FCC TEST REPORT

On Behalf of

WHISPER USA INC

WS2

Model No.: WS2M, WS2S

FCC ID: 2AG63-WS2M

Prepared for	:	WHISPER USA INC
Address	:	7700 N KENDALL DR STE 405 MIAMI, FL 33156

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building B, East Area of Nanchang Second Industrial Zone, Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China

Report Number	:	T1870494 01
Date of Receipt	:	April 6, 2017
Date of Test	:	April 7, 2017- April 25, 2017
Date of Report	:	April 26, 2017
Version Number	:	REV0

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TEST REPORT DECLARATION

Applicant	:	WHISPER USA INC
Manufacturer	:	Shenzhen Alcors Technology Co.,Ltd
EUT Description	:	WS2

(A)	Model No.	:	WS2M, WS2S
(B)	Trademark	:	Whisper
(C)	Ratings Supply	:	DC 3.7V, DC 5V
(D)	Test Voltage	:	DC 3.7V From battery, DC 5V From USB for charge

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.249: 2016, ANSI C63.10:2013

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the FCC Part15 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....…..:	Reak Yang Test Engineer	……Reak Yang……
Approved by (name + signature)…....:	Simple Guan Project Manager	……Simple Guan……
Date of issue…… ……..:	April 26, 2017	

1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

EMISSION			
Description of Test Item	**Test Requirement**	**Standard Paragraph**	**Results**
Power Line Conducted Emission Test	FCC Part 15:2016	Section 15.207	**P**
Spurious Emission Test	FCC Part 15:2016	Section 15.249&15.209	**P**
Occupied bandwidth	FCC Part 15:2016	Section 15.215	**P**
Band edge Requirement	FCC Part 15:2016	Section 15.249	**P**
Antenna Requirement	FCC Part 15:2016	Section 15.203	**P**

Note: 1. P is an abbreviation for Pass.

2. F is an abbreviation for Fail.

3. N/A is an abbreviation for Not Applicable.

2. GENERAL INFORMATION

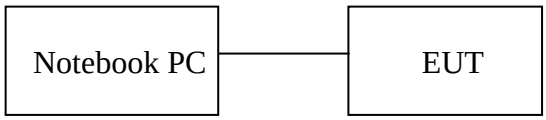
2.1.Description of Device (EUT)

Description	:	WS2
Model Number	:	WS2M, WS2S
Diff	:	All the models are the same except the appearance, this report performs the WS2M to test.
Test Voltage	:	DC 3.7V From battery, DC 5V From USB for charge
Operation frequency	:	904MHz-926MHz
Channel No.	:	13
Channel Separation	:	1MHz, 2MHz
Modulation type	:	QPSK
Data Rate	:	500Kbps
Antenna Type	:	Fixed Antenna, max gain 0.45dBi.
Software version	:	V1.0
Hardware version	:	V1.0
Trademark	:	Whisper
Applicant	:	WHISPER USA INC
Address	:	7700 N KENDALL DR STE 405 MIAMI, FL 33156
Manufacturer	:	Shenzhen Alcors Technology Co.,Ltd
Address	:	4th floor south, Bldg 23, LianChuang Sci& Tech Park, Bulan Road, LongGang District, Shenzhen, China
Sample Type	:	Prototype production

2.2.Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or DOC
1	Notebook PC	ACER	ZQT	N/A	DOC

2.3.Block Diagram of connection between EUT and simulators



2.4.Test Mode Description

Test mode:

Mode	Channel	Frequency (MHz)
QPSK	CH1	904
	CH7	915
	CH13	926

Note:
1. The test was used to control EUT work in Continuous TX mode, and select test channel, wireless mode
2. The EUT has been tested as an independent unit. And Continual Transmitting in maximum power.
3. For the relevant Conducted Measurement, the temporary antenna connector is used during the measurement. Antenna Connector Impedance: 50Ω , Cable Loss: 1.0 dB

Channel list:

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
CH 1	904	CH 6	913	CH 11	923
CH 2	905	CH 7	915	CH 12	925
CH 3	907	CH 8	917	CH 13	926
CH 4	909	CH 9	919		
CH 5	911	CH 10	921		

2.5.Test Conditions

Temperature range	21-25℃
Humidity range	40-75%
Pressure range	86-106kPa

2.6.Test Facility

Shenzhen Alpha Product Testing Co., Ltd.
Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road, Bao'an, Shenzhen, China

March 25, 2015 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

2.7.Measurement Uncertainty

(95% confidence levels, k=2)

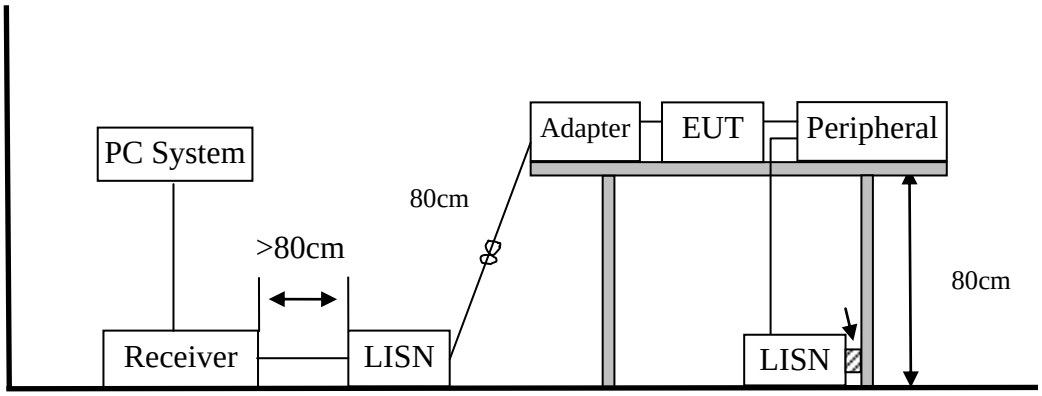
Test Item	Uncertainty
Uncertainty for Conduction emission test	2.71dB
Uncertainty for Radiation Emission test (<1G)	3.90 dB (Distance: 3m Polarize: V)
	3.92 dB (Distance: 3m Polarize: H)
Uncertainty for Radiation Emission test (>1G)	4.26 dB (Distance: 3m Polarize: V)
	4.28 dB (Distance: 3m Polarize: H)
Uncertainty for conducted RF Power	0.16dB

2.8.Test Equipment List

Equipment	Manufacture	Model No.	Serial No.	Due cal.	Cal Interval
3m Semi-Anechoic	CHENYU	N/A	N/A	2018.09.28	2Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2017.09.28	1Year
Signal Analyzer	Agilent	N9020A	MY48030494	2017.09.28	1 Year
Receiver	R&S	ESCI	101165	2017.09.28	1Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2017.09.28	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	VULB9168-438	2017.09.29	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2017.09.29	2Year
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170 D(1432)	2017.09.29	2Year
Cable（9KHz-1GHz）	SCHWARZBECK	N/A	No.2	2017.09.28	1Year
Cable(1GHz-26.5GHz)	SCHWARZBECK	N/A	No.3	2017.09.28	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2017.09.28	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2017.09.28	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2017.09.28	1 Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2017.09.28	1 Year

3. POWER LINE CONDUCTED EMISSION TEST

3.1.Block Diagram of Test Setup



3.2.Test Limits

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

Notes: 1. Emission level=Read level + LISN factor-Preamp factor + Cable loss

2. * Decreasing linearly with logarithm of frequency.

3. The lower limit shall apply at the transition frequencies.

3.3.Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4.Operating Condition of EUT

（1） Setup the EUT as shown as Section 3.1.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode taking the test.

3.5.Test Procedure

（1） The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013 on conducted Emission test.

（2） The frequency range from 150kHz to 30MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 9kHz.

（3） The frequency range from 30MHz to 1000MHz was pre-scanned with a Peak detector and all final readings of measurement from Test Receiver are Quasi-Peak and Average values.

（4） The test results are reported on Section 3.6.

3.6.Test Results

EUT	:	WS2	Test Date	:	2017.4.21
M/N	:	WS2M	Temperature	:	23.6°C
Test Engineer	:	Reak Yang	Humidity	:	54%
Test Mode	:	TX CH1			
Test Results	:	**PASS**			
Note: 1. All modes have been tested, and only worse case mode is reported only.					

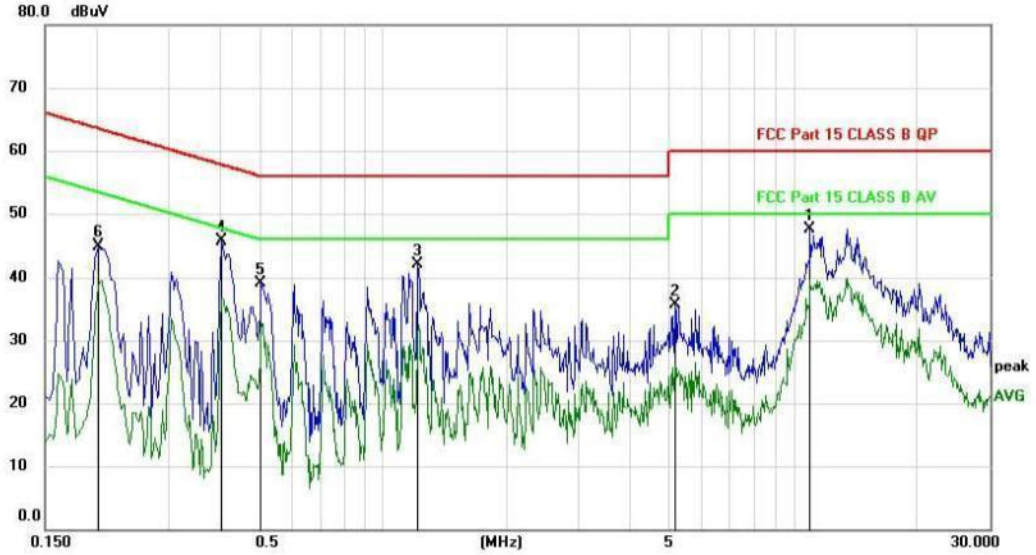
Site LAB
Limit: FCC Part 15 CLASS B QP
EUT: WS2
M/N: WS2M
Mode: 904MHz
Note:

Phase: N
Power: AC 120V/60Hz

Temperature: 23.6
Humidity: 54 %

Conducted Emission Measurement

File :WS2M Data :#4 Date: 2017-4-21 Time: 19:49:12



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		10.9340	37.09	10.36	47.45	60.00	-12.55	peak	
2		5.1620	25.56	10.20	35.76	60.00	-24.24	peak	
3		1.2140	32.33	9.85	42.18	56.00	-13.82	peak	
4	*	0.4060	35.94	9.77	45.71	57.73	-12.02	peak	
5		0.5060	29.31	9.78	39.09	56.00	-16.91	peak	
6		0.2020	35.17	9.74	44.91	63.53	-18.62	peak	

*:Maximum data x:Over limit l:over margin (Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

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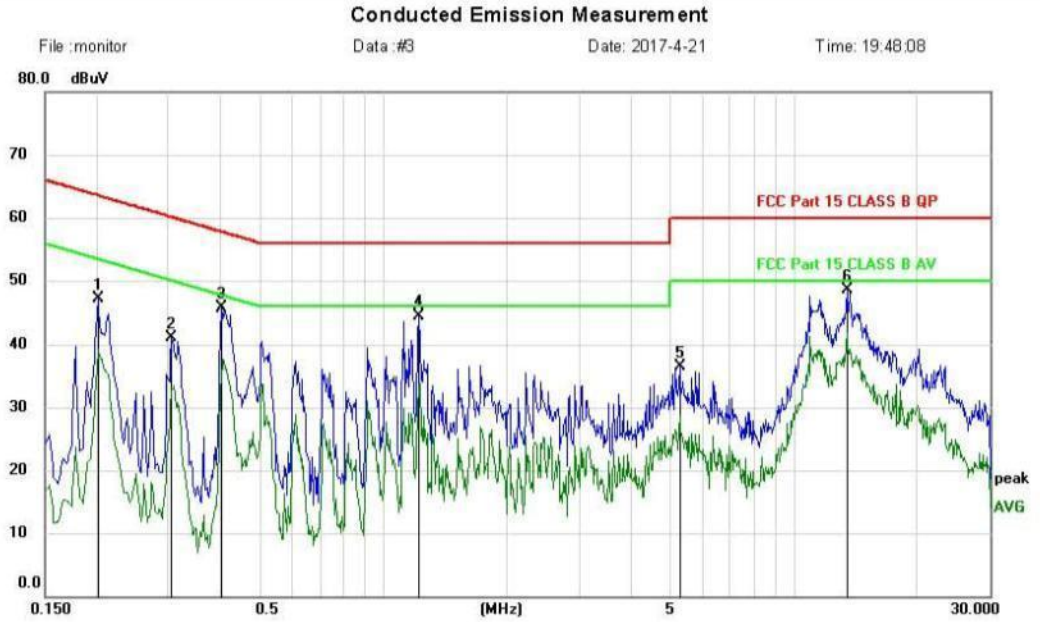
Site LAB
Limit: FCC Part 15 CLASS B QP
EUT: WS2
M/N: WS2M
Mode: 904MHz
Note:

Phase: L1
Power: AC 120V/60Hz

Temperature: 23.6
Humidity: 54 %



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2020	37.35	9.74	47.09	63.53	-16.44	peak	
2		0.3060	31.26	9.76	41.02	60.08	-19.06	peak	
3		0.4060	36.00	9.77	45.77	57.73	-11.96	peak	
4		1.2180	34.62	9.85	44.47	56.00	-11.53	peak	
5		5.2819	26.29	10.20	36.49	60.00	-23.51	peak	
6	*	13.4380	38.16	10.34	48.50	60.00	-11.50	peak	

*:Maximum data x:Over limit l:over margin (Reference Only

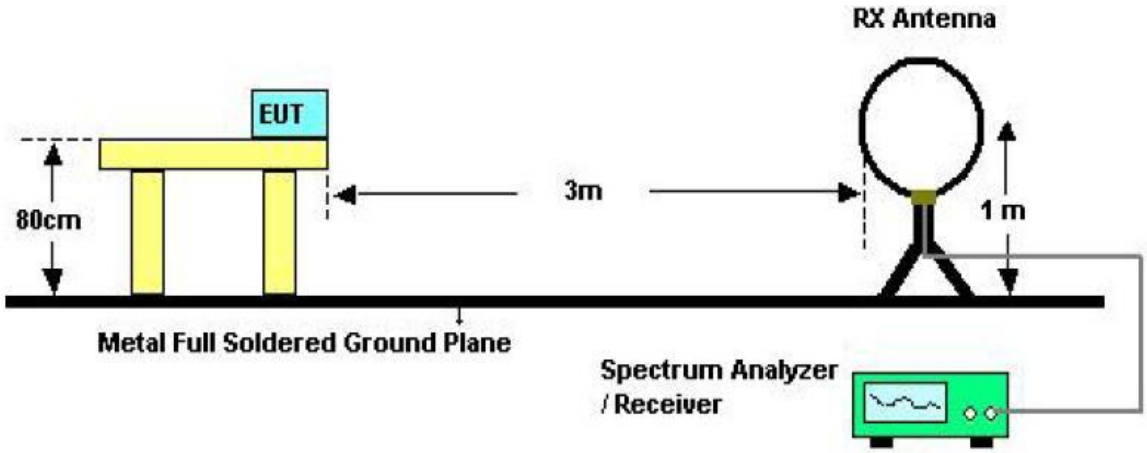
Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

E:\EZ-EMC\Test Report\Z\zhongdian\monit Page: 1 Engineer Signature:

