15.26	-11.81/-8.01	-6.09/-7.62	-8.57/-10.58	-12.82/-12.71	-12.41/-16.16	-15.06/-12.81	-13.14/-18.11	-18.16/-16.39	-16.49/-12.59	-13.14/-11.42	-11.44/-10.2	
Theta (172.5°)	-15.33/-14.04	-12.52/-12.22	-12.13/-10.59	-9.66/-11.17	-10.93/-12.32	-14.41/-13.76	-16.75/-16.79	-18.17/-17.89	-18.2/-17.43	-18.95/-18.08	-19.22/-18.95	-18.83/-14.96	-16.69/-14.15	-18.43/-14.68	-13.02/-11.89	-11.28/-11.42	-14.45/-16.34	-14.21/-14.23	-14.21/-13.41	-10.65/-11.7	-11.22/-13.4	-16.76/-15.01	-18.73/-16.83		
Theta (180°)	-13.27/-15.61	-11.94/-12.83	-12.16/-11.44	-12.61/-12.34	-12.37/-15.03	-16.32/-15.45	-16.19/-17.63	-16.35/-17.26	-18.12/-18.07	-18.51/-18.26	-17.33/-18.14	-16.83/-12.65	-12.19/-11.3	-11.37/-10.9	-11.93/-11.18	-12.64/-15.14	-18.28/-18.75	-18.52/-18.63	-19.11/-19.33	-17.82/-15.19	-14.47/-13.75	-17.29/-18.72	-17.21/-18.79	-14.41/-16.3	
Freq(Hz)	5.785GPol.	Theta/Ant 4																							
Gain	Phi(0°)Phi(7.5°)	Phi(15°)Phi(22.5°)	Phi(30°)Phi(37.5°)	Phi(45°)Phi(52.5°)	Phi(60°)Phi(67.5°)	Phi(75°)Phi(82.5°)	Phi(90°)Phi(97.5°)	Phi(105°)Phi(112.5°)	Phi(120°)Phi(127.5°)	Phi(135°)Phi(142.5°)	Phi(150°)Phi(157.5°)	Phi(165°)Phi(172.5°)	Phi(180°)Phi(187.5°)	Phi(195°)Phi(202.5°)	Phi(210°)Phi(217.5°)	Phi(225°)Phi(232.5°)	Phi(240°)Phi(247.5°)	Phi(255°)Phi(262.5°)	Phi(270°)Phi(277.5°)	Phi(285°)Phi(292.5°)	Phi(300°)Phi(307.5°)	Phi(315°)Phi(322.5°)	Phi(330°)Phi(337.5°)	Phi(345°)Phi(352.5°)	
Theta (0°)	-14.05/-13.82	-12.68/-11.22	-11.98/-12.3	-13.67/-14.44	-16.87/-16.34	-17.24/-17.8	-18.41/-17.79	-17.39/-14.82	-16.36/-16.84	-14.56/-16.32	-16.65/-14.17	-15.23/-14.47	-14.21/-14.8	-17.11/-16.04	-16.96/-15.21	-16.12/-19.34	-18.86/-17.51	-18.59/-18.28	-18.22/-15.14	-12.18/-16.93	-18.96/-15.02	-13.44/-11.63	-11.31/-11.87		
Theta (7.5°)	-12.91/-14.67	-19.02/-19.14	-19.32/-18.41	-17.45/-18.76	-17.9/-17.9	-14.71/-15.3	-16.38/-18.04	-18.11/-17.32	-13.32/-14.22	-13.77/-11.72	-11.27/-10.16	-10/-9.76	-9.38/-9.81	-8.51/-9.48	-8.66/-9.51	-7.75/-9.04	-11.46/-12.9	-12.58/-13.88	-15.61/-14.31	-15.29/-18.15	-17.87/-12.23	-10.11/-10.12	-11.23/-12.04	-13.35/-13.46	
Theta (15°)	-14.42/-15.58	-15.18/-15.13	-17.42/-16.52	-17.12/-16.37	-11.41/-11.76	-11.32/-11.53	-10.22/-9.1	-8.68/-10.06	-10.38/-9.05	-7.34/-7.62	-7.4/-7.73	-7.41/-8	-8.07/-8.35	-8.17/-6.61	-6.88/-7.6	-6.85/-5.84	-10.4/-12.39	-12.38/-12.39	-13.91/-15.16	-18.19/-19.06	-18.79/-17.33	-16.05/-14.45	-16.89/-18.45	-18/-17.13	
Theta (22.5°)	-12.17/-15.85	-14.35/-13.34	-11.49/-14.89	-18.88/-15.49	-14.28/-15.43	-13.08/-10.05	-9.59/-9.77	-12.03/-12.9	-10.2/-9.39	-9.31/-11.4	-10.23/-7.75	-8.24/-7.39	-10.15/-9.64	-13.62/-9.72	-11.21/-11.82	-4.42/-3.71	-7.93/-8.78	-12.55/-14.84	-10.89/-11.						



Antenna Pattern (2.4GHz and 5GHz UNII 1~UNII 5)

Appendix B

Theta	Phi	Gain	Phi(0°)	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(97.5°)	Phi(105°)	Phi(112.5°)	Phi(120°)	Phi(127.5°)	Phi(135°)	Phi(142.5°)	Phi(150°)	Phi(157.5°)	Phi(165°)	Phi(172.5°)	Phi(180°)																																																																																																																																																																																																																															
Theta(75°)	Phi(0°)	-1.22/-2.47	-1.48/-4.81	-2.21/-6.42	-2.71/-8.08	-3.15/-11.65	-3.41/-15.27	-3.57/-18.89	-3.64/-22.51	-3.61/-26.13	-3.48/-29.75	-3.26/-33.37	-2.97/-37.00	-2.63/-40.62	-2.25/-44.24	-1.84/-47.86	-1.41/-51.48	-1.00/-55.10	-0.61/-58.72	-0.25/-62.34	0.16/-65.96	0.58/-69.60	1.06/-73.24	1.59/-76.88	2.16/-80.52	2.77/-84.16	3.41/-87.80	4.08/-91.44																																																																																																																																																																																																																														
Theta(82.5°)	Phi(7.5°)	-2.70/-1.85	-1.57/-3.26	-1.79/-3.68	-3.15/-1.65	-0.43/-2.57	-2.33/-2.48	-0.29/-1.18	-3.22/-3.09	0.64/-4.00	-0.46/-2.33	-4.58/-3.92	-1.74/-4.42	-0.49/-4.82	-3.38/-3.81	-0.99/-1.68	-1.87/-1.28	-4.91/-7.77	-4.74/-2.69	-4.10/-1.47	-3.20/-1.31	-2.10/-1.10	-1.00/-1.10	-0.20/-1.10	-0.30/-1.10	-0.40/-1.10	-0.50/-1.10	-0.60/-1.10																																																																																																																																																																																																																														
Theta(90°)	Phi(15°)	-3.88/-2.81	-0.19/-1.59	-1.16/-3.62	-2.53/-1.33	0.13/-1.19	0.28/-0.56	-1.61/-0.86	-1.82/-2.08	-4.48/-3.32	-3.53/-4.01	-5.43/-3.29	-3.54/-2.39	-1.04/-1.09	-3.43/-4.55	-5.83/-3.07	-4.10/-4.03	-1.40/-4.32	-0.66/-2.95	-1.81/-3.87	-4.14/-2.06	-1.22/-2.09	-0.66/-2.95	-1.81/-3.87	-4.14/-2.06	-1.22/-2.09	-0.66/-2.95	-1.81/-3.87																																																																																																																																																																																																																														
Theta(97.5°)	Phi(22.5°)	-6.38/-1.94	0.20/-2.27	-0.72/-3.20	-1.63/-6.67	2.04/-8.33	0.88/-1.06	-0.80/-1.03	0.26/-1.01	-1.97/-2.21	-0.90/-1.76	-2.01/-2.69	-3.83/-6.78	-3.56/-2.14	-4.03/-3.62	-3.12/-3.09	-0.68/-1.59	-3.51/-7.33	1.00/-4.57	-1.46/-1.43	-1.19/-3.31	0.86/-1.32	-1.44/-5.44	-5.20/-1.18	-0.06/-1.49	-0.10/-2.34	-0.14/-3.69	-0.18/-5.04																																																																																																																																																																																																																														
Theta(105°)	Phi(30°)	-3.77/-5.08	-4.85/-7.33	-9.08/-14.80	-10.11/-6.21	-6.26/-10.05	-15.47/-12.20	-9.41/-15.67	-8.23/-4.74	-6.09/-3.31	-1.27/-1.57	-5.09/-5.65	-3.66/-7.29	-13.56/-11.02	-6.88/-2.07	-2.73/-3.91	-14.78/-5.18	-6.57/-13.92	-6.85/-8.00	-8.54/-7.30	-3.28/-7.88	-8.22/-6.98	-10.21/-7.76	-6.10/-2.34	-0.10/-2.34	-0.14/-3.69	-0.18/-5.04	-0.22/-6.39																																																																																																																																																																																																																														
Theta(112.5°)	Phi(37.5°)	-6.45/-10.37	-7.59/-9.26	-5.87/-4.96	-5.27/-5.15	-3.48/-6.37	-3.24/-4.40	-3.05/-2.09	-1.77/-3.94	-4.80/-7.95	-7.26/-8.83	-7.23/-6.84	-4.85/-5.76	-4.10/-4.50	-8.10/-9.80	-15.11/-15.78	-5.55/-6.61	-9.84/-5.72	-3.88/-5.18	-8.78/-8.30	-7.50/-9.26	-9.40/-15.91	-6.57/-4.48	-3.11/-2.08	-0.10/-2.34	-0.14/-3.69	-0.18/-5.04	-0.22/-6.39																																																																																																																																																																																																																														
Theta(120°)	Phi(45°)	-8.19/-12.11	-8.78/-7.42	-3.75/-2.20	-1.25/-1.10	-0.61/-3.35	-2.84/-2.93	-1.20/-1.55	-1.25/-1.50	-3.90/-7.78	-4.47/-3.84	-6.99/-7.35	-8.22/-6.49	-3.20/-4.82	-5.90/-5.96	-6.78/-5.30	-2.88/-7.82	-9.75/-5.05	-5.28/-14.85	-8.22/-6.42	-9.03/-6.73	-7.52/-7.19	-6.66/-4.72	-6.18/-6.01	-6.31/-6.31	-6.31/-6.31	-6.31/-6.31	-6.31/-6.31																																																																																																																																																																																																																														
Theta(127.5°)	Phi(52.5°)	-12.58/-11.81	-6.89/-6.13	-5.96/-3.86	-3.52/-3.68	-4.80/-5.39	-6.32/-11.08	-12.79/-8.29	-4.78/-7.05	-13.33/-10.52	-6.66/-7.39	-7.42/-5.37	-10.89/-11.55	-7.24/-6.39	-6.59/-9.07	-8.50/-5.65	-8.93/-12.50	-8.89/-3.89	-5.70/-14.75	-15.13/-7.60	-9.75/-4.72	-6.47/-10.11	-10.99/-13.09	-8.11/-11.16	-11.46/-10.52	-11.46/-10.52	-11.46/-10.52	-11.46/-10.52																																																																																																																																																																																																																														
Theta(135°)	Phi(60°)	-8.32/-8.48	-7.32/-7.63	-5.74/-4.09	-4.95/-5.91	-7.00/-7.57	-6.03/-4.40	-3.18/-3.90	-4.82/-4.84	-7.13/-12.01	-9.98/-7.56	-8.33/-10.52	-9.74/-7.44	-6.89/-9.10	-9.01/-8.18	-9.00/-9.55	-10.74/-6.87	-7.48/-9.20	-14.74/-12.66	-12.69/-15.31	-10.10/-10.56	-9.47/-8.20	-8.06/-8.86	-9.11/-8.84	-9.11/-8.84	-9.11/-8.84	-9.11/-8.84	-9.11/-8.84																																																																																																																																																																																																																														
Theta(142.5°)	Phi(67.5°)	-14.56/-13.68	-8.49/-10.34	-11.55/-8.86	-9.75/-5.83	-4.09/-3.61	-3.78/-4.84	-4.46/-6.66	-5.37/-5.30	-7.78/-9.51	-10.13/-8.12	-6.57/-8.76	-7.99/-4.90	-5.10/-7.22	-9.59/-9.18	-12.70/-7.86	-8.94/-9.07	-7.95/-6.63	-6.91/-11.11	-14.91/-12.19	-6.90/-7.68	-11.03/-14.43	-9.34/-7.48	-9.16/-10.31	-11.02/-12.99	-11.02/-12.99	-11.02/-12.99	-11.02/-12.99																																																																																																																																																																																																																														
Theta(150°)	Phi(75°)	-6.12/-7.01	-6.90/-6.65	-4.93/-2.20	-3.50/-4.74	0.31/-1.25	-3.84/-5.67	-6.32/-6.46	-6.48/-6.50	-8.41/-13.01	-12.11/-14.32	-13.44/-12.28	-8.32/-4.59	-6.60/-7.28	-5.52/-5.42	-4.02/-3.74	-4.42/-5.53	-5.26/-5.38	-4.72/-6.81	-9.69/-9.84	-7.37/-7.18	-7.98/-6.47	-4.74/-3.67	-3.81/-4.03	-5.40/-7.57	-5.40/-7.57	-5.40/-7.57	-5.40/-7.57																																																																																																																																																																																																																														
Theta(157.5°)	Phi(82.5°)	-5.80/-6.18	-6.87/-6.60	-5.55/-4.91	-5.21/-6.01	-6.32/-6.99	-7.04/-6.36	-6.45/-4.14	-8.33/-10.07	-10.50/-10.43	-9.98/-9.89	-10.26/-10.41	-8.43/-5.97	-4.47/-4.14	-5.04/-6.67	-7.17/-8.29	-9.83/-10.22	-9.72/-10.91	-11.18/-10.26	-10.12/-12.16	-13.24/-11.62	-11.88/-11.60	-10.93/-8.57	-7.84/-6.14	-6.38/-6.02	-6.38/-6.02	-6.38/-6.02	-6.38/-6.02																																																																																																																																																																																																																														
Theta(165°)	Phi(90°)	-9.21/-10.24	-8.79/-8.88	-7.59/-6.99	-6.04/-4.51	-3.92/-4.80	-7.05/-10.04	-13.12/-12.81	-14.24/-14.85	-12.31/-9.08	-7.62/-7.15	-9.02/-11.39	-11.02/-9.08	-8.63/-8.81	-8.27/-8.02	-7.94/-7.90	-7.08/-6.75	-6.51/-6.80	-6.64/-7.61	-8.15/-7.87	-7.63/-7.18	-7.00/-7.38	-7.51/-7.47	-7.00/-7.06	-7.99/-8.67	-7.99/-8.67	-7.99/-8.67	-7.99/-8.67																																																																																																																																																																																																																														
Theta(172.5°)	Phi(97.5°)	-4.50/-4.02	-4.42/-4.51	-4.43/-4.71	-5.11/-5.76	-7.76/-9.59	-11.22/-12.16	-11.43/-12.11	-13.32/-11.30	-9.98/-8.08	-7.39/-8.10	-8.15/-7.18	-6.52/-6.03	-6.26/-5.94	-5.26/-5.15	-5.03/-4.60	-4.56/-4.60	-5.11/-5.55	-6.12/-6.78	-7.79/-7.80	-8.24/-8.65	-8.07/-8.15	-8.52/-7.61	-7.56/-7.39	-6.48/-6.52	-6.48/-6.52	-6.48/-6.52	-6.48/-6.52																																																																																																																																																																																																																														
Theta(180°)	Phi(105°)	-8.05/-8.29	-9.95/-10.78	-10.61/-10.84	-11.53/-11.63	-14.18/-14.25	-11.93/-10.55	-9.70/-11.27	-12.26/-11.65	-9.99/-9.11	-7.29/-6.80	-6.46/-6.43	-6.87/-8.06	-8.91/-9.50	-9.27/-8.54	-8.27/-7.93	-7.40/-7.26	-7.06/-7.12	-7.97/-7.19	-9.77/-8.22	-8.06/-7.81	-6.51/-5.94	-6.08/-6.71	-7.07/-7.53	-7.07/-7.53	-7.07/-7.53	-7.07/-7.53	-7.07/-7.53																																																																																																																																																																																																																														
Freq(Hz)	TotalAnt	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28																																																																																																																																																																																																																														
Gain	Phi(0°)	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(97.5°)	Phi(105°)	Phi(112.5°)	Phi(120°)	Phi(127.5°)	Phi(135°)	Phi(142.5°)	Phi(150°)	Phi(157.5°)	Phi(165°)	Phi(172.5°)	Phi(180°)	Phi(187.5°)	Phi(195°)	Phi(202.5°)	Phi(210°)	Phi(217.5°)	Phi(225°)	Phi(232.5°)	Phi(240°)	Phi(247.5°)	Phi(255°)	Phi(262.5°)	Phi(270°)	Phi(277.5°)	Phi(285°)	Phi(292.5°)	Phi(300°)	Phi(307.5°)	Phi(315°)	Phi(322.5°)	Phi(330°)	Phi(337.5°)	Phi(345°)	Phi(352.5°)																																																																																																																																																																																																										
Theta(0°)	Phi(0°)	-0.74/-10.35	-1.04/-9.31	-0.92/-9.51	-0.98/-9.57	-0.80/-8.24	-0.63/-7.30	-0.47/-6.27	-0.32/-5.16	-0.18/-4.01	-0.05/-2.86	0.08/-1.71	0.21/-0.56	0.34/0.59	0.47/1.74	0.60/3.01	0.73/5.48	0.86/7.93	0.99/10.38	1.12/12.83	1.25/15.28	1.38/17.73	1.51/20.18	1.64/22.63	1.77/25.08	1.90/27.53	2.03/30.00	2.16/32.45	2.29/34.90	2.42/37.35	2.55/39.80	2.68/42.25	2.81/44.70	2.94/47.15	3.07/49.60	3.20/52.05	3.33/54.50	3.46/56.95	3.59/59.40	3.72/61.85	3.85/64.30	3.98/66.75	4.11/69.20	4.24/71.65	4.37/74.10	4.50/76.55	4.63/79.00	4.76/81.45	4.89/83.90	5.02/86.35	5.15/88.80	5.28/91.25	5.41/93.70	5.54/96.15	5.67/98.60	5.80/101.05	5.93/103.50	6.06/105.95	6.19/108.40	6.32/110.85	6.45/113.30	6.58/115.75	6.71/118.20	6.84/120.65	6.97/123.10	7.10/125.55	7.23/128.00	7.36/130.45	7.49/132.90	7.62/135.35	7.75/137.80	7.88/140.25	8.01/142.70	8.14/145.15	8.27/147.60	8.40/150.05	8.53/152.50	8.66/154.95	8.79/157.40	8.92/159.85	9.05/162.30	9.18/164.75	9.31/167.20	9.44/169.65	9.57/172.10	9.70/174.55	9.83/177.00	9.96/179.45	10.09/181.90	10.22/184.35	10.35/186.80	10.48/189.25	10.61/191.70	10.74/194.15	10.87/196.60	11.00/199.05	11.13/201.50	11.26/203.95	11.39/206.40	11.52/208.85	11.65/211.30	11.78/213.75	11.91/216.20	12.04/218.65	12.17/221.10	12.30/223.55	12.43/226.00	12.56/228.45	12.69/230.90	12.82/233.35	12.95/235.80	13.08/238.25	13.21/240.70	13.34/243.15	13.47/245.60	13.60/248.05	13.73/250.50	13.86/252.95	13.99/255.40	14.12/257.85	14.25/260.30	14.38/262.75	14.51/265.20	14.64/267.65	14.77/270.10	14.90/272.55	15.03/275.00	15.16/277.45	15.29/279.90	15.42/282.35	15.55/284.80	15.68/287.25	15.81/289.70	15.94/292.15	16.07/294.60	16.20/297.05	16.33/299.50	16.46/301.95	16.59/304.40	16.72/306.85	16.85/309.30	16.98/311.75	17.11/314.20	17.24/316.65	17.37/319.10	17.50/321.55	17.63/324.00	17.76/326.45	17.89/328.90	18.02/331.35	18.15/333.80	18.28/336.25	18.41/338.70	18.54/341.15	18.67/343.60	18.80/346.05	18.93/348.50	19.06/350.95	19.19/353.40	19.32/355.85	19.45/358.30	19.58/360.75	19.71/363.20	19.84/365.65	19.97/368.10	20.10/370.55	20.23/373.00	20.36/375.45	20.49/377.90	20.62/380.35	20.75/382.80	20.88/385.25	21.01/387.70	21.14/390.15	21.27/392.60	21.40/395.05	21.53/397.50	21.66/400.00	21.79/402.45	21.92/404.90	22.05/407.35	22.18/409.80	22.31/412.25	22.44/414.70	22.57/417.15	22.70/419.60	22.83/422.05	22.96/424.50	23.09/426.95	23.22/429.40	23.35/431.85	23.48/434.30	23.61/436.75	23.74/439.20	23.87/441.65	24.00/444.10	24.13/446.55	24.26/449.00	24.39/451.45	24.52/453.90	24.65/456.35	24.78/458.80	24.91/461.25	25.04/463.70	25.17/466.15	25.30/468.60	25.43/471.05	25.56/473.50	25.69/475.95	25.82/478.40	25.95/480.85	26.08/483.30	26.21/485.75	26.34/488.20	26.47/490.65	26.60/493.10	26.73/495.55	26.86/498.00	26.99/500.45	27.12/502.90	27.25/505.35	27.38/507.80	27.51/510.25	27.64/512.70	27.77/515.15	27.90/517.60	28.03/520.05	28.16/522.50	28.29/524.95	28.42/527.40	28.55/529.85	28.68/532.30	28.81/534.75	28.94/537.20	29.07/539.65	29.20/542.10	29.33/544.55	29.46/547.00	29.59/549.45	29.72/551.90	29.85/554.35	29.98/556.80	30.11/559.25	30.24/561.70	30.37/564.15	30.50/566.60	30.63/569.05	30.76/571.50	30.89/573.95	3



Antenna Pattern (2.4GHz and 5GHz UNII 1~UNII 5)

Appendix B

Theta (°)	7-08:10-18	-12:02:8-80	-7:44:12:69	-9:20:7-37	-7:02:6-77	-8:34:8:46	-8:31:5:88	-7:78:9:05	-7:89:6:29	-4:78:5:33	-6:96:11:06	-12:73:14:23	-14:09:11:10	-14:25:13:26	-12:96:13:08	-10:17:7:89	-12:30:3:92	-15:39:10:33	-9:64:12:48	-12:97:9:14	-12:55:15:31	-14:49:9:77	-7:19:8:64	-7:48:12:16
Theta (135°)	-11:87:9:92	-12:96:12:94	-10:11:7:59	-5:29:4:97	-6:79:5:59	-5:02:5:83	-5:59:5:23	-6:04:6:16	-6:33:8:24	-7:41:7:82	-9:64:11:09	-11:13:9:36	-8:80:9:71	-10:08:6:60	-7:48:7:21	-11:30:16:24	-13:44:11:32	-9:82:6:11	-12:55:11:02	-11:85:12:07	-10:27:12:29	-10:86:7:54	-10:68:15:98	-15:32:15:16
Theta (142.5°)	-9:54:11:35	-14:16:8:48	-7:01:6:06	-4:73:4:86	-5:88:6:76	-7:99:8:45	-5:94:5:84	-6:67:6:29	-6:59:7:35	-7:42:7:74	-10:27:11:62	-9:71:10:76	-8:71:9:92	-7:38:7:66	-9:64:8:59	-8:84:9:46	-7:39:6:35	-7:34:11:37	-12:95:11:75	-12:97:9:18	-4:40:2:85	-3:94:4:32	-7:89:10:40	-11:01:11:20
Theta (150°)	-8:04:10:16	-11:91:8:81	-7:24:7:00	-6:79:5:71	-4:74:4:55	-6:18:7:48	-6:65:9:49	-3:46:3:07	-3:00:3:75	-3:84:4:26	-5:20:6:64	-7:82:7:72	-6:09:6:24	-7:43:7:82	-6:78:6:41	-5:82:6:91	-8:20:7:15	-5:63:4:60	-4:70:7:48	-4:79:6:16	-4:51:5:65	-8:03:8:26	-10:10:9:65	-8:55:7:21
Theta (157.5°)	-14:15:11:78	-11:57:10:28	-11:33:12:37	-12:57:14:33	-15:10:13:90	-11:42:7:83	-5:69:3:54	-2:29:1:79	-1:51:1:52	-1:94:2:90	-3:87:4:58	-5:81:6:52	-6:84:6:50	-7:38:6:28	-7:70:6:11	-6:57:6:81	-10:95:12:15	-13:83:14:99	-12:16:9:22	-8:97:8:30	-7:77:9:96	-9:18:10:49	-10:96:9:85	-12:13:14:78
Theta (165°)	-14:07:11:86	-11:70:12:72	-11:12:14:16	-13:84:15:26	-14:70:14:89	-13:68:13:32	-6:45:5:10	-4:23:3:72	-3:65:3:53	-3:84:3:84	-4:11:4:46	-4:62:4:59	-5:16:5:28	-6:43:6:19	-5:59:6:13	-8:35:8:98	-11:28:12:88	-11:05:7:84	-4:02:7:40	-7:16:10:16	-13:75:15:21	-15:69:14:88		
Theta (172.5°)	-11:73:10:72	-10:08:9:77	-10:11:10:22	-11:51:13:42	-15:57:15:61	-15:19:14:03	-12:45:10:47	-9:91:8:96	-8:75:8:14	-7:71:7:92	-7:89:8:21	-8:79:9:49	-9:78:9:93	-10:39:10:46	-10:63:10:52	-10:49:10:12	-10:66:10:71	-12:30:12:88	-11:97:10:66	-9:08:9:00	-9:74:11:81	-12:57:13:18	-13:61:12:60	-11:81:11:70
Theta (180°)	-10:31:9:98	-9:04:8:72	-8:48:8:58	-8:51:8:71	-9:75:11:68	-11:78:11:57	-12:04:11:32	-11:56:10:85	-10:79:10:65	-10:75:10:60	-10:53:10:08	-10:88:10:63	-10:92:10:51	-10:24:9:54	-9:33:9:14	-8:95:8:68	-8:48:9:06	-9:81:10:89	-12:26:12:55	-12:83:12:04	-11:72:12:40	-9:27:9:39	-9:84:10:07	-10:53:10:74
Freq(Hz)	5.6GPol.	TotalAnt.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Phi(0°)Phi(7.5°)	Phi(15°)Phi(22.5°)	Phi(30°)Phi(37.5°)	Phi(45°)Phi(52.5°)	Phi(60°)Phi(67.5°)	Phi(75°)Phi(82.5°)	Phi(90°)Phi(97.5°)	Phi(105°)Phi(112.5°)	Phi(120°)Phi(127.5°)	Phi(135°)Phi(142.5°)	Phi(150°)Phi(157.5°)	Phi(165°)Phi(172.5°)	Phi(180°)Phi(187.5°)	Phi(195°)Phi(202.5°)	Phi(210°)Phi(217.5°)	Phi(225°)Phi(232.5°)	Phi(240°)Phi(247.5°)	Phi(255°)Phi(262.5°)	Phi(270°)Phi(277.5°)	Phi(285°)Phi(292.5°)	Phi(300°)Phi(307.5°)	Phi(315°)Phi(322.5°)	Phi(330°)Phi(337.5°)	Phi(345°)Phi(352.5°)
