FCC PART 15, SUBPART C

TEST AND MEASUREMENT REPORT

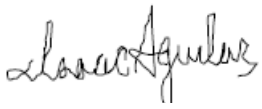
For

Actiontec Electronics Inc.

760 N. Mary Avenue,

Sunnyvale, CA 94085, USA

FCC ID: LNQF2300

Report Type: Original Report	**Product Type:** Wireless 11ac Ethernet Gateway	
Prepared By	Isaac Aguilar Test Engineer	
Report Number	R14062615-247	
Report Date	2014-07-29	
Reviewed By	Bo Li Test Engineer	
	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732-9164	

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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*"

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R14062615-247	Original	2014-07-29

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Actiontec Electronics Inc*., and their product, *FCC ID: LNQF2300*, model: *F2300* or the "EUT" as referred to in this report. The EUT is an 802.11 b/g/n final product. The EUT contains an RGMII 802.11 ac WLAN module with the *FCC ID: LNQRGM840*.

1.2 Mechanical Description of EUT

The EUT measures 26.5cm (L) x 18cm (W) x 2cm (H) and weighs approximately 0.4kg.

The data gathered are from a production sample provided by the manufacturer, serial number: R14062615-01, assigned by BACL.

1.3 Objective

This report is prepared on behalf of *Actiontec Electronics Inc*. in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15.247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, and power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

FR45203 – FCC Test report: 47 CFR FCC Part 15.407 FCC ID: LNQRGM840

1.5 Test Methodology

All measurements contained in this report were conducted in accordance 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 and FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the 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.

The following calculation follows the procedures as set forth in clause 7.2.3, ETSI TR 100 028-1 V1.4.1 (2001-12), the expression of Uncertainty in Radiated RF Testing is in accordance to ISO/IEC 17025 and TR 100 028-1 V1.4.1 (2001-12).

The expanded Measurement Uncertainty value having a confidence factor of 95%, is within a range of 5.48 dB.

This means that the value of conducted RF carrier power test will be within +/- 2.74 dB of the measuring radiated emissions power versus the expected value.
The expected value is defined as the power at the antenna of the Transmitter under Test.

1.7 Test Facility

Bay area compliance Laboratories Corp. (BACL) is:
1- An independent Commercial Test Laboratory accredited to **ISO 17025: 2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminares and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC(Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65: 1996** by **A2LA** to certify:
1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s),Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009 and FCC KDB 558074 D01 DTS Meas Guidance v03r02.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test utility used was Tera Term was provided by Actiontec Electronics Inc., and was verified by BACL Isaac Aguilar to comply with the standard requirements being tested against.

2.3 Special Equipment

There were no special accessories required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

Two firmwares were used for testing. The fireware versions are listed below and testing done with the firmware is

1) F2300-36.128L.00b
   a) § 15.205, § 15.209 § 15.247 – Radiated Emissions including Restricted Band
   b) § 15.247 (a)(2) -6 dB and 99 % Bandwidth

2) F2300-36.128L.00c
   a) § 15.207 AC Line Conducted Emission
   b) § 15.247 (b)(3) Output Power
   c) § 15.247 (e) Power Spectral Density
   d) § 15.247 (d) Conducted TX Spurious Emissions
   e) § 15.247 (d) Band Edge
   f) § 15.209 radiated Emissions

Unless otheriwise noted in section firmware F2300-36.128L.00b was used for the testing.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
IBM	Laptop	2668	L3-XMMYH
IBM	Laptop	2668	L3-XMMZV
Netgear	Wireless N-Dual Band Adaptor	WNDA3100	0230-11-3593

2.6 EUT Internal Configuration Details

Manufacturers	Descriptions	Models	Serial Numbers
Actiontec	Gateway	F2300	SB304240400003

2.7 Interface Ports and Cables

Cable Description	Length (m)	To	From
CAT.5E FTP	1.5	EUT Ethernet port 2	IBM 2668 Ethernet Port
Conducted Emissions cable	2	Specturm Analyzer	EUT
High Frequency Cable	6	Antenna	PSA
UFL Conducted Cable	0.15	Spectrum Analyzer	EUT
Coax-Cable Asset# 00661	1.5	Spectrum Analyzer	Pre-Amplifier
Coax-Cable Asset# 00601	1.5	Pre-Amplifier	Antenna Cable

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
Actiontec	Power Adaptor	STD-12020U1	N1100181
IBM	Power Adaptor	08K8204	08K8204
IBM	Power Adaptor	02K6750	02K6750

3 Summary of Test Results

Results reported relate only to the product tested.

FCC Rules	Description of Test	Result (s)
§ 15.207	AC Line Conducted Emissions	Compliant
§ 15.203	Antenna Requirements	Compliant
§ 15.247 (a)(2)	6 dB Emission Bandwidth	Compliant
§ 15.247 (b) (3)	Output Power	Compliant
§ 15.247 (e)	Power Spectral Density	Compliant
§ 15.247 (d)	Conducted Spurious Emissions	Compliant
§15.247 (d)	Band Edge	Compliant
§ 15.205, §15.209, § 15.247 (d)	Radiated Emissions Including Restriced Bands	Compliant
§ 15.209	Radiated Emissions	Compliant
§ 15.247 (i)	RF Exposure	Compliant

4 FCC §15.247 (i) & §2.1091 – RF Exposure

4.1 Applicable Standard

According to FCC §15.247(i) 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.

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)
Limits for General Population/Uncontrolled Exposure				
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

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 MPE Results

2.4 GHz Band:

Maximum peak output power at antenna input terminal (dBm):	27.35
Maximum peak output power at antenna input terminal (mW):	543.25
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	5
Maximum Antenna Gain (numeric):	3.162
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.342
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

5 GHz Module:

Maximum peak output power at antenna input terminal (dBm):	25.51
Maximum peak output power at antenna input terminal (mW):	355.63
Prediction distance (cm):	20
Prediction frequency (MHz):	5240
Maximum Antenna Gain, typical (dBi):	1.9
Maximum Antenna Gain (numeric):	1.54
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.109
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

Radio Mode	Frequency (MHz)	Max Antenna Gain (dBi)	Max Conducted Power (dBm)	Power Density @ 20 cm (mW/cm^2)	% of MPE
2.4 GHz	2437	5	27.35	0.342	34.2%
5 GHz	5240	1.9	25.51	0.109	11%

The device is compliant with the requirement MPE limit for uncontrolled exposure.

5 FCC §15.203 – Antenna Requirements

5.1 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 use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2 Antenna List

Manufacturers	Antenna Type/Pattern	Antenna Gain (dBi) @ 2.4 GHz
Wha Yu Industrial	Dipole	5

Note: The power setting was controlled by manufacture with different antenna configuration. The power setting of the different antenna will be set with the corresponded value and no more then the level reported.

The antenna consists of revese male SMA connectors with less 6 dBi gain; therefore, it complies with the antenna requirement. Please refer EUT photos.

6 FCC §15.207– AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

**Decreases with the logarithm of the frequency.*

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2009 measurement procedure. The specification used was FCC §15.207.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

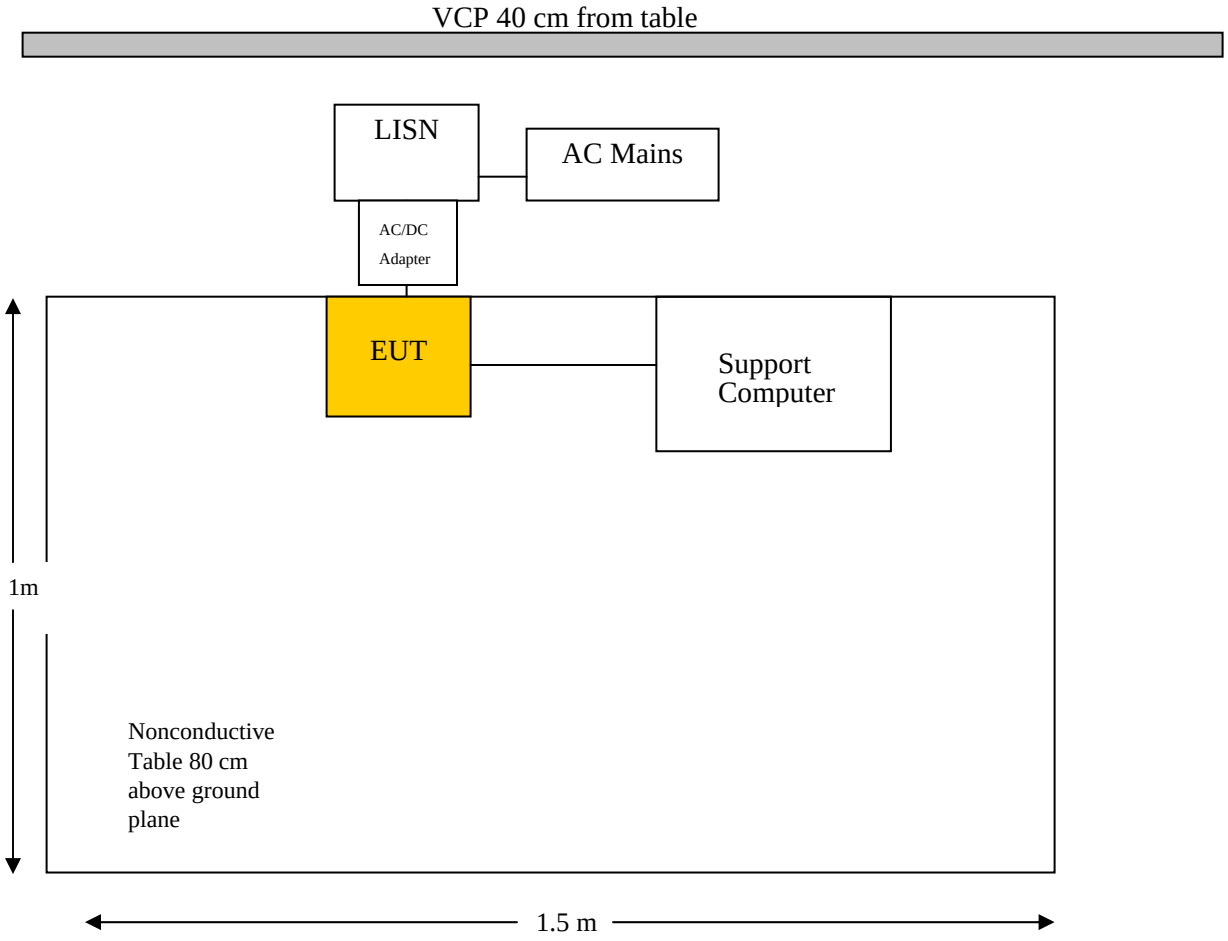
6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-2.

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

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL), the Attenuator Factor (Atten) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 dB)

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

Margin = Corrected Amplitude - Limit

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwartz	EMI Test Reciver	ESCI 1166.5950K03	100337	2014-05-28	1 year
Rohde & Schwarz	Transient Limiter	ESH 3-Z2	357.8810.52	N/A	N/A
Solar Electronics	LISN	9252-50-R-24-N	511205	2014-06-25	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

6.7 Test Environmental Conditions

Temperature:	25° C
Relative Humidity:	48 %
ATM Pressure:	102.1 kPa

The testing was performed by Isaac Aguilar on 2014-07-16 in 5m chamber 2.

6.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC standard's conducted emissions limits, with the margin reading of:

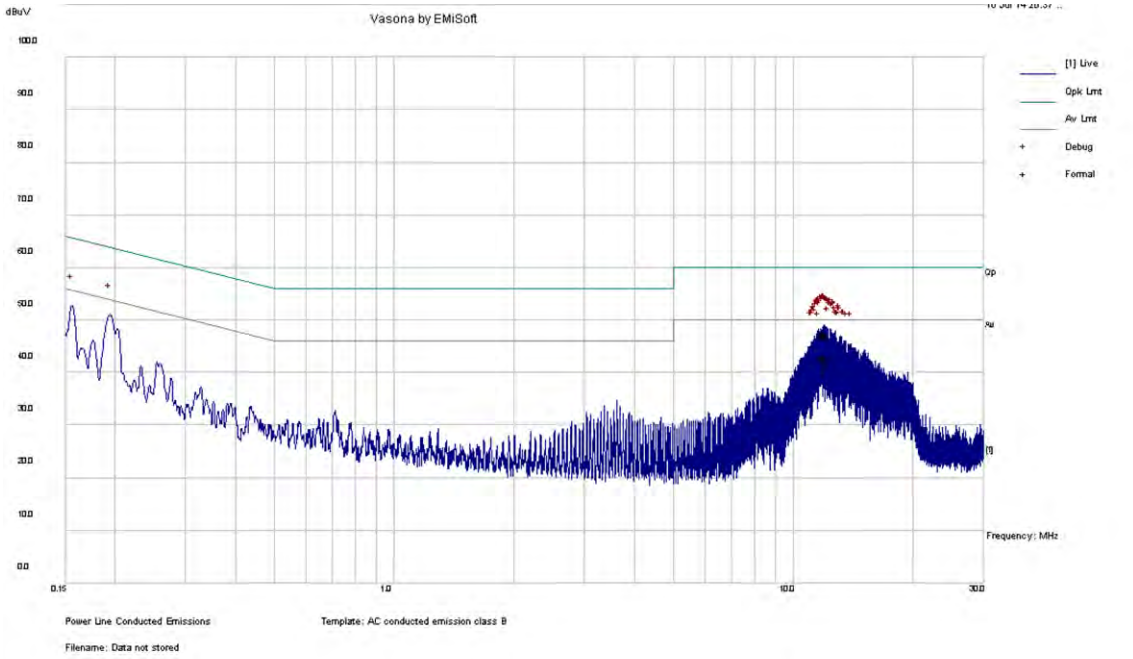
Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-6.44	11.81	Neutral	0.15-30

Note: Testing was performed with firmware version F2300-36.128L.00c

6.9 Conducted Emissions Test Plots and Data

Co-location for 2.4 GHz and 5 GHz

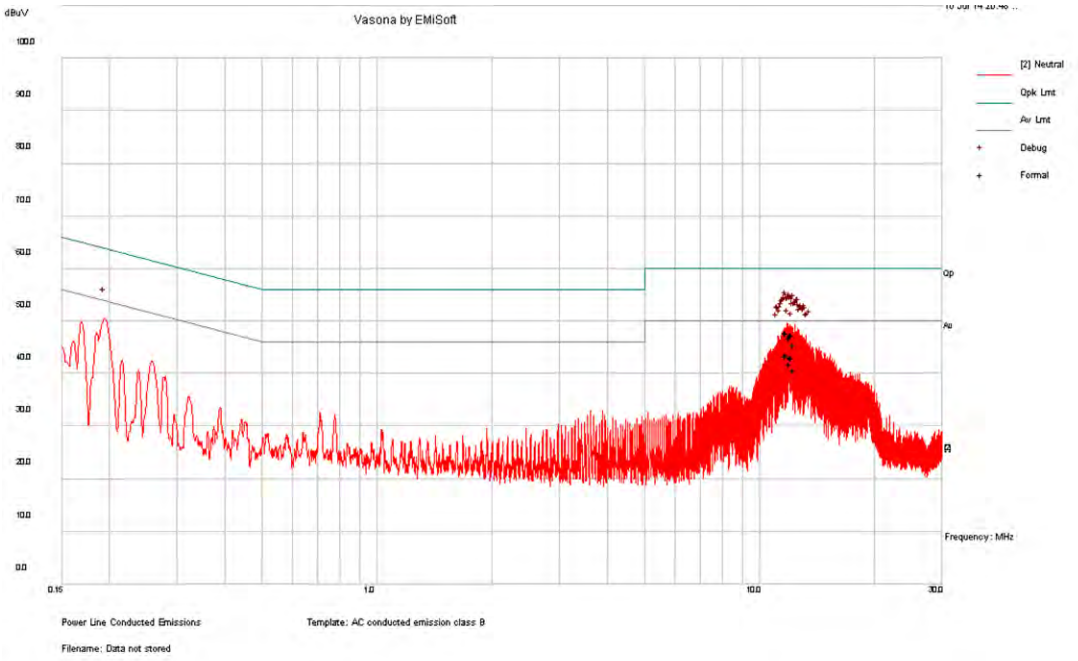
120 V, 60 Hz – Line, AC/DC Adaptor



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
11.8152	47.62	Line	60	-12.38	QP
12.07334	47.45	Line	60	-12.55	QP
11.94499	47.12	Line	60	-12.88	QP
12.01198	46.98	Line	60	-13.02	QP
11.87791	46.73	Line	60	-13.27	QP
12.13902	46.72	Line	60	-13.28	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
11.8152	42.87	Line	50	-7.13	Ave.
12.07334	42.82	Line	50	-7.18	Ave.
11.87791	42.61	Line	50	-7.39	Ave.
11.94499	42.45	Line	50	-7.55	Ave.
12.13902	41.95	Line	50	-8.05	Ave.
12.01198	40.53	Line	50	-9.47	Ave.

120 V, 60 Hz – Neutral, AC/DC Adaptor



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
11.75006	47.86	Neutral	60	-12.14	QP
11.81446	47.74	Neutral	60	-12.26	QP
12.13878	47.43	Neutral	60	-12.57	QP
12.07239	47.28	Neutral	60	-12.72	QP
12.01057	46.90	Neutral	60	-13.10	QP
12.32776	45.51	Neutral	60	-14.49	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
11.81446	43.56	Neutral	50	-6.44	Ave.
11.75006	43.39	Neutral	50	-6.61	Ave.
12.07239	43.28	Neutral	50	-6.72	Ave.
12.13878	42.92	Neutral	50	-7.08	Ave.
12.01057	41.86	Neutral	50	-8.14	Ave.
12.32776	40.71	Neutral	50	-9.29	Ave.

7 FCC §2.1051, §15.247(d) – Spurious Emissions at Antenna Terminals

7.1 Applicable Standard

For FCC §15.247(d) in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 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, provided the transmitter demonstrates compliance with the conducted power limits based on RMS averaging.

7.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11: Emissions in non-restricted frequency bands and section 12: Emissions in restricted frequency bands.

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year
Mini-Circuits	10 dB Attenuator	BW-S10W2	MCL 1144	N/A	N/A

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

7.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	45 %
ATM Pressure:	101.25 kPa

The testing was performed by Isaac Aguilar from 2014-07-03 at RF site.

7.5 Test Results

The maximum PSD level was deteremined by the method described in FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11.2: Reference level measurement. This PSD measurement is the reference level for the spurious emissions outside the non-restriced band. Mode 802.11 b Channel 1 Chain 0 was used as the reference level. The tables below report the three highest emission levels compared to the limit. It has been noted wheather the value reported is noise floor. Plot of the spurious emissions have been included. The testing was performed with firmware version *F2300-36.128L.00c*

7.5.1 Three Highest Emissions Relative to the Reference Limit for Chain 0

Low Channel for 802.11 b/g/n20/n40:

Frequency (GHz)	Amplitude (dBm)	Limit: 30 dB under the peak PSD (dBm)	Magin (dB)	Rusults	Comments
Mode 802.11 b: Low Channel (ch1)					
2.544	-30.19	-16.85	-13.34	Pass	
25.56	-30.79	-16.85	-13.94	Pass	Noise Floor
13.69	-33.04	-16.85	-16.19	Pass	Noise Floor
Mode 802.11 g: Low Channel (ch1)					
25.72	-32.06	-16.85	-15.21	Pass	Noise Floor
23.64	-32.82	-16.85	-15.97	Pass	Noise Floor
23.01	-33.53	-16.85	-16.68	Pass	Noise Floor
Mode 802.11 n20: Low Channel (ch1)					
24.93	-31.87	-16.85	-15.02	Pass	Noise Floor
13.18	-33.93	-16.85	-17.08	Pass	Noise Floor
26.07	-32.23	-16.85	-15.38	Pass	Noise Floor
Mode 802.11 n40: Low Channel (ch3)					
2.534	-21.81	-16.85	-4.96	Pass	
25.56	-33.19	-16.85	-16.34	Pass	Noise Floor
24.03	-33.31	-16.85	-16.46	Pass	Noise Floor

Middle Channel for 802.11 b/g/n20/n40

Frequency (GHz)	Amplitude (dBm)	Limit: 30 dB under the peak PSD (dBm)	Magin (dB)	Rusults	Comments
Mode 802.11 b: Middle Channel (ch6) Chain 0					
2.529	-31.39	-16.85	-14.54	Pass	
25.76	-31.14	-16.85	-14.29	Pass	Noise Floor
13.69	-31.97	-16.85	-15.12	Pass	Noise Floor
Mode 802.11 g: Middle Channel (ch6) Chain 0					
2.529	-34.24	-16.85	-17.39	Pass	
25.76	-31.63	-16.85	-14.78	Pass	Noise Floor
21.33	-33.11	-16.85	-16.26	Pass	Noise Floor
Mode 802.11 n20: Middle Channel (ch6) Chain 0					
2.534	-35.2	-16.85	-18.35	Pass	
24.28	-28.44	-16.85	-11.59	Pass	Noise Floor
25.16	-27.67	-16.85	-10.82	Pass	Noise Floor
Mode 802.11 n40: Middle Channel (ch6) Chain 0					
2.534	-30.61	-16.85	-13.76	Pass	
25.76	-31.68	-16.85	-14.83	Pass	Noise Floor
13.22	-33.39	-16.85	-16.54	Pass	Noise Floor

High Channel for 802.11 b/g/n20/n40

Frequency (GHz)	Amplitude (dBm)	Limit: 30 dB under the peak PSD (dBm)	Magin (dB)	Rusults	Comments
Mode 802.11 b: High Channel (ch 11) Chain 0					
2.539	-24.56	-16.85	-7.71	Pass	
25.32	-32.04	-16.85	-15.19	Pass	Noise Floor
24.62	-33.20	-16.85	-16.35	Pass	Noise Floor
Mode 802.11 g: High Channel (ch11) Chain 0					
25.83	-32.07	-16.85	-15.22	Pass	Noise Floor
24.35	-32.71	-16.85	-15.86	Pass	Noise Floor
16.36	-34.03	-16.85	-17.18	Pass	Noise Floor
Mode 802.11 n20: High Channel (ch11) Chain 0					
2.534	-18.12	-16.85	-1.27	Pass	
25.91	-31.88	-16.85	-15.03	Pass	Noise Floor
24.66	-32.42	-16.85	-15.57	Pass	Noise Floor
Mode 802.11 n40: High Channel (ch9) Chain 0					
2.539	-31.78	-16.85	-14.93	Pass	
25.72	-32.09	-16.85	-15.24	Pass	Noise Floor
24.66	-33.19	-16.85	-16.34	Pass	Noise Floor

7.5.2 Three Highest Emissions Relative to the Reference Limit for Chain 1

Low Channel for 802.11 b/g/n20/n40:

Frequency (GHz)	Amplitude (dBm)	Limit: 30 dB under the peak PSD (dBm)	Magin (dB)	Rusults	Comments
Mode 802.11 b: Low Channel (ch1) Chain 1					
2.539	-32.21	-16.85	-15.36	Pass	
25.76	-31.12	-16.85	-14.27	Pass	Noise Floor
26.15	-30.56	-16.85	-13.71	Pass	Noise Floor
Mode 802.11 g: Low Channel (ch1) Chain 1					
2.544	-28.71	-16.85	-11.86	Pass	
25.68	-32.71	-16.85	-15.86	Pass	Noise Floor
24.97	-33.07	-16.85	-16.22	Pass	Noise Floor
Mode 802.11 n20: Low Channel (ch1) Chain 1					
2.539	-34.78	-16.85	-17.93	Pass	
25.6	31.92	-16.85	48.77	Pass	Noise Floor
24.11	-33.14	-16.85	-16.29	Pass	Noise Floor
Mode 802.11 n40: Low Channel (ch3) Chain 1					
2.529	-34.16	-16.85	-17.31	Pass	
26.15	-32.22	-16.85	-15.37	Pass	Noise Floor
14.52	-33.89	-16.85	-17.04	Pass	Noise Floor

Middle Channel for 802.11 b/g/n20/n40

Frequency (GHz)	Amplitude (dBm)	Limit: 30 dB under the peak PSD (dBm)	Magin (dB)	Rusults	Comments
Mode 802.11 b: Middle Channel (ch6) Chain 1					
26.07	-30.33	-16.85	-13.48	Pass	Noise Floor
26.76	-31.11	-16.85	-14.26	Pass	Noise Floor
13.73	-32.99	-16.85	-16.14	Pass	Noise Floor
Mode 802.11 g: Middle Channel (ch6) Chain 1					
2.544	-37.00	-16.85	-20.15	Pass	
25.64	-32.32	-16.85	-15.47	Pass	Noise Floor
14.36	-33.56	-16.85	-16.71	Pass	Noise Floor
Mode 802.11 n20: Middle Channel (ch6) Chain 1					
2.604	-38.82	-16.85	-21.97	Pass	
26.03	-31.2	-16.85	-14.35	Pass	Noise Floor
21.37	-34.92	-16.85	-18.07	Pass	Noise Floor
Mode 802.11 n40: Middle Channel (ch6) Chain 1					
2.544	-36.88	-16.85	-20.03	Pass	
26.19	-31.72	-16.85	-14.87	Pass	Noise Floor
25.36	-32.53	-16.85	-15.68	Pass	Noise Floor

High Channel for 802.11 b/g/n20/n40

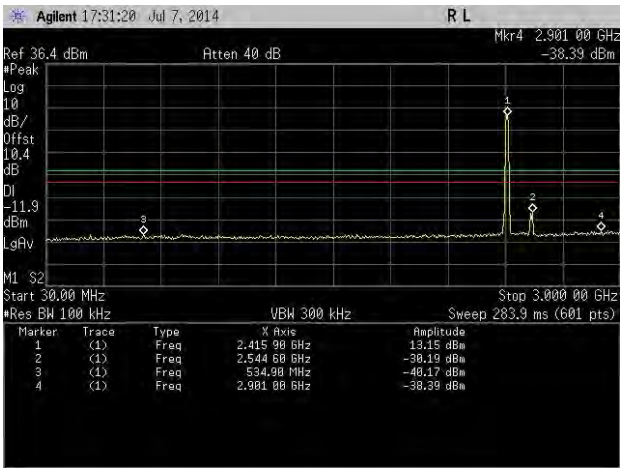
Frequency (GHz)	Amplitude (dBm)	Limit: 30 dB under the peak PSD (dBm)	Magin (dB)	Rusults	Comments
Mode 802.11 b: High Channel (ch11) Chain 1					
25.8	-31.76	-16.85	-14.91	Pass	Noise Floor
21.33	-33.56	-16.85	-16.71	Pass	Noise Floor
13.69	-33.64	-16.85	-16.79	Pass	Noise Floor
Mode 802.11 g: High Channel (ch11) Chain 1					
25.56	-31.76	-16.85	-14.91	Pass	Noise Floor
23.56	-34.10	-16.85	-17.25	Pass	Noise Floor
13.69	-33.64	-16.85	-16.79	Pass	Noise Floor
Mode 802.11 n20: High Channel (ch11) Chain 1					
2.544	-26.02	-16.85	-9.17	Pass	
25.64	-32.34	-16.85	-15.49	Pass	Noise Floor
24.7	33.63	-16.85	50.48	Pass	Noise Floor
Mode 802.11 n40: High Channel (ch9) Chain 1					
24.35	-32.17	-16.85	-15.32	Pass	Noise Floor
26.15	-32.18	-16.85	-15.33	Pass	Noise Floor
13.73	-33.17	-16.85	-16.32	Pass	Noise Floor

7.5.3 Plots of Spurious Emission for Restricted and Non-Restriced Bands

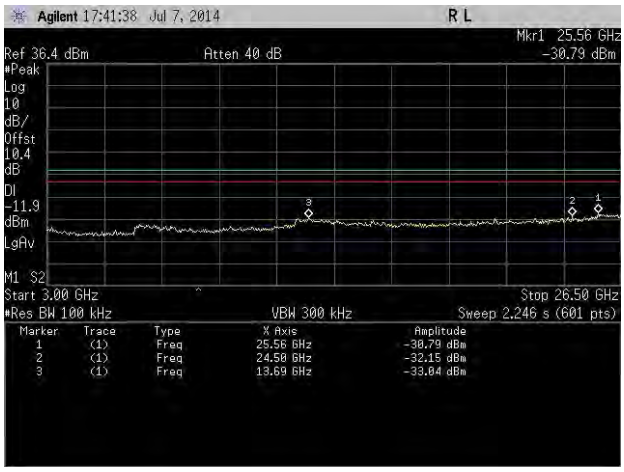
Note: The line of compliance is indicated in red not green. This line represents 30 dB below the reference point.

802.11b, Low Channel, 2412 MHz

Chain 0, Plot: 30 MHz – 3 GHz

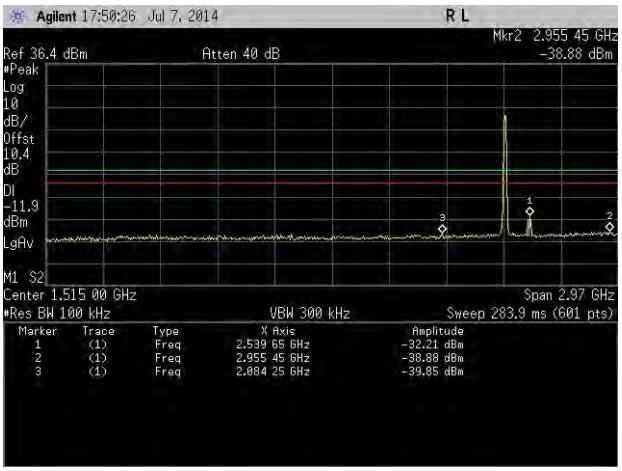


Chain 0, Plot: 3 GHz – 26 GHz

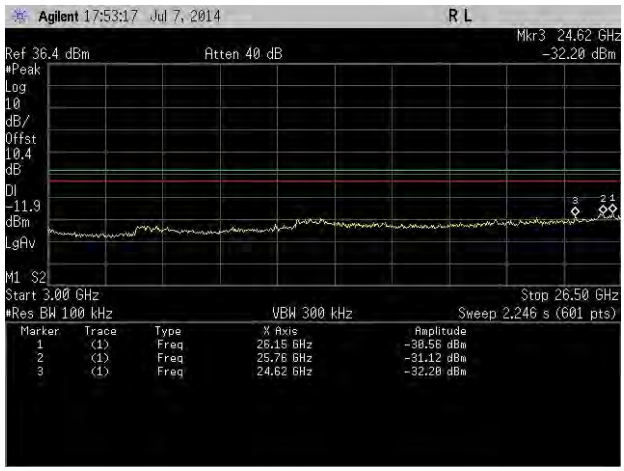


802.11b, Low Channel, 2412 MHz

Chain 1, Plot: 30 MHz – 3 GHz

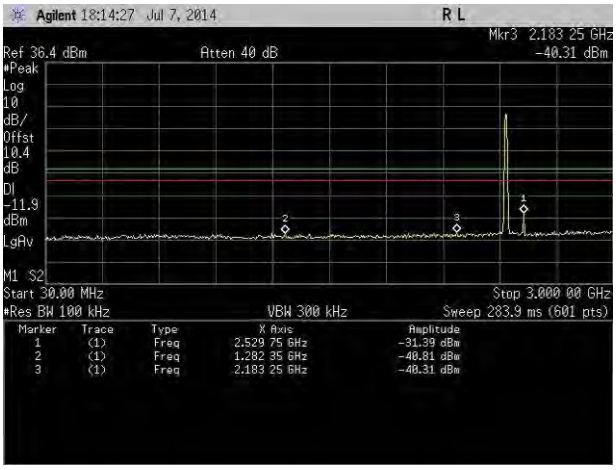


Chain 1, Plot: 3 GHz – 26 GHz

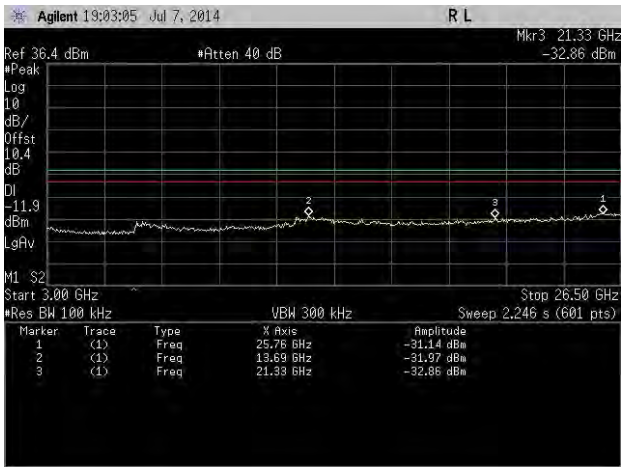


802.11b, Middle Channel, 2437 MHz

Chain 0, Plot: 30 MHz – 3 GHz

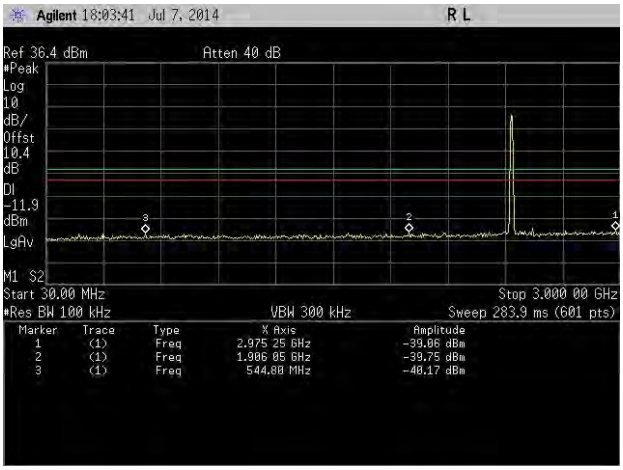


Chain 0, Plot: 3 GHz – 26 GHz

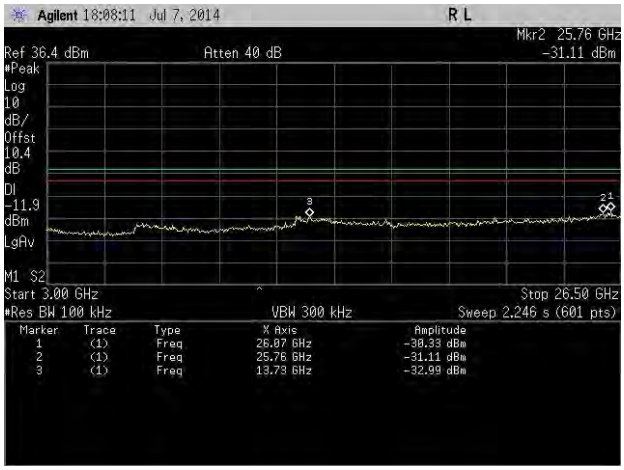


802.11b Middle Channel 2437 MHz

Chain 1, Plot: 30 MHz – 3 GHz

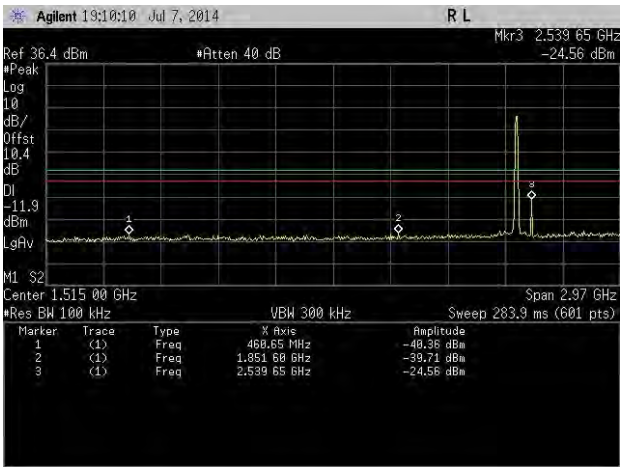


Chain 1, Plot: 3 GHz – 26 GHz

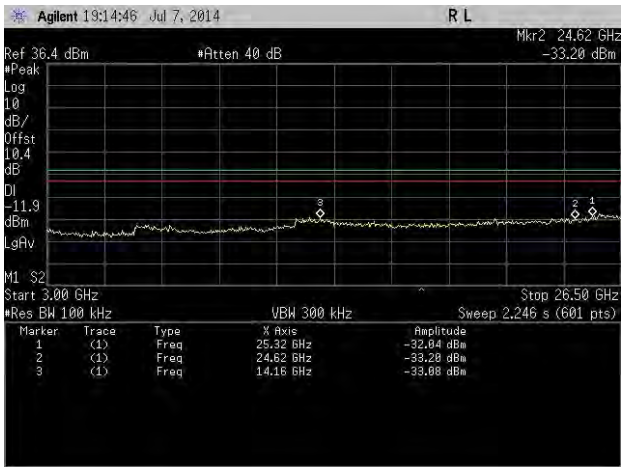


802.11b, High Channel 2462 MHz

Chain 0, Plot: 30 MHz – 3 GHz

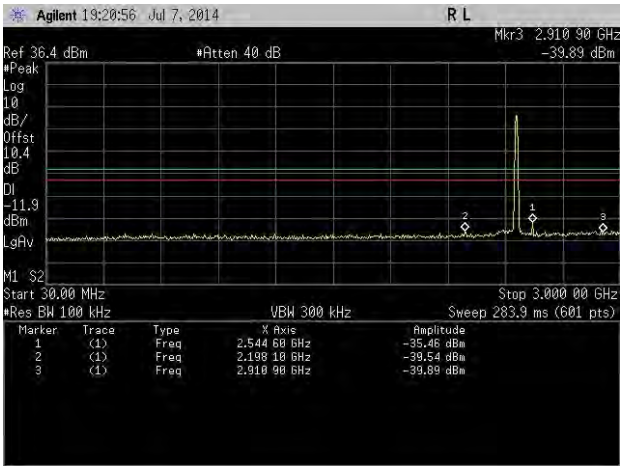


Chain 0, Plot: 3 GHz – 26 GHz

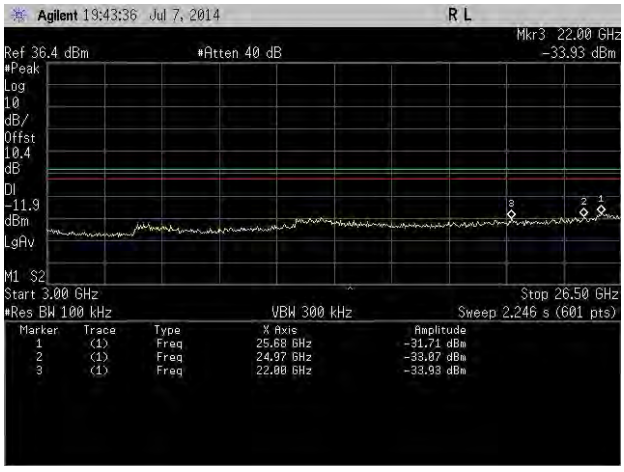


802.11b, High Channel 2462 MHz

Chain 1, Plot: 30 MHz – 3 GHz

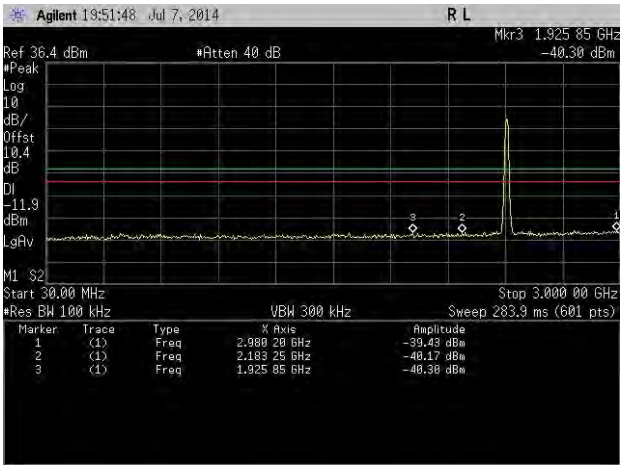


Chain 1, Plot: 3 GHz – 26 GHz

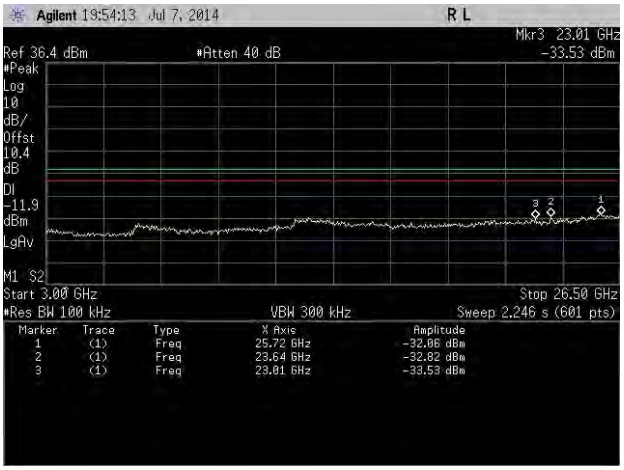


802.11g, Low Channel 2412 MHz

Chain 0, Plot: 30 MHz – 3 GHz

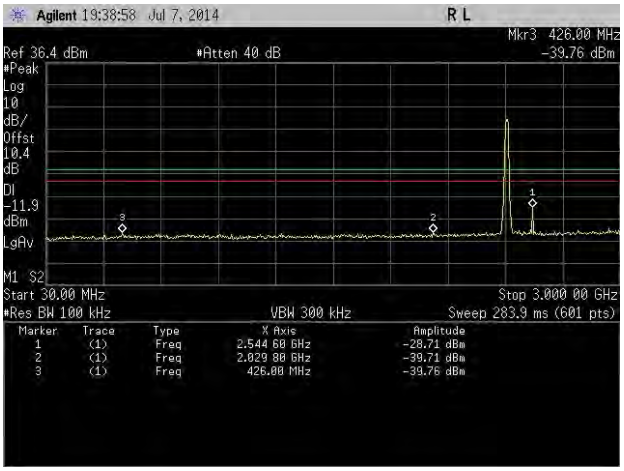


Chain 0, Plot: 3 GHz – 26 GHz

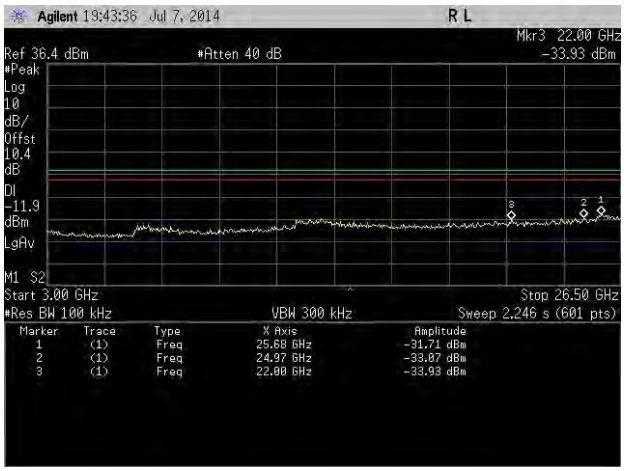


802.11g, Low Channel 2412 MHz

Chain 1, Plot: 30 MHz – 3 GHz

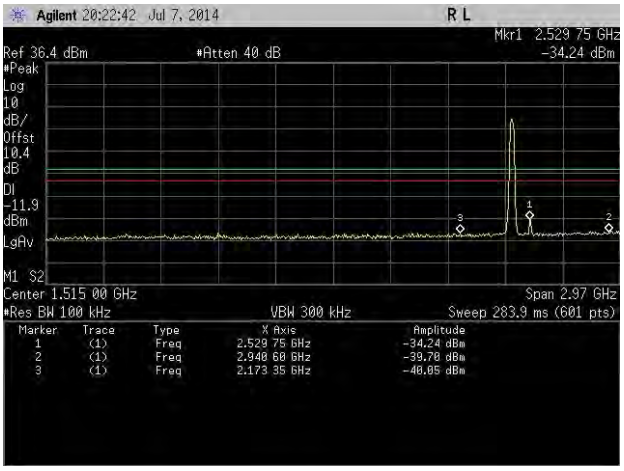


Chain 1, Plot: 3 GHz – 26 GHz

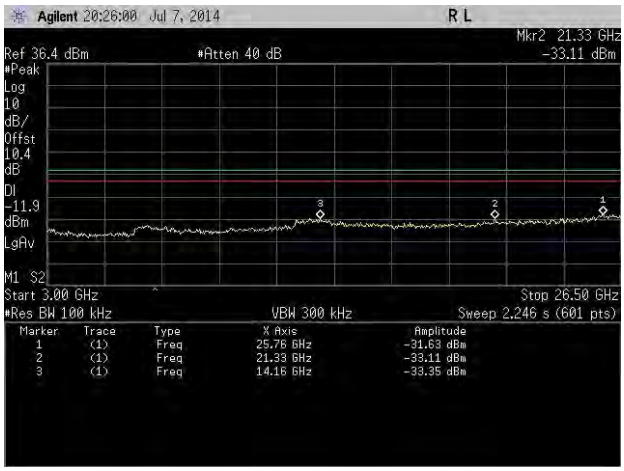


802.11g, Middle Channel 2437 MHz

Chain 0, Plot: 30 MHz – 3 GHz

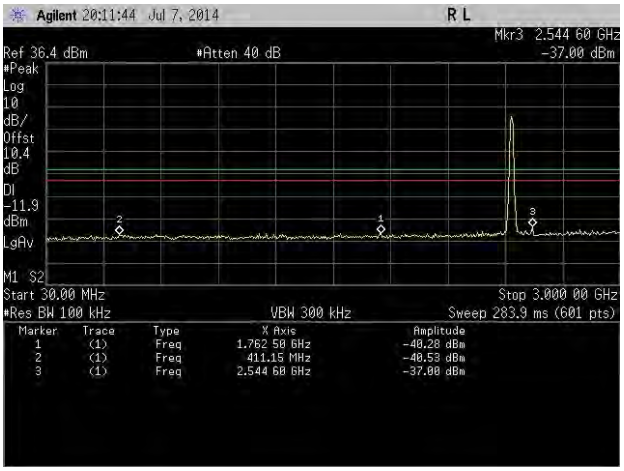


Chain 0, Plot: 3 GHz – 25 GHz

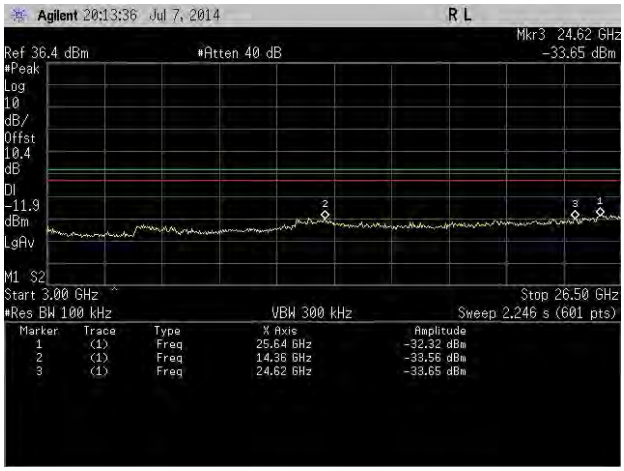


802.11g, Middle Channel 2437 MHz

Chain 1, Plot: 30 MHz – 3 GHz

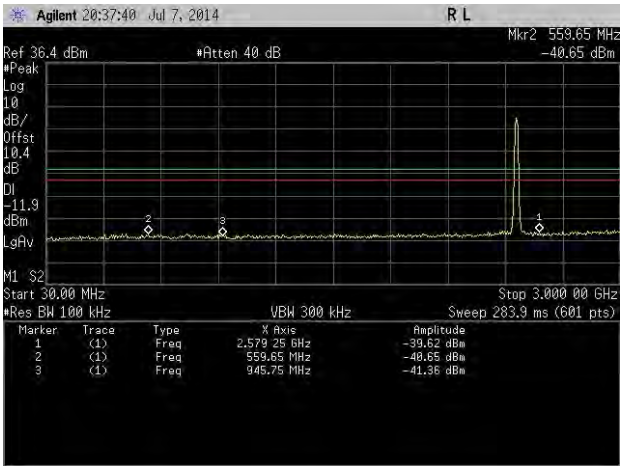


Chain 1, Plot: 3 GHz – 25 GHz

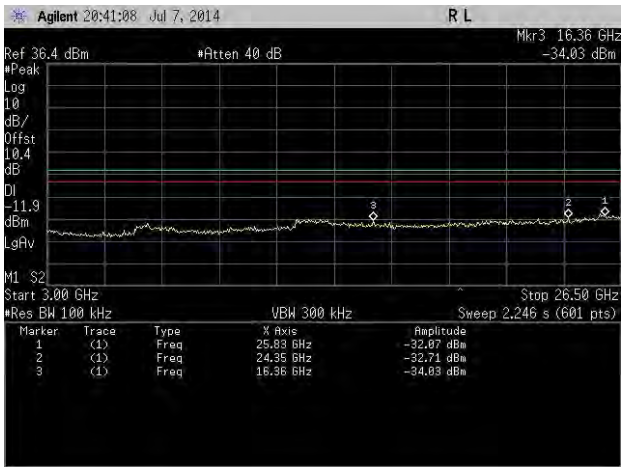


802.11g, High Channel 2462 MHz

Chain 0, Plot: 30 MHz – 3 GHz

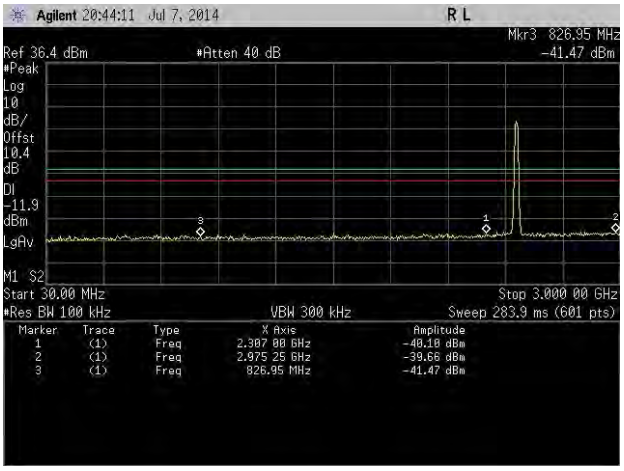


Chain 0, Plot: 3 GHz – 25 GHz

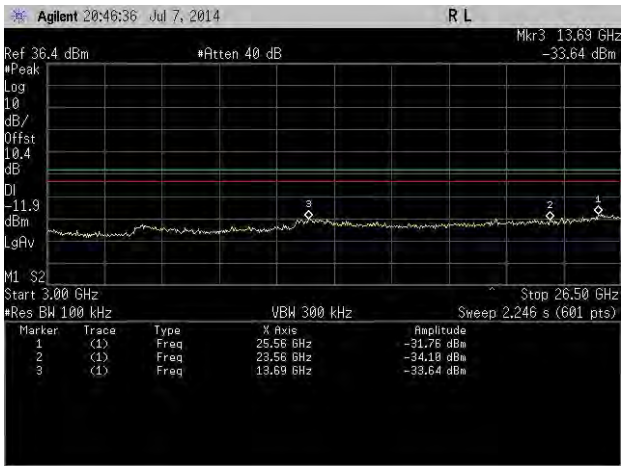


802.11g, High Channel 2462 MHz

Chain 1, Plot: 30 MHz – 3 GHz

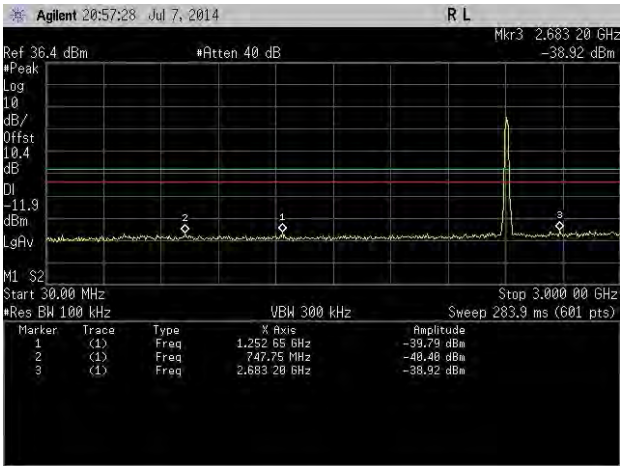


Chain 1, Plot: 3 GHz – 25 GHz

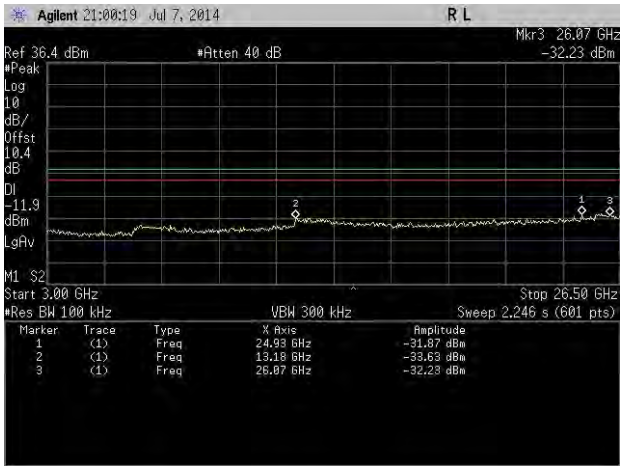


802.11 n20, Low Channel 2412 MHz

Chain 0, Plot: 30 MHz – 3 GHz

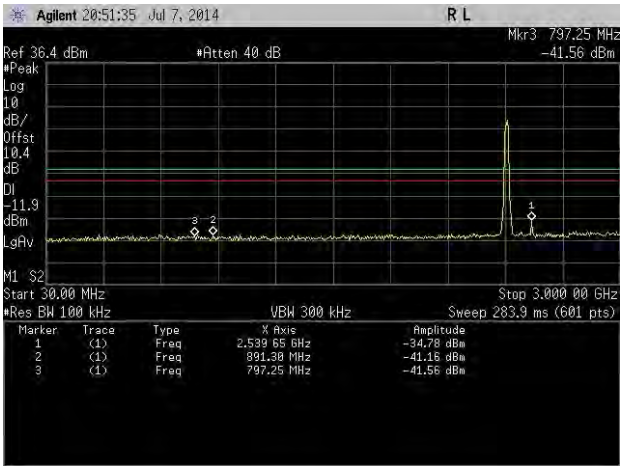


Chain 0, Plot: 3 GHz – 25 GHz

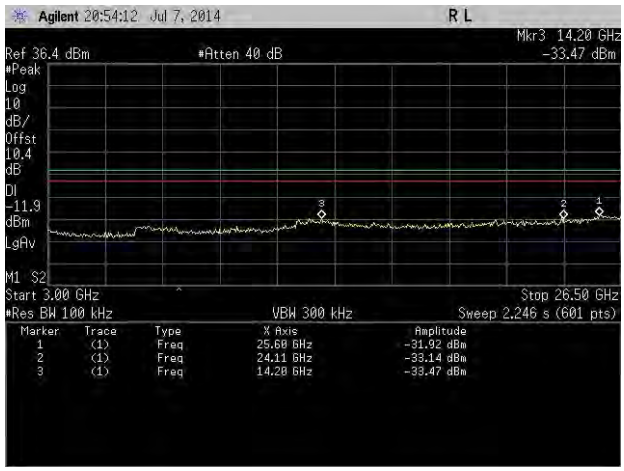


802.11 n20, low Channel 2412 MHz

Chain 1, Plot: 30 MHz – 3 GHz

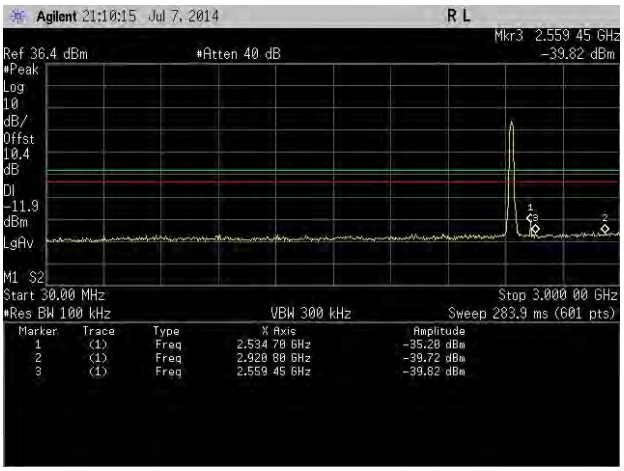


Chain 1, Plot: 3 GHz – 25 GHz

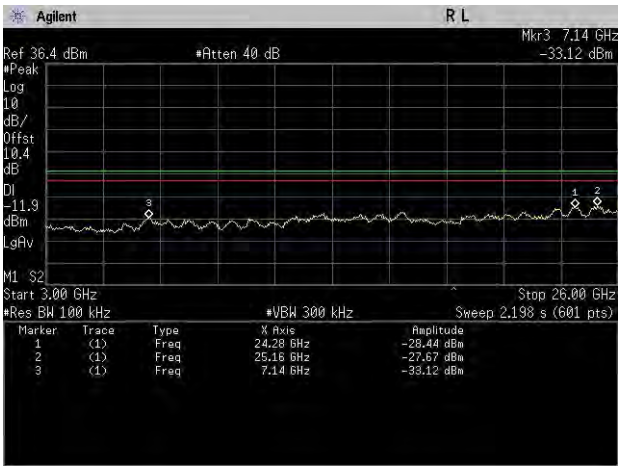


802.11 n20, Middle Channel 2437 MHz

Chain 0, Plot: 30 MHz – 3 GHz

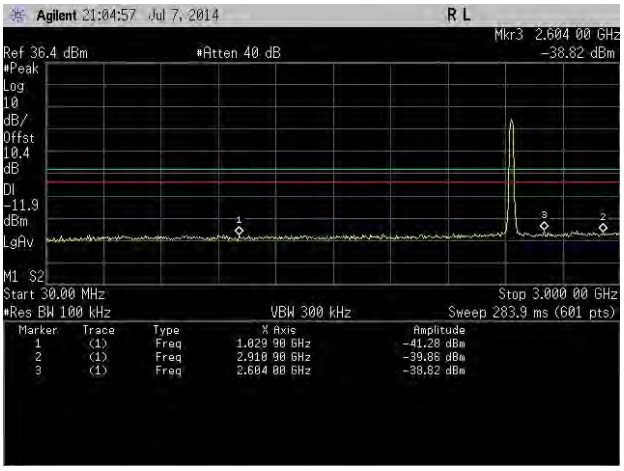


Chain 0, Plot: 3 GHz – 25 GHz

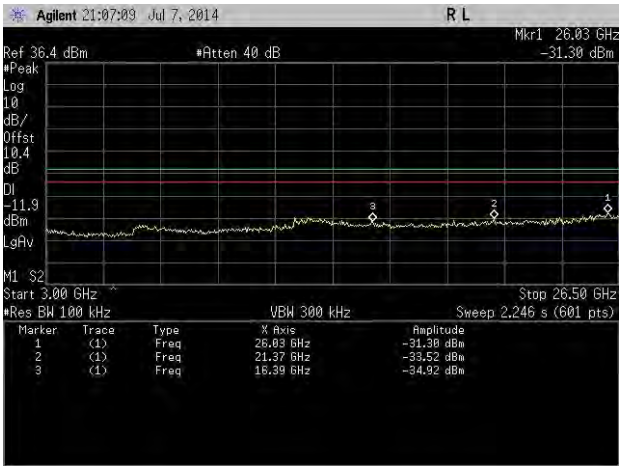


802.11 n20, Middle Channel 2437 MHz

Chain 1, Plot: 30 MHz – 3 GHz

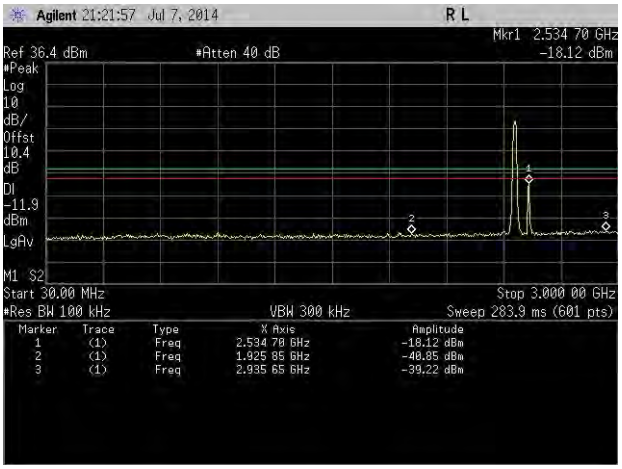


Chain 1, Plot: 3 GHz – 25 GHz

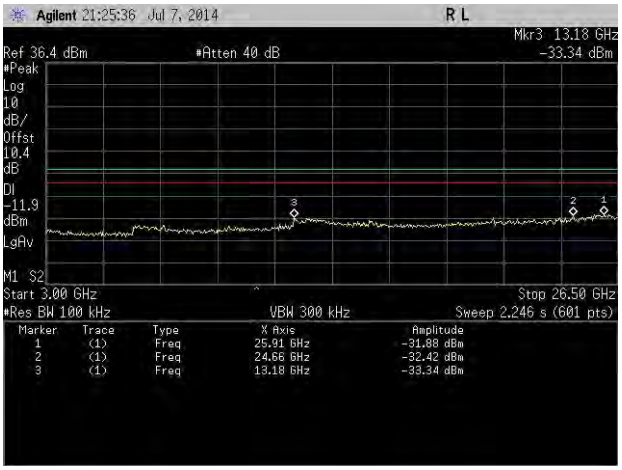


802.11 n20, High Channel 2462 MHz

Chain 0, Plot: 30 MHz – 3 GHz

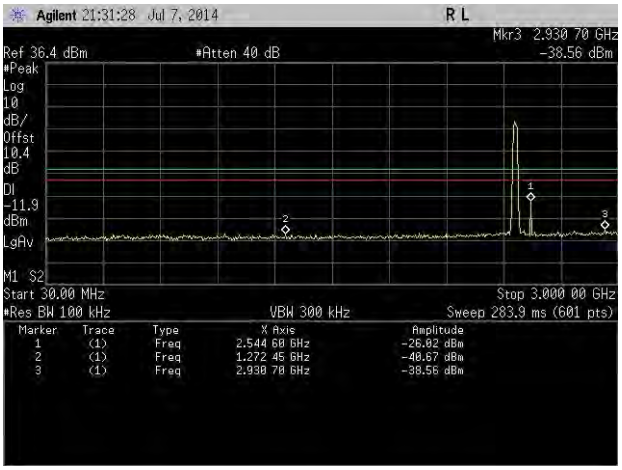


Chain 0, Plot: 3 GHz – 25 GHz

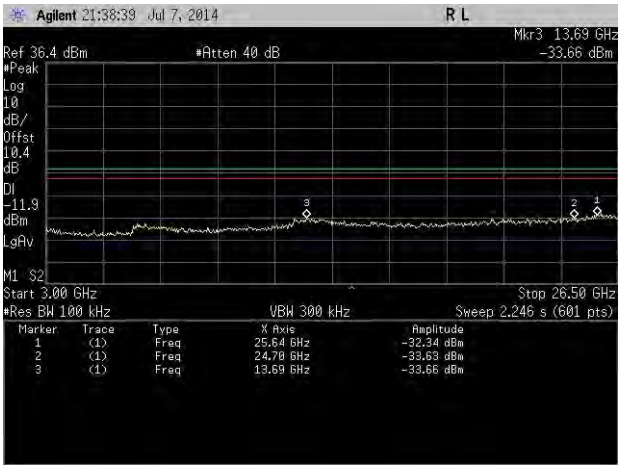


802.11 n20, High Channel 2462 MHz

Chain 1, Plot: 30 MHz – 3 GHz

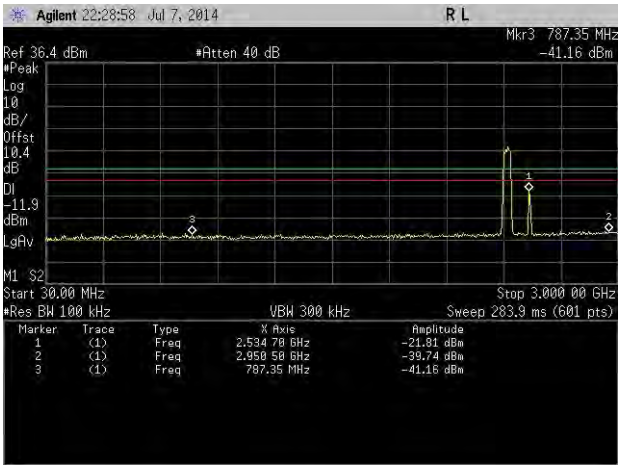


Chain 1, Plot: 3 GHz – 25 GHz

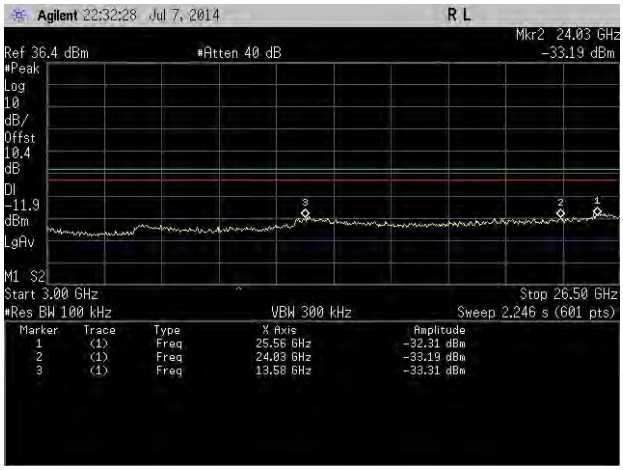


802.11 n40, LowChannel 2422 MHz

Chain 0, Plot: 30 MHz – 3 GHz

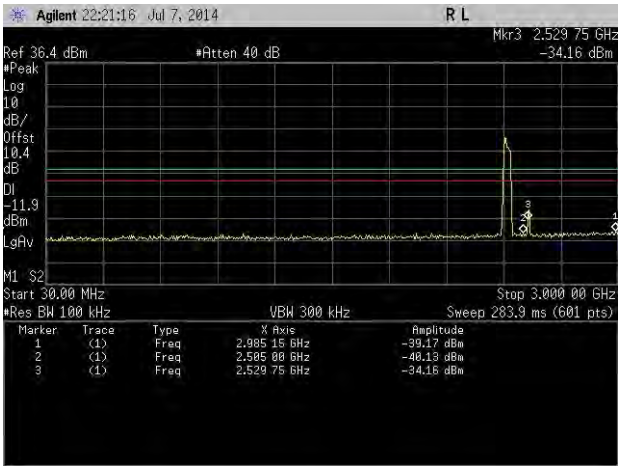


Chain 0, Plot: 3 GHz – 25 GHz

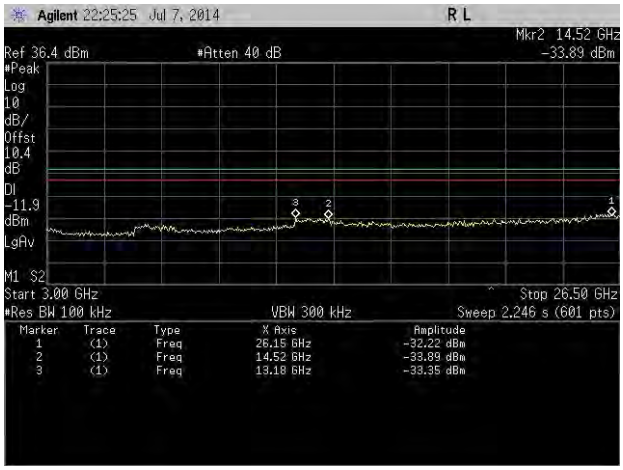


802.11 n40, Low Channel 2422 MHz

Chain 1, Plot: 30 MHz – 3 GHz

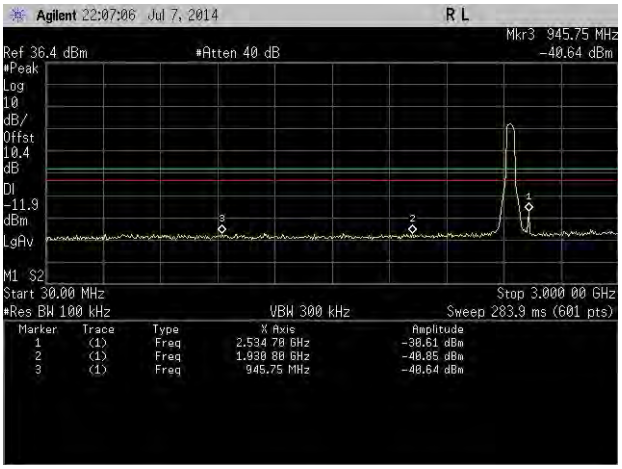


Chain 1, Plot: 3 GHz – 25 GHz

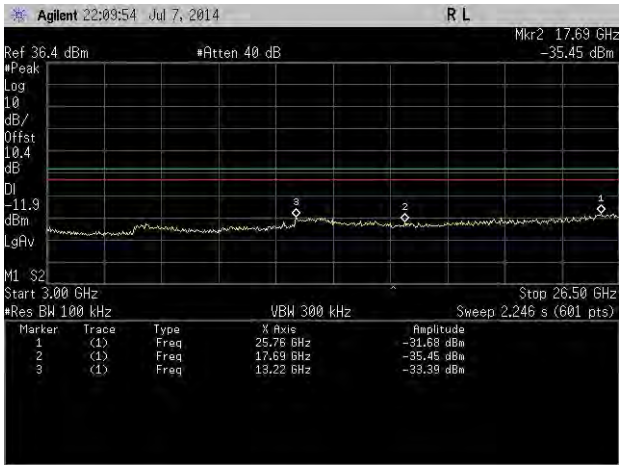


802.11 n40, Middle Channel 2437 MHz

Chain 0, Plot: 30 MHz – 3 GHz

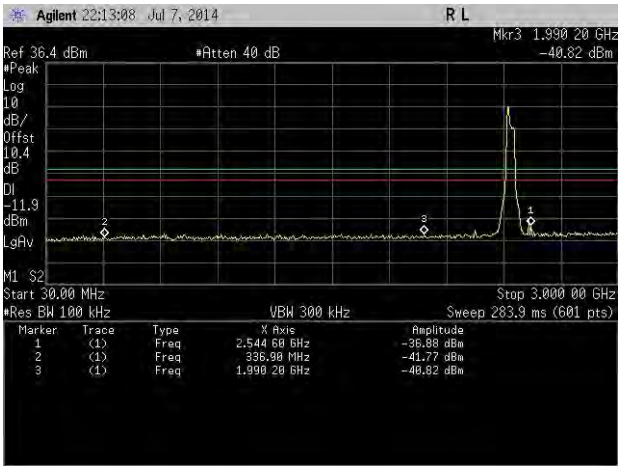


Chain 0, Plot: 3 GHz – 25 GHz

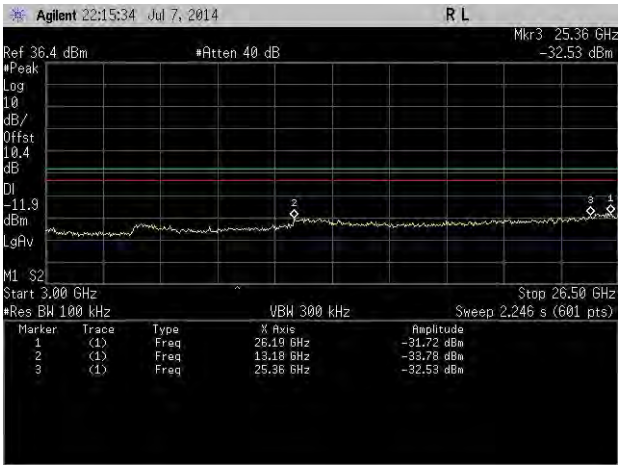


802.11 n40, Middle Channel 2437 MHz

Chain 1, Plot: 30 MHz – 3 GHz

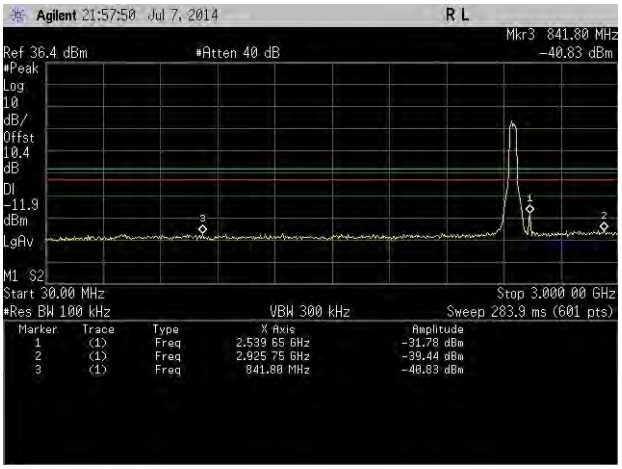


Chain 1, Plot: 3 GHz – 25 GHz

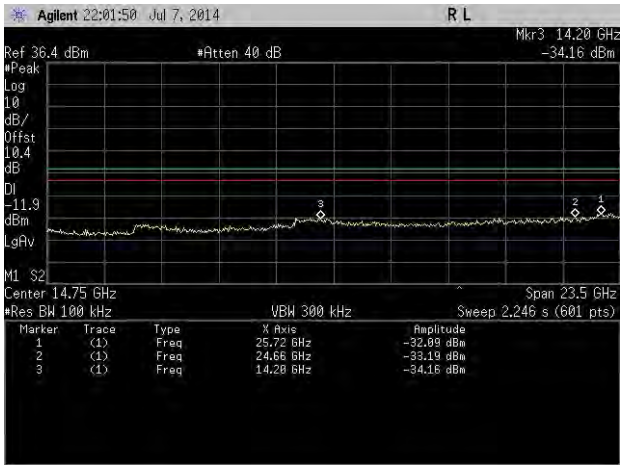


802.11 n40, High Channel 2452 MHz

Chain 0, Plot: 30 MHz – 3 GHz

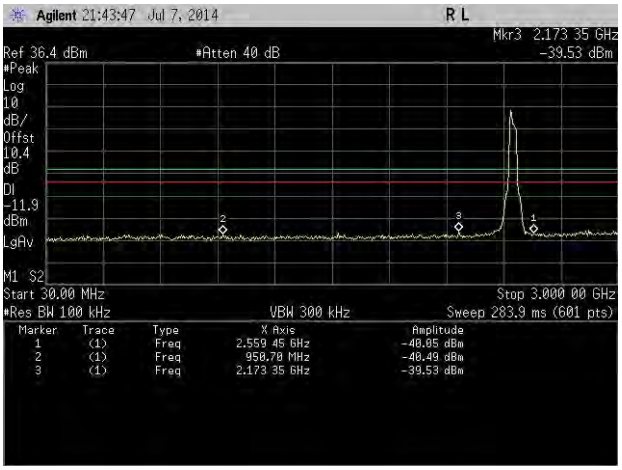


Chain 0, Plot: 3 GHz – 25 GHz

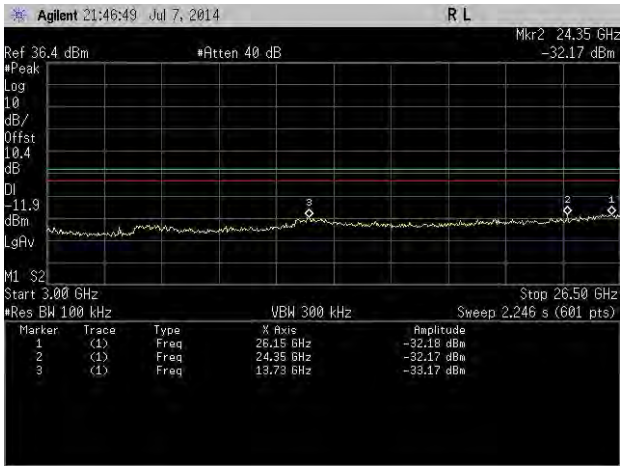


802.11 n40, High Channel 2452 MHz

Chain 1, Plot: 30 MHz – 3 GHz



Chain 1, Plot: 3 GHz – 25 GHz



8 FCC §15.205, §15.209 & §15.247(d) – Spurious Radiated Emissions

8.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

8.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

8.3 Test Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11: Emissions in non-restricted frequency bands and section 12: Emissions in restricted frequency bands. As well as ANSI C63.4: 2009 as described below:

For the radiated emissions test, the EUT host, and all support equipment power cords 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.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

8.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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

Margin = Corrected Amplitude - Limit

8.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year
Agilent	Pre-Amplifier	8449B	3008A01978	2014-03-10	1 year
Sunol Sciences	Controller	SC104V	122303-1	N/A	N/A
EMCO	Horn Antenna	3115	9511-4627	2014-01-06	1 year
Micro-Tronics	Band Reject Filter	BRM50701	160	N/A	N/A
Wisewave	Horn Antenna	ARH-4223-02	10555-01	2012-08-09	3 years
Sunol Sciences	Biconical-Log Antenna	JB3	A020106-2	2013-08-12	1 year
Hp	Pre-Amplifier	8447D	2443A04374	2014-06-09	1 year
Rohde & Schwartz	EMI Test Reciver	ESCI 1166.5950K03	100337	2014-05-28	1 year

Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

8.6 Test Environmental Conditions

Temperature:	23 ºC
Relative Humidity:	46%
ATM Pressure:	101.56 kPa

The testing was performed by Isaac Aguilar on 2014-07-17 in 5m chamber 2.

8.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C standard's radiated emissions limits, and had the worst margin of:

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode**
-1.23	374.84	Vertical	802.11 b

1 – 26 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode**
-2.395	25783	Horizontal	802.11 b

8.8 Radiated Emissions Test Data and Plots

1) 30 MHz – 1GHz, Measured at 3 meters

Quasi-Peak Measurements

2.4GHz and 5GHz worst case Co-location

All 30MHz – 1GHz spurious are digital, other emissions are on the noise floor level. The worst case result was reported.

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
374.84	44.77	100	V	0	46	-1.23
46.98	38.44	100	V	0	40	-1.56
499.97	44.05	100	V	0	46	-1.95
625.10	42.21	100	V	0	46	-3.79

2) 1–26 GHz, Measured at 3 meters

802.11b mode

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 b Low Channel (Ch1): 2412 MHz												
4824	46.17	221	100	V	33.05	0.15	4.1	34.78	48.69	74	-25.31	Peak
4824	32.98	221	100	V	33.05	0.15	4.1	34.78	35.50	54	-18.5	Ave
4824	42.76	141	100	H	33.05	0.15	4.1	34.78	45.28	74	-28.72	Peak
4824	33.98	141	100	H	33.05	0.15	4.1	34.78	36.50	54	-17.5	Ave
7236	44.18	29	126	V	35.884	0.15	9.95	35.23	54.93	74	-19.066	Peak
7236	32.24	29	126	V	35.884	0.15	9.95	35.23	42.99	54	-11.006	Ave
7236	44.29	59	145	H	35.947	0.15	9.95	35.23	55.11	74	-18.893	Peak
7236	33.14	59	145	H	35.947	0.15	9.95	35.23	43.96	54	-10.043	Ave
9648	44.27	58	100	V	37.832	0.15	10.77	35.68	57.34	74	-16.658	Peak
9648	33.34	58	100	V	37.832	0.15	10.77	35.68	46.41	54	-7.588	Ave
9648	42.75	115	100	H	37.848	0.15	10.77	35.68	55.84	74	-18.162	Peak
9648	33.49	115	100	H	37.848	0.15	10.77	35.68	46.58	54	-7.422	Ave
12060	42.1	306	100	V	39.017	0.15	13.77	34.63	60.41	74	-13.593	Peak
12060	31.6	306	100	V	39.017	0.15	13.77	34.63	49.91	54	-4.093	Ave
12060	42.15	98	100	H	39.038	0.15	13.77	34.63	60.48	74	-13.522	Peak
12060	32.51	98	100	H	39.038	0.15	13.77	34.63	50.84	54	-3.162	Ave

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 b Middle Channel (Ch 6) 2437 MHz												
4874	48.78	97	100	V	33.053	0.15	7.74	34.75	54.97	74	-19.027	Peak
4874	32.36	97	100	V	33.053	0.15	7.74	34.75	38.55	54	-15.447	Ave
4874	45.66	49	118	H	33.084	0.15	7.74	34.75	51.88	74	-22.116	Peak
4874	32.38	49	118	H	33.084	0.15	7.74	34.75	38.60	54	-15.396	Ave
7311	43.26	0	100	V	36.134	0.15	10.34	35.18	54.70	74	-19.296	Peak
7311	33.45	0	100	V	36.134	0.15	10.34	35.18	44.89	54	-9.106	Ave
7311	41.57	91	100	H	36.213	0.15	10.34	35.18	53.09	74	-20.907	Peak
7311	31.89	91	100	H	36.213	0.15	10.34	35.18	43.41	54	-10.587	Ave
9748	42.18	84	100	V	37.972	0.15	10.88	35.7	55.48	74	-18.518	Peak
9748	33.5	84	100	V	37.972	0.15	10.88	35.7	46.80	54	-7.198	Ave
9748	42.93	320	100	H	37.999	0.15	10.88	35.7	56.26	74	-17.741	Peak
9748	33.16	320	100	H	37.999	0.15	10.88	35.7	46.49	54	-7.511	Ave
12185	41.69	153	100	V	38.916	0.15	15.4	34.62	61.54	74	-12.464	Peak
12185	32.26	153	100	V	38.916	0.15	15.4	34.62	52.11	54	-1.894	Ave
12185	43.75	0	100	H	38.822	0.15	15.4	34.62	63.50	74	-10.498	Peak
12185	32.08	0	100	H	38.822	0.15	15.4	34.62	51.83	54	-2.168	Ave

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 b High Channel (Ch11) 2462 MHz												
4924	45.31	55	100	V	33.166	0.15	8.06	34.75	51.94	74	-22.064	Peak
4924	39.16	55	100	V	33.166	0.15	8.06	34.75	45.79	54	-8.214	Ave
4924	43.3	60	100	H	32.2	0.15	8.06	34.75	48.96	74	-25.04	Peak
4924	32.02	60	100	H	32.2	0.15	8.06	34.75	37.68	54	-16.32	Ave
7386	42.49	85	100	V	36.327	0.15	10.79	35.06	54.70	74	-19.303	Peak
7386	33.05	85	100	V	36.327	0.15	10.79	35.06	45.26	54	-8.743	Ave
7386	42.03	66	100	H	36.354	0.15	10.79	35.06	54.26	74	-19.736	Peak
7386	32.21	66	100	H	36.354	0.15	10.79	35.06	44.44	54	-9.556	Ave
9848	43.51	51	100	V	38.132	0.15	11.58	35.56	57.81	74	-16.188	Peak
9848	33.15	51	100	V	38.132	0.15	11.58	35.56	47.45	54	-6.548	Ave
9848	42.83	286	100	H	38.171	0.15	11.58	35.56	57.17	74	-16.829	Peak
9848	32.9	286	100	H	38.171	0.15	11.58	35.56	47.24	54	-6.759	Ave
12310	41.41	0	100	V	38.751	0.15	16.02	34.56	61.77	74	-12.229	Peak
12310	32.16	0	100	V	38.751	0.15	16.02	34.56	52.52	54	-1.479	Ave
12310	42.1	0	100	H	38.784	0.15	16.02	34.56	62.49	74	-11.506	Peak
12310	32.14	0	100	H	38.784	0.15	16.02	34.56	52.53	54	-1.466	Ave

Mode 802.11 g

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 g Low Channel (Ch1) 2412 MHz												
4824	43.47	114	100	V	33.05	0.37	4.1	34.78	46.21	74	-27.79	Peak
4824	32.15	114	100	V	33.05	0.37	4.1	34.78	34.89	54	-19.11	Ave
4824	41.46	0	100	H	33.05	0.37	4.1	34.78	44.20	74	-29.8	Peak
4824	31.81	0	100	H	33.05	0.37	4.1	34.78	34.55	54	-19.45	Ave
7236	44.11	0	100	V	35.884	0.37	9.95	35.23	55.08	74	-18.916	Peak
7236	32.84	0	100	V	35.884	0.37	9.95	35.23	43.81	54	-10.186	Ave
7236	52.78	0	100	H	35.947	0.37	9.95	35.23	63.82	74	-10.183	Peak
7236	32.47	0	100	H	35.947	0.37	9.95	35.23	43.51	54	-10.493	Ave
9648	43.54	150	100	V	37.832	0.37	10.77	35.68	56.83	74	-17.168	Peak
9648	33.27	150	100	V	37.832	0.37	10.77	35.68	46.56	54	-7.438	Ave
9648	44.2	0	100	H	37.848	0.37	10.77	35.68	57.51	74	-16.492	Peak
9648	33.38	0	100	H	37.848	0.37	10.77	35.68	46.69	54	-7.312	Ave
12060	42.9	0	100	V	39.017	0.37	13.77	34.63	61.43	74	-12.573	Peak
12060	32.51	0	100	V	39.017	0.37	13.77	34.63	51.04	54	-2.963	Ave
12060	42.42	0	100	H	39.038	0.37	13.77	34.63	60.97	74	-13.032	Peak
12060	32.46	0	100	H	39.038	0.37	13.77	34.63	51.01	54	-2.992	Ave

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 g Middle Channel (Ch 6) 2437 MHz												
4874	42.98	0	100	V	33.053	0.37	7.74	34.75	49.39	74	-24.607	Peak
4874	31.89	0	100	V	33.053	0.37	7.74	34.75	38.30	54	-15.697	Ave
4874	42.36	0	100	H	33.084	0.37	7.74	34.75	48.80	74	-25.196	Peak
4874	32.29	0	100	H	33.084	0.37	7.74	34.75	38.73	54	-15.266	Ave
7311	42.68	0	100	V	36.134	0.37	10.34	35.18	54.34	74	-19.656	Peak
7311	32.42	0	100	V	36.134	0.37	10.34	35.18	44.08	54	-9.916	Ave
7311	41.68	92	100	H	36.213	0.37	10.34	35.18	53.42	74	-20.577	Peak
7311	32.32	92	100	H	36.213	0.37	10.34	35.18	44.06	54	-9.937	Ave
9748	44.92	0	100	V	37.972	0.37	10.88	35.7	58.44	74	-15.558	Peak
9748	33.22	0	100	V	37.972	0.37	10.88	35.7	46.74	54	-7.258	Ave
9748	44.55	0	100	H	37.999	0.37	10.88	35.7	58.10	74	-15.901	Peak
9748	33.21	0	100	H	37.999	0.37	10.88	35.7	46.76	54	-7.241	Ave
12185	41.72	0	100	V	38.916	0.37	15.4	34.62	61.79	74	-12.214	Peak
12185	32.36	0	100	V	38.916	0.37	15.4	34.62	52.43	54	-1.574	Ave
12185	42.8	0	100	H	38.822	0.37	15.4	34.62	62.77	74	-11.228	Peak
12185	32.29	0	100	H	38.822	0.37	15.4	34.62	52.26	54	-1.738	Ave

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 g High Channel (Ch 11) 2462 MHz												
4924	40.95	0	100	V	33.166	0.37	8.06	34.75	47.80	74	-26.204	Peak
4924	30.4	0	100	V	33.166	0.37	8.06	34.75	37.25	54	-16.754	Ave
4924	41.36	0	100	H	32.2	0.37	8.06	34.75	47.24	74	-26.76	Peak
4924	30.46	0	100	H	32.2	0.37	8.06	34.75	36.34	54	-17.66	Ave
7386	41.71	13	100	V	36.327	0.37	10.79	35.06	54.14	74	-19.863	Peak
7386	30.88	13	100	V	36.327	0.37	10.79	35.06	43.31	54	-10.693	Ave
7386	41.26	0	100	H	36.354	0.37	10.79	35.06	53.71	74	-20.286	Peak
7386	30.85	0	100	H	36.354	0.37	10.79	35.06	43.30	54	-10.696	Ave
9848	38.49	0	100	V	38.132	0.37	11.58	35.56	53.01	74	-20.988	Peak
9848	31.35	0	100	V	38.132	0.37	11.58	35.56	45.87	54	-8.128	Ave
9848	41.82	150	100	H	38.171	0.37	11.58	35.56	56.38	74	-17.619	Peak
9848	31.41	150	100	H	38.171	0.37	11.58	35.56	45.97	54	-8.029	Ave
12310	41.5	0	100	V	38.751	0.37	16.02	34.56	62.08	74	-11.919	Peak
12310	30.71	0	100	V	38.751	0.37	16.02	34.56	51.29	54	-2.709	Ave
12310	40.02	0	100	H	38.784	0.37	16.02	34.56	60.63	74	-13.366	Peak
12310	30.69	0	100	H	38.784	0.37	16.02	34.56	51.30	54	-2.696	Ave

Mode 802.11 n40

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 n40 Low Channel (Ch 3) 2422 MHz												
4844	40.7	0	100	V	33.05	1.24	7.7	34.78	47.91	74	-26.09	Peak
4844	30.19	0	100	V	33.05	1.24	7.7	34.78	37.40	54	-16.6	Ave
4844	40.75	200	100	H	33.05	1.24	7.7	34.78	47.96	74	-26.04	Peak
4844	30.21	200	100	H	33.05	1.24	7.7	34.78	37.42	54	-16.58	Ave
7266	40.87	0	100	V	35.884	1.24	10.7	35.23	53.46	74	-20.536	Peak
7266	30.97	0	100	V	35.884	1.24	10.7	35.23	43.56	54	-10.436	Ave
7266	38.5	0	100	H	35.947	1.24	10.7	35.23	51.16	74	-22.843	Peak
7266	30.91	0	100	H	35.947	1.24	10.7	35.23	43.57	54	-10.433	Ave
9688	40.91	0	100	V	37.832	1.24	11.4	35.68	55.70	74	-18.298	Peak
9688	31.4	0	100	V	37.832	1.24	11.4	35.68	46.19	54	-7.808	Ave
9688	43.84	0	100	H	37.848	1.24	11.4	35.68	58.65	74	-15.352	Peak
9688	31.34	0	100	H	37.848	1.24	11.4	35.68	46.15	54	-7.852	Ave
12110	40.5	0	100	V	39.017	1.24	15.26	34.63	61.39	74	-12.613	Peak
12110	31.2	0	100	V	39.017	1.24	15.26	34.63	52.09	54	-1.913	Ave
12110	40.55	0	100	H	39.038	1.24	15.26	34.63	61.46	74	-12.542	Peak
12110	31.15	0	100	H	39.038	1.24	15.26	34.63	52.06	54	-1.942	Ave

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 n40 Middle Channel (Ch 6) 2437 MHz												
4874	40.03	0	100	V	33.053	1.24	7.74	34.75	47.31	74	-26.687	Peak
4874	30.47	0	100	V	33.053	1.24	7.74	34.75	37.75	54	-16.247	Ave
4874	39.95	0	100	H	33.084	1.24	7.74	34.75	47.26	74	-26.736	Peak
4874	30.53	0	100	H	33.084	1.24	7.74	34.75	37.84	54	-16.156	Ave
7311	41.52	66	100	V	36.134	1.24	10.34	35.18	54.05	74	-19.946	Peak
7311	31.34	66	100	V	36.134	1.24	10.34	35.18	43.87	54	-10.126	Ave
7311	41.69	304	100	H	36.213	1.24	10.34	35.18	54.30	74	-19.697	Peak
7311	30.98	304	100	H	36.213	1.24	10.34	35.18	43.59	54	-10.407	Ave
9748	41.46	0	100	V	37.972	1.24	10.88	35.7	55.85	74	-18.148	Peak
9748	30.41	0	100	V	37.972	1.24	10.88	35.7	44.80	54	-9.198	Ave
9748	40.51	0	100	H	37.999	1.24	10.88	35.7	54.93	74	-19.071	Peak
9748	31.34	0	100	H	37.999	1.24	10.88	35.7	45.76	54	-8.241	Ave
12185	41.17	0	100	V	38.916	1.24	15.4	34.62	62.11	74	-11.894	Peak
12185	31.01	0	100	V	38.916	1.24	15.4	34.62	51.95	54	-2.054	Ave
12185	41.64	0	100	H	38.822	1.24	15.4	34.62	62.48	74	-11.518	Peak
12185	31.06	0	100	H	38.822	1.24	15.4	34.62	51.90	54	-2.098	Ave

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Duty Cycle Correction (dB)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)					Limit (dBµV/m)	Margin (dB)	
802.11 n40 High Channel (Ch 9) 2452 MHz												
4904	41.18	346	100	V	33.166	1.24	7.71	34.75	47.16	74	-26.844	Peak
4904	30.19	346	100	V	33.166	1.24	7.71	34.75	37.40	54	-16.604	Ave
4904	39.79	0	100	H	32.2	1.24	7.71	34.75	48.03	74	-25.97	Peak
4904	30.03	0	100	H	32.2	1.24	7.71	34.75	37.69	54	-16.31	Ave
7356	41.63	270	100	V	36.327	1.24	10.54	35.06	53.18	74	-20.823	Peak
7356	31.29	270	100	V	36.327	1.24	10.54	35.06	44.16	54	-9.843	Ave
7356	40.13	0	100	H	36.354	1.24	10.54	35.06	54.25	74	-19.746	Peak
7356	31.11	0	100	H	36.354	1.24	10.54	35.06	44.52	54	-9.476	Ave
9808	41.18	0	100	V	38.132	1.24	11.67	35.56	56.54	74	-17.458	Peak
9808	31.45	0	100	V	38.132	1.24	11.67	35.56	46.93	54	-7.068	Ave
9808	41.06	0	100	H	38.171	1.24	11.67	35.56	56.58	74	-17.419	Peak
9808	31.45	0	100	H	38.171	1.24	11.67	35.56	46.49	54	-7.509	Ave
12260	41.06	127	100	V	38.751	1.24	16.36	34.56	59.92	74	-14.079	Peak
12260	30.97	127	100	V	38.751	1.24	16.36	34.56	52.72	54	-1.279	Ave
12260	38.13	0	100	H	38.784	1.24	16.36	34.56	21.82	74	-52.176	Peak
12260	30.93	0	100	H	38.784	1.24	16.36	34.56	21.82	54	-32.176	Ave

4) Co-Location

1–25 GHz, Measured at 3 meters

Freq. (MHz)	S.A. Reading (dBuV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
25737	48.12	0	100	V	35.884	16.02	36.3	63.73	74	-10.27	Peak
25737	35.03	0	100	V	35.884	16.02	36.3	50.64	54	-3.36	Ave
25783	45.98	0	100	H	35.678	16.02	35.23	62.45	74	-11.55	Peak
25783	35.14	0	100	H	35.675	16.02	35.23	51.61	54	-2.39	Ave
16542	43.77	0	100	V	39.017	13.77	34.63	61.93	74	-12.073	Peak
16542	30.75	0	100	V	39.017	13.77	34.63	48.91	54	-5.093	Ave
16063	44.66	0	100	H	39.038	13.77	34.63	62.84	74	-11.162	Peak
16063	31.31	0	100	H	39.038	13.77	34.63	49.49	54	-4.512	Ave

9 FCC §15.247(a)(2) – 6 dB Emission Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2) systems using digital modulation techniques may operate in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz

9.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8.1: DTS bandwidth

9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year
Mini-Circuits	10 dB Attenuator	BW-S10W2	MCL 1144	N/A	N/A

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

9.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	51 %
ATM Pressure:	101.85 kPa

The testing was performed by Isaac Aguilar from 2014-07-01 at RF site.

9.5 Test Results

9.5.1 6 dB Bandwidth

Frequency (MHz)	Channel	6 dB Emission Bandwidth (MHz) Chain 0	6 dB Emission Bandwidth (MHz) Chian 1	99% Emission Bandwidth (MHz) Chain 0	99% Emission Bandwidth (MHz) Chain 1	Limit (MHz)	Result
Mode: 802.11b							
2412.00	1	8.12	8.09	10.34	10.87	> 0.500	Pass
2437.00	6	8.11	8.12	10.07	10.08	> 0.500	Pass
2462.00	11	8.12	8.10	10.08	10.06	> 0.500	Pass
Mode: 802.11g							
2412.00	1	15.47	15.90	16.44	16.47	> 0.500	Pass
2437.00	6	16.31	15.12	16.48	16.44	> 0.500	Pass
2462.00	11	15.74	15.71	16.42	16.43	> 0.500	Pass
Mode 802.11 n20							
2412.00	1	17.28	17.67	17.61	17.66	> 0.500	Pass
2437.00	6	16.52	17.68	17.59	17.65	> 0.500	Pass
2462.00	11	17.62	16.92	17.57	17.59	> 0.500	Pass
Mode: 802.11 n40							
2422.00	3	35.46	35.16	36.09	35.98	> 0.500	Pass
2437.00	6	35.80	35.77	36.12	36.09	> 0.500	Pass
2452.00	9	35.80	33.02	36.16	36.09	> 0.500	Pass

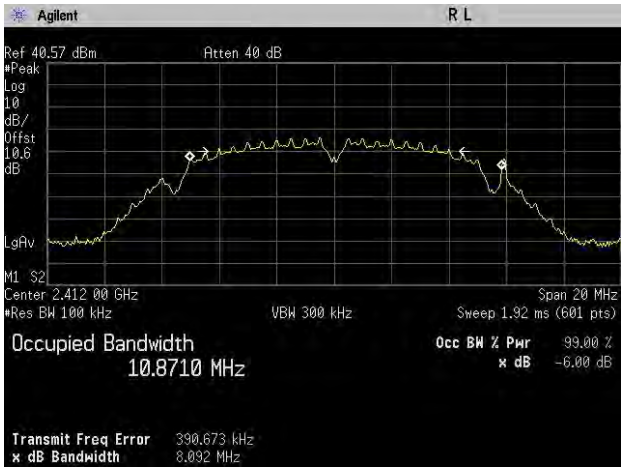
Please refer to the following plots for detailed test results

9.5.2 Plots Results

802.11b, Low Channel 2412 MHz

6 dB & 99 % EBW Chain 0

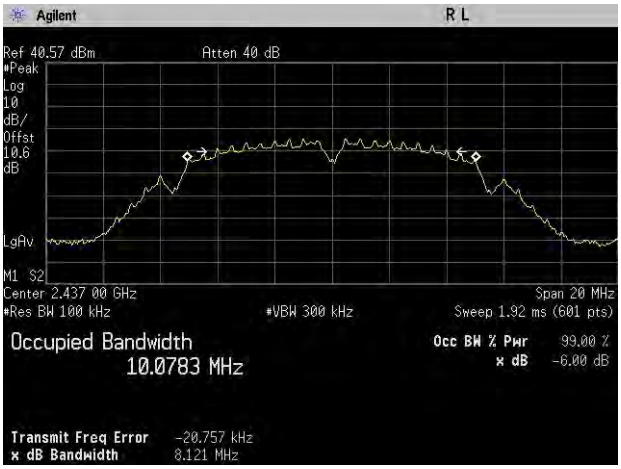
6 dB & 99 % EBW Chain 1



802.11b, Middle Channel 2437 MHz

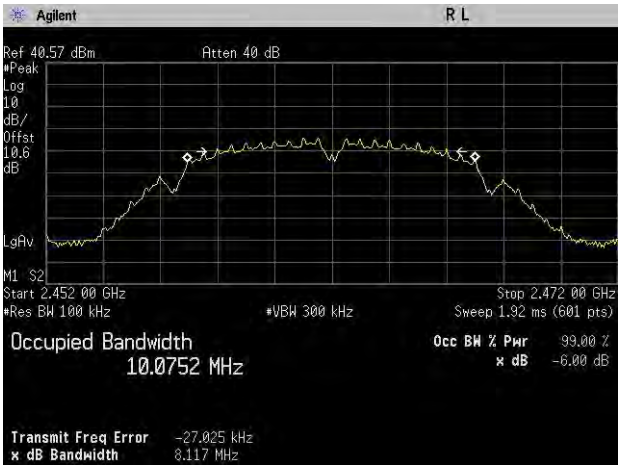
6 dB & 99 % EBW Chain 0

6 dB & 99 % EBW Chain 1

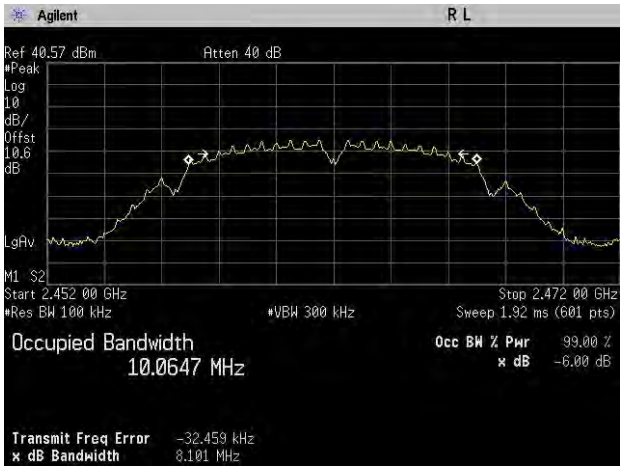


802.11b, High Channel 2462 MHz

6 dB & 99 % EBW Chain 0

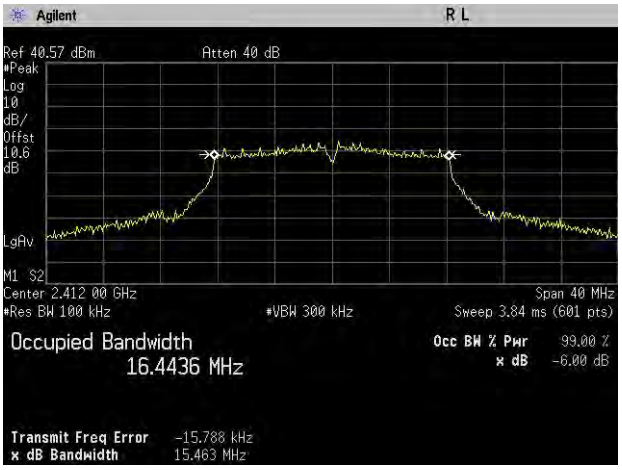


6 dB & 99 % EBW Chain 1

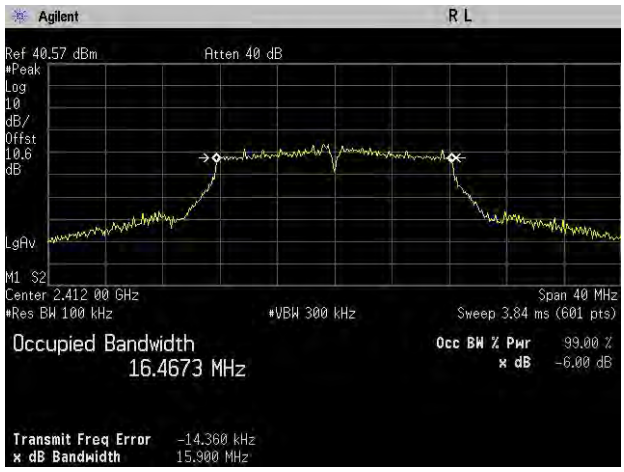


802.11g, Low Channel 2412 MHz

6 dB & 99 % EBW Chain 0

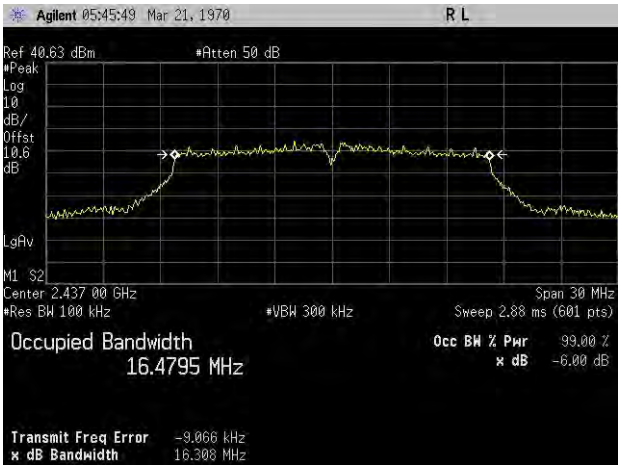


6 dB & 99 % EBW Chain 1

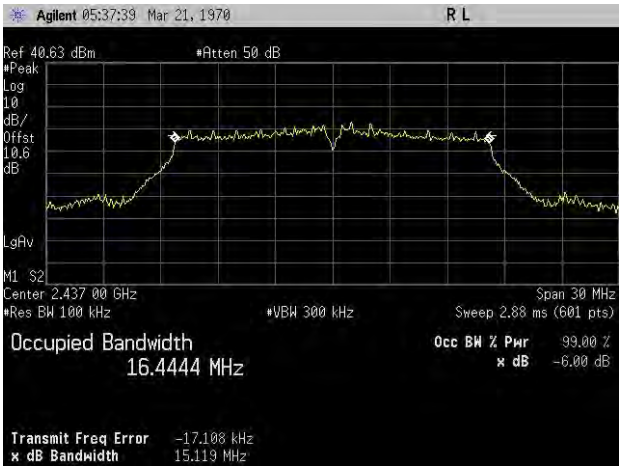


802.11g, Middle Channel 2437 MHz

6 dB & 99 % EBW Chain 0

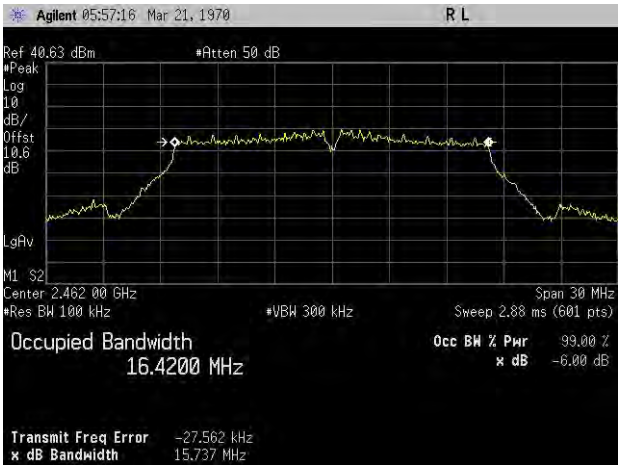


6 dB & 99 % EBW Chain 1

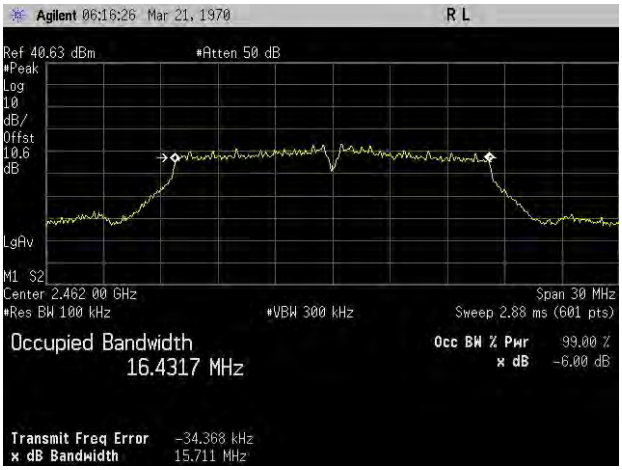


802.11g, High Channel 2462 MHz

6 dB & 99 % EBW Chain 0

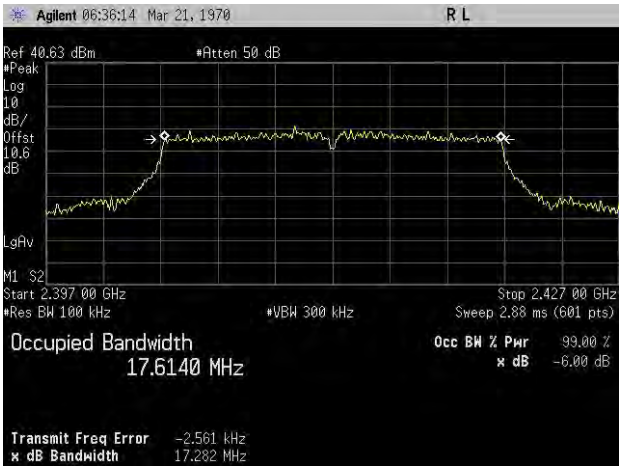


6 dB & 99 % EBW Chain 1

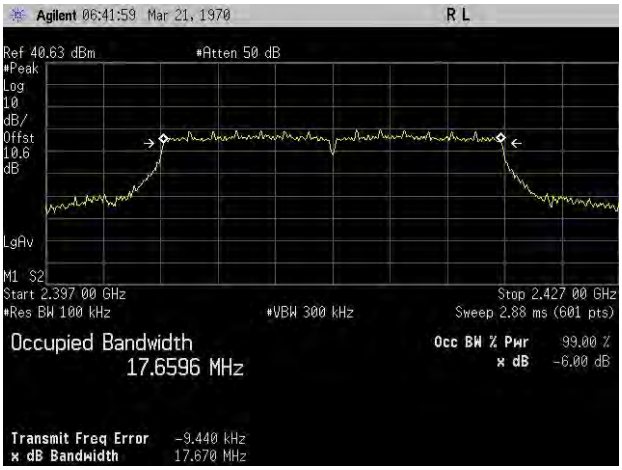


802.11 n20, Low Channel 2412 MHz

6 dB & 99 % EBW Chain 0

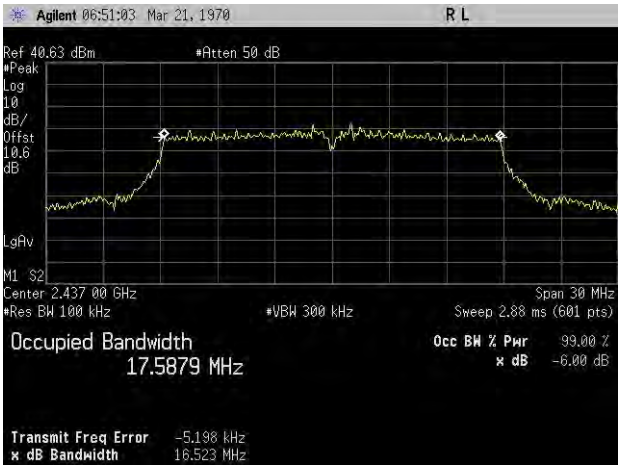


6 dB & 99 % EBW Chain 1

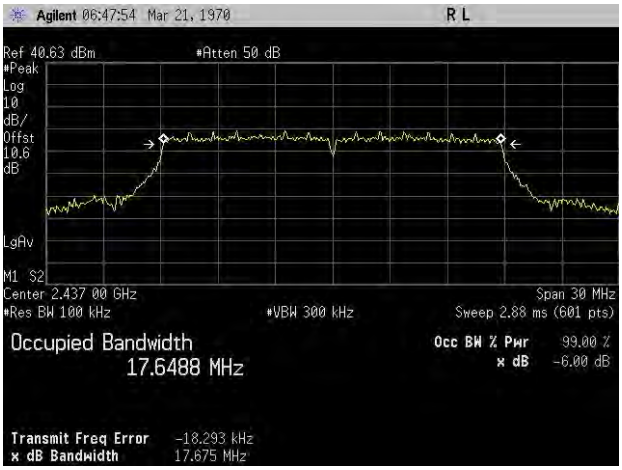


802.11 n20, Middle Channel 2437 MHz

6 dB & 99 % EBW Chain 0

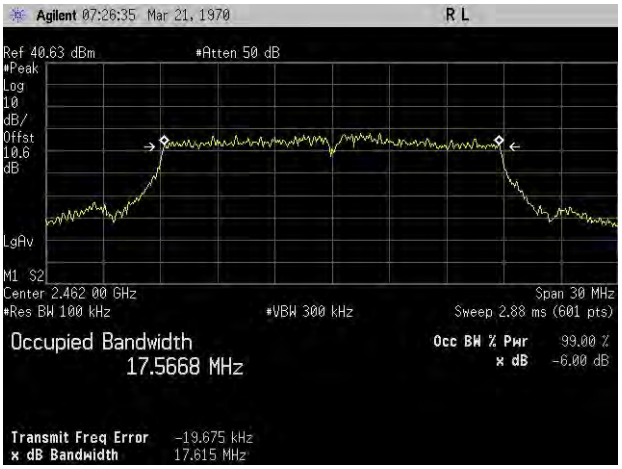


6 dB & 99 % EBW Chain 1

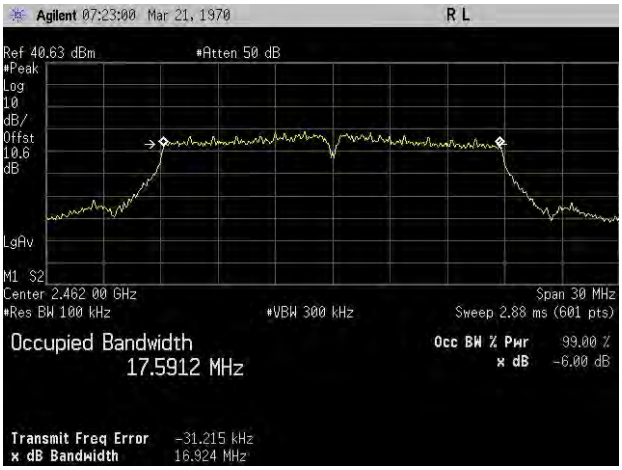


802.11n20, High Channel 2462 MHz

6 dB & 99 % EBW Chain 0

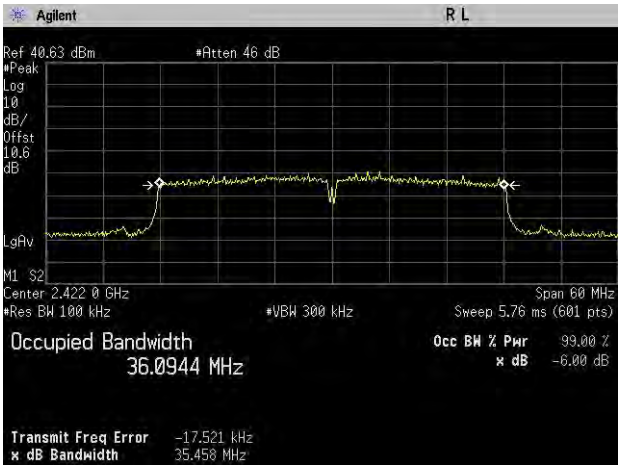


6 dB & 99 % EBW Chain 1

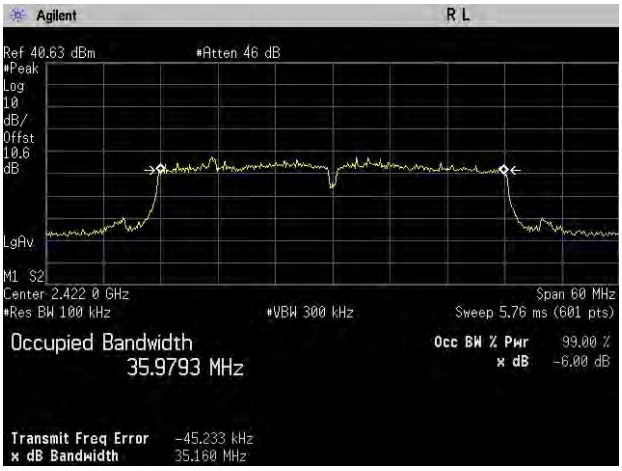


802.11n40, Low Channel 2422 MHz

6 dB & 99 % EBW Chain 0

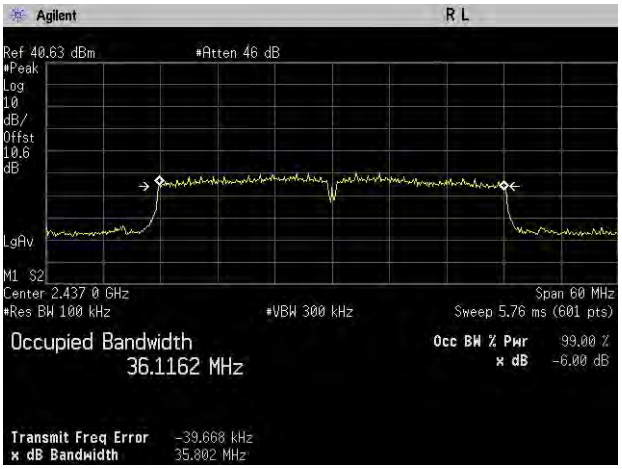


6 dB & 99 % EBW Chain 1

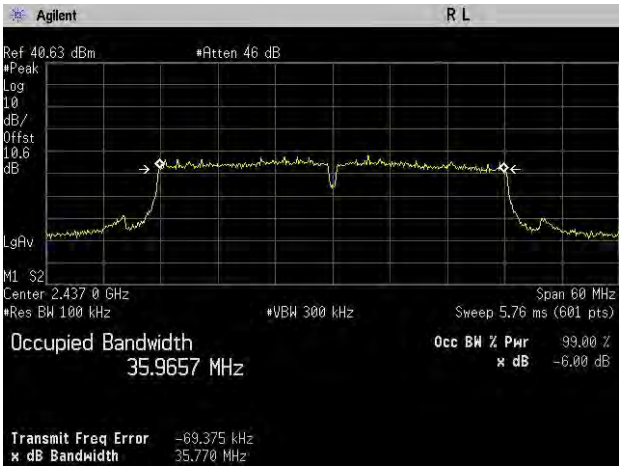


802.11n40, Middle Channel 2437 MHz

6 dB & 99 % EBW Chain 0

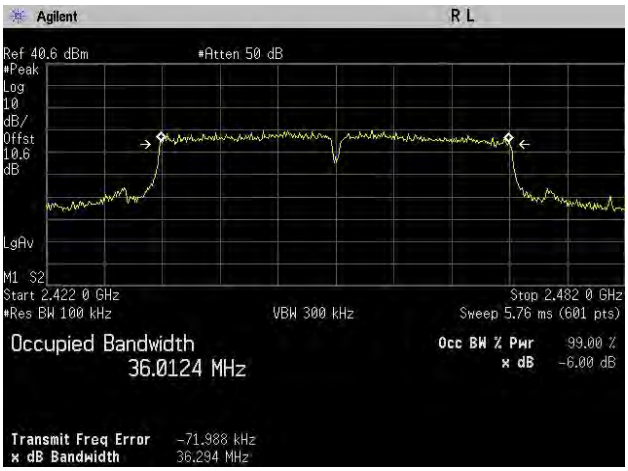


6 dB & 99 % EBW Chain 1

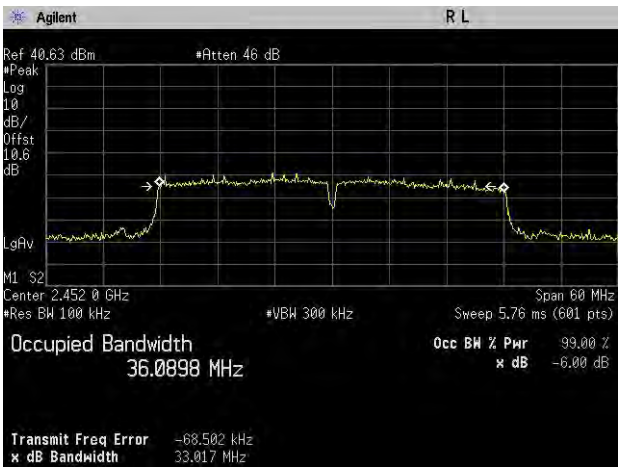


802.11n40, High Channel 2452 MHz

6 dB & 99 % EBW Chain 0



6 dB & 99 % EBW Chain 1



10 FCC §15.247(b) – Peak Output Power Measurement

10.1 Applicable Standard

According to FCC §15.247(b) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 1 Watt.

10.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9.2.2.4: Method AVGSA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle corrections).

10.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year
Mini-Circuits	10 dB Attenuator	BW-S10W2	MCL 1144	N/A	N/A

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

10.4 Test Environmental Conditions

Temperature:	25° C
Relative Humidity:	46 %
ATM Pressure:	101.28 kPa

The testing was performed by Isaac Aguilar on 2014-07-18 at RF site.

10.5 Test Results

This equipment was tested with the firmware version *F2300-36.128L.00c*.

Frequency (MHz)	TX Chain 0 Power (dBm)	TX Chain 1 Power (dBm)	Duty Cycle Correction (dB)	TX Chain 0 Power (mW)	TX Chain 1 Power (mW)	Total Power (mW)	Max Power (dBm)	Limit (dBm)	Result
Mode 802.11 b (Non-MIMO worst case reported)									
2412	24.91	24.54	0.15	320.63	294.44	N/A	25.06	30	Pass
2437	24.94	24.62	0.15	322.85	299.92	N/A	25.09	30	Pass
2462	21.29	21.34	0.15	139.32	140.93	N/A	21.49	30	Pass
Mode 802.11 g (Non-MIMO worst case reported)									
2412	23.56	23.67	0.37	247.17	253.51	N/A	24.04	30	Pass
2437	23.75	23.48	0.37	258.23	242.66	N/A	24.12	30	Pass
2462	19.52	20.53	0.37	97.5	123.03	N/A	20.9	30	Pass
Mode 802.11 n20									
2412	23.11	23.69	0.35	221.82	253.51	475.33	26.77	30	Pass
2437	23.34	23.80	0.35	233.88	260.02	493.90	26.94	30	Pass
2462	21.45	20.48	0.35	151.36	121.06	272.42	24.35	30	Pass
Mode 802.11 n40									
2422	23.06	23.13	1.24	269.15	273.53	542.68	27.35	30	Pass
2437	23.20	22.83	1.24	277.97	255.27	533.24	27.27	30	Pass
2452	18.02	18.26	1.24	84.33	89.13	173.46	22.39	30	Pass

11 FCC §15.247(d) – 100 kHz Bandwidth of Band Edges

11.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

11.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 13: Band-edge measurements

11.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year
Sunol Sciences	System Controller	SC104V	122303-1	N/A	N/A
EMCO	Horn Antenna	3115	9511-4627	2014-01-06	1 year
Agilent	Pre-Amplifier	8449B	3008A01978	2014-03-10	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

11.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	48 %
ATM Pressure:	101.26 kPa

The testing was performed by Isaac Aguilar on 2014-07-16 at RF site.

11.5 Test Results

Refer to the table and plots below for band edges. The band edges for worst case are being reported. The firmware version used to show compliance is *F2300-36.128L.00c.*

Freq. (MHz)	Raw Reading (dBµV/m)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Duty Cycle Correction (dB)	Cord. Reading (dBµV/m)	FCC		Peak/Ave
			Height (cm)	Polarity (V/H)	Antenna Factors (dB)				Limit (dBµV/m)	Margin (dB)	
Mode 802.11 b											
2400	32.61	282	100	V	28.34	4.16	0.15	65.26	74.00	-8.74	Peak
2400	20.97	282	100	V	28.34	4.16	0.15	53.62	54.00	-0.38	Ave
2483.5	31.08	300	120	V	28.37	3.72	0.15	63.32	74.00	-10.68	Peak
2483.5	20.15	300	120	V	28.37	3.72	0.15	52.39	54.00	-1.61	Ave
Mode 802.11 g											
2400	37.67	282	100	V	28.34	4.16	0.37	70.54	74.00	-3.46	Peak
2400	21.12	282	100	V	28.34	4.16	0.37	53.99	54.00	-0.01	Ave
2483.5	23.41	300	100	V	28.37	3.72	0.37	55.87	74.00	-18.13	Peak
2483.5	13.39	300	100	V	28.37	3.72	0.37	45.85	54.00	-8.15	Ave
Mode 802.11 n40											
2400	32.86	280	100	V	28.34	4.16	1.24	66.60	74.00	-7.40	Peak
2400	18.58	280	100	V	28.34	4.16	1.24	52.32	54.00	-1.68	Ave
2483.5	30.38	278	100	V	28.37	3.72	1.24	63.71	74.00	-10.29	Peak
2483.5	14.01	278	100	V	28.37	3.72	1.24	47.34	54.00	-6.66	Ave

12 FCC §15.247(e) – Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

12.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10.5: Maximum power spectral density level in the fundamental emission: Method AVGPSD-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

12.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year
Mini-Circuits	10 dB Attenuator	BW-S10W2	MCL 1144	N/A	N/A

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

12.4 Test Environmental Conditions

Temperature:	24° C
Relative Humidity:	49 %
ATM Pressure:	101.15 kPa

The testing was performed by Isaac Aguilar from 2014-07-18 at RF site.

12.5 Test Results

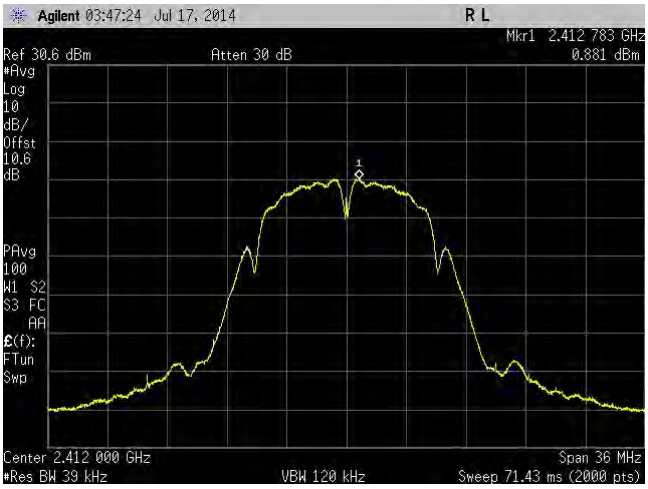
Refer to the table and plots below for the test results. This testing was performed with firmware version *F2300-36.128L.00c*. The PSD was calculated as follows:

Frequency (MHz)	TX Chain 0 Power Spectral Density (dBm)	TX Chain 1 Power Spectral Density (dBm)	Duty Cycle Correction (dB)	TX Chain 0 Power (dBm)	TX Chain 1 Power (dBm)	Max PSD (dBm)	Limit (dBm/3kHz)
Mode 802.11 b							
2412	0.88	0.71	0.15	1.03	0.86	1.03	8
2437	3.14	2.76	0.15	3.29	2.91	3.29	8
2462	2.57	1.68	0.15	2.72	1.83	2.72	8
Mode 802.11 g							
2412	-5.88	-5.41	0.37	-5.51	-5.04	-5.04	8
2437	-7.17	0.49	0.37	-6.8	0.86	0.86	8
2462	-7.54	-0.05	0.37	-7.17	0.32	0.32	8

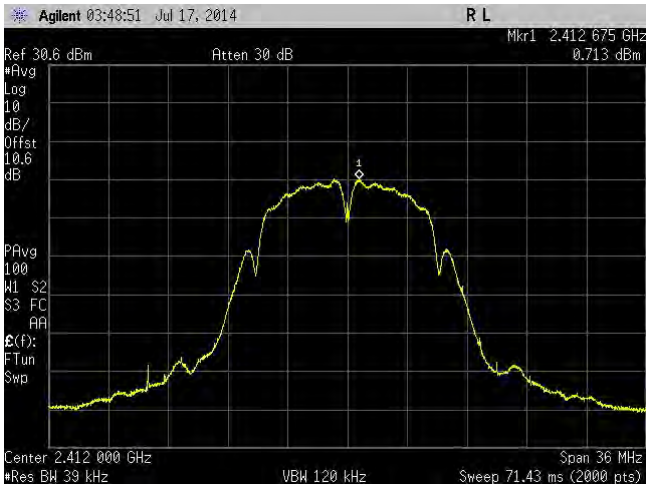
Frequency (MHz)	TX Chain 0 Power Spectral Density (dBm)	TX Chain 1 Power Spectral Density (dBm)	Duty Cycle Correction (dB)	TX Chain 0 Power (dBm)	TX Chain 1 Power (dBm)	Total PSD (dBm)	Limit (dBm/3kHz)
Mode 802.11 n20							
2412	-6.84	-6.91	0.35	-6.49	-6.56	-3.51	8
2437	-1.73	-0.40	0.35	-1.38	-0.05	2.35	8
2462	-8.07	0.37	0.35	-7.72	0.72	1.30	8
Mode 802.11 n40							
2422	-10.76	-11.20	1.24	-9.52	-9.96	-6.72	8
2437	-16.27	-10.46	1.24	-15.03	-9.22	-8.21	8
2452	-10.87	-2.93	1.24	-9.63	-1.69	-1.04	8

802.11 b, Low Channel 2412 MHz

Power Spectral Density Chain 0

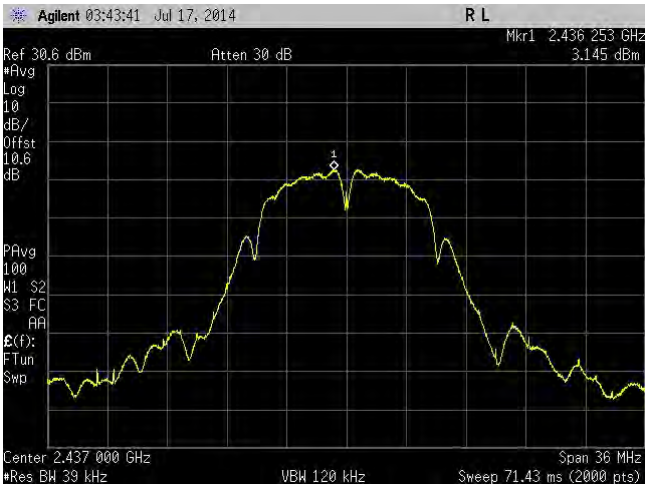


Power Spectral Density Chain 1

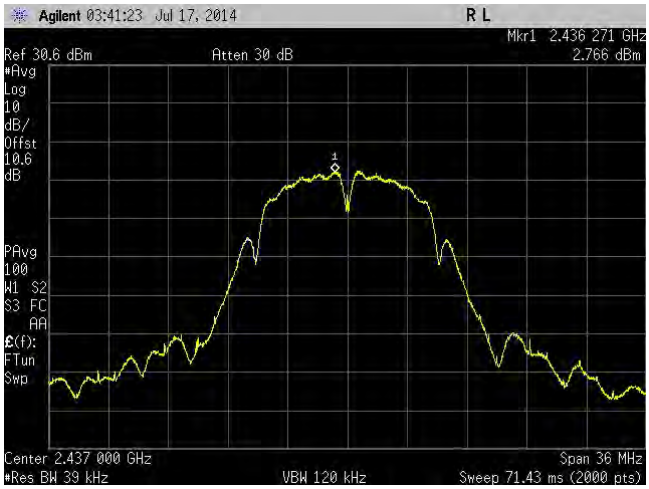


802.11 b, Middle Channel 2437 MHz

Power Spectral Density Chain 0

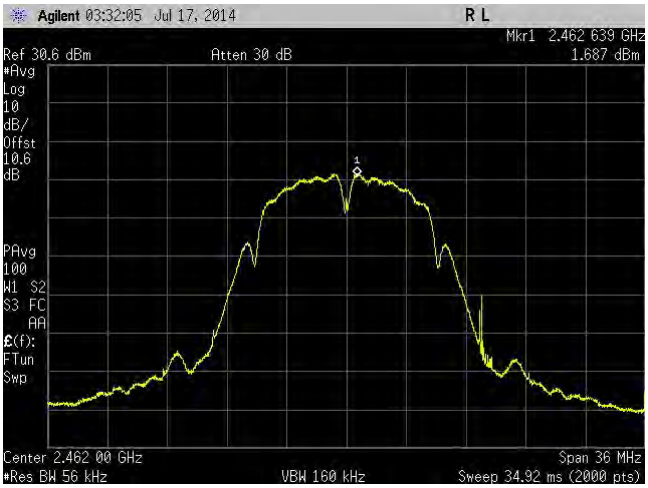


Power Spectral Density Chain 1



802.11 b, High Channel 2462 MHz

Power Spectral Density Chain 0



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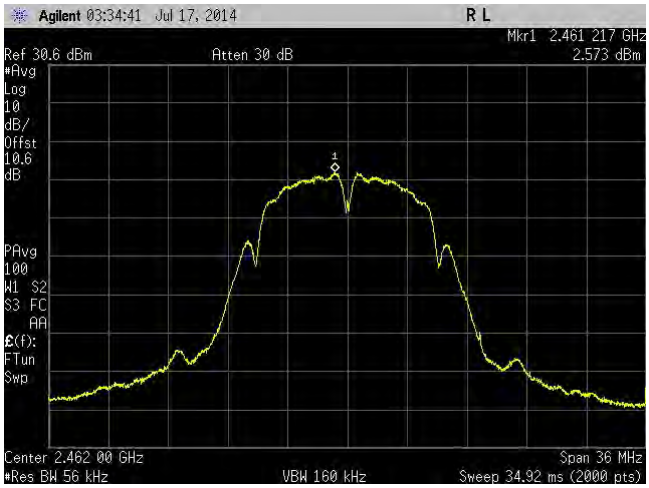
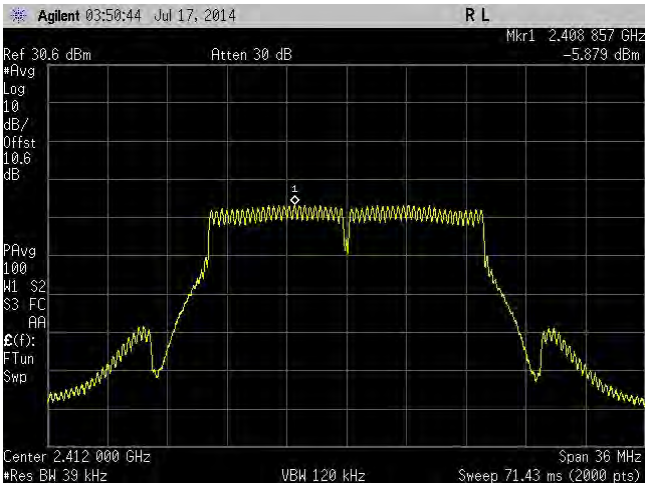
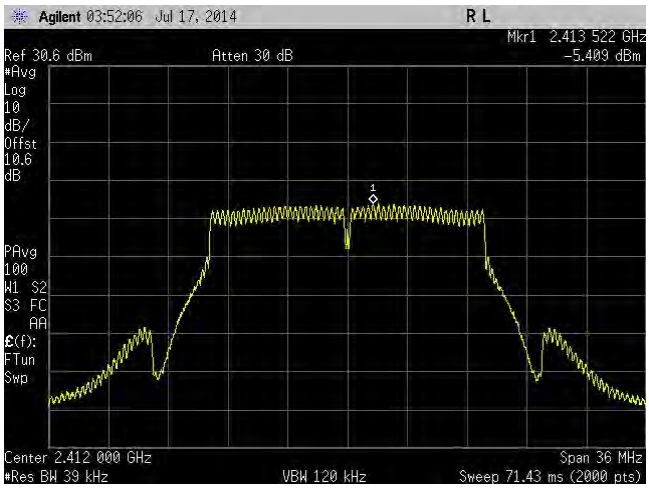


802.11 g, Low Channel 2412 MHz

Power Spectral Density Chain 0

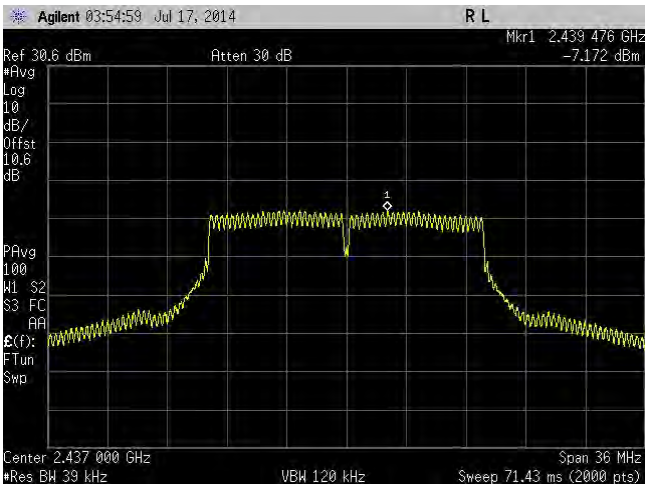


Power Spectral Density Chain 1

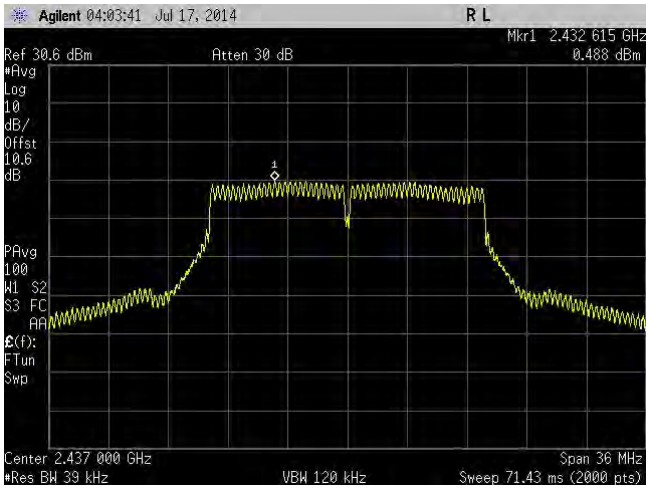


802.11 g, Middle Channel 2437 MHz

Power Spectral Density Chain 0

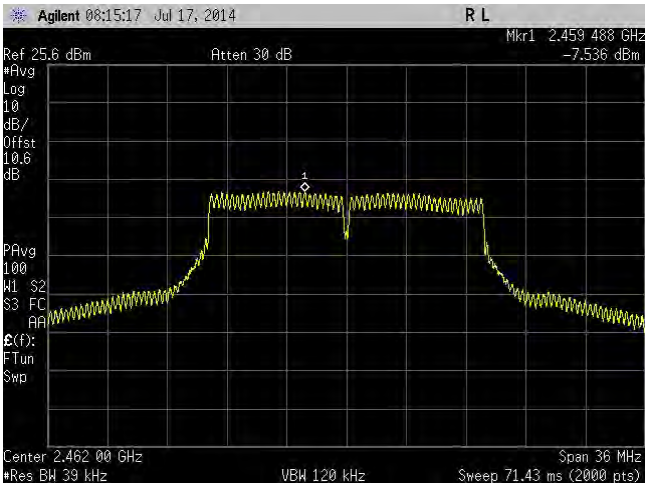


Power Spectral Density Chain 1

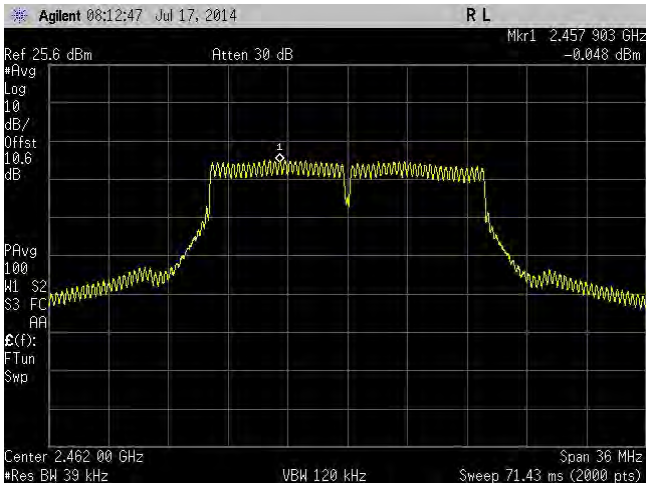


802.11 g, High Channel 2462 MHz

Power Spectral Density Chain 0

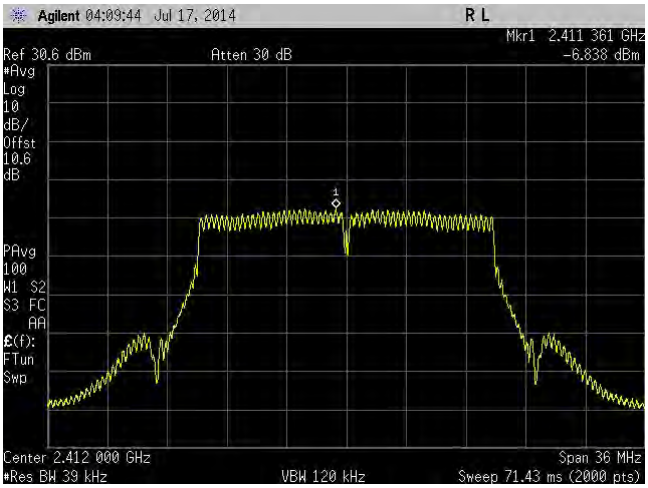


Power Spectral Density Chain 1

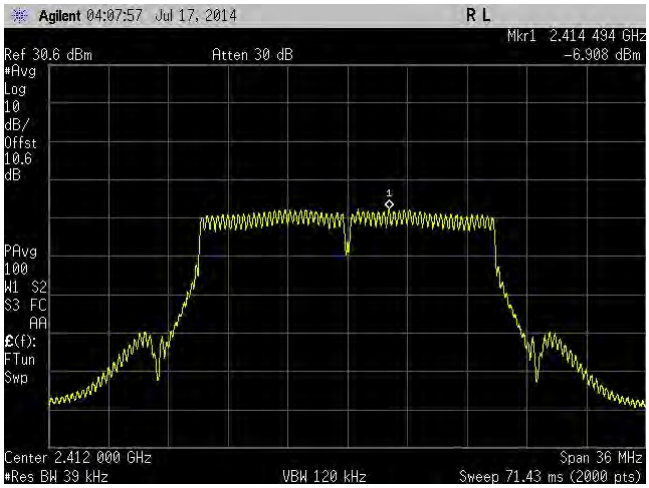


802.11 n20, Low Channel 2412 MHz

Power Spectral Density Chain 0

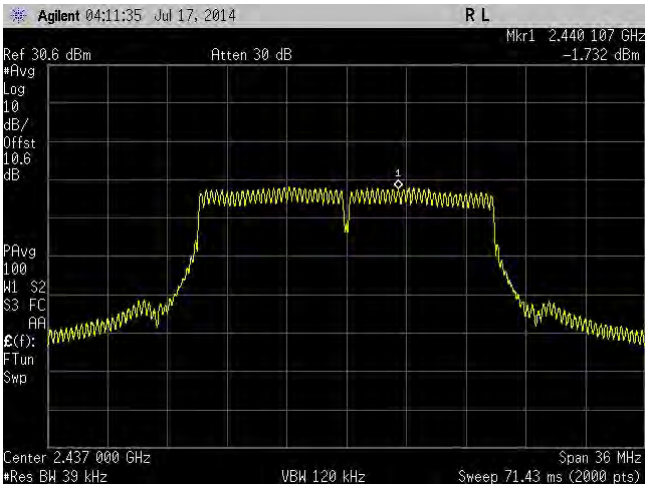


Power Spectral Density Chain 1

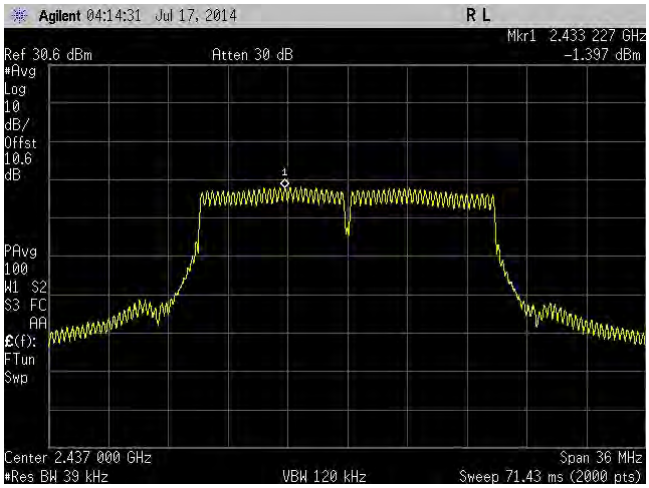


802.11 n20, Middle Channel 2437 MHz

Power Spectral Density Chain 0

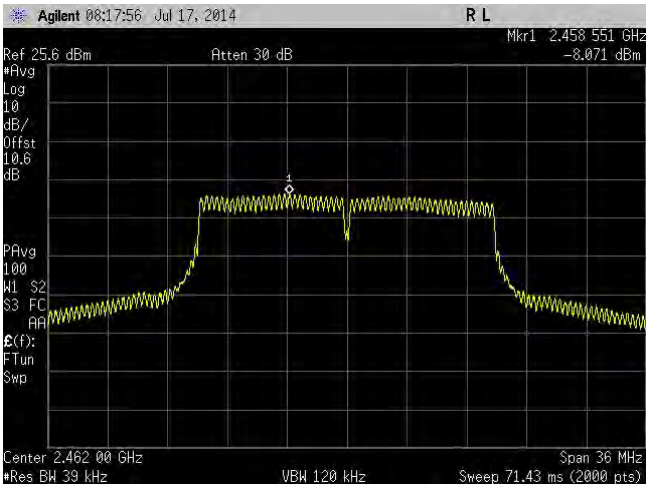


Power Spectral Density Chain 1

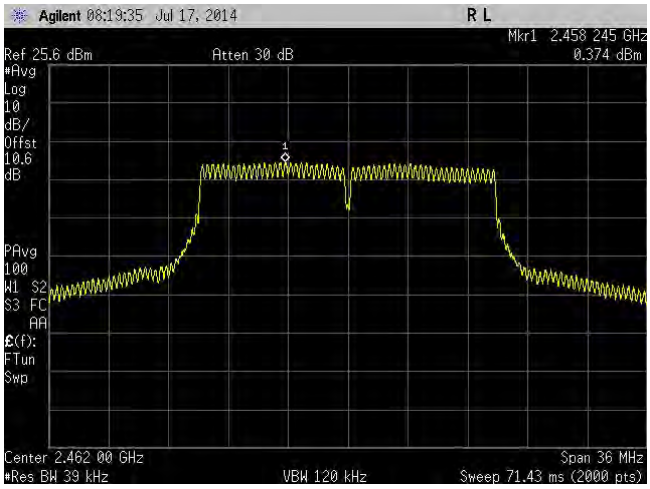


802.11 n20, High Channel 2462 MHz

Power Spectral Density Chain 0

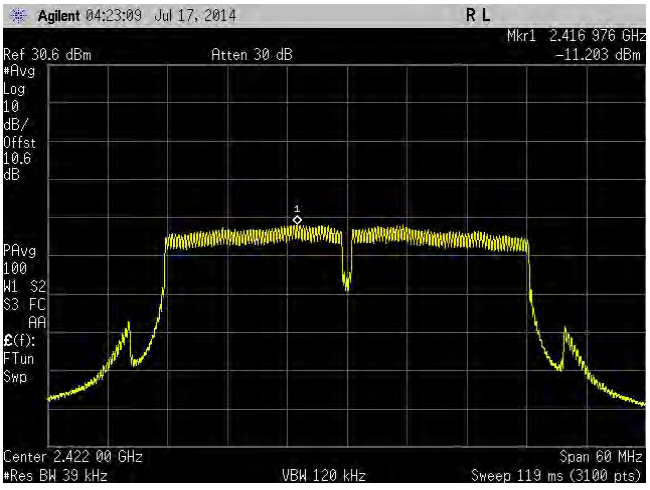


Power Spectral Density Chain 1

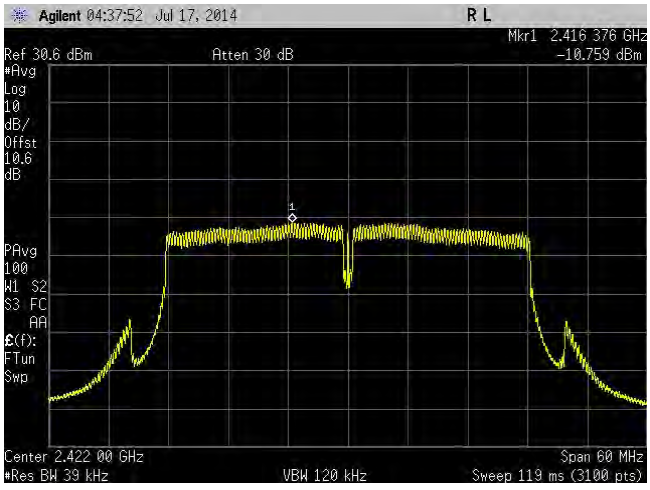


802.11 n40, Low Channel 2422 MHz

Power Spectral Density Chain 0

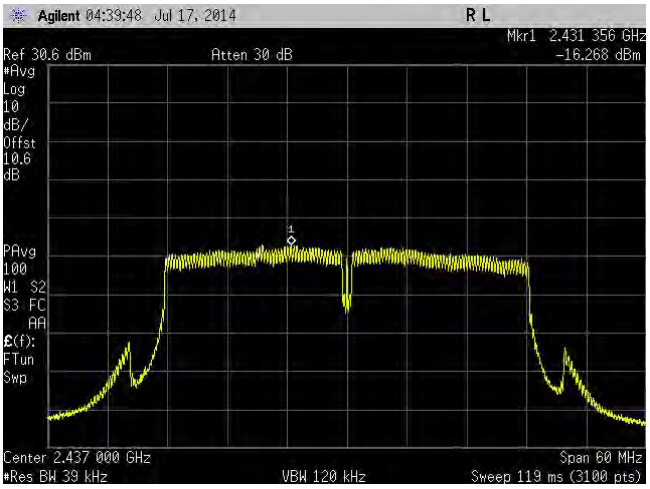


Power Spectral Density Chain 1



802.11 n40, Middle Channel 2437 MHz

Power Spectral Density Chain 0



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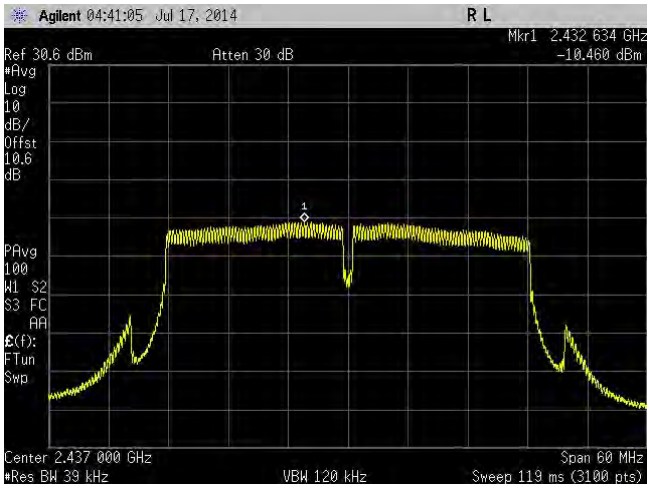
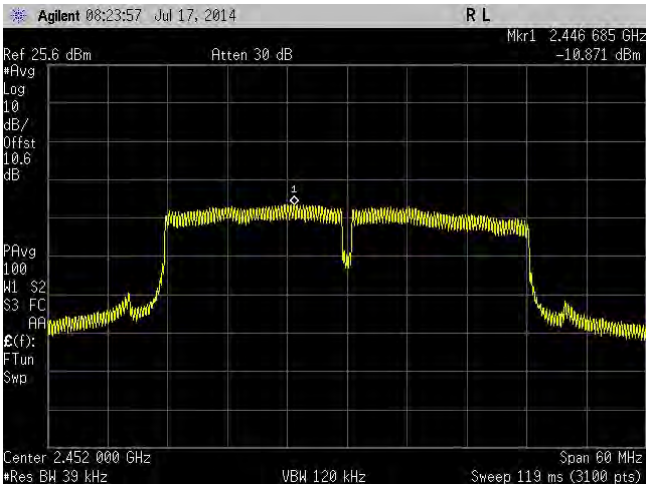


802.11 n40, High Channel 2452 MHz

Power Spectral Density Chain 0



Power Spectral Density Chain 1