

GJQ8U Antenna Report

FCC ID: A4R-GJQ8U

Oct. 02, 2023

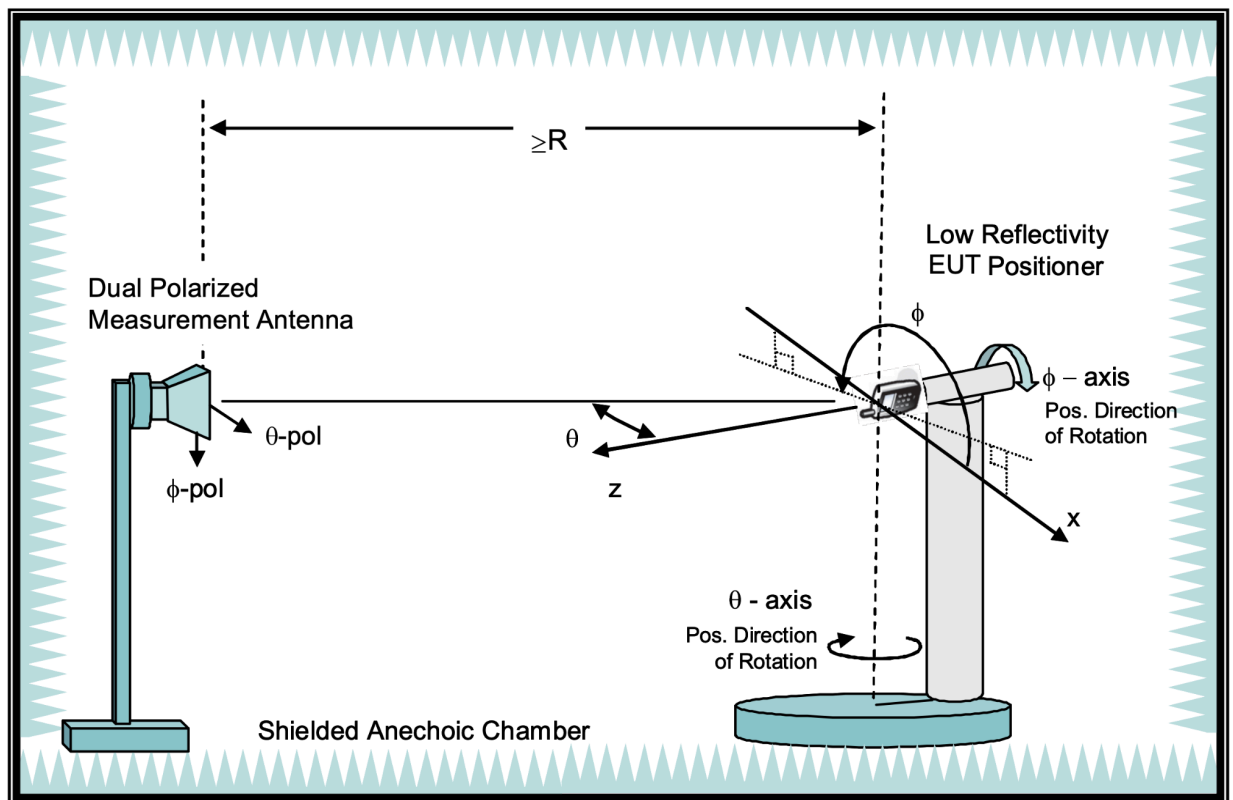
BLE/WIFI Antenna

1. Test Method

The antenna gains are obtained through measurements in a fully anechoic OTA chamber with a 3D positioner. The following pic shows an illustration of the anechoic antenna chamber which can measure the 3D radiation pattern.

Measurements are taken in discrete steps in theta and phi direction. Data is being recorded using a network analyzer (passive) for both theta and phi polarizations at each position resulting in a 3D gain pattern. Step size is < 30deg along both axes.

Gain is derived directly through spatial averaging of VNA S21 measurements (passive measurement).



2. Test Equipment and Calibration

The antenna gain measurement equipment and system are all within their calibration periods. Here is the details:

a. Chamber: 2.4 GHz and 5 GHz (UNII-1 to UNII-4)

| Site Description | Chamber Manufacturer | Type |
|---------------------------|--|----------------|
| AMS-8815 Anechoic Chamber | ETS-Lindgren | Fully Anechoic |
| Site location: | 1200 Charleston Road, Charleston Road, Mountain View, CA | |

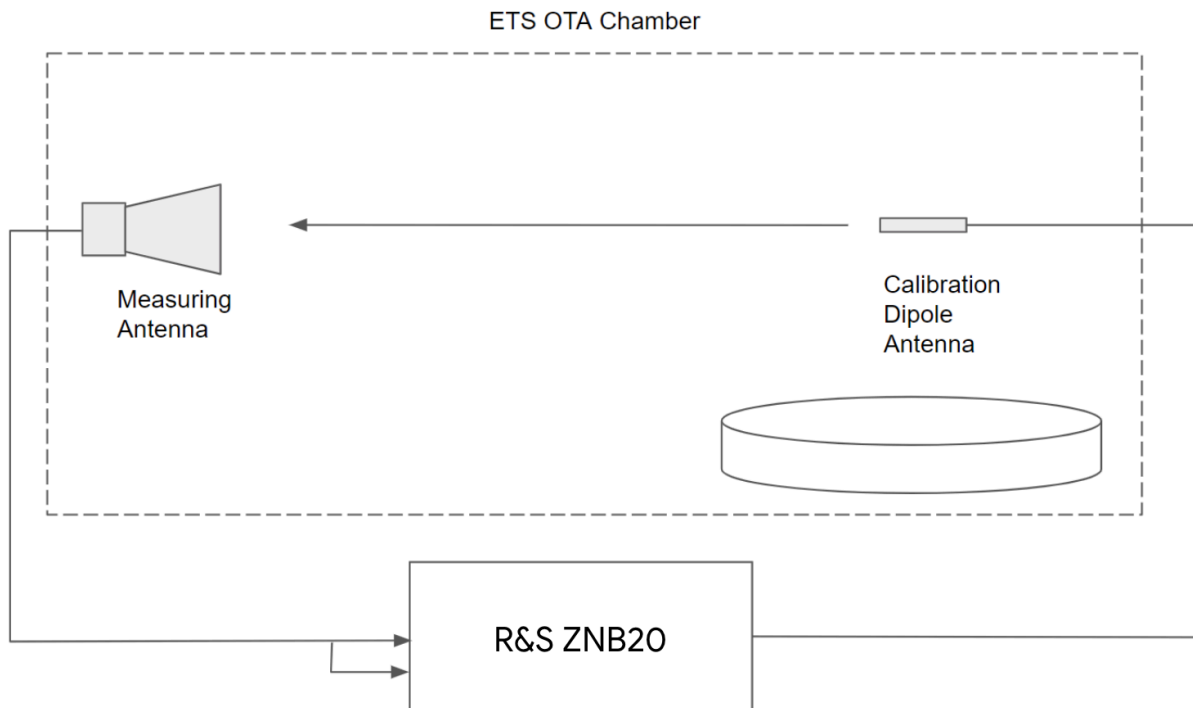
| Description | Manufacturer | Model |
|------------------|--------------|-------|
| Network Analyzer | R&S | ZNB20 |

| | |
|------------------------------|-------------------------------------|
| Equipment calibration status | - Calibration date: August.31, 2022 |
| Test dates | - Oct 2nd 2023 |
| Names of test personnel | - Cheng-Jung Lee |

3. Site Path Loss

To provide accurate antenna gain values, the chamber is calibrated with the measured path loss. The block diagram below represents the setup of the site path loss. Path loss is provided for both polarities for all WLAN frequency ranges.

a. Chamber 1: 2.4 GHz and 5 GHz (UNII-1 to UNII-4)



| Frequency (MHz) | H-Pol Path Loss | V-Pol Path Loss |
|-----------------|-----------------|-----------------|
| 2402 | -55.50 | -55.21 |
| 2412 | -55.63 | -55.31 |
| 2437 | -55.71 | -55.62 |
| 2462 | -55.85 | -55.99 |
| 2480 | -56.09 | -56.24 |
| 5180 | -69.25 | -69.03 |
| 5280 | -68.84 | -68.50 |
| 5500 | -68.42 | -68.15 |
| 5820 | -69.44 | -69.08 |

Figure: Chamber Block Diagram and Path Loss

4. Test Setup

See Setup Photo exhibit

5. Antenna Type

See description of antenna type below.

| Antenna Name | Antenna Type |
|--------------|--------------|
| Ant1 | IFA |

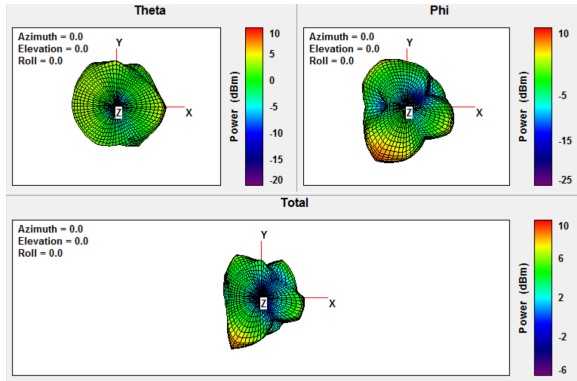
6. WLAN/BT Antennas

| Ant | Band | Frequency Band | Peak Gain(dBi) |
|------|-----------------|----------------|----------------|
| Ant1 | WiFi/BT 2.4 GHz | 2402 MHz | 0.6 |
| | | 2412 MHz | 0.5 |
| | | 2437 MHz | 0.1 |
| | | 2462 MHz | -0.2 |
| | | 2480 MHz | -0.5 |
| | UNII-1 | 5180 MHz | 1 |
| | UNII-2A | 5280 MHz | 0.3 |
| | UNII-2C | 5500 MHz | 1.5 |
| | UNII-3 | 5825 MHz | 2.4 |

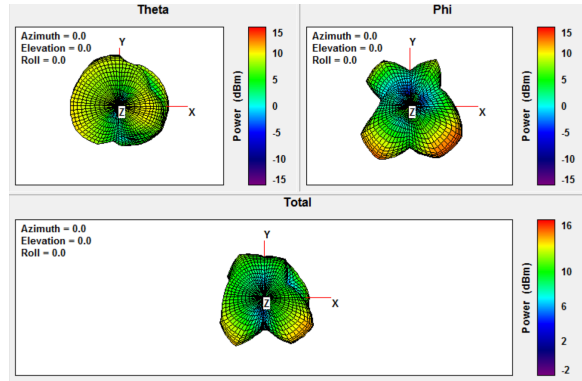
7. Radiation Plots

Ant1:

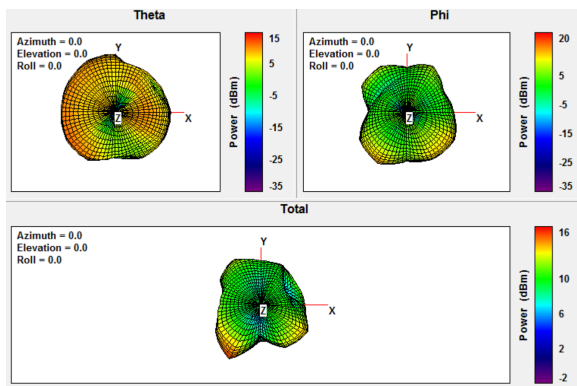
Ant1_BT Freq. 2402 MHz:



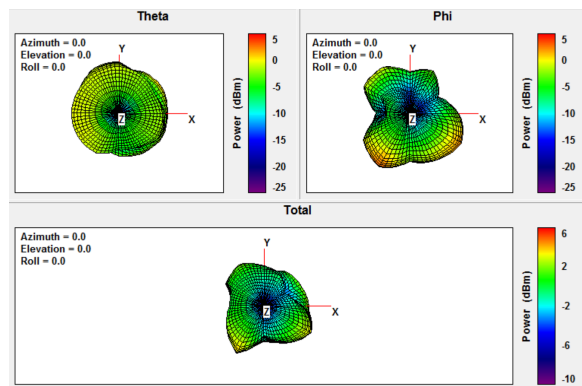
Ant1_WiFi Freq. 2462 MHz:



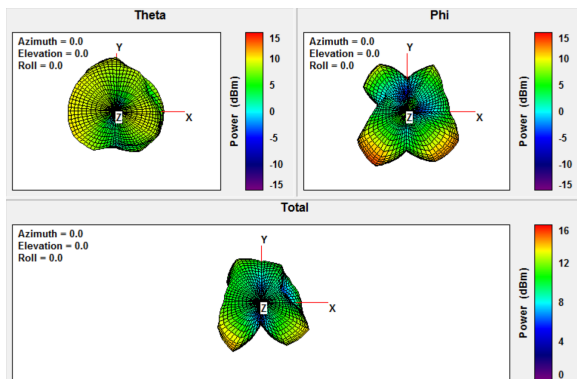
Ant1_WiFi Freq. 2412 MHz:



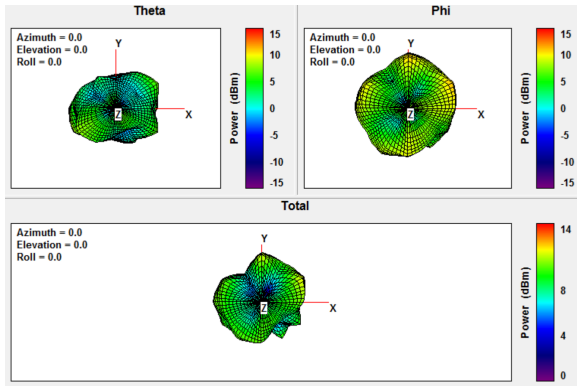
Ant1_BT Freq. 2480 MHz:



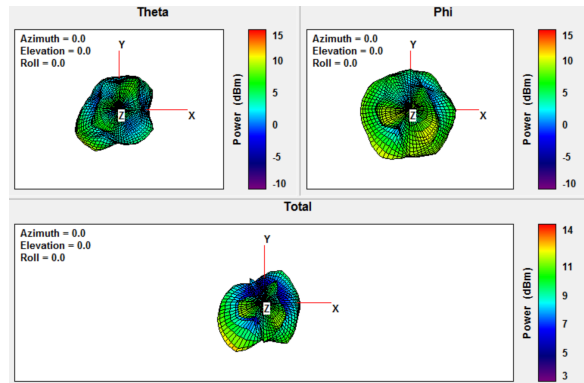
Ant1_WiFi Freq. 2437 MHz:



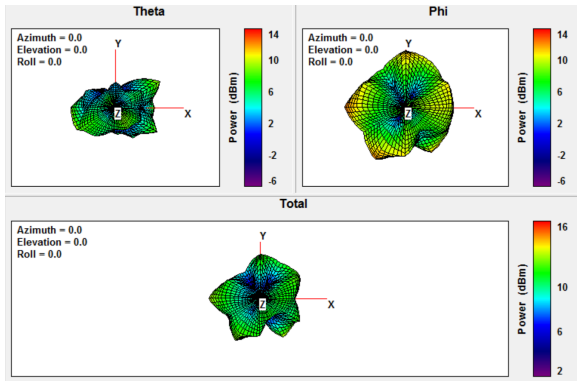
Ant1_WiFi Freq. 5180 MHz:



Ant1_WiFi Freq. 5825 MHz:



Ant1_WiFi Freq. 5280 MHz:



Ant1_WiFi Freq. 5500 MHz:

