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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT

OF

PlayStation 4 USB Wireless Receiver

Model No.: 87421805

Trade Mark: Activision

FCC ID: XLU87421805

Report No.: KAD150618059E

Issue Date: August 20, 2015

Prepared for

Activision Publishing, Inc.
3100 Ocean Park Blvd., Santa Monica, CA90405, USA

Prepared by

DONGGUAN EMTEK CO., LTD.

No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China
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VERIFICATION OF COMPLIANCE

Applicant:	Activision Publishing, Inc. 3100 Ocean Park Blvd., Santa Monica, CA90405, USA
Manufacturer:	Shao Guan Early Light International Co., Ltd. Xuri Toy Industry Zone, 6Km the Western Suburbs of ShaoGuan City, GungDong, 512000, China
Product Description:	PlayStation 4 USB Wireless Receiver
Trade Mark:	Activision
Model Number:	87421805

We hereby certify that:

The above equipment was tested by DONGGUAN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249(2014).

Date of Test : June 18, 2015 to August 20, 2015

Prepared by : 

Ivy Huang/Editor

Reviewer : 

Alan He/Supervisor

Approved & Authorized Signer : 

Sam Lv/Manager

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	KAD150618059E

Table of Contents

1. General Information

1.1 Product Description

Characteristics	Description
Product Name	PlayStation 4 USB Wireless Receiver
Model number	87421805
Power Supply	DC 5V
Modulation	GFSK
Operating Frequency Range	2402-2479MHz
Number of Channels	70
Data Rate	2Mbps
Antenna Type	Internal PCB antenna
Antenna Gain	2.22 dBi
Product Hardware version	V01
Product Software version	V1.10

1.2 Test Facility

Site Description

EMC Lab. : Registered on FCC, June 18, 2014
The Certificate Number is 247565

Registered on Industry Canada, February 19, 2014
The Certificate Number is 9444A.

Name of Firm : DONGGUAN EMTEK CO., LTD.

Site Location : No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China

2. Test Configuration

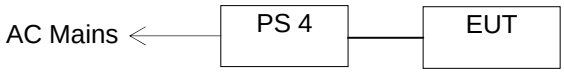


Table 2-1 Equipment Used in Tested System

Item	Equipment	Trade Mark	Model No.	FCC ID	Note
1.	PlayStation 4 USB Wireless Receiver	Activision	87421805	XLU87421805	EUT
2.	PlayStation 4	Sony	N/A	N/A	Support Equipment

Note:

(1) Unless otherwise denoted as EUT in『Remark』column , device(s) used in tested system is a support equipment.

3. Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207	AC Power Conducted Emission	Complies
§15.215(c)	20dB Bandwidth	Complies
§15.249/15.205	Band Edge	Complies
§15.249(a)	Field Strength of Fundamental Emissions	Complies
§15.249(a)(d)	Radiated Spurious Emissions	Complies
§15.203	Antenna Requirements	Complies

4. Description of test modes

For Radiated: The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	**X-Y axis**
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in Mode B. Therefore only the test data of the mode was recorded in this report.

Channel List:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
CH0	**2402**	CH20	2426	CH40	2446	CH60	2466
CH1	2407	CH21	2427	CH41	2447	CH61	2467
CH2	2408	CH22	2428	CH42	2448	CH62	2468
CH3	2409	CH23	2429	CH43	2449	CH63	2469
CH4	2410	CH24	2430	CH44	2450	CH64	2470
CH5	2411	CH25	2431	CH45	2451	CH65	2471
CH6	2412	CH26	2432	CH46	2452	CH66	2472
CH7	2413	CH27	2433	CH47	2453	CH67	2473
CH8	2414	CH28	2434	CH48	2454	CH68	2474
CH9	2415	CH29	2435	CH49	2455	**CH69**	**2479**
CH10	2416	CH30	2436	CH50	2456		
CH11	2417	CH31	2437	CH51	2457		
CH12	2418	CH32	2438	CH52	2458		
CH13	2419	CH33	2439	CH53	2459		
CH14	2420	**CH34**	**2440**	CH54	2460		
CH15	2421	CH35	2441	CH55	2461		
CH16	2422	CH36	2442	CH56	2462		
CH17	2423	CH37	2443	CH57	2463		
CH18	2424	CH38	2444	CH58	2464		
CH19	2425	CH39	2445	CH59	2465		

The 3 channels of lower, medium and higher were chosen for test.

Channel	**Frequency(MHz)**
0	2402
34	2440
69	2479

5. TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Power Density	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5℃
Humidity	±3%

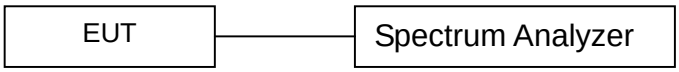
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%.

6. 20dB Bandwidth test

6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Characteristics	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSV30	1321.3008K	10Hz-30GHz	03/15/2015	03/14/2016
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	03/15/2015	03/14/2016
Antenna Connector	ARTHUR-YANG	2244-N1TG1	N/A	10Hz-30GHz	03/15/2015	03/14/2016

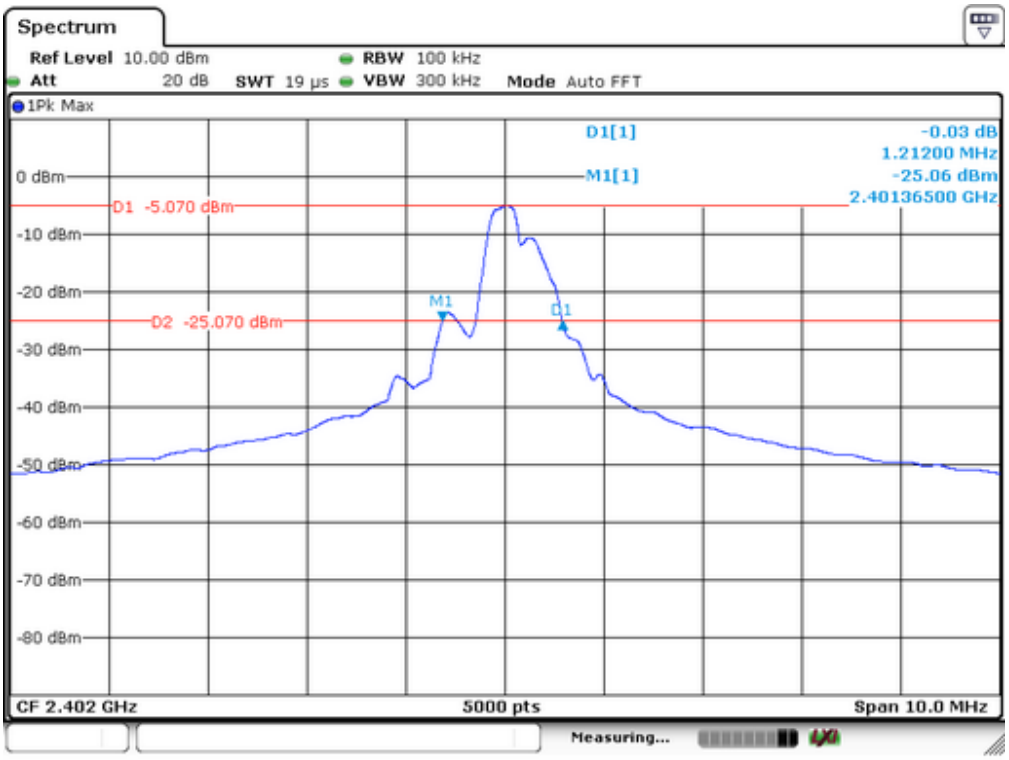
Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.
The cable loss is 0.4dBm, and impedance is 50 Ω for the antenna connector.

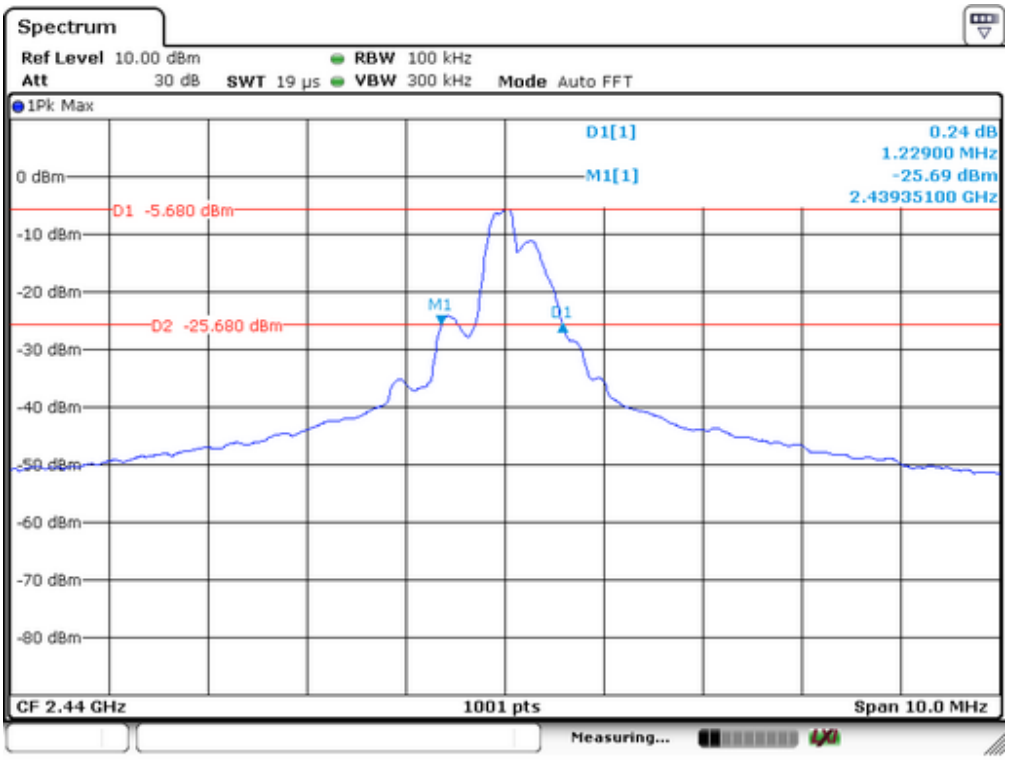
6.4 Measurement Results:

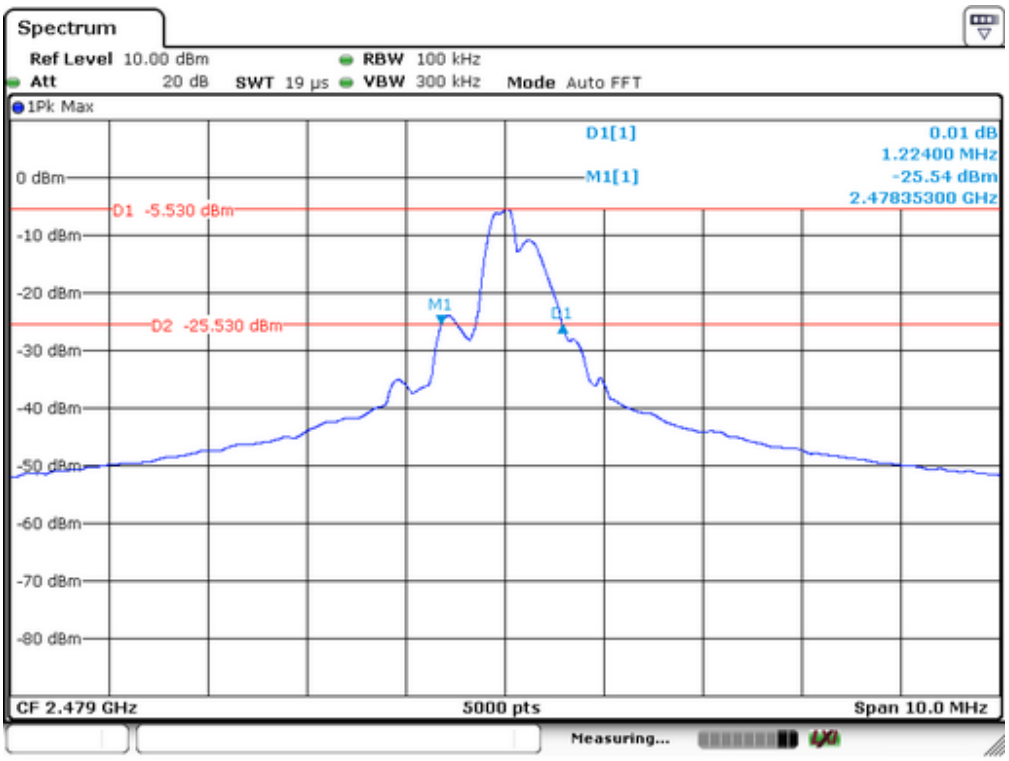
Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	July 20, 2015
Test By:	Andy	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Modulation:	GFSK		

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
0	2402	1212
34	2440	1229
69	2479	1224


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D1[1]
-0.03 dB
1.21200 MHz
M1[1]
-25.06 dBm
2.40136500 GHz
0 dBm
D1 -5.070 dBm
-10 dBm
-20 dBm
D2 -25.070 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.402 GHz
5000 pts
Span 10.0 MHz
Measuring...


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D1[1]
0.24 dB
1.22900 MHz
M1[1]
-25.69 dBm
2.43935100 GHz
0 dBm
D1 -5.680 dBm
-10 dBm
-20 dBm
D2 -25.680 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44 GHz
1001 pts
Span 10.0 MHz
Measuring...


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D1[1]
0.01 dB
1.22400 MHz
M1[1]
-25.54 dBm
2.47835300 GHz
0 dBm
D1 -5.530 dBm
-10 dBm
-20 dBm
M1
D2 -25.530 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.479 GHz
5000 pts
Span 10.0 MHz
Measuring...

7. Band EDGE test

7.1 Measurement Procedure

The EUT was placed on a styrofoam table which is 1.5m above ground plane.

The measurement procedure at the ban edges was simplified by performing the measurement in just one plot. Both, the in-band-emission and the unwanted emission were be encompassed by the span. After trace stabilization, the maximum peak was be determined by a peak detector and the value was marked by an appropriate limit line. The second limit line, which is 20dB below the first, marks the limit for the emissions in the unrestricted band. A maximum-peak-detector marks the highest emission in the unrestricted band next to the band edge.

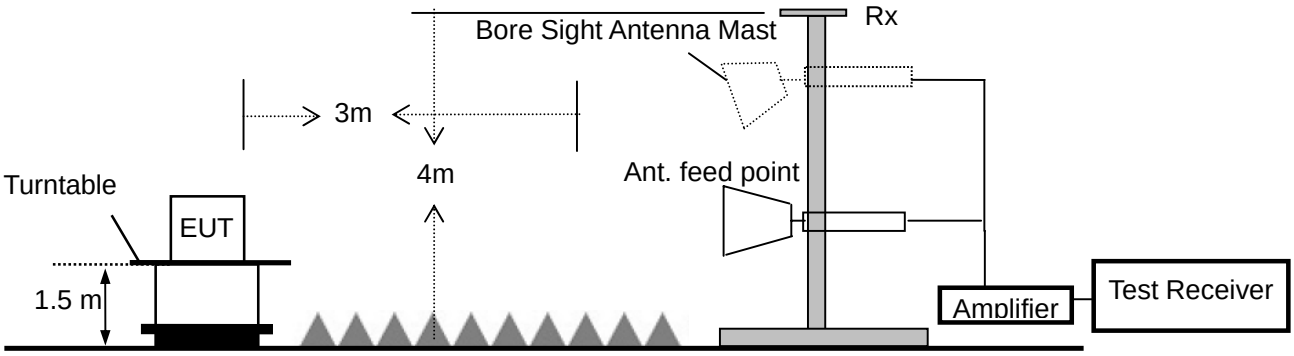
The measurements were performed at the lower end of the 2.4GHz band.

Use the following spectrum analyzer settings:

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Equipment Used:

Item	Equipment	Manufacturer	Model No.	Serial No.	Characteristics	Last Cal.	Cal. Interval
1	Signal Analyzer	Rohde & Schwarz	FSV30	103040	9KHz-40GHz	12/29/2014	1 Year
2	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1272	1GHz-18GHz	12/29/2014	1 Year
3	Boresight Antenna Tower	EMEC	AM-BS-4500-D	N/A	N/A	12/29/2014	1 Year
4	Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	12/29/2014	1 Year
5	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	12/29/2014	1 Year
6	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	12/29/2014	1 Year
7	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	12/29/2014	1 Year

7.4 Measurement Results:

Spectrum Detector:	PK	Test Date :	July 20, 2015
Test By:	Andy	Temperature :	25 ℃
Test Result:	PASS	Humidity :	50 %

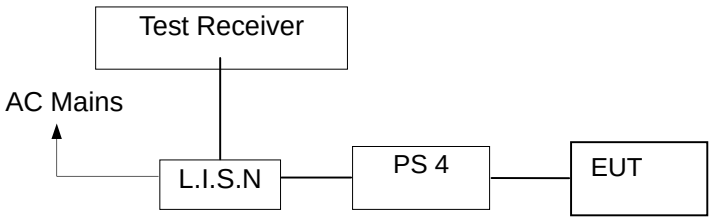
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
		PK	AV	PK	AV	PK	AV
2399.89	H	65.05	44.05	74	54	-8.95	-9.95
2399.15	V	59.35	40.39	74	54	-14.65	-13.61
2483.95	H	64.15	43.01	74	54	-9.85	-10.99
2484.15	V	58.73	37.46	74	54	-15.27	-16.54

8. Conducted Emissions Test

8.1 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used

Conducted Emission Test Site						
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**Characteristics**	**Last Cal.**	**Due date**
Test Receiver	Rohde & Schwarz	ESCS30	100018	9kHz~3GHz	03/15/2015	03/14/2016
L.I.S.N	Rohde & Schwarz	ENV216	100017	9KHz-300MHz	03/15/2015	03/14/2016
RF Switching Unit	CDS	RSU-M2	38401	9KHz-300MHz	03/15/2015	03/14/2016
Coaxial Cable	CDS	79254	46107086	9kHz~3GHz	03/15/2015	03/14/2016

8.4 Conducted Emission Limit

Conducted Emission

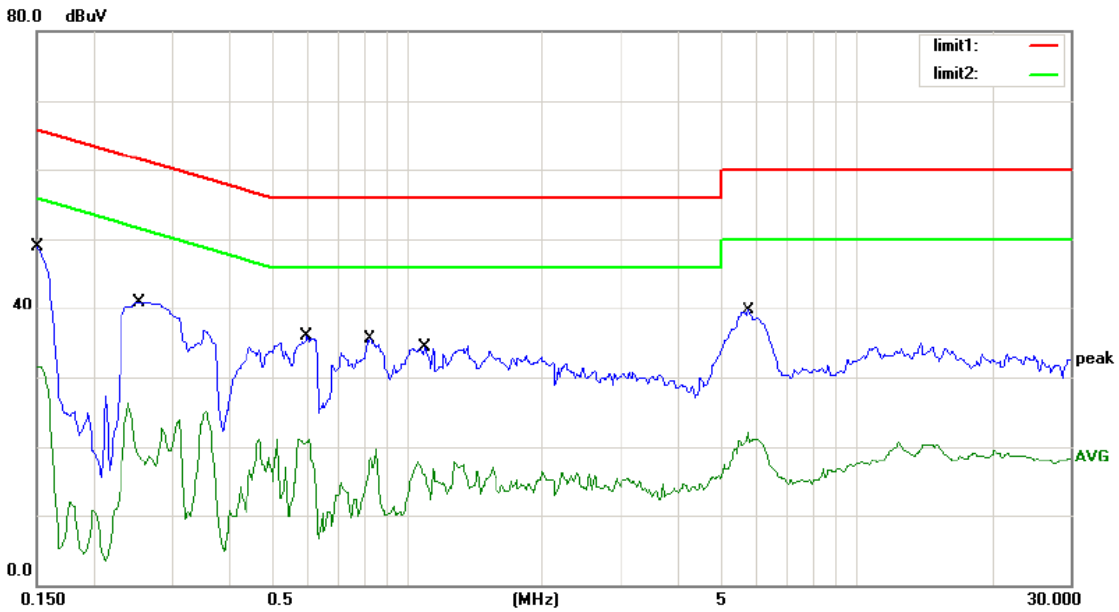
Frequency(MHz)	**Quasi-peak**	**Average**
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.5 Measurement Result

Pass.

Please refer to the following pages of the worst test mode (TX(2402MHz))



Site site #1 Phase: *L1* Temperature: 25

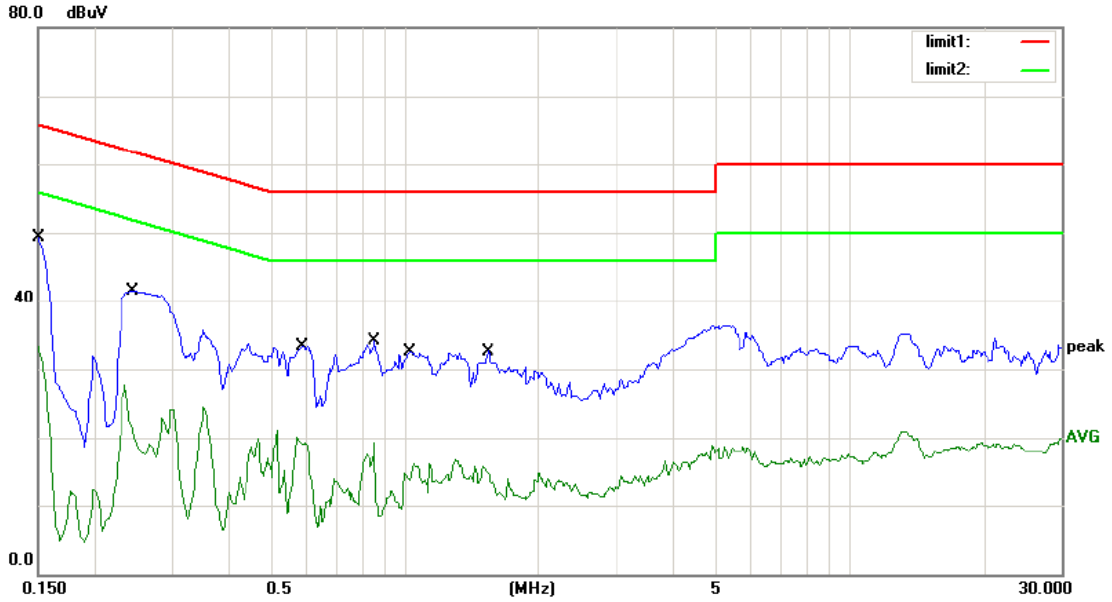
Limit: (CE)FCC PART 15 class B_QP Power: DC 5V (PS 4 input AC 120V/60Hz) Humidity: 50 %

Mode: TX2402

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	47.14	0.00	47.14	66.00	-18.86	QP	
2		0.1500	31.54	0.00	31.54	56.00	-24.46	AVG	
3		0.2535	37.68	0.00	37.68	61.64	-23.96	QP	
4		0.2535	26.22	0.00	26.22	51.64	-25.42	AVG	
5		0.6000	33.64	0.00	33.64	56.00	-22.36	QP	
6		0.6000	21.15	0.00	21.15	46.00	-24.85	AVG	
7		0.8295	33.14	0.00	33.14	56.00	-22.86	QP	
8		0.8295	19.65	0.00	19.65	46.00	-26.35	AVG	
9		1.0950	31.84	0.00	31.84	56.00	-24.16	QP	
10		1.0950	17.70	0.00	17.70	46.00	-28.30	AVG	
11		5.7700	36.87	0.00	36.87	60.00	-23.13	QP	
12		5.7700	22.10	0.00	22.10	50.00	-27.90	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.



Site site #1 Phase: *N* Temperature: 25

Limit: (CE)FCC PART 15 class B_QP Power: DC 5V (PS 4 input AC 120V/60Hz) Humidity: 50 %

Mode: TX2402

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	46.74	0.00	46.74	66.00	-19.26	QP	
2		0.1500	33.23	0.00	33.23	56.00	-22.77	AVG	
3		0.2444	38.67	0.00	38.67	61.95	-23.28	QP	
4		0.2444	27.76	0.00	27.76	51.95	-24.19	AVG	
5		0.5910	30.14	0.00	30.14	56.00	-25.86	QP	
6		0.5910	21.07	0.00	21.07	46.00	-24.93	AVG	
7		0.8610	31.74	0.00	31.74	56.00	-24.26	QP	
8		0.8610	19.38	0.00	19.38	46.00	-26.62	AVG	
9		1.0275	29.68	0.00	29.68	56.00	-26.32	QP	
10		1.0275	16.60	0.00	16.60	46.00	-29.40	AVG	
11		1.5404	29.47	0.00	29.47	56.00	-26.53	QP	
12		1.5404	15.66	0.00	15.66	46.00	-30.34	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.

8.6 Conducted Measurement Photos:

9. Radiated Emission Test

9.1 Measurement Procedure

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) 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.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.
6. Test Procedure of measurement (For Above 1GHz):
   1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).
   2) Change the antenna polarization and repeat 1) with vertical polarization.
   3) Make a hardcopy of the spectrum.
   4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
   5) Change the analyser mode to Clear/ Write and found the cone of emission.
   6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.
   7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.
   8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

The following table is the setting of spectrum analyzer:

When spectrum scanned from 30MHz to 1GHz setting resolution bandwidth 120KHz and video bandwidth 300KHz:

EMI Test Receiver	Setting
Attenuation	Auto
RB	120KHz
VB	300KHz
Detector	QP
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz:

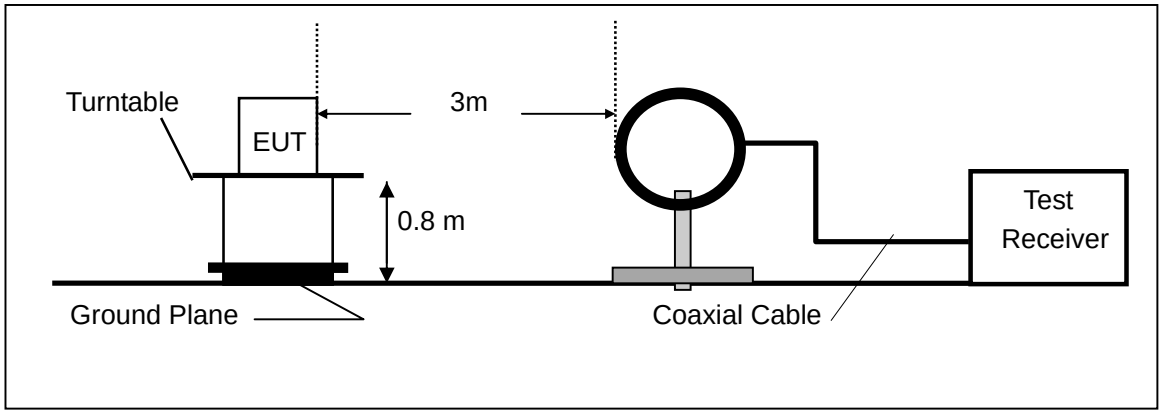
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	10Hz
Detector	Peak
Trace	Max hold

Remark:

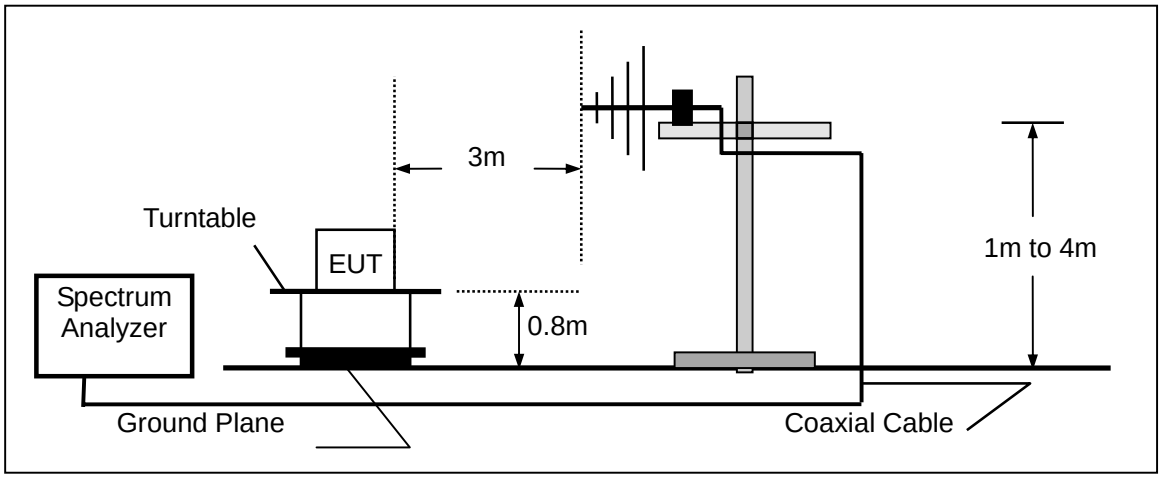
1. For Average measurement: use duty cycle correction factor method per 15.35(c).
   Duty Cycle= On time/100 milliseconds
   On time= N1*L1+N2*L2+….+Nn-1*LNn-1+Nn*Ln
   Where N1 is number for type 1 pulse, L1 is length of type 1 pulses, etc.
   Average Emission Level= Peak Emission Level+20log(Duty Cycle).

