TEST REPORT

Reference No.	:	WTF15S0831496E
FCC ID	:	2AAPV-X620
Applicant	:	Foshan Xincode Electronics Technology Co., Ltd.
Address	:	3rd Floor, 4th Block, Yuxi Industrial Zone, Shi Hu Zhou, Sanshui District, Foshan, Guangdong, China
Manufacturer	:	The same as above.
Address	:	The same as above.
Product Name	:	wireless barcode scanner
Model No	:	X-620, X-620D, X-600, X-630A, X-988, X-4600W, X-7200W, X-9700W, GT-730W, GT-750W, X-660, X-9700B, X-620C
Standards	:	FCC CFR47 Part 15 Section 15.249: 2015
Date of Receipt sample	:	Aug. 07, 2015
Date of Test	:	Aug. 08 – Dec. 16, 2015
Date of Issue	:	Dec. 16, 2015
Test Result	:	Pass

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:
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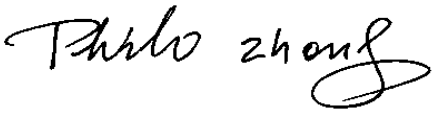
Compiled by:

Zero Zhou / Test Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Emission	15.249(a) 15.209 15.205(a)	PASS
Periodic Operation	15.35(c)	PASS
Outside of Band Emission	15.249 15.205 15.209	PASS
20dB Bandwidth	15:215(c)	PASS
Antenna Requirement	15.203	PASS

3 Contents

4 General Information

4.1 General Description of E.U.T.

Product Name	: wireless barcode scanner
Model No.	: X-620, X-620D, X-600, X-630A, X-988, X-4600W, X-7200W, X-9700W, GT-730W, GT-750W, X-660, X-9700B, X-620C
Model Differences	:All the models are the same circuit and RF module, There only difference is product appearance and model name.
Type of Modulation	: GFSK
Frequency Range	: 2402-2478MHz
The Lowest Oscillator	: 12MHz
Antenna installation	: whip antenna
Remark	:The test sample model is X-620.

4.2 Details of E.U.T.

Technical Data : DC 3.7V, 700mAh by battery

4.3 Test Facility

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

- **IC – Registration No.:7760A-1**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A-1, Oct 15, 2015.

- **FCC Test Site 1#– Registration No.: 880581**

  Waltek Services(Shenzhen) Co., Ltd. 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 880581, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

  Waltek Services(Shenzhen) Co., Ltd. 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 328995, December 3, 2014.

4.3.1 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Lower channel	Middle channel	Upper channel
Transmitting	2402MHz	2440MHz	2478MHz

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions Test Site 1#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.15,2015	Sep.14,2016
2.	LISN	R&S	ENV216	101215	Sep.15,2015	Sep.14,2016
3.	Cable	Top	TYPE16(3.5 M)	-	Sep.15,2015	Sep.14,2016
3m Semi-anechoic Chamber for Radiation						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2016
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.15,2015	Sep.14,2016
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2015	Apr.18,2016
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.15,2015	Sep.14,2016
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.19,2015	Apr.18,2016
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.19,2015	Apr.18,2016
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2015	Mar.16,2016
8	Coaxial Cable (above 1GHz)	Top	25MHz-18GHz	EW02014-7	Apr.10,2015	Apr.09,2016

5.2 Description of Support Units

Equipment	Manufacturer	Model No.
MacBook Air	Apple	A1465

5.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)

5.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dBμV between 0.15MHz & 0.5MHz
	56 dBμV between 0.5MHz & 5MHz
	60 dBμV between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

6.1 E.U.T. Operation

Operating Environment **:**

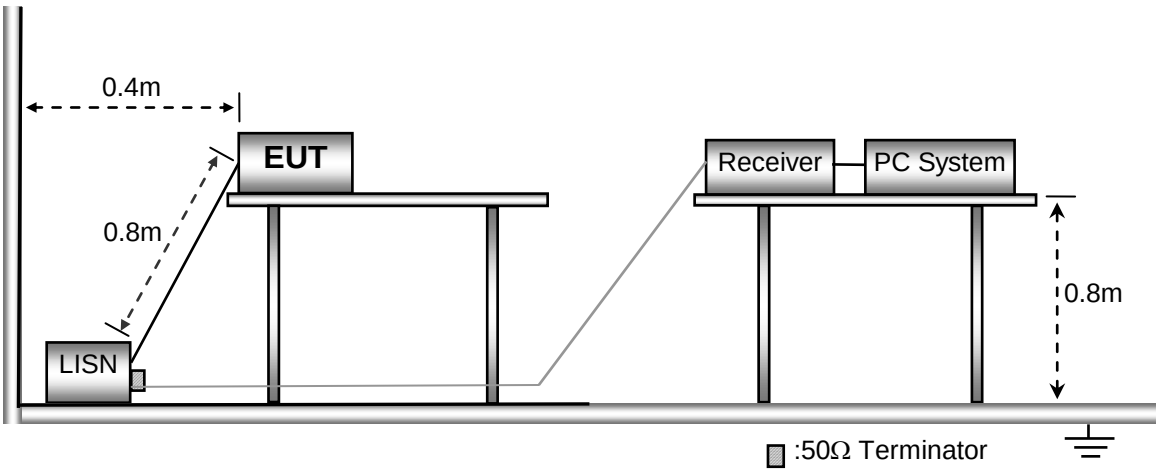
Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation **:**

The test was performed in transmitting mode, the test data were shown in the report.

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003.

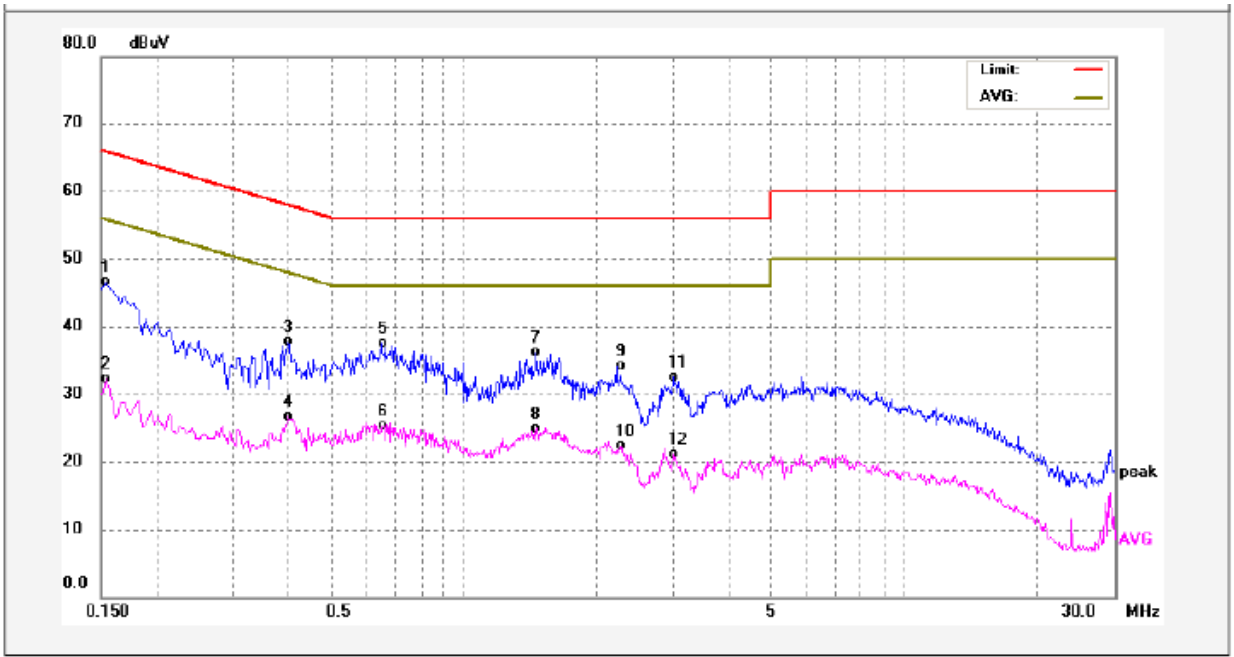


6.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

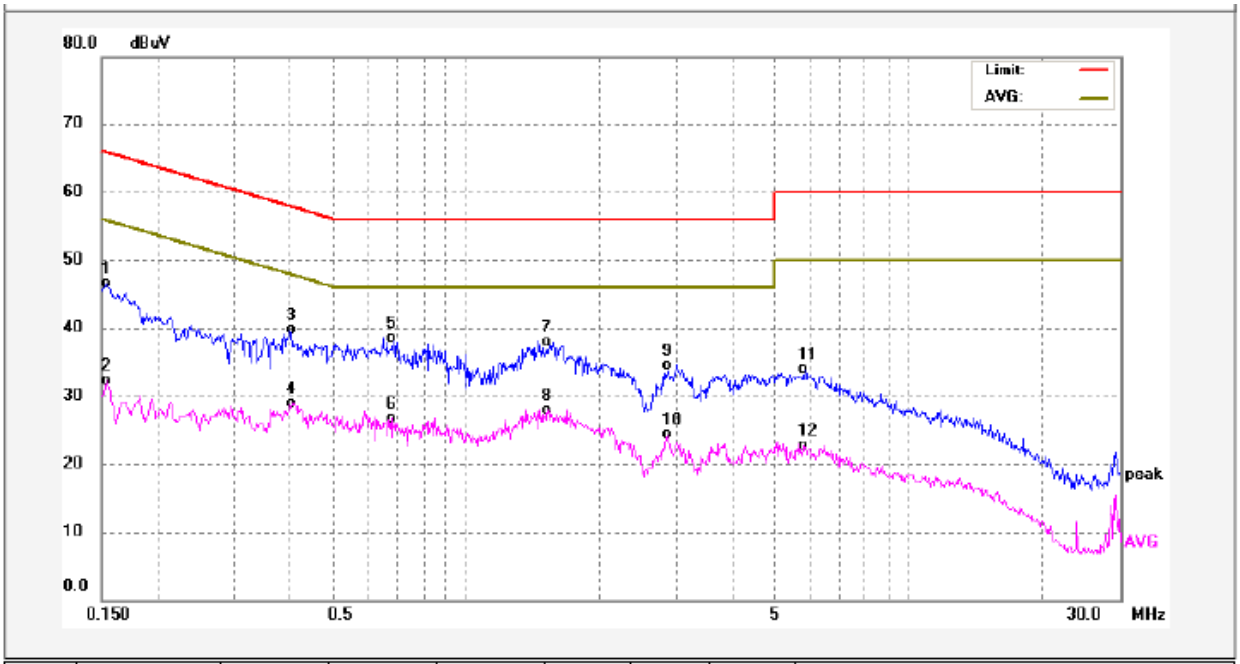
6.4 Test Result

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1539	35.35	11.18	46.53	65.78	-19.25	QP	
2	0.1539	21.07	11.18	32.25	55.78	-23.53	AVG	
3	0.3980	26.43	11.31	37.74	57.89	-20.15	QP	
4	0.3980	15.47	11.31	26.78	47.89	-21.11	AVG	
5	0.6580	26.08	11.33	37.41	56.00	-18.59	QP	
6	0.6580	13.92	11.33	25.25	46.00	-20.75	AVG	
7	1.4700	24.90	11.19	36.09	56.00	-19.91	QP	
8	1.4700	13.79	11.19	24.98	46.00	-21.02	AVG	
9	2.2820	22.98	11.20	34.18	56.00	-21.82	QP	
10	2.2820	11.20	11.20	22.40	46.00	-23.60	AVG	
11	3.0059	21.35	11.21	32.56	56.00	-23.44	QP	
12	3.0059	9.98	11.21	21.19	46.00	-24.81	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1539	35.35	11.18	46.53	65.78	-19.25	QP	
2	0.1539	21.07	11.18	32.25	55.78	-23.53	AVG	
3	0.4060	28.43	11.31	39.74	57.73	-17.99	QP	
4	0.4060	17.55	11.31	28.86	47.73	-18.87	AVG	
5	0.6820	27.07	11.34	38.41	56.00	-17.59	QP	
6	0.6820	15.36	11.34	26.70	46.00	-19.30	AVG	
7	1.5339	26.72	11.19	37.91	56.00	-18.09	QP	
8	1.5339	16.72	11.19	27.91	46.00	-18.09	AVG	
9	2.8540	23.35	11.21	34.56	56.00	-21.44	QP	
10	2.8540	13.18	11.21	24.39	46.00	-21.61	AVG	
11	5.8460	22.68	11.25	33.93	60.00	-26.07	QP	
12	5.8460	11.39	11.25	22.64	50.00	-27.36	AVG	

7 Radiation Emission Test

Test Requirement: FCC Part15 Paragraph 15.249&15.209&15.205

Test Method: ANSI 63.4: 2003

Measurement Distance: 3m

Test Result: PASS

15.249(a)Limit:

Fundamental frequency	Field strength of fundamental		Field strength of harmonics	
	mV/m	dBuV/m	uV/m	dBuV/m
902-928 MHz	50	94	500	54
2400-2483.5 MHz	50	94	500	54
5725-5875 MHz	50	94	500	54
24.0-24.25 GHz	250	108	2500	68

15.209 Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Note: RF Voltage(dBuV)=20 $\log_{10}$ RF Voltage(uV)

7.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 51.1 % RH

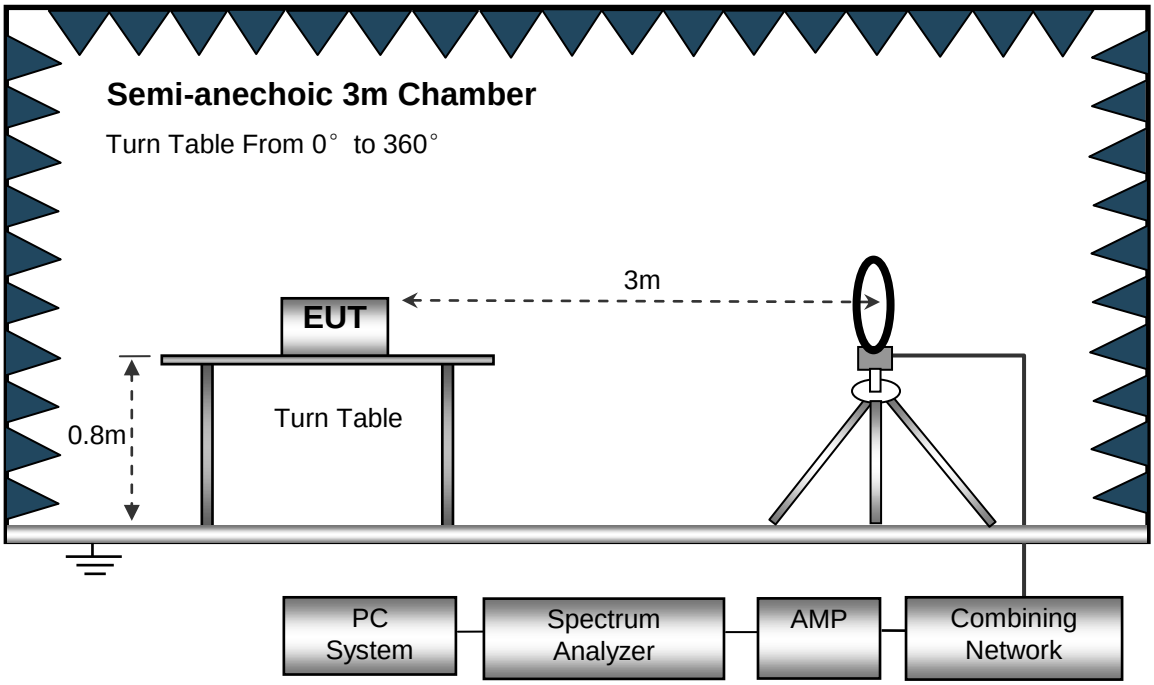
Atmospheric Pressure: 101.2kPa

EUT Operation **:**

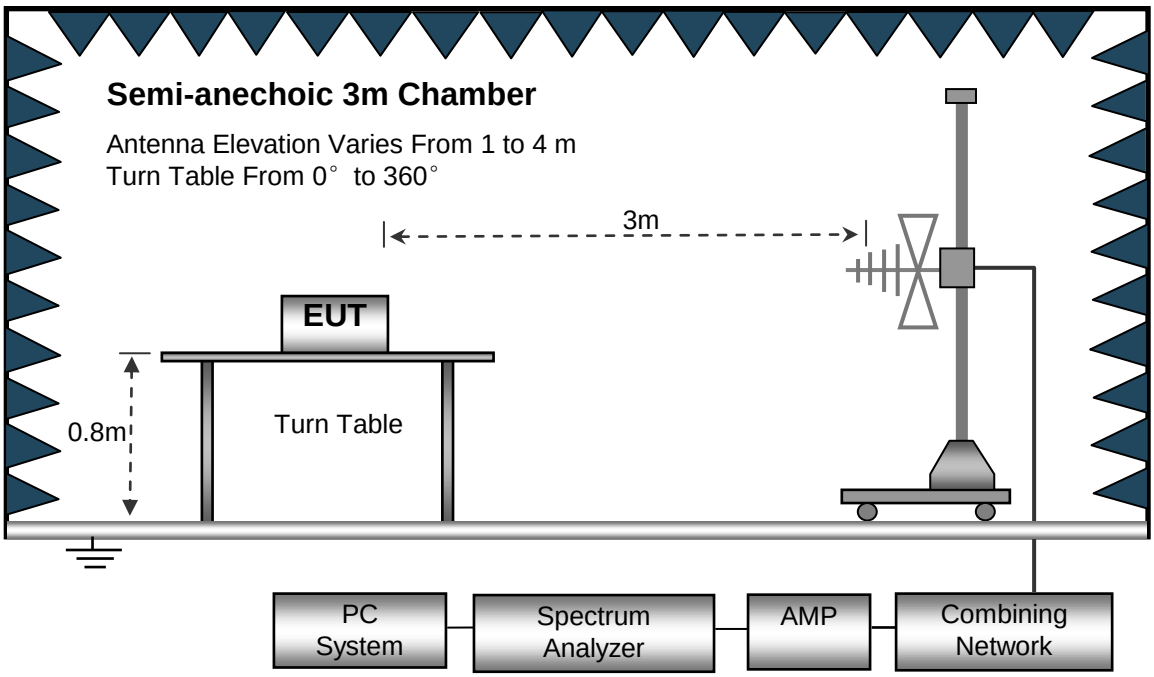
The test was performed in transmitting mode, the test data were shown in the report.

7.2 Test Setup

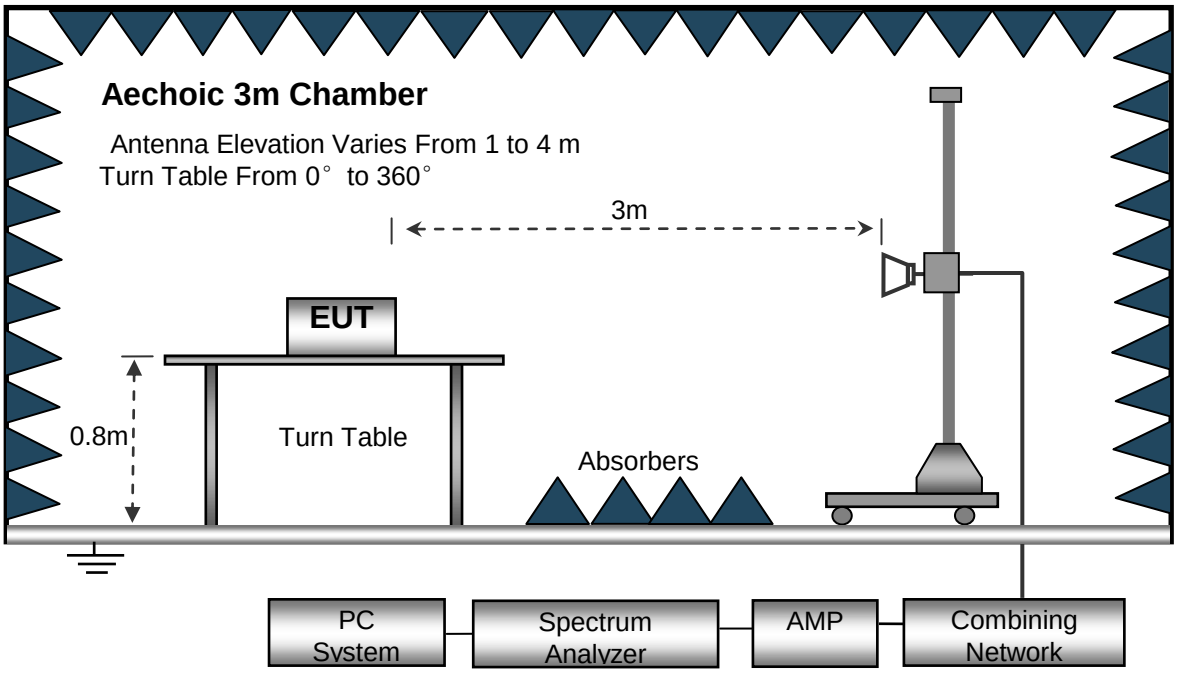
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth 10kHz
Video Bandwidth 10kHz

Resolution Bandwidth 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth 100kHz
Video Bandwidth 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth 1MHz
Video Bandwidth 3MHz
Detector ..... Ave.
Resolution Bandwidth 1MHz
Video Bandwidth 10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.5 Test Result

Test Frequency :12MHz~ 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency: 30MHz ~ 18GHz

Test Mode: Low channel Transmitting

Frequency	Receiver Reading (PK)	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude (PK)	FCC Part 15.249/209/205	
			Height	Polar			Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2402.00	87.36	356	1.8	H	-13.08	74.28	114.00	-39.72
2402.00	98.24	87	1.7	V	-13.08	85.16	114.00	-28.84
4804.00	51.36	89	1.9	H	0.09	51.45	74.00	-22.55
4804.00	42.36	127	1.0	V	0.09	42.45	74.00	-31.55
7206.00	50.14	166	1.2	H	3.01	53.15	74.00	-20.85
7206.00	46.98	127	1.6	V	3.01	49.99	74.00	-24.01
2484.37	52.65	150	1.7	H	-13.08	39.57	74.00	-34.43
2484.37	45.41	219	1.6	V	-13.08	32.33	74.00	-41.67
2389.80	50.28	102	1.2	H	-13.14	37.14	74.00	-36.86
2389.80	45.12	327	1.4	V	-13.14	31.98	74.00	-42.02

AV = Peak +20Log10(duty cycle) =Peak+(-13.57)[refer to section 8 for more detail]

Frequency	PK	RX Antenna Polar	Duty cycle Factor	Calculated AV	FCC Part 15.249/209/205	
					Limit	Margin
(MHz)	(dBμV/m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2402.00	74.28	H	-13.57	60.71	94.00	-33.29
2402.00	85.16	V	-13.57	71.59	94.00	-22.41
4804.00	51.45	H	-13.57	37.88	54.00	-16.12
4804.00	42.45	V	-13.57	28.88	54.00	-25.12
7206.00	53.15	H	-13.57	39.58	54.00	-14.42
7206.00	19.99	V	-13.57	6.42	54.00	-47.58
2484.37	39.57	H	-13.57	26.00	54.00	-28.00
2484.37	32.33	V	-13.57	18.76	54.00	-35.24
2389.80	37.14	H	-13.57	23.57	54.00	-30.43
2389.80	31.98	V	-13.57	18.41	54.00	-35.59

Test Mode: Middle channel Transmitting

Frequency	Receiver Reading (PK)	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude (PK)	FCC Part 15.249/209/205	
			Height	Polar			Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2440.00	86.54	107	1.9	H	-13.12	73.42	114.00	-40.58
2440.00	98.74	252	1.5	V	-13.12	85.62	114.00	-28.38
4880.00	50.23	170	1.2	H	0.12	50.35	74.00	-23.65
4880.00	43.39	291	1.6	V	0.12	43.51	74.00	-30.49
7320.00	51.47	276	1.7	H	3.06	54.53	74.00	-19.47
7320.00	46.97	158	1.1	V	3.06	50.03	74.00	-23.97
2483.75	51.25	107	1.4	H	-13.08	38.17	74.00	-35.83
2483.75	44.17	63	1.8	V	-13.08	31.09	74.00	-42.91
2389.60	51.04	72	2.0	H	-13.14	37.90	74.00	-36.10
2389.60	44.36	350	1.4	V	-13.14	31.22	74.00	-42.78

AV = Peak +20Log10(duty cycle) =Peak+(-13.15)[refer to section 8 for more detail]

Frequency	PK	RX Antenna Polar	Duty cycle Factor	Calculated AV	FCC Part 15.249/209/205	
					Limit	Margin
(MHz)	(dBμV/m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2440.00	73.42	H	-13.15	60.27	94.00	-33.73
2440.00	85.62	V	-13.15	72.47	94.00	-21.53
4880.00	50.35	H	-13.15	37.20	54.00	-16.80
4880.00	43.51	V	-13.15	30.36	54.00	-23.64
7320.00	54.53	H	-13.15	41.38	54.00	-12.62
7320.00	50.03	V	-13.15	36.88	54.00	-17.12
2483.75	38.17	H	-13.15	25.02	54.00	-28.98
2483.75	31.09	V	-13.15	17.94	54.00	-36.06
2389.60	37.90	H	-13.15	24.75	54.00	-29.25
2389.60	31.22	V	-13.15	18.07	54.00	-35.93

Test Mode: High channel Transmitting

Frequency	Receiver Reading (PK)	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude (PK)	FCC Part 15.249/209/205	
			Height	Polar			Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2478.00	85.97	7	1.0	H	-8.54	77.43	114.00	-36.57
2478.00	94.52	231	1.1	V	-8.54	85.98	114.00	-28.02
4956.00	51.34	104	1.9	H	0.24	51.58	74.00	-22.42
4956.00	42.64	232	1.7	V	0.24	42.88	74.00	-31.12
7434.00	52.71	95	1.3	H	3.13	55.84	74.00	-18.16
7434.00	45.06	291	2.0	V	3.13	48.19	74.00	-25.81
2483.79	52.28	210	1.5	H	-13.08	39.20	74.00	-34.80
2483.79	43.67	41	1.5	V	-13.08	30.59	74.00	-43.41
2389.38	51.62	140	1.4	H	-13.14	38.48	74.00	-35.52
2389.38	43.99	70	1.5	V	-13.14	30.85	74.00	-43.15

AV = Peak +20Log10(duty cycle)=Peak+(-14.50) [refer to section 8 for more detail]

Frequency	PK	RX Antenna Polar	Duty cycle Factor	Calculated AV	FCC Part 15.249/209/205	
					Limit	Margin
(MHz)	(dBμV/m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2478.00	77.43	H	-14.50	62.93	94.00	-31.07
2478.00	85.98	V	-14.50	71.48	94.00	-22.52
4956.00	51.58	H	-14.50	37.08	54.00	-16.92
4956.00	42.88	V	-14.50	28.38	54.00	-25.62
7434.00	55.84	H	-14.50	41.34	54.00	-12.66
7434.00	48.19	V	-14.50	33.69	54.00	-20.31
2483.79	39.20	H	-14.50	24.70	54.00	-29.30
2483.79	30.59	V	-14.50	16.09	54.00	-37.91
2389.38	38.48	H	-14.50	23.98	54.00	-30.02
2389.38	30.85	V	-14.50	16.35	54.00	-37.65

Test Frequency :From 18GHz to 25GHz

The measurements were more than 20 dB below the limit and not reported.

8 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity,the duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train * %

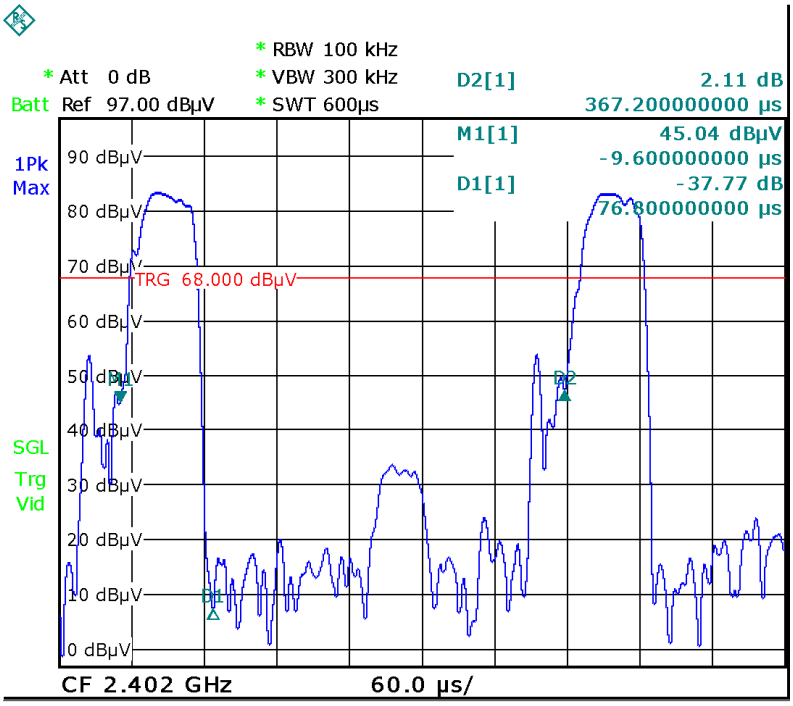
Duty Cycle Correction Factor(dB)=20 * Log_{10}(Duty Cycle)

Test Channel	Low Channel	Middle Channel	High Channel
Total transmission time(us)	76.8	81.6	69.6
Length of a complete transmission period(us)	367.2	370.8	369.6
Duty Cycle(%)	20.92	22.01	18.83
Duty Cycle Correction Factor(dB)	-13.57	-13.15	-14.50

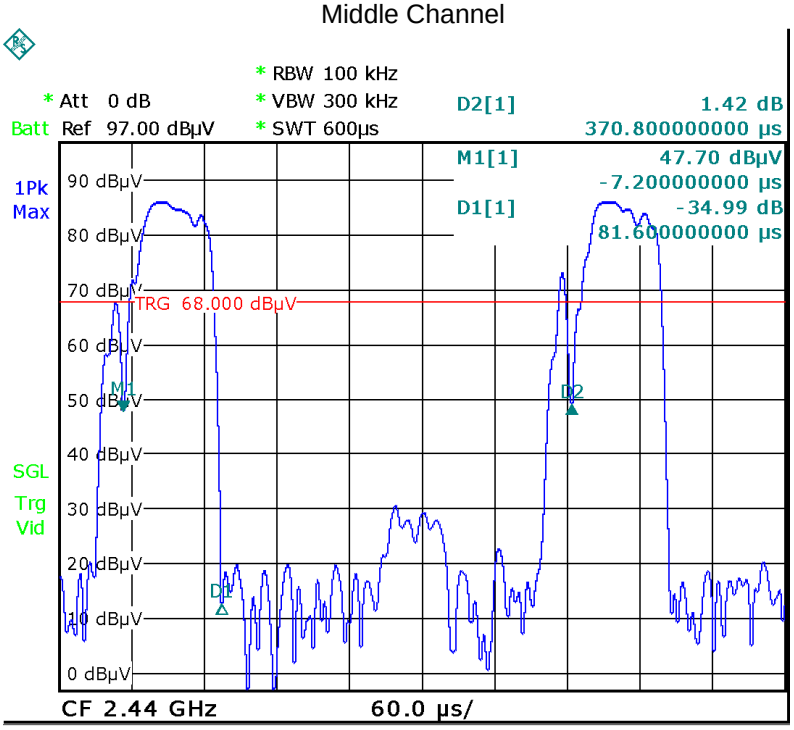
Refer to the duty cycle plot (as below)

Test plots

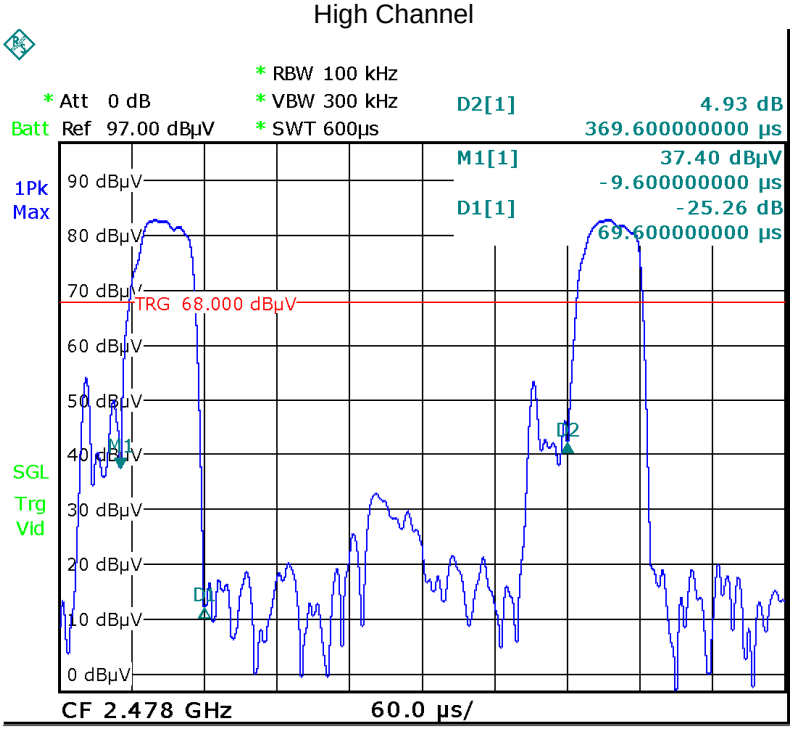
Low Channel



Middle Channel



High Channel



9 Outside of Band Emission

Test Requirement:	15.249(d):Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
Test Method:	ANSI C63.4:2003
Test Mode:	Transmitting

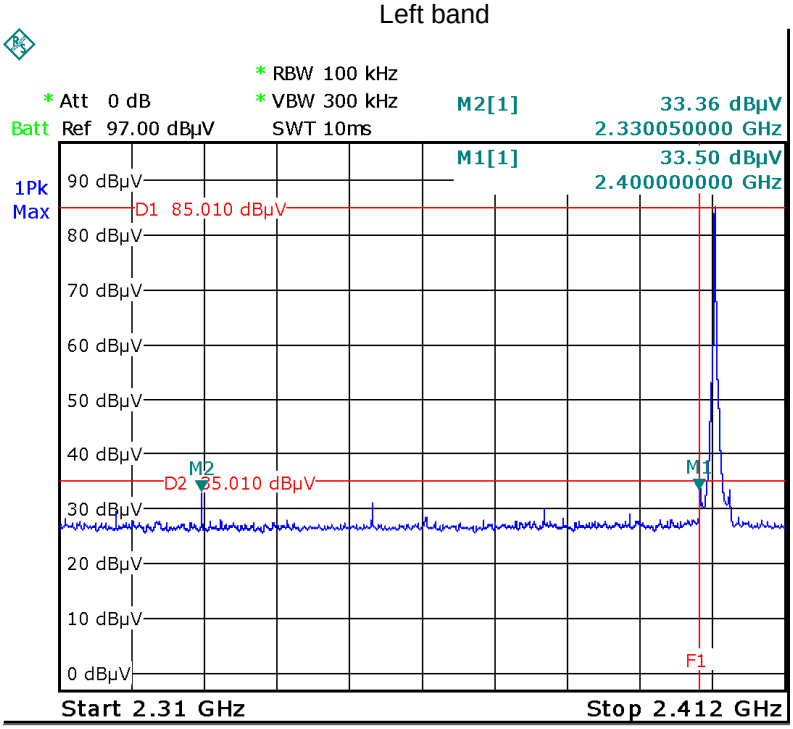
9.1 Test Procedure

Refer to section 7.4 of this test report.

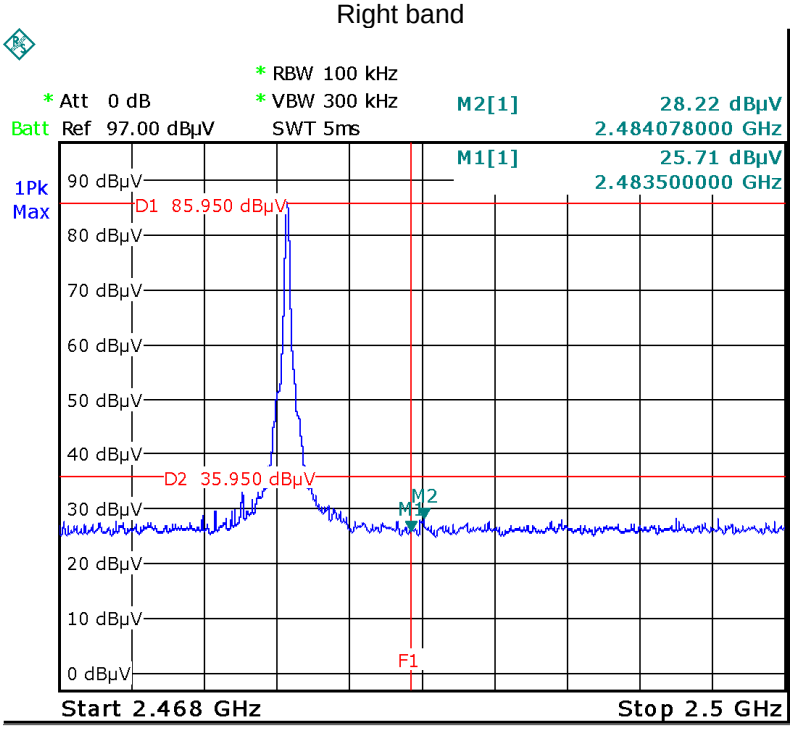
9.2 Test Result

Test plots

Left band



Right band


* RBW 100 kHz
* Att 0 dB
* VBW 300 kHz
M2[1] 28.22 dBµV
Batt Ref 97.00 dBµV
SWT 5ms
2.484078000 GHz
M1[1] 25.71 dBµV
2.483500000 GHz
1Pk
Max
90 dBµV
D1 85.950 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
D2 35.950 dBµV
30 dBµV
20 dBµV
10 dBµV
0 dBµV
M2
M1
F1
Start 2.468 GHz
Stop 2.5 GHz

10 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.215(c)

Test Method: ANSI C63.4:2003

Test Mode: Transmitting

10.1 Test Procedure

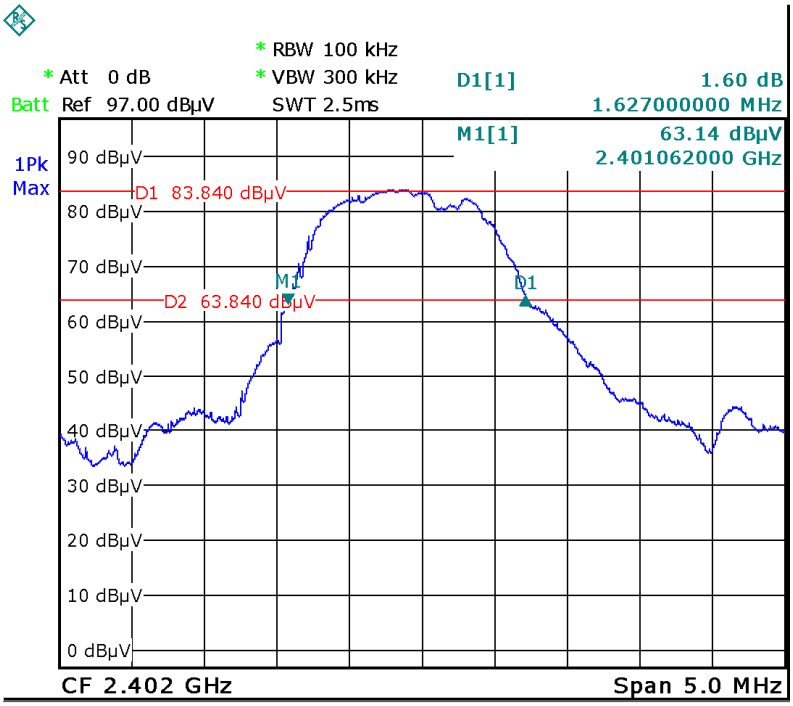
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

10.2 Test Result

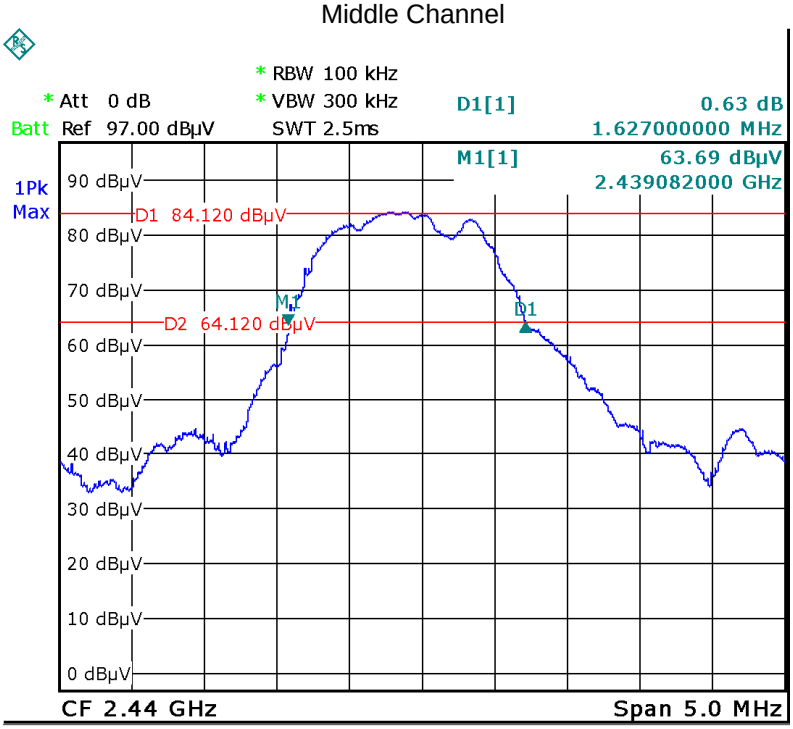
Test Channel	Bandwidth
low	1.627MHz
Middle	1.627MHz
high	1.627MHz

Test plots

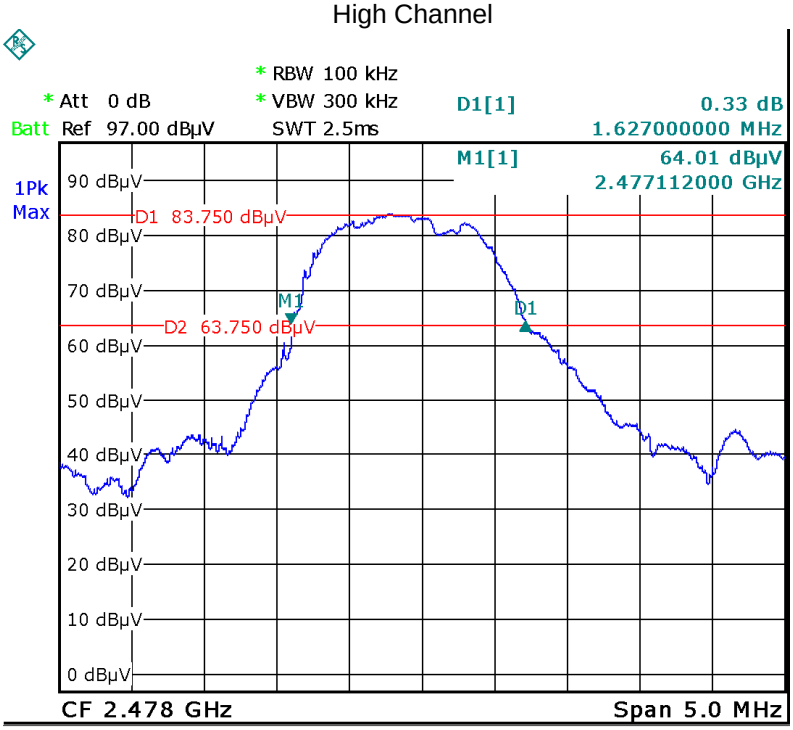
Low Channel



Middle Channel



High Channel



11 Antenna Requirement

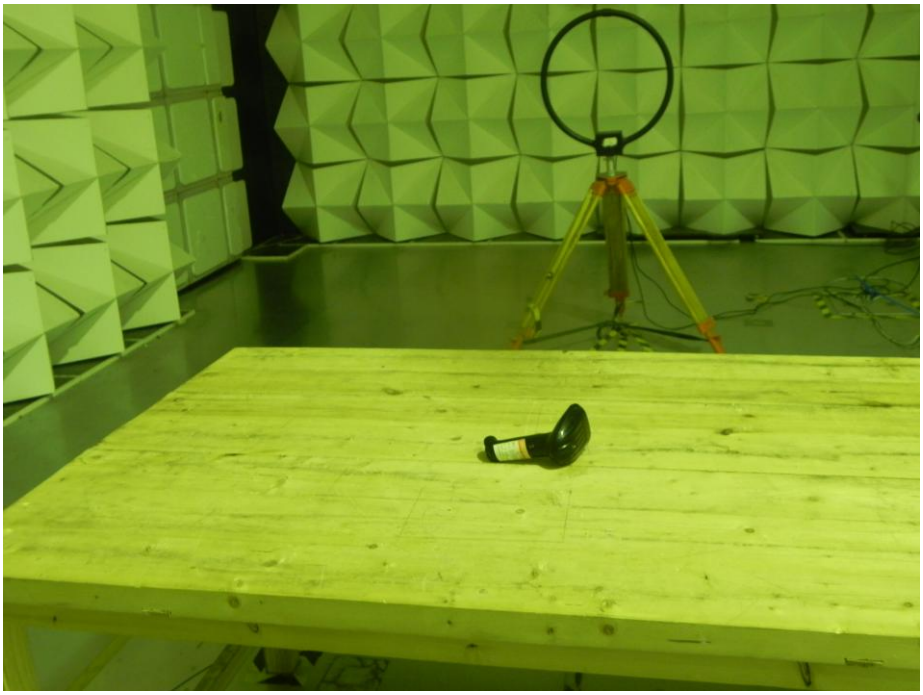
According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. This product has a whip antenna, fulfil the requirement of this section.

12 Photographs- Model X-620 Test Setup

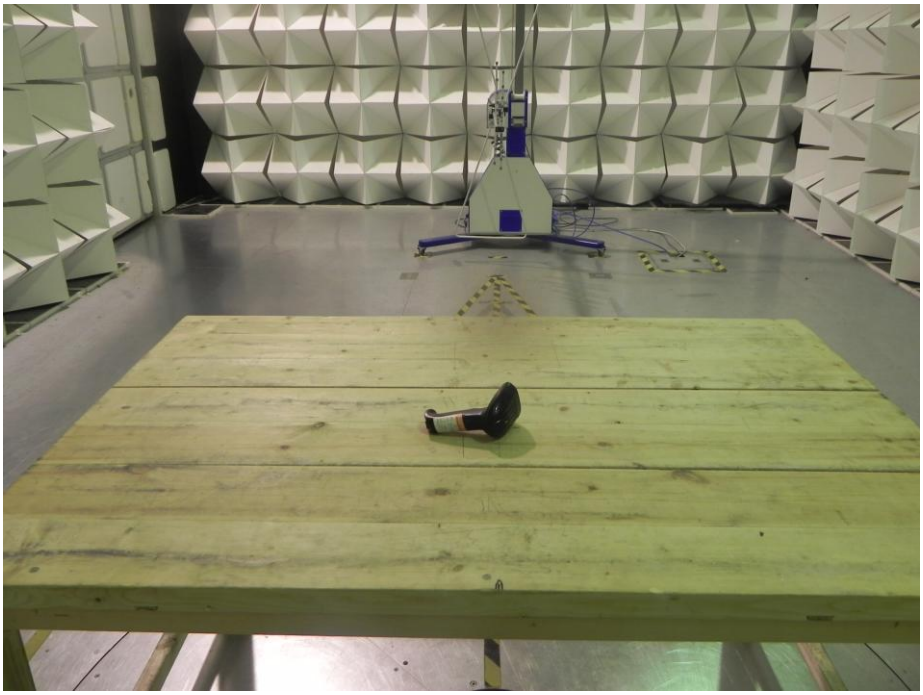
12.1 Photograph – Conducted Emission Test Setup at Test Site 1#

12.2 Radiation Emission

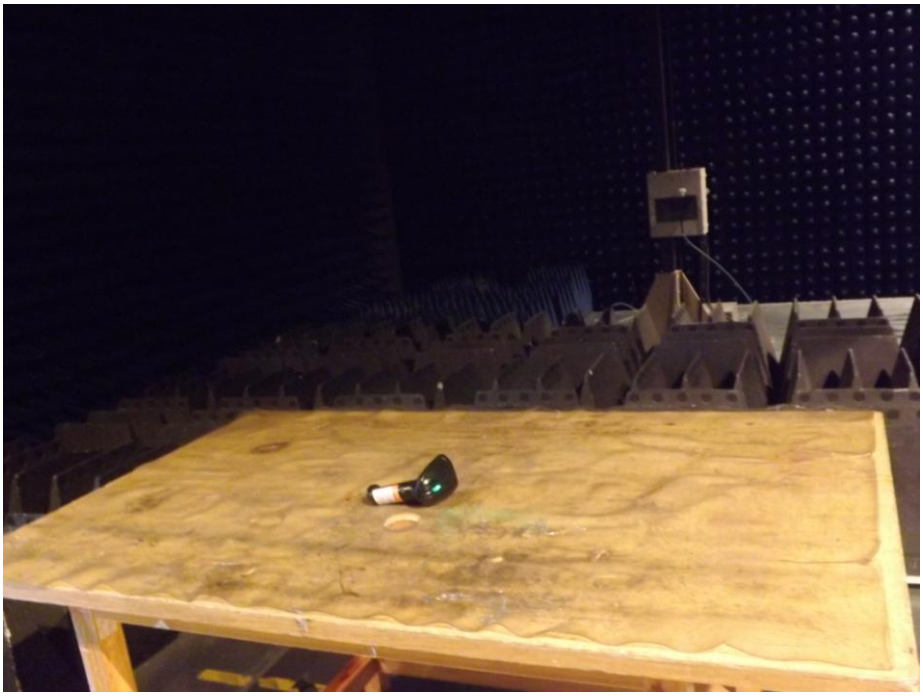
Test frequency 12MHz to 30MHz at test site 2#



Test frequency from 30MHz to 1GHz at test site 2#



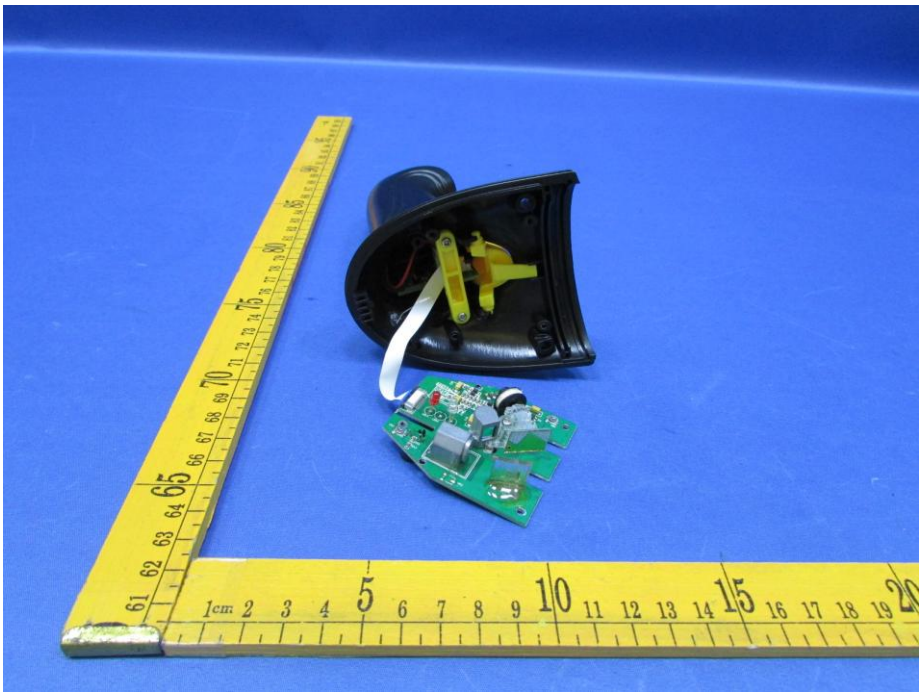
Test frequency above 1GHz at test site 1#

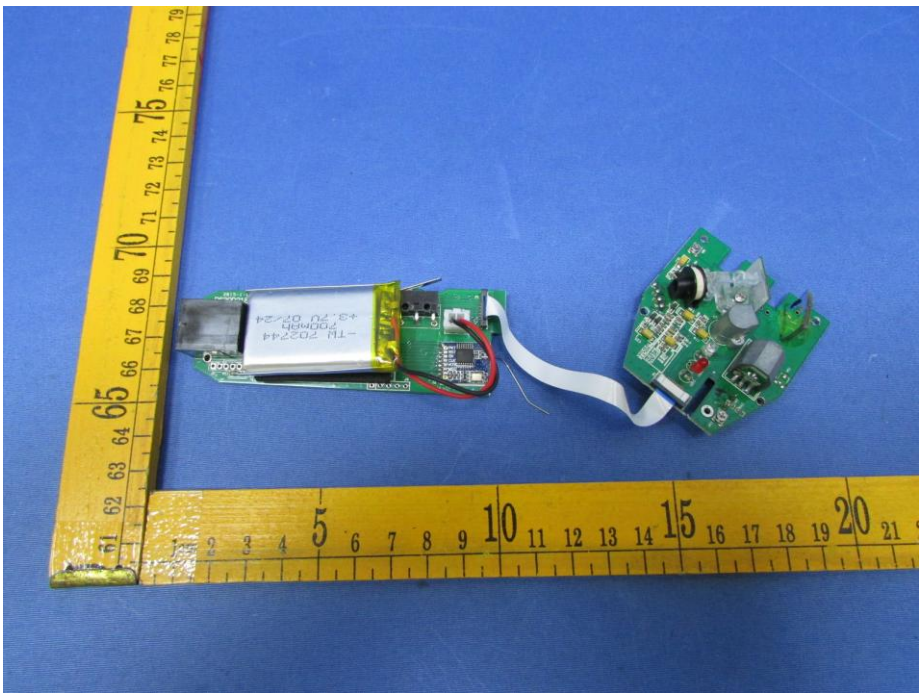


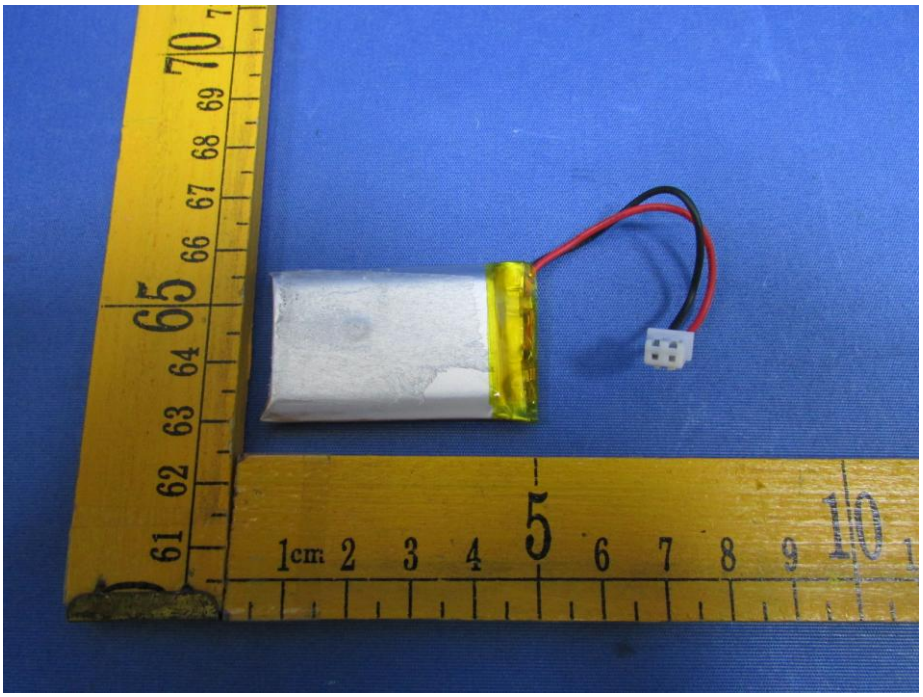
13 Photographs - Constructional Details

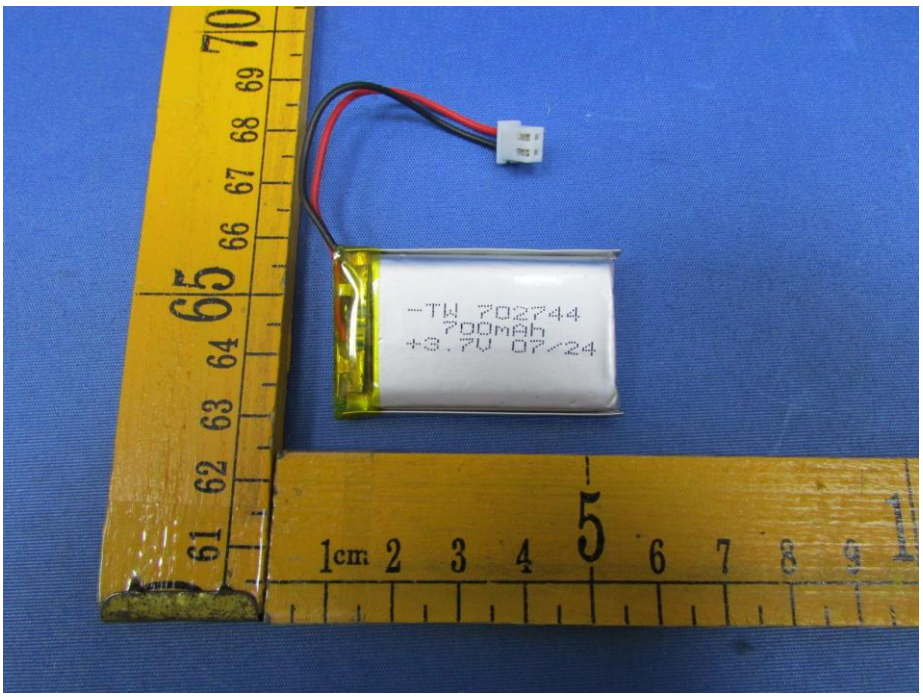
13.1 Model X-620- External Photos

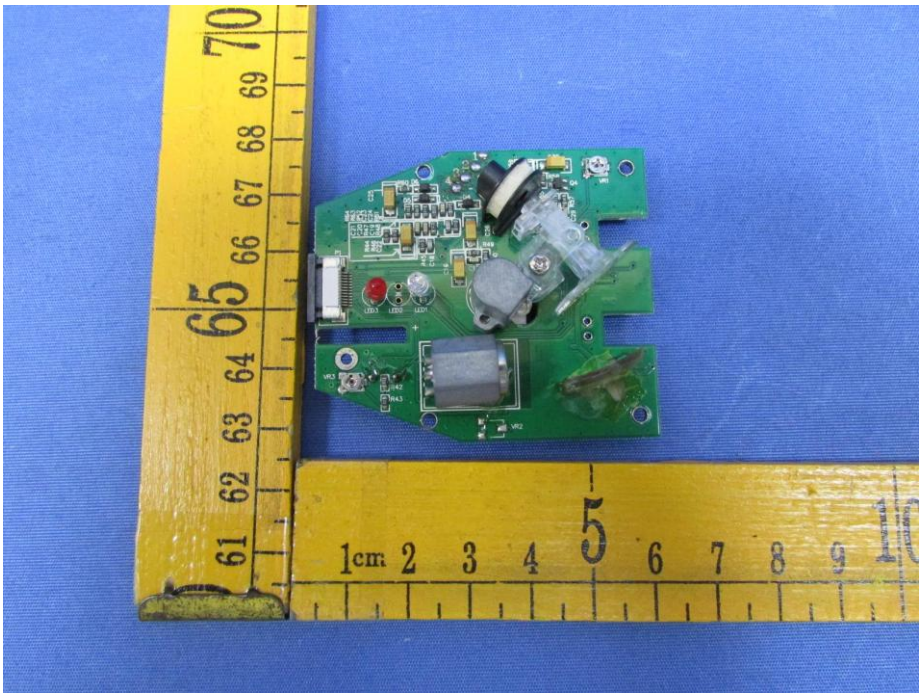
13.2 Model X-620- Internal Photos

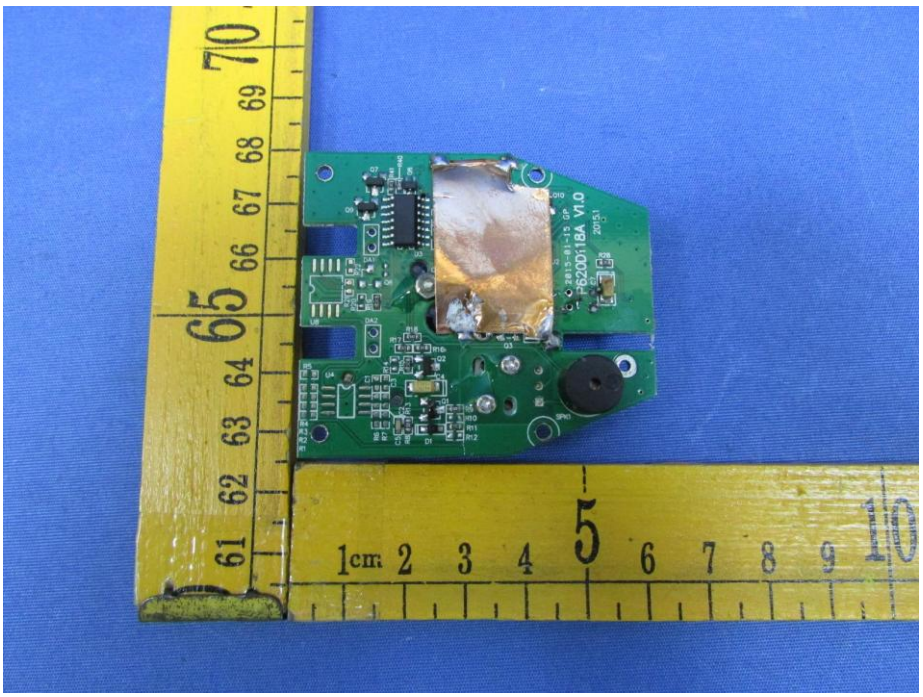


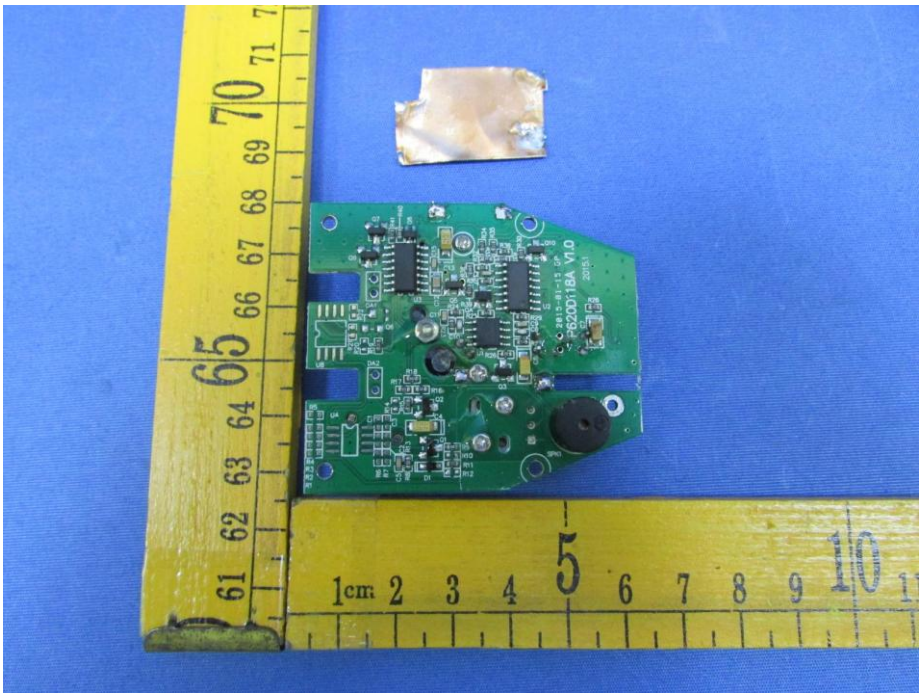


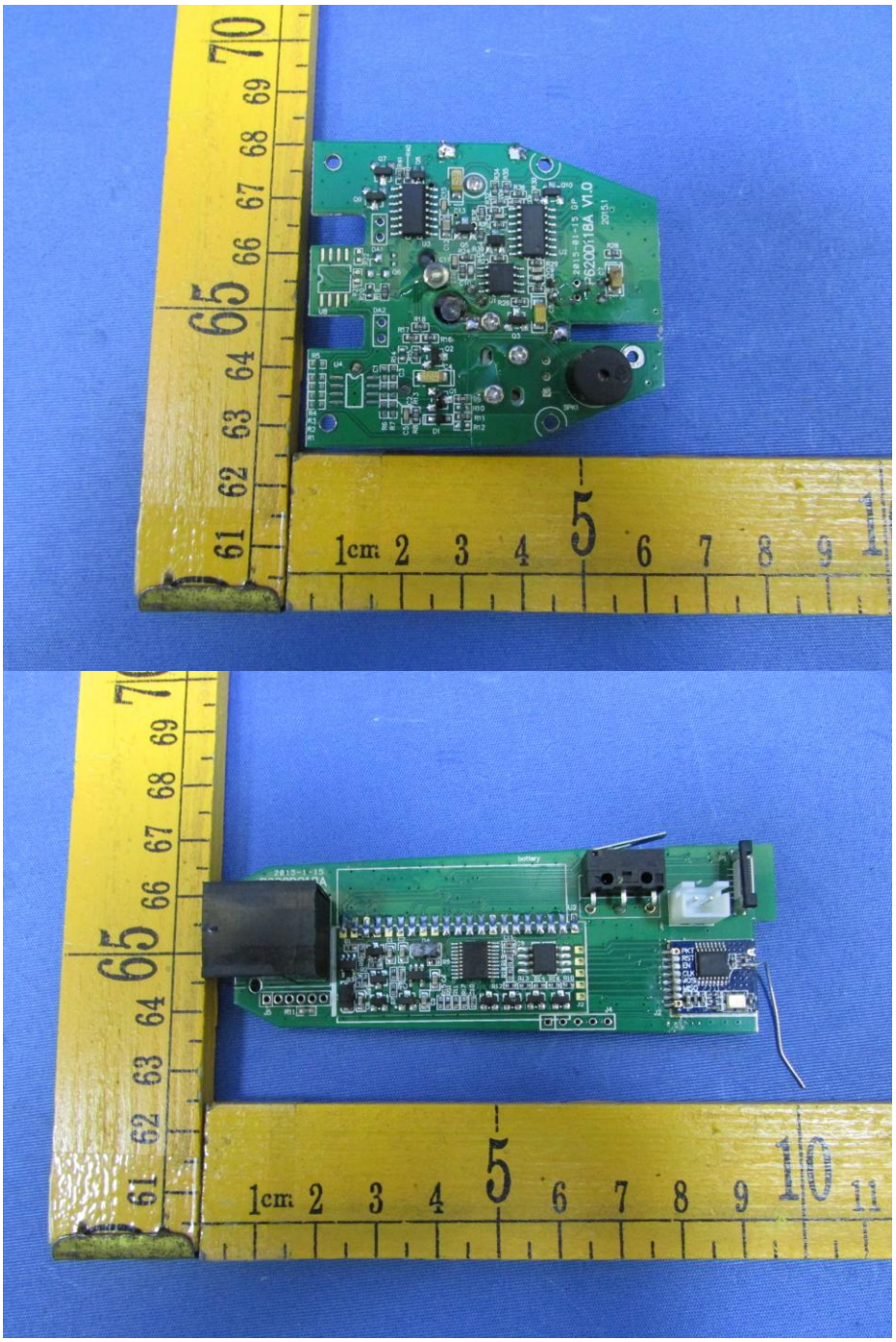


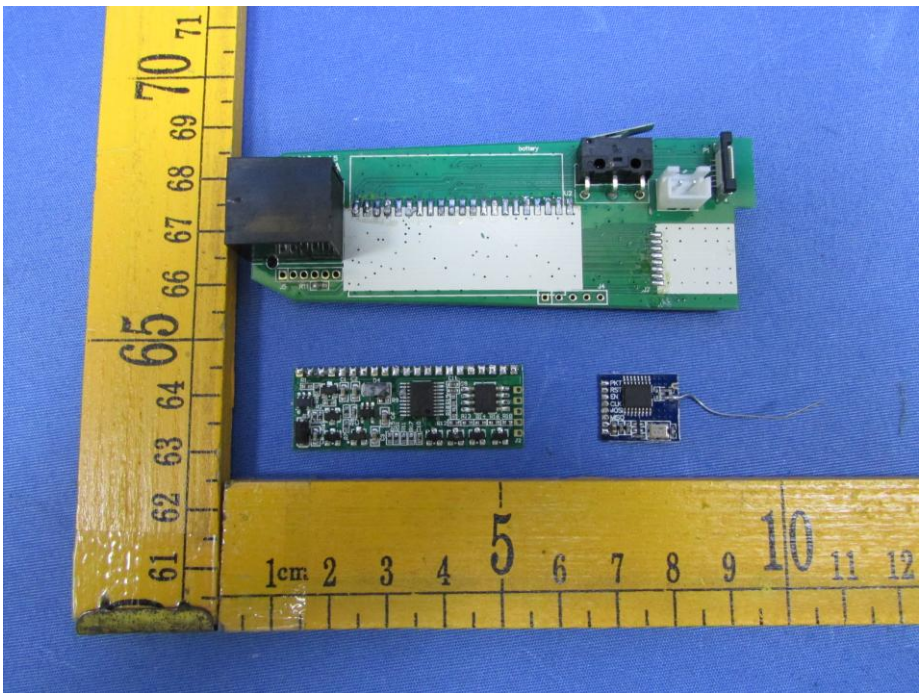

TW 702744
700mAh
+3.7V 07/24

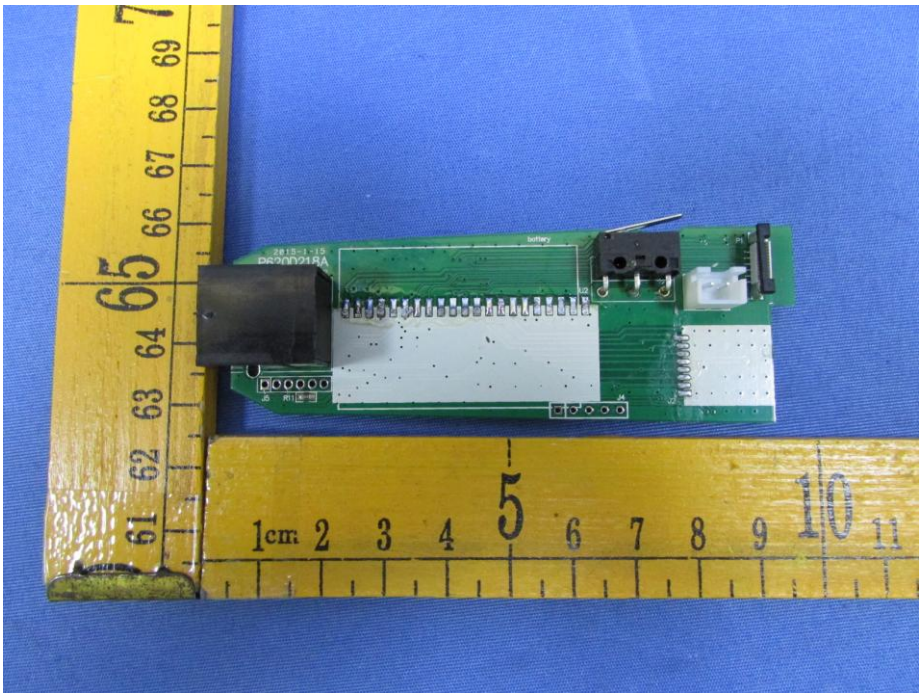


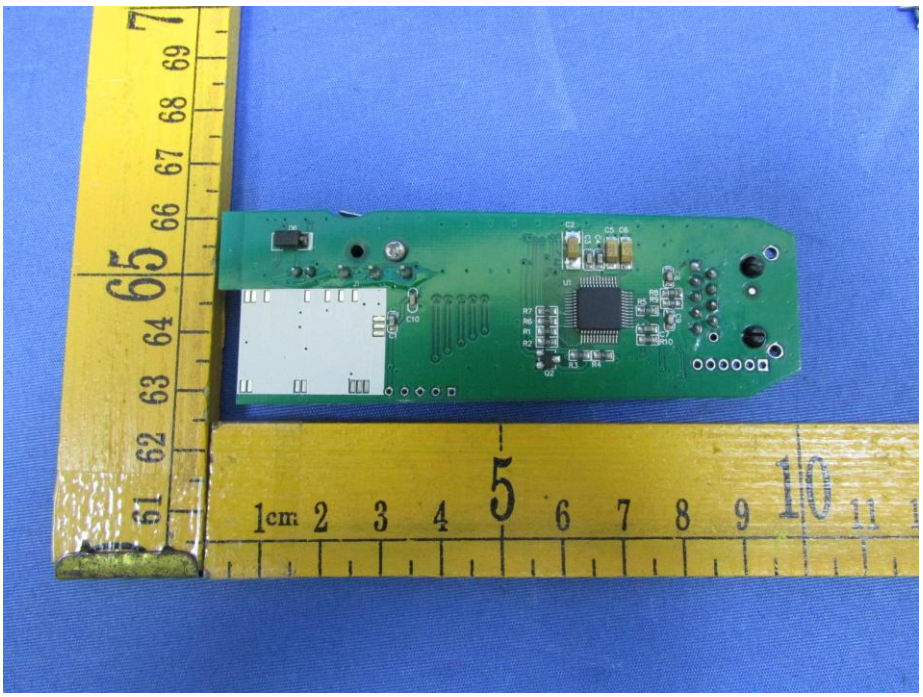


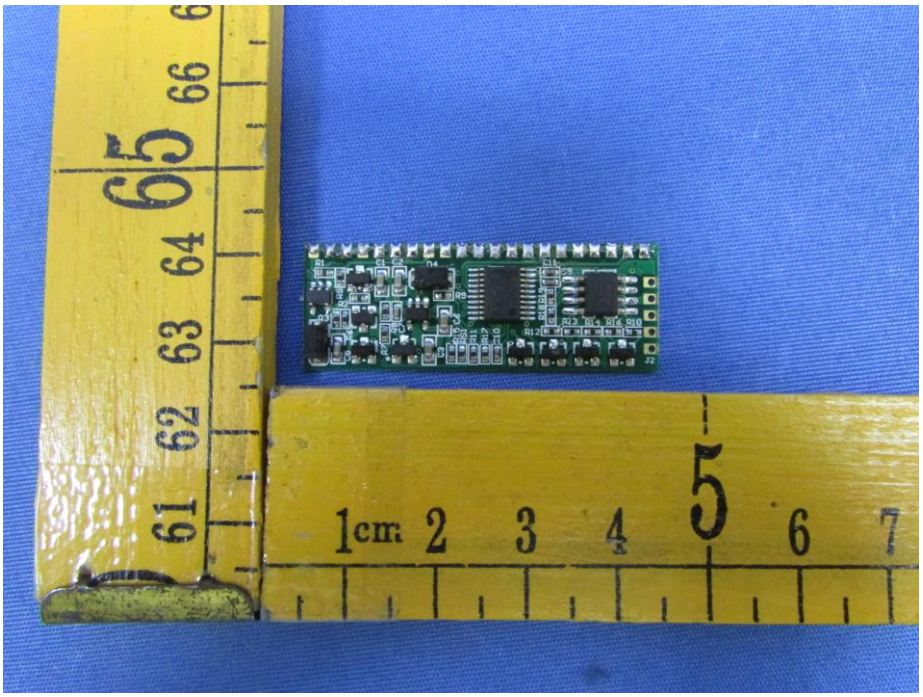


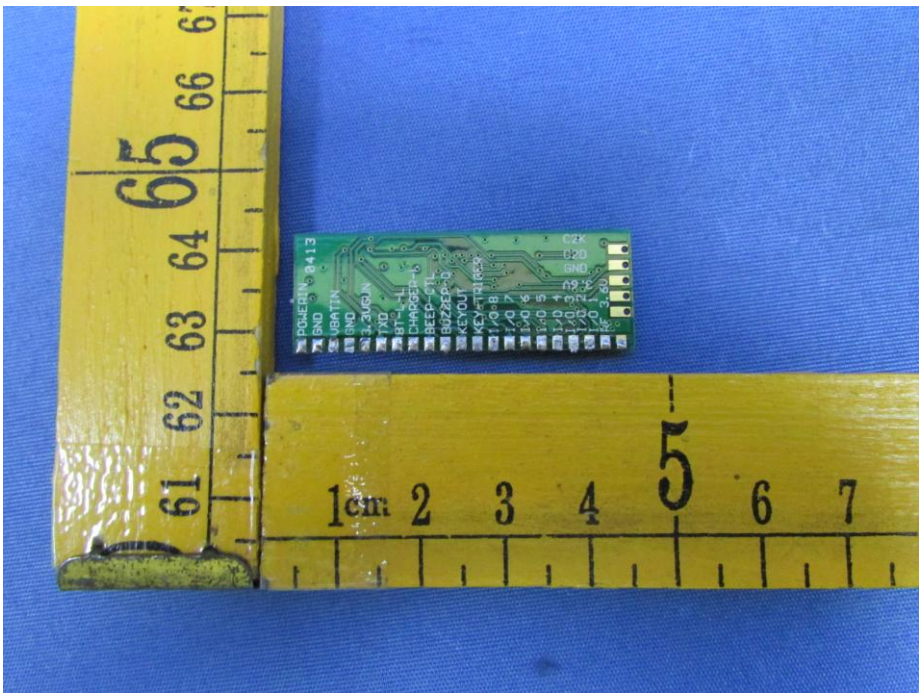


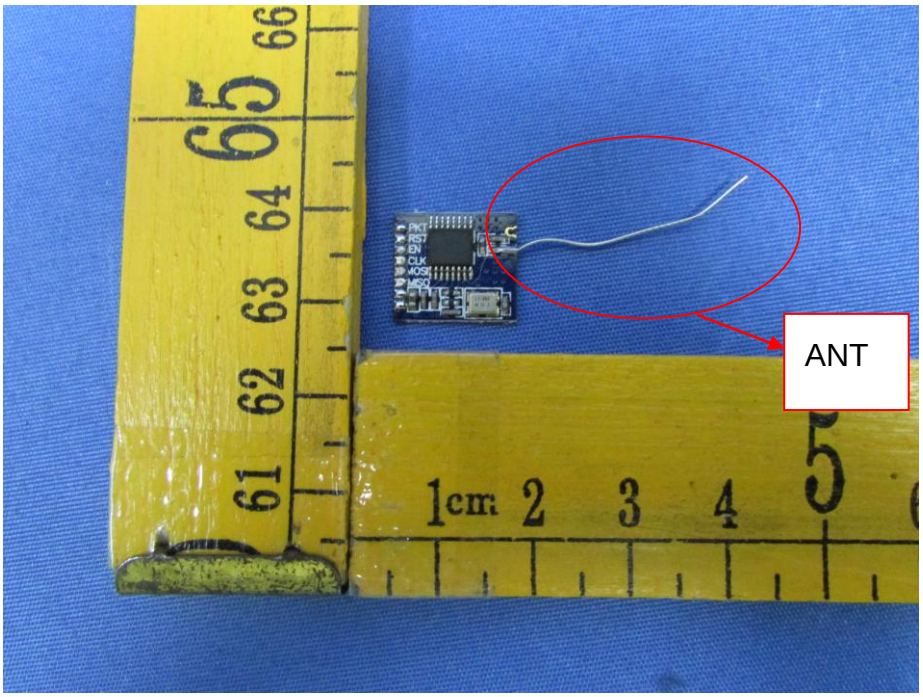








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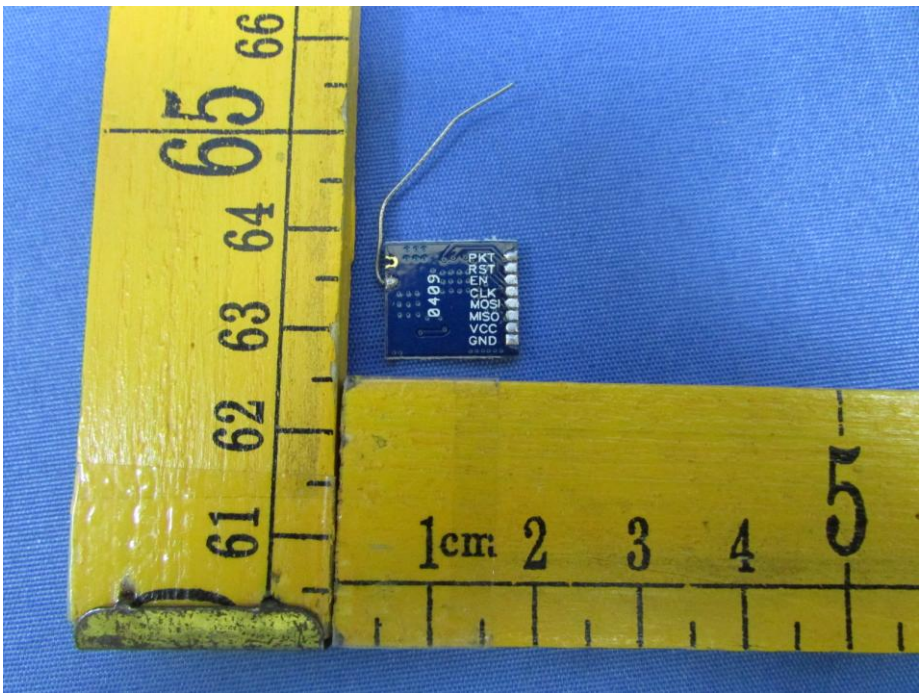

======End of Report======