



# WAP380

## Antenna Test Report

Senao Networks, Inc.

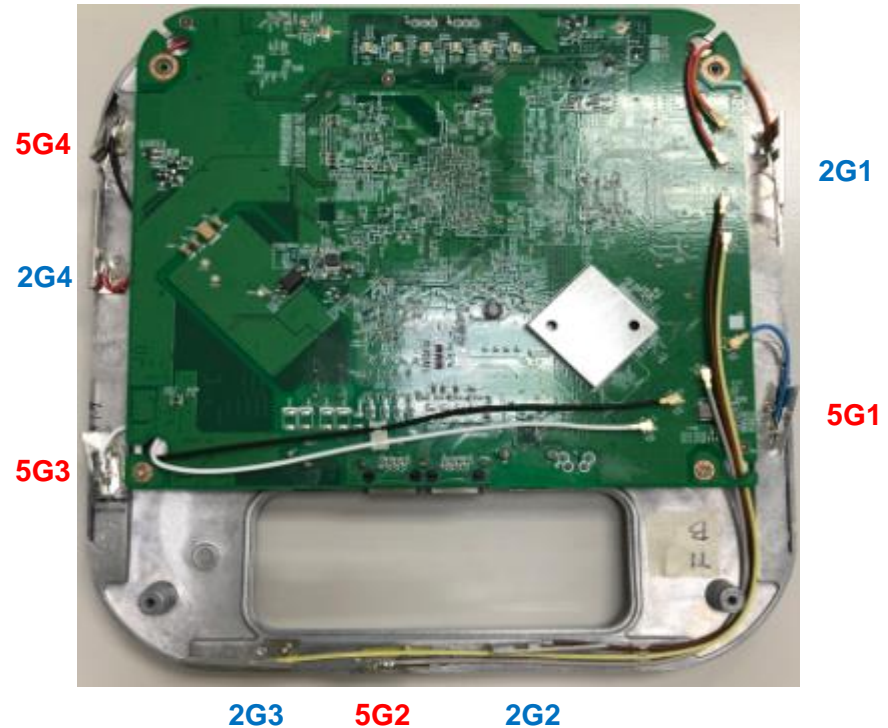
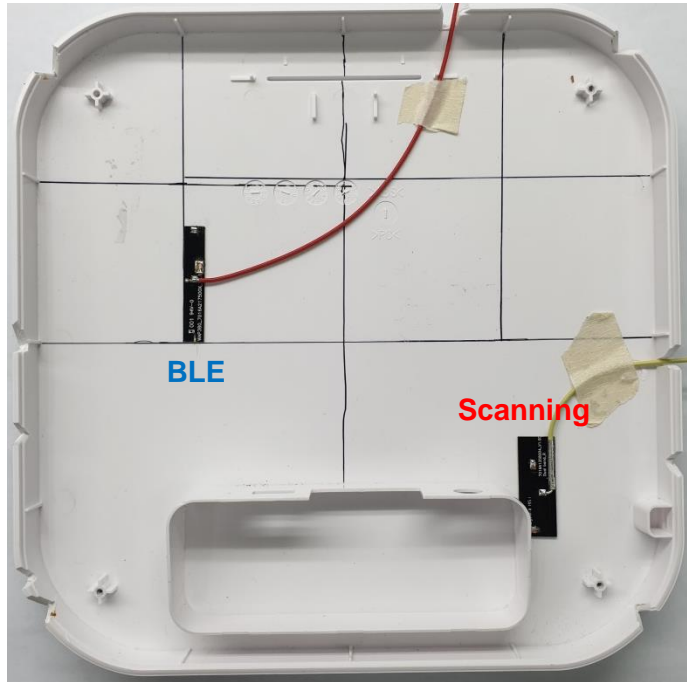
|                     |                                  |
|---------------------|----------------------------------|
| Customer            | Emplus                           |
| Project             | WAP380                           |
| Project Description | 2.4G antenna *4<br>5G antenna *4 |
| Date                | 2020/04/28                       |
| Prepared by         | Cell                             |
| Report Version      | A01                              |

- **Purpose**

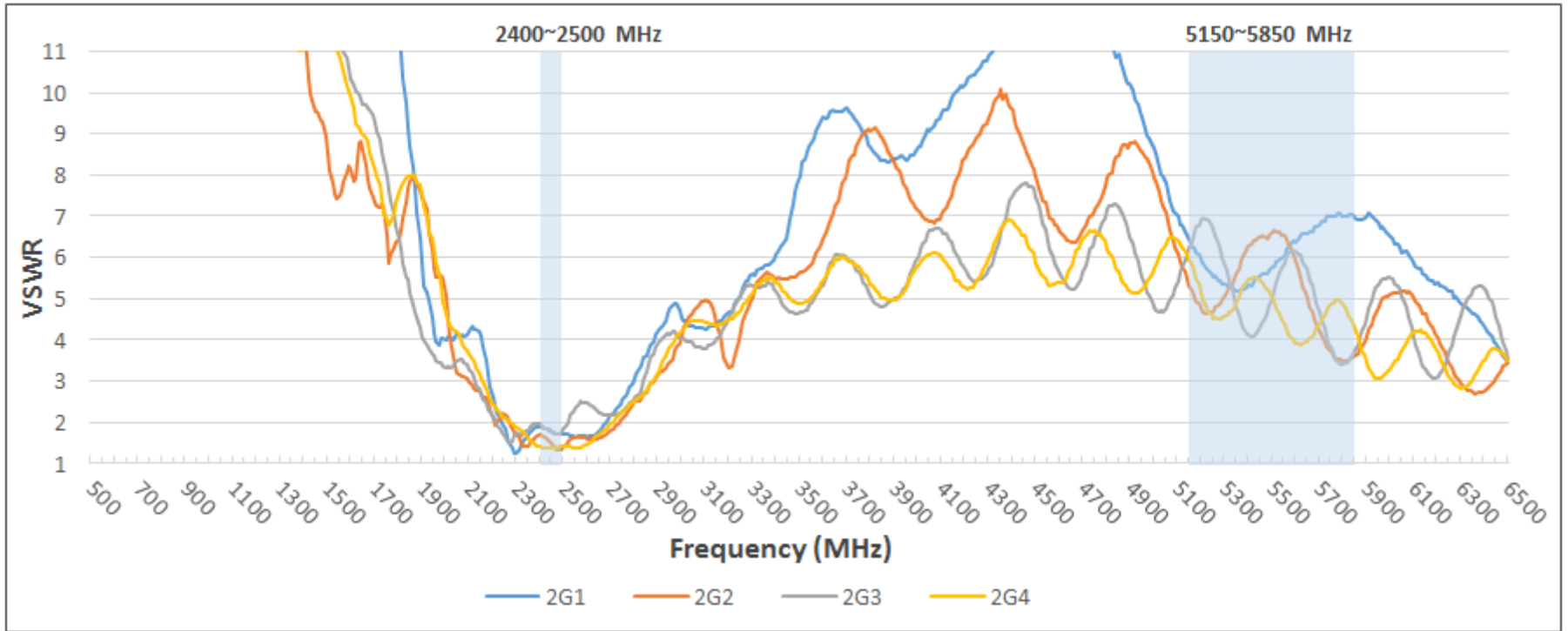
Antenna verification for WAP380 device, result as following.

- **Agenda**

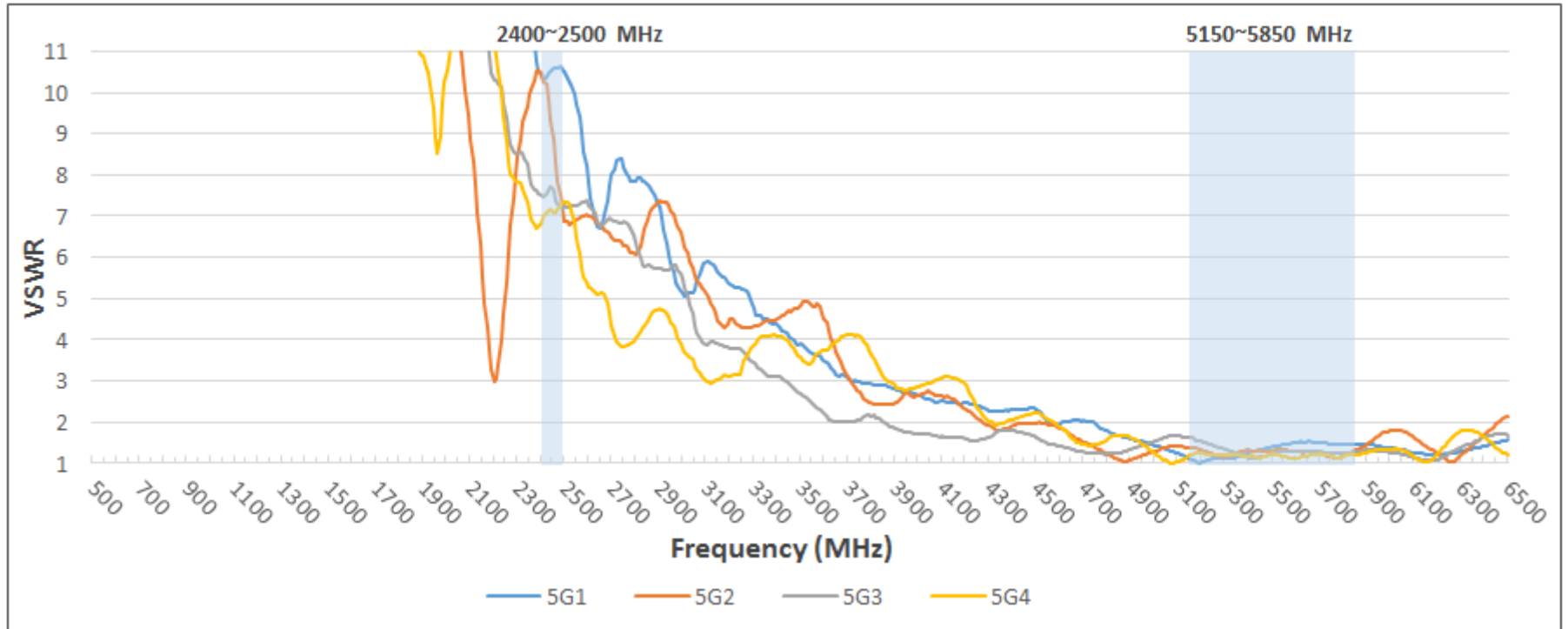
- Placement and Specification
- VSWR & Isolation
- Radiation Pattern
- Efficiency and Gain



