
PCB Antenna testreport

Document Information			
Title		PCB Antenna testreport	
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Reversion History

Revision	Description	Approved	Date
V1.0	Initial Release	George He	2018 1031
V1.1	Change PCB Antenna shape and retest	Sherman Xie	20200824

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1 Overview

1.1 Test prepare

Use module and take away the matching circuit Then soldering the RF cable at the antenna feed point and ground the cable as close to the feed as possible.

1.2 Test goal

Test PCB antenna with full test item, including antenna efficiency, gain and direction diagram.

Sample No.	Test software
1	Dtm. hex
2	Dtm. hex

2 Test Item

Test item	Test content	notice
Antenna Efficiency	To testantenna efficiency ofdifferent frequency	
Antenna Gain	To testantenna gain of different frequency	
Direction Diagram	To testtheAntenna patternofdifferent frequency	

3 Test Equipment

Equipment type	Equipment model	Last calibrationdate	Calibrationdue date
Network Analyzer	ZND7	2020.8.1	2020.9.1
Network Analyzer detector	Feitu24	2020.8.1	2020.9.1
OTA testsystem		2020.8.1	2020.9.1

4 Test data

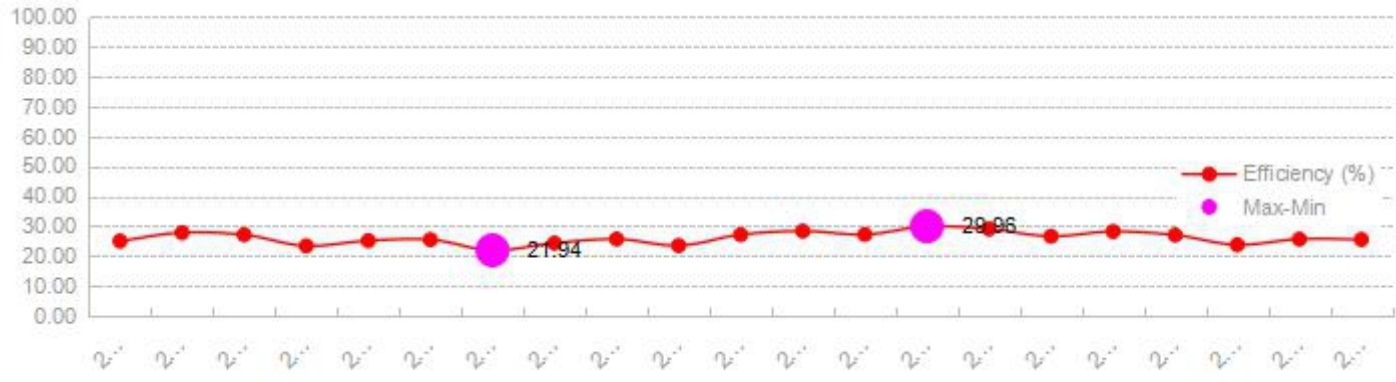
4.1 Antenna efficiency

Use the OTA test system to test the antenna efficiency of different frequency. The result is as below:

Frequency (MHz)	2400.0	2405.0	2410.0	2415.0	2420.0	2425.0	2430.0
Efficiency (%)	25.02	27.84	27.11	23.42	25.16	25.50	21.94

Frequency (MHz)	2435.0	2440.0	2445.0	2450.0	2455.0	2460.0	2465.0
Efficiency (%)	24.33	25.69	23.52	27.16	28.37	27.22	29.96

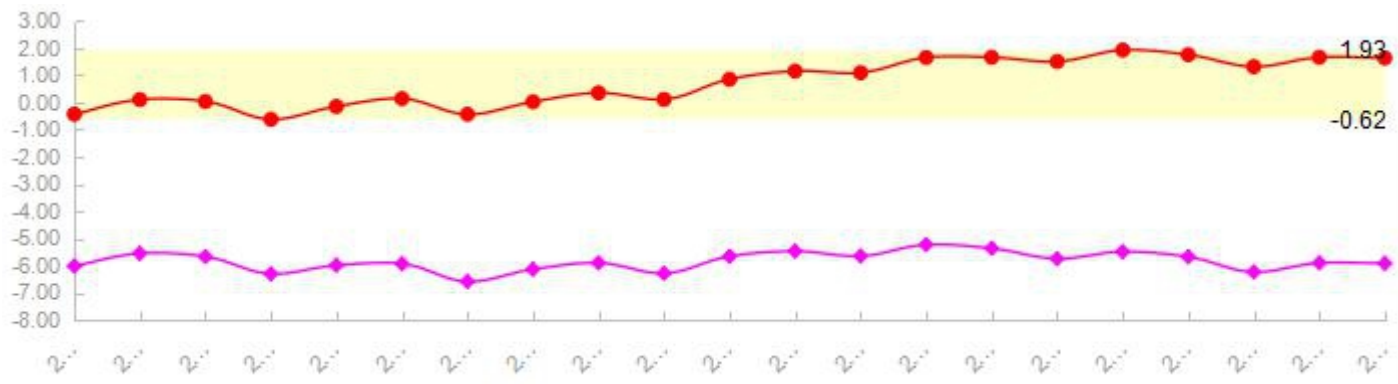
Frequency (MHz)	2470.0	2475.0	2480.0	2485.0	2490.0	2495.0	2500.0
Efficiency (%)	29.05	26.64	28.24	27.03	23.77	25.68	25.57



4.2 Antenna Gain

Use the OTA test system to test the antenna gain of different frequency. The result is as below:

Frequency (MHz)	2400.0	2405.0	2410.0	2415.0	2420.0	2425.0	2430.0
Efficiency (%)	-0.43	0.11	0.03	-0.62	-0.15	0.14	-0.44
Frequency (MHz)	2435.0	2440.0	2445.0	2450.0	2455.0	2460.0	2465.0
Efficiency (%)	0.02	0.35	0.11	0.85	1.15	1.09	1.65
Frequency (MHz)	2470.0	2475.0	2480.0	2485.0	2490.0	2495.0	2500.0
Efficiency (%)	1.66	1.50	1.93	1.76	1.32	1.66	1.64



4.3 Antenna pattern

The antenna direction is as follow figure:

Size: 17.4×13.7×1.9 mm

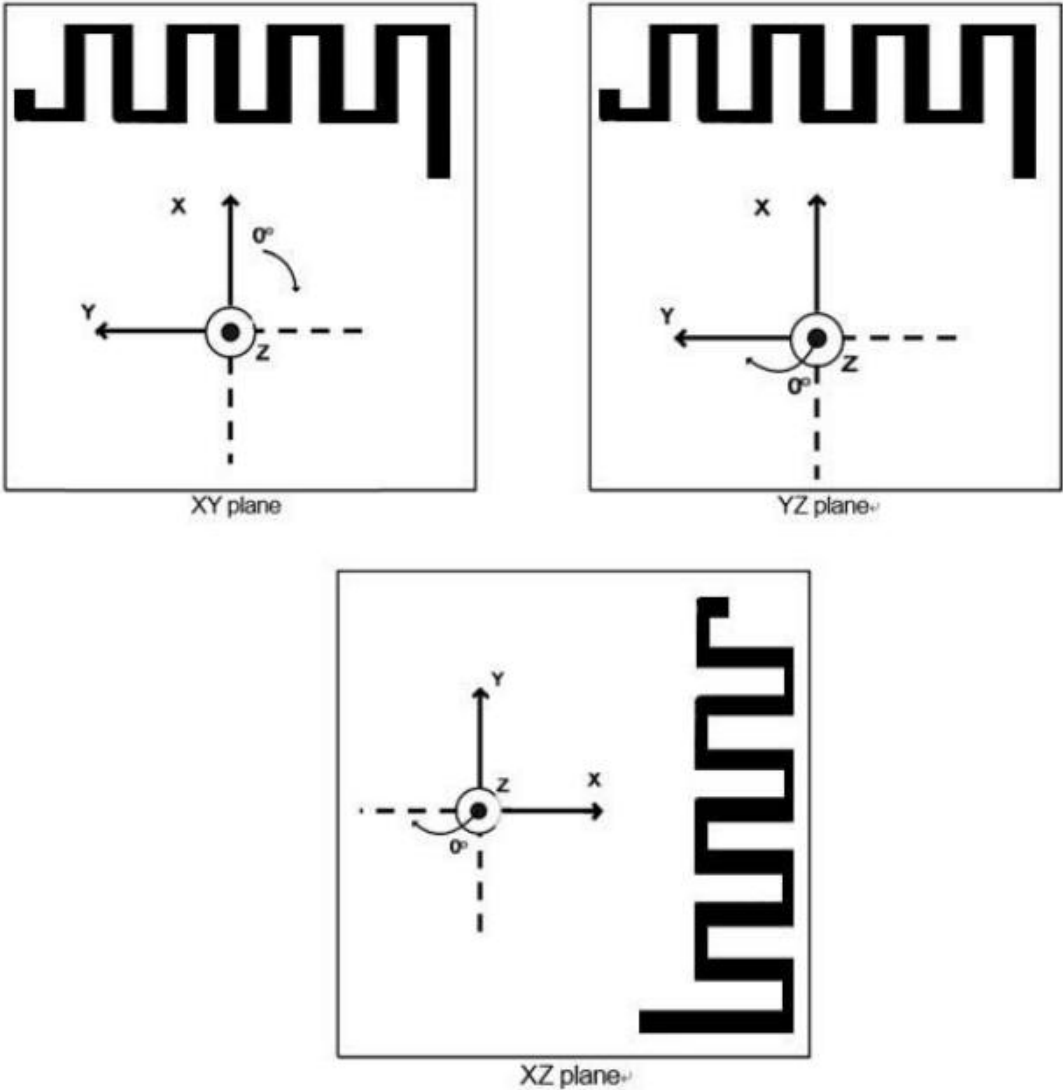
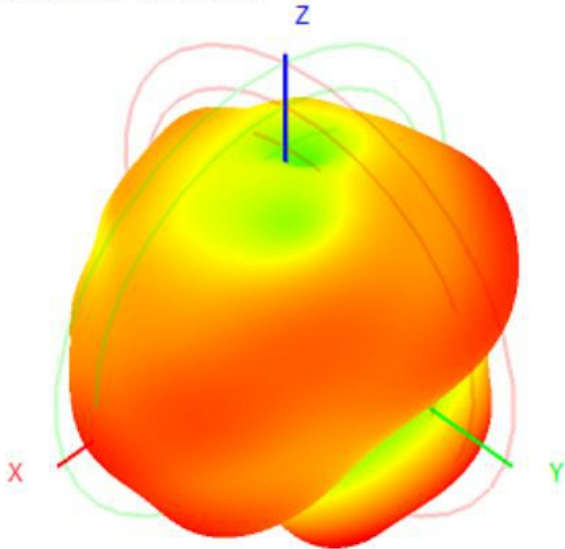


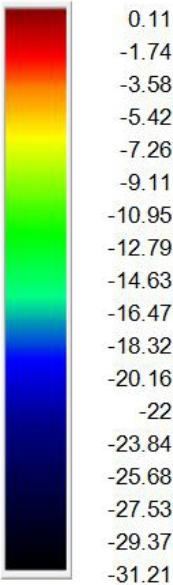
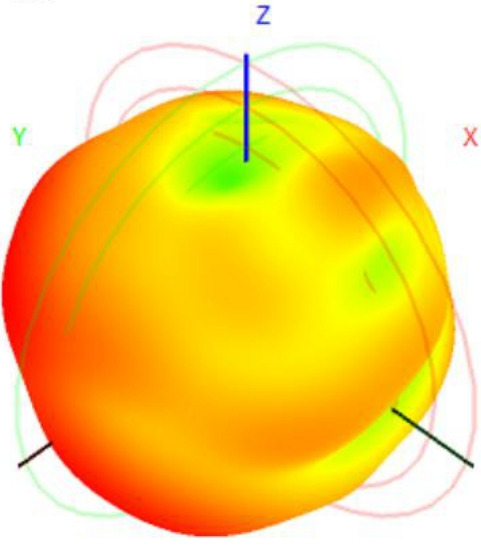
Figure 5: How to Relate the Antenna to the Radiation Patterns

3-D directiondiagram@2405MHz:

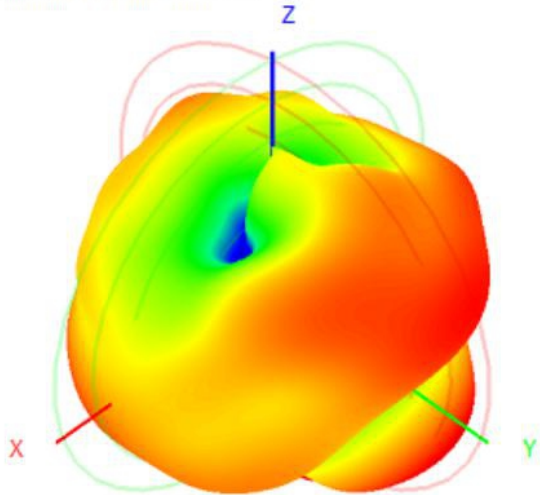
2405.0MHz H+V, Eff: 27.8%



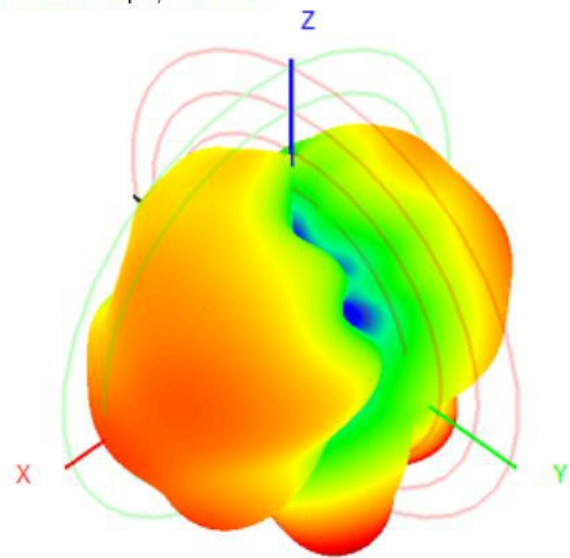
Back View



2405.0MHz Hpol, Eff: 16.9%

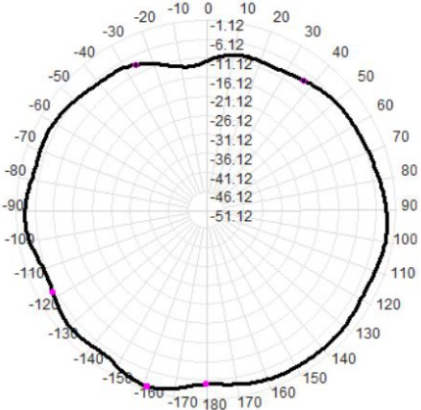


2405.0MHz Vpol, Eff: 10.9%

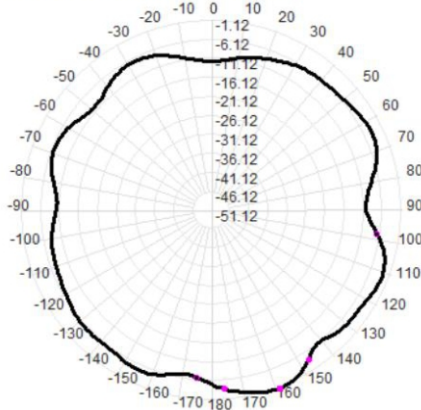


2-D directiondiagram @2405MHz:

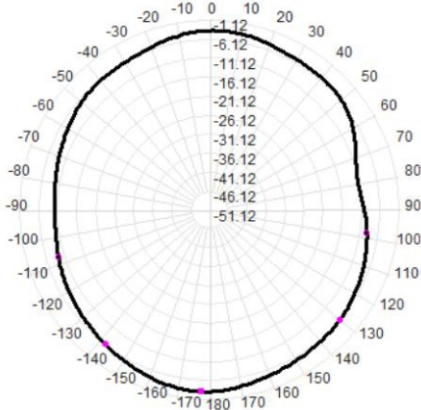
2405.0MHz Total(E1-XZ), Max= -2.44dBi



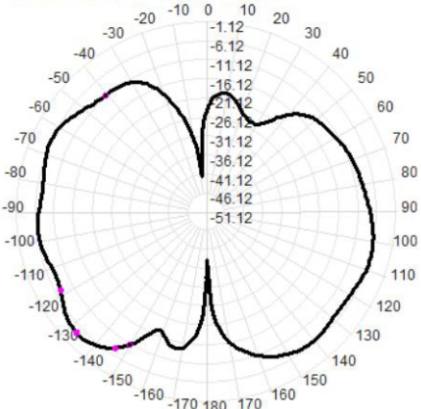
2405.0MHz Total(E2-YZ), Max= -1.12dBi



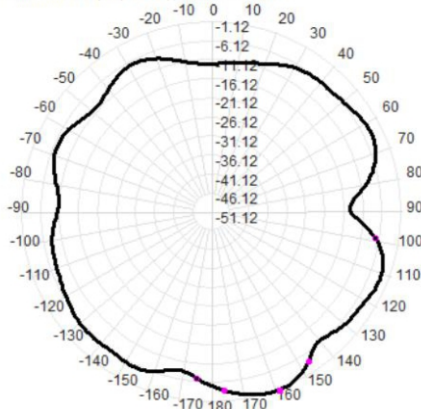
Total(H-XY), Max= -3.51dBi, CirD=8.03



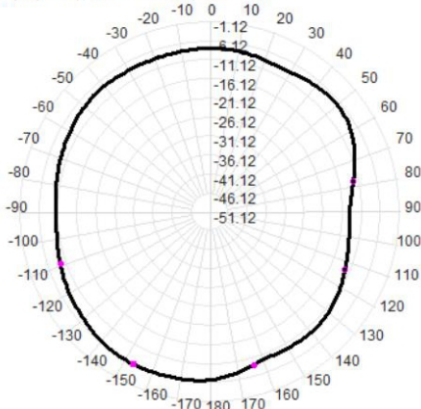
2405.0MHz Hpol(E1-XZ), Max= -4.65dBi



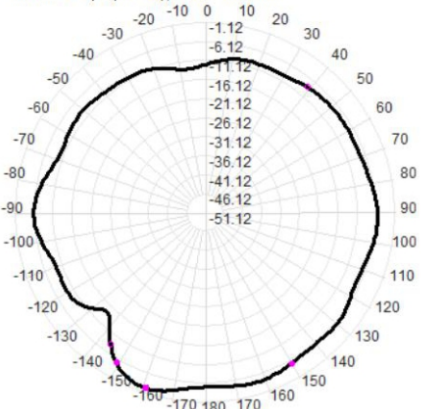
2405.0MHz Hpol(E2-YZ), Max= -1.19dBi



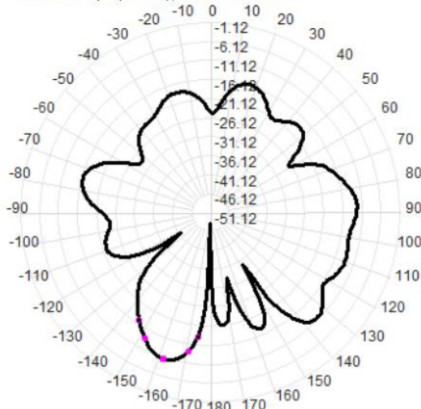
Hpol(H-XY), Max= -6.54dBi, CirD=7.94



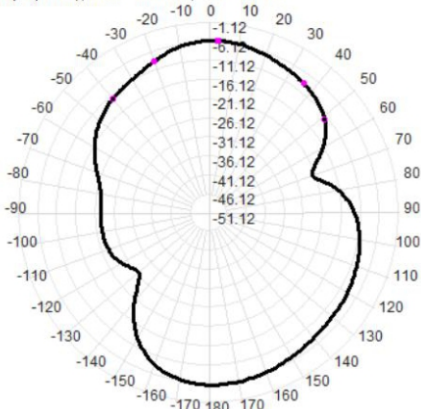
2405.0MHz Vpol(E1-XZ), Max= -2.60dBi



2405.0MHz Vpol(E2-YZ), Max= -10.97dBi

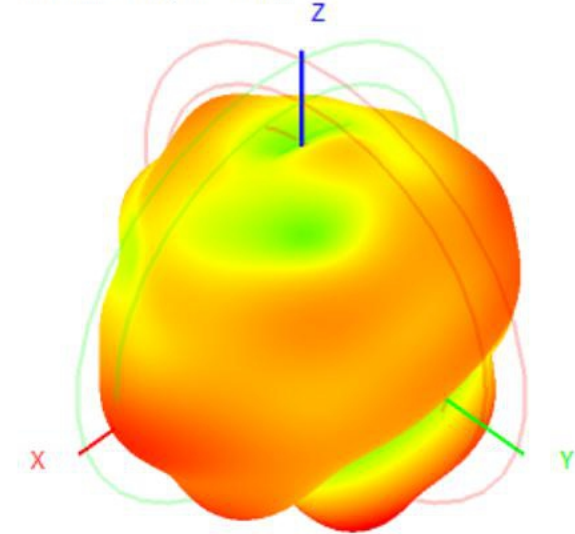


Vpol(H-XY), Max= -5.91dBi, CirD=21.11

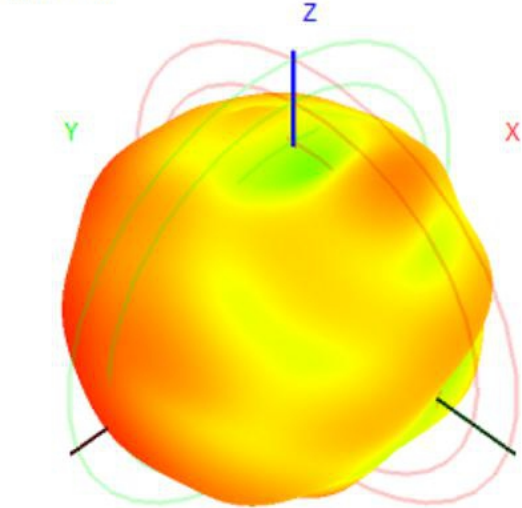


3-D directiondiagram@2445MHz:

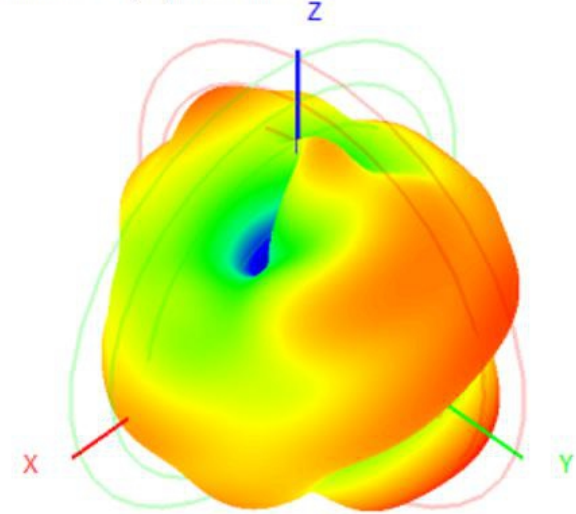
2445.0MHz H+V, Eff: 23.5%



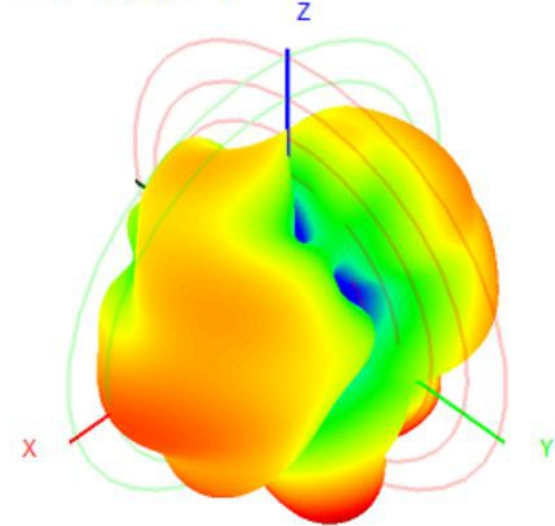
Back View



2445.0MHz Hpol, Eff: 14.4%

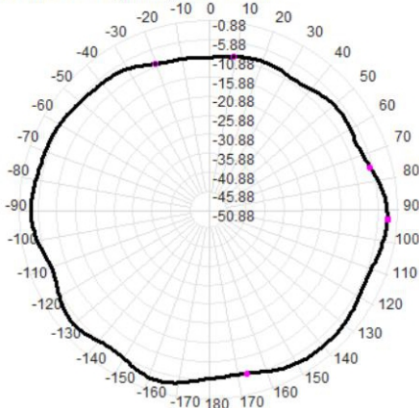


2445.0MHz Vpol, Eff: 9.1%

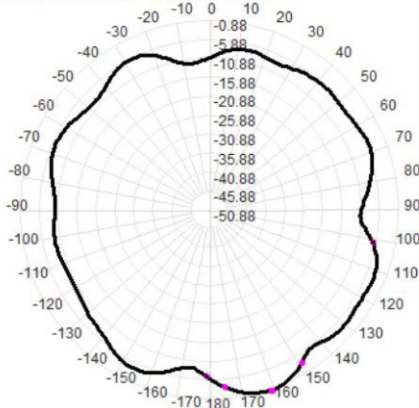


2-D directiondiagram @2445MHz:

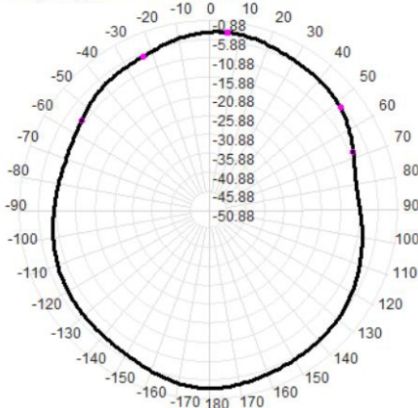
2445.0MHz Total(E1-XZ), Max=-3.89dBi



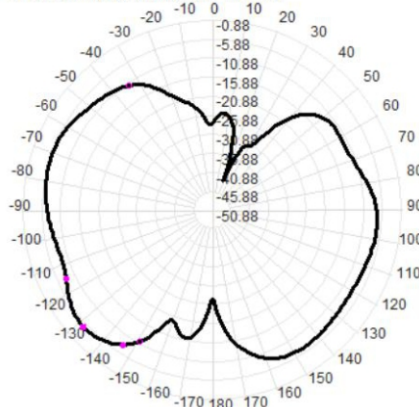
2445.0MHz Total(E2-YZ), Max=-0.88dBi



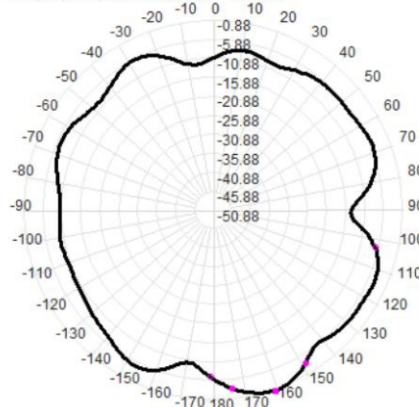
Total(H-XY), Max=-3.84dBi, CirD=7.72



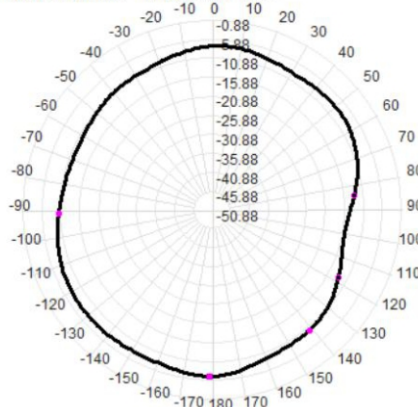
2445.0MHz Hpol(E1-XZ), Max=-5.23dBi



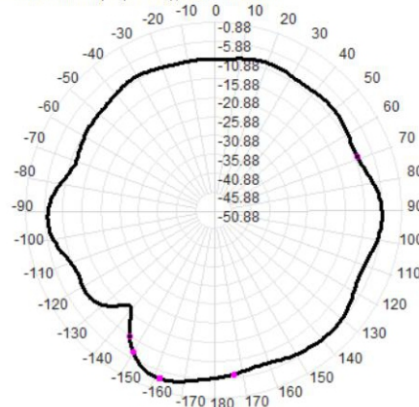
2445.0MHz Hpol(E2-YZ), Max=-0.90dBi



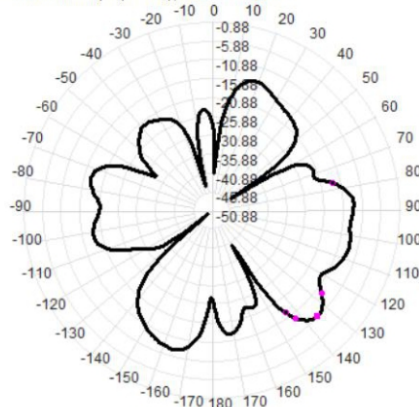
Hpol(H-XY), Max=-7.32dBi, CirD=8.32



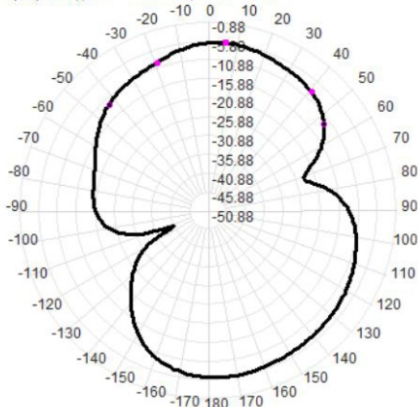
2445.0MHz Vpol(E1-XZ), Max=-4.32dBi



2445.0MHz Vpol(E2-YZ), Max=-11.56dBi

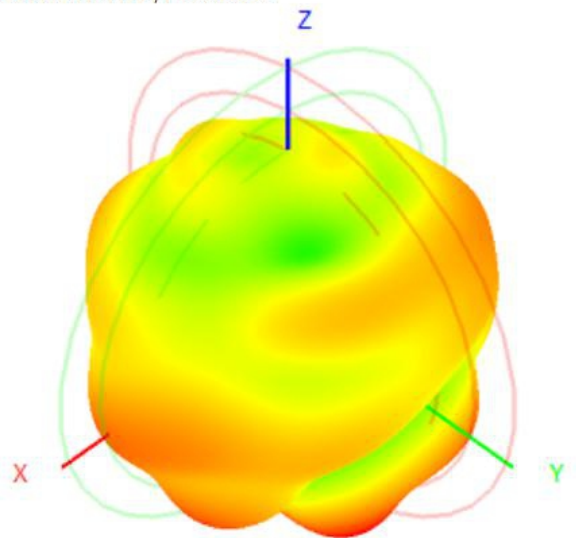


Vpol(H-XY), Max=-6.22dBi, CirD=34.90

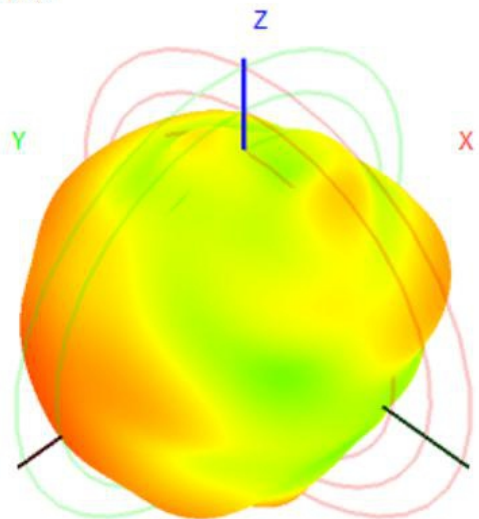


3-D directiondiagram@2480MHz:

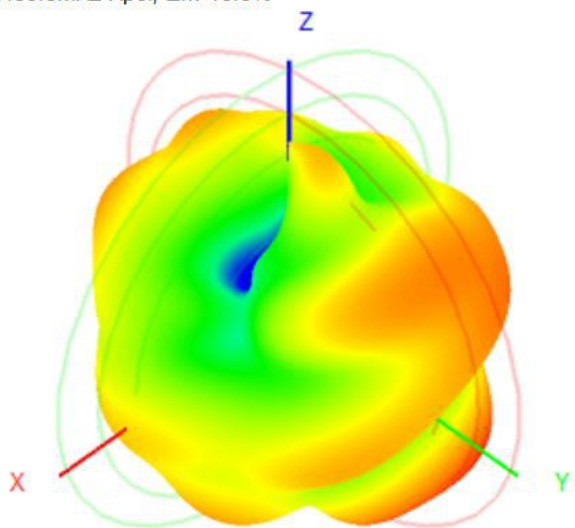
2480.0MHz H+V, Eff: 28.2%



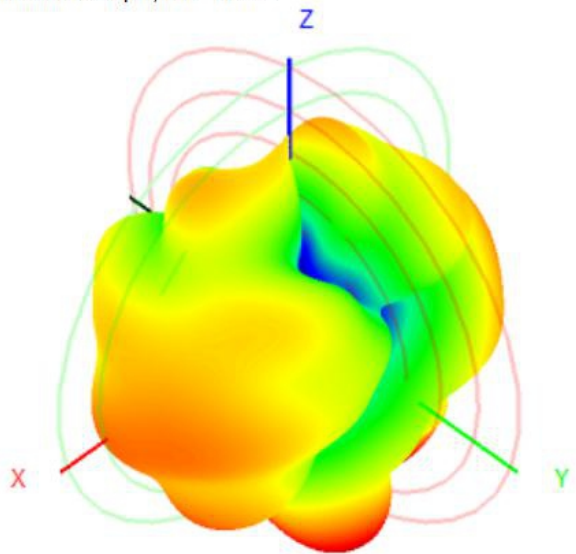
Back View



2480.0MHz Hpol, Eff: 16.8%

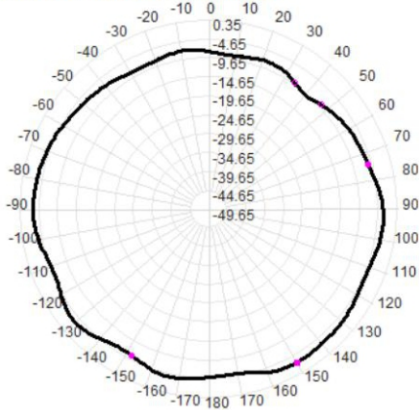


2480.0MHz Vpol, Eff: 11.5%

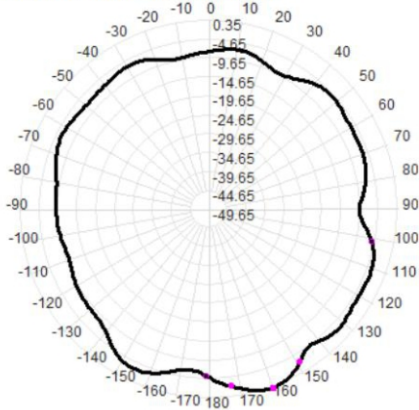


2-D directiondiagram @2480MHz:

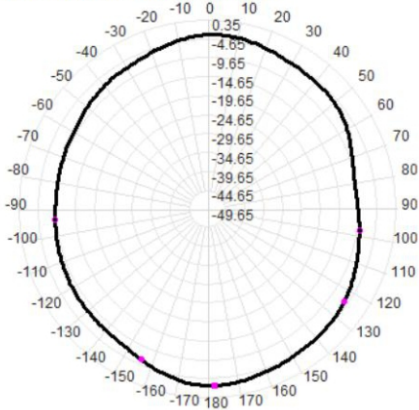
2480.0MHz Total(E1-XZ), Max= -3.02dBi



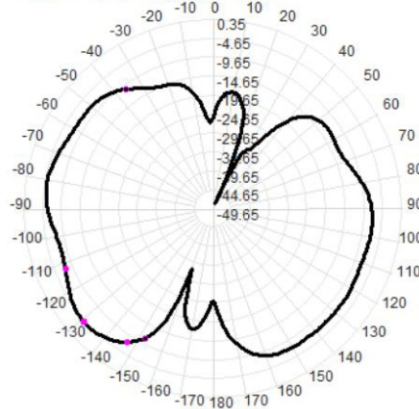
2480.0MHz Total(E2-YZ), Max= 0.35dBi



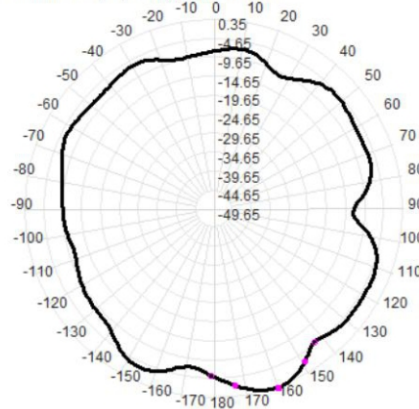
Total(H+XY), Max= -3.20dBi, CirD=7.10



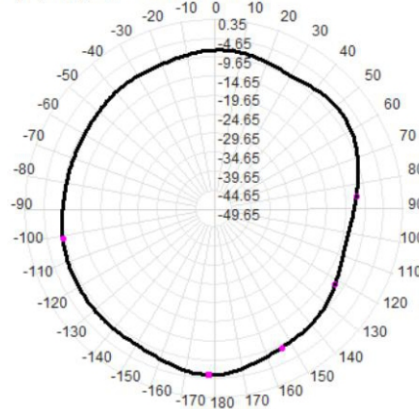
2480.0MHz Hpol(E1-XZ), Max= -4.52dBi



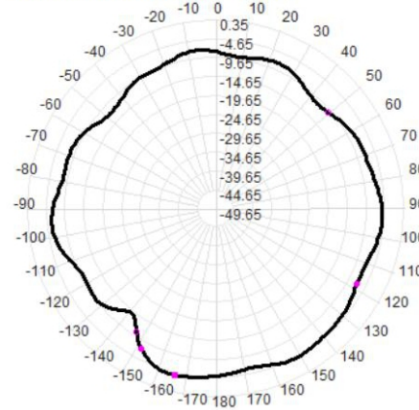
2480.0MHz Hpol(E2-YZ), Max= 0.30dBi



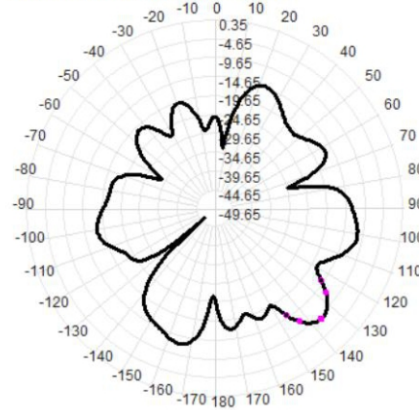
Hpol(H+XY), Max= -5.99dBi, CirD=7.79



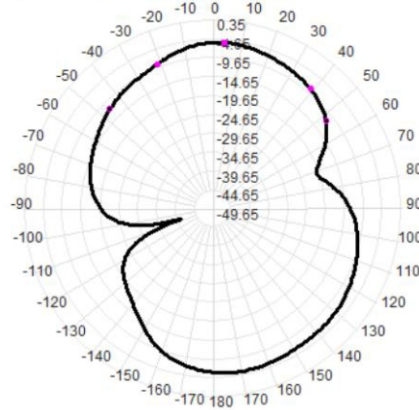
2480.0MHz Vpol(E1-XZ), Max= -4.40dBi



2480.0MHz Vpol(E2-YZ), Max= -9.23dBi



Vpol(H+XY), Max= -5.61dBi, CirD=35.24



5 Conclusion

The max gain is 2dB, the max efficiency is 30%, the antenna pattern is basically stable. It meets PCB antenna design.

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