FCC Test Report

Product Name	Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Model No.	CSW2-02IP-A1
FCC ID	WKP-CSW2-02IP-A1

Applicant	IPEVO Corp.
Address	3F, No.53, Bo-ai Road, Taipei 100, Taiwan

Date of Receipt	Jun. 14, 2016
Issued Date	Jul. 14, 2016
Report No.	1660314R-RFUSP15V00
Report Version	V1.0

Testing Laboratory
3023

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

Test Report

Issued Date: Jul. 14, 2016
Report No.: 1660314R-RFUSP15V00

Product Name	Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Applicant	IPEVO Corp.
Address	3F, No.53, Bo-ai Road, Taipei 100, Taiwan
Manufacturer	IPEVO Corp.
Model No.	CSW2-02IP-A1
EUT Rated Voltage	Power by USB 5V
EUT Test Voltage	Power by USB 5V
Trade Name	IPEVO
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2015 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By : Joanne Lin

(Senior Adm. Specialist / Joanne Lin)

Tested By : Xiao Chen

(Engineer / Xiao Chen)

Approved By :

(Director / Vincent Lin)

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Trade Name	IPEVO
Model No.	CSW2-02IP-A1
FCC ID	WKP-CSW2-02IP-A1
Frequency Range	2405-2468MHz
Channel Number	3
Type of Modulation	GFSK
Antenna Type	Chip Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	WinWave	WAN8010F245M03 WAN8010F245M04 WAN8010F245M05	Chip Antenna	3.45dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

Center Frequency of Each Channel

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	2405 MHz	Channel 2:	2440 MHz	Channel 3:	2468 MHz

Note:

1. The EUT is a Wireless Interactive Whiteboard System – IW2-Wireless Receiver with a built-in 2.4GHz wireless transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit

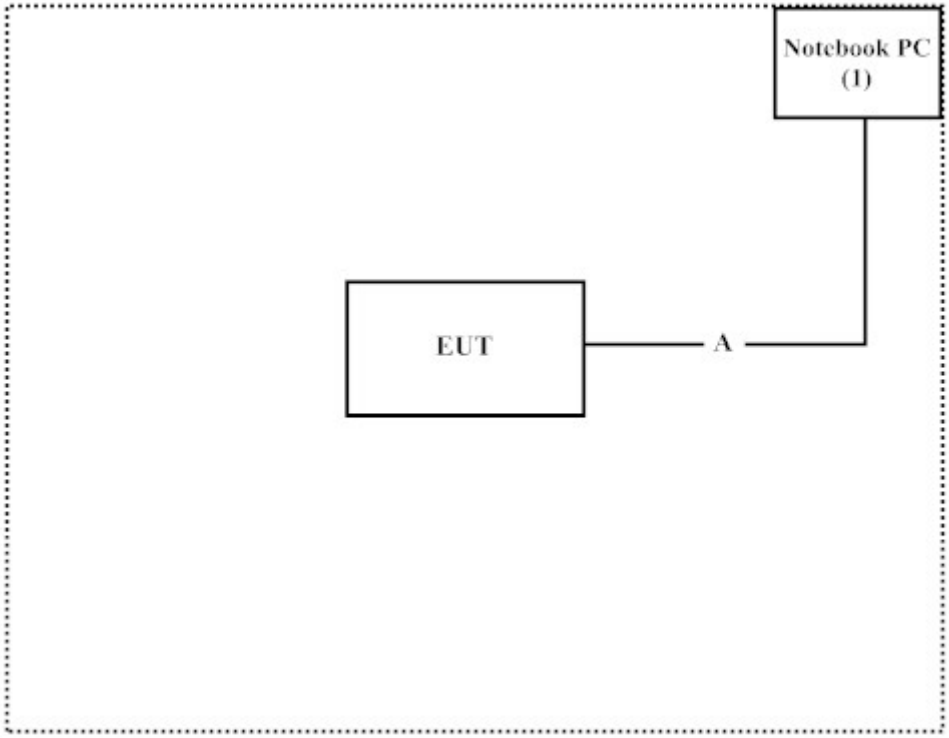
1.3. Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
A	Notebook PC	DELL	Latitude E5440	B6TYTZ1	Non-Shielded, 0.8m

Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1.7m

1.4. Configuration of Test System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in Section 1.4.
(2) The Internal Test Fixture uses in controlling EUT to transmit continuously.
(3) Configure the test mode and the test channel
(4) Start the continuous Transmit.
(5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site: http://www.quietek.com/chinese/about/certificates.aspx?bval=5
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site: http://www.quietek.com/

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

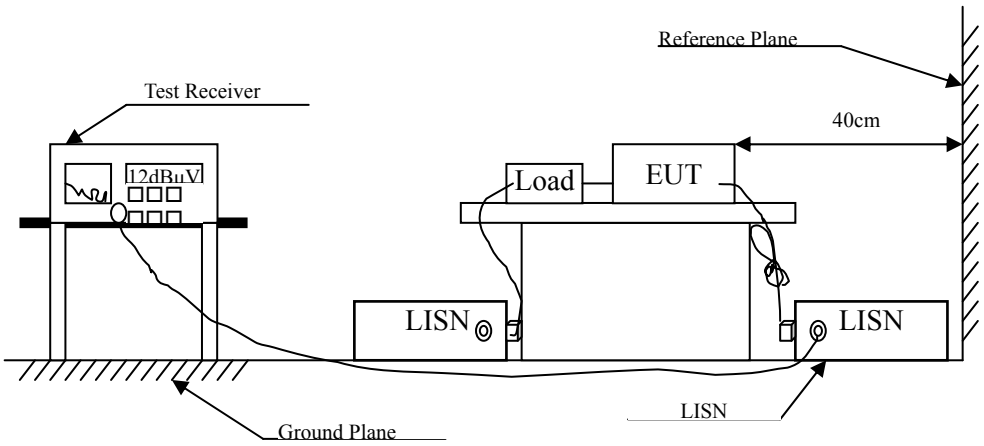
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2015	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2016	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2016	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar., 2016	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2016	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBμV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmit (2440MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.197	9.650	38.050	47.700	-16.957	64.657
0.291	9.655	25.430	35.085	-26.886	61.971
0.416	9.662	20.210	29.872	-28.528	58.400
0.486	9.666	25.210	34.876	-21.524	56.400
0.658	9.675	33.260	42.935	-13.065	56.000
1.341	9.723	26.820	36.543	-19.457	56.000
Average					
0.197	9.650	28.730	38.380	-16.277	54.657
0.291	9.655	13.050	22.705	-29.266	51.971
0.416	9.662	10.010	19.672	-28.728	48.400
0.486	9.666	15.450	25.116	-21.284	46.400
0.658	9.675	26.200	35.875	-10.125	46.000
1.341	9.723	16.090	25.813	-20.187	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmit (2440MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV	dB	dBμV
LINE 2					
Quasi-Peak					
0.205	9.661	34.960	44.621	-19.808	64.429
0.283	9.664	24.510	34.174	-28.026	62.200
0.380	9.660	22.540	32.200	-27.229	59.429
0.502	9.667	26.390	36.057	-19.943	56.000
0.650	9.675	34.010	43.685	-12.315	56.000
1.384	9.725	27.120	36.845	-19.155	56.000
Average					
0.205	9.661	26.980	36.641	-17.788	54.429
0.283	9.664	15.600	25.264	-26.936	52.200
0.380	9.660	13.430	23.090	-26.339	49.429
0.502	9.667	17.660	27.327	-18.673	46.000
0.650	9.675	24.770	34.445	-11.555	46.000
1.384	9.725	14.500	24.225	-21.775	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Radiated Emission

3.1. Test Equipment

The following test equipments are used during the radiated emission test:

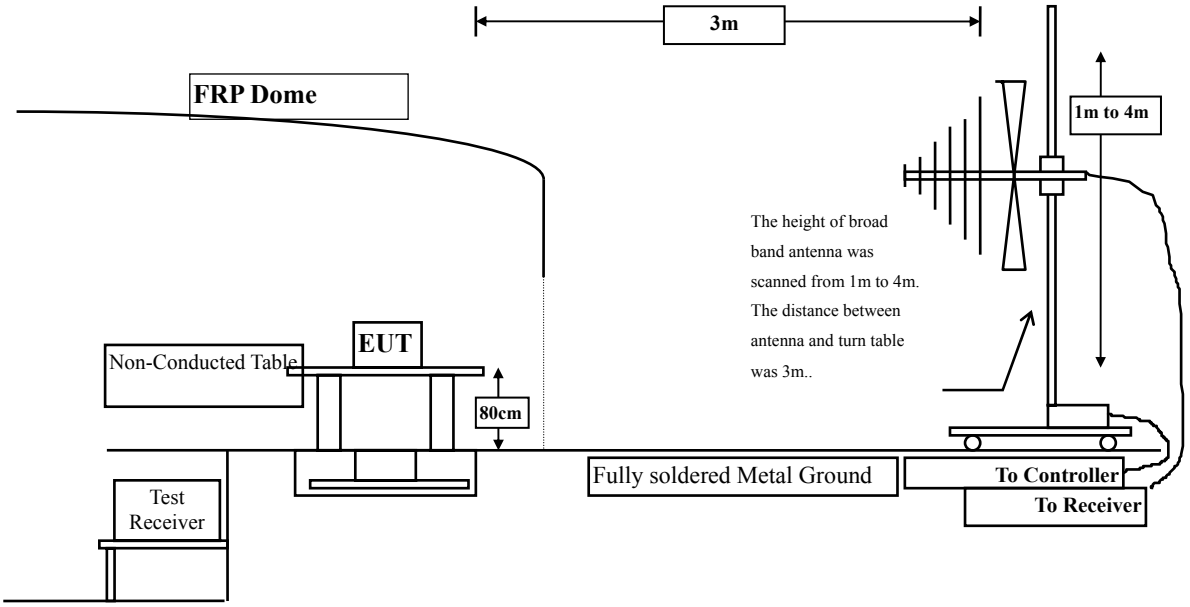
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep., 2015
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun., 2016
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun., 2016
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun., 2016
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun., 2016

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2015
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar., 2016
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2016
	X	Horn Antenna	TRC	AH-0801/95051	Aug., 2015
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2016
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul., 2016
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2016

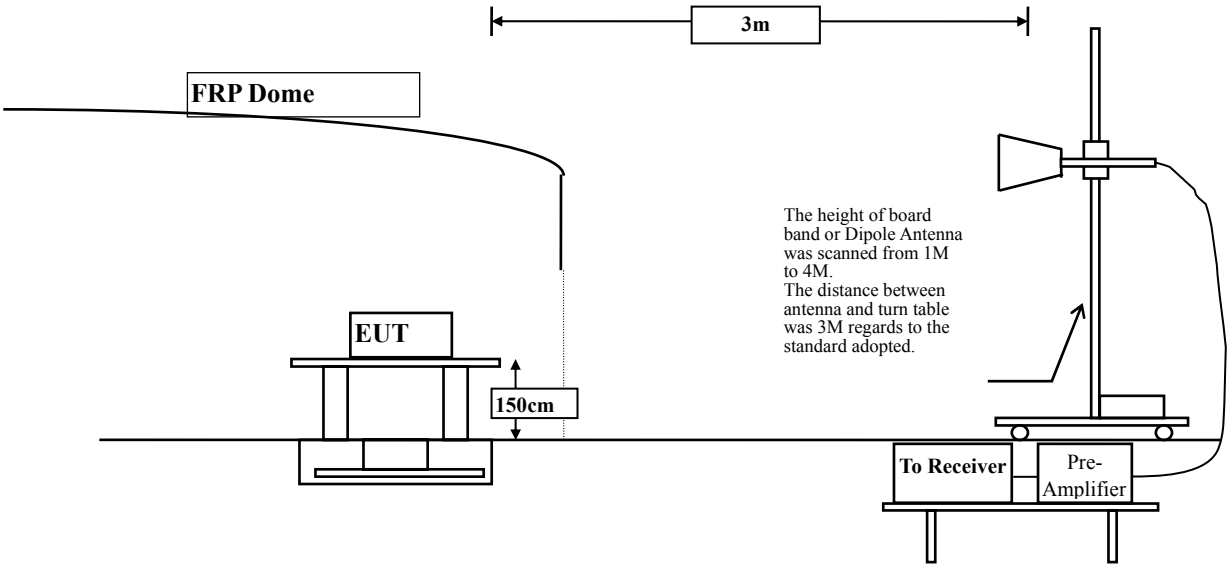
Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.3. Limits

➢ **Fundamental and Harmonics Emission Limits**

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBμV /m @3m)	(uV/m @3m)	(dBμV /m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks : 1. RF Voltage (dBμV /m) = 20 log RF Voltage (uV/m)

2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBμV /m) = 20 log E field strength (uV/m)

3.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.249 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.
The turn table is rotated 360 degrees to determine the position of the maximum emission level.
The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level.
This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.
The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.
Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.
The measurement is divided into the Preliminary Measurement and the Final Measurement.
The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.
The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.
The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

3.5. Uncertainty

± 3.9 dB above 1GHz
± 3.8 dB below 1GHz

3.6. Test Result of Radiated Emission

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit

X-Axis

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Limit dBμV /m
Horizontal					
Peak Detector:					
2405.000	-1.055	84.440	83.384	-30.616	114.000
2440.000	-0.836	85.230	84.394	-29.606	114.000
2468.000	-0.656	85.150	84.493	-29.507	114.000
Average					
Detector:					
2405.000	-1.055	79.590	78.534	-15.466	94.000
2440.000	-0.836	84.190	83.354	-10.646	94.000
2468.000	-0.656	79.170	78.513	-15.487	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit

X-Axis

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Limit dBμV /m
Vertical					
Peak Detector:					
2405.000	-1.722	87.070	85.347	-28.653	114.000
2440.000	-1.549	82.280	80.731	-33.269	114.000
2468.000	-1.390	88.540	87.149	-26.851	114.000
Average					
Detector:					
2405.000	-1.722	87.070	85.347	-8.653	94.000
2440.000	-1.549	81.320	79.771	-14.229	94.000
2468.000	-1.390	86.310	84.919	-9.081	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit

Y-Axis

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Limit dBμV /m
Horizontal					
Peak Detector:					
2405.000	-1.055	89.850	88.794	-25.206	114.000
2440.000	-0.836	88.290	87.454	-26.546	114.000
2468.000	-0.656	94.880	94.223	-19.777	114.000
Average					
Detector:					
2405.000	-1.055	85.000	83.944	-10.056	94.000
2440.000	-0.836	87.250	86.414	-7.586	94.000
2468.000	-0.656	88.900	88.243	-5.757	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit

Y-Axis

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Limit dBμV /m
Vertical					
Peak Detector:					
2405.000	-1.722	84.040	82.317	-31.683	114.000
2440.000	-1.549	83.310	81.761	-32.239	114.000
2468.000	-1.390	88.080	86.689	-27.311	114.000
Average					
Detector:					
2405.000	-1.722	81.980	80.257	-13.743	94.000
2440.000	-1.549	82.350	80.801	-13.199	94.000
2468.000	-1.390	85.760	84.369	-9.631	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit

Z-Axis

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Limit dBμV /m
Horizontal					
Peak Detector:					
2405.000	-1.055	89.790	88.734	-25.266	114.000
2440.000	-0.836	91.310	90.474	-23.526	114.000
2468.000	-0.656	90.840	90.183	-23.817	114.000
Average					
Detector:					
2405.000	-1.055	84.940	83.884	-10.116	94.000
2440.000	-0.836	90.270	89.434	-4.566	94.000
2468.000	-0.656	84.860	84.203	-9.797	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit

Z-Axis

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Limit dBμV /m
Vertical					
Peak Detector:					
2405.000	-1.722	80.850	79.127	-34.873	114.000
2440.000	-1.549	80.700	79.151	-34.849	114.000
2468.000	-1.390	81.510	80.119	-33.881	114.000
Average Detector:					
2405.000	-1.722	78.790	77.067	-16.933	94.000
2440.000	-1.549	79.740	78.191	-15.809	94.000
2468.000	-1.390	79.280	77.889	-16.111	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2405MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV /m	dB	dBμV /m
Horizontal					
Peak Detector:					
4810.000	3.323	49.070	52.393	-21.607	74.000
7215.000	10.289	32.730	43.020	-30.980	74.000
9620.000	13.595	32.820	46.416	-27.584	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4810.000	6.591	45.520	52.111	-21.889	74.000
7215.000	11.151	32.480	43.632	-30.368	74.000
9620.000	14.014	33.150	47.165	-26.835	74.000
Average Detector:					
--					

Note:
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2440MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Peak Limit dBμV /m
Horizontal Peak Detector:					
4880.000	3.010	48.910	51.920	-22.080	74.000
7320.000	11.833	33.050	44.884	-29.116	74.000
9760.000	12.580	32.590	45.171	-28.829	74.000
Average Detector					
--					
Vertical Peak Detector:					
4880.000	5.738	43.810	49.548	-24.452	74.000
7320.000	12.703	32.630	45.333	-28.667	74.000
9760.000	13.052	32.670	45.722	-28.278	74.000
Average Detector					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2468MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Peak Limit dBμV /m
Horizontal Peak Detector:					
4936.000	2.827	46.970	49.796	-24.204	74.000
7404.000	12.240	33.150	45.390	-28.610	74.000
9872.000	13.080	32.720	45.800	-28.200	74.000
Average Detector					
--					
Vertical Peak Detector:					
4936.000	5.534	42.240	47.773	-26.227	74.000
7404.000	13.360	32.940	46.300	-27.700	74.000
9872.000	13.648	33.110	46.758	-27.242	74.000
Average Detector					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2440MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV /m	dB	dBμV /m
Horizontal					
103.101	-6.876	38.833	31.957	-11.543	43.500
281.638	-5.298	36.071	30.773	-15.227	46.000
353.333	-2.447	36.420	33.972	-12.028	46.000
492.507	-0.528	40.717	40.189	-5.811	46.000
595.130	3.963	28.591	32.554	-13.446	46.000
832.710	5.750	29.741	35.492	-10.508	46.000
Vertical					
100.290	0.009	41.975	41.984	-1.516	43.500
159.333	-6.187	38.139	31.952	-11.548	43.500
215.565	-8.235	34.539	26.304	-17.196	43.500
492.507	-2.652	31.312	28.660	-17.340	46.000
832.710	2.333	34.991	37.325	-8.675	46.000
970.478	7.689	30.763	38.452	-15.548	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

4. Band Edge

4.1. Test Equipment

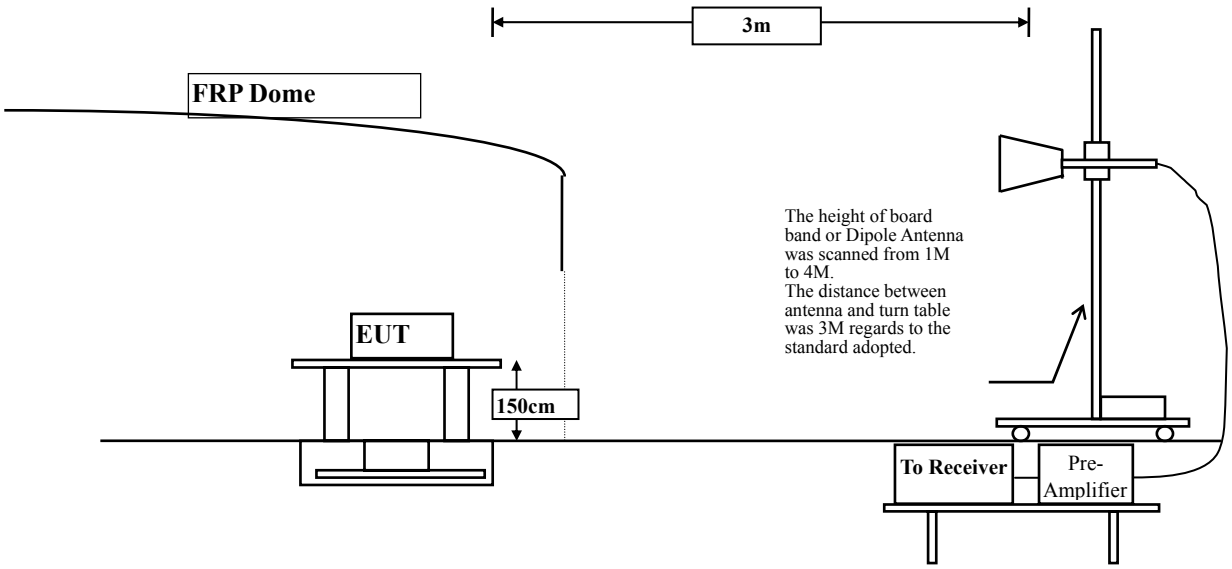
The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct., 2015
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar., 2016
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan., 2016
	X	Horn Antenna	TRC	AH-0801/95051	Aug., 2015
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2016
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul., 2016
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2016

Note: 1. All equipments are calibrated every one year.

2. The test equipments marked by "X" are used to measure the final test results.

4.2. Test Setup



4.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.4. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.
The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

4.5. Uncertainty

Conducted is ± 1.27 dB
Radiated is ± 3.9 dB

4.6. Test Result of Band Edge

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2405MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV /m)	Peak Limit (dBμV /m)	Average Limit (dBμV /m)	Result
1 (Peak)	2390.000	-1.131	52.662	51.531	74.00	54.00	Pass
1 (Peak)	2400.000	-1.084	62.146	61.063	74.00	54.00	Pass
1 (Peak)	2404.928	-1.056	90.585	89.529	--	--	--
1 (Average)	2386.812	-1.143	27.398	26.255	74.00	54.00	Pass
1 (Average)	2390.000	-1.131	25.578	24.447	74.00	54.00	Pass
1 (Average)	2400.000	-1.084	29.983	28.900	74.00	54.00	Pass
1 (Average)	2405.217	-1.055	84.283	83.228	--	--	--

Figure Channel 1: Horizontal (Peak)

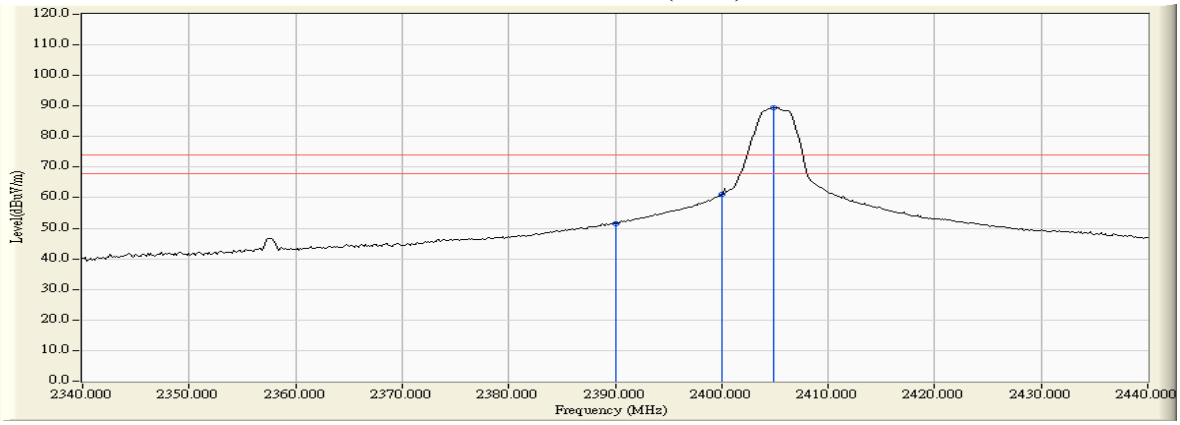
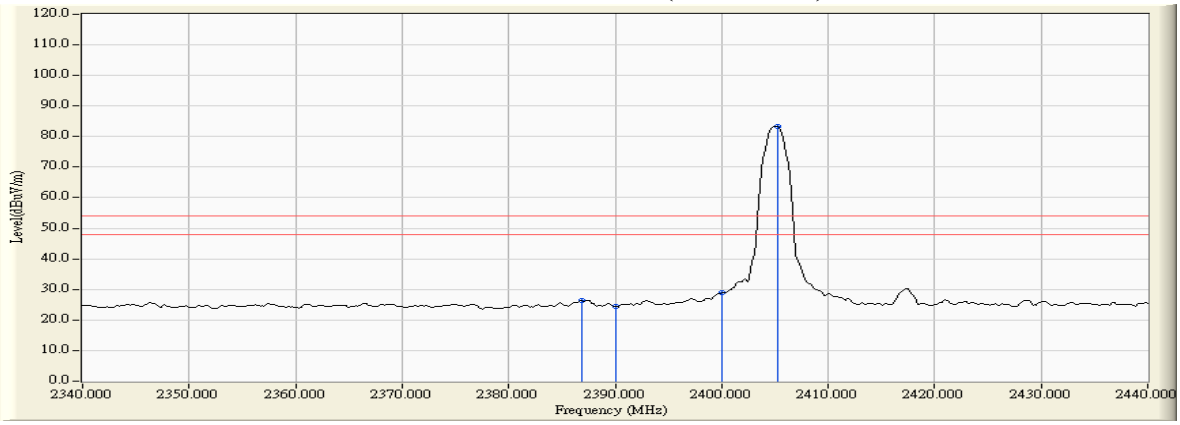


Figure Channel 1: Horizontal (AVERAGE)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2405MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV /m)	Peak Limit (dBμV /m)	Average Limit (dBμV /m)	Result
1 (Peak)	2390.000	-1.725	50.656	48.931	74.00	54.00	Pass
1 (Peak)	2400.000	-1.733	59.760	58.028	74.00	54.00	Pass
1 (Peak)	2404.783	-1.722	87.795	86.072	--	--	--
1 (Average)	2386.522	-1.709	28.257	26.548	74.00	54.00	Pass
1 (Average)	2390.000	-1.725	25.060	23.335	74.00	54.00	Pass
1 (Average)	2400.000	-1.733	30.320	28.588	74.00	54.00	Pass
1 (Average)	2405.217	-1.723	87.249	85.527	--	--	--

Figure Channel 1: Vertical (Peak)

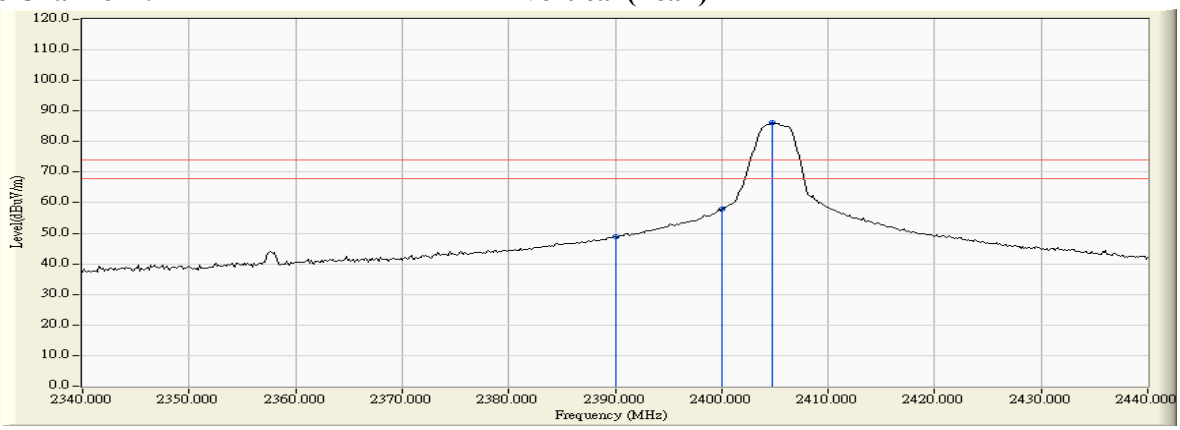
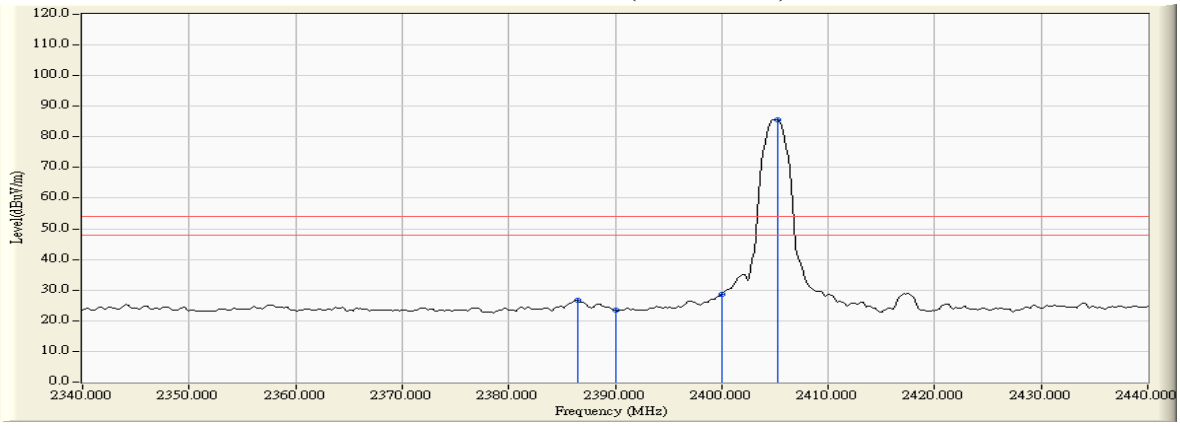


Figure Channel 1: Vertical (AVERAGE)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2468MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV /m)	Peak Limit (dBμV /m)	Average Limit (dBμV /m)	Result
3 (Peak)	2468.334	-0.654	94.986	94.331	--	--	--
3 (Peak)	2483.500	-0.558	58.263	57.705	74.00	54.00	Pass
3 (Average)	2468.334	-0.654	94.707	94.052	--	--	--
3 (Average)	2483.500	-0.558	27.050	26.492	74.00	54.00	Pass
3 (Average)	2484.372	-0.553	30.035	29.482	74.00	54.00	Pass

Figure Channel 3: Horizontal (Peak)

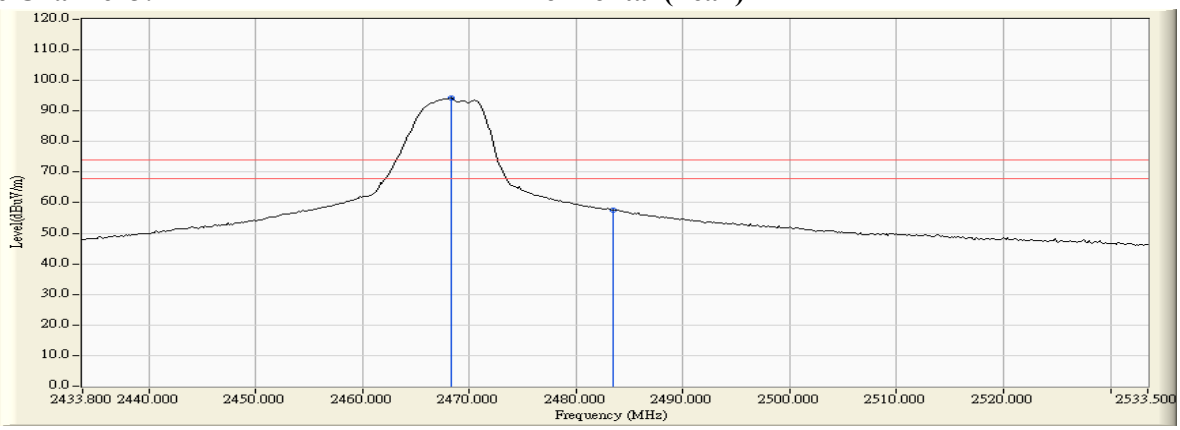
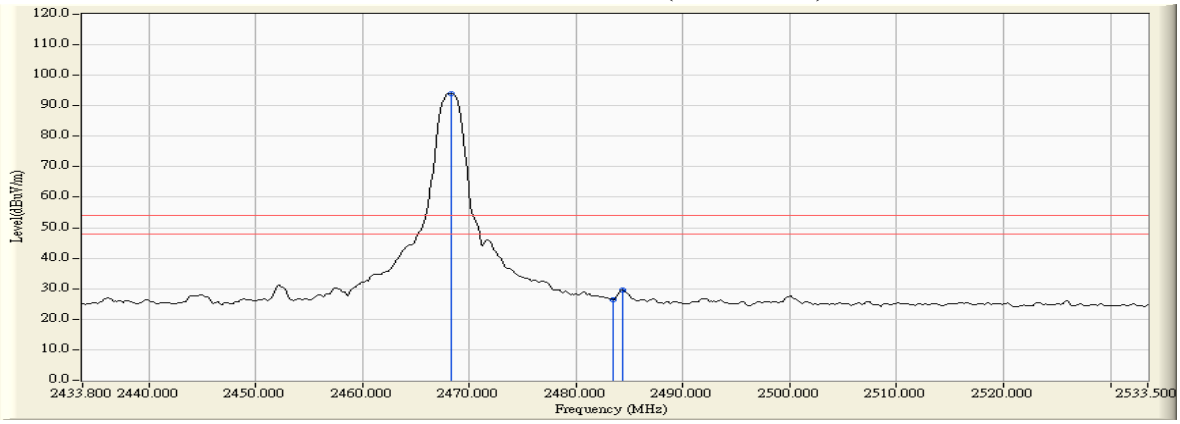


Figure Channel 3: Horizontal (AVERAGE)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.

Product : Wireless Interactive Whiteboard System – IW2-Wireless Receiver
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2468MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV /m)	Peak Limit (dBμV /m)	Average Limit (dBμV /m)	Result
3 (Peak)	2468.478	-1.388	87.839	86.451	--	--	--
3 (Peak)	2483.500	-1.305	50.798	49.493	74.00	54.00	Pass
3 (Average)	2468.334	-1.388	87.696	86.307	--	--	--
3 (Average)	2483.500	-1.305	26.022	24.717	74.00	54.00	Pass
3 (Average)	2490.730	-1.265	27.731	26.466	74.00	54.00	Pass

Figure Channel 3: Vertical (Peak)

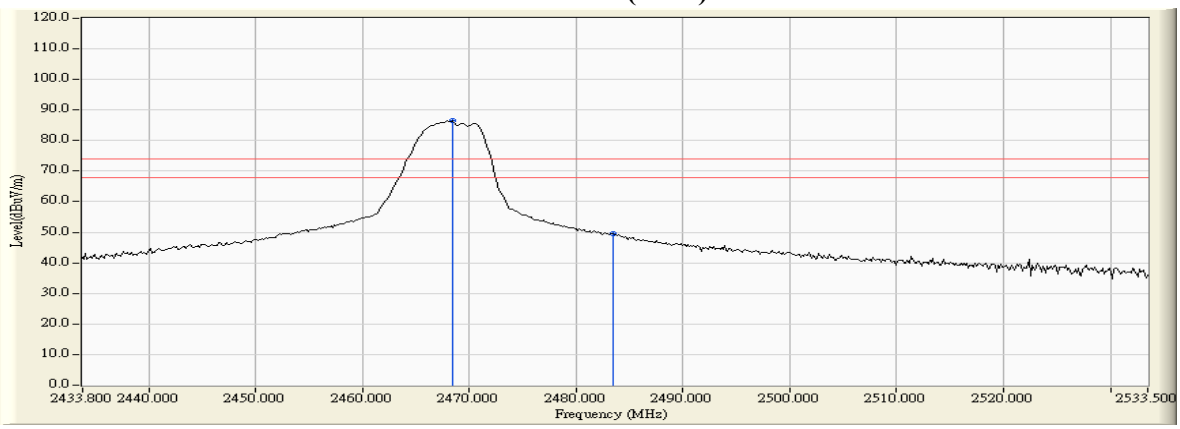
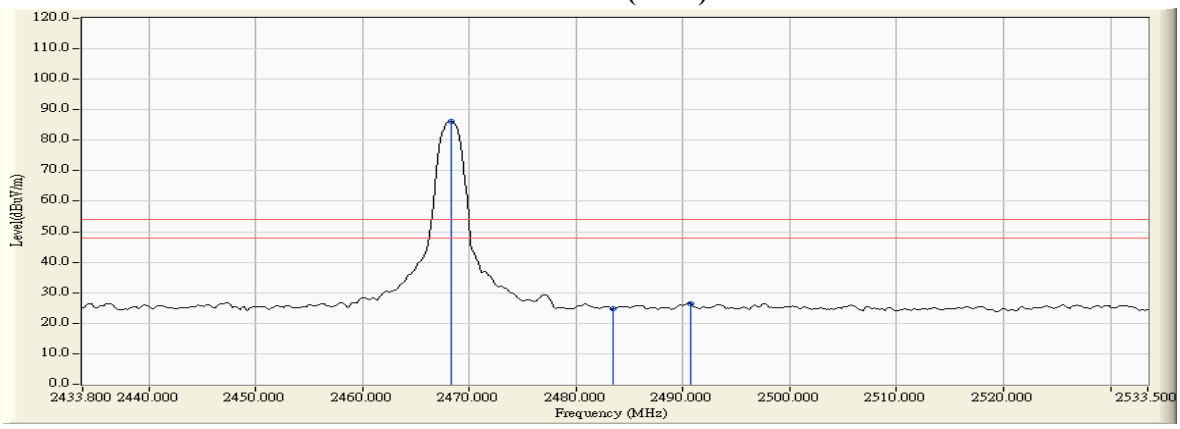


Figure Channel 3: Vertical (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.

5. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs