

# Antenna Design

## For AMIT travel router

V1.02

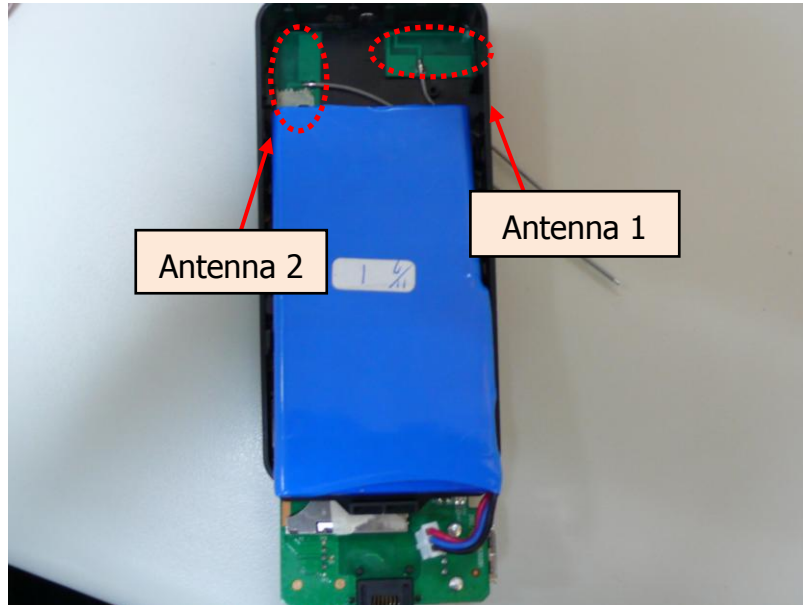
|                                     |                    |
|-------------------------------------|--------------------|
| <b>Document Number</b>              | <b>NE3-12100</b>   |
| <b>1<sup>st</sup> Released Date</b> | <b>10/31/2012</b>  |
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| <b>Review by</b>                    | <b>Byron Chang</b> |



### Electrical Specification

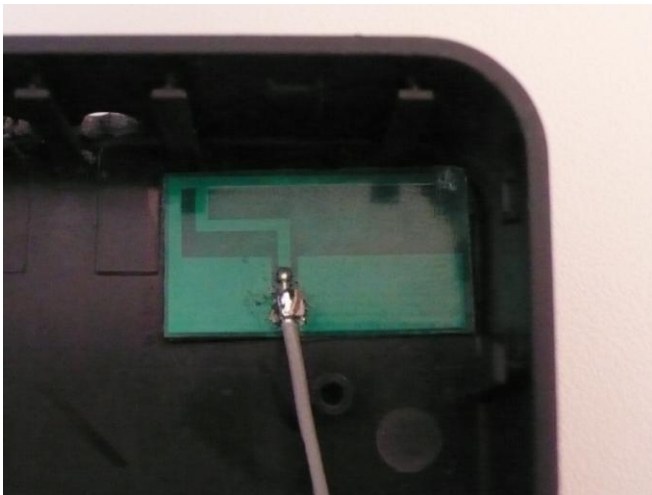
|                          |  |
|--------------------------|--|
| <b>Rough description</b> | Single band antenna(2pcs) for router(AMIT travel)                  |
| <b>Dimensions</b>        | Ant1 : (L)24mm*(W)13mm*(T)0.4mm<br>Ant2 : (L)24mm*(W)13mm*(T)0.4mm |
| <b>Impedance</b>         | 50Ω  |
| <b>Test environment</b>  | None   |
| <b>Application</b>       | 802.11b/g/n  |
| <b>Freq. Range</b>       | 2.4~2.5GHz*2   |
| <b>Gain</b>              | 3.79 dBi   |
| <b>VSWR</b>              | None   |
| <b>Radiation</b>         | Omni   |
| <b>Polarization</b>      | linear   |
| <b>HPBW / H</b>          | None   |
| <b>HPBW / E</b>          | None   |
| <b>Efficiency</b>        | None   |
| <b>Downtilt</b>          | None   |
| <b>Connector type</b>    | IPEX   |
| <b>Cable type</b>        | Φ1.13 Gray   |
| <b>Cable Length</b>      | Ant1 : 60mm<br>Ant2 : 70mm   |
| <b>Isolation</b>         | None   |

## 1. Antennas' setup and environment

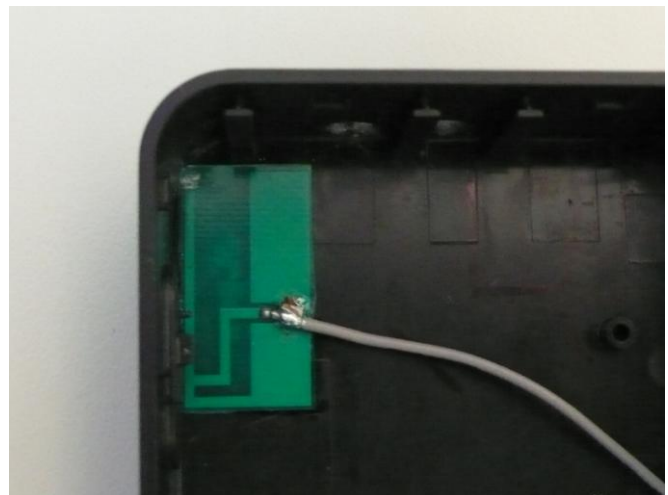


Antenna 1

Antenna 2



Antenna 1: C381-510210-A  
PCB Size: (L)24mm\*(W)13mm\*(T)0.4mm  
Sponge Size: (L)24mm\*(W)13mm\*(T)0.15mm  
Cable length : 60mm (總線長)  
55mm (外露線長)

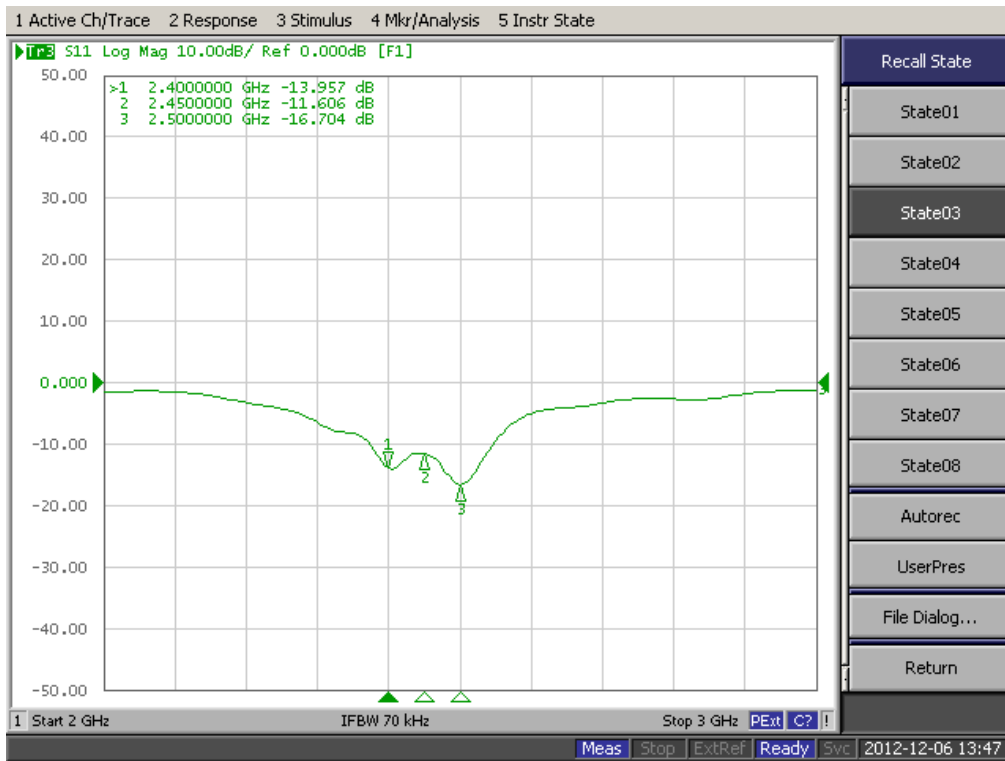


Antenna 2: C381-510209-A  
PCB Size: (L)24mm\*(W)13mm\*(T)0.4mm  
Sponge Size: (L)24mm\*(W)13mm\*(T)0.15mm  
Cable length : 70mm (總線長)  
65mm (外露線長)

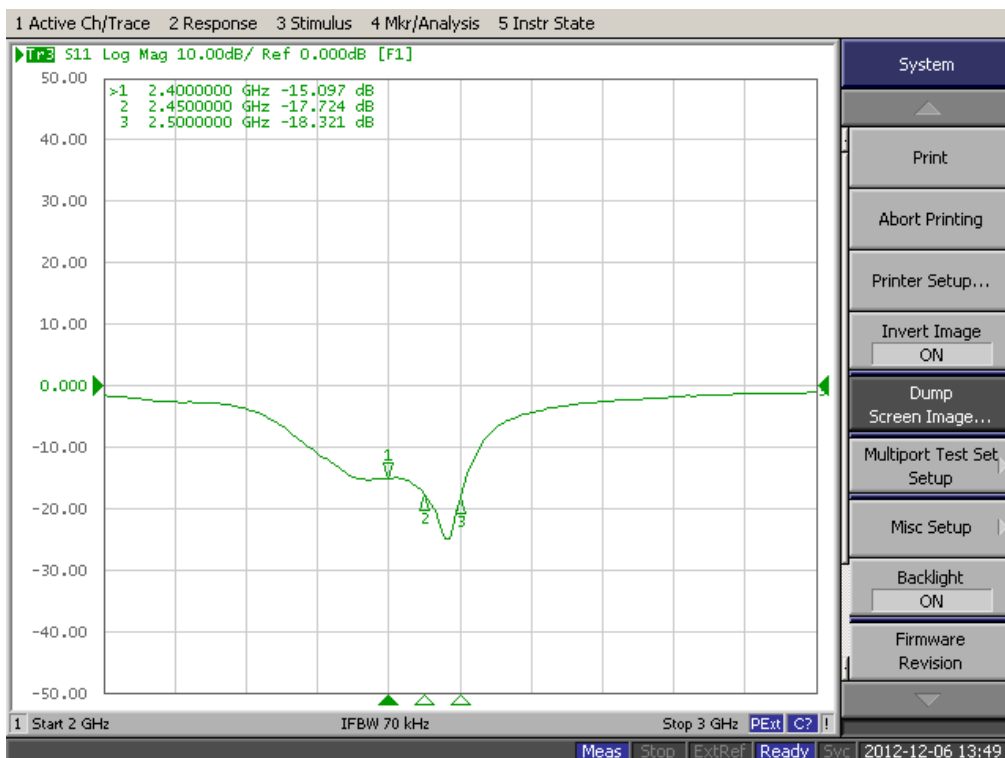
## 2. Network Analyzer Measurement

### 2.1 S11 Test Results

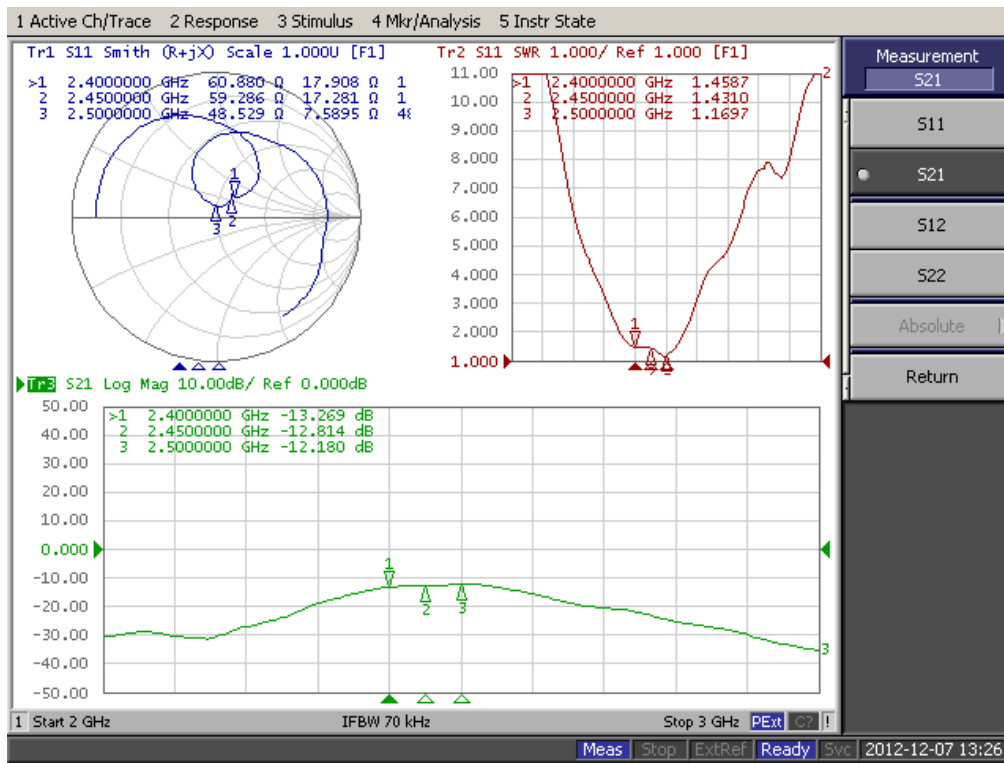
#### 2.1.1 Antenna 1



#### 2.1.2 Antenna 2

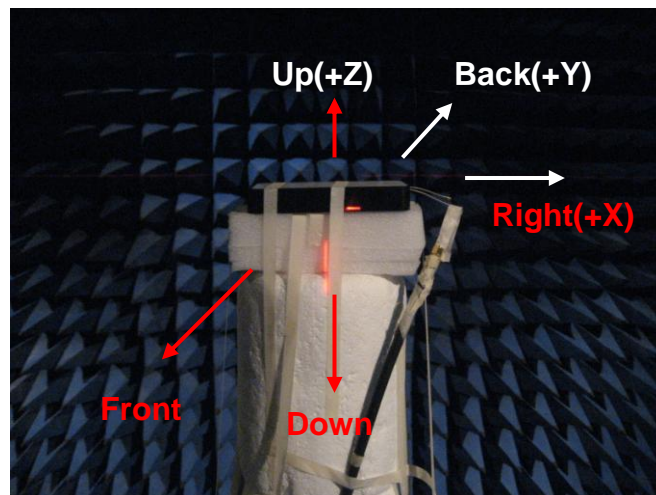
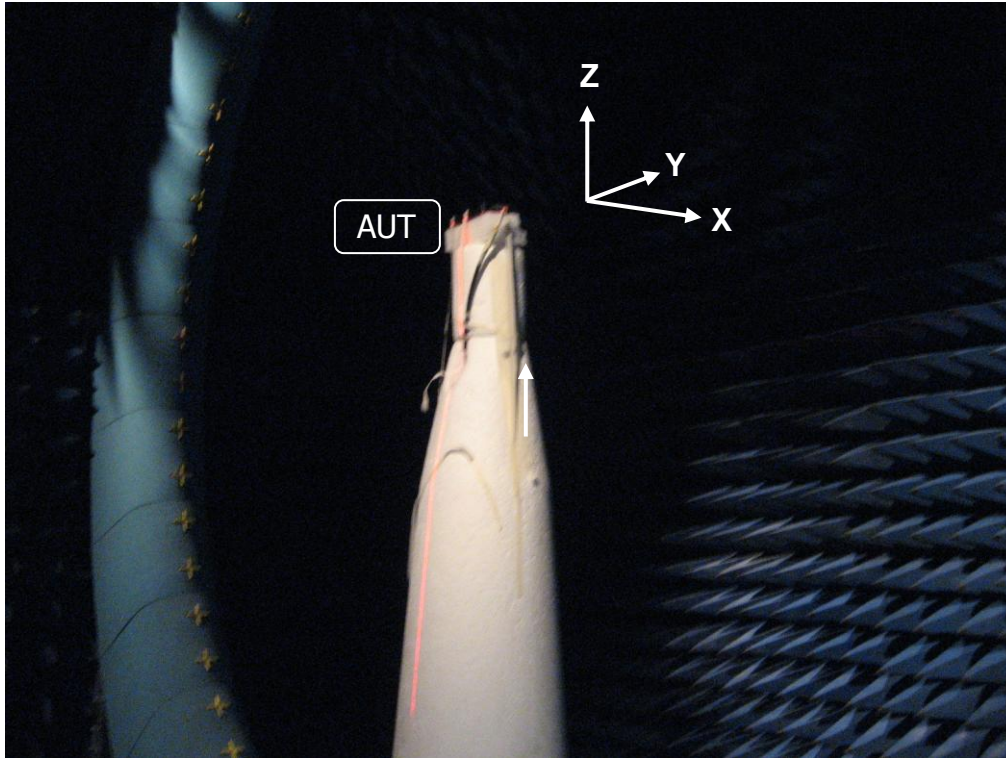


### 2.1.3 Isolation

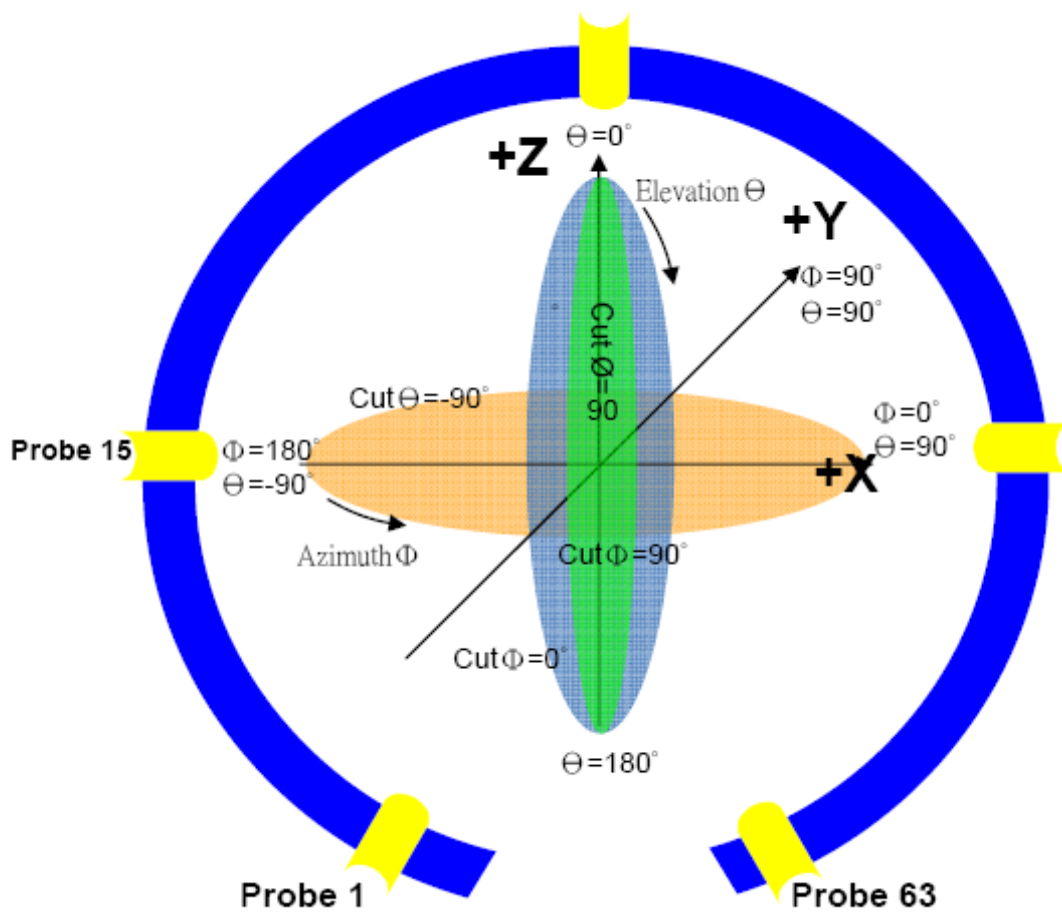


### 3. Gain & Patterns test results

#### 3.1 Measurement setting



|      | <b>XY</b> | <b>YZ</b> | <b>XZ</b> |
|------|-----------|-----------|-----------|
| 0°   | Right     | Up        | Up        |
| 90°  | Back      | Back      | Right     |
| 180° | Left      | Down      | Down      |
| 270° | Front     | Front     | Left      |

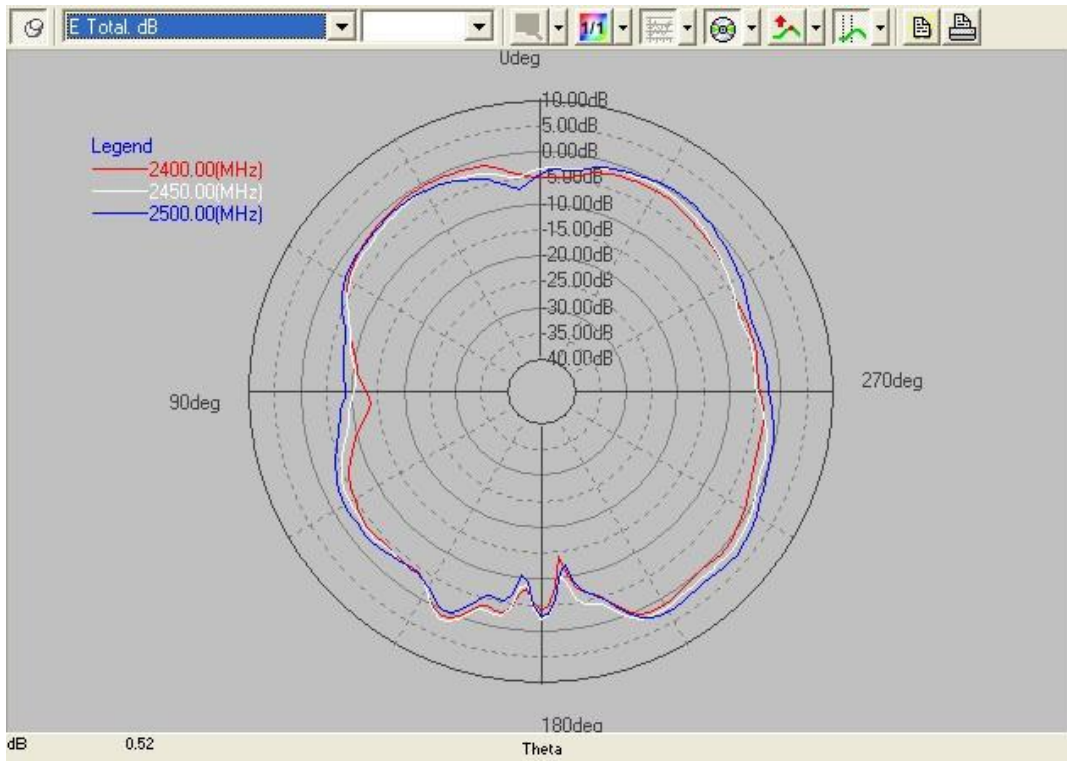


|                               | $\theta$ | $\phi$ |
|-------------------------------|----------|--------|
| Total angle                   | 175°     | 360°   |
| How many angle scan one point | 5°       | 5°     |
| Total scan point              | 36       | 73     |

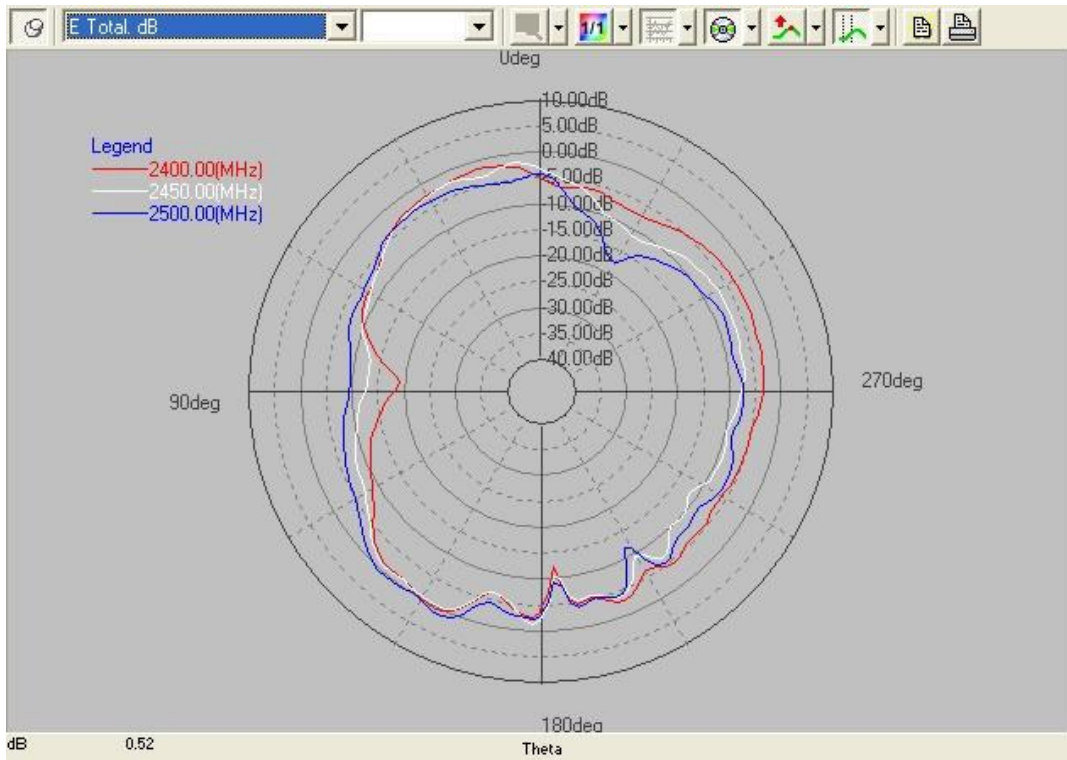


### 3.2 2D patterns

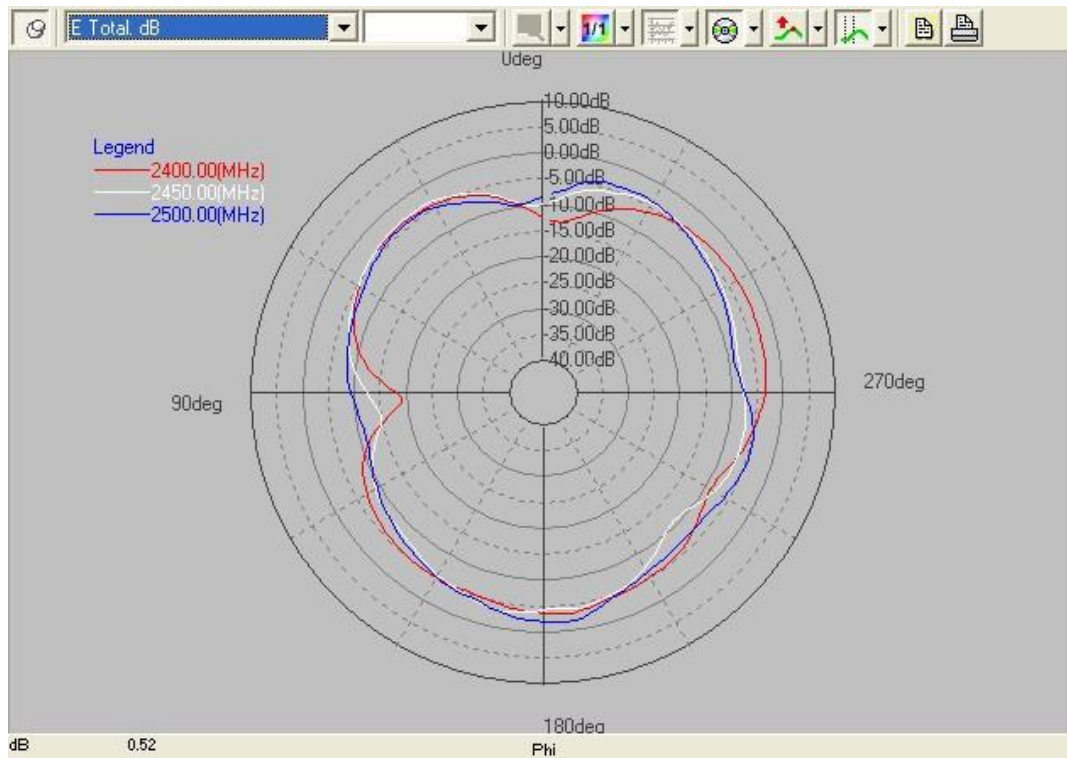
#### 3.2.1 Antenna 1(機台水平擺放)



**X-Z Plane (E-total)**

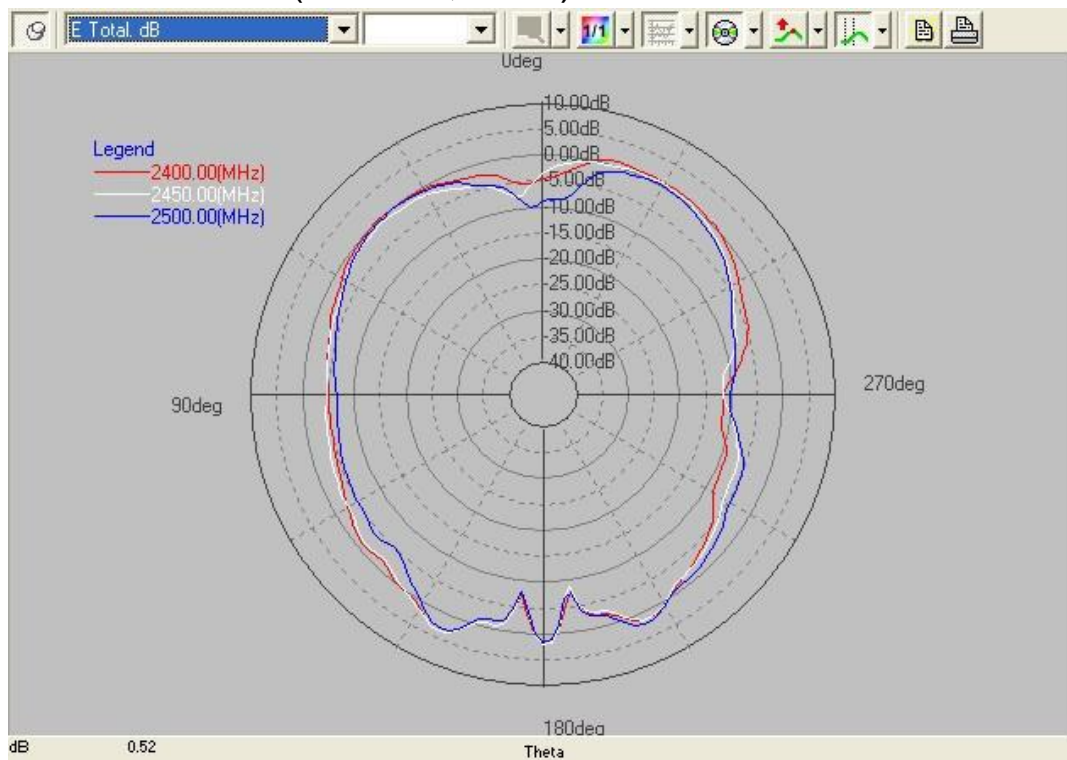


**Y-Z Plane (E-total)**

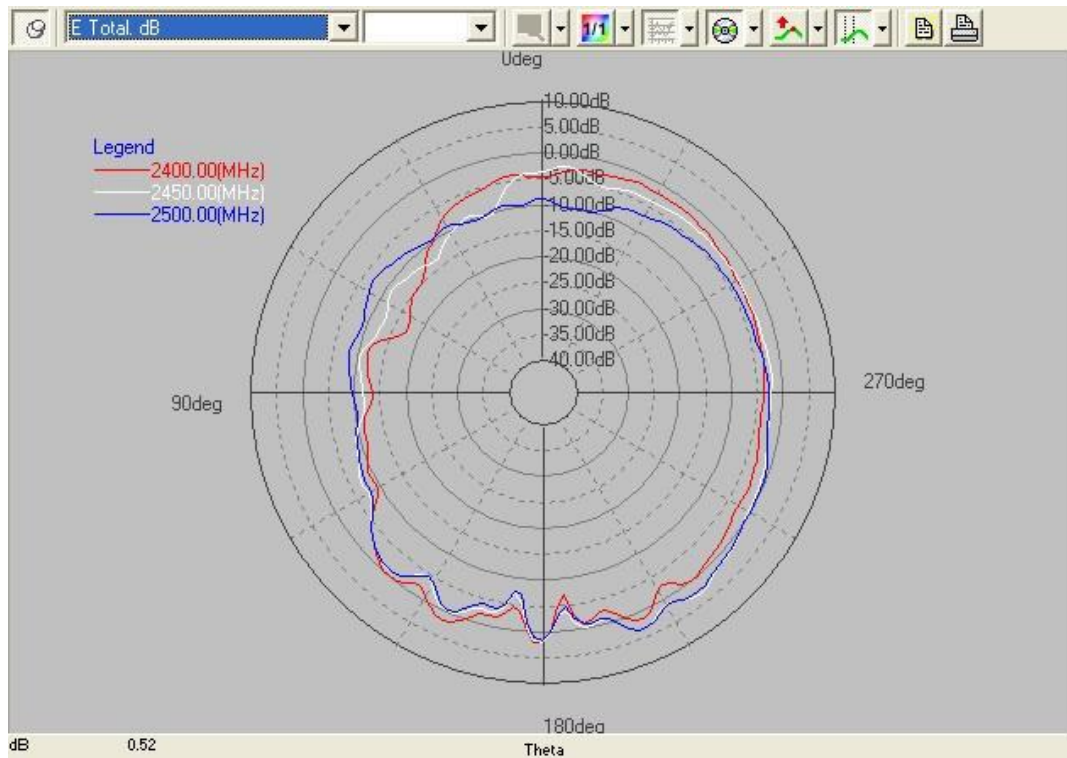


**X-Y Plane (E-total)**

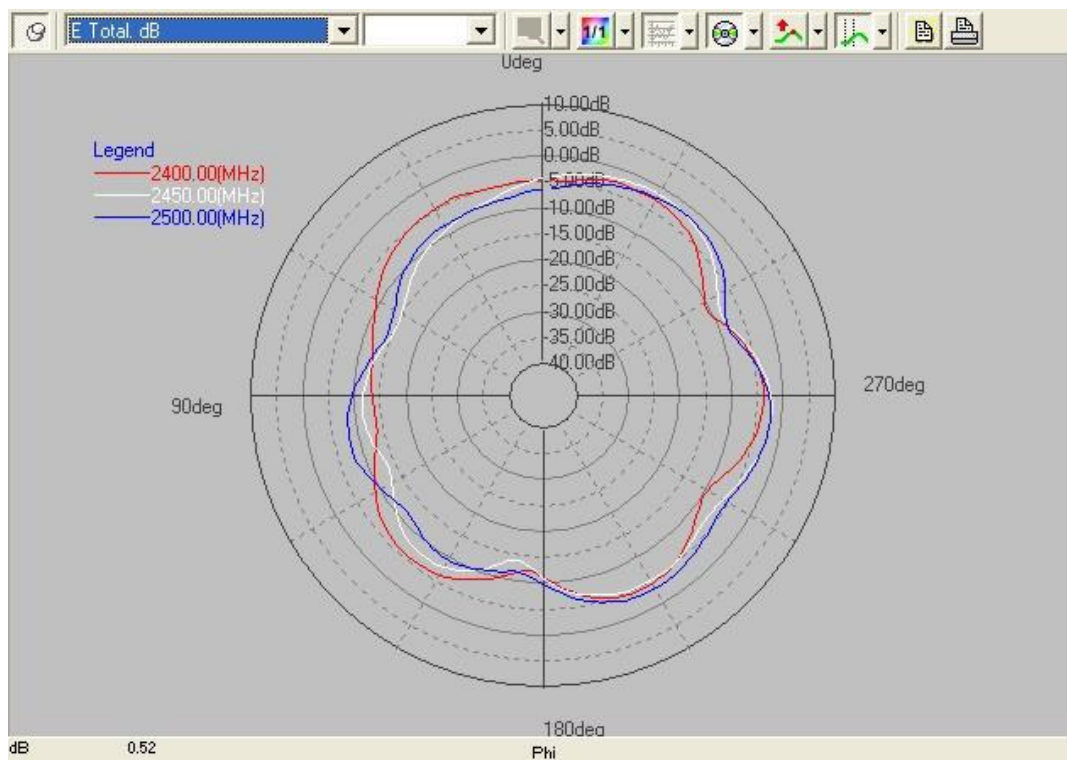
### 3.2.2 Antenna 2(機台水平擺放)



**X-Z Plane (E-total)**

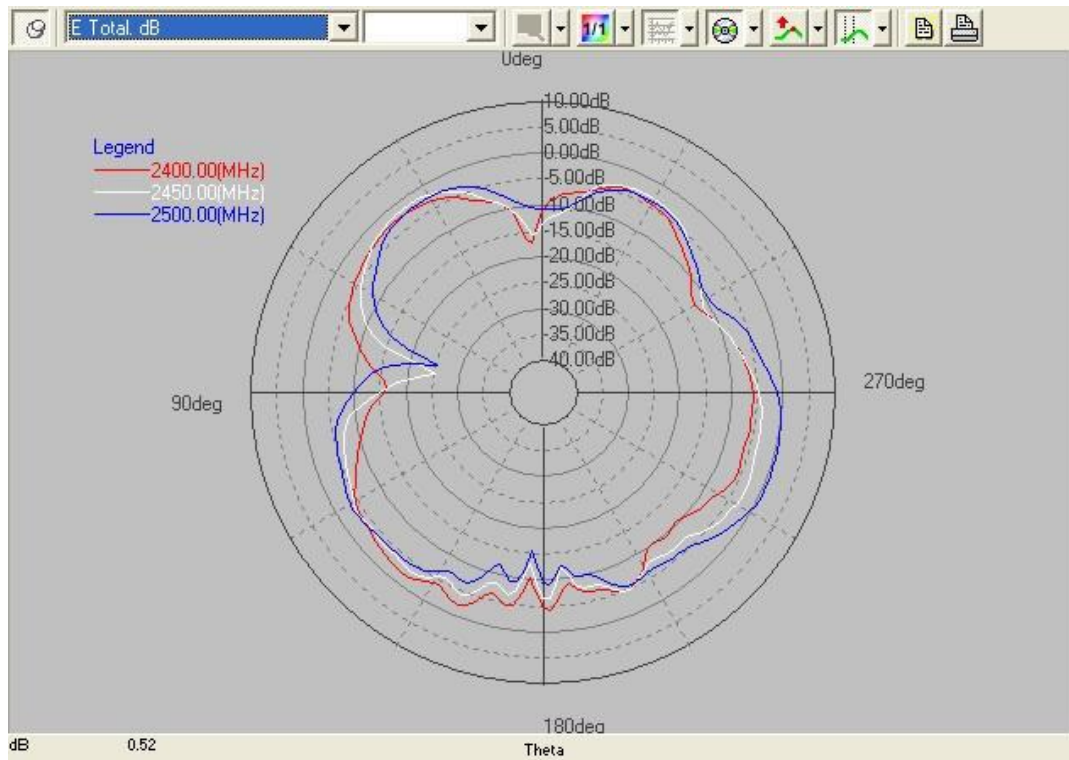


**Y-Z Plane (E-total)**

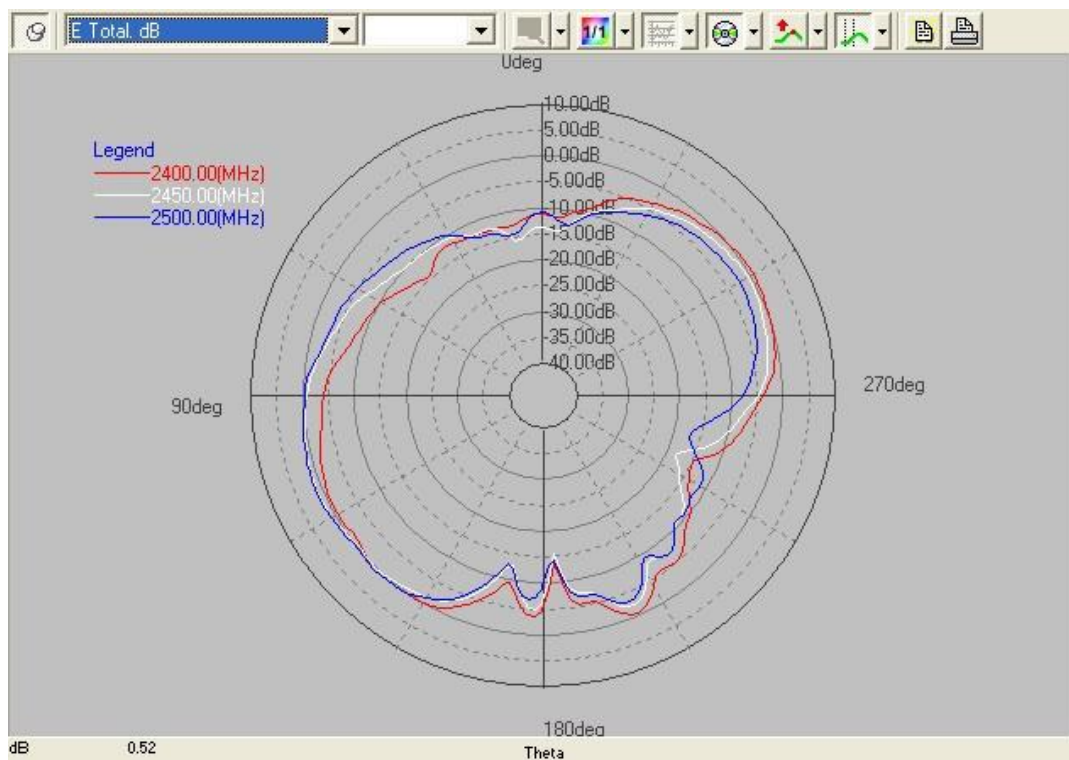


**X-Y Plane (E-total)**

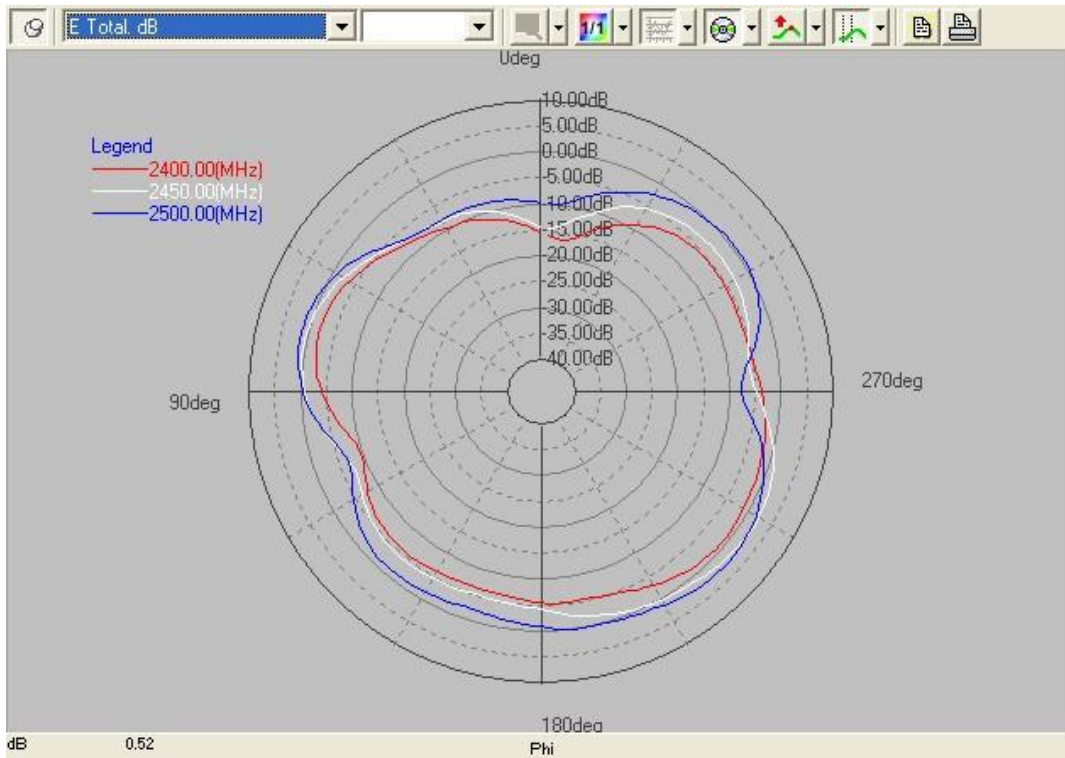
### 3.2.3 Antenna 1(機台直立擺放)



**X-Z Plane (E-total)**

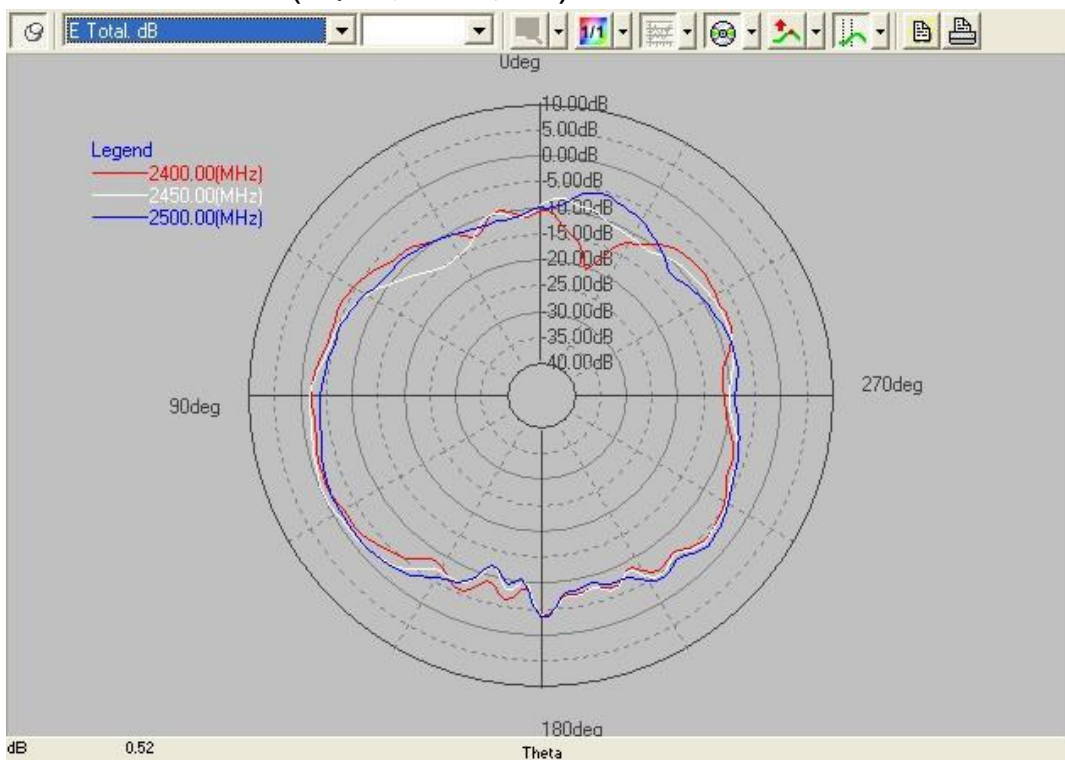


**Y-Z Plane (E-total)**

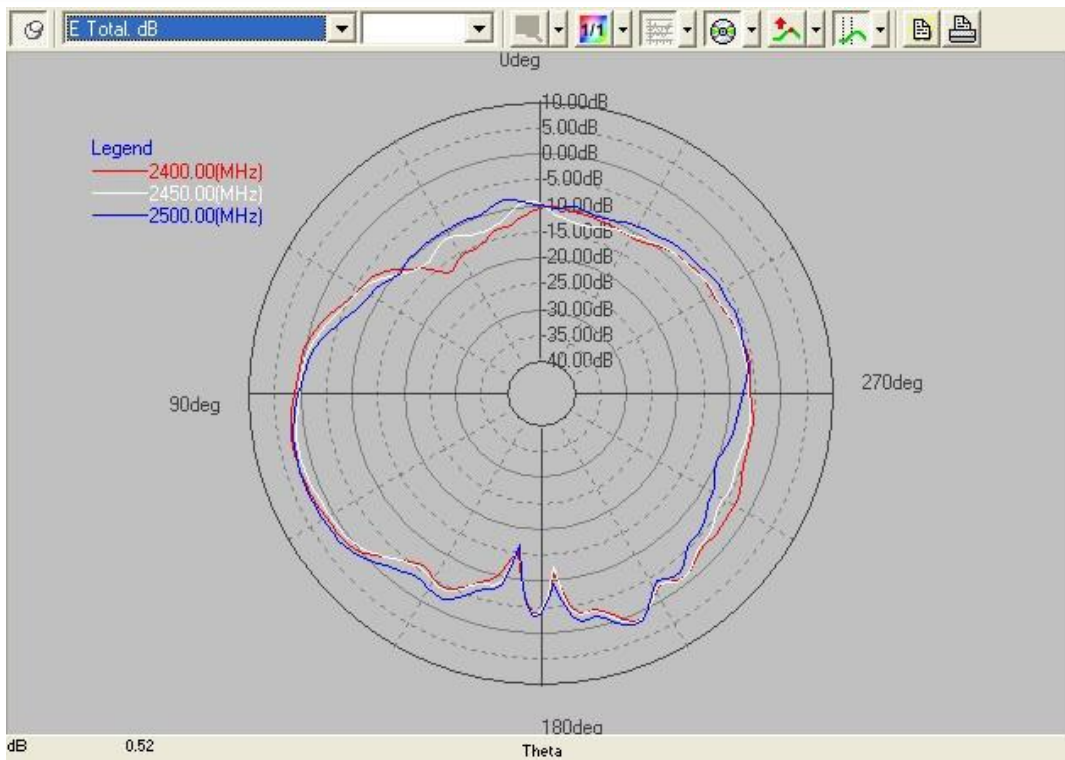


**X-Y Plane (E-total)**

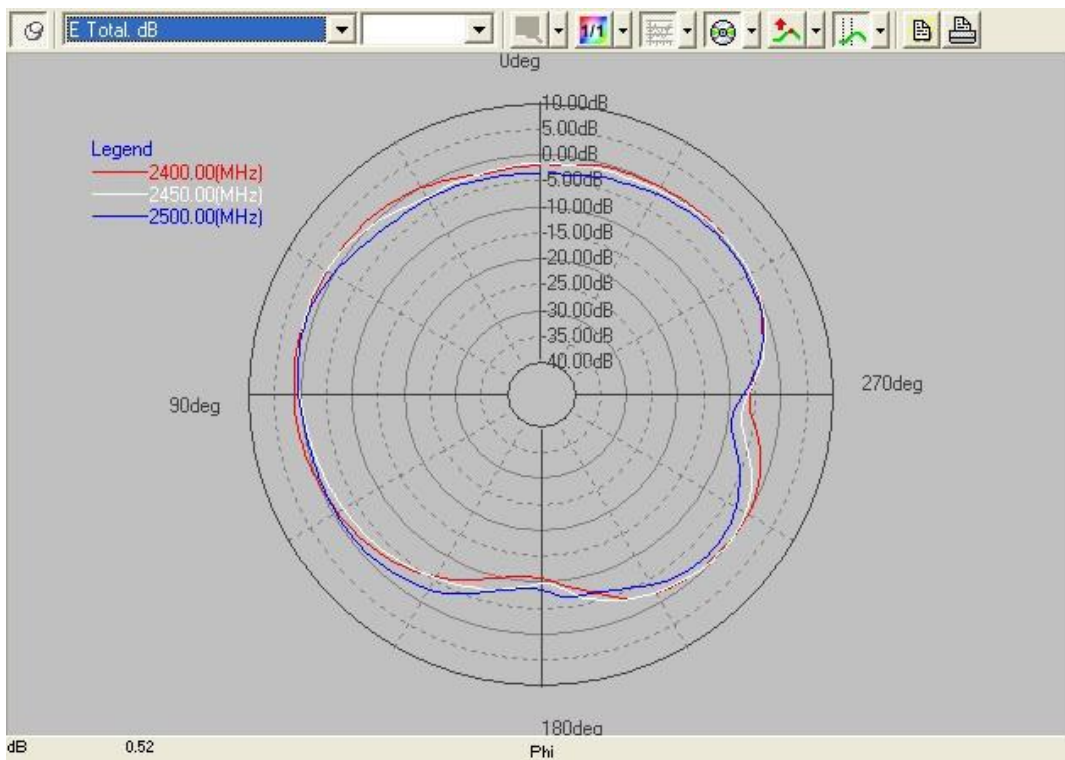
### 3.2.4 Antenna 2(機台直立擺放)



**X-Z Plane (E-total)**



**Y-Z Plane (E-total)**



**X-Y Plane (E-total)**

## 4. Summary

### 4.1 Return Loss

| Frequency | Antenna 1 (dB) | Antenna 2 (dB) |
|-----------|----------------|----------------|
| 2400MHz   | -14.0          | -15.1          |
| 2450MHz   | -11.6          | -17.7          |
| 2500MHz   | -16.7          | -18.3          |

### 4.2 Isolation

| Frequency | Isolation (dB) |
|-----------|----------------|
| 2400MHz   | -13.3          |
| 2450MHz   | -12.8          |
| 2500MHz   | -12.2          |

### 4.3 3D total Peak Gain & Efficiency

| Frequency | 機台水平擺放          |                |                 |                |
|-----------|-----------------|----------------|-----------------|----------------|
|           | Antenna 1       |                | Antenna 2       |                |
|           | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) |
| 2400MHz   | 2.89            | 41.0           | 3.43            | 47.7           |
| 2450MHz   | 3.15            | 40.3           | 3.78            | 47.4           |
| 2500MHz   | 3.72            | 44.5           | 3.79            | 45.7           |

| Frequency | 機台直立擺放          |                |                 |                |
|-----------|-----------------|----------------|-----------------|----------------|
|           | Antenna 1       |                | Antenna 2       |                |
|           | Peak Gain (dBi) | Efficiency (%) | Peak Gain (dBi) | Efficiency (%) |
| 2400MHz   | 0.64            | 37.2           | 2.74            | 47.0           |
| 2450MHz   | 2.92            | 45.9           | 2.63            | 42.7           |
| 2500MHz   | 3.24            | 52.8           | 2.97            | 41.6           |