



Antenna Composite Gain Test Report

Equipment	WiFi 6E Mesh AP
Brand Name	Adtran
Model Name	SDG-8632
Applicant	Adtran 901 Explorer Boulevard, Huntsville, Alabama, United States, 35806-2807
Standard	KDB 662911 D03 v01
Sample Received	Jul. 26, 2023
Start Test Date	Aug. 21, 2023
Final Test Date	Aug. 21, 2023


Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

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1. Operation Mode and Antenna Information

Antenna Position	RF Port	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
6G Ant1	1	Galtronics USA, Inc	Antenna_6DB1	Dipole	UFL	6G
6G Ant2	2	Galtronics USA, Inc	Antenna_6DB2	Dipole	UFL	6G
6G Ant3	3	Galtronics USA, Inc	Antenna_6DB3	Dipole	UFL	6G
6G Ant4	4	Galtronics USA, Inc	Antenna_6DB4	Dipole	UFL	6G

Note:

6GHz Operation Mode (4TX/4RX)

6G Ant1~6G 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]
5925-6425	6175
6425-6525	6475
6525-6875	6695
6875-7125	6995

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	23.5~24.5°C / 40~50%	21/Aug/2023

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

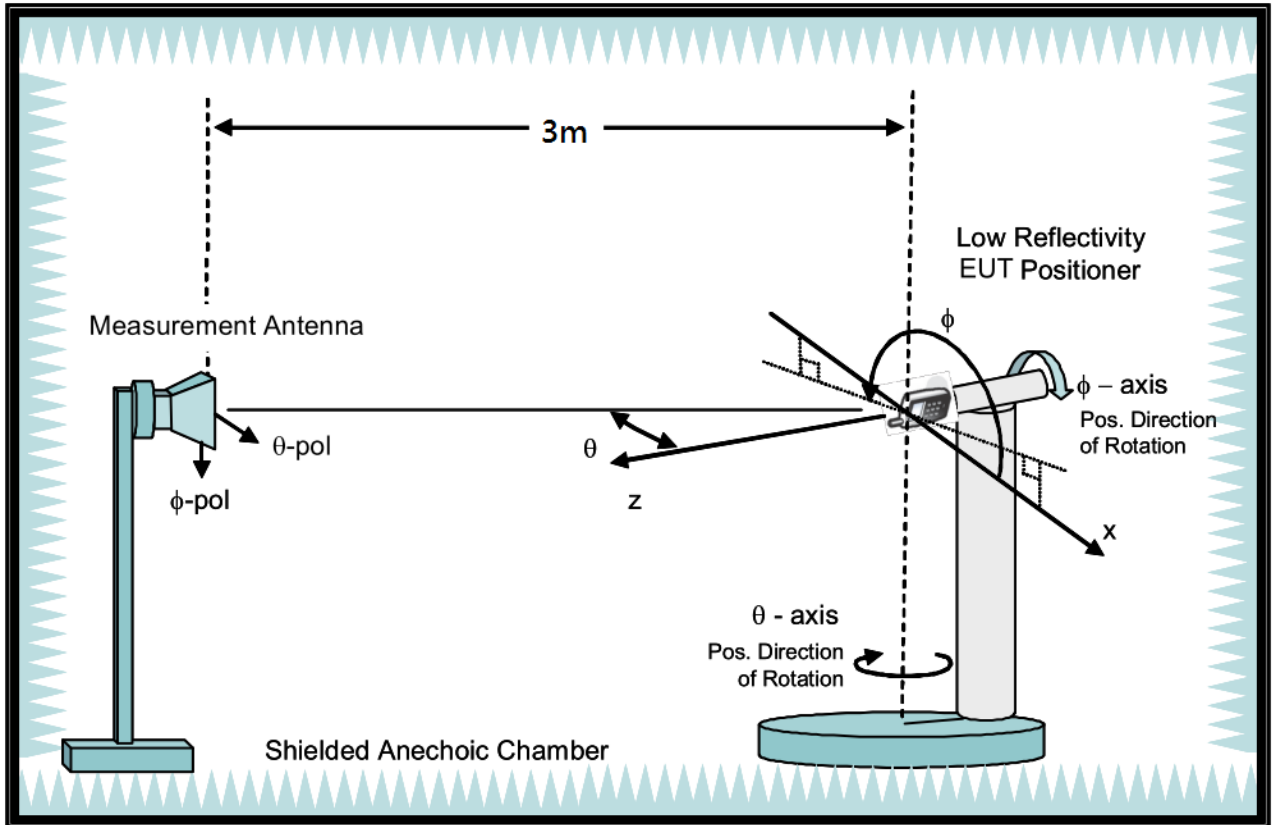
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

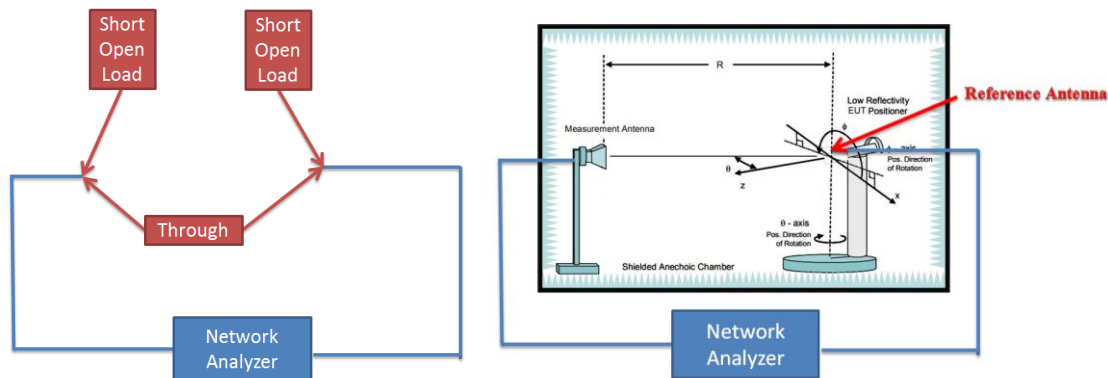
#Reference to CTIA “ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1”



5. Reference Calibration

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

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



Frequency (MHz)	2400	2450	2500	5150	5200	5300	5600	5750	5800	5900	6000	6500	7000	7200
G(theta) reading (dB)	-33.75	-33.64	-32.91	-32.21	-32.45	-32.33	-32.57	-32.94	-32.78	-33.35	-32.91	-33.81	-34.54	-35.64
G(phi) reading (dB)	-33.19	-32.12	-32.48	-32.51	-32.64	-31.68	-32.24	-32.45	-32.45	-32.85	-32.45	-33.62	-34.48	-35.24
Reference gain (dBi)	10	10.4	10.6	12.3	12.5	13.3	13.3	13.2	13.1	13	13.2	12.4	11.8	11.1
Factor(theta) (dB)	43.75	44.04	43.51	44.51	44.95	45.63	45.87	46.14	45.88	46.35	46.11	46.21	46.34	46.74
Factor(phi) (dB)	43.19	42.52	43.08	44.81	45.14	44.98	45.54	45.65	45.55	45.85	45.65	46.02	46.28	46.34

Note:

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

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

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

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



6. Test Method

EUT set on multi-axis positioner and adjust EUT's physical center to measurement reference center. Measurement antenna set at phi polarization and 1.5 meter height. Port 1 of Network analyzer connect to antenna 1 of EUT. Record G value every 7.5 degree from 0 to 352.5 degree on Phi angle and 0 to 180 on theta angle of multi-axis positioner. Then set measurement antenna to theta polarization and repeat process. Repeat process to each antenna of EUT.

DG steps:

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

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



7. Measured Values and Calculation of Maximum Gain Positions

DG_1SS max value position

Frequency (Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 (dBi)	1.36	3.8	3.14	2.45
Ant. 2 (dBi)	2.54	0.1	2.91	1
Ant. 3 (dBi)	-0.8	-7.55	-6.13	-5.18
Ant. 4 (dBi)	-2	0.72	-0.7	-3.9
DG [1SS] (dBi)	6.48	6.16	6.55	5.19
Polarization	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	97.5	90	90	90
$\Phi(^{\circ})$	255	307.5	307.5	307.5

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

DG_1SS max value position calculation

Frequency (Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 [10^(G/20)]	10^(1.36/20)	10^(3.8/20)	10^(3.14/20)	10^(2.45/20)
Ant. 2 [10^(G/20)]	10^(2.54/20)	10^(0.1/20)	10^(2.91/20)	10^(1/20)
Ant. 3 [10^(G/20)]	10^(-0.8/20)	10^(-7.55/20)	10^(-6.13/20)	10^(-5.18/20)
Ant. 4 [10^(G/20)]	10^(-2/20)	10^(0.72/20)	10^(-0.7/20)	10^(-3.9/20)
Ant. 1 [10^(G/20)] value	1.169	1.549	1.435	1.326
Ant. 2 [10^(G/20)] value	1.34	1.012	1.398	1.122
Ant. 3 [10^(G/20)] value	0.912	0.419	0.494	0.551
Ant. 4 [10^(G/20)] value	0.794	1.086	0.923	0.638
Sum All Antenna [Amax]	4.216	4.066	4.25	3.637
DG [10*log(Amax^2/Nant)]	6.48	6.16	6.55	5.19

Note:

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

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



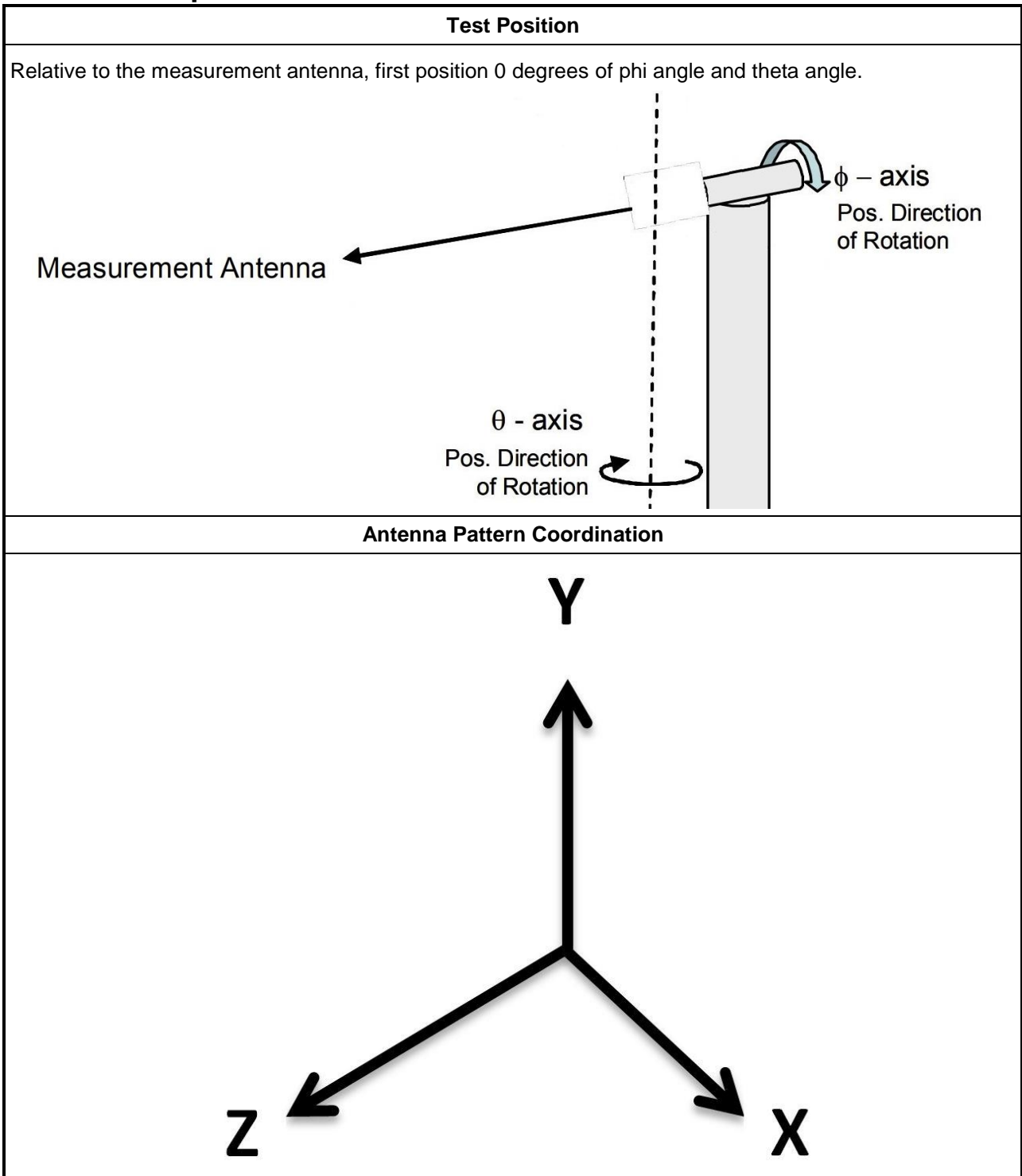
8. Summary of Test Result

Freq(Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 Max Gain (dBi)	3.9	4.13	3.14	2.6
Ant. 2 Max Gain (dBi)	3.52	3.35	4.59	2.48
Ant. 3 Max Gain (dBi)	2.84	2.23	2.02	2.96
Ant. 4 Max Gain (dBi)	2.01	2.8	2.73	1.34
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/82.5/300	Theta/90/300	Theta/90/307.5	Theta/90/300
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/90/247.5	Theta/120/247.5	Theta/127.5/210	Theta/127.5/210
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/82.5/157.5	Theta/82.5/165	Theta/90/135	Theta/105/135
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/90/30	Theta/90/75	Theta/90/0	Phi/120/330
Max Gain (dBi)	3.9	4.13	4.59	2.96
DG [1SS] (dBi)	6.48	6.16	6.55	5.19
DG [2SS] (dBi)	3.9	4.13	4.59	2.96
DG [4SS] (dBi)	3.9	4.13	4.59	2.96

Note:

1. Antenna max gain is the max value of each individual antenna through all measurement angles.
2. The max gain is the max value of all antennas.
3. Directional Gain (2SS) = Directional Gain (1SS) – 3dB. If directional gain is less than max gain, use max gain as directional gain. Refer to KDB662911D01 (F) (2) (e) (ii).
4. Directional Gain (4SS) = Directional Gain (1SS) – 6dB. If directional gain is less than max gain, use max gain as directional gain. Refer to KDB662911D01 (F) (2) (e) (ii).

9. Test Setup



Note:

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



10. Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA 9120D-1543	1GHz~18GHz	May 11, 2023	May 10, 2024
Dual Polarization Horn Antenna	Sporton	S0209DP	S0209DP-001	2GHz~9GHz	N.C.R.	N.C.R.
ENA Series Network Analyzer	AGILENT	E5071C	MY46419477	100kHz~8.5GHz	Jul. 28, 2023	Jul. 27, 2024
VNA Calibration Kit	TS RF	TS85033E-F	-	DC~9GHz	N.C.R.	N.C.R.
Multi-axis positioner	Sporton	MAPS01	MAPS01-001	Theta / Phi axis	N.C.R.	N.C.R.
Test Software	SPORTON	SENSE-RDG	V1.0.8	-	N.C.R.	N.C.R.

Note: Calibration Interval of instruments listed above is one year. NCR means Non-Calibration required.



11. Test Results

Please refer to the appendix.

