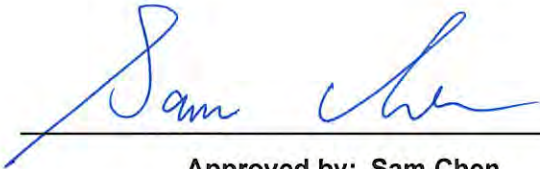




Antenna Composite Gain Test Report

FCC ID	MSQ-RTBE6X00
Equipment	BE30000 Quad Band WiFi Router
Brand Name	ASUS
Model Name	BQ16 Pro
Applicant	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou, Taipei City 112, Taiwan
Sample Received	Jul. 31, 2023
Start Test Date	Aug. 22, 2023
Final Test Date	Aug. 23, 2023



Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
AP351907	01	Initial issue of report	Nov. 03, 2023



1. Operation Mode and Antenna Information

Antenna Position	RF Port	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
2G5G Ant1	1	Walsin	RFDPA220510IMLB901	Dipole	I-PEX	2.4GHz, 5GHz UNII 1~3
2G5G Ant2	2	Walsin	RFDPA220513IMLB901	Dipole	I-PEX	2.4GHz, 5GHz UNII 1~3
2G5G Ant3	3	Walsin	RFPCA180916IMLB901	Dipole	I-PEX	2.4GHz, 5GHz UNII 1~3
2G5G Ant4	4	Walsin	RFPCA251813IMLB901	Dipole	I-PEX	2.4GHz, 5GHz UNII 1~3
6GL Ant1	3	Walsin	RFDPA100504IM6B901	Dipole	I-PEX	6GHz UNII 5~6
6GL Ant2	2	Walsin	RFDPA100514IM6B901	Dipole	I-PEX	6GHz UNII 5~6
6GL Ant3	1	Walsin	RFDPA100509IM6B901	Dipole	I-PEX	6GHz UNII 5~6
6GL Ant4	4	Walsin	RFDPA100507IM6B901	Dipole	I-PEX	6GHz UNII 5~6
6GH Ant1	2	Walsin	RFDPA100506IM6B901	Dipole	I-PEX	6GHz UNII 7~8
6GH Ant2	1	Walsin	RFDPA100506IM6B902	Dipole	I-PEX	6GHz UNII 7~8
6GH Ant3	3	Walsin	RFDPA100505IM6B901	Dipole	I-PEX	6GHz UNII 7~8
6GH Ant4	4	Walsin	RFDPA100512IM6B901	Dipole	I-PEX	6GHz UNII 7~8

Note:

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

2G5G Ant1~4 can be used as transmitting/receiving antenna.

2G5G Ant1~4 could transmit/receive simultaneously.

6GHz Operation Mode (4TX/4RX)

For UNII 5~6

6GL Ant1~4 can be used as transmitting/receiving antenna.

6GL Ant1~4 could transmit/receive simultaneously.

For UNII 7~8

6GH Ant1~4 can be used as transmitting/receiving antenna.

6GH Ant1~4 could transmit/receive simultaneously.



2. Test Frequency

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

Band [MHz]	Test Frequency [MHz]
2400-2483.5	2450
5150-5250	5200
5250-5350	5300
5470-5725	5600
5725-5850	5785
5925-6425	6175
6425-6525	6475
6525-6875	6695
6875-7125	6995

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	Aug. 22, 2023 ~ Aug. 23, 2023

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

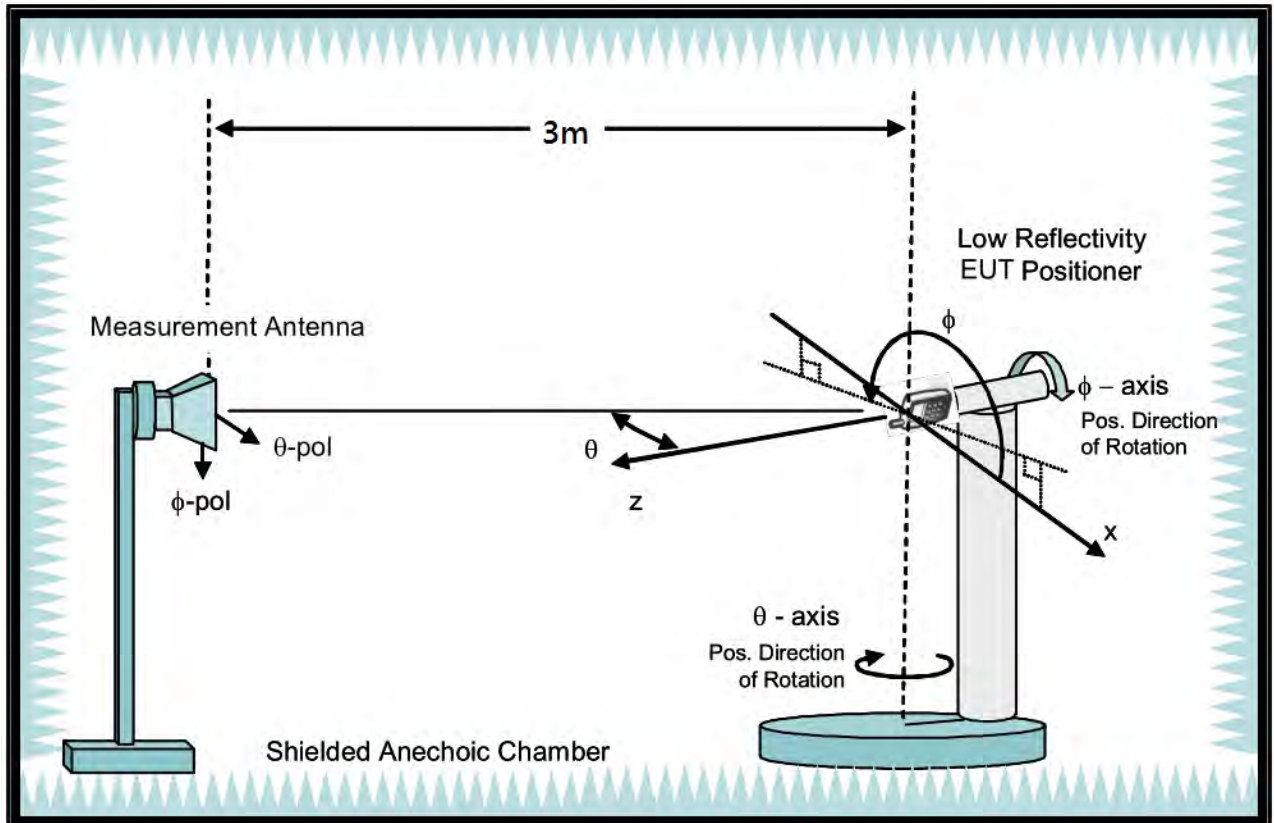
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

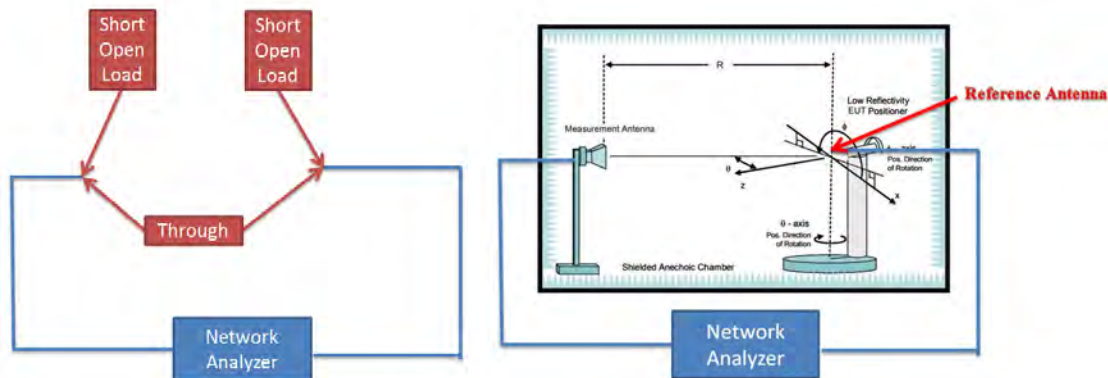
#Reference to CTIA "ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1"



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)	-33.75	-33.64	-32.91	-32.21	-32.45	-32.33	-32.57	-32.94	-32.78	-33.35	-32.91	-33.81	-34.54	-35.64
G(phi) reading (dB)	-33.19	-32.12	-32.48	-32.51	-32.64	-31.68	-32.24	-32.45	-32.45	-32.85	-32.45	-33.62	-34.48	-35.24
Reference gain (dBi)	10	10.4	10.6	12.3	12.5	13.3	13.3	13.2	13.1	13	13.2	12.4	11.8	11.1
Factor(theta) (dB)	43.75	44.04	43.51	44.51	44.95	45.63	45.87	46.14	45.88	46.35	46.11	46.21	46.34	46.74
Factor(phi) (dB)	43.19	42.52	43.08	44.81	45.14	44.98	45.54	45.65	45.55	45.85	45.65	46.02	46.28	46.34

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

For 2G5G Ant1~4:

DG_1SS max value position

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	-8.31	2.1	0.96	2.31	2.25
Ant. 2 (dBi)	-8.19	2.28	1.43	1.43	1.97
Ant. 3 (dBi)	2.8	-8.03	-10.13	-12.24	-18.53
Ant. 4 (dBi)	1.88	-5.04	-2.45	-4.4	-2.3
DG [1SS] (dBi)	4.6	4.94	4.51	4.43	4.7
Polarization	Phi	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	60	105	105	105	105
$\Phi(^{\circ})$	142.5	187.5	187.5	195	195

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 [$10^{(G/20)}$]	$10^{(-8.31/20)}$	$10^{(2.1/20)}$	$10^{(0.96/20)}$	$10^{(2.31/20)}$	$10^{(2.25/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(-8.19/20)}$	$10^{(2.28/20)}$	$10^{(1.43/20)}$	$10^{(1.43/20)}$	$10^{(1.97/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(2.8/20)}$	$10^{(-8.03/20)}$	$10^{(-10.13/20)}$	$10^{(-12.24/20)}$	$10^{(-18.53/20)}$
Ant. 4 [$10^{(G/20)}$]	$10^{(1.88/20)}$	$10^{(-5.04/20)}$	$10^{(-2.45/20)}$	$10^{(-4.4/20)}$	$10^{(-2.3/20)}$
Ant. 1 [$10^{(G/20)}$] value	0.384	1.274	1.117	1.305	1.296
Ant. 2 [$10^{(G/20)}$] value	0.389	1.3	1.179	1.179	1.255
Ant. 3 [$10^{(G/20)}$] value	1.38	0.397	0.312	0.244	0.118
Ant. 4 [$10^{(G/20)}$] value	1.242	0.56	0.754	0.603	0.767
Sum All Antenna [Amax]	3.396	3.53	3.362	3.331	3.436
DG [$10 * \log(A_{max}^2 / N_{ant})$]	4.6	4.94	4.51	4.43	4.7

Note:

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

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



For 6GL Ant1~4:

DG_1SS max value position

Frequency (Hz)	6.175G	6.475G
Ant. 1 (dBi)	-2.95	-0.59
Ant. 2 (dBi)	-1.18	-7.88
Ant. 3 (dBi)	0.79	2.37
Ant. 4 (dBi)	-5.41	-5.01
DG [1SS] (dBi)	4.13	4.12
Polarization	Theta	Theta
$\Theta(^{\circ})$	60	135
$\Phi(^{\circ})$	45	262.5

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)	6.175G	6.475G
Ant. 1 [$10^{(G/20)}$]	$10^{(-2.95/20)}$	$10^{(-0.59/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(-1.18/20)}$	$10^{(-7.88/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(0.79/20)}$	$10^{(2.37/20)}$
Ant. 4 [$10^{(G/20)}$]	$10^{(-5.41/20)}$	$10^{(-5.01/20)}$
Ant. 1 [$10^{(G/20)}$] value	0.712	0.934
Ant. 2 [$10^{(G/20)}$] value	0.873	0.404
Ant. 3 [$10^{(G/20)}$] value	1.095	1.314
Ant. 4 [$10^{(G/20)}$] value	0.536	0.562
Sum All Antenna [Amax]	3.217	3.213
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	4.13	4.12

Note:

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

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



For 6GH Ant1~4:

DG_1SS max value position

Frequency (Hz)	6.695G	6.995G
Ant. 1 (dBi)	0.54	-2.65
Ant. 2 (dBi)	-9.72	-1.51
Ant. 3 (dBi)	3.71	-0.16
Ant. 4 (dBi)	-9.56	-0.59
DG [1SS] (dBi)	4.23	4.84
Polarization	Theta	Theta
Θ (°)	135	90
Φ (°)	262.5	120

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)	6.695G	6.995G
Ant. 1 [10^(G/20)]	10^(0.54/20)	10^(-2.65/20)
Ant. 2 [10^(G/20)]	10^(-9.72/20)	10^(-1.51/20)
Ant. 3 [10^(G/20)]	10^(3.71/20)	10^(-0.16/20)
Ant. 4 [10^(G/20)]	10^(-9.56/20)	10^(-0.59/20)
Ant. 1 [10^(G/20)] value	1.064	0.737
Ant. 2 [10^(G/20)] value	0.327	0.84
Ant. 3 [10^(G/20)] value	1.533	0.982
Ant. 4 [10^(G/20)] value	0.333	0.934
Sum All Antenna [Amax]	3.256	3.494
DG [10*log(Amax^2/Nant)]	4.23	4.84

Note:

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

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



8. Summary of Test Result

For 2G5G Ant1~4:

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.48	2.1	2.16	2.31	2.3
Ant. 2 Max Gain (dBi)	2.46	3.09	3.47	2.84	3.65
Ant. 3 Max Gain (dBi)	2.8	2.67	2.36	2.36	2.39
Ant. 4 Max Gain (dBi)	2.04	2.15	2.42	2.5	2.01
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/105/157.5	Theta/105/187.5	Theta/90/60	Theta/105/195	Theta/105/202.5
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/105/225	Theta/120/277.5	Theta/120/277.5	Theta/97.5/315	Theta/120/277.5
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/60/142.5	Phi/90/165	Phi/90/165	Phi/90/97.5	Phi/97.5/90
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/67.5/127.5	Theta/82.5/202.5	Theta/82.5/210	Theta/75/172.5	Theta/75/172.5
Max Gain (dBi)	2.8	3.09	3.47	2.84	3.65
DG [1SS] (dBi)	4.6	4.94	4.51	4.43	4.7
DG [2SS] (dBi)	2.8	3.09	3.47	2.84	3.65
DG [4SS] (dBi)	2.8	3.09	3.47	2.84	3.65

For 6GL Ant1~4:

Frequency (Hz)	6.175G	6.475G
Ant. 1 Max Gain (dBi)	1.72	1.94
Ant. 2 Max Gain (dBi)	1.68	1.96
Ant. 3 Max Gain (dBi)	2.77	2.37
Ant. 4 Max Gain (dBi)	2.08	1.77
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/82.5/187.5	Phi/97.5/157.5
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/165/127.5	Theta/157.5/217.5
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/135/262.5	Theta/135/262.5
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/60/172.5	Theta/37.5/180
Max Gain (dBi)	2.77	2.37
DG [1SS] (dBi)	4.13	4.12
DG [2SS] (dBi)	2.77	2.37
DG [4SS] (dBi)	2.77	2.37



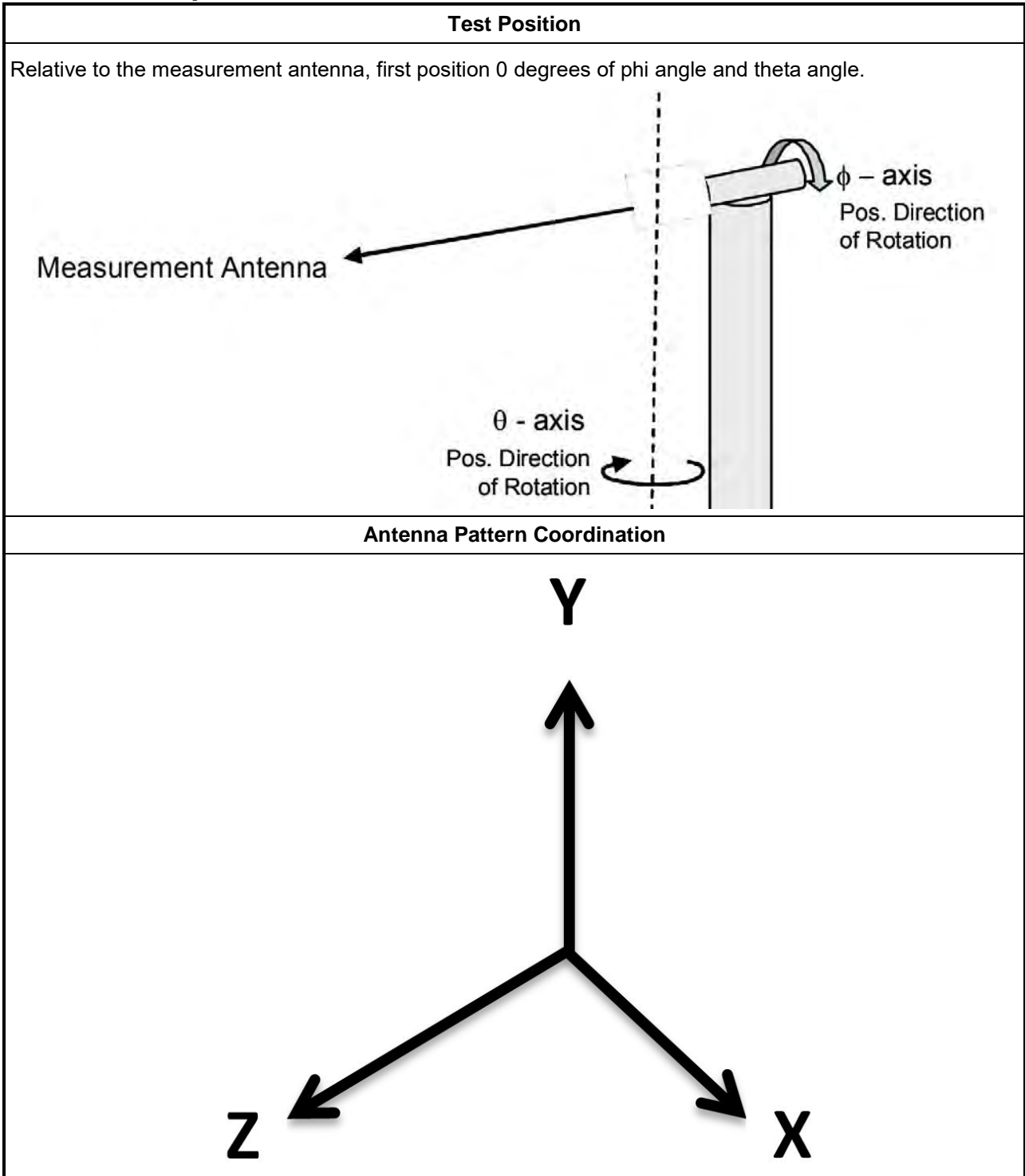
For 6GH Ant1~4:

Frequency (Hz)	6.695G	6.995G
Ant. 1 Max Gain (dBi)	2.27	1.82
Ant. 2 Max Gain (dBi)	1.52	1.7
Ant. 3 Max Gain (dBi)	3.71	3.4
Ant. 4 Max Gain (dBi)	2.11	2.23
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/75/180	Theta/112.5/217.5
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/60/345	Theta/97.5/270
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/135/262.5	Theta/135/262.5
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/37.5/157.5	Theta/37.5/172.5
Max Gain (dBi)	3.71	3.4
DG [1SS] (dBi)	4.23	4.84
DG [2SS] (dBi)	3.71	3.4
DG [4SS] (dBi)	3.71	3.4

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. Refer to KDB662911D01 (F) (2) (e) (ii)
4. Directional Gain (4SS) = Directional Gain (1SS) – 6dB. If directional gain is less than max gain, use max gain as directional gain. Refer to KDB662911D01 (F) (2) (e) (ii)

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 11, 2023	May 10, 2024
Dual Polarization Horn Antenna	Sporton	S0209DP	S0209DP-001	2GHz~9GHz	N.C.R.	N.C.R.
ENA Series Network Analyzer	AGILENT	E5071C	MY46419477	100kHz~8.5GHz	Jul. 28, 2023	Jul. 27, 2024
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 UNII 1~3.....	Page 17
Appendix B – Radiated Composite Gain of 6GHz UNII 5~6.....	Page 31
Appendix C – Radiated Composite Gain of 6GHz UNII 7~8.....	Page 37
Appendix D – Antenna Pattern of 2.4GHz and 5GHz UNII 1~3.....	Page 43
Appendix E – Antenna Pattern of 6GHz UNII 5~6.....	Page 50
Appendix F – Antenna Pattern of 6GHz UNII 7~8.....	Page 54
Appendix G – Test Photos.....	Page 58



Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.48	2.1	2.16	2.31	2.3
Ant. 2 Max Gain (dBi)	2.46	3.09	3.47	2.84	3.65
Ant. 3 Max Gain (dBi)	2.8	2.67	2.36	2.36	2.39
Ant. 4 Max Gain (dBi)	2.04	2.15	2.42	2.5	2.01
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/105/157.5	Theta/105/187.5	Theta/90/60	Theta/105/195	Theta/105/202.5
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/105/225	Theta/120/277.5	Theta/120/277.5	Theta/97.5/315	Theta/120/277.5
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/60/142.5	Phi/90/165	Phi/90/165	Phi/90/97.5	Phi/97.5/90
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/67.5/127.5	Theta/82.5/202.5	Theta/82.5/210	Theta/75/172.5	Theta/75/172.5
Max Gain (dBi)	2.8	3.09	3.47	2.84	3.65
DG [1SS] (dBi)	4.6	4.94	4.51	4.43	4.7
DG [2SS] (dBi)	2.8	3.09	3.47	2.84	3.65
DG [4SS] (dBi)	2.8	3.09	3.47	2.84	3.65



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

Appendix A

DG 1SS Result

Freq(Hz)	2.45GPol	PhiL	+													-												
DG(dB)	Φ(0°)/Φ(7.5°)	Φ(15°)/Φ(22.5°)	Φ(30°)/Φ(37.5°)	Φ(45°)/Φ(52.5°)	Φ(60°)/Φ(67.5°)	Φ(75°)/Φ(82.5°)	Φ(90°)/Φ(97.5°)	Φ(105°)/Φ(112.5°)	Φ(120°)/Φ(127.5°)	Φ(135°)/Φ(142.5°)	Φ(150°)/Φ(157.5°)	Φ(165°)/Φ(172.5°)	Φ(180°)/Φ(187.5°)	Φ(195°)/Φ(202.5°)	Φ(210°)/Φ(217.5°)	Φ(225°)/Φ(232.5°)	Φ(240°)/Φ(247.5°)	Φ(255°)/Φ(262.5°)	Φ(270°)/Φ(277.5°)	Φ(285°)/Φ(292.5°)	Φ(300°)/Φ(307.5°)	Φ(315°)/Φ(322.5°)	Φ(330°)/Φ(337.5°)	Φ(345°)/Φ(352.5°)				
θ(0°)	-1.25/-1.44	-1.56/-1.67	-1.87/-2.22	-2.53/-2.77	-2.94/-3.02	-2.79/-2.29	-1.85/-1.47	-0.99/-0.52	-0.22/-0.1	0.1/-0.28	-0.11/-0.28	-0.69/-1.06	-1.21/-1.37	-1.63/-1.7	-1.65/-2.05	-2.27/-2.45	-2.71/-1.85	-1.71/-1.32	-0.95/-0.57	-0.56/-0.43	0.42/-0.36	-0.51/-0.66	-0.78/-1.07	-1.24/-1.44				
θ(7.5°)	-1.92/-2.24	-2.31/-2.28	-2.97/-3.07	-3.07/-3.07	-3.07/-3.03	-2.59/-2.03	-1.44/-0.92	-0.59/-0.22	0.060/0.02	-0.04/-0.14	-0.41/-0.92	-1.31/-2.17	-1.98/-3.39	-1.48/-1.36	-1.27/-1.64	-1.75/-1.8	-2.19/-1.85	-1.98/-1.88	-1.56/-1.24	-0.98/-0.86	-0.79/-0.73	-0.69/-0.82	-0.91/-1.02	-1.51/-1.79				
θ(15°)	-2.35/-2.76	-2.95/-2.86	-2.89/-3.14	-3.36/-3.38	-3.13/-2.91	-2.51/-1.74	-1.06/-0.73	-0.37/-0.12	0.060/0.07	-0.02/-0.17	-0.41/-0.51	-0.87/-1.01	-0.95/-0.99	-0.99/-1.05	-0.87/-0.85	-1.19/-1.39	-1.49/-1.58	-1.77/-1.96	-1.87/-1.56	-1.32/-1.26	-1.13/-0.9	-0.72/-0.69	-0.82/-1.11	-1.54/-1.97				
θ(22.5°)	-2.8/-3.14	-3.57/-3.5	-3.47/-3.66	-3.87/-3.85	-3.69/-3.46	-3.05/-2.41	-1.91/-1.47	-1.06/-0.81	-0.5/-0.36	-0.41/-0.56	-0.88/-1.31	-1.17/-1.54	-1.77/-1.5	-1.66/-1.29	-1.44/-1.32	-1.39/-1.48	-1.64/-1.71	-1.73/-1.76	-1.71/-1.53	-1.11/-0.68	-0.54/-0.28	-0.21/-0.25	-0.43/-0.84	-1.51/-2.16				
θ(30°)	-3.04/-3.74	-4.33/-4.38	-4.45/-4.67	-4.96/-5.12	-4.14/-4.74	-3.46/-3.27	-2.48/-1.94	-1.59/-1.23	-0.79/-0.39	-0.41/-0.12	-0.21/-0.11	-1.02/-1.3	-1.36/-1.8	-1.55/-1.76	-1.87/-2.14	-2.32/-2.24	-2.67/-2.7	-2.75/-2.35	-1.96/-1.54	-1.14/-0.61	-0.24/-0.13	0.17/-0.04	-0.33/-0.69	-1.51/-2.34				
θ(37.5°)	-3.65/-4.62	-5.23/-5.58	-5.77/-5.97	-6.42/-7.05	-7.08/-6.21	-4.83/-3.53	-2.43/-1.82	-1.34/-0.67	-0.05/0.6	0.86/0.74	0.34/-0.36	-0.75/-0.88	-1.53/-1.53	-2.07/-2.3	-2.83/-3.04	-3.38/-3.78	-3.85/-3.73	-3.41/-2.63	-1.82/-1.11	-0.64/-0.31	0.05/0.32	0.20/0.08	-0.21/-0.83	-1.63/-2.73				
θ(45°)	-4.31/-5.12	-5.78/-6.46	-6.42/-7.14	-8.36/-9.73	-9.68/-8.18	-5.96/-3.85	-2.36/-1.21	-0.19/0.51	1.23/1.82	2.28/2.33	2.03/1.5	0.84/0.27	-0.21/-0.66	-0.98/-1.38	-1.92/-2.57	-2.96/-3.8	-3.93/-3.77	-3.28/-2.6	-1.79/-1.06	-0.6/-0.41	-0.31/-0.11	0.05/0.12	-0.56/-1.03	-1.91/-3.19				
θ(52.5°)	-4.07/-4.54	-4.89/-5.16	-6.1/4.9	-8.83/10.04	-9.34/7.64	-5.75/-3.69	-1.81/0.23	1.06/1.89	2.48/2.83	3.21/3.04	2.37/1.39	0.89/0.39	-0.07/-0.59	-1.18/-1.67	-2.33/-2.62	-3.48/-4.11	-4.26/-4.23	-4.31/-3.73	-2.68/-1.89	-1.54/-1.56	-1.69/-1.48	-1.23/-1.36	-1.95/-2.44	-2.92/-3.4				
θ(60°)	-2.91/-3.14	-3.57/-4.41	-5.71/4	-7.74/6.83	-5.67/-4.44	-3.25/-2.07	-0.96/0.2	1.41/2.41	3.14/3.57	3.84/4.6	3.19/2.28	1.14/0.21	-0.48/-1.18	-1.46/-1.72	-1.98/-2.75	-3.39/-3.34	-3.4/3.35	-3.01/2.08	-0.84/-0.01	0.4/0.37	-0.11/0.63	-0.13/1.51	-2.12/-2.47	-2.71/2.81				
θ(67.5°)	-4.05/-4.79	-5.59/-6.72	-7.96/9.97	-8.71/6.54	-4.59/-2.82	-1.6/-0.87	-0.38/0.14	1.02/1.95	2.73/2.79	2.41/1.76	0.97/-0.16	-0.84/-0.84	-0.89/-0.98	-1.41/-1.92	-2.08/-2.35	-2.85/-3.06	-2.52/-1.77	-0.45/0.71	1.51/1.95	2.13/1.99	1.24/0.45	-0.21/0.57	-1.24/-2.15	-2.76/-3.33				
θ(75°)	-3.43/-3.88	-4.38/-5.02	-6.07/7.08	-7.62/7.07	-5.43/-3.29	-1.74/-0.88	-0.36/0.11	0.64/1.32	2.12/2.61	2.81/2.56	1.91/1.12	0.56/0.25	0.09/-0.15	-0.72/-1.62	-2.79/-4.09	-4.05/-4.38	-4.54/-3.24	-1.47/-0.09	0.74/1.1	0.99/0.46	0.53/-1.46	-1.94/-2.19	-2.48/-2.89	3.11/3.09				
θ(82.5°)	-3.09/-2.93	-3.37/-4.17	-5.41/6.38	-6.13/5.61	-4.68/-2.94	-1.42/-0.47	0.13/0.62	1.11/1.4	1.91/2.51	2.65/2	0.89/0.31	-1.12/-0.9	-0.97/-1.07	-1.67/-2.35	-2.85/-2.97	-3.45/-3.8	-3.86/-3.21	-2.11/-1.23	-0.5/0.1	0.41/0.45	0.19/0.11	1.05/0.07	-0.87/-2.13	-3.28/-3.48				
θ(90°)	-5.21/-4.52	-4.45/-5.1	-5.78/-5.4	-4.39/-3.64	-3.68/-3.17	-1.85/-0.77	-0.23/0.03	0.13/0.1	0.43/0.52	2.11/1.92	1.35/0.81	0.55/0.43	-0.46/-0.99	-1.29/-1.1	-1.27/-2.16	-3.85/-3.59	-6.3/-6.79	-7.11/-6.82	-6.46/-5.55	-5.2/5.04	-3.83/-2.31	-1.41/-1.38	-2.28/-2.46	6.99/-6.11				
θ(97.5°)	-4.95/-4.79	-5.08/-6.39	-7.25/3.35	-5.62/-4.1	-3.43/-2.71	-1.64/-0.48	0.35/0.82	0.82/0.5	0.37/0.94	1.34/1.23	1.13/1.02	0.89/0.61	-0.19/-1.17	-1.54/-2.03	-2.73/-3.98	-4.47/-3.56	-2.03/-0.98	-0.41/-0.22	-0.55/-1.14	-1.92/-3.08	-2.39/-1.04	-0.82/-1.7	-3.23/-4.86	-6.5/7.8				
θ(105°)	-5.44/-5.32	-6.48/-8.2	-8.34/7.03	-5.26/-4.94	-5.26/-5.39	-4.24/-2.53	-1.16/0.29	0.10/1.9	0.35/0.44	0.37/0.27	0.33/0.24	-0.87/-1.38	-1.66/-1.51	-1.89/-2.57	-3.32/-3.75	-3.92/-3.27	-2.17/-1.22	-0.36/-0.13	-0.42/-1.42	-2.94/-3.2	-1.76/0.98	-0.95/-2.27	-5.03/-7.26	-7.04/5.95				
θ(112.5°)	-3.88/-3.32	-4.5	-6.58/-5.19	-3.8/3.03	-2.96/-3.25	-3.22/-2.7	-1.92/-1.3	-0.77/-0.35	0.05/0.11	-0.30/0.13	-0.02/-0.68	-1.73/-2.48	-2.46/-2.18	-2.32/-3.01	-2.25/-2.45	-2.68/0.9	0.31/0.88	1.04/0.88	0.49/-0.18	-1.34/-2.1	-1.67/-1.1	-0.82/-2.22	-5.59/-8.49	-7.73/5.06				
θ(120°)	-4.45/-3.47	-3.43/-4.2	-5.51/5.68	-4.64/-3.58	-2.96/-2.34	-1.14/0.03	0.64/0.62	-0.12/-1.04	-1.44/-1.48	-1.22/-0.92	-0.58/-1.03	-2.02/-4.32	-3.42/-2.7	-2.54/-1.99	-1.53/-1.81	-2.82/-0.6	-0.04/0.64	0.93/1.15	1.23/0.71	-0.77/-1.8	-2.29/-2.19	-1.56/-4.29	-5.27/8.52	-8.33/-5.57				
θ(127.5°)	-9.03/-7.1	-6.47/-4.95	-4.39/-3.4	-2.54/-2.31	-2.46/-1.68	-0.52/0.39	0.88/0.54	-0.53/-1.81	-2.46/-2.02	0.0/0.31	-1.45/-3.21	-3.83/-3.28	-2.68/-2.13	-3.12/-2.68	-3.4/-2.26	-1.42/-0.99	-0.61/-0.63	-0.89/-1.71	-3.16/-4.27	-6.14/-4.5	-4.29/-2.23	-3.81/-6.4	9.28/9.88	-1.51/2.16				
θ(135°)	-7.32/-10.27	-11.43/9.86	-6.46/-3.76	-2.51/2.37	-2.75/2.52	-2.28/2.09	-2.31/3.16	-4.29/5.18	-5.75/5.35	-4.34/2.91	-1.97/-1.84	-2.45/-3.76	-5.19/-6.21	-5.91/5.04	-4.44/-3.56	-1.85/-1.02	-1.32/-1.86	-2.42/3	-3.55/-3.81	-3.63/-3.02	-2.18/0.94	0.03/0.29	-0.4/-1.79	-3.45/-5.57				
θ(142.5°)	-8.65/-9.48	-11.58/-8.57	-4.79/-2.23	-0.93/-0.65	-0.93/-1.7	-1.87/-2.05	-2.01/-2.07	-2.29/-2.82	-4.09/-6.53	-7.05/-5.44	-4.8/-5.5	-5.59/-5.62	-6.56/-6.49	-6.23/-5.74	-5.03/-5.44	-3.8/-3.52	-3.94/-4.55	-4.93/-4.84	-1.44/-3.19	-2.37/-1.77	-1.3/-0.67	0.06/0.13	-0.3/-1.6	-3.66/-5.86				
θ(150°)	-9.77/-9.96	-8.39/-5.68	-3.64/-1.56	-0.48/0.15	-0.44/-1.21	-1.97/-2.56	-3.13/-3.83	-3.86/-4.07	-4.83/-5.83	-6.86/-6.27	-5.92/-5.73	-5.69/-5.89	-6.22/-6.4	-5.82/-5.61	-5.36/-5.37	-4.72/-6.24	-5.53/-5.79	-5.75/-6.1	-5.63/-5.22	-4.82/-4.36	-3.91/-3.35	-2.99/-3.12	-3.62/-5.16	-7.66/-9.67				
θ(157.5°)	-10.93/-10.52	-9/6.86	-5.05/-3.79	-2.91/2.45	-2.55/-3.01	-3.68/4.55	-5.71/6.47	-6.75/7.61	-7.66/7.55	-7.33/6.86	-6.27/-6.71	-6.85/-7.48	-7.86/7.36	-6.73/6.79	-5.55/-5.11	-5.37/5.55	-5.53/-5.4	-5.57/-5.21	-5.15/-5.14	-5.12/5.27	-5.95/6.45	-7.04/7.85	-8.31/9.18	-10.47/10.53				
θ(165°)	-9.92/-10	-10.39/9.51	-8.59/-6.97	-7.27/7.07	-6.81/7.04	-7.29/7.26	-7.03/7	-7.19/-6.8	-6.71/6.72	-7.16/7.6	-7.16/7.6	-8.43/-8.87	-8.46/7.68	-7.11/-6.68	-5.88/-4.39	-3.86/-3.49	-3.34/-3.45	-3.76/-4.26	-4.91/5.74	-6.33/7.28	-8.03/-8.52	-9.6/9.8	-9.28/7.8	-8.57/8.46				
θ(172.5°)	-7.23/-8.2	-8.54/-9.62	-10.93/11.58	-10.57/10.28	-9.71/8.08	-7/6.04	-5.38/-5.05	-5.09/-5.17	-5.39/-5.71	-5.86/-5.51	-6.17/-7.6	-8.8/-9.2	-8.69/-8.07	-7.71/-7.05	-6.06/-5.21	-4.64/-3.3	-4.88/0.07	-4.14/-4.5	-5.03/5.74	-6.4/6.85	-6.99/7.16	-7.03/6.88	-6.37/6.09	-6.11/6.41				
θ(180°)	-7.16/-7.94	-8.69/9.12	-9.52/9.56	-9.35/8.24	-7.25/-6.16	-5.39/5.04	-4.54/4.54	-4.59/4.54	-4.74/5.11	-5.51/5.74	-5.89/6.29	-6.51/6.93	-7.57/7.97	-8.14/8.12	-7.61/6.56	-5.92/5.36	-5.28/4.94	-4.74/4.37	-4.24/4.46	-5/4.44	-5.64/5.36	-5.3/5.18	-5.17/5.34	-5.73/6.41				
Freq(Hz)	2.45GPol	ThetaL	+ <td colspan="13">- </td>													-												
DG(0dB)	Φ(0°)/Φ(7.5°)	Φ(15°)/Φ(22.5°)	Φ(30°)/Φ(37.5°)	Φ(45°)/Φ(52.5°)	Φ(60°)/Φ(67.5°)	Φ(75°)/Φ(82.5°)	Φ(90°)/Φ(97.5°)	Φ(105°)/Φ(112.5°)	Φ(120°)/Φ(127.5°)	Φ(135°)/Φ(142.5°)	Φ(150°)/Φ(157.5°)	Φ(165°)/Φ(172.5°)	Φ(180°)/Φ(187.5°)	Φ(195°)/Φ(202.5°)	Φ(210°)/Φ(217.5°)	Φ(225°)/Φ(232.5°)	Φ(240°)/Φ(247.5°)	Φ(255°)/Φ(262.5°)	Φ(270°)/Φ(277.5°)	Φ(285°)/Φ(292.5°)	Φ(300°)/Φ(307.5°)	Φ(315°)/Φ(322.5°)	Φ(330°)/Φ(337.5°)	Φ(345°)/Φ(352.5°)				
θ(0°)	-1.95/-1.6	-1.38/-1.22	-1.14/1.05	-1.09/1.23	-1.24/1.22	-1.34/1.53	-1.88/2.12	-2.43/2.86	-3.45/4.03	-4.51/4.75	-4.54/3.87	-3.13/2.72	-2.43/2.2	-2.02/1.81	-2.51/1.74	-2.44/1.99	-2.18/2.37	-2.91/2.97	-3.06/3.36	-3.71/4.18	-4.39/4.35	-4.2/4.02	-3.66/3.09	-2.45/1.95				
θ(7.5°)	-1.72/-1.49	-1.27/1.14	-1.14/1.07	-1.27/1.4	-1.48/-1.58	-1.56/-1.79	-2.06/-2.39	-2.71/3.15	-3.66/4.11	-4.5/4.71	-4.53/3.84	-3.35/-2.95	-2.71/2.38	-2.32/2.01	-2.97/1.92	-2.31/2.54	-2.75/2.67	-2.82/2.96	-3.05/-3.2	-3.53/3.91	-4.11/4.19	-4.12/3.93	-3.54/2.94	-2.32/-1.87				
θ(15°)	-1.61/-1.46	-1.29/-1.22	-1.32/1.45	-1.64/1.69	-1.82/-1.74	-1.47/1.41	-1.54/1.8	-2.05/2.33	-2.63/2.19	-3.24/3.48	-3.73/3.78	-3.15/-3.19	-2.63/2.48	-2.19/2.11	-2.67/2.91	-3.78/3.87	-3.41/3.1	-2.97/2.71	-2.69/2.78	-3.27/3.55	-3.83/3.93	-3.82/3.56	-3.14/-2.6	-2.05/-1.7				
θ(22.5°)	-1.61/-1.54	-1.53/-1.61	-1.94/-2.2	-2.07/1.73	-1.49/1.33	-0.93/0.75	-0.84/-1.1	-1.39/1.65	-1.89/2.12	-2.27/2.36	-2.47/2.43	-2.42/2.49	-2.72/2.92	-3.07/3.67	-3.5/3.8	-4.11/4.18	-3.92/3.67	-3.35/3.02	-2.87/3.01	-3.3/-3.6	-3.81/3.93	-3.73/3.29	-2.86/2.44	-2.03/-1.7				
θ(30°)	-1.63/-1.65	-1.84/-2.09	-2.29/2.27	-2.06/1.7	-1.37/-1.25	-0.9/0.66	-0.68/0.88	-1.18/-1.45	-1.56/-1.44	-1.16/0.85																		



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

Appendix A

$\Theta(22.5^\circ)$	-3.76/5.14	-7.45/8.68	-8.37/7.06	-5.99/5.3	-5.27/4.89	-3.91/3.86	-3.26/2.9	-2.15/1.52	-1.07/0.93	-0.91/1.31	-1.21/2.81	-3.72/3.71	-3.5/3.3	-3.37/4.06	-4.8/5.4	-5.41/5.15	-4.72/4.33	-3.22/2.11	-1.47/1.21	-1.19/1.22	-1.03/0.85	-0.8/0.7	-0.96/1.53	-2.23/2.77
$\Theta(30^\circ)$	-6.1/7.76	-9.13/9.21	-8.41/7.39	-7.19/6.56	-6.82/6.13	-4.83/3.82	-2.76/2.17	-1.82/1.72	-1.73/1.68	-1.55/1.67	-2.34/3.4	-4.4/5.16	-5.35/4.18	-3.65/4.07	-4.53/4.61	-4.17/3.75	-3.25/3.04	-2.53/2.14	-1.74/1.35	-0.93/0.76	-1.17/1.43	-1.8/1.43	-1.78/1.19	-2.85/4.45
$\Theta(37.5^\circ)$	-7.13/8.6	-10.27/10.7	-10.01/10.39	-10.26/8.18	-5.99/4.29	-2.99/2	-1.52/1.61	-1.83/1.61	-1.32/1.06	-0.66/0.65	-1.42/2.84	-3.97/5.65	-5.33/4.16	-3.73/3.7	-3.67/3.29	-2.84/2.54	-3.4/3.9	-3.15/2.44	-1.77/1.46	-1.78/1.84	-1.25/1.03	-1.39/1.63	-2.13/2.77	-3.81/5.41
$\Theta(45^\circ)$	-6.03/7.07	-8.65/9.83	-8.91/6.02	-3.63/2.88	-2.43/1.91	-1.65/2	-2.16/2.37	-2.39/2.13	-2.27/2.26	-1.94/1.49	-1.28/1.75	-2.49/4.05	-4.77/4.48	-4.3/4.5	-4/2.87	-2.59/2.84	-2.29/1.13	-0.81/1.16	-0.98/0.72	-0.64/0.44	-0.54/0.74	-1.41/1.94	-2.3/3.49	-4.52/5.69
$\Theta(52.5^\circ)$	-5.62/7.42	-8.52/8.13	-6.15/5.05	-4.67/3.83	-4.14/3.97	-3.15/1.73	-1.45/1.76	-2.32/2.37	-2.7/3.08	-3.3/2.8	-2.14/2.13	-2.62/3.77	-4.86/4.89	-3.62/2.58	-1.53/1.71	-2.69/2.33	-2.19/2	-1.3/0.46	-0.31/0.42	-1.58/1.89	-0.180/36	0.44/0.27	-1.56/3.74	-8.44/5.47
$\Theta(60^\circ)$	-6.43/7.23	-8.83/7.95	-6.11/5.16	-3.42/3.22	-3.37/2.92	-2.14/1.09	-0.58/0.57	-0.66/1.37	-2.11/2.43	-3.65/4.17	-1.81/2.25	-3.32/4.25	-4.35/2.63	-2.52/2.98	-2.59/3.42	-3.3/2.94	-2.29/1.6	-0.73/0.74	-1.15/0.74	-1.73/1.95	-0.88/0.6	-2.27/3.71	-8.87/5.33	-1.87/5.41
$\Theta(67.5^\circ)$	-5.77/6.93	-8.5/8.58	-5.9/4.49	-4.23/5.8	-5.05/4.17	-2.55/0.97	-0.37/0.45	-1.24/2.5	-3.05/2.91	-3.36/3.18	-3.61/2.41	-1.91/2.04	-2.28/2.72	-2.21/1.38	-1.19/0.84	-1.58/1.57	-2.14/2.76	-3.08/2.1	-1.82/1.45	-1.19/2.05	-2.43/1.74	-0.16/0.45	-1.59/2.87	-3.59/4.93
$\Theta(75^\circ)$	-5.83/7.74	-9.85/8.7	-4.7/3.61	-4.02/4.68	-5.39/4.42	-2.66/0.74	-0.07/0.59	-1.77/2.5	-3.02/3.14	-2.22/2.08	-2.15/2.27	-1.88/1.6	-2.35/2.54	-2.43/1.7	-1.59/1.05	-0.59/1.64	-3.2/2.77	-2.64/2.54	-1.9/1.68	-1.59/1.21	-1.91/3.69	-2.97/1.59	-1.89/3.86	-4.37/5.14
$\Theta(82.5^\circ)$	-6.58/9.57	-11.96/9.68	-6.57/5.36	-4.84/5.06	-4.53/3.44	-1.99/0.03	0.83/0.54	-0.66/2.67	-3.25/3.49	-2.56/1.4	-0.86/0.76	-0.93/1.9	-2.54/1.65	-0.55/1.47	-1.01/2.14	-1.27/3.98	-4.21/3.08	-2.32/2.48	-2.79/3.98	-3.27/2.37	-2.29/2.45	-2.3/2.45	-2.21/2.47	-3.8/5.85
$\Theta(90^\circ)$	-7.83/9.32	-10.31/7.89	-4.8/3.68	-4.82/4.48	-4.22/3.02	-1.5/0.59	0.39/0.95	0.19/1.31	-3.01/2.68	-1.7/1.47	-1.05/0.38	0.16/1.02	-2.04/2.45	-1.83/2.2	-3.37/3.75	-3.33/4.01	-4.58/4.11	-3.48/2.89	-3.12/1.66	-2.42/3.51	-3.05/1.63	-0.6/0.63	-1.68/3.4	-5.33/6.02
$\Theta(97.5^\circ)$	-5.71/6.29	-5.78/6.46	-6.76/7.19	-9.16/8.44	-8.2/3.49	-2.95/2.73	-0.45/0.94	-1.48/1.69	-2.53/2.54	-1.46/0.92	-1.26/1.27	-1.29/2.54	-2.76/2.49	-3.48/3.83	-5.31/6.18	-6.63/8.37	-8.11/5.54	-4.47/4.29	-1.61/1.48	-1.31/0.98	-1.35/1.17	-0.28/0.2	-1.06/2.21	-4.92/5.69
$\Theta(105^\circ)$	-3.39/4.39	-6.07/4.13	-2.92/3.07	-6.85/6.69	-5.14/3.26	-2.12/2.47	-3.03/3.38	-3.28/3.31	-2.99/2.58	-1.85/1.37	-1.9/2.4	-2.68/2.14	-2.97/4.03	-4.88/5.97	-6.52/7.66	-7.62/9.25	-6.23/5.12	-4.3/3.05	-3.25/2.46	-1.53/1.3	-2.12/1.52	-1.92/3.6	-4.91/4.86	
$\Theta(112.5^\circ)$	-6.18/6.75	-6.24/5.57	-4.74/4.26	-4.74/5.28	-4.42/4.25	-4.44/5.22	-5.08/4.57	-3.62/3.26	-3.41/3.1	-1.2/0.44	-1.05/2.94	-3.81/2.63	-1.95/2.36	-4.71/3.42	-3.34/5.81	-5.76/4.64	-6.51/6.2	-6.35/7.74	-4.57/5.23	-4.95/3.74	-1.99/2.88	-2.59/3.02	-4.24/5.76	-7.6/6.29
$\Theta(120^\circ)$	-6.06/6.95	-7.71/6.51	-5.25/6.79	-8.86/7.6	-5.2/3.77	-3.38/3	-3.87/4.8	-6.25/5.02	-2.48/1.72	-1.78/2.61	-1.86/1.8	-2.79/4.42	-3.3/2.02	-3.79/3.2	-5.16/7.6	-5.75/4.87	-5.39/5.3	-7.5/5.22	-5.35/5.36	-2.41/3.72	-2.77/3.34	-5.16/5.15	-4.81/6.44	-6.69/9.27
$\Theta(127.5^\circ)$	-8.12/6.94	-6.25/5.55	-6.38/4.47	-6.12/8.93	-11.08/8.52	-6.09/4.78	-4.7/4.65	-6.29/3.78	-2.52/2.13	-3.28/1.93	-0.77/0.74	-2.51/4.47	-3.83/2.67	-3.55/1.74	-4.23/5.12	-3.33/3.71	-5.11/5.36	-5.15/4.58	-6.01/5.05	-2.45/3.93	-3.67/2.91	-4.85/6.41	-9.66/3.22	-8.02/10.25
$\Theta(135^\circ)$	-10.02/9.97	-7.89/5.1	-5.63/5.75	-5.59/7.42	-10.47/10.38	-7.56/6.81	-5.86/4.93	-5.39/3.54	-1.61/1.81	-2.74/3.76	-3.38/2.2	-3.35/4.26	-6.01/5.39	-2.71/3.79	-4.08/5.5	-4.42/7.39	-5.53/5.13	-6.48/4.62	-5.4/5.61	-4.9/3.88	-4.95/2.43	-4.73/10.04	-10.53/9.78	-7.71/9.69
$\Theta(142.5^\circ)$	-7.2/7.15	-6.68/5.58	-5.39/6.26	-6.22/7.24	-8.01/8.07	-8.62/8.51	-7.92/6.15	-4.29/3.31	-2.8/2.77	-3.91/5.45	-5.06/5.73	-6.52/6.68	-7.63/7.14	-6.36/5.66	-4.67/6.41	-9.48/2.99	-6.73/9.93	-6.35/4.96	-4.35/3.33	-3.08/3.86	-8.26/6.83	-8.21/8.81	-5.73/9.31	-10.26/13.26
$\Theta(150^\circ)$	-4.82/6.04	-8.19/9.13	-9.31/9.07	-8.45/6.83	-6.32/5.65	-4.63/5.35	-6.42/7.65	-8.31/7.79	-7.59/7.35	-7.68/7.73	-6.42/6.94	-5.83/7	-9.77/10.14	-9.33/10.22	-6.55/7.7	-6.57/5.5	-6.96/9.07	-9.05/8.07	-6.14/5.58	-7.41/9.92	-6.61/6.48	-6.62/7.52	-7.38/5.31	
$\Theta(157.5^\circ)$	-7.11/7.06	-7.17/7.11	-7.15/7.47	-7.51/7.34	-6.6/5.29	-5.13/6.29	-7.6/8.54	-9.97/11.34	-10.76/9.87	-8.86/8.87	-7.65/6.96	-7.53/7.82	-7.75/6.68	-6.28/6.15	-6.14/6.6	-8.51/9.52	-6.09/4.84	-5.63/7.32	-7.67/5.92	-4.92/4.55	-4.48/4.48	-4.67/4.54	-4.72/5.81	-6.96/7
$\Theta(165^\circ)$	-7.05/6.75	-6.81/7.81	-9.51/10.92	-9.71/8.66	-8.11/7.46	-7.77/8.01	-8.54/8.53	-8.83/9.34	-9.48/7.77	-9.55/9.79	-9.37/8.74	-8.78/7.87	-6.8/5.61	-5.08/5.4	-5.81/6.29	-4.66/5.12	-3.71/3.32	-3.83/5.5	-6.52/6.94	-6.05/6.42	-3.49/3.24	-3.8/5.09	-6.64/8.12	-8.69/8.34
$\Theta(172.5^\circ)$	-11.59/11.65	-12.01/12.54	-12.31/12.45	-11.26/11.34	-10.86/10.44	-10.41/10.43	-11.03/11.6	-12.09/11.74	-10.49/9.93	-9.02/9.13	-9.19/9.18	-8.48/7.91	-7.99/8.07	-7.88/7.7	-7.67/7.51	-7.62/8.12	-9.9/9.94	-9.05/8.29	-7.68/7.22	-7.09/7.79	-8.82/10.45	-11.23/12.42	-12.29/12.07	
$\Theta(180^\circ)$	-11.17/11.53	-11.1/10.54	-10.47/9.91	-9.8/8.33	-7.99/7.33	-6.93/7.21	-6.43/6.63	-7.87/8.78	-9.2/10.05	-10.36/11.22	-11.55/11.8	-11.76/11.41	-11.53/11.57	-11.83/12.15	-11.8/11.38	-11.72/12.07	-11.84/12.34	-11.9/12.68	-12.02/12.75	-12.31/12.74	-11.76/11.16	-11.74/11.25	-11.59/11.96	-12.11/16.2
Freq(Hz)	5.62GHz	Thetas																						
DG(dB)	$\Phi(0^\circ)/\Phi(7.5^\circ)$	$\Phi(15^\circ)/\Phi(22.5^\circ)$	$\Phi(30^\circ)/\Phi(37.5^\circ)$	$\Phi(45^\circ)/\Phi(52.5^\circ)$	$\Phi(60^\circ)/\Phi(67.5^\circ)$	$\Phi(75^\circ)/\Phi(82.5^\circ)$	$\Phi(90^\circ)/\Phi(97.5^\circ)$	$\Phi(105^\circ)/\Phi(112.5^\circ)$	$\Phi(120^\circ)/\Phi(127.5^\circ)$	$\Phi(135^\circ)/\Phi(142.5^\circ)$	$\Phi(150^\circ)/\Phi(157.5^\circ)$	$\Phi(165^\circ)/\Phi(172.5^\circ)$	$\Phi(180^\circ)/\Phi(187.5^\circ)$	$\Phi(195^\circ)/\Phi(202.5^\circ)$	$\Phi(210^\circ)/\Phi(217.5^\circ)$	$\Phi(225^\circ)/\Phi(232.5^\circ)$	$\Phi(240^\circ)/\Phi(247.5^\circ)$	$\Phi(255^\circ)/\Phi(262.5^\circ)$	$\Phi(270^\circ)/\Phi(277.5^\circ)$	$\Phi(285^\circ)/\Phi(292.5^\circ)$	$\Phi(300^\circ)/\Phi(307.5^\circ)$	$\Phi(315^\circ)/\Phi(322.5^\circ)$	$\Phi(330^\circ)/\Phi(337.5^\circ)$	$\Phi(345^\circ)/\Phi(352.5^\circ)$
$\Theta(0^\circ)$	-2.51/1.98	-1.54/1.32	-1.15/1.09	-0.93/0.92	-1.19/1.37	-1.68/2.69	-3.45/3.43	-4.52/4.79	-4.54/4.12	-3.69/3.26	-2.99/3.1	-2.76/2.45	-2.03/1.59	-1.43/1.28	-1.37/1.45	-1.46/2.07	-2.69/3.26	-3.84/4.29	-4.57/5.01	-5.23/5.75	-5.3/5.2	-5.47/5.06	-4.57/4.01	-3.39/3.03
$\Theta(7.5^\circ)$	-2.42/2.05	-1.84/1.77	-1.63/1.8	-1.94/1.98	-2.25/2.8	-3.06/3.79	-4.64/5.53	-5.66/5.84	-6.72/6.35	-5.62/6.72	-4.49/4.28	-3.96/3.53	-2.87/2.1	-1.35/0.94	-0.35/0.1	0.26/0.09	0.46/1.29	-2.5/3.38	-3.52/3.48	-3.9/4.12	-3.82/3.69	-3.86/3.43	-2.97/2.77	-2.67/2.28
$\Theta(15^\circ)$	-2.36/2.5	-2.15/2.25	-2.35/2.42	-2.67/2.71	-2.78/3.23	-3.19/3.14	-3.67/4.15	-5.06/5.46	-6.08/6.1	-5.76/5.55	-5.66/5.63	-5.74/3.73	-3.29/2.29	-1.23/0.31	0.29/0.83	0.89/0.38	-0.49/1.4	-2.45/3.25	-3.57/3.91	-3.95/3.95	-3.28/2.46	-1.87/1.58	-1.98/2.21	
$\Theta(22.5^\circ)$	-2.73/3.09	-3.01/2.54	-2.34/2.8	-3.54/3.62	-3.16/3.24	-3.35/2.96	-2.93/2.88	-2.95/3.04	-3.37/3.89	-3.86/3.69	-3.69/4.14	-4.2/3.78	-3/2.26	-1.02/0.51	0.04/0.04	0.34/0.74	-1.12/1.61	-2.12/2.51	-2.51/2.2	-2/2.14	-2.76/3.58	-4.27/4.19	-3.15/2.25	-2.03/2.39
$\Theta(30^\circ)$	-2.82/3.93	-4.14/4.03	-4.14/3.6	-3.58/3.78	-4.14/4.95	-5.13/5.09	-4.65/3.89	-3.28/2.61	-2.34/2.29	-2.2/2.31	-2.57/3.15	-3.26/2.99	-2.74/2.18	-1.73/1.56	-1.38/1.28	-1.18/0.93	-0.72/0.35	-0.46/0.73	-1.21/1.45	-1/0.79	-1.37/1.21	-2.84/3.58	-4.26/3.65	-2.6/2.25
$\Theta(37.5^\circ)$	-4.12/4.94	-4.97/4.47	-3.9/3.1	-3.83/4.77	-5.08/5.11	-4.9/4.59	-4.39/3.67	-2.71/1.76	-1.49/1.95	-2.53/2.56	-2.64/3.05	-3.14/2.52	-2.62/2.17	-1.97/2.38	-2.5/2.01	-1.68/1.75	-1.72/1.31	-1.14/1.89	-2.49/3.05	-3.16/3.38	-3.34/3.4	-3.65/3.79	-3.44/3.23	
$\Theta(45^\circ)$	-2.92/4.94	-5.95/5.58	-3.63/3.2	-3.31/4.46	-4.93/4.99	-4.84/4.35	-4.03/3.68	-3.02/2.19	-1.55/1.57	-1.85/2.24	-1.99/2.04	-1.88/1.32	-1.95/2.16	-1.91/2.29	-2.76/3.32	-2.87/2.4	-2.55/2.33	-1.87/2.22	-2.59/2.67	-2.98/3.35	-3.89/4.64	-4.58/4.3	-3.57/3.9	-2.81/8.3
$\Theta(52.5^\circ)$	-1.12/4.65	-5.69/3.78	-2.89/3.41	-2.77/3.54	-3.87/4.26	-4.48/4.22	-4.59/4.33	-2.67/1.41	-0.52/0.49	-0.85/1.95	-2.18/1.77	-1.1/0.48	-0.46/0.5	-0.79/0.73	-1.48/1.73	-1.51/1.69	-2.55/2.51	-2.67/2.38	-1.9/1.48	-1.66/2.77	-3.64/4.86	-7.29/6.68	-6.44/2.98	-2.6/1.08
$\Theta(60^\circ)$	-0.9/5.41	-6.43/3.46	-4.01/4.2	-1.87/4.27	-2.9/3.12	-2.78/1.89	-1.97/1.92	-1.59/1.49	-1.64/1.57	0.72/0.94	-1.40/1.7	0.28/0.58	0.677/0.9	0.15/0.13	-0.40/0.42	1.26/0.33	-1.68/2.22	-4.54/5.32	-4.02/3.37	-3.18/3.48	-3.25/4.84	-7.16/5.69	-3.11/2.88	-3.77/1.77
$\Theta(67.5^\circ)$	-1.13/4.53	-5.55/2.86	-4.26/2.72	-2.21/3.51	-2.29/2.25	-1.56/1.6	-1.97/2.67	-3.13/2.57	-1.91/2.35	-1/0.45	-0.19/0.85	1.11/0	0.41/1.33	0.06/0.66	1.24/2.04	0.83/2	-2.1/2.93	-5.3/6.73	-8.46/7.35	-4.15/2.47	-1.58/1.03	-1.51/3.04	-2.84/2.83	-2.99/2.03
$\Theta(75^\circ)$	0.02/1.04	-2.41/2.73	-2.98/2.35	-2.83/3.55	-3.31/3.04	-1.83/1.66	-0.66/0.93	-2.25/2.53	-0.85/0.84	-0.47/0.88	1.387/1.6	1.93/1.2	1.189/1.91	0.3										



