

FCC RADIO TEST REPORT

Applicant's company	Airyzone Technology Co., Ltd.
Applicant Address	5F., No.17-4, Ln. 112, Weiguo St., East Dist. Tainan, 701 Taiwan
FCC ID	2AC8FGC133021
Manufacturer's company	UONG XING TECHNOLOGY CO., LTD
Manufacturer Address	No.416, Sec. 1, Beixing Rd., Zhudong Township, Hsinchu County 310, Taiwan (R.O.C.)

Product Name	Airyzone Mobile Beacon
Brand Name	AIRYZONE
Model Name	MBFX14-MOT41, MBFX14-MOT11
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.249
Test Freq. Range	2402 ~ 2480MHz
Received Date	Dec. 04, 2014
Final Test Date	Dec. 15, 2014
Submission Type	Original Equipment

Statement

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2013** and **47 CFR FCC Part 15 Subpart C**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Table of Contents

1. CERTIFICATE OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Accessories.....	3
3.3. Table for Carrier Frequencies	3
3.4. Table for Test Modes	4
3.5. Table for Testing Locations.....	4
3.6. Table for Multiple Listing.....	4
3.7. Table for Supporting Units	5
3.8. Test Configurations	6
4. TEST RESULT	8
4.1. Field Strength of Fundamental Emissions Measurement	8
4.2. 20dB Spectrum Bandwidth Measurement	11
4.3. Radiated Emissions Measurement	14
4.4. Band Edge Emissions Measurement	24
4.5. Antenna Requirements	26
5. LIST OF MEASURING EQUIPMENTS	27
6. MEASUREMENT UNCERTAINTY.....	28
APPENDIX A. TEST PHOTOS	A1 ~ A5

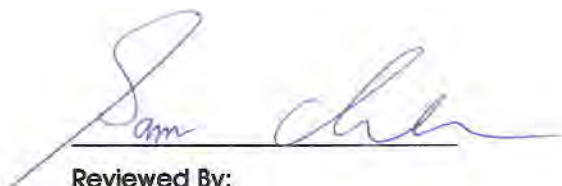
History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D0489	Rev. 01	Initial issue of report	Dec. 26, 2014

1. CERTIFICATE OF COMPLIANCE

Product Name : Airyzone Mobile Beacon
Brand Name : AIRYZONE
Model Name : MBFX14-MOT41, MBFX14-MOT11
Applicant : Airyzone Technology Co., Ltd.
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.249

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 04, 2014 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Reviewed By:

Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	Rule Section	Description of Test	Result	Under Limit
-	15.207	AC Power Line Conducted Emissions	-	Note
4.1	15.249(a)	Field Strength of Fundamental Emissions	Complies	2.64 dB
4.2	15.215(c)	20dB Spectrum Bandwidth	Complies	-
4.3	15.249(a)/(d)	Radiated Emissions	Complies	11.56 dB
4.4	15.249(d)	Band Edge Emissions	Complies	4.18 dB
4.5	15.203	Antenna Requirements	Complies	-

Note:

It was supplied power by battery for EUT; it's not necessary to apply to AC Power Port Conducted emission.

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Power Type	From battery 3V*1
Modulation	GFSK
Frequency Range	2402 ~ 2480MHz
Operation Frequency	2402 MHz, 2426 MHz, 2480 MHz
Channel Number	3
Channel Band Width (99%)	1.110 MHz
Max. Field Strength	91.36 dBuV/m at 3m
Carrier Frequencies	Please refer to section 3.3
Antenna	Antenna Type: Chip Antenna Antenna Gain: 3.45dBi

3.2. Accessories

Power	Brand	Model	Rating
Battery	Maxell	CR2032	3.0V
Others			
Silicone Case*3			

3.3. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency
2402 ~ 2480MHz	37	2402 MHz
	38	2426 MHz
	39	2480 MHz

3.4. Table for Test Modes

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Channel	Antenna
Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth	CTX	37/38/39	1
Radiated Emissions 30MHz ~ 1GHz	Normal Link	-	-
Radiated Emissions 1GHz~10 th Harmonic	CTX	37/38/39	1
Band Edge Emissions	CTX	37/39	1

The following test modes were performed for all tests:

For Radiated Emission below 1GHz test:

Mode 1. EUT 1 standing

Mode 2. EUT 1 laying

Mode 2 is the worst case, so it was selected to record in this test report

For Radiated Emission above 1GHz test:

The EUT was performed at X axis, Y axis and Z axis position. The worst case was found at X axis, so it was selected to perform test and its test result was written in the report.

Mode 1. Place EUT 1 in X axis

Note: CTX=continuously transmitting

3.5. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

3.6. Table for Multiple Listing

The EUT has two model names which are identical to each other in all aspects except for the following table:

EUT	Model Name	Parts Location (EEPROM)	Photos
1	MBFX14-MOT41	U3, U4, U7, U8	Please refer to Photographs of EUT at page 3
2	MBFX14-MOT11	U3	Please refer to Photographs of EUT at page 6

Note:

The above difference does not affect the test result of RF tests, so only EUT 1 was tested and recorded in this report.

3.7. Table for Supporting Units

For Test Site No.: 03CH01-CB

For Radiated Emission below 1GHz test:

Support Unit	Brand	Model	FCC ID
iPad	Apple	A1458	DoC

For Radiated Emission above 1GHz test:

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC
Fixture	Texas instruments	DN304	N/A

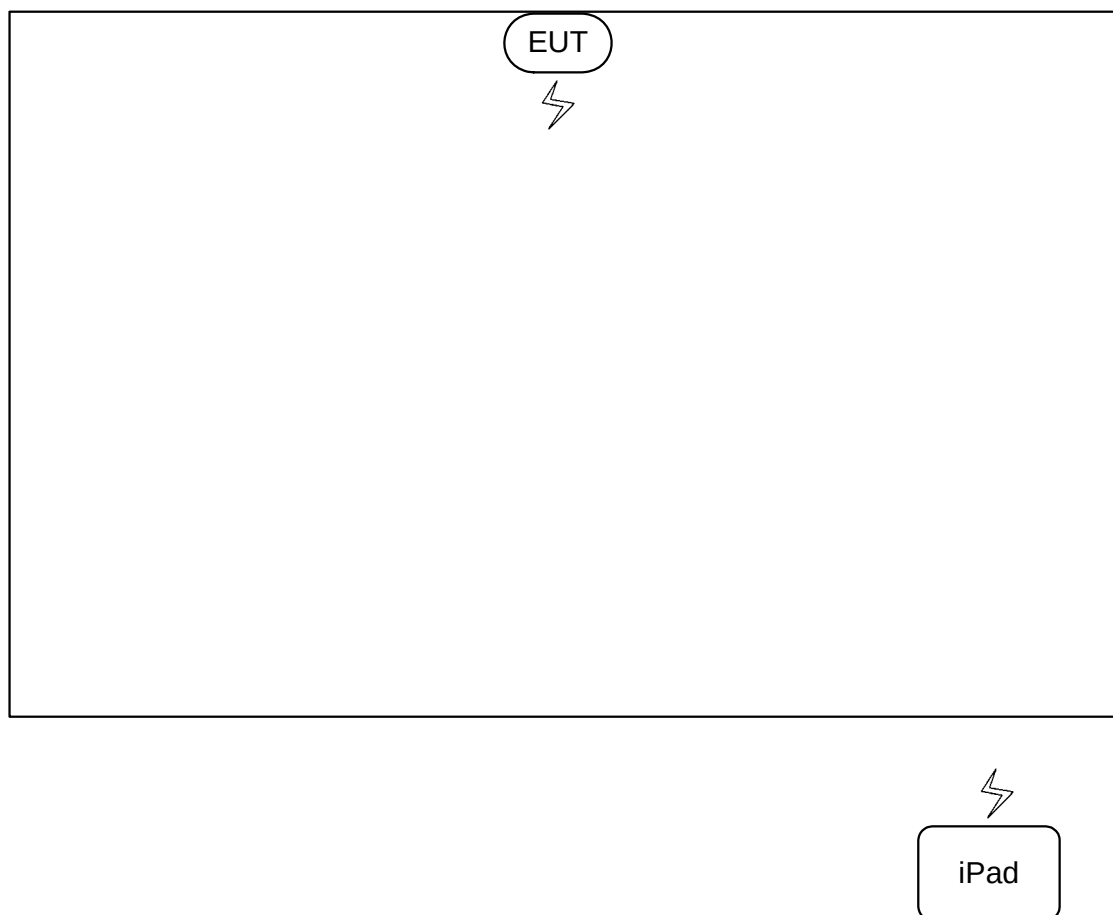
For Test Site No.: TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC
Fixture	Texas instruments	DN304	N/A

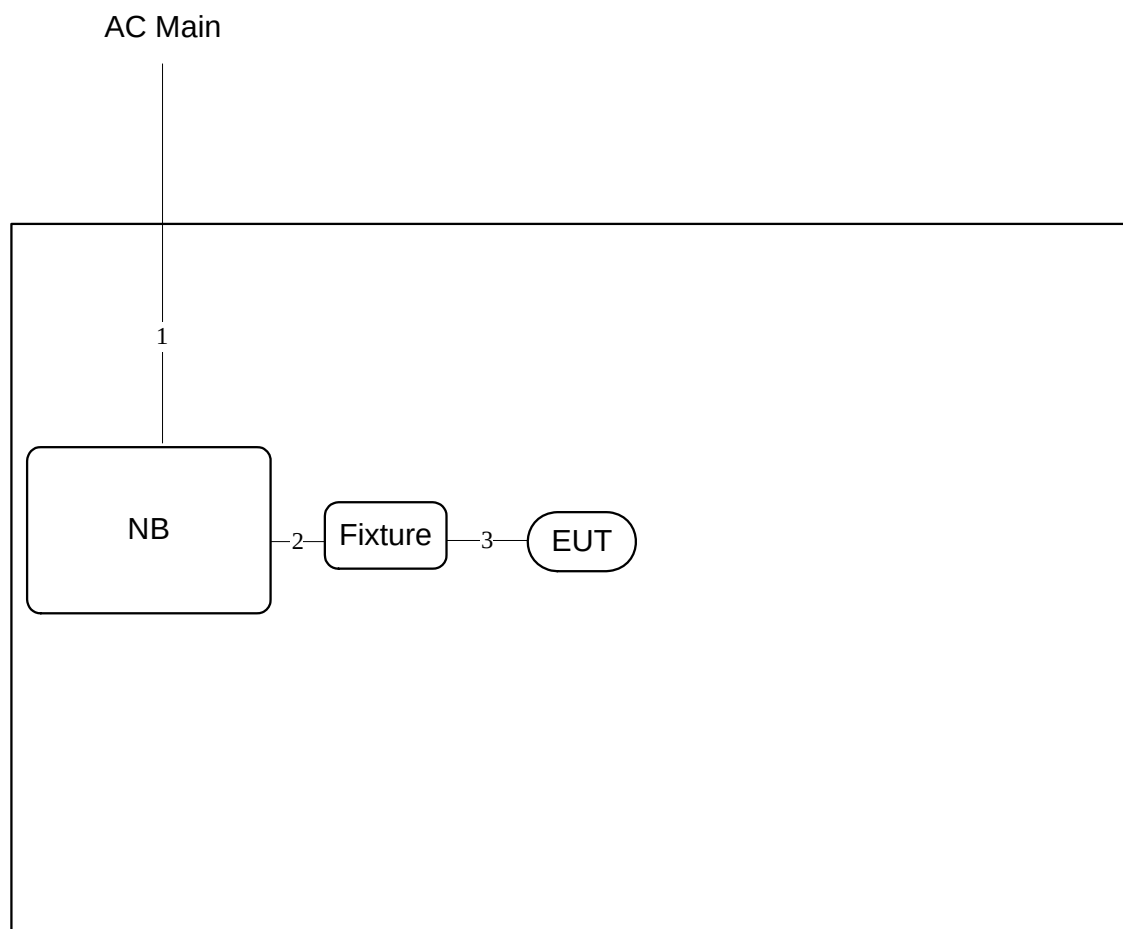
3.8. Test Configurations

3.8.1. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



Test Configuration: Above 1GHz



Item	Connection	Shielded	Length(m)
1	Power Cable	No	2.6m
2	USB Cable	Yes	1m
3	Console Cable	No	0.1m

4. TEST RESULT

4.1. Field Strength of Fundamental Emissions Measurement

4.1.1. Limit

The field strength of fundamental emissions within these bands specified at a distance of 3 meters (measurement instrumentation employing an average detector) shall comply with the following table.

Frequency Band (MHz)	Fundamental Emissions Limit (dBuV/m) at 3m
2400-2483.5	94 (Average)
	114 (Peak)

Measuring Instruments and Setting

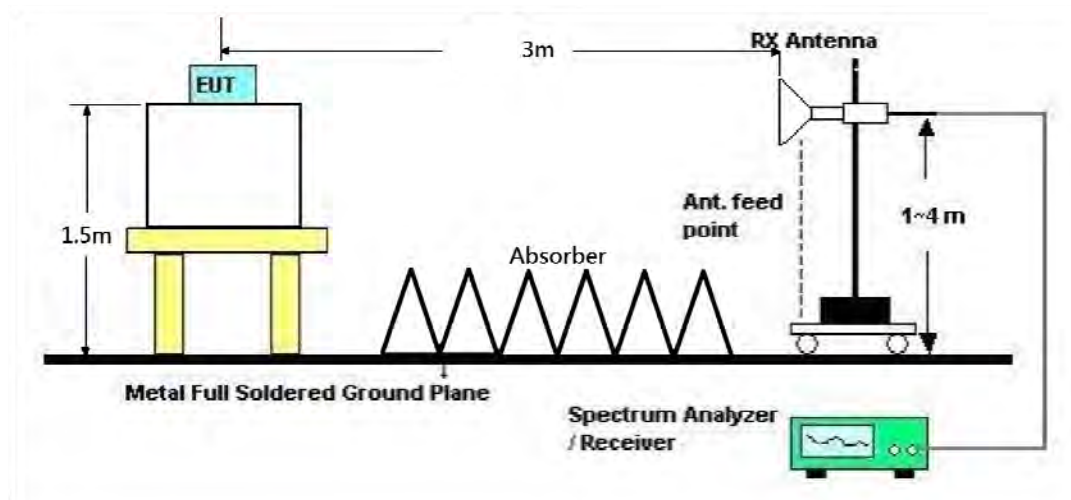
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Power Meter Parameter	Setting
RBW	1 MHz Peak / 3MHz Peak
VBW	1 MHz Peak / 10Hz Average
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.1.2. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For Fundamental emissions, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

4.1.3. Test Setup Layout



4.1.4. Test Deviation

There is no deviation with the original standard.

4.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.6. Test Result of Field Strength of Fundamental Emissions

Temperature	25°C	Humidity	40%
Test Engineer	Eason Chen / Satoshi Yang	Configurations	Channel 37, 38, 39
Test Date	Dec. 10, 2014		

Channel 37

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2402.00	91.29	94.00	-2.71	60.22	4.00	0.00	27.07	HORIZONTAL	276	100	Average
2	2402.30	92.56	114.00	-21.44	61.49	4.00	0.00	27.07	HORIZONTAL	276	100	Peak

Item 1, 2 are fundamental frequency at 2402 MHz.

Channel 38

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2426.00	90.42	94.00	-3.58	59.27	4.03	0.00	27.12	HORIZONTAL	284	100	Average
2	2426.35	91.74	114.00	-22.26	60.58	4.03	0.00	27.13	HORIZONTAL	284	100	Peak

Item 1, 2 are fundamental frequency at 2426 MHz.

Channel 39

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2479.80	92.69	114.00	-21.31	61.37	4.07	0.00	27.25	HORIZONTAL	272	100	Peak
2	2480.00	91.36	94.00	-2.64	60.04	4.07	0.00	27.25	HORIZONTAL	272	100	Average

Item 1, 2 are fundamental frequency at 2480 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

4.2. 20dB Spectrum Bandwidth Measurement

4.2.1. Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (2402 ~ 2480MHz).

4.2.2. Measuring Instruments and Setting

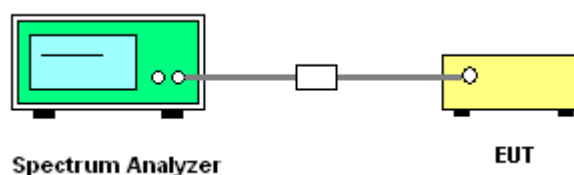
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 20dB Bandwidth
RBW	100 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

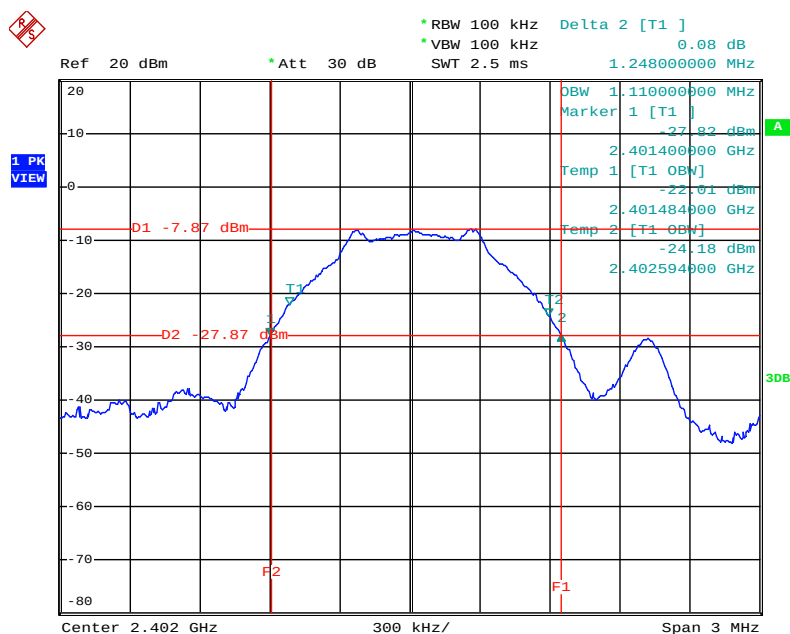
The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of 20dB Spectrum Bandwidth

Temperature	25°C	Humidity	60%
Test Engineer	Serway Li	Configurations	Channel 37/38/39

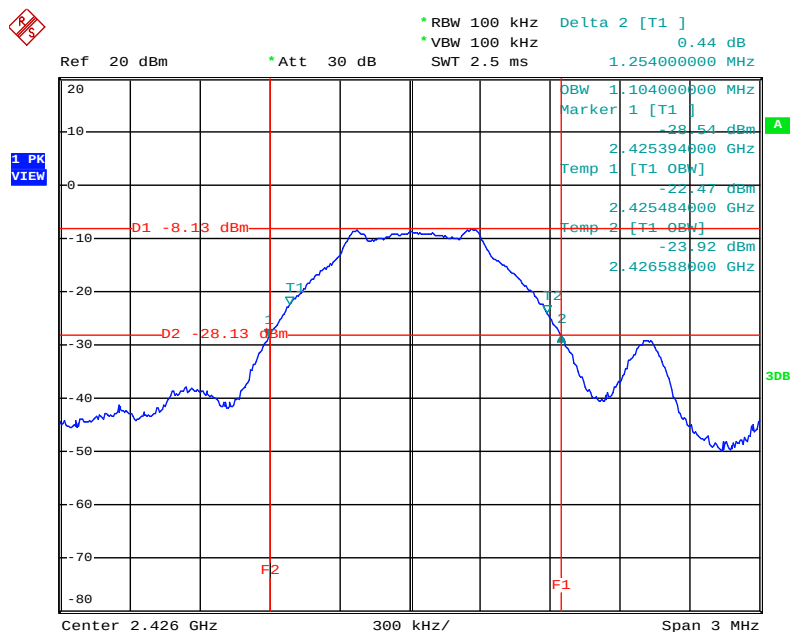
Frequency	20dB BW (MHz)	99% OBW (MHz)	Frequency range (MHz) $f_L > 2400\text{MHz}$	Frequency range (MHz) $f_H < 2483.5\text{MHz}$	Test Result
2402 MHz	1.248	1.110	2401.4840	-	Complies
2426 MHz	1.254	1.104	-	-	Complies
2480 MHz	1.236	1.104	-	2480.5520	Complies

20 dB/99% Bandwidth Plot on 2402 MHz



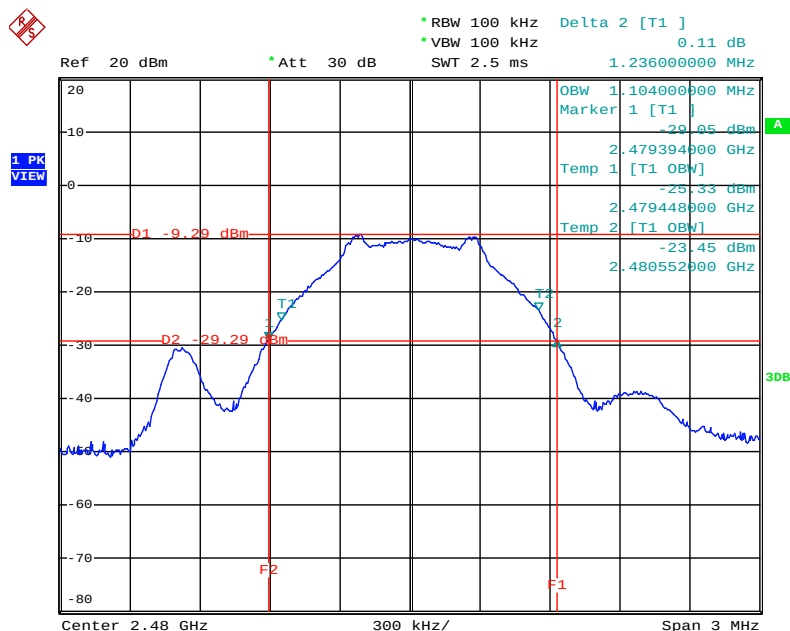
Date: 15.DEC.2014 21:41:30

20 dB/99% Bandwidth Plot on 2426 MHz



Date: 15.DEC.2014 21:45:01

20 dB/99% Bandwidth Plot on 2480 MHz



Date: 15.DEC.2014 21:47:54

4.3. Radiated Emissions Measurement

4.3.1. Limit

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other 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 comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

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

4.3.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1 000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100kHz/300kHz for Peak

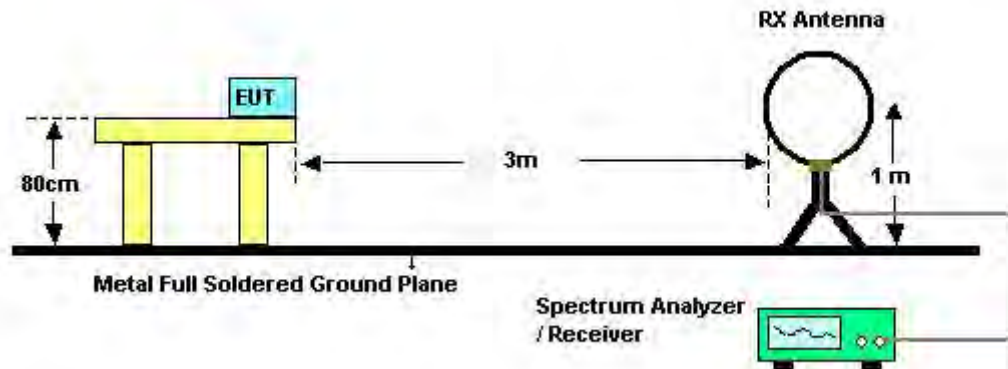
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.3.3. Test Procedures

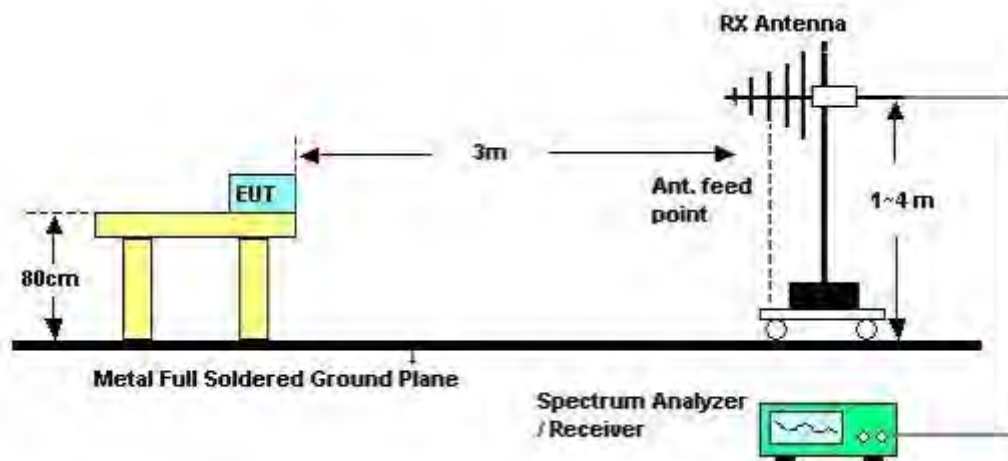
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.3.4. Test Setup Layout

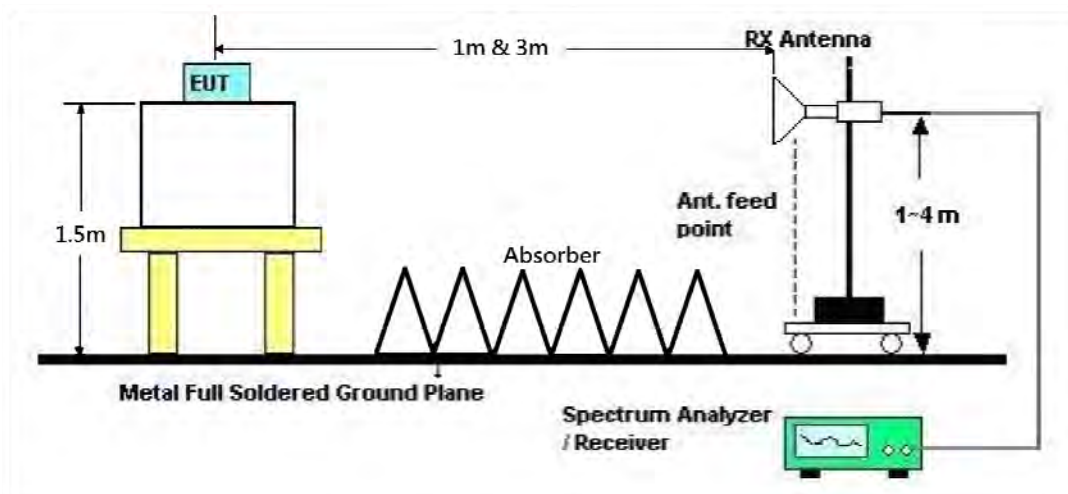
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	25°C	Humidity	40%
Test Engineer	Eason Chen / Satoshi Yang	Configurations	Normal Link
Test Date	Dec. 11, 2014	Test Mode	Mode 2

Freq. (MHz)	Level (dBuV)	Over Limit (Db)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20Db below the permissible value has no need to be reported.

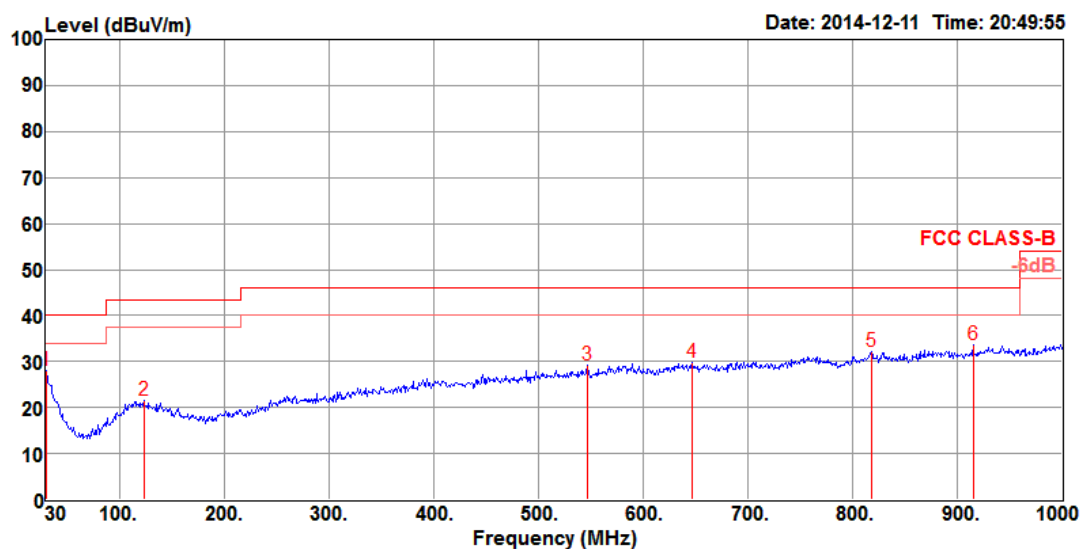
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (Db);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.3.8. Results of Radiated Emissions (30MHz~1GHz)

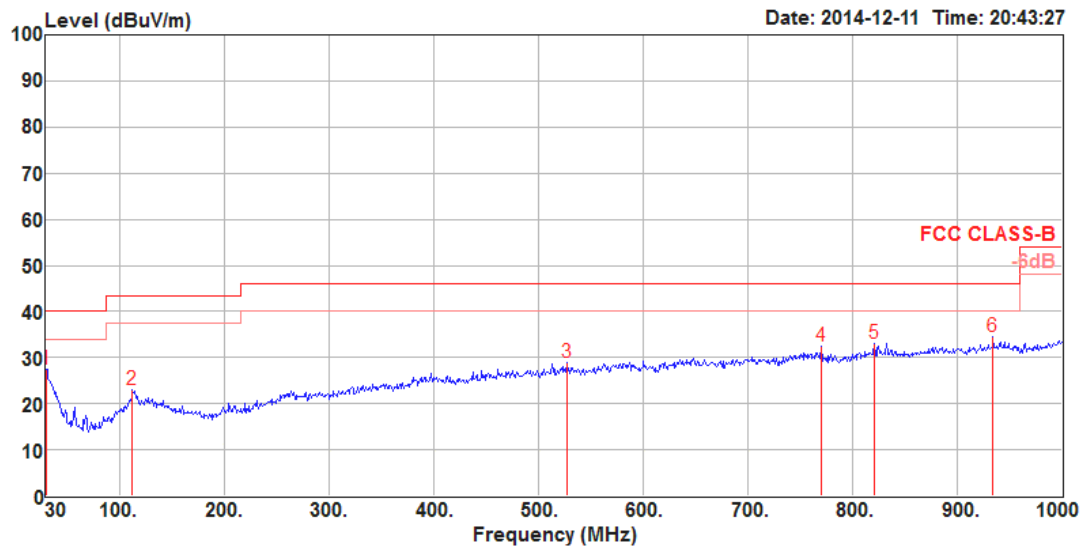
Temperature	25°C	Humidity	40%
Test Engineer	Eason Chen / Satoshi Yang	Configurations	Normal Link
Test Mode	Mode 2		

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	30.00	28.18	40.00	-11.82	39.89	0.43	20.10	32.24	Peak	200	298	HORIZONTAL
2	123.12	21.47	43.50	-22.03	40.01	0.96	12.77	32.27	Peak	150	359	HORIZONTAL
3	547.01	29.28	46.00	-16.72	40.71	2.05	18.65	32.13	Peak	150	263	HORIZONTAL
4	646.92	29.82	46.00	-16.18	40.10	2.22	19.57	32.07	Peak	400	339	HORIZONTAL
5	817.64	32.09	46.00	-13.91	40.52	2.49	20.98	31.90	Peak	125	261	HORIZONTAL
6	914.64	33.59	46.00	-12.41	40.34	2.64	21.79	31.18	Peak	300	109	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	cm	deg	Pol/Phase
1	30.00	27.50	40.00	-12.50	39.21	0.43	20.10	32.24	100	61	VERTICAL
2	112.45	23.03	43.50	-20.47	41.95	0.92	12.43	32.27	125	78	VERTICAL
3	526.64	28.85	46.00	-17.15	40.73	2.01	18.29	32.18	300	166	VERTICAL
4	770.11	32.57	46.00	-13.43	41.69	2.42	20.56	32.10	200	0	VERTICAL
5	820.55	32.95	46.00	-13.05	41.32	2.50	21.01	31.88	150	172	VERTICAL
6	934.04	34.44	46.00	-11.56	40.95	2.67	21.91	31.09	400	279	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.3.9. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	25°C	Humidity	40%
Test Engineer	Eason Chen / Satoshi Yang	Configurations	Channel 37
Test Date	Dec. 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4806.07	46.41	74.00	-27.59	43.32	5.74	33.71	31.06	HORIZONTAL	241	105	Peak
2	4806.12	36.28	54.00	-17.72	33.19	5.74	33.71	31.06	HORIZONTAL	241	105	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4803.32	49.26	74.00	-24.74	46.19	5.72	33.71	31.06	VERTICAL	105	118	Peak
2	4803.99	40.78	54.00	-13.22	37.69	5.74	33.71	31.06	VERTICAL	105	118	Average

Temperature	25°C	Humidity	40%
Test Engineer	Eason Chen / Satoshi Yang	Configurations	Channel 38
Test Date	Dec. 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Pol/Phase	deg	cm	
1	4854.00	36.05	54.00	-17.95	32.84	5.75	33.69	31.15	HORIZONTAL	242	100	Average
2	4854.02	46.54	74.00	-27.46	43.33	5.75	33.69	31.15	HORIZONTAL	242	100	Peak

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Pol/Phase	deg	cm	
1	4851.67	49.01	74.00	-24.99	45.82	5.75	33.69	31.13	VERTICAL	62	194	Peak
2	4852.02	40.32	54.00	-13.68	37.13	5.75	33.69	31.13	VERTICAL	62	194	Average

Temperature	25°C	Humidity	40%
Test Engineer	Eason Chen / Satoshi Yang	Configurations	Channel 39
Test Date	Dec. 10, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	Pol/Phase	deg	cm	
1	4958.03	39.62	54.00	-14.38	36.14	5.80	33.65	31.33	HORIZONTAL	311	100	Average
2	4958.15	47.74	74.00	-26.26	44.26	5.80	33.65	31.33	HORIZONTAL	311	100	Peak

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	Pol/Phase	deg	cm	
1	4958.03	47.19	74.00	-26.81	43.71	5.80	33.65	31.33	VERTICAL	310	100	Peak
2	4958.06	39.40	54.00	-14.60	35.92	5.80	33.65	31.33	VERTICAL	310	100	Average

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.4. Band Edge Emissions Measurement

4.4.1. Limit

Band edge emissions radiated outside of the specified frequency bands shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

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

4.4.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100kHz/300kHz for Peak

4.4.3. Test Procedures

- The test procedure is the same as section 4.3.3, only the frequency range investigated is limited to 2MHz around bandedges.
- In case the emission is fail due to the used RBW/VBW is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.4.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.3.4.

4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Band Edge and Fundamental Emissions

Temperature	25°C	Humidity	40%
Test Engineer	Eason Chen / Satoshi Yang	Configurations	Channel 37, 38, 39
Test Date	Dec. 10, 2014		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2389.48	55.58	74.00	-18.42	24.55	3.99	0.00	27.04	HORIZONTAL	276	100	Peak
2	2390.00	44.54	54.00	-9.46	13.51	3.99	0.00	27.04	HORIZONTAL	276	100	Average
3	2402.00	91.29			60.22	4.00	0.00	27.07	HORIZONTAL	276	100	Average
4	2402.30	92.56			61.49	4.00	0.00	27.07	HORIZONTAL	276	100	Peak

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2381.84	57.26	74.00	-16.74	26.25	3.99	0.00	27.02	HORIZONTAL	284	100	Peak
2	2390.00	43.73	54.00	-10.27	12.70	3.99	0.00	27.04	HORIZONTAL	284	100	Average
3	2426.00	90.42			59.27	4.03	0.00	27.12	HORIZONTAL	284	100	Average
4	2426.35	91.74			60.58	4.03	0.00	27.13	HORIZONTAL	284	100	Peak
5	2483.50	44.60	54.00	-9.40	13.27	4.07	0.00	27.26	HORIZONTAL	284	100	Average
6	2483.50	57.20	74.00	-16.80	25.87	4.07	0.00	27.26	HORIZONTAL	284	100	Peak

Item 3, 4 are the fundamental frequency at 2426MHz.

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2479.80	92.69			61.37	4.07	0.00	27.25	HORIZONTAL	272	100	Peak
2	2480.00	91.36			60.04	4.07	0.00	27.25	HORIZONTAL	272	100	Average
3	2483.53	62.18	74.00	-11.82	30.85	4.07	0.00	27.26	HORIZONTAL	272	100	Peak
4	2483.62	49.82	54.00	-4.18	18.49	4.07	0.00	27.26	HORIZONTAL	272	100	Average

Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.5. Antenna Requirements

4.5.1. 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 manufacturer 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. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.5.2. Antenna Connector Construction

Please refer to section 3.1 in this test report, antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 26, 2014	Radiation (03CH01-CB)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz - 30 MHz	Jul. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02009	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 25, 2014	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Apr. 22, 2014	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100080	9kHz ~ 40GHz	Oct. 15, 2014	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESR26	101289	9kHz~26GHz	Aug. 22, 2014	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO 2000	N/A	1 m - 4 m	N.C.R.	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec.12, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 03, 2014	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%