EMC Test Report

Application for Grant of Equipment Authorization

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

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
IC SITE REGISTRATION #:	2845B-4, 2845B-5
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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	3-19-2012	First release	

TABLE OF CONTENTS

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 E requirements for UNII Devices (using FCC DA 02-2138, August 30, 2002)

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 UNII test procedure 2002-08 DA-02-2138, August 2002

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:

RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15, Subpart E requirements for UNII Devices

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

UNII / LELAN DEVICES

Operation in the 5.15 – 5.25 GHz Band

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407(e)		Indoor operation only	Refer to user's manual	N/A	Complies
15.407(a) (2)		26dB Bandwidth	> 20MHz for all modes	N/A – limits output power if < 20MHz	N/A
15.407 (a) (1)	A9.2(1)	Output Power	a: 33.2 mW HT20: 32.5 mW HT40: 33.8 mW (Max eirp: 0.170 W)	17dBm	Complies
15.407 (a) (1)	-	Power Spectral Density	a: 2.9 dBm/MHz HT20: 2.7 dBm/MHz HT40: -0.1 dBm/MHz	4 dBm/MHz	Complies
-	A9.5 (2)			5 dBm/MHz	Complies

Requirements for all U-NII/LELAN bands

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407	A9.5a	Modulation	Digital Modulation is used	Digital modulation is required	Complies
15.407(b) (5) / 15.209	A9.3	Spurious Emissions	53.6dBµV/m @ 5149.9MHz (-0.4dB)	Refer to page 21	Complies
15.407(a)(6)	-	Peak Excursion Ratio	10.9 dB	< 13dB	Complies
	A9.5 (3)	Channel Selection	Spurious emissions tested at outermost channels in each band	Device was tested on the top, bottom and center channels in each band	N/A
15			Measurements on three channels in each band		
15.407 (c)	A9.5(4)	Operation in the absence of information to transmit	Operation is discontinued in the absence of information	Device shall automatically discontinue operation in the absence of information to transmit	Complies
15.407 (g)	A9.5 (5)	Frequency Stability	Frequency stability is better than 10ppm	Signal shall remain within the allocated band	Complies
15.407 (h1)	A9.4	Transmit Power Control	Device does not operate in either 5470 – 5725 or 5250 – 5350 MHz bands.		N/A
15.407 (h2)	A9.4	Dynamic frequency Selection (device with radar detection)	Device does not operate in either 5470 – 5725 or 5250 – 5350 MHz bands.		N/A
	A9.9g	User Manual information	Refer to Exhibit 6 for details	Warning regarding interference from Satellite Systems	Complies

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 18	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	802.11a: 16.9 MHz 802.11n 20MHz: 18.0 MHz 802.11n n40MHz: 36.6 MHz	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 simultanously. 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 25, February 2 and March 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	

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.

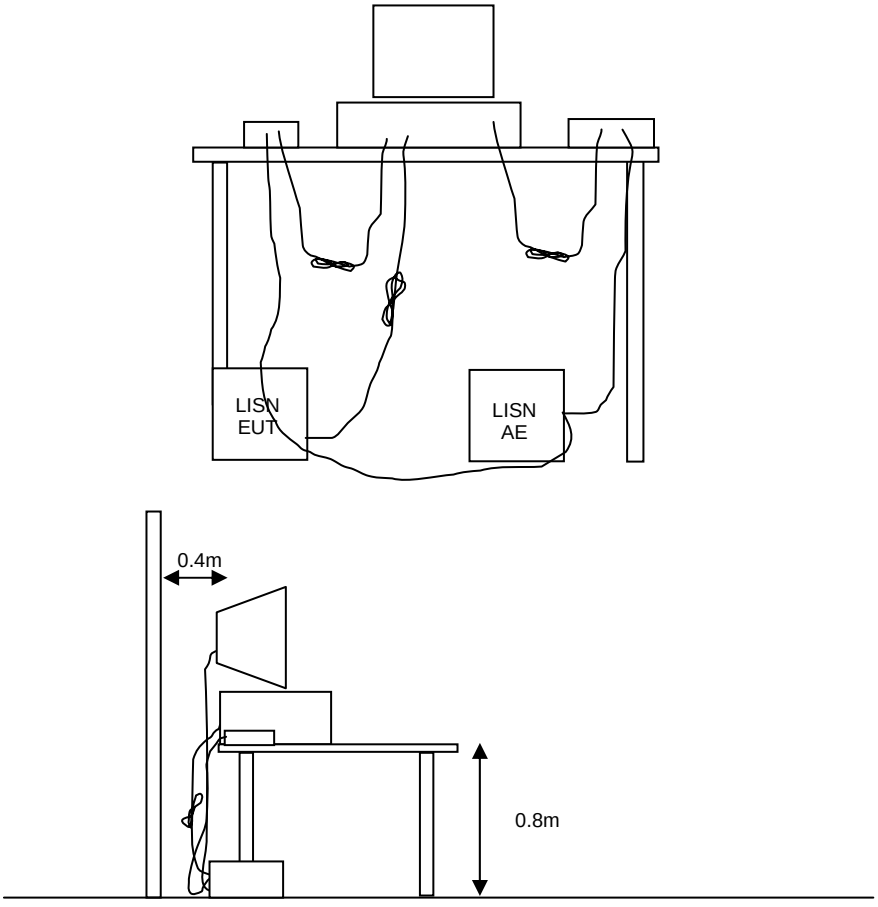


Figure 1 Typical Conducted Emissions Test Configuration

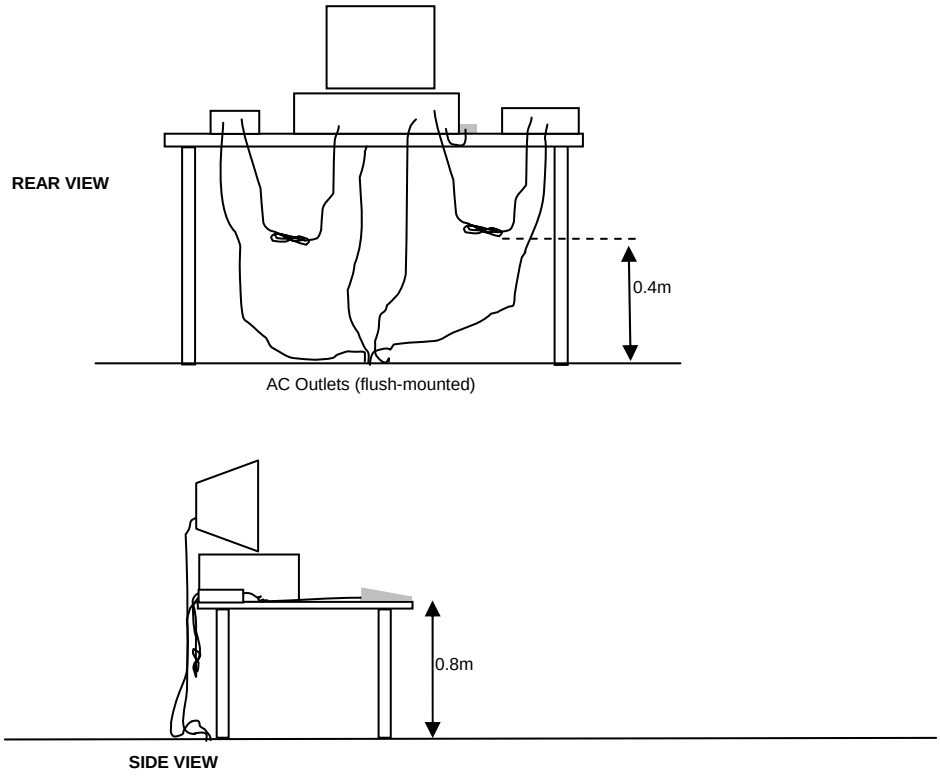
RADIATED EMISSIONS

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.

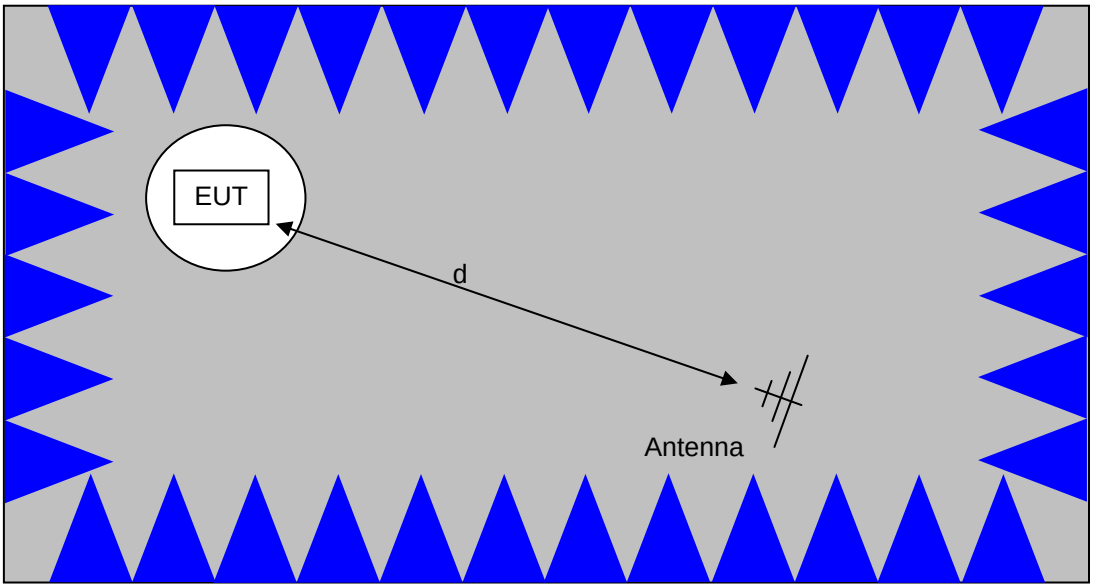
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

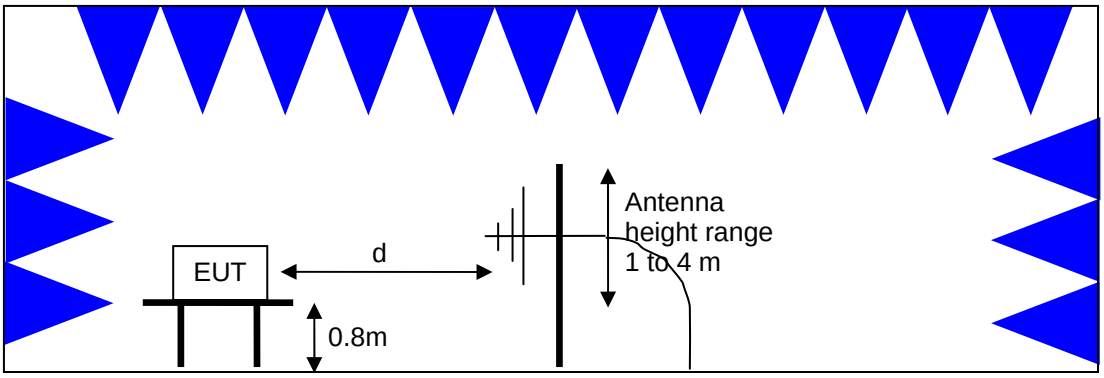


Typical Test Configuration for Radiated Field Strength Measurements



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.

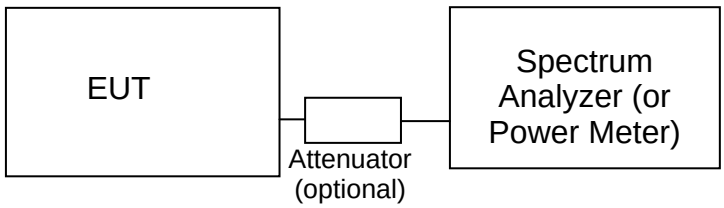
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

FCC 15.407 (a) OUTPUT POWER LIMITS

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
5150 – 5250	50mW (17 dBm)	4 dBm/MHz
5250 – 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

The peak excursion envelope is limited to 13dB.

OUTPUT POWER LIMITS –LELAN DEVICES

The table below shows the limits for output power and output power density defined by RSS 210. 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
5150 – 5250	200mW (23 dBm) eirp	10 dBm/MHz eirp
5250 – 5350	250 mW (24 dBm)[2] 1W (30dBm) eirp	11 dBm/MHz
5470 – 5725	250 mW (24 dBm)[3] 1W (30dBm) eirp	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm) 4W eirp	17 dBm/MHz

In addition, the power spectral density limit shall be reduced by 1dB for every dB the highest power spectral density exceeds the "average" power spectral density) by more than 3dB. The "average" power spectral density is determined by dividing the output power by 10log(EBW) where EBW is the 99% power bandwidth.

Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

[2] If EIRP exceeds 500mW the device must employ TPC
[3] If EIRP exceeds 500mW the device must employ TPC

SPURIOUS EMISSIONS LIMITS –UNII and LELAN DEVICES

The spurious emissions limits for signals below 1GHz are the FCC/RSS-GEN general limits. For emissions above 1GHz, signals in restricted bands are subject to the FCC/RSS GEN general limits. All other signals have a limit of –27dBm/MHz, which is a field strength of 68.3dBuV/m/MHz at a distance of 3m. This is an average limit so the peak value of the emission may not exceed –7dBm/MHz (88.3dBuV/m/MHz at a distance of 3m). For devices operating in the 5725-5850Mhz bands under the LELAN/UNII rules, the limit within 10Mhz of the allocated band is increased to –17dBm/MHz.

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, 1-26.5GHz	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 - 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 MHz	BRM50702-02	2238	10/4/2012
Hewlett Packard	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 27 - 63

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 15.247/15.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

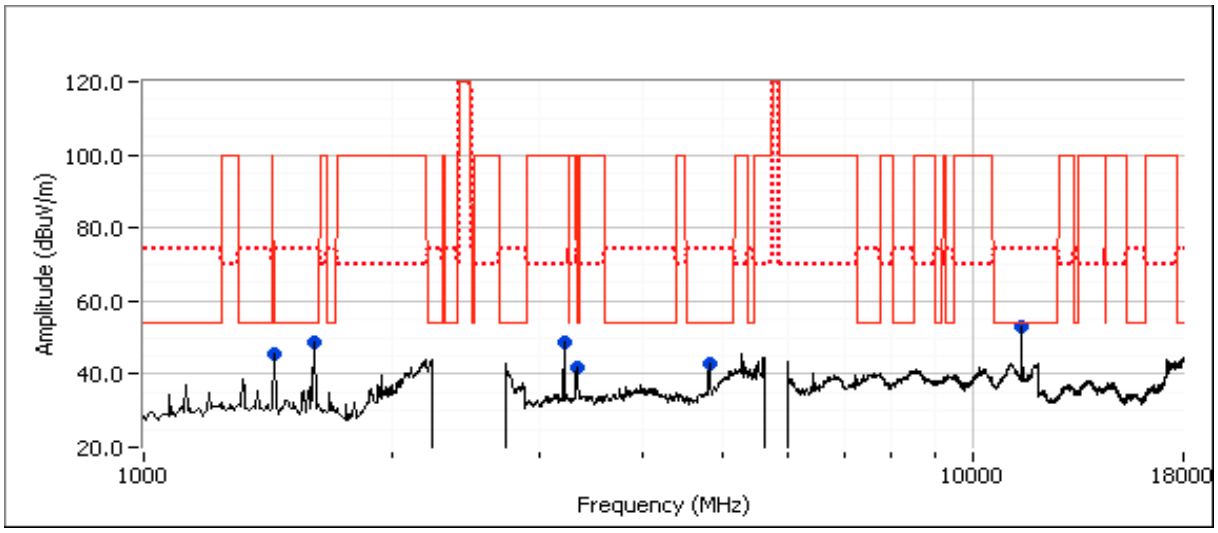
Run #1: Radiated Spurious Emissions, 1000 - 18,000 MHz. Operating Mode: 802.11g and 802.11a

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.

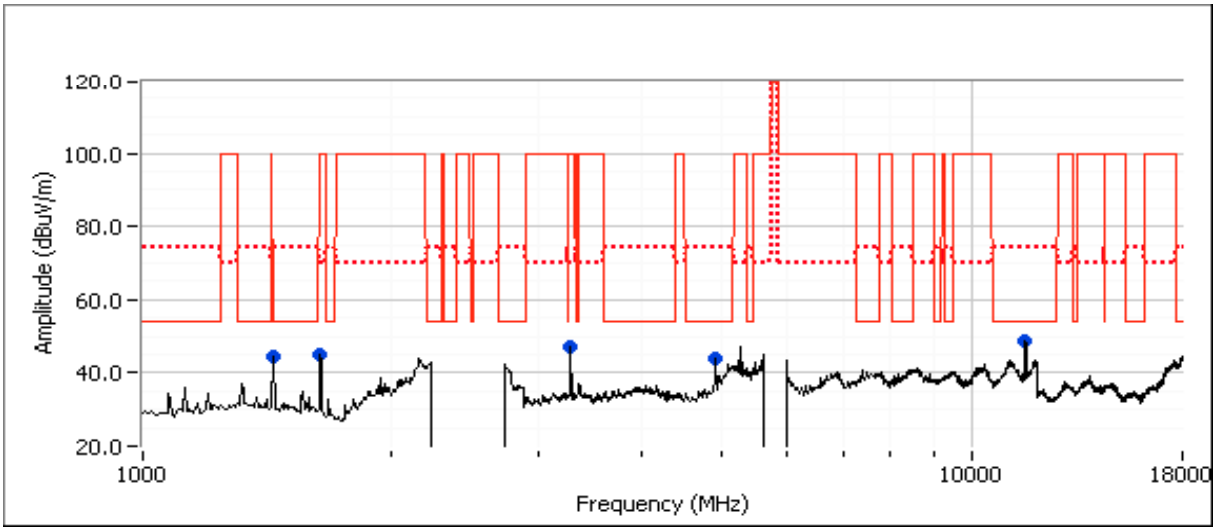


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

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 15.407 (UNII) 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.

Date of Test: 1/25/2012 17:53
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #5

Config. Used: 1
Config Change: None
EUT Voltage: 48Vdc

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

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	802.11a Chain A+B	5150-5250 Low	-		Restricted Band Edge at 5150 MHz	15.209	52.8dBµV/m @ 5149.5MHz (-1.2dB)
	802.11n20 Chain A+B	5150-5250 Low	-		Restricted Band Edge at 5150 MHz	15.209	53.6dBµV/m @ 5149.9MHz (-0.4dB)
	802.11n40 Chain A+B	5150-5250 Low	-		Restricted Band Edge at 5150 MHz	15.209	72.6dBµV/m @ 5149.8MHz (-1.4dB)

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

Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB

Antenna: 4dBi Internal Antenna
Duty Cycle: >98%

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

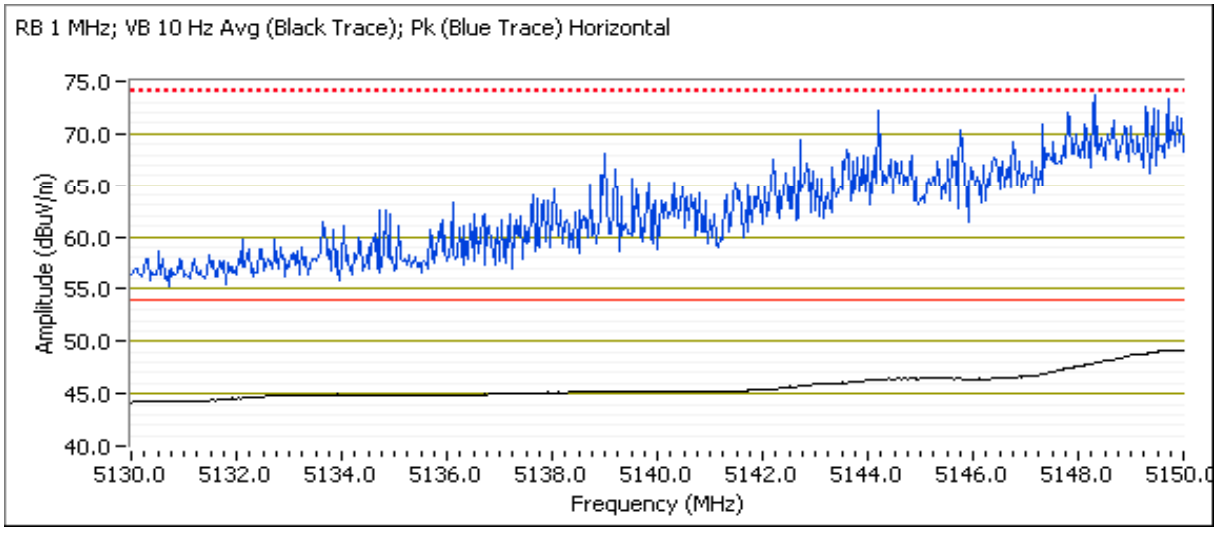
Run #1, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5150-5250 MHz Band

Date of Test: 2/25/2012
Test Engineer: Rafael Varelas
Test Location: FT Chamber #5

Run #1a: Low Channel, 802.11a

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.530	52.8	H	54.0	-1.2	AVG	314	1.0	RB 1 MHz;VB 10 Hz;Pk
5149.670	70.1	H	74.0	-3.9	PK	314	1.0	RB 1 MHz;VB 3 MHz;Pk
5149.530	49.0	V	54.0	-5.0	AVG	205	1.2	RB 1 MHz;VB 10 Hz;Pk
5143.400	69.5	V	74.0	-4.5	PK	205	1.2	RB 1 MHz;VB 3 MHz;Pk

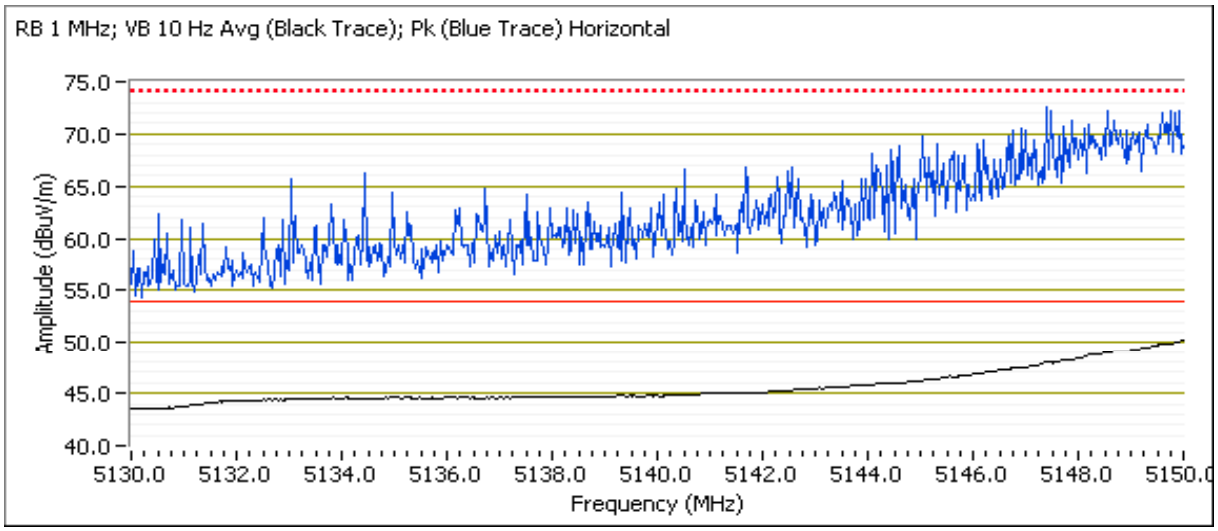


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1b: Low Channel, 802.11n20

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.930	53.6	H	54.0	-0.4	AVG	318	1.0	RB 1 MHz;VB 10 Hz;Pk
5146.970	72.0	H	74.0	-2.0	PK	318	1.0	RB 1 MHz;VB 3 MHz;Pk
5149.770	47.2	V	54.0	-6.8	AVG	165	1.0	RB 1 MHz;VB 10 Hz;Pk
5149.670	64.1	V	74.0	-9.9	PK	165	1.0	RB 1 MHz;VB 3 MHz;Pk

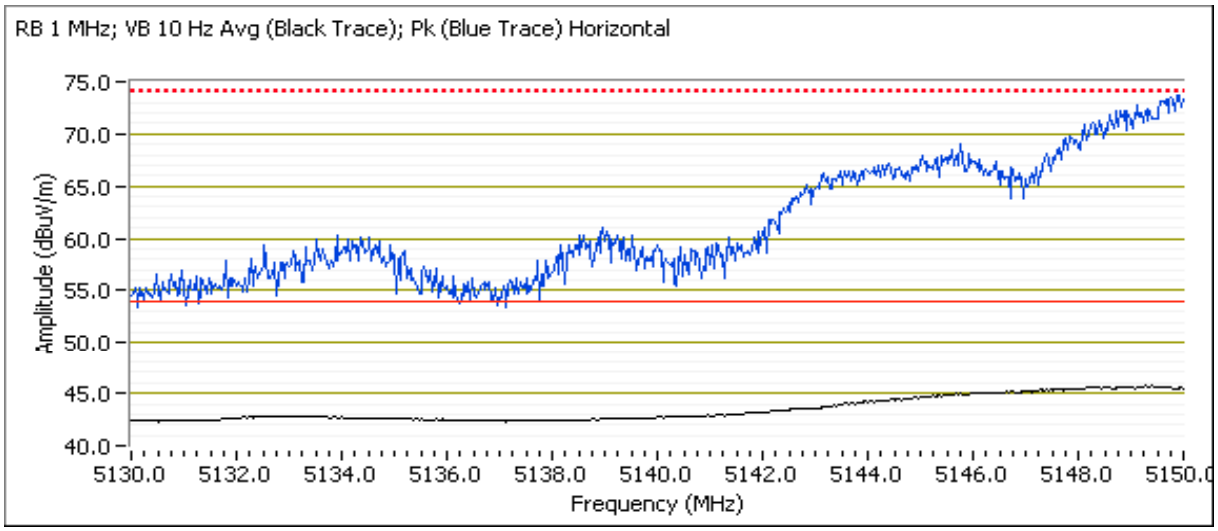


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1c: Low Channel, 802.11n40

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.130	48.3	H	54.0	-5.7	AVG	340	1.0	RB 1 MHz;VB 10 Hz;Pk
5149.770	72.6	H	74.0	-1.4	PK	340	1.0	RB 1 MHz;VB 3 MHz;Pk
5137.800	43.1	V	54.0	-10.9	AVG	90	1.5	RB 1 MHz;VB 10 Hz;Pk
5146.770	54.0	V	74.0	-20.0	PK	90	1.5	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 15.407 (UNII) 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.

Date of Test: 1/25/2012 17:53
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #5

Config. Used: 1
Config Change: None
EUT Voltage: 48Vdc

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

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1 802.11a	802.11a Chain A+B	5150-5250 Low	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	46.4dBµV/m @ 4600.0MHz (-7.6dB)
	802.11a Chain A+B	5150-5250 Center	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	46.3dBµV/m @ 4600.0MHz (-7.7dB)
	802.11a Chain A+B	5150-5250 High	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	48.5dBµV/m @ 4640.0MHz (-5.5dB)
2 802.11n20	802.11n20 Chain A+B	5150-5250 Low	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	48.3dBµV/m @ 4640.0MHz (-5.7dB)
	802.11n20 Chain A+B	5150-5250 Center	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	46.7dBµV/m @ 4600.0MHz (-7.3dB)
	802.11n20 Chain A+B	5150-5250 High	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	49.9dBµV/m @ 5440.1MHz (-4.1dB)
3 802.11n40	802.11n40 Chain A+B	5150-5250 Low	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	45.3dBµV/m @ 1440.1MHz (-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.

Test Procedure Comments:

Unless otherwise noted, average measurements above 1GHz were performed as documented in FCC KDB 789033 G) 6) d) Method VB

Antenna: 4dBi Internal Antenna
Duty Cycle: >98%

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. Operation in the 5150-5250 MHz Band. Mode: 802.11a

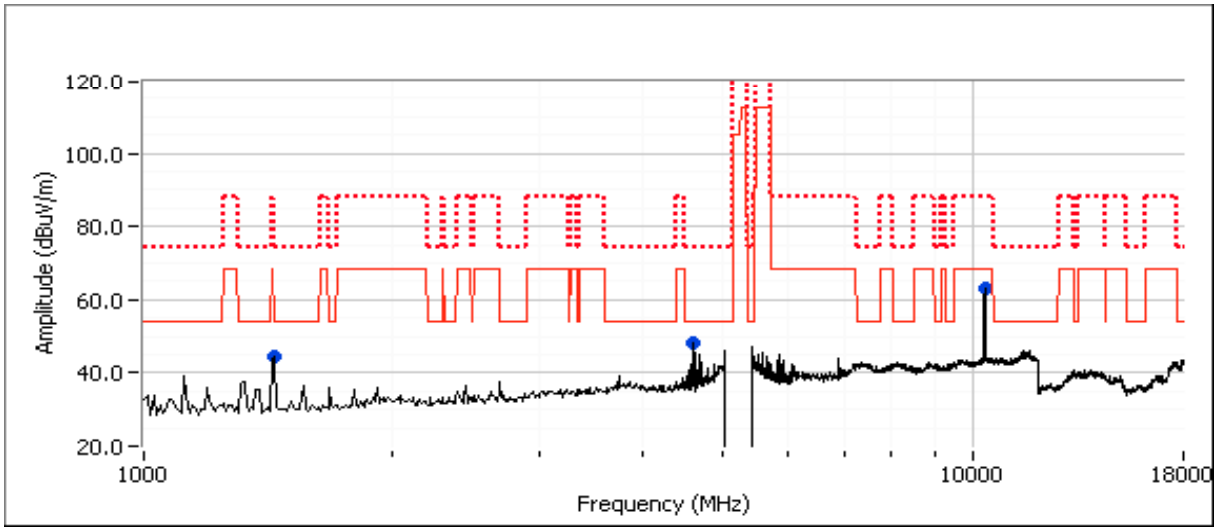
Date of Test: 1/25/2012
Test Engineer: Rafael Varelas
Test Location: FT Chamber #5

Run #1a: Low Channel @ 5180MHz

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments	Power Setting
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
4599.980	46.4	H	54.0	-7.6	AVG	296	1.1	RB 1 MHz;VB 10 Hz;Pk	
4599.960	49.4	H	74.0	-24.6	PK	296	1.1	RB 1 MHz;VB 3 MHz;Pk	
1440.010	45.1	V	54.0	-8.9	AVG	342	1.3	RB 1 MHz;VB 10 Hz;Pk	
1440.030	47.6	V	74.0	-26.4	PK	342	1.3	RB 1 MHz;VB 3 MHz;Pk	
10363.490	72.3	V	-	-	PK	220	1.2	RB 1 MHz;VB 3 MHz;Pk, note 2	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	Emission in non-restricted band, refer to antenna conducted measurements.



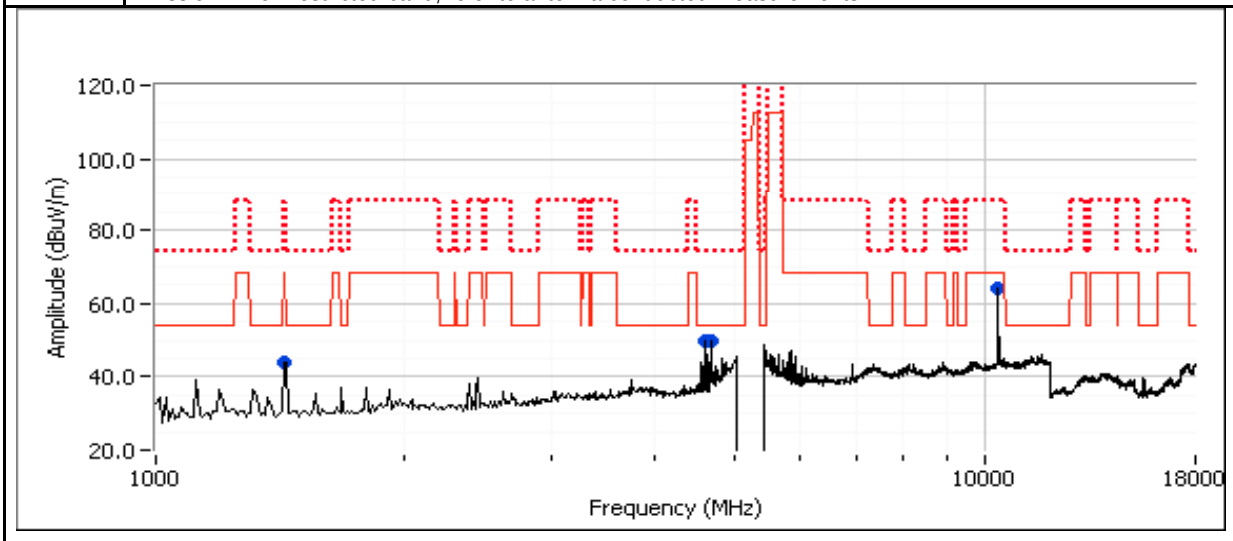
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1b: Center Channel @ 5200MHz

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments	Power Setting
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
4600.000	46.3	H	54.0	-7.7	AVG	296	1.1	RB 1 MHz;VB 10 Hz;Pk	
4600.000	49.2	H	74.0	-24.8	PK	296	1.1	RB 1 MHz;VB 3 MHz;Pk	
4680.010	44.7	H	54.0	-9.3	AVG	297	1.0	RB 1 MHz;VB 10 Hz;Pk	
4679.980	48.3	H	74.0	-25.7	PK	297	1.0	RB 1 MHz;VB 3 MHz;Pk	
1440.020	43.9	V	54.0	-10.1	AVG	348	1.3	RB 1 MHz;VB 10 Hz;Pk	
1439.980	46.3	V	74.0	-27.7	PK	348	1.3	RB 1 MHz;VB 3 MHz;Pk	
10398.170	74.0	V	-	-	PK	214	1.5	RB 1 MHz;VB 3 MHz;Pk, note 2	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	Emission in non-restricted band, refer to antenna conducted measurements.



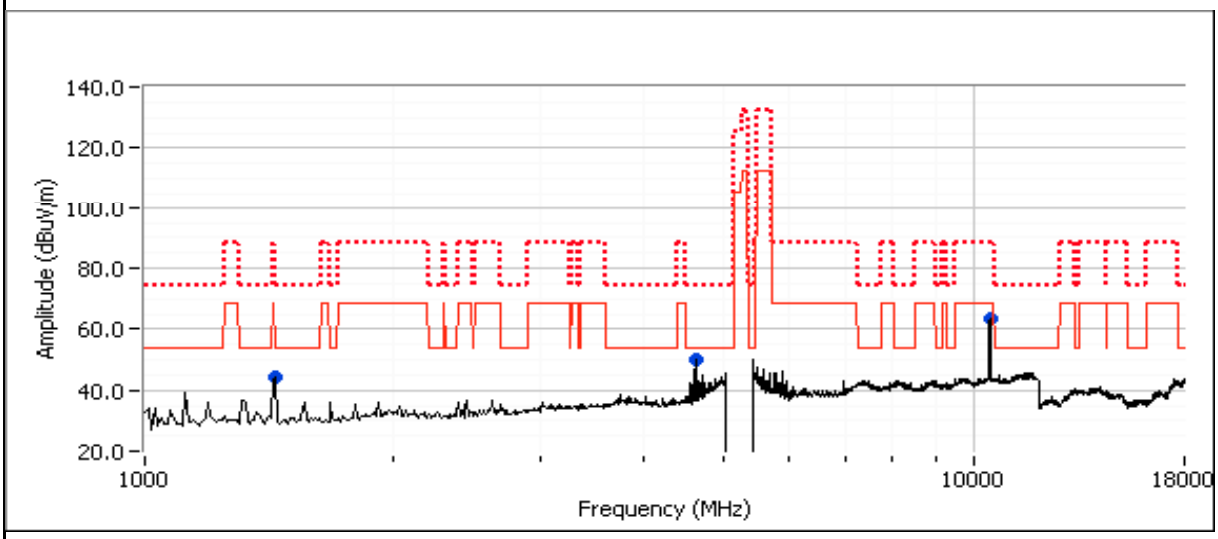
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

Run #1c: High Channel @ 5240MHz

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments	Power Setting
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
4640.000	48.5	H	54.0	-5.5	AVG	295	1.1	RB 1 MHz;VB 10 Hz;Pk	
4640.030	51.6	H	74.0	-22.4	PK	295	1.1	RB 1 MHz;VB 3 MHz;Pk	
1440.030	44.5	V	54.0	-9.5	AVG	345	1.3	RB 1 MHz;VB 10 Hz;Pk	
1439.970	47.1	V	74.0	-26.9	PK	345	1.3	RB 1 MHz;VB 3 MHz;Pk	
10481.140	71.5	V	-	-	PK	42	1.6	RB 1 MHz;VB 3 MHz;Pk, note 2	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	Emission in non-restricted band, refer to antenna conducted 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. Operation in the 5150-5250 MHz Band. Mode: 802.11n20

