SWARD 深圳市索沃德通讯技术有限公司

Shenzhen Suo Ward Communication Technology Co., Ltd.

天 线 规 格 书

Antenna specification for approval

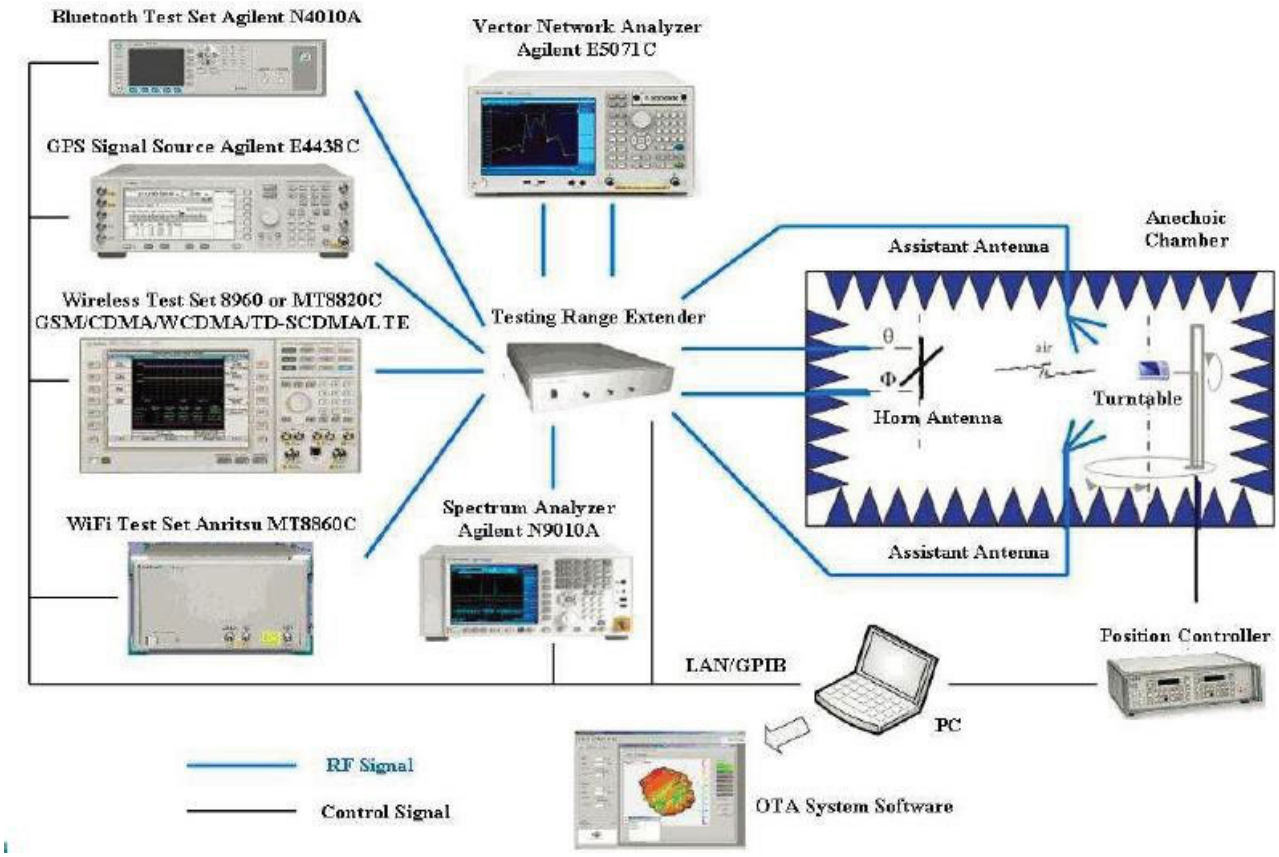
客户名称 Customer name	Lightcomm Technology Co., Ltd		
机型 Model	MID1108MS（11 寸金属壳-MT8781）		
天线频段 Antenna frequency	1.575GHz&2.4GHz&5GHz		
天线功能 Antenna function	GPS&WIFI&BT&5Gwifi 天线		
天线材质 Antenna material	FPC	FPC 颜色 FPC color	BLACK
型号 model	ST1708A-1B2-A		
料号 Material number	ST1708A-1B2-A		
客户料号 Customer Part Number			

索 沃 德 承 认 签 章 Ward accepted the signature		客 户 承 认 签 章 Client acknowledges signature	
结构 structure		采购 Purchase	
文控 Document control		结构 structure	
射频 radio frequency		工程 engineering	
审核 To examine		品质 QC	
承辦人 Responsible	Tingting Li	审核 To examine	
日期 date 2022.10.21	盖章区 Seal area	日期 date 2022.10.21	盖章区 Seal area

No.	Authentication No.	Material type	issue Date	Remarks
1	A2220186128101ER1	tinned copper wire	2022-05-17	one year
2	CANEC2200386502	halogen	2022-01-12	one year
3	CANEC2200386501	back adhesive	2022-01-12	one year
4	SHAEC2200415801	FEP sheath	2022-01-15	one year
5	SHAEC2127178503	FEPinsulation	2021-12-21	one year
6	SZXEC2203054804	tin wire	2022-09-19	one year
7	SZXEC2203054808	tin bar	2022-09-19	one year
8	ETR22300684	printing ink	2022-03-09	one year
9	EKR22501369	base material	2022-06-27	one year
10	CANEC2124348308	EVA foam	2022-01-14	one year
11	SZXEC2202709609	conductive cloth	2022-08-16	one year
12	CANEC2218227002	gold plating	2022-08-30	one year

List

一: Device support&testable antenna type



二:概述

(1)Antenna performance

1. This approval sheet supports for MID project. FPC antennas include in this project. This report is for the performance of GPS&WIFI&BT antenna.
2. Antenna shape size: Meet the requirement of MID
3. Antenna band: 1570MHz~1580MHz, 2400MHz~2500MHz&5000MHz~6000MHz
4. Antenna material: Antenna material meet the requirement of MID
5. Adhesive performance: Adhesive performance meet the requirement of MID
6. Antenna performance meet the spec below:

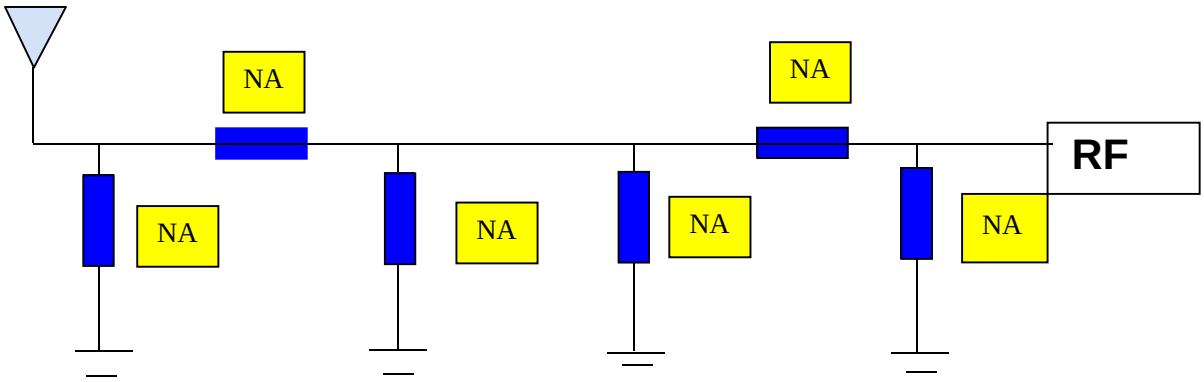
Description	1.57GHz~1.58GHz, 2.4GHz~2.5GHz&5GHz~6GHz	Units
VSWR	≤2.0	
Antenna Gain	1.57GHz~1.58GHz:-0.38 MAX 2.4GHz~2.5GHz:2.45 MAX 5GHz~6GHz:1.7 MAX	dBi
Antenna Efficiency	≥35	%
Feed Impedance	50 ohms	
Operating Temperature	-40 to +85 deg C	
Polarization / Azimuth	Linear / Omni-directional	

(2)Mechanical Information

Mechanical Dimension	
Cable Length	NA
Description	GPS&WIFI&BT antenna
Material	FPC
Coaxial Cable	NA
Environmental	
Operation Temperature	-40 to +85 deg C
Storage Temperature	-40 to +85 deg C

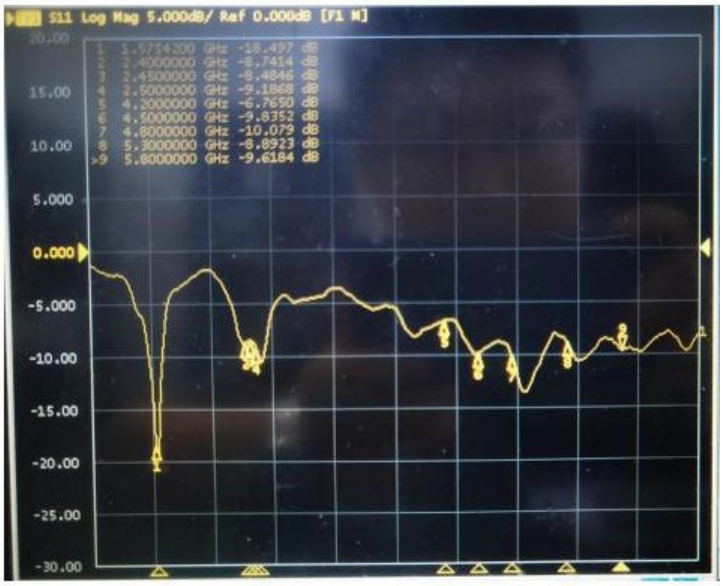
三: Matching circuit diagram&machine picture&antenna picture

(1)Matching circuit



(2) Machine picture&antenna picture

四: Antenna standing wave ratio&antenna efficiency （VSWR）



Passive Test For GPS2												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
1570	29.59	-5.29	-0.69	-2.84	9.897	19.693	-0.69	-14.71	4.6	0	43.11	42.98
1571	29.67	-5.28	-0.66	-2.81	9.926	19.747	-0.66	-14.7	4.62	0	43.11	42.98
1572	29.75	-5.27	-0.63	-2.78	9.93	19.818	-0.63	-14.75	4.63	0	43.11	42.97
1573	29.88	-5.25	-0.6	-2.75	9.955	19.927	-0.6	-14.71	4.64	0	43.11	42.97
1574	30.03	-5.23	-0.58	-2.73	10.007	20.018	-0.58	-14.66	4.65	0	43.11	42.97
1575	30.18	-5.2	-0.55	-2.7	10.056	20.123	-0.55	-14.7	4.65	0	43.11	42.96
1576	30.4	-5.17	-0.51	-2.66	10.134	20.268	-0.51	-14.79	4.66	0	43.12	42.98
1577	30.53	-5.15	-0.49	-2.64	10.18	20.352	-0.49	-14.74	4.67	0	43.13	42.99
1578	30.69	-5.13	-0.46	-2.61	10.243	20.452	-0.46	-14.72	4.67	0	43.14	43
1579	30.82	-5.11	-0.42	-2.57	10.3	20.52	-0.42	-14.95	4.69	0	43.14	43.02
1580	30.92	-5.1	-0.38	-2.53	10.34	20.579	-0.38	-14.98	4.71	0	43.15	43.03

Passive Test For 2.4G												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
2400	22.37	-6.5	-1.31	-3.46	9.914	12.457	-1.31	-16.07	5.19	90	47.81	47.38
2410	26.01	-5.85	-0.66	-2.81	11.378	14.629	-0.66	-14.96	5.19	150	47.9	47.54
2420	30.39	-5.17	-0.06	-2.21	13.063	17.324	-0.06	-13.94	5.11	120	48.08	47.81
2430	31.42	-5.03	0.02	-2.13	13.382	18.036	0.02	-13.96	5.05	120	48	47.72
2440	39.18	-4.07	1	-1.15	16.64	22.543	1	-13.36	5.07	120	48.28	48.01
2450	41.33	-3.84	1.25	-0.9	17.632	23.7	1.25	-13.33	5.08	120	48.47	48.17
2460	43.87	-3.58	1.53	-0.62	18.953	24.92	1.53	-13.25	5.11	120	48.33	48.02
2470	50.06	-3.01	2.13	-0.02	21.895	28.165	2.13	-12.92	5.14	120	48.33	47.97
2480	51.82	-2.85	2.22	0.07	22.895	28.93	2.22	-12.66	5.07	120	48.8	48.44
2490	53.97	-2.68	2.33	0.18	23.975	29.996	2.33	-12.12	5.01	120	48.55	48.3
2500	56.25	-2.5	2.45	0.3	25.127	31.125	2.45	-11.35	4.95	120	48.95	48.74

Passive Test For 5G-WIFI												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
5000	44.86	-3.48	1.7	-0.45	21.178	23.681	1.7	-22.12	5.18	0	56.19	54.79
5100	38.8	-4.11	1	-1.15	18.798	19.999	1	-15.06	5.11	30	56.99	56.03
5200	36.56	-4.37	0.22	-1.93	18.53	18.025	0.22	-14.55	4.59	30	56.13	55.29
5300	35.32	-4.52	0.36	-1.79	18.275	17.044	0.36	-16.48	4.88	0	56.19	55.48
5400	40.8	-3.89	1.05	-1.1	20.412	20.39	1.05	-14.76	4.94	0	56.4	55.65
5500	38.49	-4.15	0.59	-1.56	18.628	19.864	0.59	-15.21	4.74	0	56.16	55.65
5600	32.08	-4.94	-0.75	-2.9	14.827	17.252	-0.75	-17.47	4.19	0	56.13	55.85
5700	30.08	-5.22	-0.55	-2.7	13.312	16.772	-0.55	-16.07	4.67	90	56.62	56.26
5800	33.08	-4.8	-0.1	-2.25	12.865	20.216	-0.1	-19.64	4.7	90	56.85	56.38
5900	31.28	-5.05	-0.75	-2.9	13.55	17.727	-0.75	-22.48	4.3	90	56.59	56.12
6000	28.42	-5.46	-0.36	-2.51	15.072	13.346	-0.36	-21.26	5.1	30	57.16	57.04

五: Active data

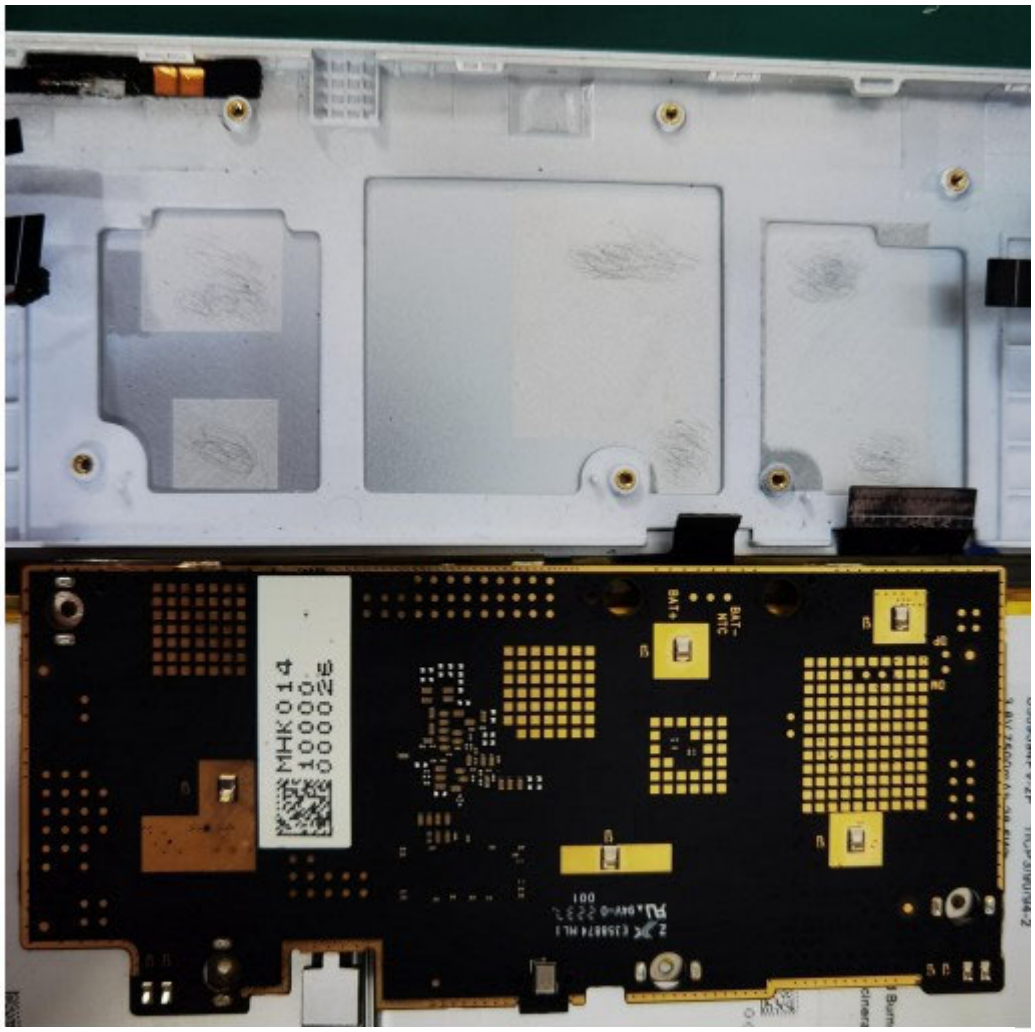
Test Result	802.11b : 11MBps			Test Result	802.11b : 11MBps		
	1	7	13		1	7	13
Frequency (MHz)	2412	2442	2472	Frequency (MHz)	2412	2442	2472
TRP(dBm)	13.85	15.06	14.72	TIS(dBm)	-83.52	-83.54	-83.24
NHPRP(dBm) 45	12.71	13.92	13.53	NHPIS(dBm) 45	-82.38	-82.4	-82.06
MAX(dBm)	18.25	19.21	18.86	MaxPosSens	-87.92	-87.68	-87.15
Test Result	802.11g : 54MBps			Test Result	802.11g : 54MBps		
	1	7	13		1	7	13
Frequency (MHz)	2412	2442	2472	Frequency (MHz)	2412	2442	2472
TRP(dBm)	13.32	13.48	12.91	TIS(dBm)	-73.81	-74.11	-72.99
NHPRP(dBm) 45	12.37	12.5	11.84	NHPIS(dBm) 45	-72.86	-73.14	-71.92
MAX(dBm)	18.9	18.62	17.3	MaxPosSens	-78.5	-78.88	-77.35
Test Result	802.11n : MCS7			Test Result	802.11n : MCS7		
	1	7	13		1	7	13
Frequency (MHz)	2412	2442	2472	Frequency (MHz)	2412	2442	2472
TRP(dBm)	13.27	13.57	13.37	TIS(dBm)	-66.67	-66.56	-65.06
NHPRP(dBm) 45	12.16	12.46	12.27	NHPIS(dBm) 45	-65.56	-65.45	-63.96
MAX(dBm)	17.84	17.72	17.68	MaxPosSens	-71.1	-71.68	-69.35

Test Result	802.11n : MCS7			Test Result	802.11n : MCS7		
	36	149	165		36	149	165
Frequency (MHz)	5180	5745	5825	Frequency (MHz)	5180	5745	5825
TRP(dBm)	11.79	11.43	12.28	TIS(dBm)	-70.39	-70.12	-68.12
NHPRP(dBm) 45	10.59	10.09	11.09	NHPIS(dBm) 45	-69.18	-68.78	-66.94
MAX(dBm)	17.42	15.74	16.75	MaxPosSens	-74.77	-73.85	-72.37
Test Result	802.11a : 54MBps			Test Result	802.11a : 54MBps		
	36	149	165		36	149	165
Frequency (MHz)	5180	5745	5825	Frequency (MHz)	5180	5745	5825
TRP(dBm)	12.59	11.9	12.82	TIS(dBm)	-75.21	-74.25	-73.17
NHPRP(dBm) 45	11.34	10.66	11.66	NHPIS(dBm) 45	-73.95	-73.02	-72.01
MAX(dBm)	17.76	16.3	16.86	MaxPosSens	-79.17	-78.05	-76.97

Test Result	802.11b : 11MBps			Test Result	802.11b : 11MBps		
	1	7	13		1	7	13
Frequency (MHz)	2412	2442	2472	Frequency (MHz)	2412	2442	2472
TRP(dBm)	13.16	14.76	15.05	TIS(dBm)	-84.14	-84.23	-84.1
NHPRP(dBm) 45	12.28	13.83	14.13	NHPIS(dBm) 45	-83.26	-83.3	-83.19
MAX(dBm)	17.27	19.2	19.96	MaxPosSens	-87.92	-87.68	-87.75
Test Result	802.11g : 54MBps			Test Result	802.11g : 54MBps		
	1	7	13		1	7	13
Frequency (MHz)	2412	2442	2472	Frequency (MHz)	2412	2442	2472
TRP(dBm)	13.44	13.51	13.06	TIS(dBm)	-73.65	-73.41	-71.26
NHPRP(dBm) 45	12.51	12.57	12.07	NHPIS(dBm) 45	-72.72	-72.48	-70.27
MAX(dBm)	17.93	18.19	17.59	MaxPosSens	-77.1	-76.88	-75.15
Test Result	802.11n : MCS7			Test Result	802.11n : MCS7		
	1	7	13		1	7	13
Frequency (MHz)	2412	2442	2472	Frequency (MHz)	2412	2442	2472
TRP(dBm)	12.15	12.99	13.08	TIS(dBm)	-65.59	-67.29	-66.16
NHPRP(dBm) 45	11.23	12.07	12.18	NHPIS(dBm) 45	-64.67	-66.36	-65.26
MAX(dBm)	16.52	17.42	18.22	MaxPosSens	-69.7	-70.88	-70.15

Test Result	802.11n : MCS7			Test Result	802.11n : MCS7		
	36	149	165		36	149	165
Frequency (MHz)	5180	5745	5825	Frequency (MHz)	5180	5745	5825
TRP(dBm)	12.59	12.04	11.95	TIS(dBm)	-66.78	-68.94	-66.75
NHPRP(dBm) 45	11.2	10.62	10.63	NHPIS(dBm) 45	-65.38	-67.52	-65.43
MAX(dBm)	17.68	17.44	17.81	MaxPosSens	-71.57	-74.29	-72.37
Test Result	802.11a : 54MBps			Test Result	802.11a : 54MBps		
	36	149	165		36	149	165
Frequency (MHz)	5180	5745	5825	Frequency (MHz)	5180	5745	5825
TRP(dBm)	12.02	12.02	12.52	TIS(dBm)	-69.38	-71.89	-67.96
NHPRP(dBm) 45	10.37	10.44	11.1	NHPIS(dBm) 45	-67.74	-70.31	-66.55
MAX(dBm)	18.29	17.64	18.38	MaxPosSens	-75.57	-77.45	-72.97

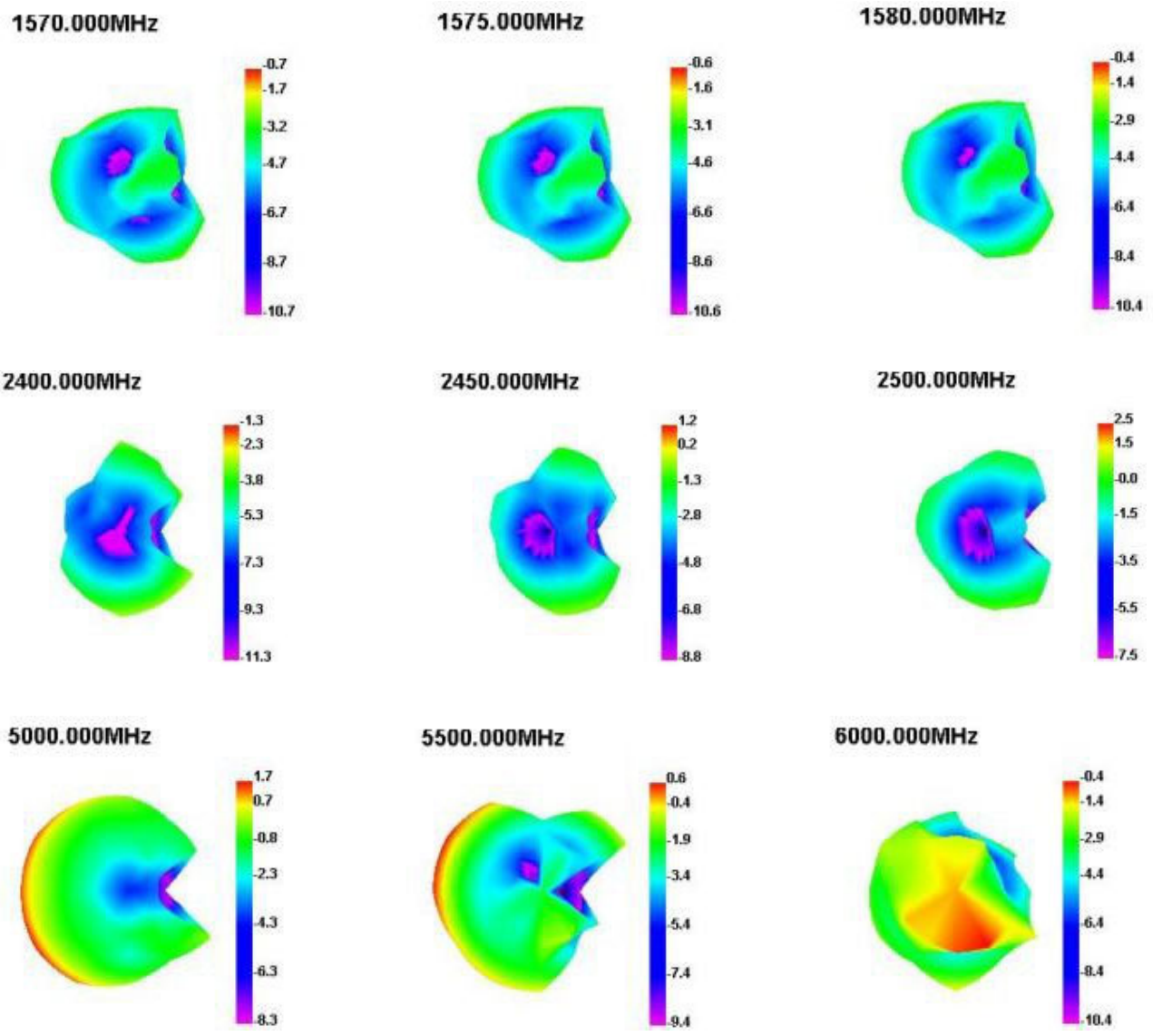
六: Environmental Treatment



Note: Please optimize the specific environmental treatment according to the test report

七: Measured Drawing of Antenna

八:3D pattern



九: Structural Drawing

3M300