FCC Test Report
(Class II Permissive Change)

Product Name	MOXA IEEE 802.11 a/b/g/n
Model No	WAPN008
FCC ID.	SLE-WAPN008

Applicant	MOXA Inc.
Address	FL.4, NO. 135. LANE 235, BAOQIAO RD. XINDIAN DIST.,NEW TAIPEI CITY, TAIWAN

Date of Receipt	Feb. 22, 2018
Issue Date	June 20, 2018
Report No.	1820210R-RFUSP26V00
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

Issue Date: June 20, 2018
Report No.: 1820210R-RFUSP26V00

Product Name	MOXA IEEE 802.11 a/b/g/n
Applicant	MOXA Inc.
Address	FL.4, NO. 135. LANE 235, BAOQIAO RD. XINDIAN DIST.,NEW TAIPEI CITY, TAIWAN
Manufacturer	MOXA Inc.
Model No.	WAPN008
FCC ID.	SLE-WAPN008
EUT Rated Voltage	DC 3.3V
EUT Test Voltage	AC 120V/60Hz
Trade Name	MOXA
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied

Documented By : Genie Chang

(Senior Adm. Specialist / Genie Chang)

Tested By : Paul Jiang

(Engineer / Paul Jiang)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	MOXA IEEE 802.11 a/b/g/n
Trade Name	MOXA
Model No.	WAPN008
FCC ID.	SLE-WAPN008
Frequency Range	802.11b/g/n-20MHz:2412-2462MHz, 802.11n-40MHz:2422-2452MHz
Number of Channels	802.11b/g/n-20MHz: 13, n-40MHz: 9
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 300Mbps
Channel separation	802.11b/g/n-20(40)MHz: 5 MHz
Type of Modulation	802.11b:DSSS, DBPSK, DQPSK, CCK 802.11g/n: OFDM, BPSK, QPSK, 16QAM, 64QAM
Antenna Type	Omni-directional
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

Antenna List:

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	MOXA	ANT-WDB-ANM-0306	Omni-directional	3.5dBi For 2.4GHz
2	MOXA	MAT-WDB-CA-RM-2-0205	Omni-directional	2.0dBi For 2.4GHz
3	MOXA	MAT-WDB-DA-RM-2-0203-1m	Omni-directional	2.0dBi For 2.4GHz
4	MOXA	ANT-WDB-ARM-0202	Omni-directional	1.8dBi For 2.4GHz
5	MOXA	ANT-WSB-AHRM-05-1.5m BK	Omni-directional	5.0dBi For 2.4GHz
6	MOXA	ANT-WDB-ARM-02	Omni-directional	2.0dBi For 2.4GHz
7	MOXA	ANT-WDB-ANM-0502	Omni-directional	5.0dBi For 2.4GHz
8	MOXA	ANT-WSB-ANF-09	Omni-directional	9.0dBi For 2.4GHz
9	MOXA	ANT-WDB-ANF-0407	Omni-directional	4.0dBi For 2.4GHz
10	MOXA	ANT-WDB-ANM-0407	Omni-directional	4.0dBi For 2.4GHz
11	MOXA	ANT-WDB-ANF-0609	Omni-directional	6.0dBi For 2.4GHz
12	MOXA	ANT-WDB-ANM-0609	Omni-directional	6.0dBi For 2.4GHz

Note: 1. The antenna of EUT is conform to FCC 15.203

2. Only the higher gain antenna was tested and recorded in this report.

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		

802.11n-40MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 3:	2422 MHz	Channel 4:	2427 MHz	Channel 5:	2432 MHz	Channel 6:	2437 MHz
Channel 7:	2442 MHz	Channel 8:	2447 MHz	Channel 9:	2452 MHz		

Note:

1. This device is a MOXA IEEE 802.11 a/b/g/n built-in 2.4GHz and 5GHz transceiver, this report for 2.4G WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report.
4. 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.
5. This is to request a Class II permissive change for FCC ID: SLE-WAPN008, originally granted on 08/25/2015.
   The major change filed under this application is:
   Change #1: Addition twelve Omni-directional antenna, antenna type is different with the original application.
   Change #2: Reduce the Output Power through firmware filing to demonstrate compliance with the Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.

Test Mode:	Mode 1: Transmit (802.11b 1Mbps)
	Mode 1: Transmit (802.11g 6Mbps)
	Mode 1: Transmit (802.11n-20BW)_14.4Mbps
	Mode 1: Transmit (802.11n-40BW)_30Mbps

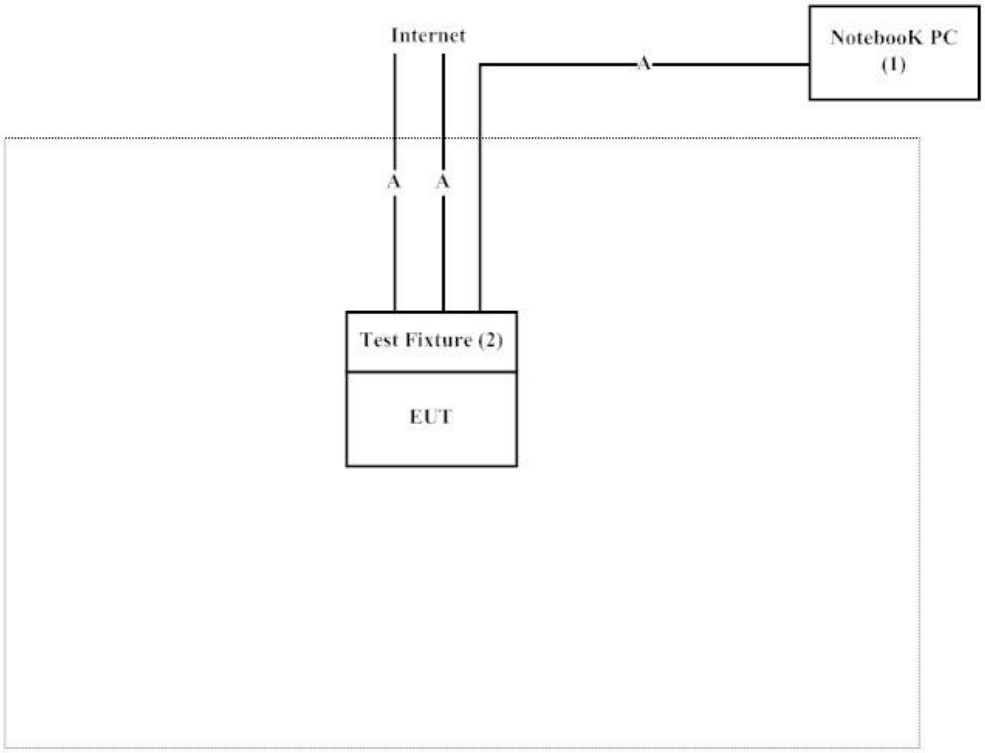
1.3. Tested System Details

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	HG26TZ1	Non-Shielded, 1.8m
2	Test Fixture	MOXA	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A	LAN Cable	Shielded, 1.8m, three PCS.

1.4. Configuration of Tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown on 1.4

(2) Execute software “ART2-GUI 2.3” on the Notebook PC.

(3) Configure the test mode, the test channel, and the data rate.

(4) Start the continuous transmission.

(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 DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd
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 : info.tw@dekra.com

FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2018/2/12	2019/2/11
X	Spectrum Analyzer	Agilent	N9010A	MY48030495	2017/10/13	2018/10/12
X	Peak Power Analyzer	Keysight	8990B	MY51000410	2017/7/19	2018/7/18
X	Wideband Power Sensor	Keysight	N1923A	MY56080003	2017/7/6	2018/7/5
X	Wideband Power Sensor	Keysight	N1923A	MY56080004	2017/7/6	2018/7/5
X	EMI Test Receiver	R&S	ESCS 30	100369	2017/11/7	2018/11/6
X	LISN	R&S	ESH3-Z5	836679/017	2018/2/9	2019/2/8
X	LISN	R&S	ENV216	100097	2018/2/9	2019/2/8
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2017/6/22	2018/6/21

For Radiated measurements /Site3/CB8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2018/3/12	2019/3/11
X	Loop Antenna	Teseq	HLA6121	37133	2017/10/13	2018/10/12
X	Bilog Antenna	Schaffner Chase	CBL6112B	2707	2017/6/25	2018/6/24
X	Coaxial Cable	DEKRA	RG 214	LC003-RG	2017/6/15	2018/6/14
X	Pre-Amplifier	Jet-Power	JPA-10M1G33	17010100033001	2017/7/19	2018/7/18
X	Horn Antenna	ETS-Lindgren	3117	00135205	2018/5/3	2019/5/2
X	Pre-Amplifier	EMCI	EMC012630SE	980210	2018/4/10	2019/4/9
X	Coaxial Cable	QuieTek	SF-106	LC035/37/41-SF	2017/6/21	2018/6/20
X	Amplifier + Cable	EMCI	EMC184045SE	980370	2018/3/21	2019/3/20
X	Horn Antenna	Com-Power	AH-840	101043	2018/1/9	2019/1/8
X	Filter	MicroTRON	BRM50701	019	2017/11/21	2018/11/20
X	Filter	Microwave Circuits	N0257881	36681	2018/1/22	2019/1/21

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version :QuieTek EMI 2.0 V2.1.113.

2. Peak Power Output

2.1. Test Setup

2.2. Limits

The maximum peak power shall be less 1 Watt.

2.3. 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 v04 section 9.1.3 PKPM1 Peak power meter method.

2.4. Uncertainty

± 1.27 dB

2.5. Test Result of Peak Power Output

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test date : 2017/03/07
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	19.2	--	--	--	21.54	<30dBm	Pass
06	2442	18.55	18.42	18.31	18.22	20.98	<30dBm	Pass
11	2462	18.48	--	--	--	20.89	<30dBm	Pass

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test date : 2017/03/07
Test Mode : Mode 1: 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	14.67	--	--	--	--	--	--	--	24.11	<30dBm	Pass
06	2442	19.23	19.14	19.05	18.94	18.83	18.76	18.64	18.52	26.76	<30dBm	Pass
11	2462	15.09	--	--	--	--	--	--	--	25.1	<30dBm	Pass

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test date : 2017/03/07
Test Mode : Mode 1: Transmit (802.11n-20BW)_14.4Mbps

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		HT0	HT1	HT2	HT3	HT4	HT5	HT6	HT7	HT0		
		Measurement Level (dBm)										
01	2412	14.05	--	--	--	--	--	--	--	23.84	<30dBm	Pass
06	2442	14.33	14.24	14.17	14.09	13.94	13.88	13.75	13.69	23.11	<30dBm	Pass
11	2462	13.74	--	--	--	--	--	--	--	23.73	<30dBm	Pass

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

CHAIN B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		HT0	HT1	HT2	HT3	HT4	HT5	HT6	HT7	HT0		
		Measurement Level (dBm)										
01	2412	13.95	--	--	--	--	--	--	--	23.34	<30dBm	Pass
06	2442	14.61	14.5	14.42	14.32	14.28	14.18	14.11	14.05	24.43	<30dBm	Pass
11	2462	14.8	--	--	--	--	--	--	--	23.77	<30dBm	Pass

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

CHAIN A+B

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
1	2412	14.4	23.84	23.34	26.61	<30dBm	Pass
6	2437	14.4	23.11	24.43	26.83	<30dBm	Pass
11	2462	14.4	23.73	23.77	26.76	<30dBm	Pass

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test date : 2017/03/07
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		HT0	HT1	HT2	HT3	HT4	HT5	HT6	HT7	HT0		
		Measurement Level (dBm)										
03	2422	10.9	--	--	--	--	--	--	--	20.6	<30dBm	Pass
06	2442	13.37	13.24	13.12	13.06	12.94	12.82	12.76	12.64	23.67	<30dBm	Pass
09	2452	10.21	--	--	--	--	--	--	--	19.44	<30dBm	Pass

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

CHAIN B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		HT0	HT1	HT2	HT3	HT4	HT5	HT6	HT7	HT0		
		Measurement Level (dBm)										
03	2422	10.67	--	--	--	--	--	--	--	20.59	<30dBm	Pass
06	2442	12.74	12.63	12.54	12.43	12.35	12.24	12.16	12.04	23.04	<30dBm	Pass
09	2452	9.55	--	--	--	--	--	--	--	18.89	<30dBm	Pass

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

CHAIN A+B

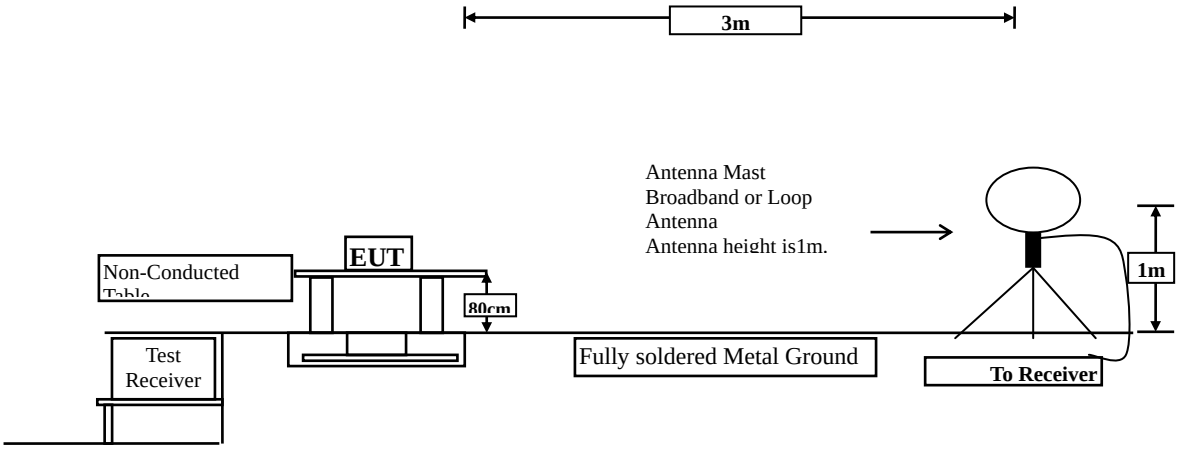
Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
3	2422	30	20.60	20.59	23.61	<30dBm	Pass
6	2437	30	23.67	23.04	26.38	<30dBm	Pass
9	2452	30	19.44	18.89	22.18	<30dBm	Pass

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

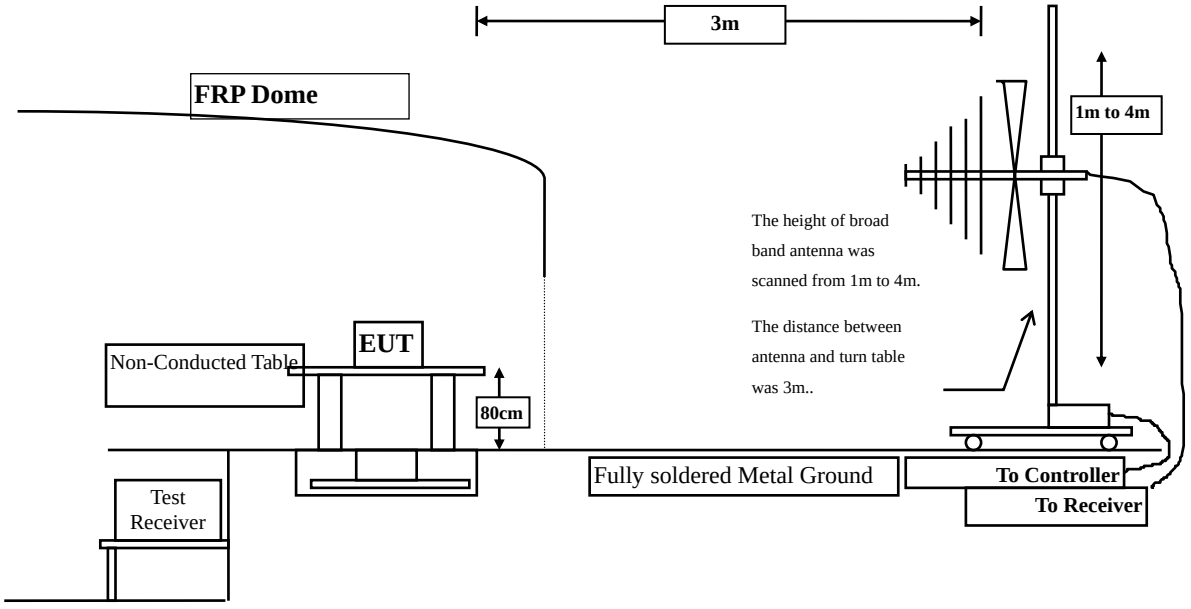
3. Radiated Emission

3.1. Test Setup

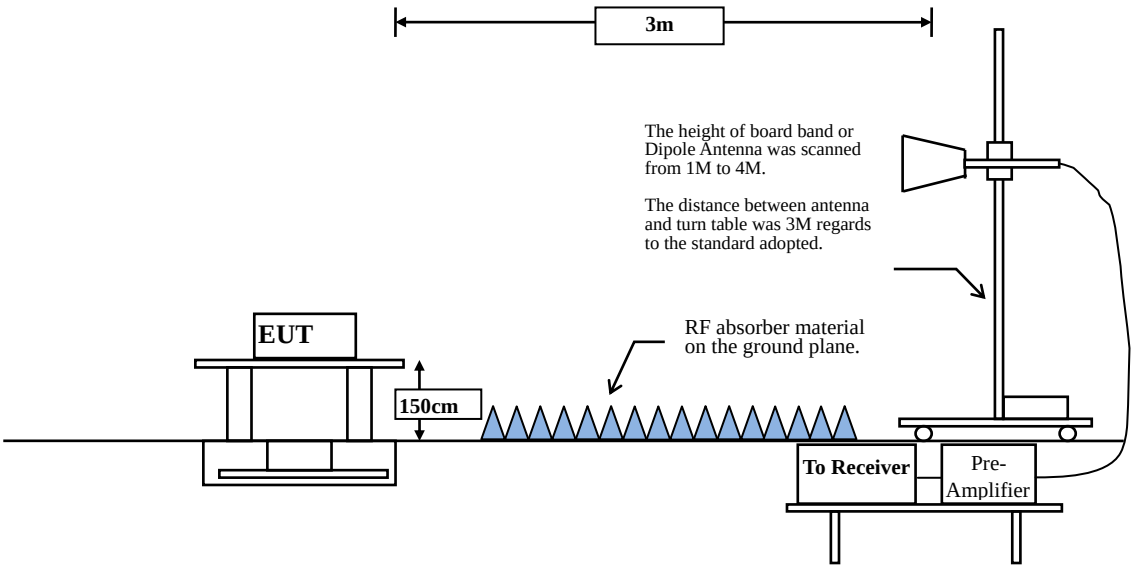
Under 30MHz



Below 1GHz



Above 1GHz



3.2. 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 (dBuV/m) = 20 log E field strength (uV/m)

3.3. 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 form 9kHz - 10th Harmonic of fundamental was investigated.

3.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

3.5. Test Result of Radiated Emission

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	2.428	47.291	49.720	-24.280	74.000
7236.000	9.177	40.430	49.607	-24.393	74.000
9648.000	10.019	36.762	46.782	-27.218	74.000
Average					
Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4824.000	2.836	49.620	52.457	-21.543	74.000
7236.000	9.676	43.332	53.008	-20.992	74.000
9648.000	10.556	36.792	47.349	-26.651	74.000
Average					
Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	2.076	46.812	48.889	-25.111	74.000
7311.000	9.512	41.906	51.418	-22.582	74.000
9748.000	9.630	38.612	48.242	-25.758	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4874.000	2.532	48.691	51.223	-22.777	74.000
7311.000	10.089	41.906	51.995	-22.005	74.000
9748.000	10.266	38.612	48.879	-25.121	74.000
Average Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4924.000	2.191	49.327	51.518	-22.482	74.000
7386.000	10.373	42.521	52.895	-21.105	74.000
9848.000	9.964	38.859	48.823	-25.177	74.000
Average					
Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4924.000	2.805	49.327	52.132	-21.868	74.000
7386.000	10.373	42.521	52.895	-21.105	74.000
9848.000	9.964	38.859	48.823	-25.177	74.000
Average					
Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11g 6Mbps)(2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	2.428	47.562	49.991	-24.009	74.000
7236.000	9.177	40.681	49.858	-24.142	74.000
9648.000	10.019	37.286	47.306	-26.694	74.000
Average					
Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4824.000	2.836	49.914	52.751	-21.249	74.000
7236.000	9.676	43.482	53.158	-20.842	74.000
9648.000	10.556	37.389	47.946	-26.054	74.000
Average					
Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	2.076	46.481	48.558	-25.442	74.000
7311.000	9.512	39.082	48.594	-25.406	74.000
9748.000	9.630	36.814	46.444	-27.556	74.000
Average					
Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4874.000	2.532	49.172	51.704	-22.296	74.000
7311.000	10.089	42.785	52.874	-21.126	74.000
9748.000	10.266	38.296	48.563	-25.437	74.000
Average					
Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11g 6Mbps) (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal Peak Detector:					
4924.000	2.191	47.820	50.011	-23.989	74.000
7386.000	10.373	41.093	51.467	-22.533	74.000
9848.000	9.964	37.284	47.248	-26.752	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical Peak Detector:					
4924.000	2.805	48.867	51.672	-22.328	74.000
7386.000	11.180	41.984	53.164	-20.836	74.000
9848.000	10.801	38.719	49.520	-24.480	74.000
Average Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11n-20BW)_14.4Mbps (2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	2.428	46.081	48.510	-25.490	74.000
7236.000	9.177	39.891	49.068	-24.932	74.000
9648.000	10.019	36.726	46.746	-27.254	74.000
Average					
Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4824.000	2.836	46.276	49.113	-24.887	74.000
7236.000	9.676	40.493	50.169	-23.831	74.000
9648.000	10.556	37.386	47.943	-26.057	74.000
Average					
Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11n-20BW)_14.4Mbps (2442 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	2.076	46.638	48.715	-25.285	74.000
7311.000	9.512	42.598	52.110	-21.890	74.000
9748.000	9.630	38.143	47.773	-26.227	74.000
Average					
Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4874.000	35.627	46.780	49.312	-24.688	74.000
7311.000	41.330	43.689	53.778	-20.222	74.000
9748.000	42.198	38.625	48.892	-25.108	74.000
Average					
Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11n-20BW)_14.4Mbps (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal Peak Detector:					
4924.000	2.191	44.841	47.032	-26.968	74.000
7386.000	10.373	48.295	58.669	-15.331	74.000
9848.000	9.964	38.775	48.739	-25.261	74.000
Average Detector:					
7386.000	10.373	24.100	34.474	-19.526	54.000
Vertical Peak Detector:					
4924.000	2.805	48.481	51.286	-22.714	74.000
7386.000	11.180	51.598	62.778	-11.222	74.000
9848.000	10.801	38.781	49.582	-24.418	74.000
Average Detector:					
7386.000	11.180	25.766	36.946	-17.054	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps (2422MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4844.000	2.280	39.526	41.807	-32.193	74.000
7266.000	9.106	37.056	46.162	-27.838	74.000
9688.000	9.663	37.597	47.260	-26.740	74.000
Average					
Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4844.000	35.799	40.859	43.567	-30.433	74.000
7266.000	41.010	38.514	48.140	-25.860	74.000
9688.000	41.770	37.809	48.093	-25.907	74.000
Average					
Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	2.076	45.972	48.049	-25.951	74.000
7311.000	9.512	42.083	51.595	-22.405	74.000
9748.000	9.630	37.628	47.258	-26.742	74.000
Average					
Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4874.000	2.532	46.271	48.803	-25.197	74.000
7311.000	10.089	43.294	53.383	-20.617	74.000
9748.000	10.266	37.928	48.195	-25.805	74.000
Average					
Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2018/03/09
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps (2452 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal Peak Detector:					
4904.000	2.000	40.862	42.863	-31.137	74.000
7356.000	10.308	37.682	47.990	-26.010	74.000
9808.000	9.850	36.914	46.764	-27.236	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical Peak Detector:					
4904.000	2.513	42.395	44.909	-29.091	74.000
7356.000	11.022	37.859	48.881	-25.119	74.000
9808.000	10.512	38.843	49.355	-24.645	74.000
Average Detector:					
--	--	--	--	--	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test date : 2017/03/10
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
104.690	-7.862	45.056	37.195	-6.305	43.500
145.430	-7.730	41.652	33.922	-9.578	43.500
315.180	-4.628	40.808	36.180	-9.820	46.000
559.620	2.147	34.218	36.365	-9.635	46.000
825.400	7.346	32.824	40.170	-5.830	46.000
949.560	7.036	33.922	40.958	-5.042	46.000
Vertical					
129.910	-3.714	43.577	39.863	-3.637	43.500
329.730	-2.266	39.134	36.868	-9.132	46.000
540.220	2.169	30.192	32.361	-13.639	46.000
675.050	0.247	40.559	40.806	-5.194	46.000
825.400	3.016	32.894	35.910	-10.090	46.000
925.310	3.215	30.013	33.228	-12.772	46.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test date : 2017/03/10
Test Mode : Mode 1: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
104.690	-7.862	44.206	36.345	-7.155	43.500
316.150	-4.614	41.236	36.622	-9.378	46.000
515.000	3.191	28.792	31.983	-14.017	46.000
675.050	2.837	35.520	38.357	-7.643	46.000
819.580	6.961	30.030	36.991	-9.009	46.000
949.560	7.036	27.987	35.023	-10.977	46.000
Vertical					
129.910	-3.714	42.212	38.498	-5.002	43.500
320.030	-4.144	41.827	37.683	-8.317	46.000
450.010	-5.869	43.094	37.225	-8.775	46.000
682.810	1.817	36.146	37.963	-8.037	46.000
814.730	2.908	32.208	35.116	-10.884	46.000
925.310	3.215	29.950	33.165	-12.835	46.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test date : 2017/03/10
Test Mode : Mode 1: Transmit (802.11n-20BW)_14.4Mbps (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
160.950	-10.116	45.516	35.400	-8.100	43.500
316.150	-4.614	40.088	35.474	-10.526	46.000
450.010	0.611	42.224	42.835	-3.165	46.000
675.050	2.837	39.895	42.732	-3.268	46.000
819.580	6.961	32.373	39.334	-6.666	46.000
939.860	6.750	32.736	39.486	-6.514	46.000
Vertical					
129.910	-3.714	42.364	38.650	-4.850	43.500
299.660	-4.061	42.501	38.440	-7.560	46.000
450.010	-5.869	43.177	37.308	-8.692	46.000
675.050	0.247	41.619	41.866	-4.134	46.000
825.400	3.016	33.208	36.224	-9.776	46.000
925.310	3.215	31.484	34.699	-11.301	46.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test date : 2017/03/10
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
104.690	-7.862	44.675	36.814	-6.686	43.500
316.150	-4.614	40.819	36.205	-9.795	46.000
515.000	3.191	33.304	36.495	-9.505	46.000
675.050	2.837	40.010	42.847	-3.153	46.000
830.250	7.328	32.053	39.381	-6.619	46.000
969.930	7.386	33.930	41.316	-12.684	54.000
Vertical					
129.910	-3.714	41.879	38.165	-5.335	43.500
299.660	-4.061	43.246	39.185	-6.815	46.000
450.010	-5.869	43.190	37.321	-8.679	46.000
675.050	0.247	40.745	40.992	-5.008	46.000
825.400	3.016	33.728	36.744	-9.256	46.000
900.090	1.958	40.458	42.416	-3.584	46.000

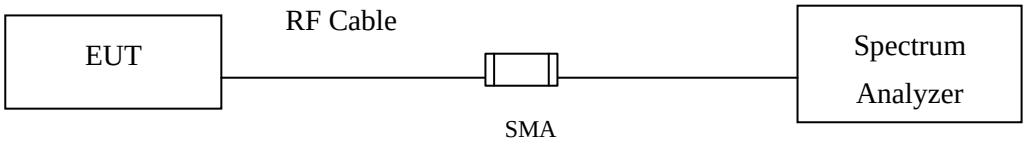
Note:

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

4. Band Edge

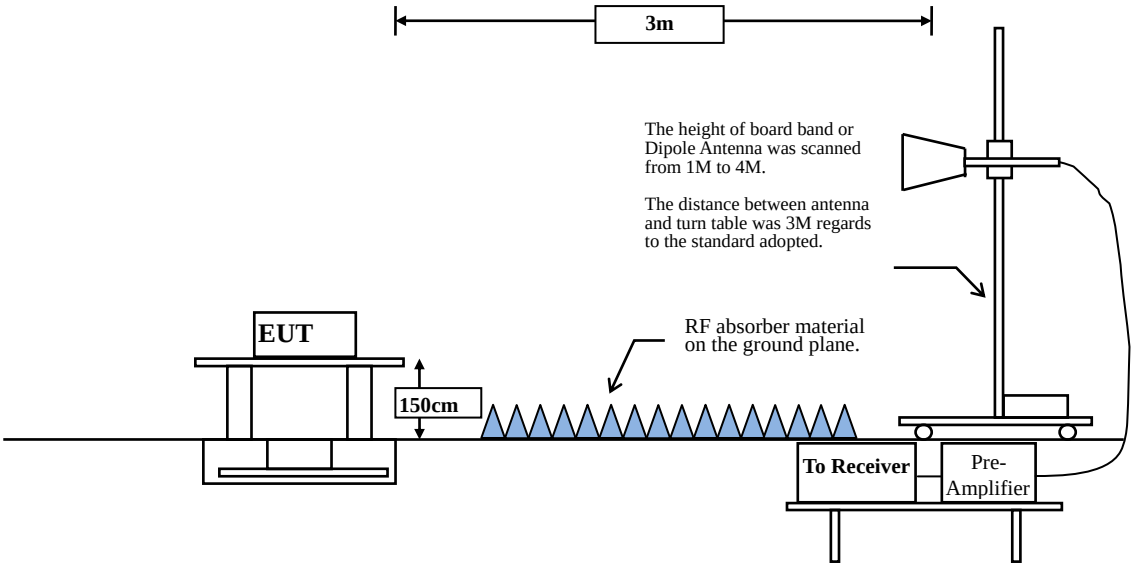
4.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



4.2. 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.

4.3. 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.

According to KDB 558074 section 12.2.5. Average power measurement procedure
RBW = 1MHz.
VBW = 10Hz, when duty cycle ≥ 98 %
VBW ≥ 1/T, when duty cycle < 98 %
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 b	100.00	--	--	10
802.11 g	98.61	5.3400	187	200
802.11 n20	97.65	2.4900	402	500
802.11 n40	94.12	1.2000	833	1000

Note: Duty Cycle Refer to Section 6

4.4. Uncertainty

± 4.08 dB above 1GHz
± 4.22 dB below 1GHz

4.5. Test Result of Band Edge

Product	:	MOXA IEEE 802.11 a/b/g/n
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2018/02/27
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)	2378.116	6.422	44.544	50.966	74.00	54.00	Pass
01 (Peak)	2390.000	6.474	43.783	50.258	74.00	54.00	Pass
01 (Peak)	2397.101	6.511	50.762	57.273	74.00	54.00	Pass
01 (Peak)	2400.000	6.528	50.433	56.961	74.00	54.00	Pass
01 (Peak)	2410.580	6.593	89.762	96.355	--	--	--
01 (Average)	2386.812	6.461	23.584	30.045	74.00	54.00	Pass
01 (Average)	2390.000	6.474	23.257	29.732	74.00	54.00	Pass
01 (Average)	2397.246	6.512	37.394	43.906	74.00	54.00	Pass
01 (Average)	2400.000	6.528	29.150	35.678	74.00	54.00	Pass
01 (Average)	2412.754	6.608	80.253	86.861	--	--	--

Figure Channel 01: Horizontal (Peak)

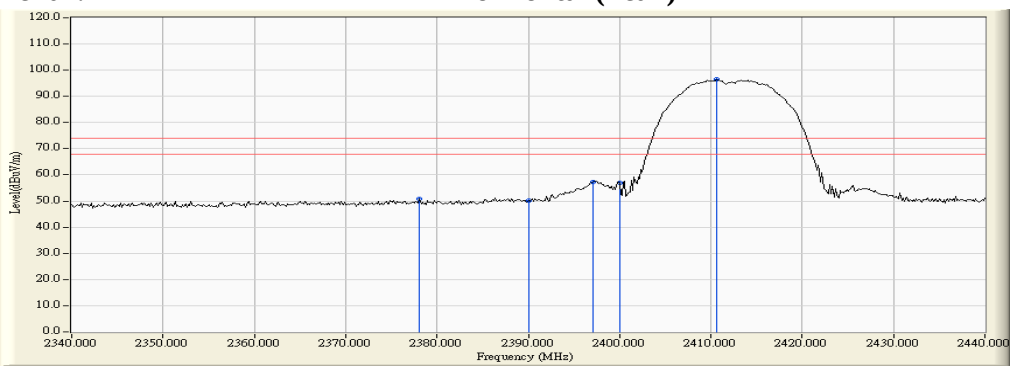
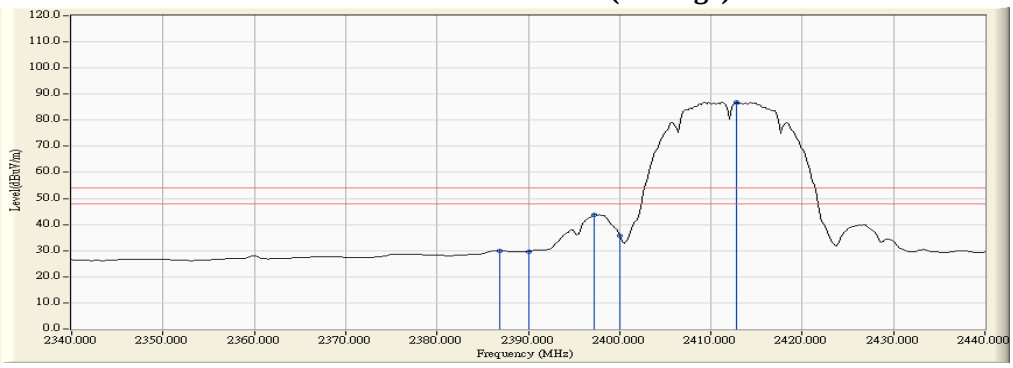


Figure Channel 01: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/27
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)	2389.710	5.882	59.713	65.595	74.00	54.00	Pass
01 (Peak)	2390.000	5.880	59.323	65.204	74.00	54.00	Pass
01 (Peak)	2397.246	5.872	66.040	71.912	--	--	--
01 (Peak)	2400.000	5.879	62.025	67.904	--	--	--
01 (Peak)	2413.043	5.921	106.731	112.651	--	--	--
01 (Average)	2386.522	5.895	37.980	43.875	74.00	54.00	Pass
01 (Average)	2390.000	5.880	37.957	43.838	74.00	54.00	Pass
01 (Average)	2397.246	5.872	53.626	59.498	--	--	--
01 (Average)	2400.000	5.879	45.522	51.401	--	--	--
01 (Average)	2412.754	5.919	97.287	103.205	--	--	--

Figure Channel 01: Vertical (Peak)

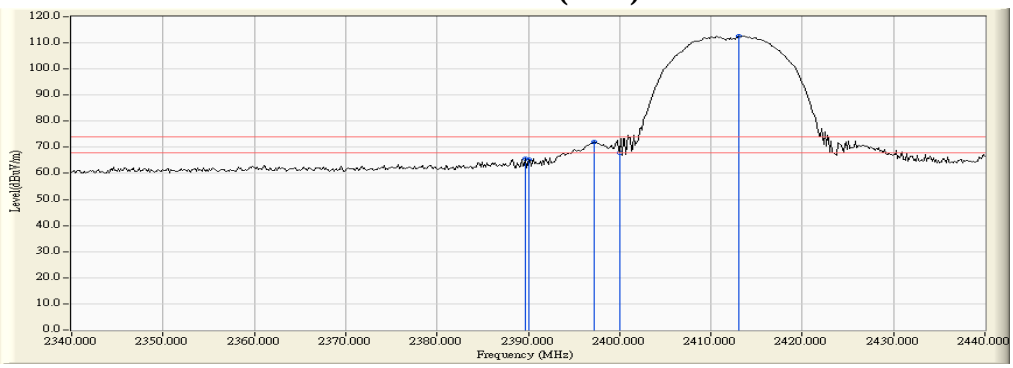
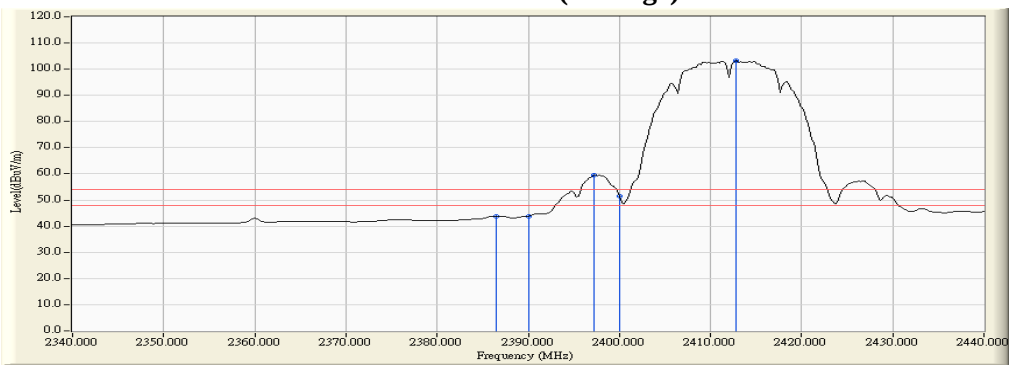


Figure Channel 01: Vertical (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/28
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

F 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)	2463.500	6.969	89.862	96.831	--	--	--
11 (Peak)	2483.500	7.110	43.449	50.559	74.00	54.00	Pass
11 (Peak)	2484.370	7.116	44.443	51.559	74.00	54.00	Pass
11 (Average)	2462.775	6.964	80.078	87.042	--	--	--
11 (Average)	2483.500	7.110	21.402	28.512	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

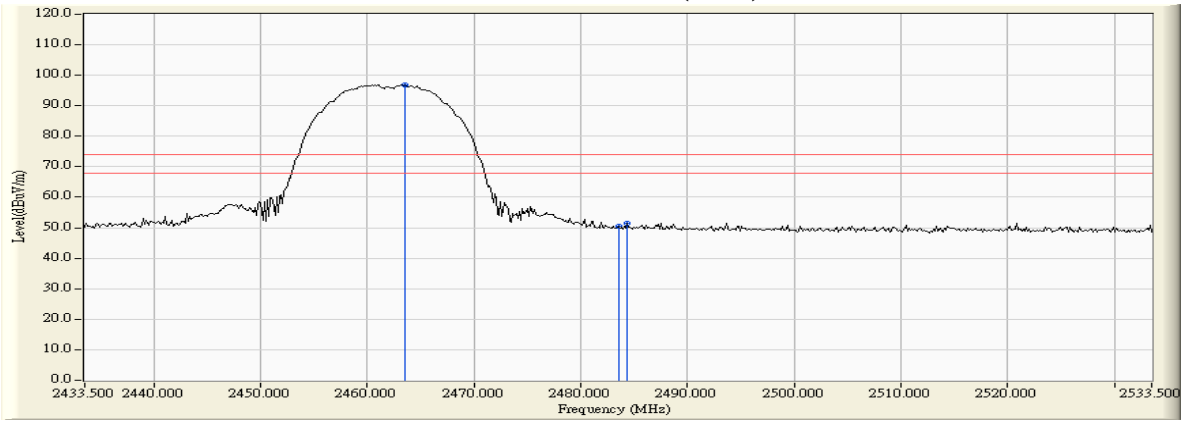
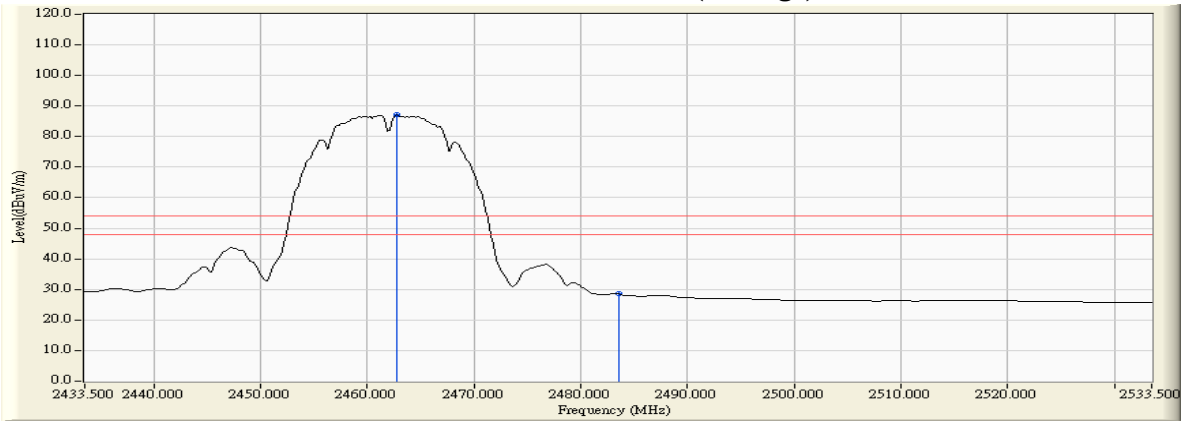


Figure Channel 11: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/28
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)	2463.065	6.236	107.556	113.792	--	--	--
11 (Peak)	2483.500	6.363	58.254	64.617	74.00	54.00	Pass
11 (Peak)	2484.659	6.371	59.956	66.327	74.00	54.00	Pass
11 (Average)	2462.775	6.234	98.299	104.533	--	--	--
11 (Average)	2483.500	6.363	39.259	45.622	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

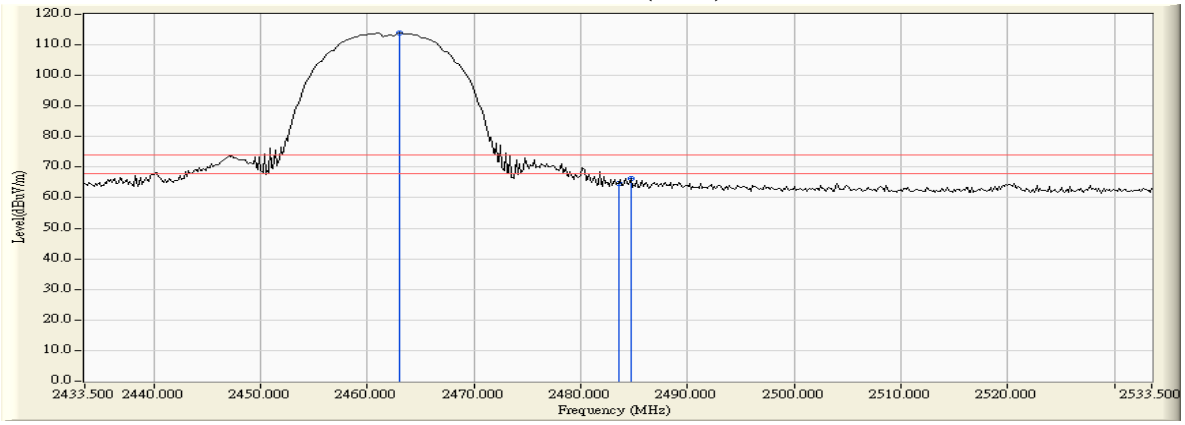
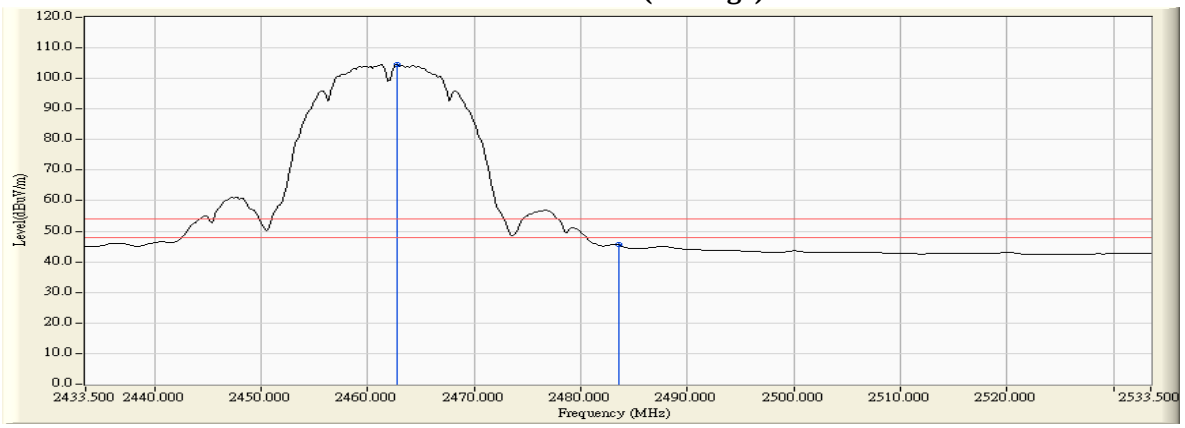


Figure Channel 11: Vertical (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/03/05
Test Mode : Mode 1: 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)	2389.420	6.472	47.512	53.984	74.00	54.00	Pass
01 (Peak)	2390.000	6.474	47.334	53.809	74.00	54.00	Pass
01 (Peak)	2400.000	6.528	68.842	75.370	--	--	--
01 (Peak)	2416.087	6.632	91.225	97.857	--	--	--
01 (Average)	2390.000	6.474	31.179	37.654	74.00	54.00	Pass
01 (Average)	2400.000	6.528	42.555	49.083	--	--	--
01 (Average)	2416.957	6.638	80.100	86.738	--	--	--

Figure Channel 01: Horizontal (Peak)

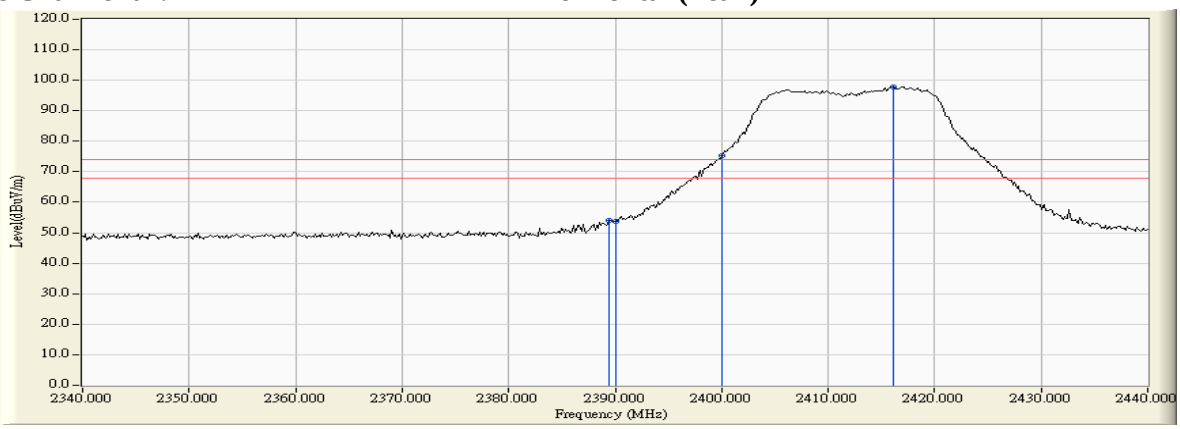
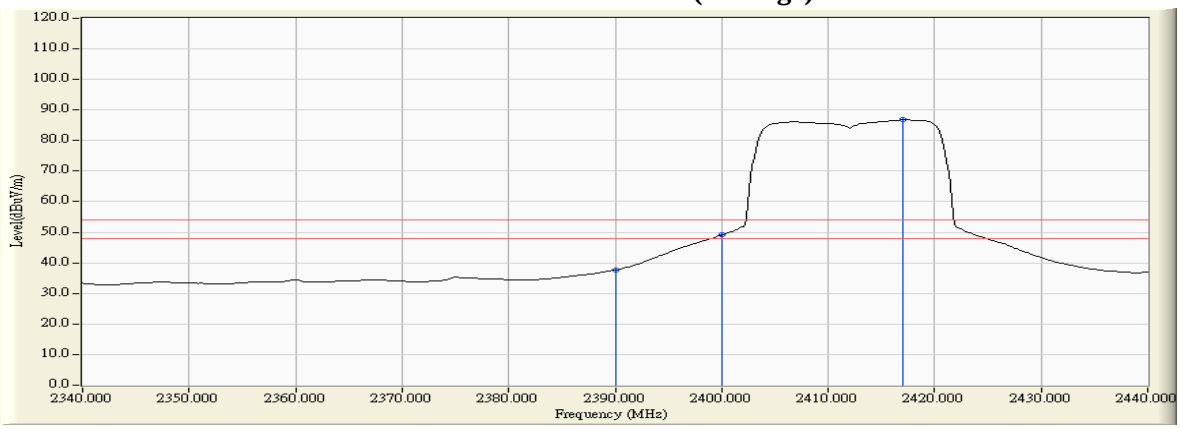


Figure Channel 01: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/03/05
Test Mode : Mode 1: 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)	2389.855	5.881	64.862	70.743	74.00	54.00	Pass
01 (Peak)	2390.000	5.880	64.508	70.389	74.00	54.00	Pass
01 (Peak)	2400.000	5.879	86.051	91.930	--	--	--
01 (Peak)	2414.783	5.931	108.190	114.121	--	--	--
01 (Average)	2390.000	5.880	47.573	53.454	74.00	54.00	Pass
01 (Average)	2400.000	5.879	59.382	65.261	--	--	--
01 (Average)	2417.971	5.951	96.179	102.130	--	--	--

Figure Channel 01: Vertical (Peak)

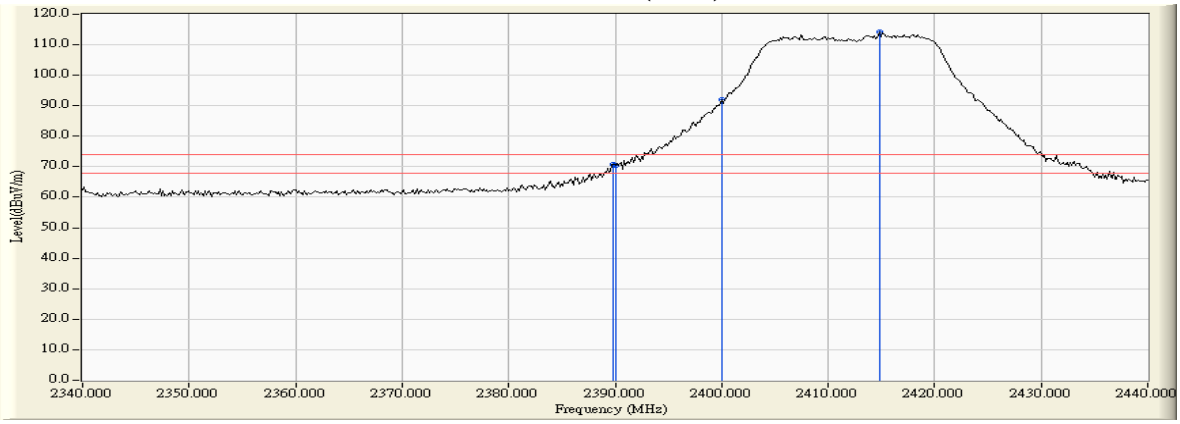
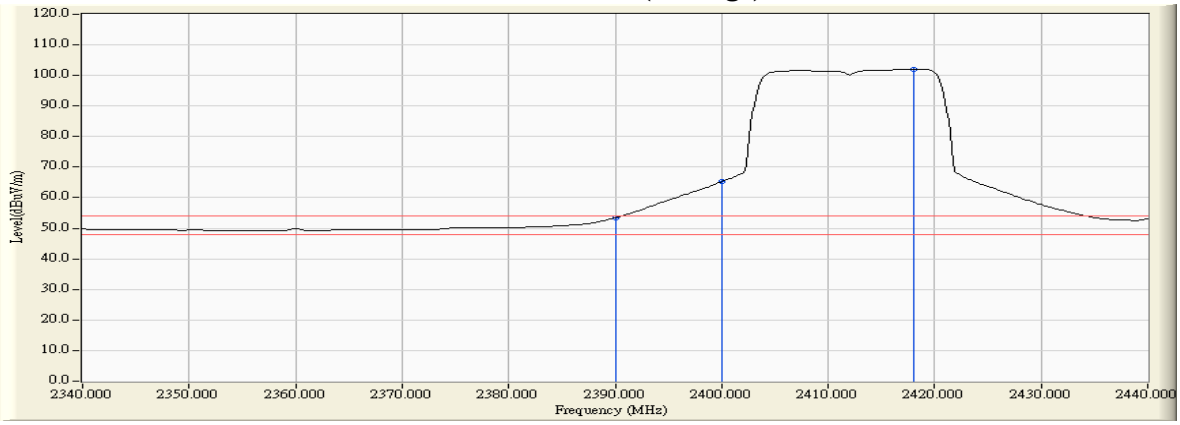


Figure Channel 01: Vertical (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/03/05
Test Mode : Mode 1: 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)	2457.558	6.927	94.020	100.947	--	--	--
11 (Peak)	2483.500	7.110	49.963	57.073	74.00	54.00	Pass
11 (Average)	2455.964	6.916	82.680	89.596	--	--	--
11 (Average)	2483.500	7.110	31.709	38.819	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

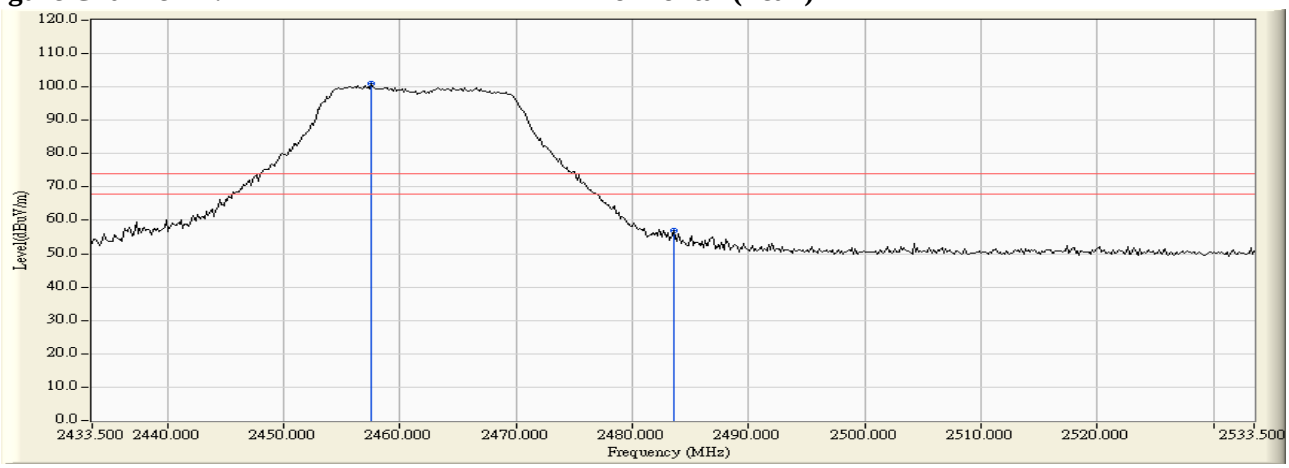
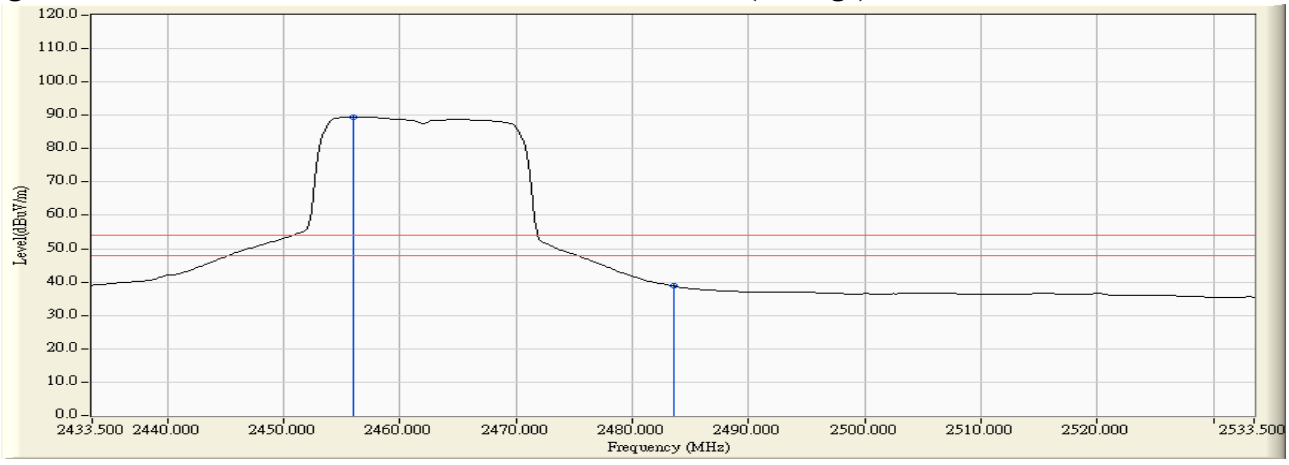


Figure Channel 11: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/03/05
Test Mode : Mode 1: 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)	2464.949	6.248	109.447	115.695	--	--	--
11 (Peak)	2483.500	6.363	66.068	72.431	74.00	54.00	Pass
11 (Average)	2456.254	6.193	97.362	103.555	--	--	--
11 (Average)	2483.500	6.363	47.108	53.471	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

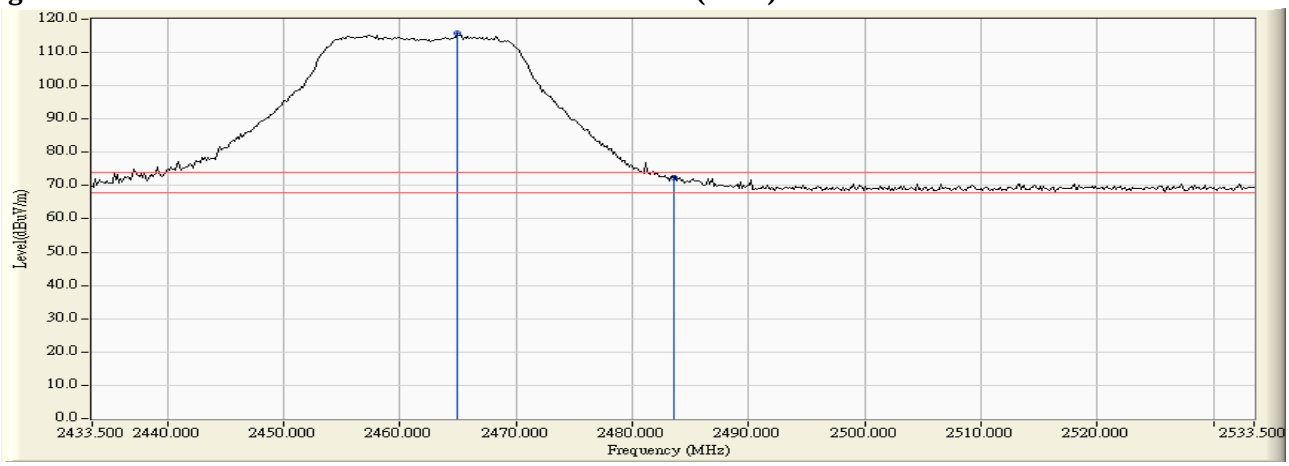
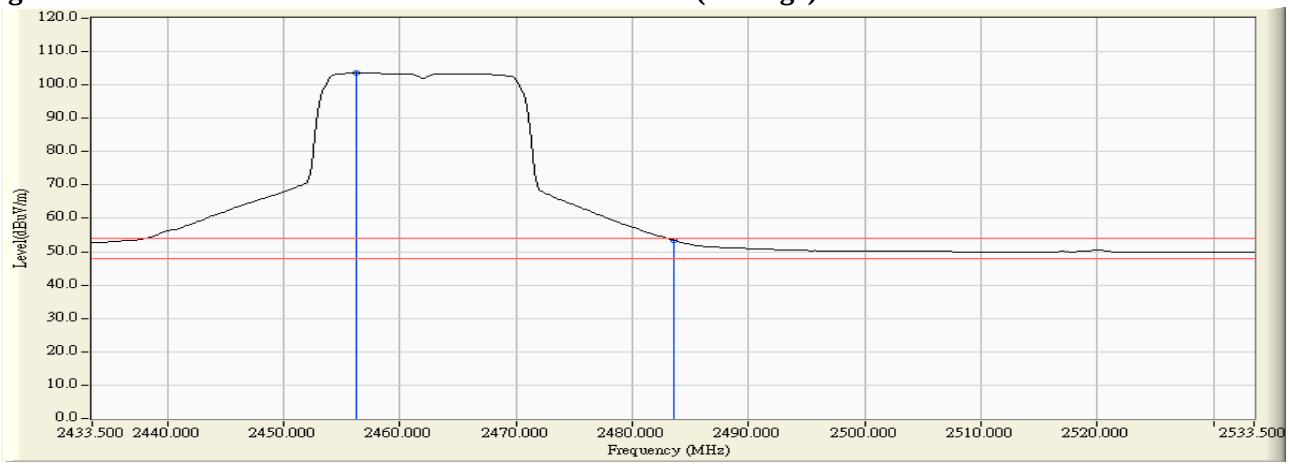


Figure Channel 11: Vertical (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product	:	MOXA IEEE 802.11 a/b/g/n
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2018/02/28
Test Mode	:	Mode 1: Transmit (802.11n-20BW)_14.4Mbps (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	6.474	52.508	58.983	74.00	54.00	Pass
01 (Peak)	2400.000	6.528	69.290	75.818	74.00	54.00	Pass
01 (Peak)	2419.275	6.655	93.162	99.817	--	--	--
01 (Average)	2390.000	6.474	28.082	34.557	74.00	54.00	Pass
01 (Average)	2400.000	6.528	38.952	45.480	--	--	--
01 (Average)	2417.971	6.646	74.558	81.203	--	--	--

Figure Channel 01: Horizontal (Peak)

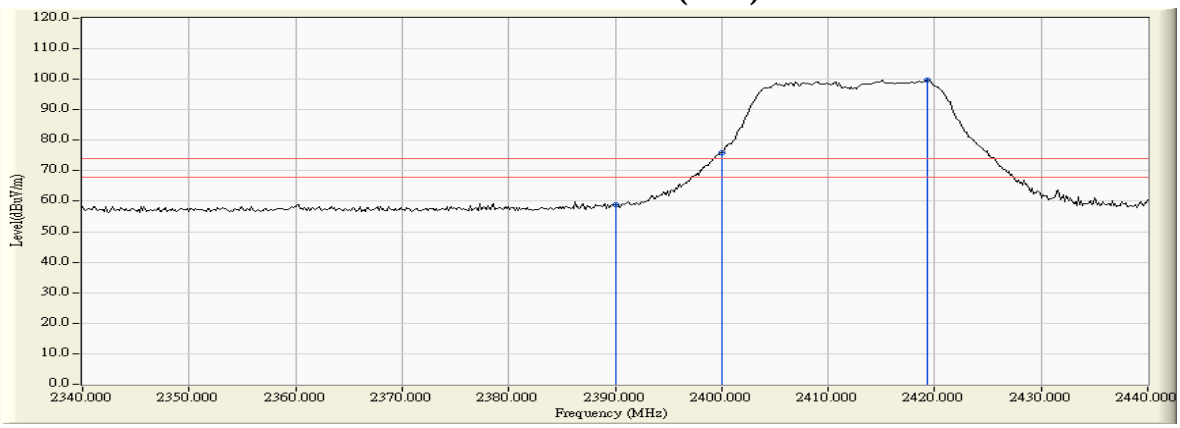
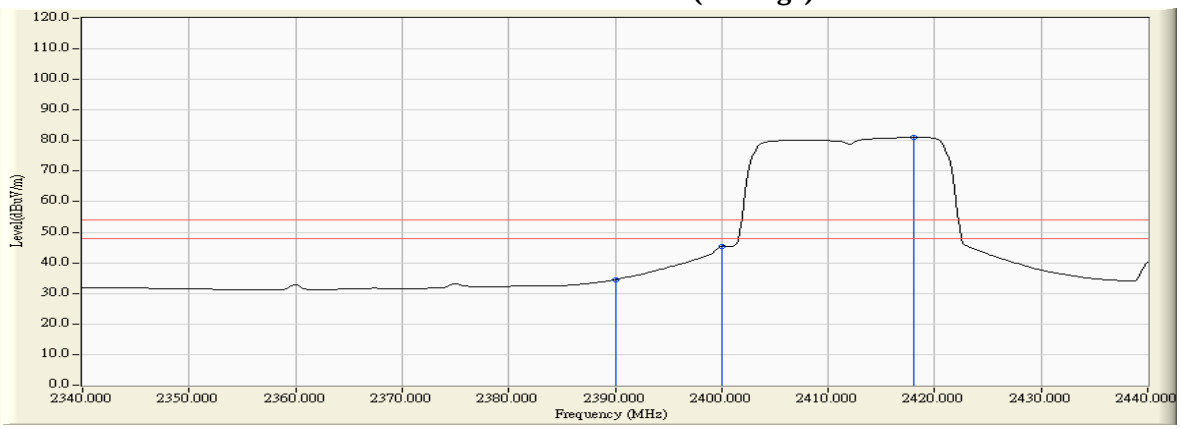


Figure Channel 01: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product	:	MOXA IEEE 802.11 a/b/g/n
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test date	:	2018/02/28
Test Mode	:	Mode 1: Transmit (802.11n-20BW)_14.4Mbps (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)	2387.681	5.890	67.385	73.275	74.00	54.00	Pass
01 (Peak)	2390.000	5.880	66.280	72.161	74.00	54.00	Pass
01 (Peak)	2400.000	5.879	87.706	93.585	--	--	--
01 (Peak)	2417.536	5.948	110.770	116.718	--	--	--
01 (Average)	2390.000	5.880	44.111	49.992	74.00	54.00	Pass
01 (Average)	2400.000	5.879	56.500	62.379	--	--	--
01 (Average)	2418.261	5.953	91.308	97.261	--	--	--

Figure Channel 01: Vertical (Peak)

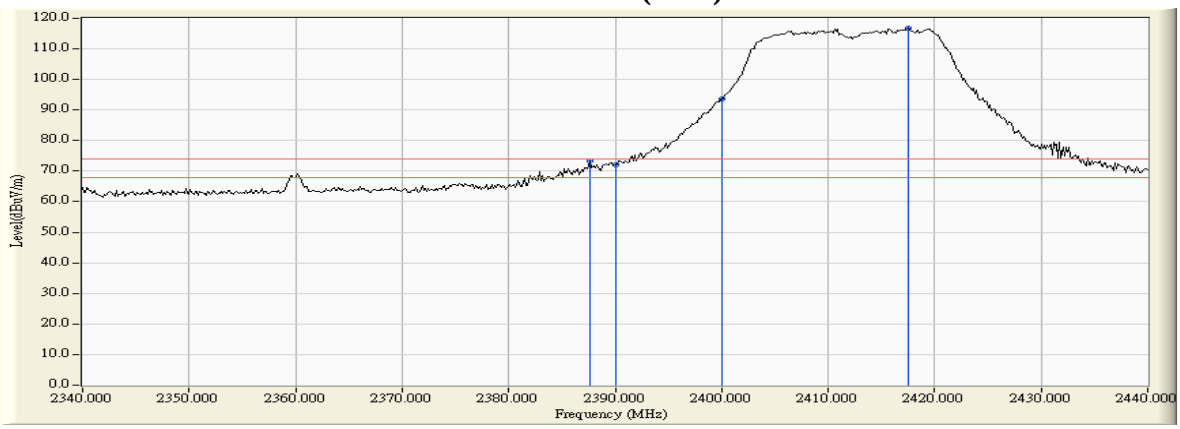
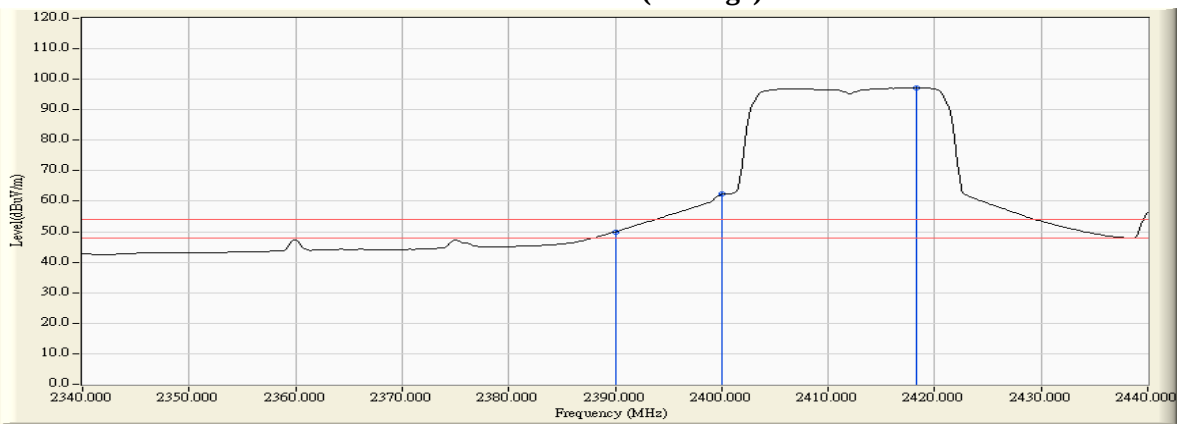


Figure Channel 01: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/28
Test Mode : Mode 1: Transmit (802.11n-20BW)_14.4Mbps (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)	2454.659	6.906	91.807	98.713	--	--	--
11 (Peak)	2483.500	7.110	51.179	58.289	74.00	54.00	Pass
11 (Peak)	2530.457	7.070	52.791	59.862	74.00	54.00	Pass
11 (Average)	2455.964	6.916	72.681	79.597	--	--	--
11 (Average)	2483.500	7.110	25.896	33.006	74.00	54.00	Pass
11 (Average)	2520.022	7.125	27.872	34.997	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

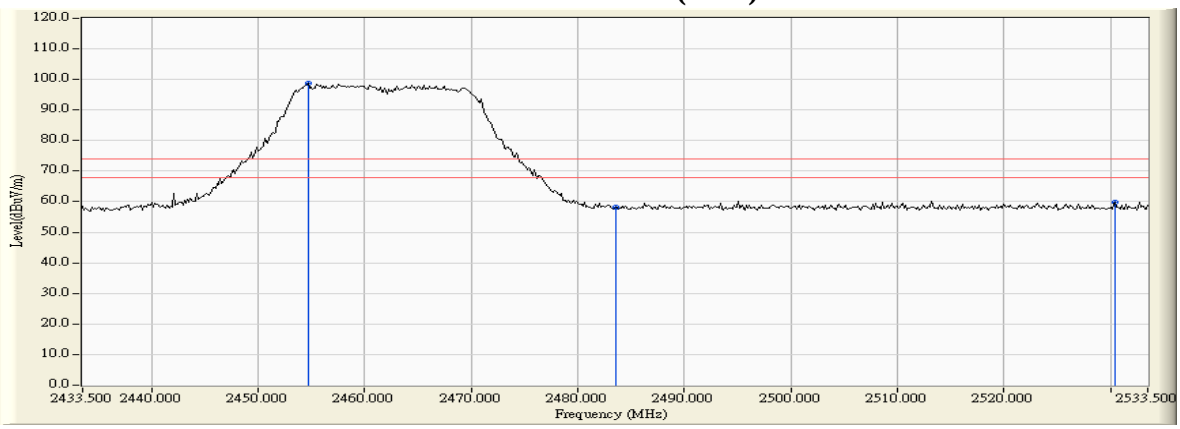
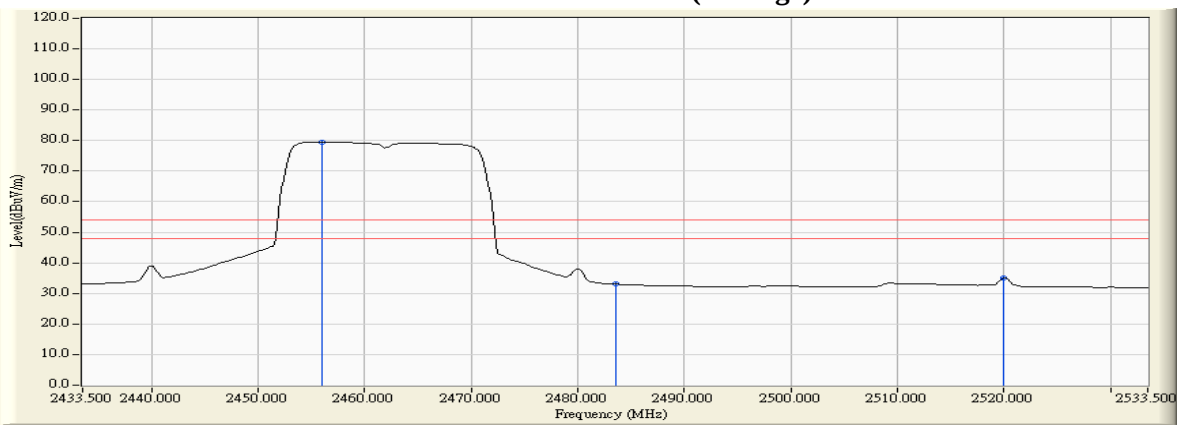


Figure Channel 11: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/28
Test Mode : Mode 1: Transmit (802.11n-20BW)_14.4Mbps (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)	2466.978	6.260	110.737	116.997	--	--	--
11 (Peak)	2483.500	6.363	64.431	70.794	74.00	54.00	Pass
11 (Peak)	2484.659	6.371	66.329	72.700	74.00	54.00	Pass
11 (Average)	2466.978	6.260	91.115	97.375	--	--	--
11 (Average)	2483.500	6.363	42.248	48.611	74.00	54.00	Pass
11 (Average)	2520.022	6.465	44.523	50.988	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

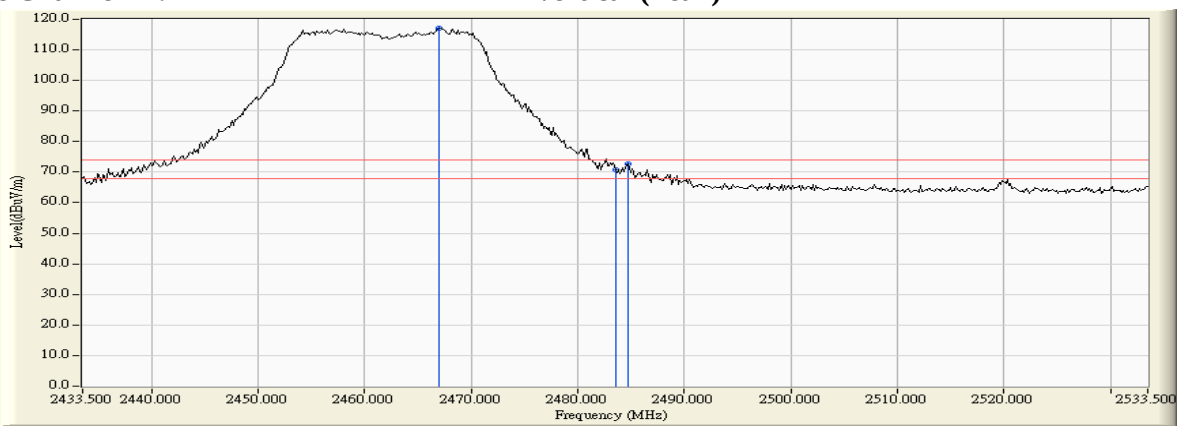
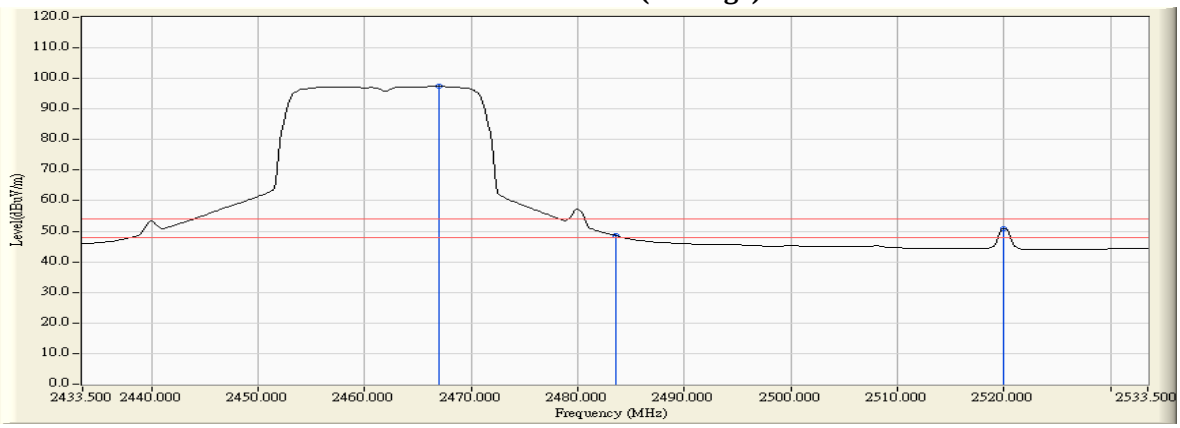


Figure Channel 11: Vertical (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/28
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps (2422MHz)

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
03 (Peak)	2390.000	6.474	53.420	59.895	74.00	54.00	Pass
03 (Peak)	2399.710	6.527	66.834	73.361	--	--	--
03 (Peak)	2400.000	6.528	65.879	72.407	--	--	--
03 (Peak)	2432.464	6.749	86.540	93.289	--	--	--
03 (Average)	2390.000	6.474	27.458	33.933	74.00	54.00	Pass
03 (Average)	2400.000	6.528	34.862	41.390	--	--	--
03 (Average)	2437.826	6.787	67.266	74.052	--	--	--

Figure Channel 03: Horizontal (Peak)

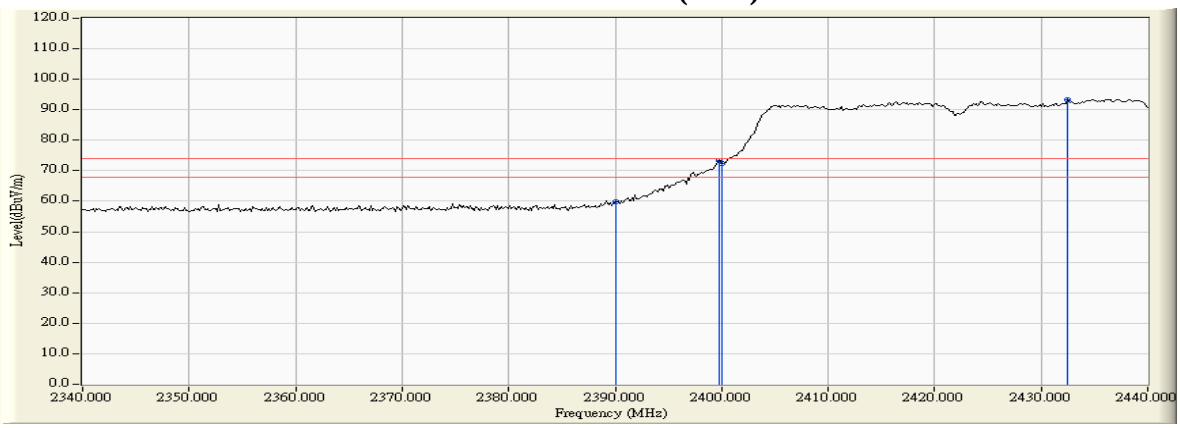
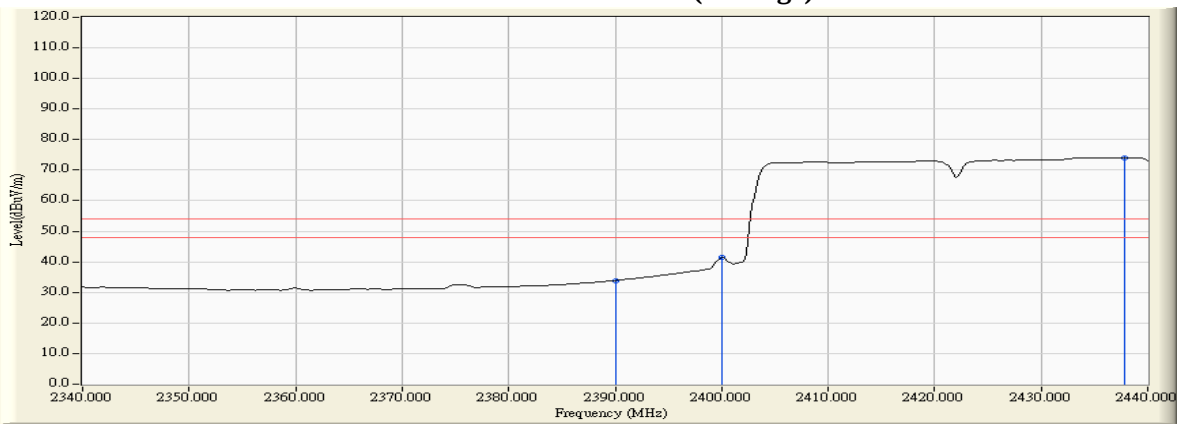


Figure Channel 03: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/28
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps (2422MHz)

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
03 (Peak)	2390.000	5.880	67.439	73.320	74.00	54.00	Pass
03 (Peak)	2400.000	5.879	83.001	88.880	74.00	54.00	Pass
03 (Peak)	2439.420	6.085	104.548	110.633	--	--	--
03 (Average)	2390.000	5.880	42.906	48.787	74.00	54.00	Pass
03 (Average)	2400.000	5.879	52.004	57.883	--	--	--
03 (Average)	2438.696	6.080	84.809	90.890	--	--	--

Figure Channel 03: Vertical (Peak)

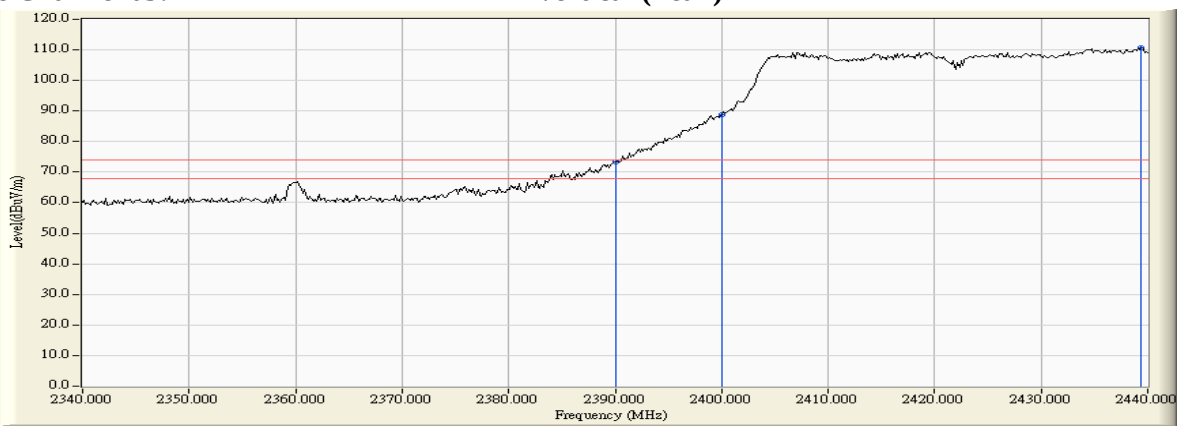
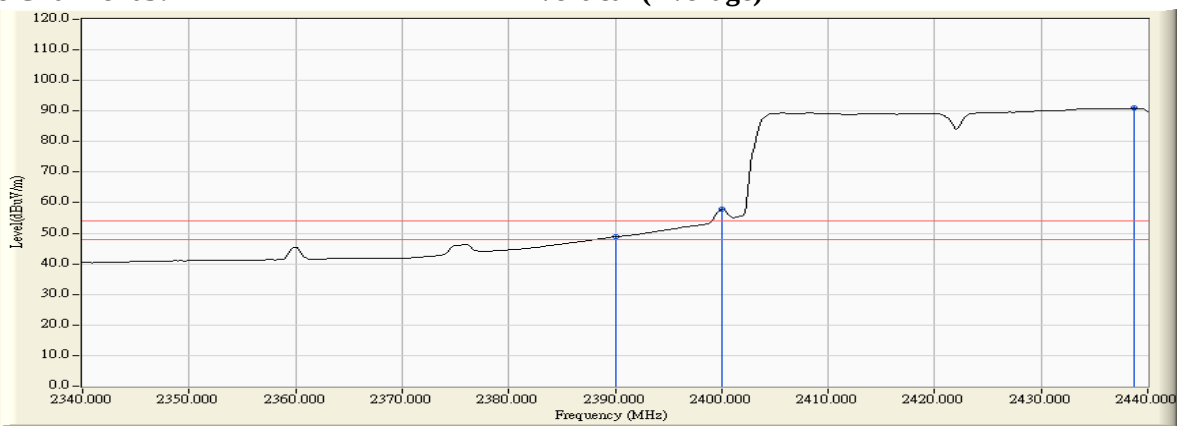


Figure Channel 03: Vertical (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/28
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps (2452MHz)

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
09 (Peak)	2435.529	6.770	84.578	91.348	--	--	--
09 (Peak)	2483.500	7.110	51.935	59.045	74.00	54.00	Pass
09 (Peak)	2527.993	7.084	53.540	60.624	74.00	54.00	Pass
09 (Average)	2437.123	6.781	65.129	71.911	--	--	--
09 (Average)	2483.500	7.110	25.768	32.878	74.00	54.00	Pass
09 (Average)	2520.022	7.125	26.821	33.946	74.00	54.00	Pass

Figure Channel 09: Horizontal (Peak)

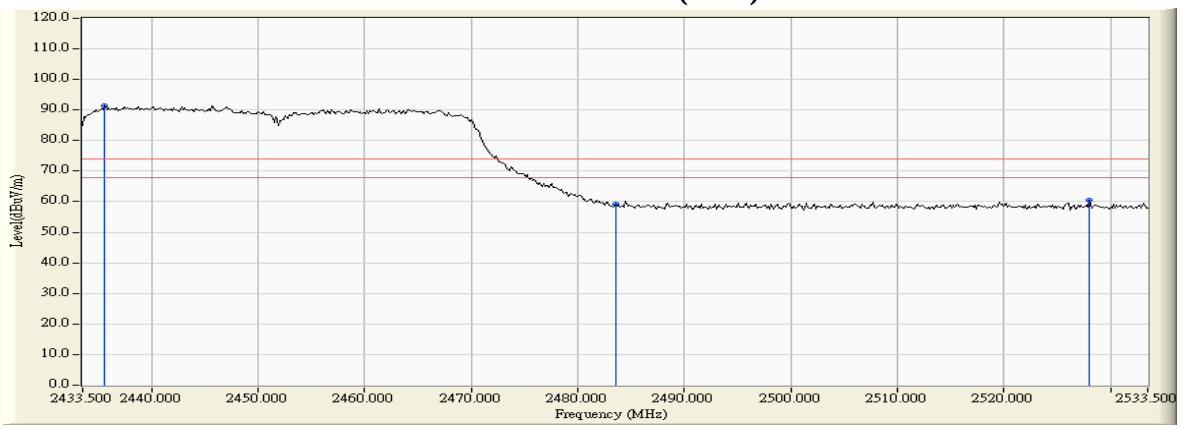
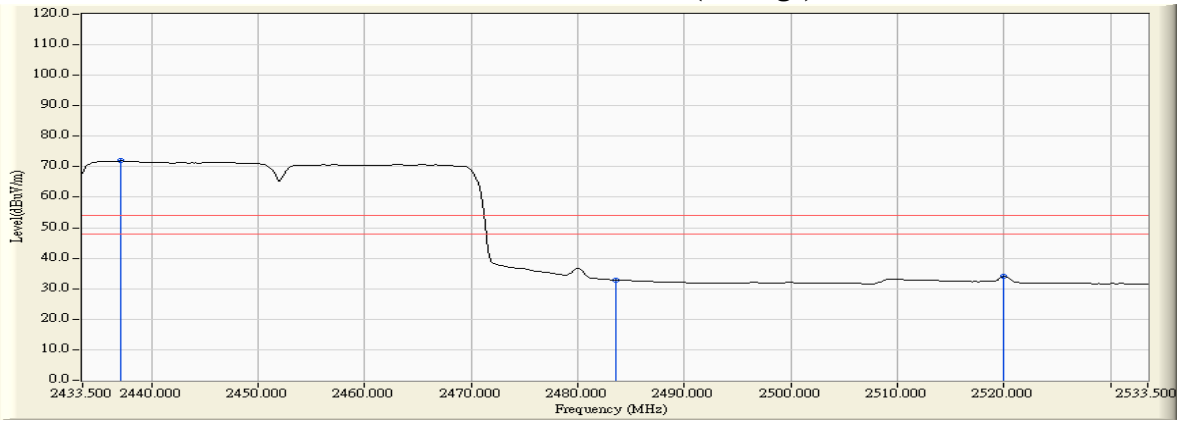


Figure Channel 09: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Band Edge
Test Site : No.3 OATS
Test date : 2018/02/28
Test Mode : Mode 1: Transmit (802.11n-40BW)_30Mbps (2452MHz)

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
09 (Peak)	2464.514	6.245	102.882	109.127	--	--	--
09 (Peak)	2483.500	6.363	66.294	72.657	74.00	54.00	Pass
09 (Peak)	2484.080	6.367	67.585	73.952	74.00	54.00	Pass
09 (Average)	2466.688	6.258	82.391	88.649	--	--	--
09 (Average)	2483.500	6.363	39.665	46.028	74.00	54.00	Pass
09 (Average)	2520.022	6.465	42.737	49.202	74.00	54.00	Pass

Figure Channel 09: Vertical (Peak)

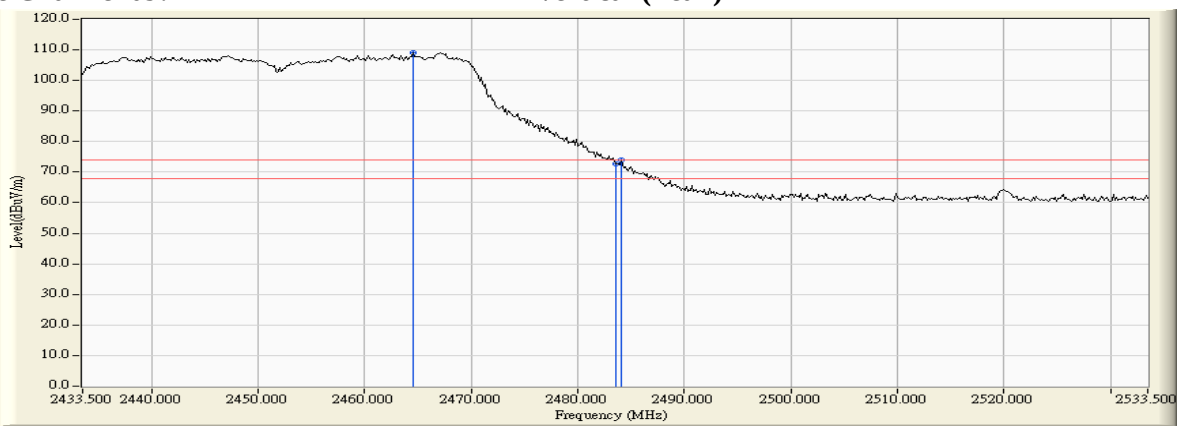
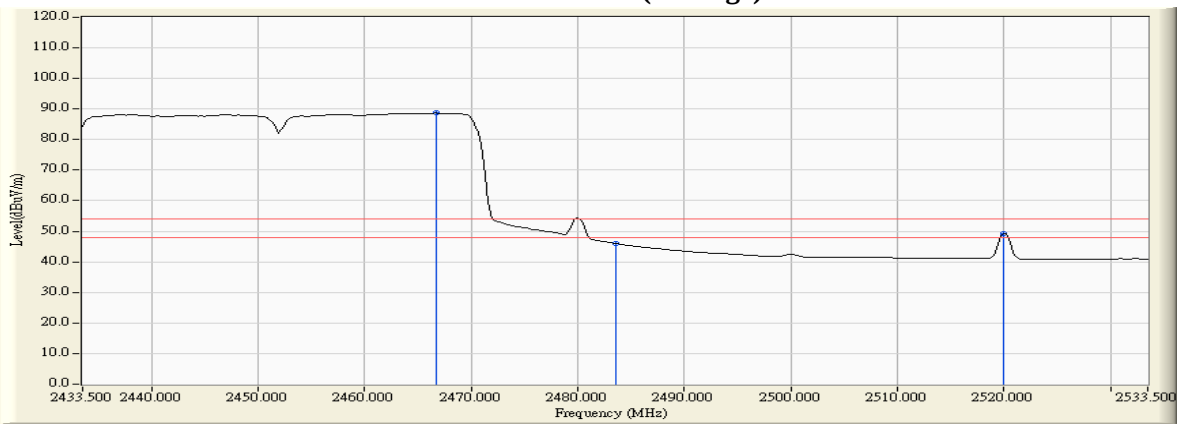


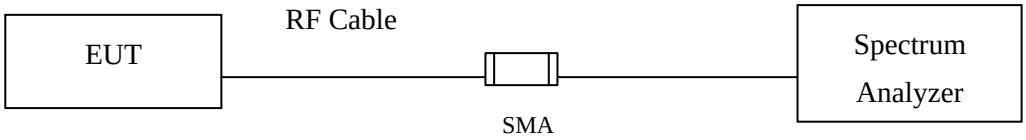
Figure Channel 09: Vertical (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

5. Duty Cycle

5.1. Test Setup



5.2. Test Procedure

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

5.3. Uncertainty

± 2.31msec

5.4. Test Result of Duty Cycle

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Duty Cycle
Test Mode : Transmit

Duty Cycle Formula:

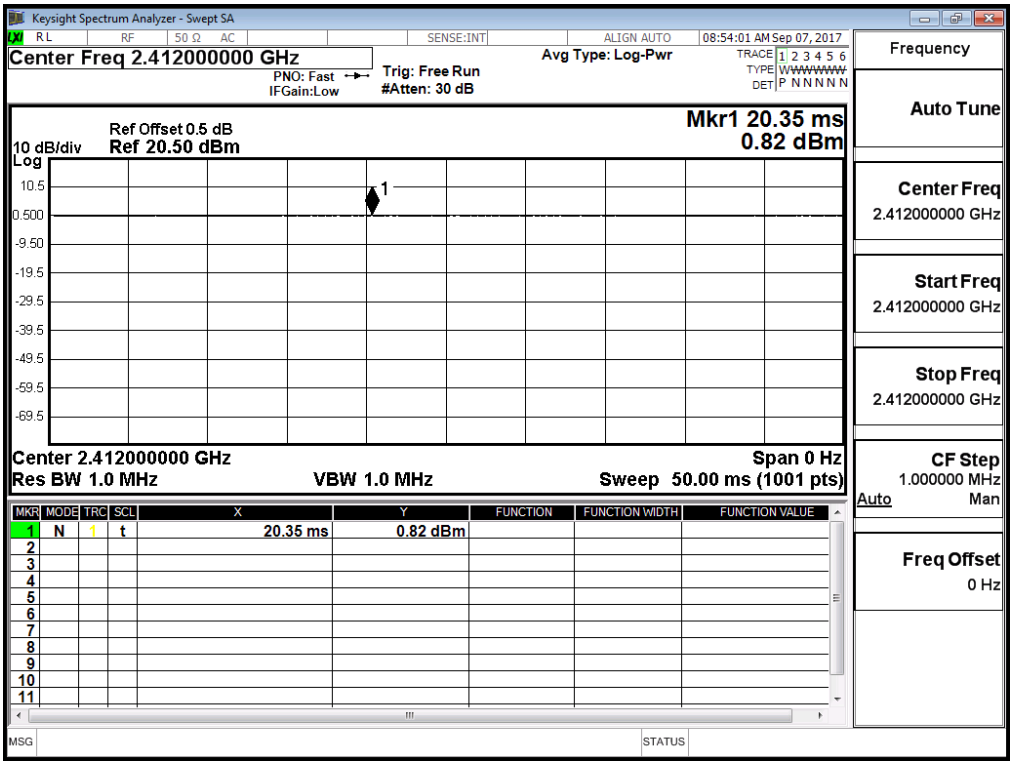
Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

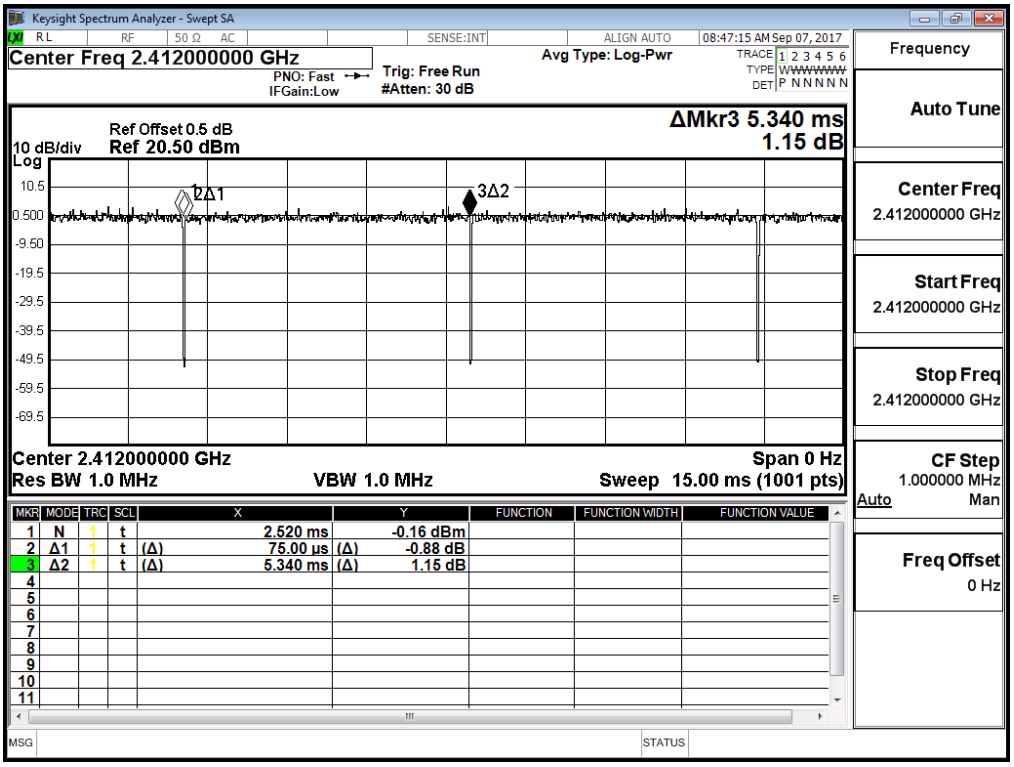
Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11b	--	--	100.00	0.00
802.11g	5.3400	5.4150	98.61	0.06
802.11n20	2.4900	2.5500	97.65	0.10
802.11n40	1.2000	1.2750	94.12	0.26

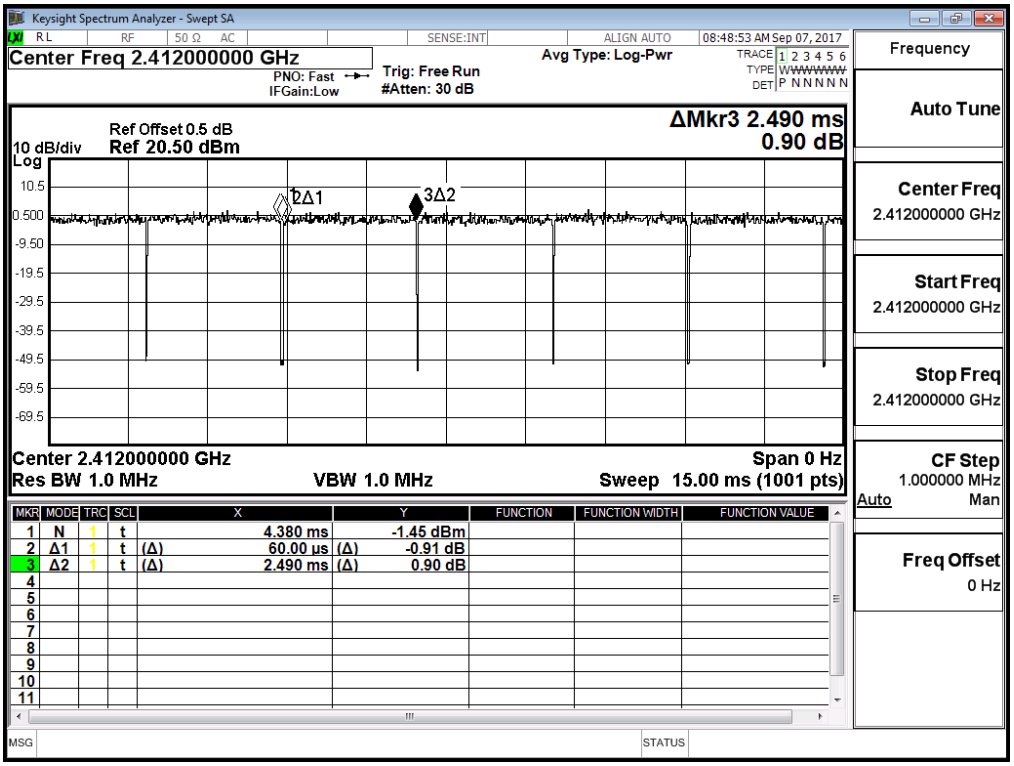
802.11b



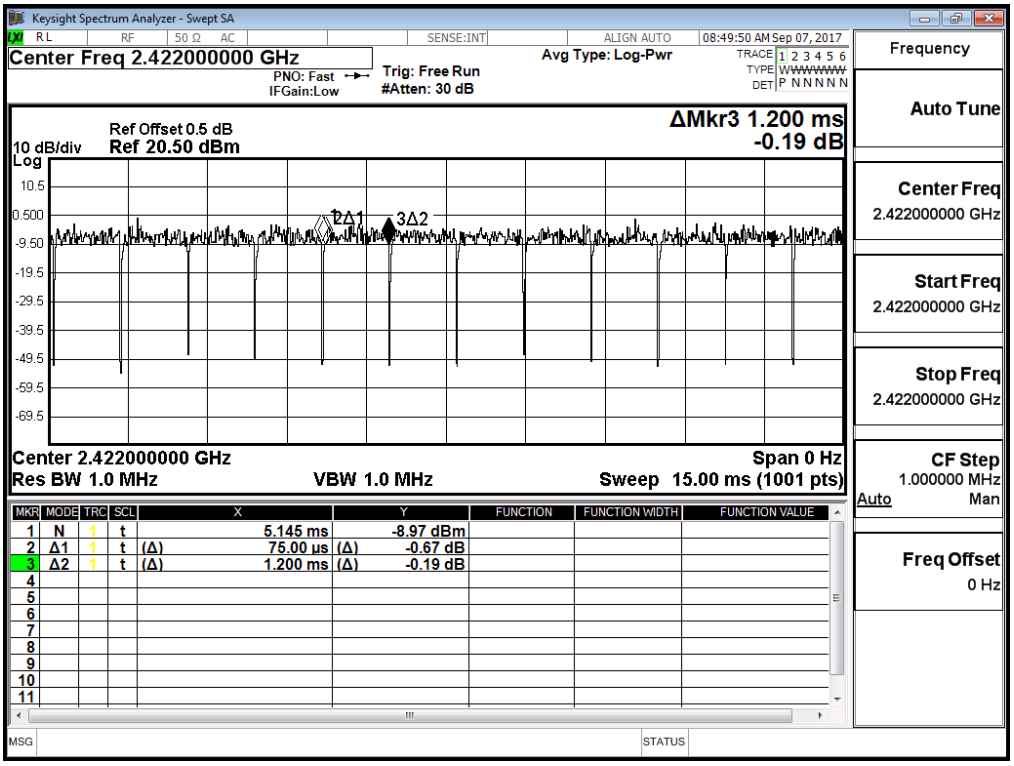
802.11g



802.11n20



802.11n40


Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω
AC
SENSE:INT
ALIGN AUTO
08:49:50 AM Sep 07, 2017
Center Freq 2.422000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE WWWWWW
DET P N N N N N
Ref Offset 0.5 dB
10 dB/div
Log
Ref 20.50 dBm
ΔMkr3 1.200 ms
-0.19 dB
10.5
0.500
-9.50
-19.5
-29.5
-39.5
-49.5
-59.5
-69.5
2Δ1
3Δ2
Center 2.422000000 GHz
Res BW 1.0 MHz
VBW 1.0 MHz
Span 0 Hz
Sweep 15.00 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 t 5.145 ms -8.97 dBm
2 Δ1 1 t (Δ) 75.00 µs (Δ) -0.67 dB
3 Δ2 1 t (Δ) 1.200 ms (Δ) -0.19 dB
4
5
6
7
8
9
10
11
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.422000000 GHz
Start Freq
2.422000000 GHz
Stop Freq
2.422000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs