



# ECW336

## Antenna Test Report

Senao Networks, Inc.

|                     |                                                   |
|---------------------|---------------------------------------------------|
| Customer            | EnGenius                                          |
| Project             | ECW336                                            |
| Project Description | 2.4G antenna *4<br>5G antenna *4<br>6G antenna *4 |
| Date                | 2022/03/09                                        |
| Prepared by         | Kenny                                             |
| Checked             | Tony                                              |
| Report Version      | A01                                               |

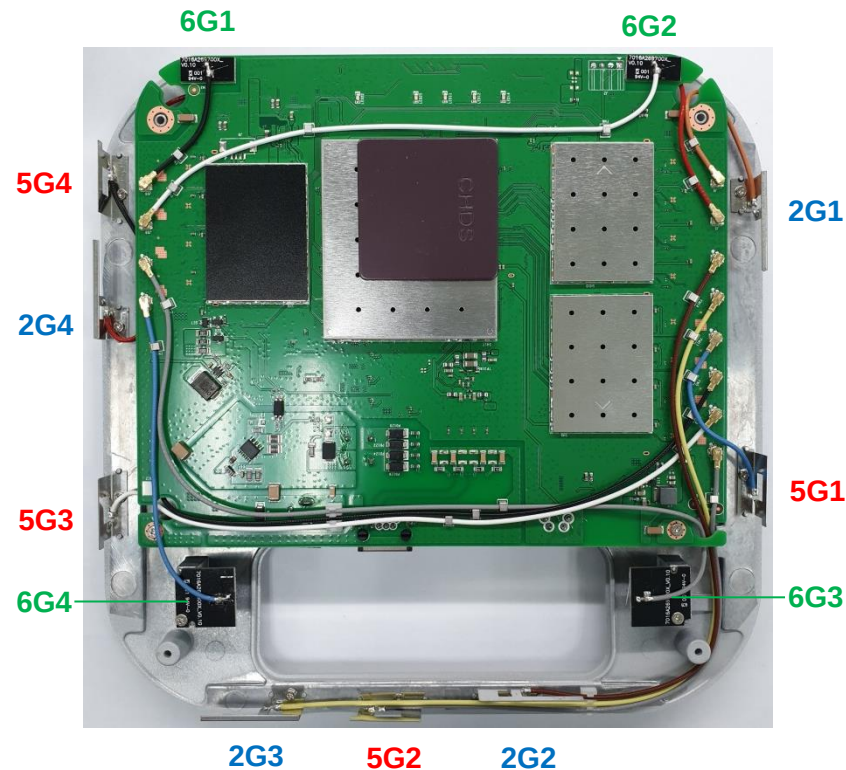
- **Purpose**

Antenna verification for ECW336 device, result as following.

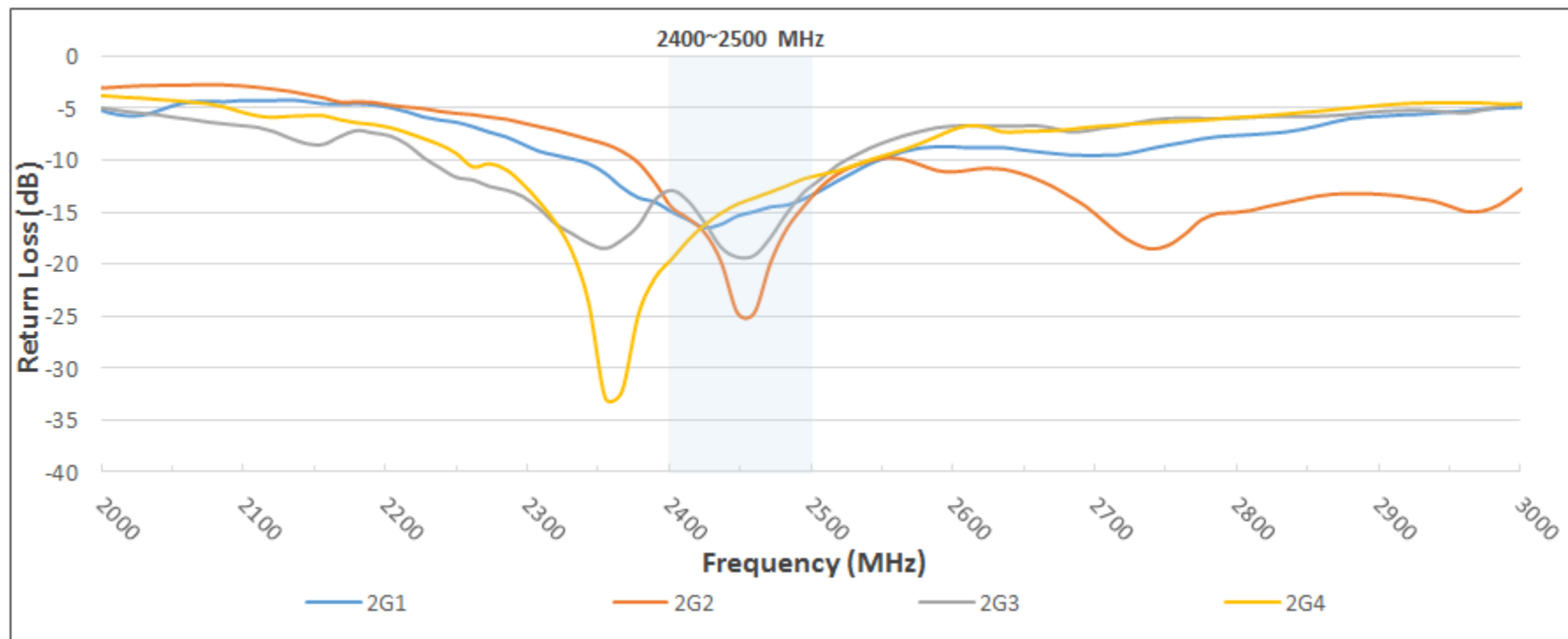
- **Agenda**

- Placement and Specification
- Return Loss & Isolation
- Radiation Pattern
- Combine Pattern
- Efficiency and Gain

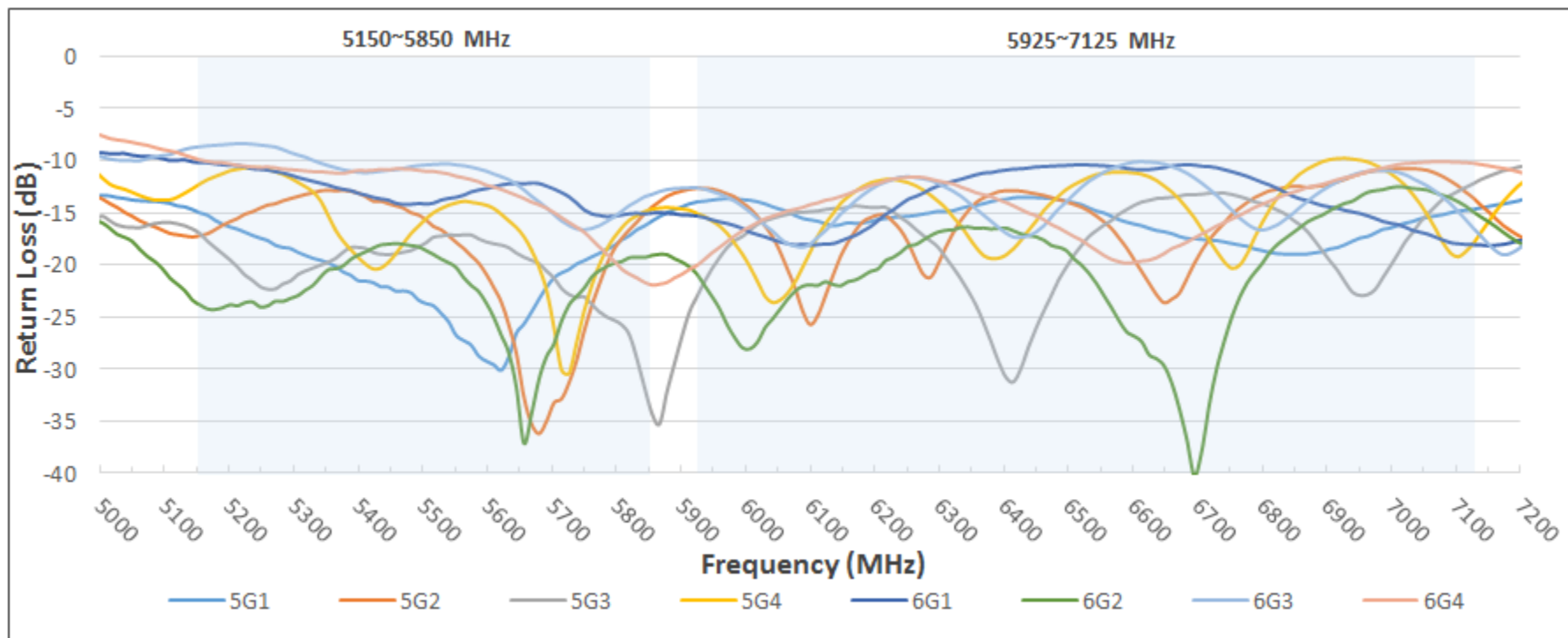
# Placement and specification



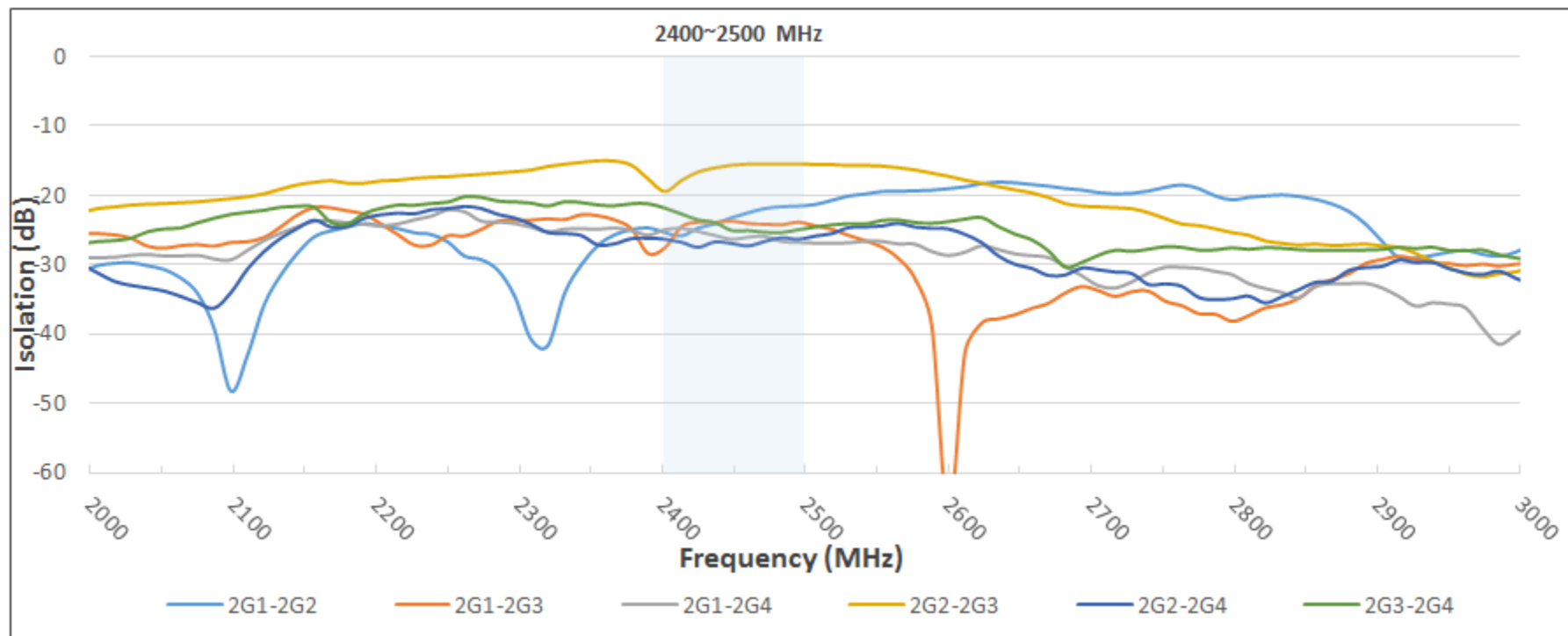
| Ant No. | Operating Band     | Gain (dBi) | Efficiency (%) | Ant type | Material | Feeding | Dimension                   |
|---------|--------------------|------------|----------------|----------|----------|---------|-----------------------------|
| 2G1~2G4 | 2400MHz ~ 2500 MHz | 2.22~4.26  | 60.7~73.9      | PIFA     | Metal    | Cable   | 29*10*7 mm <sup>3</sup>     |
| 5G1~5G4 | 5150MHz ~ 5850 MHz | 2.55~5.09  | 53.1~61.2      | PIFA     | Metal    | Cable   | 21*10*5 mm <sup>3</sup>     |
| 6G1~6G4 | 5925MHz ~ 7125 MHz | 3.71~5.48  | 55.1~65.7      | Dipole   | PCB      | Cable   | 16*7*1 mm <sup>3</sup>      |
|         |                    |            |                |          |          |         | 18*17.6*1.6 mm <sup>3</sup> |



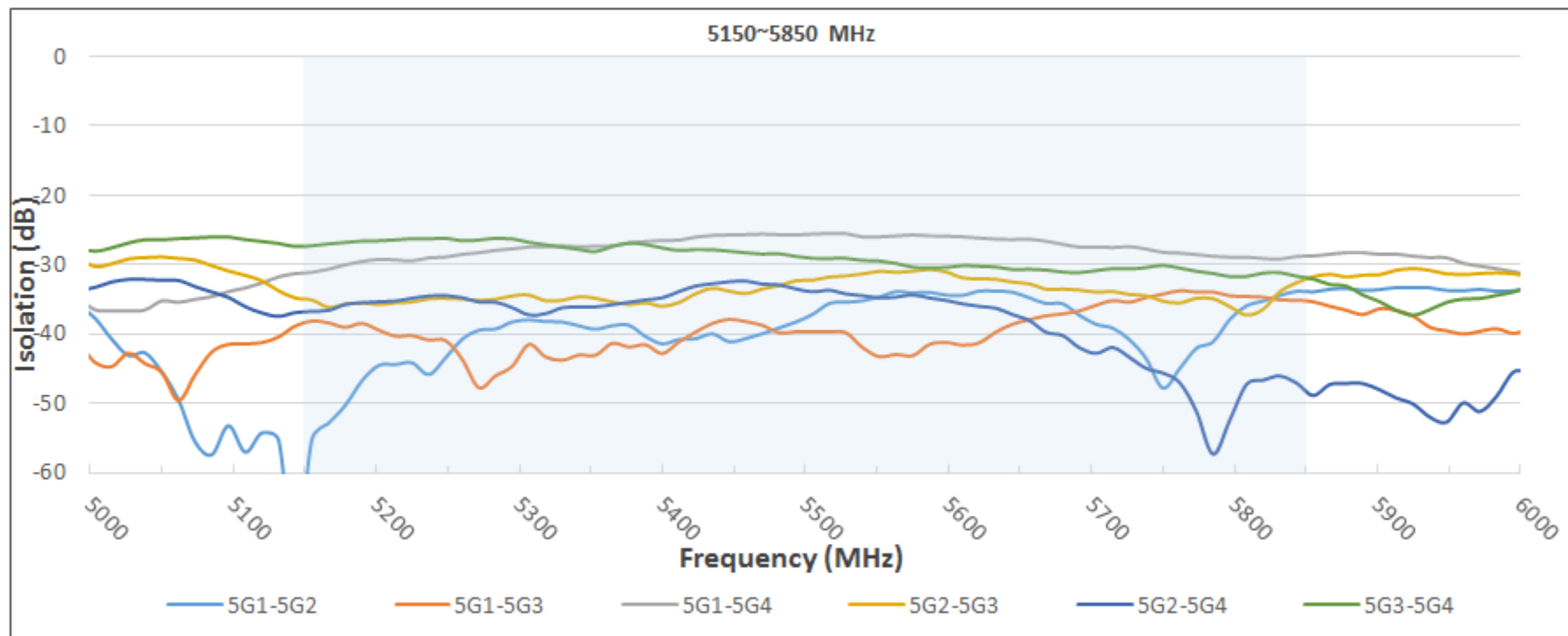
| Return Loss |        |        |        |        |
|-------------|--------|--------|--------|--------|
| Freq. (MHz) | 2G1    | 2G2    | 2G3    | 2G4    |
| 2400        | -14.96 | -14.52 | -12.91 | -19.54 |
| 2450        | -15.35 | -24.73 | -19.33 | -14.22 |
| 2500        | -13.72 | -14.43 | -13.08 | -11.79 |



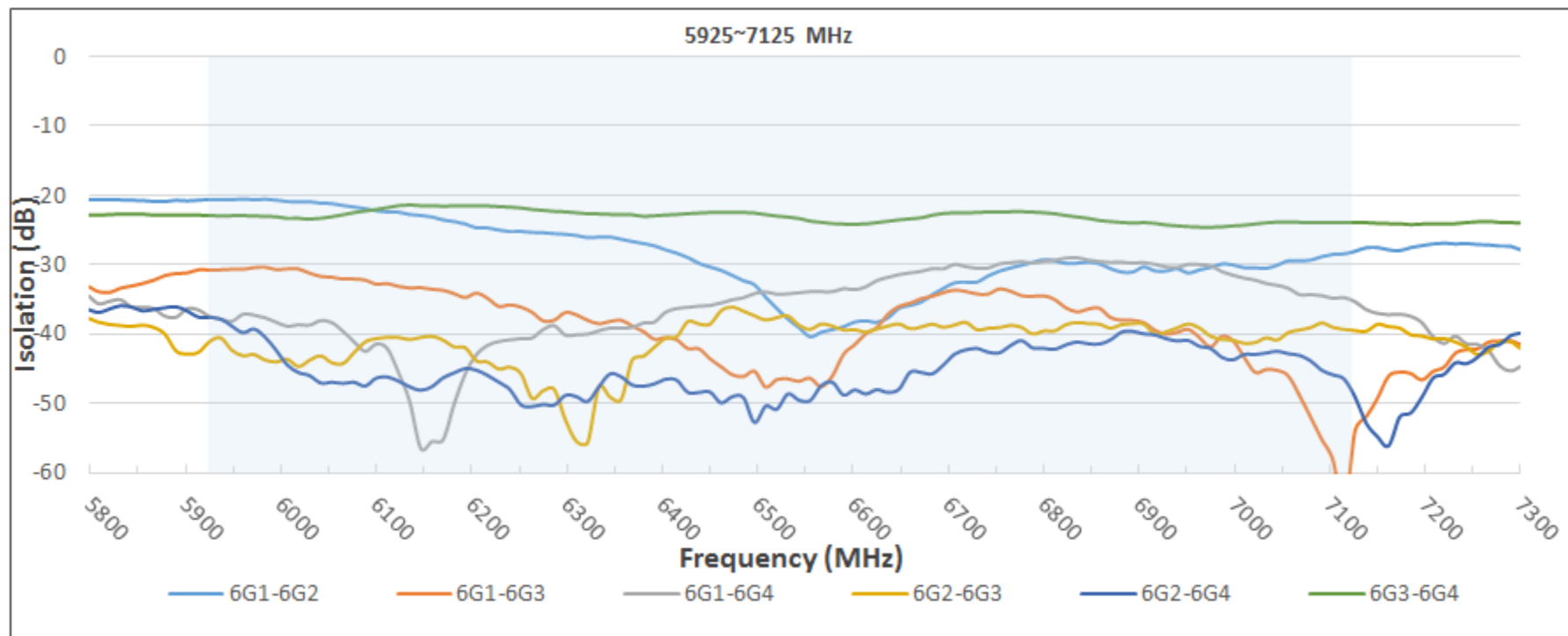
| Return Loss |        |        |        |        |        |        |        |        |
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Freq. (MHz) | 5G1    | 5G2    | 5G3    | 5G4    | 6G1    | 6G2    | 6G3    | 6G4    |
| 5150        | -15.01 | -17.19 | -17.00 | -12.23 | -10.20 | -23.85 | -8.66  | -9.94  |
| 5500        | -23.72 | -15.69 | -17.89 | -15.58 | -14.16 | -18.63 | -10.41 | -11.03 |
| 5850        | -15.79 | -14.46 | -34.29 | -14.65 | -15.03 | -19.09 | -13.24 | -21.94 |
| 5925        | -13.96 | -12.64 | -23.00 | -15.06 | -15.31 | -20.92 | -12.62 | -20.04 |
| 6500        | -13.90 | -13.95 | -20.22 | -12.77 | -10.46 | -18.62 | -13.97 | -16.86 |
| 7125        | -14.67 | -13.56 | -12.23 | -17.97 | -18.07 | -14.90 | -16.46 | -10.25 |



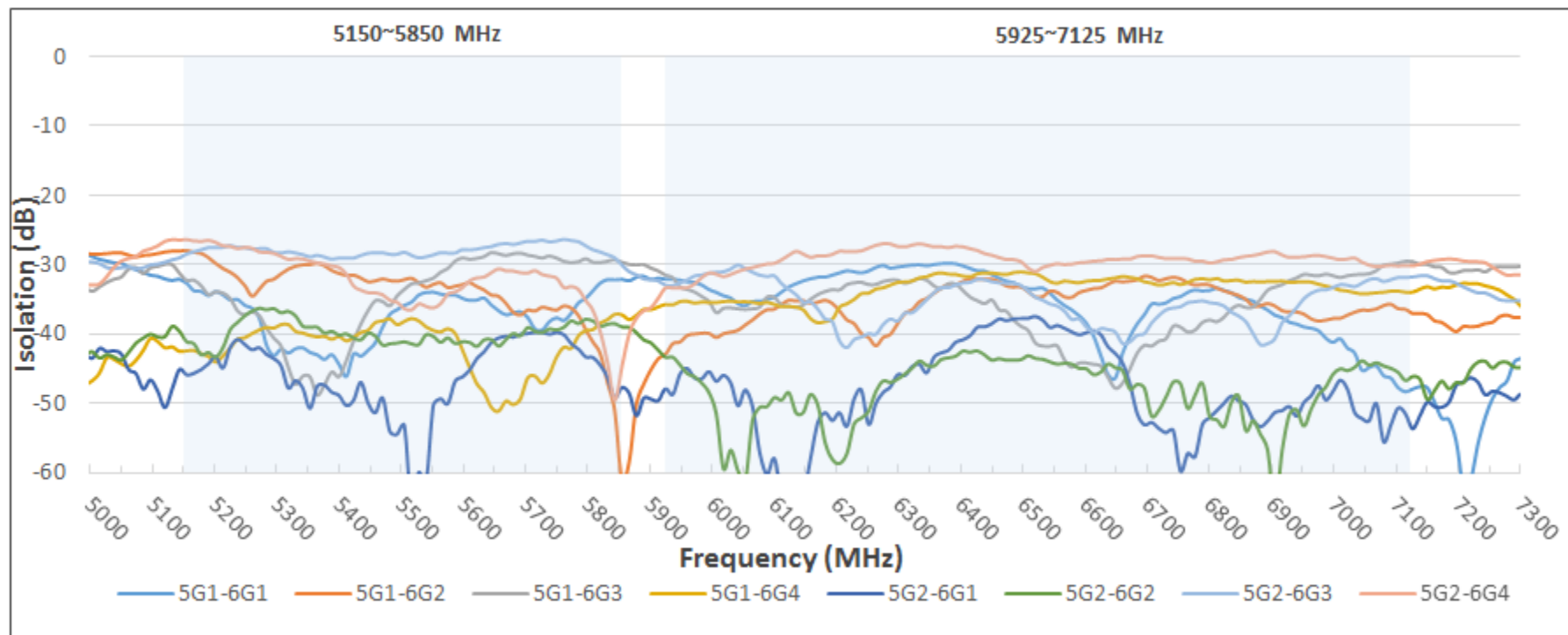
| Isolation   |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|
| Freq. (MHz) | 2G1-2G2 | 2G1-2G3 | 2G1-2G4 | 2G2-2G3 | 2G2-2G4 | 2G3-2G4 |
| 2400        | -25.38  | -27.61  | -24.98  | -19.48  | -26.34  | -21.87  |
| 2450        | -23.25  | -23.74  | -26.36  | -15.69  | -26.96  | -25.09  |
| 2500        | -21.57  | -23.90  | -26.82  | -15.53  | -26.37  | -24.99  |



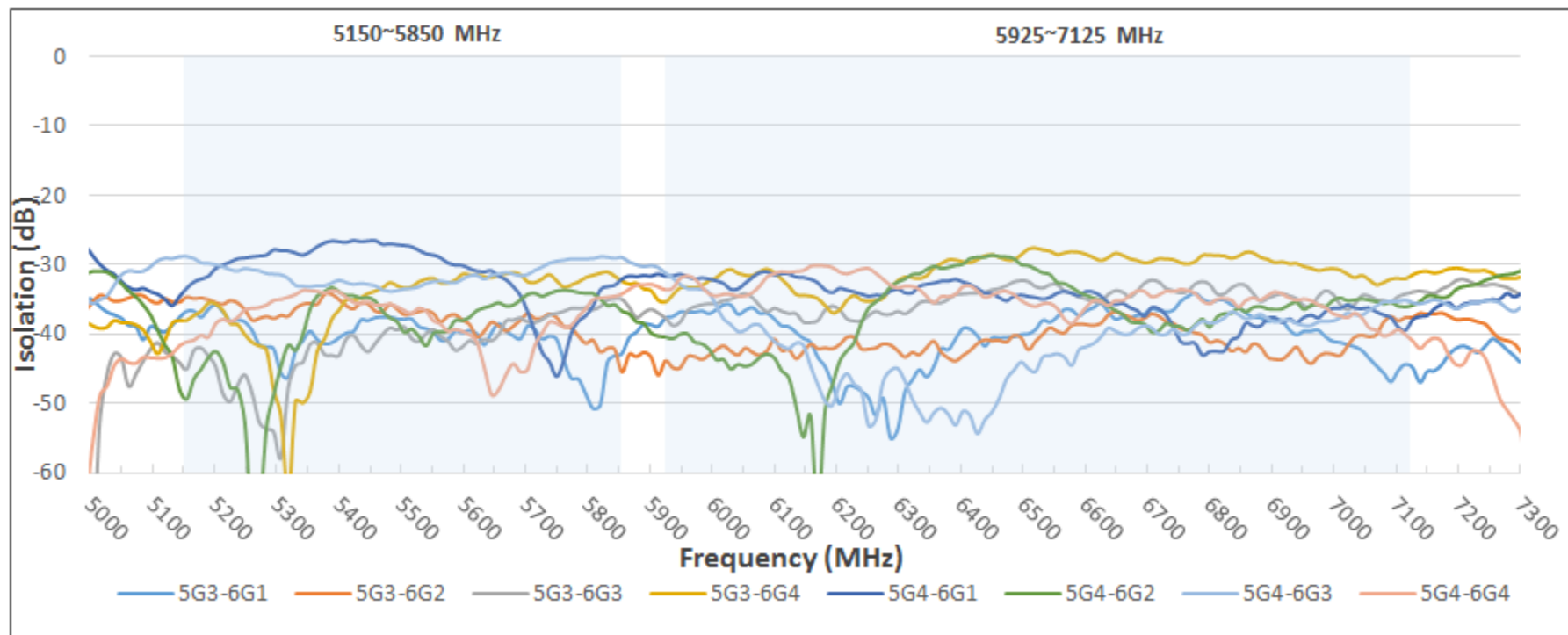
| Isolation   |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|
| Freq. (MHz) | 5G1-5G2 | 5G1-5G3 | 5G1-5G4 | 5G2-5G3 | 5G2-5G4 | 5G3-5G4 |
| 5150        | -55.18  | -38.14  | -31.13  | -35.10  | -36.76  | -27.30  |
| 5500        | -37.20  | -39.66  | -25.61  | -32.25  | -33.94  | -29.10  |
| 5850        | -33.94  | -35.35  | -28.77  | -31.76  | -48.86  | -32.08  |



| Isolation   |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|
| Freq. (MHz) | 6G1-6G2 | 6G1-6G3 | 6G1-6G4 | 6G2-6G3 | 6G2-6G4 | 6G3-6G4 |
| 5925        | -20.62  | -30.79  | -37.48  | -41.12  | -37.63  | -22.95  |
| 6500        | -32.93  | -45.38  | -34.18  | -37.39  | -52.77  | -22.60  |
| 7125        | -28.08  | -53.82  | -35.38  | -39.52  | -49.15  | -23.97  |

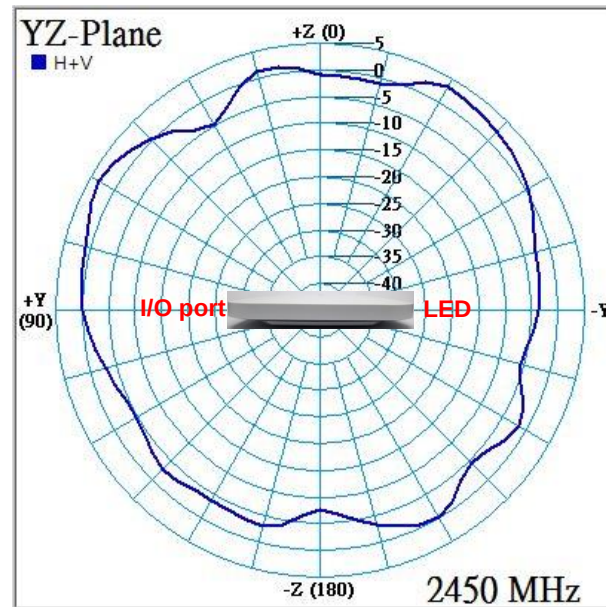
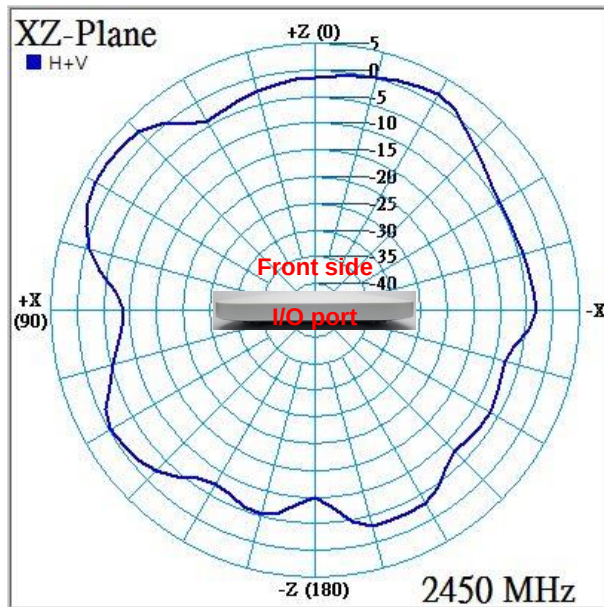
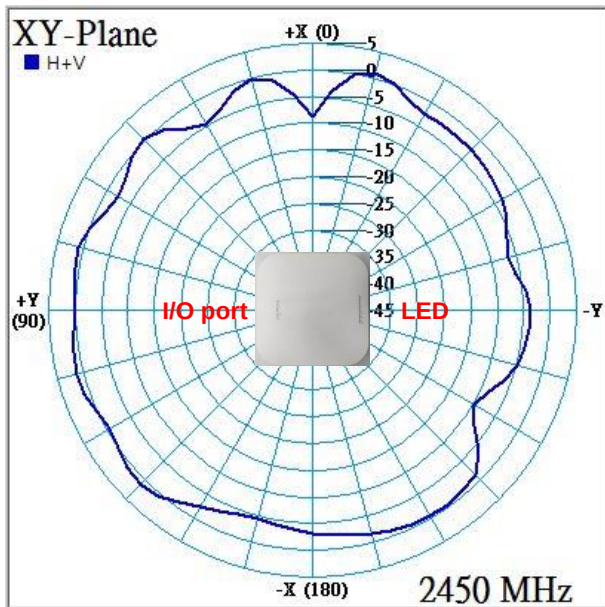
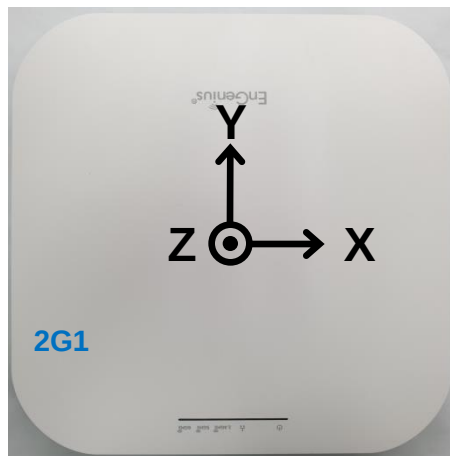


| Isolation   |         |         |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Freq. (MHz) | 5G1-6G1 | 5G1-6G2 | 5G1-6G3 | 5G1-6G4 | 5G2-6G1 | 5G2-6G2 | 5G2-6G3 | 5G2-6G4 |
| 5150        | -32.71  | -27.97  | -32.29  | -42.44  | -45.91  | -41.14  | -28.48  | -26.41  |
| 5500        | -35.88  | -32.18  | -33.59  | -38.20  | -53.21  | -41.13  | -28.24  | -36.38  |
| 5850        | -32.14  | -61.19  | -29.69  | -37.25  | -47.72  | -39.00  | -30.09  | -44.67  |
| 5925        | -32.12  | -42.92  | -31.54  | -35.75  | -47.92  | -43.37  | -32.99  | -33.40  |
| 6500        | -33.20  | -33.21  | -38.90  | -31.06  | -37.80  | -43.71  | -33.02  | -29.60  |
| 7125        | -47.95  | -37.07  | -29.60  | -33.98  | -53.67  | -46.14  | -31.80  | -30.19  |

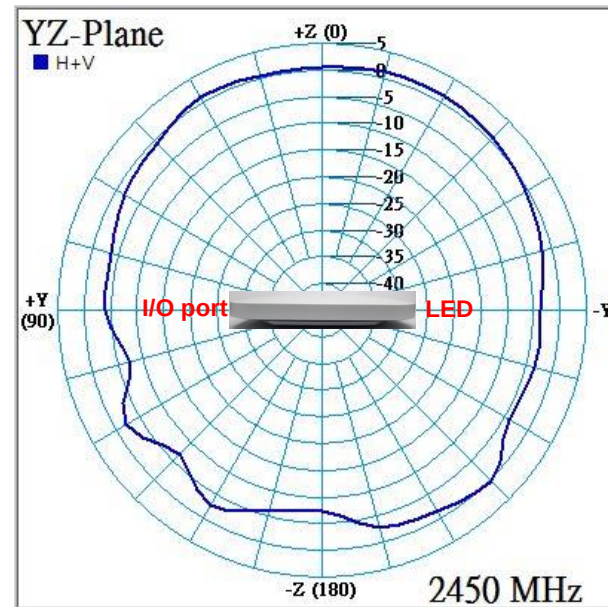
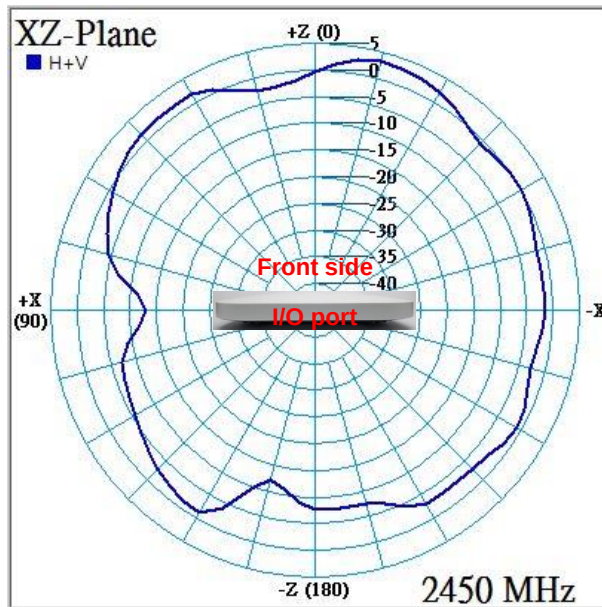
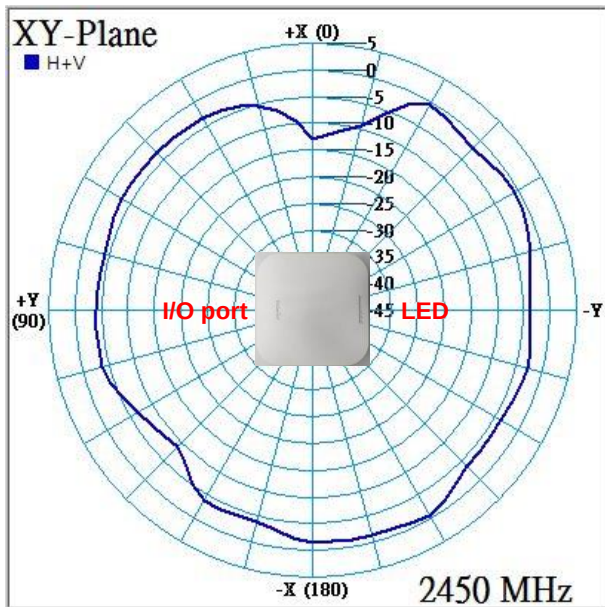
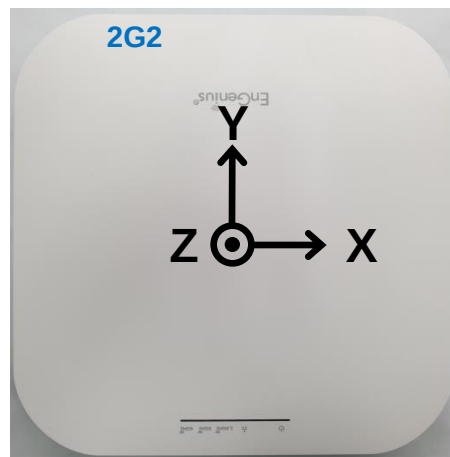


| Isolation   |         |         |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Freq. (MHz) | 5G3-6G1 | 5G3-6G2 | 5G3-6G3 | 5G3-6G4 | 5G4-6G1 | 5G4-6G2 | 5G4-6G3 | 5G4-6G4 |
| 5150        | -36.74  | -34.72  | -45.10  | -38.06  | -33.44  | -49.43  | -28.86  | -41.17  |
| 5500        | -37.92  | -37.23  | -38.99  | -33.42  | -27.26  | -39.81  | -33.51  | -36.64  |
| 5850        | -42.83  | -45.49  | -35.03  | -32.40  | -32.09  | -36.73  | -28.99  | -34.25  |
| 5925        | -37.70  | -43.91  | -37.72  | -35.42  | -31.72  | -40.45  | -31.22  | -33.65  |
| 6500        | -40.10  | -40.52  | -32.31  | -28.62  | -34.41  | -30.00  | -44.07  | -35.16  |
| 7125        | -44.90  | -37.61  | -33.97  | -31.48  | -37.95  | -35.84  | -35.53  | -41.02  |

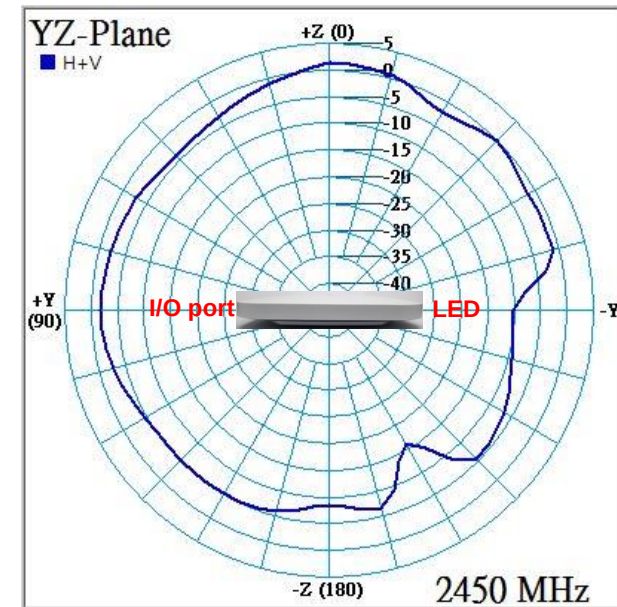
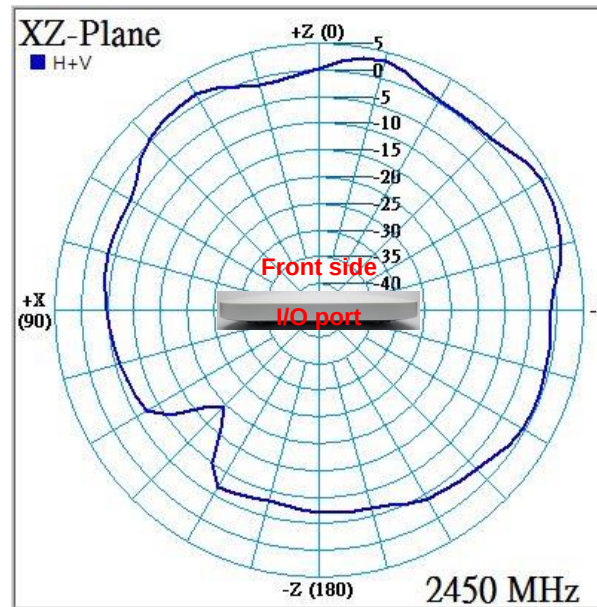
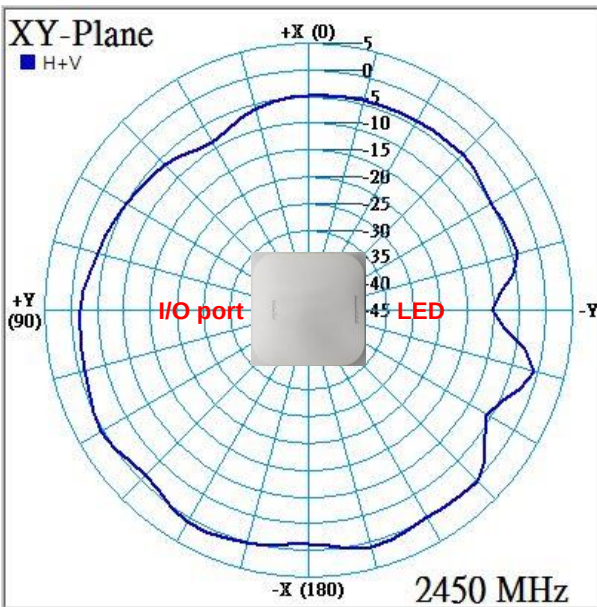
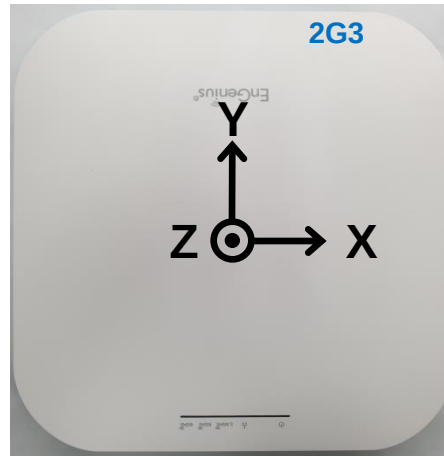
# 2D Radiation Pattern – 2G1 @ 2.45GHz



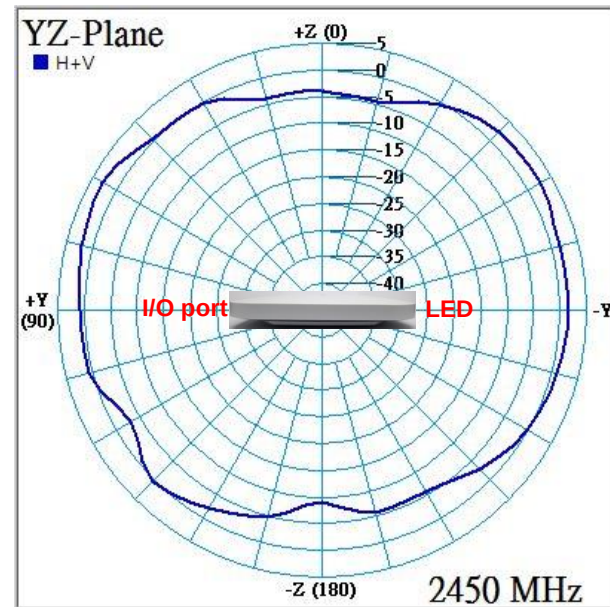
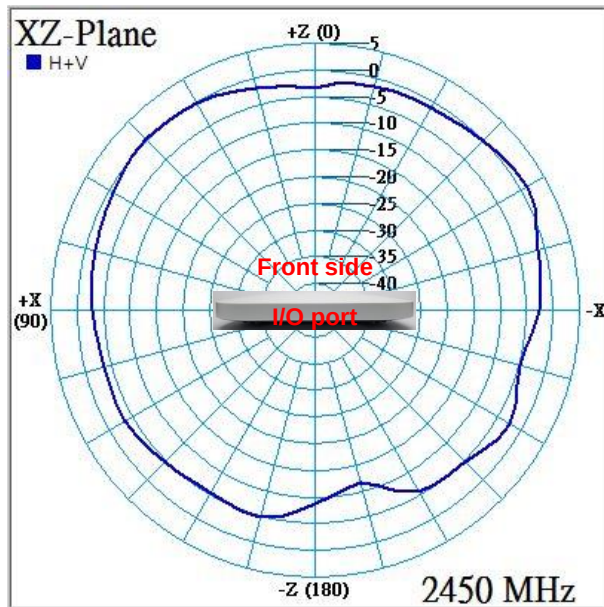
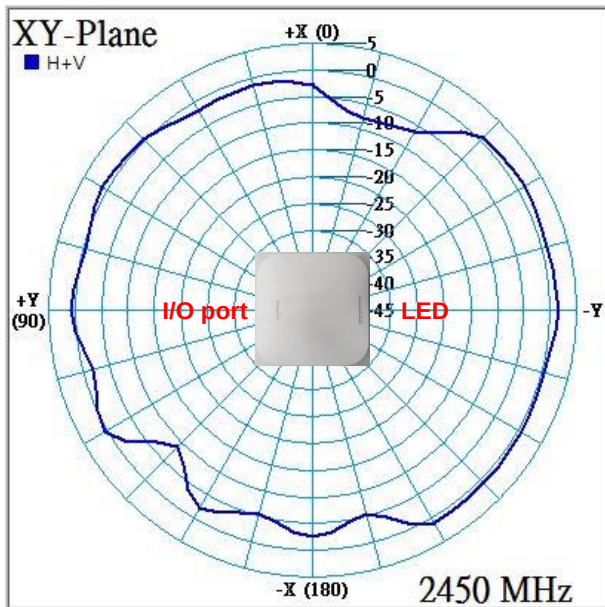
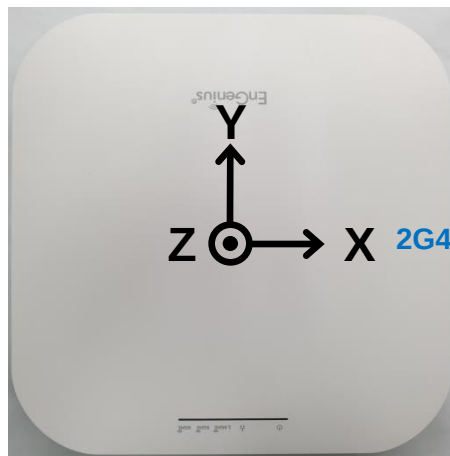
# 2D Radiation Pattern – 2G2 @ 2.45GHz



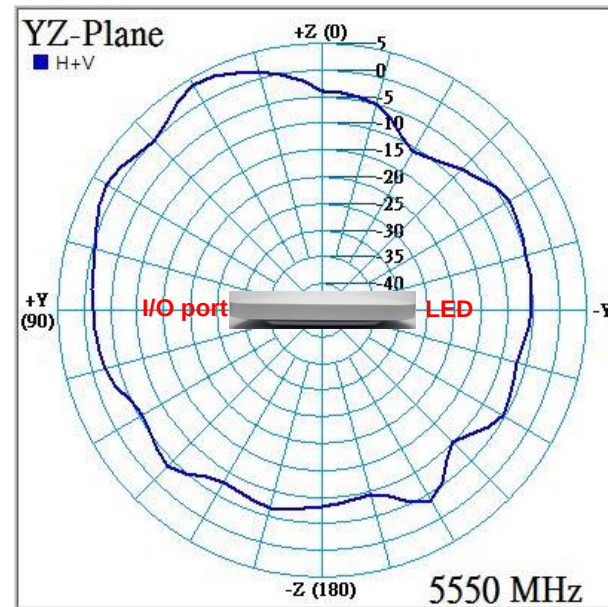
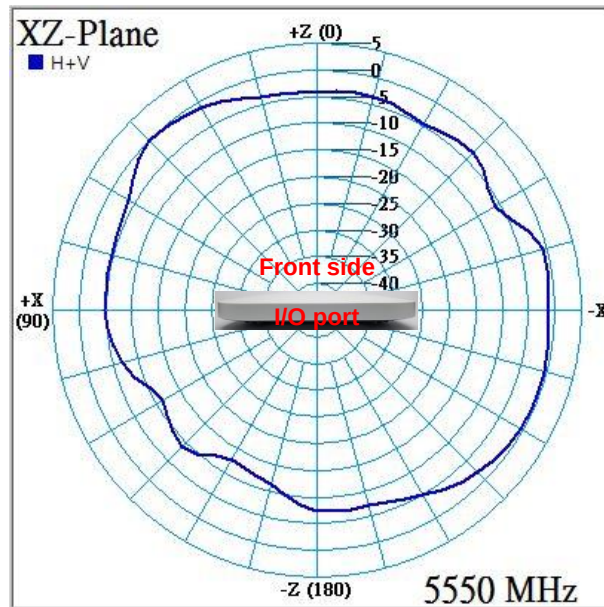
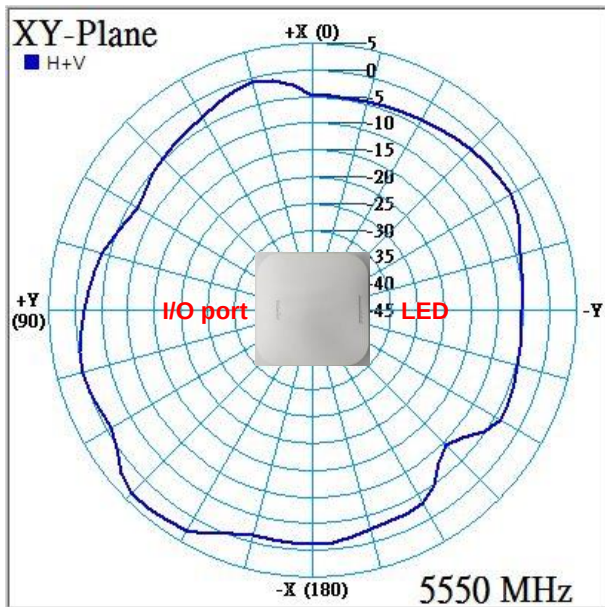
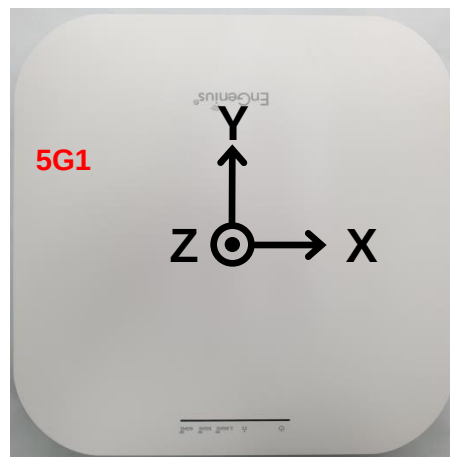
# 2D Radiation Pattern – 2G3 @ 2.45GHz



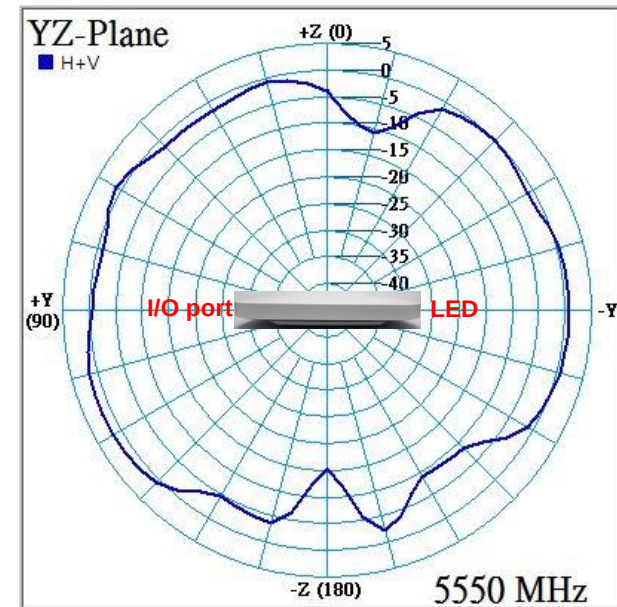
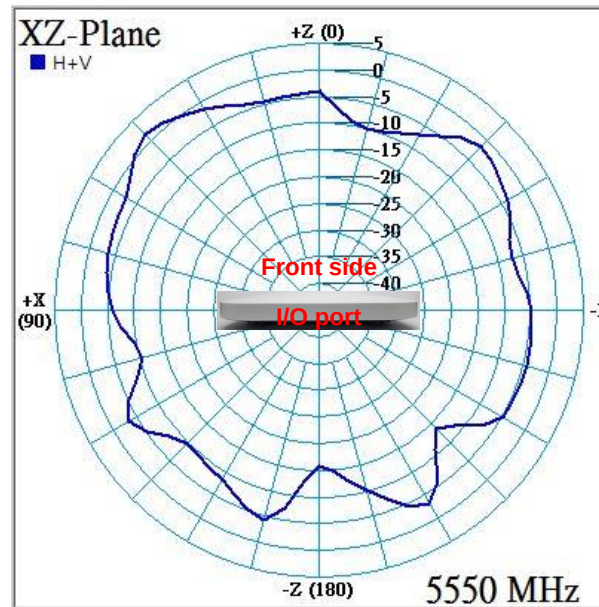
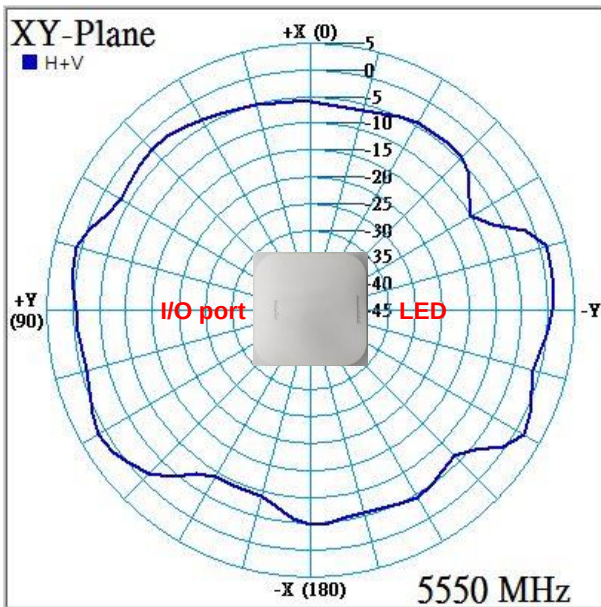
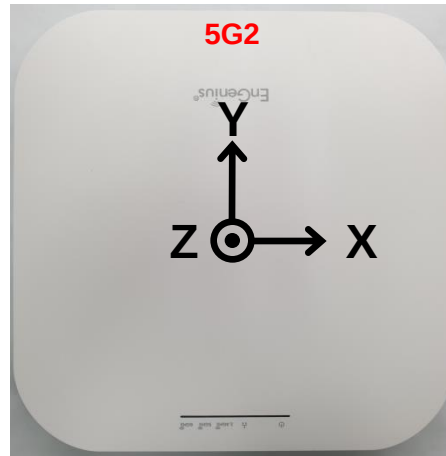
# 2D Radiation Pattern – 2G4 @ 2.45GHz



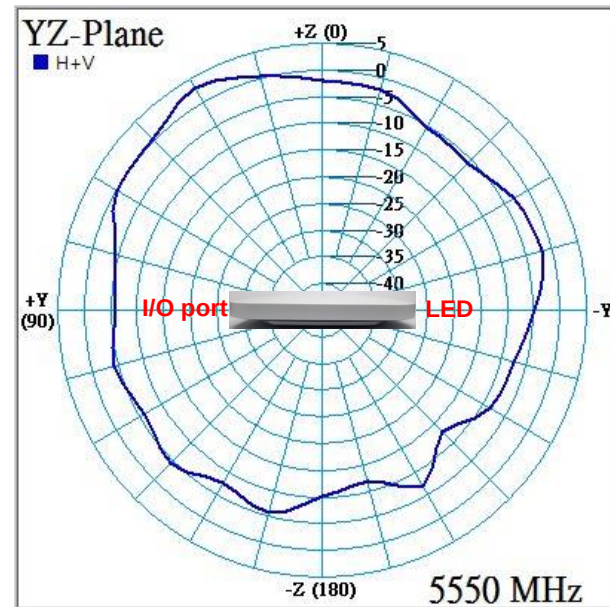
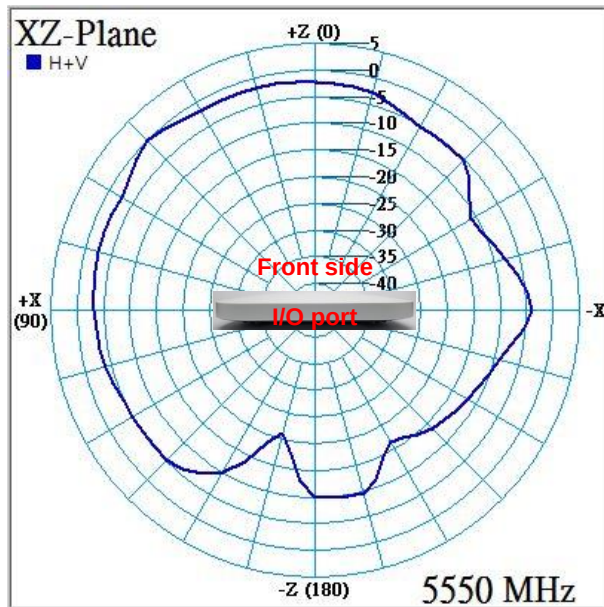
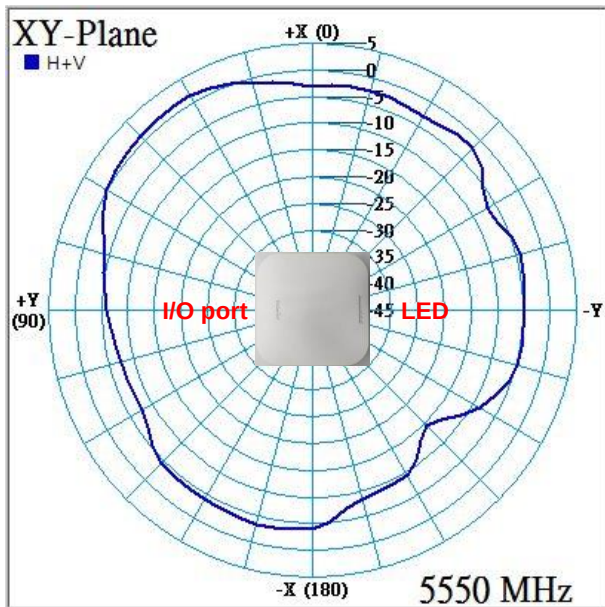
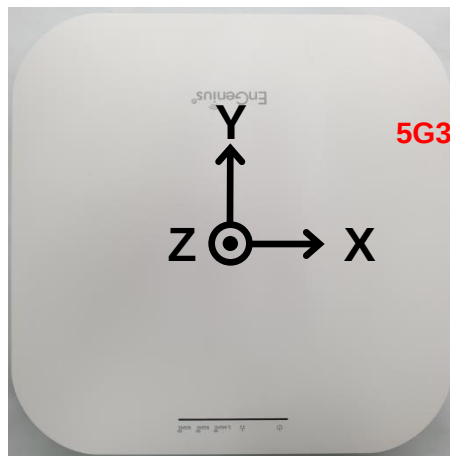
# 2D Radiation Pattern – 5G1 @ 5.55GHz



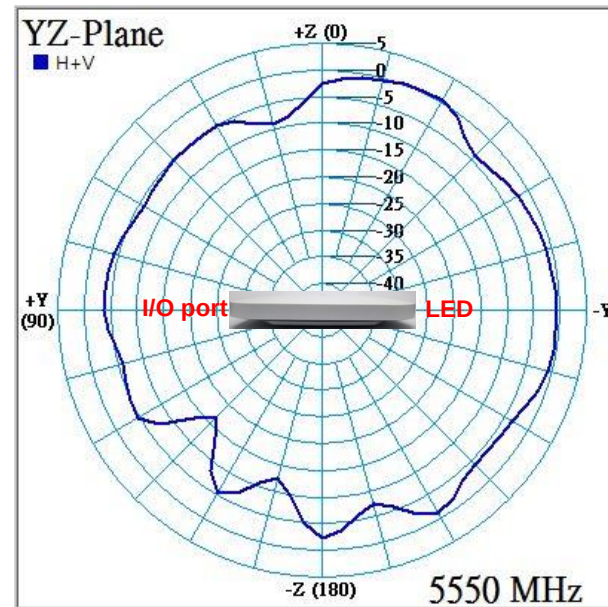
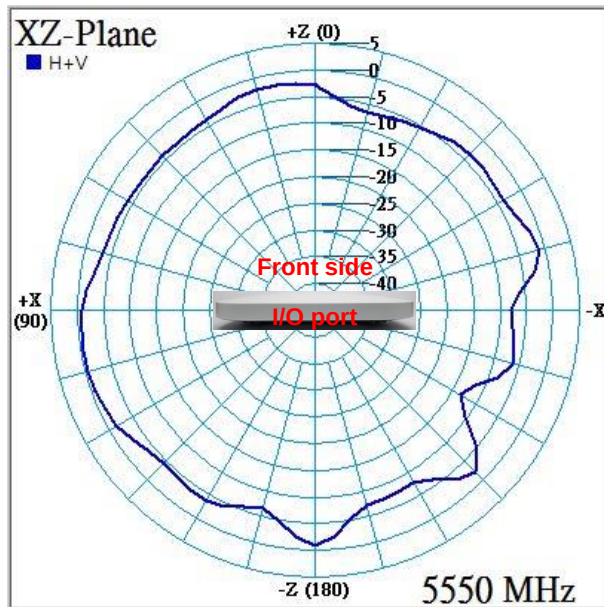
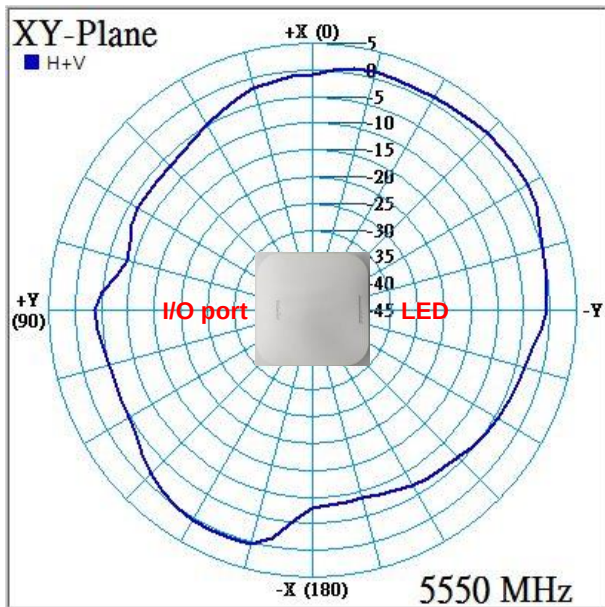
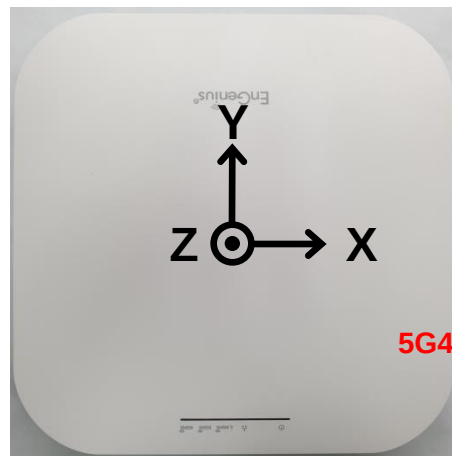
# 2D Radiation Pattern – 5G2 @ 5.55GHz



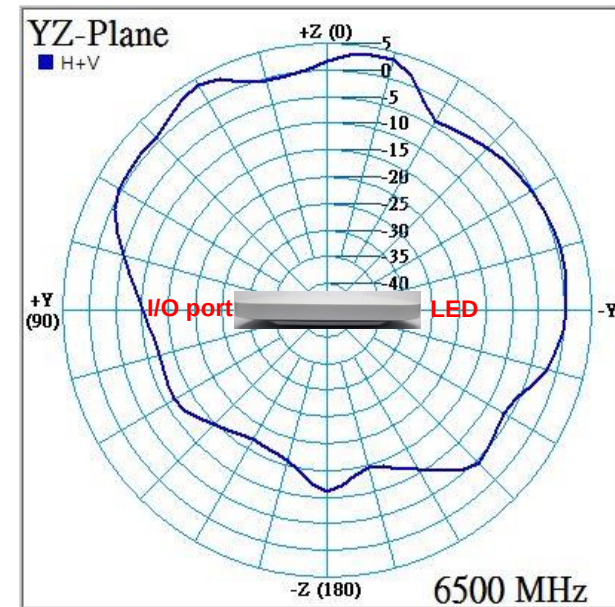
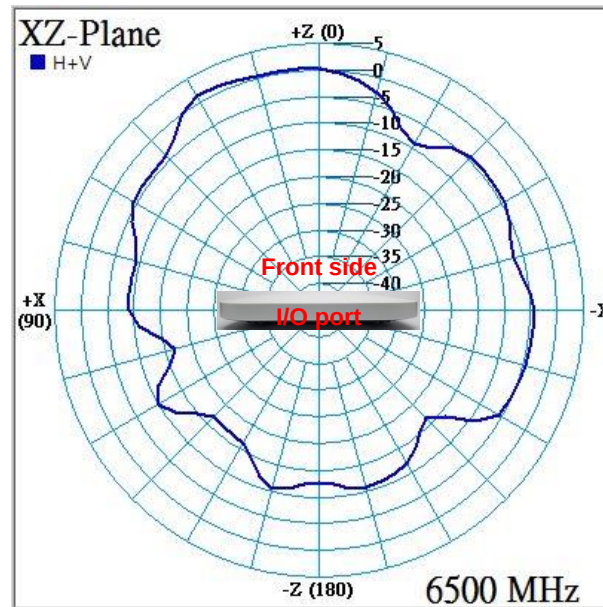
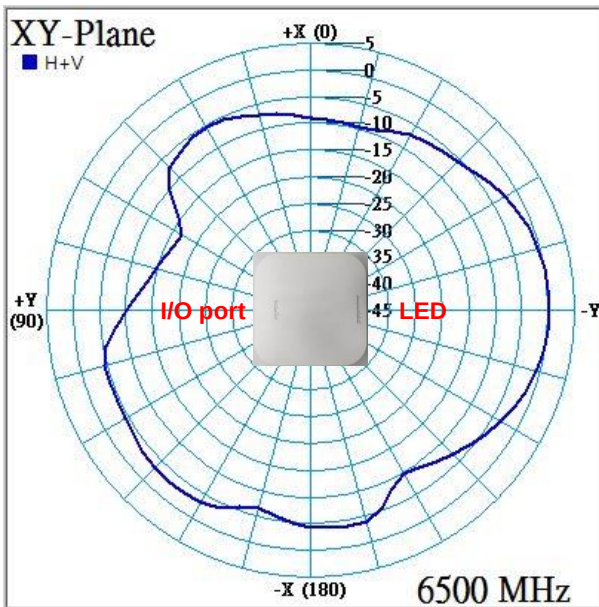
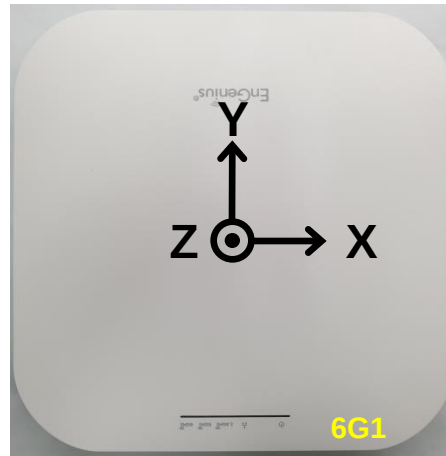
# 2D Radiation Pattern – 5G3 @ 5.55GHz



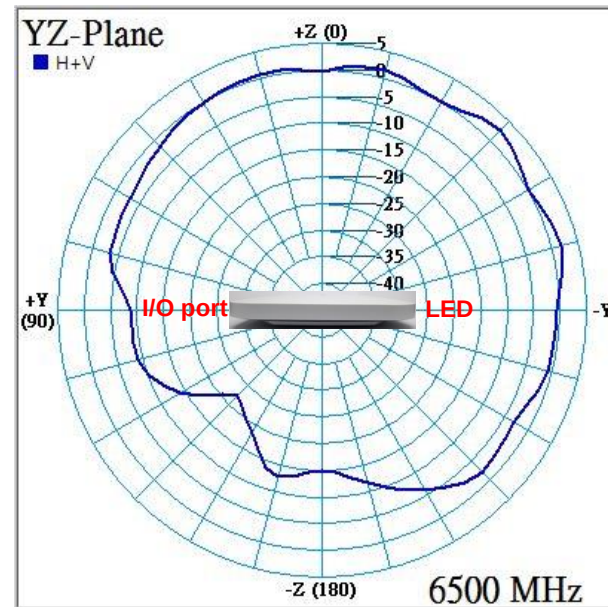
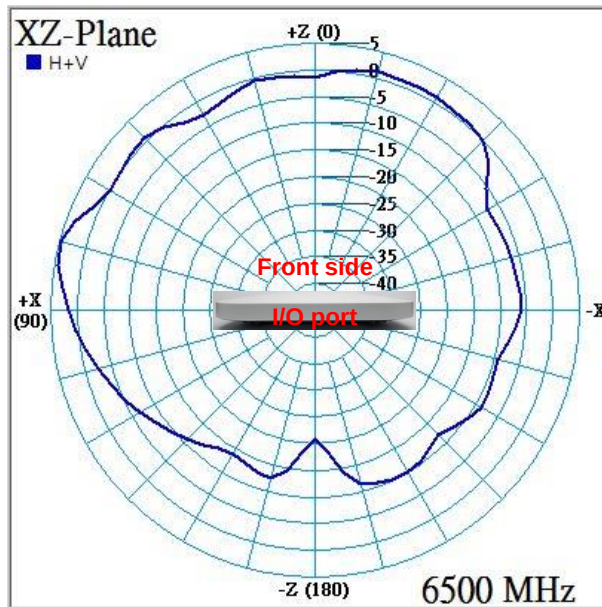
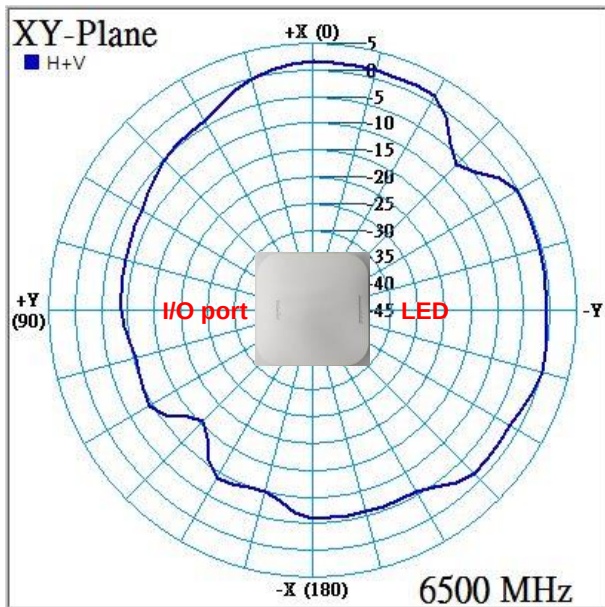
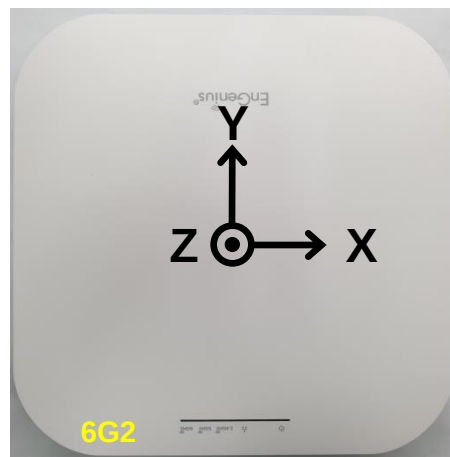
# 2D Radiation Pattern – 5G4 @ 5.55GHz



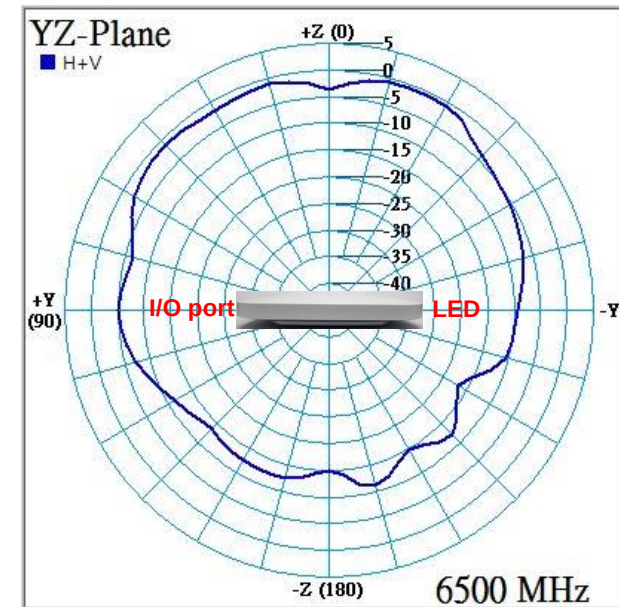
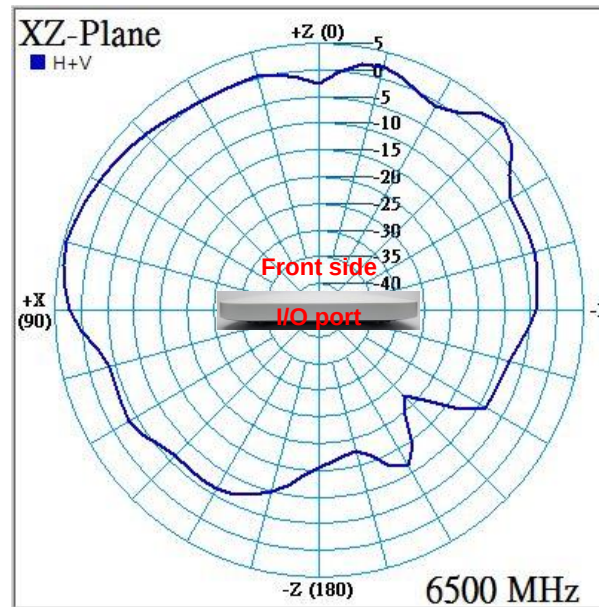
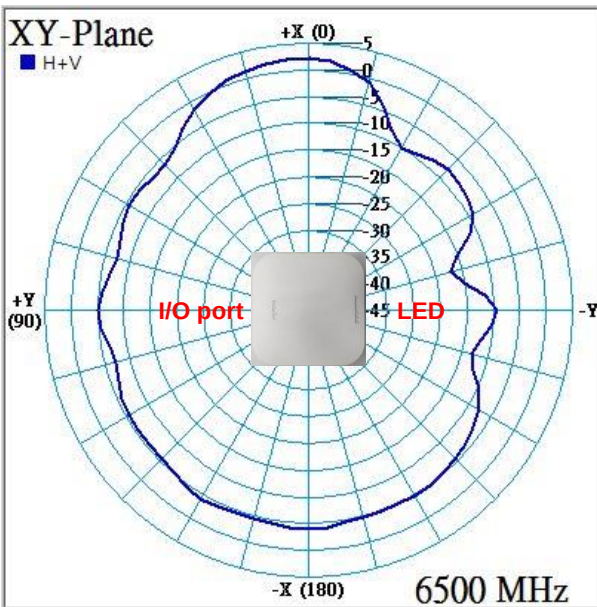
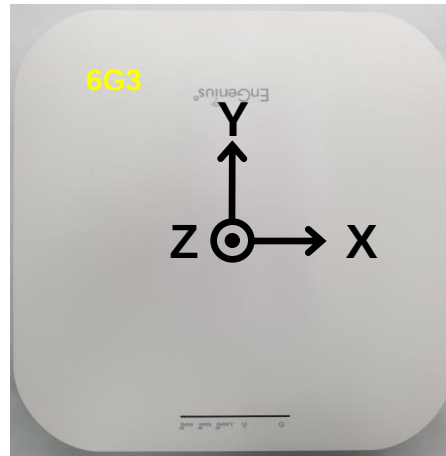
# 2D Radiation Pattern – 6G1 @ 6.5GHz



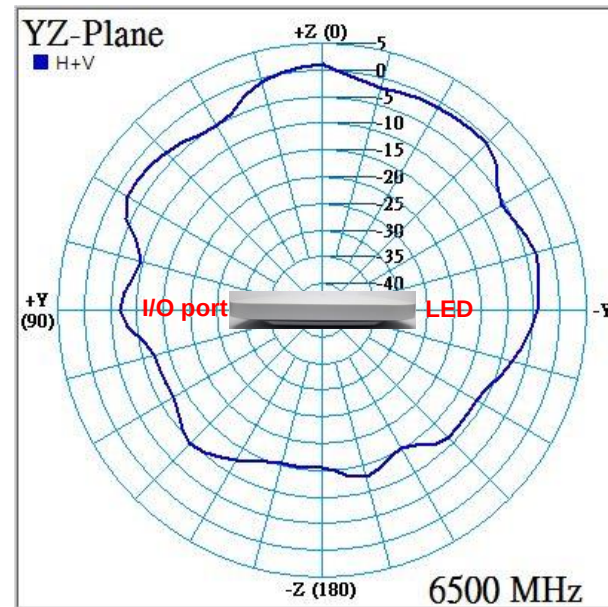
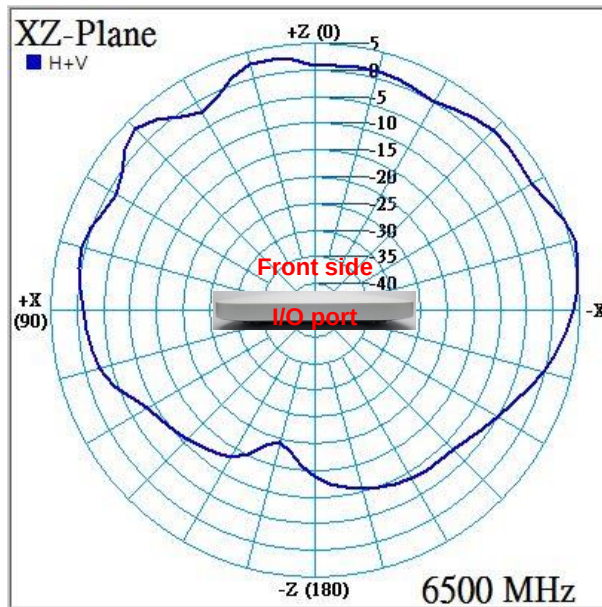
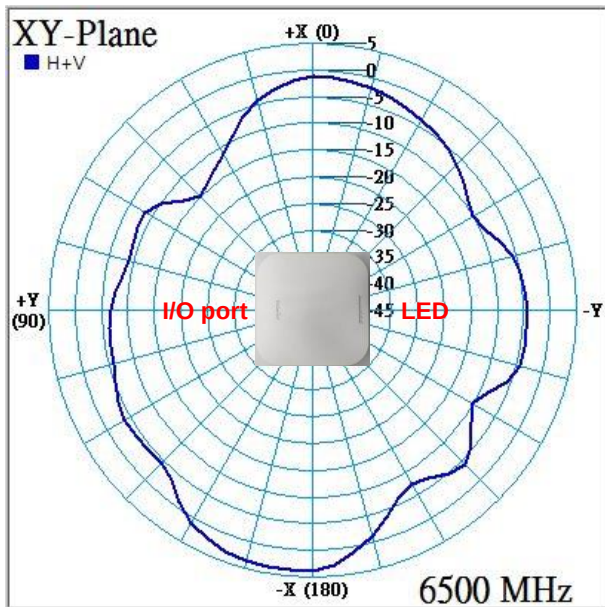
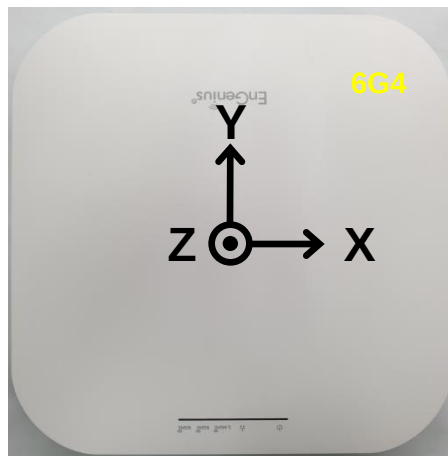
# 2D Radiation Pattern – 6G2 @ 6.5GHz



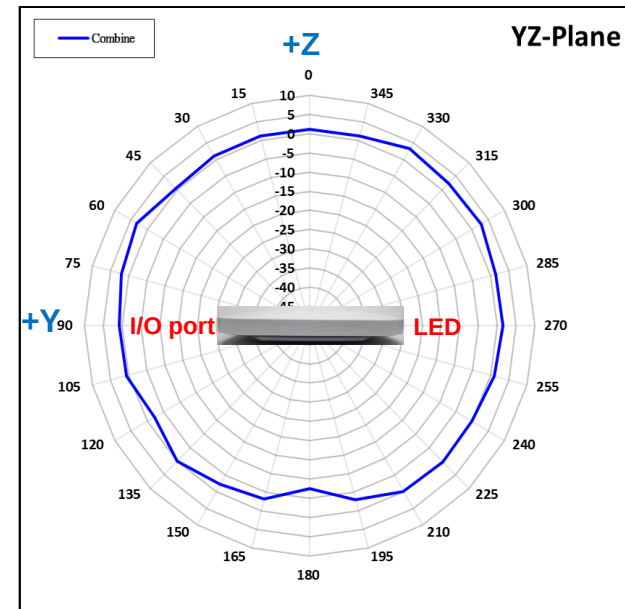
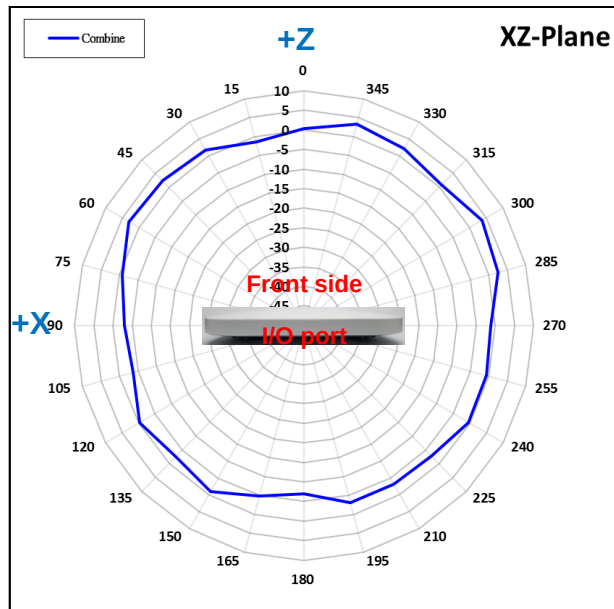
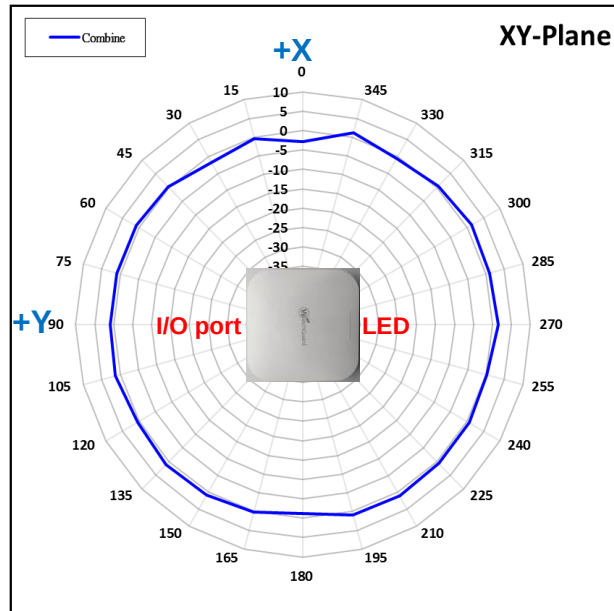
# 2D Radiation Pattern – 6G3 @ 6.5GHz



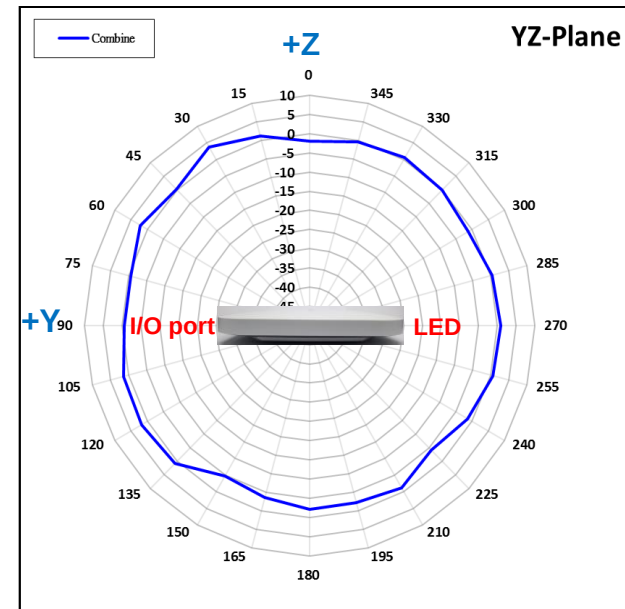
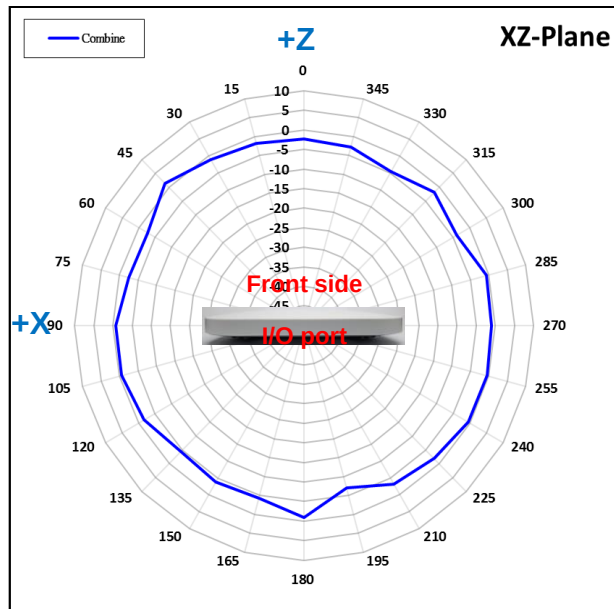
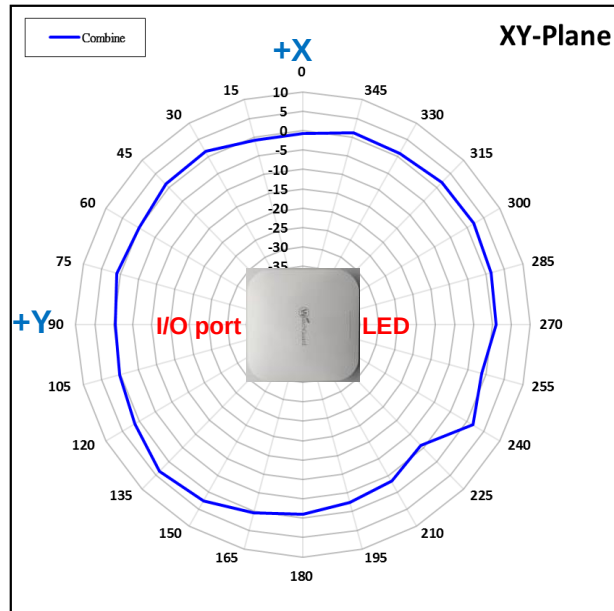
# 2D Radiation Pattern – 6G4 @ 6.5GHz



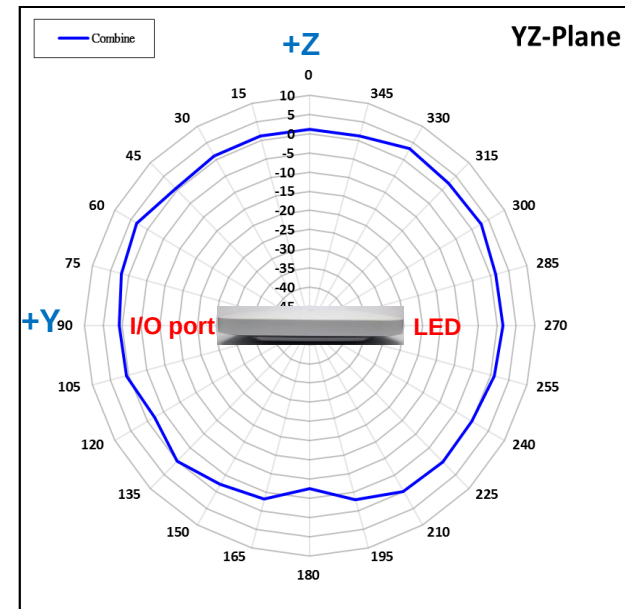
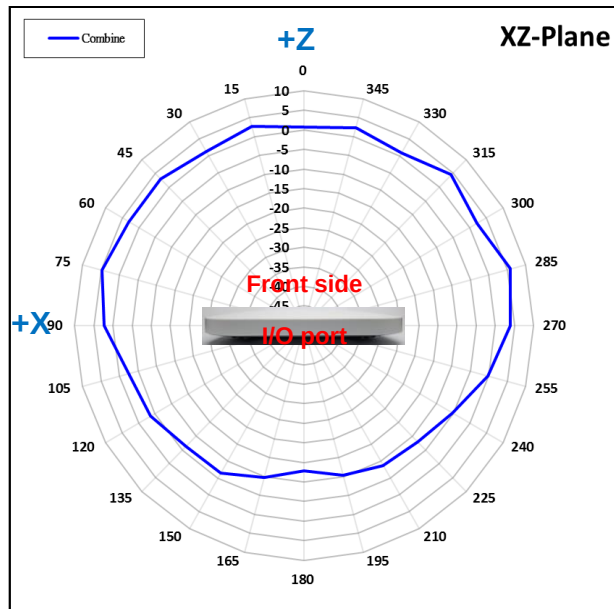
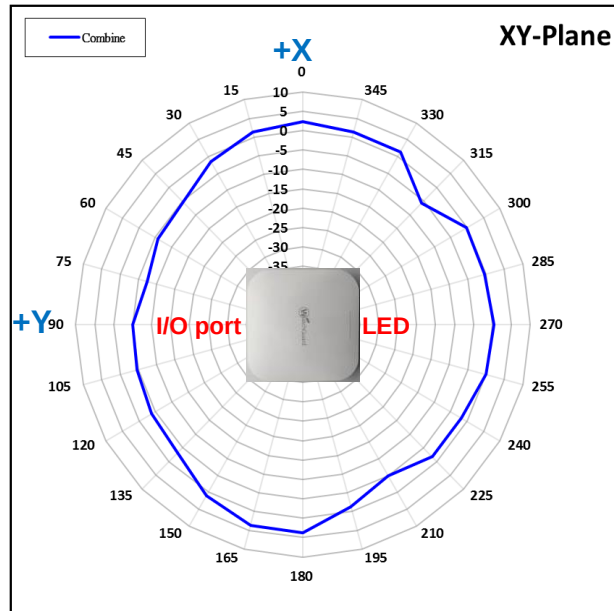
# Combine pattern – 2G @ 2.45 GHz



# Combine pattern – 5G @ 5.55 GHz



# Combine pattern – 6G @ 6.5 GHz



# Antenna Efficiency and Gain

| Antenna Performance |                |                 |                |                 |                |                 |                |                 |
|---------------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| Freq. (MHz)         | 2G1            |                 | 2G2            |                 | 2G3            |                 | 2G4            |                 |
|                     | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) |
| 2400                | 61.7           | 3.00            | 60.7           | 3.51            | 63.6           | 3.89            | 64.8           | 2.22            |
| 2450                | 67.2           | 3.30            | 67.5           | 4.11            | 62.5           | 3.71            | 72.0           | 2.90            |
| 2500                | 69.3           | 4.07            | 72.1           | 4.26            | 63.7           | 3.80            | 73.9           | 3.15            |

| Antenna Performance |                |                 |                |                 |                |                 |                |                 |
|---------------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| Freq. (MHz)         | 5G1            |                 | 5G2            |                 | 5G3            |                 | 5G4            |                 |
|                     | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) |
| 5150                | 61.2           | 4.87            | 61.8           | 4.01            | 52.6           | 4.36            | 53.1           | 3.59            |
| 5500                | 59.8           | 4.73            | 58.2           | 2.55            | 53.3           | 4.49            | 53.5           | 3.18            |
| 5850                | 60.3           | 5.09            | 61.5           | 3.04            | 54.3           | 4.56            | 56.4           | 4.01            |

| Antenna Performance |                |                 |                |                 |                |                 |                |                 |
|---------------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| Freq. (MHz)         | 6G1            |                 | 6G2            |                 | 6G3            |                 | 6G4            |                 |
|                     | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) |
| 5925                | 55.6           | 5.30            | 60.8           | 4.66            | 55.8           | 4.68            | 57.1           | 5.44            |
| 6500                | 55.2           | 3.71            | 57.5           | 4.74            | 55.1           | 4.44            | 57.5           | 5.38            |
| 7125                | 65.7           | 5.06            | 53.8           | 3.96            | 62.2           | 5.43            | 58.4           | 5.48            |