



Antenna Composite Gain Test Report

Equipment	Home Gateway
Brand Name	COMTREND
Model Name	PRT-6351, WR-2412u
Applicant	COMTREND Corporation 3F-1, 10 Lane 609, Chung Hsin Road, Section 5, San Chung Dist, New Taipei City 24159, Taiwan
Manufacturer	COMTREND Corporation 3F-1, 10 Lane 609, Chung Hsin Road, Section 5, San Chung Dist, New Taipei City 24159, Taiwan
Factory 1	Datamax Electronics (Dong Guan) Co., Ltd. Niu shan Foreign Economic Industrial park, Dong Cheng District, Dong Guan City, Guang Dong , China.
Factory 2	GIANTA CO., LTD No.130,Sec2,Yangxin Rd.,Yang Mei Dist,Taoyuan City326,Taiwan
Sample Received	Jan. 11, 2023
Start Test Date	Jan. 17, 2023
Final Test Date	Jan. 17, 2023



Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)



Table of Contents

History of this test report.....	3
1. Operation Mode and Antenna Information	4
2. Test Frequency	4
3. Testing Location.....	4
4. Test Facility and Configuration.....	5
5. Reference Calibration	6
6. Test Method	7
7. Measured Values and Calculation of Maximum Gain Positions.....	8
8. Summary of Test Result	9
9. Test Setup	10
10. Test Equipment and Calibration Data	11
11. Test Results	12



1. Operation Mode and Antenna Information

Antenna Position	RF Port	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
2G 5G Ant1	1	WHA YU	C1881-510014-A(SRF20221849)	Metal Dipole	I-Pex	2.4GHz + 5GHz
2G 5G Ant2	2	WHA YU	C1881-510015-A(SRF20221850)	Metal Dipole	I-Pex	2.4GHz + 5GHz
5G Ant3	3	WHA YU	C1881-510017-A(SRF20221860)	Metal Dipole	I-Pex	5GHz
5G Ant4	4	WHA YU	C1881-510016-A(SRF20221851)	Metal Dipole	I-Pex	5GHz

Note:

2.4GHz Operation Mode (2TX/2RX)

2G 5G Ant1~2G 5G Ant2 could transmit/receive simultaneously.

5GHz Operation Mode (4TX/4RX)

2G 5G Ant1~5G Ant4 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

Test Lab. : Sporton International Inc. Hsinhua Laboratory				
<input checked="" type="checkbox"/> Wen 33rd.St.	ADD:	No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)		
	TEL:	886-3-318-0787	FAX:	886-3-318-0287
Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	05CH03-HY	Rex Liao	23~24°C / 50~55%	17/Jan/2023

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

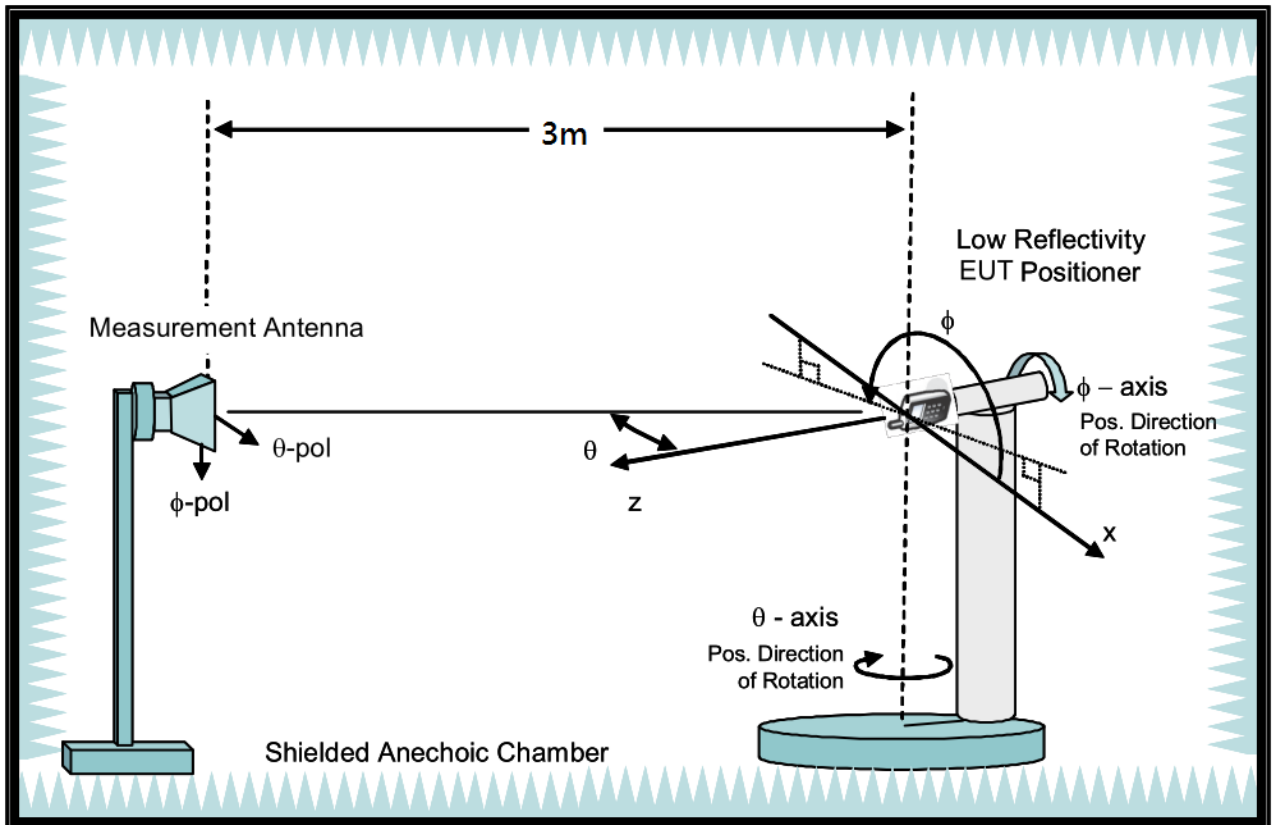
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

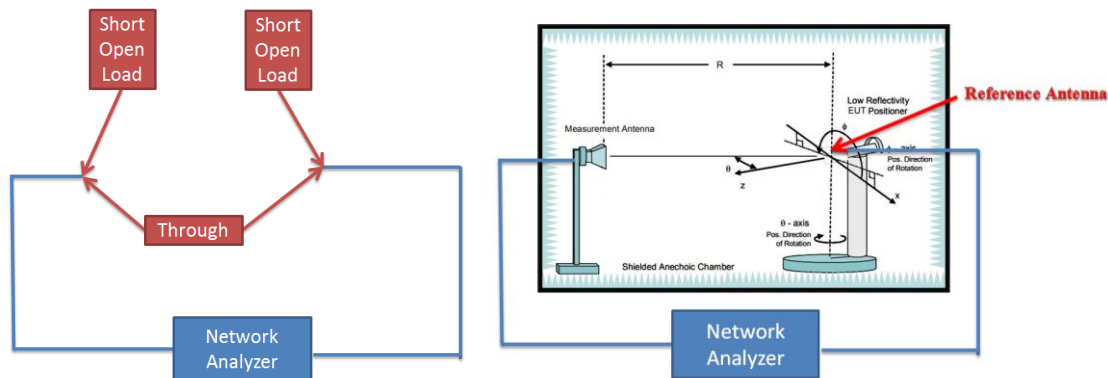
#Reference to CTIA “ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1”



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)	-33.55	-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)	2.49	-0.55	-2.5	-9.94	-7.18
Ant. 2 (dBi)	-2.58	-4.68	-0.15	1.89	3.8
Ant. 3 (dBi)	-	-10.24	-5.59	-14.18	-4.05
Ant. 4 (dBi)	-	3.09	-1.8	2.91	-2.61
DG [1SS] (dBi)	3.33	4.24	3.73	3.96	4.49
Polarization	Theta	Phi	Theta	Phi	Theta
$\Theta(^{\circ})$	127.5	142.5	52.5	112.5	165
$\Phi(^{\circ})$	180	292.5	180	247.5	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 [$10^{(G/20)}$]	$10^{(2.49/20)}$	$10^{(-0.55/20)}$	$10^{(-2.5/20)}$	$10^{(-9.94/20)}$	$10^{(-7.18/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(-2.58/20)}$	$10^{(-4.68/20)}$	$10^{(-0.15/20)}$	$10^{(1.89/20)}$	$10^{(3.8/20)}$
Ant. 3 [$10^{(G/20)}$]	-	$10^{(-10.24/20)}$	$10^{(-5.59/20)}$	$10^{(-14.18/20)}$	$10^{(-4.05/20)}$
Ant. 4 [$10^{(G/20)}$]	-	$10^{(3.09/20)}$	$10^{(-1.8/20)}$	$10^{(2.91/20)}$	$10^{(-2.61/20)}$
Ant. 1 [$10^{(G/20)}$] value	1.332	0.939	0.75	0.318	0.438
Ant. 2 [$10^{(G/20)}$] value	0.743	0.583	0.983	1.243	1.549
Ant. 3 [$10^{(G/20)}$] value	-	0.308	0.525	0.195	0.627
Ant. 4 [$10^{(G/20)}$] value	-	1.427	0.813	1.398	0.74
Sum All Antenna [Amax]	2.075	3.257	3.071	3.155	3.354
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	3.33	4.24	3.73	3.96	4.49

Note:

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

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



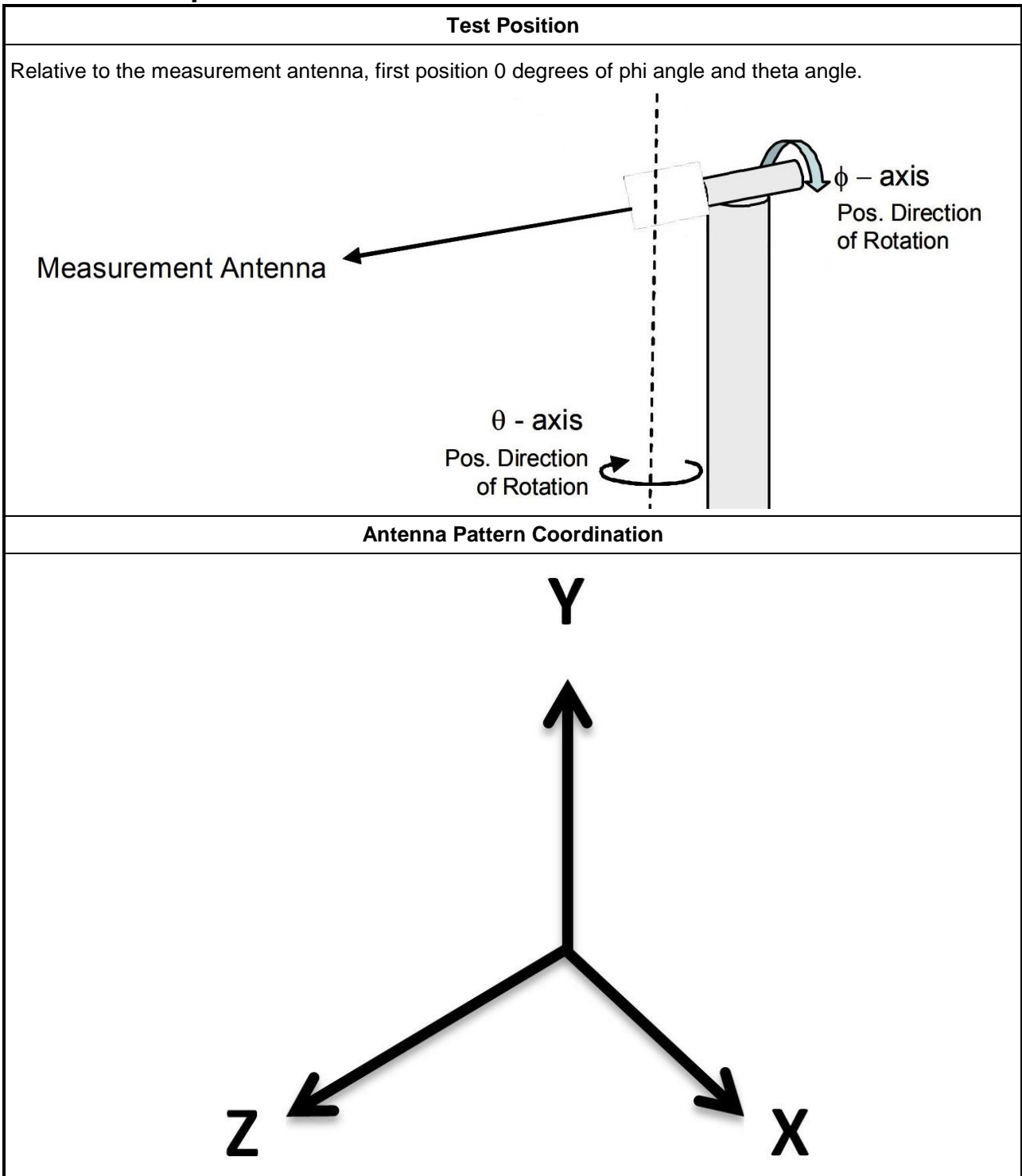
8. Summary of Test Result

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	3.06	2.44	2.7	3.24	3.62
Ant. 2 Max Gain (dBi)	3.24	1.7	1.98	3.79	3.95
Ant. 3 Max Gain (dBi)	-	3.08	2.82	2.93	3.89
Ant. 4 Max Gain (dBi)	-	3.91	3.15	3.28	4.42
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/97.5/240	Theta/90/292.5	Theta/52.5/262.5	Theta/82.5/262.5	Theta/90/285
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/127.5/112.5	Phi/97.5/307.5	Phi/97.5/307.5	Theta/165/195	Theta/165/202.5
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	-	Theta/82.5/247.5	Theta/97.5/52.5	Theta/97.5/247.5	Theta/105/255
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	-	Phi/112.5/247.5	Phi/112.5/247.5	Phi/112.5/255	Phi/112.5/255
Max Gain (dBi)	3.24	3.91	3.15	3.79	4.42
DG [1SS] (dBi)	3.33	4.24	3.73	3.96	4.49
DG [2SS] (dBi)	3.24	3.91	3.15	3.79	4.42
DG [4SS] (dBi)	-	3.91	3.15	3.79	4.42

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 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
ENA Series Network Analyzer	AGILENT	E5071C	MY46419477	100kHz~8.5GHz	July. 20, 2022	July. 19, 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&5GHz.....Page 13
Appendix B – Antenna Pattern of 2.4GHz&5GHz.....Page 27
Appendix C – Test Photos..... Page 34

————THE END————



Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	3.06	2.44	2.7	3.24	3.62
Ant. 2 Max Gain (dBi)	3.24	1.7	1.98	3.79	3.95
Ant. 3 Max Gain (dBi)		3.08	2.82	2.93	3.89
Ant. 4 Max Gain (dBi)		3.91	3.15	3.28	4.42
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/97.5/240	Theta/90/292.5	Theta/52.5/262.5	Theta/82.5/262.5	Theta/90/285
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Phi/127.5/112.5	Phi/97.5/307.5	Phi/97.5/307.5	Theta/165/195	Theta/165/202.5
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$		Theta/82.5/247.5	Theta/97.5/52.5	Theta/97.5/247.5	Theta/105/255
Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$		Phi/112.5/247.5	Phi/112.5/247.5	Phi/112.5/255	Phi/112.5/255
Max Gain (dBi)	3.24	3.91	3.15	3.79	4.42
DG [1SS] (dBi)	3.33	4.24	3.73	3.96	4.49
DG [2SS] (dBi)	3.24	3.91	3.15	3.79	4.42
DG [4SS] (dBi)		3.91	3.15	3.79	4.42