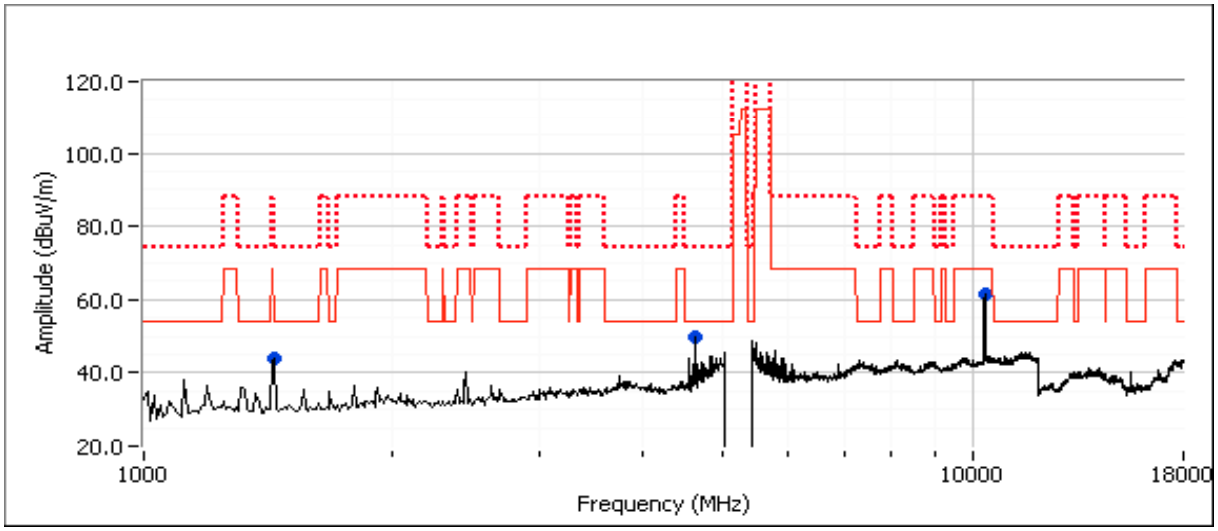
Date of Test: 1/25/2012
Test Engineer: Rafael Varelas
Test Location: FT Chamber #5

Run #2a: Low Channel @ 5180MHz

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments	Power Setting
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
4639.990	48.3	H	54.0	-5.7	AVG	307	1.1	RB 1 MHz;VB 10 Hz;Pk	
4639.960	51.1	H	74.0	-22.9	PK	307	1.1	RB 1 MHz;VB 3 MHz;Pk	
1440.040	44.7	V	54.0	-9.3	AVG	350	1.3	RB 1 MHz;VB 10 Hz;Pk	
1440.090	47.0	V	74.0	-27.0	PK	350	1.3	RB 1 MHz;VB 3 MHz;Pk	
10362.000	72.1	V	-	-	PK	266	1.5	RB 1 MHz;VB 3 MHz;Pk, note 2	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	Emission in non-restricted band, refer to antenna conducted 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

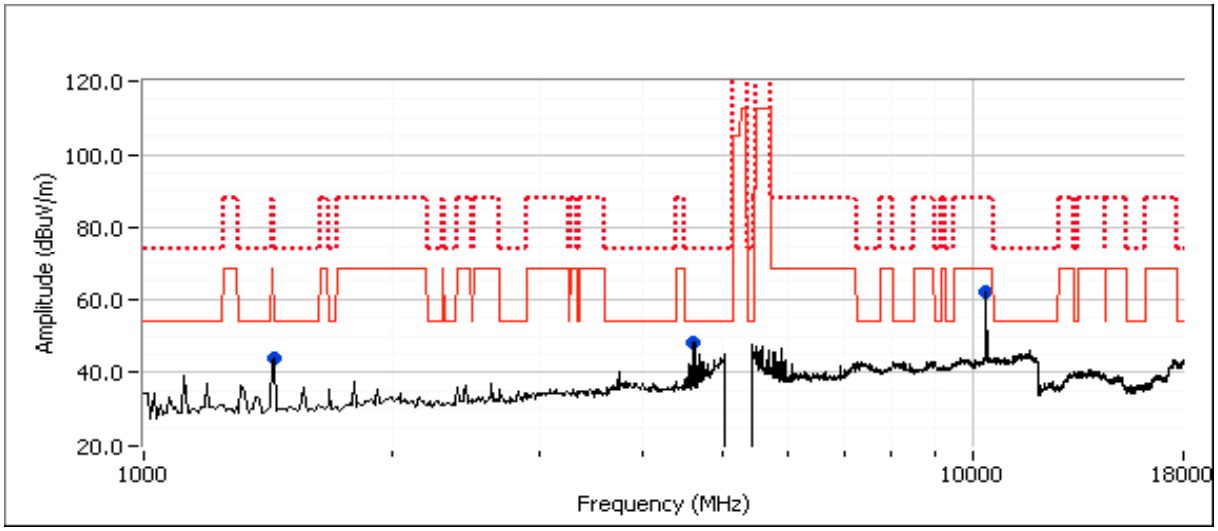
Run #2b: Center Channel @ 5200MHz

Spurious Radiated Emissions:

Power Setting

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4600.000	46.7	H	54.0	-7.3	AVG	294	1.1	RB 1 MHz;VB 10 Hz;Pk
4599.940	49.2	H	74.0	-24.8	PK	294	1.1	RB 1 MHz;VB 3 MHz;Pk
1439.990	44.1	V	54.0	-9.9	AVG	349	1.3	RB 1 MHz;VB 10 Hz;Pk
1439.980	46.9	V	74.0	-27.1	PK	349	1.3	RB 1 MHz;VB 3 MHz;Pk
10397.680	71.7	V	-	-	PK	267	1.0	RB 1 MHz;VB 3 MHz;Pk, note 2

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	Emission in non-restricted band, refer to antenna conducted 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 @ 5240MHz

Date of Test: 1/26/2012

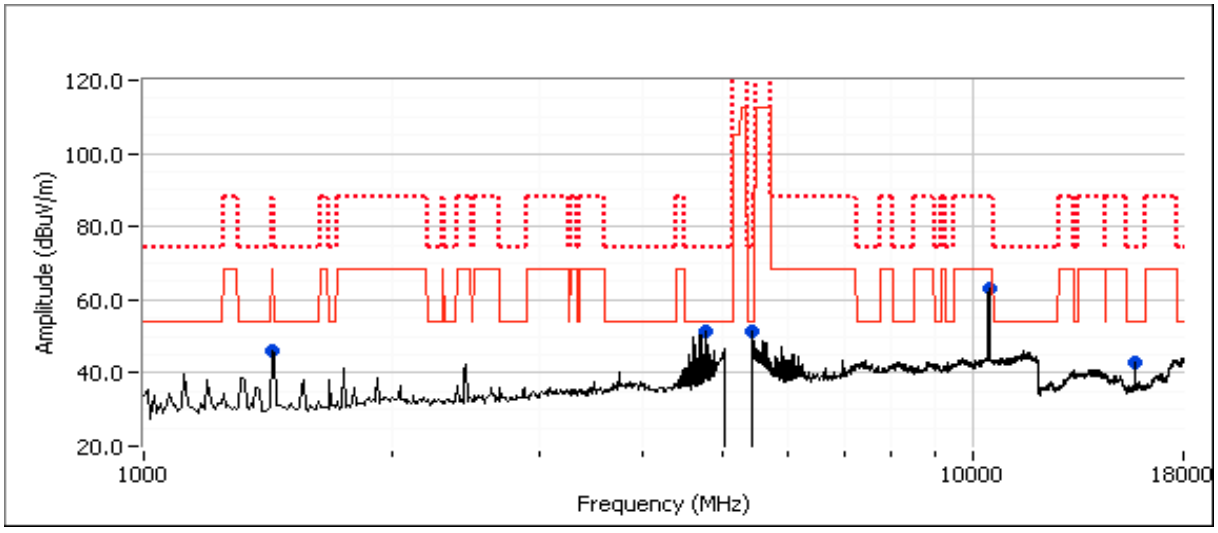
Test Engineer: Rafael Varelas

Test Location: FT Chamber #4

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5440.060	49.9	H	54.0	-4.1	AVG	319	1.1	RB 1 MHz;VB 10 Hz;Pk
5440.100	57.6	H	74.0	-16.4	PK	319	1.1	RB 1 MHz;VB 3 MHz;Pk
1440.090	45.4	V	54.0	-8.6	AVG	325	1.4	RB 1 MHz;VB 10 Hz;Pk
1440.170	47.9	V	74.0	-26.1	PK	325	1.4	RB 1 MHz;VB 3 MHz;Pk
10481.020	73.6	V	-	-	PK	257	1.3	Note 3
15720.000	43.1	V	54.0	-10.9	Peak	38	1.3	
4600.040	47.9	H	54.0	-6.1	AVG	298	1.1	RB 1 MHz;VB 10 Hz;Pk
4600.170	52.0	H	74.0	-22.0	PK	298	1.1	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 3:	Non-restricted band - Refer to antenna conducted 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 #3, Radiated Spurious Emissions, 30 - 40,000 MHz. Operation in the 5150-5250 MHz Band. Mode: 802.11n40

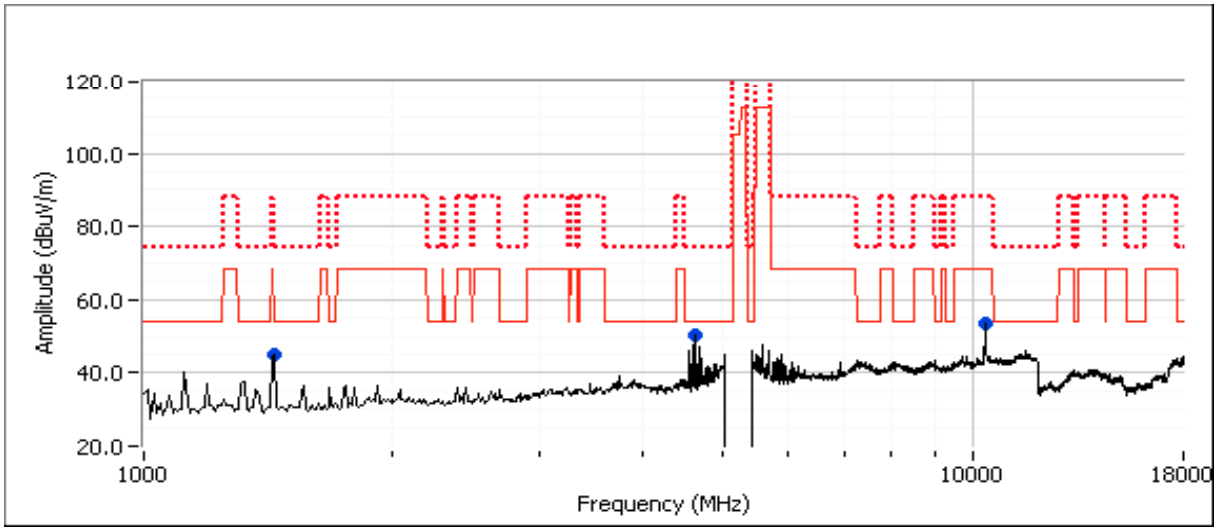
Date of Test: 1/26/2012
Test Engineer: Rafael Varelas
Test Location: FT Chamber #4

Run #3a: Low Channel @ 5190MHz

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1440.050	45.3	V	54.0	-8.7	AVG	319	0.9	RB 1 MHz;VB 10 Hz;Pk
1439.850	47.9	V	74.0	-26.1	PK	319	0.9	RB 1 MHz;VB 3 MHz;Pk
4640.030	43.1	H	54.0	-10.9	AVG	289	1.0	RB 1 MHz;VB 10 Hz;Pk
4640.300	48.6	H	74.0	-25.4	PK	289	1.0	RB 1 MHz;VB 3 MHz;Pk
10381.250	53.6	V	-	-	Peak	267	1.3	Note 3

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 3:	Non-restricted band - Refer to antenna conducted 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 (LELAN) and FCC 15.407(UNII)
Antenna Port Measurements
Power, PSD, Peak Excursion, 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: 2/2/2012 22:37
Test Engineer: Rafael Varelas
Test Location: Fremont EMC Lab #1

Config. Used: 1
Config Change: None
EUT Voltage: 48Vdc

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11a: 33.2 mW 802.11n 20MHz: 32.5 mW 802.11n n40MHz: 33.8 mW
1	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11a: 2.9 dBm/MHz 802.11n 20MHz: 2.7 dBm/MHz 802.11n n40MHz: -0.1 dBm/MHz
1	26dB Bandwidth	15.407 (Information only)	-	> 20MHz for all modes
1	99% Bandwidth	RSS 210 (Information only)	N/A	802.11a: 16.9 MHz 802.11n 20MHz: 18.0 MHz 802.11n n40MHz: 36.6 MHz
2	Peak Excursion Envelope	15.407(a) (6) 13dB	Pass	10.9dB
3	Antenna Conducted - Out of Band Spurious	15.407(b) -27dBm/MHz	Pass	All emissions below the -27dBm/MHz limit

General Test Configuration

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected

Ambient Conditions:

Temperature: 20.3 °C
Rel. Humidity: 35 %

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.

Run #1: Bandwidth, Output Power and Power Spectral Density - MIMO Systems

Note 1:	Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, # of points in sweep ≥ 2*span/RBW, sample detector, power averaging on (transmitted signal was continuous) and power integration over 40 MHz (method SA-1 of KDB 789033
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB
Note 5:	For MIMO systems the total output power and total PSD are calculated form the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power.

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

MIMO Device - 5150-5250 MHz Band

	Chain 1	Chain 2	Chain 3	Coherent	Effective[5]	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	4	4		Yes	7.0	169.9	22.3

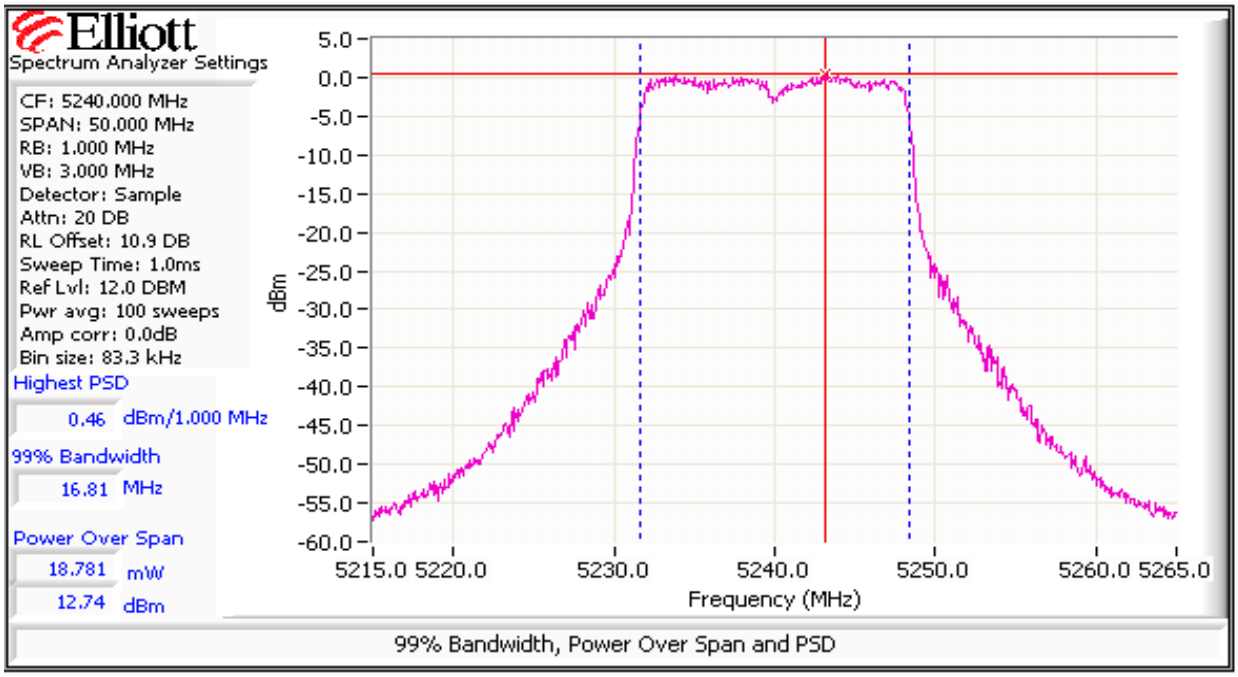
Power

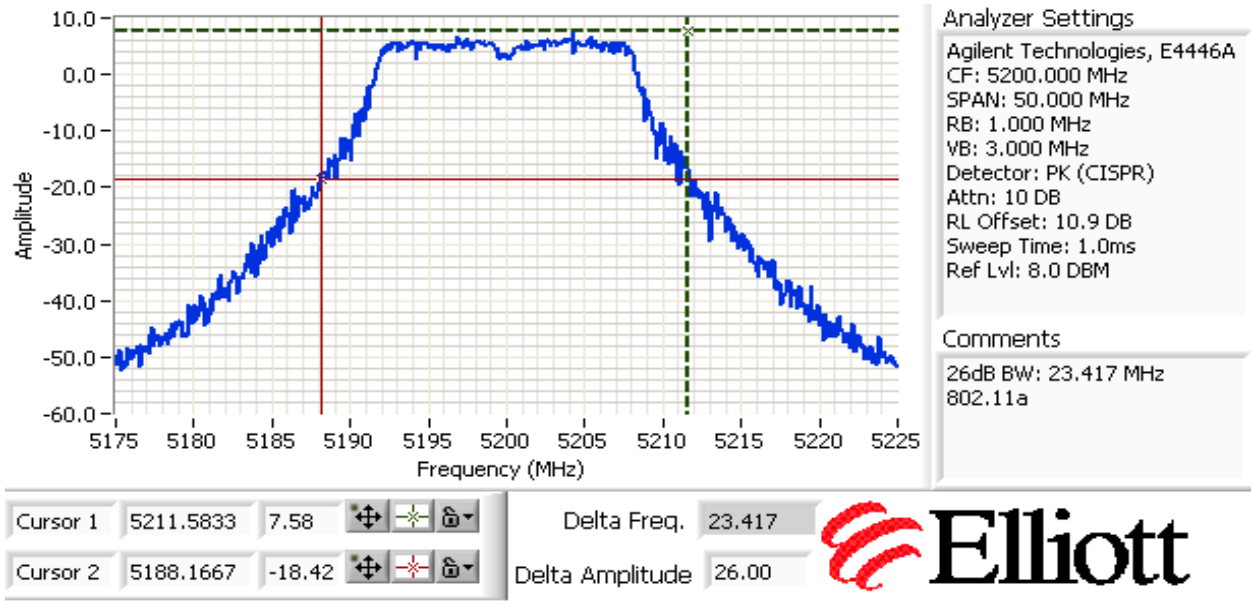
Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power[1] dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 1	Chain 2	Chain 3	mW	dBm			
802.11a Mode										
5180	12.0	25.0	11.6	12.3		31.4	15.0	16.0	0.033	PASS
5200	12.0	23.4	12.0	12.4		33.2	15.2	16.0		PASS
5240	11.0	23.8	11.4	12.7		32.4	15.1	16.0		PASS
20MHz Mode										
5180	12.0	25.8	11.6	12.2		31.1	14.9	16.0	0.032	PASS
5200	12.0	25.3	11.9	12.3		32.5	15.1	16.0		PASS
5240	11.0	25.4	11.6	12.5		32.2	15.1	16.0		PASS
40MHz Mode										
5190	12.0	48.1	12.0	12.6		33.8	15.3	16.0	0.034	PASS

PSD

Frequency (MHz)	99%[4] BW	Total Power	PSD[2] dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 1	Chain 2	Chain 3	mW/MHz	dBm/MHz	FCC	RSS 210[3]	
802.11a Mode										
5180	16.9	15.0	-0.7	0.4		2.0	2.9	3.0	3.0	PASS
5200	16.9	15.2	-0.2	-0.1		1.9	2.9	3.0	3.0	PASS
5240	16.9	15.1	-1.0	0.5		1.9	2.8	3.0	3.0	PASS
20MHz Mode										
5180	18.0	14.9	-0.6	-0.3		1.8	2.6	3.0	3.0	PASS
5200	18.0	15.1	-0.5	-0.2		1.8	2.7	3.0	3.0	PASS
5240	18.0	15.1	-0.8	-0.1		1.8	2.6	3.0	3.0	PASS
40MHz Mode										
5190	36.3	15.3	-3.5	-2.8		1.0	-0.1	3.0	3.0	PASS

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: Peak Excursion Measurement

802.11a: Device meets the requirement for the peak excursion

Freq	Peak Excursion(dB)		Freq	Peak Excursion(dB)		Freq	Peak Excursion(dB)	
(MHz)	Value	Limit	(MHz)	Value	Limit	(MHz)	Value	Limit
5180	9.9/8.6	13.0	5260		13.0	5500		13.0
5200	10.2/9.1	13.0	5300		13.0	5580		13.0
5240	9.1/8.2	13.0	5320		13.0	5700		13.0

20MHz: Device meets the requirement for the peak excursion

Freq	Peak Excursion(dB)		Freq	Peak Excursion(dB)		Freq	Peak Excursion(dB)	
(MHz)	Value	Limit	(MHz)	Value	Limit	(MHz)	Value	Limit
5180	8.3/7.8	13.0	5260		13.0	5500		13.0
5200	8.3/8.4	13.0	5300		13.0	5580		13.0
5240	8.9/9.1	13.0	5320		13.0	5700		13.0

40MHz: Device meets the requirement for the peak excursion

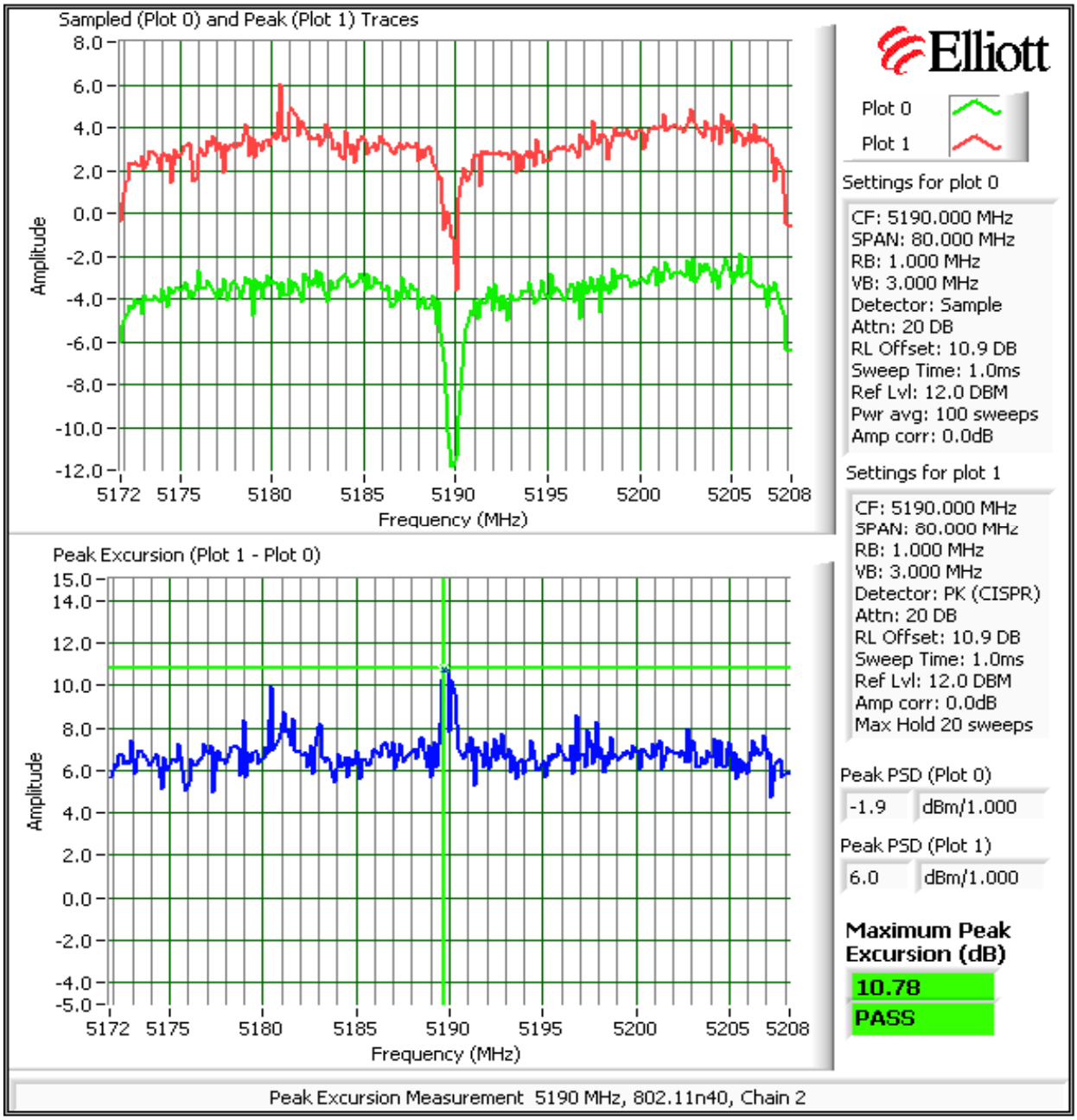
Freq	Peak Excursion(dB)		Freq	Peak Excursion(dB)		Freq	Peak Excursion(dB)	
(MHz)	Value	Limit	(MHz)	Value	Limit	(MHz)	Value	Limit
5190	10.9/10.8	13.0	5270		13.0	5510		13.0
5230		13.0	5310		13.0	5550		13.0
						5670		13.0

Plots Showing Peak Excursion

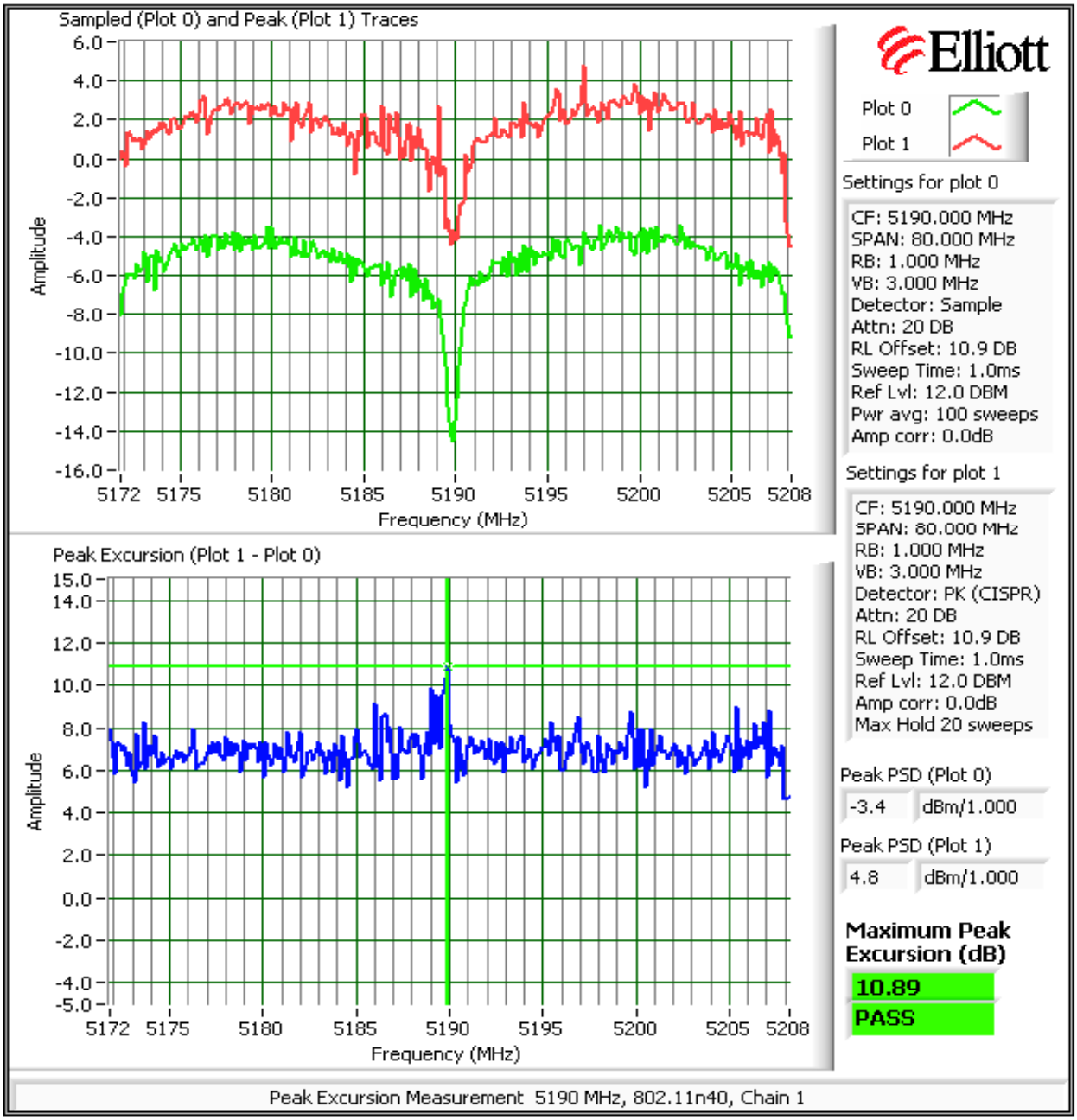
Trace A: RBW = 1MHz, VBW = 3MHz, Peak hold

