

## 承認書

Customer 客 戶:

Product Name 品 名:

Dipole Antenna

Part Number 料 號:

HX-A07-WIFI

Customer 客戶料號:

Sample Delivery Date 送樣日期:

2024. 06. 11

| 客戶確認 |     |     | Supplier 供應廠商                       |     |
|------|-----|-----|-------------------------------------|-----|
| 工程部  | 品保部 | 採購部 | 核准                                  | 送樣人 |
|      |     |     | <div>趙<br/>2024.06.11<br/>守 剛</div> | 龚银明 |

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## Table of contents

|                                   |        |
|-----------------------------------|--------|
| 1. Cover -----                    | 1      |
| 2. Directory -----                | 2      |
| 3. Finished product drawing ----- | 3      |
| 4. Test report -----              | 4 ~ 10 |

## Index:

1. Reliability Testing
2. Specification
3. S Parameter Test Data
4. Antenna Radiation Pattern

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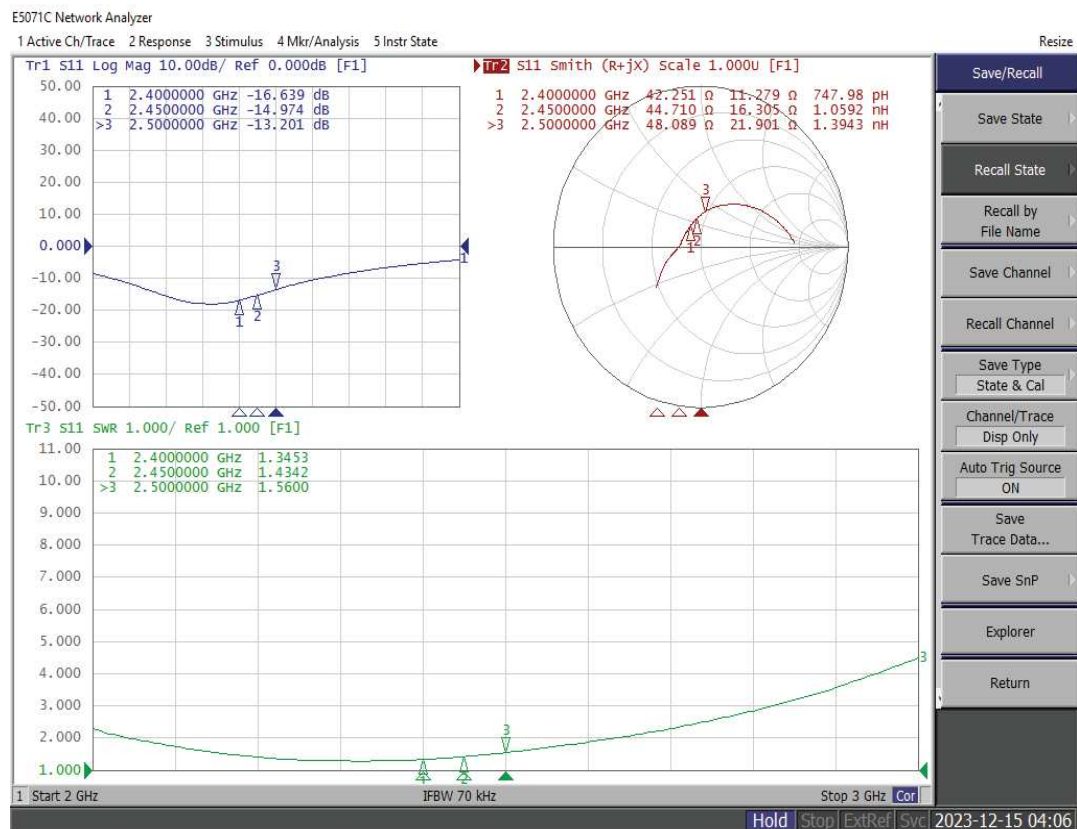
## 1. Reliability Testing

| Test Item                                | Procedure                                           | Requirement                                                                              |
|------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------|
| 1. Visual inspection and Dimension Check | Applicable methods using x5 magnification           | follow specification                                                                     |
| 2. Rapid Changing of Temperature         | -40°C (30minutes) to 80°C (30minutes);<br>24 cycles | After 2 hours recovery:<br>1. no visible damage<br>2. bandwidth tolerance<br>< $\pm 5\%$ |
| 3. Damp Heat                             | 24 hours at 60°C;<br>90 ~ 95% RH                    | After 2 hours recovery:<br>1. no visible damage<br>2. bandwidth tolerance<br>< $\pm 5\%$ |
| 4. Endurance                             | 24 hours at 80°C                                    | After 2 hours recovery:<br>1. no visible damage<br>2. bandwidth tolerance<br>< $\pm 5\%$ |
| 5. Connector Pull Strength Test          | $\geq 1.0$ Kg                                       | Hold 2~3S:<br>1. no visible damage<br>2. bandwidth tolerance<br>< $\pm 5\%$              |

## 2. Specification

| A. Electrical Characteristics |                        |
|-------------------------------|------------------------|
| S.W.R.( Tested in PC )        | <= 2.0 @ 2400~2500 MHz |
| Typical Antenna Gain          | 5dBi                   |
| Impedance                     | 50 Ohm                 |
| B. Material                   |                        |
| Material of Radiator          | CU                     |
|                               |                        |
| C. Environmental              |                        |
| Operation Temperature         | - 30 °C ~ + 85 °C      |
| Storage Temperature           | - 30 °C ~ + 85 °C      |

## 3. S.W.R. Testing Result



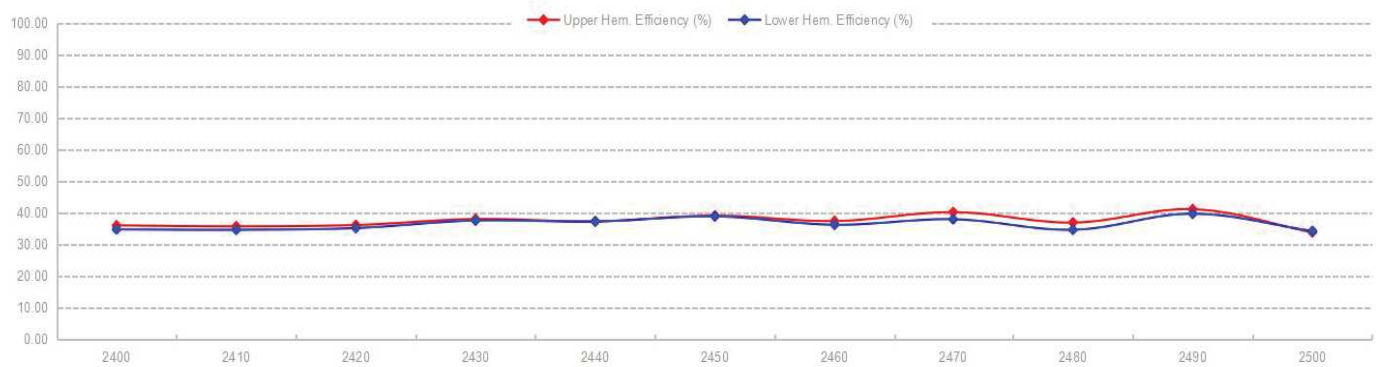
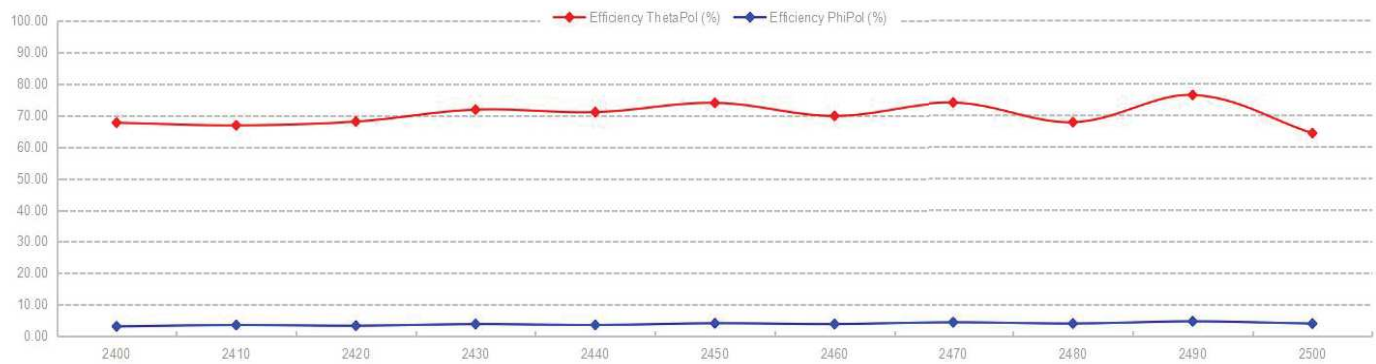
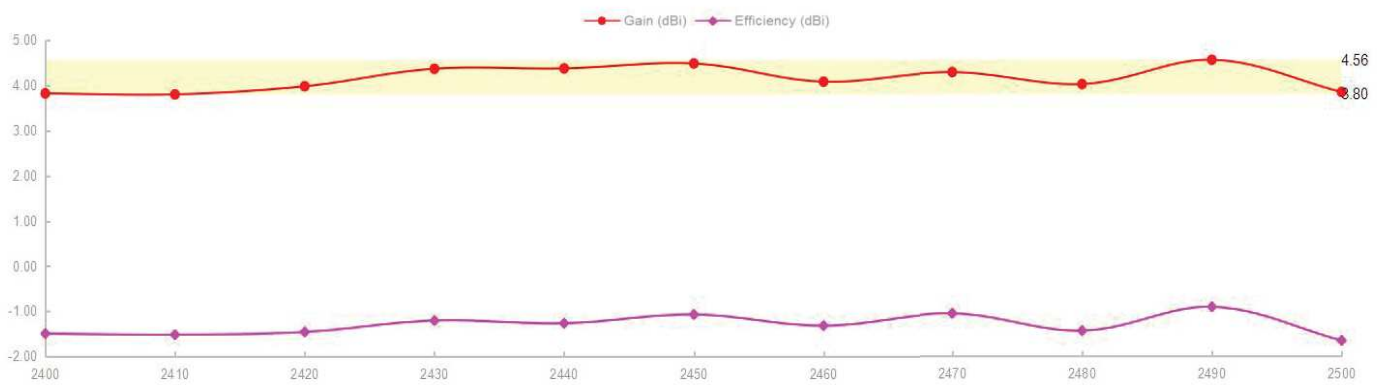
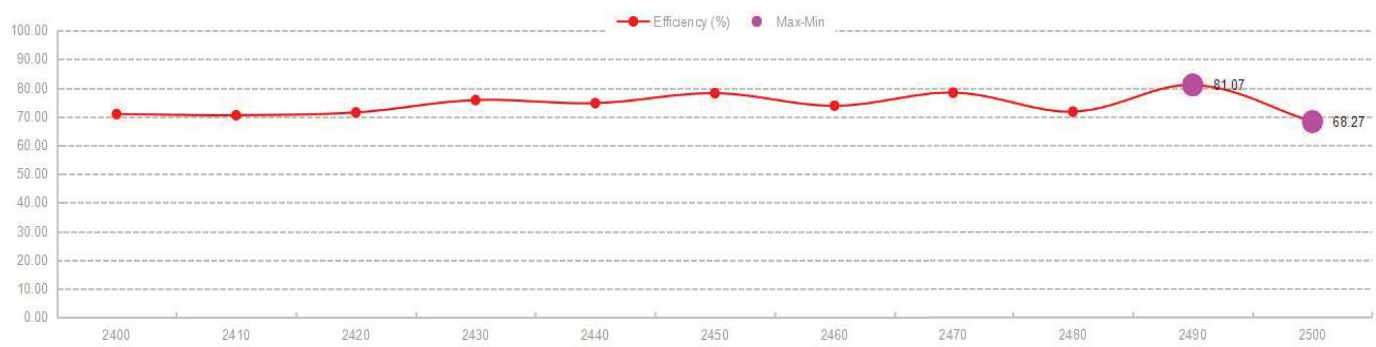


## 东莞亨松电子

| Frequency ID               | 1     | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11    |
|----------------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| Frequency (MHz)            | 2400  | 2410   | 2420   | 2430   | 2440   | 2450   | 2460   | 2470   | 2480   | 2490   | 2500  |
| Efficiency (dBi)           | -1.49 | -1.52  | -1.46  | -1.20  | -1.26  | -1.07  | -1.32  | -1.06  | -1.44  | -0.91  | -1.66 |
| Gain (dBi)                 | 3.83  | 3.80   | 3.98   | 4.37   | 4.38   | 4.49   | 4.09   | 4.29   | 4.02   | 4.56   | 3.85  |
| Efficiency (%)             | 70.94 | 70.55  | 71.52  | 75.81  | 74.77  | 78.20  | 73.85  | 78.39  | 71.77  | 81.07  | 68.27 |
| Directivity (dB)           | 5.32  | 5.32   | 5.44   | 5.58   | 5.64   | 5.56   | 5.40   | 5.35   | 5.46   | 5.47   | 5.51  |
| Peak Gain Position (Theta) | 94.00 | 96.00  | 96.00  | 97.00  | 97.00  | 98.00  | 98.00  | 85.00  | 85.00  | 86.00  | 96.00 |
| Peak Gain Position (Phi)   | 30.00 | 300.00 | 300.00 | 300.00 | 300.00 | 300.00 | 300.00 | 240.00 | 240.00 | 240.00 | 30.00 |
| Efficiency ThetaPol (%)    | 67.84 | 67.01  | 68.20  | 71.97  | 71.20  | 74.11  | 70.00  | 73.98  | 67.76  | 76.37  | 64.28 |
| Efficiency PhiPol (%)      | 3.10  | 3.54   | 3.32   | 3.84   | 3.57   | 4.08   | 3.85   | 4.41   | 4.01   | 4.70   | 3.99  |
| Upper Hem. Efficiency (%)  | 36.10 | 35.83  | 36.24  | 38.14  | 37.42  | 39.23  | 37.51  | 40.33  | 37.02  | 41.25  | 33.93 |
| Lower Hem. Efficiency (%)  | 34.84 | 34.72  | 35.28  | 37.67  | 37.35  | 38.96  | 35.34  | 38.06  | 34.75  | 39.82  | 34.35 |

| T90(H)圆度                   | 1.14   | 1.25   | 1.26   | 1.19   | 1.20   | 1.29   | 1.41   | 1.63   | 1.67   | 1.71   | 1.69   |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Gain 15deg (dBi)           |        |        |        |        |        |        |        |        |        |        |        |
| E1(XZ)波瓣宽度                 | 35.00  | 33.00  | 32.00  | 28.00  | 29.00  | 33.00  | 35.00  | 37.00  | 26.00  | 25.00  | 32.00  |
| E1(XZ)前后比                  | 12.63  | 11.51  | 10.91  | 10.28  | 10.22  | 10.00  | 9.84   | 9.45   | 9.22   | 8.90   | 8.39   |
| E2(YZ)波瓣宽度                 | 32.00  | 30.00  | 28.00  | 27.00  | 28.00  | 30.00  | 35.00  | 35.00  | 34.00  | 32.00  | 31.00  |
| E2(YZ)前后比                  | 8.41   | 8.12   | 7.88   | 7.59   | 7.24   | 6.91   | 5.47   | 6.01   | 5.76   | 5.78   | 5.83   |
| 最大增益处轴比(P)                 | 17.61  | 27.92  | 32.76  | 21.87  | 21.79  | 19.54  | 25.76  | 45.03  | 36.24  | 33.25  | 22.41  |
| 顶点(Theta=0)处轴比(P)          | 14.52  | 16.73  | 14.04  | 15.62  | 15.82  | 16.58  | 15.77  | 17.95  | 17.59  | 14.99  | 11.58  |
| 仰角10度最差(大)轴比(P)            | 60.91  | 71.14  | 60.25  | 56.26  | 61.55  | 58.17  | 60.24  | 62.43  | 56.98  | 69.53  | 64.04  |
| Hc(XY)波瓣宽度                 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 | 360.00 |
| Hc(XY)前后比                  | 0.06   | 0.07   | 0.09   | 0.11   | 0.10   | 0.05   | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
| 左旋圆极化效率(%)                 | 41.72  | 41.89  | 41.88  | 45.05  | 43.88  | 46.22  | 43.15  | 45.96  | 41.46  | 47.16  | 38.78  |
| 右旋圆极化效率(%)                 | 29.22  | 28.65  | 29.64  | 30.76  | 30.89  | 31.97  | 30.70  | 32.43  | 30.31  | 33.91  | 29.49  |
| 最大增益处交极比(+/-45极化)          | 0.51   | 8.48   | 7.48   | 7.98   | 8.36   | 10.36  | 11.05  | 1.44   | 1.46   | 0.99   | 0.97   |
| 最大增益处交极比(水平垂直极化)           | 17.38  | 6.81   | 7.81   | 7.03   | 6.69   | 4.95   | 4.88   | 21.66  | 21.41  | 24.28  | 20.51  |
| T60度Phi一圈最差交极比(+/-45极化)    | 0.00   | 0.00   | 0.02   | 0.01   | 0.00   | 0.01   | 0.00   | 0.01   | 0.03   | 0.04   | 0.00   |
| T60度Phi一圈最差交极比(水平垂直极化)     | 4.92   | 5.08   | 6.76   | 7.60   | 7.98   | 7.03   | 6.63   | 6.06   | 5.75   | 5.52   | 5.77   |
| T90度(H)Phi一圈最差交极比(+/-45极化) | 0.00   | 0.00   | 0.01   | 0.01   | 0.02   | 0.03   | 0.01   | 0.00   | 0.00   | 0.02   | 0.02   |
| T90度(H)Phi一圈最差交极比(水平垂直极化)  | 7.40   | 7.60   | 8.47   | 7.84   | 6.74   | 5.41   | 5.39   | 5.99   | 6.82   | 6.75   | 6.23   |
| 轴对称天线主瓣下倾角度(平均值)           | 1.12   | 1.00   | 0.31   | -0.81  | -2.35  | -2.44  | -0.56  | -0.19  | 0.24   | -0.56  | -1.18  |
| 轴向(Z+)水平垂直极化隔离度            | 13.59  | 14.43  | 11.04  | 9.76   | 9.27   | 9.12   | 8.54   | 8.22   | 8.52   | 8.29   | 7.58   |
| Theta85.0一周最大增益            | 3.83   | 3.80   | 3.98   | 4.37   | 4.38   | 4.49   | 4.09   | 4.29   | 4.02   | 4.56   | 3.85   |
| Theta85.0一周圆度(为最大最小增益差)    | 7.79   | 7.85   | 8.55   | 9.51   | 10.06  | 10.03  | 9.69   | 9.50   | 9.80   | 10.26  | 10.63  |

Empty



## 4. Antenna Radiation Pattern

### Testing Equipment Specification:

Antenna Anechoic Chamber Dimension: 8 x 4 x 4 m

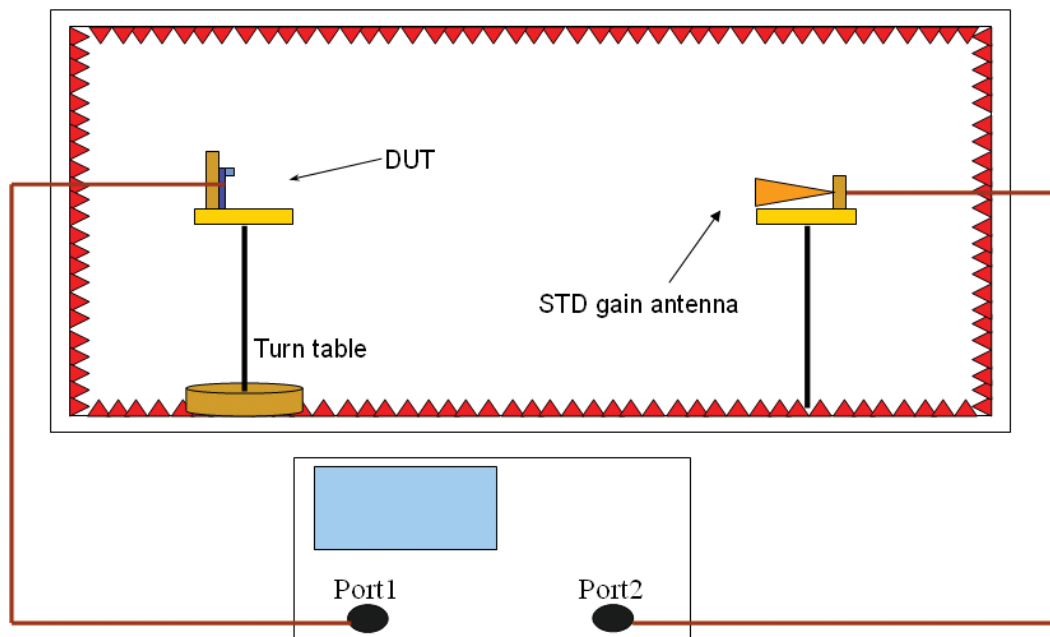
Quiet Zone: 600mm @1 GHz

Isolation: >100dB @ 1 MHz ~ 10 GHz

Testing Equipment: Agilent 5071B

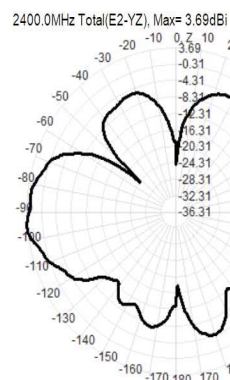
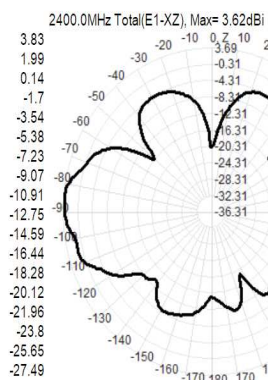
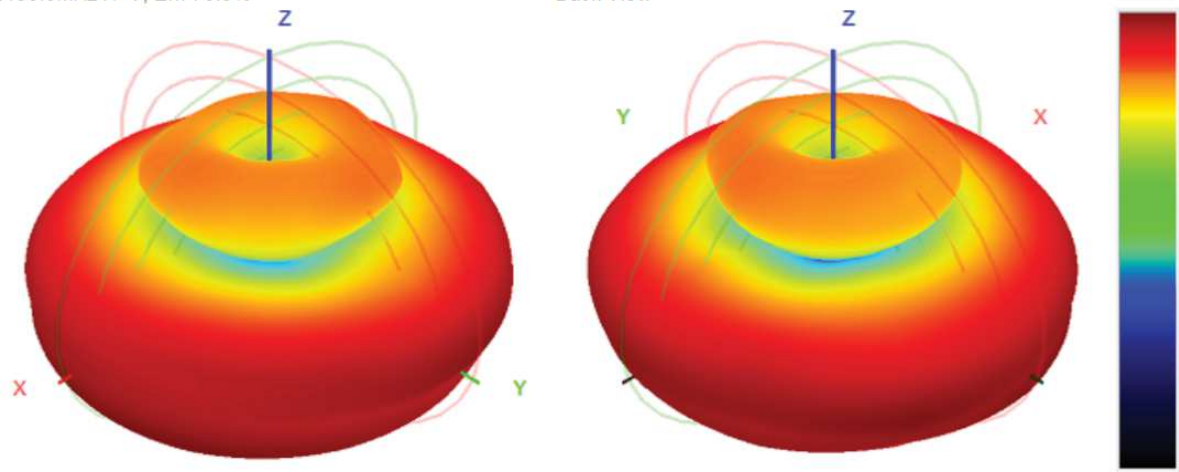
Received Antenna: 0.7 ~ 6.0 GHz for Gain Calibration

Double Ridged Horn Antenna

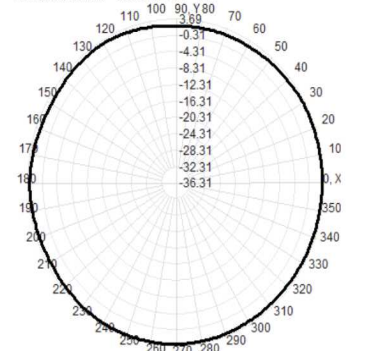


2400.0MHz H+V, Eff: 70.9%

Back View

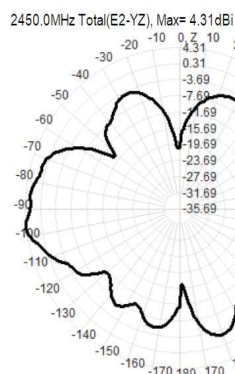
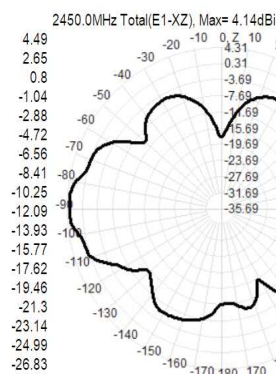
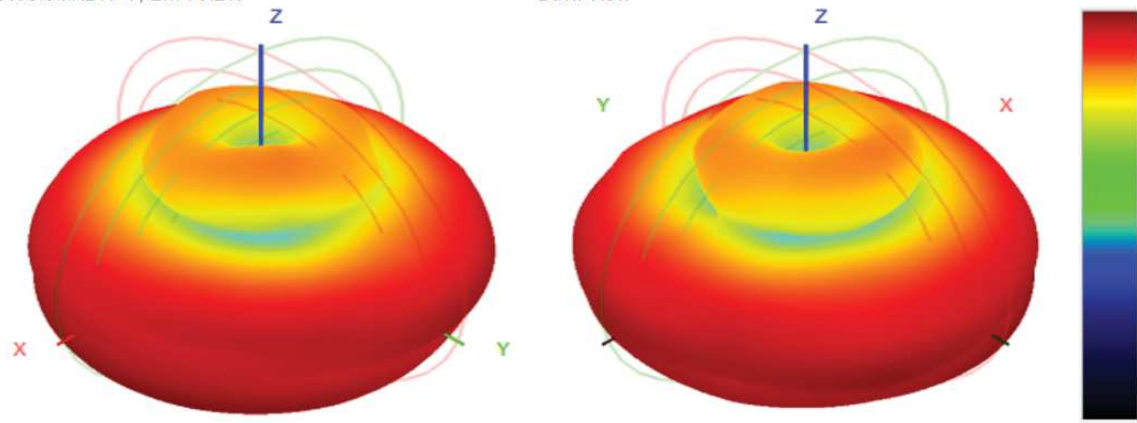


Total(H-XY), Max= 3.07dBi, CirD=1.14

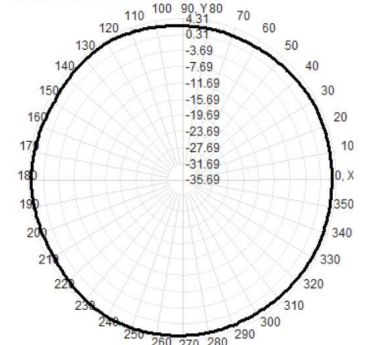


2450.0MHz H+V, Eff: 78.2%

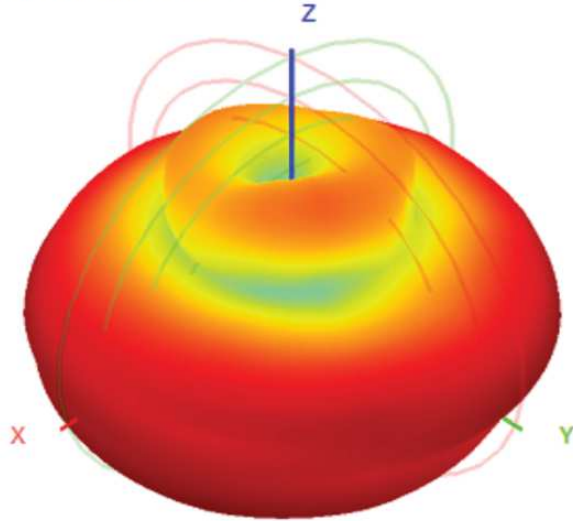
Back View



Total(H-XY), Max= 3.55dBi, CirD=1.29



2500.0MHz H+V, Eff: 68.3%



Back View