Radiated Composite Gain Data of 2.4GHz&5GHz

Appendix A

DG 1SS Result

Freq(Hz)	2.45GPol.	PhiH	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°)	
DG(dB)	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°)	Phi(360°)		
Theta(0°)	-12.09-12.96	-11.55-9.4	-7.07-5.65	-3.78-2.36	-1.49-1.01	-0.79-0.58	-0.4-0.38	-0.65-1.17	-1.95-2.79	-3.81-4.83	-6.26-7.63	-9.01-11.69	-13.48-13.17	-10.84-18.7	-6.26-14.3	-2.51-1.33	-0.47-0.09	0.41-0.55	0.65-0.72	0.60-1.0	0.52-1.55	0.25-1.81	-0.89-1.71	-2.85-4.1	-5.19-6.73	-8.78-10.55	
Theta(7.5°)	-12.74-12.94	-10.83-8.2	-6.74-4.73	-3.04-1.86	-1.28-1.03	-0.89-0.61	-0.41-0.48	-0.86-1.51	-2.28-3.02	-4.35-4.71	-6.97-7.62	-9.52-11.66	-13.93-13.65	-10.32-17.86	-6.13-4.23	-2.54-1.33	-0.34-0.03	0.73-0.01	1.19-1.18	0.93-0.4	0.44-1.62	-1.41-2.27	-3.16-4.27	-5.69-7.23	-8.52-10.51		
Theta(15°)	-15.41-12.28	-9.04-6.94	-5.3-3.81	-2.53-1.68	-1.25-0.98	-0.69-0.35	-0.22-0.38	-0.81-1.48	-1.97-2.69	-3.33-4.21	-5.59-7.14	-9.08-11.47	-14.99-15	-10.88-8.09	-6.08-4.36	-2.65-1.38	-0.35-0.37	0.31-0.45	0.43-0.34	0.13-0.24	0.81-1.71	1.25-1.19	0.88-0.34	-0.47-1.58	-3.08-4.41	-5.96-8.2	-10.08-13.14
Theta(22.5°)	-16.06-11.14	-8.2-5.95	-4.29-2.95	-2.04-1.48	-1.12-0.79	-0.39-0.07	-0.02-1	-0.67-1.36	-1.75-2.46	-3.45-4.45	-5.54-7.02	-8.68-11.38	-13.11-13.13	-10.52-7.76	-5.87-3.48	-2.85-1.68	-0.74-0.07	0.31-0.45	0.43-0.34	0.13-0.24	0.81-1.71	1.25-1.19	0.88-0.34	-0.47-1.58	-3.08-4.41	-5.96-8.2	-10.08-13.14
Theta(30°)	-15.42-11.79	-8.15-5.63	-3.77-2.49	-1.73-1.35	-1.16-0.91	-0.53-0.14	0.06-0.06	-0.17-0.68	-1.5-2.4	-3.34-4.49	-5.74-7.46	-9.05-11.56	-12.08-12.1	-9.21-7.29	-5.81-4.59	-3.49-2.48	-1.71-2.27	-1.08-1.1	1.18-1.14	0.98-0.89	-1.06-1.62	-2.49-3.41	-4.99-6.67	-9.49-13.72			
Theta(37.5°)	-15.71-13.08	-8.77-6.15	-4.13-2.72	-1.96-1.63	-1.12-0.77	-0.42-0.05	0.28-0.38	0.23-0.16	-0.74-1.49	-2.58-4.11	-6.05-8.63	-11.89-15.56	-14.67-11.6	-8.42-6.25	-4.68-3.57	-2.65-1.95	-1.5-1.35	-1.27-1.19	1.04-0.87	0.62-0.73	-0.89-1.31	-2.06-3.17	-4.44-6.08	-8.27-11.53			
Theta(45°)	-14.95-14.54	-9.77-6.87	-4.74-3.28	-2.41-1.66	-1.18-0.86	-0.51-0.26	-0.08-0.05	-0.06-0.1	-0.3-0.83	-1.83-3.43	-5.71-8.74	-12.98-15.23	-15.45-12.06	-9.51-6.99	-5.01-3.6	-2.52-1.67	-1.0-0.63	-0.48-0.44	-0.31-0.36	-0.46-0.93	-1.41-2.29	-2.94-3.86	-5.41-6.88	-9.15-12.17			
Theta(52.5°)	-15.41-14.01	-9.11-6.33	-4.41-3.03	-2.07-1.4	-1.08-1.01	-0.95-0.73	-0.51-0.4	-0.16-0.1	-0.4-1.02	-2.13-3.69	-5.86-8.48	-11.31-13.14	-13.65-12.07	-9.87-8.25	-6.84-5.45	-3.99-2.6	-1.51-0.84	-0.49-0.5	0.75-0.69	0.63-0.83	-1.33-1.85	-2.17-2.87	-4.39-6.17	-8.69-12.34			
Theta(60°)	-13.09-12.41	-8.54-5.87	-3.81-2.22	-0.99-0.31	-0.19-0.54	-1.1-1.46	-1.38-1.19	-0.59-0.53	-1.01-1.89	-3.08-4.6	-6.27-7.84	-9.45-12.05	-14.74-13.91	-11.49-8.86	-8.22-6.16	-4.4-2.82	-1.49-0.67	-0.43-0.76	-0.07-0.67	0.22-0.18	-0.77-1.92	-2.58-3.59	-4.73-6.5	-8.98-11.56			
Theta(67.5°)	-12.52-12.49	-10.47-7.78	-5.67-3.89	-2.29-1.23	-0.86-1.07	-1.54-1.8	-1.36-0.81	-0.28-0.21	-0.5-1.25	-2.6-4.25	-5.76-7.03	-8.6-11.29	-13.42-12.22	-11.35-9.99	-8.16-6.2	-4.38-2.96	-2.07-1.36	-1.1-1.26	-1.1-0.48	0.07-0.2	-1.11-2.86	-4.76-6.23	-7.85-9.92	-9.89-11.58			
Theta(75°)	-15.52-14.32	-9.88-7.25	-5.55-3.89	-2.65-1.55	-1.05-0.83	-0.95-0.88	-0.73-0.43	-0.25-0.04	0.12-0.09	-1.19-2.83	-4.43-5.79	-7.41-10.09	-12.48-15.11	-15.54-14.4	-10.74-7.87	-5.53-3.49	-1.88-0.94	-0.20-0.37	0.63-0.66	0.55-0.2	-0.46-1.44	-2.55-3.81	-5.35-7.22	-9.94-14.18			
Theta(82.5°)	-15.63-15.61	-11.33-7.57	-5.12-3.39	-1.92-1.16	-0.89-0.73	-0.11-0.36	0.52-0.14	-0.36-0.91	-0.97-1.32	-2.46-4.31	-6.06-7.92	-10.11-12.59	-15.47-14.42	-12.71-11.87	-9.45-6.61	-4.27-2.74	-1.79-1.65	-2.19-3.3	-4.67-5.09	-4.83-4.44	-4.28-4.64	-6.08-8.88	-9.15-12.17				
Theta(90°)	-13.76-13.66	-10.87-7.58	-4.57-2.61	-1.38-0.47	-0.47-0.79	-0.71-0	0.33-0.2	-0.38-1.22	-2.12-3	-3.94-5.12	-6.71-8.46	-10.82-13.66	-14.82-15.73	-14.86-15.69	-11.01-7.17	-4.39-2.76	-1.8-1.3	-1.02-0.89	-1.27-1.88	-2.4-2.19	-1.85-1.25	-1.25-2.21	-4.3-5.55	-10.74-12.65			
Theta(97.5°)	-12.53-11.38	-9.37-5.56	-3.08-1.65	-0.81-0.46	-0.52-0.84	-0.82-0.14	0.48-0.67	0.44-0.1	-0.97-2.07	-3.21-4.44	-5.92-7.9	-10.66-13.16	-15.21-15.21	-15.83-11.74	-8.47-6.09	-3.81-2.26	-1.1-0.54	-0.62-1.32	-2.33-2.95	-3.14-2.78	-2.73-2.24	-2.3-3.31	-5.58-9.44	-15.19-15.44			
Theta(105°)	-12.3-10.5	-8.02-5.24	-3.24-2	-1.34-1.19	-1.51-1.7	-1.67-1	-0.46-0.22	-0.31-0.7	-1.57-2.97	-4.63-6.02	-7.15-8.3	-9.68-11.18	-12.15-12.4	-12.71-11.87	-9.45-6.61	-4.27-2.74	-1.79-1.65	-2.19-3.3	-4.67-5.09	-4.83-4.44	-4.28-4.64	-6.08-8.88	-9.15-12.17				
Theta(112.5°)	-13.43-12.37	-9.38-6.82	-5.11-3.89	-3.1-2.9	-3.28-3.24	-2.72-2.14	-1.18-0.45	-0.03-0.13	-0.09-1	-2.59-4.37	-5.77-6.93	-8.59-10.77	-11.83-12.15	-12.54-11.61	-8.07-5.31	-3.8-2.93	-2.41-2.37	-2.84-3.72	-4.32-4.39	-4.27-4.39	-5.09-5.98	-6.7-7.72	-8.59-10.28	-13.44-14.74			
Theta(120°)	-14.88-13.11	-9.61-7.47	-6.54-5.72	-4.52-3.69	-3.71-4.14	-4.71-4.78	-3.54-2.17	-0.80-0.9	0.51-0.04	-1.23-2.92	-4.65-6.55	-9.29-13.8	-15.61-15.4	-12.48-8.73	-5.68-3.33	-1.47-0.32	0.28-0.39	-0.02-0.76	-1.6-2.48	-3.57-4.6	-5.25-5.48	-5.79-6.79	-6.68-11.1	-12.88-13.73			
Theta(127.5°)	-11.02-11.27	-9.75-8.5	-8.24-8.08	-6.52-4.72	-3.47-2.53	-1.81-1.21	-0.52-0.26	0.93-1.2	0.9-0.03	-1.57-3.35	-4.56-5.8	-8.44-13.57	-14.52-14.9	-11.87-9.29	-7.13-5.43	-4.09-3.12	-2.57-2.61	-3.2-4	-4.44-4.46	-4.56-4.5	-3.92-3.06	-2.56-2.91	-4.11-5.63	-9.08-12.92			
Theta(135°)	-9.59-8.31	-6.46-5.03	-4.29-4.46	-5.52-5.99	-4.85-3.17	-1.75-0.81	-0.15-0.39	0.73-0.67	0.1-0.97	-2.28-3.44	-4.54-6.08	-8.46-11.48	-13.97-12.39	-12.28-11.67	-9.63-7.44	-5.52-4	-2.81-1.99	-1.6-1.69	-1.91-2.25	-2.98-3.17	-2.88-2.25	-1.81-2.04	-3.13-4.94	-7.14-9.01			
Theta(142.5°)	-8.16-6.3	-4.56-3.23	-2.45-2.35	-2.89-3.48	-3.22-3.24	-1.54-1.14	-1.16-1.54	-2.2-3.02	-3.96-4.77	-5.34-5.98	-7.23-9.19	-11.37-14.71	-14.26-13.52	-11.21-8.16	-6.62-4.78	-3.39-2.4	-1.65-1.19	-1.13-1.57	-2.55-3.88	-5.21-6.15	-4.85-4.94	-5.99-7.72	-9.98-12.91				
Theta(150°)	-9.09-7.58	-6.17-5.07	-4.34-4.09	-4.26-4.25	-3.71-2.83	-2.13-1.86	-2.03-2.52	-3.23-3.87	-4.21-4.46	-4.83-5.47	-6.73-8.02	-9.63-11.58	-13.22-11.13	-9.26-7.67	-6.24-5.08	-3.87-3.04	-2.32-2.51	-4.95-7.17	-9.91-11.75	-11.94-10.86	-10.61-10.63	-11.94-13.36	-12.69-15.44				
Theta(157.5°)	-9.42-8.64	-8.26-8.09	-7.57-6.62	-7.87-8.02	-7.3-5.93	-4.76-3.91	-3.32-2.89	-2.5-2.2	-2.1-2.26	-2.74-3.52	-4.59-5.95	-7.62-9.76	-9.66-10.28	-9.22-8.45	-7.83-6.51	-5.97-5.73	-5.34-5.52	-6.28-7.55	-9.48-10.84	-10.13-9.41	-9.17-9.38	-10.17-11.95	-14.26-16.28	-12.93-10.74			
Theta(165°)	-9.94-8.68	-7.42-6.61	-5.95-5.56	-5.53-5.94	-4.44-5.47	-3.96-3.98	-4.08-3.34	-2.72-2.27	-2.01-2.07	-2.47-3.16	-4.2-5.51	-7.12-9.1	-10.43-11.17	-13.59-13.55	-12.6-11.43	-11.04-10.08	-9.42-9.08	-8.76-8.25	-7.65-7.17	-7.09-7.38	-7.94-6.62	-9.57-11.26	-12.77-15.11	-14.55-11.87			
Theta(172.5°)	-10.48-8.08	-6.62-5.61	-4.82-2.46	-3.04-0.45	-1.47-1.19	-0.46-0.87	-3.71-3.55	-4.41-3.34	-3.37-3.59	-4.1-4.88	-6.02-7.51	-9.36-11.71	-13.1-15.3	-14.62-12.75	-10.52-8.8	-5.68-6.74	-4.59-5.23	-5.13-5.34	-5.86-6.74	-7.8-8.91	-9.12-12.17	-13.83-14.82	-15.12-12.91				
Theta(180°)	-10.57-8.75	-7.53-6.58	-5.67-5	-4.56-4.33	-4.15-3.92	-3.65-3.37	-3.2-3.15	-3.17-3.25	-3.43-3.78	-4.4-5.37	-6.79-8.86	-11.48-14.58	-15.9-14.48	-12.95-11.9	-10.03-8.32	-6.89-5.93	-5.22-4.63	-4.22-4.09	-4.29-4.81	-5.54-6.58	-7.95-9.51	-11.12-13.03	-14.7-15.3	-15.95-13.25			
Theta(187.5°)	-10.57-8.75	-7.53-6.58	-5.67-5	-4.56-4.33	-4.15-3.92	-3.65-3.37	-3.2-3.15	-3.17-3.25	-3.43-3.78	-4.4-5.37	-6.79-8.86	-11.48-14.58	-15.9-14.48	-12.95-11.9	-10.03-8.32	-6.89-5.93	-5.22-4.63	-4.22-4.09	-4.29-4.81	-5.54-6.58	-7.95-9.51	-11.12-13.03	-14.7-15.3	-15.95-13.25			
Theta(195°)	-10.57-8.75	-7.53-6.58	-5.67-5	-4.56-4.33	-4.15-3.92	-3.65-3.37	-3.2-3.15	-3.17-3.25	-3.43-3.78	-4.4-5.37	-6.79-8.86	-11.48-14.58	-15.9-14.48	-12.95-11.9	-10.03-8.32	-6.89-5.93	-5.22-4.63	-4.22-4.09	-4.29-4.81	-5.54-6.58	-7.95-9.51	-11.12-13.03	-14.7-15.3	-15.95-13.25			
Theta(202.5°)	-10.57-8.75	-7.53-6.58	-5.67-5	-4.56-4.33	-4.15-3.92	-3.65-3.37	-3.2-3.15	-3.17-3.25	-3.43-3.78	-4.4-5.37	-6.79-8.86	-11.48-14.58	-15.9-14.48	-12.95-11.9	-10.03-8.32	-6.89-5.93	-5.22-4.63	-4.22-4.09	-4.29-4.81	-5.54-6.58	-7.95-9.51	-11.12-13.03	-14.7-15.3	-15.95-13.25			
Theta(210°)	-10.57-8.75	-7.53-6.58	-5.67-5	-4.56-4.33	-4.15-3.92	-3.65-3.37	-3.2-3.15	-3.17-3.25	-3.43-3.78	-4.4-5.37	-6.79-8.86	-11.48-14.58	-15.9-14.48	-12.95-11.9	-10.03-8.32	-6.89-5.93	-5.22-4.63	-4.22-4.09	-4.29-4.81	-5.54-6.58	-7.95-9.51	-11.12-13.03	-14.7-15.3	-15.95-13.25			
Theta(217.5°)	-10.57-8.75	-7.53-6.58	-5.67-5	-4.56-4.33	-4.15-3.92	-3.65-3.37	-3.2-3.15	-3.17-3.25	-3.43-3.78	-4.4-5.37	-6.79-8.86	-11.48-14.58	-15.9-14.48	-12.95-11.9	-10.03-8.32	-6.89-5.93	-5.22-4.63	-4.22-4.09	-4.29-4.81	-5.54-6.58	-7.95-9.51	-11.12-13.03	-14.7-15.3	-15.95-13			



Radiated Composite Gain Data of 2.4GHz&5GHz

Appendix A

Theta(°)	-7.22/-6.31	-5.54/-4.21	-3.44/-2.58	-1.41/-1.18	-0.62/0.81	1.42/0.93	1.08/0.74	0.29/0.34	-1.35/-1.59	-2.47/-3.69	-4.29/-4.91	-5.74/-7.48	-9.92/-9.65	-9.24/-7.55	-5.12/-2.67	-1.56/-0.6	0.23/1.18	2.49/2.6	2.98/1.97	1.51/2.1	1.41/1.05	0.72/1.32	-4.16/-6.7	-7.88/-7.53
Theta(67.5°)	-7.6/-5.61	-5.17/-4.7	-4.04/-3.34	-1.32/0.25	0.49/-0.33	0.15/1.4	1.61/1.42	0.94/0.11	-0.47/-1.38	-2.41/-3.01	-3.63/-4.33	-5.39/-8.04	-9.27/-7.5	-5.23/-4.72	-3.64/-3.09	-2.04/-0.76	0.29/0.51	1.53/0.86	0.66/1.45	0.95/1.29	0.67/0.09	0.52/0.63	-3.71/-5.48	-6.2/-7.59
Theta(75°)	-7.84/-7.66	-6.41/-5.35	-4.86/-2.49	-0.63/-1.07	-0.79/0.09	0.49/-0.34	1.27/0.93	-0.58/-1.14	-2.34/-3.4	-4.04/-4.05	-4.91/-7.1	-8.73/-9.55	-8.27/-8.89	-2.71/-2.38	-3.23/-0.46	0.62/0.17	1.01/0.65	0.42/0.83	1.71/1.8	0.48/-0.96	-0.61/1.01	-2.19/-4.21	-6.78/-8.34	
Theta(82.5°)	-8.24/-6.21	-5.12/-3.59	-2.63/-1.66	-0.64/-1.17	-1.56/-0.49	0.19/0.13	-0.64/-1.1	0.02/0.51	-1.67/-2.49	-4.61/-3.31	-2.74/-3.1	-5.31/-7.05	-6.18/-6.87	-10.51/-9.07	-4.78/-2.67	-1.67/-1.28	-1.82/0.06	0.34/2.07	0.61/0.75	0.91/0.8	0.45/-0.67	-0.52/0.13	-1.72/-4.09	-6.41/-9.92
Theta(90°)	-7.32/-4.77	-2.57/-2.12	-1.67/-1.45	-1.07/-0.56	-0.52/-0.03	0.02/-2.45	-3.74/-1.78	-1.19/-1.99	-3.23/-3.71	-4.91/-4.15	-4.41/-4.56	-6.68/-7.84	-8.84/-9.23	-10.16/-6.17	-3.86/-2.41	-1.57/-0.68	-0.74/0.21	0.01/-0.64	0.2/0.5	1.16/-0.47	1.74/1.36	1.21/0.51	-0.98/-3.08	-4.59/-7.25
Theta(97.5°)	-5.52/-4.22	-2.82/-1.14	-1.69/-2.58	-1.98/-0.67	-1.43/-2.8	-2.75/-1.4	-1.69/-1.35	-2.13/-1.94	-2.14/-2.39	-2.53/-3.56	-5.81/-5.2	-7.5/-5.77	-10.01/-9.87	-9.15/-6.88	-4.49/-2.63	-1.23/-0.2	0.37/0.68	0.84/-0.26	-0.05/1.15	2.74/2.74	1.64/2.12	1.49/0.57	-1.37/-4	-8.5/-8.74
Theta(105°)	-5.2/-4.88	-4.01/-3.23	-2.49/-1.11	-1.62/-1.42	-2.18/-1.05	-0.03/0.38	1.4/0.76	-0.24/0.54	0.04/-0.57	-2.12/-3.02	-4.86/-5.61	-8.36/-8.08	-10.34/-10.62	-9.53/-8.84	-4.75/-3.46	-1.61/1.22	1.97/2.82	3.54/2.79	2.06/2.25	2.94/2.14	2.15/1.91	1.46/-0.1	-3/-5.96	-9.49/-6.87
Theta(112.5°)	-6.78/-7.37	-5.92/-4.54	-3.31/-1.1	-2.58/-3.23	-2.33/-0.73	1.43/1.6	0.78/-0.01	0.28/-0.08	-0.52/-1.71	-3.49/-4.72	-4.92/-6.3	-8.32/-7.46	-9.82/-9.36	-9.42/-6.19	-4.95/-5.01	-2.16/0.53	2.28/4.08	4.16/3.62	3.33/3.33	2.8/-0.12	1.55/0.69	-0.19/-3.39	-6.76/-7.75	-6.89/-6.45
Theta(120°)	-5.47/-5.9	-4.71/-3.36	-2.84/-1.99	-1.86/-2.29	-1.9/-1.57	-0.57/1.25	0.68/0.84	1.22/1.41	1.07/0.6	-0.81/-3.73	-4.5/-5.42	-7.53/-7.78	-9.16/-7.5	-9.42/-9.19	-6.07/-3.9	-3.02/-0.91	-0.08/2.31	2.72/3.7	1.87/1.71	2.09/0.3	-0.06/-2.37	-4.84/-4.11	-4.37/-6.46	-6.29/-4.79
Theta(127.5°)	-6.83/-7.55	-7.18/-7.06	-6.29/-2.21	-1.78/-1.78	-2.13/-1.52	-1.21/-0.44	-0.46/0.05	-0.15/-0.31	-0.22/-0.2	-2.24/-2.89	-4.34/-4.29	-6.18/-9.11	-8.19/-7	-6.43/-4.27	-2.08/-3.38	-3.16/-2.47	-2.13/-0.55	-0.71/-4.2	-1.36/0.48	-1.41/0.89	1.15/-1	-3.27/-2.37	-5.08/-10.08	-12.23/-10.27
Theta(135°)	-4.65/-5.02	-5.63/-4.19	-5.05/-5.11	-4.06/-1.51	0.45/1.46	1.55/1.4	0.64/-0.16	-0.56/0.04	-1.18/-2.42	-1.72/-1.81	-4.58/-5.02	-5.94/-5.84	-3.91/-7.27	-9.4/-7.77	-3.07/-3.21	-3.74/-0.97	-1.06/0.06	1.14/-0.58	-2.52/0.85	-0.56/-0.49	1.18/-3.22	-1.98/-4.83	-5/-6.69	-4.77/-4.69
Theta(142.5°)	-5.99/-4.81	-5.04/-3.21	-2.91/-4.01	-3.95/-3.39	-2.64/-1.28	-1.06/-1.95	-1.83/-2.17	-3.6/-4.47	-4.29/-3.85	-5.63/-4.76	-5.63/-7.1	-5.61/-5.66	-6.45/-6.88	-6.91/-3.58	0.68/1.39	2.23/3.13	0.71/0.84	-2.12/-2.2	-0.49/0.71	0.16/-3.33	-6.27/-4.85	-3.95/-4.49	-6.57/-8.18	
Theta(150°)	-5.43/-6.01	-4.62/-2.65	-0.7/-0.73	-1.76/-3.09	-2.84/-1.96	-1.96/-3.63	-5.47/-4.7	-3.28/-2.35	-1.88/-2.39	-3.95/-4.65	-6.03/-8.07	-9.44/-8.7	-7.25/-6.35	-5.88/-5.89	-5.33/-4.68	-3.71/-3.74	-3.6/-4.42	-6.91/-3.38	-1.87/-1.69	-0.21/0.02	-1.71/-2.04	-3.8/-6.35	-6.31/-6.41	-5.65/-5.06
Theta(157.5°)	-8.35/-9.19	-8.02/-6.64	-5.16/-5.62	-5.25/-3.53	-2.39/-2.18	-1.37/-0.6	-0.47/-0.71	-0.89/-1.47	-2.37/-4.08	-6.36/-7.42	-7.54/-7.65	-8.36/-8.42	-8.33/-8.13	-7.81/-7.78	-6.06/-4.53	-1.83/0.58	1.05/-0.07	-1.02/-1.49	-2.04/-1.98	-0.97/-1.29	-3.16/-4.18	-4.58/-5.37	-5.68/-5.13	-4.81/-5.9
Theta(165°)	-5.62/-7.4	-8/-6.52	-4.18/-2.57	-1.65/-1.1	-1.01/-1.49	-2.3/-2.27	-2.47/-2.53	-2.49/-2.67	-2.93/-3.22	-3.66/-3.99	-4.46/-4.89	-5.83/-7.42	-7.95/-6.74	-4.56/-1.64	-0.29/0.01	0.08/-0.41	-0.86/-1.46	-2.43/-3.86	-5.52/-5.79	-5.22/-4.95	-5.01/-4.4	-3.29/-2.94	-2.92/-3.22	-3.98/-4.76
Theta(172.5°)	-8.87/-6.91	-5.02/-3.78	-3.63/-3.54	-3.83/-4.09	-4.36/-5.06	-5.77/-5.24	-3.63/-2.47	-1.93/-1.64	-1.61/-1.95	-2.42/-3.32	-4.9/-6.19	-6.53/-5.89	-4.95/-4.85	-5.54/-5.83	-5.72/-6.87	-7.59/-6.73	-5.35/-5.17	-5.69/-5.93	-5.69/-4.99	-4.95/-4.65	-3.55/-2.91	-2.81/-3.92	-4.92/-6.26	-7.77/-9.36
Theta(180°)	-8.32/-8.14	-7.05/-5.72	-3.83/-2.41	-1.39/-0.61	-0.36/-0.56	-0.92/-0.92	-0.47/-0.1	0.21/0.38	0.18/0.06	-0.38/-0.82	-1.34/-1.44	-3.74/-5.08	-6.32/-6.73	-6.83/-6.49	-3.65/-2.23	-1.12/-0.59	-0.86/-1.52	-2.07/-2.44	-2.52/-1.96	-1.69/-1.28	-0.94/-1.25	-2.07/-3.54	-5.37/-6.97	-7.76/-7.66
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(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°)	0.01/0.28	0.39/0.35	0.1/-0.62	-1.11/-1.11	-1.25/-1.32	-1.75/-2.82	-3.95/-4.84	-5.59/-4.58	-3.23/-1.77	-0.56/0.04	0.41/0.43	0.35/0.33	0.44/0.35	0.34/0.24	-0.03/-0.48	-0.83/-1	-1.42/-1.71	-2.38/-3.54	-4.6/-5.03	-4.42/-3.67	-2.58/-1.69	-0.78/0.1	0.45/0.41	0.12/-0.26
Theta(7.5°)	-0.16/0.15	0.33/0.62	0.46/0.26	-0.12/-0.34	-0.96/-1.49	-2.08/-3.15	-4.22/-5.58	-5.74/-4.93	-3.62/-2.41	-1.63/-0.82	0.02/0.57	0.76/0.58	0.59/0.82	0.74/0.15	-0.34/-0.84	-1.35/-2.05	-3.08/-4.16	-5.34/-6.88	-7.46/-7.23	-6.24/-5.19	-3.99/-2.6	-1.56/-1.08	-1.06/-0.9	-1.01/-0.64
Theta(15°)	0.38/0.63	0.83/1.05	0.86/0.85	0.66/0.22	-0.38/-0.99	-1.84/-3.07	-4.09/-5.26	-5.44/-5.24	-4.26/-2.94	-2.09/-1.44	-0.83/-0.26	0.17/0.42	0.79/1.3	1.56/1.38	0.86/0.4	-0.16/-1.18	-2.33/-4.07	-6.17/-8.9	-10.09/-10.2	-9.03/-6.86	-5.07/-3.57	-2.49/-2.01	-1.27/-0.9	-0.6/-0.19
Theta(22.5°)	0.87/1.19	1.53/1.64	1.06/0.96	1.12/0.34	-0.27/-0.57	-1.39/-2.09	-2.8/-3.35	-3.86/-3.71	-2.41/-1.66	-1.04/-0.58	0.08/0.86	1.24/1.05	0.75/0.95	1.09/1.27	1.13/0.85	0.33/-0.21	-0.93/-2.13	-4.19/-5.89	-7.45/-7.8	-7.64/-5.63	-3.99/-3.18	-2.1/-1.2	-0.68/-0.67	-0.44/-0.12
Theta(30°)	2.08/2.61	2.65/2.55	1.63/1.23	0.78/0.03	-1.04/-1.47	-1.83/-2.31	-2.96/-3.23	-2.68/-2.6	-2.59/-1.92	-1.01/-0.67	-0.43/0.18	0.83/0.5	-0.32/-0.42	0.34/0.98	0.81/0.14	-0.62/-1.75	-3/-3.91	-3.66/-4.31	-5.21/-5.91	-4.47/-3.42	-2.71/-1.63	-0.43/0.66	0.97/1.24	1.17/1.86
Theta(37.5°)	1.21/1.99	2.25/1.29	0.75/0.89	0.11/-0.06	-0.02/-0.61	-2.4/-3.26	-3.2/-3.13	-3.03/-2.2	-1.9/-1.6	-0.74/-0.13	0.65/1.32	1.63/0.81	-0.63/-1.13	0.72/0.96	0.38/-0.22	-0.26/-0.64	-1.49/-2.26	-2.54/-3.05	-4.36/-3.72	-3.57/-2.69	-2.12/-2.41	-1.72/-0.4	0.25/0.85	1.68/1.95
Theta(45°)	0.39/0.63	1.07/0.57	1.48/2.25	1.4/0.4	-0.05/-0.54	-1.01/-1.36	-2.52/-2.85	-1.75/-0.36	0.28/-0.07	-0.17/0.52	1.29/1.09	0.92/1.66	1.51/0.71	0.94/0.45	-0.31/0.71	1.16/0.1	-1.3/-1.74	-2.11/-1.65	-2.05/-2.82	-2.95/-2.79	-2.13/-2.84	-2.55/0.24	1.33/1.31	1.53/1.06
Theta(52.5°)	0.1/55	1.95/1.53	1.36/0.42	1.51/1.17	-0.08/-1.12	-1.32/-1.67	-0.67/-0.36	0.16/0.08	-0.54/-0.67	-0.32/0.09	1.44/1.12	1.16/2.2	1.50/52	1.09/0.82	0.93/2.06	1.47/0.38	0.6/-0.42	-1.08/-1.1	-2.38/-2.57	-2.21/-2.5	-2.64/-2.11	-3.87/-1.43	0.49/0.46	0.89/0.55
Theta(60°)	0.67/1.51	0.71/0.81	1.24/1.14	2.18/2.27	2.05/1.5	0.51/-1.19	-1.01/-0.94	-1.05/-1.72	-1.52/-0.22	0.86/1.08	1.23/1.21	1.39/1.64	0.99/-0.17	-0.37/-0.06	0.66/2.09	1.27/0.53	0.41/0.65	0.48/-0.46	-0.52/-2.9	-2.2/-2.7	-3.19/-4.07	-3.85/-3	-0.78/0.53	0.82/0.32
Theta(67.5°)	-0.58/2.13	0.42/1.42	1.07/2.27	2.44/1.81	1.04/0.27	0.76/0.67	0.23/-0.72	-3.03/-2.68	-1.03/-0.16	-0.06/0.34	0.45/0.34	0.86/0.55	0.86/1.47	0.55/0.28	1.12/1.58	-0.18/-0.18	-0.54/-0.05	1.81/0.65	-1.71/-3.95	-2.76/0.41	-3.73/-3.9	-3.02/-5.63	-1.19/-1.87	-0.72/-1.48
Theta(75°)	-1.73/0.84	0.66/2.11	0.27/0.96	1.65/1.23	1.07/0.55	0.13/-0.33	-1.29/-1.38	-1.73/-0.68	-1.45/-0.49	-0.11/-0.13	-0.81/-0.75	1.46/0.99	0.78/0.21	-0.03/0.85	0.08/1.18	1.07/1.9	0.92/3.01	3.11/1.89	0.83/-0.75	-1.19/1.28	-2.6/-2.95	-2.07/-9.48	-3.37/-2.55	-1.87/-3.32
Theta(82.5°)	-1.28/-0.3	0.33/1.22	0.79/1.1	1.15/2.77	1.41/0.85	-0.16/-0.99	-1.44/-1.54	-1.41/0.5	0.77/0.83	0.22/-0.18	0.65/0.67	2.73/1.51	1.81/0.56	-0.24/1.82	-0.16/0.71	1.31/0.79	1.13/3.13	3.85/3.91	1.69/0.21	-0.38/1.34	-4.59/-3.96	-3.94/-6.21	-4.91/-1.42	-1.38/-2.05
Theta(90°)	-2.42/-0.53	0.59/0.97	-0.11/-46	2.16/1.88	0.1/0.84	0.93/-0.21	-0.33/-0.17	-0.41/-1.7	0.79/0.52	-0.23/0.15	0.43/0.24	2.08/-0.1	1.4/0.95	-1.71/0.98	-2.05/-1.8	2.22/0.04	-0.51/2.68	2.52/1.62	-1.44/0.09	2.95/2.87	-4.57/-9.82	-1.2/-7.02	-7.61/-5.44	-5.31/-5.44
Theta(97.5°)	-4.83/-0.44	0.44/0.65	-0.68/1.28	2.11/1.86	0.82/0.67	0.43/0.43	1.08/1.82	1.66/0.94	1.11/-0.06	-0.46/0.78	1.36/0.29	0.99/0.4	0.39/-0.34	-1.6/0.73	-0.02/1.61	2.11/0.81	0.51/2.81	2.43/0.16	-3.98/0.17					



