

FCC TEST REPORT

Client Name : Monoprice, Inc.

Address : 1 Pointe Drive Suite 400, Brea CA 92821 USA

Product Name : Hyper-K Wireless Ultralight Gaming Mouse

Date : May 28, 2022



Shenzhen Anbotek Compliance Laboratory Limited

* Approved *



Contents

1. General Information	5
1.1. Client Information	5
1.2. Description of Device (EUT)	5
1.3. Auxiliary Equipment Used During Test	6
1.4. Description of Test Modes	6
1.5. List of channels	7
1.6. Description Of Test Setup	8
1.7. Test Equipment List	9
1.8. Measurement Uncertainty	10
1.9. Description of Test Facility	10
2. Summary of Test Results	11
3. Conducted Emission Test	12
3.1. Test Standard and Limit	12
3.2. Test Setup	12
3.3. Test Procedure	12
3.4. Test Data	12
4. Radiation Spurious Emission and Band Edge	15
4.1. Test Standard and Limit	15
4.2. Test Setup	15
4.3. Test Procedure	16
4.4. Test Data	17
5. Maximum Peak Output Power Test	25
5.1. Test Standard and Limit	25
5.2. Test Setup	25
5.3. Test Procedure	25
5.4. Test Data	25
6. 20DB Occupy Bandwidth Test	26
6.1. Test Standard	26
6.2. Test Setup	26
6.3. Test Procedure	26
6.4. Test Data	26
7. Carrier Frequency Separation Test	27
7.1. Test Standard and Limit	27
7.2. Test Setup	27
7.3. Test Procedure	27
7.4. Test Data	27
8. Number of Hopping Channel Test	28
8.1. Test Standard and Limit	28



8.2. Test Setup	28
8.3. Test Procedure	28
8.4. Test Data	28
9. Dwell Time Test	29
9.1. Test Standard and Limit	29
9.2. Test Setup	29
9.3. Test Procedure	29
9.4. Test Data	29
10. 100kHz Bandwidth of Frequency Band Edge Requirement	30
10.1. Test Standard and Limit	30
10.2. Test Setup	30
10.3. Test Procedure	30
10.4. Test Data	30
11. Antenna Requirement	31
11.1. Test Standard and Requirement	31
11.2. Antenna Connected Construction	31
APPENDIX I -- TEST SETUP PHOTOGRAPH	32
APPENDIX II -- EXTERNAL PHOTOGRAPH	34
APPENDIX III -- INTERNAL PHOTOGRAPH	38
APPENDIX IV -- Appendix Test Data	42



TEST REPORT

Applicant : Monoprice, Inc.
Manufacturer : Monoprice, Inc.
Product Name : Hyper-K Wireless Ultralight Gaming Mouse
Model No. : 44028
Trade Mark : N.A.
Rating(s) : Input: DC 5V, 1A (with DC 3.7V, 300mAh Battery inside)

Test Standard(s) : FCC Part15 Subpart C, Section 15.247

Test Method(s) : ANSI C63.10: 2020

The device described above is tested by Shenzhen Anbotech 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 Anbotech 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 C requirements.

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

Date of receipt

Apr. 28, 2022

Date of Test

Apr. 28~May 13, 2022

Prepared by

Tu Tu Hong

(TuTu Hong)

Approved & Authorized Signer

Kingkong Jin

(Kingkong Jin)

1. General Information

1.1. Client Information

Applicant	:	Monoprice, Inc.
Address	:	1 Pointe Drive Suite 400, Brea CA 92821 USA
Manufacturer	:	Monoprice, Inc.
Address	:	1 Pointe Drive Suite 400, Brea CA 92821 USA
Factory	:	Globaltech Industrial Co., Ltd.
Address	:	The 1st Industrial Park, Huanggang Village, Houjie Town, Dongguan, Guangdong Province, China.

1.2. Description of Device (EUT)

Product Name	:	Hyper-K Wireless Ultralight Gaming Mouse
Model No.	:	44028
Trade Mark	:	N.A.
Test Power Supply	:	AC 120V, 60Hz for adapter/DC3.7V battery inside
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Product Description	Operation Frequency:	2402-2480MHz
	Number of Channel:	16 Channels
	Modulation Type:	GFSK
	Antenna Type:	PCB Antenna
	Antenna Gain(Peak):	-1 dBi (Provided by customer)
	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 SRD 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
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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.

TEST MODE:

Pretest Mode	Description	
Mode 1	2402MHz	TX Only/TX+Charging
Mode 2	2441MHz	
Mode 3	2480MHz	

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

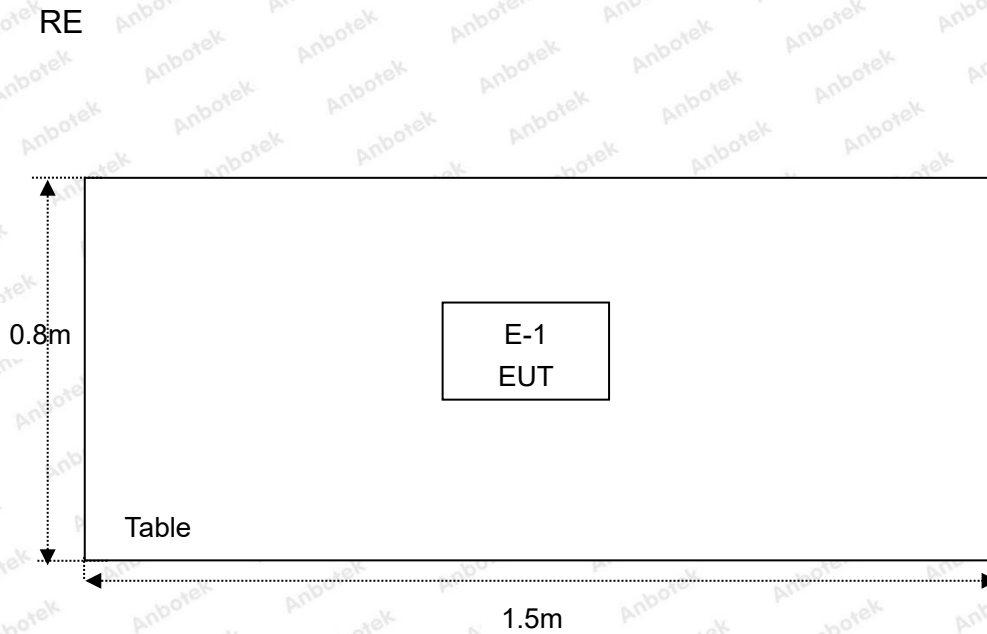
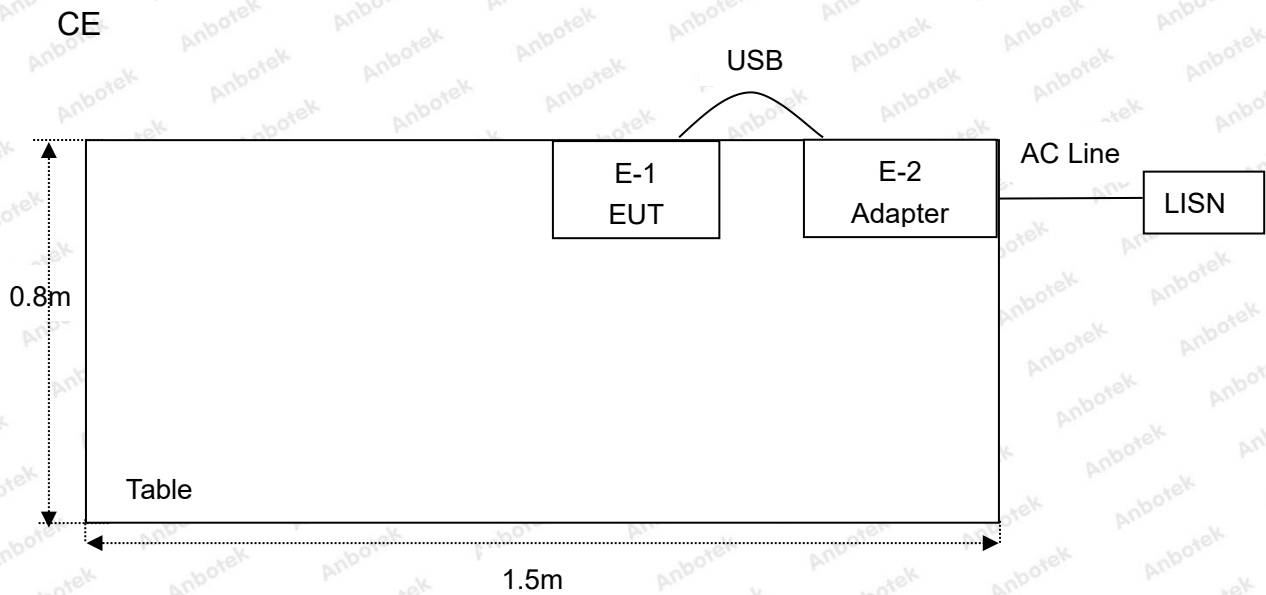
1.5. List of channels

Channel	Freq. (MHz)	Channel	Freq. (MHz)
01	2402	09	2414
02	2426	10	2436
03	2441	11	2459
04	2463	12	2473
05	2407	13	2419
06	2422	14	2439
07	2445	15	2453
08	2466	16	2480

Note:

1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

1.6. Description Of Test Setup



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040DT001	Jul 05, 2021	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 22, 2021	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 22, 2021	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2021	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 22, 2021	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Oct. 22, 2021	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Oct. 22, 2021	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 22, 2021	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Oct. 22, 2021	2 Year
10.	Horn Antenna	A-INFO	LB-180400-K F	J211060628	Oct. 22, 2021	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 22, 2021	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. 22, 2021	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 22, 2021	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 22, 2021	1 Year
16.	MXA Spectrum Analysis	KEYSIGHT	N9020A	MY53280032	Oct. 22, 2021	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 22, 2021	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 22, 2021	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 22, 2021	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80 B	N/A	Oct. 22, 2021	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 Anbotech 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 Anbotech 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 Anbotech 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 Section	Test Item	Result
15.203/15.247(c)	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209	Spurious Emission	PASS
15.247(b)(1)	Conducted Peak Output Power	PASS
15.247(a)(1)	20dB Occupied Bandwidth	PASS
15.247(a)(1)	Carrier Frequencies Separation	PASS
15.247(a)(1)	Hopping Channel Number	PASS
15.247(a)(1)	Dwell Time	PASS
15.247(d)	Band Edge	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

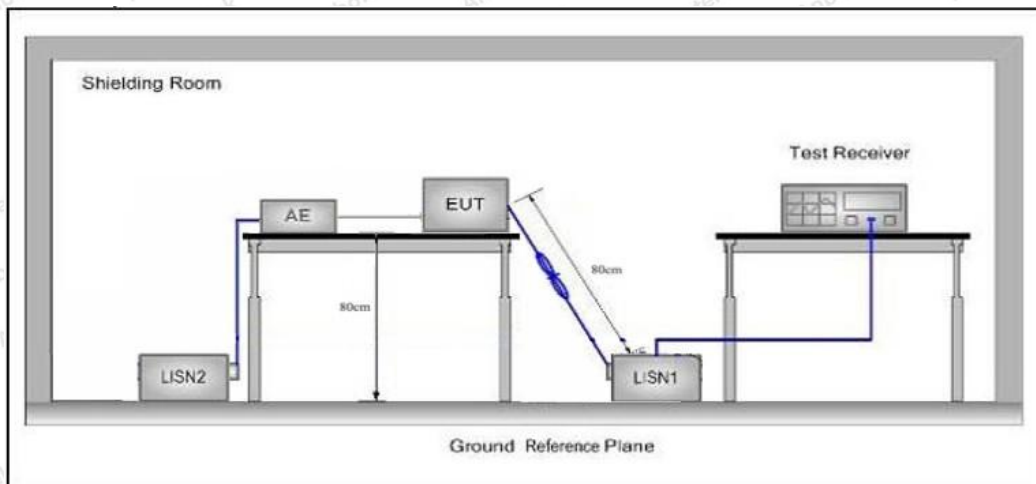


3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
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: 2020 on Conducted Emission Measurement.

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

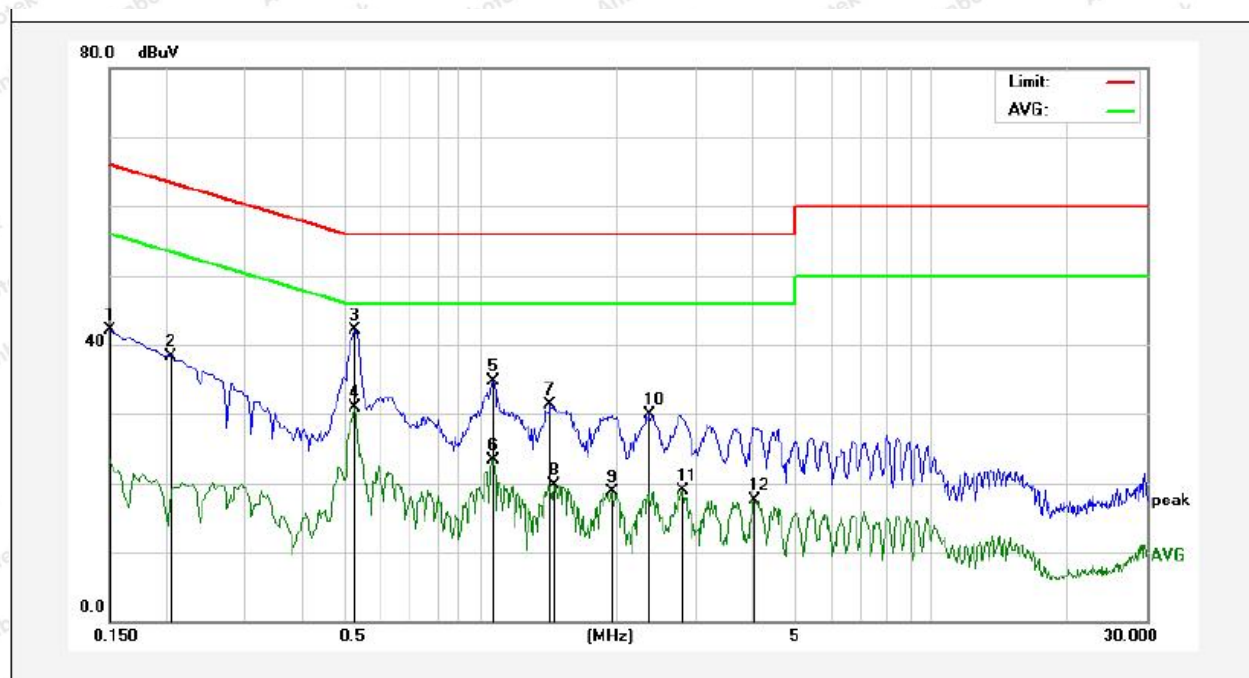
The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

During the test, pre-scan all the modes, only the worst case is recorded in the report.

Conducted Emission Test Data

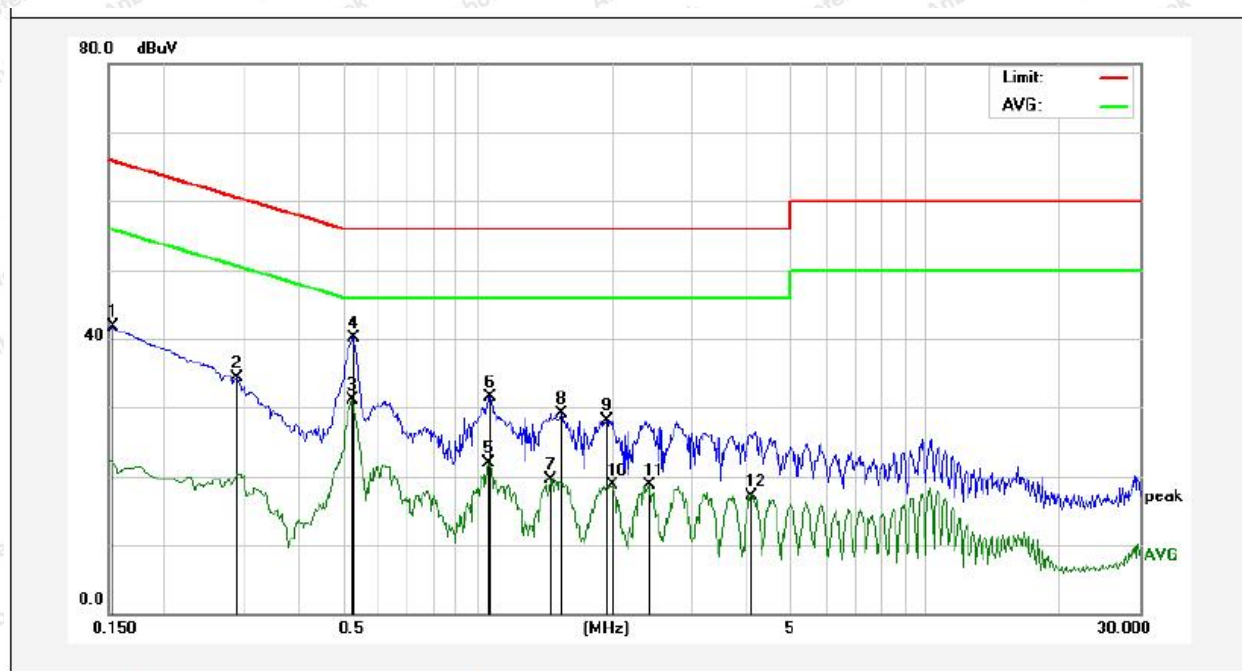
Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 120V, 60Hz for adapter
 Comment: Live Line
 Tem.: 22.8℃ Hum.: 48%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1500	42.08	0.11	42.19	65.99	-23.80	QP	
2	0.2060	38.20	0.12	38.32	63.36	-25.04	QP	
3	0.5260	41.90	0.15	42.05	56.00	-13.95	QP	
4	0.5260	30.83	0.15	30.98	46.00	-15.02	AVG	
5	1.0700	34.55	0.15	34.70	56.00	-21.30	QP	
6	1.0700	23.24	0.15	23.39	46.00	-22.61	AVG	
7	1.4260	31.09	0.14	31.23	56.00	-24.77	QP	
8	1.4540	19.66	0.14	19.80	46.00	-26.20	AVG	
9	1.9580	18.61	0.12	18.73	46.00	-27.27	AVG	
10	2.3740	29.83	0.12	29.95	56.00	-26.05	QP	
11	2.8060	18.79	0.12	18.91	46.00	-27.09	AVG	
12	4.0700	17.30	0.11	17.41	46.00	-28.59	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 120V, 60Hz for adapter
Comment: Neutral Line
Tem.: 22.8°C Hum.: 48%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1539	41.50	0.12	41.62	65.78	-24.16	QP	
2	0.2900	34.19	0.13	34.32	60.52	-26.20	QP	
3	0.5260	30.94	0.15	31.09	46.00	-14.91	AVG	
4	0.5299	39.98	0.15	40.13	56.00	-15.87	QP	
5	1.0620	21.74	0.15	21.89	46.00	-24.11	AVG	
6	1.0660	31.42	0.15	31.57	56.00	-24.43	QP	
7	1.4620	19.35	0.14	19.49	46.00	-26.51	AVG	
8	1.5380	28.90	0.13	29.03	56.00	-26.97	QP	
9	1.9460	28.01	0.12	28.13	56.00	-27.87	QP	
10	1.9940	18.63	0.12	18.75	46.00	-27.25	AVG	
11	2.4140	18.59	0.12	18.71	46.00	-27.29	AVG	
12	4.0820	17.09	0.11	17.20	46.00	-28.80	AVG	

4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
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
		-	74.0	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.

4.2. Test Setup

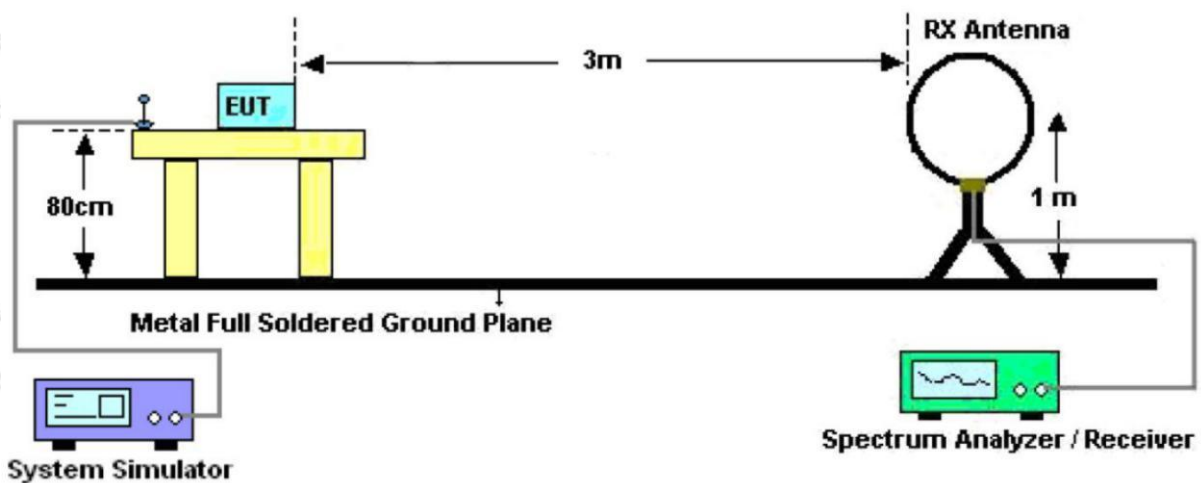


Figure 1. Below 30MHz

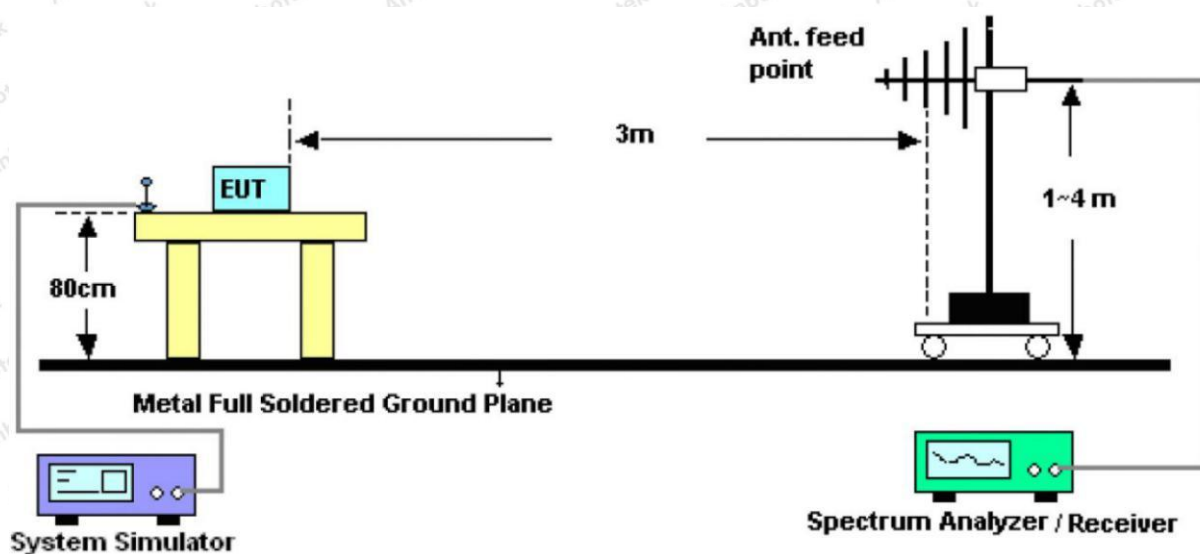


Figure 2. 30MHz to 1GHz

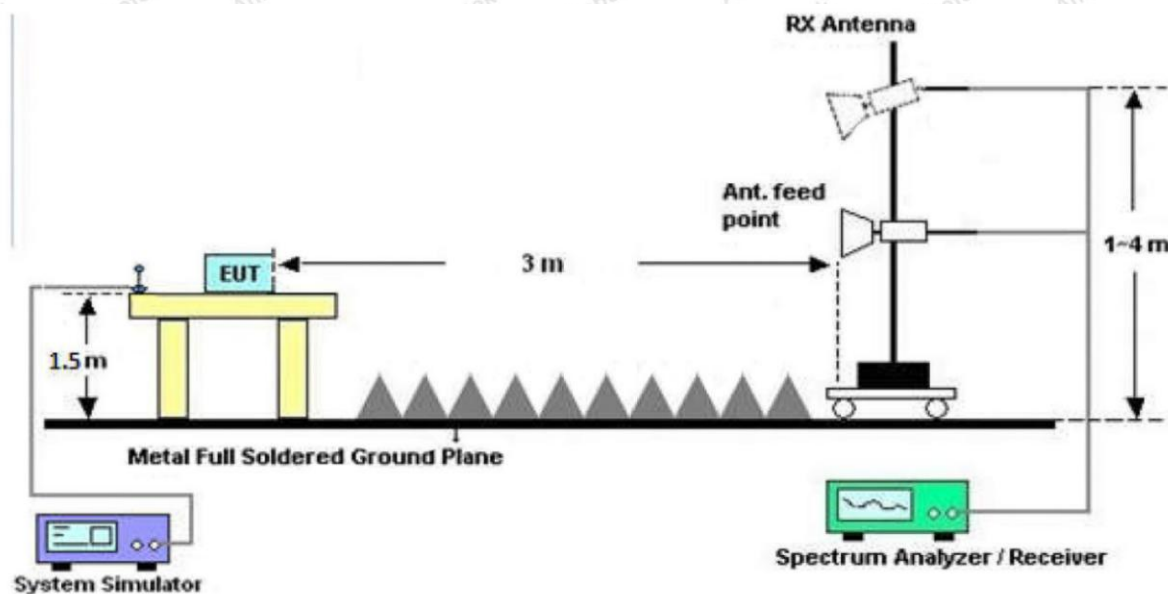


Figure 3. Above 1 GHz

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 = 120kHz, 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.

For average measurement: use duty cycle correction factor method (DCCF)

Average level = Peak level + DCCF

4.4. Test Data

PASS

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

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

During the test, pre-scan all the modes, only the worst case is recorded in the report.



Test Results (30~1000MHz)

Test Mode: Mode 1
Power Source: DC 3.7V battery inside
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 22.7°C/49%RH

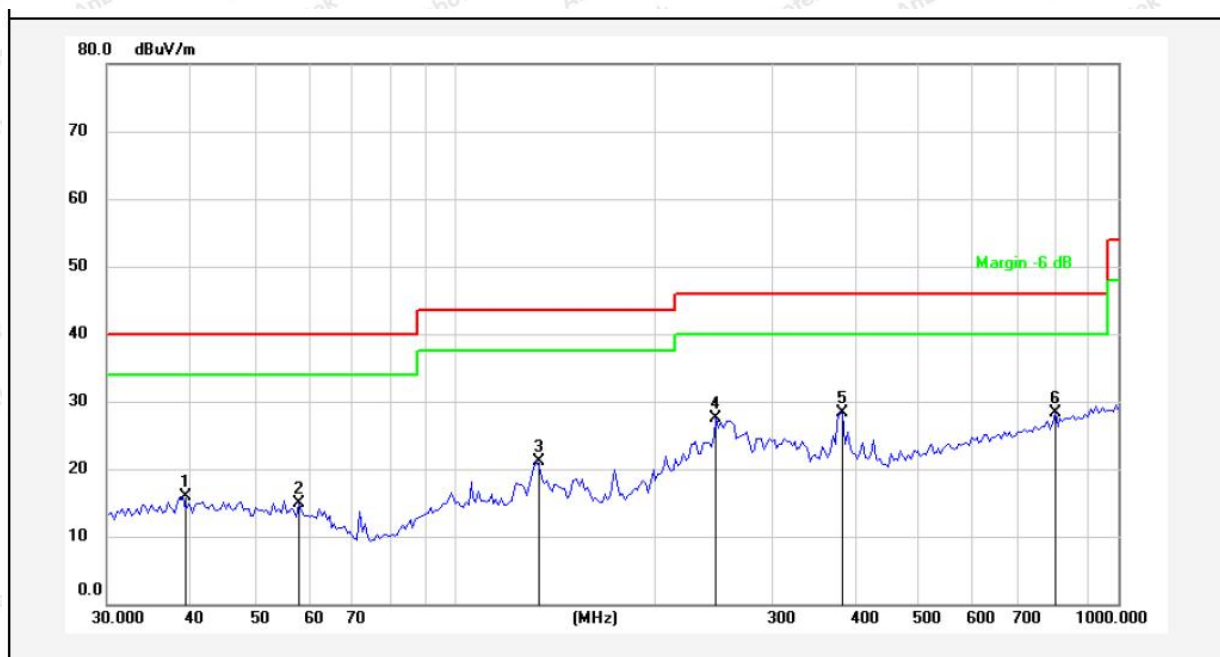


No.	Freq. (MHz)	Reading (dBuV)	Factor ()	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	106.0126	46.03	-17.73	28.30	43.50	-15.20	QP			
2	131.9889	52.62	-20.92	31.70	43.50	-11.80	QP			
3	142.8243	50.10	-21.29	28.81	43.50	-14.69	QP			
4	155.9101	49.18	-20.77	28.41	43.50	-15.09	QP			
5	381.2487	43.39	-12.87	30.52	46.00	-15.48	QP			
6	803.1933	36.35	-5.85	30.50	46.00	-15.50	QP			



Test Results (30~1000MHz)

Test Mode: Mode 1
Power Source: DC 3.7V battery inside
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 22.7°C/49%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor ()	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.0245	32.99	-17.08	15.91	40.00	-24.09	QP			
2	58.4074	32.53	-17.61	14.92	40.00	-25.08	QP			
3	133.1511	42.11	-20.98	21.13	43.50	-22.37	QP			
4	248.1165	43.67	-16.15	27.52	46.00	-18.48	QP			
5	384.6055	41.17	-12.79	28.38	46.00	-17.62	QP			
6	803.1933	34.17	-5.85	28.32	46.00	-17.68	QP			

Test Results (1GHz-25GHz)

Test channel: Lowest

Peak value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	27.49	15.27	42.76	74.00	-31.24	Vertical
7206.00	27.72	18.09	45.81	74.00	-28.19	Vertical
9608.00	28.24	23.76	52.00	74.00	-22.00	Vertical
12010.00	*			74.00		Vertical
14412.00	*			74.00		Vertical
4804.00	27.24	15.27	42.51	74.00	-31.49	Horizontal
7206.00	27.88	18.09	45.97	74.00	-28.03	Horizontal
9608.00	27.70	23.76	51.46	74.00	-22.54	Horizontal
12010.00	*			74.00		Horizontal
14412.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4804.00	15.76	15.27	31.03	54.00	-22.97	Vertical
7206.00	16.77	18.09	34.86	54.00	-19.14	Vertical
9608.00	17.71	23.76	41.47	54.00	-12.53	Vertical
12010.00	*			54.00		Vertical
14412.00	*			54.00		Vertical
4804.00	15.57	15.27	30.84	54.00	-23.16	Horizontal
7206.00	16.91	18.09	35.00	54.00	-19.00	Horizontal
9608.00	17.21	23.76	40.97	54.00	-13.03	Horizontal
12010.00	*			54.00		Horizontal
14412.00	*			54.00		Horizontal

Test Results (1GHz-25GHz)

Test channel: Middle

Peak value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	27.04	15.42	42.46	74.00	-31.54	Vertical
7323.00	27.69	18.02	45.71	74.00	-28.29	Vertical
9764.00	27.74	23.80	51.54	74.00	-22.46	Vertical
12205.00	*			74.00		Vertical
14646.00	*			74.00		Vertical
4882.00	27.05	15.42	42.47	74.00	-31.53	Horizontal
7323.00	27.75	18.02	45.77	74.00	-28.23	Horizontal
9764.00	27.42	23.80	51.22	74.00	-22.78	Horizontal
12205.00	*			74.00		Horizontal
14646.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4882.00	15.85	15.42	31.27	54.00	-22.73	Vertical
7323.00	16.63	18.02	34.65	54.00	-19.35	Vertical
9764.00	17.56	23.80	41.36	54.00	-12.64	Vertical
12205.00	*			54.00		Vertical
14646.00	*			54.00		Vertical
4882.00	15.68	15.42	31.10	54.00	-22.90	Horizontal
7323.00	17.26	18.02	35.28	54.00	-18.72	Horizontal
9764.00	17.51	23.80	41.31	54.00	-12.69	Horizontal
12205.00	*			54.00		Horizontal
14646.00	*			54.00		Horizontal



Test Results (1GHz-25GHz)

Test channel: Highest

Peak value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	27.17	15.58	42.75	74.00	-31.25	Vertical
7440.00	27.85	17.93	45.78	74.00	-28.22	Vertical
9920.00	28.44	23.83	52.27	74.00	-21.73	Vertical
12400.00	*			74.00		Vertical
14880.00	*			74.00		Vertical
4960.00	27.19	15.58	42.77	74.00	-31.23	Horizontal
7440.00	27.96	17.93	45.89	74.00	-28.11	Horizontal
9920.00	27.80	23.83	51.63	74.00	-22.37	Horizontal
12400.00	*			74.00		Horizontal
14880.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4960.00	16.97	15.58	32.55	54.00	-21.45	Vertical
7440.00	17.90	17.93	35.83	54.00	-18.17	Vertical
9920.00	18.21	23.83	42.04	54.00	-11.96	Vertical
12400.00	*			54.00		Vertical
14880.00	*			54.00		Vertical
4960.00	16.86	15.58	32.44	54.00	-21.56	Horizontal
7440.00	18.06	17.93	35.99	54.00	-18.01	Horizontal
9920.00	17.66	23.83	41.49	54.00	-12.51	Horizontal
12400.00	*			54.00		Horizontal
14880.00	*			54.00		Horizontal

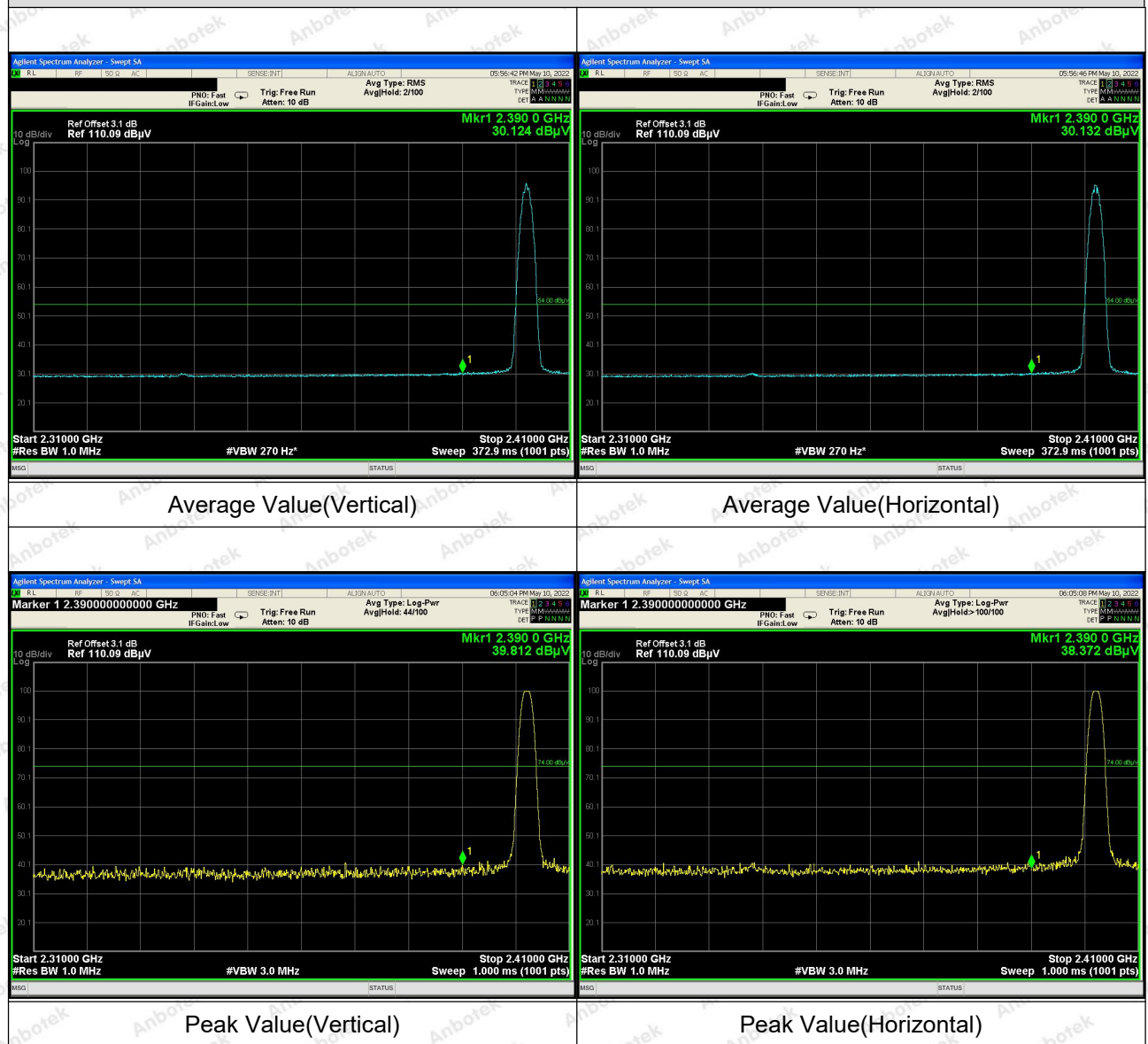
Remark:

1.Result =Read level + Factor

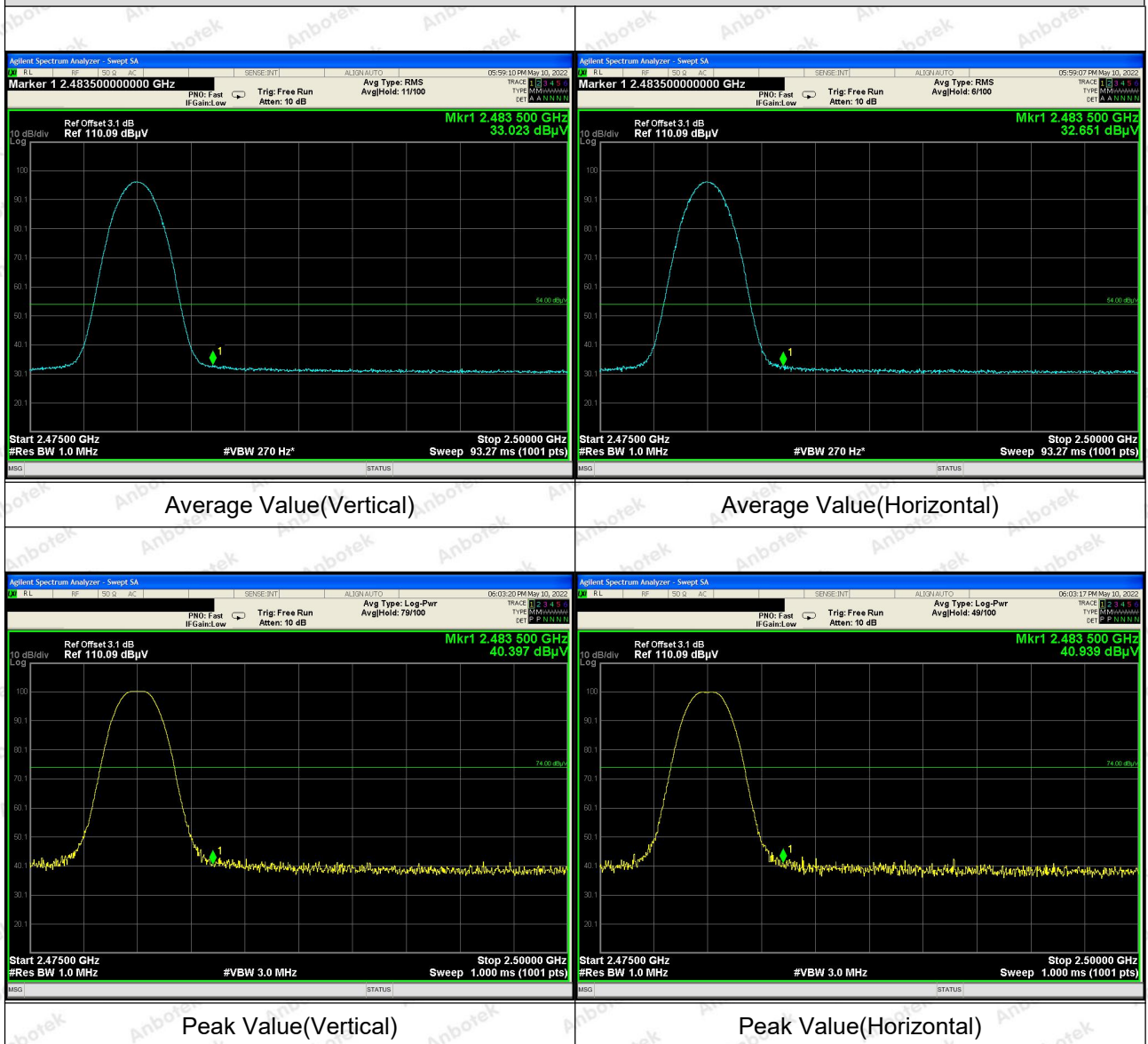
2. "*" means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Radiated Band Edge:

Test channel: Lowest



Test channel: Highest

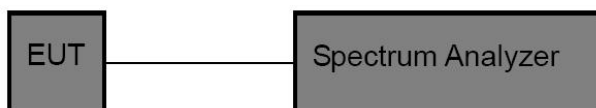


5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(1)
Test Limit	According to §15.247(b) (1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

5.2. Test Setup



5.3. Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above,
2. Spectrum Setting:
 - RBW > the 20 dB bandwidth of the emission being measured
 - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
 - VBW ≥ RBW
 - Sweep = auto
 - Detector function = peak
 - Trace = max hold

5.4. Test Data

Pass

Please refer to Appendix C of the Appendix Test Data.



6. 20DB Occupy Bandwidth Test

6.1. Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1)
---------------	------------------------------------

6.2. Test Setup



6.3. Test Procedure

Using the following spectrum analyzer settings:

1. Span= approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel.
2. Set the RBW $\geq 1\%$ of the 20 dB bandwidth.
3. Set the VBW $\geq$ RBW
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

6.4. Test Data

Pass

Please refer to Appendix A of the Appendix Test Data.

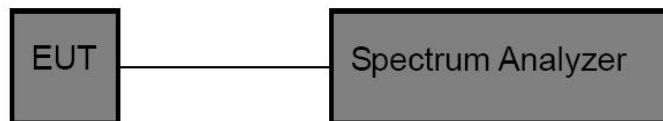


7. Carrier Frequency Separation Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	>25KHz or >two-thirds of the 20 dB bandwidth

7.2. Test Setup



7.3. Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer settings:

1. Span= Wide enough to capture the peaks of two adjacent channels
2. Set the RBW =approximately 30% of the channel spacing.
3. Set the VBW $\geq$ RBW.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

7.4. Test Data

Pass

Please refer to Appendix D of the Appendix Test Data.

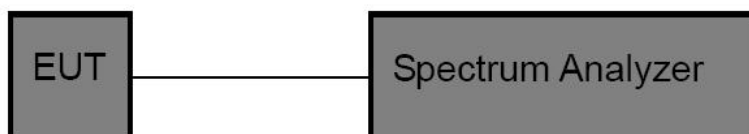


8. Number of Hopping Channel Test

8.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	>15 channels

8.2. Test Setup



8.3. Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer setting:

1. Span= the frequency band of operation
2. Set the RBW = less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
3. Set the VBW $\geq$ RBW.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

8.4. Test Data

Pass

Please refer to Appendix F of the Appendix Test Data.

9. Dwell Time Test

9.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	0.4 sec

9.2. Test Setup



9.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span= zero span, centered on a hopping channel
2. Set the RBW = 1 MHz.
3. Set the VBW = 3 MHz.
4. Sweep time = as necessary to capture the entire dwell time per hopping channel.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

9.4. Test Data

Pass

Please refer to Appendix E of the Appendix Test Data.



10. 100kHz Bandwidth of Frequency Band Edge Requirement

10.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

10.2. Test Setup



10.3. Test Procedure

The EUT must have its hopping/Non-hopping function enabled. Using the following spectrum analyzer setting:

1. Set the RBW = 100kHz.
2. Set the VBW = 300kHz.
3. Sweep time = auto couple.
4. Detector function = peak.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.

10.4. Test Data

Pass

Please refer to Appendix G & Appendix H of the Appendix Test Data.

11. Antenna Requirement

11.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /247(c)
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) 15.247(c) (1)(i) requirement: Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

11.2. Antenna Connected Construction

The antenna is PCB Antenna which permanently attached, and the best case gain of the antenna is -1 dBi. It complies with the standard requirement.

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement

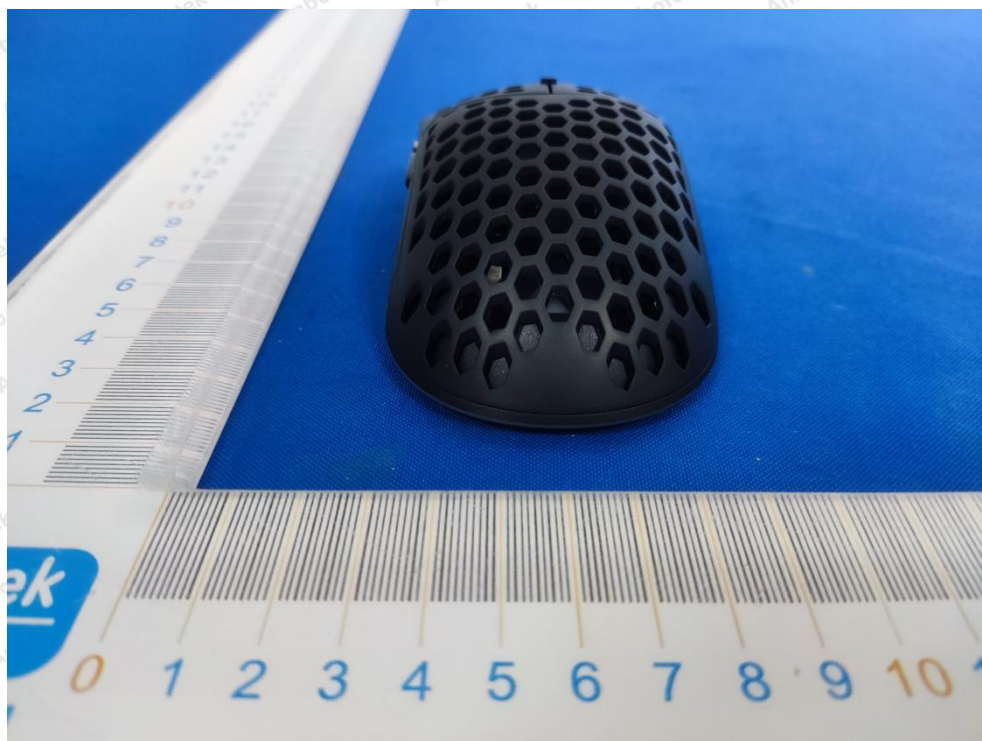


Photo of Radiation Emission Test





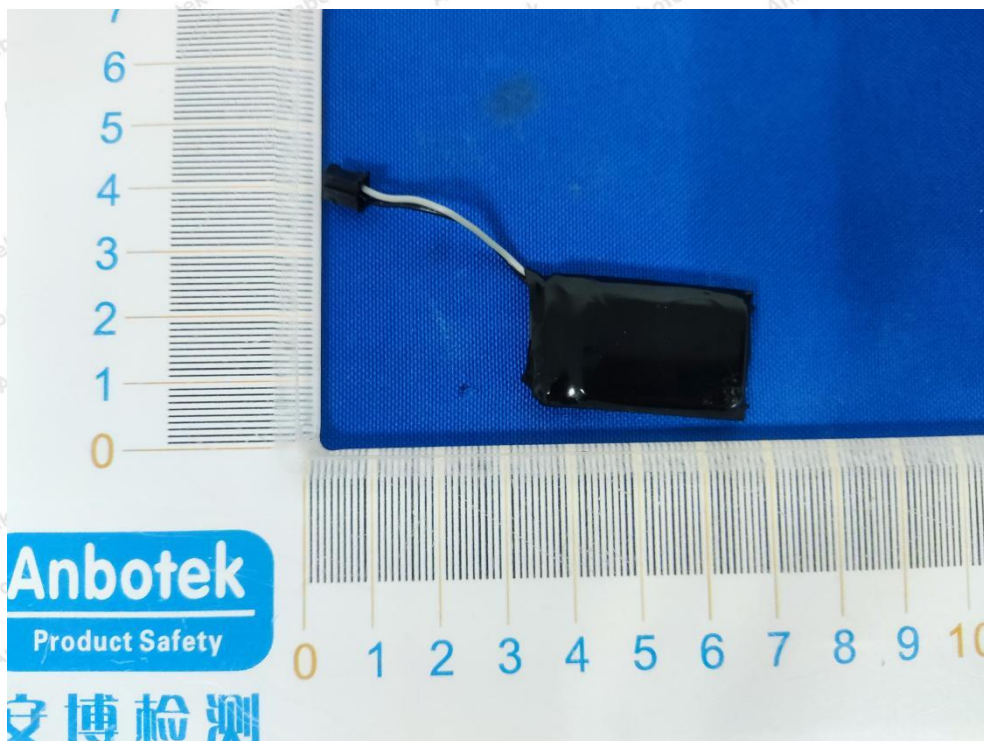
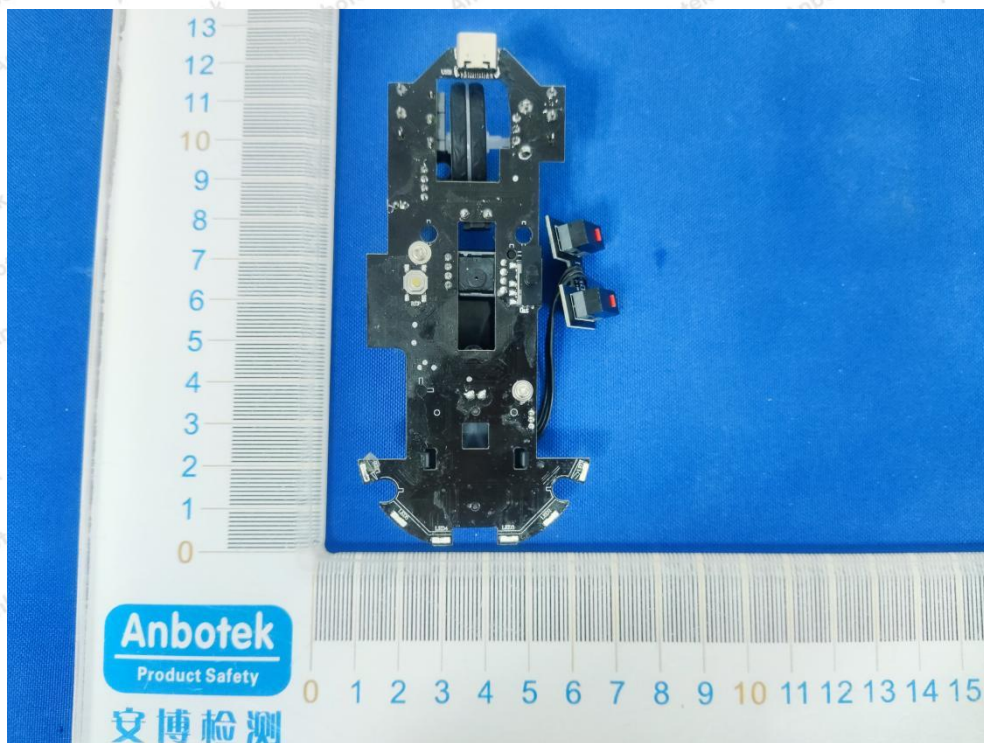
APPENDIX II -- EXTERNAL PHOTOGRAPH



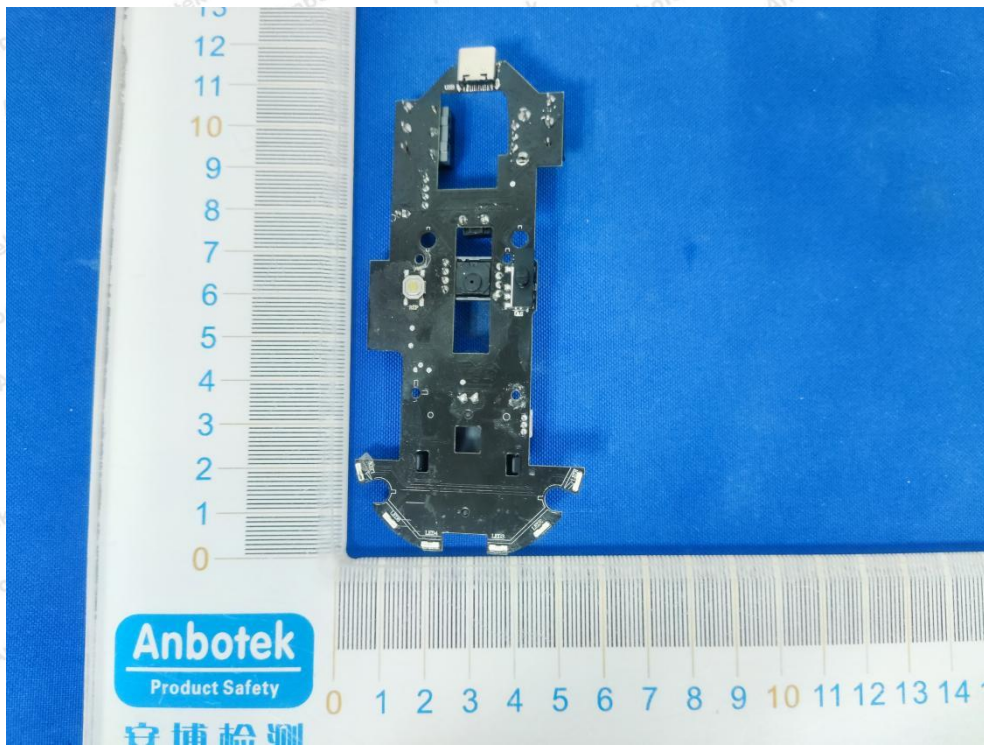
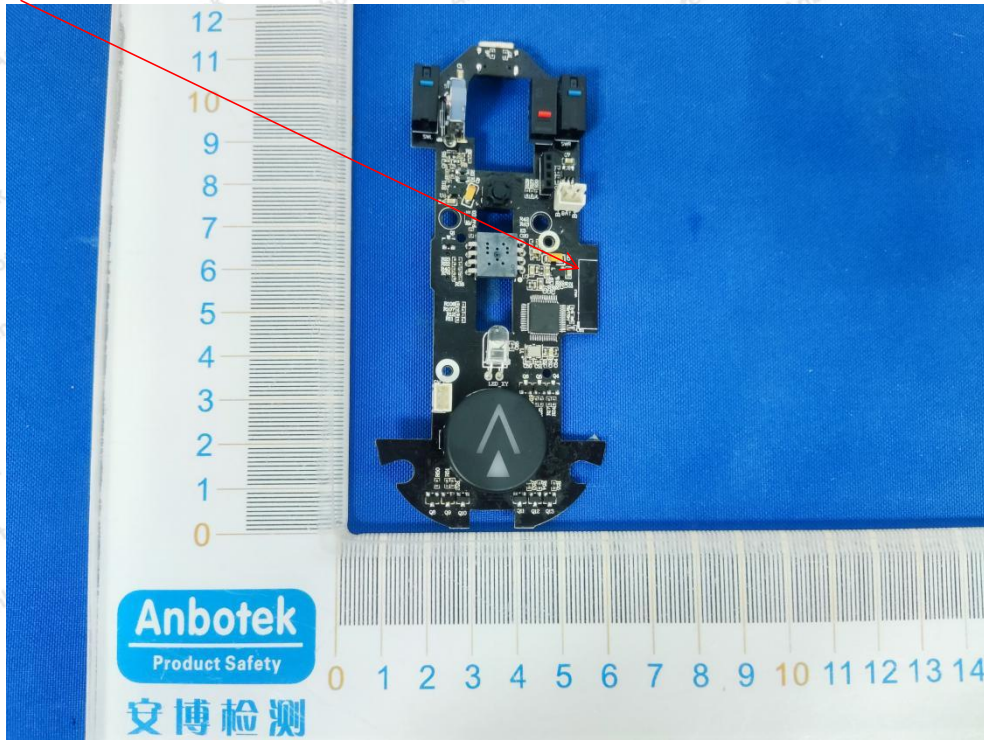


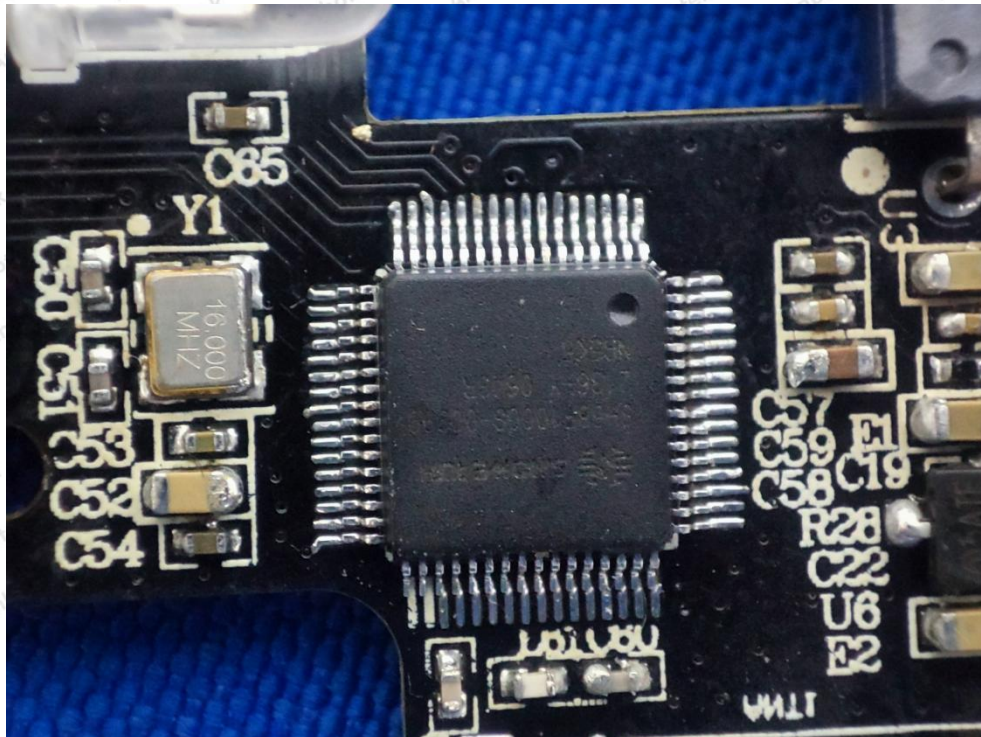


APPENDIX III -- INTERNAL PHOTOGRAPH



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APPENDIX IV – Appendix Test Data

