

WHA YU GROUP

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# Antenna Report

Version: **V 2.11**

TEST DATE : 2022/JULY/1st

TEST PERSONNEL : Davin

REVIEWER: Stone



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# Revision History

| Released Date | Version | Record                                                 |
|---------------|---------|--------------------------------------------------------|
| 2021/05/27    | V1.01   | Dual Bandx1 2Gx4 5Gx4 BTx1<br>Antenna simulated report |
| 2021/05/31    | V1.02   | Dual Bandx1 2Gx4 5Gx4 BTx1<br>Antenna simulated report |
| 2021/07/15    | V1.03   | Dual Bandx1 2Gx4 5Gx4 BTx1<br>Antenna simulated report |
| 2021/09/10    | V1.04   | Antennas are simulated in a new environment.           |
| 2021/09/23    | V1.05   | Antennas are simulated in a new environment.           |
| 2021/12/23    | V2.06   | Antennas are simulated in a new environment.           |
| 2022/03/25    | V2.07   | Customer ID change. Antennas re-design.                |
| 2022/03/31    | V2.08   | Improve isolation between antennas.                    |
| 2022/04/08    | V2.09   | Improve isolation between antennas.                    |
| 2022/06/09    | V2.10   | Antennas are designed in new machine.                  |
| 2022/07/01    | V2.11   | Wire cutting antennas are designed in machine.         |

# Specification

## Requirements of Antenna Design

| RF Function | Number of ANT | Frequency Band                      | Remark |
|-------------|---------------|-------------------------------------|--------|
| Dual Band   | 1             | 2G:2400-2500(MHz)/5G:5150-5850(MHz) |        |
| 2G          | 4             | 2400-2500(MHz)                      |        |
| 5G          | 4             | 5150-5850(MHz)                      |        |
| BT          | 1             | 2400-2500(MHz)                      |        |

## Requirements of Measurement

| Test Item   | Specification     | Remark |
|-------------|-------------------|--------|
| Return Loss | > 10dB            |        |
| Isolation   | 2G>20dB , 5G>25dB |        |
| Peak gain   | NA                |        |

# Antenna Placement & Solution

EUT Photo : Please refer to EUT Photo-1 of Test Set Up Photos (Antenna spec.)

| Antenna | ANT Type | Size (L * W * H) | Cable Length (mm)                    | Cable Type           |
|---------|----------|------------------|--------------------------------------|----------------------|
| DB      | Pifa ANT | 50mm*15mm*7mm    | 180(Exposed from carrier plate : 60) | $\Phi=1.13$ low loss |
| BT      | Pifa ANT | 33mm*7mm*9.5mm   | 126(Exposed from carrier plate : 70) | $\Phi=1.13$ low loss |
| 2G1     | Pifa ANT | 33mm*7mm*9.5mm   | 218(Exposed from carrier plate : 40) | $\Phi=1.13$ low loss |
| 2G2     | Pifa ANT | 33mm*7mm*9.5mm   | 168(Exposed from carrier plate : 40) | $\Phi=1.13$ low loss |
| 2G3     | Pifa ANT | 33mm*7mm*9.5mm   | 159(Exposed from carrier plate : 60) | $\Phi=1.13$ low loss |
| 2G4     | Pifa ANT | 33mm*7mm*9.5mm   | 228(Exposed from carrier plate : 60) | $\Phi=1.13$ low loss |

# Antenna Placement & Solution

EUT Photo : Please refer to EUT Photo-1 of Test Set Up Photos (Antenna spec.)

| Antenna | ANT Type | Size (L * W * H) | Cable Length (mm)                    | Cable Type           |
|---------|----------|------------------|--------------------------------------|----------------------|
| 5G1     | Pifa ANT | 28mm*20mm*7.5mm  | 270(Exposed from carrier plate : 50) | $\Phi=1.13$ low loss |
| 5G2     | Pifa ANT | 28mm*20mm*7.5mm  | 189(Exposed from carrier plate : 40) | $\Phi=1.13$ low loss |
| 5G3     | Pifa ANT | 28mm*20mm*7.5mm  | 180(Exposed from carrier plate : 60) | $\Phi=1.13$ low loss |
| 5G4     | Pifa ANT | 28mm*20mm*7.5mm  | 185(Exposed from carrier plate : 40) | $\Phi=1.13$ low loss |

# Test Setup for S-parameter Measurement

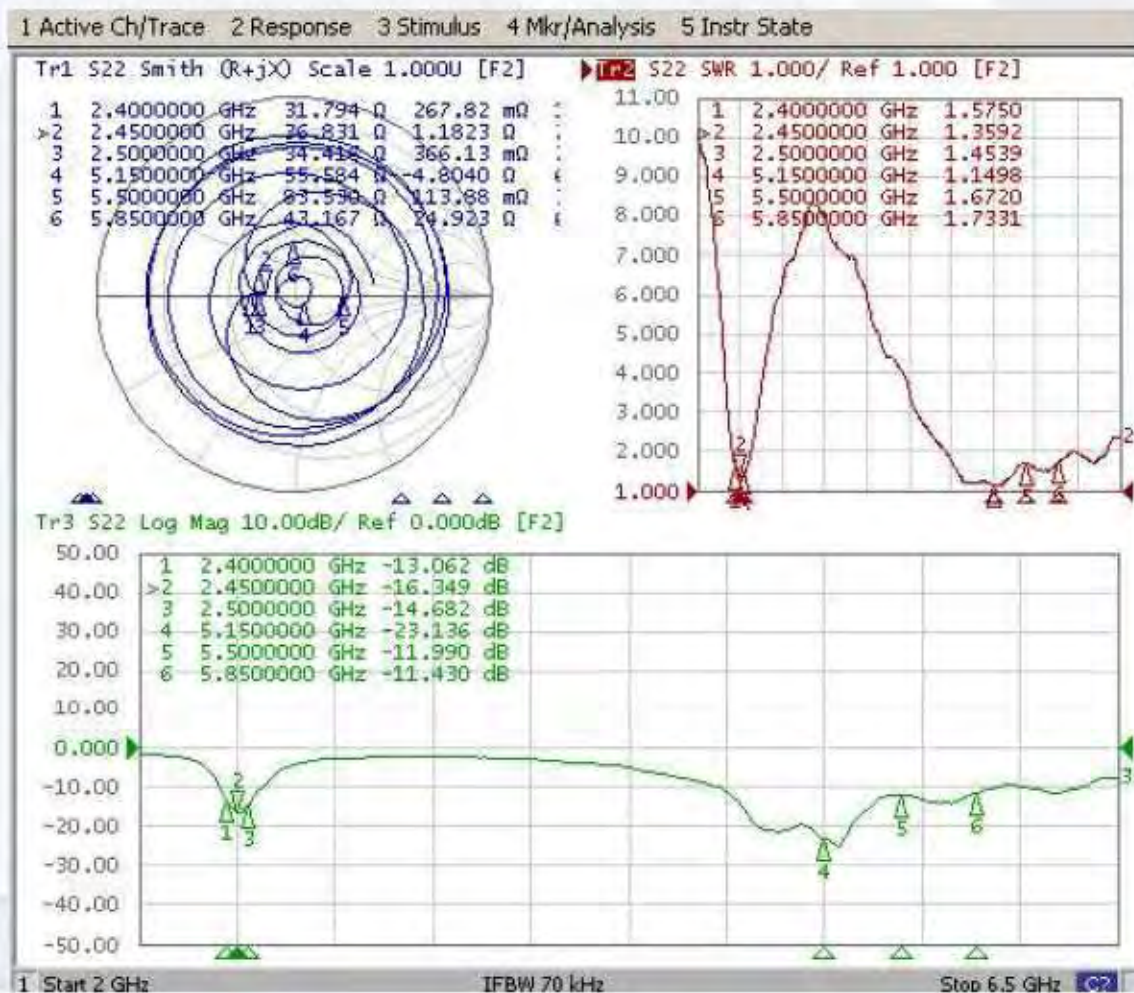


| Equipment        | Brand    | Model  | S/N        |
|------------------|----------|--------|------------|
| Network Analyzer | Keysight | E5071B | MY42403554 |

*Calibration date: 2022/1/24*

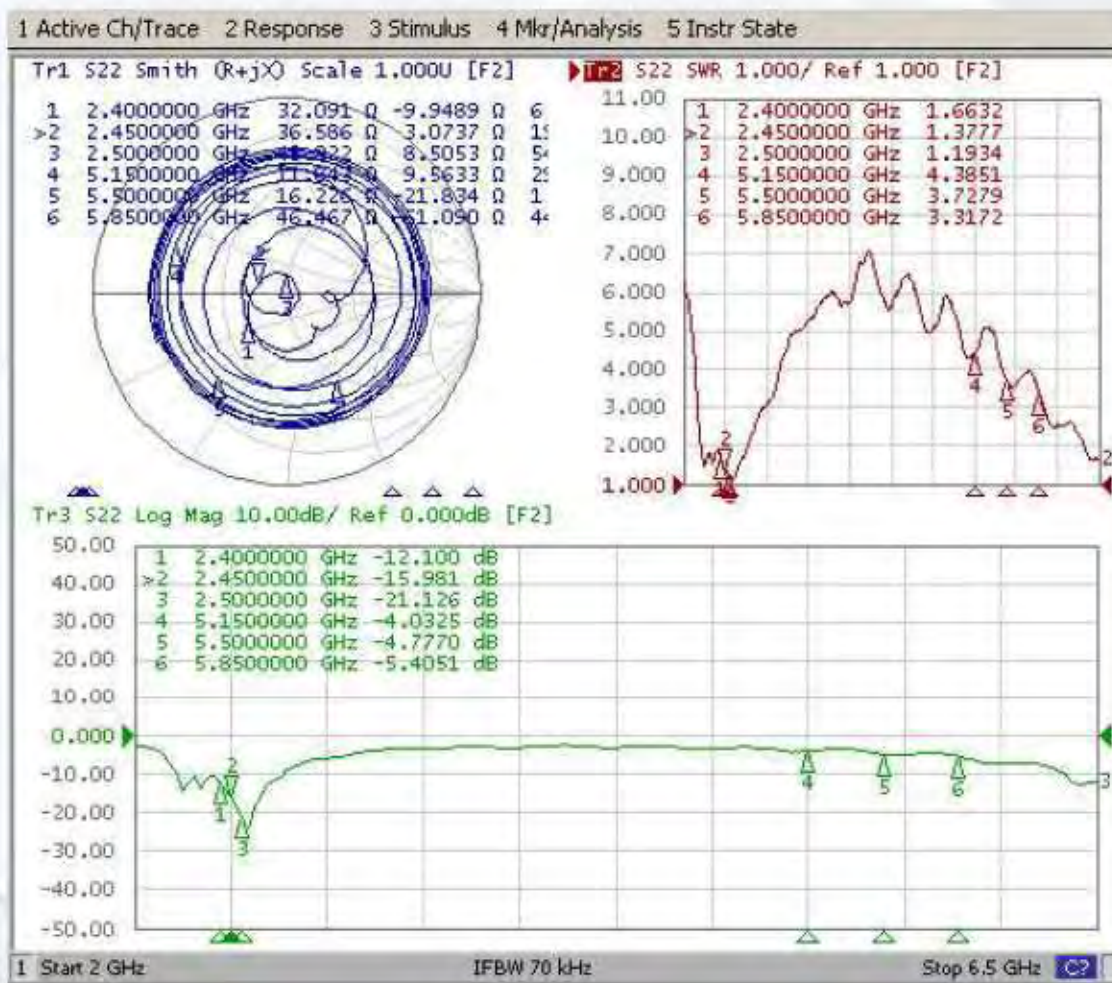
# Return Loss Results

DB(Criterion:>10 dB)



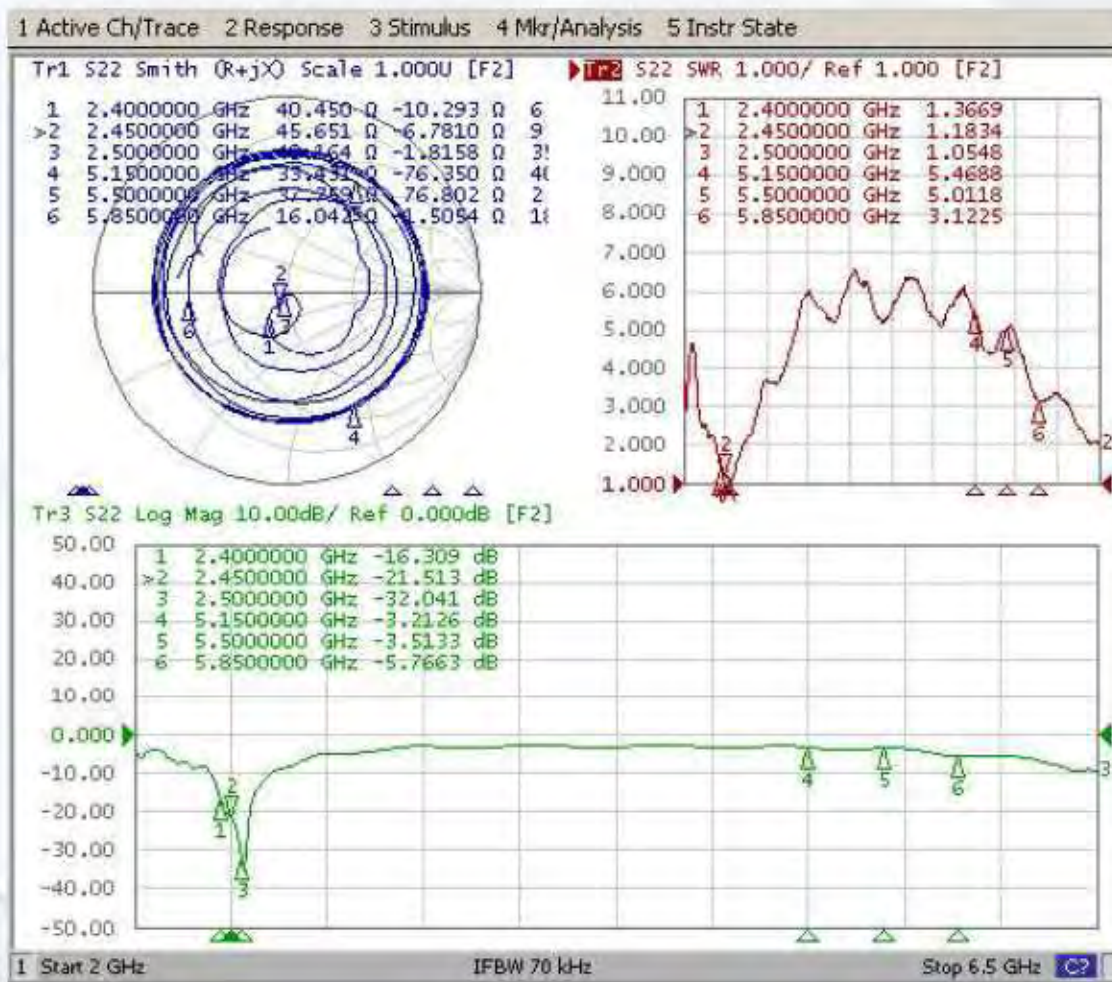
# Return Loss Results

2G1(Criterion:>10 dB)



# Return Loss Results

2G2(Criterion:>10 dB)



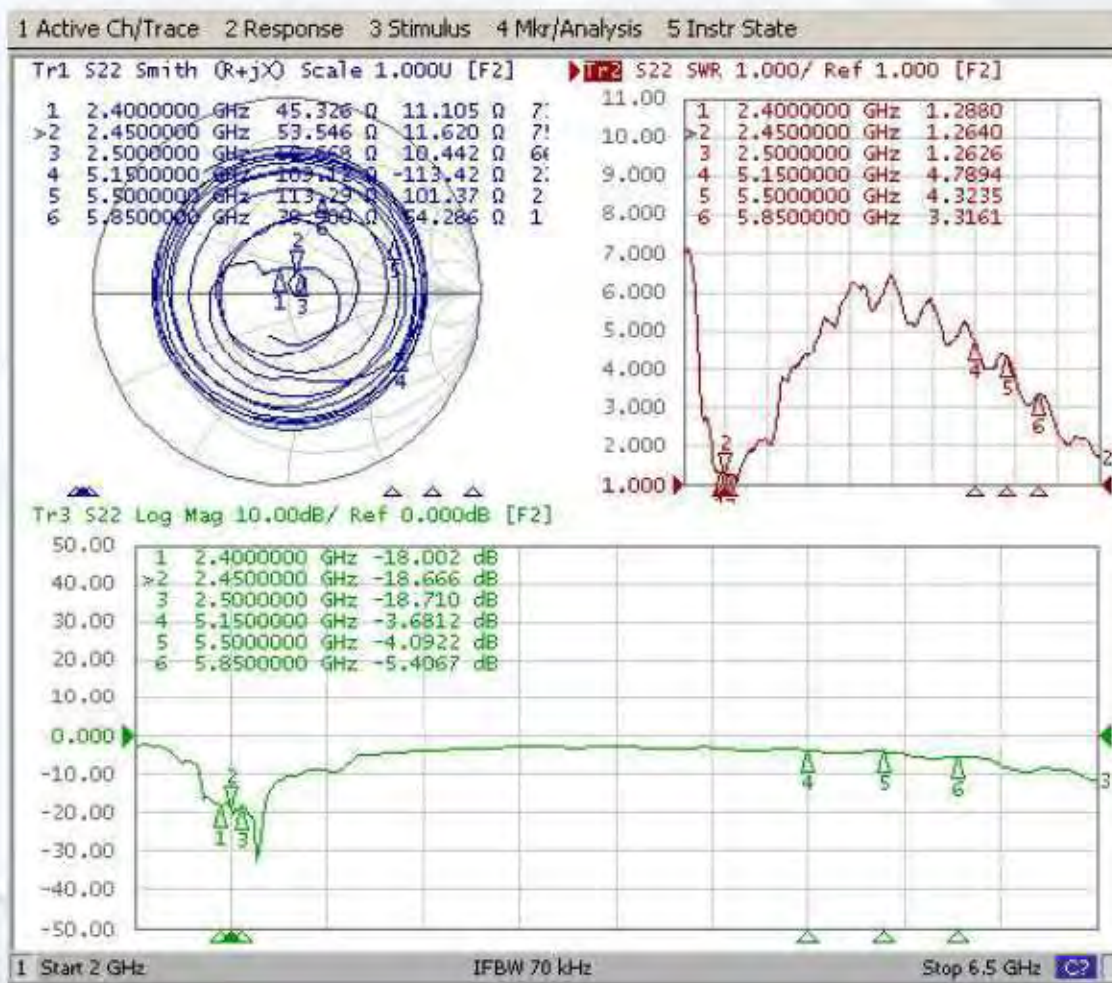
# Return Loss Results

2G3(Criterion:>10 dB)



# Return Loss Results

2G4(Criterion:>10 dB)



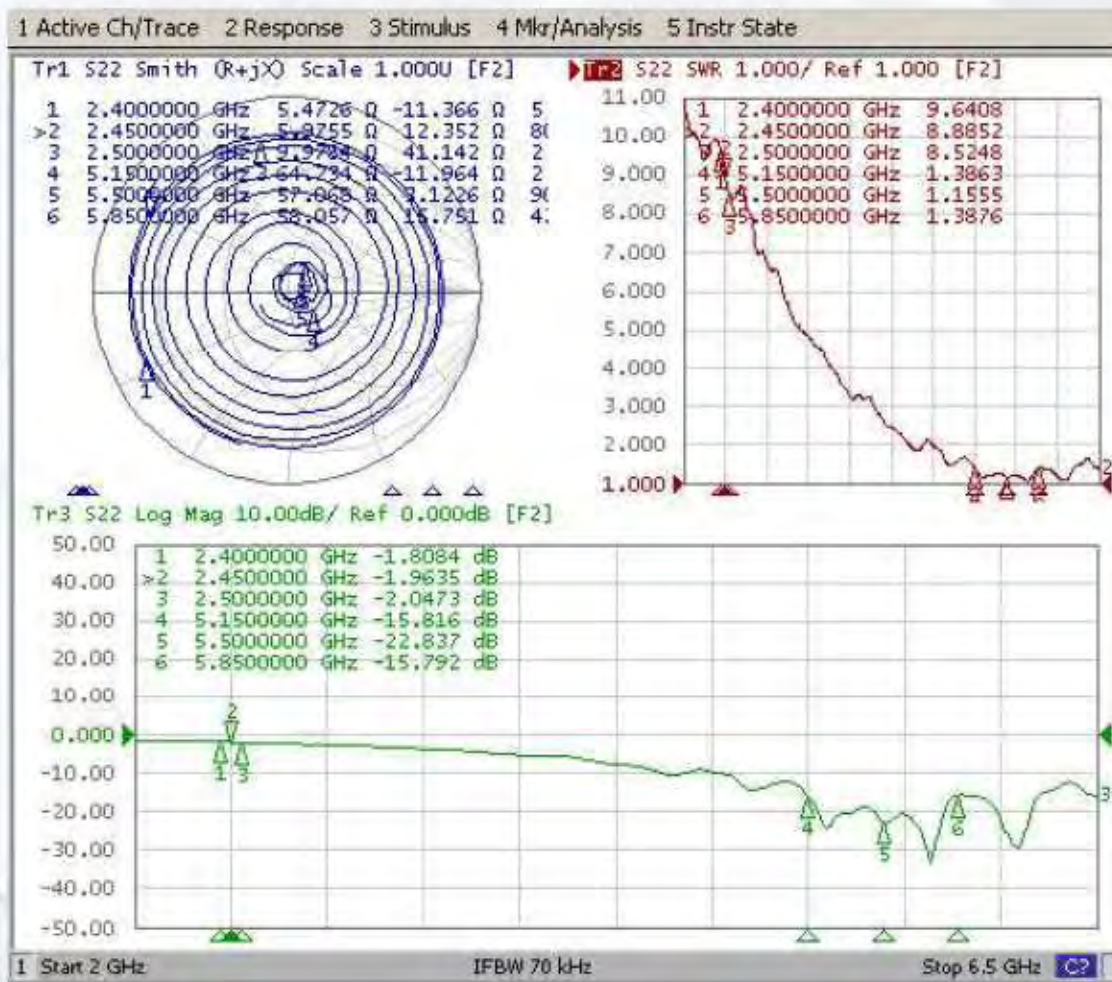
# Return Loss Results

BT(Criterion:>10 dB)



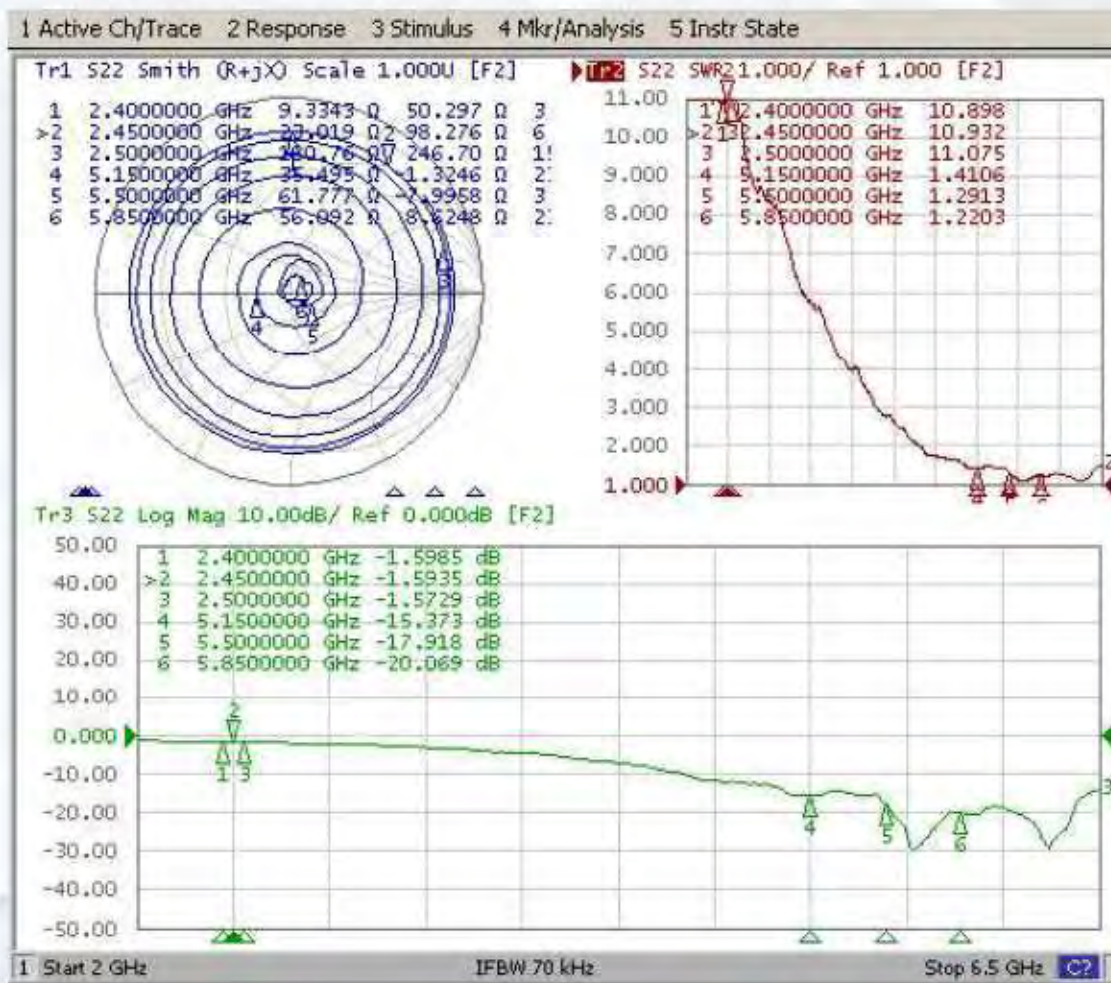
# Return Loss Results

5G1(Criterion:>10 dB)



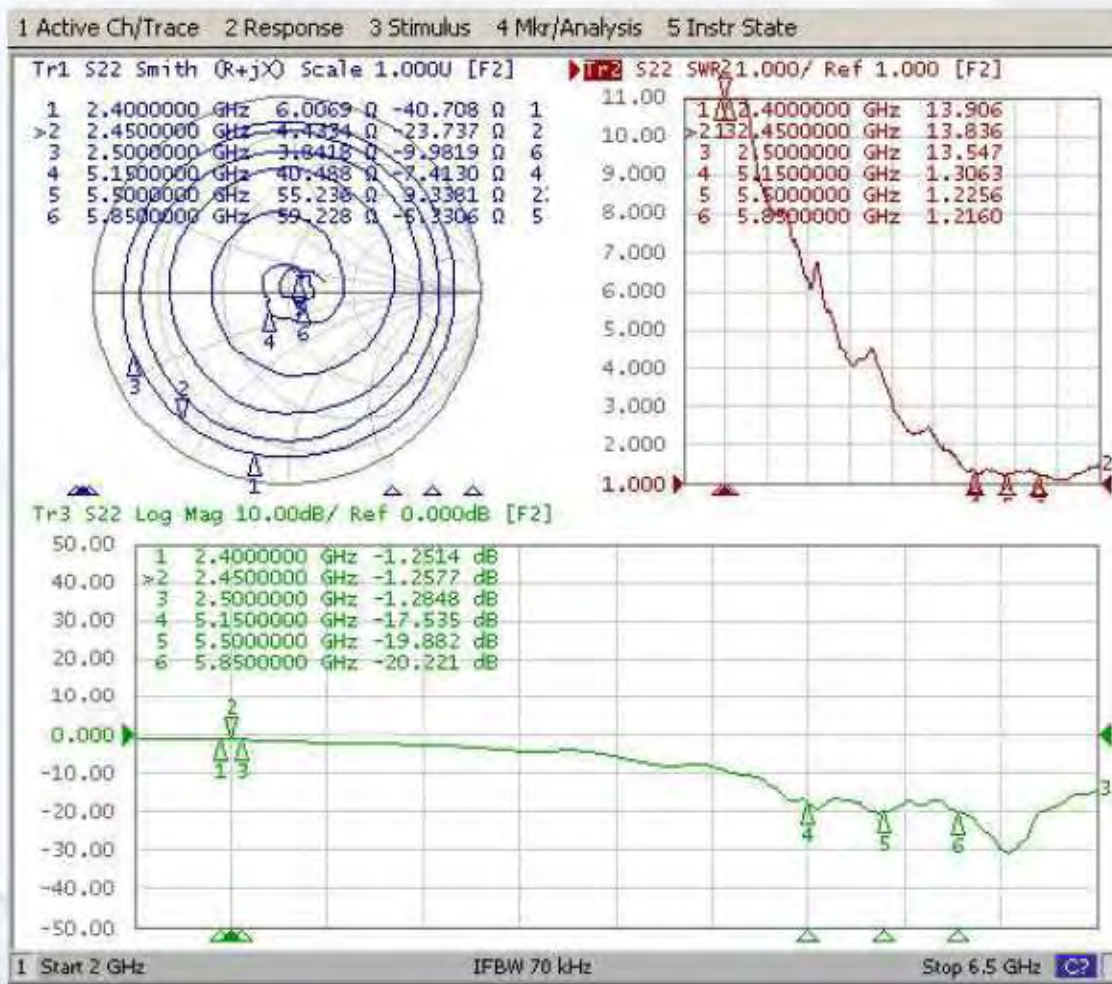
# Return Loss Results

5G2(Criterion:>10 dB)



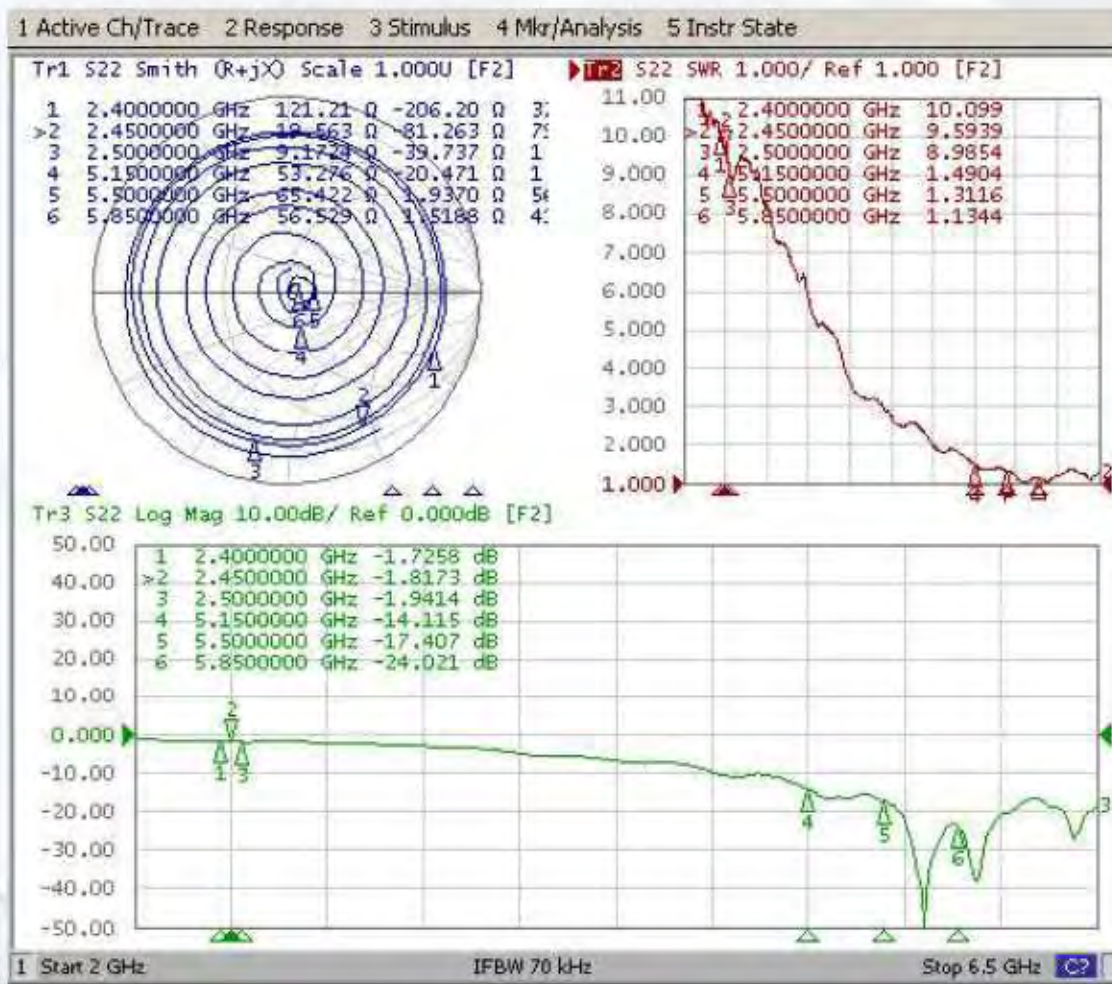
# Return Loss Results

5G3(Criterion:>10 dB)



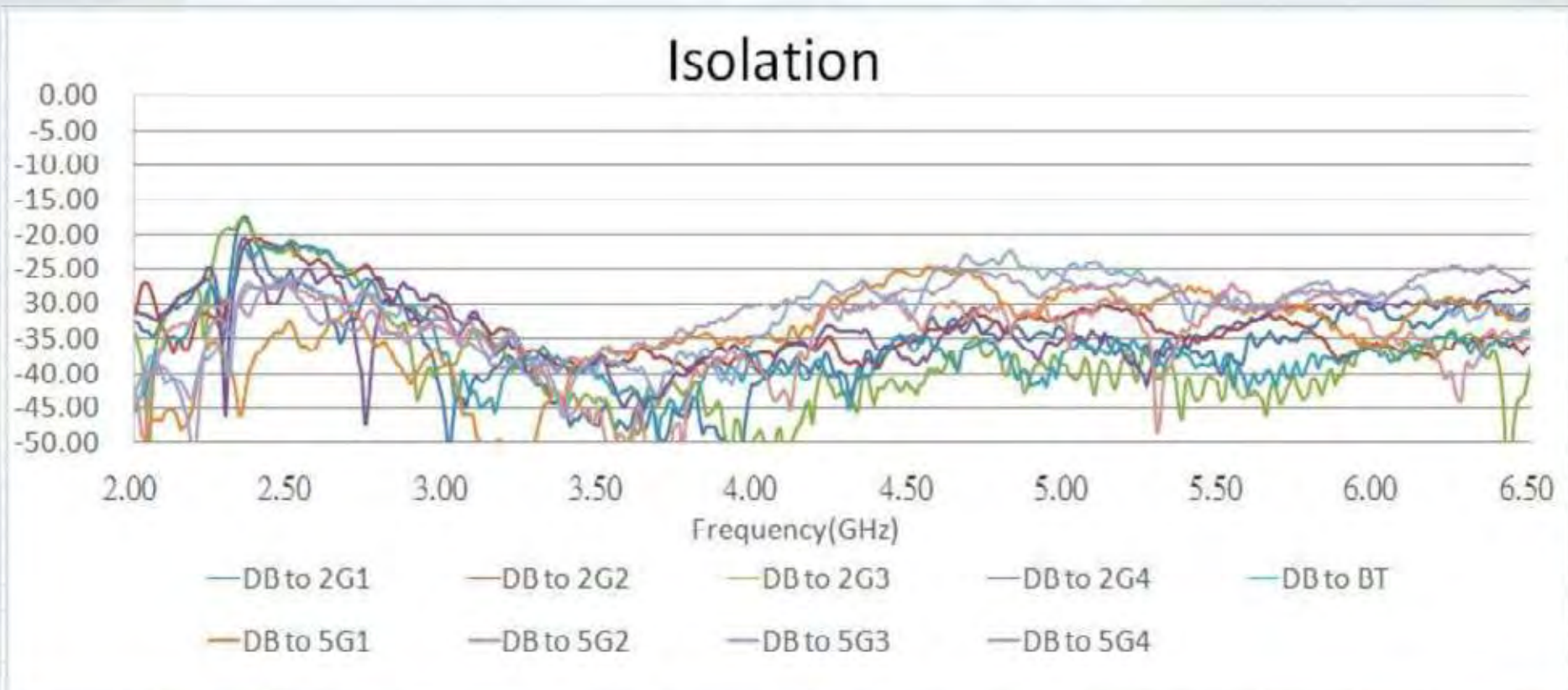
# Return Loss Results

5G4(Criterion:>10 dB)



# Isolation Results

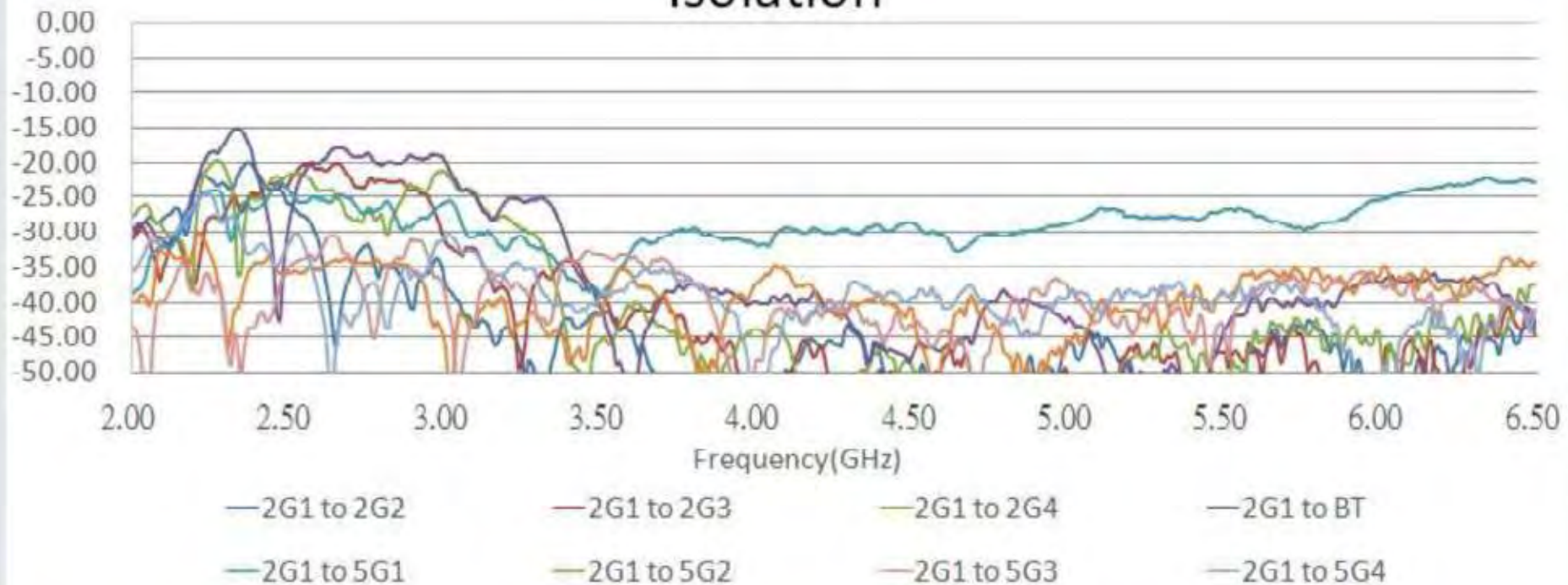
(Criterion: 2G>20dB , 5G>25dB)



# Isolation Results

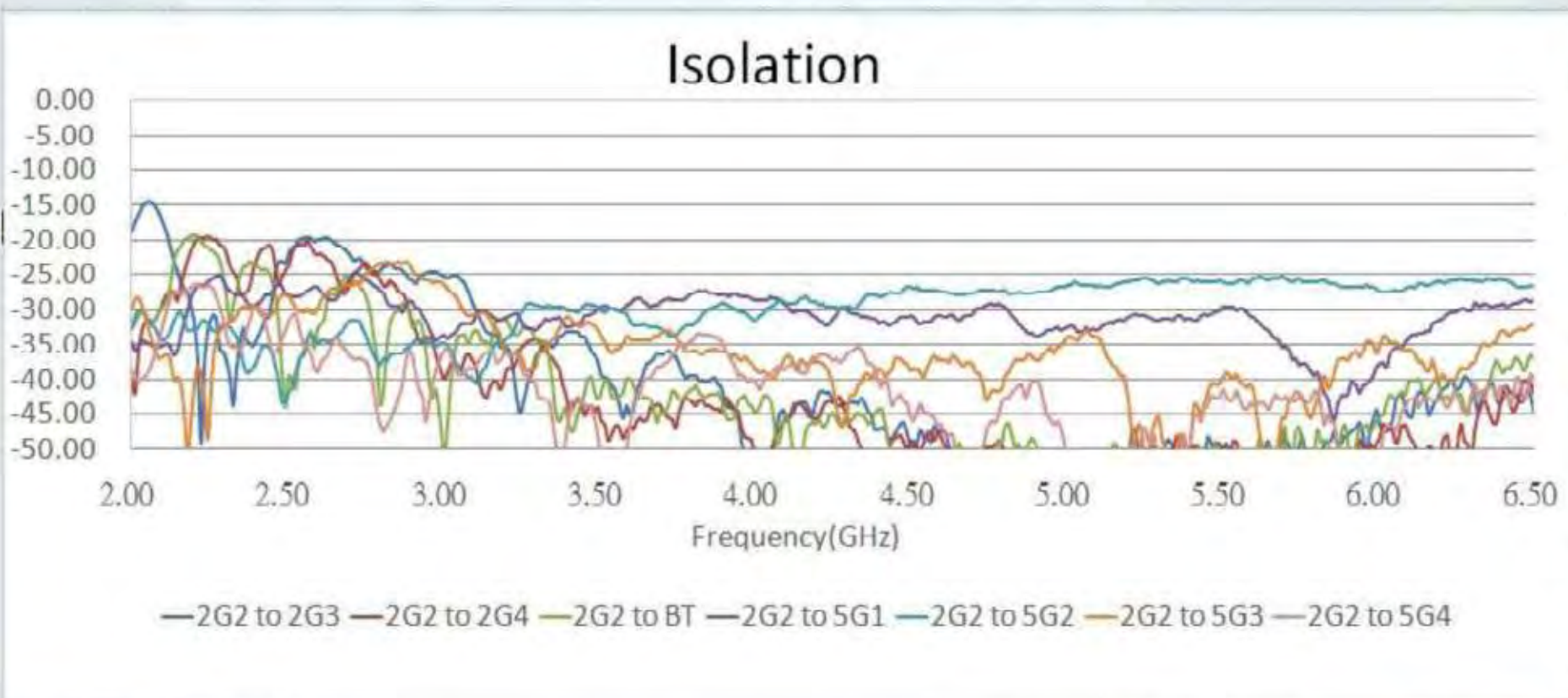
(Criterion: 2G>20dB , 5G>25dB)

## Isolation



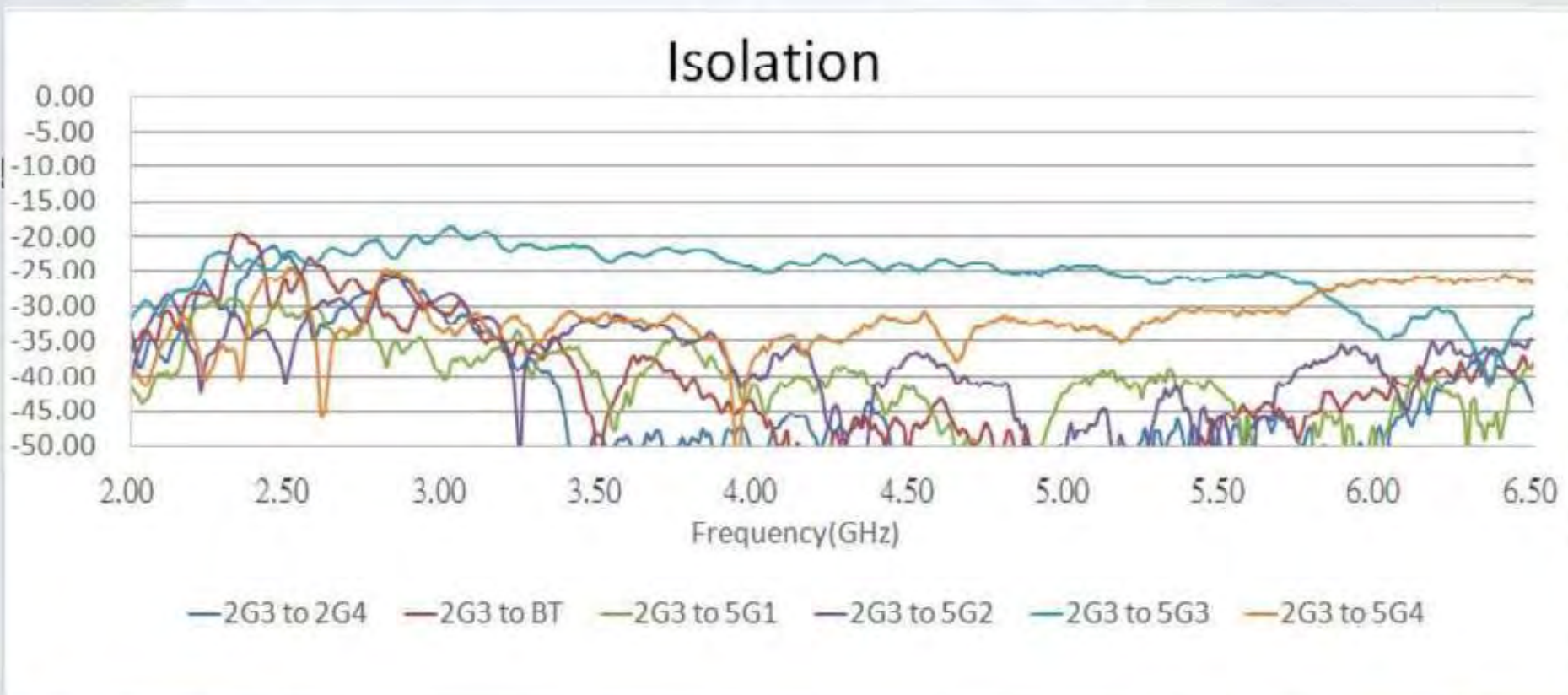
# Isolation Results

(Criterion: 2G>20dB , 5G>25dB )



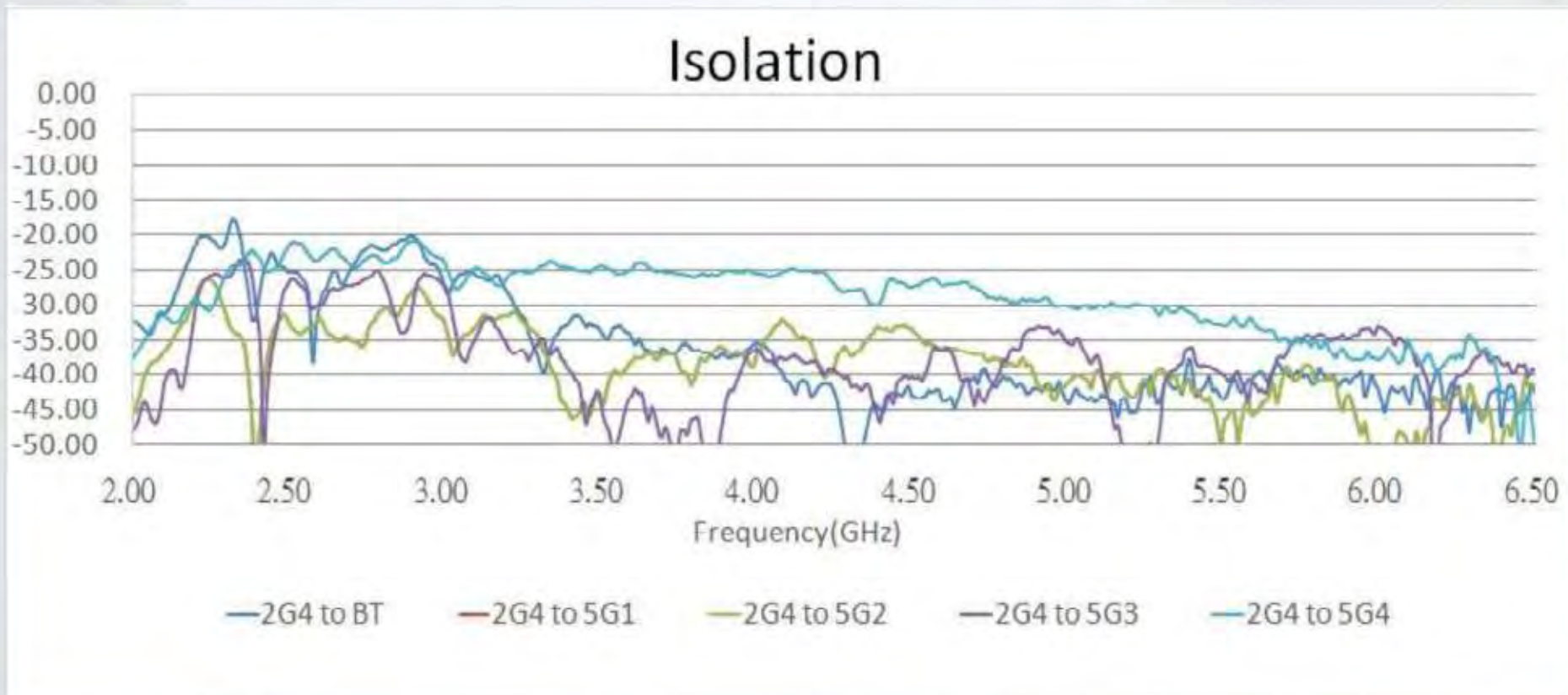
# Isolation Results

(Criterion: 2G>20dB , 5G>25dB )



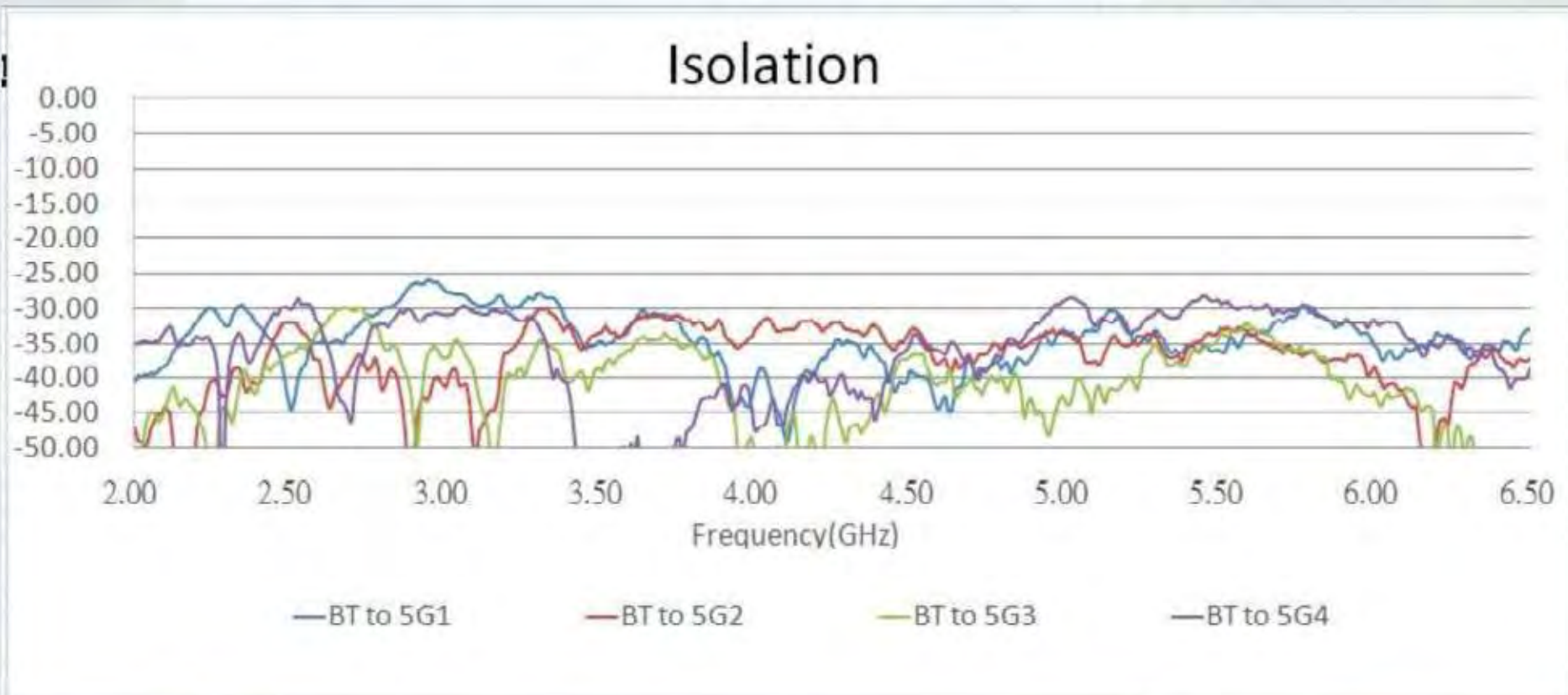
# Isolation Results

(Criterion: 2G>20dB , 5G>25dB )



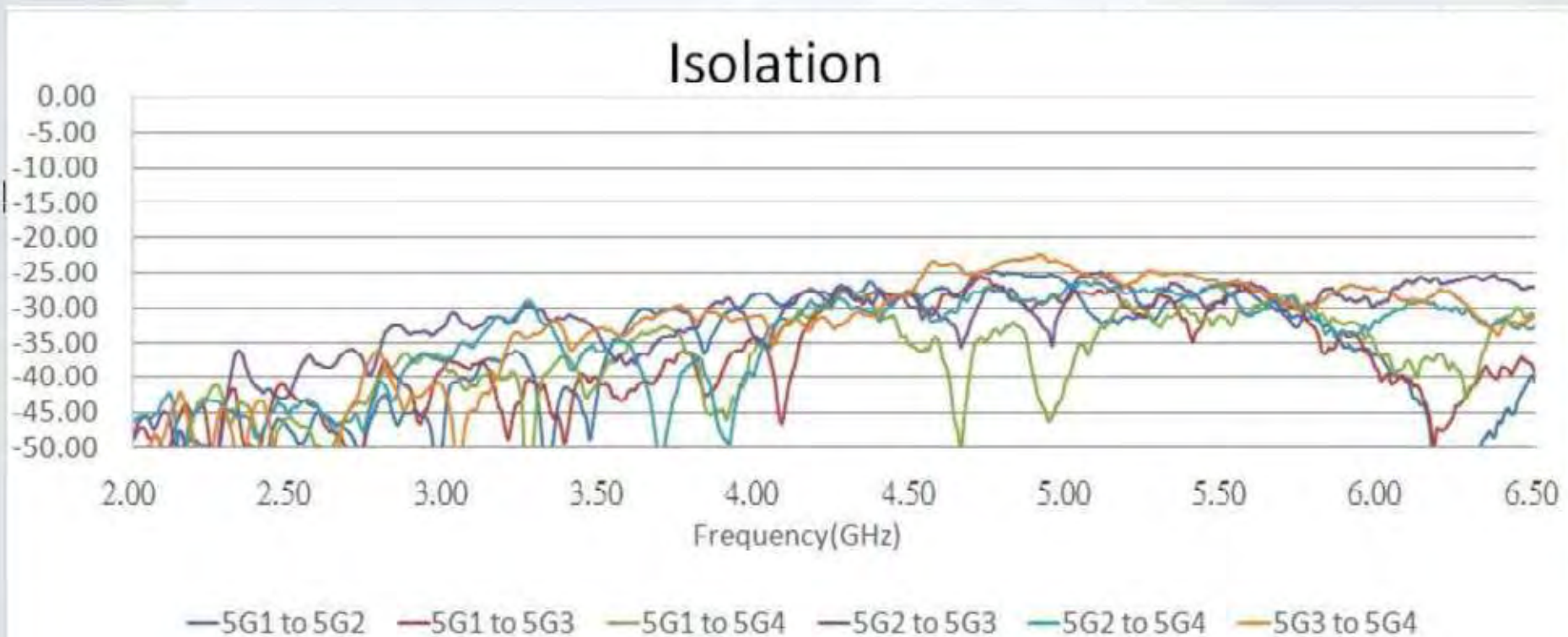
# Isolation Results

(Criterion: 2G>20dB , 5G>25dB )



# Isolation Results

(Criterion: 2G>20dB , 5G>25dB )

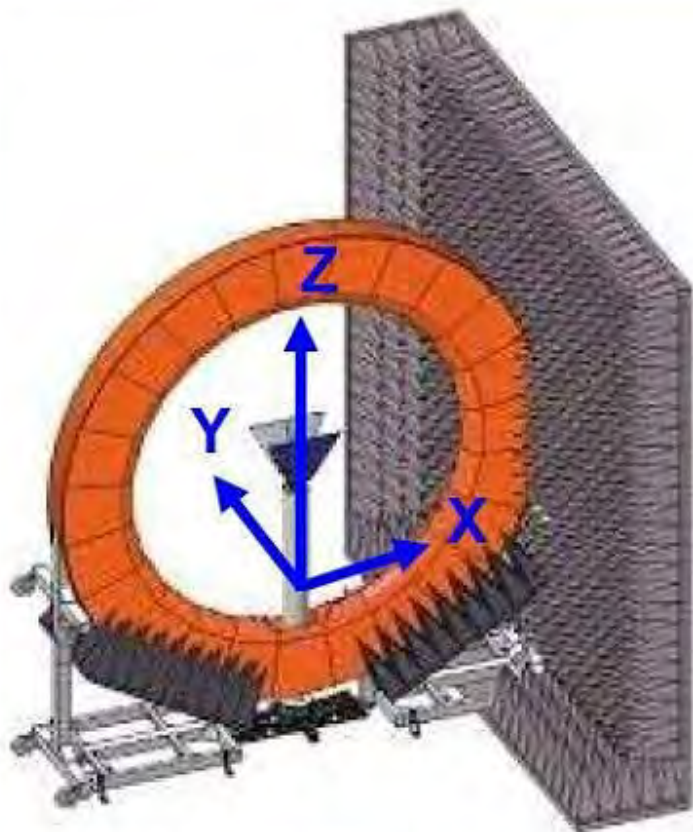


# Test Setup for Radiation Pattern Measurement

TEST EQUIPMENT & SOFTWARE SYSTEM: SATIMO SG-24L

- SATIMO SG-24L Multi-Probe Antenna Measurement System
  - Angle between probes: 15°
  - Frequency range: 400 MHz – 8.5 GHz
  - Chamber Room Size: 5m L x 5m W x 5m H
  - Software: Wave Studio
  - Calibration date: 2021.12.20

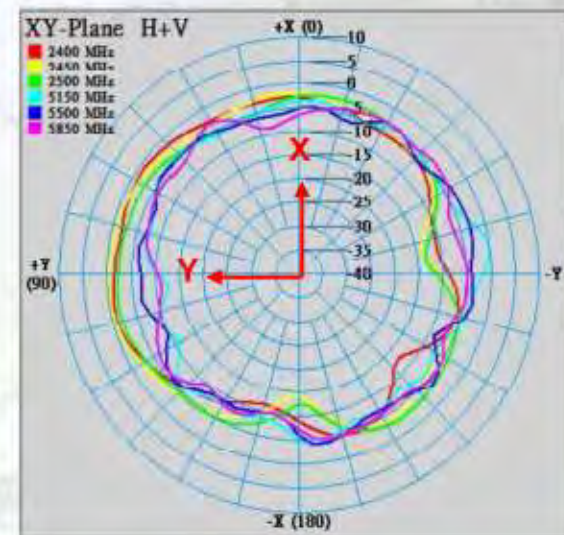
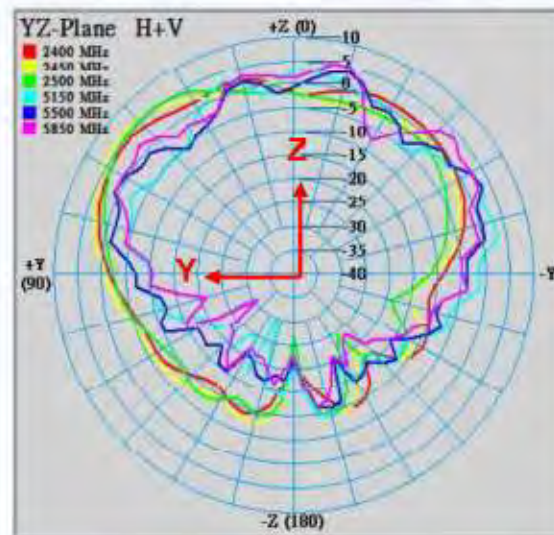
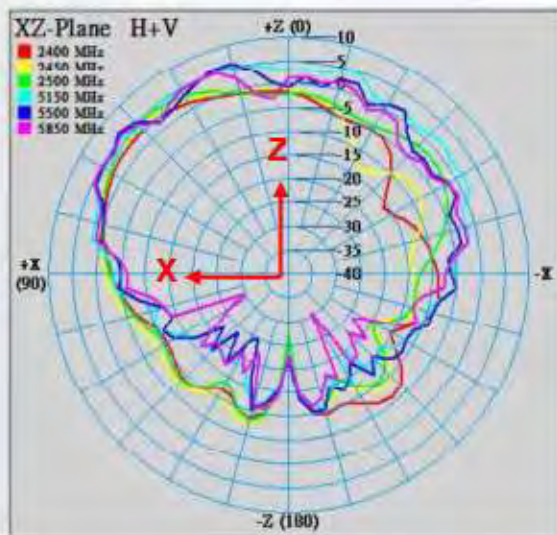
## Chamber Information



# 2D Radiation Pattern Results

DB

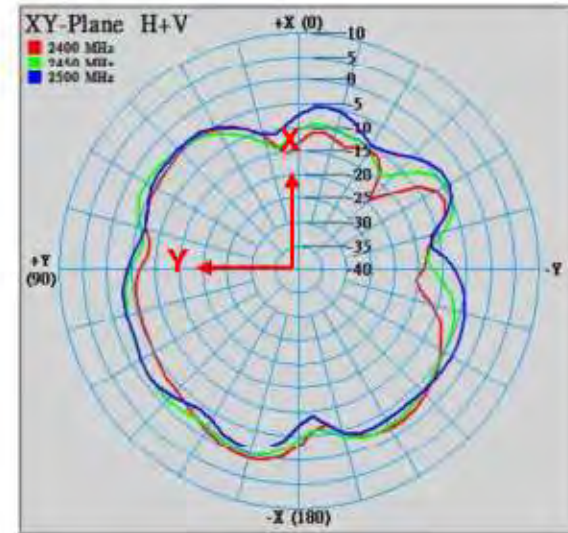
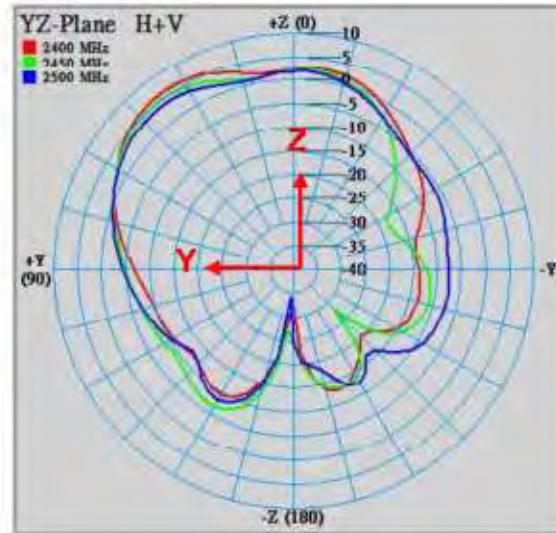
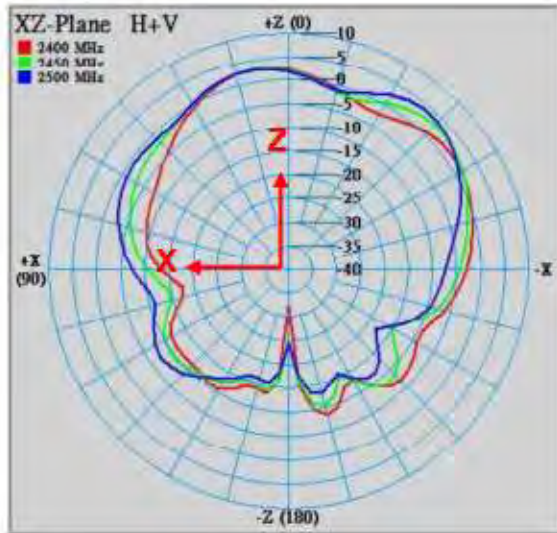
X-Y-Z Plane Photo : Please refer to X-Y-Z Plane photo-1 of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

2G1

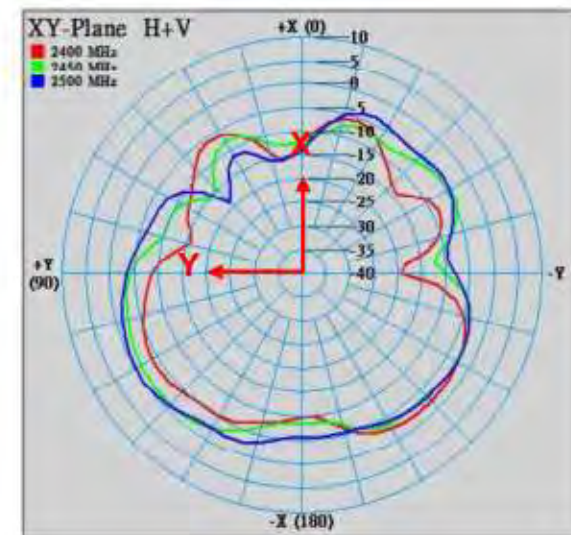
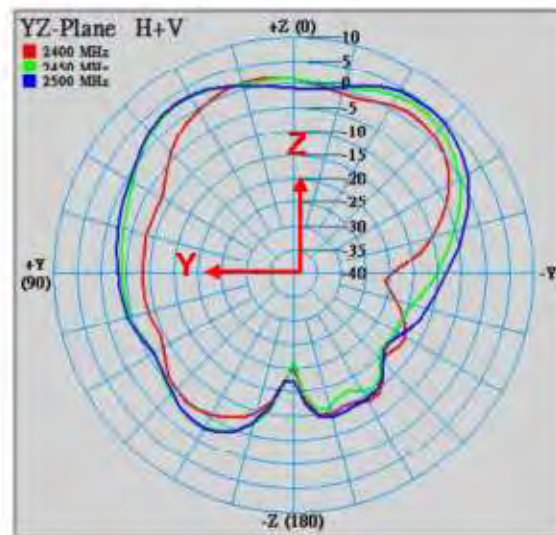
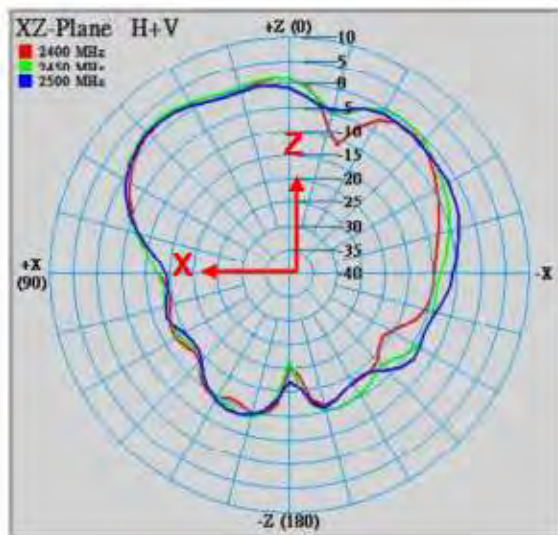
X-Y-Z Plane Photo : Please refer to X-Y-Z Plane photo-1 of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

2G2

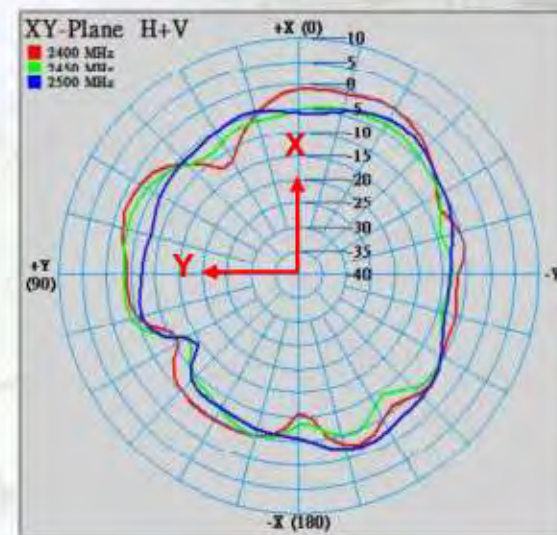
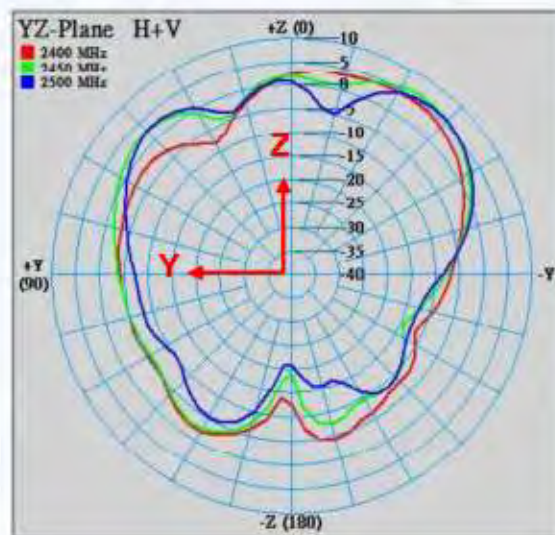
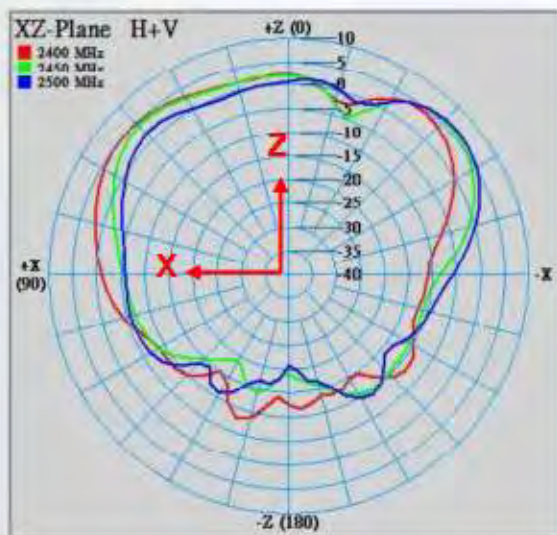
X-Y-Z Plane photo : please refer to X-Y-Z Plane photo of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

2G3

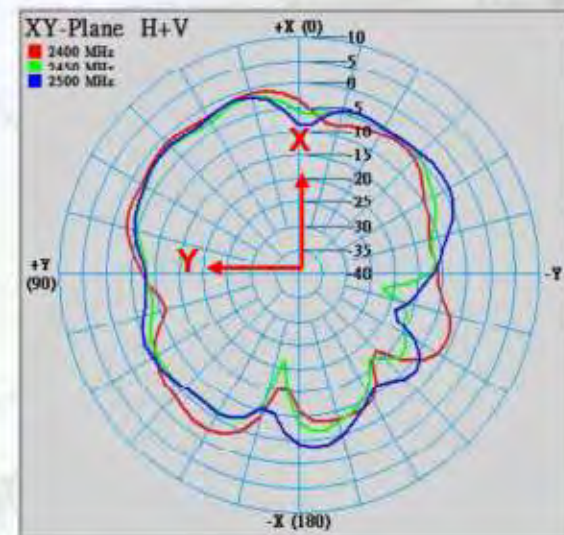
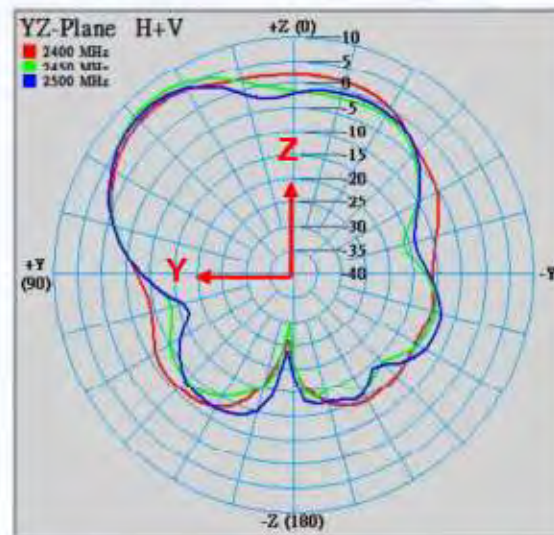
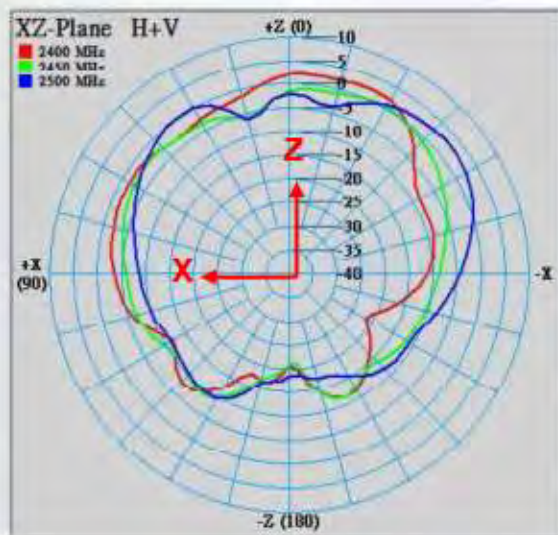
X-Y-Z Plane photo : please refer to X-Y-Z Plane photo of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

2G4

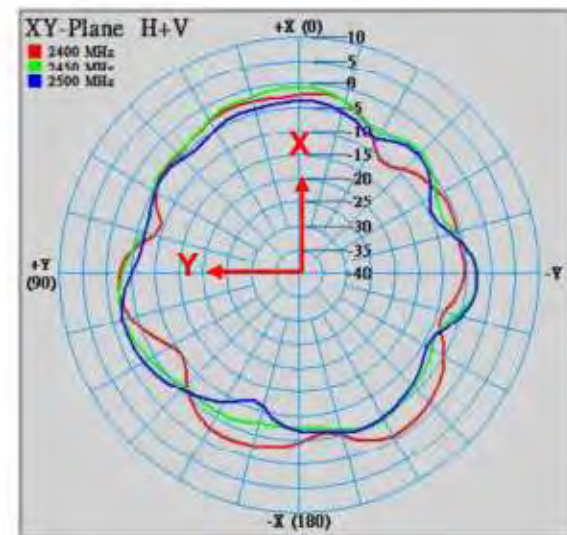
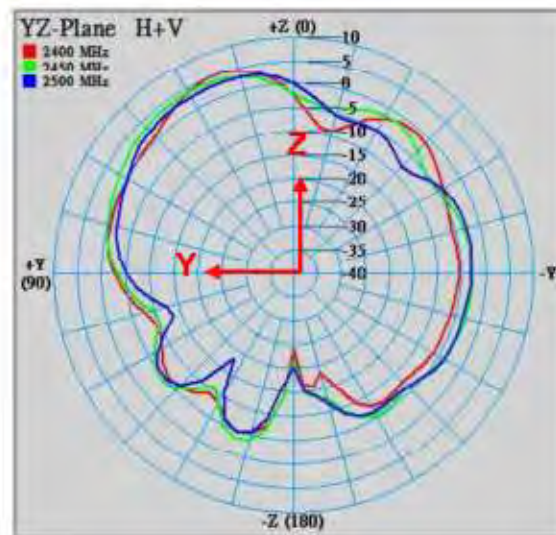
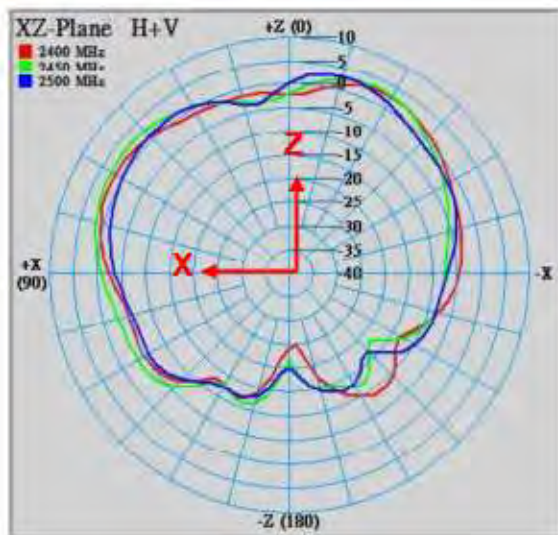
X-Y-Z Plane photo : please refer to X-Y-Z Plane photo of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

BT

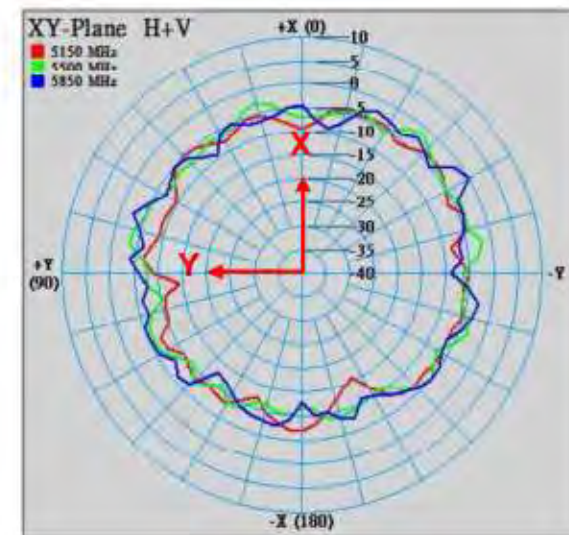
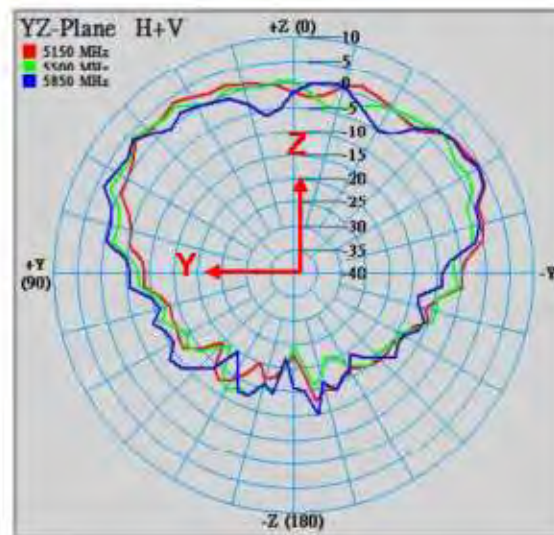
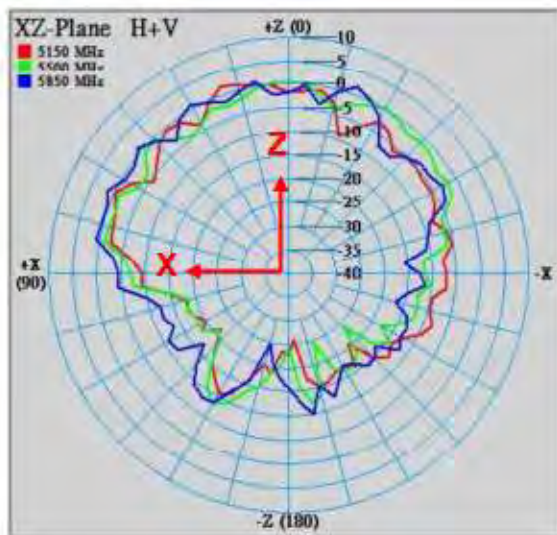
X-Y-Z Plane photo : please refer to X-Y-Z Plane photo of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

5G1

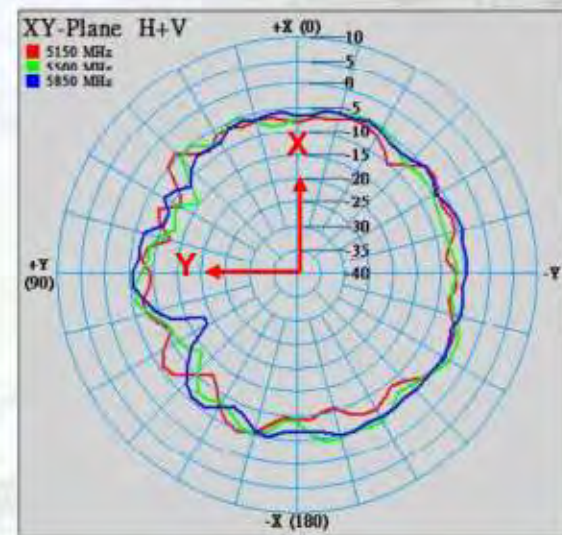
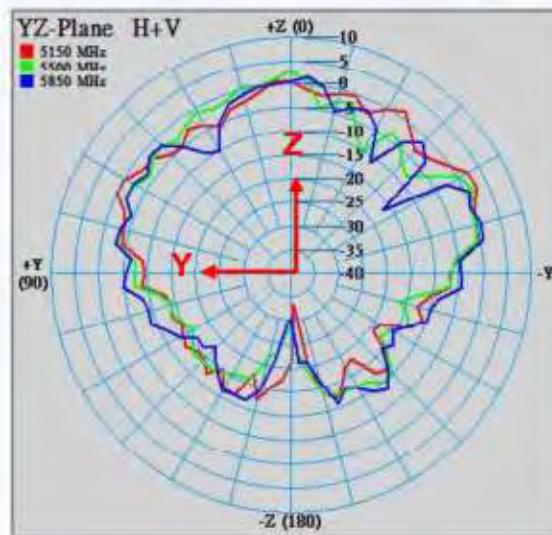
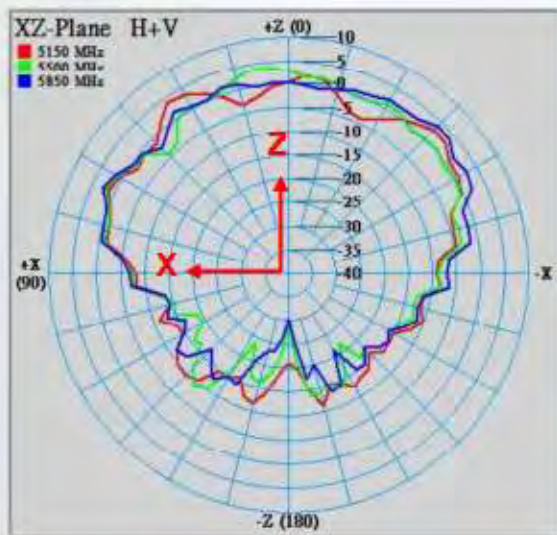
X-Y-Z Plane photo : please refer to X-Y-Z Plane photo of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

## 5G2

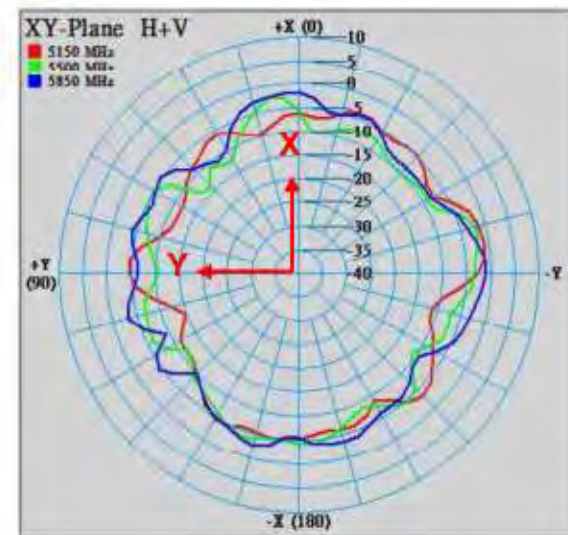
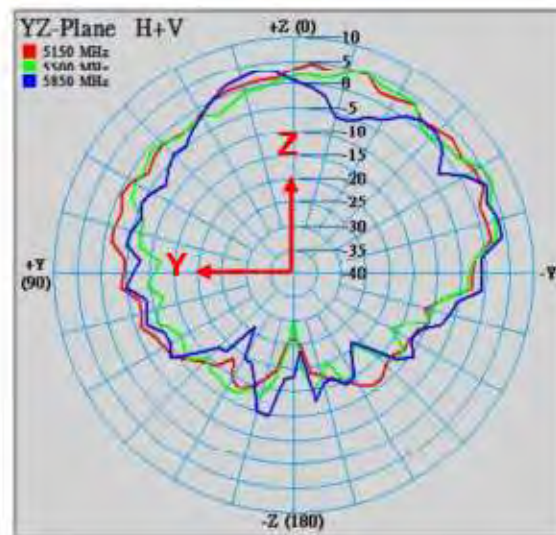
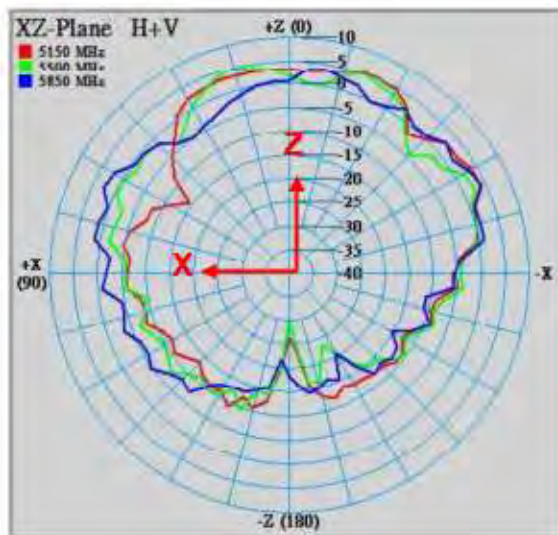
X-Y-Z Plane photo : please refer to X-Y-Z Plane photo of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

5G3

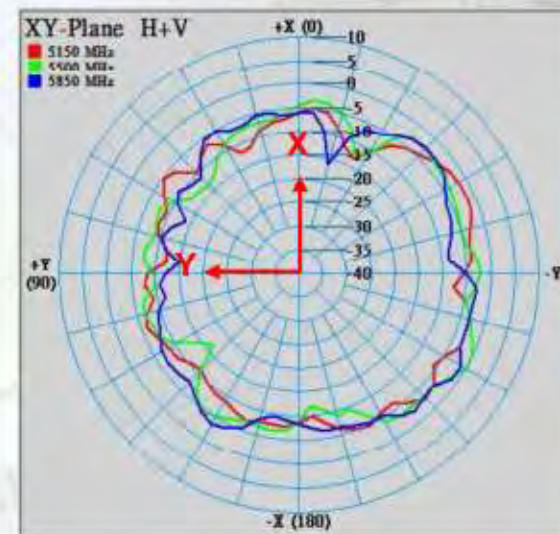
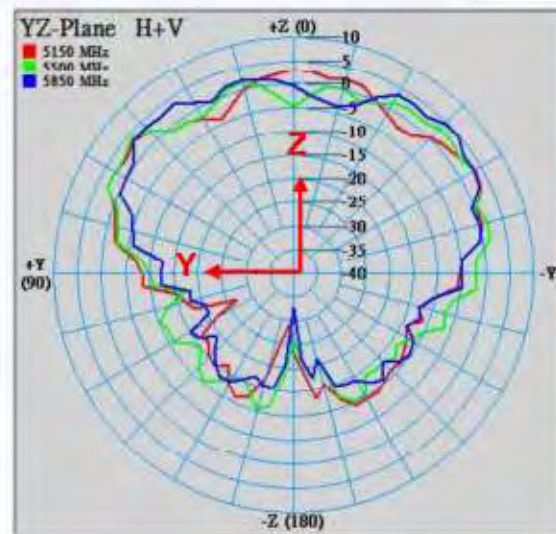
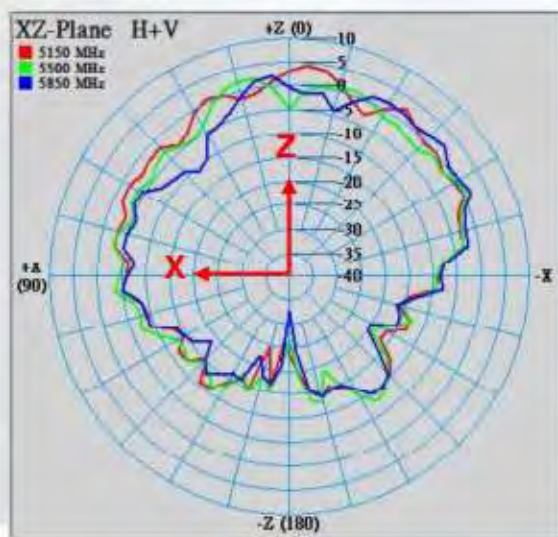
X-Y-Z Plane photo : please refer to X-Y-Z Plane photo of Test Set Up Photos (Antenna spec.)



# 2D Radiation Pattern Results

5G4

X-Y-Z Plane photo : please refer to X-Y-Z Plane photo of Test Set Up Photos (Antenna spec.)



# Results Summary

## Return Loss (Criterion: >10dB)

| Frequency (MHz) | DB (dB) |
|-----------------|---------|
| 2400            | 13      |
| 2450            | 16      |
| 2500            | 14      |
| 5150            | 23      |
| 5500            | 11      |
| 5850            | 11      |

| Frequency (MHz) | 2G1 (dB) | 2G2 (dB) | 2G3 (dB) | 2G4 (dB) | BT (dB) |
|-----------------|----------|----------|----------|----------|---------|
| 2400            | 12       | 16       | 13       | 18       | 18      |
| 2450            | 15       | 21       | 16       | 18       | 24      |
| 2500            | 21       | 32       | 22       | 18       | 23      |

# Results Summary

## Return Loss (Criterion: >10dB)

| Frequency<br>(MHz) | 5G1<br>(dB) | 5G2<br>(dB) | 5G3<br>(dB) | 5G4<br>(dB) |
|--------------------|-------------|-------------|-------------|-------------|
| 5150               | 15          | 15          | 17          | 14          |
| 5500               | 22          | 18          | 20          | 17          |
| 5850               | 15          | 20          | 20          | 24          |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | DB<br>&<br>2G1<br>(dB) | DB<br>&<br>2G2<br>(dB) | DB<br>&<br>2G3<br>(dB) | DB<br>&<br>2G4<br>(dB) | DB<br>&<br>BT<br>(dB) |
|--------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|
| 2400               | 21                     | 20                     | 21                     | 25                     | 22                    |
| 2450               | 26                     | 21                     | 22                     | 30                     | 21                    |
| 2500               | 26                     | 21                     | 22                     | 25                     | 21                    |
| 5150               | 36                     | 30                     | 41                     | 34                     | 36                    |
| 5500               | 40                     | 34                     | 43                     | 33                     | 38                    |
| 5850               | 32                     | 36                     | 39                     | 30                     | 37                    |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | DB<br>&<br>5G1<br>(dB) | DB<br>&<br>5G2<br>(dB) | DB<br>&<br>5G3<br>(dB) | DB<br>&<br>5G4<br>(dB) |
|--------------------|------------------------|------------------------|------------------------|------------------------|
| 2400               | 37                     | 27                     | 27                     | 28                     |
| 2450               | 34                     | 27                     | 27                     | 26                     |
| 2500               | 32                     | 27                     | 26                     | 26                     |
| 5150               | 28                     | 29                     | 25                     | 27                     |
| 5500               | 29                     | 28                     | 28                     | 30                     |
| 5850               | 32                     | 28                     | 27                     | 28                     |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | 2G1<br>&<br>2G2<br>(dB) | 2G1<br>&<br>2G3<br>(dB) | 2G1<br>&<br>2G4<br>(dB) | 2G1<br>&<br>BT<br>(dB) |
|--------------------|-------------------------|-------------------------|-------------------------|------------------------|
| 2400               | 21                      | 24                      | 25                      | 21                     |
| 2450               | 23                      | 23                      | 22                      | 34                     |
| 2500               | 25                      | 23                      | 21                      | 29                     |
| 5150               | 47                      | 50                      | 52                      | 56                     |
| 5500               | 58                      | 47                      | 50                      | 43                     |
| 5850               | 45                      | 61                      | 44                      | 40                     |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency (MHz) | 2G1<br>&<br>5G1<br>(dB) | 2G1<br>&<br>5G2<br>(dB) | 2G1<br>&<br>5G3<br>(dB) | 2G1<br>&<br>5G4<br>(dB) |
|-----------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 2400            | 26                      | 34                      | 42                      | 32                      |
| 2450            | 23                      | 34                      | 41                      | 34                      |
| 2500            | 23                      | 35                      | 35                      | 31                      |
| 5150            | 26                      | 40                      | 43                      | 38                      |
| 5500            | 26                      | 38                      | 45                      | 38                      |
| 5850            | 28                      | 37                      | 37                      | 43                      |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | 2G2<br>&<br>2G3<br>(dB) | 2G2<br>&<br>2G4<br>(dB) | 2G2<br>&<br>BT<br>(dB) |
|--------------------|-------------------------|-------------------------|------------------------|
| 2400               | 34                      | 22                      | 23                     |
| 2450               | 28                      | 21                      | 25                     |
| 2500               | 22                      | 23                      | 42                     |
| 5150               | 51                      | 52                      | 49                     |
| 5500               | 50                      | 51                      | 51                     |
| 5850               | 48                      | 62                      | 52                     |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequen<br>cy (MHz) | 2G2<br>&<br>5G1<br>(dB) | 2G2<br>&<br>5G2<br>(dB) | 2G2<br>&<br>5G3<br>(dB) | 2G2<br>&<br>5G4<br>(dB) |
|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 2400                | 29                      | 37                      | 29                      | 29                      |
| 2450                | 27                      | 36                      | 30                      | 36                      |
| 2500                | 27                      | 42                      | 28                      | 32                      |
| 5150                | 31                      | 26                      | 38                      | 55                      |
| 5500                | 29                      | 25                      | 39                      | 41                      |
| 5850                | 45                      | 26                      | 40                      | 46                      |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | 2G3<br>&<br>2G4<br>(dB) | 2G3<br>&<br>BT<br>(dB) |
|--------------------|-------------------------|------------------------|
| 2400               | 23                      | 21                     |
| 2450               | 21                      | 30                     |
| 2500               | 22                      | 26                     |
| 5150               | 55                      | 55                     |
| 5500               | 52                      | 45                     |
| 5850               | 54                      | 42                     |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | 2G3<br>&<br>5G1<br>(dB) | 2G3<br>&<br>5G2<br>(dB) | 2G3<br>&<br>5G3<br>(dB) | 2G3<br>&<br>5G4<br>(dB) |
|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 2400               | 33                      | 33                      | 23                      | 27                      |
| 2450               | 30                      | 34                      | 24                      | 25                      |
| 2500               | 31                      | 40                      | 22                      | 24                      |
| 5150               | 39                      | 51                      | 25                      | 34                      |
| 5500               | 42                      | 45                      | 26                      | 30                      |
| 5850               | 45                      | 37                      | 28                      | 27                      |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | 2G4<br>&<br>BT<br>(dB) | 2G4<br>&<br>5G1<br>(dB) | 2G4<br>&<br>5G2<br>(dB) | 2G4<br>&<br>5G3<br>(dB) | 2G4<br>&<br>5G4<br>(dB) |
|--------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 2400               | 29                     | 50                      | 50                      | 33                      | 23                      |
| 2450               | 22                     | 33                      | 33                      | 35                      | 24                      |
| 2500               | 25                     | 32                      | 32                      | 26                      | 21                      |
| 5150               | 44                     | 40                      | 40                      | 47                      | 30                      |
| 5500               | 43                     | 46                      | 46                      | 40                      | 33                      |
| 5850               | 40                     | 40                      | 40                      | 34                      | 37                      |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | BT<br>&<br>5G1<br>(dB) | BT<br>&<br>5G2<br>(dB) | BT<br>&<br>5G3<br>(dB) | BT<br>&<br>5G4<br>(dB) |
|--------------------|------------------------|------------------------|------------------------|------------------------|
| 2400               | 32                     | 40                     | 40                     | 35                     |
| 2450               | 35                     | 34                     | 38                     | 30                     |
| 2500               | 43                     | 32                     | 36                     | 29                     |
| 5150               | 30                     | 34                     | 41                     | 31                     |
| 5500               | 36                     | 32                     | 33                     | 29                     |
| 5850               | 31                     | 37                     | 39                     | 31                     |

# Results Summary

Isolation (Criterion: 2G>20dB , 5G>25dB )

| Frequency<br>(MHz) | 5G1<br>&<br>5G2<br>(dB) | 5G1<br>&<br>5G3<br>(dB) | 5G1<br>&<br>5G4<br>(dB) | 5G2<br>&<br>5G3<br>(dB) | 5G2<br>&<br>5G4<br>(dB) | 5G3<br>&<br>5G4<br>(dB) |
|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 2400               | 53                      | 49                      | 48                      | 41                      | 48                      | 43                      |
| 2450               | 47                      | 42                      | 50                      | 42                      | 44                      | 49                      |
| 2500               | 47                      | 41                      | 45                      | 42                      | 44                      | 62                      |
| 5150               | 31                      | 27                      | 30                      | 26                      | 26                      | 26                      |
| 5500               | 26                      | 28                      | 31                      | 29                      | 27                      | 27                      |
| 5850               | 33                      | 35                      | 31                      | 27                      | 33                      | 27                      |

# Results Summary

## Peak gain & Efficiency –DB

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 2400            | 6.8             | 71.6           |
| 2450            | 6.5             | 73.5           |
| 2500            | 5.8             | 70.6           |
| 5150            | 5.9             | 69.3           |
| 5500            | 7.1             | 68.2           |
| 5850            | 6.9             | 67.8           |

# Results Summary

## Peak gain & Efficiency –2G1

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 2400            | 6.6             | 69.7           |
| 2450            | 6.2             | 70.7           |
| 2500            | 6.1             | 70.4           |

# Results Summary

## Peak gain & Efficiency –2G2

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 2400            | 7.2             | 72.5           |
| 2450            | 6.8             | 69.2           |
| 2500            | 6.0             | 70.7           |

# Results Summary

## Peak gain & Efficiency –2G3

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 2400            | 6.2             | 72.6           |
| 2450            | 6.4             | 72.1           |
| 2500            | 7.0             | 70.7           |

# Results Summary

## Peak gain & Efficiency –2G4

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 2400            | 6.1             | 72.3           |
| 2450            | 7.1             | 71.6           |
| 2500            | 6.5             | 69.2           |

# Results Summary

## Peak gain & Efficiency –BT

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 2400            | 5.1             | 70.9           |
| 2450            | 5.1             | 68.2           |
| 2500            | 6.1             | 71.3           |

# Results Summary

## Peak gain & Efficiency –5G1

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 5150            | 6.1             | 63.9           |
| 5500            | 6.8             | 65.5           |
| 5850            | 7.2             | 68.3           |

# Results Summary

## Peak gain & Efficiency –5G2

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 5150            | 7.1             | 67.4           |
| 5500            | 6.9             | 66.7           |
| 5850            | 7.4             | 65.1           |

# Results Summary

## Peak gain & Efficiency –5G3

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 5150            | 6.4             | 75.6           |
| 5500            | 7.2             | 75.8           |
| 5850            | 6.0             | 74.6           |

# Results Summary

## Peak gain & Efficiency –5G4

| Frequency (MHz) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|-----------------|----------------|
| 5150            | 6.5             | 69.5           |
| 5500            | 7.2             | 72.3           |
| 5850            | 6.7             | 70.6           |

# Summary & Comments

## Antenna Performance Summary

- Meet Specification.

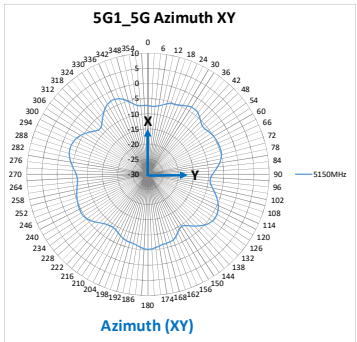
## Comments for Further Improvement

- To be confirmed by the customer.

# Antenna Datasheet (30 degrees)-5G1

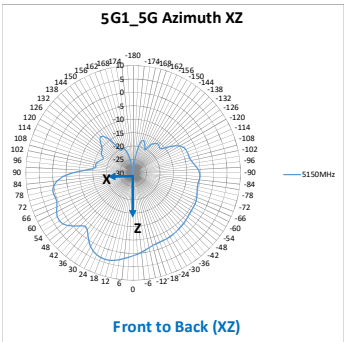
| 5.0GHz Band |             | Theta=90.000000000000(deg) X-Y |  |
|-------------|-------------|--------------------------------|--|
| Angle       | Phi         | 5150MHz                        |  |
| 0           | 0           | -7.227                         |  |
| 3           | 0.052359878 | -7.549                         |  |
| 6           | 0.104719735 | -7.404                         |  |
| 9           | 0.157079312 | -7.118                         |  |
| 12          | 0.20943951  | -6.583                         |  |
| 15          | 0.261799388 | -5.925                         |  |
| 18          | 0.314159265 | -5.31                          |  |
| 21          | 0.366519143 | -5.19                          |  |
| 24          | 0.41887902  | -4.994                         |  |
| 27          | 0.471238898 | -4.53                          |  |
| 30          | 0.523598776 | -4.012                         |  |
| 33          | 0.575958653 | -3.558                         |  |
| 36          | 0.628318531 | -3.307                         |  |
| 39          | 0.680678408 | -3.791                         |  |
| 42          | 0.733038286 | -4.568                         |  |
| 45          | 0.785398163 | -5.351                         |  |
| 48          | 0.837758041 | -5.97                          |  |
| 51          | 0.890117919 | -5.998                         |  |
| 54          | 0.942477796 | -5.644                         |  |
| 57          | 0.994837674 | -5.244                         |  |
| 60          | 1.047197551 | -4.934                         |  |
| 63          | 1.099557429 | -4.776                         |  |
| 66          | 1.151917306 | -4.693                         |  |
| 69          | 1.204277184 | -4.646                         |  |
| 72          | 1.256637061 | -4.669                         |  |
| 75          | 1.308996939 | -4.872                         |  |
| 78          | 1.361356817 | -5.314                         |  |
| 81          | 1.413716694 | -6                             |  |
| 84          | 1.466076572 | -6.978                         |  |
| 87          | 1.518436449 | -7.864                         |  |
| 90          | 1.570796327 | -8.723                         |  |
| 93          | 1.623156204 | -9.273                         |  |
| 96          | 1.675516082 | -9.388                         |  |
| 99          | 1.72787596  | -8.993                         |  |
| 102         | 1.780235837 | -8.222                         |  |
| 105         | 1.832595715 | -7.247                         |  |
| 108         | 1.884955592 | -6.255                         |  |
| 111         | 1.93731547  | -5.348                         |  |
| 114         | 1.989675347 | -4.577                         |  |
| 117         | 2.042035225 | -3.989                         |  |
| 120         | 2.094395102 | -3.629                         |  |
| 123         | 2.14675498  | -3.533                         |  |
| 126         | 2.199114858 | -3.722                         |  |
| 129         | 2.251474735 | -4.203                         |  |
| 132         | 2.303834613 | -4.959                         |  |
| 135         | 2.35619449  | -5.919                         |  |
| 138         | 2.408554368 | -7.009                         |  |
| 141         | 2.460914245 | -8.187                         |  |
| 144         | 2.513274123 | -9.152                         |  |
| 147         | 2.565634    | -9.548                         |  |
| 150         | 2.617993878 | -9.211                         |  |
| 153         | 2.670353756 | -8.42                          |  |
| 156         | 2.722713633 | -7.395                         |  |
| 159         | 2.77507351  | -6.478                         |  |
| 162         | 2.827433388 | -6.532                         |  |
| 165         | 2.879793266 | -6.425                         |  |
| 168         | 2.932153143 | -6.327                         |  |
| 171         | 2.984513021 | -6.067                         |  |
| 174         | 3.036872899 | -5.659                         |  |
| 177         | 3.089232776 | -5.309                         |  |
| 180         | 3.141592654 | -5.2                           |  |
| 183         | 3.193952531 | -5.403                         |  |
| 186         | 3.246312409 | -5.834                         |  |
| 189         | 3.298672286 | -6.315                         |  |
| 192         | 3.351032164 | -6.638                         |  |
| 195         | 3.403392041 | -6.803                         |  |
| 198         | 3.455751919 | -6.845                         |  |
| 201         | 3.508111797 | -7.255                         |  |
| 204         | 3.560471674 | -7.775                         |  |
| 207         | 3.612831552 | -8.356                         |  |
| 210         | 3.665191429 | -8.858                         |  |
| 213         | 3.717551307 | -9.072                         |  |
| 216         | 3.769911184 | -8.921                         |  |
| 219         | 3.822271062 | -8.625                         |  |
| 222         | 3.874630939 | -8.122                         |  |
| 225         | 3.926990817 | -7.386                         |  |
| 228         | 3.979350695 | -6.508                         |  |
| 231         | 4.031710572 | -5.672                         |  |
| 234         | 4.08407045  | -5.034                         |  |
| 237         | 4.136430327 | -4.661                         |  |
| 240         | 4.188790205 | -4.548                         |  |
| 243         | 4.241150082 | -4.623                         |  |
| 246         | 4.29350996  | -4.814                         |  |
| 249         | 4.345869838 | -5.051                         |  |
| 252         | 4.398229715 | -5.327                         |  |
| 255         | 4.450589593 | -5.652                         |  |
| 258         | 4.50294947  | -6.029                         |  |
| 261         | 4.555309348 | -6.398                         |  |
| 264         | 4.607669225 | -6.652                         |  |
| 267         | 4.660029103 | -6.653                         |  |
| 270         | 4.71238898  | -6.336                         |  |
| 273         | 4.764748858 | -5.73                          |  |
| 276         | 4.817108736 | -4.962                         |  |
| 279         | 4.869468613 | -4.191                         |  |
| 282         | 4.921828491 | -3.54                          |  |
| 285         | 4.974188368 | -3.09                          |  |
| 288         | 5.026548246 | -2.878                         |  |
| 291         | 5.078908123 | -2.906                         |  |
| 294         | 5.131268001 | -3.165                         |  |
| 297         | 5.183627878 | -3.637                         |  |
| 300         | 5.235987756 | -4.311                         |  |
| 303         | 5.288347634 | -5.189                         |  |
| 306         | 5.340707511 | -6.271                         |  |
| 309         | 5.393067389 | -7.381                         |  |
| 312         | 5.445427266 | -8.111                         |  |
| 315         | 5.497787144 | -8.13                          |  |
| 318         | 5.550147021 | -7.32                          |  |
| 321         | 5.602506899 | -6.177                         |  |
| 324         | 5.654866777 | -4.962                         |  |
| 327         | 5.707226654 | -3.99                          |  |
| 330         | 5.759586532 | -3.284                         |  |
| 333         | 5.811946409 | -2.806                         |  |
| 336         | 5.864306287 | -2.862                         |  |
| 339         | 5.916666164 | -3.226                         |  |
| 342         | 5.969026042 | -4.014                         |  |
| 345         | 6.021385919 | -5.07                          |  |
| 348         | 6.073745797 | -6.181                         |  |
| 351         | 6.126105675 | -6.96                          |  |
| 354         | 6.178465552 | -7.193                         |  |
| 357         | 6.23082543  | -7.229                         |  |

| Azimuth(XY)                      | 5150MHz |
|----------------------------------|---------|
| Max Value<br>30<θ<150            | -3.51   |
| Summary                          |         |
| Frequency                        | 5150    |
| Elevation angle above 30 degrees | 7.69    |



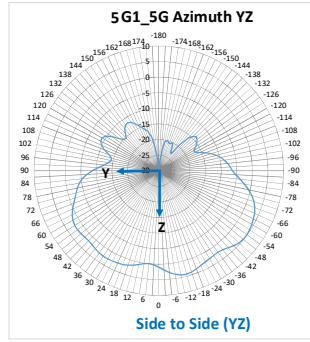
| Phi=0(deg) X-Z |             |
|----------------|-------------|
| Angle          | Theta       |
| -180           | -3.14159265 |
| -177           | -3.08923278 |
| -174           | -3.0368729  |
| -171           | -2.98451302 |
| -168           | -2.93215314 |
| -165           | -2.87979327 |
| -162           | -2.82743339 |
| -159           | -2.77507351 |
| -156           | -2.72271363 |
| -153           | -2.67035376 |
| -150           | -2.61799388 |
| -147           | -2.565634   |
| -144           | -2.51327412 |
| -141           | -2.46091425 |
| -138           | -2.40855437 |
| -135           | -2.35619449 |
| -132           | -2.30383461 |
| -129           | -2.25147474 |
| -126           | -2.19911486 |
| -123           | -2.14675498 |
| -120           | -2.0943951  |
| -117           | -2.04203522 |
| -114           | -1.98967535 |
| -111           | -1.93731547 |
| -108           | -1.88495559 |
| -105           | -1.83259571 |
| -102           | -1.78023584 |
| -99            | -1.72787596 |
| -96            | -1.67551608 |
| -93            | -1.6231562  |
| -90            | -1.57079633 |
| -87            | -1.51843645 |
| -84            | -1.46607657 |
| -81            | -1.41371669 |
| -78            | -1.36135682 |
| -75            | -1.30899694 |
| -72            | -1.25663706 |
| -69            | -1.20427718 |
| -66            | -1.15191731 |
| -63            | -1.09955743 |
| -60            | -1.04719755 |
| -57            | -0.99483767 |
| -54            | -0.94247778 |
| -51            | -0.89011792 |
| -48            | -0.83775804 |
| -45            | -0.78539816 |
| -42            | -0.73303829 |
| -39            | -0.68067841 |
| -36            | -0.62831853 |
| -33            | -0.57595865 |
| -30            | -0.52359878 |
| -27            | -0.47123889 |
| -24            | -0.41887902 |
| -21            | -0.36651914 |
| -18            | -0.31415927 |
| -15            | -0.26179939 |
| -12            | -0.20943951 |
| -9             | -0.15707963 |
| -6             | -0.10471976 |
| -3             | -0.05235988 |
| 0              | 0.00000000  |
| 3              | 0.05235988  |
| 6              | 0.10471976  |
| 9              | 0.15707963  |
| 12             | 0.20943951  |
| 15             | 0.26179939  |
| 18             | 0.31415927  |
| 21             | 0.36651914  |
| 24             | 0.41887902  |
| 27             | 0.47123889  |
| 30             | 0.52359878  |
| 33             | 0.57595865  |
| 36             | 0.62831853  |
| 39             | 0.68067841  |
| 42             | 0.73303829  |
| 45             | 0.78539816  |
| 48             | 0.83775804  |
| 51             | 0.89011792  |
| 54             | 0.94247778  |
| 57             | 0.99483767  |
| 60             | 1.04719755  |
| 63             | 1.09955743  |
| 66             | 1.15191731  |
| 69             | 1.20427718  |
| 72             | 1.25663706  |
| 75             | 1.30899694  |
| 78             | 1.36135682  |
| 81             | 1.41371669  |
| 84             | 1.46607657  |
| 87             | 1.51843645  |
| 90             | 1.57079633  |
| 93             | 1.6231562   |
| 96             | 1.67551608  |
| 99             | 1.72787596  |
| 102            | 1.78023584  |
| 105            | 1.83259571  |
| 108            | 1.88495559  |
| 111            | 1.93731547  |
| 114            | 1.98967535  |
| 117            | 2.04203522  |
| 120            | 2.0943951   |
| 123            | 2.14675498  |
| 126            | 2.19911486  |
| 129            | 2.25147474  |
| 132            | 2.30383461  |
| 135            | 2.35619449  |
| 138            | 2.40855437  |
| 141            | 2.46091425  |
| 144            | 2.51327412  |
| 147            | 2.565634    |
| 150            | 2.61799388  |
| 153            | 2.67035376  |
| 156            | 2.72271363  |
| 159            | 2.77507351  |
| 162            | 2.82743339  |
| 165            | 2.87979327  |
| 168            | 2.93215314  |
| 171            | 2.98451302  |
| 174            | 3.0368729   |
| 177            | 3.08923278  |

| From to Back(XZ)                 | 5150MHz |
|----------------------------------|---------|
| Max Value<br>30<θ<150            | -3.51   |
| Summary                          |         |
| Frequency                        | 5150    |
| Elevation angle above 30 degrees | 7.69    |



| Phi=90.000000000000(deg) Y-Z |           |
|------------------------------|-----------|
| Angle                        | Theta     |
| -180                         | -3.141593 |
| -177                         | -3.089233 |
| -174                         | -3.036873 |
| -171                         | -2.984513 |
| -168                         | -2.932153 |
| -165                         | -2.879793 |
| -162                         | -2.827433 |
| -159                         | -2.775074 |
| -156                         | -2.722714 |
| -153                         | -2.670354 |
| -150                         | -2.617994 |
| -147                         | -2.565634 |
| -144                         | -2.513274 |
| -141                         | -2.460914 |
| -138                         | -2.408554 |
| -135                         | -2.356194 |
| -132                         | -2.303835 |
| -129                         | -2.251475 |
| -126                         | -2.199115 |
| -123                         | -2.146755 |
| -120                         | -2.094395 |
| -117                         | -2.042035 |
| -114                         | -1.989675 |
| -111                         | -1.937315 |
| -108                         | -1.884956 |
| -105                         | -1.832596 |
| -102                         | -1.780236 |
| -99                          | -1.727876 |
| -96                          | -1.675516 |
| -93                          | -1.623156 |
| -90                          | -1.570796 |
| -87                          | -1.518436 |
| -84                          | -1.466077 |
| -81                          | -1.413717 |
| -78                          | -1.361357 |
| -75                          | -1.308997 |
| -72                          | -1.256637 |
| -69                          | -1.204277 |
| -66                          | -1.151917 |
| -63                          | -1.099557 |
| -60                          | -1.047198 |
| -57                          | -0.994838 |
| -54                          | -0.942478 |
| -51                          | -0.890118 |
| -48                          | -0.837758 |
| -45                          | -0.785398 |
| -42                          | -0.733038 |
| -39                          | -0.680678 |
| -36                          | -0.628319 |
| -33                          | -0.575959 |
| -30                          | -0.523599 |
| -27                          | -0.471239 |
| -24                          | -0.418879 |
| -21                          | -0.366519 |
| -18                          | -0.314159 |
| -15                          | -0.261799 |
| -12                          | -0.20944  |
| -9                           | -0.15708  |
| -6                           | -0.10472  |
| -3                           | -0.05236  |
| 0                            | 0.000000  |
| 3                            | 0.052360  |
| 6                            | 0.104719  |
| 9                            | 0.157079  |
| 12                           | 0.209439  |
| 15                           | 0.261799  |
| 18                           | 0.314159  |
| 21                           | 0.366519  |
| 24                           | 0.418879  |
| 27                           | 0.471239  |
| 30                           | 0.523599  |
| 33                           | 0.575959  |
| 36                           | 0.628319  |
| 39                           | 0.680678  |
| 42                           | 0.733038  |
| 45                           | 0.785398  |
| 48                           | 0.837758  |
| 51                           | 0.890119  |
| 54                           | 0.942478  |
| 57                           | 0.994837  |
| 60                           | 1.047197  |
| 63                           | 1.099557  |
| 66                           | 1.151917  |
| 69                           | 1.204277  |
| 72                           | 1.256637  |
| 75                           | 1.308996  |
| 78                           | 1.361358  |
| 81                           | 1.413716  |
| 84                           | 1.466076  |
| 87                           | 1.518436  |
| 90                           | 1.570796  |
| 93                           | 1.623156  |
| 96                           | 1.675516  |
| 99                           | 1.727876  |
| 102                          | 1.780236  |
| 105                          | 1.832597  |
| 108                          | 1.884956  |
| 111                          | 1.937315  |
| 114                          | 1.989675  |
| 117                          | 2.042035  |
| 120                          | 2.094395  |
| 123                          | 2.146755  |
| 126                          | 2.199119  |
| 129                          | 2.251477  |
| 132                          | 2.303836  |
| 135                          | 2.356195  |
| 138                          | 2.408554  |
| 141                          | 2.460912  |
| 144                          | 2.513274  |
| 147                          | 2.565634  |
| 150                          | 2.617993  |
| 153                          | 2.670353  |
| 156                          | 2.722716  |
| 159                          | 2.775075  |
| 162                          | 2.827434  |
| 165                          | 2.879793  |
| 168                          | 2.932153  |
| 171                          | 2.984513  |
| 174                          | 3.036872  |
| 177                          | 3.089232  |

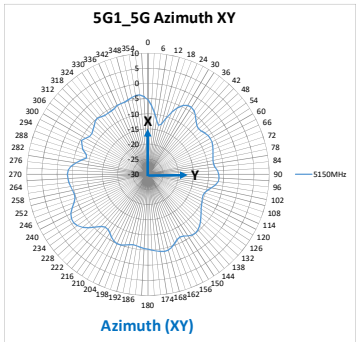
| Side to Side (YZ)                | 5150MHz |
|----------------------------------|---------|
| Max Value<br>30<θ<150            | -3.51   |
| Summary                          |         |
| Frequency                        | 5150    |
| Elevation angle above 30 degrees | 7.69    |



Antenna Datasheet (30 degrees)-5G2

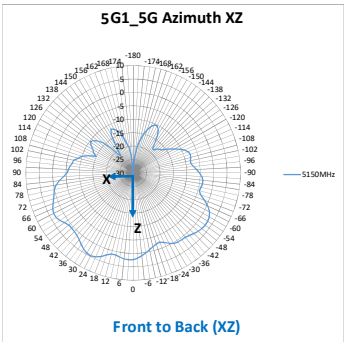
| 5.0GHz Band |             |         | Theta=90.00000000000002(deg) X-Y |  |
|-------------|-------------|---------|----------------------------------|--|
| Angle       | Phi         | 5150MHz |                                  |  |
| 0           | 0           | -5.388  |                                  |  |
| 3           | 0.052359878 | -7.272  |                                  |  |
| 6           | 0.104719755 | -9.462  |                                  |  |
| 9           | 0.157079633 | -11.826 |                                  |  |
| 12          | 0.209439511 | -13.465 |                                  |  |
| 15          | 0.261799388 | -12.842 |                                  |  |
| 18          | 0.314159265 | -10.325 |                                  |  |
| 21          | 0.366519143 | -8.011  |                                  |  |
| 24          | 0.418879021 | -5.905  |                                  |  |
| 27          | 0.471238898 | -4.45   |                                  |  |
| 30          | 0.523598776 | -3.731  |                                  |  |
| 33          | 0.575958653 | -3.644  |                                  |  |
| 36          | 0.628318531 | -4.131  |                                  |  |
| 39          | 0.680678408 | -5.076  |                                  |  |
| 42          | 0.733038286 | -6.256  |                                  |  |
| 45          | 0.785398163 | -7.205  |                                  |  |
| 48          | 0.837758041 | -7.504  |                                  |  |
| 51          | 0.890117919 | -7.305  |                                  |  |
| 54          | 0.942477796 | -6.809  |                                  |  |
| 57          | 0.994837674 | -6.39   |                                  |  |
| 60          | 1.047197551 | -6.252  |                                  |  |
| 63          | 1.099557429 | -6.309  |                                  |  |
| 66          | 1.151917306 | -6.65   |                                  |  |
| 69          | 1.204277184 | -7.004  |                                  |  |
| 72          | 1.256637061 | -7.566  |                                  |  |
| 75          | 1.308996939 | -7.757  |                                  |  |
| 78          | 1.361356817 | -8.021  |                                  |  |
| 81          | 1.413716694 | -8.064  |                                  |  |
| 84          | 1.466076572 | -7.743  |                                  |  |
| 87          | 1.518436449 | -6.976  |                                  |  |
| 90          | 1.570796327 | -6.583  |                                  |  |
| 93          | 1.623156204 | -6.459  |                                  |  |
| 96          | 1.675516082 | -6.684  |                                  |  |
| 99          | 1.72787596  | -7.455  |                                  |  |
| 102         | 1.780235837 | -8.638  |                                  |  |
| 105         | 1.832595715 | -9.697  |                                  |  |
| 108         | 1.884955592 | -10.326 |                                  |  |
| 111         | 1.93731547  | -10.553 |                                  |  |
| 114         | 1.989675347 | -10.362 |                                  |  |
| 117         | 2.042035225 | -9.984  |                                  |  |
| 120         | 2.094395102 | -9.621  |                                  |  |
| 123         | 2.14675498  | -9.083  |                                  |  |
| 126         | 2.199114858 | -8.363  |                                  |  |
| 129         | 2.251474735 | -7.538  |                                  |  |
| 132         | 2.303834613 | -6.678  |                                  |  |
| 135         | 2.35619449  | -5.896  |                                  |  |
| 138         | 2.408554368 | -5.324  |                                  |  |
| 141         | 2.460914245 | -5.082  |                                  |  |
| 144         | 2.513274123 | -5.23   |                                  |  |
| 147         | 2.565634    | -6.768  |                                  |  |
| 150         | 2.617993878 | -6.417  |                                  |  |
| 153         | 2.670353756 | -6.727  |                                  |  |
| 156         | 2.722713633 | -6.415  |                                  |  |
| 159         | 2.775073511 | -5.335  |                                  |  |
| 162         | 2.827433388 | -4.655  |                                  |  |
| 165         | 2.879793266 | -4.122  |                                  |  |
| 168         | 2.932153143 | -3.999  |                                  |  |
| 171         | 2.984513021 | -4.198  |                                  |  |
| 174         | 3.036872899 | -4.587  |                                  |  |
| 177         | 3.089232776 | -4.961  |                                  |  |
| 180         | 3.141592654 | -5.247  |                                  |  |
| 183         | 3.193952531 | -5.485  |                                  |  |
| 186         | 3.246312409 | -5.788  |                                  |  |
| 189         | 3.298672286 | -6.114  |                                  |  |
| 192         | 3.351032164 | -6.224  |                                  |  |
| 195         | 3.403392041 | -5.993  |                                  |  |
| 198         | 3.455751919 | -5.481  |                                  |  |
| 201         | 3.508111797 | -5.023  |                                  |  |
| 204         | 3.560471674 | -4.918  |                                  |  |
| 207         | 3.612831552 | -5.252  |                                  |  |
| 210         | 3.665191429 | -5.976  |                                  |  |
| 213         | 3.717551307 | -6.885  |                                  |  |
| 216         | 3.769911184 | -7.526  |                                  |  |
| 219         | 3.822271062 | -7.578  |                                  |  |
| 222         | 3.874630939 | -6.844  |                                  |  |
| 225         | 3.926990817 | -5.377  |                                  |  |
| 228         | 3.979350695 | -3.704  |                                  |  |
| 231         | 4.031710572 | -2.234  |                                  |  |
| 234         | 4.08407045  | -1.19   |                                  |  |
| 237         | 4.136430327 | -0.695  |                                  |  |
| 240         | 4.188790205 | -0.794  |                                  |  |
| 243         | 4.241150082 | -1.464  |                                  |  |
| 246         | 4.29350996  | -2.995  |                                  |  |
| 249         | 4.345869838 | -3.851  |                                  |  |
| 252         | 4.398229715 | -4.649  |                                  |  |
| 255         | 4.450589593 | -4.833  |                                  |  |
| 258         | 4.50294947  | -4.563  |                                  |  |
| 261         | 4.555309348 | -4.139  |                                  |  |
| 264         | 4.607669225 | -3.793  |                                  |  |
| 267         | 4.660029103 | -3.518  |                                  |  |
| 270         | 4.71238898  | -3.401  |                                  |  |
| 273         | 4.764748858 | -3.623  |                                  |  |
| 276         | 4.817108736 | -4.468  |                                  |  |
| 279         | 4.869468613 | -5.958  |                                  |  |
| 282         | 4.921828491 | -7.456  |                                  |  |
| 285         | 4.974188368 | -9.021  |                                  |  |
| 288         | 5.026548246 | -8.514  |                                  |  |
| 291         | 5.078908123 | -6.947  |                                  |  |
| 294         | 5.131268001 | -6.114  |                                  |  |
| 297         | 5.183627878 | -5.343  |                                  |  |
| 300         | 5.235987756 | -6.169  |                                  |  |
| 303         | 5.288347634 | -7.005  |                                  |  |
| 306         | 5.340707511 | -7.09   |                                  |  |
| 309         | 5.393067389 | -6.64   |                                  |  |
| 312         | 5.445427266 | -6.06   |                                  |  |
| 315         | 5.497787144 | -5.33   |                                  |  |
| 318         | 5.550147021 | -5.038  |                                  |  |
| 321         | 5.6025069   | -5.537  |                                  |  |
| 324         | 5.654866777 | -5.92   |                                  |  |
| 327         | 5.707226654 | -5.893  |                                  |  |
| 330         | 5.759586532 | -5.812  |                                  |  |
| 333         | 5.811946409 | -5.62   |                                  |  |
| 336         | 5.864306287 | -5.076  |                                  |  |
| 339         | 5.916666164 | -5.004  |                                  |  |
| 342         | 5.969026042 | -4.948  |                                  |  |
| 345         | 6.021385919 | -4.589  |                                  |  |
| 348         | 6.073745797 | -4.089  |                                  |  |
| 351         | 6.126105675 | -3.686  |                                  |  |
| 354         | 6.178465552 | -3.661  |                                  |  |
| 357         | 6.23082543  | -4.288  |                                  |  |

| Azimuth(XY)                      | 5150MHz |
|----------------------------------|---------|
| Max Value<br>30<θ<50             | -3.64   |
| Summary                          |         |
| Frequency                        | 5.150   |
| Elevation angle above 30 degrees | -1.32   |



| Phi=0(deg) X-Z |             |         |
|----------------|-------------|---------|
| Angle          | Theta       | 5150MHz |
| -180           | -3.14159265 | -34.653 |
| -177           | -3.08923278 | -28.527 |
| -174           | -3.0368729  | -23.479 |
| -171           | -2.98451302 | -20.083 |
| -168           | -2.93215314 | -17.499 |
| -165           | -2.87979327 | -15.218 |
| -162           | -2.82743339 | -13.141 |
| -159           | -2.77507351 | -11.484 |
| -156           | -2.72271363 | -10.481 |
| -153           | -2.67035376 | -10.323 |
| -150           | -2.61799388 | -11.267 |
| -147           | -2.565634   | -13.655 |
| -144           | -2.51327412 | -16.357 |
| -141           | -2.46091425 | -18.494 |
| -138           | -2.40855437 | -18.48  |
| -135           | -2.35619449 | -17.379 |
| -132           | -2.30383461 | -16.908 |
| -129           | -2.25147474 | -16.383 |
| -126           | -2.19911486 | -15.058 |
| -123           | -2.14675498 | -13.555 |
| -120           | -2.0943951  | -12.107 |
| -117           | -2.04203522 | -10.532 |
| -114           | -1.98967535 | -9.026  |
| -111           | -1.93731547 | -7.979  |
| -108           | -1.88495559 | -7.616  |
| -105           | -1.83259571 | -7.811  |
| -102           | -1.78023584 | -8.22   |
| -99            | -1.72787596 | -8.141  |
| -96            | -1.67551608 | -7.352  |
| -93            | -1.6231562  | -6.286  |
| -90            | -1.57079633 | -5.247  |
| -87            | -1.51843645 | -4.401  |
| -84            | -1.46607657 | -3.896  |
| -81            | -1.41371669 | -3.818  |
| -78            | -1.36135682 | -4.18   |
| -75            | -1.30899694 | -4.431  |
| -72            | -1.25663706 | -5.508  |
| -69            | -1.20427718 | -5.505  |
| -66            | -1.15191731 | 0.475   |
| -63            | -1.09955743 | 1.923   |
| -60            | -1.04719755 | 2.775   |
| -57            | -0.99483767 | 3.151   |
| -54            | -0.94247778 | 3.186   |
| -51            | -0.89011792 | 2.97    |
| -48            | -0.83775804 | 2.537   |
| -45            | -0.78539816 | 1.957   |
| -42            | -0.73303829 | 1.321   |
| -39            | -0.68067841 | 0.92    |
| -36            | -0.62831853 | 0.81    |
| -33            | -0.57595865 | 0.716   |
| -30            | -0.52359878 | 0.307   |
| -27            | -0.47123889 | -0.558  |
| -24            | -0.41887902 | -1.673  |
| -21            | -0.36651914 | -2.966  |
| -18            | -0.31415927 | -2.16   |
| -15            | -0.26179939 | -1.487  |
| -12            | -0.20943951 | -0.701  |
| -9             | -0.15707963 | 0.146   |
| -6             | -0.10471976 | 1.036   |
| -3             | -0.05235988 | 1.782   |
| 0              | 0.00000000  | 2.352   |
| 3              | 0.05235988  | 2.441   |
| 6              | 0.10471976  | 2.239   |
| 9              | 0.15707963  | 1.706   |
| 12             | 0.20943951  | 1.241   |
| 15             | 0.26179939  | 1.349   |
| 18             | 0.31415927  | 2.199   |
| 21             | 0.36651914  | 3.34    |
| 24             | 0.41887902  | 4.274   |
| 27             | 0.47123889  | 4.714   |
| 30             | 0.52359878  | 4.549   |
| 33             | 0.57595865  | 3.842   |
| 36             | 0.62831853  | 2.867   |
| 39             | 0.68067841  | 1.948   |
| 42             | 0.73303829  | 1.335   |
| 45             | 0.78539816  | 0.996   |
| 48             | 0.83775804  | 0.774   |
| 51             | 0.89011792  | 0.832   |
| 54             | 0.94247778  | 1.546   |
| 57             | 0.99483767  | 2.549   |
| 60             | 1.04719755  | 3.213   |
| 63             | 1.09955743  | 3.311   |
| 66             | 1.15191731  | 2.842   |
| 69             | 1.20427718  | 2.003   |
| 72             | 1.25663706  | 1.201   |
| 75             | 1.30899694  | 0.606   |
| 78             | 1.36135682  | 0.054   |
| 81             | 1.41371669  | -0.887  |
| 84             | 1.46607657  | -2.365  |
| 87             | 1.51843645  | -4.025  |
| 90             | 1.57079633  | -5.388  |
| 93             | 1.6231562   | -5.857  |
| 96             | 1.67551608  | -6.263  |
| 99             | 1.72787596  | -7.049  |
| 102            | 1.78023584  | -7.354  |
| 105            | 1.83259571  | -8.9    |
| 108            | 1.88495559  | -9.837  |
| 111            | 1.93731547  | -12.118 |
| 114            | 1.98967535  | -14.924 |
| 117            | 2.04203522  | -13.426 |
| 120            | 2.0943951   | -12.815 |
| 123            | 2.14675498  | -11.332 |
| 126            | 2.19911486  | -10.303 |
| 129            | 2.25147474  | -10.81  |
| 132            | 2.30383461  | -12.14  |
| 135            | 2.35619449  | -14.101 |
| 138            | 2.40855437  | -17.445 |
| 141            | 2.46091425  | -21.012 |
| 144            | 2.51327412  | -21.987 |
| 147            | 2.565634    | -18.645 |
| 150            | 2.61799388  | -13.73  |
| 153            | 2.67035376  | -11.748 |
| 156            | 2.72271363  | -12.091 |
| 159            | 2.77507351  | -13.033 |
| 162            | 2.82743339  | -14.235 |
| 165            | 2.87979327  | -16.646 |
| 168            | 2.93215314  | -18.917 |
| 171            | 2.98451302  | -20.514 |
| 174            | 3.0368729   | -23.534 |
| 177            | 3.08923278  | -29.344 |

| Front to Back(XZ)    | 5150MHz |
|----------------------|---------|
| Max Value<br>30<θ<50 |         |

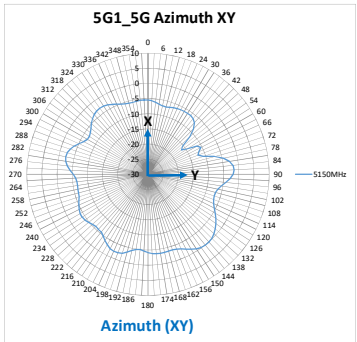


| Angle | Theta     | Phi=90.00000000000002(deg) Y-Z<br>5150MHz |
|-------|-----------|-------------------------------------------|
| -180  | -3.141593 | -34.653                                   |
| -177  | -3.089233 | -30.937                                   |
| -174  | -3.036873 | -26.901                                   |
| -171  | -2.984513 | -23.388                                   |
| -168  | -2.932153 | -20.892                                   |
| -165  | -2.879793 | -18.627                                   |
| -162  | -2.827433 | -16.561                                   |
| -159  | -2.775074 | -15.491                                   |
| -156  | -2.722714 | -15.309                                   |
| -153  | -2.670354 | -16.467                                   |
| -150  | -2.617994 | -17.213                                   |
| -147  | -2.565634 | -15.552                                   |
| -144  | -2.513274 | -13.309                                   |
| -141  | -2.460914 | -11.508                                   |
| -138  | -2.408554 | -10.777                                   |
| -135  | -2.356194 | -11.288                                   |
| -132  | -2.303835 | -12.703                                   |
| -129  | -2.251475 | -14.222                                   |
| -126  | -2.199115 | -15.209                                   |
| -123  | -2.146755 | -15.149                                   |
| -120  | -2.094395 | -14.068                                   |
| -117  | -2.042035 | -12.821                                   |
| -114  | -1.989675 | -11.744                                   |
| -111  | -1.937315 | -10.912                                   |
| -108  | -1.884955 | -10.502                                   |
| -105  | -1.832596 | -10.39                                    |
| -102  | -1.780236 | -10.217                                   |
| -99   | -1.727876 | -9.525                                    |
| -96   | -1.675516 | -8.031                                    |
| -93   | -1.623156 | -5.853                                    |
| -90   | -1.570796 | -3.401                                    |
| -87   | -1.518436 | -1.187                                    |
| -84   | -1.466077 | 0.54                                      |
| -81   | -1.413717 | 1.681                                     |
| -78   | -1.361357 | 2.24                                      |
| -75   | -1.308997 | 2.304                                     |
| -72   | -1.256637 | 2.071                                     |
| -69   | -1.204277 | 1.996                                     |
| -66   | -1.151917 | 2.314                                     |
| -63   | -1.099557 | 2.972                                     |
| -60   | -1.047198 | 3.742                                     |
| -57   | -0.994838 | 4.224                                     |
| -54   | -0.942478 | 4.202                                     |
| -51   | -0.890118 | 3.651                                     |
| -48   | -0.837758 | 2.745                                     |
| -45   | -0.785398 | 0.723                                     |
| -42   | -0.733038 | -1.786                                    |
| -39   | -0.680678 | -4.092                                    |
| -36   | -0.628319 | -5.006                                    |
| -33   | -0.575959 | -19.39                                    |
| -30   | -0.523599 | -19.62                                    |
| -27   | -0.471239 | -16.26                                    |
| -24   | -0.418879 | -1.24                                     |
| -21   | -0.366519 | -1.297                                    |
| -18   | -0.314159 | -1.207                                    |
| -15   | -0.261799 | -0.824                                    |
| -12   | -0.20944  | -0.657                                    |
| -9    | -0.15708  | -0.162                                    |
| -6    | -0.10472  | 1.455                                     |
| -3    | -0.05236  | 2.014                                     |
| 0     | 0.00000   | 2.352                                     |
| 3     | 0.052359  | 2.16                                      |
| 6     | 0.104718  | 1.672                                     |
| 9     | 0.157079  | 0.776                                     |
| 12    | 0.209439  | -0.343                                    |
| 15    | 0.261799  | -1.497                                    |
| 18    | 0.314159  | -2.544                                    |
| 21    | 0.366519  | -3.396                                    |
| 24    | 0.418879  | -3.96                                     |
| 27    | 0.471239  | -4.215                                    |
| 30    | 0.523599  | -4.14                                     |
| 33    | 0.575958  | -3.878                                    |
| 36    | 0.628318  | -3.529                                    |
| 39    | 0.680678  | -3.212                                    |
| 42    | 0.733038  | -2.942                                    |
| 45    | 0.785398  | -2.664                                    |
| 48    | 0.837758  | -2.363                                    |
| 51    | 0.890117  | -2.034                                    |
| 54    | 0.942477  | -1.708                                    |
| 57    | 0.994837  | -1.445                                    |
| 60    | 1.047197  | -1.318                                    |
| 63    | 1.099555  | -1.383                                    |
| 66    | 1.151917  | -1.676                                    |
| 69    | 1.204277  | -2.211                                    |
| 72    | 1.256637  | -2.991                                    |
| 75    | 1.308999  | -3.971                                    |
| 78    | 1.361368  | -5.057                                    |
| 81    | 1.413717  | -6.033                                    |
| 84    | 1.466076  | -6.737                                    |
| 87    | 1.518436  | -7.151                                    |
| 90    | 1.570796  | -7.455                                    |
| 93    | 1.623156  | -7.878                                    |
| 96    | 1.675516  | -8.507                                    |
| 99    | 1.727876  | -9.341                                    |
| 102   | 1.780238  | -10.358                                   |
| 105   | 1.832597  | -11.574                                   |
| 108   | 1.884956  | -12.993                                   |
| 111   | 1.937315  | -14.198                                   |
| 114   | 1.989673  | -14.915                                   |
| 117   | 2.042035  | -15.31                                    |
| 120   | 2.094395  | -15.622                                   |
| 123   | 2.146755  | -16.094                                   |
| 126   | 2.199119  | -16.152                                   |
| 129   | 2.251474  | -15.846                                   |
| 132   | 2.303836  | -15.112                                   |
| 135   | 2.356194  | -14.561                                   |
| 138   | 2.408554  | -14.115                                   |
| 141   | 2.460914  | -14.072                                   |
| 144   | 2.513274  | -14.273                                   |
| 147   | 2.565634  | -14.459                                   |
| 150   | 2.617999  | -15.78                                    |
| 153   | 2.670358  | -17.23                                    |
| 156   | 2.722716  | -18.068                                   |
| 159   | 2.775075  | -18.16                                    |
| 162   | 2.827434  | -18.095                                   |
| 165   | 2.879793  | -18.674                                   |
| 168   | 2.932151  | -20.091                                   |
| 171   | 2.984513  | -23.183                                   |
| 174   | 3.036872  | -26.381                                   |
| 177   | 3.089233  | -30.355                                   |

Antenna Datasheet (30 degrees)-5G3

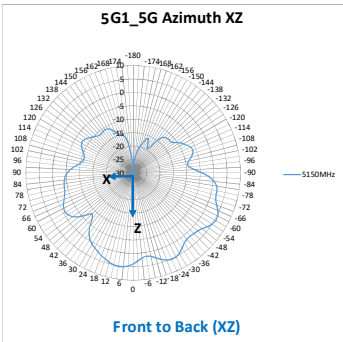
| 5.0GHz Band |             |         | Theta=90.00000000000002(deg) X-Y |  |
|-------------|-------------|---------|----------------------------------|--|
| Angle       | Phi         | 5150MHz |                                  |  |
| 0           | 0           | -5.425  |                                  |  |
| 3           | 0.052359878 | -5.685  |                                  |  |
| 6           | 0.104719755 | -6.055  |                                  |  |
| 9           | 0.157079632 | -6.531  |                                  |  |
| 12          | 0.20943951  | -6.9    |                                  |  |
| 15          | 0.261799388 | -6.961  |                                  |  |
| 18          | 0.314159265 | -6.747  |                                  |  |
| 21          | 0.366519143 | -6.466  |                                  |  |
| 24          | 0.41887902  | -6.223  |                                  |  |
| 27          | 0.471238898 | -6.066  |                                  |  |
| 30          | 0.523598776 | -6.017  |                                  |  |
| 33          | 0.575958653 | -6.012  |                                  |  |
| 36          | 0.628318531 | -6.015  |                                  |  |
| 39          | 0.680678408 | -6.324  |                                  |  |
| 42          | 0.733038286 | -7.169  |                                  |  |
| 45          | 0.785398163 | -8.734  |                                  |  |
| 48          | 0.837758041 | -11.449 |                                  |  |
| 51          | 0.890117919 | -15.366 |                                  |  |
| 54          | 0.942477796 | -16.274 |                                  |  |
| 57          | 0.994837674 | -14.512 |                                  |  |
| 60          | 1.047197551 | -11.353 |                                  |  |
| 63          | 1.099557429 | -10.416 |                                  |  |
| 66          | 1.151917306 | -11.588 |                                  |  |
| 69          | 1.204277184 | -12.334 |                                  |  |
| 72          | 1.256637061 | -10.785 |                                  |  |
| 75          | 1.308996939 | -7.239  |                                  |  |
| 78          | 1.361356817 | -4.437  |                                  |  |
| 81          | 1.413716694 | -2.709  |                                  |  |
| 84          | 1.466076572 | -1.736  |                                  |  |
| 87          | 1.518436449 | -1.487  |                                  |  |
| 90          | 1.570796327 | -1.896  |                                  |  |
| 93          | 1.623156204 | -2.846  |                                  |  |
| 96          | 1.675516082 | -4.457  |                                  |  |
| 99          | 1.72787596  | -5.514  |                                  |  |
| 102         | 1.780235837 | -6.434  |                                  |  |
| 105         | 1.832595715 | -6.916  |                                  |  |
| 108         | 1.884955592 | -7.033  |                                  |  |
| 111         | 1.93731547  | -6.79   |                                  |  |
| 114         | 1.989675347 | -6.314  |                                  |  |
| 117         | 2.042035225 | -5.485  |                                  |  |
| 120         | 2.094395102 | -4.382  |                                  |  |
| 123         | 2.14675498  | -3.58   |                                  |  |
| 126         | 2.199114858 | -2.245  |                                  |  |
| 129         | 2.251474735 | -1.385  |                                  |  |
| 132         | 2.303834613 | -0.694  |                                  |  |
| 135         | 2.35619449  | -0.191  |                                  |  |
| 138         | 2.408554368 | 0.09    |                                  |  |
| 141         | 2.460914245 | 0.11    |                                  |  |
| 144         | 2.513274123 | -0.153  |                                  |  |
| 147         | 2.565634    | -0.602  |                                  |  |
| 150         | 2.617993878 | -1.451  |                                  |  |
| 153         | 2.670353756 | -2.307  |                                  |  |
| 156         | 2.722713633 | -3.062  |                                  |  |
| 159         | 2.77507351  | -3.555  |                                  |  |
| 162         | 2.827433388 | -3.773  |                                  |  |
| 165         | 2.879793266 | -3.778  |                                  |  |
| 168         | 2.932153143 | -3.697  |                                  |  |
| 171         | 2.984513021 | -3.619  |                                  |  |
| 174         | 3.036872899 | -3.632  |                                  |  |
| 177         | 3.089232776 | -3.819  |                                  |  |
| 180         | 3.141592654 | -4.173  |                                  |  |
| 183         | 3.193952531 | -4.654  |                                  |  |
| 186         | 3.246312409 | -5.002  |                                  |  |
| 189         | 3.298672286 | -4.895  |                                  |  |
| 192         | 3.351032164 | -4.275  |                                  |  |
| 195         | 3.403392041 | -3.398  |                                  |  |
| 198         | 3.455751919 | -2.643  |                                  |  |
| 201         | 3.508111797 | -2.248  |                                  |  |
| 204         | 3.560471674 | -2.219  |                                  |  |
| 207         | 3.612831552 | -2.461  |                                  |  |
| 210         | 3.665191429 | -3.153  |                                  |  |
| 213         | 3.717551307 | -3.958  |                                  |  |
| 216         | 3.769911184 | -4.8    |                                  |  |
| 219         | 3.822271062 | -5.509  |                                  |  |
| 222         | 3.874630939 | -5.55   |                                  |  |
| 225         | 3.926990817 | -5.688  |                                  |  |
| 228         | 3.979350695 | -5.358  |                                  |  |
| 231         | 4.031710572 | -4.787  |                                  |  |
| 234         | 4.08407045  | -4.55   |                                  |  |
| 237         | 4.136430327 | -4.064  |                                  |  |
| 240         | 4.188790205 | -4.098  |                                  |  |
| 243         | 4.241150082 | -4.447  |                                  |  |
| 246         | 4.29350996  | -5.085  |                                  |  |
| 249         | 4.345869838 | -5.585  |                                  |  |
| 252         | 4.398229715 | -6.059  |                                  |  |
| 255         | 4.450589593 | -6.265  |                                  |  |
| 258         | 4.50294947  | -6.36   |                                  |  |
| 261         | 4.555309348 | -6.444  |                                  |  |
| 264         | 4.607669225 | -6.44   |                                  |  |
| 267         | 4.660029103 | -6.107  |                                  |  |
| 270         | 4.71238898  | -5.313  |                                  |  |
| 273         | 4.764748858 | -4.248  |                                  |  |
| 276         | 4.817108736 | -3.325  |                                  |  |
| 279         | 4.869468613 | -2.535  |                                  |  |
| 282         | 4.921828491 | -2.249  |                                  |  |
| 285         | 4.974188368 | -2.409  |                                  |  |
| 288         | 5.026548246 | -2.999  |                                  |  |
| 291         | 5.078908123 | -3.947  |                                  |  |
| 294         | 5.131268001 | -5.109  |                                  |  |
| 297         | 5.183627878 | -6.224  |                                  |  |
| 300         | 5.235987756 | -6.902  |                                  |  |
| 303         | 5.288347634 | -6.956  |                                  |  |
| 306         | 5.340707511 | -6.512  |                                  |  |
| 309         | 5.393067389 | -5.748  |                                  |  |
| 312         | 5.445427266 | -4.898  |                                  |  |
| 315         | 5.497787144 | -4.102  |                                  |  |
| 318         | 5.550147021 | -3.476  |                                  |  |
| 321         | 5.602506909 | -3.088  |                                  |  |
| 324         | 5.654866777 | -2.973  |                                  |  |
| 327         | 5.707226654 | -3.132  |                                  |  |
| 330         | 5.759586532 | -3.521  |                                  |  |
| 333         | 5.811946409 | -4.071  |                                  |  |
| 336         | 5.864306287 | -4.665  |                                  |  |
| 339         | 5.916666164 | -5.191  |                                  |  |
| 342         | 5.969026042 | -5.554  |                                  |  |
| 345         | 6.021385919 | -5.722  |                                  |  |
| 348         | 6.073745797 | -5.721  |                                  |  |
| 351         | 6.126105675 | -5.61   |                                  |  |
| 354         | 6.178465552 | -5.463  |                                  |  |
| 357         | 6.23082543  | -5.4    |                                  |  |

| Azimuth(XY)                      | 5150MHz |
|----------------------------------|---------|
| Max Value<br>30<θ<150            | 0.11    |
| Summary                          |         |
| Frequency                        | 5.150   |
| Elevation angle above 30 degrees | 0.57    |



| Phi=0(deg) X-Z |             |         |
|----------------|-------------|---------|
| Angle          | Theta       | 5150MHz |
| -180           | -3.14159265 | -36.213 |
| -177           | -3.08923278 | -32.46  |
| -174           | -3.0368729  | -25.496 |
| -171           | -2.98451302 | -22.828 |
| -168           | -2.93215314 | -21.284 |
| -165           | -2.87979327 | -19.638 |
| -162           | -2.82743339 | -18.242 |
| -159           | -2.77507351 | -16.399 |
| -156           | -2.72271363 | -15.962 |
| -153           | -2.67035376 | -18.07  |
| -150           | -2.61799388 | -19.535 |
| -147           | -2.565634   | -18.794 |
| -144           | -2.51327412 | -15.362 |
| -141           | -2.46091425 | -12.915 |
| -138           | -2.40855437 | -12.159 |
| -135           | -2.35619449 | -11.896 |
| -132           | -2.30383461 | -11.774 |
| -129           | -2.25147474 | -11.817 |
| -126           | -2.19911486 | -10.815 |
| -123           | -2.14675498 | -9.251  |
| -120           | -2.0943951  | -8.355  |
| -117           | -2.04203522 | -7.338  |
| -114           | -1.98967535 | -6.448  |
| -111           | -1.93731547 | -6.159  |
| -108           | -1.88495559 | -6.539  |
| -105           | -1.83259571 | -7.632  |
| -102           | -1.78023584 | -8.886  |
| -99            | -1.72787596 | -9.541  |
| -96            | -1.67551608 | -8.963  |
| -93            | -1.6231562  | -6.967  |
| -90            | -1.57079633 | -4.173  |
| -87            | -1.51843645 | -15.29  |
| -84            | -1.46607657 | 0.459   |
| -81            | -1.41371669 | 1.583   |
| -78            | -1.36135682 | 1.969   |
| -75            | -1.30899694 | 2.004   |
| -72            | -1.25663706 | 2.349   |
| -69            | -1.20427718 | 3.322   |
| -66            | -1.15191731 | 4.539   |
| -63            | -1.09955743 | 5.375   |
| -60            | -1.04719755 | 5.566   |
| -57            | -0.99483767 | 5.104   |
| -54            | -0.94247778 | 4.124   |
| -51            | -0.89011792 | 3.069   |
| -48            | -0.83775804 | 2.36    |
| -45            | -0.78539816 | 1.982   |
| -42            | -0.73303829 | 1.738   |
| -39            | -0.68067841 | 1.766   |
| -36            | -0.62831853 | 2.577   |
| -33            | -0.57595865 | 3.474   |
| -30            | -0.52359878 | 4.561   |
| -27            | -0.47123889 | 5.196   |
| -24            | -0.41887902 | 5.27    |
| -21            | -0.36651914 | 4.8     |
| -18            | -0.31415927 | 3.888   |
| -15            | -0.26179939 | 2.756   |
| -12            | -0.20943951 | 1.745   |
| -9             | -0.15707963 | 1.372   |
| -6             | -0.10471976 | 1.879   |
| -3             | -0.05235988 | 2.849   |
| 0              | 0.00000000  | 3.972   |
| 3              | 0.05235988  | 4.73    |
| 6              | 0.10471976  | 5.209   |
| 9              | 0.15707963  | 5.265   |
| 12             | 0.20943951  | 5.018   |
| 15             | 0.26179939  | 4.488   |
| 18             | 0.31415927  | 3.734   |
| 21             | 0.36651914  | 3.035   |
| 24             | 0.41887902  | 2.251   |
| 27             | 0.47123889  | 1.39    |
| 30             | 0.52359878  | 0.647   |
| 33             | 0.57595865  | -0.449  |
| 36             | 0.62831853  | -1.986  |
| 39             | 0.68067841  | -4.274  |
| 42             | 0.73303829  | -7.308  |
| 45             | 0.78539816  | -8.448  |
| 48             | 0.83775804  | -6.566  |
| 51             | 0.89011792  | -4.041  |
| 54             | 0.94247778  | -2.222  |
| 57             | 0.99483767  | -1.15   |
| 60             | 1.04719755  | -0.729  |
| 63             | 1.09955743  | -0.898  |
| 66             | 1.15191731  | -1.538  |
| 69             | 1.20427718  | -2.423  |
| 72             | 1.25663706  | -3.191  |
| 75             | 1.30899694  | -3.656  |
| 78             | 1.36135682  | -3.828  |
| 81             | 1.41371669  | -3.942  |
| 84             | 1.46607657  | -4.198  |
| 87             | 1.51843645  | -4.666  |
| 90             | 1.57079633  | -5.425  |
| 93             | 1.6231562   | -6.531  |
| 96             | 1.67551608  | -7.936  |
| 99             | 1.72787596  | -9.417  |
| 102            | 1.78023584  | -10.5   |
| 105            | 1.83259571  | -10.984 |
| 108            | 1.88495559  | -10.909 |
| 111            | 1.93731547  | -10.311 |
| 114            | 1.98967535  | -9.34   |
| 117            | 2.04203522  | -8.385  |
| 120            | 2.0943951   | -7.783  |
| 123            | 2.14675498  | -7.75   |
| 126            | 2.19911486  | -8.246  |
| 129            | 2.25147474  | -9.086  |
| 132            | 2.30383461  | -9.975  |
| 135            | 2.35619449  | -10.722 |
| 138            | 2.40855437  | -11.167 |
| 141            | 2.46091425  | -11.186 |
| 144            | 2.51327412  | -10.932 |
| 147            | 2.565634    | -10.753 |
| 150            | 2.61799388  | -10.967 |
| 153            | 2.67035376  | -11.815 |
| 156            | 2.72271363  | -13.167 |
| 159            | 2.77507351  | -14.397 |
| 162            | 2.82743339  | -15     |
| 165            | 2.87979327  | -15.633 |
| 168            | 2.93215314  | -16.537 |
| 171            | 2.98451302  | -19.083 |
| 174            | 3.0368729   | -23.302 |
| 177            | 3.08923278  | -29.525 |

| Front to Back(XZ)     | 5150MHz |
|-----------------------|---------|
| Max Value<br>30<θ<150 | 0.57    |

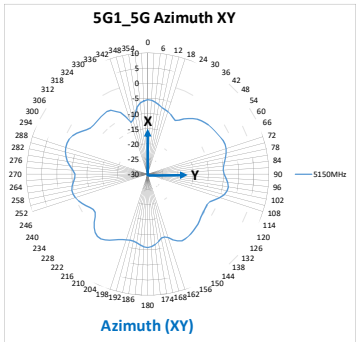


| Phi=90.00000000000002(deg) Y-Z |           |         |
|--------------------------------|-----------|---------|
| Angle                          | Theta     | 5150MHz |
| -180                           | -3.141593 | -36.213 |
| -177                           | -3.089233 | -32.339 |
| -174                           | -3.036873 | -25.112 |
| -171                           | -2.984513 | -22.235 |
| -168                           | -2.932153 | -19.83  |
| -165                           | -2.879793 | -17.165 |
| -162                           | -2.827433 | -15.025 |
| -159                           | -2.775073 | -13.669 |
| -156                           | -2.722714 | -13.237 |
| -153                           | -2.670354 | -13.496 |
| -150                           | -2.617994 | -14.661 |
| -147                           | -2.565634 | -15.649 |
| -144                           | -2.513274 | -15.05  |
| -141                           | -2.460914 | -14.464 |
| -138                           | -2.408554 | -14.951 |
| -135                           | -2.356194 | -16.48  |
| -132                           | -2.303835 | -18.007 |
| -129                           | -2.251475 | -17.029 |
| -126                           | -2.199115 | -13.439 |
| -123                           | -2.146755 | -10.811 |
| -120                           | -2.094395 | -10.04  |
| -117                           | -2.042035 | -10.131 |
| -114                           | -1.989675 | -10.518 |
| -111                           | -1.937315 | -10.768 |
| -108                           | -1.884956 | -10.368 |
| -105                           | -1.832596 | -9.364  |
| -102                           | -1.780236 | -8.476  |
| -99                            | -1.727876 | -7.829  |
| -96                            | -1.675516 | -7.24   |
| -93                            | -1.623156 | -6.443  |
| -90                            | -1.570796 | -5.313  |
| -87                            | -1.518436 | -3.901  |
| -84                            | -1.466077 | -2.453  |
| -81                            | -1.413717 | -1.186  |
| -78                            | -1.361357 | -0.168  |
| -75                            | -1.308997 | 0.652   |
| -72                            | -1.256637 | 1.331   |
| -69                            | -1.204277 | 1.878   |
| -66                            | -1.151917 | 2.277   |
| -63                            | -1.099557 | 2.433   |
| -60                            | -1.047198 | 2.261   |
| -57                            | -0.994838 | 1.757   |
| -54                            | -0.942478 | 1.048   |
| -51                            | -0.890118 | 0.344   |
| -48                            | -0.837758 | -0.079  |
| -45                            | -0.785398 | -0.08   |
| -42                            | -0.733038 | 0.342   |
| -39                            | -0.680678 | 0.539   |
| -36                            | -0.628319 | 0.281   |
| -33                            | -0.575959 | 3.409   |
| -30                            | -0.523599 | 4.588   |
| -27                            | -0.471239 | 5.39    |
| -24                            | -0.418879 | 5.861   |
| -21                            | -0.366519 | 6.024   |
| -18                            | -0.314159 | 5.946   |
| -15                            | -0.261799 | 5.711   |
| -12                            | -0.209439 | 5.406   |
| -9                             | -0.157079 | 5.096   |
| -6                             | -0.104719 | 4.787   |
| -3                             | -0.052359 | 4.408   |
| 0                              | 0.000000  | 3.972   |
| 3                              | 0.052359  | 3.318   |
| 6                              | 0.104719  | 2.446   |
| 9                              | 0.157079  | 1.406   |
| 12                             | 0.209439  | 0.5     |
| 15                             | 0.261799  | -0.073  |
| 18                             | 0.314159  | -0.096  |
| 21                             | 0.366519  | 0.287   |
| 24                             | 0.418879  | 0.511   |
| 27                             | 0.471239  | 0.819   |
| 30                             | 0.523599  | -0.037  |
| 33                             | 0.575958  | -0.909  |
| 36                             | 0.628318  | -2.271  |
| 39                             | 0.680678  | -3.705  |
| 42                             | 0.733038  | -4.808  |
| 45                             | 0.785398  | -5.105  |
| 48                             | 0.837758  | -4.553  |
| 51                             | 0.890119  | -2.902  |
| 54                             | 0.942478  | -1.9    |
| 57                             | 0.994837  | -1.293  |
| 60                             | 1.047197  | -0.546  |
| 63                             | 1.099557  | -0.037  |
| 66                             | 1.151917  | 0.311   |
| 69                             | 1.204277  | 0.527   |
| 72                             | 1.256637  | 0.566   |
| 75                             | 1.308999  | 0.412   |
| 78                             | 1.361358  | 0.096   |
| 81                             | 1.413717  | -0.34   |
| 84                             | 1.466076  | -0.846  |
| 87                             | 1.518436  | -1.373  |
| 90                             | 1.570796  | -1.896  |
| 93                             | 1.623156  | -2.415  |
| 96                             | 1.675516  | -3.585  |
| 99                             | 1.727876  | -4.322  |
| 102                            | 1.780236  | -5.167  |
| 105                            | 1.832595  | -6.046  |
| 108                            | 1.884955  | -6.806  |
| 111                            | 1.937315  | -7.551  |
| 114                            | 1.989675  | -7.787  |
| 117                            | 2.042035  | -8.313  |
| 120                            | 2.094395  | -9.02   |
| 123                            | 2.146755  | -9.801  |
| 126                            | 2.199115  | -10.501 |
| 129                            | 2.251475  | -11.219 |
| 132                            | 2.303836  | -12.02  |
| 135                            | 2.356196  | -13.574 |
| 138                            | 2.408554  | -14.877 |
| 141                            | 2.460914  | -15.109 |
| 144                            | 2.513274  | -15.64  |
| 147                            | 2.565634  | -16.218 |
| 150                            | 2.617994  | -16.652 |
| 153                            | 2.670353  | -16.834 |
| 156                            | 2.722713  | -17.056 |
| 159                            | 2.775073  | -17.793 |
| 162                            | 2.827434  | -19.223 |
| 165                            | 2.879793  | -21.879 |
| 168                            | 2.932153  | -24.778 |
| 171                            | 2.984513  | -28.339 |
| 174                            | 3.036872  | -32.339 |
| 177                            | 3.089232  | -36.213 |

Antenna Datasheet (30 degrees)-5G4

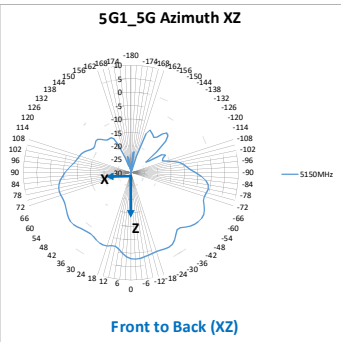
| 5.0GHz Band |             |         | Theta=90.000000000000002(deg) X-Y |  |
|-------------|-------------|---------|-----------------------------------|--|
| Angle       | Phi         | 5150MHz |                                   |  |
| 0           | 0           | -5.362  |                                   |  |
| 3           | 0.052359878 | -5.628  |                                   |  |
| 6           | 0.104719755 | -6.071  |                                   |  |
| 9           | 0.157079633 | -6.821  |                                   |  |
| 12          | 0.209439511 | -7.534  |                                   |  |
| 15          | 0.261799388 | -7.938  |                                   |  |
| 18          | 0.314159265 | -8.356  |                                   |  |
| 21          | 0.366519143 | -8.776  |                                   |  |
| 24          | 0.418879021 | -9.534  |                                   |  |
| 27          | 0.471238898 | -10.045 |                                   |  |
| 30          | 0.523598776 | -9.37   |                                   |  |
| 33          | 0.575958653 | -8.229  |                                   |  |
| 36          | 0.628318531 | -7.248  |                                   |  |
| 39          | 0.680678408 | -6.353  |                                   |  |
| 42          | 0.733038286 | -5.623  |                                   |  |
| 45          | 0.785398163 | -5.024  |                                   |  |
| 48          | 0.837758041 | -4.541  |                                   |  |
| 51          | 0.890117919 | -4.195  |                                   |  |
| 54          | 0.942477796 | -3.963  |                                   |  |
| 57          | 0.994837674 | -3.74   |                                   |  |
| 60          | 1.047197551 | -3.641  |                                   |  |
| 63          | 1.099557429 | -3.078  |                                   |  |
| 66          | 1.151917306 | -2.79   |                                   |  |
| 69          | 1.204277184 | -2.698  |                                   |  |
| 72          | 1.256637061 | -2.867  |                                   |  |
| 75          | 1.308996939 | -3.276  |                                   |  |
| 78          | 1.361356817 | -3.835  |                                   |  |
| 81          | 1.413716694 | -4.406  |                                   |  |
| 84          | 1.466076572 | -4.865  |                                   |  |
| 87          | 1.518436449 | -5.026  |                                   |  |
| 90          | 1.570796327 | -4.76   |                                   |  |
| 93          | 1.623156204 | -4.144  |                                   |  |
| 96          | 1.675516082 | -3.803  |                                   |  |
| 99          | 1.72787596  | -3.131  |                                   |  |
| 102         | 1.780235837 | -3.231  |                                   |  |
| 105         | 1.832595715 | -3.876  |                                   |  |
| 108         | 1.884955592 | -5.011  |                                   |  |
| 111         | 1.93731547  | -6.024  |                                   |  |
| 114         | 1.989675347 | -7.558  |                                   |  |
| 117         | 2.042035225 | -8.011  |                                   |  |
| 120         | 2.094395102 | -8.022  |                                   |  |
| 123         | 2.14675498  | -7.905  |                                   |  |
| 126         | 2.199114858 | -7.715  |                                   |  |
| 129         | 2.251474735 | -7.439  |                                   |  |
| 132         | 2.303834613 | -7.058  |                                   |  |
| 135         | 2.35619449  | -6.658  |                                   |  |
| 138         | 2.408554368 | -6.336  |                                   |  |
| 141         | 2.460914245 | -6.05   |                                   |  |
| 144         | 2.513274123 | -5.725  |                                   |  |
| 147         | 2.565634    | -5.324  |                                   |  |
| 150         | 2.617993878 | -5.272  |                                   |  |
| 153         | 2.670353756 | -5.304  |                                   |  |
| 156         | 2.722713633 | -5.943  |                                   |  |
| 159         | 2.775073511 | -6.809  |                                   |  |
| 162         | 2.827433388 | -7.966  |                                   |  |
| 165         | 2.879793266 | -8.583  |                                   |  |
| 168         | 2.932153143 | -8.517  |                                   |  |
| 171         | 2.984513021 | -7.536  |                                   |  |
| 174         | 3.036872899 | -6.65   |                                   |  |
| 177         | 3.089232776 | -6.096  |                                   |  |
| 180         | 3.141592654 | -5.818  |                                   |  |
| 183         | 3.193952531 | -5.982  |                                   |  |
| 186         | 3.246312409 | -6.487  |                                   |  |
| 189         | 3.298672286 | -7.07   |                                   |  |
| 192         | 3.351032164 | -7.421  |                                   |  |
| 195         | 3.403392041 | -7.461  |                                   |  |
| 198         | 3.455751919 | -7.236  |                                   |  |
| 201         | 3.508111797 | -6.833  |                                   |  |
| 204         | 3.560471674 | -6.333  |                                   |  |
| 207         | 3.612831552 | -5.631  |                                   |  |
| 210         | 3.665191429 | -4.818  |                                   |  |
| 213         | 3.717551307 | -4.086  |                                   |  |
| 216         | 3.769911184 | -3.63   |                                   |  |
| 219         | 3.822271062 | -3.6    |                                   |  |
| 222         | 3.87463094  | -4.058  |                                   |  |
| 225         | 3.926990817 | -4.966  |                                   |  |
| 228         | 3.979350695 | -6.24   |                                   |  |
| 231         | 4.031710572 | -7.635  |                                   |  |
| 234         | 4.08407045  | -8.555  |                                   |  |
| 237         | 4.136430327 | -8.561  |                                   |  |
| 240         | 4.188790205 | -7.966  |                                   |  |
| 243         | 4.241150082 | -7.114  |                                   |  |
| 246         | 4.29350996  | -6.243  |                                   |  |
| 249         | 4.345869838 | -5.462  |                                   |  |
| 252         | 4.398229715 | -4.819  |                                   |  |
| 255         | 4.450589593 | -4.42   |                                   |  |
| 258         | 4.50294947  | -4.355  |                                   |  |
| 261         | 4.555309348 | -4.699  |                                   |  |
| 264         | 4.607669225 | -5.335  |                                   |  |
| 267         | 4.660029103 | -5.878  |                                   |  |
| 270         | 4.71238898  | -5.93   |                                   |  |
| 273         | 4.764748858 | -5.208  |                                   |  |
| 276         | 4.817108736 | -4.113  |                                   |  |
| 279         | 4.869468613 | -3.135  |                                   |  |
| 282         | 4.921828491 | -2.389  |                                   |  |
| 285         | 4.974188368 | -1.864  |                                   |  |
| 288         | 5.026548246 | -1.534  |                                   |  |
| 291         | 5.078908123 | -1.399  |                                   |  |
| 294         | 5.131268001 | -1.551  |                                   |  |
| 297         | 5.183627878 | -2.049  |                                   |  |
| 300         | 5.235987756 | -2.907  |                                   |  |
| 303         | 5.288347634 | -4.028  |                                   |  |
| 306         | 5.340707511 | -5.049  |                                   |  |
| 309         | 5.393067389 | -5.711  |                                   |  |
| 312         | 5.445427266 | -5.953  |                                   |  |
| 315         | 5.497787144 | -5.888  |                                   |  |
| 318         | 5.550147021 | -5.766  |                                   |  |
| 321         | 5.602506899 | -5.623  |                                   |  |
| 324         | 5.654866777 | -5.44   |                                   |  |
| 327         | 5.707226654 | -5.323  |                                   |  |
| 330         | 5.759586532 | -5.679  |                                   |  |
| 333         | 5.811946409 | -6.778  |                                   |  |
| 336         | 5.864306287 | -7.749  |                                   |  |
| 339         | 5.916666164 | -9.601  |                                   |  |
| 342         | 5.969026042 | -12.022 |                                   |  |
| 345         | 6.021385919 | -11.348 |                                   |  |
| 348         | 6.073745797 | -9.702  |                                   |  |
| 351         | 6.126105675 | -7.58   |                                   |  |
| 354         | 6.178465552 | -6.338  |                                   |  |
| 357         | 6.23082543  | -5.779  |                                   |  |

| Azimuth(XY)                      | 5150MHz |
|----------------------------------|---------|
| Max Value<br>30<θ<150            | -2.70   |
| Summary                          |         |
| Frequency                        | 5150    |
| Elevation angle above 30 degrees | 3.02    |



| Phi=0(deg) X-Z |             |         |
|----------------|-------------|---------|
| Angle          | Theta       | 5150MHz |
| -180           | -3.14159265 | -34.178 |
| -177           | -3.08923278 | -27.133 |
| -174           | -3.0368729  | -22.31  |
| -171           | -2.98451302 | -22.112 |
| -168           | -2.93215314 | -28.441 |
| -165           | -2.87979327 | -31.537 |
| -162           | -2.82743339 | -23.47  |
| -159           | -2.77507351 | -14.519 |
| -156           | -2.72271363 | -12.605 |
| -153           | -2.67035376 | -13.198 |
| -150           | -2.61799388 | -13.767 |
| -147           | -2.565634   | -14.292 |
| -144           | -2.51327412 | -13.557 |
| -141           | -2.46091425 | -11.347 |
| -138           | -2.40855437 | -10.078 |
| -135           | -2.35619449 | -10.556 |
| -132           | -2.30383461 | -12.544 |
| -129           | -2.25147474 | -17.704 |
| -126           | -2.19911486 | -23.224 |
| -123           | -2.14675498 | -22.129 |
| -120           | -2.0943951  | -16.677 |
| -117           | -2.04203522 | -15.592 |
| -114           | -1.98967535 | -17.085 |
| -111           | -1.93731547 | -17.497 |
| -108           | -1.88495559 | -16.009 |
| -105           | -1.83259571 | -13.583 |
| -102           | -1.78023584 | -11.546 |
| -99            | -1.72787596 | -10.151 |
| -96            | -1.67551608 | -9.106  |
| -93            | -1.6231562  | -7.783  |
| -90            | -1.57079633 | -5.818  |
| -87            | -1.51843645 | -3.65   |
| -84            | -1.46607657 | -1.894  |
| -81            | -1.41371669 | -0.868  |
| -78            | -1.36135682 | -0.615  |
| -75            | -1.30899694 | -0.911  |
| -72            | -1.25663706 | -1.286  |
| -69            | -1.20427718 | -1.029  |
| -66            | -1.15191731 | -0.144  |
| -63            | -1.09955743 | 0.732   |
| -60            | -1.04719755 | 1.265   |
| -57            | -0.99483767 | 1.331   |
| -54            | -0.94247778 | 1.056   |
| -51            | -0.89011792 | 0.545   |
| -48            | -0.83775804 | -0.229  |
| -45            | -0.78539816 | -1.314  |
| -42            | -0.73303829 | -2.502  |
| -39            | -0.68067841 | -2.708  |
| -36            | -0.62831853 | -1.598  |
| -33            | -0.57595865 | -0.192  |
| -30            | -0.52359878 | 0.811   |
| -27            | -0.47123889 | 1.157   |
| -24            | -0.41887902 | 1.057   |
| -21            | -0.36651914 | 0.855   |
| -18            | -0.31415927 | 0.855   |
| -15            | -0.26179939 | 1.08    |
| -12            | -0.20943951 | 1.416   |
| -9             | -0.15707963 | 1.791   |
| -6             | -0.10471976 | 2.129   |
| -3             | -0.05235988 | 2.234   |
| 0              | 0.00000000  | 2.114   |
| 3              | 0.05235988  | 1.377   |
| 6              | 0.10471976  | 0.214   |
| 9              | 0.15707963  | -1.225  |
| 12             | 0.20943951  | -1.97   |
| 15             | 0.26179939  | -1.841  |
| 18             | 0.31415927  | -1.32   |
| 21             | 0.36651914  | -1.099  |
| 24             | 0.41887902  | -1.34   |
| 27             | 0.47123889  | -1.791  |
| 30             | 0.52359878  | -2.348  |
| 33             | 0.57595865  | -2.762  |
| 36             | 0.62831853  | -2.649  |
| 39             | 0.68067841  | -2.443  |
| 42             | 0.73303829  | -2.044  |
| 45             | 0.78539816  | -1.482  |
| 48             | 0.83775804  | -1.102  |
| 51             | 0.89011792  | -1.007  |
| 54             | 0.94247778  | -1.228  |
| 57             | 0.99483767  | -1.678  |
| 60             | 1.04719755  | -2.202  |
| 63             | 1.09955743  | -2.628  |
| 66             | 1.15191731  | -2.826  |
| 69             | 1.20427718  | -2.763  |
| 72             | 1.25663706  | -2.566  |
| 75             | 1.30899694  | -2.426  |
| 78             | 1.36135682  | -2.523  |
| 81             | 1.41371669  | -2.91   |
| 84             | 1.46607657  | -3.58   |
| 87             | 1.51843645  | -4.435  |
| 90             | 1.57079633  | -5.362  |
| 93             | 1.6231562   | -6.337  |
| 96             | 1.67551608  | -7.346  |
| 99             | 1.72787596  | -8.279  |
| 102            | 1.78023584  | -8.965  |
| 105            | 1.83259571  | -9.422  |
| 108            | 1.88495559  | -9.807  |
| 111            | 1.93731547  | -10.283 |
| 114            | 1.98967535  | -10.97  |
| 117            | 2.04203522  | -11.827 |
| 120            | 2.0943951   | -12.644 |
| 123            | 2.14675498  | -13.206 |
| 126            | 2.19911486  | -13.274 |
| 129            | 2.25147474  | -12.794 |
| 132            | 2.30383461  | -12.351 |
| 135            | 2.35619449  | -12.445 |
| 138            | 2.40855437  | -13.246 |
| 141            | 2.46091425  | -14.232 |
| 144            | 2.51327412  | -14.864 |
| 147            | 2.565634    | -14.961 |
| 150            | 2.61799388  | -14.959 |
| 153            | 2.67035376  | -15.787 |
| 156            | 2.72271363  | -19.009 |
| 159            | 2.77507351  | -24.143 |
| 162            | 2.82743339  | -27.404 |
| 165            | 2.87979327  | -25.759 |
| 168            | 2.93215314  | -23.878 |
| 171            | 2.98451302  | -24.519 |
| 174            | 3.0368729   | -27.748 |
| 177            | 3.08923278  | -31.917 |

| From to Back(XZ)      | 5150MHz |
|-----------------------|---------|
| Max Value<br>30<θ<150 |         |



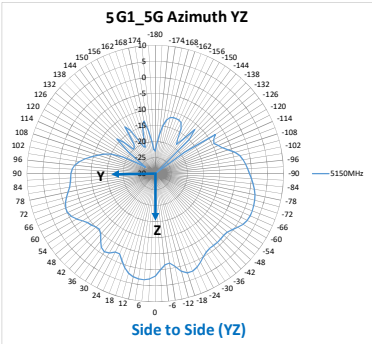
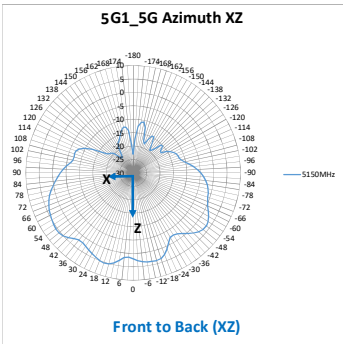
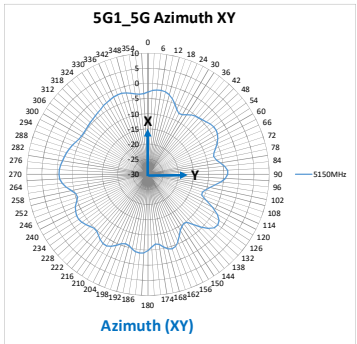
| Phi=90.000000000000002(deg) Y-Z |           |         |
|---------------------------------|-----------|---------|
| Angle                           | Theta     | 5150MHz |
| -180                            | -3.141593 | -34.178 |
| -177                            | -3.089233 | -31.085 |
| -174                            | -3.036873 | -26.134 |
| -171                            | -2.984513 | -20.605 |
| -168                            | -2.932153 | -16.89  |
| -165                            | -2.879793 | -15.284 |
| -162                            | -2.827433 | -14.233 |
| -159                            | -2.775074 | -13.582 |
| -156                            | -2.722714 | -13.286 |
| -153                            | -2.670354 | -13.054 |
| -150                            | -2.617994 | -12.655 |
| -147                            | -2.565634 | -11.953 |
| -144                            | -2.513274 | -11.201 |
| -141                            | -2.460914 | -10.563 |
| -138                            | -2.408554 | -10.08  |
| -135                            | -2.356194 | -9.806  |
| -132                            | -2.303835 | -9.301  |
| -129                            | -2.251475 | -8.232  |
| -126                            | -2.199115 | -7.21   |
| -123                            | -2.146755 | -6.465  |
| -120                            | -2.094395 | -6.064  |
| -117                            | -2.042035 | -6.113  |
| -114                            | -1.989675 | -6.526  |
| -111                            | -1.937315 | -7.149  |
| -108                            | -1.884956 | -7.75   |
| -105                            | -1.832596 | -8.064  |
| -102                            | -1.780236 | -7.893  |
| -99                             | -1.727876 | -7.579  |
| -96                             | -1.675516 | -6.763  |
| -93                             | -1.623156 | -6.259  |
| -90                             | -1.570796 | -5.93   |
| -87                             | -1.518436 | -5.668  |
| -84                             | -1.466077 | -5.198  |
| -81                             | -1.413717 | -4.339  |
| -78                             | -1.361357 | -3.024  |
| -75                             | -1.308997 | -1.43   |
| -72                             | -1.256637 | 0.129   |
| -69                             | -1.204277 | 1.465   |
| -66                             | -1.151917 | 2.492   |
| -63                             | -1.099557 | 3.208   |
| -60                             | -1.047198 | 3.634   |
| -57                             | -0.994838 | 3.809   |
| -54                             | -0.942478 | 3.73    |
| -51                             | -0.890118 | 3.399   |
| -48                             | -0.837758 | 2.798   |
| -45                             | -0.785398 | 1.9     |
| -42                             | -0.733038 | 0.743   |
| -39                             | -0.680678 | -0.541  |
| -36                             | -0.628319 | -1.841  |
| -33                             | -0.575959 | -2.811  |
| -30                             | -0.523599 | -2.648  |
| -27                             | -0.471239 | -1.38   |
| -24                             | -0.418879 | 0.208   |
| -21                             | -0.366519 | 1.54    |
| -18                             | -0.314159 | 2.34    |
| -15                             | -0.261799 | 2.603   |
| -12                             | -0.20944  | 2.429   |
| -9                              | -0.15708  | 2.043   |
| -6                              | -0.10472  | 1.736   |
| -3                              | -0.05236  | 1.776   |
| 0                               | 0.00000   | 2.114   |
| 3                               | 0.052359  | 2.647   |
| 6                               | 0.104719  | 3.1     |
| 9                               | 0.157079  | 3.399   |
| 12                              | 0.209439  | 3.446   |
| 15                              | 0.261799  | 3.164   |
| 18                              | 0.314159  | 2.6     |
| 21                              | 0.366519  | 1.888   |
| 24                              | 0.418879  | 1.076   |
| 27                              | 0.471239  | 0.263   |
| 30                              | 0.523598  | -0.344  |
| 33                              | 0.575958  | -0.583  |
| 36                              | 0.628318  | -0.242  |
| 39                              | 0.680678  | 0.575   |
| 42                              | 0.733038  | 1.663   |
| 45                              | 0.785398  | 2.171   |
| 48                              | 0.837758  | 2.679   |
| 51                              | 0.890117  | 3.029   |
| 54                              | 0.942478  | 3.399   |
| 57                              | 0.994837  | 3.735   |
| 60                              | 1.047197  | 3.915   |
| 63                              | 1.099557  | 3.764   |
| 66                              | 1.151917  | 3.198   |
| 69                              | 1.204277  | 2.808   |
| 72                              | 1.256637  | 2.279   |
| 75                              | 1.308999  | -0.61   |
| 78                              | 1.361358  | -2.034  |
| 81                              | 1.413716  | -3.187  |
| 84                              | 1.466076  | -4.014  |
| 87                              | 1.518436  | -4.52   |
| 90                              | 1.570796  | -4.76   |
| 93                              | 1.623162  | -4.968  |
| 96                              | 1.675516  | -5.446  |
| 99                              | 1.727876  | -6.286  |
| 102                             | 1.780238  | -7.565  |
| 105                             | 1.832597  | -9.526  |
| 108                             | 1.884956  | -12.127 |
| 111                             | 1.937315  | -14.862 |
| 114                             | 1.989673  | -15.948 |
| 117                             | 2.042035  | -13.404 |
| 120                             | 2.094395  | -12.06  |
| 123                             | 2.146755  | -11.25  |
| 126                             | 2.199119  | -11.114 |
| 129                             | 2.251477  | -11.948 |
| 132                             | 2.303836  | -13.361 |
| 135                             | 2.356194  | -14.676 |
| 138                             | 2.408554  | -15.228 |
| 141                             | 2.460912  | -14.001 |
| 144                             | 2.513274  | -14.587 |
| 147                             | 2.565634  | -14.238 |
| 150                             | 2.617999  | -14.196 |
| 153                             | 2.670358  | -14.413 |
| 156                             | 2.722713  | -14.849 |
| 159                             | 2.775073  | -15.531 |
| 162                             | 2.827434  | -16.84  |
| 165                             | 2.879793  | -18.285 |
| 168                             | 2.932153  | -20.222 |
| 171                             | 2.984513  | -24.104 |
| 174                             | 3.036872  | -27.488 |
| 177                             | 3.089238  | -31.15  |

# Antenna Datasheet (30 degrees)-DB

| 5.0GHz Band |             | Theta=90.00000000000002(deg) X-Y |             |
|-------------|-------------|----------------------------------|-------------|
| Angle       | Phi         | 5150MHz                          |             |
| 0           | 0           | -180                             | -3.14159265 |
| 3           | 0.052359878 | -177                             | -3.08923278 |
| 6           | 0.104719755 | -174                             | -3.0368729  |
| 9           | 0.157079632 | -171                             | -2.98451302 |
| 12          | 0.20943951  | -168                             | -2.93215314 |
| 15          | 0.261799388 | -165                             | -2.87979327 |
| 18          | 0.314159265 | -162                             | -2.82743339 |
| 21          | 0.366519143 | -159                             | -2.77507351 |
| 24          | 0.41887902  | -156                             | -2.72271363 |
| 27          | 0.471238898 | -153                             | -2.67035376 |
| 30          | 0.523598776 | -150                             | -2.61799388 |
| 33          | 0.575958653 | -147                             | -2.565634   |
| 36          | 0.628318531 | -144                             | -2.51327412 |
| 39          | 0.680678408 | -141                             | -2.46091425 |
| 42          | 0.733038286 | -138                             | -2.40855437 |
| 45          | 0.785398163 | -135                             | -2.35619449 |
| 48          | 0.837758041 | -132                             | -2.30383461 |
| 51          | 0.890117919 | -129                             | -2.25147474 |
| 54          | 0.942477796 | -126                             | -2.19911486 |
| 57          | 0.994837674 | -123                             | -2.14675498 |
| 60          | 1.047197551 | -120                             | -2.0943951  |
| 63          | 1.099557429 | -117                             | -2.04203522 |
| 66          | 1.151917306 | -114                             | -1.98967535 |
| 69          | 1.204277184 | -111                             | -1.93731547 |
| 72          | 1.256637061 | -108                             | -1.88495559 |
| 75          | 1.308996939 | -105                             | -1.83259571 |
| 78          | 1.361356817 | -102                             | -1.78023584 |
| 81          | 1.413716694 | -99                              | -1.72787596 |
| 84          | 1.466076572 | -96                              | -1.67551608 |
| 87          | 1.518436449 | -93                              | -1.6231562  |
| 90          | 1.570796327 | -90                              | -1.57079633 |
| 93          | 1.623156204 | -87                              | -1.51843645 |
| 96          | 1.675516082 | -84                              | -1.46607657 |
| 99          | 1.72787596  | -81                              | -1.41371669 |
| 102         | 1.780235837 | -78                              | -1.36135682 |
| 105         | 1.832595715 | -75                              | -1.30899694 |
| 108         | 1.884955592 | -72                              | -1.25663706 |
| 111         | 1.93731547  | -69                              | -1.20427718 |
| 114         | 1.989675347 | -66                              | -1.15191731 |
| 117         | 2.042035225 | -63                              | -1.09955743 |
| 120         | 2.094395102 | -60                              | -1.04719755 |
| 123         | 2.14675498  | -57                              | -0.99483767 |
| 126         | 2.199114858 | -54                              | -0.94247778 |
| 129         | 2.251474735 | -51                              | -0.89011792 |
| 132         | 2.303834613 | -48                              | -0.83775804 |
| 135         | 2.35619449  | -45                              | -0.78539816 |
| 138         | 2.408554368 | -42                              | -0.73303829 |
| 141         | 2.460914245 | -39                              | -0.68067841 |
| 144         | 2.513274123 | -36                              | -0.62831853 |
| 147         | 2.565634    | -33                              | -0.57595865 |
| 150         | 2.617993878 | -30                              | -0.52359878 |
| 153         | 2.670353756 | -27                              | -0.4712389  |
| 156         | 2.722713633 | -24                              | -0.41887902 |
| 159         | 2.775073511 | -21                              | -0.36651914 |
| 162         | 2.827433388 | -18                              | -0.31415927 |
| 165         | 2.879793266 | -15                              | -0.26179939 |
| 168         | 2.932153143 | -12                              | -0.20943951 |
| 171         | 2.984513021 | -9                               | -0.15707963 |
| 174         | 3.036872899 | -6                               | -0.10471976 |
| 177         | 3.089232776 | -3                               | -0.05235988 |
| 180         | 3.141592654 | 0                                | 0.00000000  |
| 183         | 3.193952531 | 3                                | 0.05235988  |
| 186         | 3.246312409 | 6                                | 0.10471976  |
| 189         | 3.298672286 | 9                                | 0.15707963  |
| 192         | 3.351032164 | 12                               | 0.20943951  |
| 195         | 3.403392041 | 15                               | 0.26179939  |
| 198         | 3.455751919 | 18                               | 0.31415927  |
| 201         | 3.508111797 | 21                               | 0.36651914  |
| 204         | 3.560471674 | 24                               | 0.41887902  |
| 207         | 3.612831552 | 27                               | 0.4712389   |
| 210         | 3.665191429 | 30                               | 0.52359878  |
| 213         | 3.717551307 | 33                               | 0.57595865  |
| 216         | 3.769911184 | 36                               | 0.62831853  |
| 219         | 3.822271062 | 39                               | 0.68067841  |
| 222         | 3.874630939 | 42                               | 0.73303829  |
| 225         | 3.926990817 | 45                               | 0.78539816  |
| 228         | 3.979350695 | 48                               | 0.83775804  |
| 231         | 4.031710572 | 51                               | 0.89011792  |
| 234         | 4.08407045  | 54                               | 0.94247778  |
| 237         | 4.136430327 | 57                               | 0.99483767  |
| 240         | 4.188790205 | 60                               | 1.04719755  |
| 243         | 4.241150082 | 63                               | 1.09955743  |
| 246         | 4.29350996  | 66                               | 1.15191731  |
| 249         | 4.345869838 | 69                               | 1.20427718  |
| 252         | 4.398229715 | 72                               | 1.25663706  |
| 255         | 4.450589593 | 75                               | 1.30899694  |
| 258         | 4.50294947  | 78                               | 1.36135682  |
| 261         | 4.555309348 | 81                               | 1.41371669  |
| 264         | 4.607669225 | 84                               | 1.46607657  |
| 267         | 4.660029103 | 87                               | 1.51843645  |
| 270         | 4.71238898  | 90                               | 1.57079633  |
| 273         | 4.764748858 | 93                               | 1.6231562   |
| 276         | 4.817108736 | 96                               | 1.67551608  |
| 279         | 4.869468613 | 99                               | 1.72787596  |
| 282         | 4.921828491 | 102                              | 1.78023584  |
| 285         | 4.974188368 | 105                              | 1.83259571  |
| 288         | 5.026548246 | 108                              | 1.88495559  |
| 291         | 5.078908123 | 111                              | 1.93731547  |
| 294         | 5.131268001 | 114                              | 1.98967535  |
| 297         | 5.183627878 | 117                              | 2.04203522  |
| 300         | 5.235987756 | 120                              | 2.0943951   |
| 303         | 5.288347634 | 123                              | 2.14675498  |
| 306         | 5.340707511 | 126                              | 2.19911486  |
| 309         | 5.393067389 | 129                              | 2.25147474  |
| 312         | 5.445427266 | 132                              | 2.30383461  |
| 315         | 5.497787144 | 135                              | 2.35619449  |
| 318         | 5.550147021 | 138                              | 2.40855437  |
| 321         | 5.602506899 | 141                              | 2.46091425  |
| 324         | 5.654866777 | 144                              | 2.51327412  |
| 327         | 5.707226654 | 147                              | 2.565634    |
| 330         | 5.759586532 | 150                              | 2.61799388  |
| 333         | 5.811946409 | 153                              | 2.67035376  |
| 336         | 5.864306287 | 156                              | 2.72271363  |
| 339         | 5.916666164 | 159                              | 2.77507351  |
| 342         | 5.969026042 | 162                              | 2.82743339  |
| 345         | 6.021385919 | 165                              | 2.87979327  |
| 348         | 6.073745797 | 168                              | 2.93215314  |
| 351         | 6.126105675 | 171                              | 2.98451302  |
| 354         | 6.178465552 | 174                              | 3.0368729   |
| 357         | 6.23082543  | 177                              | 3.08923278  |

| From to Back(XZ)                 | 5150MHz |
|----------------------------------|---------|
| Max Value<br>30<θ<150            | -1.535  |
| Summary                          | 5.150   |
| Elevation angle above 30 degrees | -0.047  |

| Side to Side(YZ)                 | 5150MHz |
|----------------------------------|---------|
| Max Value<br>30<θ<150            | -0.047  |
| Summary                          | 5.150   |
| Elevation angle above 30 degrees | -0.047  |



## Antenna Test Setup Photos (30 degrees) :

Please refer to Test Setup Photos (30 degrees) of the Test Set Up Photos (Antenna spec)