Radiated Composite Gain Data of 2.4GHz&5GHz

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(7.5)	Phi(22.5)	Phi(37.5)	Phi(52.5)	Phi(67.5)	Phi(82.5)	Phi(97.5)	Phi(112.5)	Phi(127.5)	Phi(142.5)	Phi(157.5)	Phi(172.5)	Phi(187.5)	Phi(202.5)	Phi(217.5)	Phi(232.5)	Phi(247.5)	Phi(262.5)	Phi(277.5)	Phi(292.5)	Phi(307.5)	Phi(322.5)	Phi(337.5)	Phi(352.5)	Phi(367.5)	Phi(382.5)	Phi(397.5)	Phi(412.5)	Phi(427.5)	Phi(442.5)	Phi(457.5)	Phi(472.5)	Phi(487.5)	Phi(502.5)	Phi(517.5)	Phi(532.5)		
Theta(0°)	-18.84-15.48	-17.34-19.38	-18.23-16.44	-15.43-12.78	-11.65-11.72	-12.29-12.99	-12.07-11.89	-12.53-13.99	-16.13-17.73	-18.29-18.73	-18.64-17.46	-18.93-16.58	-16.25-17.73	-19.01-17.66	-17.58-14.12	-11.73-10.11	-9.14-8.88	-8.72-8.92	-8.81-8.58	-8.79-8.58	-8.61-8.58	-11.03-13.45	-16.93-19.09	-18.05-18.45	-17.81-18.56	-18.87-18.86	-17.81-19.33	-18.41-19.49	-18.84-19.28	-15.46-14.49								
Theta(15°)	-14.48-16.61	-19.03-18.3	-18.45-17.02	-13.37-11.37	-11.02-11.85	-12.86-12.78	-12.26-12.45	-13.71-15.99	-18.27-19.4	-19.11-18.13	-18.4-18.7	-17.9-16.41	-16.55-19.09	-17.97-17.67	-18.43-15.76	-12.83-10.94	-9.75-9.18	-8.87-8.5	-8.07-7.88	-8.16-6.97	-10.77-13.62	-18.47-18.66	-18.94-18.28	-15.46-14.49														
Theta(30°)	-18.19-18.15	-17.97-18.6	-19.96-16.44	-13.82-12.66	-12.87-13.91	-14.43-13.9	-13.47-13.86	-15.45-18.26	-18.38-19.4	-18.18-19.91	-19.15-18.71	-17.77-16.25	-16.71-19.17	-18.31-10.76	-18.31-10.76	-13.92-11.88	-10.43-9.61	-9.18-8.85	-8.39-8.12	-8.31-9.13	-10.68-13.33	-17.64-18.89	-18.41-19.7	-17.16-16.82														
Theta(45°)	-19.24-17.98	-19.31-18.91	-17.81-15.44	-14.21-14.15	-14.97-15.73	-15.57-15.02	-14.81-15.22	-16.8-19.83	-18.27-18.33	-19.26-18.77	-17.44-16.32	-14.44-13.68	-14.22-16.14	-19.13-18.53	-18.47-17.66	-14.87-12.94	-11.41-10.42	-9.9-9.61	-9.29-8.89	-8.86-9.53	-10.96-13.47	-17.71-18.56	-18.87-18.86	-17.81-18.56														
Theta(60°)	-18.71-18.58	-18.94-17.83	-16.02-14.63	-14.29-15.45	-17.35-19.05	-18.89-17.31	-15.76-14.59	-14.34-15.31	-17.18-18.37	-17.93-18.01	-17.35-17.3	-15.03-13.73	-13.32-13.55	-14.16-14.83	-15.47-15.9	-15.66-14.59	-13.58-12.95	-12.66-12.68	-12.79-12.75	-12.59-12.77	-13.69-15.6	-18.09-18.43	-19.91-18.37	-19.06-18.82														
Theta(75°)	-17.97-16.75	-15.88-15.73	-14.88-14.37	-15.31-18.24	-18.08-18.55	-18.46-17.09	-14.81-13.59	-13.12-12.99	-12.44-11.74	-11.67-12.58	-14.46-16.97	-18.52-18.04	-16.64-15.24	-14.08-13.16	-12.62-12.55	-12.71-12.62	-12.65-13.32	-14.21-15.04	-16.29-17.94	-17.51-18.53	-17.42-16.52	-16.83-18.47	-18.93-19.09	-18.43-18.52														
Theta(90°)	-17.92-16.59	-16.73-17.06	-16.87-17.03	-18.69-18.56	-18.58-18.83	-18.37-17.58	-18.14-18.24	-16.91-14.12	-11.21-9.44	-8.89-9.66	-11.63-14.66	-18.97-17.91	-19.17-17.2	-18.93-16.97	-14.9-13.74	-13.25-12.89	-12.65-13.27	-14.75-17.1	-18.05-19.4	-18.31-18.89	-17.48-18.58	-16.64-16.44	-18.59-18.06	-18.62-18.02														
Theta(105°)	-18.02-17.9	-17.67-18.37	-19.04-19.03	-18.56-17.07	-16.33-16.55	-17.76-18.14	-18.01-17.8	-14.97-12.52	-10.95-10.01	-9.77-10.58	-12.49-15.31	-18.31-18.21	-17.98-18.64	-18.89-19.25	-18.83-17.97	-17.15-15.6	-14.68-14.48	-14.91-16.72	-18.81-16.4	-13.97-13.83	-15.67-16.97	-15.41-14.76	-16.67-17.48	-18.02-18.52														
Theta(120°)	-14.34-14.49	-15.41-15.97	-15.76-14.75	-12.94-11.37	-10.76-11.29	-10.37-17.54	-19.16-18.68	-13.71-12.18	-12.32-12.93	-13.18-13.49	-13.75-17.4	-14.02-15.81	-18.01-19.1	-18.67-13.49	-18.31-19.7	-19.28-18.52	-15.65-13.32	-12.91-14.42	-15.11-12.11	-10.25-10.38	-12.88-14.89	-18.51-19.27	-18.29-18.96	-19.37-16.1														
Theta(135°)	-13.26-13.43	-13.67-14.08	-14.65-15.07	-14.23-12.99	-12.34-12.64	-14.08-17.22	-17.82-17.42	-15.86-15.53	-14.83-14.21	-13.95-13.35	-12.31-11.61	-12.12-14.75	-18.27-17.95	-18.41-17.36	-17.21-18.04	-18.31-18.3	-18.74-16.07	-14.39-14.63	-13.22-10.45	-8.9-8.86	-10.71-14.74	-18.32-18.12	-18.41-16.52	-14.38-13.54														
Theta(150°)	-18.91-17.63	-16.15-16.48	-18.25-18.27	-18.63-17.82	-17.77-17.15	-18.47-18.25	-18.32-17.71	-18.85-18.35	-15.18-12.44	-12.39-13.26	-13.48-13.36	-14.06-16.66	-17.44-19.12	-18.17-17.25	-16.53-16.86	-18.28-18.75	-17.78-18.01	-16.31-13.89	-12.31-12.22	-10.39-10.22	-10.94-11.89	-12.12-11.98	-11.89-12.14	-13.57-16.2														
Theta(165°)	-18.13-18.48	-18.21-17.75	-18.34-19.01	-17.94-18.76	-19.22-19.56	-17.81-18.22	-17.88-19.1	-18.51-18.94	-15.41-13.85	-14.81-17.53	-18.11-14.7	-18.74-17.41	-18.22-17.16	-18.89-19.33	-18.51-16.35	-15.28-15	-15.42-16.07	-15.25-12.93	-12.06-13.14	-15.81-17.76	-15.89-12.58	-10.55-9.89	-10.45-12.24	-16.12-18.8														
Theta(180°)	-19.33-18.92	-17.99-18.17	-18.66-18.67	-18.84-18.52	-19.27-17.78	-17.25-16.81	-18.44-18.76	-18.27-18.21	-18.26-18.59	-18.41-17.75	-17.71-17.48	-18.39-18.61	-17.71-18.62	-18.91-19.63	-17.21-15	-13.58-13.54	-14.37-15.68	-15.62-13.1	-11.54-12.12	-15.21-17.47	-17.59-12.73	-10.52-9.38	-11.05-14.93	-17.91-18.7														
Theta(195°)	-17.27-19.06	-18.85-12.73	-10.57-10.58	-12.22-15.79	-18.74-18.39	-15.97-14.19	-14.31-15.11	-15.39-14.87	-14.41-14.71	-14.93-14.49	-14.13-14.92	-17.27-17.65	-17.44-17.85	-19-18.27	-18-19.45	-18.31-17.91	-16.45-14.95	-13.22-11.33	-10.55-11.7	-15.51-17.82	-18.63-12.08	-8.61-7.84	-9.29-12.68	-17.71-18.7														
Theta(210°)	-14.34-10.32	-8.63-8.51	-9.62-12.25	-16.74-18.99	-19.41-16.3	-15.41-17.3	-13.66-12.33	-11.55-11.7	-12.25-12.29	-12.01-12.35	-13.41-13.66	-13.16-13.23	-15.29-13.3	-18.84-17.7	-17.28-17.03	-16.08-16.21	-15.93-14.31	-16.63-17.45	-15.89-12.58	-15.77-19.17	-15.73-10.99	-7.69-6.32	-6.9-9.09	-12.77-17.8														
Theta(225°)	-17.81-18.64	-14.51-11.9	-10.13-10.68	-12.38-15.42	-19.56-15.84	-17.05-19.06	-17.46-15.47	-14.41-12.63	-11.56-11.51	-11.94-11.92	-11.34-11.15	-11.81-12.49	-12.41-12.89	-16.94-18.81	-18.09-17.68	-18.81-18.5	-15.65-14.77	-13.21-12.6	-13.09-13.92	-13.65-13.01	-12.61-10.67	-9.19-7.17	-9.71-10.48	-12.77-18.42														
Theta(240°)	-19.43-18.39	-13.65-11.1	-10.53-11.24	-12.48-14.71	-17.9-18.56	-18.33-19.34	-17.86-18.22	-17.54-16.47	-13.97-13.02	-13.02-13.23	-13.35-14.1	-16.04-19.47	-19.21-18.57	-18.95-17.9	-17.96-16.79	-13.87-12.27	-11.81-11.61	-11.42-11.31	-11.59-12.36	-13.76-14.82	-13.83-10.95	-8.82-8.55	-10.08-12.84	-15.01-16.44														
Theta(255°)	-11.49-11.91	-10.52-9.34	-8.89-9.05	-9.45-10.7	-12.38-12.93	-12.39-12.48	-13.55-15.1	-15.96-15.31	-13.85-12.73	-12.49-13.04	-13.98-14.82	-15.73-16.61	-17.03-16.81	-16.96-17.54	-17.82-17.67	-17.44-17.24	-17.31-17.69	-18.57-19.12	-18.06-16.25	-14.96-13.17	-10.58-9.79	-6.45-6.28	-7.07-7.9	-8.53-9.69														
Theta(270°)	-8.65-9.15	-8.19-7.59	-7.39-7.49	-8.23-9.99	-12.43-11.69	-11.78-11.17	-10.41-9.98	-10.12-10.88	-12.33-14.27	-16.61-17.21	-15.14-14.93	-12.92-13.13	-13.77-14.29	-15.09-15.64	-15.84-15.61	-15.77-17.42	-17.89-18.02	-19.25-13.76	-11.87-8.48	-6.41-6.52	-8.87-8.48	-14.11-10.9																
Theta(285°)	-9.68-8.56	-7.71-7.2	-7.02-7.27	-8.18-10.14	-12.66-15.17	-16.31-16.43	-16.11-15.66	-15.15-14.29	-13.36-12.95	-13.19-14.36	-16.81-19.27	-18.72-19.01	-17.04-14.54	-13.66-13.66	-14.12-14.72	-16.64-16.64	-16.88-16.27	-15.69-16.05	-16.99-17.79	-17.51-16	-13.15-10.24	-8.25-7.62	-8.2-9.67	-10.81-10.5														
Theta(300°)	-8.63-8.57	-7.87-7.37	-7.18-7.3	-7.94-9.87	-10.18-11.36	-12.58-13.93	-15.46-16.81	-17.94-19.11	-18.61-18.39	-18.43-17.79	-17.61-15.34	-13.27-11.85	-11.71-11.18	-12.04-13.48	-15.53-18.3	-19-18.72	-17.81-16.32	-14.33-13.04	-12.36-12.58	-13.36-14.01	-13.73-16.69	-11.89-12.72	-13.99-14.54	-14.11-13.23														
Theta(315°)	-9.08-8.14	-7.61-7.22	-6.94-6.92	-7.21-7.74	-8.18-8.39	-8.61-9.92	-9.46-9.92	-10.19-10.29	-10.48-10.71	-10.89-10.84	-10.47-9.21	-9.45-10.4	-12.12-13.66	-18.35-17.81	-15.36-13.5	-12.29-11.34	-10.93-11.29	-12.39-13.63	-14.27-14.29	-14.84-16.28	-18.64-19.68	-14.11-10.9																
Theta(330°)	-8.44-8.12	-7.44-7.03	-6.61-6.29	-6.22-6.47	-6.64-6.5	-6.21-6.09	-6.19-6.34	-6.36-6.25	-6.11-6.12	-6.34-6.66	-10.71-7.73	-8.43-9.26	-10.35-11.97	-14.29-17.13	-17.72-15.14	-14.33-12.24	-11.55-11.25	-11.52-12.57	-14.33-16.26	-17.42-17.17	-18.88-18.24	-17.98-18.98	-16.38-11.91															
Theta(345°)	-10.59-8.85	-7.88-7.17	-6.52-6.01	-5.85-5.92	-5.93-5.69	-5.3																																