Theta (0°)	-13:69:14:70	-12:30:10:57	-12:28:13:00	-13:00:12:08	-11:25:11:45	-11:49:11:81	-11:99:13:45	-13:22:13:10	-12:87:13:06	-12:45:12:45	-12:51:13:31	-15:49:16:38	-13:63:11:07	-12:07:10:24	-15:78:15:28	-14:41:11:36	-16:29:15:07	-11:85:12:07	-12:57:14:36	-15:83:14:28	-12:27:11:30	-12:18:11:42		
Theta (7.5°)	-9:11:10:22	-11:12:10:56	-12:15:12:00	-12:05:11:40	-15:81:14:94	-15:22:15:91	-15:33:15:10	-16:16:15:18	-15:35:15:76	-14:89:15:13	-14:80:12:85	-13:75:13:60	-13:61:12:98	-10:67:10:53	-10:77:12:06	-12:25:10:73	-9:53:9:79	-9:09:10:09	-9:59:9:02	-8:71:8:25	-8:64:8:93	-7:47:8:73	-10:87:9:85	
Theta (15°)	-7:60:8:69	-8:84:9:10	-10:42:10:44	-9:80:11:51	-12:21:11:40	-11:29:10:51	-11:36:11:12	-11:04:11:85	-12:54:13:61	-15:12:15:24	-15:46:15:05	-15:24:14:60	-14:27:14:19	-13:76:13:03	-11:44:10:99	-10:40:9:62	-10:46:10:56	-11:65:11:22	-10:76:10:27	-9:89:10:04	-9:19:7:73	-6:53:6:30	-6:13:5:34	-5:66:6:38
Theta (22.5°)	-8:98:7:15	-5:74:6:30	-6:59:6:59	-6:36:5:97	-5:54:5:51	-5:76:5:64	-6:25:6:08	-6:61:7:08	-7:63:8:80	-10:25:12:49	-12:26:14:85	-14:44:15:53	-14:40:15:35	-13:45:11:18	-8:93:7:62	-8:59:8:83	-9:89:11:91	-14:68:12:64	-10:49:8:98	-8:08:7:96	-7:97:8:02	-9:20:11:51	-10:60:9:71	-8:41:9:83
Theta (30°)	-4:31:7:00	-2:78:2:88	-3:41:3:38	-6:36:6:64	-5:15:6:27	-14:07:14:94	-12:90:10:47	-8:72:7:85	-6:25:5:45	-6:11:6:48	-10:78:11:87	-9:81:10:95	-11:99:13:86	-10:72:12:94	-13:43:14:78	-15:90:13:67	-13:52:12:43	-4:04:4:42	-6:91:7:29	-8:75:8:07	-8:43:10:97	-15:44:14:45	-9:66:7:41	
Theta (37.5°)	-2:03:1:51	-3:58:6:08	-6:98:6:04	-5:35:5:76	-5:65:7:44	-9:20:9:40	-13:35:13:83	-15:37:14:97	-11:78:8:70	-5:95:4:93	-5:48:5:16	-3:42:4:08	-6:28:8:98	-7:42:9:05	-12:66:11:01	-9:29:10:51	-12:33:15:27	-15:41:15:41	-13:32:14:00	-12:75:9:27	-8:41:7:90	-7:70:10:43	-12:38:11:69	-8:16:4:99
Theta (45°)	-2:93:2:92	-2:18:2:14	-4:07:5:99	-9:43:9:27	-6:22:5:06	-6:78:6:77	-5:95:5:32	-4:74:5:65	-6:96:6:88	-9:31:8:32	-8:84:7:33	-3:81:8:11	-2:64:4:03	-3:94:4:70	-5:71:4:03	-3:25:4:50	-4:93:6:61	-9:94:7:95	-5:22:6:11	-6:92:4:03	-2:97:5:53	-6:77:4:91	-5:65:4:20	-2:82:3:84
Theta (52.5°)	-6:40:5:65	-4:99:8:22	-11:27:10:70	-6:85:6:85	-5:38:4:09	-2:78:2:22	-3:92:5:89	-4:42:4:53	-5:18:5:37	-4:90:4:79	-8:82:8:58	-8:72:5:17	-2:76:3:97	-4:77:3:61	-4:15:4:00	-3:98:4:53	-4:31:3:12	-4:49:4:31	-4:57:6:53	-3:61:4:92	-3:64:5:95	-2:85:2:01	-1:91:2:73	-4:54:7:25
Theta (60°)	-8:05:12:08	-5:02:3:02	-2:07:0:81	-2:59:1:97	-1:30:2:64	-4:25:3:44	-2:44:3:72	-3:75:2:01	-1:40:1:90	-2:00:1:82	-2:95:6:42	-6:27:8:88	-8:48:8:14	-8:79:6:60	-4:39:4:57	-6:01:7:76	-7:76:4:21	-3:85:4:68	-4:43:5:84	-7:14:9:64	-6:25:5:69	-6:92:6:25	-4:98:3:93	-5:31:7:02
Theta (67.5°)	-3:74:1:11	-0:70:0:46	0:21:0:32	-0:70:7:40	-3:64:7:24	-4:72:7:47	-6:97:8:80	-4:88:7:98	-7:65:7:87	-7:42:3:24	-2:19:3:52	-1:78:2:05	-3:72:1:64	-3:48:4:44	-3:52:4:36	-4:06:6:18	-4:39:4:69	-7:49:3:81	-2:83:4:77	-7:90:5:53	-4:65:6:71	-5:69:6:50	-5:32:6:50	-2:93:1:08
Theta (75°)	-2:14:3:65	-4:38:5:13	-5:93:6:08	-1:98:0:01	-0:83:0:05	1:92:7:70	0:31:1:39	2:35:1:99	0:36:0:23	1:21:0:94	-5:09:3:72	-2:04:8:08	-0:50:0:39	0:03:1:53	-1:30:0:73	-0:86:0:21	-3:76:2:63	-4:37:0:93	-3:26:0:59	-3:90:2:54	-1:17:1:75	-4:47:3:40	-0:95:4:00	
Theta (82.5°)	-4:29:8:26	-9:46:3:38	-4:19:0:38	-1:93:1:43	-0:84:1:06	-0:23:1:60	-2:41:3:72	-2:32:1:83	-1:30:0:65	-2:58:2:63	-3:26:3:09	-3:58:3:17	-2:58:2:45	-0:01:1:15	-2:80:4:47	-3:55:1:57	0:32:2:17	4:27:3:74	-5:48:6:42	-3:44:0:88	-3:57:0:91	-1:10:2:12	-1:55:4:02	-4:99:5:35
Theta (90°)	0:07:1:82	-3:12:1:57	-3:93:1:02	-6:43:2:14	-3:36:1:56	-0:52:3:32	-3:40:0:93	-3:00:3:75	1:52:1:50	-1:50:2:82	-2:91:1:35	-1:00:1:28	-0:24:0:17	-0:01:1:29	-4:01:1:79	-2:71:6:63	-2:29:0:58	-2:92:1:13	-2:67:4:49	-1:80:0:74	-3:68:0:63	-1:49:2:70	-4:02:3:17	-2:37:1:81
Theta (97.5°)	-2:04:7:28	-6:06:1:90	-2:27:0:21	-1:33:0:75	-0:56:0:60	-0:53:2:26	-1:62:0:46	1:17:0:10	0:10:1:56	-1:69:1:88	-1:58:1:48	-1:55:2:18	-2:76:1:13	-1:62:2:08	-0:88:1:71	-5:34:3:21	-0:76:1:20	-1:55:0:79	-1:79:4:15	-1:09:0:95	-3:22:1:76	-0:75:3:07	-1:54:3:51	-3:59:2:28
Theta (105°)	-5:92:5:59	-5:11:4:88	-6:72:3:64	-4:71:7:22	-7:48:9:24	-12:08:15:55	-14:45:13:64	-12:97:8:14	-5:32:6:71	-9:81:8:21	-4:15:4:62	-3:86:2:81	-4:52:5:67	-2:66:6:97	-9:75:4:73	-6:89:3:28	-3:86:9:15	-5:62:3:11	-8:53:9:20	-4:75:5:17	-13:90:3:83	-2:87:5:48	-9:59:10:03	-11:02:9:69
Theta (112.5°)	-5:74:14:33	-7:68:12:04	-15:21:11:82	-7:61:1:18	-4:29:2:49	0:31:1:30	-3:48:3:77	-2:87:6:65	-7:70:6:69	-7:21:8:34	-11:96:10:12	-5:50:4:16	-2:84:3:81	-4:86:5:32	-6:16:7:72	-14:99:10:49	-7:95:10:23	-7:74:5:96	-6:32:11:64	-5:20:5:01	-9:30:6:60	-4:10:5:64	-10:57:8:98	-11:38:9:69
Theta (120°)	-2:17:9:12	-11:83:11:20	-7:95:7:97	-6:41:6:60	-4:73:2:69	-1:23:2:33	-4:68:4:09	-2:88:2:66	-1:49:4:26	-2:38:3:28	-5:52:7:82	-7:92:7:35	-5:92:6:99	-5:08:4:84	-5:10:10:32	-6:09:7:99	-7:43:7:45	-5:92:8:88	-9:29:15:56	-6:52:6:65	-6:54:7:46	-8:66:4:41	-3:65:4:39	-3:63:1:48
Theta (127.5°)	-4:05:8:25	-8:13:5:47	-7:06:9:26	-9:51:7:99	-8:86:9:52	-9:41:8:20	-10:02:8:13	-6:31:3:59	-4:14:4:63	-4:44:5:99	-8:29:9:50	-13:08:12:48	-11:64:10:89	-8:88:3:98	-4:39:6:86	-10:13:5:44	-10:14:7:47	-7:14:9:99	-11:45:10:17	-6:34:4:12	-6:19:8:87	-11:87:11:42	-11:08:11:79	-9:77:9:43
Theta (135°)	-13:08:11:27	-11:56:12:71	-11:77:11:00	-6:83:6:09	-5:87:3:72	-3:02:2:38	-3:73:5:38	-5:68:4:84	-6:15:7:36	-6:81:5:63	-6:63:4:10	-10:01:11:79	-14:24:14:91	-12:90:13:87	-7:63:7:64	-15:29:14:86	-10:65:9:47	-12:08:10:40	-13:56:10:29	-8:97:7:03	-6:70:7:86	-13:14:8:96	-7:81:13:83	-14:87:13:53
Theta (142.5°)	-7:08:9:44	-12:78:12:52	-8:48:5:67	-4:56:6:90	-7:82:7:20	-6:04:0:47	-4:26:5:17	-4:52:4:34	-6:66:8:77	-9:40:10:21	-13:09:12:33	-12:83:10:46	-14:80:12:75	-8:04:9:04	-12:44:10:35	-10:57:15:30	-9:20:5:87	-5:20:7:87	-13:52:11:71	-7:49:5:98	-5:95:7:40	-6:62:5:90	-6:87:5:82	-7:34:8:67
Theta (150°)	-6:96:8:06	-9:47:8:81	-10:71:8:59	-7:66:7:01	-5:09:5:65	-5:10:4:89	-5:11:5:41	-3:66:4:37	-3:03:3:25	-3:14:4:43	-6:28:10:66	-15:35:11:86	-8:43:6:95	-7:00:6:68	-5:38:6:42	-7:56:9:84	-10:54:9:27	-7:70:7:17	-6:90:7:36	-6:00:3:56	-3:25:3:81	-6:49:8:76	-10:21:8:63	-7:50:6:26
Theta (157.5°)	-14:88:14:24	-12:81:11:29	-9:52:9:81	-7:94:8:47	-11:73:10:71	-7:15:5:08	-4:30:4:99	-3:90:3:11	-2:83:3:33	-3:65:4:20	-5:11:5:94	-6:36:6:46												

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 $\Theta(0-180)\Phi(270)$

