FC

Test Report

Product Name	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Model No	WAPN001
FCC ID.	SLE-WAPN001

Applicant	Moxa Inc.
Address	Fl.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.

Date of Receipt	June 28, 2010
Issue Date	Aug. 04, 2010
Report No.	107007R-RFUSP42V01
Report Version	V1.0

Test Report Certification

Issue Date: Aug. 04, 2010

Report No.: 107007R-RFUSP42V01

Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Applicant	Moxa Inc.
Address	Fl.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.
Manufacturer	Moxa Inc.
Model No.	WAPN001
EUT Rated Voltage	DC 3.3V/2A
EUT Test Voltage	AC 120V/60Hz
Trade Name	MOXA
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2009 ANSI C63.4: 2003
Test Result	Complied

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By   :

(Senior Adm. Specialist / Rita Huang)

Tested By   :

(Engineer / Joe Guo)

Approved By   :

(Manager / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Trade Name	MOXA
Model No.	WAPN001
FCC ID.	SLE-WAPN001
Frequency Range	802.11b/g/n-20MHz:2412-2462MHz, 802.11n-40MHz: 2422-2452MHz 802.11a/n-20MHz::5745-5825MHz, 802.11n-40MHz::5755-5795MHz
Number of Channels	802.11b/g/n-20MHz: 11, n-40MHz: 7 802.11a/n-20MHz: 5, n-40MHz: 2
Data Speed	802.11b: 1-11Mbps, 802.11a/g: 6-54Mbps, 802.11n: 6.5-300Mbps
Channel separation	802.11b/g/n-20MHz: 5 MHz, 802.11a/n-20MHz: 20MHz 802.11n-40MHz: 40MHz
Type of Modulation	802.11b:DSSS DBPSK, DQPSK, CCK 802.11a/g/n: OFDM BPSK, QPSK, 16QAM, 64QAM
Antenna Type	Dipole
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	KINSUN	ANT-WDB-O-2	2.0dBi in 2.4GHz 2.0dBi in 5GHz
2	KINSUN	ANT-WDB-ANM-0502	5.0dBi in 2.4GHz 2.0dBi in 5GHz

Note:

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

2. The final test antenna is ANT-WDB-ANM-0502.

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		

802.11a/n-20MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 149:	5745 MHz	Channel 153:	5765 MHz	Channel 157:	5785 MHz	Channel 161:	5805 MHz
Channel 165:	5825 MHz						

802.11n-40MHz (2.4G Band) Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	2422 MHz	Channel 2:	2427 MHz	Channel 3:	2432 MHz	Channel 4:	2437 MHz
Channel 5:	2442 MHz	Channel 6:	2447 MHz	Channel 7:	2452 MHz		

802.11n-40MHz (5G Band) Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency
Channel 151:	5755 MHz	Channel 159:	5795 MHz

Note:

1. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
2. 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 14.4Mbps and 、 802.11n(40M-BW) is 30Mbps)
3. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11a/b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
4. The device is applied for modular approval.

1.2. Operational Description

The EUT is a Moxa IEEE 802.11a/b/g/n MiniPCI Module with a built-in 2.4GHz and 5GHz WLAN card. This device provided four kinds of transmitting speed 1, 2, 5.5 and 11Mbps and the device of RF carrier is DBPSK, DQPSK and CCK (IEEE 802.11b). The device provided of eight kinds of transmitting speed 6, 9, 12, 18, 24, 36, 48 and 54Mbps the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11a/g).

The device provided of eight kinds of transmitting speed 14.4,28.8,43.4,57.8,86.6,115.6,130 and 144.4Mbps in 802.11n(20M-BW) mode and 30,60,90,120,180,240,270 and 300 Mbps(40M-BW) the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11n), the IEEE 802.11n is Multiple In, Multiple Out" (MIMO) technology.

The device adapts direct sequence spread spectrum modulation. The antenna provides diversity function to improve the receiving function and the antennas to support 2(Transmit) × 2(Receive) MIMO technology.

This Moxa IEEE 802.11a/b/g/n MiniPCI Module, compliant with IEEE 802.11b and IEEE 802.11a/g/n, is a high-efficiency Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz/5GHz Direst Sequence Spread Spectrum (DSSS) radio transmission, the Moxa IEEE 802.11a/b/g/n MiniPCI Module Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b and IEEE 802.11a/g/n network.

Test Mode:	Mode 1: Transmit (802.11b 1Mbps)
	Mode 2: Transmit (802.11g 6Mbps)
	Mode 3: Transmit - 802.11a 6Mbps
	Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band)
	Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band)
	Mode 6: Transmit - 802.11n-20BW_14.4Mbps(5G Band)
	Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band)

Note: The mode1, mode2 and mode3 are test by chain A.

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	PP18L	42649348672	Non-Shielded, 0.8m
(2)	Test Fixture	N/A	N/A	N/A	N/A
(3)	Keyboard	DELL	SK-8115	MY-0DJ325-71619-7A2-0327	N/A
(4)	USB Mouse	DELL	MO56UC	G0X01JK0	N/A
(5)	Monitor	DELL	U2410	CN-0J257M-728-01I-04NL	Non-Shielded, 1.8m
(6)	Microphone & Earphone	PCHOME	N/A	N/A	N/A
(7)	IPod nano	Apple	A1199	YM7088TVVQ5	N/A

	Signal Cable Type	Signal cable Description
A	D-SUB Cable	Shielded, 1.8m, with two ferrite cores bonded.
B	Keyboard Cable	Shielded, 1.8m
C	USB Mouse Cable	Non-Shielded, 1.8m
D	Microphone & Earphone Cable	Non-Shielded, 1.5m
E	USB Cable	Non-Shielded, 1.5m

1.4. Configuration of Tested System

1.5.   EUT Exercise Software

(1) Setup the EUT as shown in Section 1.4

(2) Execute the ART program (Version 0_9_b27) on the EUT

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

(4) Press "OK" to start the continuous Transmitter.

(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/tw/ctg/cts/accreditations.htm
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/

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

Accreditation on NVLAP
NVLAP Lab Code: 200533-0

Site Name: Quietek Corporation
Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
Lin-Kou Shiang, Taipei,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2010	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2010	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2010	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2010	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

2.2. Test Setup

2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) 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: 2003 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band) (2437MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.156	9.758	34.250	44.008	-21.821	65.829
0.232	9.685	29.170	38.855	-24.802	63.657
0.287	9.654	35.090	44.744	-17.342	62.086
0.357	9.650	25.900	35.550	-24.536	60.086
0.556	9.640	20.880	30.520	-25.480	56.000
0.713	9.630	16.440	26.070	-29.930	56.000
Average					
0.156	9.758	18.340	28.098	-27.731	55.829
0.232	9.685	18.760	28.445	-25.212	53.657
0.287	9.654	32.780	42.434	-9.652	52.086
0.357	9.650	8.360	18.010	-32.076	50.086
0.556	9.640	10.700	20.340	-25.660	46.000
0.713	9.630	6.610	16.240	-29.760	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   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Conducted Emission Test
Power Line   :   Line 2
Test Mode   :   Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band) (2437MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.162	9.751	27.570	37.321	-28.336	65.657
0.189	9.724	26.320	36.044	-28.842	64.886
0.283	9.666	34.970	44.636	-17.564	62.200
0.568	9.640	22.370	32.010	-23.990	56.000
0.853	9.675	17.010	26.684	-29.316	56.000
1.158	9.670	13.580	23.250	-32.750	56.000
Average					
0.162	9.751	8.910	18.661	-36.996	55.657
0.189	9.724	23.830	33.554	-21.332	54.886
0.283	9.666	32.260	41.926	-10.274	52.200
0.568	9.640	20.270	29.910	-16.090	46.000
0.853	9.675	14.140	23.814	-22.186	46.000
1.158	9.670	11.800	21.470	-24.530	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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.158	9.756	27.910	37.666	-28.105	65.771
0.205	9.703	21.800	31.503	-32.926	64.429
0.252	9.675	22.990	32.665	-30.421	63.086
0.283	9.656	34.750	44.406	-17.794	62.200
0.357	9.650	8.340	17.990	-42.096	60.086
0.798	9.650	13.380	23.030	-32.970	56.000
Average					
0.158	9.756	6.130	15.886	-39.885	55.771
0.205	9.703	8.430	18.133	-36.296	54.429
0.252	9.675	12.630	22.305	-30.781	53.086
0.283	9.656	31.760	41.416	-10.784	52.200
0.357	9.650	3.210	12.860	-37.226	50.086
0.798	9.650	10.680	20.330	-25.670	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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.162	9.751	27.670	37.421	-28.236	65.657
0.189	9.724	25.070	34.794	-30.092	64.886
0.283	9.666	34.890	44.556	-17.644	62.200
0.412	9.650	9.950	19.600	-38.914	58.514
0.595	9.645	15.510	25.155	-30.845	56.000
0.892	9.670	10.620	20.290	-35.710	56.000
Average					
0.162	9.751	9.320	19.071	-36.586	55.657
0.189	9.724	14.400	24.124	-30.762	54.886
0.283	9.666	34.580	44.246	-7.954	52.200
0.412	9.650	5.200	14.850	-33.664	48.514
0.595	9.645	14.010	23.655	-22.345	46.000
0.892	9.670	6.240	15.910	-30.090	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.

2. "   " means the worst emission level.

3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2010
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2010
X	8-WAY Power Divider	JFW	50PD-647 / 526770 0916	Apr., 2010

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. The power combiner is used for measure 11n mode.

3.2. Test Setup

Conducted Measurement

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 Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product　　　:　　Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item　　:　　Peak Power Output Data
Test Site　　:　　No.3 OATS
Test Mode　　:　　Mode 1: Transmit (802.11b 1Mbps)

Cable loss=0.5dB		Peak Power Output (dBm)					
Channel No.	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit
		1	2	5.5	11	1	
1	2412.00	18.05	--	--	--	20.54	1Watt= 30 dBm
6	2437.00	17.92	17.85	17.82	17.77	20.39	1Watt= 30 dBm
11	2462.00	14.15	--	--	--	16.51	1Watt= 30 dBm

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

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Peak Power Output Data
Test Site   :   No.3 OATS
Test Mode :   Mode 2: Transmit (802.11g 6Mbps)

Channel No	Frequency (MHz)	Peak Power Output (dBm)								Peak Power	Required Limit	Result
		Average Power For different Data Rate (Mbps)										
		6	9	12	18	24	36	48	54	6		
01	2412	16	--	--	--	--	--	--	--	24.81	<30dBm	Pass
06	2437	18.18	18.12	18.07	18.05	18.01	17.93	17.88	17.86	25.44	<30dBm	Pass
11	2462	14.01	--	--	--	--	--	--	--	23.46	<30dBm	Pass

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

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit - 802.11a 6Mbps

Channel No	Frequency (MHz)	Peak Power Output (dBm)									Required Limit	Result
		Average Power For different Data Rate (Mbps)								Peak Power		
		6	9	12	18	24	36	48	54	6		
149	5745	17.06	--	--	--	--	--	--	--	22	<30dBm	Pass
157	5785	17.11	17.05	17.03	17.01	16.95	16.87	16.81	16.77	22.5	<30dBm	Pass
165	5825	17.1	--	--	--	--	--	--	--	23	<30dBm	Pass

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

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Peak Power Output Data
Test Site   :   No.3 OATS
Test Mode   :   Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band)

Channel No	Frequency (MHz)	Peak Power Output (dBm)									Required Limit	Result
		Average Power For different Data Rate (Mbps)								Peak Power		
		14.4	28.8	43.4	57.8	86.6	115.6	130	144.4	14.4		
01	2412	13.06	--	--	--	--	--	--	--	23.2	<30dBm	Pass
06	2437	13.09	13.05	12.98	12.95	12.91	12.88	12.85	12.81	23.11	<30dBm	Pass
11	2462	13.32	--	--	--	--	--	--	--	23.35	<30dBm	Pass

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

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band)

Channel No	Frequency (MHz)	Peak Power Output (dBm)								Peak Power	Required Limit	Result
		Average Power For different Data Rate (Mbps)										
		30	60	90	120	180	240	270	300	30		
03	2422	13.29	--	--	--	--	--	--	--	22.13	<30dBm	Pass
06	2437	13.24	13.21	13.19	13.12	13.08	13.04	13.02	12.98	22.15	<30dBm	Pass
09	2452	13.31	--	--	--	--	--	--	--	22.42	<30dBm	Pass

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

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Peak Power Output Data
Test Site   :   No.3 OATS
Test Mode   :   Mode 6: Transmit - 802.11n-20BW_14.4Mbps(5G Band)

Channel No	Frequency (MHz)	Peak Power Output (dBm)									Required Limit	Result
		Average Power For different Data Rate (Mbps)								Peak Power		
		14.4	28.8	43.4	57.8	86.6	115.6	130	144.4	14.4		
149	5745	13.03	--	--	--	--	--	--	--	23.35	<30dBm	Pass
157	5785	13.07	13.03	12.98	12.95	12.92	12.9	12.87	12.85	23.18	<30dBm	Pass
165	5825	13.18	--	--	--	--	--	--	--	22.35	<30dBm	Pass

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

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Peak Power Output Data
Test Site   :   No.3 OATS
Test Mode :   Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band)

Channel No	Frequency (MHz)	Peak Power Output (dBm)										
		Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		30	60	90	120	180	240	270	300	30		
151	5755	13.38	--	--	--	--	--	--	--	22.43	<30dBm	Pass
159	5795	13.17	13.15	13.11	13.08	13.04	13.01	12.95	12.91	22.04	<30dBm	Pass

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

4.   Radiated Emission
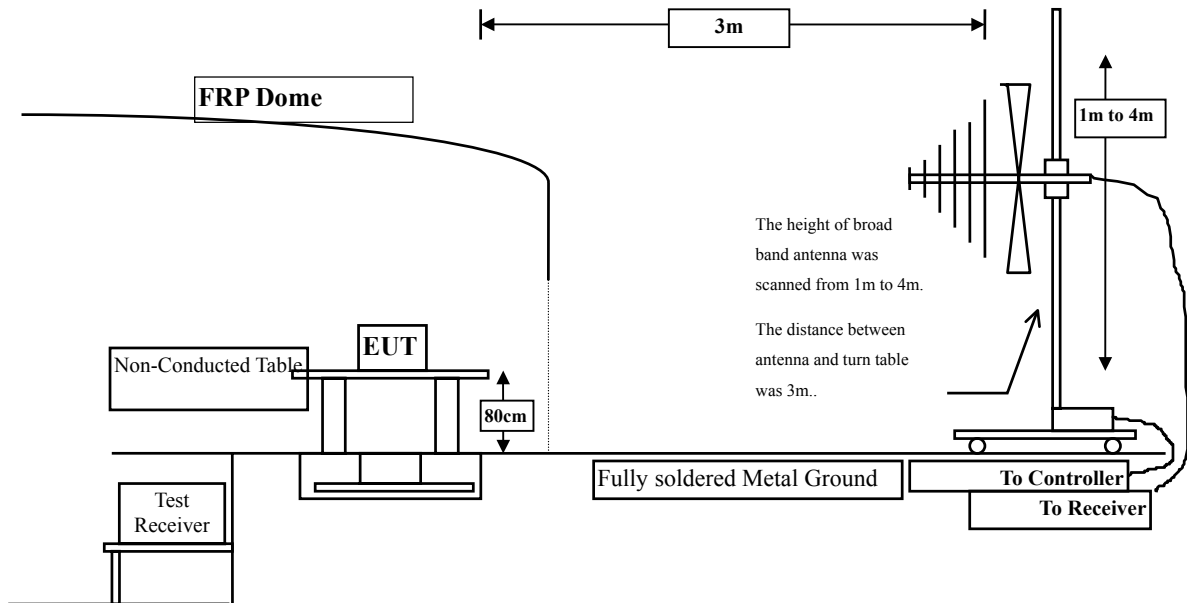
4.1.   Test Equipment

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

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2010
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2009
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2010
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2010
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

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	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 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 C63.4:2003 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 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 30MHz - 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	41.260	44.521	-29.479	74.000
7236.000	10.650	39.840	50.490	-23.510	74.000
9648.000	13.337	40.580	53.916	-20.084	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	6.421	46.720	53.141	-20.859	74.000
7236.000	11.495	41.460	52.955	-21.045	74.000
9648.000	13.807	40.150	53.956	-20.044	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	39.400	42.437	-31.563	74.000
7311.000	11.795	39.020	50.814	-23.186	74.000
9748.000	12.635	39.730	52.365	-21.635	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.812	43.600	49.411	-24.589	74.000
7311.000	12.630	40.790	53.419	-20.581	74.000
9748.000	13.126	39.520	52.646	-21.354	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module			
Test Item	:	Harmonic Radiated Emission Data			
Test Site	:	No.3 OATS			
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps) (2462 MHz)			

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4924.000	2.858	38.390	41.247	-32.753	74.000
7386.000	12.127	36.460	48.588	-25.412	74.000
9848.000	12.852	36.280	49.133	-24.867	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4924.000	5.521	42.220	47.740	-26.260	74.000
7386.000	13.254	36.490	49.744	-24.256	74.000
9848.000	13.367	36.650	50.017	-23.983	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	36.880	40.141	-33.859	74.000
7236.000	10.650	39.020	49.670	-24.330	74.000
9648.000	13.337	35.580	48.916	-25.084	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	6.421	41.660	48.081	-25.919	74.000
7236.000	11.495	42.490	53.985	-20.015	74.000
9648.000	13.807	35.950	49.756	-24.244	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. " * ", 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   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Harmonic Radiated Emission Data
Test Site   :   No.3 OATS
Test Mode   :   Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	39.040	42.077	-31.923	74.000
7311.000	11.795	41.340	53.134	-20.866	74.000
9748.000	12.635	34.780	47.415	-26.585	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.812	43.300	49.111	-24.889	74.000
7311.000	12.630	48.090	60.719	-13.281	74.000
9748.000	13.126	36.580	49.706	-24.294	74.000
Average Detector:					
7311.000	12.630	33.450	46.079	-7.921	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4924.000	5.521	38.250	43.770	-30.230	74.000
7386.000	13.254	38.310	51.564	-22.436	74.000
9848.000	13.367	36.720	50.087	-23.913	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4924.000	5.521	42.270	47.790	-26.210	74.000
7386.000	13.254	39.720	52.974	-21.026	74.000
9848.000	13.367	35.900	49.267	-24.733	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit - 802.11a 6Mbps (5745 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11490.000	17.106	37.480	54.587	-19.413	74.000
Average Detector:					
11490.000	17.106	23.460	40.567	-13.433	54.000
Vertical					
Peak Detector:					
11490.000	18.034	41.580	59.615	-14.385	74.000
Average Detector:					
11490.000	18.034	26.170	44.205	-9.795	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit - 802.11a 6Mbps (5785 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11570.000	16.809	37.740	54.549	-19.451	74.000
Average					
Detector:					
11570.000	16.809	24.140	40.949	-13.051	54.000
Vertical					
Peak Detector:					
11570.000	17.698	42.880	60.578	-13.422	74.000
Average					
Detector:					
11570.000	17.698	27.830	45.528	-8.472	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit - 802.11a 6Mbps (5825 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11650.000	16.158	40.580	56.738	-17.262	74.000
Average Detector:					
11650.000	16.158	26.650	42.808	-11.192	54.000
Vertical					
Peak Detector:					
11650.000	17.274	45.420	62.695	-11.305	74.000
Average Detector:					
11650.000	17.274	30.870	48.145	-5.855	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band) (2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	39.010	42.271	-31.729	74.000
7236.000	10.650	36.410	47.060	-26.940	74.000
9648.000	13.337	36.770	50.106	-23.894	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	6.421	37.850	44.271	-29.729	74.000
7236.000	11.495	36.600	48.095	-25.905	74.000
9648.000	13.807	37.260	51.066	-22.934	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. " * ", 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   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module

Test Item   :   Harmonic Radiated Emission Data

Test Site   :   No.3 OATS

Test Mode   :   Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	37.900	40.937	-33.063	74.000
7311.000	11.795	36.030	47.824	-26.176	74.000
9748.000	12.635	36.630	49.265	-24.735	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.812	37.980	43.791	-30.209	74.000
7311.000	12.630	35.870	48.499	-25.501	74.000
9748.000	13.126	36.570	49.696	-24.304	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band) (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4924.000	2.858	37.710	40.567	-33.433	74.000
7386.000	12.127	36.520	48.648	-25.352	74.000
9848.000	12.852	37.580	50.433	-23.567	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	5.521	36.730	42.250	-31.750	74.000
7386.000	13.254	35.910	49.164	-24.836	74.000
9848.000	13.367	37.320	50.687	-23.313	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band) (2422MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4844.000	3.171	37.270	40.441	-33.559	74.000
7266.000	11.162	36.950	48.112	-25.888	74.000
9688.000	12.964	37.610	50.575	-23.425	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4844.000	6.178	38.010	44.188	-29.812	74.000
7266.000	11.982	36.410	48.392	-25.608	74.000
9688.000	13.507	36.600	50.108	-23.892	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	37.230	40.267	-33.733	74.000
7311.000	11.795	35.740	47.534	-26.466	74.000
9748.000	12.635	36.940	49.575	-24.425	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.812	38.560	44.371	-29.629	74.000
7311.000	12.630	35.870	48.499	-25.501	74.000
9748.000	13.126	37.970	51.096	-22.904	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band) (2452 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4904.000	2.914	37.960	40.875	-33.125	74.000
7356.000	11.995	35.930	47.924	-26.076	74.000
9808.000	12.475	37.230	49.705	-24.295	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4904.000	5.530	36.860	42.391	-31.609	74.000
7356.000	13.005	35.910	48.914	-25.086	74.000
9808.000	12.901	37.230	50.131	-23.869	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 6: Transmit - 802.11n-20BW_14.4Mbps(5G Band) (5745MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11490.000	17.106	35.600	52.707	-21.293	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11490.000	18.034	35.610	53.645	-20.355	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 6: Transmit - 802.11n-20BW_14.4Mbps(5G Band) (5785 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11570.000	16.809	35.010	51.819	-22.181	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11570.000	17.698	34.900	52.598	-21.402	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 6: Transmit - 802.11n-20BW_14.4Mbps(5G Band) (5825 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11650.000	16.158	34.180	50.338	-23.662	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
11650.000	17.274	35.060	52.335	-21.665	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11580.000	16.756	35.210	51.966	-22.034	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11580.000	17.633	36.100	53.733	-20.267	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module			
Test Item	:	Harmonic Radiated Emission Data			
Test Site	:	No.3 OATS			
Test Mode	:	Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5795 MHz)			

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11590.000	16.701	34.070	50.770	-23.230	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11590.000	17.567	35.220	52.786	-21.214	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module			
Test Item	:	General Radiated Emission Data			
Test Site	:	No.3 OATS			
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)			

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
132.820	-10.230	46.007	35.777	-7.723	43.500
363.680	-1.433	41.551	40.118	-5.882	46.000
423.820	-3.167	36.186	33.019	-12.981	46.000
499.480	0.048	38.927	38.975	-7.025	46.000
631.400	1.605	35.533	37.138	-8.862	46.000
666.320	2.031	35.754	37.786	-8.214	46.000
Vertical					
121.180	-3.814	39.018	35.204	-8.296	43.500
284.140	-8.194	46.016	37.822	-8.178	46.000
344.280	-3.171	37.683	34.513	-11.487	46.000
375.320	-2.029	37.258	35.229	-10.771	46.000
466.500	-4.786	34.413	29.626	-16.374	46.000
532.460	-0.563	35.394	34.831	-11.169	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module			
Test Item	:	General Radiated Emission Data			
Test Site	:	No.3 OATS			
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)			

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
132.820	-10.230	47.461	37.231	-6.269	43.500
251.160	-5.745	43.535	37.790	-8.210	46.000
388.900	-1.684	39.574	37.890	-8.110	46.000
423.820	-3.167	35.143	31.976	-14.024	46.000
565.440	1.611	36.111	37.722	-8.278	46.000
664.380	2.062	34.981	37.043	-8.957	46.000
Vertical					
113.420	-1.849	39.233	37.384	-6.116	43.500
282.200	-8.461	43.179	34.718	-11.282	46.000
348.160	-3.458	38.026	34.568	-11.432	46.000
449.040	-7.498	42.572	35.074	-10.926	46.000
530.520	-0.517	35.629	35.112	-10.888	46.000
600.360	-2.833	32.491	29.658	-16.342	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item	:	General Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit - 802.11a 6Mbps (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
68.800	-12.425	44.275	31.850	-8.150	40.000
338.460	-3.925	42.675	38.750	-7.250	46.000
398.600	-2.268	39.745	37.477	-8.523	46.000
431.580	-2.099	36.990	34.891	-11.109	46.000
497.540	-0.273	36.881	36.608	-9.392	46.000
633.340	1.880	34.417	36.297	-9.703	46.000
Vertical					
130.880	-4.239	35.232	30.993	-12.507	43.500
183.260	-10.764	44.166	33.402	-10.098	43.500
266.680	-8.213	45.122	36.909	-9.091	46.000
406.360	-6.660	39.220	32.560	-13.440	46.000
449.040	-7.498	42.861	35.363	-10.637	46.000
530.520	-0.517	37.537	37.020	-8.980	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
43.580	-4.496	35.241	30.745	-9.255	40.000
243.400	-6.441	45.164	38.723	-7.277	46.000
385.020	-1.350	38.853	37.503	-8.497	46.000
433.520	-1.972	39.037	37.065	-8.935	46.000
497.540	-0.273	40.314	40.041	-5.959	46.000
575.140	2.923	34.868	37.791	-8.209	46.000
Vertical					
132.820	-4.440	38.708	34.268	-9.232	43.500
192.960	-9.878	44.670	34.792	-8.708	43.500
291.900	-8.004	44.539	36.534	-9.466	46.000
307.420	-6.821	44.910	38.089	-7.911	46.000
379.200	-1.505	37.835	36.329	-9.671	46.000
449.040	-7.498	44.020	36.522	-9.478	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. " * ", 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 : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
132.820	-10.230	46.394	36.164	-7.336	43.500
241.460	-6.531	44.794	38.263	-7.737	46.000
365.620	-1.329	41.858	40.529	-5.471	46.000
433.520	-1.972	39.051	37.079	-8.921	46.000
499.480	0.048	38.965	39.013	-6.987	46.000
664.380	2.062	35.762	37.824	-8.176	46.000
Vertical					
132.820	-4.440	38.937	34.497	-9.003	43.500
249.220	-7.634	45.596	37.962	-8.038	46.000
317.120	-6.895	42.119	35.224	-10.776	46.000
377.260	-1.765	35.913	34.148	-11.852	46.000
532.460	-0.563	33.127	32.564	-13.436	46.000
600.360	-2.833	33.387	30.554	-15.446	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. " * ", 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	:	Moxa IEEE 802.11a/b/g/n MiniPCI Module			
Test Item	:	General Radiated Emission Data			
Test Site	:	No.3 OATS			
Test Mode	:	Mode 6: Transmit - 802.11n-20BW_14.4Mbps(5G Band) (5785 MHz)			

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
43.580	-4.496	37.284	32.788	-7.212	40.000
274.440	-5.718	42.452	36.734	-9.266	46.000
365.620	-1.329	41.008	39.679	-6.321	46.000
400.540	-2.276	39.048	36.772	-9.228	46.000
449.040	-2.238	40.603	38.365	-7.635	46.000
507.240	0.759	38.388	39.147	-6.853	46.000
Vertical					
138.640	-5.795	41.629	35.834	-7.666	43.500
268.620	-8.842	44.990	36.148	-9.852	46.000
449.040	-7.498	43.009	35.511	-10.489	46.000
532.460	-0.563	36.442	35.879	-10.121	46.000
598.420	-2.979	35.792	32.813	-13.187	46.000
674.080	-0.501	34.036	33.535	-12.465	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. " * ", 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.
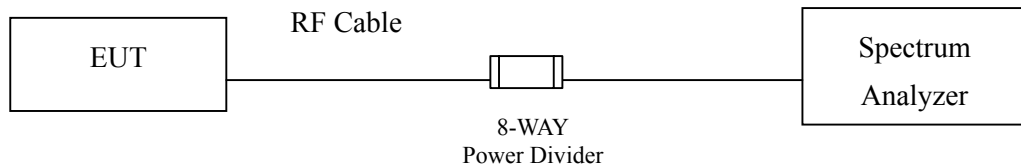
Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
43.580	-4.496	35.875	31.379	-8.621	40.000
365.620	-1.329	40.935	39.606	-6.394	46.000
398.600	-2.268	39.648	37.380	-8.620	46.000
433.520	-1.972	37.036	35.064	-10.936	46.000
466.500	0.794	39.402	40.195	-5.805	46.000
499.480	0.048	36.924	36.972	-9.028	46.000
Vertical					
142.520	-6.267	44.284	38.017	-5.483	43.500
288.020	-8.189	47.498	39.309	-6.691	46.000
377.260	-1.765	36.388	34.623	-11.377	46.000
532.460	-0.563	38.703	38.140	-7.860	46.000
600.360	-2.833	37.103	34.270	-11.730	46.000
674.080	-0.501	35.466	34.965	-11.035	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. " * ", 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.

5. RF antenna conducted test

5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2010
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2010
X	8-WAY Power Divider	JFW	50PD-647 / 526770 0916	Apr., 2010

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. The power combiner is used for measure 11n mode.

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 Mar. 2005 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 $\pm$ 1.27dB

5.6. Test Result of RF antenna conducted test

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module

Test Item : RF antenna conducted test

Test Site : No.3 OATS

Test Mode : Mode 1: Transmit (802.11b 1Mbps)
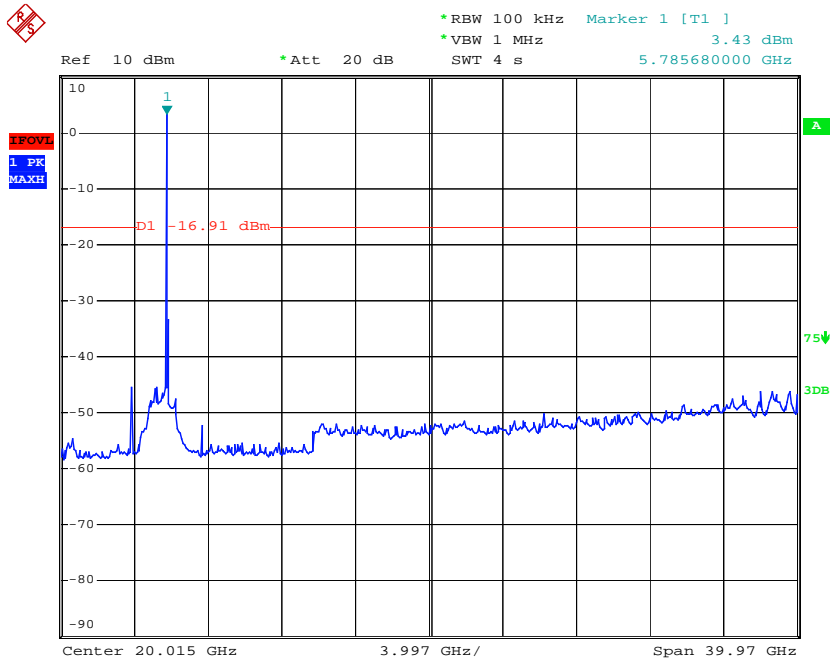
Channel 01 (2412MHz) 30MHz-25GHz

Channel 06 (2437MHz) 30MHz -25GHz

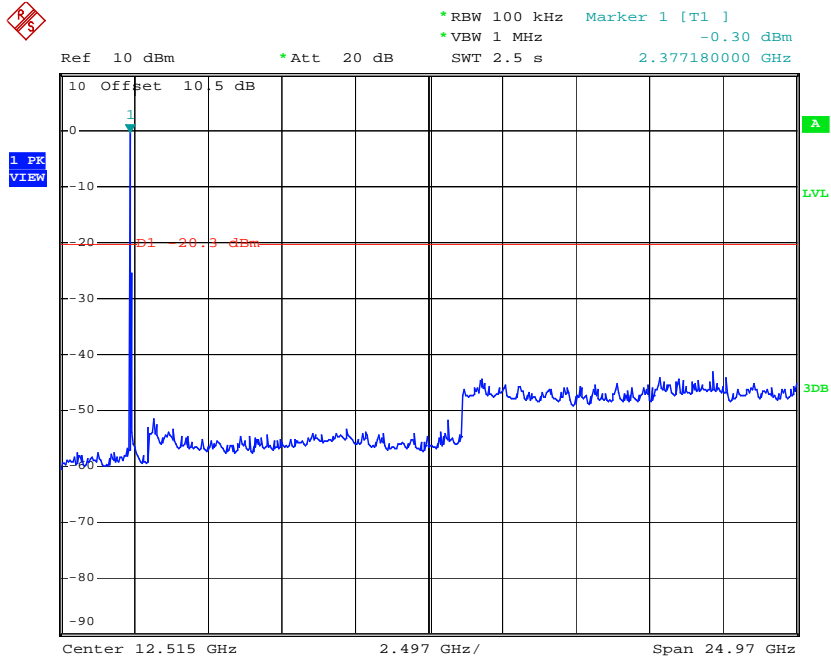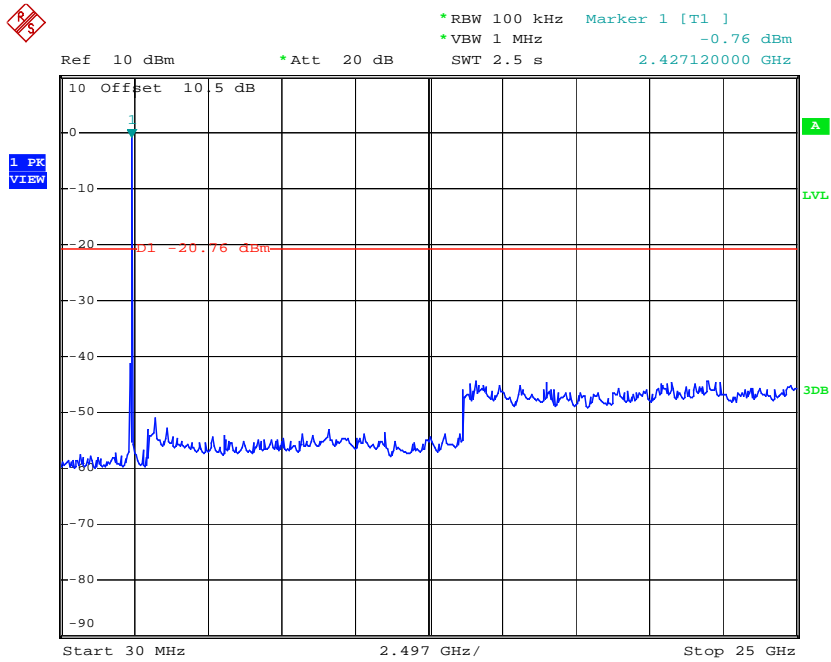**Channel 11 (2462MHz) 30MHz -25GHz**

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel 01 (2412MHz) 30MHz -25GHz

Channel 06 (2437MHz) 30MHz -25GHz

Channel 11 (2462MHz) 30MHz -25GHz

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module

Test Item : RF Antenna Conducted Spurious

Test Site : No.3 OATS

Test Mode : Mode 3: Transmit - 802.11a 6Mbps

Channel 149 (5745MHz) 30MHz -40GHz

Date: 3.AUG.2010 03:10:31

Channel 157 (5785MHz) 30MHz -40GHz

Date: 3.AUG.2010 03:08:48

Channel 165 (5825MHz) 30MHz -40GHz

Date: 3.AUG.2010 03:12:51

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   RF Antenna Conducted Spurious
Test Site   :   No.3 OATS
Test Mode   :   Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band)
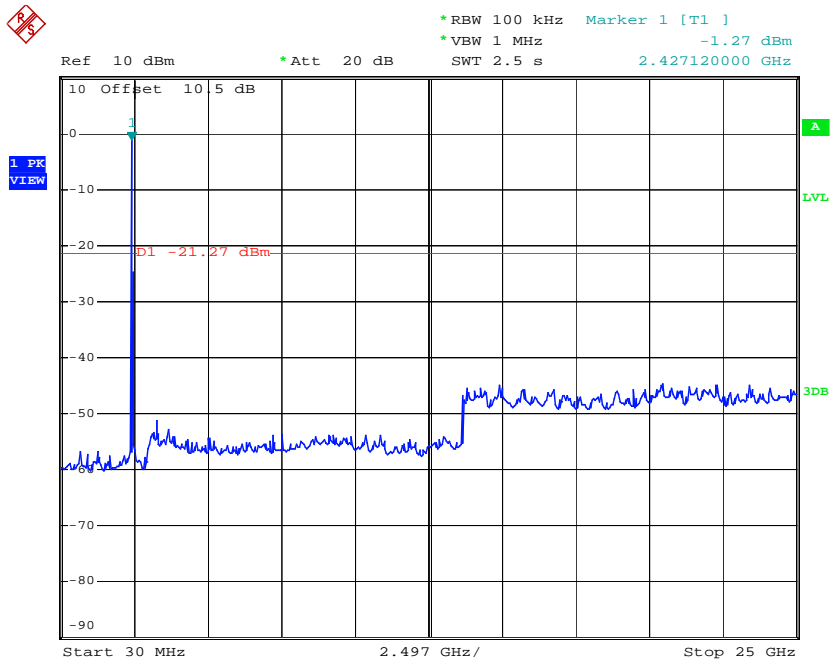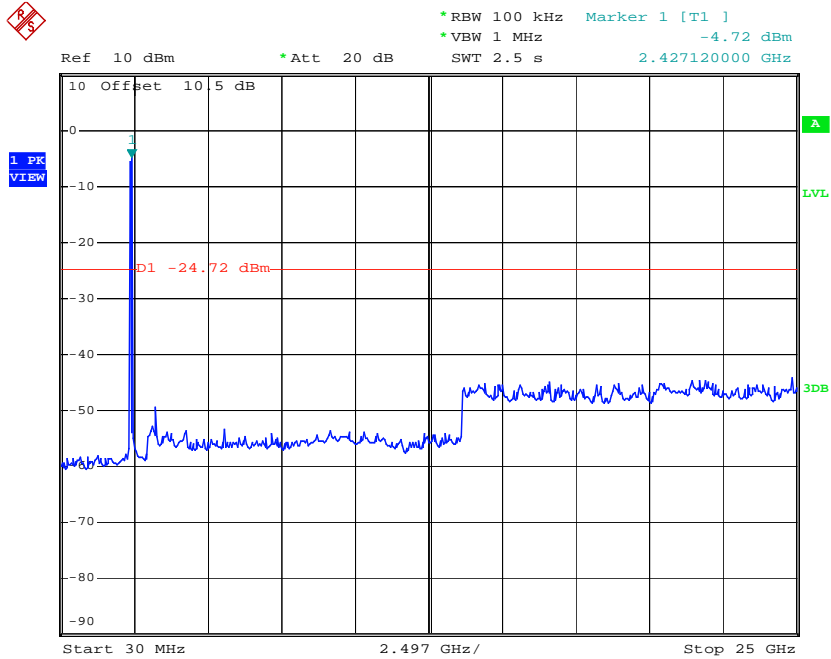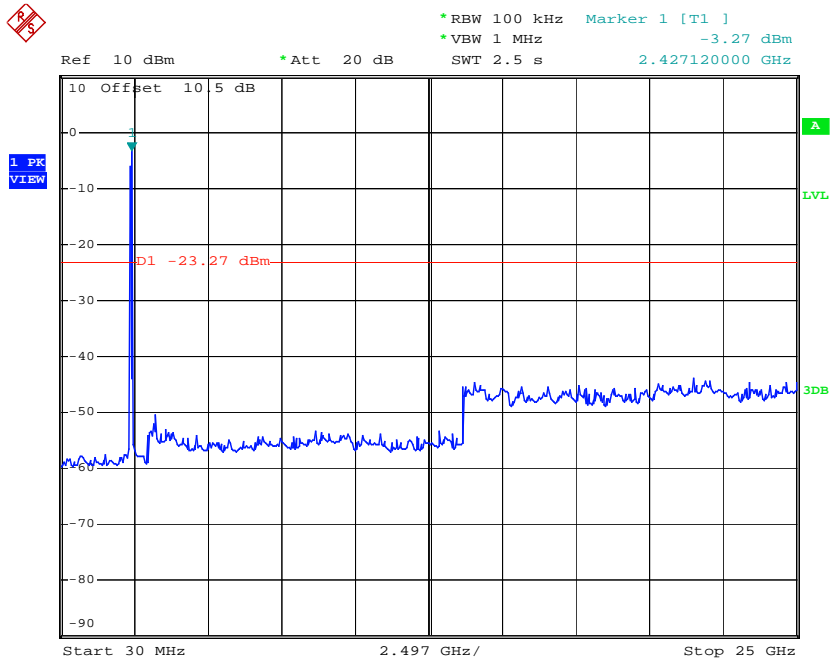
Channel 01 (2412MHz) 30MHz -25GHz

Date: 8.JUL.2010 03:45:12

Channel 06 (2437MHz) 30MHz -25GHz

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 1 MHz              -0.76 dBm
        Ref   10 dBm      *Att 20 dB   SWT 2.5 s      2.427120000 GHz
        10 Offset  10.5 dB                                          A

   1 PK                                                             LVL
   VIEW

                    D1 -20.76 dBm                                   3DB




        Start 30 MHz            2.497 GHz/           Stop 25 GHz
```

Date: 8.JUL.2010 03:44:20

Channel 11 (2462MHz) 30MHz -25GHz

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 1 MHz              -1.27 dBm
        Ref   10 dBm      *Att 20 dB   SWT 2.5 s      2.427120000 GHz
        10 Offset  10.5 dB                                          A

   1 PK                                                             LVL
   VIEW

                    D1 -21.27 dBm                                   3DB




        Start 30 MHz            2.497 GHz/           Stop 25 GHz
```

Date: 8.JUL.2010 03:43:22

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   RF Antenna Conducted Spurious
Test Site   :   No.3 OATS
Test Mode   :   Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band)
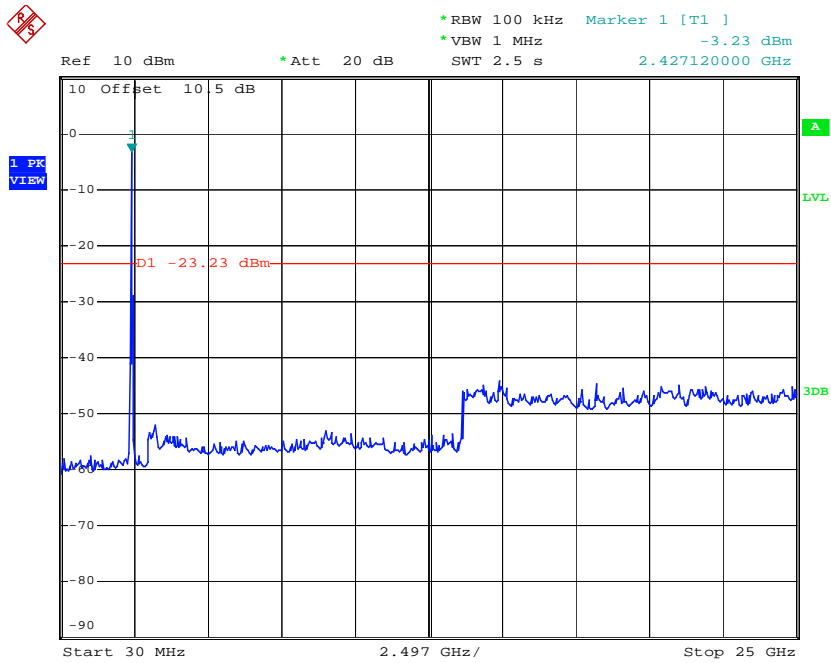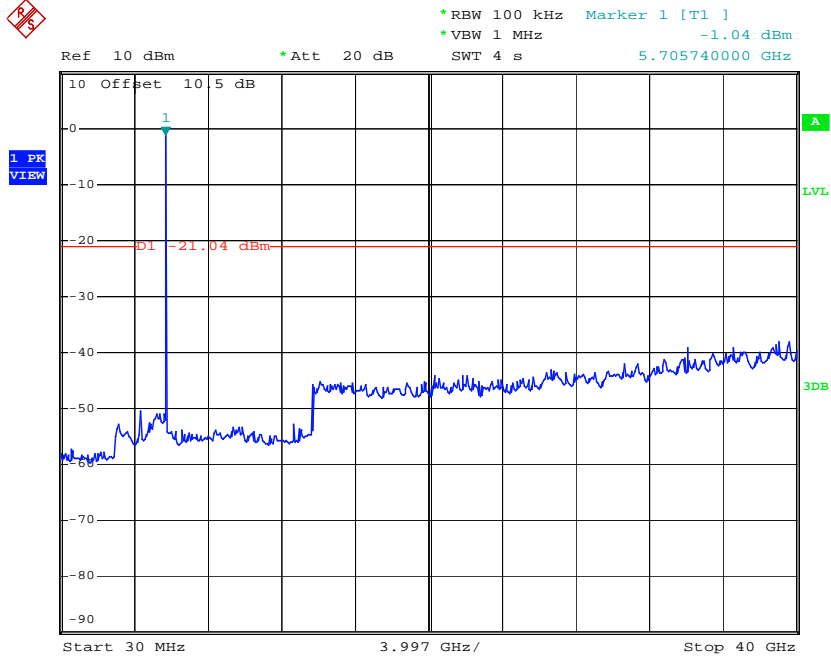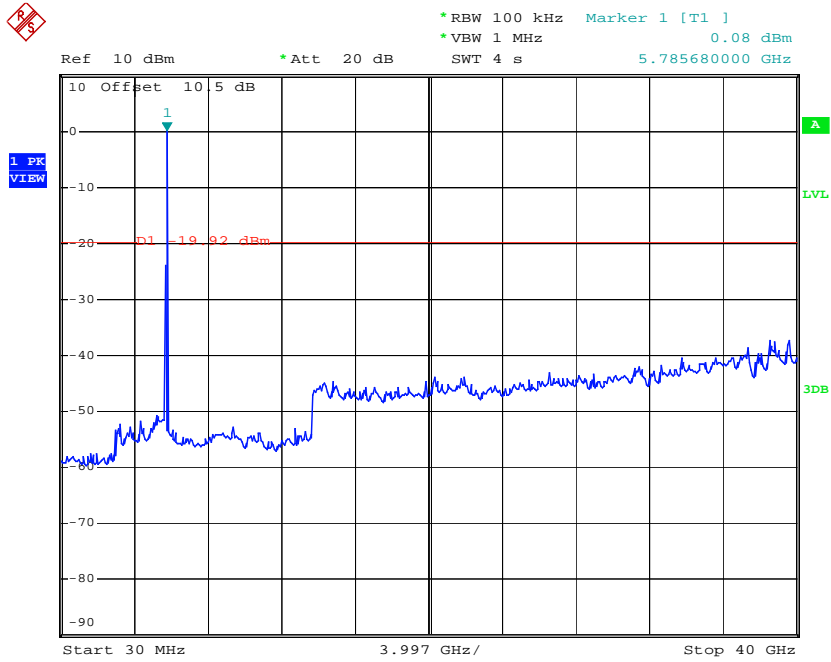
Channel 01 (2422MHz) 30MHz -25GHz

Date: 8.JUL.2010   03:40:23

Channel 04 (2437MHz) 30MHz -25GHz


```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 1 MHz              -3.27 dBm
 Ref  10 dBm        *Att  20 dB     SWT 2.5 s       2.427120000 GHz
 10  Offset  10.5 dB
```

Start 30 MHz   2.497 GHz/   Stop 25 GHz

D1 -23.27 dBm

Date: 8.JUL.2010 03:41:26

Channel 07 (2452MHz) 30MHz -25GHz


```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 1 MHz              -3.23 dBm
 Ref  10 dBm        *Att  20 dB     SWT 2.5 s       2.427120000 GHz
 10  Offset  10.5 dB
```

Start 30 MHz   2.497 GHz/   Stop 25 GHz

D1 -23.23 dBm

Date: 8.JUL.2010 03:42:16

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module

Test Item   :   RF Antenna Conducted Spurious

Test Site   :   No.3 OATS

Test Mode   :   Mode 6: Transmit - 802.11n-20BW_14.4Mbps(5G Band)
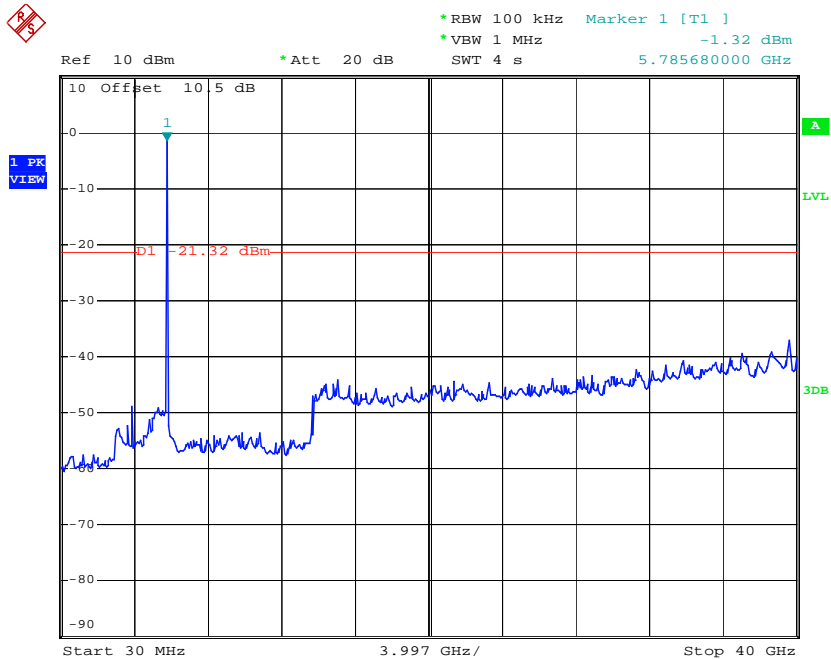
Channel 49 (5745MHz) 30MHz -40GHz

Date: 8.JUL.2010 03:33:58

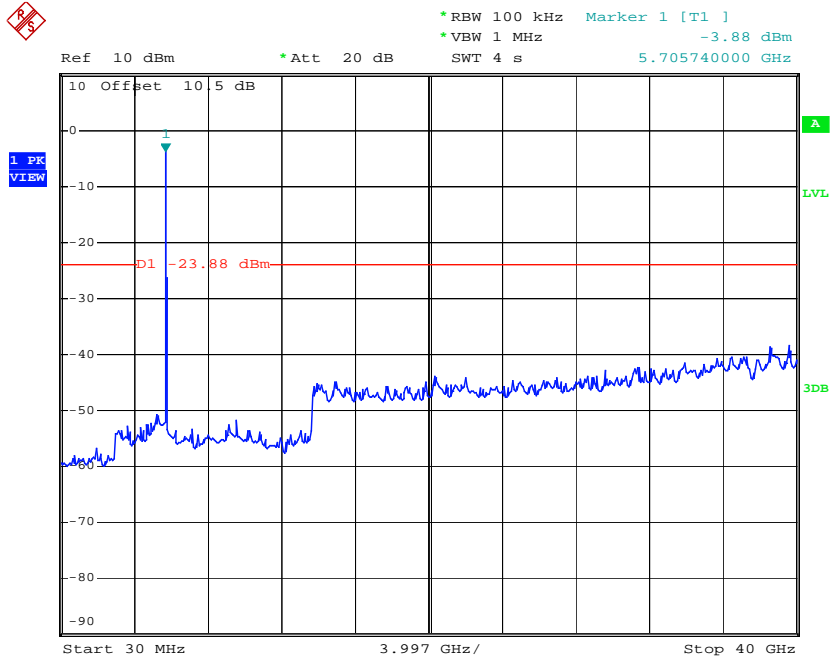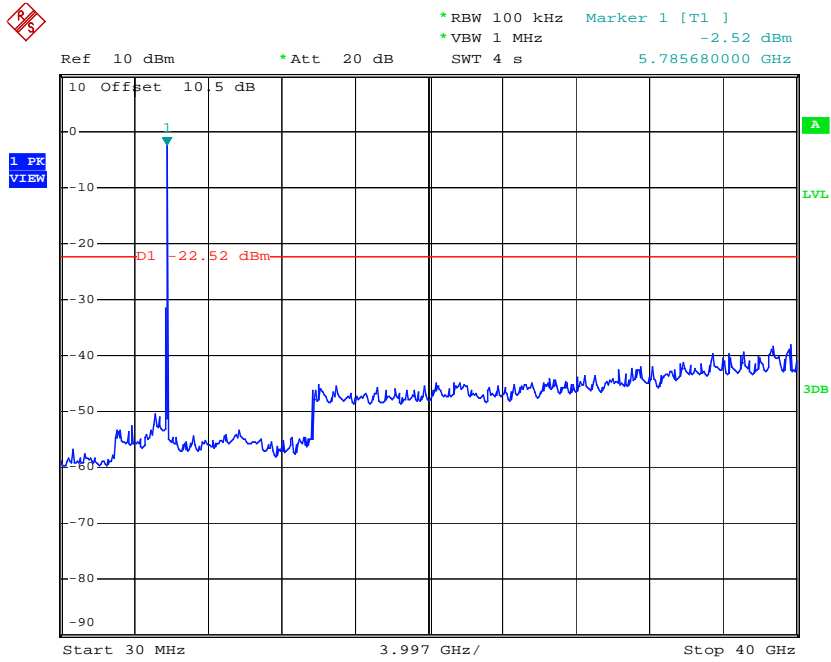## Channel 157 (5785MHz) 30MHz -40GHz

Date: 8.JUL.2010 03:32:14

Channel 165 (5825MHz) 30MHz -40GHz

Date: 8.JUL.2010 03:31:04

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band)

Channel 151 (5755MHz) 30MHz -40GHz

Date: 8.JUL.2010 03:35:48

Channel 159 (5795MHz) 30MHz -40GHz

Date: 8.JUL.2010 03:36:51

6. Band Edge

6.1. Test Equipment

RF Conducted Measurement

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2010
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2010
X	8-WAY Power Divider	JFW	50PD-647 / 526770 0916	Apr., 2010

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.
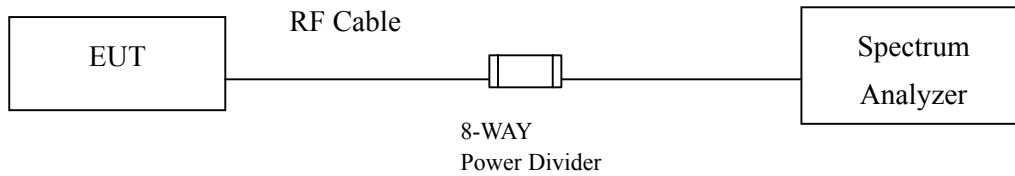3. The power combiner is used for measure 11n mode.

RF Radiated Measurement:

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

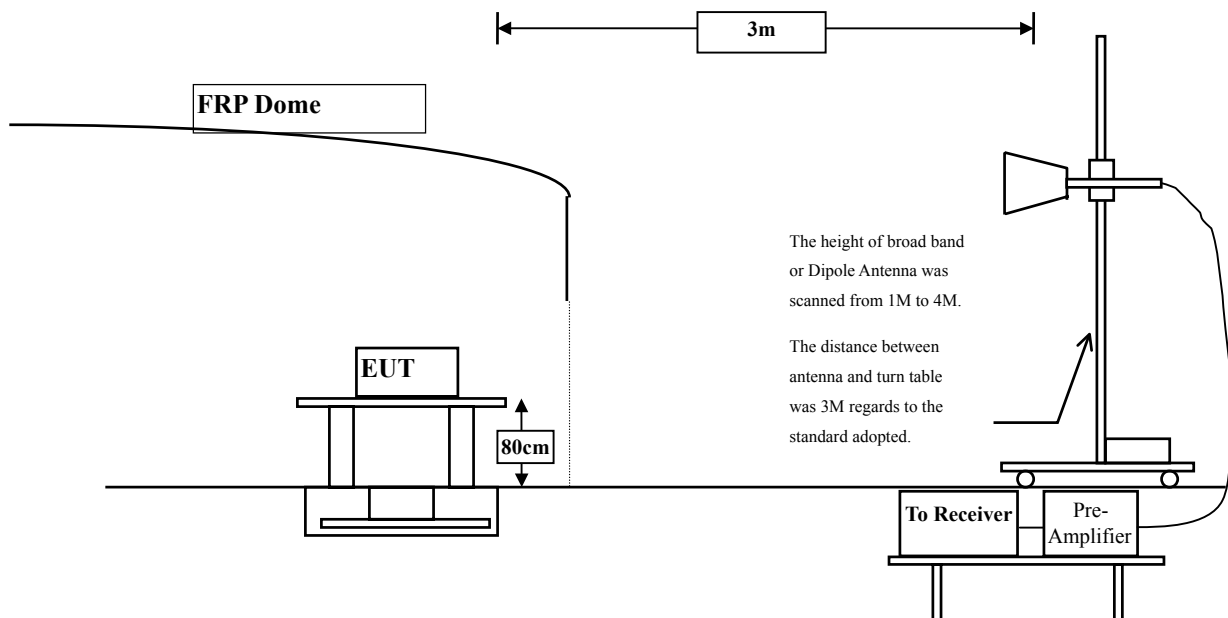| Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2010
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2009
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2010
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2010
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

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 Conducted Measurement

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 C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 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 C63.4:2003 on radiated measurement.

6.5.   Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Band Edge Data
Test Site   :   No.3 OATS
Test Mode   :   Mode 1: Transmit (802.11b 1Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	31.639	65.92	97.558	Peak
Horizontal	--	--	--	--	Average
Vertical	2412	31.639	81.11	112.748	Peak
Vertical	2412	31.639	75.42	107.058	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

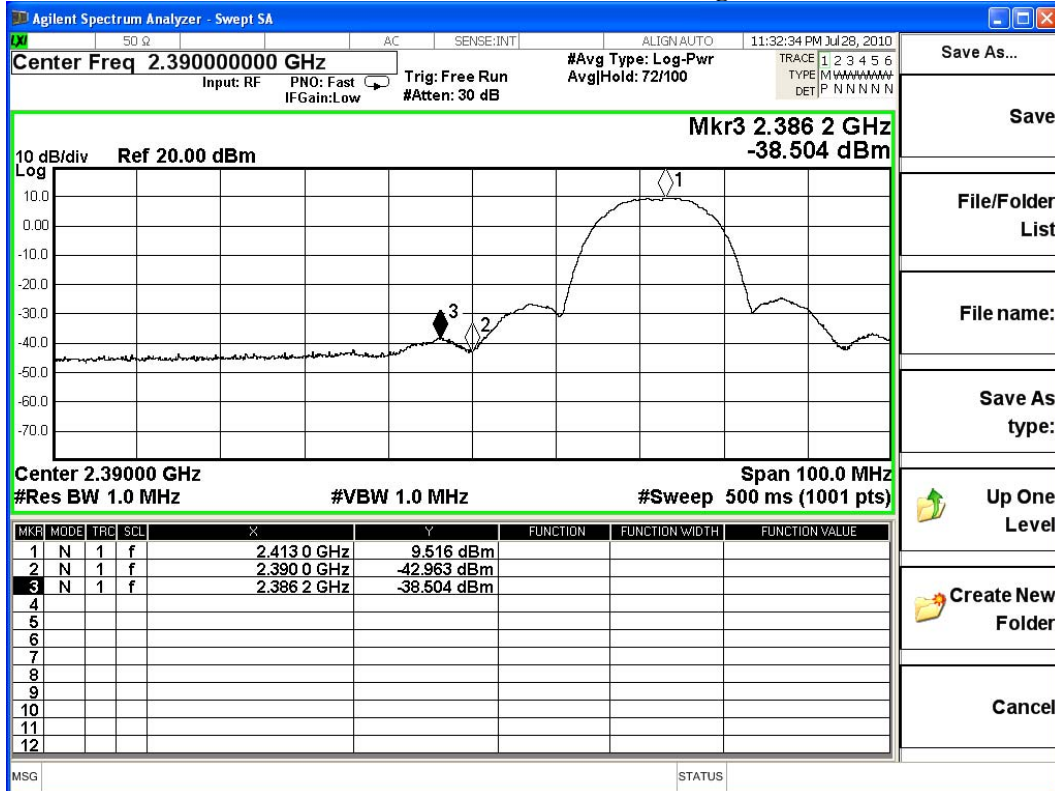| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2386.2	97.558	48.02	49.538	Peak
Horizontal	--	--	--	--	Average
Vertical	2386.2	112.748	48.02	64.728	Peak
Vertical	2386.6	107.058	53.38	53.678	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:
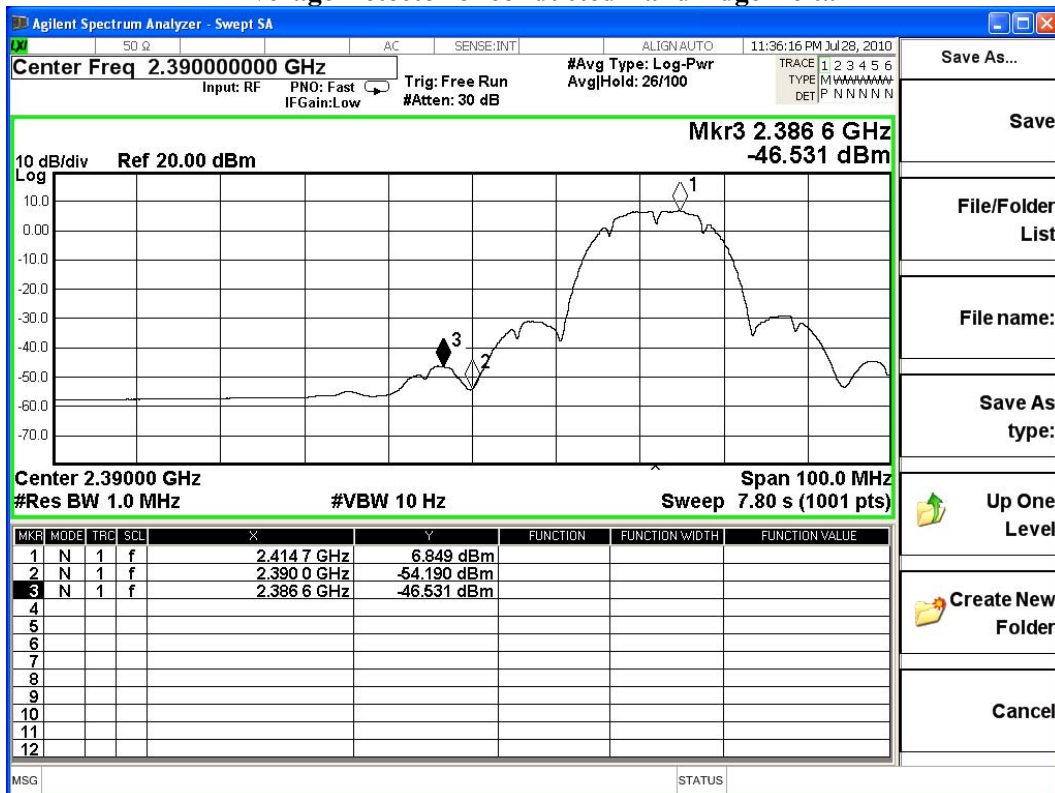
Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Band Edge Data
Test Site   :   No.3 OATS
Test Mode   :   Mode 1: Transmit (802.11b 1Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2462	32.019	62.06	94.079	Peak
Horizontal	--	--	--	--	Average
Vertical	2462	32.019	77.42	109.439	Peak
Vertical	2462	32.019	73.8	105.819	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

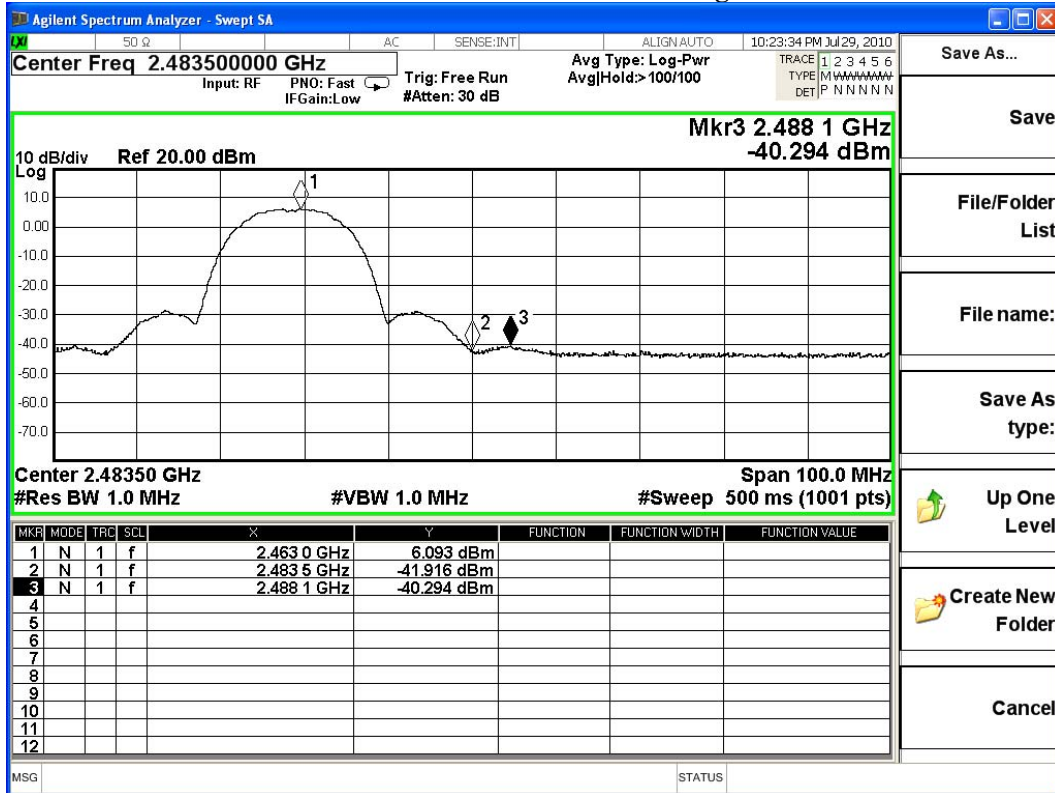| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2488.1	94.079	46.387	47.692	Peak
Horizontal	--	--	--	--	Average
Vertical	2488.1	109.439	46.387	63.052	Peak
Vertical	2487.6	105.819	54.04	51.779	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge

measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

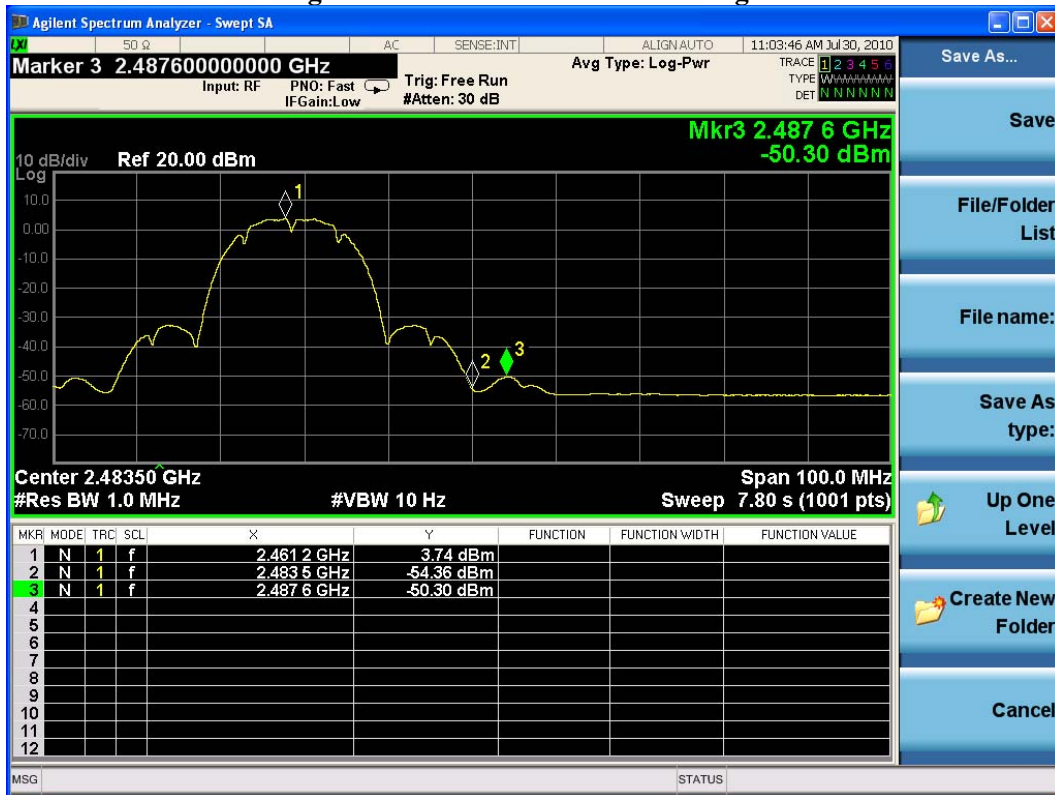F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	31.639	63.59	95.228	Peak
Horizontal	--	--	--	--	Average
Vertical	2412	30.95	81.83	112.779	Peak
Vertical	2412	30.95	71.77	102.719	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2390	95.228	43.355	51.873	Peak
Horizontal	--	--	--	--	Average
Vertical	2390	112.779	43.355	69.424	Peak
Vertical	2390	102.719	49.265	53.454	Average

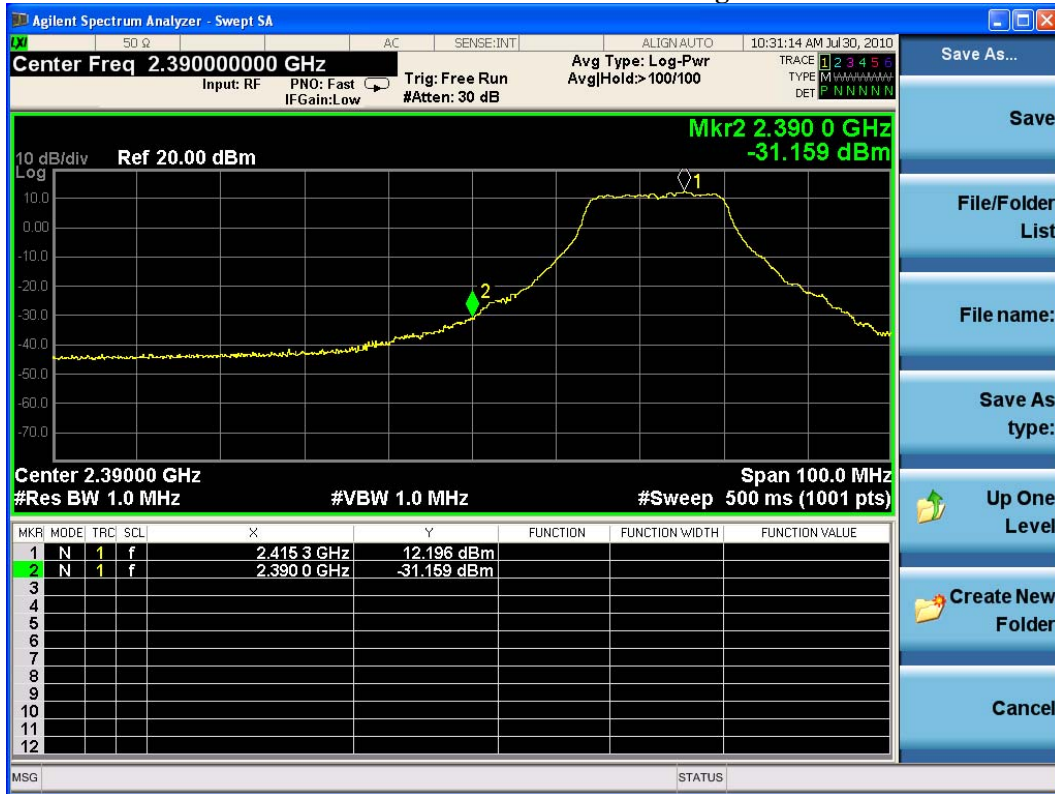Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2462	32.019	66.56	98.579	Peak
Horizontal	2462	32.019	55.47	87.489	Average
Vertical	2462	31.29	76.37	107.66	Peak
Vertical	2462	31.29	66.02	97.31	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2483.5	98.579	41.13	57.449	Peak
Horizontal	2483.5	87.489	46.99	40.499	Average
Vertical	2483.5	107.66	41.13	66.53	Peak
Vertical	2483.5	97.31	46.99	50.32	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:
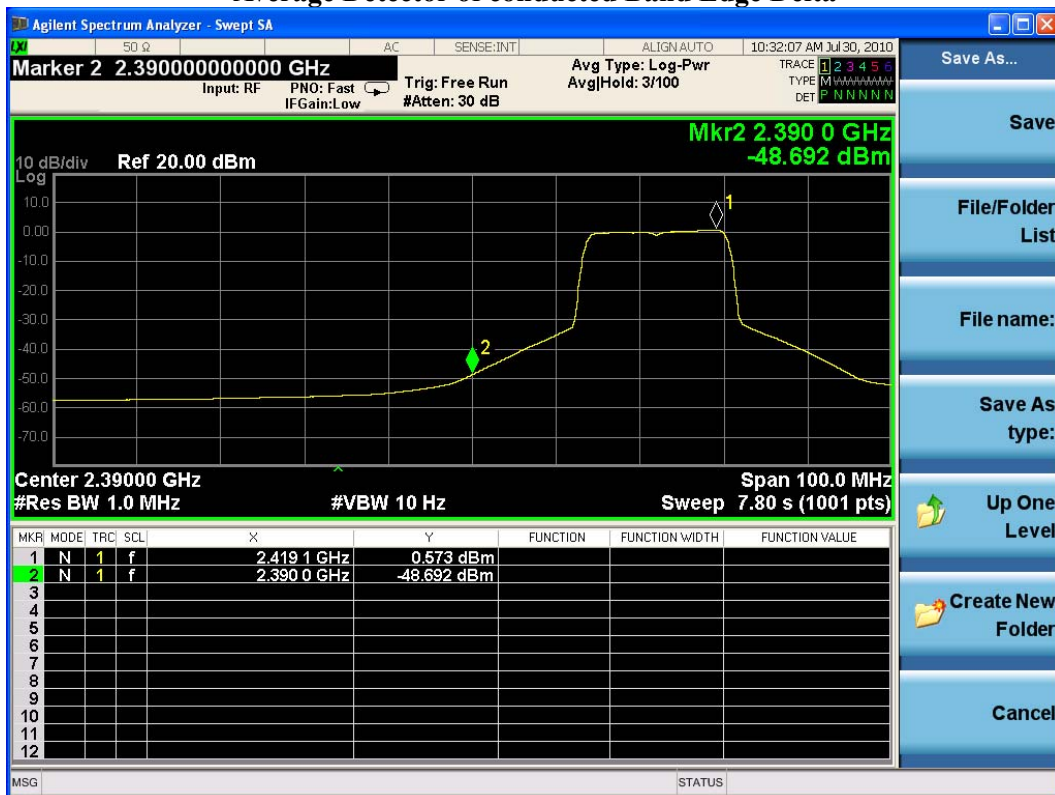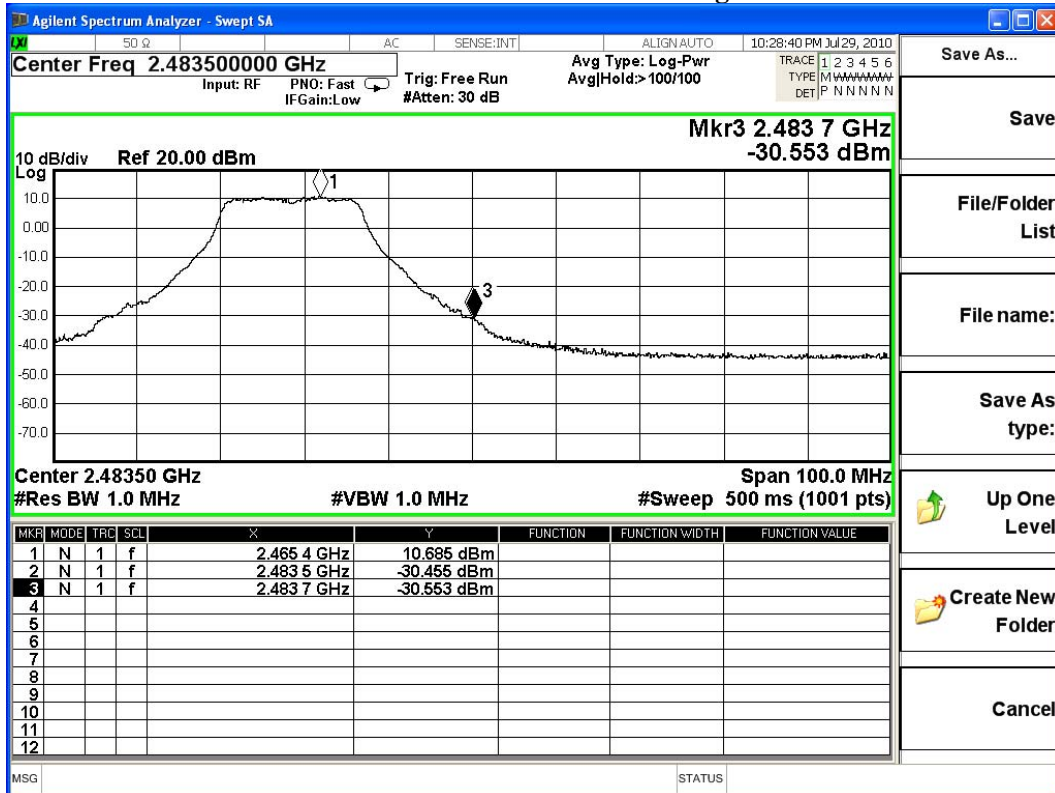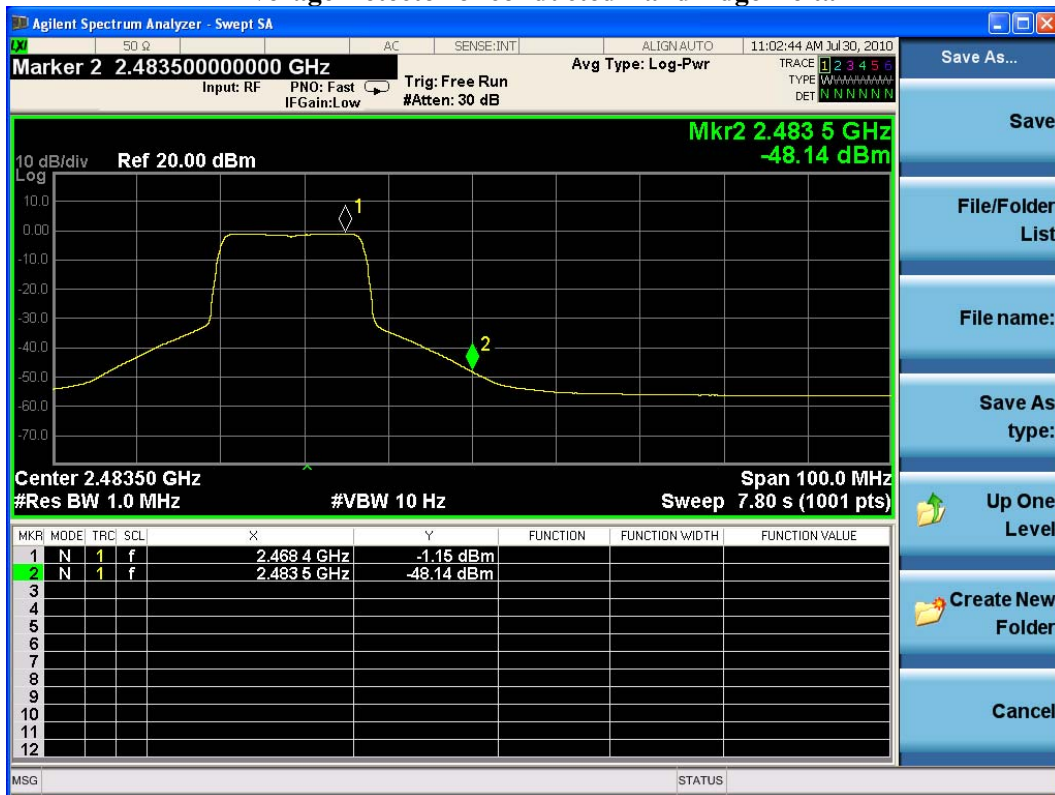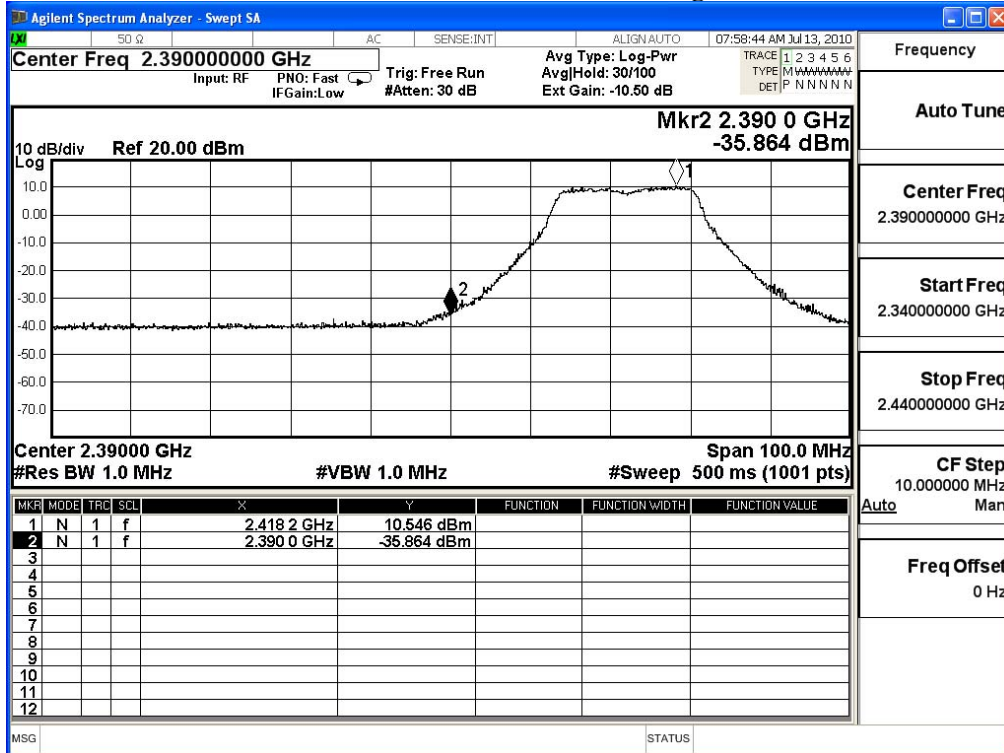
Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Agilent Spectrum Analyzer - Swept SA

| LXI | 50 Ω | | AC | SENSE:INT | | ALIGN AUTO | 10:28:40 PM Jul 29, 2010 |

Center Freq 2.483500000 GHz
Input: RF PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:> 100/100
TRACE 1 2 3 4 5 6
TYPE WWWWWW
DET P N N N N N

Mkr3 2.483 7 GHz
-30.553 dBm

10 dB/div Ref 20.00 dBm
Log

10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0

Center 2.48350 GHz
#Res BW 1.0 MHz   #VBW 1.0 MHz
Span 100.0 MHz
#Sweep 500 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.465 4 GHz	10.685 dBm			
2	N	1	f	2.483 5 GHz	-30.455 dBm			
3	N	1	f	2.483 7 GHz	-30.553 dBm			
4								
5								
6								
7								
8								
9								
10								
11								
12								

MSG   STATUS

Save As...
Save
File/Folder List
File name:
Save As type:
Up One Level
Create New Folder
Cancel

Average Detector of conducted Band Edge Delta

Agilent Spectrum Analyzer - Swept SA

| LXI | 50 Ω | | AC | SENSE:INT | | ALIGN AUTO | 11:02:44 AM Jul 30, 2010 |

Marker 2 2.483500000000 GHz
Input: RF PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE WWWWWW
DET N N N N N N

Mkr2 2.483 5 GHz
-48.14 dBm

10 dB/div Ref 20.00 dBm
Log

10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0

Center 2.48350 GHz
#Res BW 1.0 MHz   #VBW 10 Hz
Span 100.0 MHz
Sweep 7.80 s (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.468 4 GHz	-1.15 dBm			
2	N	1	f	2.483 5 GHz	-48.14 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

MSG   STATUS

Save As...
Save
File/Folder List
File name:
Save As type:
Up One Level
Create New Folder
Cancel

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	31.639	66.78	98.418	Peak
Horizontal	2412	31.639	52.1	83.738	Average
Vertical	2412	30.95	72.07	103.019	Peak
Vertical	2412	30.95	59.02	89.969	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2386.9	98.418	46.41	52.008	Peak
Horizontal	--	--	--	--	Average
Vertical	2386.9	103.019	46.41	56.609	Peak
Vertical	2390	89.969	54.234	35.735	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:
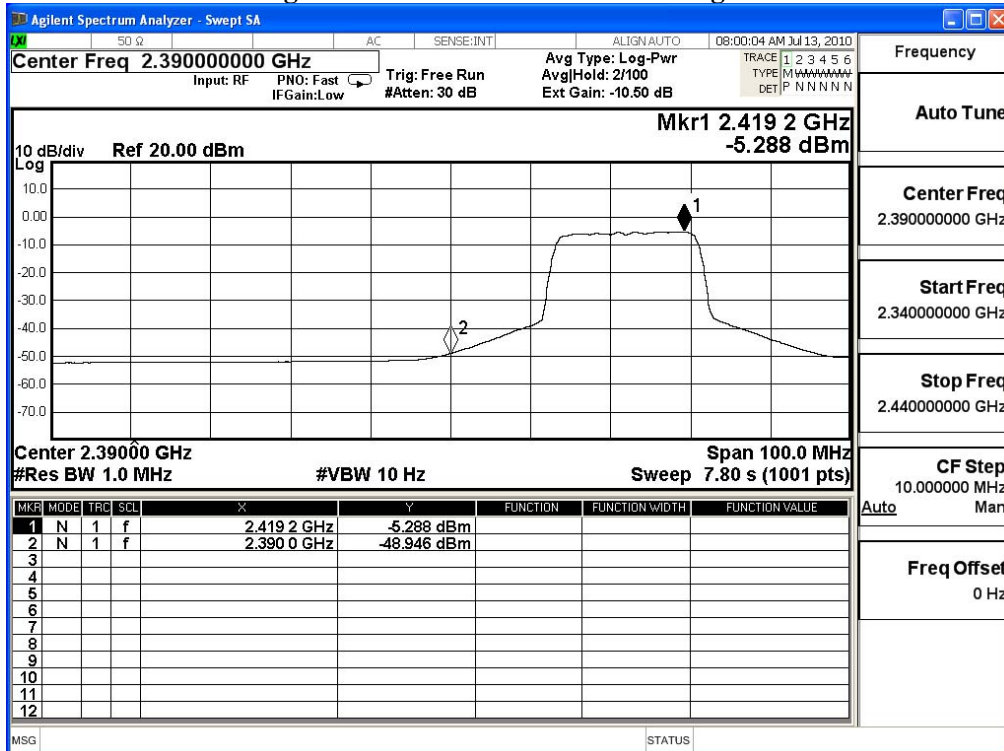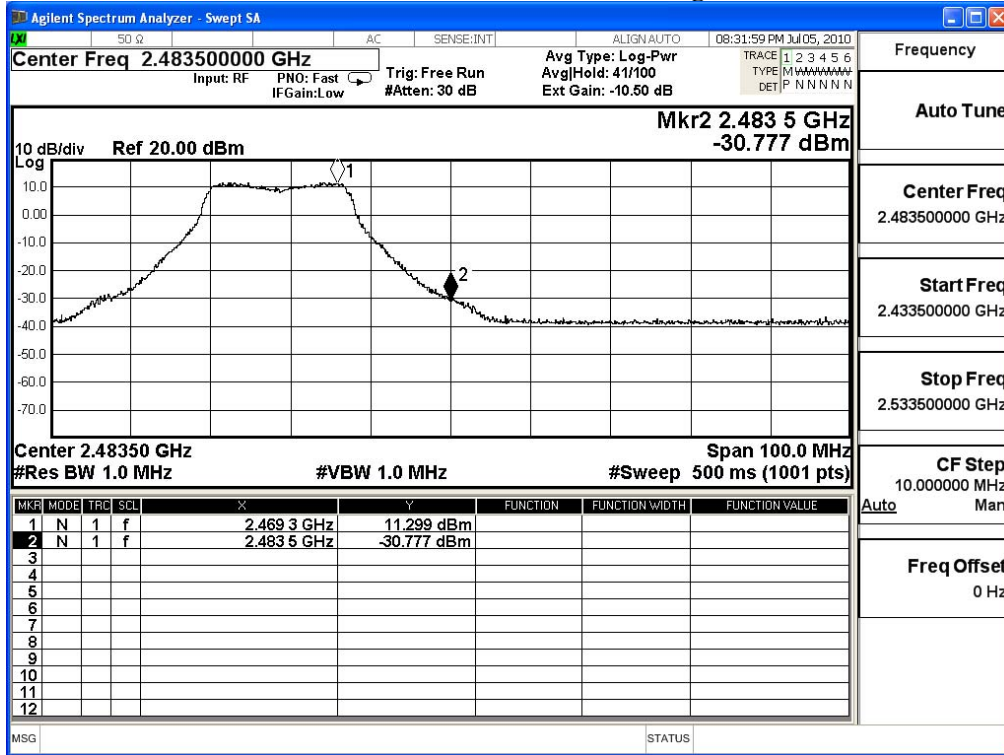
Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product : Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 4: Transmit - 802.11n-20BW_14.4Mbps(2.4G Band)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2462	32.019	62.75	94.769	Peak
Horizontal	--	--	--	--	Average
Vertical	2462	32.019	73.47	105.489	Peak
Vertical	2462	32.019	60.36	92.379	Average

Note: 1:Spectrum Analyzer setting:

  Peak detector: RBW=1MHz, VBW=1MHz

  Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2483.5	94.769	42.076	52.693	Peak
Horizontal	--	--	--	--	Average
Vertical	2483.5	105.489	42.076	63.413	Peak
Vertical	2483.5	92.379	45.181	47.198	Average

Note:

 The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:
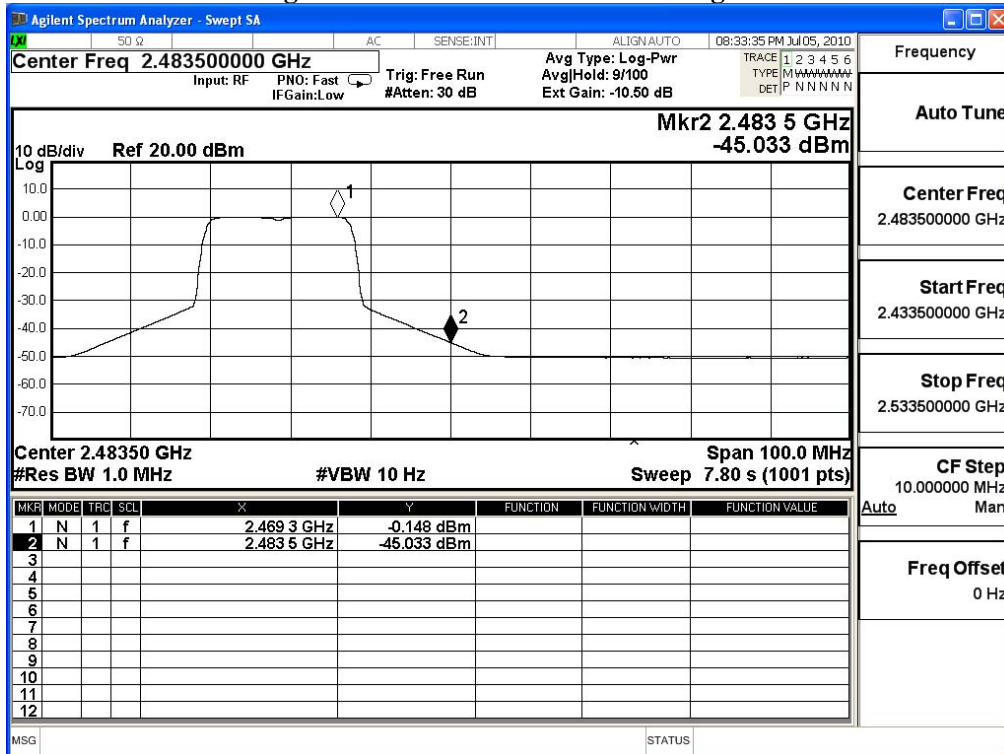
 Band Edge field Strength = F - Δ

 F = Fundamental field Strength (Peak or Average)

 Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product   :   Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item   :   Band Edge Data
Test Site   :   No.3 OATS
Test Mode   :   Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2422	31.715	61.87	93.585	Peak
Horizontal	2422	31.715	47.93	79.645	Average
Vertical	2422	31.017	69.77	100.787	Peak
Vertical	2422	31.017	56.02	87.037	Average

Note: 1:Spectrum Analyzer setting:

    Peak detector: RBW=1MHz, VBW=1MHz

    Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

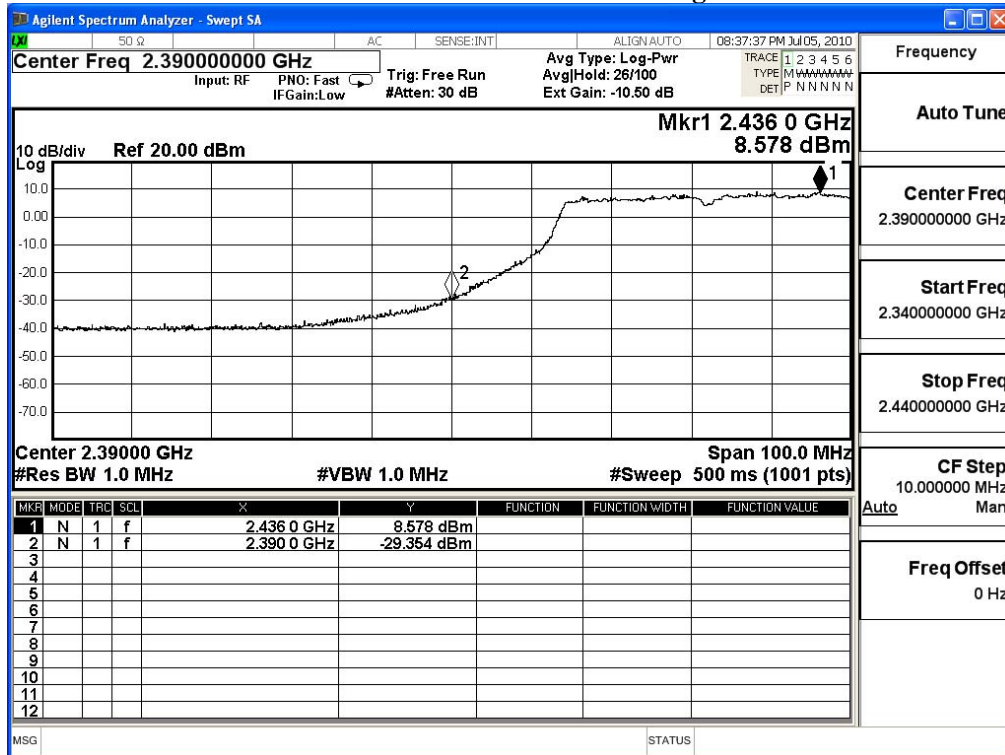| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2390	93.585	37.932	55.653	Peak
Horizontal	2390	79.645	41.132	38.513	Average
Vertical	2390	100.787	37.932	62.855	Peak
Vertical	2390	87.037	41.132	45.905	Average

Note:

    The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:
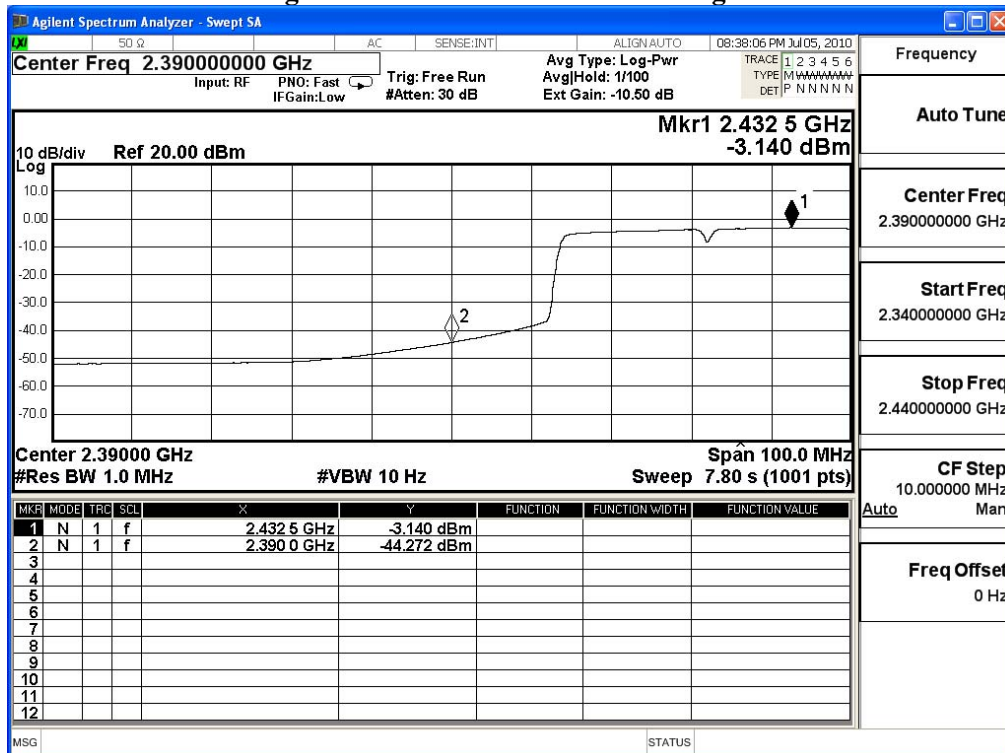
    Band Edge field Strength = F - Δ

    F = Fundamental field Strength (Peak or Average)

    Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product　　　:　　Moxa IEEE 802.11a/b/g/n MiniPCI Module
Test Item　　:　　Band Edge Data
Test Site　　　:　　No.3 OATS
Test Mode　　:　　Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2452	31.944	59.82	91.764	Peak
Horizontal	2452	31.944	47.2	79.144	Average
Vertical	2452	31.222	70.24	101.462	Peak
Vertical	2452	31.222	56.45	87.672	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

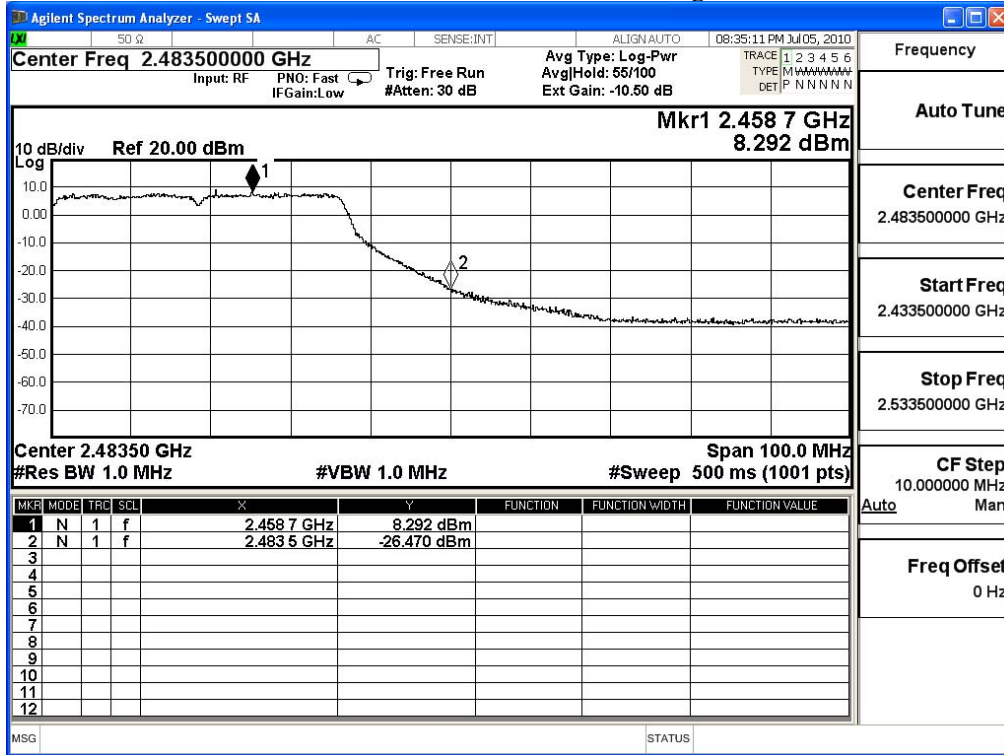| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2483.5	91.764	34.762	57.002	Peak
Horizontal	2483.5	79.144	38.35	40.794	Average
Vertical	2483.5	101.462	34.762	66.7	Peak
Vertical	2483.5	87.672	38.35	49.322	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge

measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta