Lab Code: 200707-0

FCC PART 15.407

TEST REPORT

For

JUPITER TECHNOLOGY (WUXI) CO., LTD.

No.13 Minjiang Road, Wuxi State High & New Technology Industry Development Zone,

Wuxi, Jiangsu, China

FCC ID: WIOWS3002

Report Type:	**Product Type:**
Original Report	WHDI 5.8GHz WIRELESS PROJECTOR

Test Engineer:	Felix Li
Report Number:	RSZ110728002-00B
Report Date:	2011-09-14
Reviewed By:	Merry Zhao EMC Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *JUPITER TECHNOLOGY (WUXI) CO., LTD*'s product, model number: *WS3002 (FCC ID: WIOWS3002)* ("EUT") in this report is a receiver of *WHDI 5.8GHz WIRELESS PROJECTOR,* which was measured approximately: 15.0 cm (L) x 9.0 cm (W) x 2.7 cm (H), rated input voltage: DC 5V from adapter.

Adapter Information:
Model: SL-0106-5V2A-C
Input: 100-240V AC 0.3A 50/60Hz
Output: 5.0V 2.0A

** All measurement and test data in this report was gathered from production sample serial number: 1107132 (Assigned by BACL, Shenzhen). The EUT was received on 2011-07-28.*

Objective

This Type approval report is prepared on behalf of *JUPITER TECHNOLOGY (WUXI) CO., LTD* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, and section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submission with FCC ID: WIOWS3002.
Transmitter part submission with FCC ID: WIOWS3003.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).

The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2007070.htm

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which is provided by manufacture.

The operating frequency band is 5150-5250 MHz; the test frequency is 5190 MHz and 5230 MHz.

EUT Exercise Software

Test software: APPcom & Debug View

Equipment Modifications

No modification was made to the unit tested.

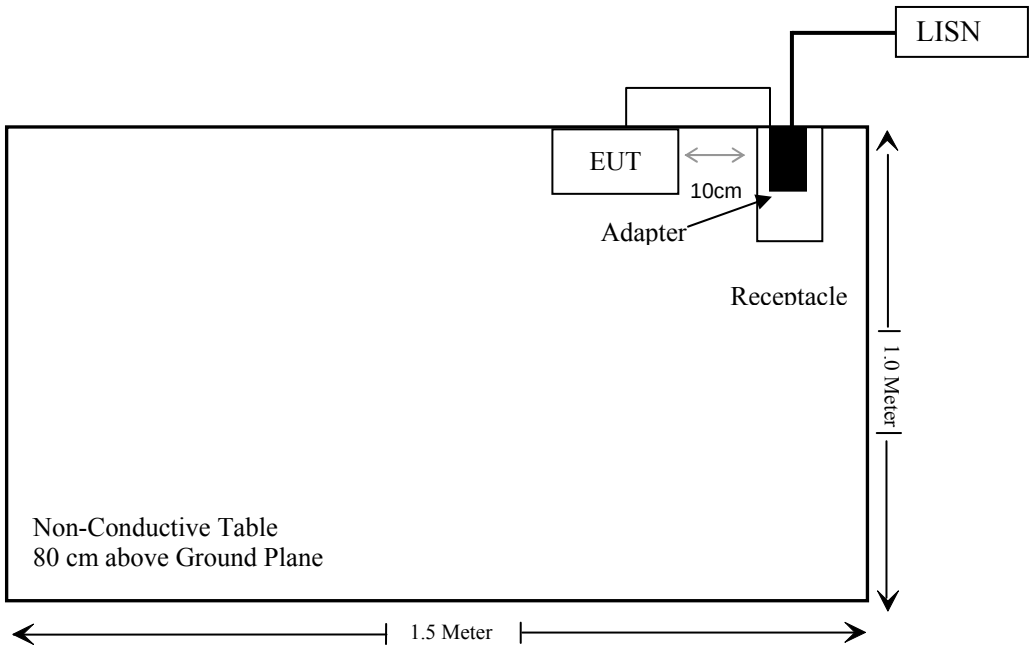
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
IBM	Laptop	T40	N/A

External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Undetachable USB Cable	0.5	Laptop	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.407 (f), §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b) (1),(6),(7)	Undesirable Emission & Restricted Bands	Compliance
§15.407(a) (1)	26 dB Bandwidth	Compliance
§15.407(a)(1),	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1),(5)	Power Spectral Density	Compliance
§15.407(a)(6)	Peak Excursion Ratio	Compliance
§15.407(g)	Frequency Stability	Compliance

FCC §15.407 (f) & §2.1091 – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to FCC §15.407 (f) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (Mw/cm^2)**	**Averaging Time (minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Test Data

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

Where: S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
5190	2	1.5849	15.0	31.62	20	0.009975	1.0
5230	2	1.5849	15.0	31.62	20	0.009975	1.0

Result: The device meets FCC MPE at 20 cm distance.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has one integral (printed on PCB) antenna for transmitting and receiving, the directional gain is 2.0 dBi. Otherwise, the EUT has four integral (printed on PCB) antennas for receiving only; please refer to the internal photos.

Result: Compliance.

FCC §15.407 (b) (6) & §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

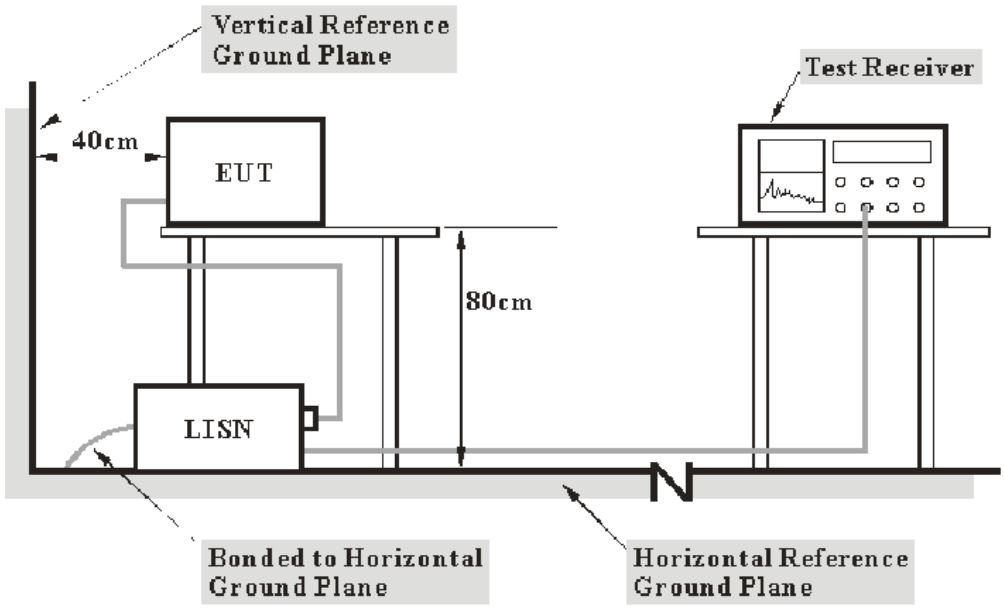
FCC §15.207, §15.407(b) (6)

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is ±2.4 dB.

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source,

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	***IF B/W***
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245	2011-03-03	2012-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2011-03-09	2012-03-08

***Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

14.24 dB at **0.200 MHz** in the **Neutral** conducted mode

Test Data

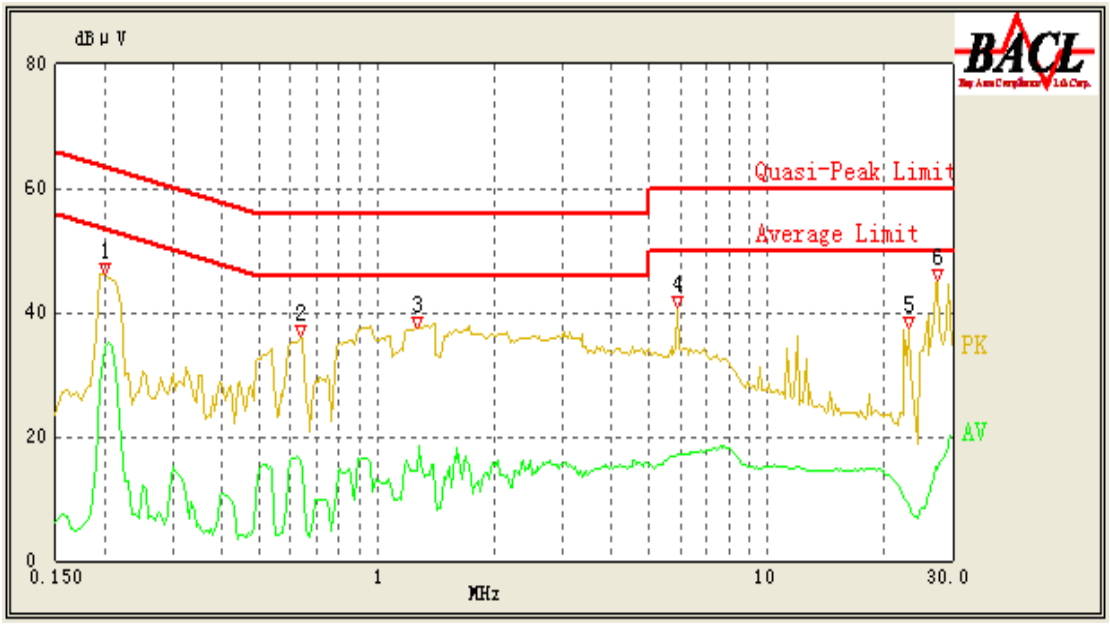
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Felix Li on 2011-09-14.

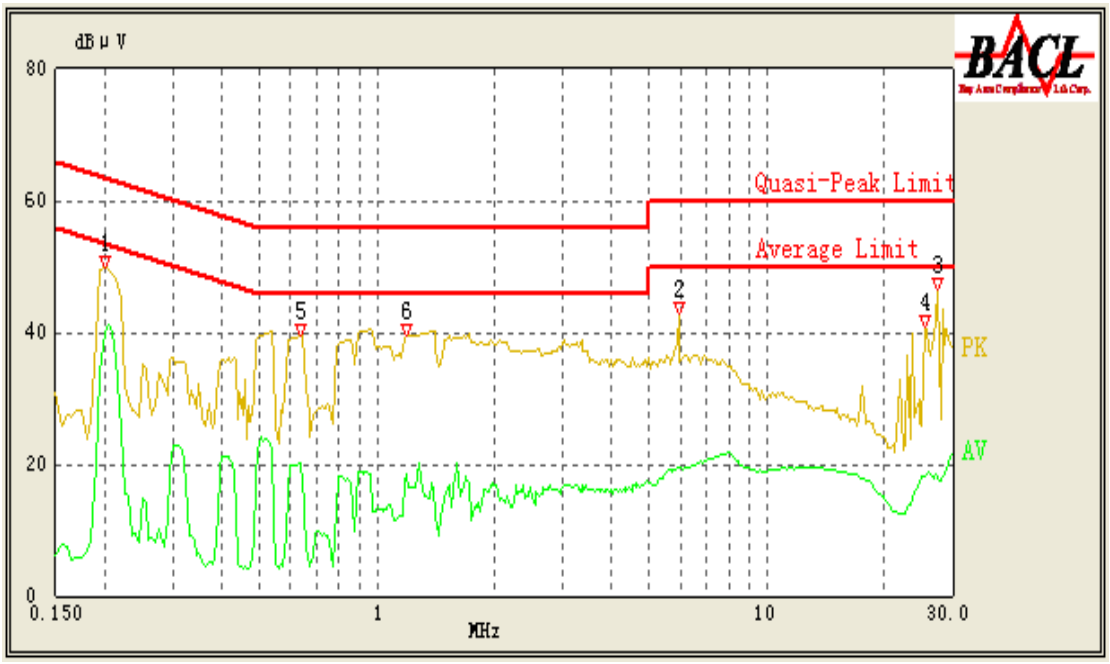
Test Mode: Transmitting

120 V, 60 Hz, Line:



Frequency (MHz)	Corrected Result (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK /QP/Ave.)
0.200	34.51	10.10	54.57	20.06	Ave.
0.200	43.80	10.10	64.57	20.77	QP
1.275	33.75	10.10	56.00	22.25	QP
0.640	33.53	10.10	56.00	22.47	QP
1.280	18.20	10.10	46.00	27.80	Ave.
0.640	16.13	10.10	46.00	29.87	Ave.
5.895	28.46	10.10	60.00	31.54	QP
5.915	17.17	10.10	50.00	32.83	Ave.
27.420	14.80	10.10	50.00	35.20	Ave.
23.055	9.04	10.10	50.00	40.96	Ave.
27.420	17.73	10.10	60.00	42.27	QP
23.130	12.29	10.10	60.00	47.71	QP

120V, 60 Hz, Neutral:



Frequency (MHz)	Corrected Result (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK /QP/Ave.)
0.200	40.33	10.10	54.57	14.24	Ave.
0.200	45.44	10.10	64.57	19.13	QP
0.635	32.66	10.10	56.00	23.34	QP
1.185	31.54	10.10	56.00	24.46	QP
0.635	20.04	10.10	46.00	25.96	Ave.
1.185	18.56	10.10	46.00	27.44	Ave.
5.930	19.37	10.10	50.00	30.63	Ave.
25.575	18.04	10.10	50.00	31.96	Ave.
5.930	27.56	10.10	60.00	32.44	QP
27.655	17.43	10.10	50.00	32.57	Ave.
27.395	22.04	10.10	60.00	37.96	QP
25.500	20.14	10.10	60.00	39.86	QP

FCC §15.209, §15.205 & §15.407(b) (1) (6) (7) – UNDESIRABLE EMISSION & RESTRICTED BANDS

Applicable Standard

FCC §15.407 (b) (1), (6), (7); §15.209; §15.205;

For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

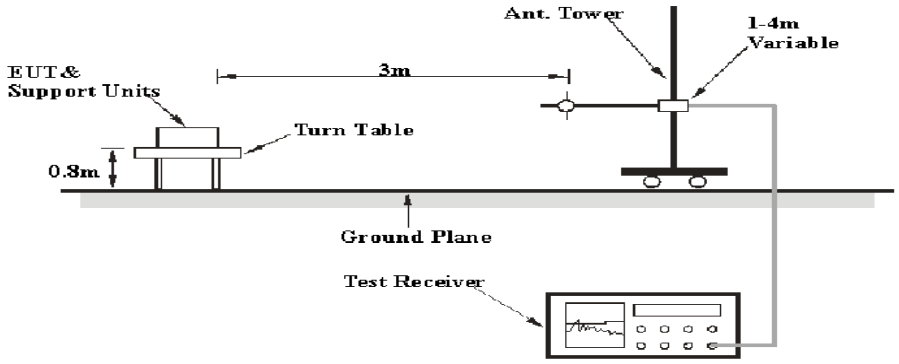
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

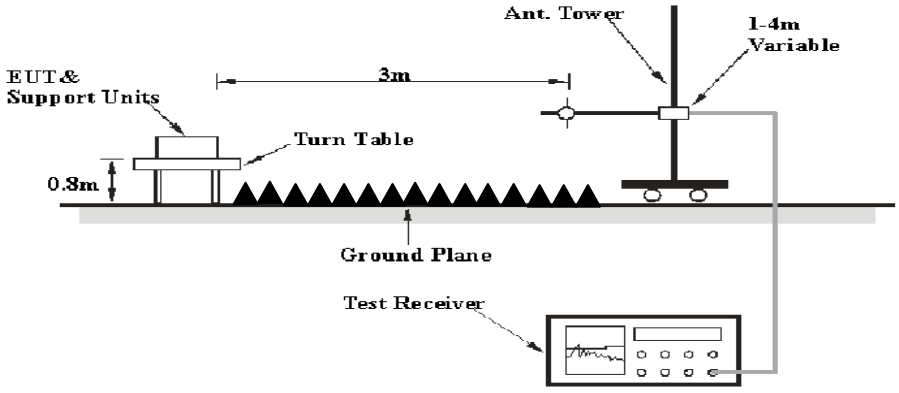
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ±4.0 dB.

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209, and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	***RBW***	***Video B/W***	***Detector***
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 40 GHz	1 MHz	3 MHz	PK
1000 MHz – 40 GHz	1 MHz	10 Hz	Ave.

Test Procedure

For the radiated emissions test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2011-08-02	2012-08-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-11	2011-11-10
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2011-07-05	2012-07-04
Mini-Circuits	Amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-07
Sunol Sciences	Horn Antenna	DRH-118	A052604	2011-05-05	2012-05-04
HP	Spectrum Analyzer	8564E	3943A01781	2011-04-12	2012-04-11
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2011-07-08	2012-07-07

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, Section 15.205, 15.209 and 15.407, with the worst margin reading of:

0.83 dB at **10460 MHz** in the **Horizontal** polarization

Test Data

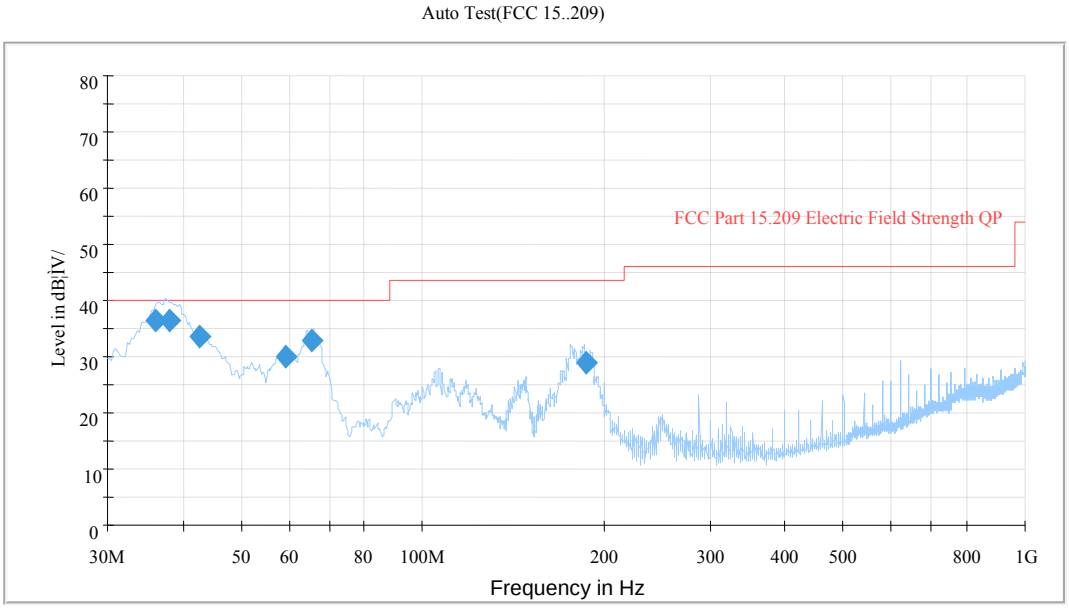
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Felix Li on 2011-08-07.

Test Mode: Transmitting

1) Below 1 GHz:



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
36.955250	37.2	100.0	V	326.0	-10.7	40.0	2.8*
35.836450	36.9	100.0	V	339.0	-9.4	40.0	3.1*
42.532500	33.6	119.0	V	292.0	-13.7	40.0	6.4
65.415450	33.4	100.0	V	309.0	-18.2	40.0	6.6
60.645450	29.6	100.0	V	335.0	-18.5	40.0	10.4
185.798600	29.6	100.0	V	223.0	-15.2	43.5	13.9

*Within measurement uncertainty!

Above 1GHz:

Indicated		Detector (PK/Ave.)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.407/15.205/15.209			
Frequency (MHz)	Receiver Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
5190 MHz												
10380	30.06	Ave.	332	1.0	H	41.4	6.69	26.2	51.95	54	2.05*	harmonic
10380	31.00	Ave.	127	1.0	V	40.4	6.69	26.2	51.89	54	2.11*	harmonic
5148.54	37.24	Ave.	125	1.1	H	36.6	4.43	26.75	51.52	54	2.48*	spurious
5148.54	55.65	PK	125	1.1	H	36.6	4.43	26.75	69.93	74	4.07	spurious
10380	47.12	PK	332	1.0	H	41.4	6.69	26.2	69.01	74	4.99	harmonic
20760	17.24	Ave.	13	1.0	H	45.9	10.35	24.7	48.79	54	5.21	harmonic
15570	22.24	Ave.	45	1.0	H	43.7	8.22	25.90	48.26	54	5.74	harmonic
15570	22.38	Ave.	45	1.1	V	43.5	8.22	25.90	48.2	54	5.8	harmonic
15570	41.81	PK	45	1.0	H	43.7	8.22	25.90	67.83	74	6.17	harmonic
5148.54	54.52	PK	24	1.0	V	35.4	4.40	26.75	67.57	74	6.43	spurious
20760	16.30	Ave.	13	1.0	V	45.6	10.35	24.7	47.55	54	6.45	harmonic
5148.54	34.37	Ave.	24	1.0	V	35.4	4.40	26.75	47.42	54	6.58	spurious
10380	46.32	PK	127	1.0	V	40.4	6.69	26.2	67.21	74	6.79	harmonic
15570	40.45	PK	45	1.1	V	43.5	8.22	25.90	66.27	74	7.73	harmonic
20760	33.31	PK	13	1.0	H	45.9	10.35	24.7	64.86	74	9.14	harmonic
20760	32.65	PK	13	1.0	V	45.6	10.35	24.7	63.9	74	10.1	harmonic
5230 MHz												
10460	31.26	Ave.	62	1.1	H	41.4	6.71	26.2	53.17	54	0.83*	harmonic
10460	51.95	PK	152	1.2	V	40.4	6.71	26.2	72.86	74	1.14*	harmonic
10460	31.34	Ave.	152	1.2	V	40.4	6.71	26.2	52.25	54	1.75*	harmonic
10460	50.05	PK	62	1.1	H	41.4	6.71	26.2	71.96	74	2.04*	harmonic
15690	24.08	Ave.	143	1.0	H	43.7	8.22	25.90	50.1	54	3.9*	harmonic
15690	24.22	Ave.	98	1.1	V	43.5	8.22	25.90	50.04	54	3.96*	harmonic
20920	16.51	Ave.	125	1.0	H	45.9	10.35	24.7	48.06	54	5.94	harmonic
20920	16.31	Ave.	246	1.1	V	45.6	10.35	24.7	47.56	54	6.44	harmonic
15690	41.34	PK	143	1.0	H	43.7	8.22	25.90	67.36	74	6.64	harmonic
15690	40.34	PK	98	1.1	V	43.5	8.22	25.90	66.16	74	7.84	harmonic
20920	33.17	PK	125	1.0	H	45.9	10.35	24.7	64.72	74	9.28	harmonic
5378.61	29.05	Ave.	354	1.1	H	36.7	4.49	26.70	43.54	54	10.46	spurious
20920	32.25	PK	246	1.1	V	45.6	10.35	24.7	63.5	74	10.5	harmonic
5378.61	45.64	PK	354	1.1	H	36.7	4.49	26.70	60.13	74	13.87	spurious
5376.36	26.21	Ave.	121	1.0	V	35.5	4.51	26.70	39.52	54	14.48	spurious
5376.36	42.22	PK	121	1.0	V	35.5	4.51	26.70	55.53	74	18.47	spurious

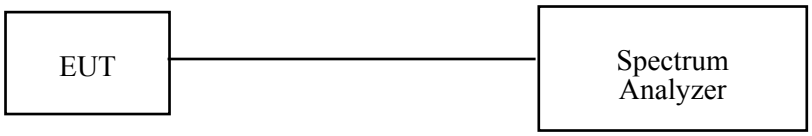
** Within measurement uncertainty.*

Conducted Spurious Emission at Antenna Port

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Use a combiner combine all the transmit chains (antenna outputs)into a single test point,then connect to the spectrum analyzer.The Resolution bandwidth is set to 1MHz, The Video bandwidth is set to 1MHz, report the peak value out of the oprating band.
3. Repeat above procedures until all frequencies measured were complete.

Offset value =attenuation+combiner loss +cable loss

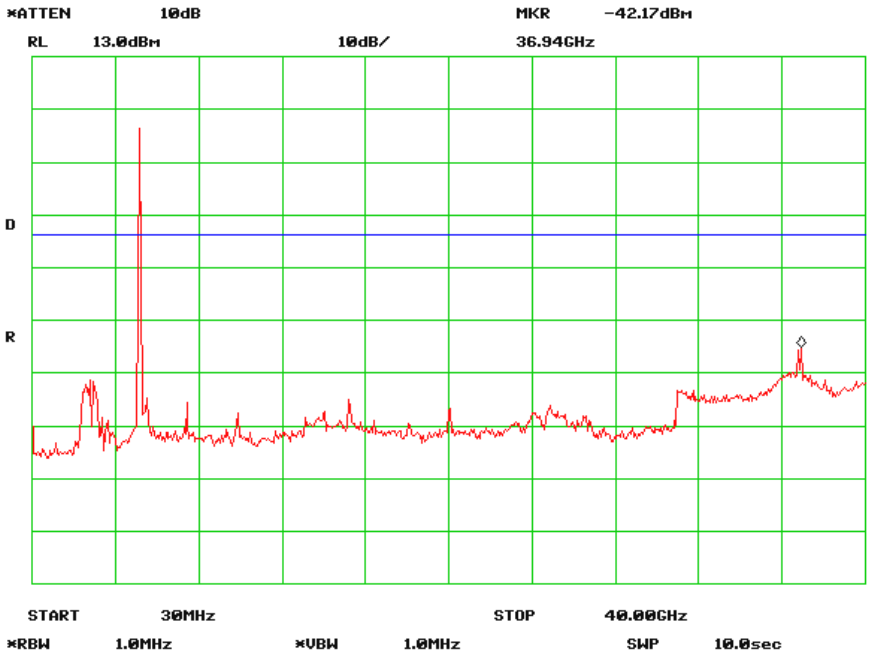


Test data

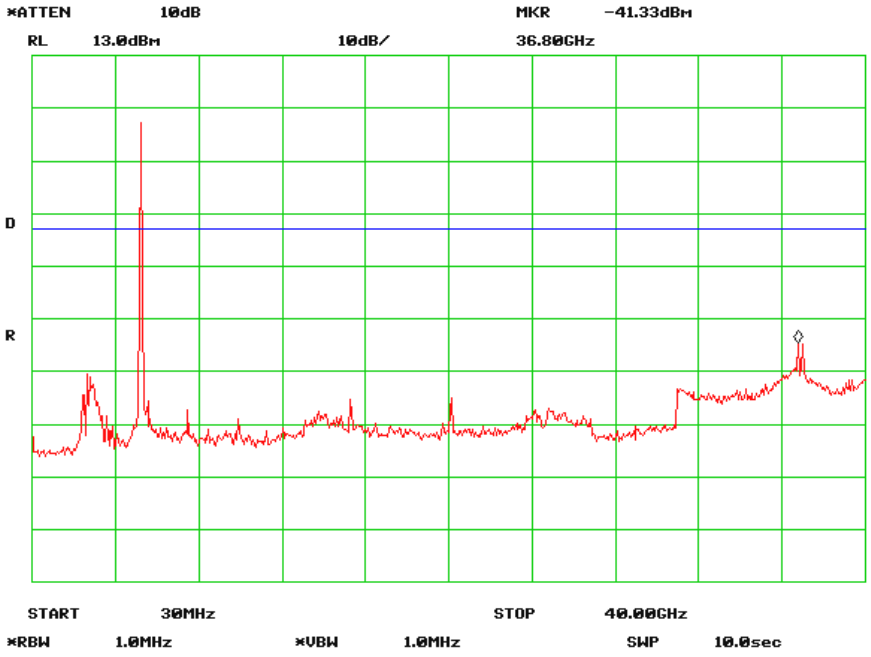
Frequency band(MHz)	Frequency (MHz)	Corrected Reading (dBm)	Calculated Value (dBm)	Limited (dBm)	Margin (dB)
5190	36800	-42.17	-42.17	-27	15.17
5230	36940	-41.33	-39.33	-27	12.33

Please refer to the following plots.

5190 MHz



5230 MHz



FCC §15.407(a) (3) – 26 dB OCCUPIED BANDWIDTH

Applicable Standard

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For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

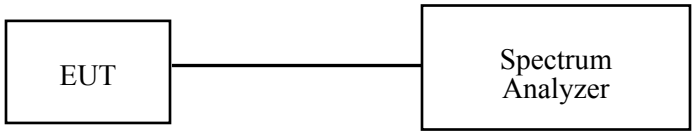
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Spectrum Analyzer	8564E	3943A01781	2011-04-12	2012-04-11

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Use a RBW = approximately 1% of the emission bandwidth.Set the VBW > RBW. Use a peak detector.Do not use the Max Hold function. Rather, use the viewbutton to capture the emission. Measure maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat, measurement as needed until the RBW/EBW ratio is approximately 1%.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.0kPa

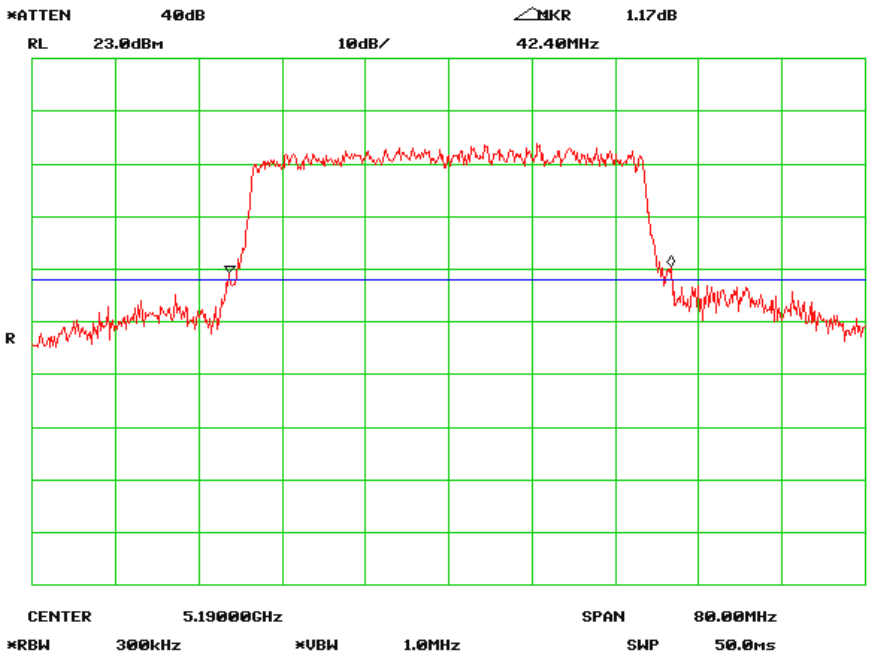
The testing was performed by Felix Li on 2011-08-17.

Test Result: Pass.

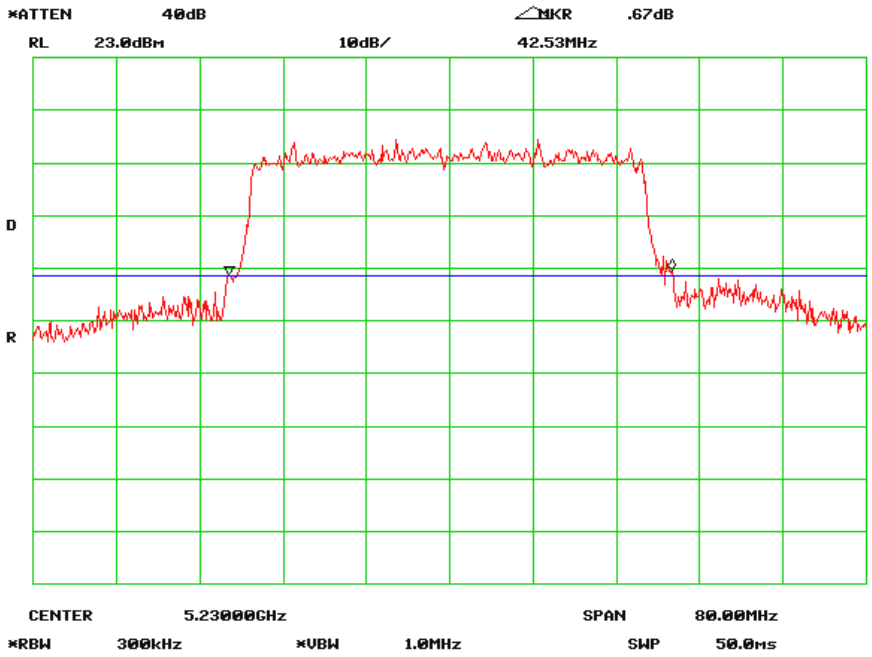
Please refer to the following tables and plots.

Channel Frequency (MHz)	26 dB Bandwidth (MHz)
5190	42.40
5230	42.53

26 dB Bandwidth-5190 MHz



26 dB Bandwidth-5230 MHz



FCC §15.407(a) (1) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Spectrum Analyzer	8564E	3943A01781	2011-04-12	2012-04-11

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set span = 80MHz (to encompass the entire emission bandwidth (EBW) of the signal). Set RBW = 1 MHz.Set VBW ≥ 3 MHz. Use sample detector mode Use a video trigger with the trigger level set to enable triggering only on full power pulses.Transmitter must operate at full control power for entire sweep of every sweep.If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”. Trace average 100 traces in power averaging mode.Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.
4. Repeat above procedures until all frequencies measured were complete.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.0kPa

The testing was performed by Felix Li on 2011-08-17.

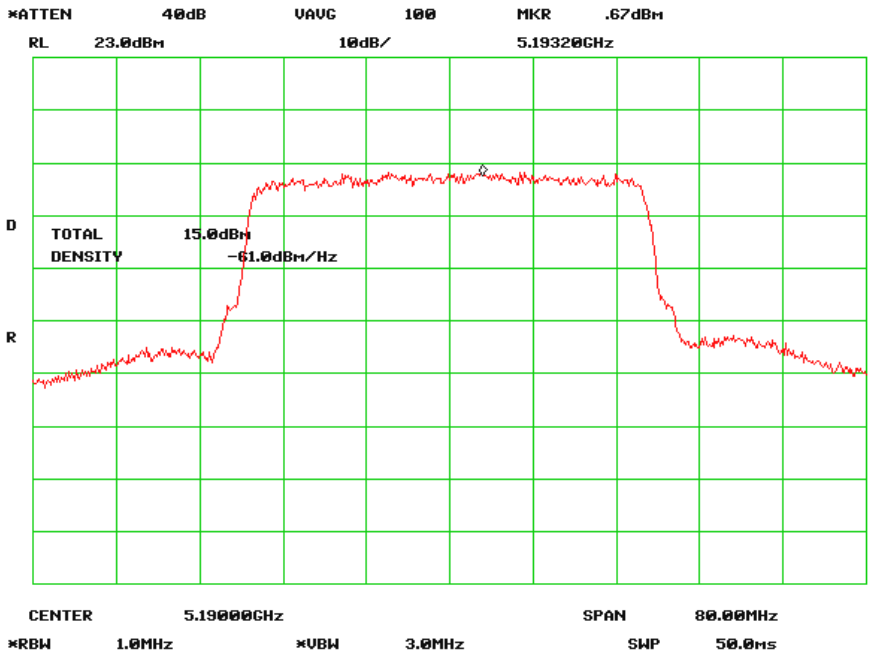
Test Mode: Transmitting

Test Result: Pass

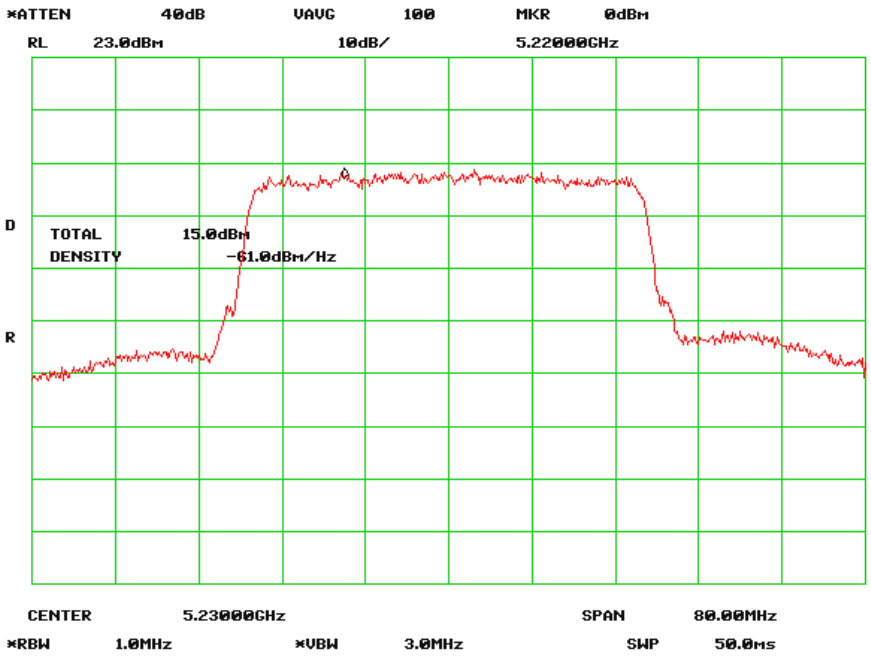
Please refer to the following tables and plots.

Frequency (MHz)	Output Power (dBm)	Limit (dBm)
5190	15.0	17
5230	15.0	17

Output Power - 5190 MHz



Output Power - 5230 MHz



FCC §15.407(a) (1) (5) - POWER SPECTRAL DENSITY

Applicable Standard

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The peak power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A resolution bandwidth less than the measurement bandwidth can be used, provided that the measured power is integrated to show total power over the measurement bandwidth. If the resolution bandwidth is approximately equal to the measurement bandwidth, and much less than the emission bandwidth of the equipment under test, the measured results shall be corrected to account for any difference between the resolution bandwidth of the test instrument and its actual noise bandwidth.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Use sample detector and power averaging (not video averaging) mode. Set RBW= 1 MHz*, VBW > 1 MHz. The PPSD is the highest level found across the emission in any 1-MHz band after 100 sweeps of averaging. This method is permitted only if the transmission pulse or sequence of pulses remains at maximum transmits power throughout each of the 100 sweeps of averaging and that the interval between pulses is not included in any of the sweeps.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Spectrum Analyzer	8564E	3943A01781	2011-04-12	2012-04-11

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

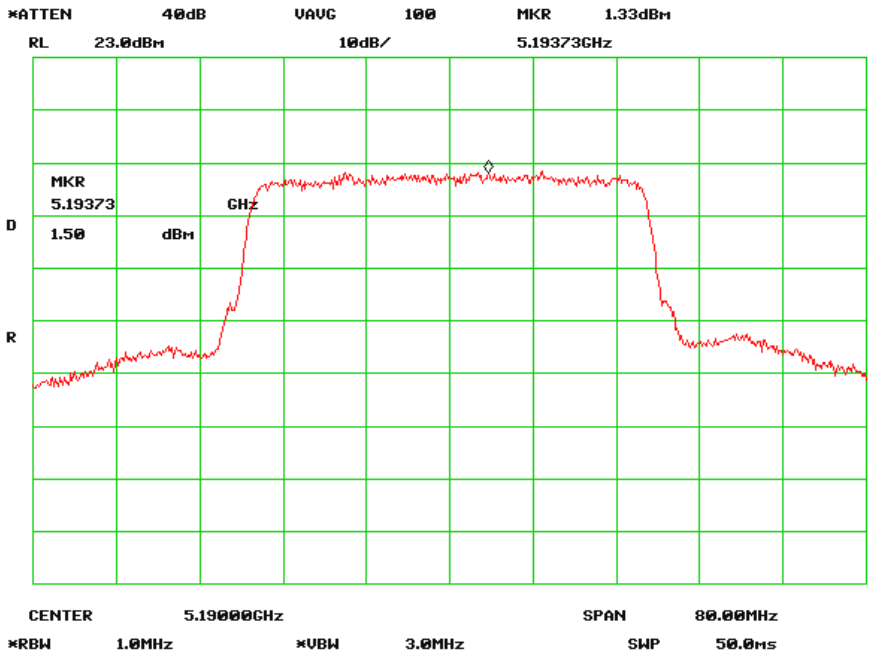
The testing was performed by Felix Li on 2011-08-17.

Test Mode: Transmitting

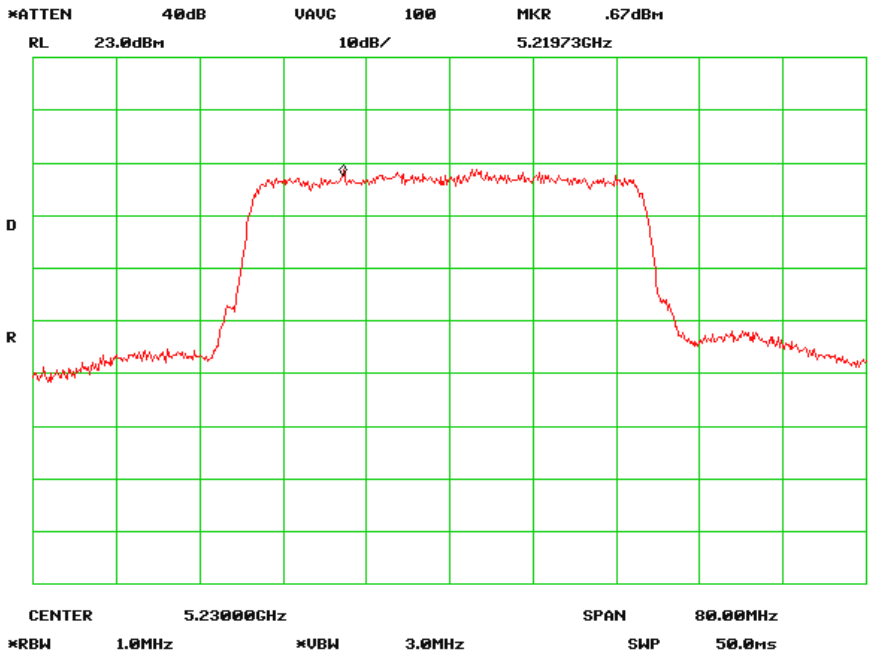
Test Result: Pass

Channel Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
5190	1.33	4
5230	0.67	4

5190 MHz



5230 MHz


*ATTEN 40dB
VAVG 100
MKR .67dBm
RL 23.0dBm
10dB/
5.21973GHz
D
R
CENTER 5.23000GHz
SPAN 80.00MHz
*RBW 1.0MHz
*VBW 3.0MHz
SWP 50.0ms

FCC §15.407(a) (6) – PEAK EXCURSION RATIO

Applicable Standard

According to §15.407(a) (6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Procedure

Set the spectrum analyzer span to view the entire emission bandwidth.
The largest difference between the following two traces must be ≤ 13 dB for all frequencies across the emission bandwidth. Submit a plot.

1st Trace:

• Set RBW = 1 MHz, VBW ≥ 3 MHz with peak detector and maxhold settings.

2nd Trace:

• create the 2nd trace using the settings described in the setion "FCC §15.407(a)(1)(2) – CONDUCTED TRANSMITTER OUTPUT POWER".

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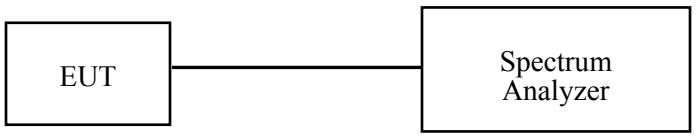


Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM30	849720/019	2011-07-08	2012-07-07

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

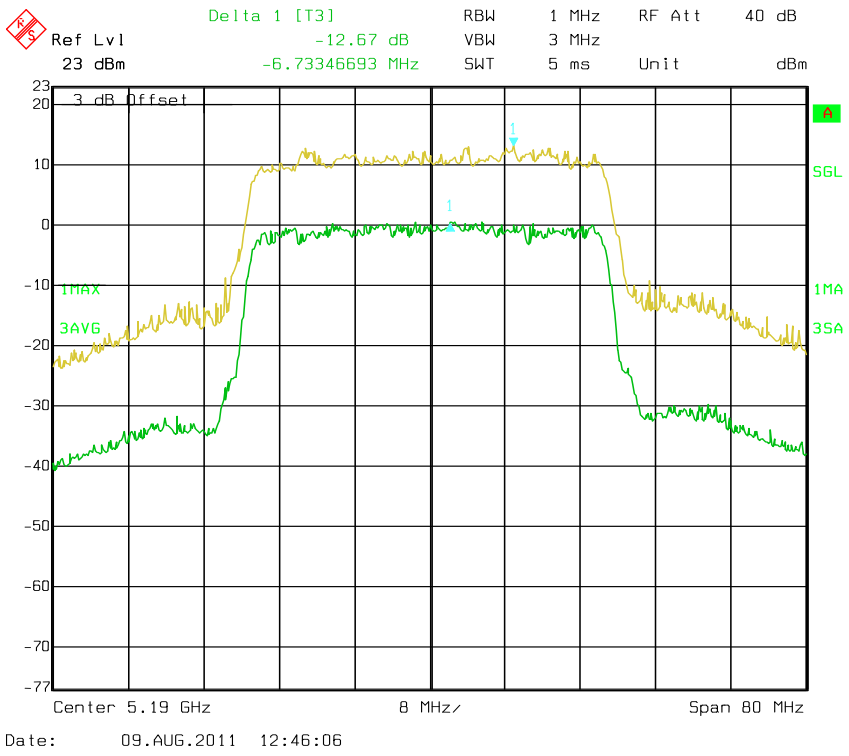
Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Felix Li on 2011-08-09.

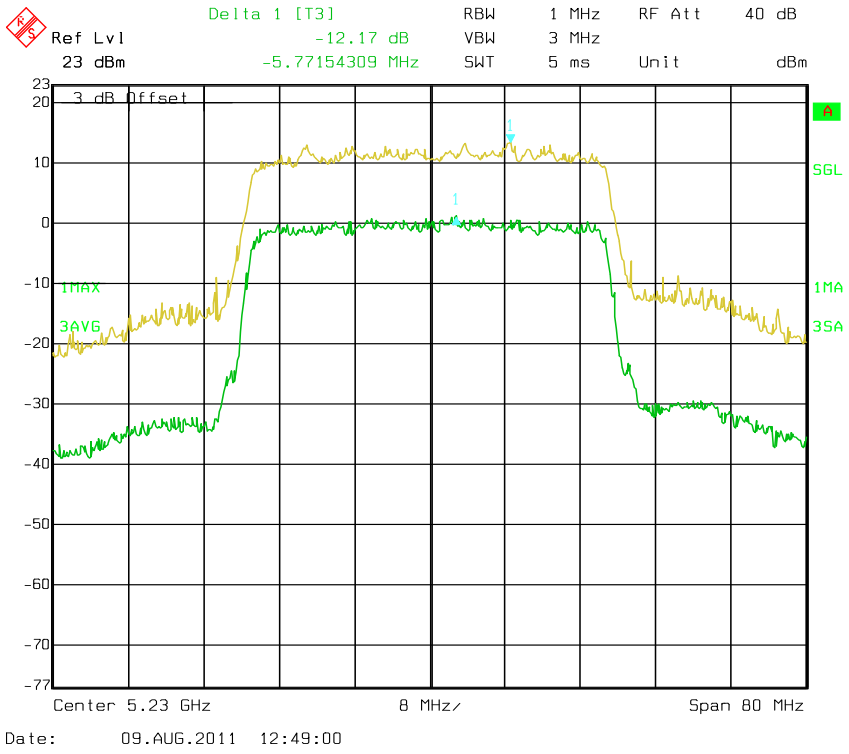
Test Mode: Transmitting

Channel Frequency (MHz)	Peak Excursion Ratio (dB)	Limit (dB)
5190	12.67	13
5230	12.17	13

5190 MHz



5230 MHz


Delta 1 [T3]
RBW 1 MHz
RF Att 40 dB
Ref Lvl
-12.17 dB
VBW 3 MHz
23 dBm
-5.77154309 MHz
SWT 5 ms
Unit dBm
23
20
10
0
-10
-20
-30
-40
-50
-60
-70
-77
3 dB Offset
1MAX
3AVG
A
SGL
1MA
3SA
Center 5.23 GHz
8 MHz/
Span 80 MHz
Date: 09.AUG.2011 12:49:00

FCC §407(g) - FREQUENCY STABILITY

Applicable Standards

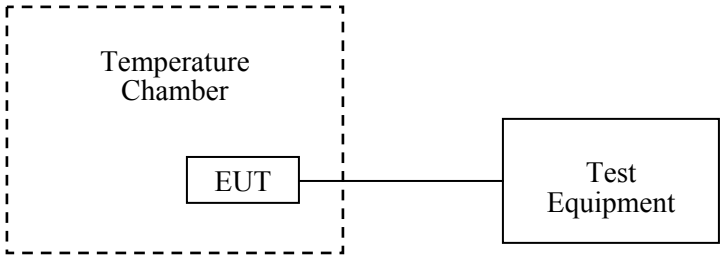
CFR47 §407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The AC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable AC power supply was connected to the adaptor terminals of the equipment under test. The voltage was set to 80% and 115% of the nominal value and was then decreased until the transmitter light no longer illuminated. The output frequency was recorded for each voltage.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
WUHUAN	Temperature & Humidity Chamber	HTP205	20021115	2011-06-04	2012-06-03
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2011-07-08	2012-07-07

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Felix Li on 2011-08-17.

Test Mode: Transmitting

Frequency Band (MHz)	Frequency (MHz)	Temperature (^{O}C)	Power Supply (V_{AC})	Measurement Frequency (MHz)
5150-5250	5190	40	138	5190.2256
			120	5190.0052
			102	5190.2563
		25	138	5190.0635
			120	5190.0135
			102	5190.2682
		0	138	5190.2564
			120	5190.0256
			102	5190.2145
	5230	40	138	5230.0158
			120	5230.0654
			102	5230.1265
		25	138	5230.0651
			120	5230.0684
			102	5230.0481
		0	138	5230.1120
			120	5230.0125
			102	5230.1203

******* END OF REPORT *******