

FCC Test Report

Product Name	Wireless module
Model No	LBEE5ZZ1GV-893
FCC ID.	2AAD3JA0M0P0

Applicant	ABILITY ENTERPRISE CO., LTD.
Address	4 Fl., No.8, Lane7, Wuchiuan Rd, Wugu Dist., New Taipei City 248, Taiwan, (R.O.C.)

Date of Receipt	Oct. 27, 2015
Issue Date	Dec. 03, 2015
Report No.	15B0029R-RFUSP26V00-A
Report Version	V1.0



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.

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Applicant	ABILITY ENTERPRISE CO., LTD.
Address	4 Fl., No.8, Lane7, Wuchiuan Rd, Wugu Dist., New Taipei City 248, Taiwan, (R.O.C.)
Manufacturer	ABILITY ENTERPRISE CO., LTD.
Model No.	LBEE5ZZ1GV-893
FCC ID.	2AAD3JA0M0P0
EUT Rated Voltage	DC 3.3V
EUT Test Voltage	DC 3.3V
Trade Name	Nikon
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2014 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v03r03
Test Result	Complied

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(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless module
Trade Name	Nikon
Model No.	LBEE5ZZ1GV-893
FCC ID.	2AAD3JA0M0P0
Frequency Range	2412-2462MHz for 802.11b/g/n-20BW
Number of Channels	802.11b/g/n-20MHz: 11
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: 7.2-72.2Mbps
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK) 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	PCB Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Murata Manufacturing Co., Ltd.	Type1GV(LBEE5ZZ1GV)	PCB	-0.1dBi for 2.4 GHz

Note: The antenna of EUT conforms to FCC 15.203.

802.11b/g/n-20MHz Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2412 MHz	Channel 02:	2417 MHz	Channel 03:	2422 MHz	Channel 04:	2427 MHz
Channel 05:	2432 MHz	Channel 06:	2437 MHz	Channel 07:	2442 MHz	Channel 08:	2447 MHz
Channel 09:	2452 MHz	Channel 10:	2457 MHz	Channel 11:	2462 MHz		

Note:

1. The EUT is a Wireless module with a built-in WLAN and Bluetooth transceiver, this report for WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report.
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps 、802.11g is 6Mbps 、802.11n(20M-BW) is 7.2Mbps)
5. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.
6. 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 (802.11b 1Mbps)
	Mode 2: Transmit (802.11g 6Mbps)
	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

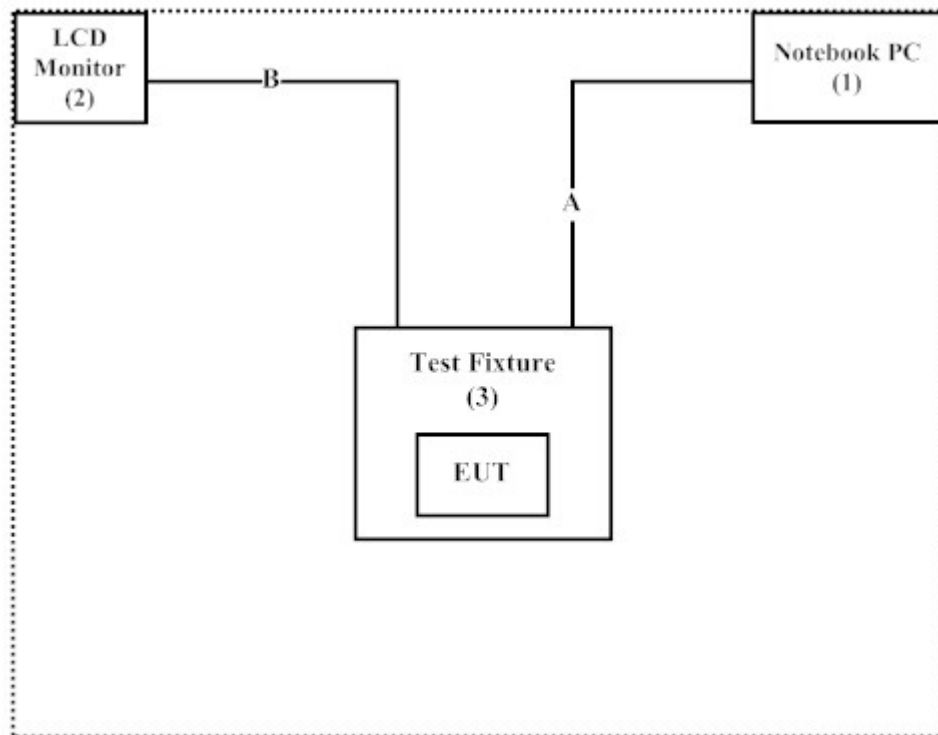
1.3. Tested System Details

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
1	Notebook PC	DELL	Latitude E5440	FS9TK32	Non-Shielded, 0.8m
2	LCD Monitor	ASUS	VS229HA	F4LMQS135395	Non-Shielded, 1.8m
3	Test Fixture	ABILITY	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1.8m, with one ferrite core bonded.
B	HDMI Cable	Non-Shielded, 1.8m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software "Sample_Project MFC Application V1.1.0.1" on the Notebook PC.
3. Configure the test mode, the test channel, and the data rate.
4. Press "OK" to 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/>

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FCC Accreditation Number: TW1014

2. Conducted Emission

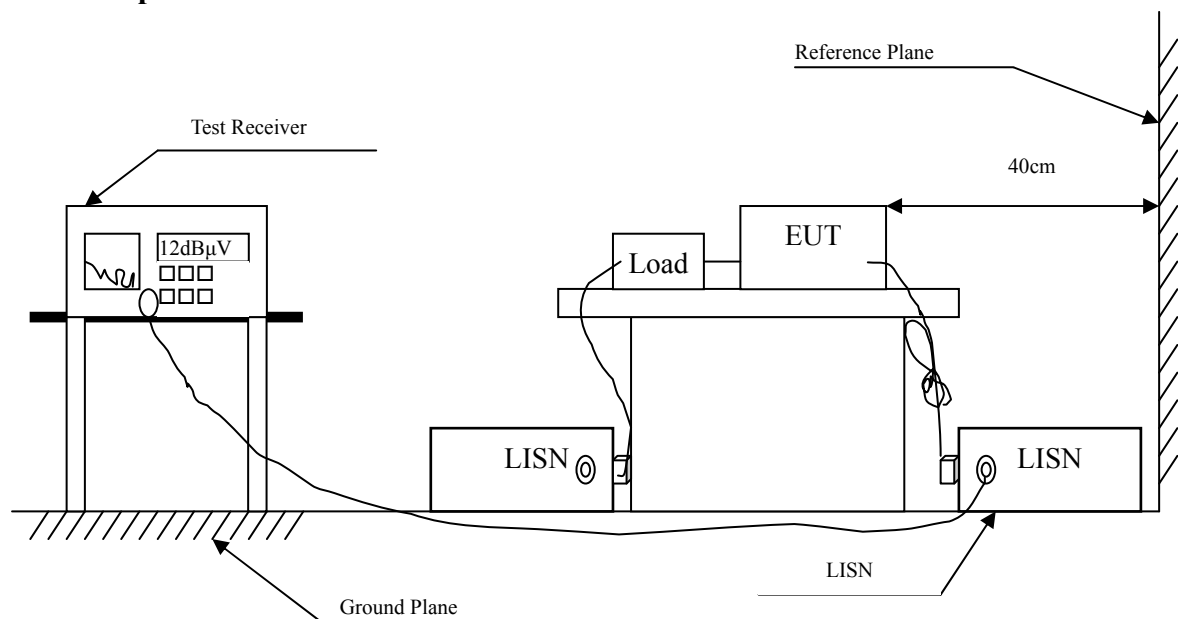
2.1. Test Equipment

	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., 2015	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2015	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar., 2015	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2015	
	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	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

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 module
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV	Margin dB	Limit dBμV
Line 1					
Quasi-Peak					
0.212	9.756	38.970	48.726	-15.503	64.229
0.310	9.763	30.710	40.473	-20.956	61.429
0.423	9.772	26.190	35.962	-22.238	58.200
0.521	9.780	20.910	30.690	-25.310	56.000
0.627	9.788	18.890	28.678	-27.322	56.000
0.728	9.796	15.160	24.956	-31.044	56.000
Average					
0.212	9.756	36.850	46.606	-7.623	54.229
0.310	9.763	26.320	36.083	-15.346	51.429
0.423	9.772	15.450	25.222	-22.978	48.200
0.521	9.780	17.730	27.510	-18.490	46.000
0.627	9.788	14.660	24.448	-21.552	46.000
0.728	9.796	11.010	20.806	-25.194	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 module
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBμV	dBμV	dB	dBμV
Line 2					
Quasi-Peak					
0.181	9.756	22.250	32.006	-33.108	65.114
0.209	9.755	41.370	51.125	-13.189	64.314
0.220	9.756	26.070	35.826	-28.174	64.000
0.314	9.764	27.010	36.774	-24.540	61.314
0.396	9.770	20.800	30.570	-28.401	58.971
0.427	9.772	22.590	32.362	-25.724	58.086
Average					
0.181	9.756	14.670	24.426	-30.688	55.114
0.209	9.755	29.370	39.125	-15.189	54.314
0.220	9.756	15.890	25.646	-28.354	54.000
0.314	9.764	23.560	33.324	-17.990	51.314
0.396	9.770	7.930	17.700	-31.271	48.971
0.427	9.772	13.300	23.072	-25.014	48.086

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. Peak Power Output

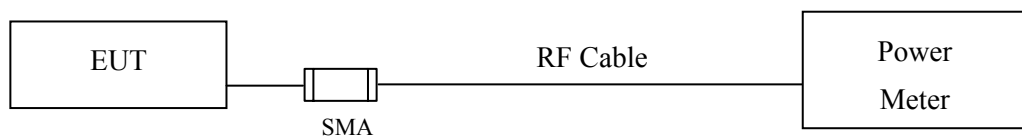
3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2015
X	Power Sensor	Anritsu	MA2411B/0738448	Jun., 2015

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



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Test Procedure

The EUT was tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 D01 DTS Meas Guidance v03r02 section 9.1.2 PKPM1 Peak power meter method.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Wireless module
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11	1		
		Measurement Level (dBm)						
01	2412	9.92	--	--	--	12.36	<30dBm	Pass
06	2437	9.98	9.86	9.78	9.66	12.41	<30dBm	Pass
11	2462	9.67	--	--	--	11.58	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : Wireless module
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54	6		
		Measurement Level (dBm)										
01	2412	9.36	--	--	--	--	--	--	--	19.35	<30dBm	Pass
06	2437	9.26	9.18	9.06	8.97	8.89	8.75	8.65	8.51	19.14	<30dBm	Pass
11	2462	9.41	--	--	--	--	--	--	--	19.94	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : Wireless module
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2	7.2		
		Measurement Level (dBm)										
01	2412	8.23	--	--	--	--	--	--	--	18.62	<30dBm	Pass
06	2437	8.25	8.19	8.06	7.98	7.84	7.76	7.64	7.58	18.25	<30dBm	Pass
11	2462	8.54	--	--	--	--	--	--	--	19.06	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

4. Radiated Emission

4.1. Test Equipment

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

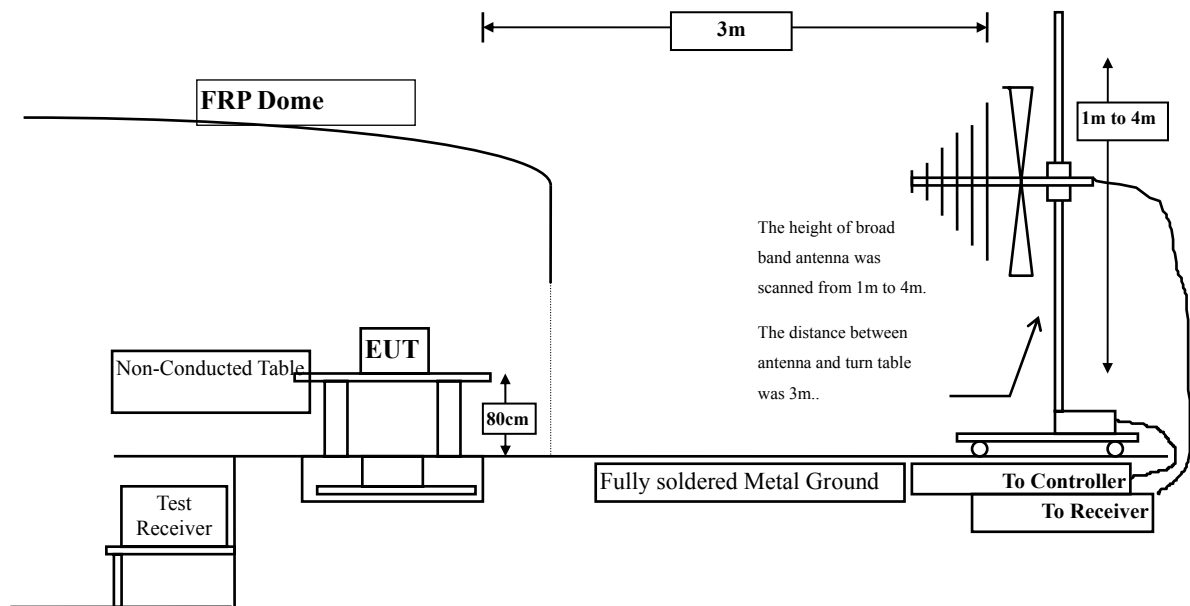
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep., 2015
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun., 2015
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun., 2015
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun., 2015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

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., 2015
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan., 2015
	X	Horn Antenna	TRC	AH-0801/95051	Aug., 2015
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2015
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul., 2015
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2015

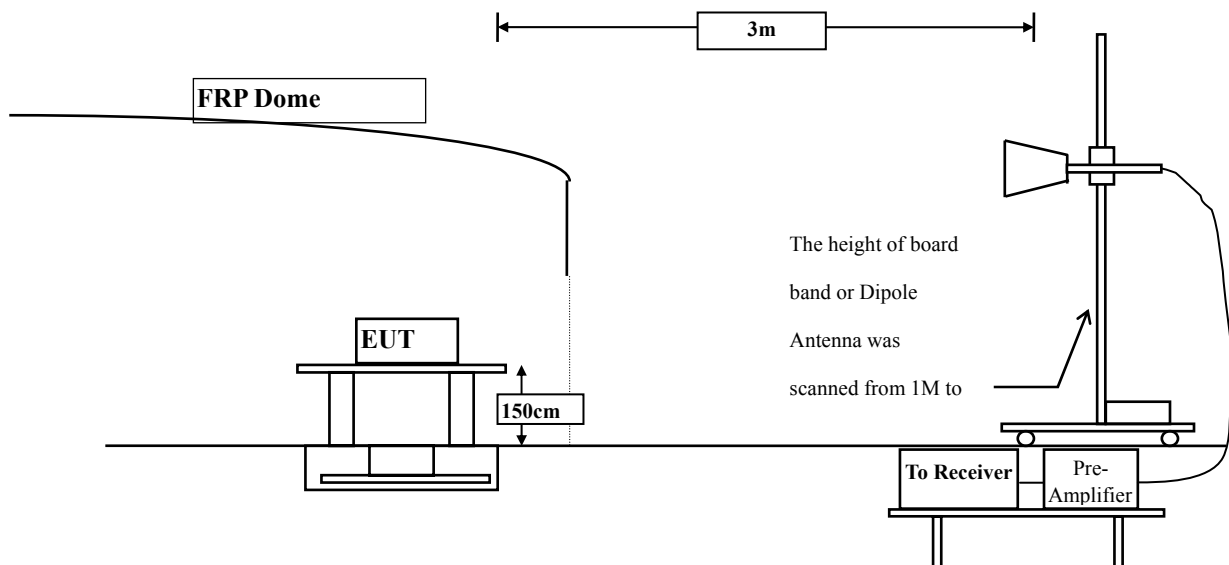
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB 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)

4.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 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 from 9kHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : Wireless module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level	dB	dB μ V/m
	dB	dB μ V	dB μ V/m		

Horizontal

Peak Detector:

4824.000	2.428	43.280	45.709	-28.291	74.000
7236.000	9.177	40.170	49.347	-24.653	74.000
9648.000	10.019	40.130	50.150	-23.850	74.000

Average Detector:

--

Vertical

Peak Detector:

4824.000	2.836	43.620	46.457	-27.543	74.000
7236.000	9.676	39.550	49.226	-24.774	74.000
9648.000	10.556	39.720	50.277	-23.723	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 module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m
Horizontal					
Peak Detector:					
4874.000	2.076	43.010	45.087	-28.913	74.000
7311.000	9.512	39.850	49.362	-24.638	74.000
9748.000	9.630	40.420	50.050	-23.950	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	2.532	42.970	45.502	-28.498	74.000
7311.000	10.089	39.340	49.429	-24.571	74.000
9748.000	10.266	40.270	50.537	-23.463	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 module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m

Horizontal

Peak Detector:

4924.000	2.191	42.200	44.391	-29.609	74.000
7386.000	10.373	39.300	49.674	-24.326	74.000
9848.000	9.964	39.980	49.944	-24.056	74.000

Average Detector:

--

Vertical

Peak Detector:

4924.000	2.805	43.030	45.835	-28.165	74.000
7386.000	11.180	39.450	50.630	-23.370	74.000
9848.000	10.801	39.820	50.621	-23.379	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 module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m

Horizontal

Peak Detector:

4824.000	2.428	42.140	44.569	-29.431	74.000
7236.000	9.177	39.000	48.177	-25.823	74.000
9648.000	10.019	40.220	50.240	-23.760	74.000

Average Detector:

--

Vertical

Peak Detector:

4824.000	2.836	40.700	43.537	-30.463	74.000
7236.000	9.676	39.610	49.286	-24.714	74.000
9648.000	10.556	39.850	50.407	-23.593	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 module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBμV	dBμV/m	dB	dBμV/m

Horizontal

Peak Detector:

4874.000	2.076	40.220	42.297	-31.703	74.000
7311.000	9.512	39.720	49.232	-24.768	74.000
9748.000	9.630	39.960	49.590	-24.410	74.000

Average Detector:

--

Vertical

Peak Detector:

4874.000	2.532	40.440	42.972	-31.028	74.000
7311.000	10.089	39.870	49.959	-24.041	74.000
9748.000	10.266	40.030	50.297	-23.703	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 module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dB μ V	dB μ V/m	dB	dB μ V/m
Horizontal					
Peak Detector:					
4924.000	2.191	40.960	43.151	-30.849	74.000
7386.000	10.373	39.820	50.194	-23.806	74.000
9848.000	9.964	40.030	49.994	-24.006	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	2.805	41.840	44.645	-29.355	74.000
7386.000	11.180	39.430	50.610	-23.390	74.000
9848.000	10.801	40.110	50.911	-23.089	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 module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2412MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m

Horizontal

Peak Detector:

4824.000	2.428	41.360	43.789	-30.211	74.000
7236.000	9.177	39.820	48.997	-25.003	74.000
9648.000	10.019	39.930	49.950	-24.050	74.000

Average Detector:

--

Vertical

Peak Detector:

4824.000	2.836	40.610	43.447	-30.553	74.000
7236.000	9.676	39.850	49.526	-24.474	74.000
9648.000	10.556	39.970	50.527	-23.473	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 module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV/m	Margin dB	Limit dBμV/m
Horizontal					
Peak Detector:					
4874.000	2.076	41.410	43.487	-30.513	74.000
7311.000	9.512	39.720	49.232	-24.768	74.000
9748.000	9.630	40.100	49.730	-24.270	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	2.532	41.220	43.752	-30.248	74.000
7311.000	10.089	39.820	49.909	-24.091	74.000
9748.000	10.266	40.060	50.327	-23.673	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 module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m

Horizontal

Peak Detector:

4924.000	2.191	42.580	44.771	-29.229	74.000
7386.000	10.373	39.530	49.904	-24.096	74.000
9848.000	9.964	39.960	49.924	-24.076	74.000

Average Detector:

--

Vertical

Peak Detector:

4924.000	2.805	42.800	45.605	-28.395	74.000
7386.000	11.180	39.580	50.760	-23.240	74.000
9848.000	10.801	39.880	50.681	-23.319	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 module
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
117.300	-7.350	28.693	21.343	-22.157	43.500
249.220	-6.216	25.958	19.742	-26.258	46.000
421.880	-0.260	32.662	32.402	-13.598	46.000
606.180	4.196	22.066	26.262	-19.738	46.000
804.060	6.271	20.602	26.873	-19.127	46.000
967.020	7.299	21.525	28.824	-25.176	54.000
Vertical					
181.320	-1.910	29.208	27.298	-16.202	43.500
377.260	0.647	23.625	24.272	-21.728	46.000
524.700	1.130	23.228	24.358	-21.642	46.000
757.500	2.487	21.113	23.600	-22.400	46.000
864.200	-0.291	27.517	27.226	-18.774	46.000
967.020	3.889	20.034	23.923	-30.077	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.

Product : Wireless module
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m
Horizontal					
125.060	-7.335	32.343	25.008	-18.492	43.500
262.800	-5.484	28.320	22.836	-23.164	46.000
421.880	-0.260	33.677	33.417	-12.583	46.000
631.400	1.266	29.684	30.950	-15.050	46.000
757.500	5.107	27.276	32.383	-13.617	46.000
864.200	6.329	31.684	38.013	-7.987	46.000
Vertical					
177.440	-1.248	32.629	31.381	-12.119	43.500
352.040	-1.292	31.945	30.653	-15.347	46.000
489.780	-2.262	29.786	27.524	-18.476	46.000
631.400	-1.454	29.684	28.230	-17.770	46.000
757.500	2.487	27.276	29.763	-16.237	46.000
864.200	-0.291	31.684	31.393	-14.607	46.000

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.

Product : Wireless module
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
125.060	-7.335	32.933	25.598	-17.902	43.500
262.800	-5.484	28.320	22.836	-23.164	46.000
419.940	-0.254	33.894	33.640	-12.360	46.000
631.400	1.266	29.684	30.950	-15.050	46.000
757.500	5.107	27.276	32.383	-13.617	46.000
864.200	6.329	31.684	38.013	-7.987	46.000
Vertical					
86.260	-4.042	34.143	30.101	-9.899	40.000
179.380	-0.824	32.266	31.442	-12.058	43.500
352.040	-1.292	32.133	30.841	-15.159	46.000
489.780	-2.262	29.786	27.524	-18.476	46.000
631.400	-1.454	29.684	28.230	-17.770	46.000
864.200	-0.291	31.753	31.462	-14.538	46.000

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.

5. RF antenna conducted test

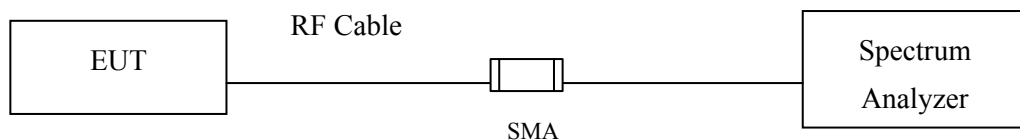
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

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.

5.2. Test Setup

RF antenna Conducted Measurement:



5.3. 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 20 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)).

5.4. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.5. Uncertainty

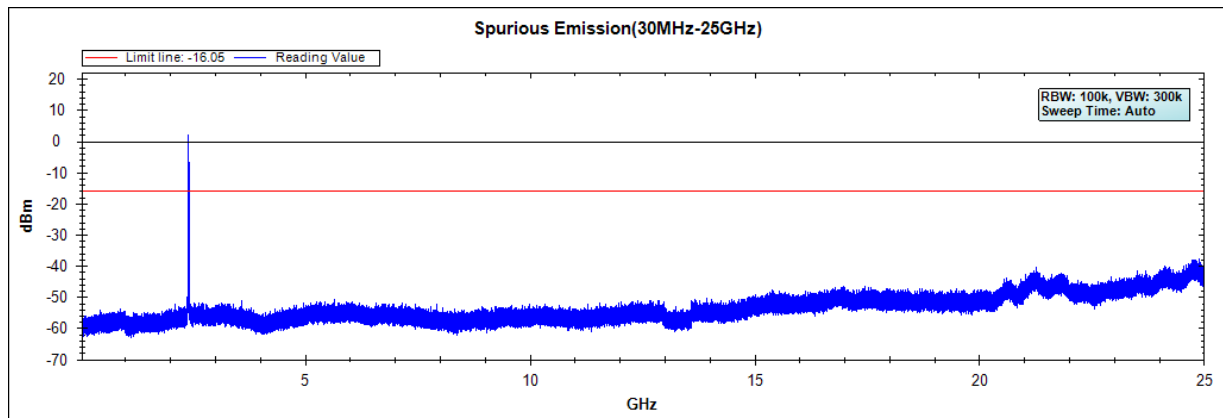
The measurement uncertainty

Conducted is defined as $\pm 1.27\text{dB}$

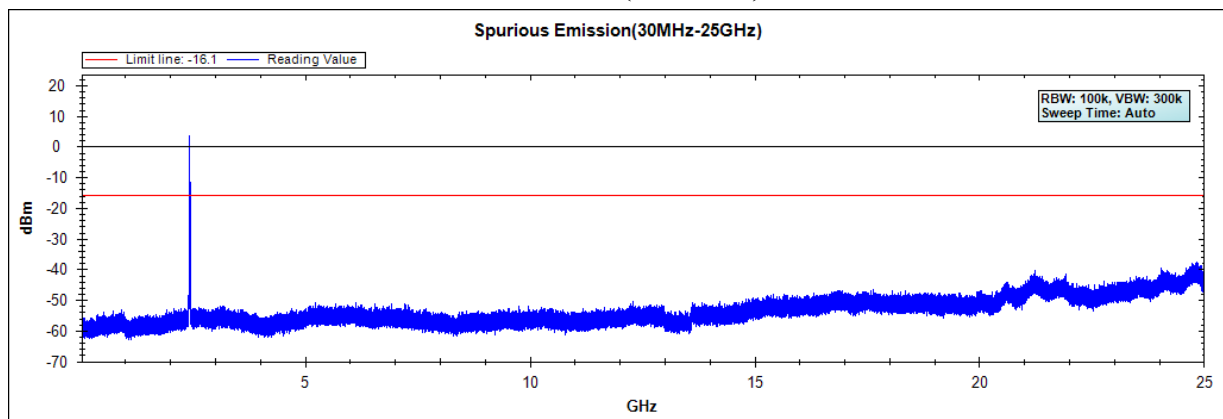
5.6. Test Result of RF antenna conducted test

Product : Wireless module
Test Item : RF antenna conducted test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

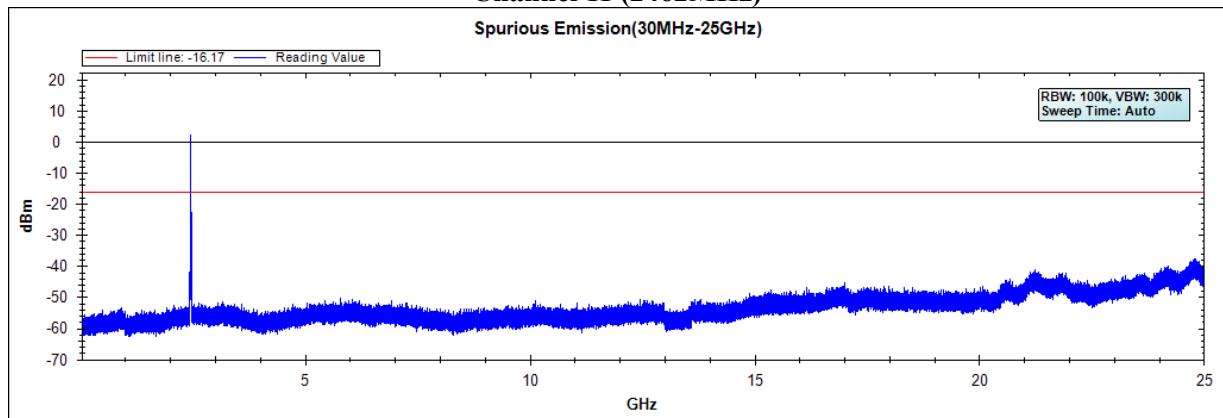
Channel 01 (2412MHz)



Channel 06 (2437MHz)



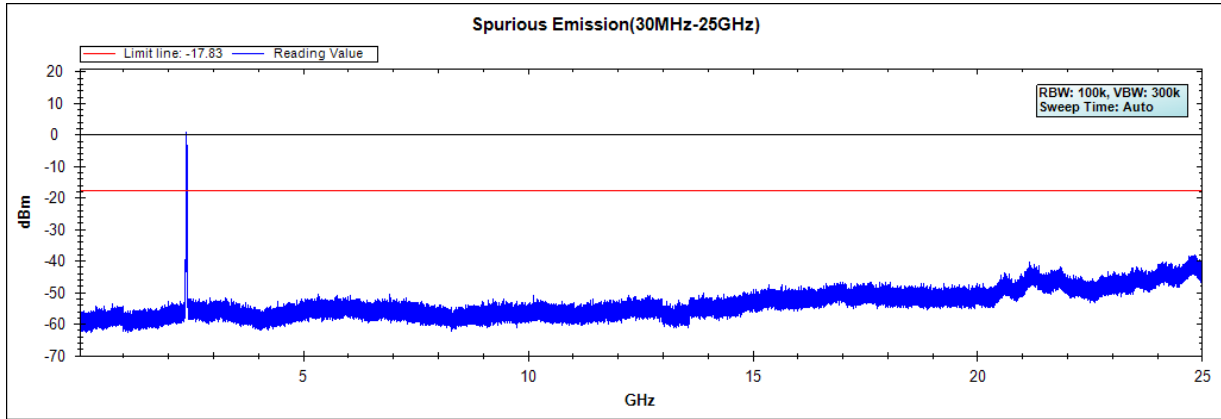
Channel 11 (2462MHz)



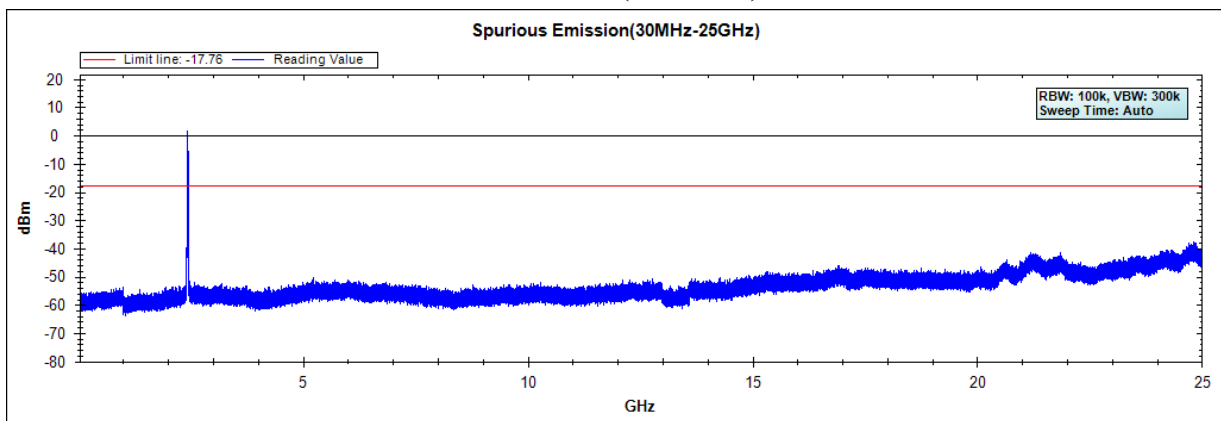
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Wireless module
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

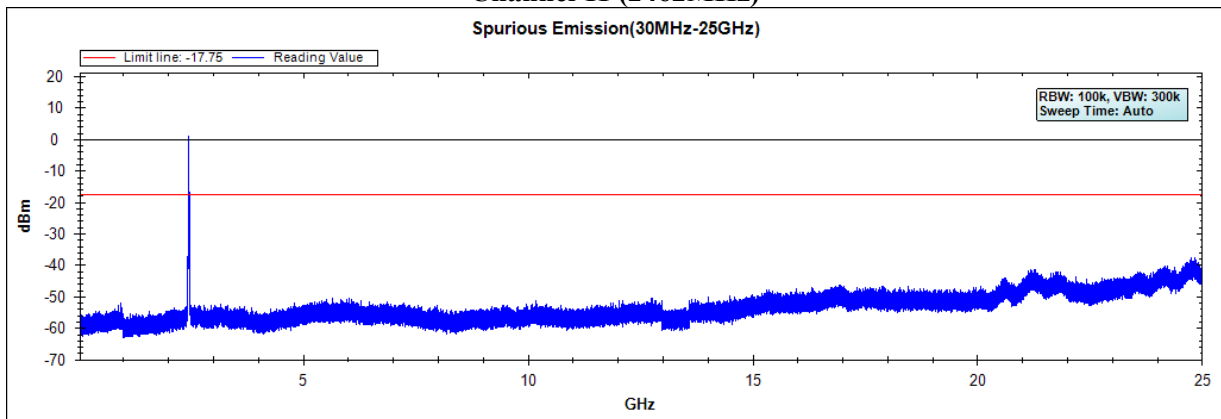
Channel 01 (2412MHz)



Channel 06 (2437MHz)



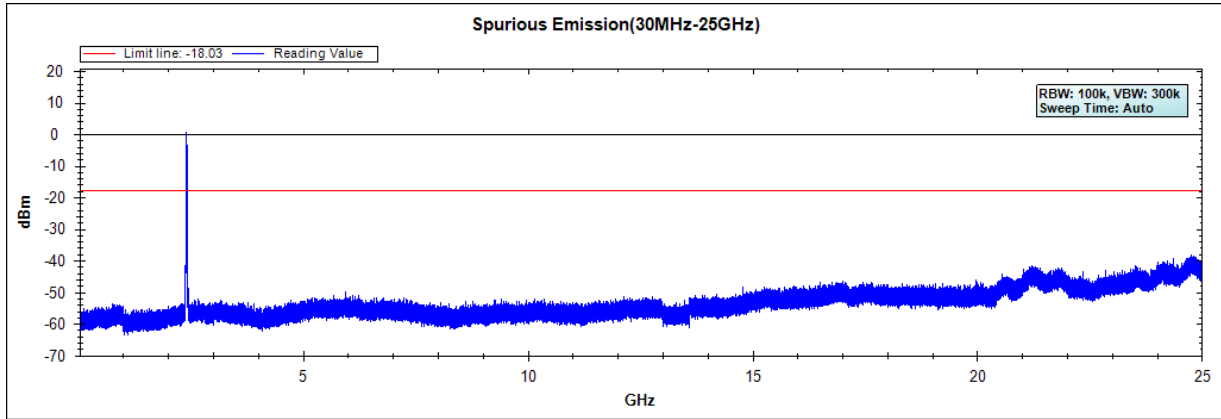
Channel 11 (2462MHz)



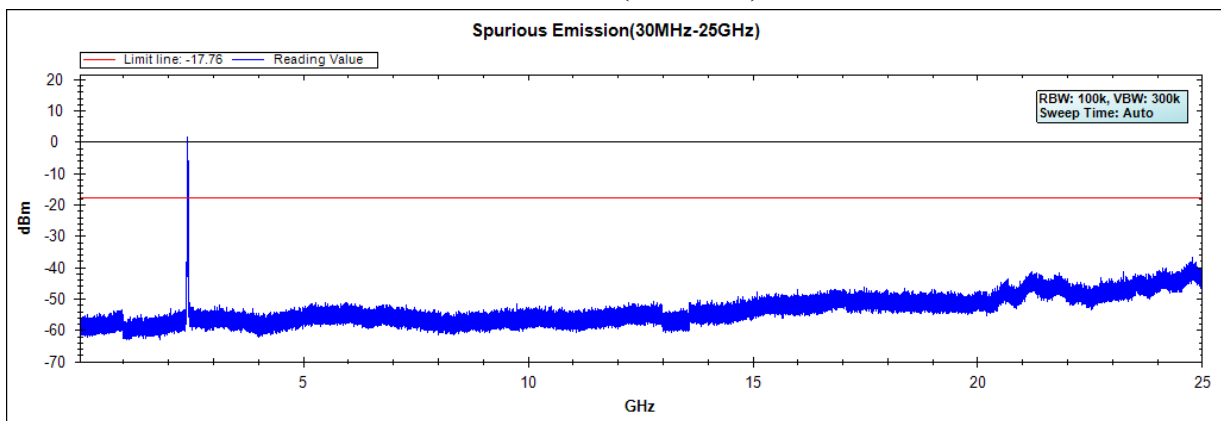
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Wireless module
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

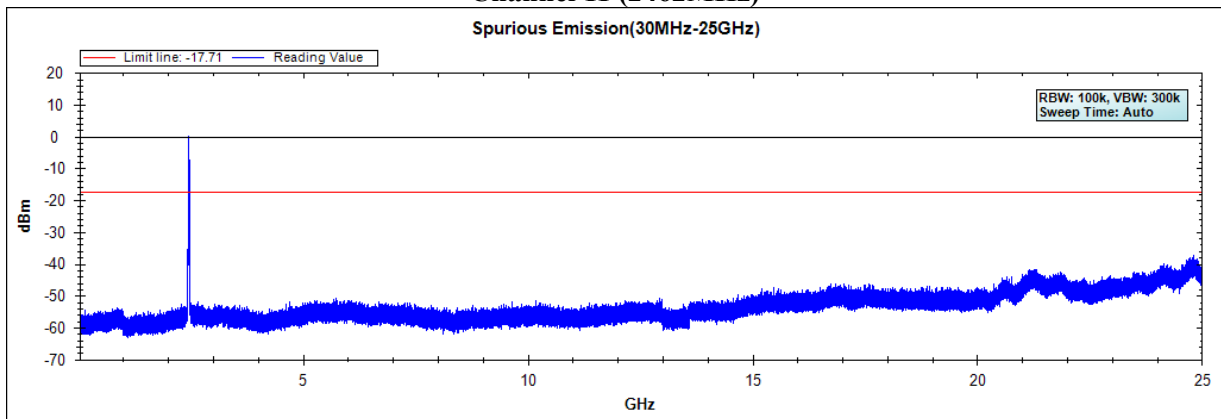
Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)



Note: The above test pattern is synthesized by multiple of the frequency range.

6. Band Edge

6.1. Test Equipment

RF Radiated Measurement:

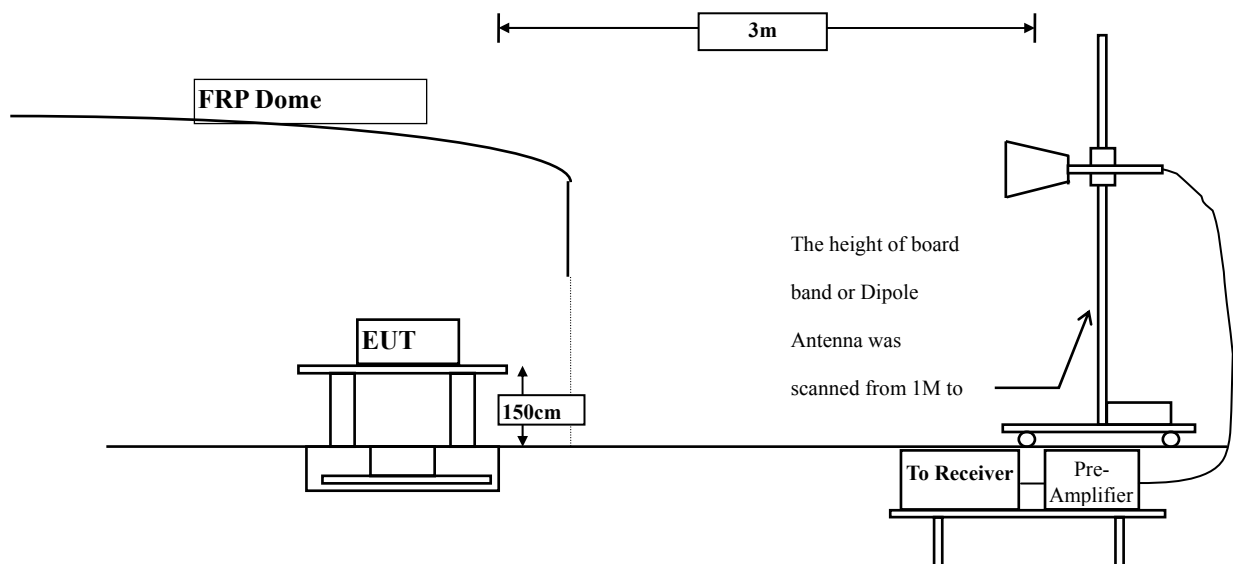
The following test equipments are used during the band edge tests:

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., 2015
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan., 2015
	X	Horn Antenna	TRC	AH-0801/95051	Aug., 2015
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2015
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul., 2015
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2015

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

6.2. Test Setup

RF Radiated Measurement:



6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

6.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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 from 1 meter to 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.

6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

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
01 (Peak)	2384.400	33.734	26.164	59.898	74.00	54.00	Pass
01 (Peak)	2390.000	33.739	24.299	58.038	74.00	54.00	Pass
01 (Peak)	2397.200	33.747	32.281	66.028	--	--	--
01 (Peak)	2400.000	33.752	30.869	64.620	--	--	--
01 (Peak)	2411.000	33.769	72.793	106.562	--	--	--
01 (Average)	2385.600	33.736	14.984	48.719	74.00	54.00	Pass
01 (Average)	2390.000	33.739	13.134	46.873	74.00	54.00	Pass
01 (Average)	2396.600	33.745	26.019	59.765	--	--	--
01 (Average)	2400.000	33.752	23.626	57.377	--	--	--
01 (Average)	2411.400	33.771	69.203	102.973	--	--	--

Figure Channel 01: Horizontal (Peak)

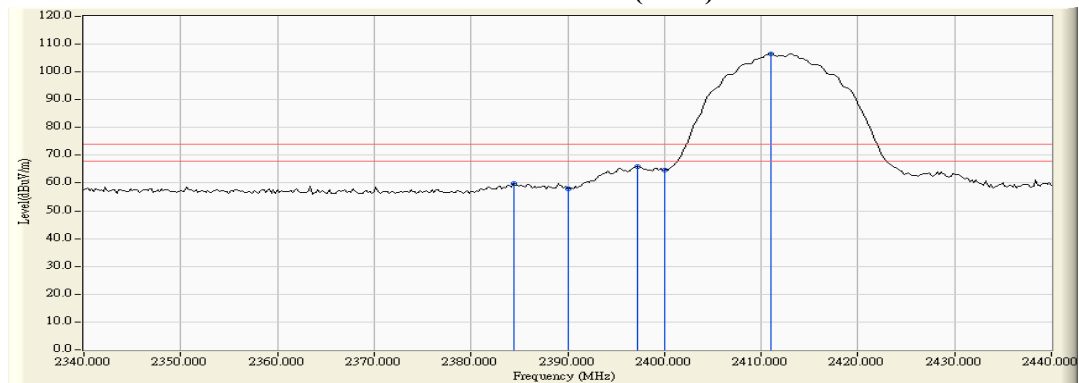
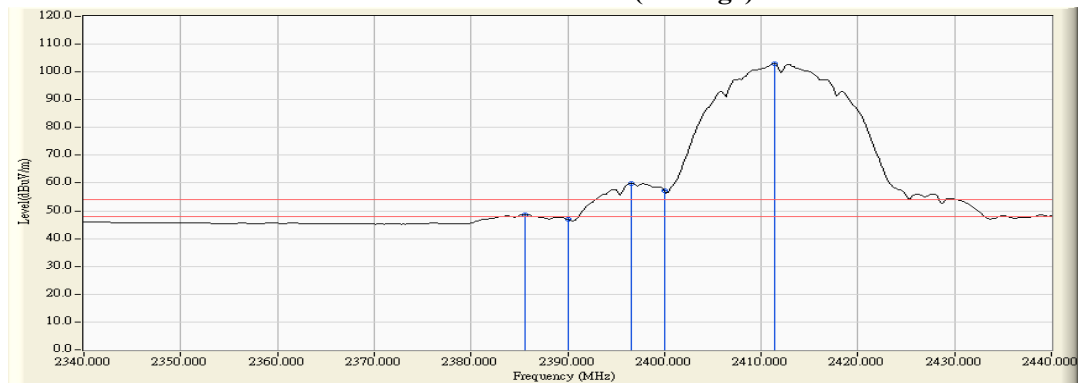


Figure Channel 01: Horizontal (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

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
01 (Peak)	2383.400	32.313	25.034	57.347	74.00	54.00	Pass
01 (Peak)	2390.000	32.267	23.784	56.051	74.00	54.00	Pass
01 (Peak)	2396.800	32.239	30.369	62.609	--	--	--
01 (Peak)	2400.000	32.241	28.321	60.562	--	--	--
01 (Peak)	2411.000	32.244	69.253	101.497	--	--	--
01 (Average)	2385.600	32.298	13.002	45.300	74.00	54.00	Pass
01 (Average)	2390.000	32.267	11.860	44.127	74.00	54.00	Pass
01 (Average)	2396.400	32.239	23.707	55.947	--	--	--
01 (Average)	2400.000	32.241	20.732	52.973	--	--	--
01 (Average)	2411.400	32.247	65.767	98.013	--	--	--

Figure Channel 01:

VERTICAL (Peak)

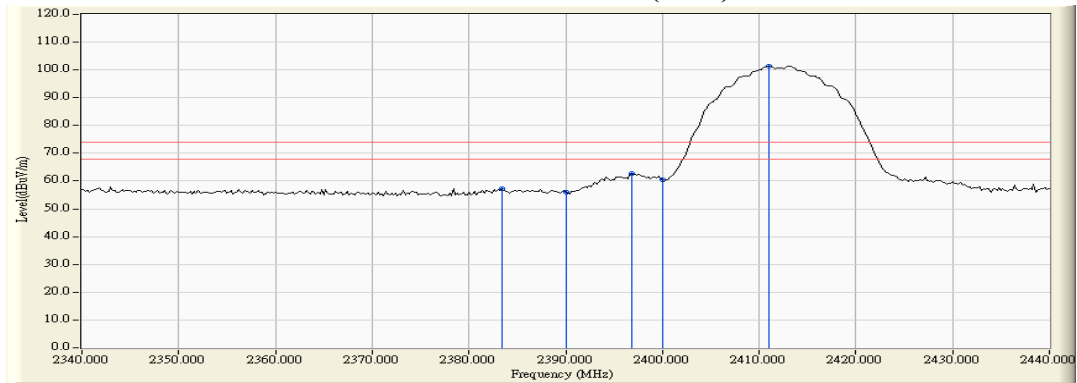
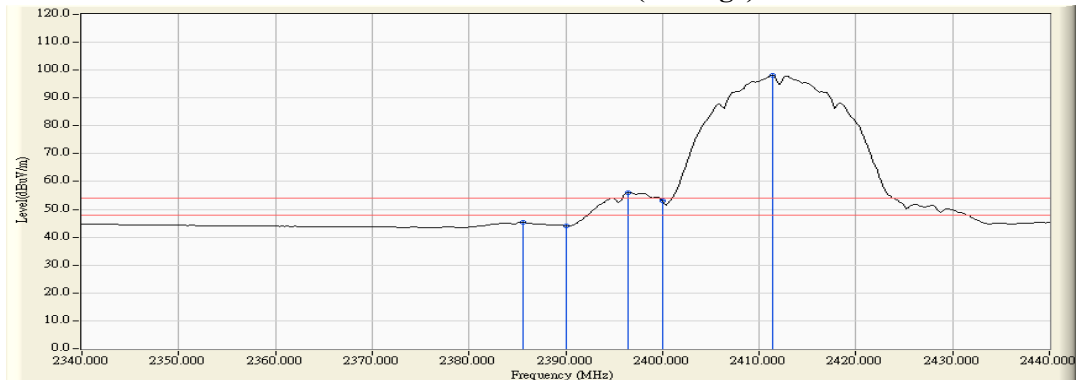


Figure Channel 01:

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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

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
11 (Peak)	2461.100	33.890	71.117	105.007	--	--	--
11 (Peak)	2483.500	33.951	24.122	58.072	74.00	54.00	Pass
11 (Peak)	2487.900	33.962	25.359	59.320	74.00	54.00	Pass
11 (Average)	2461.300	33.890	67.626	101.517	--	--	--
11 (Average)	2483.500	33.951	12.461	46.411	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

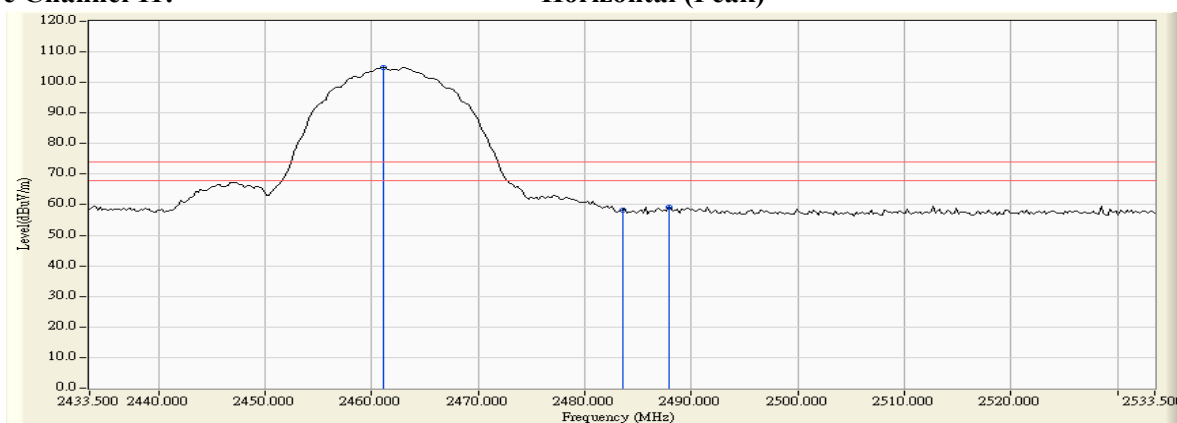
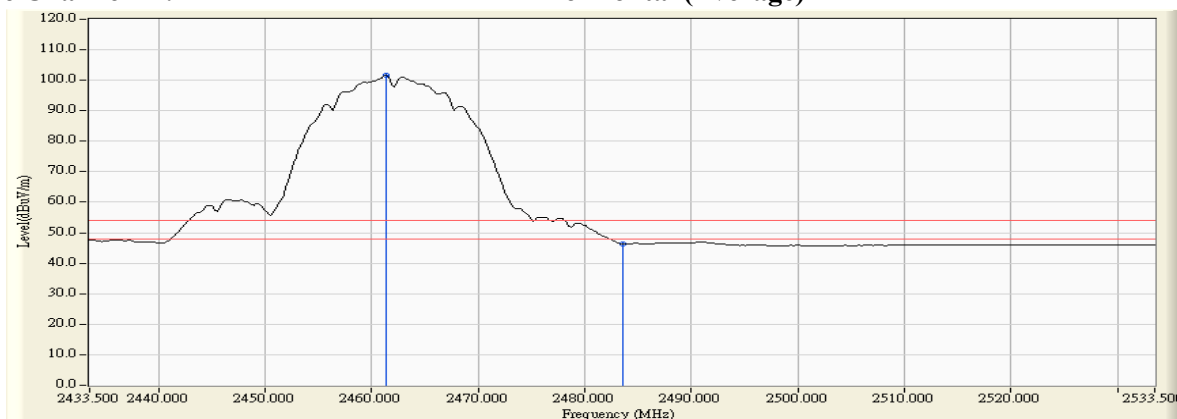


Figure Channel 11: Horizontal (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

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
11 (Peak)	2460.900	32.476	67.002	99.477	--	--	--
11 (Peak)	2483.500	32.586	23.737	56.322	74.00	54.00	Pass
11 (Peak)	2491.300	32.623	25.648	58.271	74.00	54.00	Pass
11 (Average)	2461.300	32.477	63.501	95.978	--	--	--
11 (Average)	2483.500	32.586	11.858	44.443	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

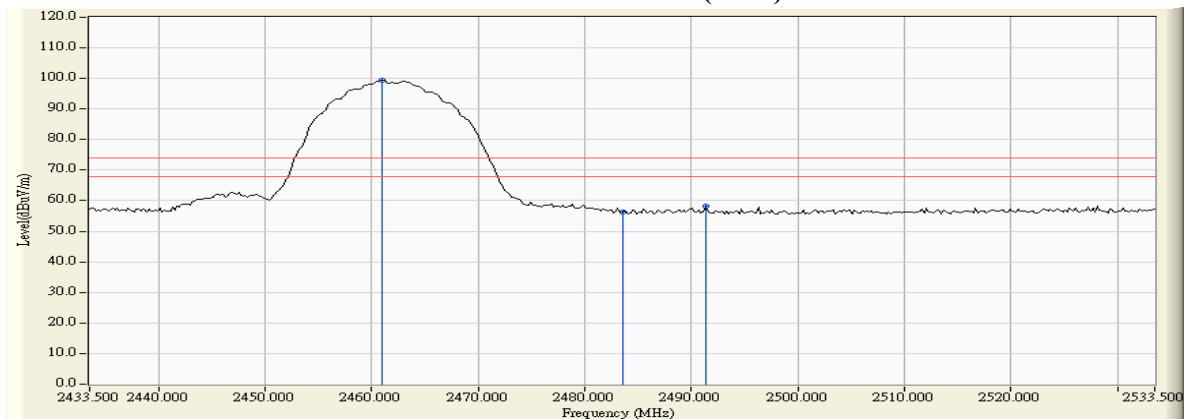
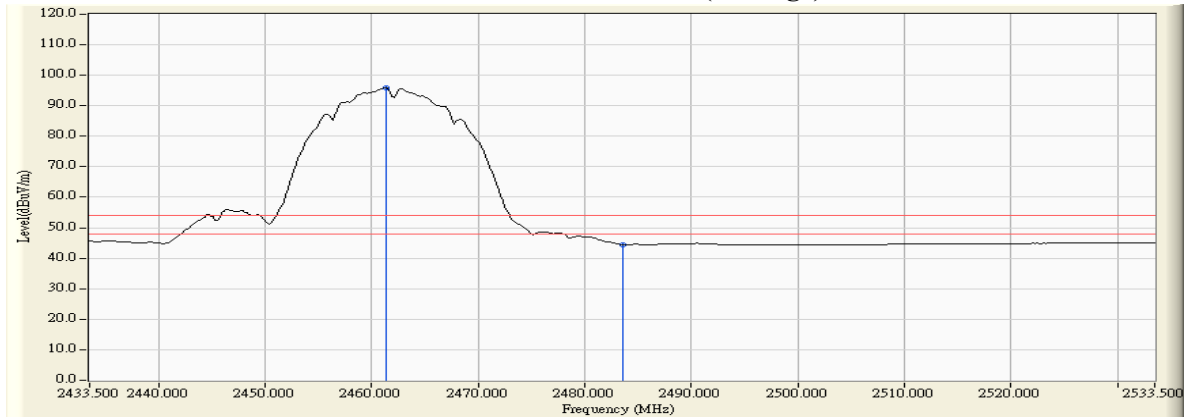


Figure Channel 11: VERTICAL (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

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
01 (Peak)	2390.000	33.739	33.688	67.427	74.00	54.00	Pass
01 (Peak)	2400.000	33.752	50.802	84.553	--	--	--
01 (Peak)	2409.400	33.767	76.816	110.583	--	--	--
01 (Average)	2390.000	33.739	18.332	52.071	74.00	54.00	Pass
01 (Average)	2400.000	33.752	31.046	64.797	--	--	--
01 (Average)	2410.600	33.769	64.884	98.653	--	--	--

Figure Channel 01: Horizontal (Peak)

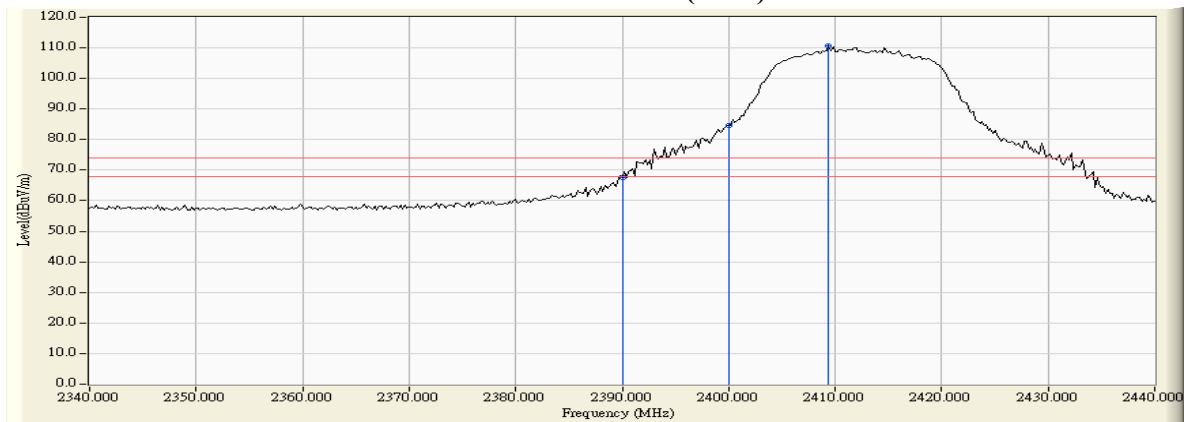
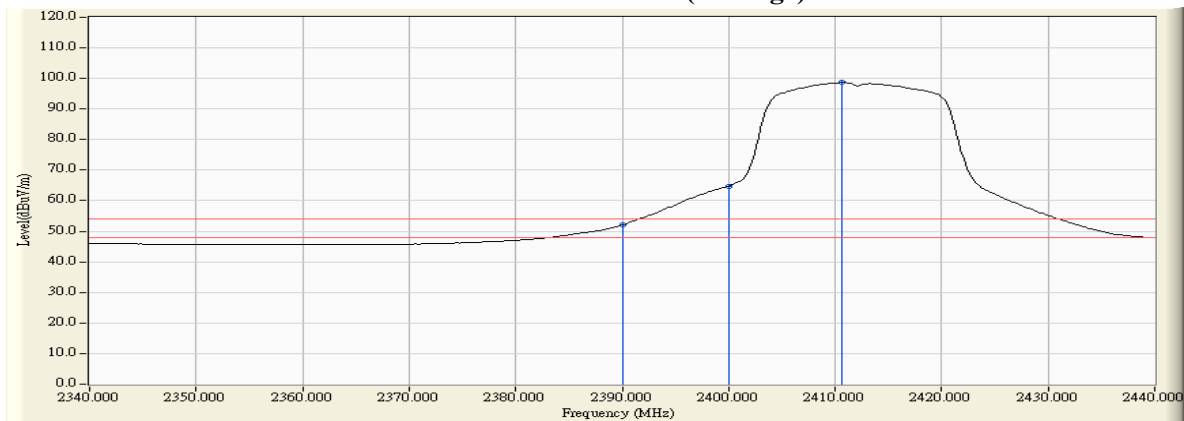


Figure Channel 01: Horizontal (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

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
01 (Peak)	2389.200	32.273	32.074	64.346	74.00	54.00	Pass
01 (Peak)	2390.000	32.267	31.646	63.913	74.00	54.00	Pass
01 (Peak)	2400.000	32.241	47.589	79.830	--	--	--
01 (Peak)	2409.800	32.244	73.206	105.450	--	--	--
01 (Average)	2390.000	32.267	16.210	48.477	74.00	54.00	Pass
01 (Average)	2400.000	32.241	28.379	60.620	--	--	--
01 (Average)	2410.800	32.244	61.391	93.635	--	--	--

Figure Channel 01:

VERTICAL (Peak)

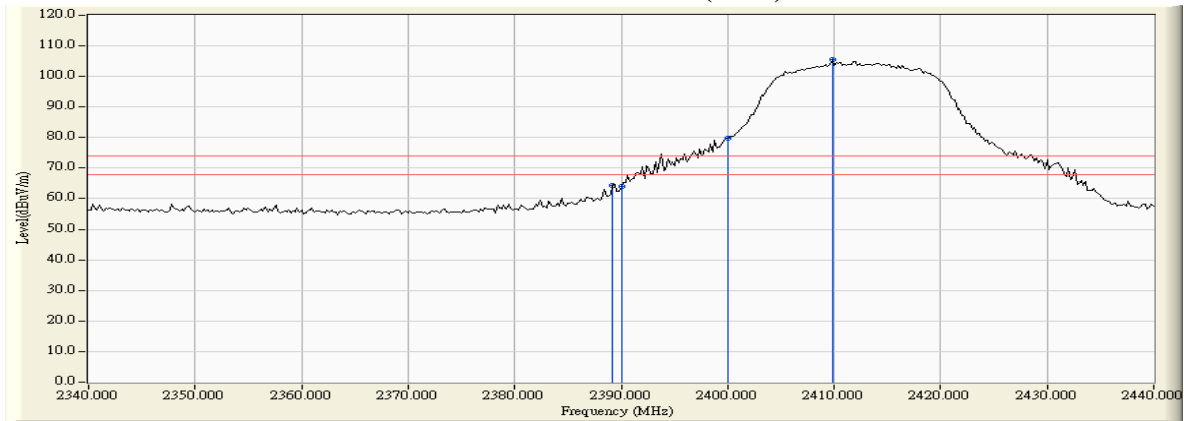
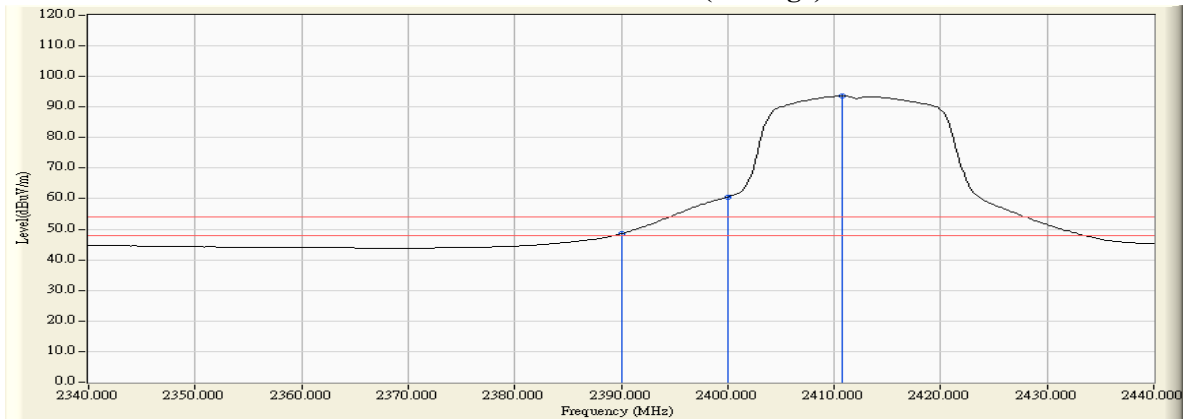


Figure Channel 01:

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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

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
11 (Peak)	2461.900	33.892	75.092	108.984	--	--	--
11 (Peak)	2483.500	33.951	32.995	66.945	74.00	54.00	Pass
11 (Average)	2460.500	33.889	63.060	96.949	--	--	--
11 (Average)	2483.500	33.951	16.299	50.249	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

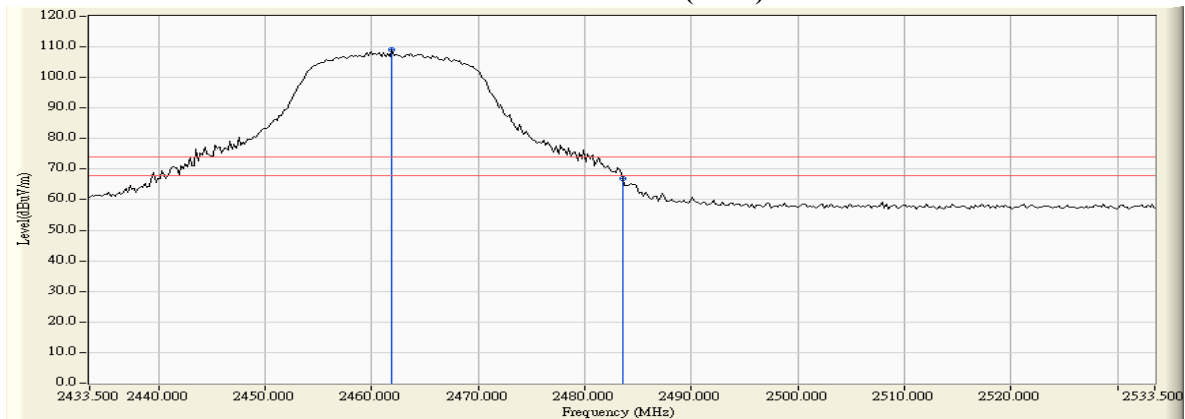
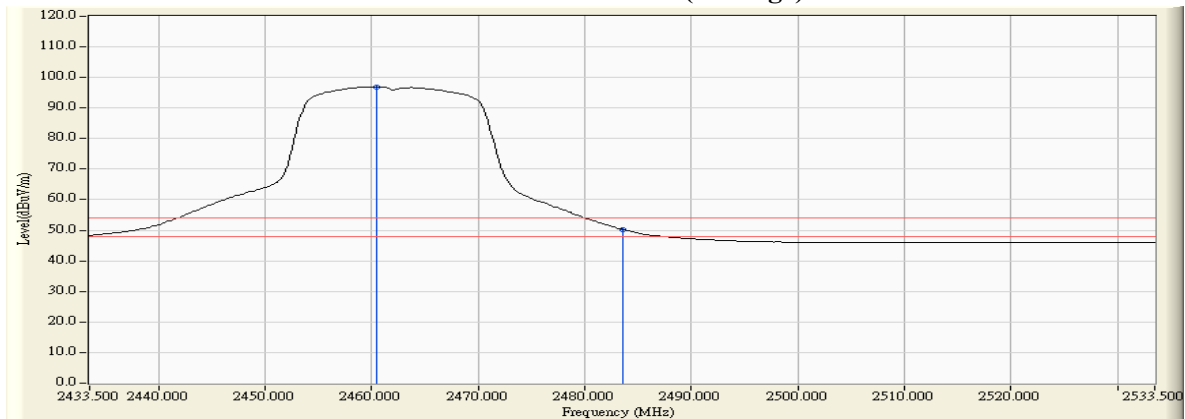


Figure Channel 11: Horizontal (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

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
11 (Peak)	2459.300	32.468	71.238	103.705	--	--	--
11 (Peak)	2483.500	32.586	29.947	62.532	74.00	54.00	Pass
11 (Average)	2459.900	32.470	59.368	91.838	--	--	--
11 (Average)	2483.500	32.586	13.746	46.331	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

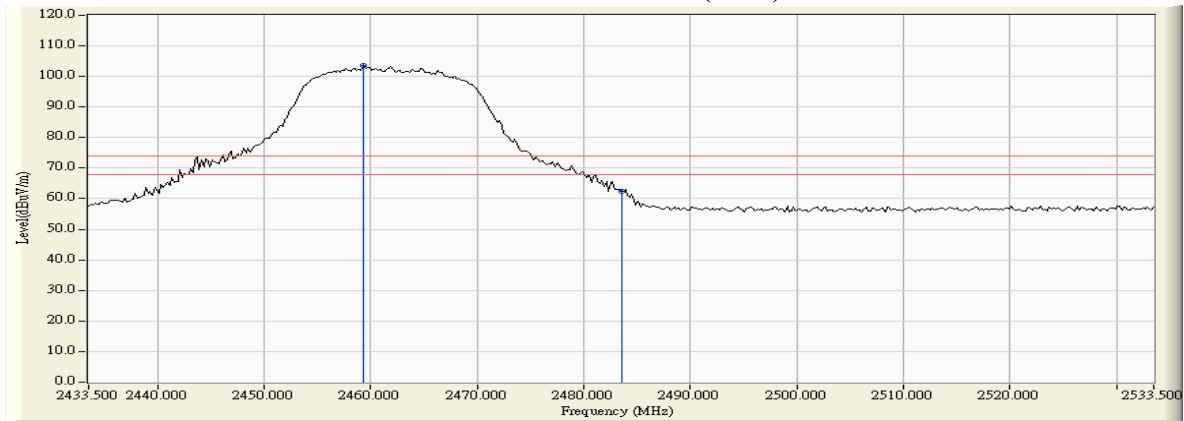
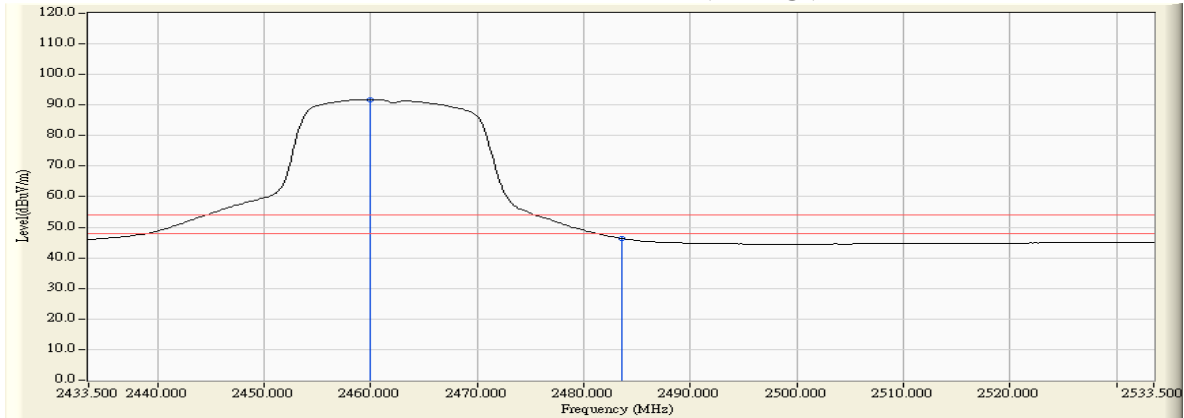


Figure Channel 11: VERTICAL (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

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
01 (Peak)	2390.000	33.739	36.628	70.367	74.00	54.00	Pass
01 (Peak)	2400.000	33.752	51.630	85.381	--	--	--
01 (Peak)	2410.800	33.769	76.072	109.841	--	--	--
01 (Average)	2390.000	33.739	19.313	53.052	74.00	54.00	Pass
01 (Average)	2400.000	33.752	31.106	64.857	--	--	--
01 (Average)	2410.600	33.769	64.514	98.283	--	--	--

Figure Channel 01: Horizontal (Peak)

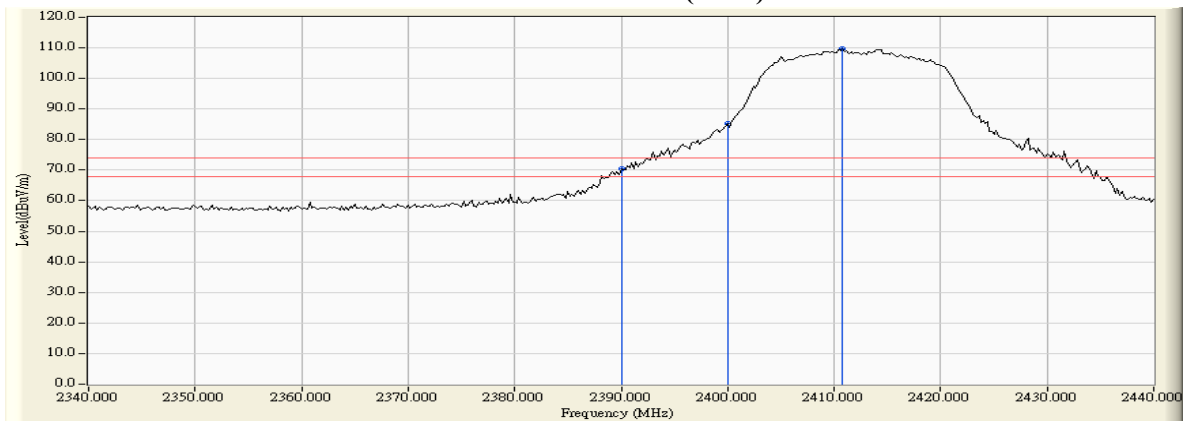
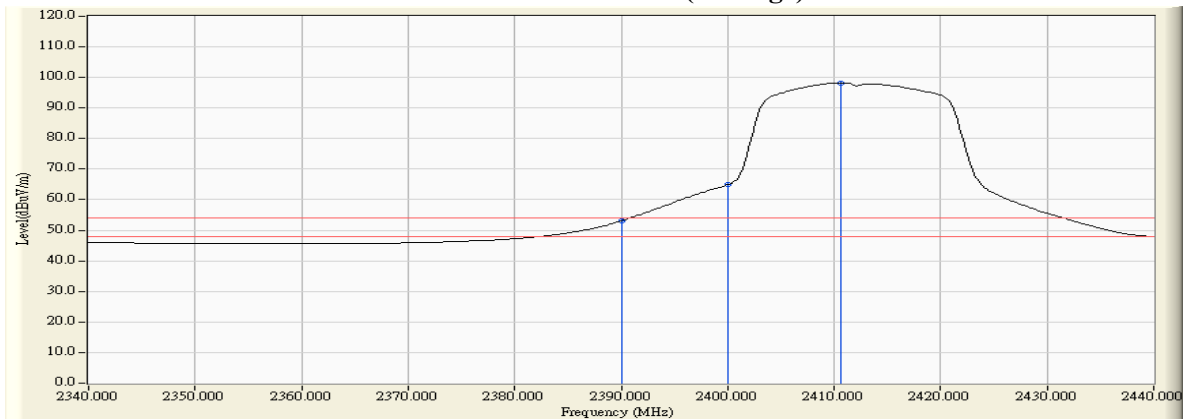


Figure Channel 01: Horizontal (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

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
01 (Peak)	2389.800	32.268	34.250	66.518	74.00	54.00	Pass
01 (Peak)	2390.000	32.267	32.866	65.133	74.00	54.00	Pass
01 (Peak)	2400.000	32.241	49.612	81.853	--	--	--
01 (Peak)	2410.200	32.244	72.560	104.804	--	--	--
01 (Average)	2390.000	32.267	17.527	49.794	74.00	54.00	Pass
01 (Average)	2400.000	32.241	28.841	61.082	--	--	--
01 (Average)	2410.600	32.244	61.112	93.356	--	--	--

Figure Channel 01: VERTICAL (Peak)

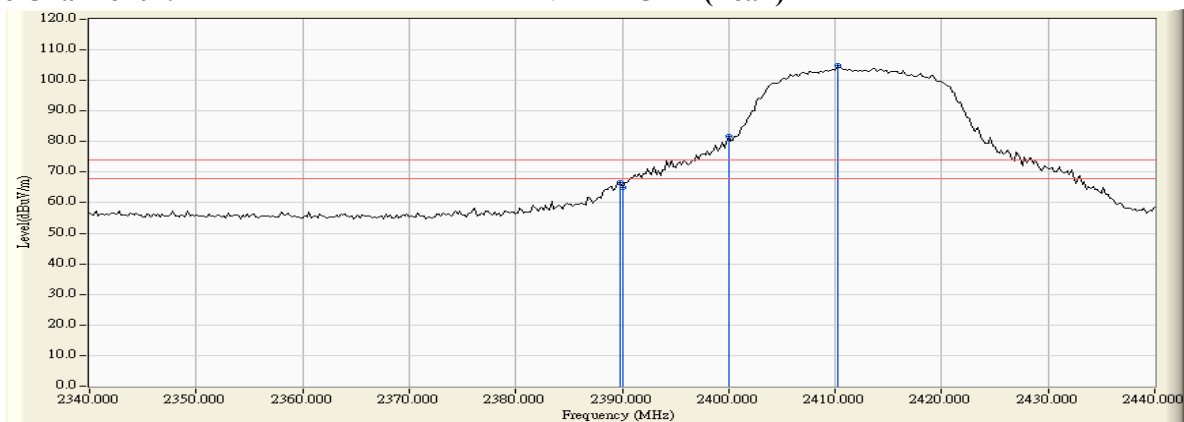
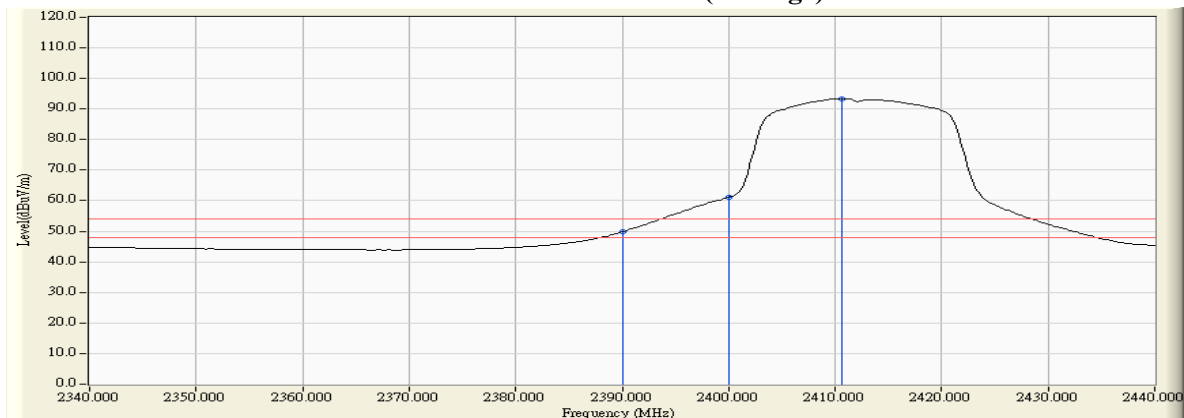


Figure Channel 01: VERTICAL (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz)

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
11 (Peak)	2460.500	33.889	74.177	108.066	--	--	--
11 (Peak)	2483.500	33.951	34.019	67.969	74.00	54.00	Pass
11 (Peak)	2484.500	33.953	34.432	68.384	74.00	54.00	Pass
11 (Average)	2460.100	33.887	62.552	96.440	--	--	--
11 (Average)	2483.500	33.951	16.775	50.725	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

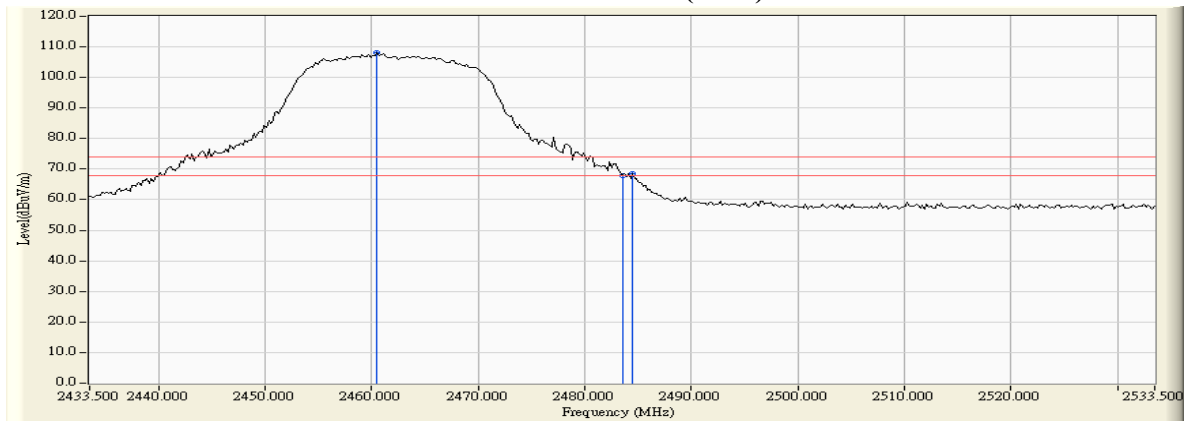
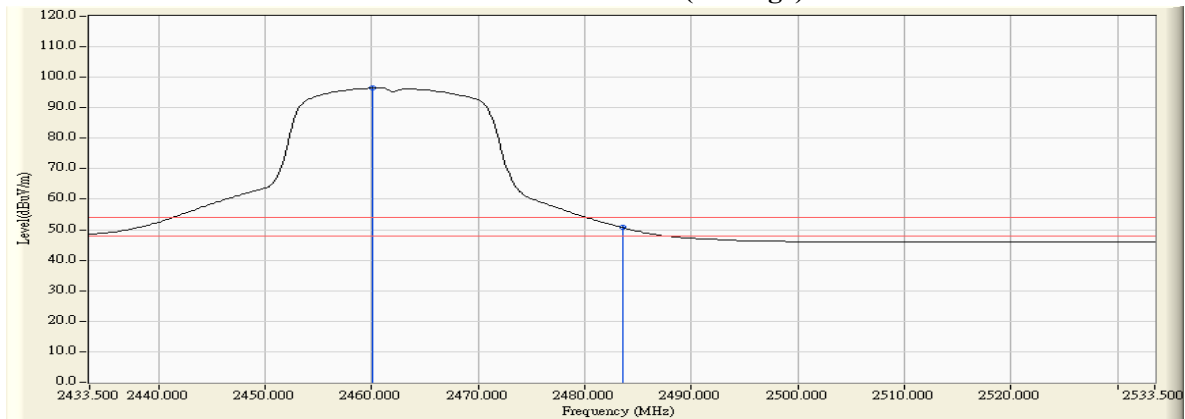


Figure Channel 11: Horizontal (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz)

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
11 (Peak)	2458.500	32.463	70.212	102.676	--	--	--
11 (Peak)	2483.500	32.586	29.693	62.278	74.00	54.00	Pass
11 (Peak)	2483.900	32.587	33.337	65.924	74.00	54.00	Pass
11 (Average)	2459.900	32.470	59.022	91.492	--	--	--
11 (Average)	2483.500	32.586	14.471	47.056	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

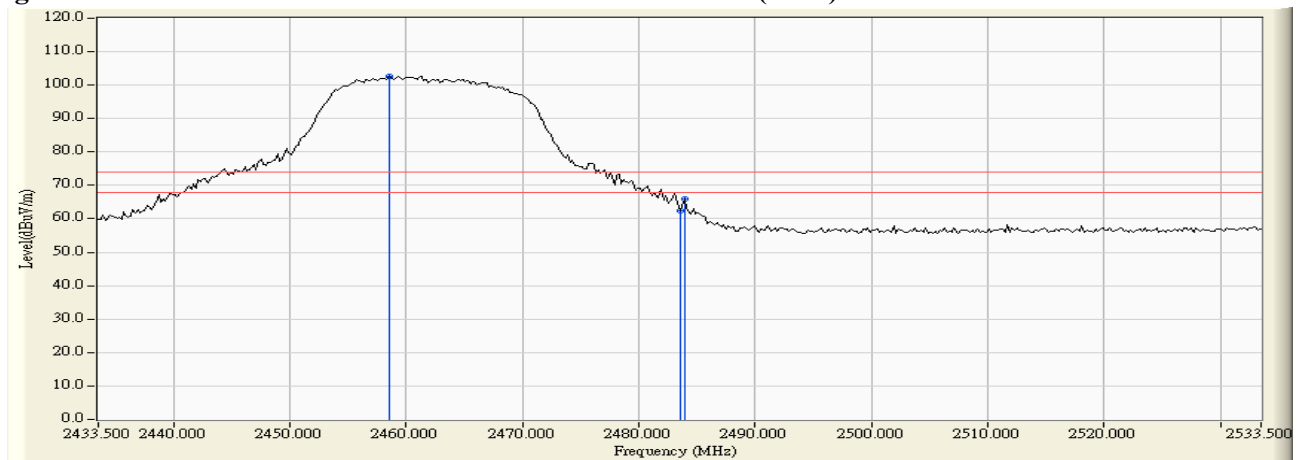
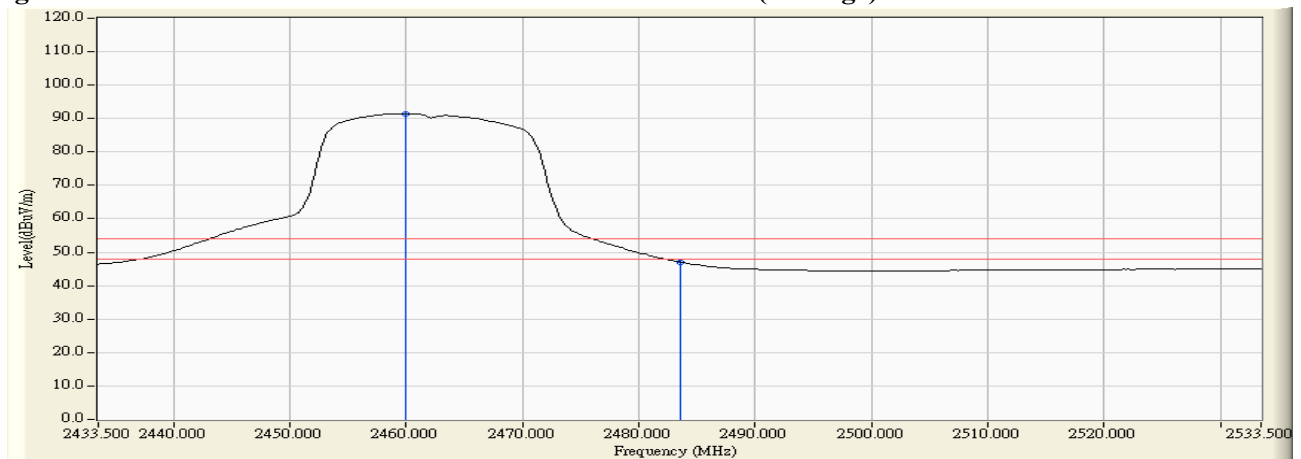


Figure Channel 11: VERTICAL (Average)



- 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.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. Occupied Bandwidth

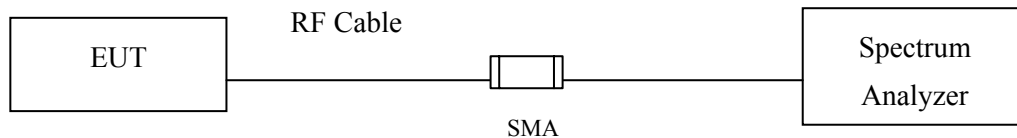
7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

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.

7.2. Test Setup



7.3. Limits

The minimum bandwidth shall be at least 500 kHz.

7.4. Test Procedure

The EUT was setup according to ANSI C63.4: 2014; tested according to DTS test procedure of Jan KDB558074 for compliance to FCC 47CFR 15.247 requirements.

7.5. Uncertainty

$\pm 150\text{Hz}$

7.6. Test Result of Occupied Bandwidth

Product : Wireless module
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	9150	>500	Pass
06	2437	9150	>500	Pass
11	2462	9150	>500	Pass

Figure Channel 01:

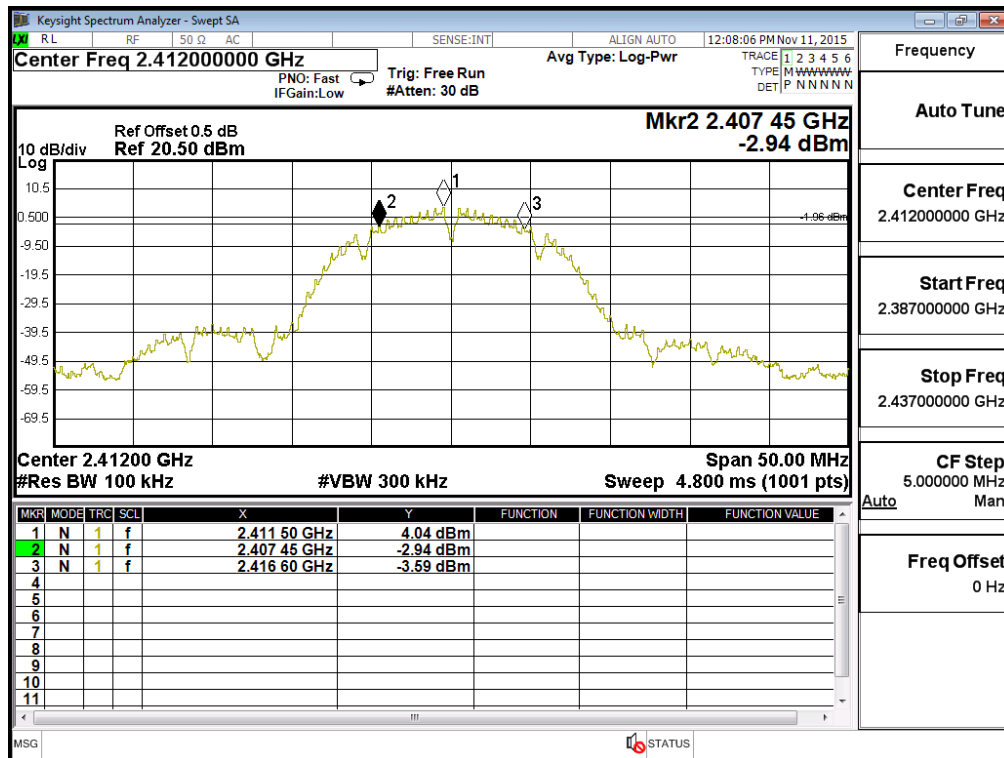


Figure Channel 06:

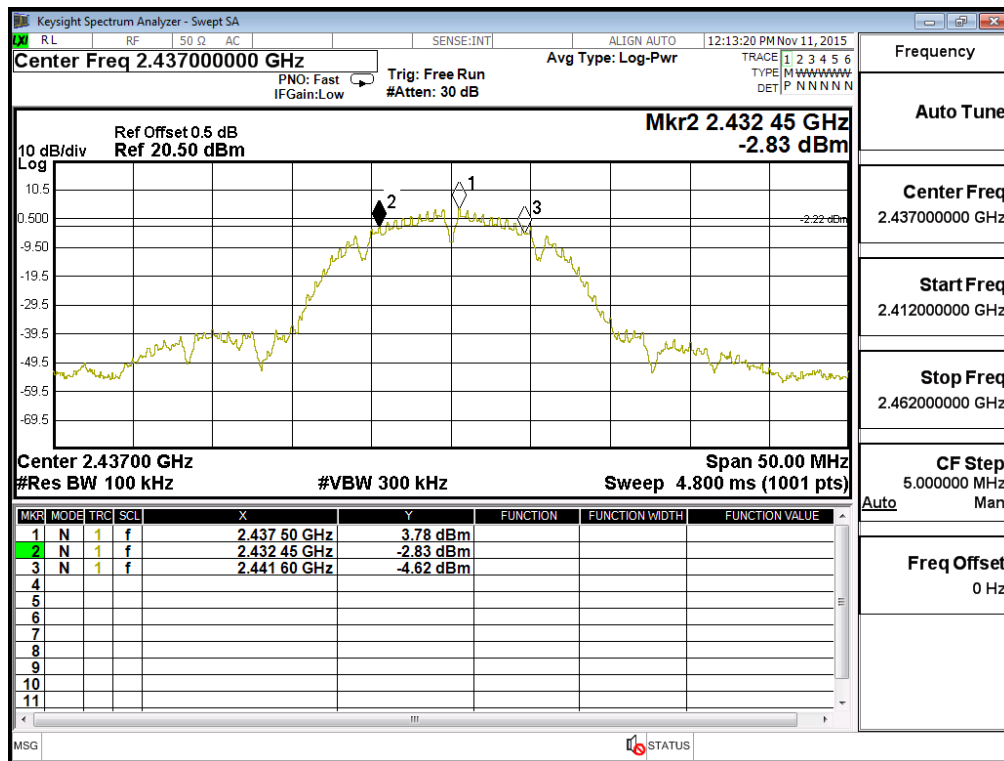
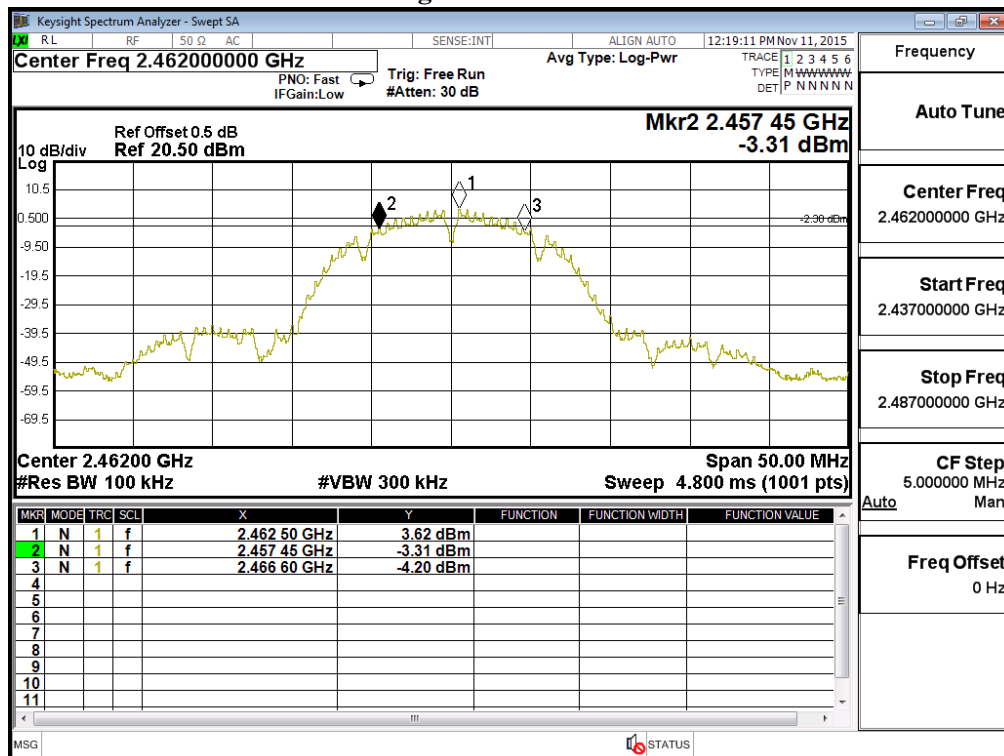


Figure Channel 11:



Product : Wireless module
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	15250	>500	Pass
06	2437	15250	>500	Pass
11	2462	15200	>500	Pass

Figure Channel 01:

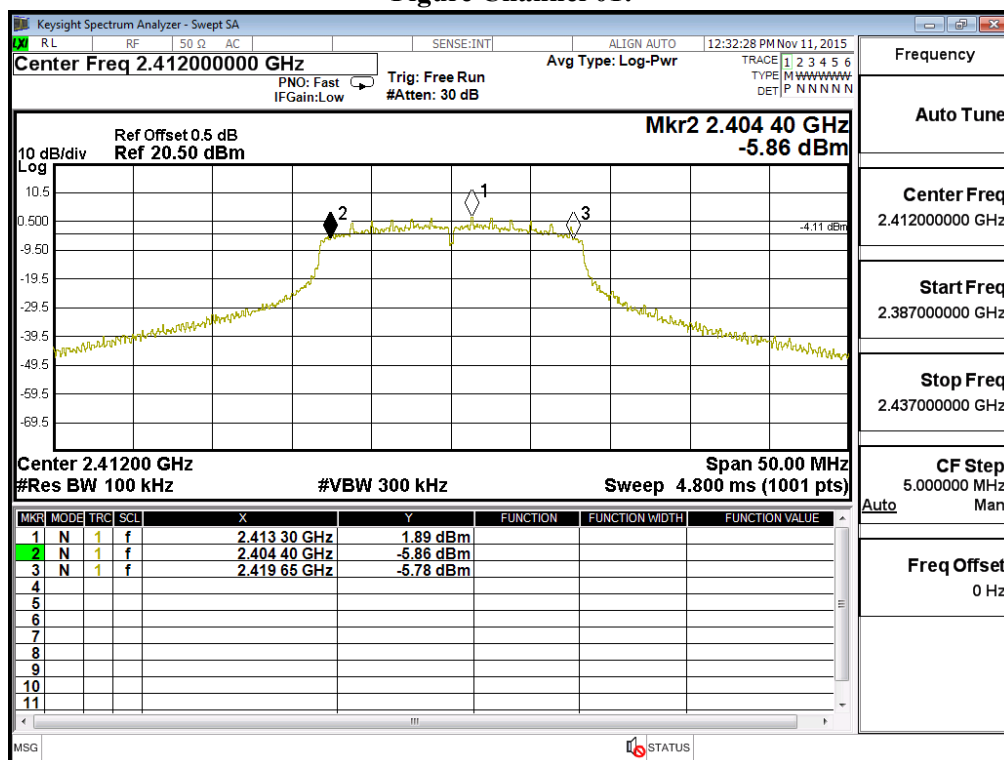


Figure Channel 06:

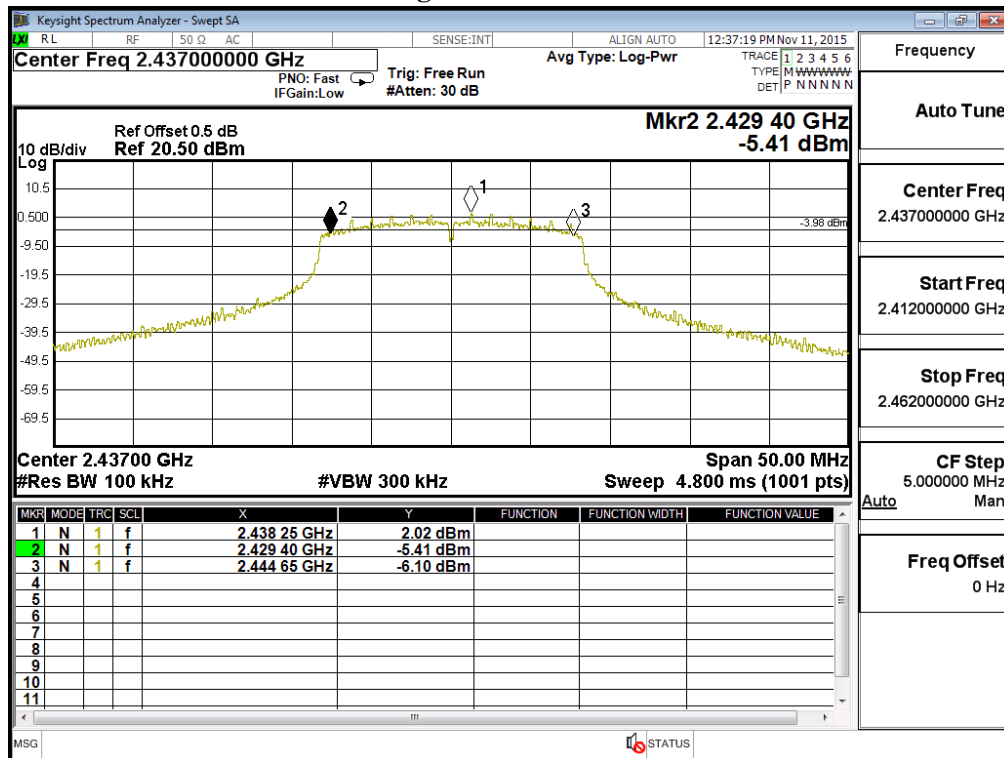
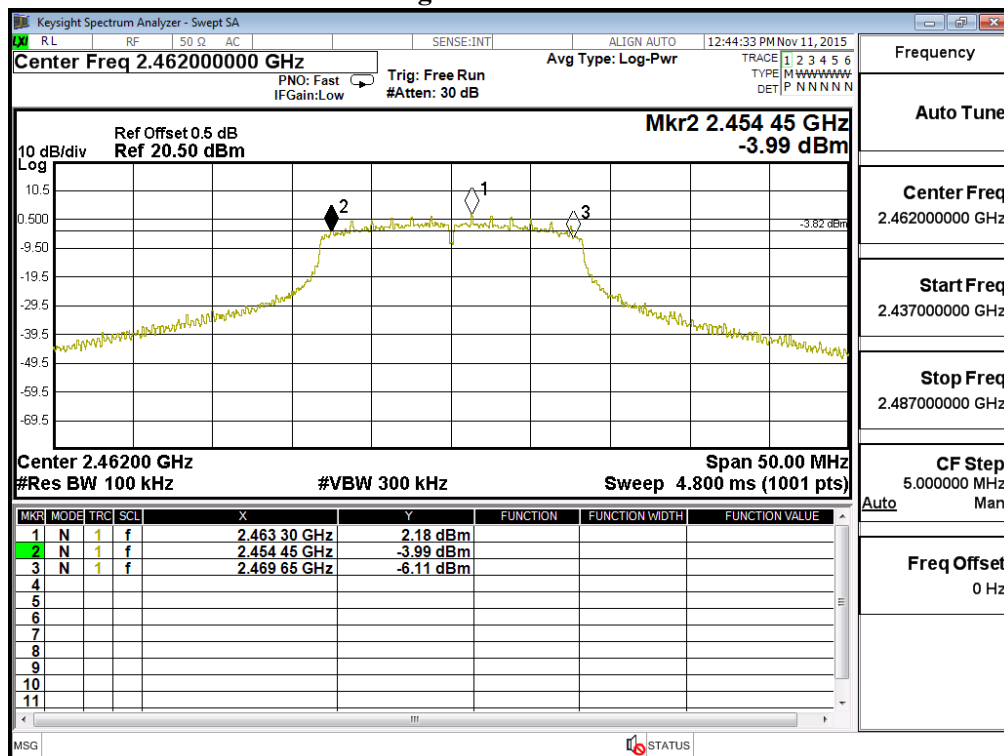


Figure Channel 11:



Product : Wireless module
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	15200	>500	Pass
06	2437	15200	>500	Pass
11	2462	15200	>500	Pass

Figure Channel 01:

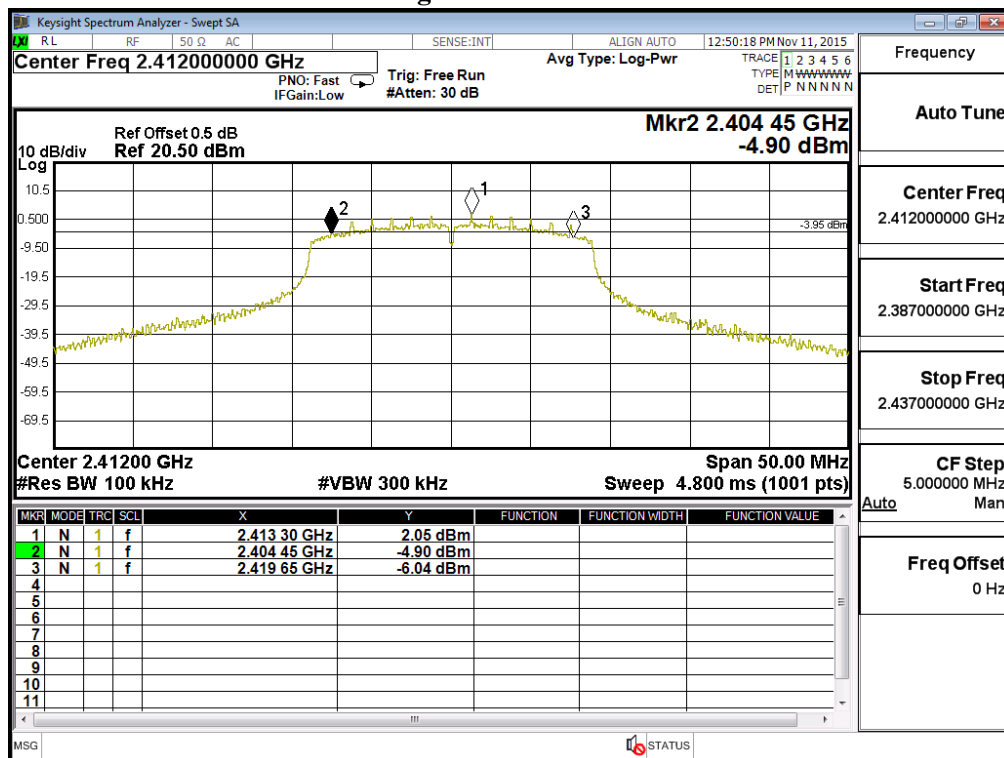


Figure Channel 06:

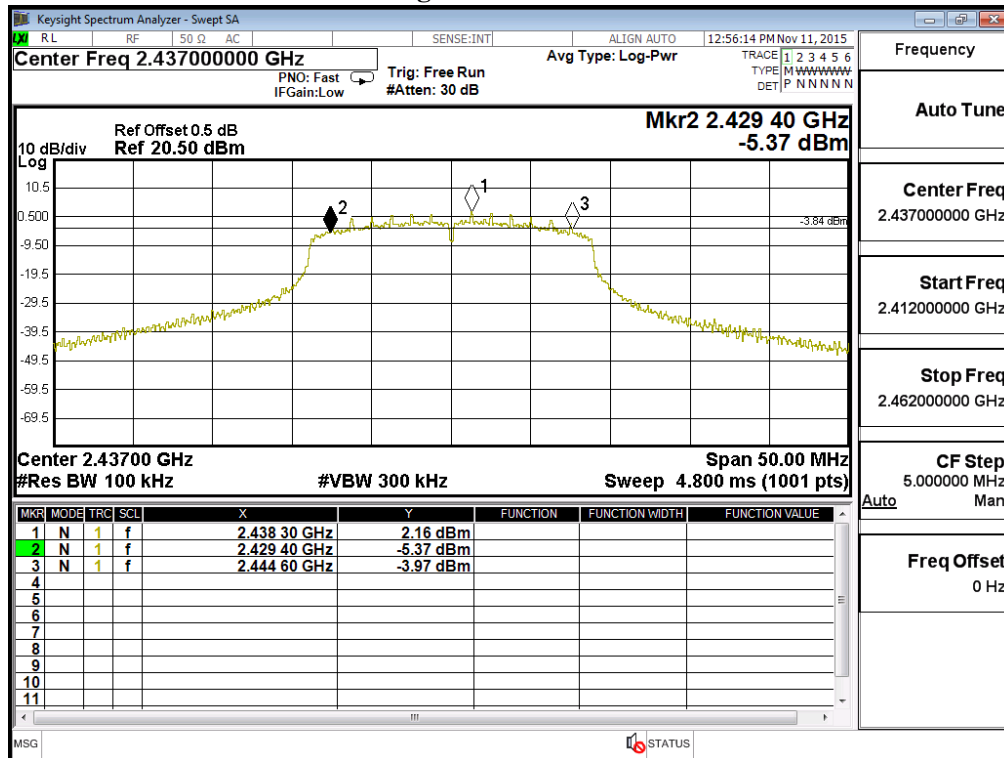
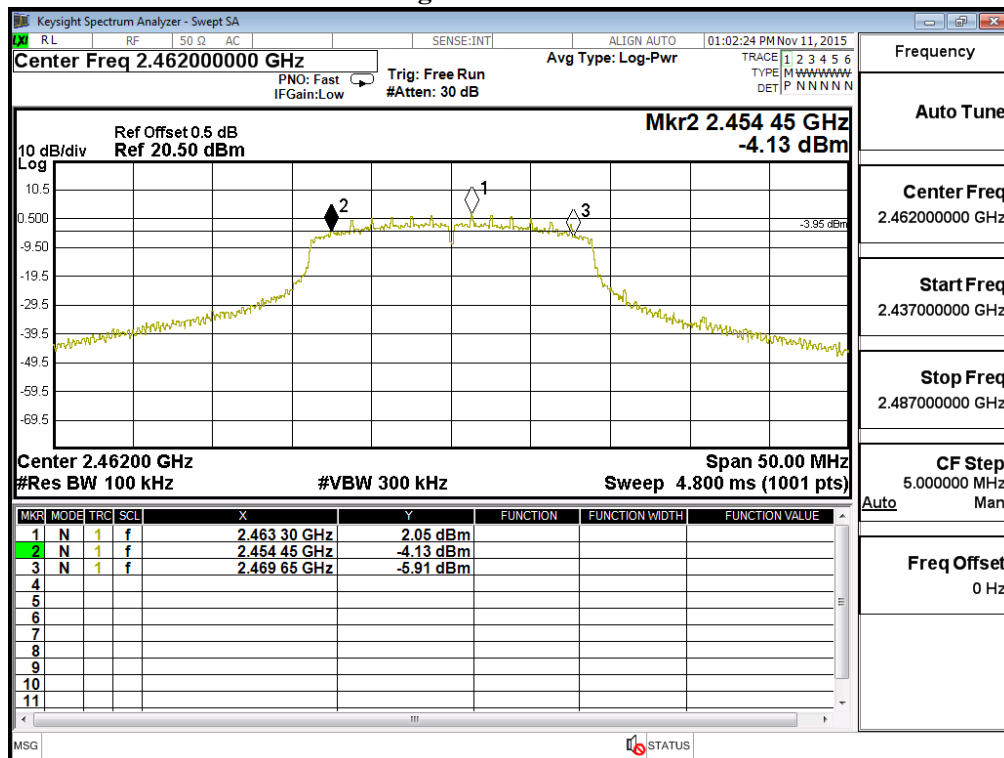


Figure Channel 11:



8. Power Density

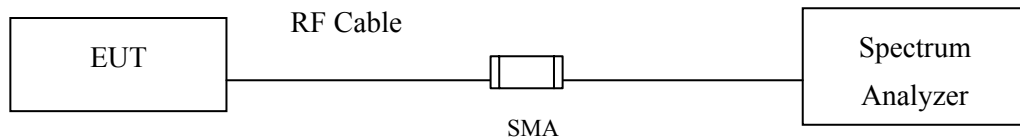
8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

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.

8.2. Test Setup



8.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.5. Uncertainty

± 1.27 dB

8.6. Test Result of Power Density

Product : Wireless module
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	3.950	< 8dBm	Pass
06	2437	3.900	< 8dBm	Pass
11	2462	3.830	< 8dBm	Pass

Figure Channel 01:

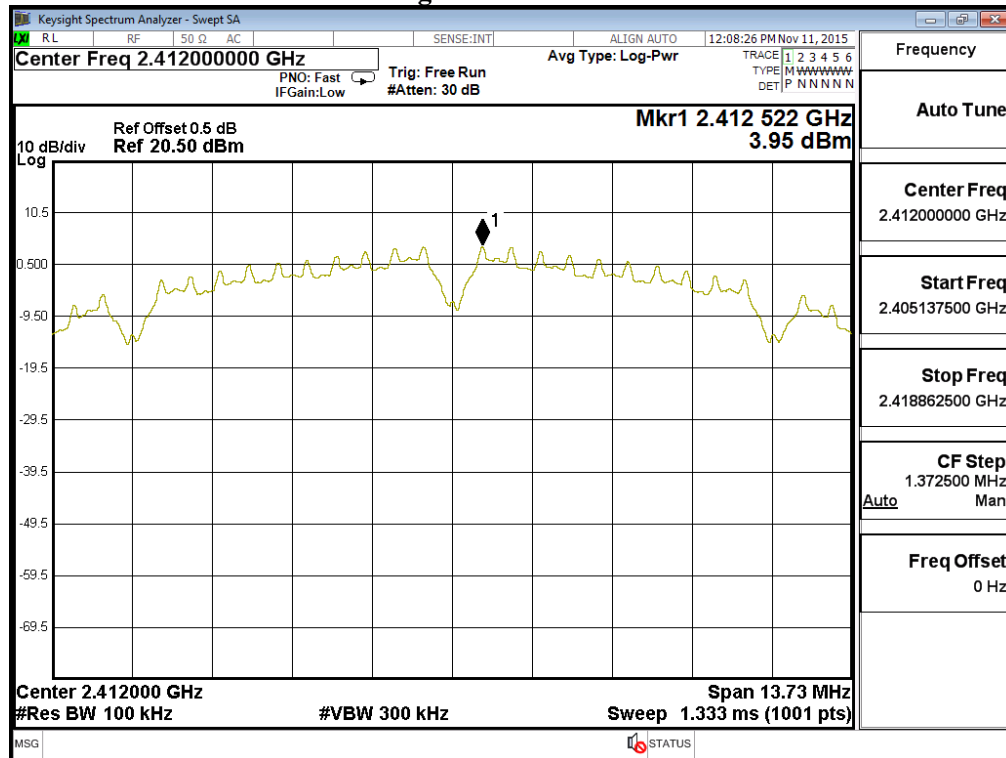


Figure Channel 06:

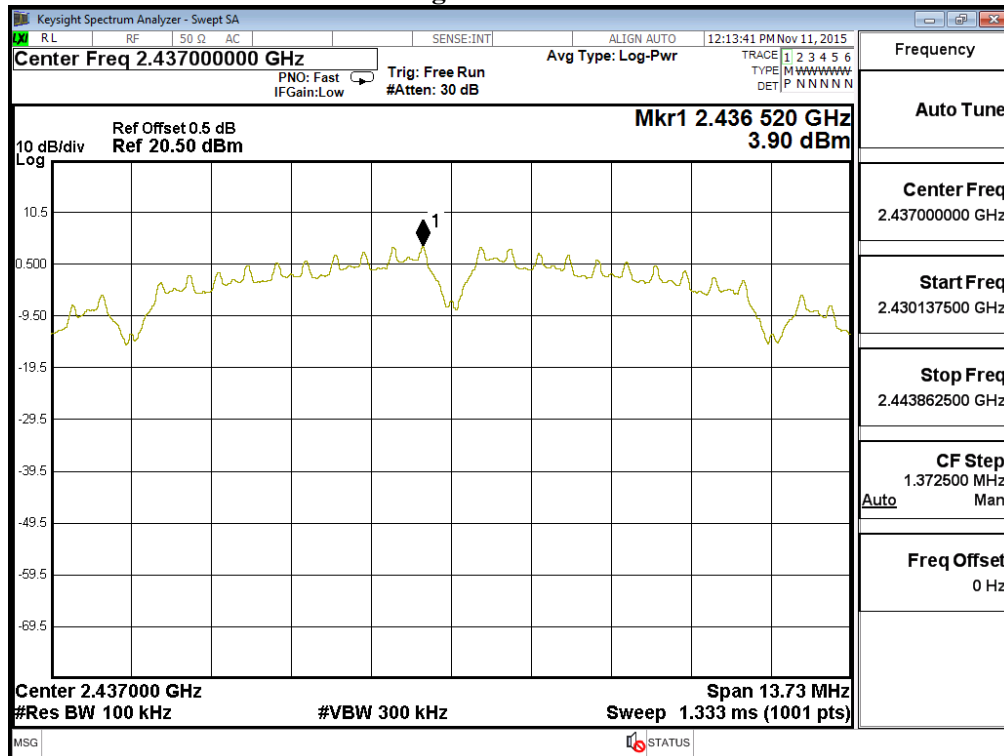
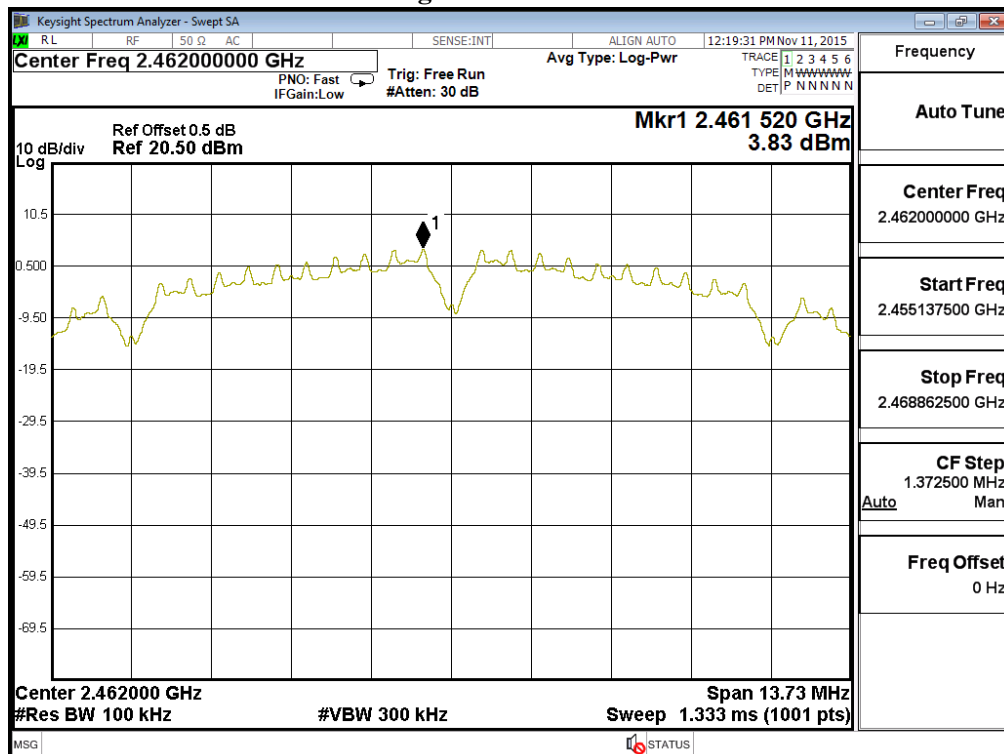


Figure Channel 11:



Product : Wireless module
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	2.170	< 8dBm	Pass
06	2437	2.240	< 8dBm	Pass
11	2462	2.240	< 8dBm	Pass

Figure Channel 01:

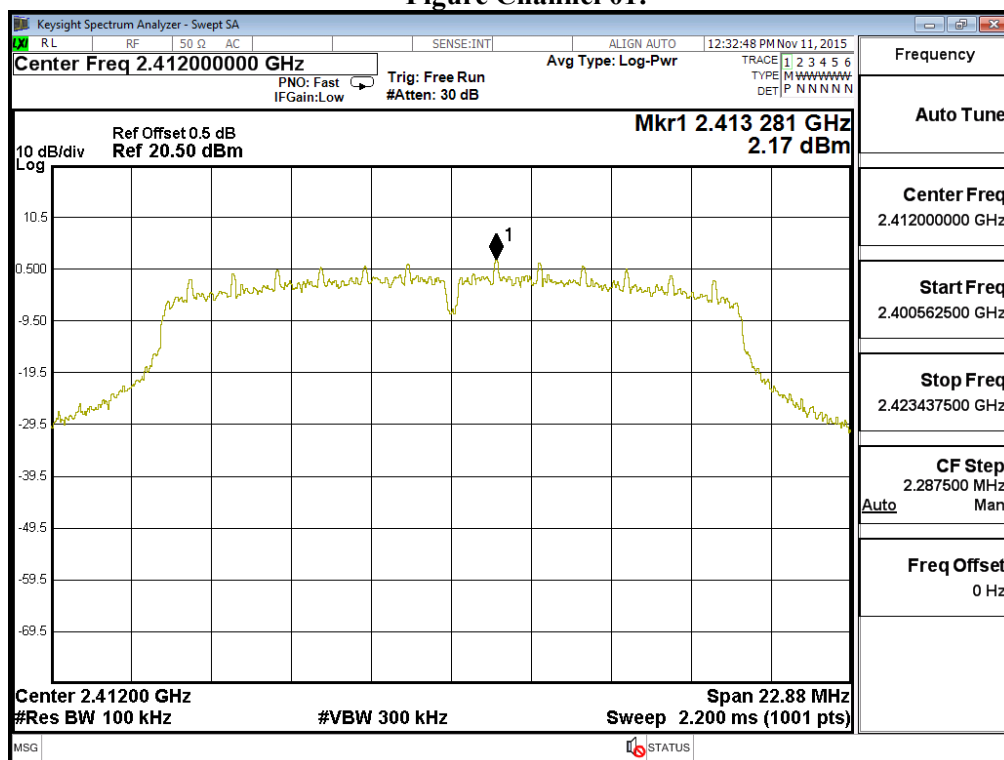


Figure Channel 06:

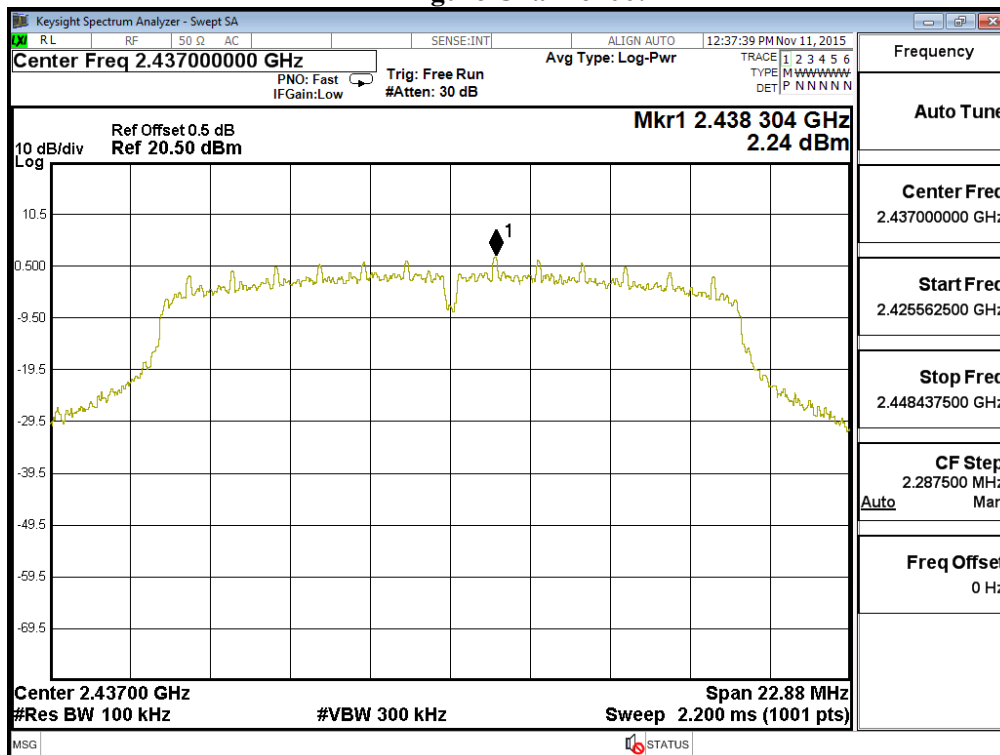
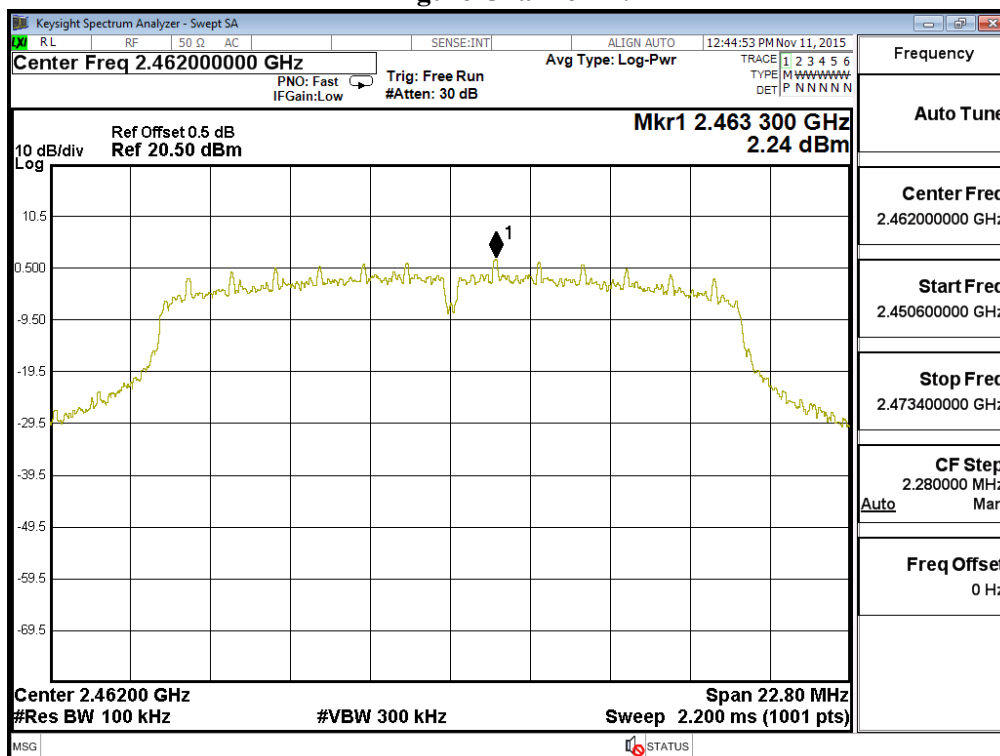


Figure Channel 11:



Product : Wireless module
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	1.970	< 8dBm	Pass
06	2437	2.240	< 8dBm	Pass
11	2462	2.290	< 8dBm	Pass

Figure Channel 01:

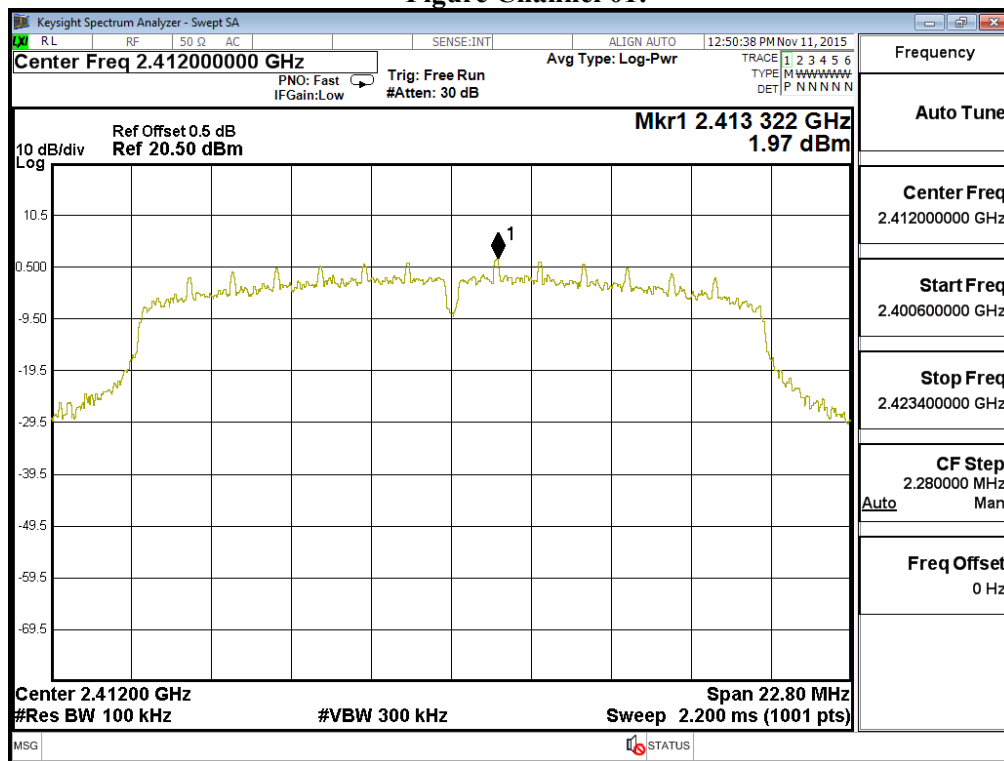


Figure Channel 06:

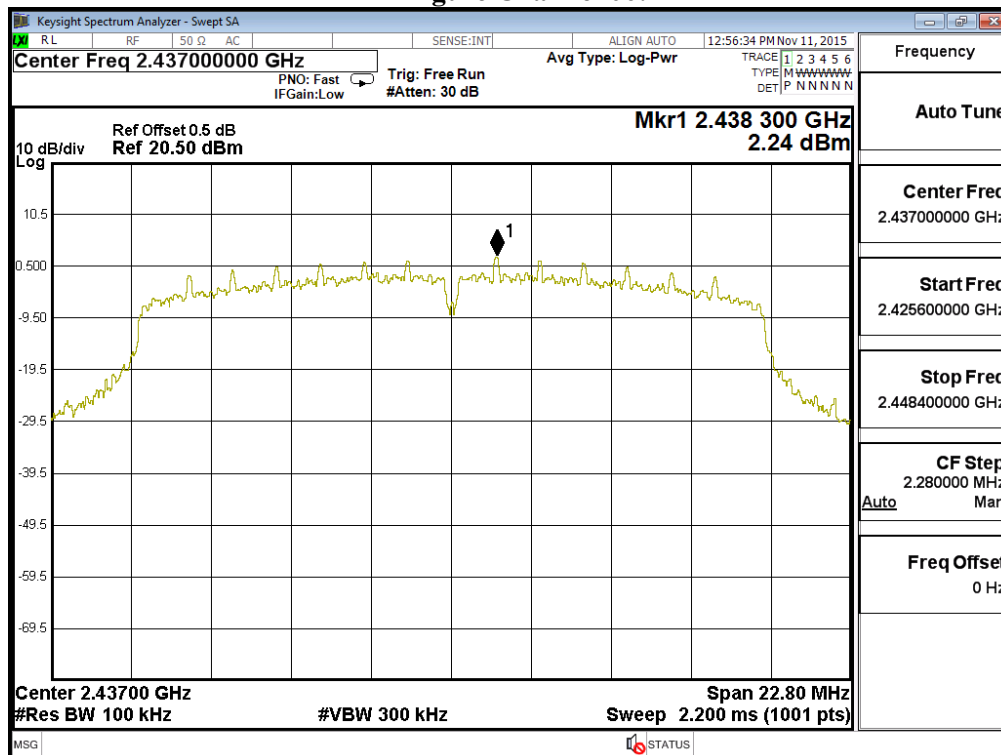
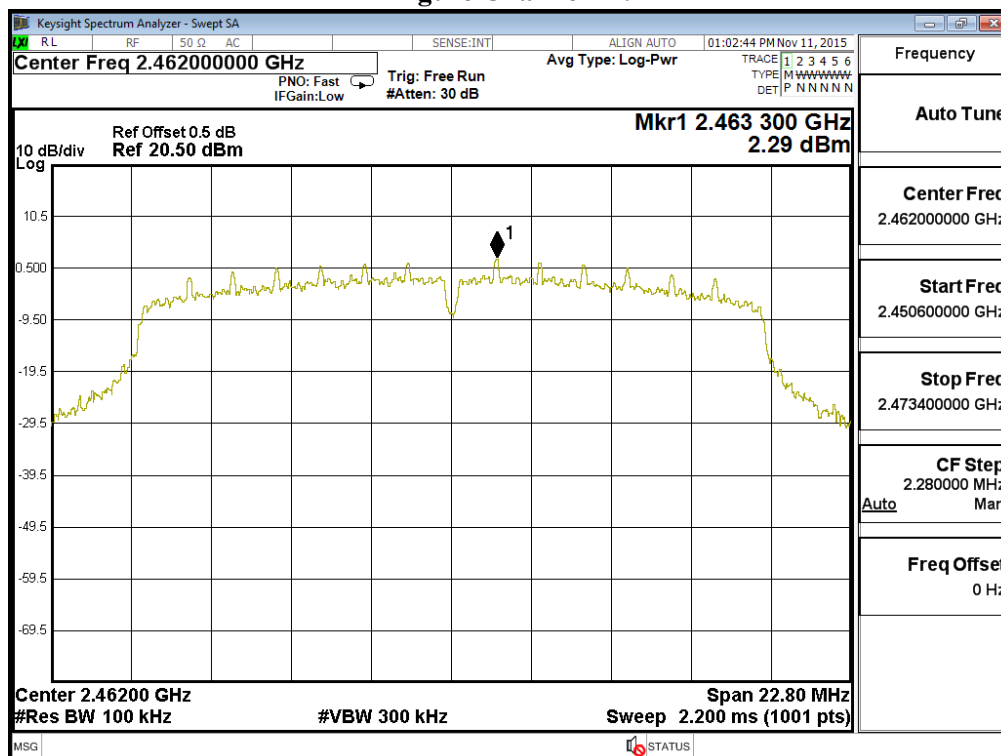


Figure Channel 11:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs