Report No.SH16050055E01

FCC EMC TEST REPORT

Issued to

Shanghai TopXGun Robotics Co.,Ltd.

For

900MHz Wireless Digital Radio

Model Name	:	900M-DATA-LINK
Trade Name	:	TopXGun
Brand Name	:	TopXGun
Standard	:	47 CFR Part 15 Subpart B
FCC ID	:	2AIUJTXG900DL
Test date	:	Oct.15, 2016
Issue date	:	Oct.15, 2016

Shanghai Skylabs Co., Ltd.

Tested by Menglan. Gu *Approved by* Gu Yeqiang *Review by* Xiaodong Wei

Shanghai Skylabs Co.,Ltd.
Building 1, NO.1399,JiangYue Rd, Minhang District Shanghai, China

Email: service@skylabs.cn
Web site: http://www.skylabs.cn

DIRECTORY

1. General Information 4

1.1 Applicant 4

1.2 Manufacturer 4

1.3 Description of EUT 5

2. Facilities and Accreditations 7

2.1 Test Facility 7

2.2 Environmental Conditions 7

2.3 Measurement Uncertainty 7

2.4 List of Equipments Used 8

2.5 Accessory Equipment 8

2.6 Test Standards and Results 9

3. Test Conditions Setting 10

3.1 Test Mode 10

4. Emission Tests 11

4.1 Conducted Emission 11

4.2 Radiated Emission Measurement 14

Annex A Photos of the EUT 18

Annex B Photos of Setup 21

Change History

Issue	Date	Reason for change
1.0	Oct.15,2016	First edition

1. General Information

1.1 Applicant

Shanghai TopXGun Robotics Co.,Ltd.
6F,NO.3 Chuqiaocheng,NO.61 Andemeng Street,Yuhua District,Nanjing City,Jiangsu Province,China

1.2 Manufacturer

Shanghai TopXGun Robotics Co.,Ltd.
6F,NO.3 Chuqiaocheng,NO.61 Andemeng Street,Yuhua District,Nanjing City,Jiangsu Province,China

1.3 Description of EUT

EUT Name.....: 900MHz Wireless Digital Radio
Model Name.....: 900MHz Wireless Digital Radio
Brand Name.....: TopXGun
Trade Name .....: 900MHz Wireless Digital Radio
Hardware Version .....: V 1.0
Software Version .....: V 1.0
Modulation Type .....: FSK(10kbps), GMSK(200kbps)
Frequency Range.....: 902 - 928 MHz
Channel Number.....: 10kbps: 64 channels; 200kbps: 64 channels

The EUT is a Wireless Digital Radio. The EUT contains Module operating at 902-928MHz ISM band. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Channel and Center Frequency

No.	Channel No.	Center Frequency (MHz)	No.	Channel No.	Center Frequency (MHz)
1	0	902.4	33	32	915.2
2	1	902.8	34	33	915.6
3	2	903.2	35	34	916
4	3	903.6	36	35	916.4
5	4	904	37	36	916.8
6	5	904.4	38	37	917.2
7	6	904.8	39	38	917.6
8	7	905.2	40	39	918
9	8	905.6	41	40	918.4
10	9	906	42	41	918.8
11	10	906.4	43	42	919.2
12	11	906.8	44	43	919.6
13	12	907.2	45	44	920
14	13	907.6	46	45	920.4
15	14	908	47	46	920.8
16	15	908.4	48	47	921.2
17	16	908.8	49	48	921.6
18	17	909.2	50	49	922
19	18	909.6	51	50	922.4
20	19	910	52	51	922.8
21	20	910.4	53	52	923.2

22	21	910.8	54	53	923.6
23	22	911.2	55	54	924
24	23	911.6	56	55	924.4
25	24	912	57	56	924.8
26	25	912.4	58	57	925.2
27	26	912.8	59	58	925.6
28	27	913.2	60	59	926
29	28	913.6	61	60	926.4
30	29	914	62	61	926.8
31	30	914.4	63	62	927.2
32	31	914.8	64	63	927.6

2. Facilities and Accreditations

2.1 Test Facility

Shanghai Skylabs Co., Ltd. (Skylabs Laboratory) is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6644. A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.
FCC registration: 196218

2.2 Environmental Conditions

Ambient temperature: 15~35°C
Relative humidity: 30~60%
Atmosphere pressure: 86-106kPa

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.
Uncertainty of Conducted Emission: ±1.76dB
Uncertainty of Radiated Emission:±3.16dB

2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	the date of calibration	Expiry Date
Shielding Room	CHENGYU	5m×4m×3m	CR	2016.4.11	2017. 4.10
EMI Test Receiver	R&S	ESCI7	100787	2016.2.28	2017.02.27
Artificial Mains Network	TESEQ	NNB 51	33285	2016.2.28	2017.02.27
3m Semi-anechoic Chamber	CHENGYU	9.2×6.25×6.15 m	SAR	2016.4.11	2017. 4.10
Broadband Log Antenna	Schwarzbeck	VULB 9163	9163-561	2016.9.24	2017. 9.23
Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1033	2016.07.24	2017.07.23
Power Supplier	NF	ES2000S	9087735	2016.10.17	2017. 10.16
RF Cable	Kewei	9k~30MHz	N/A	N/A	N/A
RF Cable	Kewei	30M~1GHz	N/A	N/A	N/A
RF Cable	Kewei	1G~10 GHz	N/A	N/A	N/A

NOTE:

Equipments listed above have been calibrated and are in the period of validation.

2.5 Accessory Equipment

Product Name	Manufacture	Model	SN.
Laptop	ACER	Aspire 4376ZG	LXPFY0C004935291221601
Laptop Adapter	LITEON	PA-1650-22	9801016502
USB Data Cable	Kewei	Type C	/

2.6 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 (e-CFR data is current as of July 20, 2016)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.109	Radiated Emission	PASS
3	ANSI C63.4-2014	Radiated Emission	PASS

3. Test Conditions Setting

3.1 Test Mode

Mode 1: Hopping On Mode

During the measurement, EUT is working in working condition hopping on transmitting mode set by PC software. In this test mode, the PC of laptop exchanges data with EUT.

Mode 2: Idle Mode

EUT is in Idle working condition set by PC software. In this test mode, the PC of laptop exchanges link control data with EUT.

NOTE:
All configurations and test modes are performed, only the worst result is recorded in this report.

4. Emission Tests

4.1 Conducted Emission

4.1.1 Requirement

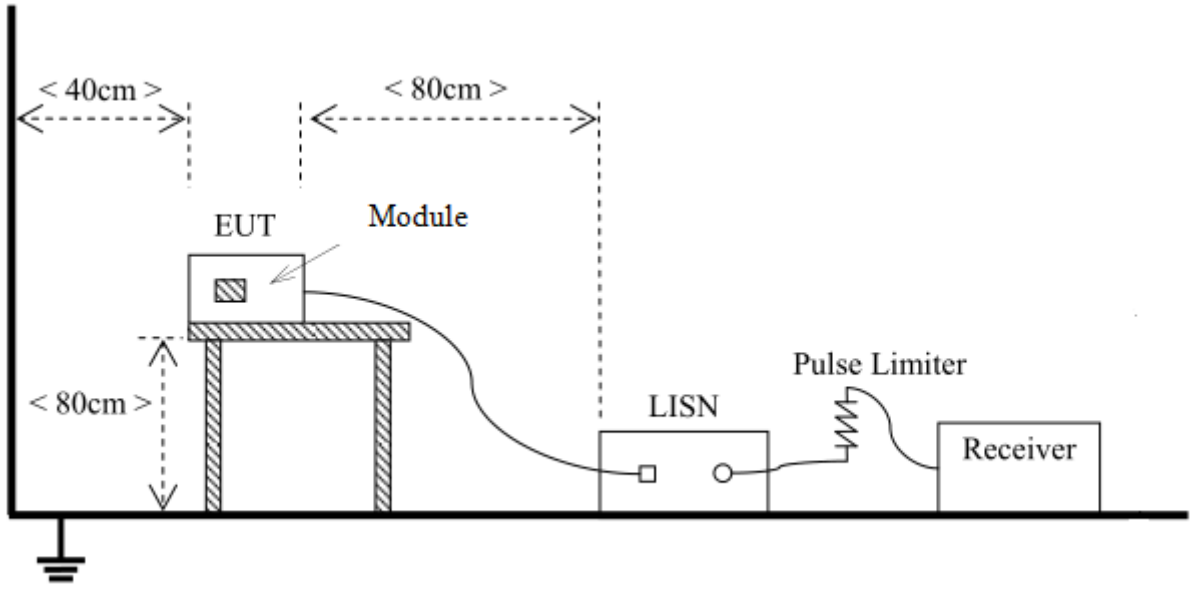
According to FCC section 15.107, Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:
(a) The lower limit shall apply at the band edges.
(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

4.1.2 Test Description

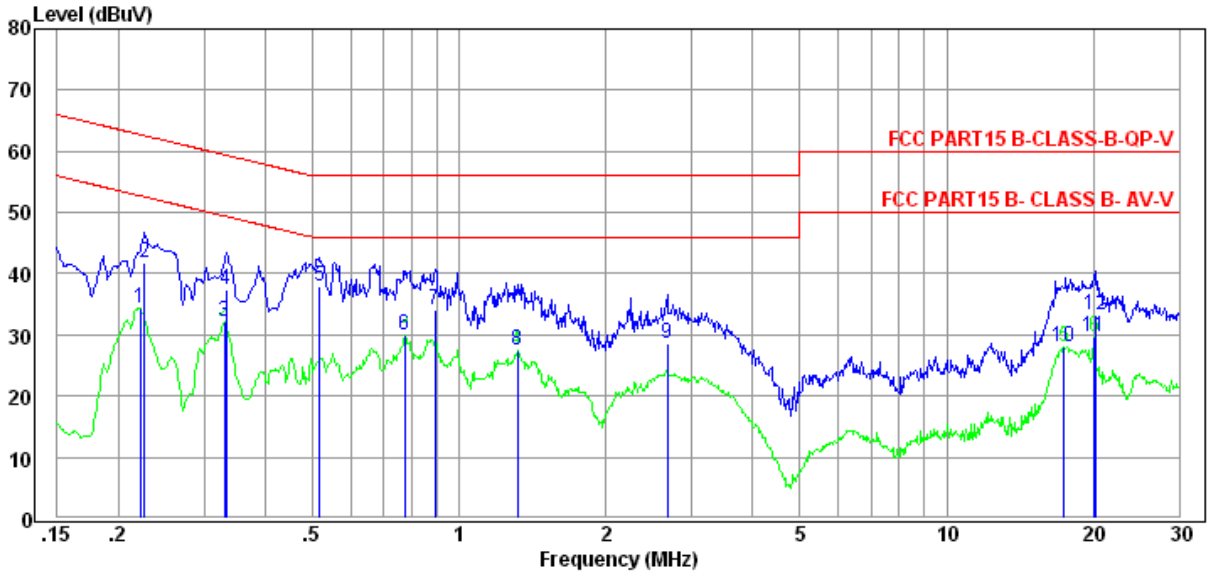
The EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2014.
The EUT works in Mode 1 condition. Test Voltage: 120 V AC, 60Hz



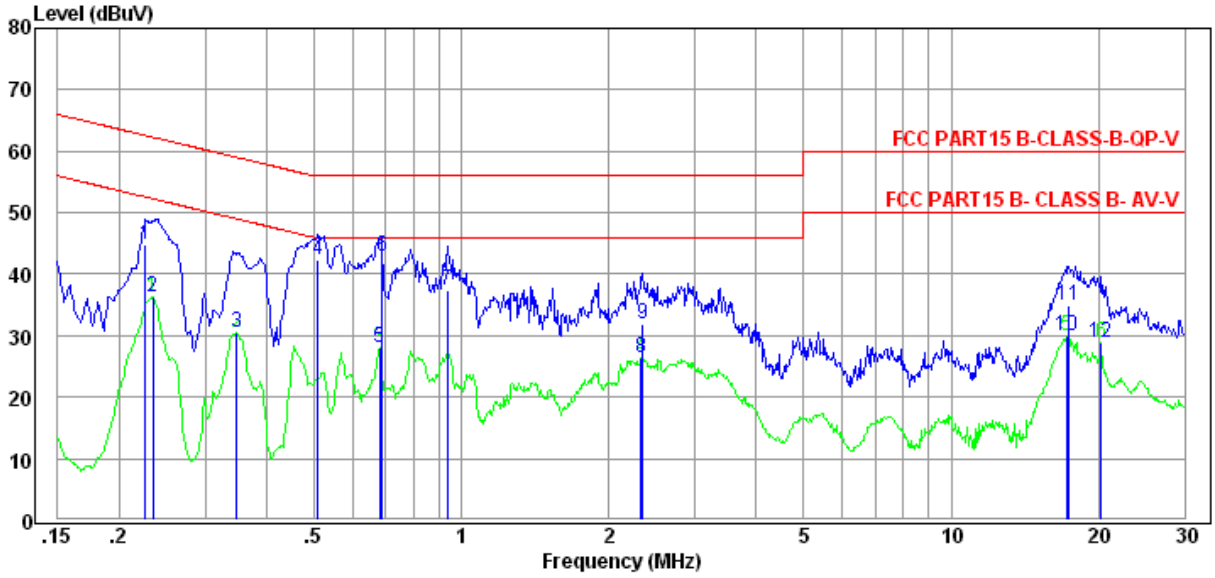
4.1.3 Test result

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Phase line	Detector
0.22	34.41	52.74	18.33	L	Average
0.23	41.81	62.57	20.76	L	QP
0.33	32.05	49.44	17.39	L	Average
0.33	37.32	59.35	22.03	L	QP
0.52	37.87	56.00	18.13	L	QP
0.78	29.88	46.00	16.12	L	Average
0.89	34.07	56.00	21.93	L	QP
1.32	27.36	46.00	18.64	L	Average
2.68	28.70	56.00	27.30	L	QP
17.38	27.94	50.00	22.06	L	Average
20.06	29.65	50.00	20.35	L	Average
20.27	33.21	60.00	26.79	L	QP
0.23	44.73	62.57	17.84	N	QP
0.24	36.41	52.26	15.85	N	Average
0.35	30.50	49.00	18.50	N	Average
0.51	42.39	56.00	13.61	N	QP
0.68	28.05	46.00	17.95	N	Average
0.69	42.76	56.00	13.24	N	QP
0.94	37.44	56.00	18.56	N	QP
2.33	26.45	46.00	19.55	N	Average
2.35	31.84	56.00	24.16	N	QP
17.20	29.83	50.00	20.17	N	Average
17.38	34.87	60.00	25.13	N	QP
20.27	28.91	50.00	21.09	N	Average

4.1.4 Test Plot



L Line



N Line

4.2 Radiated Emission Measurement

4.2.1 Limits of Radiated Emission

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a certain distance shall not exceed the following values:

Frequency (MHz)	Field Strength CLASS B (at 3m)	
	μV/m	dBμV/m
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

NOTE:
*(1) Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)].*
(2) In the emission tables above, the tighter limit applies at the band edges.

Frequency range of radiated measurements (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	**Upper frequency of measurement range (MHz)**
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

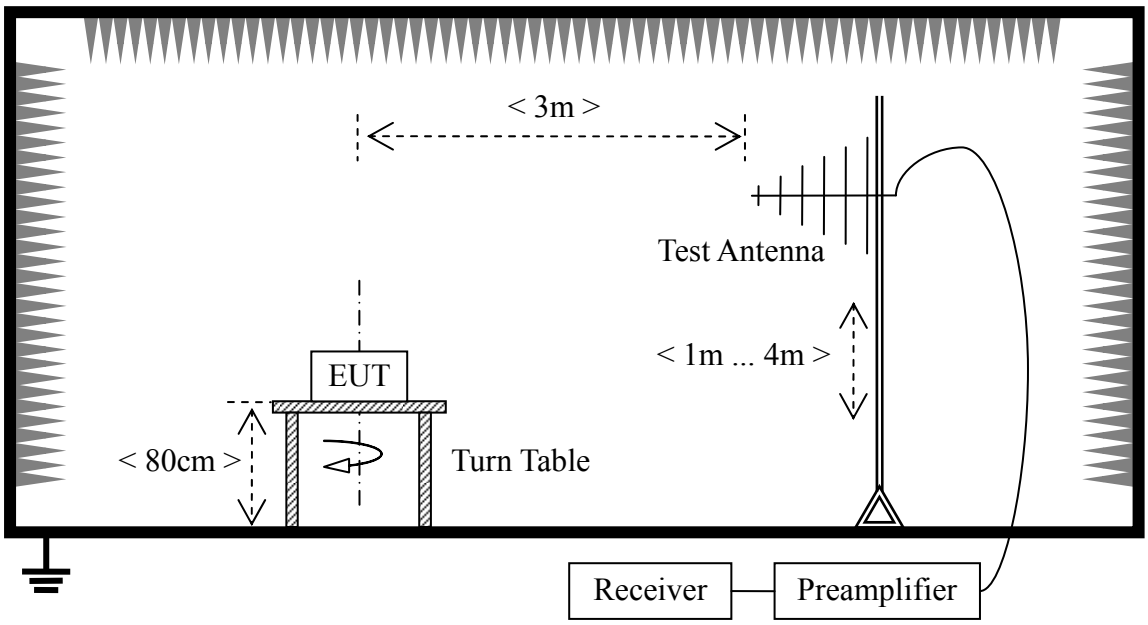
Note:
The highest frequency is 927.6MHz , So 10th harmonic is 9.276GHz, the frequency range is from 30MHz to 10GHz

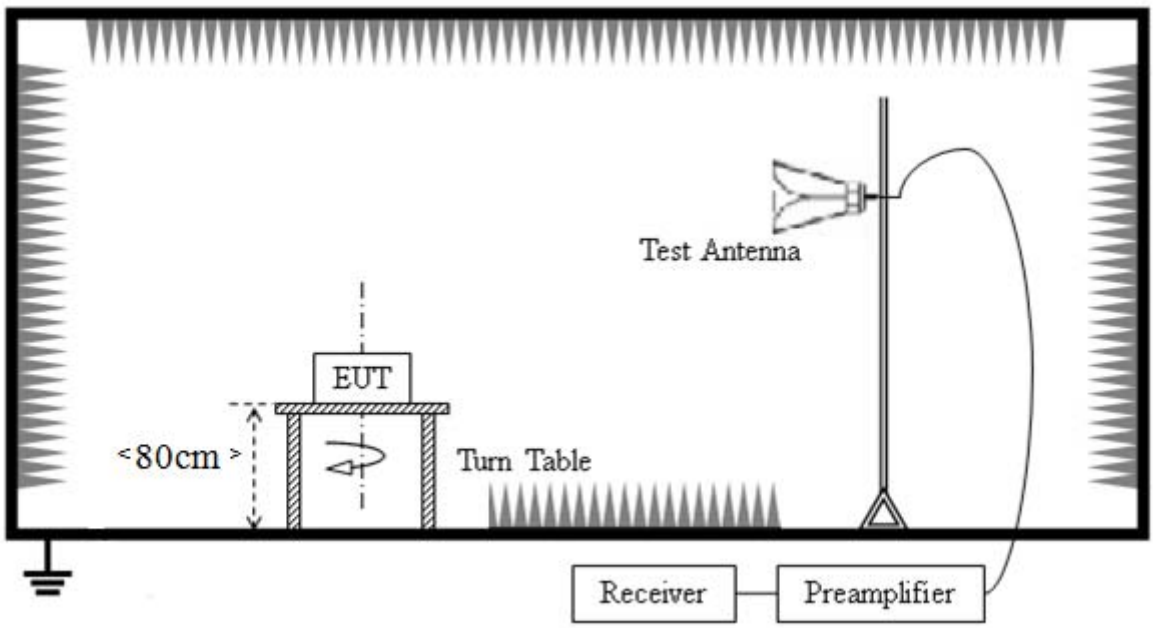
4.2.2 Test Procedure

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane.
Support equipment, if needed, was placed as per ANSI C63.4.
All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
The EUT received DC power source from USB port of laptop
The antenna was placed at 3 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
The Analyzer / Receiver quickly scanned from 30MHz to 40GHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
The worst configuration of EUT at highest emission level was recorded for reference after final test.
The EUT is set to Mode 2.

Receiver Setting:
(9-150kHz): RBW=200Hz, VBW=1kHz, Detector: PK, Max Hold.
(0.15-30MHz): RBW=9kHz, VBW=30kHz, Detector: PK, Max Hold.
(30MHz-1GHz): RBW=120kHz, VBW=300kHz, Detector: QP, Max Hold.
(Above 1GHz): RBW=1MHz, VBW=3MHz, Detector: AV, Max Hold.

4.2.3 Test Setup





Test Verdict Recorded for Suspicious Points (30MHz~10GHz): Antenna Vertical

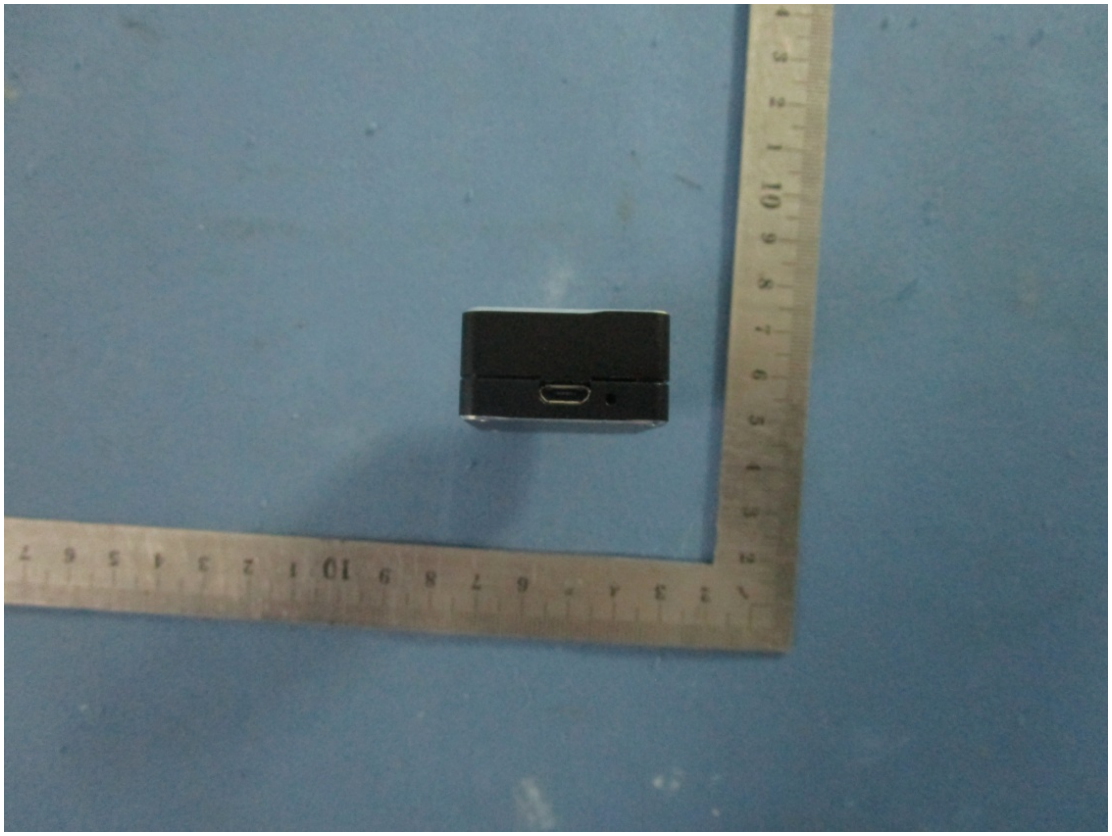
Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
47.83	35.79	40.00	4.21	Vertical	PASS
59.86	34.94	40.00	5.06	Vertical	PASS
72.08	28.58	40.00	11.42	Vertical	PASS
83.82	32.65	40.00	7.35	Vertical	PASS
95.76	33.31	43.50	10.19	Vertical	PASS
120.28	37.79	43.50	5.71	Vertical	PASS
1420.75	2.82	54.00	51.18	Vertical	PASS
1748.97	2.78	54.00	51.22	Vertical	PASS
2227.58	6.94	54.00	47.06	Vertical	PASS
2883.28	12.96	54.00	41.04	Vertical	PASS
3909.97	13.17	54.00	40.83	Vertical	PASS
4997.81	17.74	54.00	36.26	Vertical	PASS

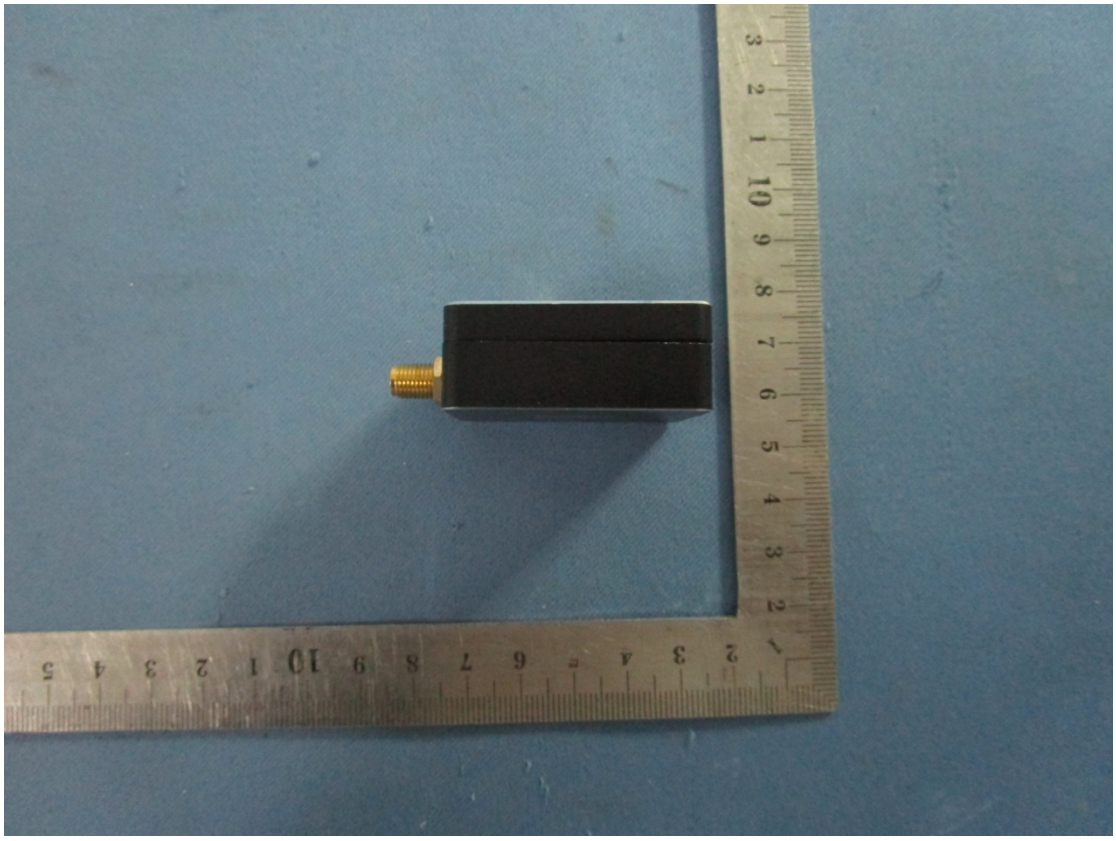
Test Verdict Recorded for Suspicious Points (30MHz~10GHz): Antenna Horizontal

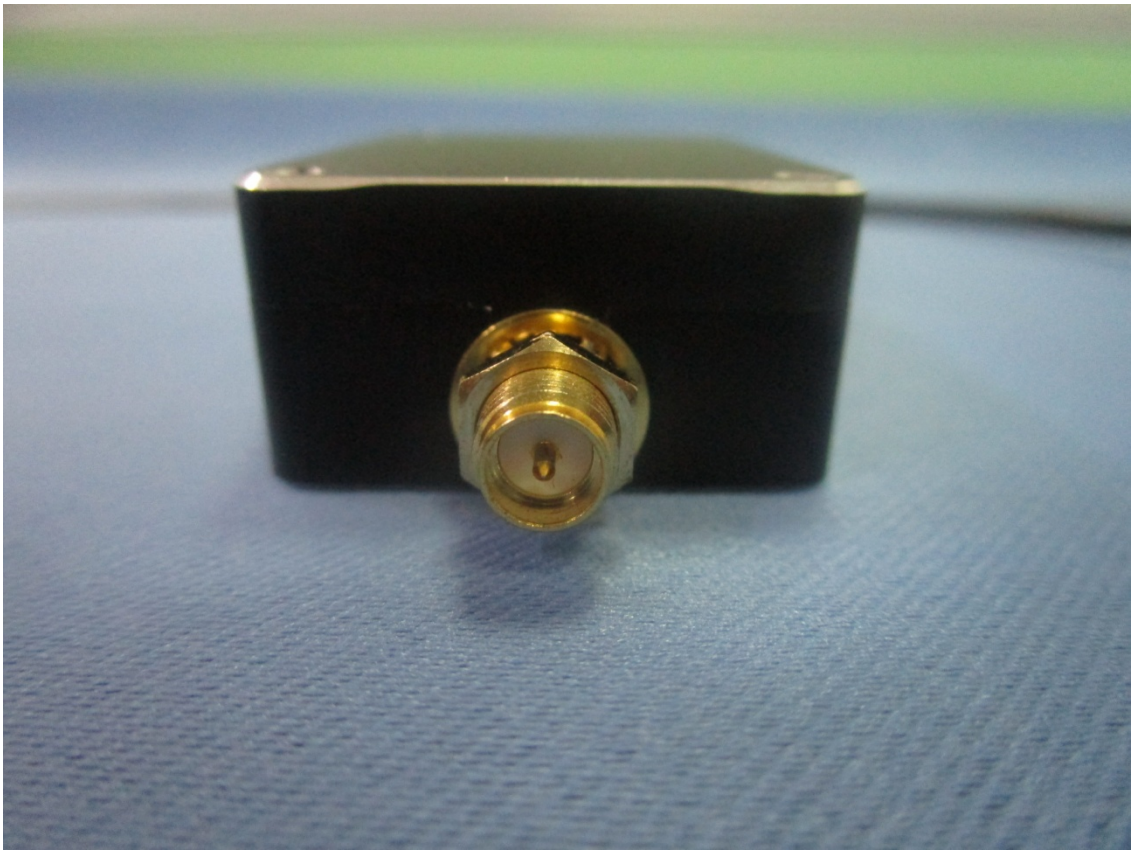
Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
47.99	30.50	40.00	9.50	Horizontal	PASS
72.08	34.45	40.00	5.55	Horizontal	PASS
95.76	39.82	43.50	3.68	Horizontal	PASS
107.89	41.95	43.50	1.55	Horizontal	PASS
131.76	38.10	43.50	5.40	Horizontal	PASS

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
143.83	40.41	43.50	3.09	Horizontal	PASS
1375.66	2.15	54.00	51.85	Horizontal	PASS
1596.24	2.69	54.00	51.31	Horizontal	PASS
2137.65	7.17	54.00	46.83	Horizontal	PASS
2872.97	13.04	54.00	40.96	Horizontal	PASS
3685.48	11.35	54.00	42.65	Horizontal	PASS
4330.40	14.92	54.00	39.08	Horizontal	PASS

Annex A Photos of the EUT



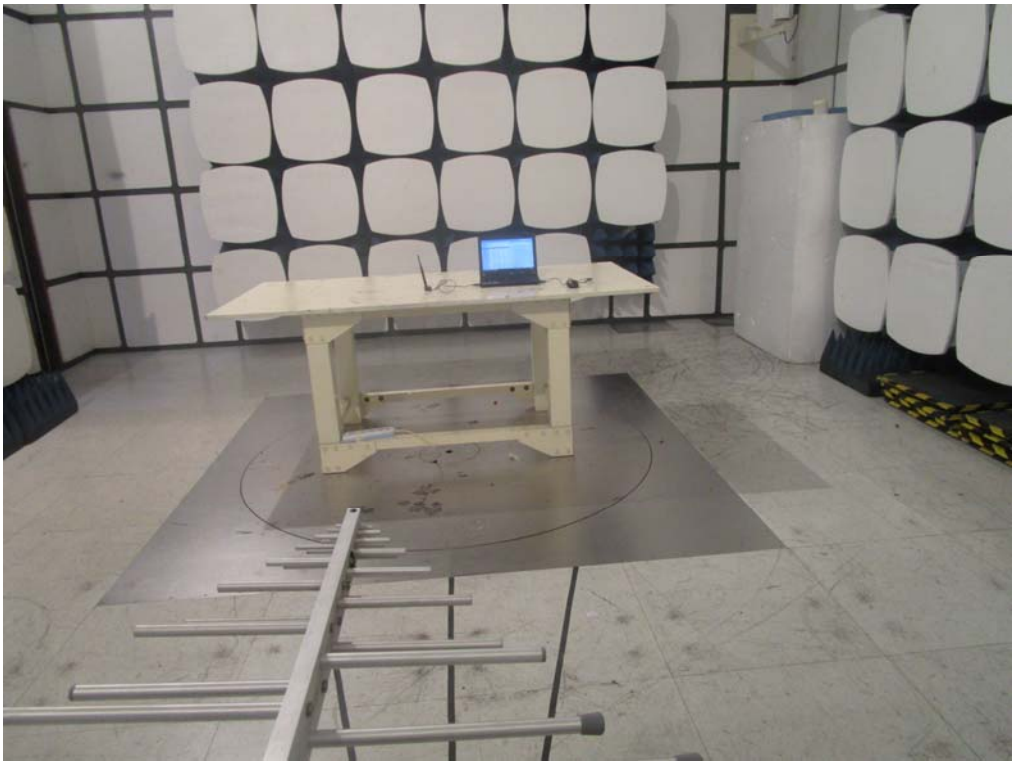




Annex B Photos of Setup

1. Conducted Emission

2. Radiated Emission



** END OF REPORT **