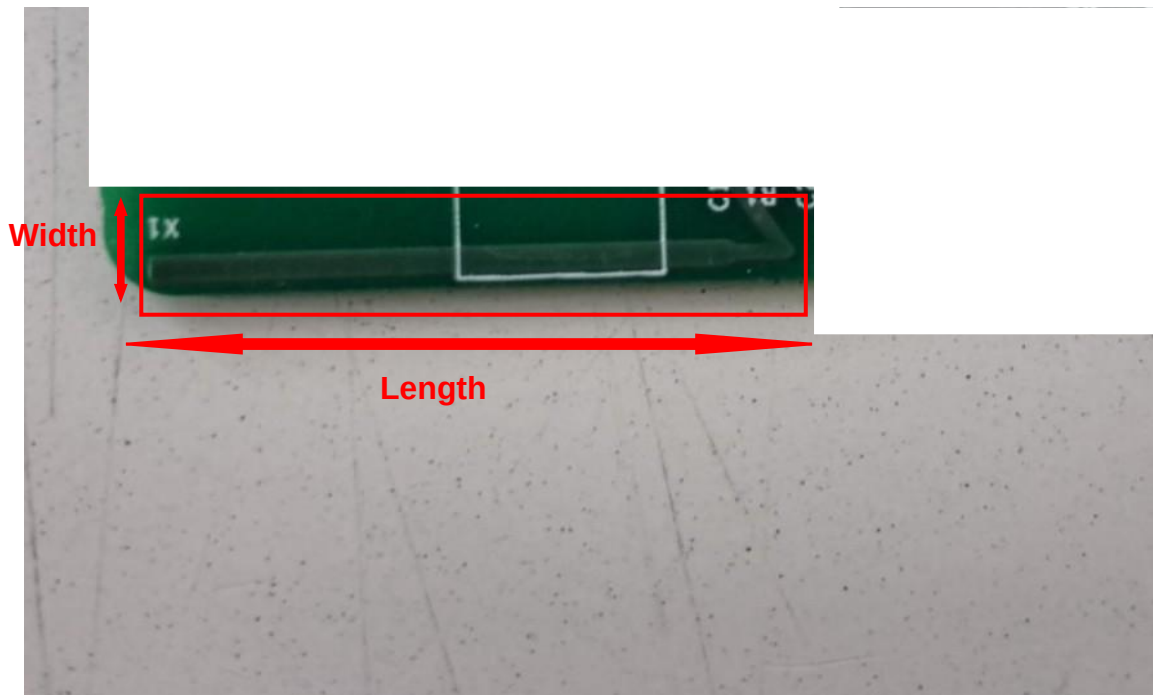


## Antenna Information

| Item                      | Contents                                                                                |
|---------------------------|-----------------------------------------------------------------------------------------|
| Antenna Type              | PCB Pattern Antenna                                                                     |
| Antenna peak gain         | 2.98 dB i                                                                               |
| Manufacturer / Model name | Prinics Co., Ltd / -                                                                    |
| Address of manufacturer   | 197-50, Saneop-ro 156beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do,<br>Republic of Korea |
| Test Laboratory           | KaiFa Technology(ShenZhen)Co.,Ltd                                                       |
| Antenna Length            | 1.6 cm                                                                                  |
| Antenna Width             | 0.6 cm                                                                                  |



**Model name: 009128E**

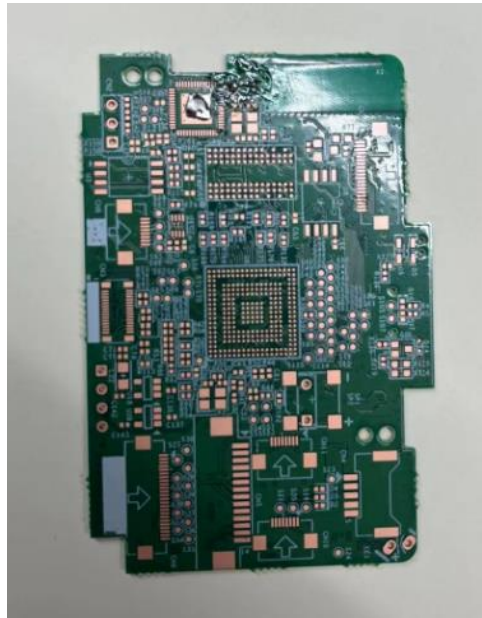
# Prinics SQ3 2G4Hz Antenna Design

## CATALOGUE

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# 1. Product Chart

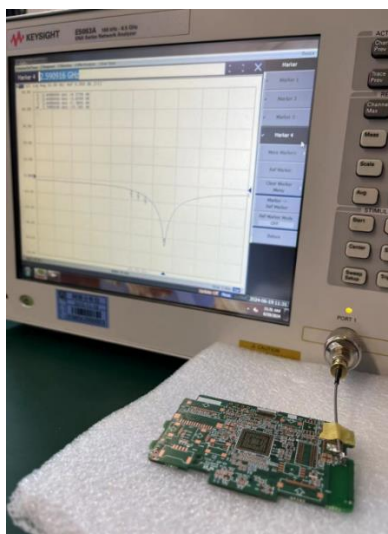
The SQ3 model debugging sample of the prinics project is as follows, and the antenna type is monopole antenna



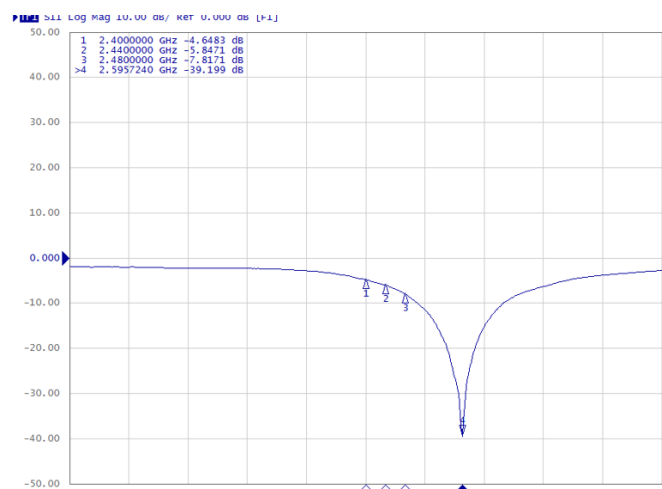
Antenna sample PCB

## 2. Antenna Test

The pi matching circuit reserved by the antenna is connected with 0ohm resistance, and the RF wire is connected to the RF output pin of the chip to test the impedance characteristics of the original antenna. The antenna and its passive parameters are shown below:



PCB antenna test



PCB antenna S11

### 3. Design Type

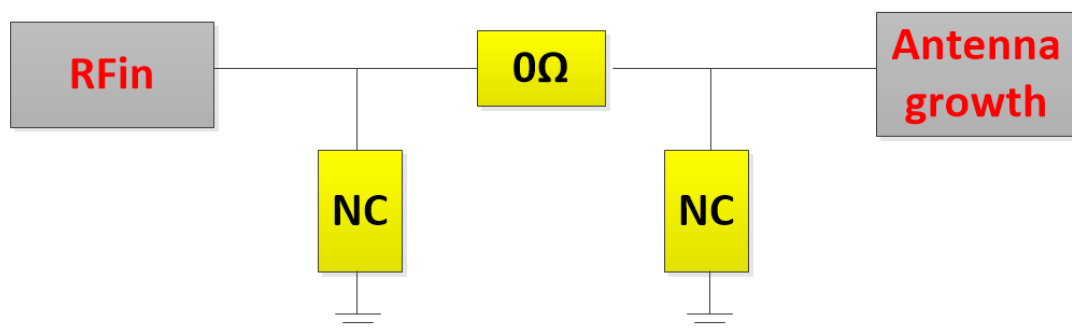
The resonant point of the PCB antenna test is near 2.6GHz, which is not in the Bluetooth operating band. After preliminary debugging, it is found that its resonance characteristics are not in the required frequency band. On the basis of the original antenna, we have two ways to debug

Way 1. The matching circuit with 0 ohms resistance is used to lengthen the antenna body so that its resonant point falls in the Bluetooth working band

Way 2. The matching circuit of series and parallel capacitors and inductors is adopted, and the length of the antenna body is kept unchanged, so that its resonant point falls in the Bluetooth working band

### 4. Design way 1

#### 4.1 Matching Circuit

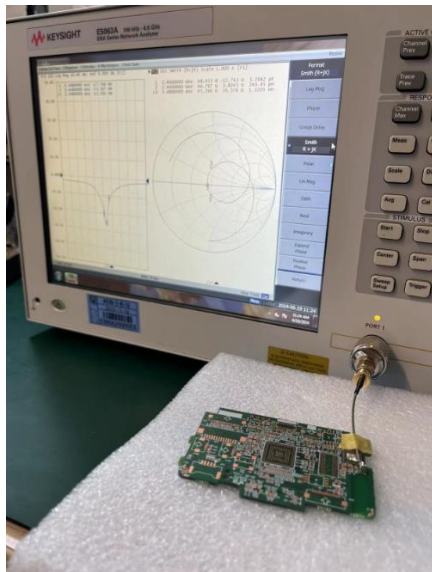


(NC, normal close)

#### 4.2 Performance Testing Chart

##### Antenna Tuning

It can use 0Ω resistor connection and use copper growing antenna end. The antenna and its passive parameters are shown below:

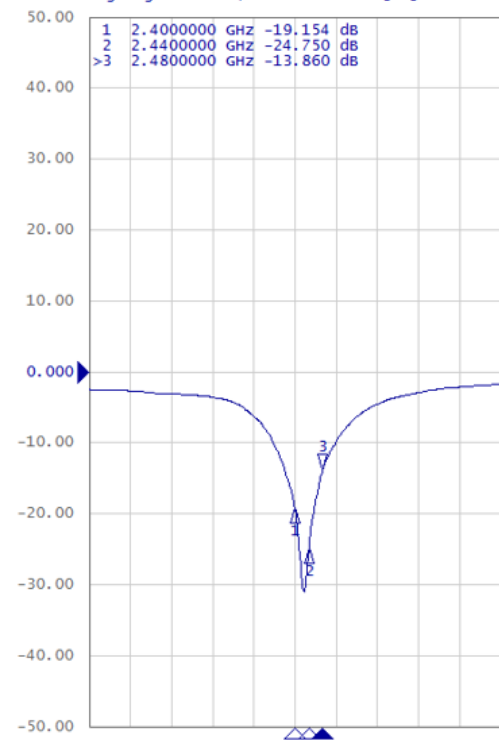


Way1 antenna sample test environment

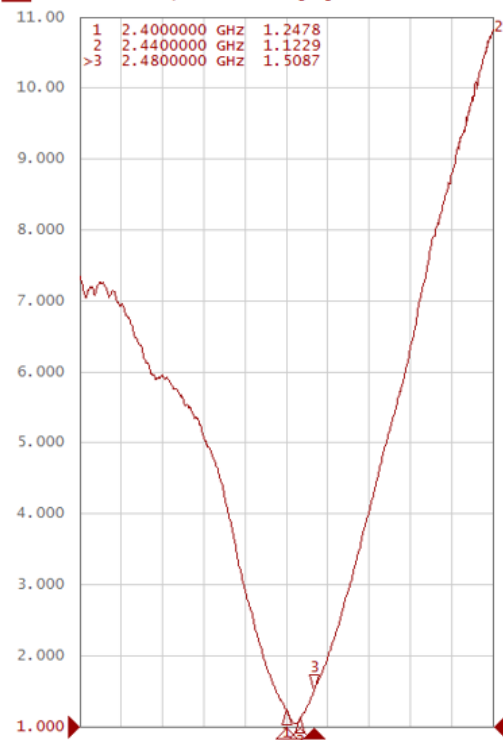


Way1 antenna sample

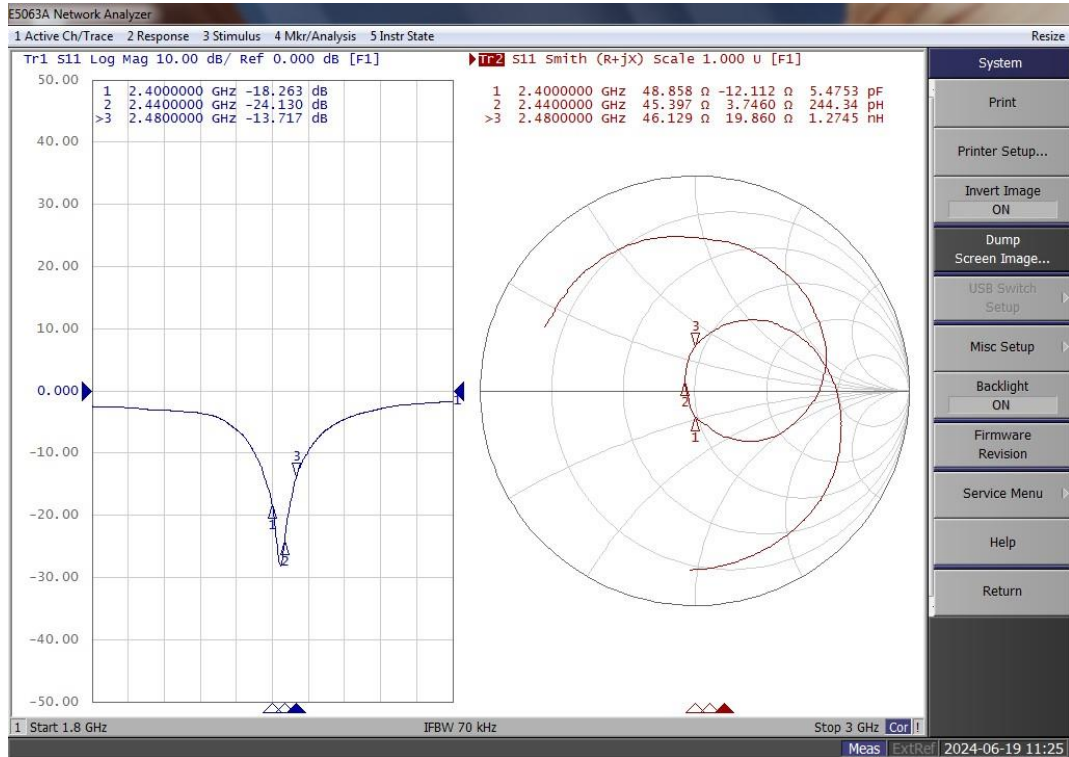
Tr1 S11 Log Mag 10.00 dB/ Ref 0.000 dB [F1]



Tr2 S11 SWR 1.000 / Ref 1.000 [F1]



Way1 antenna S11 & VSWR



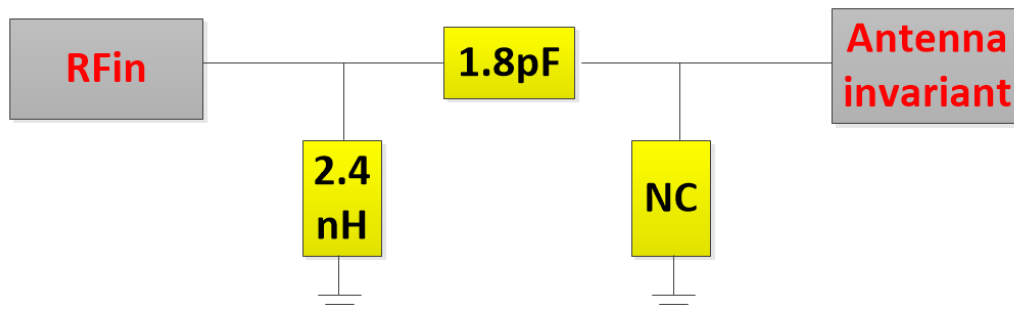
Way1 antenna S11 & Smith chart

Way1 Comparison of standing-wave ratio data

|          |       |       |       |
|----------|-------|-------|-------|
| Freq/GHz | 2.4   | 2.42  | 2.48  |
| S11/dB   | -19.1 | -24.7 | -13.8 |
| VSWR     | 1.24  | 1.12  | 1.51  |

## 5. Design way 2

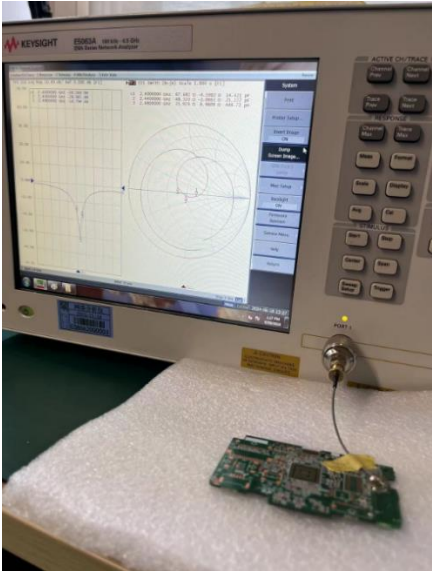
### 5.1 Matching Circuit



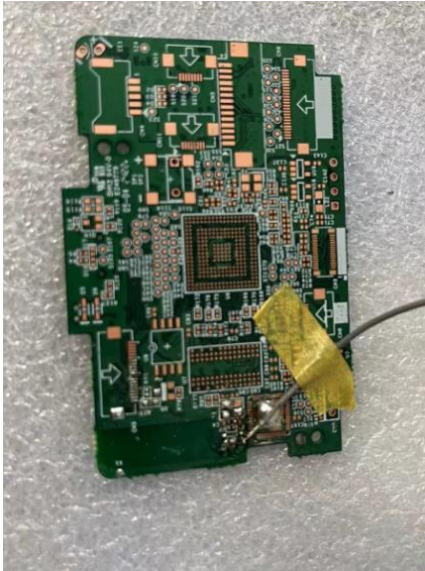
# 5.2 Performance Testing Chart

## Antenna Tuning

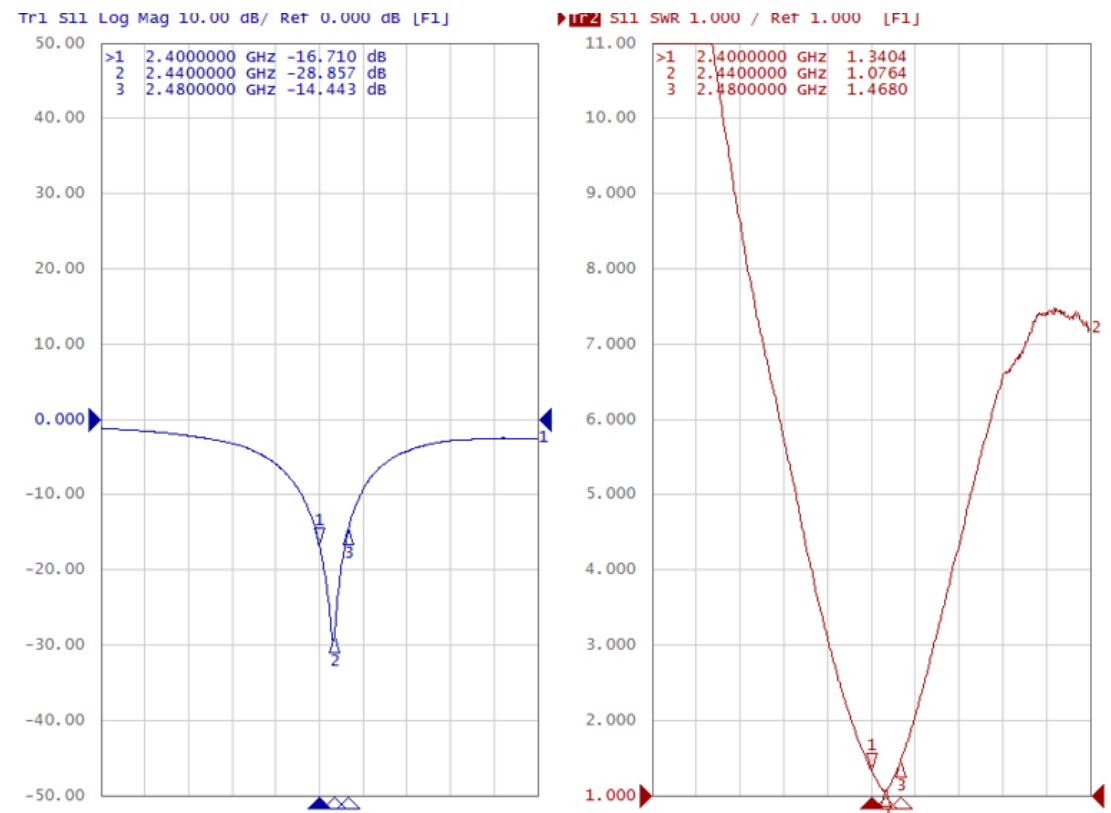
It is connected in series with 1.8pF capacitor and parallel with 2.4nH inductor. The antenna and its passive parameters are shown below:



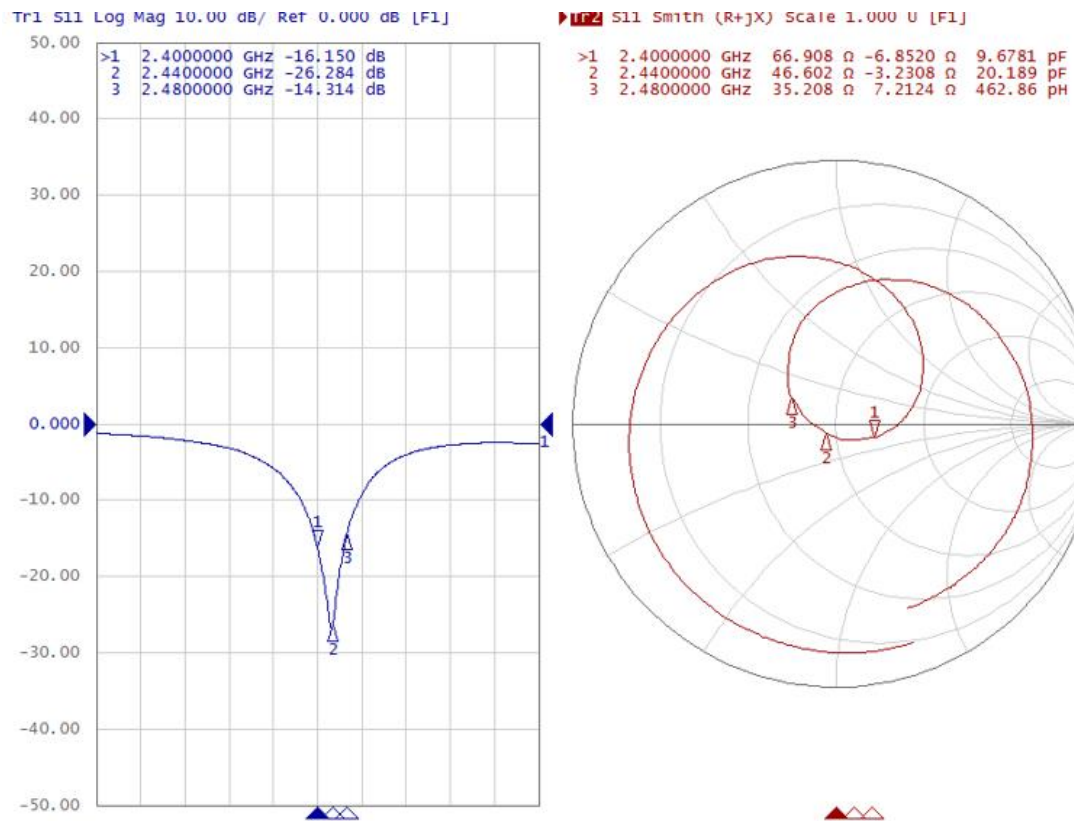
Antenna sample test environment



Antenna sample



Way2 antenna sample S11 & VSWR



Way2 antenna sample S11& Smith chart

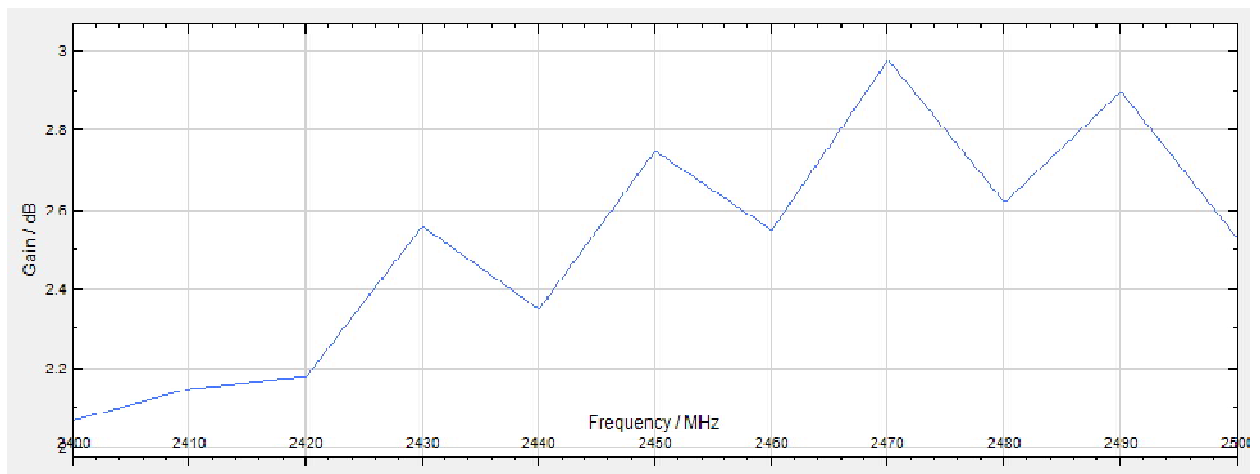
Way2 comparison of standing-wave ratio data

|          |       |       |       |
|----------|-------|-------|-------|
| Freq/GHz | 2.4   | 2.44  | 2.48  |
| S11/dB   | -16.7 | -28.8 | -14.4 |
| VSWR     | 1.34  | 1.07  | 1.47  |

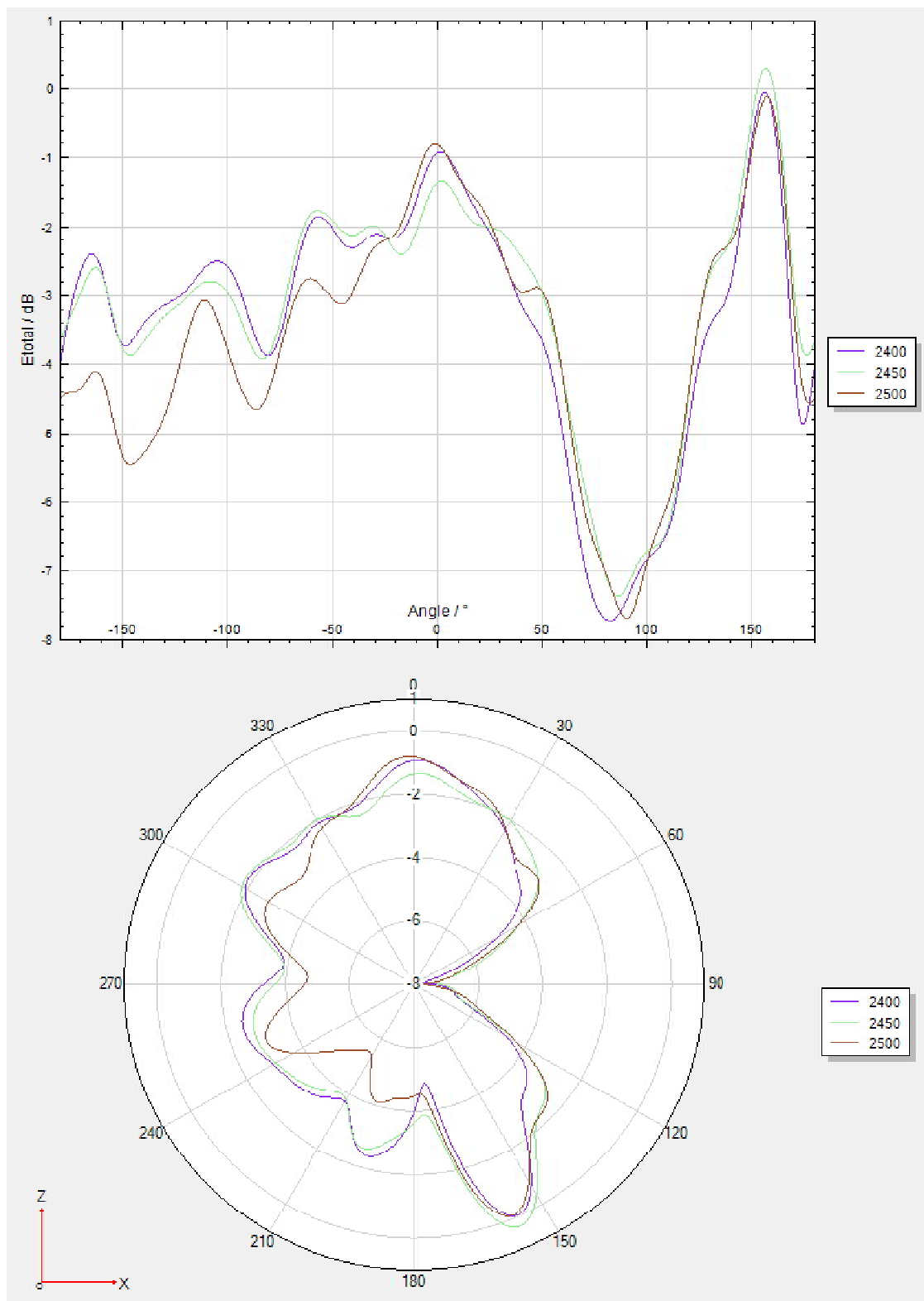
## 6. Test Result

This paper provides two methods for antenna debugging. In the cases, the antenna can have a better resonant bandwidth in the 2.4GHz band, which can meet the needs of Wi-Fi/BT communication.

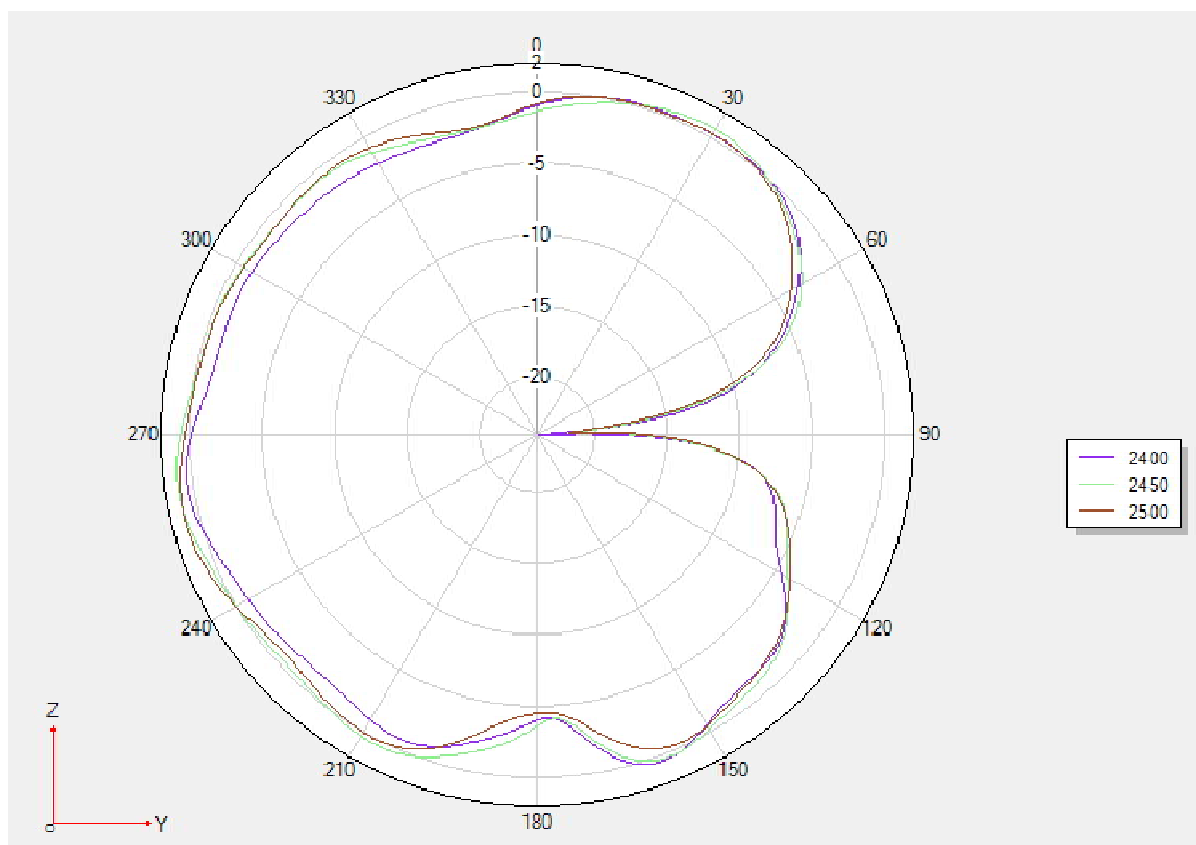
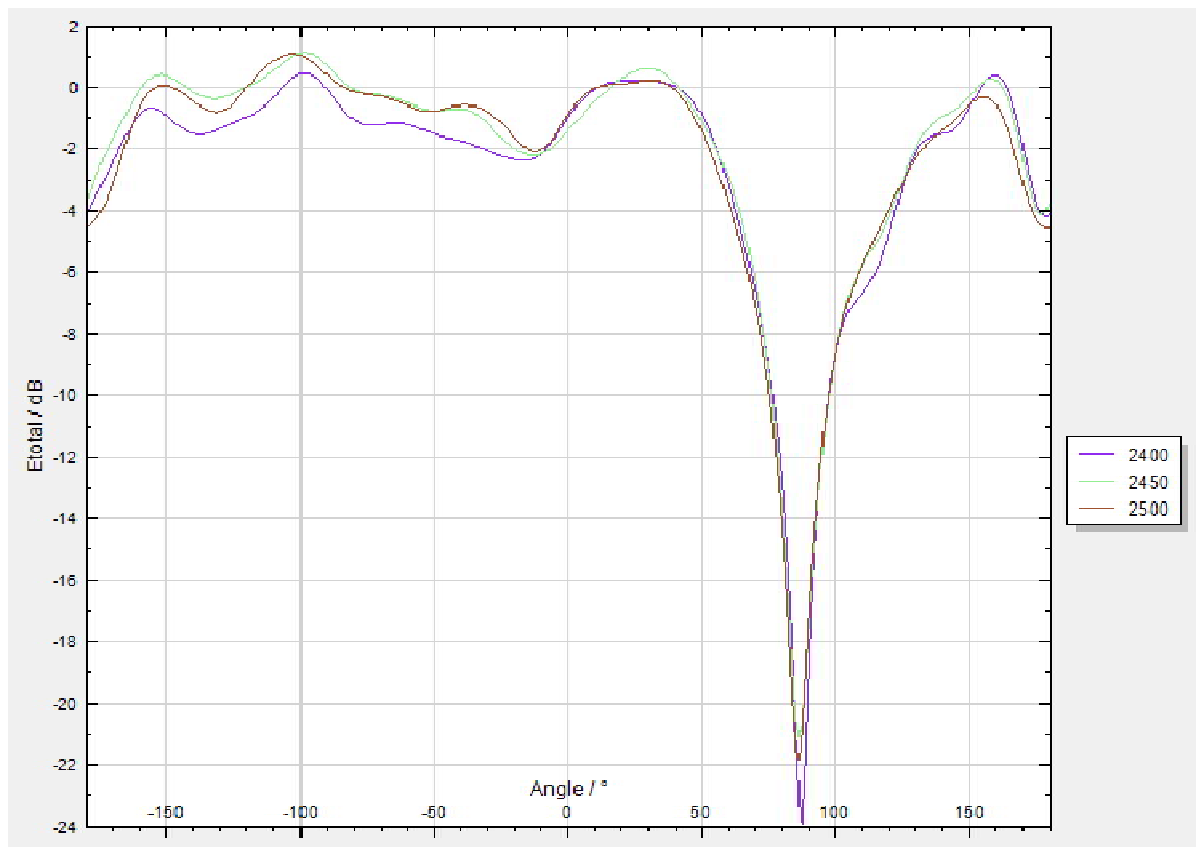
| Frequency / MHz | Peak Gain / dBi |
|-----------------|-----------------|
| 2400            | 2.07            |
| 2410            | 2.15            |
| 2420            | 2.18            |
| 2430            | 2.56            |
| 2440            | 2.35            |
| 2450            | 2.75            |
| 2460            | 2.55            |
| 2470            | 2.98            |
| 2480            | 2.62            |
| 2490            | 2.9             |
| 2500            | 2.53            |



| Frequency | MaxValue | MaxPositic | MinValue | MinPositio | BeamWidt | FrontBack | PatternRipple |
|-----------|----------|------------|----------|------------|----------|-----------|---------------|
| 2400      | -0.04    | 156        | -7.71    | 81         | 29       | 2.11      | 7.67          |
| 2450      | 0.31     | 157        | -7.36    | 86         | 39       | 2.55      | 7.67          |
| 2500      | -0.1     | 157        | -7.68    | 90         | 43       | 2.06      | 7.58          |



| Frequency | MaxValue | MaxPositic | MinValue | MinPositic | BeamWidt | FrontBackl | PatternRipple |
|-----------|----------|------------|----------|------------|----------|------------|---------------|
| 2400      | 0.48     | -99        | -23.9    | 87         | 228      | 14.73      | 24.38         |
| 2450      | 1.15     | -100       | -21.02   | 86         | 148      | 15.2       | 22.17         |
| 2500      | 1.1      | -104       | -21.79   | 86         | 148      | 11.9       | 22.89         |



| Frequency | MaxValue | MaxPositic | MinValue | MinPositio | BeamWidt | FrontBackl | PatternRipple |
|-----------|----------|------------|----------|------------|----------|------------|---------------|
| 2400      | 0.66     | 285        | -18.76   | 92         | 82       | 12         | 19.42         |
| 2450      | 1.22     | 282        | -18.84   | 94         | 85       | 15.23      | 20.06         |
| 2500      | 0.91     | 285        | -18.07   | 94         | 89       | 13.66      | 18.98         |

