EMC Test Report

Application for Grant of Equipment Authorization

Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8
FCC Part 15 Subpart C

Model: UAP-Pro

IC CERTIFICATION #:	6545A-UAPRO
FCC ID:	SWX-UAPRO
APPLICANT:	Ubiquiti Networks 91 E. Tasman Drive San Jose, CA 95134
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road. Fremont, CA. 94538-2435
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REVISION HISTORY

Rev#	Date	Comments	Modified By
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SCOPE

An electromagnetic emissions test has been performed on the Ubiquiti Networks model UAP-Pro, pursuant to the following rules:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003
FCC DTS Measurement Procedure KDB558074, March 2005

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of Ubiquiti Networks model UAP-Pro complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Ubiquiti Networks model UAP-Pro and therefore apply only to the tested sample. The sample was selected and prepared by Jennifer Sanchez of Ubiquiti Networks.

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS SUMMARY

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	b: 10.1 MHz g: 16.23 MHz HT20: 17.44 MHz HT40: 36.55 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	b: 18.0 dBm g: 17.2 dBm HT20: 18.5 dBm HT40: 11.7 dBm EIRP = 0.532 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	b: -4.7dBm/3kHz g: 3.0 dBm/3kHz HT20: 1.3 dBm/3kHz HT40: -0.8 dBm/3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions < -30dBc	< -30dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.9 dBµV/m @ 4874.1 MHz (-0.1 dB)	15.207 in restricted bands, all others <-30dBc Note 2	Complies

Note 1: EIRP calculated using antenna gain of 4 dBi per chain, aggregate of 8.8dBi.
Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).

DIGITAL TRANSMISSION SYSTEMS (5725 –5850 MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	a: 16.25MHz HT20: 17.25MHz HT40: 36.4MHz	>500kHz	Complies
15.247 (b)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	a: 25.0dBm HT20: 24.7dBm HT40: 25.0dBm EIRP = 1.589 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	a: 0.0 dBm/3kHz HT20: 0.2 dBm/3kHz HT40: -1.1 dBm/3kHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions – 30MHz – 40 GHz	All spurious emissions < -20dBc	< -30dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 40 GHz	53.8dBµV/m @ 11568.9MHz (-0.2dB)	15.207 in restricted bands, all others <-30dBc Note 2	Complies

Note 1: EIRP calculated using antenna gain of 4 dBi per chain, for an aggregate of 7dBi.
Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	EUT used integral antennas	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	52.4 dBµV @ 21.663 MHz (-7.6 dB)	Refer to page 19	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	-	-	N/A
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual	-	Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual	Antennas are permanently attached	Statement for products with detachable antenna	N/A
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	2.4GHz: 802.11b: 14.4 MHz 802.11g: 17.1 MHz 802.11n20: 18.16 MHz 802.11n40: 36.64 MHz 5GHz: a: 19.55MHz HT20: 19.47MHz HT40: 50.32MHz	Information only	N/A

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Ubiquiti Networks model UAP-Pro is an 802.11abgn access point. It has a 3x3 2.4GHz 802.11bgn radio and a 2x2 5GHz 802.11an radio. The device can operate in the 2.4 and 5GHz band simultaneously. It was treated as table-top equipment during testing to most closely simulate the end-user environment. The EUT is powered via a POE interface.

The sample was received on January 24, 2012 and tested on January 24, 27, February 6, 7, 10, 13, March 2, 6 and 12, 2012. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Ubiquiti Networks	UniFi Pro	802.11abgn Dual Band Access Point	Prototype	SWX-UAPRO

OTHER EUT DETAILS

The following EUT details should be noted:

Operation is limited to the 2.4GHz, 5150-5250 and 5725-5850 MHz bands.
Operation limited to 3x3 in 2.4GHz band, the system will not operate in a 2x2 or single chain modes at increased power/chain.
Operation limited to 2x2 in the 5GHz bands, the system will not operate in a single chain mode at increased power/chain.

ANTENNA SYSTEM

The antennas are internal to the EUT. For both 2.4 and 5GHz, the antenna gain is 4dBi for each element.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 21 cm in diameter by 4 cm height.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at Elliott.

SUPPORT EQUIPMENT

No local support equipment was used during testing.

The following equipment was used as remote support equipment for emissions testing:

Company	Model	Description	Serial Number	FCC ID
Ubiquiti	UBI-POE-24-5	PoE pwr supply	-	-
Dell	Vostro	Laptop	-	-

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	Pwr supply PoE port	Cat 5	Shielded	7
Antenna	External antenna	Direct connection	NA	NA
Pwr supply LAN port	Laptop	Cat 5	Unshielded	1
AC pwr (pwr supply)	AC mains	3 wire	Unshielded	1

EUT OPERATION

During emissions testing the EUT was transmitting on the channel & at the power level called out in the individual tests. Additional testing, as noted, was performed with both the 2.4GHz and 5GHz radios operating simultaneously.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 4	211948	2845B-4	41039 Boyce Road Fremont, CA 94538-2435
Chamber 5	211948	2845B-5	
Chamber 7	A2LA accreditation	2845B-7	

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

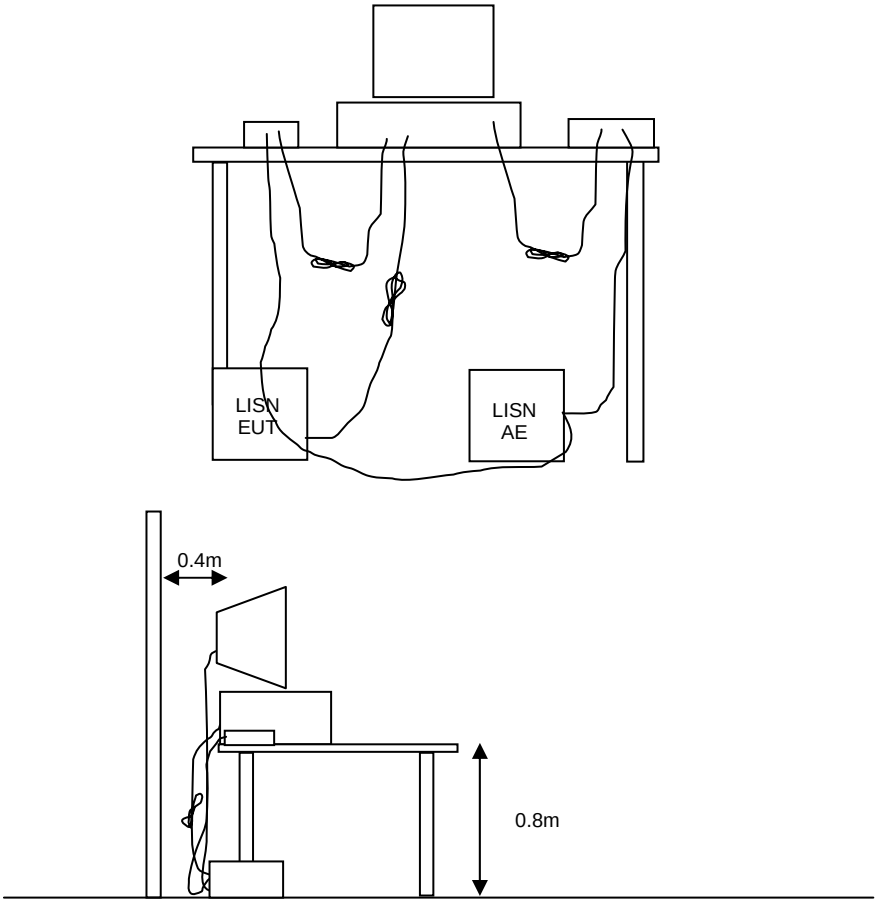


Figure 1 Typical Conducted Emissions Test Configuration

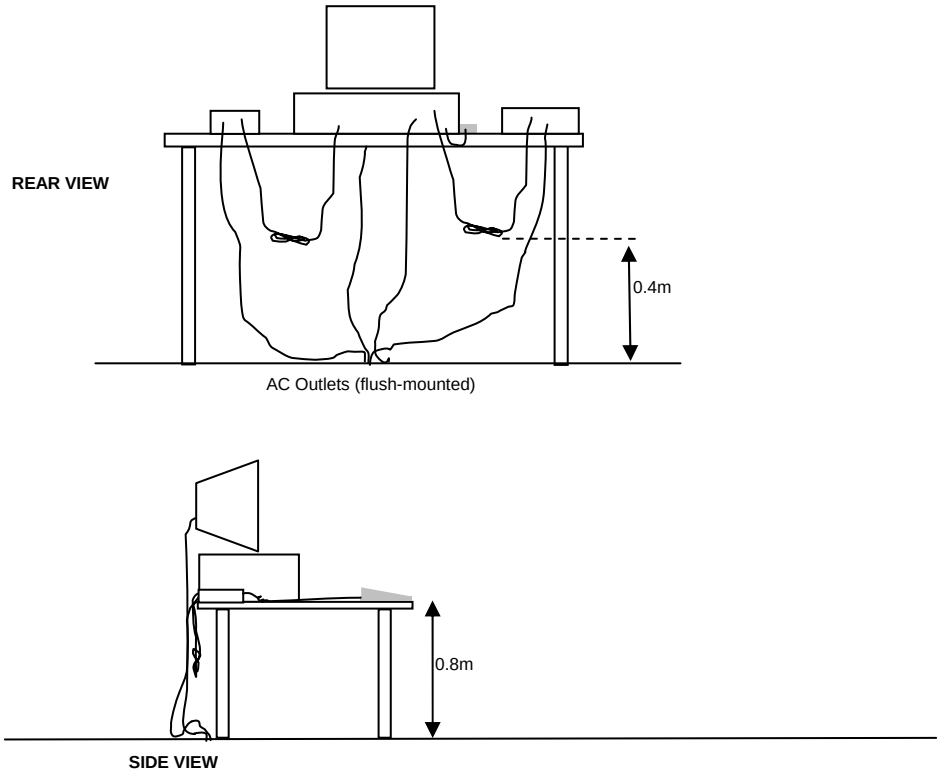
RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

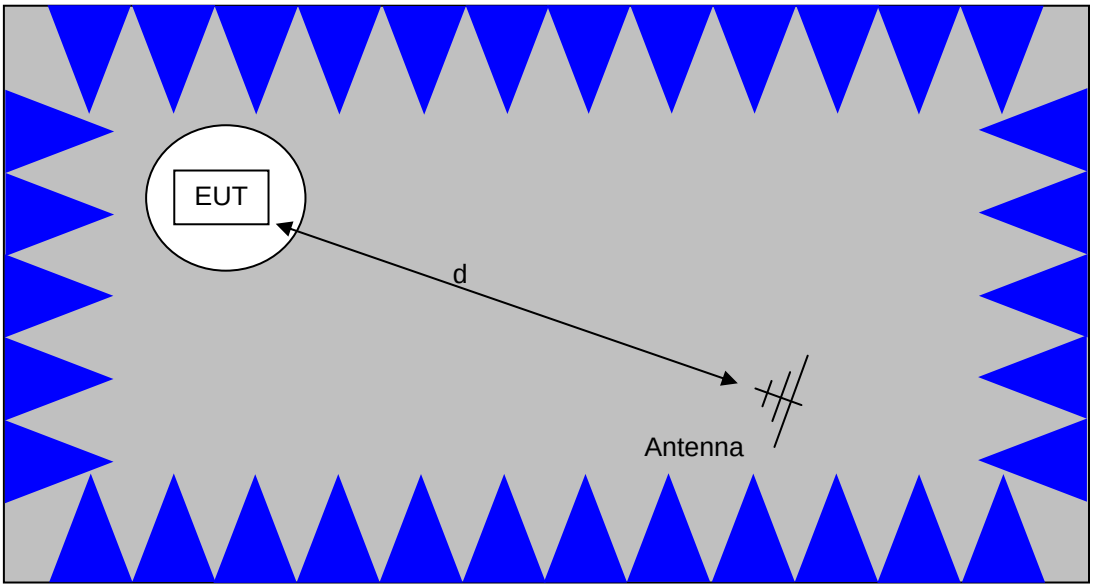
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

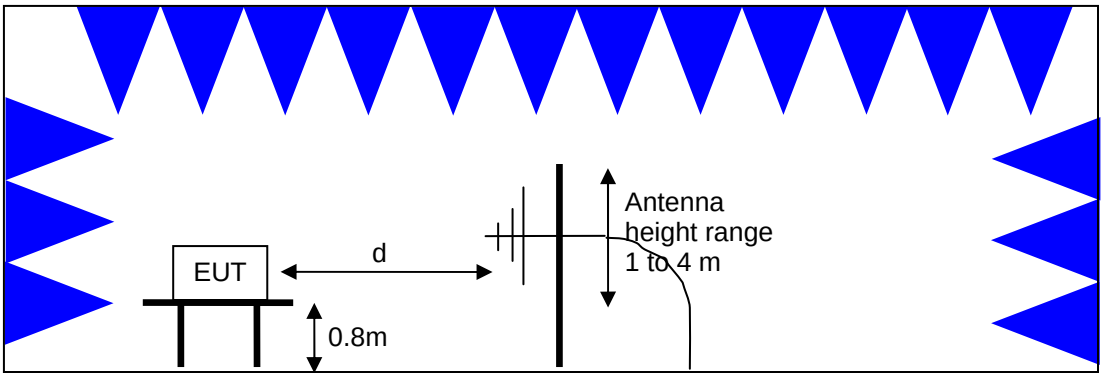


Typical Test Configuration for Radiated Field Strength Measurements



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

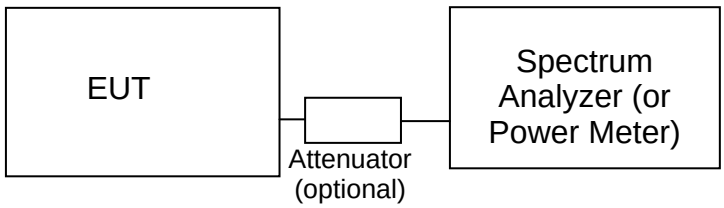
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements of power, bandwidth and power spectral density are performed, where possible, with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.



Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and Elliott's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

If power averaging is used (typically for certain digital modulation techniques), the EUT is configured to transmit continuously. Power averaging is performed using either the built-in function of the analyzer or, if the analyzer does not feature power averaging, using external software. In both cases the average power is calculated over a number of sweeps (typically 100). When the EUT cannot be configured to continuously transmit then either the analyzer is configured to perform a gated sweep to ensure that the power is averaged over periods that the device is transmitting or power averaging is disabled and a max-hold feature is used.

If a power meter is used to make output power measurements the sensor head type (peak or average) is stated in the test data table.

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS 210 Table 2, RSS GEN Table 1 and RSS 310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

[1] The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of d (meters) from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{d} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For a measurement at 3m the conversion from a logarithmic value for field strength (dBuV/m) to an eirp power (dBm) is -95.3dB.

Appendix A Test Equipment Calibration Data

Radiated Emissions, 2.4GHz Bandedges, 25-Jan-12

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	8/2/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012

Radiated Emissions, 1000 - 18,000 MHz, 26-Jan-12

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/9/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	8/15/2012
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	1729	8/5/2012

Radiated Emissions, 1000 - 18,000 MHz, 27-Jan-12

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/9/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	8/15/2012
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	1729	8/5/2012

Radio Antenna Port , 03-Feb-12

Manufacturer	Description	Model	Asset #	Cal Due
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/14/2012

Radio Antenna Port (Power and Spurious Emissions), 03-Feb-12

Manufacturer	Description	Model	Asset #	Cal Due
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/14/2012

Radiated Emissions, 1000 - 18,000 MHz, 06-Feb-12

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012
Hewlett Packard	High Pass filter, 8.2 GHz (Purple System)	P/N 84300-80039 (84125C)	1767	11/29/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	10/4/2012
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	2241	10/4/2012

Radiated Emissions, 1000 - 18,000 MHz, 07-Feb-12

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	Microwave Preamplifier, 1-	8449B	785	5/18/2012

	26.5GHz			
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012
Hewlett Packard	High Pass filter, 8.2 GHz (Purple System)	P/N 84300-80039 (84125C)	1767	11/29/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	10/4/2012
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	2241	10/4/2012

Radiated Emissions, 1000 - 26,500 MHz, 08-Feb-12

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012
Hewlett Packard	Head (Inc W1-W4, 1742 , 1743) Blue	84125C	1620	5/9/2012
A.H. Systems	Blue System Horn, 18-40GHz	SAS-574, p/n: 2581	2159	3/23/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2012

Radio Antenna Port (Power and Spurious Emissions), 09-Feb-12

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012

Radio Antenna Port (Power and Spurious Emissions), 13-Feb-12

Manufacturer	Description	Model	Asset #	Cal Due
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012

Radiated Emissions, 30 - 1,000 MHz, 15-Feb-12

Manufacturer	Description	Model	Asset #	Cal Due
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	5/28/2012
Com-Power Corp.	Preamplifier, 30-1000 MHz	PA-103A	2359	2/14/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	12/9/2012

Radiated Emissions, 1,000 - 18,000 MHz, 02-Mar-12

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	8/2/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	4/6/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/23/2013
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	10/4/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	7/28/2012

Radiated Emissions, 1000 - 18,000 MHz, 03-Mar-12

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	8/2/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/23/2013
Micro-Tronics	Band Reject Filter, 2400-2500	BRM50702-02	2238	10/4/2012

Hewlett Packard	MHz SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	7/28/2012

Conducted Emissions - AC Power Ports, 12-Mar-12

Manufacturer	Description	Model	Asset #	Cal Due
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/6/2012
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1594	5/17/2012
Fischer Custom Comm	LISN, 25A, 150kHz to 30MHz, 25 Amp,	FCC-LISN-50-25-2-09	2000	10/18/2012

Appendix B Test Data

T86160 Pages 28 - 149

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		-
Emissions Standard(s):	FCC 15.247/EN 300 328	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Ubiquiti Networks

Model

UniFi Pro

Date of Last Test: 3/16/2012

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20.3 °C
Rel. Humidity: 36 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11b Chain A+B+C	low	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.7 dBµV/m @ 2386.4 MHz (-1.3 dB)
1b		high	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	52.2 dBµV/m @ 2487.7 MHz (-1.8 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

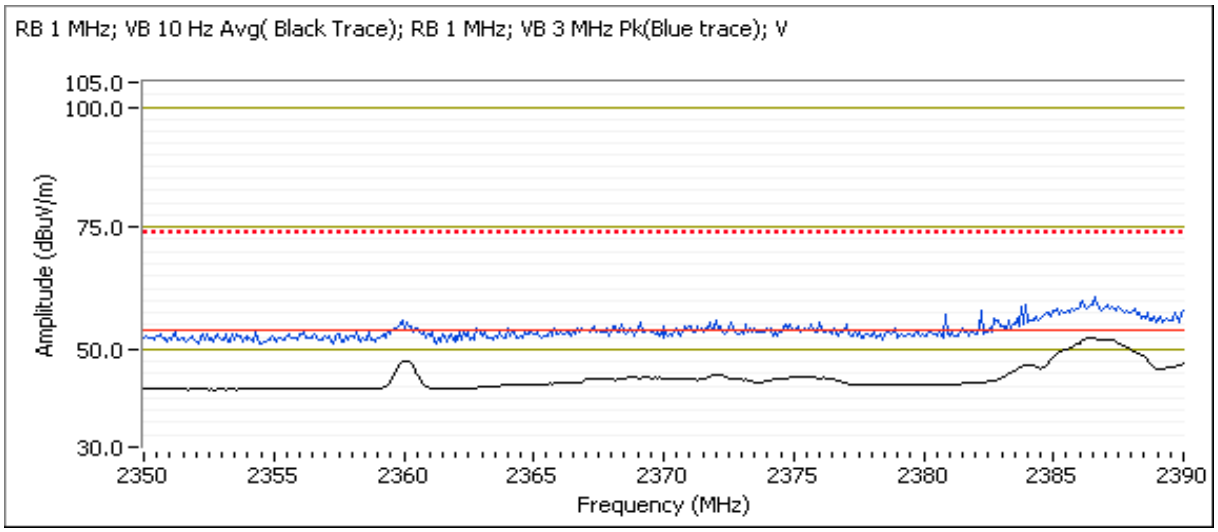
Run #1: Radiated Spurious Emissions. Operating Mode: 802.11b

Date of Test: 3/2/2012
Test Engineer: Jack Liu
Test Location: FT7

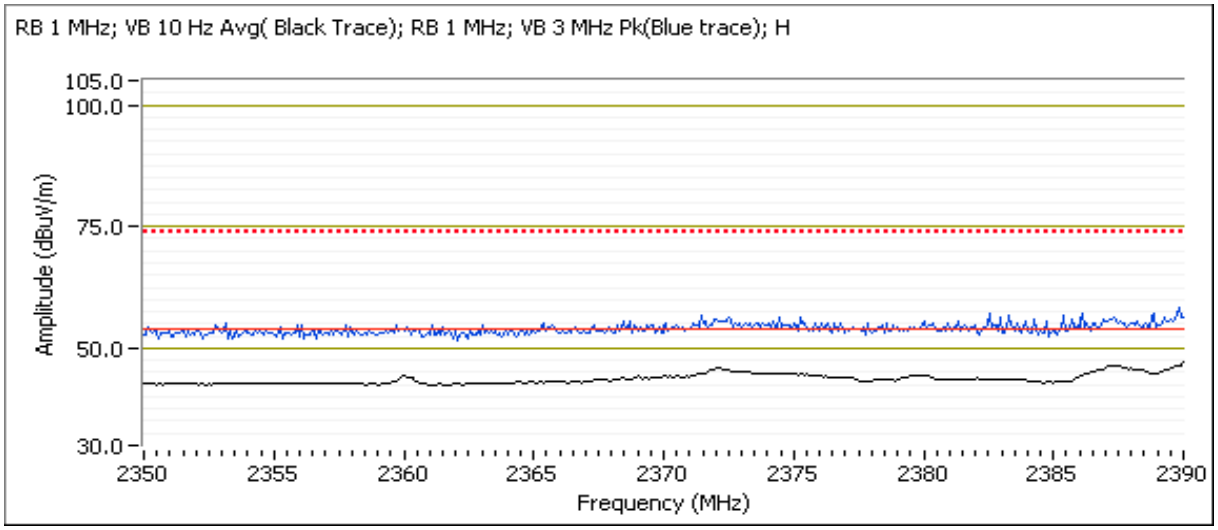
Run #1a: Low Channel @ 2412 MHz, 802.11b mode

2390 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2386.350	52.7	V	54.0	-1.3	AVG	227	1.0	
2385.410	59.1	V	74.0	-14.9	PK	227	1.0	
2390.000	47.0	H	54.0	-7.0	AVG	99	1.4	
2387.110	55.8	H	74.0	-18.2	PK	99	1.4	



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

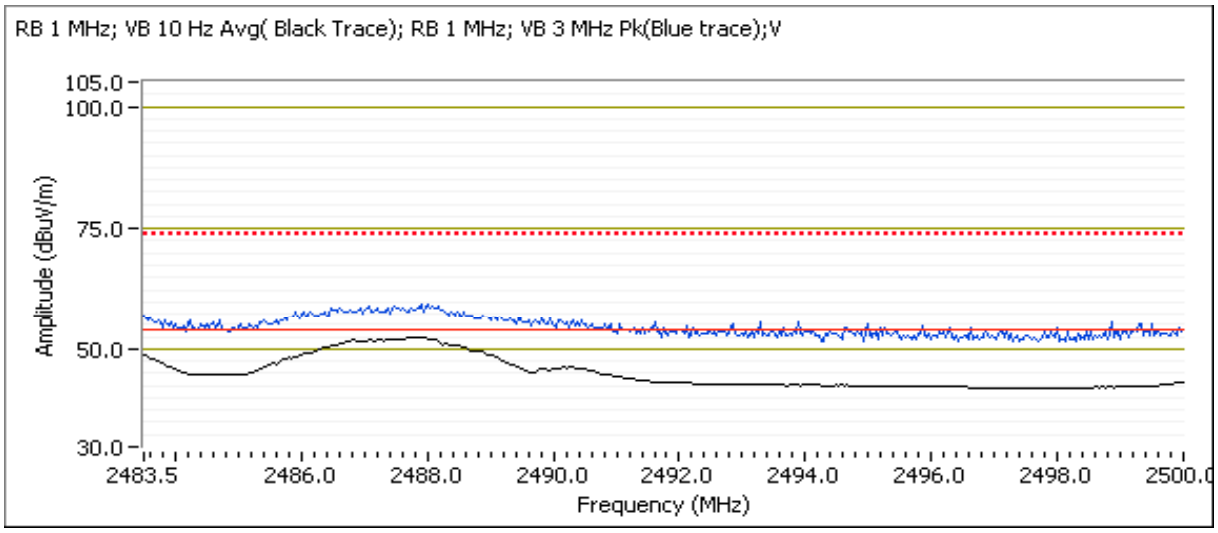


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

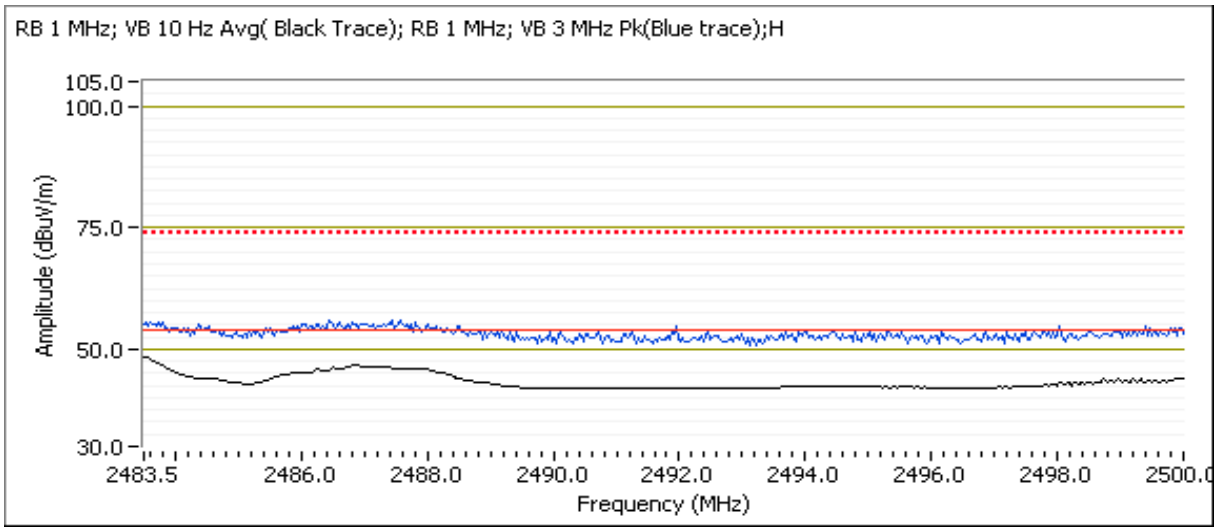
Run #1b: High Channel @ 2462 MHz, 802.11b Mode

2483.5 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2487.710	52.2	V	54.0	-1.8	AVG	248	1.0	
2487.420	60.1	V	74.0	-13.9	PK	248	1.0	
2483.500	48.3	H	54.0	-5.7	AVG	222	1.3	
2483.500	55.6	H	74.0	-18.4	PK	222	1.3	



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions (802.11b)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20.1 °C
Rel. Humidity: 34 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	b	low	-	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	53.3 dBµV/m @ 4824.0 MHz (-0.7 dB)
1b	b	center	-	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	53.9 dBµV/m @ 4874.1 MHz (-0.1 dB)
1c	b	high	-	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	53.1 dBµV/m @ 4924.1 MHz (-0.9 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Notes

No radio related emissions detected below 1GHz.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

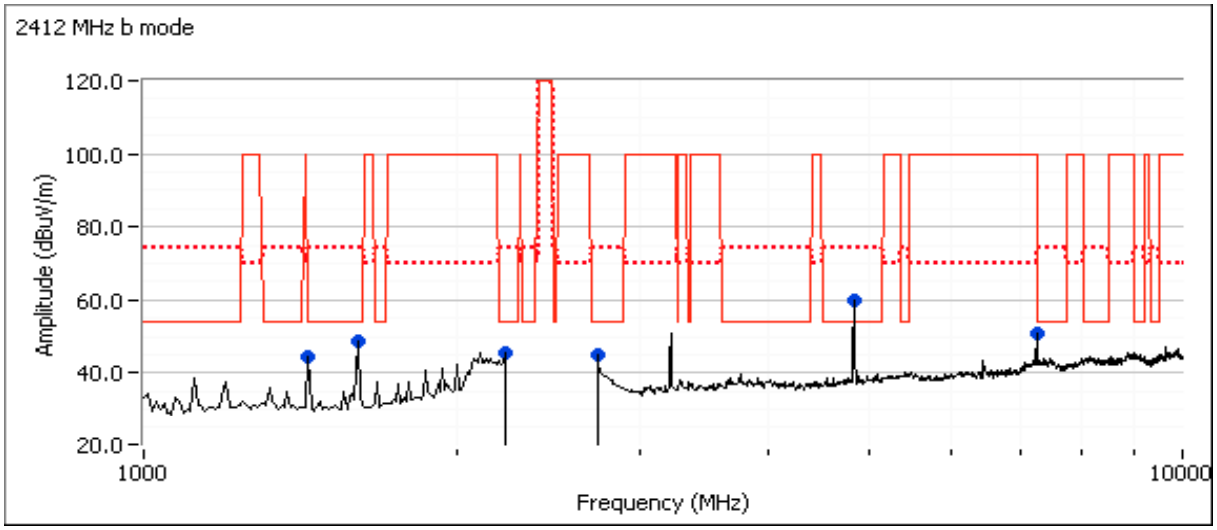
Run #1: Radiated Spurious Emissions, 1000 - 26000 MHz. Operating Mode: 802.11b

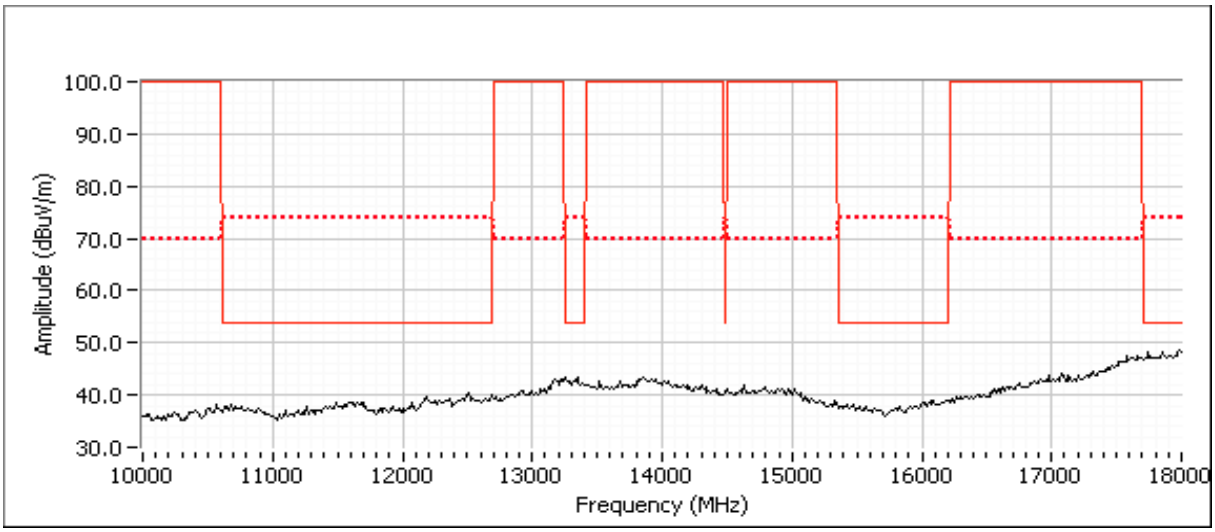
Date of Test: 3/2/2012

Test Engineer: Jack Liu

Test Location: FT7

Run #1a: Low Channel @ 2412 MHz





Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1608.030	49.9	H	54.0	-4.1	AVG	322	1.3	RB 1 MHz;VB 10 Hz;Pk
1607.970	50.9	H	74.0	-23.1	PK	322	1.3	RB 1 MHz;VB 3 MHz;Pk
1439.980	43.8	V	54.0	-10.2	AVG	243	1.3	RB 1 MHz;VB 10 Hz;Pk
1440.270	46.7	V	74.0	-27.3	PK	243	1.3	RB 1 MHz;VB 3 MHz;Pk
7233.450	51.0	V	54.0	-3.0	Peak	123	1.0	Note 2
4824.030	53.3	V	54.0	-0.7	AVG	200	1.0	RB 1 MHz;VB 10 Hz;Pk
4824.050	55.0	V	74.0	-19.0	PK	200	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

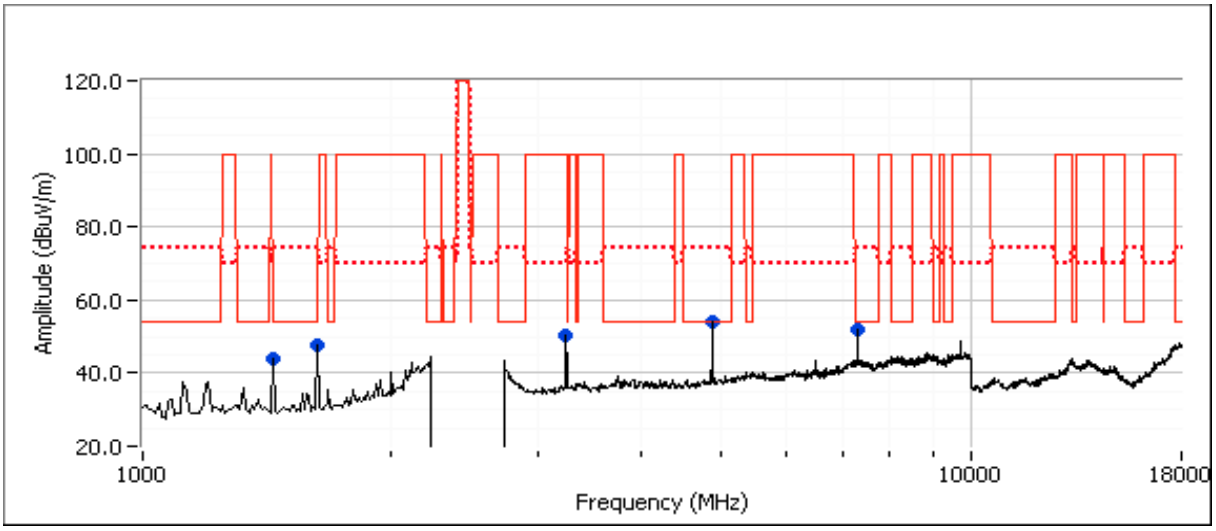
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1b: Center Channel @ 2437 MHz

Date of Test: 3/2/2012

Test Engineer: Rafael Varelas

Test Location: FT4



Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.130	53.9	V	54.0	-0.1	AVG	290	1.0	RB 1 MHz;VB 10 Hz;Pk
4874.060	55.3	V	74.0	-18.7	PK	290	1.0	RB 1 MHz;VB 3 MHz;Pk
7309.570	39.4	H	54.0	-14.6	AVG	293	1.0	RB 1 MHz;VB 10 Hz;Pk
7310.510	49.0	H	74.0	-25.0	PK	293	1.0	RB 1 MHz;VB 3 MHz;Pk
1440.000	43.4	V	54.0	-10.6	AVG	347	1.3	RB 1 MHz;VB 10 Hz;Pk
1439.890	45.9	V	74.0	-28.1	PK	347	1.3	RB 1 MHz;VB 3 MHz;Pk
3249.450	50.0	H	54.0	-4.0	AVG	212	1.0	RB 1 MHz;VB 10 Hz;Pk
3249.360	52.0	H	74.0	-22.0	PK	212	1.0	RB 1 MHz;VB 3 MHz;Pk
1624.720	47.7	H	54.0	-6.3	AVG	55	1.3	RB 1 MHz;VB 10 Hz;Pk
1624.690	49.1	H	74.0	-24.9	PK	55	1.3	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 3:	Scans made between 18 - 26GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range

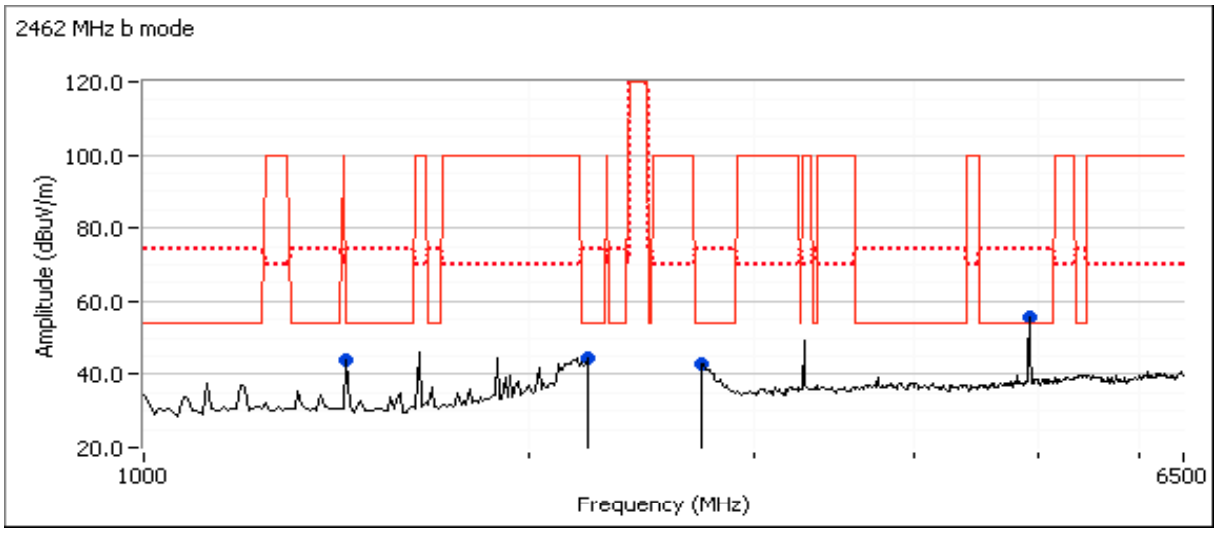
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

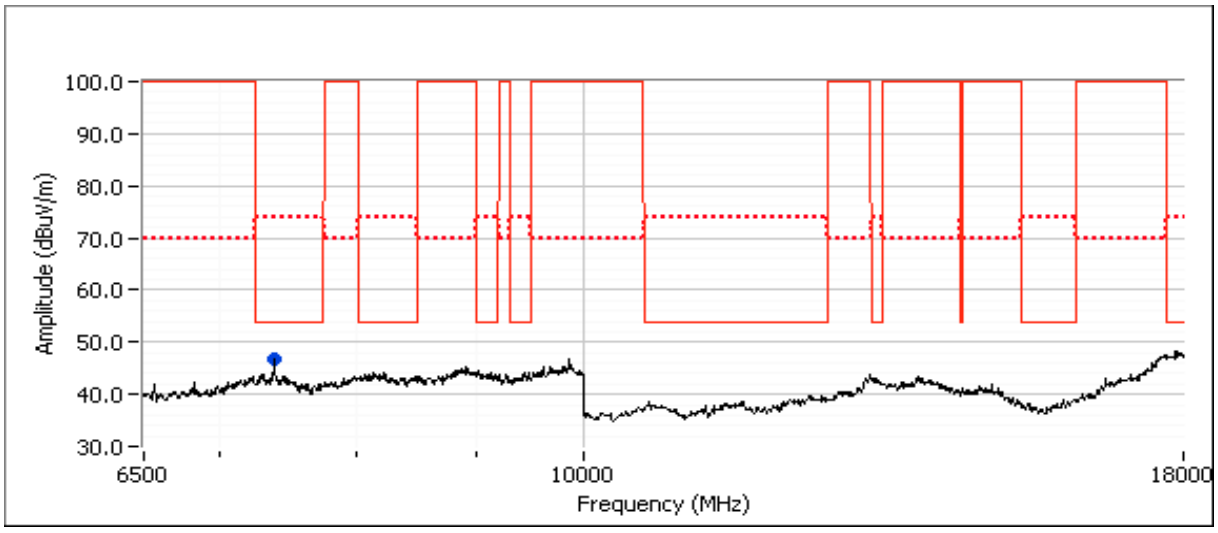
Run #1c: High Channel @ 2462 MHz

Date of Test: 3/2/2012

Test Engineer: Jack Liu / R. Varelas

Test Location: FT7





Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1440.000	43.7	V	54.0	-10.3	AVG	243	1.3	RB 1 MHz;VB 10 Hz;Pk
1439.750	46.1	V	74.0	-27.9	PK	243	1.3	RB 1 MHz;VB 3 MHz;Pk
4924.060	53.1	V	54.0	-0.9	AVG	206	1.0	RB 1 MHz;VB 10 Hz;Pk
4924.150	54.7	V	74.0	-19.3	PK	206	1.0	RB 1 MHz;VB 3 MHz;Pk
7386.900	46.5	V	54.0	-7.5	AVG	217	1.3	RB 1 MHz;VB 10 Hz;Pk
7386.730	53.6	V	74.0	-20.4	PK	217	1.3	RB 1 MHz;VB 3 MHz;Pk

Note 1: For emissions in restricted bands, the limit of 15.209 was used.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20.3 °C
Rel. Humidity: 36 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11g Chain A+B+C	low	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.8dBµV/m @ 2360.1MHz (-0.2dB)
1b		high	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	52.6dBµV/m @ 2483.6MHz (-1.4dB)
3a	802.11n20 Chain A+B+C	low	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.6dBµV/m @ 2390.0MHz (-0.4dB)
3b		high	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.5dBµV/m @ 2483.6MHz (-0.5dB)
4a	802.11n40 Chain A+B+C	low	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.9dBµV/m @ 2389.7MHz (-1.1dB)
4b		high	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.7dBµV/m @ 2483.5MHz (-0.3dB)

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

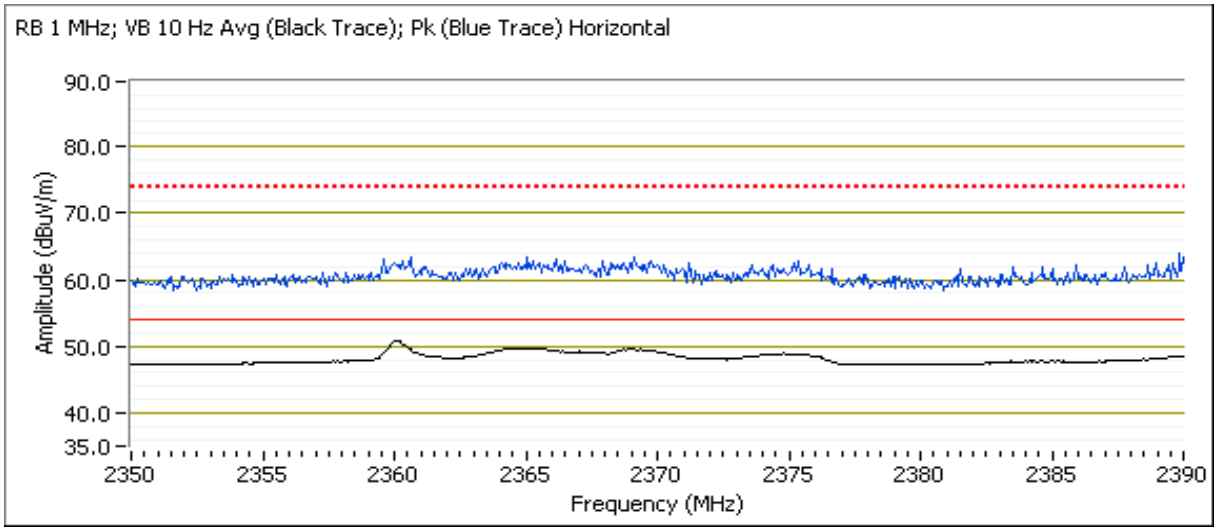
Run #1: Radiated Spurious Emissions. Operating Mode: 802.11g

Date of Test: 1/24/2012
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Run #1a: Low Channel @ 2412 MHz, 802.11g mode

2390 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2360.130	53.8	H	54.0	-0.2	AVG	310	1.1	RB 1 MHz;VB 10 Hz;Pk
2360.070	63.2	H	74.0	-10.8	PK	310	1.1	RB 1 MHz;VB 3 MHz;Pk
2389.940	51.1	H	54.0	-2.9	AVG	310	1.1	RB 1 MHz;VB 10 Hz;Pk
2389.300	62.2	H	74.0	-11.8	PK	310	1.1	RB 1 MHz;VB 3 MHz;Pk
2360.070	52.2	V	54.0	-1.8	AVG	360	1.0	RB 1 MHz;VB 10 Hz;Pk
2360.330	62.3	V	74.0	-11.7	PK	360	1.0	RB 1 MHz;VB 3 MHz;Pk

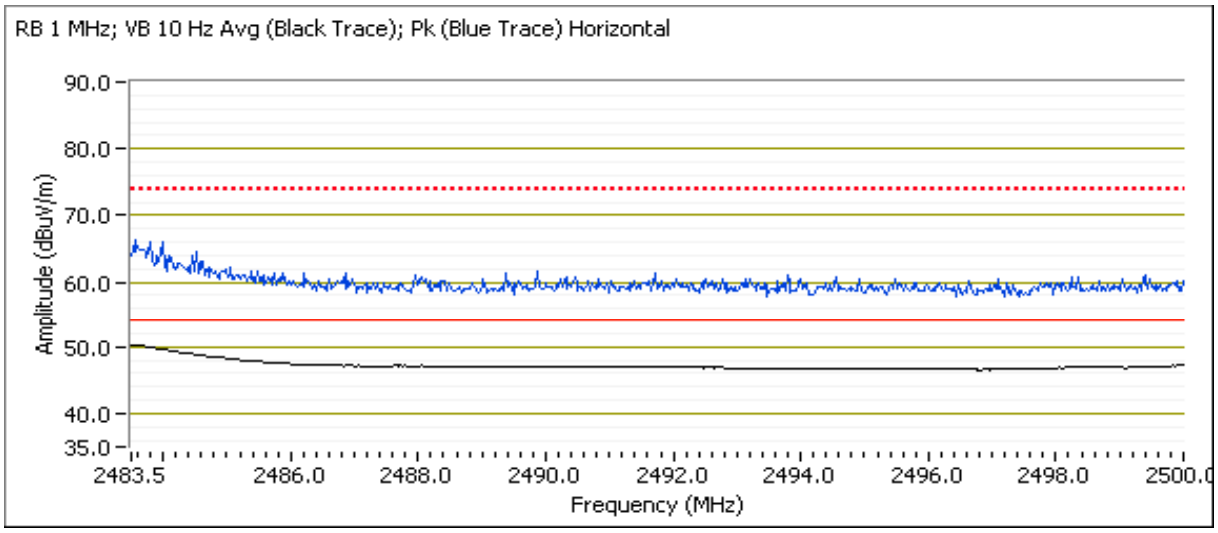


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1b: High Channel @ 2462 MHz, 802.11g Mode

2483.5 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.560	52.6	H	54.0	-1.4	AVG	248	1.1	RB 1 MHz;VB 10 Hz;Pk
2484.500	64.9	H	74.0	-9.1	PK	248	1.1	RB 1 MHz;VB 3 MHz;Pk
2483.540	52.2	V	54.0	-1.8	AVG	301	1.0	RB 1 MHz;VB 10 Hz;Pk
2484.070	64.2	V	74.0	-9.8	PK	301	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

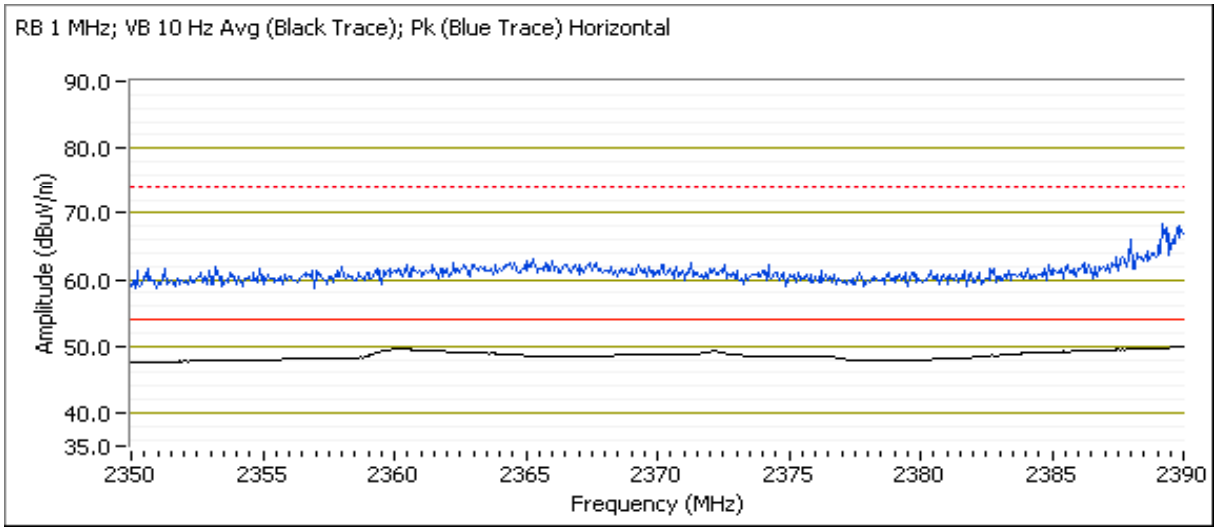
Run #3: Radiated Spurious Emissions. Operating Mode: 802.11n20

Date of Test: 1/24/2012
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Run #3a: Low Channel @ 2412 MHz, 802.11n20 Mode

2390 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2390.000	53.6	H	54.0	-0.4	AVG	304	1.1	RB 1 MHz;VB 10 Hz;Pk
2389.870	66.1	H	74.0	-7.9	PK	304	1.1	RB 1 MHz;VB 3 MHz;Pk
2390.000	51.6	V	54.0	-2.4	AVG	80	1.2	RB 1 MHz;VB 10 Hz;Pk
2389.070	61.7	V	74.0	-12.3	PK	80	1.2	RB 1 MHz;VB 3 MHz;Pk

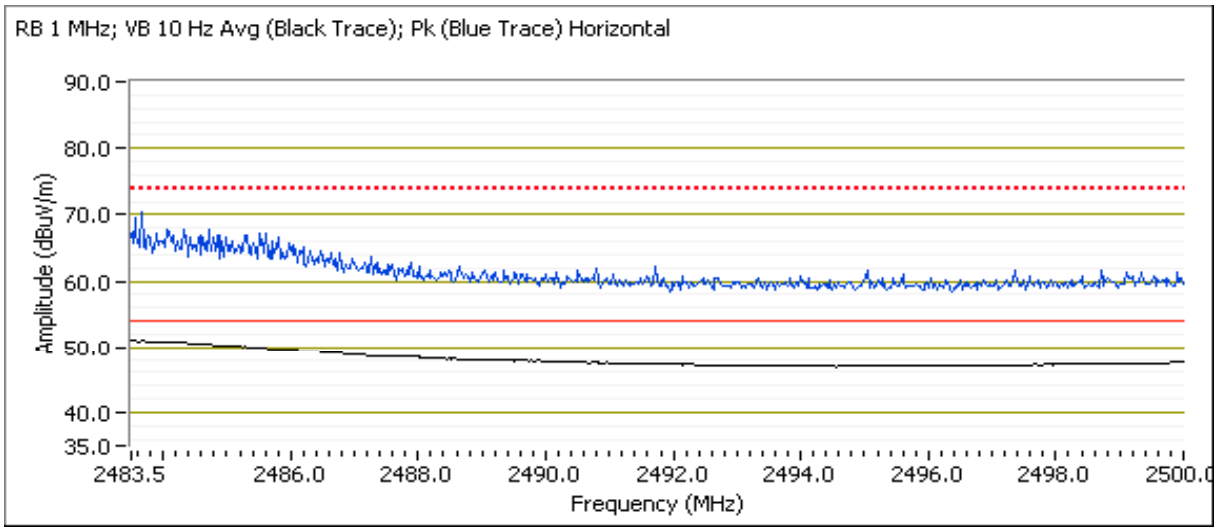


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #3b: High Channel @ 2462 MHz, 802.11n20 Mode

2483.5 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.580	53.5	H	54.0	-0.5	AVG	260	1.1	RB 1 MHz;VB 10 Hz;Pk
2484.370	66.8	H	74.0	-7.2	PK	260	1.1	RB 1 MHz;VB 3 MHz;Pk
2484.270	52.0	V	54.0	-2.0	AVG	200	1.3	RB 1 MHz;VB 10 Hz;Pk
2485.040	64.3	V	74.0	-9.7	PK	200	1.3	RB 1 MHz;VB 3 MHz;Pk



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

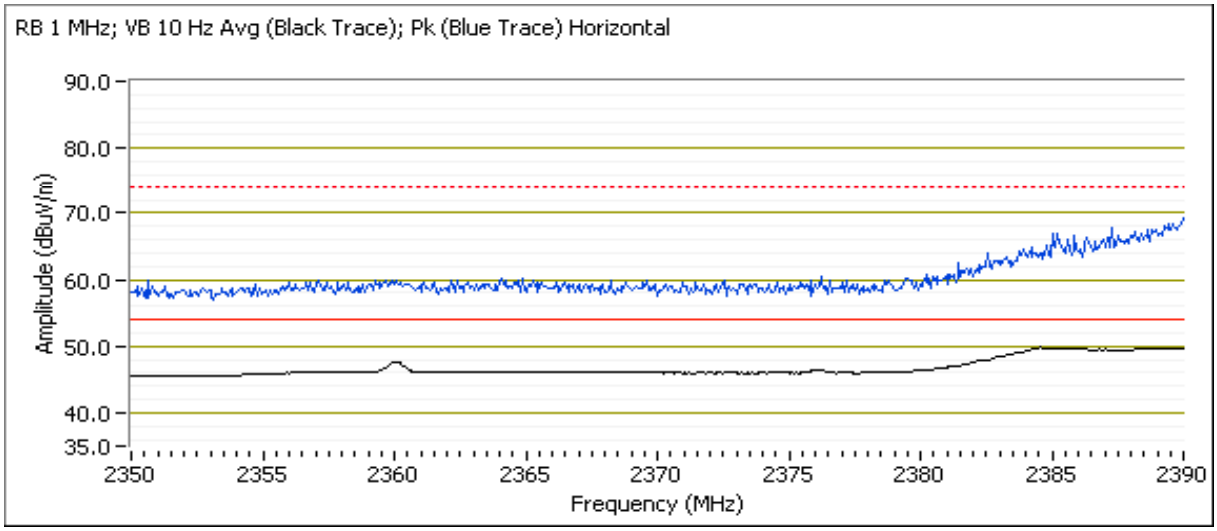
Run #4: Radiated Spurious Emissions. Operating Mode: 802.11n40

Date of Test: 1/24/2012
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Run #4a: Low Channel @ 2422 MHz, 802.11n40 Mode

2390 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.730	52.9	H	54.0	-1.1	AVG	313	1.1	RB 1 MHz;VB 10 Hz;Pk
2390.000	67.3	H	74.0	-6.7	PK	313	1.1	RB 1 MHz;VB 3 MHz;Pk
2389.870	52.0	V	54.0	-2.0	AVG	68	1.0	RB 1 MHz;VB 10 Hz;Pk
2389.870	68.3	V	74.0	-5.7	PK	68	1.0	RB 1 MHz;VB 3 MHz;Pk

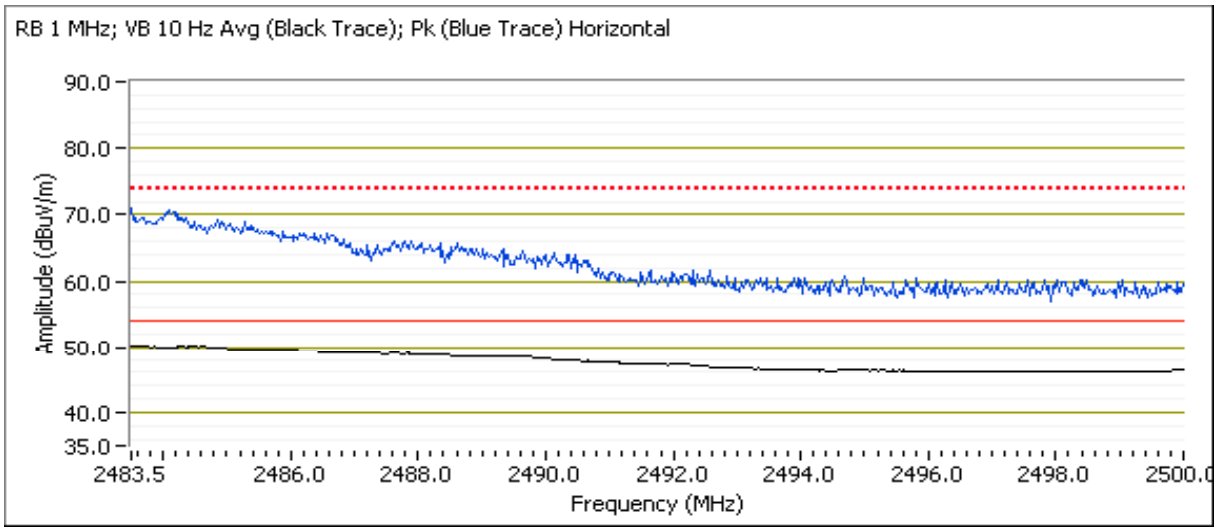


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #4b: High Channel @ 2452 MHz, 802.11n40 Mode

2483.5 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	53.7	H	54.0	-0.3	AVG	261	1.1	RB 1 MHz;VB 10 Hz;Pk
2483.940	70.1	H	74.0	-3.9	PK	261	1.1	RB 1 MHz;VB 3 MHz;Pk
2483.500	52.2	V	54.0	-1.8	AVG	302	1.0	RB 1 MHz;VB 10 Hz;Pk
2483.670	67.8	V	74.0	-6.2	PK	302	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions (802.11g, HT20, HT40)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20.1 °C
Rel. Humidity: 34 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Preliminary measurements, center channel in each mode to determine worst-case mode. High and low channels for worst-case mode in each band then evaluated.							
2a	g	center	-	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	53.0dBµV/m @ 4877.0MHz (-1.0dB)
2b	N20	center	-	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	52.9dBµV/m @ 7309.6MHz (-1.1dB)
2c	N40	center	-	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	52.3dBµV/m @ 7301.2MHz (-1.7dB)
3a	g	low	-	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	47.5dBµV/m @ 1608.0MHz (-6.5dB)
3b	g	high	-	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	45.3dBµV/m @ 2752.2MHz (-8.7dB)

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Notes

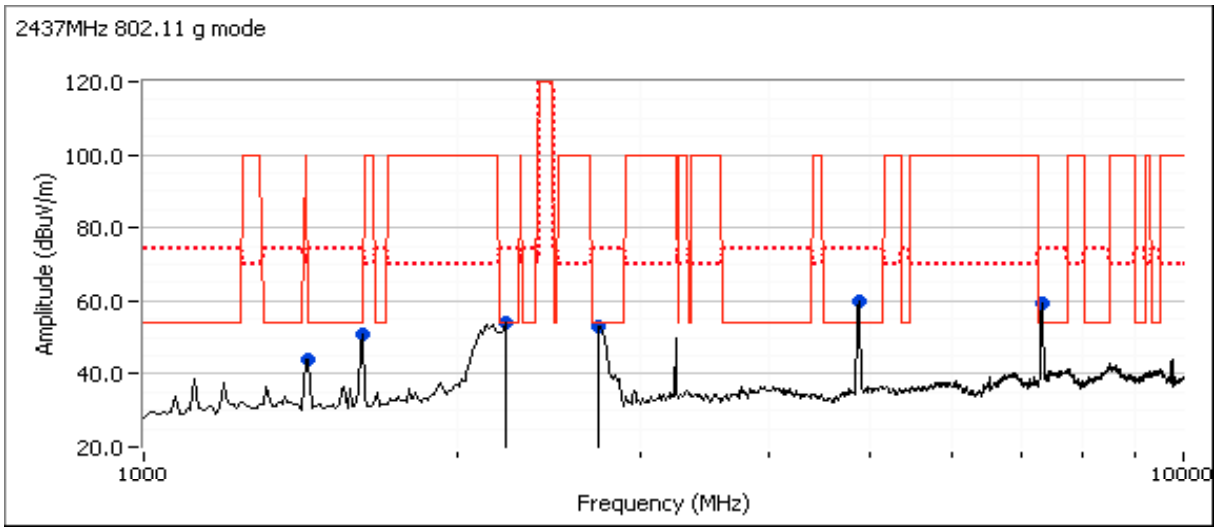
No radio related emissions detected below 1GHz.

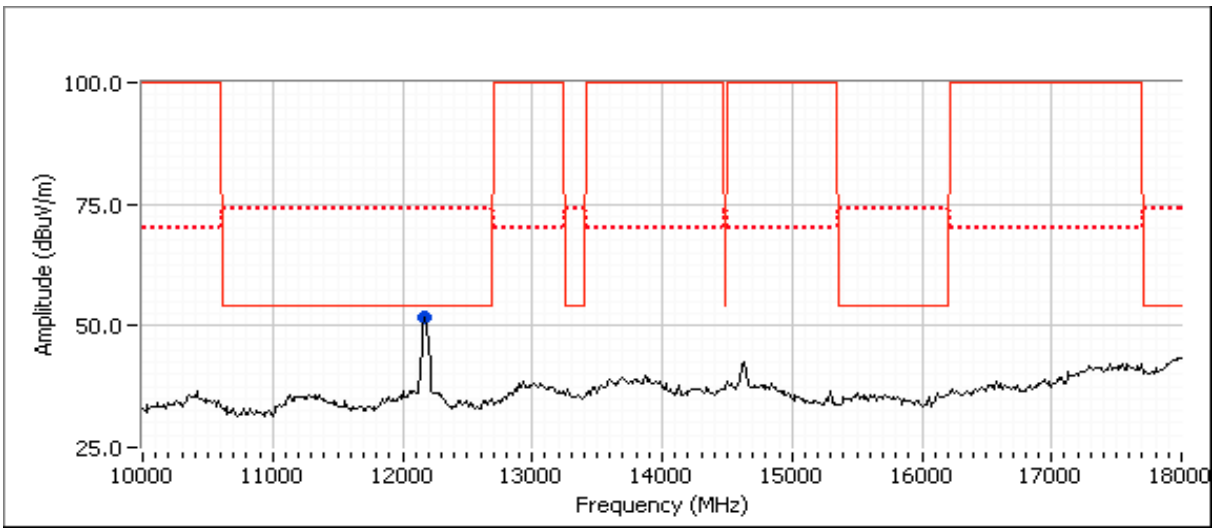
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2: Radiated Spurious Emissions, 1000 - 26000 MHz. Operating Mode: 802.11g/ n20/n40

Date of Test: 2/6/2012
Test Engineer: Jack Liu
Test Location: FT Chamber#7

Run #2a: Center Channel @ 2437 MHz- 802.11g mode





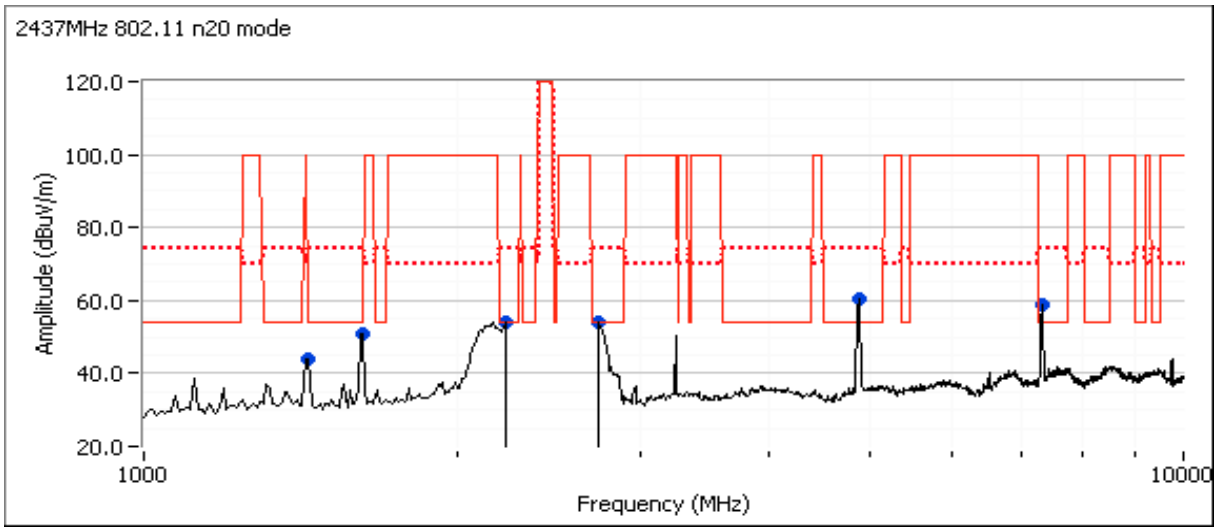
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

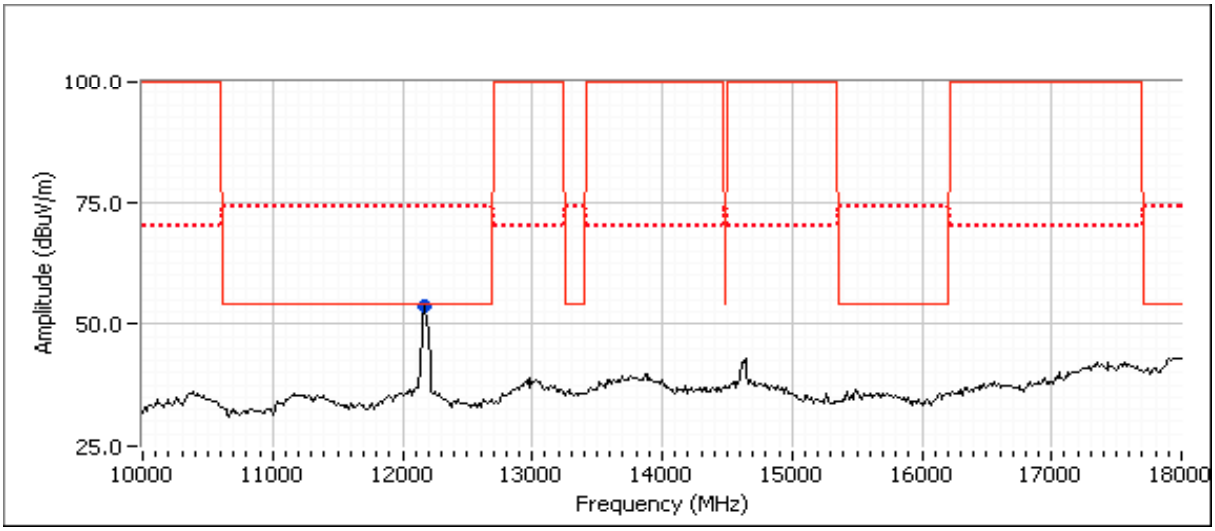
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4877.000	53.0	V	54.0	-1.0	AVG	0	1.5	RB 1 MHz;VB 10 Hz;Pk
4877.130	63.7	V	74.0	-10.3	PK	0	1.5	RB 1 MHz;VB 3 MHz;Pk
1624.730	50.4	V	54.0	-3.6	AVG	80	1.7	RB 1 MHz;VB 10 Hz;Pk
1624.710	53.3	V	74.0	-20.7	PK	80	1.7	RB 1 MHz;VB 3 MHz;Pk
2209.130	51.1	H	54.0	-2.9	AVG	170	1.3	RB 1 MHz;VB 10 Hz;Pk
2209.130	61.9	H	74.0	-12.1	PK	170	1.3	RB 1 MHz;VB 3 MHz;Pk
2754.870	52.2	H	54.0	-1.8	AVG	300	1.0	RB 1 MHz;VB 10 Hz;Pk
2753.470	61.2	H	74.0	-12.8	PK	300	1.0	RB 1 MHz;VB 3 MHz;Pk
1439.990	43.6	V	54.0	-10.4	AVG	325	2.0	RB 1 MHz;VB 10 Hz;Pk
1439.980	46.9	V	74.0	-27.1	PK	325	2.0	RB 1 MHz;VB 3 MHz;Pk
7312.310	51.2	V	54.0	-2.8	AVG	213	1.4	RB 1 MHz;VB 10 Hz;Pk
7311.930	67.2	V	74.0	-6.8	PK	213	1.4	RB 1 MHz;VB 3 MHz;Pk
12183.670	46.9	V	54.0	-7.1	AVG	102	1.2	RB 1 MHz;VB 10 Hz;Pk
12184.200	59.2	V	74.0	-14.8	PK	102	1.2	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.Refer to RF port measurements for any significant emissions.
Note 3:	Scans made between 18 - 26GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2b: Center Channel @ 2437 MHz- 802.11n20 mode





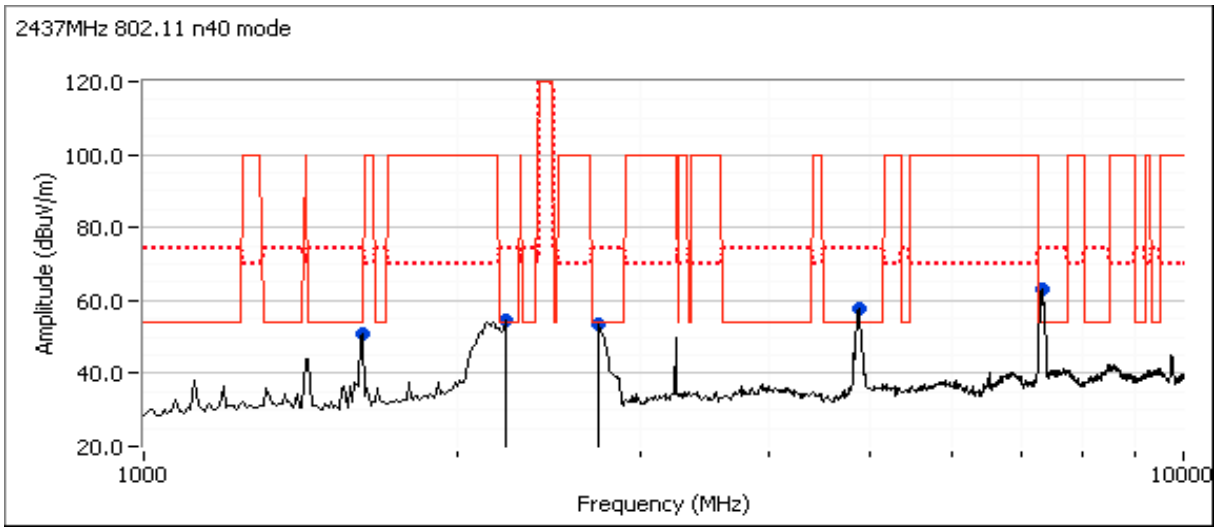
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

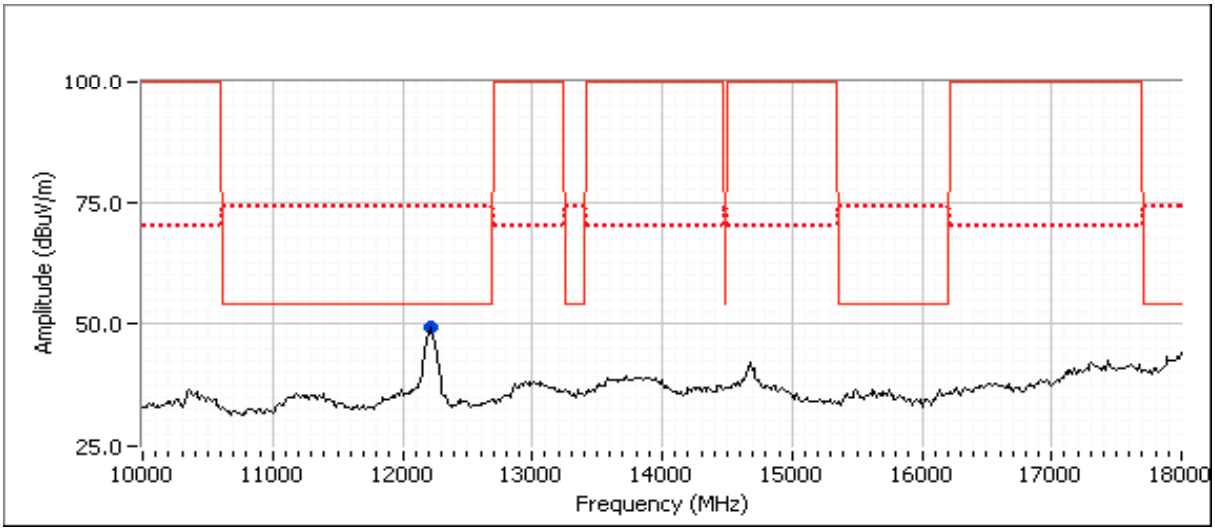
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7309.570	52.9	V	54.0	-1.1	AVG	212	1.3	RB 1 MHz;VB 10 Hz;Pk
7310.500	65.6	V	74.0	-8.4	PK	212	1.3	RB 1 MHz;VB 3 MHz;Pk
4873.460	52.7	V	54.0	-1.3	AVG	336	1.4	RB 1 MHz;VB 10 Hz;Pk
4872.460	63.1	V	74.0	-10.9	PK	336	1.4	RB 1 MHz;VB 3 MHz;Pk
1624.730	50.4	H	54.0	-3.6	AVG	132	1.3	RB 1 MHz;VB 10 Hz;Pk
1624.770	52.3	H	74.0	-21.7	PK	132	1.3	RB 1 MHz;VB 3 MHz;Pk
1440.040	44.0	V	54.0	-10.0	AVG	335	1.4	RB 1 MHz;VB 10 Hz;Pk
1440.100	46.8	V	74.0	-27.2	PK	335	1.4	RB 1 MHz;VB 3 MHz;Pk
2203.700	51.0	H	54.0	-3.0	AVG	130	1.0	RB 1 MHz;VB 10 Hz;Pk
2205.600	62.1	H	74.0	-11.9	PK	130	1.0	RB 1 MHz;VB 3 MHz;Pk
2700.470	51.0	H	54.0	-3.0	AVG	299	1.0	RB 1 MHz;VB 10 Hz;Pk
2700.350	49.5	H	74.0	-24.5	PK	299	1.0	RB 1 MHz;VB 3 MHz;Pk
12185.380	46.7	V	54.0	-7.3	AVG	62	1.2	RB 1 MHz;VB 10 Hz;Pk
12186.980	57.5	V	74.0	-16.5	PK	62	1.2	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Scans made between 18 - 26GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2c: Center Channel @ 2437 MHz- 802.11n40 mode





Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7301.200	52.3	V	54.0	-1.7	AVG	206	1.7	RB 1 MHz;VB 10 Hz;Pk
7304.140	65.7	V	74.0	-8.3	PK	206	1.7	RB 1 MHz;VB 3 MHz;Pk
1624.710	49.5	V	54.0	-4.5	AVG	77	1.5	RB 1 MHz;VB 10 Hz;Pk
1624.710	53.2	V	74.0	-20.8	PK	77	1.5	RB 1 MHz;VB 3 MHz;Pk
2208.530	50.7	H	54.0	-3.3	AVG	172	1.3	RB 1 MHz;VB 10 Hz;Pk
2210.000	63.1	H	74.0	-10.9	PK	172	1.3	RB 1 MHz;VB 3 MHz;Pk
2754.200	50.0	H	54.0	-4.0	AVG	302	1.0	RB 1 MHz;VB 10 Hz;Pk
2755.070	60.3	H	74.0	-13.7	PK	302	1.0	RB 1 MHz;VB 3 MHz;Pk
4872.930	50.7	V	54.0	-3.3	AVG	334	1.1	RB 1 MHz;VB 10 Hz;Pk
4872.860	61.4	V	74.0	-12.6	PK	334	1.1	RB 1 MHz;VB 3 MHz;Pk
12232.840	43.0	V	54.0	-11.0	AVG	100	1.2	RB 1 MHz;VB 10 Hz;Pk
12233.980	56.1	V	74.0	-17.9	PK	100	1.2	RB 1 MHz;VB 3 MHz;Pk

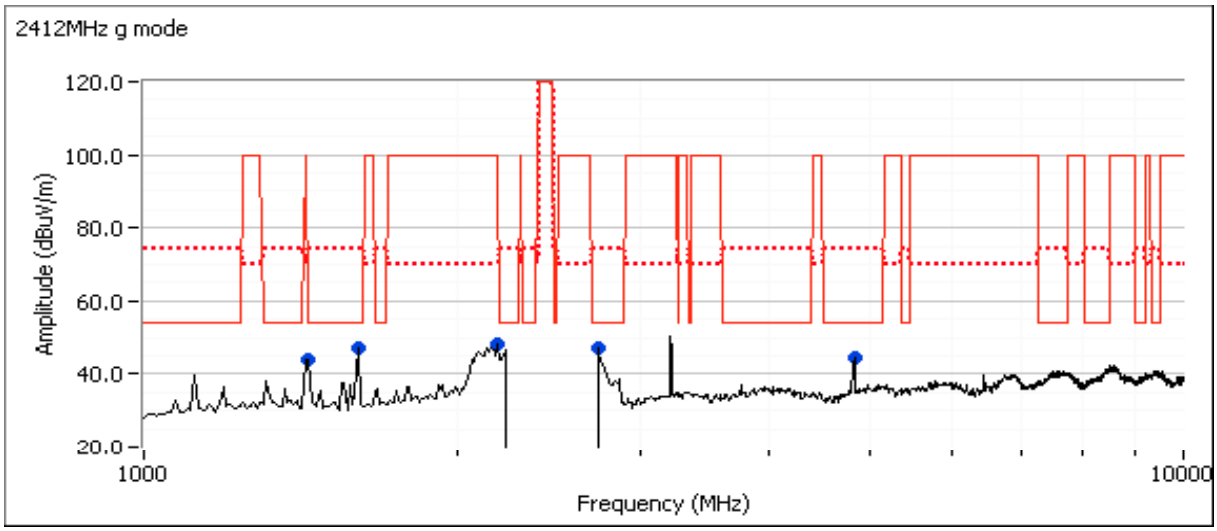
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Scans made between 18 - 26GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range

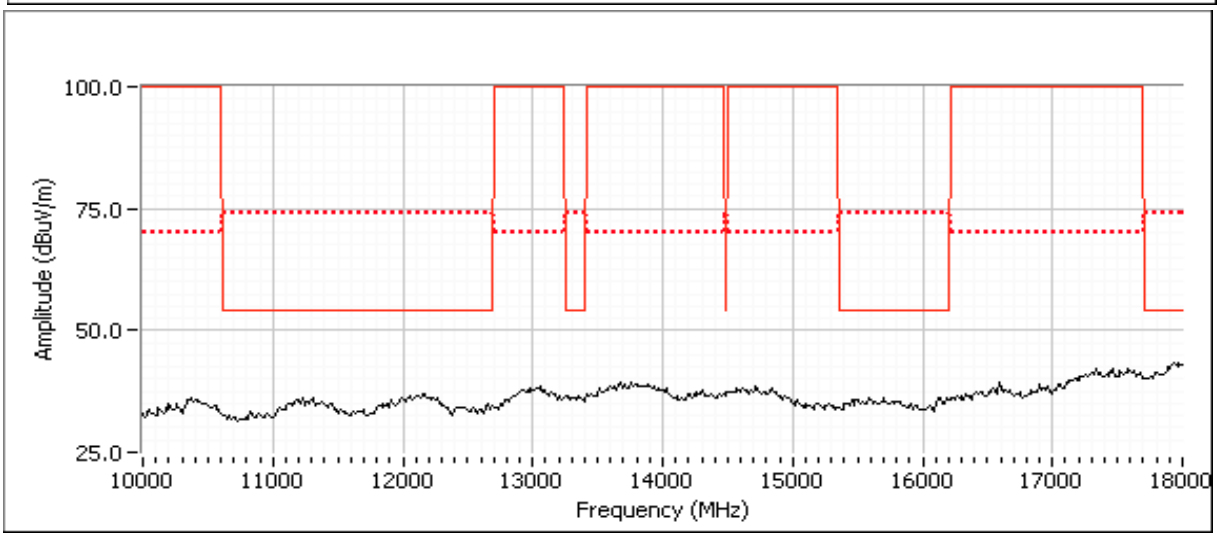
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #3: Radiated Spurious Emissions, 1000 - 26000 MHz. Operating Mode: Worst case from Run#2

Date of Test: 2/7/2012
Test Engineer: Jack Liu
Test Location: FT Chamber#7

Run #3a: Low Channel @ 2412 MHz- 802.11 g mode





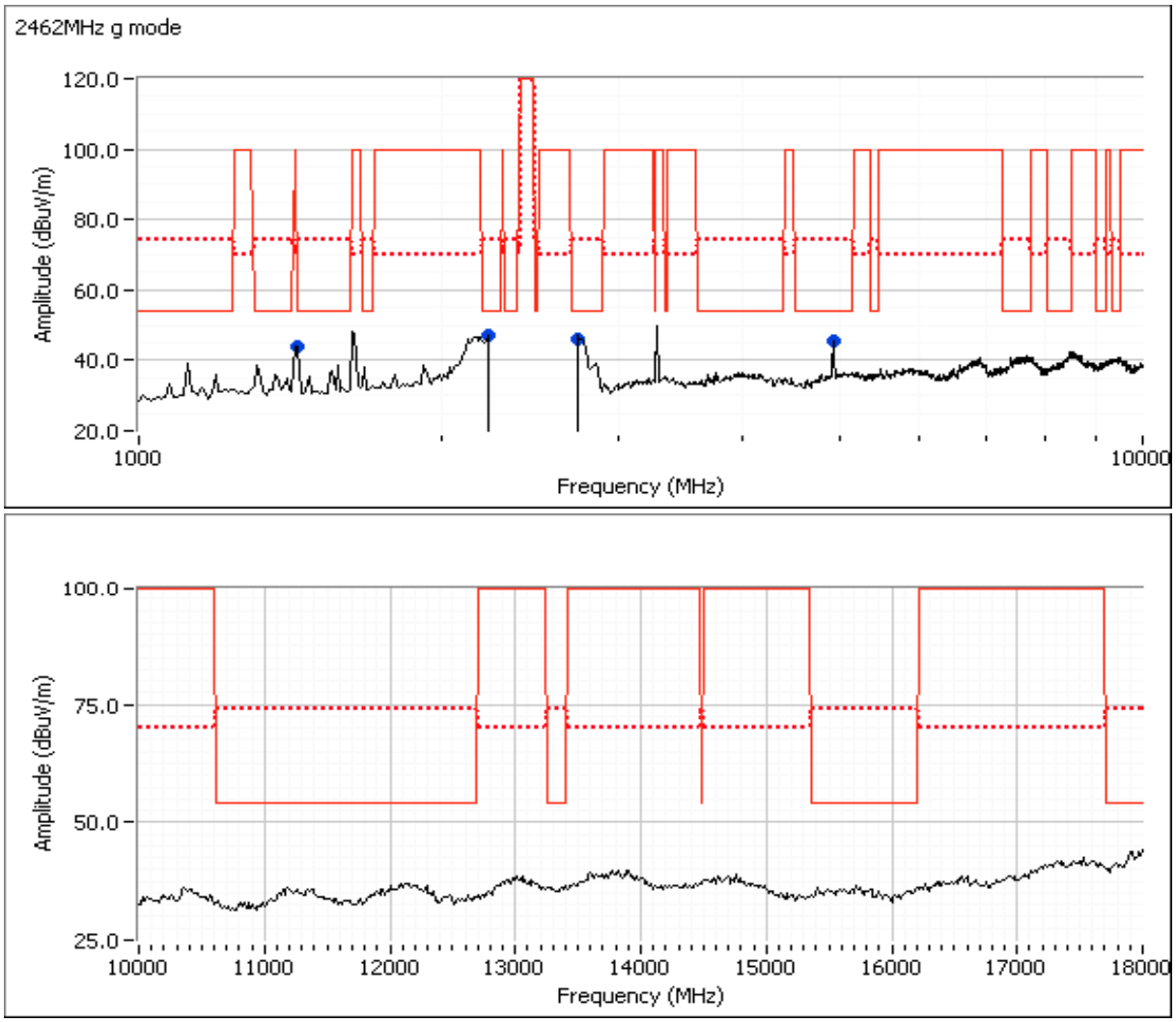
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1608.000	47.5	H	54.0	-6.5	AVG	124	1.4	RB 1 MHz;VB 10 Hz;Pk
1608.000	49.7	H	74.0	-24.3	PK	124	1.4	RB 1 MHz;VB 3 MHz;Pk
2200.040	46.1	H	54.0	-7.9	AVG	120	1.0	RB 1 MHz;VB 10 Hz;Pk
2200.080	54.9	H	74.0	-19.1	PK	120	1.0	RB 1 MHz;VB 3 MHz;Pk
2750.500	43.0	H	54.0	-11.0	AVG	247	1.3	RB 1 MHz;VB 10 Hz;Pk
2750.430	54.5	H	74.0	-19.5	PK	247	1.3	RB 1 MHz;VB 3 MHz;Pk
4825.430	44.5	V	54.0	-9.5	AVG	344	1.1	RB 1 MHz;VB 10 Hz;Pk
4825.300	57.1	V	74.0	-16.9	PK	344	1.1	RB 1 MHz;VB 3 MHz;Pk
1439.980	44.8	V	54.0	-9.2	AVG	339	1.4	RB 1 MHz;VB 10 Hz;Pk
1440.280	47.2	V	74.0	-26.8	PK	339	1.4	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #3b: High Channel @ 2462 MHz- 802.11 g mode



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2752.230	45.3	V	54.0	-8.7	AVG	190	1.2	RB 1 MHz;VB 10 Hz;Pk
2746.630	55.6	V	74.0	-18.4	PK	190	1.2	RB 1 MHz;VB 3 MHz;Pk
1440.000	45.0	V	54.0	-9.0	AVG	141	2.0	RB 1 MHz;VB 10 Hz;Pk
1439.870	47.2	V	74.0	-26.8	PK	141	2.0	RB 1 MHz;VB 3 MHz;Pk
4924.130	42.5	V	54.0	-11.5	AVG	249	1.4	RB 1 MHz;VB 10 Hz;Pk
4924.600	53.8	V	74.0	-20.2	PK	249	1.4	RB 1 MHz;VB 3 MHz;Pk
2208.400	45.2	H	54.0	-8.8	AVG	118	1.0	RB 1 MHz;VB 10 Hz;Pk
2232.930	55.8	H	74.0	-18.2	PK	118	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247/15.E Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT .

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20.4 °C
Rel. Humidity: 35 %

Summary of Results - Device Operating in the 2400-2483.5 MHz and 5725 - 5850 Bands

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11g & 802.11a	2412MHz & 5745MHz	-	-	Radiated Emissions, 1 - 18 GHz	FCC Part 15.209 / 15.247(c)	48.9 dBµV/m @ 1608.1 MHz (-5.1 dB)
			-	-			
1b	802.11g & 802.11a	2462MHz & 5825MHz	-	-	Radiated Emissions, 1 - 18 GHz	FCC Part 15.209 / 15.247(c)	47.2 dBµV/m @ 3282.8 MHz (-6.8 dB)
			-	-		FCC Part 15.209 / 15.247(c)	

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Notes

Testing performed with 2.4 and 5GHz transmitting simultaneously. Channels/bands selected based on highest output power. No radio related emissions detected below 1GHz.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

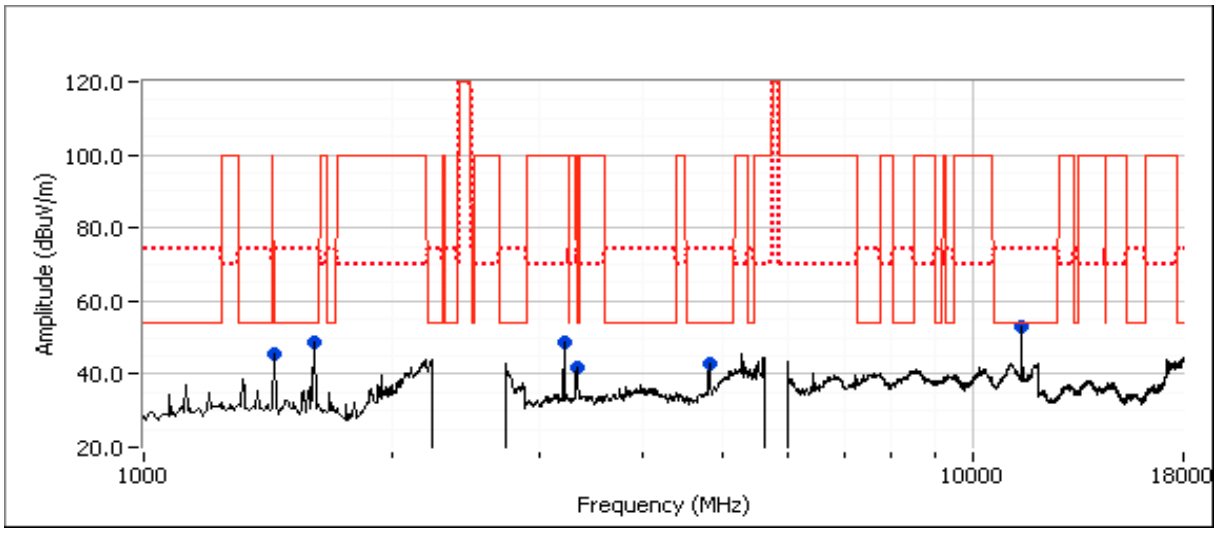
Run #1: Radiated Spurious Emissions, 1000 - 18,000 MHz. Operating Mode: 802.11g and 802.11a

Date of Test: 2/10/2012
Test Engineer: Rafael Varelas
Test Location: FT7

Run #1a: Low Channel 2412 MHz for 802.11g mode and Low Channel 5745 MHz for 802.11a mode

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1608.050	48.9	H	54.0	-5.1	AVG	39	1.0	RB 1 MHz;VB 10 Hz;Pk
1608.040	50.9	H	74.0	-23.1	PK	39	1.0	RB 1 MHz;VB 3 MHz;Pk
3332.950	39.1	H	54.0	-14.9	AVG	308	1.0	RB 1 MHz;VB 10 Hz;Pk
3333.530	50.7	H	74.0	-23.3	PK	308	1.0	RB 1 MHz;VB 3 MHz;Pk
1440.020	45.0	V	54.0	-9.0	AVG	242	1.0	RB 1 MHz;VB 10 Hz;Pk
1439.980	47.5	V	74.0	-26.5	PK	242	1.0	RB 1 MHz;VB 3 MHz;Pk
3216.130	48.8	V	54.0	-5.2	Peak	258	1.0	Note 2
4821.290	38.4	V	54.0	-15.6	AVG	137	1.0	RB 1 MHz;VB 10 Hz;Pk
4820.820	50.2	V	74.0	-23.8	PK	137	1.0	RB 1 MHz;VB 3 MHz;Pk
11469.710	35.2	V	54.0	-18.8	AVG	54	1.6	RB 1 MHz;VB 10 Hz;Pk
11471.640	45.1	V	74.0	-28.9	PK	54	1.6	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

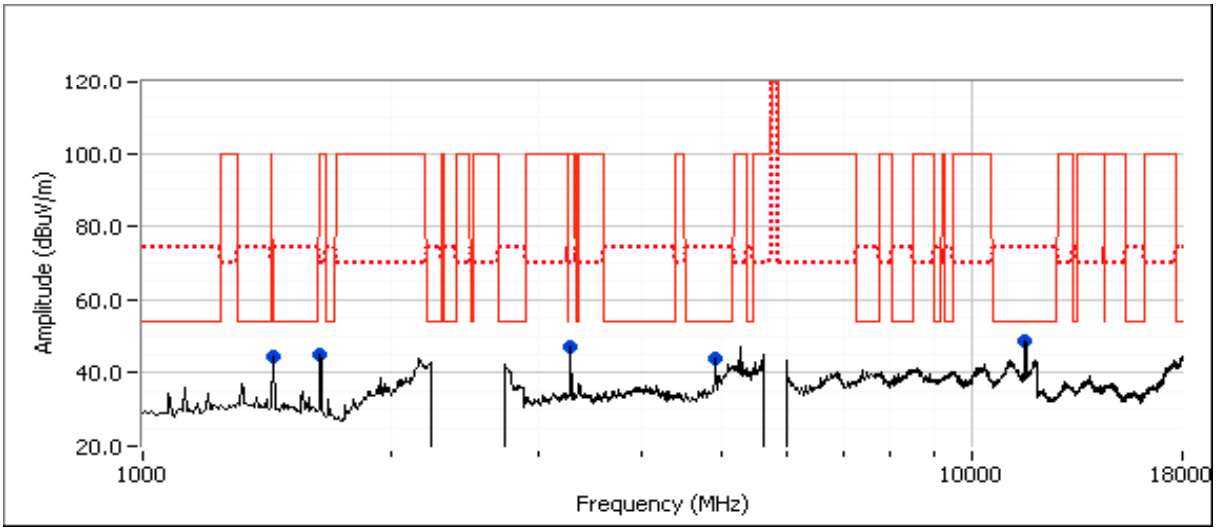


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1b: High Channel 2462 MHz for 802.11g mode and High Channel 5825 MHz for 802.11a mode

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
3282.780	47.2	V	54.0	-6.8	PK	234	1.0	Note 1
11649.640	42.6	V	54.0	-11.4	AVG	12	1.2	RB 1 MHz;VB 10 Hz;Pk
11655.240	44.3	V	74.0	-29.7	PK	12	1.2	RB 1 MHz;VB 3 MHz;Pk
4926.100	41.8	V	54.0	-12.2	AVG	166	1.4	RB 1 MHz;VB 10 Hz;Pk
4927.630	53.6	V	74.0	-20.4	PK	166	1.4	RB 1 MHz;VB 3 MHz;Pk
1641.400	45.6	H	54.0	-8.4	PK	40	1.0	Note 1
1439.990	43.4	V	54.0	-10.6	AVG	238	1.0	RB 1 MHz;VB 10 Hz;Pk
1440.150	46.4	V	74.0	-27.6	PK	238	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements
MIMO and Smart Antenna Systems
Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/2/2012
Test Engineer: Rafael Varelas
Test Location: FT4

Config. Used: 1
Config Change: None
EUT Voltage: POE

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 20.3 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
Chain A + B + C				
1	Output Power	15.247(b)	Pass	802.11b: 18.0 dBm
2	Power spectral Density (PSD)	15.247(d)	Pass	802.11b: -4.7dBm/3kHz
3	Minimum 6dB Bandwidth	15.247(a)	Pass	802.11b: 10.1 MHz
3	99% Bandwidth	RSS GEN	Pass	802.11b: 14.4 MHz
4	Spurious emissions	15.247(b)	Pass	All emissions below the -30dBc limit

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Test Note: The Out of band spurious emissions plots were taken with a single 2.4GHz radio and also with both 2.4GHz/5GHz radios transmitting

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1a: Output Power - Chain A + B + C

Operating Mode: 802.11b

Transmitted signal on chain is coherent ? Yes

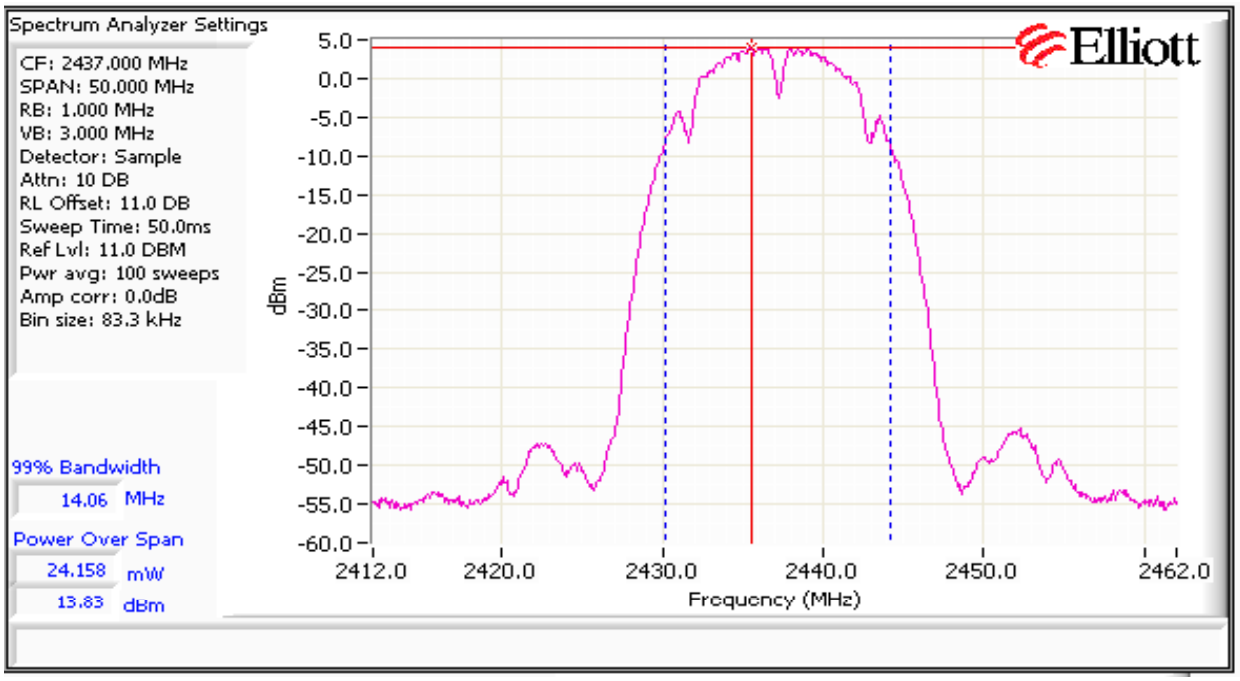
2412 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	12.2	10.8	12.8		16.8 dBm	0.048 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	16.2	14.78	16.8		25.5 dBm	0.359 W		

2437 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	13.8	12.2	13.4		18.0 dBm	0.062 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	17.8	16.2	17.4		26.7 dBm	0.471 W		

2462 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	13.6	12.1	13.0		17.7 dBm	0.059 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	17.6	16.1	17		26.5 dBm	0.445 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

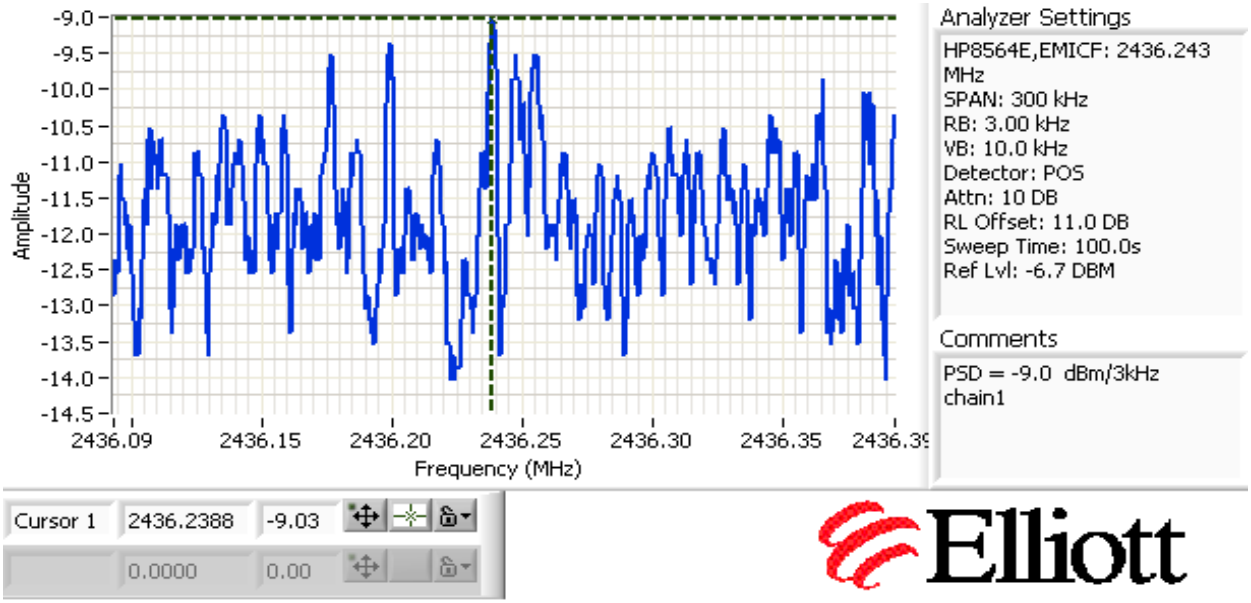


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2: Power spectral Density
802.11b

Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1 Chain 1	Chain 2	Chain 3	Chain 4	Total	Limit dBm/3kHz	Result
6	2412	-11.2	-12.7	-9.7		-6.3	8.0	Pass
7	2437	-9.0	-10.5	-9.2		-4.7	8.0	Pass
6	2462	-9.2	-10.5	-9.7		-5.0	8.0	Pass

Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.

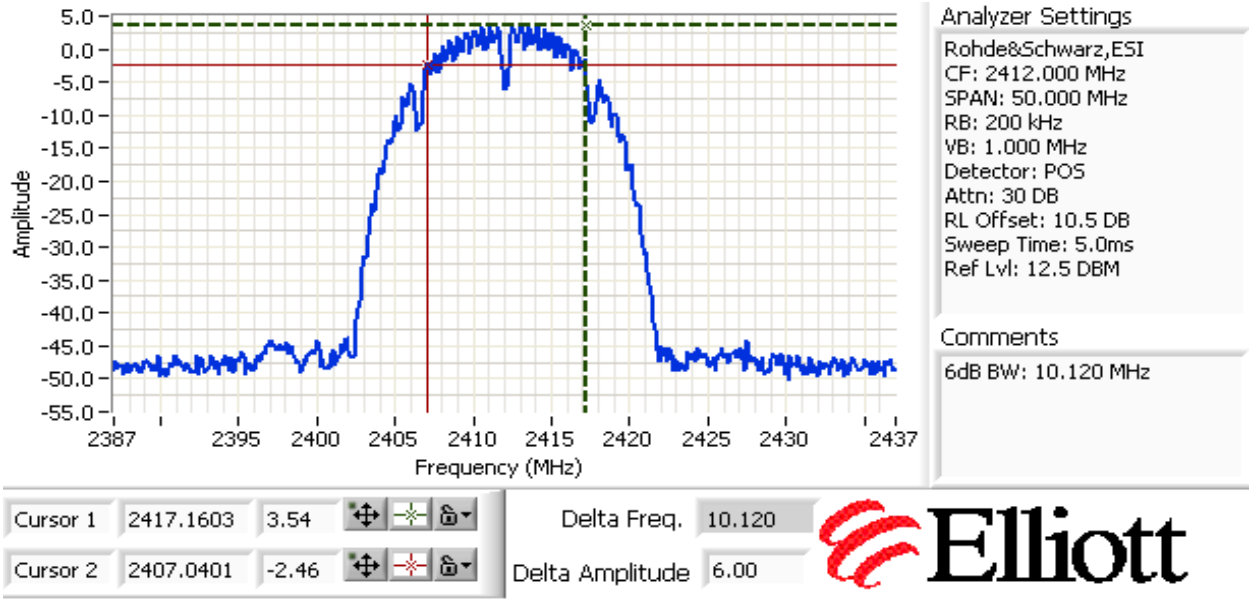


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #3: Signal Bandwidth
802.11b

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	Bandwidth (MHz) 99%	Comments
-	2412	200kHz	10.1	14.0	See power plots for 99% bandwidth measurement (RB=1MHz, VB=3MHz)
-	2437	200kHz	10.1	14.2	
-	2462	200kHz	10.2	14.4	

Note 1:	Measured on a single chain
Note 2:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #4: Out of Band Spurious Emissions
Mode: 802.11b

Power Setting Per Chain				Frequency (MHz)	Limit	Result
#1	#2	#3	#4			
-	-	-		2412	-30	Pass
-	-	-		2437	-30	Pass
-	-	-		2462	-30	Pass

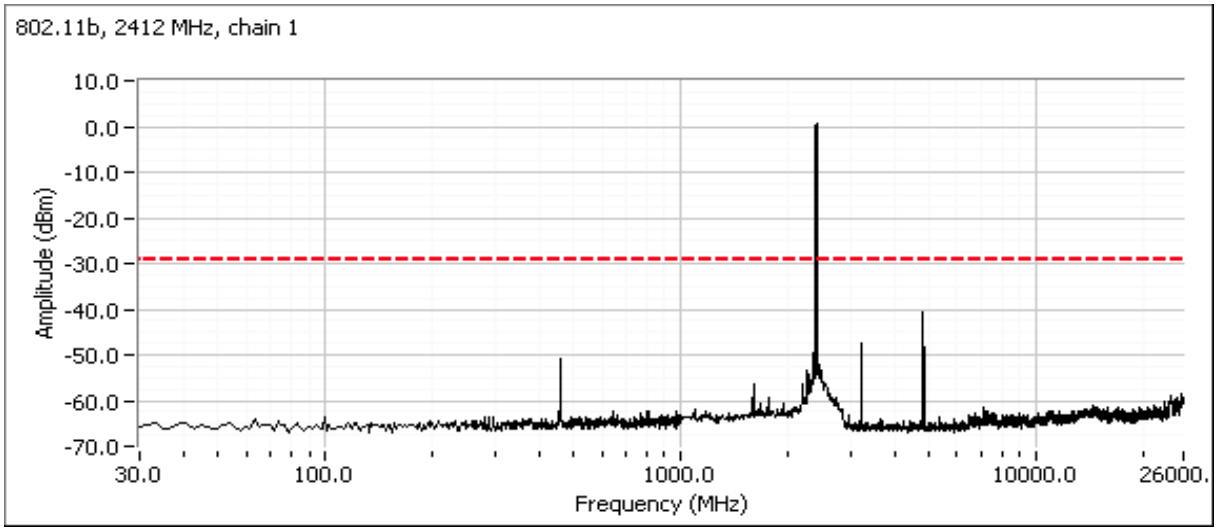
Note 1:	Measured on each chain individually

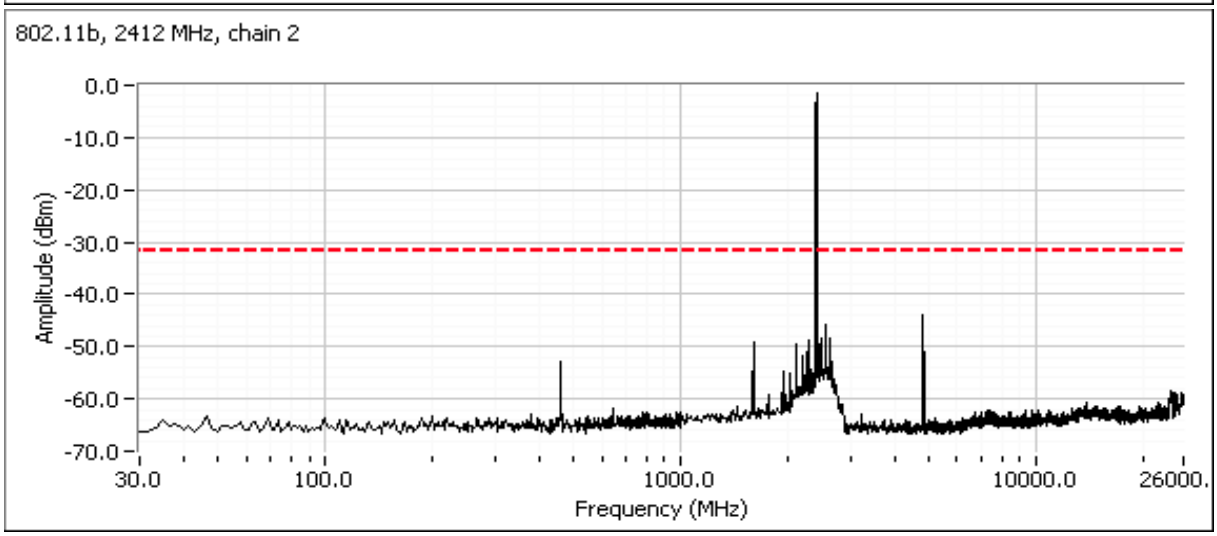
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

802.11b

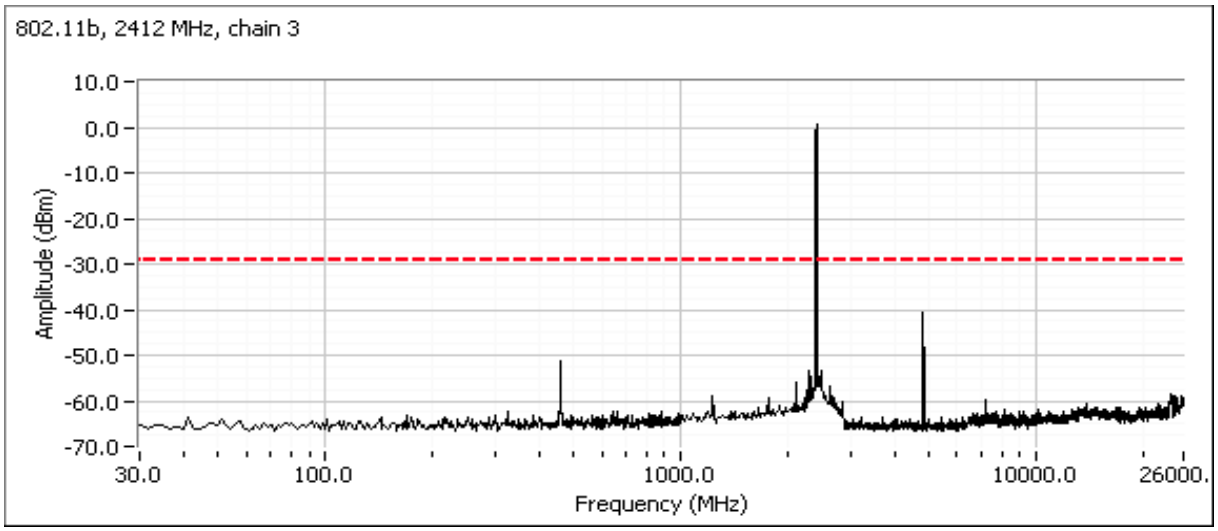
Plots for low channel, power setting(s) = 6

2GHz Tx only

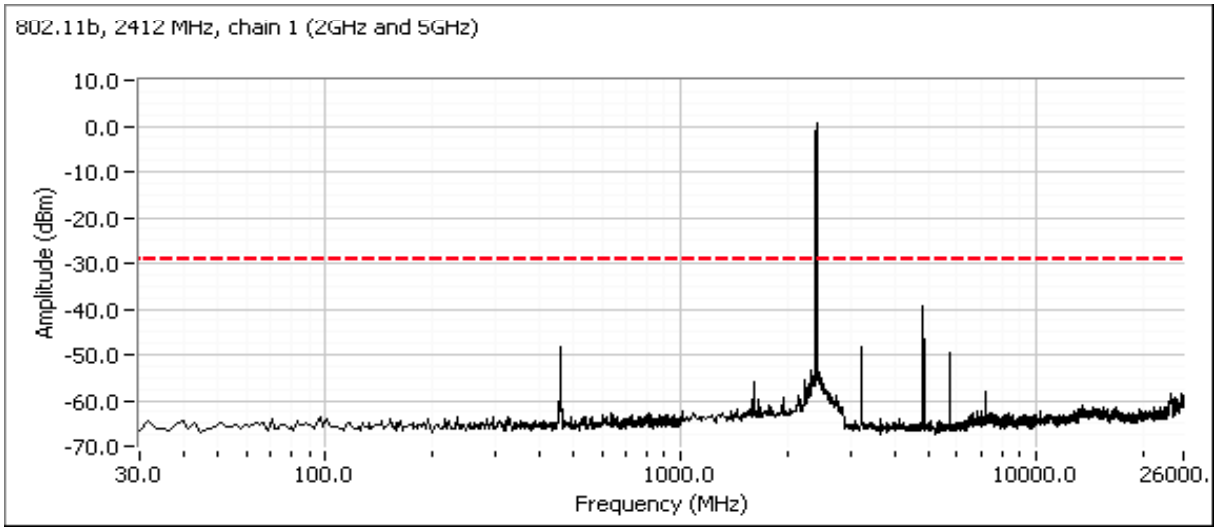




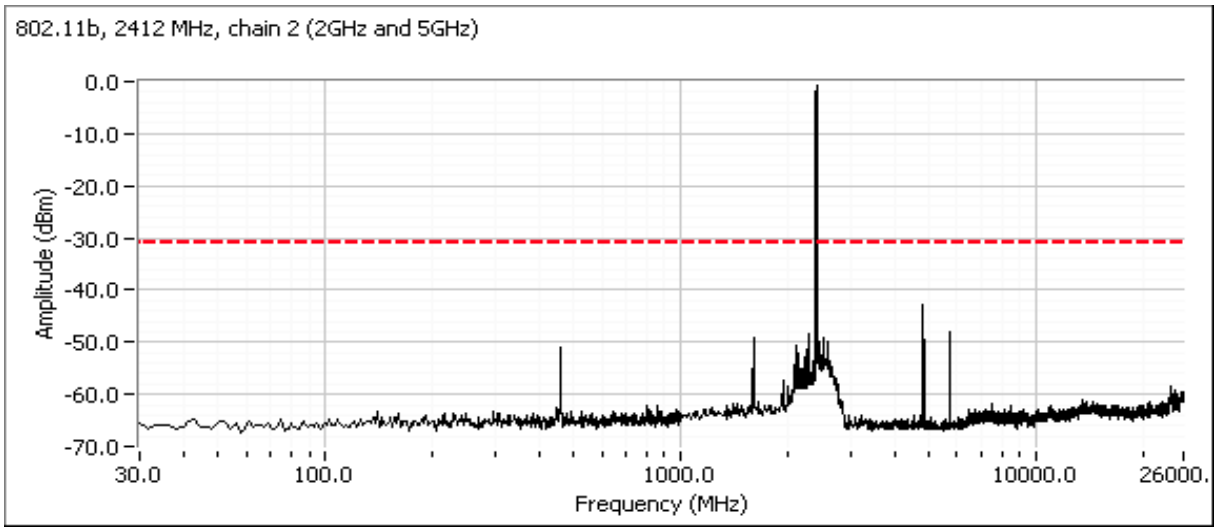
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

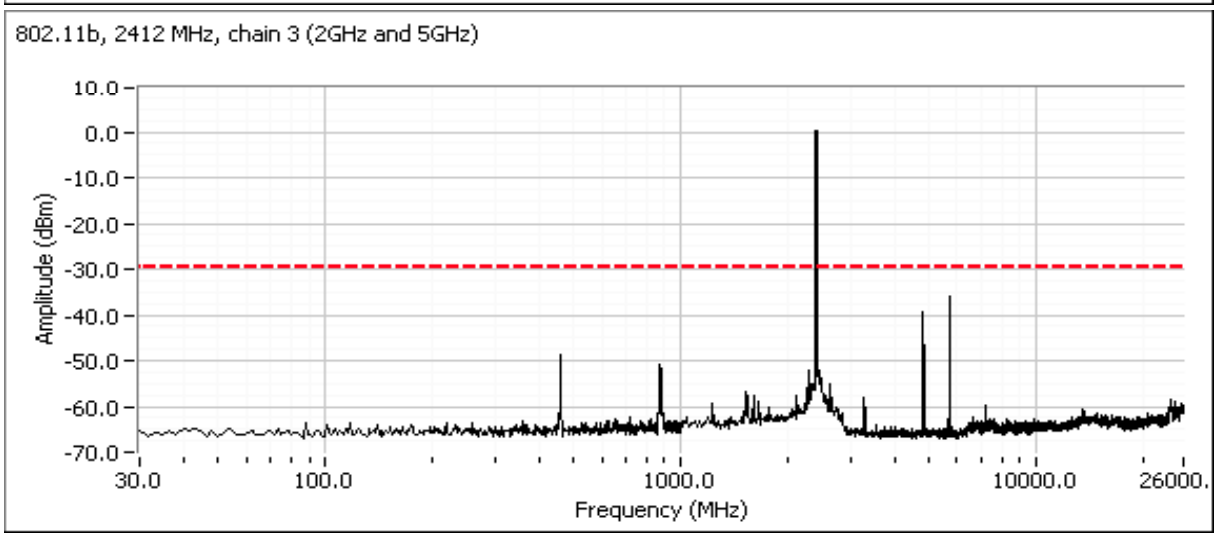


2GHz Tx and 5GHz Tx Plot (Simultaneous)



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

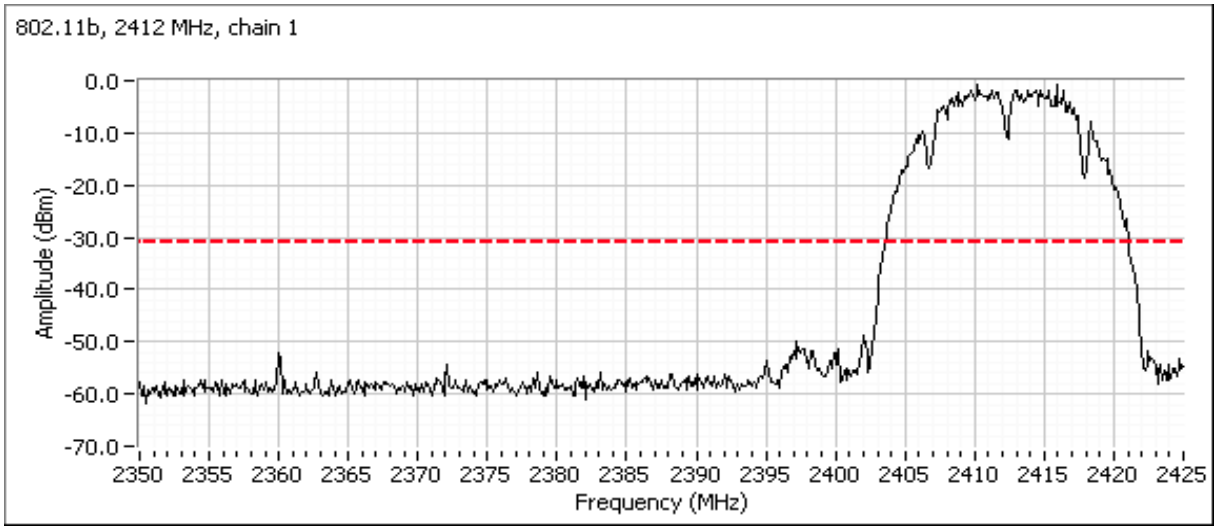


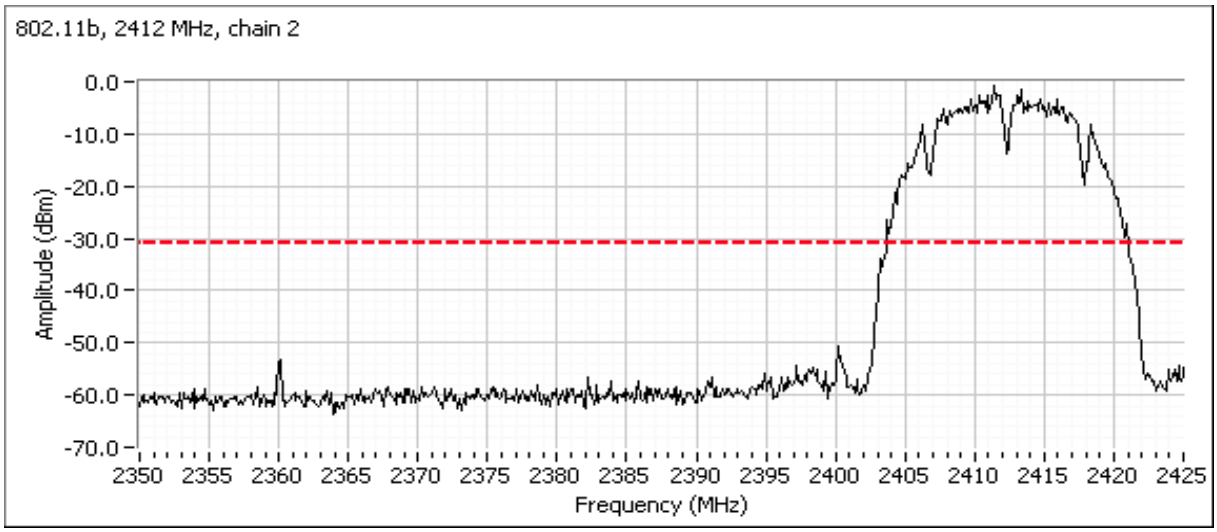


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

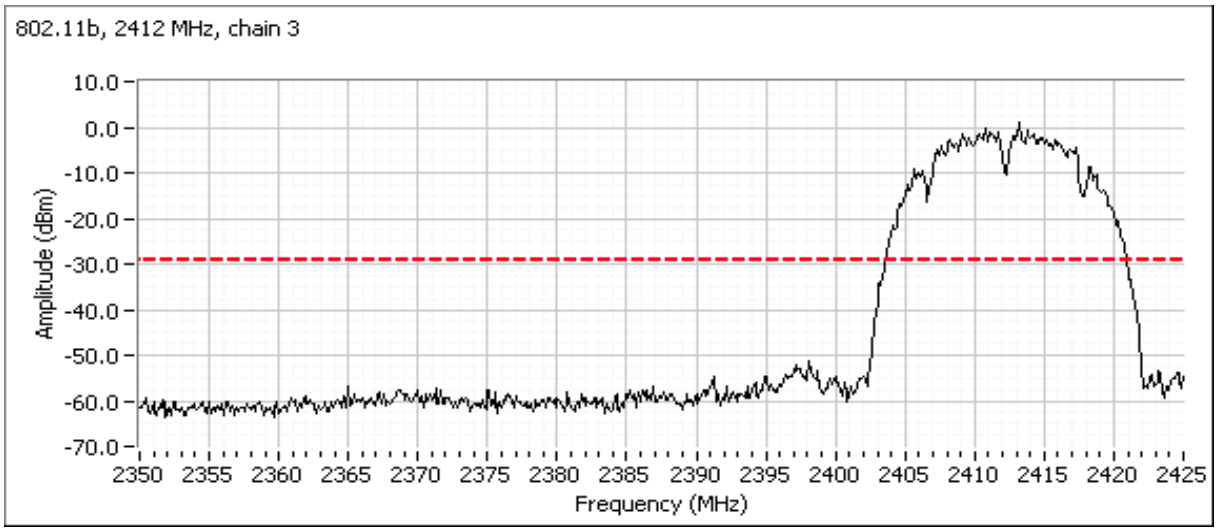
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

2GHz Tx only

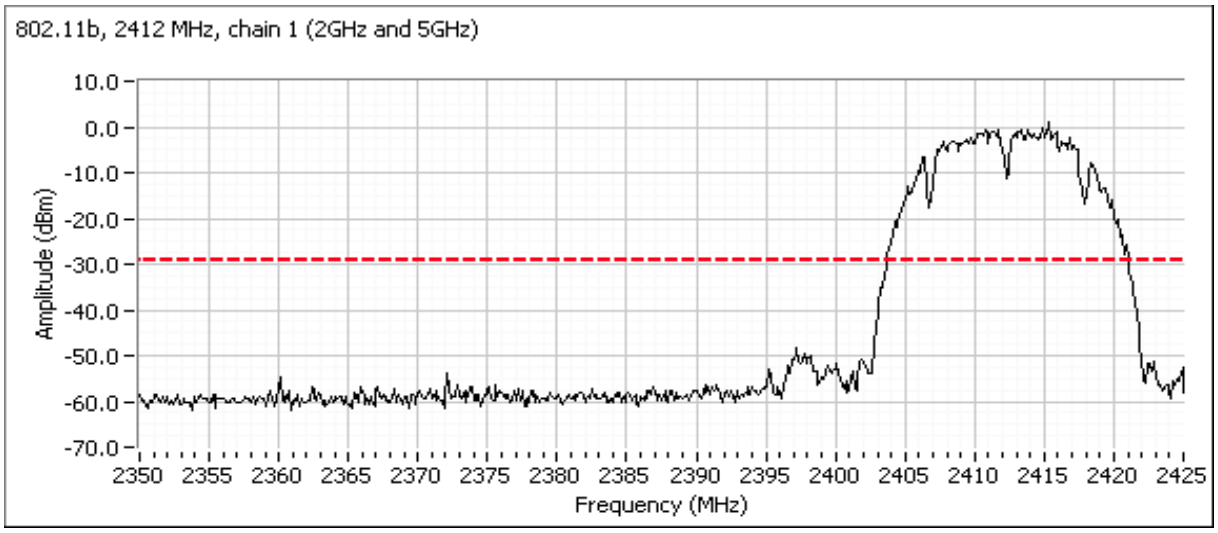




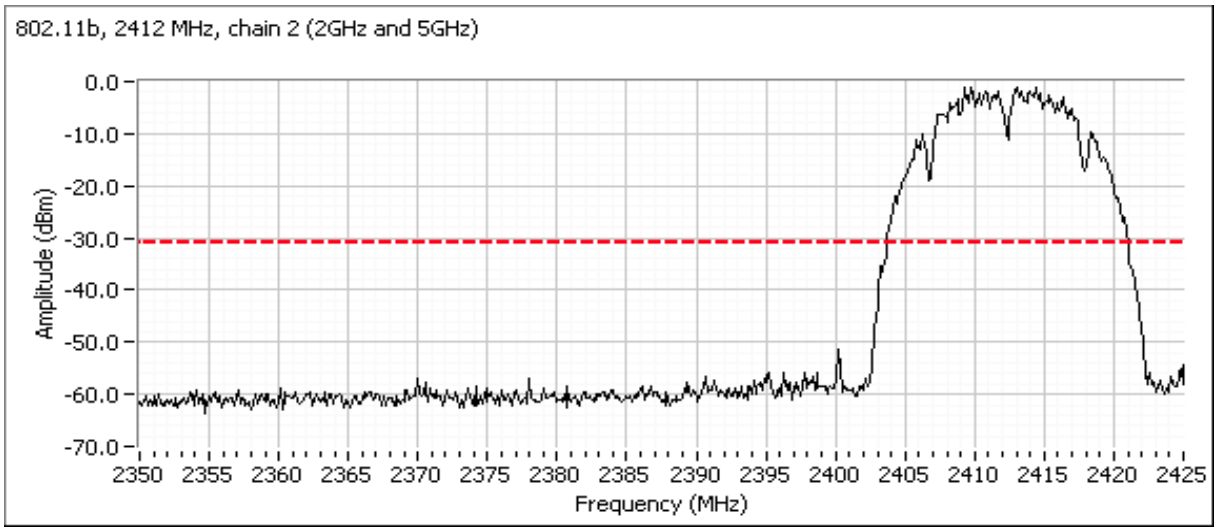
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

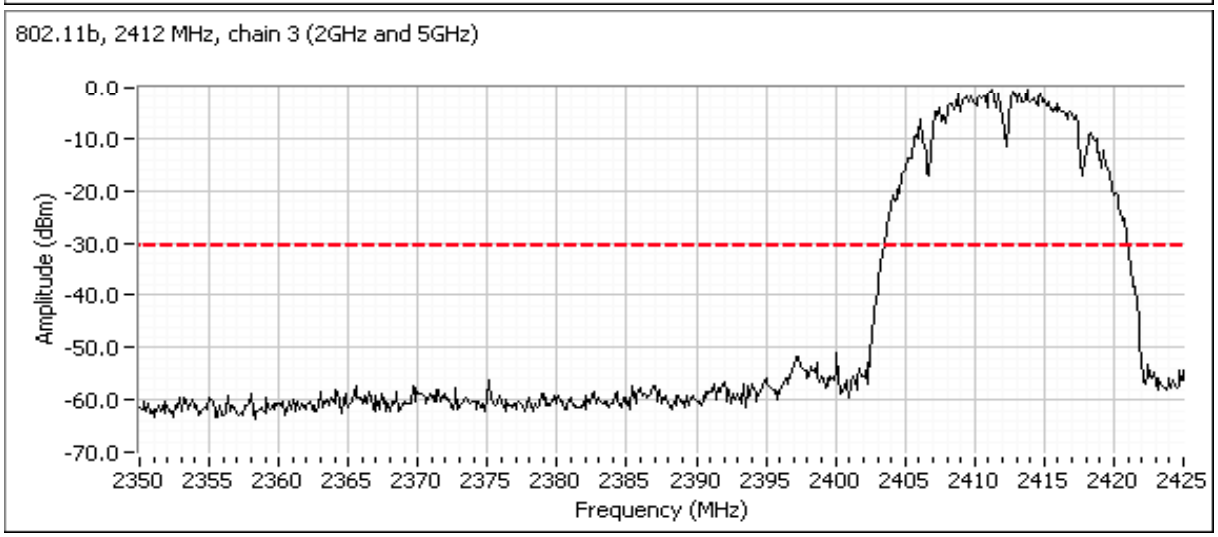


2GHz Tx and 5GHz Tx Plot (Simultaneous)



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

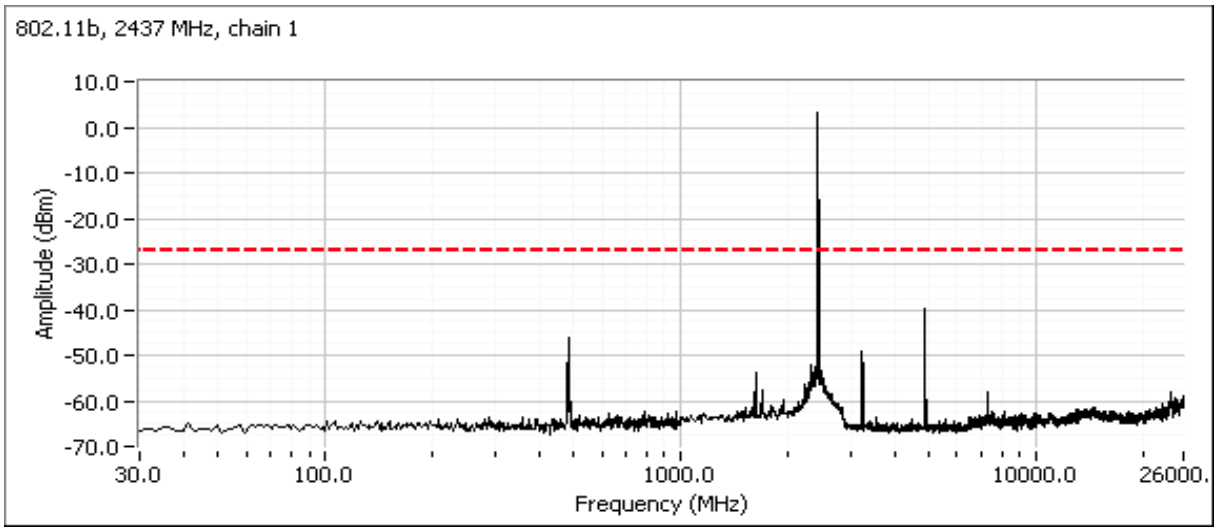


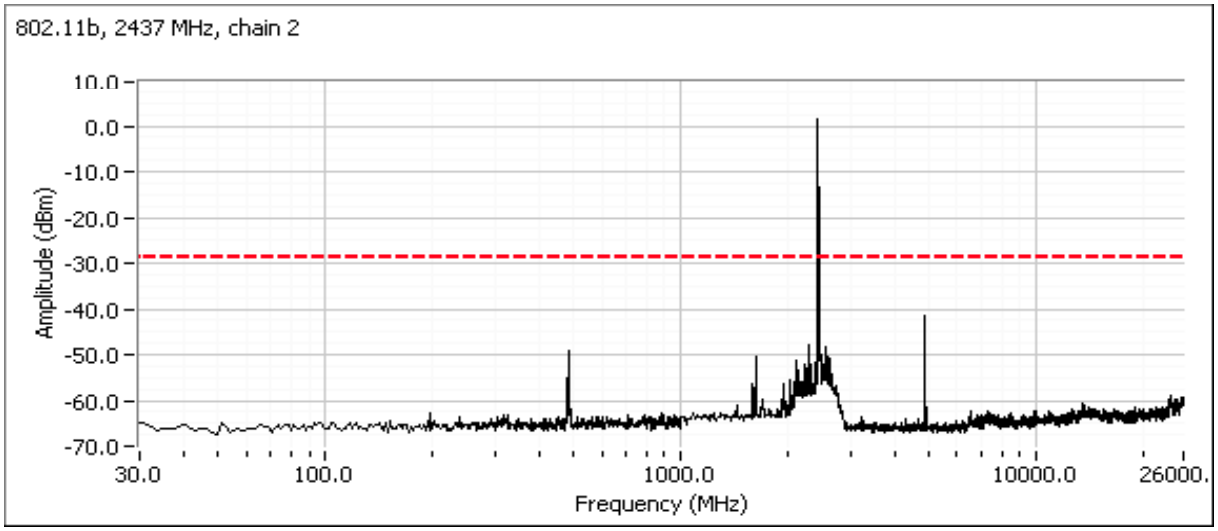


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

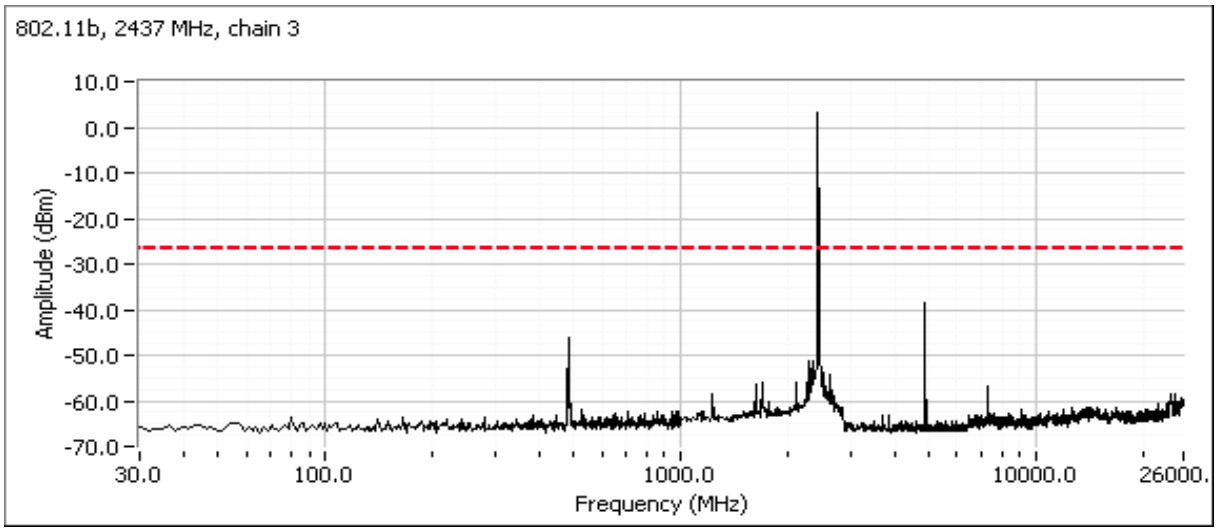
Plots for center channel, power setting(s) = 7

2GHz Tx only

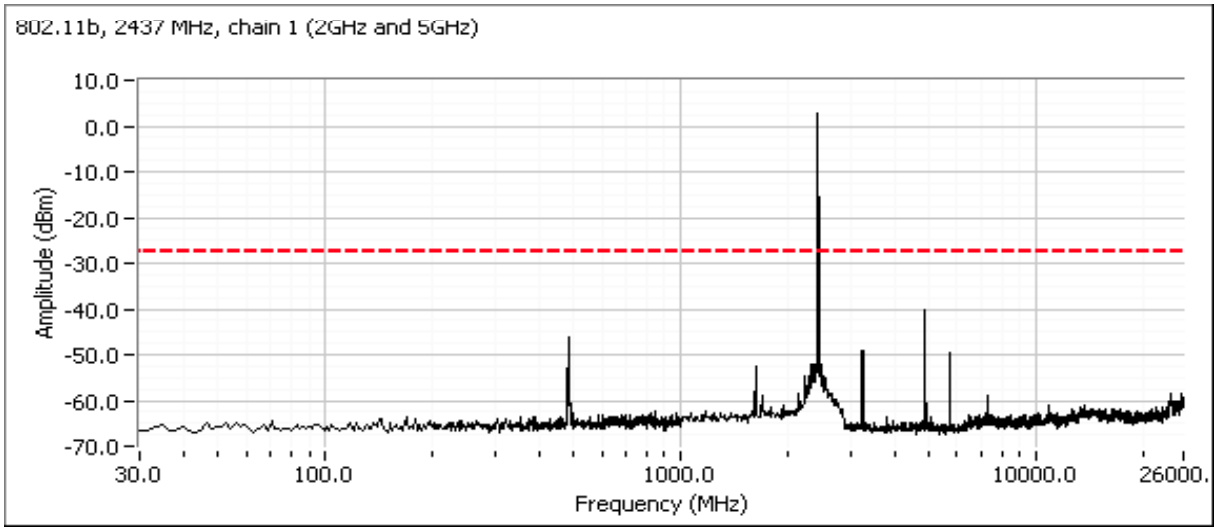




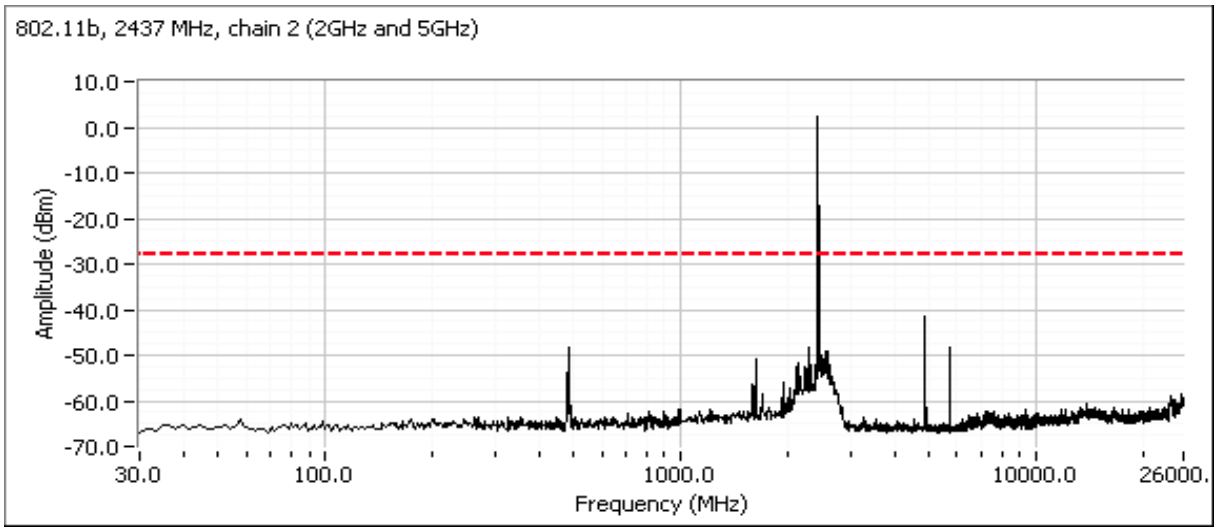
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

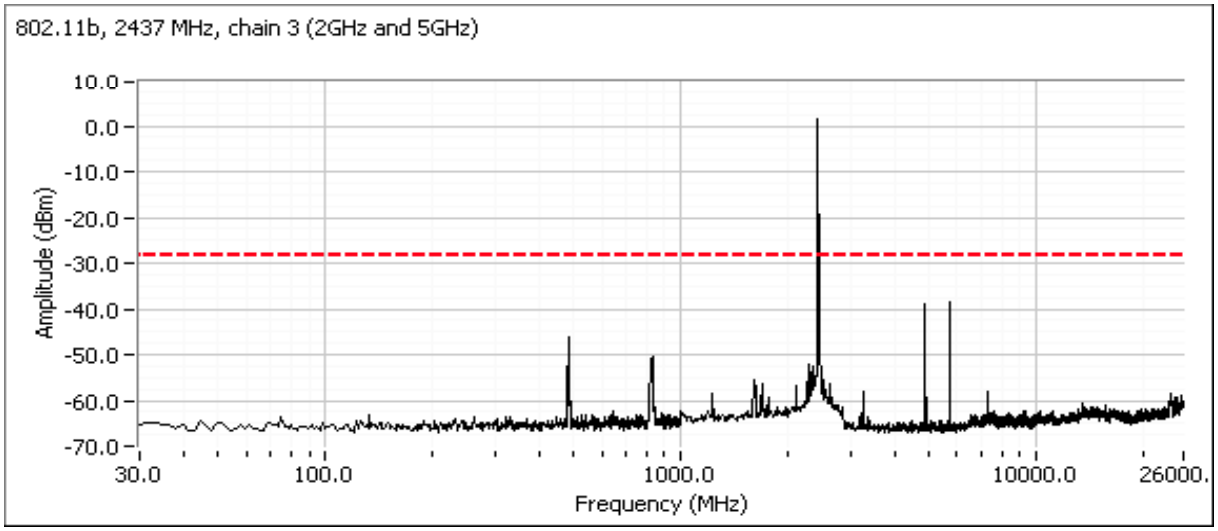


2GHz Tx and 5GHz Tx Plot (Simultaneous)



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

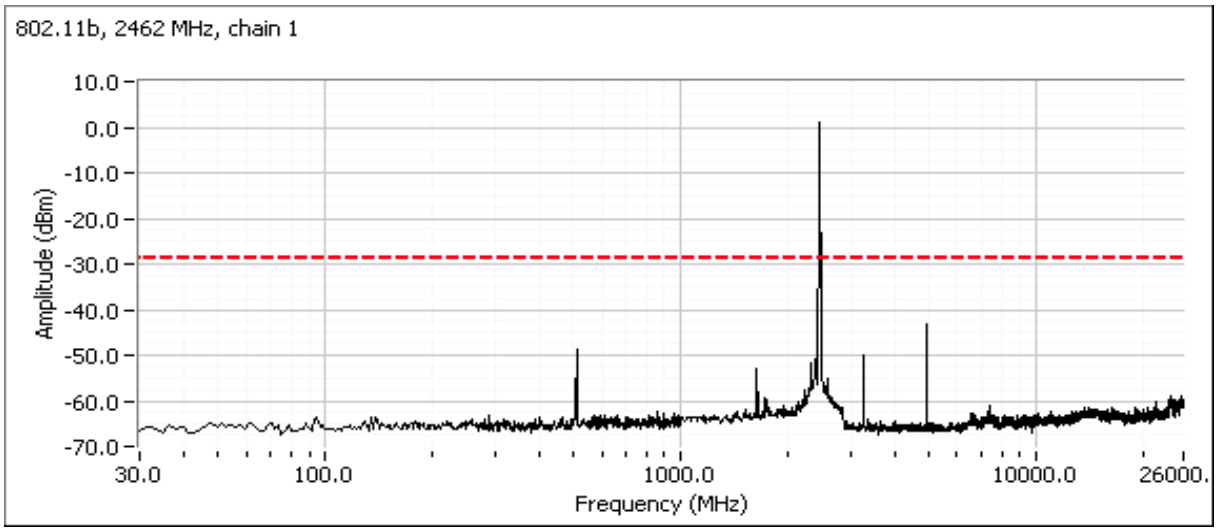


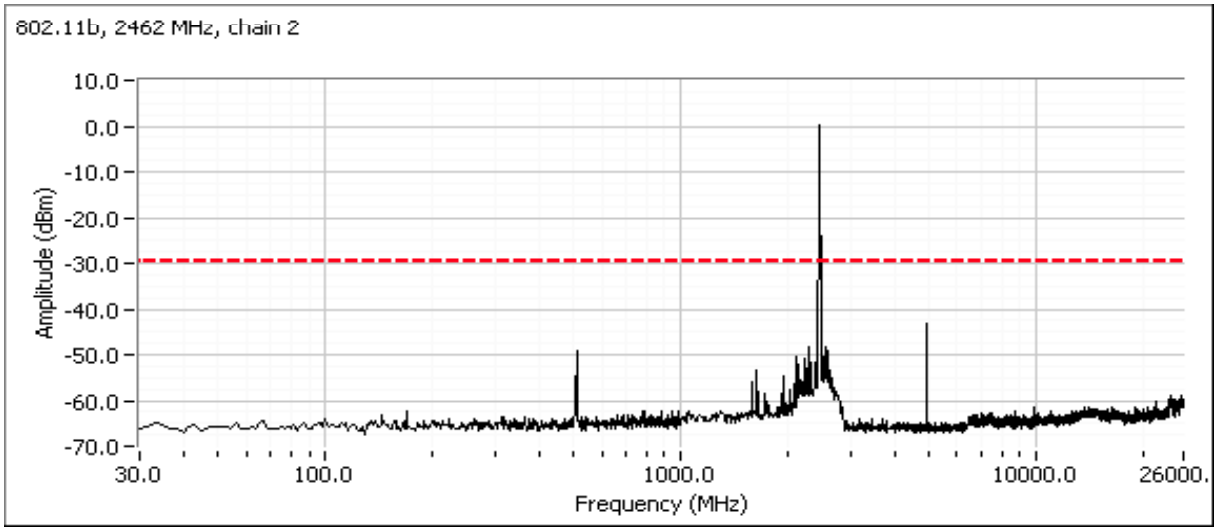


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

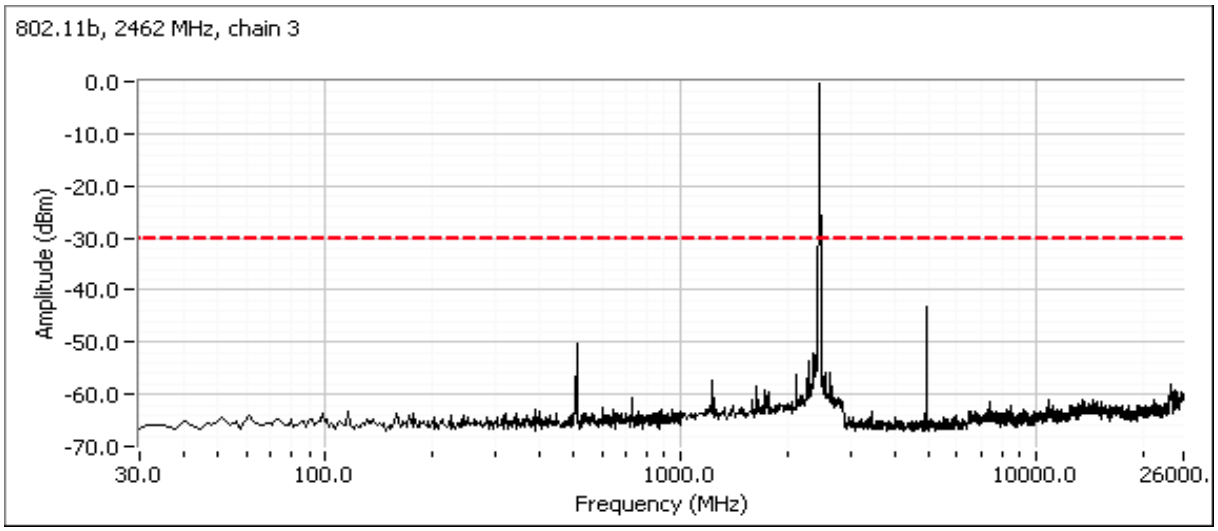
Plots for high channel, power setting(s) = 6

2GHz Tx only

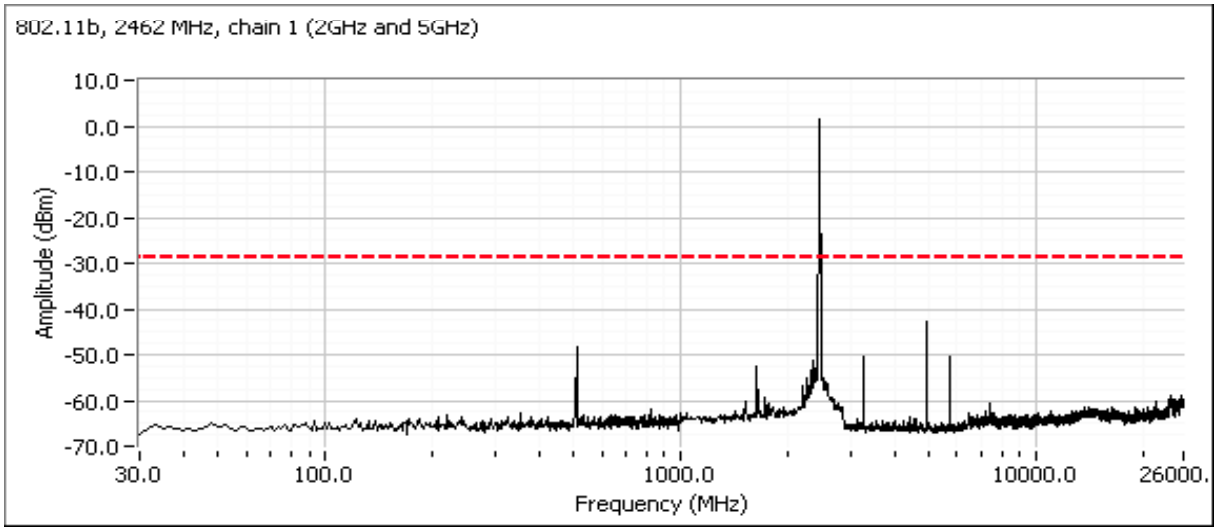




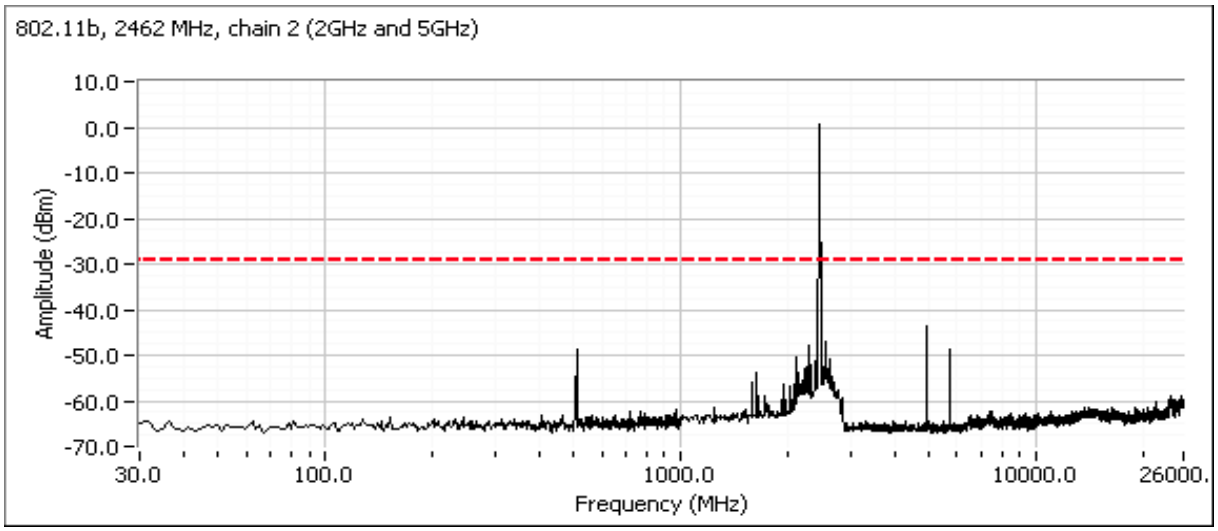
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

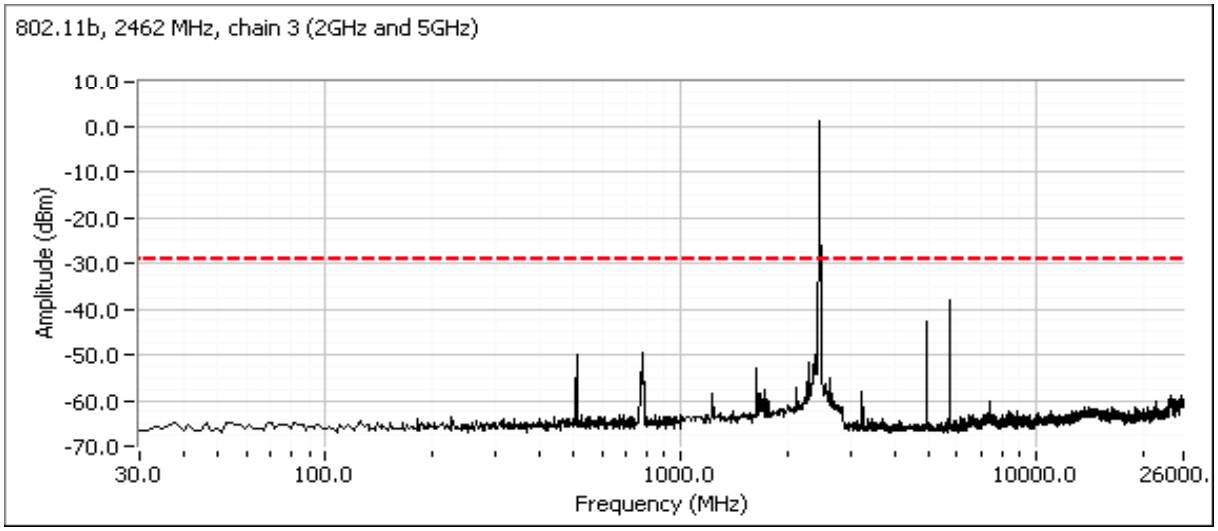


2GHz Tx and 5GHz Tx Plot (Simultaneous)



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A





Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements
MIMO and Smart Antenna Systems
Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/10/2012&2/13/2012
Test Engineer: Rafael Varelas/Jack Liu
Test Location: FT7/FT5

Config. Used: 1
Config Change: None
EUT Voltage: POE

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 20.3 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
Chain A + B + C				
1	Output Power	15.247(b)	Pass	802.11g: 17.2 dBm 802.11n20: 18.2 dBm 802.11n40: 11.7 dBm
2	Power spectral Density (PSD)	15.247(d)	Pass	802.11g: 3.0 dBm/3kHz n20: 1.3 dBm/3kHz n40: -0.8 dBm/3kHz
3	Minimum 6dB Bandwidth	15.247(a)	Pass	802.11g: 16.23 MHz 802.11n20: 17.44 MHz 802.11n40: 36.55 MHz

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

3	99% Bandwidth	RSS GEN	Pass	802.11g: 17.1 MHz 802.11n20: 18.16 MHz 802.11n40: 36.64 MHz
4	Spurious emissions	15.247(b)	Pass	All emissions below the -30dBc limit

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Testing Notes:

Center channel power results are located on a separate data sheet.

PSD, BW, and Spurious emissions testing on the center channel was performed using a higher output power setting then the final power setting. This represents a worse case condition.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1b: Output Power - Chain A + B + C

Operating Mode: 802.11g

Transmitted signal on chain is coherent ? Yes

2412 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	11.4	9.94	12.2		16.0 dBm	0.040 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	15.4	13.94	16.2		24.8 dBm	0.303 W		

2462 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	12.9	12.3	12.2		17.2 dBm	0.053 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	16.9	16.3	16.2		26.0 dBm	0.400 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1c: Output Power - Chain A + B + C

Operating Mode: 802.11n20

Transmitted signal on chain is coherent ? Yes

2412 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	13.75	12.04	14.23		18.2 dBm	0.066 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	17.75	16.04	18.23		27.0 dBm	0.499 W		

2462 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	13.28	11.98	12.74		17.5 dBm	0.056 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	17.28	15.98	16.74		26.2 dBm	0.421 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1d: Output Power - Chain A + B + C

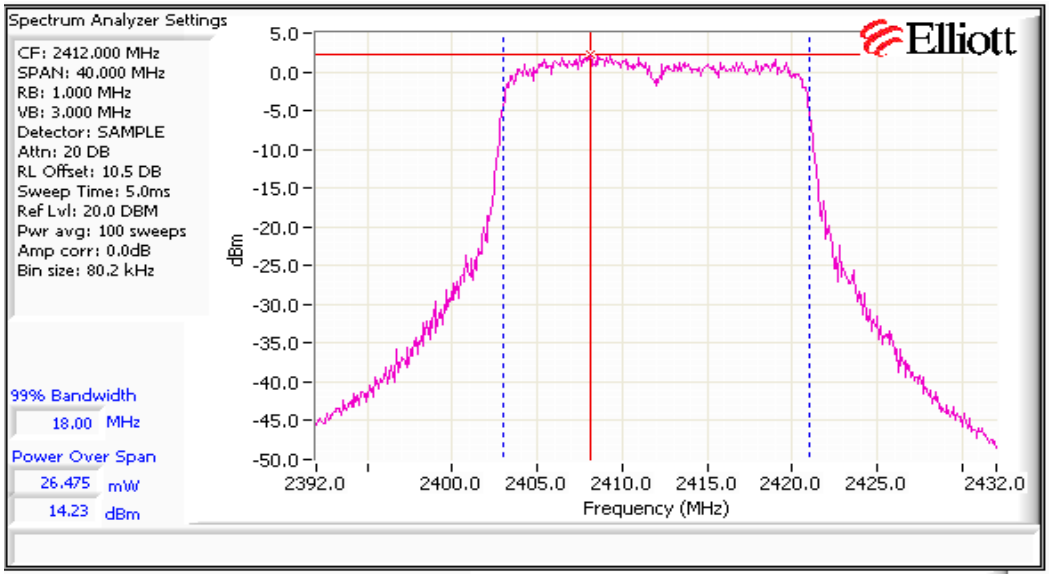
Operating Mode: 802.11n40

Transmitted signal on chain is coherent ? Yes

2422 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	6.93	5.4	7.05		11.3 dBm	0.013 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	10.93	9.4	11.05		20.1 dBm	0.101 W		

2452 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	7.03	6.16	7.47		11.7 dBm	0.015 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	11.03	10.16	11.47		20.5 dBm	0.111 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2: Power spectral Density

802.11g

Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1 Chain 1	Chain 2	Chain 3	Chain 4	Total	Limit dBm/3kHz	Result
-	2412	-12.8	-14.6	-10.9		-7.8	8.0	Pass
-	2437	-1.3	-4.0	-0.8		3.0	8.0	Pass
-	2462	-11.8	-13.1	-11.3		-7.2	8.0	Pass

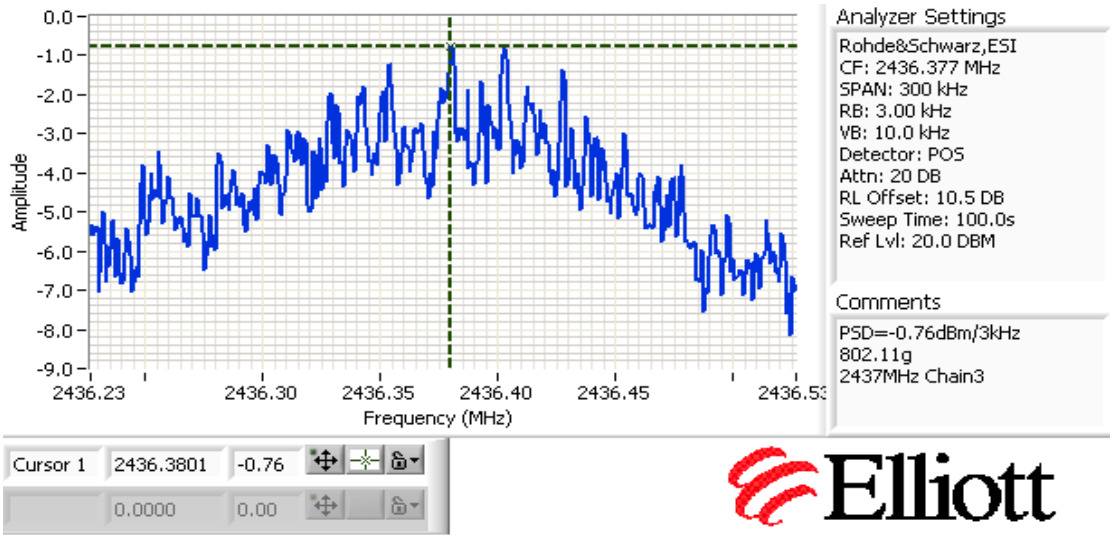
802.11n20

Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1 Chain 1	Chain 2	Chain 3	Chain 4	Total	Limit dBm/3kHz	Result
-	2412	-11.5	-13.6	-10.9		-7.1	8.0	Pass
-	2437	-3.3	-5.4	-2.2		1.3	8.0	Pass
-	2462	-12.6	-13.3	-13.5		-8.3	8.0	Pass

802.11n40

Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1 Chain 1	Chain 2	Chain 3	Chain 4	Total	Limit dBm/3kHz	Result
-	2422	-22.0	-21.5	-20.0		-16.3	8.0	Pass
-	2437	-5.6	-6.7	-4.6		-0.8	8.0	Pass
-	2452	-20.7	-22.6	-21.8		-16.9	8.0	Pass

Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #3: Signal Bandwidth

802.11g

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	Bandwidth (MHz) 99%	Comments
7	2412	200kHz	16.23	17.1	See power plots for 99% bandwidth measurement (RB=1MHz, VB=3MHz)
17	2437	200kHz	16.43	17.2	
7	2462	200kHz	16.43	17.1	

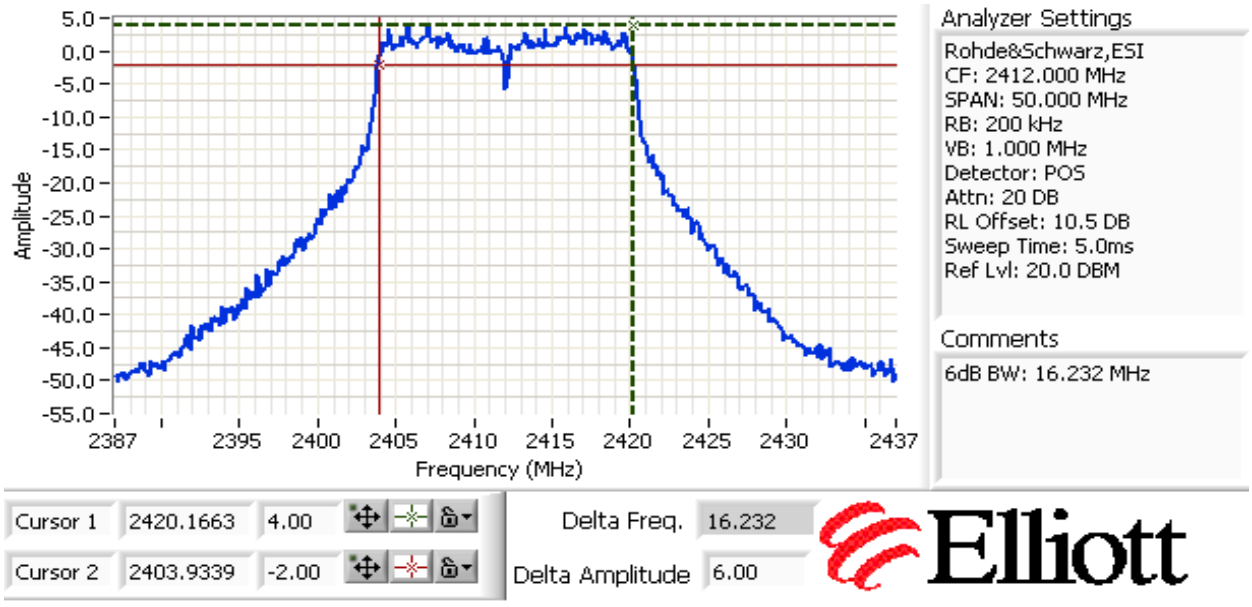
802.11n20

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	Bandwidth (MHz) 99%	Comments
8	2412	200kHz	17.54	18.16	See power plots for 99% bandwidth measurement (RB=1MHz, VB=3MHz)
16	2437	200kHz	17.44	18.16	
7	2462	200kHz	17.44	18.16	

802.11n40

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	Bandwidth (MHz) 99%	Comments
2.5	2422	500kHz	36.71	36.64	See power plots for 99% bandwidth measurement (RB=1MHz, VB=3MHz)
16	2437	500kHz	36.55	36.64	
2.5	2452	500kHz	36.55	36.64	

Note 1:	Measured on a single chain
Note 2:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #4: Out of Band Spurious Emissions

Mode: 802.11g

Power Setting Per Chain				Frequency (MHz)	Limit	Result
#1	#2	#3	#4			
-	-	-		2412	-30	Pass
-	-	-		2437	-30	Pass
-	-	-		2462	-30	Pass

Mode: 802.11n20

Power Setting Per Chain				Frequency (MHz)	Limit	Result
#1	#2	#3	#4			
-	-	-		2412	-30	Pass
-	-	-		2437	-30	Pass
-	-	-		2462	-30	Pass

Mode: 802.11n40

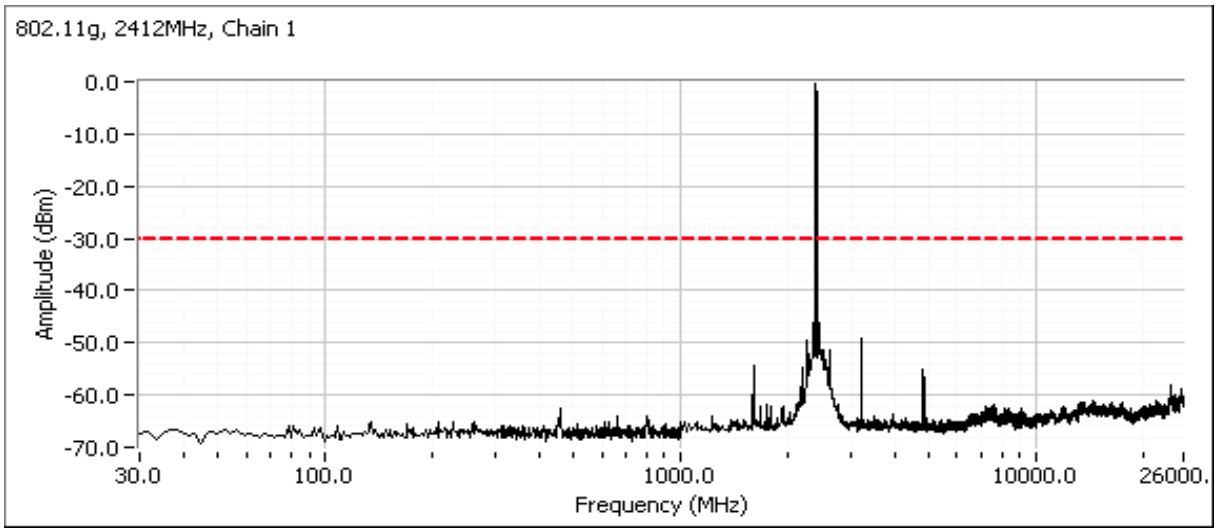
Power Setting Per Chain				Frequency (MHz)	Limit	Result
#1	#2	#3	#4			
-	-	-		2422	-30	Pass
-	-	-		2437	-30	Pass
-	-	-		2452	-30	Pass

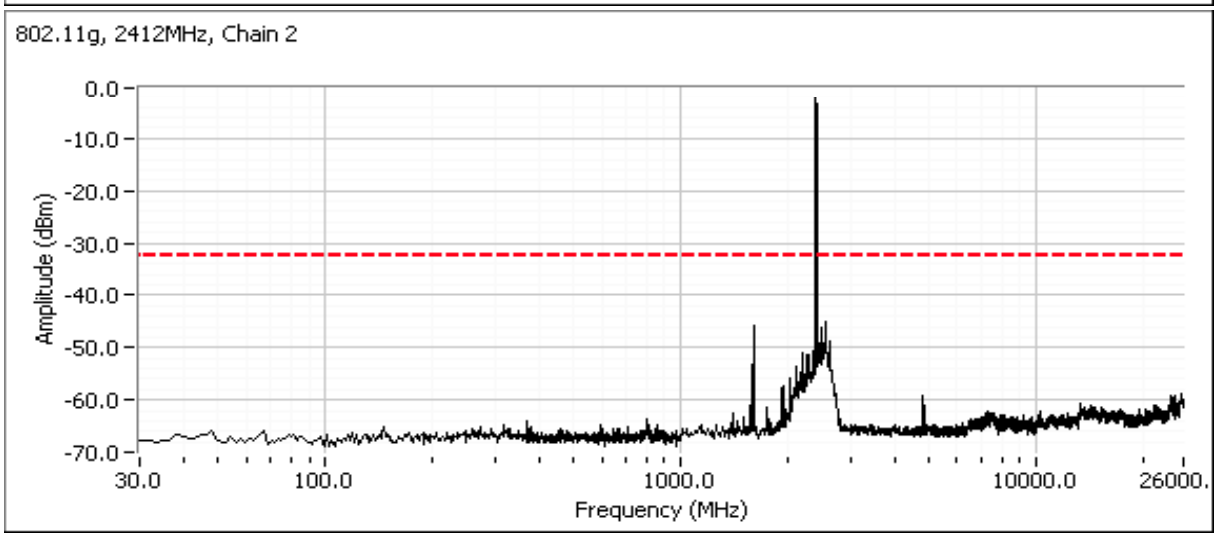
Note 1:	Measured on each chain individually

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

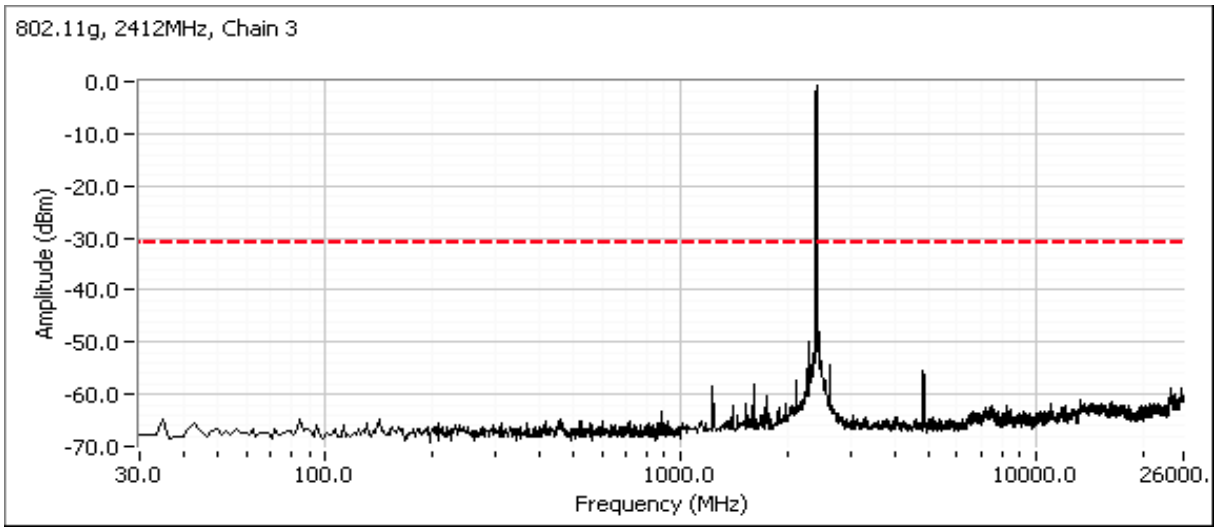
802.11g

Plots for low channel

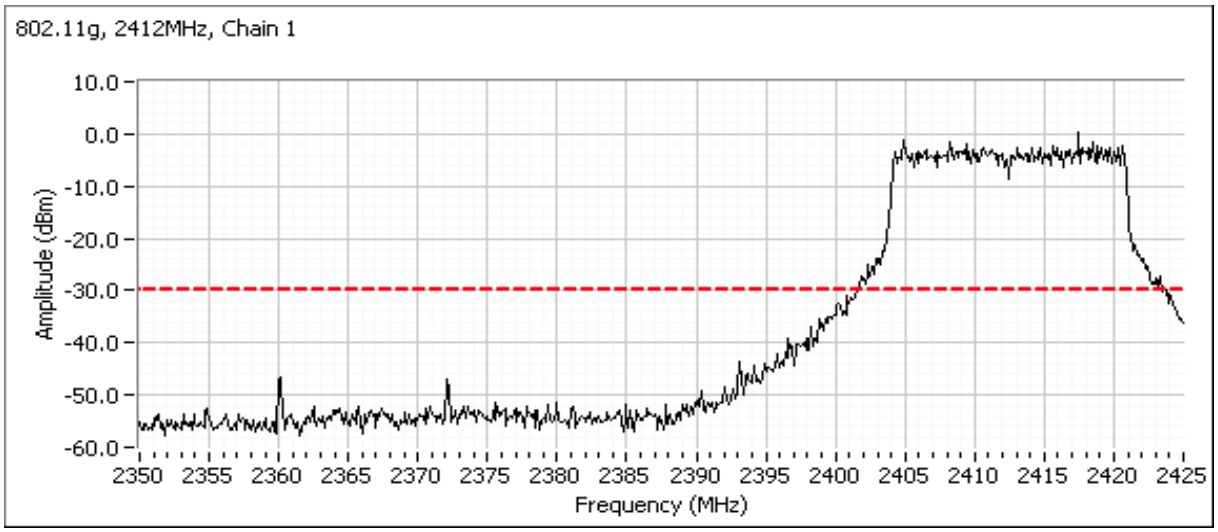




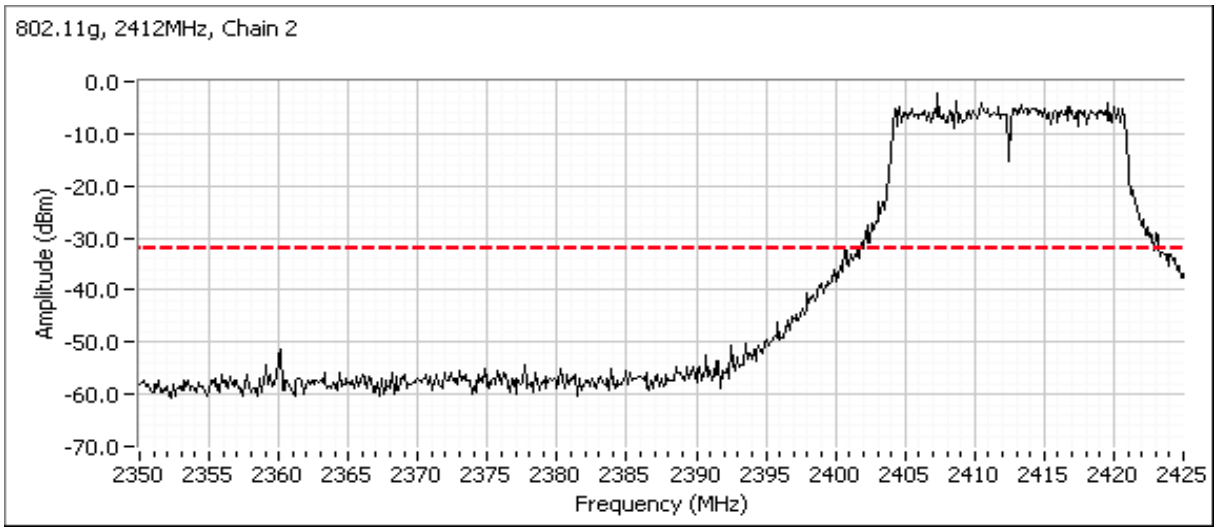
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

