



# OTA TEST REPORT

|                   |                   |
|-------------------|-------------------|
| <b>Applicant</b>  | Espressif Systems |
| <b>Product</b>    | ESP ANT B         |
| <b>Model</b>      | ESP ANT B         |
| <b>Report No.</b> | Y2209A0967-T1     |
| <b>Issue Date</b> | October 8, 2022   |

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **ANSI/IEEE Std 149-2008**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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*Approved by: Xu Kai*

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## 1. General Information

### 1.1. Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of TA technology (shanghai) co., Ltd. The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by any government agencies.

### 1.2. Testing laboratory

Company: TA Technology (Shanghai) Co., Ltd.  
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### 1.3. Laboratory Environment

|                   |                         |         |
|-------------------|-------------------------|---------|
| Temperature       | Min. =19°C, Max. = 25°C |         |
| Relative humidity | Min. =40%, Max. =72%    |         |
| Shield effect     | 0.7-6GHz                | > 100dB |
| Ground resistance | <0.5Ω                   |         |



## 2. General Description of Equipment under Test

### 2.1. Applicant Information

Company: Espressif Systems  
Address: #101, Block 2, 690 Bibo Road, Zhang Jiang High-Tech Park, Shanghai, China

### 2.2. Manufacturer Information

Company: Espressif Systems  
Address: #101, Block 2, 690 Bibo Road, Zhang Jiang High-Tech Park, Shanghai, China

### 2.3. Information of EUT

#### General information

| EUT Description       |                     |
|-----------------------|---------------------|
| Product Name:         | ESP ANT B           |
| Model                 | ESP ANT B           |
| HW Version:           | /                   |
| SW Version:           | /                   |
| Antenna Type:         | PCB Antenna         |
| Antenna Size          | 18mm *6.19mm *0.8mm |
| Antenna Manufacturer: | Espressif Systems   |
| Test Frequency:       | 2400MHz ~ 2500MHz   |

Test values partial duplicated from the original Report (Report No.:Y1806A0621-T1V3). Only add 2400 MHz, 2490 MHz and 2500 MHz test data in this report.

### 2.4. Test Date

The test is performed from June 25, 2018 to August 3, 2018 and October 5, 2022.



## 2.5. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

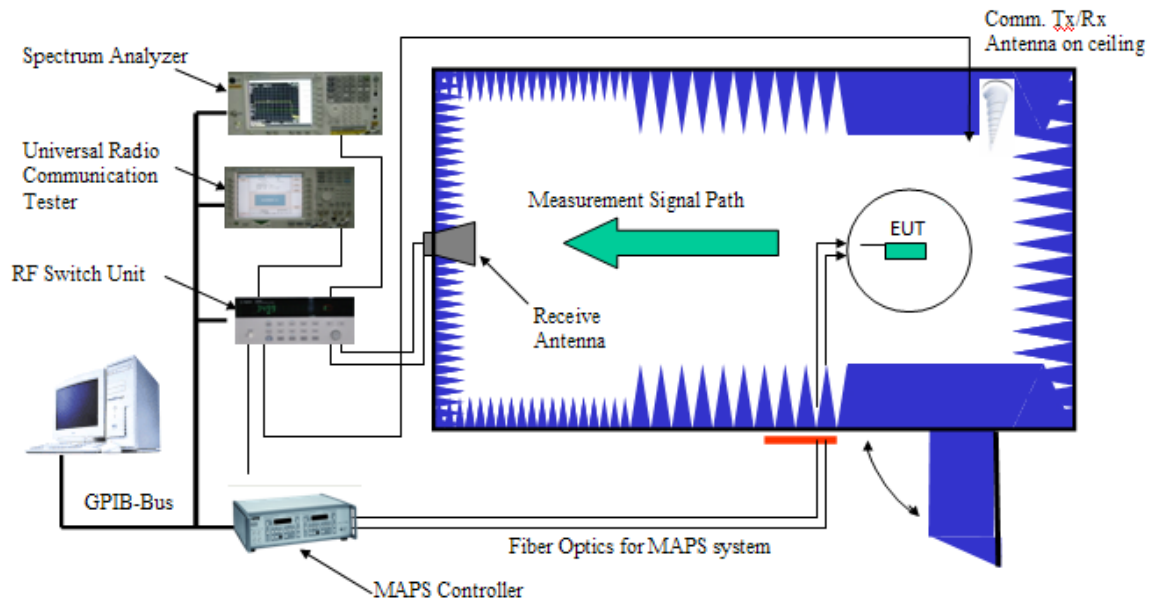
Test Method: **ANSI/IEEE Std 149-2008**



### 3. Test Conditions

#### 3.1. Test Configuration

Great-Circle-Cut method is used to measure the antenna 3D GAIN of EUT in OTA qualified anechoic chamber. Equipment Under Test (EUT) geometry centre vertical projection at the centre of platform, the distance from EUT to measurement antenna is 5m.



#### 3.2. Test Measurement

##### Spherical coordinate system

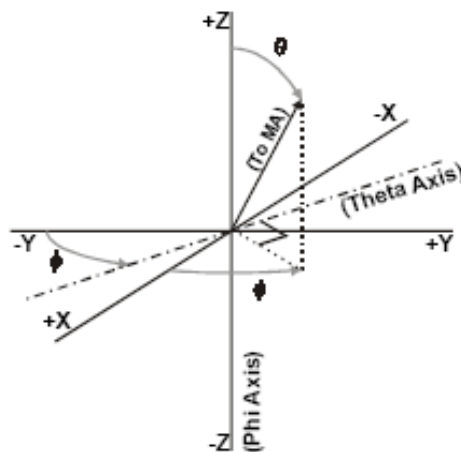


Figure 1 Test coordinate system

Note: Theta is from 0~180 degree. Phi is from 0~360. Rotate the EUT and record the Data, the step of rotation is 30 degree.

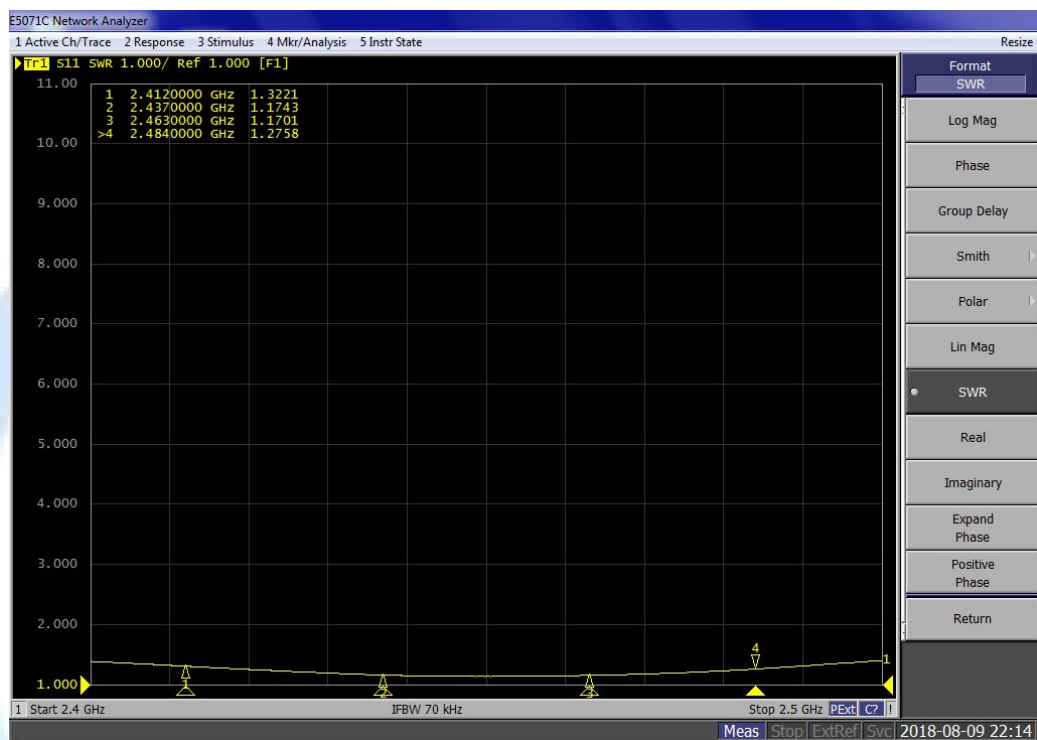
## 4. Test Results

### 4.1. Gain and Efficiency

| Test Item                              | Test State | Frequency (MHz) | Efficiency (%) | Gain (dBi) | Note         |
|----------------------------------------|------------|-----------------|----------------|------------|--------------|
| Gain                                   | Free Space | 2400            | 72.68          | 3.76       | Vertical 30° |
|                                        |            | 2412            | 73.79          | 2.39       |              |
|                                        |            | 2417            | 77.04          | 2.97       |              |
|                                        |            | 2422            | 79.83          | 2.80       |              |
|                                        |            | 2427            | 81.19          | 2.89       |              |
|                                        |            | 2432            | 80.54          | 3.04       |              |
|                                        |            | 2437            | 76.86          | 2.86       |              |
|                                        |            | 2442            | 76.17          | 2.99       |              |
|                                        |            | 2447            | 73.99          | 2.96       |              |
|                                        |            | 2452            | 72.00          | 2.80       |              |
|                                        |            | 2457            | 70.71          | 2.72       |              |
|                                        |            | 2462            | 71.31          | 2.94       |              |
|                                        |            | 2467            | 71.32          | 3.12       |              |
|                                        |            | 2472            | 72.03          | 3.28       |              |
|                                        |            | 2477            | 72.71          | 3.24       |              |
|                                        |            | 2482            | 75.42          | 3.42       |              |
|                                        |            | 2490            | 85.32          | 3.57       |              |
|                                        |            | 2500            | 86.78          | 3.28       |              |
| Note: comment variation is +/- 0.02dBi |            |                 |                |            |              |



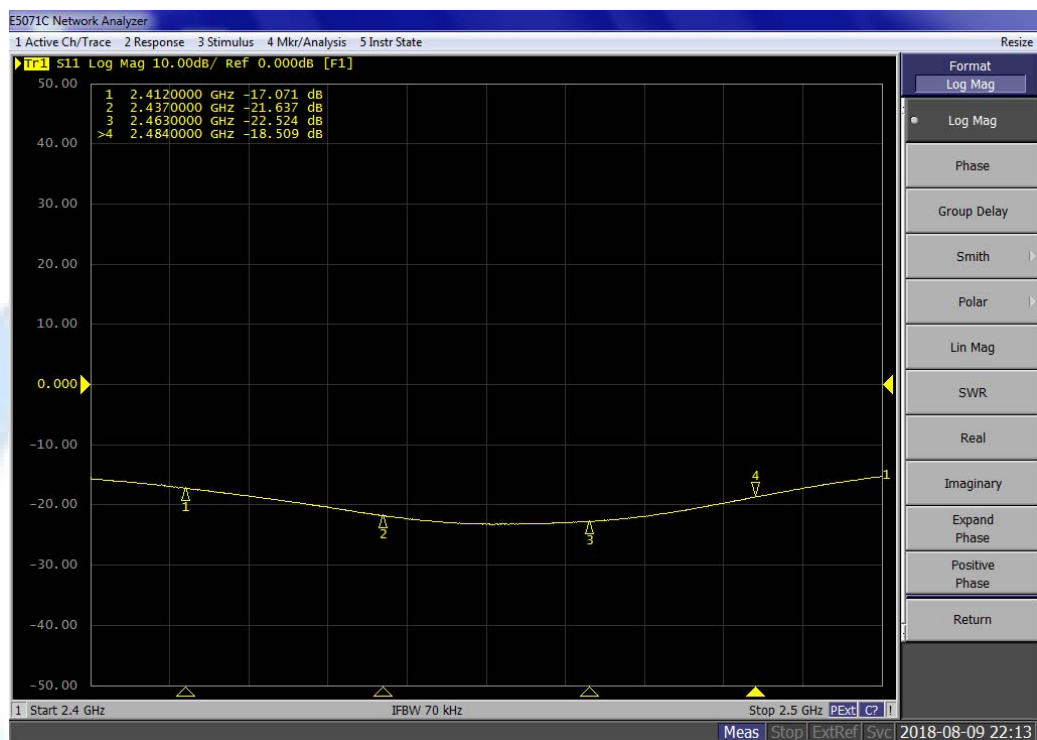
## 4.2. Voltage Standing Wave Ratio (VSWR)



| Frequency (MHz) | 2412 | 2437 | 2463 | 2484 |
|-----------------|------|------|------|------|
| VSWR            | 1.32 | 1.17 | 1.17 | 1.28 |



### 4.3. Antenna S11



| Frequency (MHz) | 2412   | 2437   | 2463   | 2484   |
|-----------------|--------|--------|--------|--------|
| S11(dB)         | -17.07 | -21.64 | -22.52 | -18.51 |



## 5. Test Equipment List

Date of Sample Received: June 25, 2018 to August 3, 2018

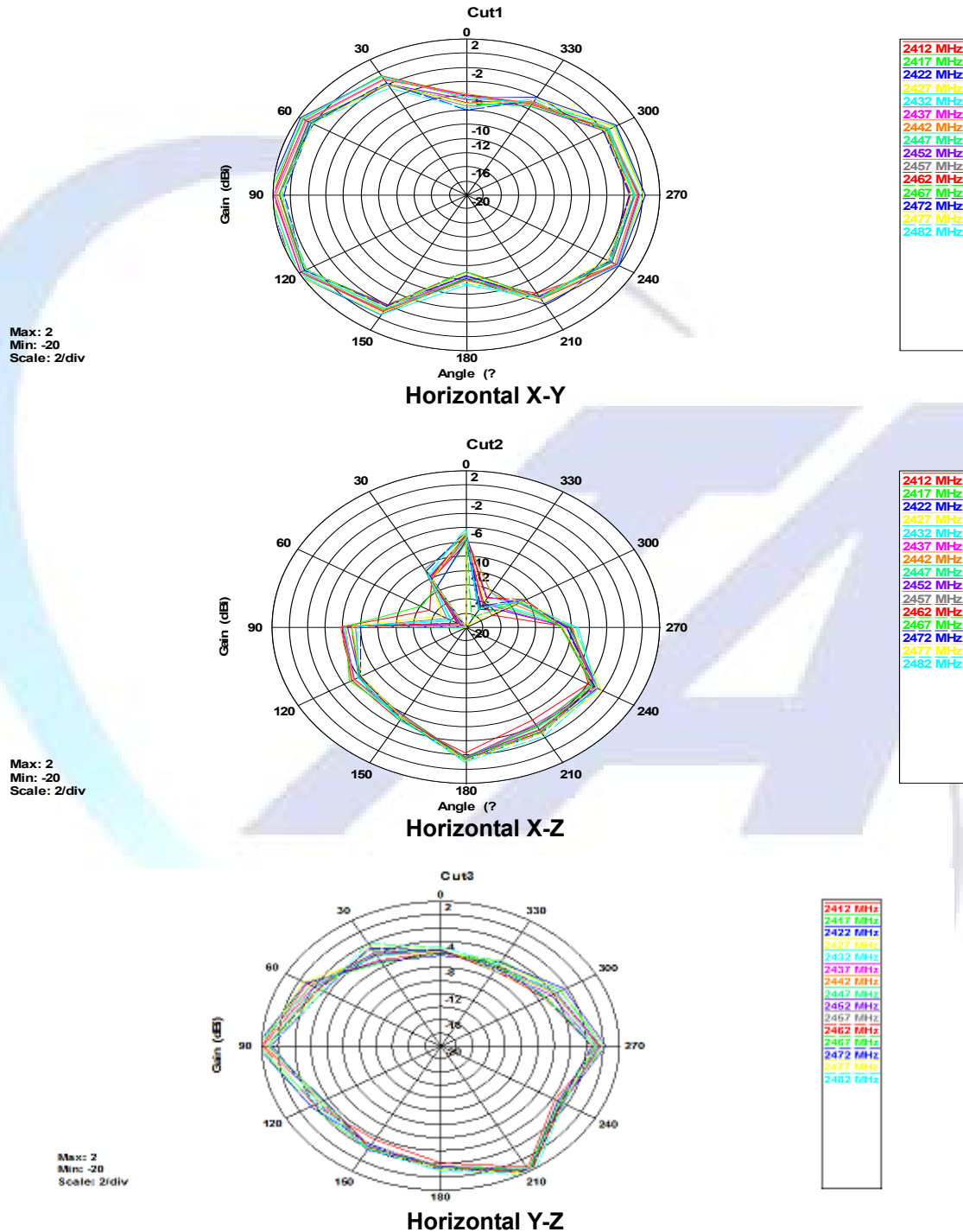
| Type of Equipment           | Manufacture  | Model Number                         | SN                  | Calibration Date | Expiration Time |
|-----------------------------|--------------|--------------------------------------|---------------------|------------------|-----------------|
| Network Analyzer            | Key sight    | E5071B                               | MY42404014          | 2018-05-20       | 2019-05-19      |
| Switch Control System       | ETS          | 7006/7001                            | 00059957/MY42001152 | 2018-05-20       | 2019-05-19      |
| Dual polarized horn antenna | ETS          | 3164-04                              | 00062743            | 2018-05-20       | 2019-05-19      |
| Anechoic Chamber            | ETS          | AMS-8500                             | CT-001157-1219      | /                | /               |
| Software                    | ETS-lindgren | EMQ-100 Pattern Measurement software | 1.09                | /                | /               |

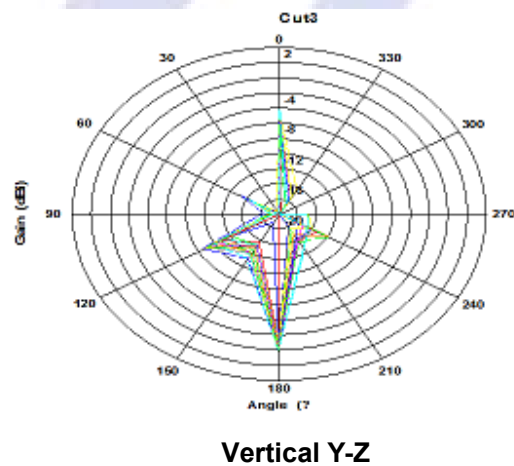
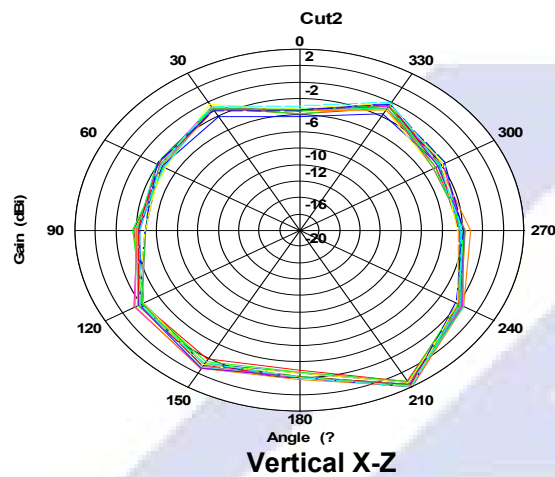
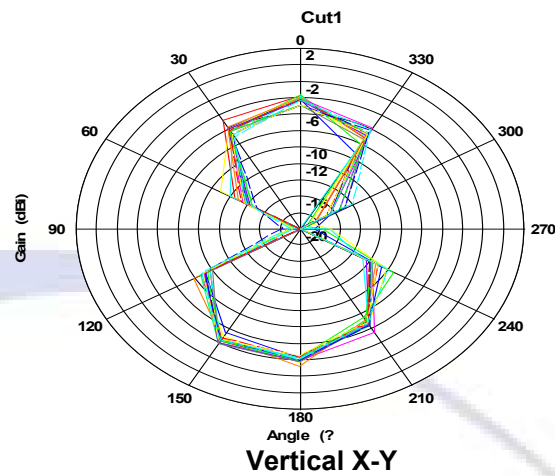
Date of Sample Received: October 5, 2022

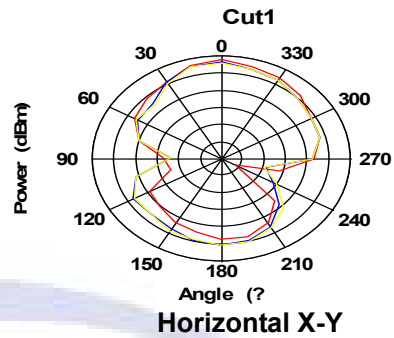
| Type of Equipment              | Manufacture | Model Number | SN                  | Calibration Date | Expiration Time |
|--------------------------------|-------------|--------------|---------------------|------------------|-----------------|
| Anechoic Chamber               | ETS         | AMS-8500     | CT-001157-1219      | 2020-05-17       | 2025-05-16      |
| Test Software                  | ETS         | EMQuest™     | REV 1.0.9           | /                | /               |
| EMCenter_Switch Control System | ETS         | 7006/7001    | 00059957/MY42001152 | /                | /               |
| Diagonal Dual Polarized Horn   | ETS         | ETS 3164-04  | 00062743            | 2020-04-14       | 2025-04-13      |
| Network Analyzer               | Keysight    | E5071B       | MY42404014          | 2022-05-14       | 2023-05-13      |



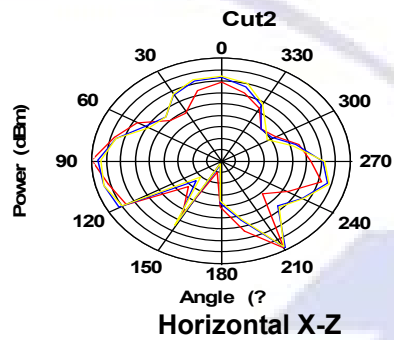
## APPENDIX A: 2-D Pattern Plots



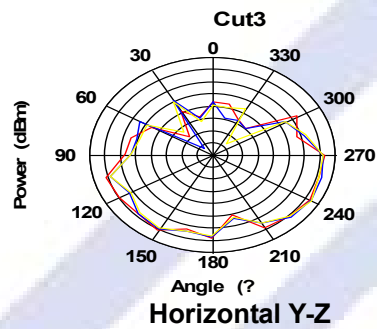




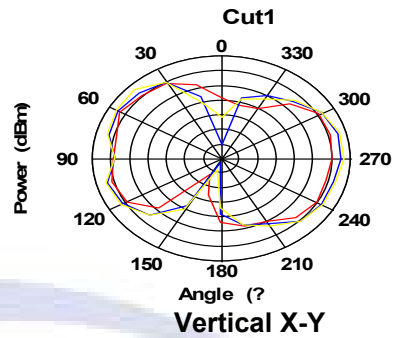
2400 MHz  
2490 MHz  
2500 MHz



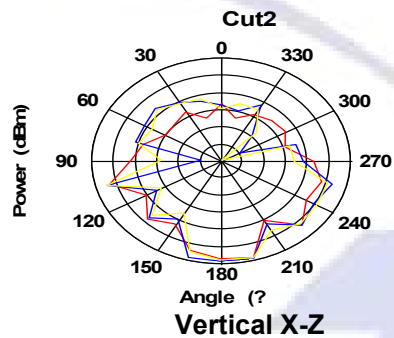
2400 MHz  
2490 MHz  
2500 MHz



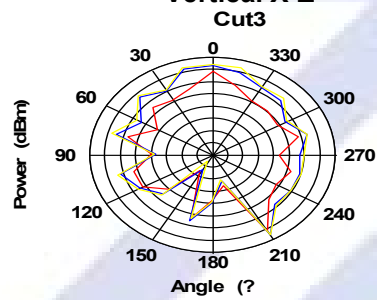
2400 MHz  
2490 MHz  
2500 MHz



2400 MHz  
2490 MHz  
2500 MHz



2400 MHz  
2490 MHz  
2500 MHz



2400 MHz  
2490 MHz  
2500 MHz