9.2 Test SET-UP (Block Diagram of Configuration)

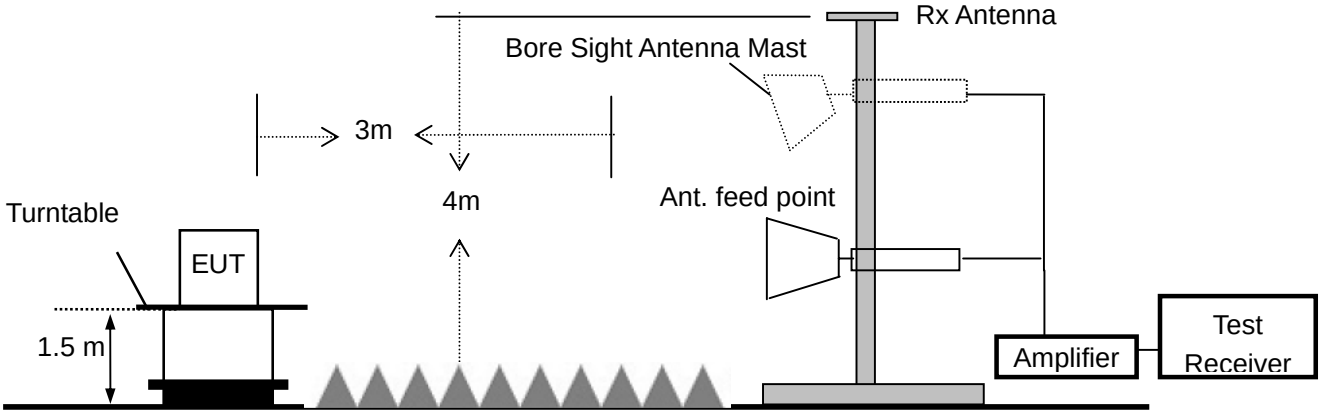
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



9.3 Measurement Equipment Used:

Item	Equipment	Manufacturer	Model No.	Serial No.	Characteristics	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	1166.5950.03	9KHz-3GHz	3/15/2015	1 Year
2.	Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	12/29/2014	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	000141	25MHz-2GHz	3/15/2015	1 Year
4.	Power Amplifier	CDS	RSU-M352	818	1MHz-1GHz	3/15/2015	1 Year
5.	Power Amplifier	HP	8447F	OPT H64	1GHz-26.5GHz	3/15/2015	1 Year
6.	Color Monitor	SUNSPO	SP-140A	N/A	--	3/15/2015	1 Year
7.	Single Line Filter	JIANLI	XL-3	N/A	--	3/15/2015	1 Year
8.	Single Phase Power Line Filter	JIANLI	DL-2X100B	N/A	--	3/15/2015	1 Year
9.	3 Phase Power Line Filter	JIANLI	DL-4X100B	N/A	--	3/15/2015	1 Year
10.	DC Power Filter	JIANLI	DL-2X50B	N/A	--	3/15/2015	1 Year
11.	Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	3/15/2015	1 Year
12.	Cable	Rosenberger	CIL02	A0783566	9KHz-3GHz	3/15/2015	1 Year
13.	Cable	Rosenberger	RG 233/U	525178	9KHz-3GHz	3/15/2015	1 Year
14.	Signal Analyzer	Rohde & Schwarz	FSV30	103040	9KHz-40GHz	12/29/2014	1 Year
15.	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1272	1GHz-18GHz	12/29/2014	1 Year
16.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	14GHz -26.5GHz	12/29/2014	1 Year
17.	Boresight Antenna Tower	EMEC	AM-BS-4500-D	N/A	N/A	12/29/2014	1 Year
18.	Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	12/29/2014	1 Year
19.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	12/29/2014	1 Year
20.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	12/29/2014	1 Year
21.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	12/29/2014	1 Year

9.4 Limit:

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

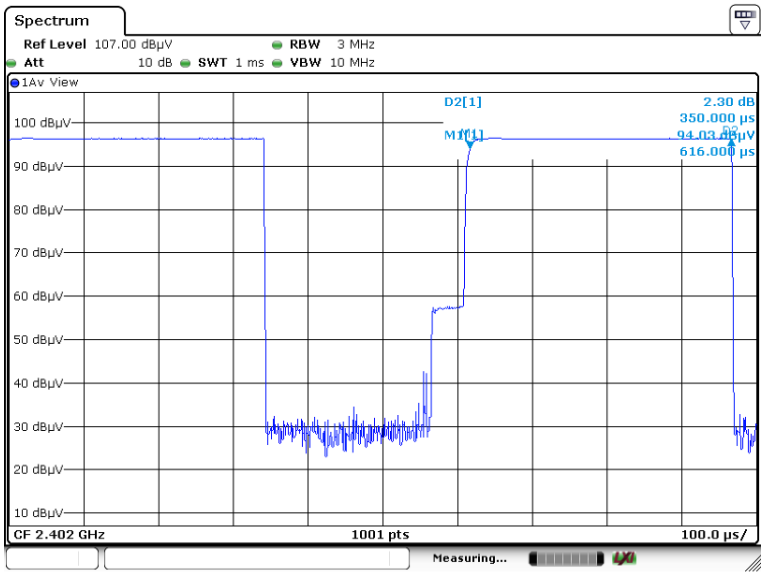
Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

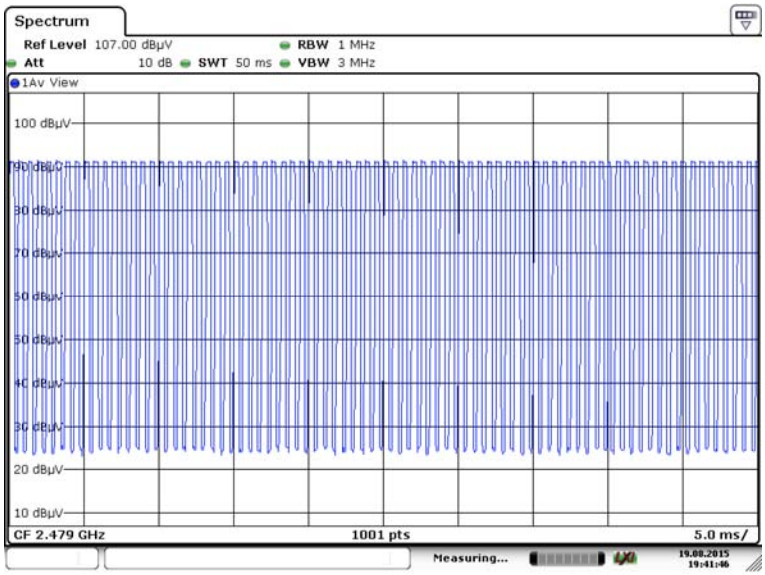
Frequency(MHz)	Filed Strength of Fundamental(at 3m)		Filed Strength of Harmonics(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
902-928	114	94	74.0	54.0
2400-2483.5	114	94	74.0	54.0
5725-5875	114	94	74.0	54.0
24000-24250	128	108	88.0	68.0

9.5 Duty Cycle Correction Factor for Average Measurement

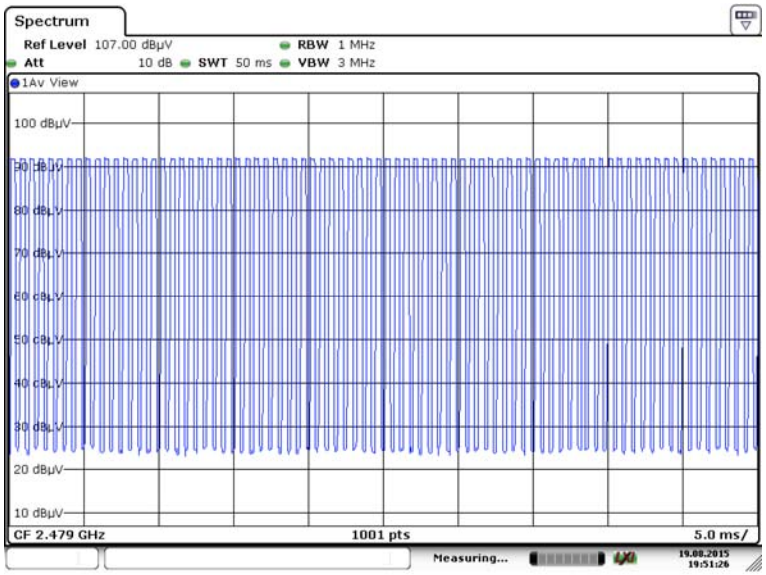
On time(One Pulse) Plot



On Time(Count Pulses) Plot



1-50ms



51-100ms

Note:

1. Worst case Duty Cycle=on time/100 milliseconds=(81+80)*0.350/100=56.35%
2. Worst case Duty Cycle correction factor=20*log(Duty Cycle)=-4.98dB

9.6 Measurement Result

Below 30MHz:

Operation Mode:	TX	Test Date :	July 20, 2015
Frequency Range:	9KHz~30MHz	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	Andy

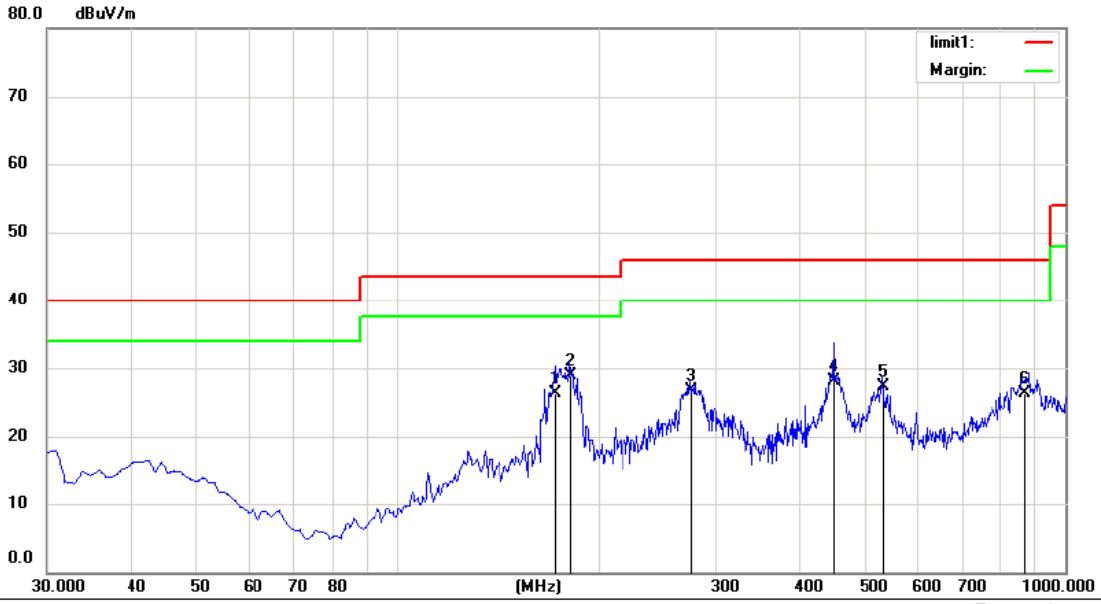
Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Below 1000MHz:

Pass.

Please refer to the following data.



Site Chamber #1 Polarization: **Horizontal** Temperature: 24

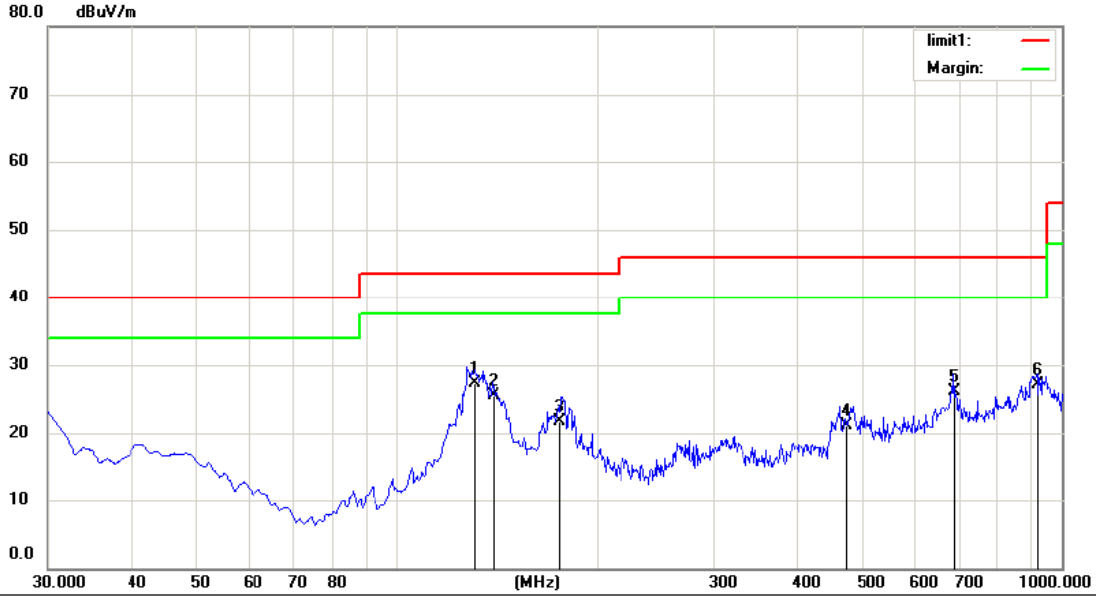
Limit: (RE)FCC PART 15 class B 3m Power: DC 5V (PS 4 input AC 120V/60Hz) Humidity: 55 %

Mode: TX 2402

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		172.5900	44.96	-18.57	26.39	43.50	-17.11	QP			
2	*	181.3200	47.63	-18.73	28.90	43.50	-14.60	QP			
3		274.4400	41.78	-15.06	26.72	46.00	-19.28	QP			
4		450.0100	39.31	-11.21	28.10	46.00	-17.90	QP			
5		534.4000	36.88	-9.51	27.37	46.00	-18.63	QP			
6		870.0200	30.55	-4.31	26.24	46.00	-19.76	QP			

*:Maximum data x:Over limit !:over margin Operator: Jack



Site Chamber #1 Polarization: **Vertical** Temperature: 24

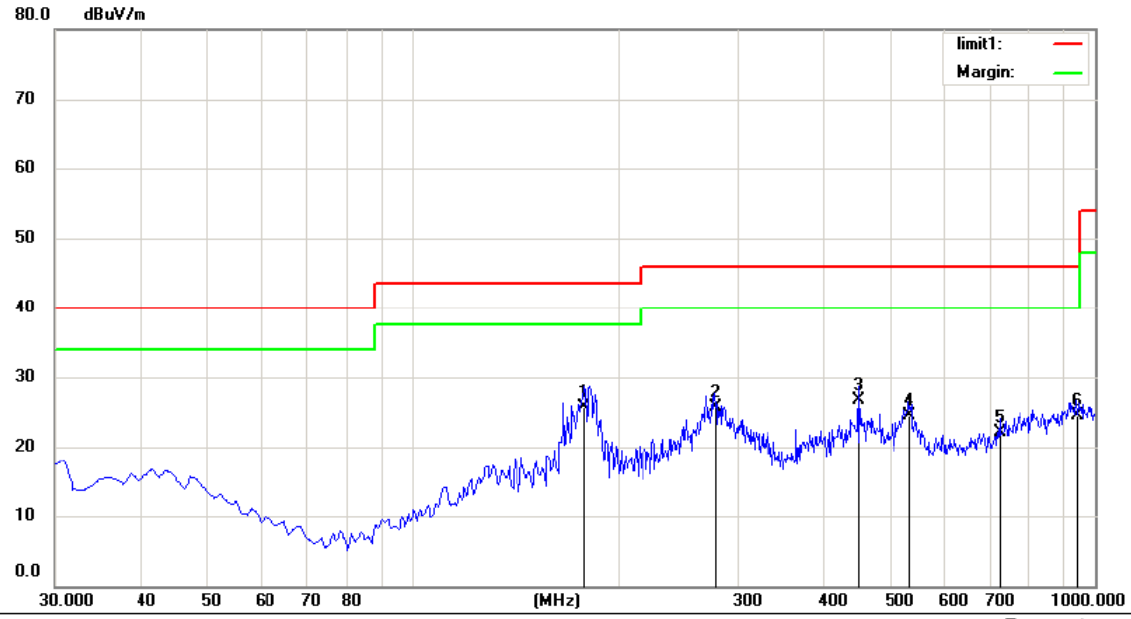
Limit: (RE)FCC PART 15 class B 3m Power: DC 5V (PS 4 input AC 120V/60Hz) Humidity: 55 %

Mode: TX 2402

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	130.8800	43.77	-16.38	27.39	43.50	-16.11	QP			
2		139.6100	42.46	-17.00	25.46	43.50	-18.04	QP			
3		175.5000	40.46	-18.70	21.76	43.50	-21.74	QP			
4		473.2900	31.85	-10.71	21.14	46.00	-24.86	QP			
5		687.6600	33.54	-7.44	26.10	46.00	-19.90	QP			
6		919.4900	29.98	-2.82	27.16	46.00	-18.84	QP			

*:Maximum data x:Over limit !:over margin Operator: Jack



Site Chamber #1 Polarization: **Horizontal** Temperature: 24

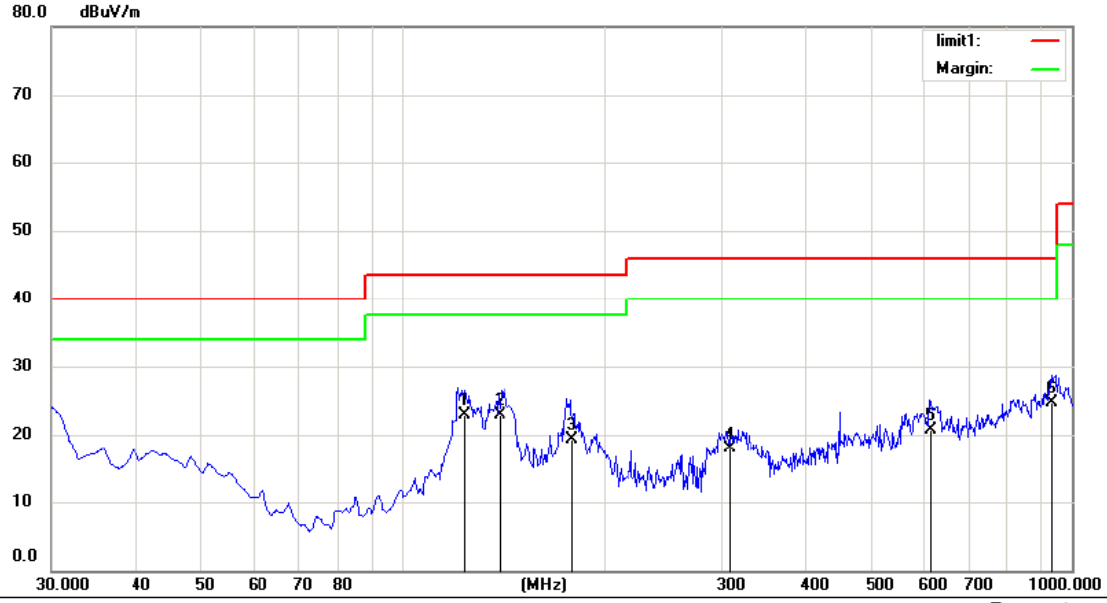
Limit: (RE)FCC PART 15 class B 3m Power: DC 5V (PS 4 input AC 120V/60Hz) Humidity: 55 %

Mode: TX 2440

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	178.4100	44.58	-18.79	25.79	43.50	-17.71	QP			
2		277.3500	40.59	-14.97	25.62	46.00	-20.38	QP			
3		450.0100	37.85	-11.21	26.64	46.00	-19.36	QP			
4		534.4000	33.96	-9.51	24.45	46.00	-21.55	QP			
5		726.4600	28.50	-6.45	22.05	46.00	-23.95	QP			
6		938.8900	27.18	-2.58	24.60	46.00	-21.40	QP			

*:Maximum data x:Over limit !:over margin Operator: Jack



Site Chamber #1 Polarization: **Vertical** Temperature: 24

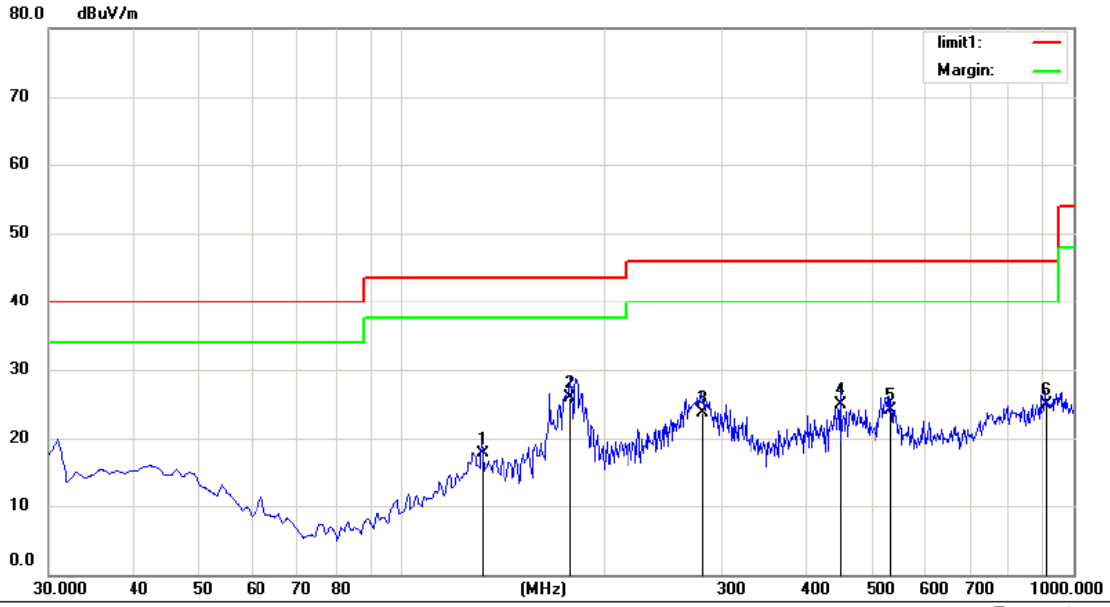
Limit: (RE)FCC PART 15 class B 3m Power: DC 5V (PS 4 input AC 120V/60Hz) Humidity: 55 %

Mode: TX 2440

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	124.0900	39.45	-16.50	22.95	43.50	-20.55	QP			
2		139.6100	39.88	-17.00	22.88	43.50	-20.62	QP			
3		179.3800	38.05	-18.81	19.24	43.50	-24.26	QP			
4		308.3900	31.69	-13.87	17.82	46.00	-28.18	QP			
5		614.9100	28.93	-8.32	20.61	46.00	-25.39	QP			
6		934.0400	27.22	-2.57	24.65	46.00	-21.35	QP			

*:Maximum data x:Over limit !:over margin Operator: Jack



Site Chamber #1 Polarization: **Horizontal** Temperature: 24

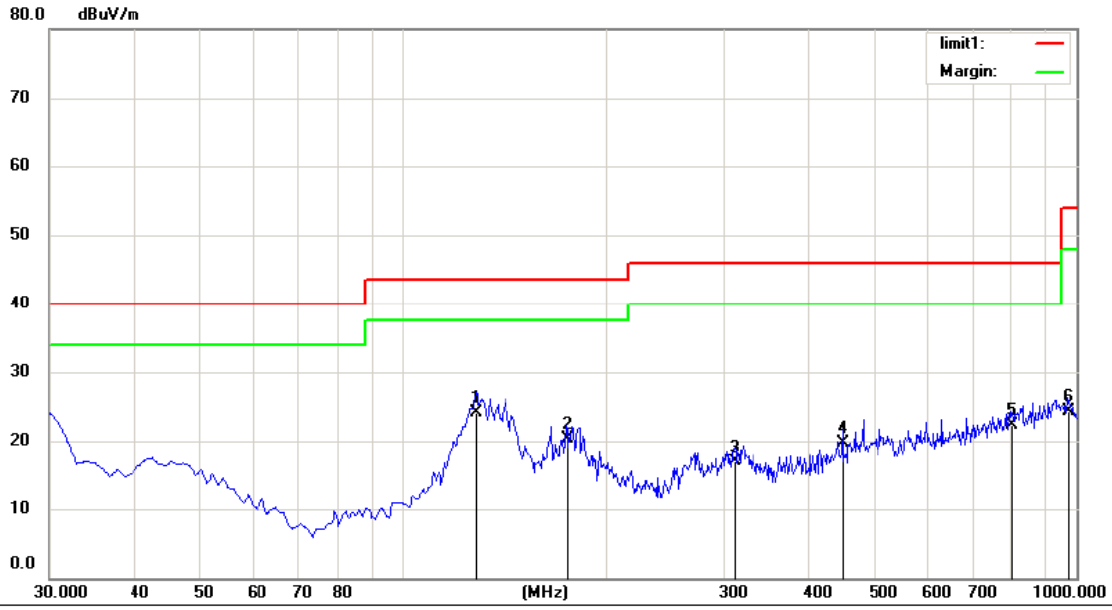
Limit: (RE)FCC PART 15 class B 3m Power: DC 5V (PS 4 input AC 120V/60Hz) Humidity: 55 %

Mode: TX 2479

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		131.8500	34.01	-16.34	17.67	43.50	-25.83	QP			
2	*	178.4100	44.70	-18.79	25.91	43.50	-17.59	QP			
3		280.2600	38.55	-14.90	23.65	46.00	-22.35	QP			
4		450.0100	36.11	-11.21	24.90	46.00	-21.10	QP			
5		534.4000	33.70	-9.51	24.19	46.00	-21.81	QP			
6		911.7300	28.12	-3.13	24.99	46.00	-21.01	QP			

*:Maximum data x:Over limit !:over margin Operator: Jack



Site Chamber #1 Polarization: **Vertical** Temperature: 24

Limit: (RE)FCC PART 15 class B 3m Power: DC 5V (PS 4 input AC 120V/60Hz) Humidity: 55 %

Mode: TX 2479

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	128.1130	40.44	-16.37	24.07	43.50	-19.43	QP			
2		175.5000	38.95	-18.70	20.25	43.50	-23.25	QP			
3		310.3300	30.74	-13.77	16.97	46.00	-29.03	QP			
4		450.0100	30.99	-11.21	19.78	46.00	-26.22	QP			
5		802.1200	27.27	-5.06	22.21	46.00	-23.79	QP			
6		968.9600	26.96	-2.72	24.24	54.00	-29.76	QP			

*:Maximum data x:Over limit !:over margin Operator: Jack

Above 1000MHz~10th Harmonics:

Operation Mode: GFSK (CH0: 2402MHz) Test Date : July 20, 2015

Freq.	Ant. Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
2402(F)	V	95.33	90.35	114	94	-18.67	-3.65
4804	V	53.24	48.26	74	54	-20.76	-5.74
7206	V	52.04	47.06	74	54	-21.96	-6.94
9608	V	51.49	46.51	74	54	-22.51	-7.49
12010	V	50.73	45.75	74	54	-23.27	-8.25
14412	V	49.25	44.27	74	54	-24.75	-9.73
16814	V	48.35	43.37	74	54	-25.65	-10.63
2402(F)	H	94.75	89.77	114	94	-19.25	-4.23
4804	H	52.15	47.17	74	54	-21.85	-6.83
7206	H	51.43	46.45	74	54	-22.57	-7.55
9608	H	50.09	45.11	74	54	-23.91	-8.89
12010	H	49.33	44.35	74	54	-24.67	-9.65
14412	H	48.04	43.06	74	54	-25.96	-10.94
16814	H	47.28	42.3	74	54	-26.72	-11.7

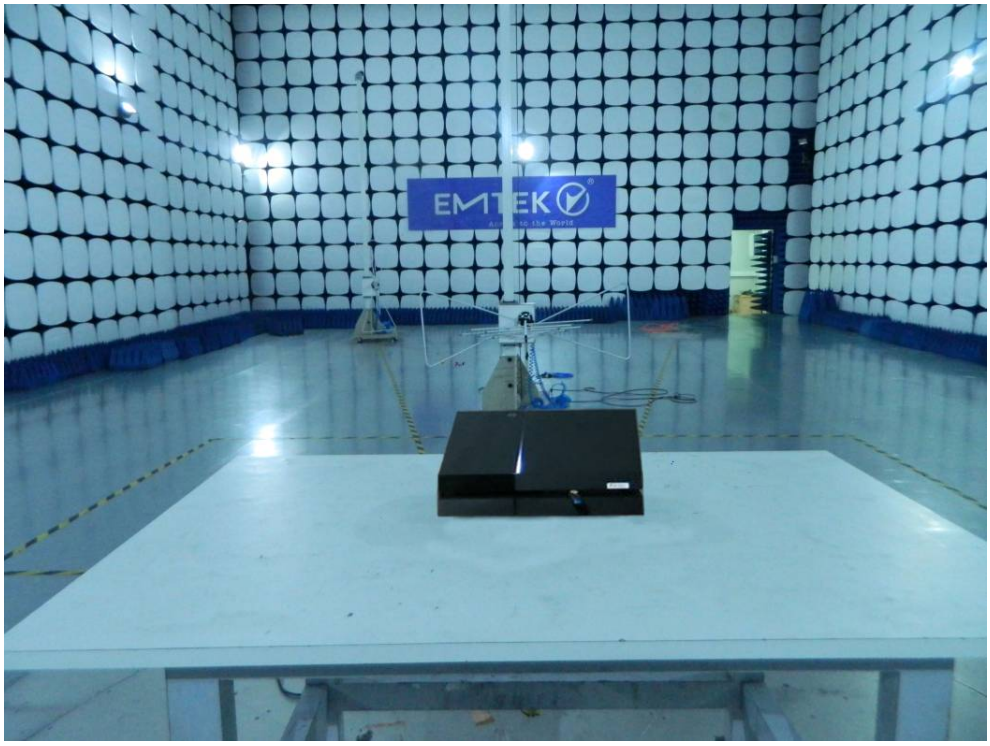
Operation Mode: GFSK (CH34: 2440MHz) Test Date : July 20, 2015

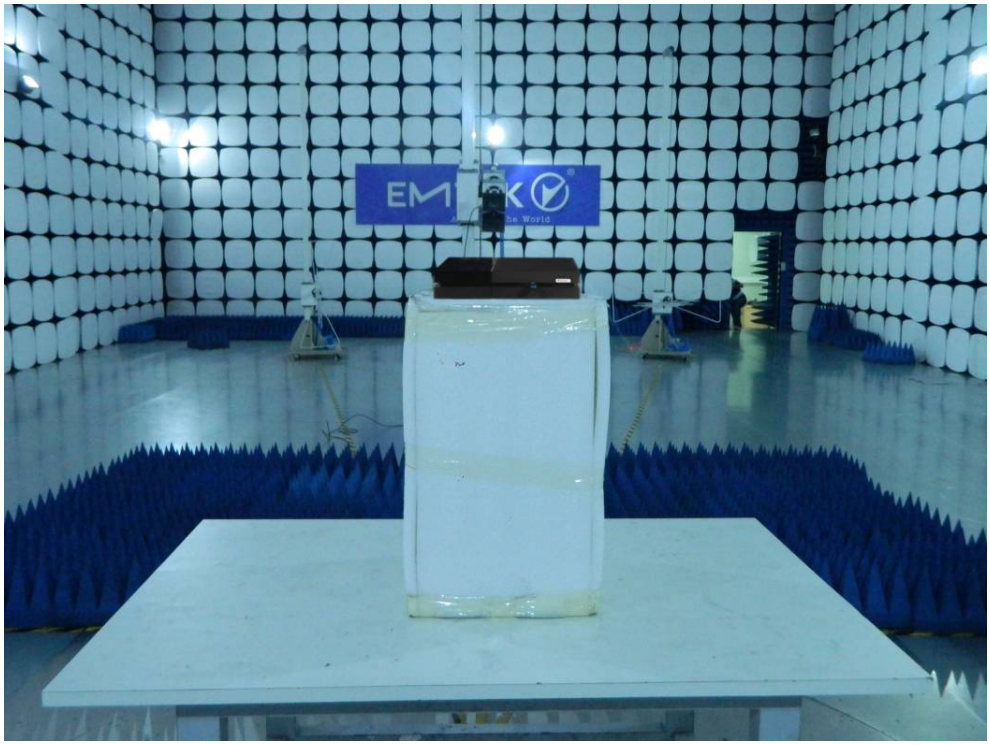
Freq.	Ant. Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
2440(F)	V	94.25	89.27	114	94	-19.75	-4.73
4880	V	53.17	48.19	74	54	-20.83	-5.81
7320	V	52.47	47.49	74	54	-21.53	-6.51
9760	V	51.06	46.08	74	54	-22.94	-7.92
12200	V	50.72	45.74	74	54	-23.28	-8.26
14640	V	49.38	44.4	74	54	-24.62	-9.6
17080	V	48.25	43.27	74	54	-25.75	-10.73
2440(F)	H	94.47	89.49	114	94	-19.53	-4.51
4880	H	52.46	47.48	74	54	-21.54	-6.52
7320	H	51.04	46.06	74	54	-22.96	-7.94
9760	H	50.72	45.74	74	54	-23.28	-8.26
12200	H	49.73	44.75	74	54	-24.27	-9.25
14640	H	48.12	43.14	74	54	-25.88	-10.86
17080	H	47.05	42.07	74	54	-26.95	-11.93

Operation Mode: GFSK (CH69: 2479MHz) Test Date : July 20, 2015

Freq.	Ant. Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
2479(F)	V	93.75	88.77	114	94	-20.25	-5.23
4958	V	55.24	50.26	74	54	-18.76	-3.74
7437	V	54.01	49.03	74	54	-19.99	-4.97
9916	V	53.27	48.29	74	54	-20.73	-5.71
12395	V	52.79	47.81	74	54	-21.21	-6.19
14874	V	51.06	46.08	74	54	-22.94	-7.92
17353	V	50.72	45.74	74	54	-23.28	-8.26
2479(F)	H	94.36	89.38	114	94	-19.64	-4.62
4958	H	54.73	49.75	74	54	-19.27	-4.25
7437	H	53.49	48.51	74	54	-20.51	-5.49
9916	H	52.05	47.07	74	54	-21.95	-6.93
12395	H	51.72	46.74	74	54	-22.28	-7.26
14874	H	50.49	45.51	74	54	-23.51	-8.49
17353	H	49.38	44.4	74	54	-24.62	-9.6

9.5 Radiated Measurement Photos:





9. Antenna requirement

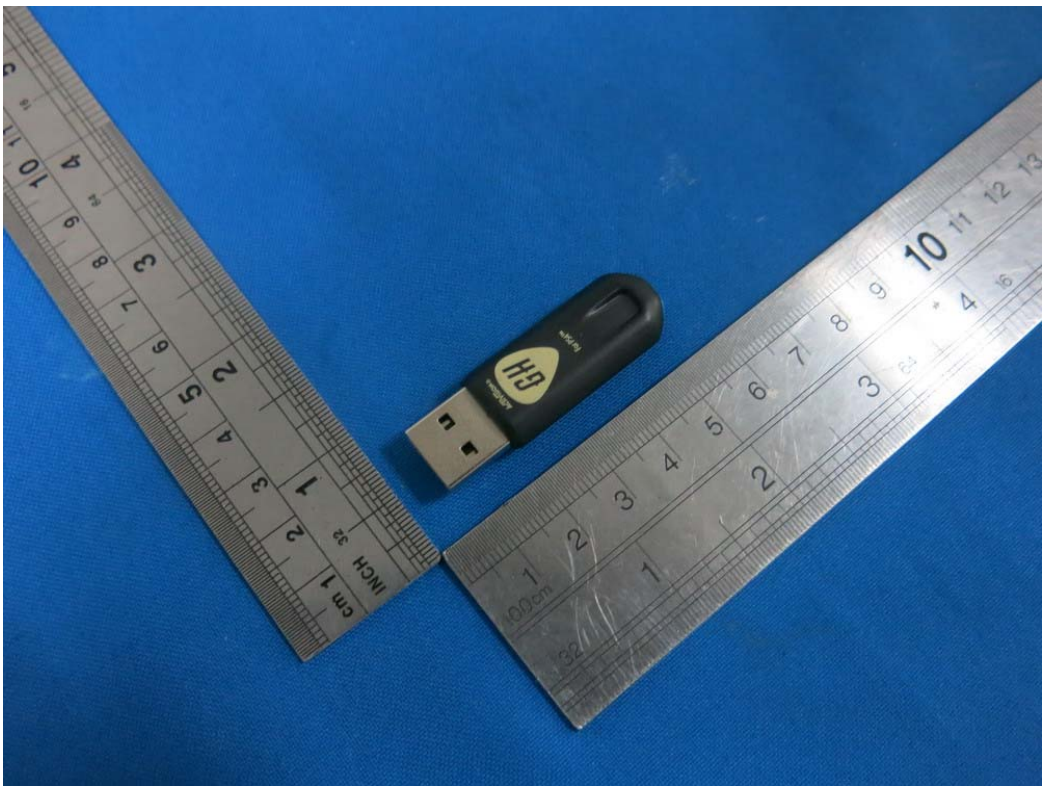
9.1 Limit

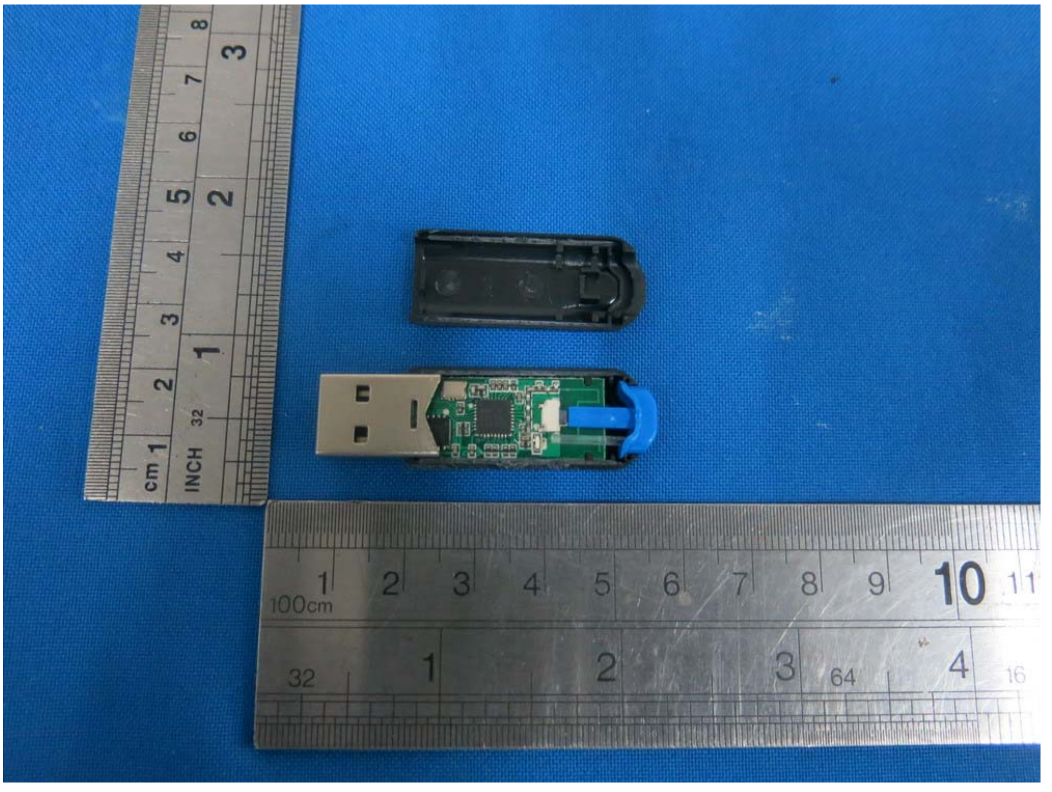
Except for special regulations, the Low-power Radio-Frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacture may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

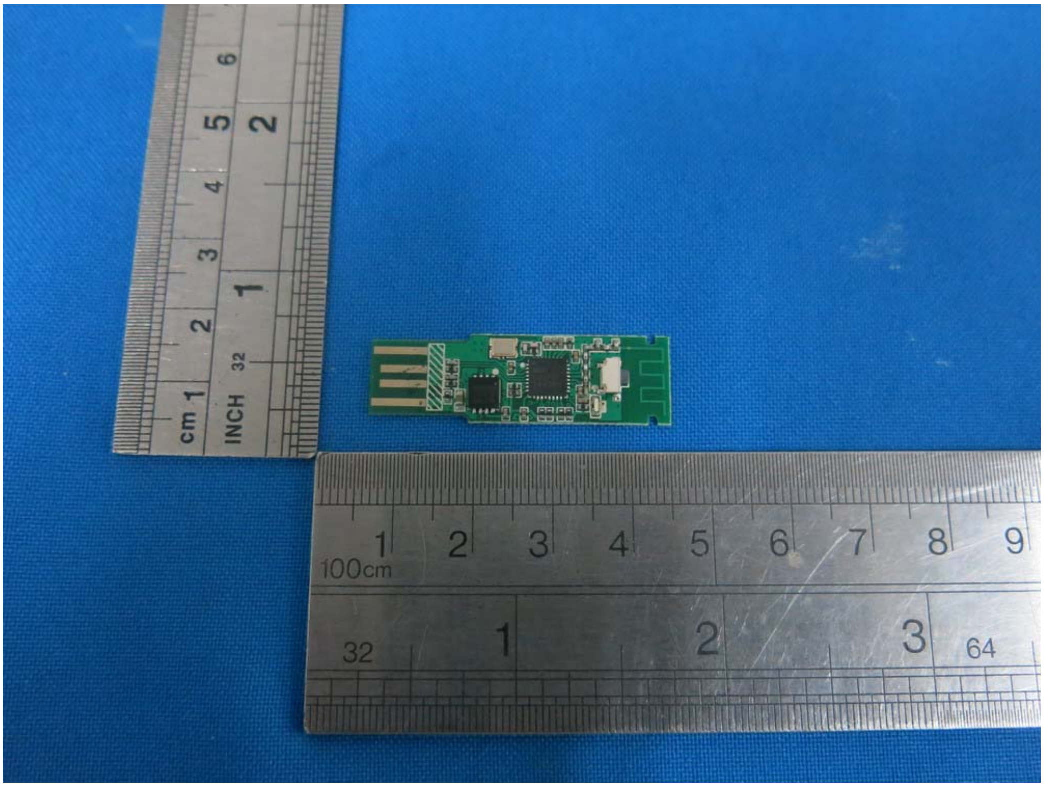
9.2 Result

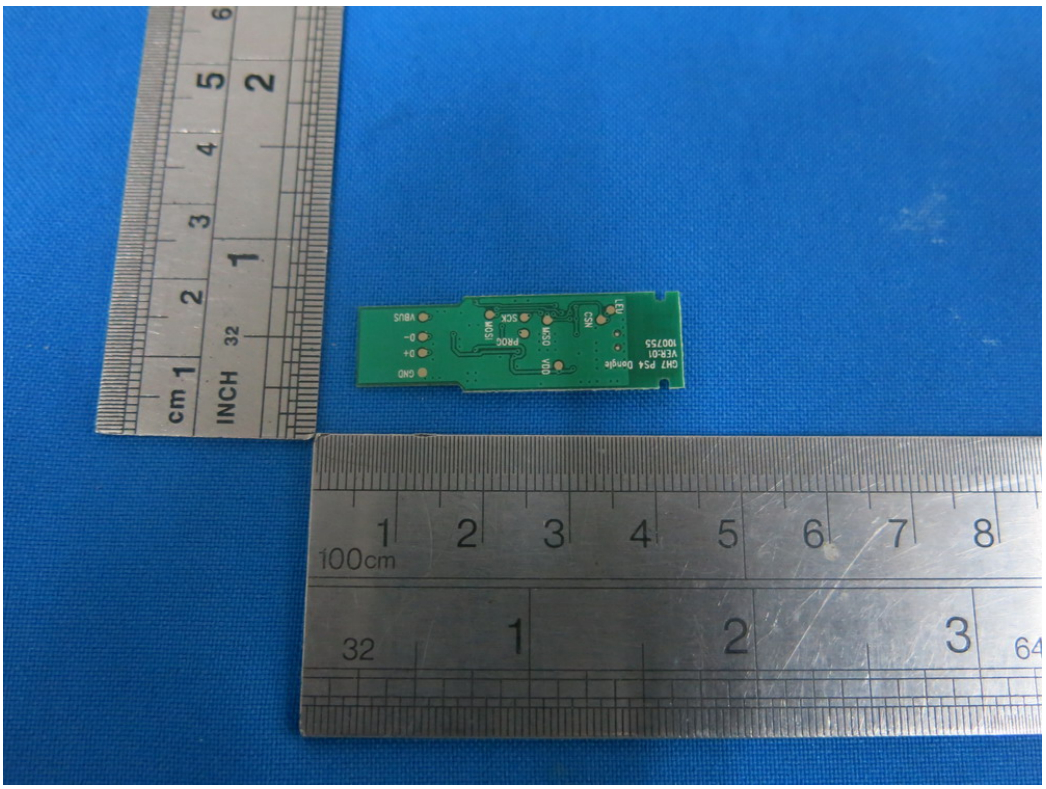
The EUT's antenna, permanent attached antenna, used a PCB antenna and integrated on PCB, The antenna's gain is 2.22dBi and meets the requirement.

APPENDIX I
(Photos of EUT)








cm 1
INCH
100cm
VBUS
D-
D+
GND
SCK
MOSI
MISO
RST
PROG
CSN
LED
CH7 PS4 Dongle
VER:01
100755