KSIGN®
KSIGN (Guangdong) Testing Co., Ltd.
West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park,
Minzhu,Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China
Tel.: + (86)755-29852678 Fax: + (86)755-29852397 E-mail: info@gdksign.cn Website: www.gdksign.com

TEST REPORT

Report No. .....:	**KS2007S00694E**
FCC ID.....:	**2AR6M-LCREF**
Applicant .....:	**ShenZhen LiCheng Technology Co.,Ltd.**
Address .....:	Rm. 2507, Bldg. 11, TianAn Cloud Park, No. 2018 XueGang Road, Bantian Town, Shenzhen City, China
Manufacturer.....:	ShenZhen LiCheng Technology Co.,Ltd.
Address.....:	Rm. 2507, Bldg. 11, TianAn Cloud Park, No. 2018 XueGang Road, Bantian Town, Shenzhen City, China
Product Name .....:	**Receiver**
Trade Mark .....:	inateck
Model/Type reference.....:	MS04001
Listed Model(s).....:	MS04002, MS04003, MS04004
Standard .....:	**FCC CFR Title 47 Part 15 Subpart C Section 15.249**
Date of Receipt.....:	Sep.03, 2020
Date of Test Date.....:	Sep.03, 2020 -Sep.24, 2020
Date of issue .....:	Sep.24, 2020
Test result.....:	**Pass**

Compiled by: (Printed name+signature)	Rory Huang	Rory Huang
Supervised by: (Printed name+signature)	Kelly Cheng	Kellycheng
Approved by: (Printed name+signature)	Cary Luo	Cary Luo

KSIGN(Guangdong) Testing Co.,Ltd. KSIGN APPROVED

Testing Laboratory Name .....:	**KSIGN(Guangdong) Testing Co., Ltd.**
Address .....:	West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu,Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	Sep.24, 2020	Original

1.3. Test Description

FCC Rules Part 15.249			
Test Item	Section in CFR 47	Result	Test Engineer
	FCC		
Antenna requirement	15.203	Pass	Rory Huang
AC Power Line Conducted Emissions	15.207	Pass	Rory Huang
20dB Bandwidth	Section 15.215(c)	Pass	Rory Huang
Band edge Emissions	Section 15.249(d)	Pass	Rory Huang
Radiated Spurious Emissions	Section 15.205(a),Section 15.209(a), Section 15.249,Section 15.35	Pass	Rory Huang

Note: The measurement uncertainty is not included in the test result.

1.4. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the KSIGN(Guangdong) Testing Co., Ltd. system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. Below is the best measurement capability for KSIGN(Guangdong) Testing Co., Ltd.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.5. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	ShenZhen LiCheng Technology Co.,Ltd.
Address:	Rm. 2507, Bldg. 11, TianAn Cloud Park, No. 2018 XueGang Road, Bantian Town, Shenzhen City, China
Manufacturer:	ShenZhen LiCheng Technology Co.,Ltd.
Address:	Rm. 2507, Bldg. 11, TianAn Cloud Park, No. 2018 XueGang Road, Bantian Town, Shenzhen City, China

2.2. General Description of EUT

Product Name:	Receiver
Trade Mark:	inateck
Model/Type reference:	MS04001
Listed Model(s):	MS04002, MS04003, MS04004
Model Different:	The difference between product models only depends on the model naming and appearance colour are different for the marketing requirement. Other power supply methods, interior structure, electrical circuits and key components are the same, which do not affect the safety and electromagnetic compatibility performance.
Power supply:	DC 5.0V(Powered by PC)
Hardware version:	VER2.0
Software version:	ZM6.0
Specification(USB receiver)	
Modulation:	GFSK
Operation frequency:	2403MHz-2480MHz
Channel number:	16
Antenna type:	PCB antenna
Antenna gain:	1.60dBi
Specification(TYPE-C receiver)	
Modulation:	GFSK
Operation frequency:	2403MHz-2480MHz
Channel number:	16
Antenna type:	PCB antenna
Antenna gain:	1.6dBi
Note: Pre-scan usb reveiver and TYPE-C receiver test, found TYPE-C test which it was worse case, so only show the test data for worse case on the test report.	

2.3. Description of Test Modes

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Operation Frequency: 2403MHz/2441MHz/2480MHz

Test mode

For RF test items:
The engineering test program was provided and enabled to make EUT continuous transmit.
For AC power line conducted emissions:
The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

2.4. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021
2	Vector Signal Generator	Agilent	N5182A	MY50142520	04/07/2021
3	Analog Signal Generator	HP	83752A	3344A00337	04/07/2021
4	Power Sensor	Agilent	E9304A	MY50390009	04/07/2021
5	Power Sensor	Agilent	E9300A	MY41498315	04/07/2021
6	Wideband Radio Communication Tester	R&S	CMW500	157282	04/07/2021
7	Climate Chamber	Angul	AGNH80L	1903042120	04/07/2021
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	04/07/2021
9	RF Control Unit	Tonscend	JS0806-2	/	04/07/2021

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	EMI Test Receiver	R&S	ESR	102525	04/07/2021
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	03/27/2021
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	03/27/2021
4	Spectrum Analyzer	HP	8593E	3831U02087	04/07/2021
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	03/29/2023
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	03/25/2021
7	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021
8	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	03/29/2023
9	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	04/07/2021
10	Pre-Amplifier	EMCI	EMC051835SE	980662	04/07/2021

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	LISN	R&S	ENV432	1326.6105.02	03/27/2021
2	EMI Test Receiver	R&S	ESR	102524	04/07/2021
3	Manual RF Switch	JS TOYO	/	MSW-01/002	04/07/2021

Note:
1)The Cal. Interval was one year.
2)The cable loss has calculated in test result which connection between each test instruments.

2.5. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE
Bluetooth and WIFI Test System	JS1120-3	2.5.77.0418

3. TEST ITEM AND RESULTS

3.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

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.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) 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 6dBi.

Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

Note: The antenna is permanently fixed to the EUT

3.2. Conducted Emission

Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

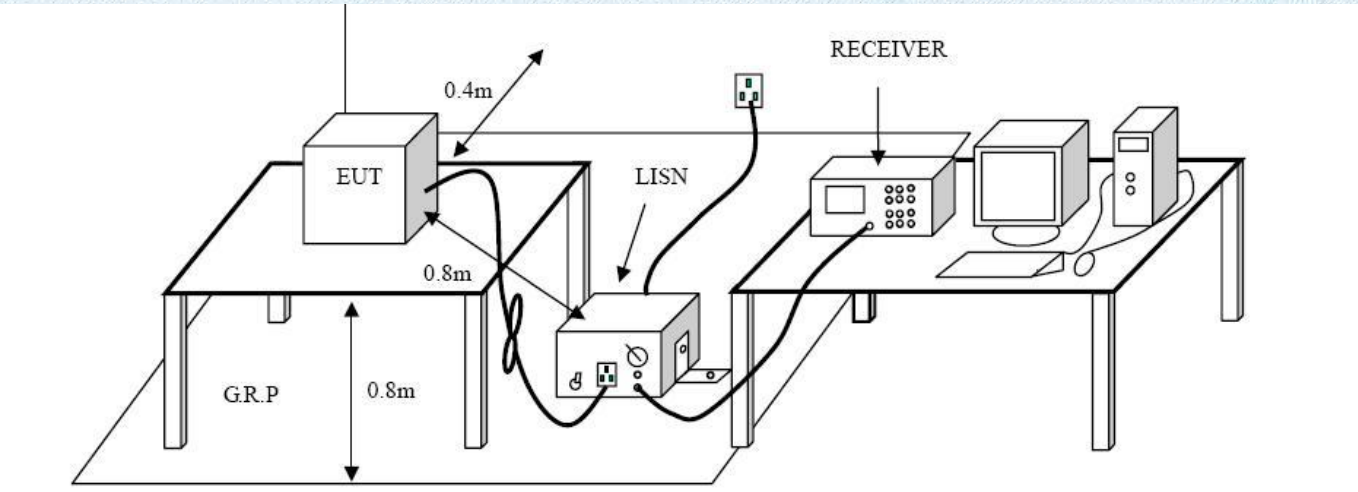
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

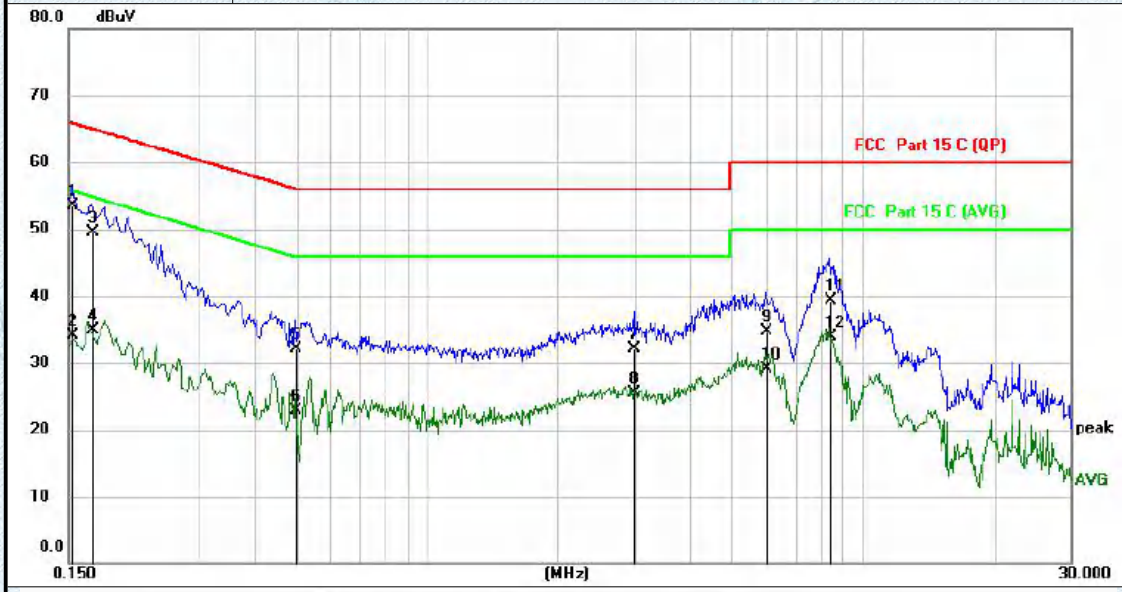
Test Mode:

Please refer to the clause 2.3.

Test Results

Pre-scan 2403MHz, 2441MHz and 2480MHz channel, and found(USB receiver) 2403MHz channel which it is worse case, so only show the test data for worse case.

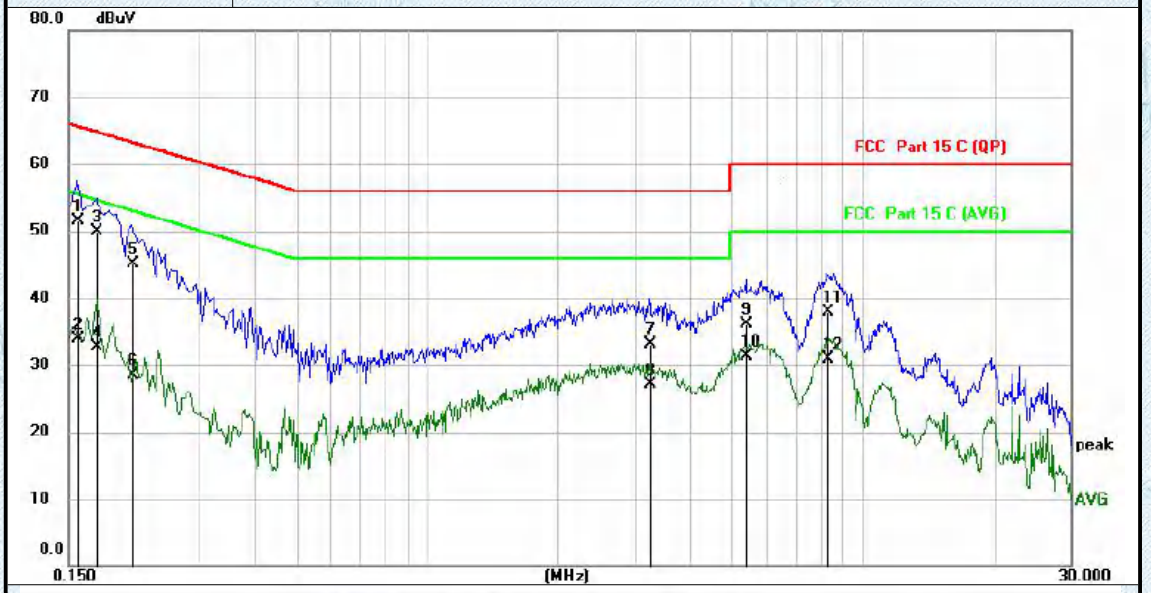
Test Voltage:	AC 120V/60 Hz
Terminal:	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1539	42.71	10.82	53.53	65.79	-12.26	QP
2		0.1539	23.35	10.82	34.17	55.79	-21.62	AVG
3		0.1703	38.68	10.85	49.53	64.95	-15.42	QP
4		0.1703	24.11	10.85	34.96	54.95	-19.99	AVG
5		0.4980	21.13	10.91	32.04	56.03	-23.99	QP
6		0.4980	11.96	10.91	22.87	46.03	-23.16	AVG
7		2.9900	21.28	10.92	32.20	56.00	-23.80	QP
8		2.9900	14.64	10.92	25.56	46.00	-20.44	AVG
9		5.9820	23.78	10.98	34.76	60.00	-25.24	QP
10		5.9820	18.09	10.98	29.07	50.00	-20.93	AVG
11		8.3900	28.33	10.96	39.29	60.00	-20.71	QP
12		8.3900	22.91	10.96	33.87	50.00	-16.13	AVG

Emission Level= Read Level+ Correct Factor

Test Voltage:	AC 120V/60 Hz
Terminal:	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1580	40.73	10.84	51.57	65.57	-14.00	QP
2		0.1580	23.11	10.84	33.95	55.57	-21.62	AVG
3		0.1740	39.07	10.86	49.93	64.77	-14.84	QP
4		0.1740	21.76	10.86	32.62	54.77	-22.15	AVG
5		0.2100	34.18	10.88	45.06	63.21	-18.15	QP
6		0.2100	17.65	10.88	28.53	53.21	-24.68	AVG
7		3.2260	22.26	10.93	33.19	56.00	-22.81	QP
8		3.2260	16.17	10.93	27.10	46.00	-18.90	AVG
9		5.3900	25.23	10.97	36.20	60.00	-23.80	QP
10		5.3900	20.35	10.97	31.32	50.00	-18.68	AVG
11		8.3180	26.91	10.93	37.84	60.00	-22.16	QP
12		8.3180	19.97	10.93	30.90	50.00	-19.10	AVG

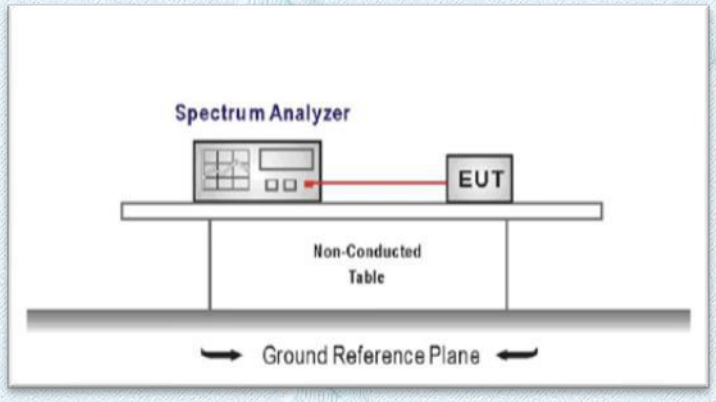
Emission Level= Read Level+ Correct Factor

3.3. 20dB Bandwidth

Limit

Operation frequency range 2400MHz~2483.5MHz.

Test Configuration



Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:

   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

   RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW

   Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

Test Mode

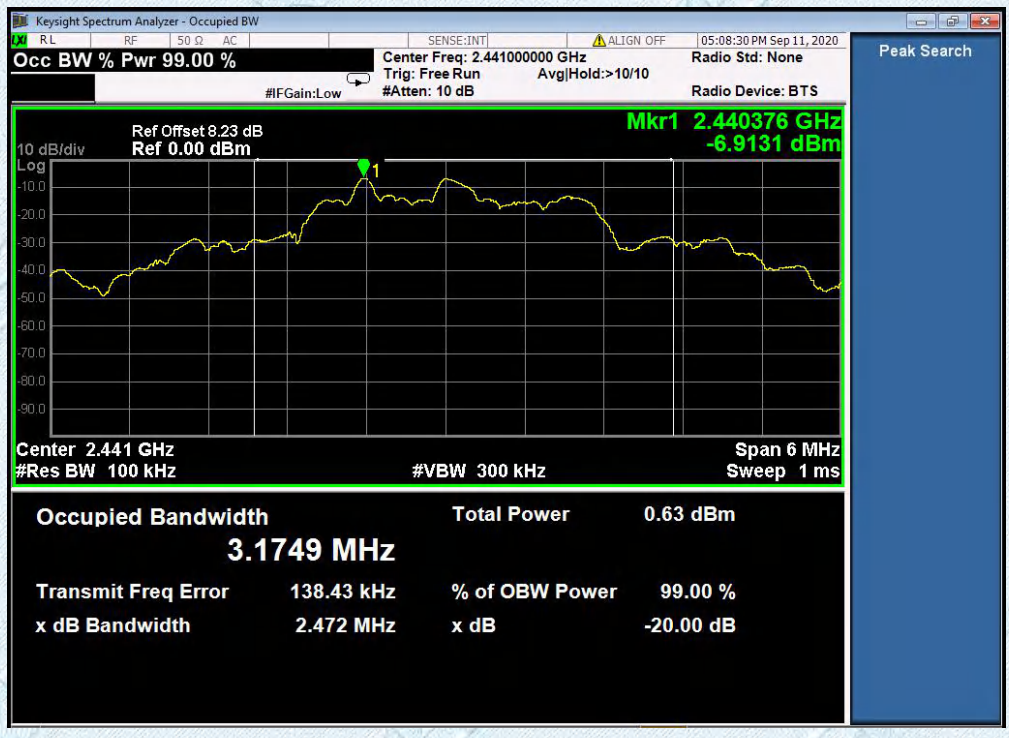
Please refer to the clause 2.3.

Test Results

Test Mode:	GFSK Mode	
Channel frequency (MHz)	20dB Bandwidth [MHz]	Verdict
2403	2.343	PASS
2441	2.472	PASS
2480	3.910	PASS
GFSK Mode		
2403 MHz		

GFSK Mode

2441 MHz



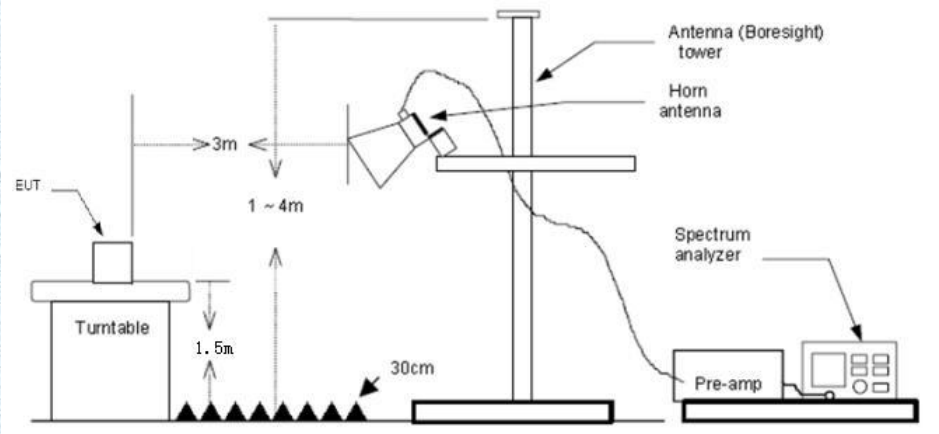
GFSK Mode

2480 MHz

3.4. Band Edge Emissions(Radiated)

Limit

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings

(1) Span shall wide enough to fully capture the emission being measured;

RBW=1MHz, VBW=3MHz PEAK detector for Peak value.

RBW=1MHz, VBW=10Hz with Average Detector for Average Value.

Test Mode

Please refer to the clause 2.3.

Test Results

☒ **Passed** ☐ **Not Applicable**

Note:

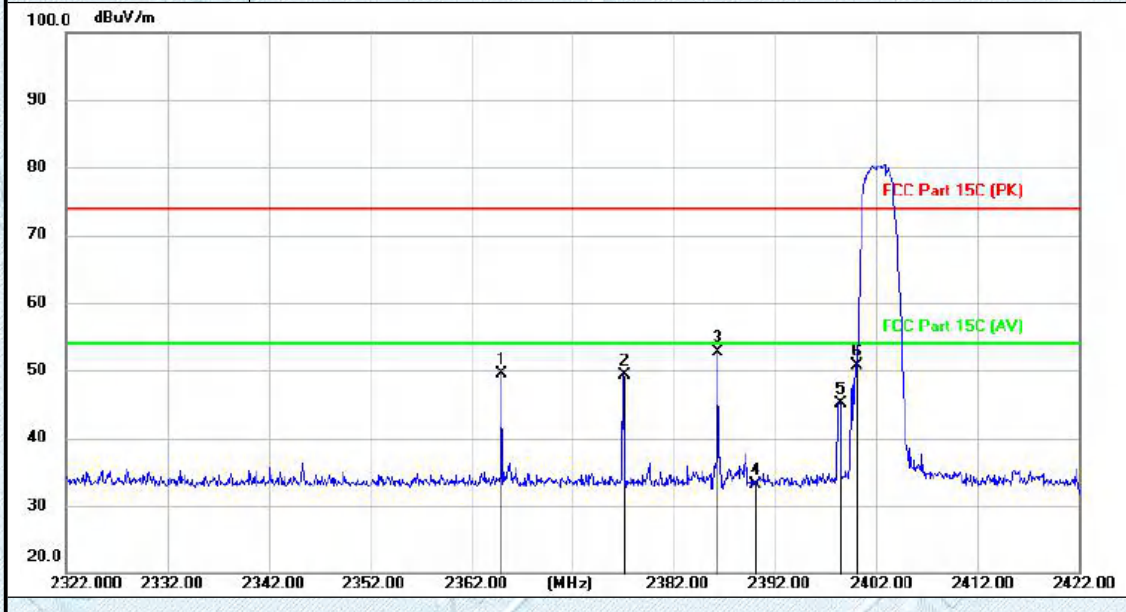
1) Final level= Read level + Antenna Factor + Cable Loss - Preamp Factor

2) Correction Factor = Antenna factor + cable loss

3) The peak level is lower than average limit(54dBuV/m), this data is the too weak instrument of signal is unable to test.

4) The emission levels of other frequencies are very lower than the limit and not show in test report.

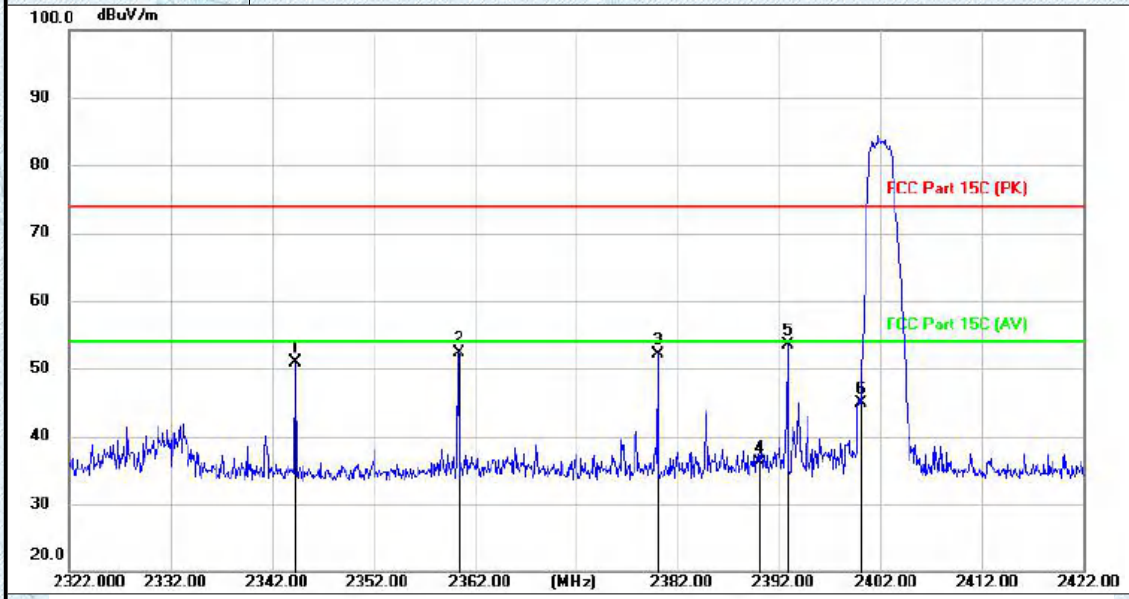
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Horizontal
Test Mode:	TX Mode 2403MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2365.000	60.50	-10.93	49.57	74.00	-24.43	peak
2		2377.080	60.24	-10.93	49.31	74.00	-24.69	peak
3	*	2386.300	63.54	-10.92	52.62	74.00	-21.38	peak
4		2390.000	44.07	-10.92	33.15	74.00	-40.85	peak
5		2398.450	56.06	-10.92	45.14	74.00	-28.86	peak
6		2400.000	61.65	-10.92	50.73	74.00	-23.27	peak

Emission Level= Read Level+ Correct Factor

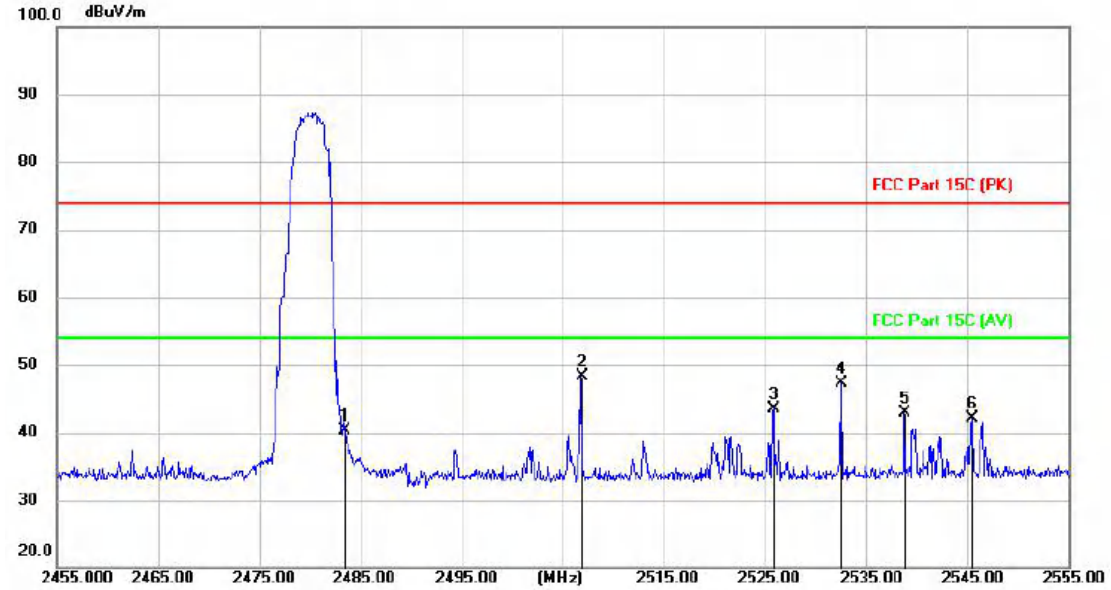
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Vertical
Test Mode:	TX Mode 2403MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2344.300	61.86	-10.93	50.93	74.00	-23.07	peak
2		2360.340	63.24	-10.93	52.31	74.00	-21.69	peak
3		2380.040	63.10	-10.92	52.18	74.00	-21.82	peak
4		2390.000	46.98	-10.92	36.06	74.00	-37.94	peak
5	*	2392.860	64.44	-10.92	53.52	74.00	-20.48	peak
6		2400.000	55.81	-10.92	44.89	74.00	-29.11	peak

Emission Level= Read Level+ Correct Factor

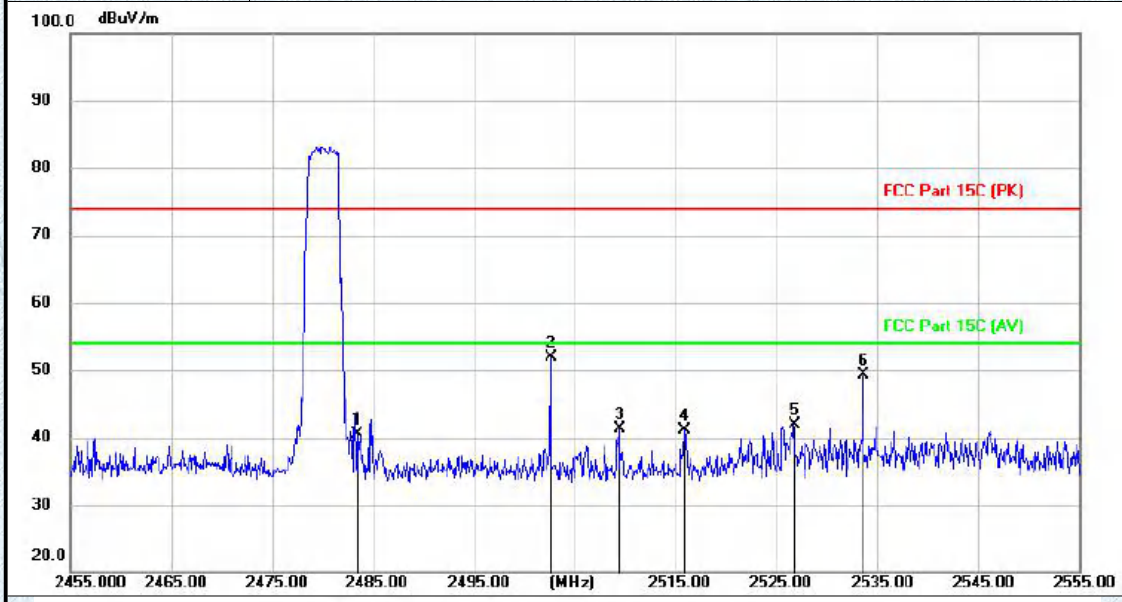
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Horizontal
Test Mode:	TX Mode 2480 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2483.500	51.15	-10.88	40.27	74.00	-33.73	peak
2	*	2506.850	59.25	-10.87	48.38	74.00	-25.62	peak
3		2525.830	54.45	-10.86	43.59	74.00	-30.41	peak
4		2532.500	58.09	-10.86	47.23	74.00	-26.77	peak
5		2538.750	53.78	-10.86	42.92	74.00	-31.08	peak
6		2545.420	52.95	-10.85	42.10	74.00	-31.90	peak

Emission Level= Read Level+ Correct Factor

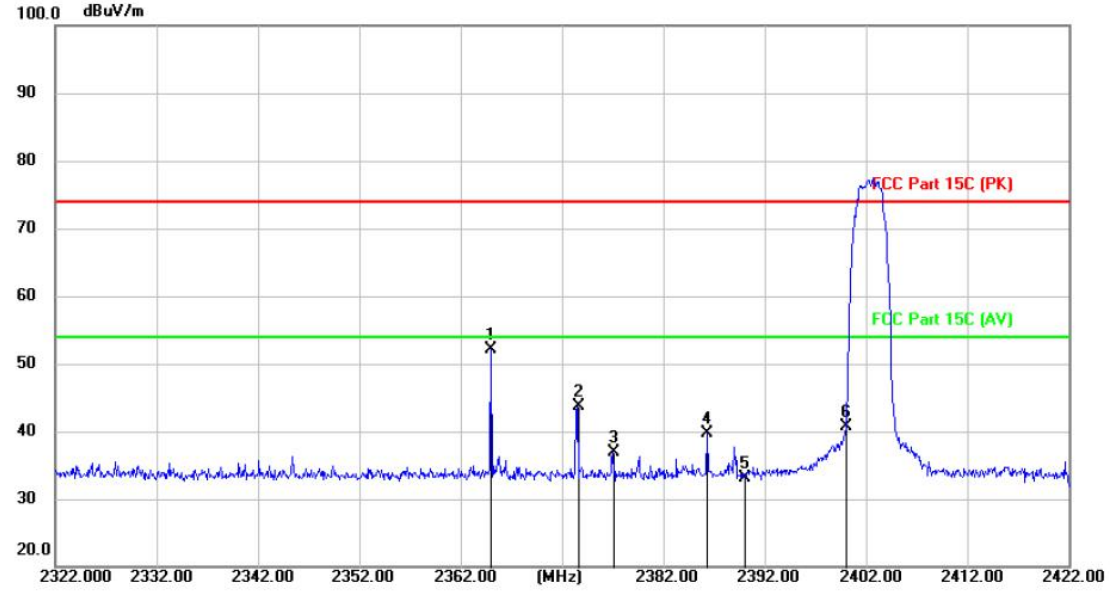
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Vertical
Test Mode:	TX Mode 2480 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2483.500	51.46	-10.88	40.58	74.00	-33.42	peak
2	*	2502.650	62.72	-10.88	51.84	74.00	-22.16	peak
3		2509.400	52.22	-10.87	41.35	74.00	-32.65	peak
4		2515.850	52.01	-10.87	41.14	74.00	-32.86	peak
5		2526.770	52.78	-10.86	41.92	74.00	-32.08	peak
6		2533.580	60.25	-10.86	49.39	74.00	-24.61	peak

Emission Level= Read Level+ Correct Factor

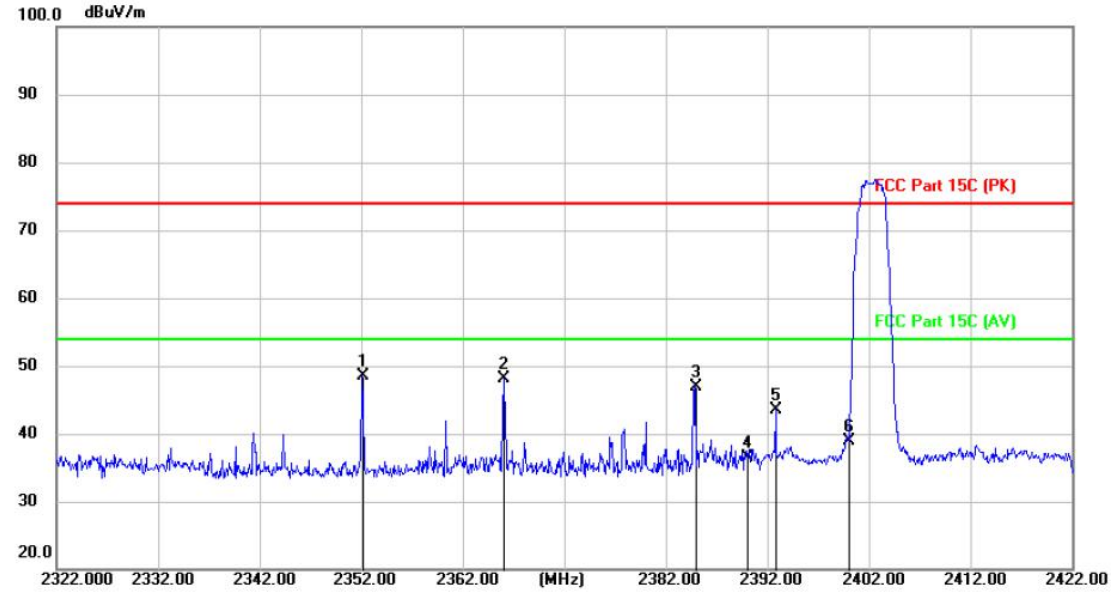
TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Horizontal
Test Mode:	TX Mode 2403MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2365.000	63.00	-10.93	52.07	74.00	-21.93	peak
2		2373.530	54.64	-10.93	43.71	74.00	-30.29	peak
3		2377.080	47.74	-10.93	36.81	74.00	-37.19	peak
4		2386.300	50.54	-10.92	39.62	74.00	-34.38	peak
5		2390.000	44.07	-10.92	33.15	74.00	-40.85	peak
6		2400.000	51.65	-10.92	40.73	74.00	-33.27	peak

Emission Level= Read Level+ Correct Factor

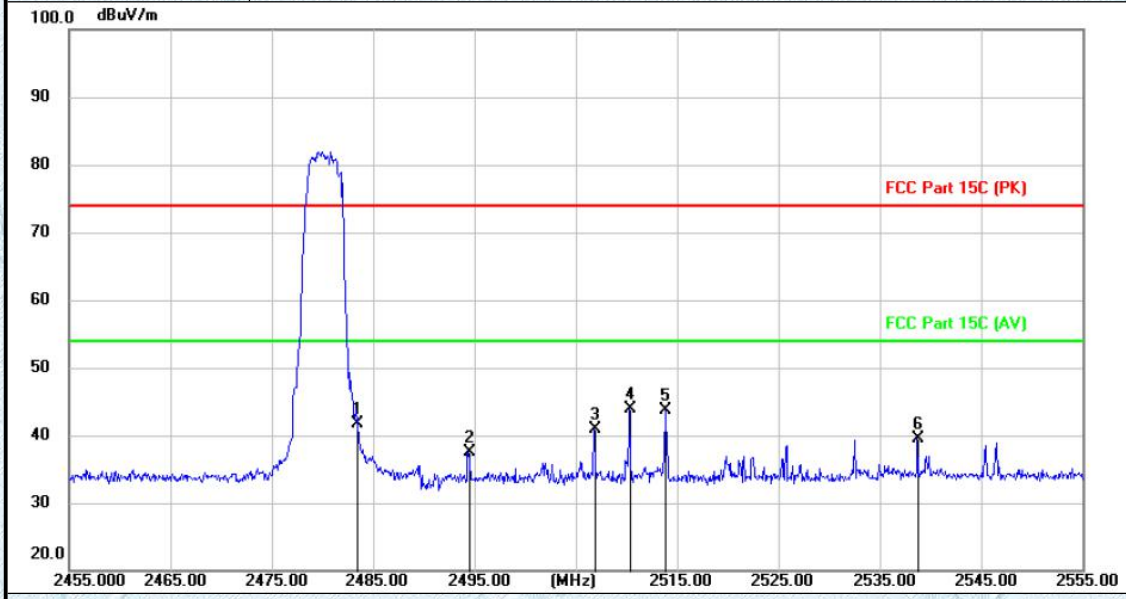
TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Vertical
Test Mode:	TX Mode 2403MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2352.150	59.54	-10.94	48.60	74.00	-25.40	peak
2		2366.060	58.95	-10.94	48.01	74.00	-25.99	peak
3		2384.920	57.92	-10.92	47.00	74.00	-27.00	peak
4		2390.000	47.48	-10.92	36.56	74.00	-37.44	peak
5		2392.860	54.44	-10.92	43.52	74.00	-30.48	peak
6		2400.000	49.81	-10.92	38.89	74.00	-35.11	peak

Emission Level= Read Level+ Correct Factor

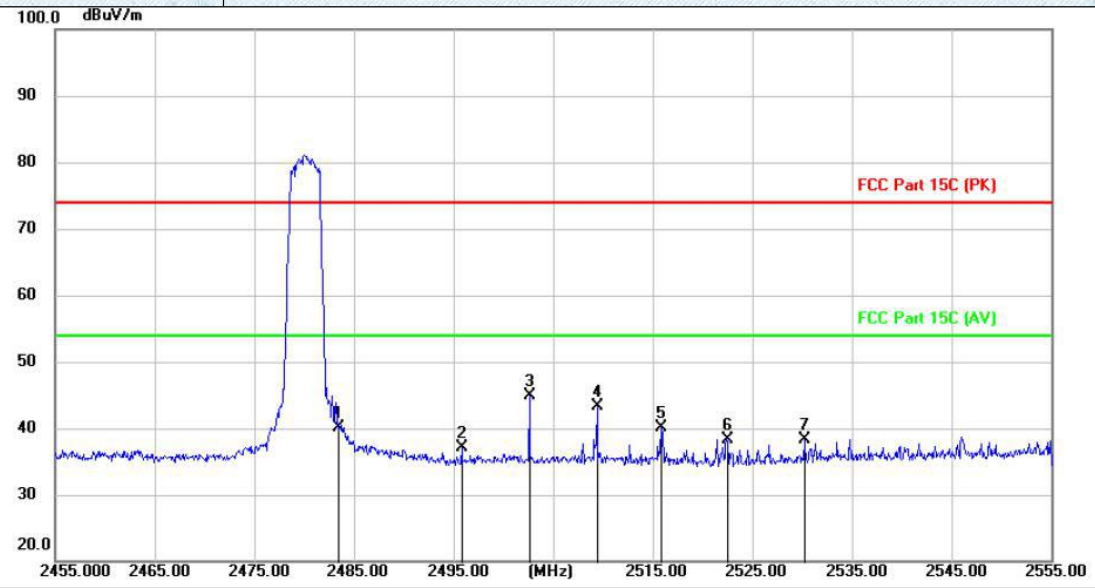
TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Horizontal
Test Mode:	TX Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2483.500	52.65	-10.88	41.77	74.00	-32.23	peak
2		2494.450	48.28	-10.87	37.41	74.00	-36.59	peak
3		2506.850	51.75	-10.87	40.88	74.00	-33.12	peak
4	*	2510.370	54.68	-10.87	43.81	74.00	-30.19	peak
5		2513.800	54.67	-10.88	43.79	74.00	-30.21	peak
6		2538.750	50.28	-10.86	39.42	74.00	-34.58	peak

Emission Level= Read Level+ Correct Factor

TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Vertical
Test Mode:	TX Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2483.500	50.96	-10.88	40.08	74.00	-33.92	peak
2		2495.820	47.90	-10.87	37.03	74.00	-36.97	peak
3	*	2502.650	55.72	-10.88	44.84	74.00	-29.16	peak
4		2509.400	54.22	-10.87	43.35	74.00	-30.65	peak
5		2515.850	51.01	-10.87	40.14	74.00	-33.86	peak
6		2522.490	49.27	-10.87	38.40	74.00	-35.60	peak
7		2530.290	49.17	-10.86	38.31	74.00	-35.69	peak

Emission Level= Read Level+ Correct Factor

3.5. Radiated Spurious Emissions

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209(a) and 15.205(a)

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0dB(μV)/m(Peak) 54.0dB(μV)/m (Average)	

Remark: (1) Emission level dBμV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

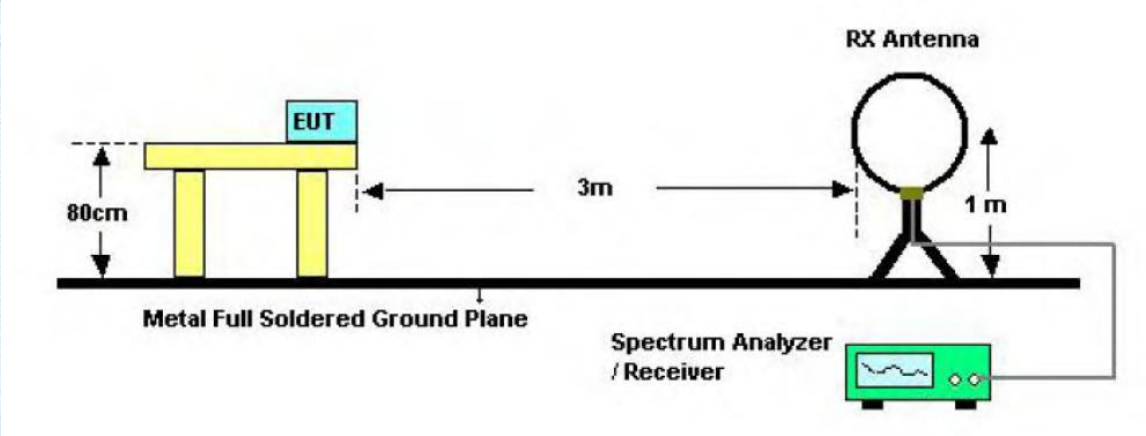
(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

FREQUENCY RANGE OF RADIATED MEASUREMENT

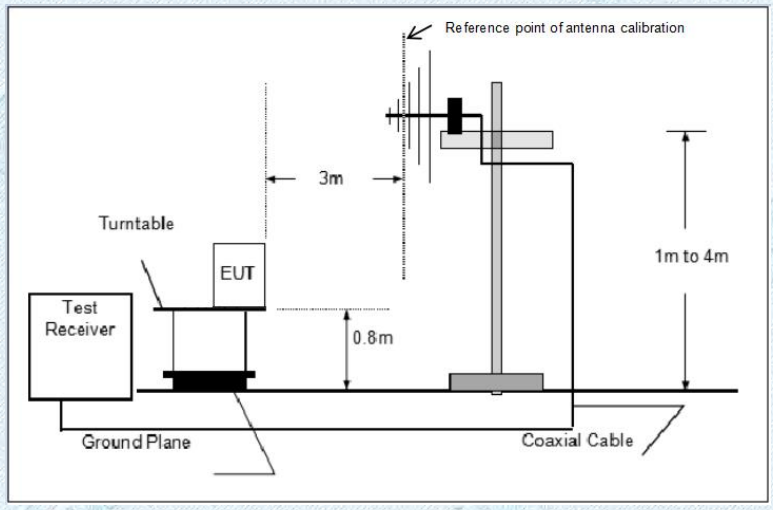
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz RBW 1MHz/ VBW 1MHz for Peak, RBW 1MHz/ VBW 10Hz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

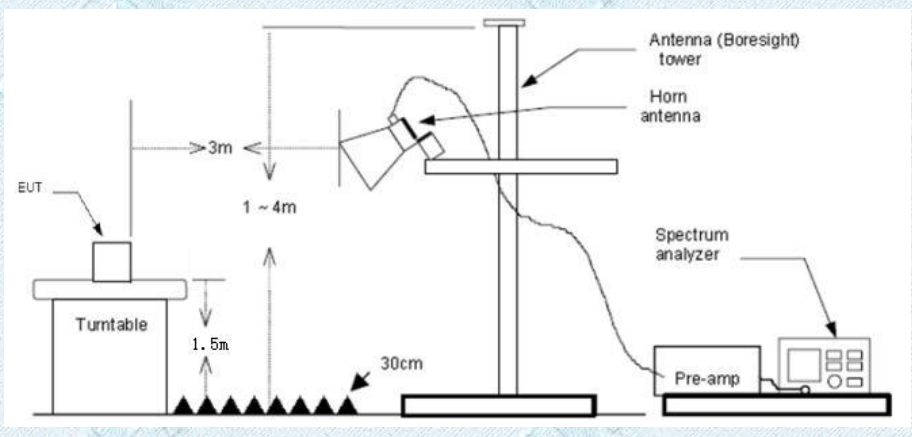
Test Configuration



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup

Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Below 1 GHz:
   RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
   If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
   (3) From 1 GHz to 10th harmonic:
   RBW=1MHz, VBW=3MHz Peak detector for Peak value.
   RBW=1MHz, VBW=10Hz RMS detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

9 KHz~30 MHz and 18GHz~25GHz

From 9 KHz~30 MHz and 18GHz~25GHz: Conclusion: PASS

Note:

1) Final level = Reading level + Correct Factor
   Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor
2) The emission levels of other frequencies are very lower than the limit and not show in test report.
3) The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4) Pre-scan 2403MHz, 2441MHz and 2480MHz mode, and found the(USB receiver) 2403MHz which it is worse case for 30MHz-1GHz , so only show the test data for worse case.
5) Pre-scan 2403MHz, 2441MHz and 2480MHz mode, and found the 2403MHz mode it is worse case for above 1GHz, so only show the test data for worse case.
6) 18GHz ~ 25GHz
   The EUT was pre-scanned the frequency band (18GHz~25GHz), found the radiated level(Background noise) lower than the limit, so don't show on the report.

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

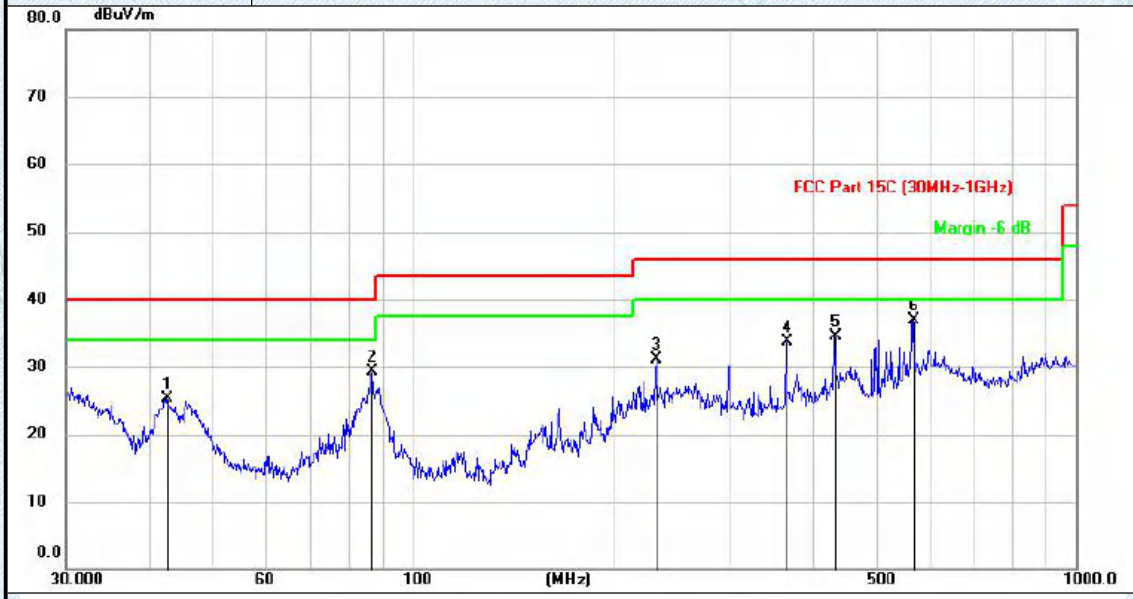
30MHz-1GHz

Test Voltage:	DC 5.0V
Ant. Pol.	Horizontal
Test Mode:	TX 2403MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		87.6633	45.06	-14.35	30.71	40.00	-9.29	peak
2		166.1263	38.88	-15.04	23.84	43.50	-19.66	peak
3		233.1851	37.88	-10.57	27.31	46.00	-18.69	peak
4		365.4108	38.97	-6.13	32.84	46.00	-13.16	peak
5	*	564.0452	43.22	-1.98	41.24	46.00	-4.76	peak
6		828.3644	37.28	0.28	37.56	46.00	-8.44	peak

Emission Level= Read Level+ Correct Factor

USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Vertical
Test Mode:	TX 2403MHz

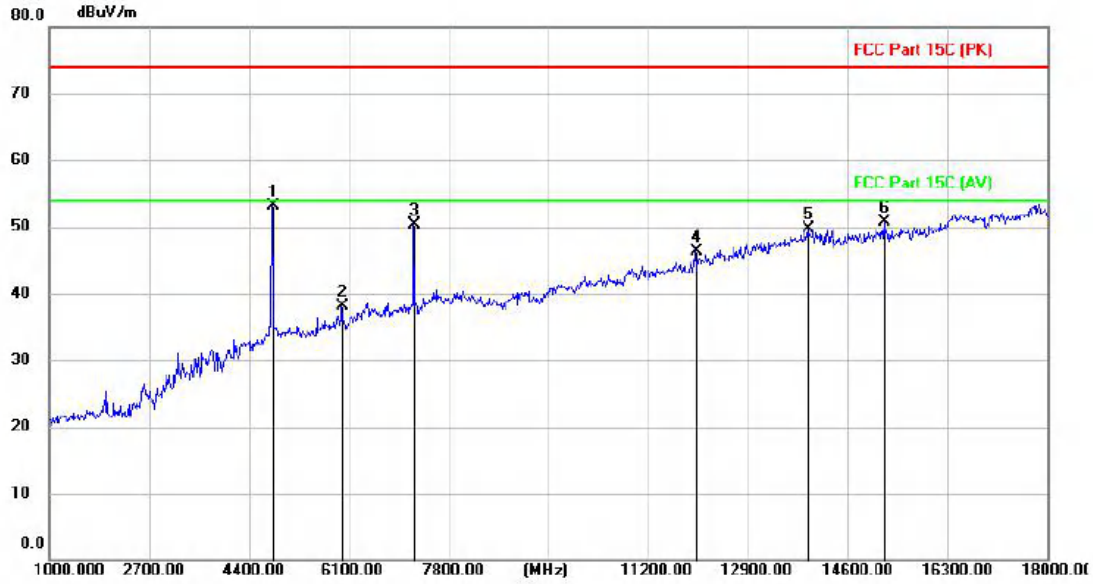


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		42.5104	36.06	-10.76	25.30	40.00	-14.70	peak
2		86.7762	43.74	-14.47	29.27	40.00	-10.73	peak
3		233.2669	41.59	-10.57	31.02	46.00	-14.98	peak
4		366.5658	39.70	-6.09	33.61	46.00	-12.39	peak
5		433.1528	39.08	-4.60	34.48	46.00	-11.52	peak
6	*	566.6223	38.71	-1.89	36.82	46.00	-9.18	peak

Emission Level= Read Level+ Correct Factor

Adobe 1GHz

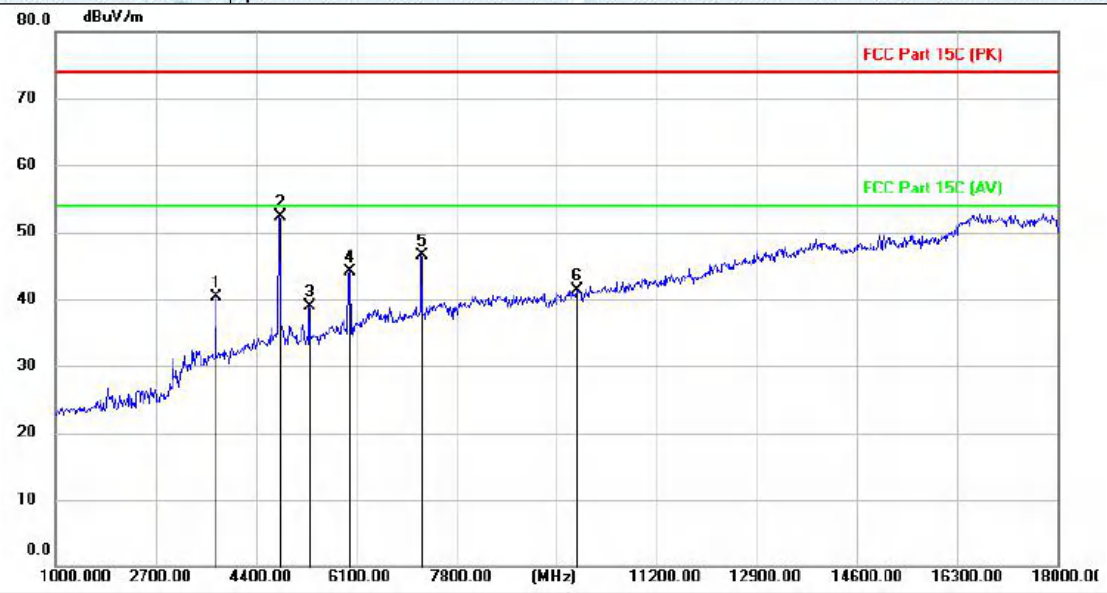
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Horizontal
Test Mode:	TX Mode 2403MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	4806.300	58.93	-5.92	53.01	74.00	-20.99	peak
2		5982.700	41.86	-3.84	38.02	74.00	-35.98	peak
3		7208.400	50.42	-0.07	50.35	74.00	-23.65	peak
4		12014.300	38.43	7.91	46.34	74.00	-27.66	peak
5		13933.600	38.63	11.15	49.78	74.00	-24.22	peak
6		15222.200	39.01	11.78	50.79	74.00	-23.21	peak

Emission Level= Read Level+ Correct Factor

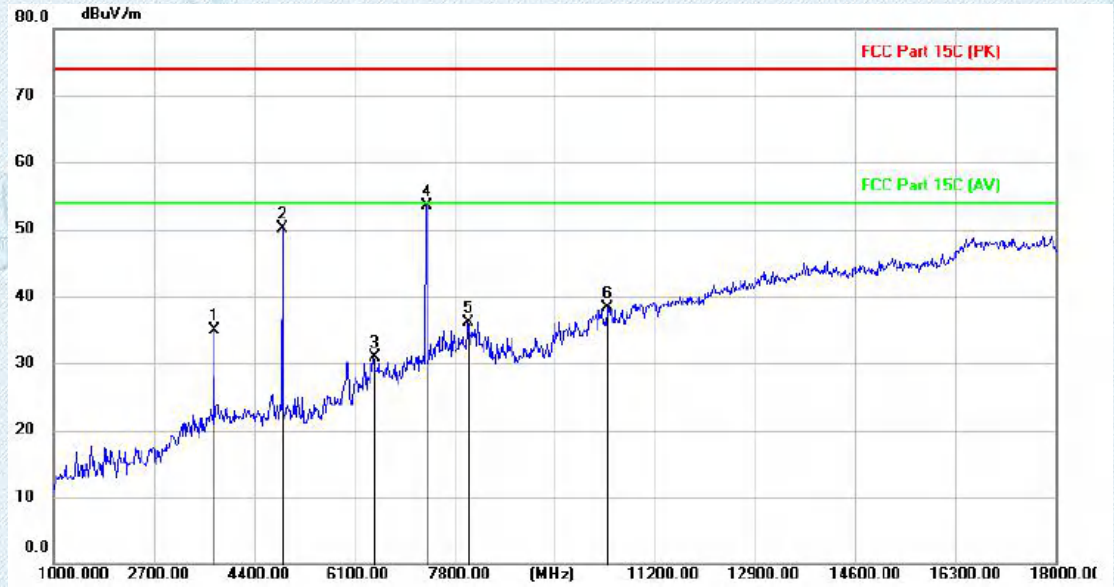
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Vertical
Test Mode:	TX Mode 2403MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3721.700	49.50	-9.12	40.38	74.00	-33.62	peak
2	*	4806.300	58.24	-5.92	52.32	74.00	-21.68	peak
3		5316.300	44.05	-5.10	38.95	74.00	-35.05	peak
4		5998.000	47.83	-3.81	44.02	74.00	-29.98	peak
5		7208.400	46.65	-0.07	46.58	74.00	-27.42	peak
6		9845.100	37.66	3.73	41.39	74.00	-32.61	peak

Emission Level= Read Level+ Correct Factor

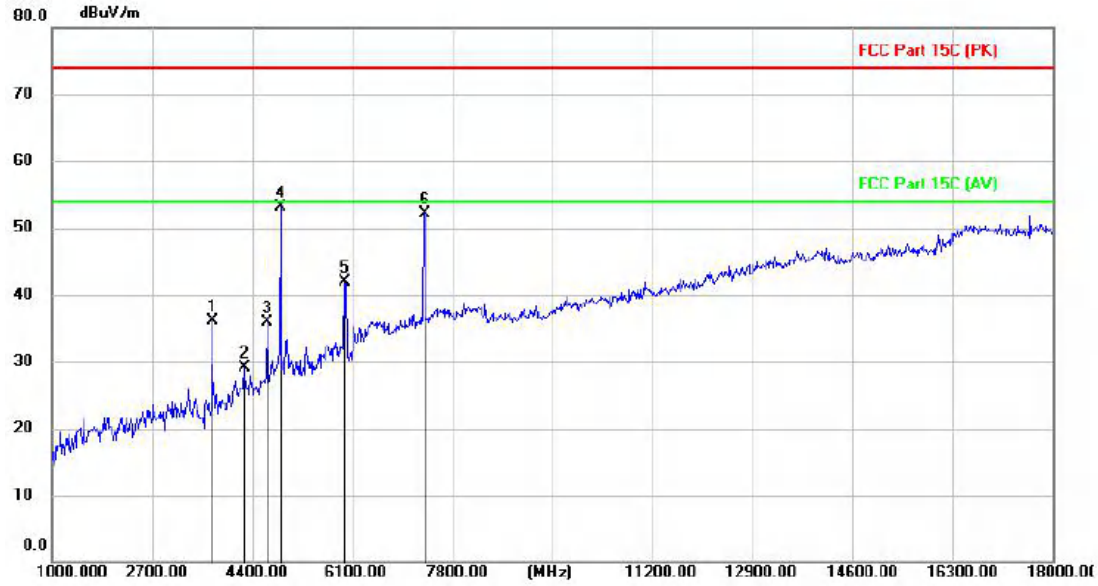
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Horizontal
Test Mode:	TX Mode 2441MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3720.000	44.12	-9.13	34.99	74.00	-39.01	peak
2		4882.800	55.89	-5.71	50.18	74.00	-23.82	peak
3		6424.700	33.19	-2.37	30.82	74.00	-43.18	peak
4	*	7322.300	53.15	0.27	53.42	74.00	-20.58	peak
5		8036.300	34.09	2.06	36.15	74.00	-37.85	peak
6		10399.300	33.49	4.75	38.24	74.00	-35.76	peak

Emission Level= Read Level+ Correct Factor

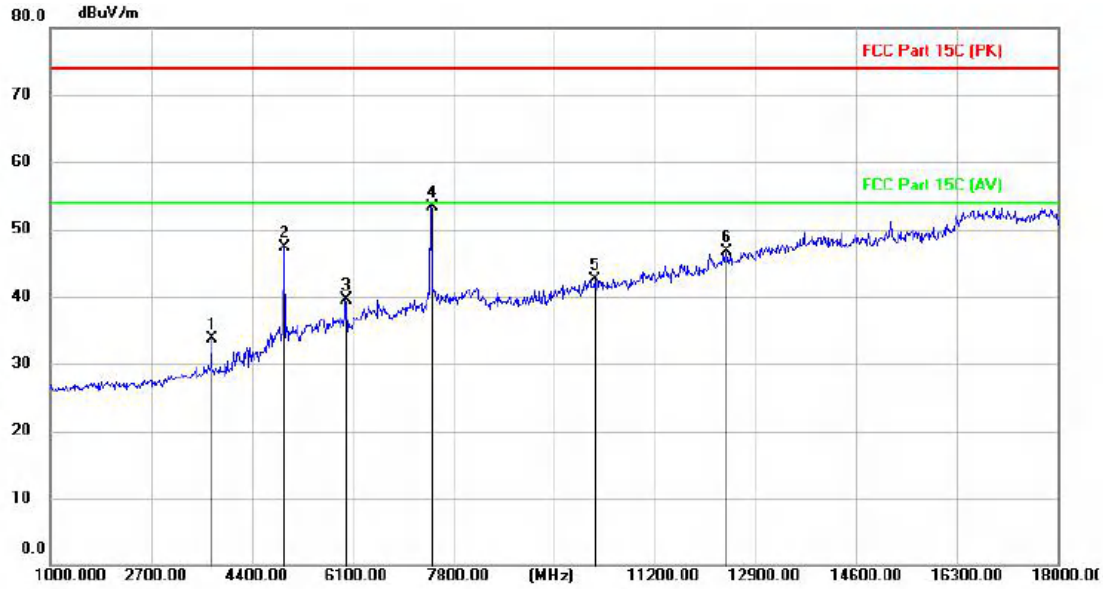
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Vertical
Test Mode:	TX Mode 2441MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3725.100	45.21	-9.12	36.09	74.00	-37.91	peak
2		4267.400	36.55	-7.53	29.02	74.00	-44.98	peak
3		4655.000	42.28	-6.33	35.95	74.00	-38.05	peak
4	*	4882.800	58.86	-5.71	53.15	74.00	-20.85	peak
5		5979.300	45.83	-3.84	41.99	74.00	-32.01	peak
6		7322.300	51.82	0.27	52.09	74.00	-21.91	peak

Emission Level= Read Level+ Correct Factor

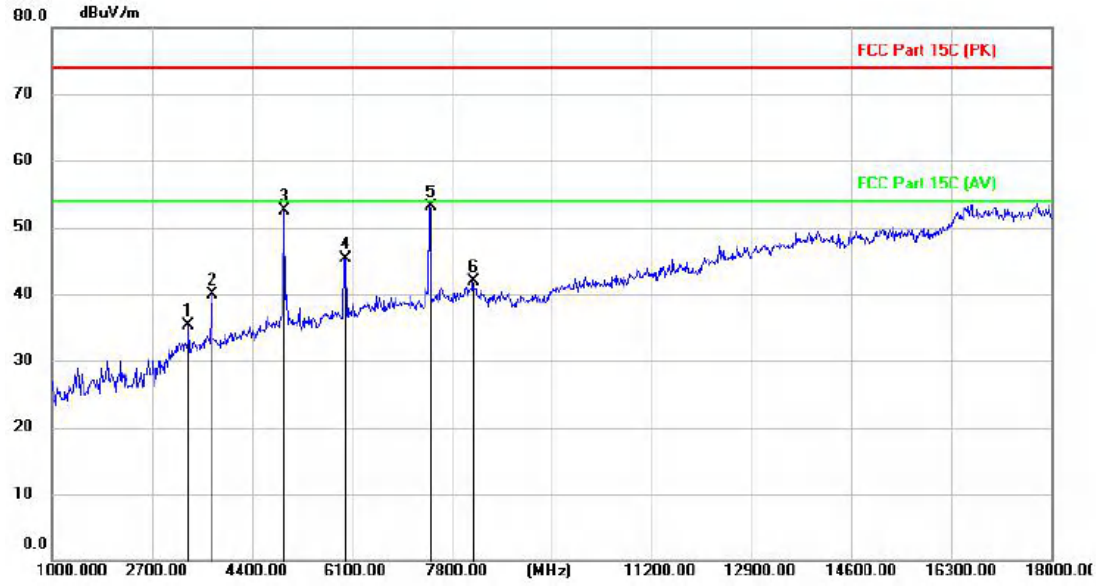
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Horizontal
Test Mode:	TX Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3728.500	42.90	-9.12	33.78	74.00	-40.22	peak
2		4959.300	52.85	-5.51	47.34	74.00	-26.66	peak
3		5994.600	43.39	-3.81	39.58	74.00	-34.42	peak
4	*	7439.600	52.59	0.64	53.23	74.00	-20.77	peak
5		10180.000	38.14	4.38	42.52	74.00	-31.48	peak
6		12400.200	37.95	8.75	46.70	74.00	-27.30	peak

Emission Level= Read Level+ Correct Factor

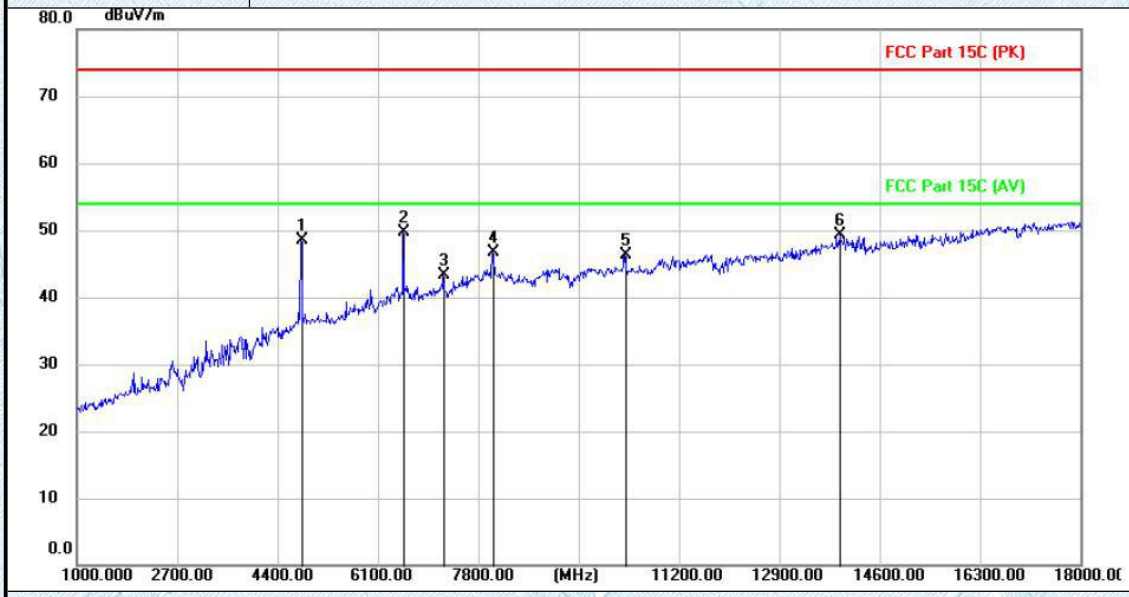
USB receiver	
Test Voltage:	DC 5.0V
Ant. Pol.	Vertical
Test Mode:	TX Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3329.000	45.22	-9.99	35.23	74.00	-38.77	peak
2		3730.200	49.10	-9.10	40.00	74.00	-34.00	peak
3		4959.300	57.93	-5.51	52.42	74.00	-21.58	peak
4		5996.300	49.12	-3.81	45.31	74.00	-28.69	peak
5	*	7439.600	52.44	0.64	53.08	74.00	-20.92	peak
6		8170.600	39.80	2.03	41.83	74.00	-32.17	peak

Emission Level= Read Level+ Correct Factor

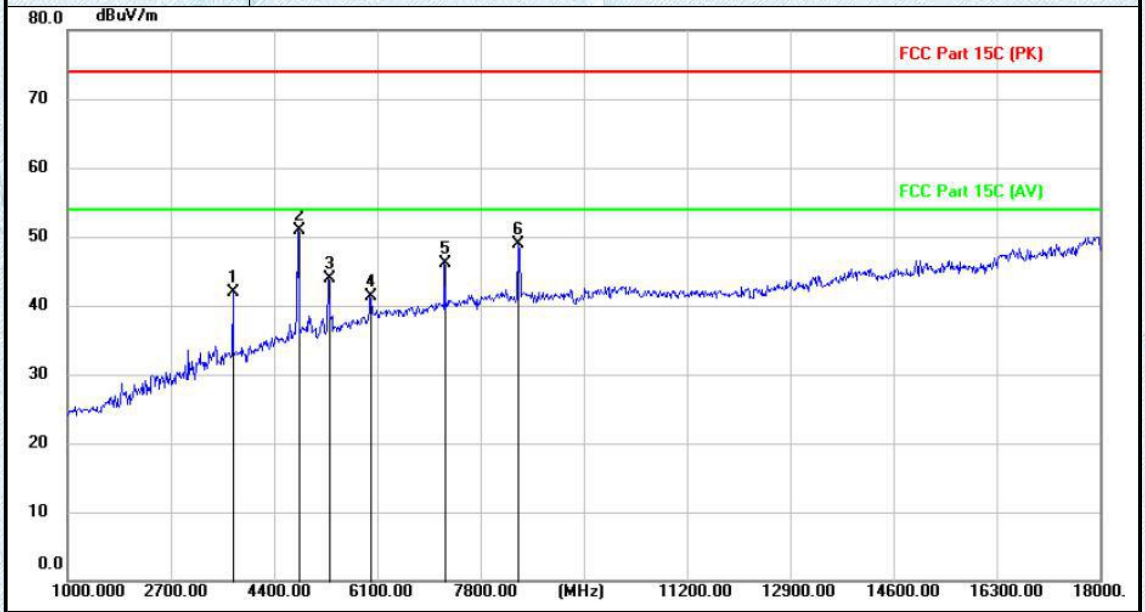
TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Horizontal
Test Mode:	TX Mode 2403MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		4806.300	54.43	-5.92	48.51	74.00	-25.49	peak
2	*	6530.100	51.73	-2.02	49.71	74.00	-24.29	peak
3		7208.400	43.42	-0.07	43.35	74.00	-30.65	peak
4		8046.500	44.68	2.06	46.74	74.00	-27.26	peak
5		10288.800	41.82	4.56	46.38	74.00	-27.62	peak
6		13933.600	38.13	11.15	49.28	74.00	-24.72	peak

Emission Level= Read Level+ Correct Factor

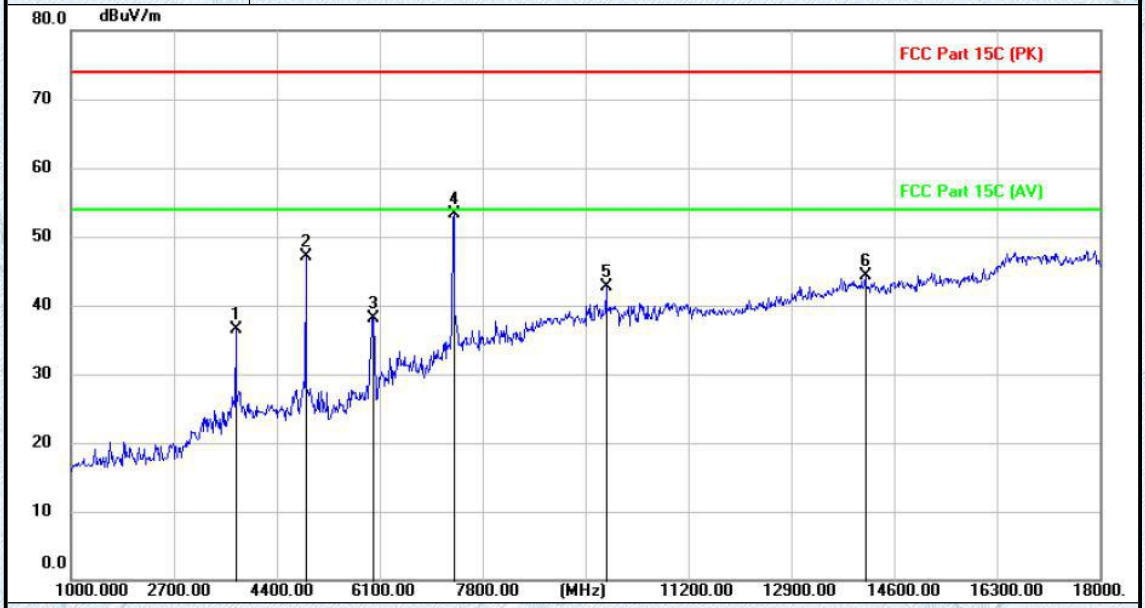
TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Vertical
Test Mode:	TX Mode 2403MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3721.700	51.00	-9.12	41.88	74.00	-32.12	peak
2	*	4806.300	56.74	-5.92	50.82	74.00	-23.18	peak
3		5316.300	49.05	-5.10	43.95	74.00	-30.05	peak
4		5991.200	45.16	-3.81	41.35	74.00	-32.65	peak
5		7208.400	46.15	-0.07	46.08	74.00	-27.92	peak
6		8422.200	46.98	1.96	48.94	74.00	-25.06	peak

Emission Level= Read Level+ Correct Factor

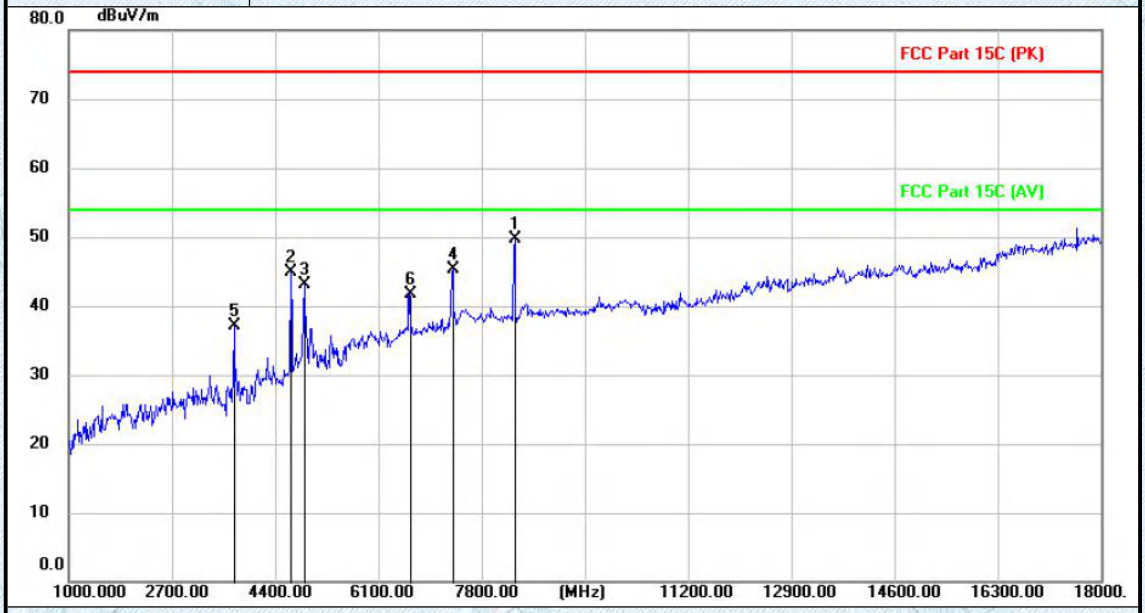
TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Horizontal
Test Mode:	TX Mode 2441MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3720.000	45.62	-9.13	36.49	74.00	-37.51	peak
2		4882.800	52.89	-5.71	47.18	74.00	-26.82	peak
3		5998.000	41.90	-3.81	38.09	74.00	-35.91	peak
4	*	7324.000	52.95	0.28	53.23	74.00	-20.77	peak
5		9851.900	38.96	3.74	42.70	74.00	-31.30	peak
6		14129.100	33.17	11.06	44.23	74.00	-29.77	peak

Emission Level= Read Level+ Correct Factor

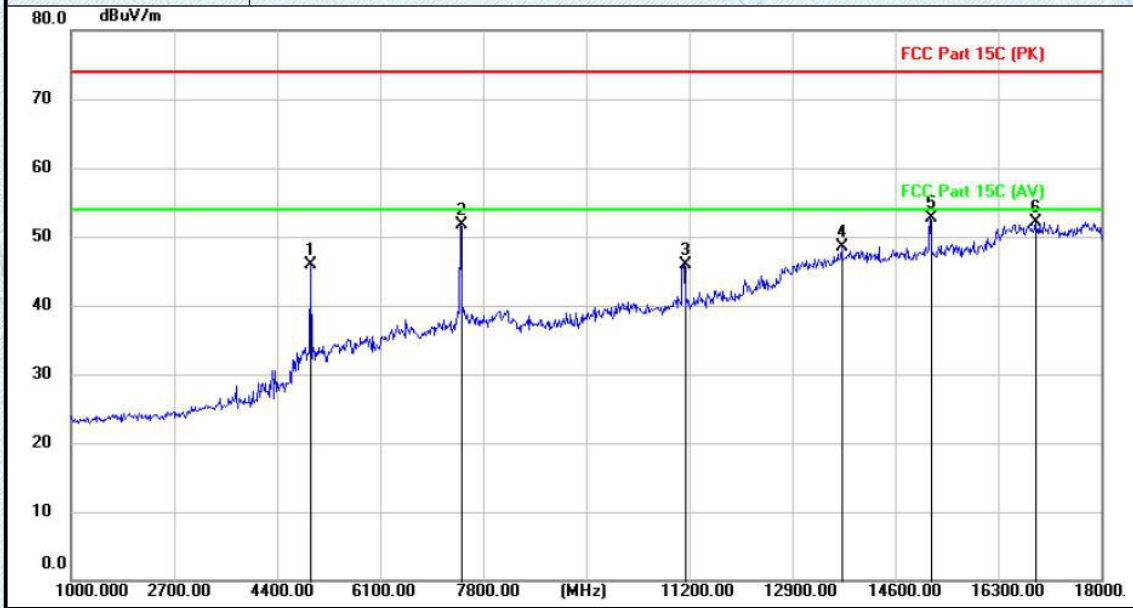
TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Vertical
Test Mode:	TX Mode 2441MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	8350.800	47.82	1.97	49.79	74.00	-24.21	peak
2		4655.000	51.28	-6.33	44.95	74.00	-29.05	peak
3		4882.800	48.86	-5.71	43.15	74.00	-30.85	peak
4		7324.000	45.11	0.28	45.39	74.00	-28.61	peak
5		3725.100	46.21	-9.12	37.09	74.00	-36.91	peak
6		6613.400	43.52	-1.79	41.73	74.00	-32.27	peak

Emission Level= Read Level+ Correct Factor

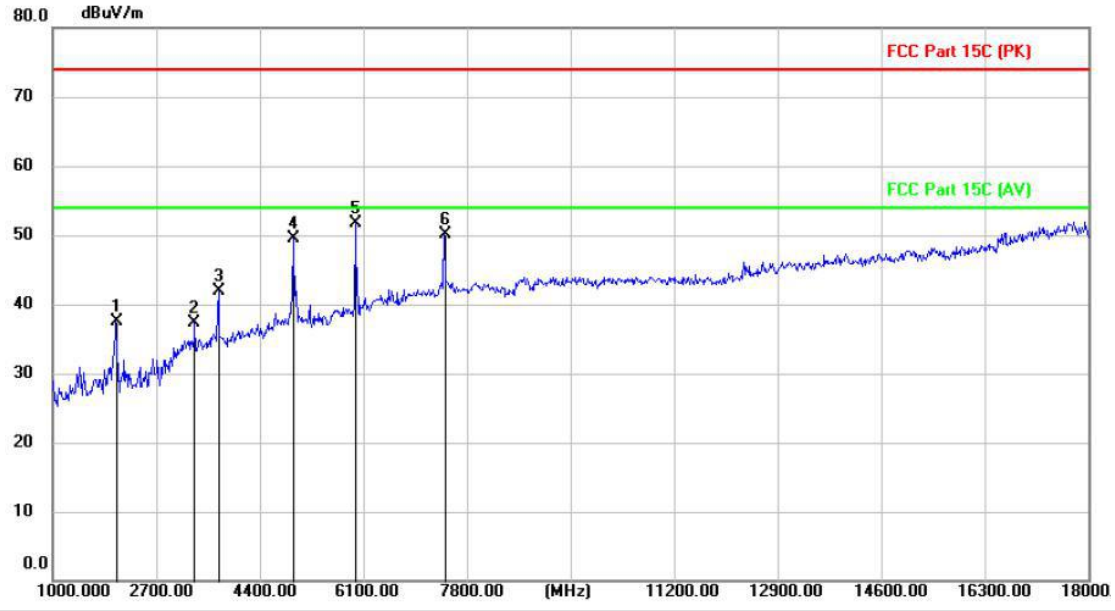
TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Horizontal
Test Mode:	TX Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		4959.300	51.35	-5.51	45.84	74.00	-28.16	peak
2		7439.600	51.09	0.64	51.73	74.00	-22.27	peak
3		11121.800	39.93	5.98	45.91	74.00	-28.09	peak
4		13729.600	37.52	10.89	48.41	74.00	-25.59	peak
5	*	15184.800	40.87	11.74	52.61	74.00	-21.39	peak
6		16925.600	38.94	13.15	52.09	74.00	-21.91	peak

Emission Level= Read Level+ Correct Factor

TYPE-C receiver	
Test Voltage:	DC 5.0V
Ant. Pol.:	Vertical
Test Mode:	TX Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2042.100	48.63	-11.04	37.59	74.00	-36.41	peak
2		3329.000	47.22	-9.99	37.23	74.00	-36.77	peak
3		3730.200	51.10	-9.10	42.00	74.00	-32.00	peak
4		4959.300	54.93	-5.51	49.42	74.00	-24.58	peak
5	*	5979.300	55.55	-3.84	51.71	74.00	-22.29	peak
6		7439.600	49.44	0.64	50.08	74.00	-23.92	peak

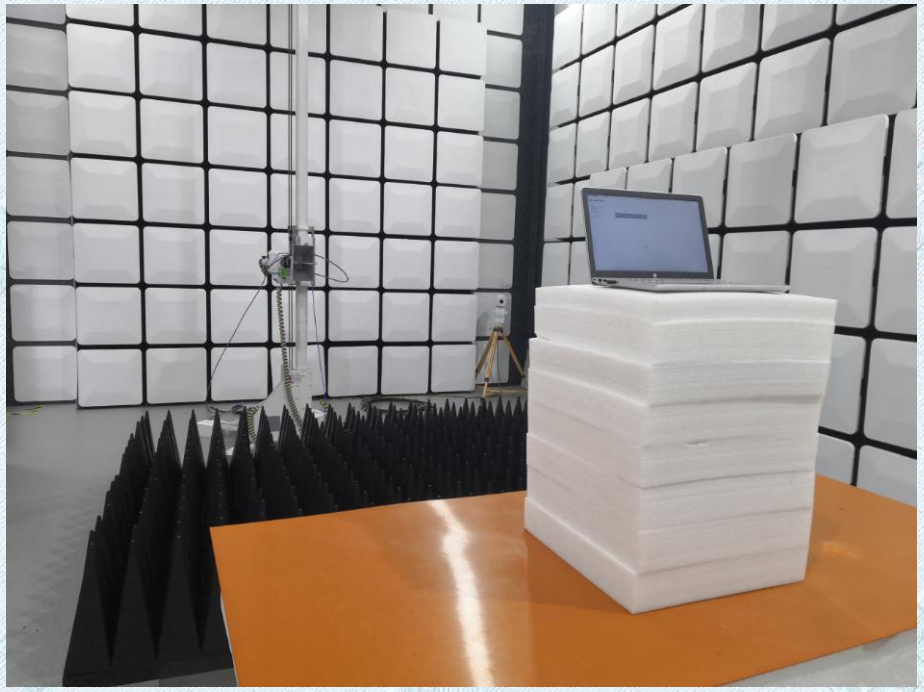
Emission Level= Read Level+ Correct Factor

4.EUT TEST PHOTOS

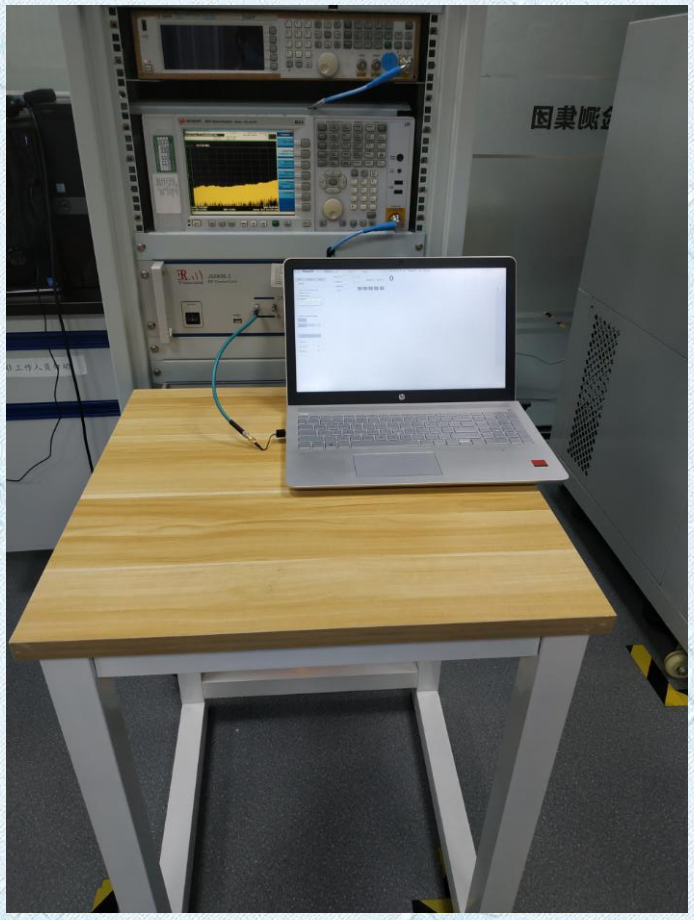
Radiated measurements(TYPE-C receiver):

30MHz-1GHz

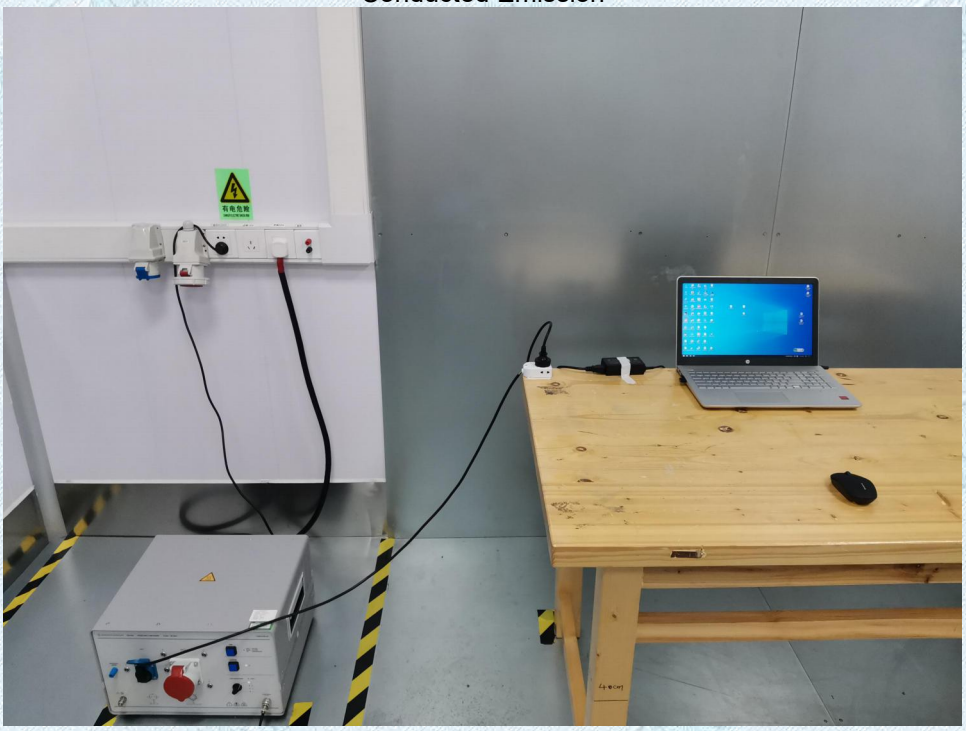
Above 1GHz



RF Conducted



Conducted Emission



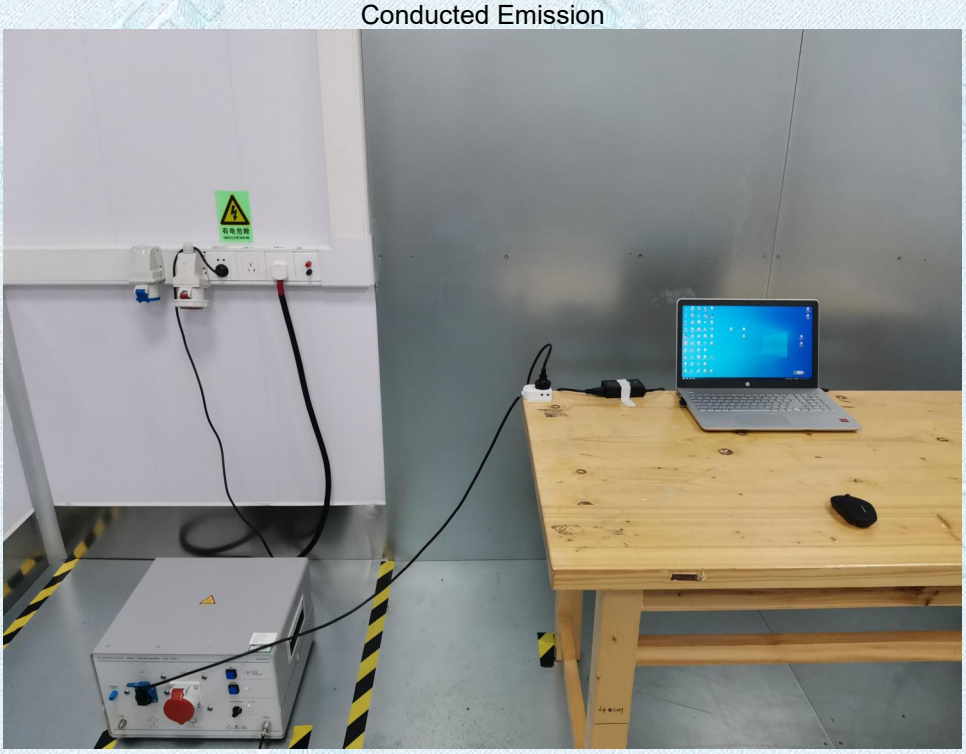
Radiated measurements(USB receiver):

30MHz-1GHz

Above 1GHz

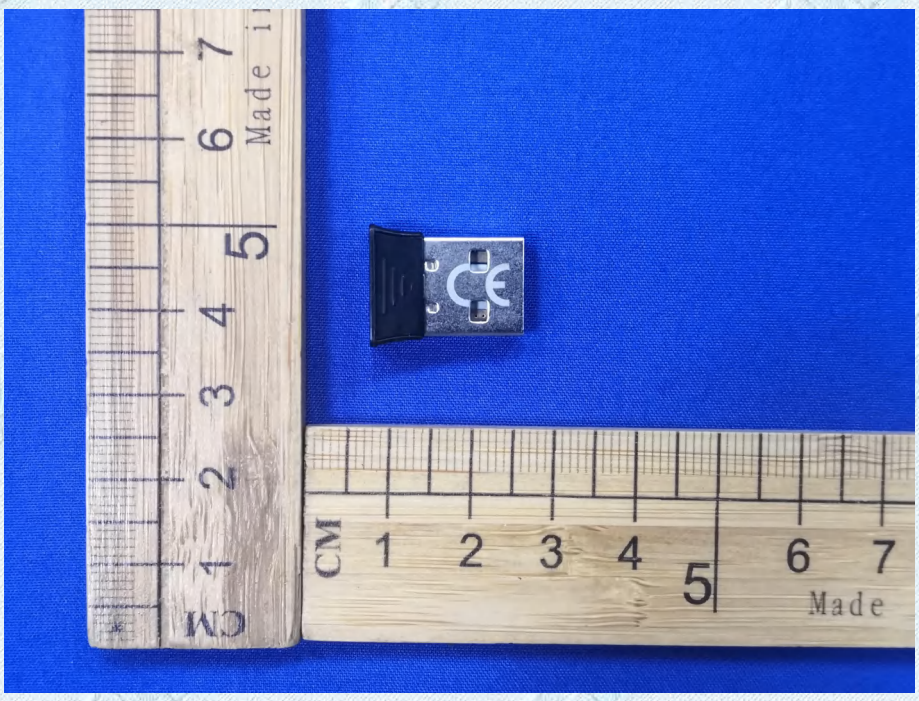
RF Conducted

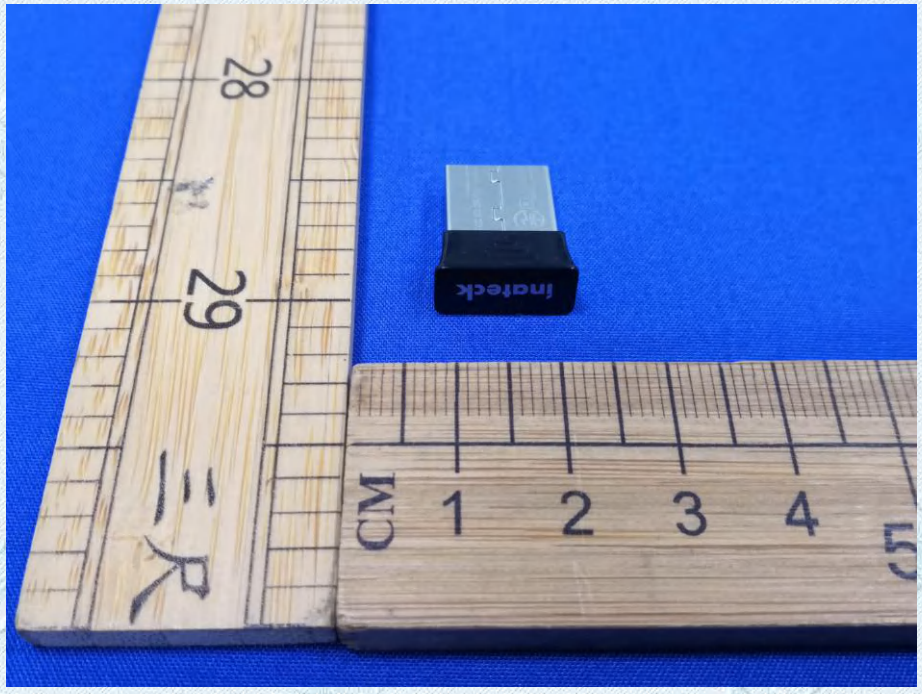
Conducted Emission



5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

External Photographs (USB receiver)

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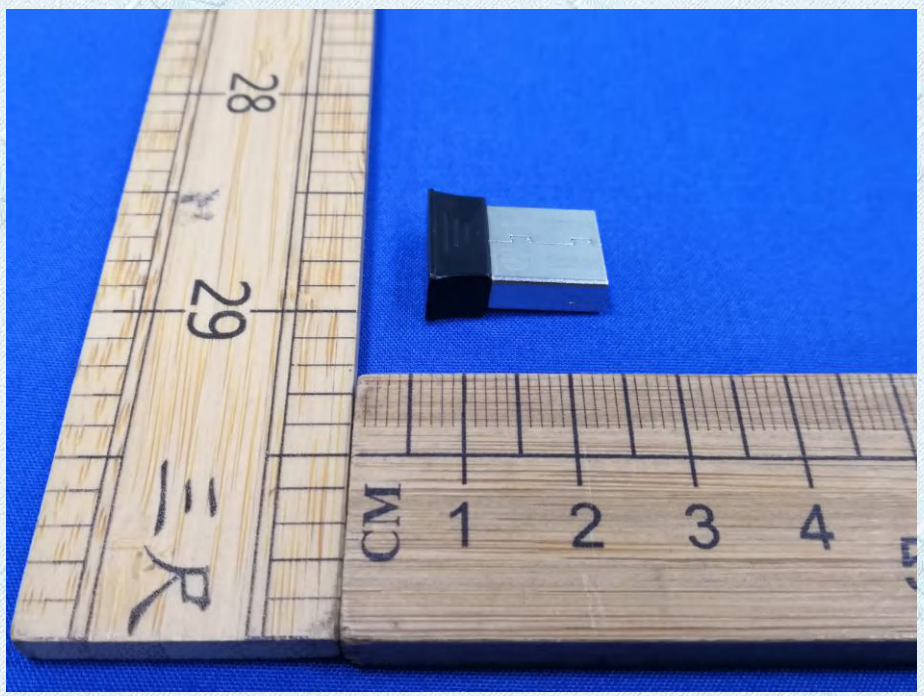
inatek


28
29
CM
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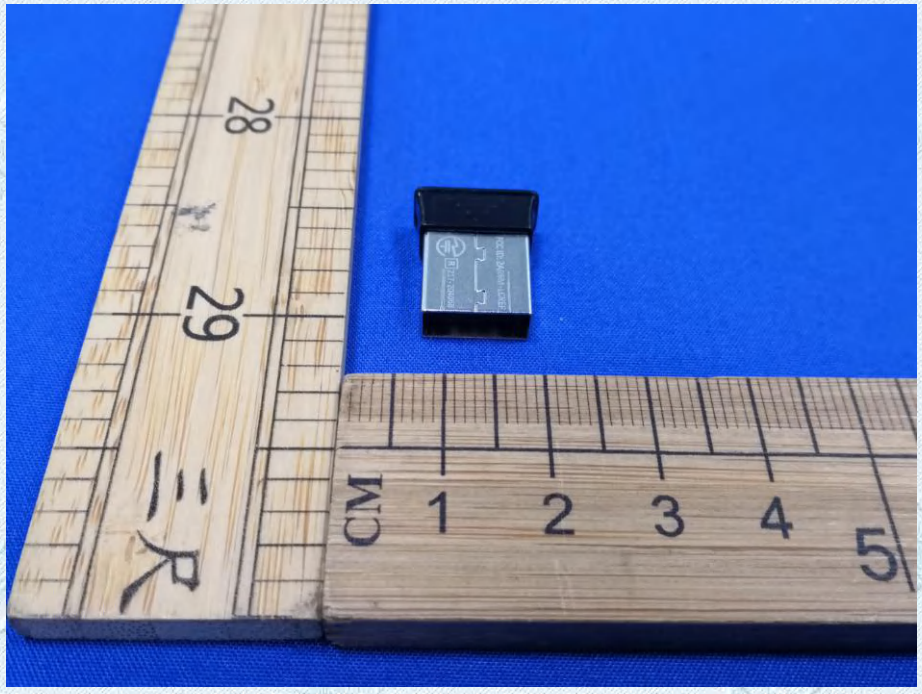
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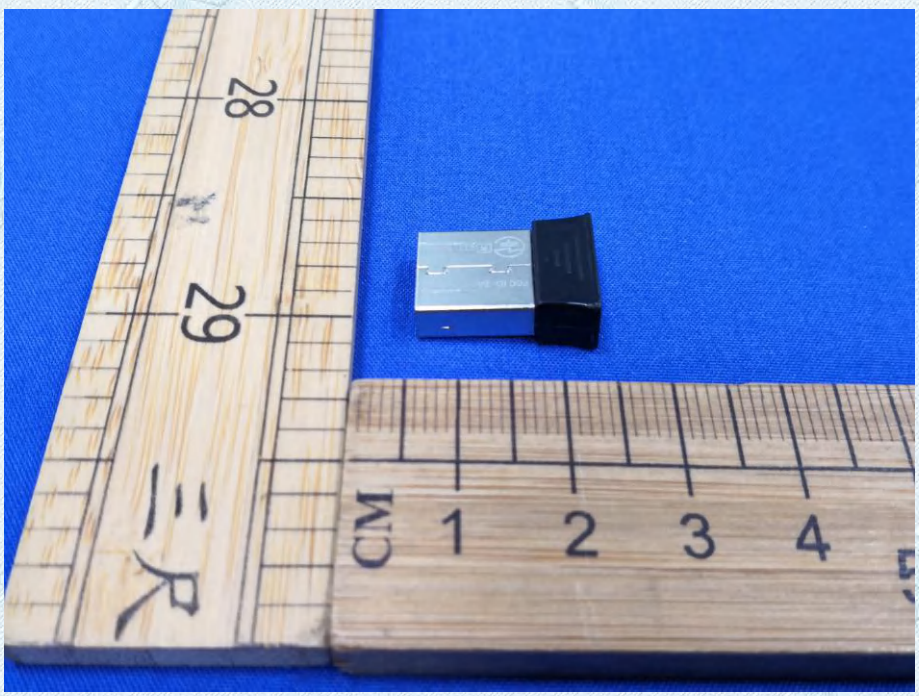
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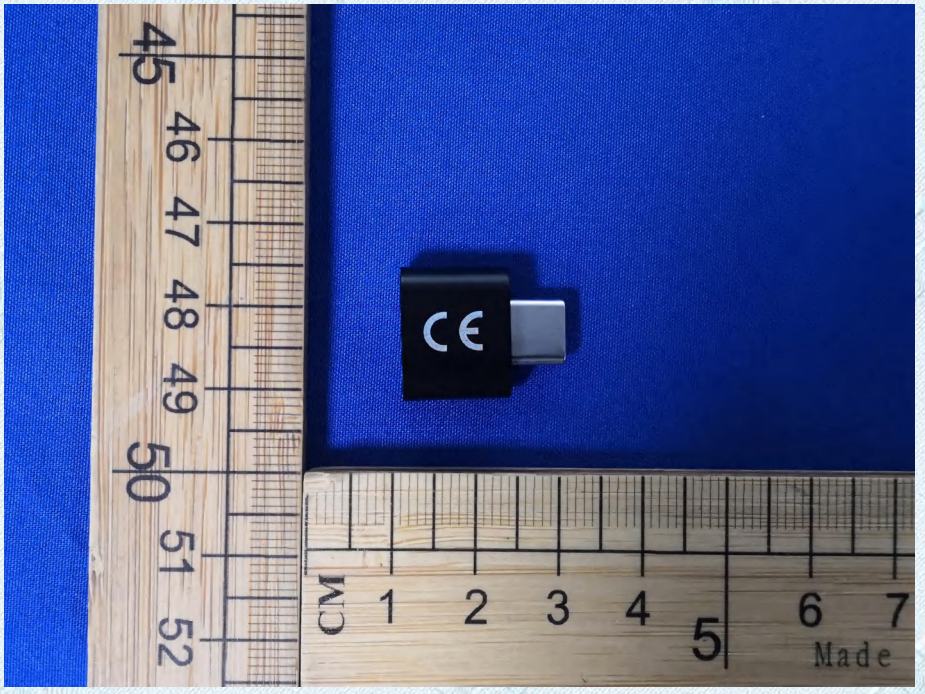
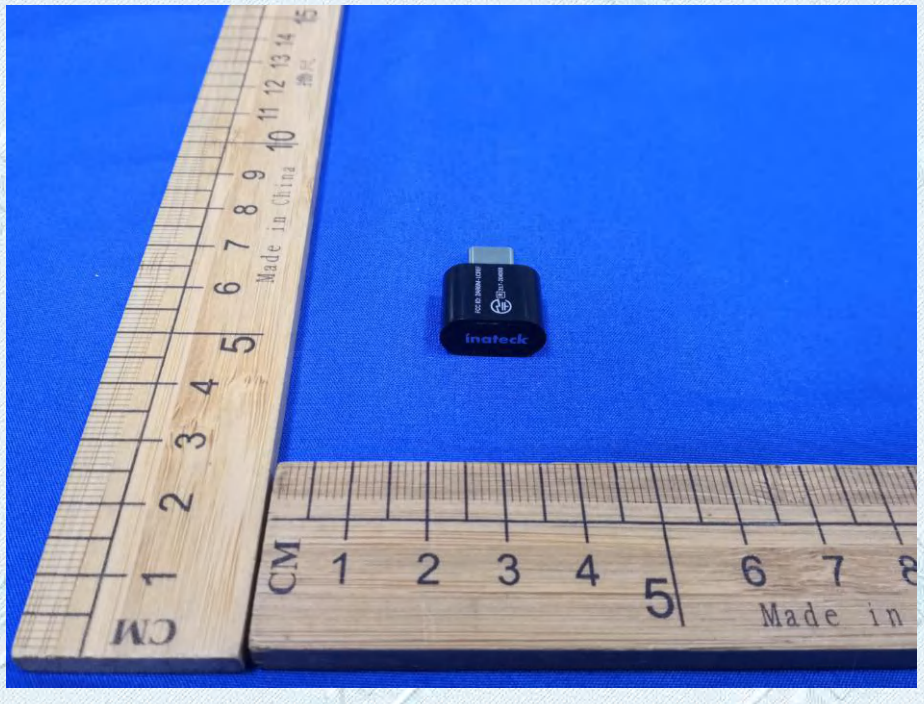
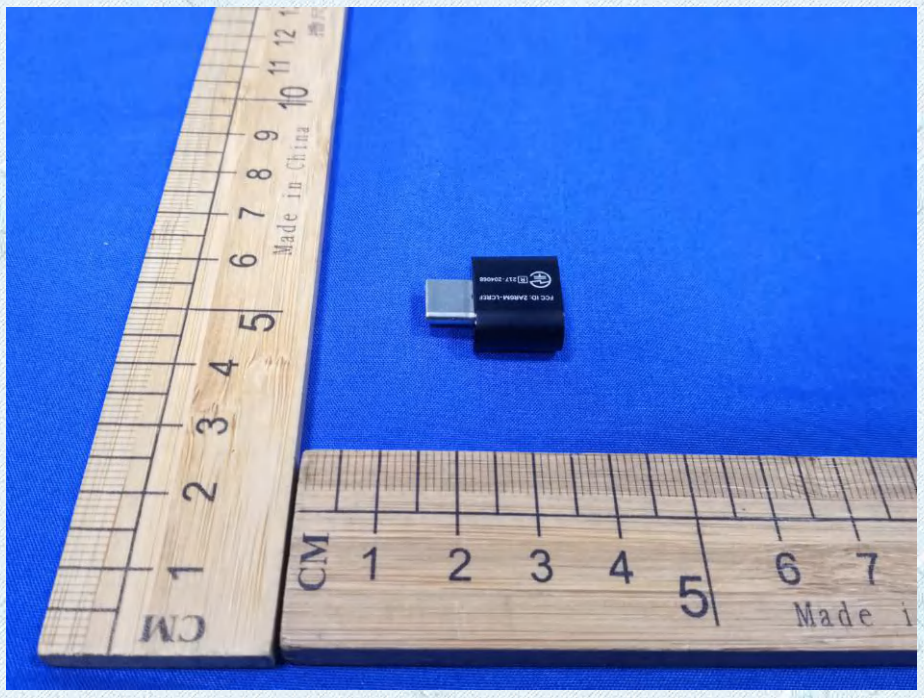
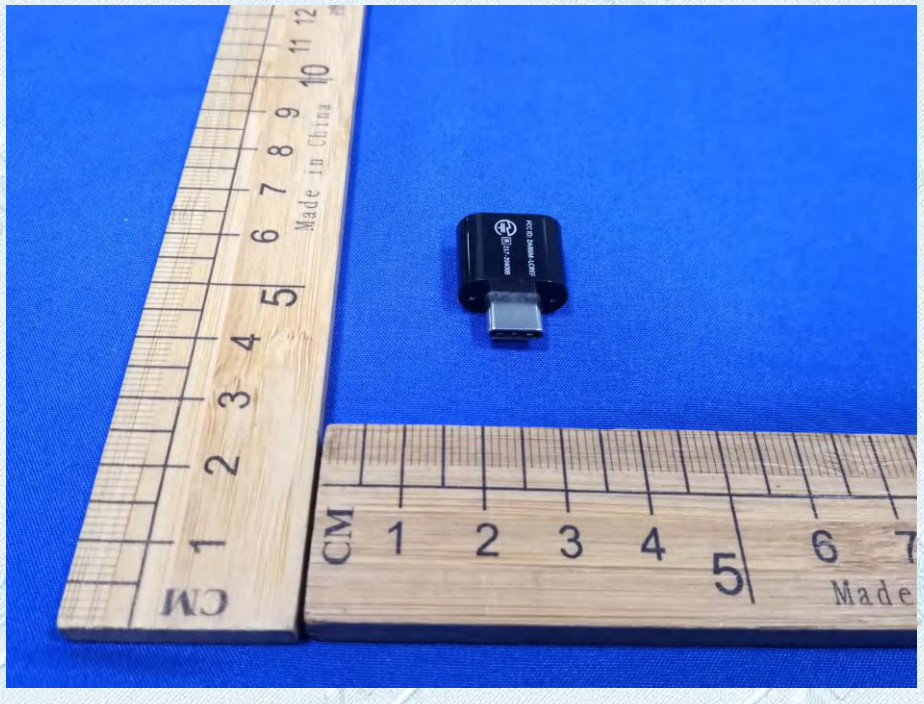
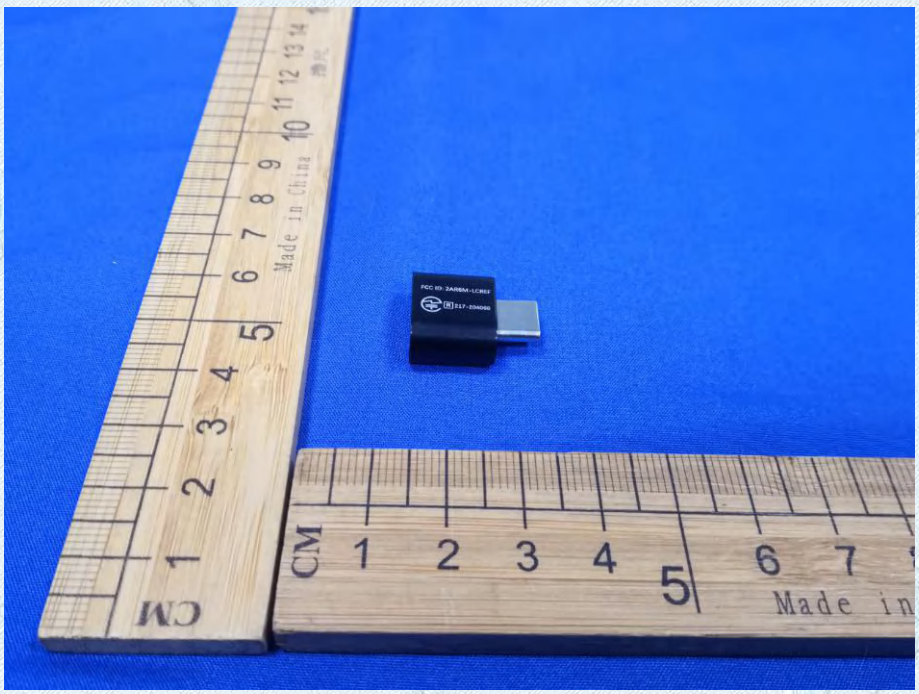
External Photographs (TYPE-C receiver)



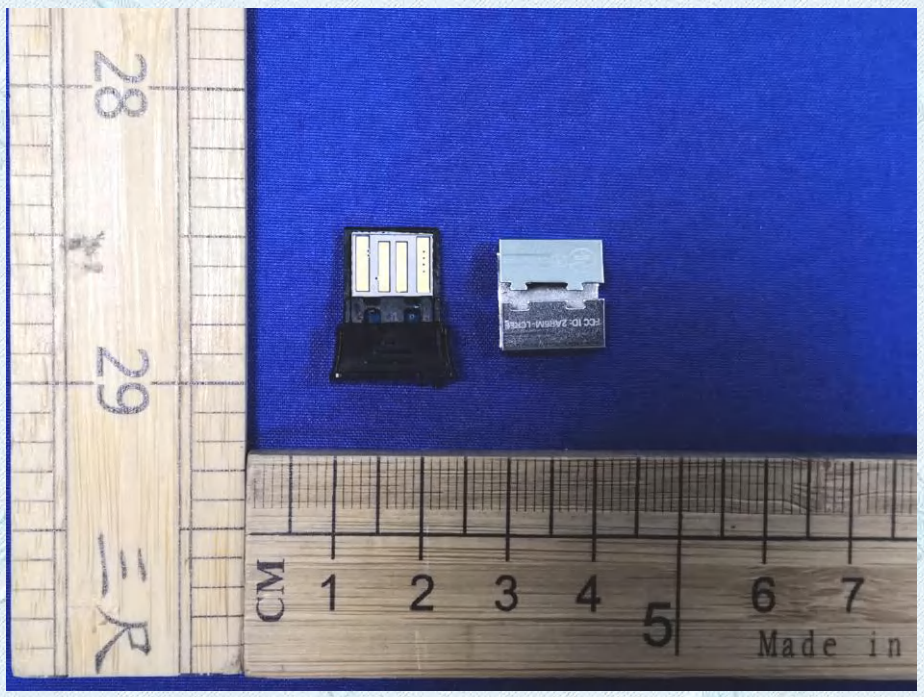

inateck
CM
Made in China

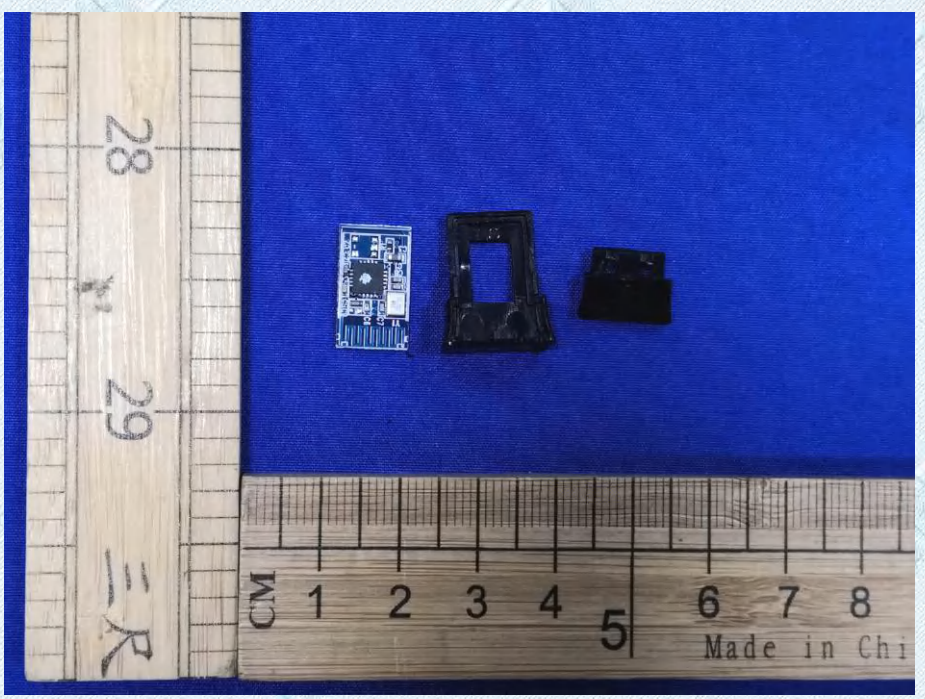

CM
Made in China

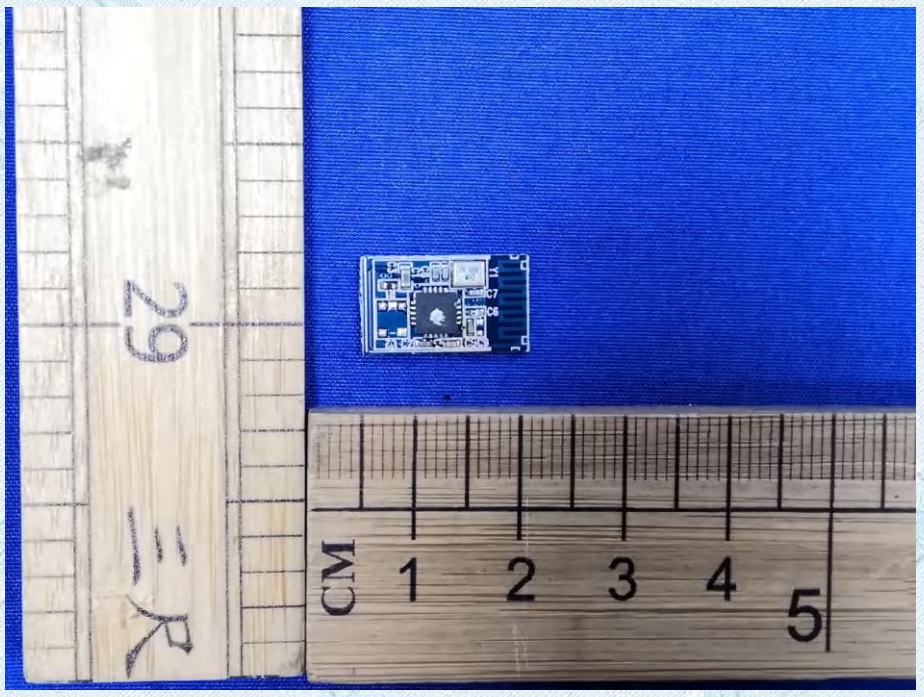

Made in China
CM
1 2 3 4 5 6 7
Made


Made in China
CM
1 2 3 4 5 6 7
Made in

Internal Photographs(USB receiver)






CM
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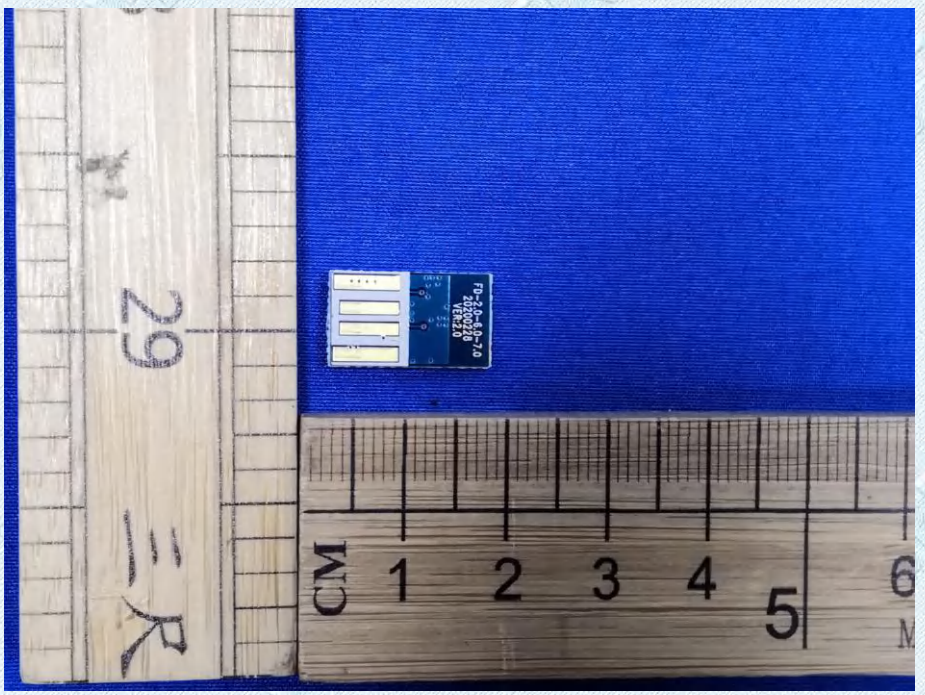
CM
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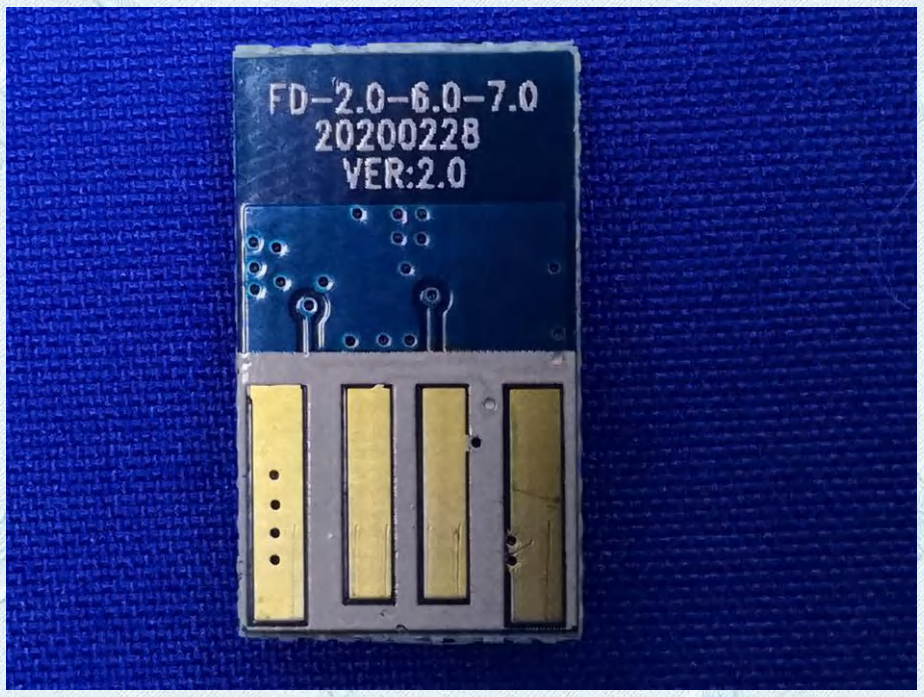
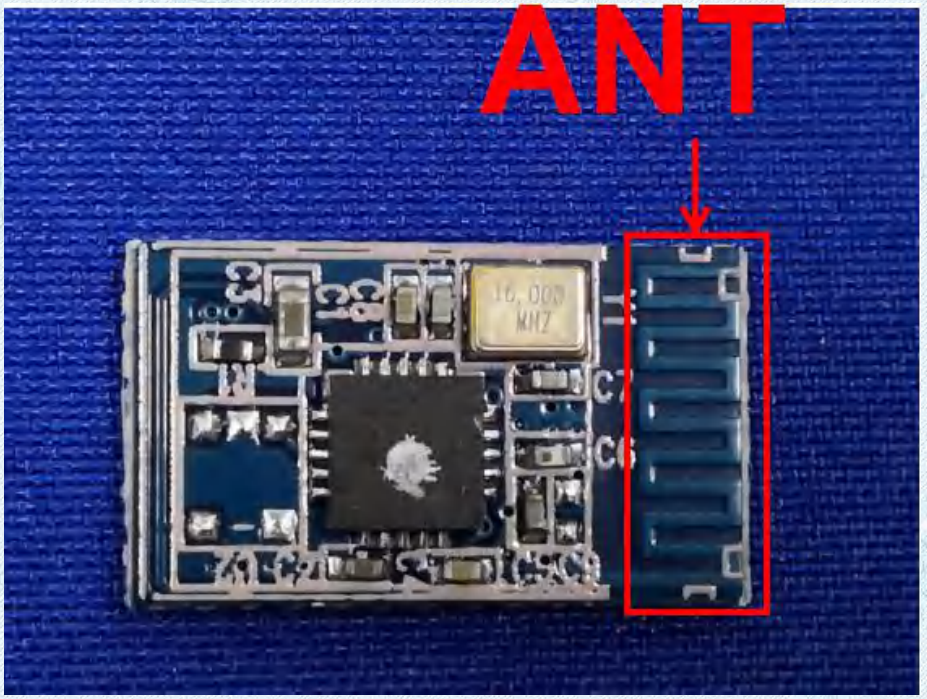

FD-2.0-6.0-7.0
20200228
VER:2.0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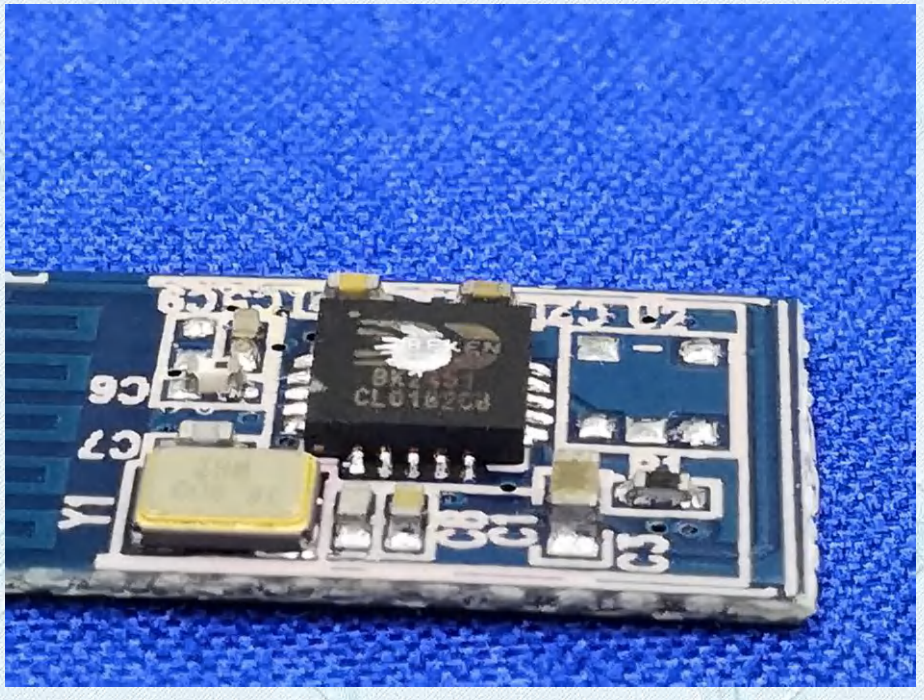
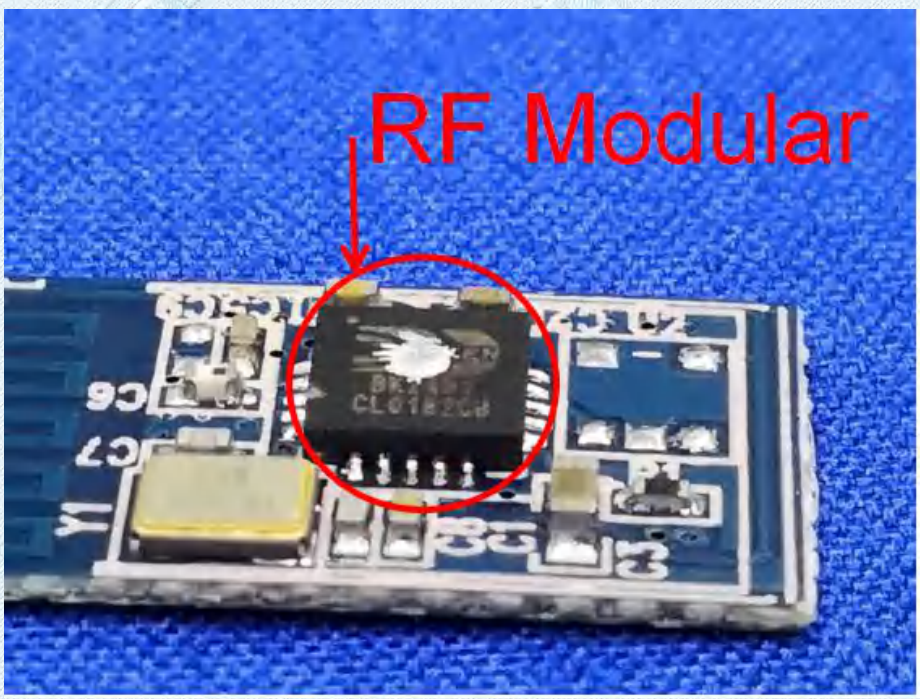
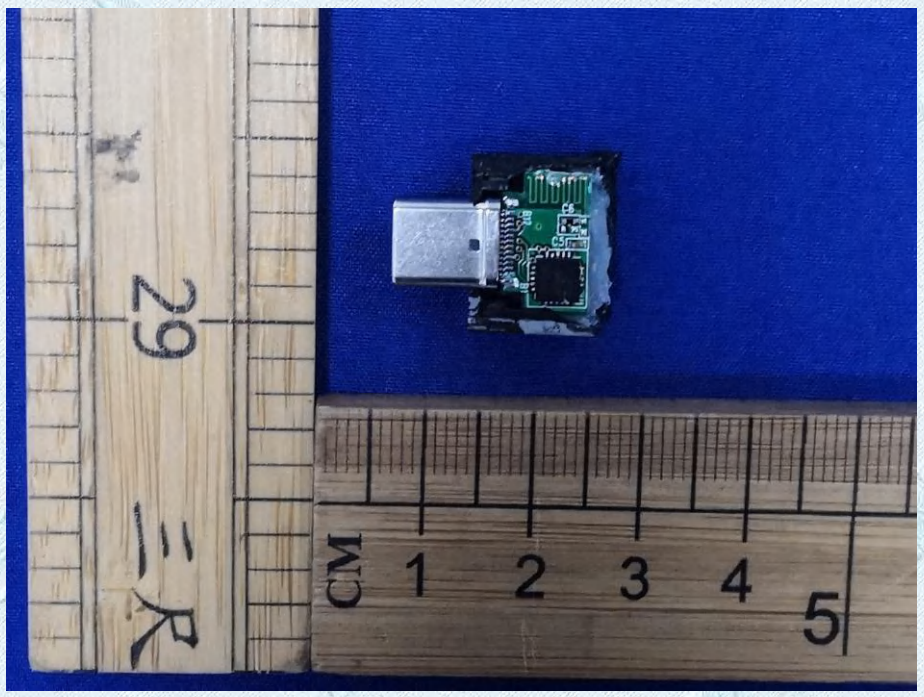
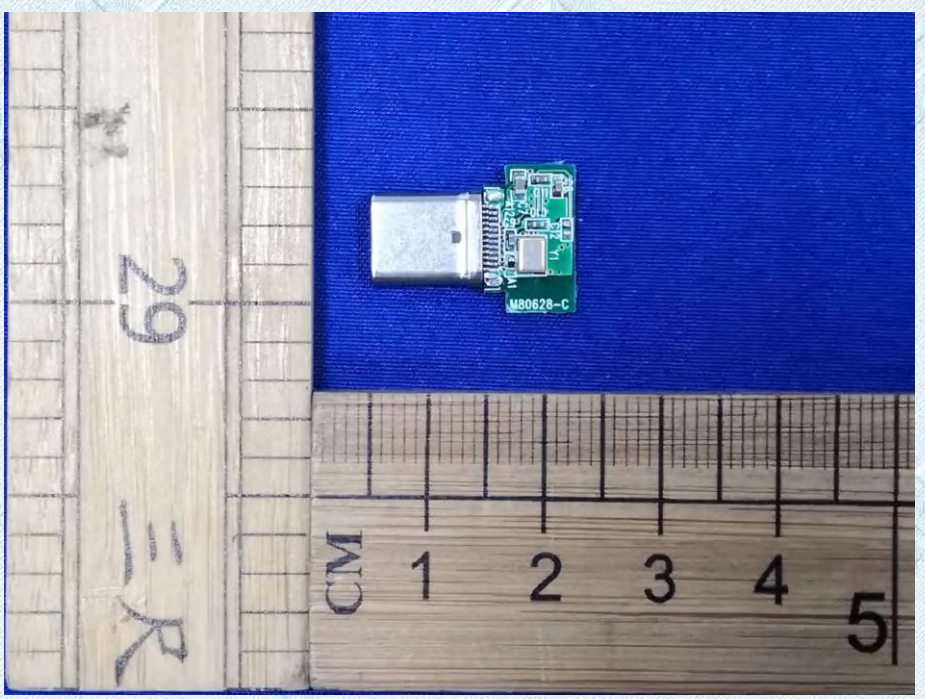
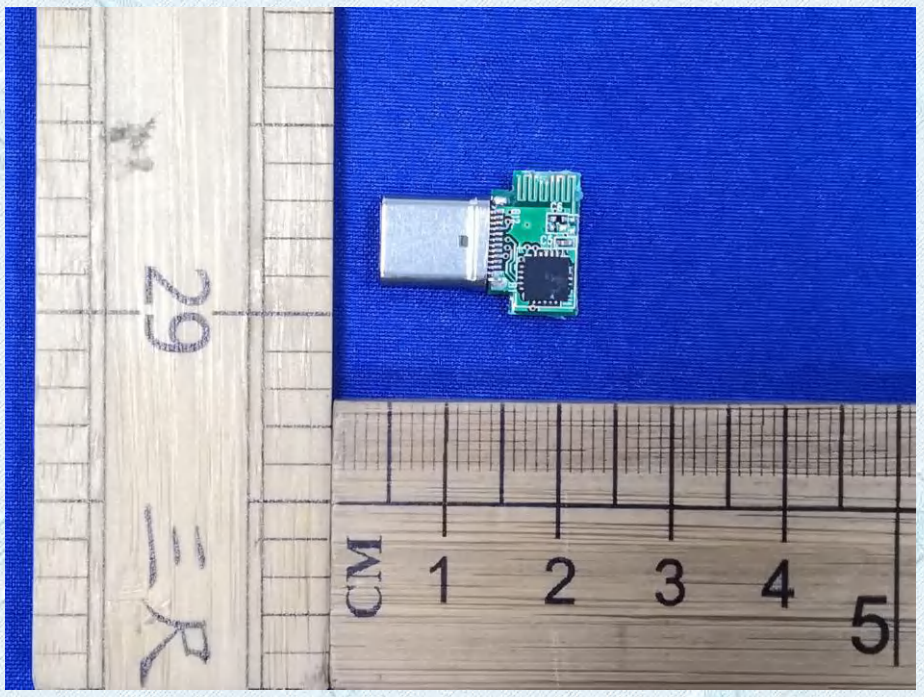



RF Modular

Internal Photographs(TYPE-C receiver)






CM
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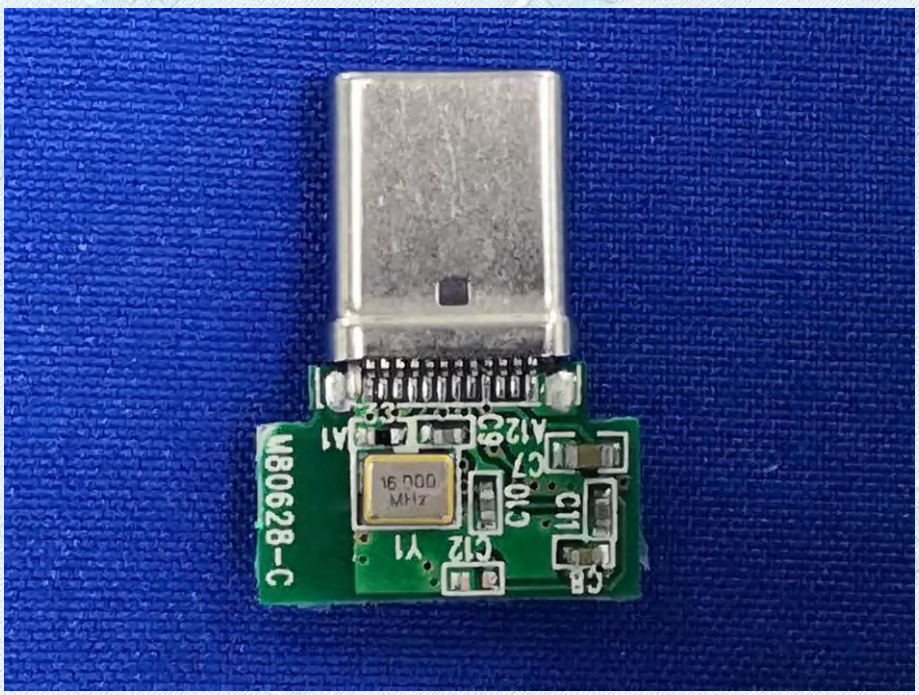
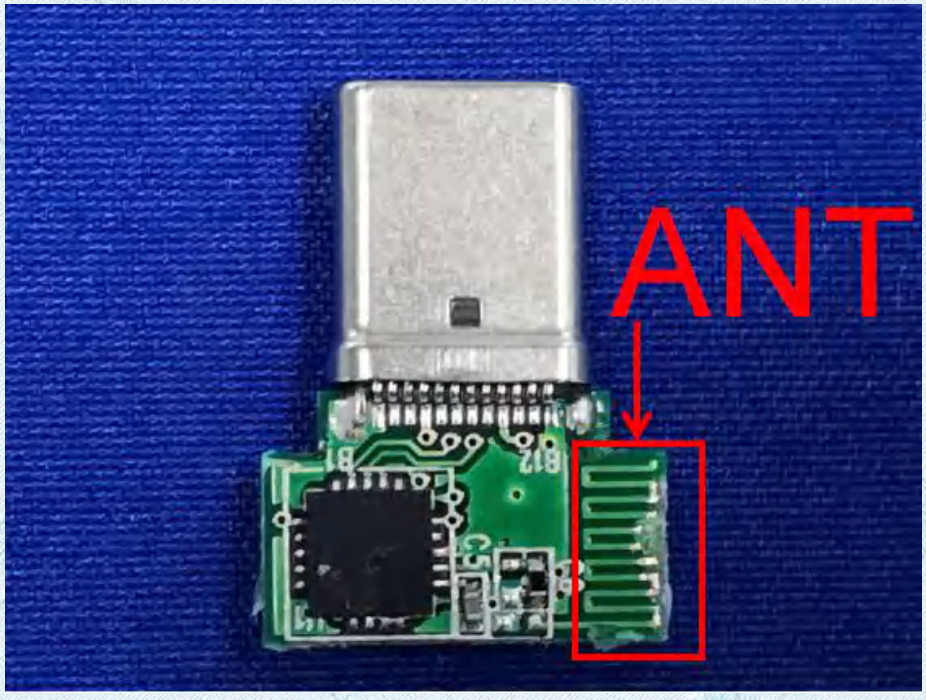

M80628-C
16.000
MHz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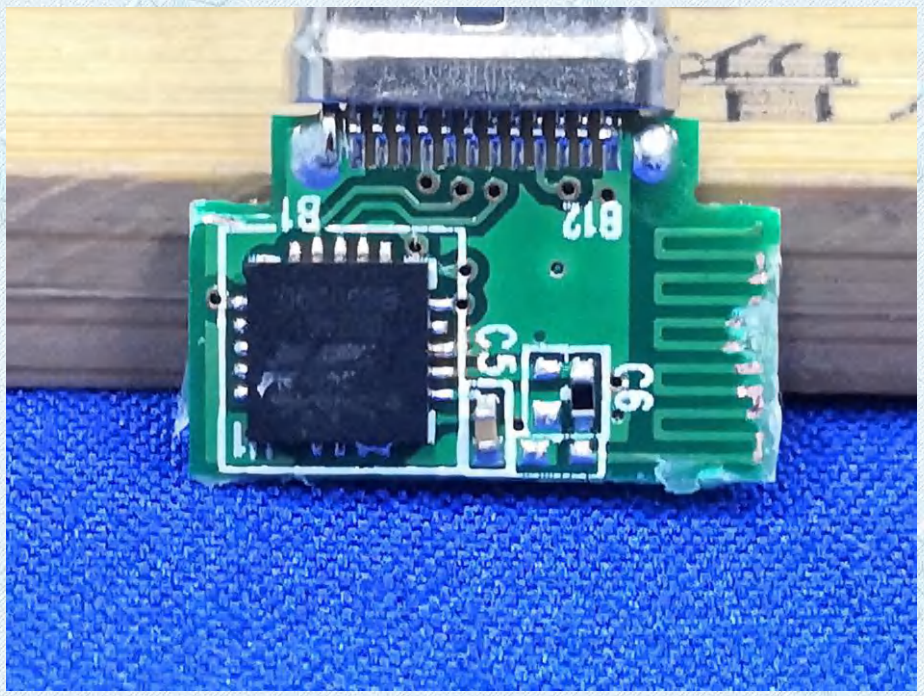

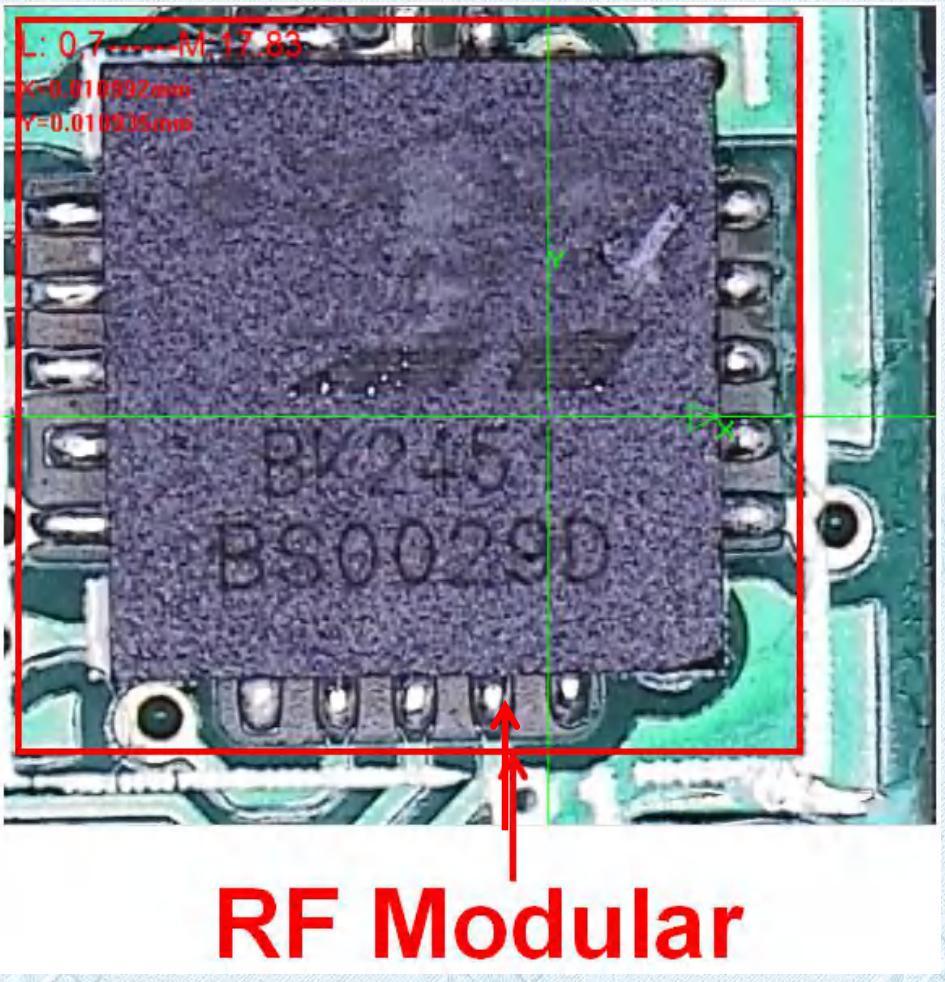

**********THE END**********