



深圳市诚连电子有限公司

Shen zhen chenglian electronic co., L T D

# 承认书

## SPECIFICATION FOR APPROVAL

客 户 名 称

CUSTOMER NAME: 华永康实业（深圳）有限公司

产 品 名 称

PRODUCT NAME: 2.4G+5G内置FPC天线

客 户 料 号

CUSTOMER HY300

诚 连 料 号

Cheng Lian CL111V1      REV:A

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
CHECKED BY:	程良日	
APPROVED BY:	张国勤	
DATE:	2023-9-4	



深圳市诚连电子有限公司

Shenzhen chenglian electronic co., LTD

## 1.规格表:

### 产品主要技术参数

主要技术指标		Main technical specifications	
频率范围 (MHZ)	2400-2500 / 5000-5850	Frequency Range (MHZ)	2400-2500 / 5000-5850
中心频率 特性阻抗( $\Omega$ )	50 $\pm$ 10	center frequency Impedance( $\Omega$ )	50 $\pm$ 10
增益(dBi)	5.40	Peak Gain(dBi)	5.40
输出电压 驻波比	<2.0	VSWR	<2.0
最大功率	10W	Admitted Power	10W
极化方式	垂直极化	Polarization	Linear,Vertical
方向性	全向性	Radiation	Omni-directional
连接方式	Cable	Connector Type	Cable
物理性能		Physical Properties	
天线本体材料	PCB+背胶	Antenna Base	PCB+背胶
天线走线材料	Copper	Antenna cover	Copper
工作温度	-20 $^{\circ}$ C~+60 $^{\circ}$ C	Operating Temp	-20 $^{\circ}$ C~+60 $^{\circ}$ C
保存温度	-20 $^{\circ}$ C~+70 $^{\circ}$ C	Storage Temp	-20 $^{\circ}$ C~+70 $^{\circ}$ C



深圳市诚连电子有限公司

Shen zhen chenglian electronic co., L T D

## 2. Test equipment and data

回波损耗及 VSWR 使用了下图的安捷伦 E5071B 网络分析仪进行测试。



E5071B 网络分析仪



深圳市诚连电子有限公司

Shen zhen chenglian electronic co., L T D

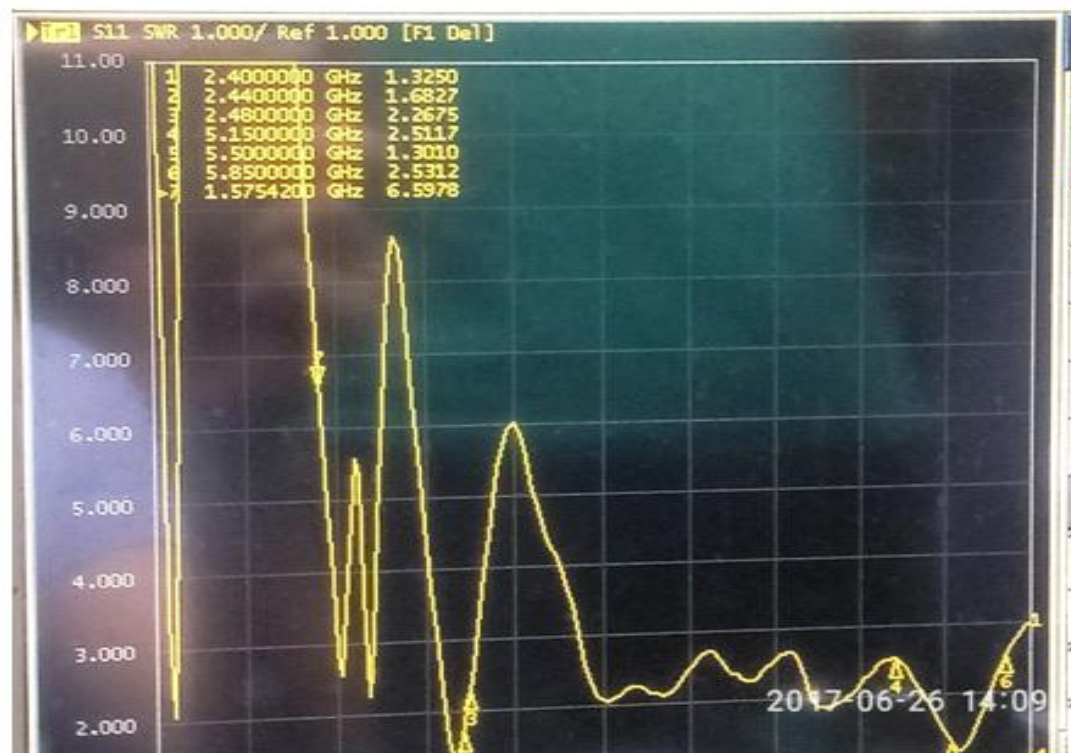
## 功率/灵敏度/效率

天线功率/灵敏度/效率使用了 SG24 微波暗室进行了测试



SG24 微波暗室

## Standing Wave



WIFI passive efficiency test data



深圳市诚连电子有限公司

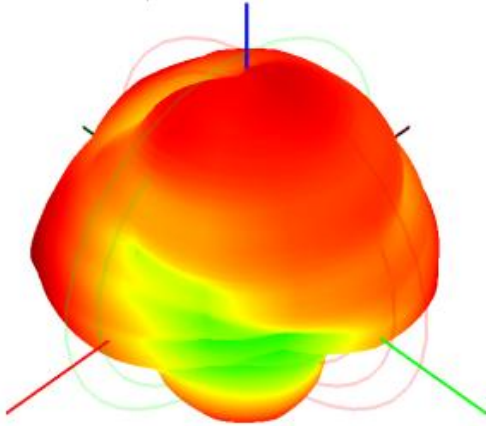
Shen zhen cheng lian electronic co., L T D

Frequency ID	1	2	3	4	5	6	7	8	9	10	11
Frequency (MHz)	2400.0	2410.0	2420.0	2430.0	2440.0	2450.0	2460.0	2470.0	2480.0	2490.0	2500.0
Efficiency (dBi)	-8.44	-9.02	-9.36	-10.16	-9.60	-10.35	-10.18	-11.05	-11.62	-11.78	-11.53
Gain (dBi)	-3.91	-4.42	-4.38	-5.01	-4.37	-4.80	-4.84	-6.03	-6.69	-6.94	-6.82
Efficiency (%)	14.32	12.52	11.59	9.65	10.96	9.23	9.60	7.85	6.89	6.64	7.03
Directivity (dB)	4.53	4.60	4.98	5.14	5.23	5.54	5.33	5.02	4.92	4.84	4.71
Peak Gain Position (Theta)	79.00	57.00	57.00	57.00	57.00	57.00	58.00	58.00	58.00	58.00	58.00
Peak Gain Position (Phi)	330.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00
Efficiency ThetaPol (%)	8.94	7.62	7.20	5.86	6.75	5.56	5.92	4.82	4.33	4.07	4.31
Efficiency PhiPol (%)	5.38	4.91	4.39	3.79	4.21	3.67	3.68	3.03	2.56	2.57	2.71
Upper Hem. Efficiency (%)	7.81	6.87	6.46	5.32	6.01	5.08	5.41	4.50	4.00	3.87	4.17
Lower Hem. Efficiency (%)	6.51	5.65	5.13	4.32	4.96	4.15	4.19	3.35	2.89	2.77	

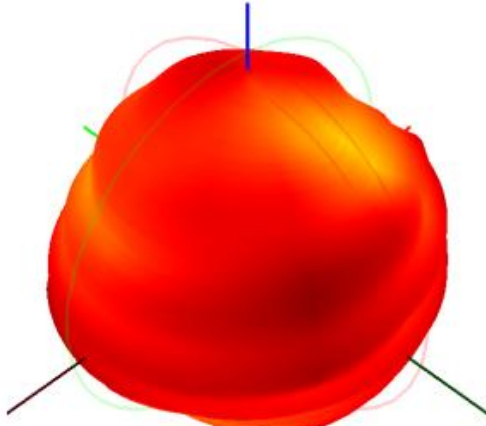
Frequency ID	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Frequency (MHz)	5150.0	5200.0	5250.0	5300.0	5350.0	5400.0	5450.0	5500.0	5550.0	5600.0	5650.0	5700.0	5750.0	5800.0	5850.0
Efficiency (dBi)	-3.88	-3.55	-3.08	-2.34	-3.35	-2.40	-2.87	-2.78	-3.13	-3.39	-3.52	-3.39	-3.85	-4.11	-4.31
Gain (dBi)	2.97	3.32	4.45	5.40	3.38	4.17	3.46	2.79	2.28	2.21	2.48	2.51	1.68	0.98	0.08
Efficiency (%)	40.96	44.14	49.15	58.33	46.25	57.60	51.70	52.75	48.67	45.86	44.50	45.84	41.18	38.77	37.10
Directivity (dB)	6.85	6.87	7.54	7.74	6.73	6.57	6.32	5.57	5.41	5.60	5.99	5.90	5.53	5.09	4.39
Peak Gain Position (Theta)	102.00	104.00	104.00	103.00	133.00	32.00	31.00	96.00	23.00	26.00	24.00	29.00	82.00	84.00	82.00
Peak Gain Position (Phi)	330.00	330.00	330.00	330.00	330.00	240.00	240.00	210.00	210.00	240.00	240.00	240.00	300.00	300.00	300.00
Efficiency ThetaPol (%)	26.61	30.17	32.89	44.38	33.03	43.79	38.38	39.83	37.51	36.05	34.36	35.12	30.53	29.54	27.07
Efficiency PhiPol (%)	14.36	13.97	16.26	13.95	13.22	13.81	13.32	12.92	11.16	9.81	10.13	10.72	10.66	9.23	10.03
Upper Hem. Efficiency (%)	21.52	23.28	26.38	31.09	25.07	30.43	27.26	27.37	25.08	24.06	23.76	25.11	22.92	21.95	21.64
Lower Hem. Efficiency (%)	19.45	20.86	22.77	27.24	21.17	27.17	24.44	25.38	23.59	21.80	20.74	20.73	18.26	16.82	15.46



2400.0MHz H+V, Eff: 14.3%



Back View



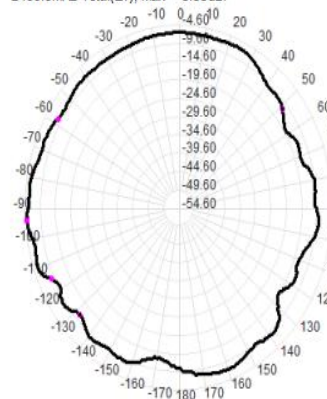




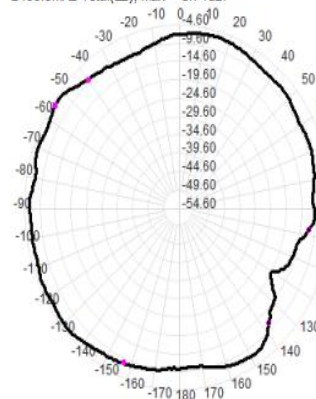
深圳市诚连电子有限公司

Shen zhen cheng lian electronic co., L T D

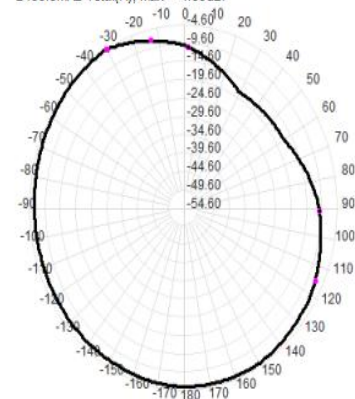
2400.0MHz Total(E1), Max=-5.33dBi



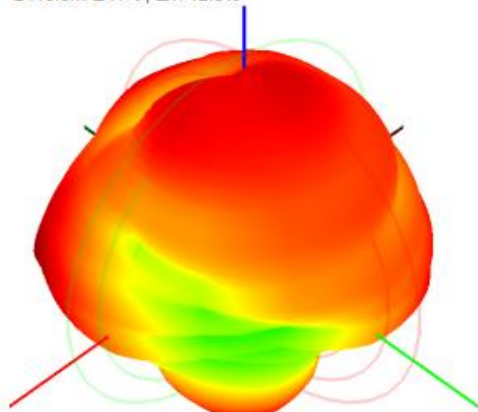
2400.0MHz Total(E2), Max=-5.74dBi



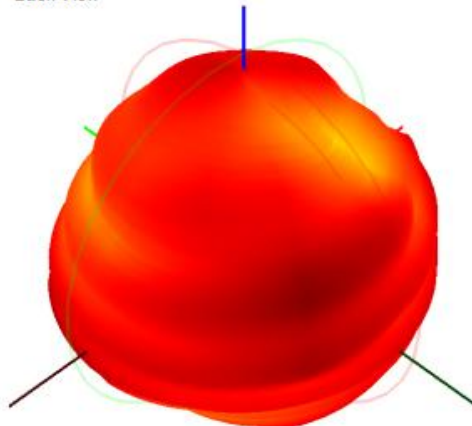
2400.0MHz Total(H), Max=-4.60dBi



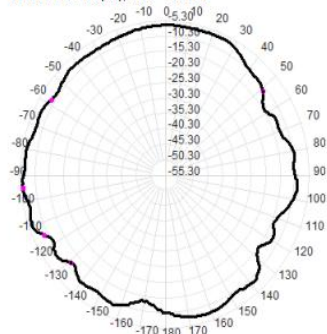
2410.0MHz H+V, Eff: 12.5%



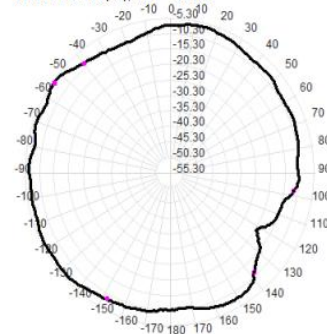
Back View



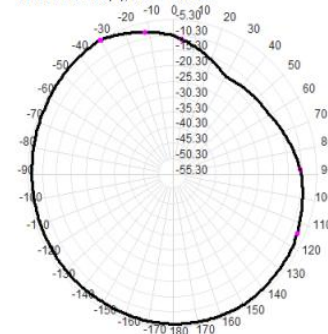
2410.0MHz Total(E1), Max=-5.99dBi



2410.0MHz Total(E2), Max=-5.99dBi



2410.0MHz Total(H), Max=-5.30dBi

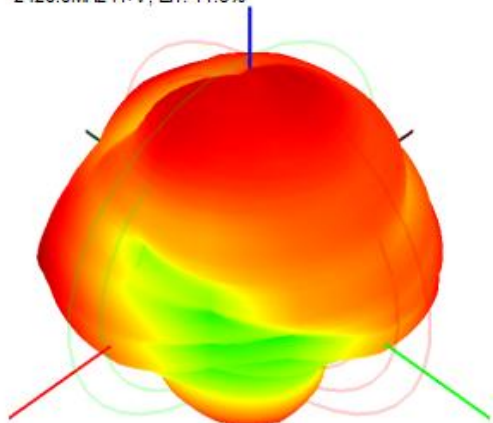




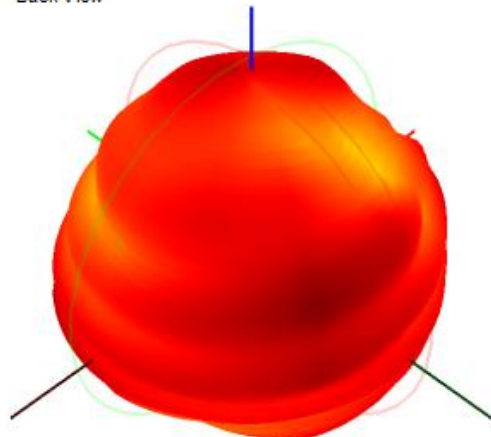
深圳市诚连电子有限公司

Shen zhen cheng lian electronic co., L T D

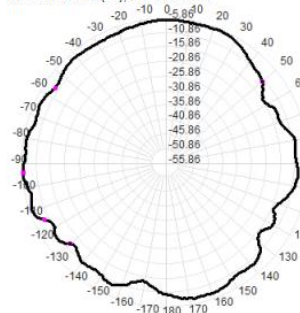
2420.0MHz H+V, Eff: 11.6%



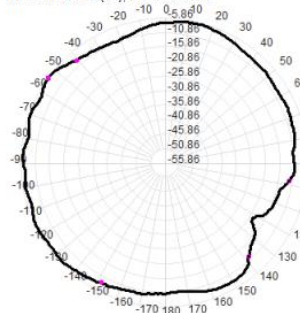
Back View



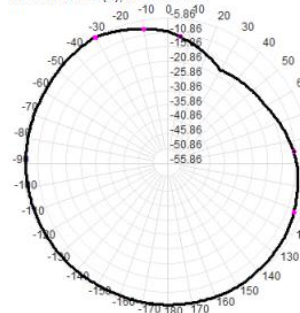
2420.0MHz Total(E1), Max=-6.35dBi



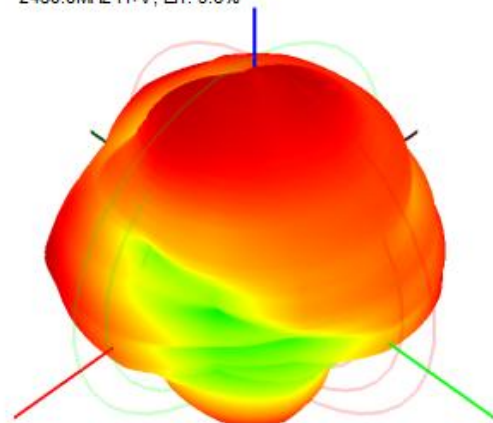
2420.0MHz Total(E2), Max=-5.95dBi



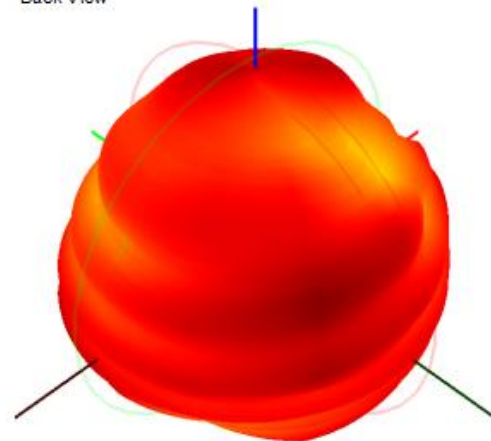
2420.0MHz Total(H), Max=-5.86dBi



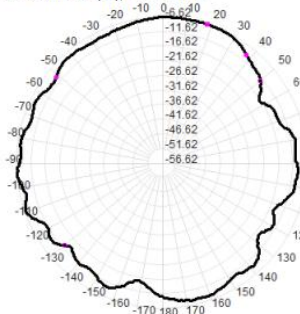
2430.0MHz H+V, Eff: 9.6%



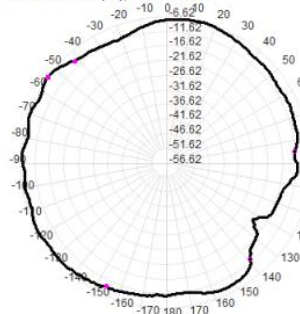
Back View



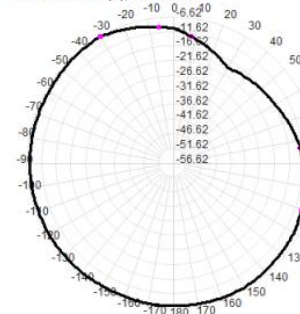
2430.0MHz Total(E1), Max=-6.70dBi



2430.0MHz Total(E2), Max=-6.62dBi



2430.0MHz Total(H), Max=-6.82dBi



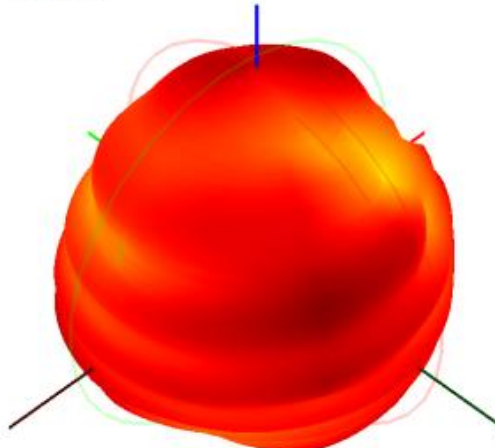
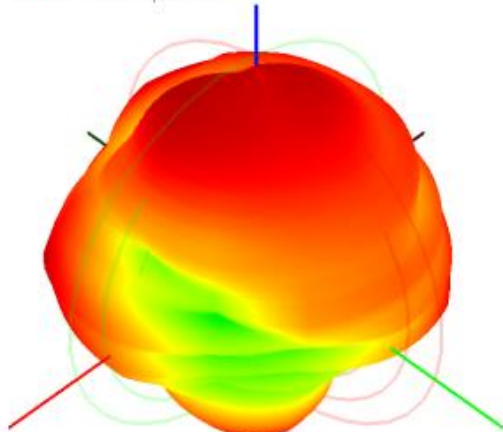


深圳市诚连电子有限公司

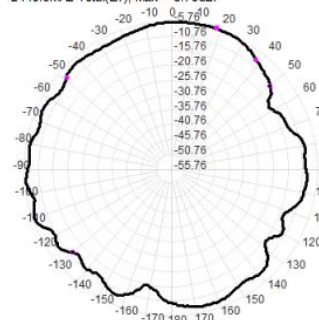
Shen zhen cheng lian electronic co., L T D

2440.0MHz H+V, Eff: 11.0%

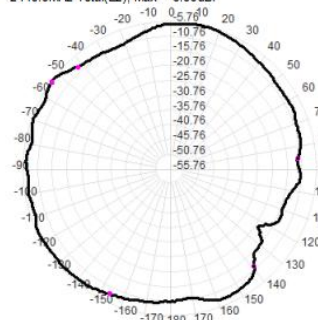
Back View



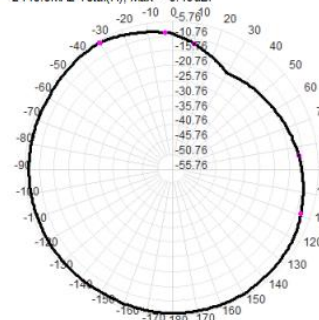
2440.0MHz Total(E1), Max=-5.76dBi



2440.0MHz Total(E2), Max=-6.00dBi

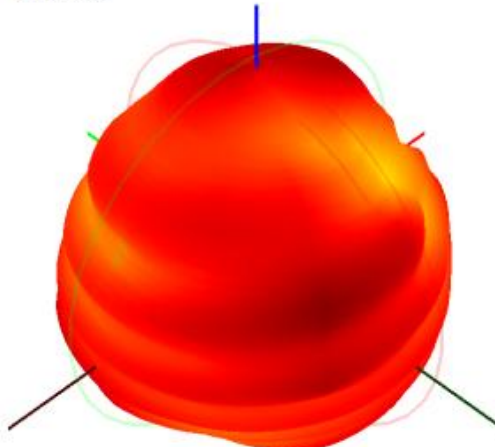
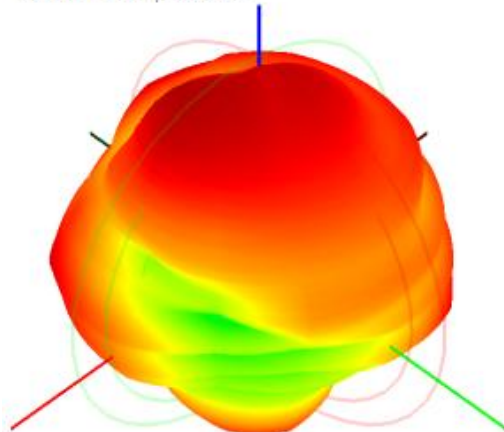


2440.0MHz Total(H), Max=-6.48dBi

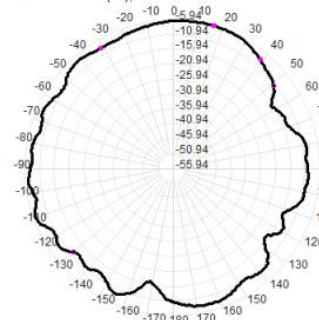


2450.0MHz H+V, Eff: 9.2%

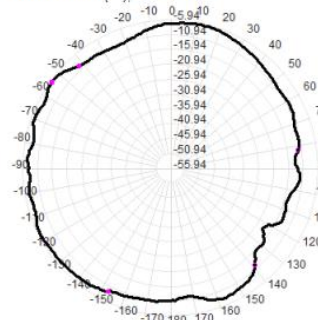
Back View



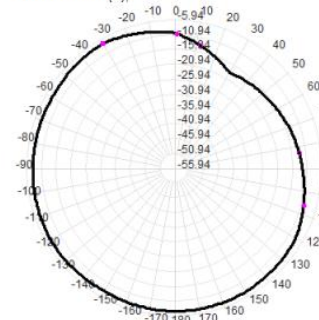
2450.0MHz Total(E1), Max=-5.94dBi



2450.0MHz Total(E2), Max=-6.45dBi



2450.0MHz Total(H), Max=-7.54dBi





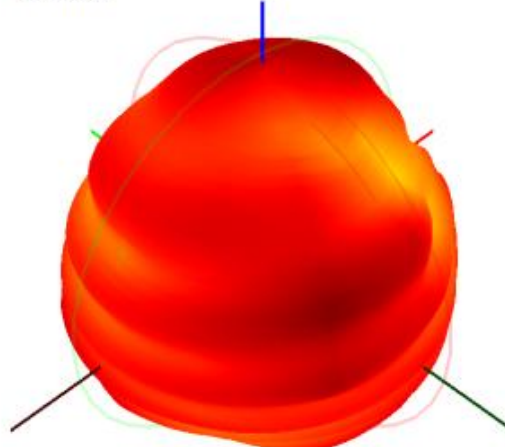
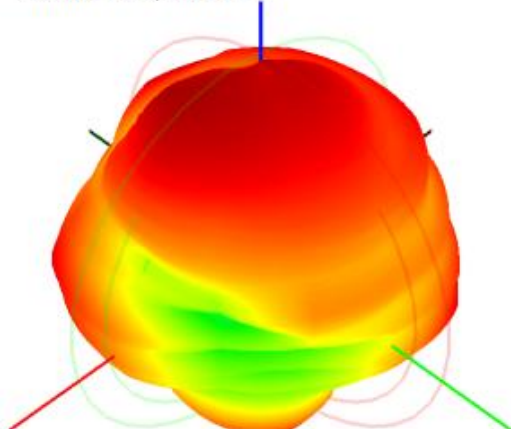


深圳市诚连电子有限公司

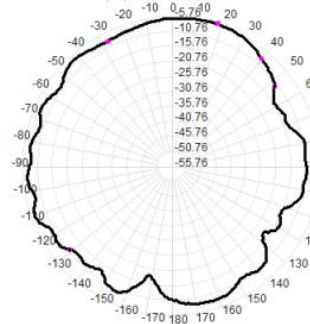
Shen zhen cheng lian electronic co., L T D

2460.0MHz H+V, Eff: 9.6%

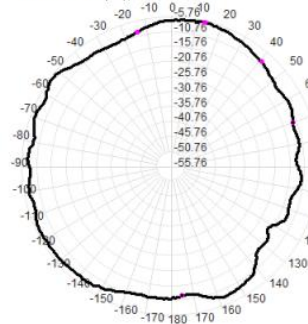
Back View



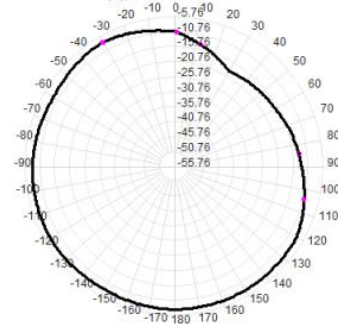
2460.0MHz Total(E1), Max=-5.76dBi



2460.0MHz Total(E2), Max=-6.42dBi

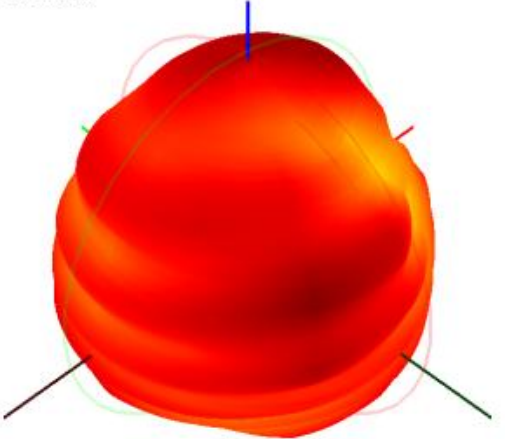
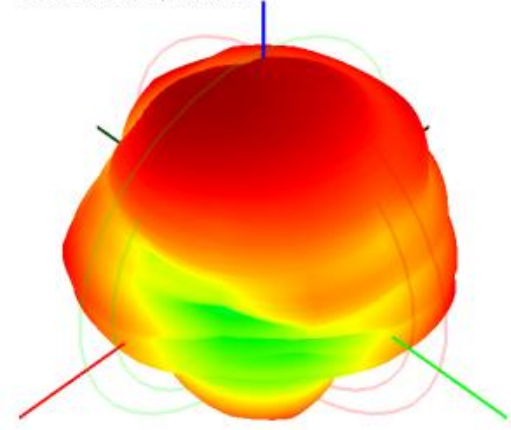


2460.0MHz Total(H), Max=-7.92dBi

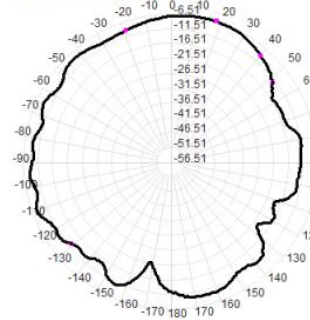


2470.0MHz H+V, Eff: 7.9%

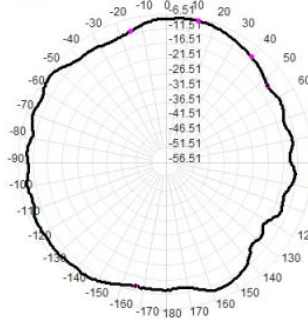
Back View



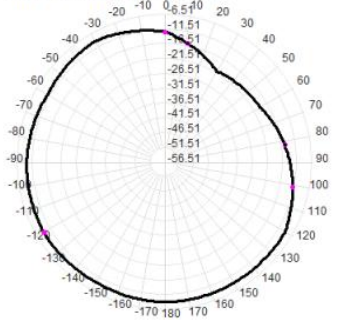
2470.0MHz Total(E1), Max=-6.51dBi



2470.0MHz Total(E2), Max=-7.52dBi



2470.0MHz Total(H), Max=-9.35dBi



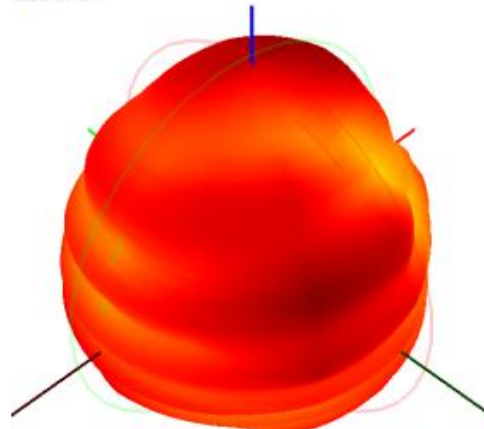
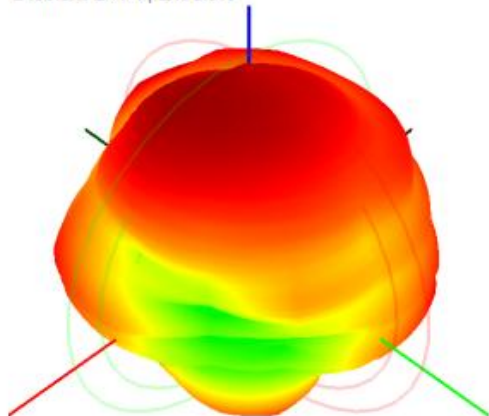


深圳市诚连电子有限公司

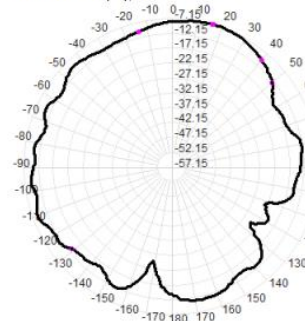
Shen zhen cheng lian electronic co., L T D

2480.0MHz H+V, Eff: 6.9%

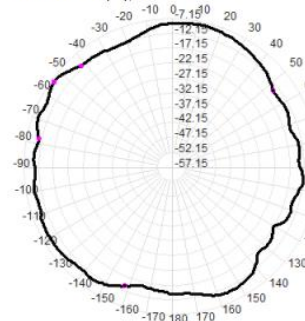
Back View



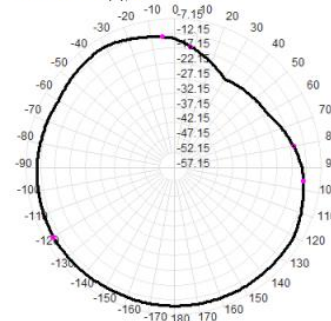
2480.0MHz Total(E1), Max=-7.15dBi



2480.0MHz Total(E2), Max=-8.16dBi

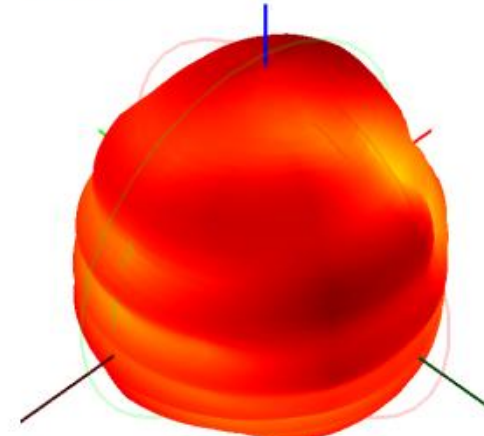
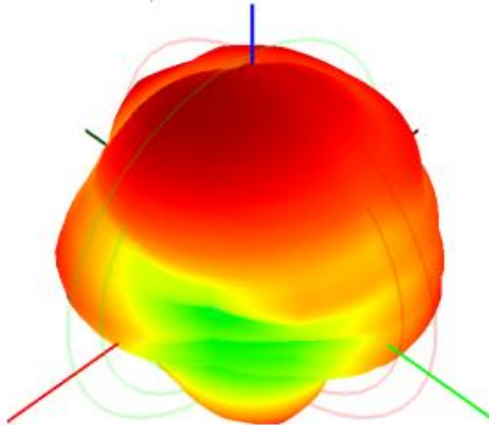


2480.0MHz Total(H), Max=-10.20dBi

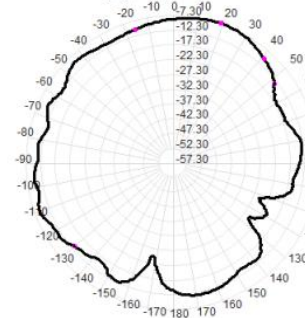


2490.0MHz H+V, Eff: 6.6%

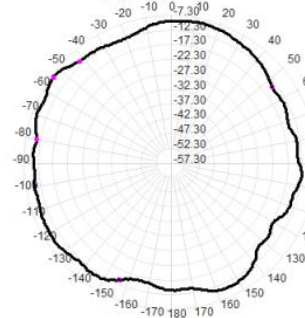
Back View



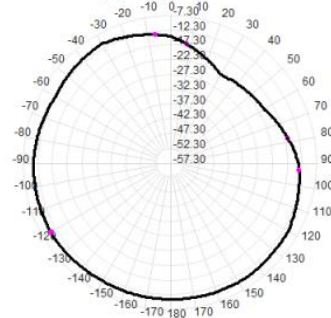
2490.0MHz Total(E1), Max=-7.30dBi



2490.0MHz Total(E2), Max=-7.97dBi



2490.0MHz Total(H), Max=-10.48dBi

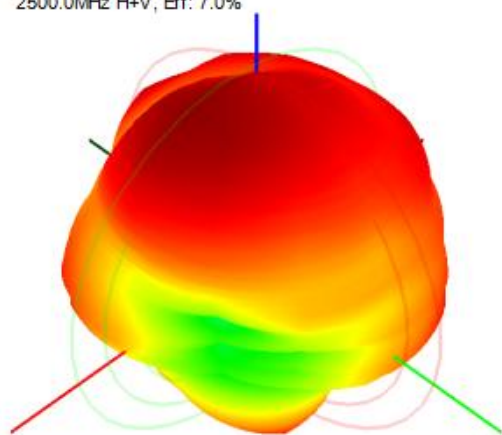




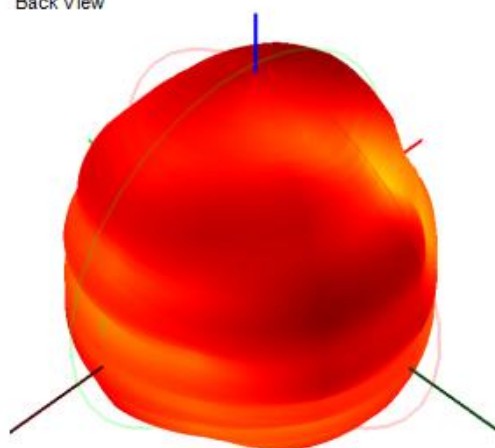
深圳市诚连电子有限公司

Shen zhen cheng lian electronic co., L T D

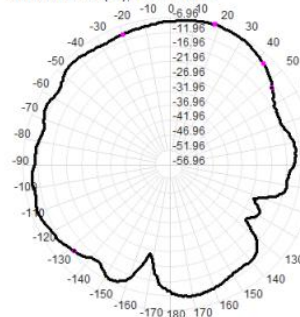
2500.0MHz H+V, Eff: 7.0%



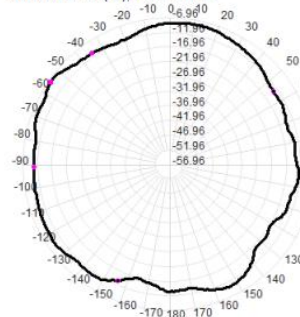
Back View



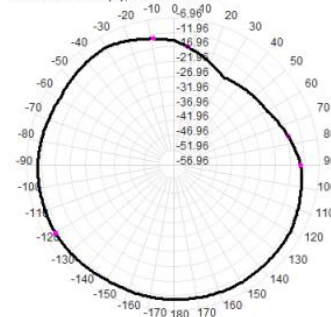
2500.0MHz Total(E1), Max=-6.96dBi



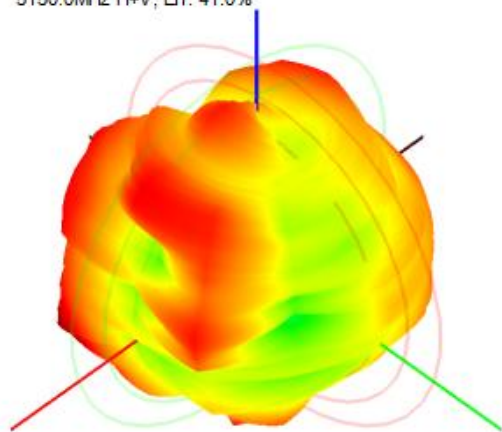
2500.0MHz Total(E2), Max=-7.81dBi



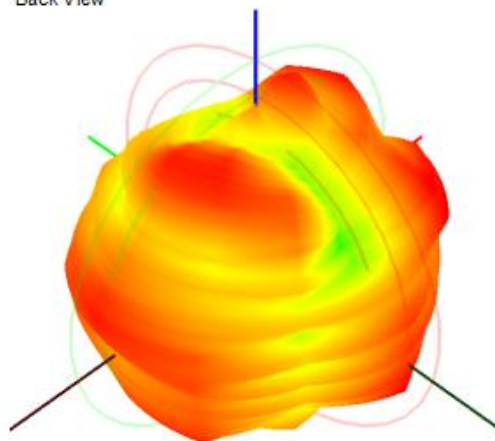
2500.0MHz Total(H), Max=-10.60dBi



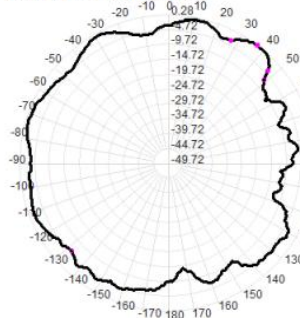
5150.0MHz H+V, Eff: 41.0%



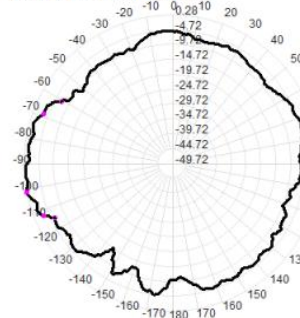
Back View



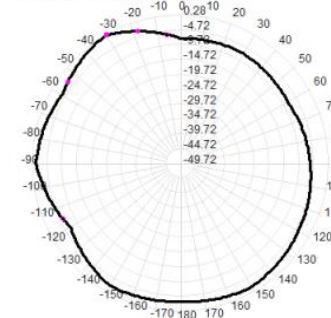
5150.0MHz Total(E1), Max=0.12dBi



5150.0MHz Total(E2), Max=0.28dBi



5150.0MHz Total(H), Max=0.14dBi



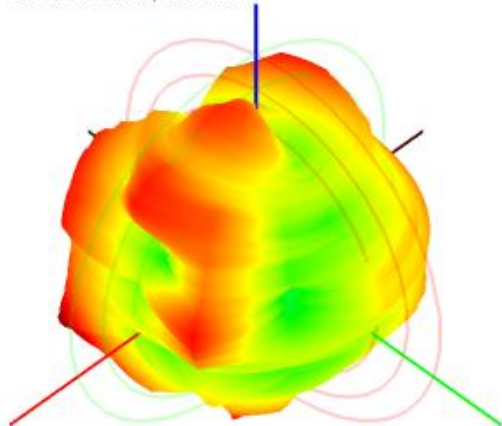




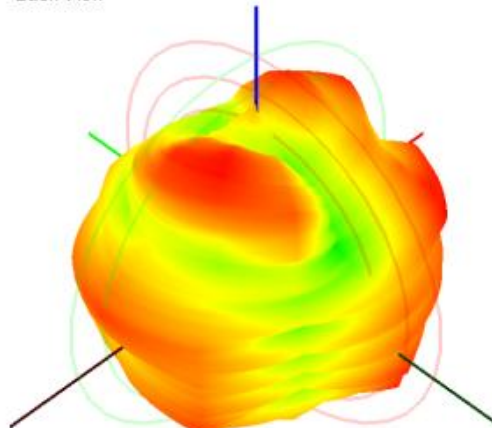
深圳市诚连电子有限公司

Shen zhen cheng lian electronic co., L T D

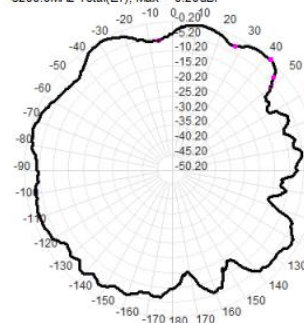
5200.0MHz H+V, Eff: 44.1%



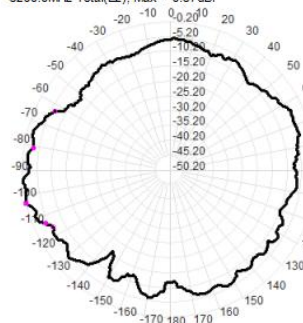
Back View



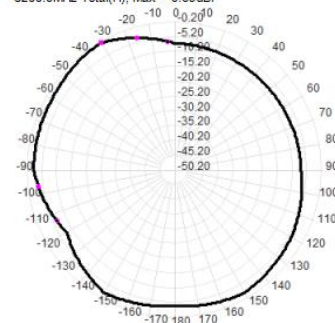
5200.0MHz Total(E1), Max=-0.20dBi



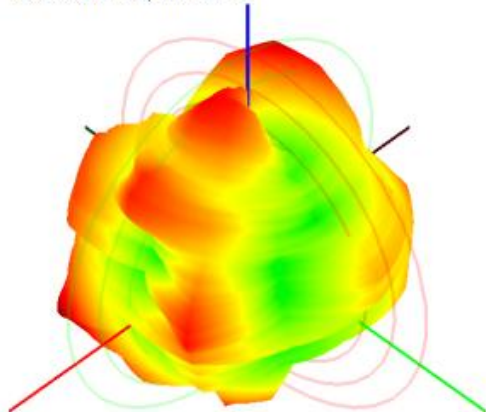
5200.0MHz Total(E2), Max=-0.37dBi



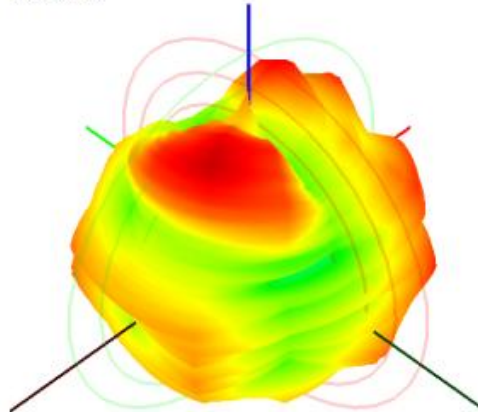
5200.0MHz Total(H), Max=-0.69dBi



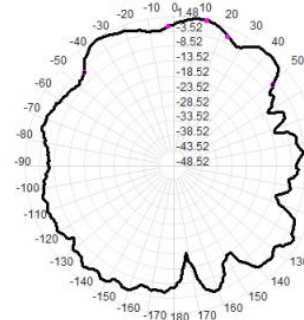
5250.0MHz H+V, Eff: 49.1%



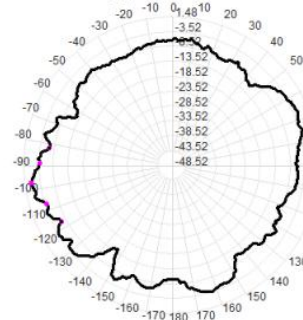
Back View



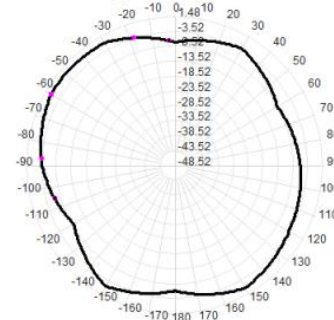
5250.0MHz Total(E1), Max= 1.48dBi



5250.0MHz Total(E2), Max=-0.82dBi



5250.0MHz Total(H), Max=-0.46dBi





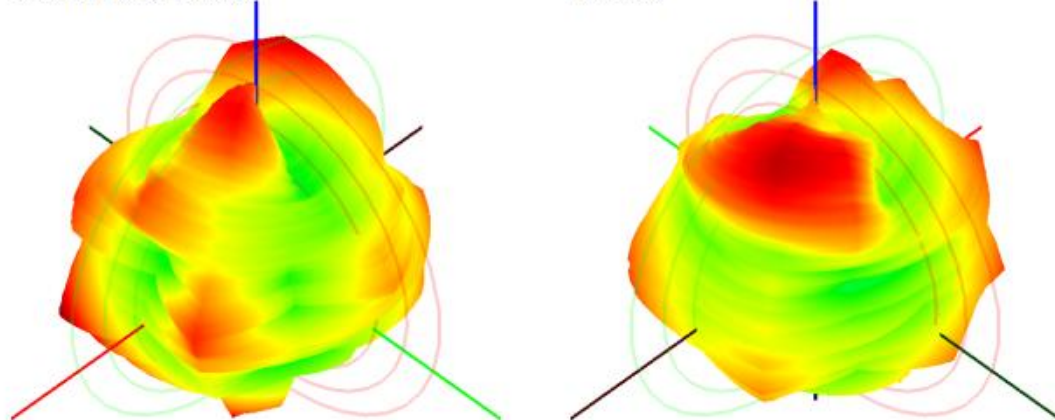


深圳市诚连电子有限公司

Shen zhen cheng lian electronic co., L T D

5300.0MHz H+V, Eff: 58.3%

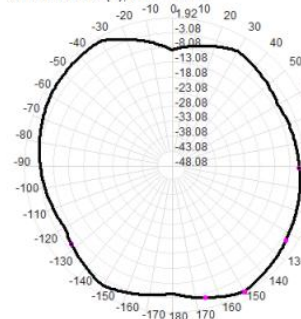
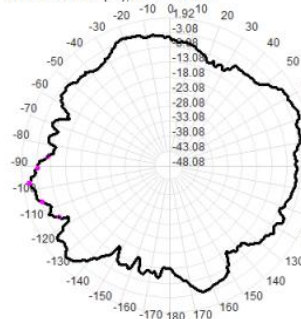
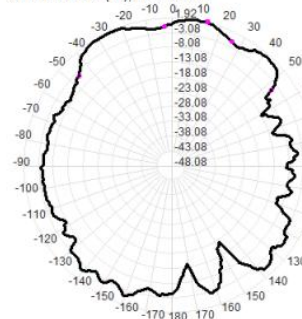
Back View



5300.0MHz Total(E1), Max= 1.92dBi

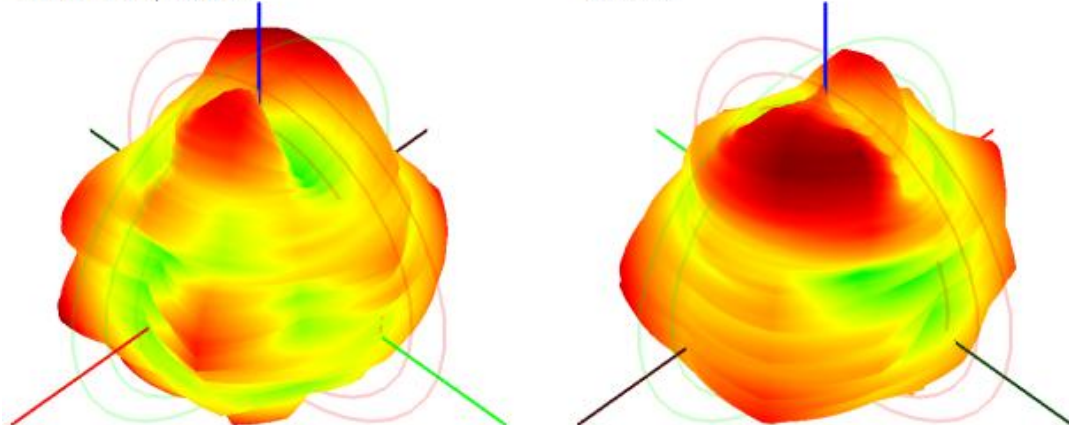
5300.0MHz Total(E2), Max= -0.24dBi

5300.0MHz Total(H), Max= 1.04dBi



5350.0MHz H+V, Eff: 46.2%

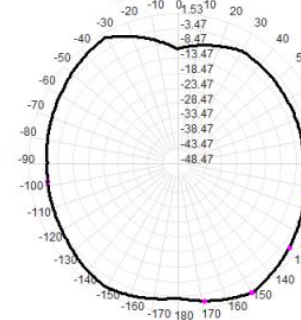
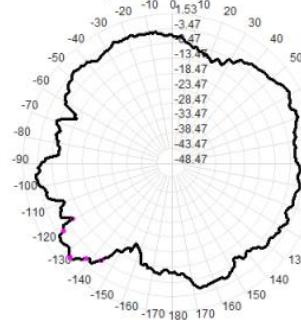
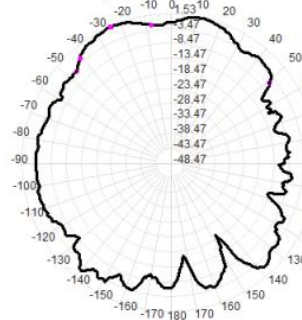
Back View



5350.0MHz Total(E1), Max= 1.39dBi

5350.0MHz Total(E2), Max= -2.09dBi

5350.0MHz Total(H), Max= 1.53dBi

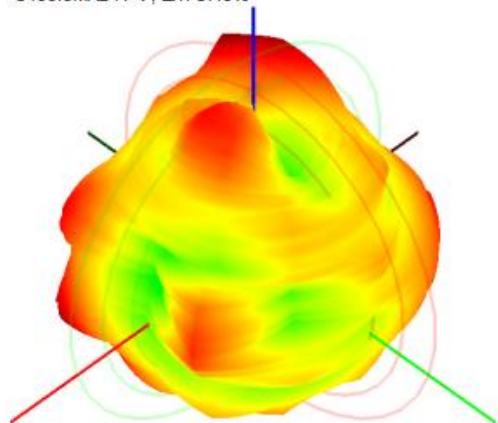




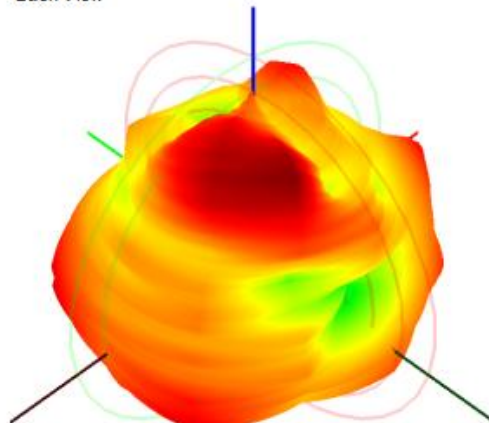
深圳市诚连电子有限公司

Shen zhen cheng lian electronic co., L T D

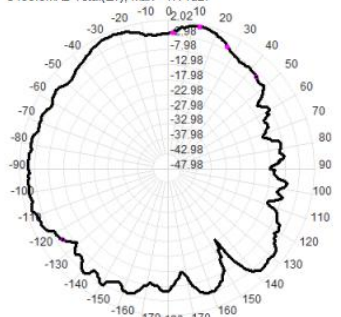
5400.0MHz H+V, Eff: 57.6%



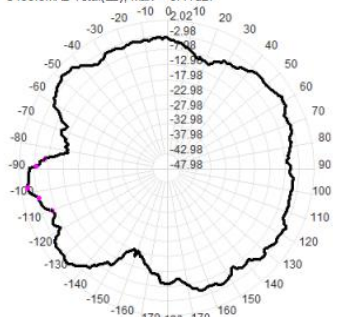
Back View



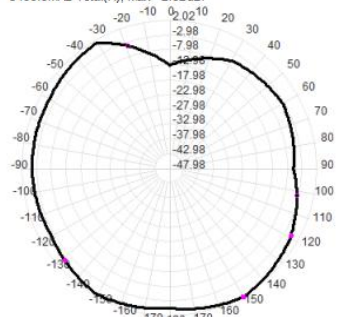
5400.0MHz Total(E1), Max= 1.14dBi



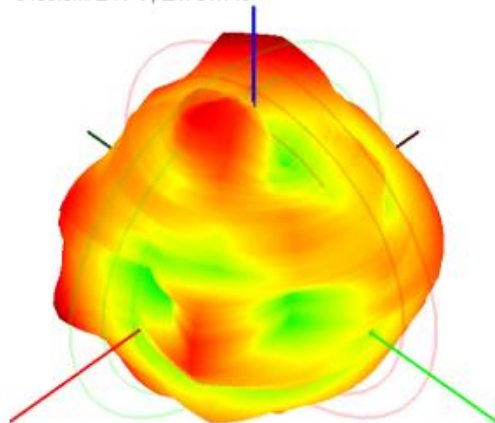
5400.0MHz Total(E2), Max= -0.41dBi



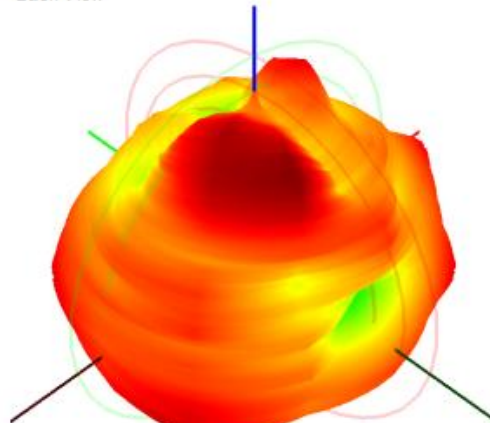
5400.0MHz Total(H), Max= 2.02dBi



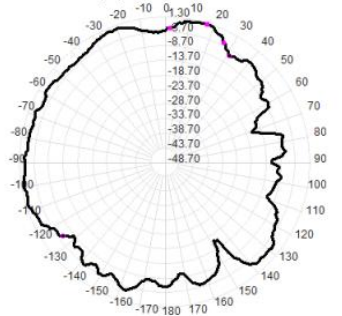
5450.0MHz H+V, Eff: 51.7%



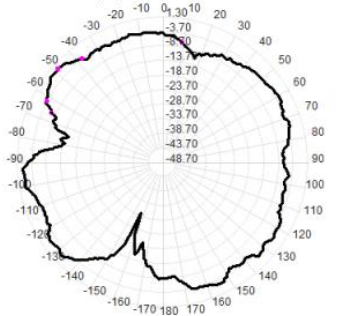
Back View



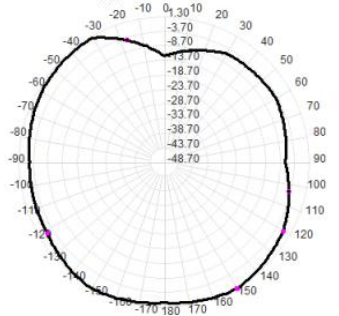
5450.0MHz Total(E1), Max= 0.84dBi



5450.0MHz Total(E2), Max= -0.42dBi



5450.0MHz Total(H), Max= 1.30dBi





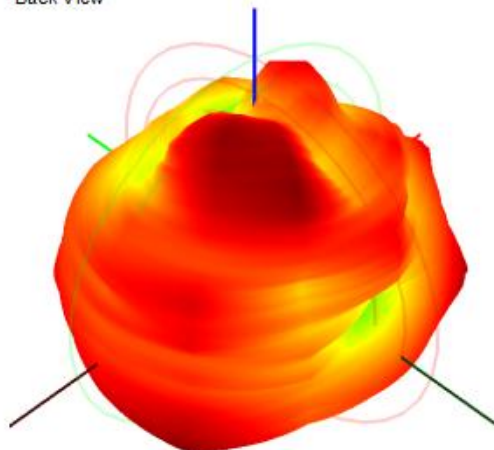
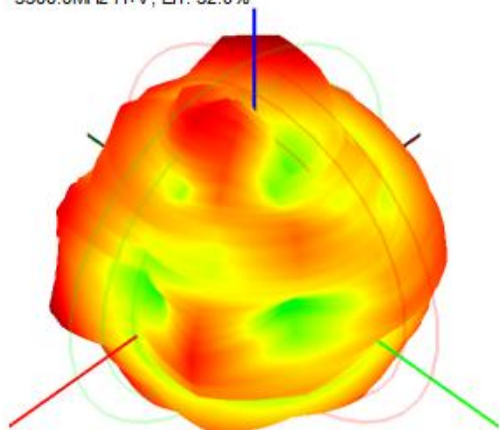


深圳市诚连电子有限公司

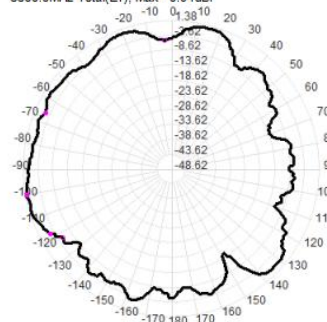
Shenzhen chenglian electronic co., LTD

5500.0MHz H+V, Eff: 52.8%

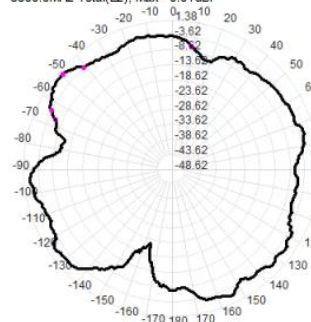
Back View



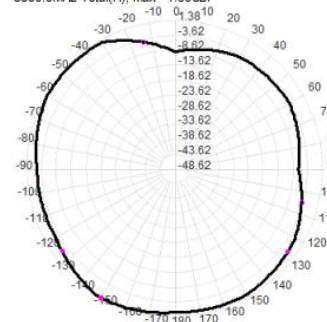
5500.0MHz Total(E1), Max=-0.84dBi



5500.0MHz Total(E2), Max=-0.01dBi

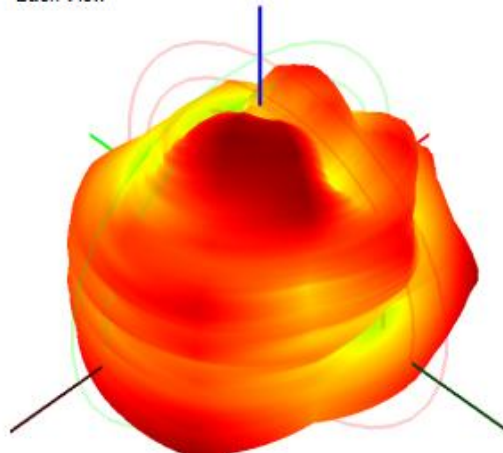
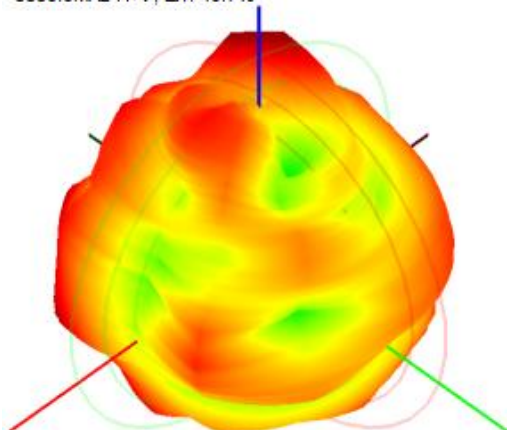


5500.0MHz Total(H), Max=1.38dBi

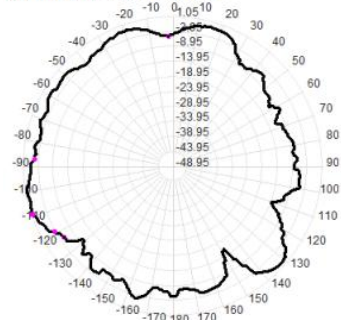


5550.0MHz H+V, Eff: 48.7%

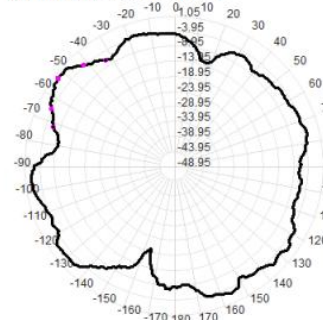
Back View



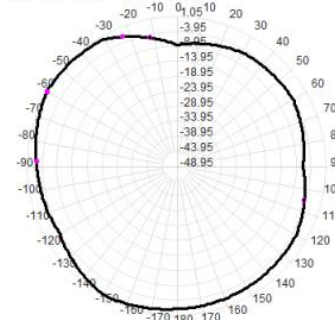
5550.0MHz Total(E1), Max=-0.46dBi



5550.0MHz Total(E2), Max=-0.30dBi



5550.0MHz Total(H), Max=1.05dBi

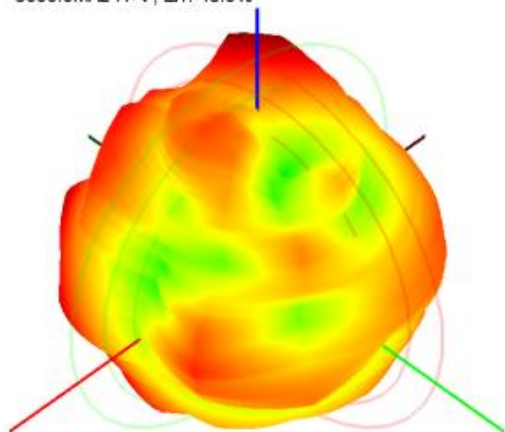




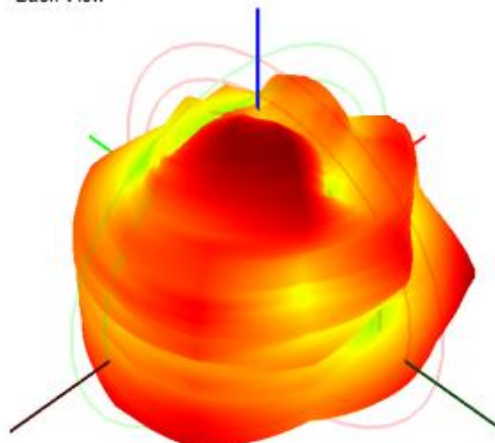
深圳市诚连电子有限公司

Shen zhen cheng lian electronic co., L T D

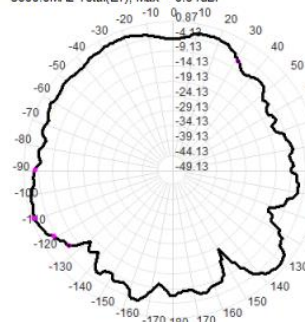
5600.0MHz H+V, Eff: 45.9%



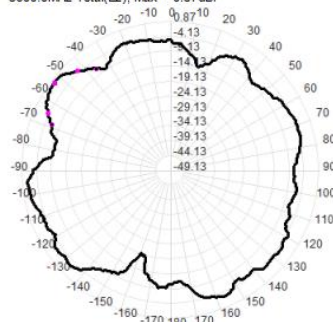
Back View



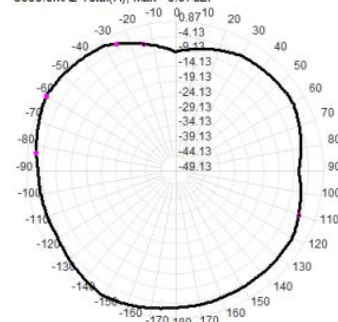
5600.0MHz Total(E1), Max=-0.04dBi



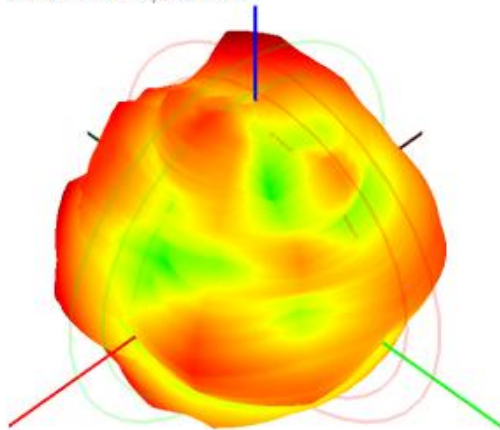
5600.0MHz Total(E2), Max=-0.37dBi



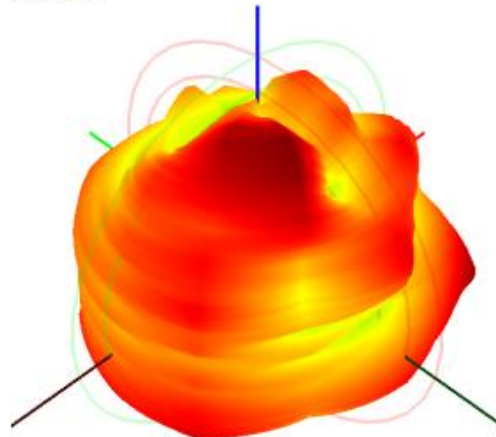
5600.0MHz Total(H), Max=0.87dBi



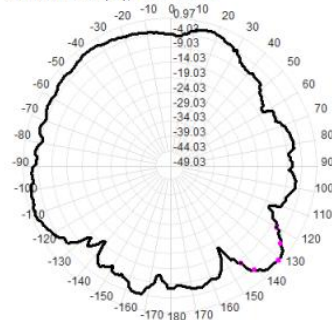
5650.0MHz H+V, Eff: 44.5%



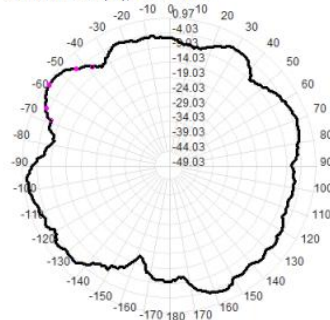
Back View



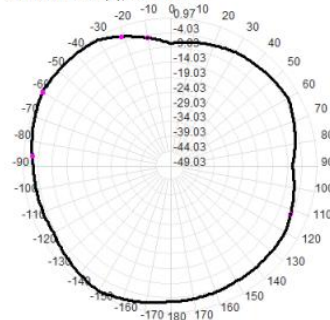
5650.0MHz Total(E1), Max=-0.44dBi



5650.0MHz Total(E2), Max=0.15dBi



5650.0MHz Total(H), Max=0.97dBi





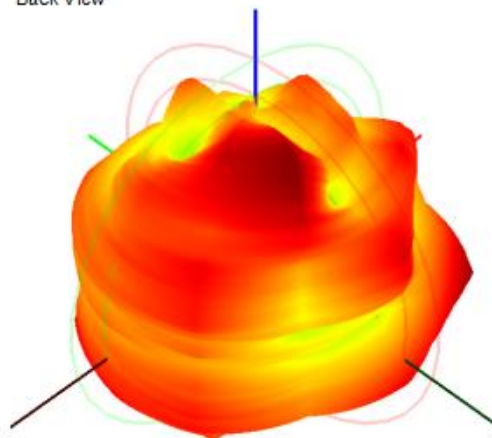
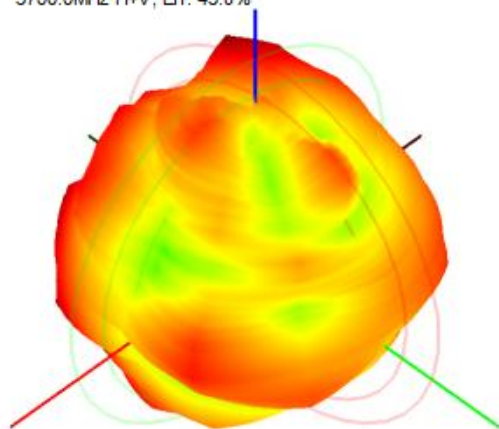


深圳市诚连电子有限公司

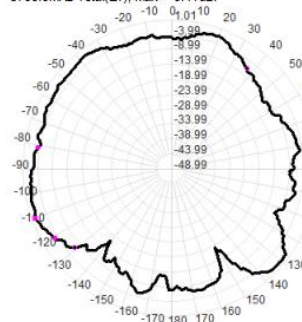
Shen zhen cheng lian electronic co., L T D

5700.0MHz H+V, Eff: 45.8%

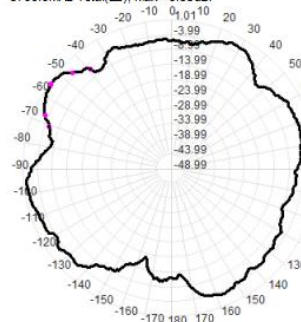
Back View



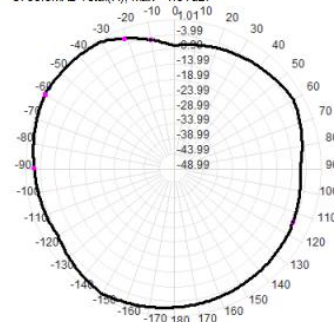
5700.0MHz Total(E1), Max=-0.41dBi



5700.0MHz Total(E2), Max=0.35dBi

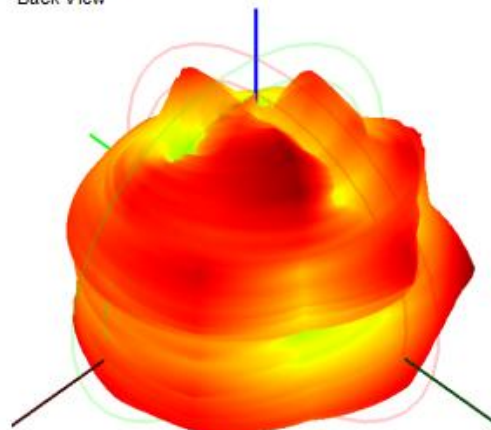
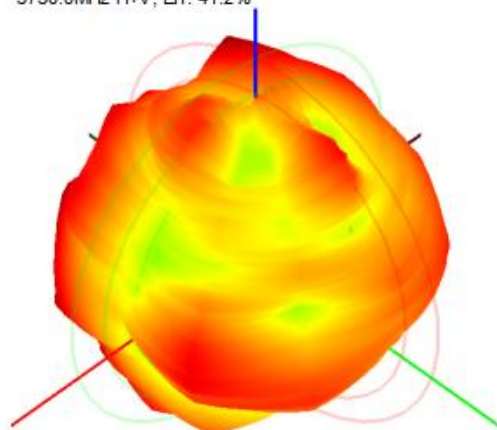


5700.0MHz Total(H), Max=1.01dBi

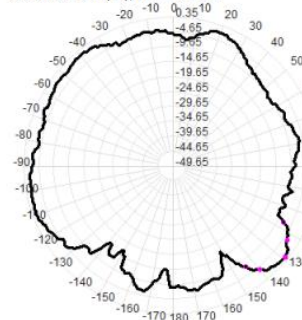


5750.0MHz H+V, Eff: 41.2%

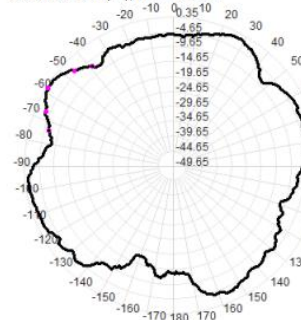
Back View



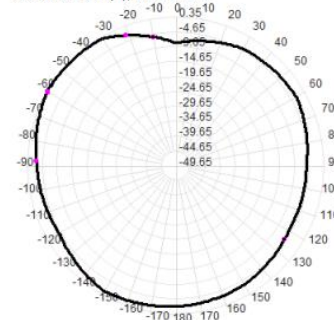
5750.0MHz Total(E1), Max=-0.83dBi



5750.0MHz Total(E2), Max=-0.23dBi



5750.0MHz Total(H), Max=0.35dBi

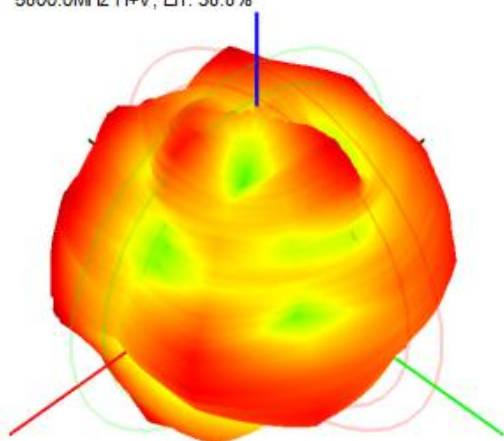




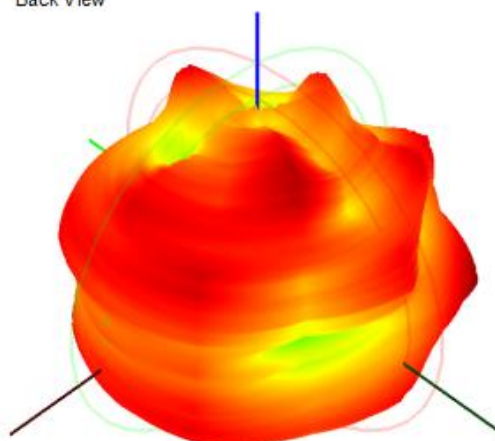
深圳市诚连电子有限公司

Shen zhen cheng lian electronic co., L T D

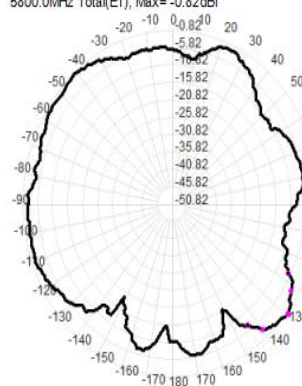
5800.0MHz H+V, Eff: 38.8%



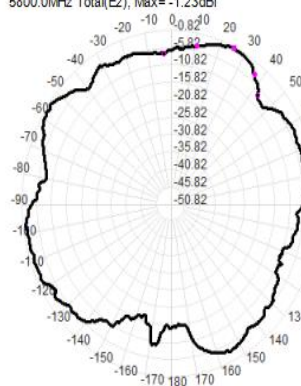
Back View



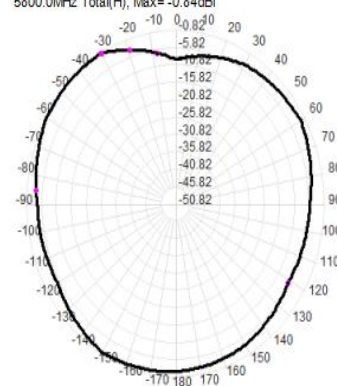
5800.0MHz Total(E1), Max=-0.82dBi



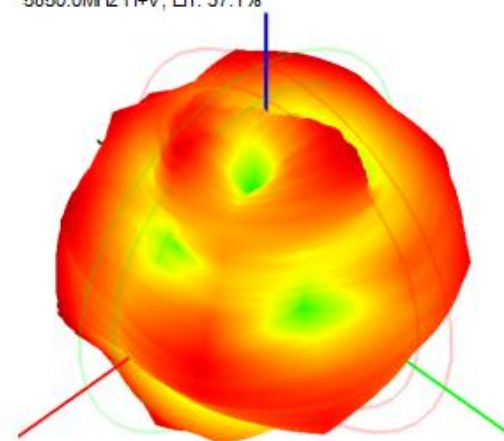
5800.0MHz Total(E2), Max=-1.23dBi



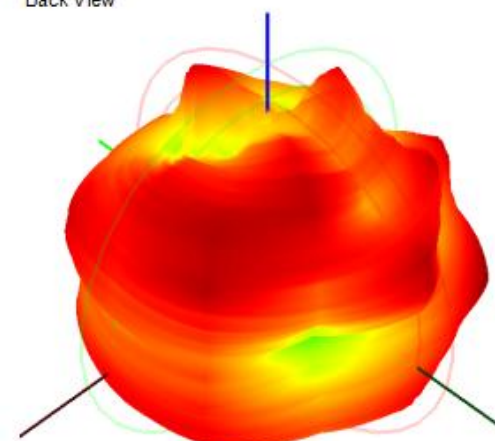
5800.0MHz Total(H), Max=-0.84dBi



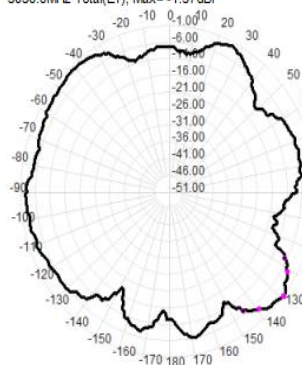
5850.0MHz H+V, Eff: 37.1%



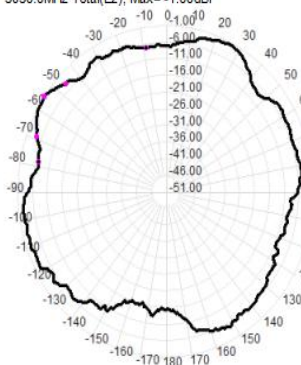
Back View



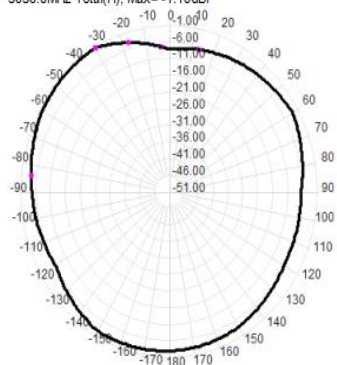
5850.0MHz Total(E1), Max=-1.37dBi



5850.0MHz Total(E2), Max=-1.00dBi



5850.0MHz Total(H), Max=-1.10dBi





深圳市诚连电子有限公司

Shen zhen chenglian electronic co., L T D

### 3.实物图:

