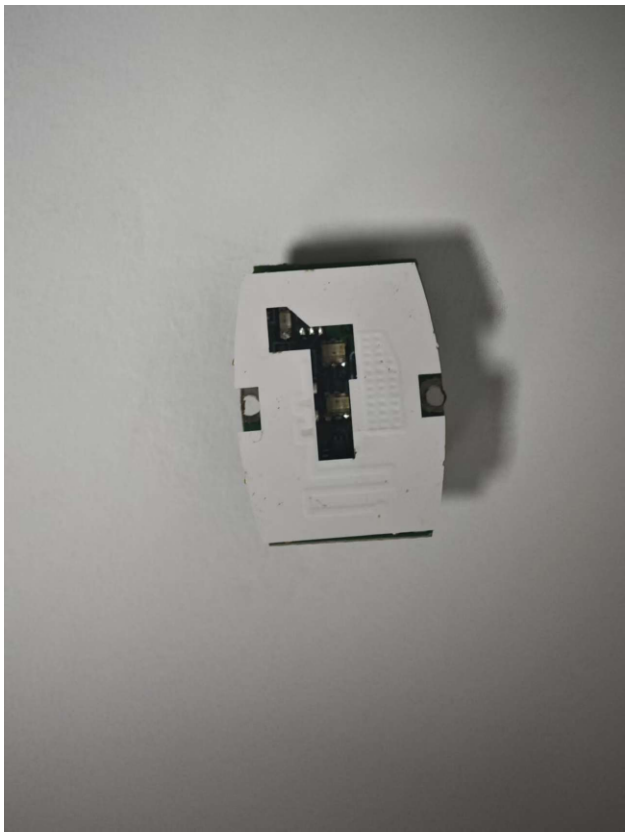


1 概述 /Overview

1.1 测试准备 / Test prepare

使用 FPC 天线，在天线馈点焊接信号线。
Use an FPC antenna and solder the signal wire at the antenna feed point.



1.2 测试目的 / Test goal

对 FPC 天线的天线性能进行全面测试，包括 天线效率，增益，方向图等 。
Conduct a comprehensive test on the performance of the FPC antenna, including antenna efficiency, gain, radiation pattern, etc.

样品编号 SampleNo.	样品型号 Sample module	测试软件版本 Testsoftware
1	LU-13B-TX	simpleBlePeripheral.hex
2	LU-13B-TX	simpleBlePeripheral.hex

深圳碧科科技有限公司

Shenzhen Beikoi

2 测试项目 TestItem

测试项目 Testitem	测试内容 Testcontent	备注 notice
天线效率 AntennaEfficiency	测试各个频点下的天线效率 Totestantennaefficiencyofdifferentsfrequency	
天线增益 AntennaGain	测试各个频点下的天线增益 Totestantennagainofdifferentsfrequency	
方向图 DirectionDiagram	测试各个频点下天线的立体方向图 TotesttheAntennapatternofdifferentsfrequency	

3 测试设备 TestEquipment

仪器设备名称 Equipmenttype	型号 Equipmentmodel	上次校准日期 Lastcalibrationdate	校准到期日期 Calibrationduedate
网络分析仪 NetworkAnalyzer	ZND7	2023.8.1	2024.9.1
网分探头 NetworkAnalyzer detector	飞图 24 Feitu24	2023.8.1	2024.9.1
OTA 测试系统 OTAtestsystem		2023.8.1	2024.9.1

深圳碧科科技有限公司

Shenzhen Beikoi

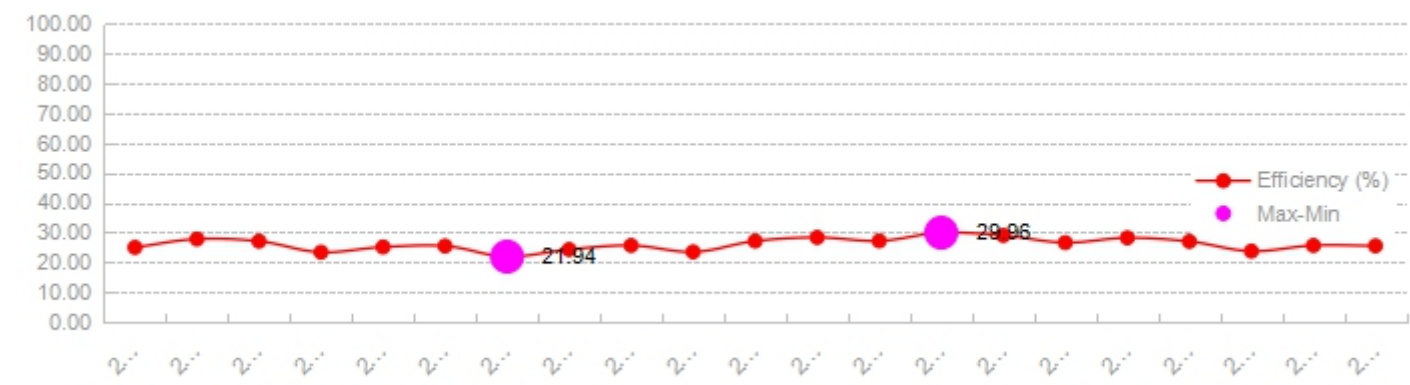
4 测试数据 Testdata

4.1 天线效率 Antennaefficiency

在暗室中，使用 OTA 测试系统测试天线在各个频点的效率，测得结果如下：

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



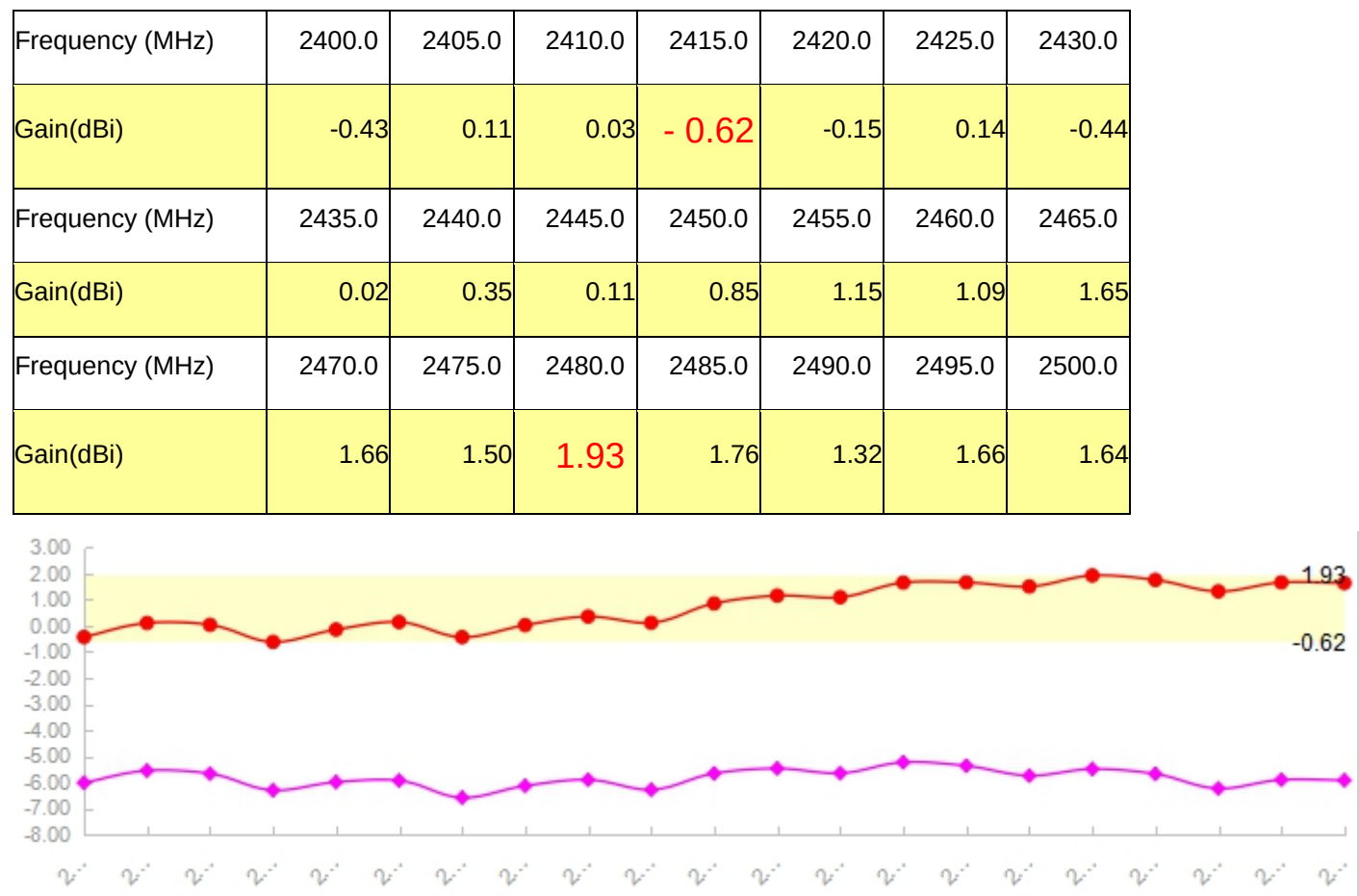
深圳碧科科技有限公司

Shenzhen Beikoi

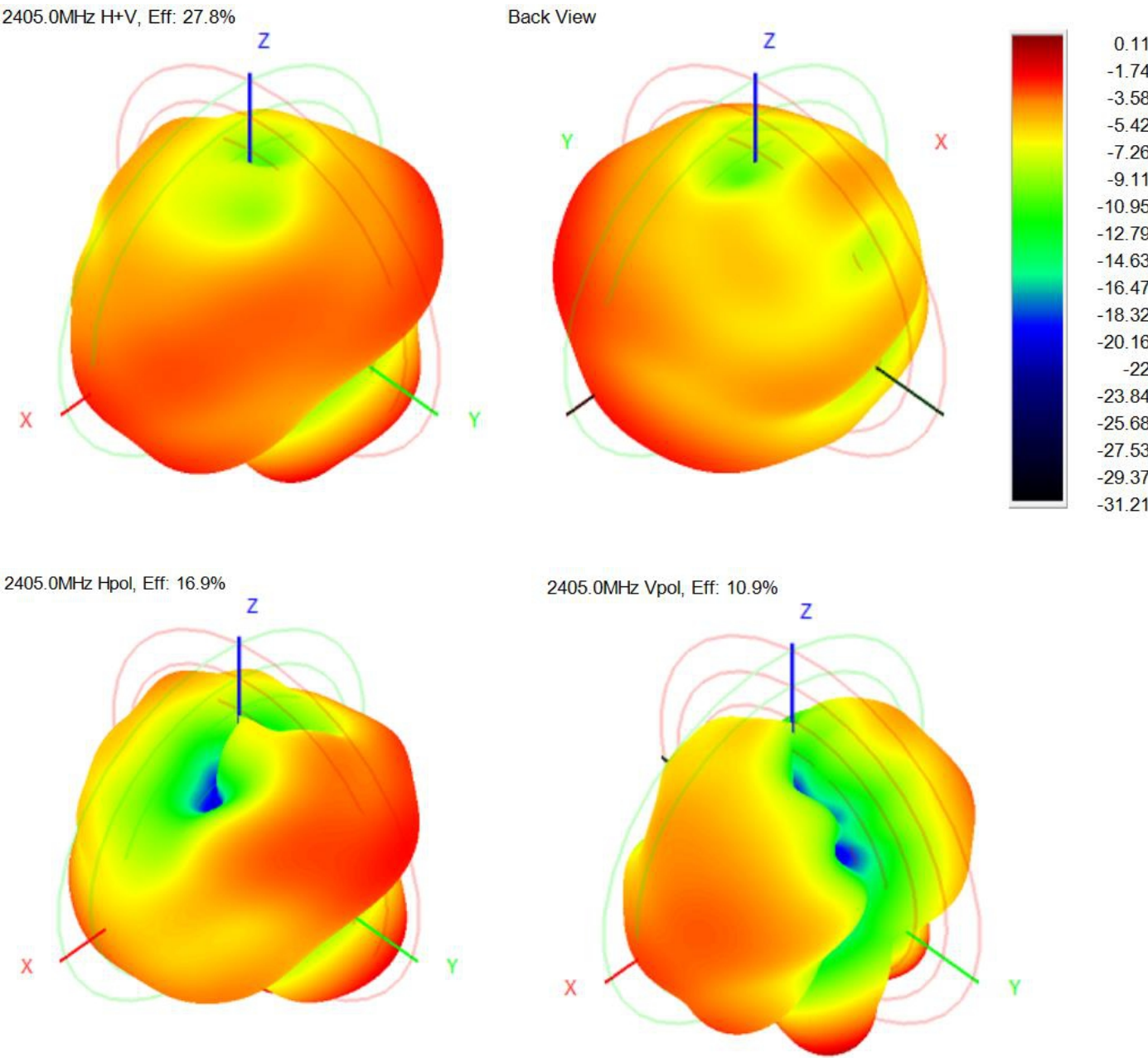
4.2 天线增益 AntennaGain

在暗室中，使用 OTA 测试系统测试天线在各个频点的效率，测得结果如下。

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



立体方向图 3-Ddirectiondiagram@2405MHz:

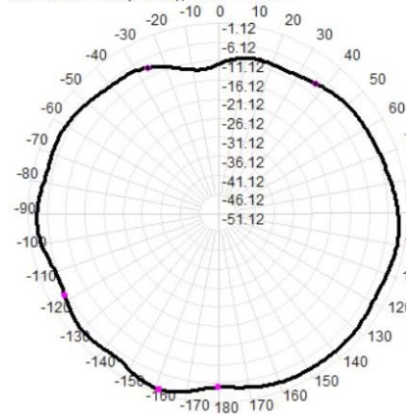


深圳碧科科技有限公司

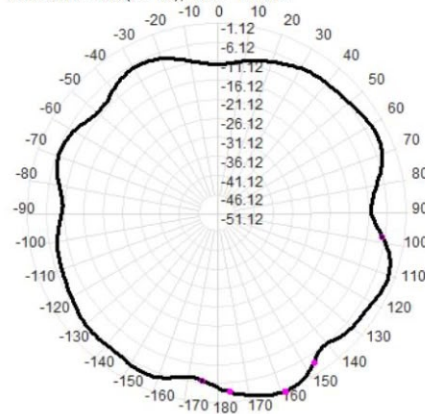
Shenzhen Beikoi

平面方向图 2-D direction diagram @2405MHz:

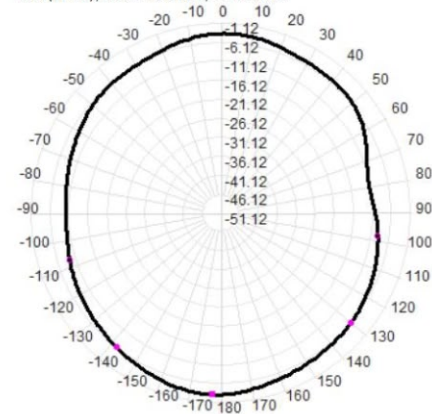
2405.0MHz Total(E1-XZ), Max= -2.44dBi



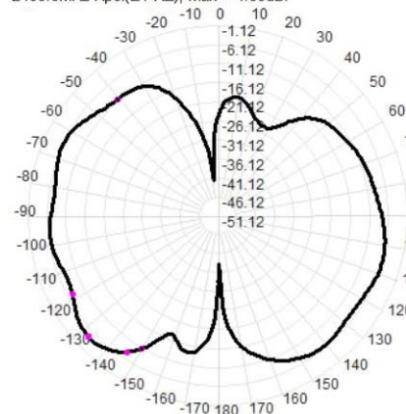
2405.0MHz Total(E2-YZ), Max= -1.12dBi



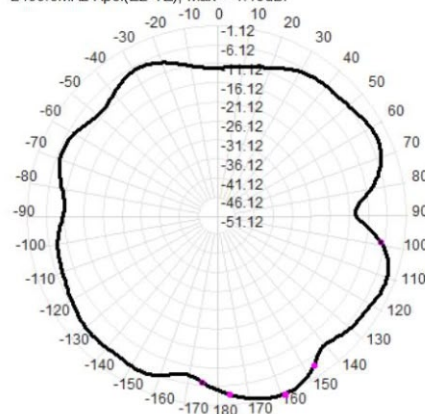
Total(H-XY), Max= -3.51dBi, CirD=8.03



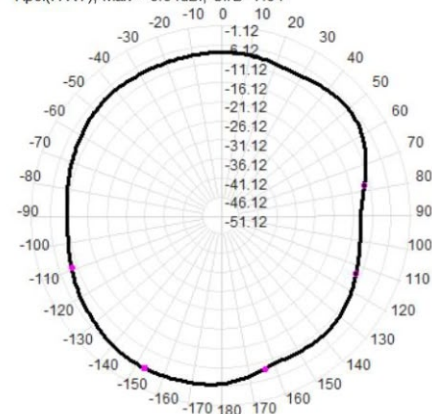
2405.0MHz Hpol(E1-XZ), Max= -4.65dBi



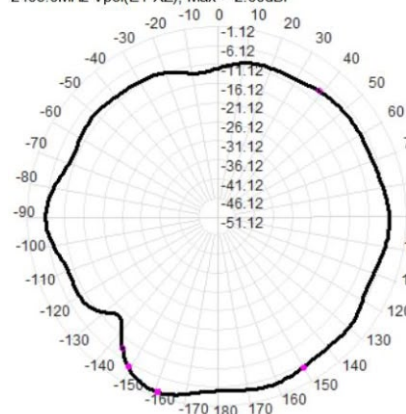
2405.0MHz Hpol(E2-YZ), Max= -1.19dBi



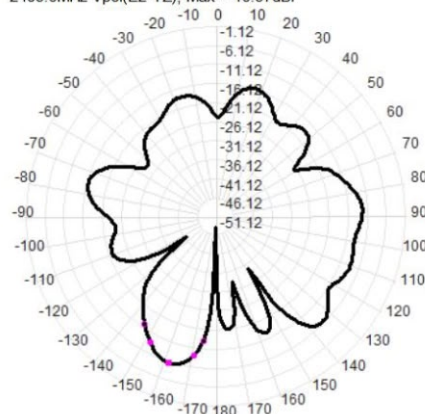
Hpol(H-XY), Max= -6.54dBi, CirD=7.94



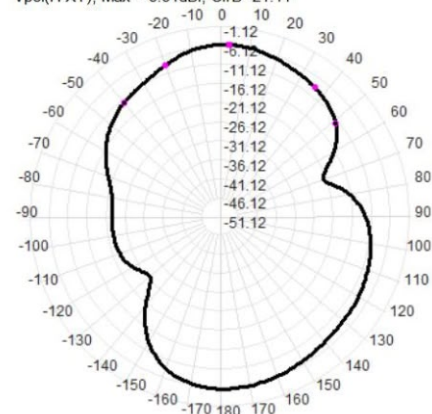
2405.0MHz Vpol(E1-XZ), Max= -2.60dBi



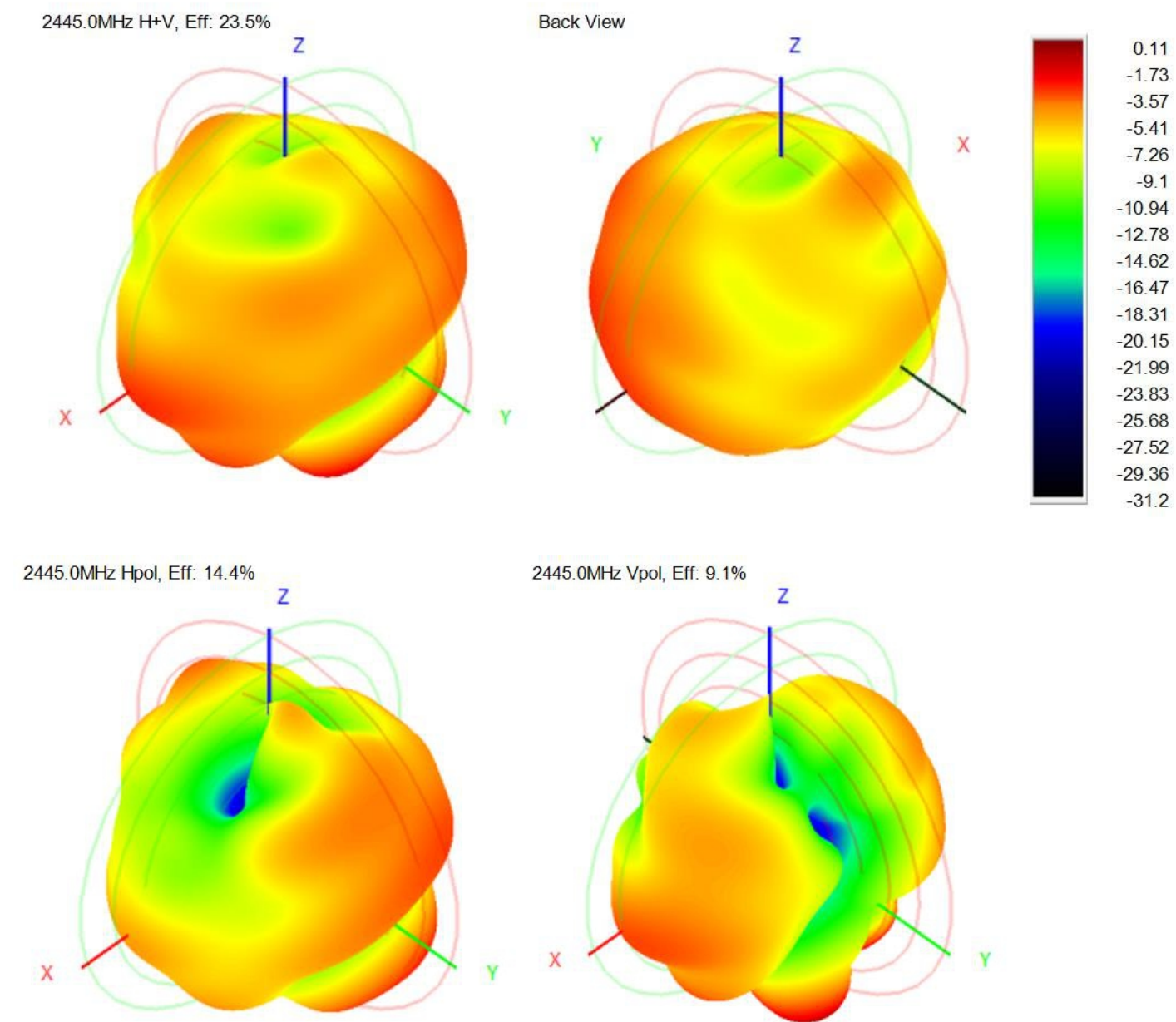
2405.0MHz Vpol(E2-YZ), Max= -10.97dBi



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



立体方向图 3-D directiondiagram@2445MHz:

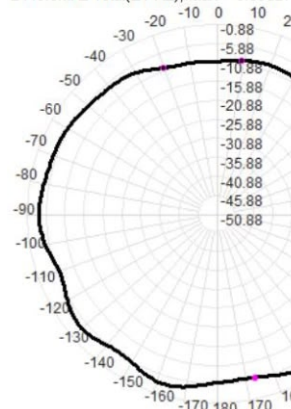


深圳碧科科技有限公司

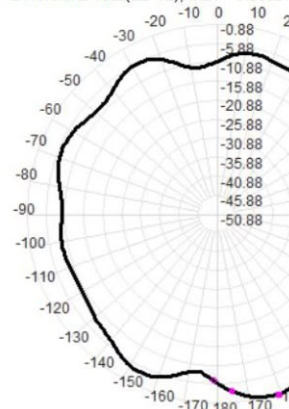
Shenzhen Beikoi

平面方向图 2-D direction diagram @2445MHz:

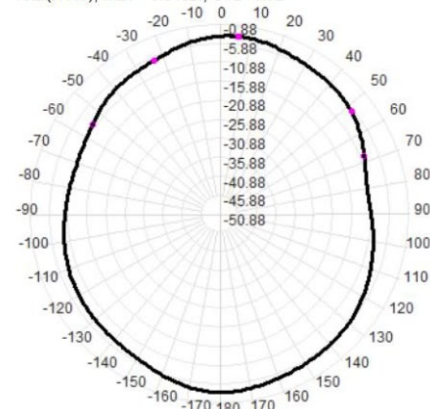
2445.0MHz Total(E1-XZ), Max= -3.89dBi



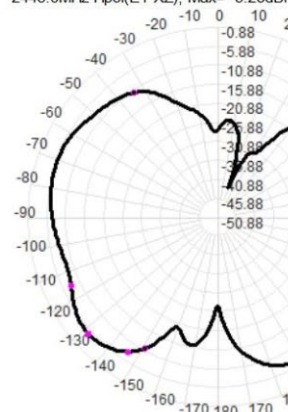
2445.0MHz Total(E2-YZ), Max= -0.88dBi



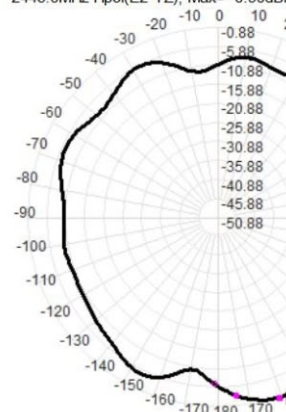
Total(H-XY), Max= -3.84dBi, CirD=7.72



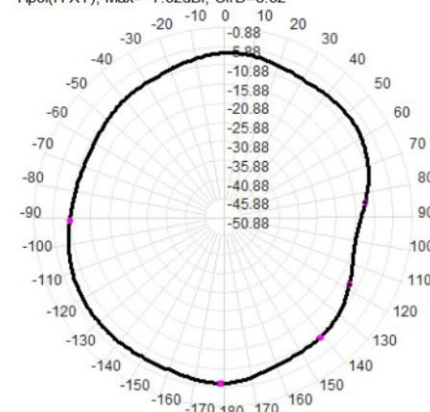
2445.0MHz Hpol(E1-XZ), Max= -5.23dBi



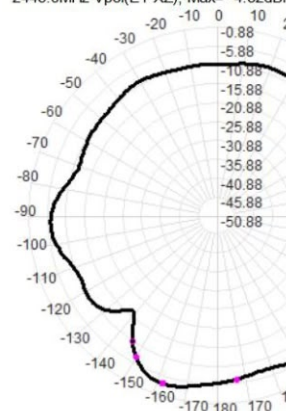
2445.0MHz Hpol(E2-YZ), Max= -0.90dBi



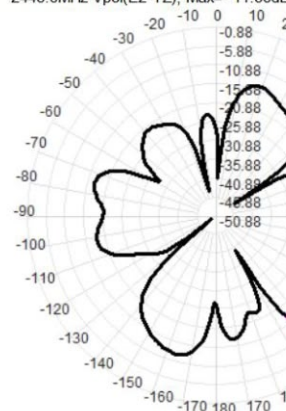
Hpol(H-XY), Max= -7.32dBi, CirD=8.32



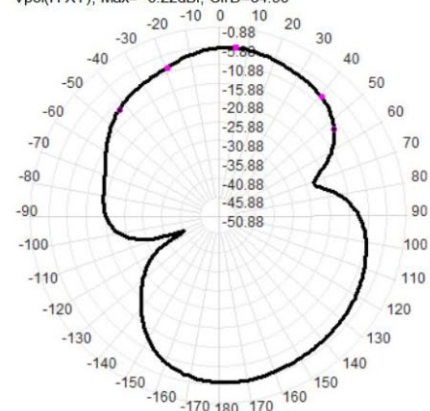
2445.0MHz Vpol(E1-XZ), Max= -4.32dBi



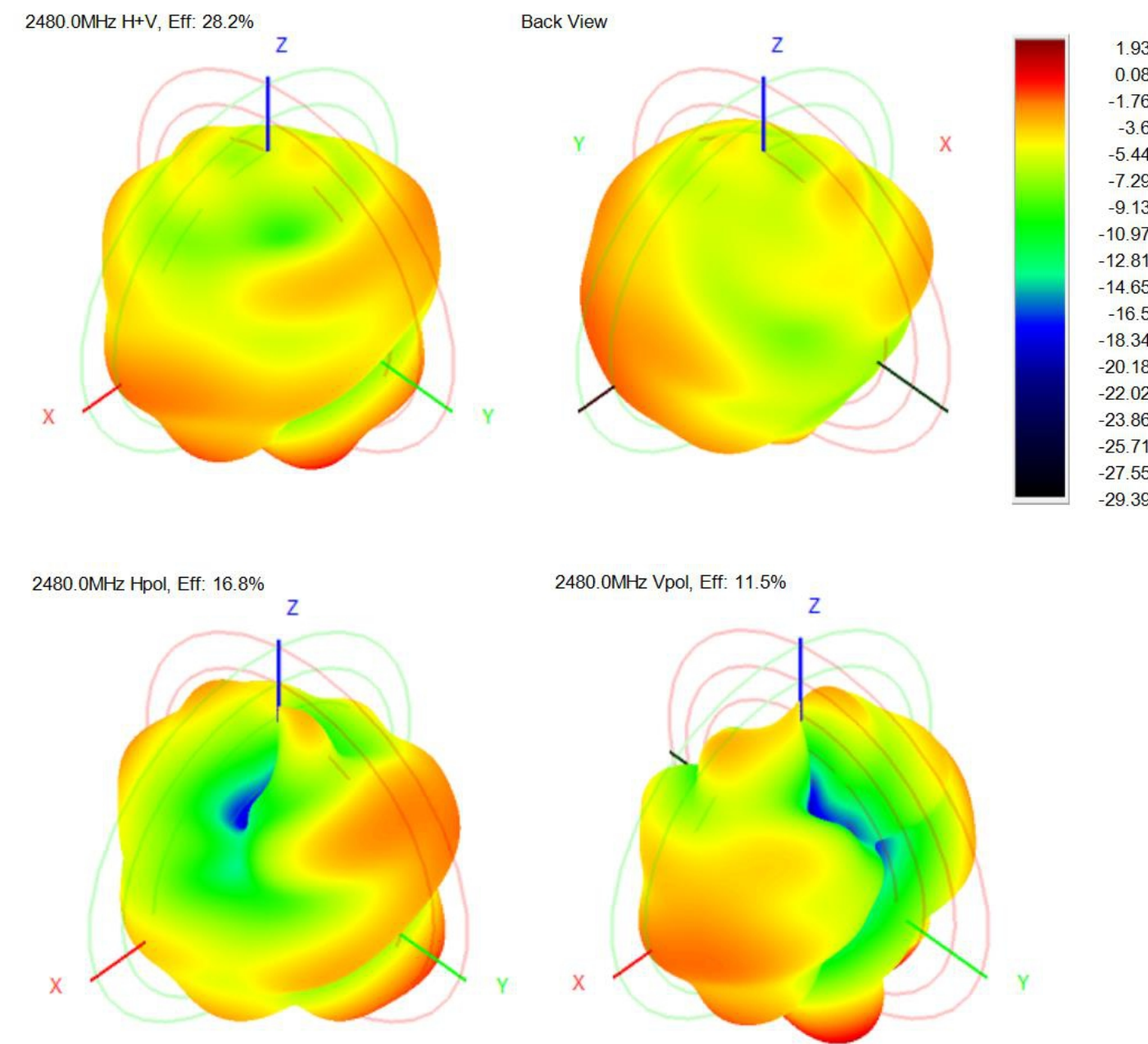
2445.0MHz Vpol(E2-YZ), Max= -11.56dBi



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



立体方向图 3-D directiondiagram@2480MHz:

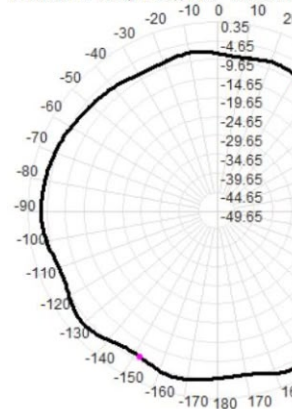


深圳碧科科技有限公司

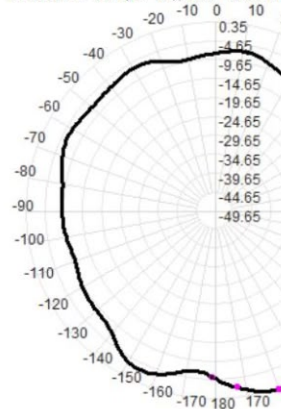
Shenzhen Beikoi

平面方向图 2D direction diagram @2480MHz:

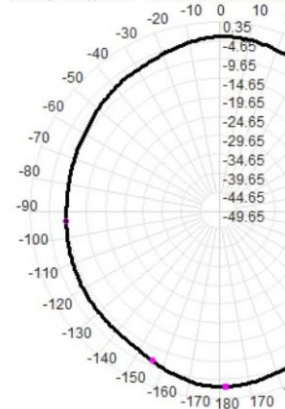
2480.0MHz Total(E1-XZ), Max= -3.02dBi



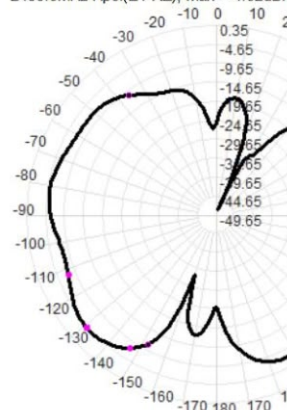
2480.0MHz Total(E2-YZ), Max= 0.35dBi



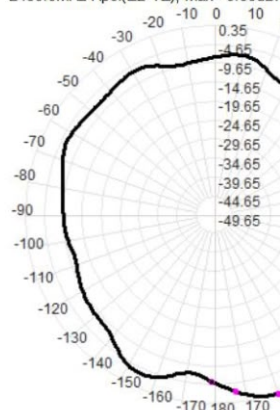
Total(H-XY), Max= -3.20dBi, CirD=7.10



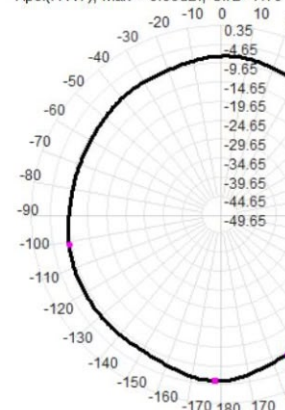
2480.0MHz Hpol(E1-XZ), Max= -4.52dBi



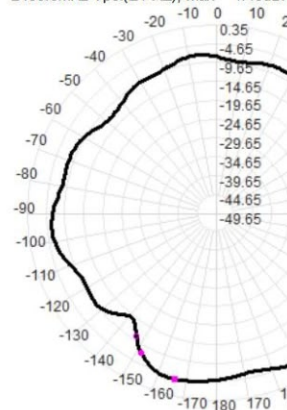
2480.0MHz Hpol(E2-YZ), Max= 0.30dBi



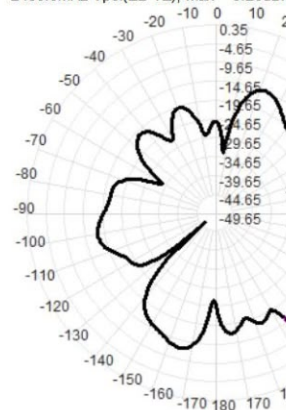
Hpol(H-XY), Max= -5.99dBi, CirD=7.79



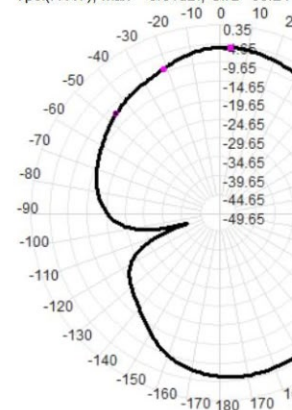
2480.0MHz Vpol(E1-XZ), Max= -4.40dBi



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



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



深圳碧科科技有限公司

Shenzhen Beikoi

5 总结 Conclusion

天线增益最大约 1.93dBi，天线效率最高约 29.96%，方向图基本平稳，符合板载天线设计要求。

The max gain is 1.93dBi, the max efficiency is 29.96%, the antenna pattern is basically stable. It meets PCB antenna design.

测试项 Test items	最大值 Maximum value	最小值 Minimum value
效率 efficiency (%)	29.96	21.94
增益 gain (dBi)	1.93	-0.62

6 联系方式 Contact Information

深圳碧科科技有限公司
Shenzhen Beikoi

地址：深圳市龙岗区五联社区将军帽工业区 29 号 B 栋 5 楼

Address: 5th Floor, Building B, No.29, Jiangjunmao Industrial Zone, Wulian Community, Longgang District, Shenzhen

电话 **Tel:** 18926008301