




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				
<input checked="" type="checkbox"/> Wen 33rd.St.	ADD:	No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)		
	TEL:	886-3-318-0787	FAX:	886-3-318-0287
Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	05CH03-HY	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

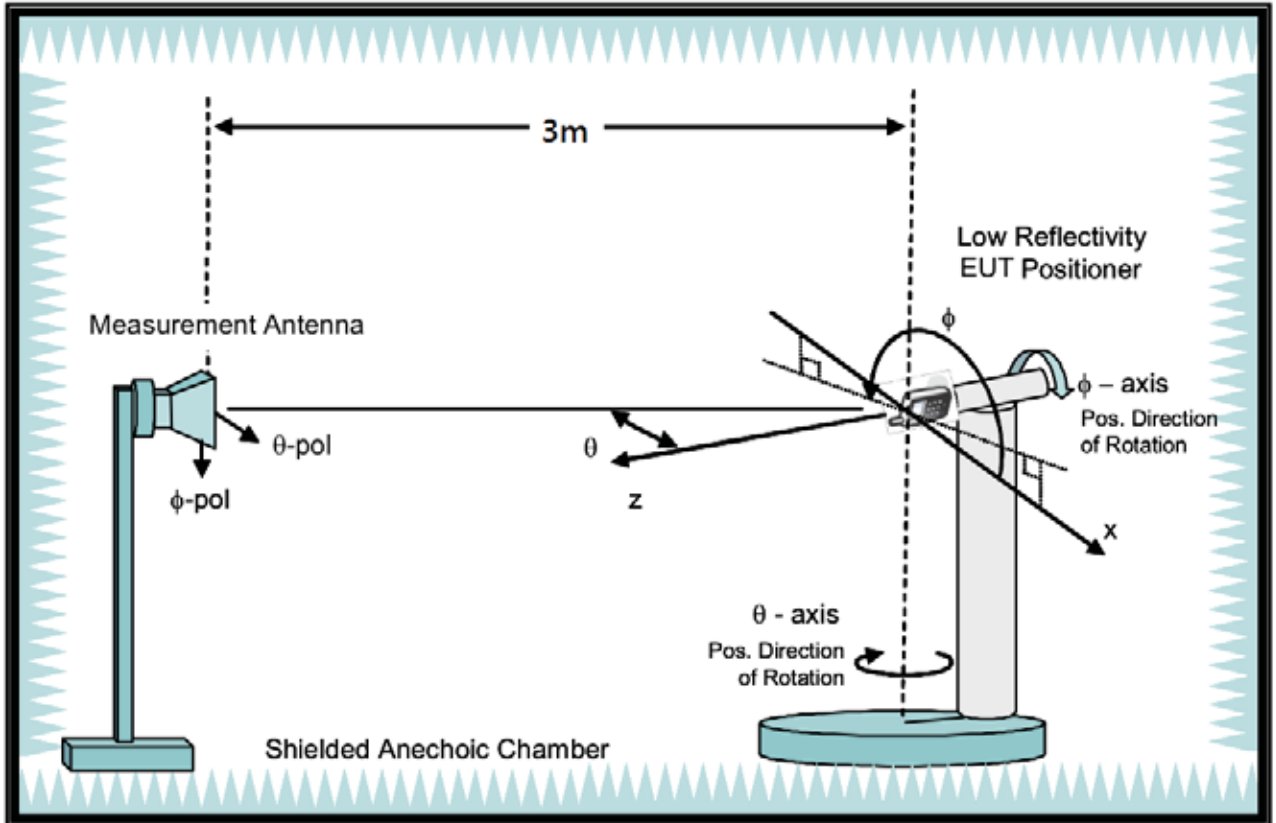
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Dual Polarization Horn antenna

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

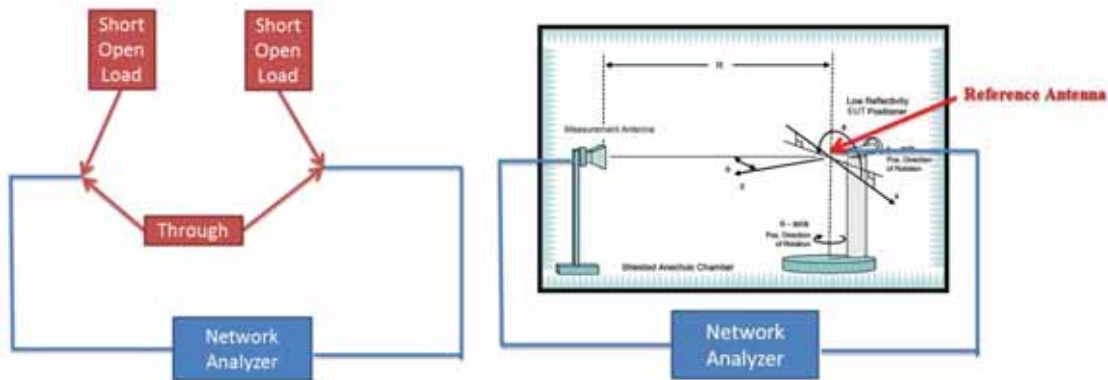
#Reference to CTIA “ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1”



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 [$10 \cdot \log(Amax^2/N_{ant})$]	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).

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



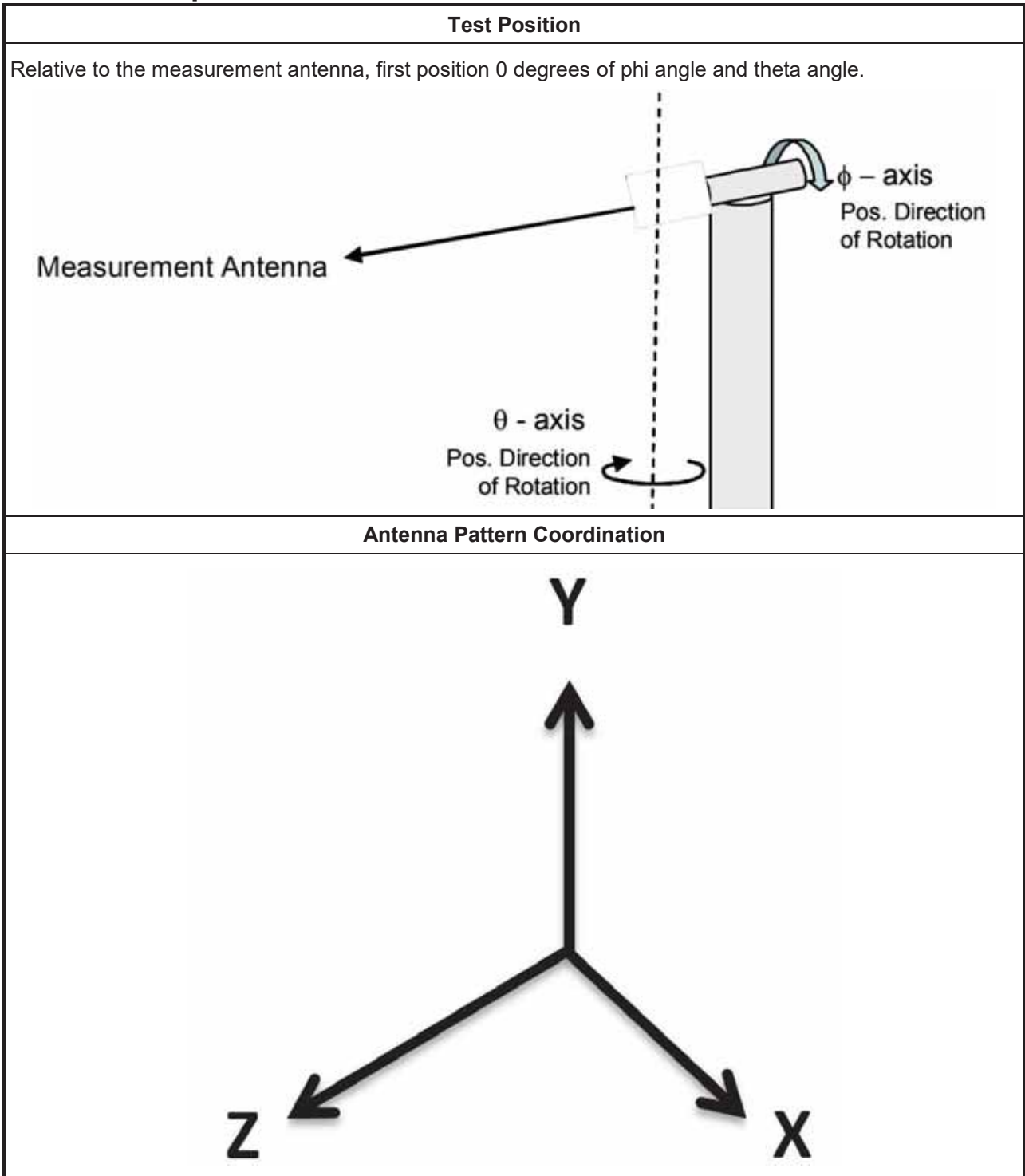
8. Summary of Test Result

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.05	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

(Hz)	1580.14	-1091.21	-0.6605	0.2105	-0.3102	0.0414	-0.4319	-0.4404	1.1131	1.1709	0.4032	0.4825	0.4475	0.6801	-0.5703	-0.6907	-1.3212	1.9611	0.0893	1.6228	2.7415	3.6395	43.71	3.9262
(Hz)	2.3811	-1.0248	-0.1510	0.7106	0.8102	-0.5905	-1.6113	-0.8502	0.8911	1.3819	1.5114	1.2918	1.8621	1.9405	-0.7344	0.0721	-0.5412	-1.2103	0.0963	1.1521	3.3324	4.4913	4.1909	3.7418
(Hz)	2.7745	-4.4124	-2.0228	-3.6334	-3.5919	-2.3179	-2.7113	-0.8504	-0.41028	0.8919	2.8232	1.7232	2.7232	1.49003	-1.2942	0.09102	-1.27185	-2.72284	-2.06696	0.3019	2.8916	2.8633	1.35115	0.66075
(Hz)	2.62031	-2.68148	-1.63278	-3.18135	-2.06188	-2.27185	-1.67109	-0.54012	-0.27011	0.64186	2.5232	2.3757	2.99276	1.6807	-1.49131	-0.6912	0.52046	0.95111	-1.08101	0.95107	1.98168	1.1037	0.76193	0.85146
(Hz)	0.96031	-1.44062	0.61213	3.36372	-5.28184	-6.54019	-0.75111	0.05014	-0.48135	0.49181	2.4628	2.7929	1.52098	-0.27199	-3.38339	-1.67032	-0.19085	-2.01283	-2.51136	-0.44011	0.07093	0.23034	2.86129	-2.62197
(Hz)	0.24109	0.01071	0.44163	2.93033	-1.12101	-1.14013	-1.25196	0.03077	0.33055	-1.06070	0.79149	2.30182	1.12109	0.33151	-2.64124	-1.66127	-0.01094	1.16018	-1.37113	0.82188	3.75137	2.43121	-4.73057	4.59132
(Hz)	0.61081	-0.03113	-0.16183	4.43583	-3.03113	-1.48066	-2.28131	-1.11034	-1.41211	-1.89016	-0.34041	1.23070	-1.13147	-0.21391	-3.78124	-1.65133	0.45184	0.620124	-2.89055	-0.63024	4.39429	2.28119	-1.46135	-1.71022
(Hz)	2.59196	-1.671287	0.671268	-4.81649	-2.83154	2.11122	-1.88123	-1.5611	-2.08126	-3.98127	-2.98174	-0.31101	-1.72175	-3.09133	-4.44124	-2.49116	-0.57123	-1.01089	-3.53027	-0.65132	4.14158	-2.93117	-2.99132	-1.28067
(Hz)	2.71277	-3.35046	2.87126	-4.54074	-4.89125	2.28117	-1.78126	-2.09122	-4.78124	-4.98123	-2.54127	-3.21148	-3.46127	-5.56126	-3.14028	-2.75124	-2.79124	-3.32023	-3.22023	2.94127	4.31153	-3.93128	4.15122	-0.73122
(Hz)	0.29419	0.61038	4.02047	-4.82052	-3.94023	-3.14217	-2.59125	-3.36134	-5.91161	-7.94163	-6.27145	-5.21391	-3.22439	-6.14189	-7.75059	-6.84044	-5.98177	-2.82011	-2.88019	-1.01449	0.99156	-4.51179	-5.98139	-4.79014
(Hz)	4.53053	0.33073	3.33073	-4.71047	-4.73036	-2.28032	-3.71036	-4.26037	-7.47014	-6.99059	-6.97039	-6.6801	-4.76019	-7.15039	-6.74058	-6.35073	-7.86057	-4.69056	-3.25034	-7.39059	6.27047	5.45019	-4.73044	-1.89019
(Hz)	4.63043	0.14032	5.02049	-5.41045	-4.97019	-3.04123	-4.22048	-4.78019	-8.19019	-7.59019	-7.59019	-7.47019	-6.64019	-8.64019	-8.05019	-7.63019	-8.65019	-6.17019	-5.39019	-7.19019	11.01043	7.01047	4.85019	-6.15019
(Hz)	4.04039	0.58076	4.71026	-5.0204	-4.51037	-3.98048	-4.07054	-3.83023	-4.10171	-7.91044	-6.61059	-4.93052	-6.63074	-6.49093	-6.37017	-7.28044	-6.25049	-4.67048	-7.98075	-7.24047	-7.77024	5.66018	-3.98042	-1.35042
(Hz)	4.52047	-5.93043	0.02046	-6.84027	-5.64041	-4.74028	-7.59045	-6.46035	-6.54025	-5.91074	-7.14027	-6.65048	-4.23041	-1.11011	-7.94049	-8.52045	-1.15046	-4.12073	-8.05049	-6.52049	-4.14048	-6.25044	-4.14048	-6.25044
(Hz)	4.51047	-8.19073	-1.69046	-6.52043	-3.42053	-5.96075	-4.82075	-7.23074	-6.45077	-7.39033	-7.36021	-6.75044	-3.08027	-2.52044	-11.52044	-8.57088	-7.94089	-8.98027	-4.87074	-5.94046	-8.09022	-2.75042	-6.88081	-6.91043
(Hz)	4.25048	-6.27044	-9.25041	-6.85055	-6.03015	-6.15043	-7.50047	-7.78049	-7.89079	-8.34088	-5.96065	-5.92054	-5.05029	-3.32052	-6.32054	-6.78043	-6.95027	-6.66073	-8.42075	-7.85074	-6.71038	-4.22018	-6.18026	-6.18026
(Hz)	4.47038	-8.14074	-6.49076	-7.28081	-6.59065	-7.25043	-10.79043	-7.97059	-8.67085	-6.65042	-6.61051	-5.90052	-3.94027	-4.82049	-6.28041	-7.10042	-7.88074	-6.89095	-7.37044	-6.85044	-4.25013	-4.13048	-4.86079	-7.95044
(Hz)	7.03079	-7.49078	-6.65077	-4.52068	-6.05077	-8.16027	-7.86047	-8.18083	-6.85046	-6.60056	-6.76047	-6.52056	-4.72047	-2.26044	-6.34085	-6.48056	-6.51026	-6.64081	-6.34085	-7.74082	-7.97042	-5.91045	-6.78042	-7.97042
(Hz)	-11.14073	-6.82046	-5.94042	-4.45044	-4.14055	-7.89079	-7.97054	-4.91927	-10.09074	-10.09074	-9.16048	-6.19048	-7.39049	-7.22046	-6.93049	-6.51043	-4.71083	-6.97084	-6.87084	-12.15042	-11.97082	-6.08079	-6.83089	-11.77084
(Hz)	-10.29078	-7.71055	-7.49078	-6.28058	-10.29058	-9.65043	-8.96019	-10.12044	-10.25018	-11.01051	-10.21055	-10.48017	-10.34059	-6.97042	-5.13049	-10.41018	-10.83048	-6.96087	-6.97042	-10.41018	-10.83048	-6.96087	-6.97042	-10.41018
(Hz)	0.43010	-6.09028	-6.03061	-6.88082	-6.91029	-6.95059	-6.97082	-10.39014	-11.36014	-10.72010	-10.21052	-11.01073	-11.96015	-8.84083	-6.78042	-7.81038	-8.44083	-6.12047	-9.14016	-10.02026	-8.83044	-4.84015	-7.36071	-6.83074
(Hz)	4.60173	-5.92047	-8.21019	0.91098	-6.93087	-6.93087	-10.12015	-10.45012	-11.01014	-11.51014	-10.21052	-10.48017	-10.72057	-8.95081	-8.18068	-7.74048	-8.68045	-6.45037	-10.02026	-9.76047	-9.19032	-6.93042	-8.56079	-8.56079
(Hz)	5.35094	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh	Thresh
(Hz)	1.880236	-1.86031	0.48023	0.57013	1.89014	1.21035	1.62077	0.46035	0.65067	-1.13035	-1.71073	-1.47028	-1.34038	-1.52014	-1.28078	-0.25008	0.22028	0.12023	0.31039	-0.85017	-1.26031	-1.51091	-2.04017	-1.58016
(Hz)	1.96021	-1.08019	-1.36012	0.62027	0.44008	0.65039	0.46019	0.69021	2.52016	-2.10098	-1.96017	-1.76017	-1.91098	-1.53018	-1.53018	-1.53018	-1.53018	0.29013	0.36022	0.22017	0.81011	0.61018	-1.19018	-1.09018
(Hz)	2.26011	-0.95017	0.18032	0.71048	1.59013	0.20018	0.26018	0.47012	1.87023	-0.57012	1.89014	1.81011	1.53018	1.81011	1.81011	1.81011	1.81011	0.39018	0.39018	0.39018	1.41018	1.41018	0.29018	-2.72014
(Hz)	4.02037	-2.98049	0.77086	2.41028	-2.32068	1.09072	0.54022	0.26011	-0.86014	-1.91077	-1.53015	-1.57028	-1.62018	0.29067	0.74059	1.41059	2.52022	2.95019	3.33025	3.72027	1.42032	1.63029	0.41018	-2.85019
(Hz)	2.03011	0.17010	0.87029	1.84078	0.93021	0.25014	0.27014	0.89098	0.85097	0.27014	0.27014	-1.10068	0.84065	1.89042	-1.10068	1.74029	0.20017	1.74029	2.92023	2.92023	2.92023	1.21018	1.04078	1.35025
(Hz)	3.330135	0.91014	1.19014	1.98044	0.91076	2.55019	3.31023	2.96058	3.66044	-1.42013	-0.14076	0.52046	0.58051	0.17018	0.62012	0.750115	1.33029	0.84072	1.29025	1.29025	1.29025	0.86036	1.26036	-1.04014
(Hz)	0.38038	0.91019	1.51047	1.98049	2.95076	1.87046	4.97041	3.97051	3.32047	-1.51004	0.97026	0.62048	0.26058	0.21012	0.91067	1.78086	-0.68088	0.12012	0.93066	0.93066	0.93066	0.51015	0.45029	-0.89041
(Hz)	0.92054	0.74013	-1.02035	0.41042	1.03017	2.75022	3.95058	5.33046	4.48058	1.07083	-0.16037	2.14024	0.280142	-0.61035	1.76028	1.37056	2.01049	0.170101	1.23029	2.22018	1.240122	-1.72025	0.18047	-0.18042
(Hz)	1.68041	-2.98044	-1.79047	0.21031	0.11031	4.71058	5.78058	3.89035	0.47013	0.61035	1.29041	0.47013	0.61035	1.92017	1.21079	2.03012	0.780101	2.54020	2.06003	-0.02039	-0.56014	1.56016	1.62016	
(Hz)	1.59053	-3.95043	-2.81016	-0.76004	1.47016	0.99053	5.86034	3.76013	0.84039	0.33044	1.62017	0.91019	0.69019	1.10068	0.51073	2.21048	0.19055	1.52014	2.94041	2.32014	-0.01052	-1.33015	0.33017	
(Hz)	1.16011	-3.09036	-3.07067	0.36016	2.43048	5.79016	3.14014	0.68017	-0.35012	0.60014	1.24014	0.39014	0.11011	1.16011	2.46017	3.12076	1.51012	0.74062	1.20044	2.34045	2.81018	1.98018	1.98018	
(Hz)	1.47018	-2.57014	-1.74077	-0.54016	2.01057	4.85073	5.72097	2.81032	0.06076	-0.55032	0.76015	0.21017	1.02092	0.46025	0.14012	2.46027	3.71046	3.62077	2.91016	-0.55010	-1.01045	-1.53020	2.42059	
(Hz)	0.11011	-0.21019	-1.61007	-1.13012	0.94056	3.88049	4.68018	2.61029	0.92014	0.31073	0.34035	0.10047	1.31034	3.31024	2.26069	-1.95014	-1.53049	-0.55025	1.86044	1.86044	1.86044	0.83042	0.83042	
(Hz)	1.56014	-3.27012	-1.27069	-3.15052	0.67012	2.08043	2.04074	0.46029	-2.89017	-1.41049	0.13057	-0.25012	0.51072	-1.66025	-1.61051	0.51056	1.42029	0.360101	0.54024	-3.83074	4.56017	2.02052	-0.86019	
(Hz)	2.72068	-4.71047	-1.71028	-1.27023	-0.58063	-0.22031	-0.31041	-0.71049	-5.12098	-4.84067	-1.12048	-1.86065	-0.160101	-0.70037	3.74015	-3.56049	7.75022	4.19029	-4.23019	-1.93020	-2.61020	-1.84014	-1.84014	
(Hz)	3.39048	-4.94026	-1.77046	-																				



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

(2)25)	5.1717-68	7.8248-68	5.7255-68	8.0331-68	11.8533-68	11.9891-68	6.3445-68	4.6614-68	4.8253-68	6.714	8.8877-68	8.1209-68	12.3911-68	10.9912-68	14.5718-68	18.0116-68	17.5918-68	13.9211-68	10.3310-68	10.0613-68	6.1241-68	3.6421-68	1.45123-68	1.82323-68	
(3)25)	3.4614-68	11.76123-68	8.9846-68	8.3511-68	17.9717-68	11.33457-68	7.38528-68	3.24125-68	2.75373-68	4.559161-68	5.12487-68	4.79558-68	6.63711-68	7.33871-68	11.71149-68	14.281321-68	12.391138-68	10.51812-68	8.820176-68	11.299451-68	5.581308-68	2.793446-68	3.011717-68	1.33126-68	4.02058-68
(4)25)	10.820136-68	16.551736-68	15.531769-68	16.521181-68	17.919055-68	17.919055-68	6.541383-68	2.989330-68	3.768468-68	5.384495-68	5.42726-68	2.29326-68	3.546465-68	7.956109-68	15.751338-68	11.210231-68	12.001367-68	16.511801-68	16.511801-68	18.51811-68	12.63671-68	4.017309-68	2.966157-68	1.871683-68	4.02058-68
(5)25)	16.81618-68	16.89110-68	10.331159-68	12.821127-68	17.97582-68	6.024584-68	6.29418-68	3.313385-68	4.771519-68	5.484489-68	3.202151-68	0.591033-68	2.33242-68	4.044783-68	16.071819-68	17.641324-68	8.349683-68	9.533121-68	11.281522-68	10.781518-68	3.12123-68	3.796333-68	0.933933-68	0.981111-68	11.81111-68
(6)25)	15.289202-68	4.659150-68	4.986559-68	6.186975-68	7.498466-68	6.538181-68	5.361376-68	3.066332-68	4.867757-68	5.484489-68	2.908286-68	0.061148-68	3.384467-68	4.537181-68	10.55114-68	11.24184-68	11.62184-68	6.518585-68	10.631173-68	14.711541-68	10.801788-68	5.996335-68	10.621129-68	10.681111-68	11.81111-68
(7)25)	8.644611-68	6.915854-68	3.541287-68	4.688468-68	8.141846-68	8.956487-68	4.6214-68	3.237827-68	4.959196-68	5.761818-68	2.281116-68	1.082172-68	3.552191-68	6.021177-68	5.980474-68	13.251471-68	6.028485-68	6.248489-68	12.751088-68	6.081828-68	16.451734-68	8.07125-68	8.741858-68	13.511845-68	11.81111-68
(8)25)	7.761919-68	4.886519-68	5.911762-68	5.911762-68	7.011554-68	5.686465-68	4.3824-68	4.071531-68	7.444877-68	6.98144-68	2.051321-68	2.051321-68	4.754225-68	4.962127-68	5.79167-68	4.071171-68	4.289889-68	5.689161-68	16.411272-68	4.316225-68	9.921021-68	3.671328-68	5.971798-68	10.411325-68	11.81111-68
(9)25)	8.36174	6.447623-68	5.161599-68	7.330877-68	4.136223-68	7.059465-68	5.784221-68	4.336077-68	7.898877-68	6.521595-68	6.126-68	3.364229-68	6.06544-68	7.37385-68	6.381238-68	8.981907-68	6.679399-68	4.894747-68	13.721433-68	3.831622-68	4.87162-68	2.796132-68	2.69114-68	11.311847-68	11.81111-68
(10)25)	7.08716	6.467633-68	8.89179-68	9.961034-68	7.415171-68	7.64582-68	4.871428-68	5.653103-68	10.291052-68	7.31933-68	7.68664-68	5.841587-68	7.221077-68	10.161818-68	9.420158-68	16.441578-68	8.866121-68	1.285149-68	17.021477-68	7.941643-68	3.94142-68	2.984404-68	7.63109-68	10.58191-68	11.81111-68
(11)25)	6.887785-68	9.991929-68	8.661979-68	12.046974-68	7.229889-68	8.17352-68	8.617354-68	6.7771338-68	12.889107-68	9.888434-68	10.71897-68	8.571271-68	9.367798-68	12.711077-68	11.998197-68	17.881051-68	14.218685-68	4.715411-68	6.671061-68	14.0211815-68	3.781495-68	3.53159-68	5.841828-68	11.202784-68	11.81111-68
(12)25)	5.689102-68	6.839723-68	7.39927-68	10.711287-68	7.719175-68	6.73944-68	10.011035-68	11.0581281-68	11.223939-68	10.791199-68	17.271786-68	12.14919-68	10.911625-68	11.301398-68	11.591797-68	9.391514-68	12.021771-68	7.391255-68	5.486154-68	19.851002-68	4.951574-68	4.455123-68	4.455123-68	4.879108-68	10.55193-68
(13)25)	8.091823-68	7.76463-68	10.78111-68	18.6111035-68	10.021498-68	1.941891-68	10.011035-68	11.0581281-68	11.223939-68	10.791199-68	17.271786-68	12.14919-68	10.911625-68	11.301398-68	11.591797-68	9.391514-68	12.021771-68	7.391255-68	5.486154-68	19.851002-68	4.951574-68	4.455123-68	4.455123-68	4.879108-68	10.55193-68
(14)25)	10.811511-68	10.2861161-68	13.081361-68	17.081123-68	7.4174-68	3.829178-68	14.751156-68	14.8881339-68	11.711251-68	15.278187-68	12.898184-68	18.04138-68	13.11114-68	13.11114-68	14.981198-68	14.981198-68	12.611427-68	11.571127-68	4.571177-68	11.751178-68	4.121133-68	4.121133-68	11.311101-68	10.281136-68	12.32138-68
(15)25)	10.851451-68	11.781127-68	11.781127-68	15.219178-68	18.777102-68	10.821102-68	13.989156-68	13.979177-68	8.046109-68	12.741887-68	15.245178-68	11.111126-68	11.731128-68	11.699151-68	11.202186-68	17.411202-68	12.611433-68	14.951023-68	7.481102-68	15.514824-68	4.212103-68	17.79118-68	14.951023-68	14.951023-68	15.421134-68
(16)25)	14.861164-68	15.391385-68	16.891399-68	19.7881458-68	5.3311268-68	11.0114948-68	17.0610411-68	11.3391111-68	11.8861254-68	11.781151-68	11.941131-68	14.251133-68	7.566466-68	5.9861441-68	18.2201468-68	18.2201468-68	11.2021191-68	11.8594862-68	6.971824-68	6.91515-68	14.781124-68	12.11319-68	12.2981182-68	12.2981182-68	12.716161-68
(17)25)	14.86911789-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(18)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(19)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(20)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(21)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(22)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(23)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(24)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(25)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(26)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(27)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.7951474-68	13.7517211-68	12.631395-68	7.8911188-68	11.820189-68	11.0691167-68	13.741161-68	12.716161-68
(28)25)	18.7841785-68	15.7101504-68	14.751194-68	18.268169-68	13.07113-68	14.0091757-68	16.9891811-68	17.7591191-68	11.731186-68	15.269148-68	8.516127-68	6.876746-68	6.789453-68	8.2061294-68	14.330131-68	18.0411271-68	14.411910-68	14.795147							



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

(Hz)	0.9994-3.5	4.160294	1.360249	2.33307	4.69868	9.69545	5.09788	6.448788	9.99785	6.90133	7.95296	4.97139	2.96527	1.059388	18.79179	7.95483	8.72418	8.05928	10.991205	8.66121	8.73159	2.748	2.57337	7.45105	
(Hz)	12.95658	6.69431	3.11652	4.29519	10.32047	10.72944	5.71727	8.720148	13.51018	8.65142	8.89721	6.36513	3.63353	8.591033	18.260136	10.22614	7.38024	5.97148	12.48117	7.45485	5.03255	1.74417	4.091158	8.341804	
(Hz)	12.95658	6.69431	3.11652	4.29519	10.32047	10.72944	5.71727	8.720148	13.51018	8.65142	8.89721	6.36513	3.63353	8.591033	18.260136	10.22614	7.38024	5.97148	12.48117	7.45485	5.03255	1.74417	4.091158	8.341804	
(Hz)	1.181702	8.801891	8.441141	11.271128	17.341168	9.38145	5.67139	8.65112	14.81187	18.69138	18.80184	9.98159	5.18136	8.33194	16.16151	18.36113	13.69165	7.73163	12.87145	14.191871	3.61148	4.23140	11.27196	13.74139	
(Hz)	8.33147	11.82181	12.25185	18.22186	17.71178	7.31176	8.38151	11.61154	18.21109	15.42182	11.41104	6.48178	8.98194	17.82192	18.33137	13.73165	11.28148	7.92152	10.56172	11.23138	2.941245	2.78146	12.81106	9.991188	
(Hz)	7.31611	9.451265	12.81186	18.74167	17.92104	8.03197	9.311564	16.47186	10.14145	18.03187	14.73123	10.46125	8.7419	11.97118	19.37106	14.72158	18.93188	13.21107	15.11173	14.41141	7.511217	11.881287	12.06123	11.33172	
(Hz)	9.09187	12.031247	14.541525	17.841852	17.121068	8.731148	12.69157	15.07130	10.341445	18.46189	16.611204	11.611204	8.281243	12.41147	11.24175	12.93176	15.791585	11.131821	10.071852	11.461143	8.891896	17.241877	16.121795	9.24178	
(Hz)	1.591082	10.09185	12.781454	18.871884	18.831468	9.781284	14.671482	13.311134	11.421036	11.671314	11.421036	10.99179	7.65189	13.82113	18.26145	14.171227	15.061146	7.391128	11.88174	6.691734	11.88174	15.84156	9.311705	8.311705	
(Hz)	11.451097	9.511038	18.36189	18.36189	15.53138	10.931183	11.181218	13.991397	18.271741	17.371184	11.671683	7.591701	7.151825	8.861234	18.321153	18.021446	15.211863	11.011421	10.411823	17.391629	11.711759	18.74158	18.891268	14.951457	
(Hz)	16.981273	12.211532	18.011798	17.71184	18.91122	13.741441	12.291073	13.961161	11.071638	14.561122	11.85944	7.971811	7.811811	11.381258	17.911134	17.73138	15.741821	11.781150	11.831557	18.521688	17.261789	17.991848	15.191697	10.761933	
(Hz)	16.981273	12.211532	18.011798	17.71184	18.91122	13.741441	12.291073	13.961161	11.071638	14.561122	11.85944	7.971811	7.811811	11.381258	17.911134	17.73138	15.741821	11.781150	11.831557	18.521688	17.261789	17.991848	15.191697	10.761933	
(Hz)	1.698101	3.669191	10.591235	12.271089	9.981038	11.671543	18.97189	10.891337	18.36189	13.44192	13.44192	14.221461	18.18189	16.641759	17.871931	18.18189	15.741821	16.641759	17.871931	18.18189	15.741821	16.641759	17.871931	18.18189	15.741821
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.971871	18.971871	18.971871	18.971871	18.971871	18.971871
(Hz)	11.841147	12.361151	12.311328	11.95104	9.781865	10.071125	14.811732	17.881167	18.461744	16.121444	14.79134	14.28119	11.811568	13.531447	17.351896	19.18130	18.68168	17.651742	18.941831	18.9					



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

Model	18.30-18.24	-18.99-18.27	-17.60-16.17	-16.02-18	-16.57-13.05	-12.97-14.44	-14.47-13.11	-13.82-14.92	-16.04-15.5	-14.87-18.93	-17.78-18.64	-15.88-16.24	-13.83-12.35	-12.88-13.61	-11.80-8.62	-8.28-10.12	-11.24-14.51	-18.50-15.05	-14.43-14.01	-15.86-18.53	-19.19-18.77	-15.87-17.05	-18.15-18.07	-16.71-17.52	
Theta	0°(17.25)	-16.18-16.68	-17.96-19.07	-17.44-18.45	-17.17-13.35	-14.36-16.36	-16.76-18.77	-18.78-19.87	-17.81-15.27	-14.20-14.78	-14.20-14.78	-11.12-0.11	-11.46-10.55	-12.35-14.16	-15.90-14.46	-15.48-14.47	-18.14-18.42	-18.10-18	-16.26-13.13	-17.84-18.12	-18.19-19.78	-16.14-15.1	-15.43-13.11	-12.73-13.12	
FreqHz	5.65Pa	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	ThetaE2	
Gain	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	0°(17.25)	
Theta	0°(17.25)	-15.26-18.11	-17.04-14.64	-18.34-6.04	-15.41-13.35	-12.31-12.8	-0.99-0.5	-0.57-0.69	-0.78-0.72	-0.30-1.79	-3.08-4.32	-5.01-2.64	-8.06-12.41	-13.85-14.42	-12.35-9.12	-17.41-16.03	-12.35-9.12	-7.29-6.83	-4.84-3.4	-1.15-0.79	-0.34-0.04	-0.65-0.4	-0.97-1.48	-1.8-2.41	-3.44-6.62
Theta	0°(17.25)	6.21-7.17	7.76-6.44	5.92-5.44	5.23-4.53	4.62-2.48	-1.78-1.38	0.76-0.1	0.72-0.03	1.04-1.2	-1.42-2.23	-3.46-6.33	-11.01-15.96	-17.41-16.03	-10.14-10.72	-5.13-4.26	2.1-0.7	0.6-0.45	-0.33-0.21	0.24-0.44	-0.68-0.88	-1.30-1.99	-2.89-3.07	-3.96-4.97	
Theta	0°(17.25)	3.81-4.5	-1.42-2.47	-4.82-5.25	-5.79-5.74	-5.31-4.1	-2.80-1.64	1.46-1.34	1.02-0.71	0.21-1.4	-2.81-2.74	-6.3-8.9	-11.01-15.96	-17.41-16.03	-7.91-5.28	-3.61-2.27	-1.72-1.48	-1.07-0.54	-0.26-0.12	0.5-0.51	-0.20-0.74	-1.54-1.42	-1.88-2.5	-1.88-2.5	
Theta	0°(17.25)	-1.07-0.89	-1.26-1.64	-1.03-1.62	-1.08-0.92	-1.20-1.11	-1.02-1.23	-0.72-0.98	-0.72-0.98	-1.27-1.23	-1.22-1.46	-1.82-2.53	-3.77-5.76	-7.22-8.89	-10.53-11.88	-12.68-11.9	-10.33-8.54	-8.47-4.05	-2.88-2.2	-2.9-2.2	-2.14	-0.8-1.1	-1.87-1.76	-3.99-3.87	-6.86-6.85
Theta	0°(17.25)	3.36-0.68	-9.22-7.27	-14.11-12.37	-9.97-7.36	-5.49-4.65	-5.22-3.9	-2.9-2.8	-5.0-4.3	-2.98-1.07	-2.80-1.27	-4.82-5.82	-8.78-9.28	-8.78-9.28	-8.50-7.9	-10.51-10.9	-10.89-13.4	-9.71-5.83	-3.97-4.82	-5.50-4.5	-3.44-1.77	-0.37-0.76	-2.96-2.07	-4.89-6.88	-2.71-1.67
Theta	0°(17.25)	4.69-10.33	-7.12-7.73	-12.28-11.54	-7.02-8.41	-3.54-3.24	-4.33-3.33	-4.87-3.88	-8.84-10	4.83-4.71	-5.12-1.79	-7.85-9.14	-7.85-9.14	-7.85-9.14	-4.27-4.76	-10.51-10.9	-10.89-13.4	-9.71-5.83	-3.97-4.82	-7.12-8.12	-8.96-8.78	-5.91-6.59	-0.71-1.53	-2.76-3.14	-3.54-1.6
Theta	0°(17.25)	4.69-10.33	-7.12-7.73	-12.28-11.54	-7.02-8.41	-3.54-3.24	-4.33-3.33	-4.87-3.88	-8.84-10	4.83-4.71	-5.12-1.79	-7.85-9.14	-7.85-9.14	-7.85-9.14	-4.27-4.76	-10.51-10.9	-10.89-13.4	-9.71-5.83	-3.97-4.82	-7.12-8.12	-8.96-8.78	-5.91-6.59	-0.71-1.53	-2.76-3.14	-3.54-1.6
Theta	0°(17.25)	5.27-14.43	-10.02-8.93	-14.92-13.25	-10.50-25	0.18-0.04	2.28-0.13	4.03-7.38	4.86-4.26	2.87-1.68	-1.82-0.45	2.78-1.69	-1.89-1.44	-1.82-0.48	2.28-0.72	-3.14-3.01	4.22-2.46	6.87-10.88	-12.77-10.64	-12.17-11.13	-10.89-8.73	-7.60-6.32	-3.29-2.07	0.20-0.52	0.01-1.48
Theta	0°(17.25)	1.19-10.37	-10.02-8.93	-14.92-13.25	-10.50-25	0.18-0.04	2.28-0.13	4.03-7.38	4.86-4.26	2.87-1.68	-1.82-0.45	2.78-1.69	-1.89-1.44	-1.82-0.48	2.28-0.72	-3.14-3.01	4.22-2.46	6.87-10.88	-12.77-10.64	-12.17-11.13	-10.89-8.73	-7.60-6.32	-3.29-2.07	0.20-0.52	0.01-1.48
Theta	0°(17.25)	2.74-9.28	-18.66-16.81	-6.30-5.36	2.35-0.16	-4.48-0.26	0.12-0.21	-1.4-1.37	-2.80-3.6	1.03-0.3	-0.2-0.2	-3.74-3.5	-3.9-2.21	-0.63-0.2	0.23-0.09	-0.88-0.31	-5.82-2.7	2.1-2.27	4.16-8.66	-6.71-14.76	-12.38-10.1	-10.17-12.29	-7.54-13.3	-0.21-0.54	0.28-1.68
Theta	0°(17.25)	3.51-7.87	-14.41-17.74	-6.11-6.71	2.11-0.13	-0.93-0.02	0.80-1.5	-1.91-2.52	-1.86-2.26	0.13-0.2	0.48-0.6	0.81-1.48	-1.81-2.24	-0.63-0.2	0.23-0.09	-0.88-0.31	-5.82-2.7	2.1-2.27	4.16-8.66	-6.71-14.76	-12.38-10.1	-10.17-12.29	-7.54-13.3	-0.21-0.54	0.28-1.68
Theta	0°(17.25)	4.82-6.95	-10.44-11.77	-5.93-6.25	-4.72-6.9	-2.51-0.82	-0.28-0.17	-2.9-4.19	-2.07-1	-0.54-0.62	0.43-0.65	-3.89	-3.0-2.18	-0.98-0.39	0.71-0.22	-3.13-3.08	-4.09-2.27	2.80-0.22	0.55-0.98	-4.8-8.84	-10.04-9.16	-17.65-13.31	-3.96-0.15	2.06	1.24-2.68
Theta	0°(17.25)	4.82-6.95	-10.44-11.77	-5.93-6.25	-4.72-6.9	-2.51-0.82	-0.28-0.17	-2.9-4.19	-2.07-1	-0.54-0.62	0.43-0.65	-3.89	-3.0-2.18	-0.98-0.39	0.71-0.22	-3.13-3.08	-4.09-2.27	2.80-0.22	0.55-0.98	-4.8-8.84	-10.04-9.16	-17.65-13.31	-3.96-0.15	2.06	1.24-2.68
Theta	0°(17.25)	5.56-10.53	-6.26-8.31	-6.97-7.01	-4.34-4.27	-4.84-3.55	-4.71-4.42	-8.71-6.43	-3.48-6.67	-4.13-3.66	-3.77-4.04	-3.4-1.47	-4.58-4.69	-1.20-0.77	-1.95-1.6	-17.19-18	-17.19-18	-17.19-18	-17.19-18	-17.19-18	-17.19-18	-17.19-18	-17.19-18	-17.19-18	-17.19-18
Theta	0°(17.25)	3.13-18.69	-10.71-7.84	-8.42-10.39	-4.48-4.42	-4.25-4.4	-4.32-4.15	-10.43-5.66	-4.62-4.79	-4.91-1.19	-1.04-1.24	-3.5-6.82	-5.97-1.17	-3.85-4.7	-4.68-1.31	-5.05-0.62	-4.58-6.37	-8.47-8.52	6.09-7.52	-12.31-17.58	-10.67-12.74	-12.43-12.25	-3.05-1.72	-1.2-1.11	
Theta	0°(17.25)	3.13-18.69	-10.71-7.84	-8.42-10.39	-4.48-4.42	-4.25-4.4	-4.32-4.15	-10.43-5.66	-4.62-4.79	-4.91-1.19	-1.04-1.24	-3.5-6.82	-5.97-1.17	-3.85-4.7	-4.68-1.31	-5.05-0.62	-4.58-6.37	-8.47-8.52	6.09-7.52	-12.31-17.58	-10.67-12.74	-12.43-12.25	-3.05-1.72	-1.2-1.11	
Theta	0°(17.25)	1.44-11.99	-15.71-13.96	-6.62-6.89	-4.56-6.09	-4.25-4.39	-5.27-5.41	-9.69-9.09	-6.62-5.6	-5.41-2.59	-1.77-1.88	-3.46-5.54	-7.81-6.09	-7.81-6.09	-5.84-1.31	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11
Theta	0°(17.25)	1.44-11.99	-15.71-13.96	-6.62-6.89	-4.56-6.09	-4.25-4.39	-5.27-5.41	-9.69-9.09	-6.62-5.6	-5.41-2.59	-1.77-1.88	-3.46-5.54	-7.81-6.09	-7.81-6.09	-5.84-1.31	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11	-11.07-11.11
Theta	0°(17.25)	-16.91-14.53	-11.63-19.19	-14.79-10.66	-5.66-7.34	-8.24-5.94	-6.48-6.69	-7.39-9.12	-6.97-4.71	-3.36-5.21	-3.17-0.82	-3.68-4.37	-6.16-6.72	-7.63-6.49	-7.13-4.88	-10.59-7.75	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8
Theta	0°(17.25)	-16.91-14.53	-11.63-19.19	-14.79-10.66	-5.66-7.34	-8.24-5.94	-6.48-6.69	-7.39-9.12	-6.97-4.71	-3.36-5.21	-3.17-0.82	-3.68-4.37	-6.16-6.72	-7.63-6.49	-7.13-4.88	-10.59-7.75	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8	-10.58-7.8
Theta	0°(17.25)	-10.23-13.44	-18.97-17.96	-18.48-12.88	-8.77-8.81	-8.85-11.5	-11.34-13.06	-8.69-8.77	-6.33-5.17	-5.16-5.56	-5.99-6.42	-5.66-6.83	-5.14-6.63	-8.83-8.24	-8.18-8.5	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64
Theta	0°(17.25)	-10.23-13.44	-18.97-17.96	-18.48-12.88	-8.77-8.81	-8.85-11.5	-11.34-13.06	-8.69-8.77	-6.33-5.17	-5.16-5.56	-5.99-6.42	-5.66-6.83	-5.14-6.63	-8.83-8.24	-8.18-8.5	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64	-12.31-12.64
Theta	0°(17.25)	-13.57-17.94	-15.34-15.13	-14.78-16.02	-14.71-12.7	-11.67-11.81	-17.34-16.38	-10.58-7.06	-5.9-5.02	-4.87-4.62	-7.29-7.47	-7.63-8.63	-7.19-9.8	-7.36-8.65	-7.26-6.63	-6.73-6.51	-11.86-14.58	-16.73-16.16	-7.29-12.76	-16.81-17.81	-12.33-14.17	-15.18-12.62	-8.07-11.81	-11.94-6.65	6.22-9.79
Theta	0°(17.25)	-13.57-17.94	-15.34-15.13	-14.78-16.02	-14.71-12.7	-11.67-11.81	-17.34-16.38	-10.58-7.06	-5.9-5.02	-4.87-4.62	-7.29-7.47	-7.63-8.63	-7.19-9.8	-7.36-8.65	-7.26-6.63	-6.73-6.51	-11.86-14.58	-16.73-16.16	-7.29-12.76	-16.81-17.81	-12.33-14.17	-15.18-12.62	-8.07-11.81	-11.94-6.65	6.22-9.79
Theta	0°(17.25)	-15.84-8.87	-17.20-16.18	-18.91-18.89	-17.11-19.06	-17.00-18.92	-18.41-18.15	-15.51-9.82	-8.28-8.39	-8.83-8.84	-8.44-8.43	-7.98-8.08	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76
Theta	0°(17.25)	-15.84-8.87	-17.20-16.18	-18.91-18.89	-17.11-19.06	-17.00-18.92	-18.41-18.15	-15.51-9.82	-8.28-8.39	-8.83-8.84	-8.44-8.43	-7.98-8.08	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76	-7.89-7.76
Theta	0°(17.25)	-14.24-18.11	-10.31-16.11	-12.43-15.61	-10.03-10.93	-7.97-8.18	-18.68-18.4	-17.08-16.65	-14.11-17	-10.36-9.32	-9.18-9.47	-8.33-8.98	-10.16-10.81	-8.33-8.98	-10.16-10.81	-8.33-8.98	-10.16-10.81	-8.33-8.98	-10.16-10.81	-8.33-8.98	-10.16-10.81	-8.33-8.98	-10.16-10.81	-8.33-8.98	-10.16-10.81
Theta	0°(17.25)	-14.24-18.11	-10.31-16.11	-12.43-15.61	-10.03-10.93	-7.97-8.18	-18.68-18.4	-17.08-16.65	-14.11-17	-10.36-9.32	-9														



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

(dBS)	-73.5/43	-4.8/45	-7.3/48	-7.9/49	-7.61/47.4	-3.2/1/0.5	0.2/0.63	-0.05/1.71	-4.54/7.9	-7.6/0.7	-4.6/1/3	-6.6/12.24	-11.7/9.751	-4.41/12.38	-2.2/0.22	-2.0/3.1	-4.4/6.12	-5.1/0.13.5	2.7/0.3/7	-5.31/8.83	-13.6/18.71	-12.54/4.7	-6.8/8.11	-6.8/8.11
(dBS)	8.81/5.58	6.05/47	-10.2/18.49	-17.8/18	-11.8/10.74	-3.4/0.65	0.84/0.78	-1.04/3.55	5.3/6.58	6.2/6.41	-1.15/4.09	-7.1/0.61	-12.11/1.85	-10.7/4.2	-3.3/4.34	-4.4/6.58	-6.2/9.03	8.8/7.14	-1.9/1.79	-6.2/6.86	-11.6/14.14	-10.5/7.74	6.4/6.64	-7.8/11.86
(dBS)	-1.4/1.06	-4.6/9.67	-8.1/0.75	-11.9/6.48	-12.2/9.57	-3.9/1.72	0.5/1.32	-0.54/1.51	4.3/5.69	6.7/6.38	-1.3/4.25	-8.3/6.21	-15.83/1.26	-15.6/9.96	4.9/4.02	-4.6/9.36	-18.0/18.22	-11.5/4.78	-2.0/1.47	-6.8/13.36	-11.1/13.4	-10.7/9.24	7.5/4.74	8.5/6.65
(dBS)	3.1/3.34	-4.2/1.39	6.6/1.76	7.4/11.1	22.2/8.4	3.6/1.21	-0.2/1.7	-0.2/1.7	3.5/1.19	6.0/3.4	-2.0/2.27	-7.9/18	-17.9/6.12	-16.6/4.10	-7.7/9.58	-6.4/8.2	-11.9/8.08	7.7/14.42	2.4/1.8	-4.6/7.74	-11.5/4.16	6.1/4.10	8.8/8.27	8.8/4.47
(dBS)	3.8/1.38	-3.6/5.48	4.7/4.74	7.9/6.85	-8.1/5.19	4.0/3.19	0.0/6.8	-2.3/3.12	6.7/5.18	6.0/3.42	3.1/4.86	-8.2/1.25	-14.41/1.63	-7.5/9.61	-7.4/1.86	-7.9/6.46	-5.3/6.29	2.3/5.15	-10.2/10.54	-16.0/12.78	9.5/11.69	8.9/12.27	8.8/8.62	4.4/7.33
(dBS)	3.2/0.37	3.1/8.56	5.0/1.43	6.3/7.82	-8.9/1.78	5.1/4.08	1.7/0.48	3.5/9.16	7.0/1.34	5.3/2.93	4.1/3.38	6.5/4.15	-16.5/9.96	8.7/5.13	8.5/2.87	9.8/1.35	7.9/4.89	6.4/3.33	2.4/2.07	-10.3/4.19	-15.5/4.81	8.0/12.27	8.8/8.62	4.4/7.33
(dBS)	5.2/2.58	-4.1/5.61	5.9/8.48	5.8/6.86	9.4/8.72	-5.3/8.45	3.4/2.91	-1.5/3.81	7.4/3.63	6.8/4.15	-6.8/3.14	5.7/1.51	-7.5/11.67	6.0/7.34	-13.1/11.81	-11.7/17.4	8.7/4.15	-10.2/2.57	-10.3/4.19	-11.7/11.4	-11.9/11.4	8.0/12.27	8.8/8.62	4.4/7.33
(dBS)	5.7/2.07	4.3/8.11	5.1/1.48	5.0/3.77	-1.9/16.55	4.7/1.76	-7.6/12.3	-3.8/4.65	6.4/7.61	6.8/4.15	6.2/6.28	-7.1/6.12	-13.4/6.92	-10.8/2.15	-11.9/16.7	9.9/8.62	6.0/6.11	-18.0/10	9.1/11.33	-14.7/6.93	-17.8/11.0	6.6/4.98	8.7/8.67	4.9/8.67
(dBS)	8.8/6.82	6.7/8.11	6.7/1.61	6.6/1.07	-10.7/12.52	5.8/6.32	8.4/3.42	-11.4/12.44	-10.4/1.67	8.8/6.99	7.9/6.12	-17.3/2.46	-10.0/7.23	-11.2/11.47	-11.5/3.27	8.7/11.35	-17.5/4.19	-17.5/4.19	-17.5/4.19	-17.5/4.19	-17.5/4.19	-17.5/4.19	-17.5/4.19	-17.5/4.19
(dBS)	7.4/1.85	-7.9/18.86	-8.0/18.44	-10.3/6.15	-11.3/20.63	4.5/3.34	-7.8/7.78	7.5/2.87	-1.5/11.81	-7.5/11.81	9.0/8.22	9.9/6.12	8.7/9.16	-17.3/4.19	-14.8/13.39	-14.8/13.39	-7.2/9.42	-14.8/13.39	6.0/6.11	-16.3/11.72	-16.3/11.72	-13.8/8.43	8.2/9.16	8.2/9.16
(dBS)	13.5/1.97	10.4/11.91	12.4/12.14	16.6/16.07	-10.9/8.77	7.1/9.47	7.5/2.87	7.9/4.12	-13.3/12.27	-11.3/6.12	-14.8/11.62	15.7/6.15	-12.0/2.93	-11.9/16.1	-18.0/9.59	7.2/7.17	11.7/11.53	-17.9/12.01	-12.2/1.75	-18.1/13.45	-19.1/11.79	-18.1/13.45	-14.2/9.15	-16.0/14.54
(dBS)	12.3/1.94	-14.1/9.73	15.2/16.15	16.6/15.21	-12.7/4.88	3.8/1.35	6.4/6.81	8.4/1.67	-13.0/11.71	-15.0/11.37	-18.1/14.81	-19.1/17.88	18.9/6.17	-18.0/18.03	-15.7/11.63	-12.1/11.78	16.6/16.07	9.9/8.21	-14.7/15.07	-16.2/15.71	-14.5/11.78	14.5/11.78	14.5/11.78	14.5/11.78
(dBS)	11.4/13.40	-12.6/15.74	-11.9/18.04	17.3/40.43	-12.9/12.99	-11.1/15.10	9.2/1.73	8.6/8.68	-14.8/11.10	-14.8/11.10	-14.8/11.10	-12.5/12.52	-11.1/11.86	-13.6/12.48	-13.1/15.75	-18.2/12.52	16.6/16.07	7.9/7.47	-11.5/4.16	-11.7/11.86	-18.5/14.14	-17.4/11.86	-17.1/11.86	-17.1/11.86
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.9/19.59	-16.0/20.15	-18.3/18.16	-18.1/17.4	7.1/10.18	-18.7/19.25	-18.1/18.67	-14.2/11.05	8.2/4.16	-7.2/10.22	-16.2/19.16	-18.9/17.39	-18.5/16.72	-18.5/16.72	-18.5/16.72
(dBS)	16.7/4.16	-16.5/13.84	-11.9/18.86	4.7/4.16	8.2/4.16	-12.9/11.62	9.5/7.13	-7.3/6.12	-3.5/11.88	-15.														



Radiated Composite Gain Data of 2.4GHz / 5GHz

Appendix A

Gain	0(17)0(17.5)	0(15)0(22.5)	0(10)0(37.5)	0(5)0(52.5)	0(0)0(67.5)	0(75)0(82.5)	0(90)0(87.5)	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)	2.281429	5.454105	6.114659	7.478111	8.417387	7.286487	6.916576	4.564377	3.44307	2.461183	1.681144	1.161821	2.370124	3.443362	4.316183	4.714755	4.630486	7.686497	6.886114	4.291347	2.981222	2.210224	1.844147	1.581083
0(17.5)	1.271139	2.661332	4.611562	6.171736	6.361833	8.961162	7.361576	5.951351	3.481305	2.591444	2.512185	3.151374	4.921588	6.841615	7.491811	8.611846	8.861822	7.711877	6.411555	4.761388	3.501238	1.981151	1.131102	0.581035
0(35)	5.38154	4.811521	6.361613	7.751888	10.261106	11.281595	9.331702	6.951501	4.841436	3.331253	2.141213	2.331325	4.391471	6.041538	6.531633	6.83161	6.921788	8.311633	7.811637	6.461475	4.131376	3.471333	3.371343	3.691454
0(52.5)	5.511601	6.791852	10.581222	12.591154	11.461152	12.171016	9.711726	6.461583	5.691535	4.341311	1.971112	1.471237	3.321424	6.211522	4.341347	3.071367	4.571666	6.111827	7.811616	4.721379	3.131261	3.261437	4.281626	5.411523
0(70)	7.831828	9.091079	11.821334	15.981266	17.871274	8.761213	11.011845	7.081588	5.031512	5.431429	2.831199	2.071284	3.19137	4.911509	3.811295	2.791314	3.931441	5.311558	6.321626	5.641372	2.961207	2.551361	5.871621	6.841651
0(107.5)	3.851519	5.971628	7.841822	8.711145	8.691833	10.441338	15.831449	14.141377	3.81309	1.81174	3.051379	3.261395	8.93147	2.811214	2.351331	4.651564	6.221667	7.271733	7.371708	5.921416	2.861272	3.071337	3.31149	
0(142.5)	3.411597	10.051113	10.621102	9.191134	16.611173	17.0718108	17.5611125	9.351762	4.71385	3.371331	2.661156	4.111694	6.151632	7.211631	4.13133	3.14115	5.781719	6.831102	12.31185	10.131827	7.191589	5.65144	3.71132	3.211327
0(177.5)	4.891362	4.751726	8.811086	9.991576	16.331938	17.621139	11.481643	4.951615	4.74127	3.751397	2.691178	4.651588	4.971598	6.221742	4.551519	4.781427	5.09177	11.4411594	10.461847	8.621635	4.761581	5.851514	5.86157	
0(212.5)	4.771455	4.841533	6.691171	16.781918	13.661255	8.03175	16.151408	2.521541	5.591414	3.751529	4.87148	9.481911	7.50172	8.521444	9.46192	7.931422	5.711818	12.721637	16.711422	10.86136	10.89172	7.45168	7.21102	
0(247.5)	7.131844	3.751332	4.1617	16.021734	4.91878	10.93164	9.41543	2.861571	5.261824	4.71825	4.87189	9.63185	7.921714	4.821561	8.591112	6.971514	4.621746	11.661145	16.981713	10.59176	9.93134	10.261157	16.181164	7.531531
0(282.5)	11.1118	4.791445	4.491506	10.071552	5.74175	13.51103	9.391932	3.531640	5.471822	4.321044	10.921979	15.441367	10.86194	9.391865	9.241105	10.35144	5.311456	11.071328	13.571835	10.721933	10.821107	12.721582	18.82183	11.221617
0(317.5)	13.361143	5.081513	3.631339	6.511822	8.0218195	18.2213107	8.2113	5.041087	5.6311433	10.411235	13.311241	17.861167	14.971434	8.24184	9.861111	11.891851	6.111731	10.481106	11.021103	13.641686	17.171828	18.761107	18.281498	
0(352.5)	8.651177	10.061727	3.681467	6.61155	11.19110	18.811838	6.68124	5.551132	1.6811803	10.411266	18.281172	17.351178	18.191124	11.0711128	12.771423	19.411405	9.26163	14.251234	12.361935	12.6811876	14.111248	18.131085	16.931141	
0(387.5)	8.931821	17.651181	7.241654	5.991114	14.391127	10.761191	6.141125	6.481111	11.2511756	12.121845	18.701472	18.281428	15.151149	10.781152	16.051158	15.531481	9.721876	16.9411624	16.071173	12.531841	18.191649	11.131037	8.451101	10.621782
0(422.5)	8.471656	10.391124	10.231186	6.31779	15.8911369	11.471153	6.11949	8.361144	11.7611627	14.141928	18.1611804	16.211293	11.6611239	16.861186	18.951158	9.441106	19.211509	16.7817679	12.231778	18.411373	12.861147	16.131254	8.221599	
0(457.5)	8.261874	8.31135	10.331756	9.3611148	16.8811511	12.841176	9.711297	16.751183	17.1811747	13.211795	14.811177	15.281149	15.8711899	18.401192	17.191162	8.951235	18.781162	17.911554	11.6711858	10.821125	8.781105	8.171855	7.06184	
0(492.5)	17.7611501	16.211595	14.3711847	10.281136	18.561184	9.4511335	15.0811375	17.461183	13.331194	11.3511915	14.8511523	15.8311945	9.4511163	7.9184	15.331172	17.871139	15.511599	18.621129	17.7411651	15.5511849	17.9911197	7.661762	11.4511473	7.95184
0(527.5)	8.871088	18.811572	17.011186	12.291144	13.2511723	18.741168	18.39112	12.7711331	9.3611296	13.8711249	8.791688	8.521656	10.461975	7.2811326	16.1811818	14.331176	19.0411796	18.991149	16.5511659	19.0311841	17.7211013	19.9311735	16.83152	14.281772
0(562.5)	8.471656	10.9311321	10.681136	17.181183	16.5511837	18.3211268	13.9711297	11.141259	12.3811335	11.3911631	14.211389	8.961731	8.36184	10.5411151	18.4711333	13.3814	15.0811724	17.9811794	18.1111791	16.9511654	13.9711447	4.51166	14.391899	16.3311461
0(597.5)	4.511632	11.4711857	18.241147	17.881192	17.8211792	14.111256	15.911318	15.0811659	14.0311369	12.4211259	13.181889	10.6411835	1911433	10.511079	13.441131	10.891119	16.611948	18.21185	18.611842	12.251102	12.371185	18.23115	9.161182	8.14155
0(632.5)	11.211231	16.1511743	16.411155	18.831182	18.1611753	17.5111758	17.161188	18.4511238	10.9611089	10.6311085	12.8311287	10.881904	8.7911055	10.551106	10.271142	18.2711877	18.261186	15.211895	15.211895	9.3511174	11.781755	6.18158	6.93149	
0(667.5)	10.3611229	13.2811454	16.5711578	17.1511607	12.9611269	15.211185	19.2611715	18.5511737	17.2411552	12.7611097	9.56182	7.361689	6.661657	6.34111	7.81111	14.3611447	18.061184	18.61189	17.9711844	12.551104	8.131765	7.561723	6.52156	6.63119
0(702.5)	18.0311781	18.1111707	18.711183	14.8311489	14.971153	17.0211747	16.5611706	18.611719	18.411887	17.4311883	17.5611647	14.8711406	1211105	10.811104	11.3111213	12.8311534	17.2811866	18.111799	18.1911842	17.1311326	9.14173	8.851744	8.731914	11.1911379
0(737.5)	8.551828	8.841937	11.0711428	17.311848	18.0511778	18.0311794	17.8211935	19.29119	18.2211654	15.5511437	11.991598	8.081715	6.941749	8.71932	9.221911	11.5511396	17.8411915	18.1111852	18.3811811	16.116113	14.8411714	18.4311773	11.671514	11.071654
0(772.5)	15.4311705	18.221154	12.8211249	12.441133	18.611187	17.8811817	18.8411864	19.7611847	18.81184	12.8511184	10.291805	8.481824	8.961854	8.871826	9.631899	10.31883	12.211429	15.971812	15.0811819	18.881803	17.82119	18.3611821	11.7611848	17.7611899
0(807.5)	3.7650294	7.669614																						
Gain	0(17)0(17.5)	0(15)0(22.5)	0(10)0(37.5)	0(5)0(52.5)	0(0)0(67.5)	0(75)0(82.5)	0(90)0(87.5)	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)	2.281429	5.454105	6.114659	7.478111	8.417387	7.286487	6.916576	4.564377	3.44307	2.461183	1.681144	1.161821	2.370124	3.443362	4.316183	4.714755	4.630486	7.686497	6.886114	4.291347	2.981222	2.210224	1.844147	1.581083
0(17.5)	1.271139	2.661332	4.611562	6.171736	6.361833	8.961162	7.361576	5.951351	3.481305	2.591444	2.512185	3.151374	4.921588	6.841615	7.491811	8.611846	8.861822	7.711877	6.411555	4.761388	3.501238	1.981151	1.131102	0.581035
0(35)	5.38154	4.811521	6.361613	7.751888	10.261106	11.281595	9.331702	6.951501	4.841436	3.331253	2.141213	2.331325	4.391471	6.041538	6.531633	6.83161	6.921788	8.311633	7.811637	6.461475	4.131376	3.471333	3.371343	3.691454
0(52.5)	5.511601	6.791852	10.581222	12.591154	11.461152	12.171016	9.711726	6.461583	5.691535	4.341311	1.971112	1.471237	3.321424	6.211522	4.341347	3.071367	4.571666	6.111827	7.811616	4.721379	3.131261	3.261437	4.281626	5.411523
0(70)	7.831828	9.091079	11.821334	15.981266	17.871274	8.761213	11.011845	7.081588	5.031512	5.431429	2.831199	2.071284	3.19137	4.911509	3.811295	2.791314	3.931441	5.311558	6.321626	5.641372	2.961207	2.551361	5.871621	6.841651
0(107.5)	3.851519	5.971628	7.841822	8.711145	8.691833	10.441338	15.831449	14.141377	3.81309	1.81174	3.051379	3.261395	8.93147	2.811214	2.351331	4.651564	6.2							



Antenna Pattern of 2.4GHz / 5GHz

Appendix B

φ(22.5°)	φ(27.0°)	φ(31.5°)	φ(36.0°)	φ(40.5°)	φ(45.0°)	φ(49.5°)	φ(54.0°)	φ(58.5°)	φ(63.0°)	φ(67.5°)	φ(72.0°)	φ(76.5°)	φ(81.0°)	φ(85.5°)	φ(90.0°)	φ(94.5°)	φ(99.0°)	φ(103.5°)	φ(108.0°)	φ(112.5°)	φ(117.0°)	φ(121.5°)	φ(126.0°)	φ(130.5°)	φ(135.0°)	φ(139.5°)	φ(144.0°)	φ(148.5°)	φ(153.0°)	φ(157.5°)	φ(162.0°)	φ(166.5°)	φ(171.0°)	φ(175.5°)	φ(180.0°)	φ(184.5°)	φ(189.0°)	φ(193.5°)	φ(198.0°)	φ(202.5°)	φ(207.0°)	φ(211.5°)	φ(216.0°)	φ(220.5°)	φ(225.0°)	φ(229.5°)	φ(234.0°)	φ(238.5°)	φ(243.0°)	φ(247.5°)	φ(252.0°)	φ(256.5°)	φ(261.0°)	φ(265.5°)	φ(270.0°)	φ(274.5°)	φ(279.0°)	φ(283.5°)	φ(288.0°)	φ(292.5°)	φ(297.0°)	φ(301.5°)	φ(306.0°)	φ(310.5°)	φ(315.0°)	φ(319.5°)	φ(324.0°)	φ(328.5°)	φ(333.0°)	φ(337.5°)	φ(342.0°)	φ(346.5°)	φ(351.0°)	φ(355.5°)	φ(360.0°)	φ(364.5°)	φ(369.0°)	φ(373.5°)	φ(378.0°)	φ(382.5°)	φ(387.0°)	φ(391.5°)	φ(396.0°)	φ(400.5°)	φ(405.0°)	φ(409.5°)	φ(414.0°)	φ(418.5°)	φ(423.0°)	φ(427.5°)	φ(432.0°)	φ(436.5°)	φ(441.0°)	φ(445.5°)	φ(450.0°)	φ(454.5°)	φ(459.0°)	φ(463.5°)	φ(468.0°)	φ(472.5°)	φ(477.0°)	φ(481.5°)	φ(486.0°)	φ(490.5°)	φ(495.0°)	φ(499.5°)	φ(504.0°)	φ(508.5°)	φ(513.0°)	φ(517.5°)	φ(522.0°)	φ(526.5°)	φ(531.0°)	φ(535.5°)	φ(540.0°)	φ(544.5°)	φ(549.0°)	φ(553.5°)	φ(558.0°)	φ(562.5°)	φ(567.0°)	φ(571.5°)	φ(576.0°)	φ(580.5°)	φ(585.0°)	φ(589.5°)	φ(594.0°)	φ(598.5°)	φ(603.0°)	φ(607.5°)	φ(612.0°)	φ(616.5°)	φ(621.0°)	φ(625.5°)	φ(630.0°)	φ(634.5°)	φ(639.0°)	φ(643.5°)	φ(648.0°)	φ(652.5°)	φ(657.0°)	φ(661.5°)	φ(666.0°)	φ(670.5°)	φ(675.0°)	φ(679.5°)	φ(684.0°)	φ(688.5°)	φ(693.0°)	φ(697.5°)	φ(702.0°)	φ(706.5°)	φ(711.0°)	φ(715.5°)	φ(720.0°)	φ(724.5°)	φ(729.0°)	φ(733.5°)	φ(738.0°)	φ(742.5°)	φ(747.0°)	φ(751.5°)	φ(756.0°)	φ(760.5°)	φ(765.0°)	φ(769.5°)	φ(774.0°)	φ(778.5°)	φ(783.0°)	φ(787.5°)	φ(792.0°)	φ(796.5°)	φ(801.0°)	φ(805.5°)	φ(810.0°)	φ(814.5°)	φ(819.0°)	φ(823.5°)	φ(828.0°)	φ(832.5°)	φ(837.0°)	φ(841.5°)	φ(846.0°)	φ(850.5°)	φ(855.0°)	φ(859.5°)	φ(864.0°)	φ(868.5°)	φ(873.0°)	φ(877.5°)	φ(882.0°)	φ(886.5°)	φ(891.0°)	φ(895.5°)	φ(900.0°)	φ(904.5°)	φ(909.0°)	φ(913.5°)	φ(918.0°)	φ(922.5°)	φ(927.0°)	φ(931.5°)	φ(936.0°)	φ(940.5°)	φ(945.0°)	φ(949.5°)	φ(954.0°)	φ(958.5°)	φ(963.0°)	φ(967.5°)	φ(972.0°)	φ(976.5°)	φ(981.0°)	φ(985.5°)	φ(990.0°)	φ(994.5°)	φ(999.0°)	φ(1003.5°)	φ(1008.0°)	φ(1012.5°)	φ(1017.0°)	φ(1021.5°)	φ(1026.0°)	φ(1030.5°)	φ(1035.0°)	φ(1039.5°)	φ(1044.0°)	φ(1048.5°)	φ(1053.0°)	φ(1057.5°)	φ(1062.0°)	φ(1066.5°)	φ(1071.0°)	φ(1075.5°)	φ(1080.0°)	φ(1084.5°)	φ(1089.0°)	φ(1093.5°)	φ(1098.0°)	φ(1102.5°)	φ(1107.0°)	φ(1111.5°)	φ(1116.0°)	φ(1120.5°)	φ(1125.0°)	φ(1129.5°)	φ(1134.0°)	φ(1138.5°)	φ(1143.0°)	φ(1147.5°)	φ(1152.0°)	φ(1156.5°)	φ(1161.0°)	φ(1165.5°)	φ(1170.0°)	φ(1174.5°)	φ(1179.0°)	φ(1183.5°)	φ(1188.0°)	φ(1192.5°)	φ(1197.0°)	φ(1201.5°)	φ(1206.0°)	φ(1210.5°)	φ(1215.0°)	φ(1219.5°)	φ(1224.0°)	φ(1228.5°)	φ(1233.0°)	φ(1237.5°)	φ(1242.0°)	φ(1246.5°)	φ(1251.0°)	φ(1255.5°)	φ(1260.0°)	φ(1264.5°)	φ(1269.0°)	φ(1273.5°)	φ(1278.0°)	φ(1282.5°)	φ(1287.0°)	φ(1291.5°)	φ(1296.0°)	φ(1300.5°)	φ(1305.0°)	φ(1309.5°)	φ(1314.0°)	φ(1318.5°)	φ(1323.0°)	φ(1327.5°)	φ(1332.0°)	φ(1336.5°)	φ(1341.0°)	φ(1345.5°)	φ(1350.0°)	φ(1354.5°)	φ(1359.0°)	φ(1363.5°)	φ(1368.0°)	φ(1372.5°)	φ(1377.0°)	φ(1381.5°)	φ(1386.0°)	φ(1390.5°)	φ(1395.0°)	φ(1399.5°)	φ(1404.0°)	φ(1408.5°)	φ(1413.0°)	φ(1417.5°)	φ(1422.0°)	φ(1426.5°)	φ(1431.0°)	φ(1435.5°)	φ(1440.0°)	φ(1444.5°)	φ(1449.0°)	φ(1453.5°)	φ(1458.0°)	φ(1462.5°)	φ(1467.0°)	φ(1471.5°)	φ(1476.0°)	φ(1480.5°)	φ(1485.0°)	φ(1489.5°)	φ(1494.0°)	φ(1498.5°)	φ(1503.0°)	φ(1507.5°)	φ(1512.0°)	φ(1516.5°)	φ(1521.0°)	φ(1525.5°)	φ(1530.0°)	φ(1534.5°)	φ(1539.0°)	φ(1543.5°)	φ(1548.0°)	φ(1552.5°)	φ(1557.0°)	φ(1561.5°)	φ(1566.0°)	φ(1570.5°)	φ(1575.0°)	φ(1579.5°)	φ(1584.0°)	φ(1588.5°)	φ(1593.0°)	φ(1597.5°)	φ(1602.0°)	φ(1606.5°)	φ(1611.0°)	φ(1615.5°)	φ(1620.0°)	φ(1624.5°)	φ(1629.0°)	φ(1633.5°)	φ(1638.0°)	φ(1642.5°)	φ(1647.0°)	φ(1651.5°)	φ(1656.0°)	φ(1660.5°)	φ(1665.0°)	φ(1669.5°)	φ(1674.0°)	φ(1678.5°)	φ(1683.0°)	φ(1687.5°)	φ(1692.0°)	φ(1696.5°)	φ(1701.0°)	φ(1705.5°)	φ(1710.0°)	φ(1714.5°)	φ(1719.0°)	φ(1723.5°)	φ(1728.0°)	φ(1732.5°)	φ(1737.0°)	φ(1741.5°)	φ(1746.0°)	φ(1750.5°)	φ(1755.0°)	φ(1759.5°)	φ(1764.0°)	φ(1768.5°)	φ(1773.0°)	φ(1777.5°)	φ(1782.0°)	φ(1786.5°)	φ(1791.0°)	φ(1795.5°)	φ(1800.0°)	φ(1804.5°)	φ(1809.0°)	φ(1813.5°)	φ(1818.0°)	φ(1822.5°)	φ(1827.0°)	φ(1831.5°)	φ(1836.0°)	φ(1840.5°)	φ(1845.0°)	φ(1849.5°)	φ(1854.0°)	φ(1858.5°)	φ(1863.0°)	φ(1867.5°)	φ(1872.0°)	φ(1876.5°)	φ(1881.0°)	φ(1885.5°)	φ(1890.0°)	φ(1894.5°)	φ(1899.0°)	φ(1903.5°)	φ(1908.0°)	φ(1912.5°)	φ(1917.0°)	φ(1921.5°)	φ(1926.0°)	φ(1930.5°)	φ(1935.0°)	φ(1939.5°)	φ(1944.0°)	φ(1948.5°)	φ(1953.0°)	φ(1957.5°)	φ(1962.0°)	φ(1966.5°)	φ(1971.0°)	φ(1975.5°)	φ(1980.0°)	φ(1984.5°)	φ(1989.0°)	φ(1993.5°)	φ(1998.0°)	φ(2002.5°)	φ(2007.0°)	φ(2011.5°)	φ(2016.0°)	φ(2020.5°)	φ(2025.0°)	φ(2029.5°)	φ(2034.0°)	φ(2038.5°)	φ(2043.0°)	φ(2047.5°)	φ(2052.0°)	φ(2056.5°)	φ(2061.0°)	φ(2065.5°)	φ(2070.0°)	φ(2074.5°)	φ(2079.0°)	φ(2083.5°)	φ(2088.0°)	φ(2092.5°)	φ(2097.0°)	φ(2101.5°)	φ(2106.0°)	φ(2110.5°)	φ(2115.0°)	φ(2119.5°)	φ(2124.0°)	φ(2128.5°)	φ(2133.0°)	φ(2137.5°)	φ(2142.0°)	φ(2146.5°)	φ(2151.0°)	φ(2155.5°)	φ(2160.0°)	φ(2164.5°)	φ(2169.0°)	φ(2173.5°)	φ(2178.0°)	φ(2182.5°)	φ(2187.0°)	φ(2191.5°)	φ(2196.0°)	φ(2200.5°)	φ(2205.0°)	φ(2209.5°)	φ(2214.0°)	φ(2218.5°)	φ(2223.0°)	φ(2227.5°)	φ(2232.0°)	φ(2236.5°)	φ(2241.0°)	φ(2245.5°)	φ(2250.0°)	φ(2254.5°)	φ(2259.0°)	φ(2263.5°)	φ(2268.0°)	φ(2272.5°)	φ(2277.0°)	φ(2281.5°)	φ(2286.0°)	φ(2290.5°)	φ(2295.0°)	φ(2299.5°)	φ(2304.0°)	φ(2308.5°)	φ(2313.0°)	φ(2317.5°)	φ(2322.0°)	φ(2326.5°)	φ(2331.0°)	φ(2335.5°)	φ(2340.0°)	φ(2344.5°)	φ(2349.0°)	φ(2353.5°)	φ(2358.0°)	φ(2362.5°)	φ(2367.0°)	φ(2371.5°)	φ(2376.0°)	φ(2380.5°)	φ(2385.0°)	φ(2389.5°)	φ(2394.0°)	φ(2398.5°)	φ(2403.0°)	φ(2407.5°)	φ(2412.0°)	φ(2416.5°)	φ(2421.0°)	φ(2425.5°)	φ(2430.0°)	φ(2434.5°)	φ(2439.0°)	φ(2443.5°)	φ(2448.0°)	φ(2452.5°)	φ(2457.0°)	φ(2461.5°)	φ(2466.0°)	φ(2470.5°)	φ(2475.0°)	φ(2479.5°)	φ(2484.0°)	φ(2488.5°)	φ(2493.0°)	φ(2497.5°)	φ(2502.0°)	φ(2506.5°)	φ(2511.0°)	φ(2515.5°)	φ(2520.0°)	φ(2524.5°)	φ(2529.0°)	φ(2533.5°)	φ(2538.0°)	φ(2542.5°)	φ(2547.0°)	φ(2551.5°)	φ(2556.0°)	φ(2560.5°)	φ(2565.0°)	φ(2569.5°)	φ(2574.0°)	φ(2578.5°)	φ(2583.0°)	φ(2587.5°)	φ(2592.0°)	φ(2596.5°)	φ(2601.0°)	φ(2605.5°)	φ(2610.0°)	φ(2614.5°)	φ(2619.0°)	φ(2623.5°)	φ(2628.0°)	φ(2632.5°)	φ(2637.0°)	φ(2641.5°)	φ(2646.0°)	φ(2650.5°)	φ(2655.0°)	φ(2659.5°)	φ(2664.0°)	φ(2668.5°)	φ(2673.0°)	φ(2677.5°)	φ(2682.0°)	φ(2686.5°)	φ(2691.0°)	φ(2695.5°)	φ(2700.0°)	φ(2704.5°)	φ(2709.0°)	φ(2713.5°)	φ(2718.0°)	φ(2722.5°)	φ(2727.0°)	φ(2731.5°)	φ(2736.0°)	φ(2740.5°)	φ(2745.0°)	φ(2749.5°)	φ(2754.0°)	φ(2758.5°)	φ(2763.0°)	φ(2767.5°)	φ(2772.0°)	φ(2776.5°)	φ(2781.0°)	φ(2785.5°)	φ(2790.0°)	φ(2794.5°)	φ(2799.0°)	φ(2803.5°)	φ(2808.0°)	φ(2812.5°)	φ(2817.0°)	φ(2821.5°)	φ(2826.0°)	φ(2830.5°)	φ(2835.0°)	φ(2839.5°)	φ(2844.0°)	φ(2848.5°)	φ(2853.0°)	φ(2857.5°)	φ(2862.0°)	φ(2866.5°)	φ(2871.0°)	φ(2875.5°)	φ(2880.0°)	φ(2884.5°)	φ(2889.0°)	φ(2893.5°)	φ(2898.0°)	φ(2902.5°)	φ(2907.0°)	φ(2911.5°)	φ(2916.0°)	φ(2920.5°)	φ(2925.0°)	φ(2929.5°)	φ(2934.0°)	φ(2938.5°)	φ(2943.0°)	φ(2947.5°)	φ(2952.0°)	φ(2956.5°)	φ(2961.0°)	φ(2965.5°)	φ(2970.0°)	φ(2974.5°)	φ(2979.0°)	φ(2983.5°)	φ(2988.0°)	φ(2992.5°)	φ(2997.0°)	φ(3001.5°)	φ(3006.0°)	φ(3010.5°)	φ(3015.0°)	φ(3019.5°)	φ(3024.0°)	φ(3028.5°)	φ(3033.0°)	φ(3037.5°)	φ(3042.0°)	φ(3046.5°)	φ(3051.0°)	φ(3055.5°)	φ(3060.0°)	φ(3064.5°)	φ(3069.0°)	φ(3073.5°)	φ(3078.0°)	φ(3082.5°)	φ(3087.0°)	φ(3091.5°)	φ(3096.0°)	φ(3100.5°)	φ(3105.0°)	φ(3109.5°)	φ(3114.0°)	φ(3118.5°)	φ(3123.0°)	φ(3127.5°)	φ(3132.0°)	φ(3136.5°)	φ(3141.0°)	φ(3145.5°)	φ(3150.0°)	φ(3154.5°)	φ(3159.0°)	φ(3163.5°)	φ(3168.0°)	φ(3172.5°)	φ(3177.0°)	φ(3181.5°)	φ(3186.0°)	φ(3190.5°)	φ(3195.0°)	φ(3199.5°)	φ(3204.0°)	φ(3208.5°)	φ(3213.0°)	φ(3217.5°)	φ(3222.0°)	φ(3226.5°)	φ(3231.0°)	φ(3235.5°)	φ(3240.0°)	φ(3244.5°)	φ(3249.0°)	φ(3253.5°)	φ(3258.0°)	φ(3262.5°)	φ(3267.0°)	φ(3271.5°)	φ(3276.0°)	φ(3280.5°)	φ(3285.0°)	φ(3289.5°)	φ(3294.0°)	φ(3298.5°)	φ(3303.0°)	φ(3307.5°)	φ(3312.0°)	φ(3316.5°)	φ(3321.0°)	φ(3325.5°)	φ(3330.0°)	φ(3334.5°)	φ(3339.0°)	φ(3343.5°)	φ(3348.0°)	φ(3352.5°)	φ(3357.0°)	φ(3361.5°)	φ(3366.0°)	φ(3370.5°)	φ(3375.0°)	φ(3379.5°)	φ(3384.0°)	φ(3388.5°)	φ(3393.0°)	φ(3397.5°)	φ(3402.0°)	φ(3406.5°)	φ(3411.0°)	φ(3415.5°)	φ(3420.0°)	φ(3424.5°)	φ(3429.0°)	φ(3433.5°)	φ(3438.0°)	φ(3442.5°)	φ(3447.0°)	φ(3451.5°)	φ(3456.0°)	φ(3460.5°)	φ(3465.0°)	φ(3469.5°)	φ(3474.0°)	φ(3478.5°)	φ(3483.0°)	φ(3487.5°)	φ(3492.0°)	φ(3496.5°)	φ(3501.0°)	φ(3505.5°)	φ(3510.0°)	φ(3514.5°)	φ(3519.0°)	φ(3523.5°)	φ(3528.0°)	φ(3532.5°)	φ(3537.0°)	φ(3541.5°)	φ(3546.0°)	φ(3550.5°)	φ(3555.0°)	φ(3559.5°)	φ(3564.0°)	φ(3568.5°)	φ(3573.0°)	φ(3577.5°)	φ(3582.0°)	φ(3586.5°)	φ(3591.0°)	φ(3595.5°)	φ(3600.0°)	φ(3604.5°)	φ(3609.0°)	φ(3613.5°)	φ(3618.0°)	φ(3622.5°)	φ(3627.0°)	φ(3631.5°)	φ(3636.0°)	φ(3640.5°)	φ(3645.0°)	φ(3649.5°)	φ(3654.0°)	φ(3658.5°)	φ(3663.0°)	φ(3667.5°)	φ(3672.0°)	φ(3676.5°)	φ(3681.0°)	φ(3685.5°)	φ(3690.0°)	φ(3694.5°)	φ(3699.0°)	φ(3703.5°)	φ(3708.0°)	φ(3712.5°)	φ(3717.0°)	φ(3721.5°)	φ(3726.0°)	φ(3730.5°)	φ(3735.0°)	φ(3739.5°)	φ(3744.0°)	φ(3748.5°)	φ(3753.0°)	φ(3757.5°)	φ(3762.0°)	φ(3766.5°)	φ(3771.0°)	φ(3775.5°)	φ(3780.0°)	φ(3784.5°)	φ(3789.0°)	φ(3793.5°)	φ(3798.0°)	φ(3802.5°)	φ(3807.0°)	φ(3811.5°)	φ(3816.0°)	φ(3820.5°)	φ(3825.0°)	φ(3829.5°)	φ(3834.0°)	φ(3838.5°)	φ(3843.0°)	φ(3847.5°)	φ(3852.0°)	φ(3856.5°)	φ(3861.0°)	φ(3865.5°)	φ(3870.0°)	φ(3874.5°)	φ(3879.0°)	φ(3883.5°)	φ(3888.0°)	φ(3892.5°)	φ(3897.0°)	φ(3901.5°)	φ(3906.0°)	φ(3910.5°)	φ(3915.0°)	φ(3919.5°)	φ(3924.0°)	φ(3928.5°)	φ(3933.0°)	φ(3937.5°)	φ(3942.0°)	φ(3946.5°)	φ(3951.0°)	φ(3955.5°)	φ(3960.0°)	φ(3964.5°)	φ(3969.0°)	φ(3973.5°)	φ(3978.0°)	φ(3982.5°)	φ(3987.0°)	φ(3991.5°)	φ(3996.0°)	φ(4000.5°)	φ(4005.0°)	φ(4009.5°)	φ(4014.0°)	φ(4018.5°)	
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Antenna Pattern of 2.4GHz / 5GHz

Appendix B

(127.5)	8.747/4.6	-7.719/61	-11.26/11.2	-13.58/13.0	8.84/6.3	6.27/1.0	-6.89/6.6	7.14/10.49	-10.62/9.5	8.90/9.19	-10.68/12.20	-10.81/14.2	8.30/8.68	-10.97/11.39	-14.45/15.67	-14.64/7.0	6.80/12.00	-15.11/10.65	-12.09/11.03	-12.91/12.27	-12.95/13.89	-7.91/7.48	6.67/8.85	8.85/7.82	
(142.5)	8.51/14.11	-12.00/14.14	-13.53/15.87	-13.50/13.10	-10.41/8.51	8.02/6.51	-5.71/6.34	7.36/8.58	-11.31/12.32	-11.15/9.97	-11.49/11.80	-11.91/9.78	12.86/9.39	-10.39/8.63	-9.36/8.26	-9.82/8.78	-13.40/11.05	8.41/7.86	-12.91/12.17	-12.41/10.99	-10.69/11.91	-11.53/10.77	8.47/11.21	-11.84/8.37	
(157.5)	-10.35/10.13	-11.79/13.86	-15.79/13.82	-12.96/11.82	-11.97/11.56	-10.34/9.45	-6.67/6.83	6.79/6.72	-6.18/7.66	-7.85/6.22	6.02/10.12	6.31/6.55	8.89/9.40	-10.20/14.14	-10.94/11.25	-12.21/11.86	-15.64/10.66	-7.29/8.28	-11.56/13.77	-11.10/10.78	-10.46/15.19	-14.97/12.09	-15.02/11.84	-15.02/11.84	
(172.5)	-14.90/15.51	-14.28/12.30	-10.59/8.47	-7.27/7.27	8.23/8.80	-11.24/10.98	-8.07/8.28	6.99/7.23	8.35/10.51	-12.20/14.41	-11.07/12.24	-14.75/14.10	-14.26/15.26	-14.51/14.98	-15.09/15.31	-12.71/9.86	8.36/10.88	-7.36/10.57	-13.71/14.52	-12.89/8.86	9.18/12.74	-15.66/12.61	-14.61/13.34	-15.26/11.49	
(187.5)	-17.72/16.82	-14.02/14.01	-11.76/12.05	-11.17/11.29	-11.64/10.77	-8.67/8.77	-10.10/10.52	-10.99/11.68	-11.49/15.34	-15.24/12.78	-10.72/9.59	-8.82/8.88	-12.86/13.17	-12.14/11.11	-12.82/12.42	-12.10/10.90	-12.82/11.23	-12.71/14.57	-13.81/13.92	-13.48/14.33	-14.21/15.22	-15.56/14.82	-12.83/10.69	-12.83/10.69	
(202.5)	-10.88/9.71	-9.98/9.88	8.67/8.86	8.18/8.81	-8.33/7.19	6.73/6.58	6.96/7.03	7.16/7.42	7.79/8.98	-10.51/11.41	-11.64/11.10	-13.87/13.42	-13.67/13.78	-12.44/11.48	-14.83/15.54	-15.38/15.45	-15.30/14.57	-15.11/13.92	-13.88/13.82	-14.28/14.33	-14.41/15.11	-15.11/15.22	-16.56/14.84	-12.83/10.69	
(217.5)	8.31/8.42	-9.15/8.88	8.59/8.17	8.49/8.71	-8.08/7.40	-7.80/7.96	8.49/8.71	8.39/8.52	-10.99/12.48	-11.42/11.90	-11.66/11.10	-13.66/12.58	-12.20/11.81	-11.98/11.71	-11.60/11.13	-12.00/12.21	-12.72/12.16	-11.51/12.14	-13.84/13.34	-13.49/14.11	-11.65/13.28	-11.78/9.70	-8.66/8.26	-8.66/8.26	
(232.5)	-10.39/9.84	-9.86/9.35	-10.94/11.50	-11.38/11.89	-12.88/14.38	-13.13/14.21	-12.18/12.87	-13.64/14.54	-14.48/13.98	-14.08/13.30	-13.20/13.06	-12.09/13.21	-13.09/13.51	-14.03/13.75	-12.57/12.46	-12.51/12.17	-13.26/12.24	-11.99/12.10	-10.82/10.90	-11.42/11.70	-11.86/12.68	-12.50/12.38	-11.40/13.07	-8.95/10.32	
Free4a	5.68Pa	Table3.3																							
Gain	0(°)/90(°)7.5	0(°)/180(°)22.5	0(°)/270(°)37.5	0(°)/360(°)52.5	0(°)/0(°)67.5	0(°)/90(°)82.5	0(°)/180(°)97.5	0(°)/270(°)112.5	0(°)/360(°)127.5	0(°)/0(°)142.5	0(°)/90(°)157.5	0(°)/180(°)172.5	0(°)/270(°)187.5	0(°)/360(°)202.5	0(°)/0(°)217.5	0(°)/90(°)232.5	0(°)/180(°)247.5	0(°)/270(°)262.5	0(°)/360(°)277.5	0(°)/0(°)292.5	0(°)/90(°)307.5	0(°)/180(°)322.5	0(°)/270(°)337.5	0(°)/360(°)352.5	
(0°)	5.75/5.95	5.83/6.40	6.18/7.24	6.42/6.58	6.44/6.52	5.89/6.20	6.01/6.56	6.20/6.5	6.56/6.5	6.75/6.63	6.55/6.41	6.10/6.71	6.17/6.13	5.34/4.48	5.27/6.08	6.03/5.77	5.65/5.59	5.45/5.33	5.45/5.74	5.91/5.51	5.15/5.33	5.30/5.12	5.20/5.78	5.53/5.18	5.25/5.71
(7.5°)	4.11/3.52	3.03/2.44	1.89/1.79	1.94/1.54	1.86/1.78	2.49/3.15	3.21/3.68	4.21/4.83	5.10/5.80	6.09/6.80	4.79/4.74	5.94/6.05	6.28/6.46	5.33/4.87	3.11/2.98	3.02/3.22	3.43/3.32	3.11/2.98	3.02/3.22	3.43/3.32	3.91/3.49	4.62/5.35	5.83/6.00	6.98/6.14	
(15°)	3.52/2.69	-1.84/0.34	-0.43/0.27	-0.58/0.79	0.63/0.45	-0.51/0.83	-1.20/1.56	2.29/3.32	3.54/4.18	-2.03/2.54	2.92/2.74	2.91/3.39	3.94/4.51	4.68/4.83	-4.66/3.32	-3.22/3.82	-2.05/1.59	1.14/0.82	1.56/1.07	-0.29/0.70	-1.11/1.55	2.49/3.49	4.23/4.40	5.15/4.22	
(22.5°)	4.67/2.28	-6.36/1.49	-5.36/1.18	5.27/4.18	-3.95/4.10	-0.98/1.12	-1.50/1.97	-2.28/1.81	-1.71/1.68	-2.00/2.00	-1.48/1.25	-1.70/2.18	-4.00/4.95	-4.98/4.73	4.41/3.63	3.22/3.82	1.50/2.04	-0.16/0.65	0.37/0.27	2.24/2.27	1.70/0.80	0.76/2.59	4.54/3.61	6.80/4.67	
(30°)	10.82/5.05	-6.29/7.31	-6.40/9.35	8.56/6.69	4.17/1.72	-0.07/0.57	0.40/0.08	0.45/0.80	0.67/0.40	1.02/0.01	0.95/1.78	-1.69/1.03	-1.06/2.28	-3.66/4.48	-5.30/6.28	-3.65/1.11	0.60/1.18	1.23/1.24	1.81/1.57	2.11/2.81	3.10/3.2	3.09/2.51	1.22/0.22	2.45/5.74	6.04/10.29
(37.5°)	6.45/6.01	-4.37/6.34	6.59/6.64	6.83/4.21	2.24/0.07	1.49/2.08	1.87/1.34	1.45/1.95	1.60/1.01	-1.61/1.93	2.99/1.86	2.50/4.35	4.65/4.78	6.09/4.29	4.09/4.20	2.40/2.73	-1.59/1.83	-0.34/0.69	-1.53/0.89	1.17/1.08	1.61/1.11	1.23/1.86	1.70/2.88	4.11/3.85	8.15/4.39
(45°)	5.55/4.20	-5.39/7.17	-4.47/6.27	7.14/7.81	1.47/1.81	3.25/2.21	-0.23/1.23	1.31/0.54	0.91/1.89	1.51/0.09	2.06/1.47	-3.98/4.51	4.49/4.34	2.11/2.24	-2.95/3.24	-1.00/1.02	0.12/0.85	0.26/0.65	-1.54/0.42	0.69/0.52	0.52/0.62	3.11/4.27	3.11/4.27	3.11/4.27	3.11/4.27
(52.5°)	4.87/3.58	-3.93/3.01	-2.83/2.16	2.19/2.66	2.83/2.47	-1.34/0.49	0.91/0.70	1.82/1.68	3.07/3.75	4.69/3.88	-2.10/2.04	-2.45/3.30	3.64/4.24	4.67/4.41	-4.35/4.35	-5.50/4.26	2.00/1.91	4.10/3.20	1.82/1.94	-0.68/0.02	-1.00/0.03	2.31/3.09	3.07/3.75	11.24/6.05	
(60°)	2.50/2.52	-1.86/2.84	-1.86/2.84	4.47/5.18	3.82/3.78	-1.13/1.02	0.50/0.43	1.58/0.80	2.28/2.59	4.99/4.34	-2.78/1.52	-1.56/2.45	2.79/4.59	4.88/4.97	-4.81/3.57	-2.97/2.92	4.78/3.27	0.47/0.44	-0.55/0.02	-1.97/2.86	4.44/3.18	2.82/3.58	5.96/3.10	11.24/6.05	
(67.5°)	1.99/1.51	-1.75/1.53	-2.25/3.88	6.56/7.52	7.74/5.58	-1.87/0.52	0.02/0.03	1.87/0.80	4.49/3.96	6.79/6.43	-2.27/1.22	-2.30/4.35	2.92/5.56	7.37/6.87	-5.69/2.28	-1.87/0.86	1.78/1.50	1.11/1.54	1.20/1.31	-0.69/0.21	-1.97/4.81	7.95/5.14	11.59/6.57	4.33/1.96	
(75°)	0.55/1.91	-2.19/1.98	-2.51/4.04	6.59/6.76	6.64/3.78	-1.14/0.22	0.07/0.24	1.48/0.66	7.78/6.19	-1.14/0.22	-3.29/4.02	3.51/5.06	6.78/6.19	-5.28/1.98	-2.90/0.39	0.99/0.05	0.22/0.23	1.21/2.50	1.00/1.43	-3.34/0.64	3.31/2.18	11.59/6.57	4.33/1.96	4.33/1.96	
(82.5°)	-1.14/2.71	-3.21/1.99	2.19/3.41	4.29/5.10	6.68/4.36	-0.75/0.04	-0.68/0.37	0.57/1.52	-10.76/5.95	6.10/3.18	-3.87/3.95	4.21/6.69	5.11/3.37	-5.28/1.95	-13.48/4.97	-1.73/3.73	1.34/1.27	0.78/2.02	-0.16/1.45	-2.71/4.33	4.77/4.96	8.09/3.38	2.88/5.57	5.82/3.82	
(90°)	-1.13/2.72	-3.70/3.26	4.64/4.23	4.19/5.06	4.46/4.29	-1.47/0.11	-1.07/0.63	-0.58/0.96	9.27/6.49	6.02/3.58	6.02/3.58	5.26/1.52	7.61/7.88	6.21/6.38	-15.13/4.75	9.47/1.88	6.34/5.57	2.27/1.95	3.48/3.48	-3.78/4.56	8.09/3.38	4.80/4.95	5.11/5.90	7.77/2.74	
(97.5°)	1.73/4.48	5.39/4.24	6.59/4.57	4.87/4.45	4.01/3.80	2.33/2.10	2.69/2.10	3.19/7.18	7.59/6.83	5.78/4.61	-5.84/4.98	6.34/6.70	8.04/7.69	6.48/6.83	-15.63/9.57	9.39/4.68	8.48/6.69	6.25/2.59	4.58/4.43	4.72/7.53	8.04/4.21	6.71/5.93	6.21/5.55	5.98/6.26	
(105°)	6.26/6.25	6.79/6.47	4.80/4.28	4.69/4.25	4.58/4.54	3.71/4.11	4.24/3.14	5.79/6.82	6.07/6.53	6.51/6.73	6.90/6.75	7.03/6.98	7.09/6.88	6.27/7.72	-12.51/4.62	-8.83/3.27	9.22/5.14	6.69/3.00	6.27/6.62	7.22/9.21	6.69/4.21	6.69/4.21	6.69/4.21	6.69/4.21	
(112.5°)	1.11/2.20	8.18/8.76	8.58/8.43	3.86/4.70	3.30/3.55	5.42/5.20	4.21/4.89	5.83/4.68	4.48/4.12	-12.95/8.12	7.38/6.33	6.89/6.76	10.86/7.73	7.99/8.65	-12.52/10.38	-10.37/9.52	6.14/2.27	3.59/6.58	5.48/2.91	-5.58/0.00	8.07/8.29	7.88/7.53	7.88/7.53	7.88/7.53	
(127.5)	8.88/8.48	9.59/11.27	8.53/8.50	8.20/8.77	6.49/6.57	4.57/1.74	5.84/4.80	6.51/5.04	5.85/5.08	5.85/5.08	4.21/1.02	12.04/8.19	8.15/10.87	13.00/11.07	-11.62/15.74	7.80/5.54	3.63/5.54	-14.99/10.22	-12.19/8.48	-12.01/9.87	8.19/10.27	8.71/7.51	8.61/6.48	6.40/8.18	
(142.5)	10.59/10.17	-10.38/12.41	-11.11/10.10	-11.44/10.37	8.86/8.96	8.93/8.95	6.45/6.34	6.79/6.63	5.36/7.29	-12.83/10.40	-13.81/10.33	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	-11.13/11.25	
(157.5)	8.83/8.96	9.45/11.74	-13.71/14.14	-14.09/12.88	-13.63/15.61	-12.90/12.91	6.71/7.02	7.71/6.14	6.63/6.56	6.47/8.33	6.95/6.78	-12.11/18.85	-13.10/12.76	-14.15/11.74	15.54/11.17	8.58/9.30	7.65/8.63	6.77/8.55	-11.93/11.81	-10.69/11.94	8.25/10.72	-13.75/9.84	8.52/8.65	13.76/12.82	
(172.5)	-14.13/13.04	-10.97/12.35	-15.63/15.22	-13.93/12.61	-11.50/9.37	-7.31/6.88	7.67/6.74	7.12/6.32	6.82/6.52	6.41/6.41	-11.90/10.04	-10.36/10.36	8.95/13.89	-11.11/11.11	-10.89/8.11	-11.13/13.41	-13.98/13.06	-13.09/9.28	-11.62/9.83	-9.99/11.69	6.90/7.34	-12.74/15.06	-12.43/12.15	-13.11/12.43	
(187.5)	-12.26/12.74	-13.97/11.71	-10.88/11.47	-10.82/11.17	-9.35/9.58	-8.71/9.33	8.86/10.77	-11.23/9.81	-7.98/7.31	-8.51/11.11	-7.04/6.91	-6.60/6.70	6.95/9.92	-10.91/10.42	-11.40/11.25	-12.84/10.51	-8.67/8.74	7.44/8.16	8.76/13.17	-14.82/13.53	-14.44/12.82	-14.48/15.52	-15.59/15.12	-13.56/12.47	
(202.5)	-11.73/12.87	-13.40/12.65	-12.68/13.30	-13.77/12.85	-12.36/12.12	-10.25/11.59	-10.68/9.17	-7.62/8.57	-6.18/6.83	-7.64/6.15	-8.08/8.49	-9.88/11.64	-11.24/9.69	-10.42/8.36	-9.26/10.26	-10.10/10.61	-12.14/14.01	-12.47/9.76	9.40/11.25	-11.10/11.20	-13.43/14.00	-11.73/12.25	-12.59/11.25	-12.59/11.25	
(217.5)	6.64/10.10	-10.54/10.61	-8.02/9.24	8.47/8.64	8.11/7.93	7.26/6.90	6.17/6.61	6.78/7.43	8.12/8.65	6.76/10.91	-12.01/13.54	-13.10/12.93	-12.31/12.38	-11.26/11.19	-10.78/9.84	6.68/6.11	6.04/7.83	7.34/6.73	6.87/7.51	-8.50/15.15	-10.68/10.83	11.00/11.25	-10.33/8.90	-12.59/11.25	
(232.5)	1.80/1.76	-7.81/6.38	-7.81/6.38	8.58/8.16	-10.53/11.48	-11.72/13.13	-11.54/12.60	-11.30/12.81	-12.10/11.79	-11.10/10.81	-12.13/13.12	-13.14/12.93	-12.47/12.81												



Antenna Pattern of 2.4GHz / 5GHz

Appendix B

Gain	0°/0°	1°/1°	2°/2°	3°/3°	4°/4°	5°/5°	6°/6°	7°/7°	8°/8°	9°/9°	10°/10°	11°/11°	12°/12°	13°/13°	14°/14°	15°/15°	16°/16°	17°/17°	18°/18°	19°/19°	20°/20°	21°/21°	22°/22°	23°/23°	24°/24°	25°/25°	26°/26°	27°/27°	28°/28°	29°/29°	30°/30°	31°/31°	32°/32°	33°/33°	34°/34°	35°/35°	36°/36°	37°/37°	38°/38°	39°/39°	40°/40°	41°/41°	42°/42°	43°/43°	44°/44°	45°/45°	46°/46°	47°/47°	48°/48°	49°/49°	50°/50°	51°/51°	52°/52°	53°/53°	54°/54°	55°/55°	56°/56°	57°/57°	58°/58°	59°/59°	60°/60°	61°/61°	62°/62°	63°/63°	64°/64°	65°/65°	66°/66°	67°/67°	68°/68°	69°/69°	70°/70°	71°/71°	72°/72°	73°/73°	74°/74°	75°/75°	76°/76°	77°/77°	78°/78°	79°/79°	80°/80°	81°/81°	82°/82°	83°/83°	84°/84°	85°/85°	86°/86°	87°/87°	88°/88°	89°/89°	90°/90°
18.28-13.25	-14.20-15.86	-15.65-14.79	-14.87-15.55	-15.14-15.63	-14.80-15.63	-16.12-15.49	-15.29-14.39	-13.42-13.40	-14.41-14.75	-15.15-15.08	-15.88-15.07	-15.68-15.53	-15.50-14.94	-15.10-15.69	-15.45-15.38	-14.60-14.20	-14.23-14.48	-14.78-15.03	-14.87-14.18	-14.58-15.04	-14.87-14.48	-14.06-13.71	-12.82-12.69	...																																																																			

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