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

Appendix A

θ(60°)	-3.82/4.8	-6.16/6.68	-5.28/5.34	-5.62/5.38	-4.38/2.81	-1.17/0.08	-0.16/-1	-1.67/1.36	-1.17/-1.53	-1.66/1.87	-3.37/3.57	-3.23/2.97	-3.05/2.89	-2.57/2.82	-3.34/3.7	-4.41/4.46	-5.09/5.88	-4.95/2.98	-1.66/0.79	-1.05/2.96	-1.19/0.78	1.47/0.34	-3.4/4.15	-4.45/5.29	
θ(67.5°)	-3.12/4.16	-5.46/5.87	-3.83/3.28	-4.35/4.66	-3.16/2.1	-1.04/0.6	1.19/0.71	-0.18/-1.1	-1.01/-1.93	-1.92/2.78	-4.57/4.09	-2.91/3.78	-3.73/2.42	-1.62/-2.23	-2.84/3.2	-3.69/3.91	-5.28/3.97	-2.39/1.71	-2.02/2.49	-2.74/3.27	-3.64/1.04	-0.61/1.52	-3.05/4.58	-3.16/4.52	
θ(75°)	-3.49/5.92	-7.94/9.02	-8.06/6.88	-7.47/6.1	-4.46/-1.95	-0.31/0.94	1.47/1.13	-0.53/1.84	-2.13/2.77	-2.87/1.68	-3.03/4.43	-3.91/4.31	-4.59/3.1	-2.8/3.96	-3.83/3.8	-3.18/2.49	-3.2/3.12	-2.96/2.39	-1.62/1.73	-3.37/3.13	-2.47/1.89	-0.79/2.23	-4.11/3.11	-2.65/3.01	
θ(82.5°)	-4.85/7.63	-10.1/8.65	-7.27/6.76	-5.44/3.61	-2.47/1.13	0.08/1.66	2.24/1.45	-0.38/2.83	-4.12/3.66	-3.43/1.44	-2.22/2.34	-2.19/3.79	-4.15/3.83	-3.4/3.45	-2.68/2.61	-2.16/2.52	-3.5/2.5	-2.13/2.96	-2.58/1.73	-1.53/1.23	-1.65/1.6	-2.49/3.53	-2.12/1.67	-3.74/4.74	
θ(90°)	-4.56/6.23	-9.25/8.32	-8.61/6.62	-6.09/5.57	-4.4/1.54	1.05/2.25	2.67/1.88	-0.39/1.78	-2.92/2.9	-2.65/2.76	-1.6/0.59	-2.24/2.99	-3.28/3.62	-2.14/-1.86	-3.72/3.37	-2.71/3.4	-4.74/3.66	-4.35/2.24	-1.57/1.6	-1.96/1.11	-0.38/1.15	-0.87/1.36	-1.29/2.01	-4.4/6.37	
θ(97.5°)	-4.02/4.62	-5.6/5.16	-6.53/6.8	-6.68/5.38	-3.64/2.43	0.19/1.6	2.14/0.73	-0.64/1.54	-2.43/2.04	-2.1/2.55	-2.78/1.87	-2.11/2.07	-0.81/1.61	-0.56/1.55	-2.77/5.4	-5.65/3.64	-7.19/6.36	-4.11/2.19	-1.71/1.21	-1.83/0.24	0.50/5.7	-0.46/1.4	-1.77/2.18	-4.82/4.45	
θ(105°)	-4.23/3.46	-3.18/4.47	-4.73/4.1	-6.27/6.76	-3.64/1.41	-1.19/0.28	-0.15/1.48	-2.84/3.68	-2.8/1.82	-1.98/2.07	-2.91/3.41	-2.74/1.82	-1.5/1.59	-2.27/2.49	-3.16/3.93	-4.22/4.67	-5.97/6.01	-1.99/0.81	-1.34/0.49	-2.19/2.26	-0.85/1.41	-2.81/2.07	-2.29/3.69	-4.88/5.81	
θ(112.5°)	-5.26/4.18	-4.83/5.75	-5.05/4.12	-4.75/5.76	-5.41/4.45	-3.74/3.95	-3.97/2.98	-3.4/4.18	-2.8/0.91	-0.35/0.92	-2.6/3.35	-4.43/4.1	-2.62/2.24	-3.69/3.79	-4.87/3.42	-4.3/1.58	-3.11/4.17	-3.12/4.15	-2.5/1.74	-6.06/5.37	-2.87/2.23	-1.64/0.62	-2.23/5.21	-5.01/7.89	
θ(120°)	-3.76/4.61	-4.87/6.3	-5.14/3.9	-3.15/4.12	-6.66/5.27	-3.97/2.83	-2.8/3.4	-4.42/3.7	-3.12/1.5	-1.31/1.81	-1.95/0.34	-1/3.51	-3.85/2.51	-4.08/3.02	-3.28/6.44	-5.01/3.67	-3.4/2.74	-4.5/8.46	-4.8/4.47	-5.69/5.37	-3.29/2.8	-3.4/3.4	-5.46/5.37	-7.37/6.1	
θ(127.5°)	-5.52/6.12	-5.2/5.48	-6.49/8.1	-8.2/6.09	-4.35/4.28	-3.1/2.27	-2.54/4.29	-4.93/4.34	-4.59/4.24	-3.96/3.02	-1.63/2.08	-3.26/5.37	-4.27/5.61	-6.77/5.02	-4.96/6.64	-5.85/6.13	-5.97/3.45	-4.92/4.74	-5.48/5.23	-4.85/5.34	-4.2/3.03	-4.8/6.84	-9.62/8.95	-8.36/7.9	
θ(135°)	-6.01/5.92	-5/4.79	-5.42/7.63	-8.61/8.55	-8.21/5.27	-3.36/2.97	-2.9/3.45	-3.89/4.27	-5.47/5.34	-5.62/5.06	-4.06/2.19	-2.23/4.87	-6.25/4.87	-3.48/3.16	-5.6/7.11	-7.8/8.58	-5.76/6.17	-4.03/4.77	-6.27/5.48	-4.89/7.66	-9.43/4.28	-5.22/6.92	-7.13/9.21	-11.78/7.9	
θ(142.5°)	-6.78/6.03	-5.66/7.56	-9.55/9.77	-8.7/6.12	-4.64/4.32	-4.27/3.7	-4.28/4.05	-4/4.29	-5.13/5.92	-6.2/5.61	-4.93/3.94	-4.12/5.33	-7.56/8.46	-7.19/7.04	-5.75/5.58	-9.09/11.53	-10.61/8.27	-6.81/7.76	-8.35/7.54	-5.63/5.73	-6.94/7.74	-7.58/8.27	-8.34/9.23	-9.34/7.77	
θ(150°)	-5.62/7.23	-9.8/11.94	-8.91/9.42	-10.55/8.59	-5.23/3.54	-3.36/3.92	-5.19/6.94	-8.3/9.27	-9.02/6.68	-4.79/3.94	-4/5.07	-5.93/5.53	-6.23/7.07	-6.15/6.86	-7.61/8.21	-8.67/7.87	-7.82/5.15	-4.73/5.9	-7.35/5.92	-5.22/5.17	-7.06/7.52	-6.43/5.91	-5.78/6.05	-6.3/4.83	
θ(157.5°)	-5.99/7.22	-8.26/6.65	-5.56/6.24	-8.06/8.02	-6.77/5.73	-6.43/8.37	-10.73/11.74	-10.54/8.39	-5.62/4.31	-3.38/2.83	-2.63/3.6	-4.83/6.68	-8.85/8.23	-8.27/10.71	-12.52/12.11	-11.25/10.94	-9.04/6.15	-5.22/5.99	-8.38/8.59	-7.03/6.16	-7.16/7.64	-7.4/6.25	-4.92/4.87	-5.72/5.56	
θ(165°)	-8.42/8.47	-7.03/5.28	-4.56/4.52	-4.95/6.01	-7.02/8.16	-8.55/9.09	-8.38/8.02	-8.03/7.66	-6.8/7.39	-7.26/4.52	-5.64/5.67	-6.34/7.59	-8.67/8.78	-7.94/7.14	-7.25/8.23	-8.83/8.21	-6.79/5.54	-5.79/7.6	-8.75/10.14	-9.74/7.79	-7.54/6.89	-6.8/7.49	-8.5/8.78	-8.92/8.72	
θ(172.5°)	-12.59/11.16	-9.54/8.36	-8.05/7.44	-7.54/7.71	-8.56/9.06	-9.65/10.31	-11.24/11.94	-11.62/10.6	-10.16/8.6	-7.5/7.32	-6.8/6.17	-6.27/6.32	-6.24/6.21	-6.42/7.04	-8.01/7.45	-6.34/5.83	-5.41/5.81	-6.91/8.35	-9.43/8.98	-8.82/8.68	-8.66/9.31	-10.33/10.8	-11.7/12.27	-12.36/12.59	
θ(180°)	-11.53/11.06	-11.42/11.27	-12.19/11.84	-11.39/11.28	-10.13/9.67	-9.58/9.57	-10.09/10.96	-10.55/10.24	-9.95/9.7	-9.4/9.63	-9.91/10.66	-11.47/11.88	-10.93/11.34	-11.14/11.34	-11.29/10.55	-9.93/9.55	-9.1/9.17	-9.64/10.1	-10.37/10.52	-10.73/11.05	-10.86/11.53	-11.99/12.65	-12.87/12.04	-11/11.58	
Freq(Hz)	5.785GHz																								
DC(dBm)	Φ(0°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)	
θ(0°)	-0.67/0.61	-0.58/0.36	0.34/0.44	-0.65/1	-1.68/2.23	-3.24/4.51	-5.42/5.85	-5.89/5.52	-5.26/4.51	-3.83/3.16	-2.47/1.66	-1/0.66	-0.37/0.11	0.04/0.13	-0.32/0.7	-1.1/1.57	-2.14/3.15	-4.14/4.85	-5.33/5.35	-5.43/5.49	-5.26/5.24	-4.59/3.58	-2.48/1.64	-1.32/0.99	
θ(7.5°)	-0.05/0.02	0.08/0.26	-0.53/0.89	-1.39/1.67	-2.24/2.63	-3.19/3.95	-4.41/4.86	-5.12/5	-4.99/5.15	-4.83/4.22	-3.53/2.56	-1.88/1.29	-0.8/0.36	-0.36/0.19	-0.63/1.1	-1.74/2.25	-2.71/3	-3.56/4.78	-5.26/5.78	-6.04/5.62	-4.73/3.88	-2.97/2.07	-1.22/0.7	-0.78/0.32	
θ(15°)	0.63048	0.15/0.31	-1.09/1.61	-1.93/1.71	-2.03/2.24	-2.5/2.72	-3.14/3.39	-3.57/3.54	-3.87/4.58	-5.36/5.47	-4.85/4.1	-3.54/3.15	-2.67/2.29	-2.38/2.42	-2.41/2.02	-1.59/1.15	-1.05/1.2	-1.37/1.78	-2.41/2.83	-3.08/3.4	-3.45/3.64	-3.19/2.62	-1.57/0.9	-0.11/0.36	
θ(22.5°)	0.45/0.06	-0.48/0.92	-1.22/0.91	-1.07/1.61	-2.04/1.79	-1.61/1.49	-1.21/1.16	-0.91/0.72	-0.67/1.21	-2.1/2.9	-2.86/2.47	-2.34/2.6	-2.8/2.52	-2.25/1.66	-1.19/0.7	-0.29/0.04	0.01/0.07	0.02/0.07	-0.32/0.22	-0.14/0.17	-0.42/0.88	-1.69/2.2	-1.91/0.99	-0.80/0.36	
θ(30°)	0.8771/01	0.28/-0.55	-0.72/0.93	-1.62/2.16	-1.96/1.73	-1.33/0.88	-0.84/0.57	-0.22/0.1	-0.48/1.17	-1.51/1.89	-1.89/1.46	-1.22/1.28	-1/0.36	0.22/0.29	-0.05/0.32	-0.44/0.66	-1.2/0.98	-0.49/0.29	-0.17/0.19	0.1/0.03	0.35/0.82	0.64/0.28	-0.15/0.15	0.53/0.67	
θ(37.5°)	0.79/0.16	-0.6/1.4	-1.35/1.45	-1.55/1.1	-0.79/0.38	0.27/0.83	0.92/0.23	-0.65/1.46	-2.16/2.77	-3.1/3.07	-2.41/1.59	-1.57/1.61	-0.97/0.51	-0.09/0.48	0.31/0.65	-0.92/1.54	-2.33/1.78	-0.6/0.26	-0.05/0.86	1.09/0.84	0.31/0.07	0.52/0.46	0.46/0.8	1.03/1.26	
θ(45°)	0.17/1.14	-2.71/3.08	-2.81/2.61	-2.77/1.58	-0.77/0.03	0.48/0.31	0.11/0.16	-0.41/1.03	-1.49/1.77	-1.97/2.18	-1.25/0.22	-0.43/1.52	-1.41/0.18	0.31/1.11	1.65/0.68	0.04/0.8	-1.68/1.71	-1.82/1.72	-0.37/0.21	0.09/0.3	0.1/0.53	-2.12/2.39	-1.64/0.67	-0.25/0.38	
θ(52.5°)	-0.59/-1.49	-2.38/-5.01	-6.22/5	-5.16/4.26	-3.57/2.55	-1.89/1.56	-1.73/2.62	-2.73/2.34	-2.13/2.12	-2.26/1.74	-0.63/0.5	0.5/0.75	-1.45/0.44	0.40/32	0.49/0.79	-0.99/1.19	-3.09/4.38	-2.68/1.82	-1.99/1.67	-1.54/1.57	-2.09/2.89	-3.54/3.94	-4.2/2.04	0.25/0.51	
θ(60°)	0.81/0.36	-0.32/2.54	-2.23/1.22	-3.01/4.36	-3.82/2.56	-2.55/2.88	-1.3/0.69	-0.66/0.21	0.74/0.14	-1.03/1.1	-0.39/0.78	1.38/0.1	-2.3/1.07	0.35/0.56	0.99/0.65	-0.71/2.78	-2.82/2.92	-1.79/1.84	-1.58/1.12	-2.49/3.63	-4.22/4.07	-3.42/3.45	-5.82/4.63	0.35/2.06	
θ(67.5°)	2.05/0	-0.27/1.6	-1.14/0.01	-1.27/1.33	-0.68/0.38	-1.13/2.31	-2.63/2.33	-1.38/0.18	0.88/0.72	0.02/0.32	0.62/1.08	1.6/0.23	-0.89/0.18	0.86/0.83	1.31/0.42	-0.74/1.88	-3.13/2.69	-2.53/1.79	-1.73/2.11	-2.84/2.79	-2.61/3.96	-4.02/2.46	-3.72/4.77	-0.44/2.81	
θ(75°)	2.58/0.17	-0.64/0.82	-1.62/1.1	-1.64/1.67	-1.38/0.51	-1.23/2.58	-3.6/3.37	-2.79/1.61	-1.12/1.1	-0.97/0.48	0.71/2.7	1.88/2.6	1.21/0.64	1.61/1.19	0.68/0.54	-0.02/1.87	-3.88/3.95	-6.11/4.29	-5.28/4.6	-4.07/3.03	-2.93/2.88	-2.69/3.74	-2.11/0.59	-0.16/2.38	
θ(82.5°)	1.08/0.58	-0.36/1.47	-1.99/0.37	-1.34/0.51	-0.9/0.99	-1.19/2.02	-3.27/4.18	-4.02/3.2	-2.29/1.6	-2.02/0.33	1.36/1.55	1.76/1.77	1.43/1.94	1.19/0.02	-0.91/0.29	-0.34/1.5	-2.59/2.07	-2.54/2.85	-2.64/1.13	-2.26/2.6	-0.92/0.28	-1.55/2.69	-2.85/0.16	2.47/2.31	
θ(90°)	-2.04/-1.31	0.03/2.16	-1.72/1.98	-1.56/0.75	-1.55/1.87	-2.34/2.52	-4.46/4.23	-4.06/2.49	-2.49/1.41	-0.05/0.4	1.03/0.95	2.16/2.08	1.85/3.9	2.591/89	-0.72/0.44	-1.42/0.3	-1.24/2.05	-2.63/2.85	-4.99/1.79	-1.45/3.07	0.65/1.6	0.79/0.25	-0.73/1.32	0.84/0.61	
θ(97.5°)	-3.54/1.93	-0.89/2.93	-2.13/0.34	-0.19/0.72	-1.67/1.97	-3.51/3.87	-3.66/2.77	-2.9/2.11	-2.33/1.49	0.68/1.2	1.31/1.27	1.68/2.46	3.05/3.7	2.82/2.94	0.39/0.33	-0.56/0.96	0.19/4.18	-5.45/2.96	-4.06/0.85	-2.99/2.99	-0.59/0.19	1.11/0.09	-1.06/3.57	-1.15/0.54	
θ(105°)	-5.15/4.54	-3.7/2.87	-1.04/0.15	-0.55/0.43	-1.07/2.3	-2.07/1.71	-2.19/2.8	-3/2.55	-1.93/0.78	2.16/2.06	1.73/2.75	3.65/3.05	3.62/4.3	4.74/5.9	2.1/1.03	0.76/1.25	-0.69/3.71	-3.62/3.07	-4.06/0.19	-2.77/2.17	0.84/1.27	-1.17/1.67	-5.04/4.83	-1.13/0.02	
θ(112.5°)	-5.21/3.6	-5.42/1.89	-0.71/1.06	-0.82/2.08	-1.37/0.72	-0.34/0.85	-1.23/2.49	-2.76/1.71	-0.60/2.4	1.5/3	3.49/3.71	4.32/4.21	4.53/4.4	3.78/2.9	2.04/0.56	0.55/2.73	-1.73/4	-2.15/7.06	-2.66/0.7	-4.22/2.57	-0.51/0.24	0.37/2.39	-6.07/6.21	-2.68/1.87	
θ(120°)	-1.41/2.43	-2.46/1.49	-1.24/1.74	-1.91/2.27	-2.88/1.27	-0.49/0.06	-1.26/2.07	-2.1																	



