



Antenna Composite Gain Test Report

1. Test Information

Report No.	AP0D2518
Equipment	AXE11000 Tri Band WiFi Router
Brand Name	ASUS
Model Name	ET12, ZenWiFi ET12, ASUS ZenWiFi ET12
Applicant	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou, Taipei 112, Taiwan
Manufacturer (1)	Compal Networking (KunShan) Co., LTD. No. 520, Nanbang Rd., Economic & Technical Development Zone Kunshan, Jiangsu Province China
Manufacturer (2)	ARCADYAN TECHNOLOGY (VIETNAM) CO., LTD. Ba Thien Industrial Park, Ba Hien commune, Binh Xuyen district, Vinh Phuc Province
Sample Received	Jul. 19, 2021
Start Test Date	Sep. 06, 2021
Final Test Date	Sep. 10, 2021
Issued Date	Nov. 16, 2021

2. Testing Location

Testing Location		
<input checked="" type="checkbox"/>	HWA YA	ADD : No.13-1 & 14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333, Taiwan R.O.C.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	05CH03-HY	Rex Liao	23.5-24.5 / 50-60	Sep. 06, 2021, Sep. 10, 2021

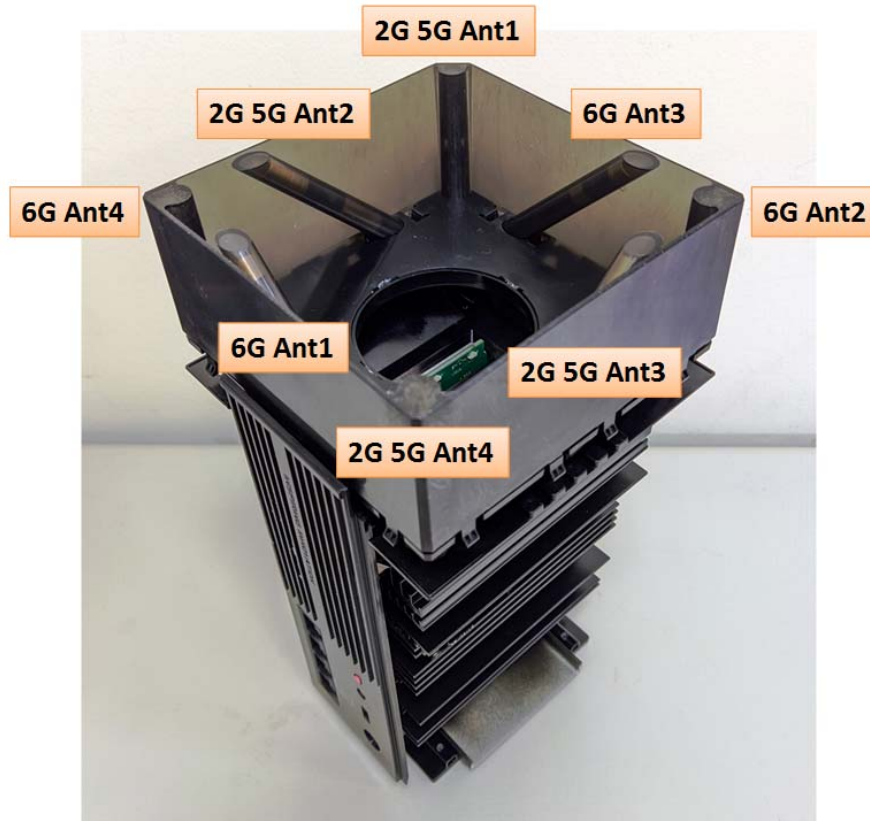


3. Test Frequency

The middle 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

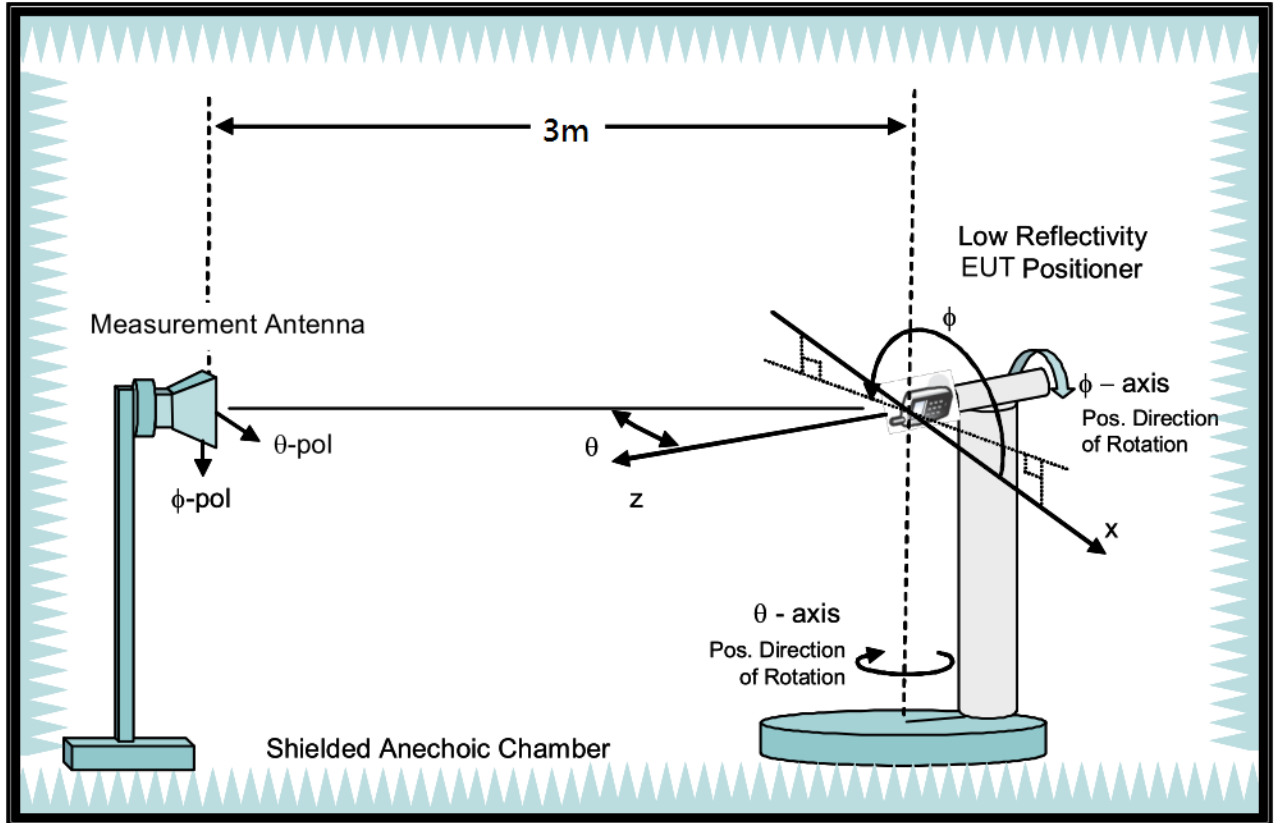
4. Antenna system



Antenna Number	Brand Name	Model Name	Ant. Type	Connector	Remark
Antenna 1	WHA YU	C660-510565-A	PIFA	I-PEX	6G Ant.1
Antenna 2	WHA YU	C660-510565-A	PIFA	I-PEX	6G Ant.2
Antenna 3	WHA YU	C660-510565-A	PIFA	I-PEX	6G Ant.3
Antenna 4	WHA YU	C660-510565-A	PIFA	I-PEX	6G Ant.4
Antenna 5	WHA YU	C660-510565-A	PIFA	I-PEX	2G/5G Ant.1
Antenna 6	WHA YU	C660-510565-A	PIFA	I-PEX	2G/5G Ant.2
Antenna 7	WHA YU	C660-510565-A	PIFA	I-PEX	2G/5G Ant.3
Antenna 8	WHA YU	C660-510565-A	PIFA	I-PEX	2G/5G Ant.4

5. Test Configuration

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



6. Test Method

EUT set on multi-axis positioner. Measurement antenna set at phi polarization and 1.5 meter height. Port 1 of Network analyzer connect to antenna 1 of EUT. Record S21 value every 15 degree from 0 to 345 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.

7. Measured Values and Calculation of Maximum Directional Gain Positions

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 (S21+iwt)	1.53 -2.12 i	0.12 +0.08 i	3.43 -1.19 i	3.1 -1.35 i	3.18 +2.36 i
Ant. 2 (S21+iwt)	-0.04 -0.61 i	-4.87 +0.16 i	-1.4 -1.03 i	-9.94 -0.69 i	-2.65 +2.64 i
Ant. 3 (S21+iwt)	-1.81 -1.54 i	-1.81 +1.08 i	-1.4 -0.24 i	-3.41 -1.44 i	-3.5 +1.76 i
Ant. 4 (S21+iwt)	3.67 -2.38 i	4.17 +1.46 i	3.95 +0.4 i	1.09 -1.36 i	-0.17 +2.8 i
DG [1SS] (dBi)	6.66	4.32	5.3	4.83	5.09
Polarization	theta	theta	theta	theta	theta
$\Theta(^{\circ})$	75	90	90	90	75
$\Phi(^{\circ})$	15	255	255	270	0

Note:

$$1. A=10^{(S21/20)}$$

$$|A\theta * e^{iwt}| = |A\theta1 * e^{iwt1} + A\theta2 * e^{iwt2} + A\theta3 * e^{iwt3} + A\theta4 * e^{iwt4} + \dots|$$

$$|A\varphi * e^{iwt}| = |A\varphi1 * e^{iwt1} + A\varphi2 * e^{iwt2} + A\varphi3 * e^{iwt3} + A\varphi4 * e^{iwt4} + \dots|$$

where

$$e^{iwt} = \cos(wt) + i\sin(wt)$$

$$|A * e^{j\omega t}| = \sqrt{Re^2 + Im^2}$$

“Re” is the real part and “Im” is the imaginary part

$$2. \text{ Directional gain (1SS)} = 10 * \log(A_{max}^2 / N_{ant}).$$

Where A_{max} is the maximum value of $|A\theta|$ and $|A\varphi|$ through all angles.



8. Summary of Test Result

Band (MHz)	2400-2483.5
Frequency (Hz)	2.45G
Ant. 1 Max Gain (dBi)	3.03
Ant. 2 Max Gain (dBi)	2.13
Ant. 3 Max Gain (dBi)	2.34
Ant. 4 Max Gain (dBi)	3.67
Max Gain (dBi)	3.67
DG [1SS] (dBi)	6.66
DG [2SS] (dBi)	3.67
DG [4SS] (dBi)	1.3

Note:

- 3. Directional Gain (2SS) = Directional Gain (1SS) – 3dB. If directional gain is less than max gain, use max gain as directional gain.
- 4. Max Gain is the maximum gain of single antenna.

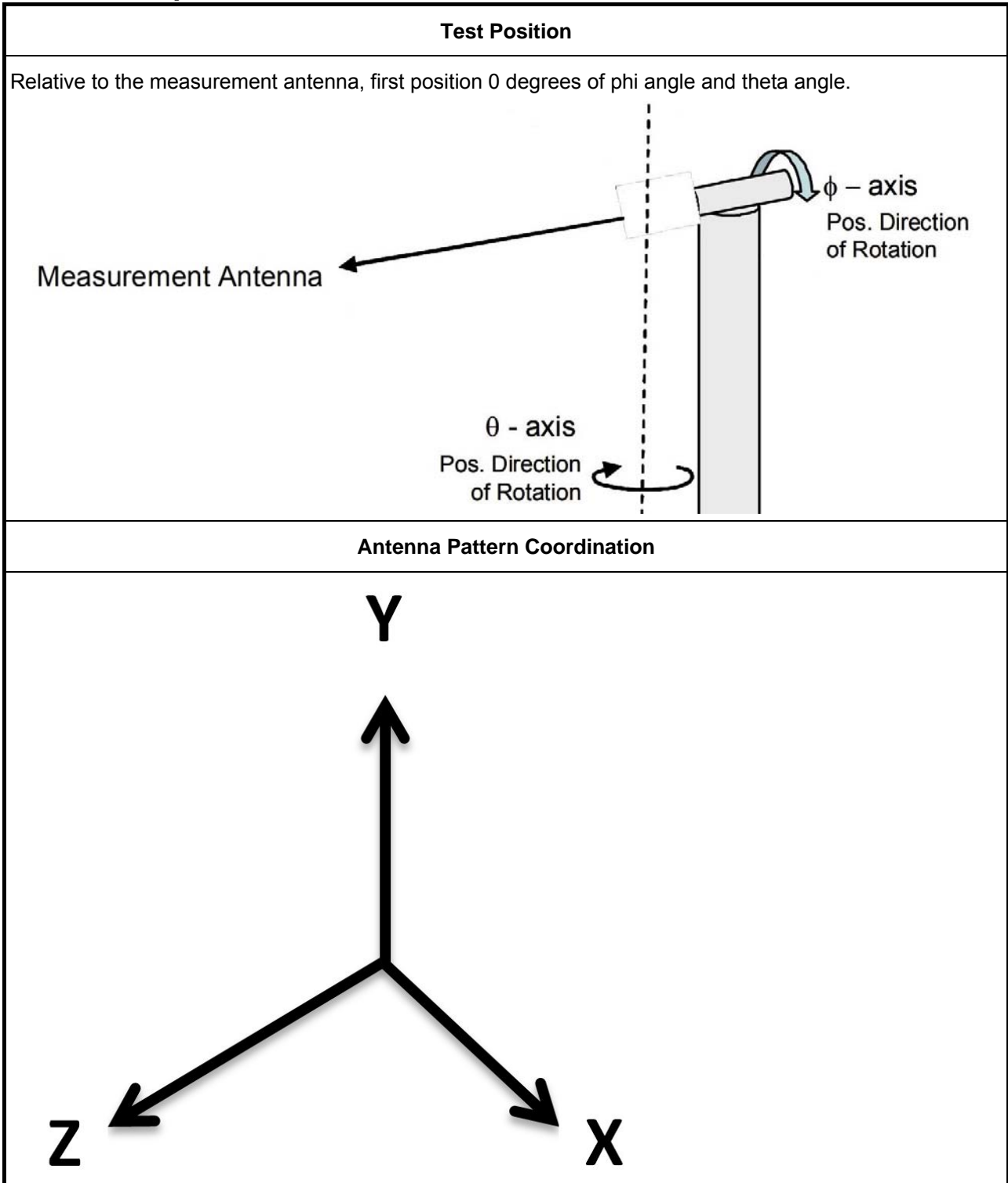


Band (MHz)	5150-5250	5250-5350	5470-5725	5725-5850
Frequency (Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	3.63	3.43	3.18	4.44
Ant. 2 Max Gain (dBi)	4.04	3.59	2.73	3.14
Ant. 3 Max Gain (dBi)	2.76	3.12	3.17	3.46
Ant. 4 Max Gain (dBi)	4.17	4.44	4.41	4.94
Max Gain (dBi)	4.17	4.44	4.41	4.94
DG [1SS] (dBi)	4.32	5.3	4.83	5.09
DG [2SS] (dBi)	4.17	4.44	4.41	4.94
DG [4SS] (dBi)	1.22	1.86	1.47	0.75

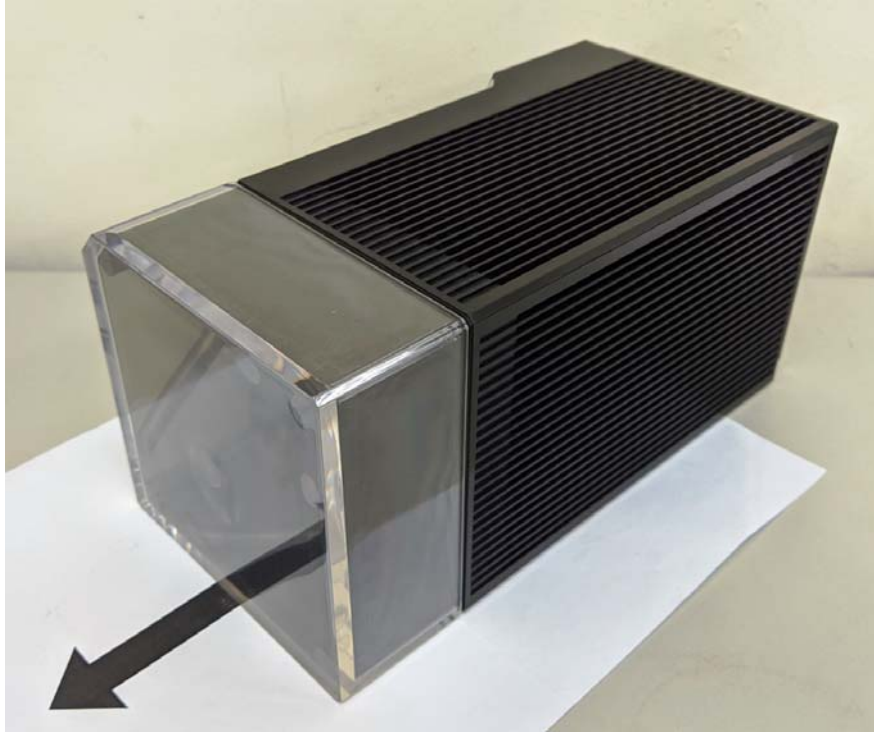
Note:

1. Directional Gain (2SS) = Directional Gain (1SS) – 3dB. If directional gain is less than max gain, use max gain as directional gain.
2. Max Gain is the maximum gain of single antenna.

9. Test Setup



Test Position





10. Test Results

Please refer to the appendix.

Appendix A – Radiated Composite Gain



Freq(Hz)	2.45G
Ant. 1 Max Gain (dBi)	3.03
Ant. 2 Max Gain (dBi)	2.13
Ant. 3 Max Gain (dBi)	2.34
Ant. 4 Max Gain (dBi)	3.67
Max Gain (dBi)	3.67
DG [1SS] (dBi)	6.66
DG [2SS] (dBi)	3.67
DG [4SS] (dBi)	1.3



DG Result

Freq(Hz)	2.45G	Pol.	Phi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DG(dBi)	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	2.31	2.43	1.9	0.96	-0.78	-3.49	-7.78	-15.45	-9.83	-3.52	-0.3	1.37	2.12	2.38	1.97	1.04	-0.9	-4.03	-8.96	-14.13	-7.14	-2.39	0.36	1.71
Θ(15°)	1.49	1.66	1.3	0.38	-1.57	-4.32	-9.39	-20.33	-13.87	-8.03	-5.29	-3.73	-2.64	-1.79	-1.25	-1.69	-3.3	-6.38	-12.4	-18.09	-8.16	-3.45	-0.73	0.81
Θ(30°)	-7.59	-4.96	-3.03	-3.02	-4.85	-8.83	-23.42	-15.48	-16.06	-25.42	-13.62	-10.37	-11.82	-16.13	-12.21	-9.27	-10.5	-17.79	-19.51	-11.25	-8.43	-7.84	-8.32	-8.73
Θ(45°)	-6.25	-11.4	-25.11	-18	-16.46	-13.21	-10.22	-10.15	-14.91	-17.03	-6.4	-3.31	-3.1	-5.43	-9.84	-13.27	-18.59	-22.32	-10.07	-7.31	-9.53	-28.35	-10.46	-5.82
Θ(60°)	-0.84	-2.73	-7.58	-18.74	-15.69	-15.47	-44.68	-19.02	-23.91	-6.4	-0.67	0.78	0.03	-2.18	-4.56	-6.51	-9.14	-10.88	-10.39	-9.33	-14.53	-13.88	-4.82	-1.68
Θ(75°)	-1.98	-2.97	-5.87	-12.53	-18.41	-14.6	-11.53	-11.86	-11.92	-8.45	-3.15	-1.03	-1.13	-2.03	-4.23	-11.38	-15.68	-8.19	-5.65	-6.79	-8.98	-5.95	-2.25	-1.67
Θ(90°)	-5.52	-3.94	-4.87	-8.98	-16.48	-20.55	-16.5	-14.22	-21.63	-12.28	-6.41	-4.72	-3.09	-2.44	-3	-5.23	-9.33	-10.67	-14.04	-14.14	-8.83	-9.57	-10.3	-7.69
Θ(105°)	-7.85	-8.57	-16.34	-14.94	-7.32	-13.48	-13.74	-6.83	-6.82	-13.5	-11.22	-3.83	-2.02	-1.98	-3.21	-5.98	-8.56	-14.08	-19.46	-9.61	-7.12	-9.49	-26.1	-12.04
Θ(120°)	-8.22	-6.44	-13.04	-22.79	-11.69	-10.39	-7.73	-4.26	-4.1	-5.9	-6.54	-4.4	-2.71	-3.28	-4.37	-5.45	-12.2	-20.47	-14.35	-4.53	-2.3	-5.45	-13.16	-11.12
Θ(135°)	-9.93	-11.86	-9.7	-10.6	-15.12	-12.97	-10.07	-8.06	-9.22	-9.99	-5.09	-1.62	-1.84	-3.08	-4.24	-9	-10.67	-10.13	-20.95	-14.56	-9.04	-9.75	-12.36	-8.34
Θ(150°)	-8.85	-10.67	-10.03	-7.89	-8.64	-7.84	-4.17	-2.53	-2.58	-3.89	-3.82	-2.33	-1.97	-3.36	-7.12	-14.18	-16.66	-17.4	-37.61	-16.71	-11.42	-9.35	-9.71	-9.47
Θ(165°)	-18.59	-39.73	-15.38	-10.13	-8.58	-8.06	-7.39	-7.83	-8.78	-10	-10.7	-9.72	-9.33	-10.48	-12.92	-12.92	-11.24	-10.21	-9.5	-9.57	-11.25	-13.37	-14.38	-14.98
Θ(180°)	-12	-20.96	-21.97	-15.55	-12.26	-10.81	-9.82	-8.65	-8.23	-8.07	-8.57	-9.57	-11.91	-17.04	-27.78	-18.57	-12.19	-8.68	-6.67	-5.76	-5.73	-5.94	-6.66	-8.2
Freq(Hz)	2.45G	Pol.	Theta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG(dBi)	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-13.82	-15.24	-6.65	-2.36	0.1	1.42	2.03	2.17	1.64	0.27	-2	-5.35	-12.45	-16.75	-6.43	-2.04	0.4	1.94	2.63	2.68	2.3	1.1	-1.26	-5.59
Θ(15°)	-17	-14.7	-5.34	-0.79	1.7	2.85	3.17	2.86	1.96	0.42	-1.37	-2.97	-5.33	-9.9	-7.54	-6.53	-1.99	0.27	1.31	1.48	1	-0.29	-2.62	-7.01
Θ(30°)	-3.22	-6.07	-7.93	-2.45	1.45	3.14	3.54	2.77	1.34	0.3	0.43	1.33	1.71	0.85	-1.97	-9.42	-8.16	-2.24	-0.09	0.07	-0.88	-1.56	-1.81	-2.17
Θ(45°)	2.51	1.44	-3.31	-8.23	-0.68	2.14	2.23	0.72	-1.51	-2.33	-1.05	1.22	2.86	3.32	1.23	-6.38	-12.19	-3.12	-1.33	-2.09	-3.65	-3.1	-0.52	1.62
Θ(60°)	4.81	5.03	1.91	-10.55	-4.31	0.35	0.66	-0.76	-2.83	-3.87	-3.11	0.29	2.88	3.51	1.31	-8.39	-7.26	-2.71	-5.02	-13.56	-21.48	-10.86	-3	2.06
Θ(75°)	5.89	6.66	3.81	-8.36	-3.9	-0.28	-3.53	-11.12	-18.37	-12.34	-8.14	-1.81	2.38	3.88	2.35	-9.98	-5.2	-3.19	-12.74	-14.3	-10.87	-9.37	-1.12	3.34
Θ(90°)	4.19	5.21	3.23	-6.12	-5.26	-2.17	-5.07	-7.92	-9.32	-14.4	-15.12	-7.37	-1.56	0.81	0.09	-12.05	-5.02	-2.38	-10.43	-18.35	-11.93	-6.17	-2.36	1.28
Θ(105°)	4.18	5.1	3.11	-5.62	-5.05	-1.88	-4.03	-9.46	-11.6	-8.19	-5.41	-2.06	0.01	2.36	1.11	-6.98	-7.6	-5.68	-17.02	-20.59	-14.52	-7.09	-1.3	1.81
Θ(120°)	1.53	1.59	0.4	-5.35	-6.88	-2.49	-3.12	-7.36	-17.48	-23.9	-12.91	-11.12	-2.55	-0.76	0.07	-2.57	-11.39	-8.92	-8.47	-8.43	-5.35	-2.86	-3.91	-0.72
Θ(135°)	-0.78	-0.98	-6.17	-14.15	-12.3	-5.96	-5.39	-7.37	-9.47	-11.88	-11.2	-6.28	-3.98	-2.5	-2.42	-7.41	-16.01	-14.7	-6.14	-3.74	-3.34	-1.94	-2.08	-2.94
Θ(150°)	-2.11	-1.98	-3.58	-5.09	-4.83	-3.59	-3.02	-3.23	-3.67	-3.62	-2.4	-0.98	-0.03	0.25	-0.76	-3.11	-7.77	-11.66	-6.08	-3.48	-3.12	-3.19	-2.81	-2.46
Θ(165°)	-6.36	-5.06	-4.36	-4.64	-5.68	-6.97	-8.02	-9.6	-11.33	-10.72	-9.19	-8.54	-8.97	-10.63	-14.53	-19.71	-14.33	-9.84	-8.39	-8.62	-9.72	-11.19	-10.88	-8.43
Θ(180°)	-6.73	-6.2	-6.01	-5.99	-6.28	-7.28	-9.5	-13.05	-22.95	-20.57	-12.26	-9.11	-7.65	-6.75	-6.06	-5.37	-5.15	-5.74	-7.58	-11.12	-16.55	-17.36	-11.64	-8.44



Gain Result

Table with 24 columns (Freq(Hz), 2.45G, Pol., Phi, Ant. 1, Ant. 2, Ant. 3) and 24 rows of gain data for various angles (0 to 165 degrees).



Radiated Composite Gain_WLAN 2.4GHz

Appendix A.1

Θ(180°)	-8.13	-7.97	-8.41	-8.92	-8.94	-8.74	-8.75	-9.34	-10.21	-11.14	-11.47	-11.14	-10.39	-9.5	-8.46	-7.51	-6.91	-7.1	-7.86	-9.09	-10.39	-10.98	-10.74	-9.14
Freq(Hz)	2.45G	Pol.	Phi	Ant. 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-8.21	-9.64	-12.25	-14.36	-15.01	-13.39	-10.89	-8.97	-8.04	-7.35	-7.12	-7.61	-8.33	-9.3	-11.26	-13.01	-14.51	-12.36	-10.09	-8.59	-8.42	-8.97	-8.37	-7.91
Θ(15°)	-8.47	-9.94	-11.89	-12.91	-13.27	-11.5	-9.71	-8.78	-8.59	-9.11	-10.28	-11.49	-12.37	-13.27	-14.14	-16.08	-21.51	-23.02	-18.36	-15.07	-12.57	-11.3	-9.89	-8.42
Θ(30°)	-10.48	-12.84	-14.8	-16.38	-20.29	-19.49	-13.54	-10.76	-10.66	-13.51	-19.99	-22.66	-15.58	-14.09	-15.73	-19.94	-24.97	-23.42	-23.98	-29.57	-27.03	-17.72	-12.65	-10.19
Θ(45°)	-9.93	-13.19	-18.87	-23.82	-22.81	-14.28	-10.18	-9.67	-11.54	-17.88	-21.65	-11.96	-10.95	-13.31	-18.55	-28.78	-24.42	-21.17	-22.4	-24.75	-29.01	-17.74	-11.2	-9.28
Θ(60°)	-8.19	-8.56	-11.39	-15.18	-21.52	-18.62	-11.8	-10.78	-14.99	-14.87	-7.71	-6.39	-8.52	-12.76	-16.7	-20.73	-21.33	-15.72	-13.32	-13	-15.63	-34.55	-16.65	-10.68
Θ(75°)	-12.98	-15.4	-19.81	-23.22	-16.64	-11.15	-8.77	-10.36	-16.14	-13.57	-6.82	-5.17	-7.81	-14.47	-35.29	-16.09	-13.12	-13.9	-13.05	-13.87	-18.57	-18.73	-12.14	-11.47
Θ(90°)	-20.5	-38.4	-30.1	-21.53	-18.69	-16.62	-12.07	-10.6	-15.32	-18.2	-9.54	-8.33	-10.12	-15.07	-28.48	-15.34	-11.85	-11.81	-13.03	-13.68	-13.65	-16.92	-17.33	-18.16
Θ(105°)	-33.32	-28.53	-26.78	-27.05	-22.91	-25.9	-13.55	-11.63	-12.86	-18.92	-15.51	-13.95	-13.28	-14.57	-17.81	-12.64	-13.06	-15.32	-15.8	-16.17	-16.6	-18.45	-22.75	-28.95
Θ(120°)	-14.16	-12.67	-11	-16.32	-12.64	-9.48	-8.09	-8.07	-11.6	-36.33	-20.74	-16.18	-12.34	-15	-14.53	-11.49	-15.8	-32.4	-21.82	-18.28	-14.13	-11.16	-14.86	-13.01
Θ(135°)	-15.85	-19.45	-19.08	-29.39	-33.21	-16.94	-15.15	-16.85	-24.46	-18.28	-22.53	-11.37	-15.64	-13.5	-11.59	-20.41	-23.98	-28.85	-21.83	-17.61	-13.81	-11.46	-14.59	-14.85
Θ(150°)	-13.76	-19.68	-17.66	-12.75	-14.03	-14.42	-11.22	-9.63	-8.63	-8.67	-9.39	-10.26	-11.2	-11.59	-13.79	-17.83	-20.52	-23.11	-18.83	-14.55	-11.36	-8.94	-9.63	-11.71
Θ(165°)	-16.61	-22.48	-33.24	-19.71	-17.58	-19.45	-21.1	-19.04	-15.81	-13.88	-14.19	-14.15	-13.98	-14.85	-15.17	-15.05	-13.44	-13.64	-15.53	-18.85	-31.1	-24.46	-18.16	-16.44
Θ(180°)	-19.11	-24.61	-18.65	-14.86	-13.37	-13.66	-15.56	-18.54	-19.73	-17.86	-15.87	-17.28	-21.81	-24.79	-18.8	-14.88	-12.28	-11.56	-11.42	-11.55	-12.05	-13.19	-14.75	-15.39
Freq(Hz)	2.45G	Pol.	Theta	Ant. 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-10.78	-9.41	-8.51	-7.7	-7.36	-7.82	-9.32	-10.72	-12.66	-14.64	-14.41	-13.33	-12.44	-10.73	-8.65	-7.24	-6.99	-6.9	-7.73	-9.75	-11.71	-13.75	-14.84	-12.87
Θ(15°)	-6.39	-5.59	-4.87	-4.15	-3.97	-4.52	-5.75	-7.42	-10.37	-14.41	-20.05	-18.65	-13.29	-10.57	-8.78	-7.39	-6.43	-6.16	-5.8	-5.81	-6.1	-6.39	-6.86	-7.11
Θ(30°)	-2.13	-2.04	-2.53	-2.63	-2.02	-1.52	-1.64	-2.71	-4.42	-5.72	-6.01	-5.27	-4.4	-4.22	-4.26	-4.36	-4.23	-4.12	-3.83	-3.8	-4.01	-4.39	-3.96	-2.87
Θ(45°)	-0.29	-0.04	-1.3	-2.25	-0.54	0.93	0.51	-1.45	-3.58	-5.01	-4.05	-1.71	-0.95	-1.57	-2.57	-2.66	-2.31	-2.3	-2.33	-1.95	-1.89	-2.32	-2.19	-1.16
Θ(60°)	1.38	2.61	0.59	-1.98	0.17	2.17	1.64	-0.24	-2	-3.68	-2.08	0.19	0.29	-0.65	-1.93	-1.45	-0.59	-1.26	-1.57	-0.65	-0.06	-1.7	-3.99	-1.92
Θ(75°)	2.33	3.67	1.12	-1.98	0.97	2.47	0.36	-2.92	-3.25	-6.22	-2.93	0.62	0.29	-0.69	-1.47	-0.01	1.28	-0.02	-0.87	0.63	1.21	-0.38	-2.58	-0.92
Θ(90°)	1.94	2.79	0.53	-2.7	-0.16	1.29	-0.33	-1.47	-1.41	-6.21	-4.1	-1.85	-1.75	-1.08	-1.76	-0.77	0.96	-0.09	-1.98	-0.92	0.72	0.18	-0.41	0.07
Θ(105°)	1.47	1.88	-1.32	-4.52	-1.45	-0.47	-3.25	-4.04	-5.11	-14.33	-6.49	-2.74	-2.7	-1.8	-2.82	-2.04	0.22	-0.9	-1.45	-1.14	-0.34	-1.57	-1.53	-0.25
Θ(120°)	0.19	-1.06	-4.38	-6.14	-3.88	-3.61	-5.68	-4.65	-7	-9.05	-3.84	-5.03	-7.16	-4.72	-1.51	-2.34	-3.44	-3.36	-2.35	-1.93	-1.8	-0.32	-1.1	-0.6
Θ(135°)	-3.67	-1.72	-4.13	-10.33	-15.6	-17.13	-13.36	-10.1	-10.56	-6.94	-4.83	-5.94	-7.92	-5.27	-4.71	-7.56	-8.9	-7.69	-5.58	-3.95	-5.23	-5.4	-5.53	-6.38
Θ(150°)	-6.38	-5.34	-5.64	-8.28	-12.8	-14.73	-12.05	-8.83	-6.45	-4.36	-3.53	-4.28	-4.7	-4.41	-4.78	-5.97	-7.48	-8.95	-8.66	-6.68	-6.04	-6.4	-6.98	-6.93
Θ(165°)	-10.68	-9.47	-9.84	-11.47	-14.17	-18.29	-25.31	-24.76	-17.34	-13.5	-10.79	-11.25	-13.84	-15.67	-16.61	-17.83	-17.99	-17.47	-16.16	-14.23	-14.05	-14.57	-14.26	-12.83
Θ(180°)	-11.55	-11.47	-12.16	-13.5	-15.15	-18.6	-26.01	-25.69	-19.48	-15.83	-13.44	-12.54	-12.36	-12.47	-12.84	-12.84	-13.85	-14.98	-18.48	-25.8	-23.57	-17.24	-13.42	-12.4



Freq(Hz)	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	3.63	3.43	3.18	4.44
Ant. 2 Max Gain (dBi)	4.04	3.59	2.73	3.14
Ant. 3 Max Gain (dBi)	2.76	3.12	3.17	3.46
Ant. 4 Max Gain (dBi)	4.17	4.44	4.41	4.94
Max Gain (dBi)	4.17	4.44	4.41	4.94
DG [1SS] (dBi)	4.32	5.3	4.83	5.09
DG [2SS] (dBi)	4.17	4.44	4.41	4.94
DG [4SS] (dBi)	1.22	1.86	1.47	0.75



DG Result

Table with columns for Freq(Hz), DG(dBi), and various Phi angles (0 to 345 degrees) for frequencies 5.2G, 5.3G, 5.6G, and 5.8G. Each frequency section includes a Theta column and a grid of DG(dBi) values for each Phi angle.



Freq(Hz)	5.785G	Pol.	Phi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DG(dBi)	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)	
Θ(0°)	-12.42	-11.77	-11.66	-13.71	-13.9	-16.12	-18.72	-11.95	-11.33	-15.44	-9.35	-9.62	-13.43	-15.03	-12.25	-11.04	-11.73	-12.06	-12.62	-12.51	-11.19	-9.58	-10.42	-10.9	
Θ(15°)	-15.75	-10.2	-9.4	-10.06	-16.74	-22.75	-14.57	-17.06	-18.09	-13.83	-9.02	-5.51	-6.27	-9.24	-16.48	-20.48	-25.97	-21.53	-27.78	-20.1	-14.88	-15.92	-14.02	-15.08	
Θ(30°)	-5.89	-4.47	-5.54	-10.17	-15.17	-19.43	-17	-14.98	-18.64	-8.08	-7.86	-8.36	-6.81	-9.06	-16.99	-10.09	-18.54	-9.39	-9.05	-9.33	-8.44	-8.91	-7.89	-11.43	
Θ(45°)	-9.07	-11.07	-14.4	-9.78	-13.64	-20.01	-31.79	-25.57	-10.66	-7.57	-25.59	-19.84	-6.31	-4.47	-14.04	-9.84	-12.85	-10.35	-8.71	-9.57	-11.98	-10.66	-15.94	-15.94	
Θ(60°)	-12.39	-6.18	-13.68	-19.32	-11.38	-35.13	-7.88	-11.07	-4.91	-28.78	-3.3	-23.62	-14.46	-3.36	-10.56	-27.06	-8.4	-36.46	-8.02	-15.78	-8.77	-8.75	-21.71	-15.61	
Θ(75°)	-5.92	-9.07	-13.25	-8.51	-11.72	-13.62	-6.27	-6.95	-6.33	-17.92	-7.69	-35.9	-23.12	-9.58	-14.54	-9.08	-5.55	-13.88	-8.9	-19.3	-15.25	-11.9	-1.86	-3.86	
Θ(90°)	-3.61	-0.97	-7.89	-24.85	-11.06	-12.94	-10.87	-20.46	-12.21	-9.85	-8.56	-15.3	-10.05	-8.86	-7.45	-5.69	-11.29	-9.25	-10.75	-10.41	-9.64	-29.07	-7.1	-5.14	
Θ(105°)	0.31	-8.78	-14.22	-11.7	-8.45	-22.87	-18.26	-7.76	-12.09	-9.68	-14.57	-2.9	-2.39	-9.64	-8.52	-3.92	-12.23	-8.19	-15.64	-5.34	-13.67	-10.86	-7.11	-10.01	
Θ(120°)	-8.17	-12.69	-3.29	-16.79	-3.85	-12.46	-15.76	-5.89	-14.5	-15.52	-13.91	-2	-1.86	-6.43	-9.61	-5.61	-13.28	-9.74	-13.09	-16.71	-4.47	-7.4	-8.56	-5.56	-13.04
Θ(135°)	-14.88	-7.33	-7.62	-15.63	-5.16	-11.38	-8.3	-14.93	-20.79	-17.02	-18.34	-20.83	-18.55	-5.75	-5.61	-13.28	-4.92	-11.51	-25.13	-9.93	-7.86	-14.74	-4.83	-7.89	
Θ(150°)	-7.02	-18.94	-18.83	-21.91	-21.94	-14.03	-6.81	-6.48	-7.4	-8.7	-4.43	-1.35	-7.88	-16.06	-28.87	-10.49	-4.5	-9.08	-10.2	-9.78	-15.25	-23.36	-15.86	-8.18	
Θ(165°)	-13.73	-10.78	-13.46	-21.57	-29.39	-15.23	-10.36	-9.79	-10.38	-11.64	-10.04	-10.11	-9.1	-7.84	-9.96	-12.14	-12.9	-19.98	-19.24	-13.77	-11.33	-8.67	-7.58	-11.53	
Θ(180°)	-16.01	-18.36	-22.08	-27.26	-20.06	-17.89	-21.82	-16.03	-18.91	-17.19	-17.54	-19.92	-20.05	-27.98	-28.8	-21.68	-20.03	-19.4	-19.84	-22.25	-34.24	-21.86	-21.56	-28.04	
Freq(Hz)	5.785G	Pol.	Theta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DG(dBi)	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)	
Θ(0°)	-13.39	-13.75	-11.61	-11.47	-11.63	-13.96	-14.12	-18.35	-14.5	-16.75	-14.86	-14.02	-12.3	-11.95	-13.55	-17.17	-15.11	-17.4	-17.29	-12.57	-12.38	-11.66	-11.6	-11.78	
Θ(15°)	-15.97	-12.62	-12.84	-10.9	-8.03	-6.93	-6.12	-5.26	-6.86	-6.06	-6.24	-7.28	-9.44	-13.71	-26.45	-22.4	-19.47	-13.85	-8.91	-8.78	-13.04	-20.77	-26.92	-21.82	
Θ(30°)	-13.01	-13.98	-9.75	-12.37	-20.64	-5.26	-1.32	-3.53	-18.03	-27.7	-12.37	-15.58	-12.41	-18.79	-21.28	-12.84	-5.68	-4.16	-3.77	-1.2	-2.91	-9.98	-9.96	-5.49	-7.71
Θ(45°)	-15.46	-20.33	-13.46	-5.85	-12.21	-2.65	2.14	-3.61	-6.75	-9.1	-17.85	-6.45	-2.04	-19.17	-10.07	-11.04	0.32	0.7	-0.65	-0.18	-0.68	-9.33	-23.18	-14.25	
Θ(60°)	-7.16	-6.89	-5.04	-10.05	-5.34	-4.6	-2.72	-1.98	-2.38	-9.2	-15.37	-4.78	-0.71	-19.28	-3.33	-5.57	-5.09	-3.52	-2.27	-2.79	0.09	-6.08	-1.36	-8.59	
Θ(75°)	5.09	-8.58	-1.68	-5.36	-3.48	2.73	-0.91	0.96	-6.52	-11.6	-10.03	1.91	3.56	-8.59	-14	-0.24	-0.65	-5.82	2.11	-2.3	2.2	-1.7	-1.54	-5.31	
Θ(90°)	2.17	-3.61	-3.96	-4.77	-8.26	0.46	-1.31	-1.92	-2.84	-8.97	-8.07	0.34	3.37	-10.67	-20.78	0.55	1.18	-6.37	3	-6.03	2.66	-5.39	-0.81	-2.22	
Θ(105°)	-3.92	-6.79	-4.02	-18.63	-3.19	-3.78	0.59	-8.86	-0.36	-11.5	-8.82	-6.29	-2.9	-8.58	-9.98	-5.12	-0.52	-11.34	1.46	-6.56	-1.84	-6.21	-1.3	-4.27	
Θ(120°)	-4.56	-4.94	-2.31	-11.13	-8.53	-22.43	-2.76	-18.72	-4.6	-8.7	-8.67	-13.05	-7.22	-5.86	-6.6	-11.89	-5.14	-7.93	-3.32	-4.49	0.6	-6.99	-17.77	-3.99	
Θ(135°)	-9.66	-9.91	-10.28	-1.99	-2.22	-10.52	-3.31	-6.34	-14.67	-4.05	-5.01	-11.14	-5.3	-2.41	-0.98	-10.29	-4.57	-4.97	-17.07	1.08	-10.3	-14.37	-8.02	-4.38	
Θ(150°)	-10.19	-21	-9.77	-1.57	-3.05	-12.15	-9.58	-8.46	-17.32	-13.85	-12.92	-19.93	-19.93	-5.6	-7.36	-10.81	-10.28	-8.92	-10.64	-21.04	-7.87	-13.84	-13.17	-12.86	-10.35
Θ(165°)	-8.1	-4.93	-4.53	-7.87	-8.25	-15	-15.14	-16.07	-17.64	-21.53	-11.47	-9.66	-5.65	-3.99	-3.73	-7.36	-18.11	-17.87	-19.66	-14.54	-14.89	-15.81	-15.02	-15.58	
Θ(180°)	-21	-17.31	-18.64	-23.89	-23.56	-13.83	-14.81	-17.12	-17.94	-16.88	-17.22	-19.99	-23.42	-18.61	-13.2	-12.26	-12.99	-14.71	-13.72	-16.98	-18.43	-13.45	-14.72	-19.14	



Gain Result

Table with columns: Freq(Hz), Pol., Phi, Ant. 1, and Gain. It contains multiple sections of data for frequencies 5.2G, 5.3G, 5.6G, and 5.8G, each with a grid of gain values for various angles and polarizations.



Radiated Composite Gain_WLAN 5GHz

Appendix A.2

Table with columns for Freq(Hz), Gain, Phi, and various Antenna angles (Ant. 1, Ant. 2) and Phi values (0 to 345 degrees). It contains multiple data blocks for different frequencies (5.785G, 5.2G, 5.3G) and antenna configurations.



Radiated Composite Gain_WLAN 5GHz

Appendix A.2

Table with columns for Freq(Hz), Gain, Phi, and various antenna angles (Ant. 2, Ant. 3). Rows are grouped by frequency (5.6G, 5.785G, 5.2G, 5.3G) and include gain values for various azimuth angles (0 to 180 degrees).



Table with columns for Gain, Azimuth (Phi), and Elevation (Theta) for various frequencies (5.3G, 5.6G, 5.785G) and antenna configurations (Ant. 3, Ant. 4). Rows show gain values for angles from 0 to 180 degrees.



Table with columns for Gain, Freq(Hz), Pol., and various Phi angles (0 to 345 degrees) for frequencies 5.2G, 5.3G, and 5.6G. Each cell contains a numerical value representing the radiated composite gain.



Θ(0°)	-9.13	-9.41	-10.75	-8.91	-9.21	-9.32	-9.08	-9.29	-10.91	-10.73	-9.37	-8.58	-10.5	-9.64	-8.19	-7.74	-8.06	-8.9	-11.79	-11.85	-10.22	-10.2	-11.73	-10.78
Θ(15°)	-11.5	-13.04	-17.46	-17.88	-13.7	-15.86	-14.58	-15.27	-16.4	-14.57	-12.9	-11.24	-8.77	-5.94	-4.85	-3.58	-4.37	-7.15	-9.52	-10.18	-14.21	-20.01	-17.13	-12.88
Θ(30°)	-17.2	-15.71	-13.76	-11.85	-23.79	-23.93	-22.47	-28.43	-12.5	-7.34	-9	-12.31	-13.08	-9.69	-10.34	-11.79	-11.45	-19.68	-13.56	-16.36	-21.86	-19.44	-14.43	-10.77
Θ(45°)	-15.1	-17.61	-17.29	-10.96	-6.48	-5.02	-6.54	-10.28	-12.91	-11.71	-8.13	-12.51	-12.67	-13.72	-12.54	-21.98	-17.67	-17.52	-15.31	-21.61	-26.26	-17.77	-17.84	-13.58
Θ(60°)	-12.56	-8.87	-7.91	-10.6	-5.06	-8.66	-9.81	-18.62	-14.46	-15.87	-15.64	-23.48	-21.63	-21.2	-23.46	-24.09	-13.97	-11.93	-11.74	-14.44	-15.65	-14.87	-19.44	-20.62
Θ(75°)	-10.55	-12.08	-11.65	-11.7	-9.55	-9.76	-11.65	-13.47	-9.92	-9.8	-8.25	-14.54	-9.7	-14.25	-20.15	-17.4	-11.68	-13.85	-17.64	-11.54	-9.5	-15.13	-12.43	-21.2
Θ(90°)	-11.47	-9.23	-10.09	-12.58	-16.13	-25.98	-17.05	-13.58	-14.82	-21.82	-13.67	-20.82	-16.37	-20.65	-21.34	-8.15	-11.25	-11.26	-19.15	-19.22	-14.04	-14.05	-10.19	-10.06
Θ(105°)	-10.06	-17.55	-18.05	-7.94	-12.34	-12.72	-26.56	-19.13	-18.19	-14.67	-11.51	-12.99	-12.56	-11.56	-14.18	-6.44	-14.89	-9.16	-13.03	-16.04	-10.79	-16.53	-13.27	-18.75
Θ(120°)	-10.38	-22.08	-12.8	-9.08	-15.31	-15.76	-16.9	-17.4	-18.66	-17.5	-8.05	-27	-6.17	-24.14	-15.37	-6.26	-10.68	-13.53	-16.41	-13.29	-10.78	-11.27	-9.71	-8.72
Θ(135°)	-20.03	-10.62	-11.25	-6.85	-5.82	-7.46	-10.67	-16.43	-10.65	-11.64	-13.38	-18.93	-15.53	-14.04	-14.96	-5.82	-9.41	-8.75	-14.05	-12.99	-12.72	-8.91	-9.13	-12.59
Θ(150°)	-25.27	-16.81	-11.08	-8.83	-20.69	-14.76	-9.13	-12.72	-17.15	-14.88	-24.42	-7.77	-11.23	-22.95	-14.78	-17	-8.81	-4.82	-12.57	-10.43	-10.56	-13.23	-24.18	-13.2
Θ(165°)	-14.11	-21.88	-16.76	-10.16	-10.58	-21.24	-18.12	-13.76	-16.91	-17.78	-13.26	-12.63	-20.94	-16.41	-8.16	-7.81	-8.81	-13.67	-18.85	-16.01	-15.84	-12.31	-8.44	-8.16
Θ(180°)	-21.44	-31.72	-17.04	-16.18	-19.57	-30.47	-41.66	-26.45	-21.91	-17.55	-18.8	-20.62	-19.41	-17.02	-15.43	-15.1	-15.42	-16.61	-18.31	-17.94	-18.51	-22.03	-29.37	-30.13
Freq(Hz)	5.785G	Pol.	Theta	Ant. 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gain	Φ(0°)	Φ(15°)	Φ(30°)	Φ(45°)	Φ(60°)	Φ(75°)	Φ(90°)	Φ(105°)	Φ(120°)	Φ(135°)	Φ(150°)	Φ(165°)	Φ(180°)	Φ(195°)	Φ(210°)	Φ(225°)	Φ(240°)	Φ(255°)	Φ(270°)	Φ(285°)	Φ(300°)	Φ(315°)	Φ(330°)	Φ(345°)
Θ(0°)	-12.33	-12.57	-9.77	-9.31	-9.6	-9.88	-9.06	-8.82	-8.43	-7.89	-8.27	-8.9	-9.57	-9.58	-9.73	-10.01	-10.19	-9.18	-8.98	-7.59	-8.54	-9.51	-11.1	-10.93
Θ(15°)	-9	-8.43	-7.89	-7.83	-9.39	-9.37	-7.81	-7.19	-7.61	-7.76	-9.69	-15.55	-22.57	-13.39	-10.3	-9.34	-8.73	-9.4	-9.72	-7.42	-4.67	-2.47	-2.57	-6.18
Θ(30°)	-8.72	-11.42	-11.04	-14.09	-18.63	-12.45	-11.07	-9.56	-9.47	-8.03	-10.86	-13.94	-12.25	-11.24	-13.15	-14.65	-9.93	-11.26	-19.89	-10.16	-6.47	-3.24	-1.91	-4.29
Θ(45°)	-7.68	-21.9	-6.63	-2.71	-2.05	-3.17	-7.2	-8.34	-12.82	-16.96	-17.53	-9.94	-9.89	-10.28	-5.61	-6.82	-6.98	-3.59	-7.27	-4.31	-2.94	-4.71	-4.96	-6.78
Θ(60°)	-5.48	-4.51	-0.06	-2.78	-9.26	-15.72	-7.95	-16.66	-10.4	-4.91	-17.85	-13.52	-7.28	-10.38	-11.06	-4.68	-8.46	-3.82	-5.26	-5.57	-2.51	-3.71	-1.71	-0.26
Θ(75°)	-0.17	0.33	-0.01	-4.86	-0.67	1.35	0.75	-3.42	-11.96	-3.39	-12.12	-0.56	1.04	0.55	-3.74	-3.56	0.52	0.88	-0.15	2.03	0.75	0.87	-0.15	2.69
Θ(90°)	-2.01	-1.5	-0.69	0.05	-0.75	2.41	-1.82	-1.59	-9.27	-5.45	-8.01	-1.64	2.6	2.26	0.1	0.64	2.53	3.59	1.01	4.94	3.48	2.01	0.42	4.53
Θ(105°)	-7.02	0.78	0.51	-3.61	-5.53	-1.55	-9.38	-9.8	-6.17	-12.8	-4.52	-9.83	-5.67	-5.21	-3.68	-0.99	-1.22	2.95	-0.33	3.9	3.53	1.59	-0.93	0.7
Θ(120°)	-2.94	0.08	-2.47	-14.56	-8.77	-8.24	-20	-15.57	-11.48	-16.59	-12.27	-7.27	-10.83	-16.07	-7.45	-6.46	-12.67	-0.48	-13.03	-1.51	-0.32	-3.62	-6.86	-1.2
Θ(135°)	-6.17	-5.82	-6.88	-8.03	-13.37	-18.38	-15.6	-27.04	-16.41	-14.56	-16.74	-12.68	-12.29	-12.09	-17.98	-9	-19.27	-2.87	-26.57	-5.95	-3.17	-11.84	-13.75	-1.72
Θ(150°)	-6.04	-6.43	-7.93	-6.19	-9.69	-17.36	-10.57	-14.08	-17.75	-14.17	-18.53	-22.26	-19.72	-14	-20.43	-17.39	-14.11	-10.67	-16.02	-14.34	-14.14	-9.47	-7.49	-4.71
Θ(165°)	-3.46	-2.68	-3.05	-7.17	-16.46	-15.69	-15.78	-18.65	-21.75	-25.88	-17.62	-15.15	-10.79	-9.23	-12.73	-16.25	-22.66	-19.95	-17.37	-18.22	-9.59	-8.19	-7.41	-6.74
Θ(180°)	-27.32	-21.32	-15.55	-13.91	-18.68	-22.48	-23.87	-17.86	-16.08	-15.5	-14.99	-14.6	-16.02	-15.61	-15.87	-17.03	-14.3	-14.91	-20.65	-17.53	-18.41	-15.43	-18.8	-28.64

—THE END—