



Antenna Composite Gain Test Report

Equipment	802.11ax 6E Wireless Access Point
Brand Name	Juniper
Model Name	AP45
Applicant	Juniper Networks, Inc. 1133 Innovation Way Sunnyvale, California 94089 USA
Manufacturer	Juniper Networks, Inc. 1133 Innovation Way Sunnyvale, California 94089 USA
Sample Received	Sep. 24, 2021
Start Test Date	Mar. 10, 2022
Final Test Date	Mar. 15, 2022



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History of this test report

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1. Operation Mode and Antenna Information

Antenna Position	Brand Name	Model Name	Ant. Type	Connector
2G 5GAnt1	Juniper	AP45	PIFA	I-PEX
2G 5GAnt2	Juniper	AP45	PIFA	I-PEX
2G 5GAnt3	Juniper	AP45	PIFA	I-PEX
2G 5GAnt4	Juniper	AP45	PIFA	I-PEX
5G Ant1	Juniper	AP45	PIFA	I-PEX
5G Ant2	Juniper	AP45	PIFA	I-PEX
5G Ant3	Juniper	AP45	PIFA	I-PEX
5G Ant4	Juniper	AP45	PIFA	I-PEX

Note:

Operation Mode (4TX/4RX)

2G 5GAnt1~2G 5GAnt4 can be used as transmitting/receiving antenna.

2G 5GAnt1~2G 5GAnt4 could transmit/receive simultaneously.

5G Ant1~5G Ant4 can be used as transmitting/receiving antenna.

5G Ant1~5G Ant4 could transmit/receive simultaneously.

Antenna operation of 2G 5GAnt1~2G 5GAnt4 and 5G Ant1~5G Ant4 have two kinds of operation mode:

Operation mode 1: 5GHz UNII 1~UNII 3 (2G 5GAnt1~2G 5GAnt4)+2.4GHz(2G 5GAnt1~2G 5GAnt4): The antenna operation was limited to the same 4x4 MIMO.

Operation mode 2: 5GHz UNII 2C, UNII 3 (2G 5GAnt1~2G 5GAnt4)+5GHz UNII 1, UNII 2A (5G Ant1~5G Ant4): The antenna operation was limited to the 4x4 MIMO.

2. 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

3. Testing Location

Testing Location		
☒	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 / 50-55	Mar. 10, 2022~Mar. 15, 2022

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m*6m*6m

Characteristic: Fully Anechoic Chamber

4. Test Facility and Configuration

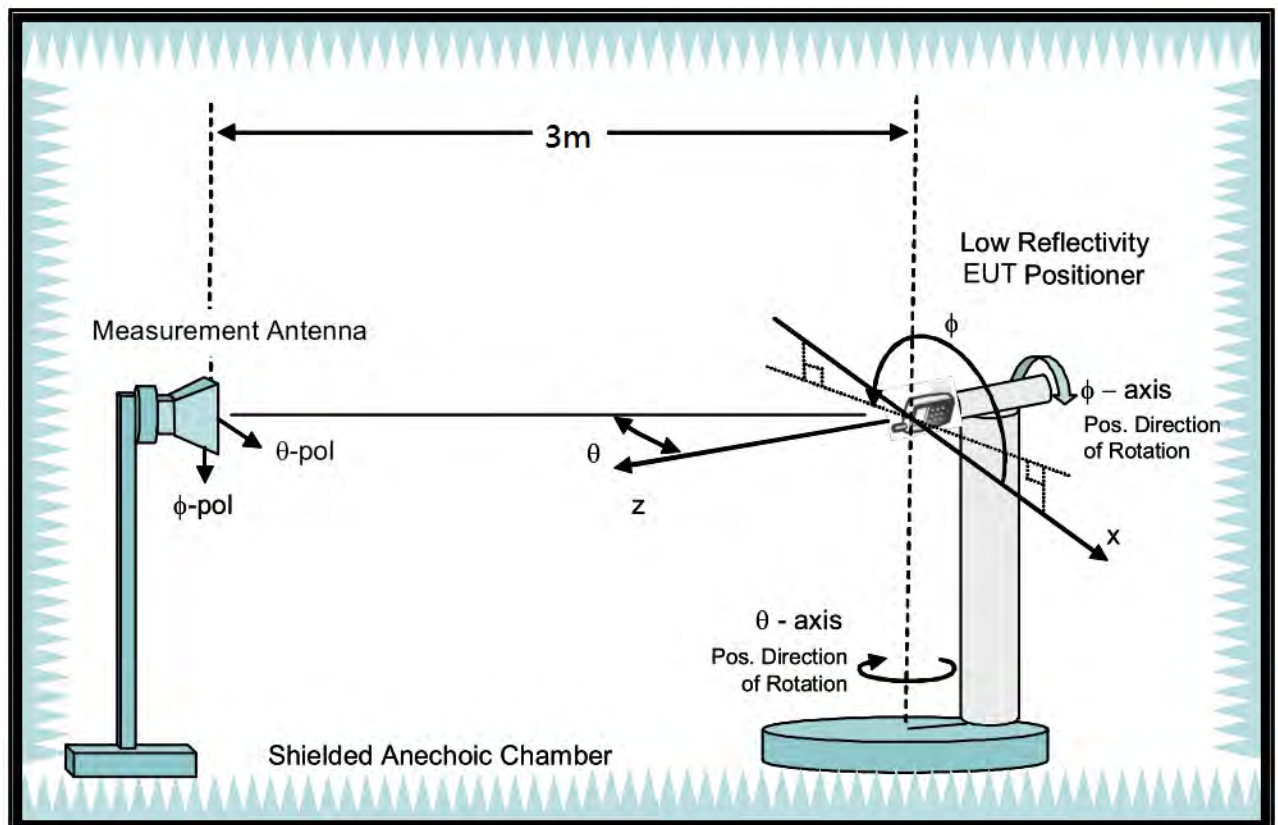
Test configuration: Reference to CITA OTA distributed-axes system configuration.

Chamber: Fully Anechoic Chamber.

Measurement antenna: Single Polarization Horn antenna calibrated according to ANSI C63.5.

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

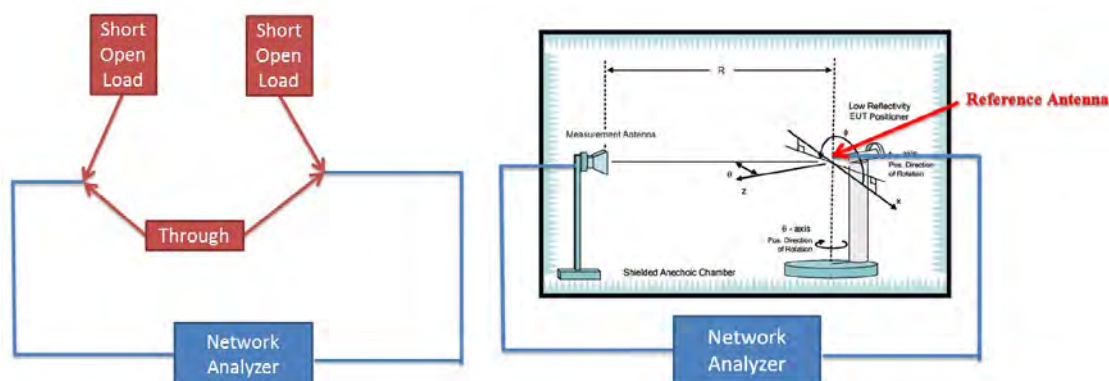
#Reference to CTIA "ctia-test-plan-for-wireless-device-over-the-air-performance-ver-3-7-1"



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 S21 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 S21 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	7500
S21 values (dBi)	-31.4	-31.4	-31.3	-31.3	-31	-30.7	-30.1	-30.5	-30.5	-30.8	-31.3	-32.8	-34.4	-35.4
Reference gain (dBi)	10.2	10.4	10.6	12.4	12.8	13.4	13.4	13.3	13.3	13.1	13.2	12.3	11.7	11.1
Factor (dB)	41.63	41.81	41.89	43.72	43.78	44.12	43.5	43.78	43.76	43.88	44.45	45.14	46.08	46.51



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 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 Gain Positions

For 2G 5GAnt.1, 2G 5GAnt.2, 2G 5GAnt.3, 2G 5GAnt.4

DG_1SS Max Value Position

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	-8.88	2.68	-2.56	3.43	0.02
Ant. 2 (dBi)	-1.16	0.74	2.25	1.17	1.52
Ant. 3 (dBi)	1.27	-0.07	0.55	1.06	1.23
Ant. 4 (dBi)	-1.29	-2.44	0.66	-1.77	-0.3
DG [1SS] (dBi)	4.23	6.44	6.41	7.19	6.67
Polarization	Theta	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	70	60	65	60	65
$\Phi(^{\circ})$	355	345	355	90	355

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 [$10^{(G/20)}$]	$10^{(-8.88/20)}$	$10^{(2.68/20)}$	$10^{(-2.56/20)}$	$10^{(3.43/20)}$	$10^{(0.02/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(-1.16/20)}$	$10^{(0.74/20)}$	$10^{(2.25/20)}$	$10^{(1.17/20)}$	$10^{(1.52/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(1.27/20)}$	$10^{(-0.07/20)}$	$10^{(0.55/20)}$	$10^{(1.06/20)}$	$10^{(1.23/20)}$
Ant. 4 [$10^{(G/20)}$]	$10^{(-1.29/20)}$	$10^{(-2.44/20)}$	$10^{(0.66/20)}$	$10^{(-1.77/20)}$	$10^{(-0.3/20)}$
Ant. 1 [$10^{(G/20)}$] value	0.36	1.361	0.745	1.484	1.002
Ant. 2 [$10^{(G/20)}$] value	0.875	1.089	1.296	1.144	1.191
Ant. 3 [$10^{(G/20)}$] value	1.157	0.992	1.065	1.13	1.152
Ant. 4 [$10^{(G/20)}$] value	0.862	0.755	1.079	0.816	0.966
Sum All Antenna [Amax]	3.254	4.197	4.185	4.574	4.312
DG [$10 \cdot \log(A_{max}^2/N_{ant})$]	4.23	6.44	6.41	7.19	6.67

Note:

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

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

DG_4SS Max Value Position

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 (dBi)	-8.88	2.68	0.34	3.43	0.02
Ant. 2 (dBi)	-1.16	0.74	1.52	1.17	1.52
Ant. 3 (dBi)	1.27	-0.07	2.19	1.06	1.23
Ant. 4 (dBi)	-1.29	-2.44	-3.58	-1.77	-0.3
DG [4SS] (dBi)	-1.28	0.6	0.6	1.35	0.69
Polarization	Theta	Theta	Theta	Theta	Theta
$\Theta(^{\circ})$	70	60	70	60	65
$\Phi(^{\circ})$	355	345	345	90	355

Note: The DG 4SS max value position is the maximum DG 4SS value calculated from section 11 table Gain Result.

DG_4SS Max Value Position Calculation

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 $((10^{(G/20)})^2)$	0.1294	1.8535	1.0814	2.2029	1.0046
Ant. 2 $((10^{(G/20)})^2)$	0.7656	1.1858	1.4191	1.3092	1.4191
Ant. 3 $((10^{(G/20)})^2)$	1.3397	0.984	1.6558	1.2764	1.3274
Ant. 4 $((10^{(G/20)})^2)$	0.743	0.5702	0.4385	0.6653	0.9333
Sum All Antenna	2.9777	4.5935	4.5948	5.4538	4.6843
DG $[10 \cdot \log(\text{sum all}/N_{\text{ant}})]$	-1.28	0.6	0.6	1.35	0.69

Note: Directional Gain (4SS) is the max value of all position. Each position value is calculated by KDB662911 D01 (e) (ii).

$$g_{j,k} = 10^{(G/20)}$$

$$\text{Directional Gain (4SS)} = 10 \cdot \log((10^{(G_{\text{ant1}}/20)})^2 + (10^{(G_{\text{ant2}}/20)})^2 + (10^{(G_{\text{ant3}}/20)})^2 + (10^{(G_{\text{ant4}}/20)})^2 + \dots) / N_{\text{ant}})$$

**For 5G Ant.1, 5G Ant.2, 5G Ant.3, 5G Ant.4****DG_1SS Max Value Position**

Frequency (Hz)	5.2G	5.3G
Ant. 1 (dBi)	2.48	2.1
Ant. 2 (dBi)	1.64	0.69
Ant. 3 (dBi)	1.2	2.72
Ant. 4 (dBi)	1.36	2.89
DG [1SS] (dBi)	7.7	8.16
Polarization	Phi	Phi
$\Theta(^{\circ})$	50	55
$\Phi(^{\circ})$	320	140

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)	5.2G	5.3G
Ant. 1 [$10^{(G/20)}$]	$10^{(2.48/20)}$	$10^{(2.1/20)}$
Ant. 2 [$10^{(G/20)}$]	$10^{(1.64/20)}$	$10^{(0.69/20)}$
Ant. 3 [$10^{(G/20)}$]	$10^{(1.2/20)}$	$10^{(2.72/20)}$
Ant. 4 [$10^{(G/20)}$]	$10^{(1.36/20)}$	$10^{(2.89/20)}$
Ant. 1 [$10^{(G/20)}$] value	1.33	1.274
Ant. 2 [$10^{(G/20)}$] value	1.208	1.083
Ant. 3 [$10^{(G/20)}$] value	1.148	1.368
Ant. 4 [$10^{(G/20)}$] value	1.169	1.395
Sum All Antenna [Amax]	4.856	5.119
DG [$10 \cdot \log(A_{\max}^2/N_{\text{ant}})$]	7.7	8.16

Note:

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

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

**DG_4SS Max Value Position**

Frequency (Hz)	5.2G	5.3G
Ant. 1 (dBi)	2.48	2.1
Ant. 2 (dBi)	1.64	0.69
Ant. 3 (dBi)	1.2	2.72
Ant. 4 (dBi)	1.36	2.89
DG [4SS] (dBi)	1.7	2.18
Polarization	Phi	Phi
$\Theta(^{\circ})$	50	55
$\Phi(^{\circ})$	320	140

Note: The DG 4SS max value position is the maximum DG 4SS value calculated from section 11 table Gain Result.

DG_4SS Max Value Position Calculation

Frequency (Hz)	5.2G	5.3G
Ant. 1 $((10^{(G/20)})^2)$	1.7701	1.6218
Ant. 2 $((10^{(G/20)})^2)$	1.4588	1.1722
Ant. 3 $((10^{(G/20)})^2)$	1.3183	1.8707
Ant. 4 $((10^{(G/20)})^2)$	1.3677	1.9454
Sum All Antenna	5.9149	6.61
DG $[10*\log(\text{sum all}/N_{\text{ant}})]$	1.7	2.18

Note: Directional Gain (4SS) is the max value of all position. Each position value is calculated by KDB662911 D01 (e) (ii).

$$g_{j,k} = 10^{(G/20)}$$

$$\text{Directional Gain (4SS)} = 10*\log((10^{(G_{\text{ant1}}/20)})^2 + (10^{(G_{\text{ant2}}/20)})^2 + (10^{(G_{\text{ant3}}/20)})^2 + (10^{(G_{\text{ant4}}/20)})^2 + \dots) / N_{\text{ant}})$$

8. Summary of Test Result

For 2G 5GAnt.1, 2G 5GAnt.2, 2G 5GAnt.3, 2G 5GAnt.4

Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.01	2.89	3.7	3.46	2.39
Ant. 2 Max Gain (dBi)	0.66	2.61	2.55	3.04	3.8
Ant. 3 Max Gain (dBi)	2.04	1.94	2.2	2.82	2.54
Ant. 4 Max Gain (dBi)	1.17	3.27	4.06	2.87	2.17
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/65/255	Theta/60/340	Theta/60/100	Theta/60/95	Theta/85/195
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/60/210	Theta/55/105	Theta/75/355	Theta/65/190	Theta/70/255
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/80/5	Theta/70/275	Theta/65/345	Theta/60/340	Theta/70/340
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Theta/105/90	Theta/65/175	Theta/65/175	Theta/60/180	Theta/75/105
Max Gain (dBi)	2.04	3.27	4.06	3.46	3.8
DG [1SS] (dBi)	4.23	6.44	6.41	7.19	6.67
DG [2SS] (dBi)	2.04	3.44	4.06	4.19	3.8
DG [4SS] (dBi)	-1.28	0.6	0.6	1.35	0.69

Note:

1. Directional Gain (2SS) = Directional Gain (1SS) – 3dB. If directional gain is less than max gain, use max gain as directional gain.
2. Each antenna max gain is the max value of measurement S21 of theta and phi through all measurement angles.
3. The max gain is the max value of all antennas.

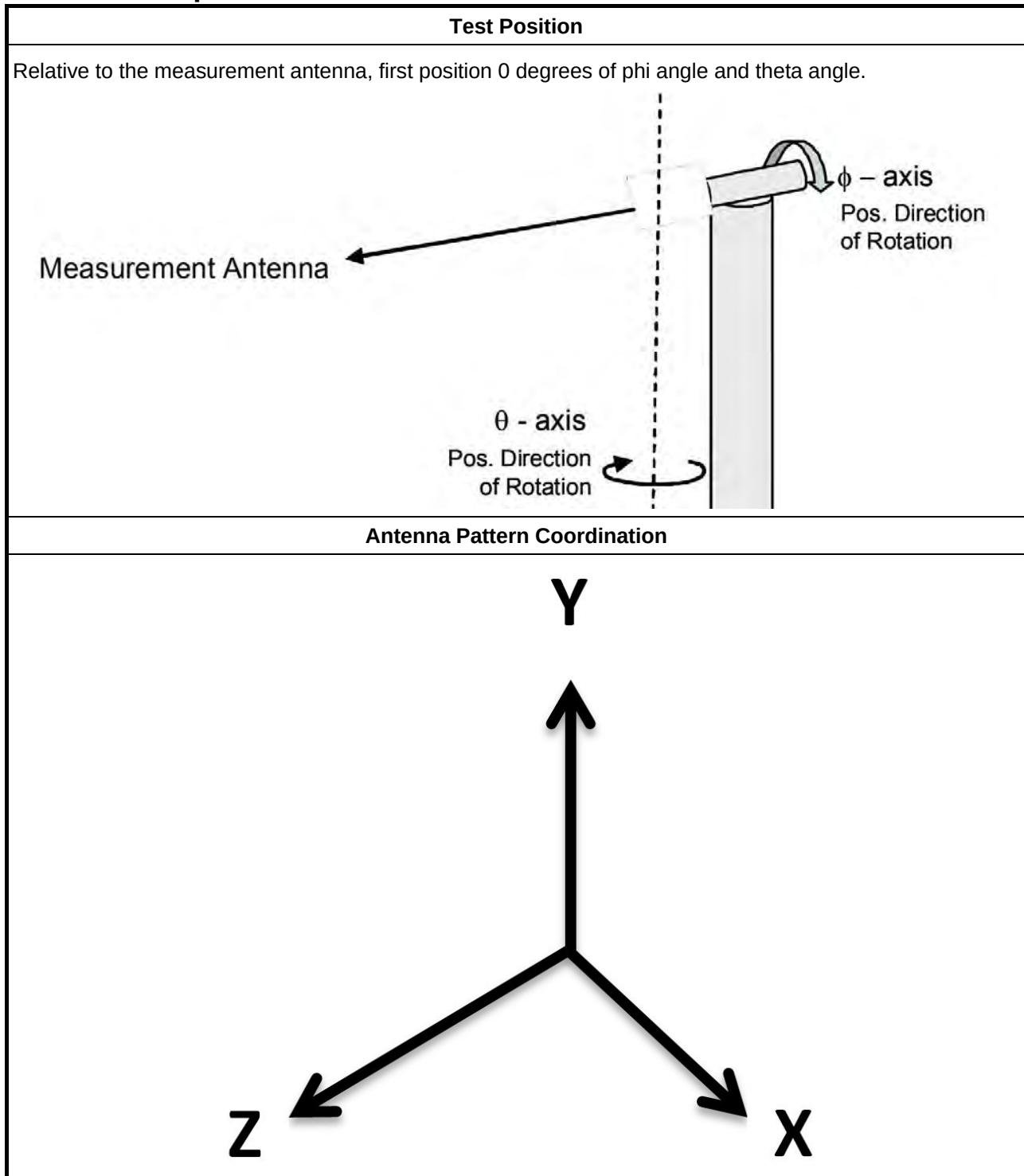
For 5G Ant.1, 5G Ant.2, 5G Ant.3, 5G Ant.4

Freq(Hz)	5.2G	5.3G
Ant. 1 Max Gain (dBi)	3.2	3.56
Ant. 2 Max Gain (dBi)	2.85	3.77
Ant. 3 Max Gain (dBi)	3.37	3.23
Ant. 4 Max Gain (dBi)	3.11	3.68
Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/45/305	Phi/55/230
Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/55/330	Phi/60/335
Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/50/140	Phi/40/215
Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$	Phi/55/215	Phi/45/315
Max Gain (dBi)	3.37	3.77
DG [1SS] (dBi)	7.7	8.16
DG [2SS] (dBi)	4.7	5.16
DG [4SS] (dBi)	1.7	2.18

Note:

1. Directional Gain (2SS) = Directional Gain (1SS) – 3dB. If directional gain is less than max gain, use max gain as directional gain.
2. Each antenna max gain is the max value of measurement S21 of theta and phi through all measurement angles.
3. The max gain is the max value of all antennas.

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-1292	1GHz~18GHz	Aug. 04, 2021	Aug. 03, 2022
ENA Series Network Analyzer	AGILENT	E5071C	MY46419201	100kHz~8.5GHz	Feb. 21, 2022	Feb. 20, 2023
Test Software	SPORTON	SENSE-RDG	V1.0.6	-	N.C.R.	N.C.R.

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

NCR means Non-Calibration required.



11. Test Results

Please refer to the appendix.

Appendix A – Radiated Composite Gain of 2G 5GAnt.1~2G 5GAnt.4	Page 16
Appendix B – Radiated Composite Gain of 5G Ant.1~5G Ant.4.....	Page 29
Appendix C – Antenna Pattern of 2G 5GAnt.1~2G 5GAnt.4.....	Page 35
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Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
Ant. 1 Max Gain (dBi)	2.01	2.89	3.7	3.46	2.39
Ant. 2 Max Gain (dBi)	0.66	2.61	2.55	3.04	3.8
Ant. 3 Max Gain (dBi)	2.04	1.94	2.2	2.82	2.54
Ant. 4 Max Gain (dBi)	1.17	3.27	4.06	2.87	2.17
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/65/255	Theta/60/340	Theta/60/100	Theta/60/95	Theta/85/195
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/60/210	Theta/55/105	Theta/75/355	Theta/65/190	Theta/70/255
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/80/5	Theta/70/275	Theta/65/345	Theta/60/340	Theta/70/340
Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Theta/105/90	Theta/65/175	Theta/65/175	Theta/60/180	Theta/75/105
Max Gain (dBi)	2.04	3.27	4.06	3.46	3.8
DG [1SS] (dBi)	4.23	6.44	6.41	7.19	6.67
DG [2SS] (dBi)	2.04	3.44	4.06	4.19	3.8
DG [4SS] (dBi)	-1.28	0.6	0.6	1.35	0.69

DG 1SS Resu

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Sporton International Inc. Hsinchu Laboratory

Gain Result

125297-760		125297-761		125297-762		125297-763		125297-764		125297-765		125297-766		125297-767		125297-768		125297-769		125297-770		125297-771		125297-772		125297-773		125297-774		125297-775		125297-776		125297-777		125297-778		125297-779		125297-780		125297-781		125297-782		125297-783		125297-784		125297-785		125297-786		125297-787		125297-788		125297-789		125297-790		125297-791		125297-792		125297-793		125297-794		125297-795		125297-796		125297-797		125297-798		125297-799		125297-800		125297-801		125297-802		125297-803		125297-804		125297-805		125297-806		125297-807		125297-808		125297-809		125297-810		125297-811		125297-812		125297-813		125297-814		125297-815		125297-816		125297-817		125297-818		125297-819		125297-820		125297-821		125297-822		125297-823		125297-824		125297-825		125297-826		125297-827		125297-828		125297-829		125297-830		125297-831		125297-832		125297-833		125297-834		125297-835		125297-836		125297-837		125297-838		125297-839		125297-840		125297-841		125297-842		125297-843		125297-844		125297-845		125297-846		125297-847		125297-848		125297-849		125297-850		125297-851		125297-852		125297-853		125297-854		125297-855		125297-856		125297-857		125297-858		125297-859		125297-860		125297-861		125297-862		125297-863		125297-864		125297-865		125297-866		125297-867		125297-868		125297-869		125297-870		125297-871		125297-872		125297-873		125297-874		125297-875		125297-876		125297-877		125297-878		125297-879		125297-880		125297-881		125297-882		125297-883		125297-884		125297-885		125297-886		125297-887		125297-888		125297-889		125297-890		125297-891		125297-892		125297-893		125297-894		125297-895		125297-896		125297-897		125297-898		125297-899		125297-900		125297-901		125297-902		125297-903		125297-904		125297-905		125297-906		125297-907		125297-908		125297-909		125297-910		125297-911		125297-912		125297-913		125297-914		125297-915		125297-916		125297-917		125297-918		125297-919		125297-920		125297-921		125297-922		125297-923		125297-924		125297-925		125297-926		125297-927		125297-928		125297-929		125297-930		125297-931		125297-932		125297-933		125297-934		125297-935		125297-936		125297-937		125297-938		125297-939		125297-940		125297-941		125297-942		125297-943		125297-944		125297-945		125297-946		125297-947		125297-948		125297-949		125297-950		125297-951		125297-952		125297-953		125297-954		125297-955		125297-956		125297-957		125297-958		125297-959		125297-960		125297-961		125297-962		125297-963		125297-964		125297-965		125297-966		125297-967		125297-968		125297-969		125297-970		125297-971		125297-972		125297-973		125297-974		125297-975		125297-976		125297-977		125297-978		125297-979		125297-980		125297-981		125297-982		125297-983		125297-984		125297-985		125297-986		125297-987		125297-988		125297-989		125297-990		125297-991		125297-992		125297-993		125297-994		125297-995		125297-996		125297-997		125297-998		125297-999		125297-1000	
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0001	4.68448744	4.68447618	4.68446492	4.68445366	4.68444240	4.68443114	4.68441988	4.68440862	4.68439736	4.68438610	4.68437484	4.68436358	4.68435232	4.68434106	4.68432980	4.68431854	4.68430728	4.68429602	4.68428476	4.68427350	4.68426224	4.68425098	4.68423972	4.68422846	4.68421720	4.68420594	4.68419468	4.68418342	4.68417216	4.68416090	4.68414964	4.68413838	4.68412712	4.68411586	4.68410460	4.68409334	4.68408208	4.68407082	4.68405956	4.68404830	4.68403704	4.68402578	4.68401452	4.68400326	4.68399200	4.68398074	4.68396948	4.68395822	4.68394696	4.68393570	4.68392444	4.68391318	4.68390192	4.68389066	4.68387940	4.68386814	4.68385688	4.68384562	4.68383436	4.68382310	4.68381184	4.68380058	4.68378932	4.68377806	4.68376680	4.68375554	4.68374428	4.68373302	4.68372176	4.68371050	4.68369924	4.68368798	4.68367672	4.68366546	4.68365420	4.68364294	4.68363168	4.68362042	4.68360916	4.68359790	4.68358664	4.68357538	4.68356412	4.68355286	4.68354160	4.68353034	4.68351908	4.68350782	4.68349656	4.68348530	4.68347404	4.68346278	4.68345152	4.68344026	4.68342900	4.68341774	4.68340648	4.68339522	4.68338396	4.68337270	4.68336144	4.68335018	4.68333892	4.68332766	4.68331640	4.68330514	4.68329388	4.68328262	4.68327136	4.68326010	4.68324884	4.68323758	4.68322632	4.68321506	4.68320380	4.68319254	4.68318128	4.68317002	4.68315876	4.68314750	4.68313624	4.68312498	4.68311372	4.68310246	4.68309120	4.68307994	4.68306868	4.68305742	4.68304616	4.68303490	4.68302364	4.68301238	4.68300112	4.68298986	4.68297860	4.68296734	4.68295608	4.68294482	4.68293356	4.68292230	4.68291104	4.68289978	4.68288852	4.68287726	4.68286600	4.68285474	4.68284348	4.68283222	4.68282096	4.68280970	4.68279844	4.68278718	4.68277592	4.68276466	4.68275340	4.68274214	4.68273088	4.68271962	4.68270836	4.68269710	4.68268584	4.68267458	4.68266332	4.68265206	4.68264080	4.68262954	4.68261828	4.68260702	4.68259576	4.68258450	4.68257324	4.68256198	4.68255072	4.68253946	4.68252820	4.68251694	4.68250568	4.68249442	4.68248316	4.68247190	4.68246064	4.68244938	4.68243812	4.68242686	4.68241560	4.68240434	4.68239308	4.68238182	4.68237056	4.68235930	4.68234804	4.68233678	4.68232552	4.68231426	4.68230300	4.68229174	4.68228048	4.68226922	4.68225796	4.68224670	4.68223544	4.68222418	4.68221292	4.68220166	4.68219040	4.68217914	4.68216788	4.68215662	4.68214536	4.68213410	4.68212284	4.68211158	4.68210032	4.68208906	4.68207780	4.68206654	4.68205528	4.68204402	4.68203276	4.68202150	4.68201024	4.68199898	4.68198772	4.68197646	4.68196520	4.68195394	4.68194268	4.68193142	4.68192016	4.68190890	4.68189764	4.68188638	4.68187512	4.68186386	4.68185260	4.68184134	4.68183008	4.68181882	4.68180756	4.68179630	4.68178504	4.68177378	4.68176252	4.68175126	4.68174000	4.68172874	4.68171748	4.68170622	4.68169496	4.68168370	4.68167244	4.68166118	4.68164992	4.68163866	4.68162740	4.68161614	4.68160488	4.68159362	4.68158236	4.68157110	4.68155984	4.68154858	4.68153732	4.68152606	4.68151480	4.68150354	4.68149228	4.68148102	4.68146976	4.68145850	4.68144724	4.68143598	4.68142472	4.68141346	4.68140220	4.68139094	4.68137968	4.68136842	4.68135716	4.68134590	4.68133464	4.68132338	4.68131212	4.68130086	4.68128960	4.68127834	4.68126708	4.68125582	4.68124456	4.68123330	4.68122204	4.68121078	4.68119952	4.68118826	4.68117700	4.68116574	4.68115448	4.68114322	4.68113196	4.68112070	4.68110944	4.68109818	4.68108692	4.68107566	4.68106440	4.68105314	4.68104188	4.68103062	4.68101936	4.68100810	4.68099684	4.68098558	4.68097432	4.68096306	4.68095180	4.68094054	4.68092928	4.68091802	4.68090676	4.68089550	4.68088424	4.68087298	4.68086172	4.68085046	4.68083920	4.68082794	4.68081668	4.68080542	4.68079416	4.68078290	4.68077164	4.68076038	4.68074912	4.68073786	4.68072660	4.68071534	4.68070408	4.68069282	4.68068156	4.68067030	4.68065904	4.68064778	4.68063652	4.68062526	4.68061400	4.68060274	4.68059148	4.68058022	4.68056896	4.68055770	4.68054644	4.68053518	4.68052392	4.68051266	4.68050140	4.68049014	4.68047888	4.68046762	4.68045636	4.68044510	4.68043384	4.68042258	4.68041132	4.68040006	4.68038880	4.68037754	4.68036628	4.68035502	4.68034376	4.68033250	4.68032124	4.68031000	4.68029874	4.68028748	4.68027622	4.68026496	4.68025370	4.68024244	4.68023118	4.68021992	4.68020866	4.68019740	4.68018614	4.68017488	4.68016362	4.68015236	4.68014110	4.68012984	4.68011858	4.68010732	4.68009606	4.68008480	4.68007354	4.68006228	4.68005102	4.68003976	4.68002850	4.68001724	4.68000598	4.67999472	4.67998346	4.67997220	4.67996094	4.67994968	4.67993842	4.67992716	4.67991590	4.67990464	4.67989338	4.67988212	4.67987086	4.67985960	4.67984834	4.67983708	4.67982582	4.67981456	4.67980330	4.67979204	4.67978078	4.67976952	4.67975826	4.67974700	4.67973574	4.67972448	4.67971322	4.67970196	4.67969070	4.67967944	4.67966818	4.67965692	4.67964566	4.67963440	4.67962314	4.67961188	4.67960062	4.67958936	4.67957810	4.67956684	4.67955558	4.67954432	4.67953306	4.67952180	4.67951054	4.67949928	4.67948802	4.67947676	4.67946550	4.67945424	4.67944298	4.67943172	4.67942046	4.67940920	4.67939794	4.67938668	4.67937542	4.67936416	4.67935290	4.67934164	4.67933038	4.67931912	4.67930786	4.67929660	4.67928534	4.67927408	4.67926282	4.67925156	4.67924030	4.67922904	4.67921778	4.67920652	4.67919526	4.67918400	4.67917274	4.67916148	4.67915022	4.67913896	4.67912770	4.67911644	4.67910518	4.67909392	4.67908266	4.67907140	4.67906014	4.67904888	4.67903762	4.67902636	4.67901510	4.67900384	4.67899258	4.67898132	4.67897006	4.67895880	4.67894754	4.67893628	4.67892502	4.67891376	4.67890250	4.67889124	4.67888000	4.67886874	4.67885748	4.67884622	4.67883496	4.67882370	4.67881244	4.67880118	4.67878992	4.67877866	4.67876740	4.67875614	4.67874488	4.67873362	4.67872236	4.67871110	4.67870000	4.67868874	4.67867748	4.67866622	4.67865496	4.67864370	4.67863244	4.67862118	4.67861000	4.67859874	4.67858748	4.67857622	4.67856496	4.67855370	4.67854244	4.67853118	4.67852000	4.67850874	4.67849748	4.67848622	4.67847496	4.67846370	4.67845244	4.67844118	4.67842992	4.67841866	4.67840740	4.67839614	4.67838488	4.67837362	4.67836236	4.67835110	4.67833984	4.67832858	4.67831732	4.67830606	4.67829480	4.67828354	4.67827228	4.67826102	4.67824976	4.67823850	4.67822724	4.67821598	4.67820472	4.67819346	4.67818220	4.67817094	4.67815968	4.67814842	4.67813716	4.67812590	4.67811464	4.67810338	4.67809212	4.67808086	4.67806960	4.67805834	4.67804708	4.67803582	4.67802456	4.67801330	4.67800204	4.67799078	4.67797952	4.67796826	4.67795700	4.67794574	4.67793448	4.67792322	4.67791196	4.67790070	4.67788944	4.67787818	4.67786692	4.67785566	4.67784440	4.67783314	4.67782188	4.67781062	4.67779936	4.67778810	4.67777684	4.67776558	4.67775432	4.67774306	4.67773180	4.67772054	4.67770928	4.67769802	4.67768676	4.67767550	4.67766424	4.67765298	4.67764172	4.67763046	4.67761920	4.67760794	4.67759668	4.67758542	4.67757416	4.67756290	4.67755164	4.67754038	4.67752912	4.67751786	4.67750660	4.67749534	4.67748408	4.67747282	4.67746156	4.67745030	4.67743904	4.67742778	4.67741652	4.67740526	4.67739400	4.67738274	4.67737148	4.67736022	4.67734896	4.67733770	4.67732644	4.67731518	4.67730392	4.67729266	4.67728140	4.67727014	4.67725888	4.67724762	4.67723636	4.67722510	4.67721384	4.67720258	4.67719132	4.67718006	4.67716880	4.67715754	4.67714628	4.67713502	4.67712376	4.67711250	4.67710124	4.67709000	4.67707874	4.67706748	4.67705622	4.67704496	4.67703370	4.67702244	4.67701118	4.67700000	4.67698874	4.67697748	4.67696622	4.67695500	4.67694374	4.67693248	4.67692122	4.67691000	4.67689874	4.67688748	4.67687622	4.67686500	4.67685374	4.67684248	4.67683122	4.67682000	4.67680874	4.67679748	4.67678622	4.67677500	4.67676374	4.67675248	4.67674122	4.67673000	4.67671874	4.67670748	4.67669622	4.67668500	4.67667374	4.67666248	4.67665122	4.67664000	4.67662874	4.67661748	4.67660622	4.67659500	4.67658374	4.67657378	4.67656252	4.67655126	4.67654000	4.67652874	4.67651748	4.67650622	4.67649500	4.67648374	4.67647248	4.67646122	4.67645000	4.67643874	4.67642748	4.67641622	4.67640500	4.67639374	4.67638248	4.67637122	4.67636000	4.67634874	4.67633748	4.67632622	4.67631500	4.67630374	4.67629248	4.67628122	4.67627000	4.67625874	4.67624748	4.67623622	4.67622500	4.67621374	4.67620248	4.67619122	4.67618000	4.67616874	4.67615748	4.67614622	4.67613500	4.67612374	4.67611248	4.67610122	4.67609000	4.67607874	4.67606748	4.67605622	4.67604500	4.67603374	4.67602248	4.67601122	4.67600000	4.67598874	4.67597748	4.67596622	4.67595500	4.67594374	4.67593248	4.67592122	4.67591000	4.67589874	4.67588748	4.67587622	4.67586500	4.67585374	4.67584248	4.67583122	4.67582000	4.67580874	4.67579748	4.67578622	4.67577500	4.67576374	4.67575248	4.67574122	4.67573000	4.67571874	4.67570748	4.67569622	4.67568500	4.67567374	4.67566248	4.67565122	4.67564000	4.67562874	4.67561748	4.67560622	4.67559500	4.67558374	4.67557248	4.67556122	4.67555000	4.67553874	4.67552748	4.67551622	4.67550500	4.67549374	4.67548248	4.67547122	4.67546000	4.67544874	4.67543748	4.67542622	4.67541500	4.67540374	4.67539248	4.67538122	4.67537000	4.67535874	4.67534748	4.67533
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Freq(Hz)	5.2G	5.3G
Ant. 1 Max Gain (dBi)	3.2	3.56
Ant. 2 Max Gain (dBi)	2.85	3.77
Ant. 3 Max Gain (dBi)	3.37	3.23
Ant. 4 Max Gain (dBi)	3.11	3.68
Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Phi/45/305	Phi/55/230
Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Phi/55/330	Phi/60/335
Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Phi/50/140	Phi/40/215
Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$	Phi/55/215	Phi/45/315
Max Gain (dBi)	3.37	3.77
DG [1SS] (dBi)	7.7	8.16
DG [2SS] (dBi)	4.7	5.16
DG [4SS] (dBi)	1.7	2.18

DG 1SS Result

[illegible]

Sporton International Inc. Hsinchu Laboratory