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

Appendix A

Gain Result

Freq(Hz)	2.45GPol	PhiAnt.1	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°)
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(°)	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(5°)	-17.74-18.26	-16.41-14.46	-13.17-12.13	-11.59-11.56	-12.18-13.5	-15.49-17.91	-18.44-17.84	-19.25-19.18	-17.91-19.14	-18.93-18.76	-18.15-18.31	-17.51-15.55	-14.19-13.04	-12.25-11.83	-11.63-11.9	-12.39-13.03	-14.05-15.59	-18.09-18.26	-18.46-18.18	-17.87-17.53	-18.75-18.57	-17.77-18.51	-18.62-17.91	-18.98-18.31
Theta(15°)	-18.11-18.82	-18.11-15.18	-13.28-12.48	-12.32-12.87	-14.16-16.68	-18.73-18.24	-17.41-18.69	-17.99-18.54	-18.48-18.75	-18.61-18.8	-19.59-16.72	-14.67-13.26	-12.25-11.45	-10.91-10.46	-10.13-10.1	-10.13-10.3	-10.65-11.34	-12.63-14.25	-15.84-16.53	-16.61-16.53	-16.59-16.77	-16.96-17.26	-17.69-18.46	-18.62-17.4
Theta(30°)	-19.17-18.87	-19.37-15.82	-13.97-13.29	-13.71-14.73	-16.56-18.19	-18.97-18.64	-19.23-19.55	-18.35-19.12	-18.29-17.77	-18.45-18.41	-18.45-16.28	-14.69-13.34	-12.29-11.39	-10.59-9.8	-9.22-8.81	-8.44-8.11	-9.98-11.77	-10.98-11.17	-12.33-12.69	-13.14-13.8	-14.63-15.56	-16.46-17.54	-19.31-18.54	
Theta(45°)	-18.45-18.87	-19.41-15.9	-14.21-13.85	-14.56-15.91	-17.46-17.56	-18.56-18.57	-18.09-17.74	-18.43-18.45	-18.55-18.94	-18.71-19.28	-18.22-17.29	-15.31-13.52	-12.04-11.23	-10.32-9.87	-9.61-9.51	-9.31-8.8	-8.39-8.23	-8.37-8.74	-9.32-9.72	-10.24-10.94	-12.03-13.51	-15.19-17.53	-17.98-17.13	-18.99-18.15
Theta(60°)	-18.41-19.2	-17.51-15.59	-14.57-14.62	-15.72-17.33	-18.51-18.21	-19.18-19.08	-17.76-18.41	-18.17-18.77	-16.35-16.06	-16.92-18.17	-18.55-17.4	-15.39-12.98	-11.52-10.52	-10.09-10.2	-10.78-11.42	-11.85-11.63	-12.10-10.72	-10.08-9.56	-9.12-9	-9.41-10.57	-12.54-15.32	-19.41-18.25	-17.86-19.22	-18.15-17.99
Theta(75°)	-15.91-16.18	-15.83-15.33	-15.21-16.92	-15.79-18.49	-19.16-18.78	-18.33-17.82	-17.69-16.98	-14.71-13.12	-12.16-11.91	-12.34-13.1	-13.88-14	-12.89-11.7	-9.73-8.87	-8.99-8.83	-9.14-9.26	-9.54-10.22	-11.21-12	-11.94-10.87	-9.62-8.93	-9.19-10.6	-13.17-16.95	-18.38-18.87	-18.99-16.63	-15.56-15.58
Theta(90°)	-13.81-14.1	-14.94-16.33	-16.53-16.01	-15.42-14.89	-13.92-13.33	-13.12-12.61	-12.04-11.22	-10.49-9.88	-9.51-9.54	-10.03-10.88	-12.05-12.91	-12.53-11.95	-10.14-9.51	-9.41-9.63	-9.35-8.96	-9.17-10.28	-12.39-15.48	-18.67-16.32	-12.92-11.25	-11.46-13.13	-16.14-18.22	-18.49-18.38	-19.28-16.46	-14.67-13.85
Theta(105°)	-11.51-12.03	-14.11-18.96	-18.44-17.11	-13.97-11.51	-9.96-9.66	-10.10-10.65	-10.55-9.86	-8.93-8.43	-8.54-9.14	-10.03-8.31	-10.69-12.49	-14.42-14.18	-15.31-12.72	-11.51-10.54	-9.29-8.64	-8.71-9.78	-11.21-13.5	-15.15-14.67	-12.96-12.7	-14.27-17.29	-19.26-18.12	-18.61-19.03	-18.35-15.51	-13.34-11.99
Theta(120°)	-12.61-12.24	-13.47-17.6	-17.83-17.3	-15.86-11.89	-9.91-9.92	-11.12-11	-12.05-10.82	-9.45-8.67	-8.95-10.31	-12.42-15.42	-17.88-18.69	-18.09-14.38	-11.02-9.71	-9.19-8.77	-8.09-7.84	-8.45-9.28	-9.79-10.47	-10.73-10.21	-10.81-10.65	-12.42-14.93	-17.86-18.48	-18.91-17.44	-17.32-18.39	-15.52-13.38
Theta(135°)	-12.83-13.69	-14.09-15.93	-17.79-16.3	-13.63-10.66	-9.06-9.01	-9.61-9.66	-9.13-8.6	-8.25-7.97	-8.21-9.15	-10.38-11.23	-12.14-12.98	-13.64-14.22	-14.51-14.83	-15.68-15.87	-14.81-14.6	-16.17-16.5	-15.82-12.93	-10.53-8.87	-8.33-8.85	-10.44-13.07	-17.69-18.99	-19.19-18.97	-17.84-16.06	-14.19-12.65
Theta(150°)	-7.56-8.24	-9.61-12.04	-16.13-16.99	-13.33-10.48	-9.17-8.66	-7.76-6.59	-5.94-6	-6.51-6.92	-7.01-7.14	-7.64-8.5	-9.98-12.57	-17.33-18.29	-19.02-18.55	-16.51-14.87	-14.04-14.02	-14.91-15.48	-13.09-10.67	-8.82-7.5	-8.61-6.94	-7.84-9.62	-12.76-16.71	-17.66-18.04	-18.51-15.74	-11.74-8.66
Theta(165°)	-7.16-7.03	-8.35-10.64	-14.38-16.66	-13.23-10.84	-10.27-9.88	-8.53-7	-6.29-6.45	-7.37-8.25	-8.09-7.24	-7.29-8.3	-10.02-13.19	-17.58-17.35	-15.95-14.61	-12.41-10.8	-10.31-10.71	-12.81-18.58	-17.39-13.78	-10.81	-9.94-9.17	-11.52-14.73	-14.34-10.22	-17.96-9.76	-12.62-16.24	-16.32-10.08
Theta(180°)	-4.71-5.85	-7.71-9.92	-14.46-18.57	-17.28-12.35	-10.92-10.18	-8.91-7.3	-6.32-6.25	-7.12-7.97	-6.91-5.34	-4.99-5.57	-6.48-8.34	-11.01-13.35	-16.27-18.4	-17.67-16.71	-17.09-18.26	-18.89-13.03	-7.53-4.83	-3.13-2.58	-3.39-5.83	-10.23-17.53	-11.87-6.93	-5.53-6.59	-9.48-12.2	-12.48-9.34
Theta(195°)	-7.33-6.44	-7.53-10.27	-13.96-19.73	-19.15-16.17	-13.31-12.37	-11.42-9.83	-8.55-8.32	-9.74-11.8	-10.08-7.39	-6.63-6.62	-7.11-6.23	-10.34-12.74	-15.62-17.96	-14.52-15.67	-18.29-12.83	-6.83-14.2	-2.41-8.2	-2.91-6.4	-13.28-12.62	-6.94-3.37	-2.61-3.84	-7.28-11.23	-9.48-11.52	-11.38-9.43
Theta(210°)	-6.72-6.58	-8.00-11.99	-18.97-17.77	-17.94-16.15	-14.06-14.07	-14.74-14.59	-14.04-15.12	-18.58-18.34	-11.76-8.28	-7.21-6.85	-6.87-7.86	-9.78-12.72	-15.66-16.16	-16.26-14.94	-15.18-10.4	-4.41-2.26	-2.25-5.77	-13.75-18.4	-7.51-4.1	-3.571-3.22	-9.29-12.09	-9.34-17.53		
Theta(225°)	-9.15-8.49	-9.28-12.17	-17.05-18.89	-18.81-18.68	-17.51-19.07	-19.03-18.3	-17.16-15.27	-15.45-16.04	-14.49-12.57	-11.89-11.07	-10.42-11.22	-12.49-13.03	-13.41-12.77	-11.11-9.67	-9.81-13.59	-17.38-8.89	-4.99-2.99	-1.92-2.03	-3.81-8.1	-17.99-15.61	-7.82-5.08	-4.87-6.93	-12.43-18.23	-14.49-10.53
Theta(240°)	-14.67-13.82	-13.56-13.84	-14.25-15	-15.85-17.08	-18.99-18.53	-19.12-17.73	-18.93-13.23	-12.63-14.54	-17.38-13.13	-15.54-12.2	-10.27-9.88	-9.93-9.92	-10.43-11.11	-10.78-10.05	-11.26-17.19	-19.21-10.38	-6.67-4.72	-5.19-7.86	-10.32-9.51	-7.33-6.2	-6.62-8.4	-13.61-16.84	-19.11-15.9	
Theta(255°)	-16.03-17.65	-18.66-17.31	-15.51-15.41	-16.89-19.19	-18.75-18.38	-18.71-16.32	-13.28-12.3	-16.65-17.56	-19.16-18.46	-15.61-14.2	-15.83-18.78	-18.69-18.59	-16.43-14.13	-15.13-15.99	-11.53-8.1	-6.19-5.2	-4.68-4.66	-5.31-6.37	-7.48-8.54	-9.66-11.5	-14.82-18.09	-19.08-17.49	-14.59-14.54	
Theta(270°)	-14.12-16.95	-18.51-16.11	-13.35-12.45	-13.32-16.03	-17.11-17.19	-18.41-16.3	-14.11-12.89	-12.21-11.88	-12.16-13.63	-16.86-18.87	-17.18-15.32	-14.26-12.86	-11.05-9.31	-8.11-7.73	-8.26-9.36	-10.19-10.25	-10.18-10.25	-10.02-9.73	-9.75-10.21	-10.83-12.16	-14.68-18.76	-18.68-18.17	-13.07-11.11	-10.91-11.97
Theta(285°)	-12.66-13.38	-12.61-10.81	-9.21-8.54	-9.04-10.86	-13.79-18.1	-18.74-17.99	-18.62-18.42	-15.59-14.34	-14.11-14.72	-15.62-15.73	-14.88-13.98	-12.74-11.46	-10.41-9.68	-9.35-9.76	-10.27-11.94	-14.36-17.72	-18.33-19.35	-15.76-13.29	-12.13-11.78	-12.13-13.43	-15.92-18.35	-18.97-18.47	-13.49-11.56	-11.12-16.14
Theta(300°)	-13.68-15.38	-15.94-14.23	-12.38-11.45	-11.71-11.31	-15.18-16.76	-16.07-14.76	-13.59-12.64	-12.11-11.87	-11.86-12.04	-11.43-13.17	-14.21-15.11	-15.84-16.19	-16.34-16.66	-17.72-18.23	-18.52-18.72	-18.91-18.95	-17.19-14.59	-13.49-12.65	-12.39-14.24	-16.27-17.83	-18.85-18.65	-15.91-13.36	-12.36-12.51	
Theta(315°)	-13.12-15.24	-19.09-17.81	-17.71-18.08	-19.17-18.37	-17.84-16.52	-14.07-12.26	-10.98-10.17	-9.79-9.7	-10.10-7.1	-11.93-13.84	-16.51-17.89	-18.45-19.05	-18.51-18.05	-19.81-18.86	-16.43-14.23	-12.95-11.39	-10.74-10.66	-11.18-12.15	-13.43-14.8	-16.05-17.43	-17.62-17.74	-19.11-18.83	-15.93-13.47	-12.35-12.52
Theta(330°)	-11.31-12.21	-13.34-14.35	-15.27-16.52	-17.87-18.65	-18.57-16.47	-14.11-12.16	-10.89-10.11	-9.87-10.09	-10.88-12.43	-14.94-18.76	-17.48-18.36	-18.43-17.18	-15.59-14.62	-13.64-12.65	-11.59-10.56	-9.74-9.21	-9.04-9.45	-10.48-12.18	-14.45-17.25	-18.26-18.11	-17.71-18.41	-17.65-17.04	-14.28-12.52	-11.39-11.1
Theta(345°)	-10.49-10.68	-10.91-11.1	-11.28-11.77	-12.53-13.16	-13.56-13.34	-12.67-11.77	-11.05-10.78	-10.89-11.58	-13.15-5.52	-18.36-19.46	-19.03-18.6	-15.31-13.47	-12.65-12.11	-11.78-11.44	-11.06-10.75	-10.54-10.29	-10.32-10.7	-11.49-12.5	-13.51-14.57	-16.06-17.64	-19.16-18.02	-17.15-15.16	-13.46-12.17	-11.22-10.72
Freq(Hz)	2.45GPol	PhiAnt.1	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°)
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°						



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

Appendix A

Table with columns for Frequency (MHz), Azimuth (Theta), Elevation (Phi), and Gain (dBi) for various antenna configurations (Theta(°), Phi(°), and combinations of both) across a range of frequencies from 2.4GHz to 5.8GHz. Includes a detailed header for Gain and sub-headers for various antenna types like Phi(15°)Phi(22.5°), etc.



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

Appendix A

Theta	-11.28/-16.56	-18.89/-17.61	-16.91/-18.58	-18.31/-14.03	-13.06/-12.56	-14.67/-18.09	-18.63/-17.45	-18.96/-18.72	-18.17/-18.17	-18.52/-12.75	-11.24/-17.45	-18.91/-19.27	-18.66/-11.44	-8.57/-13.26	-19.34/-14.62	-13.22/-10.73	-9.95/-9.16	-12.91/-11.51	-9.28/-10.31	-16.13/-18.36	-16.58/-14.63	-7.91/-12.11	-17.93/-10.34	-10.05/-10.81
Phi(75°)	-11.28/-16.56	-18.89/-17.61	-16.91/-18.58	-18.31/-14.03	-13.06/-12.56	-14.67/-18.09	-18.63/-17.45	-18.96/-18.72	-18.17/-18.17	-18.52/-12.75	-11.24/-17.45	-18.91/-19.27	-18.66/-11.44	-8.57/-13.26	-19.34/-14.62	-13.22/-10.73	-9.95/-9.16	-12.91/-11.51	-9.28/-10.31	-16.13/-18.36	-16.58/-14.63	-7.91/-12.11	-17.93/-10.34	-10.05/-10.81
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-10.02/-11.58	-18.35/-14.46	-13.11/-18.47	-13.87/-8.88	9.38/-10.99	-16.57/-16.01	-15.51/-14.03	-12.94/-11.32	-12.33/-14.8	-18.72/-10.7	-13.35/-16.47	-12.96/-16.1	-17.47/-16.46	-13.31/-15.85	-14.52/-14.82	-13.74/-12.5	-10.93/-8.4	-8.71/-17.1	-18.11/-18.4	-13.77/-15.71	-18.55/-10.27	9.68/-10.8	-8.71/-8.32	-10.45/-13.31
Phi(75°)	-10.02/-11.58	-18.35/-14.46	-13.11/-18.47	-13.87/-8.88	9.38/-10.99	-16.57/-16.01	-15.51/-14.03	-12.94/-11.32	-12.33/-14.8	-18.72/-10.7	-13.35/-16.47	-12.96/-16.1	-17.47/-16.46	-13.31/-15.85	-14.52/-14.82	-13.74/-12.5	-10.93/-8.4	-8.71/-17.1	-18.11/-18.4	-13.77/-15.71	-18.55/-10.27	9.68/-10.8	-8.71/-8.32	-10.45/-13.31
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-8.24/-12.79	-18.11/-13.26	-16.51/-18.12	-13.81/-13.86	-16.21/-14.4	-15.24/-15.55	-14.39/-12.42	-11.71/-11.38	-12.33/-14.8	-18.72/-10.7	-13.35/-16.47	-12.96/-16.1	-17.47/-16.46	-13.31/-15.85	-14.52/-14.82	-13.74/-12.5	-10.93/-8.4	-8.71/-17.1	-18.11/-18.4	-13.77/-15.71	-18.55/-10.27	9.68/-10.8	-8.71/-8.32	-10.45/-13.31
Phi(75°)	-8.24/-12.79	-18.11/-13.26	-16.51/-18.12	-13.81/-13.86	-16.21/-14.4	-15.24/-15.55	-14.39/-12.42	-11.71/-11.38	-12.33/-14.8	-18.72/-10.7	-13.35/-16.47	-12.96/-16.1	-17.47/-16.46	-13.31/-15.85	-14.52/-14.82	-13.74/-12.5	-10.93/-8.4	-8.71/-17.1	-18.11/-18.4	-13.77/-15.71	-18.55/-10.27	9.68/-10.8	-8.71/-8.32	-10.45/-13.31
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-8.51/-12.2	-13.27/9.29	-12.73/17.84	-11.47/-10.61	-13.02/-17.78	-18.19/-19.02	-15.24/13.17	-16.66/-12.42	-12.81/-14.3	-18.39/11.94	-18.33/19.48	-13.41/-12	-12.56/-15.45	-18.85/-19.16	-18.27/-18.03	-19.04/13.06	-13.72/15.65	-17.81/14.28	-18.65/-16.55	-15.09/16.11	-18.56/-17.2	-10.47/8.21	-5.69/6.46	-10.25/8.63
Phi(75°)	-8.51/-12.2	-13.27/9.29	-12.73/17.84	-11.47/-10.61	-13.02/-17.78	-18.19/-19.02	-15.24/13.17	-16.66/-12.42	-12.81/-14.3	-18.39/11.94	-18.33/19.48	-13.41/-12	-12.56/-15.45	-18.85/-19.16	-18.27/-18.03	-19.04/13.06	-13.72/15.65	-17.81/14.28	-18.65/-16.55	-15.09/16.11	-18.56/-17.2	-10.47/8.21	-5.69/6.46	-10.25/8.63
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-11.54/-9.37	-8.03/-10.41	-12.37/-9.31	-8.86/-8.7	9.68/-11.25	-13.25/-14.68	-14.53/-13.62	-16.48/-18.36	-15.41/-11.22	-14.79/13.54	-13.52/-17.9	-18.72/-13.49	-11.23/-12.3	-15.17/-17.6	-16.78/-17.77	-17.57/14.99	-13.05/-11.56	-12.81/14.7	-14.28/-18.68	-18.69/-13.54	-11.18/-4.35	-3.72/7.44	-9.43/10.71	-9.43/10.71
Phi(75°)	-11.54/-9.37	-8.03/-10.41	-12.37/-9.31	-8.86/-8.7	9.68/-11.25	-13.25/-14.68	-14.53/-13.62	-16.48/-18.36	-15.41/-11.22	-14.79/13.54	-13.52/-17.9	-18.72/-13.49	-11.23/-12.3	-15.17/-17.6	-16.78/-17.77	-17.57/14.99	-13.05/-11.56	-12.81/14.7	-14.28/-18.68	-18.69/-13.54	-11.18/-4.35	-3.72/7.44	-9.43/10.71	-9.43/10.71
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-13.48/-8.53	-10.78/-13.24	-12.14/-7.26	-6.27/-6.38	-7.94/-12.03	-16.53/-17.65	-18.32/-18.73	-18.75/-18.36	-17.36/-10.45	-8.41/-10.03	-17.71/17.74	-15.53/-14.33	-9.49/-9.32	-14.97/-18.21	-18.64/-13.31	-18.99/9.85	-8.38/-10.9	-13.92/-15.06	-18.03/-18.45	-17.32/15.77	-18.77/8.02	-11.81/4.02	-3.92/4.74	-8.66/14.47
Phi(75°)	-13.48/-8.53	-10.78/-13.24	-12.14/-7.26	-6.27/-6.38	-7.94/-12.03	-16.53/-17.65	-18.32/-18.73	-18.75/-18.36	-17.36/-10.45	-8.41/-10.03	-17.71/17.74	-15.53/-14.33	-9.49/-9.32	-14.97/-18.21	-18.64/-13.31	-18.99/9.85	-8.38/-10.9	-13.92/-15.06	-18.03/-18.45	-17.32/15.77	-18.77/8.02	-11.81/4.02	-3.92/4.74	-8.66/14.47
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-8.85/-10.63	-15.51/10.82	-6.87/6.66	-5.76/5.7	-8.01/8.8	9.21/9.23	-10.96/-13.53	-17.49/-18.87	-16.64/9.39	-7.71/10.58	-9.48/7.98	-9.37/15.98	-19.18/-17.56	-14.31/13.11	-18.11/18.71	-16.02/-16.81	-10.61/8.52	-13.06/-18.16	-12.45/-13.41	-16.53/-13.62	-14.38/7.43	-7.57/6.91	-10.16/14.45	-18.91/14.47
Phi(75°)	-8.85/-10.63	-15.51/10.82	-6.87/6.66	-5.76/5.7	-8.01/8.8	9.21/9.23	-10.96/-13.53	-17.49/-18.87	-16.64/9.39	-7.71/10.58	-9.48/7.98	-9.37/15.98	-19.18/-17.56	-14.31/13.11	-18.11/18.71	-16.02/-16.81	-10.61/8.52	-13.06/-18.16	-12.45/-13.41	-16.53/-13.62	-14.38/7.43	-7.57/6.91	-10.16/14.45	-18.91/14.47
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-10.41/-10.05	-10.21/9.45	-7.76/7.08	-12.23/12.09	-8.91/5.77	-5.21/6.49	-8.17/10.09	-10.83/12.16	-18.11/13.24	-11.66/12.75	-13.61/16.96	-18.59/-18.91	-18.55/-18.64	-18.71/18.51	-18.61/-18.68	-12.97/18.5	-18.81/-18.33	-14.13/14.72	-18.54/-16.51	-14.42/8.04	-14.63/10.82	-7.61/9.27	-14.18/8.84	-17.36/15.31
Phi(75°)	-10.41/-10.05	-10.21/9.45	-7.76/7.08	-12.23/12.09	-8.91/5.77	-5.21/6.49	-8.17/10.09	-10.83/12.16	-18.11/13.24	-11.66/12.75	-13.61/16.96	-18.59/-18.91	-18.55/-18.64	-18.71/18.51	-18.61/-18.68	-12.97/18.5	-18.81/-18.33	-14.13/14.72	-18.54/-16.51	-14.42/8.04	-14.63/10.82	-7.61/9.27	-14.18/8.84	-17.36/15.31
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-11.01/8.28	-7.32/8.16	9.07/11.54	-18.29/15	9.01/6.34	4.51/4.42	-6.37/8.13	-7.68/9.86	-16.17/15.28	-16.14/15.37	-14.12/14.9	-15.74/17.59	-19.11/18.59	-18.08/14.02	-12.16/13.77	-16.07/17.87	-14.91/14.16	-18.72/18.58	-17.35/17.58	-18.06/18.72	-17.81/15.56	-16.43/13	-13.41/15.76	-18.79/17.39
Phi(75°)	-11.01/8.28	-7.32/8.16	9.07/11.54	-18.29/15	9.01/6.34	4.51/4.42	-6.37/8.13	-7.68/9.86	-16.17/15.28	-16.14/15.37	-14.12/14.9	-15.74/17.59	-19.11/18.59	-18.08/14.02	-12.16/13.77	-16.07/17.87	-14.91/14.16	-18.72/18.58	-17.35/17.58	-18.06/18.72	-17.81/15.56	-16.43/13	-13.41/15.76	-18.79/17.39
Gain	Φ(75°)Φ(75°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Theta	-6.65/4.83	-5.81/8.41	-12.88/18.44	-17.61/11.74	-8.58/6.72	-6.06/5.68	-5.68/5.29	-5.48/6.71	-9.26/10.45	-9.74/10.21	-10.53/12.85	-17.43/18.25	-18.26/15.49	-11.42/11.05	-16.73/17.86	-18.73/18.76	-15.88/10.38	-17.38/19.13	-18.71/19.18	-1				



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

Appendix A

Table with columns for frequency (MHz), gain (dBi), and various polarization and antenna parameters. It contains multiple rows of numerical data for different antenna configurations.



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

Appendix A

Theta (°)	17.94~18.86	19.09~17.71	16.61~15.99	17.45~18.82	18.24~14.32	11.74~12.78	12.62~14.04	17.02~17.78	19.21~18.91	18.14~17.86	18.12~16.22	13.33~11.28	9.27~7.97	-7.13~6.74	-7.17~4.2	-7.89~7.81	-8.36~9.48	-12.71~17.41	-17.72~16.74	-14.24~14.42	-17.41~19.19	-18.53~17.98	-18.82~18.93	-19.37~17.55
Freq(Hz)	5.6GPol	Theta/Ant 2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
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(87.5)	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°)	-11.6~11.48	-13.12~15.59	-17.23~18.77	-17.54~17.34	-15.66~12.34	-12.22~13.3	-14.13~14.32	-15.19~17.42	-19.09~18.77	-18.84~18.03	-18.18~16	-18.58~18.02	-19.19~18.3	-18.45~18.85	-17.41~18.49	-19.1~18.84	-19.02~19.23	-18.39~18.63	-18.54~18.24	-18.83~18.42	-18.84~18.11	-18.47~19.04	-18.66~17.68	-13.91~13.04
Theta(7.5°)	-8.22~8.73	-9.6~11.72	-14.65~18.55	-8.52~9.17	-9.36~9.97	-11.35~12.35	-11.48~10.22	-10.16~10.14	9.84~8.8	-7.6~4.44	-6.04~4.9	-6.33~6.77	-7.34~8.16	9.31~10.6	-12.53~14.24	-16.59~18.4	-18.71~18.38	-17.84~16.13	-13.78~12.31	-10.4~9	-8.58~7.9	-7.69~7.39	-6.83~6.41	
Theta(15°)	-5.58~7.91	-10.35~14.89	-17.97~17.75	-18.6~18.51	-19.16~16.35	-14.07~11.05	-8.88~7.25	-6.34~5.87	-5.72~5.52	-6.11~7.2	-8.15~8.62	-8.35~7.72	-7.03~6.78	-7.04~7.48	-8.48~9.23	-9.62~9.06	-9.07~9.19	-8.74~8.2	-8.13~9.15	-10.71~12.49	-14.83~11.3	-7.57~5.72	-4.78~3.49	-4.72~9.1
Theta(22.5°)	-4.15~5.82	-7.72~11.19	-17.49~18.53	-19.05~18.93	-17.87~16.49	-12.18~8.97	-7.27~6.48	-5.74~5.63	-5.55~5.56	-7.16~9.56	-12.25~13.36	-12.62~11.42	-10.58~10.67	-11.55~13.67	-15.72~14.55	-13.09~11.55	-9.61~7.17	-5.61~5.37	-6.32~7.55	-6.68~6.26	-7.25~7.69	-8.77~9.67	-7.82~5.14	-4.52~4.11
Theta(30°)	-3.83~4.98	-6.94~9.71	-13.34~17.27	-16.21~14	-14.03~11.92	-7.57~4.61	-4.65~4.94	-6.57~5.69	-7.71~7.54	-8.56~10.94	-14.44~13.43	-14.38~16.2	-18.24~15.67	-10.59~8.02	-7.22~7.71	-7.59~6.95	-6.82~7.59	-10.64~10.69	-8.74~7.65	-5.45~4.17	-4.22~5.34	-4.66~6.82	-4.36~3.6	
Theta(37.5°)	-5.19~7.71	-10.32~12.54	-15.34~18.21	-16.66~11.02	-9.43~8.33	-6.15~4.17	-3.63~3.47	-3.69~3.88	-4.34~4.88	-6.16~8.74	-12.48~12.59	-10.95~12.05	-17.35~18.59	-11.06~7.94	-5.61~5.68	-6.92~9.15	-9.59~8.29	-7.25~7.51	-7.47~8.71	-9.53~11.42	-11.38~8.82	-6.24~9.44	-4.42~5.51	-5.71~5.06
Theta(45°)	-6.81~5.79	-8.43~12.69	-12.77~11.57	-10.91~8.73	-8.92~8.08	-6.81~5.85	-4.72~3.47	-2.92~2.43	-4.37~6.4	-8.86~10.84	-14.75~13.71	-9.72~9.12	-12.16~13.11	-9.81~6.37	-6.86~8.83	-7.64~6.42	-6.38~6.38	-5.71~6.13	-7.53~8.67	-7.25~5.5	-6.3~9.61	-11.22~8.79	-6.99~7.23	-9.03~9.18
Theta(52.5°)	-7.48~7.32	-8.45~14.97	-12.68~10.5	-11.19~9.01	-6.61~5.29	-3.69~3.52	-4.93~4.65	-3.76~5.03	-4.84~5.64	-8.36~11.94	-11.15~13.77	-8.44~7.68	-10.74~7.21	-5.22~4.95	-5.73~6.94	-6.67~8.78	-9.07~11.12	-11.19~9.98	-10.67~9.93	-7.95~8.17	-11.63~14.36	-9.17~4.74	-3.72~6.18	
Theta(60°)	-6.39~9.46	-7.96~14.16	-15.17~9.39	-14.51~16.18	9.76~6.4	-4.21~3.94	-3.54~2.41	-5.12~4.24	-2.76~3.86	-6.88~7.74	-6.47~5.34	-2.05~6.14	-7.03~3.53	-4.11~6.1	-4.88~5.11	-3.99~5.33	-7.59~6.64	-6.69~8.2	-9.17~10.2	-11.99~12.21	-9.19~8.52	-3.75~5.29	-8.37~6.11	-2.99~3.72
Theta(67.5°)	-3.94~13.57	-8.43~8.43	-13.31~8.42	-9.65~11.38	-8.98~7.32	-5.07~2.89	-2.76~5.42	-3.12~4.04	-3.12~4.04	-5.88~4.62	-3.42~1.81	-0.83~4.25	-5.14~3.04	-3.65~4.12	-5.09~4.82	-4.55~6.66	-7.85~7.24	-8.94~7.71	-6.23~7.07	-8.57~5.8	-3.47~3.76	-2.71~3.12	-2.72~3.74	-1.85~0.97
Theta(75°)	-1.23~8.1	-5.23~8.48	-17.83~7.85	-12.97~13.8	-11.57~7.04	-4.79~2.6	-3.43~3.87	-6.25~5.13	-2.15~2.6	-5.54~3.44	-0.77~1.36	-1.87~3.26	-4.22~3.8	-3.74~3.97	-6.15~5.56	-6.14~7.57	-9.01~14.42	-17.21~9.23	-7.98~7.07	-5.96~2.99	-2.15~2.38	-2.36~1.75	-0.94~1.15	-1.89~0.03
Theta(82.5°)	-1.46~4.84	-3.02~8.37	-14.1~6.19	-15.89~12.79	-11.69~7.81	-6.62~4.01	-4.26~7.51	-9.03~4.92	-3.34~3.36	-4.49~3.28	-1.06~1.49	-2.85~2.7	-3.51~4.84	-2.47~2.62	-5.08~4.03	-6.44~10.77	-12.71~17.93	-15.26~14.48	-11.27~11.13	-1.94~3.55	-1.49~0.25	-0.97~1.7	-1.13~1.01	-0.93~0.75
Theta(90°)	-3.65~3.31	-2.29~7.18	-9.59~6.21	-11.92~10.07	-10.17~9	-9.16~5.2	-12~16.16	-9.91~6.56	-5.57~5.59	-4.67~2.3	-2.26~2.33	-2.01~2.25	-0.96~3.03	-3.85~4.2	-4.84~7.47	-11.64~9.24	-12.99~5.51	-6.23~9.4	-5.17~5.8	-2.18~9.4	-0.171~43	1.11~2.96	5.31~2.2	0.99~0.85
Theta(97.5°)	-0.67~6.23	-3.61~8.9	-10.95~8.89	-11.07~14.02	-11.73~13.05	-15.43~18.4	-14.87~18.2	-14.87~18.2	-10.37~10.1	-2.92~0.95	-1.93~1.82	0.38~2.49	-1.98~0.28	-0.36~3.26	-3.54~6.63	-5.88~6.83	-4.36~15.15	-6.20~6.13	-6.57~6.26	1.332~51	2.84~1.66	-11~5.64	1.04~0.04	
Theta(105°)	-9.42~12.69	-3.11~5.93	-8.44~10.4	-18.74~17.11	-13.27~16.12	-14.31~15.73	-15.19~12.99	-14.34~9.25	-7.23~2.83	-1.15~1.04	-0.240~1.2	0.020~1.1	1.43~0.61	1.43065	-1.39~7.08	-2.21~5.07	-2.63~17.7	-3.43~13.67	-7.061~35	-6.89~5.35	0.630~56	1.52~0.51	-6.59~4.69	0.08~0.09
Theta(112.5°)	-9.58~11.92	-8.66~8.91	-10.52~13.25	-18.96~17.05	-12.89~9.13	-13.79~13.56	-17.13~17.58	-12.04~6.14	-2.57~1.53	-3.86~1.91	0.1305	0.491~7.1	1.78~1.47	1.62~8.22	-3.9~15.83	-1.08~9.33	0.91~11.9	-2.98~12.86	-1.872~36	-5.17~3.44	1.371~143	0.811~203	-1.071~63	-1.76~9.94
Theta(120°)	-5.61~12.95	-18.06~9.4	-12.68~10.5	-13.59~12.44	-18.62~16	-9.01~8.49	-9.26~9.64	-3.73~5.65	-5.05~4.97	-9.01~8.49	-2.73~2.11	-0.990~43	-1.29~1.19	-0.76~1.9	-8.34~9.94	-2.96~7.1	-2.752~36	-5.05~8.22	0.13~281	-3.89~204	-1.11~10.3	-3.76~2.78		
Theta(127.5°)	-5.73~10.1	-11.47~16.72	-12.26~18.49	-13.86~10.54	-17.23~17.91	-18.26~11.18	-9.33~13.37	-8.19~6.05	-4.08~4.1	-3.14~1.31	-1.83~2.44	-2.87~1.53	-1.58~3.75	-8.24~5.81	-6.51~5.2	-3.04~4.81	-4.04~5.2	-2.731~2	-4.14~8	-3.08~4.47	-8.37~5.02	-5.85~5.94	-3.01~4.36	
Theta(135°)	-9.79~12.92	-11.68~11.39	-16.6~19.36	-19.09~16.3	-11.86~12.95	-16.93~17.84	-13.76~12.55	-11.57~11.27	-8.07~4.11	-2.34~2.91	-2.38~0.89	-0.91~3.51	-4.78~2.48	-1.8~2.5	-2.2~4.83	-4.6~8.3	-4.57~15.8	-4.07~3.55	-4.57~15.8	-12.51~6.54	-6.76~7.33	-6.47~6.22	-5.26~7.1	
Theta(142.5°)	-17.88~16.75	-17.63~7.67	-19.27~17.38	-17.62~17.68	-16.07~19.02	-14.71~10.21	-9.22~11.12	-13.5~13.35	-17.73~23.1	-11.77~8.81	-1.56~2.11	-2.19~2.42	-3.19~2.77	-2.54~1.78	-1.8~3.92	-1.81~2.99	-4.075~9.8	-4.51~6.43	-5.73~15.4	-2.48~9.29	-10.36~18.8	-12.17~6.37	-3.78~3.12	-4.18~7.73
Theta(150°)	-18.81~16.36	-10.72~8.25	-8.62~12.26	-15.88~17.4	-18.73~19.01	-19.31~12.65	-10.53~11.18	-11.57~8.89	-5.74~4.05	-2.79~1.91	-1.74~1.96	-1.9~2.08	-2.94~3.7	-3.04~1.82	-1.87~2.47	-3.39~7.78	-14.18~11.04	-6.59~4.48	-6.4~7.53	-6.47~7.85	-9.99~10.14	-11.6~17.81	-18.52~14.18	-8.64~9.54
Theta(157.5°)	-13.94~17.88	-18.31~17.71	-19.02~17.82	-17.23~19.97	-15.76~17.21	-17.18~15.97	-14.73~17.23	-15.41~12.12	-9.32~8.72	-8.28~7	-5.57~4.8	-4.9~6.16	-7.8~8.78	-7.95~6.91	-6.5~7.38	-9.65~12.93	-13.09~13.21	-10.91~8.6	-9.23~9.35	-6.99~5.76	-5.83~6.42	-11.3~18.45	-14.7~13.32	-10.67~10
Theta(165°)	-18.64~18.4	-18.74~16.59	-15.59~15.88	-15.69~11.81	-17.43~17.71	-18.84~18.04	-17.38~18.68	-16.47~16.25	-15.91~17.87	-18.71~18.21	-18.36~14.96	-13.44~13.79	-14.52~14.45	-14.34~13.8	-14.39~14.37	-10.83~10.43	-8.69~8.45	-9.14~10.58	-12.95~14.44	-10.07~9.72	-7.87~7.34	-7.89~9.92	-12.38~15.13	-16.63~17.99
Theta(172.5°)	-13.66~14.85	-15.26~15.81	-17.08~17.62	-18.74~18.5	-19~17.78	-18.99~15.01	-12.51~11.27	-11.76~11.76	-11.98~12.36	-12.23~12.79	-14.02~16.16	-18.51~18.73	-18.69~18.71	-18.86~19.04	-17.75~18.64	-17.87~15.69	-14.07~12.42	-10.54~9.96	-11.47~14.88	-18.23~17.37	-16.19~17.11	-19.17~19.01	-18.74~18.56	-16.79~15.57
Theta(180°)	-12.62~14.01	-16.37~18.91	-18.14~17.59	-16.28~17.02	-18.98~18.87	-18.18~17.91	-18.12~18.48	-19.25~18.25	-19.19~18.27	-17.02~16.53	-15.91~15.75	-16.03~15.6	-15.84~15.99	-16.93~17.92	-18.97~15.99	-18.93~17.53	-19.05~18.37	-18.18~17.2	-19.05~18.27	-18.34~17.98	-17.84~15.09	-14.78~13.73	-12.52~11.78	-12.72~14.18
Freq(Hz)	5.785GPol	Theta/Ant 2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Gain	Phi(0)Phi(7.5) <td>Phi(15)Phi(22.5) <td>Phi(30)Phi(37.5) <td>Phi(45)Phi(52.5) <td>Phi(60)Phi(67.5) <td>Phi(75)Phi(82.5) <td>Phi(90)Phi(87.5) <td>Phi(105)Phi(112.5) <td>Phi(120)Phi(127.5) <td>Phi(135)Phi(142.5) <td>Phi(150)Phi(157.5) <td>Phi(165)Phi(172.5) <td>Phi(180)Phi(187.5) <td>Phi(195)Phi(202.5) <td>Phi(210)Phi(217.5) <td>Phi(225)Phi(232.5) <td>Phi(240)Phi(247.5) <td>Phi(255)Phi(262.5) <td>Phi(270)Phi(277.5) <td>Phi(285)Phi(292.5) <td>Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	Phi(15)Phi(22.5) <td>Phi(30)Phi(37.5) <td>Phi(45)Phi(52.5) <td>Phi(60)Phi(67.5) <td>Phi(75)Phi(82.5) <td>Phi(90)Phi(87.5) <td>Phi(105)Phi(112.5) <td>Phi(120)Phi(127.5) <td>Phi(135)Phi(142.5) <td>Phi(150)Phi(157.5) <td>Phi(165)Phi(172.5) <td>Phi(180)Phi(187.5) <td>Phi(195)Phi(202.5) <td>Phi(210)Phi(217.5) <td>Phi(225)Phi(232.5) <td>Phi(240)Phi(247.5) <td>Phi(255)Phi(262.5) <td>Phi(270)Phi(277.5) <td>Phi(285)Phi(292.5) <td>Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	Phi(30)Phi(37.5) <td>Phi(45)Phi(52.5) <td>Phi(60)Phi(67.5) <td>Phi(75)Phi(82.5) <td>Phi(90)Phi(87.5) <td>Phi(105)Phi(112.5) <td>Phi(120)Phi(127.5) <td>Phi(135)Phi(142.5) <td>Phi(150)Phi(157.5) <td>Phi(165)Phi(172.5) <td>Phi(180)Phi(187.5) <td>Phi(195)Phi(202.5) <td>Phi(210)Phi(217.5) <td>Phi(225)Phi(232.5) <td>Phi(240)Phi(247.5) <td>Phi(255)Phi(262.5) <td>Phi(270)Phi(277.5) <td>Phi(285)Phi(292.5) <td>Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	Phi(45)Phi(52.5) <td>Phi(60)Phi(67.5) <td>Phi(75)Phi(82.5) <td>Phi(90)Phi(87.5) <td>Phi(105)Phi(112.5) <td>Phi(120)Phi(127.5) <td>Phi(135)Phi(142.5) <td>Phi(150)Phi(157.5) <td>Phi(165)Phi(172.5) <td>Phi(180)Phi(187.5) <td>Phi(195)Phi(202.5) <td>Phi(210)Phi(217.5) <td>Phi(225)Phi(232.5) <td>Phi(240)Phi(247.5) <td>Phi(255)Phi(262.5) <td>Phi(270)Phi(277.5) <td>Phi(285)Phi(292.5) <td>Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	Phi(60)Phi(67.5) <td>Phi(75)Phi(82.5) <td>Phi(90)Phi(87.5) <td>Phi(105)Phi(112.5) <td>Phi(120)Phi(127.5) <td>Phi(135)Phi(142.5) <td>Phi(150)Phi(157.5) <td>Phi(165)Phi(172.5) <td>Phi(180)Phi(187.5) <td>Phi(195)Phi(202.5) <td>Phi(210)Phi(217.5) <td>Phi(225)Phi(232.5) <td>Phi(240)Phi(247.5) <td>Phi(255)Phi(262.5) <td>Phi(270)Phi(277.5) <td>Phi(285)Phi(292.5) <td>Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) 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<td>Phi(345)Phi(352.5) </td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	Phi(105)Phi(112.5) <td>Phi(120)Phi(127.5) <td>Phi(135)Phi(142.5) <td>Phi(150)Phi(157.5) <td>Phi(165)Phi(172.5) <td>Phi(180)Phi(187.5) <td>Phi(195)Phi(202.5) <td>Phi(210)Phi(217.5) <td>Phi(225)Phi(232.5) <td>Phi(240)Phi(247.5) <td>Phi(255)Phi(262.5) <td>Phi(270)Phi(277.5) <td>Phi(285)Phi(292.5) <td>Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td></td></td></td></td></td></td></td></td></td></td></td></td></td></td></td>	Phi(120)Phi(127.5) <td>Phi(135)Phi(142.5) <td>Phi(150)Phi(157.5) <td>Phi(165)Phi(172.5) <td>Phi(180)Phi(187.5) <td>Phi(195)Phi(202.5) <td>Phi(210)Phi(217.5) <td>Phi(225)Phi(232.5) <td>Phi(240)Phi(247.5) <td>Phi(255)Phi(262.5) <td>Phi(270)Phi(277.5) <td>Phi(285)Phi(292.5) <td>Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) 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<td>Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td></td></td></td>	Phi(300)Phi(307.5) <td>Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td></td></td>	Phi(315)Phi(322.5) <td>Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td></td>	Phi(330)Phi(337.5) <td>Phi(345)Phi(352.5) </td>	Phi(345)Phi(352.5)
Theta(0°)	-9.42~10.02	-11.05~10.69	-11.53~12.03	-10.78~9.88	-8.64~8.28	-7.64~8.83	9.14~8.82	8.23~8.2	9.07~10.47	-12.15~13.6	-15.18~16.87	-16.69~18.7	-13.13~11.2	-11.01~9.6	9.39~9.22	8.32~8.75	9.39~9.22	8.99~9.02	9.16~10.37	-11.27~12.27	-13.43~14.34	-12.71~14.2	-15.3~13.21	
Theta(7.5°)	-10.16~10.53	9.71~8.88	-8.31~8.45	-8.85~8.21	-8.54~8.59	-8.21~10.18	-10.61~11.63	-11.21~11.15	-11.73~13.17	-13.16~13.25	-13.18~13.28	-13.62~13.96	-12.93~12.71	-11.47~11.64	-11.49~11.64	-10.66~9.26	-8.68~8.38	-8.91~8.62	-7.79~7.44	-8.9~31	-10.64~12.25	-13.85~14.49	-14.56~15.85	-15.18~11.32
Theta(15°)	-15.38~11	-9.04~9.38	-8.76~9.56	-11.4																				



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Gain	Φ(0°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Gain	Φ(0°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Gain	Φ(0°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Gain	Φ(0°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Gain	Φ(0°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)
Gain	Φ(0°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)



Radiated Composite Gain of 2.4GHz and 5GHz UNII 1~3

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Theta (°)	-18.97/-18.46	-17.64/-19	-19.11/-16.36	-17.59/-15.35	-12.16/-11.05	-10.41/-10.31	9.91/10.37	-12.41/-15.06	-16.95/-18.34	-18.37/-18.86	-15.94/-15.94	-13.76/-15.53	-14.56/-13.13	-14.31/-12.43	-16.53/-16.2	-16.11/-13.41	-16.12/-17.9	-17.66/-15.58	-13.5/-12.41	-10.68/-10.53	-12.41/-17.93	-18.62/-15.53	-15.87/-18.46	-17.68/-17.67	
Theta (82.5°)	-18.2/-19.2	-17.22/-18.64	-18.11/-18.36	-19.04/-18.58	-17.44/-16.36	-14.29/-14.2	-15.47/-16.84	-16.86/-16.45	-16.68/-17.89	-17.55/-18.41	-12.74/-12.81	-13.09/-15.21	-12.7/-14.4	-14.3/-13.4	-18.97/-14.93	-13.06/-12.46	-13.5/-13.3	-13.27/-14.58	-11.28/-10.18	-11.2/-13.47	-18.62/-17.16	-13.6/-11.67	-14.99/-18.69	-18.23/-19.16	
Theta (90°)	-17.26/-17.33	-19.03/-18.51	-18.13/-17.66	-18.58/-18.7	-18.22/-17.46	-16.56/-16.3	-17.67/-18.04	-16.76/-17.19	-17.03/-18.49	-16.71/-19.37	-17.62/-15.61	-14.96/-14.42	-13.62/-15.23	-17.71/-17.84	-18.98/-18.49	-13.81/-13.43	-12.65/-15.76	-13.81/-14.23	-14.04/-10.93	-11.03/-17.07	-18.62/-15.04	-18.18/-18.54	-18.09/-18.12	-17.91/-18.78	
Theta (97.5°)	-18.04/-18.65	-14.11/-18.34	-18.06/-14.74	-14.07/-19.02	-18.55/-18.25	-17.63/-18.72	-18.19/-18.98	-15.83/-15	-15.28/-18.05	-18.27/-17.81	-18.93/-16.6	-18.17/-17.45	-15.46/-17.52	-18.52/-19.15	-19.32/-19.15	-17.79/-15.66	-18.22/-16.2	-17.98/-17.25	-15.97/-19.09	-19.12/-16.49	-19.54/-17.49	-18.59/-16.27	-18.27/-17.46	-18.33/-18.54	
Theta (105°)	-13.96/-11.54	-8.28/-16.01	-12.19/-10.33	-11.57/-16.06	-19.08/-17.15	-18.94/-18.83	-14.83/-12.07	-10.39/-10.13	-10.45/-13.33	-17.88/-18.73	-18.42/-16.87	-15.64/-14.47	-12.7/-10.13	-12.34/-14.41	-14.89/-16.14	-19.01/-18.57	-18.53/-17.43	-17.9/-15.31	-19.07/-19.3	-17.28/-19.07	-14.06/-14.42	-12.6/-17.06	-12.59/-15.32	-18.99/-19.8	
Theta (112.5°)	-8.19/-9.37	-14.98/-11.54	-10.46/-8.37	-10.21/-10.06	-15.54/-16.77	-14.37/-12.67	-11.55/-10.08	-9.47/-9.96	-11.39/-14.63	-17.3/-18.42	-18.39/-18.12	-18.62/-15.04	-13.71/-13.29	-17.44/-16.08	-15.13/-15.67	-17.79/-10.59	-9.03/-10.73	-14.04/-10.93	-11.03/-17.07	-18.53/-15.49	-15.86/-14.88	-17.29/-16.09	-12.77/-15.86	-18.54/-15.12	
Theta (120°)	-6.85/-6.54	-7.73/-12.44	-12.98/-10.06	-10.07/-10.88	-12.3/-15.02	-15.68/-13.01	-10.52/-9.69	-9.85/-10.57	-12.18/-13.54	-19.53/-18.14	-18.09/-15.42	-13.69/-18.24	-14.58/-12.64	-17.1/-14.53	-14.67/-16.71	-14.15/-19.18	-6.79/-6.8	-12.04/-14.04	-9.7/-14.28	-19.25/-14.47	-18.53/-15.14	-18.37/-19.28	-12.51/-15.21	-18.37/-9.39	
Theta (127.5°)	-5.27/-7.16	-8.43/-12.95	-12.73/-10.93	-12.83/-16.82	-18.15/-18.53	-17.33/-16.85	-13.54/-11.87	-12.26/-14	-15.25/-16.87	-19.02/-17.33	-13.67/-12.31	-12.56/-14.71	-13.55/-17.39	-14.16/-10	-12.1/-18.67	-15.36/-7.99	-4.92/-6.68	-10.37/-13.11	9.67/-12	-18.94/-11.89	-17.62/-12.61	-13.17/-17.7	-17.17/-13.85	-13.16/-10.71	
Theta (135°)	-7.09/-7.64	-11.29/-14.88	-16.35/-14.53	-13.02/-13.47	-16.98/-17.66	-17.83/-13.63	-15.46/-18	-17.81/-17.04	-18.43/-18.03	-19.42/-18.79	-17.46/-13.38	-10.61/-12.39	-15.51/-11.81	-15.43/-15.66	-17.09/-18.09	-10.53/-9.03	-6.24/-5.99	-10.46/-17.9	-13.55/-11.97	-12.38/-9.92	-16.49/-11.63	-8.78/-16.73	-8.44/-12.17	-13.28/-10.53	
Theta (142.5°)	-6.57/-7.1	-10.05/-10.56	-10.31/-10.88	-12.51/-13.89	-15.78/-16.97	-17.84/-17.81	-17.68/-16.76	-17.77/-17.18	-18.48/-18.19	-18.74/-17.97	-14.65/-12.39	-13.44/-15.6	-13.24/-14.87	-14.88/-10.95	-13.49/-9.79	-8.94/-9.5	-6.84/-10.6	-18.27/-18.43	-16.17/-11.22	-11.26/-10.35	-12.72/-11.71	-6.98/-10.82	-11.59/-13.28	-15.37/-9.39	
Theta (150°)	-7.98/-7.58	-10.03/-12.57	-14.62/-14.77	-14.27/-14.99	-18.86/-18.32	-19.19/-42	-19.71/-8.09	-18.16/-17.68	-17.57/-18.34	-17.42/-14.72	-13.77/-14.83	-14.95/-18.72	-18.73/-17.99	-12.18/-10.55	-9.24/-9.07	-10.67/-9.03	-8.56/-14.78	-19.09/-17.5	-16.2/-10.96	-11.33/-11.69	-11.81/-13.72	-12.21/-14.05	-18.13/-19.92	-15.84/-13.72	
Theta (157.5°)	-10.67/-7.77	-6.66/-8.45	-12.17/-15.9	-18.1/-17.02	-12.22/-18.46	-18.46/-17.78	-17.64/-11.21	-18.24/-18.33	-18.24/-16.27	-13.42/-12.17	-13.38/-17.7	-18.46/-17.59	-15.23/-13.05	-11.42/-9.78	-8.38/-8.8	-11.14/-13.19	-15.56/-17.84	-17.82/-18.09	-18.29/-16.39	-17.3/-18.5	-17.41/-17.9	-12.12/-17.72	-15.34/-13.17	-12.28/-10.79	
Theta (165°)	-12.05/-11.32	-11.98/-14.35	-17.61/-17.85	-17.52/-18.91	-18.44/-18.32	-18.88/-18.4	-17.72/-17.86	-19.11/-19.24	-19.39/-15.15	-12.37/-10.67	-9.93/-9.75	-10.02/-11.46	-13.88/-13.73	-11.06/-9.03	-8.28/-9.03	-10.54/-11.96	-13.16/-14.44	-16.45/-17.82	-18.6/-18.33	-18.83/-16.3	-15.41/-15	-15.34/-16.18	-16.97/-18.5	-19.11/-15.59	
Theta (172.5°)	-18.12/-16.57	-15.88/-15.17	-15.04/-17.34	-17.93/-18.81	-18.59/-18.41	-18.21/-17.63	-18.58/-18.84	-17.9/-18.86	-16.51/-14.86	-13.85/-13.25	-12.72/-12.49	-12.51/-12.52	-12.25/-11.84	-11.82/-12.17	-13.09/-13.9	-14.77/-15.52	-16.77/-16.94	-19.12/-17.82	-17.63/-17.54	-17.6/-19.53	-19.29/-17.82	-16.68/-19.12	-17.82/-16.82		
Theta (180°)	-10.88/-10.03	-10.56/-11.6	-12.55/-14.19	-16.76/-18.43	-18.37/-17.77	-18.14/-18.15	-19.17/-17.64	-18.71/-19.4	-19.04/-18.57	-18.23/-17.75	-17.91/-18.08	-17.38/-16.35	-16.03/-16.37	-17.66/-18.24	-17.39/-18.32	-18.47/-18.17	-19.14/-18.82	-18.77/-18.3	-18.94/-18.54	-18.86/-18.47	-18.08/-16.47	-15.66/-14.76	-13.99/-12.49	-12.99/-12.47	
Gain	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 (7.5°)	8.6/-9.66	-10.07/-9.8	-10.00/-10.61	-11.83/-12.37	-12.07/-12.07	-11.94/-11.35	-10.62/-9.7	-9.53/-9.36	-8.85/-8.74	-8.81/-8.73	-8.83/-8.87	-9.22/-9.84	-10.71/-11.82	-12.07/-13	-14.09/-15.28	-16.28/-19.7	-15.14/-13.97	-14.81/-13.47	-10.76/-9.99	-9.89/-9.72	-9.85/-9.41	-9.91/-8.6	-9.91/-8.6	-9.91/-8.6	
Theta (7.5°)	8.58/-9.6	-10.04/-10.5	-11.47/-12.6	-14.4/-16.38	-17.14/-17.09	-16.63/-14.87	-13.61/-12.23	-11.6/-10.78	-10.32/-9.58	-9.16/-8.82	-8.84/-8.97	-9.23/-9.6	-10.13/-10.17	-10.4/-10.53	-10.82/-11.11	-11.38/-11.84	-12.07/-12.37	-12.36/-11.38	-10.31/-10	-9.47/-9.26	-9.07/-9.25	-9.48/-9.11	-8.72/-8.71	-8.81/-8.5	
Theta (15°)	-8.2/-8.41	-9.26/-10.54	-12.19/-11.71	-15.83/-16.06	-15.67/-13.43	-10.98/-9.64	-8.61/-8.74	-7.23/-6.76	-6.45/-6.21	-6.08/-5.81	-6.02/-6.25	-6.66/-7.39	-7.97/-8.3	-8.86/-9.38	-9.81/-10.14	-10.93/-11.8	-13.09/-15.1	-17.45/-15.22	-11.96/-9.56	-8.13/-7.29	-7.02/-7.14	-7.49/-7.25	-6.86/-7.6	-7.36/-7.36	
Theta (22.5°)	-6.49/-6.86	-8.27/-9.48	-12.13/-10.8	-13.12/-11.52	-9.91/-9.6	-6.75/-6.57	-4.88/-4.26	-4.04/-3.99	-4.14/-4.08	-4.91/-4.39	-4.05/-4.57	-4.17/-4.08	-4.31/-4.39	-4.95/-4.57	-4.17/-4.08	-4.31/-4.39	-4.95/-4.57	-4.17/-4.08	-4.31/-4.39	-4.95/-4.57	-4.17/-4.08	-4.31/-4.39	-4.95/-4.57	-4.17/-4.08	-4.31/-4.39
Theta (30°)	-6.22/-6.39	-7.69/-10.29	-13.06/-14.21	-13.32/-10.97	-9.5/-8.74	-7.13/-6.26	-5.33/-4.27	-3.31/-2.62	-2.22/-2.13	-2.19/-2.38	-2.49/-2.76	-2.66/-2.83	-3.44/-4.33	-5.13/-5.77	-6.73/-7.89	-9.17/-10.5	-12.17/-12.25	-10.21/-8.64	-7.58/-6.23	-5.22/-4.81	-4.24/-3.66	-3.09/-3.04	-3.74/-4.67	-6.17/-6.94	
Theta (37.5°)	-8.26/-7.9	-8.81/-11.07	-13.69/-14.3	-12.41/-11.9	-10.99/-10.39	-9.93/-8.88	-8.87/-8.21	-4.11/-2.35	-1.79/-1.47	-1.52/-1.75	-1.76/-1.34	-0.97/-1.27	-1.89/-2.51	-3.67/-5.52	-7.15/-9.02	-10.51/-11.72	-10.87/-8.17	-3.88/-2.93	-2.86/-3.71	-5.21/-5.03	-3.79/-2.81	-2.19/-2.7	-4.3/-7.04		
Theta (45°)	-9.35/-9.84	-12.27/-16.67	-17.71/-16.64	-15.73/-14.98	-16.24/-16.18	-13.94/-8.85	-6.82/-5.49	-3.32/-3.19	-2.33/-1.63	-1.51/-1.92	-2.18/-1.85	-1.31/-0.78	-0.61/-1.06	-2.34/-1.12	-5.99/-6.7	-8.44/-9.28	-8.99/-7.25	-5.65/-3.59	-1.97/-1.09	-0.49/-1.34	-3.32/-3.2	-3.02/-3.23	-4.24/-5.24	-6.17/-6.94	
Theta (52.5°)	-10.1/-10.33	-12.51/-18.74	-19.17/-18.4	-18.98/-18.16	-17.72/-17.28	-14.46/-10.7	-7.27/-4.48	-2.67/-2.04	-2.13/-2.12	-2.12/-2.05	-1.65/-1.25	-0.68/-0.08	0.12/-0.4	-1.82/-3.88	-5/-6.1	-9.04/-11.48	-12.79/-9.13	-5.85/-3.6	-2.72/-2.36	-1.87/-2.07	-2.8/-2.75	-2.93/-3.66	-5.34/-8.05	-9.7/-10.28	
Theta (60°)	-5.39/-8.05	-11.08/-14.73	-17.58/-18.26	-17.49/-15.42	-11.49/-9.61	-8.49/-7.65	-5.99/-4.44	-3.16/-1.84	-0.76/-1.07	-0.37/-1.28	-2.43/-2.99	-3.07/-5.24	-1.36/-1.08	-1.61/-3.21	-4.27/-1.7	-9.03/-10.7	-11.69/-8.91	-6.98/-5.19	-4.35/-4.1	-4.49/-4.1	-3.47/-3.0	-3.4/-4.2	-4.82/-3.34	-6.25/-6.2	
Theta (67.5°)	-5.89/-8.92	-14.89/-16.58	-15.79/-16.44	-18.92/-14.05	-9.12/-6.21	-5.02/-4.46	-4.23/-4.23	-2.14/-1.66	-0.53/-1.07	-2.71/-2.11	-2.51/-1.78	-0.26/-0.86	-0.65/-1.9	-3.03/-5.56	-8.26/-9.92	-11.64/-9.62	-8.95/-6.67	-9.26/-8.9	-8.35/-6.61	-3.78/-3.44	-3.32/-3.8	-3.34/-3.8	-4.81/-6.18		
Theta (75°)	-6.88/-10.78	-18.95/-19.03	-18.31/-19.08	-15.08/-11.05	-7.75/-5.2	-3.21/-1.77	-1.29/-1.79	-2.92/-3.11	-1.6/-0.16	0.22/-0.07	-0.41/-0.42	-0.89/-1.73	-1.74/-1.46	-1.88/-3.43	-4.28/-6.2	-7.26/-9.29	-13.68/-13.43	-10.97/-11.62	-10.22/-8.16	-5.92/-2.94	-1.84/-1.42	-1.54/-2.46	-3.38/-3.35	-3.51/-5.3	
Theta (82.5°)	-13.29/-18.74	-18.01/-17.53	-17.67/-16.17	-12.03/-10.66	-8.19/-5.57	-2.75/-0.93	-0.33/-0.72	-1.56/-2.38	-2.31/-3.7	-0.37/-0.05	0.21/0.81	0.75/0.1	-0.51/-0.49	-0.86/-2.33	-3.34/-7.7	-7.89/-11.47	-16.2/-12.89	-11.82/-11.5	-11.71/-7.19	-5.83/-2.88	-0.11/-0.35	-2.88/-4.8	-4.5/-4.3	-6.08/-6.11	
Theta (90°)	-14.14/-11.55	-16.11/-18.81	-14.02/-11.67	-12.33/-13.16	-8.37/-4.84	-1.71/0.4	1.61/2.36	0.29/-1.23	-1.68/-0.91	0.4/-0.85	-0.35/0.59	0.93/0.79	0.47/0.18	-0.23/-1.5	-3.58/-5.79	-8.24/-12.55	-11.1/-13.23	-15.48/-17.29	-9.37/-6.62	-2.67/-0.56	0.14/-1.34	-3.66/-6.96	-7.54/-7.77	-9.37/-15.55	
Theta (97.5°)	-9.1/-8.88	-13.83/-14.42	-12.02/-9.41	-11.89/-16.89	-8.85/-3.64	-1.71/0.05	1.01/1.36	0.64/-0.18	-0.47/-0.35	-0.22/0.59	-0.73/0.2	0.46/0.71	0.44/0.44	-0.66/-2.57	-4.31/-6.47	-7.28/-8.82	-11.84/-14.58	-13.63/-11.64	-5.76/-3.89	-3.22/-1.28	-1.21/-2.68	-6.57/-6.4	-8.28/-7.28	-7.72/-9.2	
Theta (105°)	-7.48/-8.78	-10.34/-14.19	-19.32/-18.92	-19.25/-18.07	-7.68/-2.95	-1.57/0.13	0.35/0.15	-1.77/0.73	-0.19/0.45	-0.89/0.58	-0.78/-0.47	-1.15/-1.08	-1.55/-2.41	-3.06/-4.71	-5.29/-7.07	-9.79/-14.54	-10.74/-9.08	-5.71/-4.53	-4.09/-2.61	-3.03/-4.87	-5.59/-6.32	-7.15/-5.52	-6.92/-9.4		
Theta (112.5°)	-7.36/-8.32	-11.53/-14.85	-18.65/-18.62	-16.47/-18.05	-11.25/-4.36	-2.41/-1.76	-1.82/-2.5	-3.34/-1.4	-2.29/0.66	-1.03/-1.57	-2.01/-0.76	-1.62/-1.96	-2.03/-3.71	-2.07/-3.71	-4.77/-6.1	-7.52/-7.45	-8.24/-11.67	-10.67/-11.7	-8.12/-5.87	-6.18/-5.14	-4.92/-6.17	-6.52/-8.71	-6.43/-9.67	-8.24/-9.89	
Theta (120°)	-9.21/-13.75	-12.5/-13.58	-18.62/-17.94	-18.78/-15.73	-10.66/-8.11																				



Radiated Composite Gain of 2.4GHz and 5GHz UHf 1~3

Appendix A

Θ	127.5	135	142.5	150	157.5	165	172.5	180	187.5	195	202.5	210	217.5	225	232.5	240	247.5	255	262.5	270	277.5	285	292.5	300	307.5	315	322.5	330	337.5	345
Gain	Φ(0°)Φ(7.5°)	Φ(15°)Φ(22.5°)	Φ(30°)Φ(37.5°)	Φ(45°)Φ(52.5°)	Φ(60°)Φ(67.5°)	Φ(75°)Φ(82.5°)	Φ(90°)Φ(97.5°)	Φ(105°)Φ(112.5°)	Φ(120°)Φ(127.5°)	Φ(135°)Φ(142.5°)	Φ(150°)Φ(157.5°)	Φ(165°)Φ(172.5°)	Φ(180°)Φ(187.5°)	Φ(195°)Φ(202.5°)	Φ(210°)Φ(217.5°)	Φ(225°)Φ(232.5°)	Φ(240°)Φ(247.5°)	Φ(255°)Φ(262.5°)	Φ(270°)Φ(277.5°)	Φ(285°)Φ(292.5°)	Φ(300°)Φ(307.5°)	Φ(315°)Φ(322.5°)	Φ(330°)Φ(337.5°)	Φ(345°)Φ(352.5°)						
Θ(0°)	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15	-1.15
Θ(7.5°)	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36	-5.36