Radiated Composite Gain Data of 2.4GHz&5GHz

Appendix A

Theta (°)	-13.44-12.21	-15.72-16.99	-18.01-19.11	-18.92-18.3	-17.21-18.77	-17.57-15.36	-14.61-13.81	-13.02-11.57	-11.68-12.32	-15.06-16.54	-18.06-18.5	-17.5-12.19	-11.29-13.3	-18.05-18.48	-18.79-14.71	-18.44-15.84	-13.74-11.89	-11.04-10.8	-10.88-10.76	-12.96-15.14	-18.02-17.42	-17.95-18.58	-18.77-18.59	-18.72-14.78	
Theta (30°)	-10.31-10.23	-14.39-18.05	-18.48-17.44	-17.98-16.95	-15.33-16.32	-18.92-17.81	-17.63-18.28	-18.84-14.94	-10.89-8.65	-7.55-7.31	-8.02-10.17	-11.02-9.4	-8.74-10.2	-15.79-18.19	-16.96-14.72	-15.16-18.69	-18.78-15.42	-15.13-17.55	-18.84-17.61	-15.62-15.53	-17.61-17.5	-17.73-12.91	-10.85-10.97	-13.68-11.72	
Theta (45°)	-13.06-11.31	-7.67-6.46	-8.42-10.73	-12.11-15.11	-18.96-18.02	-17.41-16.86	-14.78-14.37	-15.52-15.6	-10.48-9.34	-10.11-9.03	-7.79-9.94	-13.41-12.54	-10.63-10.62	-12.32-13.78	-17.03-17.85	-17.47-17.5	-19.14-19.31	-16.27-16.09	-10.91-9.65	-12.30-10.5	-8.64-7.81	-11.37-11.79	-10.17-13.76	-11.13-11.94	
Theta (60°)	-19.10-13.3	-7.27-8.06	-10.06-11.06	-14.71-13.1	-14.63-18.17	-19.66-14.17	-14.82-17.2	-14.31-13.25	-15.06-16.21	-19.16-27	-17.19-12.52	-10.16-13.07	-9.7-8.98	-9.89-12.06	-13.89-16.43	-18.34-17.49	-17.53-15.03	-11.81-11.41	-15.38-18.32	-18.07-18.51	-10.89-14.93	-6.65-14.4	-17.11-17.26	-19.04-18.47	
Theta (75°)	-18.46-12.88	-9.58-9.92	-10.46-10.75	-10.03-10.87	-18.48-13.5	-11.14-17.96	-15.07-15.26	-19.24-18.48	-18.38-18.25	-18.64-18.59	-13.91-17.12	-17.7-17.48	-19.23-19.13	-18.24-16.96	-13.71-14.52	-18.91-14.39	-16.86-15.76	-13.95-17.57	-19.07-17.33	-18.64-18.69	-15.25-16.03	-18.1-18.66	-13.84-12.98	-17.79-17.75	
Theta (90°)	-11.59-10.17	-8.96-9.19	-12.45-14.14	-9.41-11.22	-18.75-18.31	-16.52-19.24	-9.56-7.5	-8.48-10.93	-18.85-19.1	-17.6-18.54	-15.17-17.18	-17.37-15.88	-14.86-16.98	-17.05-14.24	-10.27-17.3	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.63-17.63	-18.82-19.36
Theta (105°)	-9.86-8.65	-7.11-9.65	-9.99-12.79	-7.73-9.33	-16.09-14.5	-17.96-18.54	-17.8-19.2	-17.82-15.74	-14.98-18.24	-15.05-13.87	-13.04-12.9	-17.08-17.45	-15.06-15.1	-12.91-17.91	-15.28-9.83	-8.97-17.65	-17.64-14.02	-11.09-11.95	-15.13-18.46	-18.37-18.88	-8.09-8.45	-12.87-12.77	-9.02-10.42	-17.9-14.63	
Theta (120°)	-12.87-9.46	-7.25-8.2	-7.79-9.33	-17.81-18.62	-9.65-10.3	-17.82-15.01	-15.99-17.64	-18.86-18	-14.31-10.62	-17.69-17.24	-9.47-9.72	-12.83-15.95	-17.02-16.51	-17.29-16.72	-11.32-13.76	-17.13-18.48	-15.22-14.31	-14.37-9.2	-6.46-16.26	-10.22-18.89	-9.62-16.87	-10.22-18.89	-9.62-16.87	-10.22-18.89	
Theta (135°)	-13.29-13.14	-8.54-8.85	-13.02-13.54	-7.58-8.82	-18.37-14.99	-10.99-12.37	-12.26-14.16	-18.51-18.05	-17.59-17.34	-18.27-14.91	-14.93-11.83	-12.2-15.86	-17.04-17.74	-18.99-18.18	-17.87-17.8	-16.95-18.57	-17.48-18.71	-18.53-18.19	-14.99-18.82	-18.36-17.64	-17.95-18.36	-18.31-13.83	-10.48-13.19	-17.93-18.79	
Theta (150°)	-18.46-12.88	-9.58-9.92	-10.46-10.75	-10.03-10.87	-18.48-13.5	-11.14-17.96	-15.07-15.26	-19.24-18.48	-18.38-18.25	-18.64-18.59	-13.91-17.12	-17.7-17.48	-19.23-19.13	-18.24-16.96	-13.71-14.52	-18.91-14.39	-16.86-15.76	-13.95-17.57	-19.07-17.33	-18.64-18.69	-15.25-16.03	-18.1-18.66	-13.84-12.98	-17.79-17.75	
Theta (165°)	-11.59-10.17	-8.96-9.19	-12.45-14.14	-9.41-11.22	-18.75-18.31	-16.52-19.24	-9.56-7.5	-8.48-10.93	-18.85-19.1	-17.6-18.54	-15.17-17.18	-17.37-15.88	-14.86-16.98	-17.05-14.24	-10.27-17.3	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.63-17.63	-18.82-19.36
Theta (180°)	-9.86-8.65	-7.11-9.65	-9.99-12.79	-7.73-9.33	-16.09-14.5	-17.96-18.54	-17.8-19.2	-17.82-15.74	-14.98-18.24	-15.05-13.87	-13.04-12.9	-17.08-17.45	-15.06-15.1	-12.91-17.91	-15.28-9.83	-8.97-17.65	-17.64-14.02	-11.09-11.95	-15.13-18.46	-18.37-18.88	-8.09-8.45	-12.87-12.77	-9.02-10.42	-17.9-14.63	
Theta (225°)	-13.29-13.14	-8.54-8.85	-13.02-13.54	-7.58-8.82	-18.37-14.99	-10.99-12.37	-12.26-14.16	-18.51-18.05	-17.59-17.34	-18.27-14.91	-14.93-11.83	-12.2-15.86	-17.04-17.74	-18.99-18.18	-17.87-17.8	-16.95-18.57	-17.48-18.71	-18.53-18.19	-14.99-18.82	-18.36-17.64	-17.95-18.36	-18.31-13.83	-10.48-13.19	-17.93-18.79	
Theta (270°)	-19.10-13.3	-7.27-8.06	-10.06-11.06	-14.71-13.1	-14.63-18.17	-19.66-14.17	-14.82-17.2	-14.31-13.25	-15.06-16.21	-19.16-27	-17.19-12.52	-10.16-13.07	-9.7-8.98	-9.89-12.06	-13.89-16.43	-18.34-17.49	-17.53-15.03	-11.81-11.41	-15.38-18.32	-18.07-18.51	-10.89-14.93	-6.65-14.4	-17.11-17.26	-19.04-18.47	
Theta (315°)	-18.46-12.88	-9.58-9.92	-10.46-10.75	-10.03-10.87	-18.48-13.5	-11.14-17.96	-15.07-15.26	-19.24-18.48	-18.38-18.25	-18.64-18.59	-13.91-17.12	-17.7-17.48	-19.23-19.13	-18.24-16.96	-13.71-14.52	-18.91-14.39	-16.86-15.76	-13.95-17.57	-19.07-17.33	-18.64-18.69	-15.25-16.03	-18.1-18.66	-13.84-12.98	-17.79-17.75	
Theta (360°)	-11.59-10.17	-8.96-9.19	-12.45-14.14	-9.41-11.22	-18.75-18.31	-16.52-19.24	-9.56-7.5	-8.48-10.93	-18.85-19.1	-17.6-18.54	-15.17-17.18	-17.37-15.88	-14.86-16.98	-17.05-14.24	-10.27-17.3	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.63-17.63	-18.82-19.36
Theta (405°)	-9.86-8.65	-7.11-9.65	-9.99-12.79	-7.73-9.33	-16.09-14.5	-17.96-18.54	-17.8-19.2	-17.82-15.74	-14.98-18.24	-15.05-13.87	-13.04-12.9	-17.08-17.45	-15.06-15.1	-12.91-17.91	-15.28-9.83	-8.97-17.65	-17.64-14.02	-11.09-11.95	-15.13-18.46	-18.37-18.88	-8.09-8.45	-12.87-12.77	-9.02-10.42	-17.9-14.63	
Theta (450°)	-12.87-9.46	-7.25-8.2	-7.79-9.33	-17.81-18.62	-9.65-10.3	-17.82-15.01	-15.99-17.64	-18.86-18	-14.31-10.62	-17.69-17.24	-9.47-9.72	-12.83-15.95	-17.02-16.51	-17.29-16.72	-11.32-13.76	-17.13-18.48	-15.22-14.31	-14.37-9.2	-6.46-16.26	-10.22-18.89	-9.62-16.87	-10.22-18.89	-9.62-16.87	-10.22-18.89	
Theta (525°)	-13.29-13.14	-8.54-8.85	-13.02-13.54	-7.58-8.82	-18.37-14.99	-10.99-12.37	-12.26-14.16	-18.51-18.05	-17.59-17.34	-18.27-14.91	-14.93-11.83	-12.2-15.86	-17.04-17.74	-18.99-18.18	-17.87-17.8	-16.95-18.57	-17.48-18.71	-18.53-18.19	-14.99-18.82	-18.36-17.64	-17.95-18.36	-18.31-13.83	-10.48-13.19	-17.93-18.79	
Theta (570°)	-18.46-12.88	-9.58-9.92	-10.46-10.75	-10.03-10.87	-18.48-13.5	-11.14-17.96	-15.07-15.26	-19.24-18.48	-18.38-18.25	-18.64-18.59	-13.91-17.12	-17.7-17.48	-19.23-19.13	-18.24-16.96	-13.71-14.52	-18.91-14.39	-16.86-15.76	-13.95-17.57	-19.07-17.33	-18.64-18.69	-15.25-16.03	-18.1-18.66	-13.84-12.98	-17.79-17.75	
Theta (615°)	-11.59-10.17	-8.96-9.19	-12.45-14.14	-9.41-11.22	-18.75-18.31	-16.52-19.24	-9.56-7.5	-8.48-10.93	-18.85-19.1	-17.6-18.54	-15.17-17.18	-17.37-15.88	-14.86-16.98	-17.05-14.24	-10.27-17.3	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.63-17.63	-18.82-19.36
Theta (660°)	-9.86-8.65	-7.11-9.65	-9.99-12.79	-7.73-9.33	-16.09-14.5	-17.96-18.54	-17.8-19.2	-17.82-15.74	-14.98-18.24	-15.05-13.87	-13.04-12.9	-17.08-17.45	-15.06-15.1	-12.91-17.91	-15.28-9.83	-8.97-17.65	-17.64-14.02	-11.09-11.95	-15.13-18.46	-18.37-18.88	-8.09-8.45	-12.87-12.77	-9.02-10.42	-17.9-14.63	
Theta (705°)	-12.87-9.46	-7.25-8.2	-7.79-9.33	-17.81-18.62	-9.65-10.3	-17.82-15.01	-15.99-17.64	-18.86-18	-14.31-10.62	-17.69-17.24	-9.47-9.72	-12.83-15.95	-17.02-16.51	-17.29-16.72	-11.32-13.76	-17.13-18.48	-15.22-14.31	-14.37-9.2	-6.46-16.26	-10.22-18.89	-9.62-16.87	-10.22-18.89	-9.62-16.87	-10.22-18.89	
Theta (750°)	-13.29-13.14	-8.54-8.85	-13.02-13.54	-7.58-8.82	-18.37-14.99	-10.99-12.37	-12.26-14.16	-18.51-18.05	-17.59-17.34	-18.27-14.91	-14.93-11.83	-12.2-15.86	-17.04-17.74	-18.99-18.18	-17.87-17.8	-16.95-18.57	-17.48-18.71	-18.53-18.19	-14.99-18.82	-18.36-17.64	-17.95-18.36	-18.31-13.83	-10.48-13.19	-17.93-18.79	
Theta (825°)	-19.10-13.3	-7.27-8.06	-10.06-11.06	-14.71-13.1	-14.63-18.17	-19.66-14.17	-14.82-17.2	-14.31-13.25	-15.06-16.21	-19.16-27	-17.19-12.52	-10.16-13.07	-9.7-8.98	-9.89-12.06	-13.89-16.43	-18.34-17.49	-17.53-15.03	-11.81-11.41	-15.38-18.32	-18.07-18.51	-10.89-14.93	-6.65-14.4	-17.11-17.26	-19.04-18.47	
Theta (870°)	-18.46-12.88	-9.58-9.92	-10.46-10.75	-10.03-10.87	-18.48-13.5	-11.14-17.96	-15.07-15.26	-19.24-18.48	-18.38-18.25	-18.64-18.59	-13.91-17.12	-17.7-17.48	-19.23-19.13	-18.24-16.96	-13.71-14.52	-18.91-14.39	-16.86-15.76	-13.95-17.57	-19.07-17.33	-18.64-18.69	-15.25-16.03	-18.1-18.66	-13.84-12.98	-17.79-17.75	
Theta (915°)	-11.59-10.17	-8.96-9.19	-12.45-14.14	-9.41-11.22	-18.75-18.31	-16.52-19.24	-9.56-7.5	-8.48-10.93	-18.85-19.1	-17.6-18.54	-15.17-17.18	-17.37-15.88	-14.86-16.98	-17.05-14.24	-10.27-17.3	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.11-9.95	-14.71-13.24	-10.24-14.23	-7.57-11.01	-11.63-17.63	-18.82-19.36
Theta (960°)	-9.86-8.65	-7.11-9.65	-9.99-12.79	-7.73-9.33	-16.09-14.5	-17.96-18.54	-17.8-19.2	-17.82-15.74	-14.98-18.24	-15.05-13.87	-13.04-12.9	-17.08-17.45	-15.06-15.1	-12.91-17.91	-15.28-9.83	-8.97-17.65	-17.64-14.02	-11.09-11.95	-15.13-18.46	-18.37-18.88	-8.09-8.45	-12.87-12.77	-9.02-10.42	-17.9-14.63	
Theta (1005°)	-12.87-9.46	-7.25-8.2	-7.79-9.33	-17.81-18.62	-9.65-10.3	-17.82-15.01	-15.99-17.64	-18.86-18	-14.31-10.62	-17.69-17.24	-9.47-9.72	-12.83-15.95	-17.02-16.51	-17.29-16.72	-11.32-13.76	-17.13-18.48	-15.22-14.31	-14.37-9.2	-6.46-16.26	-10.22-18.89	-9.62-16.87	-10.22-18.89	-9.62-16.87	-10.22-18.89	
Theta (1050°)	-13.29-13.14	-8.54-8.85	-13.02-13.54	-7.58-8.82	-18.37-14.99	-10.99-																			



Radiated Composite Gain Data of 2.4GHz&5GHz

Appendix A

Theta (112.5°)	-11.36/9.41	-8.54/5.44	-4.91/1.81	-6.96/9.82	-9.98/4.58	-2.37/2.25	-1.51/0.63	0.58/0.47	-0.72/0.88	-1.42/2.07	-3.73/-6.32	-9.52/13.14	-19.24/17.68	-13.02/8.46	-10.06/8.33	-5.49/-3.77	-0.46/0.73	-1.06/2.38	-2.34/-0.61	-3.26/2.73	-0.71/1.63	-4.8/6.87	-10.14/-18.88	-16.03/-15.94
Theta (120°)	-11.14/-8.05	-12.3/-10.87	-12.09/-8.89	-3.96/-4.15	-8.36/-3.01	-1/0.99	-0.29/0.03	-0.13/-0.72	-1.02/-6.61	-0.87/-2.28	-2.99/-3.62	-4.67/-6.83	-8.39/-7.38	-9.66/-9.38	-5.96/-8.33	-3.69/-1.87	0.15/-2.59	-5.22/-7.92	-4.82/-1.61	-5.83/-7.83	-3.95/-2.53	-2.47/-3.84	-9.21/-18.17	-17.59/-18.5
Theta (127.5°)	-7.78/-2.57	-6.28/-5.8	-5.98/-4.5	-2.82/-3.89	-3.57/-3.07	-0.72/0.66	-0.05/0.47	-0.83/-1.48	-1.93/-2.23	-2.02/0.8	-1.38/-1.88	-2.08/-4.84	-7.19/-6.83	-5.07/-6.42	-1.17/-3.22	-5.47/-0.25	-1.81/-3.02	-5.93/-12.45	-5.91/-2.93	-9.5/-8.85	-5.23/-6.44	-11.41/-10.22	-6.83/-8.69	-13.11/-12.09
Theta (135°)	-11.86/-8.53	-5/6.07	-6.89/-6.46	-5.39/-5.83	-8.3/-6.71	-7.14/-5.2	-1.77/0.18	0.79/0.27	-3.12/-4.49	-3.16/-2.63	-2.37/-1.77	-3.87/-7.2	-5.65/-7.44	-17.68/-19.03	-14.3/-7.61	-0.11/-1.13	-5.58/-4.9	-13.12/-9.44	-14.21/-5.09	-15.47/-12.28	-15.31/-7.59	-5.85/-7.22	-11.04/-12.12	-18.73/-13
Theta (142.5°)	-10.97/-8.24	-6.12/-5.83	-5.53/-5.46	-7.37/-7.67	-6.05/-2.61	-0.44/-0.83	-1.23/-0.47	0.07/0.65	0.91/-0.22	-2.64/-9	-7.57/-10.87	-11.78/-9.19	-7.35/-6.68	-5.94/-6.7	-8.62/-3.2	-2/-3.34	0.07/0.76	-1.86/-2.15	-5.96/-5.23	-4.87/-6.68	-9.72/-14.29	-12.24/-16.91	-16.79/-18	-14.78/-12.94
Theta (150°)	-16.76/-15.38	-17.83/-12.84	-7.61/-4.73	-3.62/-2.8	-1.46/-0.39	0.26/0.32	-0.42/-1.35	-1.15/-0.57	-0.73/-1.54	-2.83/-4.86	-7.83/-10.62	-12.59/-15.08	-14.25/-10.95	-9.91/-11.76	-12.85/-13.96	-17.16/-9.33	-8.19/-10.73	-8.62/-10.09	-14.42/-11.12	-18.33/-10.86	-8.23/-12.46	-16.77/-19.39	-18.51/-17.86	-18.02/-18.49
Theta (157.5°)	-8.9/-10.17	-14.38/-18.44	-12.7/-8.68	-6.45/-5.2	-3.74/-2.37	-1.53/-1.29	-1.72/-9.8	-3.94/-4.03	-3.93/-3.98	-3.93/-3.92	-4.24/-5.36	-7.47/-10.08	-12.8/-17.78	-18.53/-12.54	-9.16/-7.47	-5.86/-5.19	-6.18/-7.89	-9.21/-10.47	-13.34/-14.41	-8.97/-6.75	-8.36/-13.75	-15.02/-13.41	-14.65/-12.54	-9.94/-9.08
Theta (165°)	-13.81/-14.09	-13.85/-11.55	-8.19/-5.56	-3.29/-2.39	-1.61/-1.06	-0.98/-1.15	-1.46/-2.13	-3.43/-5.11	-6.67/-7.8	-8.88/-9.86	-11.04/-12.63	-15.29/-12.72	-16.67/-16.15	-10.6/-7.64	-6.71/-7.52	-10.46/-16.82	-17.81/-15.84	-12.06/-11.15	-13.56/-18.7	-15.88/-12.9	-12.98/-13.84	-13.03/-11.79	-12.99/-15.22	-14.43/-14
Theta (172.5°)	-14.42/-13.41	-11.49/-9.53	-7.83/-6.75	-6.17/-6.47	-7.54/-8.7	-10.21/-12.46	-14.89/-18.7	-18.98/-19.01	-15.51/-12.3	-9.95/-8.54	-7.67/-7.02	-6.43/-5.9	-5.57/-5.7	-6.54/-7.52	-7.78/-6.93	-5.32/-3.89	-3.03/-2.94	-3.31/-4.39	-12.47/-14.91	-16.58/-19.69	-17.72/-13.76	-13.27/-14.45	-14.37/-14.39	
Theta (180°)	-17.08/-13.5	-10.29/-8.18	-6.61/-5.28	-4.47/3.82	-3.34/3	-2.84/2.8	-2.83/2.58	-2.26/2.17	-2.24/2.36	-2.75/3.36	-4.4/5.78	-7.27/8.84	-10.08/-10.41	-9.43/7.73	-5.83/4.4	-3.47/3.09	-3.16/3.71	4.59/5.64	-6.98/7.69	-7.61/7.18	-7.22/8.33	-10.67/13.79	-16.79/18.87	-18.22/17.68
Freq(Hz)	5.20Pol.	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(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°)	-4.16/-3.75	-3.04/-2.56	-2.92/3.7	-4.55/5.58	-6.89/8.34	-10.01/11.55	-13.36/15.3	-14.07/12.81	-10.83/9.28	-7.86/6.43	-5.64/4.82	-4.29/3.91	-3.48/3.17	-3.02/3.15	-3.67/4.16	-4.59/5.23	-6.05/7.21	-8.76/10.77	-13.22/14.63	-13.97/11.52	-9.47/7.97	6.7/5.64	-4.96/4.8	-4.64/4.4
Theta (7.5°)	-2.67/-2.4	-2.58/-2.85	-3.46/-4.16	-4.69/5.35	-6.61/8.35	-10.57/12.97	-15.11/17.77	-18.67/18.33	-19.17/-32	-13.23/10.11	-7.58/5.85	-4.68/3.76	-3.48/3.31	-3.37/4.01	-4.93/5.89	-6.71/7.5	-8.46/9.69	-11.18/12.61	-14.1/14.07	-12.41/10.33	-8.54/7.01	-5.62/4.26	-3.52/3.02	-2.59/2.67
Theta (15°)	-0.83/-0.83	-1.03/-1.69	-2.71/3.93	-5.38/-6.8	-8.97/12.06	-15.02/12.95	-17.01/19.86	-16.11/19.01	-18.88/15.62	-11.24/8.3	-6.33/5.38	-4.97/5	-5.25/5.36	-5.47/5.26	-4.69/4.01	-3.57/3.86	-5.01/5.96	-9.6/13.11	-15.19/13.42	-10.95/8.99	-7.6/6.22	-4.83/3.9	-3.28/2.61	-1.86/1.28
Theta (22.5°)	-1.35/-1.45	-1.91/-2.29	-2.73/3.44	-4.95/7.19	-9.67/11.99	-13.38/14.76	-15.45/15.53	-17.88/18.26	-19.16/17.57	-12.52/9.31	-7.32/6.28	-6.09/6.06	-5.46/4.53	-3.73/3.08	-2.62/2.29	-2.12/2.54	-3.73/5.91	-9.21/13.94	-18.93/18.22	-12.89/9.44	-6.87/4.42	-2.59/1.75	-1.52/1.65	-1.74/1.58
Theta (30°)	-8.84/-5.45	-4.74/-4.71	-6.28/-8.4	-8.66/-4.7	-10.61/11.6	-11.94/14.41	-18.96/19.2	-17.37/17.81	-16.88/12.27	-14.52/10.11	-6.88/5.23	-4.4/3.78	-2.89/1.95	-1.34/1.29	-1.64/1.97	-2.74/4.1	-5.86/7.13	-8.13/10.09	-13.53/18.77	-17.82/13.61	-8.68/6.1	-5/4.85	-5.16/5.23	-5.38/5.8
Theta (37.5°)	-1.89/-2.31	-2.91/3.7	-5.43/7.4	-10.09/10.65	-13.1/18.33	-18.03/17.68	-18.09/18.17	-16.17/15.07	-16.98/18.68	-18.18/11.54	-11.25/9.23	-3.87/3.47	-3.1/2.5	-2.44/2.81	-2.64/2.83	-4.35/4.85	-8.41/5.79	-8.26/11.08	-11.63/9.48	-8.29/6.62	-11.41/11.65	-10.33/8.05	-7.59/4.01	-2.62/1.99
Theta (45°)	-3.1/2.82	-3.2/3.41	-4.87/6.95	-6.54/6.13	-7.05/10.48	-16.78/18.19	-17.53/16.14	-12.64/12.35	-13.94/17.15	-16.31/11.75	-7.71/5.33	-4.23/3.22	-1.94/1.06	-1.27/1.6	-1.37/2.31	-2.53/1.97	-4.06/8.12	-10.43/9.66	-8.99/8.85	-8.13/7.61	-7.42/7.74	-6.84/8.77	-7.89/6.12	-4.41/3.61
Theta (52.5°)	-6.78/-5.47	-4.55/-3.63	-3.62/5.79	-8.26/10.98	-10.78/11.94	-15.84/17.22	-17.46/18.23	-18.29/12.93	-16.96/16.2	-14.01/10.75	-6.66/3.84	-2.28/1.18	-0.6/0.41	-0.32/0.63	-1.69/2.74	-3.8/5.53	-8.61/9.65	-12.75/14.84	-12.58/11.35	-12.83/16.67	-18.91/15.64	-10.54/8.18	-7.61/7.74	-7.18/6.69
Theta (60°)	-7.89/-8.31	-8.76/6.8	-5.25/6.61	-8.24/11.24	-11.94/14.53	-15.41/14.22	-17.87/15.09	-13.71/15.52	-17.73/17.96	-16.11/9.81	-11.91/8.22	-4.58/6.25	-0.18/0.17	-0.88/0.65	-2.61/4.43	-5.87/12.14	-18.27/14.91	-16.43/17.95	-14.89/13.32	-16.01/18.85	-16.6/12.25	-10.78/10.07	-7.36/6.06	
Theta (67.5°)	-4.06/-5.27	-8.24/-16.97	-16.2/11.21	-10.62/17	-13.22/12.89	-18.41/17.6	-18.47/14.66	-11.02/15.89	-18.38/18.69	-17.81/15.08	-10.71/7.88	-6.43/5.04	-3.92/3.43	-2.29/1.63	-2.55/3.05	-5.07/6.52	-7.79/13.02	-18.06/13.91	-13.02/14.8	-16.65/17.55	-18.5/17.34	-17.4/13.98	-9.7/7.33	-5.43/4.2
Theta (75°)	-5.38/5.3	-7.16/11.77	-19.03/16.73	-18.28/10.92	-14.03/14.56	-18.47/18.06	-18.88/12.98	-10.92/13.19	-18.6/18.55	-15.85/10.65	-8.11/6.64	-6.02/5.18	-4.3/4.27	-3.82/4.45	-5.03/5.66	-9.84/12.9	-11.22/10.28	-15.35/17.8	-12.92/13.88	-13.61/14.1	-16.31/13.89	-12.73/13.76	-13.27/14.45	-6.52/5.8
Theta (82.5°)	-8.12/7.33	-8.39/10.9	-15.41/13.78	-18.53/18.53	-13.88/14.66	-15.26/18.86	-18.21/25	-10.9/16.24	-18.59/18.33	-11.76/7.45	-11.74/7.3	-6.48/5.47	-4.81/5.39	-5.14/5.33	-5.12/6.87	-9.91/12.02	-17.74/18.94	-16.38/18.46	-18.57/14.1	-13.56/18.07	-17.89/18.3	-18.31/14.63	-12.74/12.91	-11.51/10.3
Theta (90°)	-11.73/12.49	-12.27/12.95	-17.69/18.57	-13.1/15.09	-16.21/11.6	-11.31/11.57	-13.11/13.32	-12.01/14.65	-17.84/18.25	-11/9.33	-9.15/9.7	-12.51/11.19	-8.73/10.21	-8.88/8.02	-8.91/14.02	-15.11/15.27	-16.65/17.63	-18.08/18.44	-12.86/17.43	-15.96/14.48	-16.23/14.99	-15.96/18.54	-17.93/18.25	-19.2/16.14
Theta (97.5°)	-9.17/13.18	-18.17/19.13	-14.55/14.39	-11.05/12.47	-18.97/18.11	-17.55/17.04	-17.11/19.21	-14.59/17.52	-16.88/17.92	-18.01/16.74	-14.56/12.14	-13.2/16.69	-11.61/11.55	-9.95/10.92	-11.43/13.28	-17.08/17.76	-14.77/14.12	-14.56/15.31	-14.74/15.12	-13.47/18.82	-11.39/13.33	-13.05/14.29	-12.41/16.91	-18.03/17.64
Theta (105°)	-12.12/12.85	-12.04/17.67	-8.11/15.99	-9.47/6.39	-16.9/12.56	-18.69/18.2	-19.04/18.52	-18.67/15.5	-11.24/17.83	-10.91/13.09	-13.56/12.14	-13.02/9.23	-12.75/10.73	-10.83/12.95	-12.24/12.42	-14.68/19.32	-17.42/14.12	-15.14/12.14	-12.01/13.4	-11.84/16	-10.71/12.51	-16.79/12.25	-17.72/16.4	
Theta (112.5°)	-7.37/12.51	-7.93/11.28	-6.89/8.88	-9.28/8.37	-12.46/11.88	-18.46/18.28	-17.85/12.89	-6.49/6.09	-6.84/8.12	-10.51/11.52	-10.47/13.55	-18.04/18.56	-18.15/15.07	-8.65/7.35	-7.37/8.55	-11.82/18.15	-18.45/14.4	-12.32/9.43	-10.9/16.96	-16.07/15.74	-12.43/9.02	-8.95/7.96	-7.18/8.89	-8.17/6.2
Theta (120°)	-3.7/6.07	-4.87/8.07	-4.33/2	-4.92/3.71	-14.3/19.22	-16.17/19.15	-9.78/17.78	-11.85/8.01	-7.08/7.93	-11.73/16.62	-15.33/15.74	-13.74/12.09	-10.89/7.46	-8.64/9.58	-15.29/17.38	-18.15/16.89	-14.51/17.7	-12.09/8.1	-7.43/14.94	-4.62/7.14	-5.34/11.49	-16.35/10.49	-3.21/1.27	
Theta (127.5°)	-1.27/5.33	-3.72/5.7	-6.5/4.28	-6.41/13.75	-18.78/17.97	-18.49/13.21	-11.56/14.81	-18.10/7.6	-7.09/6.22	-9.19/8.51	-9.01/9.06	-7.63/6.54	-8.62/9.95	-8.85/9.55	-8.74/17.6	-15.94/16.01	-7.59/11.64	-9.74/6.6	-10.61/15.29	-12.74/5.24	-4.65/5.25	-5.09/4.23	-1.93/2.1	
Theta (135°)	-2.92/9.1	-10.77/6.46	-7.96/6.39	-6.78/12.99	-14.41/10.6	-11.92/14.36	-16.29/19.2	-14.06/10.11	-9.48/8.66	-7.44/7.16	-6.37/6.43	-5.99/4.01	-3.64/4.8	-4.23/3.88	-12.12/10.66	-11.52/2.76	-3.17/7.08	-6.99/12.71	-18.96/8.54	-6.08/15.7	-2.53/6.62	-7.37/7.48	-7.45/10.84	-6/2.32
Theta (142.5°)	-2.85/9.59	-6.92/4.7	-4.6/6.89	-8.83/15.89	-17.9/18.26	-16.52/17.47	-12.82/11.28	-11.96/13.23	-11.65/10.42	-9.58/9.61	-4.27/4.7	-7.19/5.75	-3.66/4.43	-5.12/5.55	-3.66/1.56	-4.88/6.6	-7.71/8.18	-15.3/18.77	-18.4/6.6	-3.15/6.7	-5.76/3.82	-19.04/15.61	-6.27/1.96	
Theta (150°)	-4.83/7.38	-13.59/15.45	-15.55/15.06	-14.02/11.9	-10.29/10.58	-12.35/12.56	-12.39/10.21	-10.63/10.21	-10.48/11.22	-8.41/7.32	-9.83/18.69	-12.48/7.31	-6.66/8.9	-15.62/18.26	-11.05/10.45	-8.98/7.65	-10.81/15.89	-13.88/9.11	-8.49/13.79	-13.88/9.2	-5.99/5.96	-7.4/5.98	-5.69/4.77	
Theta (157.5°)	-6.54/6.77	-8.04/9.65	-10.03/9.37	-9.47/11.62	-16.4/17.3	-19.06/18.25	-19.09/19.2	-17.78/18.65	-17.04/17.27	-16.06/12.88	-10.77/10.45	-10.64/6.33	-2.31/0.21	0.3/0.15	-1.12/2.19	-3.28/4.55	-5.51/8.82	-9.3						



