FCC Test Report

Client Name	:	SIYI Technology (Shenzhen) Co., Ltd
Address	:	Room 1002, Tower 2, Jiufang Square, Tiezai Road, Gongle Community, Xixiang Street, Baoan District, Shenzhen, China
Product Name	:	MK15 Transmitter
Date	:	Oct. 08, 2021

Shenzhen Anbotek Compliance Laboratory Limited

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TEST REPORT

Applicant	:	SIYI Technology (Shenzhen) Co., Ltd
Manufacturer	:	SIYI Technology (Shenzhen) Co., Ltd
Product Name	:	MK15 Transmitter
Model No.	:	MK15TX
Trade Mark	:	SIYI
Rating(s)	:	Input: DC 7.2V, 1A(via adapter input: 100-240V~ 50/60Hz 0.8A; with DC 7.2V, 10200mAh battery inside)
Test Standard(s)	:	**FCC Part15 Subpart E, Paragraph 15.407**
Test Method(s)	:	**ANSI C63.10: 2020,** **KDB 789033 D02 General UNII Test Procedures New Rules v02r01** **KDB 662911 D01 Multiple Transmitter Output v02r01**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart E requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt	Jul. 27, 2021
Date of Test	Jul. 27~Sept. 27, 2021
Prepared By	Ella Liang (Ella Liang)
Approved & Authorized Signer	Kingkong Jin (Kingkong Jin)

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel:(86) 755-26066440 Fax: (86) 755-26014772 Email: service@anbotek.com
Hotline 400-003-0500
www.anbotek.com

1. General Information

1.1. Client Information

Applicant	:	SIYI Technology (Shenzhen) Co., Ltd
Address	:	Room 1002, Tower 2, Jiufang Square, Tiezai Road, Gongle Community, Xixiang Street, Baoan District, Shenzhen, China
Manufacturer	:	SIYI Technology (Shenzhen) Co., Ltd
Address	:	Room 1002, Tower 2, Jiufang Square, Tiezai Road, Gongle Community, Xixiang Street, Baoan District, Shenzhen, China
Factory	:	SIYI Technology (Shenzhen) Co., Ltd
Address	:	Floor 2, Building C, Yuxing Science & Technology Industrial Park, Xixiang Street, Baoan District, Shenzhen

1.2. Description of Device (EUT)

Product Name	:	MK15 Transmitter	
Model No.	:	MK15TX	
Trade Mark	:	SIYI	
Test Power Supply	:	AC 120V, 60Hz for adapter / AC 240V, 60Hz for adapter/ DC 7.2V Battery inside	
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)	
Product Description	:	Operation Frequency:	5745MHz~5825MHz
		Number of Channel:	5 Channels for 802.11a
		Modulation Type:	OFDM
		Antenna Type:	Rod antenna
		Antenna Gain(Peak):	ANT1/ANT2: 5 dBi
		Adapter:	N/A
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2) This report is for 5.8G WiFi module.			

1.3. Auxiliary Equipment Used During Test

Adapter		M/N: A2023 Input: AC 100-240V 0.7A 50-60Hz USB1 Output: DC 5V 2.4A USB2 Output: DC 5V 2.4A

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Mode	Test channel	Frequency (MHz)
OFDM(802.11a/n20/ac20)	CH 149	5745MHz
	CH 157	5785MHz
	CH 165	5825MHz

Note:
1. The measurements are performed at the highest, middle, lowest available channels.
2. The EUT has been tested as an independent unit. And Continual Transmitting in maximum power.
3. For the relevant Conducted Measurement, the temporary antenna connector is used during the measurement. Antenna Connector Impedance: 50Ω, Cable Loss: 1.0 dB
4. The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is more than 98%

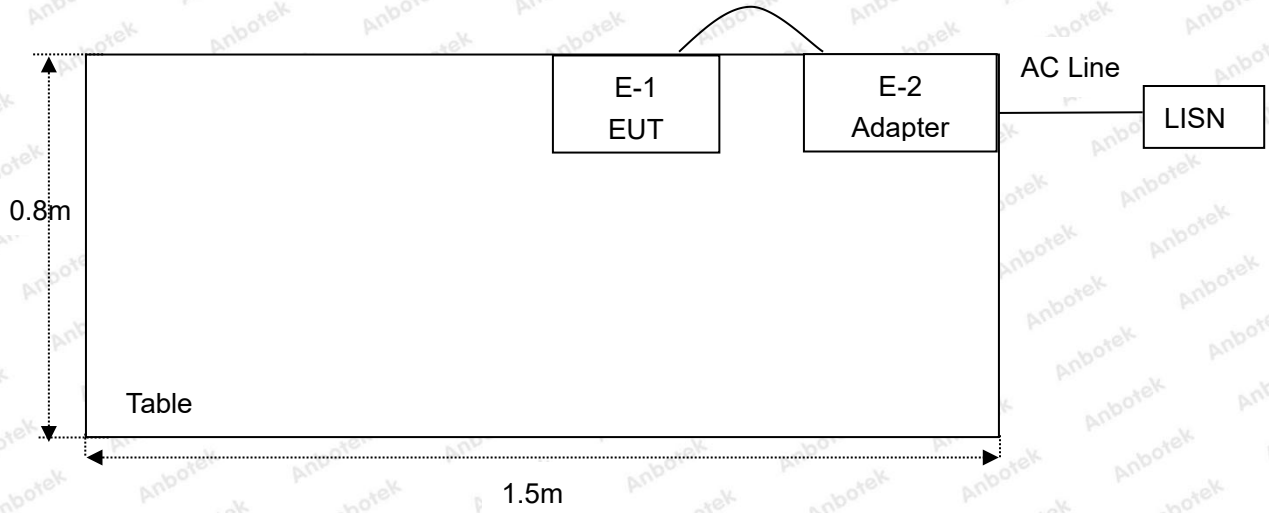
1.5. List of channels

802.11a

Channel	Freq.(MHz)	Channel	Freq.(MHz)
149	5745	153	5765
157	5785	161	5805
165	5825		

1.6. Description Of Test Setup

CE



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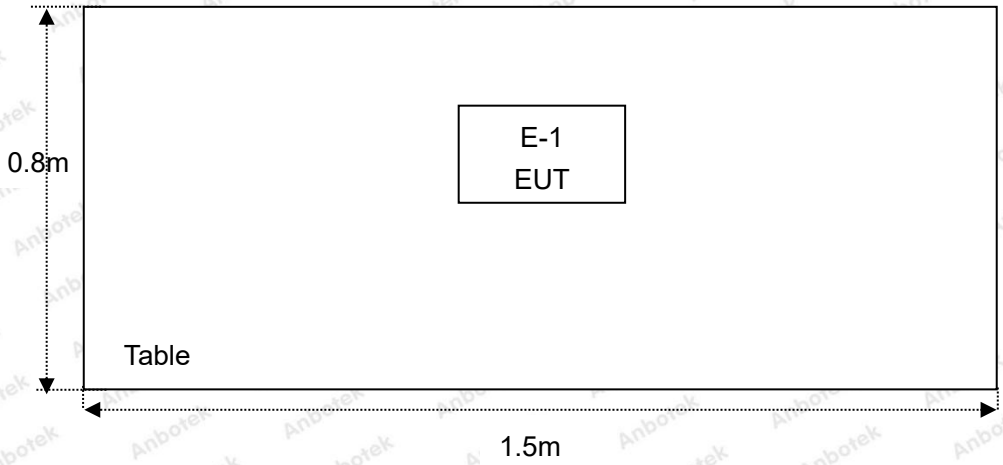


1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 26, 2020	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 26, 2020	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 26, 2020	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Oct. 26, 2020	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 02, 2020	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 02, 2020	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 02, 2020	2 Year
10.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Nov. 02, 2020	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 26, 2020	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Oct. 26, 2020	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 26, 2020	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 26, 2020	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 26, 2020	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 26, 2020	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 26, 2020	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Oct. 26, 2020	1 Year

1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB

1.9. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.
1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test Results

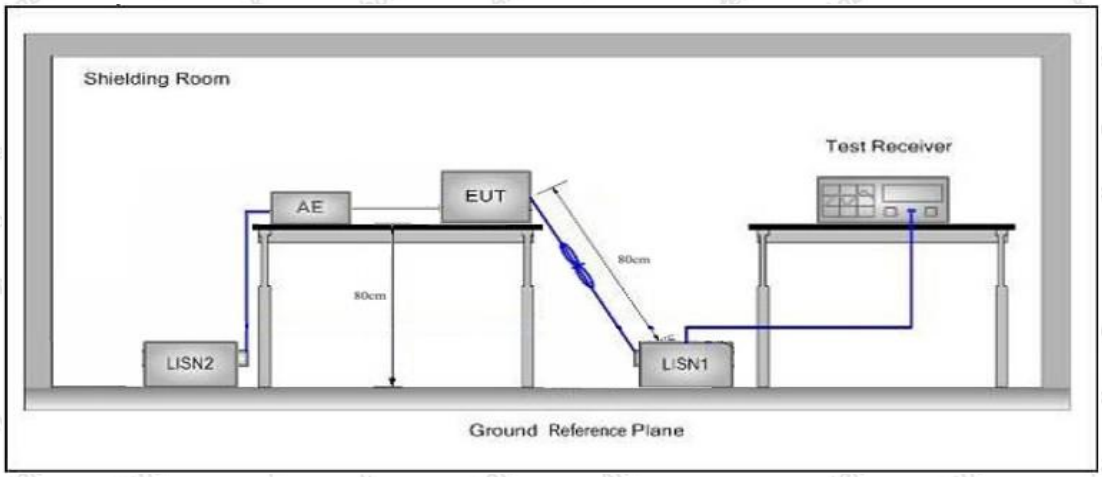
Standard	Test Type	Result
15.207 & 15.407	Conducted Emission	PASS
15.205/15.209	Spurious Emission	PASS
15.407(b)	Band Edge	PASS
15.407(a)(5)&15.407(e)	Occupy Bandwidth	PASS
15.407(a)(3)	Maximum Conducted Output Power	PASS
15.407(a)(1)(3)	Peak Power Spectral Density	PASS
15.203	Antenna Requirement	PASS
15.407(g)	Frequency Stability	PASS

3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207&15.407		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: (1) *Decreasing linearly with logarithm of the frequency. (2) The lower limit shall apply at the transition frequency.			

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2010 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

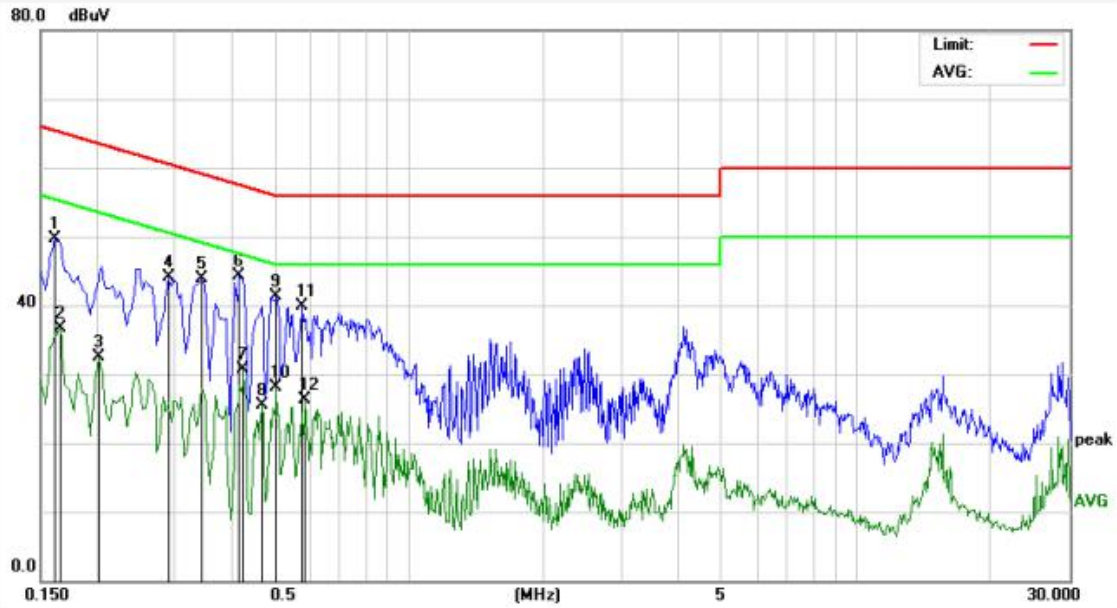
The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

During the test, pre-scan all modes, and found the 802.11a for ANT1+2 which is the worst case, only the worst case is recorded in the report.

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: 802.11a for ANT1
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.: 24.5℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1620	39.60	10.12	49.72	65.36	-15.64	QP	
2	0.1660	26.59	10.12	36.71	55.15	-18.44	AVG	
3	0.2020	22.40	10.12	32.52	53.52	-21.00	AVG	
4	0.2900	34.01	10.13	44.14	60.52	-16.38	QP	
5	0.3460	33.81	10.12	43.93	59.06	-15.13	QP	
6	0.4180	34.21	10.12	44.33	57.49	-13.16	QP	
7	0.4260	20.51	10.12	30.63	47.33	-16.70	AVG	
8	0.4700	15.39	10.14	25.53	46.51	-20.98	AVG	
9	0.5060	31.17	10.15	41.32	56.00	-14.68	QP	
10	0.5060	17.96	10.15	28.11	46.00	-17.89	AVG	
11	0.5780	29.78	10.15	39.93	56.00	-16.07	QP	
12	0.5860	16.06	10.15	26.21	46.00	-19.79	AVG	

Conducted Emission Test Data

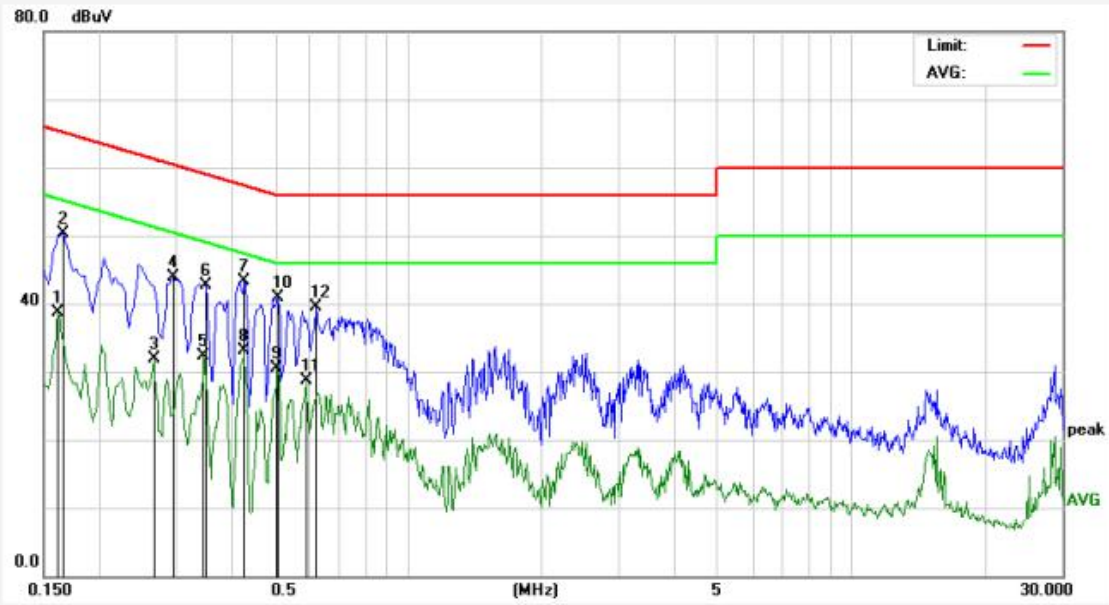
Test Site: 1# Shielded Room

Operating Condition: 802.11a for ANT1

Test Specification: AC 120V, 60Hz for adapter

Comment: Neutral Line

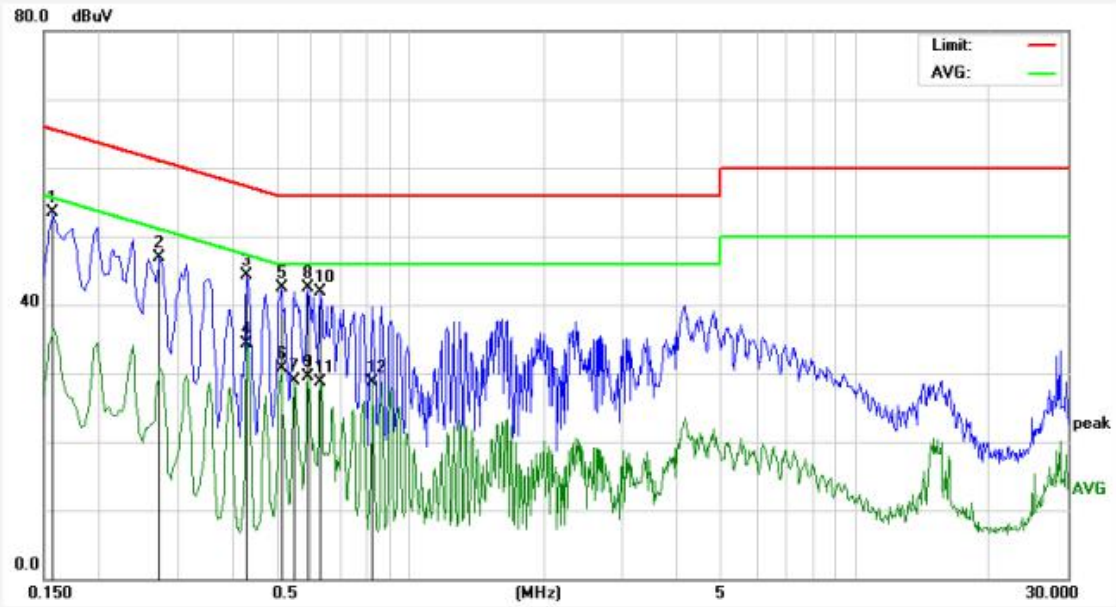
Tem.: 24.5℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1620	28.60	10.12	38.72	55.36	-16.64	AVG	
2	0.1660	40.23	10.12	50.35	65.15	-14.80	QP	
3	0.2660	21.82	10.13	31.95	51.24	-19.29	AVG	
4	0.2940	33.79	10.13	43.92	60.41	-16.49	QP	
5	0.3460	22.12	10.12	32.24	49.06	-16.82	AVG	
6	0.3500	32.56	10.12	42.68	58.96	-16.28	QP	
7	0.4260	33.22	10.12	43.34	57.33	-13.99	QP	
8	0.4260	23.06	10.12	33.18	47.33	-14.15	AVG	
9	0.5060	20.27	10.15	30.42	46.00	-15.58	AVG	
10	0.5100	30.71	10.15	40.86	56.00	-15.14	QP	
11	0.5899	18.54	10.15	28.69	46.00	-17.31	AVG	
12	0.6180	29.32	10.15	39.47	56.00	-16.53	QP	

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: 802.11a for ANT1
Test Specification: AC 240V, 60Hz for adapter
Comment: Live Line
Tem.: 24.5℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1580	43.29	10.12	53.41	65.56	-12.15	QP	
2	0.2740	36.85	10.13	46.98	60.99	-14.01	QP	
3	0.4300	34.24	10.12	44.36	57.25	-12.89	QP	
4	0.4300	24.19	10.12	34.31	47.25	-12.94	AVG	
5	0.5140	32.38	10.15	42.53	56.00	-13.47	QP	
6	0.5140	20.63	10.15	30.78	46.00	-15.22	AVG	
7	0.5500	18.78	10.15	28.93	46.00	-17.07	AVG	
8	0.5899	32.31	10.15	42.46	56.00	-13.54	QP	
9	0.5899	19.30	10.15	29.45	46.00	-16.55	AVG	
10	0.6300	31.83	10.15	41.98	56.00	-14.02	QP	
11	0.6300	18.59	10.15	28.74	46.00	-17.26	AVG	
12	0.8220	18.56	10.15	28.71	46.00	-17.29	AVG	

Conducted Emission Test Data

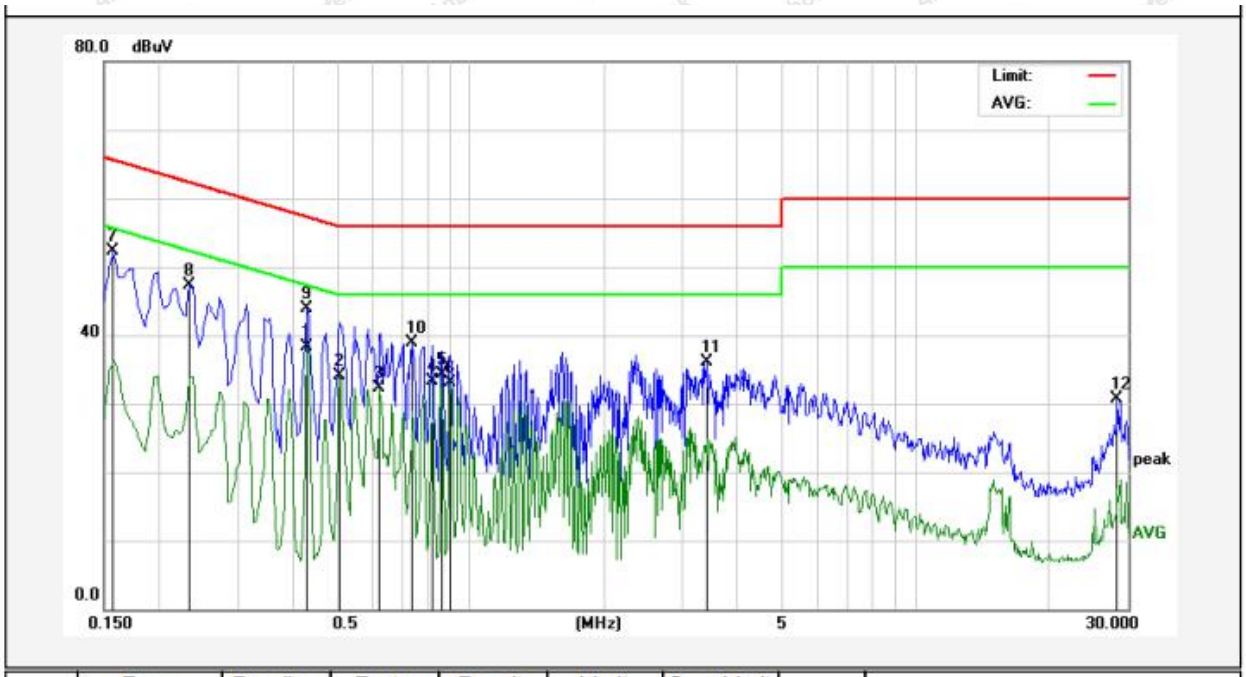
Test Site: 1# Shielded Room

Operating Condition: 802.11a for ANT1

Test Specification: AC 240V, 60Hz for adapter

Comment: Neutral Line

Tem.: 24.5℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.4300	28.27	10.12	38.39	47.25	-8.86	AVG	
2	0.5100	24.01	10.15	34.16	46.00	-11.84	AVG	
3	0.6260	22.24	10.15	32.39	46.00	-13.61	AVG	
4	0.8220	23.17	10.15	33.32	46.00	-12.68	AVG	
5	0.8620	24.16	10.15	34.31	46.00	-11.69	AVG	
6	0.9020	22.98	10.15	33.13	46.00	-12.87	AVG	
7	0.1580	42.26	10.12	52.38	65.56	-13.18	QP	
8	0.2340	37.12	10.12	47.24	62.30	-15.06	QP	
9	0.4300	33.70	10.12	43.82	57.25	-13.43	QP	
10	0.7420	28.69	10.15	38.84	56.00	-17.16	QP	
11	3.3980	26.06	10.12	36.18	56.00	-19.82	QP	
12	28.3500	20.34	10.30	30.64	60.00	-29.36	QP	

4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209, 15.205 and 15.407				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	68.2	Peak	3

Remark:
(1)The lower limit shall apply at the transition frequency.
(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.
(3)Above 1GHz limit:E[dBμV/m] = EIRP[dBm] + 95.2=68.2 dBuV/m, for EIPR[dBm]=-27dBm.

4.2. Test Setup

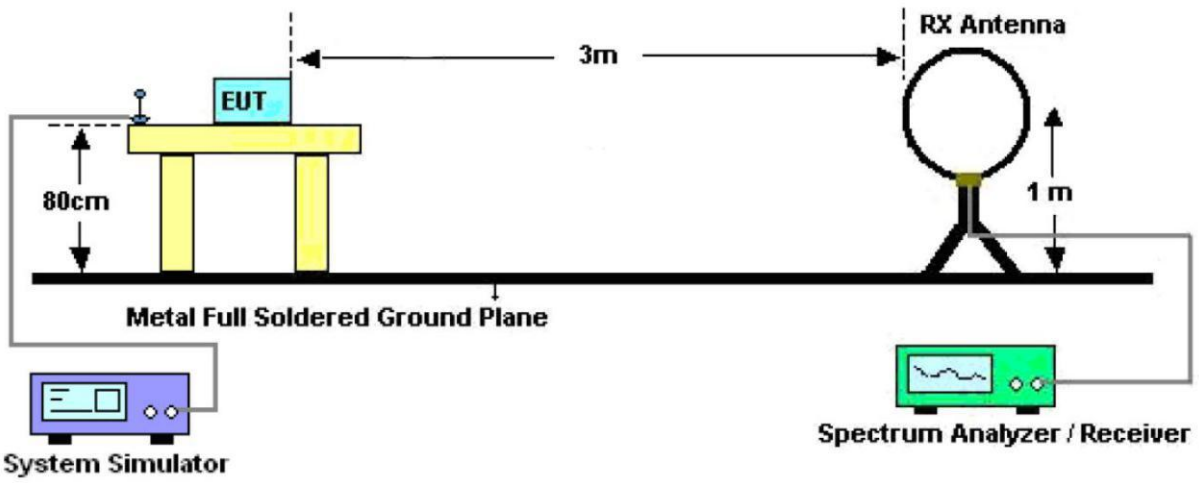


Figure 1. Below 30MHz

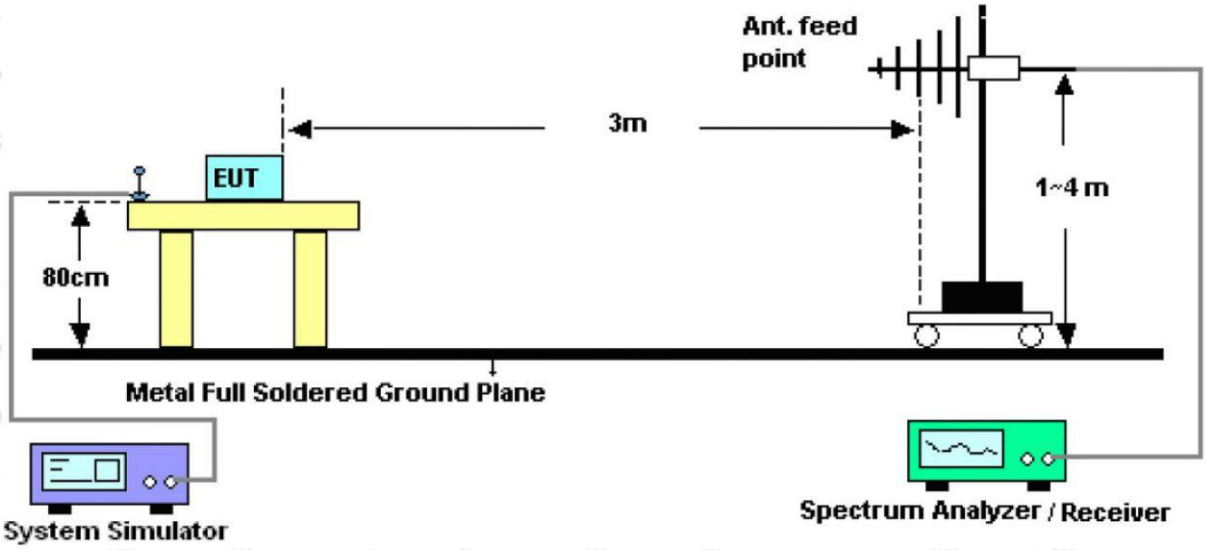


Figure 2. 30MHz to 1GHz

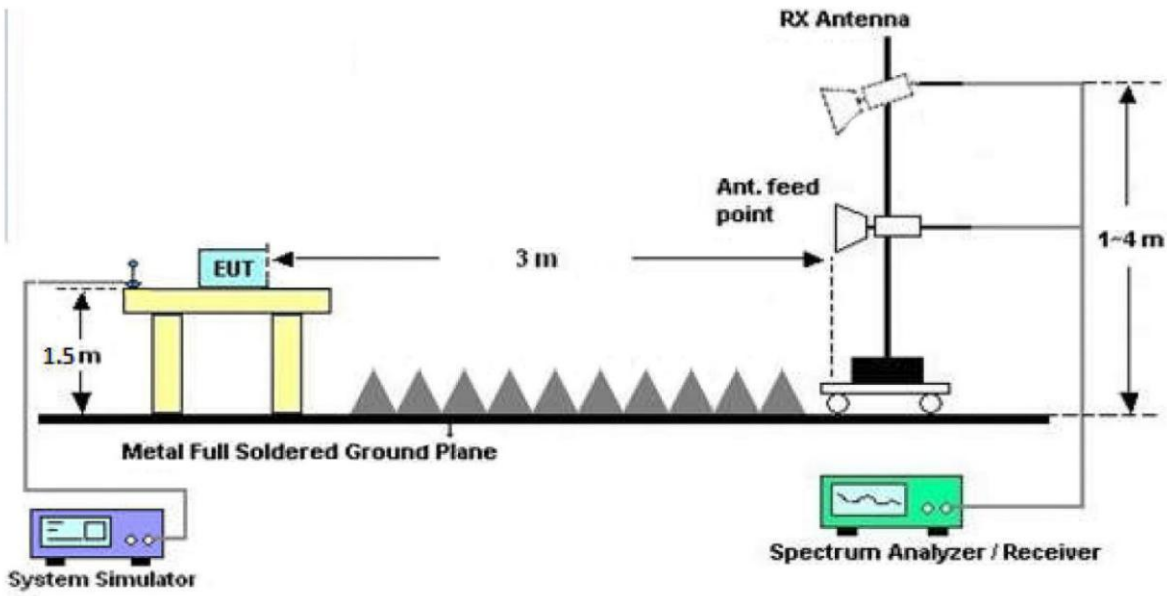


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

For 9kHz to 150kHz, Set the spectrum analyzer as:
RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:
RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:
RBW = 100kHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.
.
For above 1GHz, Set the spectrum analyzer as:
RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.
RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

PASS

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

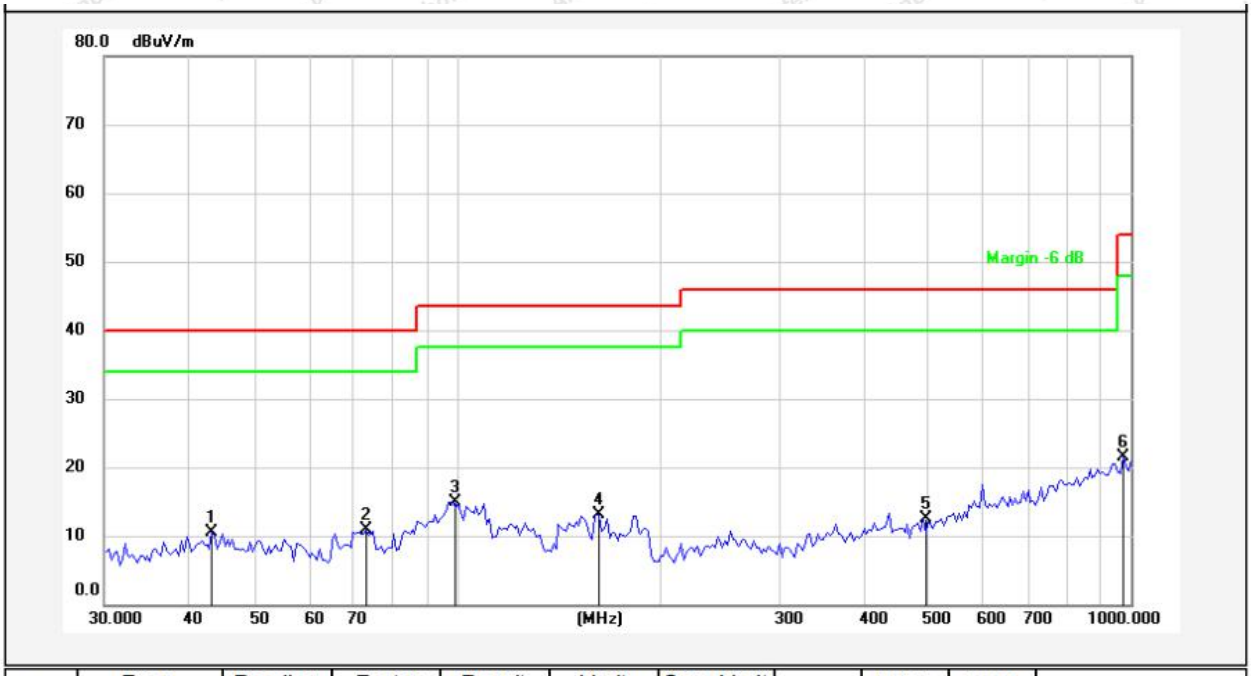
Test Results (30~1000MHz)

Test Mode: 802.11a for ANT1

Power Source: DC 7.2V Battery inside

Polarization: Vertical

Temp.(℃)/Hum.(%RH): 24.8℃/41%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor ()	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	43.3534	26.11	-15.59	10.52	40.00	-29.48	peak			
2	73.3593	31.76	-20.95	10.81	40.00	-29.19	peak			
3	98.8326	30.75	-15.77	14.98	43.50	-28.52	peak			
4	161.4742	33.00	-19.85	13.15	43.50	-30.35	peak			
5	491.6059	27.02	-14.51	12.51	46.00	-33.49	peak			
6	974.0436	28.32	-6.89	21.43	54.00	-32.57	peak			

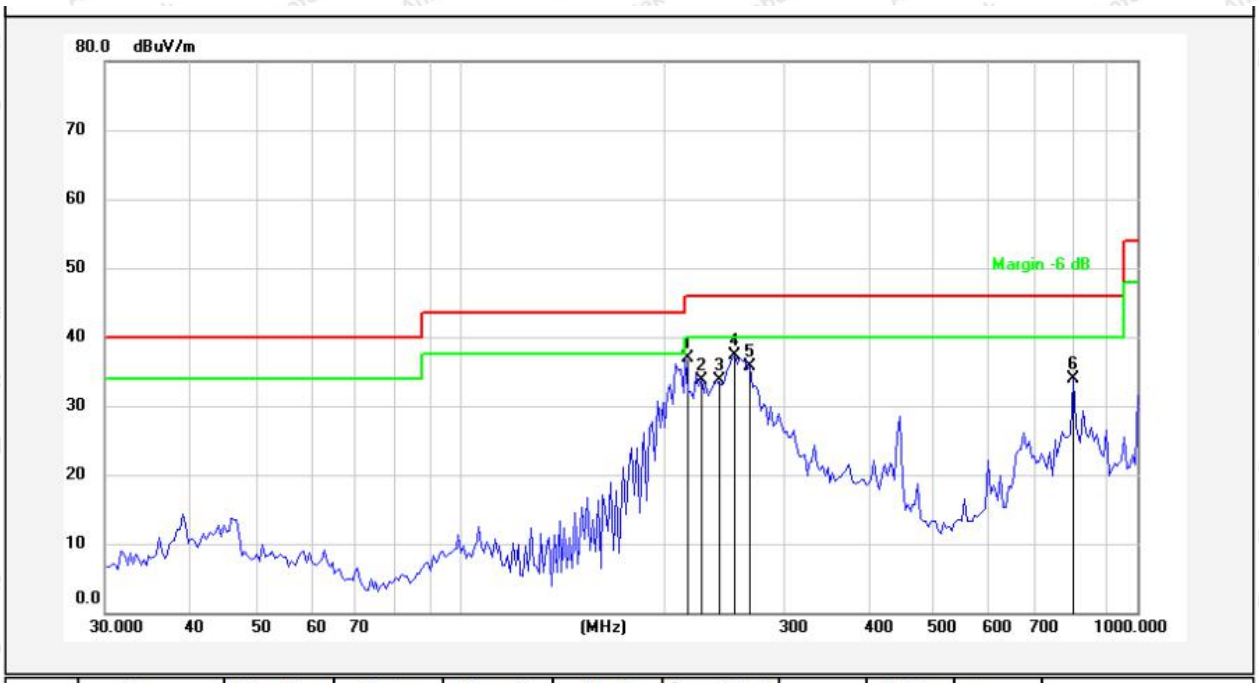
Test Results (30~1000MHz)

Test Mode: 802.11a for ANT1

Power Source: DC 7.2V Battery inside

Polarization: Horizontal

Temp.(℃)/Hum.(%RH): 24.8℃/41%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor ()	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	215.6456	54.19	-17.29	36.90	43.50	-6.60	peak			
2	227.2917	50.52	-16.80	33.72	46.00	-12.28	peak			
3	239.5670	49.94	-16.22	33.72	46.00	-12.28	peak			
4	254.7283	53.44	-16.19	37.25	46.00	-8.75	peak			
5	268.4852	52.49	-16.76	35.73	46.00	-10.27	peak			
6	803.1933	42.71	-8.90	33.81	46.00	-12.19	peak			

Note: During the test, pre-scan all modes, and found the 802.11a for ANT1 which is the worst case, only the worst case is recorded in the report.

ANT 1:

Test Results (Above 1000MHz)

Test Mode: IEEE 802.11a				Test channel: Low CH		
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.000	28.40	23.36	51.76	68.20	-16.44	V
17235.000	29.64	31.97	61.61	68.20	-6.59	V
11490.000	28.69	23.36	52.05	68.20	-16.15	H
17235.000	29.91	31.97	61.88	68.20	-6.32	H
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	polarization
11490.000	17.59	23.36	40.95	54.00	-13.05	V
17235.000	18.25	31.97	50.22	54.00	-3.78	V
11490.000	17.72	23.36	41.08	54.00	-12.92	H
17235.000	17.93	31.97	49.90	54.00	-4.10	H

Test Mode: IEEE 802.11a				Test channel: Middle CH		
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.000	28.98	23.42	52.40	68.20	-15.80	V
17355.000	29.52	32.18	61.70	68.20	-6.50	V
11570.000	28.89	23.42	52.31	68.20	-15.89	H
17355.000	30.00	32.18	62.18	68.20	-6.02	H
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	polarization
11570.000	18.858	23.42	42.28	54.00	-11.72	V
17355.000	18.570	32.18	50.75	54.00	-3.25	V
11570.000	18.714	23.42	42.13	54.00	-11.87	H
17355.000	18.306	32.18	50.49	54.00	-3.51	H

Test Mode: IEEE 802.11a				Test channel: High CH		
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.000	28.49	23.49	51.98	68.20	-16.22	V
17475.000	29.76	32.39	62.15	68.20	-6.05	V
11650.000	28.63	23.49	52.12	68.20	-16.08	H
17475.000	29.61	32.39	62.00	68.20	-6.20	H
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	polarization
11650.000	17.93	23.49	41.42	54.00	-12.58	V
17475.000	18.37	32.39	50.76	54.00	-3.24	V
11650.000	17.89	23.49	41.38	54.00	-12.62	H
17475.000	18.28	32.39	50.67	54.00	-3.33	H

Remark:

1. During the test, pre-scan the ANT1, ANT2 mode, and found the ANT1 mode is worse case , the report only record this mode.
2. Result =Reading + Factor

ANT 1:

Radiated Band Edge:

Test Mode: 802.11a	Test channel: Lowest

Peak value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	38.76	17.05	55.81	68.20	-12.39	Horizontal
5725.00	39.38	17.05	56.43	68.20	-11.77	Vertical

Average value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
5725.00	28.79	17.05	45.84	54.00	-8.16	Horizontal
5725.00	29.87	17.05	46.92	54.00	-7.08	Vertical

Test Mode: 802.11a	Test channel: Highest

Peak value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	38.71	17.21	55.92	68.20	-12.28	Horizontal
5850.00	39.02	17.21	56.23	68.20	-11.97	Vertical

Average value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
5850.00	28.76	17.21	45.97	54.00	-8.03	Horizontal
5850.00	28.84	17.21	46.05	54.00	-7.95	Vertical

Remark: 1. Result =Reading + Factor

ANT 2:

Radiated Band Edge:

Test Mode: 802.11a				Test channel: Lowest		
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
5725.00	38.80	17.05	55.85	68.20	-12.36	Horizontal
5725.00	39.43	17.05	56.48	68.20	-11.73	Vertical
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
5725.00	28.81	17.05	45.86	54.00	-8.14	Horizontal
5725.00	29.90	17.05	46.95	54.00	-7.05	Vertical

Test Mode: 802.11a				Test channel: Highest		
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
5850.00	38.76	17.21	55.97	68.20	-12.24	Horizontal
5850.00	39.07	17.21	56.28	68.20	-11.93	Vertical
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
5850.00	28.80	17.21	46.01	54.00	-8.00	Horizontal
5850.00	28.87	17.21	46.08	54.00	-7.93	Vertical

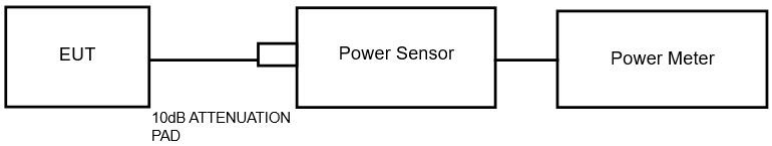
Remark: 1. Result =Reading + Factor

5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.407 (a) (3)
Test Limit	30dBm

5.2. Test Setup



5.3. Test Procedure

1. The Transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the power value.
3. Repeat above procedures on all channels needed to be tested.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

5.4. Test Data

Pass

Please refer to Appendix B of the Appendix Test Data.

Additional test for duty cycle.

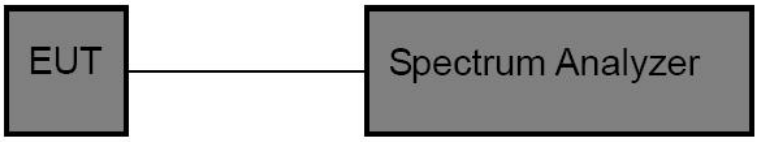
Please refer to Appendix F of the Appendix Test Data.

6. Occupy Bandwidth Test

6.1. Test Standard

Test Standard	FCC Part15 C Section 15.407 (a)(5)&15.407(e)

6.2. Test Setup



6.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

3. Set the spectrum analyzer as:

26 dB &99%bandwidth

RBW = approximately 1% of the emission bandwidth;
Set the VBW＞RBW;
Detector= Peak
Trace mode= Max hold.
Sweep- auto couple.

6 dB bandwidth

RBW = approximately 1% of the emission bandwidth;
Set the VBW＞RBW;
Detector= Peak
Trace mode= Max hold.
Sweep- auto couple.

4. Measure the maximum width of the emission that is 26dB /6dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer.

5. Repeat until all the rest channels are investigated.

6.4. Test Data

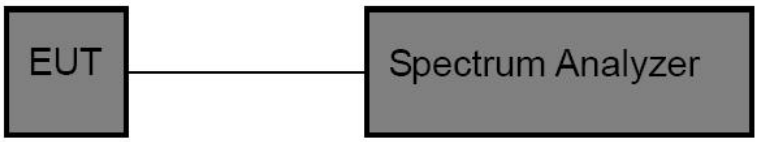
Pass
Please refer to Appendix A2 of the Appendix Test Data.

7. Power Spectral Density Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.407 (a) (3)
Test Limit	30 dBm/500KHz

7.2. Test Setup



7.3. Test Procedure

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz).

1. The EUT is directly connected to the spectrum analyzer;
2. Set RBW =510KHz;
3. Set VBW ≥ 3 RBW=2MHz;
3. Set the span to encompass the entire emissions bandwidth (EBW) of the signal;
5. Detector=RMS;
6. Sweep time= auto couple;
7. Trace mode=max. hold;

7.4. Test Data

Pass

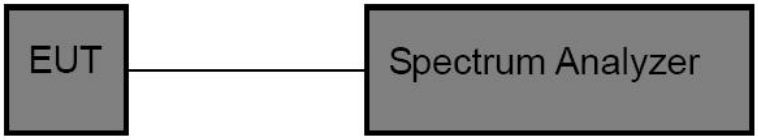
Please refer to Appendix C of the Appendix Test Data.

8. Frequency Stability

8.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.407(g) &Part2 J Section 2.1055
Test Limit	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

8.2. Test Setup



8.3. Test Procedure

The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

8.4. Test Data

Pass

Please refer to Appendix E of the Appendix Test Data.

9. Antenna Requirement

9.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /15.407
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 2) 15.407 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

9.2. Antenna Connected Construction

The antenna is a Rod antenna which permanently attached, and the best case gain of the 5 dBi. It complies with the standard requirement.

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Power Line Conducted Emission Test

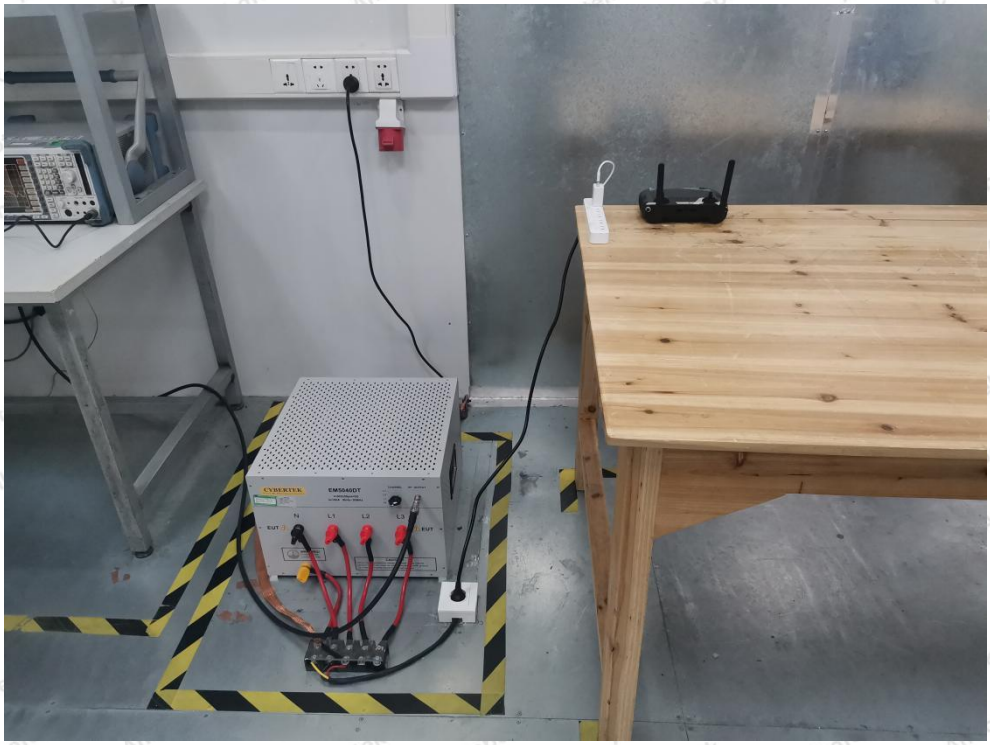


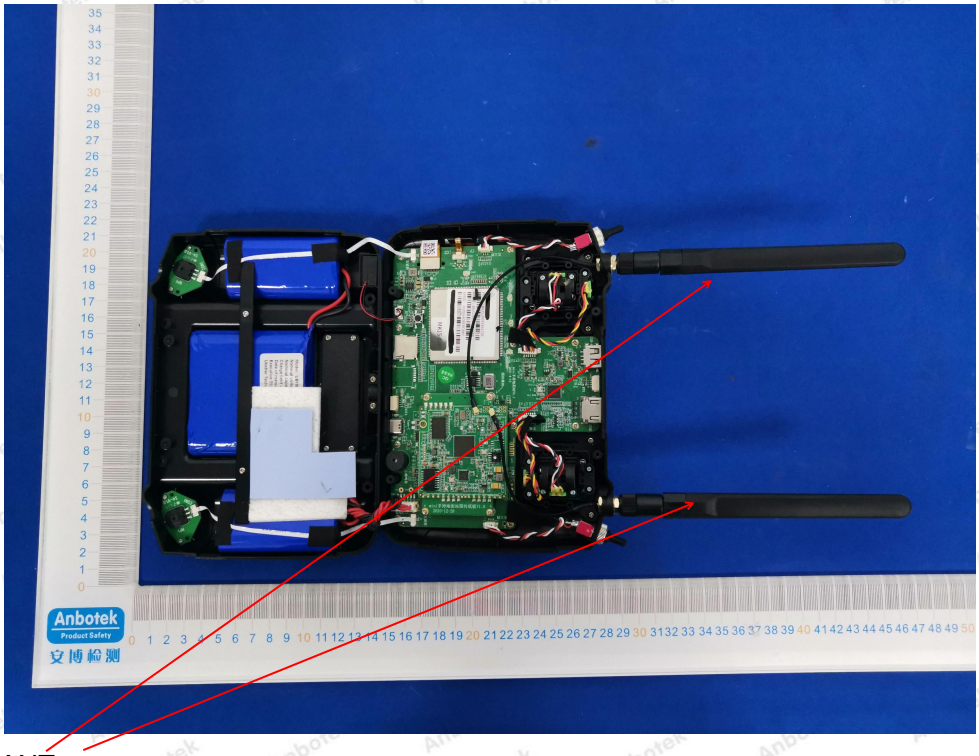
Photo of Radiation Emission Test

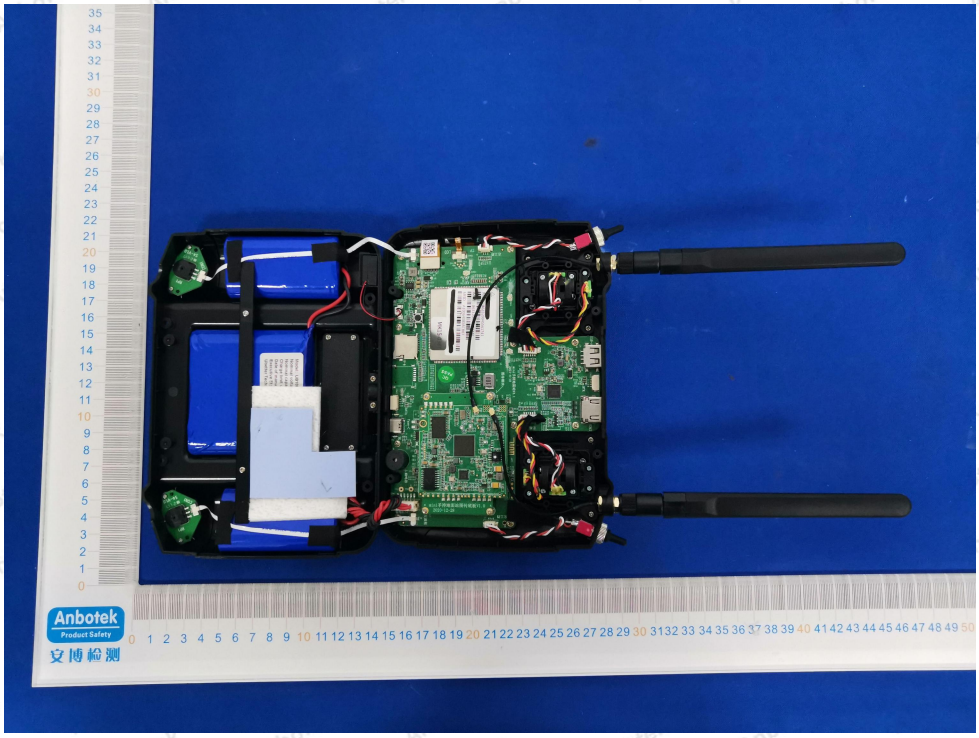
APPENDIX II -- EXTERNAL PHOTOGRAPH

Anbotek
Product Safety

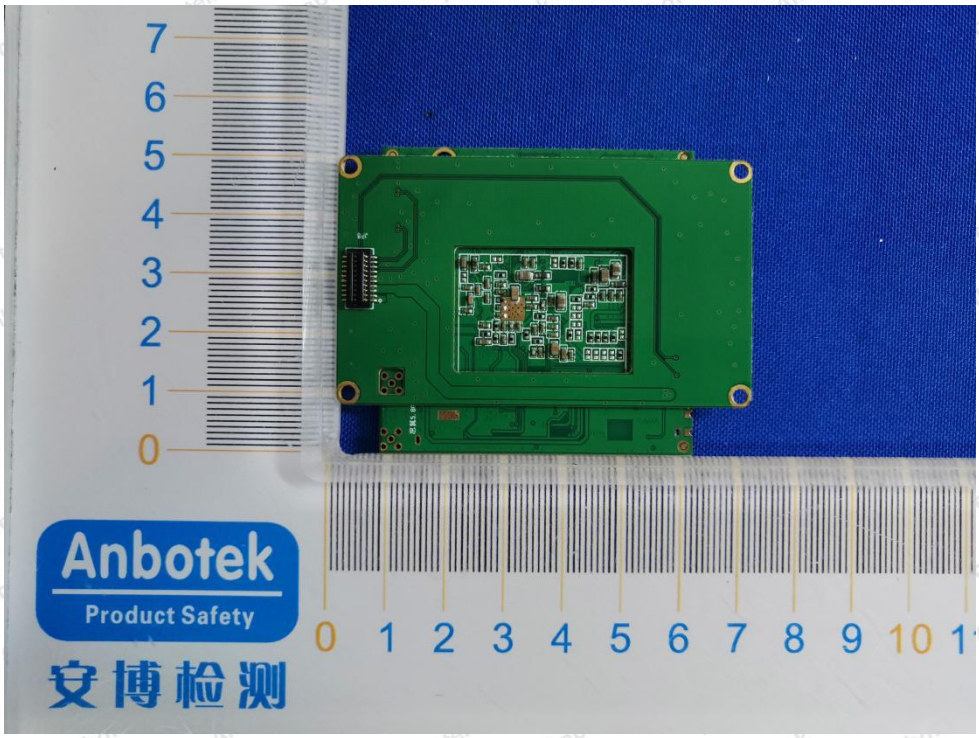
Upgrade
SIM

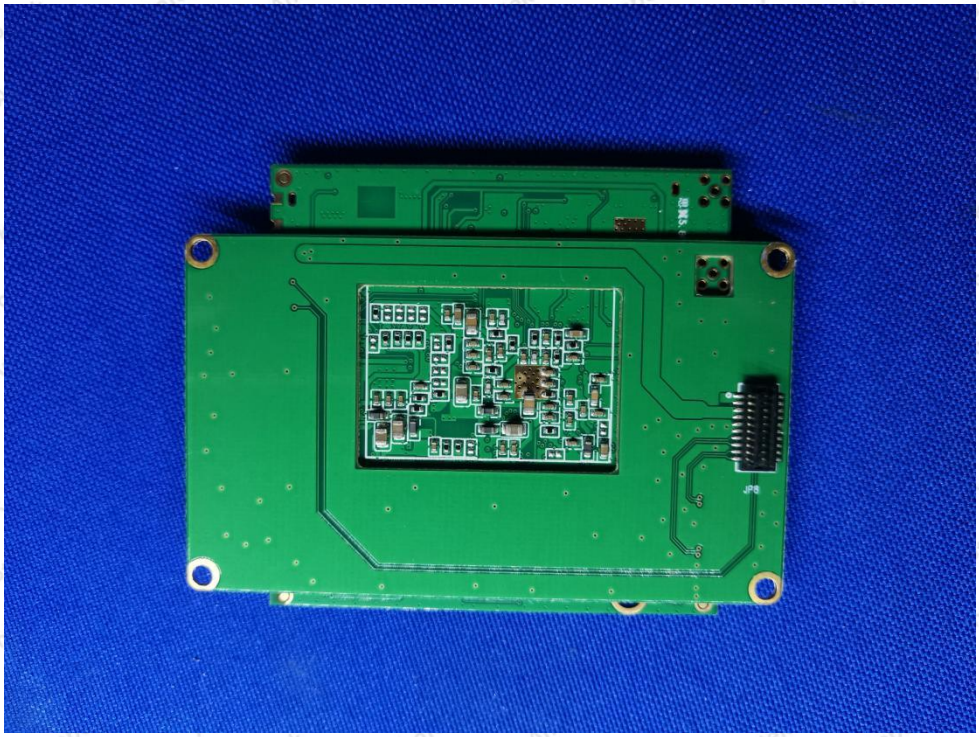
APPENDIX III -- INTERNAL PHOTOGRAPH

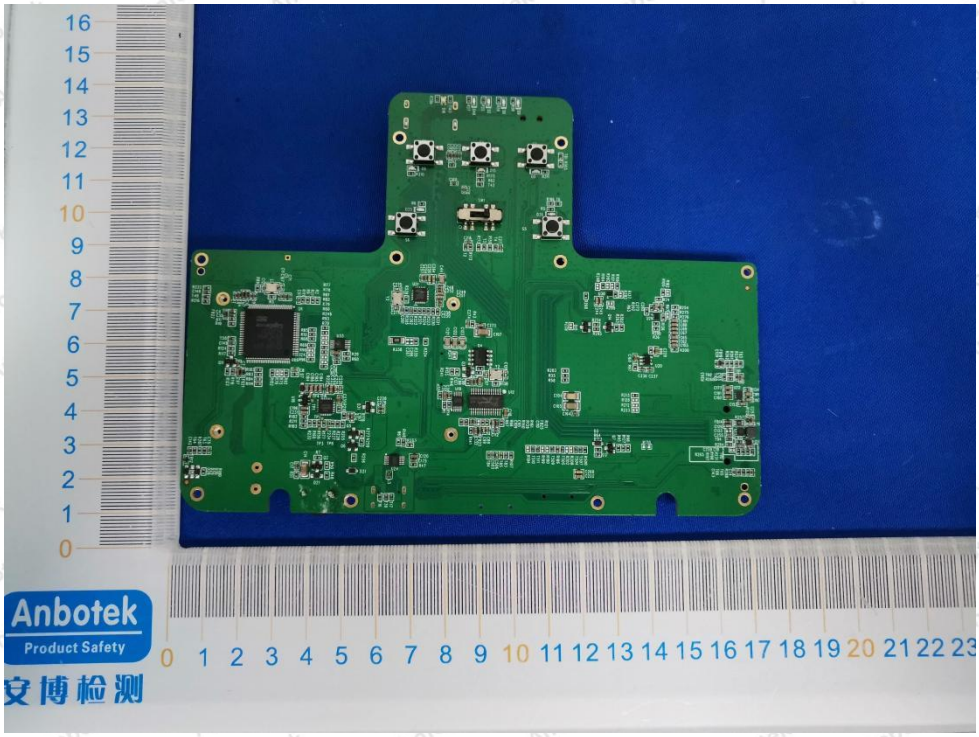


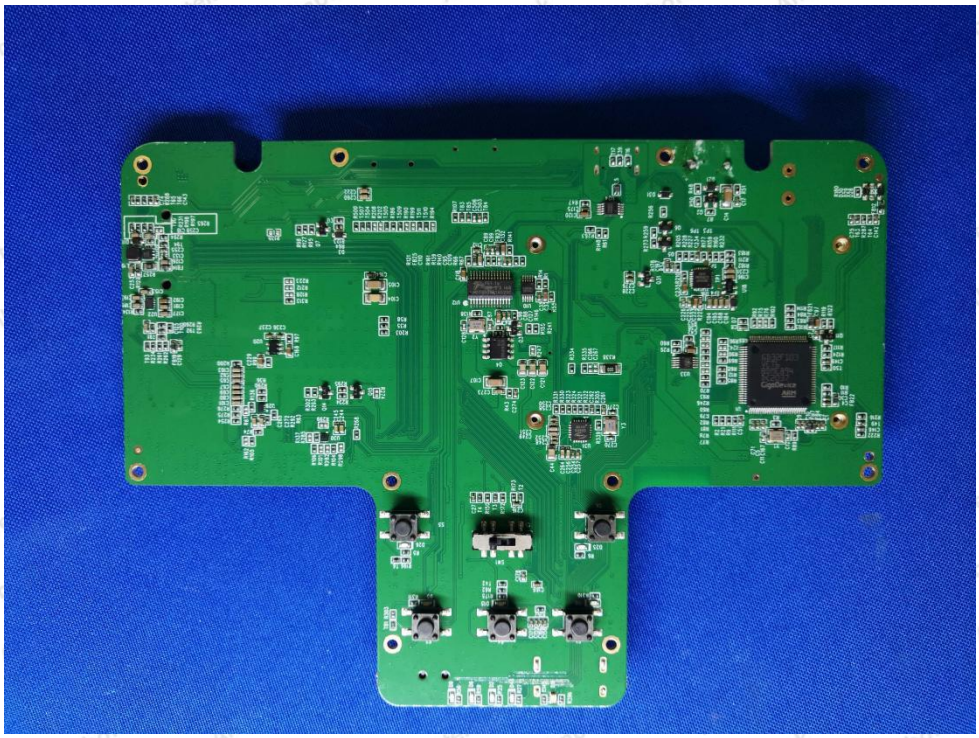


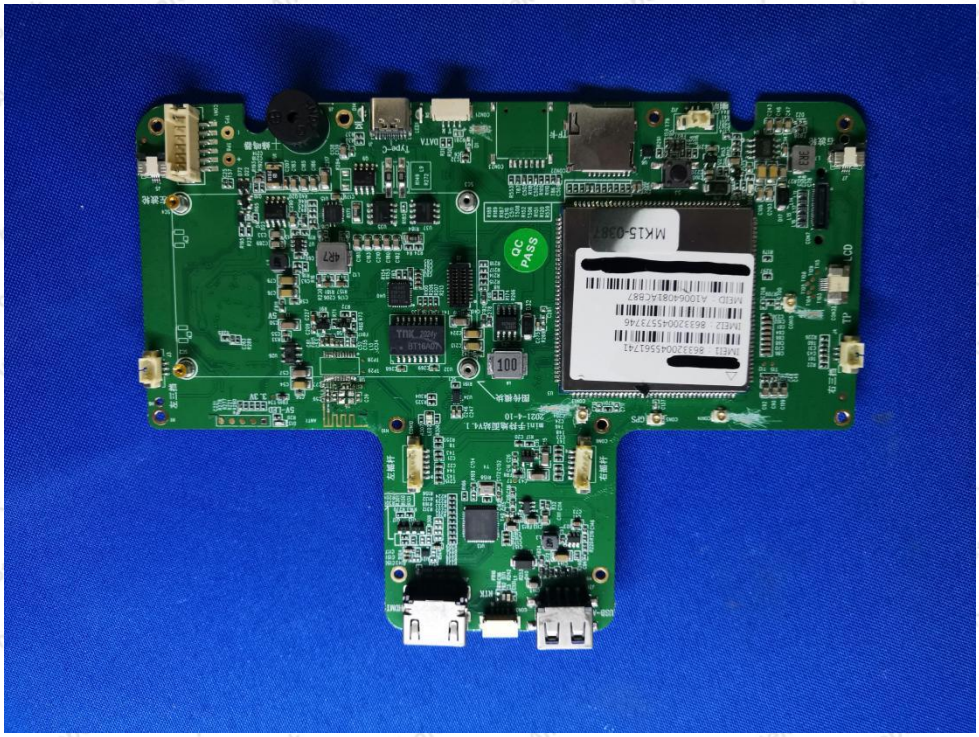
Model: UB18650-2S4P
Nominal voltage: 7.2V
Nominal capacity: 10200mAh 73.44Wh
Charge limit voltage: 8.4V
Date of manufacture: 202105
Executive Standard: GB31241-2014


Anbotek
Product Safety
安博检测









APPENDIX IV – Appendix Test Data