



# Antenna Composite Gain Test Report

|                 |  |
|-----------------|--|
| FCC ID          | LDK-9160S2578<br>LDK-9160S2875   |
| Equipment       | Cisco Catalyst Wireless 9166I Series Access Points /<br>Cisco Catalyst Wireless 9164I Series Access Points |
| Brand Name      | CISCO  |
| Model Name      | CW9166I-B, CW9164I-B, CW9166I-MR, CW9164I-MR   |
| Applicant       | Cisco Systems Inc<br>125 West Tasman Drive San Jose California United States 95134-1706                    |
| Manufacturer    | Cisco Systems Inc<br>125 West Tasman Drive San Jose California United States 95134-1706                    |
| Sample Received | Dec. 28, 2021  |
| Start Test Date | Jan. 05, 2022  |
| Final Test Date | Jan. 05, 2022  |

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### 1. Operation Mode and Antenna Information

| Antenna Position | Port                   |                        |                                  |                                |                                  | Brand | P/N          | Ant. Type         | Connector | Modes of Operation                             |
|------------------|------------------------|------------------------|----------------------------------|--------------------------------|----------------------------------|-------|--------------|-------------------|-----------|--|
|                  | R1: WLAN 2.4GHz (SKU1) | R1: WLAN 2.4GHz (SKU2) | R1: WLAN 5GHz UNII 1~3 (SKU1, 2) | R2: WLAN 5GHz UNII 2C~3 (SKU1) | R2: WLAN 6GHz UNII 5~8 (SKU1, 2) |       |              |                   |           |  |
| 2G5G Ant1        | 3                      | -                      | 4                                | -                              | -                                | CISCO | 95XEAJ15.G04 | Folded            | I-PEX     | WLAN 2.4GHz & WLAN 5GHz UNII 1~3               |
| 2G5G Ant2        | 4                      | -                      | 3                                | -                              | -                                | CISCO | 95XEAJ15.G03 | Folded            | I-PEX     |  |
| 2G5G Ant3        | 2                      | 2                      | 2                                | -                              | -                                | CISCO | 95XEAJ15.G05 | Folded            | I-PEX     |  |
| 2G5G Ant4        | 1                      | 1                      | 1                                | -                              | -                                | CISCO | 95XEAJ15.G06 | Folded            | I-PEX     |  |
| 5G6G Ant1        | -                      | -                      | -                                | 4                              | 4                                | CISCO | 95XEAJ15.G12 | H-POL Alford loop | I-PEX     | WLAN 5GHz UNII 2C, UNII 3 & WLAN 6GHz UNII 5~8 |
| 5G6G Ant2        | -                      | -                      | -                                | 3                              | 3                                | CISCO | 95XEAJ15.G11 | H-POL Alford loop | I-PEX     |  |
| 5G6G Ant3        | -                      | -                      | -                                | 1                              | 1                                | CISCO | 95XEAJ15.G09 | H-POL Alford loop | I-PEX     |  |
| 5G6G Ant4        | -                      | -                      | -                                | 2                              | 2                                | CISCO | 95XEAJ15.G10 | H-POL Alford loop | I-PEX     |  |

R means Radio.

Note:

**<SKU 1>**

For 2G5G Ant1~2G5G Ant4

2.4GHz and 5GHz Operation Mode (1TX, 2TX, 4TX/4RX)

1TX:

2G5G Ant4 can be used as transmitting/receiving antenna.

2TX:

2G5G Ant3~Ant4 can be used as transmitting/receiving antenna.

2G5G Ant3~Ant4 could transmit/receive simultaneously.

4TX:

2G5G Ant1~Ant4 can be used as transmitting/receiving antenna.

2G5G Ant1~Ant4 could transmit/receive simultaneously.

Antenna operation of 2G5G Ant1~Ant4 and 5G6G Ant1~Ant4 have two kinds of the operation mode of 5GHz:

Operation mode 1: 5GHz UNII 1~UNII 3 (2G5G Ant1~Ant4).

Operation mode 2: 5GHz UNII 1, UNII 2A (2G5G Ant1~Ant4)+5GHz UNII 2C, UNII 3 (5G6G Ant1~Ant4).

The antenna operation was limited to the 4x4 MIMO for each band.

**<SKU 2>**

For 2G5G Ant1~2G5G Ant4

2.4GHz Operation Mode (1TX, 2TX/2RX)

5GHz Operation Mode (1TX, 2TX, 4TX/4RX)

1TX:

2G5G Ant4 can be used as transmitting/receiving antenna.

2TX:

2G5G Ant3~Ant4 can be used as transmitting/receiving antenna.

2G5G Ant3~Ant4 could transmit/receive simultaneously.

4TX:

2G5G Ant1~Ant4 can be used as transmitting/receiving antenna.

2G5G Ant1~Ant4 could transmit/receive simultaneously.



<SKU 1 >

For 5G6G Ant1~5G6G Ant4  
 5GHz and 6GHz Operation Mode (1TX, 2TX, 4TX/4RX)  
 1TX:  
 5G6G Ant3 can be used as transmitting/receiving antenna.  
 2TX:  
 5G6G Ant3~Ant4 can be used as transmitting/receiving antenna.  
 5G6G Ant3~Ant4 could transmit/receive simultaneously.  
 4TX:  
 5G6G Ant1~Ant4 can be used as transmitting/receiving antenna.  
 5G6G Ant1~Ant4 could transmit/receive simultaneously.

<SKU 2>

For 5G6G Ant1~5G6G Ant4  
 6GHz Operation Mode (1TX, 2TX, 4TX/4RX)  
 1TX:  
 5G6G Ant3 can be used as transmitting/receiving antenna.  
 2TX:  
 5G6G Ant3~Ant4 can be used as transmitting/receiving antenna.  
 5G6G Ant3~Ant4 could transmit/receive simultaneously.  
 4TX:  
 5G6G Ant1~Ant4 can be used as transmitting/receiving antenna.  
 5G6G Ant1~Ant4 could transmit/receive simultaneously.

2. Table for Multiple Listing

| SKU | FCC ID         | Equipment Name                                       | Model Name | SW     | R1: 2.4GHz          | R1: 5GHz Low Band or R1: 5GHz Full Band      | R2: 5GHz High band or R2: 6GHz | R3: 2.4GHz/5GHz/6GHz | R4: Blue-tooth |
|-----|----------------|--|------------|--------|---------------------|--|--------------------------------|----------------------|----------------|
| 1   | LDK-916 0S2578 | Catalyst Wireless 9166I Wi-Fi 6E Series Access Point | CW9166I-B  | Cisco  | √<br>(1/2/4TX +4RX) | √<br>(With 80+80MHz)                         | √                              | √                    | √              |
|     |                |  | CW9166I-MR | Meraki | √<br>(1/2/4TX +4RX) | √<br>(Without 80+80MHz)                      | √                              | √                    | √              |
|     |                | Catalyst Wireless 9164I Wi-Fi 6E Series Access Point | CW9164I-B  | Cisco  | √<br>(1/2TX +2RX)   | √<br>(5GHz Full Band only, with 80+80MHz)    | √<br>(6GHz only)               | √                    | √              |
|     |                |  | CW9164I-MR | Meraki | √<br>(1/2TX +2RX)   | √<br>(5GHz Full Band only, without 80+80MHz) | √<br>(6GHz only)               | √                    | √              |
| 2   | LDK-916 0S2875 | Catalyst Wireless 9164I Wi-Fi 6E Series Access Point | CW9164I-B  | Cisco  | √<br>(1/2TX +2RX)   | √<br>(5GHz Full Band only, with 80+80MHz)    | √<br>(6GHz only)               | √                    | √              |
|     |                |  | CW9164I-MR | Meraki | √<br>(1/2TX +2RX)   | √<br>(5GHz Full Band only, without 80+80MHz) | √<br>(6GHz only)               | √                    | √              |

Note1: From the above models, model: CW9166I-B was selected as representative model for the test and its data was recorded in this report.

Note2: The above information was declared by manufacturer.

### 3. Table for Radio function

| Function<br>Radio     | WLAN 2.4GHz | WLAN 5GHz<br>UNII 1~2A | WLAN 5GHz<br>UNII 2C~3 | WLAN 6GHz<br>UNII 5~8 | Bluetooth |
|-----------------------|-------------|------------------------|------------------------|-----------------------|-----------|
| 1<br>(Iron Radio)     | V           | V                      | V                      | -                     | -         |
| 2<br>(Pine Radio)     | -           | -                      | V<br>(SKU 1 only)      | V                     | -         |
| 3<br>(Scanning Radio) | V           | V                      | V                      | V                     | -         |
| 4                     | -           | -                      | -                      | -                     | V         |

Note1 : The above information was declared by manufacturer and

Note2 : The Radio 2 and Radio 3 can't operate simultaneously.

### 4. Table for Permissive Change

This product is an extension of original one reported under Sporton project number: AP1D2822-01AA.

Below is the table for the change of the product with respect to the original one.

| Modifications  | Performance Checking   |
|--|--|
| Adding SKU 2. The differences from the SKU 1 were below:<br>a. Changing Radio 1: 2.4GHz to "2TX/2RX" from "4TX/4RX".<br>b. Removing switch & filter of Radio 1: 5GHz low band.<br>c. Removing switch & filter of Radio 2: 5GHz high band.<br>d. Changing FCC ID to "LDK-9160S2875" from "LDK-9160S2578". | After evaluating, it doesn't affect the test result of this test report. |

Note: All of the test results are based on original test report.

### 5. 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                 |
| 5925-6425   | 6175                 |
| 6425-6525   | 6475                 |
| 6525-6875   | 6695                 |
| 6875-7125   | 6995                 |



### 6. Testing Location

| Testing Location                              |        |  |
|---|--------|--|
| Sporton International Inc. Hsinhua Laboratory |        |  |
| <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      | 19-20 / 50-55             | Jan. 05, 2022 |

Note:

Testing Site Information

Brand Name: TDK

Dimension: 11m\*6m\*6m

Characteristic: Fully Anechoic Chamber

## 7. Test Facility and Configuration

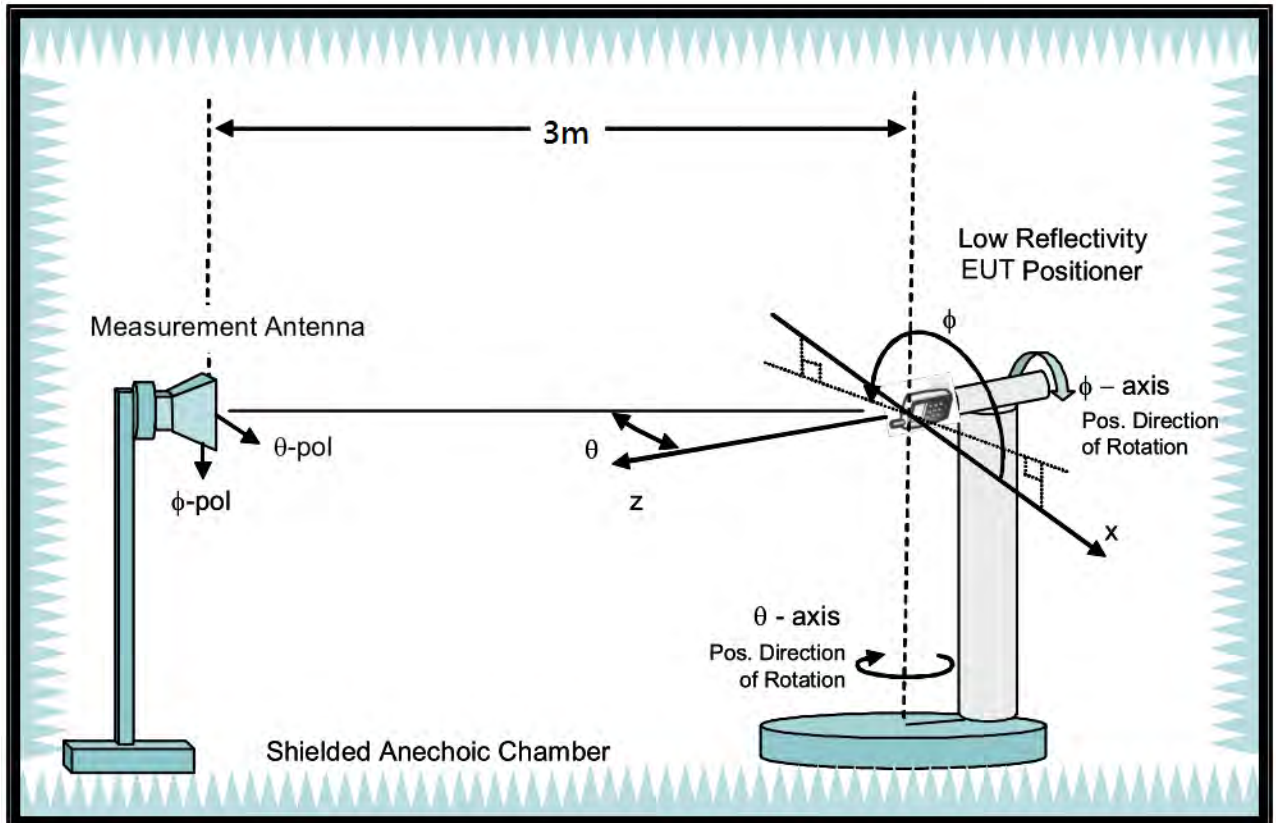
Test configuration: Reference to CITA OTA distributed-axes system configuration.

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"

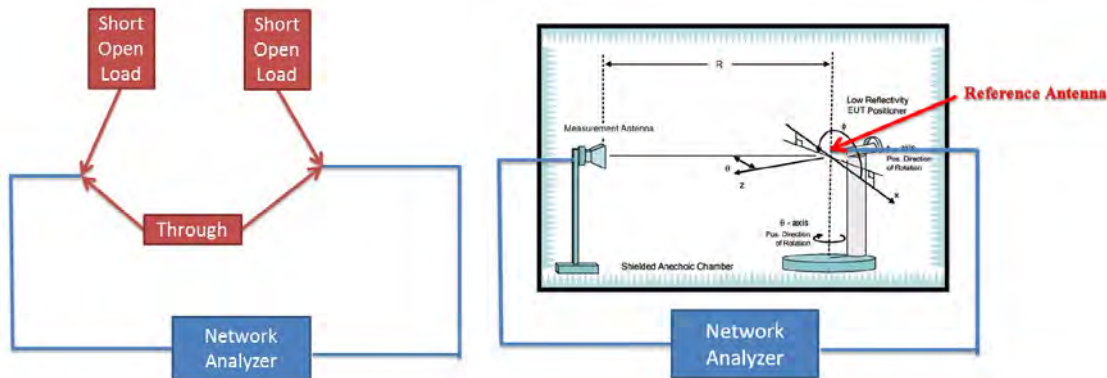




### 8. Reference Calibration

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  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| G reading (dB)       | -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)          | 41.34 | 41.55 | 41.68 | 43.24 | 43.56 | 43.68 | 43.79 | 43.91 | 43.99 | 44.43 | 44.49 | 45.24 | 46.12 | 46.31 |

Note:

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

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

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

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



## **9. 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 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.

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 9 tables.

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

## 10. Measured Values and Calculation of Maximum Gain Positions

<Antenna Position: 2G/5G Ant1~4>

For 2TX:

DG\_1SS max value position

| Frequency (Hz) | 2.45G | 5.2G  | 5.3G  | 5.6G  | 5.785G |
|----------------|-------|-------|-------|-------|--------|
| Ant. 3 (dBi)   | 1     | -1.93 | -0.86 | -1.24 | 0.48   |
| Ant. 4 (dBi)   | 1.55  | 5.24  | 4.53  | 3.86  | 1.77   |
| DG [1SS] (dBi) | 4.29  | 5.39  | 5.26  | 4.69  | 4.16   |
| Polarization   | Theta | Theta | Theta | Theta | Theta  |
| $\Theta$ (°)   | 60    | 75    | 60    | 60    | 60     |
| $\Phi$ (°)     | 345   | 150   | 135   | 135   | 30     |

Note: The DG 1SS max value position is the maximum value of section 14 table DG 1SS Result.

DG\_1SS max value position calculation

| Frequency (Hz)                           | 2.45G            | 5.2G              | 5.3G              | 5.6G              | 5.785G           |
|--|------------------|-------------------|-------------------|-------------------|------------------|
| Ant. 3 [ $10^{(G/20)}$ ]                 | $10^{(1/20)}$    | $10^{(-1.93/20)}$ | $10^{(-0.86/20)}$ | $10^{(-1.24/20)}$ | $10^{(0.48/20)}$ |
| Ant. 4 [ $10^{(G/20)}$ ]                 | $10^{(1.55/20)}$ | $10^{(5.24/20)}$  | $10^{(4.53/20)}$  | $10^{(3.86/20)}$  | $10^{(1.77/20)}$ |
| Ant. 3 [ $10^{(G/20)}$ ] value           | 1.122            | 0.801             | 0.906             | 0.867             | 1.057            |
| Ant. 4 [ $10^{(G/20)}$ ] value           | 1.195            | 1.828             | 1.685             | 1.56              | 1.226            |
| Sum All Antenna [Amax]                   | 2.317            | 2.629             | 2.59              | 2.427             | 2.283            |
| DG<br>[ $10^{\log(A_{max}^2/N_{ant})}$ ] | 4.29             | 5.39              | 5.26              | 4.69              | 4.16             |

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



DG\_2SS max value position

| Frequency (Hz) | 2.45G | 5.2G  | 5.3G  | 5.6G  | 5.785G |
|----------------|-------|-------|-------|-------|--------|
| Ant. 3 (dBi)   | 1     | -1.93 | -3.34 | -1.24 | -3.53  |
| Ant. 4 (dBi)   | 1.55  | 5.24  | 5.46  | 3.86  | 3.94   |
| DG [4SS] (dBi) | 1.28  | 2.99  | 2.99  | 2.02  | 1.65   |
| Polarization   | Theta | Theta | Theta | Theta | Theta  |
| $\Theta$ (°)   | 60    | 75    | 75    | 60    | 60     |
| $\Phi$ (°)     | 345   | 150   | 150   | 135   | 135    |

Note:

The DG 2SS max value position is the maximum DG 2SS value calculated from section 14 table Gain Result.

DG\_2SS max value position calculation

| Frequency (Hz)                                | 2.45G  | 5.2G   | 5.3G   | 5.6G   | 5.785G |
|---|--------|--------|--------|--------|--------|
| Ant. 3 $((10^{(G/20)})^2)$                    | 1.2589 | 0.6412 | 0.4634 | 0.7516 | 0.4436 |
| Ant. 4 $((10^{(G/20)})^2)$                    | 1.4289 | 3.342  | 3.5156 | 2.4322 | 2.4774 |
| Sum All Antenna                               | 2.6878 | 3.9832 | 3.9791 | 3.1838 | 2.921  |
| DG $[10*\log(\text{sum all}/N_{\text{ant}})]$ | 1.28   | 2.99   | 2.99   | 2.02   | 1.65   |

Note: Directional Gain (2SS) is the max value of all position. Each position value is calculated by KDB662911 D01 (e) (ii).

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

Directional Gain (2SS) =  $10*\log((10^{(G_{\text{ant}1}/20)})^2+(10^{(G_{\text{ant}2}/20)})^2+ (10^{(G_{\text{ant}3}/20)})^2 +(10^{(G_{\text{ant}4}/20)})^2+ \dots)/N_{\text{ant}})$



For 4TX:

DG\_1SS Max Value Position

| Frequency (Hz)     | 2.45G | 5.2G  | 5.3G  | 5.6G  | 5.785G |
|--------------------|-------|-------|-------|-------|--------|
| Ant. 1 (dBi)       | 2     | 2.96  | 0.86  | 0.74  | 0.76   |
| Ant. 2 (dBi)       | 0.73  | 0.64  | -0.79 | -2.26 | -2.84  |
| Ant. 3 (dBi)       | -0.06 | 0.05  | -0.86 | -1.24 | 1.65   |
| Ant. 4 (dBi)       | 0.79  | -0.14 | 4.53  | 3.86  | -0.39  |
| DG [1SS] (dBi)     | 6.92  | 6.99  | 7.25  | 6.62  | 5.97   |
| Polarization       | Theta | Theta | Theta | Theta | Theta  |
| $\Theta(^{\circ})$ | 60    | 45    | 60    | 60    | 60     |
| $\Phi(^{\circ})$   | 285   | 225   | 135   | 135   | 45     |

Note: The DG 1SS max value position is the maximum value of section 14 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 <sup>^(G/20)</sup> ]       | 10 <sup>^(2/20)</sup>     | 10 <sup>^(2.96/20)</sup>  | 10 <sup>^(0.86/20)</sup>  | 10 <sup>^(0.74/20)</sup>  | 10 <sup>^(0.76/20)</sup>  |
| Ant. 2 [10 <sup>^(G/20)</sup> ]       | 10 <sup>^(0.73/20)</sup>  | 10 <sup>^(0.64/20)</sup>  | 10 <sup>^(-0.79/20)</sup> | 10 <sup>^(-2.26/20)</sup> | 10 <sup>^(-2.84/20)</sup> |
| Ant. 3 [10 <sup>^(G/20)</sup> ]       | 10 <sup>^(-0.06/20)</sup> | 10 <sup>^(0.05/20)</sup>  | 10 <sup>^(-0.86/20)</sup> | 10 <sup>^(-1.24/20)</sup> | 10 <sup>^(1.65/20)</sup>  |
| Ant. 4 [10 <sup>^(G/20)</sup> ]       | 10 <sup>^(0.79/20)</sup>  | 10 <sup>^(-0.14/20)</sup> | 10 <sup>^(4.53/20)</sup>  | 10 <sup>^(3.86/20)</sup>  | 10 <sup>^(-0.39/20)</sup> |
| Ant. 1 [10 <sup>^(G/20)</sup> ] value | 1.259                     | 1.406                     | 1.104                     | 1.089                     | 1.091                     |
| Ant. 2 [10 <sup>^(G/20)</sup> ] value | 1.088                     | 1.076                     | 0.913                     | 0.771                     | 0.721                     |
| Ant. 3 [10 <sup>^(G/20)</sup> ] value | 0.993                     | 1.006                     | 0.906                     | 0.867                     | 1.209                     |
| Ant. 4 [10 <sup>^(G/20)</sup> ] value | 1.095                     | 0.984                     | 1.685                     | 1.56                      | 0.956                     |
| Sum All Antenna [Amax]                | 4.435                     | 4.472                     | 4.607                     | 4.286                     | 3.978                     |
| DG [10*log(Amax <sup>2</sup> /Nant)]  | 6.92                      | 6.99                      | 7.25                      | 6.62                      | 5.97                      |

Note:

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

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



**DG\_4SS Max Value Position**

| Frequency (Hz) | 2.45G | 5.2G  | 5.3G  | 5.6G  | 5.785G |
|----------------|-------|-------|-------|-------|--------|
| Ant. 1 (dBi)   | 2     | 1.31  | 0.86  | 0.74  | -0.57  |
| Ant. 2 (dBi)   | 0.73  | 0.7   | -0.79 | -2.26 | -3.36  |
| Ant. 3 (dBi)   | -0.06 | -3.9  | -0.86 | -1.24 | -3.53  |
| Ant. 4 (dBi)   | 0.79  | 3.44  | 4.53  | 3.86  | 3.94   |
| DG [4SS] (dBi) | 0.93  | 1.09  | 1.55  | 0.94  | 0.27   |
| Polarization   | Theta | Theta | Theta | Theta | Theta  |
| $\Theta$ (°)   | 60    | 75    | 60    | 60    | 60     |
| $\Phi$ (°)     | 285   | 165   | 135   | 135   | 135    |

Note:

The DG 4SS max value position is the maximum DG 4SS value calculated from section 14 table Gain Result.

**DG\_4SS Max Value Position Calculation**

| Frequency (Hz)                                | 2.45G  | 5.2G   | 5.3G   | 5.6G   | 5.785G |
|---|--------|--------|--------|--------|--------|
| Ant. 1 $((10^{(G/20)})^2)$                    | 1.5849 | 1.3521 | 1.219  | 1.1858 | 0.877  |
| Ant. 2 $((10^{(G/20)})^2)$                    | 1.183  | 1.1749 | 0.8337 | 0.5943 | 0.4613 |
| Ant. 3 $((10^{(G/20)})^2)$                    | 0.9863 | 0.4074 | 0.8204 | 0.7516 | 0.4436 |
| Ant. 4 $((10^{(G/20)})^2)$                    | 1.1995 | 2.208  | 2.8379 | 2.4322 | 2.4774 |
| Sum All Antenna                               | 4.9537 | 5.1424 | 5.7109 | 4.9639 | 4.2593 |
| DG $[10*\log(\text{sum all}/N_{\text{ant}})]$ | 0.93   | 1.09   | 1.55   | 0.94   | 0.27   |

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

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

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



<Antenna Position: 5G6G Ant1~5G6G Ant4>

For 2TX:

**DG\_1SS Max Value Position**

| Frequency (Hz) | 5.6G | 5.785G | 6.175G | 6.475G | 6.695G | 6.995G |
|----------------|------|--------|--------|--------|--------|--------|
| Ant. 3 (dBi)   | 3.21 | 4.36   | 2.34   | 2.31   | 0.99   | 0.61   |
| Ant. 4 (dBi)   | 2.39 | -0.68  | 2.4    | 0.52   | 1.24   | -0.51  |
| DG [1SS] (dBi) | 5.82 | 5.21   | 5.38   | 4.47   | 4.13   | 3.08   |
| Polarization   | Phi  | Phi    | Phi    | Phi    | Phi    | Phi    |
| $\Theta$ (°)   | 75   | 75     | 75     | 75     | 75     | 75     |
| $\Phi$ (°)     | 90   | 75     | 345    | 135    | 60     | 60     |

Note: The DG 1SS max value position is the maximum value of section 14 table DG 1SS Result.

**DG\_1SS Max Value Position Calculation**

| Frequency (Hz)                            | 5.6G             | 5.785G            | 6.175G           | 6.475G           | 6.695G           | 6.995G            |
|---|------------------|-------------------|------------------|------------------|------------------|-------------------|
| Ant. 3 [ $10^{(G/20)}$ ]                  | $10^{(3.21/20)}$ | $10^{(4.36/20)}$  | $10^{(2.34/20)}$ | $10^{(2.31/20)}$ | $10^{(0.99/20)}$ | $10^{(0.61/20)}$  |
| Ant. 4 [ $10^{(G/20)}$ ]                  | $10^{(2.39/20)}$ | $10^{(-0.68/20)}$ | $10^{(2.4/20)}$  | $10^{(0.52/20)}$ | $10^{(1.24/20)}$ | $10^{(-0.51/20)}$ |
| Ant. 3 [ $10^{(G/20)}$ ] value            | 1.447            | 1.652             | 1.309            | 1.305            | 1.121            | 1.073             |
| Ant. 4 [ $10^{(G/20)}$ ] value            | 1.317            | 0.925             | 1.318            | 1.062            | 1.153            | 0.943             |
| Sum All Antenna [Amax]                    | 2.764            | 2.577             | 2.627            | 2.366            | 2.274            | 2.016             |
| DG [ $10 \cdot \log(A_{max}^2/N_{ant})$ ] | 5.82             | 5.21              | 5.38             | 4.47             | 4.13             | 3.08              |

Note:

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

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



DG\_2SS Max Value Position

| Frequency (Hz) | 5.6G | 5.785G | 6.175G | 6.475G | 6.695G | 6.995G |
|----------------|------|--------|--------|--------|--------|--------|
| Ant. 3 (dBi)   | 3.21 | 4.36   | 2.34   | -4.05  | 0.99   | 0.61   |
| Ant. 4 (dBi)   | 2.39 | -0.68  | 2.4    | 3.96   | 1.24   | -0.51  |
| DG [4SS] (dBi) | 2.82 | 2.53   | 2.37   | 1.59   | 1.12   | 0.09   |
| Polarization   | Phi  | Phi    | Phi    | Phi    | Phi    | Phi    |
| θ (°)          | 75   | 75     | 75     | 75     | 75     | 75     |
| Φ (°)          | 90   | 75     | 345    | 45     | 60     | 60     |

Note:

The DG 2SS max value position is the maximum DG 2SS value calculated from section 14 table Gain Result.

DG\_2SS Max Value Position Calculation

| Frequency (Hz)            | 5.6G   | 5.785G | 6.175G | 6.475G | 6.695G | 6.995G |
|---------------------------|--------|--------|--------|--------|--------|--------|
| Ant. 3 ((10^(G/20))^2)    | 2.0941 | 2.729  | 1.714  | 0.3936 | 1.256  | 1.1508 |
| Ant. 4 ((10^(G/20))^2)    | 1.7338 | 0.8551 | 1.7378 | 2.4889 | 1.3305 | 0.8892 |
| Sum All Antenna           | 3.8279 | 3.584  | 3.4518 | 2.8824 | 2.5865 | 2.04   |
| DG [10*log(sum all/Nant)] | 2.82   | 2.53   | 2.37   | 1.59   | 1.12   | 0.09   |

Note: Directional Gain (2SS) is the max value of all position. Each position value is calculated by KDB662911 D01 (e) (ii).

g<sub>j,k</sub> = 10^(G/20)

Directional Gain (2SS) = 10\*log((10^(G<sub>ant1</sub>/20))^2+(10^(G<sub>ant2</sub>/20))^2+ +(10^(G<sub>ant3</sub>/20))^2 +(10^(G<sub>ant4</sub>/20))^2+.....)/N<sub>ant</sub>)





For 4TX:

DG\_1SS Max Value Position

| Frequency (Hz) | 5.6G | 5.785G | 6.175G | 6.475G | 6.695G | 6.995G |
|----------------|------|--------|--------|--------|--------|--------|
| Ant. 1 (dBi)   | 2.62 | 1.36   | 1.33   | -1.43  | 1.11   | 0.77   |
| Ant. 2 (dBi)   | 2.05 | 2.09   | -0.69  | 1.2    | 0.26   | -3.16  |
| Ant. 3 (dBi)   | 3.21 | 2.59   | 2.34   | 0.27   | -1.07  | -5.42  |
| Ant. 4 (dBi)   | 2.39 | 1.66   | 2.4    | -0.2   | -0.33  | 0.33   |
| DG [1SS] (dBi) | 8.6  | 7.96   | 7.45   | 6.03   | 6.05   | 4.51   |
| Polarization   | Phi  | Phi    | Phi    | Phi    | Phi    | Phi    |
| $\Theta$ (°)   | 75   | 75     | 75     | 75     | 75     | 75     |
| $\Phi$ (°)     | 90   | 180    | 345    | 210    | 315    | 315    |

Note: The DG 1SS max value position is the maximum value of section 14 table DG 1SS Result.

DG\_1SS Max Value Position Calculation

| Frequency (Hz)                               | 5.6G             | 5.785G           | 6.175G            | 6.475G            | 6.695G            | 6.995G            |
|--|------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Ant. 1 [ $10^{(G/20)}$ ]                     | $10^{(2.62/20)}$ | $10^{(1.36/20)}$ | $10^{(1.33/20)}$  | $10^{(-1.43/20)}$ | $10^{(1.11/20)}$  | $10^{(0.77/20)}$  |
| Ant. 2 [ $10^{(G/20)}$ ]                     | $10^{(2.05/20)}$ | $10^{(2.09/20)}$ | $10^{(-0.69/20)}$ | $10^{(1.2/20)}$   | $10^{(0.26/20)}$  | $10^{(-3.16/20)}$ |
| Ant. 3 [ $10^{(G/20)}$ ]                     | $10^{(3.21/20)}$ | $10^{(2.59/20)}$ | $10^{(2.34/20)}$  | $10^{(0.27/20)}$  | $10^{(-1.07/20)}$ | $10^{(-5.42/20)}$ |
| Ant. 4 [ $10^{(G/20)}$ ]                     | $10^{(2.39/20)}$ | $10^{(1.66/20)}$ | $10^{(2.4/20)}$   | $10^{(-0.2/20)}$  | $10^{(-0.33/20)}$ | $10^{(0.33/20)}$  |
| Ant. 1 [ $10^{(G/20)}$ ]<br>value            | 1.352            | 1.169            | 1.165             | 0.848             | 1.136             | 1.093             |
| Ant. 2 [ $10^{(G/20)}$ ]<br>value            | 1.266            | 1.272            | 0.924             | 1.148             | 1.03              | 0.695             |
| Ant. 3 [ $10^{(G/20)}$ ]<br>value            | 1.447            | 1.347            | 1.309             | 1.032             | 0.884             | 0.536             |
| Ant. 4 [ $10^{(G/20)}$ ]<br>value            | 1.317            | 1.211            | 1.318             | 0.977             | 0.963             | 1.039             |
| Sum All Antenna<br>[Amax]                    | 5.382            | 5                | 4.717             | 4.005             | 4.014             | 3.362             |
| DG<br>[ $10 \cdot \log(A_{max}^2/N_{ant})$ ] | 8.6              | 7.96             | 7.45              | 6.03              | 6.05              | 4.51              |

Note:

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

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



DG\_4SS Max Value Position

| Frequency (Hz) | 5.6G | 5.785G | 6.175G | 6.475G | 6.695G | 6.995G |
|----------------|------|--------|--------|--------|--------|--------|
| Ant. 1 (dBi)   | 2.62 | 0.52   | 1.33   | -0.35  | 1.11   | 0.77   |
| Ant. 2 (dBi)   | 2.05 | 4.72   | -0.69  | -3.44  | 0.26   | -3.16  |
| Ant. 3 (dBi)   | 3.21 | -0.49  | 2.34   | -4.05  | -1.07  | -5.42  |
| Ant. 4 (dBi)   | 2.39 | 1.85   | 2.4    | 3.96   | -0.33  | 0.33   |
| DG [4SS] (dBi) | 2.59 | 2.12   | 1.51   | 0.27   | 0.07   | -1.19  |
| Polarization   | Phi  | Phi    | Phi    | Phi    | Phi    | Phi    |
| Θ (°)          | 75   | 75     | 75     | 75     | 75     | 75     |
| Φ (°)          | 90   | 165    | 345    | 45     | 315    | 315    |

Note:

The DG 4SS max value position is the maximum DG 4SS value calculated from section 14 table Gain Result.

DG\_4SS Max Value Position Calculation

| Frequency (Hz)                                      | 5.6G   | 5.785G | 6.175G | 6.475G | 6.695G | 6.995G |
|---|--------|--------|--------|--------|--------|--------|
| Ant. 1 $((10^{(G/20)})^2)$                          | 1.8281 | 1.1272 | 1.3583 | 0.9226 | 1.2912 | 1.194  |
| Ant. 2 $((10^{(G/20)})^2)$                          | 1.6032 | 2.9648 | 0.8531 | 0.4529 | 1.0617 | 0.4831 |
| Ant. 3 $((10^{(G/20)})^2)$                          | 2.0941 | 0.8933 | 1.714  | 0.3936 | 0.7816 | 0.2871 |
| Ant. 4 $((10^{(G/20)})^2)$                          | 1.7338 | 1.5311 | 1.7378 | 2.4889 | 0.9268 | 1.0789 |
| Sum All Antenna                                     | 7.2593 | 6.5164 | 5.6632 | 4.2579 | 4.0614 | 3.0431 |
| DG $[10 \cdot \log(\text{sum all}/N_{\text{ant}})]$ | 2.59   | 2.12   | 1.51   | 0.27   | 0.07   | -1.19  |

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

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

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

## 11. Summary of Test Result

<Antenna Position: 2G/5G Ant1~4>

For 2TX:

| Frequency (Hz)   | 2.45G        | 5.2G         | 5.3G         | 5.6G         | 5.785G       |
|--|--------------|--------------|--------------|--------------|--------------|
| Ant. 3 Max Gain (dBi)                                  | 2.79         | 2.78         | 2.74         | 2.66         | 1.91         |
| Ant. 4 Max Gain (dBi)                                  | 2.62         | 5.24         | 5.46         | 4.26         | 3.94         |
| Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Theta/30/210 | Theta/75/60  | Theta/75/30  | Theta/75/60  | Theta/75/255 |
| Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Theta/15/315 | Theta/75/150 | Theta/75/150 | Theta/75/150 | Theta/60/135 |
| Max Gain (dBi)   | 2.79         | 5.24         | 5.46         | 4.26         | 3.94         |
| DG [1SS] (dBi)   | 4.29         | 5.39         | 5.26         | 4.69         | 4.16         |
| DG [2SS] (dBi)   | 1.28         | 2.99         | 2.99         | 2.02         | 1.65         |

For 4TX

| Frequency (Hz)   | 2.45G        | 5.2G         | 5.3G         | 5.6G         | 5.785G       |
|--|--------------|--------------|--------------|--------------|--------------|
| Ant. 1 Max Gain (dBi)                                  | 2.79         | 4.27         | 3.94         | 1.88         | 2.57         |
| Ant. 2 Max Gain (dBi)                                  | 2.43         | 5.09         | 5.16         | 2.89         | 2.72         |
| Ant. 3 Max Gain (dBi)                                  | 2.79         | 2.78         | 2.74         | 2.66         | 1.91         |
| Ant. 4 Max Gain (dBi)                                  | 2.62         | 5.24         | 5.46         | 4.26         | 3.94         |
| Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Theta/0/195  | Theta/75/240 | Theta/75/240 | Theta/75/240 | Theta/60/225 |
| Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Theta/60/165 | Theta/75/330 | Theta/75/330 | Theta/75/330 | Theta/75/330 |
| Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Theta/30/210 | Theta/75/60  | Theta/75/30  | Theta/75/60  | Theta/75/255 |
| Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Theta/15/315 | Theta/75/150 | Theta/75/150 | Theta/75/150 | Theta/60/135 |
| Max Gain (dBi)   | 2.79         | 5.24         | 5.46         | 4.26         | 3.94         |
| DG [1SS] (dBi)   | 6.92         | 6.99         | 7.25         | 6.62         | 5.97         |
| DG [2SS] (dBi)   | 3.92         | 5.24         | 5.46         | 4.26         | 3.94         |
| DG [4SS] (dBi)   | 0.93         | 1.09         | 1.55         | 0.94         | 0.27         |

**Note:**

1. For 4TX modes. 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.



<Antenna Position: 5G6G Ant1~5G6G Ant4>

For 2TX:

| Frequency (Hz)   | 5.6G       | 5.785G     | 6.175G    | 6.475G     | 6.695G    | 6.995G     |
|--|------------|------------|-----------|------------|-----------|------------|
| Ant. 3 Max Gain (dBi)                                  | 3.42       | 4.36       | 2.95      | 2.31       | 0.99      | 0.61       |
| Ant. 4 Max Gain (dBi)                                  | 3.67       | 4.23       | 2.91      | 3.96       | 1.59      | 0.33       |
| Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Phi/75/180 | Phi/75/75  | Phi/75/75 | Phi/75/135 | Phi/75/60 | Phi/75/60  |
| Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Phi/60/0   | Phi/60/345 | Phi/75/45 | Phi/75/45  | Phi/75/45 | Phi/75/315 |
| Max Gain (dBi)   | 3.67       | 4.36       | 2.95      | 3.96       | 1.59      | 0.61       |
| DG [1SS] (dBi)   | 5.82       | 5.21       | 5.38      | 4.47       | 4.13      | 3.08       |
| DG [2SS] (dBi)   | 2.82       | 2.53       | 2.37      | 1.59       | 1.12      | 0.09       |

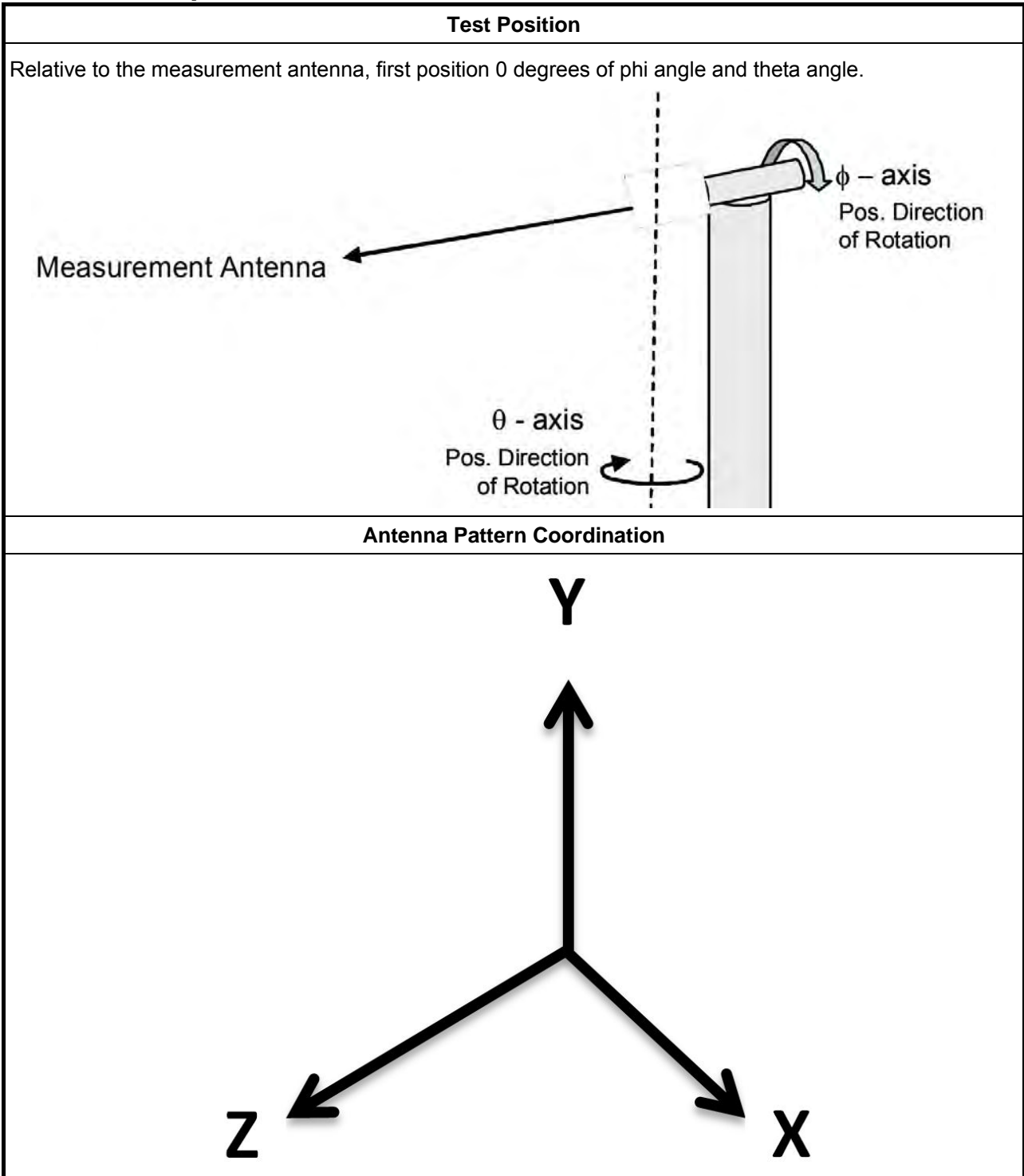
For 4TX

| Frequency (Hz)   | 5.6G       | 5.785G     | 6.175G     | 6.475G     | 6.695G     | 6.995G     |
|--|------------|------------|------------|------------|------------|------------|
| Ant. 1 Max Gain (dBi)                                  | 2.98       | 4.19       | 2.4        | 2.41       | 1.39       | 0.77       |
| Ant. 2 Max Gain (dBi)                                  | 3.46       | 4.94       | 2.95       | 1.96       | 1.32       | 0.87       |
| Ant. 3 Max Gain (dBi)                                  | 3.42       | 4.36       | 2.95       | 2.31       | 0.99       | 0.61       |
| Ant. 4 Max Gain (dBi)                                  | 3.67       | 4.23       | 2.91       | 3.96       | 1.59       | 0.33       |
| Ant. 1 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Phi/60/0   | Phi/75/255 | Phi/75/255 | Phi/75/315 | Phi/75/240 | Phi/75/315 |
| Ant. 2 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Phi/75/180 | Phi/75/150 | Phi/75/165 | Phi/75/225 | Phi/75/210 | Phi/75/240 |
| Ant. 3 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Phi/75/180 | Phi/75/75  | Phi/75/75  | Phi/75/135 | Phi/75/60  | Phi/75/60  |
| Ant. 4 Polarization/ $\Theta(^{\circ})/\Phi(^{\circ})$ | Phi/60/0   | Phi/60/345 | Phi/75/45  | Phi/75/45  | Phi/75/45  | Phi/75/315 |
| Max Gain (dBi)   | 3.67       | 4.94       | 2.95       | 3.96       | 1.59       | 0.87       |
| DG [1SS] (dBi)   | 8.6        | 7.96       | 7.45       | 6.03       | 6.05       | 4.51       |
| DG [2SS] (dBi)   | 5.6        | 4.96       | 4.45       | 3.96       | 3.05       | 1.51       |
| DG [4SS] (dBi)   | 2.59       | 2.12       | 1.51       | 0.27       | 0.07       | -1.19      |

Note:

1. For 4TX modes. 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.

## 12. Test Setup



Note:

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



**13. Test Equipment and Calibration Data**

| <b>Instrument</b> | <b>Brand</b> | <b>Model No.</b> | <b>Serial No.</b> | <b>Characteristics</b> | <b>Calibration Date</b> | <b>Calibration Due Date</b> |
|-------------------|--------------|------------------|-------------------|------------------------|-------------------------|-----------------------------|
| Horn Antenna      | SCHWARZBECK  | BBHA9120D        | BBHA 9120D-1292   | 1GHz~18GHz             | Aug. 04, 2021           | Aug. 03, 2022               |
| 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.



## 14. Test Results

Please refer to the appendix.

Appendix A – Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4).....Page 24

Appendix B – Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4).....Page 39

Appendix C – Antenna Pattern of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4).....Page 57

Appendix D – Antenna Pattern of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4).....Page 62

Appendix E – Test Photos..... Page 68



| Freq(Hz)                                      | 2.45G        | 5.2G         | 5.3G         | 5.6G         | 5.785G       |
|---|--------------|--------------|--------------|--------------|--------------|
| Ant. 3 Max Gain (dBi)                         | 2.79         | 2.78         | 2.74         | 2.66         | 1.91         |
| Ant. 4 Max Gain (dBi)                         | 2.62         | 5.24         | 5.46         | 4.26         | 3.94         |
| Ant. 3 Polarization/ $\theta$ (°)/ $\phi$ (°) | Theta/30/210 | Theta/75/60  | Theta/75/30  | Theta/75/60  | Theta/75/255 |
| Ant. 4 Polarization/ $\theta$ (°)/ $\phi$ (°) | Theta/15/315 | Theta/75/150 | Theta/75/150 | Theta/75/150 | Theta/60/135 |
| Max Gain (dBi)                                | 2.79         | 5.24         | 5.46         | 4.26         | 3.94         |
| DG [1SS] (dBi)                                | 4.29         | 5.39         | 5.26         | 4.69         | 4.16         |
| DG [2SS] (dBi)                                | 1.28         | 2.99         | 2.99         | 2.02         | 1.65         |





DG 1SS Result

Table with columns for Freq(Hz), DG(dBi), and various Phi angles (0 to 345 degrees) for frequencies 2.45G, 5.2G, and 5.3G. The table contains multiple rows of data for each frequency, showing gain values in dB across different angles.



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3(2G5G Ant3~Ant4)\_2TX

Appendix A.1

Table with columns for frequency (5.6G, 5.785G), polarization (Pol.), and various angles (Theta, Phi) from 0 to 180 degrees. It contains numerical gain values in dB for each combination.



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3(2G5G Ant3~Ant4)\_2TX

Appendix A.1

Gain Result

Table with columns for Freq(Hz), Gain, and various Phi and Theta angles (0 to 180 degrees) for 2.45G, 5.2G, and 5.3G frequencies. The table contains multiple rows of gain data for each frequency and angle combination.



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3(2G5G Ant3~Ant4)\_2TX

Appendix A.1

Table with columns for Frequency (5.6G, 5.785G, 2.45G, 5.2G), Gain, and various Phi angles (0 to 345 degrees). Includes sub-headers for Polarization (Pol.), Phase (Phi), and Antenna (Ant. 3, Ant. 4).



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3(2G5G Ant3~Ant4)\_2TX

Appendix A.1

Table with columns for frequency (5.3G, 5.6G, 5.785G), polarization (Pol.), phase (Phi), antenna (Ant. 4), and gain (Phi(0) to Phi(345)). Rows show gain values for various angles (Theta) and frequencies.



| Freq(Hz)   | 2.45G        | 5.2G         | 5.3G         | 5.6G         | 5.785G       |
|--|--------------|--------------|--------------|--------------|--------------|
| Ant. 1 Max Gain (dBi)                                  | 2.79         | 4.27         | 3.94         | 1.88         | 2.57         |
| Ant. 2 Max Gain (dBi)                                  | 2.43         | 5.09         | 5.16         | 2.89         | 2.72         |
| Ant. 3 Max Gain (dBi)                                  | 2.79         | 2.78         | 2.74         | 2.66         | 1.91         |
| Ant. 4 Max Gain (dBi)                                  | 2.62         | 5.24         | 5.46         | 4.26         | 3.94         |
| Ant. 1 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$ | Theta/0/195  | Theta/75/240 | Theta/75/240 | Theta/75/240 | Theta/60/225 |
| Ant. 2 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$ | Theta/60/165 | Theta/75/330 | Theta/75/330 | Theta/75/330 | Theta/75/330 |
| Ant. 3 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$ | Theta/30/210 | Theta/75/60  | Theta/75/30  | Theta/75/60  | Theta/75/255 |
| Ant. 4 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$ | Theta/15/315 | Theta/75/150 | Theta/75/150 | Theta/75/150 | Theta/60/135 |
| Max Gain (dBi)   | 2.79         | 5.24         | 5.46         | 4.26         | 3.94         |
| DG [1SS] (dBi)   | 6.92         | 6.99         | 7.25         | 6.62         | 5.97         |
| DG [2SS] (dBi)   | 3.92         | 5.24         | 5.46         | 4.26         | 3.94         |
| DG [4SS] (dBi)   | 0.93         | 1.09         | 1.55         | 0.94         | 0.27         |



DG 1SS Result

Table with columns for Freq(Hz), DG(dBi), and various Phi angles (0 to 345 degrees) for frequencies 2.45G, 5.2G, and 5.3G. The table contains multiple rows of data for each frequency, showing gain values in dB across different angles.



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)\_4TX

Appendix A.2

Table with columns for frequency (5.6G, 5.785G), polarization (Phi, Theta), and various azimuthal angles (0 to 345 degrees). Rows show DG(dBi) values for each combination.





Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)\_4TX

Appendix A.2

Gain Result

Table with columns for Freq(Hz), Gain, and various Phi angles (0 to 345 degrees) for frequencies 2.45G, 5.2G, and 5.3G. The table contains multiple rows of gain data for each frequency and angle combination.



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)\_4TX

Appendix A.2

Table with columns for frequency (5.6G, 5.785G, 2.45G, 5.2G), polarization (Pol.), theta angle, antenna (Ant. 1, 2), and gain values for various phi angles (0 to 345 degrees).



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)\_4TX

Appendix A.2

Table with columns for frequency (5.3G, 5.6G, 5.785G, 2.45G), polarization (Pol.), phase (Phi), antenna (Ant. 2, 3), and gain for various angles (Theta) and azimuths (Phi). Values range from -18.0 to 5.6 dBm.



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)\_4TX

Appendix A.2

Table with columns for Gain, Theta, and various Phi angles (0 to 345 degrees) for frequencies 2.45G, 5.2G, 5.3G, and 5.6G. The table contains numerical gain values for each combination of frequency and angle.



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)\_4TX

Appendix A.2

Table with columns for frequency (5.785G, 2.45G, 5.2G), polarization (Pol.), phase (Phi), antenna (Ant. 3, Ant. 4), and gain values for various angles (Theta and Phi) from 0 to 165 degrees.



Radiated Composite Gain of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)\_4TX

Appendix A.2

Table with columns for Frequency (5.3G, 5.6G, 5.785G), Polarization (Phi), and Azimuth (Theta) for various antenna configurations (Ant. 1-4). Rows show Gain values for different azimuth angles (0 to 180 degrees) and polarization angles (0 to 165 degrees).



**Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8  
(5G6G Ant3~Ant4)\_2TX**

**Appendix B.1**

| Freq(Hz)   | 5.6G       | 5.785G     | 6.175G    | 6.475G     | 6.695G    | 6.995G     |
|--|------------|------------|-----------|------------|-----------|------------|
| Ant. 3 Max Gain (dBi)                                  | 3.42       | 4.36       | 2.95      | 2.31       | 0.99      | 0.61       |
| Ant. 4 Max Gain (dBi)                                  | 3.67       | 4.23       | 2.91      | 3.96       | 1.59      | 0.33       |
| Ant. 3 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$ | Phi/75/180 | Phi/75/75  | Phi/75/75 | Phi/75/135 | Phi/75/60 | Phi/75/60  |
| Ant. 4 Polarization/ $\theta(^{\circ})/\phi(^{\circ})$ | Phi/60/0   | Phi/60/345 | Phi/75/45 | Phi/75/45  | Phi/75/45 | Phi/75/315 |
| Max Gain (dBi)   | 3.67       | 4.36       | 2.95      | 3.96       | 1.59      | 0.61       |
| DG [1SS] (dBi)   | 5.82       | 5.21       | 5.38      | 4.47       | 4.13      | 3.08       |
| DG [2SS] (dBi)   | 2.82       | 2.53       | 2.37      | 1.59       | 1.12      | 0.09       |







# Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5-8 (5G6G Ant3~Ant4)\_2TX

| Freq(Hz) | 6.475G | 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°)    | -6.59  | -9.29  | -10.23 | -10.57 | -11.19 | -13.2  | -10.71 | -9      | -7.33   | -6.14   | -5.14   | -5.43   | -6.85   | -8.91   | -10.9   | -12.79  | -13.82  | -16.15  | -15.88  | -13.01  | -12.68  | -11.87  | -10.62  | -10.96  |
| Θ(15°)   | -3.52  | -6.03  | -6.01  | -6.18  | -6.68  | -7.58  | -8.09  | -11.5   | -9.8    | -9.59   | -12.92  | -10.63  | -6.34   | -2.65   | -2.48   | -3.53   | -3.61   | -2.86   | -1.56   | -1.64   | -3.01   | -3.09   | -3.53   | -4.89   |
| Θ(30°)   | -1.77  | -2.27  | -2.64  | -2.1   | -3.39  | -3.65  | -5.08  | -3.93   | -1.46   | -0.94   | -4.24   | -5.28   | -2.82   | -0.32   | 0.19    | -2.14   | -3.86   | -3.19   | -1.31   | -1.11   | -2.19   | -2.87   | -0.4    | -1.64   |
| Θ(45°)   | -1.83  | -3.54  | -4.48  | -4.32  | -3.06  | -2.21  | -3.98  | -4.11   | -2.33   | -0.27   | -2.98   | -2.43   | -2.49   | -1.78   | 0.38    | -0.09   | -1.01   | -4.54   | -2.1    | -6.72   | 0.72    | -1.57   | -1.29   | -2.47   |
| Θ(60°)   | -2.24  | 0.63   | 0.64   | 1.09   | 0.36   | -2.07  | -0.85  | -1.98   | -5.56   | -3.67   | -6.14   | -5.16   | -2.93   | -1.74   | -1.14   | -2.43   | -5.29   | -5.22   | -5.22   | -5.35   | -5.61   | -2.89   | -0.06   | -0.13   |
| Θ(75°)   | -0.89  | 1.28   | 2.95   | 3.86   | 3.41   | -0.25  | -0.89  | 0.82    | 1.48    | 4.47    | 2.38    | 2.35    | 2.25    | 1.86    | 3.05    | 1.78    | 0.4     | -0.03   | -0.58   | 0.81    | -1.81   | 0.76    | 1.57    | 1.69    |
| Θ(90°)   | -4.27  | -4.28  | -0.06  | 1.75   | 2.37   | 0.79   | -0.54  | 0.31    | 1.7     | 1.6     | 2.39    | 1.16    | -0.75   | 0.54    | -0.37   | -2.71   | -1.35   | 0.6     | -1.61   | 0.18    | -4.6    | -4.68   | -2.22   | 0.49    |
| Θ(105°)  | -5.6   | -7.71  | -4.19  | -3.54  | -2.03  | -4.05  | -4.67  | -3.06   | -2.84   | -2.06   | -1.05   | -4.45   | -2.88   | -3.33   | -6.65   | -5.42   | -8.35   | -8.22   | -8.85   | -10.41  | -10.53  | -7.3    | -5.87   | -5.67   |
| Θ(120°)  | -10.91 | -11.26 | -8.83  | -6.58  | -6.4   | -7.7   | -6.46  | -5.08   | -5.02   | -6.16   | -7.28   | -7.57   | -6.29   | -8.91   | -10.35  | -9.32   | -9.95   | -8.4    | -11.5   | -10.94  | -12.63  | -11.86  | -8.56   | -11.72  |
| Θ(135°)  | -14.18 | -14.43 | -12    | -10.06 | -12.79 | -11.02 | -11.91 | -9.88   | -8.77   | -8.78   | -12.17  | -10.56  | -10.19  | -11.18  | -10.84  | -10.67  | -9.67   | -9.11   | -11.3   | -9.54   | -11.06  | -14.61  | -11.83  | -15.17  |
| Θ(150°)  | -13.91 | -15.07 | -16.63 | -12.96 | -14.61 | -19.79 | -15.48 | -12.73  | -13.39  | -12.02  | -11.2   | -12.71  | -16.67  | -18.49  | -15.88  | -12.09  | -15.05  | -19.04  | -7.79   | -17.93  | -18.07  | -17.27  | -20.24  | -18.96  |
| Θ(165°)  | -17.72 | -15.95 | -15.83 | -13.96 | -17.06 | -19.11 | -18.17 | -17.46  | -18.53  | -15.57  | -14.32  | -13.68  | -18.29  | -16.62  | -18.06  | -16.53  | -15.91  | -18.15  | -19.44  | -19.09  | -22.74  | -21.11  | -21.9   | -18.78  |
| Θ(180°)  | -17.17 | -17.33 | -19.08 | -19.47 | -20.64 | -22.41 | -18.65 | -17.83  | -17.64  | -17.83  | -17.39  | -16.13  | -15.77  | -17     | -21.09  | -21.61  | -20.79  | -18.9   | -17.7   | -14.6   | -15.51  | -18     | -17.83  | -19.81  |
| Freq(Hz) | 6.475G | 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°)    | -11.2  | -9.61  | -7.34  | -7.95  | -8.18  | -8.29  | -7.82  | -9.57   | -9.07   | -8.57   | -7.94   | -8.5    | -10.95  | -10.8   | -10.15  | -10.93  | -8.82   | -9.45   | -10.02  | -11.35  | -12.22  | -13.92  | -15.63  | -18.08  |
| Θ(15°)   | -8.27  | -7.99  | -9     | -10.57 | -9.47  | -9.62  | -9.14  | -9.66   | -10.17  | -12.98  | -14.9   | -10.08  | -5.17   | -3.64   | -6.42   | -7.16   | -9.57   | -11.52  | -11.5   | -11.29  | -12.42  | -13.57  | -8.67   | -7.31   |
| Θ(30°)   | -14.38 | -9.84  | -9.71  | -11.88 | -14.36 | -10.95 | -10.15 | -13.93  | -15.48  | -15.22  | -15.17  | -12.55  | -6.44   | -8.37   | -11.26  | -7.51   | -9.64   | -10.57  | -10.9   | -18.56  | -13.46  | -11.82  | -11.52  | -8.39   |
| Θ(45°)   | -8.99  | -18.99 | -14.15 | -10.39 | -11.38 | -10.6  | -13.86 | -14.73  | -19.05  | -11.56  | -7.06   | -6.57   | -10     | -18.92  | -13.38  | -16.41  | -12.41  | -9.13   | -16.85  | -18.72  | -13.26  | -12.51  | -9.06   | -8.62   |
| Θ(60°)   | -16.74 | -13.45 | -17.92 | -12.95 | -16.13 | -11.19 | -13.21 | -15.92  | -22.97  | -12.99  | -9.32   | -7.5    | -10.98  | -22.07  | -22.8   | -12.3   | -15.83  | -13.39  | -19.12  | -17.44  | -15.65  | -15.74  | -9.8    | -13.1   |
| Θ(75°)   | -16.75 | -15.54 | -10.32 | -13.78 | -14.54 | -13.61 | -18.65 | -16.36  | -15.62  | -19.56  | -16.49  | -15.17  | -18.61  | -19.43  | -11.66  | -14.35  | -16.82  | -11.87  | -15.52  | -14.17  | -15.45  | -18.97  | -21.21  | -15.23  |
| Θ(90°)   | -20.03 | -19.79 | -12.56 | -14.69 | -11.31 | -12.77 | -19.12 | -12.08  | -15.19  | -22     | -21.4   | -18.4   | -19.92  | -15.84  | -15.45  | -18.54  | -15.87  | -11.66  | -16.98  | -14.59  | -14.81  | -19.09  | -18.34  | -12.59  |
| Θ(105°)  | -20.05 | -22.35 | -15.29 | -17.62 | -12.74 | -12.75 | -18.73 | -15.28  | -16.17  | -21.91  | -18.48  | -19.7   | -16.79  | -18.82  | -17.39  | -18.77  | -21.65  | -21.31  | -20.18  | -18.31  | -20.13  | -19.92  | -18.75  | -17.31  |
| Θ(120°)  | -22.49 | -18.23 | -17.54 | -20.48 | -16.1  | -18.07 | -19.85 | -14.98  | -19.47  | -22.64  | -20.18  | -17.52  | -22.55  | -21.11  | -21.85  | -15.71  | -22.24  | -18.98  | -21.29  | -22.56  | -17.4   | -21.59  | -17.52  | -14.25  |
| Θ(135°)  | -22.58 | -18.64 | -16.72 | -20.69 | -16.53 | -19.72 | -21.17 | -18.58  | -22.76  | -19.36  | -17.23  | -22.36  | -22.25  | -20.58  | -19.68  | -19.24  | -22.06  | -18.13  | -23.22  | -21.14  | -19.14  | -17.1   | -12.9   | -17.57  |
| Θ(150°)  | -16.43 | -18.99 | -16.67 | -18.27 | -22.05 | -22.76 | -21.78 | -19.68  | -22.4   | -18.71  | -22.11  | -21.76  | -22.53  | -21.08  | -21.73  | -21.48  | -22.14  | -18.34  | -20.9   | -18.42  | -21.63  | -17.23  | -18.93  | -22.85  |
| Θ(165°)  | -16.91 | -22.49 | -22.59 | -19.35 | -22.96 | -21.95 | -21.41 | -21.03  | -20.61  | -19.85  | -21.79  | -20.45  | -20     | -19.81  | -15.81  | -18.22  | -19.2   | -21.22  | -22.01  | -13.12  | -18.87  | -17.57  | -15.29  | -20.35  |
| Θ(180°)  | -20.19 | -18.86 | -18.57 | -15.78 | -14.85 | -15.85 | -19.46 | -19.79  | -19.5   | -20.9   | -21.73  | -21.83  | -22.81  | -20.77  | -15.77  | -17.6   | -18.68  | -17.3   | -19.66  | -20.98  | -21.12  | -19.87  | -18.9   | -17.79  |
| Freq(Hz) | 6.695G | 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°)    | -4.86  | -6.54  | -8.61  | -9.71  | -10.41 | -10.05 | -6.92  | -5.05   | -4.04   | -3.36   | -2.59   | -3.15   | -4.4    | -7.44   | -11.74  | -14.98  | -16.12  | -13.39  | -8.87   | -8.18   | -8.27   | -7.59   | -8.37   | -9.41   |
| Θ(15°)   | -2.97  | -4.2   | -3.04  | -5.24  | -6.08  | -7.92  | -9.19  | -7.65   | -5.54   | -8.69   | -14.87  | -11.85  | -8.1    | -3.71   | -2.42   | -4.06   | -4.54   | -3.37   | -3.14   | -2.37   | -3.16   | -1.79   | -2.72   | -4.02   |
| Θ(30°)   | -1.01  | -2.19  | -3.38  | -3.35  | -4.33  | -3.57  | -5.38  | -5.43   | -2.53   | -3.27   | -7.46   | -3.58   | -3.62   | -2.9    | -0.13   | -0.96   | -3.79   | -2.43   | -3.56   | -2.8    | -2.53   | -1.51   | -0.39   | -1.63   |
| Θ(45°)   | -1.81  | -0.67  | -1.28  | -1.63  | -2.82  | -3.22  | -3.6   | -1.09   | -0.31   | 0.35    | -1.74   | -3.56   | -3.14   | -1.87   | -0.68   | 1.16    | 0.23    | -1.82   | -4.2    | -4.24   | 0.26    | -1.63   | 0.87    | -1.74   |
| Θ(60°)   | -2.02  | -0.49  | -0.26  | -0.37  | -0.53  | -1.94  | -1.95  | 0.08    | -4.51   | -5.06   | -4.29   | -5.04   | -4.33   | -3.74   | -2.42   | -2.33   | -4.95   | -10.34  | -11.66  | -8.13   | -6.98   | -4.78   | -0.28   | -2.36   |
| Θ(75°)   | -1.28  | 0.19   | 2.08   | 2.76   | 4.13   | 2.17   | -0.93  | 1.69    | 1.56    | 2.92    | 0.52    | 0.04    | 0.62    | -0.41   | -0.63   | -0.9    | 0.83    | -0.47   | -1.51   | -1.59   | -3.71   | 2.32    | 1.54    | 0.77    |
| Θ(90°)   | -7.31  | -2.64  | -1.54  | 0.48   | 1.87   | 0.27   | -3.75  | 2.02    | 2.86    | 1.92    | 1.13    | -1.05   | -2.91   | -1.91   | -1.84   | -6.53   | -0.82   | 0.98    | -3.94   | -0.93   | -3.78   | -1.92   | -0.7    | 0.54    |
| Θ(105°)  | -7.43  | -10.35 | -5.37  | -3.63  | -1.31  | -3.84  | -7.16  | -0.9    | -2.12   | -2.54   | -1.89   | -5.53   | -5.77   | -5.12   | -7.37   | -6.82   | -7.95   | -8.62   | -9.31   | -10.34  | -9.74   | -8.36   | -4.66   | -6.31   |
| Θ(120°)  | -13.41 | -12.7  | -9.97  | -6.62  | -7.92  | -9.33  | -12.08 | -3.85   | -5.75   | -5.13   | -6.68   | -8.95   | -9.7    | -11.77  | -8.99   | -11.18  | -13.2   | -7.88   | -13.4   | -9.96   | -14.06  | -9.18   | -9.87   | -13.76  |
| Θ(135°)  | -16.15 | -12.17 | -13.81 | -9.25  | -12.73 | -14.12 | -16.08 | -9.26   | -8.97   | -10.78  | -12.02  | -14.91  | -11.48  | -11.01  | -9.65   | -13.48  | -10.64  | -6.18   | -11.08  | -9.52   | -9.73   | -13.14  | -10.64  | -12.24  |
| Θ(150°)  | -12.75 | -14.76 | -17.09 | -10.17 | -21.63 | -21.39 | -13.64 | -12.61  | -9.93   | -10.34  | -14.82  | -14.31  | -16.56  | -21.9   | -12.99  | -13.76  | -16.02  | -11.73  | -8.51   | -16.01  | -18.52  | -14.58  | -19.53  | -13.58  |
| Θ(165°)  | -15.57 | -13.92 | -12.68 | -11.5  | -13.28 | -17.09 | -15.45 | -12.97  | -13.34  | -14.76  | -15.85  | -14.7   | -17.26  | -18.6   | -22.84  | -18.63  | -13.88  | -16.17  | -15.76  | -16.18  | -18.56  | -17.91  | -19.75  | -16.43  |
| Θ(180°)  | -16.74 | -17.98 | -18.91 | -20    | -17.94 | -12.98 | -11.3  | -15.71  | -17.68  | -14.56  | -14.65  | -15.63  | -14.96  | -18.7   | -20.62  | -18.47  | -19.39  | -16.96  | -17.21  | -17.1   | -15.99  | -17.7   | -20.58  | -20.28  |
| Freq(Hz) | 6.695G | 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°)    | -5.65  | -4.58  | -3.58  | -4.16  | -4.51  | -4.77  | -5.68  | -6.63   | -7.67   | -8.54   | -9.07   | -8.37   | -6.43   | -5.51   | -5.65   | -6.81   | -6.94   | -6.42   | -8.4    | -10     | -12.12  | -14.42  | -15.56  | -14.12  |
| Θ(15°)   | -12.55 | -10.42 | -11.86 | -10.04 | -8.37  | -8.53  | -9.17  | -11.6   | -10.95  | -9.01   | -18.69  | -7.85   | -5.14   | -3.77   | -5.57   | -8.2    | -8.47   | -8.06   | -9.41   | -13.64  | -14.58  | -13.97  | -9.57   | -9.78   |
| Θ(30°)   | -16    | -11.96 | -13.3  | -10.27 | -14.53 | -13.73 | -11.96 | -14.98  | -12.36  | -17.5   | -15.25  | -10.51  | -7.01   | -6.08   | -7.54   | -7.53   | -13.92  | -11.96  | -8.39   | -16.34  | -11.68  | -9.49   | -8.48   | -8.21   |
| Θ(45°)   | -5.77  | -9.24  | -6.57  | -6.6   | -5.86  | -7.25  | -10.51 | -7.29   | -10.27  | -13.44  | -6.87   | -5.13   | -5.33   | -11.03  | -11.22  | -13.62  | -12.48  | -7.71   | -13.82  | -11.1   |         |         |         |         |





Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant3~Ant4)\_2TX

Table with columns for frequency (6.475G, 6.695G, 6.995G, 5.6G), polarization (Pol., Theta, Phi), antenna (Ant. 3, Ant. 4), and gain values for various azimuth angles (0 to 180 degrees) and elevation angles (0 to 15 degrees).



**Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8  
(5G6G Ant3~Ant4)\_2TX**

**Appendix B.1**

| Theta       | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |        |
|-------------|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------|
| Theta(75°)  | -23.78  | -19.01   | -24.47   | -18.87   | -15.15   | -19.81   | -9.76    | -14.1     | -16.47    | -12.06    | -14.82    | -19.97    | -13.28    | -18.27    | -19.83    | -18.03    | -16.39    | -16.82    | -25.34    | -17.12    | -18.97    | -24.71    | -19.62    | -19.44    |        |
| Theta(90°)  | -23.32  | -18.87   | -23.6    | -25.96   | -21.06   | -25.63   | -15.49   | -18.23    | -15.53    | -14.17    | -13.99    | -22.71    | -12.04    | -16.43    | -19.37    | -15.66    | -16.29    | -23.24    | -18.41    | -25.36    | -23.55    | -18.87    | -24.4     | -24.4     |        |
| Theta(105°) | -18.36  | -19.66   | -25.32   | -23.05   | -25.52   | -25.33   | -19.75   | -25.69    | -23.08    | -20.02    | -17.09    | -25.58    | -23.03    | -22.55    | -20.27    | -22.94    | -25.47    | -19.53    | -24.8     | -24.78    | -24.25    | -20.78    | -23.91    | -24.48    |        |
| Theta(120°) | -21.95  | -24.87   | -25.77   | -22.16   | -26.18   | -23.38   | -23.36   | -24.51    | -22.99    | -24.83    | -17.47    | -26.77    | -24.72    | -17.38    | -24.43    | -25.02    | -25.9     | -22.12    | -25.83    | -25.94    | -25.15    | -25.48    | -24.47    | -23.15    |        |
| Theta(135°) | -21.14  | -21.84   | -24.2    | -25.33   | -25.38   | -24.95   | -25.13   | -25.45    | -26.06    | -23.9     | -22.79    | -24.92    | -24.63    | -23.61    | -24.42    | -18.14    | -24.99    | -18.79    | -21.31    | -20.32    | -19.31    | -25.74    | -23.81    | -22.09    |        |
| Theta(150°) | -21.68  | -23.46   | -24.87   | -24.85   | -25.14   | -25.63   | -24.87   | -24.98    | -23.64    | -25.79    | -26.29    | -25.58    | -21.3     | -18.52    | -26.03    | -25.97    | -22.92    | -26.23    | -21.69    | -22.44    | -24.87    | -21.93    | -23.83    | -24.38    |        |
| Theta(165°) | -25.43  | -22.48   | -22.39   | -25.74   | -26.16   | -24.71   | -22.39   | -25.67    | -26.77    | -21.68    | -24.66    | -20.12    | -22.43    | -11.48    | -17.44    | -24.91    | -25.51    | -25.73    | -24.89    | -25.31    | -16.56    | -17.78    | -20.93    | -20.83    |        |
| Theta(180°) | -22.98  | -20.48   | -25.38   | -20.59   | -24.4    | -25.49   | -25.46   | -25.01    | -24.19    | -21.09    | -24.74    | -25.87    | -26.01    | -25.17    | -25.37    | -24.43    | -24.97    | -26.08    | -24.59    | -25.16    | -22.51    | -25.15    | -24.43    | -25.4     |        |
| Freq(Hz)    | 5.785G  | Pol.     | Phi      | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |        |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |        |
| Theta(0°)   | -16.86  | -14.97   | -11.19   | -7.55    | -7.55    | -7.34    | -6.24    | -7.15     | -8.81     | -11.14    | -15.61    | -26.05    | -15.48    | -10.46    | -9.76     | -10.54    | -9.05     | -9.46     | -11.19    | -13.5     | -14.24    | -15.85    | -20.35    | -17.6     |        |
| Theta(15°)  | -8.31   | -10.14   | -8.81    | -6.93    | -5.03    | -4.6     | -7.02    | -10.36    | -12.13    | -10.4     | -8.64     | -8.77     | -7.63     | -6.99     | -6.44     | -5.51     | -4.77     | -5.71     | -7.91     | -10.18    | -11.15    | -11.6     | -10.91    | -12.59    |        |
| Theta(30°)  | -2.62   | -4.26    | -6.61    | -7.08    | -5.39    | -5.2     | -6.15    | -5.07     | -5.51     | -5.58     | -5.95     | -5.32     | -3.63     | -1.44     | -1.26     | -1.32     | -1.29     | -3.2      | -3.74     | -5.44     | -7.18     | -7.25     | -4.16     | -3.01     |        |
| Theta(45°)  | 0.71    | -1.8     | -4.45    | -6.32    | -7.57    | -6.5     | -4.68    | -4.06     | -6.52     | -7.85     | -3.47     | -1.75     | -0.96     | -0.2      | 0.04      | -2.34     | -4.35     | -4.17     | -5.25     | -9.7      | -14.94    | -4.47     | -2.5      | -1.02     |        |
| Theta(60°)  | 2.57    | -0.89    | -0.31    | -2.41    | -1.83    | -2.36    | -1.09    | 0.79      | 0.48      | -5.13     | -5.36     | -2.13     | -0.65     | -0.97     | -3.97     | -4.75     | -6.92     | -2.99     | -1.13     | -1.04     | -2.93     | -0.18     | 3.87      | 4.23      |        |
| Theta(75°)  | 0.81    | -3.75    | -0.58    | -0.81    | 0.32     | -0.68    | 0.71     | 3.83      | 3.05      | -0.97     | -1.59     | 1.85      | 1.66      | -0.25     | -1.51     | -2.67     | -1.7      | 1.03      | 0.39      | 1.42      | -3.07     | -0.38     | 3.21      | 3.43      |        |
| Theta(90°)  | -3.05   | -8.22    | -3.54    | -3.92    | -2.04    | -4.01    | -1.16    | 1.88      | 0.46      | -3.96     | -4.19     | -0.04     | -0.55     | -2.9      | -4.06     | -5.59     | -3.97     | -0.5      | -0.29     | -0.08     | -7.21     | -5.37     | -0.95     | -0.39     |        |
| Theta(105°) | -8      | -11.86   | -8.06    | -9.29    | -6.3     | -7.12    | -5.75    | -1.89     | -3.24     | -8.43     | -8.9      | -5.7      | -6.86     | -8.6      | -10.42    | -17.55    | -10.14    | -8.3      | -10.49    | -9.3      | -16.33    | -7.25     | -5.85     | -4.97     |        |
| Theta(120°) | -13.56  | -12.98   | -13.87   | -12.73   | -13.48   | -10.94   | -9.12    | -8.86     | -5.97     | -13       | -12.62    | -12.13    | -10.72    | -11.44    | -12.23    | -17.76    | -10.74    | -9.12     | -10.59    | -8.52     | -12.04    | -12.48    | -9.73     | -9.74     |        |
| Theta(135°) | -17.38  | -24.93   | -22.44   | -16.15   | -13.34   | -15.43   | -13      | -10.92    | -12.92    | -15.33    | -15.34    | -11.85    | -16.78    | -19.66    | -14.2     | -25.78    | -16.09    | -18.03    | -23.91    | -11.55    | -19.54    | -15.32    | -15.81    | -16.83    |        |
| Theta(150°) | -23.57  | -17.43   | -21.56   | -25.47   | -16.3    | -16.47   | -19.2    | -14.53    | -11.63    | -17.92    | -16.74    | -17.12    | -25.37    | -25.9     | -20.54    | -19.42    | -25.86    | -24.55    | -23.97    | -22.21    | -18.54    | -22.99    | -16.99    | -19.97    |        |
| Theta(165°) | -23.42  | -18.5    | -19.9    | -24.51   | -25.71   | -21.53   | -16.9    | -21.08    | -24.82    | -18.18    | -18.73    | -17.89    | -15.62    | -21.78    | -22.64    | -17.55    | -24.98    | -24.7     | -24.19    | -19.24    | -25.86    | -23.31    | -26.3     | -25.75    |        |
| Theta(180°) | -25.03  | -24.99   | -25.79   | -25.81   | -24.71   | -22.05   | -20.22   | -22.26    | -19.29    | -20.29    | -25.54    | -25.75    | -25.06    | -24.6     | -25.91    | -25.1     | -24.53    | -22.39    | -21.22    | -21.22    | -22.78    | -20.69    | -20.37    | -22.17    |        |
| Freq(Hz)    | 5.785G  | Pol.     | Theta    | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |        |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |        |
| Theta(0°)   | -8.93   | -10.88   | -12.82   | -14      | -17.72   | -20.12   | -14.08   | -11.37    | -8.9      | -6.6      | -5.93     | -6.34     | -7.56     | -7.88     | -10.53    | -16.68    | -18.63    | -19.31    | -16.34    | -12.25    | -10.88    | -11.86    | -12.8     | -13.17    |        |
| Theta(15°)  | -6.56   | -12.96   | -13.7    | -12.18   | -14.66   | -18.39   | -17.41   | -17.7     | -15.44    | -17.32    | -24.01    | -19.12    | -17       | -13.51    | -16.15    | -13.32    | -17.53    | -25.9     | -17.77    | -16.32    | -16.13    | -13.24    | -8.92     | -6.75     |        |
| Theta(30°)  | -6.96   | -11.27   | -14.72   | -25.5    | -25.89   | -10.81   | -11.23   | -14.95    | -25.73    | -23.96    | -17.64    | -25.05    | -9.28     | -11.27    | -13.81    | -9.8      | -8.19     | -9.97     | -16.52    | -24.15    | -25.2     | -24.39    | -22.27    | -9.33     |        |
| Theta(45°)  | -13.83  | -10.24   | -12.46   | -13.57   | -17.06   | -12.73   | -9.51    | -12.52    | -19.68    | -13.38    | -11.3     | -11.65    | -18.02    | -25.83    | -14.67    | -13.38    | -7.78     | -13.52    | -24.1     | -17.6     | -12.77    | -12.53    | -18.3     | -11.77    |        |
| Theta(60°)  | -15.83  | -17.64   | -18.73   | -16.17   | -17.52   | -15.64   | -10.28   | -11.88    | -22.14    | -16.18    | -25.92    | -13.69    | -9.94     | -25.71    | -17.41    | -24.73    | -11.03    | -15.02    | -25.59    | -20.85    | -18.6     | -17.49    | -19.31    | -15.96    |        |
| Theta(75°)  | -22.36  | -23.48   | -19.21   | -13.24   | -25.56   | -19.92   | -14.87   | -14.13    | -14.19    | -11.71    | -14.31    | -24.97    | -11.38    | -19.35    | -15.36    | -26.31    | -16.4     | -14.96    | -20.33    | -15.8     | -17.38    | -24.95    | -16.74    | -19.39    |        |
| Theta(90°)  | -21.45  | -19.53   | -21.96   | -14.73   | -25.1    | -19      | -19.46   | -17.92    | -18.82    | -15.81    | -14.96    | -24.61    | -15.58    | -16.32    | -16.02    | -20.53    | -16       | -19.39    | -24.22    | -17.64    | -20.75    | -26.1     | -15.78    | -21.2     |        |
| Theta(105°) | -16.32  | -22.57   | -25.25   | -18.5    | -26.23   | -25.91   | -26.1    | -21.61    | -24.89    | -21.83    | -20.37    | -24.83    | -25.09    | -20.49    | -25.9     | -24.69    | -26.05    | -21.08    | -25.7     | -26.18    | -25.38    | -21.88    | -19.14    | -23.38    |        |
| Theta(120°) | -24.81  | -21.91   | -25.12   | -25.52   | -24.74   | -25.96   | -25.62   | -22.66    | -26.1     | -25.94    | -21.41    | -21.13    | -20.7     | -18.76    | -25.97    | -23.27    | -24.42    | -21.17    | -26.09    | -24.87    | -26.07    | -25.36    | -21.2     | -22.53    |        |
| Theta(135°) | -20.96  | -17.47   | -24.69   | -24.66   | -25.42   | -26.21   | -24.81   | -25.15    | -22.25    | -23.74    | -24.63    | -25.22    | -19.6     | -23.33    | -20.25    | -21.46    | -21.47    | -23.83    | -24.08    | -22.58    | -22.5     | -25.29    | -25.23    | -26.45    |        |
| Theta(150°) | -25.7   | -20.36   | -25.68   | -24.93   | -26.65   | -23.68   | -24.89   | -24.71    | -25.77    | -24.29    | -25.36    | -25.64    | -18.51    | -17.75    | -18.99    | -21.83    | -25.07    | -25.93    | -23.57    | -25.68    | -24.07    | -20.52    | -25.14    | -25.1     |        |
| Theta(165°) | -14.89  | -17.23   | -25.42   | -25.69   | -25.59   | -23.8    | -24.59   | -25.14    | -23.75    | -24.55    | -25.38    | -20.89    | -22.94    | -14.53    | -10.78    | -22.9     | -21.53    | -20.03    | -26.37    | -24.41    | -16.75    | -19.41    | -19.05    | -24.82    |        |
| Theta(180°) | -18.63  | -17.97   | -20.44   | -20.08   | -20.73   | -26.27   | -24.41   | -26.2     | -24.96    | -23.57    | -24.92    | -25.84    | -25.71    | -18.82    | -16.02    | -20.55    | -25.31    | -25.36    | -24.81    | -25.5     | -25.52    | -25.42    | -25.87    | -24.6     |        |
| Freq(Hz)    | 6.175G  | Pol.     | Phi      | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |        |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |        |
| Theta(0°)   | -9.69   | -9.66    | -8.74    | -8.87    | -8.78    | -9.6     | -11      | -13.63    | -16.12    | -17.63    | -13.83    | -10.92    | -9.91     | -9.23     | -8.65     | -10.19    | -12.52    | -12.59    | -16.08    | -22.8     | -26.13    | -22.46    | -18.66    | -16.6     |        |
| Theta(15°)  | -8.41   | -10.19   | -16.25   | -14.7    | -9.65    | -9.65    | -9.24    | -8.85     | -7.69     | -7.95     | -7.57     | -7.53     | -7.44     | -5.44     | -5.38     | -6.97     | -5.3      | -6.91     | -9.41     | -11.19    | -12.04    | -13.43    | -10.96    | -11.54    |        |
| Theta(30°)  | -2.85   | -3.9     | -5.13    | -4.88    | -3.06    | -2.6     | -4.82    | -7.22     | -3.75     | -3        | -4.49     | -6.69     | -3.2      | 0.12      | -1.65     | -3.4      | -2.17     | -3.41     | -4.07     | -5.11     | -8.71     | -12.41    | -4.13     | -4.26     |        |
| Theta(45°)  | -1.38   | -2.73    | -6.09    | -13.04   | -17      | -13.08   | -6.98    | -6.37     | -4.09     | -3.53     | -4.31     | -5.7      | -1.55     | -1.94     | -2.51     | 0         | -2.17     | -5.38     | -5.7      | -2.94     | -7.04     | -7.8      | -5.92     | -5.67     | -4.65  |
| Theta(60°)  | -2.12   | 0.94     | 1.88     | 0.72     | -1.2     | -4       | -3.01    | -2.11     | -3.9      | -4.92     | -21.72    | -9.67     | -5.21     | -7.1      | -15.55    | -9.87     | -6.41     | -5.65     | -2.38     | -2.59     | -5.49     | -1.19     | 1.92      | 1.51      |        |
| Theta(75°)  | -3.16   | 0.37     | 2.46     | 2.91     | 0.56     | -1.59    | -0.75    | 2.9       | 1.41      | -0.98     | -2.4      | 1.37      | 0.54      | -1.21     | -2.11     | -1.4      | 1.08      | 0.37      | 0.46      | 1.25      | -2.94     | -0.4      | 2.01      | 2.4       |        |
| Theta(90°)  | -6.41   | -4.65    | -1.56    | -1.26    | -2.3     | -3.86    | -4.37    | -0.07     | -0.98     | -2.17     | -4.31     | 0.63      | -0.55     | -3.25     | -2.57     | -2.97     | -0.18     | -0.15     | -0.43     | -0.39     | -5.25     | -5.18     | -1.73     | -2.83     |        |
| Theta(105°) | -8.54   | -10.95   | -4.92    | -5.3     | -6.17    | -7.17    | -7.18    | -2.91     | -3.97     | -6.74     | -9.87     | -3.84     | -3.34     | -6.82     | -5.91     | -9.29     | -10.78    | -10.78    | -8.92     | -9.83     | -9.94     | -7.39     | -5.14     | -7.36     |        |
| Theta(120°) | -13.48  | -10.81   | -12.4    | -10.85   | -10.84   | -11.11   | -13.3    | -7.63     | -9.72     | -12.91    | -13.75    | -8.91     | -8.77     | -7.07     | -9.71     | -9.24     | -20.74    | -6.11     | -9.62     | -8.81     | -10.23    | -14.8     | -15.13    | -11.46    | -11.12 |
| Theta(135°) | -17.25  | -14.74   | -13.7    | -12.65   | -15.04   | -18.46   | -14.02   | -14.99    | -9.4      | -15.32    | -15.36</  |           |           |           |           |           |           |           |           |           |           |           |           |           |        |



**Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5-8  
(5G6G Ant3~Ant4)\_2TX**

| Theta (°)    | -2.97   | -5.45    | -6.88    | -6.03    | -8.71    | -12.4    | -14.04   | -8.84     | -5.61     | -4.05     | -6.41     | -2.84     | -4.52     | -3.92     | -1.11     | -1.67     | -5.36     | -4.28     | -7.53     | -7.87     | -7.17     | -4.22     | -3.07     | -4.47     |
|--------------|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Theta (45°)  | -3.82   | -3.04    | -5.85    | -6.39    | -4.29    | -6.38    | -8.81    | -5.3      | -3.84     | -3.01     | -4.12     | -5.08     | -5.41     | -6.47     | -3.59     | -0.32     | -3.1      | -4.72     | -6.72     | -7.43     | -3.49     | -6.67     | -3.11     | -4.03     |
| Theta (60°)  | -4.06   | -0.55    | -0.5     | -0.37    | -3.89    | -4.38    | -4.12    | -3.27     | -6.55     | -8.05     | -5.94     | -8.18     | -10.82    | -15.62    | -9.03     | -8.17     | -8.19     | -10.43    | -15.47    | -10.6     | -7.13     | -3.43     | -1.74     | -2.62     |
| Theta (75°)  | -3.98   | -1.84    | 1.02     | 1.59     | 1.24     | 0.18     | -2.57    | -1.17     | -2        | -0.27     | -7.08     | -2.95     | -3.33     | -8.74     | -8.14     | -6.47     | -1.15     | -3.08     | -4.85     | -0.57     | -5.14     | -0.33     | -0.88     | -2.27     |
| Theta (90°)  | -11.51  | -5.85    | -2.46    | -0.58    | -0.57    | -2.14    | -6.07    | -0.39     | -0.51     | -1.4      | -3.64     | -4.52     | -6.93     | -10.23    | -11.16    | -13.18    | -1.35     | -0.98     | -5.46     | -2.21     | -8.17     | -5.93     | -2.92     | -3.67     |
| Theta (105°) | -11.05  | -11.62   | -6.14    | -5.36    | -3.03    | -6.32    | -9.09    | -3.29     | -5.76     | -4.78     | -7.58     | -7.99     | -9.1      | -10.08    | -11.86    | -14.23    | -13.26    | -12.86    | -10.9     | -9.87     | -15.18    | -8.12     | -9.87     | -7.56     |
| Theta (120°) | -14.87  | -15.77   | -10.69   | -8.59    | -9.31    | -13.16   | -13.28   | -6.69     | -8.67     | -8.88     | -10.92    | -10.21    | -13.48    | -19.56    | -18.74    | -21.53    | -13.08    | -11.02    | -13.68    | -10.36    | -17.43    | -15.61    | -11.11    | -16.44    |
| Theta (135°) | -25.16  | -20.67   | -12.99   | -10.64   | -15.59   | -18.74   | -21.17   | -10.87    | -10.44    | -15.4     | -16.2     | -16.64    | -14.22    | -13.66    | -12.63    | -24.34    | -9.85     | -11.52    | -10.72    | -9.7      | -21.65    | -14.85    | -14.54    | -18.21    |
| Theta (150°) | -19.49  | -19.7    | -17.27   | -14.12   | -24.01   | -25.14   | -17.32   | -15.95    | -16.93    | -13.27    | -16.73    | -14.78    | -16.16    | -25.78    | -20.02    | -16.73    | -15.72    | -15.19    | -12.25    | -25.94    | -24.56    | -25.15    | -25.54    | -18.14    |
| Theta (165°) | -19.76  | -16.42   | -17.4    | -15.17   | -21.97   | -21.81   | -19.47   | -22.61    | -18.23    | -16.24    | -17.39    | -14.3     | -18.01    | -19.18    | -25.59    | -19.56    | -19.45    | -23.86    | -26.19    | -25.71    | -24.43    | -25.85    | -22       | -21.03    |
| Theta (180°) | -23.39  | -21.42   | -19.35   | -24.26   | -25.19   | -21.48   | -18.62   | -20.68    | -25.54    | -20.48    | -22.54    | -20.95    | -18.7     | -18.84    | -25.21    | -25.13    | -23.26    | -20.2     | -21.08    | -19.31    | -20.09    | -19.71    | -21.85    | -25.07    |
| Freq(Hz)     | 6.695G  | Pol.     | Theta    | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain         | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta (0°)   | -11.09  | -7.97    | -5.72    | -5.84    | -5.6     | -4.99    | -4.88    | -5.98     | -7.96     | -11.09    | -16.22    | -19.79    | -13       | -8.5      | -6.52     | -6.85     | -6.12     | -5.59     | -6.96     | -8.16     | -11.31    | -16.36    | -24.81    | -20.17    |
| Theta (15°)  | -15.83  | -11.06   | -10.53   | -8.66    | -8.66    | -9.38    | -9       | -13.85    | -13.97    | -9.1      | -23.36    | -7.67     | -5.13     | -4.16     | -6.17     | -11.16    | -14.78    | -12.39    | -10.82    | -13.58    | -13.86    | -21.59    | -22.12    | -18.83    |
| Theta (30°)  | -16.04  | -13.26   | -18.09   | -9.88    | -16.66   | -25.17   | -23.66   | -18.06    | -13.87    | -23       | -25.78    | -12.64    | -7.36     | -5.45     | -9.42     | -13.34    | -14.38    | -20.18    | -16.4     | -25.56    | -15.27    | -8.4      | -17.51    | -16.03    |
| Theta (45°)  | -8.18   | -9.28    | -8.44    | -10.19   | -7.03    | -8.98    | -10.01   | -8.23     | -11.62    | -17.48    | -11.46    | -10.43    | -11.66    | -12.34    | -15.06    | -16.36    | -22.77    | -14.28    | -20.1     | -11.81    | -8.29     | -10.29    | -10.14    | -10.56    |
| Theta (60°)  | -14.4   | -19.3    | -17.72   | -16.72   | -10.62   | -11.32   | -10.98   | -12.24    | -16.82    | -24.77    | -11.91    | -8.62     | -14.27    | -19.51    | -19.38    | -14.8     | -12.4     | -9.52     | -25.28    | -16.53    | -12.31    | -11.43    | -10.75    | -18.05    |
| Theta (75°)  | -15.15  | -18.01   | -15.04   | -14.29   | -14.64   | -12.71   | -21.3    | -23.85    | -24.16    | -16.15    | -24.72    | -13.9     | -13.58    | -22.52    | -16.07    | -22.83    | -16.01    | -16.8     | -13.4     | -14.07    | -24.78    | -17.01    | -26.77    | -13.91    |
| Theta (90°)  | -21.33  | -14.99   | -16.46   | -12.45   | -11.53   | -11.58   | -18.52   | -13.95    | -24.75    | -13.74    | -18.86    | -21.14    | -14.79    | -16.13    | -13.36    | -16.76    | -13.65    | -17.4     | -12.6     | -12.36    | -20.7     | -13.2     | -23.39    | -11.56    |
| Theta (105°) | -20.54  | -19.84   | -19.8    | -12.56   | -12.89   | -18.47   | -18.03   | -14.01    | -25.57    | -21.64    | -23.27    | -23.57    | -12.91    | -23.08    | -24.76    | -23.25    | -22.3     | -26.12    | -18.97    | -15.09    | -23.14    | -16.41    | -15.7     | -12.58    |
| Theta (120°) | -18.12  | -18.31   | -16.81   | -16.86   | -18.45   | -18.92   | -23.09   | -15.35    | -25.71    | -15.35    | -21.41    | -19.7     | -20.05    | -22.1     | -21.55    | -18.92    | -23.46    | -22.9     | -25.58    | -14.18    | -18.37    | -21.85    | -18.11    | -18.41    |
| Theta (135°) | -25.48  | -19.36   | -14.14   | -19.21   | -24.47   | -24.7    | -22.62   | -17.38    | -26.23    | -24.22    | -21.07    | -25.15    | -25.02    | -21.8     | -19.66    | -17.29    | -14.27    | -18.02    | -24.99    | -18.71    | -20.53    | -11.92    | -23.5     | -20.33    |
| Theta (150°) | -25.35  | -19.08   | -19.15   | -17.77   | -22.95   | -25.83   | -26.05   | -19.11    | -26.01    | -17.12    | -20.06    | -18.62    | -24.88    | -26.14    | -25.68    | -26.14    | -25.54    | -23.49    | -25.84    | -19.73    | -24.25    | -21.53    | -20.48    | -20.04    |
| Theta (165°) | -16.65  | -18.51   | -19.56   | -20.53   | -25.92   | -24.61   | -25.49   | -25.2     | -23.98    | -25.39    | -17.37    | -24.11    | -19.86    | -13.55    | -19.51    | -22.92    | -22.5     | -24.25    | -20.49    | -19.9     | -16.94    | -20.73    | -17.67    |           |
| Theta (180°) | -19.24  | -19.46   | -19.74   | -18.15   | -17.83   | -17.47   | -18.04   | -20.43    | -22.85    | -24.17    | -26.01    | -21.63    | -23.28    | -25.67    | -19.23    | -14.82    | -21.17    | -18.93    | -19.19    | -23.36    | -23.37    | -24.97    | -21.96    | -20.29    |
| Freq(Hz)     | 6.995G  | Pol.     | Phi      | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain         | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta (0°)   | -7.94   | -9.94    | -12.4    | -15.91   | -19.18   | -17.48   | -17.38   | -12.71    | -11.72    | -11.51    | -9.27     | -9.71     | -8.57     | -10.1     | -13.19    | -18.12    | -20.06    | -20.32    | -14.87    | -12.26    | -11.3     | -11.87    | -9.86     | -9.32     |
| Theta (15°)  | -13.59  | -9.26    | -9.05    | -11.98   | -12.79   | -13.14   | -15.63   | -20.15    | -23.29    | -18.69    | -12.63    | -12.06    | -11.73    | -12.1     | -11.93    | -12.52    | -16.78    | -15.21    | -6.53     | -5.15     | -7.27     | -7.57     | -12.28    | -14.39    |
| Theta (30°)  | -5.81   | -9.88    | -17.74   | -24.33   | -10.72   | -9.59    | -10.91   | -6.89     | -6.11     | -9.35     | -8.4      | -6.17     | -6.44     | -7.3      | -4.18     | -1.93     | -2.46     | -2.79     | -8.32     | -9.49     | -9.86     | -4.94     | -7.16     | -8.65     |
| Theta (45°)  | -7.96   | -6.81    | -8.95    | -5.77    | -4.8     | -10.52   | -9.92    | -5.8      | -2.32     | -7.54     | -3.73     | -5.07     | -4.54     | -2.65     | -4.98     | -1.51     | -3.21     | -2.42     | -4.41     | -4.69     | -6.69     | -4.21     | -2.83     | -4.67     |
| Theta (60°)  | -4.63   | -6.12    | -3.49    | -3.66    | -4.58    | -7.51    | -6.93    | -8.14     | -5.14     | -9.8      | -7.03     | -6        | -4.95     | -7.27     | -8.4      | -11.29    | -14.16    | -9.46     | -7.45     | -18.82    | -13.16    | -3.56     | -3.34     | -5.59     |
| Theta (75°)  | -3.73   | -6.9     | -4.41    | -0.65    | -0.51    | -2.92    | -9.22    | -4.52     | -2.87     | -7.74     | -8.6      | -7.13     | -4.72     | -5.83     | -9.06     | -7.69     | -6.1      | -9.84     | -6.84     | -5.01     | -4.58     | 0.33      | -1.87     | -5.33     |
| Theta (90°)  | -7.7    | -13.76   | -7.74    | -3.21    | -4.08    | -5.75    | -6.19    | -6.31     | -5.81     | -3.35     | -6.99     | -7.03     | -6.52     | -5.68     | -10.35    | -11.53    | -6.06     | -8.32     | -6.94     | -6.67     | -8.71     | -2.51     | -4.2      | -6.71     |
| Theta (105°) | -16.48  | -18.71   | -10.95   | -6.97    | -9.01    | -10.41   | -11.88   | -11.35    | -8.96     | -8.95     | -10.19    | -10.62    | -11.95    | -11.41    | -18.07    | -16.46    | -12.32    | -14.79    | -16.76    | -12.88    | -10.43    | -6.86     | -10.18    | -10.74    |
| Theta (120°) | -16.72  | -20.12   | -13.16   | -10.38   | -12.2    | -14.72   | -11.24   | -13.38    | -13.53    | -10.29    | -13.49    | -14.16    | -14.97    | -15.96    | -15.19    | -16.3     | -18.18    | -14.84    | -14.69    | -14.3     | -19.88    | -12.29    | -12.86    | -16.31    |
| Theta (135°) | -21.54  | -18.42   | -16.49   | -17.32   | -19.65   | -22.92   | -16.55   | -16.5     | -11.88    | -15.14    | -21.55    | -22.86    | -14.68    | -18.94    | -20.31    | -13.42    | -16.41    | -13.74    | -11.58    | -20.46    | -13.47    | -21.89    | -19.62    |           |
| Theta (150°) | -20.36  | -22.11   | -17.04   | -16.28   | -25.43   | -26.28   | -18.77   | -19.15    | -11.71    | -13.11    | -12.57    | -14.42    | -18.78    | -21.34    | -14.41    | -19.79    | -17.43    | -21.09    | -13.84    | -25.22    | -25.71    | -24.36    | -25.35    | -21.48    |
| Theta (165°) | -26.26  | -23.98   | -17.24   | -15.07   | -20.92   | -24.04   | -16.37   | -20.39    | -17.59    | -16.2     | -14.99    | -15.27    | -14.77    | -21.21    | -16.64    | -16.46    | -22.14    | -18.45    | -23.51    | -23.55    | -25.04    | -19.71    | -21.35    | -25.46    |
| Theta (180°) | -23.8   | -23.19   | -20.65   | -18.25   | -16.74   | -14.91   | -15.48   | -22.14    | -19.51    | -21.13    | -23.67    | -25.89    | -25.68    | -24.29    | -25.02    | -25.53    | -25.68    | -21.51    | -19.11    | -20.29    | -19.84    | -18.17    | -20.64    | -21.51    |
| Freq(Hz)     | 6.995G  | Pol.     | Theta    | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain         | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta (0°)   | -15.68  | -11.32   | -9.68    | -9.03    | -9.34    | -8.48    | -9.86    | -11.45    | -12.62    | -13.93    | -14.45    | -17       | -13.46    | -11.92    | -11.75    | -11.32    | -8.09     | -9.29     | -11.05    | -10.51    | -14.82    | -17.07    | -20.38    | -21.46    |
| Theta (15°)  | -15.1   | -19.59   | -15.89   | -11.4    | -11.71   | -12.76   | -15.22   | -21.29    | -18.97    | -11.92    | -18.05    | -6.49     | -3.78     | -4.12     | -5.17     | -6.57     | -5.42     | -4.22     | -5.97     | -14.88    | -18.41    | -11.54    | -9.31     | -11.5     |
| Theta (30°)  | -6.58   | -9.1     | -6.22    | -4.97    | -7.05    | -8.08    | -8.77    | -7.67     | -6.31     | -9.32     | -9.88     | -6.88     | -5.33     | -4.41     | -4.84     | -7.72     | -7.53     | -6.97     | -7.53     | -5.95     | -5.72     | -5.56     | -10.33    | -6.43     |
| Theta (45°)  | -4.41   | -1.38    | -3.25    | -5.01    | -3.53    | -2.14    | -3.28    | -2.75     | -5.49     | -14.73    | -11.78    | -9.42     | -9.49     | -11.16    | -8.84     | -11.59    | -9.52     | -7.6      | -4.5      | -6.12     | -5.25     | -5.32     | -3.78     | -3.96     |
| Theta (60°)  | -15.43  | -12.37   | -16.8    | -12.39   | -13.09   | -6.08    | -4.81    | -4.83     | -2.44     | -9.41     | -8.77     | -8.9      | -9.93     | -8.79     | -11.32    | -12.43    | -15.9     | -7.39     | -9.57     | -15.02    | -12.77    | -13.27    | -10.47    | -12.16    |
| Theta (75°)  | -6.07   | -12.53   | -8.96    | -12.29   | -12.97   | -10.34   | -13.06   | -18.8     | -19.11    | -16.71    | -14.39    | -16.88    | -13.97    | -13.07    | -8.14     | -13.06    | -8.46     | -20.45    | -13.41    | -12.34    | -11.88    | -9.24     | -12.45    | -18.06    |
| Theta (90°)  | -7.64   | -12.36   | -7.45    | -10.11   | -7.04    | -9.5     | -8.95    | -8.34     | -7.43     | -10.16    | -10.79    | -12.63    | -7.46     | -8        | -10.36    | -14.21    | -5.78     | -10.52    | -12.74    | -8.31     | -11.01    | -9.42     | -11.09    | -10.37    |
| Theta (105°) | -13.61  | -14.03   | -11.87   | -10.25   | -11.25   | -12.05   | -10      | -9.8      | -9.22     | -12.18    | -13.15    | -16.16    | -13.64    | -14.38    | -         |           |           |           |           |           |           |           |           |           |



**Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5-8  
(5G6G Ant1~Ant4)\_4TX**

**Appendix B.2**

| Freq(Hz)   | 5.6G       | 5.785G     | 6.175G     | 6.475G     | 6.695G     | 6.995G     |
|--|------------|------------|------------|------------|------------|------------|
| Ant. 1 Max Gain (dBi)                                  | 2.98       | 4.19       | 2.4        | 2.41       | 1.39       | 0.77       |
| Ant. 2 Max Gain (dBi)                                  | 3.46       | 4.94       | 2.95       | 1.96       | 1.32       | 0.87       |
| Ant. 3 Max Gain (dBi)                                  | 3.42       | 4.36       | 2.95       | 2.31       | 0.99       | 0.61       |
| Ant. 4 Max Gain (dBi)                                  | 3.67       | 4.23       | 2.91       | 3.96       | 1.59       | 0.33       |
| Ant. 1 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$ | Phi/60/0   | Phi/75/255 | Phi/75/255 | Phi/75/315 | Phi/75/240 | Phi/75/315 |
| Ant. 2 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$ | Phi/75/180 | Phi/75/150 | Phi/75/165 | Phi/75/225 | Phi/75/210 | Phi/75/240 |
| Ant. 3 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$ | Phi/75/180 | Phi/75/75  | Phi/75/75  | Phi/75/135 | Phi/75/60  | Phi/75/60  |
| Ant. 4 Polarization/ $\theta(^{\circ})/\Phi(^{\circ})$ | Phi/60/0   | Phi/60/345 | Phi/75/45  | Phi/75/45  | Phi/75/45  | Phi/75/315 |
| Max Gain (dBi)   | 3.67       | 4.94       | 2.95       | 3.96       | 1.59       | 0.87       |
| DG [1SS] (dBi)   | 8.6        | 7.96       | 7.45       | 6.03       | 6.05       | 4.51       |
| DG [2SS] (dBi)   | 5.6        | 4.96       | 4.45       | 3.96       | 3.05       | 1.51       |
| DG [4SS] (dBi)   | 2.59       | 2.12       | 1.51       | 0.27       | 0.07       | -1.19      |





Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5-8 (5G6G Ant1~Ant4)\_4TX

Table with columns for Freq(Hz), DG(dBi), and various Phi angles (0 to 345 degrees) for frequencies 6.475G, 6.695G, and 6.995G. The table contains numerical data for each combination of frequency and angle.







# Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4)\_4TX

| Theta       | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
|-------------|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Theta(135°) | -16.09  | -17.6    | -14.19   | -14.35   | -14.97   | -10.86   | -15.61   | -13.69    | -14.58    | -17.1     | -13.14    | -12.97    | -12.71    | -11.07    | -17.07    | -14.03    | -14.61    | -11.62    | -17.15    | -9.43     | -9.18     | -10.5     | -11.92    | -16.24    |
| Theta(150°) | -18.07  | -20.71   | -17.33   | -17.97   | -17.02   | -14.83   | -24.63   | -20.02    | -15.43    | -14.08    | -14.71    | -16.73    | -21.79    | -13.36    | -16.66    | -21.93    | -19.43    | -14.99    | -26.13    | -23.35    | -15.29    | -15.54    | -23.17    | -20.84    |
| Theta(165°) | -25.47  | -22.44   | -21.13   | -24.3    | -18.04   | -20.41   | -22.02   | -14.5     | -16.71    | -15.63    | -15.85    | -24.84    | -21.71    | -16.11    | -25.69    | -23.6     | -16.93    | -19.63    | -21.28    | -15.33    | -23.16    | -17.42    | -15.15    | -20.82    |
| Theta(180°) | -22.02  | -26      | -24.69   | -25.71   | -25.84   | -24.46   | -21.38   | -18.8     | -18.31    | -18.36    | -21.6     | -18.82    | -21.16    | -24.93    | -25.04    | -24.83    | -26.22    | -21.6     | -22.63    | -20.75    | -22.72    | -25.65    | -25.53    | -25.63    |
| Freq(Hz)    | 6.475G  | Pol.     | Theta    | Ant. 1   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta(0°)   | -11.29  | -11.66   | -13.9    | -16.24   | -18.05   | -23.51   | -22.02   | -18.12    | -14.25    | -11.85    | -10.39    | -10.21    | -9.83     | -10.52    | -12.66    | -16.27    | -20.4     | -21.53    | -18.12    | -15.86    | -13.82    | -11.6     | -10.8     | -10.03    |
| Theta(15°)  | -19.96  | -13.08   | -12.04   | -9.57    | -7.32    | -8.13    | -12.2    | -15.88    | -10.64    | -9.84     | -12.06    | -15.61    | -14.11    | -12.45    | -17.47    | -19.12    | -13.47    | -12.03    | -12.1     | -12.08    | -13.84    | -19.05    | -23.49    | -15.6     |
| Theta(30°)  | -18.16  | -18.66   | -24.87   | -10.77   | -16.5    | -25.41   | -13.74   | -11.4     | -16.43    | -16.06    | -12.15    | -7.82     | -24.91    | -19.38    | -19.97    | -17.75    | -15.04    | -14.79    | -17.42    | -17.24    | -19.83    | -16.6     | -16.13    | -15.7     |
| Theta(45°)  | -12.82  | -23.23   | -23.09   | -20.22   | -11.81   | -12.2    | -14.42   | -24.52    | -19.31    | -24.87    | -12.03    | -12.65    | -19.71    | -22.15    | -17.39    | -11.52    | -12.26    | -13.23    | -16.04    | -21.91    | -19.68    | -14.94    | -12.71    | -14.74    |
| Theta(60°)  | -23.37  | -12.68   | -14.65   | -11.67   | -14.49   | -19.55   | -25.95   | -19.36    | -25.2     | -13.47    | -8.55     | -14.33    | -22.28    | -21.98    | -14.59    | -14.88    | -14.54    | -12.07    | -14.4     | -26.34    | -15.87    | -17.74    | -21.4     | -23.97    |
| Theta(75°)  | -18.98  | -13.29   | -14.73   | -10.23   | -12.24   | -18.39   | -19.03   | -14.28    | -22.05    | -19.29    | -19.98    | -22.66    | -25.41    | -18.41    | -24.59    | -14.56    | -25.4     | -19.98    | -19.73    | -20.47    | -16.79    | -22.73    | -14.27    | -16.13    |
| Theta(90°)  | -26.52  | -17.47   | -20.45   | -15.47   | -12.9    | -22.42   | -17.02   | -12.79    | -25.77    | -15.06    | -16.1     | -22.13    | -22.15    | -18.92    | -14.81    | -22.01    | -17.76    | -15.92    | -22.71    | -17.88    | -24.1     | -21.12    | -13.13    | -13.44    |
| Theta(105°) | -22.43  | -24.79   | -22.33   | -19.24   | -15.89   | -20.68   | -21.28   | -18.63    | -23.82    | -22.06    | -25.22    | -25.02    | -24.27    | -20.17    | -25.32    | -24.74    | -25.17    | -25.97    | -21.52    | -22.66    | -17.87    | -25.31    | -22.93    | -14.83    |
| Theta(120°) | -24.88  | -22.3    | -25.87   | -25.31   | -23.45   | -23.11   | -21.47   | -14.28    | -24.1     | -20.35    | -18.14    | -25.2     | -24.87    | -18.35    | -14.62    | -22.47    | -25.04    | -22.77    | -25.82    | -23.48    | -21.45    | -21.53    | -18.22    | -20.51    |
| Theta(135°) | -25.51  | -24.77   | -25.27   | -24.57   | -20.16   | -23.97   | -26.2    | -22.98    | -22.39    | -22.48    | -21.85    | -25.59    | -20.03    | -26.22    | -21.62    | -23.79    | -22.97    | -21       | -18.95    | -25.56    | -25.18    | -20.18    | -19.25    | -19.65    |
| Theta(150°) | -22.59  | -24.79   | -25.73   | -25.25   | -26      | -24.95   | -23.89   | -22.42    | -25.36    | -25.45    | -19.29    | -18.17    | -25.84    | -19.25    | -20.05    | -25.14    | -24.96    | -24.84    | -16.69    | -25.08    | -24.83    | -25.78    | -18.75    | -22.51    |
| Theta(165°) | -16.99  | -25.92   | -25.75   | -16.96   | -23.09   | -22.33   | -18.33   | -25.9     | -19.28    | -22       | -20.74    | -24.58    | -20.76    | -24.18    | -18.29    | -16.15    | -23.96    | -26.04    | -22.34    | -25.06    | -25.1     | -17.11    | -19.37    | -19.4     |
| Theta(180°) | -16.74  | -18.82   | -18.92   | -19.88   | -20.53   | -22.31   | -21.03   | -19.36    | -26.18    | -25.98    | -22.07    | -19.04    | -21.73    | -25.07    | -24.39    | -26.16    | -19.64    | -18.39    | -21.9     | -22.55    | -23.18    | -25.21    | -24.92    | -24.11    |
| Freq(Hz)    | 6.695G  | Pol.     | Phi      | Ant. 1   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta(0°)   | -15.24  | -23.97   | -20.13   | -15.19   | -11.33   | -8.81    | -6.75    | -6.42     | -6.92     | -8.3      | -9.13     | -11.36    | -16.21    | -19.9     | -14.54    | -11.75    | -8.25     | -7.58     | -7.24     | -7.32     | -9.49     | -9.06     | -11.16    | -15.68    |
| Theta(15°)  | -13.22  | -16.59   | -20.29   | -25.57   | -25.19   | -25.08   | -18.89   | -12.39    | -7.35     | -5.16     | -7.56     | -9.75     | -6.49     | -4.93     | -5.07     | -4.11     | -4.37     | -5.09     | -5.71     | -6.96     | -8.56     | -9.82     | -17.41    | -16.87    |
| Theta(30°)  | -5.65   | -4.58    | -6.17    | -4.71    | -6.58    | -8.95    | -7.67    | -9.62     | -7.46     | -3.6      | -2.46     | -3.47     | -3.57     | -4.24     | -5.69     | -3.02     | -2.68     | -3.42     | -6.83     | -8.8      | -2.64     | -2.81     | -4.17     | -6.3      |
| Theta(45°)  | -3.28   | -2.88    | -4.5     | -4.82    | -7.15    | -10.11   | -9.47    | -3.44     | -2.88     | -3.44     | -3.31     | -3.95     | -2.45     | -1.1      | -3.05     | -5.36     | -4.35     | -6.04     | -5.69     | -4.08     | -5.53     | -7.26     | -7        | -8.11     |
| Theta(60°)  | -1.8    | -2.09    | -2.05    | -4.45    | -6.96    | -19.05   | -16.44   | -13.39    | -3.41     | -3.85     | -4.86     | -8.68     | -11.12    | -21.94    | -7.92     | -4.91     | -3.92     | -8.5      | -6.99     | -2.38     | -2.91     | -0.59     | -1.15     | -1.38     |
| Theta(75°)  | -3.26   | -2.48    | -1.85    | -0.63    | -0.56    | -4.08    | -6.84    | -8.52     | -8.97     | -6.5      | -5.54     | -2.69     | -3.55     | -3.49     | -5.67     | -3.59     | -1.39     | -3.35     | -4.38     | -0.02     | 0.62      | 1.11      | 0.44      | -1.38     |
| Theta(90°)  | -9.06   | -5.37    | -5.2     | -3.41    | -4.64    | -1.31    | -6.99    | -6.38     | -7.19     | -5.36     | -6.31     | -3.75     | -7.47     | -6.55     | -7.86     | -4.73     | 0.98      | -4.37     | -9.74     | -1.89     | -0.06     | -3.6      | -3.28     | -4.53     |
| Theta(105°) | -9.17   | -8.95    | -9.81    | -6.43    | -5.02    | -5.13    | -9.62    | -8.48     | -9.01     | -9.28     | -9.41     | -7.11     | -8.12     | -10.1     | -11.9     | -10.43    | -7.16     | -13.04    | -21.32    | -10.57    | -5.09     | -5.44     | -6.04     | -6.47     |
| Theta(120°) | -19.38  | -15.06   | -11.81   | -9.53    | -13.63   | -7.52    | -14.75   | -9.59     | -18.29    | -15.58    | -14.47    | -10.84    | -11.92    | -14.52    | -11.73    | -13.82    | -8.12     | -16.7     | -18.24    | -10.05    | -6.99     | -12.25    | -14.32    | -19.84    |
| Theta(135°) | -18     | -20.77   | -17.66   | -13.16   | -12.16   | -13.28   | -21      | -14.2     | -17.66    | -19.35    | -13.39    | -12.74    | -18.69    | -12.54    | -17.68    | -13.33    | -8.43     | -13.02    | -20.92    | -8.76     | -9.04     | -14.61    | -17.64    | -18.43    |
| Theta(150°) | -16.27  | -25.45   | -17.8    | -18.26   | -19.94   | -17.01   | -25.3    | -25.67    | -18.77    | -16.33    | -16.38    | -23.79    | -20.28    | -14.52    | -16.91    | -14.6     | -16.99    | -17.51    | -19.42    | -22.6     | -15.19    | -16.1     | -20.66    | -19.15    |
| Theta(165°) | -25.24  | -26.03   | -25.53   | -25.35   | -17.23   | -13.52   | -26.39   | -15.6     | -16.76    | -16.58    | -12.33    | -25.96    | -25.12    | -18.51    | -20.95    | -24.73    | -25.41    | -24.09    | -22.44    | -16.86    | -21.34    | -18.04    | -14.16    | -22.42    |
| Theta(180°) | -18.08  | -18.34   | -20.98   | -23.3    | -25.76   | -22.53   | -18.53   | -17.71    | -17.39    | -20.39    | -19.68    | -20.05    | -18.67    | -21.17    | -22.32    | -22.22    | -24.73    | -26.14    | -25.3     | -21.86    | -21.61    | -22.12    | -25.19    | -24.82    |
| Freq(Hz)    | 6.695G  | Pol.     | Theta    | Ant. 1   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta(0°)   | -6.9    | -7.24    | -7.01    | -9.18    | -11.84   | -13.25   | -18.15   | -25.81    | -17.87    | -13.7     | -9.5      | -7.35     | -6.18     | -5.12     | -5.66     | -9.02     | -11.28    | -14.89    | -22.54    | -21.58    | -18.23    | -11.29    | -9.43     | -7.63     |
| Theta(15°)  | -18.68  | -13.24   | -11.8    | -12.45   | -12.22   | -11.35   | -13.5    | -22.94    | -15.89    | -10.79    | -10.34    | -10.24    | -7.9      | -10.8     | -16.56    | -22.05    | -17.09    | -16.28    | -15.01    | -16.45    | -15.45    | -13.33    | -24.6     | -15.59    |
| Theta(30°)  | -9.89   | -14.95   | -23.3    | -12.58   | -18.36   | -14.74   | -8.5     | -9.69     | -12.11    | -15       | -19.57    | -10.3     | -15.6     | -26.6     | -21.87    | -14.42    | -14.27    | -22.52    | -17.73    | -15.91    | -15.06    | -14.37    | -18.62    | -10.13    |
| Theta(45°)  | -7.26   | -13.23   | -16.59   | -17.6    | -11.95   | -9.04    | -11.52   | -15.63    | -20.72    | -23.26    | -16.34    | -18.48    | -16.68    | -12.52    | -13.42    | -10.32    | -10.62    | -15.39    | -13.73    | -11.58    | -14.51    | -13.89    | -9.25     | -9.54     |
| Theta(60°)  | -15.91  | -19.76   | -25.18   | -8.24    | -13.75   | -14.29   | -21.17   | -25.53    | -15.07    | -14.72    | -11.44    | -14.01    | -21.85    | -18.48    | -15.46    | -13.18    | -15.98    | -18.28    | -18.11    | -16.36    | -20.7     | -20.8     | -13.19    | -13.31    |
| Theta(75°)  | -14.32  | -13.88   | -13.19   | -8.37    | -8.6     | -20.13   | -21.18   | -14.7     | -22.44    | -16.44    | -13.71    | -17.78    | -20.58    | -26.21    | -23.64    | -24.57    | -21       | -25.59    | -12.77    | -16.21    | -16.11    | -19.46    | -11.72    | -15.67    |
| Theta(90°)  | -20.94  | -15.49   | -16.7    | -12.99   | -8.51    | -14.84   | -15.57   | -13.14    | -18.44    | -13.6     | -18.06    | -26.13    | -21.38    | -16.45    | -18.35    | -19.63    | -21.87    | -21.59    | -14.61    | -13       | -12.92    | -24.78    | -10.33    | -12.96    |
| Theta(105°) | -22.53  | -21.87   | -16.36   | -19.99   | -13.89   | -13.64   | -23.9    | -16.13    | -21.01    | -19.59    | -20.92    | -25.79    | -13.64    | -18.42    | -23.9     | -21.01    | -22.95    | -21.72    | -24.52    | -20.85    | -19.83    | -18.29    | -20.11    | -18.39    |
| Theta(120°) | -23.87  | -19.43   | -25.68   | -18.26   | -18.65   | -21.33   |          |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |



**Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4)\_4TX**

| Theta       | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |       |
|-------------|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
| Theta(90°)  | -26.33  | -25.04   | -24.28   | -18.43   | -20.69   | -23.97   | -24.58   | -23.95    | -22.59    | -17.4     | -20.68    | -18.66    | -16.02    | -25.06    | -20.18    | -22.66    | -24.6     | -24.49    | -20.2     | -17.72    | -24.99    | -20.7     | -25.01    | -24.88    |       |
| Theta(105°) | -24.9   | -25.45   | -22.18   | -25.21   | -22.81   | -26.02   | -22.98   | -24.51    | -25.3     | -25.84    | -22.13    | -23.39    | -18.65    | -25.68    | -24.45    | -24.51    | -18.63    | -26.05    | -25.07    | -26.18    | -25.68    | -24.37    | -25.06    | -25.37    |       |
| Theta(120°) | -25.14  | -25.87   | -25.48   | -20.41   | -24.72   | -25.88   | -24.63   | -25       | -25.69    | -25.43    | -26.05    | -19.91    | -17.51    | -24.94    | -24.72    | -25.94    | -22.87    | -23.2     | -25.72    | -21.85    | -23.31    | -25.1     | -23.79    | -26.24    |       |
| Theta(135°) | -25.48  | -23      | -23.62   | -25.25   | -21.64   | -26.54   | -24.76   | -24.74    | -24.73    | -25.13    | -25.46    | -26.24    | -25.17    | -23.39    | -25.64    | -24.6     | -25.37    | -21.08    | -23.72    | -19.55    | -19.49    | -22.91    | -24.63    | -24.21    |       |
| Theta(150°) | -17.53  | -20      | -18.45   | -24.41   | -20.48   | -22.23   | -23.88   | -24.72    | -26.49    | -24.89    | -20.08    | -21.45    | -22.03    | -22.91    | -25.16    | -23.76    | -25.58    | -25.55    | -25.64    | -21.26    | -25.67    | -25.83    | -24.55    | -22.96    |       |
| Theta(165°) | -25.9   | -18.12   | -15.32   | -18.2    | -22.54   | -24.38   | -25.62   | -24.36    | -25.22    | -26.21    | -24.99    | -24.3     | -17.89    | -22.63    | -26.6     | -19.2     | -19.12    | -21.88    | -20.97    | -24.18    | -24.69    | -20.89    | -20.2     | -24.72    |       |
| Theta(180°) | -19.36  | -19.26   | -15.11   | -16.51   | -15.84   | -17.14   | -20.12   | -22.41    | -22.13    | -19.55    | -17.53    | -17.54    | -15.83    | -14.8     | -15.83    | -16.58    | -17.97    | -23.05    | -25.16    | -24.91    | -25.12    | -22.77    | -20.48    | -18.55    |       |
| Freq(Hz)    | 5.785G  | Pol.     | Phi      | Ant. 2   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |       |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |       |
| Theta(0°)   | -10.6   | -10.68   | -12.05   | -11.56   | -13.37   | -17.73   | -25.47   | -25.98    | -17.09    | -12.7     | -10.59    | -9.94     | -9.7      | -9.54     | -10.6     | -12.41    | -14.12    | -15.02    | -19.1     | -24.45    | -22.94    | -20.11    | -15.23    | -13.36    |       |
| Theta(15°)  | -7.71   | -6.9     | -6.79    | -6.56    | -7.82    | -9.74    | -11.7    | -13.75    | -13.4     | -13.19    | -16       | -20.74    | -13.29    | -9.03     | -7.08     | -7.59     | -8.87     | -9.51     | -8.92     | -7.97     | -8.39     | -9.4      | -9.25     | -9.2      |       |
| Theta(30°)  | -2.99   | -2.82    | -3.73    | -3.39    | -3.04    | -2.82    | -5.03    | -7.11     | -10.69    | -8.53     | -5.17     | -3.74     | -4.26     | -4.18     | -3.94     | -3.93     | -3.98     | -6.4      | -6.99     | -7.94     | -8.51     | -5.46     | -3.52     | -4.09     |       |
| Theta(45°)  | -5.82   | -4.54    | -4.36    | -2.68    | -0.81    | -0.67    | -0.42    | -1.46     | -5.33     | -6.78     | -7.41     | -3.34     | -2.93     | -3.11     | -6.4      | -5.79     | -3.99     | -0.84     | -0.17     | -0.54     | -1.52     | -8.21     | -12.23    | -6.87     |       |
| Theta(60°)  | -1.77   | -1.35    | -1.28    | -5.23    | -7.74    | -4.03    | -2.64    | -2.2      | -4.65     | -2.04     | 0.83      | 2.33      | 1.85      | -1.49     | -0.67     | -1.62     | -2.43     | -1.51     | 0.24      | 0.05      | -0.03     | -3.46     | 0.07      | 1.1       |       |
| Theta(75°)  | -1.5    | -0.13    | -0.15    | -1.98    | -1.6     | 0.06     | 0.88     | 0.69      | -0.57     | 0.34      | 4.94      | 4.72      | 2.09      | -4.39     | 0.32      | -1.6      | -1.5      | -2.43     | 0.02      | 1.84      | 0.21      | -3.99     | -0.13     | 1.27      |       |
| Theta(90°)  | -5.63   | -4.64    | -4.34    | -4.88    | -3.77    | -0.47    | -2.91    | -1.74     | -4.55     | -3.43     | 2.15      | 2.31      | -0.28     | -8.55     | -2.83     | -5.58     | -2.98     | -4.63     | -1.83     | 0.81      | -2.66     | -6.99     | -3.74     | -3.74     |       |
| Theta(105°) | -9.18   | -7.99    | -9.28    | -10.81   | -7.57    | -6.06    | -7.7     | -7.93     | -8.38     | -9.17     | -2.18     | -2.78     | -5.39     | -12.12    | -7.21     | -11.38    | -9.95     | -13.38    | -11.28    | -11.32    | -9.5      | -16.13    | -6.51     | -8.25     |       |
| Theta(120°) | -17.01  | -12.41   | -13.85   | -17.15   | -11.67   | -10.78   | -12.48   | -13.87    | -14.05    | -10.84    | -6.29     | -7.07     | -8        | -15.62    | -16.34    | -17       | -13.29    | -10.25    | -11.17    | -6.75     | -6.43     | -18.11    | -11.31    | -14.64    |       |
| Theta(135°) | -18.68  | -16.27   | -14.88   | -15.17   | -15.17   | -18.72   | -18.76   | -20.68    | -13.43    | -13.69    | -13.95    | -12.57    | -19.05    | -15.02    | -16.94    | -18.52    | -18.36    | -25.37    | -14.95    | -15.92    | -14.79    | -19.85    | -17.47    | -15.37    |       |
| Theta(150°) | -24.29  | -25.74   | -19.1    | -24.44   | -22.23   | -15.82   | -16.01   | -16.38    | -18.07    | -17.99    | -14.05    | -14.66    | -18.17    | -21.35    | -23.31    | -19.01    | -25.98    | -25.38    | -22.33    | -26.25    | -25.2     | -26.26    | -20.66    | -15.6     |       |
| Theta(165°) | -26.19  | -20.15   | -17.74   | -25.26   | -24.4    | -15.57   | -16.06   | -24.39    | -25.56    | -21.14    | -22.33    | -25.1     | -24.65    | -24.3     | -21.58    | -20.94    | -14.45    | -21.81    | -24.33    | -19.54    | -20.55    | -25.26    | -25.75    | -24.43    |       |
| Theta(180°) | -19.51  | -19.24   | -18.39   | -23.49   | -20.46   | -18.21   | -16.56   | -16.65    | -13.5     | -12.99    | -13.34    | -14.54    | -17.29    | -23.67    | -25.81    | -22.44    | -17.85    | -17.56    | -17.64    | -17.85    | -19.2     | -21.32    | -25.57    | -25       |       |
| Freq(Hz)    | 5.785G  | Pol.     | Theta    | Ant. 2   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |       |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |       |
| Theta(0°)   | -22.86  | -25      | -19.72   | -14.55   | -12.74   | -10.81   | -9.45    | -9.49     | -10.19    | -11.94    | -14.03    | -18.21    | -24.02    | -18.97    | -16.18    | -13.95    | -13.51    | -12.7     | -13.12    | -12.74    | -12.07    | -14.3     | -14.49    | -16.41    |       |
| Theta(15°)  | -17.26  | -22.05   | -11.64   | -9.02    | -10.24   | -11.18   | -14.47   | -16.34    | -10.92    | -7.65     | -7.3      | -13.05    | -13.49    | -10.33    | -11.18    | -14.69    | -16.23    | -16.71    | -18.25    | -18.06    | -17.68    | -14.44    | -16.85    | -22.68    |       |
| Theta(30°)  | -14.22  | -10.75   | -15.03   | -12.72   | -13.63   | -10.54   | -7.94    | -11.42    | -17.51    | -21.67    | -19.98    | -13.19    | -19.64    | -13.78    | -15.26    | -18.17    | -16.46    | -17.25    | -26.28    | -22.27    | -24.77    | -15.93    | -12.38    | -14.81    |       |
| Theta(45°)  | -15.77  | -15.58   | -18.03   | -14.08   | -9.87    | -7.17    | -12.43   | -18.96    | -16.96    | -17.95    | -18.33    | -12.44    | -19.43    | -19.21    | -19.34    | -23.53    | -21.95    | -17.75    | -17.08    | -17.4     | -20.66    | -26.21    | -19.36    | -20.24    |       |
| Theta(60°)  | -18.75  | -14.95   | -17.68   | -15.46   | -22.16   | -10.73   | -21.84   | -14.15    | -25.11    | -16.48    | -25.82    | -18.55    | -18.14    | -12.92    | -26.13    | -25.23    | -16.95    | -16.51    | -17.06    | -18.62    | -14.04    | -18.44    | -22.06    | -22.06    |       |
| Theta(75°)  | -18.42  | -21.33   | -16.97   | -15.75   | -19.42   | -25.42   | -25.65   | -15.67    | -25.53    | -19.13    | -15.77    | -15.09    | -16.92    | -25.39    | -25.67    | -24.76    | -21.28    | -24.68    | -25.01    | -19.01    | -21.3     | -15.87    | -18.54    | -25       |       |
| Theta(90°)  | -19.51  | -23.84   | -20.24   | -21.24   | -21.64   | -23.15   | -26.28   | -19.56    | -25.62    | -23.28    | -16.17    | -16.85    | -17.75    | -16.65    | -20.95    | -24.33    | -24.75    | -18.12    | -23.66    | -22.08    | -24.72    | -19.85    | -22.22    | -24.76    |       |
| Theta(105°) | -26.68  | -25.77   | -25.53   | -20.8    | -25.07   | -25.16   | -24.25   | -22.91    | -24.9     | -22.49    | -24.81    | -15.15    | -14.82    | -24.83    | -18.47    | -26.08    | -24.32    | -24.26    | -24.74    | -24.34    | -26.32    | -24.06    | -25.86    | -19.54    |       |
| Theta(120°) | -26.22  | -25.66   | -25      | -21.35   | -25.88   | -24.06   | -25.14   | -25.95    | -24.25    | -25.83    | -26.02    | -23.99    | -24.66    | -23.7     | -24.66    | -25.2     | -18.89    | -21.38    | -24.21    | -23.77    | -24.82    | -22.17    | -26.1     | -24.33    |       |
| Theta(135°) | -26.28  | -22.56   | -26.26   | -25.69   | -19.1    | -23.37   | -25.42   | -24.43    | -25.15    | -25.73    | -21.22    | -25.49    | -17.73    | -23.98    | -20.01    | -22.8     | -26.04    | -24.95    | -21.58    | -21.62    | -23.31    | -25.63    | -24.45    | -24.35    |       |
| Theta(150°) | -20.15  | -17.38   | -19.16   | -22.82   | -25.95   | -24.65   | -24.01   | -25.12    | -25.05    | -25.26    | -24.05    | -21.04    | -24.03    | -23.56    | -25.25    | -19.38    | -26.1     | -25.38    | -24.93    | -24.7     | -25.69    | -25.55    | -22.52    | -23.42    |       |
| Theta(165°) | -16.17  | -19.9    | -18.12   | -25.39   | -17.3    | -17.74   | -24.93   | -25.5     | -25.44    | -25.31    | -23.41    | -22.7     | -24.68    | -25.76    | -24.29    | -26.53    | -25.65    | -22.76    | -23.93    | -25.86    | -19.22    | -14.23    | -18.35    | -20.55    |       |
| Theta(180°) | -20.84  | -22.29   | -17.22   | -15.97   | -16.69   | -16.97   | -17.48   | -24.58    | -23.35    | -22.13    | -20.75    | -18.95    | -16.72    | -14.67    | -14.62    | -15.89    | -17.42    | -20.65    | -26.12    | -22.74    | -20.51    | -17.48    | -17.24    | -17.78    |       |
| Freq(Hz)    | 6.175G  | Pol.     | Phi      | Ant. 2   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |       |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |       |
| Theta(0°)   | -8.28   | -10.29   | -9.37    | -10.58   | -12.84   | -15.84   | -15.56   | -14.55    | -11.3     | -8.97     | -7.41     | -6.9      | -6.78     | -7.66     | -8.7      | -10.82    | -12.46    | -14.27    | -17.2     | -21.7     | -20.3     | -18.21    | -14.6     | -12.12    |       |
| Theta(15°)  | -7.07   | -6.16    | -5.71    | -4.26    | -5.63    | -6.75    | -6.91    | -8.36     | -12.14    | -18.52    | -17.89    | -14.12    | -14.02    | -12.81    | -12.23    | -14.46    | -16.12    | -23.63    | -15.83    | -9.92     | -6.35     | -5.93     | -7.18     | -10.14    |       |
| Theta(30°)  | -3.67   | -2.86    | -4.55    | -5.39    | -4.34    | -3.1     | -5.93    | -7.07     | -5.65     | -6.74     | -3.48     | -3.77     | -5.67     | -4.75     | -3.84     | -2.53     | -1.77     | -3.11     | -6.63     | -8.52     | -6.65     | -6.41     | -6.17     | -6.8      |       |
| Theta(45°)  | -6.59   | -5.71    | -6.84    | -4.61    | -2.54    | -4.06    | -2.11    | -0.22     | -1.66     | -4.7      | -3.34     | -4.82     | -4.66     | -5.73     | -7.53     | -12.25    | -8.75     | -3.55     | -1.66     | -2.7      | -4.32     | -5.78     | -14.99    | -13.57    |       |
| Theta(60°)  | -3.44   | -0.19    | -3.16    | -6.79    | -9.67    | -12.21   | -9.58    | -11.42    | -0.44     | -1.15     | -4.16     | -0.64     | 0.56      | -1.36     | -2.9      | -0.44     | -1.78     | -2.21     | -1.79     | 0.01      | -1.98     | -3.85     | -1.38     | -2.97     | -3.06 |
| Theta(75°)  | -2.53   | 1.35     | 0.03     | -0.62    | -1.89    | -1.18    | -2.23    | -1.56     | -3.48     | -2.02     | 2.33      | 2.95      | -0.68     | -1.09     | 1.52      | 0.73      | 1.32      | 0.59      | 1.79      | 1.77      | -0.21     | -0.19     | -0.46     | -0.69     |       |
| Theta(90°)  | -5.38   | -4.05    | -4.69    | -2       | -1.76    | -3.91    | -1.36    | -6.13     | -5.21     | -3.43     | -0.39     | 1.78      | -1.14     | -2.41     | -1.36     | -3.71     | -1.13     | 0.43      | 0.77      | 1.09      | -2.86     | -3.97     | -3.66     | -4.14     |       |
| Theta(105°) | -8.64   | -9.2     | -10.63   | -7.01    | -6.07    | -6.31    | -6.06    | -8.14     | -11.06    | -10.03    | -4.54     | -2.69     | -4.76     | -8.07     | -6.21     | -11.18    | -6.07     | -7.83     | -6.24     | -9.33     | -6.06     | -8.56     | -8.87     | -8.38     |       |
| Theta(120°) | -16.64  | -10.52   | -14.02   | -13.21   | -8.39    | -13.89   | -8.48    | -12.89    | -15.78    | -15.6     | -8.27     | -7.83     | -8.58     | -11.16    | -7.3      | -12.22    | -10.3     | -8.17     | -12.74    | -11.26    | -6.2      | -16.5     | -8.96     | -15.15    |       |
| Theta(135°) | -18.5   | -18.72   | -16.61   | -17.86   | -11.54   | -13.04   | -14.38   | -12.07    | -15.3     | -14.87    | -11.47    | -10.91    | -12.81    | -13.39    | -11.89    | -18.42    | -12.39    | -12.92    | -12.55    | -13.25    | -8.06     | -16.05    | -14.45    | -13.16    |       |
| Theta(150°) | -20.01  | -17      | -14.76   | -22.31   | -20.26   | -16.77   | -15.59   | -16.71    | -20.42    | -24.15    | -18.16    | -18.29    |           |           |           |           |           |           |           |           |           |           |           |           |       |





Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4)\_4TX

Table with columns for Frequency (6.175G, 6.475G, 6.695G), Polarization (Phi), and various angles (Theta) from 0 to 165 degrees. It contains a grid of gain values for different antenna configurations.



Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4)\_4TX

Appendix B.2

Table with columns for frequency (6.995G, 5.6G, 5.785G, 6.175G), gain, and various antenna orientations (Theta and Phi). The table contains numerical data for each combination of frequency and orientation.





**Radiated Composite Gain of 5GHz UNII 2C, 3, 6GHz UNII 5~8  
(5G6G Ant1~Ant4)\_4TX**

**Appendix B.2**

|         |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| θ(90°)  | -7.64  | -12.36 | -7.45  | -10.11 | -7.04  | -9.5   | -8.95  | -8.34  | -7.43  | -10.16 | -10.79 | -12.63 | -7.46  | -8     | -10.36 | -14.21 | -5.78  | -10.52 | -12.74 | -8.31  | -11.01 | -9.42  | -11.09 | -10.37 |
| θ(105°) | -13.61 | -14.03 | -11.87 | -10.25 | -11.25 | -12.05 | -10    | -9.8   | -9.22  | -12.18 | -13.15 | -16.16 | -13.64 | -14.38 | -10.16 | -16.07 | -15.84 | -18.23 | -18.02 | -15.96 | -11.13 | -9.63  | -15.97 | -11.4  |
| θ(120°) | -17.59 | -25.12 | -12.85 | -10.29 | -13.67 | -14.39 | -16.91 | -9.62  | -13.59 | -13.15 | -17.29 | -17.43 | -12.44 | -11.7  | -23.72 | -20.18 | -20.1  | -20.56 | -22.52 | -14.19 | -13.67 | -14.56 | -16.45 | -15.51 |
| θ(135°) | -15.24 | -19.68 | -14.66 | -13.97 | -17.64 | -19.05 | -15.13 | -14.09 | -18.91 | -13.82 | -23.82 | -18.17 | -26.24 | -16.2  | -20.49 | -19.32 | -11.96 | -20.84 | -24.8  | -13.86 | -19.46 | -16.3  | -19.48 | -20.46 |
| θ(150°) | -21.83 | -15.96 | -17.38 | -23.36 | -20.63 | -26.37 | -21.57 | -18.32 | -19.72 | -25.27 | -18.95 | -19.7  | -17.91 | -18.12 | -24.81 | -20.53 | -24.13 | -20.84 | -26.27 | -16.8  | -26.15 | -21.35 | -12.52 | -14.14 |
| θ(165°) | -16.52 | -12.97 | -13.22 | -18.37 | -23.46 | -17.87 | -18.11 | -17.07 | -23.37 | -25.44 | -24.73 | -25.4  | -25.2  | -25.42 | -19.6  | -24.56 | -23.14 | -25.59 | -21.34 | -21.16 | -25.21 | -20.2  | -18.82 | -21.9  |
| θ(180°) | -20.4  | -17.94 | -17.83 | -22.87 | -24.8  | -21.58 | -24.91 | -20.25 | -19.12 | -21.66 | -22.8  | -20.2  | -21.11 | -25.47 | -18.6  | -15.7  | -19.45 | -19.43 | -19.86 | -23.21 | -23.71 | -25.83 | -24.39 | -22.33 |





# Antenna Pattern of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)

# Appendix C

## Total Gain Data

| Freq(Hz) | 2.45G  | Pol.   | Total  | Ant. 1 | -      | -      | -      | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |         |         |        |
|----------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| 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°) |        |
| 2.45G    | 2.34   | 2.49   | 1.91   | 1.91   | 2.22   | 2.02   | 2.18   | 2.43    | 2.33    | 2.32    | 2.31    | 2.25    | 2.50    | 2.83    | 2.59    | 1.88    | 2.27    | 2.38    | 1.80    | 1.91    | 2.21    | 2.43    | 2.45    | 2.32    |        |
| Θ(0°)    | 0.70   | 0.84   | 0.92   | 1.43   | 2.25   | 1.96   | 1.69   | 2.06    | 1.98    | 1.81    | 1.37    | 0.72    | 0.62    | 0.71    | 0.84    | 1.10    | 1.48    | 1.87    | 2.54    | 2.95    | 2.93    | 2.97    | 2.26    | 1.55    |        |
| Θ(15°)   | 0.54   | 1.59   | 1.85   | 1.52   | 2.28   | 2.05   | 0.50   | -0.16   | 0.19    | 1.11    | 0.63    | -0.85   | -2.13   | -1.53   | -0.49   | -1.04   | -0.97   | 0.16    | 0.69    | 1.39    | 1.58    | 0.51    | -0.78   | -0.95   |        |
| Θ(30°)   | 0.30   | 1.79   | 2.31   | 1.20   | 1.29   | 2.33   | 1.44   | -0.09   | -1.45   | 0.14    | 1.49    | 1.57    | 0.04    | -0.94   | -0.06   | -0.22   | -0.37   | 1.11    | 3.00    | 2.37    | 0.71    | -2.29   | -3.91   | -0.97   |        |
| Θ(45°)   | -1.53  | 0.36   | 0.63   | -0.51  | -1.21  | 1.02   | 2.14   | 0.54    | -2.30   | 0.51    | 2.00    | 2.21    | 0.64    | -2.42   | -1.26   | -2.94   | -5.88   | -0.34   | 3.01    | 3.25    | 1.20    | -1.50   | -3.48   | -0.04   |        |
| Θ(60°)   | -1.40  | -0.14  | -0.72  | -2.40  | -0.65  | 2.29   | 1.96   | 0.77    | -1.85   | -0.29   | 2.27    | 2.36    | -0.99   | -4.73   | -3.24   | -8.35   | -8.71   | -1.67   | 1.42    | 1.97    | -1.03   | -2.18   | -2.14   | 0.09    |        |
| Θ(75°)   | -1.59  | -0.95  | -1.17  | -2.77  | -1.13  | 1.45   | -0.32  | 0.47    | -1.56   | -2.17   | 0.55    | 1.40    | -1.51   | -2.75   | -2.48   | -9.69   | -2.21   | -1.40   | 1.18    | -1.73   | -2.41   | -2.53   | -4.91   | -0.71   |        |
| Θ(90°)   | -1.98  | -3.98  | -3.01  | -2.98  | -0.14  | -0.73  | -0.34  | 0.21    | -4.85   | -3.12   | -1.09   | -1.97   | -3.77   | -3.55   | -2.13   | -3.93   | -3.08   | -4.76   | -0.24   | -3.46   | -7.15   | -3.27   | -5.91   | -3.10   |        |
| Θ(105°)  | -5.20  | -4.53  | -5.58  | -3.12  | -2.14  | -0.17  | -0.54  | -3.77   | -3.21   | -4.83   | -6.41   | -3.42   | -2.03   | -4.32   | -8.90   | -8.78   | -4.49   | -11.78  | -3.94   | -8.95   | -9.54   | -4.92   | -6.07   | -5.59   |        |
| Θ(120°)  | -6.32  | -3.78  | -4.07  | -4.24  | -4.20  | -2.27  | -2.76  | -5.12   | -4.35   | -5.29   | -8.89   | -3.15   | -4.52   | -12.21  | -12.91  | -9.41   | -9.04   | -8.89   | -8.29   | -7.21   | -6.98   | -5.97   | -4.29   | -5.13   |        |
| Θ(135°)  | -6.67  | -5.07  | -4.05  | -3.54  | -2.99  | -2.99  | -5.05  | -3.80   | -3.44   | -4.97   | -6.58   | -9.80   | -12.20  | -7.95   | -4.25   | -2.98   | -4.15   | -4.08   | -4.64   | -7.62   | -6.52   | -5.13   | -4.59   | -6.02   |        |
| Θ(150°)  | -3.25  | -3.87  | -4.54  | -3.76  | -3.35  | -3.02  | -2.35  | -2.79   | -5.21   | -8.09   | -8.88   | -8.37   | -8.45   | -9.96   | -9.81   | -11.01  | -13.79  | -10.00  | -7.71   | -6.96   | -6.10   | -4.34   | -3.80   | -3.29   |        |
| Θ(165°)  | -5.35  | -5.42  | -4.98  | -4.83  | -4.84  | -5.61  | -6.26  | -6.97   | -8.39   | -8.36   | -7.26   | -7.33   | -8.39   | -8.44   | -6.49   | -5.87   | -5.14   | -4.21   | -4.79   | -5.49   | -4.98   | -4.41   | -3.98   | -4.46   |        |
| 5.2G     | 5.2G   | Pol.   | Total  | Ant. 1 | -      | -      | -      | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |        |
| 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°)    | -7.55  | -6.95  | -7.84  | -6.65  | -7.41  | -7.13  | -8.38  | -7.29   | -8.42   | -8.18   | -8.13   | -8.98   | -6.94   | -6.76   | -6.42   | -7.47   | -6.93   | -6.73   | -8.63   | -6.99   | -6.64   | -7.23   | -7.95   | -7.68   |        |
| Θ(15°)   | -8.30  | -7.68  | -6.42  | -4.62  | -4.28  | -4.46  | -3.89  | -3.26   | -3.79   | -3.38   | -1.48   | -1.67   | -3.47   | -3.67   | -4.22   | -4.52   | -7.04   | -7.25   | -8.02   | -8.85   | -6.26   | -7.38   | -7.82   | -6.81   |        |
| Θ(30°)   | -6.02  | -3.54  | -3.99  | -5.60  | -2.71  | -1.97  | -1.70  | -0.86   | 0.69    | -0.67   | -0.10   | -1.71   | -0.44   | -0.19   | -0.47   | -1.28   | -0.18   | -2.79   | -3.36   | -5.66   | -4.46   | -10.10  | -5.71   | -5.63   |        |
| Θ(45°)   | -3.07  | -2.68  | 0.05   | 0.86   | -0.40  | 0.29   | 0.31   | 1.36    | -1.07   | 2.70    | 0.15    | -1.31   | -0.31   | -0.46   | 2.18    | 3.00    | 0.49    | -0.90   | -2.21   | -2.03   | -4.05   | 0.20    | -1.85   | -2.28   |        |
| Θ(60°)   | -0.99  | 0.78   | -1.34  | -2.06  | 0.91   | 1.93   | 0.11   | 0.93    | -0.52   | 2.17    | -2.35   | -0.96   | 0.56    | 1.99    | 0.80    | 2.51    | 2.33    | 0.25    | 0.83    | 0.97    | -4.79   | 1.26    | -2.73   | -1.45   |        |
| Θ(75°)   | -1.10  | -0.26  | -4.83  | -3.31  | -2.72  | -1.03  | -1.30  | 0.30    | 0.09    | 1.99    | -1.76   | 1.58    | 0.84    | 1.42    | 3.71    | 1.74    | 4.55    | 1.68    | -0.30   | -0.24   | -2.54   | -1.64   | -1.47   | -0.81   |        |
| Θ(90°)   | -2.26  | -2.22  | -4.07  | -3.17  | -2.08  | -2.60  | -3.13  | 0.60    | -1.11   | 0.23    | -1.42   | -0.00   | 1.56    | -0.66   | -1.18   | -0.69   | 1.97    | -1.99   | 0.73    | -0.20   | -3.75   | -3.71   | -3.55   | -0.92   |        |
| Θ(105°)  | -2.99  | -2.76  | -4.87  | -4.40  | -3.57  | -3.27  | -1.63  | -0.91   | 0.16    | -3.29   | -2.70   | -1.46   | -1.26   | -2.02   | -2.94   | -9.48   | -2.60   | -5.62   | -2.79   | -5.64   | -5.32   | -5.34   | -4.57   | -3.59   |        |
| Θ(120°)  | -4.65  | -5.26  | -4.96  | -4.75  | -2.88  | -4.14  | -3.25  | -3.87   | -1.03   | -6.30   | -5.01   | -11.33  | -3.45   | -6.12   | -11.33  | -7.57   | -6.25   | -6.96   | -11.00  | -5.03   | -10.79  | -3.26   | -8.51   | -5.37   |        |
| Θ(135°)  | -5.82  | -5.14  | -5.61  | -4.73  | -7.02  | -5.50  | -5.28  | -4.93   | -3.15   | -3.97   | -5.20   | -10.15  | -6.22   | -7.61   | -6.71   | -8.69   | -13.38  | -8.14   | -9.64   | -8.49   | -14.40  | -6.69   | -4.85   | -5.25   |        |
| Θ(150°)  | -6.17  | -7.00  | -7.40  | -6.36  | -5.48  | -7.03  | -7.53  | -6.21   | -5.88   | -5.28   | -6.34   | -4.64   | -8.45   | -9.06   | -14.49  | -7.85   | -8.24   | -14.02  | -4.55   | -6.69   | -6.14   | -10.18  | -5.96   | -5.34   |        |
| Θ(165°)  | -9.35  | -10.62 | -10.25 | -9.34  | -9.17  | -7.17  | -8.05  | -9.16   | -4.26   | -4.70   | -9.78   | -13.09  | -10.29  | -12.42  | -13.05  | -14.11  | -11.38  | -8.28   | -8.52   | -8.10   | -5.66   | -10.32  | -7.57   | -7.53   |        |
| Θ(180°)  | -6.75  | -6.59  | -7.17  | -9.09  | -9.18  | -6.24  | -5.71  | -8.44   | -11.35  | -12.67  | -12.20  | -11.95  | -9.14   | -6.93   | -5.65   | -6.06   | -6.12   | -6.88   | -7.35   | -6.79   | -7.35   | -7.11   | -7.02   | -7.31   |        |
| 5.3G     | 5.3G   | Pol.   | Total  | Ant. 1 | -      | -      | -      | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |        |
| 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°)    | -10.14 | -8.04  | -9.90  | -7.53  | -8.44  | -9.60  | -8.89  | -8.44   | -9.46   | -9.29   | -8.71   | -8.24   | -8.32   | -8.58   | -8.61   | -8.11   | -8.97   | -9.87   | -8.45   | -8.22   | -8.22   | -9.28   | -9.49   | -9.75   |        |
| Θ(15°)   | -7.45  | -7.49  | -5.64  | -5.42  | -4.13  | -4.58  | -4.82  | -4.76   | -4.72   | -4.21   | -7.70   | -3.59   | -5.02   | -7.17   | -3.59   | -5.02   | -7.17   | -3.59   | -5.02   | -7.17   | -3.59   | -5.02   | -7.17   | -3.59   |        |
| Θ(30°)   | -5.99  | -3.71  | -5.01  | -4.79  | -2.01  | -1.29  | -0.99  | -0.94   | 1.00    | -0.84   | -0.13   | -2.12   | -0.79   | -1.06   | 0.34    | -1.22   | -1.75   | -3.97   | -4.27   | -3.91   | -6.02   | -8.18   | -4.04   | -5.02   |        |
| Θ(45°)   | -0.88  | -1.18  | 0.57   | -0.50  | 0.76   | 1.03   | 0.39   | 1.62    | -0.53   | 2.36    | 0.85    | -0.93   | -0.37   | 0.85    | 2.12    | 2.71    | 0.90    | -1.82   | -1.84   | -2.14   | -4.57   | 0.80    | -2.74   | -1.98   |        |
| Θ(60°)   | 0.49   | 1.74   | -2.86  | -0.44  | 0.29   | 1.06   | 0.11   | 0.70    | 1.47    | 1.44    | -1.57   | -3.12   | -0.43   | -0.11   | 1.97    | 1.93    | 2.77    | 1.01    | -0.88   | -0.11   | -3.23   | 0.28    | -1.20   | -2.63   |        |
| Θ(75°)   | 0.03   | -1.02  | -3.55  | -3.16  | -2.27  | -0.89  | -0.95  | 0.80    | 0.25    | 1.78    | -4.01   | 1.91    | 0.76    | 1.59    | 3.60    | 1.89    | 4.05    | 1.50    | -0.59   | 0.41    | -3.74   | -2.97   | -2.44   | 0.04    |        |
| Θ(90°)   | -1.28  | -1.82  | -4.50  | -3.68  | -1.75  | -0.99  | -2.63  | 0.36    | -0.71   | -0.32   | 3.24    | -1.86   | 0.11    | -1.66   | -1.75   | -1.22   | 3.01    | -1.86   | 0.29    | -1.18   | -5.96   | -3.87   | -3.30   | -0.06   |        |
| Θ(105°)  | -1.46  | -2.21  | -4.12  | -3.09  | -2.45  | -3.07  | -1.52  | -1.00   | -0.64   | -4.43   | -1.66   | -1.34   | -1.55   | -2.37   | -2.21   | -9.70   | -3.03   | -5.72   | -1.79   | -6.19   | -6.69   | -4.13   | -3.75   | -4.13   |        |
| Θ(120°)  | -4.47  | -4.94  | -5.12  | -4.98  | -3.41  | -2.83  | -2.56  | -3.64   | -1.94   | -5.27   | -3.53   | -3.65   | -6.32   | -10.66  | -8.04   | -4.27   | -5.61   | -10.28  | -6.08   | -13.53  | -3.87   | -9.00   | -6.94   | -6.68   |        |
| Θ(135°)  | -6.99  | -5.72  | -7.18  | -5.10  | -6.75  | -6.21  | -5.15  | -5.69   | -2.45   | -4.26   | -4.71   | -8.35   | -6.54   | -5.97   | -6.85   | -7.54   | -12.50  | -8.64   | -8.78   | -7.68   | -11.87  | -9.46   | -4.51   | -6.40   |        |
| Θ(150°)  | -5.68  | -7.35  | -7.53  | -6.22  | -5.08  | -7.09  | -7.48  | -5.69   | -4.40   | -4.92   | -4.54   | -4.26   | -8.46   | -11.33  | -14.85  | -7.96   | -10.11  | -12.57  | -4.61   | -7.99   | -6.66   | -9.59   | -7.98   | -4.71   |        |
| Θ(165°)  | -8.15  | -10.54 | -9.01  | -8.56  | -7.57  | -7.22  | -5.96  | -9.44   | -5.61   | -13.98  | -5.06   | -9.83   | -11.51  | -9.89   | -13.58  | -13.98  | -9.59   | -8.17   | -8.62   | -8.23   | -6.90   | -8.81   | -7.78   | -6.98   |        |
| Θ(180°)  | -5.95  | -5.86  | -5.77  | -7.27  | -7.11  | -5.17  | -4.39  | -7.38   | -9.84   | -9.56   | -9.24   | -13.93  | -7.50   | -5.56   | -4.44   | -6.25   | -6.64   | -6.98   | -5.72   | -6.12   | -7.02   | -6.20   | -6.63   | -5.94   |        |
| 5.6G     | 5.6G   | Pol.   | Total  | Ant. 1 | -      | -      | -      | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       |        |
| 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°)    | -9.39  | -10.98 | -10.85 | -10.84 | -10.60 | -11.40 | -11.54 | -10.95  | -11.92  | -10.64  | -11.19  | -9.26   | -10.76  | -11.03  | -11.02  | -9.72   | -11.49  | -11.19  | -11.23  | -11.62  | -10.44  | -9.91   | -10.46  | -12.01  | -10.74 |
| Θ(15°)   | -7.67  | -5.87  | -5.51  | -4.21  | -3.49  | -5.05  | -3.90  | -4.28   | -4.15   | -5.03   | -6.05   | -5.80   | -6.87   | -7.95   | -7.41   | -7.16   | -9.23   | -11.64  | -12.00  | -12.53  | -12.77  | -13.43  | -8.89   | -9.10   |        |
| Θ(30°)   | -2.89  | -2.56  | -1.78  | -2.70  | -1.95  | -1.80  | -1.68  | -2.21   | -1.85   | -1.77   | -2.58   | -2.44   | -3.57   | -2.02   | -1.53   | -1.83   | -3.45   | -5.03   | -8.19   | -9.35   | -11.66  | -2.98   | -6.41   | -5.16   |        |
| Θ(45°)   | -1.67  | 0.71   | -0.94  | -1.85  | -0.32  | 0.79   | -0.06  | -0.18   | -0.90   | -0.01   | -0.77   | -0.89   | -1.68   | -1.52   | 1.03    | 1.65    | -0.01   | -2.20   | -4.15   | -6.67   | -4.41   | -0.53   | -1.60   | -3.68   |        |
| Θ(60°)   | -1.14  | -0.25  | -1.66  | -2.10  | -2.85  | -1.33  | -0.32  | 0.85    | -0.85   | 1.03    | -0.51   | 0.21    | -2.16   | -2.09   | 0.01    | 0.85    | 0.67    | 1.90    | 0.76    | 0.42    | -2.10   | -2.90   | -4.45   | -1.14   |        |
| Θ(75°)   | -2.39  | -2.49  | -0.97  | 0.02   | -0.44  | -1.38  | -0.60  | -0.29   | 0.98    | 0.49    | -1.58   | 0.30    | 0.36    | 1.14    | 1.67    | 0.56    | 1.93    | 0.26    | -3.22   | -2.84   | -6.20   | -3.58</ |         |         |        |



Antenna Pattern of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)

Appendix C

Table with columns for frequency (5.3G, 5.6G, 5.785G, 2.45G, 5.2G, 5.3G, 5.6G), polarization (Pol.), total gain, and azimuth/elevation angles (0 to 180 degrees) for various antenna configurations (Ant 2, Ant 3).

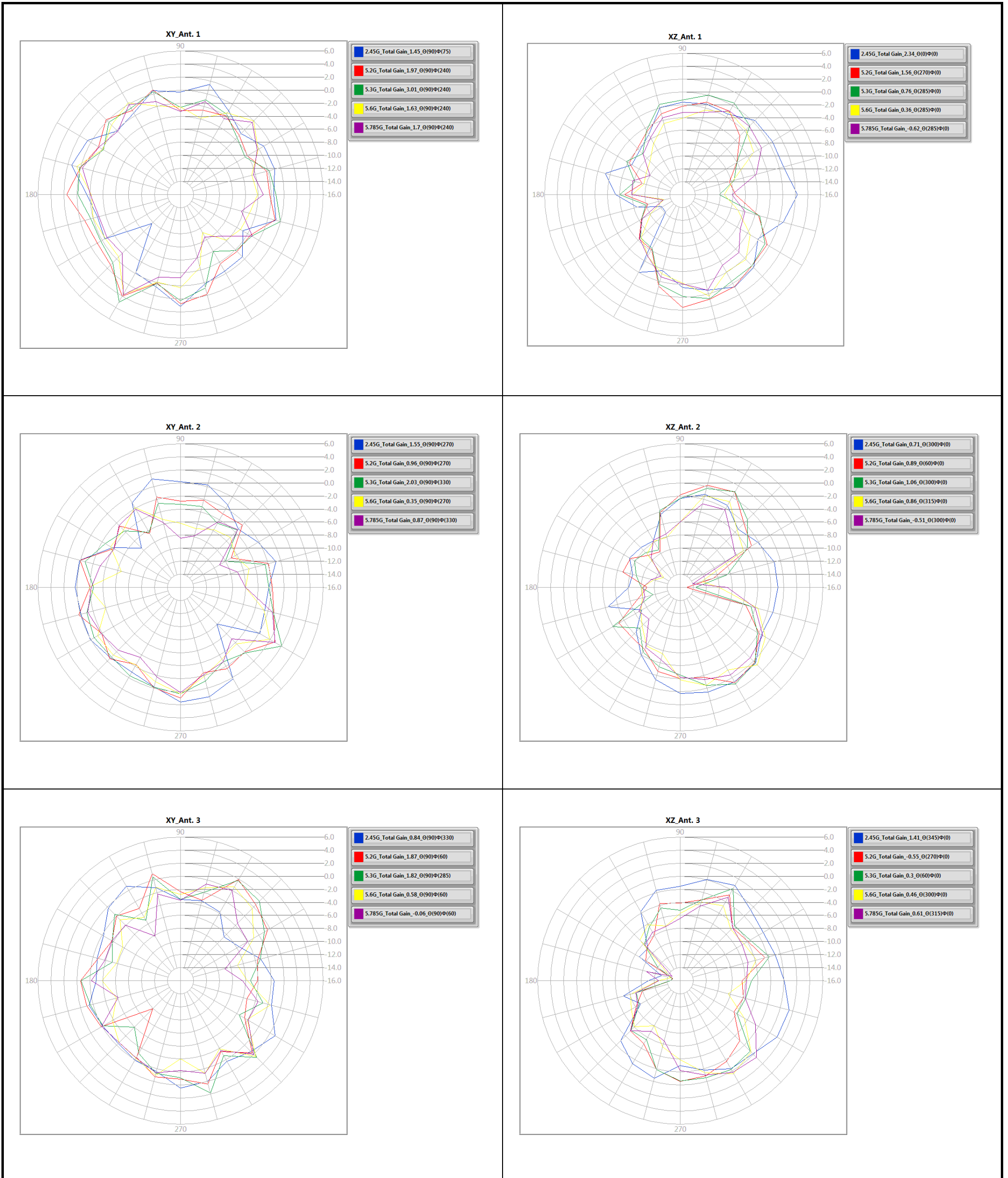


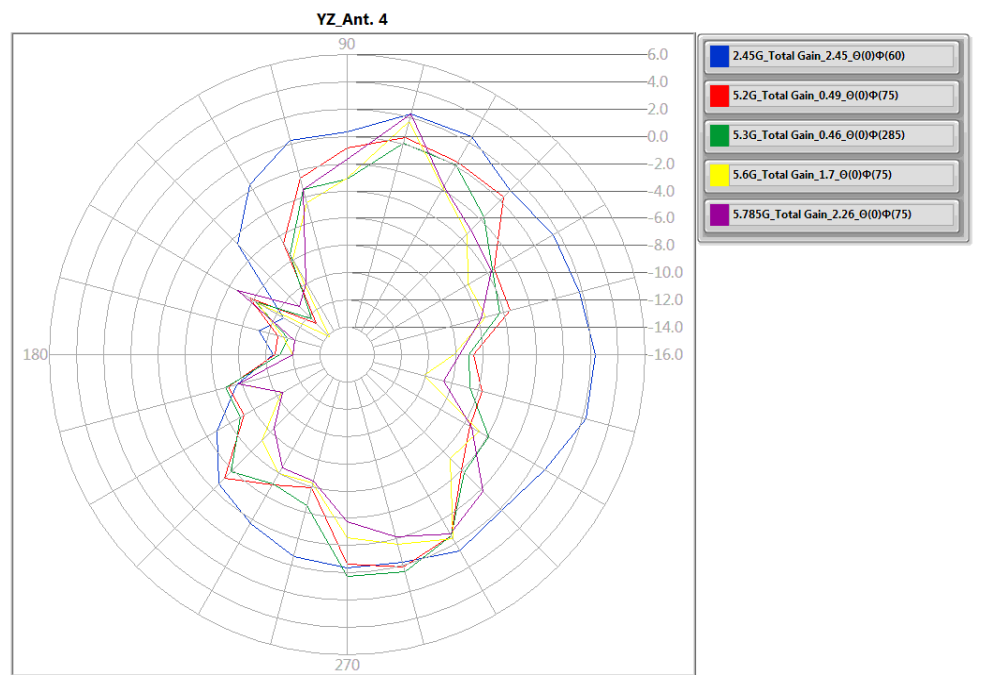
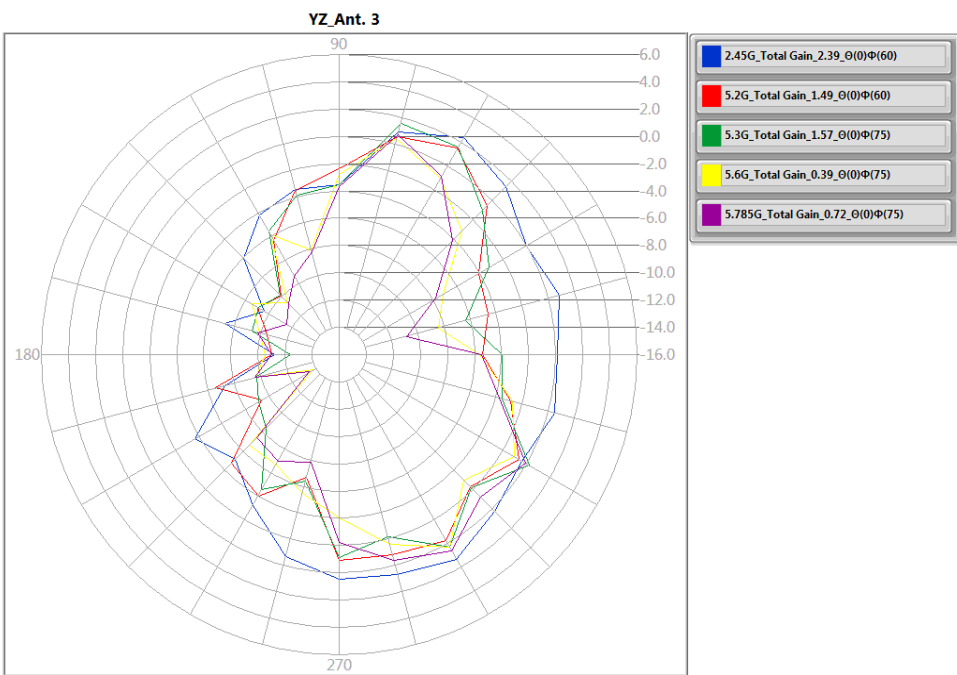
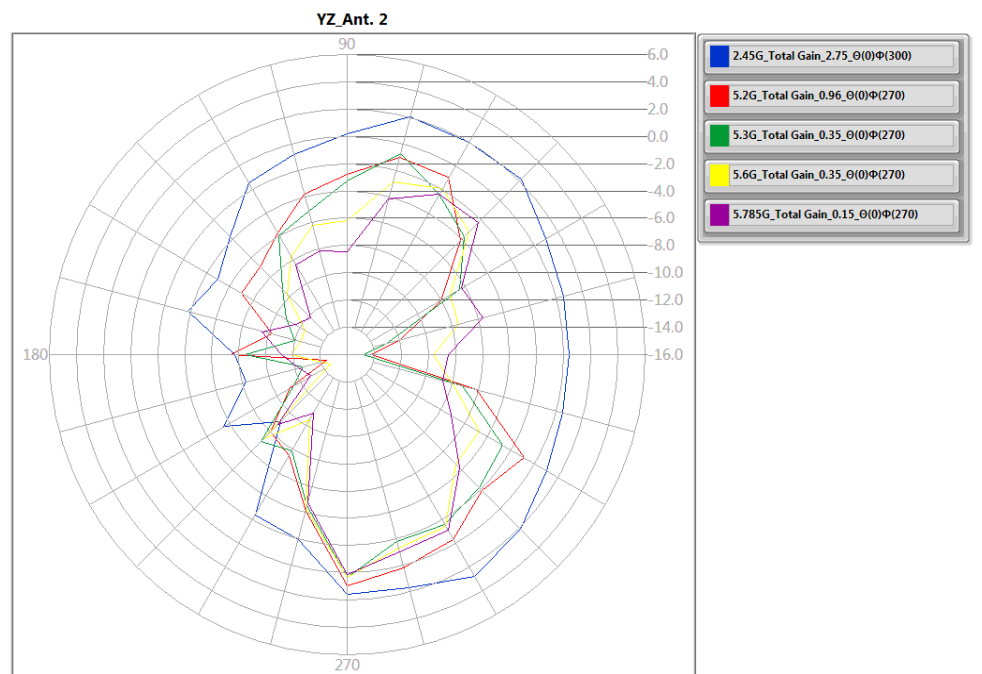
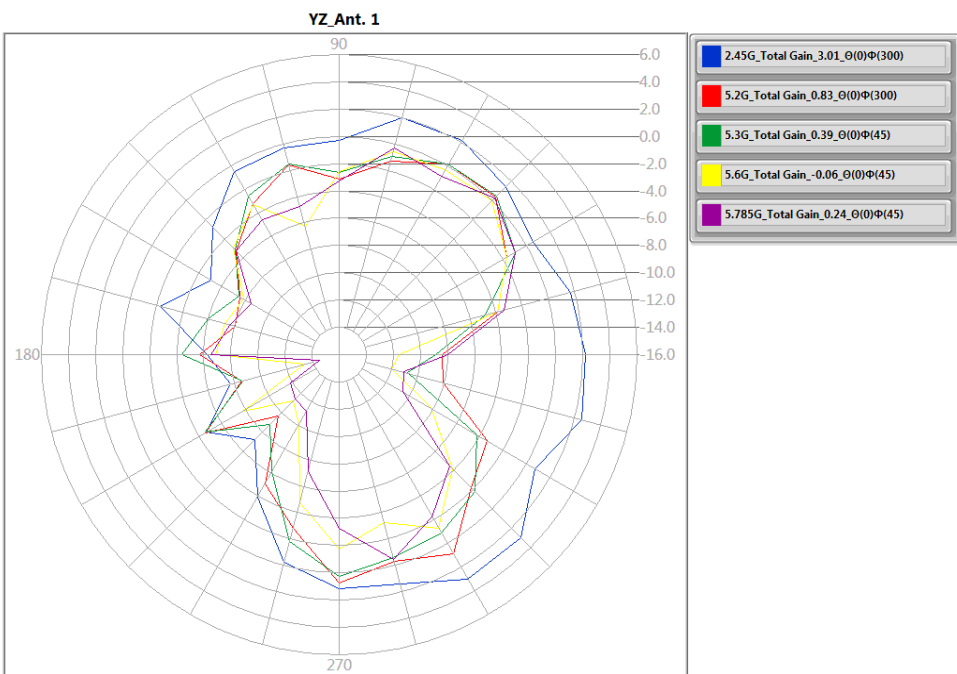
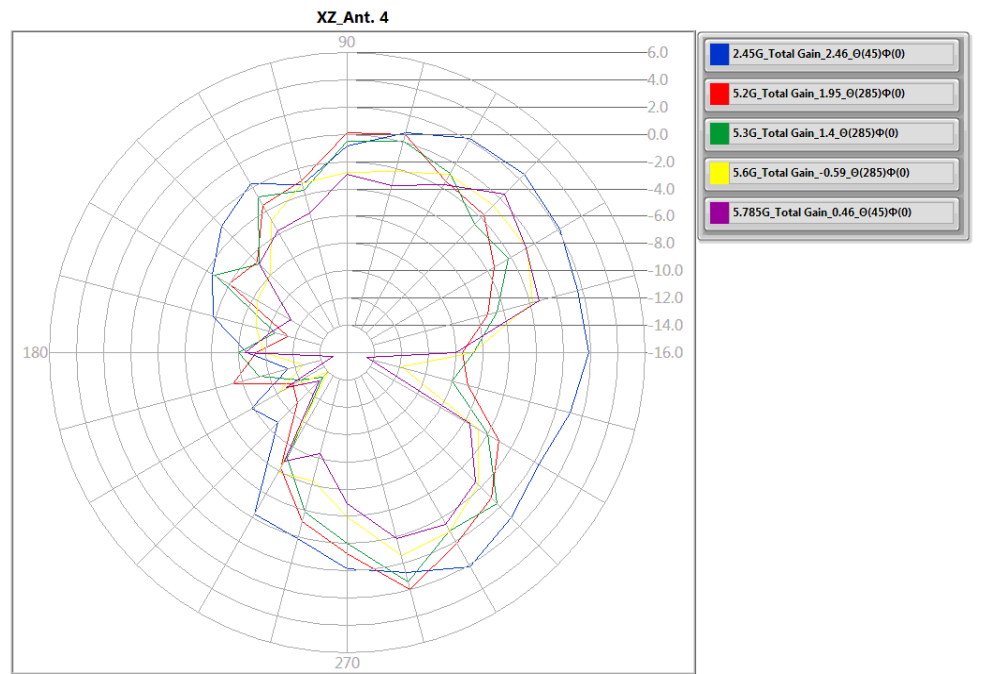
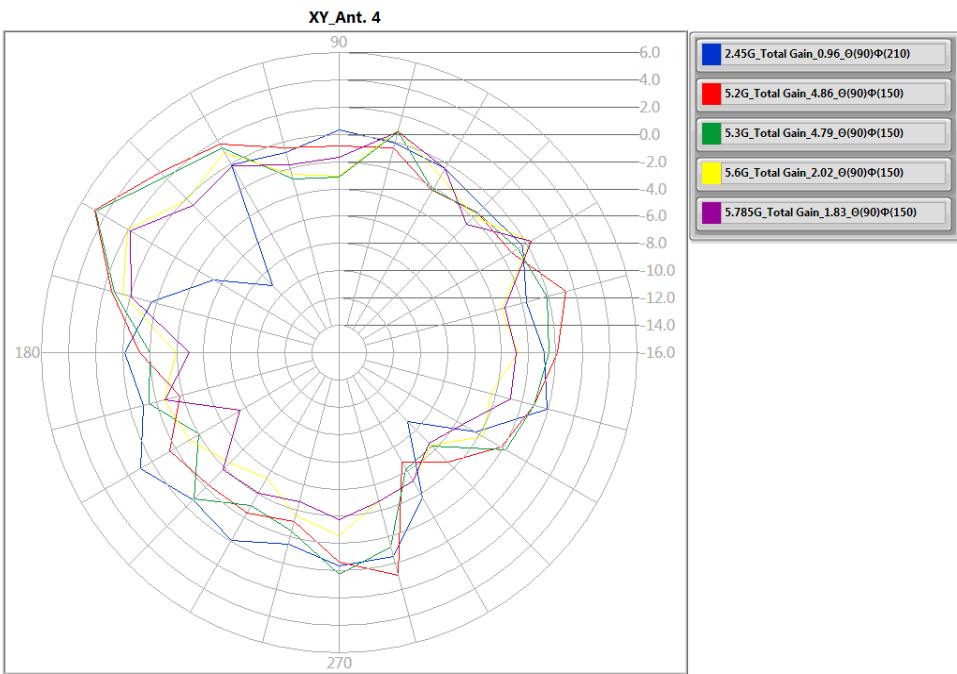
Antenna Pattern of 2.4GHz, 5GHz UNII 1~3 (2G5G Ant1~Ant4)

Appendix C

Table with columns for Frequency (5.785G, 2.45G, 5.2G, 5.3G, 5.6G, 5.785G), Polarization (Pol.), Total Gain, and Azimuth (Ant. 3, Ant. 4). Rows list gain values for various azimuth angles (0 to 180 degrees) and elevation angles (0 to 180 degrees).

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







Antenna Pattern of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4)

Appendix D

Total Gain Data

Table with columns for Freq(Hz), Pol., Total, and Antenna 1-4. Rows include Gain and Theta values for frequencies 5.785G, 6.175G, 6.475G, 6.695G, and 6.995G. Values range from -18.65 to 3.09.



Antenna Pattern of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4)

Appendix D

Table with columns for frequency (5.785G, 6.175G, 6.475G, 6.695G, 6.995G, 5.6G), gain, and various azimuth angles (0 to 180 degrees) for Ant 2, Ant 3, and Ant 4. The table contains numerical values representing antenna gain in different directions.



Antenna Pattern of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4)

Appendix D

Table with columns for frequency (6.175G, 6.475G, 6.695G, 6.995G, 5.6G, 5.785G), polarization (Pol.), total gain, and azimuthal angles (Theta) from 0 to 180 degrees. Each angle has a corresponding gain value in dBS.





Antenna Pattern of 5GHz UNII 2C, 3, 6GHz UNII 5~8 (5G6G Ant1~Ant4)

Appendix D

| Theta       | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
|-------------|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Theta(45°)  | -1.35   | -2.04    | -5.72    | -10.77   | -13.34   | -12.28   | -5.82    | -6.06     | -3.68     | -2.84     | -3.12     | -1.07     | -1.82     | -2.41     | 0.02      | -2.07     | -3.93     | -4.98     | -2.72     | -6.81     | -7.28     | -5.61     | -5.13     | -4.61     |
| Theta(60°)  | -2.08   | 0.95     | 2.00     | 0.76     | -1.13    | -3.86    | -2.49    | -1.95     | -3.86     | -4.86     | -17.62    | -7.46     | -4.12     | -7.04     | -15.12    | -9.39     | -5.91     | -5.30     | -2.26     | -2.39     | -5.08     | -1.15     | 1.98      | 1.53      |
| Theta(75°)  | -3.13   | 0.38     | 2.55     | 2.97     | 0.60     | -1.52    | -0.62    | 2.96      | 1.51      | -0.81     | -2.33     | 1.46      | 0.75      | -1.16     | -1.82     | -1.32     | 1.12      | 0.41      | 0.49      | 1.37      | -2.87     | -0.38     | 2.05      | 2.42      |
| Theta(90°)  | -6.34   | -4.62    | -1.45    | -1.12    | -2.06    | -3.73    | -4.28    | 0.01      | -0.86     | -2.00     | -4.04     | 0.70      | -0.53     | -3.17     | -2.44     | -2.94     | -0.17     | -0.13     | -0.39     | -0.29     | -5.20     | -5.13     | -1.64     | -2.65     |
| Theta(105°) | -8.45   | -10.81   | -4.84    | -5.04    | -5.98    | -6.98    | -7.11    | -2.88     | -3.94     | -6.57     | -9.58     | -3.79     | -3.28     | -6.63     | -5.86     | -9.15     | -10.60    | -10.52    | -8.82     | -9.72     | -9.44     | -7.33     | -4.87     | -7.19     |
| Theta(120°) | -12.71  | -10.67   | -12.12   | -10.11   | -10.21   | -10.95   | -13.02   | -7.54     | -8.62     | -12.62    | -12.60    | -8.78     | -7.00     | -9.47     | -8.69     | -16.37    | -6.07     | -9.51     | -8.71     | -9.86     | -14.35    | -14.70    | -10.41    | -10.81    |
| Theta(135°) | -15.82  | -14.10   | -13.45   | -11.77   | -14.61   | -17.72   | -13.76   | -14.61    | -9.23     | -14.85    | -14.36    | -11.78    | -14.34    | -17.58    | -10.47    | -14.03    | -10.83    | -10.27    | -11.10    | -11.09    | -17.39    | -11.55    | -14.69    | -17.61    |
| Theta(150°) | -15.45  | -14.33   | -17.52   | -18.17   | -16.53   | -16.57   | -18.33   | -17.39    | -14.13    | -16.61    | -14.99    | -12.14    | -17.63    | -17.86    | -16.99    | -13.58    | -17.60    | -21.72    | -14.20    | -18.11    | -15.33    | -20.73    | -15.00    | -18.69    |
| Theta(165°) | -15.08  | -17.59   | -16.03   | -18.73   | -19.65   | -17.37   | -16.40   | -16.77    | -12.64    | -18.09    | -18.45    | -16.71    | -15.03    | -16.44    | -13.07    | -14.19    | -12.48    | -18.54    | -20.66    | -15.87    | -14.00    | -15.15    | -16.37    | -22.14    |
| Theta(180°) | -19.21  | -18.68   | -17.21   | -18.08   | -19.29   | -20.97   | -19.18   | -19.65    | -21.39    | -21.49    | -20.40    | -19.41    | -19.35    | -21.06    | -19.16    | -16.35    | -18.05    | -19.29    | -17.05    | -17.98    | -20.15    | -18.93    | -19.52    | -20.71    |
| Freq(Hz)    | 6.475G  | Pol.     | Total    | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta(0°)   | -5.66   | -6.81    | -6.70    | -7.18    | -8.26    | -8.09    | -6.89    | -7.49     | -6.65     | -6.63     | -6.46     | -6.29     | -6.45     | -6.78     | -8.14     | -9.99     | -9.25     | -9.41     | -9.30     | -9.18     | -9.45     | -10.07    | -10.32    | -9.90     |
| Theta(15°)  | -8.21   | -7.31    | -6.93    | -7.87    | -7.84    | -9.27    | -10.31   | -11.17    | -8.74     | -9.18     | -13.29    | -7.13     | -3.90     | -1.61     | -2.70     | -4.02     | -4.62     | -3.78     | -2.02     | -2.33     | -4.37     | -6.88     | -8.41     | -8.84     |
| Theta(30°)  | -4.05   | -4.07    | -4.95    | -4.24    | -5.50    | -4.95    | -6.72    | -6.57     | -3.90     | -2.04     | -5.87     | -5.98     | -1.61     | -0.03     | -0.76     | -2.16     | -3.29     | -2.87     | -2.65     | -3.03     | -4.55     | -5.11     | -3.48     | -4.44     |
| Theta(45°)  | -3.63   | -5.45    | -8.52    | -8.76    | -5.32    | -4.52    | -6.66    | -5.58     | -4.53     | -1.24     | -3.90     | -3.39     | -5.22     | -5.59     | -1.60     | -0.29     | -2.94     | -5.86     | -4.46     | -7.68     | -2.15     | -6.26     | -3.56     | -3.11     |
| Theta(60°)  | -4.83   | 0.09     | 1.37     | 1.40     | -3.34    | -4.36    | -2.29    | -4.01     | -7.31     | -7.02     | -8.92     | -7.01     | -8.94     | -11.48    | -11.78    | -8.65     | -8.20     | -7.02     | -9.74     | -7.08     | -4.86     | -1.92     | 0.34      | -0.31     |
| Theta(75°)  | -5.39   | -0.14    | 3.26     | 4.03     | 0.06     | -3.73    | -2.61    | -1.87     | -2.04     | 0.55      | -0.52     | -0.51     | -1.99     | -1.97     | -0.01     | -2.72     | -1.79     | -3.93     | -3.30     | -0.81     | -6.11     | -1.13     | 0.62      | 0.03      |
| Theta(90°)  | -8.60   | -5.66    | -0.54    | 1.18     | -1.27    | -3.73    | -2.64    | -2.33     | -2.30     | -1.66     | -0.14     | -1.94     | -4.51     | -4.00     | -3.04     | -6.75     | -2.45     | -1.91     | -3.18     | -1.96     | -9.57     | -5.07     | -2.98     | -1.38     |
| Theta(105°) | -9.47   | -7.72    | -3.91    | -5.73    | -5.73    | -8.03    | -6.57    | -5.29     | -7.94     | -3.68     | -4.19     | -7.50     | -6.89     | -7.31     | -7.49     | -9.81     | -12.08    | -12.89    | -11.44    | -9.24     | -15.08    | -7.11     | -7.10     | -7.56     |
| Theta(120°) | -16.15  | -12.01   | -8.41    | -7.82    | -8.29    | -12.79   | -8.22    | -8.71     | -8.82     | -8.89     | -9.40     | -10.66    | -10.07    | -13.71    | -10.36    | -12.77    | -10.32    | -12.94    | -13.03    | -12.78    | -16.31    | -13.10    | -8.77     | -10.86    |
| Theta(135°) | -17.09  | -16.34   | -10.34   | -11.58   | -15.62   | -14.11   | -12.85   | -12.72    | -11.19    | -11.69    | -13.63    | -13.27    | -13.57    | -13.47    | -9.37     | -14.94    | -8.73     | -13.32    | -12.07    | -10.57    | -19.58    | -13.35    | -11.13    | -18.47    |
| Theta(150°) | -19.84  | -15.43   | -16.43   | -12.92   | -15.21   | -21.07   | -17.67   | -16.50    | -16.19    | -14.34    | -13.64    | -12.56    | -18.89    | -21.20    | -17.91    | -12.32    | -15.40    | -17.87    | -11.34    | -16.70    | -21.28    | -16.13    | -17.50    | -21.99    |
| Theta(165°) | -16.33  | -16.52   | -17.93   | -14.41   | -17.72   | -19.97   | -21.85   | -20.42    | -19.56    | -16.62    | -17.86    | -13.09    | -17.33    | -15.86    | -14.59    | -15.89    | -14.96    | -20.04    | -21.62    | -17.50    | -19.18    | -19.19    | -21.24    | -21.05    |
| Theta(180°) | -20.75  | -19.78   | -19.92   | -18.07   | -18.45   | -19.48   | -20.91   | -19.91    | -18.93    | -19.52    | -22.36    | -21.09    | -19.58    | -19.54    | -15.86    | -16.72    | -20.00    | -18.54    | -20.99    | -17.16    | -18.32    | -19.11    | -18.63    | -19.68    |
| Freq(Hz)    | 6.695G  | Pol.     | Total    | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta(0°)   | -3.32   | -3.62    | -3.85    | -4.85    | -5.40    | -4.90    | -4.24    | -4.35     | -4.68     | -4.67     | -3.90     | -3.78     | -3.49     | -3.97     | -5.08     | -6.52     | -6.06     | -5.42     | -5.79     | -6.15     | -6.81     | -7.34     | -6.71     | -7.29     |
| Theta(15°)  | -7.62   | -6.90    | -6.42    | -6.86    | -7.02    | -8.25    | -8.72    | -11.94    | -9.47     | -7.57     | -16.07    | -6.59     | -3.50     | -1.49     | -1.90     | -5.58     | -7.58     | -4.94     | -3.34     | -2.11     | -4.11     | -5.45     | -8.07     | -8.29     |
| Theta(30°)  | -2.76   | -4.78    | -6.56    | -4.53    | -8.06    | -12.18   | -13.59   | -8.35     | -5.01     | -4.00     | -6.36     | -2.41     | -2.70     | -1.61     | -0.51     | -1.38     | -4.85     | -4.17     | -7.00     | -7.80     | -6.54     | -2.82     | -2.92     | -4.18     |
| Theta(45°)  | -2.46   | -2.11    | -3.94    | -4.88    | -2.44    | -4.48    | -6.36    | -3.51     | -3.17     | -2.86     | -3.38     | -3.97     | -4.49     | -5.47     | -3.29     | -0.21     | -3.05     | -4.26     | -6.53     | -6.08     | -2.25     | -5.10     | -2.32     | -3.16     |
| Theta(60°)  | -3.68   | -0.49    | -0.42    | -0.27    | -3.05    | -3.58    | -3.31    | -2.75     | -6.16     | -7.96     | -4.96     | -5.38     | -9.20     | -14.13    | -8.65     | -7.32     | -6.79     | -6.94     | -15.04    | -9.61     | -5.98     | -2.79     | -1.23     | -2.50     |
| Theta(75°)  | -3.66   | -1.74    | 1.13     | 1.70     | 1.35     | 0.40     | -2.51    | -1.15     | -1.97     | -0.16     | -7.01     | -2.61     | -2.94     | -8.56     | -7.49     | -6.37     | -1.01     | -2.90     | -4.28     | -0.38     | -5.09     | -0.24     | -0.87     | -1.98     |
| Theta(90°)  | -11.08  | -5.35    | -2.29    | -0.31    | -0.24    | -1.67    | -5.83    | -0.20     | -0.49     | -1.15     | -3.51     | -4.43     | -6.27     | -9.24     | -9.11     | -11.60    | -1.10     | -0.88     | -4.69     | -1.81     | -7.93     | -5.18     | -2.88     | -3.02     |
| Theta(105°) | -10.59  | -11.01   | -5.96    | -4.60    | -2.60    | -6.06    | -8.57    | -2.94     | -5.71     | -4.69     | -7.46     | -7.87     | -7.59     | -9.87     | -11.64    | -13.72    | -12.75    | -12.66    | -10.27    | -8.73     | -14.54    | -7.52     | -8.86     | -6.37     |
| Theta(120°) | -13.19  | -13.85   | -9.74    | -7.99    | -8.81    | -12.14   | -12.85   | -6.14     | -8.58     | -8.00     | -10.55    | -9.75     | -12.62    | -17.64    | -16.91    | -17.02    | -12.70    | -10.75    | -13.41    | -8.85     | -14.86    | -14.68    | -10.32    | -14.30    |
| Theta(135°) | -22.31  | -16.96   | -10.52   | -10.07   | -15.06   | -17.76   | -18.82   | -9.99     | -10.33    | -14.86    | -14.98    | -16.07    | -13.87    | -13.04    | -11.84    | -16.51    | -8.51     | -10.64    | -10.56    | -9.19     | -18.04    | -10.13    | -14.02    | -16.13    |
| Theta(150°) | -18.49  | -16.37   | -15.10   | -12.56   | -20.44   | -22.46   | -16.77   | -14.24    | -16.42    | -11.77    | -15.07    | -13.28    | -15.61    | -22.95    | -18.98    | -16.26    | -15.29    | -14.59    | -12.06    | -18.80    | -21.39    | -19.96    | -19.30    | -15.98    |
| Theta(165°) | -14.92  | -14.33   | -15.34   | -14.06   | -20.50   | -19.98   | -18.50   | -20.70    | -17.44    | -15.56    | -16.75    | -12.56    | -17.06    | -16.50    | -13.29    | -16.52    | -17.84    | -20.12    | -22.10    | -19.35    | -18.59    | -16.41    | -18.31    | -16.02    |
| Theta(180°) | -17.83  | -17.32   | -16.53   | -17.20   | -17.10   | -16.02   | -15.31   | -17.54    | -20.98    | -18.93    | -20.93    | -18.27    | -17.40    | -18.02    | -18.25    | -14.43    | -19.08    | -16.51    | -17.02    | -17.87    | -18.42    | -18.58    | -18.89    | -19.04    |
| Freq(Hz)    | 6.995G  | Pol.     | Total    | Ant. 4   | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Gain        | Phi(0°) | Phi(15°) | Phi(30°) | Phi(45°) | Phi(60°) | Phi(75°) | Phi(90°) | Phi(105°) | Phi(120°) | Phi(135°) | Phi(150°) | Phi(165°) | Phi(180°) | Phi(195°) | Phi(210°) | Phi(225°) | Phi(240°) | Phi(255°) | Phi(270°) | Phi(285°) | Phi(300°) | Phi(315°) | Phi(330°) | Phi(345°) |
| Theta(0°)   | -7.26   | -7.57    | -7.82    | -8.22    | -8.91    | -7.97    | -9.15    | -9.02     | -9.14     | -9.54     | -8.12     | -8.97     | -7.35     | -7.91     | -9.40     | -10.50    | -7.82     | -8.96     | -9.54     | -8.29     | -9.70     | -10.72    | -9.49     | -9.06     |
| Theta(15°)  | -11.27  | -8.88    | -8.23    | -8.67    | -9.21    | -9.94    | -12.41   | -17.67    | -17.60    | -11.09    | -11.53    | -5.43     | -3.13     | -3.48     | -4.34     | -5.59     | -5.11     | -3.89     | -3.23     | -4.71     | -6.95     | -6.11     | -7.54     | -9.70     |
| Theta(30°)  | -3.17   | -6.46    | -5.92    | -4.92    | -5.50    | -5.76    | -6.70    | -4.25     | -3.20     | -6.32     | -6.07     | -3.50     | -2.84     | -2.61     | -1.49     | -0.91     | -1.28     | -1.39     | -4.90     | -4.36     | -4.30     | -2.23     | -5.45     | -4.39     |
| Theta(45°)  | -2.82   | -0.29    | -2.21    | -2.36    |          |          |          |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |

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