Appendix A – Radiated Composite Gain of 6GHz.....Page 13
Appendix B – Radiated Composite Gain of 6GHz.....Page 24
Appendix C –Test Photos.....Page 30

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Freq(Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 1 Max Gain (dBi)	3.9	4.13	3.14	2.6
Ant. 2 Max Gain (dBi)	3.52	3.35	4.59	2.48
Ant. 3 Max Gain (dBi)	2.84	2.23	2.02	2.96
Ant. 4 Max Gain (dBi)	2.01	2.8	2.73	1.34
Ant. 1 Polarization/ θ (°)/ Φ (°)	Theta/82.5/300	Theta/90/300	Theta/90/307.5	Theta/90/300
Ant. 2 Polarization/ θ (°)/ Φ (°)	Theta/90/247.5	Theta/120/247.5	Theta/127.5/210	Theta/127.5/210
Ant. 3 Polarization/ θ (°)/ Φ (°)	Theta/82.5/157.5	Theta/82.5/165	Theta/90/135	Theta/105/135
Ant. 4 Polarization/ θ (°)/ Φ (°)	Theta/90/30	Theta/90/75	Theta/90/0	Phi/120/330
Max Gain (dBi)	3.9	4.13	4.59	2.96
DG [1SS] (dBi)	6.48	6.16	6.55	5.19
DG [2SS] (dBi)	3.9	4.13	4.59	2.96
DG [4SS] (dBi)	3.9	4.13	4.59	2.96



Radiated Composite Gain Data of 6GHz

Appendix A

Theta (deg)	-1.34/-2.21	-2.36/-2.22	-2.12/-2.89	-3.44/-3.03	-2.64/-2.19	-2.58/-3.05	-3.09/-3.02	-2.38/-1.66	-1.13/-1	-0.57/0.18	0.70/92	0.74/0.26	-0.37/-0.91	-1.28/-2	-2.69/-3.11	-2.94/-2.87	-3.46/-3.74	-3.79/-3.76	-3.31/-2.92	-2.97/-3.04	-2.54/-1.21	-0.71/-0.41	0.16/0.08	-0.04/-0.92
Theta (30°)	-0.71/-0.6	-1.18/-2.05	-2.36/-2.79	-3.48/-3.31	-3.13/-2.57	-2.53/-2.44	-2.98/-3.11	-2.56/-1.7	-0.8/-0.51	-0.41/0	0.53/0.65	0.81/1.18	1.30/92	-0.14/-1.8	-3.4/-3.97	-3.96/-3.07	-2.01/-2.83	-2.65/-3.47	-3.77/-2.83	-1.83/-1.39	-2.43/-3.17	-3.04/-2.81	-1.68/-0.86	-0.71/-1.18
Theta (37.5°)	-2.24/-1.74	-1.36/-1.33	-1.19/-1.57	-2.71/-2.38	-3.03/-2.62	-2.37/-2.99	-1.46/-1.29	-2.14/-1.8	-1.3/-0.59	-0.31/-0.29	2.91/3.39	2.03/2.71	2.34/3.35	0.38/-0.89	-2.63/-3.49	-2.72/-1.99	-1.55/-1.09	-0.71/-0.54	-0.54/-0.81	-1.3/-1.17	-1.06/-1.82	-2.47/-2.67	-3.03/-2.81	-1.44/-1.76
Theta (45°)	-2.95/-2.81	-3.43/-3.09	-3.71/-5.25	-5.15/-4.21	-3.83/-2.85	-2.89/-3.04	-2.55/-1.42	-1.06/-1.24	-1.37/-1.58	-1.56/-1.16	0/1.1	1.71/1.55	1.38/1.3	1.07/0.35	-1.55/-4.04	-3.78/-2.13	-1.56/-1.29	-0.91/-0.51	-0.74/-1.43	-1.37/1.1	-1.63/-2.9	-3.48/-3.35	-3.09/-3.31	-3.49/-3.14
Theta (52.5°)	-2.21/-0.68	-1.51/-2.19	-3.46/-4.01	-4.79/-3.59	-3.23/-3.6	-3.38/-1.64	-0.49/-0.03	-0.45/-1.43	-1.84/-1.87	-1.56/-1.19	0.41/1.7	1.18/0.77	1.0/78	0.35/-0.24	-1.15/-2.76	-2.33/-1.35	-0.82/-0.7	0.12/-0.08	0.19/-0.39	-0.63/-1.61	-2.06/-2.75	-3.08/-3.62	-3.07/-2.71	-3.57/-3.21
Theta (60°)	-1.77/-0.12	-0.89/-2.24	-4.19/-4.73	-3.71/-2.02	-1.38/-1.7	-1.27/0.25	-1.88/-1.73	-0.31/-1.05	-1.38/-1.63	-2.5/-2.77	-1.01/0.21	0.06/-0.7	-0.34/-0.2	-0.64/-1.42	-3.21/-1.8	-2.89/-2.18	-2.67/-2.51	-2.81/-2.55	-1.82/-2.11	-2.54/-2.71	-3.16/-4.37	-5.57/-2.07	-1.44/-1.79	-2.81/-1.93
Theta (67.5°)	-1.14/0.21	-0.2/-1.38	-4.22/-4.9	-3.58/-2.13	-2.14/-1.27	-0.91/0.33	0.57/0.34	-1.53/-3.13	-2.3/-4.2	-5.17/-4.48	-2.94/-3.28	-2.41/-1.3	-2.23/-1.76	-2.55/-2.76	-2.94/-3.33	-2.46/-1.66	-1.42/-2.71	-3/-1.11	0.81/6.7	0.19/-1.7	-1.84/-3.33	-2.31/-1.98	-3.78/-4	-5.18/-3.47
Theta (75°)	-2.51/-0.86	-1.09/-2.84	-5.33/-6.19	-4.68/-3.1	-1.6/-1.6	-1.71/0.01	1.05/-0.49	-2.33/-1.74	-2.41/-1.85	-4.46/-8.69	-6.23/-4.43	-4.86/-3.65	-4.21/-3.96	-3.88/-3.61	-3.99/-4.07	-4.23/-2.47	-0.89/-2.13	-1.63/0.04	1.61/1.75	0.31/0.06	-2.83/-2.82	-3.38/-3.75	-4.51/-6.02	-0.82/-2.85
Theta (82.5°)	-1.61/-2.34	-1.26/-2.11	-4.4/-6.59	-3.98/-1.75	-1.57/-2.37	-1.83/-1.73	-2.67/-3.76	-6.86/-5.12	-5.34/-5.75	-6.51/-7.27	-6.27/-5.22	-5.14/-4.09	-4.2/-3.87	-4.84/-4.21	-2.26/-2.72	-3.37/-0.44	-0.29/-2.08	-1.86/0.35	0.62/0.49	-1.04/-2.07	-1.67/-3.1	-6.73/-5.79	-6.18/-6.06	-5.61/-3.39
Theta (90°)	-2.99/-6.32	-5.25/-6.36	-7.26/-9.95	-8.39/-5.1	-6.62/-6.43	-5.31/-3.37	-3.46/-4.84	-8.85/-4.1	-2.99/-5.3	-7.37/-9.58	-6.59/-6.99	-7.06/-7.5	-7.81/6.49	-7.01/8.32	-5.25/-4.22	-4.64/-2.16	-1.52/-2.39	-1.39/-1.38	-2.18/-2.27	-5.08/-4.59	-1.89/-3.97	-7.26/-6.39	-5.59/-5.62	-4.42/-3.56
Theta (97.5°)	-3.71/-7.15	-7.5/-9.26	-8.32/-11.88	-10.89/-9.63	-6.9/-8.76	-10.7/-10.37	-9.06/-6.53	-7.68/-7.2	-8.61/-10.4	-8.43/-8.97	-9.5/-8.62	-6.66/-5.73	-6.16/-5.97	-4.84/-4.71	-5.62/-7.97	-6/-6.23	-5.78/-6.08	-6.31/-6.32	-8.24/-9.06	-12.7/-23	-4.83/-5.01	-6.12/-6.94	-3.81/-4.91	-3.66/-5.99
Theta (105°)	-6.57/-6.52	-12.69/-9.48	-6.94/-6.61	-8.46/-7.22	-9.09/-9.09	-9.48/-8.16	-6.21/-5.5	-4.07/-2.55	-2.49/-5.58	-5.75/-7.74	-6.85/-6.86	-7.07/-9.04	-8.41/8.37	-6.02/-6.67	-8.11/-6.61	-9.52/-5.35	-5.56/-7.06	-8.74/-8.92	-9.89/-8.82	-9.91/6.58	-6.71/4.4	-4.57/-2.9	-3.41/-1.64	-3.85/-4.05
Theta (112.5°)	-5.37/-6.43	-7.56/-6.65	-7.44/-6.56	-9.36/-8.3	-6.87/-9.24	-8.61/-6.59	-5.48/-4.28	-2.89/-2.21	-4.11/-2.74	-3.28/-5.78	-7.1/-5.37	-6.77/-8.92	-6.71/6.67	-7.24/-8.88	-9.51/-10.09	-6.57/-4.06	-5.48/-6.18	-7.48/-7.17	-11.03/-8.64	-5.63/-4.54	-7.92/-5.88	-3.82/-3.87	-2.29/-2.42	-2.74/-3.82
Theta (120°)	-2.95/-4.01	-5.86/-5.72	-4.71/-4.56	-4.58/-4.36	-2.81/-3.63	-4.74/-4.21	-3.65/-4.35	-3.69/-3.37	-2.91/-3.59	-3.74/-4.64	-5.74/-3.71	-4.36/-4.11	-5.26/-4.95	-5.61/-6.79	-5.63/-6.07	-8.34/-8.04	-5.12/-7.29	-4.94/-5.32	-7.57/-4.46	-3.36/-3.42	-3.29/-4.46	-5.4/-1.98	-1.09/-3.13	-0.27/-0.79
Theta (127.5°)	-3.26/-3.23	-3.49/-6.59	-6.63/-7.25	-6.88/-3.59	-3.86/-4.58	-4.68/-5.65	-4.12/-3.16	-5.74/-4.08	-2.97/-2.29	-2.24/-3.11	-2.56/-2.95	-3.91/-3.51	-4.5/-3.26	-1.49/-5.37	-3.55/-4.01	-6.4/-4.09	-4.23/-3.1	-4.23/-4.03	-6.66/-3.51	-5.12/1.18	-2.97/-0.19	-0.69/-2.46		
Theta (135°)	-4.68/-5.64	-5.04/-2.53	-4.22/-5.95	-5.47/-4.31	-3.4/-4.66	-4.15/-1.66	-1.81/-2.82	-3.9/-3.96	-3.01/-2.44	-3.87/-3.26	-3.17/-4.94	-3.42/-5.39	-3.63/-4.6	-3.26/-3.17	-3.96/-2.8	-5.92/-2.69	-2.44/-3.54	-4.57/-2.87	-3.5/-3.35	-1.2/-3.6	-6.94/-3.56	-3.64/-6.01	-2.31/-5.26	-3.63/-4.39
Theta (142.5°)	-2.73/-3.16	-4.21/-4.01	-2.46/-2.96	-2.46/-2.38	-2.81/-3.63	-4.74/-4.21	-3.65/-4.35	-3.69/-3.37	-2.91/-3.59	-3.74/-4.64	-5.74/-3.71	-4.36/-4.11	-5.26/-4.95	-5.61/-6.79	-5.63/-6.07	-8.34/-8.04	-5.12/-7.29	-4.94/-5.32	-7.57/-4.46	-3.36/-3.42	-3.29/-4.46	-5.4/-1.98	-1.09/-3.13	-0.27/-0.79
Theta (150°)	-5.51/-5.5	-7.01/-4.19	-8.51/8.44	-7.47/-6.64	-6.28/-5.24	-4.5/-3.6	-5.62/-5.94	-5.37/-4.5	-4.28/-5.29	-8.7/-5.6	-4.69/-4.27	-5.26/-6.05	-7.4/-5.51	-4.98/-5.07	-6.06/-6.67	-7.44/-6.11	-8.91/-16.16	-8.91/8.31	-10.48/-9.49	-7.75/-9.11	-7.42/-6.9	-5.91/-6.87	-3.68/-3.32	-2.56/-2.93
Theta (157.5°)	-4.09/-4.71	-3.42/-2.56	-3.34/-4.14	-4.66/-6.08	-5.24/-5.42	-5.21/-5.16	-4.37/-3.39	-2.99/-2.11	-1.58/-2.07	-3.35/-4.02	-3.44/-3.04	-3.96/-5.77	-6.61/-6.29	-5.78/-4.87	-4.25/-3.82	-3.72/-5.24	-5.55/-5.22	-5.09/-6.73	-8.9/-10.3	-8.74/-6.42	-4.16/-3.11	-3.66/-2.99	-2.65/-2.72	-2.63/-3.03
Theta (165°)	-6.15/-9.74	-4.27/-2.77	-3.04/-1.77	-4.95/-5.21	-6.14/-6.81	-6.36/-4.51	-4.89/-3.96	-3.08/-2.66	-2.54/-2.67	-2.97/-3.14	-3.5/-4.02	-4.73/-5.87	-6.69/-7.49	-7.42/-6.86	-5.89/-4.5	-3.03/-2.36	-2.85/-3.39	-4.24/-5.75	-7.68/-8.92	-7.71/-5.97	-4.67/-3.85	-3.2/-2.98	-3.92/-3.73	-5.09/-1.71
Theta (172.5°)	-10.02/-10.2	-10.64/-10.56	-10.28/-9.88	-9.41/-8.65	-8.23/-8.16	-9.1/7.59	-6.86/-6.95	-6.42/-6.33	-6.06/-5.43	-8.4/-9.48	-5.28/-6.02	-7.28/-8.57	-8.5/8.21	-7.53/-6.77	-5.83/-4.56	-3.98/-4.19	-4.51/-5.38	-6.5/-7.85	-8.23/-7.97	-7.82/-7.49	-7.34/-6.98	-6.81/-7.88	-10.05/-9.95	
Theta (180°)	-6.65/-6.65	-7.12/-8.02	-8.87/-9.45	-10.61/-11.29	-11.13/-11.91	-11.63/-10.54	-9.53/-8.79	-8.36/-8.51	-9.72/-9.75	-10.63/-11.95	-11.78/-12.12	-11.23/-10.76	-10.25/-9.69	-8.81/-9.98	-7.47/-7.7	-7.39/-7.15	-7.16/-7.51	-7.03/-7.28	-7.82/-7.46	-7.59/-7.69	-8.27/-8.48	-8.35/-7.55	-6.99/-5.98	-5.93/-5.79
Freq(Hz)	6.955GPol.	Theta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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°)	-5.64/-4.96	-4.41/-3.5	-2.27/-1.53	-0.70/-2.1	-0.18/-0.24	-0.5/-1.1	-1.53/-2.1	-2.89/-3.56	-4.27/-4.82	-5.18/-5.5	-5.56/-5.8	-5.73/-5.45	-5.01/-4.42	-3.69/-2.98	-2.36/-2	-1.87/-1.9	-2.1/7.6	-1.55/-1.45	-1.78/-2.53	-3.43/-3.98	-4.88/-5.9	-5.98/-5.91	-5.88/-6.19	-6.22/-6.28
Theta (7.5°)	-4.66/-4.48	-3.92/-2.85	-2.44/-2.14	-1.66/-1.62	-1.57/-1.5	-1.33/-1.63	-2.01/-2.4	-3.17/-3.82	-4.48/-4.92	-5.66/-6.41	-6.67/-6.67	-6.56/-5.96	-5.58/-4.51	-3.99/-2.41	-1.69/-1.24	-0.96/-0.55	-0.26/-0.05	-0.16/-0.43	-0.91/-6.2	-2.66/-3.56	-4.41/-5.12	-5.22/-5.18	-4.81/-4.35	-4.84/-4.79
Theta (15°)	-3.5/-3.17	-2.56/-2.2	-2.11/-2.52	-3.07/-3.61	-3.66/-3.14	-3.09/-3.19	-3.13/-3.36	-3.73/-4.53	-5.41/-6.13	-6.47/-6.92	-7.1/7.08	-6.76/-6.15	-5.42/-4.63	-3.62/-2.64	-2.02/-1.6	-1.35/-1.08	-0.73/-0.52	-0.25/-0.26	-0.56/-1.03	-1.61/-1.93	-2.97/-3.78	-3.81/-3.55	-3.12/-3.12	-3.55/-3.73
Theta (22.5°)	-3.43/-3.38	-2.83/-2.32	-2.55/-3.1	-3.21/-2.86	-2.01/-2.05	-2.12/-2.36	-1.91/-2.57	-2.71/-3.53	-4.56/-4.97	-5.19/-5.43	-5.87/-6.26	-5.65/-5.09	-4.35/-3.65	-3.11/-2.67	-1.94/-1.3	-1.18/-1.19	-1.15/-0.85	-0.81/-1.07	-1.35/-1.97	-2.23/-2.64	-3.02/-3.36	-3.39/-3.58	-2.95/-2.51	-2.66/-2.85
Theta (30°)	-2.96/-3.19	-1.98/-1.19	-0.89/-0.58	0.18/0.45	0.55/0.27	0.14/-0.21	-0.97/-1.63	-2.25/-2.55	-3.57/-3.75	-4.64/-4.55	-5.95/-6.98	-5.31/-3.27	-2.13/-1.95	-2.14/-2.04	-1.91/-1.7	-1.41/-0.87	-0.37/-0.07	-0.15/-0.16	-2.26/-2.32	-2.27/-2.43	-2.29/-2.83	-2.26/-2.38		
Theta (37.5°)	-0.9/-0.6	-0.58/-0.51	-0.25/0.39	0.68/1.12	1.32/1.32	1.22/0.58	-0.48/-1.22	-1.34/-0.94	-0.79/-1.47	-1.49/-1.08	-1.48/-2.31	-2.15/-1.07	0.08/0.35	0.16/0.57	0.29/-0.1	-0.71/-1.31	-0.84/-0.06	-0.14/-0.34	0.07/0.71	0.97/0.48	-0.19/0.61	-1.08/-1.34	-1.46/-2.65	-2.26/-1.51
Theta (45°)	-1.05/-1.71	-1.95/-2.06	-1.89/-1.02	0.03/1.33	1.41/4.1	0.91/0.09	-0.69/-0.45	-0.51/-0.86	-1.36/-2.23	-1.72/-0.14	1.21/3.6	1.1/65	2.17/1.96	1.72/1.1	1.93/1.72	1.17/0.88	0.73/0.25	-0.03/0.91	1.71/1.58	1.57/1.21	0.70/3.3	-0.56/-1.89	-2.07/-2.27	-2.37/-1.91
Theta (52.5°)	0.56/1.54	1.03/0.72	1.02/0.84	0.34/1.58	1.98/2.34	2.18/2.06	0.29/0.83	0.64/0.31	-0.07/0.6	-0.71/-0.25	1.06/2.28	2.79/3.1	2.49/2.22	2.22/2.03	1.93/1.78	1.41/1.27	1.06/0.36	0.29/0.21	0.18/0.62	0.61/0.2	-0.95/0.29	0.26/0.35	-1.11/-1.96	-1.89/-0.82
Theta (60°)	3.05/2.74	1.67/1.09	0.93/0.78	1.28/1.78	1.78/1.96	2.04/1.81	1.71/1.6	1.36/0.57	0.31/-0.17	-0.45/0.38	1.03/1.9	2.79/3.37	2.92/2.73	2.44/2.68	3.21/2.95	1.44/1.04	0.52/0.68	-1.01/-0.45	0.08/0.19	-0.22/0.72	-0.51/-0.24	1.49/1.3		



Radiated Composite Gain Data of 6GHz

Appendix A

Theta (°)	Phi (°)	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°)	
Theta (22.5°)	Phi(0°)	-4.67-4.45	-4.19-3.46	-2.34-2.41	-4.08-5.03	-6.11-6.16	-8.34-10.34	-11.48-13.72	-14.29-13.78	-12.49-11.07	-9.56-8.62	-6.34-10.33	-10.52-10.59	-10.25-9.53	-8.12-6.74	-5.72-5.51	-3.95-6.39	-8.07-10.55	-14.23-18.83	-18.22-18.11	-18.93-16.34	-14.72-11.41	-10.67-9.4	-6.3-2.54	-4.75-4.73
Theta (30°)	Phi(0°)	-5.11-3.98	-3.46-3.53	-3.99-4.45	-4.85-4.54	-4.22-3.35	-5.24-7.8	-12.08-11.7	-15.45-13.8	-12.32-11.9	-10.09-8.29	-7.38-7.7	-8.09-7.8	-7.8-7.3	-7.9-8.1	-8.82-8.76	-8.03-7.4	-6.45-7.22	-9.05-11.21	-13.41-14.87	-15.29-14.3	-11.95-11.41	-11.68-11.99	-9.67-8.05	-7.3-5.55
Theta (37.5°)	Phi(0°)	-7.66-4.94	-3.29-3.07	-2.67-2.8	-3.98-4.31	-4.39-5.45	-7.31-11.26	-18.52-18.33	-17.14-18.17	-16.27-10.69	-6.98-6.04	-5.82-6.47	-5.63-4.82	-6.09-8.74	-9.65-9.49	-11.24-11.96	-8.41-7.17	-7.29-5.99	-9.05-10.44	-13.89-16.47	-15.64-13.24	-14.04-14.73	-18.38-19.04	-18.34-18.43	-13.87-9.34
Theta (45°)	Phi(0°)	-7.47-6.34	-6.35-5.61	-6.88-9.71	-8.17-5.56	-5-5.22	-7.06-12.79	-18.19-13.27	-10.95-10.86	-10.87-10.45	-8.45-6.4	-4.77-5.64	-5.21-4.62	-5.4-6.5	-6.71-9.7	-8.23-10.77	-11.36-9.74	-7.68-7.88	-10.13-10.71	-9.74-9.99	-12.85-18.94	-17.63-18.28	-17.45-18.18	-18.17-18.1	-16.21-12.11
Theta (52.5°)	Phi(0°)	-11.28-7.36	-6.21-5.05	-6.69-9.79	-9.54-6.62	-6.19-7.86	-12.77-9.55	-7.85-6.03	-6.54-9.76	-10.58-8.84	-8.3-9.02	-7.89-7.6	-6.72-6.03	-7.22-6.32	-6.77-8.42	-8.29-6.62	-7.83-8.77	-6.13-13.3	-8.07-8.63	-9.97-12.96	-16.55-17.68	-18.23-17.57	-18.61-15	-18.61-15	-13.08-11.83
Theta (60°)	Phi(0°)	-10.49-6.16	-4.71-5.16	-6.73-7.25	-2.71-4.98	-5.77-5.3	-7.71-9.58	-11.77-9.56	-12.16-12.38	-13.16-11.42	-8.43-7.06	-6.32-5.91	-7.09-10.25	-14.12-14.62	-10.89-10.25	-7.49-7.48	-8.02-10.57	-7.15-12.5	-16.78-17.11	-19.12-14.76	-16.18-15.77	-16.18-15.55	-18.23-17.33	-14.12-12.2	-14.27-11.82
Theta (67.5°)	Phi(0°)	-9.62-6.12	-6.64-5.48	-7.99-9.99	-5.91-6.65	-7.11-5.3	-3.31-2.78	-3.57-4.2	-7.04-17.13	-12.28-11.79	-11.56-11.85	-12.21-15.47	-12.09-6.85	-7.12-4.44	-6.53-8.74	-6.32-8	-6.95-10.21	-7.24-6.41	-8.63-7.17	-6.59-6.83	-8.85-13.4	-18.93-16.77	-9.34-8.32	-11.49-13.07	-18.25-13.65
Theta (75°)	Phi(0°)	-12.05-10.64	-9.59-9.86	-15.44-14.47	-7.7-5.6	-3.63-2.74	-3.47-3.98	-3.59-6.07	-18.71-15.51	-11.97-12	-17.37-12.63	-16.92-10.94	-15.1-16.34	-12.75-13.08	-15.1-9.86	-7.04-5.56	-5.91-8.98	-9.58-9.56	-7.87-8.76	-7.43-4.54	-5.73-10.15	-11.98-11.5	-16.16-15.77	-16.18-15.55	-10.11-10.96
Theta (82.5°)	Phi(0°)	-6.9-8.05	-6.99-7.3	-9.5-9.8	-5.35-3.37	-2.91-2.58	-4.06-3.91	-5.14-7.01	-13.48-18.43	-17.33-18.8	-15.15-18.8	-12.35-6.07	-16.1-15.88	-14.77-10.2	-4.77-2.04	-4.28-6.77	-6.06-5.91	-5.37-6.42	-7.15-12.5	-16.78-17.11	-19.12-14.76	-16.18-15.77	-16.18-15.55	-18.23-17.33	-12.61-11.52
Theta (90°)	Phi(0°)	-6.52-12.48	-12.94-12.87	-14.92-15.36	-13.61-9.14	-8.78-6.22	-6.95-6.52	-5.81-7.02	-16.97-9.97	-7.85-12.95	-12.85-18.99	-12.41-19.68	-19.11-19.39	-13.98-6.57	-7.09-14.81	-9.54-5.8	-4.28-4	-6.21-5.48	-6.31-9.98	-18.21-19.2	-15.16-13.36	-12.21-13.25	-18.15-12.65	-13.32-10.97	-6.24-8.2
Theta (97.5°)	Phi(0°)	-6.36-13.32	-11.71-18.46	-16.25-18.74	-13.02-17.41	-8.69-17.07	-18.71-15.51	-11.97-12	-17.37-12.63	-16.92-10.94	-15.1-16.34	-12.75-13.08	-15.1-9.86	-7.04-5.56	-5.91-8.98	-9.58-9.56	-7.87-8.76	-7.43-4.54	-5.73-10.15	-11.98-11.5	-16.16-15.77	-16.18-15.55	-18.23-17.33	-14.12-12.2	-14.27-11.82
Theta (105°)	Phi(0°)	-18.97-18.46	-18.57-16.63	-18.06-18.35	-12.84-12.26	-12.82-13.35	-14.69-10.45	-9.82-10.33	-13.97-9.6	-6.79-10.29	-12.43-10.03	-10.47-10.66	-10.02-11.99	-12.1-12.5	-12.11-11.53	-12.98-7.59	-11.18-9.64	-8.49-10.58	-14.17-10.06	-18.25-13.69	-18.13-11.22	-8.51-7.81	-12.75-11.56	-18.43-6.86	-12.31-12.88
Theta (112.5°)	Phi(0°)	-18.39-15.58	-11.89-10.34	-10.24-8.1	-12.98-15.05	-12.14-17.63	-18.39-11.83	-11.92-18.07	-17.44-10.77	-16.55-12.17	-16.03-19.11	-13.82-8	-7.92-13.39	-16.44-17.99	-18.81-18.15	-17.88-13.74	-9.2-8.89	-8.57-13.53	-12.33-18.07	-15.18-17.76	-14.99-9.37	-9.97-12.47	-14.23-19.29	-9.59-10.06	-16.29-17.53
Theta (120°)	Phi(0°)	-18.31-13.66	-11.67-10.04	-6.41-7.47	-4.98-6.63	-4.95-6.14	-9.68-13.23	-10.87-12.51	-15.12-13.37	-11.22-17.6	-18.56-18.11	-18.07-17.88	-16.74-16.94	-14.11-11.72	-18.91-12.83	-12.81-9.3	-19.66-18.87	-17.4-15.13	-18.4-17.48	-9.56-11.24	-9.62-5.09	-8.54-9.03	-12.35-17.63	-11.87-10.74	-18.21-18.72
Theta (127.5°)	Phi(0°)	-15.65-12.05	-8.33-11.34	-10.9-28	-10.08-9.12	-10.51-10.93	-18.27-18.57	-19.11-13.86	-18.5-17.92	-17.99-10.12	-8.31-7.05	-8.68-11.81	-15.56-13.69	-12.35-9.63	-6.35-11.42	-13.17-18.11	-11.26-14.07	-17.59-7.76	-17.31-9.58	-13.62-11.32	-14.62-18.29	-18.79-13.33	-14.37-9.98	-12.77-17.41	
Theta (135°)	Phi(0°)	-12.27-11.92	-8.27-6.58	-10.22-16.28	-16.83-11.9	-7.65-7.75	-7.07-5.98	-7.61-9.72	-13.37-16.58	-18.85-12.8	-12.12-10.21	-11.7-16.18	-17.69-17.55	-17.4-18.38	-17.94-18.31	-18.1-5.32	-9.94-13.08	-7.78-10.76	-16.25-4.22	-5.21-17.88	-18.04-11.73	-18.89-12.77	-14.52-19.03	-11.27-10.33	-10.26-15.06
Theta (142.5°)	Phi(0°)	-8.16-4.57	-5.36-7.45	-3.88-4.6	-5.61-5.21	-5.06-7.31	-9.31-11.1	-8.91-17.8	-8.65-7.7	-4.77-8.52	-15.57-17.29	-8.06-9.94	-11.36-12	-13.61-16.94	-11.81-5.38	-6.59-4.81	-5.33-6.2	-6.49-8.34	-5.35-12.83	-18.71-17.11	-19.27-14.65	-15.1-16.05	-14.87-17.85	-9.92-9.63	-11.54-12.03
Theta (150°)	Phi(0°)	-18.57-12.56	-13.12-18	-18.26-18.27	-16.81-16.19	-17.45-13.81	-10.29-5.98	-9.92-12.02	-10.09-7.3	-6.69-8.7	-16.52-11.97	-5.59-4.43	-7.38-11.74	-10.27-10.3	-9.94-9.38	-6.38-12.54	-14.43-13.9	-9.59-10.72	-17.61-17.16	-17.43-18.53	-19.04-18.23	-17.81-17.25	-17.81-17.99	-16.35-12.53	
Theta (157.5°)	Phi(0°)	-6.86-7.13	-5.48-4.22	-4.04-4.99	-5.95-7.77	-11.07-15.68	-17.55-16.91	-13.07-11.62	-11.14-8.65	-8.48-11.47	-17.98-18.45	-11.03-10.18	-10.82-10.88	-11.94-11.53	-8.51-6.24	-5.34-5.28	-6.95-11.4	-14.78-10.93	-9.18-10.53	-13.98-17.34	-18.3-18.6	-14.55-13.89	-17.35-10.86	-8.05-6.52	-5.26-4.64
Theta (165°)	Phi(0°)	-8.63-7.02	-5.04-3.2	-2.95-4.4	-6.28-7.55	-10.21-15.9	-18.82-17.92	-17.17-12.89	-10.23-9.98	-11.06-13.55	-15.1-14.71	-14.82-14.63	-16.01-18.58	-17.92-15.58	-12.96-10.58	-9.66-8.48	-6.77-6.87	-6.31-6.1	-5.81-6.56	-9.54-18.51	-16.42-10.54	-8.81-8.58	-8.26-8.17	-9.07-11.22	-12.49-13.03
Theta (172.5°)	Phi(0°)	-15.36-18.06	-18.98-18.39	-18.62-18.2	-17.14-23	-13.06-14.39	-18.14-16.17	-12.55-10.01	-9.68-10.53	-11.47-11.1	-10.37-10.52	-10.24-10.55	-10.45-11.21	-11.19-10.21	-8.81-6.78	-5.18-4.4	-3.74-3.99	-4.75-6.63	-9.57-15.62	-19.1-18.3	-14.16-12.56	-10.92-9.95	-9.02-9.98	-11.54-12.03	
Theta (180°)	Phi(0°)	-8.27-8.57	-8.77-8.54	-9.18-10.21	-11.96-14.39	-13.93-17.78	-18.12-17.76	-18.05-17.41	-17.67-18.03	-18.83-18.5	-18.64-17.84	-17.04-16.47	-16.02-14.92	-13.13-11.9	-10.69-9.76	-9.05-8.86	-8.68-8.92	-9.36-10.35	-11.75-13.6	-14.13-14.89	-16.79-17.6	-15.45-15.2	-14.6-12.47	-10.67-9.17	-8.7-7.4
Theta (22.5°)	Phi(15°)	-18.87-17.7	-18.84-15.6	-11.42-9.35	-7.82-6.34	-5.52-4.58	-3.86-3.6	-3.38-3.4	-3.41-3.75	-3.88-4.36	-5.16-6.06	-7.07-8.36	-10.19-12.61	-16.34-18.69	-18.35-15.28	-13.07-12.17	-10.91-10.51	-9.73-8.89	-8.31-7.63	-7.91-7.92	-8.23-7.98	-8.09-8.71	-9.26-9.12	-10.86-12.4	-14.96-16.38
Theta (30°)	Phi(15°)	-11.69-13.61	-13.99-13.37	-13.03-11.85	-11.45-11.04	-10.4-9.36	-8.43-8.3	-8.41-8.07	-8.25-8.12	-7.95-8.54	-9.58-11.11	-12.96-14.16	-17.24-17.71	-18.74-19.17	-16.85-13.64	-11.08-9.25	-7.86-6.04	-4.95-3.83	-3.08-2.72	-2.35-2.41	-2.74-2.87	-3.59-4.33	-5.54-5.62	-8.32-9.47	-11.47-12.35
Theta (37.5°)	Phi(15°)	-6.34-7.36	-9.07-11.36	-11.15-11.36	-11.76-12.13	-11.74-11.52	-11.51-11.06	-10.19-9.82	-9.84-10.14	-10.14-10.72	-10.86-11.92	-13.24-10.71	-19.01-17.76	-18.23-18.98	-14.72-16.01	-11.27-9.06	-7.22-6.05	-4.73-3.66	-2.47-1.96	-1.58-1.51	-1.25-1.05	-1.54-2.02	-2.69-3.3	-4.03-5.01	-5.41-6.23
Theta (45°)	Phi(15°)	-5.41-7.11	-7.53-8.26	-10.35-13.66	-15.1-14.12	-10.44-9.05	-7.88-7.78	-7.14-8.68	-9.05-9.77	-10.9-10.84	-10.9-12.54	-15.64-18.76	-18.66-17.83	-18.42-19.14	-18.87-17.43	-13.15-10.04	-8.67-6.46	-4.49-3.18	-2.51-2.09	-1.84-1.64	-1.21-1.36	-1.37-1.72	-1.67-1.52	-1.44-1.92	-2.78-4.23
Theta (52.5°)	Phi(15°)	-4.23-5.34	-5.73-6.36	-7.52-9.15	-9.57-10.1	-9.3-8.52	-4.72-7.74	-9.04-9.94	-11.16-10.94	-11.04-10.34	-8.88-8.48	-11.19-14.54	-16.89-18.69	-18.49-15.81	-11.75-9.55	-10.12-11.05	-9.58-7.61	-4.63-3.39	-2.55-1.53	-1.13-0.81	-0.94-1.14	-1.23-1.7	-2.21-2.86	-2.31-1.79	-1.64-2.25
Theta (60°)	Phi(15°)	-3.84-4.61	-6.03-6.02	-7.72-10.18	-10.73-9.79	-11.31-11.63	-11.27-10.99	-13.09-12.8	-10.87-9.69	-6.78-5.53	-5.94-6.87	-9.13-12.11	-13.92-11.61	-7.29-7.12	-7.89-8.32	-8.19-7.16	-4.99-2.95	-1.87-2.08	-0.82-0.45	-0.21-0.08	-0.48-1.18	-2.1-2.98	-3.74-3.44		
Theta (67.5°)	Phi(15°)	-4.64-6.02	-8.83-8.38	-10.27-15.02	-12.79-10.5	-13.55-15.29	-14.04-14.76	-17.49-13.56	-11.31-11.44	-10.53-9.9	-9.08-9.19	-11.27-8.8	-7.96-7.96	-7.31-6.63	-5.63-5.78	-6.3-4.75	-3.46-4.23	-3.81-2.65	-2.24-2.37	-1.34-0.52	0.15-0.73	-0.65-1.94	-2.32-4.16	-6.44-5.45	
Theta (75°)	Phi(15°)	-1.61-1.17	-2.41-3.09	-4.91-3.69	-4.74-3.99	-7.08-11.64	-17.39-16.13	-12.89-12.04	-8.06-6																



Radiated Composite Gain Data of 6GHz

Appendix A

Theta	6.39-7.58	-7.61-7.24	-8.87-9.82	-18.41-17.99	-10.15-10.54	-18.96-15.73	-9.78-8.62	-11.38-15.29	-13.49-11.04	-10.41-9.8	-10.13-7.94	-7.71-7.69	-8.61-10.97	-12.69-14.44	-16.65-17.02	-17.15-12.22	-12.18-16.51	-16.38-15.93	-13.06-12.64	-11.11-14.69	-17.12-11.65	-10.61-12.38	-18.24-16.29	-9.47-5.51																							
Theta	(82.5°)	-11.78-13.95	-10.26-9.85	-8.39-10.61	-18.21-18.03	-11.99-12.88	-18.71-14.36	-8.24-6.99	-9.39-15.98	-16.42-10.44	-10.54-12.89	-10.43-9.1	-8.17-9.73	-13.23-15.08	-15.51-14.44	-13.55-18.18	-15.59-12.75	-11.79-16.05	-17.59-18.67	-16.21-12.67	-14.27-17.2	-9.92-11.56	-9.25-13.84	-18.33-17.91	-13.33-10.67																						
Theta	(90°)	-18.32-18.04	-18.69-11.7	9.94-11.23	-18.68-18.19	-12.86-15.02	-13.61-9.47	-8.34-8.47	-13.48-17.44	-19.24-16.63	-13.82-13.76	-11.44-10.28	-9.19-10.38	-11.32-11.9	-16.25-14.46	-12.44-15.09	-17.54-11.5	-9.93-11.56	-17.32-18.65	-14.49-11.57	-10.41-13.53	-14.51-14.86	-11.18-11.83	-18.78-16.82	-16.72-18.31																						
Theta	(97.5°)	-17.11-17.32	-18.05-14.9	-18.37-18.57	-18.89-18.38	-18.71-18.54	-15.81-12.5	-12.38-12.17	-16.64-15.23	-16.51-13.33	-19.06-17.93	-15.95-13.27	-9.77-12.6	-13.49-18.64	-15.14-14.23	-12.86-17.73	-17.86-11.21	-9.91-13.85	-18.25-19.29	-19.02-17.6	-18.23-18.98	-18.76-14.77	-17.61-17.57	-15.16-13.54	-18.27-17.26																						
Theta	(105°)	-17.56-15.83	-16.51-18.63	-18.15-19.2	-18.27-15.62	-16.39-16.12	-15.75-15.09	-15.36-18.46	-16.17-9.36	-14.17-18.1	-17.86-15.62	-16.15-17.62	-15.32-17.95	-16.53-14.44	-8.39-9.37	-13.64-15.96	-13.29-14.24	-17.96-18.4	-19.02-18.82	-17.97-18.82	-18.89-18.57	-15.13-14.74	-15.73-17.84	-18.42-17.82	-18.42-17.82																						
Theta	(112.5°)	-11.71-9.3	-16.89-18.66	-17.89-14.89	-17.39-18.18	-12.03-17.33	-18.13-17.97	-17.35-18.94	-15.97-13.91	-9.61-11.4	-16.55-13.66	-13.42-13.35	-18.88-14.69	-13.41-10.94	-9.47-11.52	-12.07-19.13	-18.08-12.93	-16.92-17.64	-16.07-12.77	-18.41-12.81	-11.97-17.97	-14.18-13.2	-13.17-14.94	-16.79-19.46	-15.41-15.48																						
Theta	(120°)	-6.44-9.84	-9.67-8.04	-8.33-15.02	-18.49-14.91	-13-13.17	-17.81-15.2	-11.93-16.95	-17.18-11.78	-8.87-9.43	-8.97-12.18	-10.71-18.27	-16.86-12.33	-12.81-6.69	-8.95-9.76	-12.88-17.71	-18.37-17.49	-18.23-18.87	-16.11-17.6	-16.32-17.29	-13.81-18.94	-19.02-10.93	-13.79-17.91	-14.55-15.2	-14.66-7.38																						
Theta	(127.5°)	-14.51-17.63	-11.64-13.48	-14.8-18.87	-15.98-10.26	-11.39-17.13	-18.91-17.96	-12.41-9.91	-14.99-16.12	-10.85-7.34	-10.27-7.44	-6.99-8.95	-7.95-11.25	-9.38-7.1	-10.64-5.79	-8.71-17.55	-19.04-18.51	-13.74-11.21	-14.94-18.63	-14.21-18.14	-10.51-15.63	-18.84-7.04	-10.79-12.29	-18.72-11.53	-18.36-8.74																						
Theta	(135°)	-9.74-17.01	-14.55-9.84	-12.78-18.44	-13.79-10.73	-7.61-10.61	-17.27-13.01	-8.91-9.65	-11.23-11.23	-8.67-10.56	-8.27-7.89	-11.42-8.97	-10.27-11.16	-9.79-2.05	-7.46-5.93	-7.27-13.51	-17.62-15.35	-15.99-11.87	-18.18-10.77	-17.15-14.86	-12.22-11.34	-3.08-8.78	-12.61-11.2	-19.19-11.42																							
Theta	(142.5°)	-15.96-13.68	-14.66-15.95	-12.95-14.58	-18.94-19.4	-15.62-15.96	-18.81-13.68	-7.93-6.5	-8.36-12.23	-13.61-9.86	-10.06-12.46	-9.22-7.43	-11.62-16.07	-12.45-11.93	-12.97-13.96	-13.84-16.89	-18.71-17.95	-18.23-18.57	-18.87-19.26	-12.09-17.07	-13.54-13.26	-11.12-18.49	-10.95-17.22	-17.95-16.24	-15.31-18.42																						
Theta	(150°)	-11.54-17.78	-18.07-17.81	-19.26-18.67	-18.6-18.77	-19.88-18.47	-14.75-12.51	-13.58-15.98	-18.13-17.8	-13.33-12.43	-13.52-11.78	-11.64-14.27	-13.13-14.48	-17.14-17.14	-14.16-14.14	-17.19-18.54	-17.93-18.54	-17.13-18.55	-17.09-18.6	-18.79-17.87	-13.25-10.01	-10.36-12.95	-11.12-9.75	-10.85-9.3	-8.07-12.2																						
Theta	(157.5°)	-7.36-7.62	-8.5-10.44	-11.74-17.43	-18.67-16.99	-13.02-11.42	-12.42-13.04	-12.11-3.8	-10.97-11.07	-10.86-10.82	-10.14-11.09	-12.94-14.2	-15.17-18.9	-18.39-19.2	-18.94-15.76	-14.51-13.81	-18.38-19.05	-18.41-17.87	-18.45-17.18	-14.91-14.62	-16.32-16.39	-14.02-11.4	-11.53-9.85	-9.03-7.65	-6.57-7.73																						
Theta	(165°)	-18.36-18.18	-18.87-18.48	-18.8-18.64	-18.44-15.85	-14.12-14.62	-15.93-17.06	-15.41-12.75	-10.65-9.01	-7.78-6.92	-6.94-7.88	-8.62-10.41	-12.38-14.5	-17.36-17.87	-18.39-18.37	-17.78-18.27	-17.86-18.73	-15.47-12.72	-10.88-10.23	-10.59-11.25	-12.07-9.81	-6.94-6.19	-7.47-9.61	-10.49-11.72	-12.74-14.06																						
Theta	(172.5°)	-14.75-13.79	-13.71-14.33	-15.65-18.41	-18.64-18.33	-18.07-16.04	-13.97-14.43	-13.63-13.45	-12.68-11.09	-10.25-9.58	-9.04-8.9	-9.05-7.7	-10.86-11.43	-11.68-12.64	-13.37-14.53	-15.01-14.55	-12.47-10.46	-9.27-9.8	-12.33-15.59	-17.66-18.4	-16.85-15.76	-13.81-15.24	-16.69-18.83	-19.78-16.65	-17.31-15.25																						
Theta	(180°)	-18.18-19.12	-15.46-13.44	-13.61-15.82	-17.93-17.66	-17.52-16.89	-14.81-15.33	-13.92-13.04	-12.06-10.82	-10.59-10.47	-11.03-10.74	-11.32-11.09	-11.53-12.33	-12.65-14.47	-16.21-17.57	-18.45-17.89	-18.41-17.9	-18.71-17.82	-18.73-17.65	-18.35-19.05	-18.04-15.51	-13.66-10.78	-9.93-10.06	-11.39-13.65	-15.19-16.87																						
Theta	Phi	Ant 2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+																						
Gain	Phi(75°)	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°)	-8.05-8.51	-8.68-8.73	-8.71-8.93	-8.95-10.03	-11.76-13.24	-15.57-18.68	-17.48-18.67	-18.79-17.79	-18.55-17.82	-16.37-14.34	-13.49-12.59	-11.65-11.12	-10.45-10.28	-10.45-11.27	-11.14-10.91	-11.81-12.95	-15.38-18.18	-18.36-18.34	-18.75-18.53	-17.63-16.53	-13.57-12.62	-11.18-9.64	-8.31-7.4	-7.85-8.07																						
Theta	(7.5°)	-12.59-13.9	-13.83-12.82	-11.11-10.53	-10.62-11.13	-12.03-13.55	-15.93-17.34	-18.03-19.24	-18.13-18.06	-13.68-11.32	-9.65-8.86	-8.28-8.09	-7.61-7.06	-6.81-6.95	-8.2-8.73	-8.8-8.56	-9.34-9.84	-12.02-14.4	-15.69-17.64	-18.04-17.83	-19.18-18.31	-19.18-14.1	-16.37-13.57	-11.01-10.63	-8.58-11.34																						
Theta	(15°)	-18.66-14.3	-12.11-10.84	-10.33-9.76	-8.83-8.1	-7.41-7.76	-7.82-8.67	-10.16-11.11	-13.13-13.98	-13.24-10.95	-8.02-7.29	-6.23-5.93	-5.79-5.58	-5.5-5.22	-4.78-4.57	-4.92-5.34	-6.28-6.55	-8.64-7.24	-8.54-9.49	-11.35-14.24	-18.18-18.16	-17.38-18	-18.02-17.63	-19.09-18.23	-16.24-16.81																						
Theta	(22.5°)	-15.82-13.82	-11.86-9.74	-8.3-7.5	-6.81-7.85	-7.64-8.49	-9.64-10.89	-12-12.92	-13.84-14.34	-13.93-11.85	-9.03-7.39	-6.67-6.74	-6.46-5.74	-4.99-4.54	-3.67-3.38	-3.21-3.8	-4.48-4.74	-5.04-5.78	-7.03-8.77	-9.78-10.66	-12.52-14.94	-18.97-17.35	-18.51-19.12	-17.76-16.69	-17.85-17.86																						
Theta	(30°)	-15.79-13.91	-12.48-10.77	-9.25-9.64	-10.18-10.84	-10.83-11.84	-12.78-12.78	-14.44-15.57	-14.18-13.34	-12.14-10.4	-8.45-7.28	-6.96-6.73	-6.11-5.16	-4.53-3.93	-3.22-2.52	-2.08-2.85	-3.15-2.77	-2.76-3.82	-5.31-6.19	-7.47-9.1	-11.11-13.1	-14.73-15.19	-14.11-11.95	-11.11-10.8	-11.95-13.94																						
Theta	(37.5°)	-11.93-18.25	-12-11.96	-9.84-11.01	-12.03-13.98	-14.91-15.98	-18.02-18.48	-17.95-16.63	-14.17-12.24	-11.14-9.52	-7.95-6.73	-6.03-5.41	-4.36-3.3	-2.78-2.77	-2.51-1.91	-1.61-1.08	-0.10-0.79	-1.73-1.87	-2.07-2.88	-4.77-6.21	-8.29-9.91	-9.61-9.56	-10.03-11.54	-13.69-13.46	-12.96-15.2																						
Theta	(45°)	-11.31-14.87	-16.32-12.55	-13.69-16.46	-16.64-18.05	-18.88-18.14	-19.19-16.14	-13.85-11.86	-10.94-9.82	-8.79-8.71	-6.58-5.49	-5.13-5.2	-4.47-3.96	-3.91-3.17	-1.93-1.16	-0.20-2.2	0.140-0.7	-0.11-0.91	-2.94-4.08	-4.94-6.55	-6.47-6.45	-7.63-9.64	-6.29-7	-10.78-13.36	-12.74-10.86																						
Theta	(52.5°)	-8.78-10.15	-15.29-14.1	-13.32-12.45	-10.92-10.54	-13.12-15.71	-15.28-12.61	-9.62-8.84	-9.61-8.34	-4.64-4.77	-3.94-4.37	-3.94-4.14	-3.97-4.08	-3.01-2.21	-1.85-0.03	0.071-0.3	0.051-1.03	-0.73-2.25	-3.19-4.29	-4.97-4.85	-6.82-8.18	-7.58-5.54	-4.16-3.66	-6.31-6.46	-11.59-12.6																						
Theta	(60°)	-10.17-7.87	-10.68-9.11	-11.30-10.53	-10.12-11.23	-12.35-13.33	-15.50-10.31	-8.79-7.76	-7.85-6.77	-5.3-3.56	-2.41-3.06	-2.41-3.06	-2.41-3.06	-1.01-1.11	-1.13-1.08	-3.91-3.53	-3.71-4.77	-6.11-10.08	-7.91-7.17	-8.11-10.08	-7.91-7.17	-6.68-6	-6.46-7.02	-7.98-11.34																							
Theta	(67.5°)	-5.51-7.46	-11.37-11.91	-13.02-10.42	-6.56-8.69	-10.81-12.6	-11.04-11.11	-9.06-6.9	-5.57-5.25	-4.76-2.66	-1.37-3.27	-4.18-3.3	-3.37-3.05	-3.07-2.03	-1.01-0.19	0.85-0.42	0.130-1	-0.42-1.91	-1.14-3.22	-3.72-5.81	-8.32-6.63	-6.84-6.86	-5.47-3.87	-5.64-6.25	-3.84-5.8																						
Theta	(75°)	-3.72-6.82	-8.71-8.74	-13.11-8.84	-6.54-8.31	-9.65-9.68	-7.62-6.89	-7.26-3.85	-2.61-3.25	-4.29-2.02	-0.71-2.2	-1.62-1.66	-2.58-2.57	-1.25-0.21	0.18-0.71	-0.41-0.77	-0.91-1.7	-0.96-2.83	-2.71-3.3	-3.46-4.39	-3.61-2.24	-2.99-2.95	-3.36-3.73	-1.08-4.03																							
Theta	(82.5°)	-3.25-7.08	-8.81-7.36	-12.29-11.75	-9.61-10.86	-16.23-9.03	-6.17-5.88	-7.59-2.64	0-1.31	-3.35-1.55	-0.89-1.4	-1.57-1.4	-1.85-1.1	-2.60-2.06	-1.86-3.7	-2.68-1.21	-0.64-1.65	0.47-1.33	-0.91-0.76	-2.34-3.03	-2.97-0.62	-5.51-1.99	-2.39-3.98	-1.44-4.28																							
Theta	(90°)	-5.19-7.66	-8.24-8.49	-13.86-9.52	-9.09-10.04	-18.34-10.34	-4.26-3.91	-6.26-4.25	-0.04-0.68	-4.56-2.48	-0.75-0.54	-2.61-3.09	-0.72-0.26	-1.09-3.05	0.97-0.24	-1.12-3.57	-1.39-0.68	2.33-3.52	1.56-0.88	-0.24-0.87	0.08-2.59	-1.53-0.51	1.01-2.3	-1.87-2.44	-1.29-2.03																						
Theta	(97.5°)	-10.44-13.12																																													



Radiated Composite Gain Data of 6GHz

Appendix A

Theta (°)	-18.02/-12.33	-13.49/-10.54	-8.97/-10.05	-18.85/-15.88	-7.96/-9.79	-8.96/-6.89	-8.49/-7.56	-7.33/-8.92	-9.54/-6.29	-5.7/-6.32	-7.63/-5.57	-8.09/-6.03	-11.44/-6.69	-9.69/-13.47	-15.34/-16.55	-17.87/-10.94	-9.35/-11.64	-18.73/-11.22	-18.83/-8.16	-6.12/-11.32	-11.71/-12.27	-9.32/-9.14	-7.71/-6.63	-6.45/-7.54
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 (°)	-18.02/-12.33	-13.49/-10.54	-8.97/-10.05	-18.85/-15.88	-7.96/-9.79	-8.96/-6.89	-8.49/-7.56	-7.33/-8.92	-9.54/-6.29	-5.7/-6.32	-7.63/-5.57	-8.09/-6.03	-11.44/-6.69	-9.69/-13.47	-15.34/-16.55	-17.87/-10.94	-9.35/-11.64	-18.73/-11.22	-18.83/-8.16	-6.12/-11.32	-11.71/-12.27	-9.32/-9.14	-7.71/-6.63	-6.45/-7.54
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 (°)	-18.02/-12.33	-13.49/-10.54	-8.97/-10.05	-18.85/-15.88	-7.96/-9.79	-8.96/-6.89	-8.49/-7.56	-7.33/-8.92	-9.54/-6.29	-5.7/-6.32	-7.63/-5.57	-8.09/-6.03	-11.44/-6.69	-9.69/-13.47	-15.34/-16.55	-17.87/-10.94	-9.35/-11.64	-18.73/-11.22	-18.83/-8.16	-6.12/-11.32	-11.71/-12.27	-9.32/-9.14	-7.71/-6.63	-6.45/-7.54
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 (°)	-18.02/-12.33	-13.49/-10.54	-8.97/-10.05	-18.85/-15.88	-7.96/-9.79	-8.96/-6.89	-8.49/-7.56	-7.33/-8.92	-9.54/-6.29	-5.7/-6.32	-7.63/-5.57	-8.09/-6.03	-11.44/-6.69	-9.69/-13.47	-15.34/-16.55	-17.87/-10.94	-9.35/-11.64	-18.73/-11.22	-18.83/-8.16	-6.12/-11.32	-11.71/-12.27	-9.32/-9.14	-7.71/-6.63	-6.45/-7.54



Radiated Composite Gain Data of 6GHz

Appendix A

Theta (°)	Phi (°)	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°)		
Theta(25°)	Phi(0°)	-14.93/-12.13	-11.43/-11.36	-11.41/-11.4	-10.49/-8.59	-6.94/-5.42	-4.59/-4.47	-4.08/-4.61	-5.22/-6.32	-7.42/-8.01	-7.68/-7.67	-7.94/-8.4	-9.78/-12.23	-13.99/-12.65	-11.23/-10.8	-10.13/-9.52	-8.81/-8.67	-8.76/-8.54	-8.71/-9.27	-10.34/-11.61	-12.27/-13.1	-14.29/-18.56	-18.86/-18.49	-19.29/-19.73	-18.11/-16.33	
Theta(30°)	Phi(0°)	-16.73/-14.29	-13.09/-12.83	-11.45/-10.4	-9.06/-6.52	-5.63/-4.96	-4.08/-3.46	-3.14/-3	-3.29/-4.0	-5.02/-4.9	-4.1/-3.94	-4.84/-5.21	-6.87/-9.71	-9.26/-9.05	-10.22/-13.38	-14.44/-13.17	-12.06/-10.49	-10.81/-10.49	-8.85/-10.24	-10.89/-10.38	-9.94/-10.31	-10.18/-9.24	-9.5/-10.43	-12.94/-18.68	-19.21/-18.19	
Theta(35°)	Phi(0°)	-15.41/-12.44	-12.34/-14.01	-12.16/-8.64	-6.69/-5.58	-5.11/-4.41	-3.17/-2.8	-3.08/-3.21	-2.76/-2.26	-2.39/-2.61	-2.44/-2.31	-2.72/-2.71	-2.78/-3.8	-4.78/-6.3	-8.25/-6.61	-10.29/-9.25	-11.03/-12.07	-10.87/-10	-9.83/-8.61	-7.54/-6.22	-6.15/-4.71	-5.47/-6.63	-8.28/-10.45	-10.95/-16.72	-18.64/-17.9	
Theta(45°)	Phi(0°)	-13.05/-12.13	-13.84/-18.68	-18.76/-10.85	-7.61/-8.43	-3.48/-2.39	-2.14/-2.03	-2.04/-1.82	-2.03/-2.06	-2.28/-2.16	-1.51/-1.33	-0.11/-0.41	-0.23/-0.53	-0.9/-1.76	-3.65/-3.56	-4.87/-5.35	-6.16/-7.12	-7.97/-8.22	-9.38/-7.52	-4.26/-3.05	-3.32/-0.05	-5.67/-7.44	-8.6/-11.53	-16.83/-14.57	-13.38/-13.02	
Theta(50°)	Phi(0°)	-6.99/-5.23	-4.36/-8.28	-15.15/-14.53	-10.03/-6.14	-3.58/-1.84	-0.66/-0.43	-0.81/-1.23	-1.65/-1.93	-2.39/-2.39	-2.19/-1.35	-0.150/0.63	0.57/0.36	-0.54/-1.29	-2.82/-3.16	-4.12/-4.95	-5.38/-5.23	-5.54/-7.32	-5.98/-5.86	-5.75/-4.62	-4.77/-4.84	-5.23/-5.83	-8.46/-8.14	-10.24/-13.57	-8.54/-8.47	
Theta(60°)	Phi(0°)	-4.26/-2.82	-4.22/-4.76	-8.16/-8.07	-8.21/-6.49	-4.52/-2.86	-1.97/-1.71	-1.82/-1.4	-0.99/-1.72	-1.56/-1.91	-1.82/-1.91	-0.83/-0.36	0.050/0.31	0.981/0.1	0.85/-4.74	-2.22/-2.85	-3.48/-3.6	-5.13/-6.97	-7.39/-7.32	-7.11/-4.3	-6.55/-7.22	-5.16/-6.21	-6.11/-5.55	-7.62/-9.71	-8.94/-10.52	-7.14/-7.9
Theta(65°)	Phi(0°)	-4.04/-2.96	-2.19/-2.61	-3.72/-4.01	-4.23/-4.47	-3.63/-1.82	-0.650/0.18	0.01/-0.1	-0.76/-1.32	-1.17/-1.24	-0.79/-1.07	0.330/0.5	1.290/0.5	-0.28/-1.37	-2.28/-2.57	-3.44/-4.7	-6.97/-7.38	-6.48/-7.49	-11.1/-14.65	-13.1/-10.39	-9.58/-9.28	-9.29/-8.41	-9.32/-9.32	-10.74/-9.26	-8.04/-5.71	
Theta(75°)	Phi(0°)	-5.24/-3.72	-2.13/-2.1	-1.51/-0.94	-1.57/-2.6	-2.38/-0.81	0.391/0.4	1.311/4.8	0.41/-1.07	-0.76/-0.99	0.770/0.5	0.41/-1.04	-2.36/-2.38	-2.32/-2.98	-6.64/-5.34	-5.12/-5.81	-7.87/-8.24	-13.18/-13.4	-13.57/-10.99	-9.8/-7.5	-8.66/-9.62	-12.89/-13.21	-12.43/-8.56			
Theta(82.5°)	Phi(0°)	-5.91/-4.65	-3.94/-3.46	-1.91/-1.03	-1.21/-1.89	-2.93/-2.12	-0.980/0.66	0.160/2.3	0.73/-0.16	0.330/0.2	0.971/3.1	1.51/-0.28	-1.13/-1.68	-0.28/-2.17	-4.21/-2.99	-3.64/-4.29	-4.4/-6.47	-9.85/-11.54	-17.23/-18.46	-12.17/-7.4	-10.77/-11.77	-18.37/-19.94	-15.71/-9.91			
Theta(90°)	Phi(0°)	-5.61/-3.56	-3.27/-2.31	-2.12/-1.51	-0.92/-1.48	-1.67/-1.78	-1.49/-1.03	-1.69/-1.27	-0.31/-0.4	-0.47/-1.12	2.021/9	1.430/8.4	1.231/4.4	1.750/1.9	-1.28/-3.69	-0.56/-1.31	-2.73/-3.39	-3.63/-3.7	-2.63/-3.48	-7.14/-9.62	-18.91/-15.5	-10.31/-6.13	-7.31/-8.62	-16.63/-18.54	-14.31/-9.18	
Theta(97.5°)	Phi(0°)	-2.23/-2.16	-4.09/-4.4	-3.1/-1.76	-0.46/-1.62	-1.81/-2.04	-2.31/-1.47	-1.42/-2.07	0.1/-26	-0.870/4.7	1.871/66	1.311/33	0.991/1.1	0.41/-3.07	-3.38/-4	-1.39/-2.65	-4/-5.28	-9.99/-8.48	-2.3/-2	-8.93/-10.66	-12.94/-10.92	-13.62/-8.26	-10.5/-11.7	-13.41/-8.12	-9.8/-8.2	
Theta(105°)	Phi(0°)	-2.88/-1.62	-1.42/-2.17	-2.87/-2.88	-2.52/-1.43	-1.13/-2.12	-1.65/-1.03	-0.930/2.7	1.17/-2.01	-0.70/4.4	0.850/6	0.691/2.7	1.231/1	1.01/-3.05	-3.11/-4.52	-2.27/-3.1	-4.51/-9.84	-2.89/-4.15	-13.15/-10.74	-8.82/-6.43	-15.14/-9.69	-11.01/-18.1	-18.01/-10.28	-8.36/-11.2		
Theta(112.5°)	Phi(0°)	-2.89/-2.85	-3.26/-4.59	-4.81/-3.23	-3.18/-3.24	-2.33/-3.88	-1.78/-2.18	-1.63/-0.99	-2.17/-6.53	-5.14/-3.91	-2.14/-1.27	-1.48/-1.14	-0.71/-1.63	-2.14/-4.58	-6.46/-6.2	-6.89/-6.08	-5.76/-13.02	-9.13/-3.02	-1.96/-11.43	-11.58/-9.73	-4.47/-11.72	-18.71/-7.6	-11.94/-14.12	-15.92/-6.17	-6.93/-5.04	
Theta(120°)	Phi(0°)	-2.84/-2.65	-2.71/-5.99	-5.33/-6.22	-7.16/-2.6	-4.49/-3.1	-2.77/-1.86	-0.94/-0.75	-2.09/-2.2	-6.06/-7.92	-8.18/-10.58	-6.69/-7.41	-5.29/-5.98	-6.51/-6.95	-9.47/-7.46	-13.91/-4.52	-6.03/-12.56	-8.91/-3.49	-2.22/-11.86	-16.63/-11.52	-4.93/-14.86	-14.76/-7.68	-18.87/-18.74	-13.64/-6.01	-4.67/-3.4	
Theta(127.5°)	Phi(0°)	-5.14/-6.61	-4.73/-4.76	-6.69/-9.06	-9.65/-10.49	-8.78/-5.21	-3.17/-2.4	-2.44/-1.71	-0.77/-2.03	-2.88/-3.58	-5.52/-4.91	-4.62/-3.25	-5.94/-4.0	-7.56/-8.43	-10.21/-10.65	-11.18/-4.63	-10.63/-11.04	-9.59/-9.44	-6.71/-6.83	-18.62/-17.91	-17.07/-18.75	-19.24/-6.47	-17.72/-14.73	-13.69/-9.59	-7.13/-4.77	
Theta(135°)	Phi(0°)	-16.88/-12.65	-7.71/-7.56	-9.01/-12.35	-14.79/-13.99	-10.55/-8.89	-7.17/-5.69	-3.45/-2.89	-3.28/-2.72	-2.81/-4.09	-4.22/-3.92	-4.15/-4.27	-3.87/-4.14	-3.62/-4.19	-5.51/-10.54	-11.27/-6.41	-9.24/-10.91	-8.57/-9.15	-7.2/-18.74	-18.27/-10.17	-8.81/-9.56	-10.21/-18.49	-13.91/-17.96	-15.13/-11.5	-13.86/-16.1	
Theta(142.5°)	Phi(0°)	-18.29/-11.79	-10.18/-9.9	-14.32/-18.25	-19.27/-15.67	-18.22/-10.65	-7.19/-5.53	-4.77/-1.44	-4.38/-2.69	-7.01/-6.5	-6.31/-4.91	-3.91/-3.99	-5.33/-6.45	-9.66/-7.99	-9.76/-13.61	-18.39/-14.98	-17.93/-13.65	-12.31/-9.32	-12.95/-17.72	-19.18/-14.58	-18.92/-19.7	-18.68/-19.18	-19.07/-17.45	-15.31/-10.25	-11.61/-6.55	
Theta(150°)	Phi(0°)	-14.37/-11.53	-13.69/-15.98	-17.01/-18.92	-18.11/-14.06	-10.91/-11.24	-8.64/-6.46	-5.92/-5.87	-6.62/-5.19	-5.54/-5.66	-5.42/-5.93	-6.92/-6.58	-11.82/-16.84	-15.31/-9.99	-10.65/-13.21	-12.46/-10.08	-7.79/-4.94	-10.81/-8.77	-11.25/-11.47	-12.96/-8.39	-7.83/-10.15	-11.68/-16.3	-19.11/-16.12	-11.86/-9.04	-7.83/-11.46	
Theta(157.5°)	Phi(0°)	-11.41/-15.06	-18.11/-15.85	-14.69/-16.15	-16.06/-15.15	-12.2/-10.46	-8.04/-5.61	-4.5/-3.98	-3.95/-4.55	-4.81/-4.92	-5.29/-5.79	-6.18/-5.88	-4.05/-2.53	-2.78/-3.69	-0.98/-5.34	-4.98/-5	-6.14/-6.22	-6.11/-8.32	-13.91/-18.44	-14.25/-9.9	-10.35/-14.13	-17.56/-18.5	-18.13/-19.12	-12.84/-11.25	-10.88/-10.91	
Theta(165°)	Phi(0°)	-18.91/-18.84	-17.86/-17.71	-18.41/-19.18	-19.16/-18.08	-19.65/-14.1	-12.56/-11.7	-10.29/-9.37	-8.69/-8.34	-8.86/-2.25	-9.45/-8.78	-7.25/-8.8	-5.2/-4.8	-3.92/-2.96	-3.04/-6.1	-6.92/-7.4	-7.21/-7.17	-8.78/-14.5	-17.6/-18.3	-11.94/-8.95	-9.17/-11.66	-19.39/-18.78	-14.32/-13.73	-11.93/-11.22	-12.71/-6.55	
Theta(172.5°)	Phi(0°)	-17.48/-18.35	-18.21/-19.19	-17.85/-19.68	-18.41/-16.53	-13.49/-11.99	-10.69/-10.12	-9.96/9.51	-9.53/-9.14	-8.15/-7.3	-6.68/-6.31	-6.16/-5.95	-5.78/-5.71	-5.85/-6.4	-6.51/-6.5	-7.38/-9.65	-13.44/-17.38	-18.41/-18.5	-18.68/-18.87	-18.79/-18.15	-14.56/-12.18	-12.64/-15.58	-18.27/-16.99	-18.06/-18.27		
Theta(180°)	Phi(0°)	-18.51/-19.59	-18.91/-18.18	-17.37/-18.44	-17.83/-17.32	-18.77/-17.82	-18.74/-19.42	-16.78/-14.64	-13.38/-12.63	-12.45/-11.77	-11.66/-12.13	-13.04/-14.56	-16.38/-17.26	-16.77/-15.83	-14.65/-15.56	-18.31/-17.58	-18.42/-18.75	-17.32/-18.76	-18.49/-19.31	-18.08/-17.97	-19.45/-19.07	-18.13/-18.76	-18.38/-17.54	-18.27/-17.95	-18.78/-18.4	
Phi(0°)	Phi(0°)	7.71/-7.43	-7.71/-7.33	-7.15/-7.37	-7.63/-8.24	-8.63/-9.28	-9.43/-10.06	-9.97/-10.06	-10.77/-12.16	-12.86/-12.65	-11.93/-11.81	-12.31/-10.93	-10.13/-9.11	-9.57/-7.71	-7.11/-6.87	-6.55/-5.69	-5.54/-5.43	-5.90/-6.69	-6.31/-6.09	-7.13/-9.34	-10.68/-10.12	-10.27/-9.6	-9.4/-9.05	-9.5/-8.6	-7.77/-7.35	
Phi(7.5°)	Phi(0°)	-8.11/-7.34	-6.41/-6.12	-5.79/-5.91	-6.28/-6.34	-6.71/-6.98	-7.81/-8.43	-9.42/-9.08	-9.87/-9.28	-9.18/-9.59	-10.68/-11.26	-10.41/-9.4	-9.27/-7.7	-7.57/-5.72	-7.83/-7.7	-7.89/-7.38	-7.85/-8.51	-8.14/-7.69	-8.71/-7.02	-8.71/-7.02	-13.14/-10.7	-14.68/-11.78	-10.99/-10.62	-12.12/-12.14	-10.31/-8.35	
Phi(15°)	Phi(0°)	-12.94/-11.08	-9.15/-8.77	-8.15/-9.2	-6.38/-6.12	-5.96/-6.19	-7.38/-8.14	-9.12/-8.96	-9.39/-7.77	-6.91/-6.47	-7.24/-8.12	-9.21/-10.21	-9.71/-10.21	-7.14/-6.43	-6.31/-6.91	-7.54/-8.2	-6.86/-8.85	-9.74/-9.22	-7.75/-7.02	-6.92/-7.2	-8.85/-10.94	-13.95/-15.89	-12.78/-14.35	-12.78/-13.09	-15.15/-13.58	
Phi(22.5°)	Phi(0°)	-17.64/-17.15	-12.65/-8.97	-6.88/-5.91	-5.36/-5.41	-6.15/-7.42	-9.61/-11.61	-12.38/-12.04	-10.71/-8.87	-7.68/-6.71	-5.94/-6.34	-7.26/-7.88	-7.46/-6.17	-5.48/-5.44	-5.75/-6.5	-7.03/-7.08	-7.04/-7.51	-7.95/-10.03	-12.26/-13.48	-15.12/-15.45	-14.44/-11.22	-9.4/-8.94	-9.87/-11.13	-11.33/-11.76	-14.48/-18.76	
Phi(30°)	Phi(0°)	-10.78/-12.24	-11.64/-10.39	-7.71/-5.65	-4.23/-7.8	-4.02/-5.41	-8.05/-10.96	-14.51/-15.81	-12.62/-10.87	-9.65/-8.55	-7.95/-5.55	-5.68/-5.02	-4.58/-4.12	-4.22/-4.76	-4.94/-5.88	-6.08/-7.09	-7.05/-9.65	-6.43/-6.25	-6.79/-8.09	-11.15/-13.9	-13.72/-14.22	-9.64/-9.11	-10.46/-11.84	-11.03/-9.93		
Phi(37.5°)	Phi(0°)	-10.78/-12.24	-9.58/-8.16	-7.75/-5.66	-4.68/-4.41	-4.14/-5.95	-7.12/-10.41	-16.71/-17.63	-17.44/-13.4	-12.46/-11.4	-9.16/-6.47	-4.39/-2.99	-1.52/-0.22	-0.08/-0.2	-0.88/-2.09	-3.11/-4.47	-6.71/-7.5	-9.61/-10.3	-10.72/-11.31	-11.21/-9.91	-7.07/-7.23	-9.13/-10.28	-12.21/-12.76	-9.97/-10.65	-11.25/-10.54	
Phi(45°)	Phi(0°)	-14.83/-16.42	-10.93/-8.18	-5.43/-6.67	-3.85/-3.33	-4.17/-5.49	-7.11/-9.91	-13.75/-18.96	-19.01/-17.58	-17.66/-15.41	-11.95/-8.57	-4.51/-2.07	-0.410/0.46	1.26/1	1.050/0.2	0.21/-1.75	-1.58/-2.57	-3.13/-3.7	-3.65/-6.38	-8.91/-10.29	-13.46/-15.47	-11.81/-12.73	-14.93/-17.75	-18.33/-14.79	-13.61/-13.26	
Phi(52.5°)	Phi(0°)	-8.39/-3.94	-19.41/-14.17	-8.99/-9.72	-7.11/-1.18	-6.61/-6.51	-6.24/-1.84	-11.77/-13.64	-18.65/-17.25	-15.93/-13.59	-8.01/-5.48	-3.92/-3.29	-0.850/4.4	0.760/4.9	0.28/0.06	-0.64/-0.34	0.410/1.6	-0.770/-0.67	-2.58/-1.48	-9.43/-10.29	-13.38/-14.55	-12.01/-13.18				



Radiated Composite Gain Data of 6GHz

Appendix A

Theta (°)	Phi (°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)	
Theta (7.5°)	Phi(7.5°)	-1.82/-1.32	-0.63/0.35	0.09/-0.62	-1.42/-0.4	-0.61/-0.04	-0.29/-0.62	-0.29/-0.08	-1.01/-2.48	-4.83/-4.11	-1.09/-0.5	-1.53/-1.64	-2.73/-2.44	-5.38/-5.83	-6.46/-6.44	-10.99/-11.35	-9.62/-7.89	-10.88/-14.47	-11.98/-11.08	-11.44/-11.84	-7.2/-4.87	-4.45/-2.49	-2.74/-2.99	-3.95/-4.85	-3.56/-2.53					
Theta (7.5°)	Phi(15°)	-2.1/-1.78	-0.66/-0.45	-0.27/-1.64	-1.51/-0.53	-1.29/0.12	0.03/-0.81	-1.71/-1.86	-1.37/-1.36	-3.91/-3.18	-1.32/0.25	-1.22/-2.08	-2.98/-2.42	-4.48/-6.2	-8.25/-7.51	-9.94/-9.04	-9.23/-6.08	-10.38/-15.35	-9.22/-5.85	-8.93/-11.32	-5.07/-2.85	-2.03/-2.11	-3.04/-2.89	-2.12/-3.7	-1.88/-2.56					
Theta (7.5°)	Phi(22.5°)	-1.65/-1.96	-0.93/-1.83	-0.78/-2.94	-2.04/-1.23	-0.91/0.91	-0.26/0.03	0.33/-0.19	-0.95/-1.2	-2.74/-1.96	-0.06/0.43	-1.28/-1.25	-1.13/-2.43	-6.26/-5.51	-3.45/-1.8	-10.35/-10.63	-6.19/-6.07	-9.75/-15	-4.88/-3.33	-4.66/-5.93	-1.48/-1.15	-2.45/-2.46	-2.85/-2.33	-1.91/-3.37	-2.84/-3.14					
Theta (7.5°)	Phi(30°)	-3.77/-0.49	1.13/1.16	2.01/0.35	-0.53/0.08	0.31/1.76	0.81/1.86	0.96/0	-1.05/-2.47	-4.48/-4.07	-0.58/0.88	0.48/0.69	-1.55/-1.91	-2.02/-8.03	-2.37/-3.38	-6.06/-9.64	-5.97/-6.67	-9.22/-2.22	-1.69/-1.95	-3.09/-1.7	1.35/1.51	0.58/1.27	-0.24/-2.66	-1.14/-2.21	-4.48/0.8					
Theta (7.5°)	Phi(37.5°)	-3.89/-0.8	1.2/0.91	1.84/0.09	-0.6/-0.12	0.75/1.57	0.89/1.98	0.86/-0.12	-2.44/-4.59	-7.15/-3.91	-0.71/0.24	-2.1/-2.07	-1.84/-6.38	-8.49/-8.26	-3.14/-5.66	-12.07/-14.75	-7.24/-9.27	-10.71/-14.75	-2.74/-4	-4.5/-5.81	0.05/-0.3	-0.65/-0.3	-3.31/-1.95	-1.24/-1.8	-3.43/-1.22					
Theta (7.5°)	Phi(45°)	-3.26/-0.37	-0.30/0.55	-0.62/-2.25	-2.51/-2.35	-2.07/0.96	-0.18/0.61	0.91/0.38	-3.76/-5.03	-7.28/-3.89	-0.56/0.1	-1.58/-2.52	-2.73/0.1	-4.61/-3.08	-5.88/-11.49	-10.63/-9.96	-7.64/-6.19	-4.88/-3.33	-4.66/-5.93	-1.48/-1.15	-2.45/-2.46	-2.85/-2.33	-1.91/-3.37	-2.84/-3.14						
Theta (12.5°)	Phi(7.5°)	-3.55/-0.8	-0.47/1.24	1.38/0.65	-1.02/0.25	-0.11/0.91	0.92/0.43	-0.28/-2.22	-3.83/-5.09	-9.78/-6.06	-2.46/-2.07	-3.03/-3.2	-3.2/-4.31	-7.63/-6.64	-5.54/-5.46	-12.69/-18.42	-16.81/-14.08	-5.6/-5.19	-3.27/-4.34	-10.37/-6.36	0.19/-0.26	-0.97/-1.55	-2.54/-0.87	-0.67/-4.92	-3.72/-3.94					
Theta (12.5°)	Phi(15°)	-0.88/-1.43	0.47/0.79	1.16/0.77	-0.56/-1.1	0.15/0.9	1.45/0.37	-0.47/-1.71	-3.47/-4.76	-15.73/-9.1	-4.4/-4.01	-4.28/-2.07	-5.09/-3.52	-9.77/-12.27	-9.77/-6.99	-9.44/-13.12	-16.84/-10.37	-6.98/-11.48	-3.08/-10.5	-16.01/-14.17	-2.69/-3.1	-3.22/-5.24	-10.39/-2.61	-1.28/-5.5	-1.1/-3.53					
Theta (12.5°)	Phi(22.5°)	-1.08/-2.38	-1.18/-2.22	-1.22/-2.99	-3.02/-2.67	-1.61/-1.97	-1.78/-1.56	-3.16/-5.23	-7.33/-11.37	-13.18/-9.3	-5.74/-4.89	-5.42/-6.27	-8.28/-11.47	-15.43/-15.39	-16.91/-8.67	-13.68/-10.56	-7.03/-19.03	-4.41/-4.17	-10.26/-10.2	-2.12/-2.25	-2.95/-8.74	-8.32/-4.3	-2.44/-6.24	-1.57/-2.36						
Theta (12.5°)	Phi(30°)	-5.92/-5.55	-3.36/-3.59	-3.05/3	-3.97/-4.95	-4.99/-4.01	-3.89/-4.38	-5.14/-6.28	-10.28/-17.77	-19.25/-10.25	-6.93/-4.88	-5.94/-5.49	-6.64/-8.13	-12.88/-17.5	-17.45/-13.89	-17.75/-16.28	-17.4/-8.56	-6.92/-10.22	-5/-5.85	-10.07/-14.11	-5.35/-5.84	-6.21/-7.93	-9.67/-9.42	-10.33/-16.98	-7.27/-6.53					
Theta (12.5°)	Phi(37.5°)	-9.16/8.8	-5.2/-3.79	-3.46/-2.79	-2.5/-2.99	-4.17/-5.36	-7/-8.42	-9.71/-10.96	-12.57/-14.99	-18.56/-17.38	-18.11/-13.62	-11.54/-11.07	-13.85/-19.13	-19.72/-17.94	-11.88/-10.35	-16.83/-11.35	-10.74/-12.96	-17.76/-12.08	-10.78/-10.95	-8.89/-17.78	-7.96/-6.6	-8.8/-11.89	-13.66/-11.89	-14.71/-12.93	-6.59/-6.29					
Theta (150°)	Phi(7.5°)	-8.93/-7.29	-4.7/-2.39	-1.15/-0.99	-0.9/-0.88	-1.14/-1.79	-2.46/-2.74	-3.57/-4.44	-6.25/-4.44	-11.64/-14.09	-16/-18	-18.06/-13.95	-17.58/-18.36	-17.52/-16.35	-13.87/-13.04	-13.63/-13.73	-12.75/-14.45	-18.44/-11.78	-6.39/-5.48	-8.91/-14.04	-15.52/-10.51	-8.32/-8.48	-6.55/-3.95	-3.82/-6.24	-7.49/-1.66					
Theta (157.5°)	Phi(7.5°)	-4.67/-6.2	-6.45/-6.54	-6.39/-6.66	-7.14/-7.55	-7.8/-8.42	-8.82/-8.87	-9.29/-10.12	-11.92/-14.83	-17.93/-19.43	-19.71/-16.22	-14.99/-14	-13.44/-15.77	-17.71/-17.82	-13.64/-13.71	-17.62/-19.56	-18.97/-17.83	-18.97/-18.71	-16.42/-13.86	-12.62/-11.04	-11.08/-10.65	-9.58/-7.68	-6.02/-5.53	-5/-4.07	-2.88/-2.69					
Theta (165°)	Phi(7.5°)	-6.95/-7.41	-7.48/-7.54	-7.45/-7.34	-6.35/-6.41	-4.8/-4.72	-4.75/-5.21	-5.83/-6.44	-7.76/-9.13	-10.42/-11.89	-10.42/-11.89	-13.91/-16.44	-19.12/-19.03	-18.99/-18.95	-17.82/-18.75	-18.35/-14.61	-11.73/-10.35	-10.27/-13.26	-19.18/-18.84	-12.89/-10.06	-10.22/-12.32	-14.76/-16.15	-16.36/-16.56	-14.71/-12.93	-9.86/-7.71	-6.59/-6.29				
Theta (172.5°)	Phi(7.5°)	-15.59/-15.61	-15.21/-13.48	-12.05/-11.47	-10.38/-10.09	-9.84/-9.36	-8.79/-9.01	-9.45/-10.52	-11.39/-13.79	-17.27/-18.69	-18.14/-18.98	-17.42/-17.33	-18.12/-19.38	-18.89/-15.61	-15.88/-13.87	-14.42/-18.19	-18.48/-16.87	-18.69/-16.25	-15.65/-17.27	-18.19/-16.68	-17.16/-18.68	-17.18/-18.58	-18.74/-17.96	-16.53/-15.87						
Theta (180°)	Phi(7.5°)	-18.94/-17.74	-17.57/-16.66	-15.54/-16.84	-18.48/-18.52	-16.09/-13.06	-12.17/-12.08	-12.91/-15.2	-17.73/-18.91	-18.38/-19.25	-19.18/-18.56	-17.6/-19.36	-18.48/-17.75	-16.3/-16.41	-16.28/-16.83	-18.61/-17.7	-17.75/-18.95	-17.97/-18	-17.61/-17.41	-15.98/-15.08	-15.4/-16.11	-18.96/-18.33	-17.34/-18.38	-17.43/-18.32	-18.47/-17.52					
Theta (180°)	Phi(15°)	6.475GPol	PhiAnt 4																											
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)	Phi(67.5°)	Phi(75°)	Phi(82.5°)	Phi(90°)	Phi(105°)	Phi(120°)	Phi(135°)	Phi(150°)	Phi(165°)	Phi(180°)	Phi(195°)	Phi(210°)	Phi(225°)	Phi(240°)	Phi(255°)	Phi(270°)	Phi(285°)	Phi(300°)	Phi(315°)	Phi(330°)	Phi(345°)
Theta (0°)	Gain	Phi(7.5°)	Phi(15°)	Phi(22.5°)	Phi(30°)	Phi(37.5°)	Phi(45°)	Phi(52.5°)	Phi(60°)																					



Antenna Pattern of 6GHz

Appendix B

θ(60°)	-6.61/-7.14	-5.38/-4.98	-4.47/-5.59	-5.80/-5.28	-5.12/-5.76	-4.82/-3.84	-2.01/-0.70	-0.28/-0.70	-1.09/-1.60	-2.39/-1.90	-1.82/-1.64	-1.10/-0.87	-0.07/0.06	0.24/-1.06	-1.93/-2.06	-2.14/-1.95	-2.54/-4.38	-3.67/-2.34	-2.04/-3.71	-6.63/-9.19	-10.26/-9.13	-8.03/-7.08	-6.65/-6.11	-5.76/-6.08
θ(67.5°)	-6.33/-7.38	-5.69/-3.89	-2.10/-2.53	-3.60/-3.72	-4.27/-4.21	-3.37/-2.03	-0.94/-1.06	0.98/0.98	0.750/6.60	0.170/8.1	1.221/3.4	0.700/1.5	0.090/2.7	-0.21/-1.70	-2.19/-1.13	-1.17/-1.91	-5.04/-5.48	-3.26/-2.24	-2.36/-5.36	-10.26/-15.26	-13.70/-8.98	-8.34/-8.88	-7.30/-5.23	-5.00/-6.62
θ(75°)	-5.27/-4.22	-3.56/-2.36	-1.59/-1.59	-2.77/-3.08	-3.74/-2.70	-2.77/-2.03	-1.07/0.43	1.472/1.1	1.261/2.9	0.941/8.4	2.923/2.5	2.652/0.0	0.931/2.8	1.010/0.7	-1.47/-2.05	-1.83/-0.57	-3.02/-1.87	-0.88/-0.03	-1.48/-3.48	-9.45/-13.56	-7.70/-5.70	-9.22/-13.82	-10.48/-8.44	-7.48/-5.71
θ(82.5°)	-3.14/-3.52	-3.10/-2.26	-1.51/-0.49	-1.35/-2.53	-4.24/-2.33	-2.26/-2.32	-1.63/-0.53	0.801/7.7	1.151/0.0	1.001/8.3	2.833/4.3	2.832/5.1	2.202/2.6	1.810/1.9	-2.77/-3.52	-3.01/-2.00	-0.95/-0.26	1.23/0.26	-2.95/-6.52	9.87/-5.72	-3.62/-4.45	-6.78/-14.29	-11.09/-8.20	-5.32/-6.60
θ(90°)	-3.12/-3.51	-1.72/-2.54	-2.39/-0.41	-1.86/-3.05	-3.79/-1.84	-2.33/-1.13	-1.67/-0.31	0.401/7.2	0.820/4.6	0.570/9.6	1.661/9.5	2.211/3.6	2.130/4.7	1.26/-2.13	-3.86/-5.58	-4.95/-3.12	-2.80/-0.04	0.41/-0.57	-5.88/-5.32	-6.66/-4.02	-3.49/-4.62	-8.90/-10.88	-11.68/-9.84	-6.58/-7.56
θ(97.5°)	-2.76/-1.22	0.37/-0.59	-0.88/0.09	-0.56/-1.45	-3.10/-1.30	-1.02/-0.40	-0.53/-0.08	0.661/7.9	0.570/3.2	0.340/7.1	1.851/7.6	2.701/0.7	1.720/3.2	-0.10/-4.04	-4.20/-6.07	-6.68/-5.57	-0.56/-4.46	-1.17/-6.80	-7.12/-5.42	-6.10/-4.76	-8.47/-7.59	-4.75/-3.99	-3.10/-4.18	
θ(105°)	-2.63/-0.93	0.34/-0.88	-1.04/0.06	-0.55/-1.58	-3.11/-1.04	-1.32/-0.72	-1.31/-1.44	-0.72/0.80	-0.32/-1.34	-1.07/-0.89	0.670/6.6	1.530/6.0	1.180/1.0	-0.28/-3.60	-6.01/-5.07	-4.39/-7.50	-4.49/-0.55	-1.54/-8.43	-8.69/-4.76	-4.87/-4.71	-8.22/-6.78	-9.83/-7.77	-5.73/-2.42	-3.42/-5.33
θ(112.5°)	-1.94/-1.47	-0.60/-1.77	-1.66/-1.95	-2.06/-3.72	-3.90/-2.89	-1.41/-0.39	-0.81/-0.72	0.23/-0.53	-2.42/-2.29	-4.92/-4.68	-3.40/-2.63	-1.81/-0.97	-1.13/-0.81	-3.79/-5.21	-8.47/-4.03	-5.70/-7.09	-1.40/-0.08	-1.60/-1.95	-15.01/-5.12	-12.11/-8.15	-8.44/-11.07	-13.30/-8.55	-6.06/-4.74	-2.98/-3.35
θ(120°)	-1.63/-0.35	-0.99/-1.68	-2.80/-1.93	-1.82/-2.46	-2.95/-3.92	-2.56/-2.23	-1.12/-0.62	-0.70/-1.09	-1.39/-2.22	-2.56/-2.72	-3.12/-0.99	-2.06/-0.86	-5.10/-5.42	-6.03/-1.41	-5.41/-6.55	-2.10/-2.98	-2.16/-8.31	-9.46/-5.64	-1.63/-8.07	-7.10/-12.08	-8.67/-8.94	-7.69/-3.68	-2.05/-2.82	
θ(127.5°)	-1.86/-1.95	-3.11/-3.95	-4.67/-3.59	-3.19/-4.01	-4.16/-4.25	-4.23/-2.82	-3.15/-2.92	-2.72/-1.60	-0.56/-0.85	-0.75/-0.92	-0.65/-1.80	-1.61/-2.86	-1.65/-3.88	-3.27/-5.56	-3.41/-2.05	-8.08/-11.4	-4.11/-4.44	-2.25/-4.74	-7.95/-3.47	-2.05/-9.38	-4.81/-5.46	-15.61/-7.42	-9.52/-4.55	-3.00/-2.94
θ(135°)	-5.25/-4.46	-7.96/-6.86	-6.53/-5.74	-5.68/-7.94	-9.68/-6.55	-4.33/-4.20	-2.74/-1.99	-1.42/-0.96	-1.31/-1.52	-1.71/-1.48	-1.28/-2.14	-1.29/-2.62	-2.73/-4.93	-4.73/-6.44	-5.27/-6.38	-7.56/-13.00	-5.09/-8.88	-2.56/-6.95	-7.65/-4.08	-3.60/-5.44	-14.40/-8.43	-12.73/-14.82	-13.06/-8.60	-5.58/-0.57
θ(142.5°)	-9.06/-10.84	-12.21/-10.15	-6.15/-5.13	-4.03/-4.56	-6.15/-4.48	-7.43/-5.54	-4.39/-3.19	-2.83/-3.55	-3.59/-2.86	-2.57/-2.65	-3.96/-4.41	-6.08/-8.19	-8.39/-10.88	-6.36/-11.17	-8.63/-5.27	-14.14/-4.35	-5.37/-8.58	-13.83/-14.21	-11.77/-11.37	-8.09/-6.45	-7.75/-10.39	-12.75/-9.14	-7.27/-5.82	-4.67/-4.90
θ(150°)	-8.24/-9.40	-9.69/-10.93	-9.32/-8.75	-8.65/-8.03	-6.77/-5.80	-5.42/-5.32	-5.61/-6.03	-5.50/-4.63	-4.71/-5.74	-6.62/-7.37	-8.93/-10.63	-8.95/-7.15	-6.81/-7.69	-7.48/-6.88	-5.30/-4.25	-4.31/-6.09	-7.91/-9.12	-10.07/-7.40	-6.72/-9.66	-10.38/-8.42	-8.45/-10.21	-15.15/-13.42	-7.88/-5.15	-4.72/-5.92
θ(157.5°)	-7.72/-8.94	-7.78/-6.36	-8.88/-8.08	-4.01/-4.71	-6.20/-7.95	-9.26/-10.47	-10.07/-8.70	-7.03/-5.34	-3.82/-3.31	-3.47/-4.29	-5.28/-5.66	-5.94/-7.36	-8.86/-9.24	-8.82/-8.37	-7.32/-7.02	-6.57/-6.62	-7.29/-8.45	-9.10/-9.94	-11.61/-11.75	-13.40/-10.78	-7.01/-6.54	-17.17/-11.40	-12.55/-9.30	-6.63/-6.33
θ(165°)	-14.68/-14.57	-12.01/-10.18	-8.87/-9.95	-6.97/-6.25	-6.08/-5.94	-6.17/-6.82	-7.33/-8.46	-9.21/-8.81	-8.73/-8.75	-8.58/-8.66	-8.62/-7.74	-6.29/-5.22	-4.62/-3.91	-3.41/-2.96	-2.77/-3.11	-4.58/-7.80	-12.19/-14.98	-14.23/-12.67	-12.52/-14.88	-15.22/-14.79	-13.52/-13.58	-14.26/-14.14	-13.59/-13.24	-12.88/-13.40
θ(172.5°)	-14.27/-12.92	-12.64/-13.48	-14.35/-14.46	-13.57/-12.02	-11.05/-9.97	-10.34/-11.51	-11.67/-12.29	-12.41/-12.25	-11.72/-11.14	-10.61/-10.56	-10.42/-10.57	-10.26/-9.15	-7.74/-6.56	-6.04/-5.99	-6.68/-8.17	-9.88/-11.76	-13.54/-15.60	-15.41/-14.29	-11.10/-9.95	-9.61/-9.96	-10.96/-11.49	-11.21/-11.28	-12.59/-14.21	-13.73/-14.35
θ(180°)	-13.87/-14.12	-13.98/-13.48	-12.68/-12.22	-12.47/-13.14	-13.62/-15.09	-15.37/-15.35	-14.74/-14.97	-14.76/-14.66	-14.67/-13.58	-13.10/-12.43	-12.12/-11.50	-10.75/-10.40	-8.19/-8.69	-8.22/-7.81	-7.41/-7.93	-8.49/-9.05	-9.38/-10.11	-10.20/-9.70	-9.06/-8.55	-8.74/-8.57	-8.90/-8.43	-9.96/-11.11	-12.28/-11.68	-12.19/-12.88
Freq(Hz)	6.475GPol	TotalAnt.3																						
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°)	-7.61/-7.08	-7.50/-7.75	-8.41/-9.19	-9.59/-9.37	-8.85/-8.76	-9.01/-9.15	-9.40/-9.80	-10.08/-9.83	-9.89/-9.48	-9.84/-9.86	-9.78/-9.62	-9.46/-9.63	-9.71/-10.20	-10.38/-10.53	-9.85/-9.28	-8.30/-8.33	-8.40/-8.83	-8.86/-8.48	-7.59/-7.52	-7.81/-7.75	-7.76/-7.53	-7.04/-7.27	-7.67/-7.97	-7.96/-7.31
θ(7.5°)	-9.81/-9.97	-10.88/-11.10	-11.16/-10.92	-10.64/-10.03	-9.44/-9.20	-9.04/-9.57	-9.69/-9.23	-8.62/-7.66	-7.17/-6.84	-6.78/-6.86	-7.08/-7.32	-7.23/-7.09	-6.11/-5.48	-5.51/-5.61	-5.90/-5.98	-6.12/-6.41	-7.10/-9.00	-8.53/-8.63	-8.79/-9.32	-9.78/-9.75	-10.11/-10.11	-10.10/-10.50	-9.95/-9.81	-10.05/-9.85
θ(15°)	-8.79/-8.86	-9.88/-10.14	-9.38/-8.40	-7.69/-7.02	-6.47/-6.64	-6.42/-6.76	-6.79/-6.39	-5.81/-5.61	-5.61/-5.81	-5.58/-5.18	-4.66/-4.65	-5.07/-5.25	-4.89/-4.43	-4.02/-4.11	-4.64/-5.45	-6.53/-7.77	-9.08/-10.36	-11.26/-10.79	-11.19/-12.09	-12.81/-12.31	-11.94/-11.53	-10.52/-9.55	-8.95/-8.31	-8.50/-9.63
θ(22.5°)	-5.53/-8.96	-8.43/-7.61	-6.69/-4.53	-5.15/-5.26	-5.70/-6.16	-5.43/-3.77	-5.04/-4.74	-4.67/-5.11	-5.83/-6.20	-5.73/-4.45	-3.72/-3.66	-3.99/-3.70	-3.05/-2.09	-1.79/-2.04	-4.26/-3.39	-4.78/-5.65	-6.95/-8.02	-9.06/-10.36	-10.71/-9.57	-8.21/-7.79	-7.44/-7.20	-6.81/-6.81	-7.12/-5.99	-8.13/-6.69
θ(30°)	-8.80/-8.60	-7.58/-6.69	-6.28/-5.64	-4.94/-3.32	-2.69/-4.45	-2.69/-4.45	-4.53/-5.46	-1.66/-6.40	-5.93/-5.42	-5.73/-5.73	-5.05/-4.21	-3.36/-2.11	-1.44/-1.34	-1.95/-2.16	-2.27/-2.89	-4.08/-5.28	-6.63/-3.88	-8.83/-9.06	-5.85/-5.41	-5.14/-5.38	-6.24/-6.96	-5.58/-6.46	-7.14/-8.45	
θ(37.5°)	-9.98/-10.46	-12.11/-10.89	-9.62/-6.70	-4.37/-2.67	-2.32/-2.26	-2.43/-2.31	-2.39/-2.94	-4.39/-5.42	-5.44/-4.82	-4.58/-4.23	-3.31/-2.28	-1.89/-1.04	-0.26/-0.80	-0.78/-0.67	-0.92/-1.67	-2.30/-2.88	-4.21/-5.07	-6.07/-6.05	-5.79/-5.94	-6.03/-5.52	-6.12/-8.14	-9.37/-10.35	-11.08/-10.50	-11.52/-11.38
θ(45°)	-5.74/-6.63	-8.97/-11.57	-10.21/-7.25	-5.35/-4.32	-2.82/-1.93	-1.37/-1.04	-1.30/-1.77	-2.51/-3.48	-4.31/-4.42	-3.55/-2.45	-2.21/-1.12	-1.12/-1.79	0.090/1.3	0.610/3.9	-0.89/-0.56	-0.08/-0.45	-0.61/-1.05	-1.48/-2.59	-3.31/-3.01	-3.32/-2.27	-7.09/-7.93	-9.58/-9.94	-10.47/-10.98	-8.79/-6.91
θ(52.5°)	-1.71/-5.16	-6.19/-7.11	-7.73/-6.42	-4.45/-3.65	-2.96/-2.97	-2.26/-1.00	-0.13/-0.25	-0.92/-1.82	-2.73/-2.67	-2.06/-2.50	0.51/0.09	1.10/1.19	0.760/7.8	0.020/6.5	-2.07/-0.98	-1.01/-1.17	-1.98/-2.73	-4.43/-4.60	-4.07/-5.31	-6.65/-6.68	-6.51/-7.89	-8.16/-10.46	-10.22/-9.68	-8.65/-6.70
θ(60°)	-3.60/-2.50	-3.25/-4.49	-6.15/-3.43	-4.00/-3.53	-3.47/-3.46	-1.480/1.3	0.780/4.5	-0.34/-1.43	-1.83/-1.69	-1.99/-1.25	-0.05/-1.12	1.25/1.53	0.600/5.0	-0.640/0.1	-0.150/7.9	0.580/0.8	-1.29/-4.29	-6.33/-5.78	-5.81/-6.14	-6.87/-7.06	-8.05/-9.22	-10.19/-8.52	-8.13/-7.04	-7.43/-4.08
θ(67.5°)	-4.04/-2.23	-1.62/-0.92	-2.31/-2.24	-2.27/-1.67	-1.92/-1.56	0.231/0.3	1.420/5.6	-0.39/-0.90	-2.26/-2.68	-2.68/-2.24	-0.940/4.5	0.830/7.3	-0.75/-1.04	-1.28/-1.20	-1.40/-1.44	-1.66/-1.33	-2.74/-4.70	-4.52/-2.71	-2.22/-3.38	-5.86/-9.94	-11.87/-11.07	-9.29/-6.08	-6.69/-4.20	-6.24/-3.80
θ(75°)	-5.39/-3.57	-2.22/-1.13	-2.15/-2.00	-1.96/-1.82	-2.21/-1.93	-0.430/6.5	1.471/1.4	0.130/5.1	-0.83/-1.42	-1.19/-1.77	-0.190/8.8	1.921/7.9	0.591/1.03	-1.84/-1.64	-1.15/-1.59	-2.69/-3.33	-3.05/-4.23	-1.99/-0.58	-0.02/-1.63	-8.85/-14.97	-12.11/-8.18	-9.08/-7.51	-9.32/-7.70	-7.21/-6.89
θ(82.5°)	-4.43/-3.01	-2.53/-1.41	-1.75/-2.30	-3.23/-2.37	-2.25/-3.21	-2.73/-1.57	-0.140/5.5	-0.170/4.6	-0.030/0.4	0.61/-0.51	0.710/9.5	2.281/8.8	0.80/-0.28	-1.170/5.0	-0.16/-0.98	-2.53/-2.51	-3.21/-0.95	1.380/5.1	0.89/-3.73	-12.38/-13.92	-7.29/-6.93	-8.24/-10.71	-11.16/-7.87	-7.29/-5.20
θ(90°)	-3.44/-4.63	-4.15/-1.96	-1.32/-2.20	-2.85/-1.80	-1.88/-3.31	-2.29/-1.62	-0.340/1.0	0.060/4.8	-0.56/-1.06	-0.65/-0.62	0.281/0.7	1.772/0.2	0.95/-0.51	-1.11/-1.01	-0.40/-2.69	-5.79/-5.05	-3.72/-3.53	-0.50/-0.48	-4.26/-5.59	-12.38/-9.97	-5.27/-5.81	-8.97/-10.62	-10.68/-8.57	-6.75/-4.70
θ(97.5°)	-1.46/-2.00	-1.41/-2.99	-3.32/-2.39	-2.63/-1.92	-1.35/-2.45	-1.59/-1.28	0.401/3.1	0.87/-0.79	-0.91/-1.51	-0.68/-0.55	-0.091/1.0	1.000/1.1	-0.39/-2.64	-1.39/-2.65	-2.29/-3.45	-4.05/-7.65	-7.60/-3.43	-2.55/-4.29	-8.82/-9.86	-10.43/-11.28	-7.62/-5.12	-9.92/-13.56	-8.41/-10.37	-7.30/-6.64
θ(105°)	-2.68/-1.76	-1.57/-2.23	-1.64/-1.26	-2.73/-2.11	-0.97/-1.93	-1.60/-1.55	-0.580/2.0	-0.24/-2.66	-2.69/-2.91	-2.63/-1.39	-0.330/5.9	0.970/4.2	-0.44/-1.57	-2.00/-3.04	-3.57/-4.57	-6.07/-8.00	-9.11/-7.47	-4.01/-7.06	-10.35/-8.47	-6.81/-7.70	-11.38/-9.92	-9.40/-13.18	-12.98/-8.97	-7.89/-6.89
θ(112.5°)	-2.76/-2.66	-2.20/-4.13	-4.56/-5.41	-3.83/-2.64	-2.44/-2.34	-1.86/-1.40	-0.57/-1.00	-2.12/-2.70	-4.79/-7.67	-5.22/-5.55	-3.69/-2.97	-2.14/-2.77	-3.47/-3.45											



Antenna Pattern of 6GHz

Appendix B

θ (112.5°)	-2.49/-0.23	-0.02/1.39	1.43/0.76	-0.93/0.30	-0.04/0.97	0.96/0.48	-0.23/-2.06	-3.00/-4.05	-7.69/-5.17	-2.32/-1.98	-2.86/-3.08	-3.06/-3.95	-6.69/-5.56	-5.31/-5.23	-11.76/-13.62	-11.05/-10.93	-5.40/-4.74	-2.49/-3.06	-9.59/-5.89	0.24/-0.14	-0.89/-1.40	-2.05/-0.55	-0.17/-3.62	-2.97/-3.35
θ (120°)	0.28/-0.63	0.84/0.86	1.20/0.83	-0.49/-0.06	0.24/1.00	1.58/0.43	-0.38/-1.39	-2.88/-5.93	-9.70/-7.68	-4.21/-3.86	-4.08/-6.38	-4.50/-4.99	-8.26/-10.17	-9.06/-6.10	-7.48/-8.15	-12.38/-9.61	-6.24/-9.03	-2.03/-7.56	-14.07/-10.22	-2.40/-2.50	-3.07/-5.05	-9.49/-1.81	-0.52/-3.07	-0.06/-1.60
θ (127.5°)	-0.13/-1.36	-0.64/-1.82	-1.13/-2.80	-2.89/-2.55	-1.53/-1.86	-1.62/-1.29	-2.73/-4.09	-5.05/-7.46	-10.88/-8.85	-5.12/-3.54	-4.21/-5.75	-7.70/-8.12	-7.60/-8.90	-9.60/-13.12	-11.05/-5.53	-11.96/-5.50	-6.28/-13.97	-3.59/-3.31	-9.65/-9.00	-1.79/-1.98	-2.65/-7.66	-7.48/-3.72	-1.43/-3.90	-0.37/-1.21
θ (135°)	-5.39/-4.91	-3.13/-3.24	-2.91/-2.90	-3.82/-4.72	-4.77/-3.89	-3.76/-4.16	-4.43/-4.99	-7.43/-10.32	-11.88/-9.26	-6.64/-4.63	-5.48/-5.23	-6.32/-6.93	-8.96/-11.40	-9.98/-8.56	-9.35/-9.90	-12.28/-7.36	-6.51/-7.63	-3.28/-4.60	-9.32/-12.19	-4.89/-5.09	-5.94/-6.86	-8.36/-8.03	-8.40/-11.26	-6.24/-5.64
θ (142.5°)	-7.40/-6.43	-5.03/-3.62	-3.32/-2.64	-2.40/-2.90	-4.02/-5.15	-6.70/-7.79	-8.26/-7.26	-6.86/-7.81	-10.43/-15.02	-15.49/-15.22	-15.28/-12.23	-10.70/-10.07	-11.07/-10.68	-9.78/-8.80	-6.66/-10.07	-11.17/-8.99	-14.60/-7.83	-6.50/-9.21	-13.30/-10.81	-10.00/-10.02	-8.38/-6.63	-6.54/-5.85	-7.36/-8.52	-9.17/-7.95
θ (150°)	-5.53/-4.68	-3.44/-1.50	-0.56/-0.72	-0.83/-0.79	-1.07/-1.69	-2.36/-2.63	-3.34/-4.22	-6.32/-8.73	-10.89/-12.69	-13.87/-15.42	-15.49/-14.74	-15.13/-15.29	-13.00/-10.02	-7.31/-6.90	-9.27/-12.37	-11.68/-12.62	-13.19/-10.77	-6.17/-4.91	-8.04/-12.80	-13.88/-9.69	-7.01/-6.05	-5.24/-3.64	-3.67/-5.90	-6.38/-5.62
θ (157.5°)	-2.11/-2.95	-3.52/-3.82	-4.04/-4.93	-6.28/-7.25	-7.49/-7.97	-7.47/-6.61	-6.14/-7.18	-8.62/-9.83	-9.33/-8.77	-8.21/-7.88	-8.37/-8.95	-8.42/-8.07	-7.92/-7.94	-7.01/-8.18	-12.16/-13.81	-11.36/-10.14	-10.29/-12.77	-13.95/-12.72	-11.73/-10.26	-10.40/-9.94	-8.66/-6.04	-4.12/-3.22	-2.82/-2.36	-1.95/-1.41
θ (165°)	-5.63/-6.19	-4.66/-6.19	-5.63/-5.64	-5.22/-4.77	-4.43/-4.57	-4.55/-5.04	-5.65/-5.89	-6.37/-7.26	-8.12/-9.09	-9.79/-10.19	-11.45/-13.02	-15.45/-15.87	-15.02/-15.47	-15.54/-13.11	-9.37/-6.85	-5.90/-7.31	-11.10/-16.06	-11.72/-9.55	-9.65/-11.29	-12.88/-12.94	-13.44/-12.12	-9.59/-8.54	-7.13/-5.88	-5.30/-5.04
θ (172.5°)	-13.50/-13.91	-13.53/-12.25	-11.01/-10.30	-9.36/-9.04	-8.58/-8.07	-7.18/-7.18	-6.77/-6.90	-6.98/-7.45	-8.36/-9.19	-10.27/-12.24	-13.31/-12.76	-11.16/-9.95	-9.39/-9.25	-9.38/-9.68	-10.02/-10.25	-12.07/-15.08	-15.45/-15.47	-15.84/-13.92	-13.54/-14.88	-15.08/-13.27	-13.26/-13.35	-12.17/-12.19	-12.06/-13.02	-13.34/-13.90
θ (180°)	-15.44/-14.98	-14.98/-14.29	-13.55/-14.69	-15.52/-15.45	-14.18/-14.49	-10.20/-9.42	-8.87/-8.81	-8.84/-9.52	-10.26/-11.51	-12.32/-13.21	-13.29/-14.20	-13.82/-14.01	-13.43/-13.67	-13.94/-14.13	-15.86/-15.46	-15.08/-15.02	-15.40/-15.30	-15.24/-14.40	-14.03/-13.57	-13.80/-14.13	-15.44/-15.74	-14.99/-15.98	-14.97/-15.29	-15.31/-14.76
Freq(Hz)	6.475GPol.	TotalAnt. 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°)	-11.24/-10.84	-10.79/-11.39	-11.13/-10.29	-9.85/-9.57	-9.59/-10.44	-10.76/-11.98	-11.77/-11.72	-11.15/-11.26	-10.76/-10.30	-10.22/-10.48	-10.97/-11.09	-10.66/-10.16	-10.23/-10.31	-9.84/-9.29	-9.03/-9.04	-9.48/-10.25	-10.30/-9.84	-9.65/-9.10	-9.00/-9.21	-9.10/-9.74	-10.20/-9.98	-10.33/-10.53	-10.52/-10.32	-10.05/-10.48
θ (7.5°)	-8.23/-7.98	-8.42/-8.70	-8.27/-8.53	-9.22/-8.85	-9.54/-9.71	-9.59/-9.11	-8.86/-9.18	-8.99/-9.29	-9.57/-9.25	-8.76/-8.96	-9.21/-9.13	-8.74/-8.71	-9.26/-8.99	-9.34/-9.38	-8.92/-9.26	-9.58/-9.87	-10.13/-10.01	-9.96/-9.56	-9.49/-9.65	-10.41/-11.59	-11.86/-11.66	-11.05/-10.65	-10.11/-9.37	-8.86/-9.45
θ (15°)	-5.46/-5.37	-5.45/-5.75	-5.49/-5.92	-6.39/-6.78	-6.94/-7.06	-7.14/-7.31	-7.75/-8.25	-9.06/-9.14	-8.24/-7.84	-6.99/-6.44	-6.40/-6.39	-6.12/-6.04	-5.89/-6.07	-6.61/-6.95	-7.57/-8.29	-8.92/-9.82	-10.12/-10.89	-12.46/-13.01	-13.95/-13.07	-11.71/-10.75	-9.16/-8.23	-7.15/-6.80	-5.42/-5.80	-4.04/-3.80
θ (22.5°)	-4.88/-4.60	-4.59/-4.22	-4.48/-4.75	-5.36/-5.69	-5.61/-5.72	-5.77/-6.09	-6.71/-6.21	-5.29/-5.14	-4.78/-4.53	-3.92/-3.36	-3.70/-4.09	-4.61/-5.14	-5.74/-6.27	-7.12/-8.57	-10.01/-10.64	-11.14/-11.60	-11.78/-10.51	-9.45/-9.21	-9.51/-9.25	-9.35/-9.23	-10.77/-12.84	-12.80/-10.67	-8.37/-6.98	-5.74/-5.14
θ (30°)	-3.34/-3.73	-3.51/-3.62	-3.70/-3.65	-3.54/-3.23	-3.11/-3.33	-3.21/-3.26	-3.54/-3.62	4.14/-4.45	-5.00/-5.95	-6.17/-5.60	-4.68/-3.81	-3.08/-3.33	-4.20/-5.24	-6.21/-7.49	-7.76/-8.40	-9.62/-11.22	-11.39/-12.97	-12.81/-9.77	-8.25/-7.47	-7.91/-7.70	-7.60/-8.77	-9.74/-8.64	-8.84/-5.47	-3.83/-3.00
θ (37.5°)	-3.64/-4.32	-3.49/-4.31	-3.36/-3.43	-3.36/-3.33	-2.42/-2.36	-2.37/-2.50	-3.31/-3.43	-4.73/-4.90	-7.73/-9.00	-8.24/-5.27	-3.75/-3.33	-3.40/-4.34	-6.40/-6.99	-7.42/-7.87	-8.58/-9.83	-10.20/-10.10	-10.30/-11.62	-12.07/-10.89	-8.84/-7.57	-6.57/-6.18	-7.12/-6.90	-10.91/-8.11	-5.45/-4.42	-4.04/-3.69
θ (45°)	-2.67/-2.56	-2.95/-2.98	-3.63/-3.65	-3.29/-2.65	-2.06/-1.76	-1.50/-1.12	-1.06/-0.99	-1.17/-1.98	-4.82/-6.68	-9.59/-6.32	-3.57/-2.35	-2.49/-3.32	-5.43/-5.88	-8.07/-10.46	-13.10/-11.55	-8.39/-8.72	-10.55/-10.85	-8.80/-8.26	-7.57/-4.71	-2.73/-2.73	-3.28/-5.63	-8.33/-7.41	-5.46/-3.94	-3.15/-2.98
θ (52.5°)	-3.31/-3.24	-2.95/-2.86	-2.96/-2.35	-2.86/-1.80	-1.61/-1.86	-1.74/-1.99	-1.81/-1.51	-1.94/-2.96	-5.08/-6.89	-4.17/-2.13	-0.99/-0.82	-1.48/-3.87	-8.41/-7.21	-8.43/-12.52	-10.14/-8.59	-7.97/-7.88	-9.75/-13.25	-13.51/-11.03	-7.55/-8.00	-7.80/-6.62	-5.11/-4.46	-4.57/-3.95	-4.53/-4.18	-3.63/-4.29
θ (60°)	-2.31/-1.81	-1.49/-2.16	-3.22/-3.93	-3.24/-2.60	-1.44/-0.48	-0.17/-0.04	-0.23/-0.00	-0.38/-1.76	-4.57/-6.65	-5.24/-2.17	-1.29/-1.33	-2.48/-1.19	-5.92/-7.85	-7.99/-12.36	-13.30/-11.46	-8.64/-9.30	-11.00/-12.75	-15.65/-10.69	-8.51/-7.47	-7.18/-6.27	-3.73/-3.23	-2.62/-1.29	-2.56/-3.76	-3.18/-3.34
θ (67.5°)	-2.76/-1.34	-1.49/-1.96	-2.57/-3.24	-1.72/-1.02	-0.02/0.54	0.60/0.17	-0.59/-1.38	2.06/-2.53	-3.14/-3.91	-3.95/-1.55	-1.95/-3.46	-4.16/-7.25	-9.40/-14.45	-12.15/-15.70	-14.00/-7.45	-5.48/-4.69	-7.12/-11.71	-13.72/-7.54	-4.71/-4.86	-4.71/-3.26	-2.47/-1.52	-1.52/-1.21	-2.28/-3.27	-3.51/-2.87
θ (75°)	-0.79/0.16	0.41/0.35	-0.57/-1.21	0.09/0.20	1.19/0.89	0.87/1.01	0.54/1.10	-1.23/-3.05	-4.59/-6.18	-4.36/-1.38	-0.56/-2.04	-3.16/-5.67	-6.75/-12.86	-13.02/-12.44	-13.30/-9.46	-6.02/-3.89	-7.09/-9.62	-10.02/-6.49	-4.69/-4.37	-3.94/-2.07	-1.17/-0.64	-1.60/-1.23	-1.85/-5.79	-4.03/-2.86
θ (82.5°)	0.44/1.30	1.41/0.94	-0.45/-1.66	0.04/0.67	0.93/0.42	1.29/1.34	0.05/1.01	-1.52/-4.56	-6.22/-5.43	-2.05/-1.02	-0.77/-2.10	-2.56/-3.75	-5.43/-9.99	-6.71/-6.83	-9.74/-8.39	-6.73/-3.29	-4.79/-7.87	-5.48/-3.55	-3.57/-2.90	-1.10/0.27	1.19/0.27	-1.42/-1.23	-0.71/-2.97	-2.21/-1.56
θ (90°)	1.62/1.38	2.38/1.11	0.16/-0.83	0.34/0.32	1.44/0.60	2.85/2.28	1.34/0.01	-1.30/-3.59	-2.97/-3.78	-2.38/-0.75	-0.48/-1.88	-4.13/-3.01	-3.26/-6.45	-5.52/-6.91	-10.52/-9.85	-5.04/-3.40	-4.21/-3.89	4.56/-5.74	-4.29/-3.53	-1.13/0.24	1.51/1.24	-1.47/-1.23	-0.65/-2.70	-1.95/-1.63
θ (97.5°)	1.51/0.53	2.52/1.16	1.13/0.06	1.54/1.44	2.33/0.71	2.75/1.75	0.70/0.67	-0.96/-3.16	-4.44/-7.75	-4.09/-3.29	-4.82/-4.73	-3.65/-4.59	-7.19/-13.13	-7.66/-8.02	-10.80/-9.78	-6.33/-7.25	-8.78/-3.61	-7.48/-5.94	-4.83/-4.24	-1.30/-1.17	1.29/1.35	-2.93/-1.37	-0.66/-1.58	-2.06/-0.41
θ (105°)	1.44/1.45	2.33/1.02	0.22/-1.51	-0.37/-1.18	1.09/0.91	1.33/1.44	0.10/0.88	-0.18/-1.75	-2.57/-4.85	-0.44/-2.02	-2.59/-4.48	-3.81/-3.53	-4.57/-9.82	-6.96/-7.07	-10.67/-15.91	-8.89/-10.46	-11.71/-3.65	-6.88/-5.04	-4.68/-4.24	-4.52/2.86	-1.34/-2.48	-5.49/-2.38	-1.38/-2.00	-0.73/-0.36
θ (112.5°)	0.48/1.80	1.32/1.58	0.85/-0.36	-0.23/-0.26	-0.80/-0.26	-1.11/-0.43	-1.56/-1.59	-2.16/-2.22	-1.98/-3.14	-5.11/-3.35	-5.62/-6.53	-5.91/-6.01	-8.25/-8.26	-5.78/-8.31	-12.35/-14.25	-9.77/-13.69	-7.85/-7.52	-6.17/-2.65	-7.19/-7.11	-1.22/-0.87	-1.91/-2.84	-3.62/-4.02	-0.91/-2.17	-1.67/-0.20
θ (120°)	0.25/0.82	0.16/1.56	0.56/0.80	0.66/1.16	1.06/1.32	0.68/-0.21	-0.50/-1.83	-2.82/-1.87	-3.21/-1.11	-9.01/-6.46	-7.59/-7.37	-4.21/-5.13	-6.89/-12.60	-6.27/-6.50	-7.14/-13.04	-6.59/-11.91	-7.62/-10.35	-3.67/-4.96	-11.37/-12.47	-3.19/-3.09	-3.58/-8.37	-0.36/-0.83	-0.94/-1.87	0.33/0.31
θ (127.5°)	0.56/-0.28	-0.12/-0.69	-1.30/-1.48	-2.14/-1.70	-2.07/-1.84	-1.38/-1.71	-2.80/-2.59	-1.91/-3.28	-6.20/-6.08	-10.05/-9.90	-5.55/-6.36	-8.10/-7.30	-9.97/-13.02	-11.98/-15.21	-15.55/-3.24	-14.01/-5.68	-4.69/-14.86	-4.71/-3.58	-9.24/-14.26	-5.99/-5.50	-5.73/-8.72	-7.78/-3.98	-4.39/-3.14	-0.92/-1.12
θ (135°)	-3.66/-2.73	-1.51/-2.43	-2.34/-3.85	-4.17/-5.02	-4.58/-4.58	-4.77/-5.48	-4.11/-4.04	-3.98/-6.56	-9.47/-10.61	-9.40/-7.57	-10.50/-5.55	-7.23/-11.42	-7.93/-9.90	-11.10/-11.13	-14.99/-6.79	-8.14/-10.66	-6.75/-3.89	-8.62/-11.17	-7.52/-7.83	-5.95/-9.72	-9.12/-7.57	-8.97/-9.72	-7.35/-6.46	
θ (142.5°)	-6.86/-5.01	-3.98/-3.53	-3.21/-2.52	-2.42/-2.05	-1.89/-1.96	-2.30/-3.38	-4.93/-4.65	-3.90/-3.48	-5.32/-6.41	-7.36/-8.14	-10.00/-12.58	-14.86/-13.48	-10.77/-10.90	-6.49/-6.25	-6.48/-8.57	-10.46/-8.57	-14.91/-11.51	-12.10/-12.72	-12.10/-9.49	-10.99/-10.32	-9.89/-9.27	-10.11/-10.49	-9.17/-8.96	-7.12/-6.99
θ (150°)	-4.22/-3.70	-2.82/-2.39	-2.29/-1.97	-1.48/-1.42	-1.75/-1.60	-1.85/-2.57	-4.04/-5.94	-7.15/-7.73	-9.56/-11.36	-11.75/-10.46	-8.97/-8.52	-9.60/-14.37	-16.12/-13.77	-8.99/-6.81	-8.61/-12.31	-10.71/-13.11	-15.11/-14.47	-7.06/-6.74	-11.41/-12.68	-13.62/-14.28	-12.85/-11.91	-8.80/-6.75	-6.57/-6.39	-5.19/-4.25
θ (157.5°)	-2.34/-3.38	-4.24/-4.65	-5.22/-4.96	-4.39/-3.81	-3.92/-3.86	-3.97/-4.06	-4.15/-4.68	-5.45/-5.81	-4.94/-4.07	-3.91/-4.35	-5.19/-5.97	-6.99/-9.30	-5.21/-6.09	-5.99/-6.52	-10.10/-14.35	-13.92/-13.18	-15.43/-15.43	-12.45/-9.96	-11.33/-14.28	-15.05/-12.23	-7.42/-4.64	-3.19/-2.12	-1.90/-1.73	-1.18/-1.30
θ (1																								

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

