

SPECIFICATION FOR APPROVAL

Company name: COLOMBIANA DE COMERCIO S. A.

Specification: Internal permanent antenna

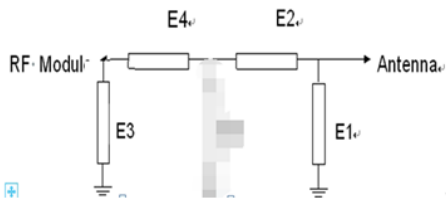
BT+WIFI+GPS Antenna

1、 Specification

This report mainly provides the testing conditions of various electric and structural performance parameters for cell phone antenna ----K6520 Picture 1 shows the antenna designed by FUBANG.



2 、 Matching circuit diagram



3、 VSWR Testing

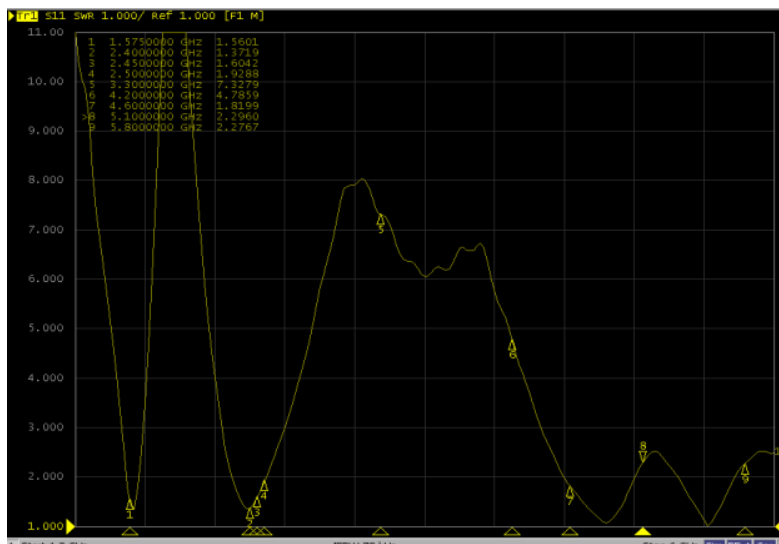
3.1 Testing connection

The VSWR testing devices are connected in sequence: Agilent5071C Network Analyzer →Testing Cable → Customer-providing Devices.

3.2 VSWR

The following table expresses the VSWR value of antenna's two edges of its frequency range. With regard to the relevant diagram of VSWR

3.3 Testing data



GPS/WIFI/BT				
Item	Freq (MHz)	VSWR	Freq (MHz)	VSWR
	TX		RX	
GPS	1575	≤2.0		
WIFI/BT	2400	≤2.0	2500	≤1.3

4、 Test the efficiency of the antenna Testing

4.1 Testing field

FB Microwave Anechoic Chamber : testing frequency ranges from 400MHz to 6GHz and the 40cm diameter spherical quiet zone, the chamber provides less than -90dB reflectivity from 400MHz—6GHz.

4.2 Testing results

The following table indicates the testing results related to Power and Sensitivity in Microwave Anechoic Chamber, concerning the relative diagram.

Freq (MHz)	Effi (%)	Gain (dBi)
1550	26.26	-1.0
1560	28.97	-0.7
1570	31.46	-0.4
1580	31.68	-0.4
1590	30.11	-0.4
1600	26.32	-1.1
1610	22.57	-1.9

Freq (MHz)	Effi (%)	Gain (dBi)
2400	32.33	1.0
2410	30.46	0.7
2420	29.35	0.5
2430	28.06	0.3
2440	26.95	0.2
2450	25.65	0.0
2460	24.14	-0.2
2470	22.53	-0.4
2480	21.36	-0.6
2490	20.14	-0.8
2500	19.38	-1.0

Freq (MHz)	Effi (%)	Gain (dBi)	Freq (MHz)	Effi (%)	Gain (dBi)
5100	36.01	1.4	5440	34.61	0.5
5120	39.28	1.6	5460	34.23	0.6
5140	34.33	1.2	5480	33.92	0.7
5160	36.22	1.2	5500	33.25	0.7
5180	36.12	0.9	5520	33.25	0.7
5200	35.12	0.3	5540	33.10	0.8
5220	35.56	0.6	5560	34.67	1.3
5240	36.58	0.5	5580	33.73	1.1
5260	34.93	-0.1	5600	32.46	0.9
5280	34.67	-0.4	5620	32.68	0.7
5300	35.84	-0.5	5640	30.90	0.7
5320	34.40	-0.7	5660	31.33	0.7
5340	35.93	-0.1	5680	30.62	0.8
5360	34.53	-0.3	5700	30.49	0.5
5380	35.23	0.0	5720	29.63	0.7
5400	35.36	0.1	5740	29.29	0.6
5420	34.92	0.3	5760	27.56	0.5
			5780	26.32	0.1
			5800	26.89	0.3

Test Result	Wifi 2.4G			Wifi 5.8G		
	1	6	11	40	56	157

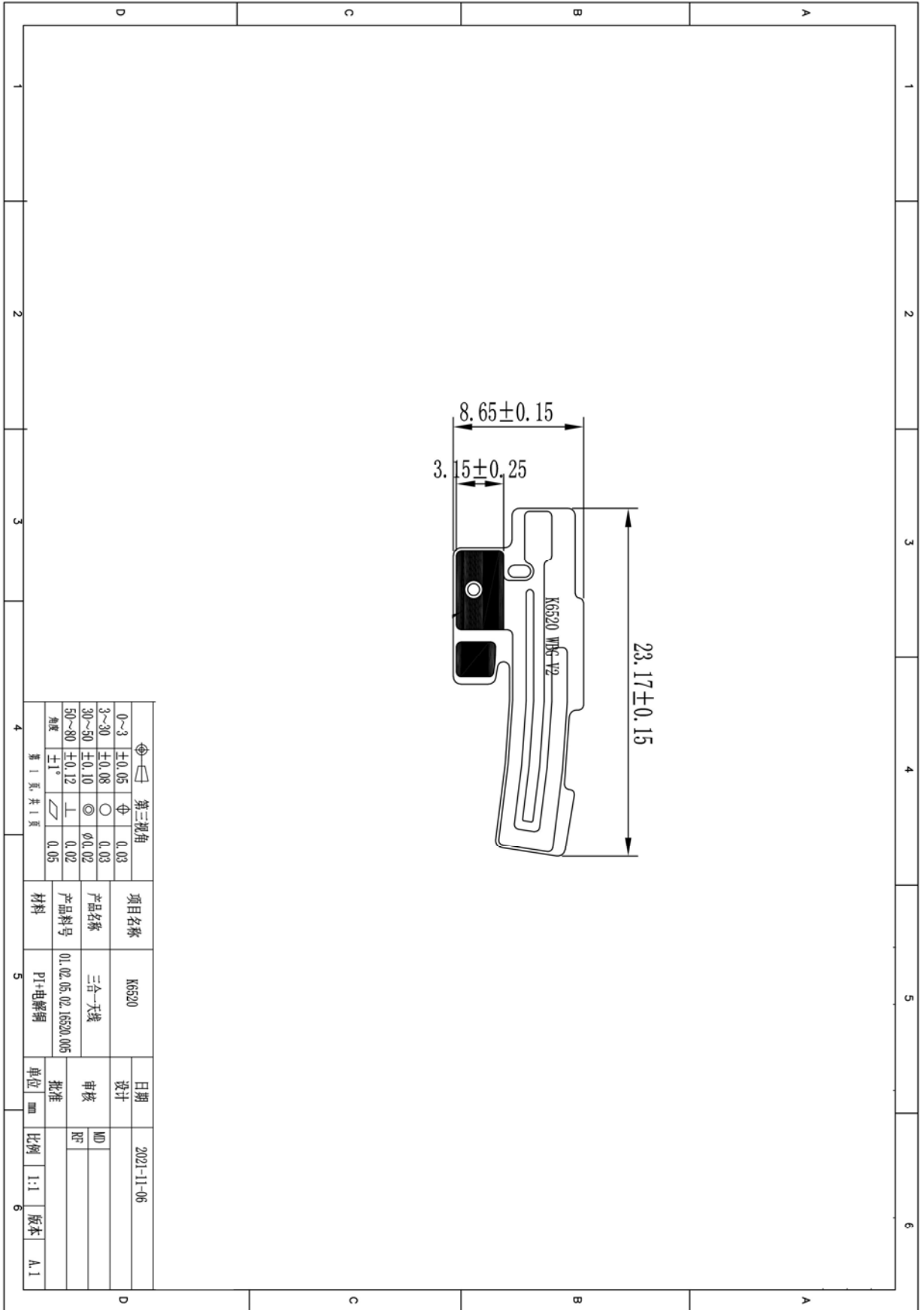
Frequency (MHz)	2412	2437	2462			
TRP(dBm)	12.83	12.5	12.2	10.74	10.09	9.99
TIS(dBm)	-82.75	-82.38	-81.6	-72.1	-71.5	-71.29
AdditionalInfor	802.11b : 11Mbps			802.11a : 54Mbps		

Test	GPS TIS
Frequency (MHz)	1575.42
TIS(dBm)	-140.23

5、 Environmental treatment

Environment handling of the original machine.

6.Engineering Draw



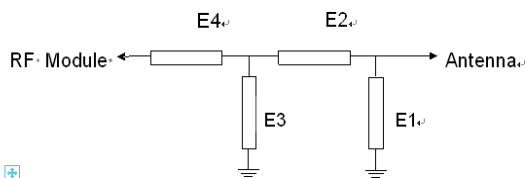
4G Main Antenna

1、 Specification

This report mainly provides the testing conditions of various electric and structural performance parameters for cell phone antenna ----K6520 Picture 1 shows the antenna designed by FUBANG.



2 、 Matching circuit diagram



3、 VSWR Testing

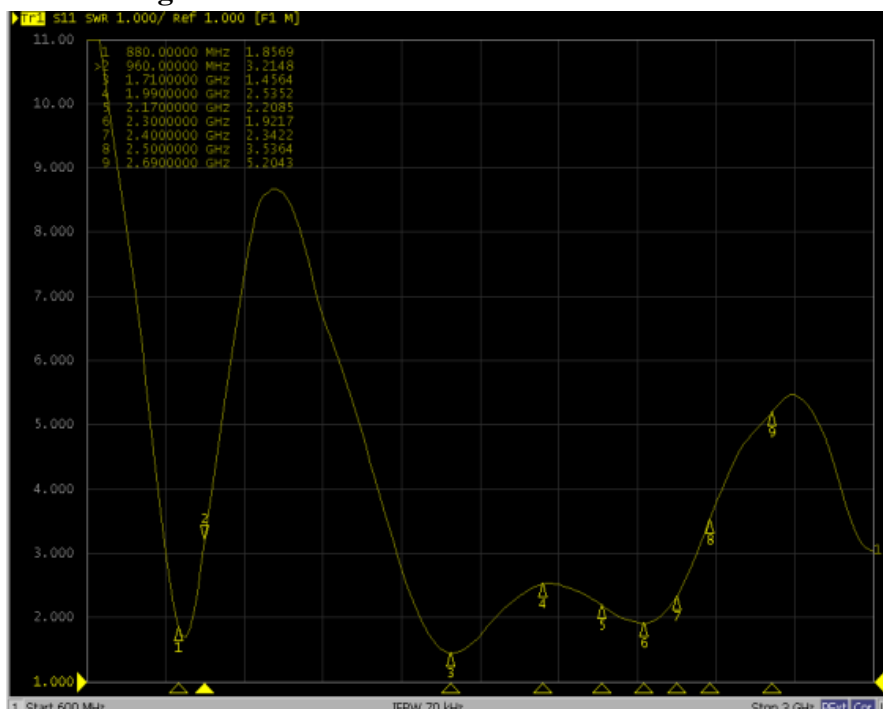
3.1 Testing connection

The VSWR testing devices are connected in sequence: Agilent5071C Network Analyzer → Testing Cable → Customer-providing Devices.

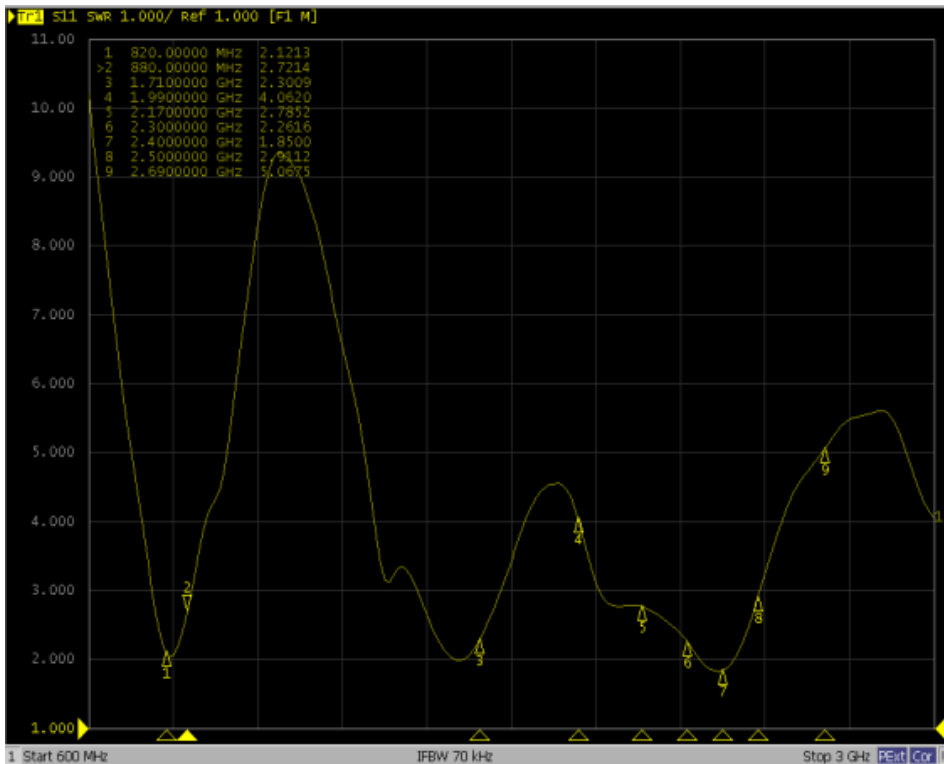
3.2 VSWR

The following table expresses the VSWR value of antenna's two edges of its frequency range. With regard to the relevant diagram of VSWR

3.3 Testing data



VSWR Tuner Works at RF1



VSWR Tuner Works at RF2

Main antenna VSWR									
Freq(MHz)	824	894	1710	1990	2170	2300	2400	2500	2700
Free Space	4.13	2.15	2.63	3.45	3.09	1.22	1.65	2.05	1.97

4、 Test the efficiency of the antenna Testing

4.1 Testing field

FB Microwave Anechoic Chamber : testing frequency ranges from 400MHz to 6GHz and the 40cm diameter spherical quiet zone, the chamber provides less than -90dB reflectivity from 400MHz—6GHz.

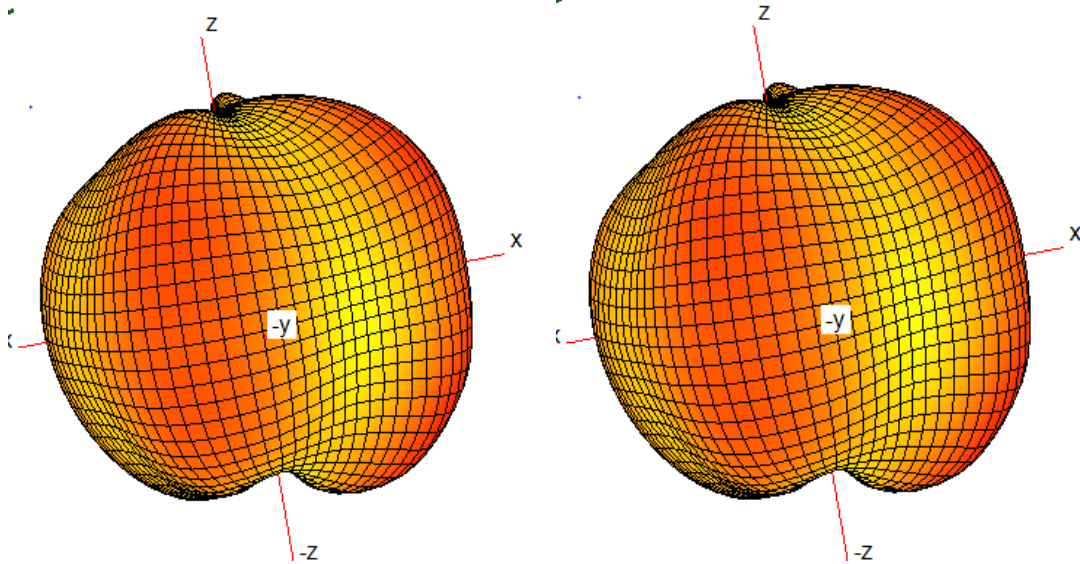
4.2 Testing results

The following table indicates the testing results related to Power and Sensitivity in Microwave Anechoic Chamber, concerning the relative diagram.

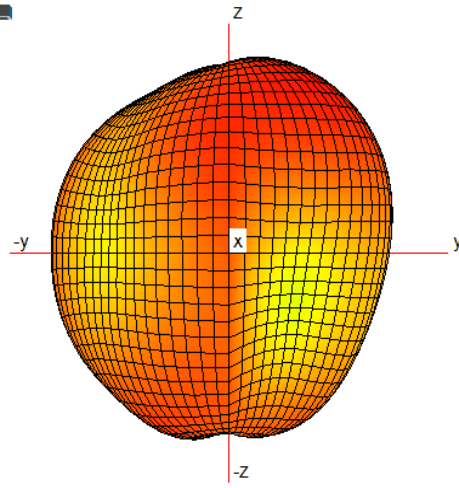
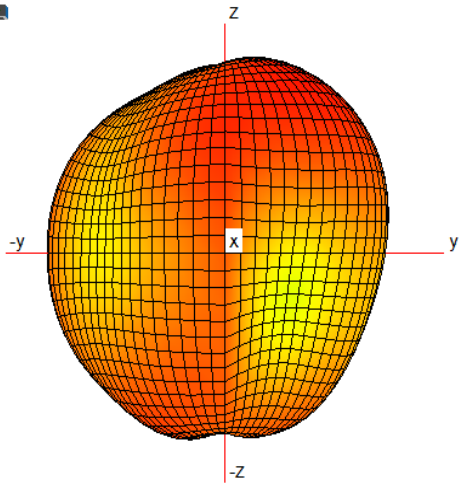
Freq (MHz)	Effi (%)	Gain (dBi)	Freq (MHz)	Effi (%)	Gain (dBi)	Freq (MHz)	Effi (%)	Gain (dBi)
820	16%	-4.7	1700	20%	-2.8	2200	33%	-3.6
830	16%	-4.8	1720	23%	-2.6	2220	33%	-3.7
840	15%	-5.1	1740	25%	-2.3	2240	33%	-3.6
850	13%	-5.4	1760	27%	-2.0	2260	32%	-3.8
860	12%	-5.8	1780	28%	-1.9	2280	33%	-3.8
870	12%	-6.0	1800	29%	-2.2	2300	32%	-3.9
880	14%	-6.3	1820	29%	-2.3	2320	31%	-4.0
890	18%	-5.1	1840	29%	-2.6	2340	29%	-4.0

COLOMBIANA DE COMERCIO S.A.

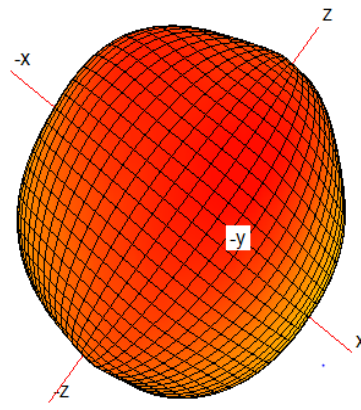
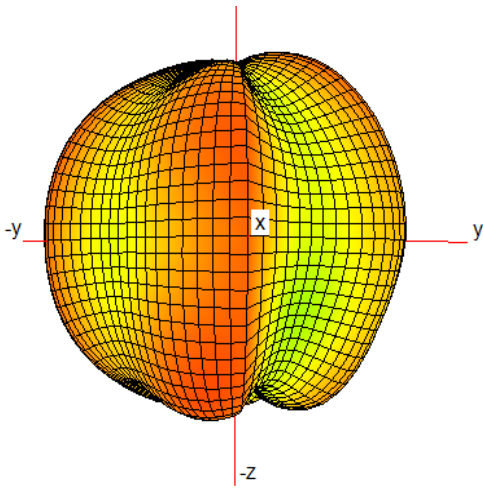
900	19%	-5.0	1860	28%	-2.4	2360	29%	-3.7
910	19%	-4.9	1880	27%	-2.5	2380	27%	-3.6
920	17%	-5.0	1900	27%	-2.5	2400	25%	-3.6
930	16%	-5.1	1920	27%	-2.4	2420	22%	-3.4
940	14%	-5.3	1940	27%	-2.6	2440	20%	-3.5
950	13%	-5.5	1960	25%	-2.8	2460	18%	-3.3
960	12%	-5.7	1980	25%	-3.0	2480	17%	-3.2
			2000	25%	-3.1	2500	15%	-3.1
			2020	26%	-3.2	2520	14%	-2.8
			2040	27%	-3.1	2540	13%	-3.0
			2060	28%	-3.0	2560	11%	-3.5
			2080	28%	-3.1	2580	10%	-3.9
			2100	29%	-3.4	2600	10%	-4.3
			2120	30%	-3.3	2620	9%	-4.6
			2140	30%	-3.4	2640	8%	-5.0
			2160	32%	-3.4	2660	8%	-5.4
			2180	33%	-3.3	2680	7%	-6.0
						2700	7%	-6.8



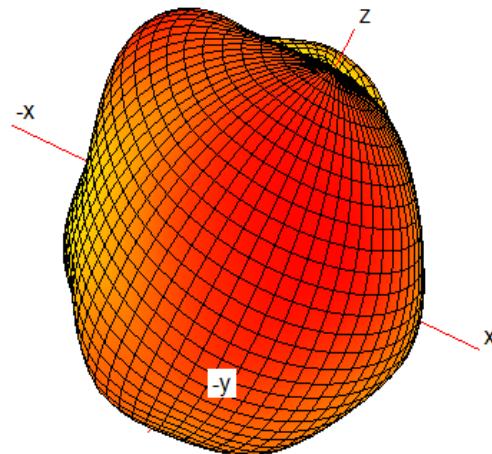
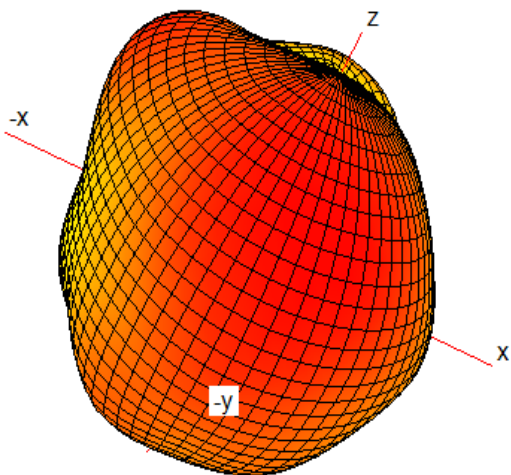
800



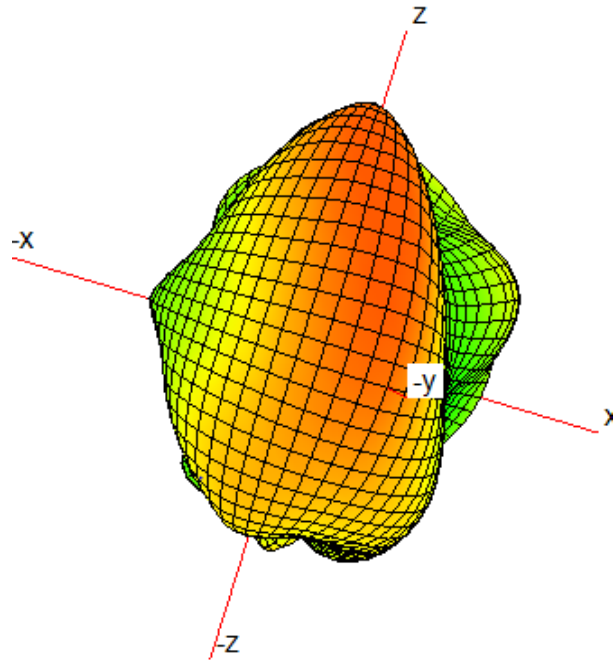
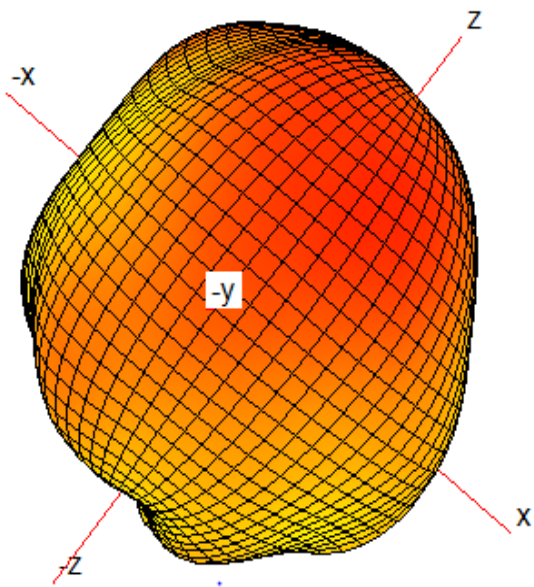
900



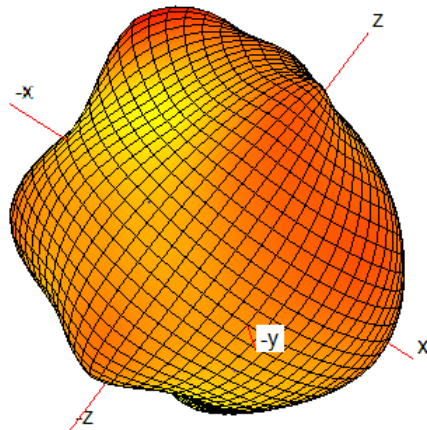
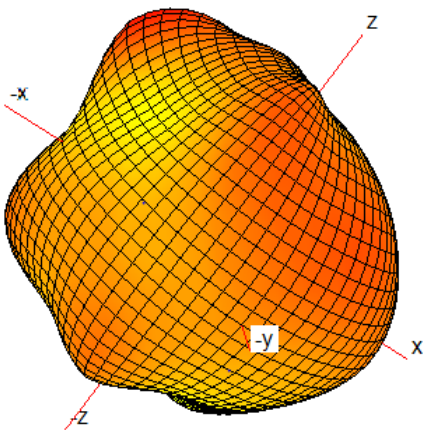
1800



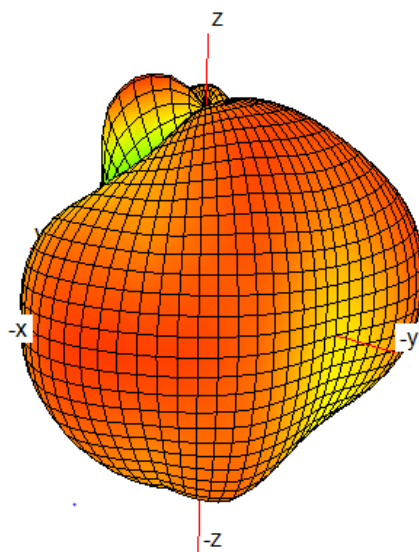
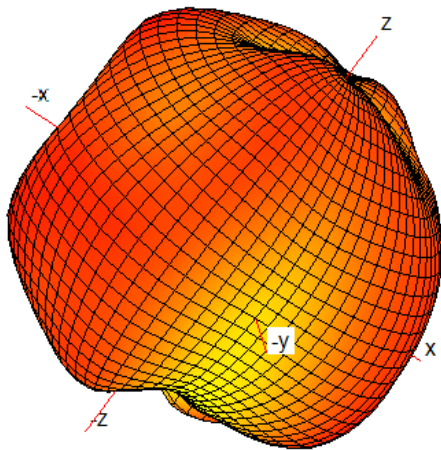
2100



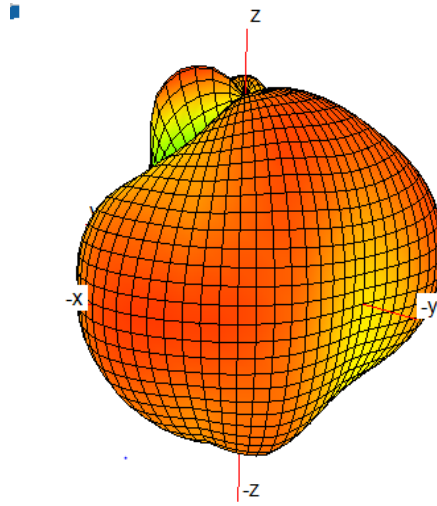
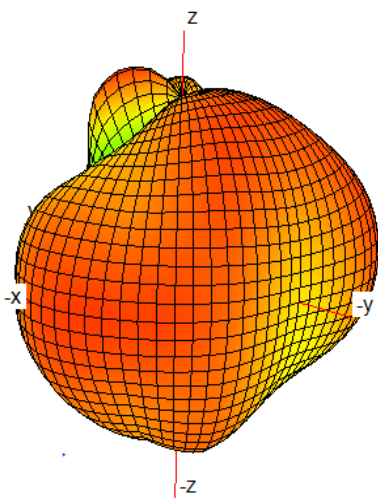
2300



2400



2500

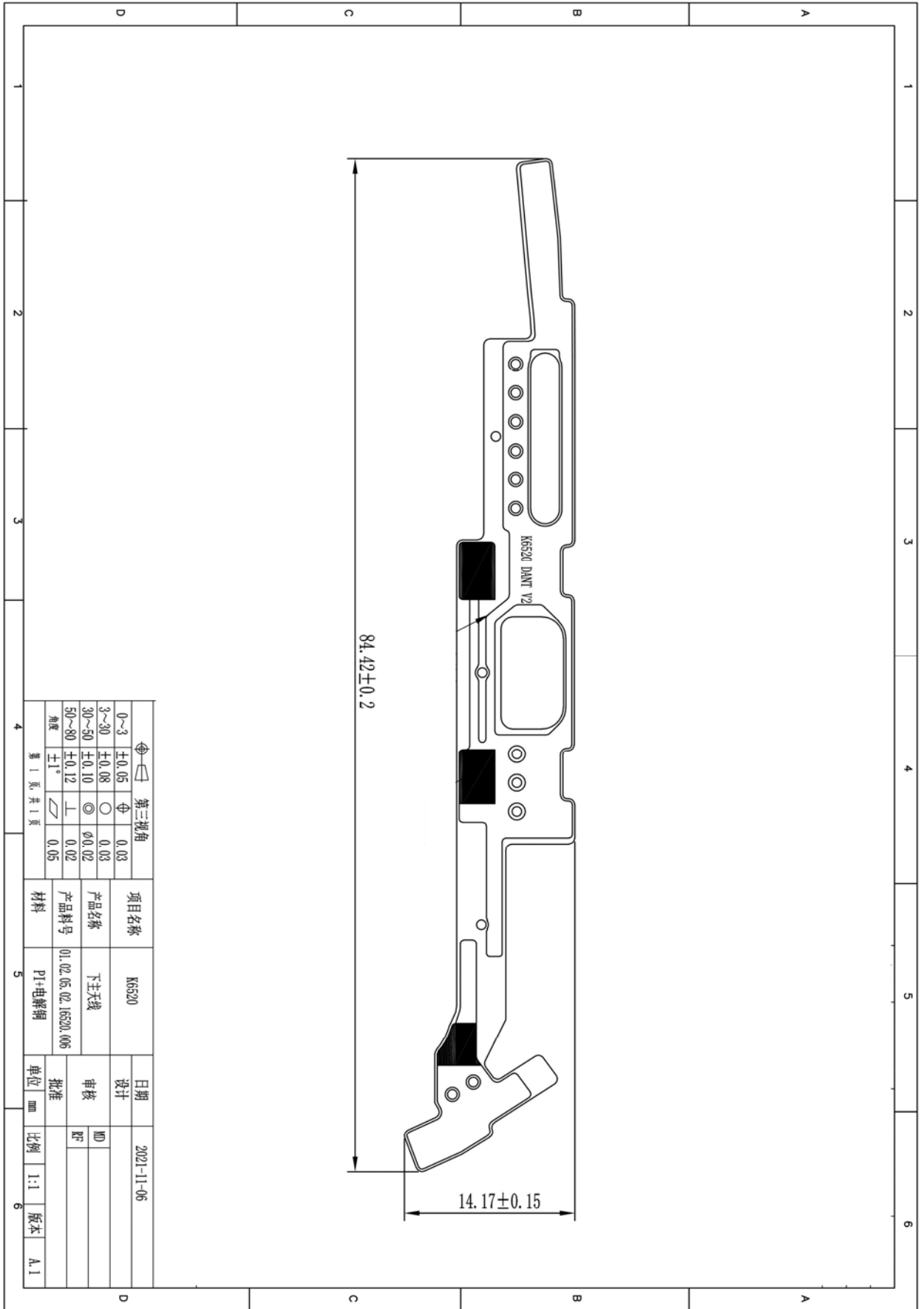


2700

5. Environmental treatment

Environment handling of the original machine.

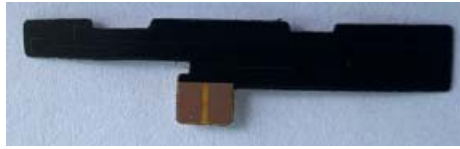
6. Engineering Draw



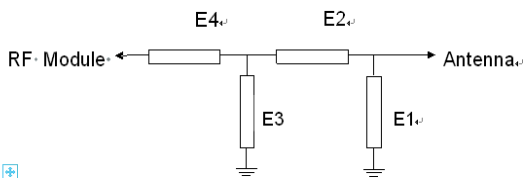
4G DIV Antenna

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2 、 Matching circuit diagram



3、 VSWR Testing

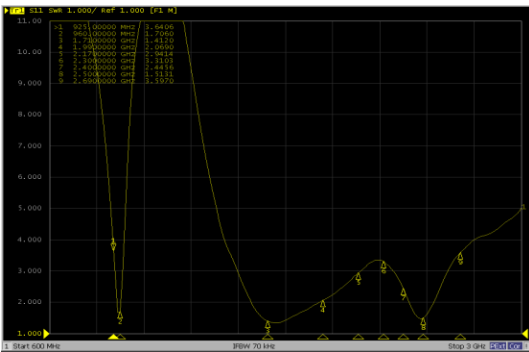
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The VSWR testing devices are connected in sequence: Agilent5071C Network Analyzer → Testing Cable → Customer-providing Devices.

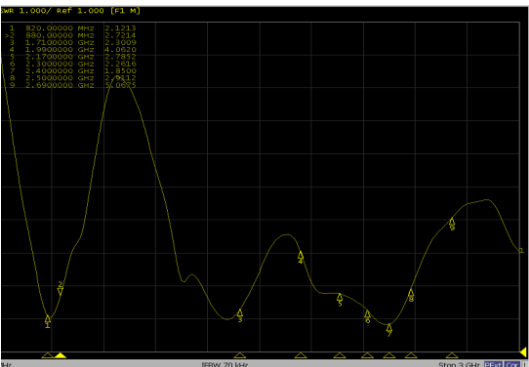
3.2 VSWR

The following table expresses the VSWR value of antenna’s two edges of its frequency range. With regard to the relevant diagram of VSWR

3.3 Testing data



VSWR Tuner Works at RF1



VSWR Tuner Works at RF2

DIV antenna VSWR									
Freq(MHz)	880	960	1710	1990	2170	2300	2400	2500	2700
Free Space	4.28	3.72	2.18	3.27	3.10	3.07	3.48	3.65	1.98

4、 Test the efficiency of the antenna Testing

4.1 Testing field

FB Microwave Anechoic Chamber : testing frequency ranges from 400MHz to 6GHz and the 40cm diameter spherical quiet zone, the chamber provides less than -90dB reflectivity from 400MHz—6GHz.

4.2 Testing results

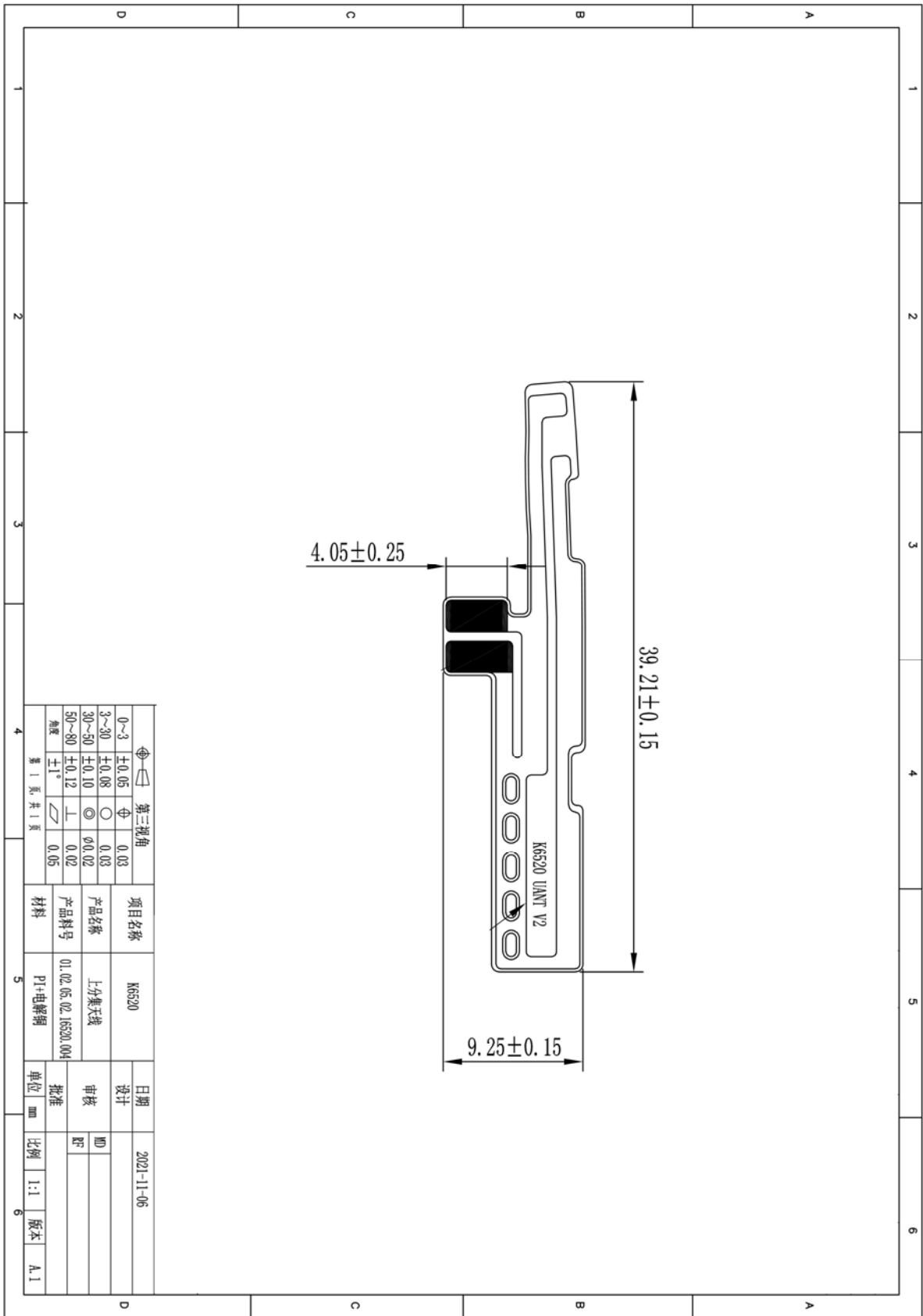
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Freq (MHz)	Effi (%)	Gain (dBi)	Freq (MHz)	Effi (%)	Gain (dBi)	Freq (MHz)	Effi (%)	Gain (dBi)	Freq (MHz)	Effi (%)	Gain (dBi)
820	9.96	-6.3	1700	35.07	-0.4	2140	24%	-2.6	2600	27.04	-1.9
830	10.73	-6.0	1720	36.31	-0.3	2160	25%	-2.4	2620	26.50	-1.8
840	11.82	-5.5	1740	38.30	0.2	2180	26%	-2.2	2640	25.20	-2.5
850	12.85	-5.1	1760	39.15	0.3	2200	26%	-2.1	2660	24.30	-2.8
860	13.91	-5.0	1780	39.62	0.3	2220	26%	-1.8	2680	23.10	-3.0
870	14.72	-5.2	1800	39.15	0.1	2240	28%	-1.4	2700	22.10	-2.9
880	14.85	-5.0	1820	37.86	-0.5	2260	30%	-1.1			
890	14.17	-5.1	1840	37.05	-0.7	2280	31%	-0.8			
900	12.80	-5.5	1860	36.15	-1.2	2300	32%	-0.4			
910	6.61	-6.9	1880	35.92	-1.2	2320	33%	0.0			
920	8.56	-5.7	1900	35.79	-1.3	2340	35%	0.3			
930	11.25	-4.8	1920	34.70	-1.4	2360	39%	0.9			
940	14.11	-4.3	1940	32.30	-1.8	2380	40%	1.1			
950	15.67	-5.0	1960	30.62	-2.1	2400	42%	1.3			
960	13.29	-6.6	1980	28.70	-2.4	2420	42%	1.2			
			2000	26.86	-2.8	2440	41%	1.0			
			2020	25.78	-3.0	2460	40%	0.8			
			2040	26.47	-2.9	2480	38%	0.5			
			2060	25.61	-3.1	2500	36%	0.3			
			2080	24.53	-3.0	2520	34%	0.0			
			2100	24.90	-2.7	2540	32%	-0.7			
			2120	25.02	-2.4	2560	30%	-1.2			
						2580	29%	-1.9			

5. Environmental treatment

Environment handling of the original machine.

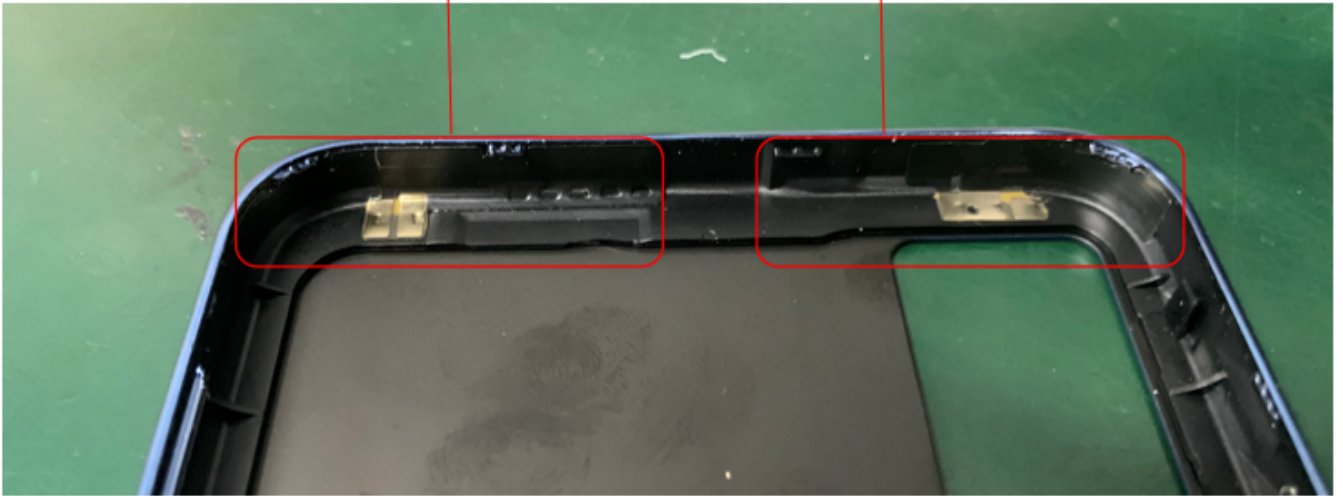
6. Engineering Draw



Antenna Picture

4G DIV

WBG



4G Main Antenna

