FCC TEST REPORT

For

Seal Shield Corporation

2.4GHz Wireless Keyboard

Model No.: SSXKSV099WP(MAIN TEST), SK-0410AG

Prepared For	:	Seal Shield Corporation
Address	:	3105 Riverside Avenue Jacksonville, FL 32205 United States

Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
Address	:	1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China Tel: (86) 755-26066544 Fax: (86) 755-26014772

Report Number	:	R0217060077W
Date of Test	:	Jun. 19~Jul 07, 2017
Date of Report	:	Jul. 07, 2017

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TEST REPORT

Applicant	:	Seal Shield Corporation
Manufacturer	:	Shenzhen SQT Electronics Co., Ltd.
Product Name	:	2.4GHz Wireless Keyboard
Model No.	:	SSXKSV099WP(MAIN TEST), SK-0410AG
Trade Mark	:	SEAL SHIELD™
Rating(s)	:	Input DC 5V, 10mA (DC 3.7V, 250mAh Battery Inside)

Test Standard(s)	**:**	**FCC Part15 Subpart C, Paragraph 15.249**
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 Test : : Jun. 19~Jul 07, 2017

Prepared by : : Winkey Wang
(Tested Engineer / Winkey Wang)

Reviewer : : Amy Ding
(Project Manager / Amy Ding)

Approved & Authorized Signer : : Tom Chen
(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	Seal Shield Corporation
Address	:	3105 Riverside Avenue Jacksonville, FL 32205 United States
Manufacturer	:	Shenzhen SQT Electronics Co., Ltd.
Address	:	ZhengChengFeng Technology Zone, Xinsha Road, ShaYi Village, Sha jing Town, Baoan Area, Shenzhen, China

1.2. Description of Device (EUT)

Product Name	:	2.4GHz Wireless Keyboard	
Model No.	:	SSXKSV099WP(MAIN TEST), SK-0410AG (Note: All samples are the same except the model number and colour, so we prepare "SSXKSV099WP(MAIN TEST)" for test only.)	
Trade Mark	:	SEAL SHIELD™	
Test Power Supply	:	AC 120V, 60Hz for adapter / AC 240V, 60Hz for adapter/ DC 3.7V Battery Inside	
Product Description	:	Operation Frequency:	2408~2474MHz
		Number of Channel:	34 Channels, 2MHz Spacing
		Modulation Type:	FSK
		Antenna Type:	PCB Antenna
		Antenna Gain(Peak):	-0.61 dbi
Remark: 1)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.			

1.3. Auxiliary Equipment Used During Test

Adapter	:	Manufacturer: ZTE M/N: STC-A2050I1000USBA-C S/N: 201202102100876 Input: 100-240V~50/60Hz 0.3A Output: DC 5V, 1000mA

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	CH01
Mode 2	CH17
Mode 3	CH34

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX mode

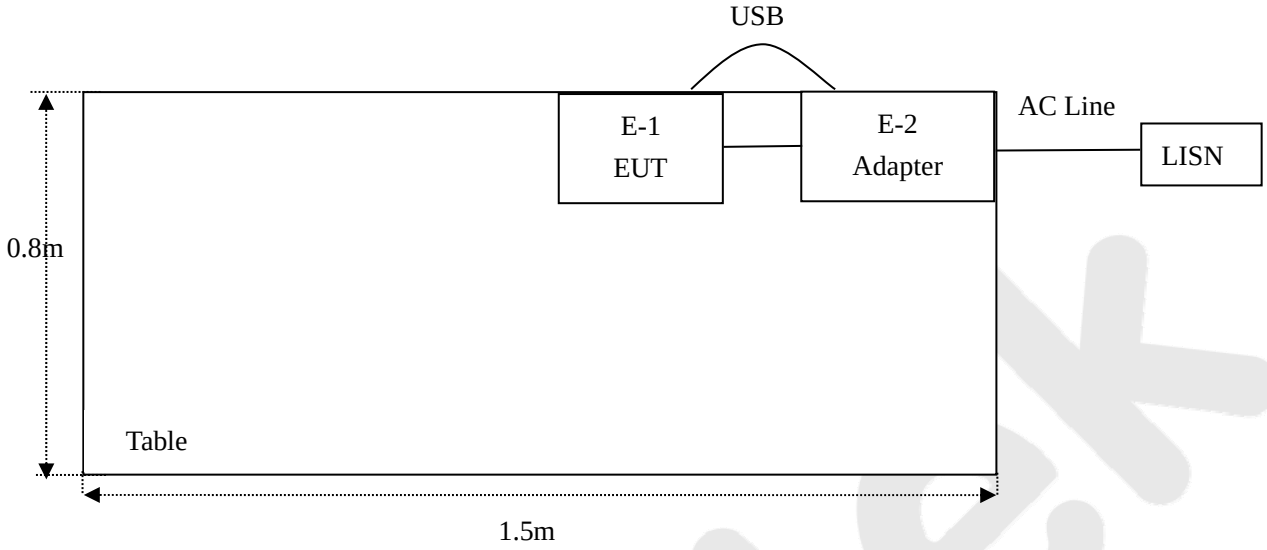
For Radiated Emission	
Final Test Mode	Description
Mode 1	CH01
Mode 2	CH17
Mode 3	CH34

1.5. List of Channels

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
01	2408	10	2426	19	2444	28	2462
02	2410	11	2428	20	2446	29	2464
03	2412	12	2430	21	2448	30	2466
04	2414	13	2432	22	2450	31	2468
05	2416	14	2434	23	2452	32	2470
06	2418	15	2436	24	2454	33	2472
07	2420	16	2438	25	2456	34	2474
08	2422	17	2440	26	2458		
09	2424	18	2442	27	2460		

1.6. Description of Test Setup

CE



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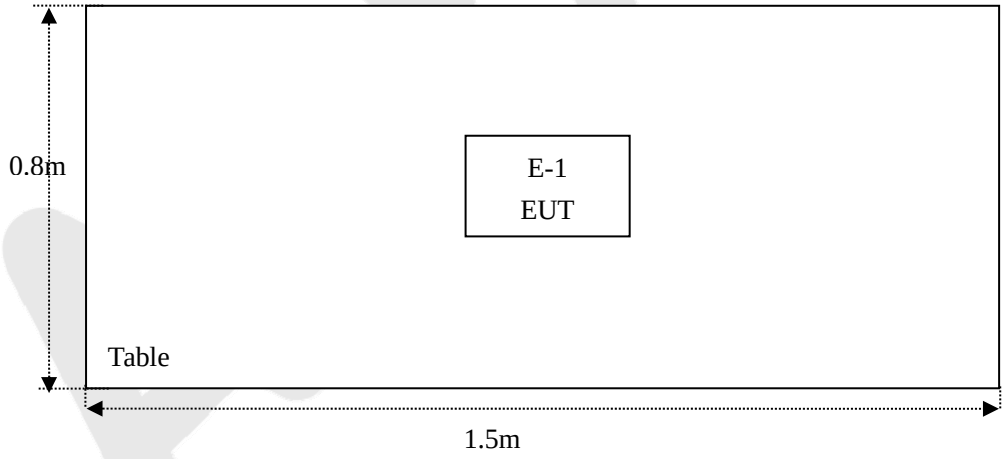


1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	May 27, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	May 27, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 27, 2017	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	May 27, 2017	1 Year
5.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	May 27, 2017	1 Year
6.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	May 27, 2017	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	May 31, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 31, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	HFH2-Z2	100047	Apr. 03, 2017	1 Year
10.	Pre-amplifier	SONOMA	310N	186860	May 27, 2017	1 Year
11.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
12.	Power Sensor	DAER	RPR3006W	15I00041SN045	May 27, 2017	1 Year
13.	Power Sensor	DAER	RPR3006W	15I00041SN046	May 27, 2017	1 Year
14.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	May 27, 2017	1 Year
15.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	May 27, 2017	1 Year
16.	Signal Generator	Agilent	E4421B	MY41000743	May 27, 2017	1 Year
17.	DC Power supply	IVYTECH	IV6003	1601D6030007	May 26, 2017	1 Year
18.	TEMP&HUMI PROGRAMMABLE CHAMBER	Sertep	ZJ-HWHS80B	ZJ-17042804	Mar. 03, 2017	1 Year

1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal)
		Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.9. Description of Test Facility

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

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed 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 752021, July 06, 2016.

ISED-Registration No.: 8058A-1

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-1, June 13, 2016.

Test Location

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

2. Summary of Test Results

Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.249	Radiated Emission	PASS
15.215(c)	20dB Bandwidth	PASS
15.249(c)	Band Edge	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

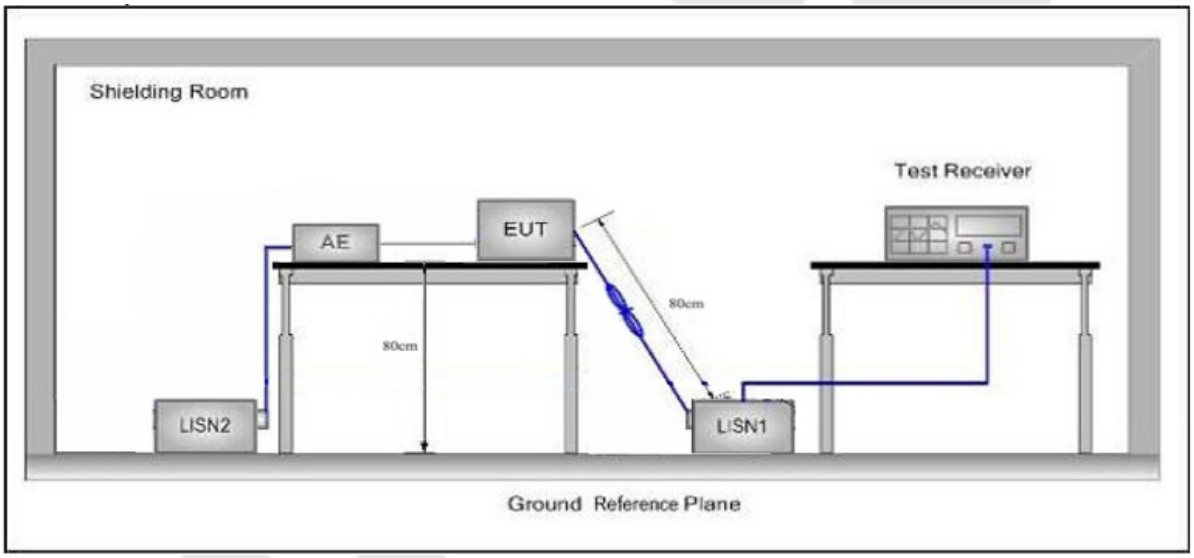
3. Conducted Emission Test

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

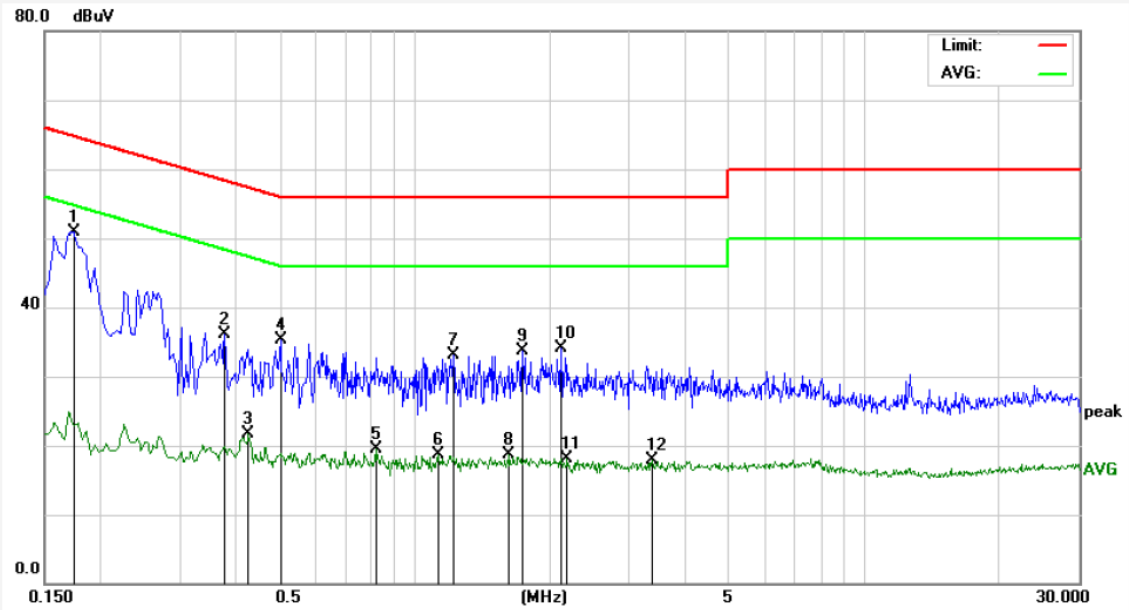
The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted 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 C63.10-2013 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

Please to see the following pages

Conducted Emission Test Data

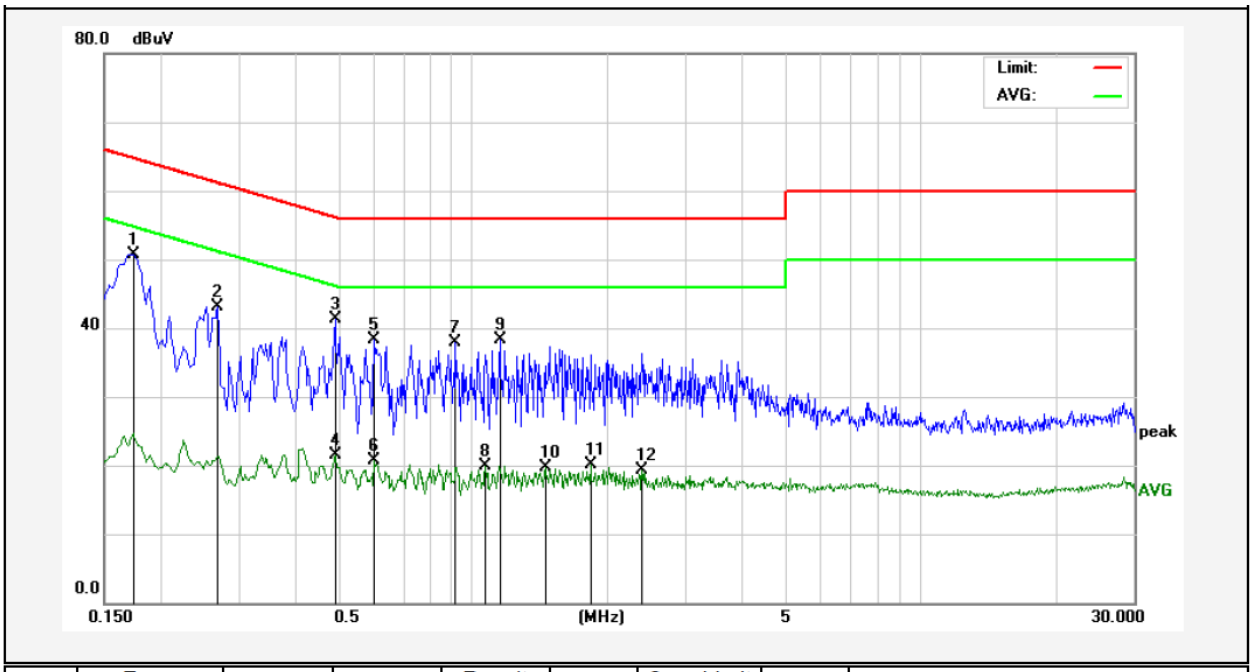
Test Site: 1# Shielded Room
Operating Condition: TX mode
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1740	31.07	19.90	50.97	64.76	-13.79	QP	
2	0.3780	16.18	19.93	36.11	58.32	-22.21	QP	
3	0.4260	1.68	19.95	21.63	47.33	-25.70	AVG	
4	0.5020	15.42	19.98	35.40	56.00	-20.60	QP	
5	0.8180	-0.59	20.07	19.48	46.00	-26.52	AVG	
6	1.1260	-1.37	20.12	18.75	46.00	-27.25	AVG	
7	1.2220	13.00	20.12	33.12	56.00	-22.88	QP	
8	1.6260	-1.48	20.13	18.65	46.00	-27.35	AVG	
9	1.7420	13.55	20.13	33.68	56.00	-22.32	QP	
10	2.1140	13.90	20.14	34.04	56.00	-21.96	QP	
11	2.1860	-1.99	20.14	18.15	46.00	-27.85	AVG	
12	3.3780	-2.35	20.17	17.82	46.00	-28.18	AVG	

Conducted Emission Test Data

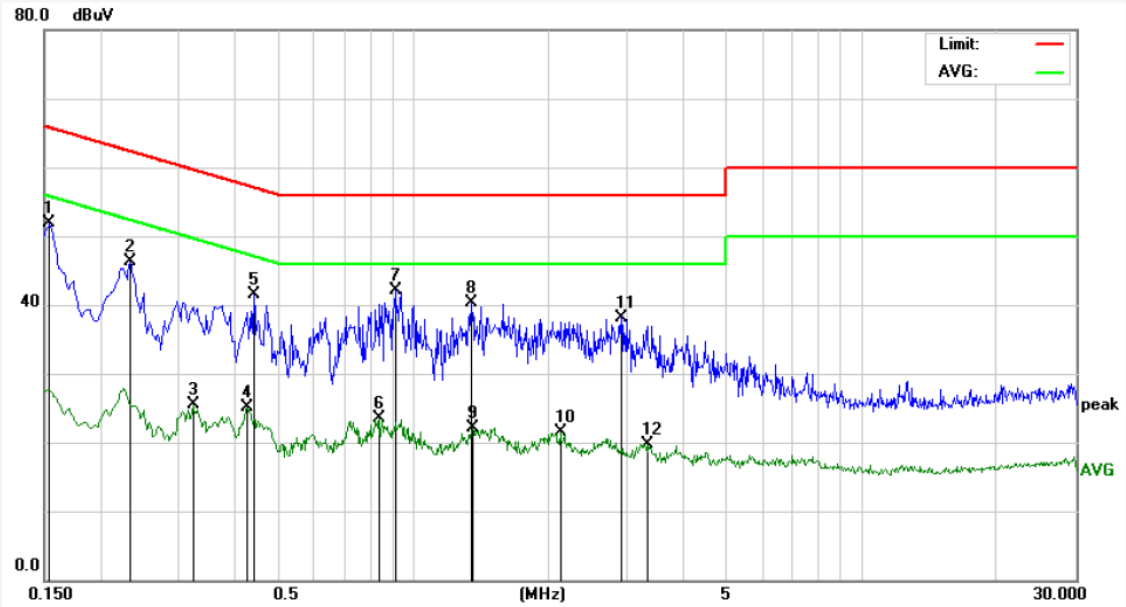
Test Site: 1# Shielded Room
Operating Condition: TX mode
Test Specification: AC 120V, 60Hz for adapter
Comment: Neutral Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1740	30.90	19.90	50.80	64.76	-13.96	QP	
2	0.2700	23.22	19.89	43.11	61.12	-18.01	QP	
3	0.4940	21.39	19.98	41.37	56.10	-14.73	QP	
4	0.4940	1.43	19.98	21.41	46.10	-24.69	AVG	
5	0.6020	18.39	20.01	38.40	56.00	-17.60	QP	
6	0.6020	0.67	20.01	20.68	46.00	-25.32	AVG	
7	0.9180	17.88	20.10	37.98	56.00	-18.02	QP	
8	1.0660	-0.15	20.12	19.97	46.00	-26.03	AVG	
9	1.1500	18.20	20.12	38.32	56.00	-17.68	QP	
10	1.4540	-0.40	20.13	19.73	46.00	-26.27	AVG	
11	1.8380	-0.08	20.14	20.06	46.00	-25.94	AVG	
12	2.3940	-0.76	20.15	19.39	46.00	-26.61	AVG	

Conducted Emission Test Data

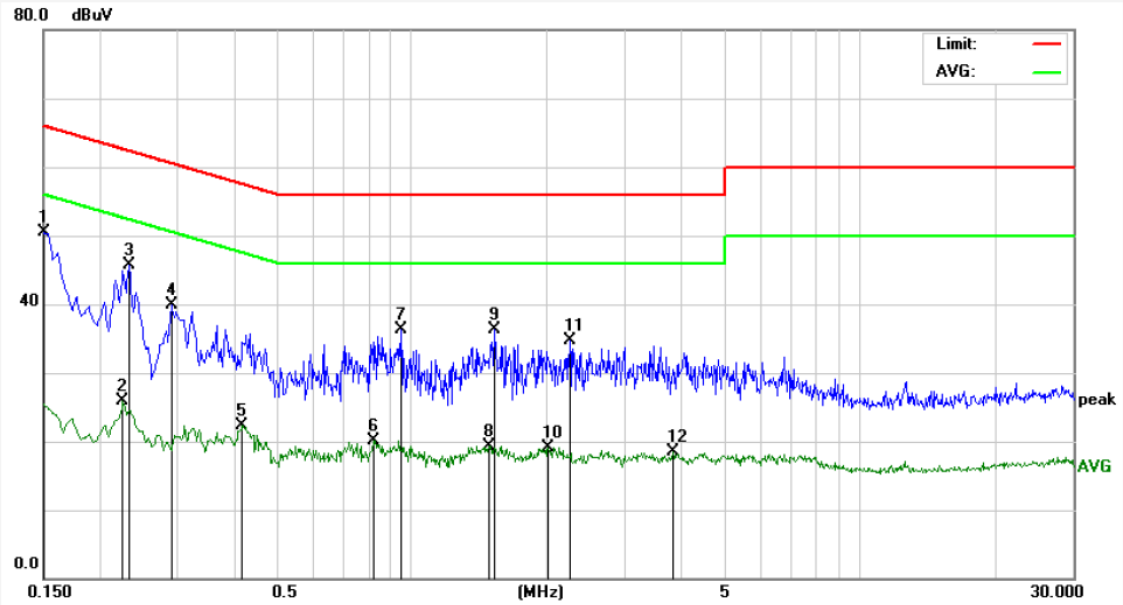
Test Site: 1# Shielded Room
Operating Condition: TX mode
Test Specification: AC 240V, 60Hz for adapter
Comment: Live Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1539	32.04	19.90	51.94	65.78	-13.84	QP	
2	0.2340	26.39	19.89	46.28	62.30	-16.02	QP	
3	0.3220	5.52	19.90	25.42	49.65	-24.23	AVG	
4	0.4260	5.11	19.95	25.06	47.33	-22.27	AVG	
5	0.4420	21.52	19.95	41.47	57.02	-15.55	QP	
6	0.8420	3.51	20.08	23.59	46.00	-22.41	AVG	
7	0.9100	22.08	20.10	42.18	56.00	-13.82	QP	
8	1.3500	20.10	20.13	40.23	56.00	-15.77	QP	
9	1.3540	1.89	20.13	22.02	46.00	-23.98	AVG	
10	2.1220	1.33	20.14	21.47	46.00	-24.53	AVG	
11	2.9100	18.04	20.16	38.20	56.00	-17.80	QP	
12	3.3340	-0.41	20.17	19.76	46.00	-26.24	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: TX mode
Test Specification: AC 240V, 60Hz for adapter
Comment: Neutral Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1499	30.53	19.90	50.43	66.00	-15.57	QP	
2	0.2260	6.06	19.89	25.95	52.59	-26.64	AVG	
3	0.2340	25.87	19.89	45.76	62.30	-16.54	QP	
4	0.2900	20.06	19.89	39.95	60.52	-20.57	QP	
5	0.4180	2.38	19.94	22.32	47.49	-25.17	AVG	
6	0.8180	0.12	20.07	20.19	46.00	-25.81	AVG	
7	0.9460	16.15	20.11	36.26	56.00	-19.74	QP	
8	1.4860	-0.79	20.13	19.34	46.00	-26.66	AVG	
9	1.5339	16.17	20.13	36.30	56.00	-19.70	QP	
10	2.0140	-0.98	20.14	19.16	46.00	-26.84	AVG	
11	2.2580	14.48	20.15	34.63	56.00	-21.37	QP	
12	3.8300	-1.68	20.18	18.50	46.00	-27.50	AVG	

4. Radiated 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.

Test Standard	FCC Part15 C Section 15.249					
Test Limit	Frequency (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	2400~2483.5	50	-	114.0	Peak	3
	2400~2483.5	50	-	94.0	Average	3
	2400~2483.5	-	500	74.0	Peak	3
	2400~2483.5	-	500	54.0	Average	3

Remark:

(1) 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

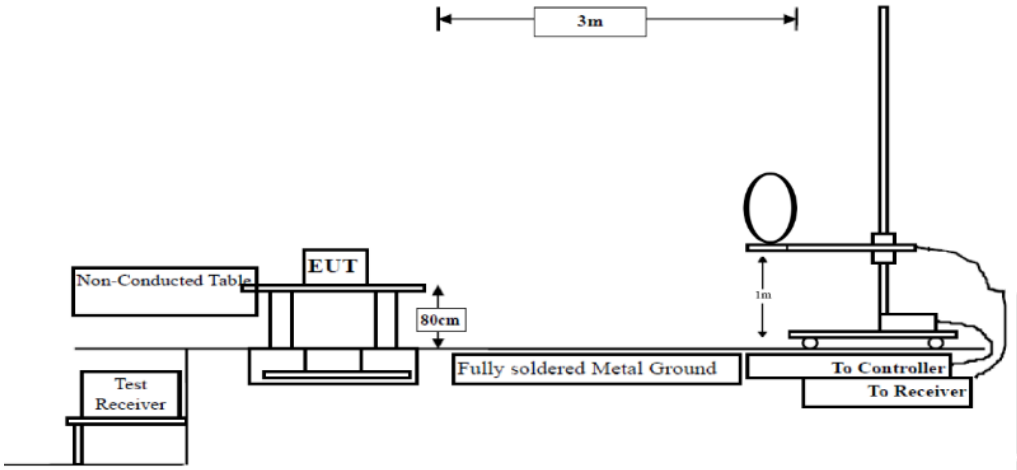


Figure 1. Below 30MHz

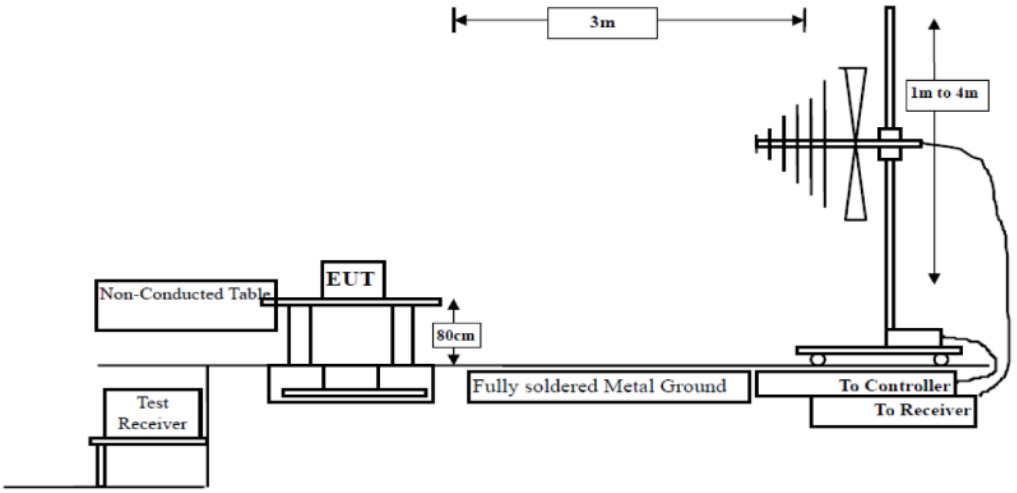


Figure 2. 30MHz to 1GHz

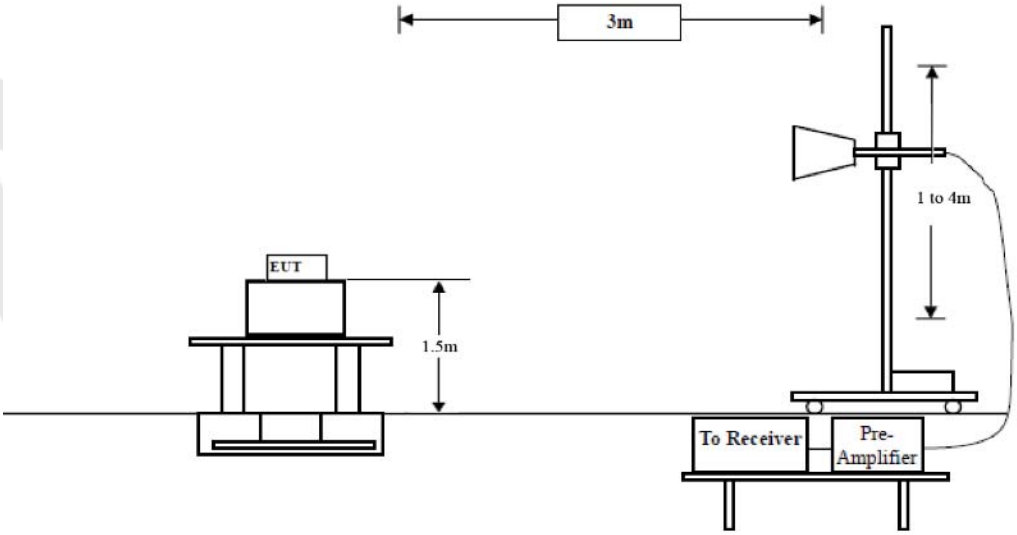


Figure 3. Above 1 GHz

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 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

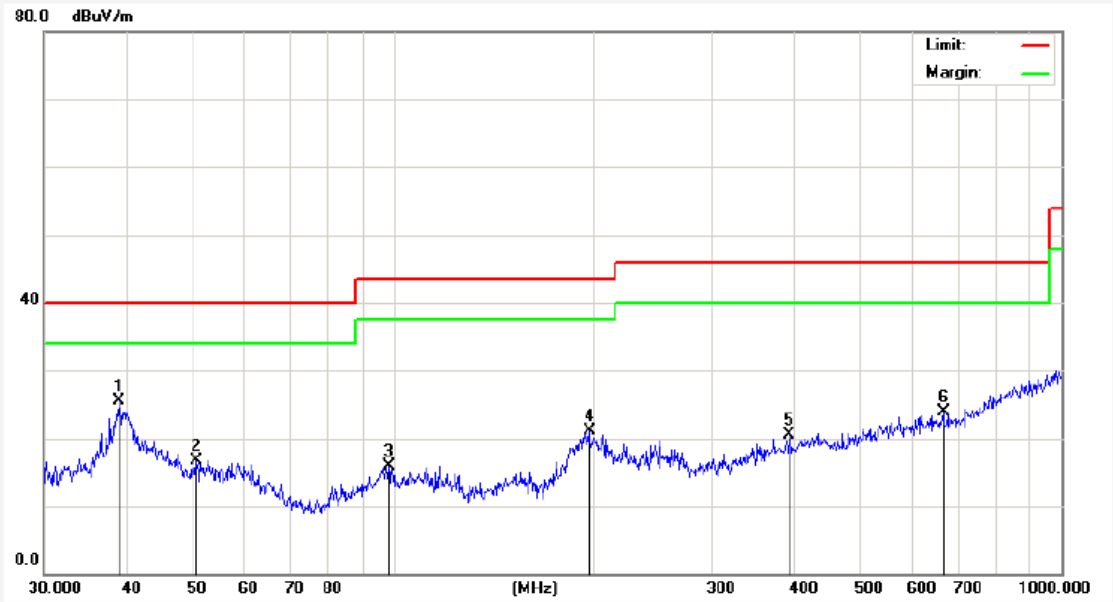
PASS

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.

The test results of 9kHz-30MHz and above 18000MHz are attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Test Results (30~1000MHz)

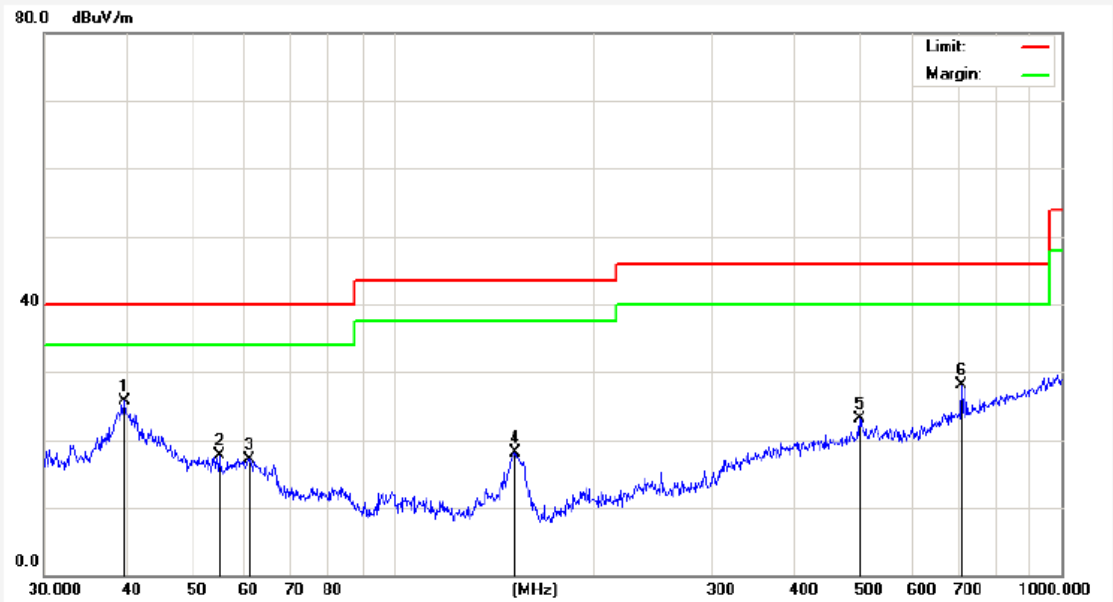
Job No.:	0217060077W	Temp.(℃)/Hum.(%RH):	24.3℃/55%RH
Standard:	FCC PART 15C	Power Source:	AC 120V, 60Hz for adapter
Test Mode:	TX Mode	Polarization:	Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	38.8878	36.69	-11.24	25.45	40.00	-14.55	QP	300	100	
2	50.7637	31.41	-14.63	16.78	40.00	-23.22	QP	300	240	
3	98.4866	36.75	-20.85	15.90	43.50	-27.60	QP	300	360	
4	196.5098	42.05	-20.89	21.16	43.50	-22.34	QP	300	74	
5	392.0951	33.46	-13.03	20.43	46.00	-25.57	QP	300	66	
6	665.8035	33.27	-9.42	23.85	46.00	-22.15	QP	300	98	

Test Results (30~1000MHz)

Job No.:	0217060077W	Temp.(℃)/Hum.(%RH):	24.3℃/55%RH
Standard:	FCC PART 15C	Power Source:	AC 120V, 60Hz for adapter
Test Mode:	TX Mode	Polarization:	Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.5757	36.40	-10.70	25.70	40.00	-14.30	QP	300	57	
2	54.8348	32.62	-14.91	17.71	40.00	-22.29	QP	300	85	
3	60.9176	32.91	-15.77	17.14	40.00	-22.86	QP	300	114	
4	152.1297	36.42	-18.24	18.18	43.50	-25.32	QP	300	230	
5	499.4247	34.14	-10.96	23.18	46.00	-22.82	QP	300	110	
6	709.1823	36.39	-8.21	28.18	46.00	-17.82	QP	300	96	

Test Results (Above 1000MHz)

Test Mode: CH01 (Low channel)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
2408.0000	93.43	31.12	2.18	35.33	91.40	114.00	-22.60	V	Peak
2408.0000	84.74	31.12	2.18	35.33	82.71	94.00	-11.29	V	AVG
4816.0000	47.64	34.01	2.58	34.65	49.58	74.00	-24.42	V	Peak
4816.0000	41.92	34.01	2.58	34.65	43.86	54.00	-10.14	V	AVG
7224.0000	44.58	36.16	2.97	35.07	48.64	74.00	-25.36	V	Peak
7224.0000	34.74	36.16	2.97	35.07	38.80	54.00	-15.20	V	AVG
9632.0000	*								
12040.0000	*								
14448.0000	*								
16856.0000	*								
2408.0000	90.77	31.12	2.18	35.33	88.74	114.00	-25.26	H	Peak
2408.0000	82.67	31.12	2.18	35.33	80.64	94.00	-13.36	H	AVG
4816.0000	44.71	34.01	2.58	34.65	46.65	74.00	-27.35	H	Peak
4816.0000	37.82	34.01	2.58	34.65	39.76	54.00	-14.24	H	AVG
7224.0000	40.16	36.16	2.97	35.07	44.22	74.00	-29.78	H	Peak
7224.0000	33.47	36.16	2.97	35.07	37.53	54.00	-16.47	H	AVG
9632.0000	*								
12040.0000	*								
14448.0000	*								
16856.0000	*								

Test Mode: CH17 (Middle channel)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
2440.0000	92.87	31.12	2.20	24.51	94.62	114.00	-19.38	V	Peak
2440.0000	87.55	31.22	2.20	24.51	89.55	94.00	-4.45	V	AVG
4880.0000	47.41	34.98	2.49	34.14	50.74	74.00	-23.26	V	Peak
4880.0000	41.33	34.98	2.49	34.14	44.66	54.00	-9.34	V	AVG
7320.0000	38.54	36.01	3.01	34.56	43.00	74.00	-31.00	V	Peak
7320.0000	33.74	36.01	3.01	34.56	38.20	54.00	-15.80	V	AVG
9760.0000	*								
12200.0000	*								
14640.0000	*								
17080.0000	*								
2440.0000	89.87	31.12	2.20	24.51	98.68	114.00	-15.32	H	Peak
2440.0000	78.57	31.12	2.20	24.51	87.38	94.00	-6.62	H	AVG
4880.0000	42.11	34.98	2.49	34.14	45.44	74.00	-28.56	H	Peak
4880.0000	36.41	34.98	2.49	34.14	39.74	54.00	-14.26	H	AVG
7320.0000	38.71	36.01	3.01	34.56	43.17	74.00	-30.83	H	Peak
7320.0000	32.52	36.01	3.01	34.56	36.98	54.00	-17.02	H	AVG
9760.0000	*								
12200.0000	*								
14640.0000	*								
17080.0000	*								

Test Mode: CH34 (High channel)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
2474.0000	96.01	31.65	2.23	36.07	93.82	114.00	-20.18	V	Peak
2474.0000	84.45	31.65	2.23	36.07	82.26	94.00	-11.74	V	AVG
4948.0000	50.21	35.06	2.60	34.93	52.94	74.00	-21.06	V	Peak
4948.0000	41.62	35.06	2.60	34.93	44.35	54.00	-9.65	V	AVG
7422.0000	37.93	36.19	3.12	35.11	42.13	74.00	-31.87	V	Peak
7422.0000	33.51	36.19	3.12	35.11	37.71	54.00	-16.29	V	AVG
9896.0000	*								
12370.0000	*								
14844.0000	*								
17318.0000	*								
2474.0000	91.67	31.65	2.23	36.07	89.48	114.00	-24.52	H	Peak
2474.0000	73.24	31.65	2.23	36.07	71.05	94.00	-22.95	H	AVG
4948.0000	44.27	35.06	2.60	34.93	47.00	74.00	-27.00	H	Peak
4948.0000	37.23	35.06	2.60	34.93	39.96	54.00	-14.04	H	AVG
7422.0000	42.65	36.19	3.12	35.11	46.85	74.00	-27.15	H	Peak
7422.0000	34.21	36.19	3.12	35.11	38.41	54.00	-15.59	H	AVG
9896.0000	*								
12370.0000	*								
14844.0000	*								
17318.0000	*								

Radiated Band Edge:

Test Mode:					Test channel: Lowest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2390.00	51.84	29.15	3.41	34.01	50.39	74.00	-23.61	V
2400.00	54.44	29.16	3.43	34.01	53.02	74.00	-20.98	V
2390.00	50.00	29.15	3.41	34.01	48.55	74.00	-25.45	H
2400.00	53.62	29.16	3.43	34.01	52.20	74.00	-21.80	H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2390.00	40.17	29.15	3.41	34.01	38.72	54.00	-15.28	V
2400.00	43.85	29.16	3.43	34.01	42.43	54.00	-11.57	V
2390.00	40.00	29.15	3.41	34.01	38.55	54.00	-15.45	H
2400.00	42.18	29.16	3.43	34.01	40.76	54.00	-13.24	H

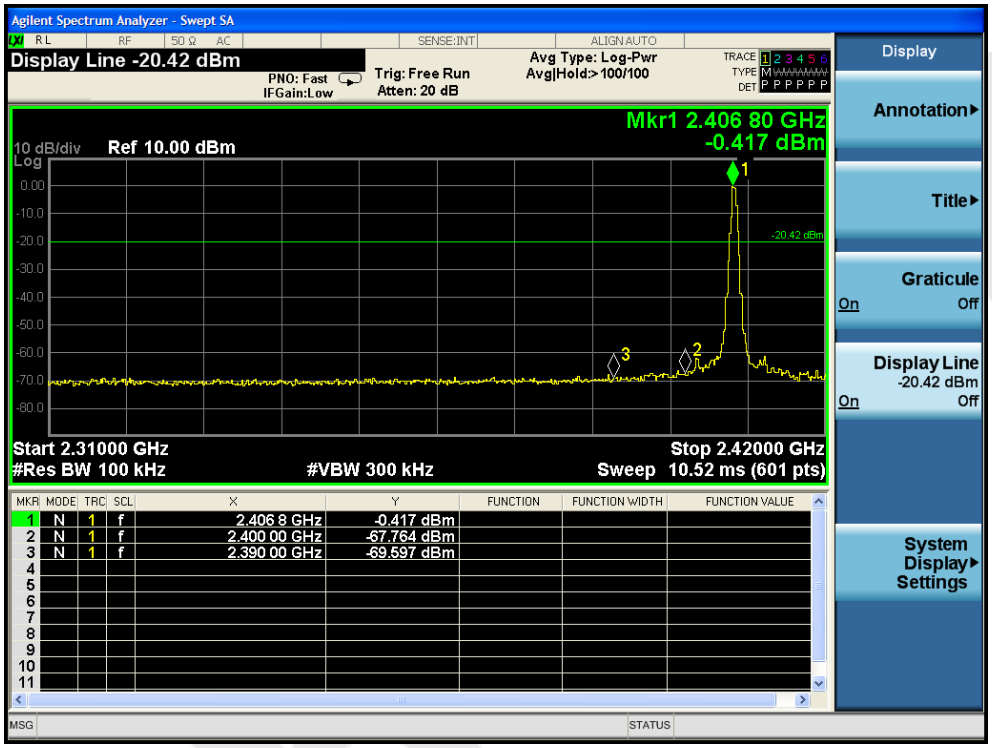
Test Mode:					Test channel: Highest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2483.50	55.33	29.28	3.53	34.03	54.11	74.00	-19.89	V
2500.00	51.21	29.30	3.56	34.03	50.04	74.00	-23.96	V
2483.50	56.33	29.28	3.53	34.03	55.11	74.00	-18.89	H
2500.00	54.54	29.30	3.56	34.03	53.37	74.00	-20.63	H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2483.50	43.00	29.28	3.53	34.03	41.78	54.00	-12.22	V
2500.00	40.20	29.30	3.56	34.03	39.03	54.00	-14.97	V
2483.50	40.51	29.28	3.53	34.03	39.29	54.00	-14.71	H
2500.00	37.34	29.30	3.56	34.03	36.17	54.00	-17.83	H

Remark:

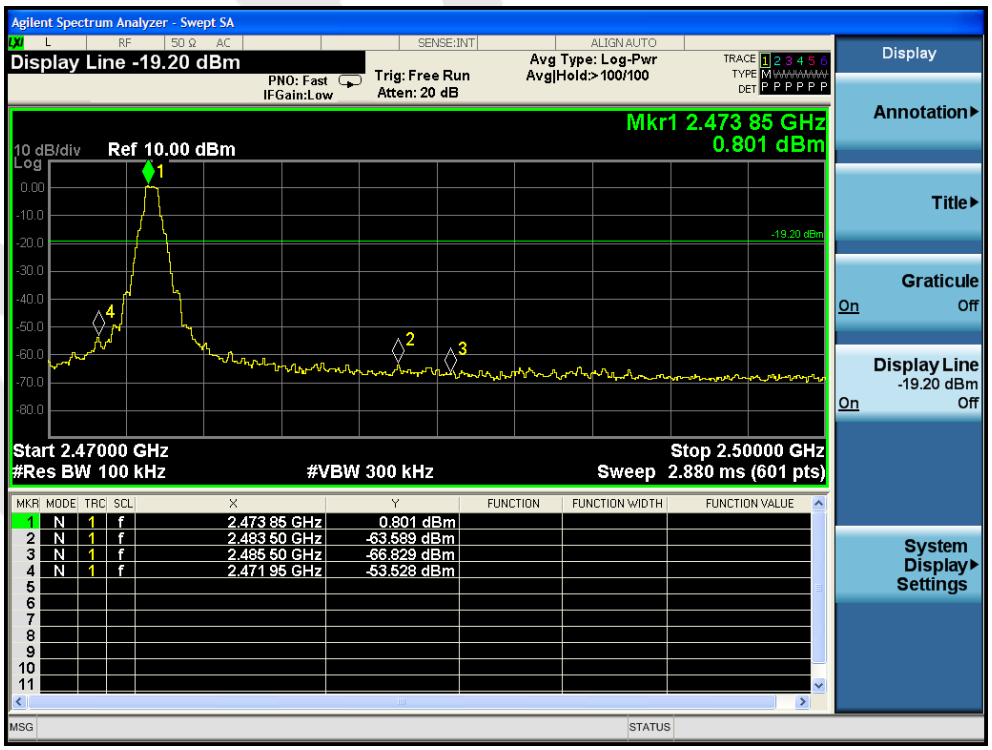
1. Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

Conducted band edge

Frequency Band (MHz)	Delta Peak toBand Emission (dBc)	Limit (dBc)	Results
2400	67.347	>20	PASS
2483.5	64.390	>20	PASS



Lowest



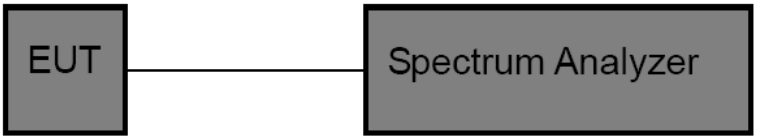
Highest

5. 20dB Bandwidth Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.249

5.2. Test Setup



5.3. 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:

RBW = 100kHz, VBW⩾3*RBW =300kHz,

Detector= Average

Trace mode= Max hold.

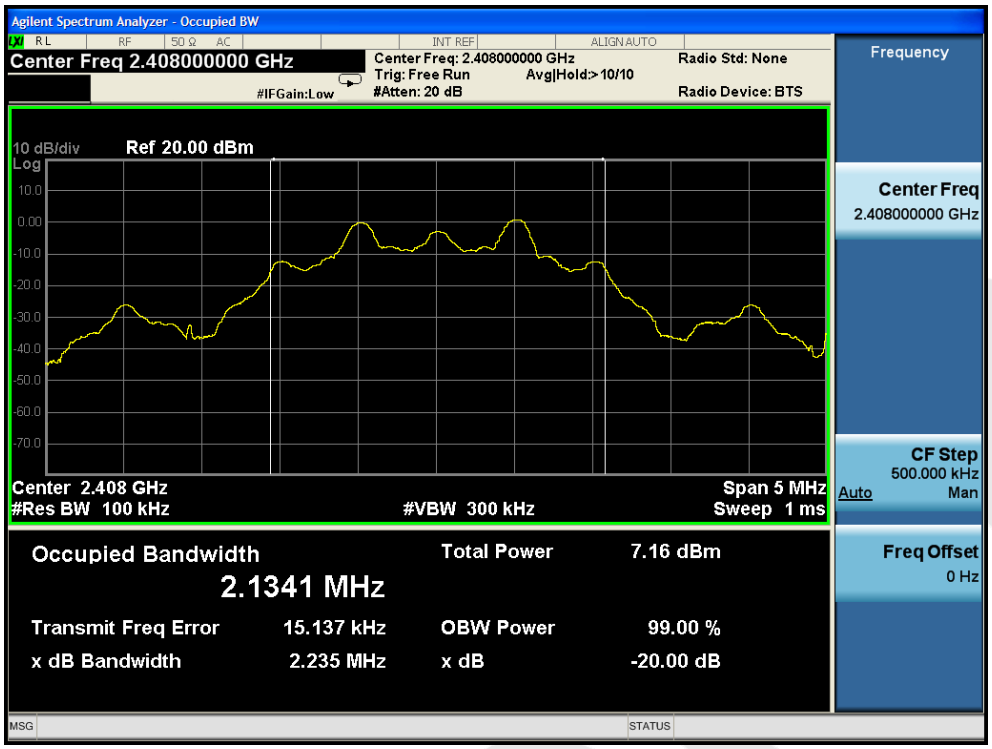
Sweep- auto couple.

4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

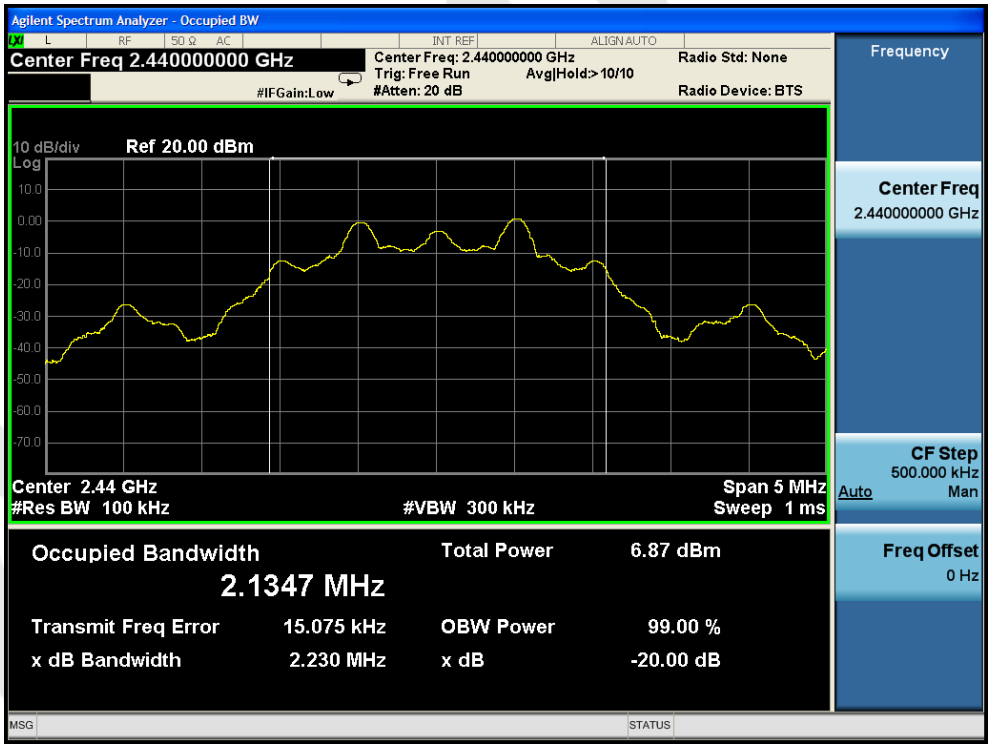
5.4. Test Data

Test Item	:	20dB Bandwidth	Test Mode	:	TX Mode
Test Voltage	:	DC 3.7V Battery Inside	Temperature	:	24℃
Test Result	:	PASS	Humidity	:	55%RH

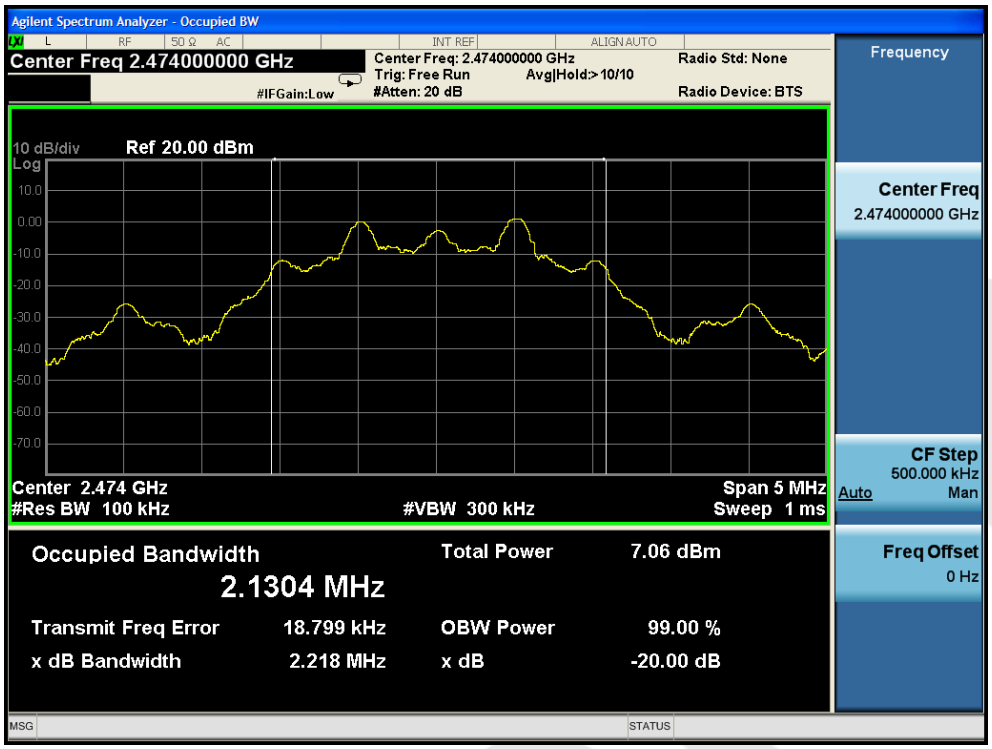
Frequency (MHz)	Bandwidth (kHz)	Result
2408MHZ	2235	PASS
2440MHZ	2230	PASS
2474MHZ	2218	PASS



Test Mode: Low



Test Mode: Middle



Test Mode: High

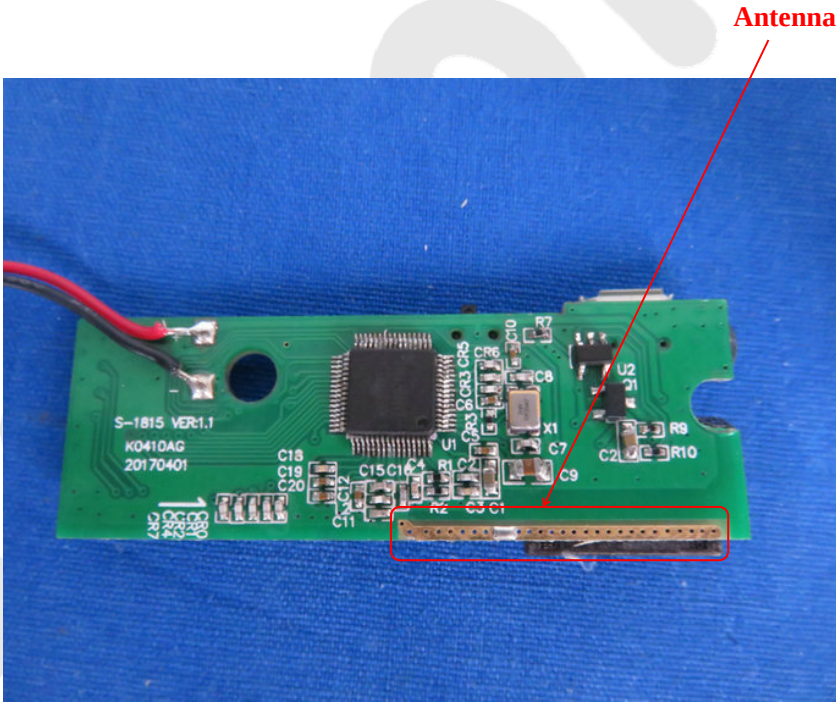
6. Antenna Requirement

6.1. 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. 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.

6.2. Antenna Connected Construction

The antenna is a PCB Antenna which permanently attached, and the best case gain of the antenna is -0.61dBi. It complies with the standard requirement.



APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement

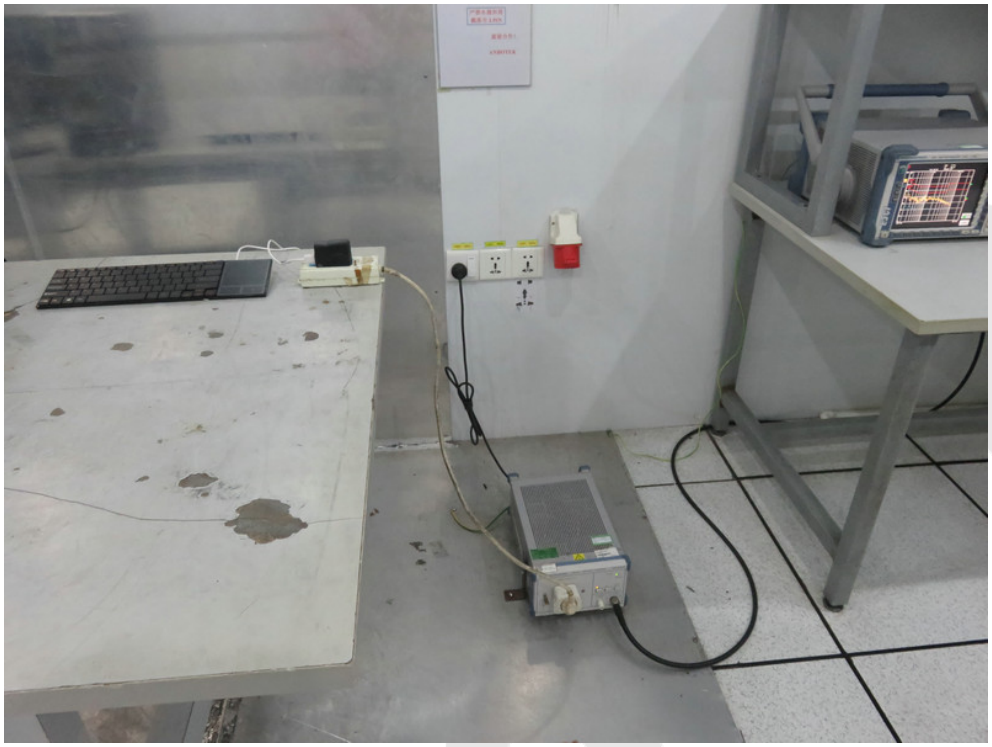
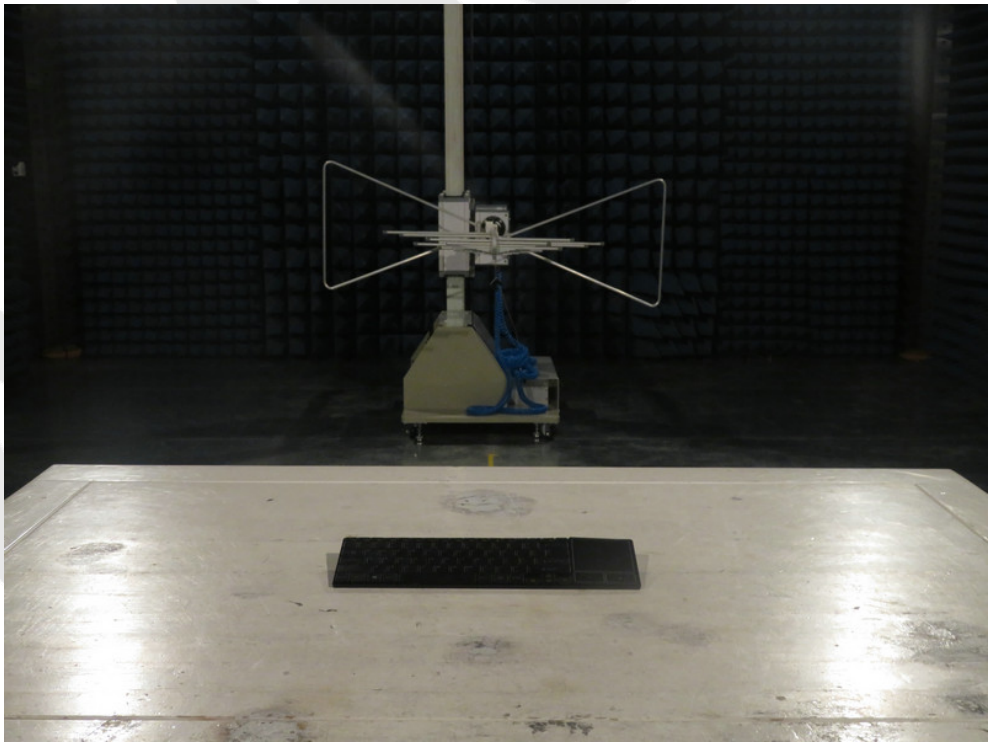
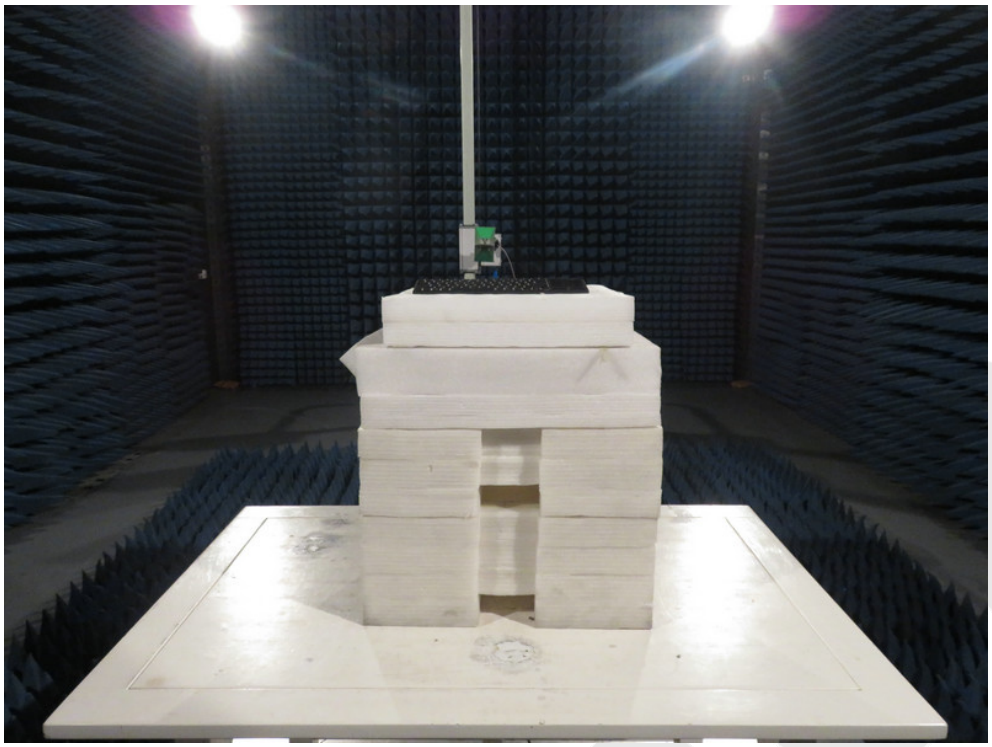
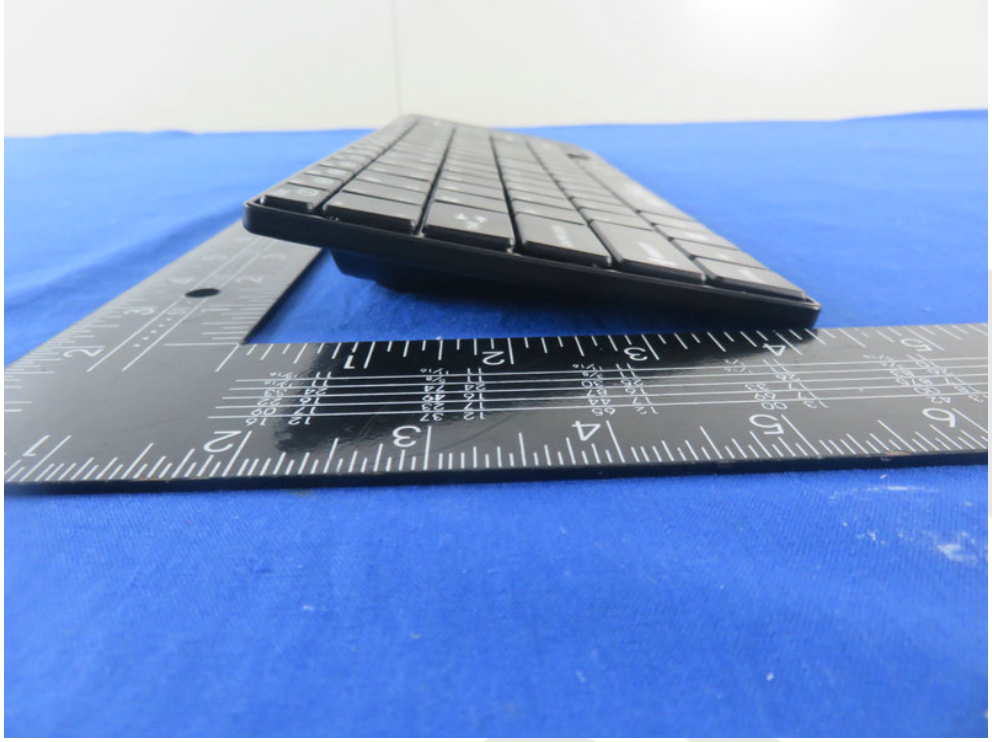


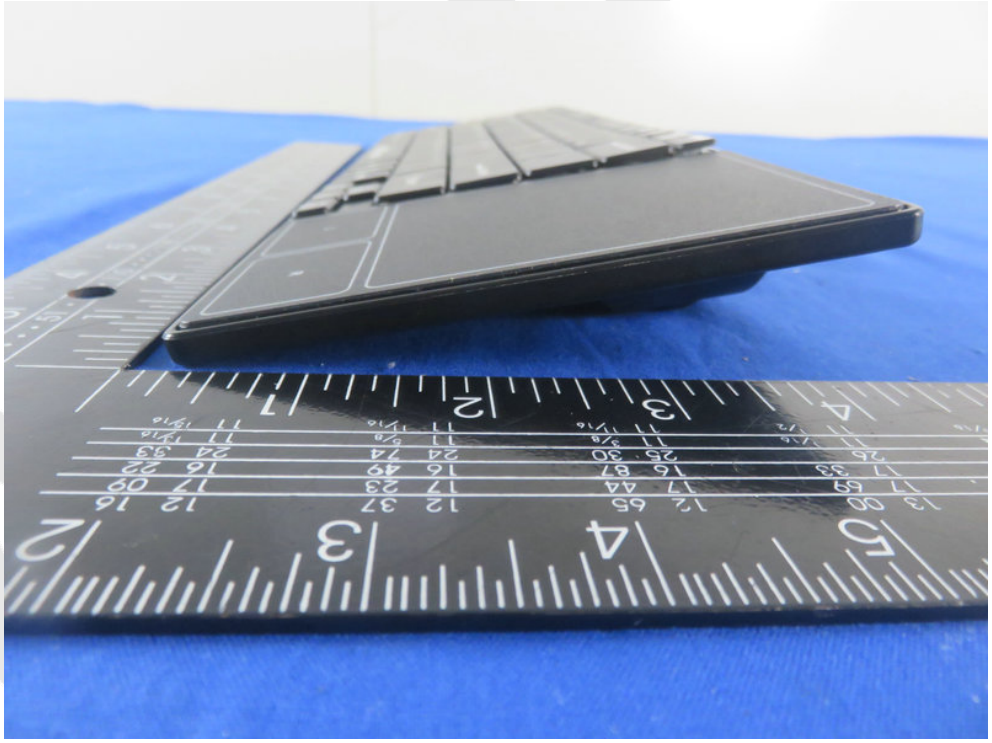
Photo of Radiation Emission Test



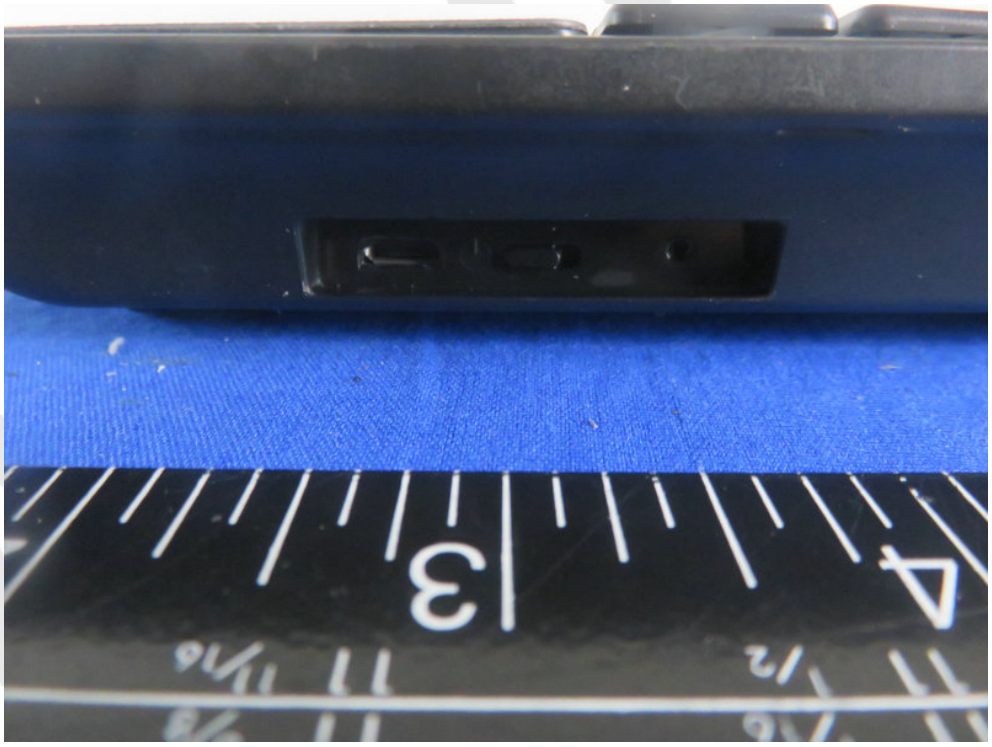


APPENDIX II -- EXTERNAL PHOTOGRAPH

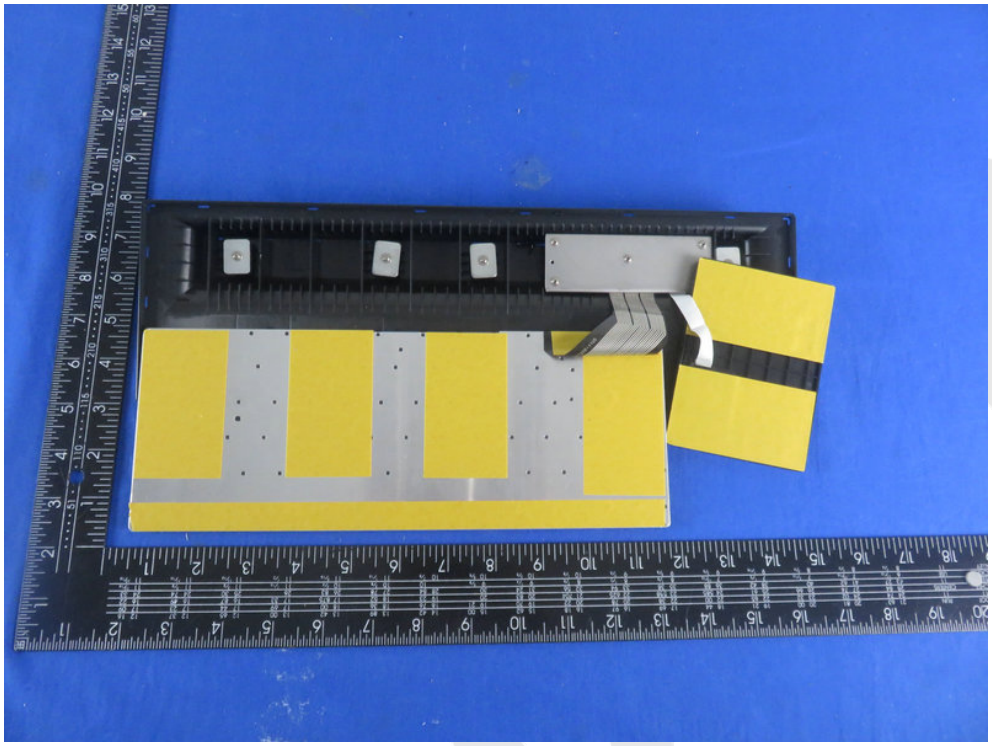


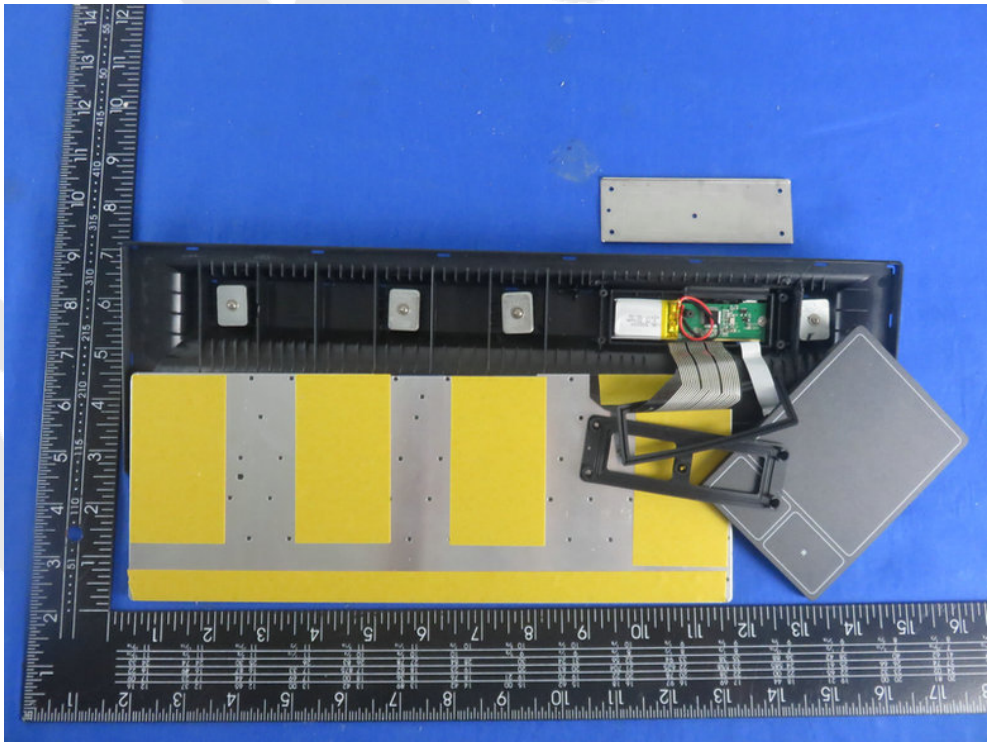


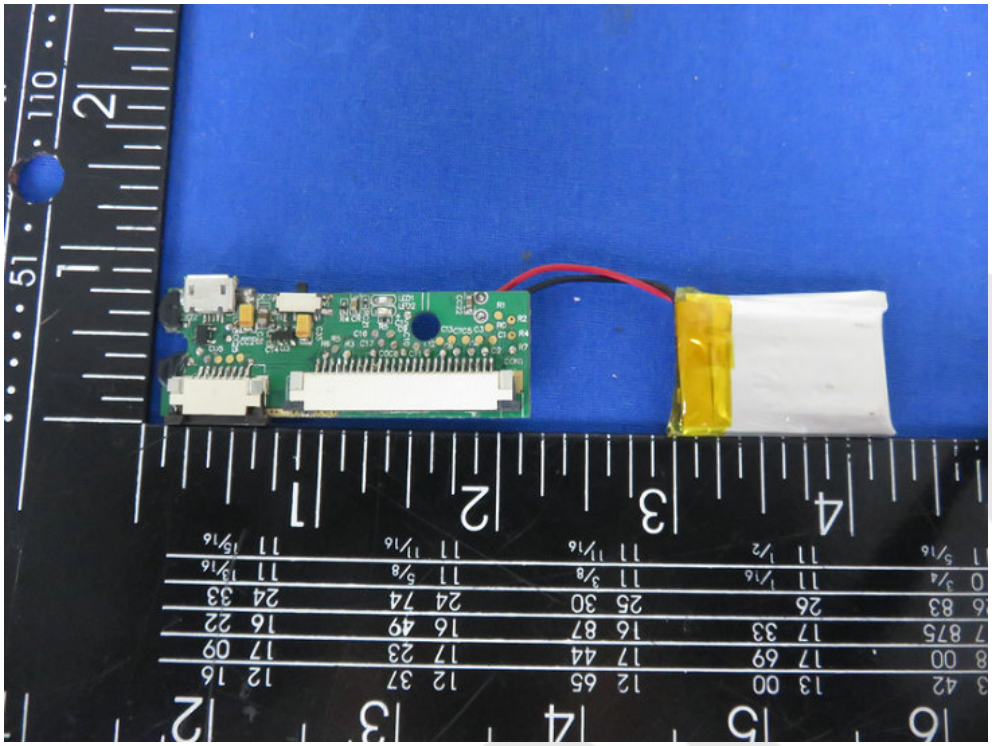
SEAL SHIELD

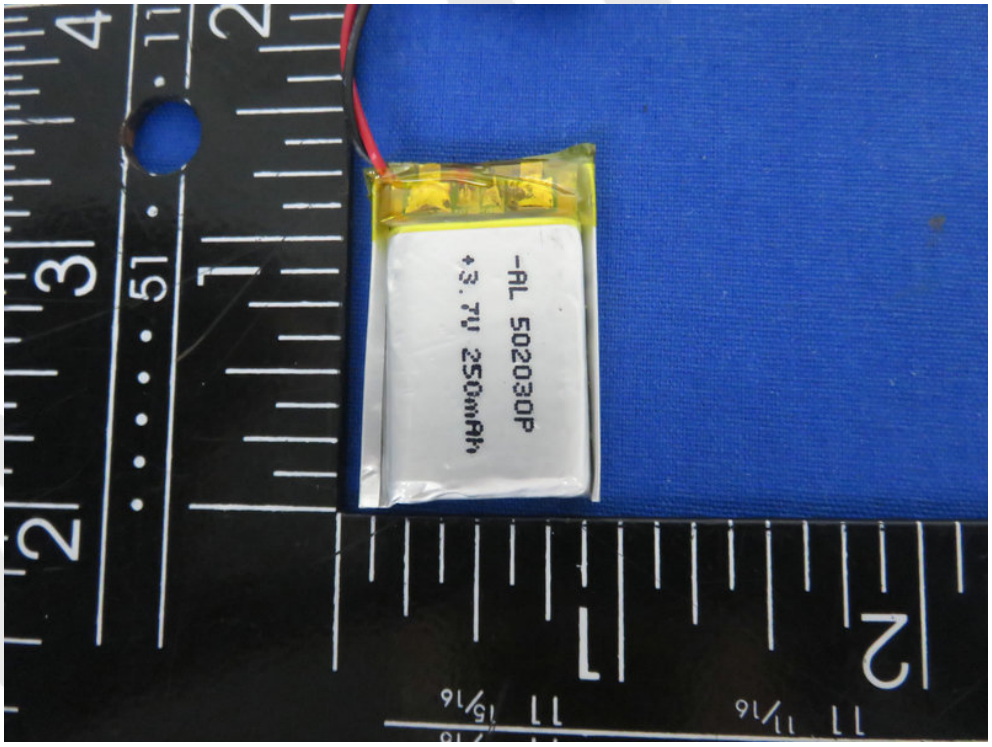


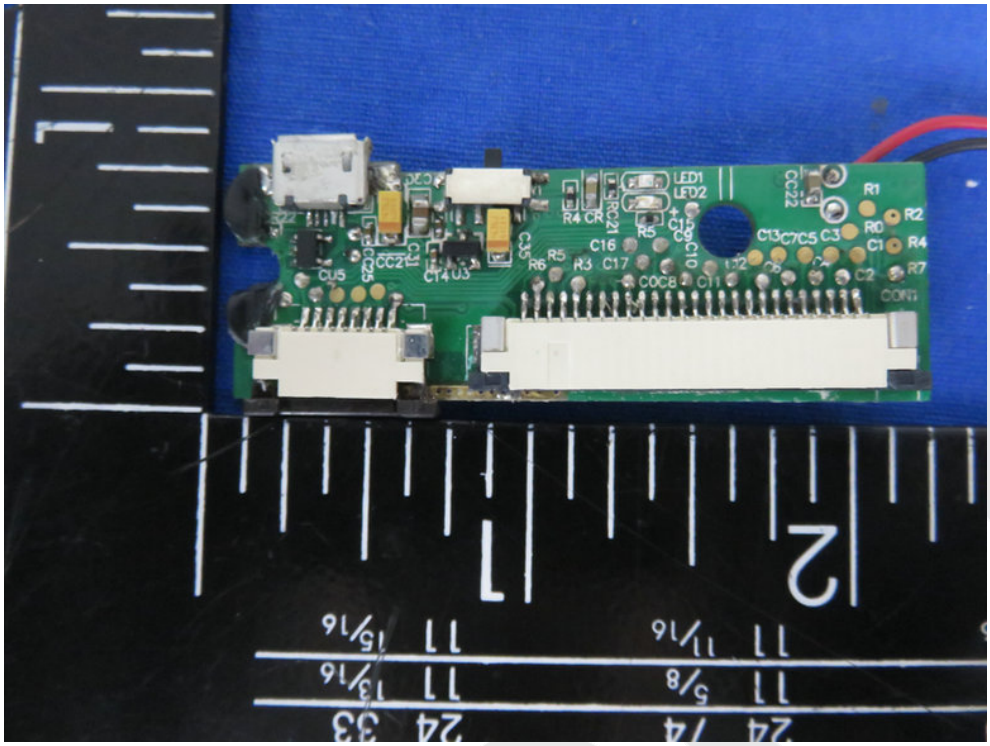
APPENDIX III -- INTERNAL PHOTOGRAPH

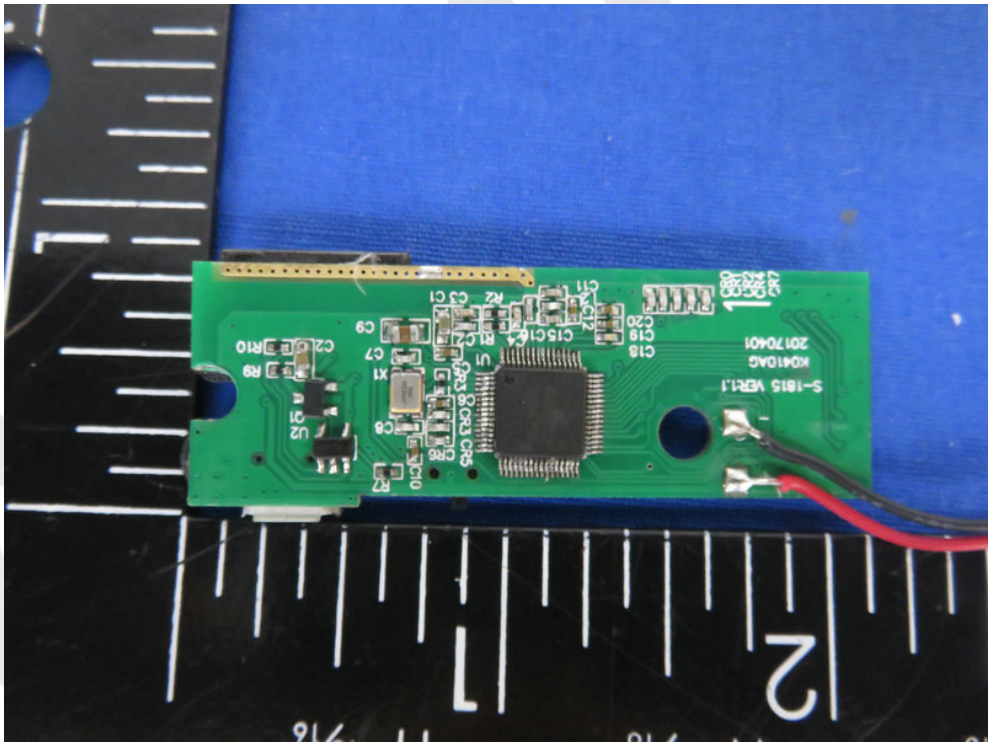


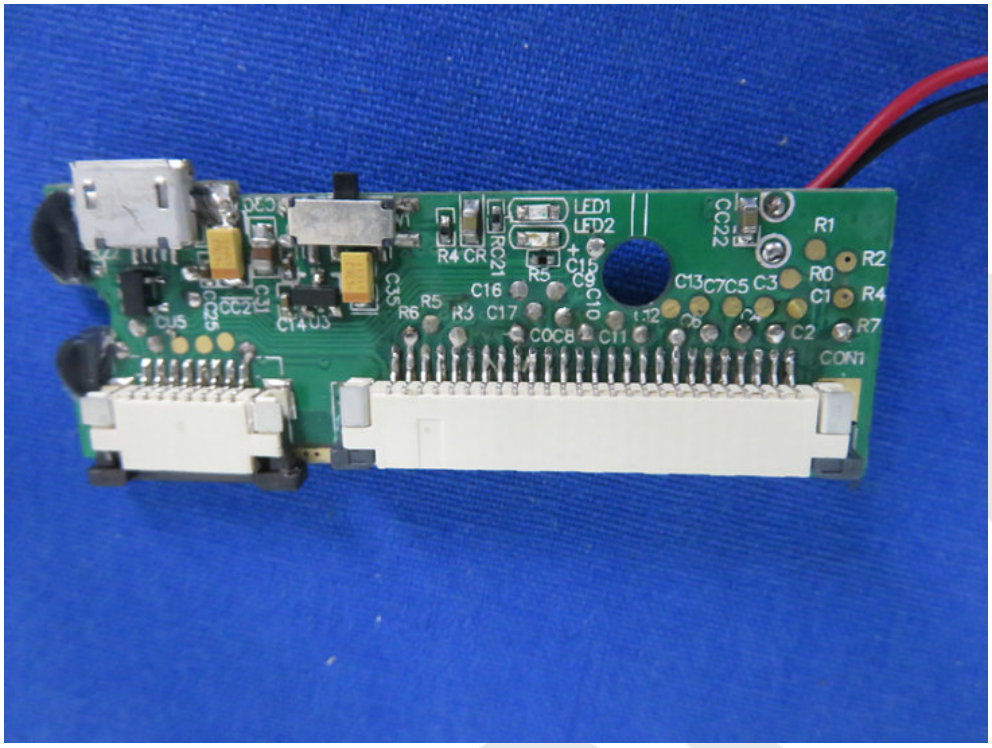


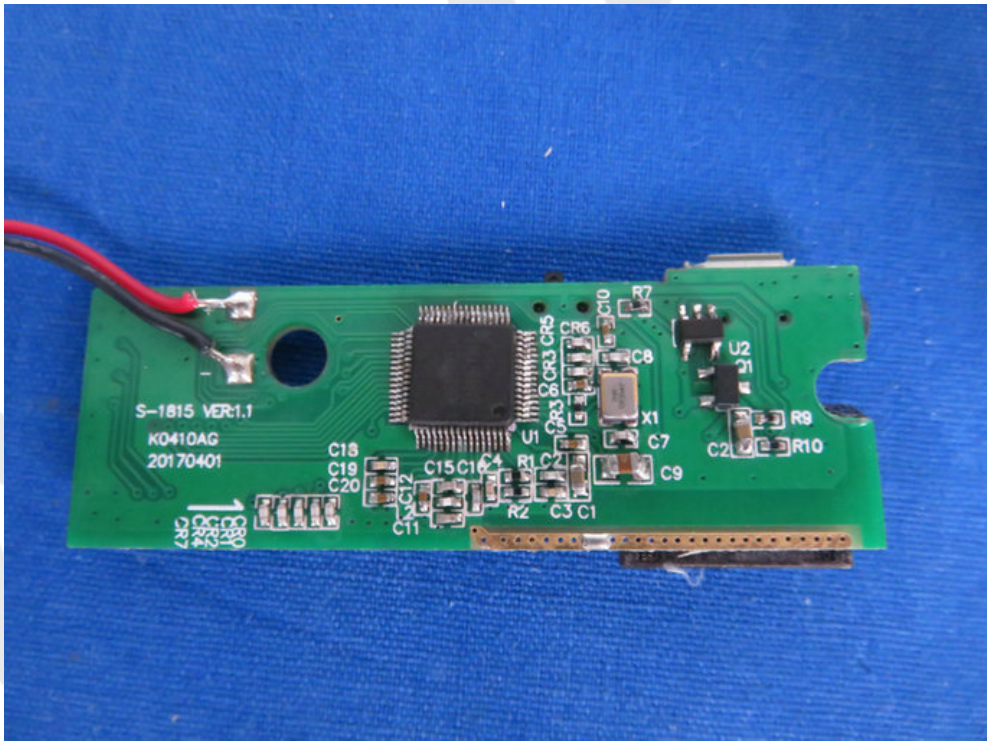



-AL 502030P
3.7V 250mAh






LED1
LED2
R1
R2
R0
R4
R7
C1
C2
C3
C13
C7
C5
C16
C17
R5
R6
R3
C35
CON1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K0410AG
20170401
U1
U2
X1
R7
R9
R10
C7
C8
C9
C18
C19
C20
C15
C11
R2
C3
C1