



Test Report

Product Name	MOXA IEEE 802.11 a/b/g/n PCI-e
Model No	WAPN002
FCC ID.	SLE-WAPN002

Applicant	Moxa Inc.
Address	Fl.4. No.135. Lane 235, Baoqiao Rd. Xindian Dist, New Taipei City, Taiwan.

Date of Receipt	Oct. 21, 2011
Issue Date	Nov. 23, 2011
Report No.	11A306R-RFUSP28V01
Report Version	V1.0

The test results relate only to the samples tested.

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Test Report Certification

Issue Date: Nov. 23, 2011

Report No.: 11A306R-RFUSP28V01



Accredited by NIST (NVLAP)
NVLAP Lab Code: 200533-0

Product Name	MOXA IEEE 802.11 a/b/g/n PCI-e
Applicant	Moxa Inc.
Address	Fl.4. No.135. Lane 235, Baoqiao Rd. Xindian Dist, New Taipei City, Taiwan.
Manufacturer	Moxa Inc.
Model No.	WAPN002
FCC ID.	SLE-WAPN002
EUT Rated Voltage	DC 3.3V (Power by PCI Express)
EUT Test Voltage	DC 3.3V (Power by PCI Express)
Trade Name	MOXA
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2010 ANSI C63.4: 2009
Test Result	Complied



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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	MOXA IEEE 802.11 a/b/g/n PCI-e
Trade Name	MOXA
Model No.	WAPN002
FCC ID.	SLE-WAPN002
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: up to 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
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	KINSUN	ANT-WDB-O-2	Dipole	2dBi for 2.4 GHz 2dBi for 5GHz
2	KINSUN	ANT-WDB-ANM-0502	Dipole	5dBi for 2.4 GHz 2dBi for 5GHz

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		

802.11a/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 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		

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. This device is a MOXA IEEE 802.11 a/b/g/n PCI-e With a built-in 2.4GHz and 5GHz WLAN transceiver.
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. (802.11b is 1Mbps 、802.11g is 6Mbps 、802.11n(20M-BW) is 14.4Mbps and 、802.11n(40M-BW) is 30Mbps).
4. 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.

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)

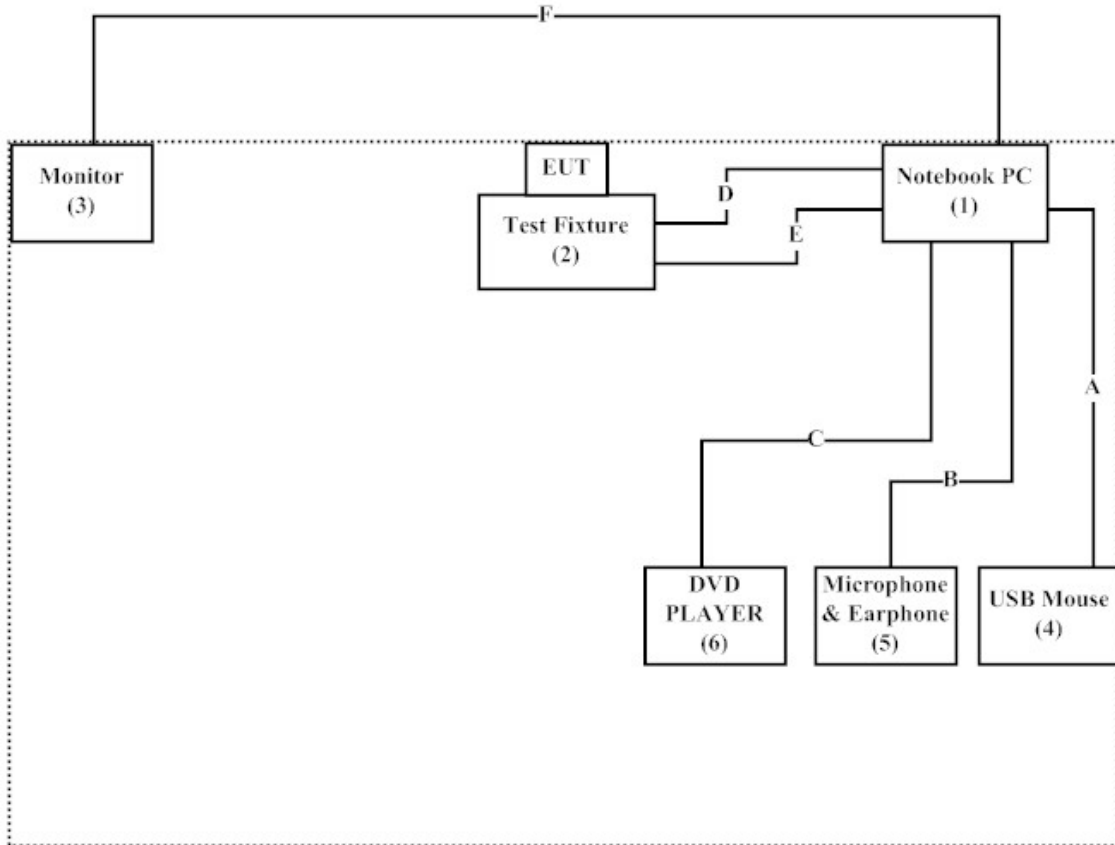
1.3. Tested System Details

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	PPT	N/A	Non-Shielded, 0.8m
(2) Test Fixture	MOXA	N/A	N/A	N/A
(3) Monitor	LG	W2261VT	907YHED07356	Non-Shielded, 1.8m
(4) USB Mouse	DELL	M056U0A	F0Y01YEP	N/A
(5) Microphone & Earphone	PCHOME	N/A	N/A	N/A
(6) DVD PLAYER	DELL	PD01S	N/A	N/A

	Signal Cable Type	Signal cable Description
A	USB Mouse Cable	Non-Shielded, 1.8m
B	Microphone & Earphone Cable	Non-Shielded, 2.5m
C	USB DVD PLAYER Cable	Non-Shielded, 1m
D	RS-232 to RJ-45 Cable	Non-Shielded, 1m
E	RJ45 Cable	Non-Shielded, 1.5m
F	VGA Cable	Non-Shielded, 1.5m,with one ferrite core bonded.

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute “ART v0.9.B27” program on the Notebook.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous Transmit.
- (5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

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

The related certificate for our laboratories about the test site and management system can be downloaded from

Quietek Corporation's Web Site : <http://www.quietek.com/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



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FCC Accreditation Number: TW1014



2. Conducted Emission

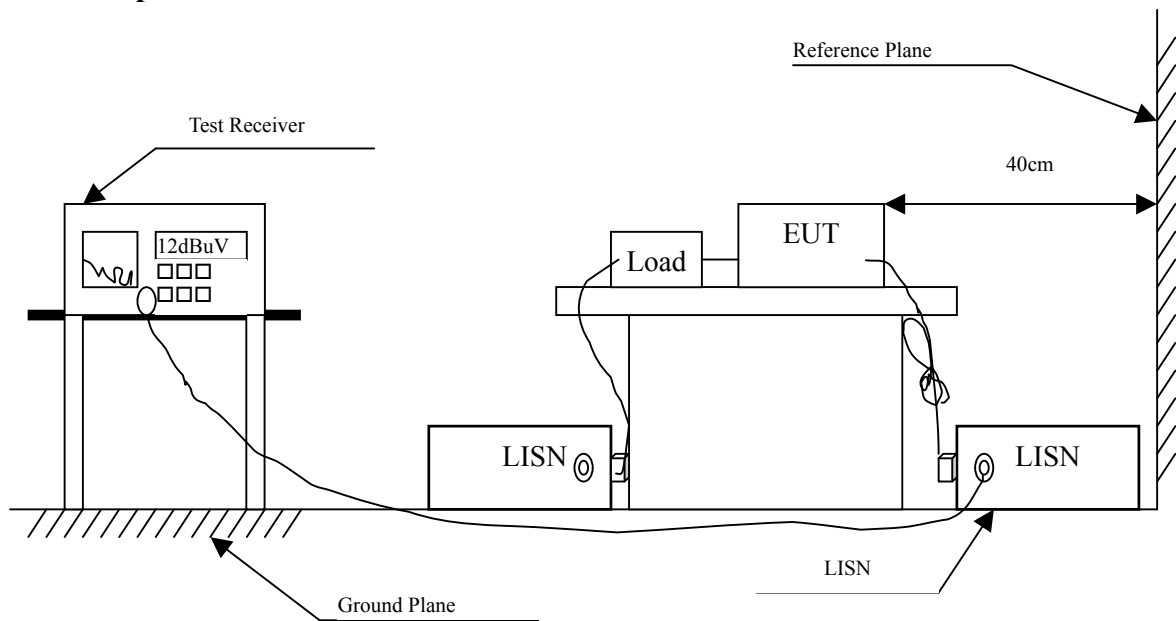
2.1. Test Equipment

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

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2011	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2011	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2011	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2011	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2011	
No.1 Shielded Room					

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: 2009 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 802.11 a/b/g/n PCI-e
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.212	9.688	37.770	47.458	-16.771	64.229
0.283	9.656	36.500	46.156	-16.044	62.200
0.494	9.650	41.140	50.790	-5.381	56.171
0.634	9.650	36.480	46.130	-9.870	56.000
4.306	9.710	29.940	39.650	-16.350	56.000
16.162	9.890	23.910	33.800	-26.200	60.000
Average					
0.212	9.688	37.370	47.058	-7.171	54.229
0.283	9.656	36.410	46.066	-6.134	52.200
0.634	9.650	33.670	43.320	-2.680	46.000
4.306	9.710	28.300	38.010	-7.990	46.000
16.162	9.890	17.370	27.260	-22.740	50.000

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 802.11 a/b/g/n PCI-e
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.166	9.720	23.810	33.530	-32.013	65.543
0.205	9.693	21.760	31.453	-32.976	64.429
0.564	9.650	32.590	42.240	-13.760	56.000
1.834	9.700	31.500	41.200	-14.800	56.000
4.369	9.720	33.790	43.510	-12.490	56.000
15.787	9.990	21.680	31.670	-28.330	60.000
Average					
0.166	9.720	8.520	18.240	-37.303	55.543
0.205	9.693	17.270	26.963	-27.466	54.429
0.564	9.650	30.440	40.090	-5.910	46.000
1.834	9.700	29.800	39.500	-6.500	46.000
4.369	9.720	30.300	40.020	-5.980	46.000
15.787	9.990	15.690	25.680	-24.320	50.000

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 802.11 a/b/g/n PCI-e
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.212	9.688	37.450	47.138	-17.091	64.229
0.283	9.656	36.410	46.066	-16.134	62.200
0.494	9.650	40.210	49.860	-6.311	56.171
0.986	9.690	29.850	39.540	-16.460	56.000
4.365	9.710	30.430	40.140	-15.860	56.000
16.330	9.890	25.420	35.310	-24.690	60.000
Average					
0.212	9.688	35.990	45.678	-8.551	54.229
0.283	9.656	36.400	46.056	-6.144	52.200
0.494	9.650	34.030	43.680	-2.491	46.171
0.986	9.690	29.840	39.530	-6.470	46.000
4.365	9.710	28.180	37.890	-8.110	46.000
16.330	9.890	18.470	28.360	-21.640	50.000

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 802.11 a/b/g/n PCI-e
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.209	9.691	28.180	37.871	-26.443	64.314
0.494	9.650	34.810	44.460	-11.711	56.171
1.337	9.690	30.870	40.560	-15.440	56.000
2.462	9.700	29.890	39.590	-16.410	56.000
4.080	9.710	32.970	42.680	-13.320	56.000
17.091	10.020	23.440	33.460	-26.540	60.000
Average					
0.209	9.691	27.790	37.481	-16.833	54.314
0.494	9.650	32.390	42.040	-4.131	46.171
1.337	9.690	29.990	39.680	-6.320	46.000
2.462	9.700	29.010	38.710	-7.290	46.000
4.080	9.710	31.660	41.370	-4.630	46.000
17.091	10.020	17.360	27.380	-22.620	50.000

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

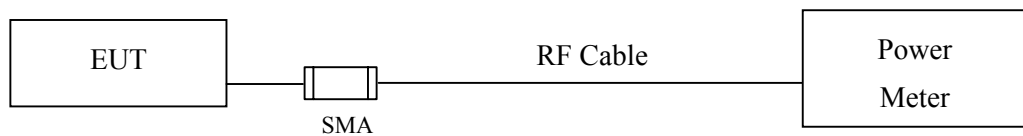
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2011
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2011

Note:

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

3.2. Test Setup

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 802.11 a/b/g/n PCI-e
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 802.11b 1Mbps

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11			
		Measurement Level (dBm)						
01	2412	16.97	--	--	--	19.49	<30dBm	Pass
06	2437	17.68	17.6	17.51	17.41	20.25	<30dBm	Pass
11	2462	13.97	--	--	--	16.56	<30dBm	Pass

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54			
		Measurement Level (dBm)										
01	2412	16	--	--	--	--	--	--	--	24.7	<30dBm	Pass
06	2437	17.91	17.85	17.81	17.75	17.71	17.62	17.58	17.5	25.49	<30dBm	Pass
11	2462	13.86	--	--	--	--	--	--	--	23.39	<30dBm	Pass

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

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

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54			
		Measurement Level (dBm)										
149	5745	15.2	--	--	--	--	--	--	--	22.07	<30dBm	Pass
157	5785	14.3	14.24	14.21	14.19	14.15	14.1	14.07	14.02	21.55	<30dBm	Pass
165	5825	13.4	--	--	--	--	--	--	--	21.2	<30dBm	Pass

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

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

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
		Measurement Level (dBm)								
01	2412	9.97	--	--	--	--	--	--	--	20.6
06	2437	9.88	9.81	9.75	9.71	9.67	9.62	9.57	9.53	20.21
11	2462	9.83	--	--	--	--	--	--	--	21.1

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

CHAIN B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
		Measurement Level (dBm)								
01	2412	9.95	--	--	--	--	--	--	--	19.73
06	2437	10.42	9.97	9.94	9.84	9.78	9.71	9.62	9.59	20.21
11	2462	10.39	--	--	--	--	--	--	--	20.21

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

CHAIN A+B

Channel	Frequency (MHz)	Data Rata (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
1	2412	HT8	20.60	19.73	23.20	<30dBm	Pass
6	2437	HT8	20.21	20.21	23.22	<30dBm	Pass
11	2462	HT8	21.10	20.21	23.69	<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 PCI-e
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 5: Transmit - 802.11n-40BW_30Mbps(2.4G Band)

CHAIN A

Channel No	Frequency (MHz)	Average Power								Peak Power
		For different Data Rate (Mbps)								
		30	60	90	120	180	240	270	300	
Measurement Level (dBm)										
3	2422	9.7	--	--	--	--	--	--	--	21.25
6	2437	9.83	9.76	9.71	9.65	9.62	9.57	9.51	9.44	21.29
9	2452	9.4	--	--	--	--	--	--	--	20.86

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

CHAIN B

Channel No	Frequency (MHz)	Average Power								Peak Power
		For different Data Rate (Mbps)								
		30	60	90	120	180	240	270	300	
Measurement Level (dBm)										
3	2422	10.46	--	--	--	--	--	--	--	21.35
6	2437	10.21	9.94	9.91	9.84	9.79	9.72	9.68	9.6	21.37
9	2452	9.9	--	--	--	--	--	--	--	20.59

Note: Peak Power Output Value =Reading value on peak 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	HT8	21.25	21.35	24.31	<30dBm	Pass
6	2437	HT8	21.29	21.37	24.34	<30dBm	Pass
9	2452	HT8	20.86	20.59	23.74	<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 PCI-e
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 6: Transmit - 802.11n-20BW_14.4Mbps(5G Band)

CHAIN A

Channel No	Frequency (MHz)	Average Power								Peak Power
		For different Data Rate (Mbps)								
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
Measurement Level (dBm)										
149	5745	10.8	--	--	--	--	--	--	--	19.77
157	5785	10.7	10.66	10.61	10.54	10.5	10.47	10.41	10.35	19.58
165	5825	11.12	--	--	--	--	--	--	--	19.78

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

CHAIN B

Channel No	Frequency (MHz)	Average Power								Peak Power
		For different Data Rate (Mbps)								
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
Measurement Level (dBm)										
149	5745	9.6	--	--	--	--	--	--	--	19.96
157	5785	9.2	9.18	9.15	9.13	9.1	9.05	9.01	8.97	19.37
165	5825	9.1	--	--	--	--	--	--	--	19.41

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

CHAIN A+B

Channel	Frequency (MHz)	Data Rata (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
149	5745	HT8	19.77	19.96	22.88	<30dBm	Pass
157	5785	HT8	19.58	19.37	22.49	<30dBm	Pass
165	5825	HT8	19.78	19.41	22.61	<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 PCI-e
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band)

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power
		30	60	90	120	180	240	270	300	
		Measurement Level (dBm)								
151	5755	11.25	--	--	--	--	--	--	--	20.26
159	5795	10.74	10.7	10.68	10.64	10.59	10.57	10.51	10.46	19.94

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

CHAIN B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power
		30	60	90	120	180	240	270	300	
		Measurement Level (dBm)								
151	5755	9.73	--	--	--	--	--	--	--	20.82
159	5795	9.18	9.14	9.1	9.08	9.04	9	8.94	8.9	20.24

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

CHAIN A+B

Channel	Frequency (MHz)	Data Rata (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
151	5755	HT8	20.26	20.82	23.56	<30dBm	Pass
159	5795	HT8	19.94	20.24	23.10	<30dBm	Pass

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

4. Radiated Emission

4.1. Test Equipment

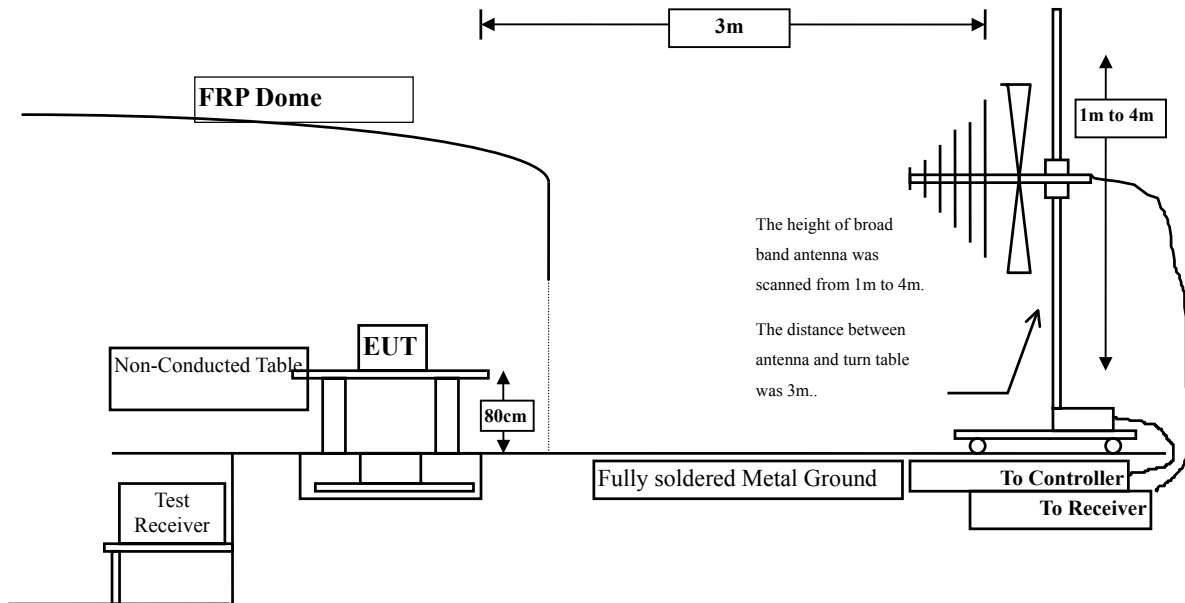
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2011
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2011
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

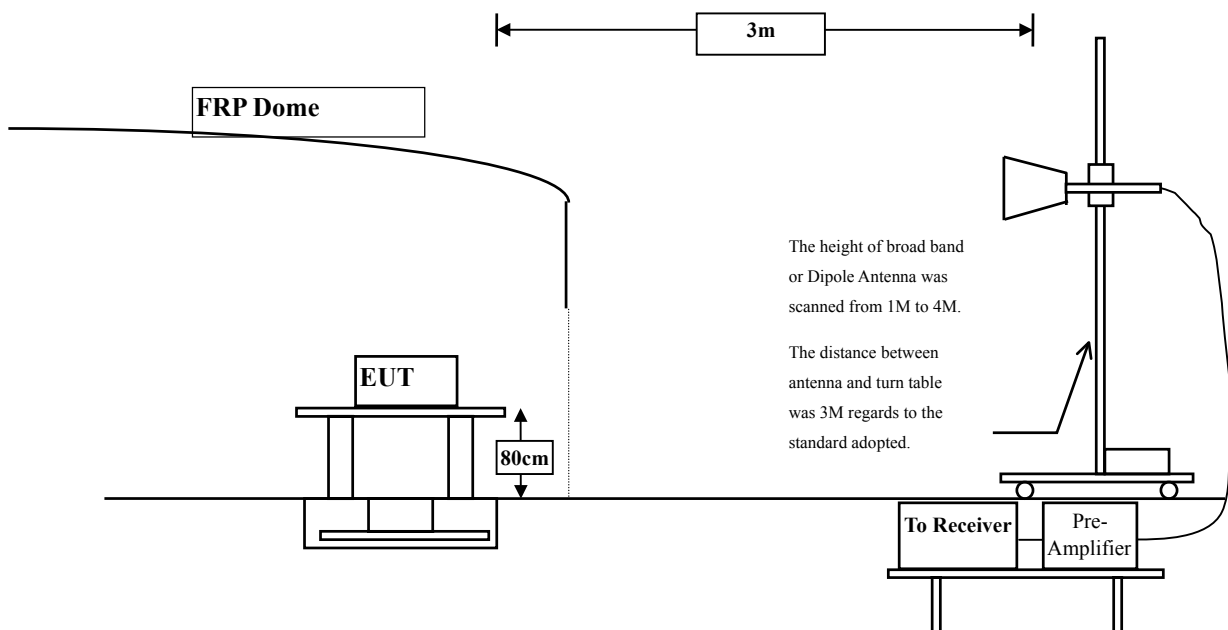
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

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, 2009 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 C63.4:2009 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 802.11 a/b/g/n PCI-e
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 802.11b 1Mbps (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	40.510	43.771	-30.229	74.000
7236.000	10.650	36.800	47.450	-26.550	74.000
9648.000	13.337	37.780	51.116	-22.884	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	6.421	50.720	57.141	-16.859	74.000
7236.000	11.495	38.480	49.975	-24.025	74.000
9648.000	13.807	38.740	52.546	-21.454	74.000
Average Detector:					
4824.000	6.421	45.220	51.641	-2.359	54.000

Note:

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

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

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	40.010	43.047	-30.953	74.000
7311.000	11.795	36.100	47.894	-26.106	74.000
9748.000	12.635	38.390	51.025	-22.975	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.812	49.830	55.641	-18.359	74.000
7311.000	12.630	37.450	50.079	-23.921	74.000
9748.000	13.126	40.310	53.436	-20.564	74.000
Average Detector:					
4874.000	5.812	44.540	50.351	-3.649	54.000

Note:

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

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

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	2.858	39.030	41.887	-32.113	74.000
7386.000	12.127	34.970	47.098	-26.902	74.000
9848.000	12.852	37.280	50.133	-23.867	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	5.521	46.920	52.440	-21.560	74.000
7386.000	13.254	35.600	48.854	-25.146	74.000
9848.000	13.367	38.230	51.597	-22.403	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	38.090	41.351	-32.649	74.000
7236.000	10.650	36.540	47.190	-26.810	74.000
9648.000	13.337	37.130	50.466	-23.534	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	6.421	47.270	53.691	-20.309	74.000
7236.000	11.495	37.800	49.295	-24.705	74.000
9648.000	13.807	36.470	50.276	-23.724	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	39.170	42.207	-31.793	74.000
7311.000	11.795	36.770	48.564	-25.436	74.000
9748.000	12.635	38.800	51.435	-22.565	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.812	51.850	57.661	-16.339	74.000
7311.000	12.630	39.850	52.479	-21.521	74.000
9748.000	13.126	38.420	51.546	-22.454	74.000
Average Detector:					
4874.000	5.812	36.580	42.391	-11.609	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	2.858	38.080	40.937	-33.063	74.000
7386.000	12.127	35.790	47.918	-26.082	74.000
9848.000	12.852	36.930	49.783	-24.217	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	5.521	45.610	51.130	-22.870	74.000
7386.000	13.254	35.660	48.914	-25.086	74.000
9848.000	13.367	37.350	50.717	-23.283	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit - 802.11a 6Mbps (5745 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
11490.000	17.106	35.620	52.727	-21.273	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11490.000	18.034	35.570	53.605	-20.395	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit - 802.11a 6Mbps (5785 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
11570.000	16.809	35.350	52.159	-21.841	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11570.000	17.698	35.870	53.568	-20.432	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit - 802.11a 6Mbps (5825 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBUV	Measurement Level dBUV/m	Margin dB	Limit dBUV/m
Horizontal					
Peak Detector:					
11650.000	16.158	32.270	48.428	-25.572	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11650.000	17.274	32.170	49.445	-24.555	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.261	37.680	40.941	-33.059	74.000
7236.000	10.650	36.460	47.110	-26.890	74.000
9648.000	13.337	36.460	49.796	-24.204	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	6.421	43.700	50.121	-23.879	74.000
7236.000	11.495	36.690	48.185	-25.815	74.000
9648.000	13.807	36.440	50.246	-23.754	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	37.350	40.387	-33.613	74.000
7311.000	11.795	35.290	47.084	-26.916	74.000
9748.000	12.635	36.990	49.625	-24.375	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.812	45.100	50.911	-23.089	74.000
7311.000	12.630	36.300	48.929	-25.071	74.000
9748.000	13.126	37.270	50.396	-23.604	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	2.858	38.520	41.377	-32.623	74.000
7386.000	12.127	35.330	47.458	-26.542	74.000
9848.000	12.852	36.750	49.603	-24.397	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	5.521	45.750	51.270	-22.730	74.000
7386.000	13.254	35.540	48.794	-25.206	74.000
9848.000	13.367	37.060	50.427	-23.573	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4844.000	3.171	38.510	41.681	-32.319	74.000
7266.000	11.162	35.910	47.072	-26.928	74.000
9688.000	12.964	36.900	49.865	-24.135	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4844.000	6.178	43.640	49.818	-24.182	74.000
7266.000	11.982	35.840	47.822	-26.178	74.000
9688.000	13.507	36.830	50.338	-23.662	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	3.038	46.810	49.847	-24.153	74.000
7311.000	11.795	38.590	50.384	-23.616	74.000
9748.000	12.635	42.330	54.965	-19.035	74.000
Average Detector:					
9748.000	12.635	24.450	37.085	-16.915	54.000
Vertical					
Peak Detector:					
4874.000	5.812	57.600	63.411	-10.589	74.000
7311.000	12.630	46.030	58.659	-15.341	74.000
9748.000	13.126	45.500	58.626	-15.374	74.000
Average Detector:					
4874.000	5.812	40.440	46.251	-7.749	54.000
7311.000	12.630	31.600	44.229	-9.771	54.000
9748.000	13.126	25.890	39.016	-14.984	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4904.000	2.914	37.620	40.535	-33.465	74.000
7356.000	11.995	35.070	47.064	-26.936	74.000
9808.000	12.475	36.690	49.165	-24.835	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4904.000	5.530	45.870	51.401	-22.599	74.000
7356.000	13.005	35.630	48.634	-25.366	74.000
9808.000	12.901	36.430	49.331	-24.669	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
11490.000	17.106	35.300	52.407	-21.593	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11490.000	18.034	35.720	53.755	-20.245	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
11570.000	16.809	32.950	49.759	-24.241	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11570.000	17.698	33.450	51.148	-22.852	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
11650.000	16.158	34.870	51.028	-22.972	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11650.000	17.274	33.900	51.175	-22.825	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
11510.000	17.124	35.060	52.184	-21.816	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11510.000	18.081	34.810	52.891	-21.109	74.000
Average Detector:					
--					

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBUV	Measurement Level dBUV/m	Margin dB	Limit dBUV/m
Horizontal					
Peak Detector:					
11590.000	16.701	34.730	51.430	-22.570	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11590.000	17.567	35.000	52.566	-21.434	74.000
Average Detector:					
--					

Note:

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

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

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
375.320	-1.209	37.869	36.660	-9.340	46.000
600.360	3.977	33.514	37.491	-8.509	46.000
664.380	2.062	33.682	35.744	-10.256	46.000
709.000	3.458	38.931	42.389	-3.611	46.000
875.840	5.271	34.425	39.696	-6.304	46.000
963.140	6.664	28.140	34.804	-19.196	54.000
Vertical					
385.020	-2.820	39.337	36.517	-9.483	46.000
563.500	-5.335	38.051	32.716	-13.284	46.000
664.380	-1.918	38.449	36.531	-9.469	46.000
749.740	2.510	38.684	41.194	-4.806	46.000
800.180	2.801	37.172	39.973	-6.027	46.000
949.560	6.615	32.036	38.651	-7.349	46.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
334.580	-3.901	41.859	37.958	-8.042	46.000
400.540	-2.276	36.819	34.543	-11.457	46.000
625.580	1.770	41.282	43.052	-2.948	46.000
749.740	3.320	38.792	42.112	-3.888	46.000
875.840	5.271	32.015	37.286	-8.714	46.000
963.140	6.664	26.576	33.240	-20.760	54.000
Vertical					
400.540	-5.156	37.965	32.810	-13.190	46.000
532.460	-0.563	31.837	31.274	-14.726	46.000
625.580	-2.600	38.194	35.594	-10.406	46.000
749.740	2.510	39.032	41.542	-4.458	46.000
800.180	2.801	36.839	39.640	-6.360	46.000
963.140	7.604	27.479	35.083	-18.917	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit - 802.11a 6Mbps (5785MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
400.540	-2.276	38.843	36.567	-9.433	46.000
600.360	3.977	38.561	42.538	-3.462	46.000
625.580	1.770	40.530	42.300	-3.700	46.000
749.740	3.320	38.197	41.517	-4.483	46.000
800.180	5.141	35.810	40.951	-5.049	46.000
875.840	5.271	33.364	38.635	-7.365	46.000
Vertical					
375.320	-2.029	39.039	37.010	-8.990	46.000
542.160	-0.269	34.040	33.771	-12.229	46.000
625.580	-2.600	38.736	36.136	-9.864	46.000
749.740	2.510	39.146	41.656	-4.344	46.000
875.840	1.621	34.237	35.858	-10.142	46.000
963.140	7.604	28.952	36.556	-17.444	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
355.920	-2.528	38.918	36.390	-9.610	46.000
400.540	-2.276	36.593	34.317	-11.683	46.000
600.360	3.977	31.306	35.283	-10.717	46.000
749.740	3.320	37.733	41.053	-4.947	46.000
875.840	5.271	36.101	41.372	-4.628	46.000
968.960	6.981	27.692	34.673	-19.327	54.000
Vertical					
375.320	-2.029	39.409	37.380	-8.620	46.000
625.580	-2.600	38.436	35.836	-10.164	46.000
749.740	2.510	39.616	42.126	-3.874	46.000
800.180	2.801	37.157	39.958	-6.042	46.000
875.840	1.621	32.493	34.114	-11.886	46.000
951.500	6.621	28.671	35.292	-10.708	46.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
330.700	-4.492	42.846	38.354	-7.646	46.000
400.540	-2.276	37.269	34.993	-11.007	46.000
474.260	0.024	30.784	30.807	-15.193	46.000
600.360	3.977	34.274	38.251	-7.749	46.000
749.740	3.320	37.819	41.139	-4.861	46.000
875.840	5.271	35.104	40.375	-5.625	46.000
Vertical					
375.320	-2.029	40.798	38.769	-7.231	46.000
625.580	-2.600	38.235	35.635	-10.365	46.000
749.740	2.510	38.982	41.492	-4.508	46.000
800.180	2.801	36.721	39.522	-6.478	46.000
875.840	1.621	33.816	35.437	-10.563	46.000
967.020	8.071	28.864	36.935	-17.065	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
400.540	-2.276	38.981	36.705	-9.295	46.000
474.260	0.024	33.195	33.218	-12.782	46.000
625.580	1.770	40.359	42.129	-3.871	46.000
749.740	3.320	38.075	41.395	-4.605	46.000
800.180	5.141	35.630	40.771	-5.229	46.000
875.840	5.271	32.591	37.862	-8.138	46.000
Vertical					
375.320	-2.029	39.219	37.190	-8.810	46.000
625.580	-2.600	38.344	35.744	-10.256	46.000
749.740	2.510	38.564	41.074	-4.926	46.000
800.180	2.801	37.027	39.828	-6.172	46.000
875.840	1.621	32.811	34.432	-11.568	46.000
967.020	8.071	29.063	37.134	-16.866	54.000

Note:

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

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 7: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
375.320	-1.209	37.784	36.575	-9.425	46.000
600.360	3.977	34.768	38.745	-7.255	46.000
625.580	1.770	40.302	42.072	-3.928	46.000
749.740	3.320	36.282	39.602	-6.398	46.000
800.180	5.141	35.156	40.297	-5.703	46.000
875.840	5.271	30.945	36.216	-9.784	46.000
Vertical					
375.320	-2.029	38.885	36.856	-9.144	46.000
528.580	-0.462	30.362	29.900	-16.100	46.000
625.580	-2.600	39.166	36.566	-9.434	46.000
749.740	2.510	38.769	41.279	-4.721	46.000
800.180	2.801	36.460	39.261	-6.739	46.000
875.840	1.621	32.233	33.854	-12.146	46.000

Note:

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

5. RF antenna conducted test

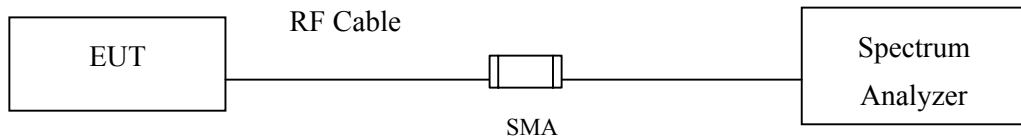
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

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

5.2. Test Setup

RF antenna Conducted Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.4. Test Procedure

The EUT was tested according to DTS test procedure of 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

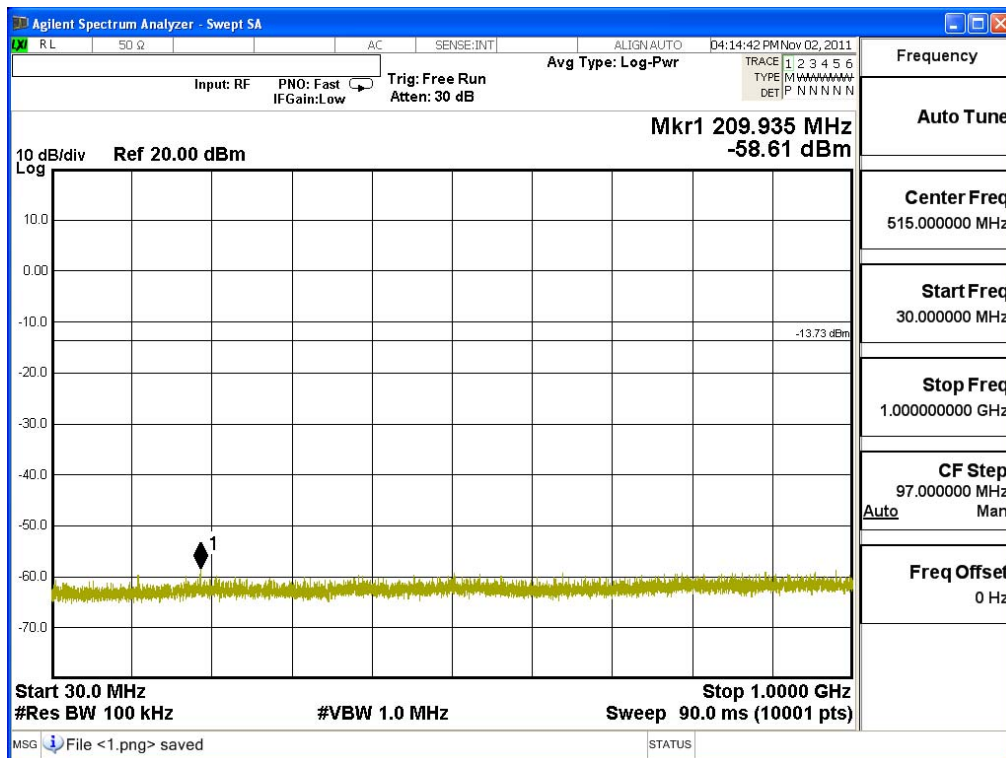
The measurement uncertainty

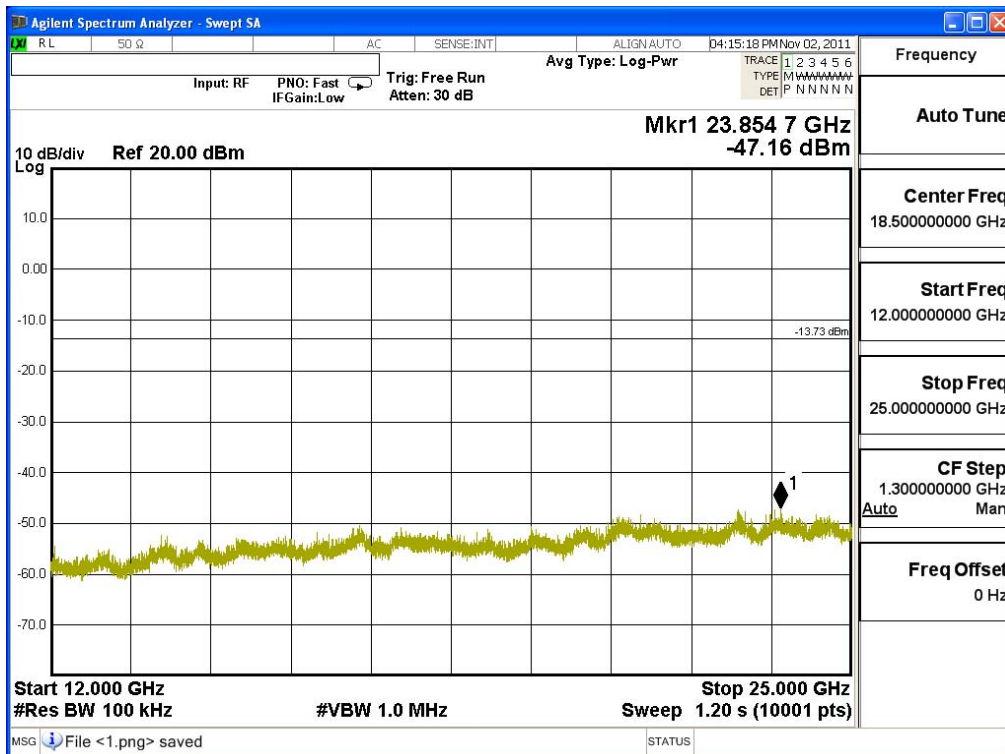
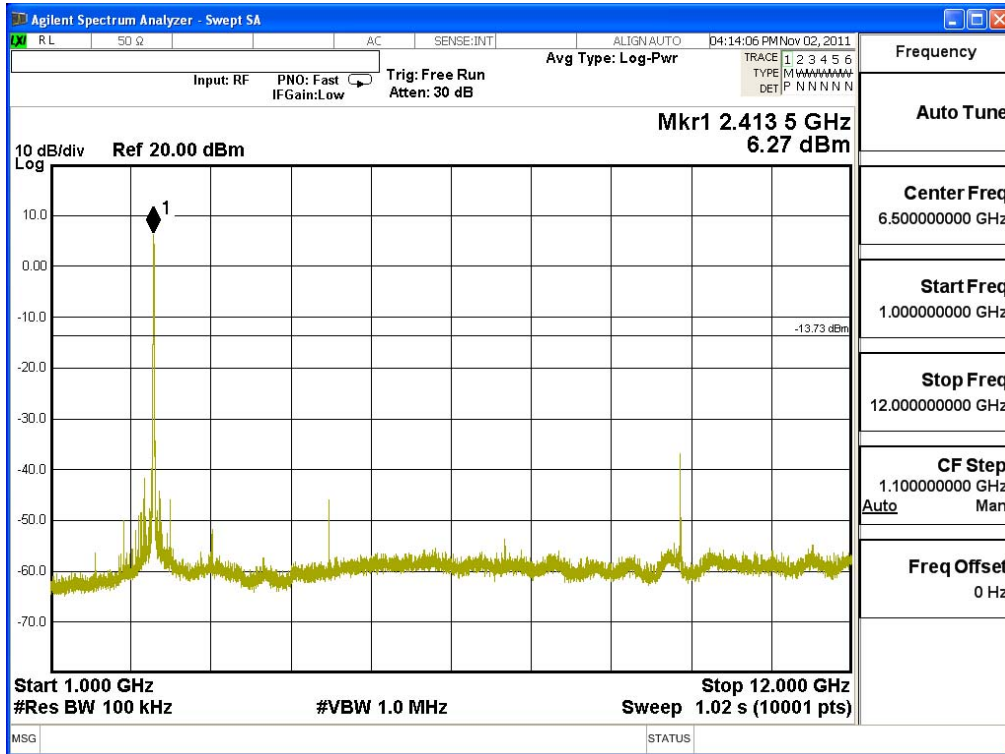
Conducted is defined as $\pm 1.27\text{dB}$

5.6. Test Result of RF antenna conducted test

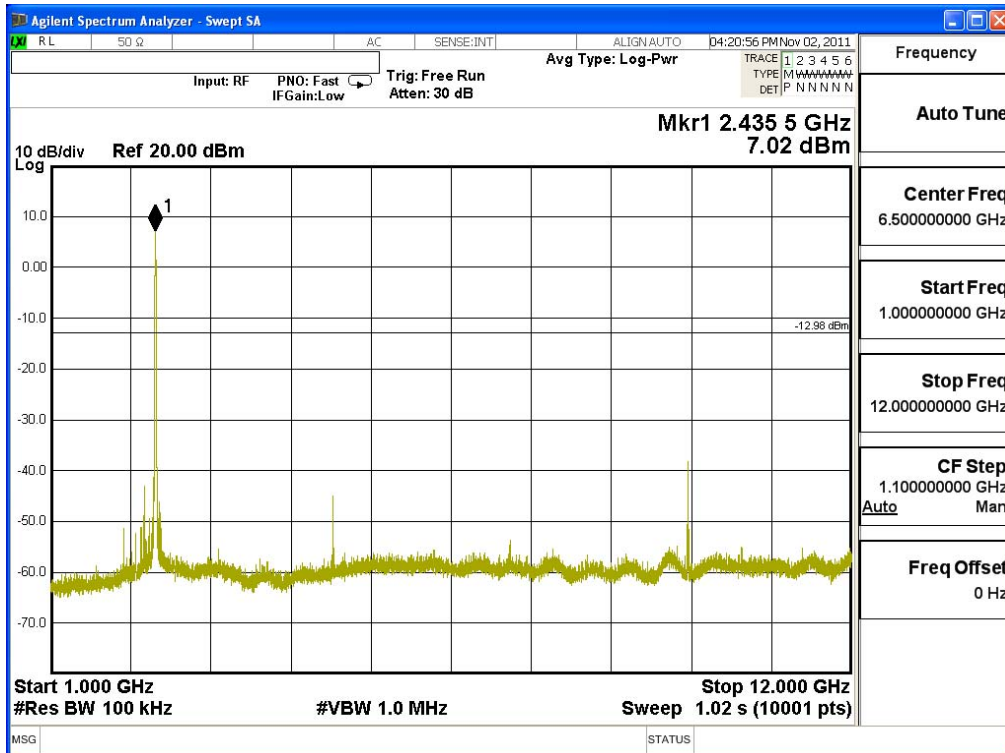
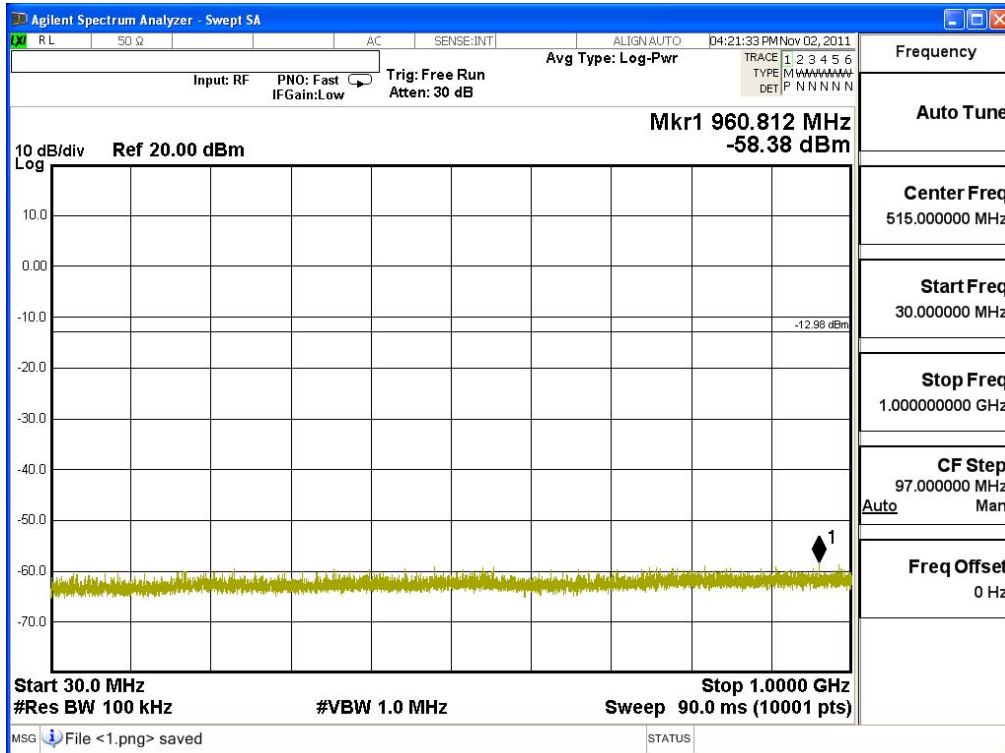
Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : RF antenna conducted test
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - 802.11b 1Mbps

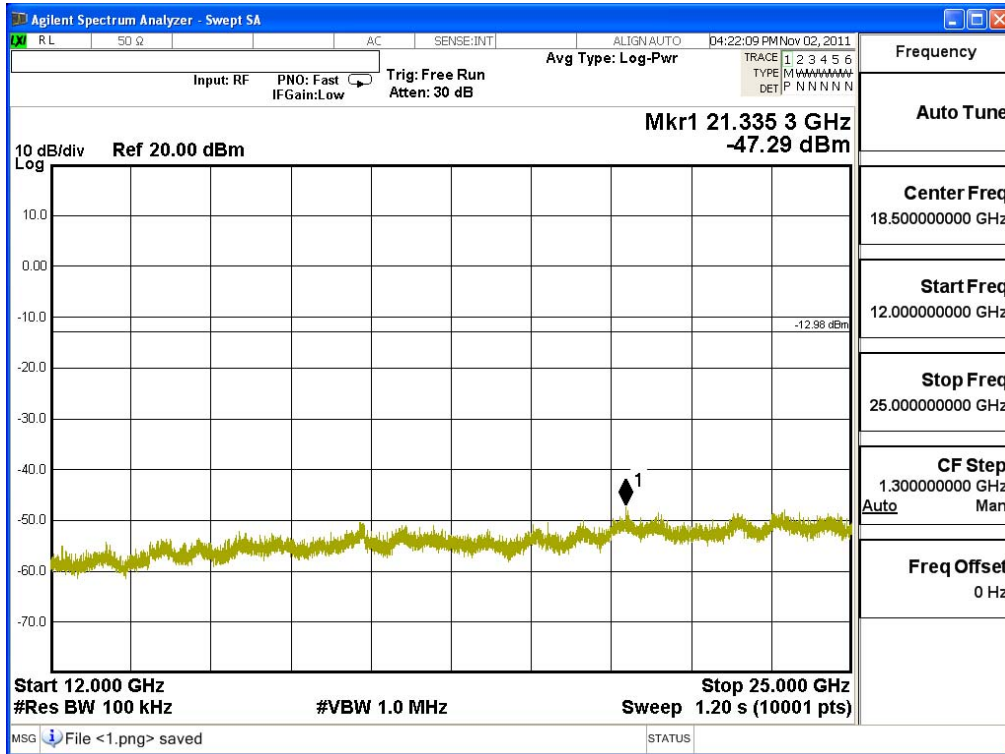
Channel 01 (2412MHz) 30MHz-25GHz-Chain A



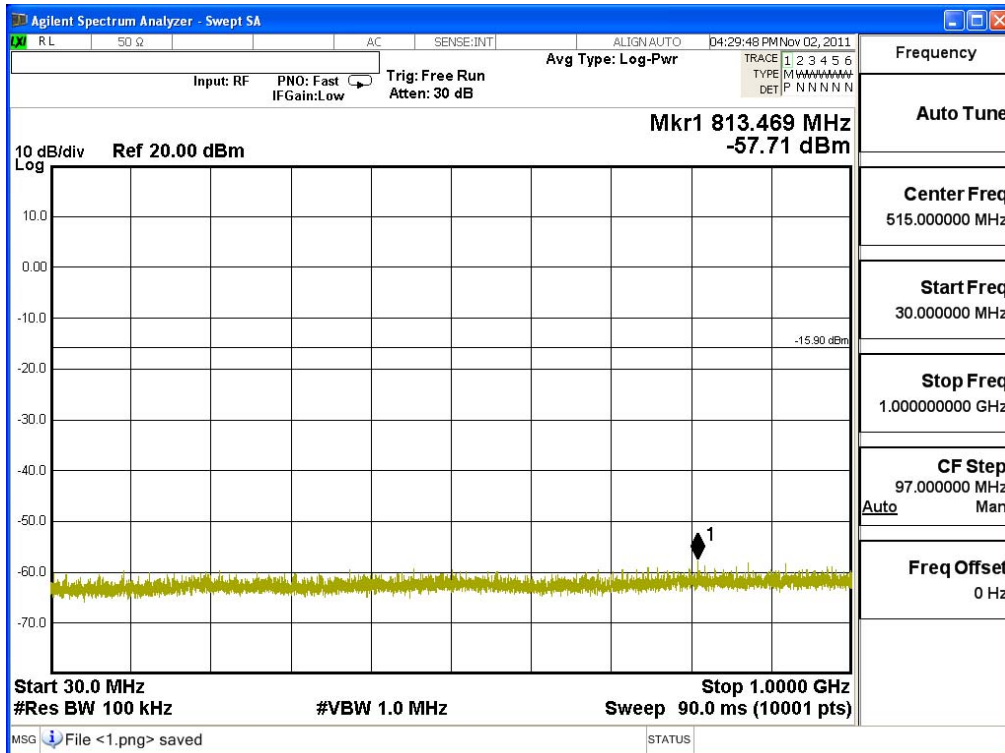


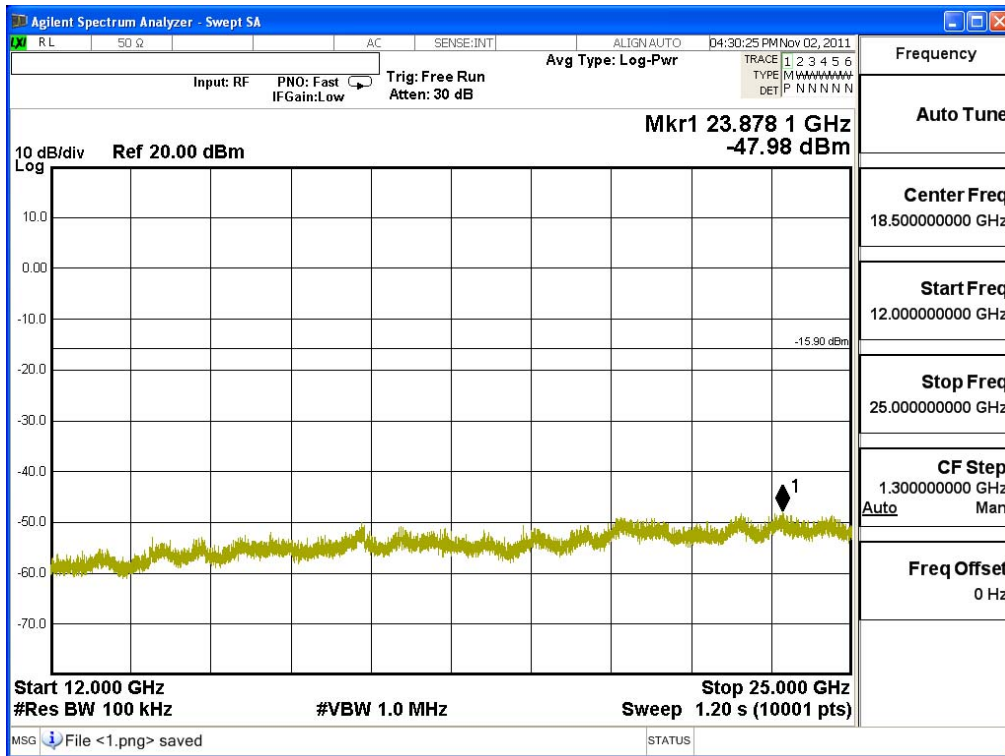
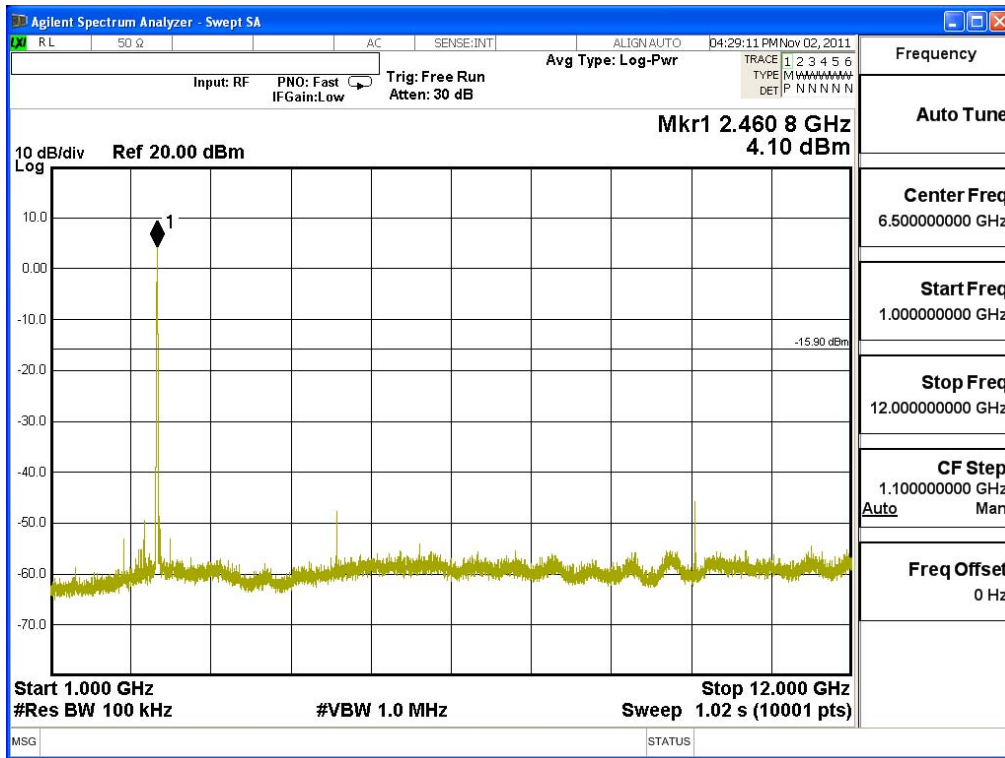
Channel 06 (2437MHz) 30MHz -25GHz-Chain A





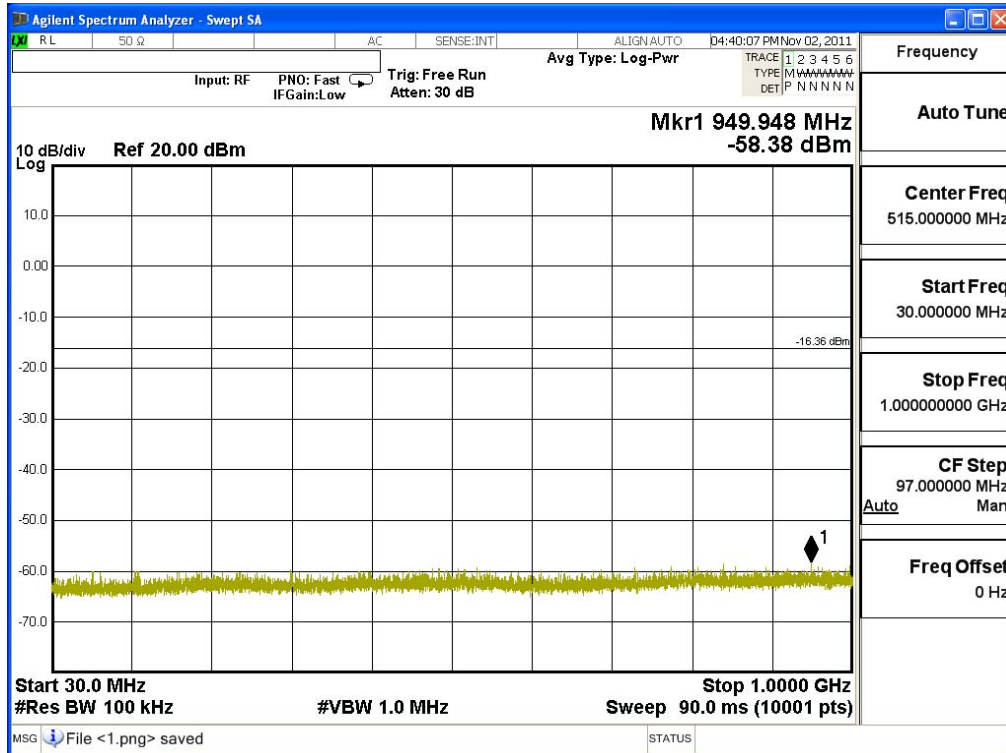
Channel 11 (2462MHz) 30MHz -25GHz-Chain A

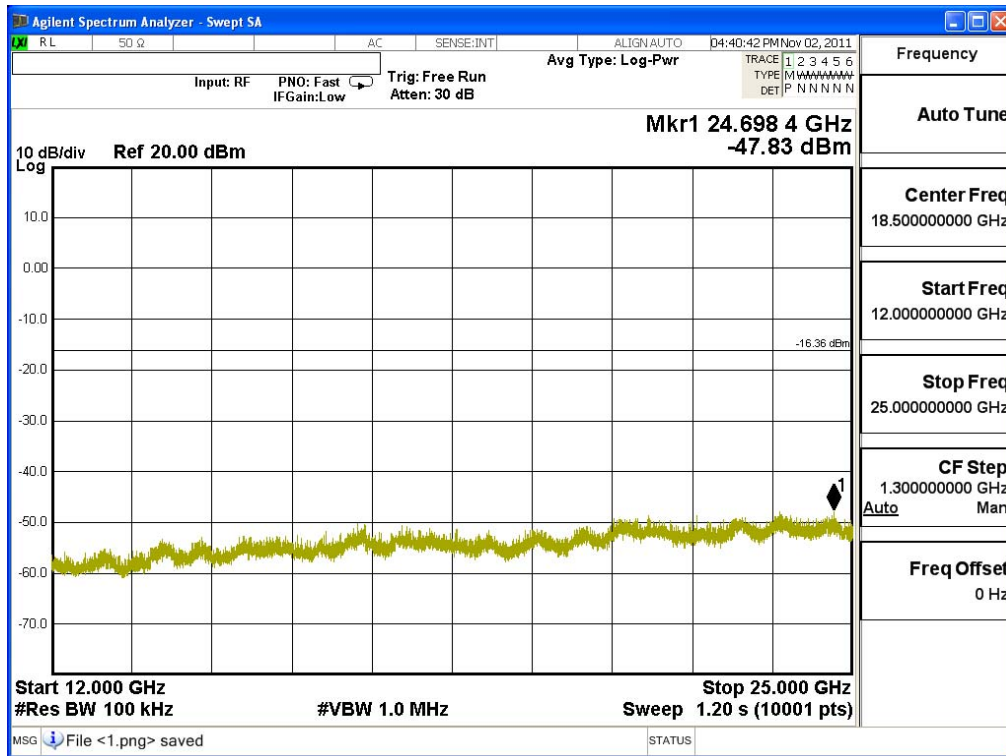
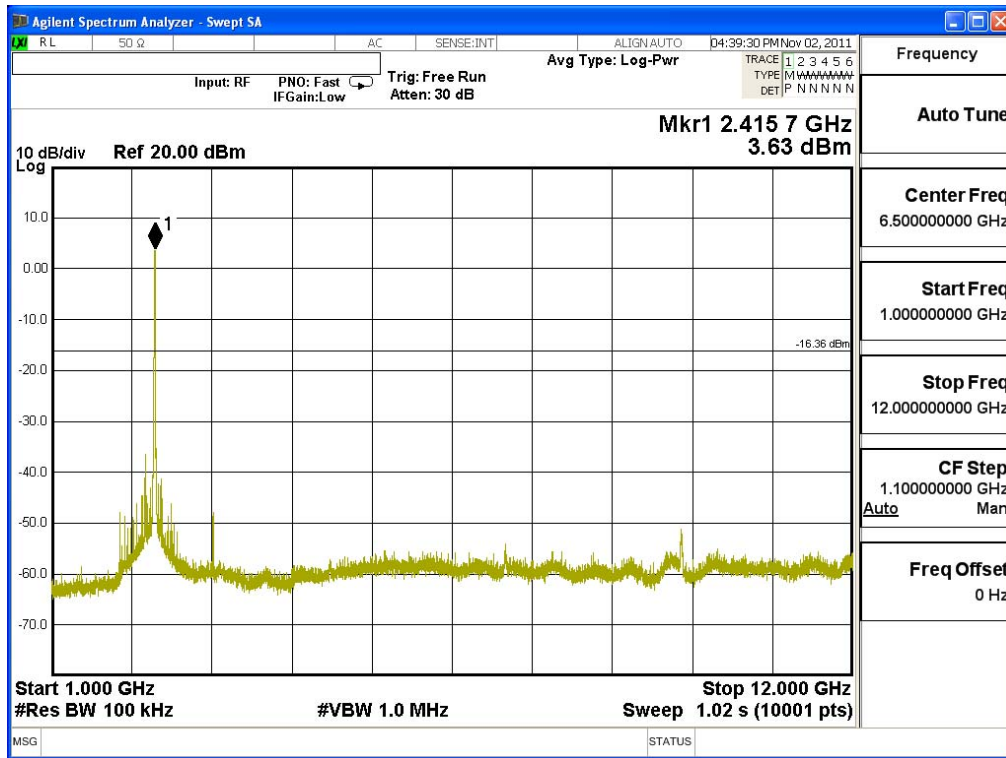




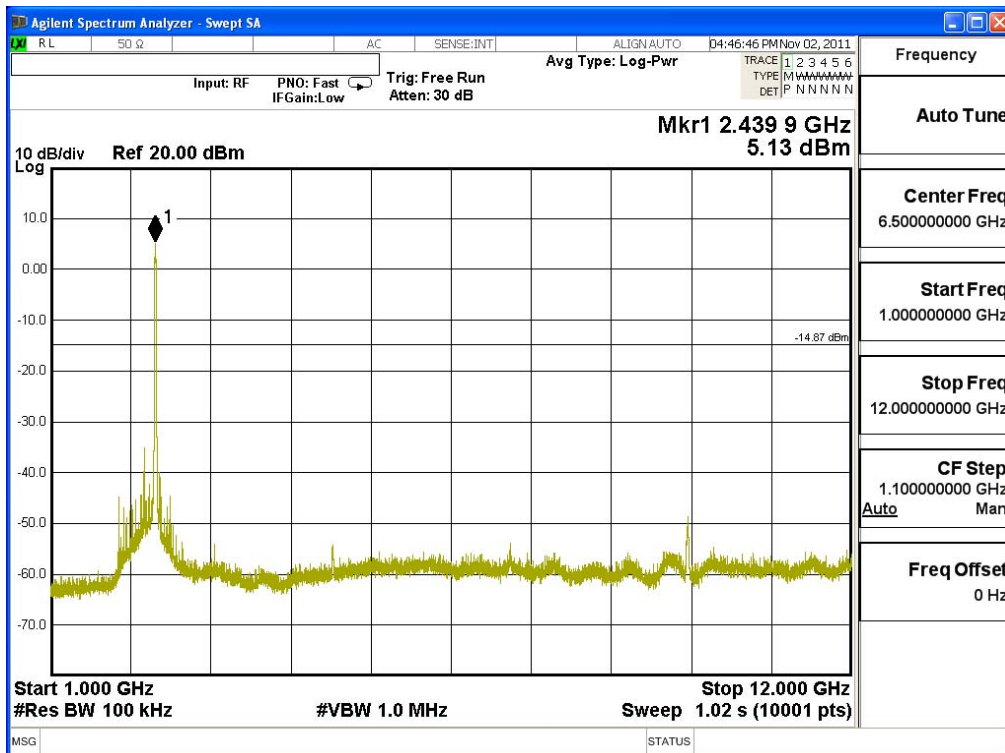
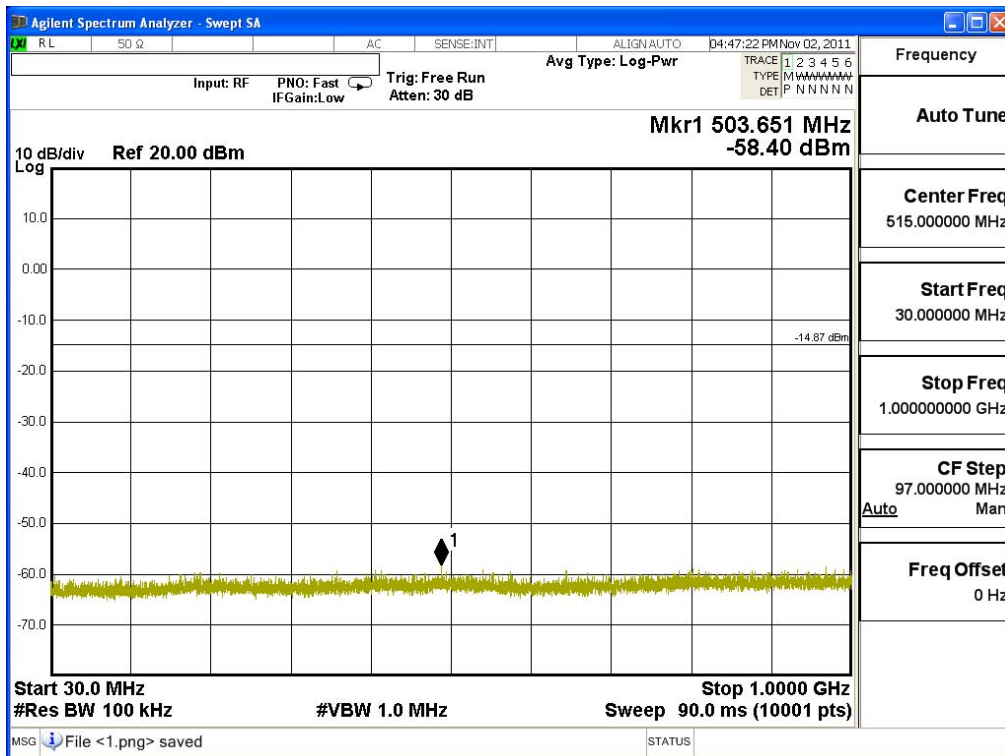
Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : RF Antenna Conducted Spurious
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps

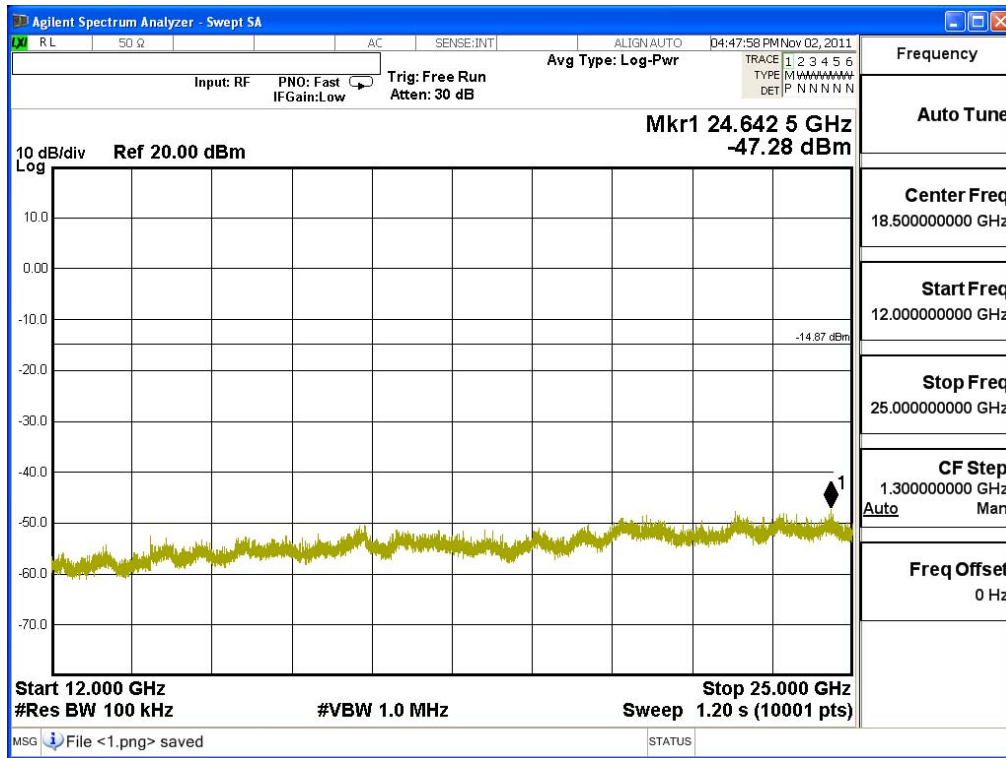
Channel 01 (2412MHz) 30MHz -25GHz-Chain A



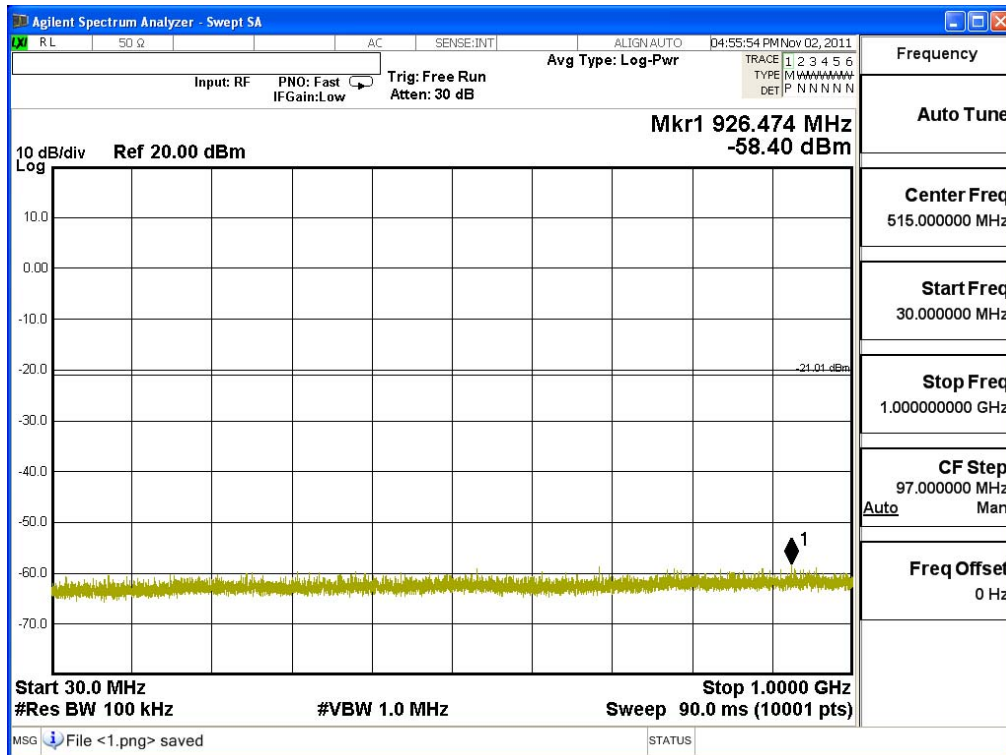


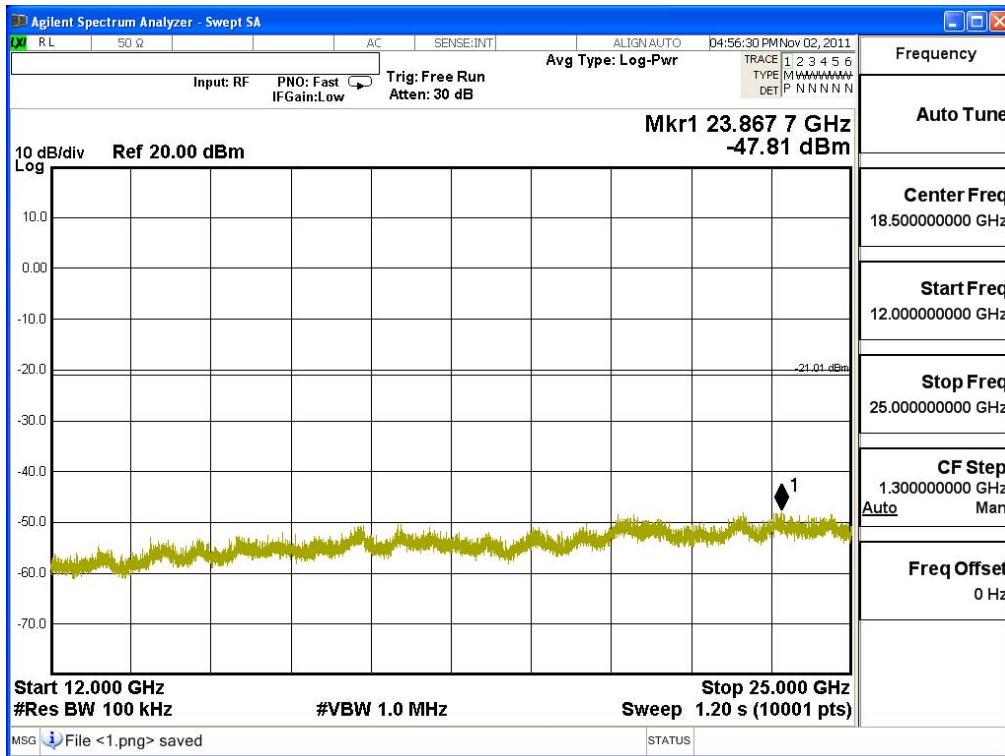
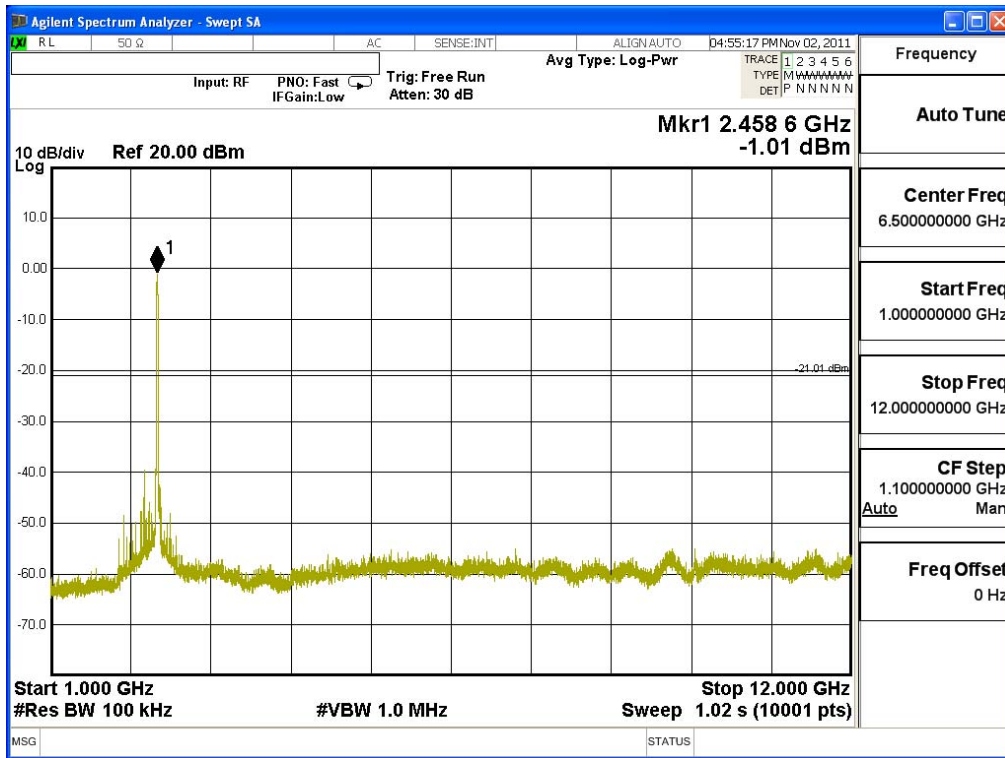
Channel 06 (2437MHz) 30MHz -25GHz-Chain A





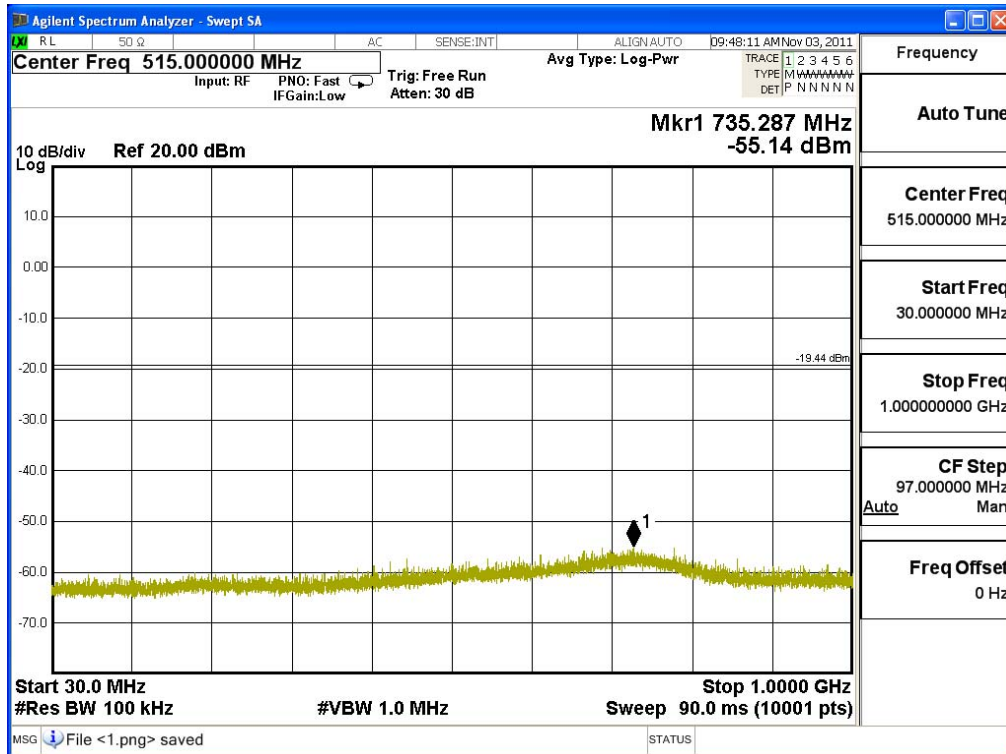
Channel 11 (2462MHz) 30MHz -25GHz-Chain A

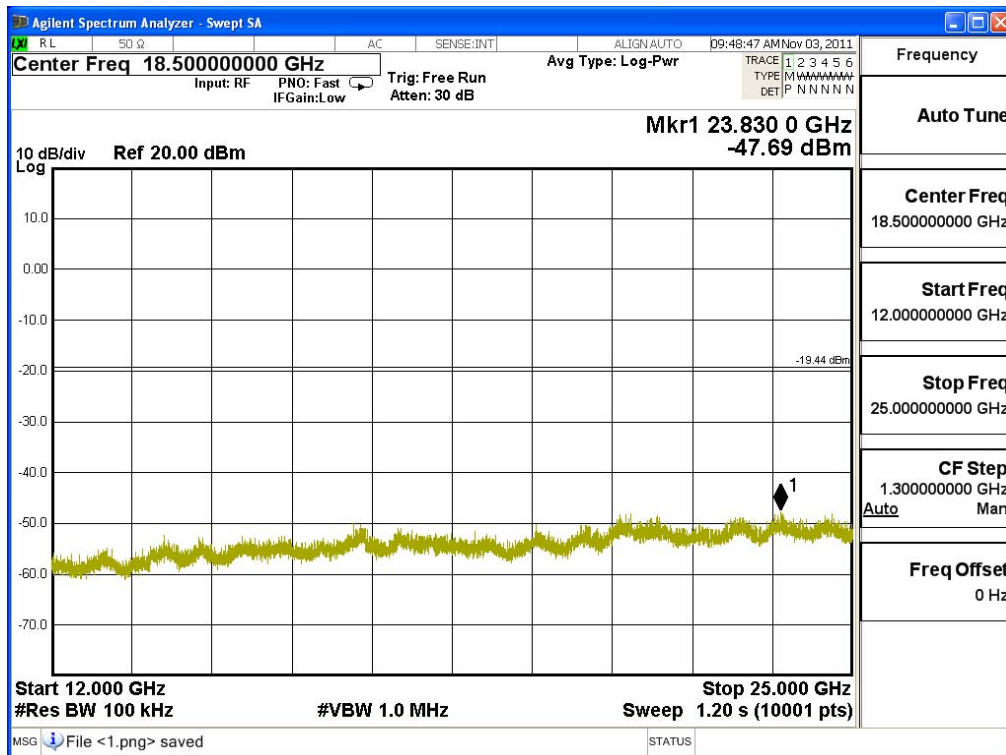
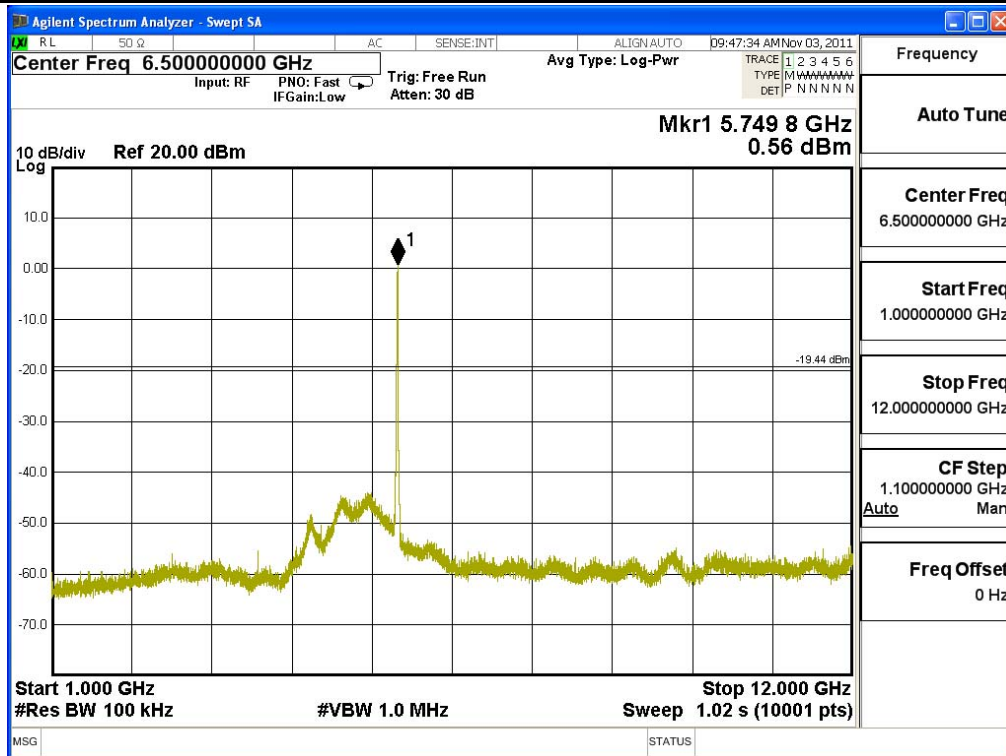


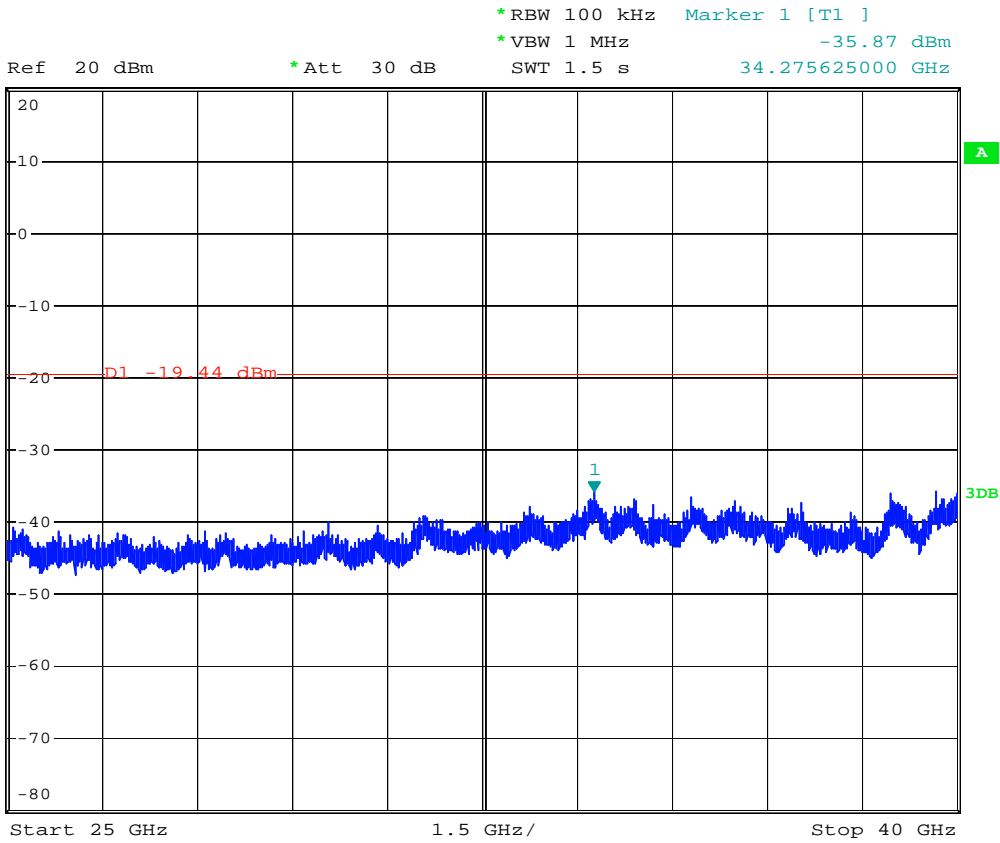


Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 Test Item : RF Antenna Conducted Spurious
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmit - 802.11a 6Mbps

Channel 149 (5745MHz) 30MHz -40GHz-Chain A

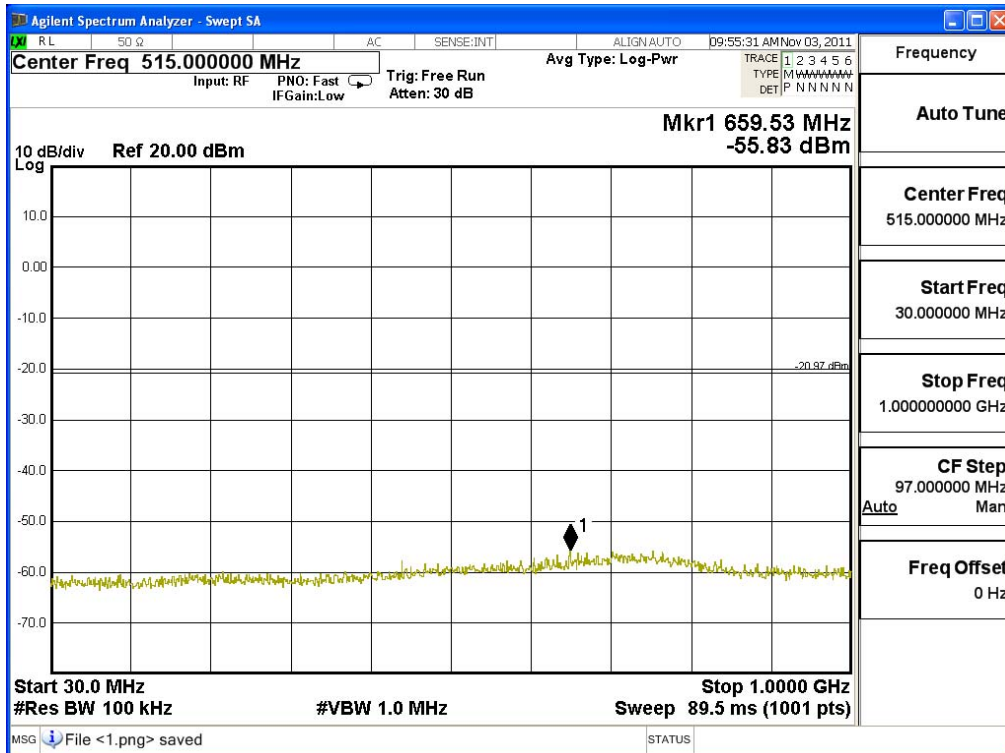


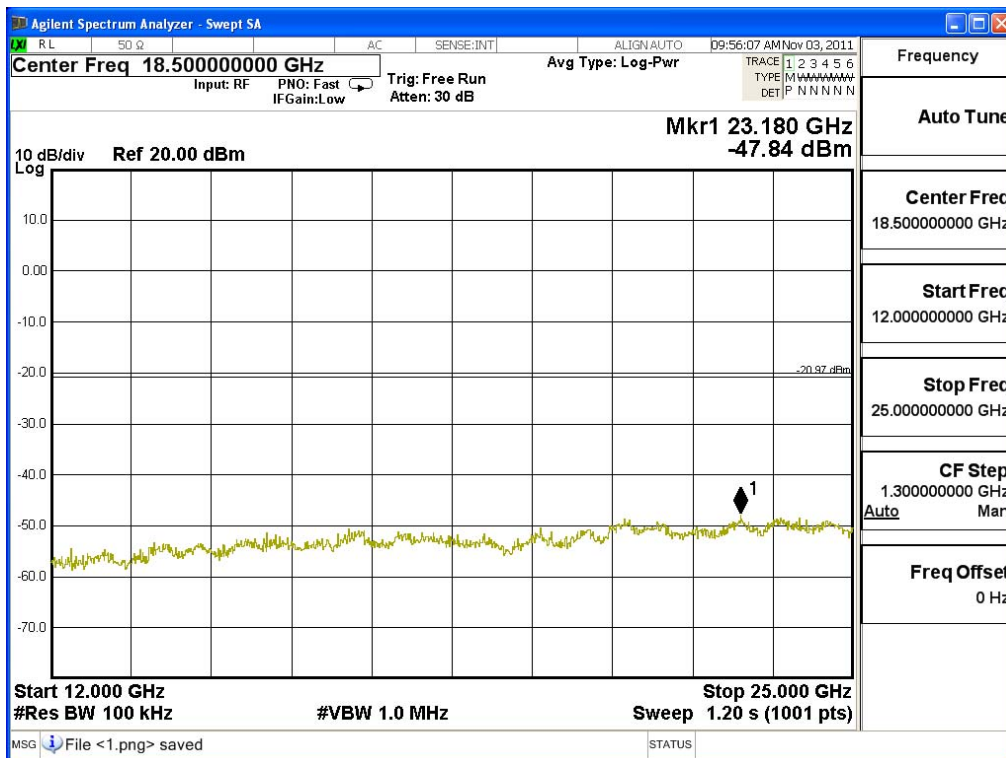
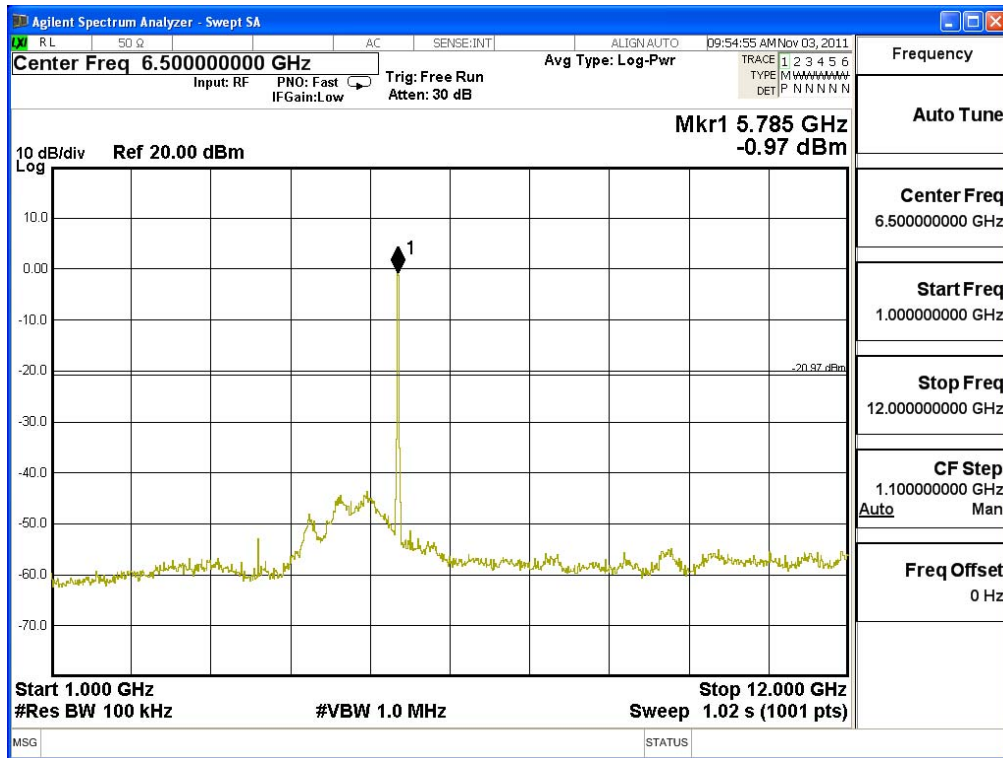




Date: 30.NOV.2011 08:29:10

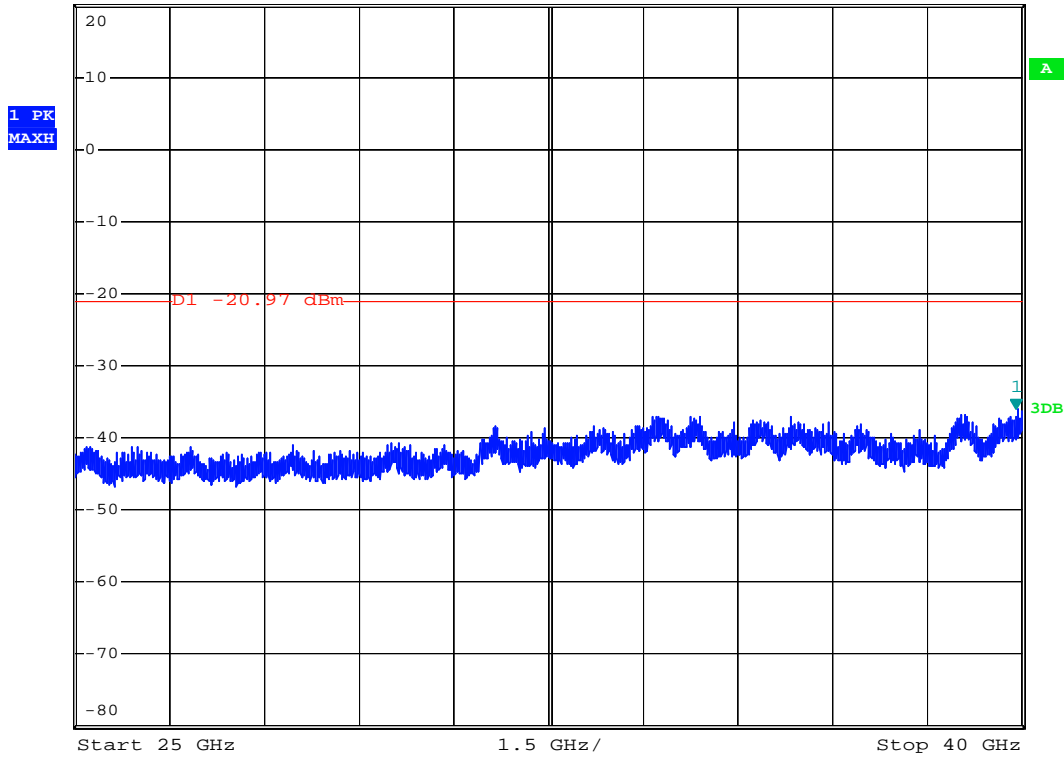
Channel 157 (5785MHz) 30MHz -40GHz-Chain A





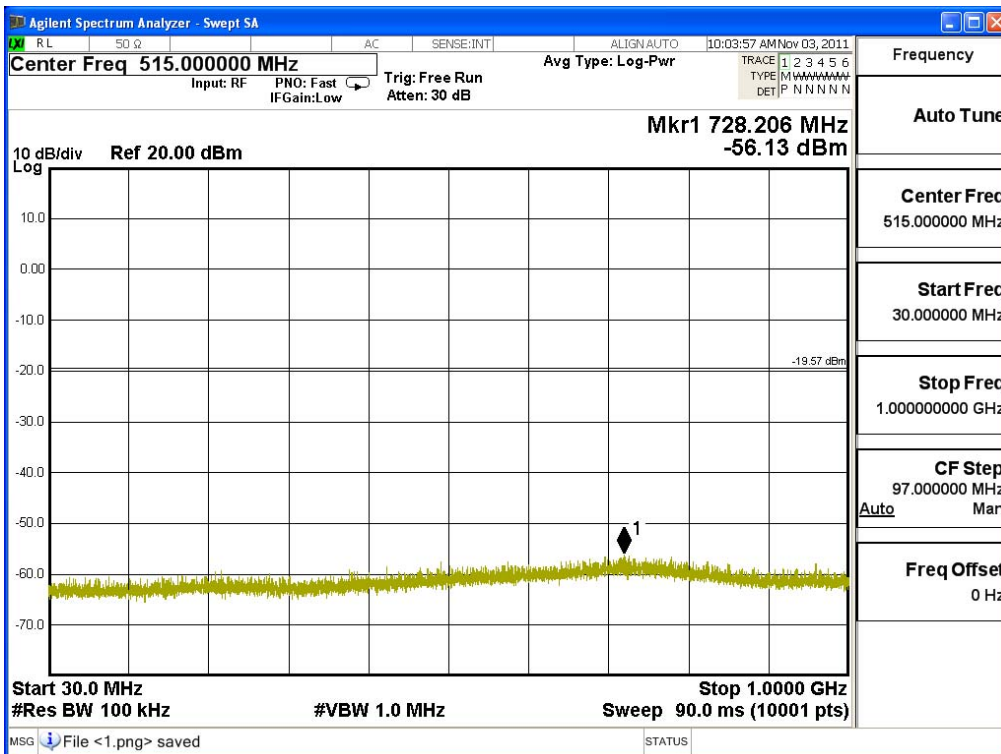


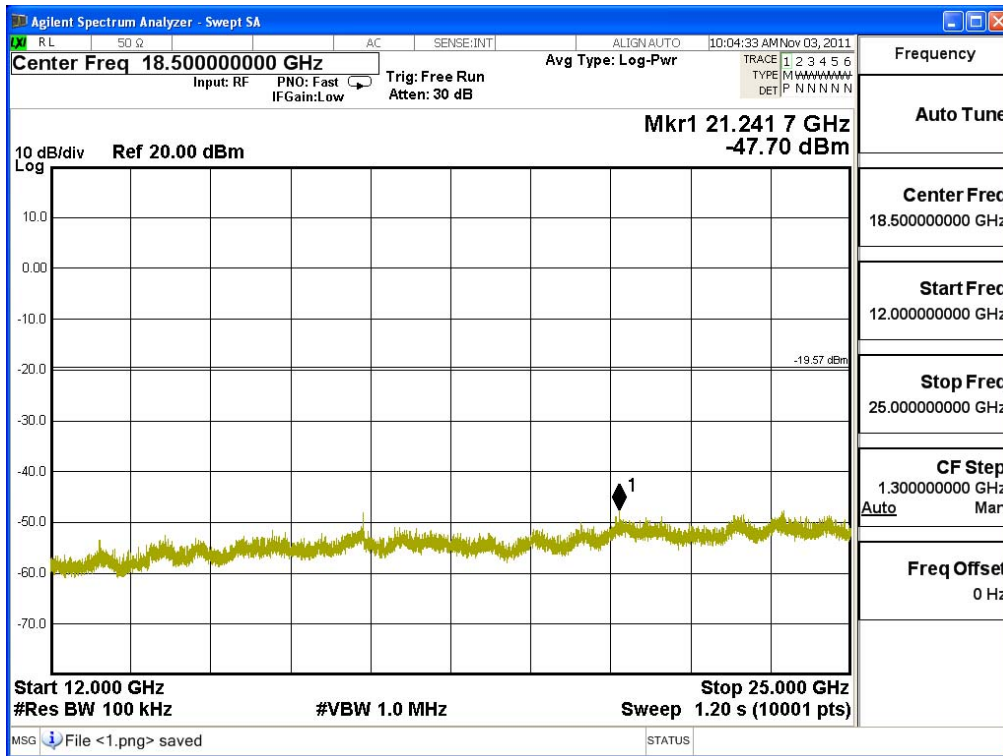
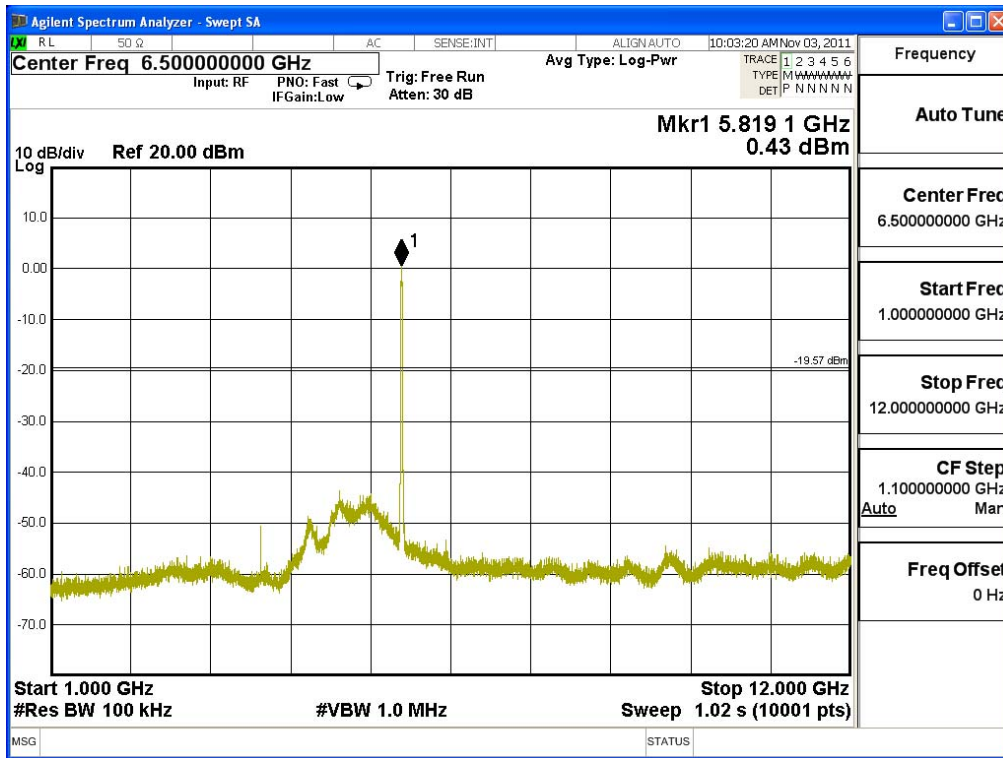
*RBW 100 kHz Marker 1 [T1]
 *VBW 1 MHz -36.03 dBm
 Ref 20 dBm SWT 1.5 s 39.913750000 GHz



Date: 30.NOV.2011 08:26:21

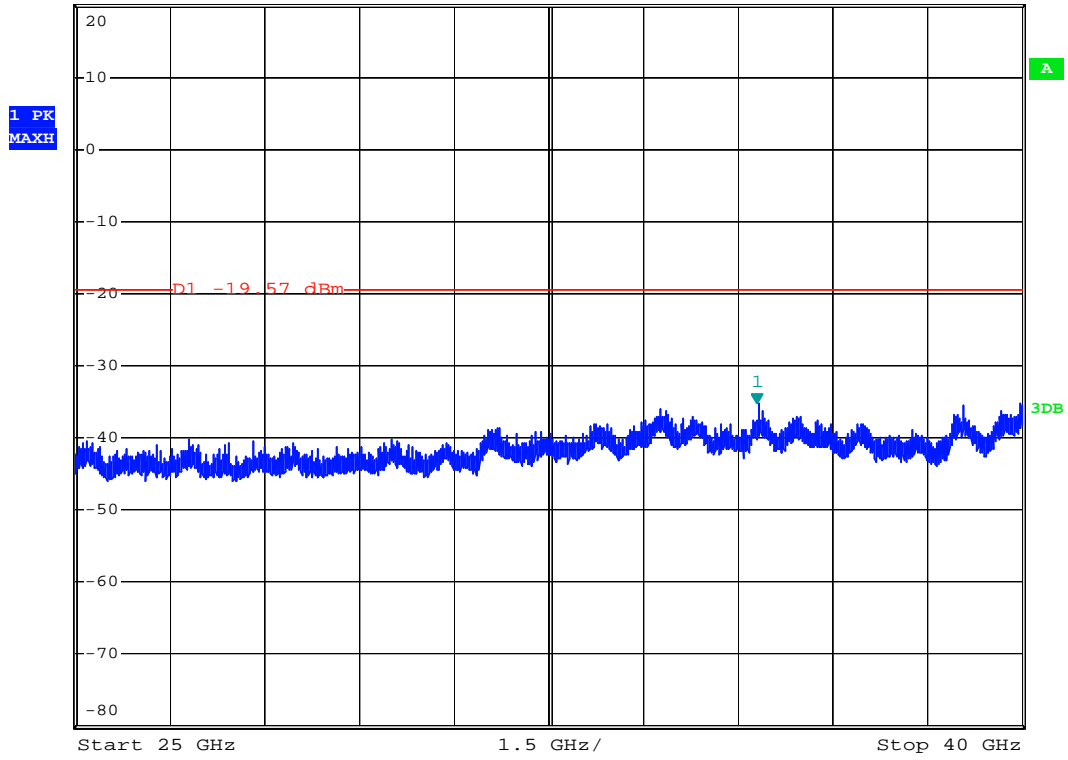
Channel 165 (5825MHz) 30MHz -40GHz-Chain A







Ref 20 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
*VBW 1 MHz -35.36 dBm
SWT 1.5 s 35.813125000 GHz



Date: 30.NOV.2011 08:27:48

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
 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-Chain A

