



Antenna Composite Gain Test Report

Equipment	4x4 Dual-band Outdoor Access Point
Brand Name	ALTA LABS 
Model Name	AP6-Pro-Outdoor
Applicant	SoundVision Technologies, dba Alta Labs 192 N Old Hwy 91, Unit 1 Hurricane,Utah,United States 84737
Manufacturer	SoundVision Technologies, dba Alta Labs 192 N Old Hwy 91, Unit 1 Hurricane,Utah,United States 84737
Standard	KDB 662911 D03 v01
Sample Received	Apr. 03, 2024
Start Test Date	Apr. 10, 2024
Final Test Date	Apr. 26, 2024


Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

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



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1. Operation Mode and Antenna Information

Antenna Position	RF Port	Brand Name	Model Name	Ant. Type	Connector	Modes of Operation
5GAnt3	1	LITEON	3010001490GD	PIFA	I-Pex	Radio 2_5G
2G5GAnt1	2	LITEON	3010001491GD	PIFA	I-Pex	Radio 1_2.4G Radio 2_5G
2G5GAnt2	3	LITEON	3010001492GD	PIFA	I-Pex	Radio 1_2.4G Radio 2_5G
5GAnt4	4	LITEON	3010001493GD	PIFA	I-Pex	Radio 2_5G

Note:

For 2.4GHz function:

For IEEE 802.11 b/g/n/VHT/ax mode (2TX/2RX)

2G5GAnt1, 2G5GAnt2 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11 a/n/ac/ax mode (4TX/4RX)

2G5GAnt1, 2G5GAnt2, 5GAnt3, 5GAnt4 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				
☒ 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	Rofy Chen / Rex	23.5~24.5°C / 50~55%	10/Apr/2024~26/Apr/2024

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

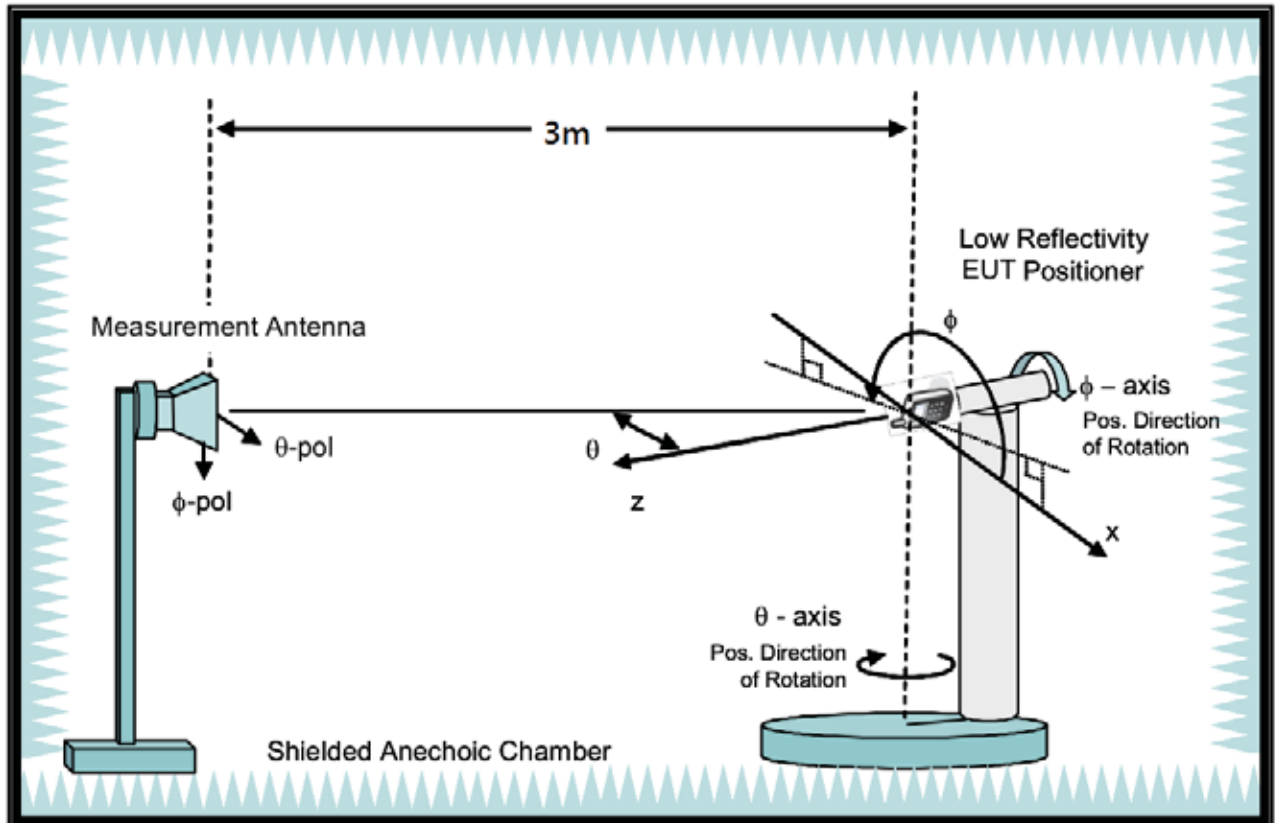
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

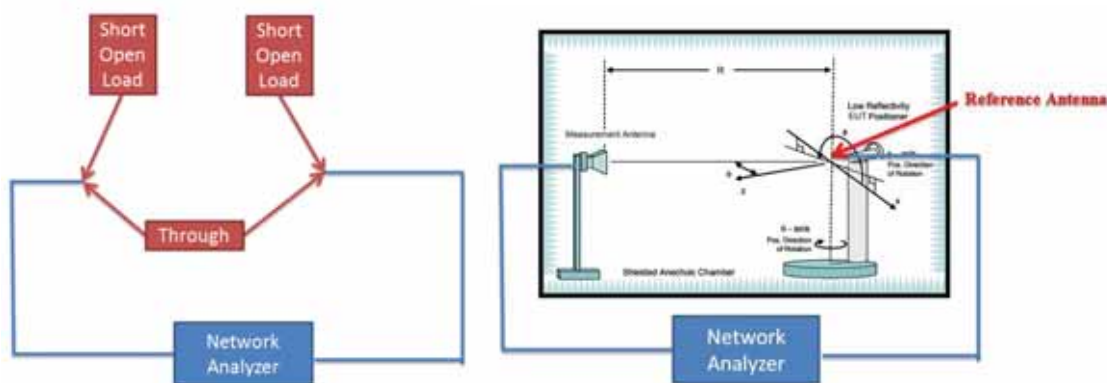
#Reference to CTIA "ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1"



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:

$$G \text{ reading (dB)} = 20 \cdot \log(V_2/V_1) = 10 \cdot \log(P_2/P_1)$$

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)	-4.34	1.07	1.04	-0.42	0.03
Ant. 2 (dBi)	2.97	0.08	-0.68	-0.17	-2.26
Ant. 3 (dBi)	-	-1.29	0.55	-1.97	-0.22
Ant. 4 (dBi)	-	-2.17	-1.82	1.8	0.9
DG [1SS] (dBi)	3.07	5.53	5.86	5.93	5.71
Polarization	Phi	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	157.5	67.5	67.5	82.5	82.5
$\Phi(^{\circ})$	187.5	90	90	82.5	82.5

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)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 [$10^{(G/20)}$]	$10^{(-4.34/20)}$	$10^{(1.07/20)}$	$10^{(1.04/20)}$	$10^{(-0.42/20)}$	$10^{(0.03/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(2.97/20)}$	$10^{(0.08/20)}$	$10^{(-0.68/20)}$	$10^{(-0.17/20)}$	$10^{(-2.26/20)}$
Ant. 3 [$10^{(G/20)}$]	-	$10^{(-1.29/20)}$	$10^{(0.55/20)}$	$10^{(-1.97/20)}$	$10^{(-0.22/20)}$
Ant. 4 [$10^{(G/20)}$]	-	$10^{(-2.17/20)}$	$10^{(-1.82/20)}$	$10^{(1.8/20)}$	$10^{(0.9/20)}$
Ant. 1 [$10^{(G/20)}$] value	0.607	1.131	1.127	0.953	1.003
Ant. 2 [$10^{(G/20)}$] value	1.408	1.009	0.925	0.981	0.771
Ant. 3 [$10^{(G/20)}$] value	-	0.862	1.065	0.797	0.975
Ant. 4 [$10^{(G/20)}$] value	-	0.779	0.811	1.23	1.109
Sum All Antenna [Amax]	2.014	3.781	3.928	3.961	3.859
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	3.07	5.53	5.86	5.93	5.71

Note:

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

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

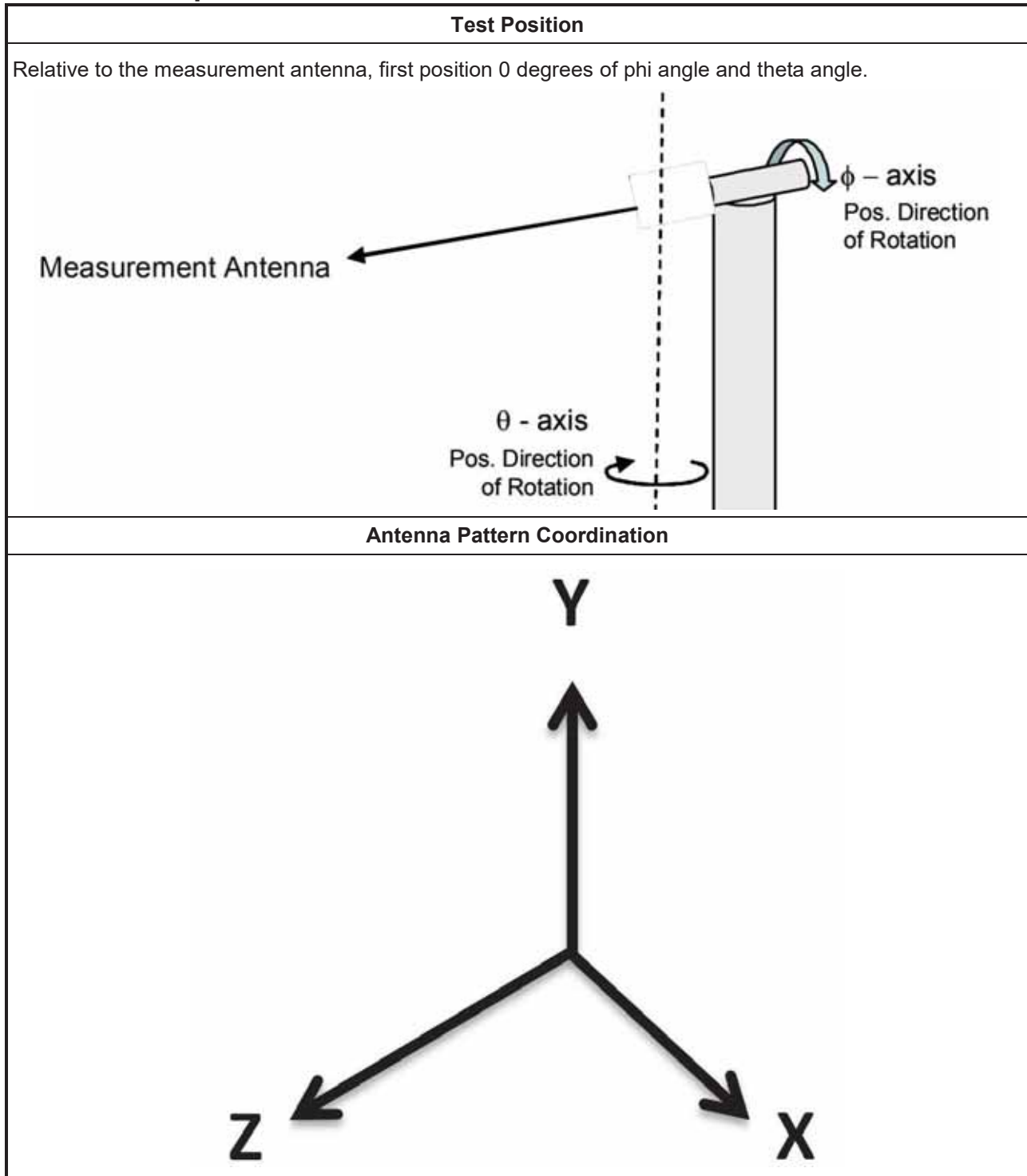
**8. Summary of Test Result**

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.05	3.16	2.05	2.84	3.46
Ant. 2 Max Gain (dBi)	2.97	3.28	2.67	2.66	2.31
Ant. 3 Max Gain (dBi)	-	4.1	3.49	2.55	2.69
Ant. 4 Max Gain (dBi)	-	2.03	3.31	4.04	4.22
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/97.5/112.5	Theta/60/82.5	Theta/67.5/75	Theta/45/105	Theta/37.5/105
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/157.5/187.5	Theta/75/337.5	Theta/75/337.5	Theta/82.5/337.5	Theta/82.5/337.5
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	-	Phi/22.5/307.5	Phi/22.5/300	Phi/30/300	Theta/90/105
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	-	Theta/75/277.5	Theta/75/277.5	Theta/75/247.5	Theta/75/285
Max Gain (dBi)	2.97	4.1	3.49	4.04	4.22
DG [1SS] (dBi)	3.07	5.53	5.86	5.93	5.71
DG [2SS] (dBi)	2.97	4.1	3.49	4.04	4.22
DG [4SS] (dBi)	-	4.1	3.49	4.04	4.22

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	NCR	NCR
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	NCR	NCR
Multi-axis positioner	Sporton	MAPS01	MAPS01-001	Theta / Phi axis	NCR	NCR
Test Software	SPORTON	SENSE-RDG	V1.0.8	-	NCR.	NCR

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

NCR means Non-Calibration required.



11. Test Results

Please refer to the appendix.

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————THE END————



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.05	3.16	2.05	2.84	3.46
Ant. 2 Max Gain (dBi)	2.97	3.28	2.67	2.66	2.31
Ant. 3 Max Gain (dBi)		4.1	3.49	2.55	2.69
Ant. 4 Max Gain (dBi)		2.03	3.31	4.04	4.22
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/97.5/112.5	Theta/60/82.5	Theta/67.5/75	Theta/45/105	Theta/37.5/105
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Phi/157.5/187.5	Theta/75/337.5	Theta/75/337.5	Theta/82.5/337.5	Theta/82.5/337.5
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$		Phi/22.5/307.5	Phi/22.5/300	Phi/30/300	Theta/90/105
Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$		Theta/75/277.5	Theta/75/277.5	Theta/75/247.5	Theta/75/285
Max Gain (dBi)	2.97	4.1	3.49	4.04	4.22
DG [1SS] (dBi)	3.07	5.53	5.86	5.93	5.71
DG [2SS] (dBi)	2.97	4.1	3.49	4.04	4.22
DG [4SS] (dBi)		4.1	3.49	4.04	4.22



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

(H25)	1.580.14	-1.091.21	-0.660.06	0.210.06	0.310.22	0.040.14	-0.430.79	-0.440.34	1.111.31	1.170.79	0.40.32	0.480.25	0.440.75	0.680.01	-0.570.83	-0.690.07	-1.320.28	-1.961.1	0.090.93	1.622.28	2.740.15	3.63.95	43.71	3.992.6
(H26)	2.381.13	-0.120.68	-0.150.13	0.720.76	0.810.92	-0.590.85	-1.610.173	-0.850.2	0.891.13	1.381.58	1.510.14	1.291.58	1.980.31	1.940.55	-0.730.44	0.270.21	-0.541.12	-1.210.73	-0.090.43	1.152.15	3.330.23	4.491.33	4.190.89	3.743.18
(H27)	2.774.45	-0.411.24	-0.202.258	-0.361.34	-0.591.19	-2.310.79	-2.171.39	-0.850.44	-0.410.28	0.932.19	2.82.32	1.772.32	2.722.35	1.490.03	-1.290.42	0.090.02	-1.270.185	-2.720.284	-2.060.96	0.301.9	2.801.36	2.882.23	1.351.15	0.660.75
(H28)	2.620.31	-2.681.48	-1.630.27	-3.190.35	-3.261.18	-2.271.85	-1.671.109	0.040.12	-0.271.11	0.641.86	2.532.52	2.312.57	2.992.76	1.680.07	-1.491.31	-0.690.12	0.530.48	0.951.11	-1.081.01	0.051.07	1.991.68	1.110.37	0.7610.93	-0.650.46
(H29)	-0.960.31	-1.440.62	-0.611.23	-3.360.72	-2.591.84	-0.540.19	0.751.11	0.050.04	0.481.35	0.491.81	2.462.8	2.791.92	1.520.98	-1.591.97	-3.380.39	-2.001.83	-0.190.85	-2.010.283	-2.510.36	-0.441.01	0.710.93	0.230.34	-1.4810.29	-2.621.97
(H30)	0.241.09	0.010.17	0.440.63	0.930.33	-1.120.21	-1.140.13	-1.231.96	0.030.77	0.330.55	-1.060.07	0.791.49	2.321.62	1.121.09	0.331.15	-2.641.44	-1.661.27	-0.010.94	-1.051.68	-3.171.13	0.821.88	3.751.437	2.431.251	4.731.597	4.590.32
(H31)	-0.610.81	-0.301.13	0.150.183	4.430.583	-0.303.13	-0.480.46	-2.291.351	-1.110.34	-1.412.1	-1.891.06	-0.340.41	1.231.07	-1.131.147	-0.3131	-3.7810.24	-1.651.93	-0.450.184	0.021.124	-2.891.05	-0.6310.24	-4.391.429	-2.281.19	-1.461.345	-1.711.82
(H32)	2.390.96	-1.671.287	-0.671.68	-4.81.6	2.831.54	2.110.22	-1.890.253	-1.591.1	2.081.28	-3.981.57	-2.591.74	-0.311.01	-1.721.75	-0.391.53	-4.441.14	-2.491.16	-0.571.43	-1.010.89	-3.530.27	-0.591.32	-1.410.58	-2.931.17	-2.991.332	-1.261.67
(H33)	2.127.227	-3.350.49	2.871.26	4.541.73	4.691.52	2.28.2	-1.791.206	-2.091.232	4.791.26	-5.491.23	-4.681.92	2.541.97	3.141.28	4.561.77	5.551.76	3.141.28	2.751.464	0.711.75	3.321.63	2.891.47	4.31.13	3.931.2	4.151.32	3.771.68
(H34)	3.294.19	4.610.68	4.220.67	4.820.62	3.940.23	3.141.271	-2.591.235	3.390.334	5.971.61	7.964.43	6.217.46	5.21.331	3.223.43	6.114.39	-7.750.95	-6.891.434	-5.931.737	-2.891.1	-2.881.91	-4.841.919	-6.991.516	-4.513.79	-5.991.939	-4.791.14
(H35)	4.530.651	3.350.73	3.330.73	3.751.47	4.731.39	2.391.28	3.7710.36	4.291.371	4.411.74	6.691.91	6.9710.37	6.681.4	4.761.51	7.751.95	8.174.58	8.251.73	7.961.571	4.691.516	3.251.34	7.791.97	6.271.437	5.415.19	6.731.414	-1.691.19
(H36)	4.991.630	4.141.32	5.020.23	5.641.65	4.971.23	3.941.3	4.011.72	4.221.49	8.11.75	-0.911.702	-0.891.69	7.951.734	4.791.473	6.611.83	-0.561.123	-1.061.65	-1.061.65	6.171.49	5.331.79	-1.011.943	-7.701.447	-6.991.625	1.161.365	3.311.931
(H37)	4.941.59	5.091.76	6.710.96	5.01.4	4.511.37	3.991.48	4.071.654	4.071.654	8.331.23	-1.011.771	7.911.44	6.611.97	4.810.52	6.691.974	8.461.93	9.137	7.291.64	8.251.69	4.467.74	7.981.75	7.21.47	7.771.74	6.961.16	3.981.32
(H38)	4.521.457	5.831.93	8.020.496	5.81.27	5.641.61	-4.741.28	7.291.45	8.961.63	6.461.35	8.951.62	8.911.74	7.141.27	7.940.49	4.231.61	7.111.01	7.940.49	8.320.45	9.111.46	4.121.703	7.330.49	4.051.419	5.721.429	6.141.63	4.051.41
(H39)	4.511.687	-8.197.83	-8.191.46	6.520.43	3.420.53	-5.961.75	-4.821.75	-7.231.44	5.941.57	-7.394.33	-7.369.21	6.751.74	3.081.27	2.521.64	-11.520.94	8.571.88	-7.791.489	8.961.527	-4.871.74	-5.941.6	8.961.522	-2.751.62	5.681.681	8.911.23
(H40)	4.251.618	-8.271.44	4.251.61	8.851.555	0.031.15	-1.915.43	-7.591.437	-7.791.48	7.891.78	8.341.88	-5.961.05	5.920.534	5.921.299	3.321.52	-6.321.54	4.781.43	8.651.727	4.661.728	6.661.783	8.421.35	7.851.34	6.771.538	6.221.1138	6.161.926
(H41)	4.617.38	-8.147.46	6.691.76	-7.281.61	5.691.05	-7.251.13	-10.791.143	-7.971.59	-5.871.65	4.651.82	6.51.15	-5.991.52	3.91.427	-4.821.938	8.281.41	-7.121.812	-7.861.74	6.891.905	-7.371.44	4.851.4	4.231.513	8.131.14	4.861.759	7.761.914
(H42)	7.031.739	7.491.708	6.631.477	4.521.688	4.051.77	-8.161.27	-8.161.27	-11.101.1	-8.571.84	4.610.93	4.610.93	-6.601.576	4.161.14	4.271.54	-11.261.125	8.511.426	4.601.67	4.341.785	8.681.936	-7.471.62	7.871.35	5.911.65	7.911.64	-7.911.64
(H43)	-11.141.73	-6.821.66	-5.31.42	4.451.04	4.141.85	-7.891.79	-7.891.84	4.919.27	-10.091.74	-5.961.97	6.191.658	-7.391.49	-7.221.26	-8.931.49	6.511.433	-4.711.63	4.691.784	4.671.814	-12.151.112	-8.931.62	8.081.79	6.831.68	-11.771.614	-7.911.614
(H44)	-10.291.78	-7.171.55	-7.481.87	4.281.85	-10.291.85	-8.961.9	-10.31.124	-12.051.185	-10.91.11	-10.211.95	6.991.97	-10.31.95	-10.31.95	6.131.69	4.991.78	4.991.85	6.671.04	-10.481.119	-10.711.08	-10.711.08	9.961.927	8.911.68	9.961.927	8.911.68
(H45)	-0.810.16	-0.691.28	-0.610.61	4.581.82	6.911.029	-6.951.99	-6.91.102	-10.931.104	-11.361.114	-10.721.057	-11.091.173	-11.961.105	-8.841.63	-7.781.82	-7.811.838	-8.441.83	8.121.847	8.141.16	9.412.96	8.811.44	8.431.15	7.761.717	4.631.74	-8.561.74
(H46)	-8.461.753	-6.931.74	-8.431.919	6.911.938	6.911.938	6.911.938	-10.121.93	-10.121.93	-10.121.93	-11.511.104	-10.211.92	-11.511.104	-10.211.92	-8.411.86	-8.11.86	-7.921.85	-7.921.85	-8.881.85	4.651.937	-10.031.926	9.791.937	9.151.932	8.911.932	8.561.937
Freq(Hz)	3.530.94	Theta																						
Phi(deg)	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57	0.011.907.57
Theta(deg)	1.881.236	-1.861.31	4.891.023	0.571.03	1.091.04	1.21.35	1.630.77	0.601.67	0.651.67	-1.131.35	-1.711.73	-1.141.128	1.341.158	1.521.14	-1.261.76	0.250.08	0.230.28	0.121.63	4.310.39	-0.851.117	-1.261.131	-1.511.191	3.261.17	-1.581.158
(H1)	1.751.121	-1.081.19	-1.361.12	0.691.27	0.640.08	0.651.09	0.461.17	0.591.21	0.521.16	-2.511.76	-1.091.158	-1.161.17	1.971.178	1.911.16	0.320.58	1.402.114	2.011.291	2.991.13	3.991.62	4.671.198	4.671.198	4.671.198	4.671.198	4.671.198
(H2)	2.261.161	-0.951.37	0.161.32	0.771.148	1.591.3	0.920.49	0.261.29	0.871.142	1.871.233	3.821.181	-1.891.134	-1.861.11	1.531.136	1.01.35	0.281.12	3.781.19	3.691.15	3.641.17	3.851.56	3.971.19	1.410.39	0.791.14	0.211.4	2.721.54
(H3)	4.021.337	-2.961.49	0.771.86	2.411.08	3.221.16	1.981.72	0.540.52	0.261.421	0.861.141	-1.911.77	-1.531.15	-1.971.29	-1.101.67	0.291.67	0.740.9	1.411.96	2.591.62	2.951.19	3.331.25	2.721.07	1.401.62	1.520.91	4.611.16	-2.961.91
(H4)	2.031.113	0.171.37	0.691.29	1.941.76	0.931.21	0.291.01	0.571.07	0.271.04	0.891.98	0.651.97	0.271.04	-11.06	0.641.16	1.841.92	1.741.96	1.411.96	1.742.92	1.742.92	1.742.92	1.742.92	1.742.92	1.742.92	1.742.92	1.742.92
(H5)	3.331.135	0.911.14	1.191.14	0.981.44	0.911.76	2.51.19	3.312.83	2.961.58	3.921.64	-1.421.03	-0.140.76	0.921.06	0.581.95	0.171.08	0.261.32	0.791.115	-3.321.929	0.840.72	1.291.25	0.981.19	0.061.35	0.341.2	1.261.38	-0.411.94
(H6)	0.380.38	1.931.19	1.511.57	1.581.69	3.551.75	4.781.16	4.571.61	3.971.51	8.351.32	-1.51.04	0.921.68	1.351.24	0.691.51	1.261.12	1.701.88	-0.681.08	0.211.12	0.931.86	0.641.07	0.511.075	0.451.02	0.891.031	0.281.78	0.281.78
(H7)	0.741.013	-1.610.35	0.010.42	1.031.77	2.751.22	3.951.58	5.331.46	4.481.58	1.071.83	-1.611.37	2.142.4	0.281.142	0.611.35	1.762.08	1.371.56	2.071.49	0.171.01	1.232.09	2.21.18	1.241.122	-1.721.075	0.181.47	0.181.47	1.251.14
(H8)	0.160.41	-2.981.34	-1.791.07	0.211.07	4.711.58	5.781.38	3.892.35	0.471.03	0.641.36	1.201.41	0.691.97	0.911.09	0.891.91	1.108.05	0.511.73	2.211.148	0.191.65	1.521.41	2.941.41	2.921.24	-0.091.152	-1.331.15	0.332.17	1.991.17
(H9)	1.591.053	-3.591.43	-2.811.16	-6.761.04	1.471.16	0.595.63	5.965.34	3.761.35	0.840.97	0.331.44	1.621.37	0.891.14	1.108.05	0.511.73	2.211.148	0.191.65	1.521.41	2.941.41	2.921.24	-0.091.152	-1.331.15	0.332.17	1.991.17	1.991.17
(H10)	1.161.01	-3.091.36	-3.371.07	4.361.16	2.401.84	5.041.78	5.781.16	3.241.14	0.691.97	-0.351.02	1.711.17	0.511.22	-0.261.05	1.261.134	0.611.11	1.671.121	2.461.37	2.671.6	3.131.75	1.751.12	0.731.042	-1.270.94	2.341.05	2.341.05
(H11)	1.471.018	-2.571.14	-1.741.77	-0.511.16	2.011.57	4.851.73	5.721.97	2.811.32	0.061.76	-0.551.32	0.761.05	0.111.03	1.091.62	0.461.25	1.4	2.462.37	3.714.46	3.621.77	2.912.16	-0.551.011	-0.131.145	-1.131.07	2.412.99	2.281.51
(H12)	0.111.01	-2.251.94	-1.61.07	-1.131.102	0.941.96	3.881.49	4.481.18	2.611.29	0.921.17	0.241.09	0.561.35	0.291.147	3.171.33	3.312.04	2.261.69	1.141.15	-1.511.29	0.451.155	1.891.64	1.891.64	1.891.64	1.891.64	1.891.64	1.891.64
(H13)	-1.561.141	-3.271.72	-1.271.169	-3.110.52	0.571.2	2.082.43	2.061.74	0.461.429	2.981.17	-1.411.91	0.130.57	0.021.162	0.511.72	-1.691.25	-1.611.									



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

φ(θ)5°	-0.480.41	0.71.61	0.87-1.38	-2.271.3.38	-1.84-2.38	-2.411.1.12	-0.68-1.73	-2.48-2.28	-2.421.2.63	-1.821.2.51	-0.730.58	0.60.63	0.641.72	-0.991.27	-4.691.22	-2.971.46	-1.110.07	-2.021.2.97	-2.431.3.24	-0.981.2	-3.99-2.87	-1.781.2.51	-6.181.4.98	-2.191.17.17
φ(10°)	-2.161.0.3	-0.220.48	0.341.14	-1.811.3.57	0.081.1.73	-2.731.2.32	-0.691.8.82	-2.612.12	-3.161.4.57	-3.151.4.85	-3.061.8.83	-0.810.26	-0.221.0.79	-2.891.7.3	-6.261.1.87	-2.541.1.3	-1.161.0.26	-1.661.3.84	-2.571.3.25	-0.871.0.99	-3.912.81	-2.061.3.01	-4.661.4.3	-2.371.1.35
φ(82°)	-3.321.1.88	-1.631.0.83	-0.531.1.64	-1.621.4.37	-4.141.2.26	-5.121.3.69	-1.151.4.98	-2.971.3.8	-4.551.0.89	-5.771.7.77	-4.881.2.15	-1.731.1.56	-2.041.1.87	-2.611.4.48	-6.941.3.36	-5.021.2.81	-0.831.0.03	-1.712.96	-2.631.2.9	-0.931.1.3	-2.571.3.91	-3.171.3.66	-5.211.4.14	-2.671.1.98
φ(80°)	-2.612.7.8	-3.061.1.97	-1.761.2.89	-2.851.6.97	-7.713.1.33	-6.021.0.43	-0.751.5.37	-3.481.5.52	-6.611.1.54	-8.111.9.41	-6.631.4.39	-3.531.2.38	-3.061.3.13	-4.321.3.56	-9.331.4.25	-8.111.4.44	-2.811.2.6	-3.581.4.45	-4.531.3.18	-2.681.2.83	-3.591.5.2	-2.913.39	-6.691.4.1	-2.861.1.95
φ(87°)	-4.215.4.8	-6.491.4.44	-3.511.4.4	-3.111.6.98	-7.821.4.81	-5.281.4.74	-0.951.6.47	-3.381.5.58	-10.041.12.34	-10.191.12.34	-11.161.6.36	-5.111.4.09	-3.541.3.63	-4.881.8.11	-11.241.7.9	-10.871.6.79	-4.961.5.5	-5.721.4.14	-4.111.4.72	-5.981.5.5	-5.141.5.29	-3.391.6.68	-4.831.4.04	-3.041.1.77
φ(118°)	-4.451.5.31	-5.721.4.55	-5.431.6.68	-4.841.6.06	-6.715.0.5	-4.411.4.13	-1.391.6.83	-5.141.6.8	-8.681.11.26	-10.191.10.21	-10.781.8.65	-6.161.4.87	-4.971.5.76	-7.141.7.11	-10.511.10.28	-11.381.7.14	-6.061.5.96	-8.511.4.24	-8.151.6.93	-8.51.8.58	-5.741.4.52	-8.061.10.5	-9.71.5	-2.981.2.57
φ(112°)	-3.613.4.9	-3.941.43	-5.591.6.42	-5.721.6.43	-4.881.6.93	-4.481.5.07	-4.121.7.89	-7.261.7.3	-6.711.10.82	-6.151.9.03	-6.281.7.93	-7.141.6.76	-5.881.4.86	-7.211.9.41	-10.491.7.02	-10.021.5.31	-6.571.6.29	-9.481.7.21	-10.241.5.37	-6.161.8.03	-4.961.5.8	-7.91.7.78	-5.991.4.36	-4.021.4.45
φ(120°)	-3.041.5.01	-8.11.63	-6.361.6.8	-5.711.7.23	-6.281.7.08	-4.641.5.02	-6.591.6.67	-7.591.6.54	-6.491.8.58	-6.361.9.57	-7.671.7.25	-7.21.5.35	-4.911.6.32	-4.781.4	-7.121.6.45	-6.611.6.66	-9.231.8.03	-8.481.6.8	-5.841.6.73	-7.451.10.87	-7.021.4.72	-5.571.5.25	-4.531.5.5	-3.251.2.58
φ(127°)	-2.771.5.51	-6.441.5.92	-5.351.6.91	-6.571.4.5	-6.731.7.83	-5.061.4.49	-8.71.8.2	-5.021.5.46	-5.821.7.11	-7.661.6.45	-4.81.4.93	-5.861.3.62	-4.541.3.96	-4.281.5.05	-7.481.6.73	-6.641.4	-11.291.9.12	-5.551.5.67	-3.471.7.79	-7.621.6.53	-8.581.5.57	-5.731.7.61	-7.631.5.94	-4.481.3.95
φ(130°)	-5.451.5.99	-5.951.5.54	-5.861.7	-6.011.6.25	-7.621.7.84	-7.071.7.41	-6.861.6.48	-4.911.6.35	-6.011.7.96	-6.831.7.83	-6.521.5.76	-3.841.4.09	-4.391.4.09	-3.481.4.45	-5.651.4.81	-4.461.7.84	-6.051.7.08	-5.031.6.67	-6.311.6.23	-9.411.7.22	-6.651.7.81	-4.111.5.58	-4.961.6.21	-7.751.7.24
φ(142°)	-3.481.4.26	-5.521.5.26	-8.101.6.65	-7.381.6.5	-8.981.8.83	-7.591.6.75	-8.601.7.16	-7.331.6.86	-4.421.7.66	-6.261.6.86	-5.921.5.14	-6.281.7	-5.581.5.21	-4.851.6.94	-8.151.9.71	-6.271.4.87	-5.481.9.1	-6.691.9.32	-4.91.8.89	-71.7	-6.71.6.36	-10.261.6.14	-3.751.5.23	-6.541.5.87
φ(100°)	-7.41.6.16	-6.381.6.87	-6.871.8.68	-7.81.7.43	-8.271.10.37	-9.881.7.19	-7.881.7.98	-7.531.6.81	-5.961.6.76	-5.11.5.41	-5.971.5.24	-3.431.3.48	-4.181.4.15	-4.131.32	-6.261.10.52	-11.981.9.65	-8.11.8.82	-6.961.8.86	-8.811.7.91	-7.381.6.31	-9.121.4.55	-3.711.3.63	-61.24	-61.24
φ(157°)	-7.371.7.82	-8.271.8.55	-8.991.9.14	-8.971.7.99	-6.991.6.12	-7.691.11.1	-12.451.10.58	-10.991.9.04	-7.61.6.9	-5.761.6.45	-5.221.4.36	-3.112.37	-2.671.4.13	-0.951.6.78	-6.941.6.25	-11.141.8.36	-4.681.6.26	-5.471.6.98	-5.511.9.12	-8.971.7.93	-8.121.6.94	-7.381.6.07	-4.81.5.25	-5.611.6.75
φ(165°)	-8.911.6.32	-10.431.10.14	-10.191.10.48	-8.581.6.25	-7.661.7.15	-7.341.65	-9.291.9.44	-8.471.9.35	-9.371.9.16	-8.721.8.49	-8.531.8.1	-7.681.7.01	-6.761.7.5	-6.311.4.48	-3.851.4.68	-4.451.7.84	-8.891.9.95	-10.541.11.61	-11.011.9.74	-9.411.9.21	-8.441.7.82	-7.941.7.91	-71.67	-8.981.6.8
φ(172°)	-6.341.6.53	-7.281.8.16	-8.361.8.95	-8.491.9.33	-9.311.9.63	-8.541.9.3	-9.011.8.91	-8.761.9.34	-9.271.9.36	-8.721.9.38	-8.171.7.47	-7.41.4.82	-5.871.5.77	-6.561.6.46	-6.531.7.41	-8.751.10.82	-12.111.12.22	-12.331.12.28	-12.411.11.43	-10.721.10.18	-9.381.9.81	-8.691.9.32	-8.821.7.49	-4.581.6.2
φ(180°)	-6.511.6.48	-6.31.5.66	-5.131.5.44	-5.71.6.44	-7.541.8.41	-8.521.8.98	-8.871.10.82	-10.281.10.35	-10.351.10.55	-10.411.10.13	-8.841.8.82	-8.211.8.34	-8.291.9.22	-9.51.9.3	-8.271.8.42	-8.131.8.89	-8.771.9.66	-10.011.10.54	-11.151.10.85	-10.381.9.87	-8.291.9.07	-8.841.8.8	-8.271.8.1	-8.031.7.52
Freq(Hz)	5.78501.94	Theta	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ	φ
DG(dB)	φ(1°)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°)
φ(1°)	-2.712.51	-2.111.1.52	-0.661.0.66	0.371.0.88	1.141.1.04	0.676.4	0.091.0.29	-0.661.1.22	-1.851.2.56	-3.361.4.09	-4.061.4	-3.851.3.31	-2.671.1.79	-0.951.0.88	0.551.23	1.771.0.27	2.771.2.19	2.021.1.6	1.076.54	0.121.0.64	-1.671.2.44	-3.221.3.41	-5.231.3.02	-2.81.2.68
φ(7.5°)	-1.381.0.57	-0.10.3	11.7	2.132.42	2.591.61	2.361.98	1.661.33	0.791.0.01	-1.111.0.21	-2.771.3.76	-4.11.37	-3.421.3.62	-3.461.3.15	-3.071.2.9	-2.131.1.65	-1.411.1.12	-0.911.0.86	-1.051.1.17	-1.261.1.37	-1.521.1.74	-2.061.2.51	-2.91.3.56	-3.61.3.65	-1.281.2.25
φ(15°)	-1.691.0.65	0.060.13	-0.021.0.15	0.071.0.48	0.911.24	1.581.59	1.401.1.15	0.41.0.47	-1.231.2.54	-3.431.4.17	-4.221.3.63	-3.031.2.64	-2.591.2.89	-2.871.2.85	-2.651.2.14	-1.771.1.15	-0.320.41	0.921.36	1.681.81	1.681.44	0.791.0.83	-0.651.1.15	-1.741.2.42	-3.011.2.39
φ(22.5°)	-3.261.2.01	-1.161.0.81	-0.961.1.04	-1.171.1.19	-0.530.58	1.521.04	2.191.96	1.511.23	0.910.27	-1.331.3.59	-5.081.4.18	-3.91.3.35	-3.491.2.9	-2.141.1.75	-1.741.1.21	-2.191.1.23	0.321.82	2.811.72	4.331.58	4.281.75	2.781.44	0.031.1.57	-3.261.4.28	-5.31.6.82
φ(30°)	-2.311.1.42	-1.281.1.82	-1.191.0.17	0.201.34	0.931.44	2.331.14	3.082.6	2.512.69	2.421.26	-0.61.3.15	-4.71.4.01	-2.021.1.09	-1.361.1.89	-2.041.1.26	-2.171.1.74	-0.451.0.9	2.771.89	3.561.36	4.841.82	4.481.43	1.153.41	26.14	-1.231.4.26	-2.991.2.79
φ(37.5°)	-1.361.1.35	-1.771.2.67	-2.671.0.7	0.921.65	1.792.22	3.331.4	3.871.79	4.171.96	2.751.22	-0.421.1.05	-1.541.6.8	-0.171.0.37	-1.321.2.53	-3.091.2.12	-1.691.1.52	0.131.73	2.561.29	3.681.71	3.751.35	2.783.34	4.343.93	2.771.13	-1.711.2.81	-3.61.2.79
φ(45°)	-1.911.4.8	-1.611.2.54	-0.671.0.5	1.622.11	2.753.48	4.451.04	5.141.73	4.451.99	2.851.99	0.261.0.87	0.111.19	0.741.0.85	-1.210.87	-0.591.1.04	0.581.64	3.651.86	3.941.75	5.341.43	2.681.89	2.271.2.37	0.491.2.18	-1.931.0.25	6.991.6.31	
φ(52.5°)	-0.321.2.91	-1.431.0.49	1.871.0.81	2.432.41	3.41.27	5.295.68	5.211.4.8	3.661.03	3.642.44	0.341.0.81	-1.141.0.54	-0.531.1.22	-1.091.0.88	0.881.4.07	1.242.39	2.251.1.22	4.193.72	3.593.63	4.341.1	2.1361.18	1.411.48	-0.321.4.48	1.001.36	2.952.58
φ(60°)	0.61.3.57	-1.781.0.27	1.542.15	2.521.5	2.891.41	5.184.91	4.271.93	3.641.26	3.671.86	1.281.17	-1.591.2.45	0.971.0.56	0.741.64	2.371.43	1.541.39	1.321.36	4.021.0.86	3.971.36	3.621.94	2.841.0.47	1.3681.81	0.331.8.82	6.571.35	3.453.36
φ(67.5°)	-0.713.08	-1.981.2.32	0.651.58	2.912.99	1.891.03	5.035.11	4.885.23	5.171.43	3.062.8	2.471.16	0.821.1	-0.751.0.43	0.691.1.39	0.831.1	2.521.2	0.951.04	3.371.3	4.141.99	3.182.78	3.111.52	0.171.0.54	0.861.45	0.371.0.93	2.442.11
φ(75°)	-0.852.58	-0.961.8.82	0.051.06	3.631.4.01	1.911.86	5.251.26	5.451.4	3.561.4.97	3.152.55	3.052.3	2.481.82	-0.710.06	1.081.93	0.531.72	2.032.05	1.541.0.01	2.351.3	3.181.14	3.392.89	3.371.42	0.981.0.93	0.071.12	1.981.79	3.162.16
φ(82.5°)	-0.861.71	-0.21.99	-0.501.08	3.881.86	5.531.64	5.261.71	5.415.16	5.591.48	3.861.91	3.981.01	3.351.96	0.961.0.16	0.261.13	-0.481.74	1.782.14	1.071.07	3.341.41	5.041.36	4.321.35	2.871.93	1.711.74	1.981.71	3.111.34	
φ(89°)	-0.261.1.12	-1.091.1.79	-0.161.23	3.341.52	-0.142.37	4.731.96	5.061.2	5.181.93	2.431.17	0.721.66	2.721.79	-0.031.0.79	-1.641.36	-1.228.3	0.371.51	-0.221.0.93	2.481.41	5.421.4	4.771.26	2.871.43	0.981.1.15	-1.941.2.8	1.031.24	0.541.1.82
φ(97.5°)	-0.671.6.82	-3.512.19	-1.101.47	3.251.69	-0.061.74	3.751.55	3.361.43	3.781.23	-0.271.28	-1.238.6	1.511.99	-0.261.2.32	-2.281.69	-1.321.0.25	-1.661.1.25	-1.331.1.44	0.842.02	4.913.37	3.351.97	0.881.2.54	-2.151.1.59	-4.881.0.61	-0.331.1.98	-3.061.3.95
φ(105°)	-2.611.5.58	-4.751.1.85	-2.711.0.8	1.951.39	0.991.29	2.812.1	1.803.33	2.791.19	-0.11.0.56	-0.671.0.18	0.261.1.24	-2.531.1.33	-1.211.0.2	-3.771.4.24	-2.241.1.81	0.271.12	3.221.12	1.371.13	0.791.2.93	-4.591.3.09	-6.081.2.64	-0.071.0.11	-1.481.3.73	
φ(112.5°)	-6.381.7.15	-5.061.2.22	-2.281.0.38	1.421.27	0.671.03	0.991.02	0.022.32	1.061.1.73	0.011.0.12	-2.891.3.02	-1.851.1.31	-0.891.1.95	-1.381.2.75	-1.761.3.02	-5.891.2.75	-1.751.1.36	-1.621.0.42	0.831.1.3	-0.681.1.13	-0.451.37	-61.73	-5.421.3.72	-3.791.1.8	-1.251.1.42
φ(120°)	-6.281.4.93	-3.581.2.02	-2.411.0.47	0.061.0.31	-1.641.0.87	-0.471.1.49	-2.261.0.8	-0.361.3.34	-0.41.0.69	-3.531.3.64	-1.91.1.32	-1.421.3.86</												



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Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

(Hz)	5.117-6.8	7.82-8.58	5.72-5.86	8.03-11.98	-18.53-12.3	-11.39-6.91	-6.34-5.24	-4.86-4.5	-4.62-5.3	6.74	-8.86-7.87	8.12-10.39	-12.39-11.84	-10.99-12.5	-14.57-18.25	-18.01-16.42	-17.59-16.93	-13.92-11.43	-10.33-10.45	-10.06-8.13	-12.42-4.71	-3.64-2.51	-1.45-12.3	-1.82-12.2
(Hz)	3.46-14.85	-11.76-12.39	8.94-66.68	8.35-11.68	-17.97-17.27	-11.33-45.7	-7.38-56.28	-3.24-2.5	2.75-3.73	4.55-6.01	-5.12-4.87	4.78-5.58	6.63-7.1	7.33-8.71	-11.74-14.69	-14.28-13.21	-12.38-11.98	-10.51-12	8.92-10.78	-11.29-9.15	5.53-3.08	2.79-3.48	3.01-17.7	-1.33-26.2
(Hz)	6.02-13.96	-18.67-17.36	-15.53-17.69	-16.52-13.81	-15.71-12.55	-9.79-10.5	6.54-3.83	2.89-3.03	3.76-4.68	5.38-4.95	3.47-2.8	2.29-2.26	3.54-4.65	-7.95-10.09	-15.75-13.58	-11.51-10.23	-12.03-13.67	-15.91-18.01	-16.82-11.73	-12.67-15.22	-10.59-11.8	-3.12-2.3	3.79-3.33	8.93-31.1
(Hz)	16.18-16.18	-10.69-10	-10.33-11.59	-12.82-12.17	9.75-82	9.02-84	-6.29-14.8	3.31-3.85	4.77-15.9	5.48-4.89	-3.20-1.51	0.59-10.3	2.33-42	0.04-7.3	-16.07-18.79	-17.64-13.24	8.34-9.83	9.53-821	-11.26-11.22	-10.59-11.8	-3.12-2.3	3.79-3.33	8.93-31.1	8.93-31.1
(Hz)	8.64-6.01	6.91-5.84	3.54-2.87	4.88-6.38	8.14-8.46	8.95-8.67	4.76-3.15	2.37-2.87	4.95-6.96	5.76-4.18	2.28-1.16	1.08-2.72	3.55-3.91	5.02-17.7	6.96-7.4	13.23-14.71	8.02-8.85	8.24-8.49	-17.70-10.88	6.86-4.28	-16.45-17.34	8.07-5.25	8.74-9.58	-13.51-14.92
(Hz)	7.76-6.19	-4.88-6.5	5.29-4.81	5.91-7.62	-7.01-5.54	-6.58-6.65	-4.92-4	-4.07-5.31	7.44-8.7	5.98-4.4	-3.23-2.51	2.03-3.82	4.75-4.25	6.98-2.7	-7.09-6.76	8.47-17.71	4.25-8.88	5.68-6.71	-16.41-12.72	-4.32-6.25	9.92-10.21	3.67-3.28	9.97-7.98	-10.41-13.25
(Hz)	8.36-7.4	6.44-6.25	5.16-5.99	7.33-6.07	4.13-22.3	-7.05-6.65	5.78-4.21	4.53-6.07	7.89-8.77	6.52-6.95	6.42-6	3.38-4.29	6.06-5.44	7.37-8.5	6.38-13.28	8.58-19.67	6.07-9.38	4.89-4.7	-16.27-13.93	8.39-6.2	-4.87-6.2	7.26-3.02	6.26-9.14	-11.94-8.7
(Hz)	7.587-1.6	8.67-8.73	8.89-8.79	8.96-10.54	7.41-5.71	7.64-5.82	4.87-4.28	4.53-6.07	7.89-8.77	7.3-5.93	7.64-6.84	5.84-5.87	5.82-6.36	-11.86-16	6.42-15.58	8.64-15.78	8.86-12.1	2.85-4.79	-13.72-14.77	7.5-6.43	3.54-3.42	2.98-4.04	-11.59-6.47	-11.59-6.47
(Hz)	6.887-7.85	8.48-8.99	8.88-10.79	-12.48-9.74	-7.22-8.69	8.17-3.62	8.87-7.54	6.77-13.86	-12.88-10.47	8.88-8.48	-10.78-8.87	8.5-7.21	9.30-7.96	-15.71-17.67	-11.88-19.57	-7.88-10.51	-14.32-16.85	4.71-5.61	-14.03-13.15	3.78-4.58	3.55-3.9	8.84-12.58	-11.52-7.84	-11.52-7.84
(Hz)	7.689-10.82	6.837-2.23	7.9-9.53	-17.70-12.07	7.71-7.25	7.79-7.44	-10.41-10.85	11.58-12.81	11.23-9.95	-10.79-11.99	-12.71-17.86	-12.4-9.39	10.91-6.85	-11.37-18.98	-11.57-17.87	9.76-15.4	12.22-17.71	7.76-7.25	5.48-15.54	-19.26-10.92	14.95-15.74	4.45-6.32	8.79-10.6	-10.55-9.93
(Hz)	8.051-8.93	7.7-8.63	-13.78-11.1	8.81-13.05	10.02-11.68	7.19-8.91	-12.09-12.83	8.81-9.84	-15.37-18.82	17.88-11.71	14.3-16.15	12.34-16.78	18.56-16.93	8.60-13.82	8.90-17.71	-18.99-17.76	15.98-16.93	8.60-13.82	8.90-17.71	-18.99-17.76	15.98-16.93	7.85-12.64	-17.47-16.02	-11.59-10.47
(Hz)	18.11-15.1	-10.96-11.61	-13.09-14.36	-17.88-12.22	7.47-4	3.32-9.78	-14.75-17.56	14.88-13.08	17.71-12.51	-17.52-18.97	-12.69-18.84	18.84-18.48	13.11-14.74	-14.29-19.98	-16.88-19.68	14.19-18.98	12.01-14.72	11.57-17.27	4.57-17.7	-11.51-12.78	4.14-12.93	13.12-11.01	-16.26-11.98	-12.32-13.88
(Hz)	-10.85-15.45	-10.96-19.18	-17.58-17.42	-15.57-17.89	-18.77-10.82	-10.32-15.38	-13.95-15.56	-13.78-17.47	8.04-6.99	-12.74-18.87	-15.24-18.78	-11.11-11.26	11.73-11.88	-11.69-15.1	-12.02-18.54	-17.4-18.17	-12.61-14.32	-16.48-10.22	7.48-19.28	7.25-14.84	-8.22-12.03	-17.79-15.8	-14.09-14.32	-14.09-14.32
(Hz)	14.86-16.4	-15.36-19.5	-16.49-18.99	-17.88-14.34	9.31-16.28	-11.01-14.98	-17.46-14.91	-11.33-11.11	-11.86-12.54	-17.37-15.85	-11.94-13.1	-14.25-12.33	-7.56-6.46	5.96-14.41	-18.22-16.46	-18.22-17.69	-11.26-19.12	11.85-8.62	8.97-18.24	8.91-55	-14.19-12.4	-12.13-13.9	-12.28-18.12	-17.71-61
(Hz)	18.08-17.89	-18.55-16.57	-17.77-17.84	-18.28-15.69	-13.07-13	-14.09-17.57	-18.98-18.1	-17.15-19.11	-17.71-18.82	-15.26-18.48	-8.51-27	-6.89-7.66	6.78-8.53	8.26-12.94	-15.26-18.31	-18.50-17.12	-14.19-19.14	-16.75-14.7	-13.75-17.21	-12.63-7.95	-7.83-11.68	-11.82-9.88	-1.06-15.7	-13.74-15.84
(Hz)	17.84-18.75	-17.38-12.12	-6.99-6.78	-11.26-11.77	-18.69-16.44	-14.33-13.17	-13.52-15.45	-17.72-16.48	-17.36-18.18	-18.68-15.73	-17.84-16.47	-8.74-28	-10.10-10.88	6.84-15.57	-18.74-12.69	-9.51-10.32	8.92-11.06	-14.71-18.46	-16.06-10.27	-16.34-12.44	-19.58-10.38	8.95-8.87	8.95-8.87	8.95-8.87
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.07-18.71	-18.07-17.72	-19.04-11.1	-17.78-18.1	-14.18-13.73	-11.55-13.58	-16.21-19.4
(Hz)	18.81-18.78	-11.33-11.68	-5.62-5.65	-6.45-8.91	-14.11-12.3	-11.97-11.28	-12.59-13.69	-14.32-15.71	-17.86-15.27	-17.19-18.18	-8.6-9.14	-10.58-10.37	-14.48-13.72	-13.43-15.12	-15.21-14.32	-10.88-8.89	6.19-13.49	-18.0						



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

(H9°)	8.99±4.35	-4.16±2.94	-3.30±2.49	2.33±3.07	4.49±6.08	6.99±4.55	-5.09±7.88	-4.44±7.88	9.59±7.85	-6.50±7.33	-7.55±5.86	-4.57±3.9	2.96±5.7	-1.05±8.8	-18.79±7.9	-7.55±4.83	-8.72±4.18	8.05±9.26	-10.99±12.05	-8.66±8.21	-8.75±5.59	-2.74±4.8	5.75±7.37	-7.45±6.05	
(H82°)	12.59±6.58	-6.89±4.31	-3.11±5.2	4.29±5.19	-10.30±34.7	-10.72±54.4	5.71±7.27	8.70±10.48	-13.51±10.8	-8.65±14.2	-12.43±13.99	-11.97±6.16	-7.86±5.63	-4.50±4.79	-8.72±9.2	-12.20±13.7	-13.79±6.65	-11.26±4.18	5.97±4.88	-12.48±11.7	-7.45±6.85	-5.00±5.55	-1.74±1.47	4.09±11.58	-8.34±10.84
(H75°)	12.30±6.79	-7.67±4.3	-7.34±5.35	4.19±4.84	-12.49±9.27	-10.26±5.67	-5.14±7.09	-7.54±12.38	-15.86±15.21	-12.43±13.99	-11.97±6.16	-7.86±5.63	-4.50±4.79	-8.72±9.2	-12.20±13.7	-13.79±6.65	-11.26±4.18	5.97±4.88	-12.48±11.7	-7.45±6.85	-5.00±5.55	-1.74±1.47	4.09±11.58	-8.34±10.84	
(H67°)	11.18±7.02	-8.02±9.9	-8.44±14.11	-11.27±12.78	-15.41±10.66	9.38±45	-5.63±7.39	8.65±11.52	-14.58±18.57	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	-16.89±18.2	
(H185°)	8.33±7.47	-11.88±11.1	-12.25±18.35	-10.22±16.67	-17.31±7.78	3.88±5.1	-1.86±10.54	-10.22±10.99	-12.62±18.98	-18.57±17.38	-18.53±12.21	-11.41±10.41	-6.44±7.6	-8.98±9.14	-13.82±15.85	-19.11±11.77	-17.82±13.16	-17.82±13.16	-17.82±13.16	-17.82±13.16	-17.82±13.16	-17.82±13.16	-17.82±13.16	-17.82±13.16	
(H125°)	7.31±6.11	9.45±12.65	-12.81±16.98	-17.94±16.73	-17.92±10.04	8.03±9.7	9.35±15.64	-16.47±8.86	-11.01±17.85	-10.83±18.27	-14.72±22.3	-10.46±12.55	8.74±9	-11.97±11.8	-19.37±16.86	-14.72±15.98	-18.95±18.51	-13.21±10.76	-15.11±13.75	-14.4±14.19	-7.5±12.17	-15.88±18.27	-12.06±12.93	-11.33±9.72	
(H120°)	9.09±9.57	-12.03±12.47	-14.54±15.25	-17.94±18.52	-17.12±10.66	6.73±11.48	-12.69±15.37	-15.07±10.38	-10.34±14.45	-16.46±19.58	-14.61±12.04	8.28±12.43	-12.41±7.17	-11.24±10.75	-12.93±15.76	-15.79±15.85	-11.13±18.21	-10.07±18.52	-10.77±18.52	-10.77±18.52	-10.77±18.52	-10.77±18.52	-10.77±18.52	-10.77±18.52	
(H127°)	1.50±10.85	-10.09±65	-12.75±14.54	-18.81±18.84	-15.83±16.46	9.79±12.84	-14.67±14.82	-13.19±11.34	-11.10±11.2	-11.37±13.14	-11.42±10.36	-10.09±7.99	7.65±8.9	-13.52±15.1	-18.26±16.45	-14.17±16.27	-15.06±14.36	7.39±12.98	4.66±17.34	-11.88±17.34	-19.03±10.1	-15.11±18.85	-18.07±19.51	8.31±10.75	
(H145°)	10.51±10.97	9.51±10.8	-18.35±16.49	-18.31±18.57	-18.35±13.98	-10.39±11.8	-11.18±12.12	-18.39±13.97	-15.27±14.71	-16.21±11.94	-11.87±6.83	7.53±7.01	-17.13±2.5	-8.86±12.14	-18.02±15.13	-18.02±14.66	-15.21±18.63	-11.01±14.01	-11.47±18.23	-17.35±9.29	-17.17±17.59	-18.74±15.96	-18.89±16.26	-143±15.67	
(H142°)	16.38±12.73	-12.31±15.22	-16.01±17.96	-17.71±16.84	-13.91±12.12	-13.74±14.41	-12.91±10.73	-13.96±16.11	-11.07±16.58	-14.86±16.22	-11.59±14.4	8.15±7.97	7.81±6.1	-11.26±12.58	-17.91±13.14	-17.75±13.8	-17.25±18.21	-17.81±10.51	-11.83±15.57	-18.52±16.68	-17.26±17.86	-15.51±16.67	-16.79±15.33	-16.79±15.33	
(H150°)	16.56±17.54	-13.52±12.43	-13.15±15.95	-18.43±14.38	-12.60±10.66	-11.56±14.86	-14.38±10.74	-13.47±14.24	-14.31±12.5	-11.59±17.4	9.25±9.14	8.23±9.87	7.66±7.51	-11.47±11.11	-15.93±16.76	-14.33±17.25	-17.95±18.45	-17.47±16.58	-18.97±18.43	-18.98±16.01	-18.59±17.75	-17.55±15.25	-14.72±13.74	-12.51±1	
(H107°)	12.88±10.51	6.86±9.91	-10.56±12.35	-12.27±10.86	9.89±10.38	-11.67±14.53	-18.76±17.98	-16.96±18.37	-18.36±19.86	-13.54±12.8	-11.59±12.94	8.15±7.99	9.86±12.14	-13.47±14.27	-14.22±16.81	-18.95±16.48	-16.54±14.37	-16.64±17.59	-18.98±16.17	-18.98±16.17	-18.98±16.17	-18.98±16.17	-18.98±16.17	-18.98±16.17	
(H104°)	11.84±14.17	-12.36±11.91	-12.37±12.38	-11.95±10.44	9.78±9.65	-10.07±12.35	-14.01±17.32	-17.88±17.56	-17.46±17.44	-16.13±14.44	-12.79±15.16	-14.98±14.34	-14.29±18	-11.15±15.68	-13.53±14.72	-17.35±16.96	-19±16.39	-16.96±18.66	-17.65±17.42	-17.66±18.31	-18.07±18.77	-18.03±18.71	-18.47±17.59	-17.54±12.42	
(H172°)	16.19±14.36	-14.4±17.1	-12.96±11.62	-11.00±11.41	-12.10±11.47	-15.57±17.26	-18.70±19.17	-17.19±18.27	-17.20±17.77	-17.95±16.25	-16.75±16.35	-16.51±18.84	-16.19±17.74	-17.52±16.02	-16.93±14.83	-18.69±17.67	-18.07±18.71	-18.94±18.13	-17.97±17.19	-17.24±16.58	-18.16±16.29	-17.34±18.02	-18.46±17.76	-16.21±15.58	
(H180°)	-12.66±19.95	-10.87±11.22	-11.06±10.85	-11.36±12.7	-14.06±14.82	-14.89±15.78	-18.21±18.98	-18.05±19.2	-18.74±16.79	-18.88±18.24	-18.17±17.1	-18.23±18.22	-17.71±19.17	-18.91±18.77	-18.71±19.82	-17.31±17.65	-18.56±18.94	-18.07±18.83	-19.34±18.15	-18.33±18.64	-19.52±17.8	-15.66±14.91	-14.46±13.78	-14.21±14.28	
FreeRx0	5.7655Rx0	Thx0x1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gain	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	0°(7°/9°/5°)	
(H°)	-1.41±7.3	-7.17±6.9	-6.73±6.7	7.48±7.4	6.71±10.72	-11.96±11.8	-16.77±16.1	-18.19±18.9	-18.34±16.17	-15.06±14.18	-13.66±14.68	-9.68±6.48	-7.35±4.99	7.14±65	-6.51±26	-6.34±55	-8.60±7.39	8.04±13.2	-10.76±12.84	-13.51±14.55	-18.16±18.56	-17.04±14.37	-12.15±12.67	-8.63±24	
(H15°)	8.53±6.18	-7.62±7.01	-5.89±5.1	4.86±5.16	-5.64±5.63	-5.64±5.32	-7.47±8.59	-6.21±9.95	-11.65±13.53	-14.03±11.48	-12.53±11.89	-11.33±10.25	-8.26±7.1	7.71±83	-8.77±76	-11.42±13.99	-15.53±18.2	-10.02±18.89	-17.31±10.58	-14.61±15.15	-13.05±12.46	-12.23±12.35	-11.89±18.06	-10.65±16.76	
(H17°)	-17.78±8.83	-7.26±10.5	-6.15±4.38	-11.43±9.68	-4.41±4.57	-4.45±4.07	-5.46±5.43	-7.53±4.88	-9.35±9.59	-10.48±11.18	-12.13±11.11	-13.13±10.26	-11.03±12.48	-11.57±11.15	-11.12±12.84	-11.92±12.84	-11.98±10.68	-9.76±5.84	-5.56±21	-6.46±16.38	-7.68±6.85	-14.15±11.1	-12.36±11.96	-12.36±11.96	
(H22°)	-12.13±10.55	-7.6±2.8	-5.13±4.5	-5.37±1.39	-6.22±4.93	-4.33±4.23	-4.21±3.88	-3.26±2.73	-3.08±4.58	-7.39±16.97	-18.73±17.31	-18.71±14.97	-18.64±14.22	-12.22±14.63	-16.44±10.34	-2.57±17.3	7.95±8.16	-6.62±4.78	-3.65±27.2	-2.13±27.7	-4.54±5.04	-6.02±9.98	-16.95±19.18	-16.95±19.18	
(H37°)	8.07±8.13	7.89±7.9	5.93±5.18	5.54±2.59	-1.45±6.87	1.97±2	2.763±2	3.46±2.1	1.48±0.64	2.373±4.9	-4.23±4.07	-3.44±3.64	5.94±16.6	-16.75±19.16	6.21±17.1	-14.56±9.61	-7.24±8.33	-18.19±12.45	-16.21±17.31	6.25±24.2	-2.95±2.23	-4.26±7	8.21±8.67	-15.28±16.47	
(H52°)	7.31±8.14	6.28±9.64	7.84±6.86	-6.26±4.5	2.36±1	1.912±1	2.615±5.4	2.231±7	1.48±0.64	2.373±4.9	-4.23±4.07	-3.44±3.64	5.94±16.6	-16.75±19.16	6.21±17.1	-14.56±9.61	-7.24±8.33	-18.19±12.45	-16.21±17.31	6.25±24.2	-2.95±2.23	-4.26±7	8.21±8.67	-15.28±16.47	
(H57°)	5.75±10.78	-15.56±10.04	7.13±6.63	6.83±5.24	-4.02±1.48	0.751±24	0.51±10.8	-1.91±2.75	3.72±4.19	4.71±2	-4.714±29	-4.24±6.79	-13.08±7.91	7.58±16.12	-12.71±6.89	-8.08±5.81	-5.48±7.98	2.91±6.14	-6.763±54	-4.61±71.1	-4.88±3.85	5.87±13.75	-10.88±14.5	-2.03±20.8	
(H67°)	4.67±10.78	-13.46±7.16	6.48±4.97	4.42±4.3	-4.37±2.2	-0.717±29	4.25±33	-3.94±3.62	-2.59±2.27	-0.33±1.83	-0.50±5.98	-4.49±4.85	-8.35±19.98	-8.35±19.98	-10.07±6.45	-8.69±7.35	-2.68±2.02	-0.73±1.41	-6.65±11.1	8.4±28	-3.99±9.98	-3.75±12.97	-10.79±10.63	-3.75±12.97	
(H87°)	15.74±17.29	-12.97±14.3	-10.93±12.35	-13.71±29.8	-1.48±1.31	-2.85±6.69	1.15±17	2.16±2.23	1.51±10.4	3.20±1.86	-1.38±3.34	3.74±5.45	7.31±10.15	-10.35±16.98	-10.29±6.9	-11.40±1.51	7.54±6.63	-1.71±1.21	3.34±4.9	-5.54±4.75	-6.86±1.13	-2.48±1.6	9.13±10.43	-6.58±9.97	
(H107°)	17.22±11.53	-1.743±1.91	-1.59±1.74	1.15±1.14	3.23±1.1	-2.76±5.56	-0.23±2.36	-0.95±1.59	-1.67±1.71	-1.47±6.18	0.072±1.91	-4.89±4.55	-4.54±5.62	-15.34±19.16	-13.95±16.04	-11.56±10.75	-7.59±6.63	3.01±1.56	-7.77±10.6	7.9±13	-2.51±5.36	-4.54±4.3	6.33±5.3	-6.51±10.37	
(H82°)	-13.9±11	-4.64±7.6	-1.58±2	-1.06±6.05	1.53±2.96	0.767±103	0.49±3.07	0.95±1.91	2.75±3.49	1.74±6.6	-0.22±1.71	5.29±15.9	5.24±6.42	-11.41±14.8	-11.51±19.82	-14.34±12.12	-6.96±4.83	0.16±5.99	5.62±7.29	-6.39±26.5	-6.07±6.05	-7.74±4.89	-4.53±4.44	-7.82±17.17	
(H97°)	-13.85±11.52	-5.65±3.67	2.98±1.81	8.85±12.59	4.87±3.67	-1.79±4.09	-0.30±1.5	-1.68±2.37	2.47±4.38	-4.06±1.25	0.98±7.26	4.17±8.26	5.91±5.15	8.43±11	-17.33±18.98	-14.74±16.14	-5.45±5.24	2.08±0.03	2.97±2.98	5.21±4.63	0.74±4.89	-12.98±4.74	6.14±26	-8.46±18.23	
(H97°)	-17.51±16.3	-7.27±12.7	-4.73±13.1	-1.82±2.48	-2.61±1.67	-2.93±0.6	-1.84±2.34	-3.14±2.36	5.94±1.77	-1.04±3.27	-5.69±5.91	-6.67±6.36	-1.47±10.42	-17.24±13.2	-17.40±8.92	-7.08±7.73	-1.47±13.7	4.13±17	-11.47±10.82	-4.26±5.32	-18.59±4.61	-18.59±4.61	-18.59±4.61	-18.59±4.61	
(H107°)	-13.48±16.38	-6.85±6.07	-6.86±4.59	-3.21±2.55	-5.64±7.48	-14.14±26	-2.12±1.36	-2.72±2.39	-3.66±7.63	-8.33±7.47	-3.42±1.91	-4.57±7.92	-9.45±7.1	6.51±14	-18.27±15.83	-8.83±13.68	-7.91±9.57	-4.32±6.75	-0.86±6.2	-3.75±9.2	-10.23±9.71	-17.78±16.2	7.15±6.2	-12.74±16.2	
(H112°)	-17.72±17.53	-11.20±10.82	-7.17±17.1	-4.24±14	-7.27±6.1	-6.25±6.77	-3.76±9.2	-3.29±2.84	-4.56±2.67	-14.74±9.3	-3.49±2.94	-5.19±9.27	-9.48±9.74	-6.77±12.12	-10.41±12.69	-10.16±11.43	-8.99±10.46	-5.95±16.04	-12.73±7.48	-4.82±6.65	-11.84±9.74	-16.22±6.81	-7.28±10.13	-11.51±15.78	
(H127°)	-16.94±11.24	-10.59±10.84	-8.34±55	-6.41±6.82	-12.06±10.46	6.97±8.28	-6.04±4.75	-4.55±4.52	5.91±10.2	-16.66±15.63	-4.29±2.3	-3.69±10.3	-11.69±9.62	-6.91±14.4	-14.81±15.7	-13.93±12.66	-10.95±10.02	4.73±18.88	-10.46±13.77	-5.65±6.79	-18.11±7.83	-14.67±9.18	-11.45±11.7	-19.15±16.32	
(H127°)	-16.94±11.24	-10.59±10.84	-8.34±55	-6.41±6.82	-12.06±10.46	6.97±8.28	-6.04±4.75	-4.55±4.52	5.91±10.2	-16.66±15.63	-4.29±2.3	-3.69±10.3	-11.69±9.62	-6.91±14.4	-14										



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

θ(112°)	-10.82-6.62	-10.51-12.91	-9.91-12.32	-7.48-9.68	-9.99-6.64	-12.40-7.69	-8.45-8.1	-12.89-18.91	-18.16-18.81	-17.51-18.29	-11.99-10.36	-14.28-14.56	-11.79-7.2	-10.01-10.57	-10.42-14.5	-11.86-12.87	-14.39-14.84	-13.39-12.53	-10.91-10.97	-9.67-13.18	-17.51-9.82	-17.49-17.53	-17.09-10.84	-8.81-11.48
θ(120°)	-8.64-7.53	-9.81-7.13	-7.82-11.27	-4.39-7.54	-8.81-7.06	-6.74-7.28	-12.10-14.75	-13.77-11.71	-18.25-18.2	-17.49-18.54	-15.15-19.57	-15.03-14.78	-11.77-9.38	-8.84-10.02	-11.86-13.98	-8.45-9.83	-13.93-12.62	-8.58-7.78	-12.88-15.22	-10.12-10.78	-12.12-16.18	-9.93-18.93	-12.04-10.94	-11.21-10.22
θ(122°)	-3.71-9.4	-11.31-13.95	-6.09-9.25	-4.12-6.47	-4.96-6.66	-8.91-10.35	-11.61-9.97	-10.91-18.84	-19.14-18.68	-16.51-19.89	-16.49-13.86	-15.41-14.68	-12.94-13.87	-16.51-17.27	-15.43-19.6	-8.79-13.3	-13.70-13.66	-10.04-10.47	-12.64-12.72	-14.22-17.47	-7.46-18.27	-17.89-18.71	-18.77-17.98	
θ(130°)	-7.59-11.75	-19.33-14.76	-6.96-7.98	-7.88-6.98	-7.23-6.86	-13.13-10.72	-12.10-15.35	-12.89-14.45	-18.84-17.39	-18.63-17.85	-17.29-14.44	-12.35-12.29	-13.92-14.19	-14.15-12.1	-13.26-12.18	-13.98-11.64	-14.39-7.9	-8.22-6.7	-7.24-8.6	-13.34-16.46	-14.95-12.28	-11.33-12	-15.74-18.22	-16.12-16.15
θ(142°)	-15.38-15.36	-10.27-8.28	-7.48-7.13	-7.31-8.3	-8.91-8.82	-6.41-8.87	-10.32-18.84	-18.26-15.91	-16.01-16.24	-17.98-18.84	-17.39-17.4	-14.22-12.88	-12.18-13.21	-12.02-12.49	-14.71-14.18	-15.52-11.39	-8.39-8.83	-12.55-10.19	-8.49-8.17	-11.73-10.88	-9.33-9.93	-13.04-10.94	-10.65-13.41	-18.55-13.03
θ(150°)	-11.97-10.83	-7.19-8.42	-14.16-10.86	-6.96-5.9	-7.10-12.07	-13.11-10.01	-11.16-14.63	-18.29-14.28	-13.54-14.24	-17.70-17.48	-17.34-17.56	-14.61-14.6	-15.17-13.91	-14.89-17.6	-15.85-16.14	-15.36-13.48	-18.43-11.22	-6.87-8.42	-4.63-6.55	-8.99-10.26	-10.41-12.8	-18.11-18.16	-17.53-18.16	-18.52-15.05
θ(157°)	-10.89-12.42	-12.59-16.18	-19.05-14.97	-10.12-8.55	-9.98-14.01	-14.71-11.28	-13.13-14.15	-17.23-18.76	-17.76-19.23	-16.51-12.12	-17.79-18.13	-18.59-18.87	-18.41-18.21	-14.02-16.2	-13.01-12.19	-11.01-9.82	-17.81-12.69	-6.29-6.79	-7.84-9.9	-13.91-18.23	-18.74-18.69	-14.62-12.15	-14.02-17.13	-17.71-18.27
θ(160°)	-18.96-18.9	-19.34-18.14	-18.15-18.37	-14.73-14.42	-15.71-18.42	-18.46-18.47	-17.18-17.43	-18.52-18.94	-17.76-19.32	-17.87-18.98	-18.48-18.76	-18.19-18.29	-18.95-17.92	-15.71-14.22	-12.91-12.88	-11.01-9.38	-8.79-8.4	-8.19-10.5	-11.69-12.93	-14.08-14.73	-18.91-18.68	-16.84-17.97	-17.87-17.28	-16.54-18.1
θ(172°)	-18.67-18.87	-18.26-15.9	-14.53-14.37	-14.13-14.17	-15.71-17.36	-18.70-18.95	-14.96-14.59	-15.41-16.41	-16.31-17.07	-18.27-18.88	-18.82-18.74	-18.91-18.69	-17.91-18.63	-14.15-14.19	-9.73-8.8	-8.30-8.7	-9.11-9.98	-11.45-12.55	-12.51-12.91	-14.23-14.28	-14.14-14.02	-15.08-17.1	-17.73-19.91	-17.45-17.16
θ(180°)	-16.29-16.53	-17.01-16.4	-15.28-13.74	-12.41-11.8	-11.27-11.21	-11.36-18.96	-10.84-11	-11.79-13.02	-13.59-15.52	-19.13-18.22	-18.19-18.76	-18.48-17.18	-15.16-14.17	-13.79-13.53	-13.43-13.11	-12.91-13.22	-12.98-13.15	-14.37-17.38	-17.94-17.32	-19.52-18.12	-18.89-18.69	-17.86-17.97	-18.19-18.64	-17.89-18.34
FreeGain	5.5296	Threshld 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Gain	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
θ(112°)	-10.82-6.62	-10.51-12.91	-9.91-12.32	-7.48-9.68	-9.99-6.64	-12.40-7.69	-8.45-8.1	-12.89-18.91	-18.16-18.81	-17.51-18.29	-11.99-10.36	-14.28-14.56	-11.79-7.2	-10.01-10.57	-10.42-14.5	-11.86-12.87	-14.39-14.84	-13.39-12.53	-10.91-10.97	-9.67-13.18	-17.51-9.82	-17.49-17.53	-17.09-10.84	-8.81-11.48
θ(120°)	-8.64-7.53	-9.81-7.13	-7.82-11.27	-4.39-7.54	-8.81-7.06	-6.74-7.28	-12.10-14.75	-13.77-11.71	-18.25-18.2	-17.49-18.54	-15.15-19.57	-15.03-14.78	-11.77-9.38	-8.84-10.02	-11.86-13.98	-8.45-9.83	-13.93-12.62	-8.58-7.78	-12.88-15.22	-10.12-10.78	-12.12-16.18	-9.93-18.93	-12.04-10.94	-11.21-10.22
θ(122°)	-3.71-9.4	-11.31-13.95	-6.09-9.25	-4.12-6.47	-4.96-6.66	-8.91-10.35	-11.61-9.97	-10.91-18.84	-19.14-18.68	-16.51-19.89	-16.49-13.86	-15.41-14.68	-12.94-13.87	-16.51-17.27	-15.43-19.6	-8.79-13.3	-13.70-13.66	-10.04-10.47	-12.64-12.72	-14.22-17.47	-7.46-18.27	-17.89-18.71	-18.77-17.98	
θ(130°)	-7.59-11.75	-19.33-14.76	-6.96-7.98	-7.88-6.98	-7.23-6.86	-13.13-10.72	-12.10-15.35	-12.89-14.45	-18.84-17.39	-18.63-17.85	-17.29-14.44	-12.35-12.29	-13.92-14.19	-14.15-12.1	-13.26-12.18	-13.98-11.64	-14.39-7.9	-8.22-6.7	-7.24-8.6	-13.34-16.46	-14.95-12.28	-11.33-12	-15.74-18.22	-16.12-16.15
θ(142°)	-15.38-15.36	-10.27-8.28	-7.48-7.13	-7.31-8.3	-8.91-8.82	-6.41-8.87	-10.32-18.84	-18.26-15.91	-16.01-16.24	-17.98-18.84	-17.39-17.4	-14.22-12.88	-12.18-13.21	-12.02-12.49	-14.71-14.18	-15.52-11.39	-8.39-8.83	-12.55-10.19	-8.49-8.17	-11.73-10.88	-9.33-9.93	-13.04-10.94	-10.65-13.41	-18.55-13.03
θ(150°)	-11.97-10.83	-7.19-8.42	-14.16-10.86	-6.96-5.9	-7.10-12.07	-13.11-10.01	-11.16-14.63	-18.29-14.28	-13.54-14.24	-17.70-17.48	-17.34-17.56	-14.61-14.6	-15.17-13.91	-14.89-17.6	-15.85-16.14	-15.36-13.48	-18.43-11.22	-6.87-8.42	-4.63-6.55	-8.99-10.26	-10.41-12.8	-18.11-18.16	-17.53-18.16	-18.52-15.05
θ(157°)	-10.89-12.42	-12.59-16.18	-19.05-14.97	-10.12-8.55	-9.98-14.01	-14.71-11.28	-13.13-14.15	-17.23-18.76	-17.76-19.23	-16.51-12.12	-17.79-18.13	-18.59-18.87	-18.41-18.21	-14.02-16.2	-13.01-12.19	-11.01-9.82	-17.81-12.69	-6.29-6.79	-7.84-9.9	-13.91-18.23	-18.74-18.69	-14.62-12.15	-14.02-17.13	-17.71-18.27
θ(160°)	-18.96-18.9	-19.34-18.14	-18.15-18.37	-14.73-14.42	-15.71-18.42	-18.46-18.47	-17.18-17.43	-18.52-18.94	-17.76-19.32	-17.87-18.98	-18.48-18.76	-18.19-18.29	-18.95-17.92	-15.71-14.22	-12.91-12.88	-11.01-9.38	-8.79-8.4	-8.19-10.5	-11.69-12.93	-14.08-14.73	-18.91-18.68	-16.84-17.97	-17.87-17.28	-16.54-18.1
θ(172°)	-18.67-18.87	-18.26-15.9	-14.53-14.37	-14.13-14.17	-15.71-17.36	-18.70-18.95	-14.96-14.59	-15.41-16.41	-16.31-17.07	-18.27-18.88	-18.82-18.74	-18.91-18.69	-17.91-18.63	-14.15-14.19	-9.73-8.8	-8.30-8.7	-9.11-9.98	-11.45-12.55	-12.51-12.91	-14.23-14.28	-14.14-14.02	-15.08-17.1	-17.73-19.91	-17.45-17.16
θ(180°)	-16.29-16.53	-17.01-16.4	-15.28-13.74	-12.41-11.8	-11.27-11.21	-11.36-18.96	-10.84-11	-11.79-13.02	-13.59-15.52	-19.13-18.22	-18.19-18.76	-18.48-17.18	-15.16-14.17	-13.79-13.53	-13.43-13.11	-12.91-13.22	-12.98-13.15	-14.37-17.38	-17.94-17.32	-19.52-18.12	-18.89-18.69	-17.86-17.97	-18.19-18.64	-17.89-18.34
FreeGain	5.5296	Threshld 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Gain	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
θ(112°)	-10.82-6.62	-10.51-12.91	-9.91-12.32	-7.48-9.68	-9.99-6.64	-12.40-7.69	-8.45-8.1	-12.89-18.91	-18.16-18.81	-17.51-18.29	-11.99-10.36	-14.28-14.56	-11.79-7.2	-10.01-10.57	-10.42-14.5	-11.86-12.87	-14.39-14.84	-13.39-12.53	-10.91-10.97	-9.67-13.18	-17.51-9.82	-17.49-17.53	-17.09-10.84	-8.81-11.48
θ(120°)	-8.64-7.53	-9.81-7.13	-7.82-11.27	-4.39-7.54	-8.81-7.06	-6.74-7.28	-12.10-14.75	-13.77-11.71	-18.25-18.2	-17.49-18.54	-15.15-19.57	-15.03-14.78	-11.77-9.38	-8.84-10.02	-11.86-13.98	-8.45-9.83	-13.93-12.62	-8.58-7.78	-12.88-15.22	-10.12-10.78	-12.12-16.18	-9.93-18.93	-12.04-10.94	-11.21-10.22
θ(122°)	-3.71-9.4	-11.31-13.95	-6.09-9.25	-4.12-6.47	-4.96-6.66	-8.91-10.35	-11.61-9.97	-10.91-18.84	-19.14-18.68	-16.51-19.89	-16.49-13.86	-15.41-14.68	-12.94-13.87	-16.51-17.27	-15.43-19.6	-8.79-13.3	-13.70-13.66	-10.04-10.47	-12.64-12.72	-14.22-17.47	-7.46-18.27	-17.89-18.71	-18.77-17.98	
θ(130°)	-7.59-11.75	-19.33-14.76	-6.96-7.98	-7.88-6.98	-7.23-6.86	-13.13-10.72	-12.10-15.35	-12.89-14.45	-18.84-17.39	-18.63-17.85	-17.29-14.44	-12.35-12.29	-13.92-14.19	-14.15-12.1	-13.26-12.18	-13.98-11.64	-14.39-7.9	-8.22-6.7	-7.24-8.6	-13.34-16.46	-14.95-12.28	-11.33-12	-15.74-18.22	-16.12-16.15
θ(142°)	-15.38-15.36	-10.27-8.28	-7.48-7.13	-7.31-8.3	-8.91-8.82	-6.41-8.87	-10.32-18.84	-18.26-15.91	-16.01-16.24	-17.98-18.84	-17.39-17.4	-14.22-12.88	-12.18-13.21	-12.02-12.49	-14.71-14.18	-15.52-11.39	-8.39-8.83	-12.55-10.19	-8.49-8.17	-11.73-10.88	-9.33-9.93	-13.04-10.94	-10.65-13.41	-18.55-13.03
θ(150°)	-11.97-10.83	-7.19-8.42	-14.16-10.86	-6.96-5.9	-7.10-12.07	-13.11-10.01	-11.16-14.63	-18.29-14.28	-13.54-14.24	-17.70-17.48	-17.34-17.56	-14.61-14.6	-15.17-13.91	-14.89-17.6	-15.85-16.14	-15.36-13.48	-18.43-11.22	-6.87-8.42	-4.63-6.55	-8.99-10.26	-10.41-12.8	-18.11-18.16	-17.53-18.16	-18.52-15.05
θ(157°)	-10.89-12.42	-12.59-16.18	-19.05-14.97	-10.12-8.55	-9.98-14.01	-14.71-11.28	-13.13-14.15	-17.23-18.76	-17.76-19.23	-16.51-12.12	-17.79-18.13	-18.59-18.87	-18.41-18.21	-14.02-16.2	-13.01-12.19	-11.01-9.82	-17.81-12.69	-6.29-6.79	-7.84-9.9	-13.91-18.23	-18.74-18.69	-14.62-12.15	-14.02-17.13	-17.71-18.27
θ(160°)	-18.96-18.9	-19.34-18.14	-18.15-18.37	-14.73-14.42	-15.71-18.42	-18.46-18.47	-17.18-17.43	-18.52-18.94	-17.76-19.32	-17.87-18.98	-18.48-18.76	-18.19-18.29	-18.95-17.92	-15.71-14.22	-12.91-12.88	-11.01-9.38	-8.79-8.4	-8.19-10.5	-11.69-12.93	-14.08-14.73	-18.91-18.68	-16.84-17.97	-17.87-17.28	-16.54-18.1
θ(172°)	-18.67-18.87	-18.26-15.9	-14.53-14.37	-14.13-14.17	-15.71-17.36	-18.70-18.95	-14.96-14.59	-15.41-16.41	-16.31-17.07	-18.27-18.88	-18.82-18.74	-18.91-18.69	-17.91-18.63	-14.15-14.19	-9.73-8.8	-8.30-8.7	-9.11-9.98	-11.45-12.55	-12.51-12.91	-14.23-14.28	-14.14-14.02	-15.08-17.1	-17.73-19.91	-17.45-17.16



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

		-18.30-18.24		-18.99-18.27		-17.60-16.17		-18.02-18		-16.57-13.05		-12.97-14.44		-14.47-13.1		-13.02-14.92		-16.04-15.5		-14.87-18.83		-17.73-18.64		-15.86-16.24		-13.03-12.35		-12.88-13.61		-11.90-8.62		-8.29-10.12		-11.24-14.51		-18.95-15.05		-14.43-14.01		-15.86-18.53		-19.19-18.77		-15.87-17.05		-18.15-18.07		-16.71-17.52																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		-16.19-18.68		-17.56-18.07		-17.44-18.46		-18.13-14.98		-13.17-13.35		-14.36-16.36		-16.76-16.7		-18.73-18.78		-12.97-18.07		-16.71-8.52		-14.02-14.16		-11.31-10.21		-11.46-10.55		-12.95-14.66		-15.90-14.61		-15.49-14.47		-18.14-18.42		-18.19-108		-18.26-18.33		-17.84-18.2		-19.13-19.76		-16.14-15.1		-15.43-13.81		-17.29-13.82																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		-14.84-13.53		-12.91-10.54		-14.04-13.86		-13.06-12.77		-11.81-12.19		-11.29-11.41		-12.93-13.5		-14.09-14.61		-14.87-14.59		-14.24-16.78		-16.02-17.56		-14.16-16.33		-11.99-16.53		-16.69-16.3		-11.02-12.57		-11.63-12.11		-12.72-15		-15.36-18.93		-15.01-18.65		-18.84-18.94		-16.51-15.35																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

(Hz)	-73.63	-4.84	-7.38	-7.99	-7.61	-3.27	0.29	-0.59	-1.71	-4.54	-7.69	-6.67	-6.93	-11.79	-4.41	-2.22	-2.93	-4.48	-5.16	-2.78	-5.31	-13.89	-12.54	-5.88	-4.88							
(Hz)	8.81	5.84	12.82	18.75	11.86	1.86	3.46	5.58	6.26	1.14	-15.48	-10.42	-7.21	-12.11	-10.74	-3.34	-4.48	-6.58	-6.23	8.87	-1.89	-4.26	-11.67	-14.14	-6.46	-7.81						
(Hz)	-1.46	4.69	6.67	8.10	-11.96	-12.29	-3.71	0.51	3.22	6.35	6.78	-3.93	-15.83	-15.89	-4.96	-4.89	-18.02	-18.22	-11.58	-1.47	-2.05	-4.74	-10.74	-7.44	-4.56	-5.45						
(Hz)	3.13	-4.24	6.16	6.61	7.41	22.84	3.61	-0.17	-2.57	6.68	6.51	-4.34	-2.62	-7.58	-17.96	-12.64	-10.77	-7.95	-6.48	7.71	-4.24	-8.45	-11.46	-9.46	-5.14	-5.45						
(Hz)	-3.88	-3.65	4.74	4.79	5.86	-8.95	-4.19	4.03	2.19	0.68	7.51	5.68	5.95	4.72	-1.84	-14.83	-7.58	-5.91	-5.83	2.68	-2.35	-10.42	-10.54	-9.51	-5.19	-4.84						
(Hz)	3.20	3.67	3.18	5.64	5.37	4.99	7.18	5.14	4.08	1.77	4.04	4.13	4.13	4.13	6.54	5.67	-1.62	9.96	8.75	13.26	8.50	8.47	-10.34	-10.34	-8.89	-12.27	-4.74	-3.33				
(Hz)	-5.28	-4.56	-1.55	5.98	4.98	5.86	9.48	7.2	5.84	3.21	6.35	-1.61	7.42	7.63	6.81	5.5	-1.41	7.51	6.71	4.59	-10.22	5.27	-5.43	-13.14	-11.14	-7.89	-12.2	-4.55	-2.22			
(Hz)	5.72	7.07	4.32	5.11	5.19	4.48	5.03	7.7	19.65	4.74	4.7	7.6	12.3	8.39	4.65	6.28	5.28	7.19	17.38	13.46	7.32	-10.82	15.74	-11.91	6.77	8.98	-4.77	-4.99	-6.77			
(Hz)	8.86	8.22	6.67	5.61	5.61	5.67	-10.32	-1.77	7.52	5.89	6.32	4.6	4.24	-14.24	-4.81	6.67	8.89	9.98	7.86	12	-11.58	-11.57	-15.37	-6.81	7.6	9.10	-12.5	-8.41	-7.62	-8.88		
(Hz)	7.47	7.81	7.81	8.04	4.36	15.36	1.32	6.33	4.54	-7.87	1.68	7.52	6.67	-11.91	8.82	9.95	12.2	11.98	8.79	14.98	13.39	7.25	9.42	-1.85	8.71	6.86	5.07	-10.31	-6.56	-5.14		
(Hz)	3.59	9.72	10.44	10.52	10.49	10.07	10.86	7.19	4.47	7.03	12.31	13.37	12.27	11.86	14.36	15.54	10.75	12.22	10.38	17.14	-18.78	2.71	17.33	-13.22	17.78	-18.41	10.35	-12.99	-14.54	-10.96	-14.54	
(Hz)	12.31	19.94	14.91	19.73	12.45	16.16	18.65	15.21	17.29	4.88	3.87	5.6	6.46	5.1	6.47	9.57	13.07	17.61	15.99	17.13	18.16	17.41	18.17	18.86	16.72	18.17	18.86	16.72	18.17	18.86	16.72	
(Hz)	14.19	14.49	-13.64	15.87	-19.18	16.04	17.36	14.03	12.99	-11.19	10.08	9.71	7.73	4.89	10.88	-14.87	11.39	-9.85	14.34	12.55	15.12	11.71	11.86	-13.62	14.48	-19.15	17.82	18.91	17.18	18.91	17.18	
(Hz)	16.74	16.47	-16.74	-13.84	-11.87	16.84	4.91	10.6	-12.91	9.12	9.57	7.83	-7.39	7.82	9.35	13.88	-16.59	15.99	-16.04	16.25	-16.88	16.16	-17.1	17.8	-17.8	-16.7	16.7	16.7	16.7	16.7	16.7	
(Hz)	16.72	15.73	-18.71	19.31	-13.48	13.2	-12.77	12.31	-12.24	-14.31	-10.29	-12.59	13.38	-14.06	15.13	-17.85	-18.08	-17.88	-18.73	-14.94	-12.72	-11.85	-14.38	-15.61	-13.72	-13.84	-14.11	-13.38	-14.11	-13.38	-14.11	
(Hz)	18.84	14.23	-13.78	12.83	-10.37	14.48	-4.89	8.2	8.87	6.5	-6.97	10.2	-7.78	-7.81	7.68	15.95	-16.46	-17.76	-17.86	-17.62	-15.29	16.16	-18.17	16.7	-18.17	16.7	-18.17	16.7	-18.17	16.7	-18.17	16.7
(Hz)	18.76	12.57	-12.35	-11.09	-8.97	14.1	6.81	-10.24	-45.48	8.63	-9.92	9.86	-10.08	-10.68	-11.79	-13.13	-15.41	-16.46	-16.14	-15.72	-15.27	-13.98	-13.14	-13.2	-13.28	-12.82	-12.62	-12.72	-13.13	-13.2	-13.13	
(Hz)	18.70	18.4	-18.71	18.54	-18.71	18.75	-18.71	18.75	-15.53	-14.21	-10.58	-12.34	-10.47	-12.15	-16.46	-15.48	-16.12	-15.77	-15.28	-14.54	-14.98	-15.14	-14.91	-14.74	-15.13	-14.71	-15.13	-14.71	-15.13	-14.71	-15.13	-14.71
FreeQ	5.80	Phat	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Gain	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
(Hz)	-1.35	-16.7	-17.07	-17.37	-16.49	-17.28	-13.11	-16.14	-8.01	3.84	-7.63	-7.29	-6.59	-6.47	-5.4	-5.89	-6.67	-7.56	-17.47	-10.82	-10.52	-11.12	-11.79	-12.86	-15.31	-14.88	-12.57	-15.49	-12.86	-15.49	-12.86	
(Hz)	-1.37	-14.25	-13.73	-12.81	-11.87	-10.33	8.16	6.58	-5.91	4.55	-4.02	4.31	-4.77	-5.27	-5.58	-5.89	-6.53	-6.92	-8.27	-10.23	-10.77	-13.31	-13.81	-14.07	-14.07	-14.07	-14.07	-14.07	-14.07	-14.07	-14.07	-14.07
(Hz)	-1.39	-11.59	-13.50	-12.33	-11.86	-9	-7.15	3.36	-4.23	3.44	-3.02	2.66	2.46	2.4	-3.19	-3.89	-4.66	-5.51	-6.26	0.54	-5.76	-5.36	-7.49	-8.66	-12.45	-15.57	-17.49	-18.86	-17.49	-18.86	-17.49	-18.86
(Hz)	-1.88	-11.47	-13.52	-11.47	-11.52	-11.81	-10.57	-7.28	4.25	1.28	-1.48	-1.67	-2.47	-3.17	-4.17	-4.54	-5.3	-6.07	-6.98	-7.56	-10.1	-12.96	-12.71	-13.67	-14.61	-15.75	-16.89	-15.75	-16.89	-15.75	-16.89	-15.75
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.88	0.71	0.89	1.09	0.76	1.07	0.97	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28	13.28	-16.57	4.55	-2.24	-1.27	-1.01	-1.85	-3.46	-4.41	-5.22	-4.24	-4.07	-4.77	-5.44	-6.46	-8.64	-11.13	-14.65	-15.33	-14.72	-14.32	-13.71	-12.11	-11.96	-10.38	-8.62	-7.45
(Hz)	0.97	1.39	-11.77	14.74	-16.28																											



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

E142.51		-17.88-18.11	-16.16-10.32	-12.06-12.16	-12.21-12.17	-11.01-11.98	-13.95-12.82	-15.49-13.09	-11.11-11.87	-15.41-18.98	-17.58-15.66	-12.95-11.51	-16.28-18.97	-12.14-10.48	-12.21-15.78	-9.05-9.87	-8.59-6.17	-11.32-18.97	-14.13-4.83	-2.65-4.86	-8.52-18.47	-14.18-12.39	-18.15-18.89	-18.79-17.57	
E150.51		-17.73-18.33	-18.67-15.72	-17.84-18.65	-16.50-18.11	-16.83-13.61	-12.19-10.19	-9.59-9.86	-8.52-11.11	-13.82-19.17	-17.61-19.34	-18.02-10.33	-18.89-18.37	-16.71-18.49	-14.35-13.17	-12.12-12.16	-12.36-10.35	-7.65-7.58	-11.65-14.18	-11.91-9.77	-6.06-8.01	-10.18-15.35	-18.23-17.84	-17.74-17.87	-16.15-15.78
E157.51		-17.95-17.37	-17.42-18.67	-18.18-18.62	-17.18-13.13	-11.95-11.89	-12.42-12.75	-11.31-11.53	-14.51-17.79	-16.64-17.22	-17.64-17.97	-16.07-16.99	-14.51-13.31	-14.61-16.48	-18.49-19.18	-17.41-17.39	-15.13-15.29	-19.06-17.27	-16.16-12.27	-12.06-12.27	-12.33-16.32	-19.13-17.46	-16.80-18.68	-16.21-19.01	
E162.51		-17.50-19.17	-19.06-17.91	-12.95-12.11	-14.12-17.14	-18.11-15.69	-13.54-12.42	-14.08-15.96	-16.51-17.83	-18.65-18.11	-18.77-18.11	-17.88-17.28	-17.25-18.13	-19.02-17.78	-18.31-17.61	-15.71-14.29	-10.86-10.98	-11.58-13.08	-15.25-17.61	-15.78-13.84	-12.21-11.3	-10.71-10.52	-11.76-13.61	-17.41-17.42	-18.13-18.14
E172.51		-18.07-18.89	-19.18-17.93	-19.23-17.56	-18.87-18.34	-18.34-19.13	-17.72-18.16	-18.43-17.32	-18.95-19.33	-18.85-19.04	-17.21-18.29	-18.33-18.01	-18-18.96	-18.98-18.85	-18.71-18.92	-18.08-19.22	-18.29-18.54	-18.32-19.28	-18.04-18.14	-18.33-18.19	-18.76-14.8	-13.78-12.96	-13.25-15.67	-16.88-17.51	-18.97-19.14
E177.51		-17.90-18.96	-18.56-18.77	-18.96-17.67	-17.81-18.91	-18.27-18.49	-17.96-18.48	-19.36-18.28	-18.91-16.75	-15.33-16.24	-18.47-18.62	-19.31-18.63	-19.03-18.22	-18.81-18.35	-18.89-17.42	-18.71-18.78	-17.84-18.64	-18.81-18.61	-18.14-18.73	-18.94-18.53	-18.75-17.96	-18.15-18.07	-17.93-17.93	-18.27-17.78	-18.10-17.73
FreqHz		5.35GHz	PhdLat. 4	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
Gain		0°(150°/57.5)	0°(150°/22.5)	0°(150°/107.5)	0°(150°/202.5)	0°(150°/67.5)	0°(150°/202.5)	0°(150°/142.5)	0°(150°/157.5)	0°(150°/172.5)	0°(150°/167.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)	0°(150°/202.5)
E179.51		8.98-11.76	-12.02-13.47	-14.07-15.14	-14.36-12.87	10.98-10.27	-1.98-0.54	-8.69-9.34	-7.81-7.85	7.29-7.28	-6.19-7.32	-5.15-7.52	-6.08-6.88	7.18-7.16	-2.97-7.92	-8.53-6.48	8.71-7.17	-6.25-7.92	-8.58-6.64	-6.31-6.44	-6.24-6.21	-6.41-6.57	-6.57-6.78	-6.57-6.78	-6.57-6.78
E187.51		-18.19-17.74	-12.02-13.94	-11.89-11.77	-13.14-15.62	-14.36-13.24	-11.19-10.47	-9.09-9.89	-7.59-6.47	-5.88-5.54	-5.46-6.52	-4.95-6.45	-3.95-4.14	-4.40-5.41	-5.54-7.61	-6.44-6.17	-6.04-6.86	-8.12-7.1	-6.41-6.57	-5.85-6.87	-5.72-6.38	-5.73-6.03	-4.87-6.89	-5.37-6.06	-6.75-6.84
E192.51		6.75-7.32	-7.92-7.56	-8.22-9.11	-10.92-13.95	-14.04-13.14	-10.23-9.88	-10.26-9.23	-7.48-5.5	-4.46-3.82	-3.76-3.96	-3.73-3.96	-4.12-4.18	-4.31-6.02	-4.21-7.97	-5.43-6.85	-6.84-6.44	-6.31-6.44	-6.24-6.21	-6.41-6.57	-6.57-6.78	-6.57-6.78	-6.57-6.78	-6.57-6.78	-6.57-6.78
E197.51		3.48-4.17	-3.91-3.48	-3.74-5.72	-8.32-10.29	-13.48-12.91	-13.10-10.22	-13.11-12.35	-10.55-8.02	-6.94-3.47	-3.17-3.56	-3.20-3.43	-4.45-4.7	-4.64-5.58	-7.11-10.28	-12.56-10.55	-8.12-7.28	-7.98-8.67	-8.15-9.22	-6.88-7.79	-6.87-6.76	-5.54-6.43	-4.21-7.1	-1.88-1.38	-1.77-1.28
E207.51		5.72-7.91	-6.38-7.44	-7.02-9.12	-13.38-19.68	-17.92-17.17	-18.43-19.13	-12.10-12.12	-3.98-4.04	-6.64-6.84	-7.95-7.25	-6.29-6.31	-4.16-7.39	-3.63-4.43	-6.83-6.88	-10.35-8.65	-7.71-10.23	-10.12-11.78	-12.53-11.19	-6.36-7.28	-6.04-6.22	-4.26-4.34	-4.39-4.31	-4.08-3.66	-2.81-3.47
E212.51		5.98-6.04	-8.62-8.61	-9.19-12.38	-11.57-10.61	-11.99-10.86	-17.44-19.18	-11.77-10.82	-6.65-6.76	-4.48-3.36	-3.22-3.14	-2.30-3.89	-4.03-3.57	-3.16-4.07	-6.00-7.7	-7.39-6.52	-6.49-6.87	-7.62-10.47	-10.39-10.88	-7.62-6.5	-5.72-6.28	-5.97-6.48	-6.76-6.34	-5.12-5.46	-5.12-5.46
E22.51		6.48-6.89	-8.62-8.61	-11.97-10.67	-14.58-19.28	-13.24-12.57	-10.24-10.09	-9.17-9.77	-4.42-4.14	-3.33-4.09	-3.54-3.71	-2.59-4.1	-4.4-3.5	-3.61-4.78	-6.09-10.15	-8.46-8.61	-5.98-11.84	-12.43-12.91	-11.28-8.87	-8.96-8.68	-6.63-5.55	-5.25-5.25	-5.49-5.49	-5.49-5.49	-5.49-5.49
E27.51		8.51-6.64	-6.5-7.27	-7.24-13.28	-19.44-18.89	-18.89-10.38	-10.82-8.77	-8.26-10.16	-4.08-3.26	-3.44-3.47	-4.63-1.1	-4.26-6.65	-4.76-5.7	-7.18-6.35	-6.02-7.91	-8.62-7.83	-6.28-6.62	-8.20-10.15	-11.68-13.31	-14.88-14.47	-14.78-12.55	-8.96-6.88	-7.84-10.1	-13.79-13.61	-8.89-8.36
E28.51		8.51-6.65	-6.5-6.35	-6.03-10.22	-12.66-17.54	-11.1-11.79	-10.89-10.67	-8.80-10.32	-3.89-3.2	-4.54-3.2	-4.94-7	-6.24-10.24	-6.09-10.25	-4.42-12.17	-12.07-18.67	-17.93-11.19	-7.73-8.64	-10.41-10.67	-13.44-16.48	-14.18-16.48	-15.18-15.4	-11.09-8.85	-9.77-9.1	-13.46-13.1	-7.43-6.4
E28.51		-19.86-19.3	-7.58-6.41	-3.57-6.09	-6.43-17.77	-6.38-7.82	-18.07-12.03	-6.69-6.26	-5.48-3.46	-5.24-6.94	-7.22-6.12	-8.11-10.16	-9.91-13.69	-13.36-11.59	-11.89-15.69	-15.48-6.49	-7.32-8.34	-9.86-11.17	-13.24-18.19	-17.25-14.09	-18.04-18.44	-15.51-15.02	-16.76-15.2	-15.41-12.9	-12.29-13.2
E28.51		-18.82-11.21	-6.58-6.44	-6.03-6.56	-7.84-14.14	-13.12-13.95	-19.05-18.82	-6.79-6.02	-5.58-3.54	-7.53-6.7	-8.61-9.34	-10.15-15.15	-13.18-13.16	-16.14-18.49	-18.77-18.94	-15.61-18.1	-11.45-11.1	-13.04-18.85	-19.14-18.77	-18.46-18.22	-16.46-15.43	-18.14-18.37	-17.62-17.78	-15.59-15.6	
E28.51		-18.71-15.65	-12.27-11.62	-7.92-6.67	-7.34-10.36	-10.90-11.76	-19.42-19.11	-6.41.8	-6.45-4.45	-6.99-8.85	-13.76-7.16	-10.72-18.14	-17.42-17.17	-12.82-14.62	-17.99-17.54	-14.21-15.98	-12.22-12.96	-18.91-18.46	-14.38-12.63	-16.88-19.09	-17.96-18.63	-18.11-13.64	-17.86-18.02	-16.90-19.44	-13.14-13.61
E28.51		-10.32-12.57	-18.11-19.04	-17.10-10.02	-8.2-15.15	-10.77-12.31	-13.19-14.55	-6.47-10.35	-7.84-6.52	-13.48-11.67	-18.08-13.39	-15.88-16.15	-13.93-18.66	-13.73-13.64	-15.37-13.32	-15.12-13.96	-15.81-14.85	-13.80-17.99	-17.12-15.99	-17.34-18.6	-18.81-14.5	-13.87-16.97	-15.22-18.96	-17.32-19.11	-17.32-19.11
E102.51		-17.93-14.1	-17.70-18.66	-11.27-13.16	-7.71-19.59	-8.41-13.35	-13.26-12.79	-8.99-7.91	-10.29-6.63	-17.98-12.31	-17.52-8.57	-12.56-12.32	-13.46-15.29	-8.99-8.08	-11.08-13.11	-14.78-16.05	-12.24-12.78	-14.77-19.69	-18.81-17.99	-16.64-17.36	-18.63-19.12	-18.29-9.2	-17.99-10.57	-9.06-17.57	-9.06-17.57
E112.51		6.34-7.33	-7.96-14.7	-13.88-15.63	-8.41-13	-17.53-18.76	-12.16-11.22	-12.14-6.38	-18.93-13.48	-18.33-12.08	-16.41-12.47	-15.99-18.63	-11.10-10.98	-8.46-10.55	-9.11-16.18	-14.78-16.05	-11.42-12.62	-12.02-15.26	-16.82-17.47	-16.44-15.27	-18.76-18.66	-18.93-18.66	-12.61-13	-10.52-14.57	-9.38-6.5
E117.51		-11.94-9.13	-11.65-13.44	-17.44-18.02	-16.25-18.69	-14.12-18.01	-12.65-8.76	-18.83-13.66	-17.98-15.71	-18.38-11.68	-15.69-7.35	-4.68-9.34	-6.71-14.46	-12.63-9.51	-4.34-6.49	-9.58-13.31	-11.59-19.59	-15.88-18.29	-17.71-18.28	-18.03-16.32	-17.66-17.87	-18.03-13.36	-13.37-12.67	-9.38-14.7	-13.12-8.3
E127.51		-13.94-13.44	-14.07-13.14	-19.38-18.98	-17.32-19.1	-10.12-15.39	-13.20-17.28	-19.18-19.86	-16.21-13.98	-14.98-7.35	-8.11-10.49	-11.59-10.55	-11.12-9.46	-14.57-9.74	-18.41-13.39	-17.16-10.96	-12.16-19.81	-16.97-17.47	-16.45-18.72	-16.25-16.95	-19.31-12.24	-2.54-9.25	-13.99-13.99	-16.14-18.14	-16.14-18.14
E137.51		7.78-8.51	-11.49-12.95	-12.86-18.36	-16.48-18.17	-16.61-14.33	-18.36-19.79	-14.88-18.96	-14.59-14.47	-8.87-8.48	-10.26-10.19	-10.34-10.94	-10.58-10.19	-10.47-10.72	-5.88-10.97	-11.62-16.54	-11.58-14.39	-15.68-16.18	-14.48-18.17	-17.68-18.02	-14.48-18.17	-15.16-16.88	-10.24-8.23	-11.14-18.23	-13.34-18.1
E142.51		6.4-10.12	-13.19-13.02	-13.07-14.8	-12.59-16.92	-13.87-14.08	-15.57-16.55	-17.46-19.67	-14.88-11.55	-19.19-10.16	-17.11-17.23	-10.32-12.29	-16.31-12.65	-7.97-16.68	-6.22-10.95	-14.97-19.19	-15.12-12.44	-14.89-13.16	-13.24-18.15	-15.99-18.19	-17.26-17.34	-14.73-16.37	-19.49-11.14	-6.88-7.65	-8.76-7.48
E147.51		8.98-9.58	-14.8.																						



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

Gain	0(15°)/0(7.5°)	0(15°)/0(22.5°)	0(30°)/0(7.5°)	0(45°)/0(0.0°)	0(45°)/0(67.5°)	0(60°)/0(7.5°)	0(75°)/0(0.0°)	0(90°)/0(0.0°)	0(105°)/0(112.5°)	0(120°)/0(127.5°)	0(135°)/0(142.5°)	0(150°)/0(157.5°)	0(165°)/0(172.5°)	0(180°)/0(187.5°)	0(195°)/0(202.5°)	0(210°)/0(217.5°)	0(225°)/0(232.5°)	0(240°)/0(247.5°)	0(255°)/0(262.5°)	0(270°)/0(277.5°)	0(285°)/0(292.5°)	0(300°)/0(307.5°)	0(315°)/0(322.5°)	0(330°)/0(337.5°)	0(345°)/0(352.5°)	
0(0°)	2.89-4.28	5.45-6.05	6.11-6.89	7.47-8.11	8.41-8.87	7.28-8.47	6.91-6.76	5.96-3.71	3.41-3.07	2.46-1.83	1.48-1.44	2.51-2.85	3.10-3.74	4.92-5.88	6.66-6.3	7.49-8.11	8.86-8.22	7.37-7	6.41-5.55	4.29-3.47	2.98-2.52	2.21-2.24	1.84-1.47	1.13-1.02	0.98-0.85	
0(15°)	1.271-1.99	2.86-3.82	4.61-5.62	6.71-7.36	8.36-8.83	8.96-7.02	7.36-6.76	5.90-3.91	3.48-3.05	2.56-2.4	1.59-1.54	2.51-2.85	3.10-3.74	4.92-5.88	6.66-6.3	7.49-8.11	8.86-8.22	7.37-7	6.41-5.55	4.29-3.47	2.98-2.38	1.98-1.51	1.13-1.02	0.98-0.85		
0(30°)	5.38-6.4	4.81-5.21	6.36-6.13	7.79-8.88	10.26-11.06	11.28-9.5	9.33-7.82	6.89-5.01	4.84-4.36	3.33-2.53	2.14-2.13	2.33-3.25	4.39-4.71	6.04-6.38	8.3-6.3	7.61-6.37	6.46-4.75	4.13-3.76	3.47-3.33	3.37-3.43	3.26-4.37	3.26-4.37	3.26-4.37	3.26-4.37	3.26-4.37	
0(22.5°)	5.51-6.01	6.79-8.52	10.58-12.22	12.58-11.94	11.48-11.92	12.17-10.66	9.71-7.26	6.46-5.83	5.69-5.35	4.34-3.1	1.97-1.2	1.47-2.37	3.32-4.24	6.21-6.22	4.34-3.47	3.07-3.67	4.57-6.66	8.11-8.27	7.81-6.16	4.72-3.79	3.13-2.8	3.26-4.37	3.26-4.37	3.26-4.37	3.26-4.37	
0(30°)	7.83-8.28	6.09-10.79	11.82-13.04	15.98-12.66	17.87-7.24	8.76-12.3	11.01-8.45	7.08-5.88	5.03-5.12	6.43-4.29	2.83-1.99	2.07-2.84	3.19-3.7	4.9-5.09	3.91-2.85	2.79-3.14	3.93-4.41	5.3-5.58	6.32-6.26	6.64-3.72	2.98-2.07	2.55-3.61	5-8.87	6.84-6.51		
0(37.5°)	3.83-5.19	5.97-6.28	7.84-8.22	8.71-11.45	8.89-8.53	10.44-13.98	15.83-14.49	10.19-6.09	4.14-3.77	3.8-3.09	1.9-1.74	3.05-3.79	3.26-3.95	4.9-4.17	2.81-2.14	2.35-3.31	4.62-5.64	6.22-6.67	7.27-7.33	7.37-7.08	5.92-4.16	2.88-2.72	3.07-3.37	3.3-3.49		
0(45°)	3.41-5.97	10.05-11.3	10.62-10.2	8.19-13.44	14.61-11.73	17.07-19.08	17.56-11.25	9.59-7.62	4.71-3.85	3.37-3.31	2.86-1.96	4.11-6.94	6.15-6.32	7.21-6.31	4.13-3.3	3.14-1.5	5.78-7.19	8.63-10.02	12.3-11.85	10.13-8.27	7.19-5.69	5.65-4.4	3.71-3.2	3.21-3.27		
0(52.5°)	4.89-5.82	4.79-7.26	8.81-10.86	9.89-15.76	18.33-16.58	17.62-11.38	11.48-6.43	4.95-6.15	4.71-4.27	3.75-3.87	2.82-2.18	4.83-5.88	4.97-5.98	6.22-7.42	4.55-5.19	4.78-4.37	6.08-7.8	11.44-15.94	17.88-14.18	10.46-8.47	8.82-6.85	4.78-5.81	5.85-5.14	5.88-5.57		
0(60°)	4.77-4.55	4.84-5.33	6.88-7.17	18.78-19	13.86-12.55	8.63-7.5	10.15-10.68	2.52-5.41	5.59-4.14	3.75-5.25	4.87-4.48	9.48-9.01	7.50-7.2	8.52-9.48	7.58-9.22	7.52-9.22	6.77-6.16	16.71-14.22	10.56-8.85	10.08-9.72	7.45-6.84	2.71-2.82	4.58-4.03	4.58-4.03		
0(67.5°)	7.13-6.4	3.79-3.02	4.18-67	16.02-17.34	6.9-6.78	10.89-9.84	9.4-6.43	2.88-6.71	3.56-8.34	6.71-6.52	8.58-7.89	9.63-8.45	7.82-7.14	4.82-5.61	8.59-11.2	8.07-5.74	4.82-7.46	11.66-14.45	16.08-17.13	10.58-9.76	8.82-9.74	10.26-12.57	16.18-11.64	7.53-6.31		
0(75°)	11-11.6	4.79-4.45	4.49-5.06	10.07-15.52	5.74-7.5	13.51-10.3	9.39-9.32	3.53-4.60	5.47-8.02	4.32-10.84	10.32-9.79	15.44-13.67	10.88-9.39	9.38-8.85	9.24-10.5	10.35-7.44	5.31-6.56	11.07-13.28	13.57-16.35	10.72-9.33	10.82-10.37	12.72-15.82	18.82-18.3	11.29-6.17		
0(82.5°)	13.36-11.43	5.48-5.3	3.63-3.39	6.51-18.82	8.02-8.19	18.22-13.01	8.21-13	5.84-10.87	5.63-14.33	8.41-14.26	13.3-12.41	17.88-16.87	14.87-9.34	8.24-8.4	9.88-11.43	11.88-9.51	6.11-7.31	10.48-10.06	11.48-16.97	11.82-10.03	13.64-16.86	17.71-18.28	18.78-17.07	18.28-14.98		
0(90°)	8.65-11.7	3.88-6.47	3.88-6.47	6.46-15.6	11.19-10	18.81-15.88	6.88-12.4	5.55-11.32	12.68-18.03	10.41-12.66	18.28-11.72	17.36-17.78	18.18-12.4	11.07-11.28	12.71-14.23	19.41-14.05	8.28-9.63	14.25-12.34	12.38-19.05	12.93-13.48	18.84-18.76	14.11-12.48	13.01-10.85	16.33-11.41		
0(97.5°)	8.83-18.21	17.65-16.91	7.24-6.94	5.99-11.44	14.39-11.27	10.76-19.1	6.14-14.25	6.48-11.11	13.25-17.85	12-18.45	18.72-14.72	18.28-14.26	15.15-11.49	10.78-15.2	16.05-15.58	15.53-14.81	8.72-9.76	16.84-16.24	16.07-17.9	12.53-18.41	18.19-16.49	11.13-10.37	8.45-10.01	10.62-7.82		
0(105°)	8.45-12.29	9.35-12.44	10.23-11.86	4.31-7.79	15.89-13.69	11.47-15.3	6.11-9.49	8.36-14.14	15.78-16.27	14.14-19.28	18.16-18.04	16.21-12.93	15.19-14.31	12.98-16.88	18.96-15.68	18.96-15.68	9.44-10.06	19.21-15.09	16.78-16.79	12.23-17.68	18.41-13.73	12.88-14.17	15.13-12.54	8.22-5.89		
0(112.5°)	8.26-7.84	8.51-11.35	10.33-17.56	9.36-11.48	18.88-15.11	12.84-17.76	9.71-12.97	16.79-18.9	17.18-17.16	13.21-17.95	14.81-17.07	15.41-11.93	13.28-14.19	15.87-18.89	18.48-19.02	17.19-11.62	8.85-12.56	18.78-16.12	17.91-15.54	11.87-18.58	18.02-12.5	8.78-10.5	8.17-10.55	10.07-8.62		
0(120°)	8.76-15.01	16.21-15.95	14.71-18.47	15.28-13.16	18.56-18.34	8.45-13.35	15.89-13.75	17.48-18.13	13.33-19.94	11.35-17.15	14.85-15.23	15.83-9.45	9.45-11.63	7.91-8.4	15.33-17.2	17.87-13.39	15.51-15.99	18.62-17.29	17.74-16.17	17.98-11.97	18.81-10.37	17.62-7.82	11.45-14.73	7.56-4.94		
0(127.5°)	8.87-10.88	18.81-15.72	11.97-18.96	12.29-14.9	13.25-12.73	18.74-13.68	18.38-12	12.77-13.31	6.39-12.96	13.87-12.49	8.79-6.88	8.52-6.65	10.49-9.75	7.28-10.32	16.18-18.18	14.33-11.46	18.04-17.96	18.99-19.48	18.55-16.59	19.03-18.97	17.72-13.13	18.93-17.35	18.83-5.52	14.28-7.72		
0(135°)	8.47-16.86	10.93-13.21	10.68-13.16	17.18-18.63	15.85-18.97	18.32-12.68	13.97-12.97	11.14-12.59	12.38-13.35	11.38-13.61	14.21-13.89	8.96-7.31	8.36-8.4	10.54-11.51	18.47-13.33	13.38-14	15.08-17.24	17.88-17.94	18.11-17.91	16.05-16.54	13.07-14.47	4.51-6.66	14.38-9.89	16.33-16.41		
0(142.5°)	4.51-6.32	11.47-18.17	18.46-14.47	17.88-19.09	18.42-17.92	14.11-12.56	15.91-13.8	15.08-16.59	14.03-13.69	12.42-15.29	13.18-8.89	10.64-18.35	19.1-14.3	10.51-10.79	13.44-11.82	10.89-11.19	16.61-19.48	18.21-18.5	18.61-18.42	12.59-10.02	12.31-17.85	18.23-13.5	8.16-12.82	8.14-5.5		
0(150°)	11.21-12.31	16.15-17.43	16.41-15.5	18.83-18.82	18.16-17.53	14.73-14.87	17.51-17.56	17.16-18.88	16.45-12.38	10.96-10.89	10.63-10.85	12.83-12.87	10.88-9.04	8.79-10.65	10.55-10.06	10.27-14.12	18.27-18.77	18.26-18.33	18.25-18.96	15.21-9.95	8.25-11.74	11.78-7.55	5.18-5.58	4.9-8.08		
0(157.5°)	10.36-12.29	13.28-14.54	16.57-15.78	17.15-16.07	12.86-12.69	15.21-18.5	19.26-17.15	18.55-17.37	16.24-15.52	12.78-10.97	9.58-4.2	7.39-6.89	6.66-6.57	6.34-11	7.16-11.1	14.36-14.47	18.06-18.4	18.84-18.9	17.97-16.64	12.55-10.04	8.13-7.65	7.56-7.23	6.52-6.56	4.83-6.19		
0(165°)	18.03-17.61	18.11-17.07	18.71-18.3	14.83-14.89	14.97-15.3	17.02-17.47	16.58-17.06	18.61-17.19	18.41-18.87	17.43-18.83	17.56-16.47	14.87-14.06	12.11-10.5	10.81-10.14	11.31-12.13	12.83-15.34	17.28-18.66	18.11-17.99	18.19-18.42	17.13-13.26	8.14-7.3	6.85-7.44	7.83-9.14	11.18-13.79		
0(172.5°)	8.35-8.28	8.84-9.37	11.07-14.28	17.1-18.48	18.05-17.78	18.03-17.94	17.62-15.05	19.26-19	18.22-16.54	15.55-14.37	11.99-9.58	8.09-7.15	6.94-7.49	8.71-9.32	6.22-9.91	11.55-13.96	17.84-19.15	18.11-18.52	18.38-16.91	16.15-16.13	14.82-17.14	18.43-17.73	18.72-13.12	11.07-8.54		
0(180°)	15.43-17.05	18.22-15.4	12.82-12.49	12.44-13.9	18.61-17.87	18.84-18.84	19.78-18.47	18.81-14.83	12.85-11.84	10.29-9.05	8.48-8.54	8.98-9.54	8.87-8.62	8.83-9.89	10.3-10.83	12.21-14.29	15.97-18.12	18.88-18.03	17.82-19	18.36-18.51	17.62-19	17.98-18.44	17.76-18.99			
Thresh	3.765-9.94	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	Thresh-4	
Gain	0(15°)/0(7.5°)	0(15°)/0(22.5°)	0(30°)/0(7.5°)	0(45°)/0(0.0°)	0(45°)/0(67.5°)	0(60°)/0(7.5°)	0(75°)/0(0.0°)	0(90°)/0(0.0°)	0(105°)/0(112.5°)	0(120°)/0(127.5°)	0(135°)/0(142.5°)	0(150°)/0(157.5°)	0(165°)/0(172.5°)	0(180°)/0(187.5°)	0(195°)/0(202.5°)	0(210°)/0(217.5°)	0(225°)/0(232.5°)	0(240°)/0(247.5°)	0(255°)/0(262.5°)	0(270°)/0(277.5°)	0(285°)/0(292.5°)	0(300°)/0(307.5°)	0(315°)/0(322.5°)	0(330°)/0(337.5°)	0(345°)/0(352.5°)	
0(0°)	5.44-5.72	5.07-4.78	4.73-3.51	2.98-2.49	2.23-2.33	2.51-2.58	2.52-3.14	3.17-3.42	4.82-5.15	6.08-7.18	8.22-8.88	8.21-7.69	8.78-8.67	9.16-9.13	3.62-3.88	2.21-2	2.33-2.55	3.06-3.48	4.15-4.59	4-7.19	8.46-8.86	8.5-8.43	8.55-7.42			
0(15°)	7.71-7.43	7.33-7.08	6.34-6.11	4.44-3.99	3.82-3.88	4.12-4.39	4.84-6.26	5.91-6.88	6.08-6.69	11.05-11.53	10.71-16	7.44-6.94	5.27-4.75	4.38-3.78	3.63-3.38	3.89-2.73	2.71-2.77	2.98-3.04	2.98-2.9	2.79-3.18	3.74-4.54	5.13-5.56	5.34-6.84	7.04-7.4		
0(30°)	7.74-8.24	7.74-8.66	9.79-11.55	11.81-11.21	8.92-8.82	7.77-7.27	9.69-9.06	10.41-11.38	13.34-15.54	16.31-15.56	11.84-8.56	8.28-4.56	3.35-2.75	2.45-2.28	2.9-2.33	3.39-2.89	2.39-2.02	1.88-1.87	1.05-2.08	1.96-1.87	3.52-4.66	5.76-6.85	8.43-6.54	8.95-8.47		
0(22.5°)	7.02-6.1	5.84-6.69	6.91-6.01	5.77-5.68	4.92-4.82	5.49-6.26	7.39-6.21	11.37-12.4	12.26-12.84	14.51-15.32	13.38-6.59	5.89-4.36	3.28-2.67	3.63-3.14	3.36-3.15	2.43-1.21	0.43-0.31	0.75-1.19	1.11-1.1	0.49-0.03	1.29-2.72	5.08-7.97	11.35-11.44	11.29-8.91		
0(30°)	10.78-10.32	11.29-10.63	6.97-4.34	2.86-2.98	4.05-5.58	6.81-8.44	11.85-14.34	16.09-17.82	18.71-16.26	14.69-18.18	13.71-10.7	7.89-5														



Antenna Pattern of 2.4GHz / 5GHz

Appendix B

(H25°)	5.94(-2.7)	-5.53(-5.1)	-4.66(-4.6)	-5.13(-4.1)	-5.90(-4.8)	-4.06(-3.6)	-2.96(-2.1)	-1.22(-0.5)	0.32(-0.7)	-1.62(-2.6)	-3.99(-5.6)	-7.91(-9.9)	-12.49(-11.4)	9.43(-7.2)	4.43(-4.0)	-8.50(-9.8)	-8.89(-6.8)	-4.78(-3.1)	3.15(-2.8)	-2.41(-2.7)	-2.80(-3.3)	-3.46(-3.4)	-3.68(-4.2)	-4.85(-4.2)	
(H24°)	7.44(-7.8)	-6.54(-4.2)	-3.72(-3.4)	-4.91(-5.3)	-3.91(-7.7)	-2.80(-8.1)	1.24(-7.2)	1.22(-2.2)	1.84(-5.8)	-0.81(-6.9)	-2.22(-5.5)	-2.90(-2.4)	-3.30(-1.4)	5.16(-4.6)	-5.71(-6.6)	-10.10(-4.8)	-6.21(-6.3)	-7.18(-7.7)	4.32(-4.3)	-3.02(-2.5)	-1.45(-2.0)	-3.40(-7.3)	-1.19(-2.9)	-3.57(-4.0)	
(H23°)	4.17(-5.2)	-3.15(-1.9)	-2.14(-2.2)	-2.51(-2.3)	-1.03(-0.9)	3.26(-6.0)	3.80(-3.5)	2.64(-1.0)	0.00(-0.4)	-1.23(-0.7)	-1.89(-2.9)	-4.28(-2.6)	-6.71(-1.3)	14.28(-13.1)	-10.62(-4.5)	-6.77(-7.2)	-6.71(-11.3)	-14.28(-13.1)	-1.54(-1.2)	-2.49(-2.2)	-4.49(-2.4)	-4.98(-2.6)	-2.86(-4.1)	-2.86(-4.1)	
(H22°)	3.30(-2.7)	-0.69(-2.1)	-0.22(-2.1)	-1.00(-1.5)	-1.28(-3.3)	2.25(-2.2)	3.31(-1.7)	3.02(-2.7)	1.21(-1.6)	-0.08(-1.6)	-0.78(-0.4)	-0.03(-0.7)	-1.19(-1.4)	2.86(-1.9)	-3.46(-4.0)	-7.37(-5.0)	-4.01(-4.8)	-5.01(-2.9)	3.15(-5.6)	-8.13(-5.4)	-2.82(-2.5)	-3.25(-5.4)	-3.97(-4.9)	-1.65(-2.7)	
(H21°)	2.20(-1.7)	-0.38(-0.9)	0.60(-1.6)	0.70(-1.2)	-0.70(-1.2)	1.62(-2.2)	1.56(-4.2)	-1.59(-5.6)	-1.31(-5.0)	-0.59(-1.4)	-0.71(-4.2)	-0.87(-6.8)	-2.60(-3.2)	4.59(-5.2)	-1.75(-4.2)	-4.11(-5.4)	-2.51(-0.7)	1.47(-1.6)	3.17(-6.2)	-3.31(-1.2)	-2.32(-5.0)	-3.57(-5.0)	-0.90(-1.6)	-1.01(-1.4)	
(H20°)	2.20(-1.98)	-1.50(-1.4)	1.10(-1.2)	0.74(-2.2)	-1.32(-1.9)	-0.35(-0.3)	0.29(-1.98)	-2.19(-1.7)	0.48(-5.8)	0.53(-6.9)	2.31(-2.2)	-0.65(-0.4)	-2.55(-5.6)	-4.59(-6.8)	-6.96(-2.4)	-5.86(-3.6)	-3.78(-3.4)	-1.37(-1.2)	4.40(-2.0)	6.45(-1.0)	8.30(-3.4)	-1.44(-3.7)	-4.48(-2.1)	-1.43(-2.4)	
(H19°)	6.07(-3.7)	-1.71(-2.1)	1.58(-1.4)	0.91(-0.8)	-1.91(-2.4)	-0.41(-0.1)	0.12(-0.45)	-0.50(-1.24)	0.47(-0.4)	-0.00(-0.38)	-0.63(-1.15)	-0.65(-1.53)	-2.09(-5.2)	-7.10(-7.4)	-10.25(-9.6)	-6.06(-3.89)	-4.71(-3.16)	-0.59(-0.92)	-2.36(-1.02)	-4.61(-4.84)	-6.94(-3.12)	-0.40(-1.86)	-4.91(-3.67)	-3.09(-3.3)	
(H18°)	8.24(-3.9)	-1.50(-1.4)	1.37(-0.8)	1.29(-0.1)	-1.75(-2.05)	-0.24(-0.6)	1.01(-0.35)	0.12(-0.67)	-0.97(-1.6)	-0.30(-0.9)	0.63(-0.54)	-1.72(-1.20)	-0.67(-1.35)	-6.92(-4.0)	-12.37(-7.1)	-6.10(-3.84)	-5.11(-2.22)	-0.73(-0.88)	-6.08(-2.95)	-5.20(-1.94)	-1.58(-2.46)	-0.51(-1.53)	-3.89(-3.46)	-1.47(-1.7)	
(H17°)	9.89(-4.2)	-2.43(-0.4)	0.50(-0.3)	0.60(-0.1)	3.34(-2.20)	0.34(-1.1)	1.38(-0.4)	2.40(-2.34)	-0.85(-0.9)	1.07(-0.63)	-2.50(-2.38)	-1.35(-2.85)	-3.82(-5.4)	-15.49(-9.49)	-10.21(-5.36)	-4.19(-5.0)	-1.11(-0.84)	-8.87(-6.19)	-4.88(-2.24)	0.89(-0.56)	-0.76(-1.50)	-2.54(-3.67)	-5.50(-3.6)	-5.50(-3.6)	
(H16°)	-7.01(-5.53)	-3.51(-2.14)	-1.82(-1.1)	-1.11(-0.59)	-4.78(-2.1)	-1.21(-0.8)	0.80(-0.9)	0.68(-1.9)	-2.28(-4.4)	-3.47(-1.02)	0.53(-0.19)	-2.62(-3.87)	-2.38(-2.28)	-5.58(-7.3)	-14.74(-12.34)	-11.20(-7.94)	-4.44(-1.87)	-0.80(-1.6)	2.15(-2.43)	-4.24(-3.80)	1.30(-4.49)	-2.32(-2.28)	-5.26(-5.0)	6.16(-1.76)	
(H15°)	-10.27(-5.73)	-4.59(-2.34)	-3.01(-1.3)	-1.50(-1.98)	-5.03(-3.39)	-1.78(-1.4)	0.30(-1.2)	-1.02(-1.84)	-2.61(-5.78)	-6.09(-1.35)	-0.96(-1.37)	-4.00(-6.31)	-2.91(-3.02)	-13.86(-12.59)	-10.65(-9.58)	-4.22(-3.38)	-3.50(-1.16)	-3.79(-3.0)	3.76(-5.21)	-3.76(-5.21)	0.94(-0.67)	-2.00(-2.33)	-5.54(-5.68)	-2.40(-2.33)	
(H14°)	-7.91(-7.13)	-7.44(-6.4)	-6.90(-4.41)	-3.71(-2.1)	-5.28(-3.39)	-2.71(-1.6)	0.00(-1.3)	2.31(-2.30)	1.34(-4.48)	-7.90(-4.1)	-3.29(-2.52)	-3.69(-5.65)	-4.44(-4.40)	-5.69(-6.8)	-12.02(-11.98)	-8.35(-6.98)	-7.54(-7.99)	-3.76(-4.07)	-7.56(-5.66)	-3.80(-4.73)	0.98(-0.67)	-0.88(-1.53)	-4.74(-5.73)	-4.74(-5.73)	
(H13°)	6.83(-7.6)	-7.23(-6.3)	-6.12(-4.6)	-4.02(-1.4)	8.11(-4.63)	-4.04(-1.3)	-2.72(-2.09)	-3.09(-2.06)	-3.57(-7.81)	-13.07(-4.62)	-4.19(-2.76)	-4.09(-7.80)	-5.44(-6.25)	-7.72(-8.61)	-16.38(-9.55)	-8.86(-1.12)	-0.89(-0.80)	-5.20(-5.95)	-10.75(-7.94)	-4.19(-7.59)	-6.17(-7.94)	-13.64(-5.1)	-6.02(-4.2)	-9.12(-7.6)	
(H12°)	4.34(-6.42)	-8.40(-2.57)	-7.37(-2.40)	-4.78(-0.65)	-7.09(-7.56)	-4.78(-0.65)	-4.19(-3.02)	-4.57(-8.1)	-7.20(-4.49)	-3.65(-9.32)	-4.84(-7.82)	-7.20(-4.49)	-6.84(-7.82)	-7.20(-4.49)	-9.65(-9.32)	-10.36(-10.79)	-7.32(-10.52)	-3.56(-10.07)	-8.72(-12.52)	-4.57(-10.14)	-7.91(-9.30)	-12.76(-4.73)	-12.40(-10.32)	-8.82(-9.65)	
(H11°)	7.58(-7.52)	-7.37(-7.38)	-6.90(-6.76)	-4.70(-6.56)	9.94(-6.81)	-7.04(-5.85)	-8.58(-6.11)	-5.16(-5.31)	6.26(-10.15)	-8.63(-5.58)	-3.40(-3.74)	-4.34(-7.45)	-6.40(-7.94)	-11.65(-11.2)	-14.96(-9.88)	-12.48(-10.06)	-10.10(-9.26)	-6.61(-8.3)	-5.77(-14.04)	-8.74(-8.57)	-10.84(-8.00)	-10.96(-12.56)	-14.96(-15.05)	-7.98(-6.0)	
(H10°)	-12.33(-7.86)	-6.98(-6.66)	-10.45(-6.10)	-8.69(-6.82)	-11.46(-6.81)	-7.51(-7.02)	-7.81(-7.39)	-6.50(-6.49)	-7.23(-6.87)	-8.43(-8.96)	-4.48(-3.76)	-6.64(-7.28)	-6.64(-7.28)	-11.71(-11.77)	-14.87(-13.65)	-12.88(-11.14)	-10.38(-9.74)	-7.84(-11.53)	-3.88(-7.69)	-10.89(-12.82)	-12.09(-13.80)	-15.74(-11.27)	-7.67(-12.36)	-9.26(-10.69)	
(H9°)	-15.01(-9.85)	-10.21(-10.48)	-11.96(-11.31)	-11.88(-11.59)	-11.36(-9.36)	-7.93(-7.79)	-7.42(-6.47)	-1.42(-6.71)	-7.35(-6.89)	-11.40(-10.51)	-4.94(-5.48)	-5.49(-5.84)	-7.33(-7.7)	-10.59(-11.42)	-15.02(-12.06)	-14.81(-14.08)	-11.18(-9.37)	-8.47(-11.20)	-8.91(-11.1)	-10.83(-10.18)	-13.36(-15.09)	-15.03(-13.1)	-13.78(-9.48)	-9.26(-10.69)	
(H8°)	-12.10(-14.88)	-12.40(-10.18)	-8.31(-7.98)	-9.24(-8.21)	-7.98(-7.78)	-7.42(-6.49)	-4.25(-6.14)	-4.04(-6.16)	-7.85(-6.95)	-10.14(-10.25)	-8.75(-9.48)	-7.53(-6.49)	-7.16(-6.02)	-10.90(-10.66)	-15.02(-12.40)	-10.90(-11.99)	-11.46(-11.82)	-14.80(-15.43)	-15.02(-15.35)	-15.20(-15.10)	-15.06(-12.04)	-13.74(-11.98)	-10.10(-11.70)	-10.10(-11.70)	
(H7°)	-11.43(-9.41)	-8.88(-9.4)	-8.96(-9.78)	-8.94(-9.78)	-4.36(-9.57)	-6.16(-7.21)	-8.64(-8.87)	-8.10(-9.64)	-10.64(-12.21)	-12.31(-11.64)	-11.82(-11.58)	-10.09(-9.06)	-9.37(-11.37)	-10.67(-10.18)	-10.16(-11.81)	-12.61(-13.63)	-13.42(-11.92)	-11.87(-13.25)	-15.24(-12.17)	-14.89(-14.48)	-12.33(-12.96)	-12.87(-12.19)	-11.19(-13.23)	-12.87(-12.19)	
(H6°)	-10.86(-10.79)	-12.81(-10.2)	-8.81(-9.26)	-8.36(-9.47)	-3.92(-9.12)	-6.50(-9.56)	-6.13(-7.28)	-8.69(-9.64)	-3.96(-9.65)	-8.64(-11.31)	-12.70(-13.21)	-12.84(-12.87)	-12.97(-15.07)	-14.13(-13.96)	-12.11(-13.12)	-10.99(-11.48)	-10.99(-10.68)	-6.09(-10.48)	-11.96(-12.15)	-12.81(-13.02)	-12.75(-11.85)	-10.46(-11.70)	-14.23(-12.81)	-14.23(-12.81)	
(H5°)	-10.40(-12.88)	-13.16(-12.63)	-11.72(-10.80)	-8.89(-9.63)	-10.24(-10.5)	-11.30(-11.09)	-12.36(-13.01)	-12.36(-13.01)	-12.62(-14.21)	-12.54(-12.22)	-12.63(-12.17)	-14.02(-15.18)	-15.09(-13.42)	-14.74(-15.09)	-15.00(-14.41)	-14.86(-15.36)	-15.78(-12.57)	-14.78(-15.38)	-15.69(-12.57)	-14.06(-13.77)	-14.68(-15.16)	-15.25(-15.02)	-15.25(-15.02)	-15.25(-15.02)	
(H4°)	-11.69(-10.21)	-8.91(-10.60)	-10.37(-10.17)	-10.52(-11.17)	-12.40(-11.88)	-11.22(-11.10)	-11.46(-11.31)	-11.46(-11.31)	-10.74(-10.99)	-10.78(-10.71)	-10.71(-11.24)	-11.70(-11.88)	-12.68(-14.06)	-14.51(-15.42)	-15.00(-14.14)	-13.64(-12.82)	-13.21(-12.88)	-13.21(-12.88)	-12.50(-12.78)	-11.46(-11.88)	-12.09(-11.58)	-12.12(-12.10)	-12.12(-12.10)	-12.12(-12.10)	
Freq(Hz)	2.450(PHz)	Table 2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Gain	0°(H°/V°)	0°(H°/V22.5°)	0°(H°/V30°)	0°(H°/V45°)	0°(H°/V60°)	0°(H°/V87°)	0°(H°/V90°)	0°(H°/V90°/12.5°)	0°(H°/V120°)	0°(H°/V142.5°)	0°(H°/V157°)	0°(H°/V157°)	0°(H°/V157°)	0°(H°/V180°)	0°(H°/V202.5°)	0°(H°/V217.5°)	0°(H°/V225°)	0°(H°/V247.5°)	0°(H°/V262.5°)	0°(H°/V277.5°)	0°(H°/V292.5°)	0°(H°/V307°)	0°(H°/V322.5°)	0°(H°/V337°)	0°(H°/V362.5°)
(H1°)	4.84(-6.87)	4.89(-6.84)	4.99(-7.19)	7.44(-7.8)	-7.72(-7.4)	-7.33(-7.4)	-7.34(-7.27)	-7.23(-7.15)	-7.00(-6.87)	-6.69(-6.48)	-6.21(-6.95)	-5.73(-5.15)	-5.86(-5.31)	-4.80(-6.63)	-7.07(-7.14)	-7.16(-7.22)	-7.28(-7.19)	-7.89(-8.34)	-6.82(-6.85)	-4.38(-6.39)	-5.93(-5.56)	-5.92(-6.40)	-4.11(-6.19)	-4.11(-6.19)	-4.11(-6.19)
(H2°)	7.57(-5.67)	5.41(-5.26)	5.30(-5.09)	5.94(-6.11)	-4.17(-6.14)	-5.59(-5.08)	-6.49(-5.24)	-6.42(-5.24)	-6.42(-5.56)	-6.07(-6.03)	-6.42(-6.21)	-6.01(-6.10)	-5.79(-6.25)	-4.99(-6.58)	-6.97(-7.30)	-7.70(-7.34)	-6.90(-6.25)	-7.98(-7.88)	-7.60(-7.43)	-7.19(-7.48)	-5.96(-6.10)	-5.94(-6.10)	-4.22(-5.75)	-4.22(-5.75)	-4.22(-5.75)
(H3°)	5.91(-6.71)	5.51(-6.36)	5.15(-6.02)	5.92(-6.08)	-5.10(-5.97)	-5.67(-5.57)	-6.59(-5.75)	-6.89(-5.81)	-6.91(-5.96)	-6.92(-6.02)	-5.71(-6.44)	-5.59(-6.44)	-5.87(-6.31)	-5.71(-6.88)	-7.69(-7.57)	-7.27(-7.38)	-7.27(-7.38)	-8.04(-8.34)	-6.15(-6.07)	-5.98(-6.53)	-5.99(-5.98)	-4.84(-6.07)	-4.84(-6.07)	-4.84(-6.07)	-4.84(-6.07)
(H4°)	4.99(-4.99)	-4.50(-4.82)	-4.99(-5.23)	-6.70(-5.31)	5.51(-6.48)	-6.30(-6.03)	-5.92(-5.58)	-5.89(-5.70)	-5.68(-5.61)	-5.59(-5.53)	-5.01(-7.47)	-4.51(-4.40)	-4.50(-4.40)	-5.23(-5.69)	-5.19(-5.54)	-4.98(-5.71)	-7.30(-7.59)	-7.84(-8.08)	-5.18(-6.18)	-5.96(-7.39)	-7.90(-7.31)	-7.51(-7.07)	-4.23(-5.96)	-5.96(-5.92)	-5.96(-5.92)
(H5°)	4.05(-3.34)	5.33(-5.35)	-3.99(-4.12)	-4.89(-5.67)	5.80(-6.00)	-8.00(-4.46)	-6.19(-5.99)	-5.89(-5.82)	-5.36(-5.36)	-5.13(-4.26)	-4.94(-3.94)	-4.50(-4.33)	-4.73(-5.15)	-4.73(-5.15)	-4.04(-4.74)	-6.80(-7.44)	-8.16(-8.88)	-5.09(-6.67)	-10.37(-10.72)	-10.37(-10.72)	-10.37(-10.72)	-4.23(-5.96)	-5.96(-5.92)	-5.96(-5.92)	-5.96(-5.92)
(H6°)	4.07(-3.73)	-3.96(-3.60)	-3.74(-3.23)	-5.03(-4.1)	7.35(-7.82)	-3.14(-7.62)	-7.17(-8.40)	-6.61(-6.35)	-6.95(-6.44)	-4.98(-4.64)	-4.37(-4.09)	-3.93(-3.93)	-4.09(-4.43)	-4.91(-5.36)	-5.66(-6.00)	-5.94(-6.25)	-6.89(-7.89)	-8.70(-8.67)	-10.99(-11.4)	-12.00(-12.47)	-12.00(-12.47)	-10.99(-11.4)	-7.93(-6.40)	-5.92(-6.44)	-5.92(-6.44)
(H7°)	5.85(-6.39)	-5.13(-5.23)	-5.39(-4.69)	-5.78(-5.63)	-7.39(-7.28)	-3.93(-4.13)	-8.64(-6.35)	-7.77(-7.21)	-6.54(-5.56)	-4.91(-5.34)	-4.56(-5.34)	-4.51(-4.70)	-4.52(-5.20)	-4.72(-5.16)	-4.66(-5.42)	-6.43(-6.99)	-7.68(-8.52)	-10.65(-11.73)	-12.34(-12.10)	-11.71(-11.71)	-11.71(-11.71)	-11.71(-11.71)	-7.42(-6.17)	-7.42(-6.17)	-7.42(-6.17)
(H8°)	5.74(-7.64)	-7.88(-8.38)	-8.95(-8.62)	-7.88(-8.38)	-6.45(-6.80)	-6.20(-10.07)	-11.11(-10.69)	-11.37(-10.87)	-6.57(-6.74)	-6.16(-7.46)	-4.56(-4.77)	-5.23(-5.73)	-6.04(-6.62)	-6.64(-6.67)	-6.89(-8.42)	-7.19(-7.71)	-8.21(-8.4)	-4.45(-8.70)	-8.50(-10.22)	-8.95(-10.42)	-11.43(-13.18)	-15.70(-14.52)	-14.58(-10.97)	-14.58(-10.97)	-14.58(-10.97)
(H9°)	4.04(-6.76)	-7.45(-8.20)	-9.31(-11.07)	-11.85(-12.10)	-10.28(-10.46)	-8.54(-7.37)	-7.20(-10.28)	-10.00(-12.27)	-10.28(-11.89)	-6.10(-7.47)	-6.65(-6.49)	-6.73(-6.96)	-6.88(-8.42)	-6.80(-7.13)	-7.00(-6.43)	-7.44(-7.34)	-7.29(-8.22)	-10.33(-10.90)	-14.68(-15.18)	-13.66(-11.80)	-13.66(-11.80)	-13.66(-11.80)	-13.66(-11.80)	-13.66(-11.80)	-13.66(-11.80)
(H10°)	8.44(-1.57)	-8.64(-4.3)	-8.91(-9.06)	-8.76(-10.62)	-10.21(-13.43)	-13.89(-13.43)	-4.29(-7.45)	-7.88(-6.59)	-11.09(-11.65)	-11.70(-12.45)	-8.64(-7.92)	-7.30(-7.17)	-7.24(-7.30)	-7.24(-7.30)	-7.20(-7.38)	-6.81(-7.56)	-6.89(-7.08)	-6.00(-8.56)	-10.67(-11.58)	-12.51(-13.88)	-15.09(-14.54)	-12.12(-10.03)	-4.91(-8.75)	-8.72(-8.35)	-8.72(-8.35)
(H11°)	-11.45(-14.94)	-11.45(-14.16)	-10.42(-10.40)	-10.42(-10.40)	-7.54(-8.40)	-9.91(-7.10)	-12.42(-12.75)	-13.26(-12.46)	-10.49(-10.56)	-11.75(-12.57)	-7.45(-7.41)	-7.11(-7.14)	-6.57(-5.95)	-5.80(-5.99)	-7.60										



Antenna Pattern of 2.4GHz / 5GHz

Appendix B

φ(0°)	0.03/-3.03	-11.09/-12.78	-4.79/-6.40	-3.81/-6.67	0.810/3	1.64/34	-0.96/-2.62	-1.47/-6.19	0.198/25	-0.36/-2.00	-1.99/-2.03	-1.60/-0.89	0.030/75	1.088/87	-0.88/-1.55	-4.38/-148	-0.04/-148	-1.25/-638	-4.12/-648	-5.41/-740	-13.98/-1484	-6.78/-152	1.729/30	2.94/-17
φ(82°)	-1.16/-3.98	-9.29/-13.04	-5.50/-6.61	-4.48/-2.29	2.200/36	0.79/03	-1.14/-2.25	-1.87/-6.04	-0.360/68	0.48/-142	-2.02/-2.21	-1.83/-120	0.260/18	1.076/53	-2.57/-239	-6.72/-255	0.426/-17	-0.28/-42	-3.49/-154	-4.98/-47	-12.89/-102	-3.80/-41	2.40/-15	3.54/-59
φ(164°)	-1.83/-420	-7.33/-10.96	-6.20/-4.77	-3.12/-3.30	-3.32/-0.84	-0.17/-1.09	-2.02/-3.34	-2.98/-238	-1.160/52	0.87/-679	-2.03/-1.79	-2.57/-194	-1.43/-0.28	-0.360/12	-2.37/-66	-6.36/-157	0.21/-0.23	-0.66/-0.46	-3.41/-598	-5.44/-625	-11.69/-652	-1.720/-14	1.150/28	2.93/-03
φ(246°)	-4.39/-6.63	-8.19/-9.90	-6.72/-4.94	-1.97/-3.08	-4.05/-1.80	-1.55/-2.16	-3.48/-2.86	-3.35/-3.16	-1.720/62	0.62/-1.73	-3.59/-337	-2.87/-269	-1.93/-188	-1.91/-198	-3.99/-4.64	-5.29/-289	-2.10/-144	-1.120/-165	-6.94/-127	-7.87/-412	-11.21/-88	-3.07/-23	0.77/-0.74	0.16/-0.68
φ(328°)	-5.02/-10.08	-8.72/-6.72	-6.13/-6.68	-2.53/-3.20	-2.21/-2.21	-3.53/-4.42	-7.72/-5.46	-3.97/-4.12	-2.42/-0.02	0.46/-1.28	-3.52/-3.59	-5.14/-2.89	-2.95/-203	-1.32/-128	-3.50/-2.64	-3.52/-387	-3.28/-334	-4.40/-451	-6.88/-1427	-12.37/-592	-11.44/-828	-6.36/-505	-5.20/-1.04	0.12/-0.59
φ(410°)	-5.83/-9.68	-8.11/-6.86	-6.06/-7.93	-2.99/-2.26	-1.49/-3.16	-3.34/-4.21	-7.72/-5.30	-3.49/-3.86	-3.32/-1.12	0.02/-1.09	-2.71/-4.35	-4.60/-3.86	-2.77/-138	-3.52/-338	-3.87/-93	-4.30/-606	-7.38/-546	-5.78/-177	-11.29/-122	-9.60/-489	-12.87/-1132	-11.35/-392	-2.89/-142	-6.40/-3.56
φ(492°)	-6.13/-6.74	-9.33/-6.45	-6.64/-6.52	-2.95/-4.19	-1.86/-1.62	-3.54/-4.16	-7.59/-6.62	-4.37/-4.51	-4.89/-247	-1.66/-1.99	-3.02/-4.53	-5.69/-6.79	-5.10/-339	-4.07/-213	-3.27/-220	-5.53/-580	-8.44/-845	-3.59/-568	-7.95/-15.75	-15.06/-147	-6.49/-6.34	-10.91/-12.66	-4.78/-2.65	-2.33/-0.78
φ(574°)	-5.06/-9.33	-10.88/-6.83	-6.79/-5.29	-2.80/-4.53	-6.02/-4.30	-5.17/-4.54	-5.62/-6.49	-6.09/-3.74	-5.09/-4.99	-3.03/-3.51	-3.12/-4.02	-5.69/-4.03	-4.28/-322	-3.73/-355	-8.11/-65	-4.28/-744	-12.40/-888	-5.01/-584	-6.10/-636	-16.89/-146	-8.89/-499	-3.45/-91	-9.89/-6.30	-10.18/-5.64
φ(656°)	-5.56/-10.94	-12.57/-8.66	-7.50/-6.79	-4.07/-5.97	-6.52/-4.25	-6.39/-6.11	-7.29/-5.29	-4.96/-4.55	-4.75/-5.17	-5.59/-4.84	-6.16/-6.41	-4.38/-6.11	-6.09/-421	-5.16/-3.44	-5.54/-470	-5.57/-1030	-11.53/-644	-3.04/-535	-7.46/-6.84	-16.60/-13.94	-7.43/-7.51	-8.89/-6.43	-7.99/-6.80	-6.50/-5.29
φ(738°)	-6.89/-10.62	-7.59/-6.28	-7.02/-5.34	-5.09/-7.02	-7.07/-6.79	-8.83/-6.87	-4.05/-5.38	-4.09/-5.33	-4.46/-5.10	-6.78/-6.25	-6.78/-6.81	-4.89/-5.24	-4.42/-4.25	-5.15/-6.46	-4.93/-6.89	-6.15/-789	-5.78/-680	-6.91/-608	-6.47/-616	-6.93/-6.79	-6.38/-12.29	-6.62/-5.15	-5.86/-6.16	-5.86/-6.16
φ(820°)	-7.738/-6.92	-8.95/-12.22	-8.25/-6.65	-5.14/-6.78	-10.59/-10.07	-10.09/-13.67	-13.42/-12.41	-6.36/-6.05	-5.55/-5.66	-7.28/-6.72	-7.28/-6.58	-5.64/-7.28	-6.02/-5.15	-11.59/-11.71	-8.25/-10.57	-9.16/-9.88	-12.27/-10.01	-7.51/-7.24	-9.45/-10.22	-10.76/-10.27	-6.93/-7.91	-7.49/-10.12	-15.36/-10.87	-7.49/-10.12
φ(902°)	-12.18/-12.32	-14.95/-13.76	-11.23/-9.14	-6.93/-14.63	-10.51/-10.30	-9.91/-12.02	-12.70/-10.13	-7.21/-6.30	-4.47/-4.02	-4.88/-5.68	-4.88/-5.92	-8.60/-11.88	-6.78/-10.29	-10.60/-11.03	-12.26/-11.57	-6.72/-6.84	-6.68/-637	-11.28/-10.40	-15.71/-14.24	-13.23/-10.88	-9.10/-9.86	-11.97/-10.26	-9.10/-9.86	-9.10/-9.86
φ(984°)	-13.21/-11.15	-8.78/-9.49	-11.29/-12.87	-15.90/-15.47	-14.20/-11.98	-11.34/-12.97	-12.58/-11.51	-10.28/-9.92	-9.32/-8.78	-8.15/-9.10	-7.85/-8.61	-9.47/-9.72	-8.96/-921	-6.26/-7.79	-7.61/-6.96	-6.88/-7.28	-8.87/-11.55	-14.44/-13.69	-12.83/-10.64	-10.31/-10.78	-12.28/-15.51	-13.80/-15.51	-15.67/-14.92	-14.17/-13.48
φ(1066°)	-8.75/-9.22	-3.36/-8.97	-10.67/-10.18	-15.39/-13.25	-12.08/-13.26	-11.98/-11.64	-11.10/-10.70	-10.68/-9.85	-9.22/-9.67	-7.85/-8.26	-8.77/-9.75	-7.91/-7.96	-7.24/-7.56	-7.86/-9.73	-10.87/-10.23	-13.87/-15.36	-15.39/-13.69	-10.87/-10.61	-12.21/-12.47	-11.81/-11.74	-11.32/-9.87	-8.82/-9.52	-8.82/-9.52	-8.82/-9.52
φ(1148°)	-9.42/-9.86	-10.03/-10.16	-10.91/-11.48	-11.48/-11.58	-11.01/-10.68	-9.95/-9.64	-10.32/-11.04	-10.78/-10.38	-10.89/-11.81	-11.41/-10.22	-9.11/-9.33	-7.76/-7.42	-8.31/-9.68	-10.68/-10.61	-10.77/-10.99	-10.96/-10.95	-10.95/-11.28	-11.59/-13.50	-15.50/-14.58	-12.77/-11.26	-9.79/-9.18	-6.53/-9.63	-10.13/-10.32	-9.56/-9.33
FreeRx0	5.765Rx0	TableRx0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	φ(0°/φ67.5°)	φ(30°/φ37.5°)	φ(45°/φ56.25°)	φ(60°/φ67.5°)	φ(75°/φ82.5°)	φ(90°/φ97.5°)	φ(105°/φ112.5°)	φ(120°/φ127.5°)	φ(135°/φ142.5°)	φ(150°/φ157.5°)	φ(165°/φ172.5°)	φ(180°/φ187.5°)	φ(195°/φ202.5°)	φ(210°/φ217.5°)	φ(225°/φ232.5°)	φ(240°/φ247.5°)	φ(255°/φ262.5°)	φ(270°/φ277.5°)	φ(285°/φ292.5°)	φ(300°/φ307.5°)	φ(315°/φ322.5°)	φ(330°/φ337.5°)	φ(345°/φ352.5°)	
φ(0°)	-1.14/-1.00	-1.06/-1.45	-1.82/-1.87	-1.74/-1.57	-1.75/-1.96	-2.25/-2.19	-2.09/-2.05	-1.94/-1.67	-1.58/-1.87	-2.00/-1.79	-1.83/-2.25	-2.07/-2.05	-2.07/-2.08	-1.98/-2.04	-2.49/-2.74	-2.49/-2.08	-1.78/-1.81	-1.50/-1.48	-1.38/-1.17	-0.93/-0.61	-0.53/-0.70	-1.00/-1.09	0.83/-0.98	
φ(7.5°)	-2.11/-2.22	-2.49/-2.73	-3.10/-3.07	-2.62/-2.08	-1.77/-1.60	-1.46/-1.19	-0.79/-0.49	-1.11/-0.05	0.026/-0.30	0.18/-0.13	-0.52/-0.27	-0.35/-0.63	-0.80/-0.89	-1.21/-1.46	-1.40/-1.68	-2.30/-2.67	-2.66/-2.72	-2.98/-3.04	-3.07/-3.06	-2.98/-2.48	-2.23/-2.14	-2.12/-2.09	-1.97/-2.45	-2.78/-2.28
φ(15°)	-0.93/-0.75	-1.57/-1.24	-2.36/-2.21	-1.81/-1.28	-0.69/-0.28	-0.030/-1.17	0.050/-0.30	-0.36/-0.27	-0.12/-0.16	-0.54/-0.81	-0.66/-0.73	-1.14/-1.67	-1.78/-1.87	-2.35/-2.21	-2.91/-3.20	-3.58/-3.86	-3.96/-3.99	-3.65/-3.30	-2.57/-1.58	-0.98/-0.69	-0.28/-0.13	0.15/-0.84	-1.16/-1.17	
φ(22.5°)	-5.83/-6.62	-4.32/-3.53	-1.80/-1.46	-1.81/-3.25	-2.91/-2.33	-1.82/-1.59	-1.50/-1.43	-2.46/-2.25	-1.49/-0.71	-0.39/-0.23	-0.45/-0.95	-1.26/-1.19	-1.25/-1.60	-1.53/-1.24	-1.51/-2.43	-3.57/-3.86	-3.46/-2.74	-3.07/-3.29	-2.92/-2.33	-1.86/-1.36	-2.16/-2.89	0.47/-0.70	-3.09/-3.64	-4.43/-4.91
φ(30°)	-2.89/-3.27	-4.36/-3.20	-3.70/-2.02	-1.27/-1.81	-3.40/-4.28	-4.19/-3.56	-4.20/-4.82	-4.30/-4.57	-2.96/-3.22	-1.82/-1.35	-1.16/-1.81	-2.26/-2.09	-1.88/-1.81	-1.65/-1.21	-1.91/-2.42	-2.38/-1.59	-2.30/-2.23	-2.38/-1.68	-2.36/-2.36	-2.21/-1.53	0.81/-0.70	0.42/-0.01	-0.26/-1.12	
φ(37.5°)	-2.26/-1.99	-6.85/-1.57	-2.27/-2.21	-1.48/-1.99	-4.11/-4.87	-3.74/-3.77	-5.77/-5.90	-5.53/-6.20	-3.72/-3.99	-2.81/-1.99	-1.26/-2.35	0.220/-0.77	-0.69/-0.60	-0.54/-0.23	-0.21/-0.53	-0.61/-0.34	-0.62/-1.79	-1.51/-1.41	-2.46/-2.37	-3.26/-2.34	-0.620/-73	1.040/-43	-1.22/-2.75	-3.28/-2.83
φ(45°)	0.278/-0.79	0.650/-2.88	-0.33/-0.96	-0.56/-0.63	0.28/-3.76	-3.99/-4.16	-4.89/-6.54	-6.39/-6.29	-3.22/-3.25	-1.26/-2.00	-0.69/-2.08	0.780/-1.74	-0.31/-1.70	-1.29/-0.54	0.21/-0.58	-0.52/-1.04	-1.32/-2.30	-3.74/-2.79	-4.68/-3.58	-2.19/-1.79	-2.57/-3.30	-2.67/-1.65	-1.20/-2.40	
φ(52.5°)	-0.83/-2.91	-1.28/-0.44	-6.81/-1.08	0.01/-3.4	-2.02/-3.12	-1.99/-1.73	-3.39/-5.28	-2.50/-5.15	0.598/-0.60	-2.74/-3.45	-2.92/-1.19	-0.37/-0.18	0.007/-0.88	-1.16/-1.22	0.505/-42	-0.75/-1.37	-1.36/-1.34	-1.99/-2.37	-3.86/-3.68	-3.77/-3.98	-4.19/-4.44	-3.72/-1.20	0.90/-1.87	1.79/-1.27
φ(60°)	-1.03/-4.11	-4.03/-1.98	-1.79/-2.25	-0.01/-0.15	-1.260/-5.4	-0.62/-0.48	-1.69/-0.34	-1.72/-0.67	-0.99/-0.25	-0.28/-0.37	-1.17/-0.20	-0.760/-0.78	0.690/-0.55	0.540/-1.17	-0.340/-1.17	-4.360/-3.41	-3.980/-2.22	-5.650/-6.65	-7.590/-7.51	-3.960/-6.02	-5.890/-6.02	-5.640/-5.90	1.680/-6.67	
φ(67.5°)	-1.38/-2.47	-7.99/-4.41	4.01/-0.49	-0.97/-0.76	1.26/-1.98	0.94/-0.07	-1.27/-0.13	0.71/-0.67	0.020/-0.38	-1.01/-1.36	-0.75/-1.78	-1.63/-1.54	-0.210/-0.28	-0.740/-1.19	-1.18/-2.25	-0.880/-1.95	-5.940/-4.61	-4.800/-4.36	-6.930/-6.46	-8.590/-8.22	-5.960/-6.12	-5.960/-6.12	-5.960/-6.12	
φ(75°)	-1.74/-0.47	-11.84/-8.38	-5.27/-7.43	-3.23/-2.77	1.07/-1.15	0.879/-0.92	-0.95/-1.42	-0.69/-0.65	0.138/-0.95	-0.360/-0.63	-1.11/-1.31	-1.59/-1.32	-0.91/-0.13	1.147/-0.98	0.038/-0.54	-0.984/-3.27	-4.750/-2.31	-0.53/-1.68	-5.447/-5.96	-5.145/-117	-12.79/-10.99	-7.994/-2.02	0.082/-2.68	2.580/-40
φ(82.5°)	-2.850/-4.68	-0.906/-12.64	-6.64/-6.10	-3.570/-6.00	1.770/-1.01	0.712/-0.71	-1.79/-1.71	-0.550/-0.80	0.917/-0.22	-1.59/-1.72	-1.39/-1.14	-1.03/-0.91	-0.690/-0.25	-0.298/-1.10	-2.914/-2.62	0.070/-0.32	0.101/-1.12	-3.474/-3.62	-3.939/-11.04	-5.130/-1.98	0.810/-1.22	3.96/-17	-0.810/-1.22	
φ(90°)	-2.484/-4.43	-7.484/-3.45	-6.930/-4.48	-2.920/-4.30	-3.430/-2.22	-0.533/-3.75	-3.14/-3.02	-2.020/-2.98	-0.610/-2.4	-1.110/-4.28	-2.962/-0.26	-2.98/-1.28	-1.750/-1.08	-2.108/-2.72	-0.751/-1.91	-3.744/-4.99	-1.880/-0.61	0.760/-2.7	-3.115/-3.22	-4.013/-3.83	-1.339/-14.48	-3.960/-1.86	0.861/-52	3.080/-14
φ(97.5°)	-4.432/-6.84	-3.34/-8.93	-7.37/-4.26	-1.37/-4.09	-1.18/-2.40	-2.04/-5.15	-4.330/-3.94	-3.300/-2.56	-1.300/-3.56	-1.870/-3.67	-4.120/-2.83	-2.94/-1.96	-2.20/-2.13	-3.16/-1.41	-3.24/-2.08	-3.65/-1.20	-5.133/-4.89	-6.832/-2.70	-6.832/-2.70	-13.27/-13.80	-4.359/-2.12	-1.331/-2.02	-3.000/-1.4	
φ(105°)	-4.359/-9.40	-8.317/-0.33	-8.44/-1.46	-1.820/-3.81	-0.894/-2.48	-2.624/-4.33	-6.01/-4.35	-3.75/-4.04	-2.771/-1.20	-2.264/-4.33	-5.074/-4.00	-3.760/-4.05	-2.822/-2.27	-4.483/-3.67	-3.545/-2.68	-3.962/-3.99	-4.09/-5.69	-4.203/-3.10	0.041/-2.33	-8.753/-3.65	-13.83/-11.99	-6.235/-6.57	-4.911/-2.2	0.152/-57
φ(112.5°)	-6.890/-10.69	-8.694/-2.55	-7.70/-5.18	-1.730/-2.61	-3.760/-3.43	-7.935/-9.87	-8.50/-4.81	-5.110/-6.80	-3.621/-1.16	-4.410/-3.71	-5.721/-4.06	-3.46/-4.54	-4.564/-5.15	-4.413/-3.71	-3.682/-3.92	-5.854/-6.22	-7.970/-10.33	-10.721/-9.31	-10.721/-9.31	-10.721/-9.31	-10.721/-9.31	-10.721/-9.31	-10.721/-9.31	-10.721/-9.31
φ(120°)	-7.040/-6.78	-8.424/-6.08	-6.79/-5.58	-2.49/-5.14	-2.29/-3.19	-4.827/-1.11	-11.06/-6.96	-6.63/-6.45	-5.302/-2.37	-2.393/-4.44	-4.66/-6.46	-6.11/-6.02	-4.515/-7.05	-5.264/-5.22	-3.854/-2.47	-4.915/-4.68	-5.49/-12.23	-5.49/-5.48	-6.023/-1.68	-14.550/-8.00	-4.96/-4.61	-11.57/-12.27	-6.071/-4.38	-2.954/-3.98
φ(127.5°)	-5.960/-9.50	-9.32/-5.98	-7.53/-6.21	-3.83/-4.74	-1.18/-1.53	-5.994/-2.40	-6.89/-7.48	-6.34/-6.47	-5.031/-4.68	-6.70/-6.05	-7.83/-6.54	-8.215/-6.46	-6.214/-6.58	-4.734/-6.28	-4.153/-4.23	-6.868/-5.94	-6.957/-5.72	-6.554/-5.52	-5.917/-2.21	-6.831/-1.78	-8.811/-1.47	-11.62/-8.2		



Antenna Pattern of 2.4GHz / 5GHz

Appendix B

φ(180°)	-12.88-13.25	-14.82-15.66	-15.65-14.79	-14.87-15.55	-15.14-15.63	-14.86-15.63	-16.12-15.49	-15.29-14.39	-13.42-13.40	-14.41-14.75	-15.13-15.08	-15.88-15.07	-15.68-15.53	-15.80-14.94	-15.16-15.69	-15.45-15.38	-14.80-14.20	-14.23-14.48	-14.78-15.03	-14.87-14.18	-14.58-15.04	-14.87-14.48	-14.80-13.71	-12.82-12.89
Freq(Hz)	5.3GHz	Total(dB)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Gain	φ(179°/57.5°)	φ(15°/92.25°)	φ(30°/60.75°)	φ(45°/45.25°)	φ(60°/30.75°)	φ(75°/14.75°)	φ(90°/0°)	φ(105°/9.25°)	φ(120°/0°/112.5°)	φ(135°/9°/127.5°)	φ(150°/18°/142.5°)	φ(165°/27°/172.5°)	φ(180°/36°/187.5°)	φ(195°/45°/202.5°)	φ(210°/54°/217.5°)	φ(225°/63°/232.5°)	φ(240°/72°/247.5°)	φ(255°/81°/262.5°)	φ(270°/90°/277.5°)	φ(285°/99°/292.5°)	φ(300°/108°/307.5°)	φ(315°/117°/322.5°)	φ(330°/126°/337.5°)	φ(345°/135°/352.5°)
φ(1°)	4.14-14.15	-4.53-9.09	-5.59-4.67	-3.94-3.89	-4.01-2.44	-4.17-14.00	-4.19-4.08	-4.40-4.48	-4.49-4.64	-4.69-4.98	-5.30-5.20	-5.08-5.13	-5.08-5.17	-5.30-5.75	-6.24-5.80	-5.69-5.62	-5.36-5.31	-5.30-5.20	-5.23-5.16	-5.19-5.10	-5.19-5.32	-5.36-5.29	-5.43-5.38	-5.10-5.46
φ(15°)	5.87-6.33	-6.99-7.77	-8.09-8.55	-8.23-7.71	-7.17-7.66	-7.90-7.88	-7.42-7.29	-6.84-6.54	-6.27-6.03	-5.58-5.34	-4.84-4.00	-3.78-3.80	-3.63-3.47	-3.35-3.51	-3.51-3.03	-2.94-2.08	-1.98-2.07	-2.19-2.27	-2.43-2.70	-2.87-3.13	-3.38-3.84	-4.14-4.95	-5.10-5.00	-5.10-5.54
φ(30°)	6.37-6.46	-6.70-6.02	-5.51-4.76	-4.77-4.29	-4.26-4.44	-5.16-5.65	-5.45-5.57	-5.51-5.33	-5.15-5.03	-5.18-4.54	-3.94-3.19	-2.99-2.86	-2.35-2.03	-1.83-1.85	-0.98-0.46	-0.52-0.86	-1.16-1.25	-1.43-1.60	-1.50-1.62	-1.74-2.01	-2.50-3.06	-3.72-4.35	-4.69-5.68	
φ(45°)	6.27-7.08	-6.28-6.74	-3.85-2.84	-2.77-3.08	-3.67-4.18	-4.84-5.38	-6.01-5.59	-4.94-3.95	-3.52-3.23	-3.59-3.74	-2.88-2.27	-2.99-2.86	-1.98-1.86	-1.72-1.71	-2.88-2.37	-1.98-1.64	-1.12-1.18	-1.68-2.06	-2.11-1.87	-1.85-1.72	-1.86-1.78	-1.36-1.38	-3.37-4.48	
φ(60°)	2.57-3.06	-2.89-3.26	-2.20-2.44	-3.08-3.97	-4.77-5.58	-6.14-7.22	-8.49-8.11	-6.95-5.98	-5.21-4.20	-3.02-2.44	-2.83-2.05	-3.10-2.35	-2.50-2.04	-1.90-1.99	-2.52-2.11	-3.25-2.44	-2.79-2.34	-1.65-1.64	-2.04-2.01	-2.19-2.19	-2.59-1.59	-4.95-0.70	-1.36-1.69	
φ(75°)	4.61-5.02	-4.49-3.32	-3.29-3.13	-5.37-6.22	-6.40-4.29	-3.88-4.16	-4.29-3.77	-3.34-3.41	-2.96-3.38	-2.69-3.10	-2.35-1.38	-1.59-0.39	-0.71-1.20	-0.23-0.56	-2.92-3.10	-2.91-4.03	-4.86-4.28	-2.95-1.76	-1.36-1.24	-1.36-1.59	-1.90-1.45	-1.69-1.99	-1.74-2.02	
φ(90°)	5.69-5.63	-3.36-1.76	-2.59-2.85	-2.91-3.69	-2.90-3.81	-2.77-1.47	-2.33-1.44	-0.89-1.35	-2.40-3.24	-2.24-3.13	-1.96-0.99	-1.60-1.10	-1.49-1.48	-1.49-1.48	-1.42-0.26	-0.73-1.82	-2.00-2.11	-2.19-1.40	-1.88-1.43	-2.25-2.49	-2.13-1.87	-2.10-1.18	-4.42-4.74	-3.19-3.52
φ(105°)	6.09-6.04	-4.70-3.12	-3.18-2.11	-2.35-4.47	-3.13-1.42	-1.17-2.27	-3.52-1.81	0.09-0.43	-2.38-3.94	-2.35-2.27	-2.29-2.42	-1.46-1.19	-2.47-3.10	-1.71-0.54	-0.86-1.38	-1.34-1.15	-0.92-0.25	-0.76-0.62	-0.86-1.46	-2.29-1.56	-1.43-1.79	-2.69-2.38	-3.47-4.27	
φ(120°)	6.46-1.46	-4.30-3.36	-3.89-1.80	-2.39-1.16	-0.96-0.49	-3.83-1.25	-3.22-0.29	0.00-0.18	-1.93-3.53	-2.42-0.98	-3.72-0.06	-2.70-0.51	-1.85-0.51	-1.08-2.21	-1.82-0.22	0.46-0.08	0.70-0.42	0.95-1.41	0.38-0.81	-0.54-0.95	-2.72-4.03	-5.75-4.76	-5.11-7.73	
φ(135°)	4.21-2.86	-4.44-4.64	-4.73-4.42	-4.19-6.11	-4.16-5.87	-2.69-0.13	-1.03-0.14	0.58-0.02	-2.00-3.93	-4.32-3.86	-5.83-5.51	-4.73-4.15	-2.94-1.40	-2.38-0.40	-3.38-1.01	0.80-0.28	0.10-0.84	1.41-1.77	2.55-1.18	1.91-0.15	-0.36-0.76	-2.29-3.75	-4.71-3.83	-4.28-6.31
φ(150°)	4.10-3.87	-5.53-5.95	-3.16-2.81	-4.17-1.45	-4.48-2.35	-1.47-2.72	-0.86-0.04	0.57-1.08	-2.99-4.47	-6.41-6.41	-4.89-6.69	-5.90-5.87	-4.32-1.55	-2.53-0.45	-4.40-1.77	0.40-0.14	-0.20-0.29	1.23-2.39	2.44-0.93	-0.90-1.84	-4.29-4.73	-4.35-4.68	-6.89-7.73	
φ(165°)	2.48-4.06	-4.80-3.28	-4.24-2.67	-4.45-7.31	-3.08-1.49	-0.19-0.94	0.73-0.01	-0.37-2.03	-5.34-5.91	-6.17-4.94	-5.84-7.04	-6.95-6.86	-5.27-3.51	-5.68-6.57	-5.71-1.98	0.00-0.12	-0.84-0.20	0.34-0.23	0.79-2.23	0.70-0.55	0.19-0.22	-5.85-6.78	-4.33-6.68	-0.90-5.32
φ(180°)	5.29-5.33	-6.76-4.74	-6.50-5.87	-6.70-6.21	-3.84-1.87	-0.85-0.39	-0.47-0.89	-1.39-3.35	-8.19-7.00	-5.12-6.44	-6.61-7.52	-7.56-9.47	-5.19-4.58	-6.68-6.72	-4.77-4.09	-1.33-0.82	-3.09-2.04	-1.07-0.70	-1.03-1.15	-3.62-5.36	-2.08-3.50	-7.65-7.69	-7.44-8.26	-8.03-9.46
φ(195°)	8.22-7.03	-7.77-8.77	-6.26-7.38	-7.84-6.46	-4.13-4.81	-4.26-4.25	-3.16-3.60	-4.34-4.62	-10.91-11.69	-15.13-14.70	-10.53-8.00	-7.78-8.33	-5.20-6.73	-6.89-4.82	-6.07-4.27	-2.92-0.16	-5.67-4.53	-4.78-3.14	-3.30-4.67	-9.21-11.09	-5.51-6.33	-8.56-10.72	-12.16-12.75	-6.69-7.73
φ(210°)	11.05-9	-10.66-10.70	-10.10-10.27	-7.35-4.34	-4.44-8.98	-8.71-7.42	-6.07-4.06	-4.99-5.60	-13.07-11.62	-17.10-16.74	-11.53-8.85	-7.49-6.48	-4.85-3.69	-5.64-7.25	-7.88-7.03	-4.52-3.40	-7.89-7.21	-8.59-4.04	-4.63-7.33	-11.14-14.95	-8.34-5.86	-8.51-9.55	-13.71-11.74	-12.01-12.85
φ(225°)	5.14-5.09	-10.67-11.46	-12.66-12.20	-6.81-6.42	-4.46-13.35	-6.66-5.91	-6.63-6.41	-5.03-8.83	-15.06-11.27	-15.10-16.74	-15.23-12.07	-8.49-8.72	-4.59-4.63	-4.86-7.43	-6.64-6.41	-3.42-3.05	-4.12-7.74	-6.11-6.27	-4.44-6.05	-7.14-8.96	-7.86-7.43	-7.75-11.11	-13.41-13.18	-8.77-10.20
φ(240°)	5.89-4.85	-8.99-6.13	-12.45-15.15	-10.44-8.67	-10.57-13.55	-7.30-3.84	-5.76-5.23	-4.21-8.86	-15.29-10.75	-12.36-7.01	-6.48-6.84	-6.87-11.64	-11.27-3.88	-2.74-3.76	-4.77-8.93	-4.77-8.93	-2.90-7.38	-6.11-6.08	-4.11-5.28	-4.06-7.71	-5.30-3.77	-4.30-7.14	-7.49-9.33	-15.17-10.45
φ(255°)	-10.23-9.91	-10.59-10.45	-8.12-15.13	-14.54-14.49	-9.67-12.31	-6.72-5.53	-8.45-11.12	-8.90-12.28	-8.70-7.48	-8.37-7.85	-10.83-14.11	-10.47-7.98	-6.32-3.12	-1.71-3.13	-12.64-6.09	-8.77-7.12	-2.35-7.89	-3.69-8.42	-12.50-1.99	-1.81-6.41	-7.96-4.72	-2.74-5.79	-12.82-12.81	-13.70-12.48
φ(270°)	-7.43-7.38	-9.01-10.65	-10.69-11.21	-13.78-15.05	-11.30-9.56	-10.60-7.56	-10.18-18.08	-10.33-13.05	-10.18-15.1	-9.56-17.10	-10.94-10.18	-9.55-8.47	-8.59-12.17	-8.59-12.17	-10.02-8.44	-7.37-1.41	-6.16-5.48	-4.86-12.61	-11.62-1.31	0.14-3.41	-8.41-10.96	-3.98-4.25	-10.36-15.68	-11.81-6.47
φ(285°)	4.20-5.36	-10.42-9.58	-9.32-10.28	-11.33-11.23	-10.16-9.46	-9.28-10.14	-13.43-12.65	-10.52-9.25	-8.05-8.60	-10.89-10.42	-9.07-9.84	-8.80-7.32	-7.38-6.13	-6.52-6.16	-6.75-9.40	-3.95-4.49	-6.46-4.26	-7.80-15.12	-13.98-3.63	-1.65-3.69	-7.65-14.47	-12.86-7.79	-6.40-8.67	-7.55-5.68
φ(300°)	6.50-6.09	-10.71-11.63	-9.73-9.39	-11.66-15.66	-14.00-11.91	-9.50-4.72	-8.37-9.42	-8.53-10.65	-15.07-12.69	-9.84-6.40	-9.51-12.20	-14.42-12.40	-9.39-7.30	-7.07-7.56	-6.54-5.46	-5.42-5.59	-6.73-6.83	-9.18-11.56	-10.11-6.09	-4.87-6.12	-8.80-11.40	-12.90-11.29	-8.86-8.26	-7.96-6.44
φ(315°)	-14.22-10.73	-8.86-10.48	-11.01-10.49	-10.25-10.03	-8.14-8.41	-10.46-10.81	-10.75-11.49	-13.35-14.49	-16.32-15.38	-15.59-11.11	-9.69-8.26	-7.10-6.43	-6.64-6.65	-6.18-6.74	-10.56-11.31	-11.49-9.32	-9.00-10.69	-12.52-13.75	-12.50-9.85	-8.01-7.51	-8.44-8.63	-8.69-8.90	-8.62-12.31	-15.51-15.41
φ(330°)	15.98-11.58	-7.59-7.23	-8.32-8.87	-10.04-11.47	-11.94-11.30	-11.01-11.48	-12.22-12.48	-13.14-14.41	-14.02-15.34	-15.19-15.31	-13.31-11.41	-11.48-11.27	-11.48-11.53	-10.57-10.48	-9.75-9.71	-10.89-10.26	-10.01-10.18	-11.19-10.80	-14.19-13.68	-8.69-9.16	-8.92-9.42	-8.92-9.42	-12.44-15.98	
φ(345°)	14.53-15.69	-14.70-15.44	-8.42-14.18	-14.08-13.64	-13.76-13.91	-14.51-15.37	-15.59-15.14	-14.46-15.08	-15.17-15.25	-15.83-15.38	-14.87-14.13	-13.71-12.25	-11.48-14.58	-13.71-12.25	-11.48-14.58	-13.71-12.25	-11.48-14.58	-13.71-12.25	-11.48-14.58	-13.71-12.25	-11.48-14.58	-13.71-12.25	-11.48-14.58	-13.71-12.25
φ(180°)	-13.74-12.77	-12.89-13.29	-14.53-15.25	-15.07-15.08	-15.63-15.48	-15.29-15.65	-16.08-15.40	-14.81-14.57	-14.19-14.10	-14.23-14.16	-14.75-14.21	-13.84-13.95	-15.63-14.83	-15.86-14.94	-14.64-13.65	-13.75-13.23	-13.80-14.52	-14.83-14.86	-14.65-13.95	-15.22-15.59	-15.56-15.94	-14.53-15.48	-14.78-13.63	-13.16-13.40
Freq(Hz)	5.8GHz	Total(dB)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Gain	φ(179°/57.5°)	φ(15°/92.25°)	φ(30°/60.75°)	φ(45°/45.25°)	φ(60°/30.75°)	φ(75°/14.75°)	φ(90°/0°)	φ(105°/9.25°)	φ(120°/0°/112.5°)	φ(135°/9°/142.5°)	φ(150°/18°/157.5°)	φ(165°/27°/172.5°)	φ(180°/36°/187.5°)	φ(195°/45°/202.5°)	φ(210°/54°/217.5°)	φ(225°/63°/232.5°)	φ(240°/72°/247.5°)	φ(255°/81°/262.5°)	φ(270°/90°/277.5°)	φ(285°/99°/292.5°)	φ(300°/108°/307.5°)	φ(315°/117°/322.5°)	φ(330°/126°/337.5°)	φ(345°/135°/352.5°)
φ(1°)	-0.57-0.81	-0.80-0.35	-1.01-0.05	0.02-0.02	0.01-0.01	0.02-0.14	-0.00-0.01	0.21-0.45	0.41-0.22	0.46-0.82	0.64-0.51	0.44-0.41	0.01-0.53	0.41-0.12	0.15-0.29	-0.18-0.26	-0.29-0.21	0.19-0.29	-0.20-0.11	0.10-0.31	0.42-0.72	0.86-0.88	0.54-0.28	
φ(15°)	-1.56-1.83	-1.49-1.07	-0.69-1.37	-1.87-2.00	-1.50-2.01	-2.11-1.52	-1.49-1.13	-0.90-0.55	-0.66-0.53	-1.42-1.12	-0.46-0.86	-0.91-0.84	-1.01-1.24	-1.19-1.12	-1.16-1.33	-1.19-0.86	-0.40-0.17	-0.21-0.23	0.31-0.38	-0.29-0.10	-0.27-0.27	-0.18-0.09	-0.01-0.27	-6.53-1.18
φ(30°)	2.50-3.25	-4.45-5.28	-6.26-6.51	-7.07-7.69	-6.38-6.30	-5.14-3.52	-2.99-2.20	-2.21-1.57	-1.32-1.71	-0.61-0.95	-1.96-1.73	-1.47-1.29	-1.29-1.04	-0.90-1.22	-1.56-1.28	-0.60-0.27	-0.24-0.33	-0.57-0.86	-1.12-0.39	-1.46-1.45	-1.47-1.21	-1.19-1.21	-2.25-0.63	
φ(45°)	4.04-5.63	-7.19-7.49	-5.97-5.18	-3.22-2.88	-3.42-4.60	-4.14-4.74	-6.96-6.11	-5.51-5.06	-4.25-3.60	-3.09-3.21	-2.80-1.84	-1.70-1.70	0.42-0.14	0.51-0.79	0.45-0.14	-0.49-0.02	-0.51-0.07	0.54-0.02	0.86-0.47	2.45-1.82	-0.47-1.44	-1.99-1.60	-1.40-1.13	-2.50-2.94
φ(60°)	3.88-4.20	-6.22-6.23	-2.62-2.63	-2.10-1.68	-2.38-3.38	-6.00-4.11	-8.24-8.11	-6.69-4.83	-3.48-2.53	-2.42-2.01	-1.54-0.45	-0.78-0.61	0.35-0.32	0.82-0.96	1.19-1.40									

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

