



Shenzhen Global Test Service Co.,Ltd.

1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.249

Report Reference No..... GTSR17030003

FCC ID..... 2ALD9-H2

Compiled by

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Date of issue.....: Mar. 16, 2017

Representative Laboratory Name : Shenzhen Global Test Service Co.,Ltd.

Address: 1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

Testing Laboratory Name Shenzhen CTL Testing Technology Co., Ltd

Address: 1/F.-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, Guangdong, China

Applicant's name..... Zhejiang Topso Technology Co., Ltd.

Address: 4th Floor, Building 6, No.368 Jinpeng Street, Sandun Town, West Lake District, Hangzhou City, Zhejiang Province, China.

Test specification

Standard: FCC Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz

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Test item description Electric skateboard

Trade Mark: /

Manufacturer: Zhejiang Topso Technology Co., Ltd.

Model/Type reference.....: H2(Remote control)

Listed Models: H1(Remote control)

Modulation Type: GFSK

Operation Frequency.....: From 2402MHz to 2480MHz

EUT Type: Production Unit

Hardware Version: E253642-Y-D

Software Version: TP-V1.0

Rating: DC 3.7V

Result.....: **PASS**

TEST REPORT

Test Report No. :	GTSR17030003	Mar. 16, 2017
		Date of issue

Equipment under Test : Electric skateboard

Model /Type : H2(Remote control)

Listed Models : H1(Remote control)

Applicant : **Zhejiang Topso Technology Co., Ltd.**

Address : 4th Floor, Building 6, No.368 Jinpeng Street, Sandun Town, West Lake District, Hangzhou City, Zhejiang Province, China.

Manufacturer : **Zhejiang Topso Technology Co., Ltd.**

Address : 4th Floor, Building 6, No.368 Jinpeng Street, Sandun Town, West Lake District, Hangzhou City, Zhejiang Province, China.

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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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

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Mar. 05, 2017
Testing commenced on	:	Mar. 05, 2017
Testing concluded on	:	Mar. 16, 2017

2.2. Product Description

Name of EUT	Electric skateboard
Trade Mark	/
Model Number	H2(Remote control)
List Model	H1(Remote control)
FCC ID	2ALD9-H2
Antenna Type	Internal antenna
Operation frequency	From 2402MHz to 2480MHz
Modulation Type	GFSK
Antenna gain	-1.2dBi

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 230V / 50 Hz	<input type="radio"/> 120V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (specified in blank below)	

DC 3.7V

2.4. Short description of the Equipment under Test (EUT)

This is a Electric skateboard.

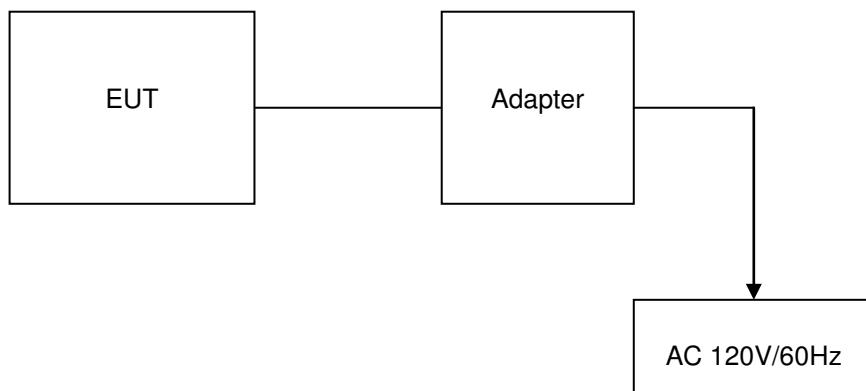
For more details, refer to the user's manual of the EUT.

2.5. EUT operation mode

There are 40 channels provided to the EUT. Channel 00/19/39 was selected to test.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

2.6. Block Diagram of Test Setup



Adapter:

Model: A31-699-50500
 Input: 100-240V~50/60Hz 0.15A
 Output: 5.0V DC 0.5A
 Power Cable: 120cm
 ◇ Shielded ◆ Unshielded

2.7. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2ALD9-H2** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

2.8. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer

- Supplied by the lab

<input type="radio"/> /	M/N: /
	Manufacturer: /

2.9. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.

1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

Shenzhen CTL Testing Technology Co., Ltd.

1/F.-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, Guangdong, China

3.2. Test Facility

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

FCC-Registration No.: 964637

Shenzhen Global Test Service 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 964637, Jul 24, 2015.

CNAS-Lab Code: L8169

Shenzhen Global Test Service Co.,Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories. Date of Registration: Dec. 11, 2015. Valid time is until Dec. 10, 2018.

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology 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 970318, December 19, 2013.

3.3. Environmental conditions

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

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Test Description

FCC PART 15.249		
FCC Part 15.249(a)	Field Strength of Fundamental	PASS
FCC Part 15.209	Spurious Emission	PASS
FCC Part 15.209	Band edge	PASS
FCC Part 15.215(c)	Occupied bandwidth	PASS
FCC Part 15.207	Conducted Emission	PASS
FCC Part 15.203	Antenna Requirement	PASS

Remark:

1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

3.5. Statement of the 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 CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service Co.,Ltd. quality 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.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	2.20 dB	(1)
Occupied Bandwidth	0.01ppm	(1)
Radiated Emission 30~1000MHz	4.10dB	(1)
Radiated Emission Above 1GHz	4.32dB	(1)
Conducted Disturbance0.15~30MHz	3.20dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6. Equipments Used during the Test

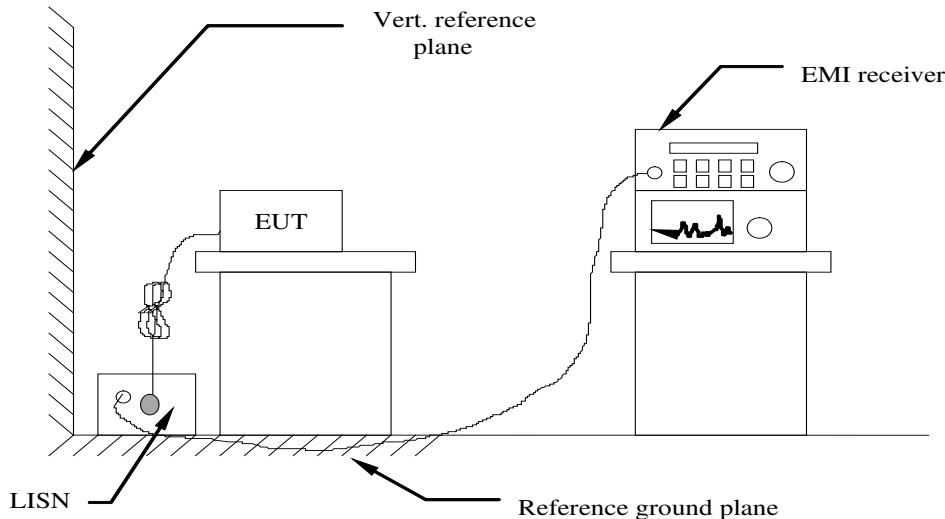
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2016/06/02	2017/06/01
EMI Test Receiver	R&S	ESCI	103710	2016/06/02	2017/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2016/05/21	2017/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2016/05/21	2017/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2016/05/19	2017/05/18
Active Loop Antenna	SCHWARZBEC K	FMZB1519	1519-037	2016/05/19	2017/05/18
Amplifier	Agilent	8349B	3008A02306	2016/05/19	2017/05/18
Amplifier	Agilent	8447D	2944A10176	2016/05/19	2017/05/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2016/05/20	2017/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2016/05/20	2017/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2016/05/20	2017/05/19
Coaxial Cables	HUBER+SUHNE R	SUCOFLEX 104PEA-10M	10m	2016/06/02	2017/06/01
Coaxial Cables	HUBER+SUHNE R	SUCOFLEX 104PEA-3M	3m	2016/06/02	2017/06/01
Coaxial Cables	HUBER+SUHNE R	SUCOFLEX 104PEA-3M	3m	2016/06/02	2017/06/01
RF Cable	Megalon	RF-A303	N/A	2016/06/02	2017/06/01

Note: 1. The Cal.Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013.
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013.
- 4 The EUT received DC 5V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

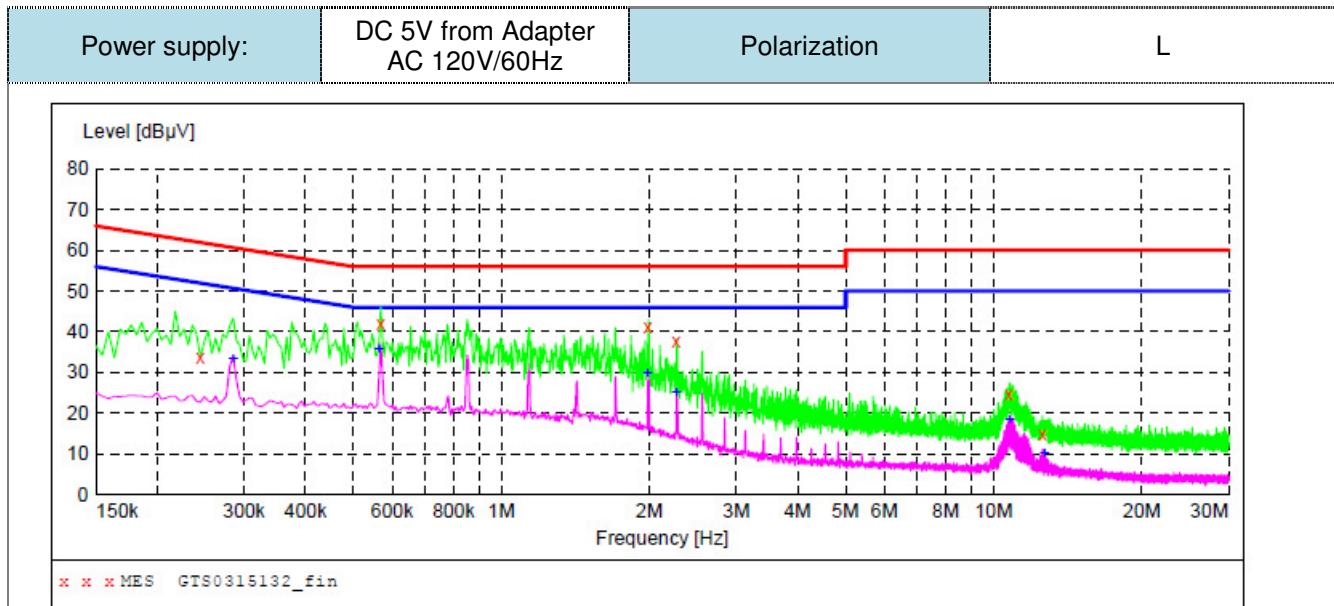
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST RESULTS

Remark:We tested three positions in AC 120V/60Hz and AC 240V/60Hz, the worst case was recorded .


MEASUREMENT RESULT: "GTS0315132_fin"

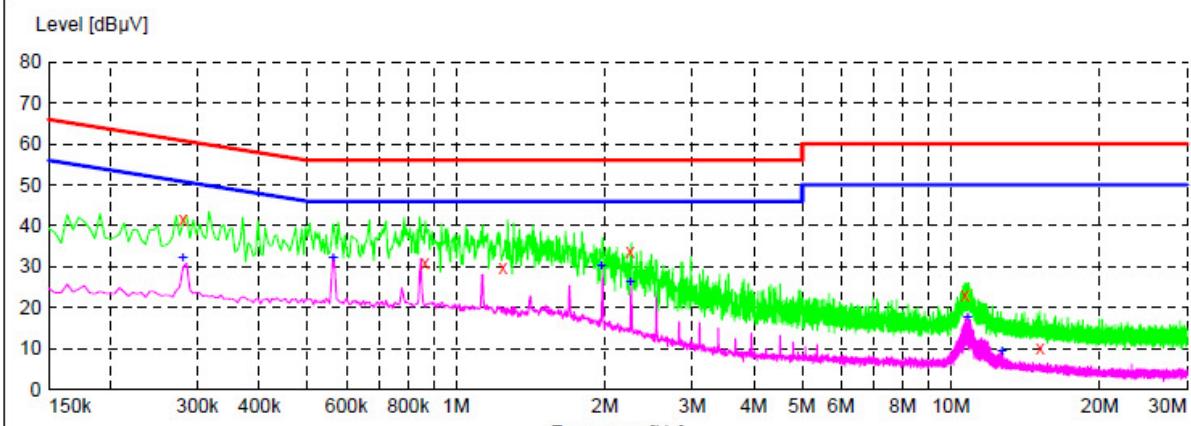
3/15/2017 5:52PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.244500	33.90	10.0	62	28.1	QP	L1	GND
0.568500	41.90	9.7	56	14.1	QP	L1	GND
1.981500	41.00	9.5	56	15.0	QP	L1	GND
2.265000	37.50	9.5	56	18.5	QP	L1	GND
10.738500	24.50	8.8	60	35.5	QP	L1	GND
12.547500	14.90	8.5	60	45.1	QP	L1	GND

MEASUREMENT RESULT: "GTS0315132_fin2"

3/15/2017 5:52PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.285000	33.40	9.9	51	17.6	AV	L1	GND
0.564000	35.90	9.7	46	10.1	AV	L1	GND
1.981500	29.90	9.5	46	16.1	AV	L1	GND
2.265000	25.10	9.5	46	20.9	AV	L1	GND
10.770000	18.30	8.8	50	31.7	AV	L1	GND
12.669000	10.20	8.5	50	39.8	AV	L1	GND

Power supply:	DC 5V from Adapter AC 120V/60Hz	Polarization	N
 <p>Level [dBμV]</p> <p>Frequency [Hz]</p> <p>xx MES GTS0315133_fin</p>			

MEASUREMENT RESULT: "GTS0315133_fin"

3/15/2017 5:56PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.280500	41.70	9.9	61	19.3	QP	N	GND
0.865500	31.10	9.6	56	24.9	QP	N	GND
1.243500	29.80	9.6	56	26.2	QP	N	GND
2.247000	33.60	9.5	56	22.4	QP	N	GND
10.680000	23.00	8.8	60	37.0	QP	N	GND
15.144000	10.20	8.1	60	49.8	QP	N	GND

MEASUREMENT RESULT: "GTS0315133_fin2"

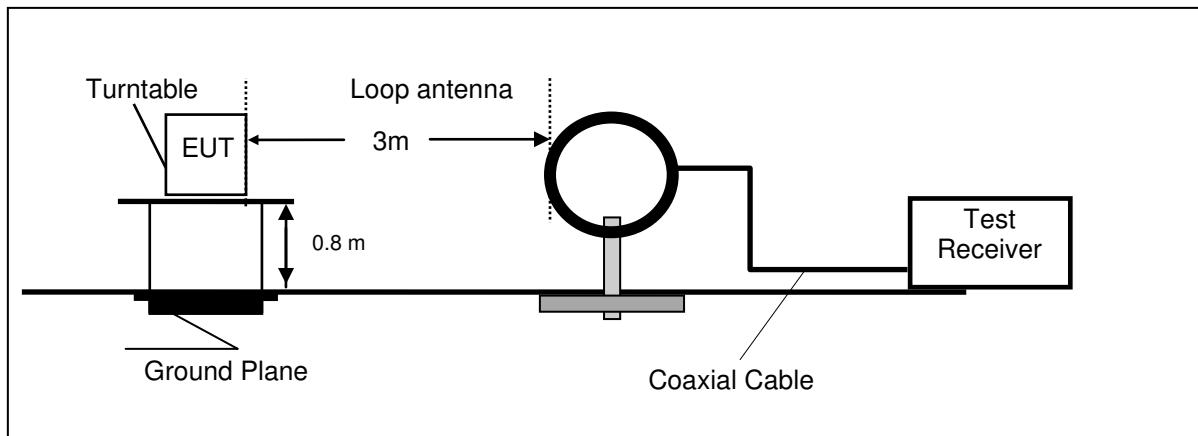
3/15/2017 5:56PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.280500	32.00	9.9	51	19.0	AV	N	GND
0.564000	32.00	9.7	46	14.0	AV	N	GND
1.968000	30.10	9.5	46	15.9	AV	N	GND
2.251500	26.20	9.5	46	19.8	AV	N	GND
10.801500	17.50	8.8	50	32.5	AV	N	GND
12.673500	9.30	8.5	50	40.7	AV	N	GND

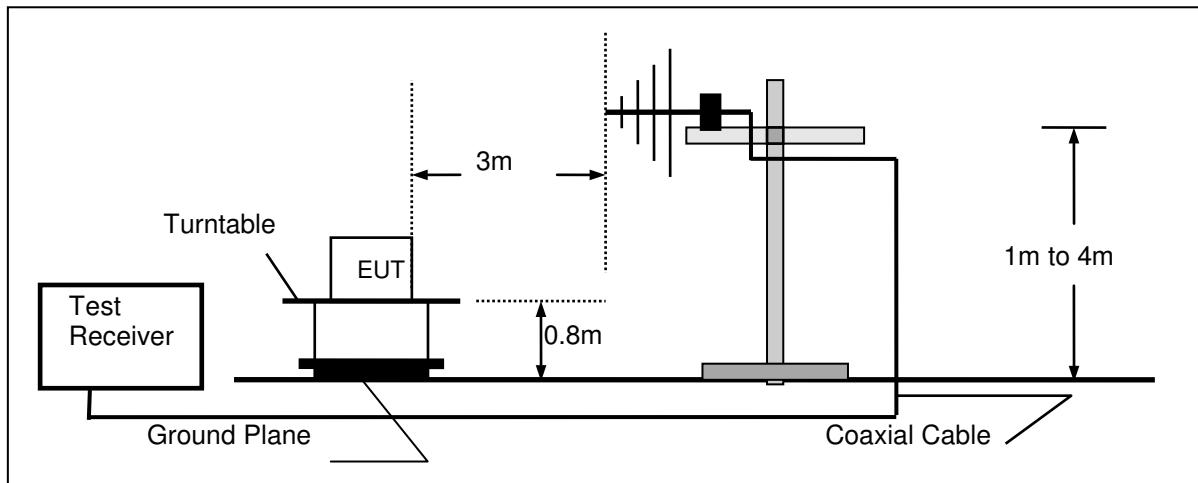
4.2. Radiated Emissions and Band Edge

TEST CONFIGURATION

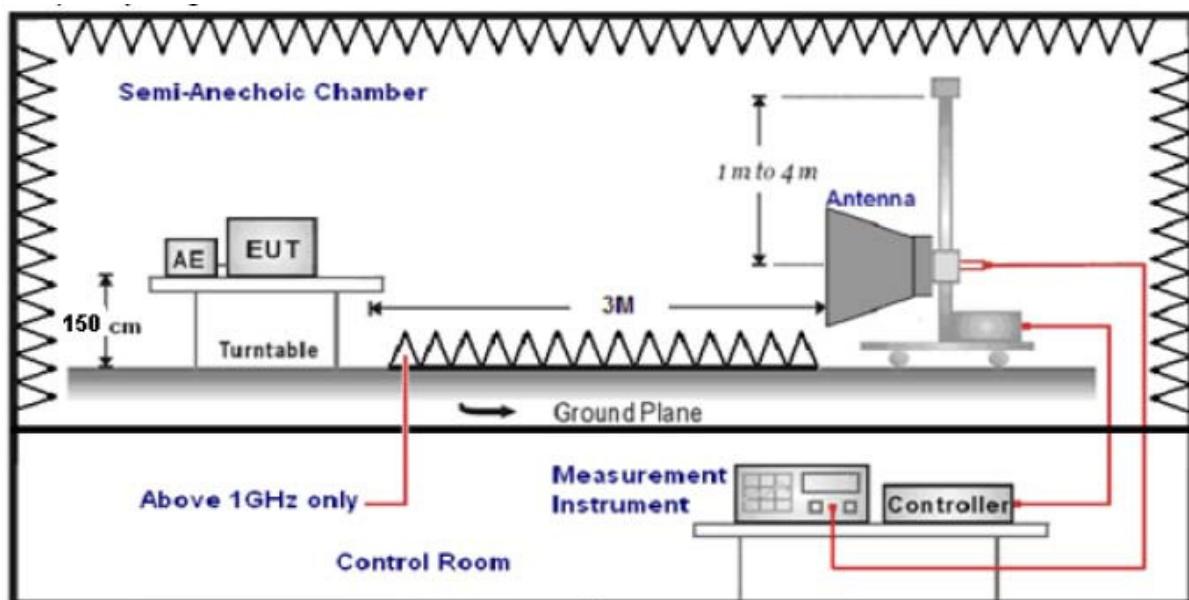
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz; the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz-25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

LIMIT

According 15.249, the field strength of emissions from intentional radiators operated within 2400MHz-2483.5 MHz shall not exceed 94dB μ V/m (50mV/m):

FCC PART 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.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

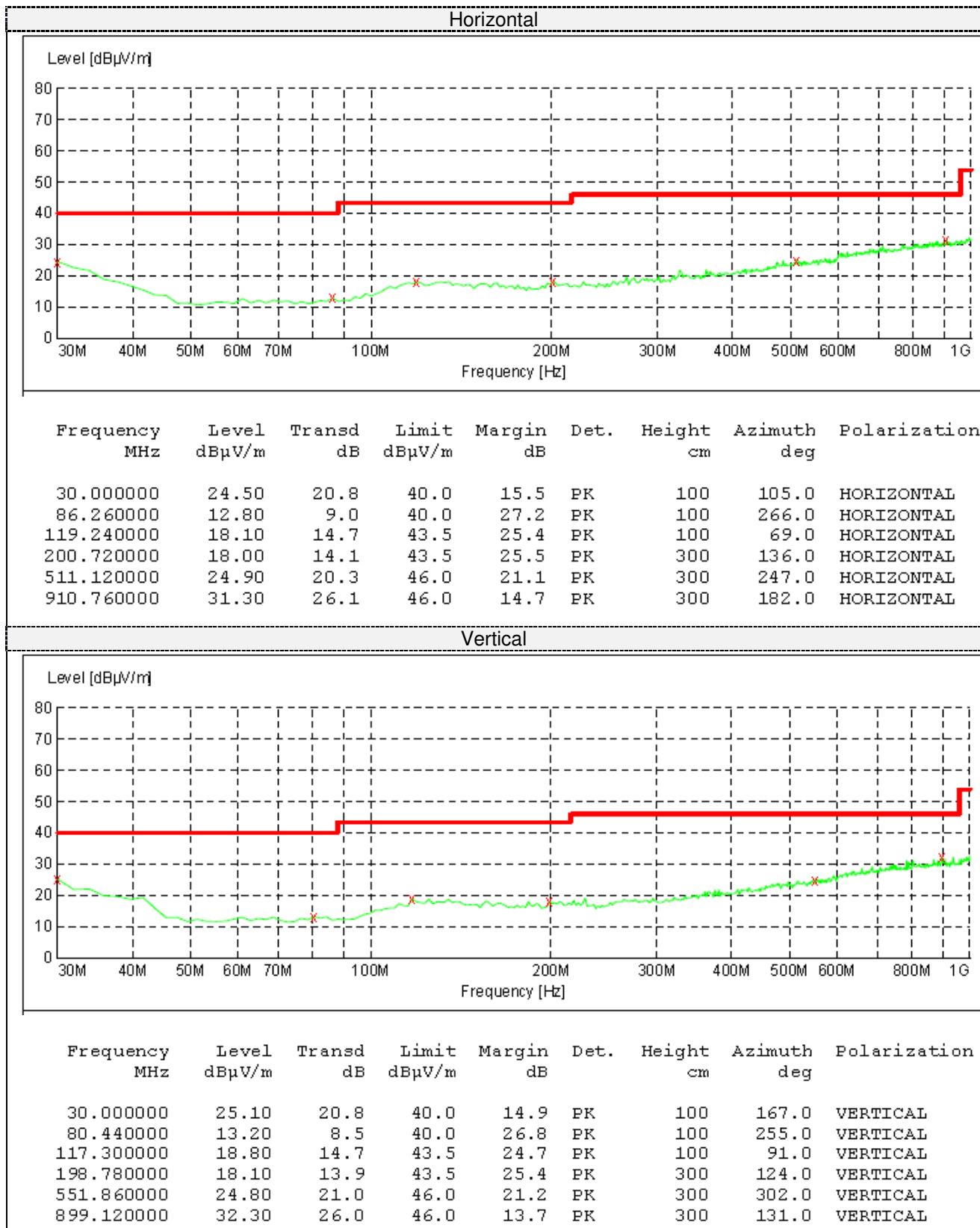
TEST RESULTS

Remark: We tested three positions in AC 120V/60Hz and AC 240V/60Hz, the worst case was recorded.
Test site: Shenzhen CTL Testing Technology Co., Ltd.

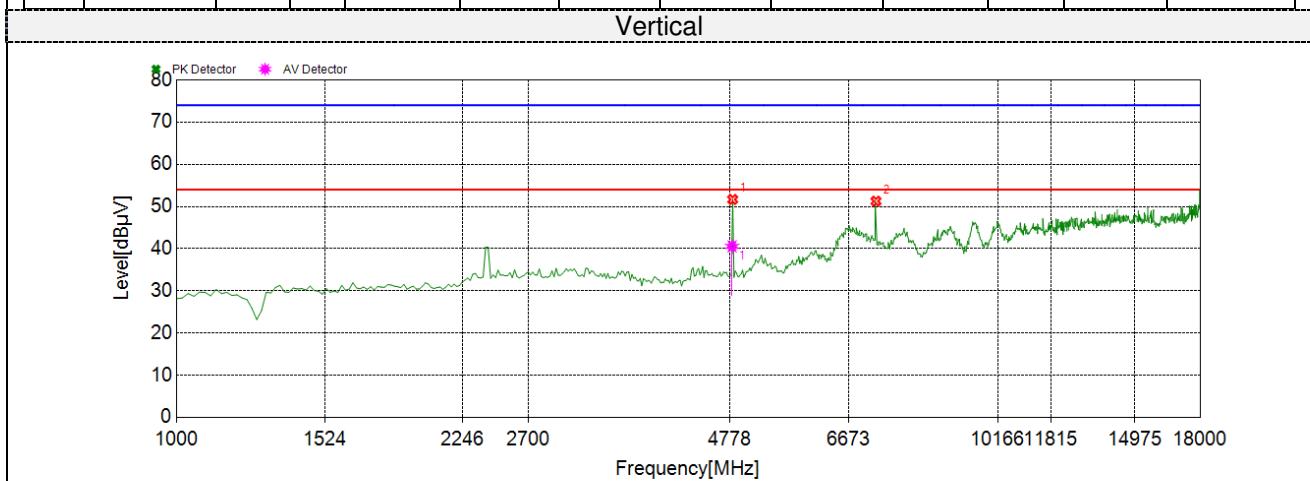
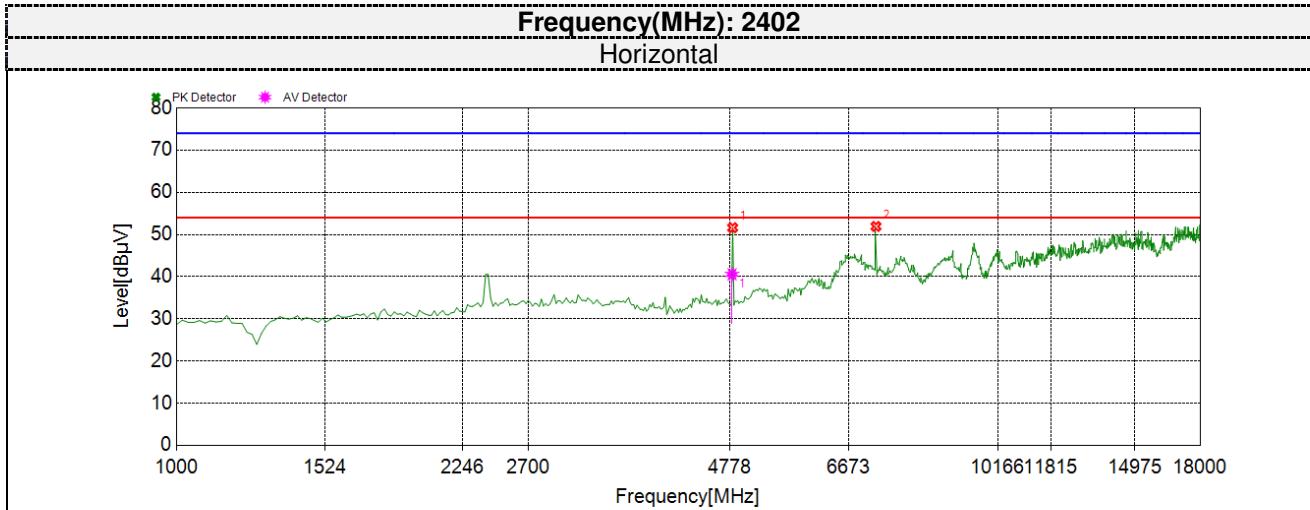
For 9KHz to 30MHz

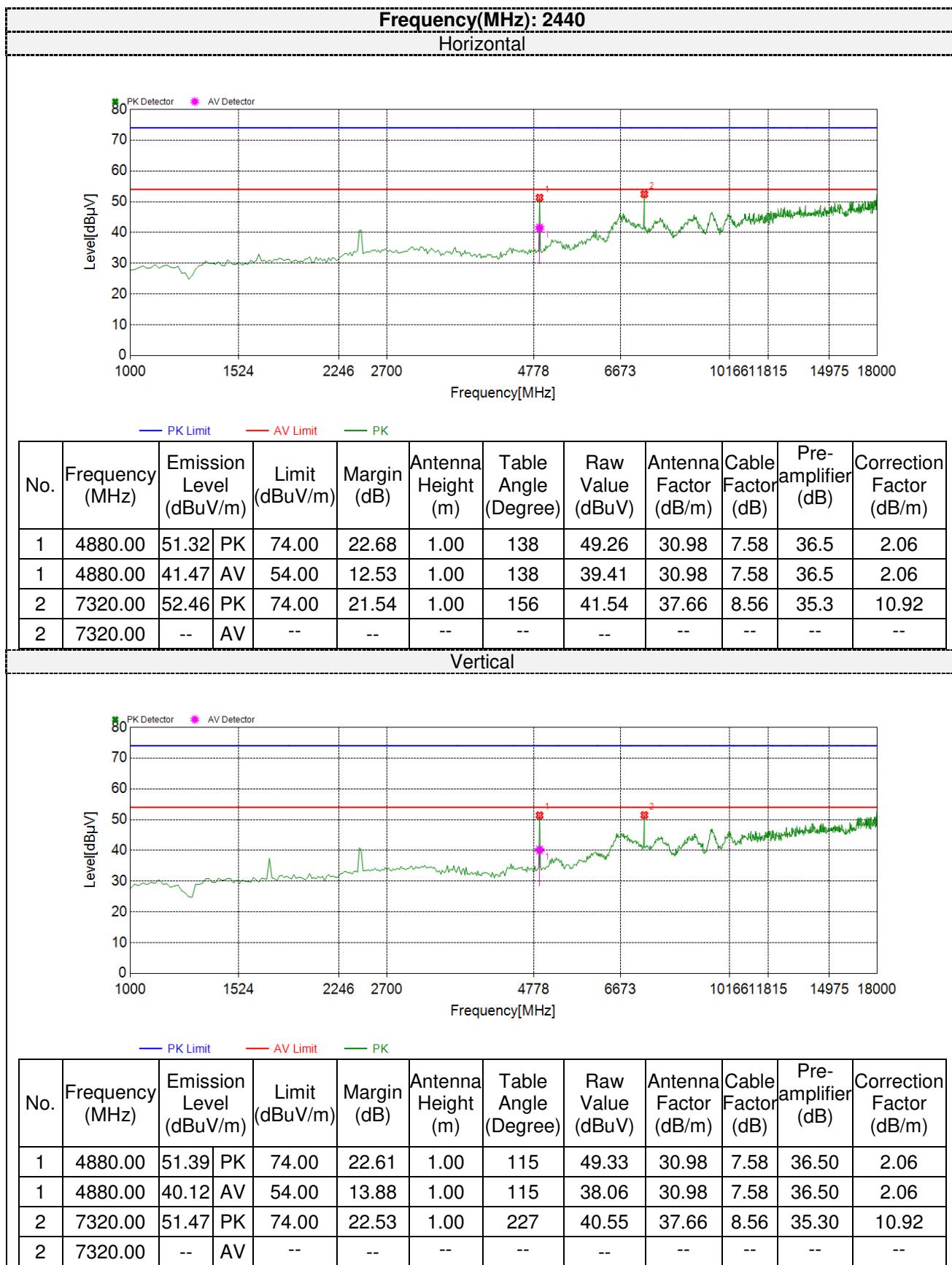
Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Result
0.18	55.37	102.50	47.13	QP	PASS
1.26	42.68	65.60	22.92	QP	PASS
16.87	45.69	69.54	23.85	QP	PASS
26.34	43.22	69.54	26.32	QP	PASS

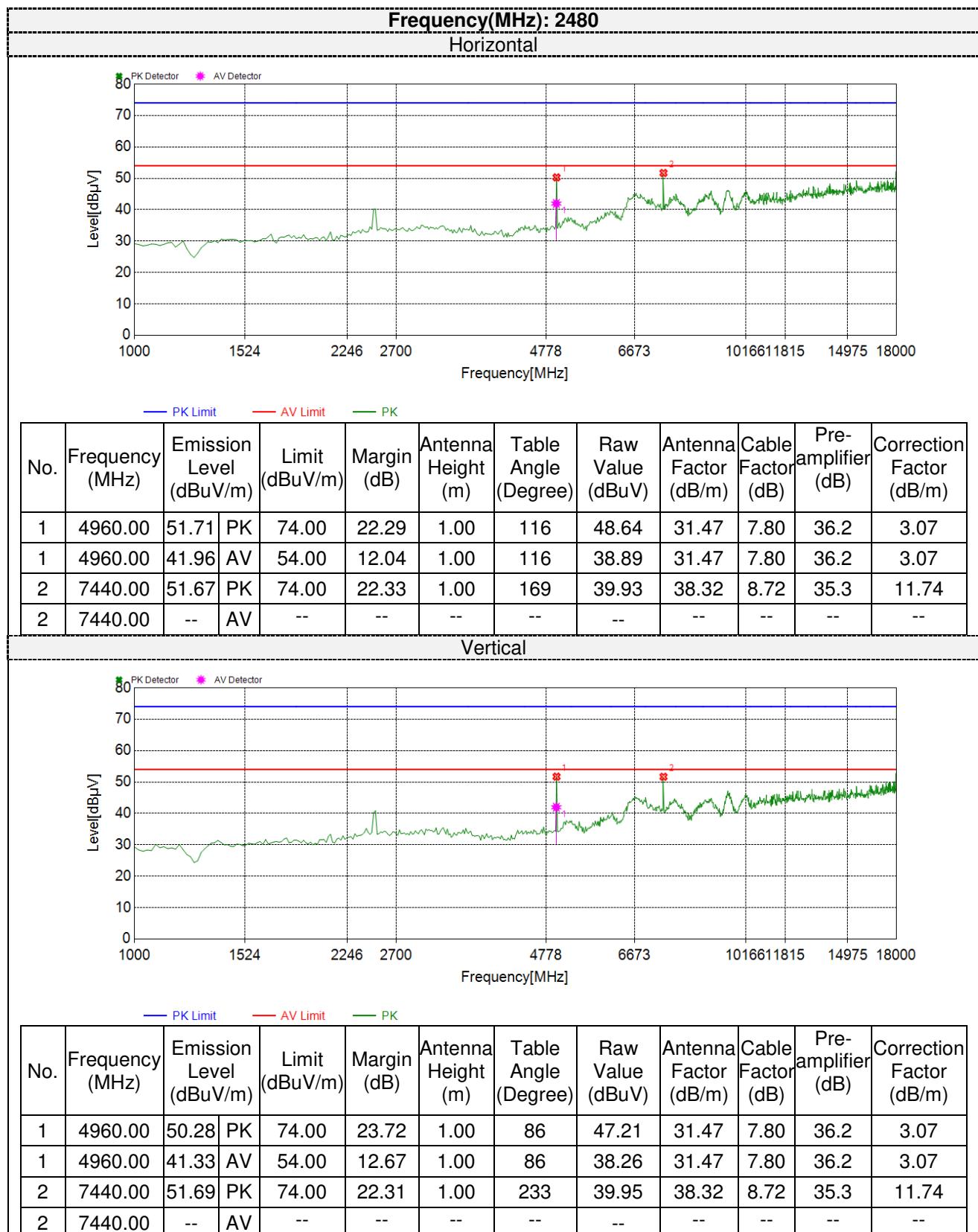
For 30MHz to 1000MHz



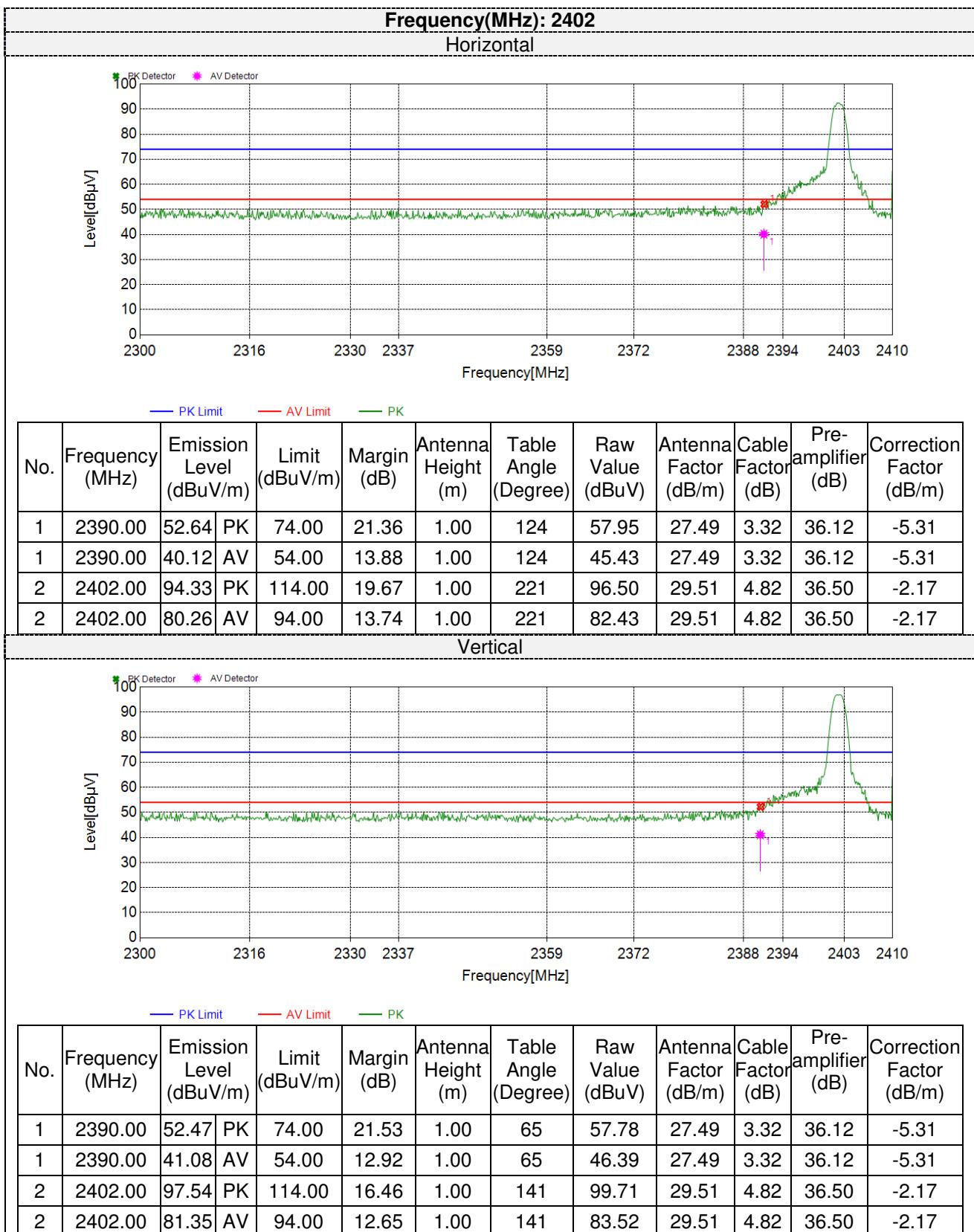
For 1GHz to 25GHz

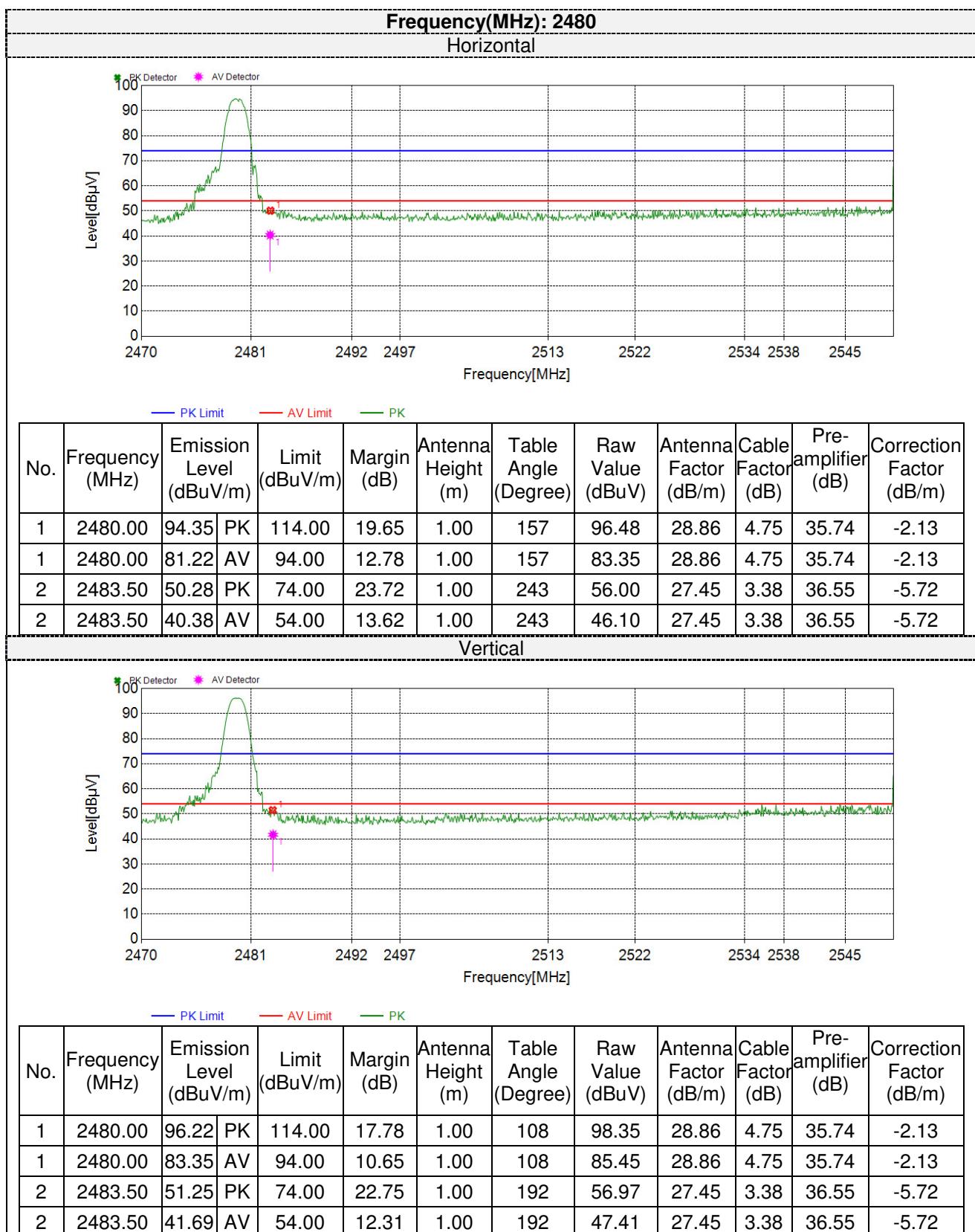






Bandedge Measurement



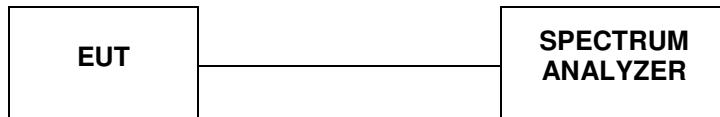


REMARKS:

1. Emission level (dB_{uV}/m) = Raw Value (dB_{uV}) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
7. For fundamental frequency, RBW 3MHz VBW 3MHz Peak detector is for PK Value ; RMS detector is for AV value.

4.3. Occupied Bandwidth Measurement

TEST CONFIGURATION



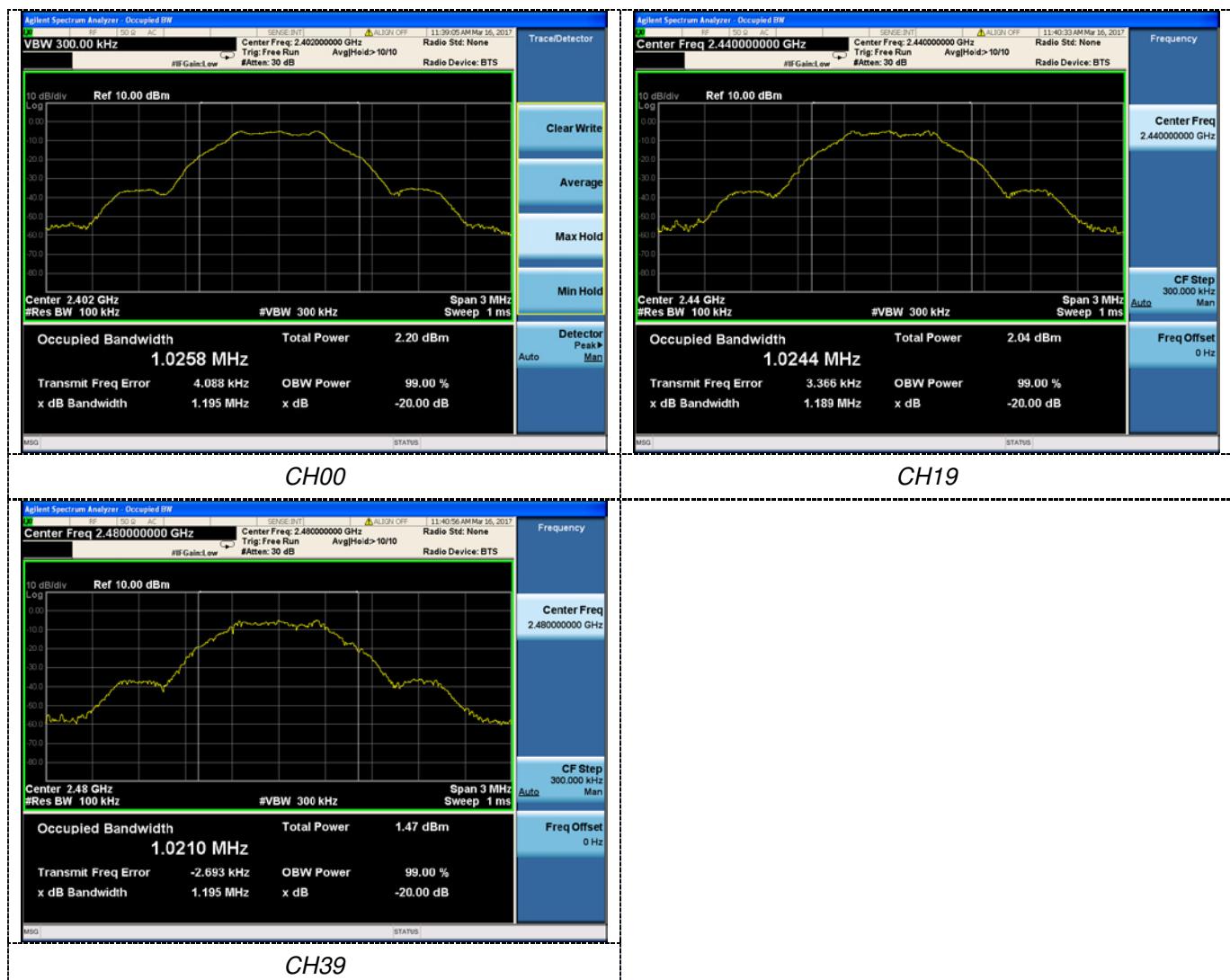
TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW.

TEST RESULTS

Type	Channel	99% OBW (MHz)	20dB bandwidth (MHz)	Result
GFSK	00	1.0258	1.195	Pass
	19	1.0244	1.189	
	39	1.0210	1.195	

Note: 1.The test results including the cable lose.



4.4. Antenna Requirement

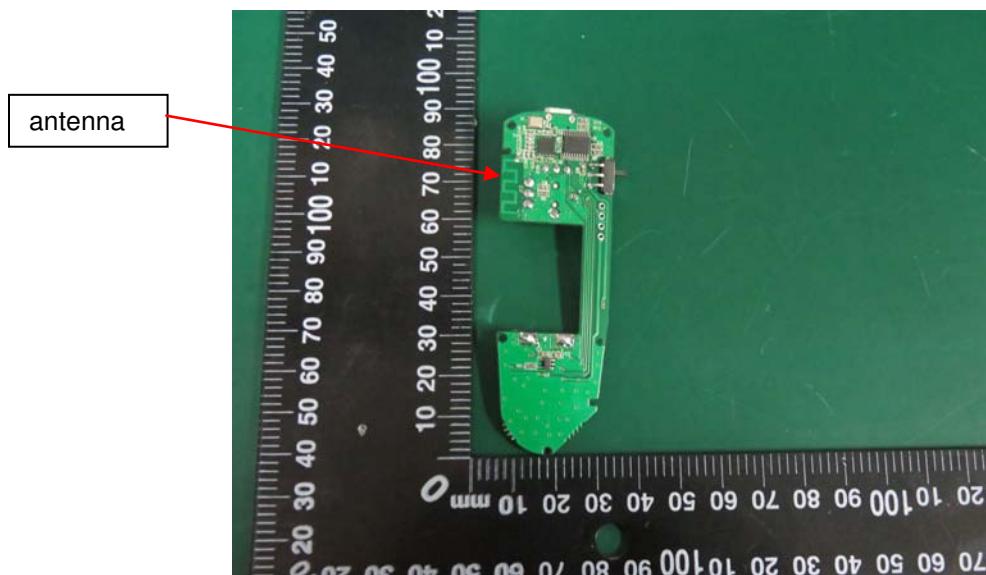
Standard Applicable

For intentional device, according to FCC 47 CFR 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.

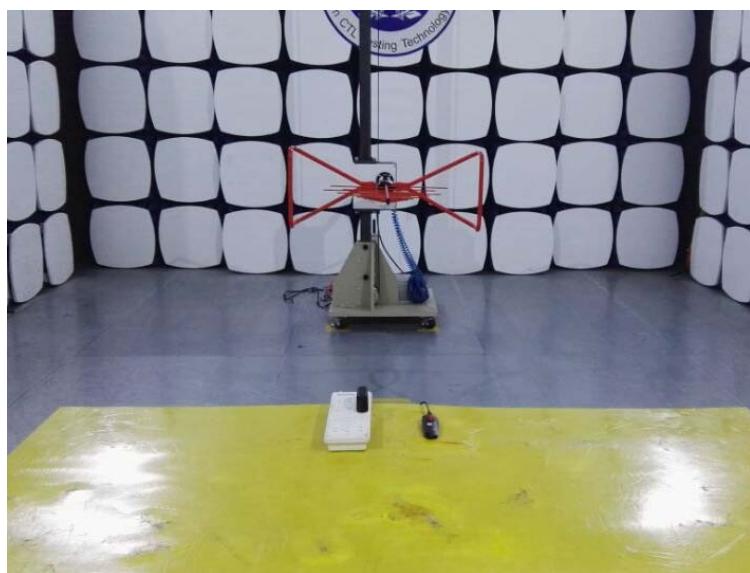
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

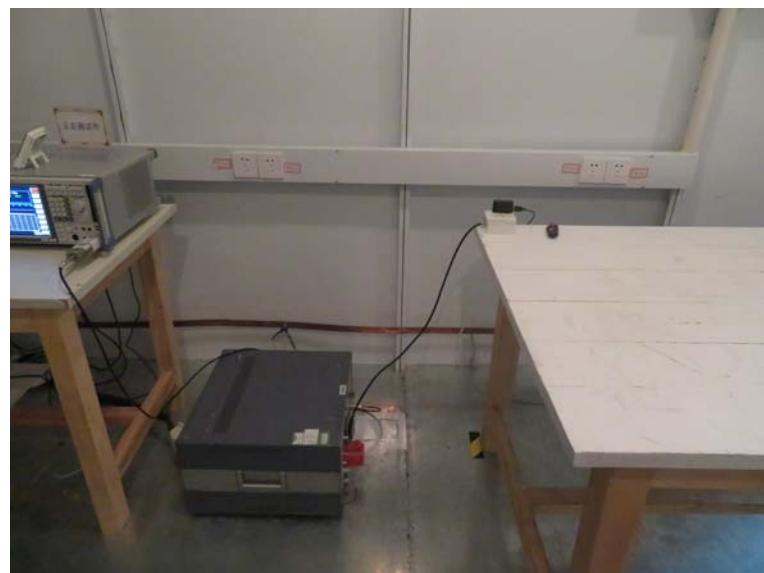
Antenna Information

The antenna is layout on PCB board, The directional gains of antenna used for transmitting is -1.2 dBi.



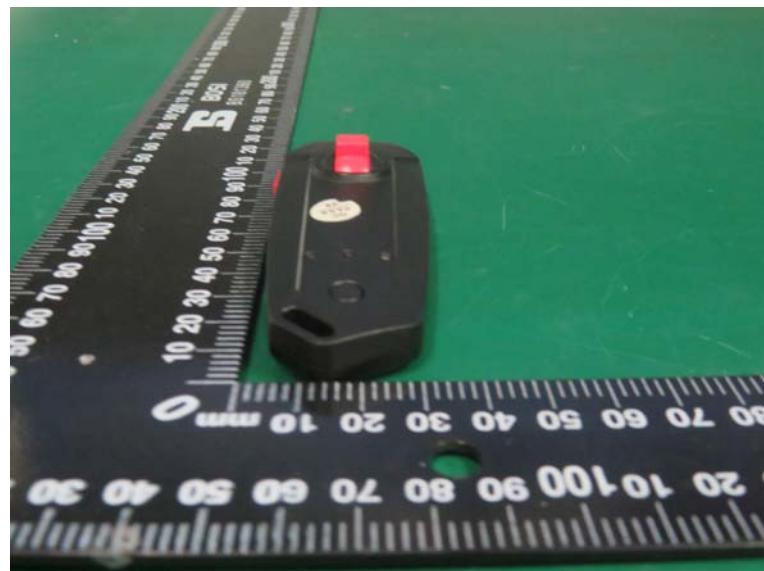
5. Test Setup Photos of the EUT

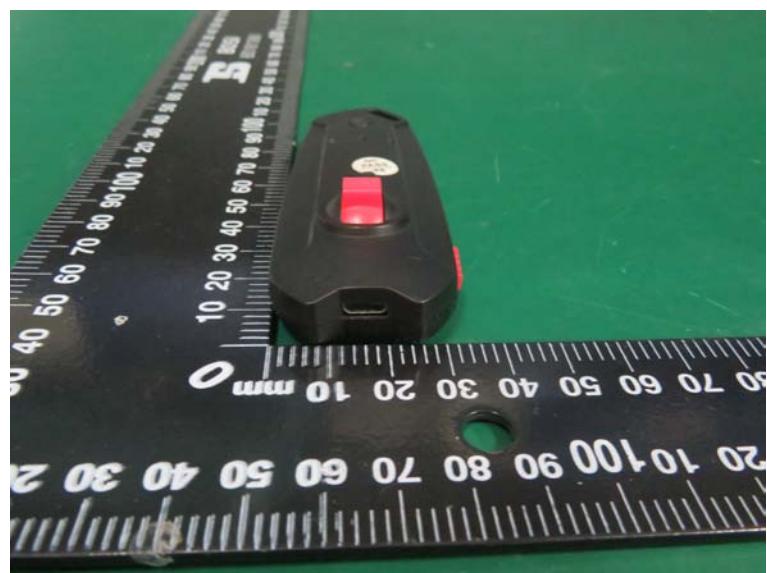
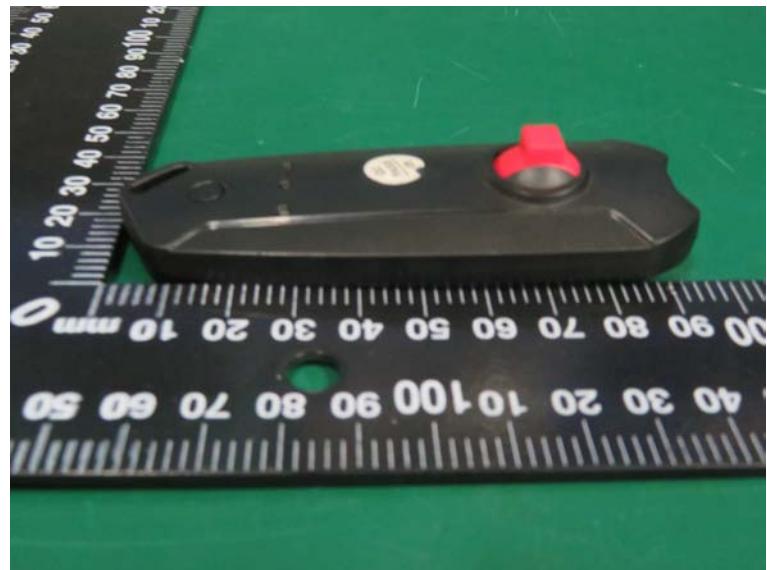




6. External and Internal Photos of the EUT

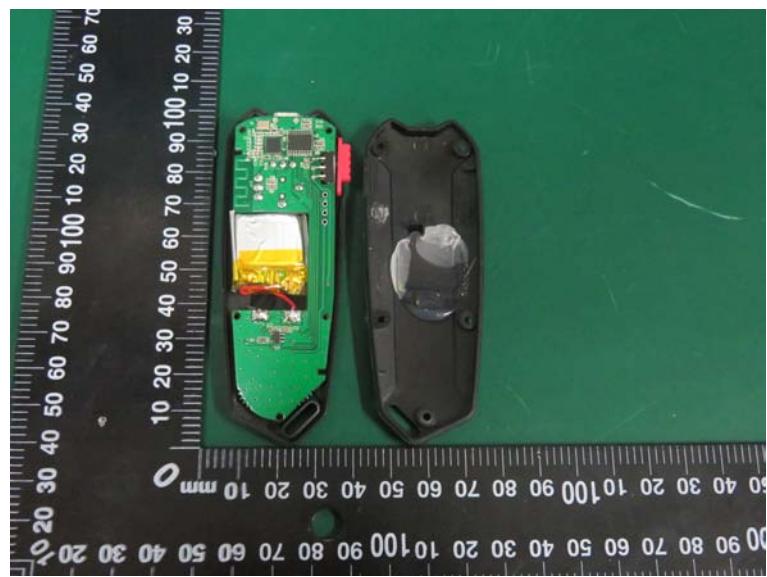
External Photos

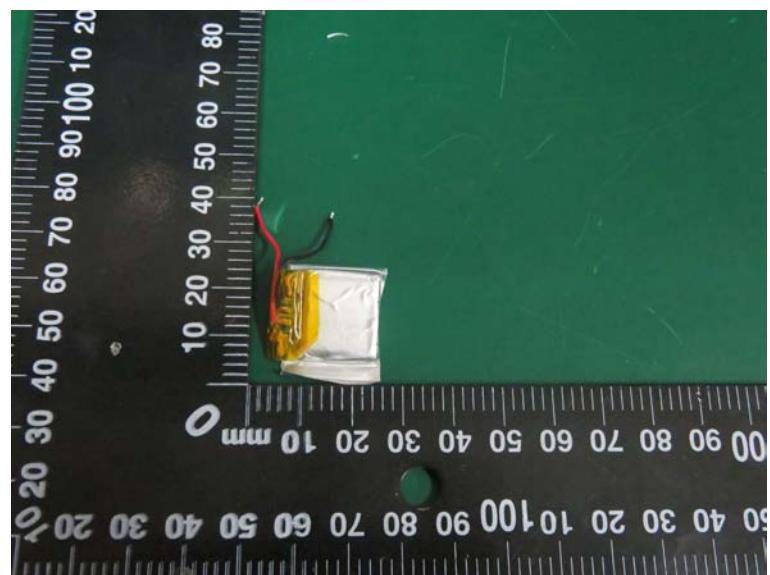
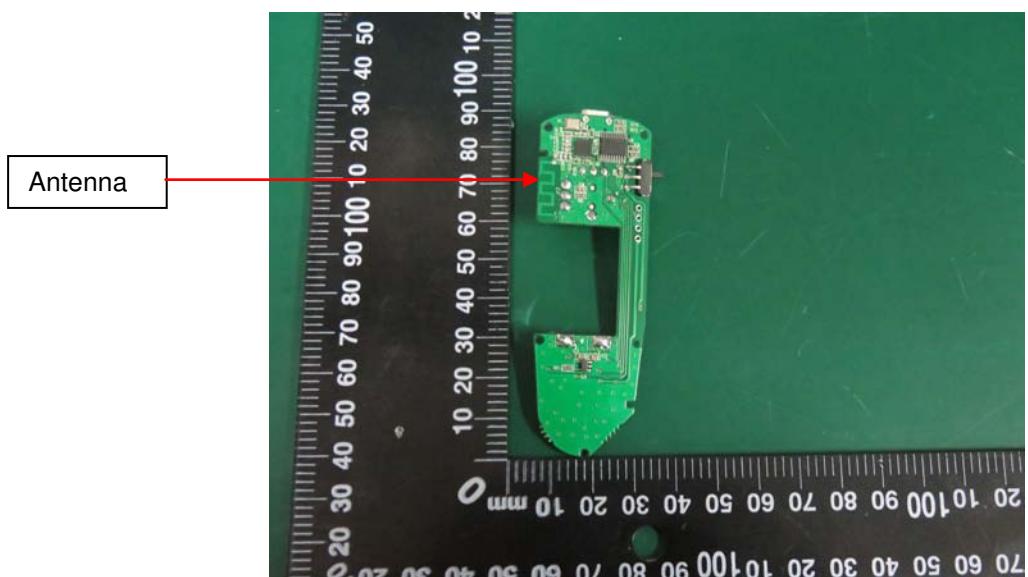
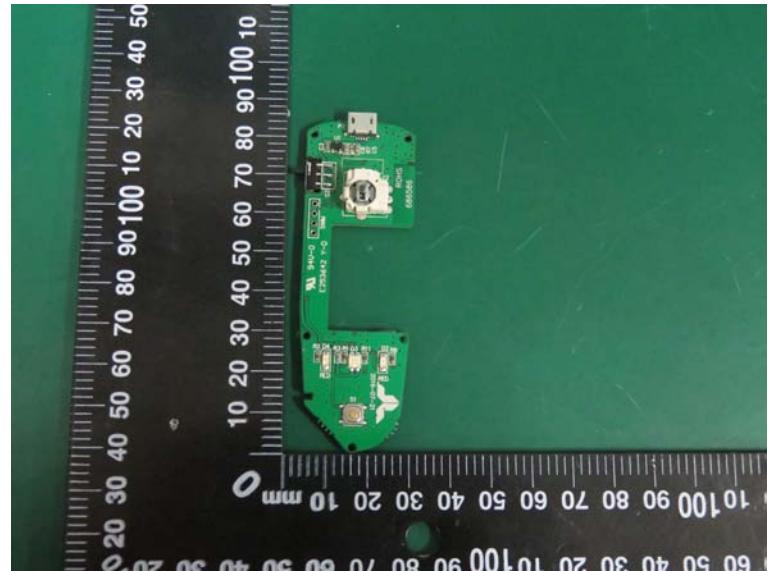






Internal Photos





.....End of Report.....