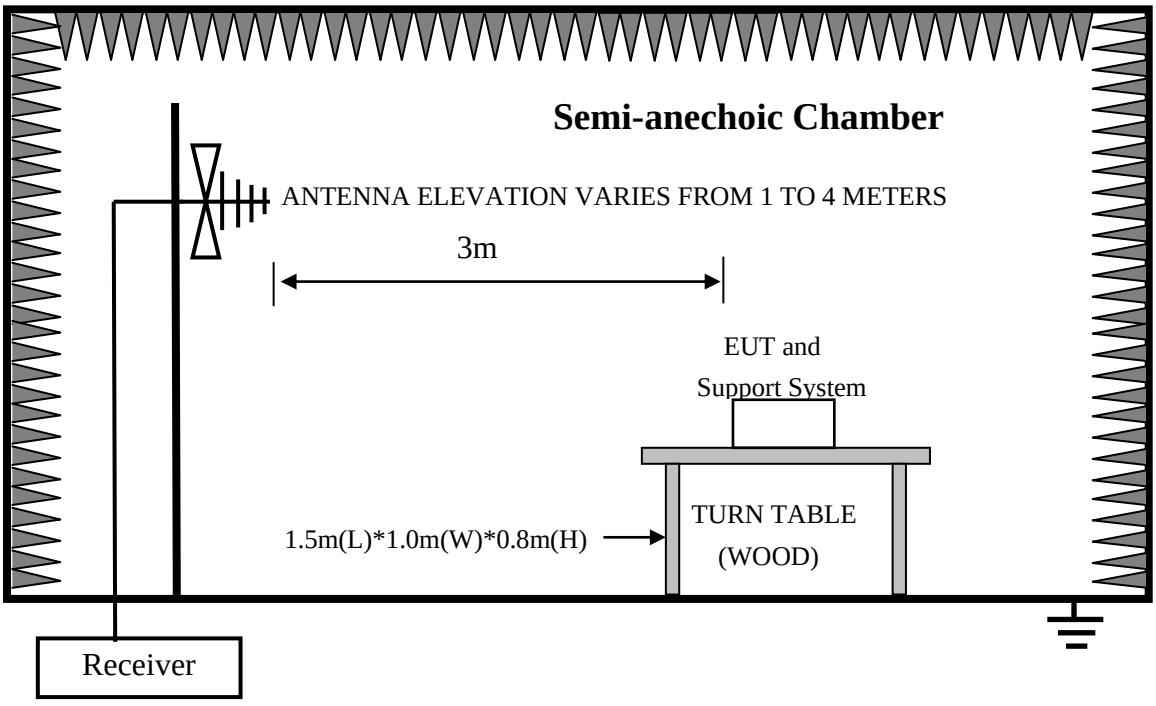
4. RADIATED EMISSION TEST

4.1.Block Diagram of Test Setup

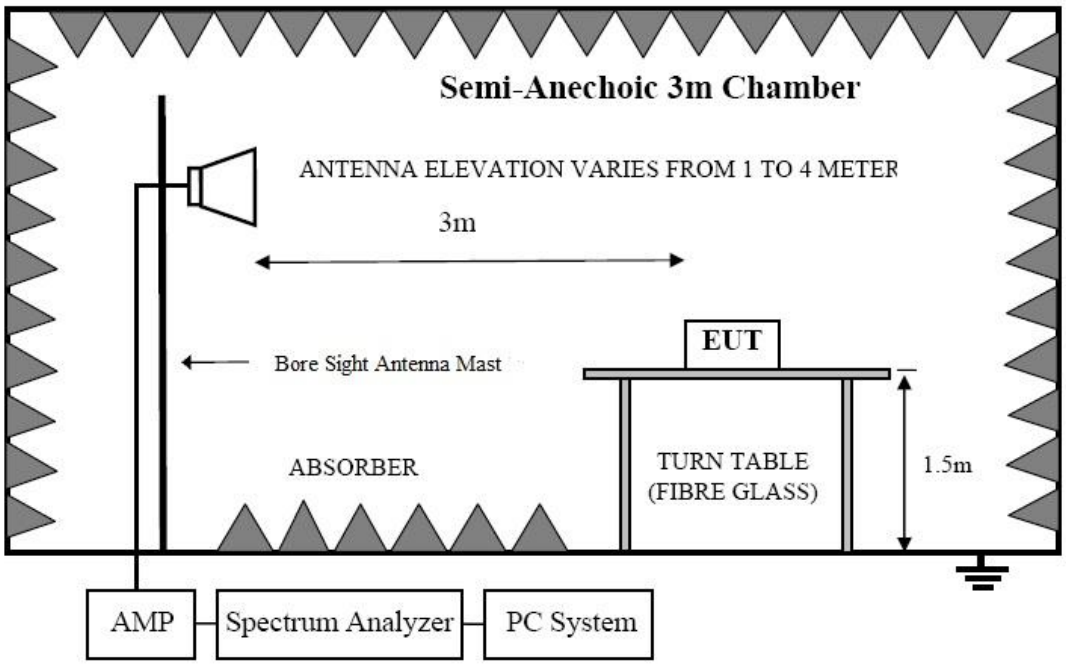
In Semi Anechoic Chamber (3m) Test Setup Diagram for 9KHz~30MHz



In Semi Anechoic Chamber (3m) Test Setup Diagram for 30MHz~1000MHz



In Semi Anechoic Chamber (3m) Test Setup Diagram for Above 1GHz



4.2.Test Limit

Frequency MHz	Distance (Meters)	Field Strengths Limits	
		uV/m	dB uV/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 1.705	30	24000/F(kHz)	----
1.705 30	30	30	29.5
30 88	3	100(3nW)	40
88 216	3	150(6.8nW)	43.5
216 960	3	200(12nW)	46
Above 960	3	500(75nW)	54
Carrier frequency	3	50000(avg)	113.97(peak) 93.97(avg)

Notes:
1. Emission level = Read level + Antenna Factor - Preamp Factor + Cable Loss
2. The smaller limit shall apply at the cross point between two frequency bands.
3. Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.
4. For frequencies above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

4.3.Configuration of EUT on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

4.4.Operating Condition of EUT

（1） Setup the EUT as shown as Section 4.1.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode taking the test.

4.5.Test Procedure

（1） The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1GHz and 150 cm above the ground plane inside a semi-anechoic chamber for above 1GHz. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10: 2013 on Radiated Emission test.

（2） For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

（3） Test antenna was located 4m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.

(a) Change work frequency or channel of device if practicable.

(b) Change modulation type of device if practicable.

(c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

（4） For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP

（5） The frequency range from 9KHz to 150KHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 200Hz.
The frequency range from 150KHz to 30MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 9KHz.
The frequency range from 30MHz to 1000MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 120kHz.
The frequency range from above 1GHz is checked, the bandwidth of Signal Analyzer (Signal Analyzer N9020A) is set at 1MHz.

（6） The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector and all final readings of measurement from Test Receiver are Quasi-Peak values, the frequency range from 1GHz to 6GHz was pre-scanned with a peak detector and all final readings of measurement from Spectrum Analyzer are peak and average values checked, all measurement distance is 3m in 3m semi anechoic chamber.

（7） Test for all x, y, z axes is performed and only the worst case of X xes was recorded in the test report.

（8） The test results are reported on Section 4.6.

4.6.Test Results

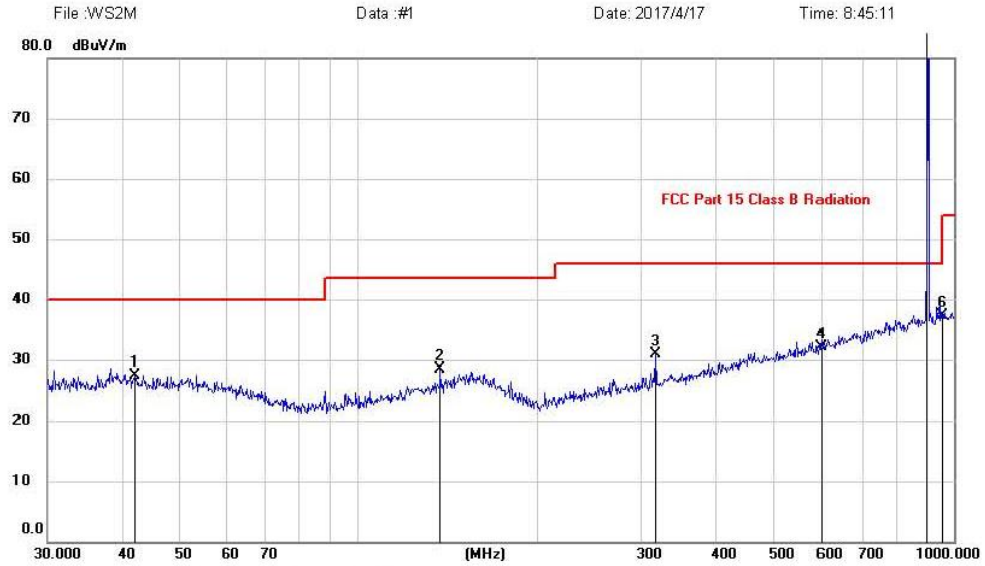
Frequency Range	:	**9KHz~30MHz**			
EUT	:	WS2	Test Date	:	2017.04.17
M/N	:	WS2M	Temperature	:	23.8℃
Test Engineer	:	Reak Yang	Humidity	:	56%
Test Mode	:	TX			
Test Results	:	**PASS**			
Note:	1. Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.				

Frequency Range	:	**30MHz~1000MHz**			
EUT	:	WS2	Test Date	:	2017.04.17
M/N	:	WS2M	Temperature	:	23.8℃
Test Engineer	:	Reak Yang	Humidity	:	56%
Test Mode	:	TX			
Test Results	:	**PASS**			
Note:	1. The test results are listed in next pages. 2. This mode is worst case mode, and this report only reflected the worst mode. 3. If the limits for the measurement with the quasi-peak detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.				

Site LAB 966-2 Chamber	Polarization: ***Vertical***	Temperature: 23.8
Limit: FCC Part 15 Class B Radiation	Power: DC 3.7V	Humidity: 56 %
EUT: WS2	Distance:	
M/N: WS2M		
Mode:904MHz		
Note:		

Engineer Signature:

Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		42.0066	13.44	14.12	27.56	40.00	-12.44	peak			
2		136.9391	14.77	13.65	28.42	43.50	-15.08	peak			
3		316.5889	17.10	13.79	30.89	46.00	-15.11	peak			
4		600.0000	12.67	19.34	32.01	46.00	-13.99	QP			
5	*	904.0093	66.37	23.04	89.41			QP			
6		960.0000	13.33	23.92	37.25	46.00	-8.75	QP			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

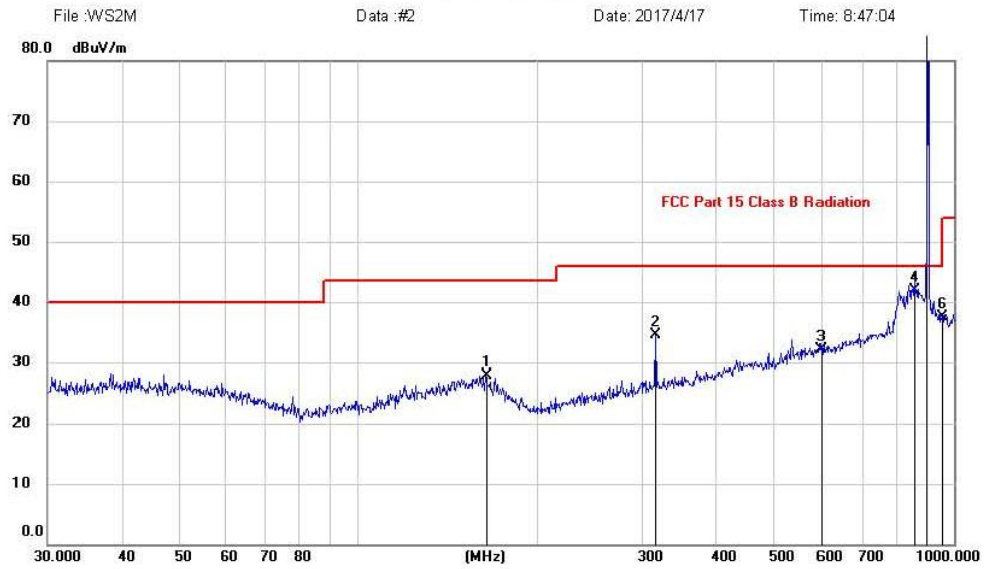
Site LAB 966-2 Chamber
Limit: FCC Part 15 Class B Radiation
EUT: WS2
M/N: WS2M
Mode:904MHz
Note:

Polarization: *Horizontal*
Power: DC 3.7V
Distance:

Temperature: 23.8
Humidity: 56 %

Engineer Signature:

Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		163.7550	13.62	14.28	27.90	43.50	-15.60	peak			
2		316.5890	20.69	13.79	34.48	46.00	-11.52	peak			
3		600.0000	12.79	19.34	32.13	46.00	-13.87	QP			
4		860.0352	19.45	22.46	41.91	46.00	-4.09	QP			
5	*	904.0094	70.75	23.04	93.79			QP			
6		960.0000	13.59	23.92	37.51	46.00	-8.49	QP			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

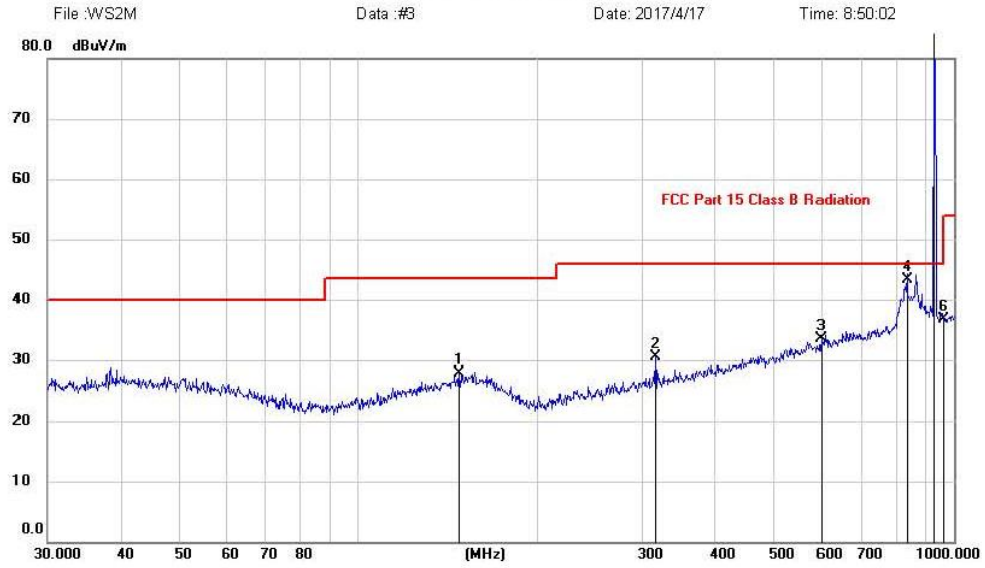
Site LAB 966-2 Chamber
Limit: FCC Part 15 Class B Radiation
EUT: WS2
M/N: WS2M
Mode:926MHz
Note:

Polarization: *Horizontal*
Power: DC 3.7V
Distance:

Temperature: 23.8
Humidity: 56 %

Engineer Signature:

Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		147.4036	13.48	14.36	27.84	43.50	-15.66	peak			
2		316.5890	16.70	13.79	30.49	46.00	-15.51	peak			
3		600.0000	14.13	19.34	33.47	46.00	-12.53	QP			
4		833.3171	21.16	22.19	43.35	46.00	-2.65	QP			
5	*	926.0082	69.89	23.38	93.27			QP			
6		960.0000	12.69	23.92	36.61	46.00	-9.39	QP			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

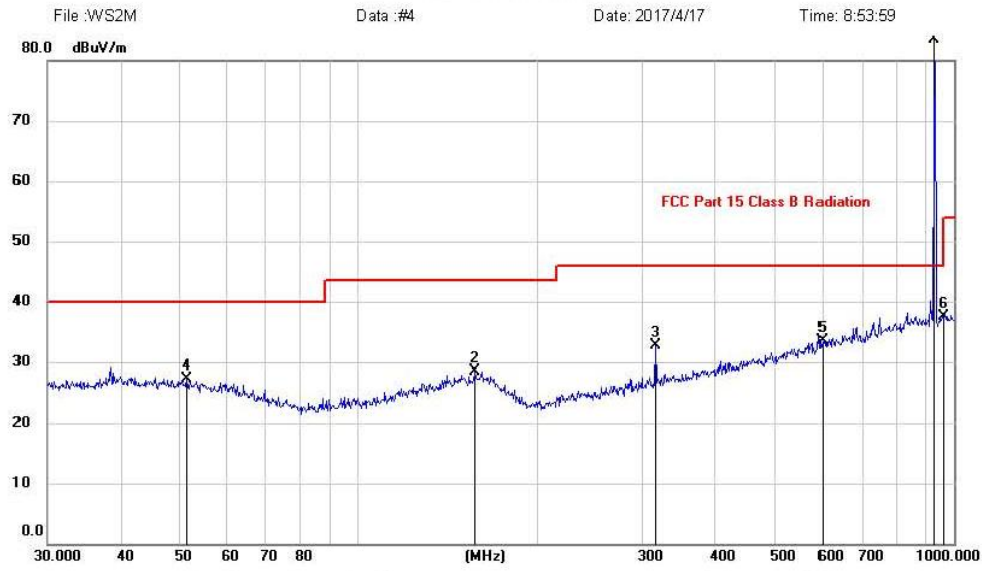
Site LAB 966-2 Chamber
Limit: FCC Part 15 Class B Radiation
EUT: WS2
M/N: WS2M
Mode:926MHz
Note:

Polarization: *Vertical*
Power: DC 3.7V
Distance:

Temperature: 23.8
Humidity: 56 %

Engineer Signature:

Radiated Emission Measurement

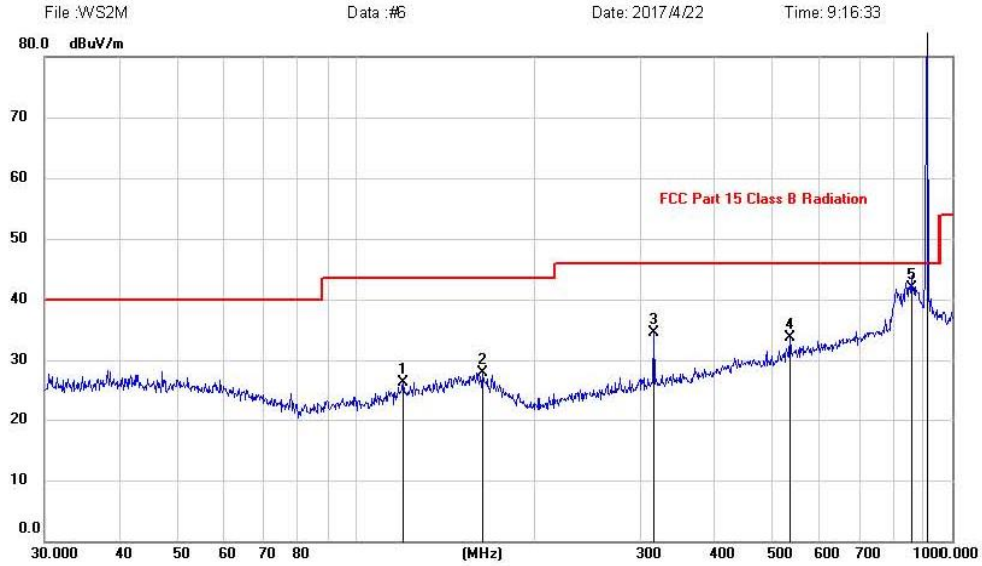


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	926.0082	64.77	23.38	88.15			QP			
2		157.0074	13.99	14.58	28.57	43.50	-14.93	peak			
3		316.5890	18.94	13.79	32.73	46.00	-13.27	peak			
4		51.4807	13.75	13.63	27.38	40.00	-12.62	peak			
5		600.0000	14.10	19.34	33.44	46.00	-12.56	QP			
6		960.0000	13.61	23.92	37.53	46.00	-8.47	QP			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Site LAB	Polarization: *Horizontal*	Temperature:	23.8
Limit: FCC Part 15 Class B Radiation	Power:	Humidity:	56 %
EUT: WS2	Distance:		
M/N: WS2M			
Mode:915MHz			
Note:			

Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		119.8555	13.65	12.58	26.23	43.50	-17.27	peak			
2		163.7547	13.62	14.28	27.90	43.50	-15.60	peak			
3		316.5889	20.69	13.79	34.48	46.00	-11.52	peak			
4		535.7073	15.42	18.19	33.61	46.00	-12.39	peak			
5		860.0352	19.52	22.46	41.98	46.00	-4.02	QP			
6	*	915.0034	66.81	23.43	90.24			QP			

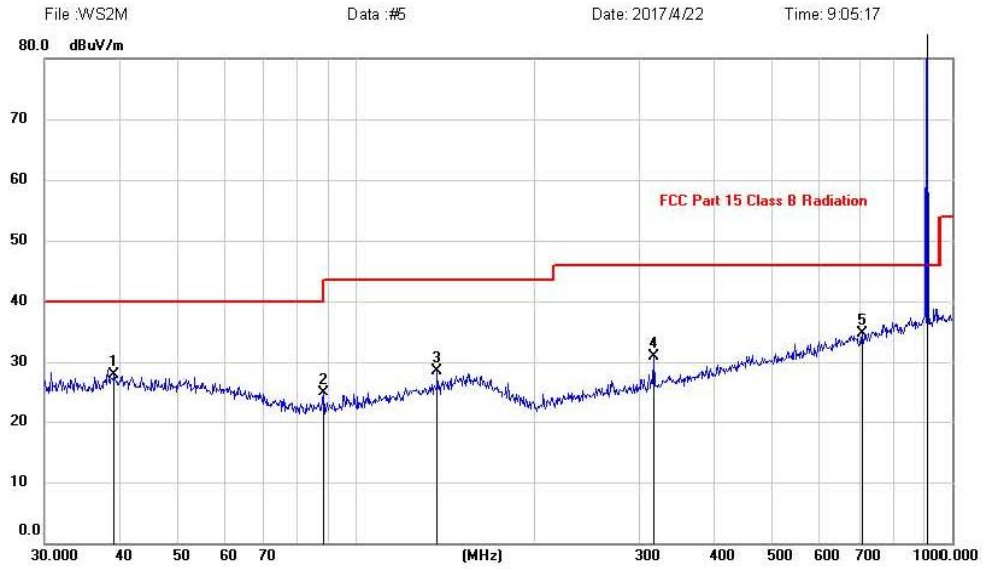
Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Site LAB
Limit: FCC Part 15 Class B Radiation
EUT: WS2
M/N: WS2M
Mode:915MHz
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 23.8
Humidity: 56 %

Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		39.2991	13.61	14.21	27.82	40.00	-12.18	peak			
2		88.0327	15.25	9.73	24.98	43.50	-18.52	peak			
3		136.9389	14.77	13.65	28.42	43.50	-15.08	peak			
4		316.5889	17.10	13.79	30.89	46.00	-15.11	peak			
5		709.1823	14.15	20.63	34.78	46.00	-11.22	peak			
6	*	915.0032	63.17	23.43	86.60			QP			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Frequency Range : **1GHz~25GHz**								
EUT : WS2					Test Date : 2017.04.17			
M/N : WS2M					Temperature : 24℃			
Test Engineer : Reak Yang					Humidity : 56%			
Test Mode : TX 904MHz								
Test Results : **PASS**								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	1808	H	44.77	-4.62	40.15	74	-33.85	Peak
2	1808	H	--	-4.62	--	54	--	Avg
3	2712	H	45.58	-3.37	42.21	74	-31.79	Peak
4	2712	H	--	-3.37	--	54	--	Avg
5	4520	H	46.91	-2.57	44.34	74	-29.66	Peak
6	4520	H	--	-2.57	--	54	--	Avg
1	1808	V	45.81	-4.62	41.19	74	-32.81	Peak
2	1808	V	--	-4.62	--	54	--	Avg
3	2712	V	45.37	-3.37	42.00	74	-32.00	Peak
4	2712	V	--	-3.37	--	54	--	Avg
5	4520	V	46.44	-2.57	43.87	74	-30.13	Peak
6	4520	V	--	-2.57	--	54	--	Avg

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor.
Margin= Result-Limit.
3. Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK.
4. Spectrum Set for AV measure: RBW=1MHz, VBW=3MHz, Sweep time=Auto, Detector: Avg.
5. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

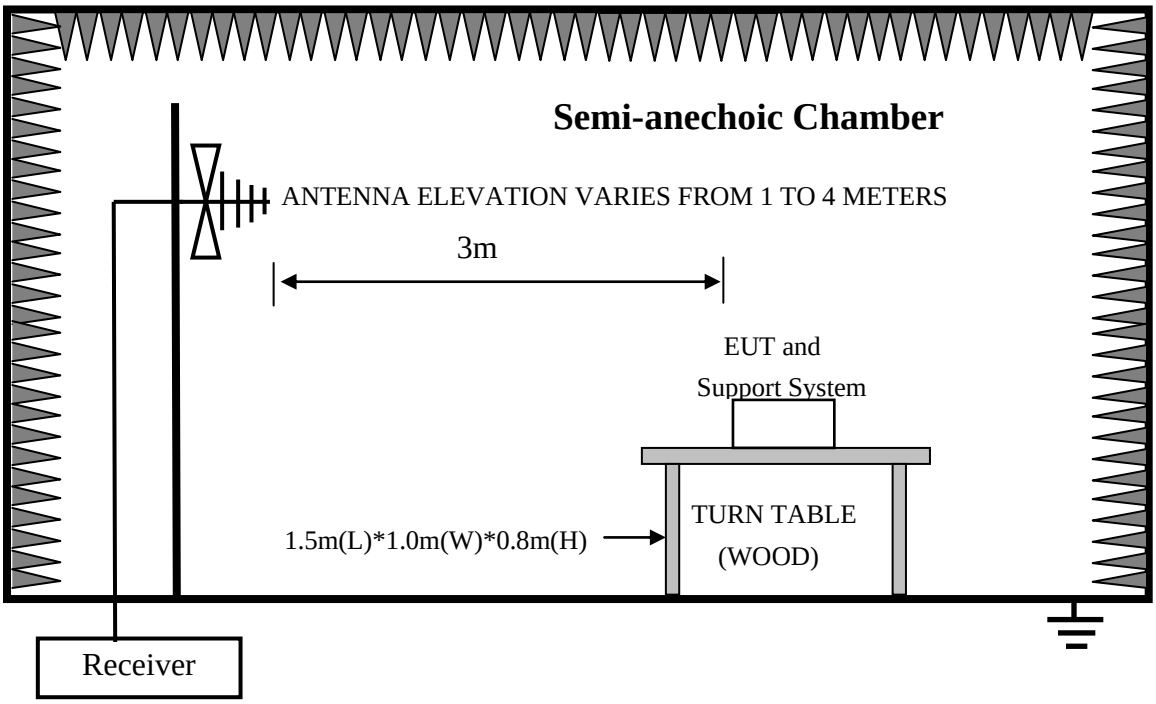
Frequency Range : **1GHz~25GHz**								
EUT : WS2					Test Date : 2017.04.17			
M/N : WS2M					Temperature : 24℃			
Test Engineer : Reak Yang					Humidity : 56%			
Test Mode : TX 915MHz								
Test Results : **PASS**								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	1830	H	44.65	-4.56	40.09	74	-33.91	Peak
2	1830	H	--	-4.56	--	54	--	Avg
3	2745	H	45.72	-3.21	42.51	74	-31.49	Peak
4	2709	H	--	-3.21	--	54	--	Avg
5	4575	H	46.37	-2.54	43.83	74	-30.17	Peak
6	4575	H	--	-2.54	--	54	--	Avg
1	1830	V	44.29	-4.56	39.73	74	-34.27	Peak
2	1830	V	--	-4.56	--	54	--	Avg
3	2745	V	45.38	-3.21	42.17	74	-31.83	Peak
4	2709	V	--	-3.21	--	54	--	Avg
5	4575	V	47.19	-2.54	44.65	74	-29.35	Peak
6	4575	V	--	-2.54	--	54	--	Avg

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor.
Margin= Result-Limit.
3. Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK.
4. Spectrum Set for AV measure: RBW=1MHz, VBW=3MHz, Sweep time=Auto, Detector: Avg.
5. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

Frequency Range : **1GHz~25GHz**								
EUT : WS2					Test Date : 2017.04.17			
M/N : WS2M					Temperature : 24℃			
Test Engineer : Reak Yang					Humidity : 56%			
Test Mode : TX 926MHz								
Test Results : **PASS**								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	1852	H	46.21	-4.52	41.69	74	-32.31	Peak
2	1852	H	--	-4.52	--	54	--	Avg
3	2778	H	45.59	-3.17	42.42	74	-31.58	Peak
4	2778	H	--	-3.17	--	54	--	Avg
5	4630	H	47.27	-2.51	44.76	74	-29.24	Peak
6	4630	H	--	-2.51	--	54	--	Avg
1	1852	V	45.78	-4.52	41.26	74	-32.74	Peak
2	1852	V	--	-4.52	--	54	--	Avg
3	2778	V	45.67	-3.17	42.50	74	-31.50	Peak
4	2778	V	--	-3.17	--	54	--	Avg
5	4630	V	46.95	-2.51	44.44	74	-29.56	Peak
6	4630	V	--	-2.51	--	54	--	Avg
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit. 3. Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK. 4. Spectrum Set for AV measure: RBW=1MHz, VBW=3MHz, Sweep time=Auto, Detector: Avg. 5. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.								

5. BAND EDGE TEST

5.1.Block Diagram of Test Setup



5.2.Test Limit

Please refer section15.249 and section 15.205.

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 section 15.209, whichever is the lesser attenuation.

249(e) As show in section 15.35(b), for frequencies above 1000MHz,the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak filed strength shall not exceed 2500 millivolts/meter at 3meters along the antenna azimuth.

5.3.Configuration of EUT on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

5.4.Operating Condition of EUT

（1） Setup the EUT as shown as Section 5.1.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode taking the test.

5.5.Test Procedure

（1） The EUT was placed on a non-metallic table, 150 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10: 2013 on Radiated Emission test.

（2） For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

（3） Test antenna was located 4m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
(a) Change work frequency or channel of device if practicable.

(b) Change modulation type of device if practicable.

(c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

（5） The frequency range from above 1GHz is checked, the bandwidth of Signal Analyzer (Signal Analyzer N9020A) is set at 1MHz.

（6） The frequency range from 1GHz to 6GHz was pre-scanned with a peak detector and all final readings of measurement from Spectrum Analyzer are peak and average values checked, all measurement distance is 3m in 3m semi anechoic chamber.

（7） Test for all x, y, z axes is performed and only the worst case of X xes was recorded in the test report.

（8） The test results are reported on Section 5.6.

5.6.Test Results

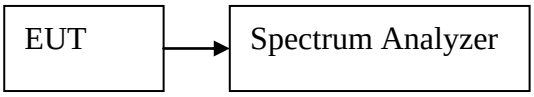
EUT	:	WS2	Test Date	:	2017.04.25
M/N	:	WS2M	Temperature	:	23.8℃
Test Engineer	:	Reak Yang	Humidity	:	56%
Test Mode	:	TX 904MHz			
Test Results	:	**PASS**			

No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	600	H	14.13	19.34	33.47	46(QP)	-12.53	QP
2	902	H	16.22	22.77	38.99	46(QP)	-7.01	QP
3	960	H	13.59	23.92	37.51	46(QP)	-8.49	QP
4	--	--	--	--	--	--	--	--
1	600	V	12.67	19.34	32.01	46(QP)	-13.99	QP
2	902	V	13.08	22.77	35.85	46(QP)	-10.15	QP
3	960	V	13.33	23.92	37.25	46(QP)	-8.75	QP
4	--	--	--	--	--	--	--	--
Test Mode	:	TX 926MHz						
Test Results	:	**PASS**						
1	600	H	14.13	19.34	33.47	46(QP)	-12.53	QP
2	928	H	12.95	23.46	36.41	46(QP)	-9.59	QP
3.	960	H	12.69	23.92	36.61	46(QP)	-9.39	QP
4.	--	--	--	--	--	--	--	--
1	600	V	14.10	19.34	33.44	46(QP)	-12.56	QP
2	928	V	13.14	23.46	36.60	46(QP)	-9.40	QP
3.	960	V	13.61	23.92	37.53	46(QP)	-8.47	QP
4.	--	--	--	--	--	--	--	--

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor, Margin= Result-Limit.
3. Spectrum Set for PK measure: RBW=120KHz, VBW=300KHz, Sweep time=Auto, Detector: PK.
4. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

6. OCCUPIED BANDWIDTH TEST

6.1.Block Diagram of Test Setup



6.2.Test Limit

Please refer section15.249 and section 15.205.

6.3.Test Procedure

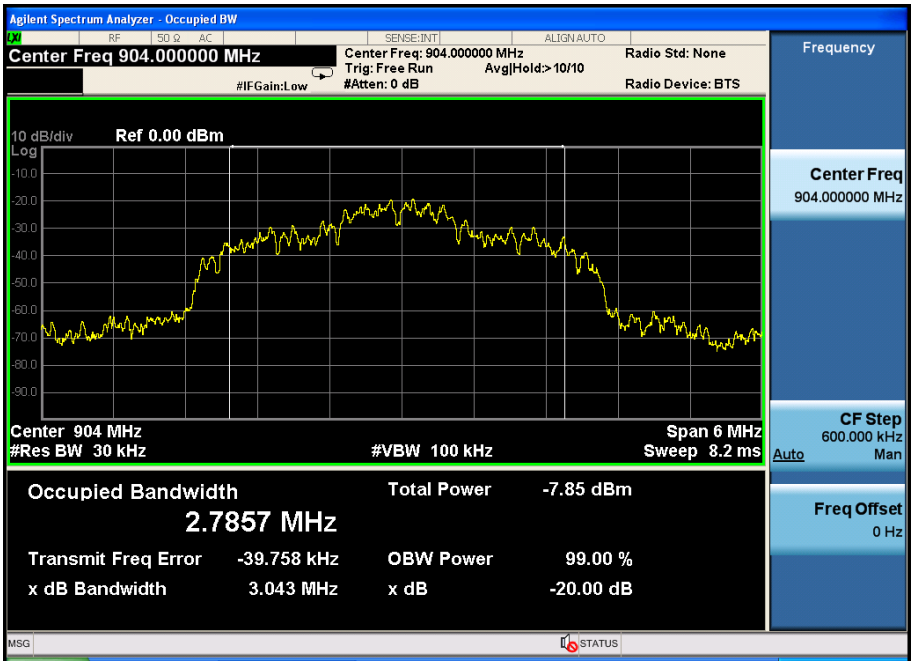
（1） The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

（2） The test receiver RBW set 30KHz,VBW set 100KHz,Sweep time set auto.

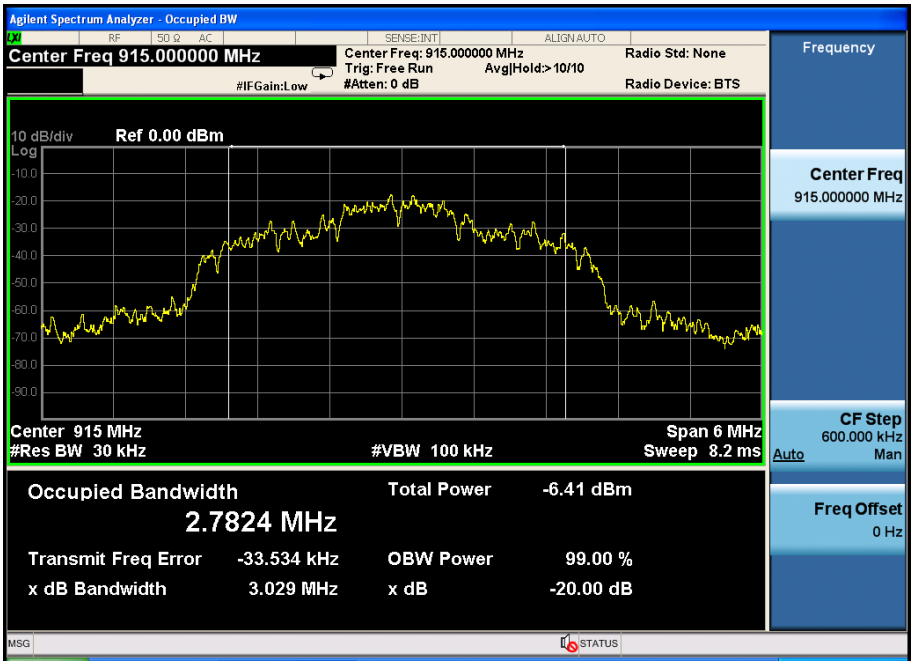
6.4.Test Results

EUT	: WS2		Test Date	: 2017.04.24
M/N	: WS2M		Temperature	: 24℃
Test Engineer	: Reak Yang		Humidity	: 56%
Test Results	: **PASS**			
Mode	Frequency MHz	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)
QPSK	904	3.043	2.7857	/
	915	3.029	2.7824	/
	926	3.034	2.7787	/
Note: 1. The test results are listed in next pages.				

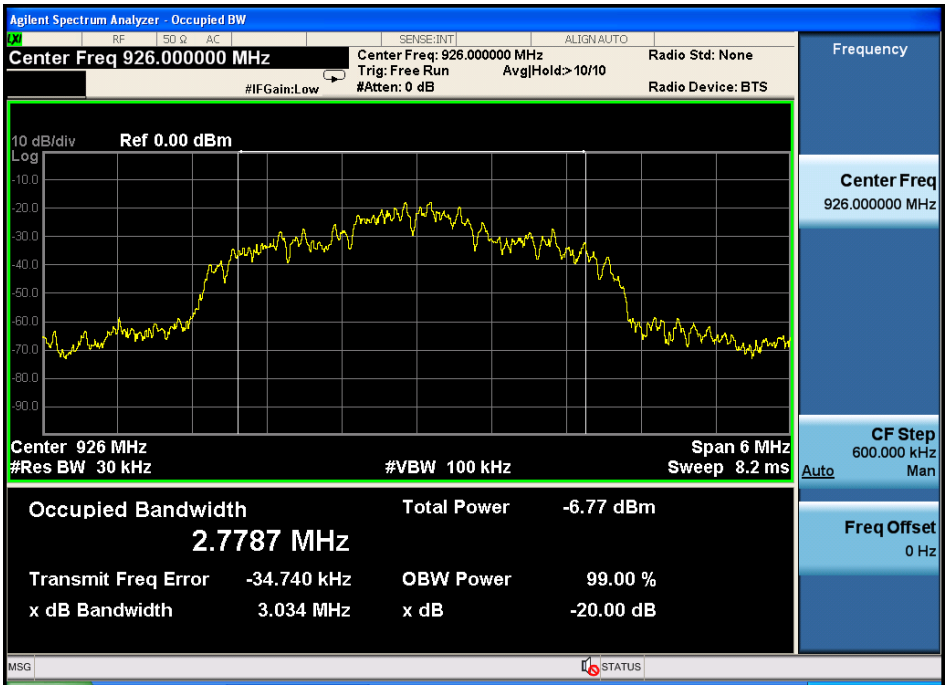
Frequency: 904MHz



Frequency: 915MHz



Frequency: 926MHz



7. ANTENNA REQUIREMENT

7.1. Standard Requirement

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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

7.2. Antenna Connected Construction

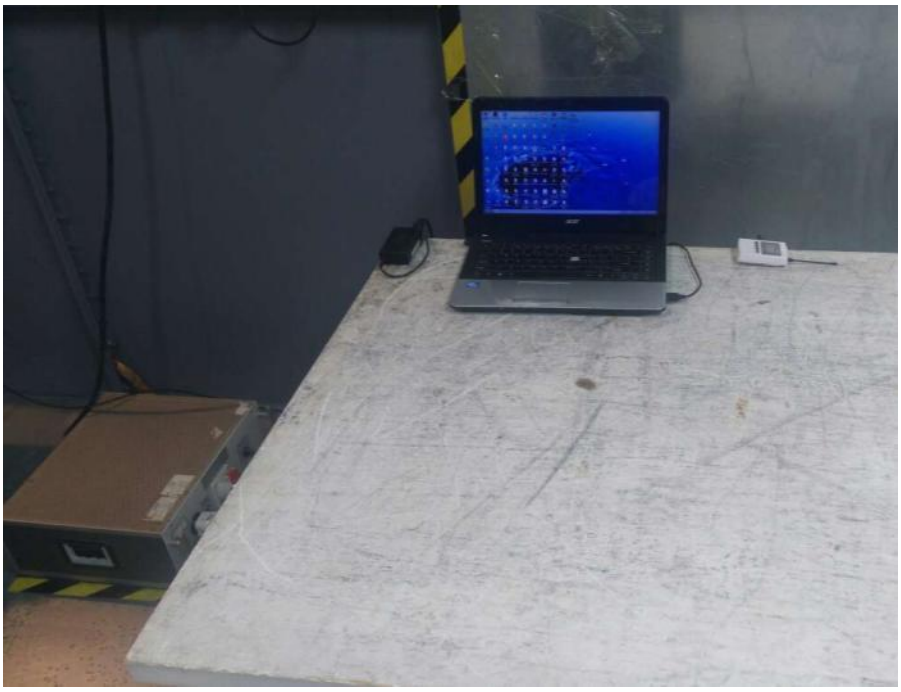
The directional gains of antenna used for transmitting is 0.45dBi, and the antenna is fixed antenna no consideration of replacement. Please see EUT photo for details.

7.3. Results

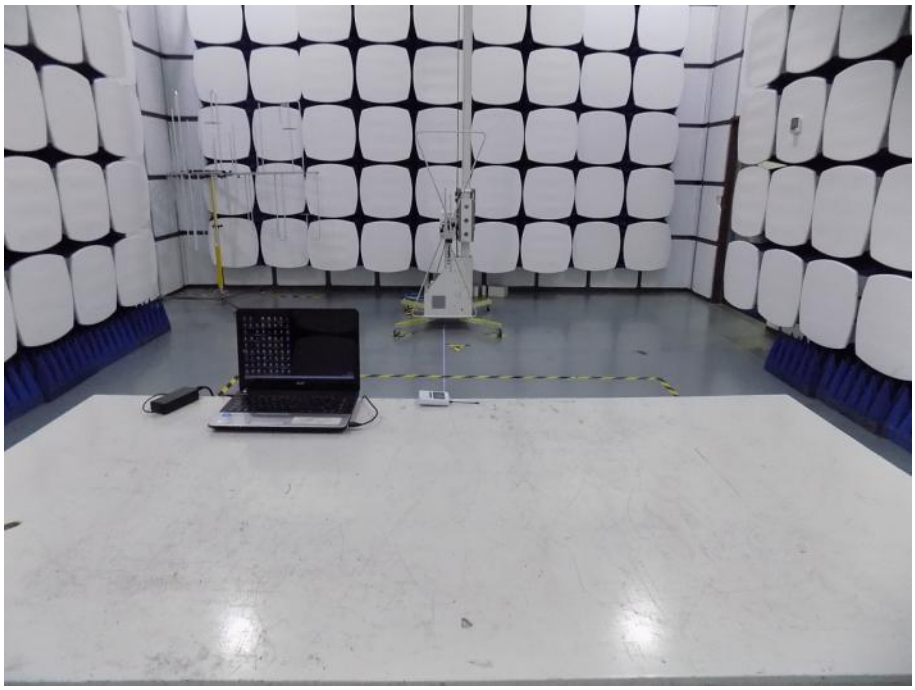
The EUT antenna is fixed Antenna. It comply with the standard requirement.

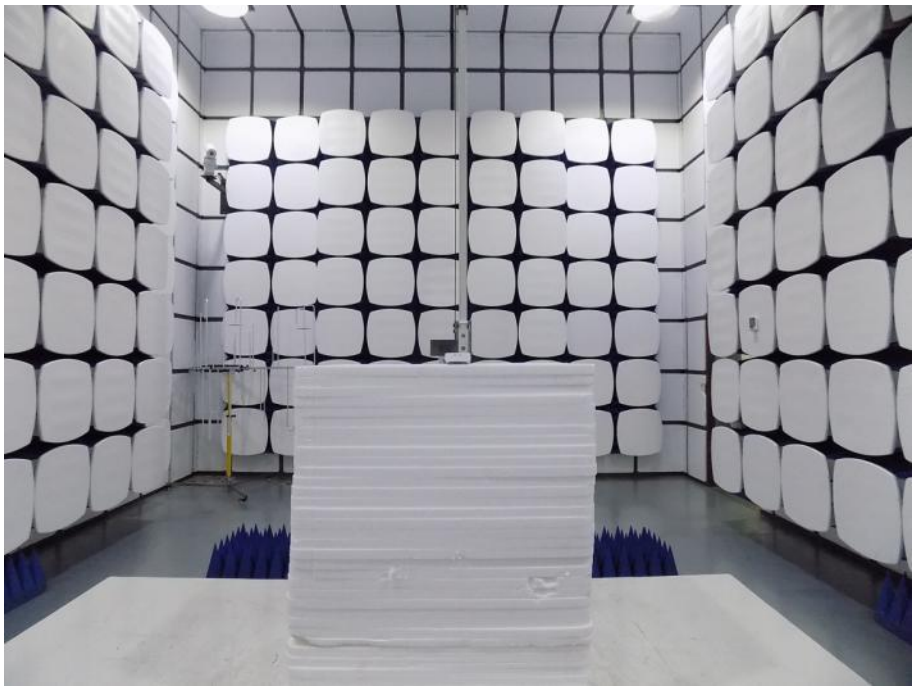
8. PHOTOGRAPH

8.1.Photo of Conducted Emission



8.2.Photos of Radiated Emission Test (In Semi Anechoic Chamber)





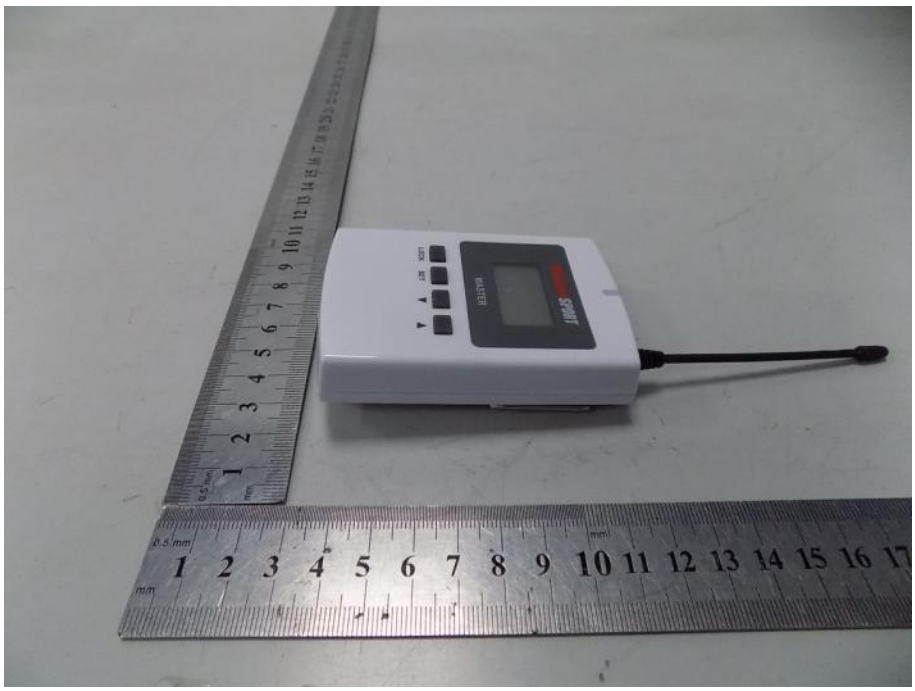
9. PHOTOS OF THE EUT

EUT View

EUT View

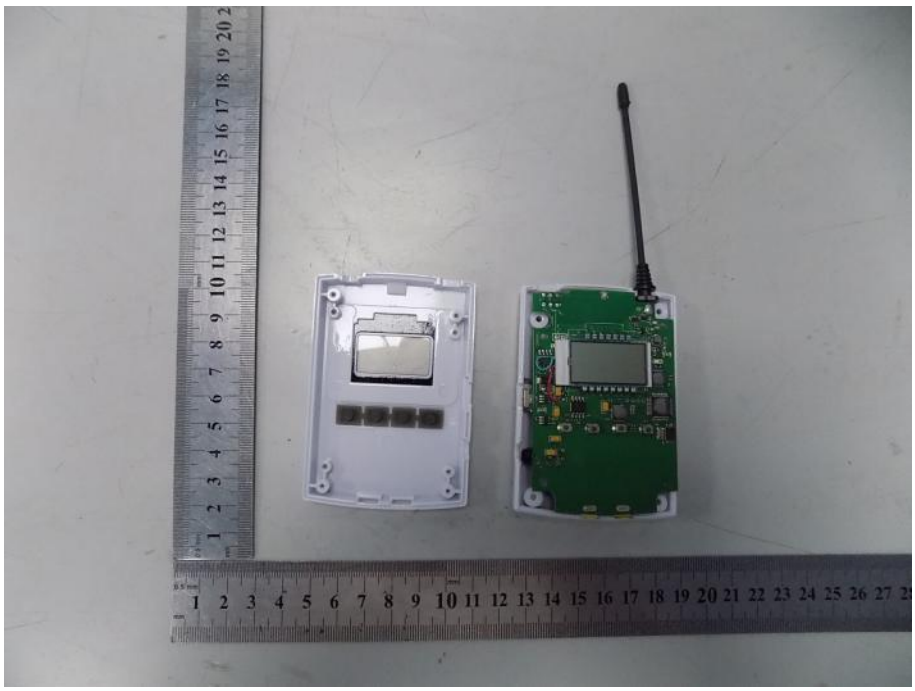
EUT View

EUT View



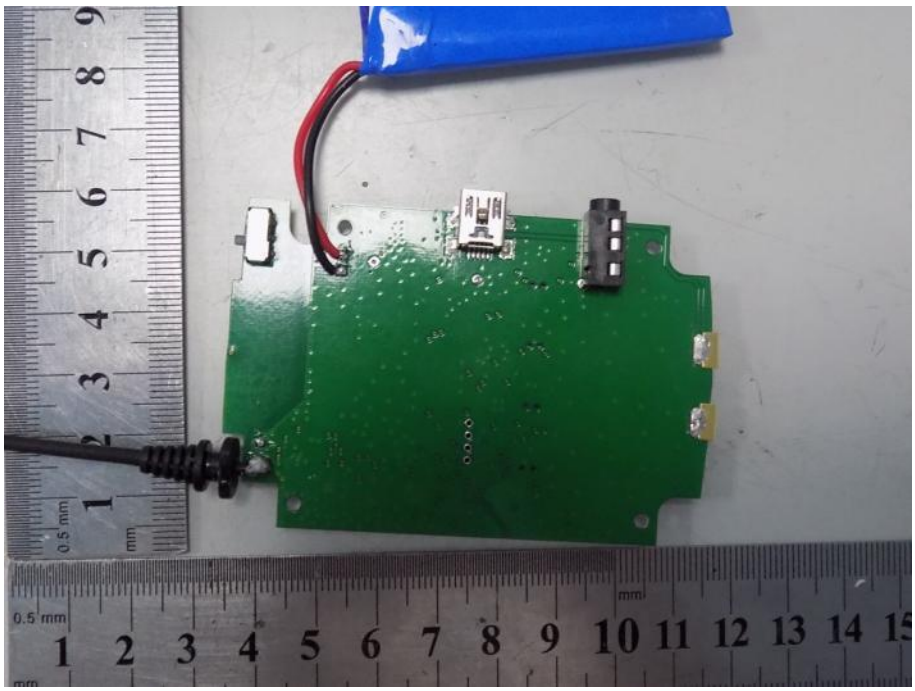
EUT View

EUT View



EUT View

EUT View



EUT View

----END OF REPORT----