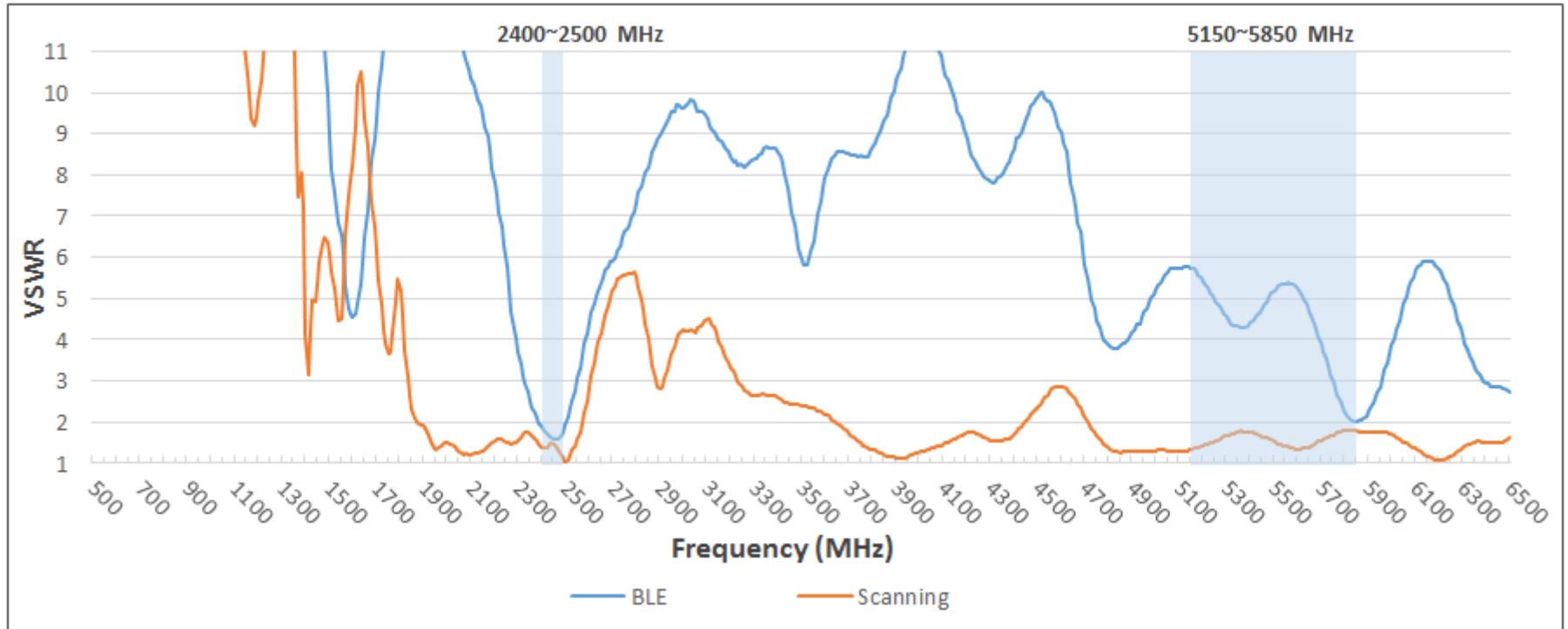
| Ant No.  | Operating Band                           | Gain (dBi)             | Efficiency (%)         | Ant type | Material | Feeding | Dimension                   |
|----------|--|------------------------|------------------------|----------|----------|---------|-----------------------------|
| 2G1~2G4  | 2400MHz ~ 2500 MHz                       | 2.70~5.01              | 60.4~76.0              | PIFA     | Metal    | Cable   | 29*10*7 mm <sup>3</sup>     |
| 5G1~5G4  | 5150MHz ~ 5850 MHz                       | 3.81~5.65              | 51.4~68.3              | PIFA     | Metal    | Cable   | 21*10*5 mm <sup>3</sup>     |
| BLE      | 2400MHz ~ 2500 MHz                       | 5.04~5.90              | 53.1~61.9              | Dipole   | PCB      | Cable   | 38*6.5*0.55 mm <sup>3</sup> |
| Scanning | 2400MHz ~ 2500 MHz<br>5150MHz ~ 5850 MHz | 3.50~4.33<br>5.72~6.17 | 53.0~63.0<br>52.4~60.7 | PIFA     | PCB      | Cable   | 32*12*0.95 mm <sup>3</sup>  |



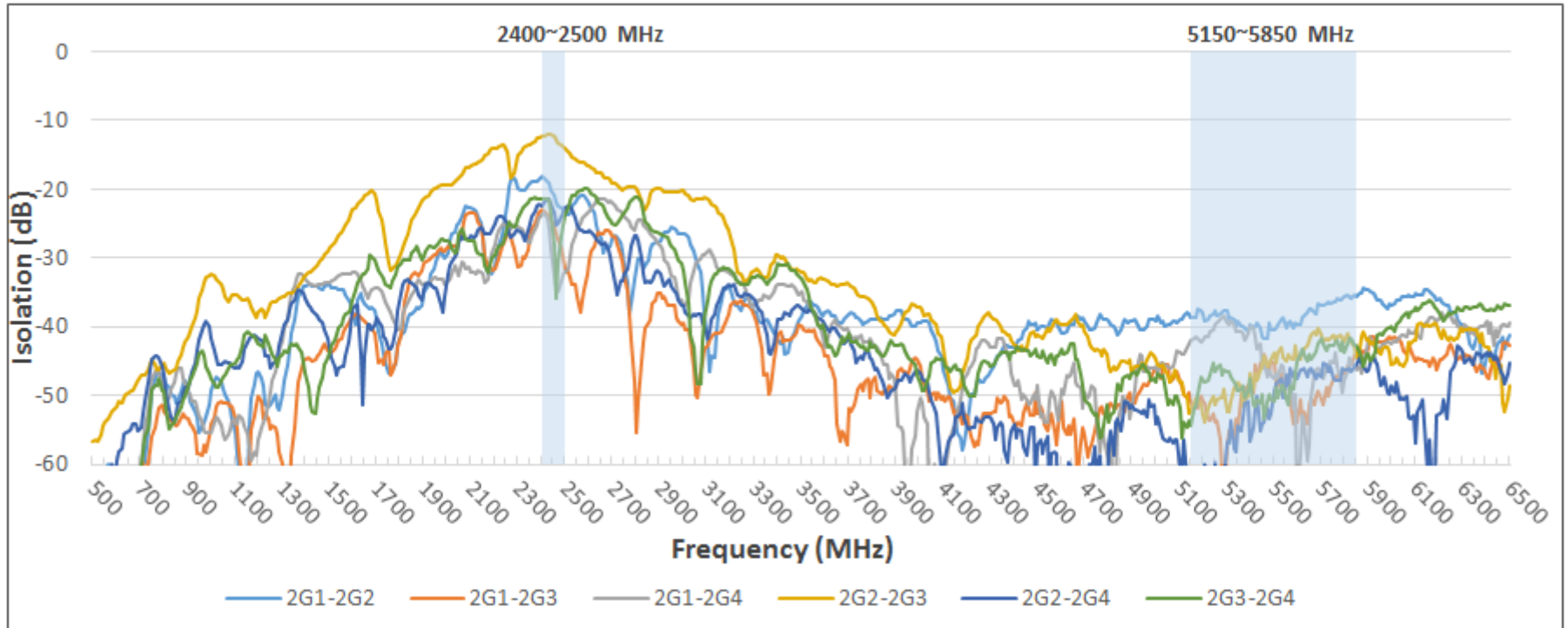
| VSWR        |      |      |      |      |
|-------------|------|------|------|------|
| Freq. (MHz) | 2G1  | 2G2  | 2G3  | 2G4  |
| 2400        | 1.88 | 1.69 | 1.95 | 1.40 |
| 2450        | 1.77 | 1.47 | 1.76 | 1.39 |
| 2500        | 1.73 | 1.40 | 1.82 | 1.42 |



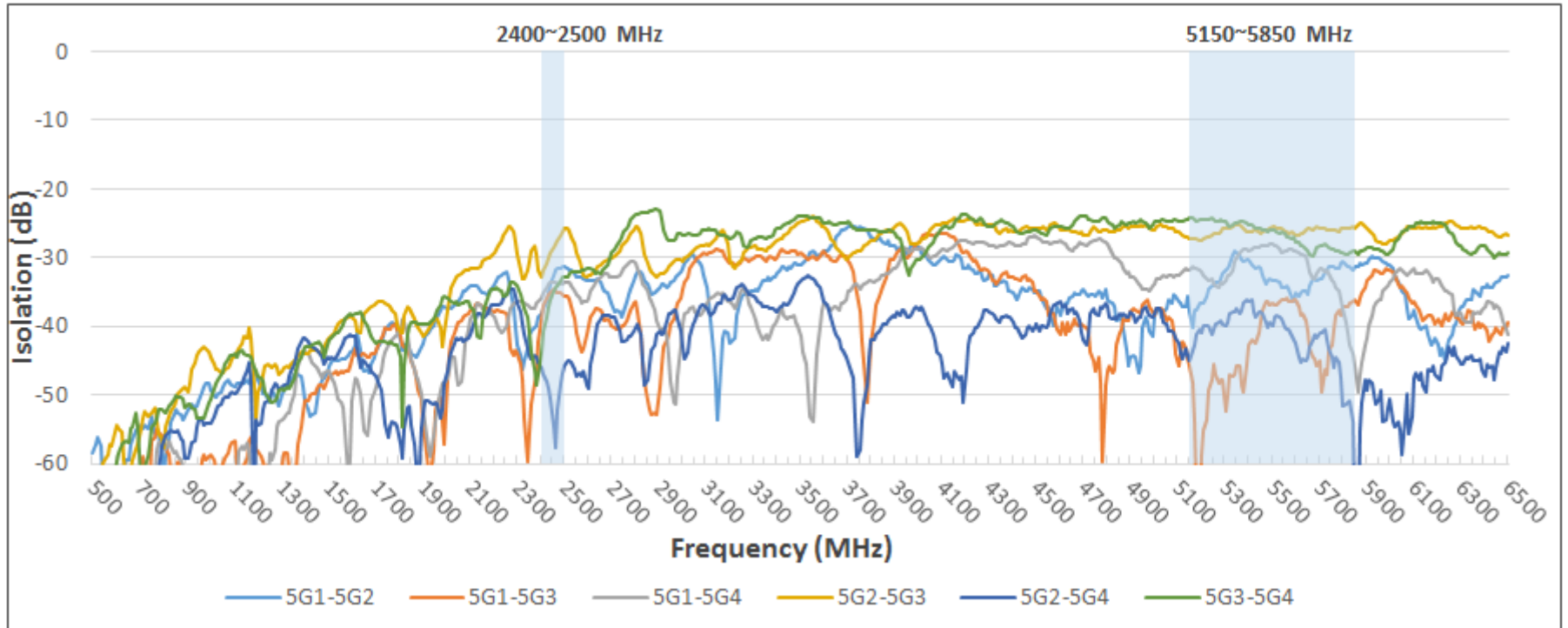
| VSWR        |      |      |      |      |
|-------------|------|------|------|------|
| Freq. (MHz) | 5G1  | 5G2  | 5G3  | 5G4  |
| 5150        | 1.39 | 1.38 | 1.20 | 1.64 |
| 5500        | 1.13 | 1.31 | 1.06 | 1.21 |
| 5850        | 1.47 | 1.32 | 1.12 | 1.13 |



| VSWR        |      |          |
|-------------|------|----------|
| Freq. (MHz) | BLE  | Scanning |
| 2400        | 1.87 | 1.39     |
| 2450        | 1.60 | 1.47     |
| 2500        | 1.93 | 1.03     |
| 5150        |      | 1.34     |
| 5500        |      | 1.53     |
| 5850        |      | 1.78     |

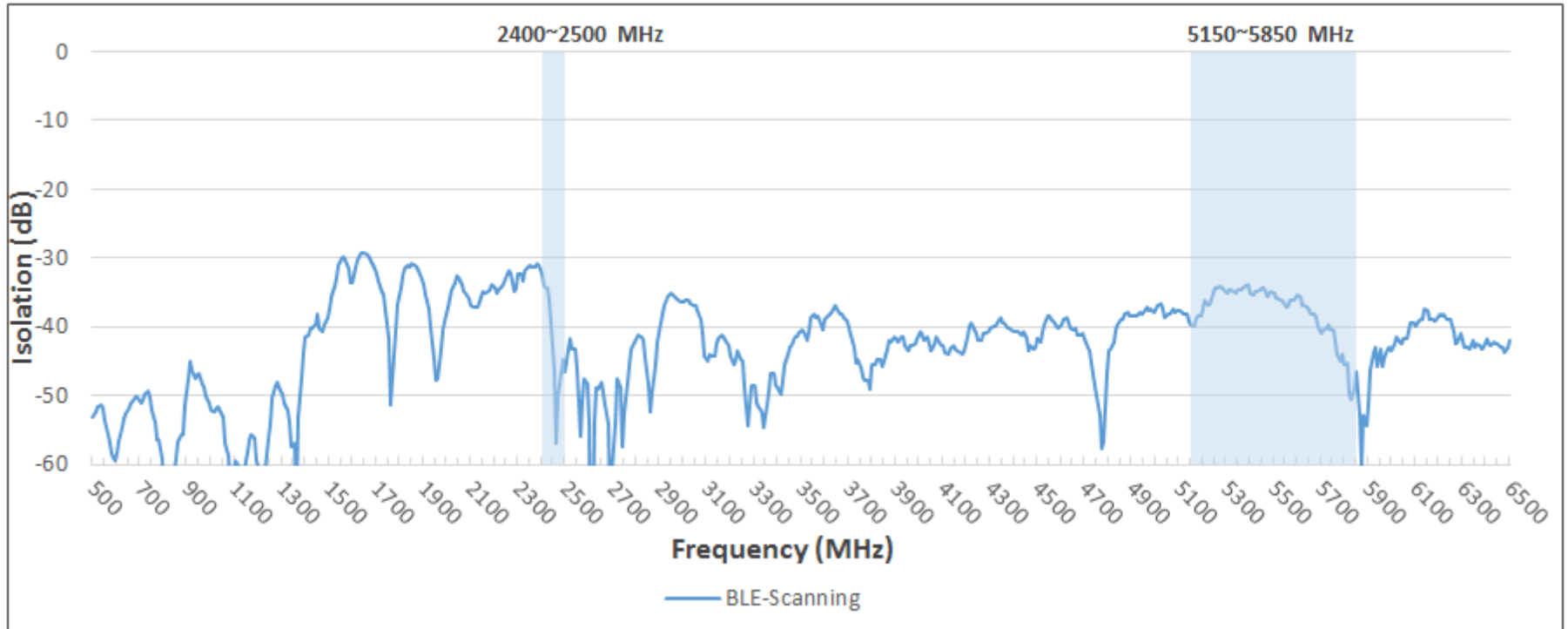


| Isolation   |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|
| Freq. (MHz) | 2G1-2G2 | 2G1-2G3 | 2G1-2G4 | 2G2-2G3 | 2G2-2G4 | 2G3-2G4 |
| 2400        | -18.17  | -22.96  | -23.65  | -12.42  | -22.39  | -21.42  |
| 2450        | -21.05  | -25.51  | -32.70  | -12.40  | -23.54  | -28.34  |
| 2500        | -23.44  | -31.51  | -32.13  | -14.15  | -22.82  | -23.80  |

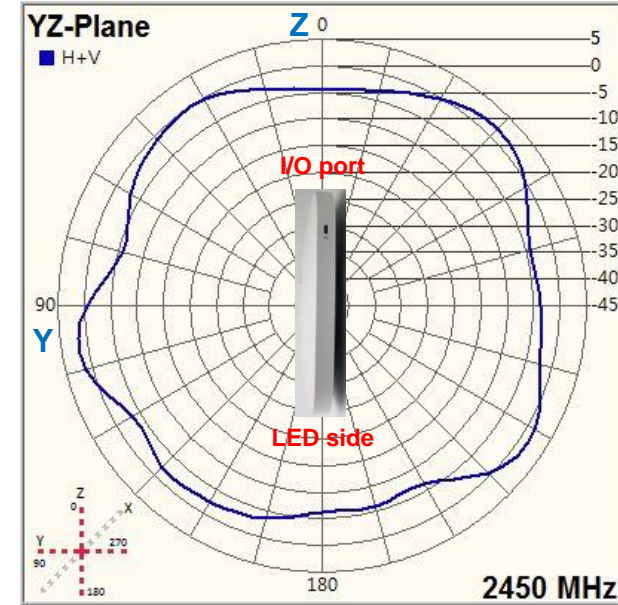
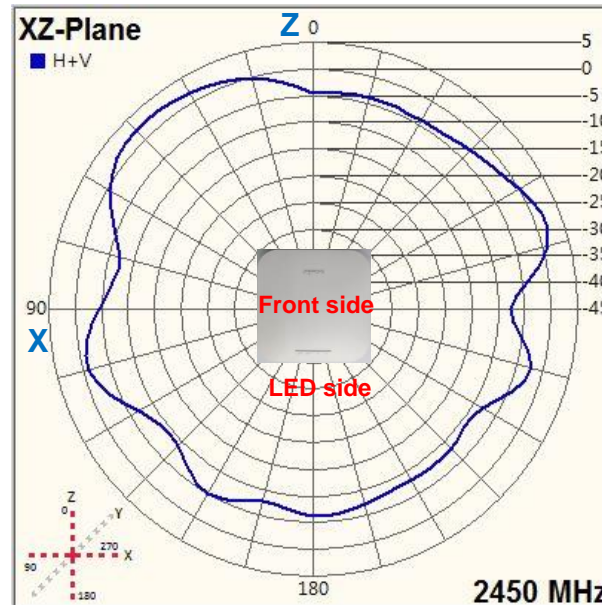
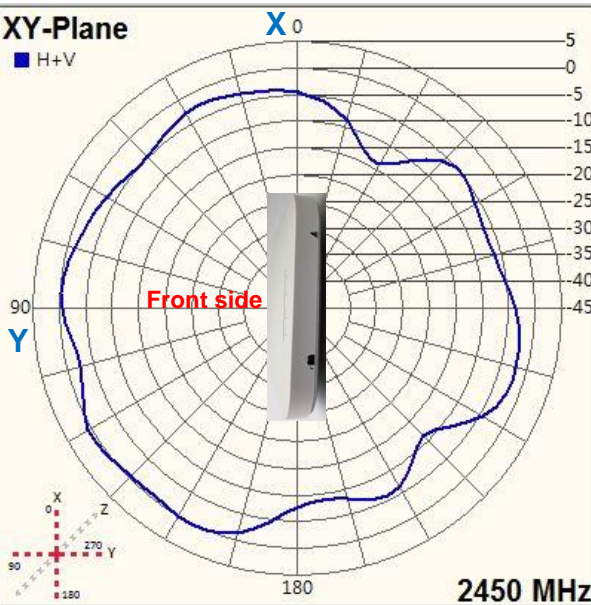
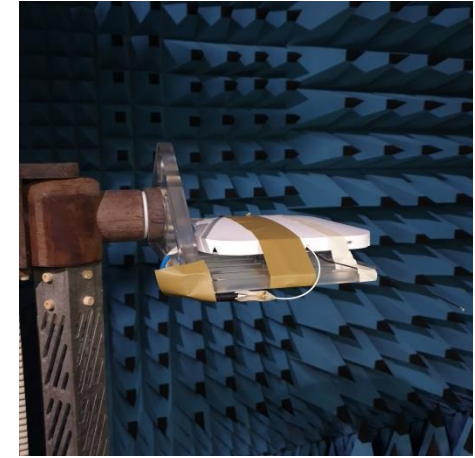
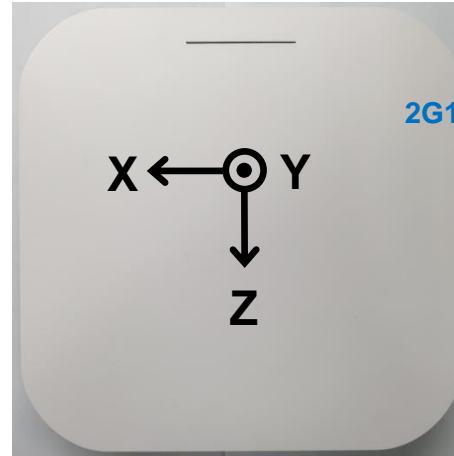
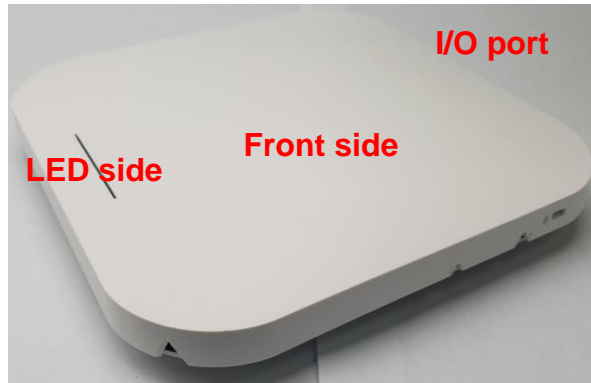


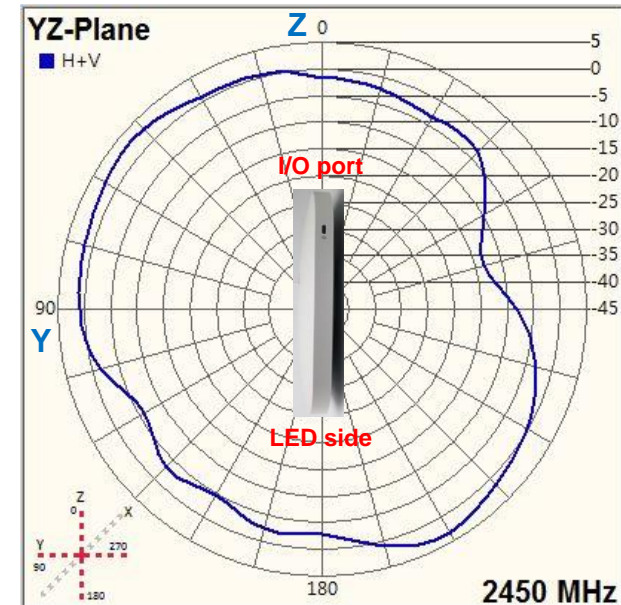
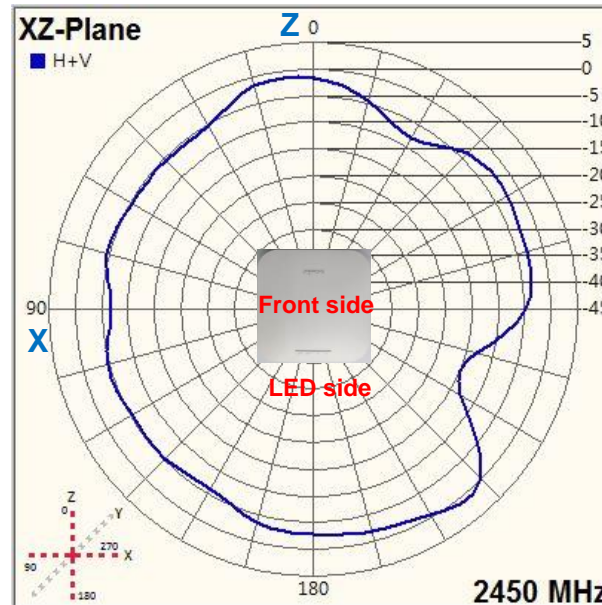
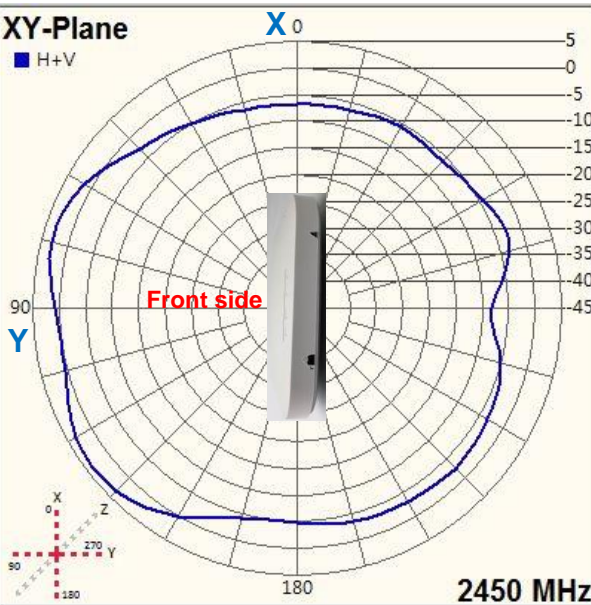
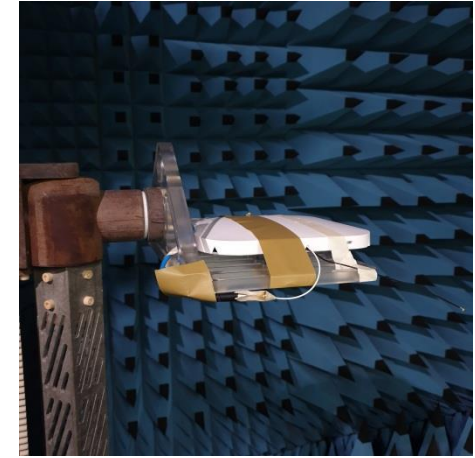
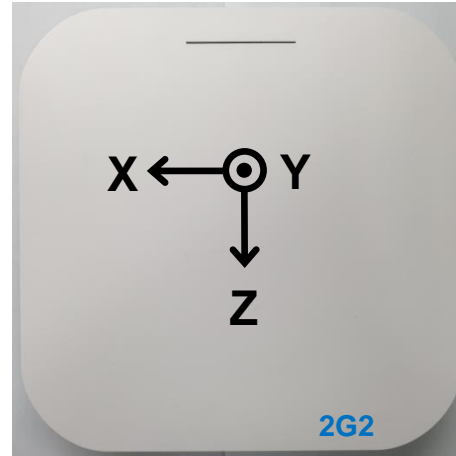
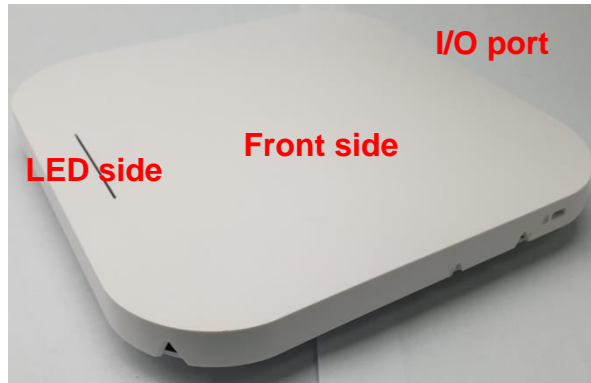
| Isolation   |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|
| Freq. (MHz) | 5G1-5G2 | 5G1-5G3 | 5G1-5G4 | 5G2-5G3 | 5G2-5G4 | 5G3-5G4 |
| 5150        | -38.01  | -45.90  | -31.76  | -27.40  | -45.11  | -24.34  |
| 5500        | -33.28  | -36.76  | -28.12  | -25.39  | -40.03  | -26.09  |
| 5850        | -31.30  | -36.11  | -45.84  | -25.74  | -69.13  | -29.17  |

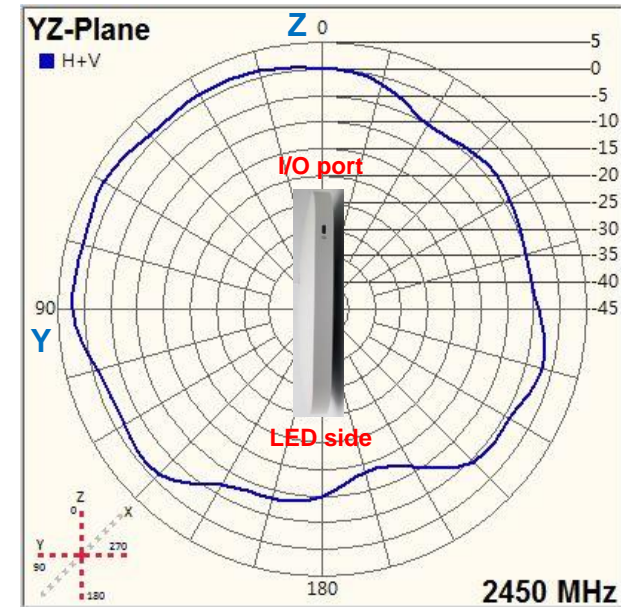
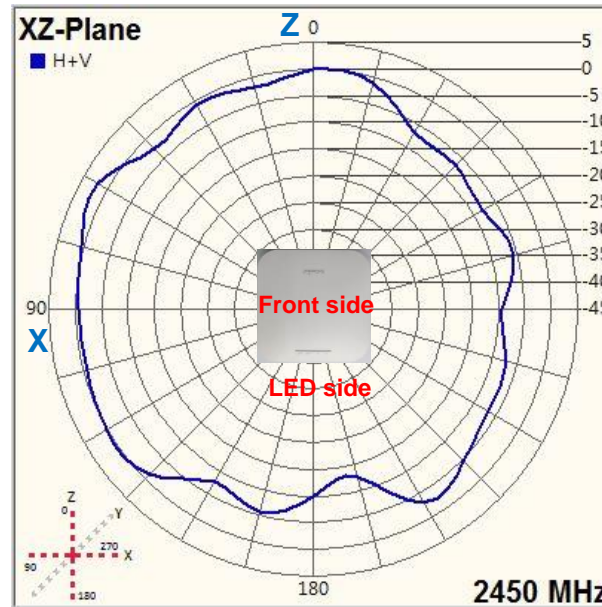
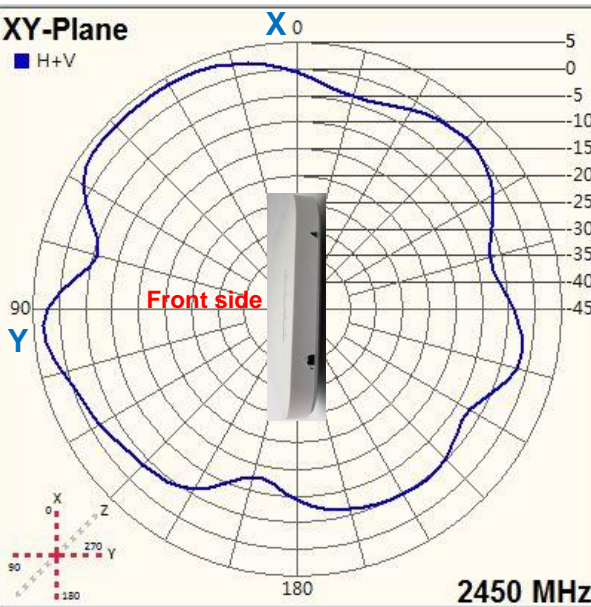
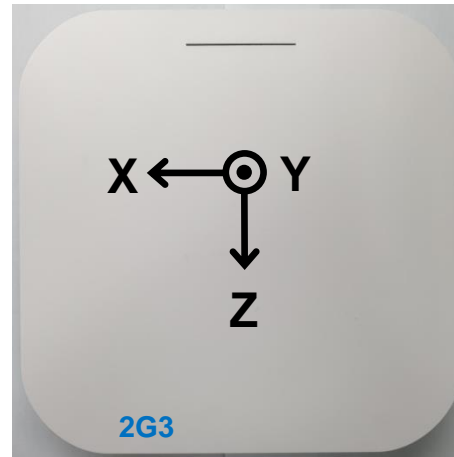
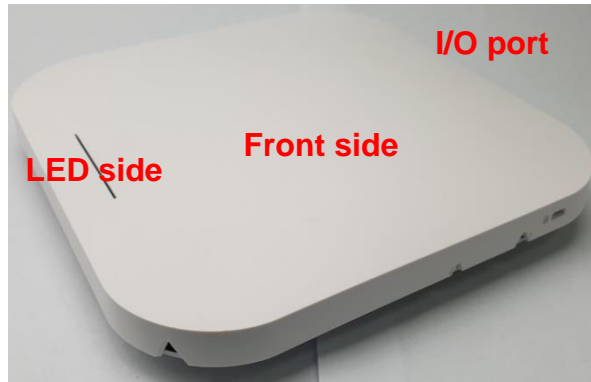




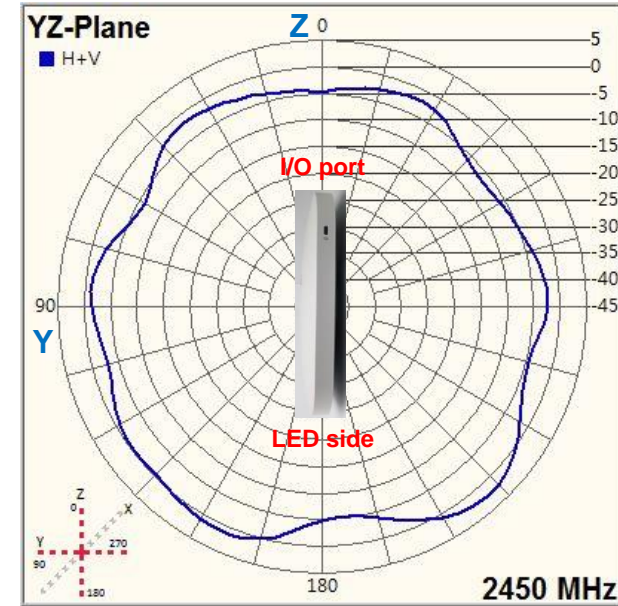
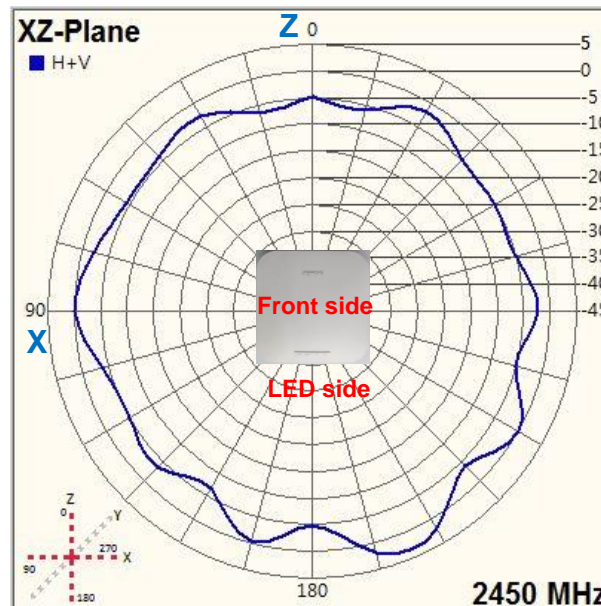
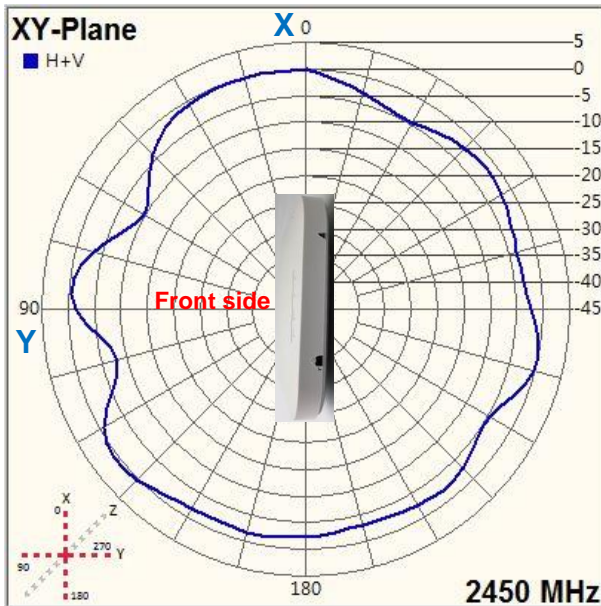
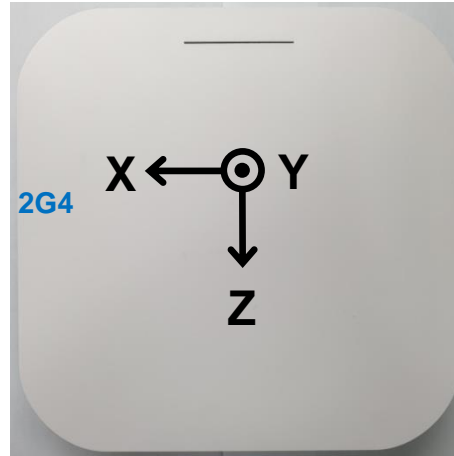
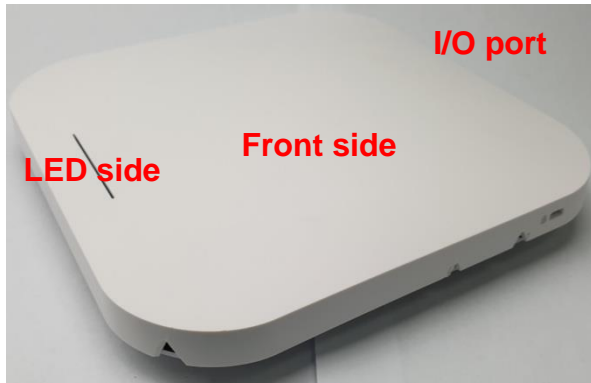
| Isolation   |              |
|-------------|--------------|
| Freq. (MHz) | BLE-Scanning |
| 2400        | -32.42       |
| 2450        | -46.47       |
| 2500        | -46.67       |
| 5150        | -39.76       |
| 5500        | -35.21       |
| 5850        | -46.44       |

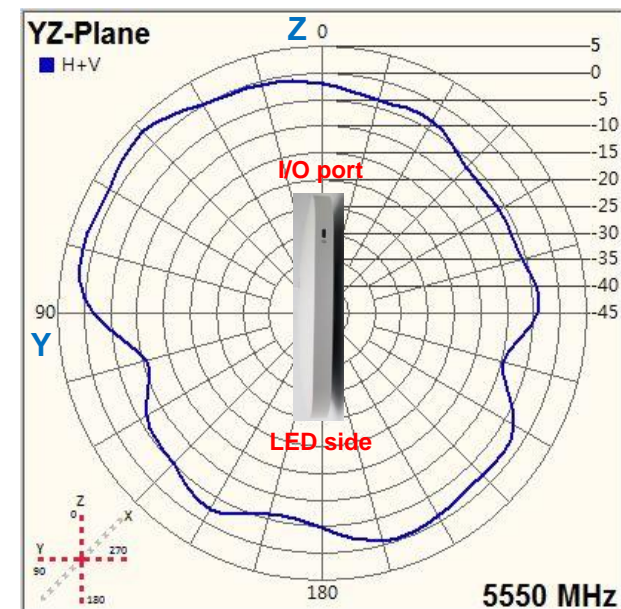
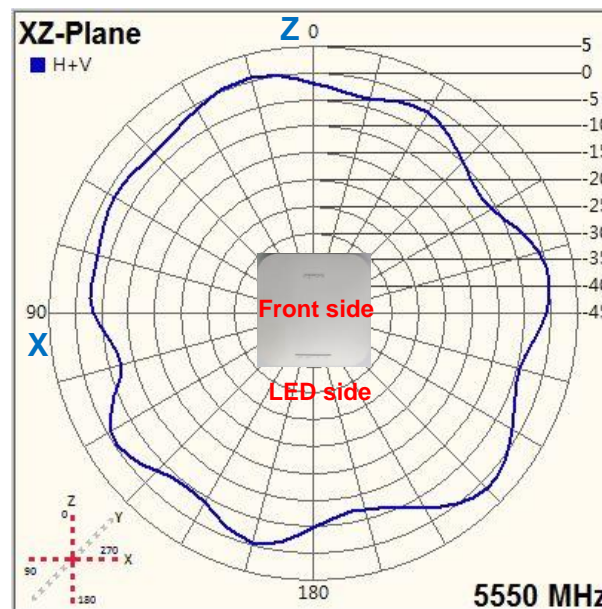
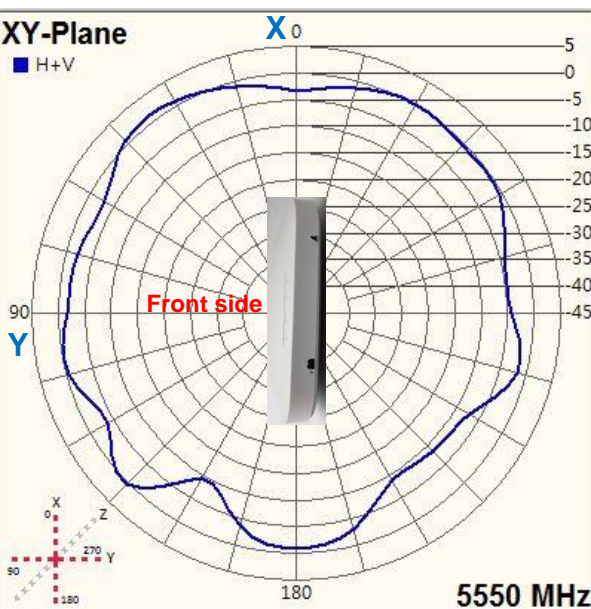
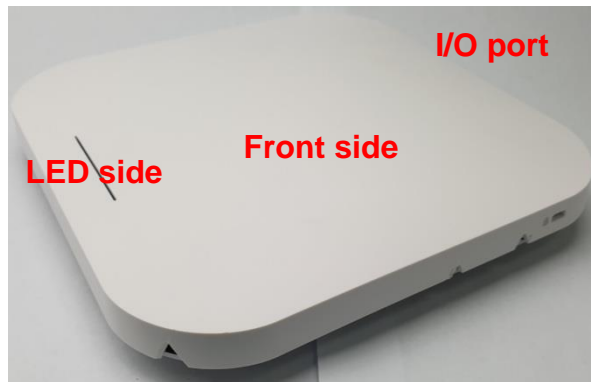


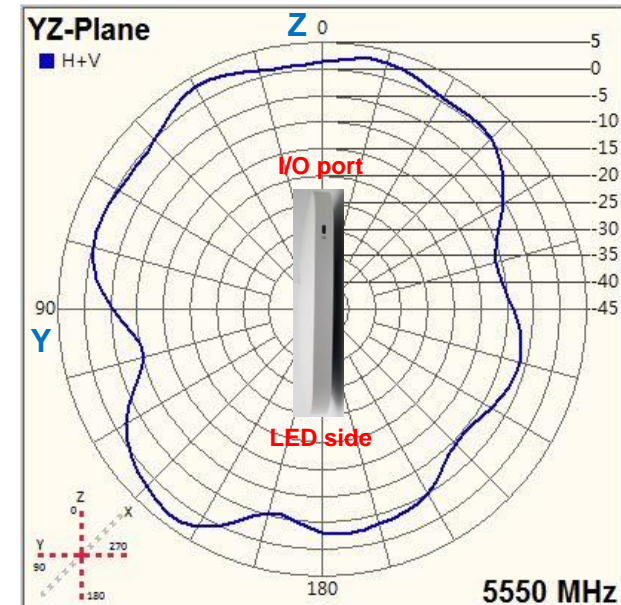
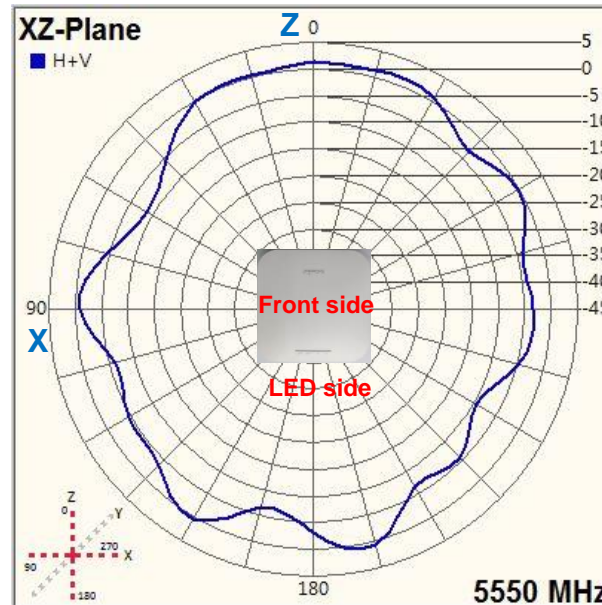
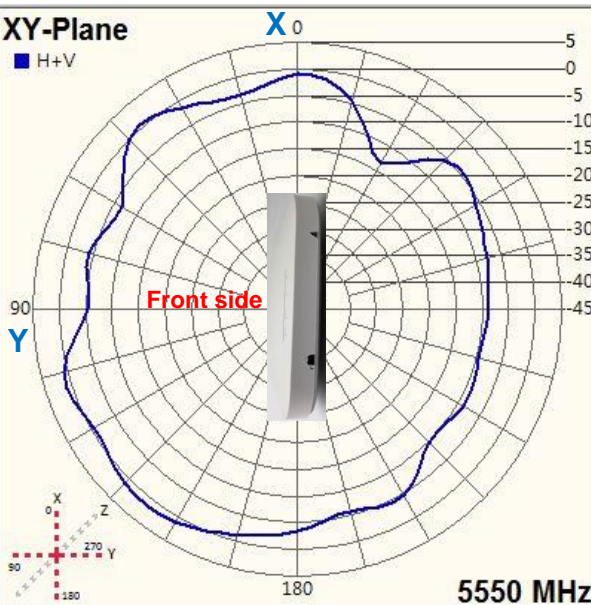
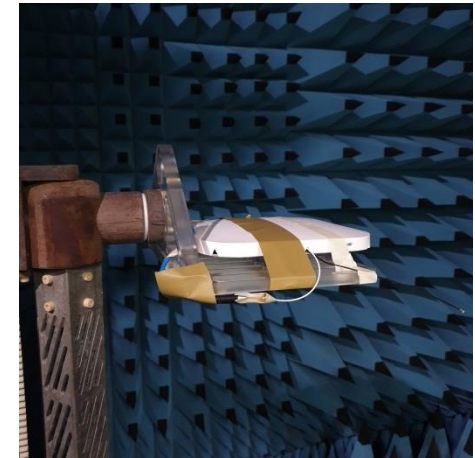
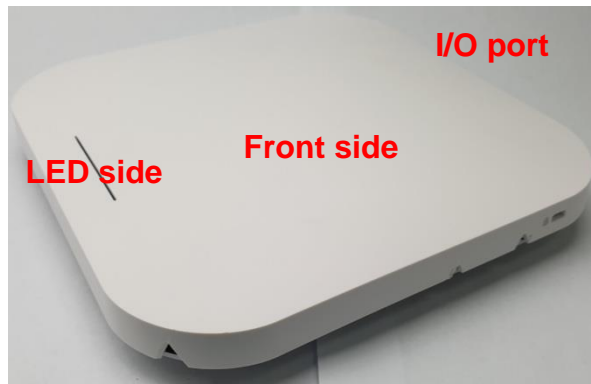


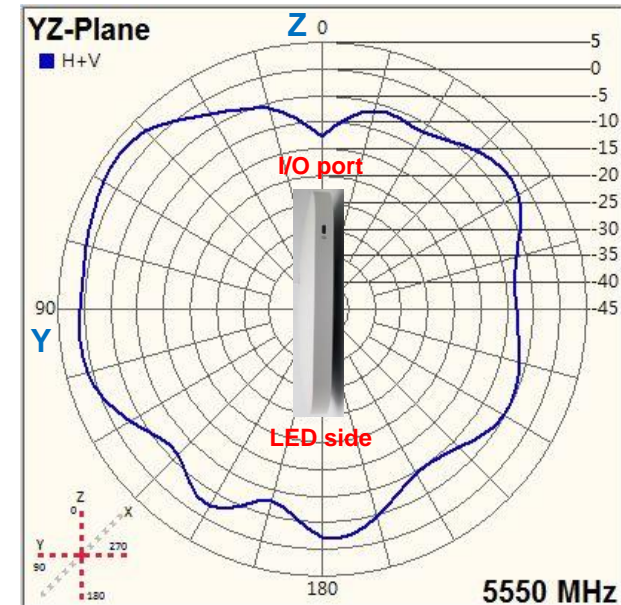
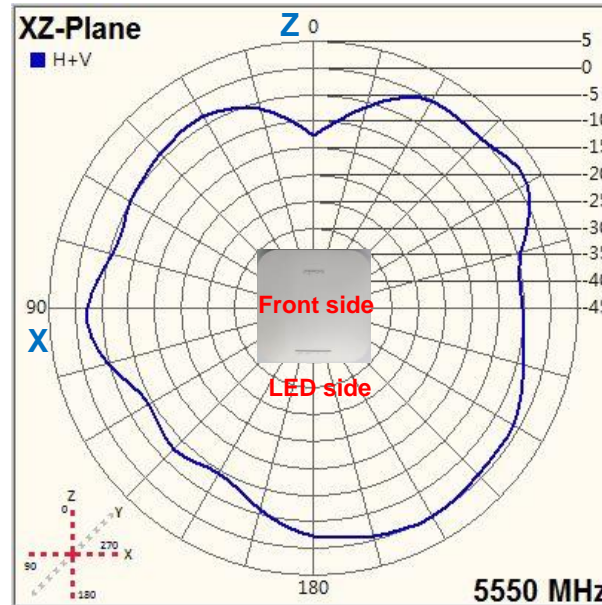
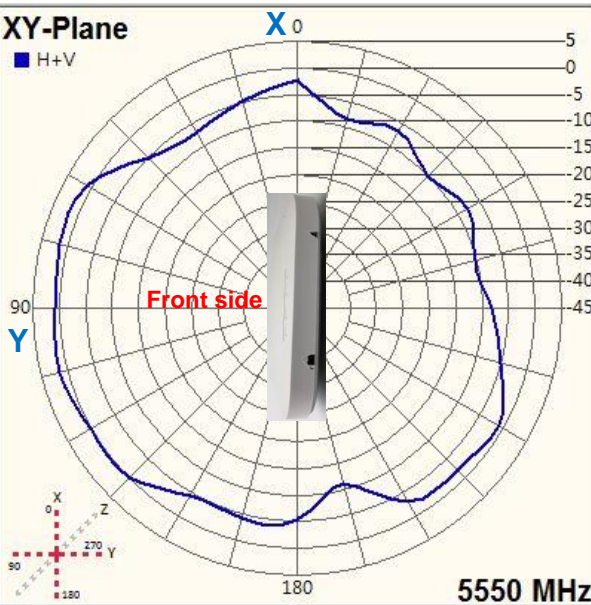
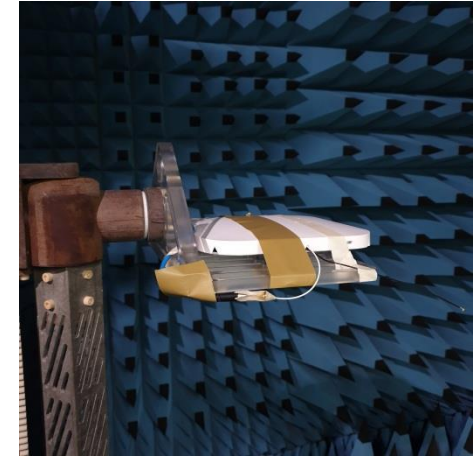
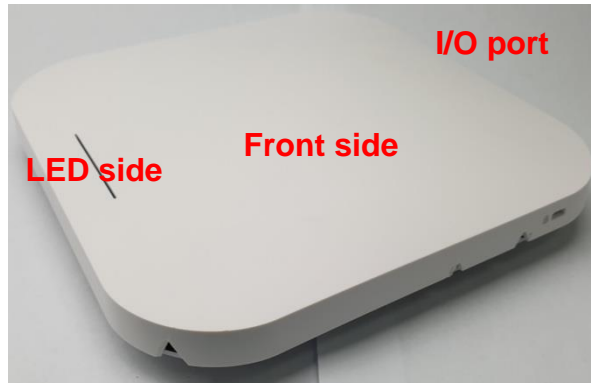


# 2D Radiation Pattern – 2G4 @ 2.45GHz

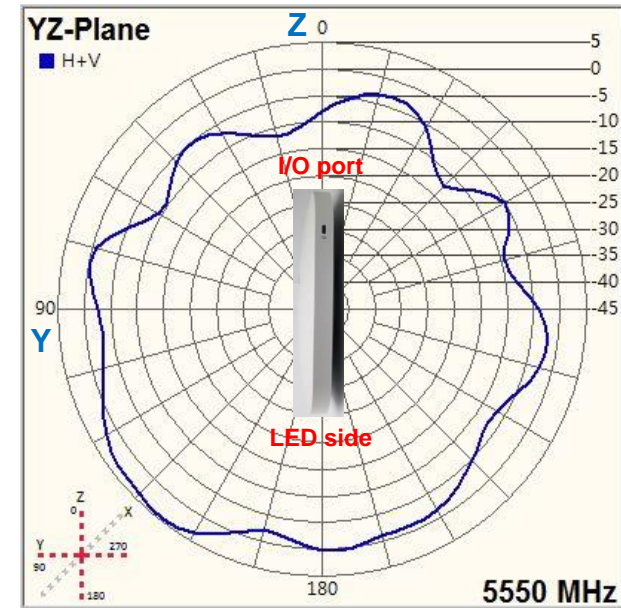
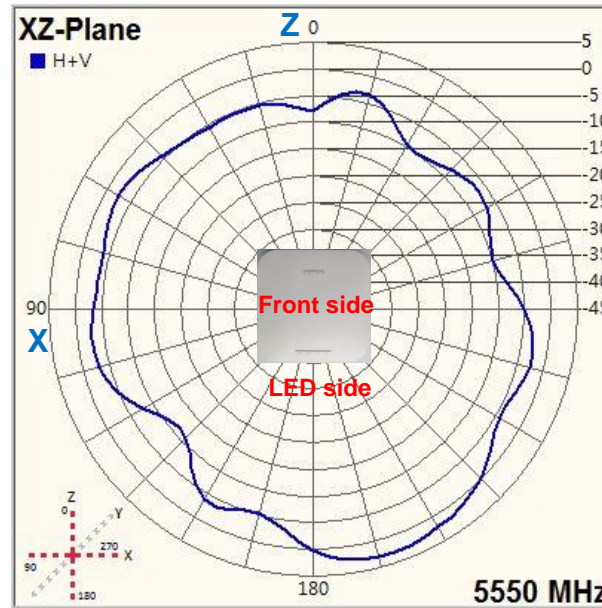
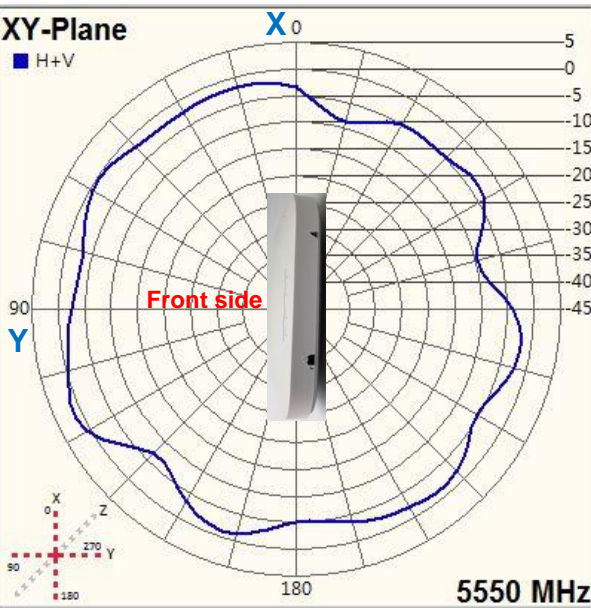
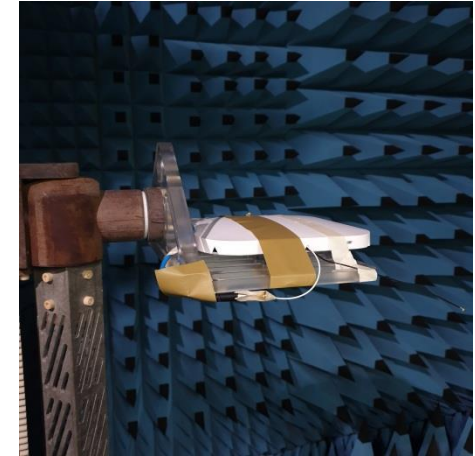
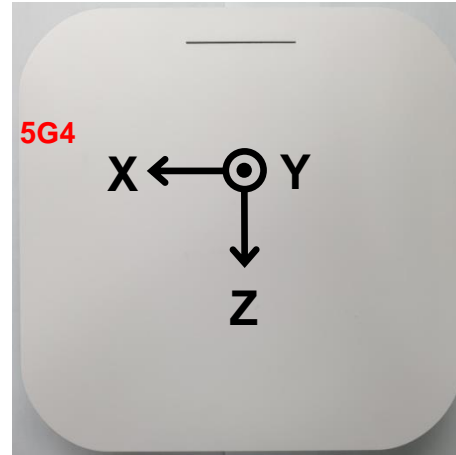
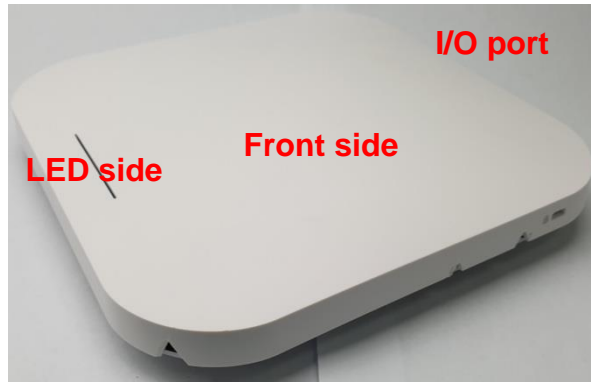


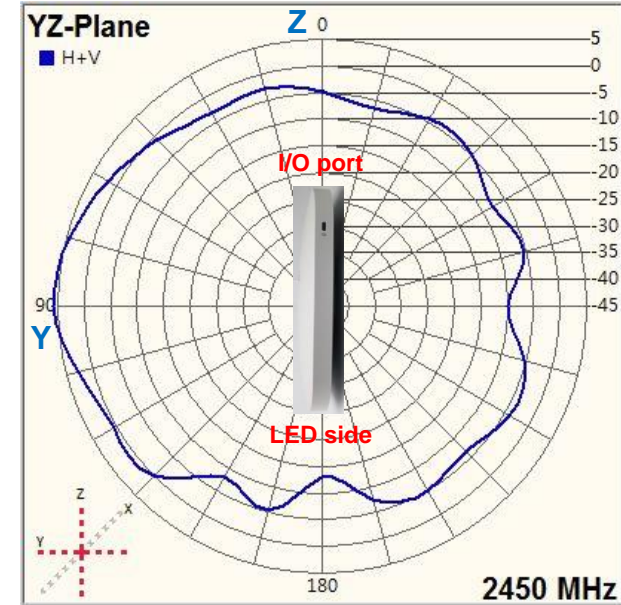
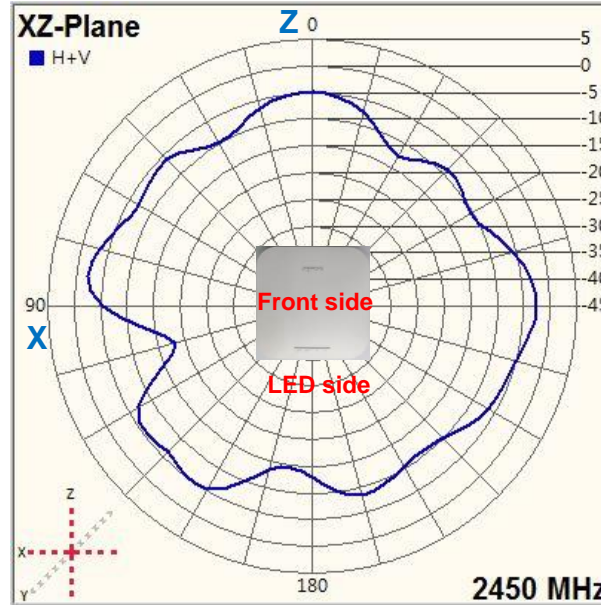
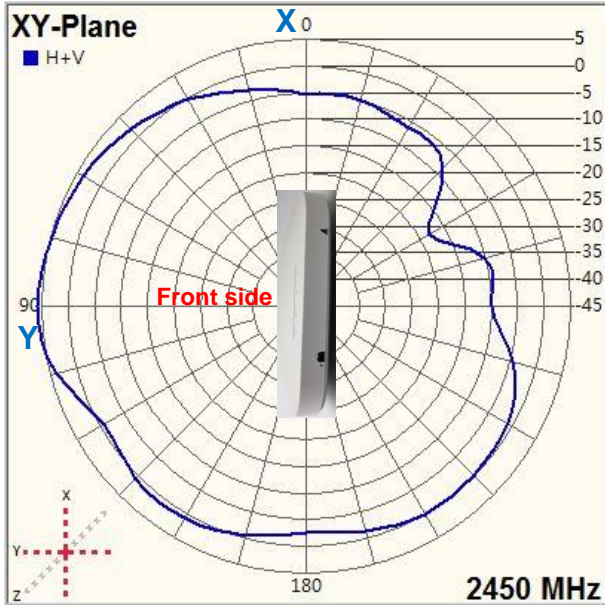
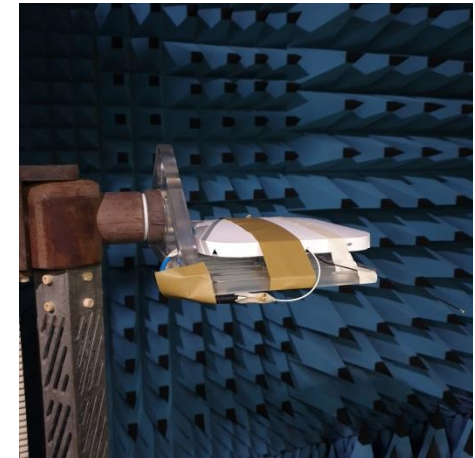


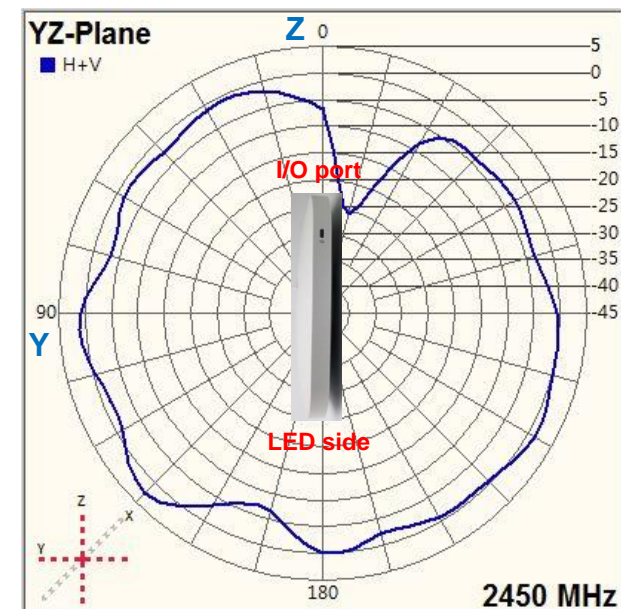
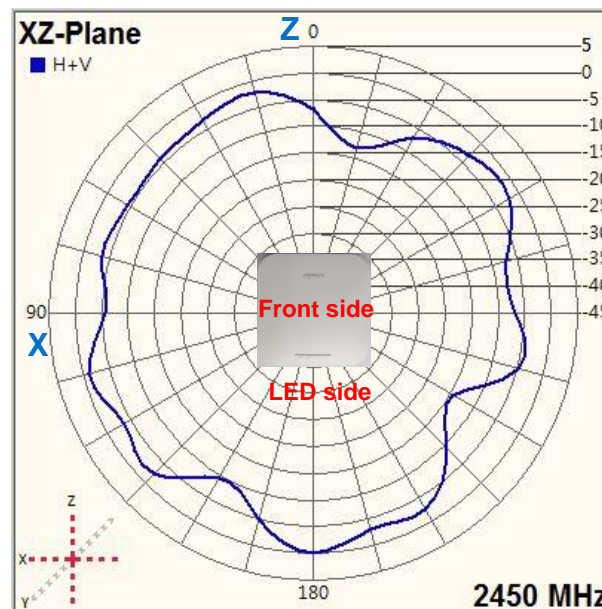
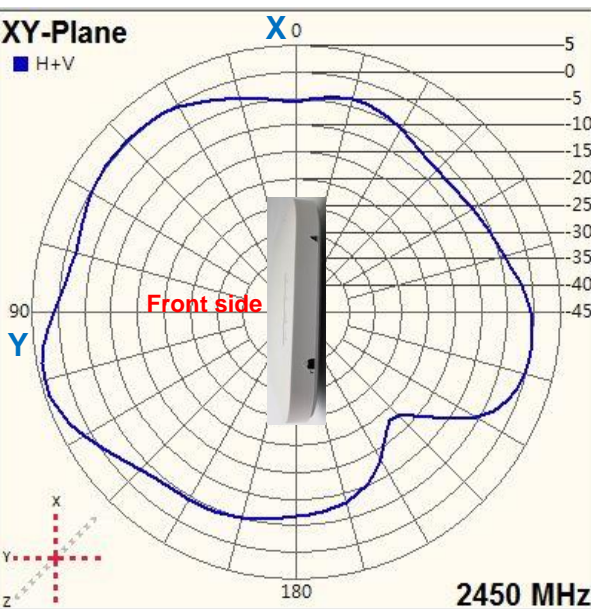
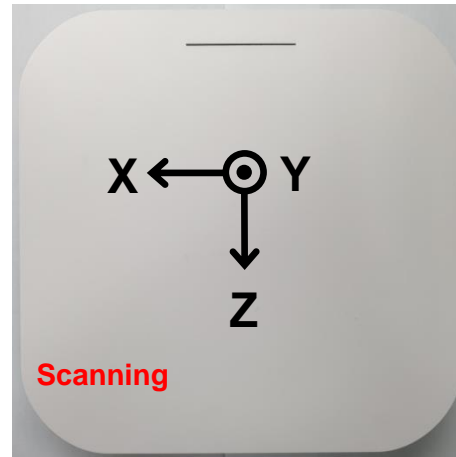
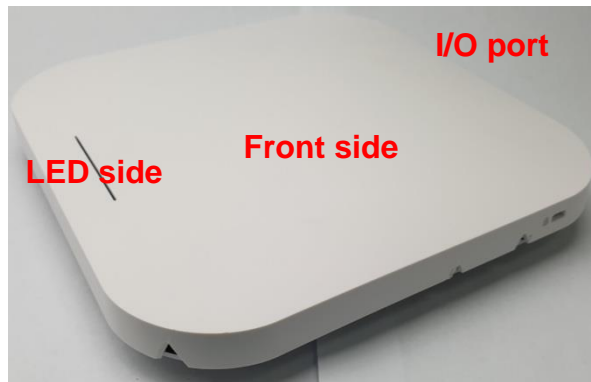


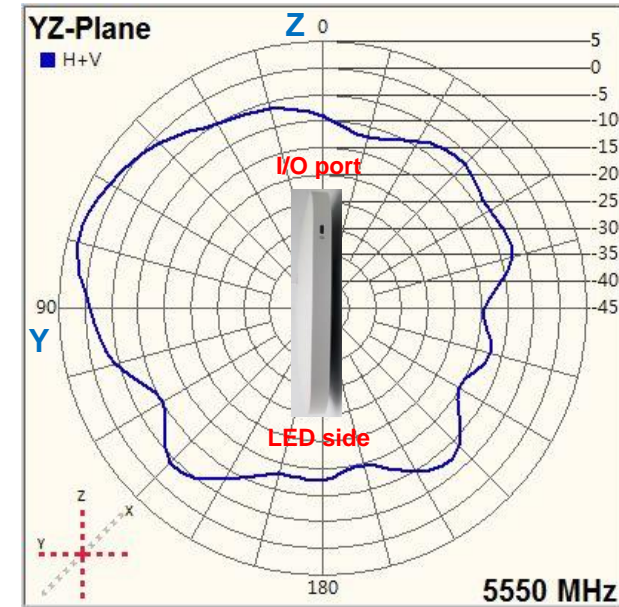
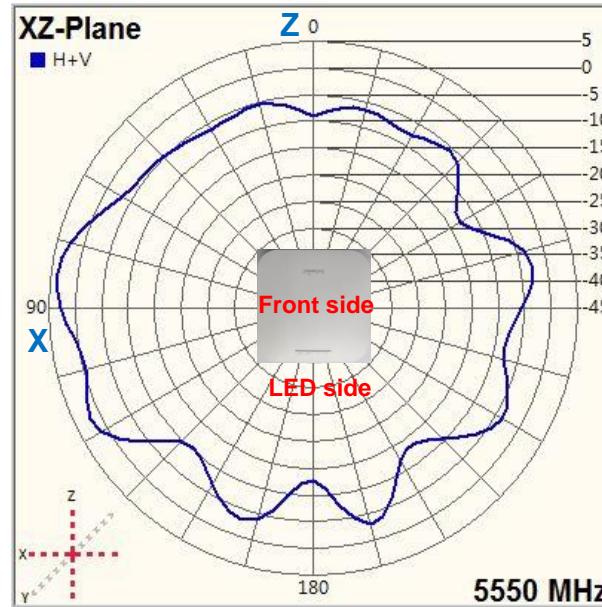
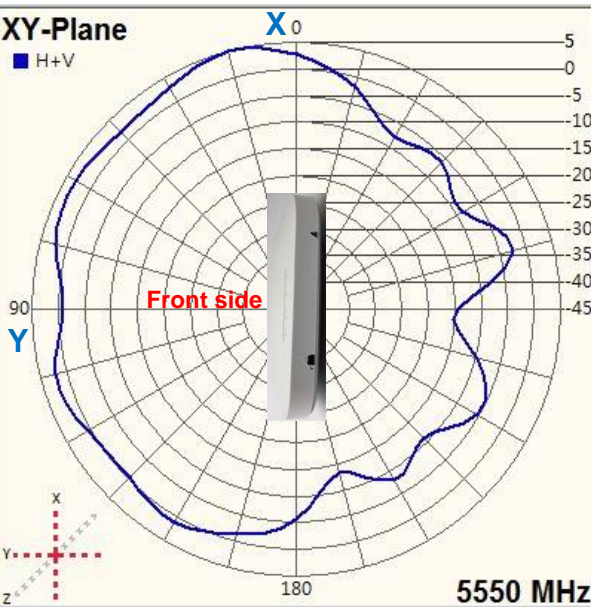
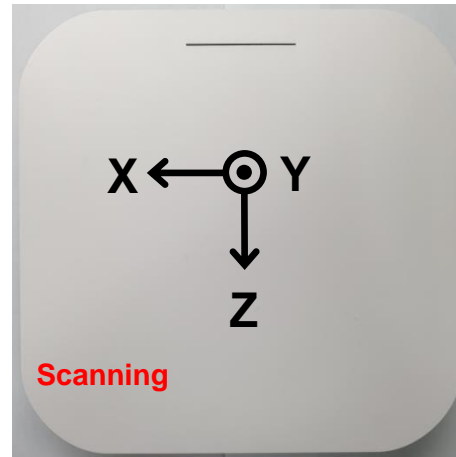
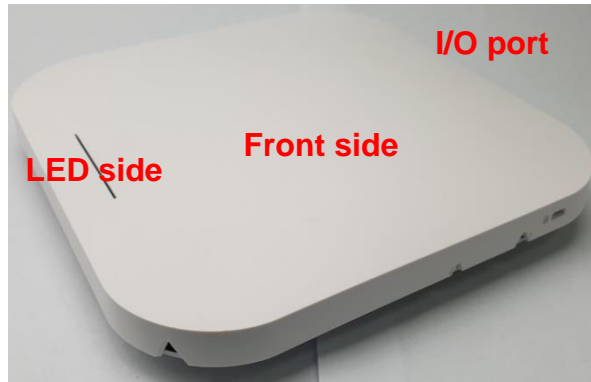












# Antenna Efficiency and Gain

| Antenna Performance |                |                 |                |                 |
|---------------------|----------------|-----------------|----------------|-----------------|
| Freq. (MHz)         | 2G1            |                 | 2G2            |                 |
|                     | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) |
| 2400                | 61.1           | 2.70            | 67.7           | 3.93            |
| 2450                | 63.9           | 2.87            | 68.9           | 4.08            |
| 2500                | 66.4           | 3.70            | 76.0           | 3.59            |

| Antenna Performance |                |                 |                |                 |
|---------------------|----------------|-----------------|----------------|-----------------|
| Freq. (MHz)         | 5G1            |                 | 5G2            |                 |
|                     | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) |
| 5150                | 63.9           | 5.13            | 62.9           | 4.26            |
| 5500                | 61.1           | 4.19            | 60.5           | 3.58            |
| 5850                | 60.1           | 5.19            | 57.8           | 3.81            |

| Antenna Performance |                |                 |                |                 |
|---------------------|----------------|-----------------|----------------|-----------------|
| Freq. (MHz)         | 2G3            |                 | 2G4            |                 |
|                     | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) |
| 2400                | 63.0           | 4.12            | 60.4           | 3.26            |
| 2450                | 65.0           | 3.55            | 65.1           | 4.73            |
| 2500                | 60.5           | 3.30            | 62.3           | 5.01            |

| Antenna Performance |                |                 |                |                 |
|---------------------|----------------|-----------------|----------------|-----------------|
| Freq. (MHz)         | 5G3            |                 | 5G4            |                 |
|                     | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) |
| 5150                | 57.7           | 4.03            | 54.0           | 4.25            |
| 5500                | 58.9           | 4.02            | 54.7           | 5.04            |
| 5850                | 60.6           | 4.56            | 50.3           | 4.00            |

| Antenna Performance |                |                 |                |                 |
|---------------------|----------------|-----------------|----------------|-----------------|
| Freq. (MHz)         | BLE            |                 | Scanning       |                 |
|                     | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) |
| 2400                | 58.9           | 5.04            | 54.3           | 4.33            |
| 2450                | 61.9           | 5.90            | 53.0           | 4.27            |
| 2500                | 53.1           | 5.22            | 63.0           | 3.50            |
| 5150                |                |                 | 60.7           | 6.17            |
| 5500                |                |                 | 54.6           | 5.72            |
| 5850                |                |                 | 52.4           | 6.17            |