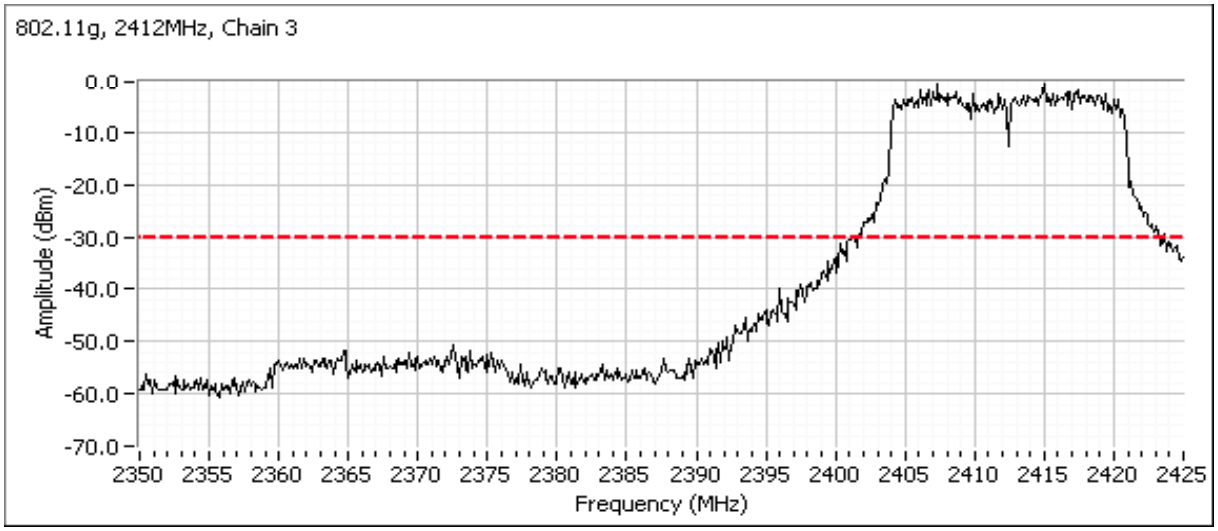


Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



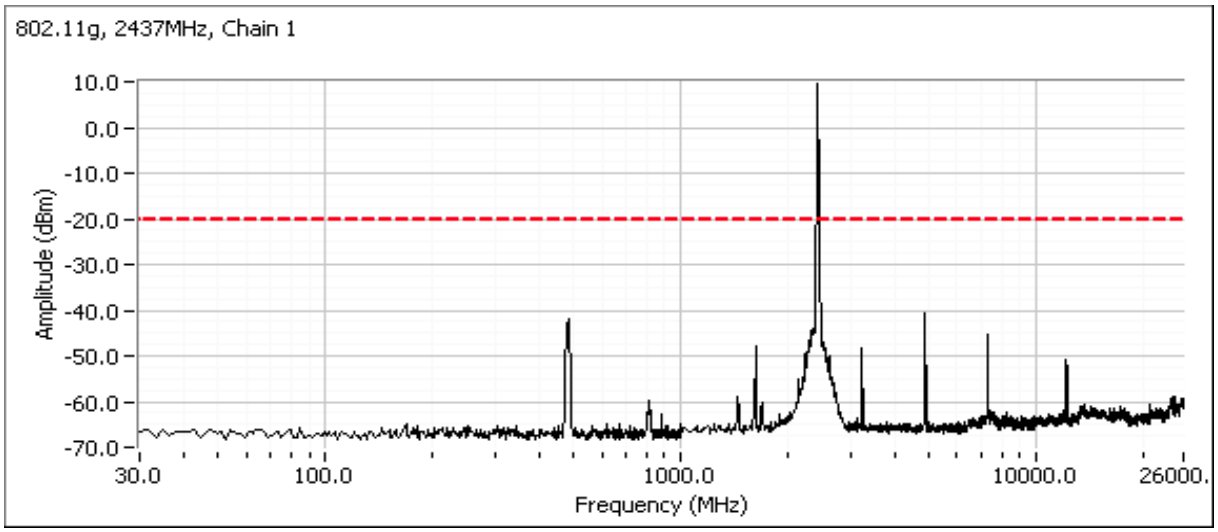
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

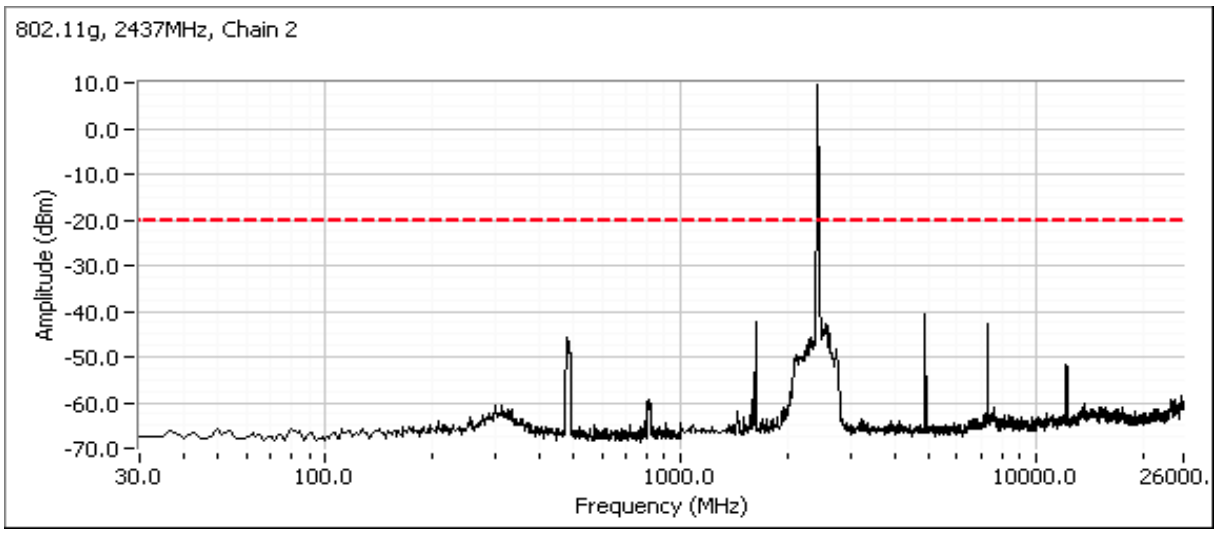




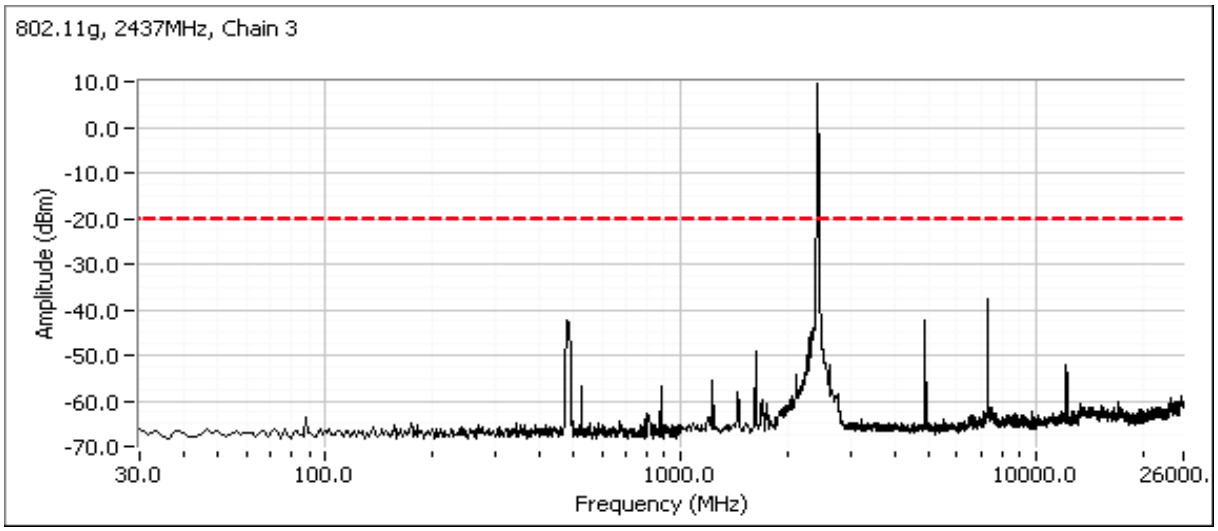
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Plots for center channel

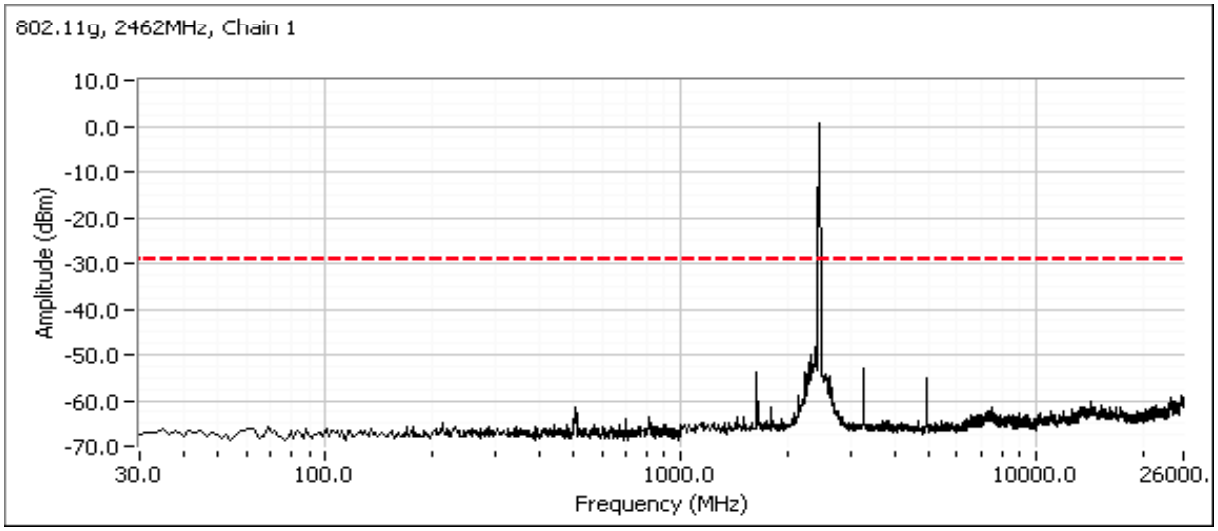




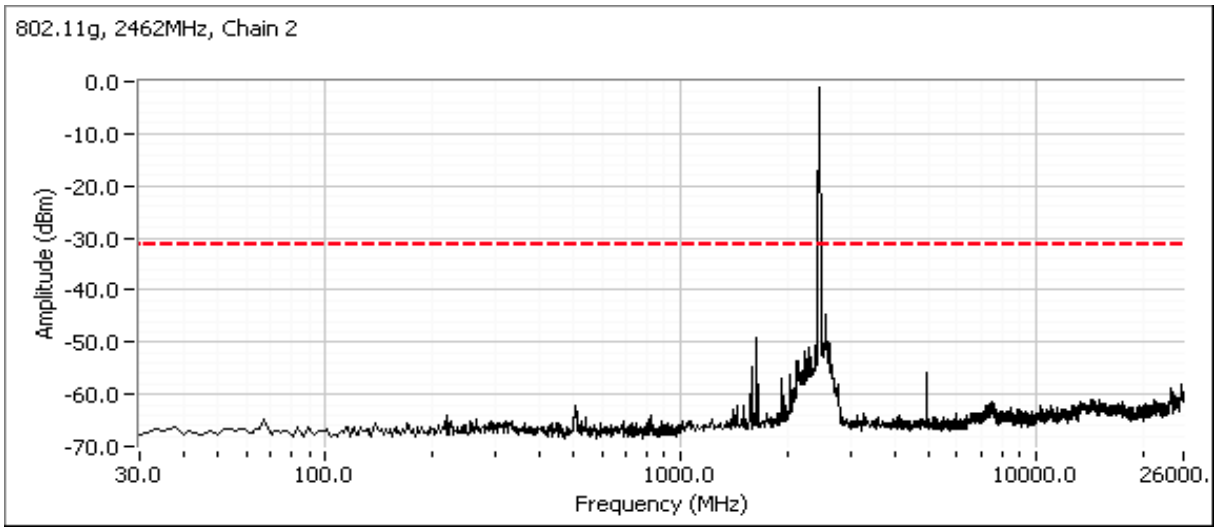
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

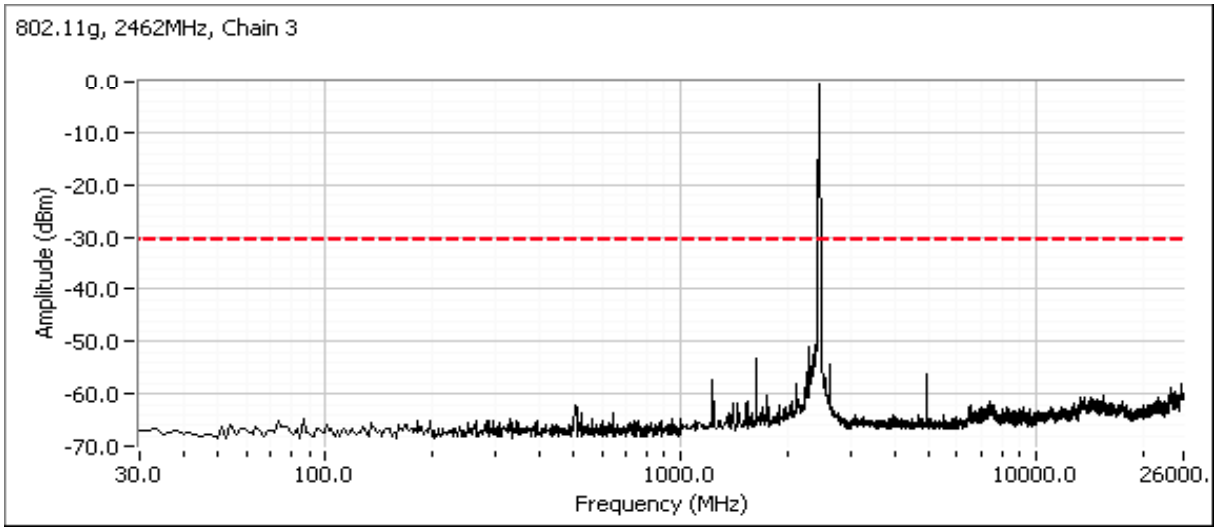


Plots for high channel



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

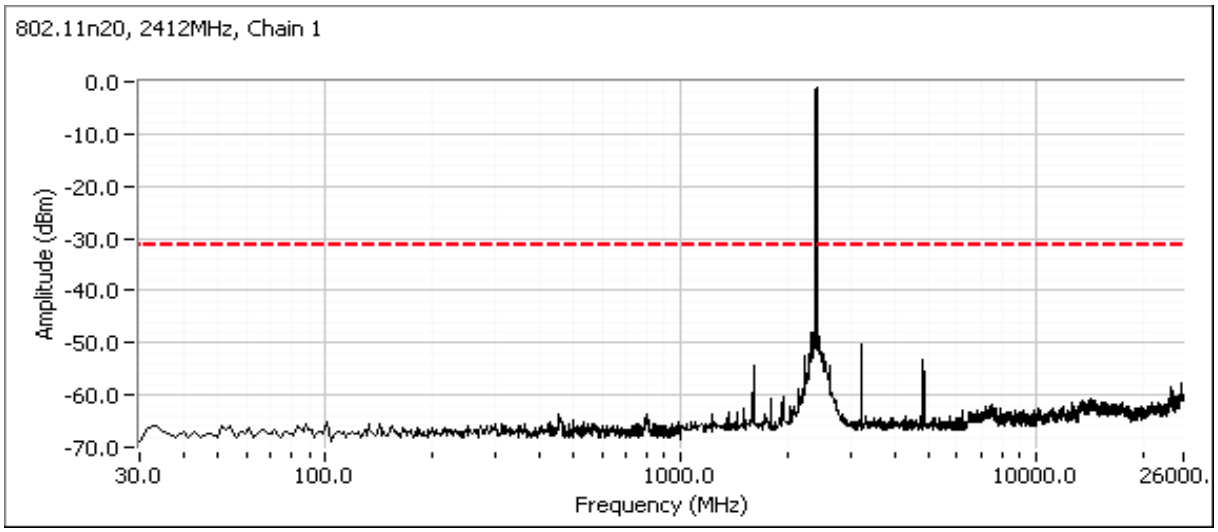


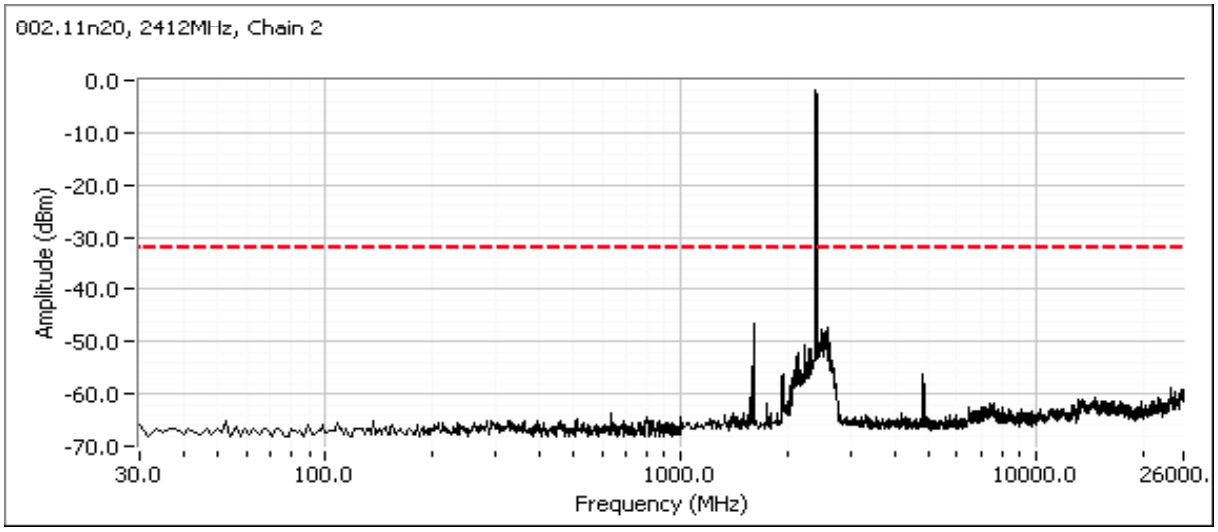


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

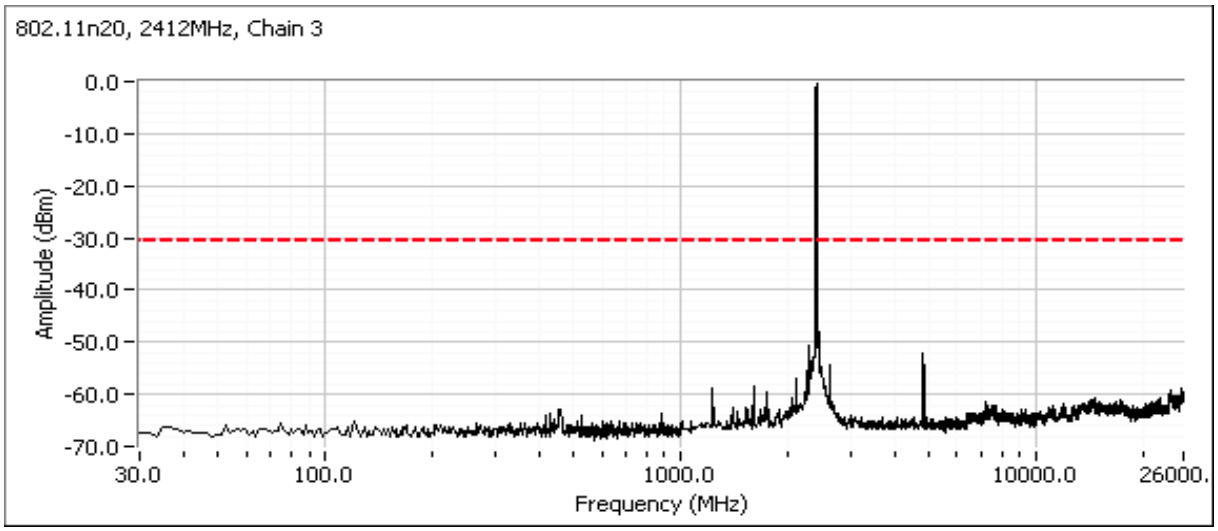
802.11n20

Plots for low channel

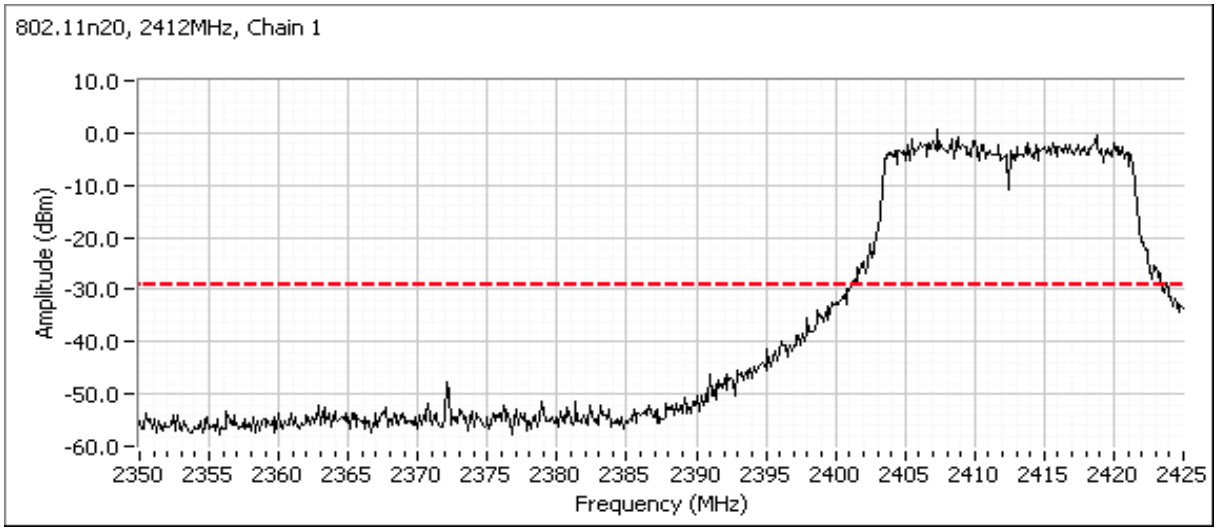




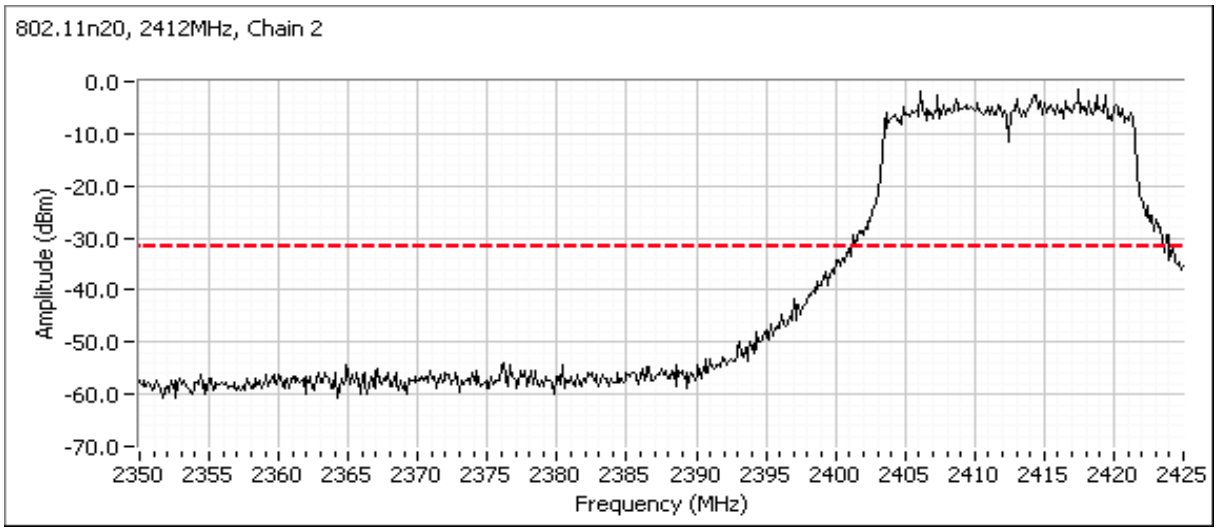
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

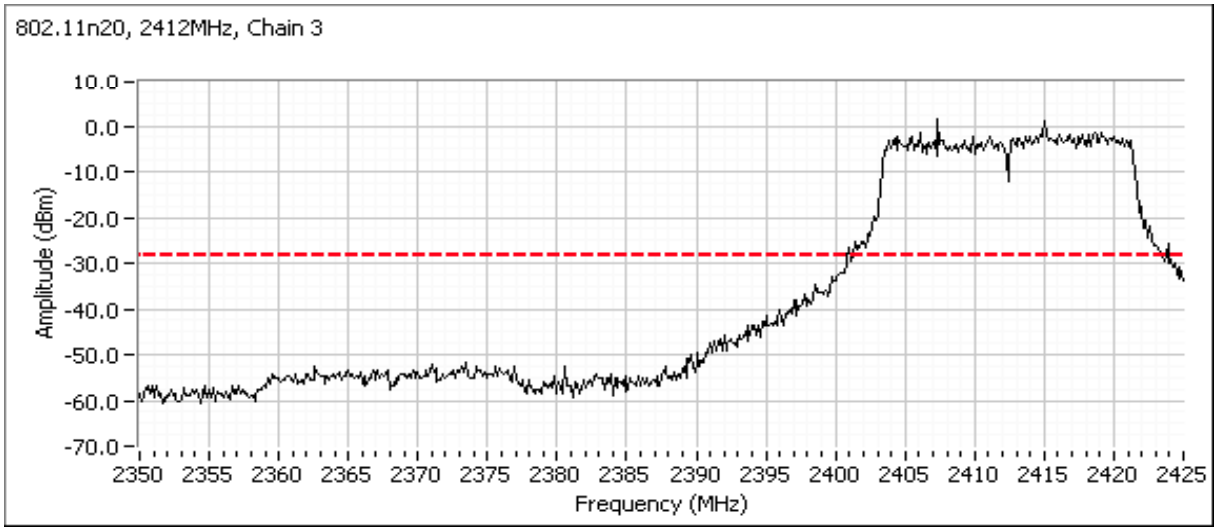


Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



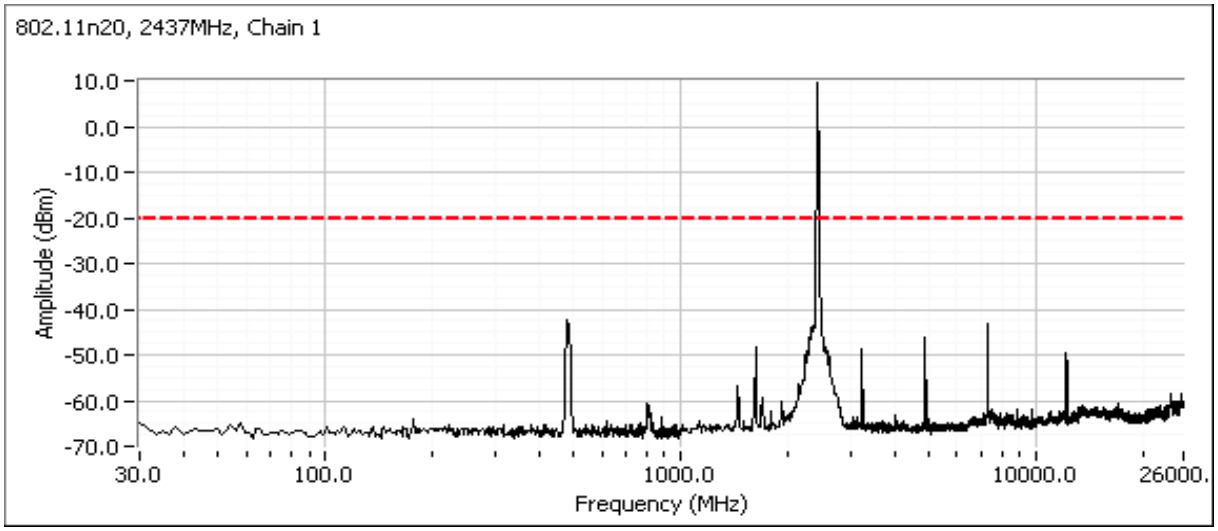
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

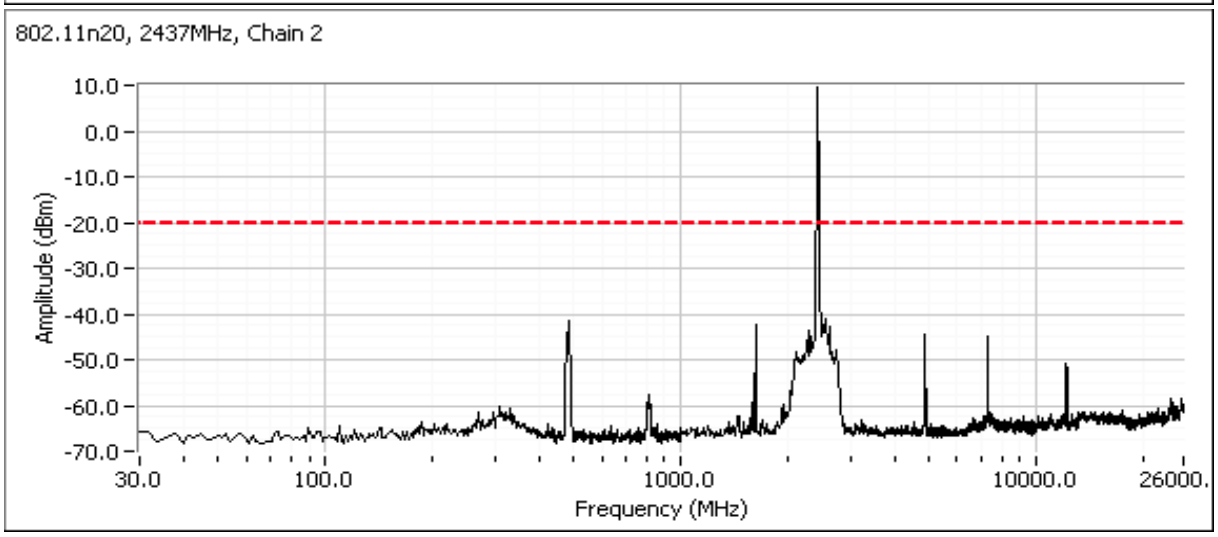




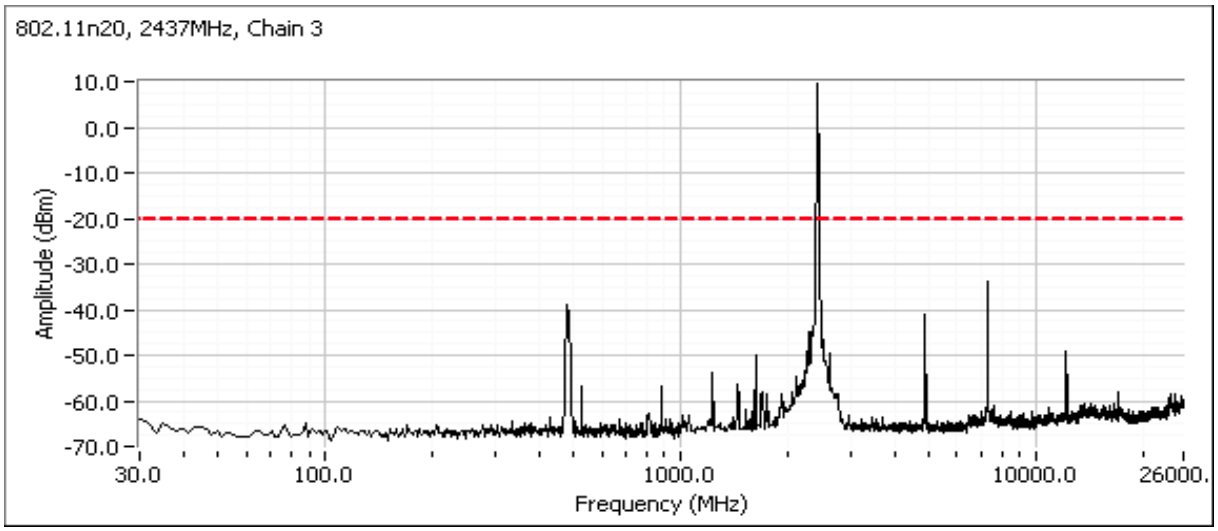
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Plots for center channel

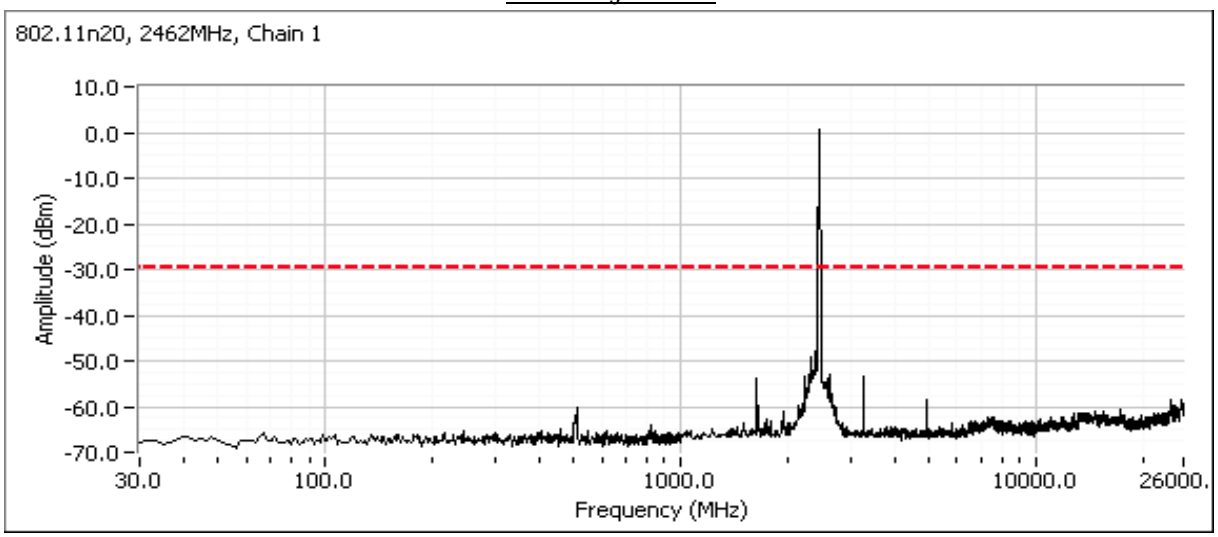




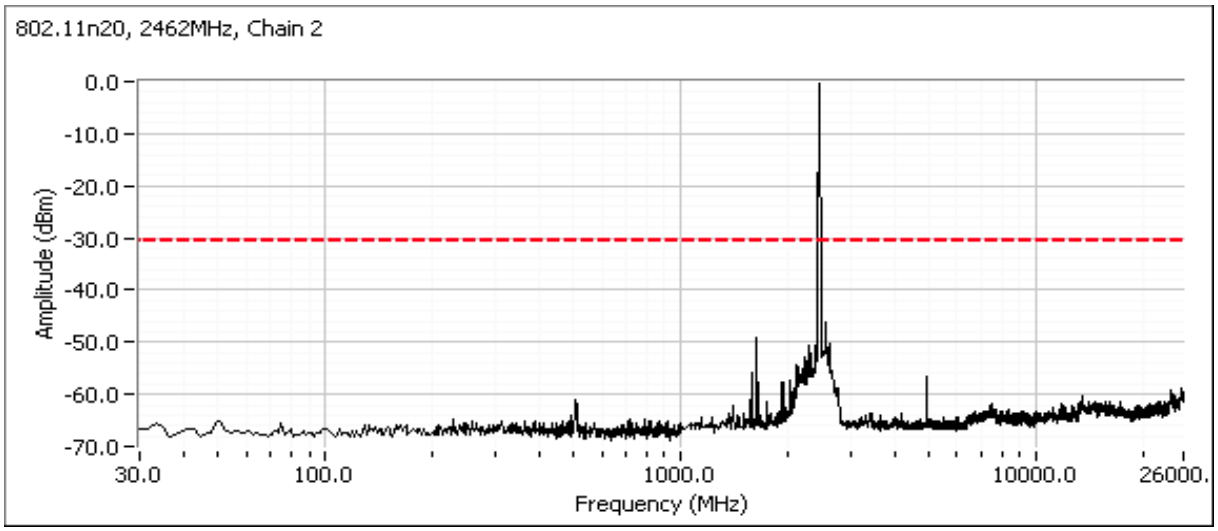
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

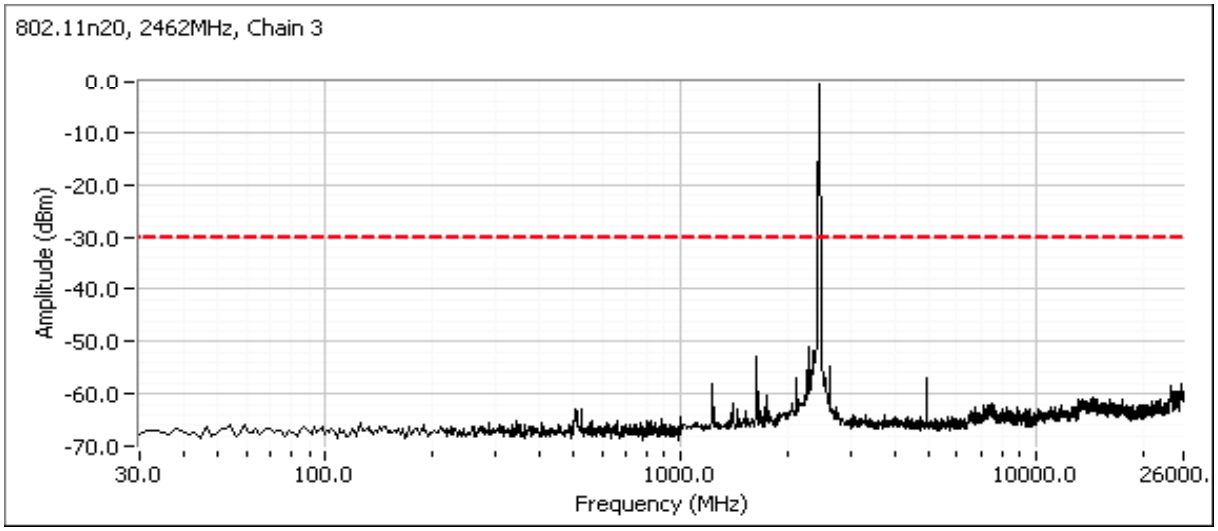


Plots for high channel



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

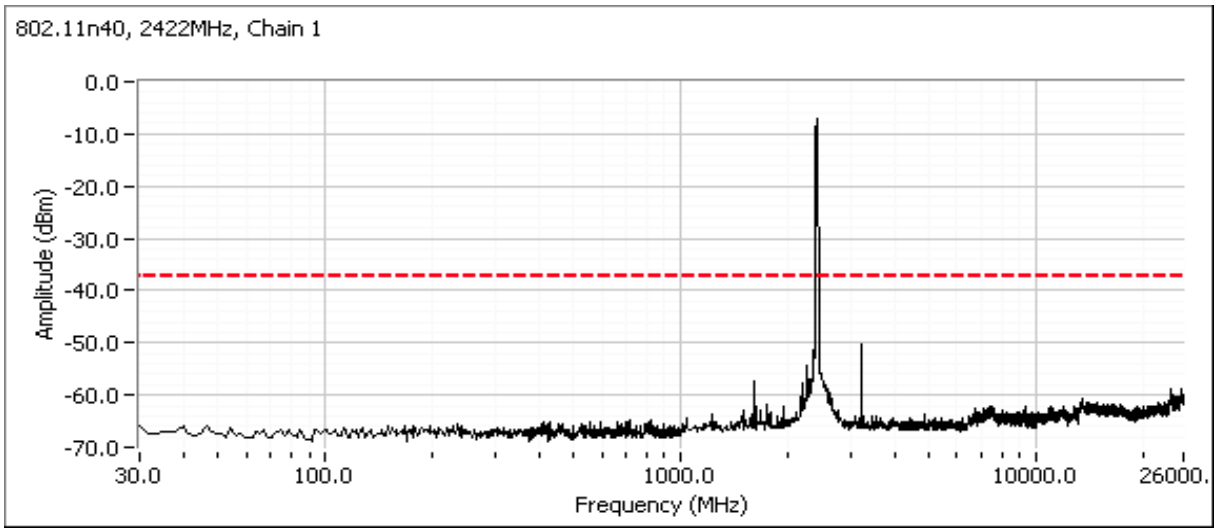


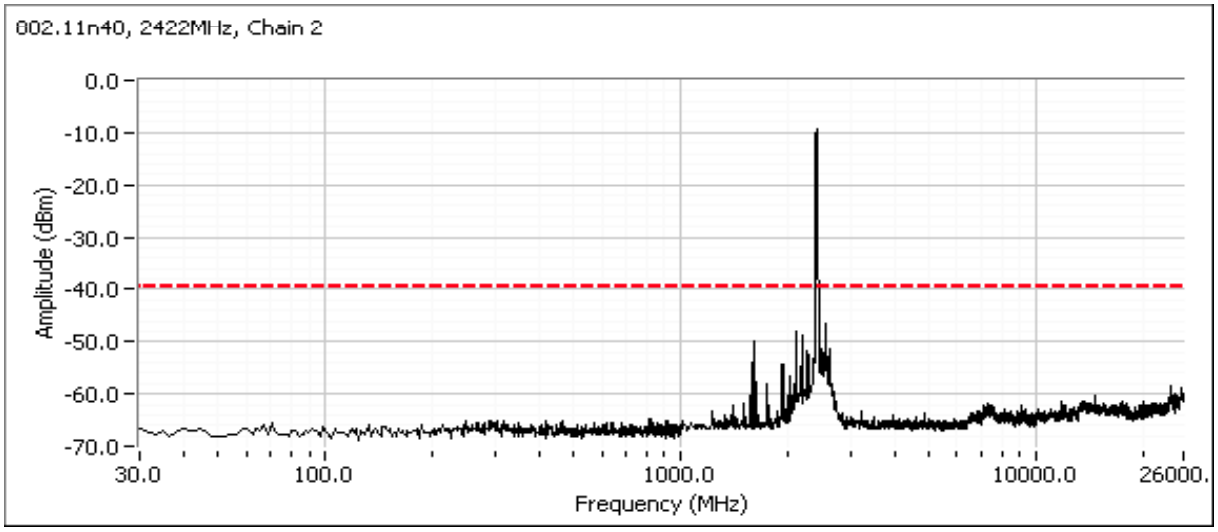


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

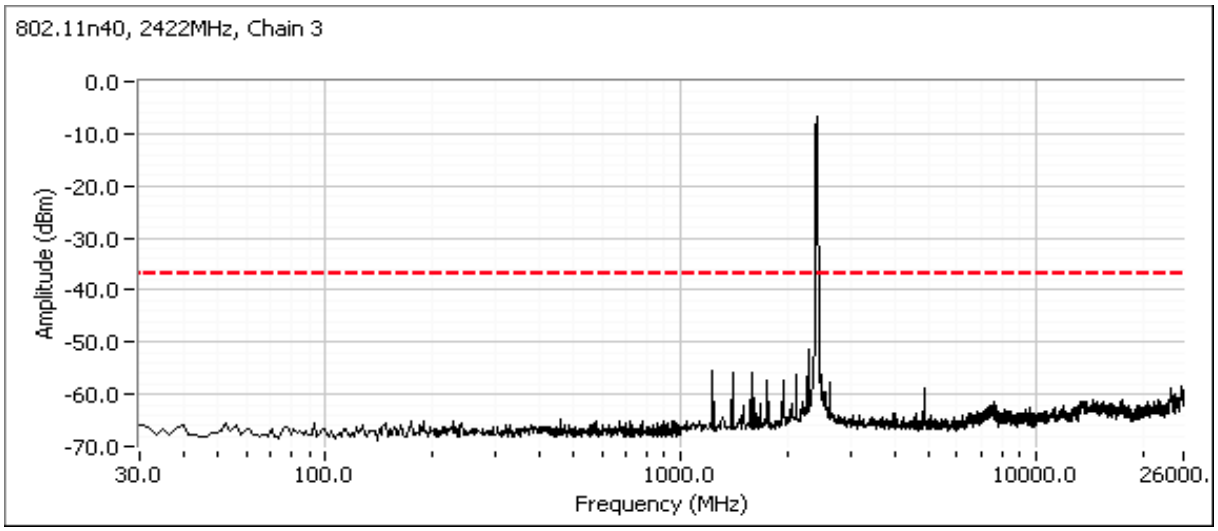
802.11n40

Plots for low channel.

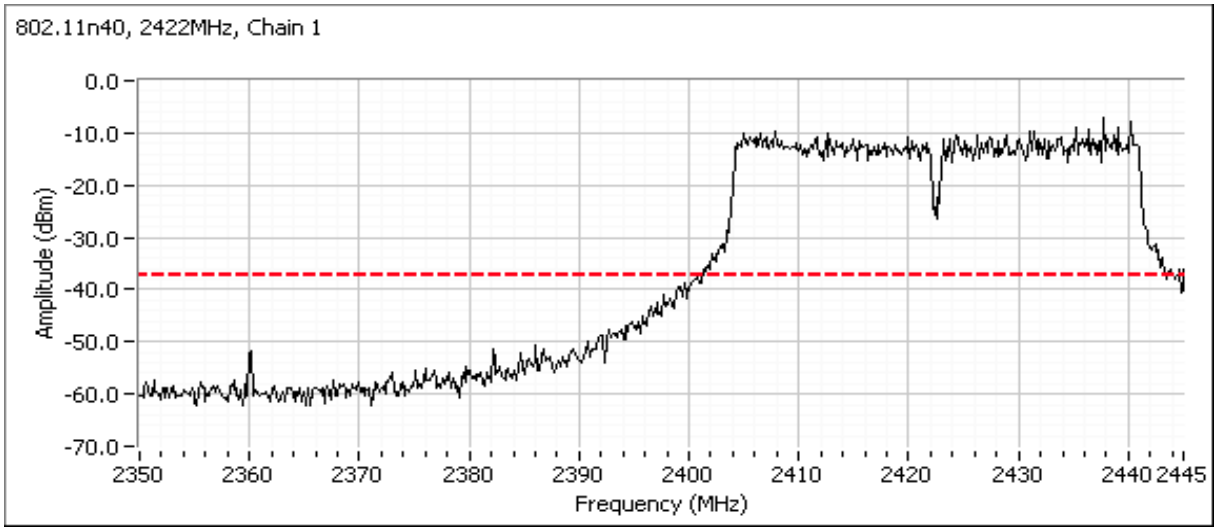




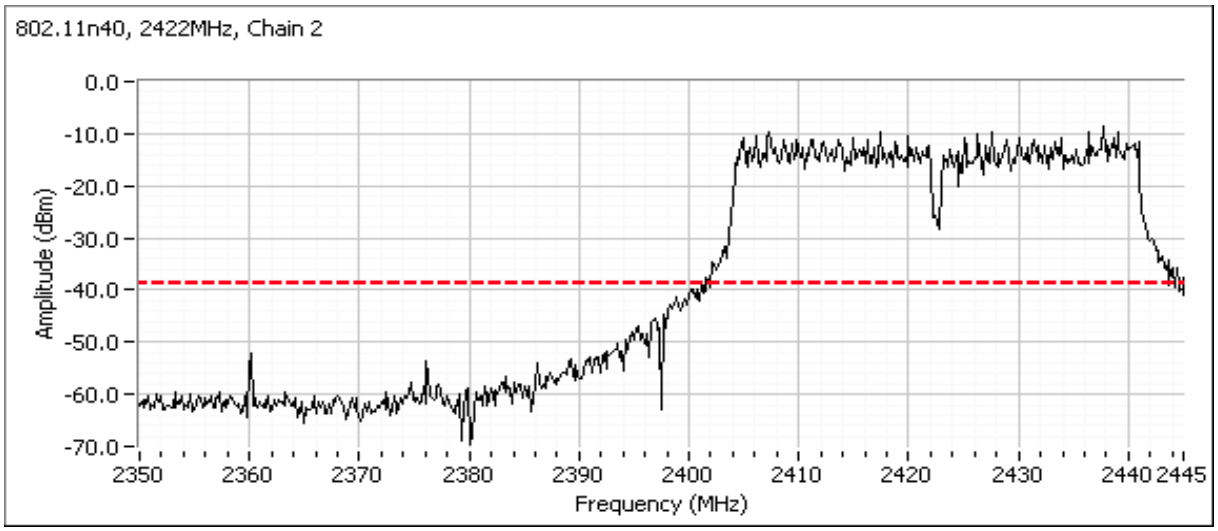
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

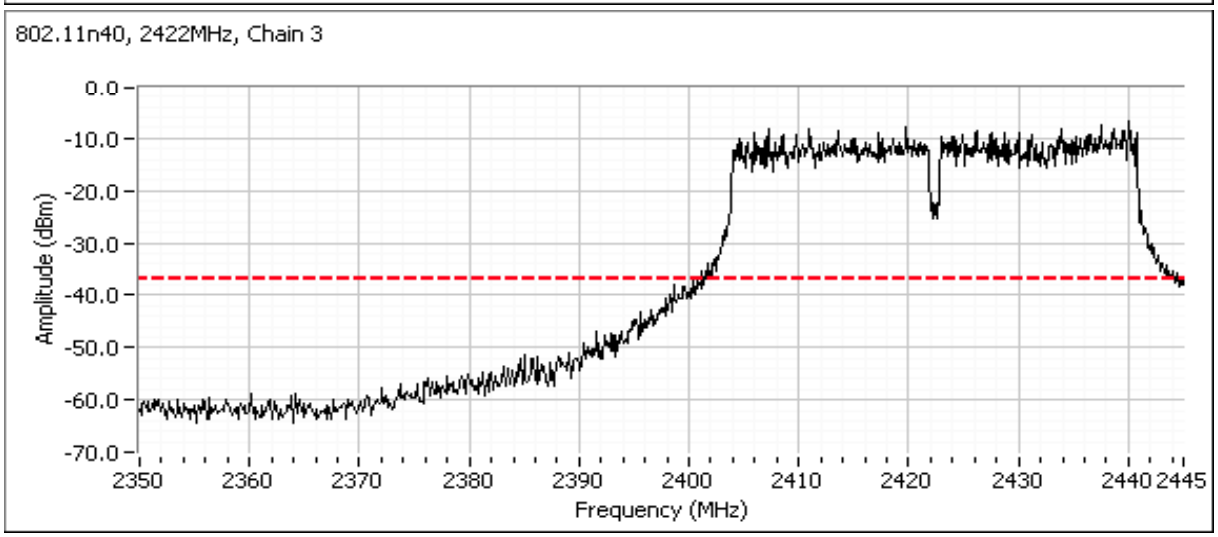


Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



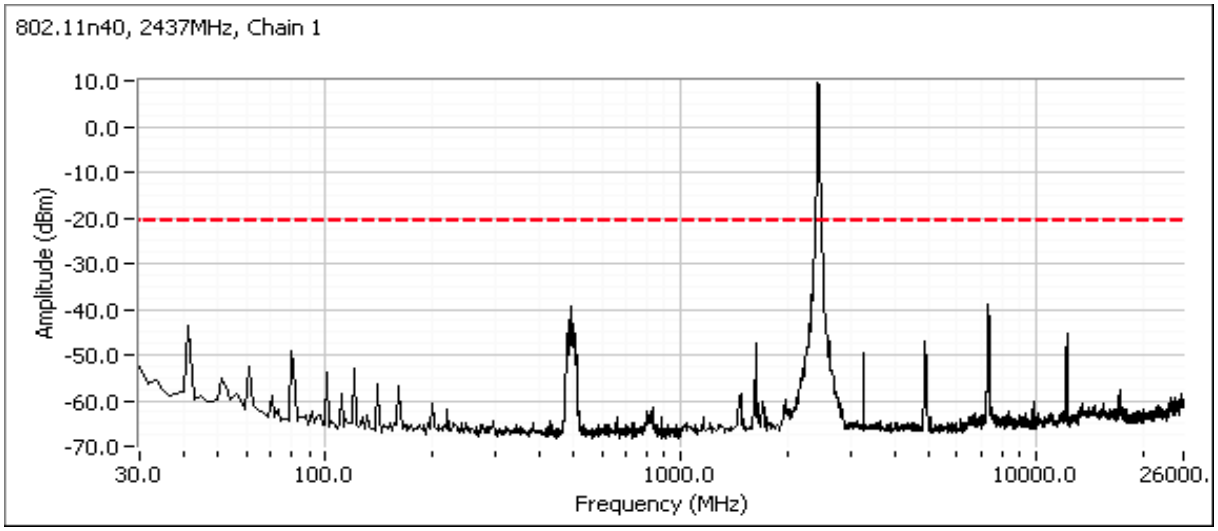
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

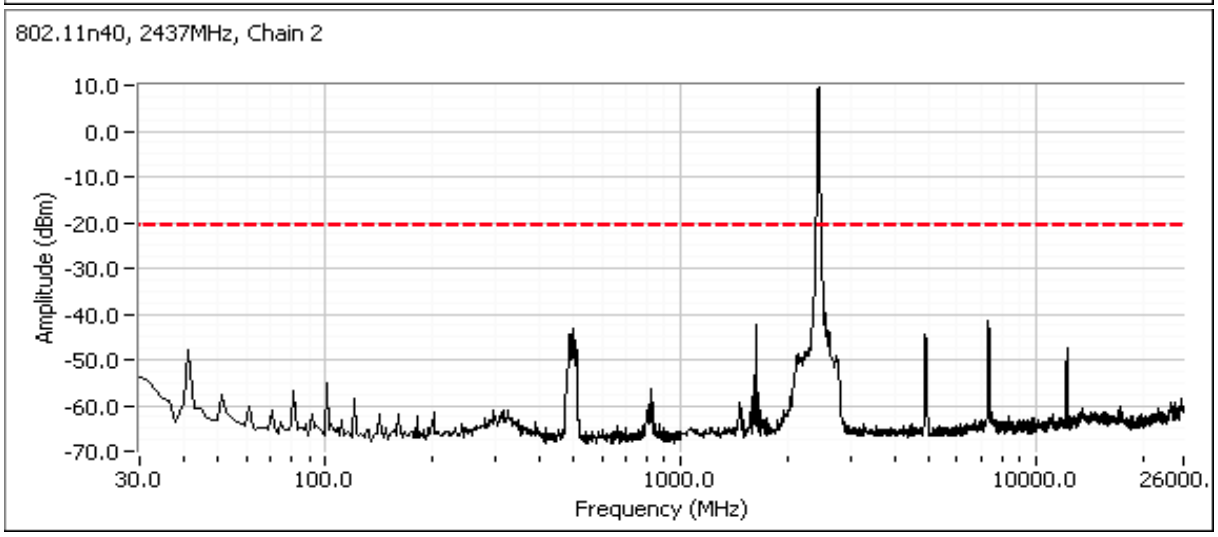




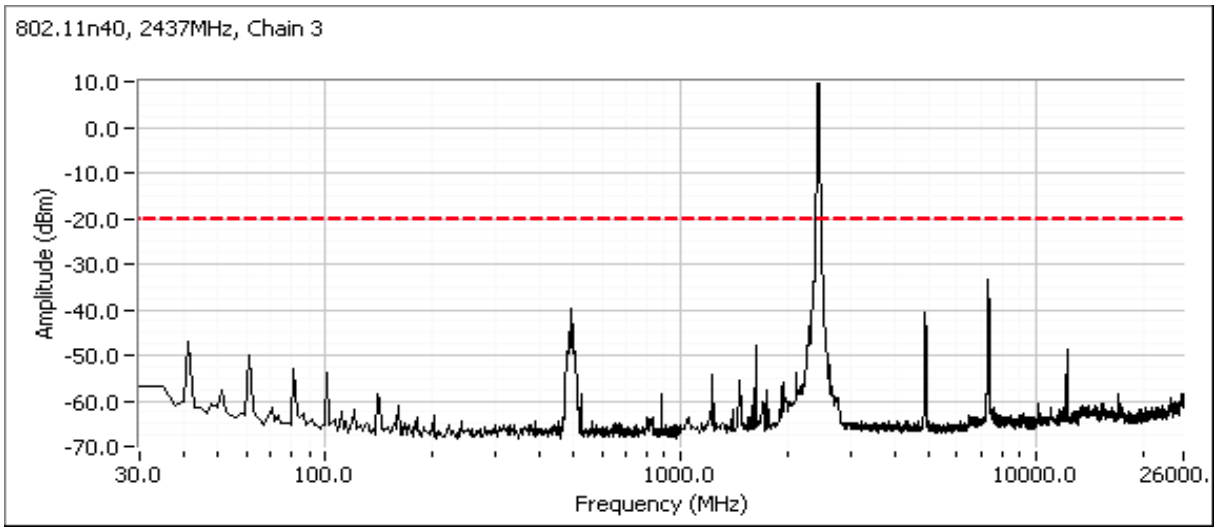
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Plots for center channel

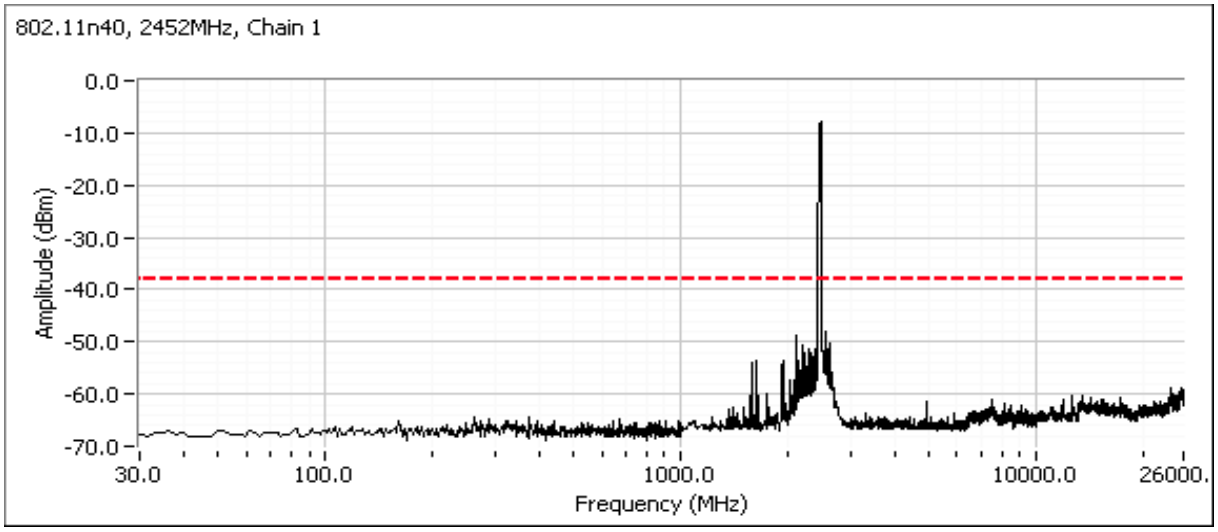




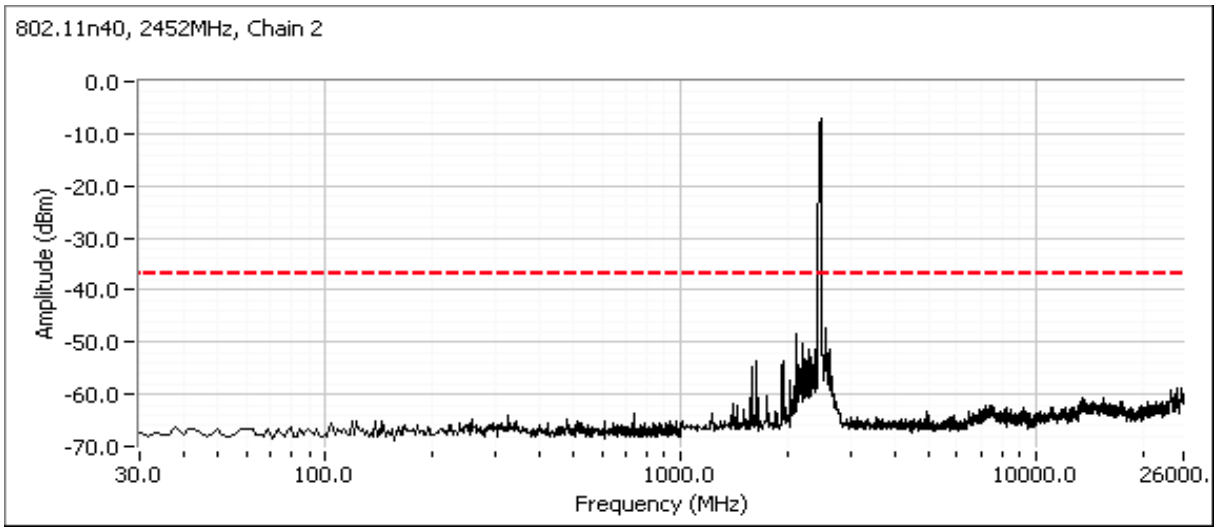
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

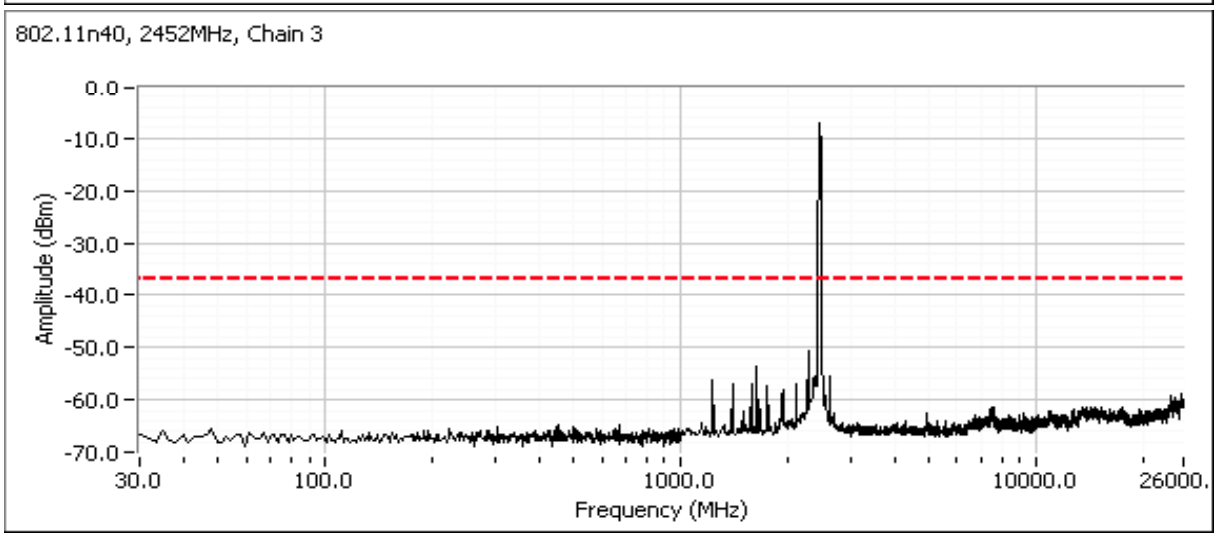


Plots for high channel,



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A





Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements
MIMO and Smart Antenna Systems
Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/6/2012
Test Engineer: Rafael Varelas
Test Location: FT4

Config. Used: 1
Config Change: None
EUT Voltage: POE

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 20.3 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
Chain A + B + C				
1	Output Power	15.247(b)	Pass	802.11g: 17.1 dBm 802.11n20: 18.5 dBm 802.11n40: 11.6 dBm

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1b: Output Power - Chain A + B + C

Operating Mode: 802.11g

Transmitted signal on chain is coherent ? Yes

2437 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	12.0	11.1	13.5		17.1 dBm	0.051 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	16	15.1	17.5		25.9 dBm	0.385 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1c: Output Power - Chain A + B + C

Operating Mode: 802.11n20

Transmitted signal on chain is coherent ? Yes

2437 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	13.8	12.5	14.6		18.5 dBm	0.071 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	17.8	16.5	18.6		27.3 dBm	0.532 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

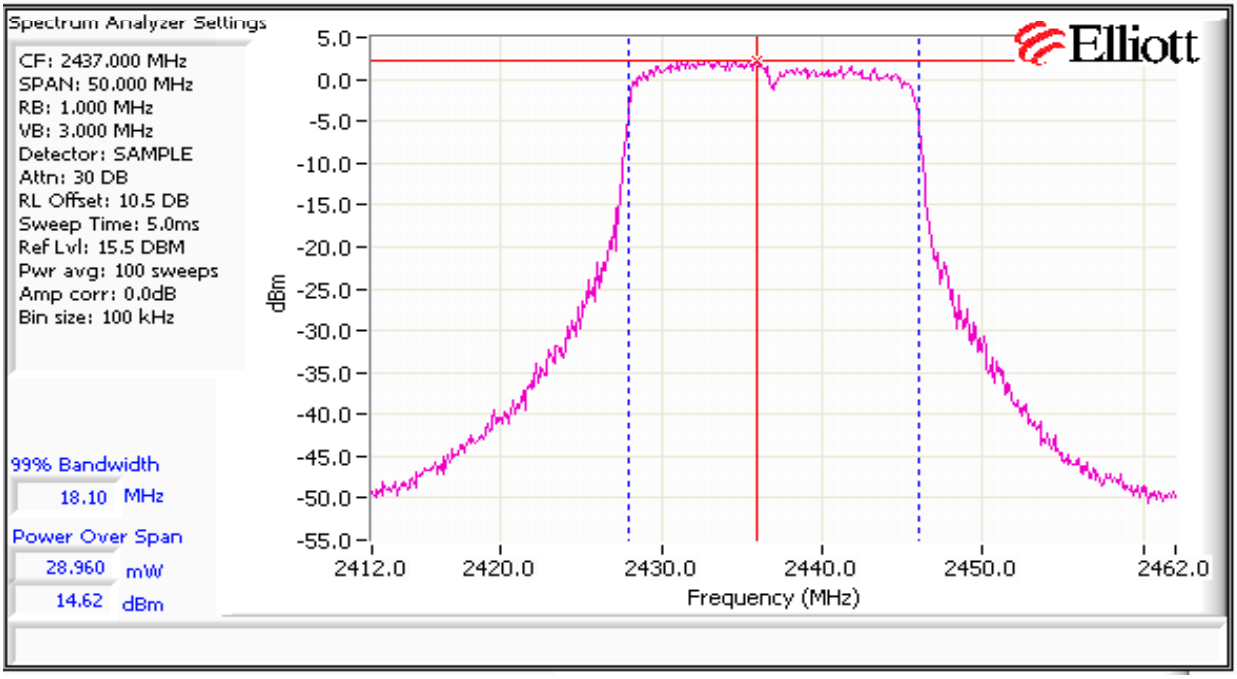
Run #1d: Output Power - Chain A + B + C

Operating Mode: 802.11n40

Transmitted signal on chain is coherent ? Yes

2437 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-	-					
Output Power (dBm) Note 1	6.4	5.7	8.0		11.6 dBm	0.014 W	27.2 dBm	0.528 W
Antenna Gain (dBi) Note 2	4	4	4		8.8 dBi		Pass	
eirp (dBm) Note 2	10.4	9.7	12		20.4 dBm	0.108 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 20.3 °C
Rel. Humidity: 35 %

Summary of Results - Device Operating in the 5725 - 5850 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11a	low	-	-	Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	52.1dBµV/m @ 11488.2MHz (-1.9dB)
1b	802.11a	center	-	-	Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	53.8dBµV/m @ 11568.9MHz (-0.2dB)
1c	802.11a	high	-	-	Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	49.8dBµV/m @ 11649.9MHz (-4.2dB)
2a	802.11n20	low	-	-	Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	52.3dBµV/m @ 11488.3MHz (-1.7dB)
2b	802.11n20	center	-	-	Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	51.9dBµV/m @ 11568.6MHz (-2.1dB)
2c	802.11n20	high	-	-	Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	51.9dBµV/m @ 11568.6MHz (-2.1dB)
3a	802.11n40	low	-	-	Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	48.2 dBµV/m @ 11588.8 MHz (-5.8 dB)
3b	802.11n40	high	-	-	Radiated Emissions, 1 - 40GHz	FCC Part 15.209 / 15.247(c)	48.9 dBµV/m @ 11504.7 MHz (-5.1 dB)

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 40,000 MHz. Operating Mode: 802.11a

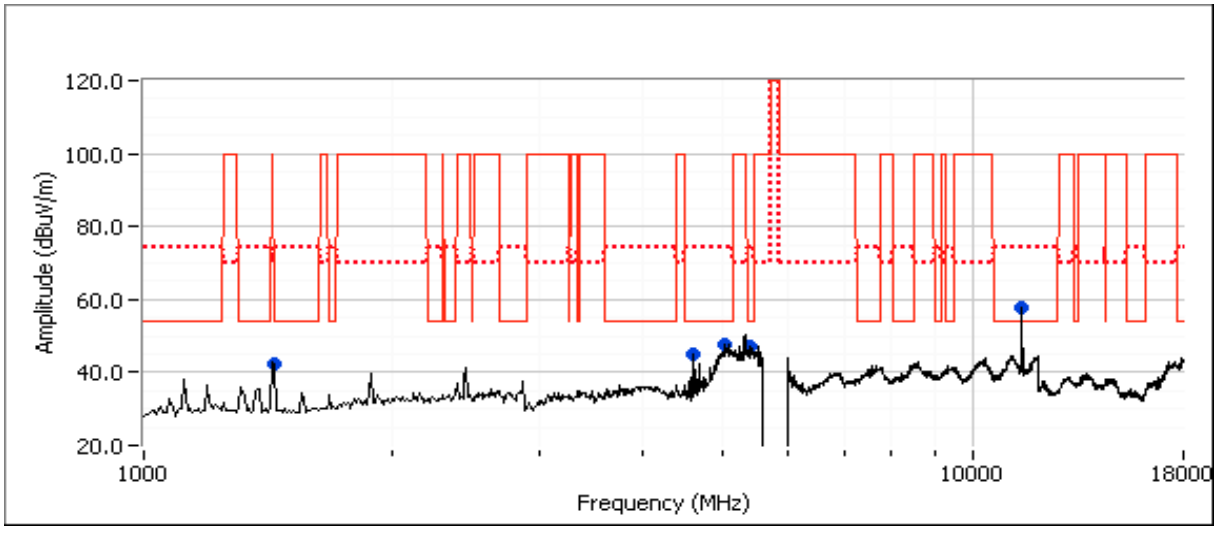
Date of Test: 1/27/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #4

Run #1a: Low Channel @ 5745 MHz

Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11488.220	52.1	V	54.0	-1.9	AVG	168	1.7	RB 1 MHz;VB 10 Hz;Pk
11487.820	63.1	V	74.0	-10.9	PK	168	1.7	RB 1 MHz;VB 3 MHz;Pk
4600.000	40.0	H	54.0	-14.0	AVG	296	1.1	RB 1 MHz;VB 10 Hz;Pk
4599.900	45.8	H	74.0	-28.2	PK	296	1.1	RB 1 MHz;VB 3 MHz;Pk
1440.020	42.4	V	54.0	-11.6	AVG	146	1.3	RB 1 MHz;VB 10 Hz;Pk
1439.890	45.3	V	74.0	-28.7	PK	146	1.3	RB 1 MHz;VB 3 MHz;Pk
5033.330	47.5	H	54.0	-6.5	Peak	308	1.3	Note 3
5390.830	47.1	H	54.0	-6.9	Peak	308	1.3	Note 3

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Refer to BE measurements

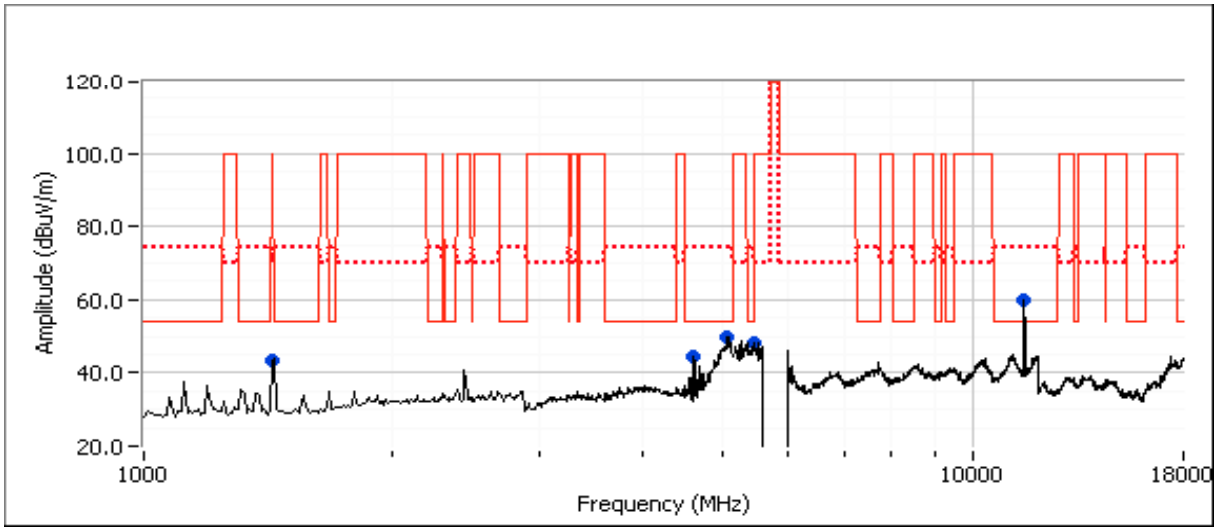


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1b: Center Channel @ 5785 MHz
Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11568.860	53.8	V	54.0	-0.2	AVG	157	1.6	RB 1 MHz;VB 10 Hz;Pk
11568.460	64.4	V	74.0	-9.6	PK	157	1.6	RB 1 MHz;VB 3 MHz;Pk
4600.020	46.2	H	54.0	-7.8	AVG	293	1.1	RB 1 MHz;VB 10 Hz;Pk
4600.040	49.2	H	74.0	-24.8	PK	293	1.1	RB 1 MHz;VB 3 MHz;Pk
1440.030	43.6	V	54.0	-10.4	AVG	331	1.3	RB 1 MHz;VB 10 Hz;Pk
1440.210	46.1	V	74.0	-27.9	PK	331	1.3	RB 1 MHz;VB 3 MHz;Pk
5051.670	49.9	H	54.0	-4.1	Peak	313	1.0	Note 3
5445.830	48.0	H	54.0	-6.0	Peak	328	1.0	Note 3

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Refer to BE measurements

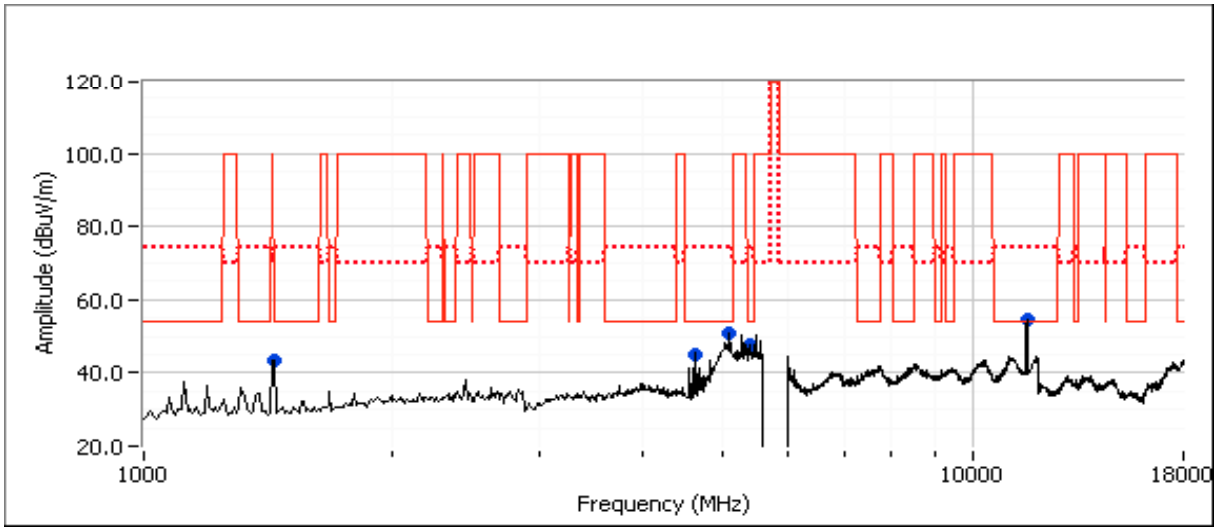


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1c: High Channel @ 5825 MHz
Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11649.910	49.8	V	54.0	-4.2	AVG	142	1.5	RB 1 MHz;VB 10 Hz;Pk
11649.770	60.6	V	74.0	-13.4	PK	142	1.5	RB 1 MHz;VB 3 MHz;Pk
1440.040	43.3	V	54.0	-10.7	AVG	137	1.3	RB 1 MHz;VB 10 Hz;Pk
1440.010	45.8	V	74.0	-28.2	PK	137	1.3	RB 1 MHz;VB 3 MHz;Pk
4640.010	46.2	H	54.0	-7.8	AVG	295	1.0	RB 1 MHz;VB 10 Hz;Pk
4640.020	50.1	H	74.0	-23.9	PK	295	1.0	RB 1 MHz;VB 3 MHz;Pk
5097.500	50.6	H	-	-	Peak	287	1.0	Note 3
5390.830	47.7	H	-	-	Peak	318	1.3	Note 3

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Refer to BE measurements



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2: Radiated Spurious Emissions, 30 - 40,000 MHz. Operating Mode: 802.11n20

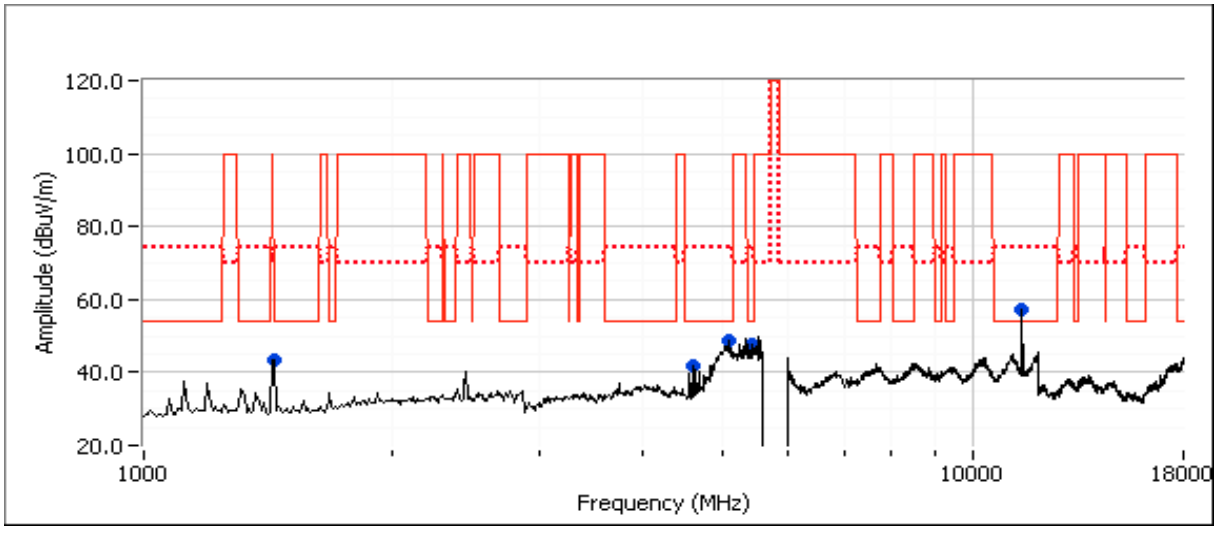
Date of Test: 1/27/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #4

Run #2a: Low Channel @ 5745 MHz

Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11488.280	52.3	V	54.0	-1.7	AVG	144	1.6	RB 1 MHz;VB 10 Hz;Pk
11485.880	63.4	V	74.0	-10.6	PK	144	1.6	RB 1 MHz;VB 3 MHz;Pk
4600.040	45.6	H	54.0	-8.4	AVG	289	1.0	RB 1 MHz;VB 10 Hz;Pk
4600.140	48.8	H	74.0	-25.2	PK	289	1.0	RB 1 MHz;VB 3 MHz;Pk
1440.050	42.1	V	54.0	-11.9	AVG	352	1.3	RB 1 MHz;VB 10 Hz;Pk
1440.010	45.2	V	74.0	-28.8	PK	352	1.3	RB 1 MHz;VB 3 MHz;Pk
5097.500	48.6	H	54.0	-5.4	Peak	285	1.0	Note 3
5436.670	47.9	H	54.0	-6.1	Peak	321	1.0	Note 3

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Refer to BE measurements

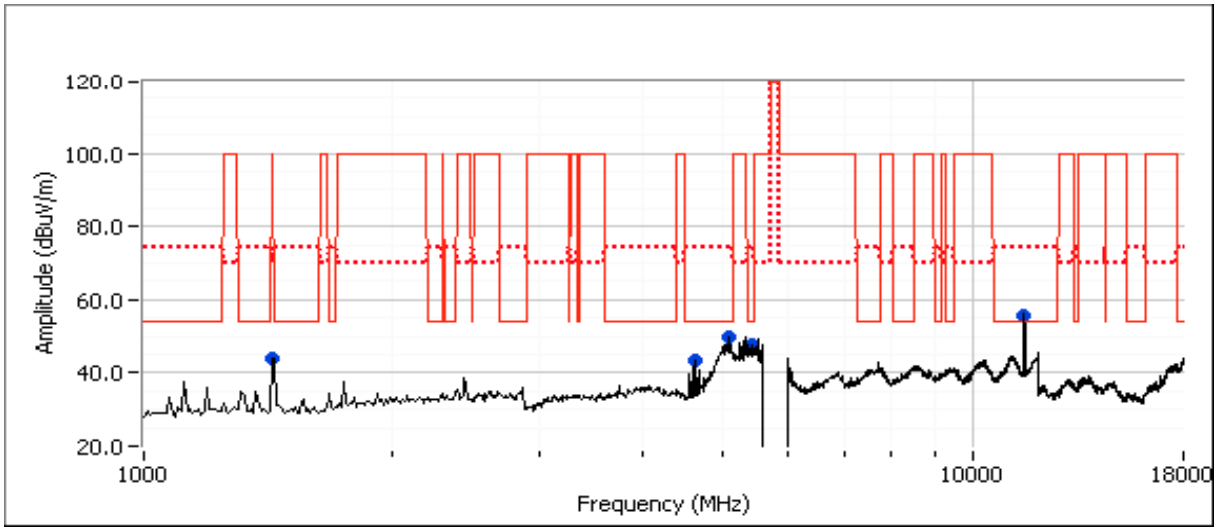


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2b: Center Channel @ 5785 MHz
Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11568.590	51.9	V	54.0	-2.1	AVG	151	1.6	RB 1 MHz;VB 10 Hz;Pk
11566.520	63.7	V	74.0	-10.3	PK	151	1.6	RB 1 MHz;VB 3 MHz;Pk
4640.030	41.5	V	54.0	-12.5	AVG	194	1.1	RB 1 MHz;VB 10 Hz;Pk
4639.940	46.3	V	74.0	-27.7	PK	194	1.1	RB 1 MHz;VB 3 MHz;Pk
1440.010	42.8	V	54.0	-11.2	AVG	342	1.3	RB 1 MHz;VB 10 Hz;Pk
1439.820	45.7	V	74.0	-28.3	PK	342	1.3	RB 1 MHz;VB 3 MHz;Pk
5097.500	49.8	H	54.0	-4.2	Peak	287	1.0	Note 3
5436.670	47.4	H	54.0	-6.6	Peak	330	1.3	Note 3

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Refer to BE measurements

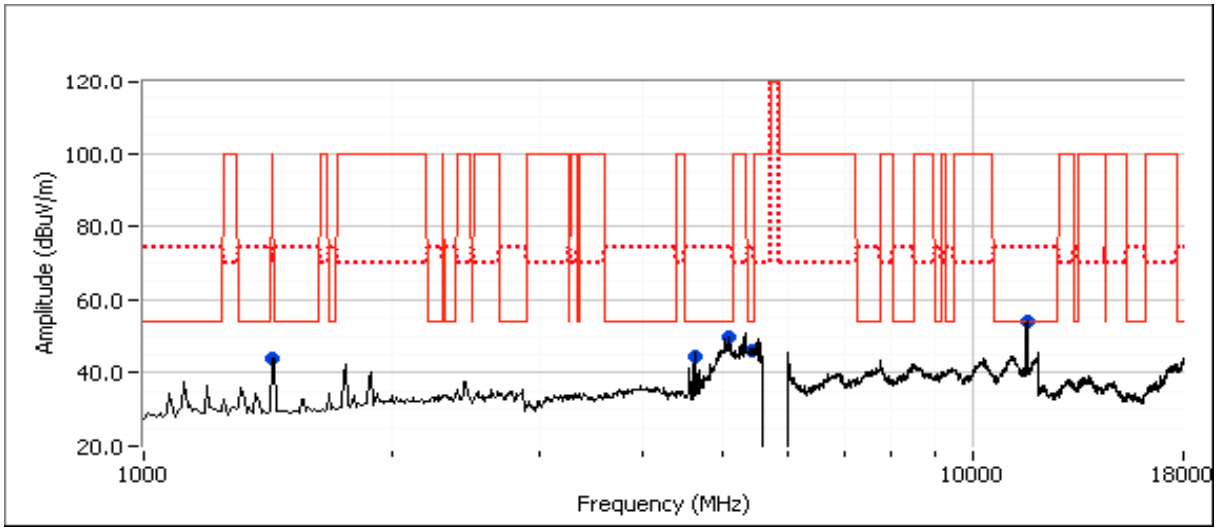


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2c: High Channel @ 5825 MHz
Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11647.710	51.0	V	54.0	-3.0	AVG	155	1.5	RB 1 MHz;VB 10 Hz;Pk
11646.510	62.2	V	74.0	-11.8	PK	155	1.5	RB 1 MHz;VB 3 MHz;Pk
4639.950	43.1	H	54.0	-10.9	AVG	274	1.0	RB 1 MHz;VB 10 Hz;Pk
4640.020	48.2	H	74.0	-25.8	PK	274	1.0	RB 1 MHz;VB 3 MHz;Pk
1440.030	43.3	V	54.0	-10.7	AVG	334	1.3	RB 1 MHz;VB 10 Hz;Pk
1440.060	45.8	V	74.0	-28.2	PK	334	1.3	RB 1 MHz;VB 3 MHz;Pk
5097.500	49.6	H	54.0	-4.4	Peak	285	1.0	Note 3
5427.500	45.9	H	54.0	-8.1	Peak	332	1.0	Note 3

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Refer to BE measurements



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #3a: Low Channel @ 5755 MHz

Date of Test: 2/6/2012

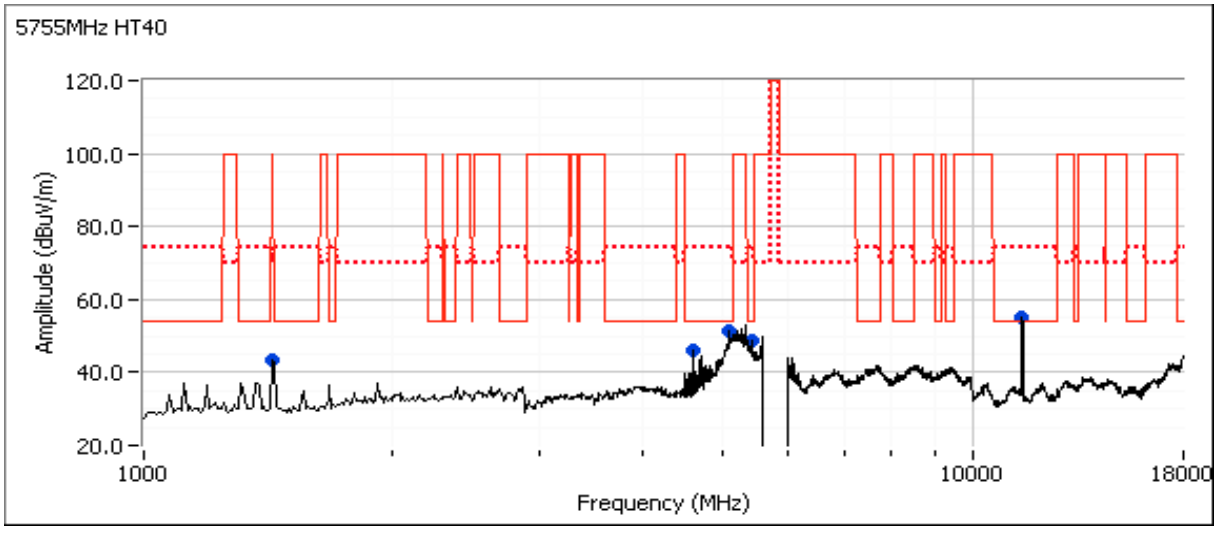
Test Engineer: Jack Liu

Test Location: FT Chamber #7

Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11588.790	48.2	V	54.0	-5.8	AVG	152	1.5	RB 1 MHz;VB 10 Hz;Pk
11586.680	60.2	V	74.0	-13.8	PK	152	1.5	RB 1 MHz;VB 3 MHz;Pk
1440.020	41.3	V	54.0	-12.7	AVG	6	1.4	RB 1 MHz;VB 10 Hz;Pk
1440.070	44.2	V	74.0	-29.8	PK	6	1.4	RB 1 MHz;VB 3 MHz;Pk
4600.020	35.6	H	54.0	-18.4	AVG	0	1.0	RB 1 MHz;VB 10 Hz;Pk
4599.940	43.2	H	74.0	-30.8	PK	0	1.0	RB 1 MHz;VB 3 MHz;Pk
5104.000	48.0	H	54.0	-6.0	AVG	318	1.0	RB 1 MHz;VB 10 Hz;Pk
5104.790	56.5	H	74.0	-17.5	PK	318	1.0	RB 1 MHz;VB 3 MHz;Pk
5456.010	44.7	H	54.0	-9.3	AVG	317	1.1	RB 1 MHz;VB 10 Hz;Pk
5455.850	54.4	H	74.0	-19.6	PK	317	1.1	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Refer to BE measurements



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #3b: High Channel @ 5795 MHz

Date of Test: 2/6/2012

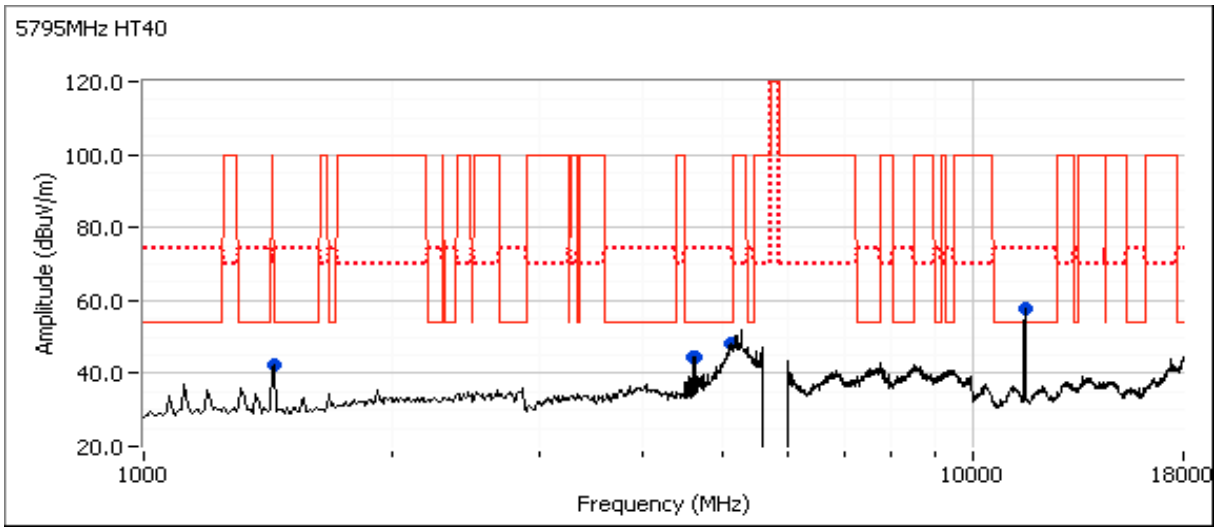
Test Engineer: Jack Liu

Test Location: FT Chamber #7

Spurious Emissions:

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11504.720	48.9	V	54.0	-5.1	AVG	151	1.7	RB 1 MHz;VB 10 Hz;Pk
11506.520	60.5	V	74.0	-13.5	PK	151	1.7	RB 1 MHz;VB 3 MHz;Pk
1440.050	41.8	V	54.0	-12.2	AVG	330	1.4	RB 1 MHz;VB 10 Hz;Pk
1440.070	44.8	V	74.0	-29.2	PK	330	1.4	RB 1 MHz;VB 3 MHz;Pk
4599.980	41.1	H	54.0	-12.9	AVG	303	1.0	RB 1 MHz;VB 10 Hz;Pk
4600.040	46.2	H	74.0	-27.8	PK	303	1.0	RB 1 MHz;VB 3 MHz;Pk
4640.020	45.7	H	54.0	-8.3	AVG	305	1.0	RB 1 MHz;VB 10 Hz;Pk
4640.100	49.8	H	74.0	-24.2	PK	305	1.0	RB 1 MHz;VB 3 MHz;Pk
5104.000	47.3	H	54.0	-6.7	AVG	320	1.0	RB 1 MHz;VB 10 Hz;Pk
5104.140	56.6	H	74.0	-17.4	PK	320	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.
Note 3:	Refer to BE measurements



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements
MIMO and Smart Antenna Systems
Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/3/2012
Test Engineer: Jack Liu / R. Varelas
Test Location: Fremont EMC Lab #4

Config. Used: 1
Config Change: None
EUT Voltage: 48V POE

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 20.4 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	25		Output Power	15.247(b)	Pass	a: 25.0dBm HT20: 24.7dBm HT40: 25.0dBm
2	25		Power spectral Density (PSD)	15.247(d)	Pass	0.2 dBm/3kHz
3	25		Minimum 6dB Bandwidth	15.247(a)	Pass	a: 16.25MHz HT20: 17.25MHz HT40: 36.4MHz
3	25		99% Bandwidth	RSS GEN	Pass	a: 19.55MHz HT20: 19.47MHz HT40: 50.32MHz
4	25		Spurious emissions	15.247(b)	Pass	All emissions are below the -30dBc limit

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1: Output Power - Chain A + B

Run 1a: Operating Mode: 802.11 a
Transmitted signal on chain is coherent ? Yes

5745 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-						
Output Power (dBm) Note 1	17.05	17.42			20.2 dBm	0.106 W	29.0 dBm	0.792 W
Antenna Gain (dBi) Note 2	4	4			7.0 dBi		Pass	
eirp (dBm) Note 2	21.05	21.42			27.3 dBm	0.532 W		

5785 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-						
Output Power (dBm) Note 1	21.26	22.56			25.0 dBm	0.314 W	29.0 dBm	0.792 W
Antenna Gain (dBi) Note 2	4	4			7.0 dBi		Pass	
eirp (dBm) Note 2	25.26	26.56			32.0 dBm	1.577 W		

5825 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-						
Output Power (dBm) Note 1	19.78	21.46			23.7 dBm	0.235 W	29.0 dBm	0.792 W
Antenna Gain (dBi) Note 2	4	4			7.0 dBi		Pass	
eirp (dBm) Note 2	23.78	25.46			30.7 dBm	1.181 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	The power setting is provided for reference purposes only.

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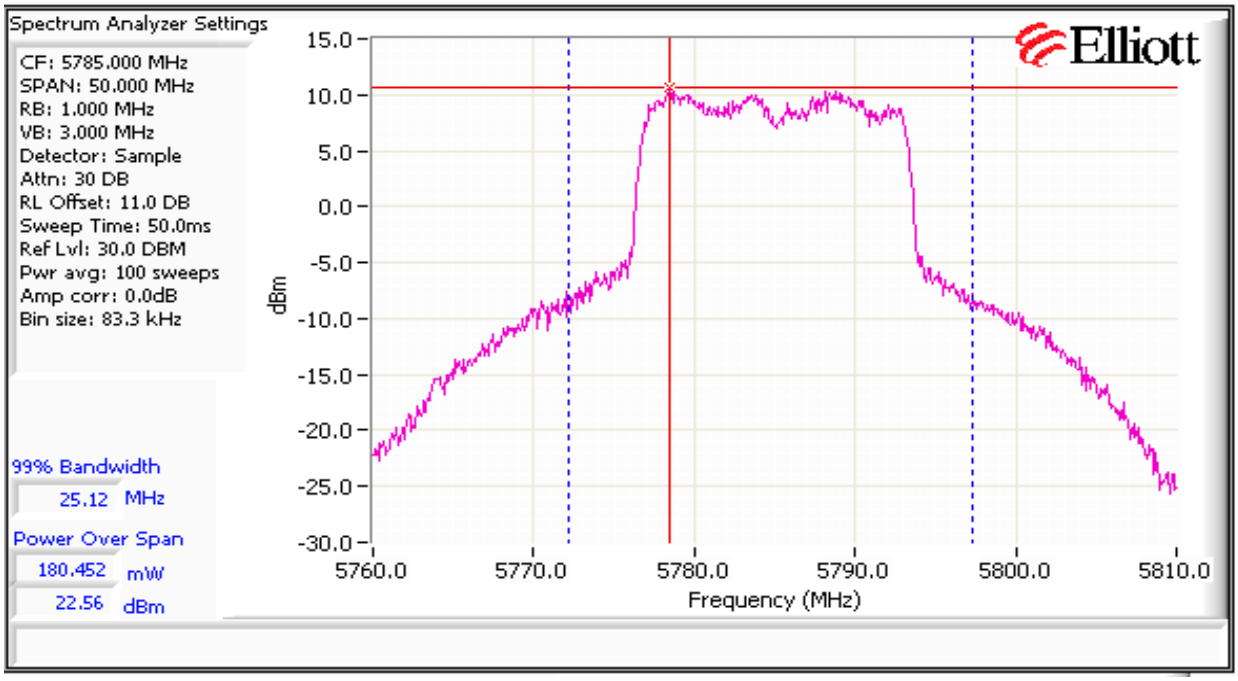
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run 1b: Operating Mode: 802.11 HT20

Transmitted signal on chain is coherent ? Yes

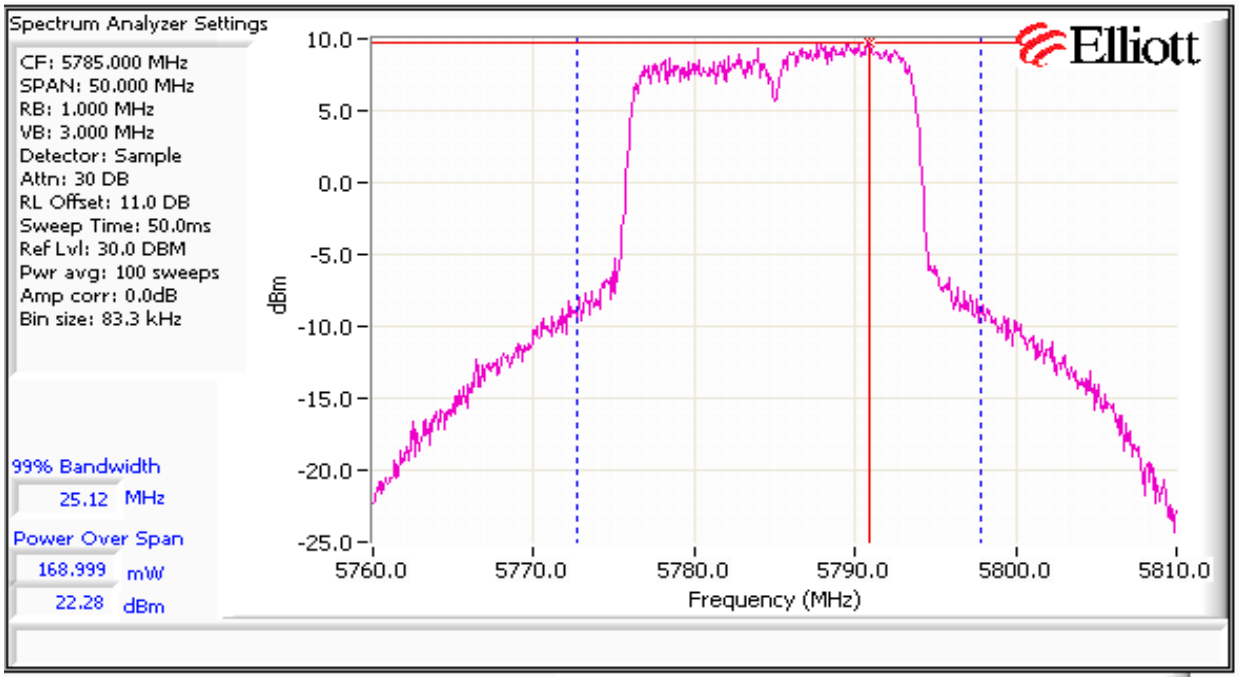
5745 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-						
Output Power (dBm) Note 1	16.99	16.5			19.8 dBm	0.095 W	29.0 dBm	0.792 W
Antenna Gain (dBi) Note 2	4	4			7.0 dBi		Pass	
eirp (dBm) Note 2	20.99	20.5			26.8 dBm	0.476 W		

5785 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-						
Output Power (dBm) Note 1	21.03	22.28			24.7 dBm	0.296 W	29.0 dBm	0.792 W
Antenna Gain (dBi) Note 2	4	4			7.0 dBi		Pass	
eirp (dBm) Note 2	25.03	26.28			31.7 dBm	1.486 W		

5825 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-						
Output Power (dBm) Note 1	20.16	21.16			23.7 dBm	0.234 W	29.0 dBm	0.792 W
Antenna Gain (dBi) Note 2	4	4			7.0 dBi		Pass	
eirp (dBm) Note 2	24.16	25.16			30.7 dBm	1.177 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	The power setting is provided for reference purposes only.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run 1c: Operating Mode: 802.11 HT40

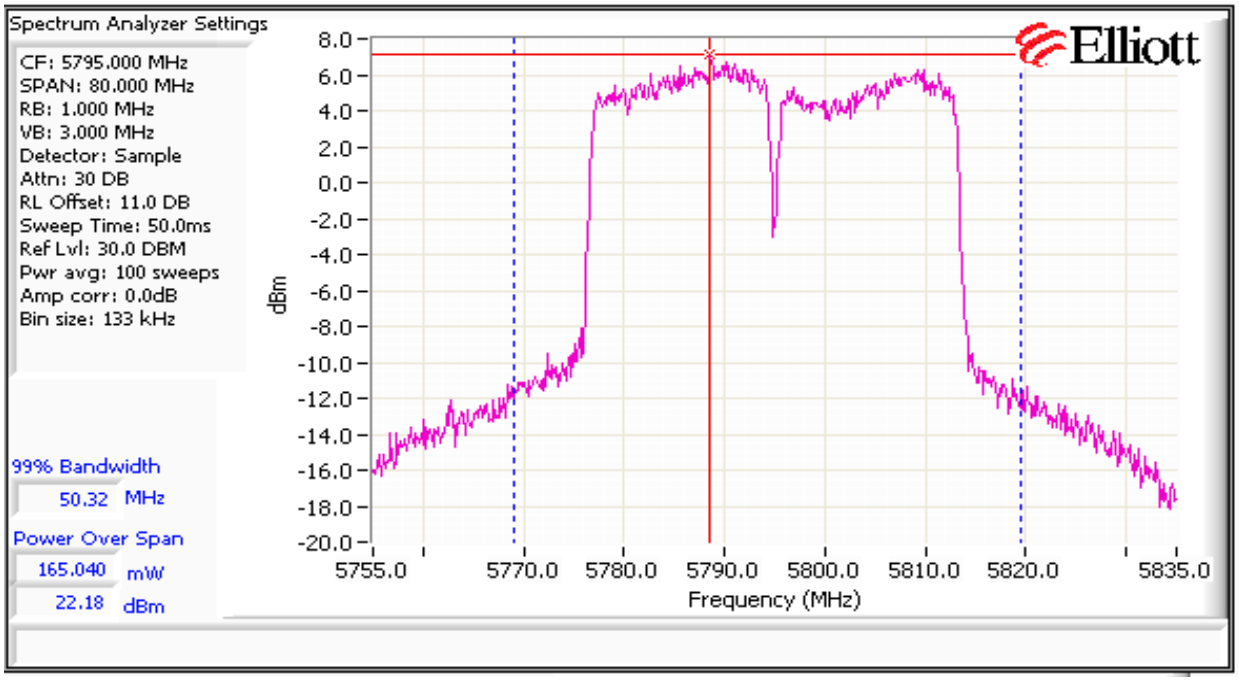
Transmitted signal on chain is coherent ? yes

5755 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-						
Output Power (dBm) Note 1	12.6	11.4			15.1 dBm	0.032 W	29.0 dBm	0.792 W
Antenna Gain (dBi) Note 2	4	4			7.0 dBi		Pass	
eirp (dBm) Note 2	16.6	15.4			22.1 dBm	0.161 W		

5795 MHz	Chain 1	Chain 2	Chain 3	Chain 4	Total Across All Chains		Limit	
Power Setting Note 3	-	-						
Output Power (dBm) Note 1	21.79	22.18			25.0 dBm	0.316 W	29.0 dBm	0.792 W
Antenna Gain (dBi) Note 2	4	4			7.0 dBi		Pass	
eirp (dBm) Note 2	25.79	26.18			32.0 dBm	1.589 W		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 80 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	As there is coherency between chains the effective antenna gain is the sum of the individual antenna gains and the eirp is the product of the total power and the effective antenna gain
Note 3:	The power setting is provided for reference purposes only.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



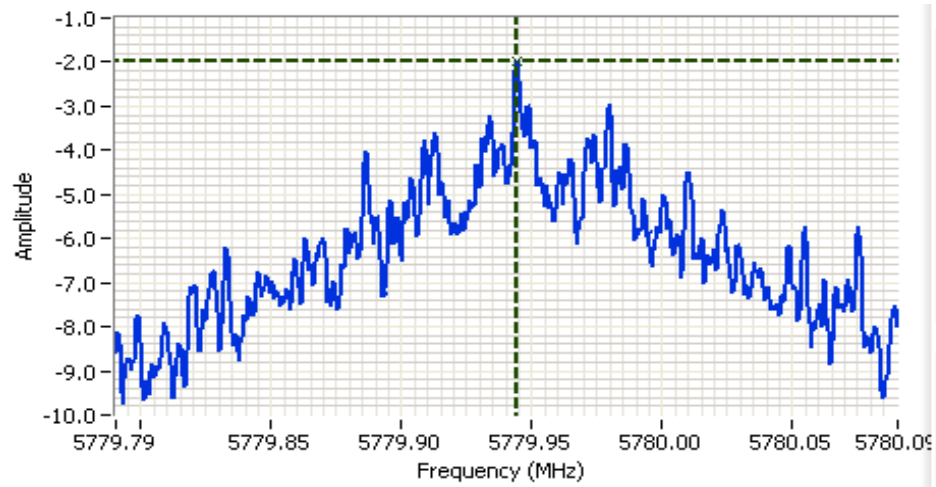
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #2: Power spectral Density

Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1 Chain 1	Chain 2	Chain 3	Chain 4	Total	Limit dBm/3kHz	Result
-	5745 - a	-5.8	-6.7			-3.2	8.0	Pass
-	5785 - a	-3.2	-2.8			0.0	8.0	Pass
-	5825 - a	-2.6	-3.5			0.0	8.0	Pass
-	5745 - HT20	-5.0	-2.4			-0.5	8.0	Pass
-	5785 - HT20	-2.0	-3.9			0.2	8.0	Pass
-	5825 - HT20	-4.8	-3.5			-1.1	8.0	Pass
-	5755 - HT40	-6.7	-5.8			-3.2	8.0	Pass
-	5795 - HT40	-4.5	-5.5			-1.9	8.0	Pass

Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



Analyzer Settings

Agilent Technologies, E4446A
CF: 5779.940 MHz
SPAN: 300 kHz
RB: 3.00 kHz
VB: 9.10 kHz
Detector: POS
Attn: 30 DB
RL Offset: 11.0 DB
Sweep Time: 100.0s
Ref Lvl: 30.0 DBM

Comments

PSD = -1.96dBm/3kHz
HT20
5785MHz Chain 1

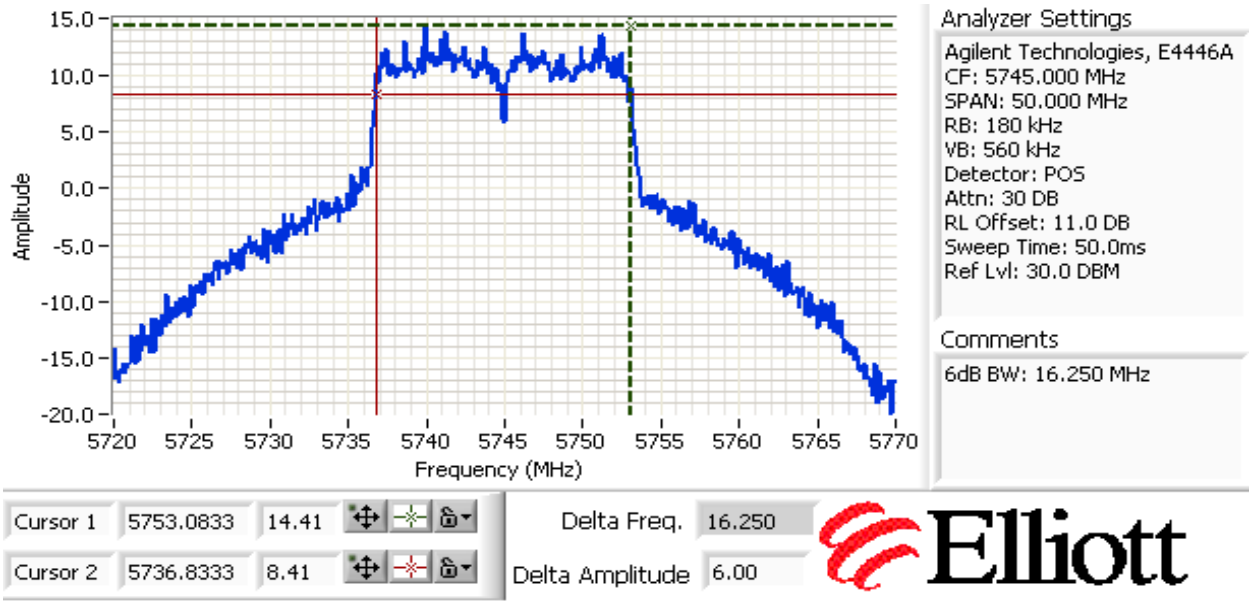
Elliott

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	Bandwidth (MHz) 99%	Comments
-	5745 - a	180kHz	16.25	25.46	
-	5785 - a	180kHz	16.33	25.12	
-	5825 - a	180kHz	16.33	19.55	
-	5745 - HT20	180kHz	17.25	26.54	See power plots for 99% bandwidth measurement (RB=1MHz, VB=3MHz)
-	5785 - HT20	180kHz	17.25	25.12	
-	5825 - HT20	180kHz	17.33	19.47	
-	5755 - HT40	390kHz	36.4	54.44	
-	5795 - HT40	390kHz	36.4	50.32	

Note 1:	Measured on a single chain
Note 2:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB



Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #4: Out of Band Spurious Emissions

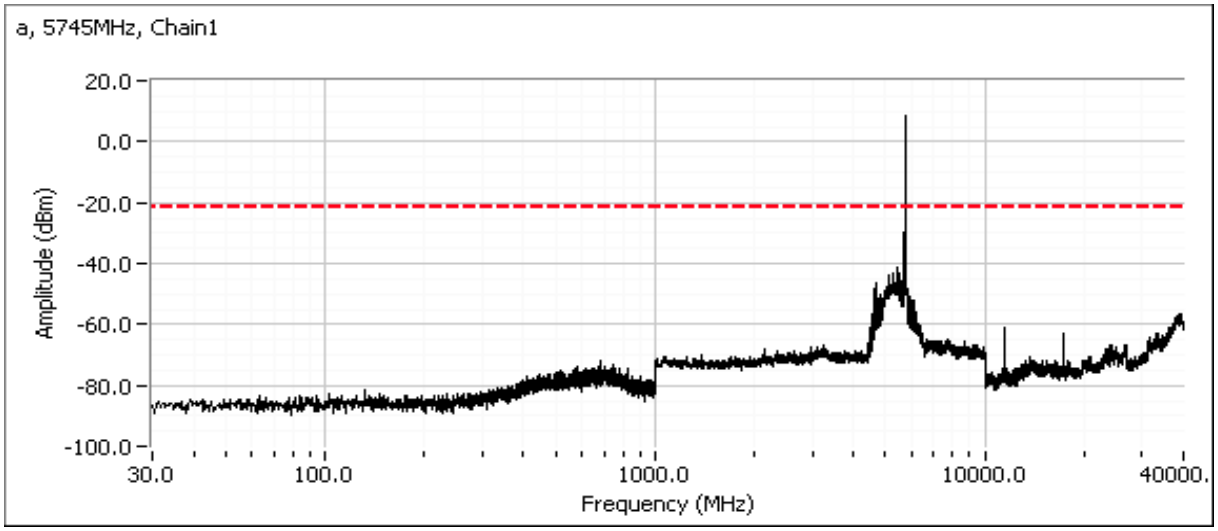
Power Setting	Frequency (MHz)	Limit	Result
-	5745 - a	-30 dBc	pass
-	5785 - a		pass
-	5825 - a		pass
-	5745 - HT20	-30 dBc	pass
-	5785 - HT20		pass
-	5825 - HT20		pass
-	5755 - HT40	-30dBc	pass
-	5795 - HT40		pass

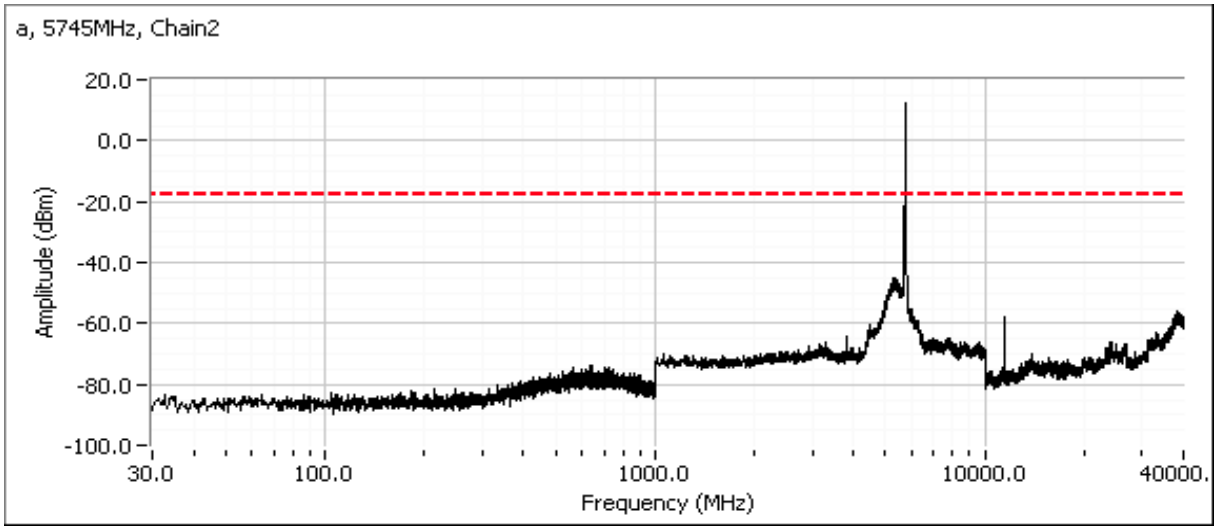
Note 1:	Measured on each chain individually

Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

a

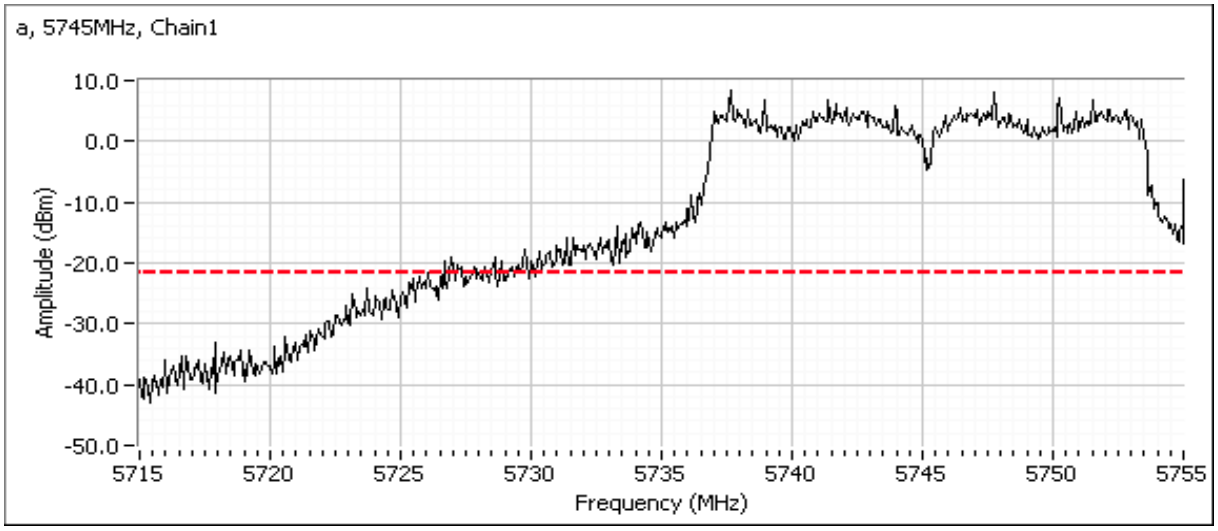
Plots for low channel

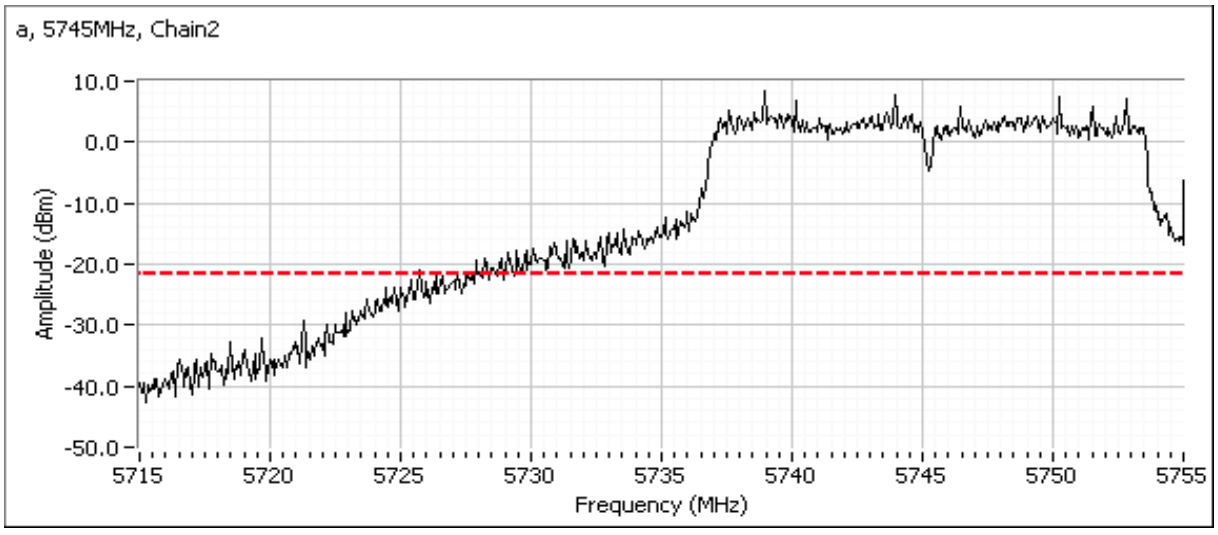




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

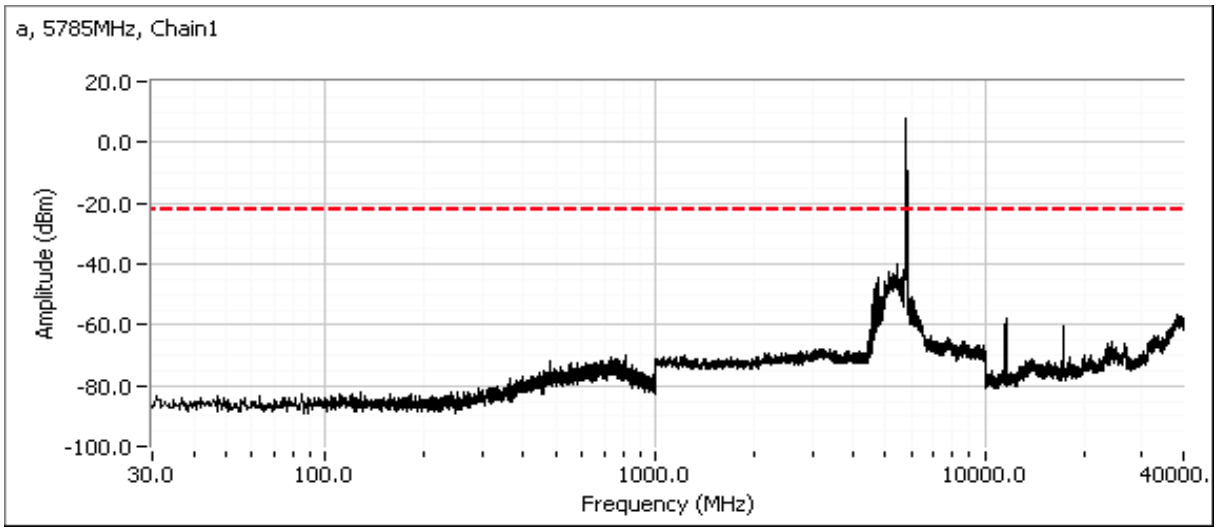
Additional plot from 5715 - 5755 MHz showing compliance with -30dBc at the band edge.

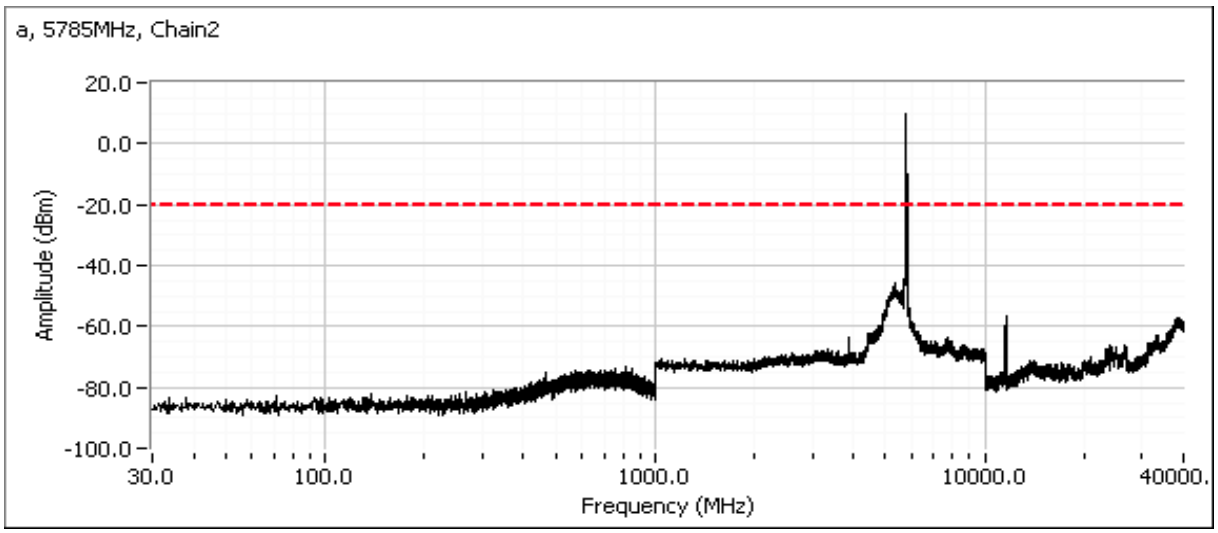




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

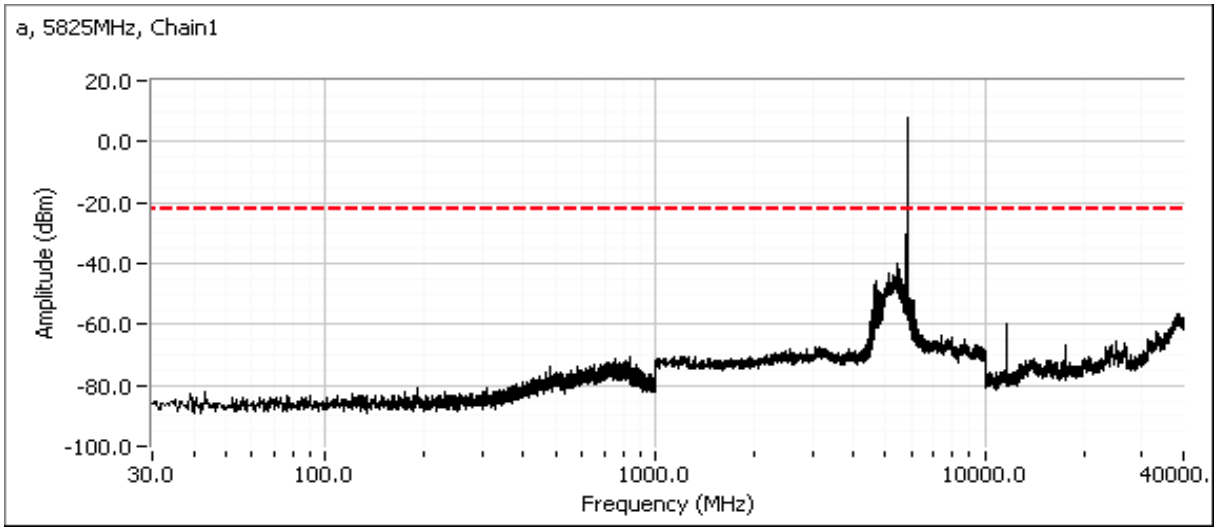
Plots for center channel

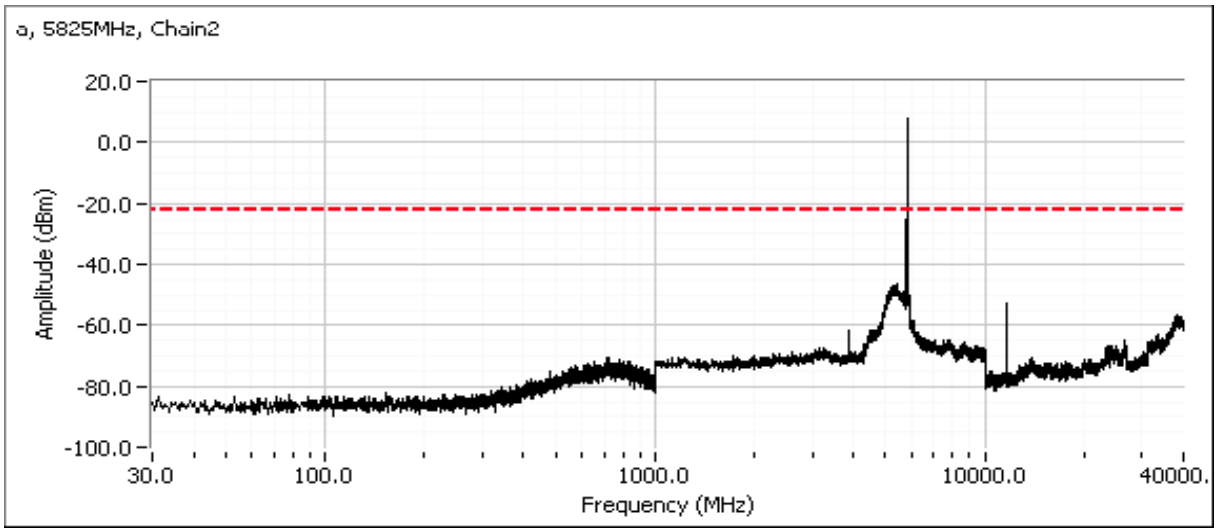




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

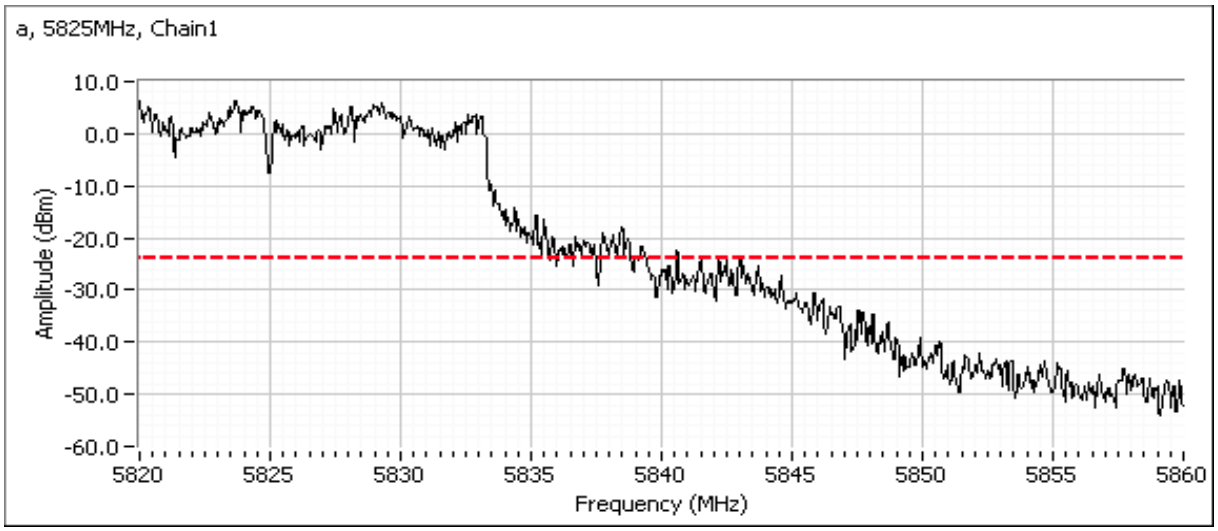
Plots for high channel

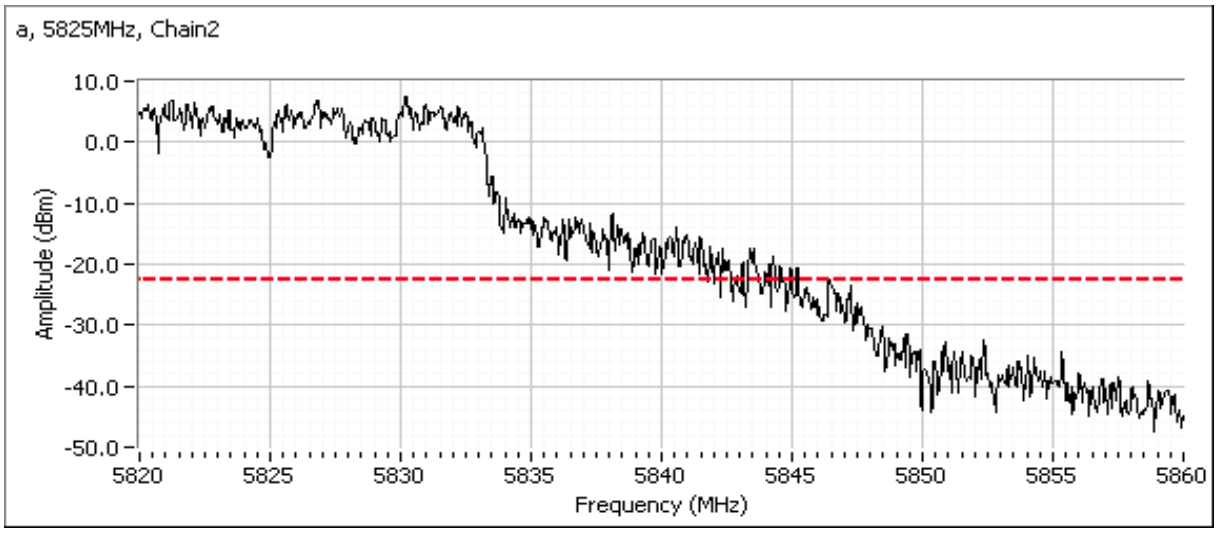




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Additional plot from 5820 - 5860 MHz showing compliance with -30dBc at the band edge.

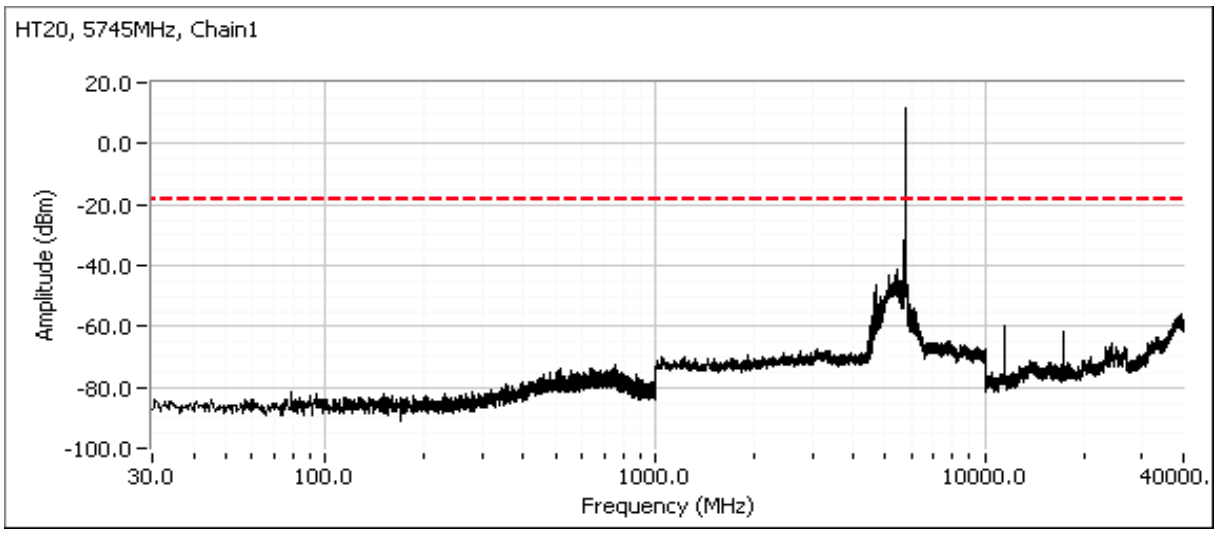


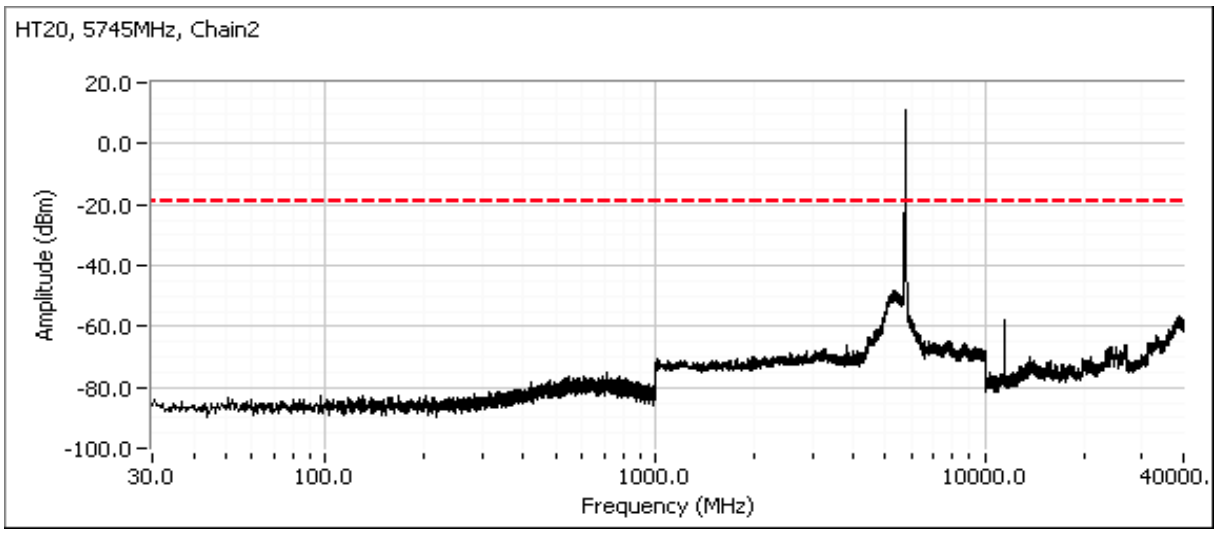


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

HT20

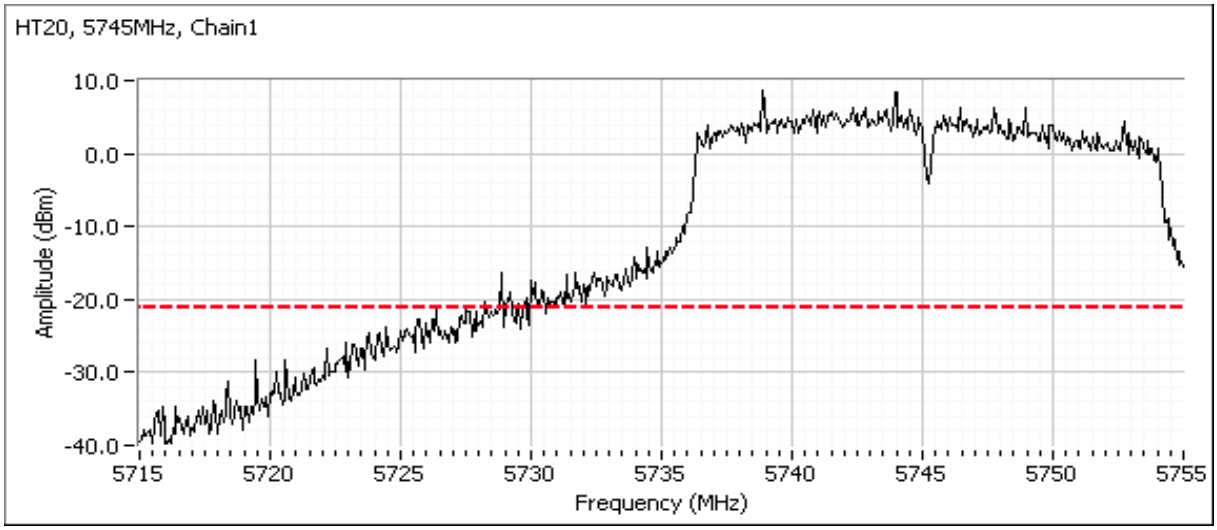
Plots for low channel

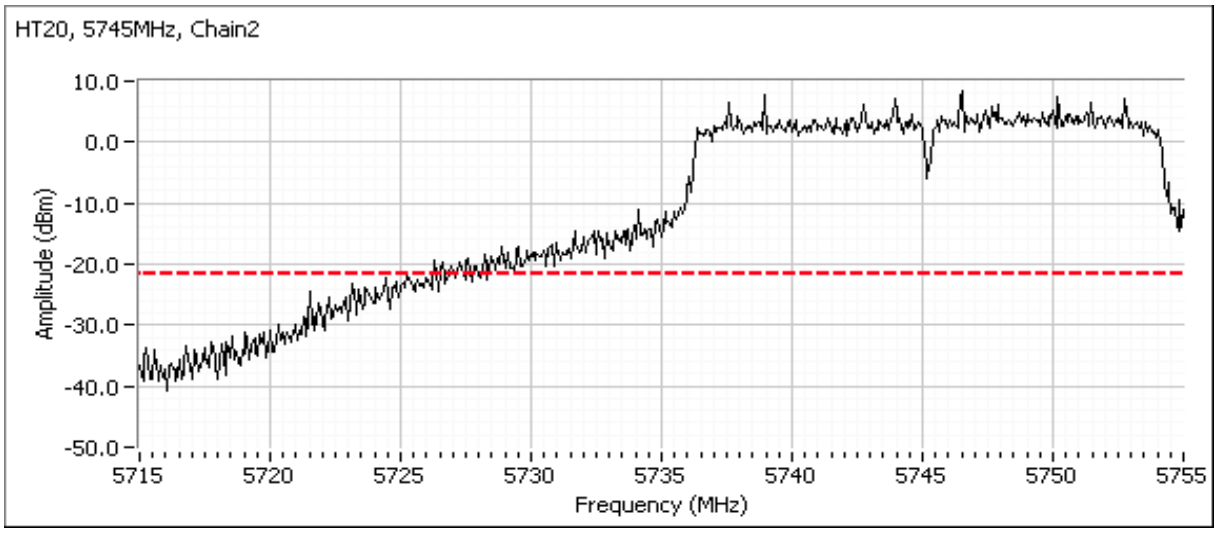




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

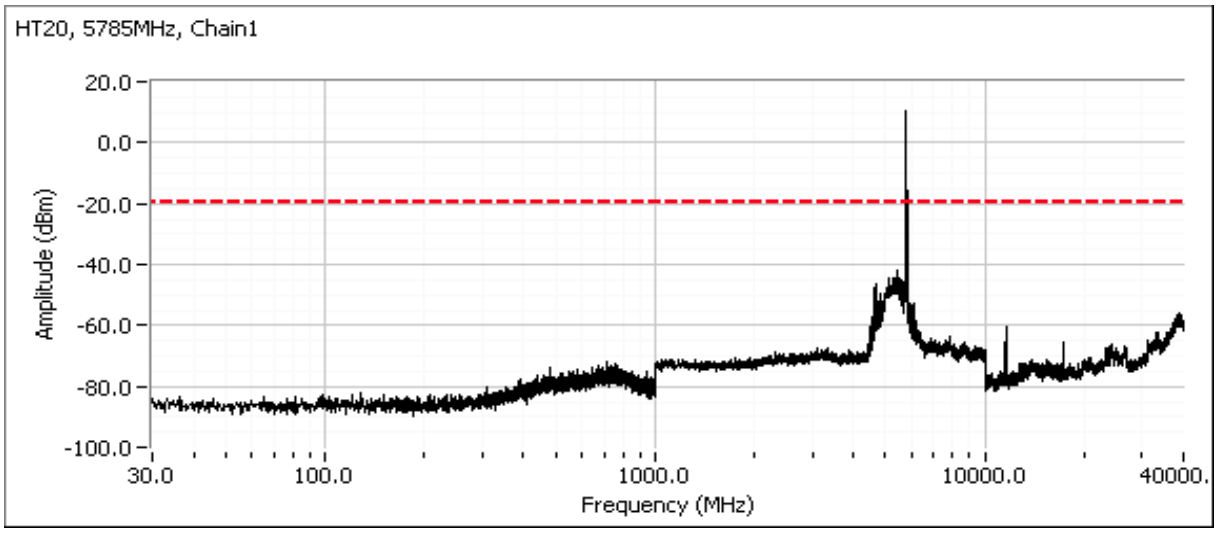
Additional plot from 5820 - 5860 MHz showing compliance with -30dBc at the band edge.

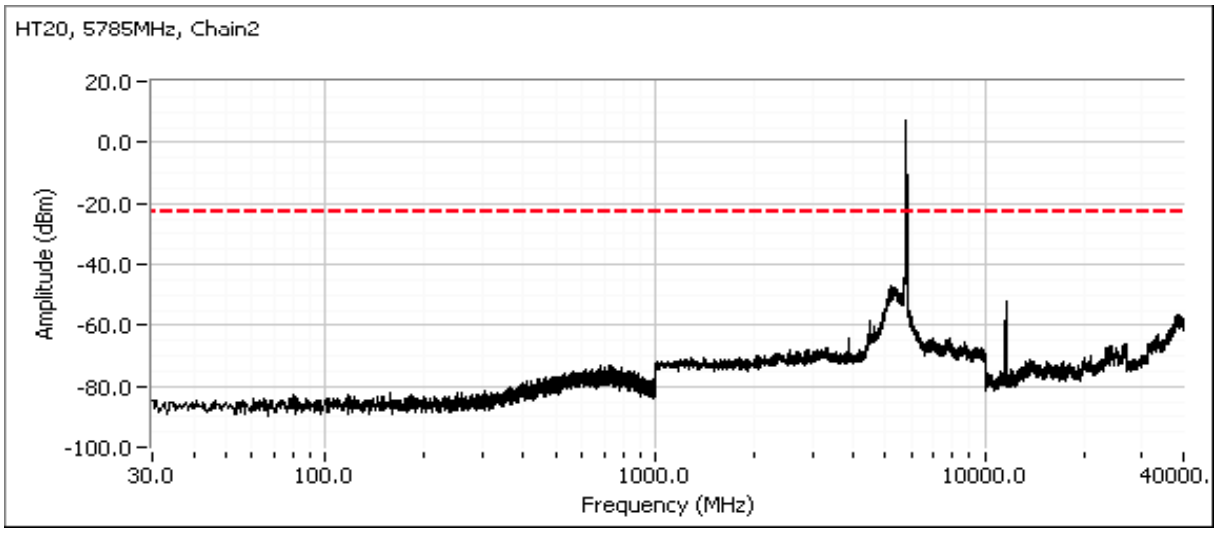




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

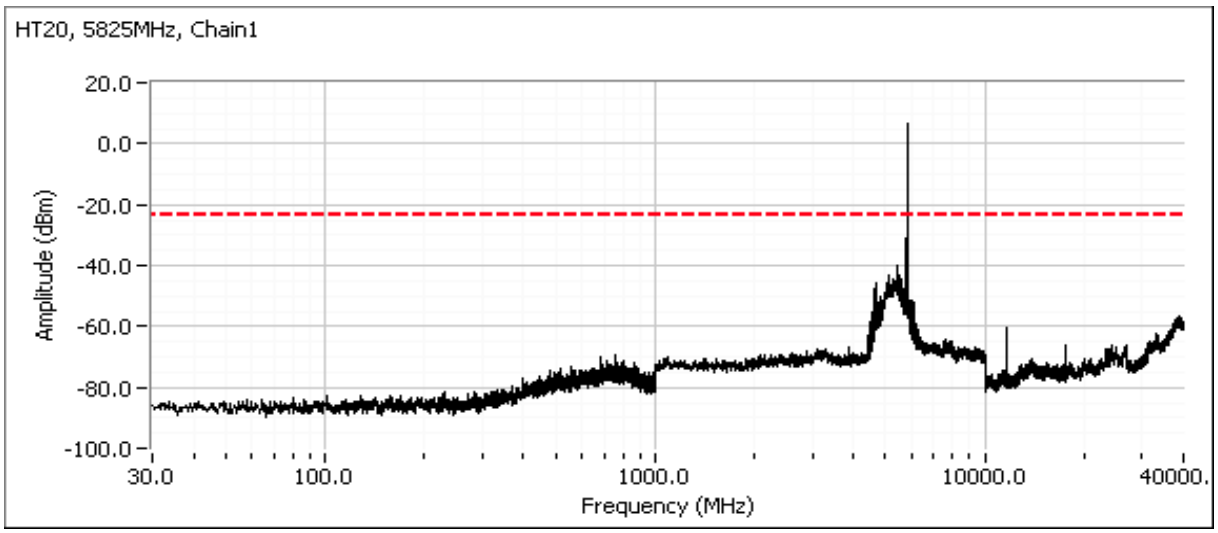
Plots for center channel

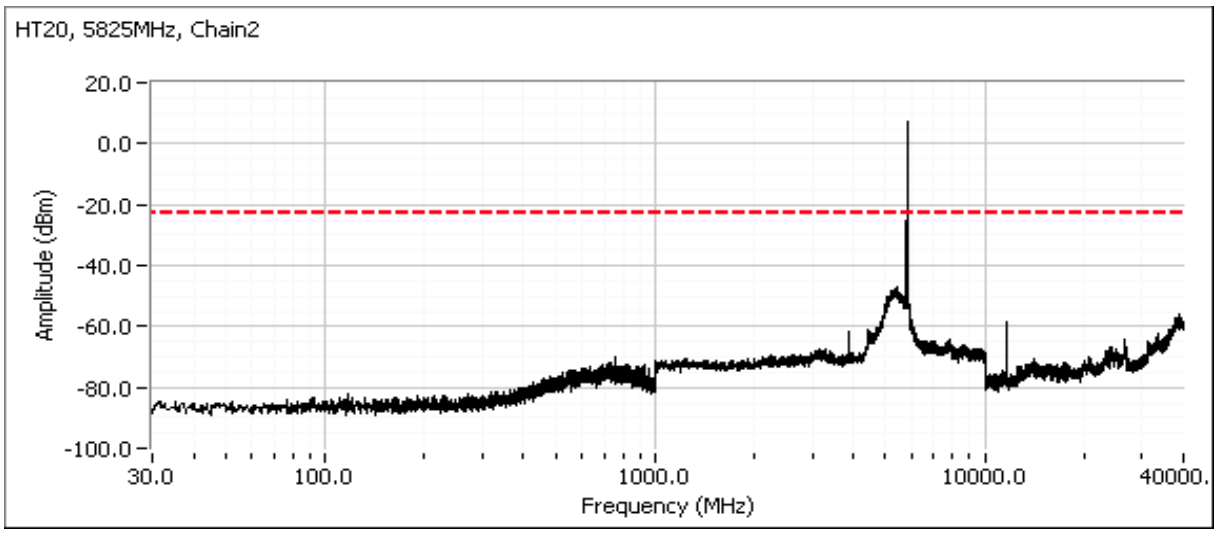




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

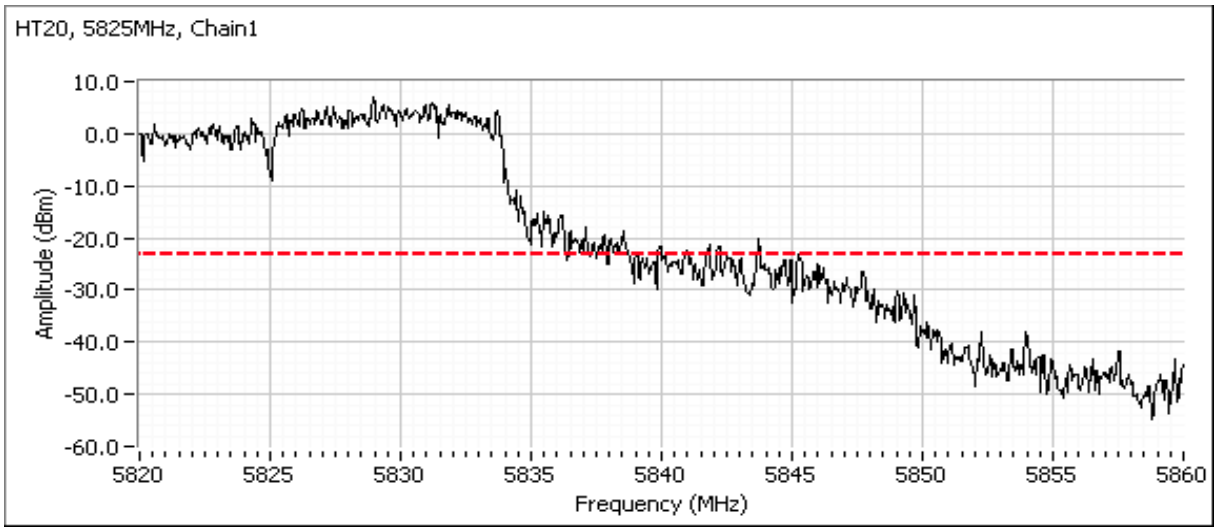
Plots for high channel

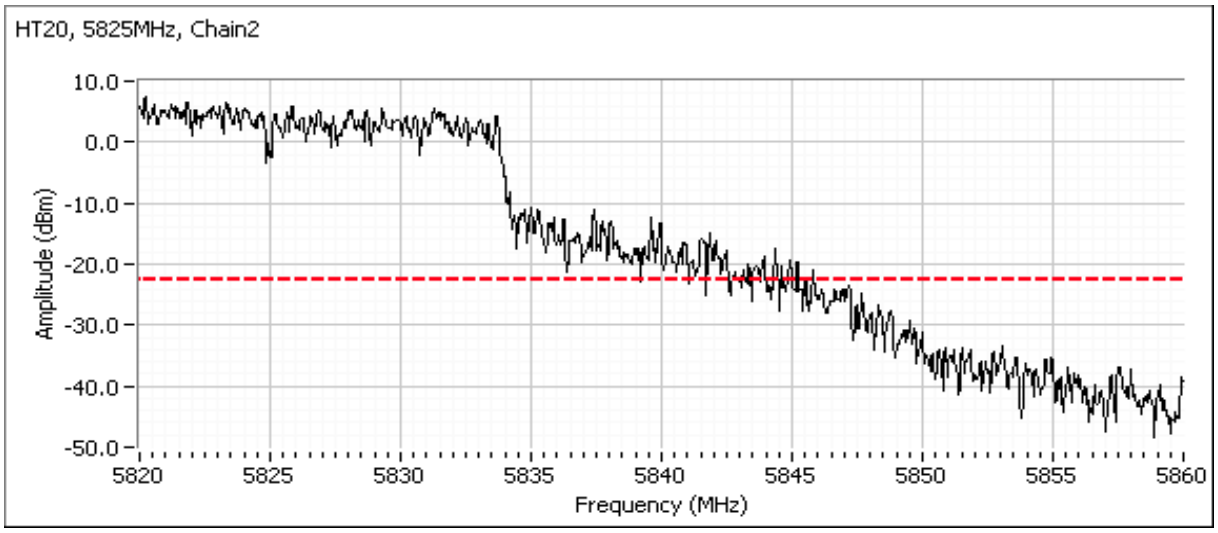




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Additional plot from 5715 - 5755 MHz showing compliance with -30dBc at the band edge.

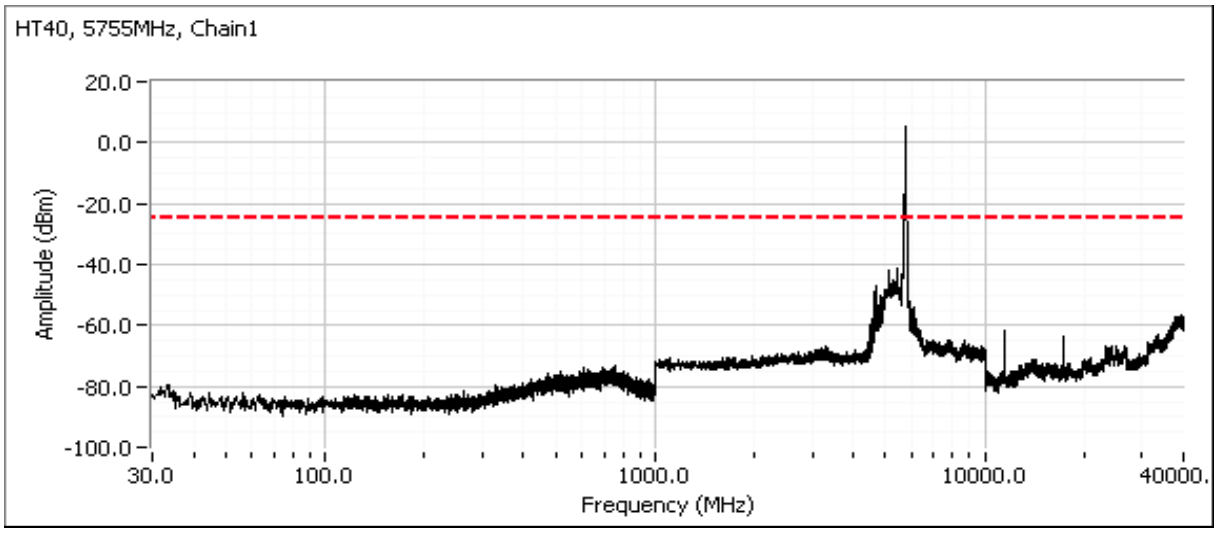


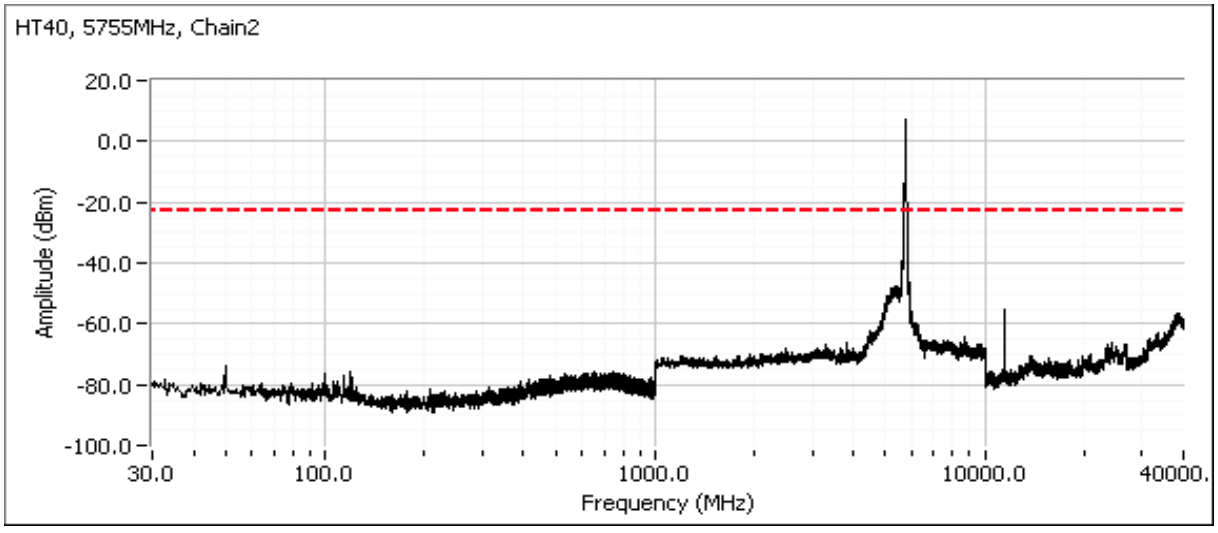


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

HT40

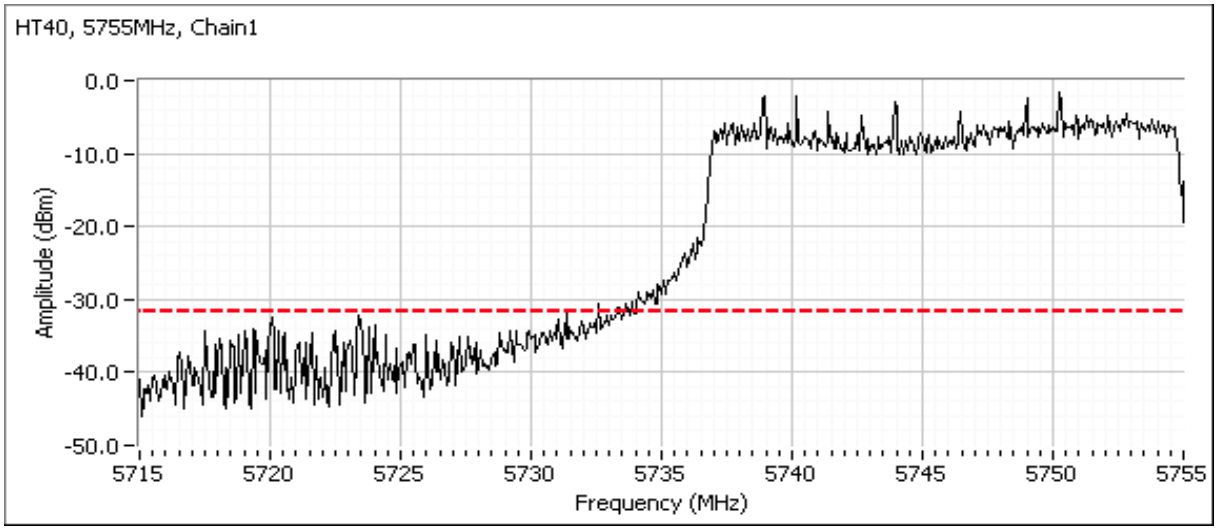
Plots for low channel

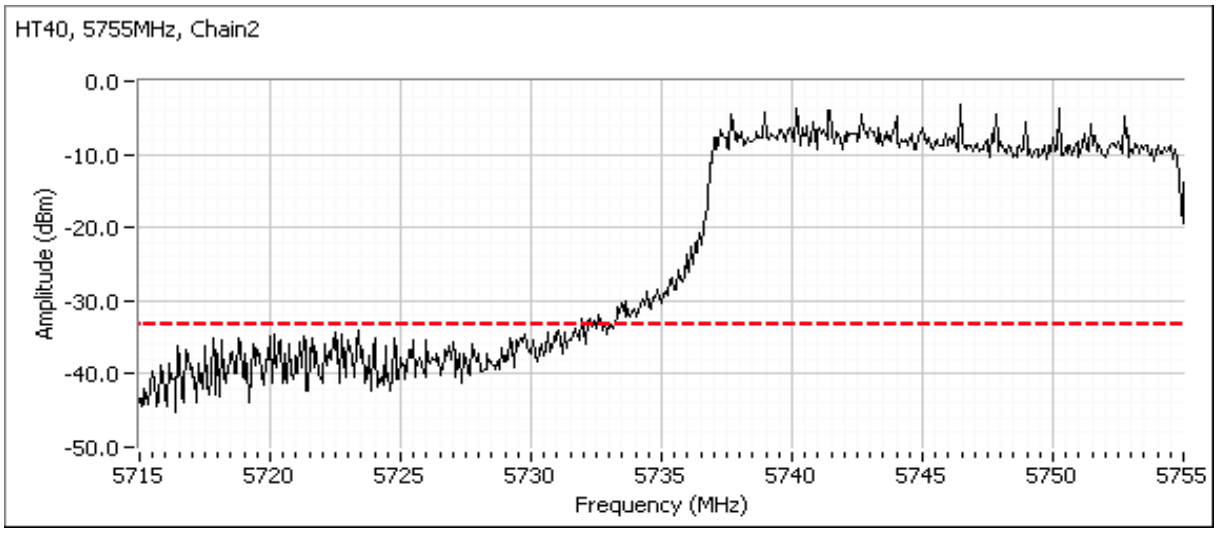




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

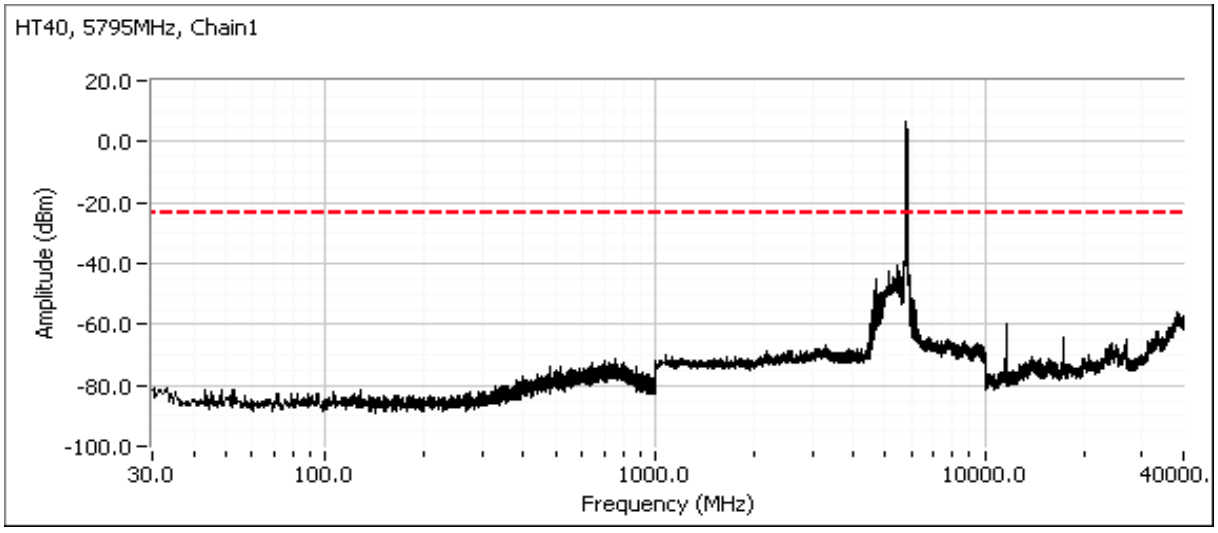
Additional plot from 5715 - 5755 MHz showing compliance with -30dBc at the band edge.

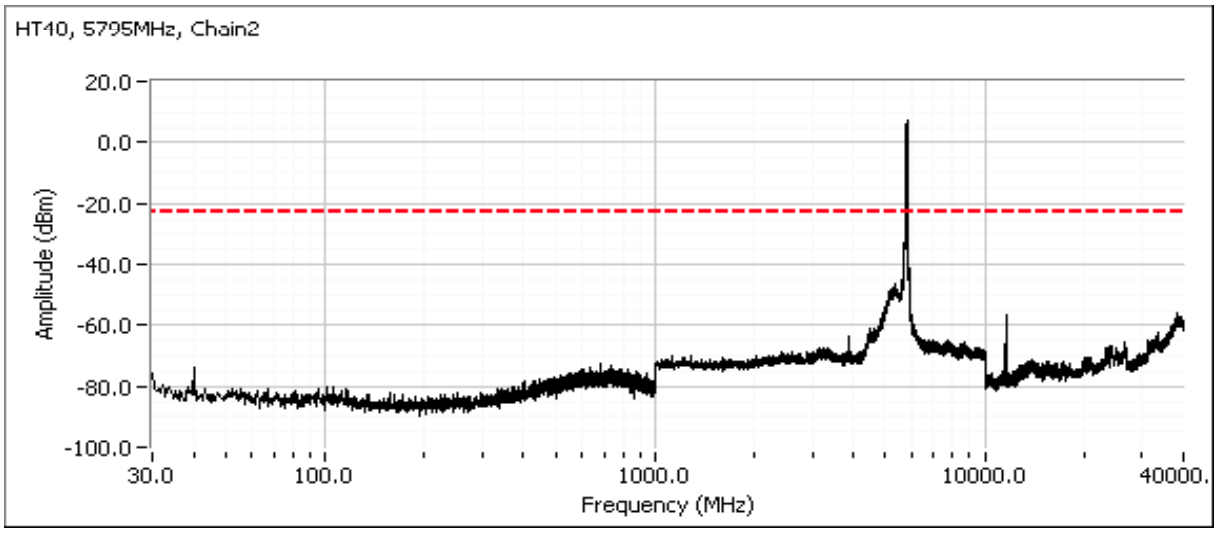




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

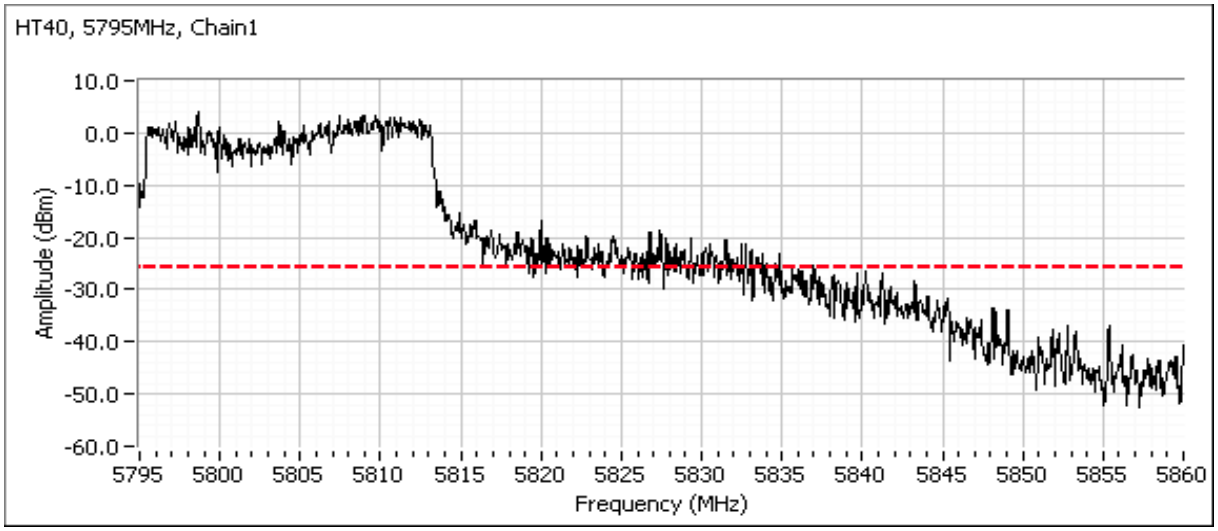
Plots for high channel

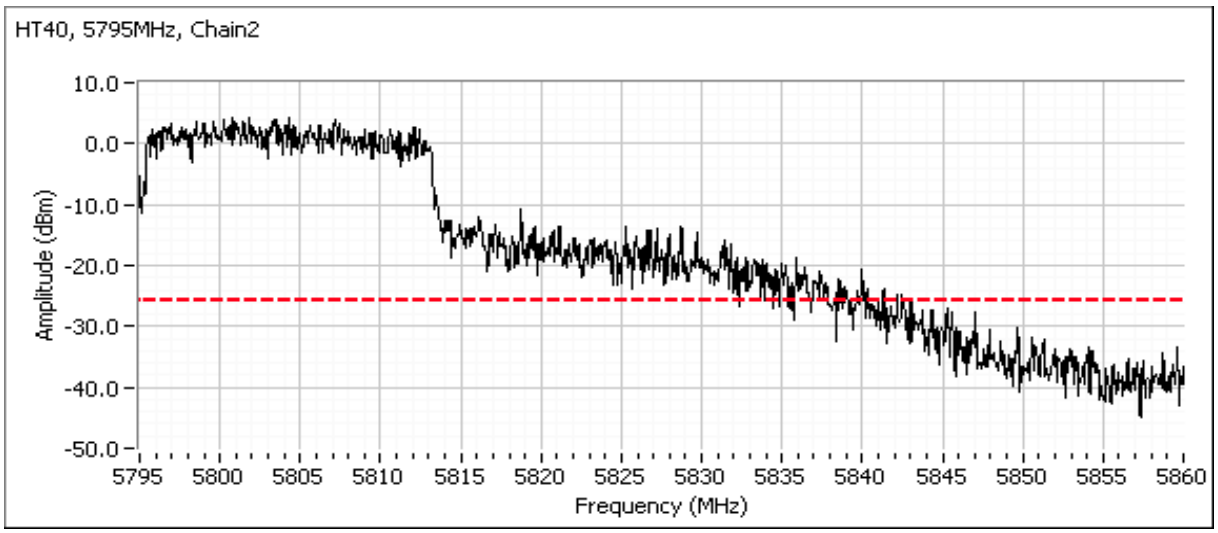




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Additional plot from 5820 - 5860 MHz showing compliance with -30dBc at the band edge.





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Conducted Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/12/2012
Test Engineer: Joseph Cadigal
Test Location: Fremont Chamber #4
Config. Used: 1
Config Change: none
EUT Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Ambient Conditions:

Temperature: 20.3 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	CE, AC Power,120V/60Hz	Class A	Pass	52.4 dBµV @ 21.663 MHz (-7.6 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

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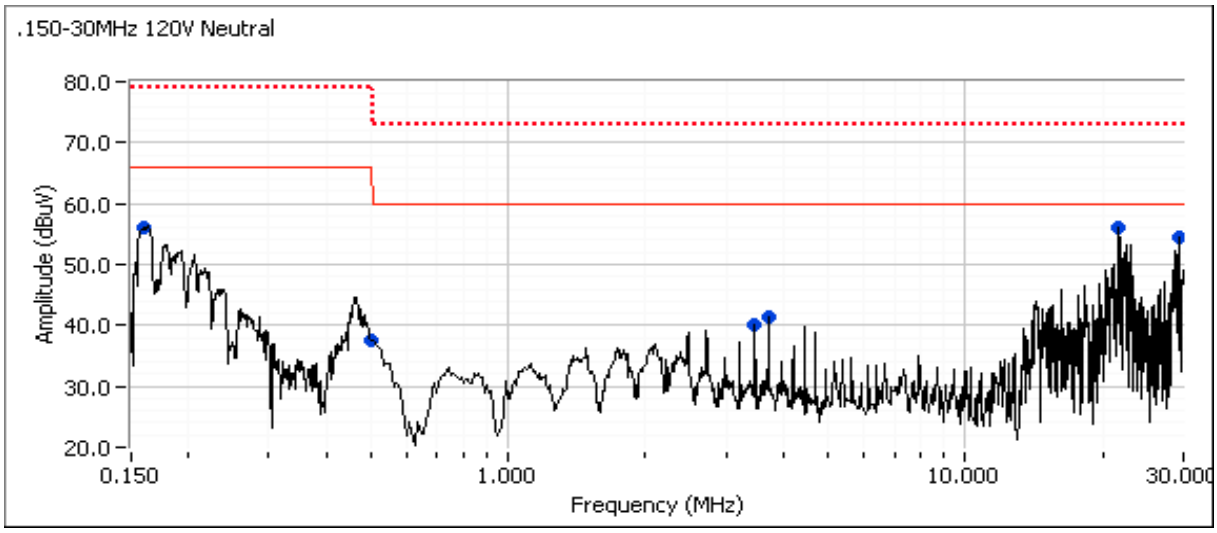
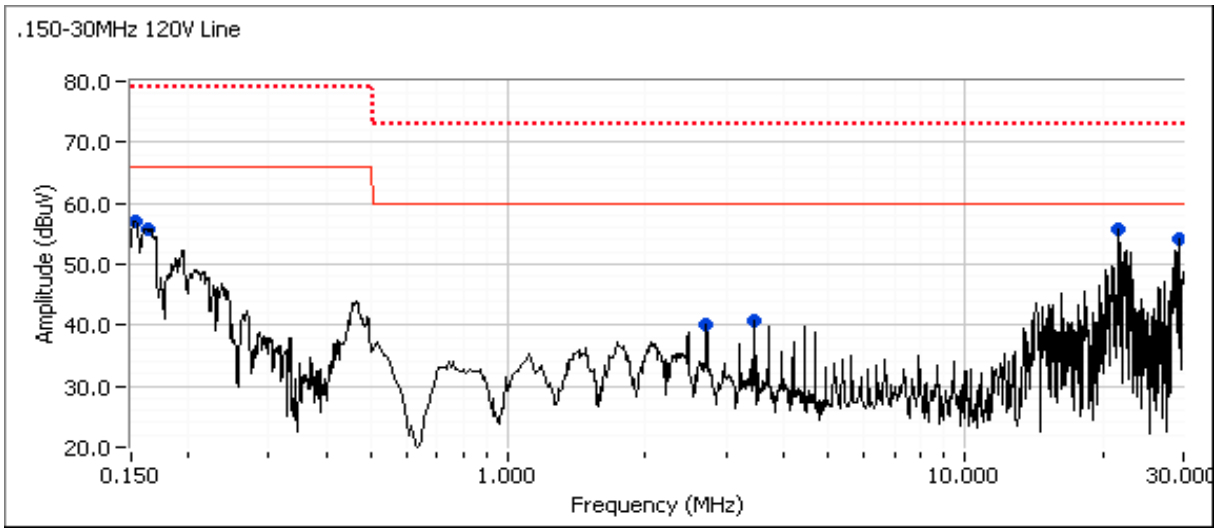
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz





Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	-

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	AC	Class A		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.160	56.0	Neutral	66.0	-10.0	Peak	
3.460	40.0	Neutral	60.0	-20.0	Peak	
3.707	41.5	Neutral	60.0	-18.5	Peak	
0.499	37.7	Neutral	66.0	-28.3	Peak	
21.663	56.2	Neutral	60.0	-3.8	Peak	
29.236	54.5	Neutral	60.0	-5.5	Peak	
0.153	57.0	Line 1	66.0	-9.0	Peak	
0.163	55.8	Line 1	66.0	-10.2	Peak	
2.718	40.0	Line 1	60.0	-20.0	Peak	
3.460	40.9	Line 1	60.0	-19.1	Peak	
21.663	55.7	Line 1	60.0	-4.3	Peak	
29.236	54.3	Line 1	60.0	-5.7	Peak	

Final quasi-peak and average readings

Frequency	Level	AC	Class A		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
21.663	52.4	Neutral	60.0	-7.6	AVG	AVG (0.10s)
21.663	51.7	Line 1	60.0	-8.3	AVG	AVG (0.10s)
29.236	50.8	Line 1	60.0	-9.2	AVG	AVG (0.10s)
29.236	50.7	Neutral	60.0	-9.3	AVG	AVG (0.10s)
21.663	56.0	Neutral	73.0	-17.0	QP	QP (1.00s)
21.663	55.5	Line 1	73.0	-17.5	QP	QP (1.00s)
29.236	54.0	Neutral	73.0	-19.0	QP	QP (1.00s)
29.236	54.0	Line 1	73.0	-19.0	QP	QP (1.00s)
0.153	55.1	Line 1	79.0	-23.9	QP	QP (1.00s)
0.160	54.7	Neutral	79.0	-24.3	QP	QP (1.00s)
0.163	54.0	Line 1	79.0	-25.0	QP	QP (1.00s)
3.460	33.6	Line 1	60.0	-26.4	AVG	AVG (0.10s)
3.460	32.9	Neutral	60.0	-27.1	AVG	AVG (0.10s)
2.718	32.9	Line 1	60.0	-27.1	AVG	AVG (0.10s)
3.707	32.0	Neutral	60.0	-28.0	AVG	AVG (0.10s)
0.160	36.7	Neutral	66.0	-29.3	AVG	AVG (0.10s)
0.153	35.0	Line 1	66.0	-31.0	AVG	AVG (0.10s)
0.163	32.8	Line 1	66.0	-33.2	AVG	AVG (0.10s)
3.460	39.3	Line 1	73.0	-33.7	QP	QP (1.00s)
3.460	39.0	Neutral	73.0	-34.0	QP	QP (1.00s)
3.707	39.0	Neutral	73.0	-34.0	QP	QP (1.00s)
2.718	37.9	Line 1	73.0	-35.1	QP	QP (1.00s)
0.499	27.2	Neutral	66.0	-38.8	AVG	AVG (0.10s)
0.499	35.8	Neutral	79.0	-43.2	QP	QP (1.00s)

End of Report

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marks the last page of this test report.