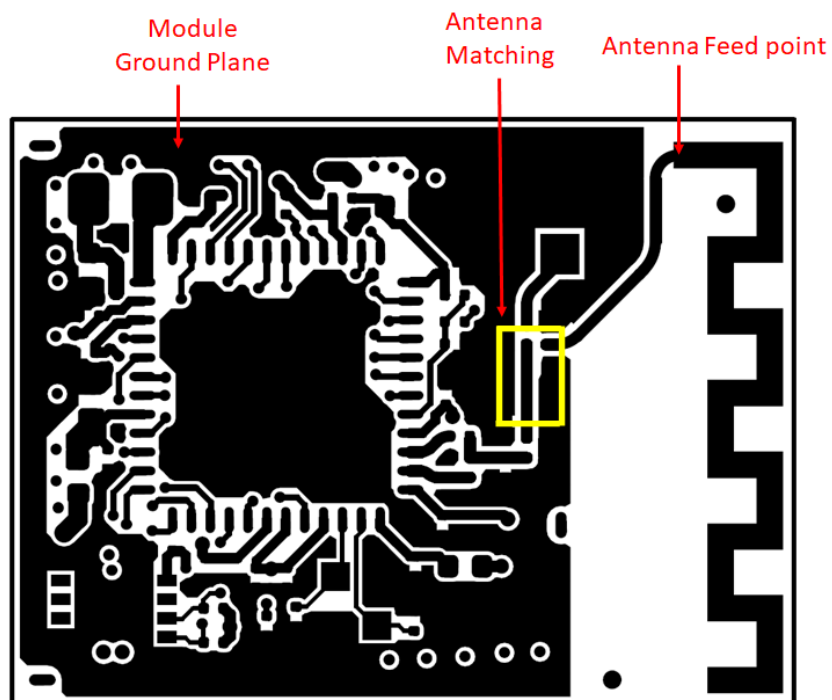


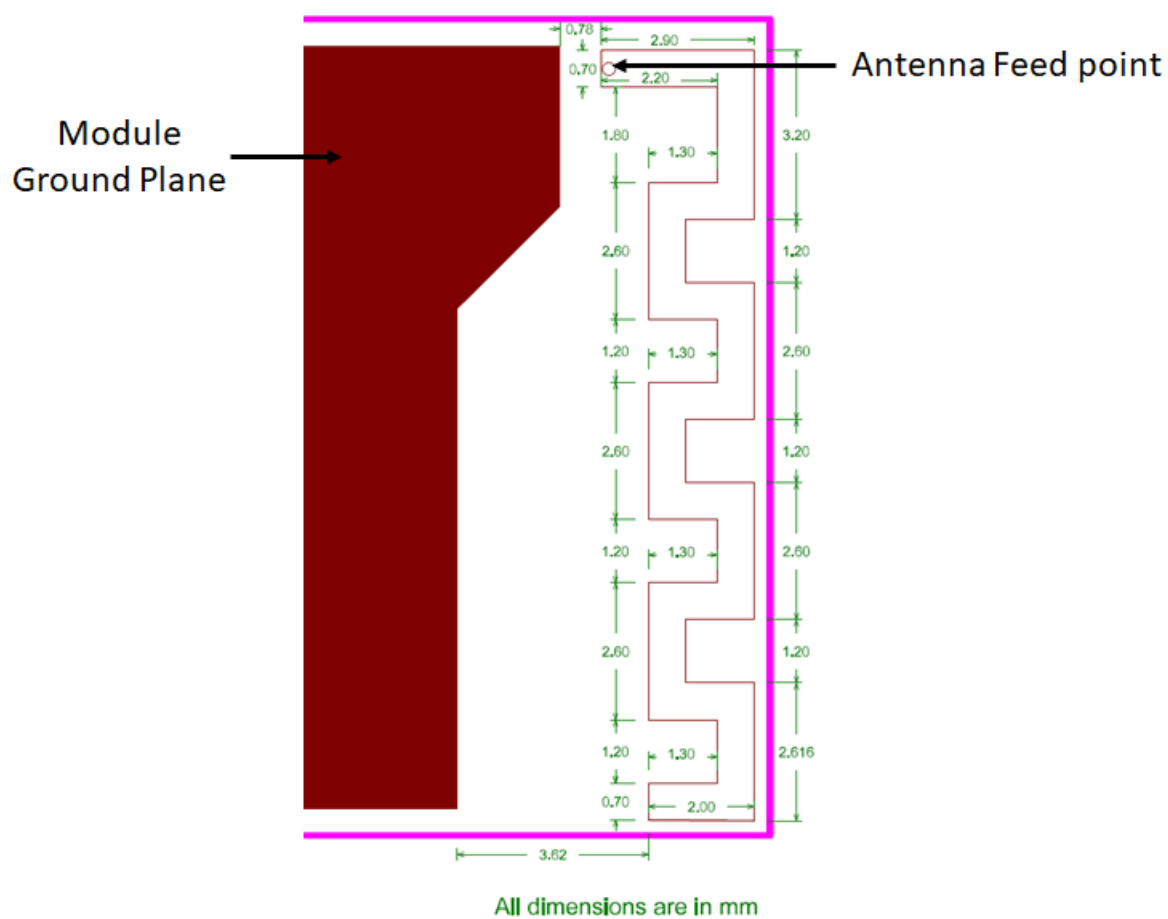
**WBZ451 Module
PCB Antenna Test Report
Rev - 1.0**

1. Antenna Details

a. PCB Antenna on WBZ451 Module



b. Antenna Dimension



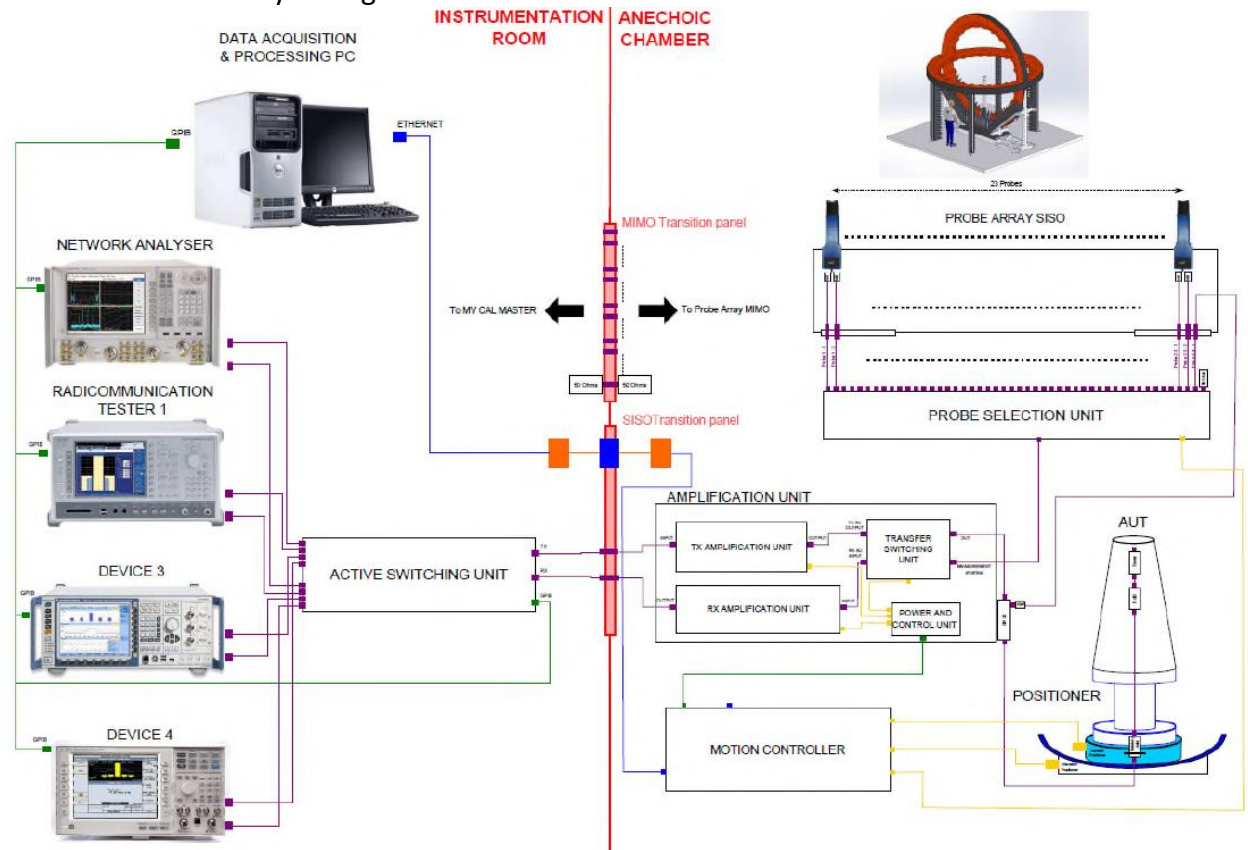
2. Measurement System Information:

a. Testing Condition

- Temperature: $22 \pm 3^\circ\text{C}$
- Humidity: $< 80\%$

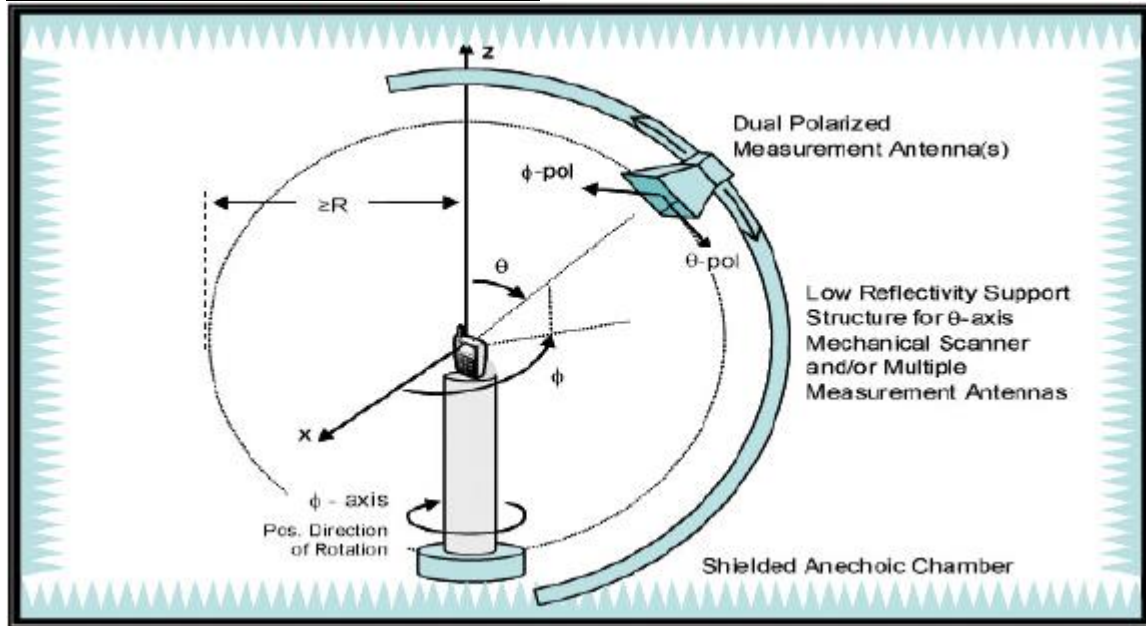
b. Measurement Facility

- Measurement Chamber: MVG 3D fully anechoic chamber and its measuring system (Stargate-24-L)
- Basic Station Simulator: Anritsu MT8820C (or R&S CMU200)
- Network Analyzer: Agilent E5071C



Measurements are performed in a MVG Stargate-24-L with the StarAct interface for a base station simulator. The Stargate-24-L has 23 probe antennas mounted with equal spacing on a circular arch. Electronics switching of the probe antennas provides outstanding measurement speed. The geometry of the setup, with only a Styrofoam column within 1.6 meters of the EUT, ensures minimum interference and low ripple on the measured radiation patterns. The DUT is placed on top of the pedestal, in the center of the system.

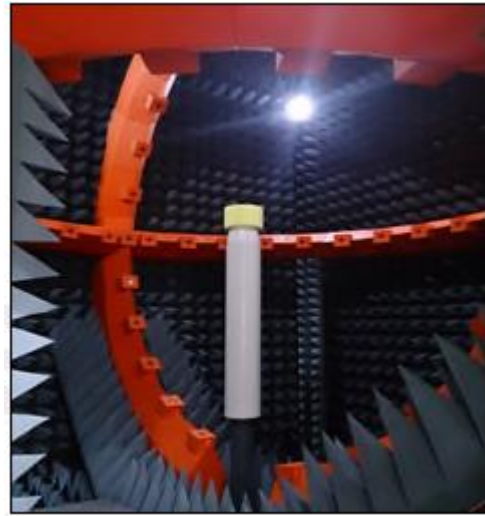
Typical Setup for MVG Stargate-24-L:



Instruments View



Inside View

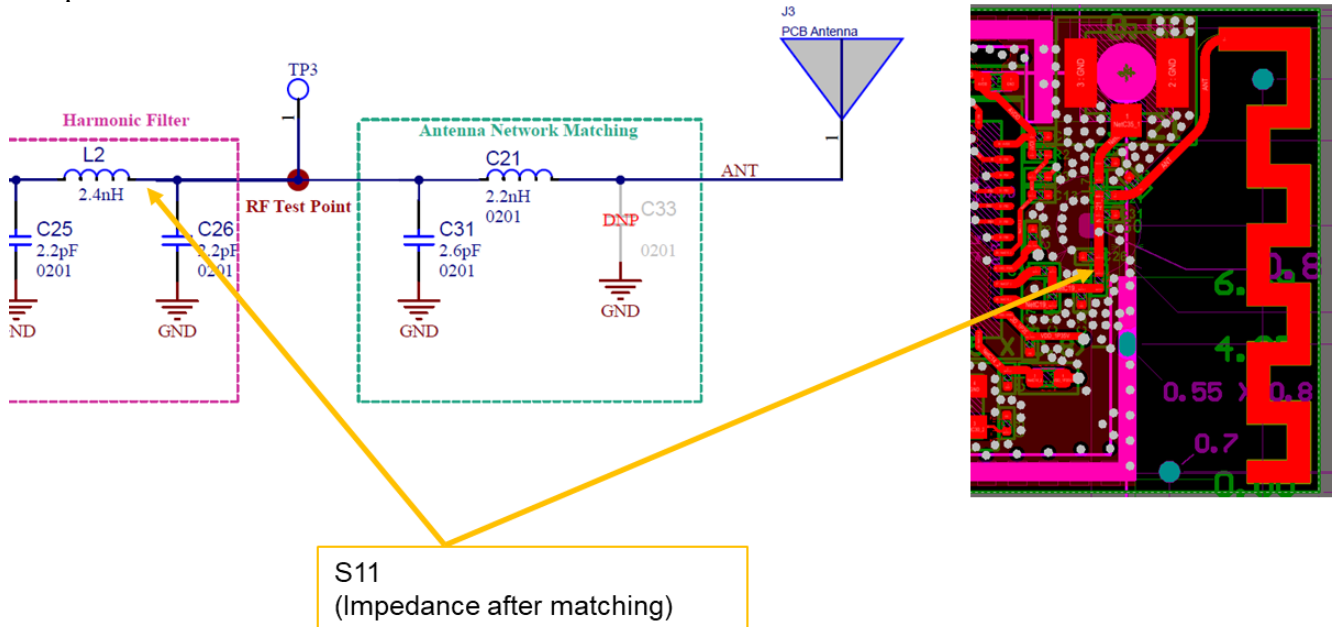


3. Testing Laboratory:

SGS Taiwan Ltd. Electronics & Communication Laboratory, New Taipei City, Taiwan.

4. EUT:

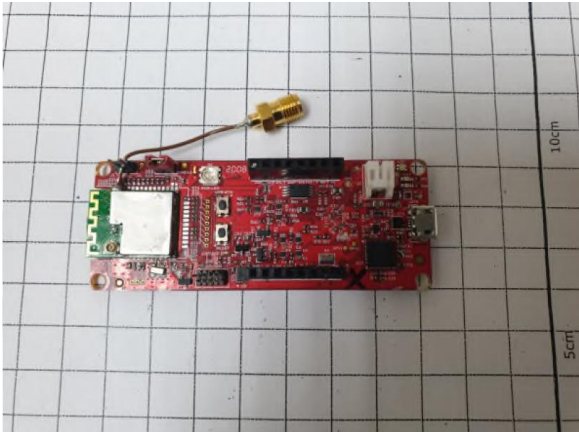
PCB antenna performance is evaluated with WBZ451 module mounted on the curiosity board with the antenna matching components C21 and C31 mounted with 2.2nH (LQP03HQ2N2B02) and 2.6pF (GRM0335C1H2R6BA01) respectively and all the other components are not mounted.



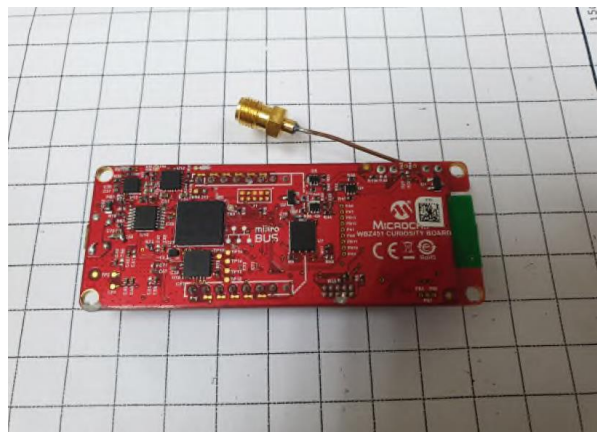
The semi-rigid coax RF cable is soldered on L2 component pad (marked in the above image) for the testing which is inside the RF shield area shown below,



Front View

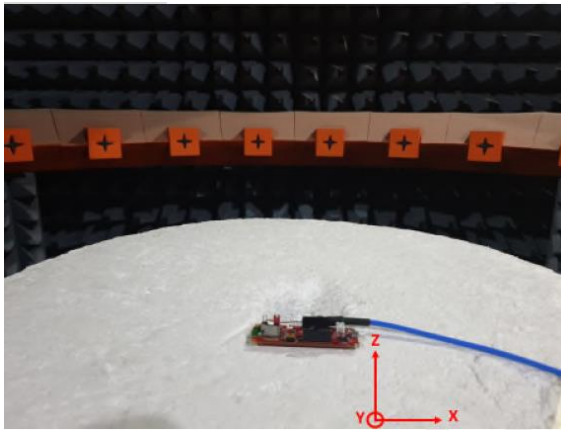


Back View

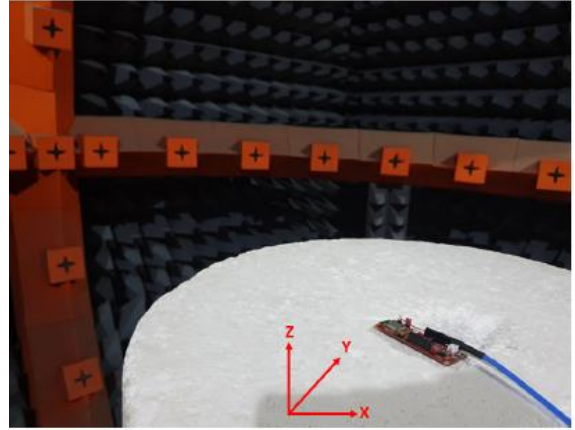


5. Test Setup:

Front View



Side View



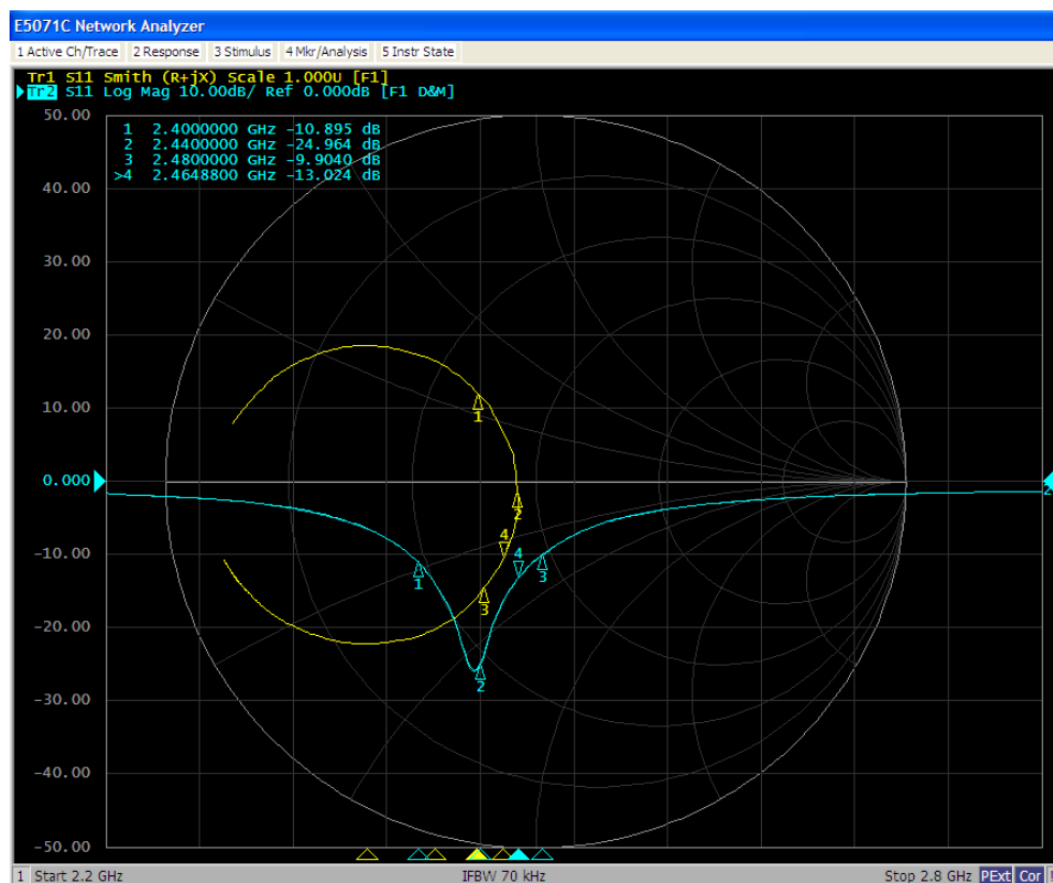
6. Antenna Characteristics:

The WBZ451 module uses an on-board PCB antenna and mounted on the WBZ451 curiosity board as shown in section.4

a. Antenna Gain and Efficiency

| Freq (MHz) | Peak Gain. dBi | Efficiency | Average Gain. dBi |
|------------|----------------|------------|-------------------|
| 2400.00 | 1.75 | 45.50% | -3.42 |
| 2410.00 | 1.84 | 47.14% | -3.27 |
| 2420.00 | 1.98 | 48.43% | -3.15 |
| 2430.00 | 2.36 | 50.18% | -3.00 |
| 2440.00 | 2.29 | 48.67% | -3.13 |
| 2450.00 | 2.02 | 46.27% | -3.35 |
| 2460.00 | 1.72 | 44.36% | -3.53 |
| 2470.00 | 1.10 | 40.22% | -3.96 |
| 2480.00 | 0.67 | 36.99% | -4.32 |
| 2490.00 | 0.84 | 37.36% | -4.28 |
| 2500.00 | 0.63 | 34.27% | -4.65 |

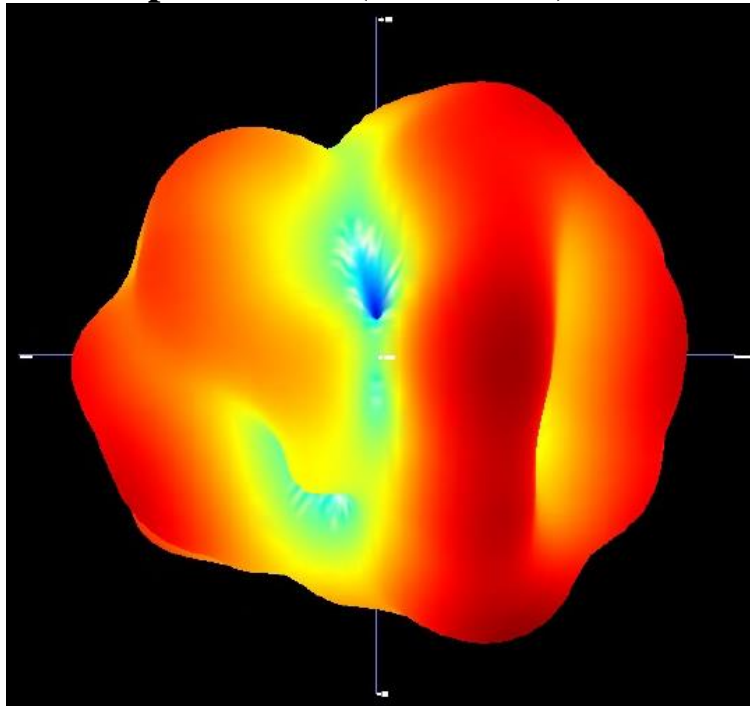
b. Return Loss (S11) Plot:



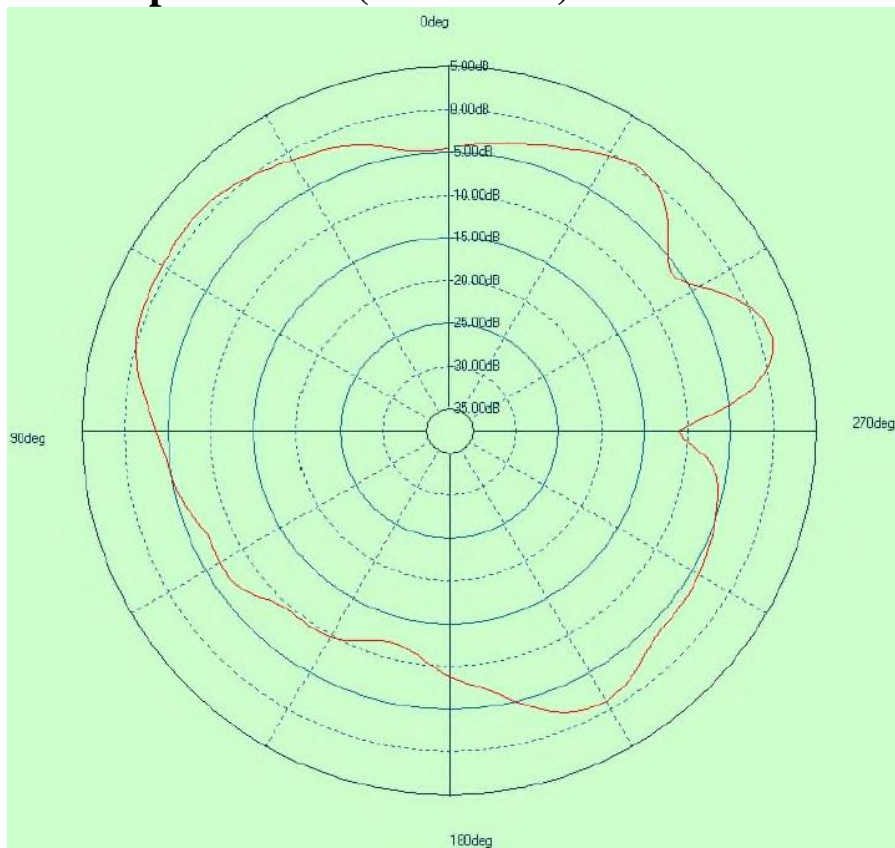
c. Antenna 3D Plot Matrix

All plots in this section show the total EIRP (EIRP + EIRP) with the +axis pointing out of the page, +y-axis pointing right, and +z-axis pointing up.

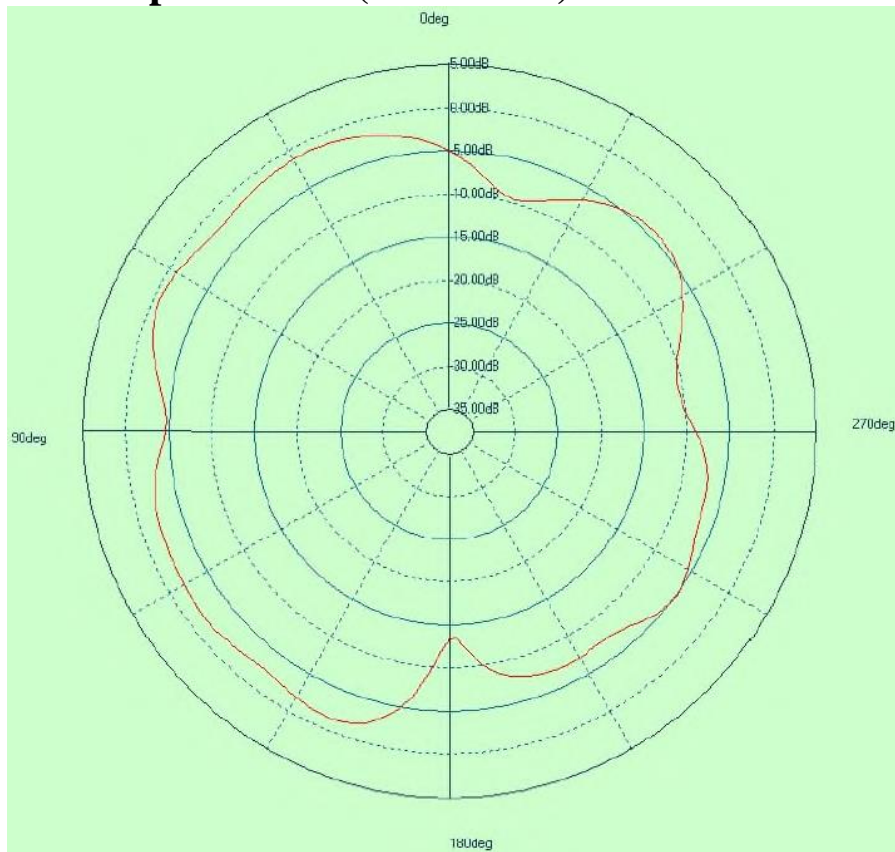
i. Free Space EIRP (2450 MHz)



ii. Free Space EIRP (2450 MHz) – XY cut



iii. Free Space EIRP (2450 MHz) – XZ cut



iv. Free Space EIRP (2450 MHz) – YZ cut

