FCC Test Report

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

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

Date of Receipt	June 11, 2015
Issued Date	Aug. 05, 2015
Report No.	1560344R-RFUSP48V00
Report Version	V1.0

Testing Laboratory
3023

Test Report

Issued Date: Aug. 05, 2015
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Applicant	MOXA Inc.
Address	FL.4, NO. 135. LANE 235, BAOQIAO RD. XINDIAN DIST.,NEW TAIPEI CITY, TAIWAN
Manufacturer	MOXA Inc.
Model No.	WAPN008
FCC ID.	SLE-WAPN008
EUT Rated Voltage	DC 3.3V
EUT Test Voltage	AC 120V/60Hz
Trade Name	MOXA
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2014 ANSI C63.4: 2014, ANSI C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v01
Test Result	Complied

Documented By : Genie Chang

(Senior Adm. Specialist / Genie Chang)

Tested By : Benjamin Pan

(Engineer / Benjamin Pan)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	MOXA IEEE 802.11 a/b/g/n
Trade Name	MOXA
FCC ID.	SLE-WAPN008
Model No.	WAPN008
Frequency Range	802.11a/n-20MHz: 5180-5320MHz, 5500-5700MHz, 5745-5825MHz 802.11n-40MHz: 5190-5310, 5510-5670MHz, 5755-5795MHz0
Number of Channels	802.11a/n-20MHz: 24; 802.11n-40MHz: 11
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 300Mbps
Channel Control	Auto
Type of Modulation	802.11a/n:OFDM, BPSK, QPSK, 16QAM, 64QAM
Antenna type	Dipole Antenna
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	KINSUN	ANT-WDB-O-2 BK	Dipole	2.34dBi For 5.15~5.35GHz 2.34dBi For 5.47~5.725GHz
2	KINSUN	ANT-WDB-ANM-0502	Dipole	1.41dBi For 5.15~5.35GHz 1.41dBi For 5.47~5.725GHz

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.

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

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 36:	5180 MHz	Channel 40:	5200 MHz	Channel 44:	5220 MHz	Channel 48:	5240 MHz
Channel 52:	5260 MHz	Channel 56:	5280 MHz	Channel 60:	5300 MHz	Channel 64:	5320 MHz
Channel 100:	5500 MHz	Channel 104:	5520 MHz	Channel 108:	5540 MHz	Channel 112:	5560 MHz
Channel 116:	5580 MHz	Channel 120:	5600 MHz	Channel 124:	5620 MHz	Channel 128:	5640 MHz
Channel 132:	5660 MHz	Channel 136:	5680 MHz	Channel 140:	5700 MHz	Channel 149:	5745 MHz
Channel 153:	5765 MHz	Channel 157:	5785 MHz	Channel 161:	5805 MHz	Channel 165:	5825 MHz

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

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 38:	5190 MHz	Channel 46:	5230 MHz	Channel 54:	5270 MHz	Channel 62:	5310 MHz
Channel 102:	5510 MHz	Channel 110:	5550 MHz	Channel 118:	5590 MHz	Channel 126:	5630 MHz
Channel 134:	5670 MHz	Channel 151:	5755 MHz	Channel 159:	5795 MHz		

Note:

1. This device is a MOXA IEEE 802.11 a/b/g/n with a built-in 802.11a/b/g/n WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report. (802.11a is chain A)
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps、802.11n-20BW is 14.4Mbps、802.11n-40BW is 30Mbps)
5. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.
6. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit (802.11a-6Mbps) Mode 2: Transmit (802.11n-20BW 14.4Mbps) Mode 3: Transmit (802.11n-40BW 30Mbps)

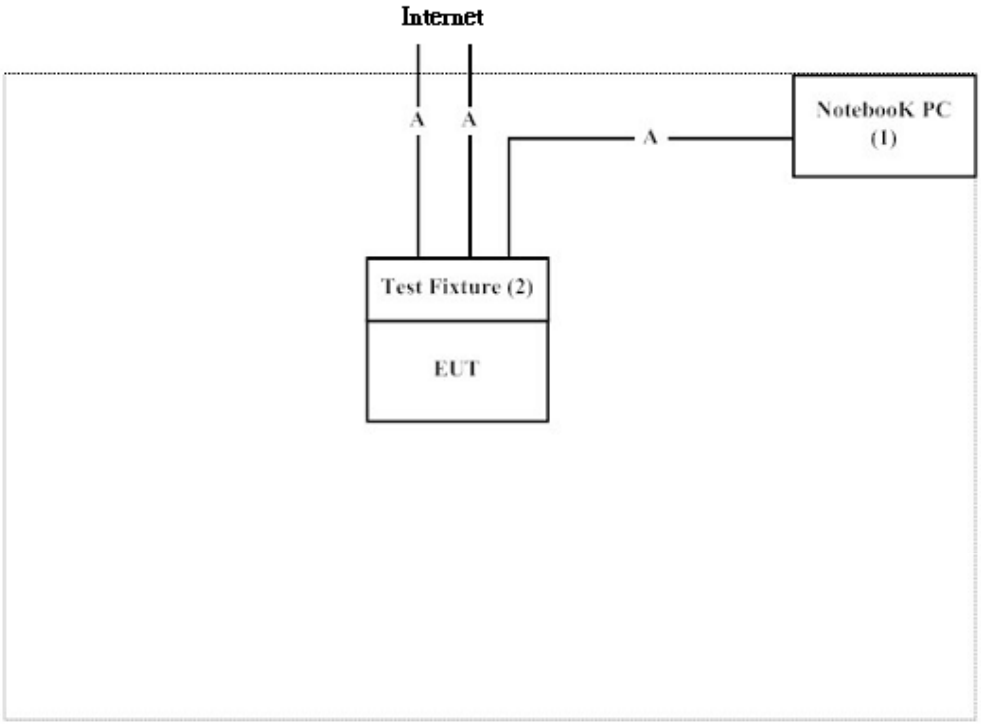
1.3. Tested System Datails

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

Product		Manufacturer	Model No.	Serial No.	Power Cord
(1)	Notebook PC	DELL	PPT	N/A	Non-Shielded, 1.8m
(2)	Test Fixture	MOXA	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A	RJ-45 Cable	Shielded, 1.8m, three PCS.

1.4. Configuration of tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown on 1.4
(2) Execute “ART2-GUI 2.3” program on the EUT.
(3) Configure the test mode, the test channel, and the data rate.
(4) Start the continuous transmission.
(5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

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

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

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

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

Site Name: Quietek Corporation
Site Address: No. 5-22, 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

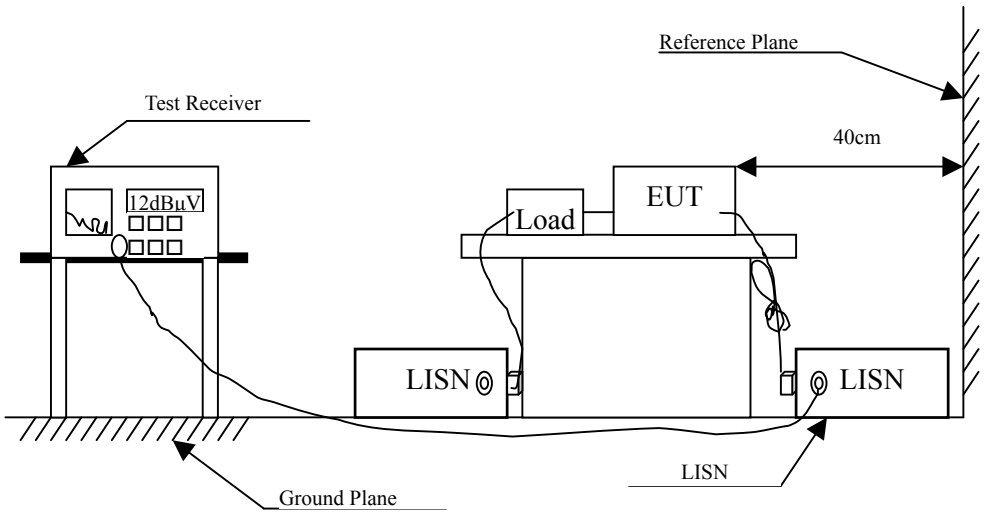
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2014	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2015	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2015	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2015	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2015	
	No.1 Shielded Room				

Note:

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

2.2. Test Setup



2.3. Limits

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

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

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.
The EUT was setup to ANSI C63.4, 2014; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5190MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.150	9.671	35.570	45.241	-20.759	66.000
0.181	9.662	33.100	42.762	-22.352	65.114
0.548	9.679	32.550	42.229	-13.771	56.000
1.576	9.745	20.380	30.125	-25.875	56.000
2.322	9.783	22.640	32.423	-23.577	56.000
18.478	10.048	10.270	20.318	-39.682	60.000
Average					
0.150	9.671	24.050	33.721	-22.279	56.000
0.181	9.662	23.290	32.952	-22.162	55.114
0.548	9.679	30.520	40.199	-5.801	46.000
1.576	9.745	13.090	22.835	-23.165	46.000
2.322	9.783	15.190	24.973	-21.027	46.000
18.478	10.048	1.300	11.348	-38.652	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
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5190MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 2					
Quasi-Peak					
0.181	9.662	31.280	40.942	-24.172	65.114
0.212	9.661	27.940	37.601	-26.628	64.229
0.551	9.680	31.710	41.390	-14.610	56.000
1.986	9.768	22.380	32.148	-23.852	56.000
2.369	9.784	22.370	32.154	-23.846	56.000
4.220	9.836	14.470	24.306	-31.694	56.000
Average					
0.181	9.662	19.430	29.092	-26.022	55.114
0.212	9.661	17.480	27.141	-27.088	54.229
0.551	9.680	28.880	38.560	-7.440	46.000
1.986	9.768	15.290	25.058	-20.942	46.000
2.369	9.784	14.530	24.314	-21.686	46.000
4.220	9.836	5.210	15.046	-30.954	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 802.11 a/b/g/n
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5270MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.150	9.671	35.510	45.181	-20.819	66.000
0.244	9.663	27.860	37.523	-25.791	63.314
0.552	9.680	32.330	42.010	-13.990	56.000
1.552	9.744	21.870	31.614	-24.386	56.000
2.322	9.783	22.820	32.603	-23.397	56.000
18.646	10.049	12.620	22.669	-37.331	60.000
Average					
0.150	9.671	24.050	33.721	-22.279	56.000
0.244	9.663	20.040	29.703	-23.611	53.314
0.552	9.680	28.820	38.500	-7.500	46.000
1.552	9.744	16.450	26.194	-19.806	46.000
2.322	9.783	14.910	24.693	-21.307	46.000
18.646	10.049	2.290	12.339	-37.661	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
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5270MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 2					
Quasi-Peak					
0.154	9.670	35.710	45.380	-20.506	65.886
0.181	9.662	31.220	40.882	-24.232	65.114
0.552	9.680	31.460	41.140	-14.860	56.000
1.556	9.744	20.660	30.404	-25.596	56.000
2.318	9.782	23.000	32.782	-23.218	56.000
18.599	10.169	12.710	22.879	-37.121	60.000
Average					
0.154	9.670	22.390	32.060	-23.826	55.886
0.181	9.662	19.390	29.052	-26.062	55.114
0.552	9.680	28.070	37.750	-8.250	46.000
1.556	9.744	14.740	24.484	-21.516	46.000
2.318	9.782	15.170	24.952	-21.048	46.000
18.599	10.169	3.560	13.729	-36.271	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
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5550MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.150	9.671	35.690	45.361	-20.639	66.000
0.177	9.663	27.340	37.003	-28.226	65.229
0.552	9.680	32.270	41.950	-14.050	56.000
1.548	9.744	21.330	31.074	-24.926	56.000
2.353	9.783	22.550	32.333	-23.667	56.000
4.209	9.835	16.040	25.875	-30.125	56.000
Average					
0.150	9.671	24.150	33.821	-22.179	56.000
0.177	9.663	16.940	26.603	-28.626	55.229
0.552	9.680	28.350	38.030	-7.970	46.000
1.548	9.744	15.210	24.954	-21.046	46.000
2.353	9.783	14.860	24.643	-21.357	46.000
4.209	9.835	7.290	17.125	-28.875	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 802.11 a/b/g/n
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5550MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 2					
Quasi-Peak					
0.154	9.670	35.510	45.180	-20.706	65.886
0.185	9.661	30.900	40.561	-24.439	65.000
0.548	9.679	31.610	41.289	-14.711	56.000
1.580	9.746	19.610	29.356	-26.644	56.000
2.345	9.783	22.970	32.753	-23.247	56.000
18.353	10.167	13.850	24.017	-35.983	60.000
Average					
0.154	9.670	22.250	31.920	-23.966	55.886
0.185	9.661	18.960	28.621	-26.379	55.000
0.548	9.679	29.480	39.159	-6.841	46.000
1.580	9.746	13.150	22.896	-23.104	46.000
2.345	9.783	15.260	25.043	-20.957	46.000
18.353	10.167	4.000	14.167	-35.833	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. Maximun conducted output power

3.1. Test Equipment

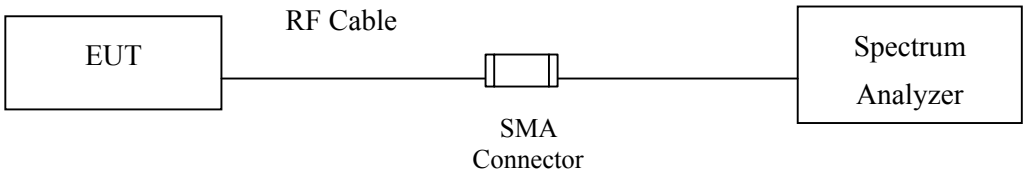
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2015
X	Power Sensor	Anritsu	MA2411B/0738448	Jun., 2015
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

Note:

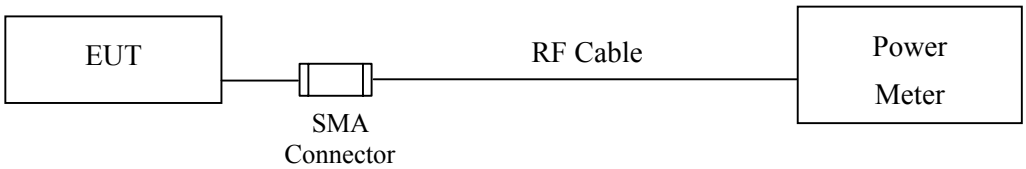
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

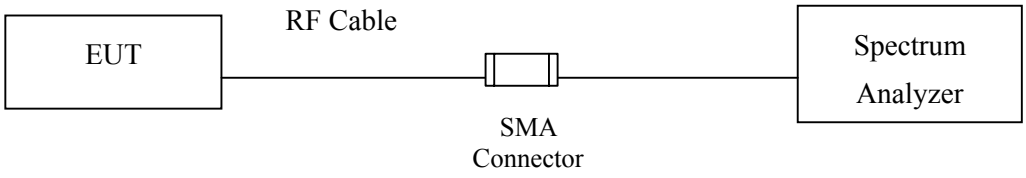
26dBc Occupied Bandwidth



Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac)



3.3. Limits

3.3.1. For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.3. For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any

corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.4. Test Procedure

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater the 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW≦40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)
Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D01 section F) procedure is used for measurements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Maximum conducted output power

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11a-6Mbps)

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		6	9	12	18	24	36	48	54	
		Measurement Level (dBm)								
36	5180	19.32	--	--	--	--	--	--	--	<24dBm
44	5220	21.74	21.59	21.44	21.38	21.29	21.15	21.05	20.94	<24dBm
48	5240	21.73	--	--	--	--	--	--	--	<24dBm
52	5260	22.12	--	--	--	--	--	--	--	<24dBm
60	5300	22.13	22.01	21.97	21.83	21.74	21.65	21.49	21.34	<24dBm
64	5320	18.92	--	--	--	--	--	--	--	<24dBm
100	5500	16.48	--	--	--	--	--	--	--	<24dBm
116	5580	22.58	22.51	22.42	22.34	22.19	22.03	21.95	21.71	<24dBm
140	5700	15.42	--	--	--	--	--	--	--	<24dBm
149	5745	16.34	--	--	--	--	--	--	--	<30dBm
157	5785	16.19	--	--	--	--	--	--	--	<30dBm
165	5825	17.78	17.62	17.51	17.38	17.25	17.11	17.05	16.95	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

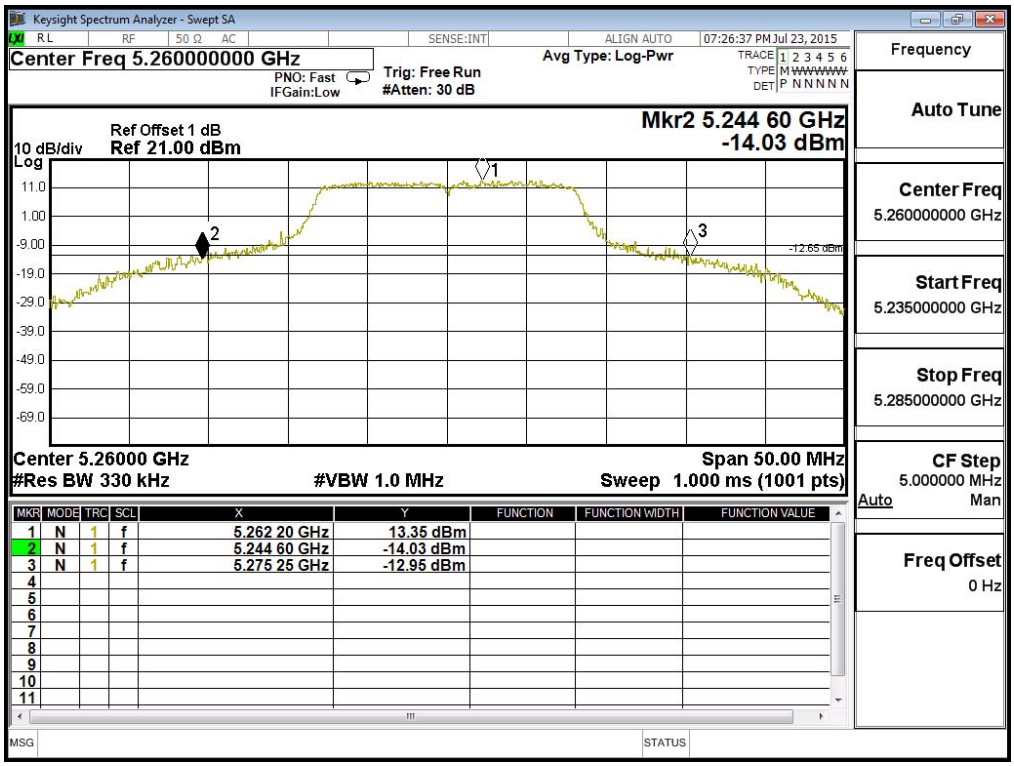
Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	--	19.32	24	--
44	5220	--	21.74	24	--
48	5240	--	21.73	24	--
52	5260	30.650	22.12	24	25.86
60	5300	30.600	22.13	24	25.86
64	5320	22.650	18.92	24	24.55
100	5500	22.000	16.48	24	24.42
116	5580	35.150	22.58	24	26.46
140	5700	22.150	15.42	24	24.45
149	5745	--	16.34	30	--
157	5785	--	16.19	30	--
165	5825	--	17.78	30	--

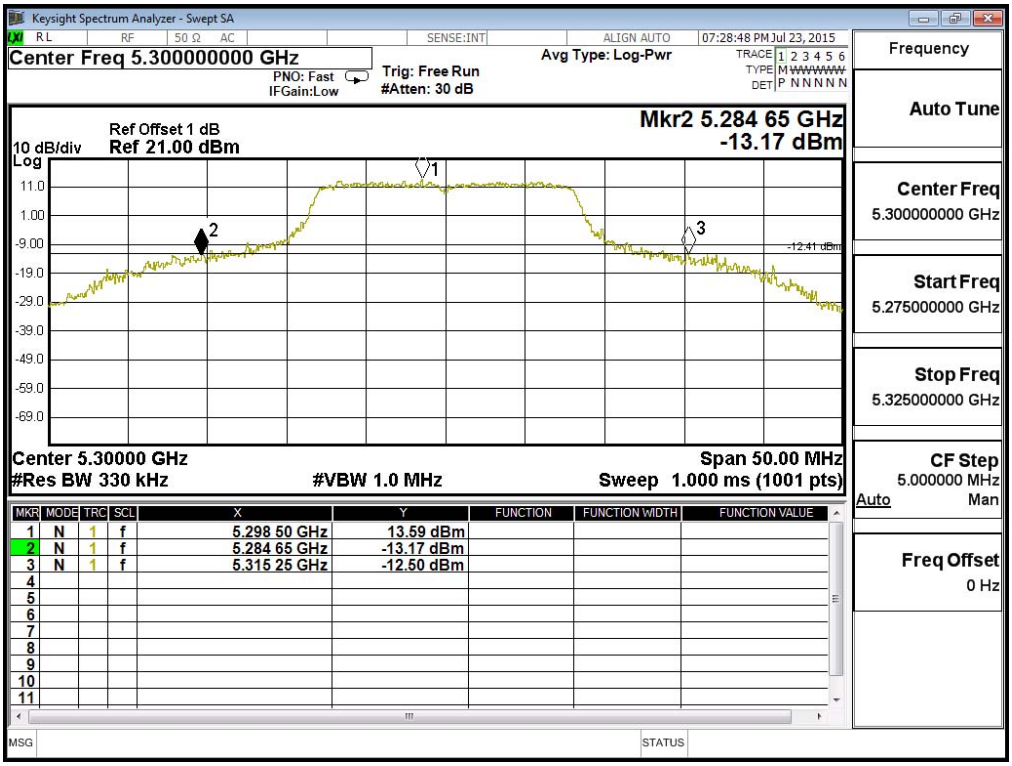
Note:
1. Power Output Value =Reading value on average power meter + cable loss
2. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

26dBc Occupied Bandwidth:

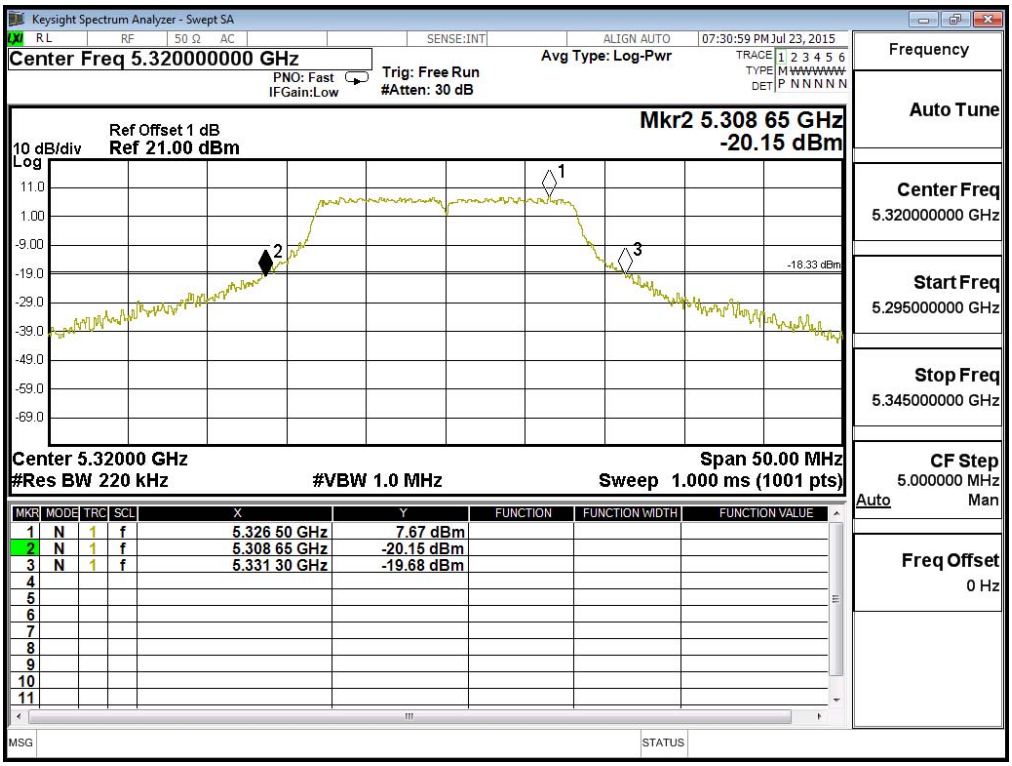
Channel 52:



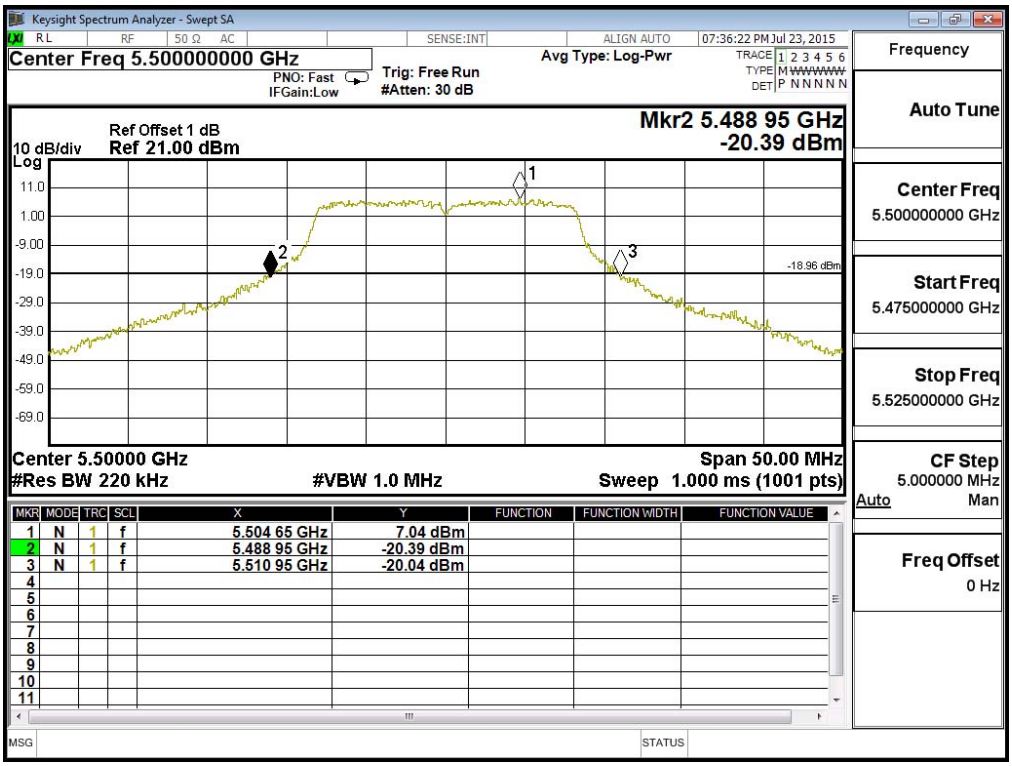
Channel 60:



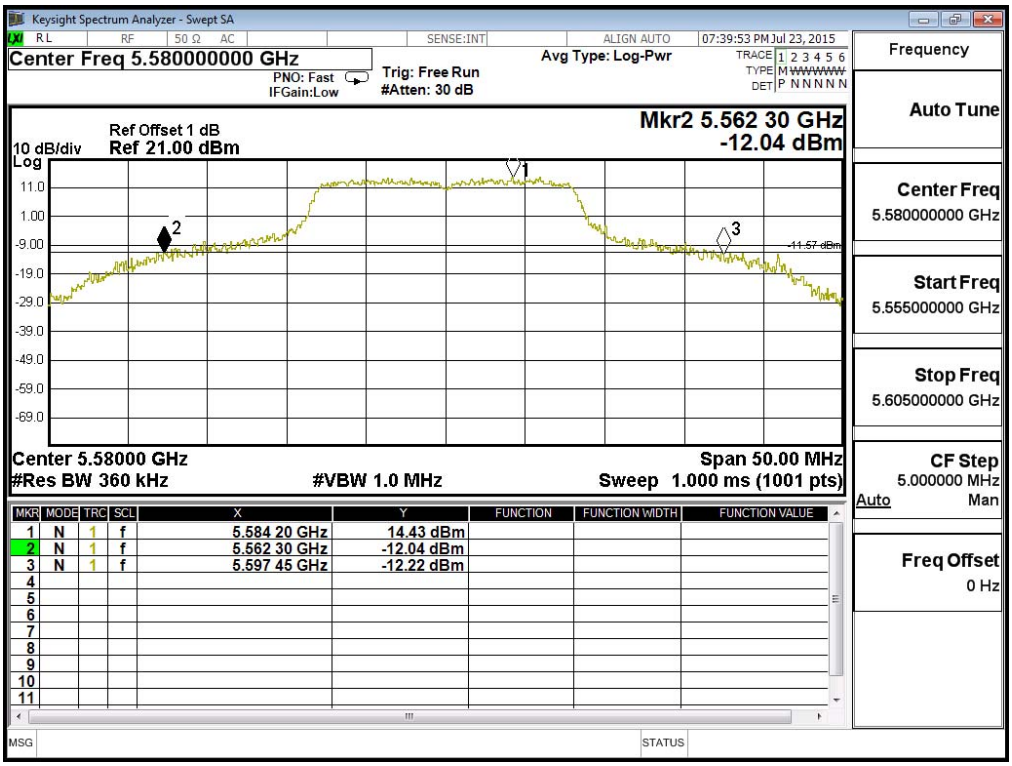
Channel 64:



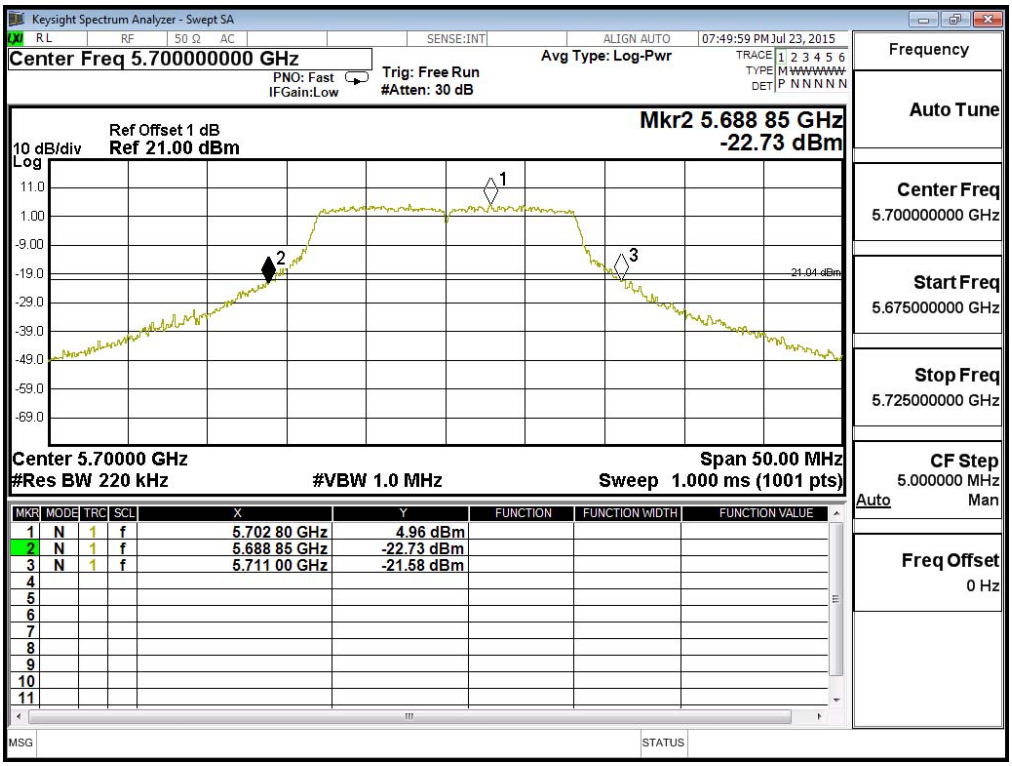
Channel 100:



Channel 116:



Channel 140:



Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps)

CHAIN A

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
		Measurement Level (dBm)								
36	5180	17.76	--	--	--	--	--	--	--	<24dBm
44	5220	18.59	--	--	--	--	--	--	--	<24dBm
48	5240	18.82	18.77	18.62	18.54	18.33	18.19	18.01	17.97	<24dBm
52	5260	19.51	--	--	--	--	--	--	--	<24dBm
60	5300	19.32	--	--	--	--	--	--	--	<24dBm
64	5320	20.02	19.89	19.76	19.68	19.54	19.44	19.35	19.26	<24dBm
100	5500	15.68	--	--	--	--	--	--	--	<24dBm
116	5580	19.68	19.55	19.48	19.37	19.24	19.15	18.99	18.81	<24dBm
140	5700	18.18	--	--	--	--	--	--	--	<24dBm
149	5745	18.02	--	--	--	--	--	--	--	<30dBm
157	5785	20.11	19.97	19.76	19.62	19.54	19.48	19.44	19.39	<30dBm
165	5825	19.89	--	--	--	--	--	--	--	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
		Measurement Level (dBm)								
36	5180	19.11	--	--	--	--	--	--	--	<24dBm
44	5220	19.29	19.18	19.07	18.92	18.84	18.65	18.52	18.44	<24dBm
48	5240	19.18	--	--	--	--	--	--	--	<24dBm
52	5260	19.37	19.22	19.07	18.96	18.85	18.76	18.64	18.55	<24dBm
60	5300	18.65	--	--	--	--	--	--	--	<24dBm
64	5320	19.22	--	--	--	--	--	--	--	<24dBm
100	5500	15.48	--	--	--	--	--	--	--	<24dBm
116	5580	20.1	19.75	19.71	19.6	19.48	19.37	19.29	19.23	<24dBm
140	5700	15.98	--	--	--	--	--	--	--	<24dBm
149	5745	16.02	--	--	--	--	--	--	--	<30dBm
157	5785	17.74	--	--	--	--	--	--	--	<30dBm
165	5825	18.45	18.31	18.22	18.04	17.98	17.86	17.77	17.71	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

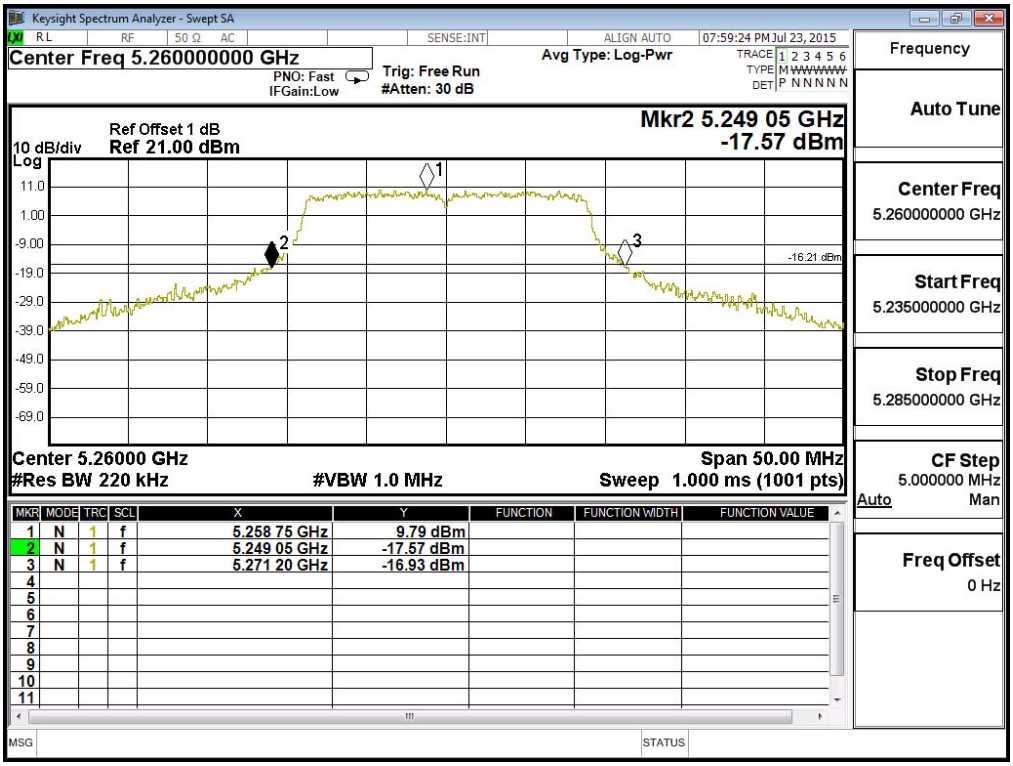
(CHAIN A+ B)

Channel Number	Frequency (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Output Power (dBm)	Output Power Limit	
						(dBm)	dBm+10log(BW)
36	5180	--	17.76	19.11	21.50	24	--
44	5220	--	18.59	19.29	21.96	24	--
48	5240	--	18.82	19.18	22.01	24	--
52	5260	21.700	19.51	19.37	22.45	24	24.36
60	5300	22.050	19.32	18.65	22.01	24	24.43
64	5320	21.600	20.02	19.22	22.65	24	24.34
100	5500	21.700	15.68	15.48	18.59	24	24.36
116	5580	22.400	19.68	20.10	22.91	24	24.50
140	5700	22.150	18.18	15.98	20.23	24	24.45
149	5745	--	18.02	16.02	20.14	30	--
157	5785	--	20.11	17.74	22.10	30	--
165	5825	--	19.89	18.45	22.24	30	--

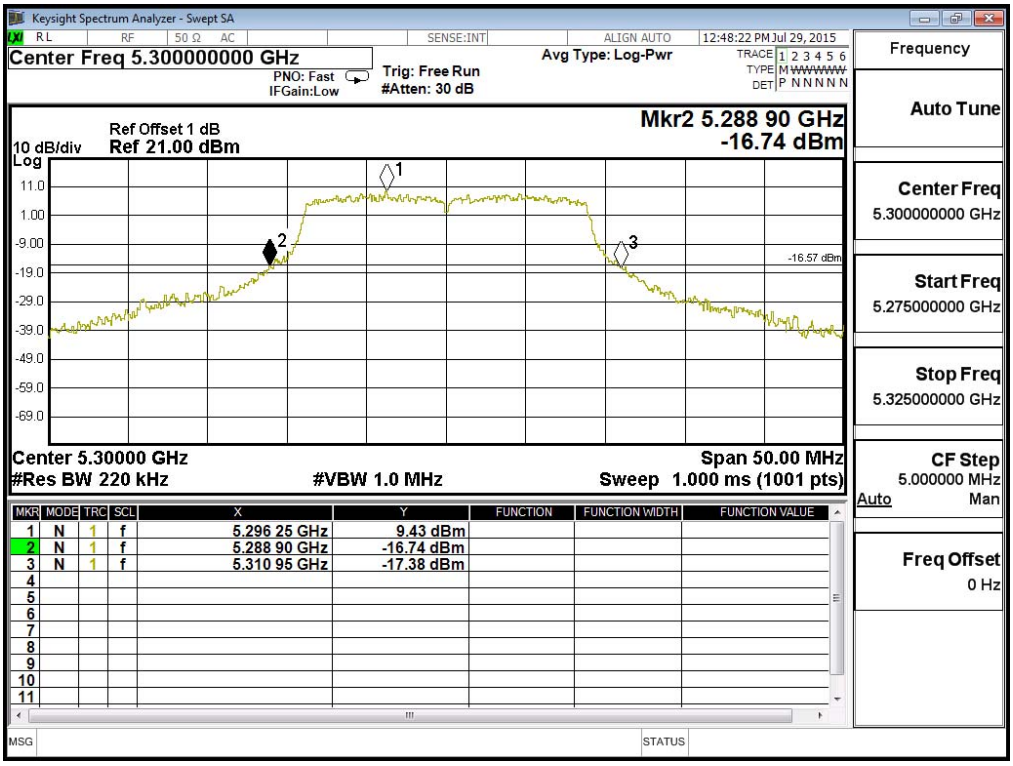
Note:

1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

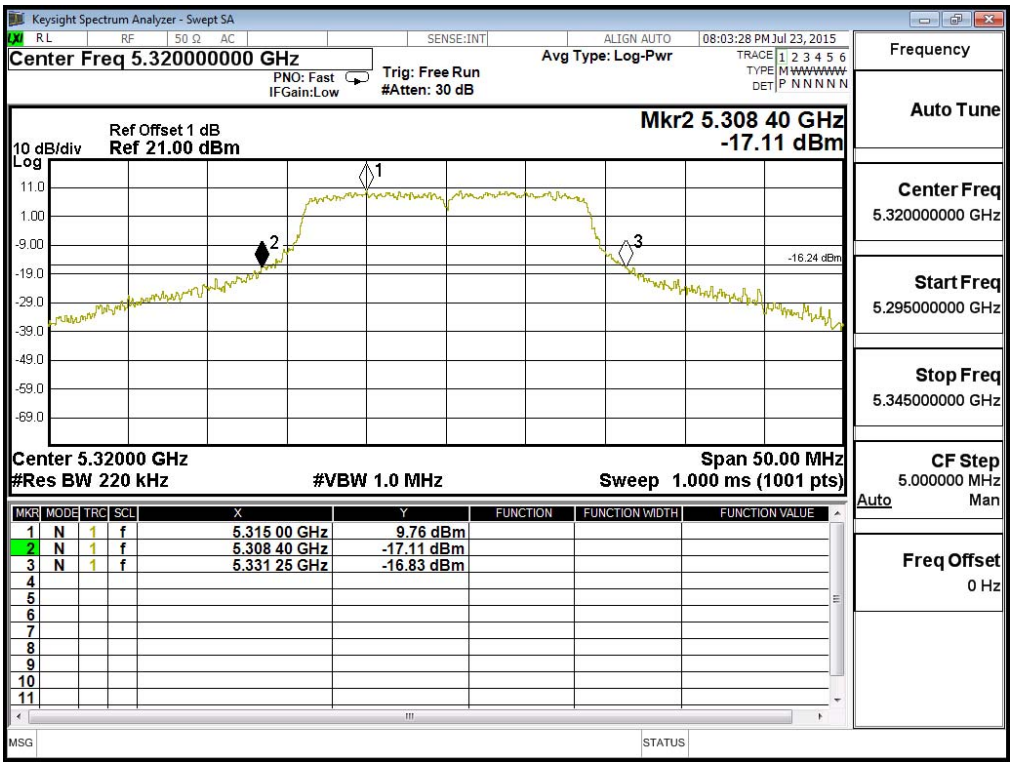
26dBc Occupied Bandwidth:
Channel 52 -Chain A



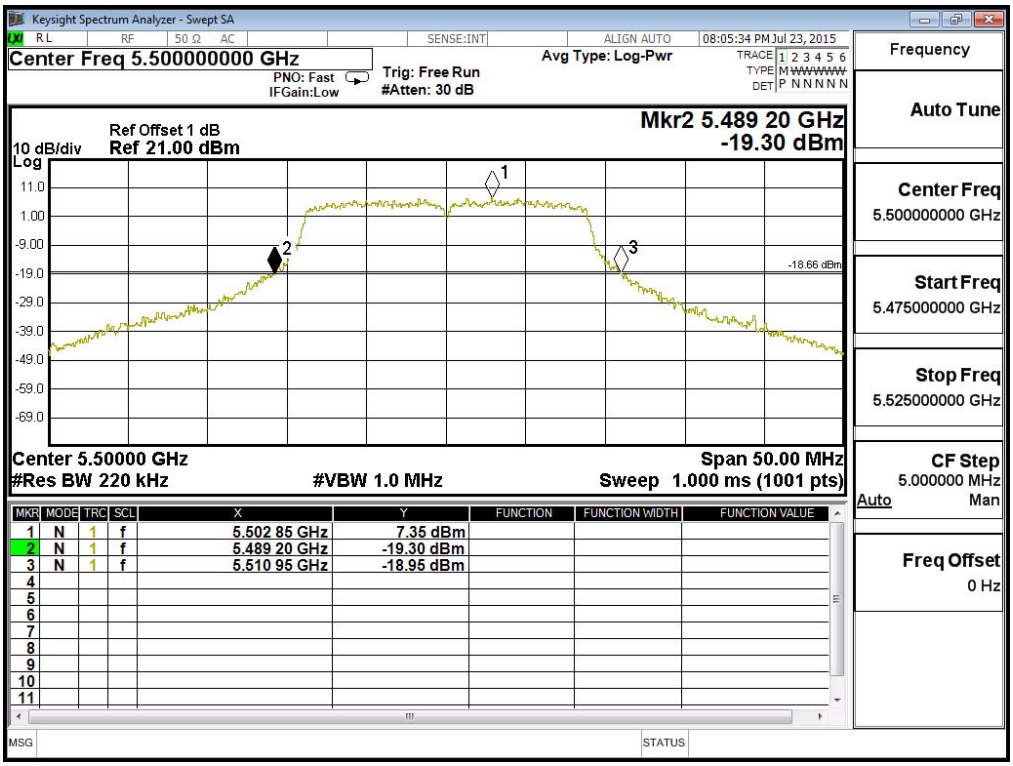
Channel 60 -Chain A



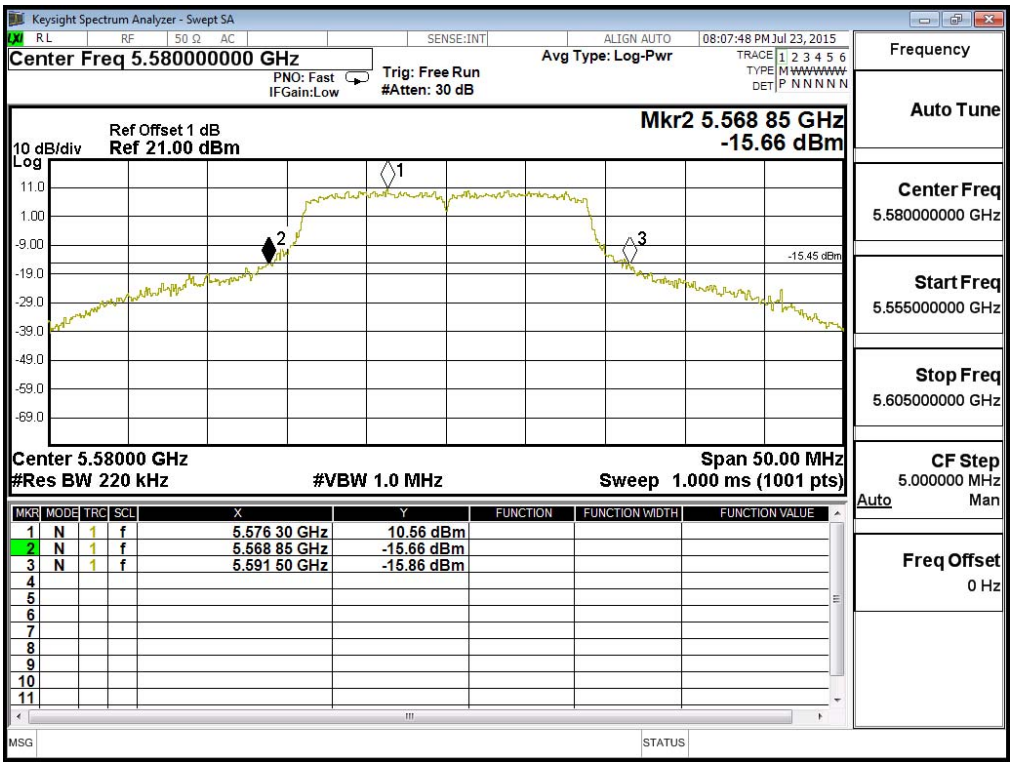
Channel 64 -Chain A



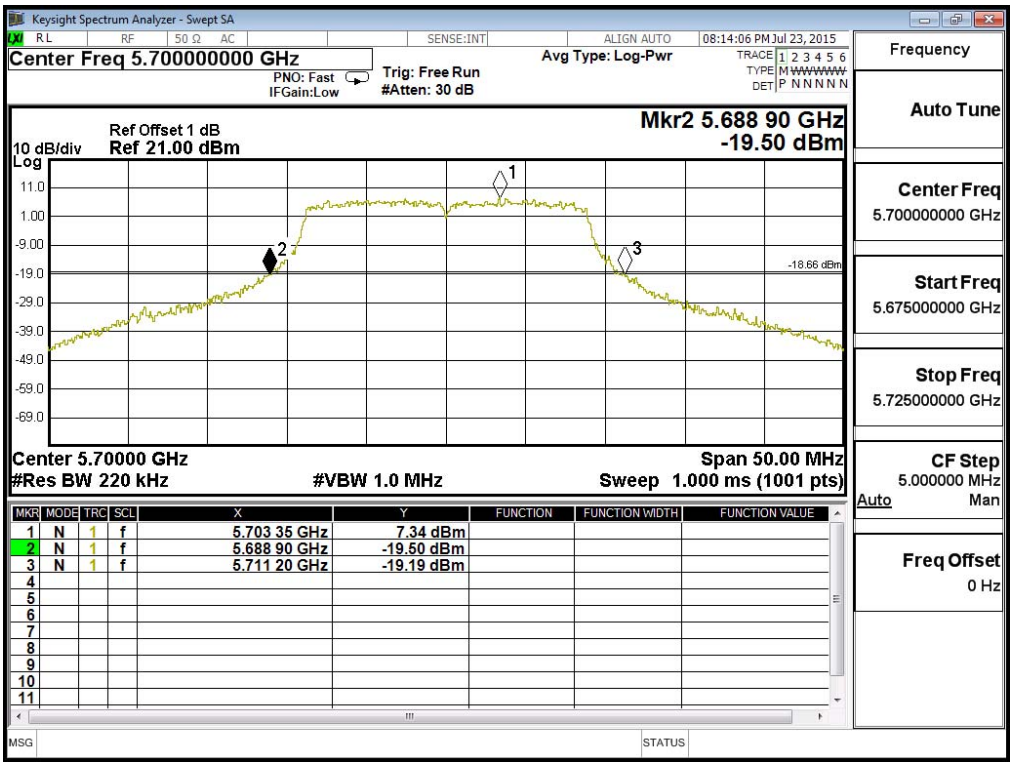
Channel 100 -Chain A



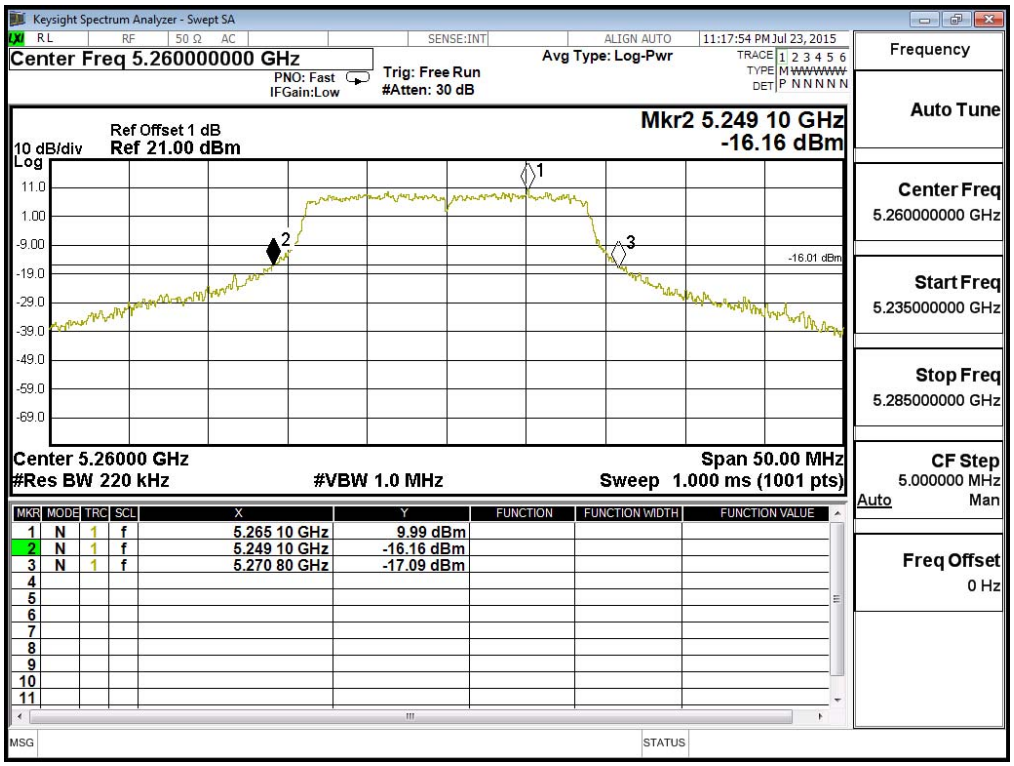
Channel 116 -Chain A



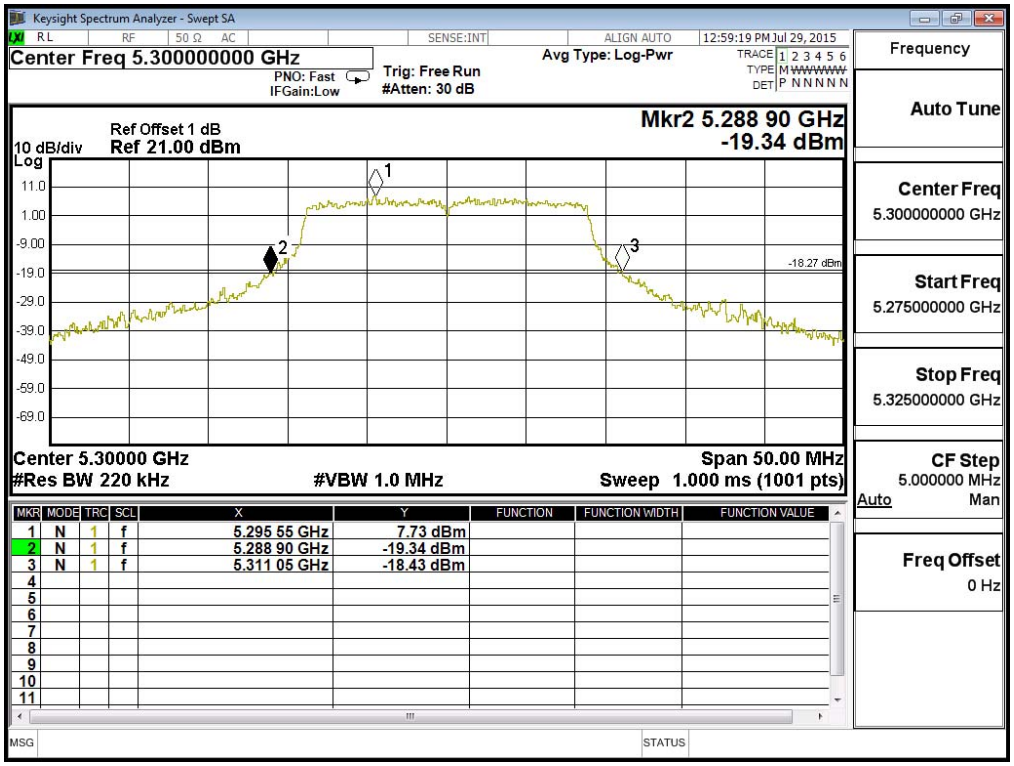
Channel 140 -Chain A



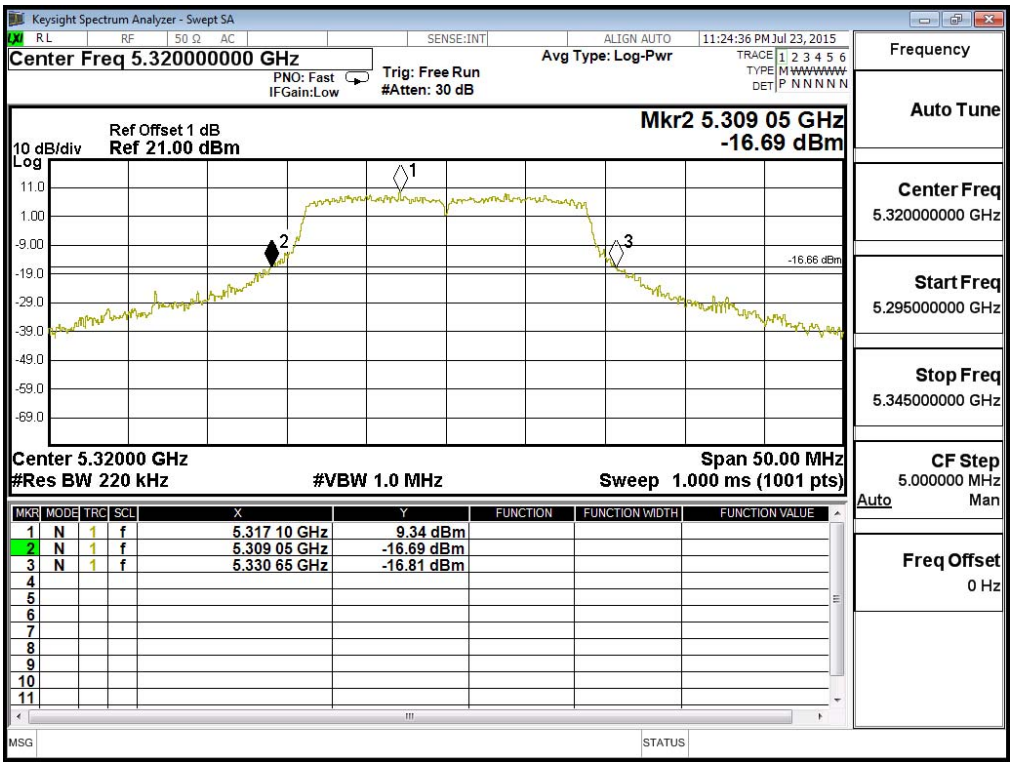
26dBc Occupied Bandwidth:
Channel 52 -Chain B



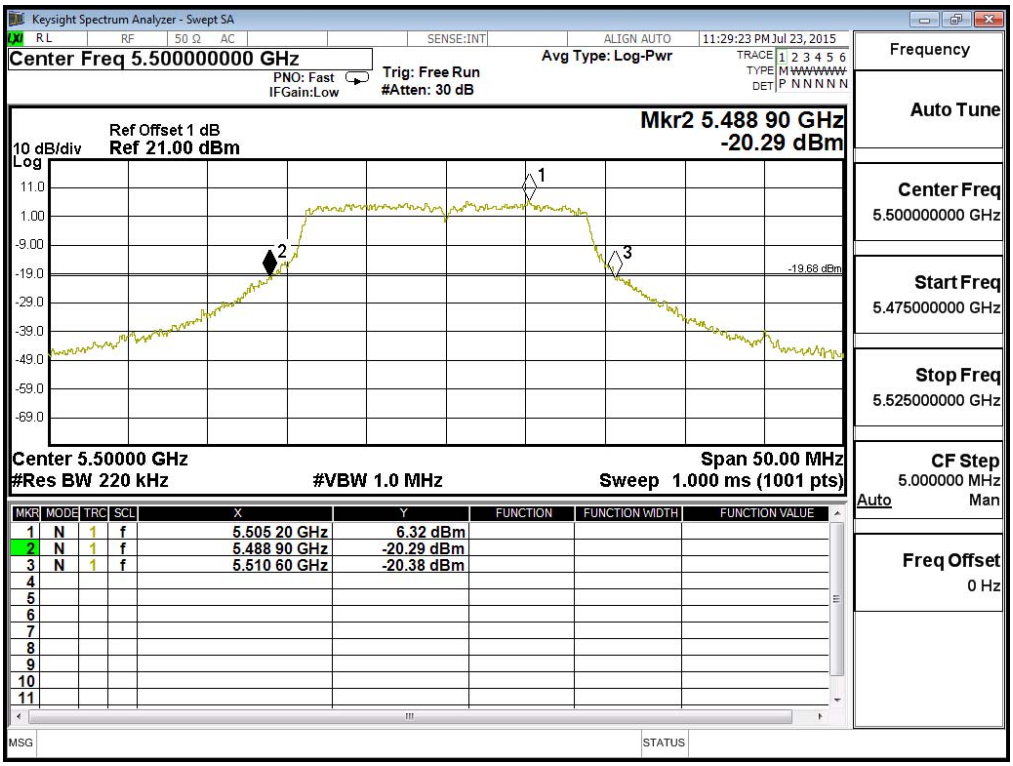
Channel 60 -Chain B



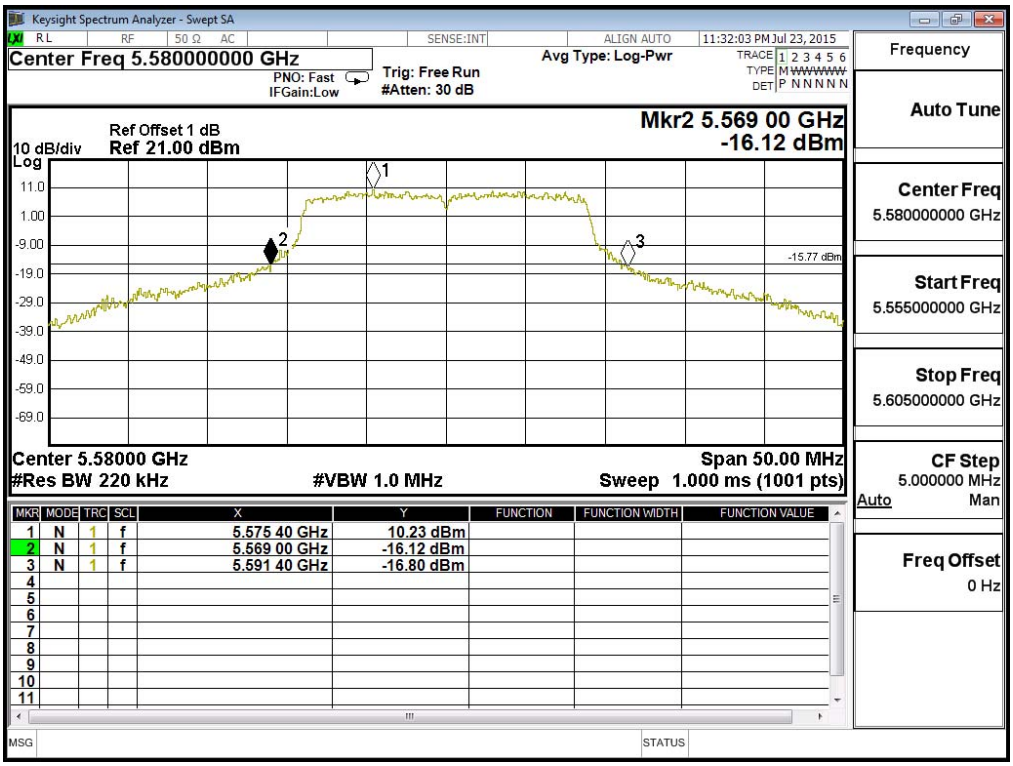
Channel 64 -Chain B



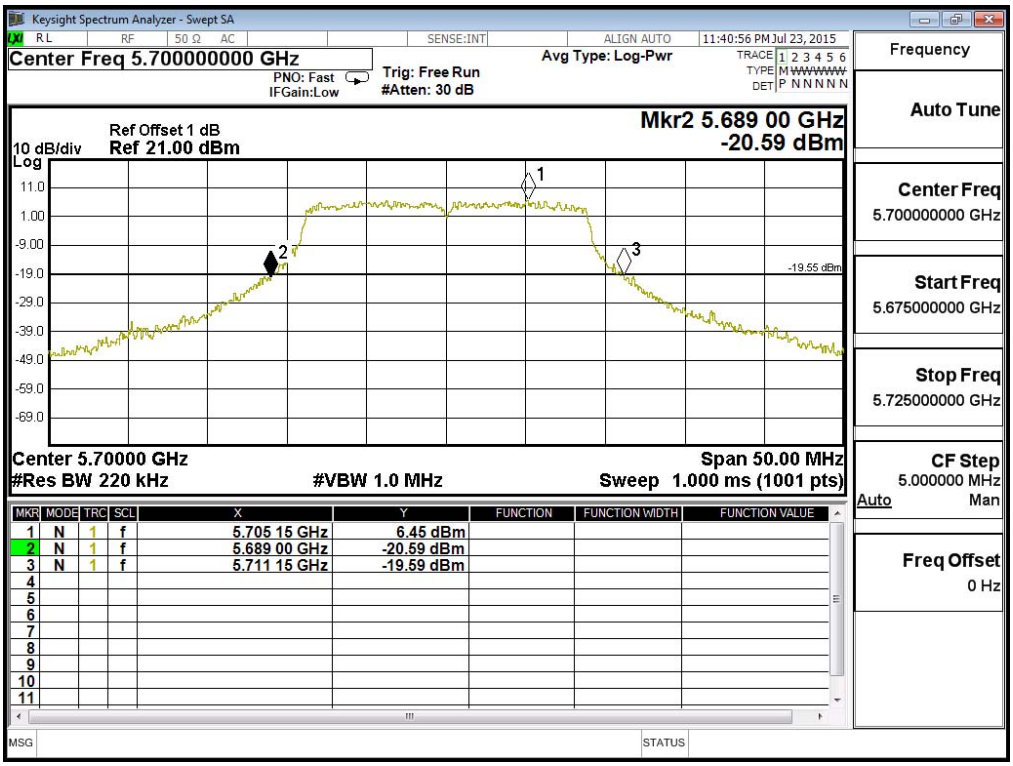
Channel 100 -Chain B



Channel 116 -Chain B



Channel 140 -Chain B



Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps)

CHAIN A

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		30	60	90	120	180	240	270	300	
		Measurement Level (dBm)								
38	5190	13.12	--	--	--	--	--	--	--	<24dBm
46	5230	20.54	20.38	20.24	20.09	19.96	19.88	19.82	19.75	<24dBm
54	5270	20.5	20.33	20.29	20.04	19.97	19.85	19.74	19.66	<24dBm
62	5310	15.68	--	--	--	--	--	--	--	<24dBm
102	5510	13.92	--	--	--	--	--	--	--	<24dBm
110	5550	20.2	19.89	19.76	19.59	19.52	19.48	19.41	19.36	<24dBm
134	5670	18.72	--	--	--	--	--	--	--	<24dBm
151	5755	15.44	--	--	--	--	--	--	--	<30dBm
159	5795	20.52	20.22	20.19	20.05	19.99	19.82	19.75	19.69	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		30	60	90	120	180	240	270	300	
		Measurement Level (dBm)								
38	5190	14.45	--	--	--	--	--	--	--	<24dBm
46	5230	20.92	20.79	20.67	20.58	20.42	20.37	20.18	20.1	<24dBm
54	5270	20.64	20.49	20.37	20.26	20.17	20.05	19.89	19.78	<24dBm
62	5310	15.95	--	--	--	--	--	--	--	<24dBm
102	5510	13.82	--	--	--	--	--	--	--	<24dBm
110	5550	20.54	20.37	20.31	20.14	20.05	19.93	19.84	19.73	<24dBm
134	5670	18.28	--	--	--	--	--	--	--	<24dBm
151	5755	12.76	--	--	--	--	--	--	--	<30dBm
159	5795	17.68	17.6	17.48	17.39	17.31	17.1	16.92	16.85	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

(CHAIN A+ B)

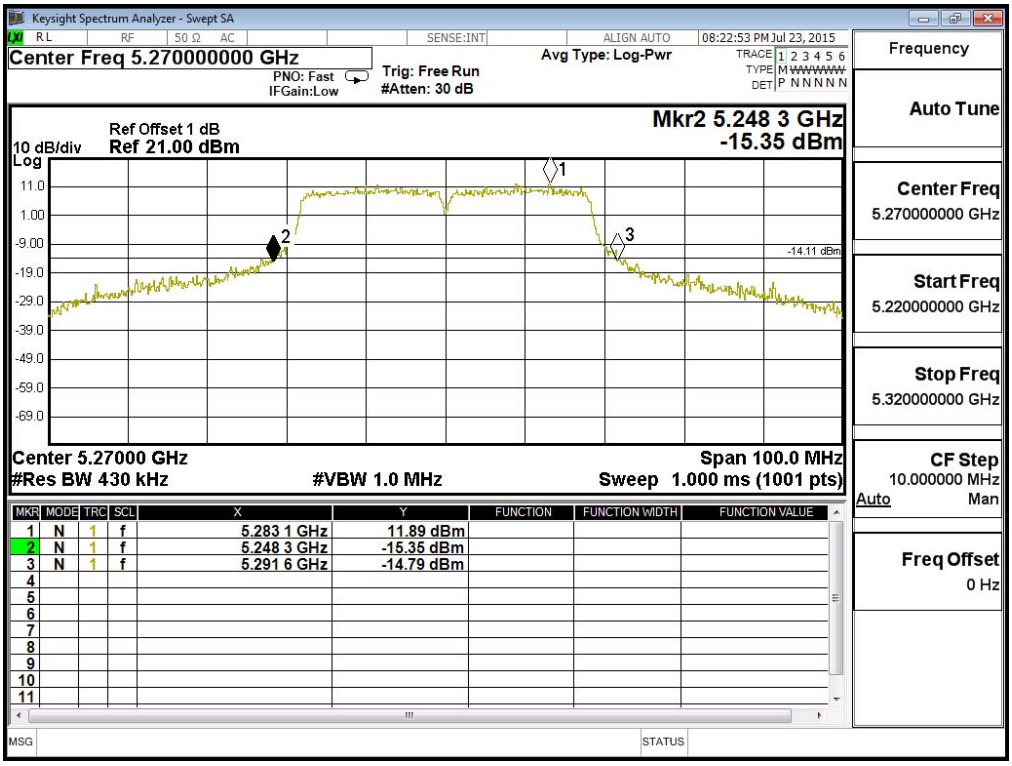
Channel Number	Frequency (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Output Power (dBm)	Output Power Limit	
						(dBm)	dBm+10log(BW)
38	5190	--	13.12	14.45	16.85	24	--
46	5230	--	20.54	20.92	23.74	24	--
54	5270	43.300	20.50	20.64	23.58	24	27.36
62	5310	43.000	15.68	15.95	18.83	24	27.33
102	5510	43.800	13.92	13.82	16.88	24	27.41
110	5550	46.400	20.20	20.54	23.38	24	27.67
134	5670	44.900	18.72	18.28	21.52	24	27.52
151	5755	--	15.44	12.76	17.31	30	--
159	5795	--	20.52	17.68	22.34	30	--

Note:

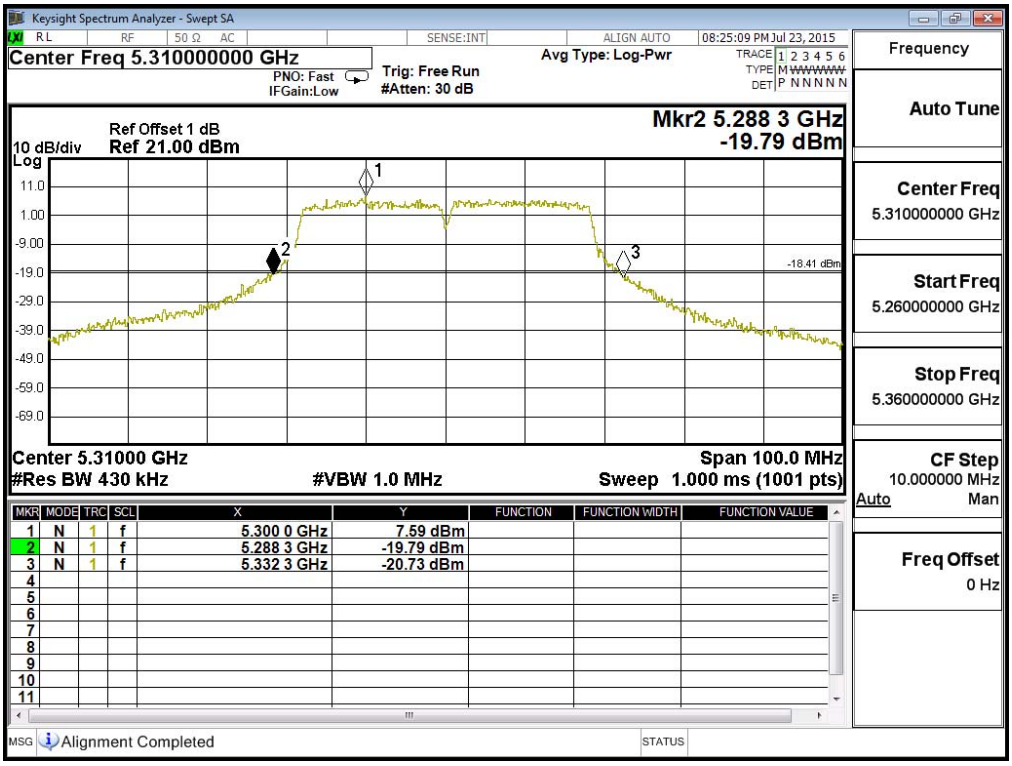
1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

26dBc Occupied Bandwidth:

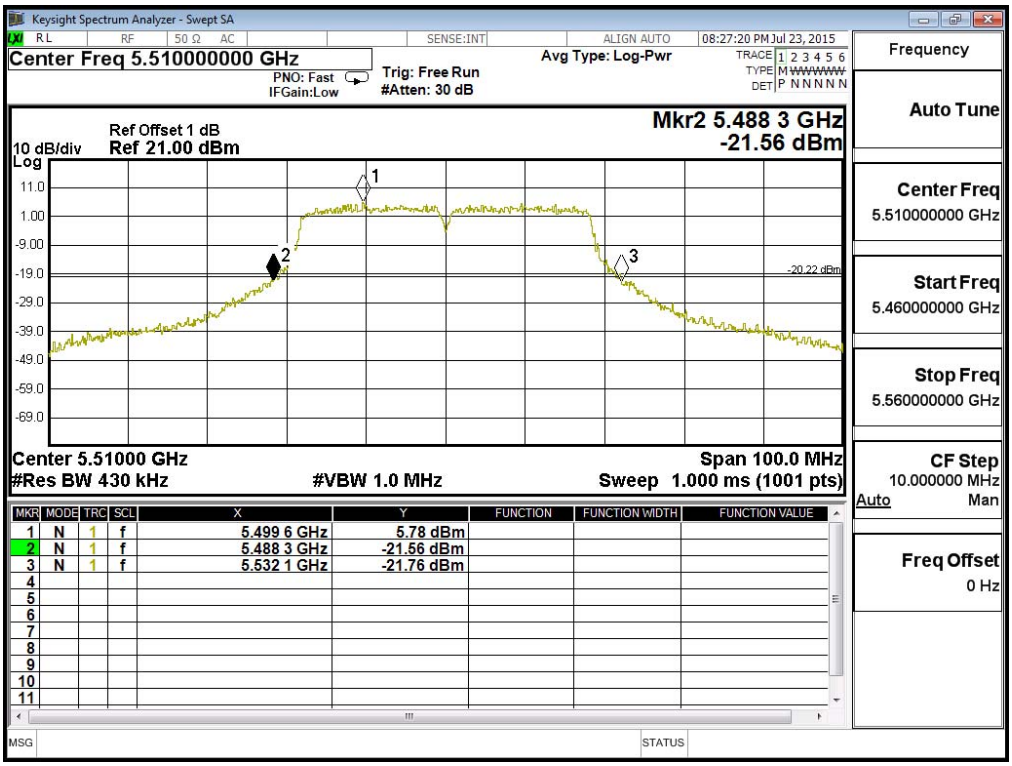
Channel 54 – Chain A



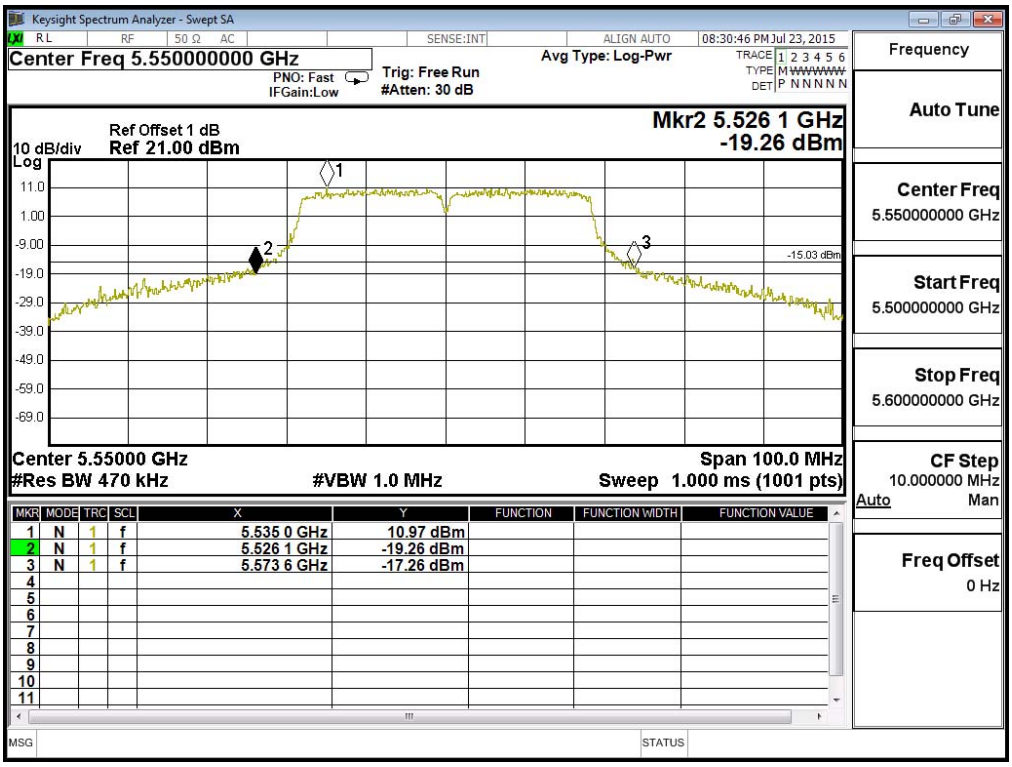
Channel 62 – Chain A



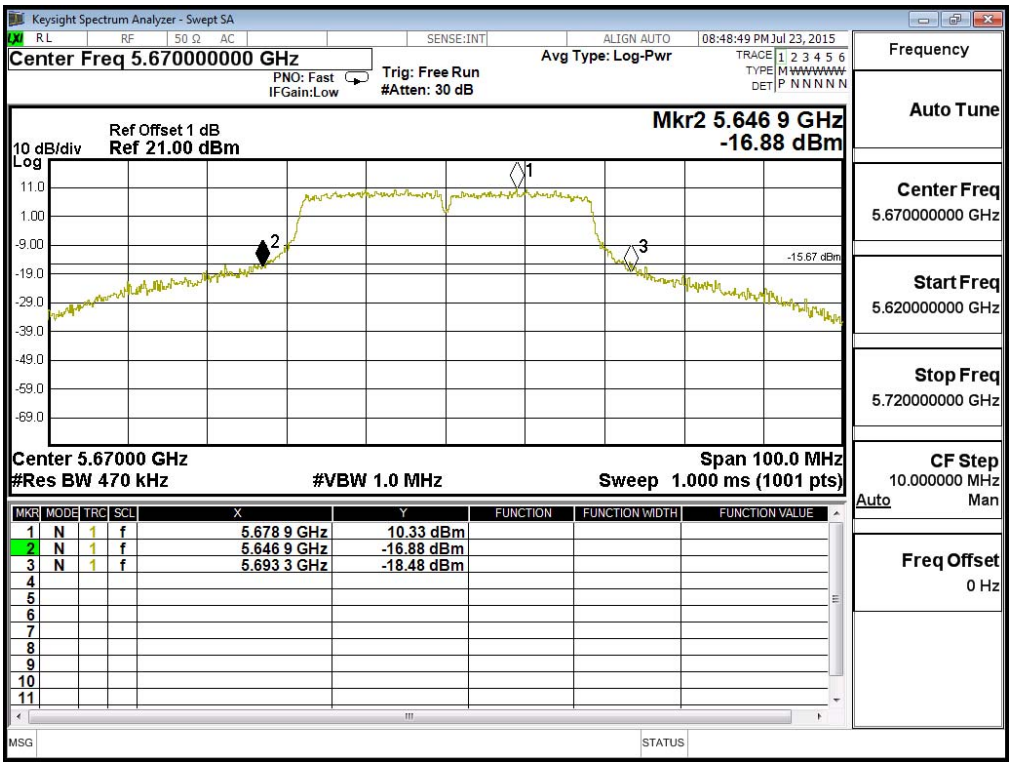
Channel 102 – Chain A



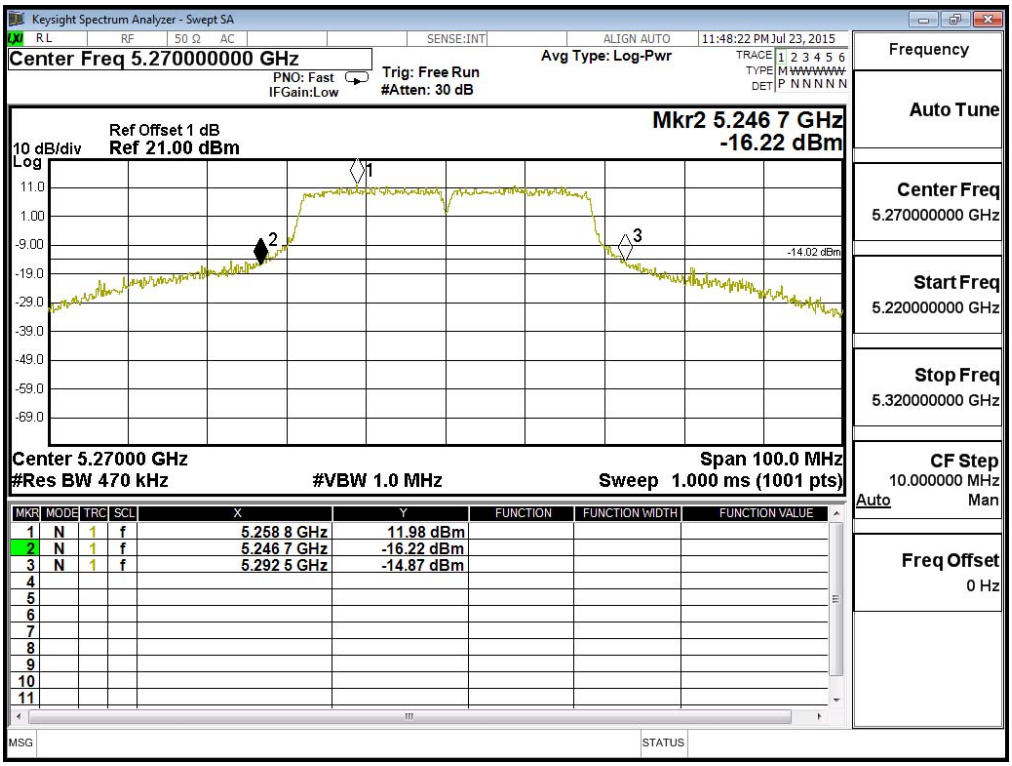
Channel 110 – Chain A



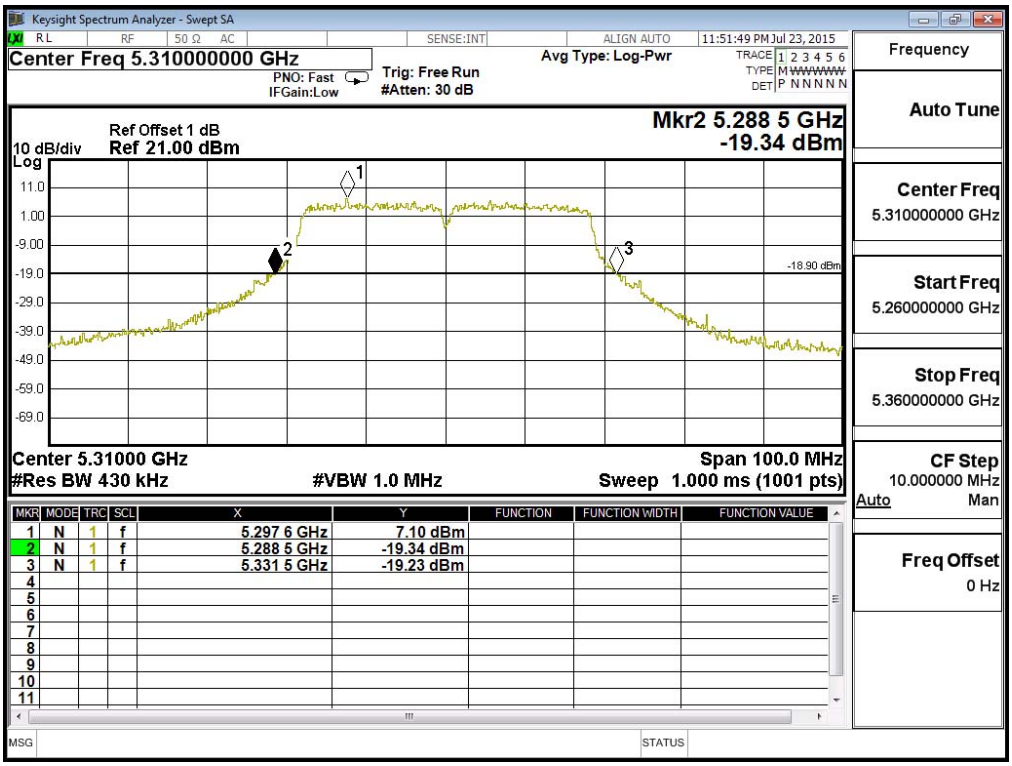
Channel 134 – Chain A



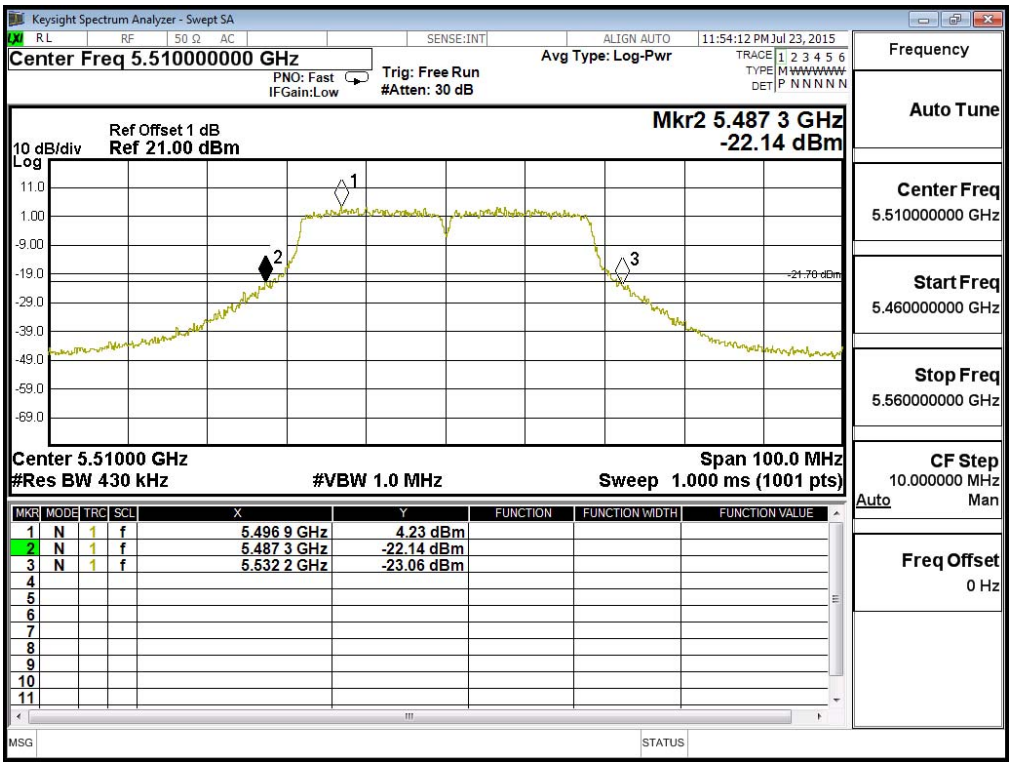
26dBc Occupied Bandwidth:
Channel 54 – Chain B



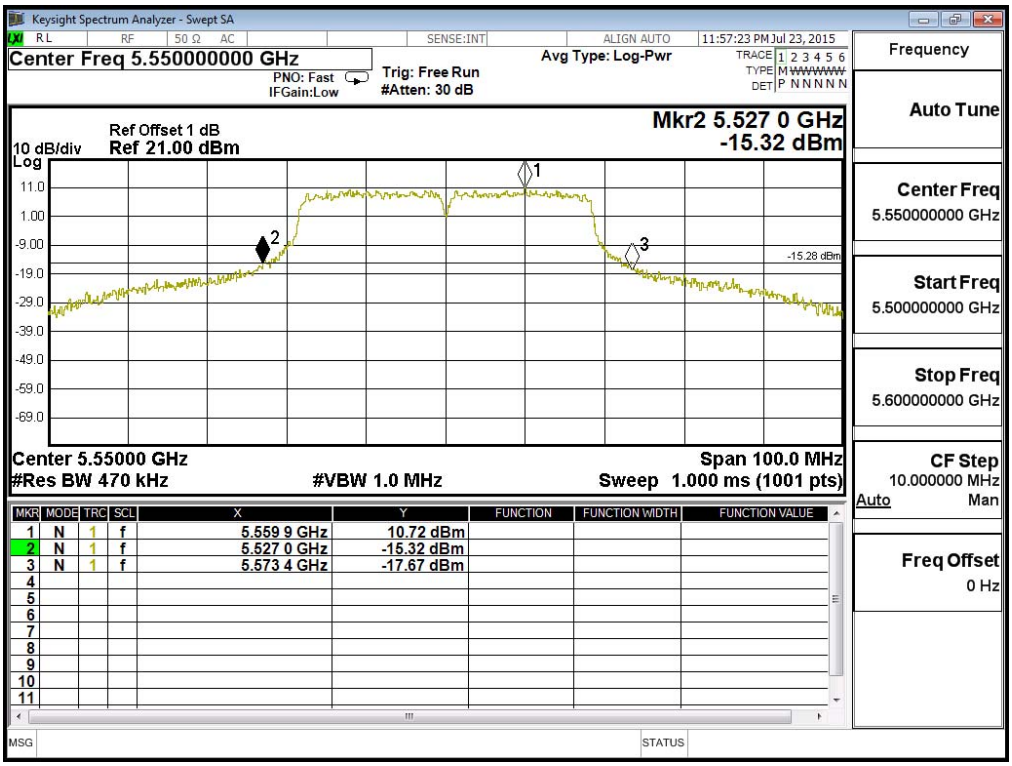
Channel 62 – Chain B



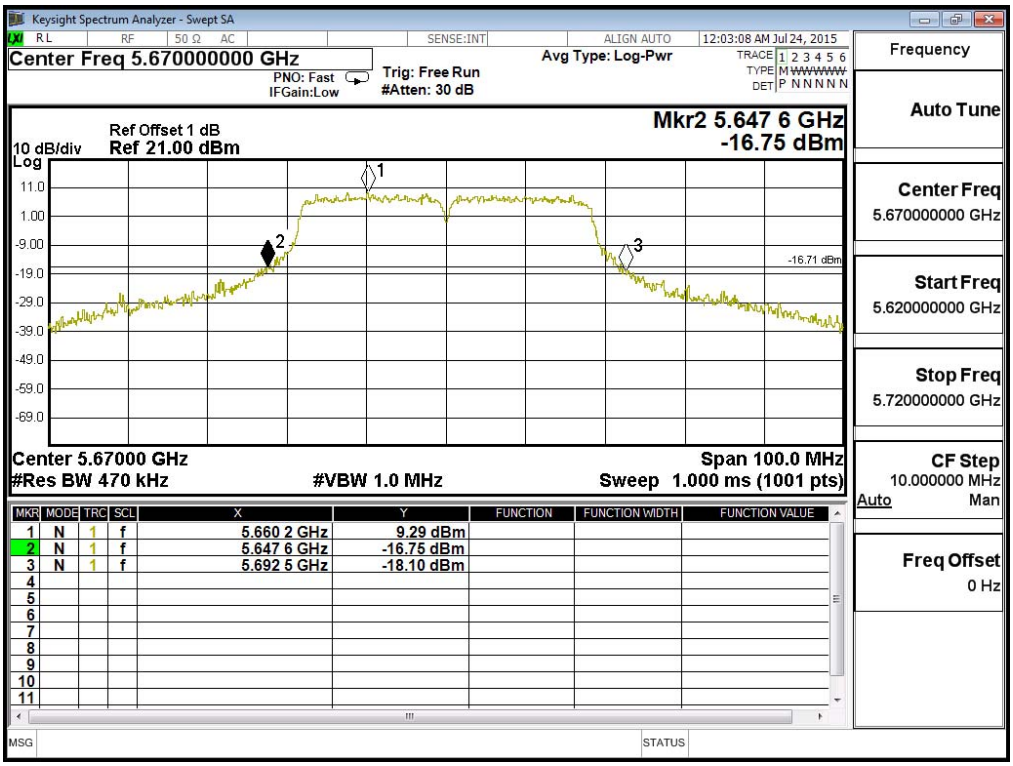
Channel 102 – Chain B



Channel 110 – Chain B



Channel 134 – Chain B



4. Peak Power Spectral Density

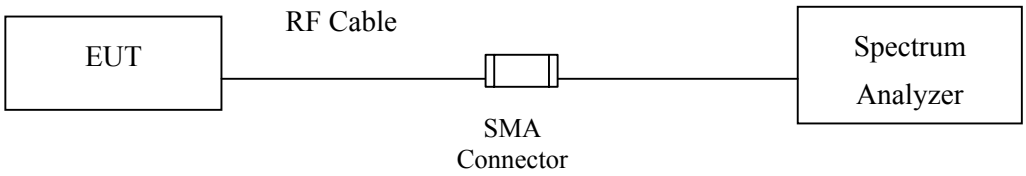
4.1. Test Equipment

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

Note:

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

4.2. Test Setup



4.3. Limits

(1) For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the

equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.+

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

4.4. Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.
The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.
SA-1 method is selected to run the test.
For the band 5.725-5.85 GHz, Scale the observed power level to an equivalent value in 500 kHz by adjusting (increase) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log (500 kHz/100 kHz) = 6.98 dB.

4.5. Uncertainty

± 1.27 dB

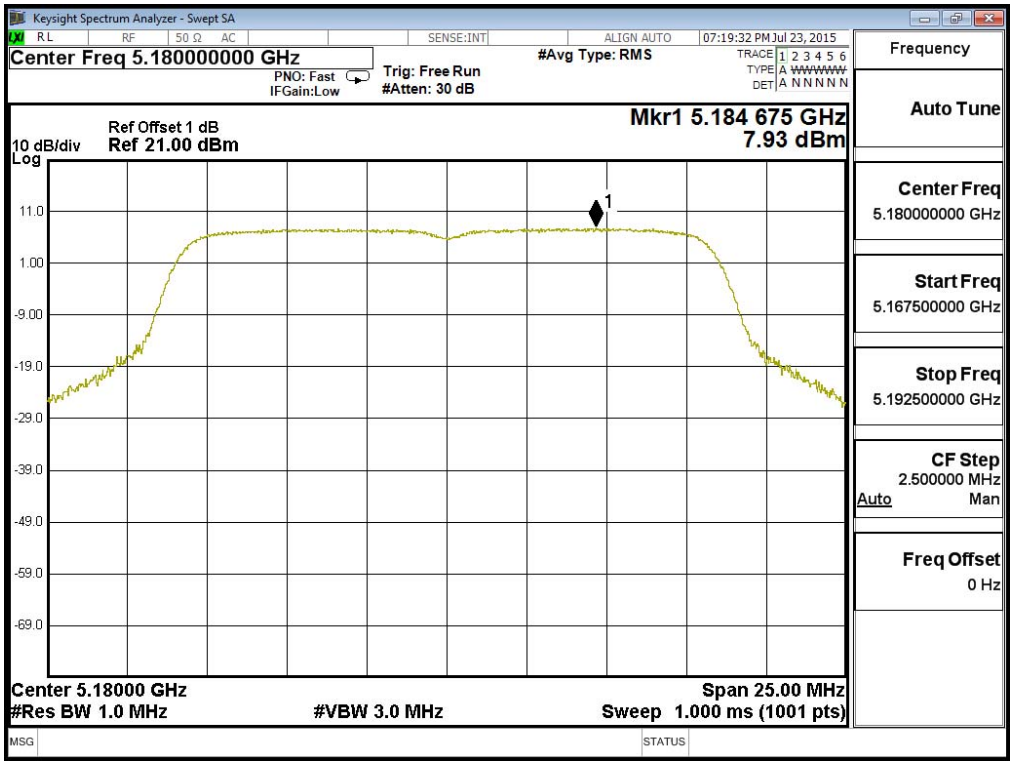
4.6. Test Result of Peak Power Spectral Density

Product : MOXA IEEE 802.11 a/b/g/n
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11a-6Mbps)

Channel Number	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit (dBm)	Result
36	5180	6	7.930	17	Pass
44	5220	6	10.130	17	Pass
48	5240	6	9.830	17	Pass
52	5260	6	10.350	11	Pass
60	5300	6	9.970	11	Pass
64	5320	6	6.670	11	Pass
100	5500	6	5.610	11	Pass
116	5580	6	10.620	11	Pass
140	5700	6	3.850	11	Pass

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	6	-4.230	6.980	2.750	<30	Pass
157	5785	6	0.710	6.980	7.690	<30	Pass
165	5825	6	-3.020	6.980	3.960	<30	Pass

Channel 36:



Channel 44: