

FCC Test Report

Client Name : Excelsecu Data Technology Co., Ltd.

Address : Unit 701-708, South 7/F, SDGI Building A, No.2 Kefeng Rd.,
Nanshan District, Shenzhen, Guangdong, China

Product Name : FIDO Authenticator

Date : Dec. 30, 2019

Shenzhen Anbotek Compliance Laboratory Limited



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TEST REPORT

Applicant : Excelsecu Data Technology Co., Ltd.
Manufacturer : Excelsecu Data Technology Co., Ltd.
Product Name : FIDO Authenticator
Model No. : eSecu FIDO2 Fingerprint Key
Trade Mark : excelsecu
Rating(s) : Input: DC 5V, 100mA (with DC 3.7V, 40 mAh Battery inside)

Test Standard(s) : FCC Part15 Subpart C 2018, Section 15.225

Test Method(s) : ANSI C63.10: 2013

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 C 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

Nov. 20, 2019

Date of Test

Nov. 20~Dec. 27, 2019

Prepared By



Dolly Mo

(Engineer / Dolly Mo)

Reviewer

Bibo Zhang

(Supervisor / Bibo Zhang)

Approved & Authorized Signer

Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	Excelsecu Data Technology Co., Ltd.
Address	:	Unit 701-708, South 7/F, SDGI Building A, No.2 Kefeng Rd., Nanshan District, Shenzhen, Guangdong, China
Manufacturer	:	Excelsecu Data Technology Co., Ltd.
Address	:	Unit 701-708, South 7/F, SDGI Building A, No.2 Kefeng Rd., Nanshan District, Shenzhen, Guangdong, China
Factory	:	Shenzhen Excelsecu Data Technology Co., Ltd. Baoan Branch
Address	:	4F, Building #28, Shancheng Industrial Park, Shixin Community Langxin Community, Shiyan Street, Baoan District, Shenzhen City, China

1.2. Description of Device (EUT)

Product Name	:	FIDO Authenticator	
Model No.	:	eSecu FIDO2 Fingerprint Key	
Trade Mark	:	excelsecu	
Test Power Supply	:	AC 120V, 60Hz for MacBook Air / DC 5V USB Port	
Product Description	:	Operation Frequency:	NFC: 13.56MHz BLE: 2402~2480MHz
	:	Number of Channel:	NFC: 1 Channels BLE: 40 Channels
	:	Modulation Type:	NFC: ASK BLE: GFSK
	:	Antenna Type:	PCB Antenna
	:	Antenna Gain(Peak):	2.5 dBi
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 NFC module.			

1.3. Auxiliary Equipment Used During Test

MacBook Air	:	Model: A1466
		Input: 14.85V/3.05A
		CMIIT ID:C02HXB48DRV
		Adapter:
		Input: AC 100-240V, 1A, 50-60Hz
		Output: 14.85V/3.05A

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.

Pretest Mode	Description
Mode 1	TX Mode

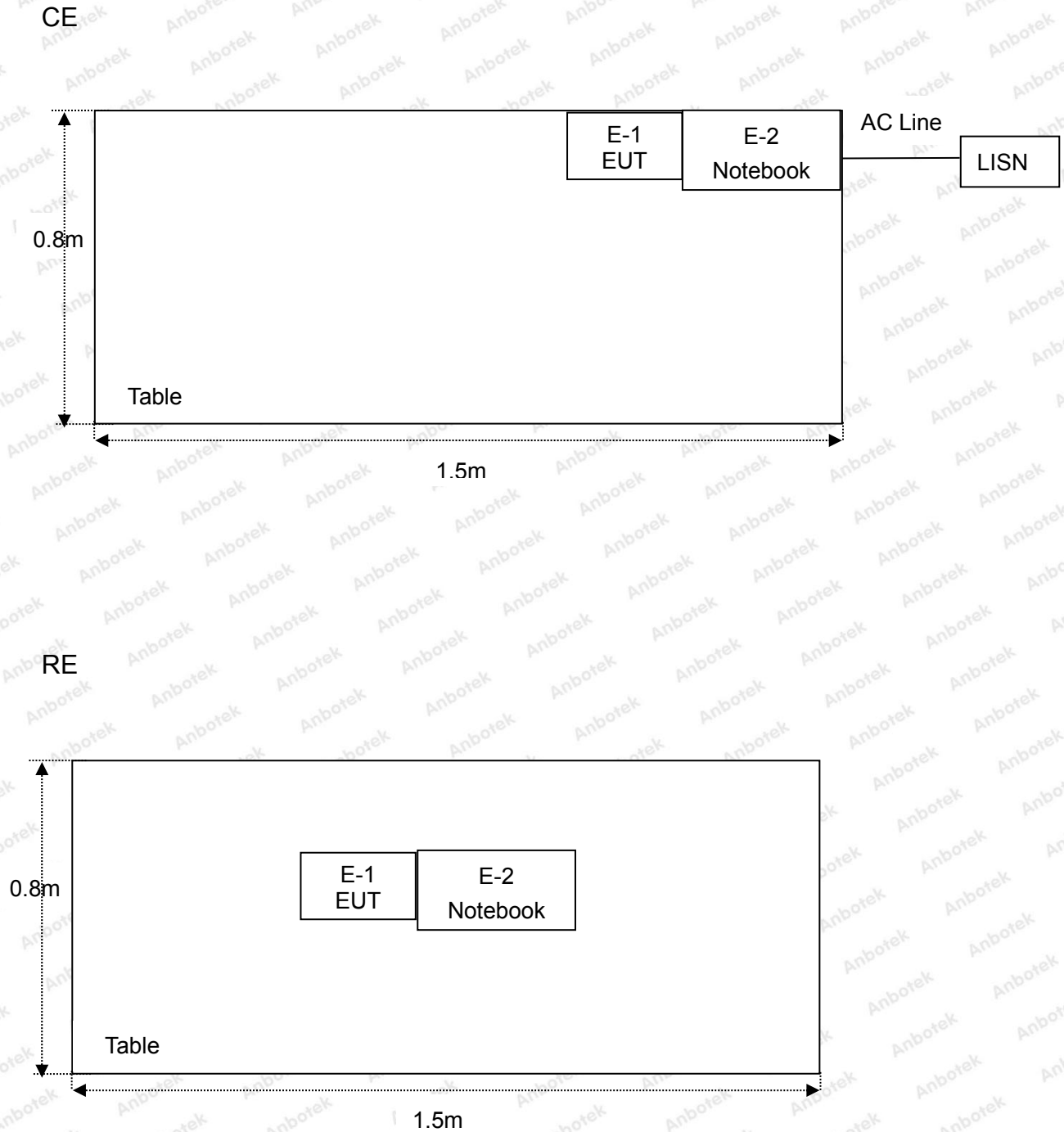
For Radiated Emission	
Final Test Mode	Description
Mode 1	TX Mode

Note: During the test, the EUT was keeping continuous transmission.

1.5. List of channels

Channel	Freq. (MHz)	Note (Modulation Type)
01	13.56	ASK

1.6. Description Of Test Setup



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	Nov. 04, 2019	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESPI3	101604	Nov. 04, 2019	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 04, 2019	1 Year
4.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 04, 2019	1 Year
5.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Nov. 04, 2019	1 Year
6.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 01, 2019	1 Year
7.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 01, 2019	1 Year
8.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 01, 2019	1 Year
9.	Horn Antenna	A-INFO	LB-180400-K F	J211060628	Nov. 01, 2019	1 Year
10.	Pre-amplifier	SONOMA	310N	186860	Nov. 04, 2019	1 Year
11.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
12.	RF Test Control System	YIHENG	YH3000	2017430	Nov. 04, 2019	1 Year
13.	Power Sensor	DAER	RPR3006W	15I00041SN045	Nov. 04, 2019	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN046	Nov. 04, 2019	1 Year
15.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 04, 2019	1 Year
16.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 04, 2019	1 Year
17.	Signal Generator	Agilent	E4421B	MY41000743	Nov. 04, 2019	1 Year
18.	DC Power Supply	LW	TPR-6420D	374470	Nov. 04, 2019	1 Year
19.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80 B	N/A	Nov. 04, 2019	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, September 27, 2019.

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, March 07, 2019.

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

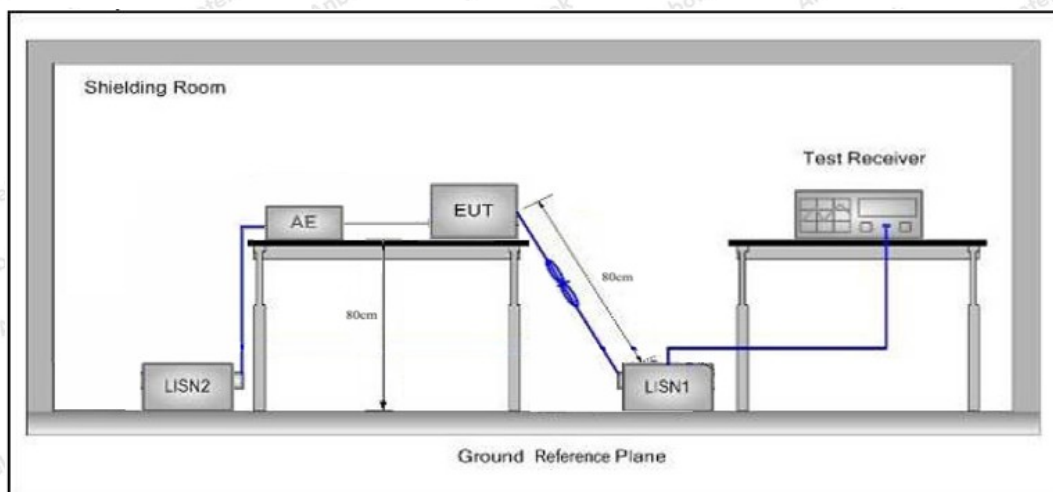
Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209/15.225(b)	Spurious Emission	PASS
15.225(c)	20dB Occupied Bandwidth	PASS
15.225	Frequency Tolerance	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

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 C63.10-2013 on Conducted Emission Measurement.

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

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

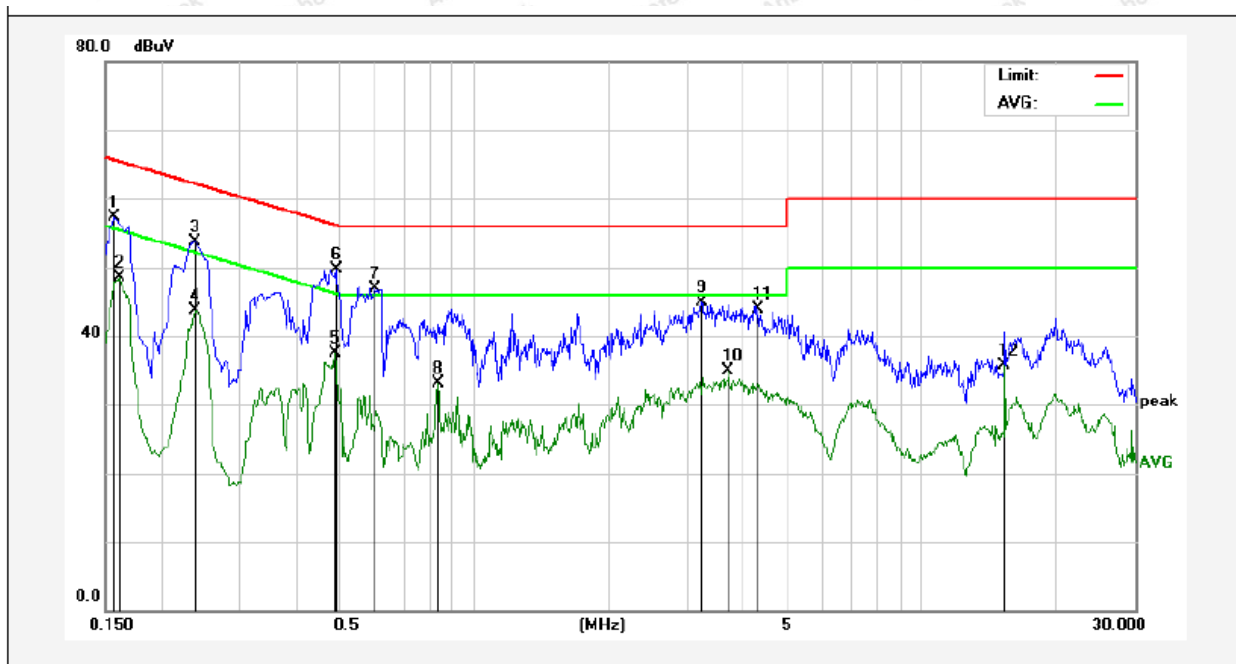
3.4. Test Data

PASS

During the test, pre-scan all the modes, and found the Low channel which is the worst case, only the worst case is recorded in the report.

Conducted Emission Test Data

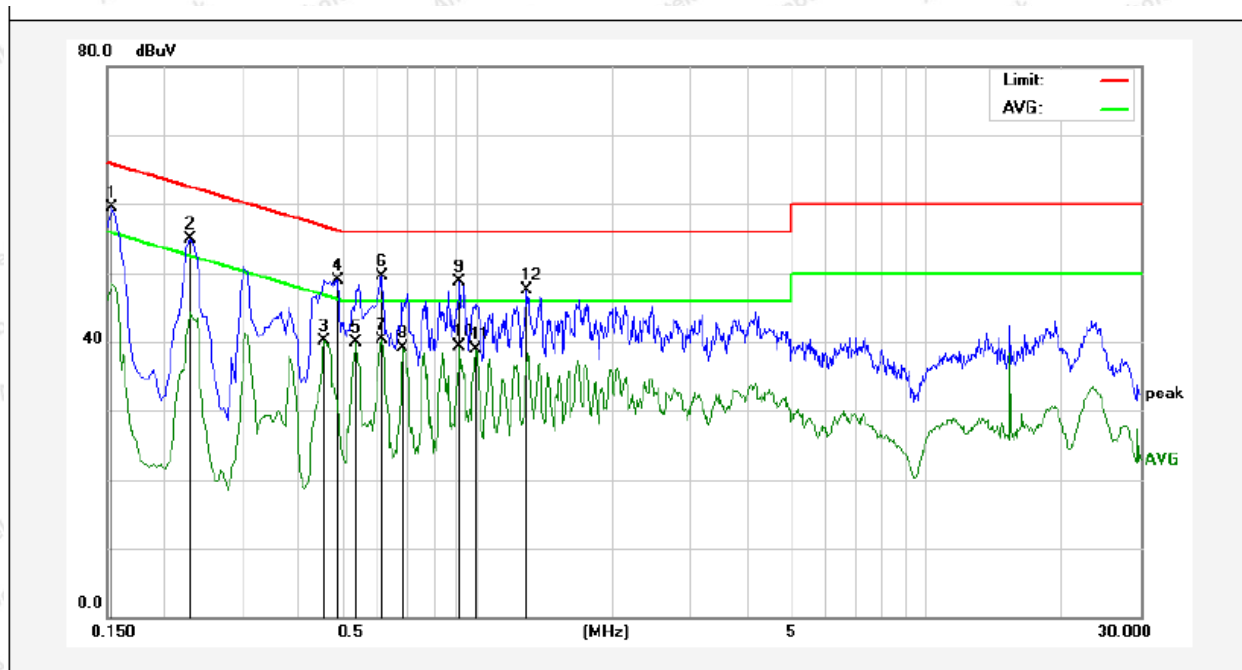
Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 120V, 60Hz for MacBook Air
Comment: Live Line
Tem.: 21.7°C Hum.: 54%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1580	37.41	19.90	57.31	65.56	-8.25	QP	
2	0.1620	28.57	19.90	48.47	55.36	-6.89	AVG	
3	0.2380	33.82	19.89	53.71	62.16	-8.45	QP	
4	0.2380	23.76	19.89	43.65	52.16	-8.51	AVG	
5	0.4900	17.47	19.98	37.45	46.17	-8.72	AVG	
6	0.4940	29.78	19.98	49.76	56.10	-6.34	QP	
7	0.6020	26.99	20.01	47.00	56.00	-9.00	QP	
8	0.8340	13.00	20.08	33.08	46.00	-12.92	AVG	
9	3.2340	24.66	20.16	44.82	56.00	-11.18	QP	
10	3.7180	14.73	20.17	34.90	46.00	-11.10	AVG	
11	4.3260	23.69	20.19	43.88	56.00	-12.12	QP	
12	15.3580	15.37	20.27	35.64	50.00	-14.36	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 120V, 60Hz for MacBook Air
 Comment: Neutral Line
 Tem.: 21.7°C Hum.: 54%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1539	39.63	19.90	59.53	65.78	-6.25	QP	
2	0.2300	35.08	19.89	54.97	62.45	-7.48	QP	
3	0.4580	20.20	19.96	40.16	46.73	-6.57	AVG	
4	0.4900	28.99	19.98	48.97	56.17	-7.20	QP	
5	0.5380	20.01	19.99	40.00	46.00	-6.00	AVG	
6	0.6140	29.52	20.01	49.53	56.00	-6.47	QP	
7	0.6140	20.26	20.01	40.27	46.00	-5.73	AVG	
8	0.6860	18.98	20.04	39.02	46.00	-6.98	AVG	
9	0.9180	28.60	20.10	48.70	56.00	-7.30	QP	
10	0.9180	19.24	20.10	39.34	46.00	-6.66	AVG	
11	0.9900	18.79	20.12	38.91	46.00	-7.09	AVG	
12	1.2940	27.40	20.13	47.53	56.00	-8.47	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 15.225(b)				
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.					

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Note:

(1) The tighter limit shall apply at the boundary between two frequency range.

(2) Limitation expressed in dBuV/m is calculated by $20\log$ Emission Level (uV/m).

(3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^2$.

Example:

F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as $Ld1 = L1 = 30uV/m * (10)^2 = 100 * 30 uV/m$

4.2. Test Setup

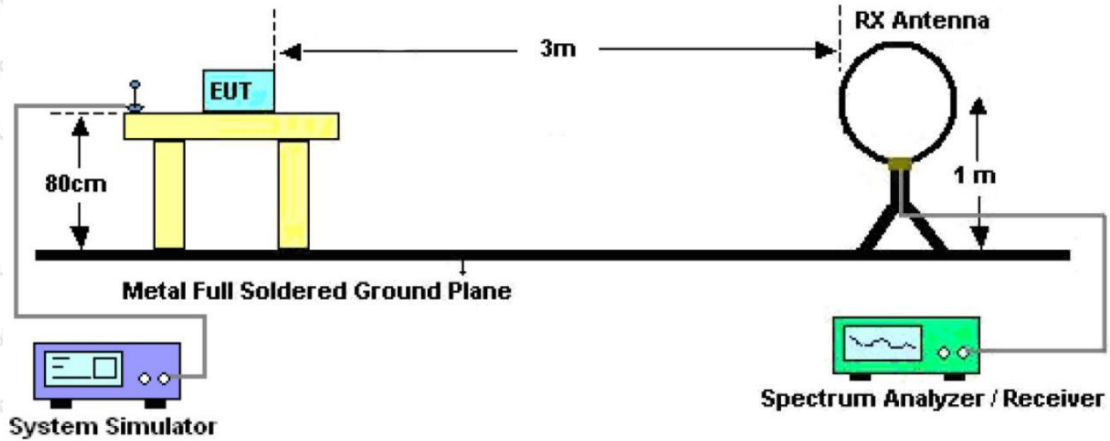


Figure 1. Below 30MHz

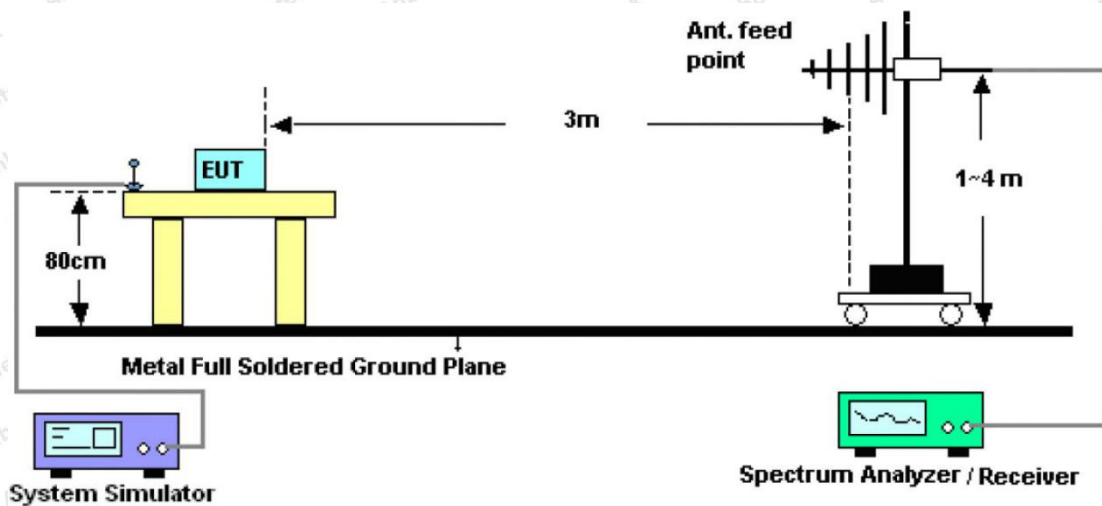


Figure 2. 30MHz to 1GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m 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 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

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.

Test Results (9KHz~30MHz)

Indicated		Table Angle Degree	Antenna Height (m)	Detector	Correction Factor			Corrected Amplitude (dBuV/m) @3m	FCC part 15.225	
Freq. (MHz)	Corrected Amplitude (dBuV/m) @3m				Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)		Limit (dBuV/m) @3m	Result
0.050	6.32	70	1.0	QP	83.1	0.1	30	59.51	113.62	PASS
0.690	26.81	142	1.0	QP	51.2	0.1	30	48.11	70.83	PASS
27.12	20.21	90	1.0	QP	31.0	0.2	30	21.41	69.54	PASS



Test Results (30~1000MHz)

Job No.: SZAWW191120005-01

Temp.(°C)/Hum.(%RH): 23°C/54%RH

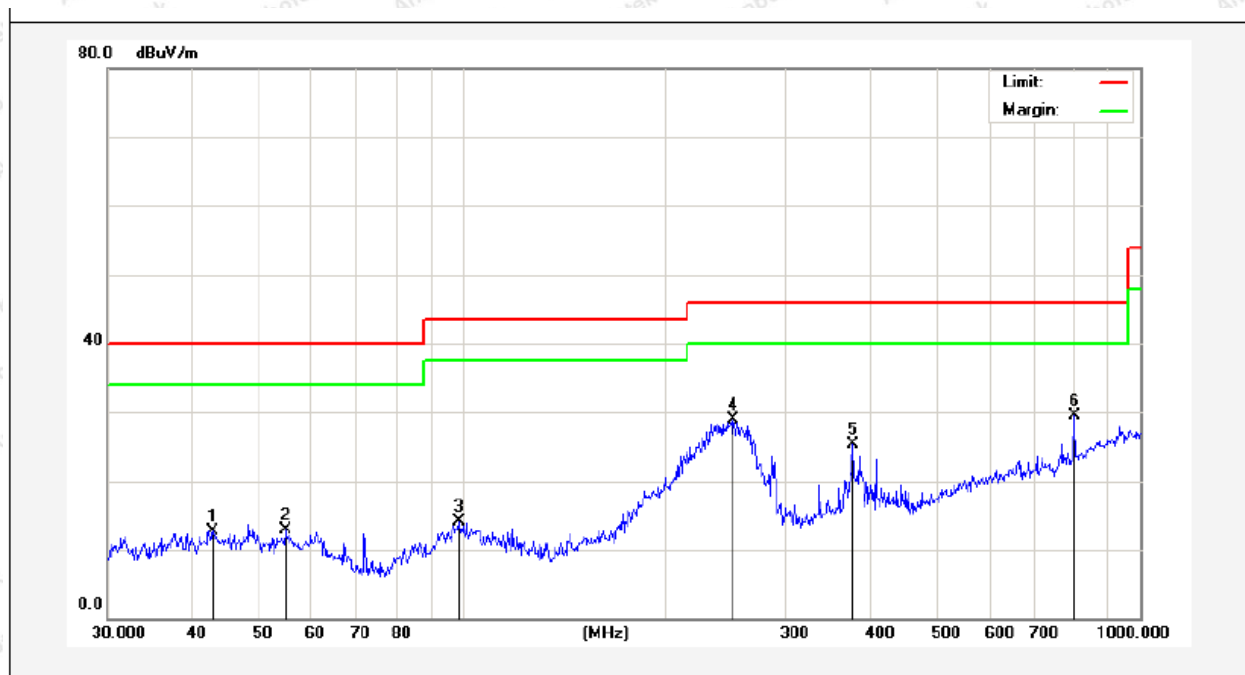
Standard: FCC PART 15C

Power Source: DC 5V USB Port

Test Mode: TX Mode

Polarization: Horizontal

Note:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	42.8998	30.57	-17.79	12.78	40.00	-27.22	QP	100	360	
2	54.8348	31.20	-18.21	12.99	40.00	-27.01	QP	100	0	
3	98.8326	36.68	-22.60	14.08	43.50	-29.42	QP	100	360	
4	251.1804	49.53	-20.67	28.86	46.00	-17.14	QP	100	0	
5	377.2591	41.04	-15.65	25.39	46.00	-20.61	QP	100	360	
6	798.9797	38.08	-8.54	29.54	46.00	-16.46	QP	100	0	

Test Results (30~1000MHz)

Job No.: SZAWW191120005-01

Temp.(°C)/Hum.(%RH): 23°C/54%RH

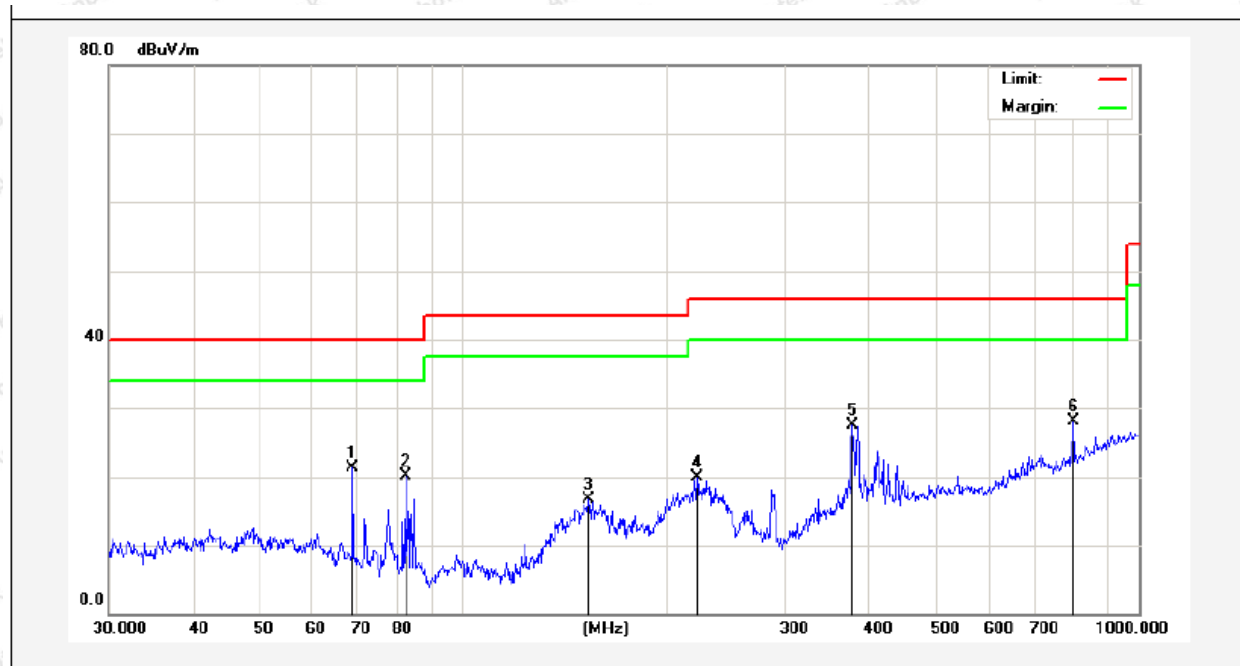
Standard: FCC PART 15C

Power Source: DC 5V USB Port

Test Mode: TX Mode

Polarization: Vertical

Note:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	68.8721	42.34	-20.98	21.36	40.00	-18.64	QP	100	0	
2	82.3588	40.72	-20.52	20.20	40.00	-19.80	QP	100	360	
3	153.7385	37.39	-20.71	16.68	43.50	-26.82	QP	100	0	
4	222.1698	37.05	-17.14	19.91	46.00	-26.09	QP	100	360	
5	377.2591	42.21	-14.65	27.56	46.00	-18.44	QP	100	0	
6	801.7863	35.62	-7.49	28.13	46.00	-17.87	QP	100	360	

Remark:

1. Results = Reading + Cable Loss +Ant Factor –Amplifier

Test Results (Inband)

Indicated			Table Angle Degree	Antenna Height (m)	Detector	Correction Factor			Corrected Amplitude (dBuV/m) @3m	FCC part 15.225	
Frequency Range (MHz)	Mark Point (MHz)	Corrected Amplitude (dBuV/m) @3m				Ant. Factor (dB)	Cable Loss (dB)	Pre- Amp. Gain (dB)		Limit (dBuV/m) @3m	Result
13.110~13.410	13.391	71.52	0	1.0	QP	20.8	0.2	30.2	62.32	80.5	PASS
13.410~13.553	13.539	73.62	0	1.0	QP	20.9	0.2	30.2	64.52	90.5	PASS
13.553~13.567	13.557	96.12	0	1.0	QP	20.9	0.2	30.2	87.02	124	PASS
13.567~13.710	13.571	56.31	0	1.0	QP	21.1	0.2	30.2	47.41	90.5	PASS
13.710~14.010	13.878	70.22	0	1.0	QP	21.2	0.2	30.2	61.42	80.5	PASS

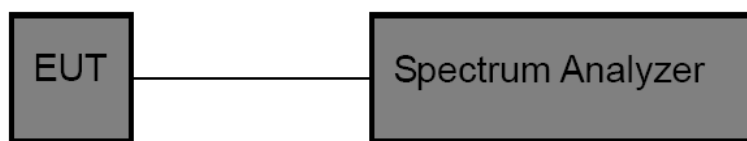


5. Frequency Tolerance

5.1. Test Requirement

According to FCC section 15.225, the devices operating in the 13.553~13.567 MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20°C to +50°C using an environmental chamber. The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

5.2. Test Setup



5.3. Test Procedure

Let the EUT works on temperature variation of -20 degrees to +50 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. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4. Test Data

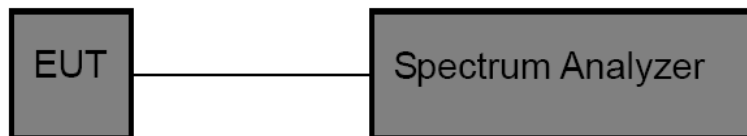
Test Condition				
	Voltage (V)	Temperature (°C)	Test Result (Hz)	Limit (Hz)
Normal Condition	AC 120V	-20	35	1356
		+20	36	1356
		+50	34	1356
Extreme Condition	AC 102V	+20	42	1356
	AC 138V	+20	47	1356

6. 20DB Occupy Bandwidth Test

6.1. Test Standard and Limit

According to FCC section 15.215(c), the 20dB bandwidth should be contained within the frequency band designated in the rule section under which the EUT is operated, it was measured with a spectrum analyzer connected the EUT while the EUT is operating in transmission mode.

6.2. Test Setup



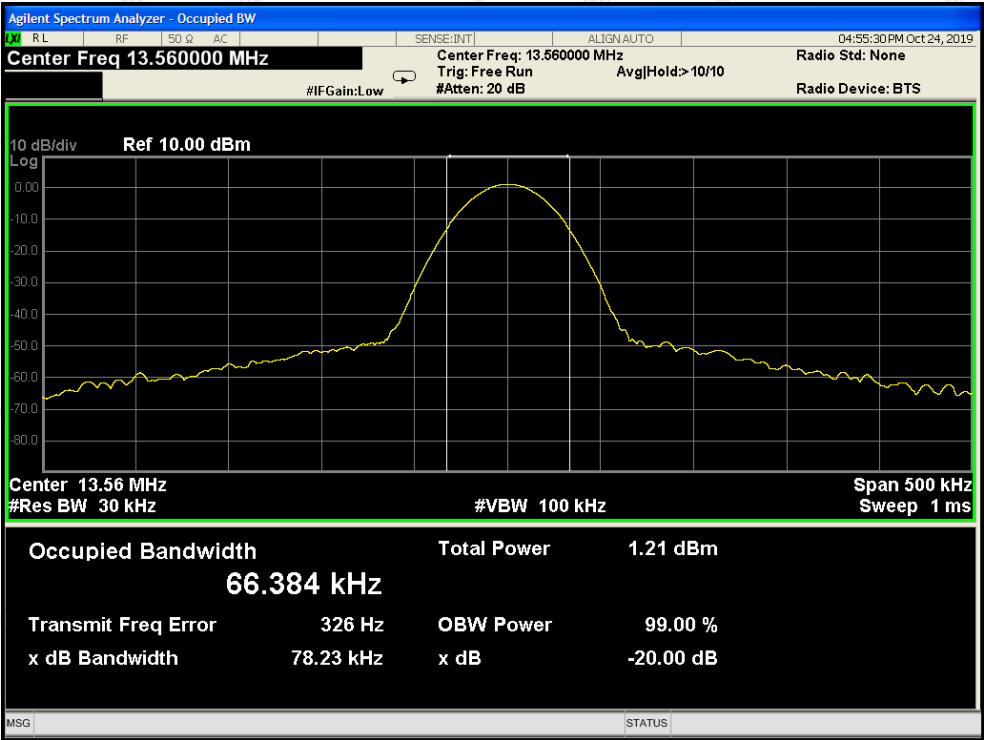
6.3. Test Procedure

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

6.4. Test Data

Test Item	: 20dB Bandwidth	Test Mode	: Continuously transmitting
Test Voltage	: AC 120V, 60Hz for MacBook Air	Temperature	: 24℃
Test Result	: PASS	Humidity	: 55%RH

Freq. (MHz)	Modulation Type	Bandwidth (kHz)	Results
13.56	ASK	78.23	PASS



13.56MHz

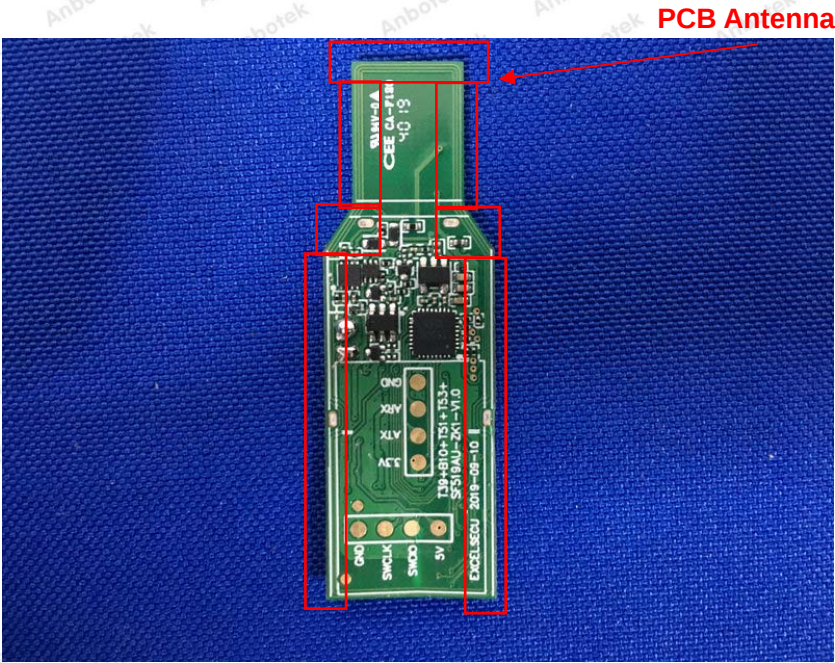
7. Antenna Requirement

7.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
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. Antenna requirement must meet at least one of the following: 1) Antenna must be permanently attached to device. 2) The antenna must use a unique type of connector to attach to the device. 3) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.

7.2. Antenna Connected Construction

The antenna is a PCB antenna which permanently attached, and the best case gain of the antenna is 2.5 dBi. It complies with the standard requirement.



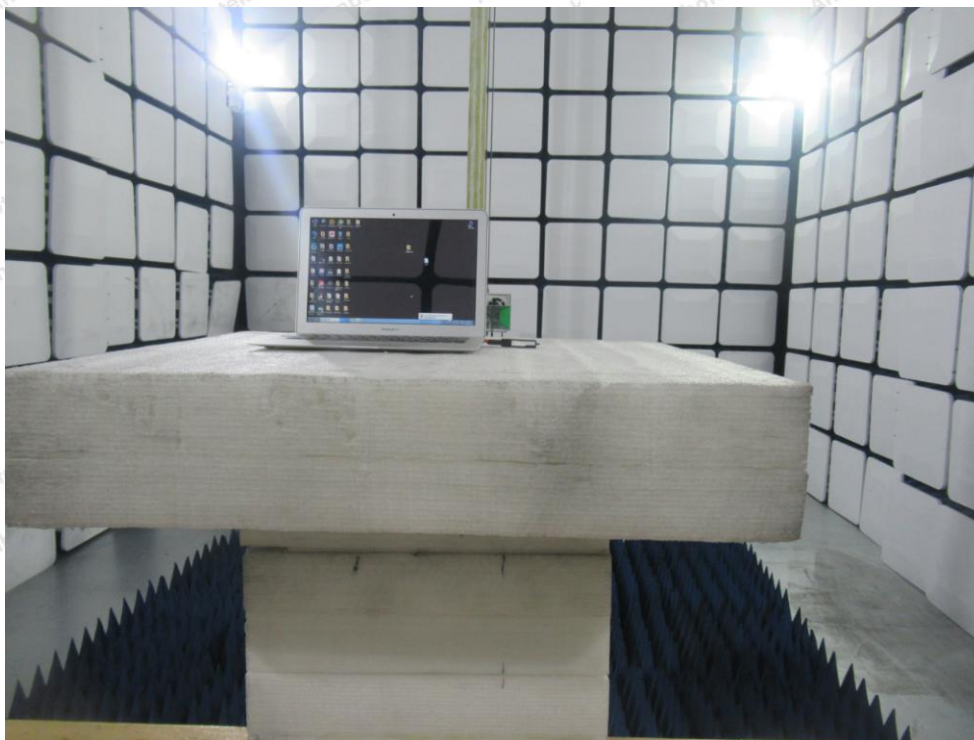
APPENDIX I -- TEST SETUP PHOTOGRAPH

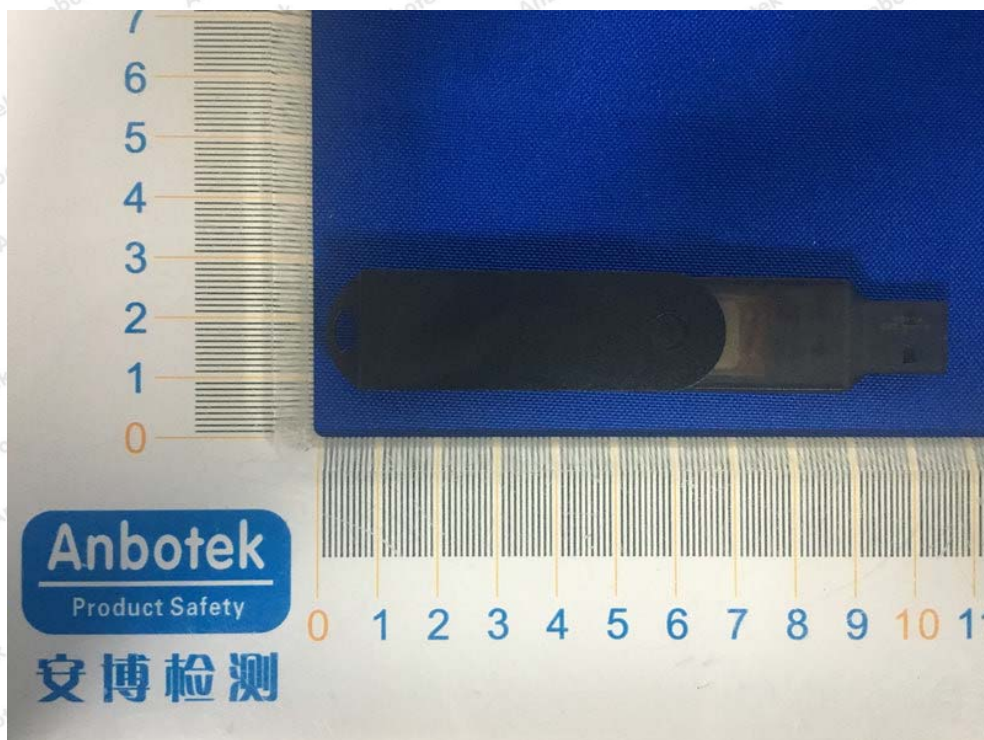
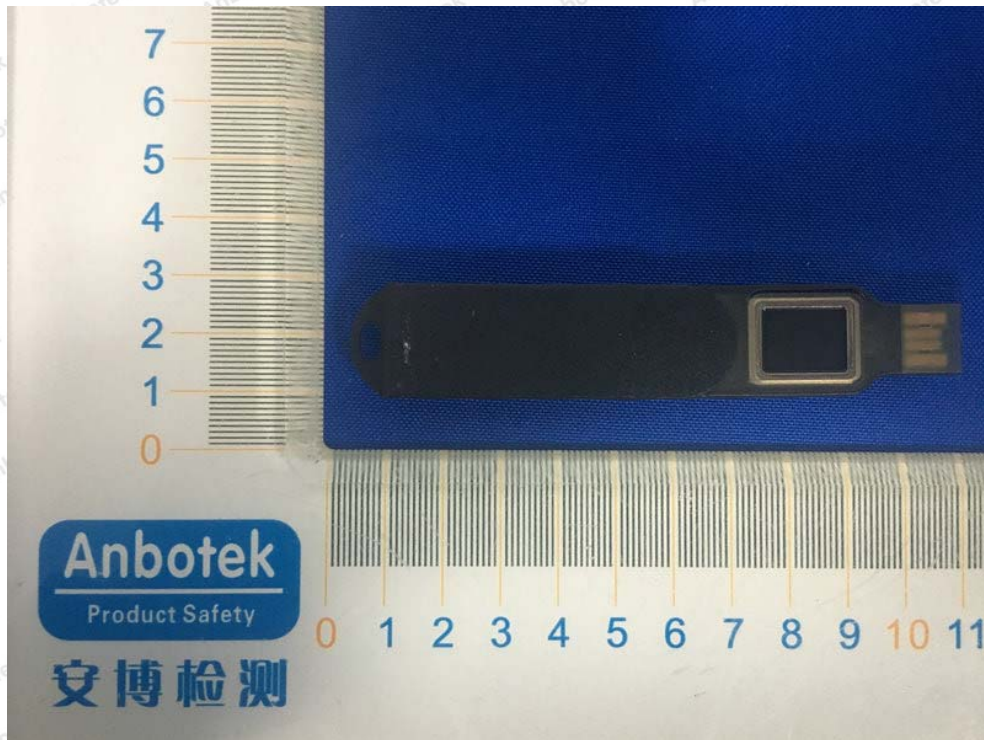
Photo of Conducted Emission Test

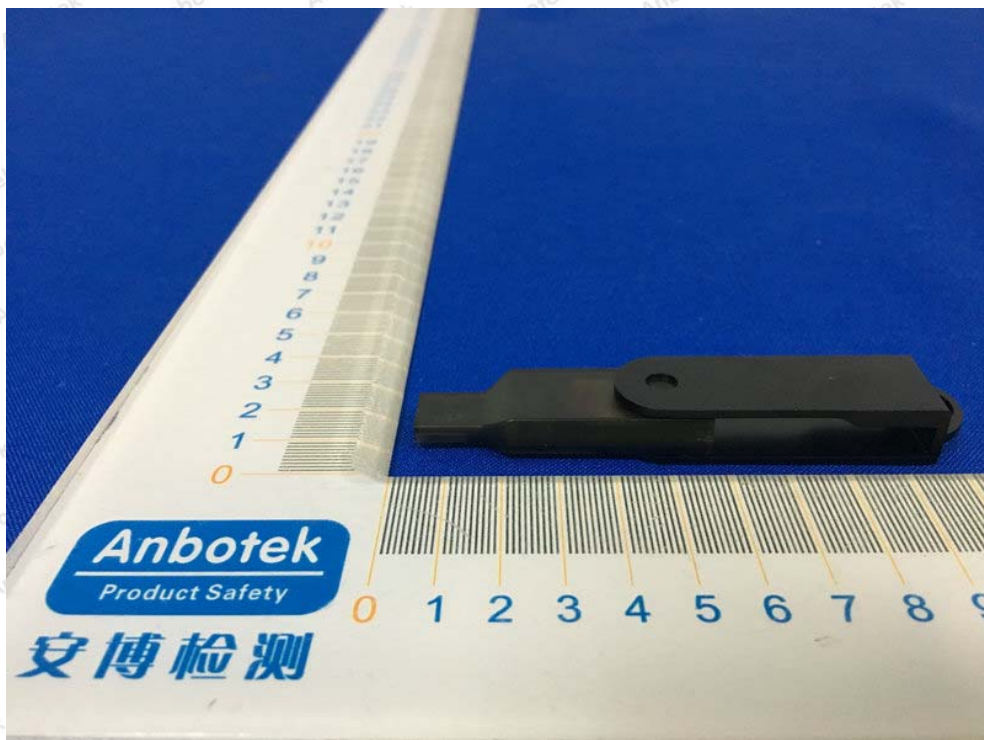
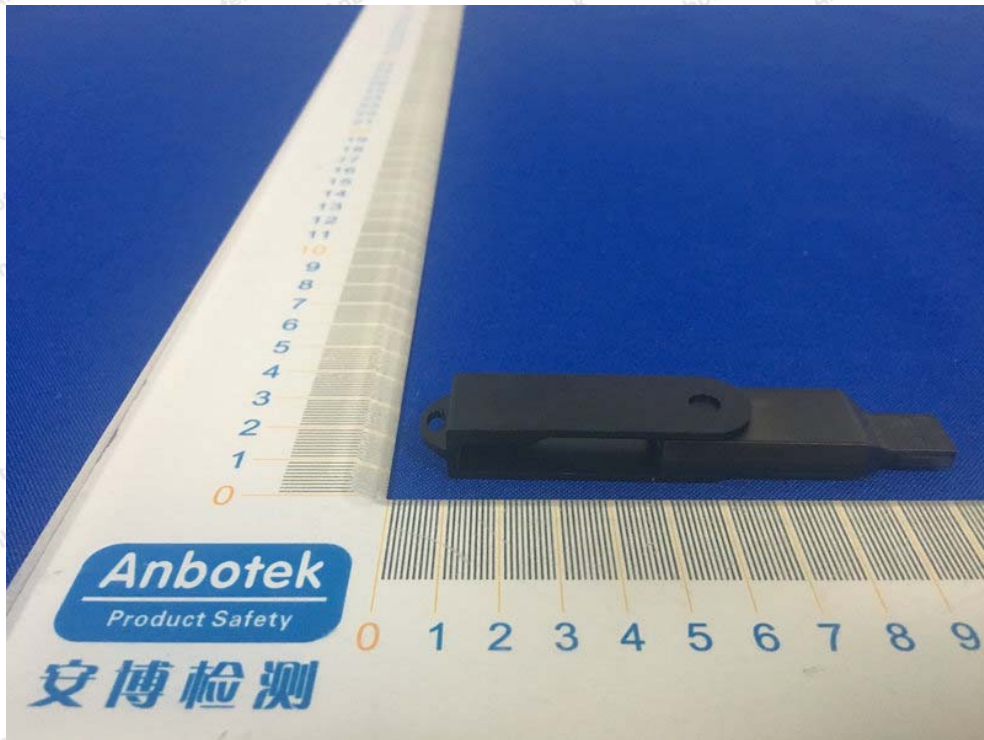


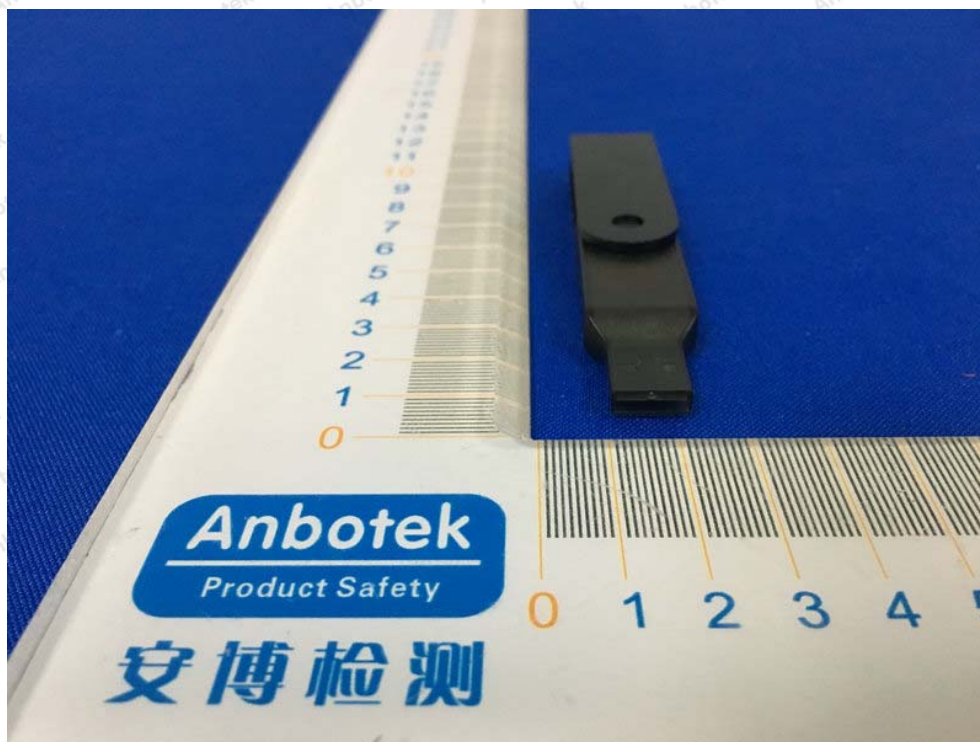
Photo of Radiation Emission Test



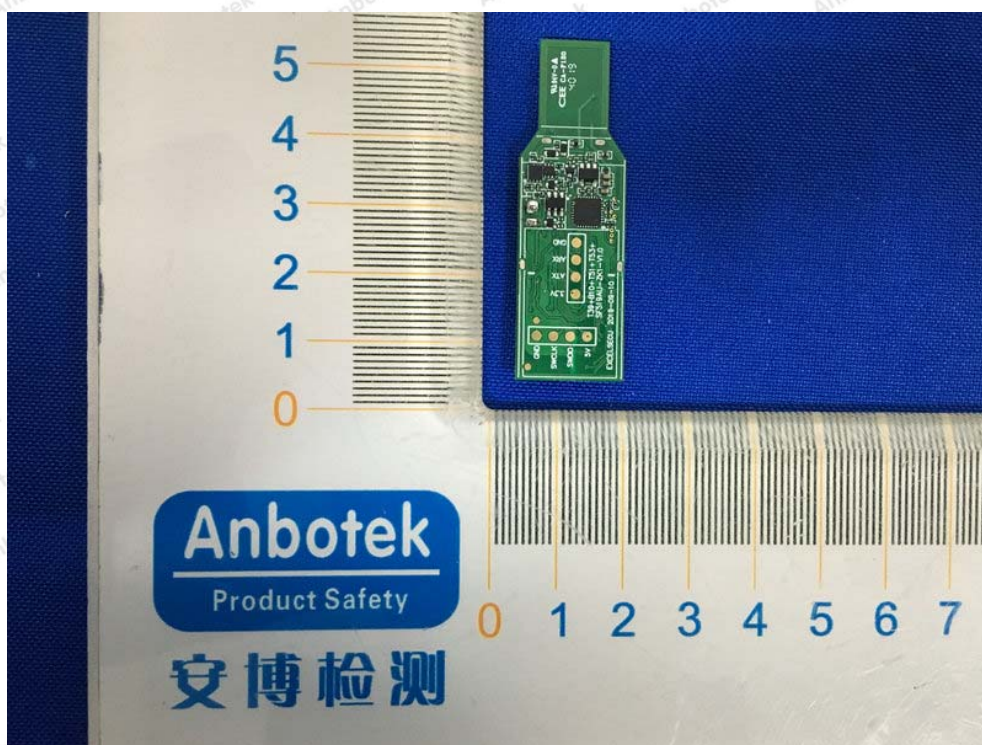


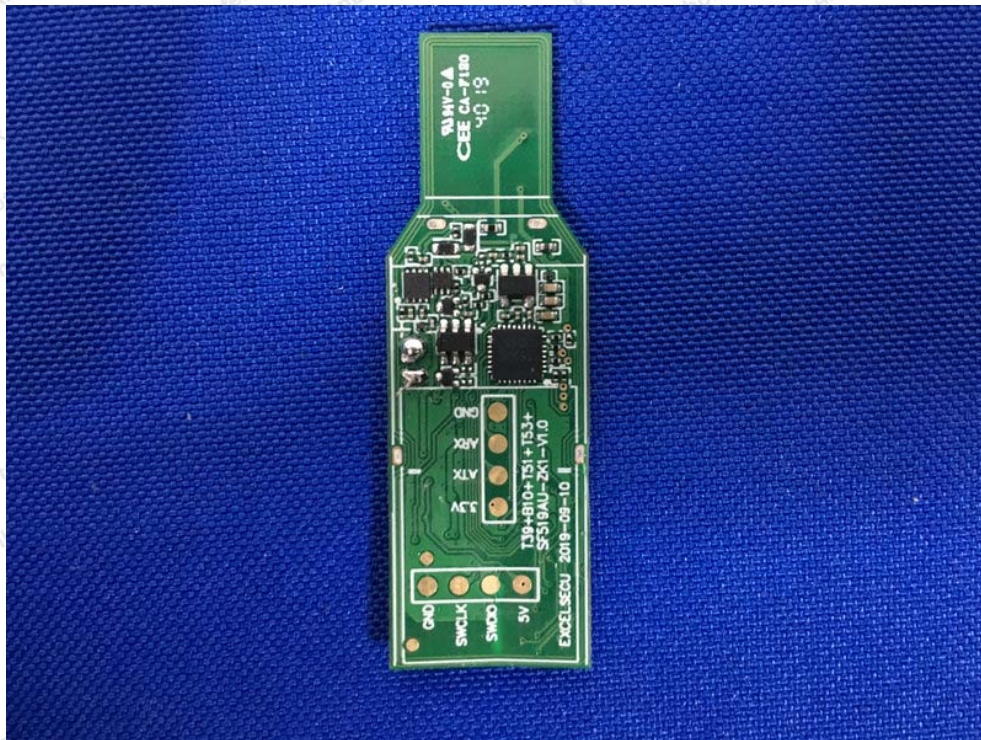
APPENDIX II -- EXTERNAL PHOTOGRAPH





APPENDIX III -- INTERNAL PHOTOGRAPH





----- End of Report -----