Radiated Composite Gain Data of 2.4GHz&5GHz

Appendix A

θ (60°)	-10.63-8.69	-6.05-4.03	-2.34-1.54	-1.98-0.55	-0.56-1.09	-1.55-2.01	-1.56-1.44	-2.23-3.36	-4.54-6.64	-6.38-8.04	-5.52-4.74	-6.29-8.49	-6.81-7.36	-7.37-9.44	-3.39-3.32	-3.85-2.76	-3.83-7.77	-2.42-2.57	-2.66-3.06	-3.68-2.52	-6.53-7.68	-9.28-10.25	-9.62-8.67	-6.71-15
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°)	-17.81-18.31	-16.68-14.07	-12.51-13	-13.74-15.12	-14.99-14.4	-15.27-15.75	-17.95-18.5	-18.16-17.24	-18.91-18.33	-19.07-18.18	-18.18-17.92	-17.78-19.6	-19.19-15.12	-14.01-13.53	-13.56-14.49	-15.55-15.67	-15.45-15.53	-16.06-19.7	-18.94-18.22	-19.17-19.02	-17.51-16.16	-14.81-18.1	-17.93-18.2	-13.61-9.32
θ (7.5°)	-17.81-17.97	-18.51-16.27	-14.11-14.49	-15.92-18.57	-18.93-18.05	-19.19-19.06	-18.81-18.88	-18.47-18.54	-18.91-18.06	-19.77-18.11	-18.71-18.11	-18.93-19.6	-19.38-17.36	-18.73-14.98	-17.36-16.5	-16.71-16.5	-16.71-16.5	-16.71-16.5	-16.71-16.5	-16.71-16.5	-16.71-16.5	-16.71-16.5	-16.71-16.5	-16.71-16.5
θ (15°)	-18.74-18.51	-18-18.38	-18.15-18.26	-17.87-18.76	-18.33-17.86	-18.31-17.32	-18.21-18.49	-17.91-17.73	-19.27-18.11	-18.71-18	-17.27-17.38	-18.47-18.45	-16.71-14.62	-15.53-15.03	-13.03-11.23	-10.42-9.73	-9.83-10.72	-11.84-13.08	-14.82-17.63	-19.21-17.78	-18.35-19.11	-18.23-17.51	-17.54-18.02	-17.46-17.59
θ (22.5°)	-17.64-13.57	-13.96-14.07	-13.88-17.72	-18.34-17.44	-18.41-19.23	-18.28-18.11	-17.97-18.71	-18.11-18.87	-17.49-19.21	-18.24-17.85	-19.06-18.04	-18.23-17.81	-18.54-19.11	-18.39-18.36	-16.78-14.35	-12.45-12.12	-13.64-14.94	-18.37-17.24	-18.21-17.53	-18.61-18.86	-18.22-17.11	-15.98-15.78	-16.81-16.39	-15.81-16.41
θ (30°)	-13.22-14.59	-13.22-14.42	-13.95-17.72	-19.08-19.14	-18.45-19.03	-17.14-17.64	-17.97-18.19	-18.17-18.57	-18.06-17.88	-17.95-18.64	-18.71-18.85	-16.24-13.93	-14.77-16.49	-17.36-16.5	-16.71-18.13	-19.11-18.42	-17.56-14	-13.08-13.99	-16.62-19.21	-16.13-18.72	-19.05-18.42	-19.22-17.01	-18.26-10.13	-8.87-9.96
θ (37.5°)	-10.26-9.55	-11.67-14.14	-15.15-16.03	-17.57-16.53	-14.99-15.01	-18.21-17.71	-18.31-18.81	-18.76-18.58	-18.47-18.49	-17.81-18.58	-18.99-17.51	-19.21-18.19	-18.08-18.94	-18.75-19.38	-18.31-17.86	-17.82-18.36	-17.67-18.01	-17.04-17.79	-13.46-15.33	-19.12-16.8	-17.67-18.93	-18.57-17.71	-14.79-12	-10.33-10.16
θ (45°)	-11.81-9.21	-8.87-10.18	-13.54-14.72	-13.68-14.65	-15.33-15.94	-16.38-15.03	-17.14-17.17	-19.11-18.28	-18.71-18.05	-19.09-18.75	-18.27-16.11	-16.53-31.1	-16.82-18.98	-18.58-17.72	-17.81-18.54	-15.69-18.9	-18.71-17.8	-16.91-18.31	-18.37-17.41	-18.21-17.53	-16.81-18.86	-15.93-14.82	-17.02-19.2	-11.31-10.79
θ (52.5°)	-11.75-12.48	-11.71-11.34	-13.58-16.51	-19.21-18.68	-18.51-18.14	-18.43-13.64	-14.81-17.73	-18.37-18.96	-18.45-17.55	-15.63-19.11	-17.31-17.76	-18.61-17.71	-18.46-19.11	-18.46-19.11	-15.65-16.8	-19.03-14.28	-8.93-11.6	-11.61-11.82	-12.16-13.27	-11.93-11.63	-12.78-18.15	-17.38-18.15	-17.38-18.15	-11.47-11.48
θ (60°)	-6.93-7.23	-10.81-12.72	-18.46-19.12	-17.58-18.83	-18.59-15.82	-14.94-17.48	-18.21-18.99	-13.51-11.98	-15.42-13.66	-11.82-13.33	-19.06-17.89	-17.12-18.8	-17.38-18.12	-16.84-14.14	-13.93-17.46	-17.36-18.33	-12.55-9.56	-12.63-10.7	-13.71-12.98	-13.52-9.78	-10.43-14.86	-14.94-12.43	-10.94-15.38	-17.49-10.64
θ (67.5°)	-11.61-10.87	-12.22-12.45	-17.76-18.01	-17.48-15.06	-15.45-17.35	-14.74-16.69	-18.43-17.17	-15.55-17.02	-18.78-18.88	-18.95-18.86	-17.11-19.56	-17.91-13.16	-12.29-14.35	-16.43-16.51	-18.46-17.77	-18.09-17.23	-12.15-10.24	-7.97-12.54	-9.06-19.10	-10.39-11.02	-12.3-9.21	-7.41-13.92	-14.17-19.3	-18.64-13.63
θ (75°)	-18.46-18.09	-18.62-18.28	-18.01-14.99	-12.57-15.65	-18.83-13.25	-14.14-19.83	-18.55-17.89	-19.39-16.69	-18.87-19.05	-18.02-18.72	-18.21-17.58	-19.32-17.12	-17.82-18.56	-12.49-10.02	-11.66-16.64	-17.52-14.45	-13.92-9.68	-11.21-12.57	-13.16-11.27	-13.27-9.52	-9.92-15.24	-9.21-10.33	-18.31-18.48	-15.93-19.12
θ (82.5°)	-18.39-18.82	-18.59-12.62	-12.68-13.65	-13.68-10.89	-11.99-15.72	-15.38-17.71	-17.48-17.58	-15.05-15.24	-16.97-17.48	-18.81-18.2	-18.45-16.06	-16.76-17.31	-18.08-18.34	-17.65-19.33	-17.14-15.51	-19.27-17.82	-13.88-14.82	-7.74-11.05	-14.04-13.12	-15.97-18.57	-18.32-17.95	-18.11-18.83	-14.99-14.05	-18.63-18.41
θ (90°)	-18.79-18.29	-16.87-12.77	-17.78-14.55	-10.3-10.71	-16.76-18.83	-18.03-19.2	-16.98-18.35	-18.59-18.38	-18.34-18.32	-17.17-19.24	-18.83-17.57	-18.25-18.32	-17.89-17.82	-18.27-16.62	-16.52-18.47	-17.12-18.13	-18.26-17.94	-16.16-15.12	-19.57-14.99	-14.9-18.1	-11.77-13.76	-18.92-19.28	-14.28-17.92	-18.73-16.39
θ (97.5°)	-17.75-16.35	-18.68-18.45	-18.81-14.42	-19.11-17.42	-16.88-16.49	-13.17-12.65	-13.61-18.54	-19.11-15.84	-14.28-16.52	-18.41-19.11	-18.71-18.71	-18.08-18.81	-18.69-18.69	-17.86-17.44	-19.28-19.09	-18.16-19.19	-17.19-18.66	-17.47-18.92	-18.54-17.23	-16.61-13.09	-9.55-13.23	-18.14-18.9	-15.51-18.53	-15.51-18.53
θ (105°)	-10.63-18.42	-17.86-19.36	-12.83-9.31	-17.15-13.48	-10.19-13.51	-15.04-12.78	-16.17-18.73	-17.57-15.73	-16.55-15.03	-17.28-18.94	-18.42-18.15	-17.19-16.04	-18.04-16.47	-15.76-17.3	-18.92-15.98	-19.89-18.31	-18.18-18.76	-18.32-19.04	-16.71-16.68	-16.65-16.68	-15.24-11.22	-11.53-9.45	-9.8-14.94	-13.69-9.31
θ (112.5°)	-11.03-18.4	-18.09-14.89	-15.46-14.74	-16.91-17.89	-16.83-14.36	-15.12-15.02	-19.42-18.08	-15.86-17.85	-16.85-13.68	-14.54-18.75	-17.98-18.69	-18.41-12.27	-15.98-15.17	-16.16-15.03	-16.81-17.42	-18.31-17.5	-12.37-14.18	-17.38-16.67	-17.71-12.59	-15.37-14	-13.43-13.16	-12.96-12.06	-10.89-14.27	-18.35-13.9
θ (120°)	-11.51-12.93	-17.69-17.95	-18.82-14.42	-12.13-13.44	-18.42-18.47	-16.88-18.99	-17.65-17.92	-17.99-18.59	-15.71-10.8	-12.31-14.67	-13.23-18.99	-18.98-18.11	-17.54-16.12	-16.02-16.79	-12.39-14.31	-17.56-18.82	-18.45-13.14	-10.47-11.25	-16.75-18.35	-18.61-17.4	-10.51-18.28	-18.74-9.94	-11.09-18.34	-18.99-18.31
θ (127.5°)	-13.67-13.57	-16.67-17.04	-18.11-11.14	-13.59-18.93	-18.48-18.08	-15.46-15.55	-18.71-18.75	-18.28-15.68	-18.33-16.02	-19.11-13.46	-17.83-14.4	-18.91-15.69	-18.21-17.88	-12.91-12.7	-18.73-18.45	-18.25-17.94	-12.41-12.46	-10.59-13.56	-12.07-12.46	-7.89-11.36	-11.34-9.79	-9.19-16.7	-13.61-16.26	-11.31-10.79
θ (135°)	-4.45-7.15	-14.59-15.15	-14.91-14.18	-12.99-14.6	-17.56-18.6	-18.64-18.16	-18.07-18.58	-19.07-18.9	-18.81-17.44	-18.27-12.32	-17.25-15.11	-15.83-17.59	-12.86-18.25	-14.05-13.35	-17.19-18.55	-11.27-12.86	-18.39-17.75	-10.65-15.74	-11.94-14.35	-18.21-10.07	-7.69-14.96	-7.59-9.89	-8.53-10.69	-15.04-7.68
θ (142.5°)	-3.27-8.24	-12.41-18.74	-18.58-17.14	-14.41-16.17	-17.82-17.97	-18.52-19.12	-18.67-18.67	-17.91-18.02	-19.05-15.37	-19.87-18.16	-16.26-19.28	-17.95-18.42	-14.87-17.14	-16.42-15.24	-13.1-14.99	-16.68-10.86	-9.21-10.56	-12.91-18.04	-14.37-13.74	-13.8-15.7	-17.88-11.61	-7.89-7.47	-6.32-10.62	-18.19-14.67
θ (150°)	-11.37-9.09	-10.67-13.6	-12.84-13.79	-18.13-17.31	-17.24-15.83	-17.68-19.06	-18.54-18.26	-18.21-18.29	-17.88-18.24	-17.37-13.58	-17.71-16.35	-16.31-14.17	-16.29-17.62	-16.77-11.17	-18.48-17.13	-19.19-15.55	-16.22-19.45	-18.34-12.84	-14.79-19.03	-13.88-13.47	-16.16-15.8	-11.77-11.48	-11.92-16.69	-15.92-17.41
θ (157.5°)	-19.08-17.29	-17.71-17.49	-19.31-17.61	-18.19-17.6	-15.09-16.09	-17.69-18.02	-17.54-17.98	-19.18-18.22	-18.49-18.28	-18.55-18.45	-17.87-19.01	-18.49-18.39	-18.26-18.52	-18.78-18.07	-13.98-10.64	-9.48-10.55	-12.66-12.14	-11.22-13.03	-17.99-14.6	-10.10-11.01	-13.14-14.4	-13.38-13.15	-12.55-13.48	-18.14-17.28
θ (165°)	-15.16-19.39	-16.78-14.67	-12.71-12.51	-13.11-18.87	-18.37-17.66	-18.64-18.52	-19.07-19.08	-19.02-18.27	-16.24-14.27	-13.1-13.49	-14.99-19.09	-18.71-18.03	-9.42-7.92	-8.32-10.06	-11.51-11.41	-11.39-11.03	-10.58-11.45	-15.52-19.36	-15.21-12.45	-11.76-13.04	-14.61-13.68	-14.42-18.19	-19.05-16.23	-13.37-14.09
θ (172.5°)	-15.09-14.49	-16.92-15.62	-14.41-14.84	-14.11-13.86	-12.52-11.28	-11.49-11.86	-13.78-17.33	-18.08-19.24	-18.91-17.26	-18.68-18.75	-18.53-17.51	-13.58-12.02	-11.64-16.2	-16.88-13.49	-10.02-8.78	-12.81-10.03	-10.87-18.98	-15.65-16.93	-13.68-12.3	-12.12-12.64	-13.52-15.01	-16.86-18.76	-18.51-15.19	-12.93-13.71
θ (180°)	-10.86-11.46	-9.71-8.92	-9.9-9.62	-8.94-8.81	-7.89-7.67	-8.34-9	-10.63-13.18	-15.72-18.13	-18.28-19.1	-19.07-16.03	-11.98-9.09	-7.38-7.37	-9.38-10.63	-9.93-9.41	-10.13-11.7	-13.09-14.58	-15.13-13.68	-12.95-12.79	-14.09-14.39	-15.01-14.4	-13.72-14.1	-13.71-13.32	-13.41-13.48	-12.84-10.85
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°)	-17.89-18.33	-18.09-18.89	-18.83-18.63	-19.11-18.92	-19.13-18.35	-18.33-18.43	-17.34-17.34	-18.39-19.43	-19.19-17.21	-14.93-14.22	-14.58-16.62	-18.19-18.9	-18.08-18.48	-19.31-17.46	-18.91-18.18	-18.84-19.53	-19.51-18.76	-18.96-17.88	-15.73-15.54	-16.17-16.7	-16.38-15.73	-14.58-13.59	-12.93-12.96	-14.38-16.61
θ (7.5°)	-19.26-17.69	-18.78-18.71	-19.25-18.67	-19.37-17.77	-19.53-19.34	-19.31-18.71	-17.21-17.1	-17.32-17.14	-14.98-12.6	-10.21-9.02	-8.76-8.76	-9.39-12.02	-10.58-10.72	-13.1-10.81	-13.62-17.4	-19.03-18.39	-18.71-18.19	-17.97-17.14	-18.34-18.16	-18.05-18.75	-19.12-19.09	-17.29-15.91	-16.44-10.93	-19.12-17.88
θ (15°)	-17.09-15.34	-14.14-14.99	-16.53-16.47	-17.59-18.06	-18.47-18.01	-18.28-17.99	-15.46-13.72	-12.74-11.3	-10.46-9.18	-8.21-8.39	-8.48-8.56	-9.12-9.19	-9.31-8.88	-11.29-12.99	-14.13-15.32									



Radiated Composite Gain Data of 2.4GHz&5GHz

Appendix A

Theta (150°)	-3.76/-8.66	-8.99/-6.82	-8.35/-9.93	-15.88/-18.46	-15.14/-9.5	-7.81/-7.66	-8.75/-11.04	-14.81/-15.43	-11.29/-9.64	-12.22/-18.6	-17.69/-12.18	-8.97/-7.45	-6.74/-7.37	-11.48/-16.13	-17.15/-15.83	-5.23/-3.53	-6.08/-9.15	-12.96/-18.59	-16.18/-14	-19.71/-16.33	-13.64/-10.77	-9.59/-10.53	-9.78/-6.06	-3.42/-2.67
Theta (157.5°)	-8.32/-9.04	-11.28/-11.56	-11.07/-8.57	-5.62/-4.48	-4.78/-5.88	-7.27/-8.99	-14.99/-19.27	-16.07/-9.99	-7.33/-7.43	-12.05/-17.79	-9.1/-5.18	-3.39/-2.09	-1.75/-3.16	-6.32/-9.49	-8.79/-5.37	-3.55/-4.17	-6.15/-9.52	-12.76/-13.79	-12.88/-11.7	-12.01/-14.33	-17.29/-18.12	-13.24/-8.7	-6.64/-6.31	-7.07/-8.57
Theta (165°)	1.94/-1.52	-0.08/-0.22	-1.22/-1.41	-8.15/-10.79	-12.41/-11.55	-10.43/-9.84	-9.91/-10.62	-12.38/-14.59	-17.44/-18.24	-17.38/-18.76	-16.62/-13.32	-11.03/-8.38	-6.36/-5.3	-5.02/-4.73	-4.35/-4.22	-4.48/-5.23	-6.55/-10.14	-11.28/-13.82	-11.35/-12.41	-13.58/-13.53	-10.81/-7.52	-5.88/-4.16	-2.34/-0.18	1.37/-1.26
Theta (172.5°)	-3.62/-4.32	-3.96/-4.4	-4.74/-4.08	-3.33/-3.1	-3.23/-3.8	-4.91/-7.04	-10.53/-16.88	-18.56/-15.69	-11.07/-9.14	-8.23/-8.22	-9.11/3	-15.24/-17.96	-19.15/-15.04	-12.34/-10.91	-10.58/-11.41	-11.82/-10.79	-9.59/-9.88	-10.06/-10.92	-12.61/-15.65	-18.52/-16.61	-12.05/-8.32	-5.56/-3.95	-2.94/-2.08	-1.52/-2.03
Theta (180°)	-0.66/-0.31	0.23/-0.93	-1.26/-1.35	-2.58/-4.04	-6/-6.64	-12.07/-16.38	-18.67/-14.42	-10.89/-8.23	-6.53/-5.27	-4.54/-4.1	-3.72/-3.42	-3.44/-3.41	-3.82/-4.66	-5.13/-4.89	-4.62/-4.83	-6.23/-8.4	-11.49/-16	-18.12/-19.29	-14.93/-12.17	-9.39/-7.14	-5.93/-4.95	-4.24/-3.99	-4.11/-4.12	-3.49/-2.1
Freq(Hz)	5.3GPol.	PhiAnt.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°)	-11.01/-10.89	-9.97/-7.82	-5.94/-4.48	-3.51/2.49	-1.74/-1.17	-0.84/-0.81	-0.85/-0.39	-0.31/-0.9	-1.8/-2.58	-3.36/-4.38	-5.93/-9.2	-10.18/-13.62	-14.43/-12.66	-10.67/-8.49	-6.45/-4.69	-3.24/-2.4	-1.71/-1.16	-0.8/-0.56	-0.5/-0.62	-1.12/-1.58	-2.02/-2.51	-3.34/-4.67	-5.97/-7.43	-9.57/-11.26
Theta (7.5°)	-12.94/-12.65	-10.19/-8.62	-7.3/-5.72	-3.97/-2.53	-1.56/-1.13	-0.79/-0.41	-0.06/-0.2	-0.11/-0.72	-1.65/-2.89	-2.95/-5.2	-4.78/-9.41	-12.71/-17.36	-18.31/-14.27	-10.05/-7.84	-5.88/-4.14	-2.88/-1.96	-1.27/-0.91	-0.63/-0.5	-0.4/-0.69	-1.23/-1.65	-2.21/-2.91	-3.81/-5.11	-6.64/-8.71	-10.61/-11.61
Theta (15°)	-18.55/-19.8	-12.06/-8.46	-6.54/-5.11	-3.5/-2.24	-1.68/-1.43	-0.95/-0.46	-0.46/-0.6	-0.47/-0.67	-1.36/-2.43	-2.55/-4.34	-4.04/-7.61	-8.04/-10.72	-14.98/-19.08	-16.92/-11.71	-7.95/-5.1	-3.06/-1.52	-0.66/-0.17	0.19/0.37	0.37/0.11	-0.14/-0.25	-0.29/-0.87	-1.82/-3.17	-5.4/-6.63	-11.16/-13.92
Theta (22.5°)	-17.21/-18.25	-12.5/-8.02	-6.62/-3.88	-2.63/-1.95	-2.27/-2.44	-1.86/-1.44	-1.36/-1.07	-1.05/-1.32	-1.59/-1.69	-1.85/-2.27	-3.23/-5.43	-8.56/-11.89	-12.52/-10.59	-7.89/-6.13	-4.83/-3.52	-2.21/-1.04	-0.20/-0.8	0.26/0.06	-0.27/-0.4	-0.45/-0.58	-0.8/-1.15	-1.92/-3.24	-6.12/-10.53	-15.13/-18.4
Theta (30°)	-17.17/-15.73	-11.19/-7.17	-4.86/-3.66	-2.81/-2.62	-3.19/-2.63	-1.08/-0.06	0.61/0.03	0.66/0.03	-0.56/-1.37	-2.72/-5.46	-7.09/-10.34	-13.31/-17.74	-17.54/-10.99	-6.48/-4.29	-3.37/-3.48	-3.54/-3	-2.52/-2.29	-1.83/-1.67	-2.52/-3.83	-3.66/-2.5	-2.29/-2.81	-3.81/-5.17	-7.39/-10.7	-15.55/-18.64
Theta (37.5°)	-12.26/-12.37	-12.91/-10.06	-6.34/-3.81	-2.24/-1.67	-1.07/-0.32	0.47/0.61	0.6/0.4	-0.08/-0.35	-1.32/-2.92	-4.44/-6.2	-7.98/-9.87	-10.11/-14.47	-19.02/-17.61	-12.41/-8.77	-5.61/-3.44	-2.02/-0.83	0.09/0.37	0.50/0.73	1.10/0.9	-0.06/-0.74	-1.15/-3.21	-4.45/-7.09	-9.14/-11.95	-18.14/-16.73
Theta (45°)	-18/-18.18	-18.2/-11.08	-5.86/-3.14	-2.36/-2.55	-2.34/-2.14	-2.04/-0.84	0.59/1.71	1.58/0.34	-1.37/-2.61	-3.61/-5.29	-6.91/-6.73	-5.91/-7.55	-12.07/-14.78	-12.49/-10.22	-7.64/-3.52	-0.09/-1.69	1.99/0.79	-0.57/-1.29	-1.55/-1	0.11/0.11	-0.35/-1.19	-2.78/-5.16	-8.87/-13.77	-15.32/-15.34
Theta (52.5°)	-17.66/-17.21	-17.75/-12.96	-9.89/-7.4	-4.91/-3.2	-2.03/-1.24	-0.98/-1.54	-1.03/-0.3	-1.42/-1.82	-1.38/-1.79	-3.38/-6.3	-5.73/-6.12	-18.39/-18.7	-16.27/-10.85	-6.34/-4.69	-3.25/-1.63	-0.72/-0.41	-0.61/-1.43	-0.71/-0.02	-0.07/-0.1	-1.56/-2.47	-7.69/-12.03	-11.26/-12.47	-12.77/-13.55	
Theta (60°)	-17.96/-18.98	-15.38/-10.5	-6.71/-5.19	-5.49/-4.9	-2.23/-0.34	-1.05/-0.16	1.02/0.03	-1.71/-1.78	-1.31/-1.94	-4.89/-7.17	-10.95/-14.2	-7.94/-12.51	-19.19/-19.38	-10.57/-6.98	-5.74/-5.36	-4.16/-2.64	-1.32/-0.69	-1.64/-1.99	-1.52/-0.75	-0.53/-2.18	-3.91/-6.44	-4.34/-4.95	-6.12/-9.42	-12.77/-16.43
Theta (67.5°)	-17.42/-18.01	-10.23/-6.98	-5.91/-6.35	-5.19/-1.16	-2.05/-2.3	-3.8/-1.42	-0.1/-0.24	-0.45/-0.16	-1.91/-4.25	-3.55/-3.47	-4.77/-5.91	-9.88/-14.37	-17.25/-19.34	-15.37/-8.72	-6.14/-5.69	-6.16/-5.65	-4.01/-2.7	-1.65/-2.6	-2.22/-1.63	-1.3/-0.79	-2.86/-5.42	-6.24/-7.21	-7.93/-9.01	-12.45/-18.28
Theta (75°)	-15.69/-10.2	-6.77/-5.31	-6.5/-5.92	-2.13/-1.01	-0.15/-1.03	-3.13/-1.2	-0.91/-1.09	-2.83/-4.54	-4.54/-3.39	-2.77/-2.76	-4.06/-6.49	-10.83/-10.67	-9.74/-13.95	-16.37/-8.99	-5.75/-4.7	-5.29/-6.28	-3.82/-1.45	-1.82/-2.92	-3.18/-2.2	-1.67/-1.66	-2.64/-5.92	-5.54/-7.4	-6.53/-7.37	-12.04/-13.55
Theta (82.5°)	-14.08/-8.23	-5.56/-4.97	-4.02/-1.95	-1.03/-1.23	-2.34/-3.76	-2.84/-3.35	-4.87/-6.79	-8.44/-8.34	-6.79/-4.53	-4.15/-5.2	-5.81/-9.2	-14.06/-14.36	-18.56/-13.55	-12.06/-9.4	-6.84/-4.11	-2.44/-3.17	-3.86/-2.84	-4.75/-1.78	-5.11/-3.24	-3.08/-3.34	-1.94/-3.79	-2.56/-2.13	-3.49/-5.63	-10.22/-17.72
Theta (90°)	-10.83/-7.08	-5.51/-4.57	-3.28/-2.33	-2.56/-3.38	-3.56/-4.58	-5.45/-4.59	-5.09/-5.44	-0.47/0.63	-4.58/-7.93	-7.7/-7.64	-6.66/-6.66	-6.95/-6.55	-13.03/-18.78	-9.27/-8.99	-6.39/-3.72	-3.36/-1.85	-1.51/-5.59	-5.04/-1.25	-0.16/-0.91	-1.11/-1.44	-4.06/-2.84	-4.31/-7.78	-14.66/-18.3	
Theta (97.5°)	-8.46/-9.79	-11.32/-7.55	-7.42/-7.28	-6.05/-2.99	-1.67/-2.36	-5.63/-2.56	0.62/4.7	2.65/0.67	-1.82/-3.95	-5.78/-9.05	-10.65/-17.01	-16.82/-11.91	-11.21/-8.17	-7.87/-12.47	-16.92/-8.93	-2.53/-0.45	-0.88/0.58	1.51/0.86	-1.21/0.33	0.94/-1.2	-1.89/-2.07	-4.2/-6.97	-9.05/-10.82	-9.5/-8.13
Theta (105°)	-11.84/-8.9	-10.93/-14.46	-12.61/-12.08	-6.76/-1.84	-0.28/-2.3	-5.11/-2.02	0.92/4.6	2.34/0.05	-3.13/-1.52	-2.5/-6.29	-6.91/-7.37	-8.49/-12.72	-18.19/-11.96	-9.11/-6.13	-6.72/-7.67	-2.57/1.1	1.72/1.33	1.75/1.37	0.59/1.55	2.04/-0.99	-1.81/-5.06	-7.87/-9.74	-7.32/-5.21	-6.19/-11.09
Theta (112.5°)	-17.81/-18.63	-18.14/-18.96	-18.91/-9.84	-4.35/-1.61	-1.88/-3.73	-5.09/-5.19	-2.61/0.33	-1.14/-2.38	-1.16/-1.96	-4.23/-6.12	-4.19/-6.55	-13.61/-11.14	-10.68/-7.89	-3.98/-1.47	-1.66/-0.54	1.98/3.15	2.89/2.35	1.73/0.53	-1.19/-1.14	-6.17/-8.03	-5.82/-4.23	-5.44/-10.08	-9.61/-15.54	
Theta (120°)	-12.75/-17.61	-17.33/-13.43	-12.17/-7.44	-6.62/-7.91	-2.72/-5.95	-5.01/2.74	-1.24/-1.91	-4.17/1.1	-4.57/-3.2	-5.44/-8.11	-4.97/-3.84	-4.73/-4.59	-11.39/-18.4	-9.57/7.1	-4.07/-2.77	-2.79/-2.41	-0.64/1.43	1.23/0.57	0.22/0.07	-2.28/3.83	-5.91/-7.99	-13.11/-13.31	-9.61/-7.67	-8.54/-11.69
Theta (127.5°)	-14.68/-10.96	-9.49/-8.94	-6.92/-6.11	-4.43/-4.89	-7.83/-6.86	-5.09/-2.68	-1.18/-1.75	-3.31/3.89	-6.03/-10.4	-6.49/-6.69	-8.33/-6.66	-12.21/-10.53	-10.49/-7.47	-1.82/-1.44	-2.78/-1.87	-1.37/0.21	0.55/-1.89	-3.61/-0.58	-1.71/-2.64	-4.95/-7.23	-7.05/-5.67	-6.38/-6.16	-10.32/-15.17	
Theta (135°)	-11.14/-13.18	-11.46/-8.22	-6.43/-8.53	-5.79/-4.18	-3.63/-6.24	-8.64/-7.24	-5.79/-4.11	-4.94/-7.9	-8.47/-8.1	-12.74/-10.65	-6.31/8.7	-11.08/-10.4	-9.74/-8.89	-2.74/-3.03	-2.63/-1.26	-2.04/-2.1	-1.89/-1.99	-3.36/-0.46	-1.87/0.59	0.44/-2.44	-15.10/-0.66	-6.35/-4.56	-4.83/-6.75	
Theta (142.5°)	-17.74/-17.37	-13.36/-15.78	-10.67/6.99	-5.22/-5.74	-6.28/-0.67	-4.75/3.73	-7.28/8.71	-7.99/-5.61	-5.43/-0.85	-12.33/-9.64	-11.58/-13.67	-14.13/-13.2	-15.08/-16.32	-19.23/-18.39	-18.71/-10.05	-3.40/-8.6	-2.57/-3.56	-3.16/-1.49	-0.70/5	2.77/2.35	-0.14/-2.24	-7.06/-19.08	-10.27/-9.7	-9.48/-13.49
Theta (150°)	-10.97/-19.81	-15.66/-11.52	-7.17/-6.36	-6.71/-5.62	-5.39/-5.52	-6.18/-6.85	-8.11/-10.35	-12.21/-14.45	-18.24/-18.73	-19.52/-16.75	-14.09/-11.24	-10.22/-11.19	-9.44/-8.83	-9.28/-11.37	-13.76/-9.75	-5.16/-3.37	-2.33/-0.12	0.18/-0.55	0.24/1	0.01/-2.64	-3.73/-9.04	-6.81/-5.39	-3.81/-5.21	-8.61/-9.39
Theta (157.5°)	-11.25/-16.86	-18.35/-14.12	-12.17/-10.8	-10.14/-10.94	-12.53/-12.8	-11.53/-9.92	-6.12/-4.25	-3.56/-2.68	-6.26/-10.38	-18.46/-17.12	-11.55/-9.94	-11.09/-16.82	-17.46/-18.26	-15.28/-14.42	-17.69/-18.28	-12.18/-8.44	-7.16/-9.9	-7.44/-7.44	-6.35/-5.75	-5.05/-3.86	-3.29/-3.39	-3.35/-3.15	-3.35/-3.66	-4.68/-7.23
Theta (165°)	-10.51/-15.88	-13.37/17.17	-7.16/-5.55	-5.56/-6.71	-6.26/-6.37	-7.94/-10.56	-13.31/-15.79	-17.52/-17.81	-18.12/-17.77	-14.43/-12.76	-12.49/-13.2	-14.14/-16.43	-18.28/-18.38	-18.54/-18.72	-17.81/-18.01	-14.16/-10.16	-8.17/-13	-8.65/-10.22	-11.64/-10.73	-9.97/-6.77	-6.12/-4.8	-3.33/-2.84	-2.89/-3.73	-5.03/-7.29
Theta (172.5°)	-17.67/-13.05	-10.31/-12.06	-9.92/-9.88	-10.83/-12	-11.74/-9.3	-6.99/-5.33	-4.65/-4.45	-4.43/-5.49	-5.1/-0.69	-7.63/-10.47	-14.86/-17.46	-15.73/-14.26	-13.85/-13.41	-14.95/-16.14	-19.13/-18.78	-18.26/-18.6	-18.22/-17.47	-14.79/-12.42	-10.17/-18.5	-6.66/-5.47	-4.91/-4.95	-5.16/-5.8	-7.29/-7.93	-14.56/-17.97
Theta (180°)	-18.87/-17.09	-10.69/-10.62	-8.05/-5.89	-6.03/-4.41	-4.23/-4.29	-4.62/-5.23	-6.07/-6.04	-5.6/-5.17	-4.86/-4.69	-4.62/-5.99	-6.98/-8.29	-10.34/-12.08	-13.41/14	-13.24/-11.8	-10.07/-8.31	-6.78/-5.35	-4.35/-3.93	-3.46/-3.28	-2.6/-2.92	-3.4/-3.83	-4.28/-5.26	-6.17/-8.24	-10.11/-6.12	-13.91/-15.68
Freq(Hz)	5.3GPol.	ThetaAnt.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°)	-0.02/-0.3	0.02/-0.4	-0.94/-1.8	-2.56/-3.35	-4.36/-6.29	-8.56/-11.96	-15.89/-17.68	-15.18/-12.15	-9.31/-6.88	-4.72/-3.48	-2.75/-2	-1.54/-1.36	-1.1											



Radiated Composite Gain Data of 2.4GHz&5GHz

Appendix A

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°)	-12.52/-15.05	-19.13/-18.46	-15.06/-11.55	-8.93/-6.54	-4.83/-2.87	-2.05/-1.37	-1.13/-1.55	-1.88/-1.67	-1.52/-1.78	-2.28/-2.82	-3.76/-5.39	-7.25/-10.39	-14.61/-18.26	-18.12/-15.14	-11.02/-8.5	-6.67/-5.44	-4.35/-3.2	-2.27/-1.53	-1.06/-0.99	-1.13/-1.29	-1.45/-1.6	-1.78/-2.83	-4.31/-6.36	-8.51/-10.8
Θ(7.5°)	-11.18/-12.05	-14.98/-14.37	-9.68/-6.93	-5.42/-4.3	-2.88/-1.88	-1.19/-0.82	-0.58/-1	-1.21/-1.11	-1.17/-1.87	-2.82/-3.92	-5.38/-7.36	-10.14/-14.27	-18.99/-18.89	-18.24/-15.67	-11.24/-8.26	-6.38/-5.3	-4.51/-4.1	-3.38/-2.59	-2.2/-2.13	-2.26/-2.59	-2.79/-2.62	-2.85/-3.68	-4.86/-6.25	-8.14/-10.24
Θ(15°)	-11.44/-11.27	-11.86/-11.64	-8.08/-4.89	-3.24/-2.68	-2.47/-2.37	-2.11/-1.82	-1.54/-1.6	-1.23/-1.33	-1.9/-3.04	-4.57/-5.9	-7.09/-7.72	-8.74/-11.78	-18.24/-18.74	-19.45/-15.11	-12.89/-10.32	-7.7/-5.73	-4.16/-3.01	-1.87/-1.04	-0.66/-0.57	-0.86/-1.21	-1.51/-2.22	-3.36/-4.38	-5.58/-6.76	-9.05/-11.04
Θ(22.5°)	-18.46/-18.54	-12.37/-10.32	-8.17/-5.35	-3.92/-3.64	-3.44/-2.75	-2.36/-1.97	-2.06/-1.56	-1.26/-1.57	-2.22/-3.34	-4.53/-5.7	-7.07/-9.17	-13.01/-18	-18.35/-17.2	-12.87/-9.22	-7.09/-5.58	-4.76/-3.87	-2.86/-2.15	-1.71/-1.27	-0.93/-0.56	-0.36/-0.68	-1.24/-2.4	-3.82/-5.02	-6.34/-7.24	-9.32/-12.23
Θ(30°)	-18.59/-15.86	-11.44/-10.77	-8.87/-5.51	-3.63/-3.07	-2.83/-2.18	-1.49/-0.6	-0.64/-0.51	-1.02/-1.76	-2.73/-3.65	-4.27/-4.94	-6.18/-7.48	-8.83/-11.77	-16.84/-18.56	-13.95/-9.08	-5.74/-4.18	-3.86/-4.38	-5.01/-4.76	-3.02/-1.18	-0.32/-0.45	-0.72/-0.47	-0.76/-1.93	-3.35/-4.16	-5.02/-6.07	-8.01/-11.63
Θ(37.5°)	-18.91/-17.29	-14.61/-11.56	-8.56/-5.53	-4.11/-3.65	-2.75/-0.84	-0.12/-0.36	-0.9/-0.6	-0.64/-0.37	-0.71/-1.69	-3.09/-5.15	-7.8/35	-10.21/-14.25	-16.51/-11.19	-8.27/-7.25	-6.75/-5.9	-4.35/-2.78	-1.37/-0.56	-0.51/-0.97	-0.67/-0.05	-0.51/-1.02	-1.43/-3.13	-5.91/-7.62	-8.21/-8.56	-10.01/-15.03
Θ(45°)	-17.21/-15.71	-12.77/-8.99	-6.12/-3.75	-2.74/-1.86	-0.95/-0.57	-0.76/-0.46	-0.71/-1.12	-1.31/-1.01	-1.04/-1.12	-2.19/-4.37	-6.09/-9.01	-11.21/-17.28	-18.13/-16.02	-12.91/-8.67	-5.59/-3.91	-2.36/-0.49	0.30/6.1	1.41/2.46	2.87/2.56	1.94/0.47	-0.78/-1.71	-3.1/-4.87	-8.15/-10.67	-13.36/-14.93
Θ(52.5°)	-17.36/-14.35	-11.26/-9.27	-7.31/-6.46	-5.16/-2.69	-1.19/-0.76	-0.84/-1.8	-3.14/-1.85	0.05/0.93	0.07/-1.58	-3.17/-4.87	-7.42/-8.6	-9.88/-13.82	-15.1/-17.31	-18.55/-8.25	-4.65/-2.16	-0.66/0.21	0.59/0.8	1.38/1.57	1.10/4.6	-0.17/-1.01	-1.29/-1.43	-3.08/-4.8	-8.18/-13.06	-15.93/-18.13
Θ(60°)	-17.61/-11.78	-8.51/-6.65	-5.81/-6.01	-4.83/-3.13	-1.91/-0.34	-1.02/-2.12	-1.08/0	0.01/-1.33	-2.84/-2.78	-4.12/-4.61	-5.24/-5.61	-6.81/-10.56	-15.91/-13.05	-10.12/-8.26	-5.66/-3.54	-1.89/-1.18	-1.11/-0.97	0.21/1.16	0.50/1.4	-0.16/-1.16	-2.06/-1.71	-2.98/-5.64	-8.82/-11.56	-14.17/-18.18
Θ(67.5°)	-15.89/-9.93	-9.96/-8.66	-5.75/-5.14	-3.65/-0.97	-0.71/-2.31	-0.89/0.92	2.28/2.62	0.85/-0.72	-1.1/1.87	-2.53/-3.34	-3.55/-4.1	-6.93/-14.26	-18.24/-9.79	-6.13/-7.9	-8.01/-6.16	-2.98/-1.54	-1.51/-0.84	0.15/-0.36	-0.28/-0.43	-0.1/-0.84	-2.19/-1.99	-2.47/-3.74	-6.52/-10.26	-15.83/-16.64
Θ(75°)	-13.36/-12.43	-9.63/-7.89	-6.74/-5.13	-2.58/-2.4	-3.46/-4.7	-3.95/-1.46	-0.87/-2.56	-4.09/-2.25	-0.88/-1.07	-2.5/-3.46	-4.22/-3.68	-4.42/-6.87	-8.93/-13.36	-16.59/-9.02	-6.13/-5.85	-4.51/-1.94	-1.88/-2.73	-1.99/-1.23	-1.57/-1.13	0.59/0.88	-2.03/-2.61	-3.34/-5	-6.85/-10.32	-15.07/-12.89
Θ(82.5°)	-15.96/-11.4	-9.27/-7.06	-5.31/-3.97	-3.14/-2.73	-2.77/-2.13	-2.08/-2.92	-3.99/-5.81	-2.75/-1.79	-1.72/-3.3	-5.46/-3.1	-2.71/-3.02	-5.43/-8.87	-6.51/-8.47	-18.35/-14.58	-6.24/-2.85	-1.41/-2.42	-3.44/-2.28	-2.43/0.08	-0.11/-0.26	-1.58/0.33	-0.81/-3.47	-3.42/-3.32	-5.61/-9.84	-12.83/-18.91
Θ(90°)	-15.86/-10.61	-6.82/-6.39	-4.39/-2.64	-2.78/-2.52	-1.58/-2.76	-3.83/-9	-11.63/-4.97	-2.98/-4.16	-6.81/-5.44	-4.71/-3.24	-4.71/-5.34	-10.19/-12.9	-8.71/-10.49	-13.15/-7.49	-4.27/-1.83	-0.39/-0.68	-0.87/-1.4	-3.22/-3.03	-2.03/-0.8	-1.52/-3.4	-0.27/-1.58	-0.85/-1.77	-3.03/-6.71	-101/-18.56
Θ(97.5°)	-10.32/-7.74	-6.41/-3.86	-2.91/-3.19	-3.51/-2.49	-3.22/-5.7	-7.53/-5.88	-5.94/-3.67	-5.03/-4.42	-2.77/-3.61	-3.91/-2.44	-4.33/-3.55	-8.49/-5.93	-15.55/-14.86	-18.39/-9.84	-5.39/-2.37	-4.01/0.95	0.65/0.76	-0.48/-3.37	-2.40/0.5	1.13/1.17	-0.17/-0.52	-2.25/-2.39	-3.61/-5.91	-15.13/-17.29
Θ(105°)	-11.76/-8.79	-9.52/-7.92	-5.97/-5.14	-4.92/-6.45	-10.96/-5.8	-4.46/-3.18	-1.31/-2.24	-3.42/-1.03	0.43/-1.84	-4.71/-4.88	-7.56/-7.1	-11.61/-9.27	-15.09/-17.57	-17.95/-18.98	-8.95/-4.34	0.22/2.08	1.54/2.24	3.04/1.91	2.44/1.84	1.61/0.96	0.57/0.28	-2.28/-7.73	-7.59/-6.93	-10.73/-10.31
Θ(112.5°)	-18.06/-13.94	-13.84/-10.96	-9.06/-9.86	-11.11/-12.18	-10.29/-4.65	-0.09/-0.1	0.13/-0.56	-0.15/0.25	-0.34/-1.89	-3.21/-6.37	-7.71/-8.29	-12.39/-12.11	-16.83/-15.37	-10.48/-8.61	-5.66/-3.04	-0.99/0.29	1.37/3.61	4.42/3.76	3.69/2.11	1.68/-1.69	-1.26/-3.71	-4.58/-7.78	-13.14/-12.5	-11.72/-14.07
Θ(120°)	-17.51/-17.94	-13.48/-8.64	-7.19/-7.28	-10/-4.83	-5.94/-5.43	-3.55/-0.85	-0.69/0.55	1.38/1.85	0.49/-1.49	-3.07/-4.87	-8.85/-6.19	-4.68/-7.47	-9.87/-6.43	-10.55/-13.51	-5.69/-2.12	-1.02/-0.56	0.29/2.49	2.02/0.47	1.53/0.46	0.07/-0.88	-3.55/-8.66	-12.5/-7.88	-4.31/-5.48	-9.94/-8.06
Θ(127.5°)	-19/-18.92	-18.22/-17.57	-18.91/-9.22	-7.07/-5.49	-4.73/-5.8	-8.79/-10.79	-9.45/-6.06	-3.94/-3.4	-1.72/-2.02	-6.51/-9.43	-8.95/-7.3	-13.31/-14.52	-9.72/-5.77	-7.04/-5.35	-2.28/-1.61	-2.73/-2.23	-1.22/1.36	1.55/-3.35	-1.66/0.35	-1.86/-0.69	-3.29/-5.42	-11.49/-5.34	-7.15/-13.94	-18.88/-17.57
Θ(135°)	-11.98/-11.41	-10.22/-11.03	-18.65/-10.95	-5.91/-4.72	-4.02/-1.62	-0.9/-2.84	-4.13/-4.84	-6.06/-4.95	-6.26/-6.74	-4.92/-7.36	-7.71/-8.29	-12.39/-12.11	-16.83/-15.37	-10.48/-8.61	-5.66/-3.04	-0.99/0.29	1.37/3.61	4.42/3.76	3.69/2.11	1.68/-1.69	-1.26/-3.71	-4.58/-7.78	-13.14/-12.5	-11.72/-14.07
Θ(142.5°)	-16.17/-13.43	-10.08/-9.45	-9.33/-14.11	-16.81/-8.88	-10.38/-9.42	-6.85/-6.67	-6.92/-8.95	-15.08/-18.87	-1.02/-9.99	-14.26/-7.5	-4.68/-7.47	-9.89/-9.74	-6.18/-5.67	-18.71/-7.78	-6.81/-5.14	-1.02/1.41	0.65/0.8	-0.11/-0.88	-1.95/-0.07	1.41/-0.52	-1.47/-3.23	-14.53/-9.32	-5.11/-3.85	-6.71/-15.03
Θ(150°)	-13.24/-18.51	-19.03/-9.87	-4.53/-2.49	-2.41/-3.65	-4.67/-4.26	-5.36/-9.49	-12.56/-11.83	-10.33/-9.33	-8.25/-8.98	-14.38/-18.56	-19.01/-13.91	-10.37/-9.83	-8.06/-7.2	-8.63/-12.17	-18.08/-12.66	-5.09/-2.28	-2.62/-3.78	-5.36/-3.25	-2.12/-0.35	1.98/2.16	0.65/-1.3	-4.32/-8.8	-9.54/-8.19	-7.98/-9.93
Θ(157.5°)	-12.01/-17.99	-18.91/-17.49	-17.21/-18.54	-14.84/-12.04	-12.04/-11.15	-9.41/-9.99	-7.51/-6.44	-5.34/-5.48	-7.28/-10.22	-13.08/-13.65	-12.93/-13.56	-18.16/-18.74	-14.01/-10.62	-10.83/-12.92	-15.24/-11.61	-6.11/-2.62	-0.89/-1.4	-3.28/-2.49	-2.06/-2.39	-3.16/-3.79	-4.05/-3.77	-3.43/-3.22	-4.84/-6.43	-9.94/-8.06
Θ(165°)	-9.35/-17.85	-18.34/-14.78	-9.77/0.8	-5.44/-3.97	-3.58/-3.7	-4.35/-5.41	-6.44/-6.52	-6.64/-7.69	-9.22/-10.54	-11.44/-11.27	-10.33/-9.98	-11.55/-15.6	-18.54/-18.03	-18.08/-12.06	-9.31/-8.51	-7.87/-6.11	-4.43/-4.61	-5.33/-5.73	-6.76/-7.33	-7.65/-6.84	-5.25/-3.82	-2.58/-1.75	-1.47/-2.09	-3.34/-5.59
Θ(172.5°)	-13.37/-10.04	-6.29/-4.67	-4.75/-4.47	-5.22/-6.66	-8.76/-12.74	-18.85/-16.18	-9.94/-6.68	-5.39/-4.89	-4.65/-5.07	-6.21/-8.5	-12.45/-17.04	-14.91/-12.72	-13.33/-16.26	-17.31/-15.51	-12.86/-14.85	-13.09/-10.9	-10.31/0.06	-7.72/-4.46	-5.57/-4.86	-4.39/-3.34	-2.18/-1.49	-1.19/-1.75	-3.28/-5.77	-9.31/-12.91
Θ(180°)	-17.58/-18.14	-18.11/-14.85	-10.88/-7.18	-5.44/-3.7	-3.38/-3.94	-4.75/-4.78	-4.22/-3.79	-3.36/-2.64	-1.87/-1.65	-2.19/-3.35	-4.52/-6.12	-8.78/-12.9	-17.09/-13.83	-11.08/-8.54	-6.36/-4.67	-3.25/-2.13	-1.47/-1.07	-0.79/-0.65	-0.53/-0.49	-0.57/-1.08	-1.99/-3.5	-5.69/-8.14	-10.16/-11.75	-12.03/-15.01
Freq(Hz)	5.785GPol	ThetaAnt 4																						
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°)	-1.83/-1.31	-1.04/-0.63	-1.04/-1.85	-2.37/-2.57	-3.32/-3.83	-4.74/-6.75	-9.59/-14.18	-19.39/-18.89	-14.27/-10.48	-7.27/-5.24	-3.68/-2.91	-2.61/2.27	-1.64/-1.14	-1.11/-1.16	-1.26/-1.73	-2.25/-3.06	-4.11/-5	-6.61/-8.77	-11.61/-15.84	-18.69/-18.15	-13.17/-9.56	-6.62/-4.69	-3.76/-3.26	-3.11/-2.87
Θ(7.5°)	-1.81/-1.26	-0.72/-0.19	-0.04/-0.17	-0.37/-1.16	-2.64/-3.65	-4.64/-6.98	-10.06/-15.15	-18.66/-18.59	-13.88/-9.6	-7.05/-5.24	-3.93/-3.41	-3.26/-3.26	-2.93/-2.52	-2.89/-2.95	-3.39/-3.97	-4.62/-5.43	-6.21/-7.07	-8.81/-10.58	-12.86/-15.15	-18.79/-16.66	-12.17/-9.22	-7.23/-6	-5.06/-3.92	-3.44/-3.07
Θ(15°)	-1.04/-0.31	-0.03/0.43	0.02/0.86	0.29/-0.89	-2.66/-4	-6.13/-9.28	-12.39/-16.59	-18.14/-17.23	-13.81/-8.98	-6.28/-4.96	-4.37/-4.4	-3.71/-3.29	-2.83/-2.35	-2.24/-2.72	-3.37/-3.78	-4.24/-5.62	-6.54/-8.46	-10.84/-13.95	-16.15/-18.28	-18.65/-13.77	-9.36/-6.65	-5.29/-4.6	-3.71/-3.12	-2.81/-1.95
Θ(22.5°)	-2.05/-1.09	-0.43/0.22	-0.51/-0.89	-0.76/-1.77	-3.16/-4.14	-6.64/-9.16	-12.47/-17.22	-18.01/-14.62	-11.73/-9.45	-6.97/-4.82	-2.85/-1.63	-1.32/-1.68	-2.25/-2.26	-2.38/-2.46	-3.19									



Antenna Pattern of 2.4GHz&5GHz

Appendix B

θ (°)	5.60-5.79	5.82-6.26	5.43-4.04	4.08-5.14	3.15-1.17	-0.96-0.41	0.76/0.31	-1.41/-1.34	-3.67/-3.24	-3.58/-3.74	-4.29/-4.68	-4.42/-4.58	-4.01/-4.03	-3.66/-2.52	-2.62/-1.21	-0.93/0.29	0.47/0.21	0.05/0.78	-0.90/-1.72	-2.49/-2.22	-2.88/-2.91	-3.97/-3.39	-1.94/-2.37	-4.63/-6.35
φ (75°)	-4.96/-3.55	-3.20/-3.58	-4.79/-5.07	-5.08/-2.62	-1.75/-1.02	-0.11/-0.48	-1.38/-0.78	-1.79/-3.39	-4.17/-1.43	-3.57/-3.29	-4.16/-5.69	-6.61/-6.98	-7.81/-7.20	-6.48/-5.68	-4.38/-2.44	-1.63/0.26	-0.05/-0.99	-0.87/-1.77	-1.18/-2.80	-4.21/-2.32	-2.65/-3.75	-3.19/-2.67	-3.93/-3.52	-4.32/-5.95
φ (82.5°)	-4.27/-3.81	-3.18/-3.16	-3.47/-3.97	-2.66/-1.98	-2.61/-1.16	0.30/0.52	0.48/0.09	-0.56/-2.33	-4.89/-5.01	-4.36/-4.39	-4.35/-4.18	-5.09/-8.00	-7.99/-6.98	-7.36/-7.26	-6.52/-6.05	-5.43/-2.48	-2.52/-0.76	-0.60/0.25	-0.53/-1.93	-2.71/-2.55	-2.60/-2.53	-1.03/-1.26	-3.67/-4.23	-3.87/-6.63
φ (90°)	-5.18/-4.24	-2.58/-2.38	-2.45/-2.46	-3.20/-3.06	-2.68/-1.25	-0.56/-1.08	-3.26/-3.27	-1.79/-2.70	-3.48/-3.51	-3.80/-4.68	-5.00/-6.22	-6.15/-7.35	-7.68/-7.76	-8.95/-8.13	-7.95/-8.04	-5.52/-3.46	-0.76/1.35	1.06/0.73	-0.50/-0.79	0.34/-2.76	-2.53/-0.34	-0.87/-0.49	-2.50/-4.53	-5.41/-6.38
φ (97.5°)	-9.87/-6.83	-3.24/-1.53	-2.02/-3.20	-5.22/-3.30	-3.35/-3.64	-2.35/-2.22	-3.47/-4.25	-4.52/-3.82	-3.25/-3.52	-3.44/-3.69	-5.28/-8.95	-11.27/-14.73	-16.05/-15.98	-13.77/-9.36	-9.34/-7.16	-4.45/-1.46	-0.27/0.56	0.37/-0.07	-0.49/0.34	-0.26/-1.36	-0.01/1.36	0.78/-1.85	-4.20/-8.33	-9.35/-11.64
φ (105°)	-8.14/-6.73	-3.34/-1.17	-1.93/-2.26	-2.76/-2.46	-3.90/-4.83	-2.02/-1.12	-0.62/-0.67	-2.26/-3.28	-3.14/-3.05	-3.14/-3.05	-4.96/-7.14	-9.36/-14.01	-15.25/-14.39	-13.82/-15.15	-14.67/-11.97	-4.41/-1.64	-0.96/0.74	0.97/0.20	-2.12/-0.20	-0.59/-1.08	0.72/0.48	-0.87/-3.17	-9.25/-12.57	-11.59/-11.21
φ (112.5°)	-7.78/-4.80	-3.65/-3.43	-3.29/-2.98	-1.54/-2.65	-1.87/-1.79	-1.89/-1.23	-0.99/-2.42	-1.91/-0.36	-0.82/-2.19	-2.32/-2.70	-4.41/-6.65	-7.79/-10.48	-14.40/-12.56	-11.14/-8.13	-8.07/-9.11	-3.94/-1.82	0.55/1.93	0.15/1.00	-3.21/0.17	-0.79/-2.13	0.10/-0.72	-2.40/-3.67	-8.12/-11.06	-9.08/-10.05
φ (120°)	-2.93/-4.18	-3.40/-2.78	-1.21/-1.69	-2.23/-2.68	-3.02/-3.26	-2.37/-1.57	-1.95/-1.82	-1.14/-0.82	0.30/-0.05	-0.67/-1.84	-3.70/-5.50	-7.60/-8.53	-8.22/-9.55	-9.56/-11.36	-14.51/-11.23	-6.57/-3.01	-1.54/-0.67	-0.59/-1.68	-2.76/-0.26	-0.66/-4.35	-4.97/-3.11	-5.13/-10.73	-15.17/-14.66	-5.92/-6.31
φ (127.5°)	-3.15/-4.86	-5.51/-5.98	-4.96/-3.21	-2.79/-2.11	-4.15/-3.14	-1.41/-0.92	0.04/0.09	0.72/0.04	0.09/0.35	-0.43/-1.76	-3.47/-5.99	-9.21/-14.73	-13.34/-15.83	-13.85/-9.80	-8.06/-9.40	-10.77/-9.52	-6.74/-5.72	-4.00/-6.75	-2.57/-3.35	-3.05/-5.51	-7.22/-4.16	-4.56/-6.20	-3.90/-4.40	
φ (135°)	-8.09/-8.58	-3.93/-4.64	-5.66/-4.78	-5.41/-4.71	-1.26/-0.91	-0.72/0.37	0.71/1.05	1.74/1.96	0.56/-1.27	-2.02/-3.07	-5.02/-4.92	-4.12/-4.12	-4.82/-4.88	-3.79/-4.35	-8.07/-12.90	-11.69/-6.88	-7.11/-12.77	-13.86/-9.90	-8.50/-5.51	-6.94/-11.20	-5.54/-4.16	-4.93/-10.26	-12.02/-15.31	-10.21/-6.71
φ (142.5°)	-1.44/-5.44	-4.48/-3.39	-3.14/-2.21	-2.12/-2.80	-2.18/-0.07	0.27/-0.36	0.23/0.55	-0.49/-1.96	-2.59/-3.52	-5.21/-5.37	-4.29/-4.26	-5.60/-6.49	-5.59/-4.91	-4.05/-3.68	-5.41/-3.74	-6.02/0.22	1.17/0.74	-3.09/-4.42	-6.52/-9.54	-10.52/-0.60	-0.08/-3.47	-5.35/-9.02	-8.15/-7.61	-3.12/-3.02
φ (150°)	-1.69/-5.90	-8.00/-5.54	-4.87/-5.52	-6.13/-4.11	-3.11/-2.38	-1.52/-1.96	-3.67/-3.93	-2.00/-0.80	-0.61/-0.88	-1.55/-2.24	-6.40/-8.74	-7.99/-8.27	-12.34/-14.69	-11.36/-10.42	-11.54/-14.17	-15.14/-13.90	-14.36/-15.58	-16.01/-16.09	-17.52/-10.90	-14.88/-11.97	-10.02/-5.65	-4.77/-5.28	-7.41/-6.67	-3.17/-0.70
φ (157.5°)	-2.07/-3.15	-4.88/-5.23	-4.07/-4.11	-4.85/-4.84	-3.09/-1.47	-0.15/0.66	0.73/0.30	0.05/-0.15	-0.56/-1.48	-2.84/-3.92	-4.02/-4.11	-5.14/-5.59	-3.71/-1.74	-0.91/-1.01	-1.40/-1.90	-2.15/-1.94	-2.34/-4.06	-7.26/-10.47	-10.46/-7.44	-5.04/-5.32	-10.21/-15.68	-12.32/-8.57	-4.91/-3.07	-2.39/-2.15
φ (165°)	-9.93/-10.29	-9.28/-6.17	-1.21/-2.09	-2.18/-2.09	-1.96/-1.97	-2.29/-2.63	-2.99/-3.71	-4.17/-4.33	-4.07/-3.60	-4.07/-3.60	-2.70/-2.01	-8.00/0.77	2.25/3.33	3.96/3.99	3.34/2.20	0.66/-1.09	-3.17/-5.49	-8.00/-9.78	-10.98/-11.12	-10.46/-10.18	-11.38/-10.07	-10.17/-13.52	-15.30/-12.91	-10.18/-9.44
φ (172.5°)	-12.38/-10.64	-9.56/-8.79	-8.27/-9.93	-7.89/-8.13	-7.69/-6.70	-6.28/-5.79	-5.05/-4.65	-4.80/-4.66	-4.29/-3.69	-2.87/-2.18	-1.86/-1.09	-0.60/-0.39	-0.33/-0.50	1.10/-1.94	-2.62/-3.08	-3.48/-4.22	-5.06/-6.04	-7.06/-9.08	-8.72/-9.30	-9.54/-11.04	-12.96/-14.60	-15.08/-14.19	-13.97/-13.93	-14.76/-14.59
φ (180°)	-3.40/-3.25	-3.08/-2.62	-2.27/-1.84	-1.58/-1.64	-1.90/-2.03	-2.14/-2.26	-2.28/-2.12	-1.88/-1.92	-2.18/-2.26	-2.45/-2.50	-2.42/-2.15	-1.81/-1.60	-1.44/-1.26	-0.83/-0.28	0.13/0.05	-0.39/-1.07	-2.13/-3.69	-5.53/-7.48	-8.52/-7.68	-6.62/-5.44	-4.37/-3.51	-2.83/-2.33	-2.00/-2.08	-2.56/-3.05
Gain	5.785dBi	TotalAnt.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
φ (0°)	-1.26/-0.78	-0.24/-0.17	-0.14/-0.34	-0.57/-0.90	-0.88/-0.94	-0.99/-0.96	-1.01/-0.95	-0.97/-0.78	-0.69/-0.64	-0.51/-0.41	-0.50/-0.52	-0.58/-0.68	-0.45/-0.22	-0.08/0.00	0.03/-0.12	-0.01/0.19	0.36/0.39	-0.01/-0.40	-0.55/-0.84	-0.92/-0.86	-0.75/-0.90	-1.02/-1.03	-1.27/-1.67	-1.88/-1.78
φ (7.5°)	-0.65/-0.39	-0.23/-0.24	-0.31/-0.36	-0.52/-0.68	-0.72/-0.95	-1.22/-1.47	-1.63/-1.81	-1.86/-2.10	-2.27/-2.16	-2.11/-1.98	-1.89/-1.58	-1.29/-1.16	-0.94/-0.60	-0.31/0.00	0.19/0.27	0.45/0.57	0.56/0.44	0.31/0.36	0.32/0.00	-0.14/-0.20	-0.21/-0.43	-0.55/-0.70	-0.93/-1.12	-1.25/-1.04
φ (15°)	-0.37/-0.39	-0.57/-0.74	-0.87/-0.64	-0.43/-0.31	0.07/-0.07	-0.37/-0.68	-0.89/-1.19	-1.46/-1.91	-2.26/-2.44	-2.79/-2.97	-2.96/-2.79	-2.51/-2.06	-1.69/-1.36	-1.20/-1.15	-1.14/-1.08	-1.02/-0.96	-0.67/-0.28	0.34/0.76	0.79/0.39	-0.19/-0.51	-0.69/-0.93	-0.75/-0.56	-0.53/-0.67	-0.68/-0.60
φ (22.5°)	-0.24/-0.61	-1.18/-1.58	-1.95/-1.95	-1.38/-1.06	-0.35/-0.17	-0.12/-0.01	-0.27/-0.59	-0.88/-1.43	-1.86/-2.12	-2.33/-2.68	-2.96/-3.22	-3.12/-2.95	-2.70/-3.00	-3.84/-4.07	-3.88/-3.24	-2.55/-1.61	-0.53/0.56	1.15/1.34	1.30/0.94	0.53/0.44	0.18/-0.21	-0.67/-0.83	-1.16/-1.29	-0.98/-0.84
φ (30°)	-0.25/-0.64	-0.93/-0.80	-0.63/-0.77	-0.60/-0.57	-0.25/0.44	0.56/0.54	0.56/0.37	0.16/-0.30	-0.95/-1.26	-2.85/-3.41	-4.36/-5.00	-5.88/-6.34	-5.87/-5.28	-4.60/-4.01	-2.72/-1.63	-1.47/-1.73	-1.24/-2.08	0.20/0.15	-0.09/-0.46	-0.18/-0.16	0.42/0.69	0.57/0.05	-0.64/-0.59	
φ (37.5°)	-1.44/-0.96	-1.52/-2.92	-2.93/-2.04	-2.04/-1.45	-0.84/-0.27	0.01/0.26	-1.24/-1.61	-1.98/-2.09	-2.28/-2.34	-4.05/-4.27	-4.39/-5.76	-5.89/-6.44	-5.88/-4.54	-4.40/-3.41	-2.59/-3.55	-3.95/-2.03	-0.92/-0.45	-0.26/-0.65	-1.06/-1.41	-0.36/0.43	0.40/0.52	0.81/0.07	-0.84/-1.58	
φ (45°)	-1.90/-2.96	-2.74/-2.57	-1.72/-0.33	-0.89/-1.58	-1.33/-1.15	-0.49/-0.12	-0.48/-0.60	-0.62/-1.04	-1.99/-2.96	-3.38/-4.12	-5.44/-6.53	-6.67/-5.79	-5.52/-4.89	-3.90/-3.72	-4.21/-3.21	-2.13/-1.34	0.08/0.71	0.98/0.85	0.01/-0.01	0.96/1.69	1.11/0.34	-0.21/-0.93	-1.02/-0.84	-1.17/-1.34
φ (52.5°)	-1.21/-1.59	-1.69/-1.79	-3.30/-2.50	-2.00/-2.26	-1.56/-0.44	0.69/0.81	0.40/-0.15	-0.95/-1.54	-2.03/-2.71	-3.19/-3.51	-4.47/-5.81	-6.02/-6.72	-7.13/-6.19	-5.77/-4.89	-3.52/-1.75	-0.12/-0.13	0.56/0.90	1.31/1.79	1.37/0.83	0.53/0.36	0.58/0.28	-0.25/-0.32	-1.12/-2.25	-2.37/-1.56
φ (60°)	-3.60/-3.45	-4.90/-4.12	-3.09/-1.99	-1.16/-1.34	-0.68/0.10	0.44/0.22	-1.36/-1.81	-3.02/-4.14	-4.96/-5.55	-7.01/-7.53	-7.77/-7.47	-6.78/-5.96	-5.24/-2.52	-0.26/-1.41	1.02/0.87	1.18/1.19	1.50/0.91	0.84/0.36	-0.04/0.11	-0.47/-2.83	-3.40/-2.66	-3.57/-4.23		
φ (67.5°)	-7.69/-7.52	-7.42/-6.61	-4.46/-3.70	-2.53/-0.97	-0.63/-1.30	-1.40/-0.60	-1.23/-2.12	-1.89/-1.95	-2.47/-3.91	-5.60/-7.54	-8.10/-8.48	-7.01/-6.56	-6.99/-5.60	-5.30/-3.00	-2.01/-2.38	-2.95/-2.08	-0.49/-1.38	-0.44/-1.41	-1.73/-1.49	-1.26/-0.84	-1.17/-2.41	-3.07/-3.33	-3.56/-3.37	-4.39/-6.01
φ (75°)	-7.21/-7.66	-6.94/-6.31	-6.65/-9.22	-2.34/-1.24	-1.24/-0.93	-0.82/-1.03	-0.29/-0.41	-2.19/-3.17	-3.99/-4.14	-5.07/-6.71	-7.29/-7.97	-8.19/-8.70	-8.04/-6.50	-4.82/-4.84	-5.05/-3.81	-4.72/-2.07	-1.75/-1.52	-0.84/-1.00	-0.86/-1.00	-1.86/-1.26	-1.94/-3.31	-3.21/-3.67	-3.93/-4.02	-6.64/-8.28
φ (82.5°)	-6.64/-5.42	-4.31/-3.66	-3.89/-3.40	-3.39/-3.29	-2.88/-1.22	-0.31/0.08	-0.02/0.04	-0.42/-2.82	-4.86/-6.39	-7.68/-9.61	-6.47/-7.36	-8.57/-9.54	-9.36/-7.32	-8.74/-8.63	-7.05/-5.33	-3.27/-0.47	-0.38/0.15	-0.38/0.15	-0.81/-0.98	0.17/-1.45	-1.33/-1.18	-1.07/-0.74	-3.10/-4.90	-8.43/-8.88
φ (90°)	-7.09/-4.40	-1.92/-1.72	-1.77/-3.95	-4.00/-2.30	-1.82/-1.00	-0.54/-1.67	-2.01/-1.52	-2.01/-2.55	-3.07/-5.45	-8.72/-8.28	-8.32/-7.91	-6.90/-8.27	-8.46/-10.91	-13.50/-10.12	-7.44/-6.36	-5.92/-2.98	-3.26/-0.47	-0.10/-0.97	-0.54/-0.37	-0.85/-0.31	-0.29/0.63	0.56/-0.58	-3.85/-5.87	-6.59/-8.72
φ (97.5°)	-8.86/-5.45	-2.53/-1.36	-2.88/-6.45	-3.87/-4.28	-4.08/-2.93	-1.88/-1.11	-1.09/-1.68	-2.20/-2.72	-4.66/-5.04	-4.67/-7.33	-11.58/-12.03	-11.89/-10.08	-12.05/-12.22	-9.16/-8.57	-7.89/-9.80	-6.17/-4.26	-2.15/-1.51	-0.15/0.15	-0.40/0.43	1.57/2.13	1.65/1.51	0.72/-0.17	-3.34/-9.84	-10.08/-9.19
φ (105°)	-6.36/-4.62	-3.18/-2.36	-2.79/-2.00	-1.68/-2.02	-0.53/-0.10	-0.18/-0.47	-0.40/-0.55	-0.61/-0.94	-3.46/-4.06	-3.40/-4.14	-5.12/-7.03	-10.23/-13.87	-14.03/-11.92	-9.34/-8.63	-8.67/-10.07	-8.18/-2.48	0.36/1.90	1.75/1.28	0.51/1.12	2.19/1.09	1.68/1.53	1.35/0.30	-4.49/-10.46	-12.21/-10.54
φ (112.5°)	-9.05/-6.87	-5.01/-2.82	-2.43/-1.68	-1.42/-1.15	-0.38/-0.78	-0.76/-0.41	-1.47/-2.71	-2.41/-2.96	-3.04/-4.25	-6.56/-6.48	-6.34/-7.13	-8.44/-7.87	-10.59/-11.15	-11.49/-9.98	-9.59/-12.69	-6.46/-2.50	0.19/2.47	1.99/2.14	0.95/2.46	1.48/-1.01	0.77/0.86	-0.78/-4.18	-10.68/-13.04	-10.31/-10.62
φ (120°)	-3.28/-4.39	-2.07/-2.18	-1.35/-1.95	-1.02/-1.37	-1.09/-2.72	-1.29/-0.73	-1.17/-0.71	-0.54/-0.84	-0.77/-0.89	-2.06/-2.42	-6.41/-8.29	-8.73/-11.14	-10.98/-9.46	-11.10/-10.68	-15.49/-14.63	-9.95/-5.93	-3.99/-1.42	0.01/0.39	-1.93/0.30	0.74/-1.29	-1.89/-1.01	-3.95/-9.25	-13.99/-13.34	-7.41/-4.06
φ (127.5°)	-4.47/-5.15	-5.38/-5.14	-3.22/-1.10	-0.60/0.32	-1.83/-1.07	-0.13/0.97	1.94/1.85	1.03/0.20	-0.44/-0.78	-1.08/-1.79	-3.58/-5.88	-7.60/-7.13	-15.02/-13.90	-11.13/-9.67	-7.32/-9.92	-10.38/-8.17	-9.41/-11.74	-7.80/-10.11	-5.44/-9.99	-5.55/-2.53	-1.49/-2.57	-3.52/-3.20	-5.54/-10.02	-4.39/-2.31



Antenna Pattern of 2.4GHz&5GHz

Appendix B

Theta (112.5°)	-5.18/-5.29	-2.00/-3.20	-1.70/-1.03	0.67/1.20	0.55/0.18	0.24/0.88	2.08/1.64	0.43/-1.70	-2.25/0.09	0.88/-0.47	-0.62/-1.45	-2.72/-2.05	-3.52/-2.28	-1.66/-0.67	1.42/-0.13	-3.08/-1.37	-0.25/1.53	1.52/0.44	-2.72/-9.25	-5.87/-1.59	-3.79/-7.24	-8.26/-10.41	-5.19/-8.43	-7.02/-8.41
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°)
Theta (120°)	-7.32/-7.29	-3.46/-1.84	-0.00/-0.37	0.25/0.27	-1.12/-1.80	-0.70/0.78	1.99/1.99	0.38/0.20	0.31/0.99	1.18/0.98	0.85/-1.65	-1.26/-1.21	-3.03/-0.45	-3.14/-1.28	2.24/0.99	-2.70/-6.66	-1.70/-1.28	0.37/0.44	-4.26/-15.91	-7.30/-1.68	-2.26/-4.05	-13.07/-6.69	-3.68/-10.46	-6.90/-6.88
Theta (135°)	-2.90/-4.35	-3.35/-4.12	-5.28/-4.23	-2.87/-9.09	-0.81/-1.57	-2.89/-3.90	-4.04/-3.34	-2.62/-2.32	-1.69/-4.07	0.37/0.16	-0.37/0.10	-0.70/-2.66	-1.46/-1.26	-2.78/-1.38	0.01/-2.46	-4.77/-7.42	-6.03/-3.40	-3.65/-1.87	-6.80/-11.17	-7.15/-6.69	-5.28/-6.23	-5.39/-7.70	-5.61/-5.26	-5.66/-2.11
Theta (150°)	-3.57/-3.19	-4.05/-5.19	-6.93/-8.07	-5.36/-2.78	-1.89/-2.02	-2.71/-3.80	-4.17/-3.29	-2.59/-2.07	-1.77/-1.95	-2.27/-2.59	-5.57/-4.75	-6.60/-6.17	-7.27/-7.45	-7.06/-5.66	-7.41/-12.54	-7.92/-8.79	-5.73/-6.10	-10.24/-10.88	-7.75/-6.14	-5.77/-5.60	-7.81/-8.33	-9.49/-8.40	-7.83/-5.35	-7.83/-5.35
Theta (165°)	-1.10/-9.83	-8.26/-7.35	-6.60/-6.42	-5.18/-4.67	-4.39/-4.73	-5.48/-6.30	-5.99/-5.74	-5.45/-5.06	-4.83/-4.86	-4.82/-4.84	-5.14/-5.43	-5.75/-6.08	-6.50/-7.24	-8.11/-8.94	-6.00/-6.61	-8.74/-8.20	-11.06/-10.25	-8.00/-7.85	-9.12/-9.94	-9.91/-9.02	-10.52/-12.82	-15.71/-12.54	-15.71/-12.54	-15.71/-12.54
Theta (180°)	-12.10/-9.36	-8.33/-9.31	-10.31/-8.62	-7.24/-6.98	-7.15/-7.30	-7.86/-7.82	-7.23/-7.36	-7.64/-6.81	-5.67/-4.91	-4.53/-5.00	-5.75/-6.32	-6.41/-5.89	-5.18/-4.72	-4.77/-5.29	-6.57/-8.03	-9.74/-12.67	-13.81/-10.54	-8.45/-8.88	-10.56/-10.08	-8.20/-8.08	-8.87/-9.37	-9.87/-11.01	-13.17/-14.28	-14.53/-13.49
Theta (195°)	-9.33/-7.76	-7.69/-8.03	-8.09/-8.54	-7.87/-8.07	-8.44/-8.32	-8.10/-7.61	-6.56/-5.90	-5.67/-5.44	-4.69/-3.80	-3.58/-3.66	-3.59/-3.25	-3.18/-3.54	-4.19/-5.27	-6.96/-8.14	-8.23/-8.10	-8.47/-9.28	-9.35/-9.58	-8.90/-8.99	-9.13/-9.30	-9.11/-9.33	-11.84/-14.41	-15.48/-14.75	-12.44/-10.85	-10.59/-10.39
Theta (210°)	-12.54/-11.97	-11.95/-12.57	-12.81/-13.14	-11.70/-10.21	-9.34/-8.10	-7.32/-6.80	-6.31/-6.35	-6.79/-7.32	-7.49/-7.00	-5.95/-5.76	-5.32/-5.36	-5.63/-6.09	-6.61/-6.53	-7.19/-8.30	-5.63/-6.09	-9.70/-9.42	-10.00/-9.34	-8.92/-8.74	-8.88/-9.08	-9.30/-10.17	-12.05/-12.70	-12.08/-10.84	-11.06/-11.82	-11.06/-11.82
Theta (225°)	-8.96/-8.87	-9.18/-9.12	-8.87/-8.71	-7.58/-6.62	-6.05/-6.16	-6.43/-6.91	-7.35/-7.83	-8.38/-9.08	-9.90/-10.14	-9.38/-8.73	-8.24/-7.95	-7.58/-7.29	-7.22/-7.38	-7.90/-8.66	-10.06/-10.94	-11.46/-12.29	-13.62/-13.82	-13.91/-14.27	-13.41/-12.95	-12.04/-10.33	-9.20/-9.03	-9.02/-9.45	-10.05/-10.42	-10.13/-9.34
Theta (240°)	-14.83/-15.31	-14.32/-12.83	-11.59/-12.03	-12.63/-13.61	-13.57/-13.28	-13.48/-13.88	-14.62/-15.02	-15.27/-16.32	-16.04/-14.72	-13.51/-12.75	-13.01/-14.21	-14.97/-16.23	-15.59/-13.47	-12.89/-12.05	-12.45/-12.94	-13.88/-14.17	-14.01/-13.14	-14.26/-14.90	-14.03/-13.67	-13.94/-14.74	-13.89/-12.93	-11.68/-12.25	-11.74/-11.83	-10.96/-12.31
Theta (255°)	-15.96/-14.82	-15.62/-14.31	-12.94/-13.09	-14.30/-15.66	-16.21/-15.64	-16.19/-15.87	-14.93/-14.89	-14.85/-14.54	-13.38/-11.51	-9.54/-8.52	-8.32/-8.20	-8.88/-5.55	-9.41/-8.65	-8.34/-8.75	-9.69/-9.97	-10.15/-9.89	-10.39/-10.99	-12.27/-12.79	-14.06/-15.77	-15.51/-15.40	-15.88/-15.96	-15.03/-14.15	-14.23/-14.93	-15.67/-15.19
Theta (270°)	-14.83/-13.63	-12.64/-13.35	-14.25/-13.81	-14.72/-15.39	-15.52/-14.92	-15.28/-14.63	-13.61/-12.47	-11.58/-10.41	-9.92/-8.67	-7.84/-7.71	-7.62/-7.87	-8.07/-8.14	-8.42/-8.10	-8.37/-8.72	-9.06/-9.01	-8.88/-8.67	-9.13/-9.95	-10.98/-11.46	-15.32/-13.86	-14.51/-14.18	-13.02/-13.22	-14.60/-15.49	-14.98/-14.83	-14.98/-14.83
Theta (285°)	-12.71/-10.33	-8.93/-9.81	-10.95/-12.49	-15.02/-14.06	-13.39/-13.09	-12.32/-10.49	-9.02/-9.21	-9.09/-8.74	-8.63/-9.00	-9.73/-10.93	-13.19/-14.31	-14.03/-11.55	-9.62/-9.04	-9.46/-10.77	-11.84/-11.91	-10.96/-10.66	-10.40/-9.18	-7.72/-7.86	-8.42/-9.01	-9.46/-9.58	-10.04/-9.36	-9.73/-10.80	-12.55/-13.86	-13.52/-12.90
Theta (300°)	-8.25/-8.86	-9.13/-8.71	-9.96/-11.04	-10.99/-9.05	-8.49/-8.74	-8.40/-8.00	-7.03/-7.10	-7.37/-7.93	-9.20/-10.95	-12.60/-15.40	-15.99/-15.38	-13.11/-9.12	-8.49/-9.80	-11.88/-10.91	-9.23/-9.55	-11.09/-11.24	-8.12/-5.44	-5.12/-5.60	-6.78/-5.75	-5.48/-6.67	-7.23/-8.28	-10.12/-12.16	-11.23/-9.32	-7.57/-7.39
Theta (315°)	-5.61/-6.15	-5.74/-5.31	-6.16/-7.11	-8.57/-8.56	-8.62/-8.74	-6.75/-6.40	-6.02/-6.15	-5.65/-6.09	-7.10/-8.06	-9.00/-8.83	-9.92/-9.21	-9.73/-9.48	-9.35/-9.35	-10.02/-8.32	-6.14/-6.66	-6.45/-6.93	-9.52/-9.61	-5.62/-5.93	-3.84/-3.69	-4.05/-4.85	-5.80/-6.09	-5.66/-5.94	-8.08/-6.66	-8.47/-7.13
Theta (330°)	-5.61/-4.26	-3.21/-3.15	-4.38/-4.77	-4.96/-5.65	-7.03/-9.24	-6.31/-4.05	-3.88/-4.33	-4.21/-4.14	-4.72/-5.83	-6.60/-6.36	-5.41/-5.06	-4.83/-4.73	-5.50/-6.41	-7.83/-8.58	-6.23/-5.68	-6.76/-6.62	-4.30/-5.46	-7.02/-5.03	-6.96/-6.77	-6.25/-7.56	-7.90/-7.47	-6.94/-5.91	-5.34/-4.90	-4.78/-5.07
Theta (345°)	-1.78/-7.03	-5.33/-4.25	-3.42/-2.88	-2.43/-1.67	-2.17/-3.72	-4.25/-4.21	-4.88/-4.50	-5.84/-5.52	-4.51/-3.39	-2.94/-2.44	-1.96/-2.16	-2.71/-4.57	-6.58/-5.94	-6.21/-7.51	-5.99/-5.82	-5.88/-4.38	-4.62/-4.61	-5.06/-5.92	-3.84/-3.69	-4.05/-4.85	-5.80/-6.09	-5.66/-5.94	-8.08/-6.66	-8.47/-7.13
Theta (360°)	-3.25/-2.77	-3.35/-2.68	-2.32/-2.68	-1.34/-1.16	-1.06/-1.57	-1.49/-1.56	-1.78/-3.44	-5.61/-7.54	-6.49/-4.39	-2.12/-2.04	-3.46/-4.59	-4.23/-5.10	-7.52/-6.09	-3.43/-4.42	-2.69/-2.22	-3.52/-3.74	-2.69/-2.22	-3.52/-3.74	-2.69/-2.22	-3.52/-3.74	-2.69/-2.22	-3.52/-3.74	-2.69/-2.22	-3.52/-3.74
Theta (375°)	-5.36/-4.21	-4.06/-1.63	-0.27/-0.69	-0.46/0.39	-0.23/-0.67	-0.78/-1.36	-0.09/-1.11	4.31/-5.50	-7.23/-5.30	-3.58/-3.10	-5.06/-7.38	-6.23/-7.50	-7.53/-5.58	-10.02/-6.15	-3.57/-4.05	-4.82/-1.87	-0.33/0.69	0.69/1.36	-1.48/-2.78	-3.18/-4.51	-5.16/-4.68	-5.69/-7.74	-6.68/-6.17	-5.24/-4.90
Theta (390°)	-8.55/-6.41	-4.07/-0.65	-0.16/-0.02	0.79/1.19	0.37/1.38	0.37/1.44	-1.05/-1.48	-3.74/-4.20	-3.83/-3.68	-3.35/-2.82	-3.50/-5.50	-5.03/-5.83	-6.68/-6.28	-8.08/-2.79	-2.52/-2.88	-3.68/-5.55	1.03/2.50	1.79/1.11	0.24/-0.77	-1.59/-2.12	-5.65/-6.49	-6.35/-8.98	-7.03/-5.04	-5.25/-6.93
Theta (405°)	-10.72/-5.41	-3.02/-0.18	0.20/1.36	1.61/2.08	1.16/0.92	0.65/0.31	0.35/0.86	-2.70/-4.83	-5.39/-4.87	-4.22/-1.98	-3.15/-2.19	-1.00/-3.76	-2.16/-3.71	-3.41/5.00	-0.83/0.80	-1.70/0.15	2.19/2.17	3.09/1.89	0.63/0.16	-0.60/-2.40	-8.11/-5.08	-7.15/-3.77	-10.32/-8.62	-5.70/-10.22
Theta (420°)	-10.92/-4.34	-3.41/0.15	-0.47/0.63	1.82/1.88	0.17/1.23	0.86/0.46	0.73/0.34	-1.49/-4.12	-4.23/-2.79	-2.49/-1.41	-3.08/-4.72	-2.81/-6.47	-1.49/-2.51	-2.36/0.21	0.61/1.62	1.05/-0.42	2.27/2.60	2.46/0.62	-1.09/-1.95	-0.62/0.22	-10.10/-7.82	-5.05/-15.60	-6.47/-4.52	-6.14/-4.97
Theta (435°)	-6.89/-2.51	-0.97/-1.15	-0.76/0.42	1.26/1.76	0.41/0.60	0.67/0.90	1.49/1.54	1.16/-1.66	-2.22/-2.14	-1.99/-1.71	-4.10/-3.57	-2.94/-3.57	-2.64/-2.98	-1.67/0.47	1.50/2.88	1.11/0.63	2.57/2.96	2.95/0.37	-4.46/-4.34	-1.61/-0.04	-11.83/-10.28	-3.52/-11.12	-15.08/-8.00	-11.73/-4.72
Theta (450°)	-9.95/-3.84	-2.24/-1.53	-1.08/0.31	2.01/2.11	0.47/0.66	0.97/2.50	2.58/2.50	1.72/0.33	-0.03/0.03	-1.20/1.05	-1.45/-1.38	-2.73/2.96	-4.54/-9.93	-1.55/0.19	1.59/1.56	3.86/0.54	5.12/0.99	2.81/0.44	-5.45/-6.34	-2.86/0.57	-10.78/9.69	-2.84/-7.24	-7.88/-7.08	-2.11/-2.26
Theta (465°)	-4.83/-4.58	-2.39/-2.76	-0.54/-1.03	0.68/0.99	0.61/0.66	1.67/2.68	2.40/1.51	0.51/0.21	0.99/0.35	-0.02/-0.48	-0.71/-0.12	-1.52/-0.44	-2.18/-2.04	-2.43/-1.90	1.35/1.64	-1.43/-1.66	0.90/1.50	2.24/-0.19	-3.28/-10.77	-9.31/-3.35	-6.77/-7.33	-6.15/-9.50	-4.48/-7.11	-5.50/-2.05
Theta (480°)	-5.60/-7.18	-1.30/-1.01	-0.25/-1.53	-0.45/0.12	-0.30/0.02	1.16/1.58	1.53/1.64	1.23/0.76	-0.89/0.37	0.85/0.13	0.84/0.12	-1.31/-0.60	-4.10/-1.83	-1.47/-2.78	1.93/1.40	-2.20/-4.66	-2.60/0.56	0.89/0.69	-3.07/-13.98	-7.49/-2.07	-3.87/-9.53	-9.60/-5.41	-5.35/-12.68	-6.42/-5.39
Theta (495°)	-6.95/-4.35	-2.01/0.67	-1.20/2.27	-1.16/0.57	-1.48/-2.28	-2.66/-1.90	0.11/1.02	0.28/0.41	0.32/-0.43	-0.50/0.43	-0.06/1.81	0.09/0.05	-0.58/1.25	-1.18/-1.10	1.38/0.02	-3.54/5.75	-1.26/0.96	-0.36/0.96	-4.14/-12.28	-5.82/0.53	-2.06/2.46	-10.40/-7.52	-4.08/-7.74	-3.65/-2.84
Theta (510°)	-2.95/-2.69	-3.55/-5.47	-4.29/-3.59	-1.71/-1.34	-2.17/-3.60	-4.00/-3.97	-2.82/-2.75	-3.01/2.18	-0.96/-1.20	-2.11/-1.45	-1.09/-0.46	-0.04/-1.48	-1.22/-0.75	-2.14/-2.72	-1.51/-1.47	-0.60/-5.34	-6.16/-1.88	-3.13/-2.58	-6.67/-12.23	-8.93/-1.28	-3.49/-5.07	-6.91/-9.14	-5.27/-4.59	-3.05/-1.50
Theta (525°)	-4.08/-4.02	-4.60/-6.13	-9.29/-7.61	-3.90/-2.53	-2.17/-3.18	-5.42/-7.43	-6.86/-5.81	-4.54/-3.29	-3.63/-3.75	-2.86/-2.48	-2.69/-2.79	-2.50/-2.79	-2.37/-2.43	-3.43/-3.38	-3.02/-3.94	-3.61/-5.60	-7.83/-6.15	-7.33/-6.82	-10.68/-12.56	-9.33/-7.24	-8.04/-8.32	-7.26/-6.07	-6.00/-9.97	-7.60/-5.89
Theta (540°)	-6.65/-4.87	-5.16/-5.55	-6.86/-7.65	-8.63/-7.80	-6.95/-7.47	-8.32/-7.93	-6.86/-5.89	-6.20/-5.91	-4.70/-4.37	-4.99/-5.01	-4.43/-4.29	-4.83/-5.24	-5.22/-4.80	-4.83/-4.78	-4.42/-4.42	-5.55/-6.56	-5.45/-7.05	-8.19/-6.64	-9.36/-13.97	-12.44/-12.34	-14.24/-13.01	-11.07/-10.38	-11.06/-14.98	-13.86/-8.41
Theta (555°)	-10.59/-10.63	-12.85/-12.08	-10.88/-8.95	-8.91/-9.24	-8.82/-9.95	-10.70/-10.00	-8.89/-7.44	-6.81/-5.92	-6.39/-6.77	-6.84/-6.16	-5.09/-4.43	-4.14/-4.17	-4.48/-4.63	-4.17/-3.56	-3.34/3.81	-4.88/-6.71	-10.37/-11.36	-9.47/-9.32	-11.53/-11.14	-9.06/9.30	-10.74/-8.96	-7.18/-7.65	-9.07/-10.30	-12.25/-11.58
Theta (570°)	-11.24/-11.47	-8.99/-7.91	-7.08/-7.42	-8.54/-8.80	-11.20/-11.65	-11.82/-10.66	-9.42/-8.77	-8.08/-6.76	-5.56/-4.95	-4.50/-4.42	-4.70/-5.24	-5.51/-5.17	-4.75/-4.42	-4.96/-6.26	-7.32/-7.75	-8.63/-9.37	-9.60/-9.47	-10.19/-9.56	-8.44/-7.45	-7.29/-8.20	-10.00/-11.53	-12.98/-15.35	-13.36/-10.46	-9.26/-10.78
Theta (585°)	-13.32/-13.11	-14.56/-12.91	-12.02/-12.53	-11.97/-10.90	-9.44/-8.05	-7.39/-6.87	-6.80/-7.04	-7.35/-7.41	-7.46/-7.36	-7.51/-7														

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