Trace B: Same settings as used for power/PSD measurements (RBW = 1 MHz, VBW = 3MHz, Integrated average power)

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



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: Out Of Band Spurious Emissions - Antenna Conducted

MIMO Devices: Antenna gain used is the effective gain calculated in the power section of this data sheet. The plots were obtained for each chain individually and the limit was adjusted to account for all chains transmitting simultaneously

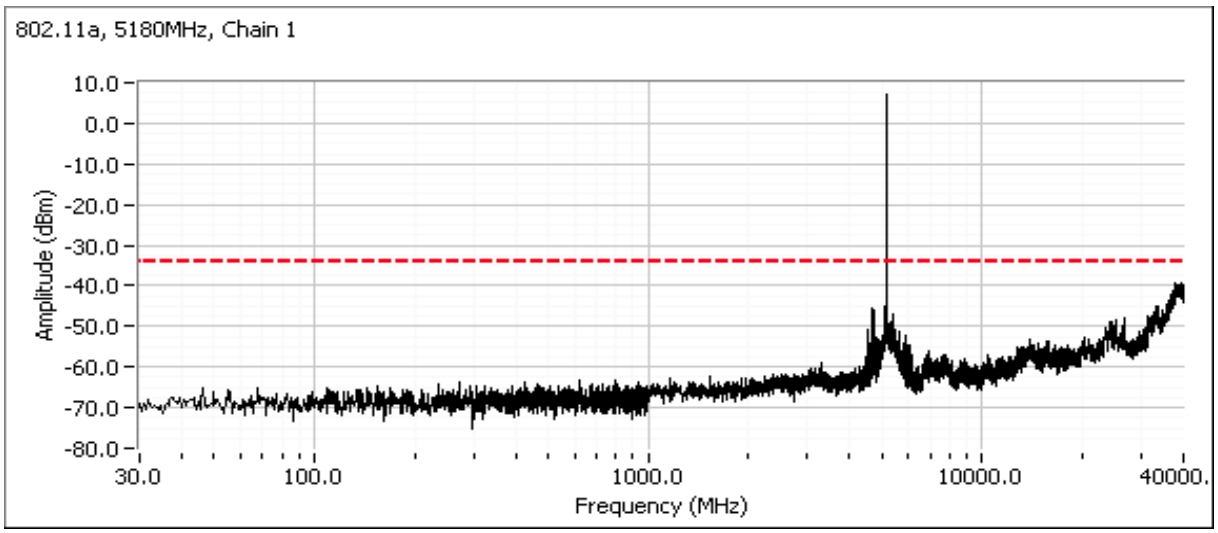
Number of transmit chains:	2	
Maximum Antenna Gain:	4.0	dBi
Spurious Limit:	-27.0	dBm/MHz eirp
Adjustment for 2 chains:	-3.0	dB adjustment for multiple chains.
Limit Used On Plots [Note 1]:	-34.0	dBm/MHz Peak Limit (RB=VB=1MHz)

Note 1:	The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements for signals more than 50MHz fr
Note 2:	All spurious signals below 1GHz are measured during digital device radiated emissions test.
Note 3:	Signals within 10MHz of the 5.725 or 5.825 Band edge are subject to a limit of -17dBm EIRP
Note 4:	If the device is for outdoor use then the -27dBm eirp limit also applies in the 5150 - 5250 MHz band.
Note 5:	Signals that fall in the restricted bands of 15.205 are subject to the limit of 15.209.

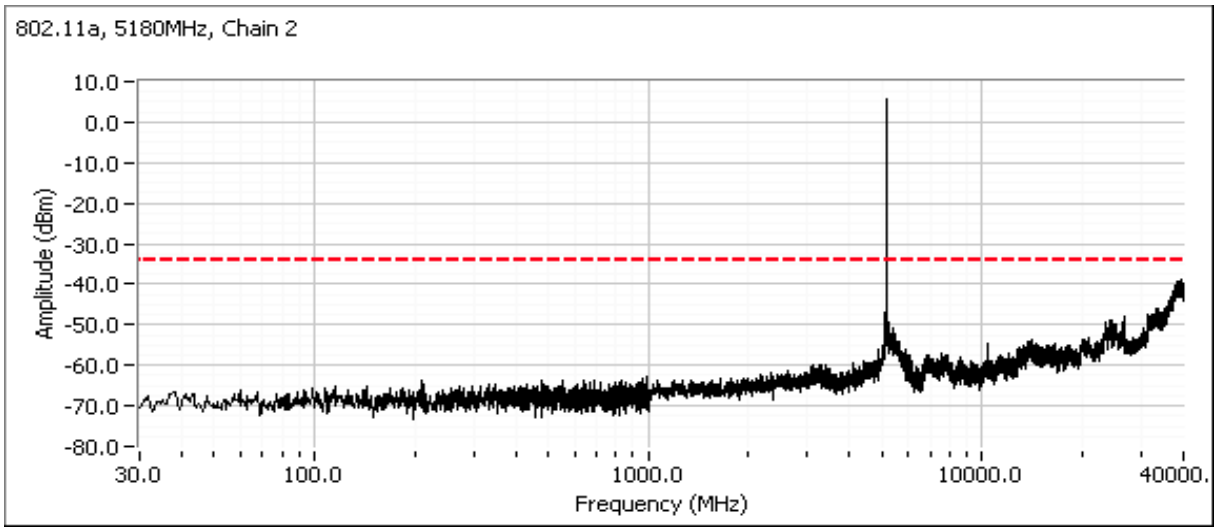
Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

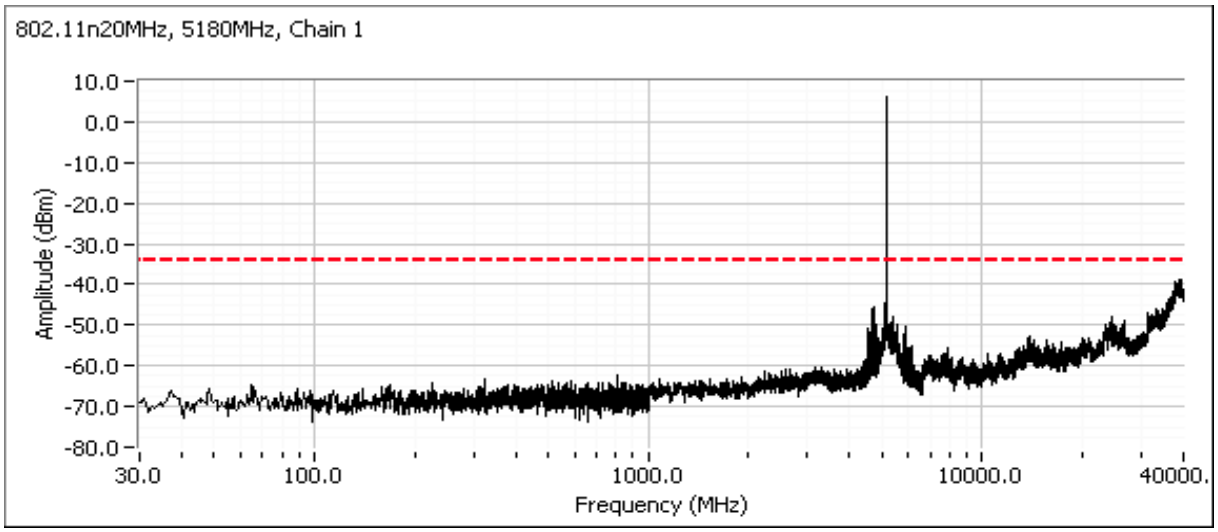
Low channel, 5150 - 5250 MHz Band

Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

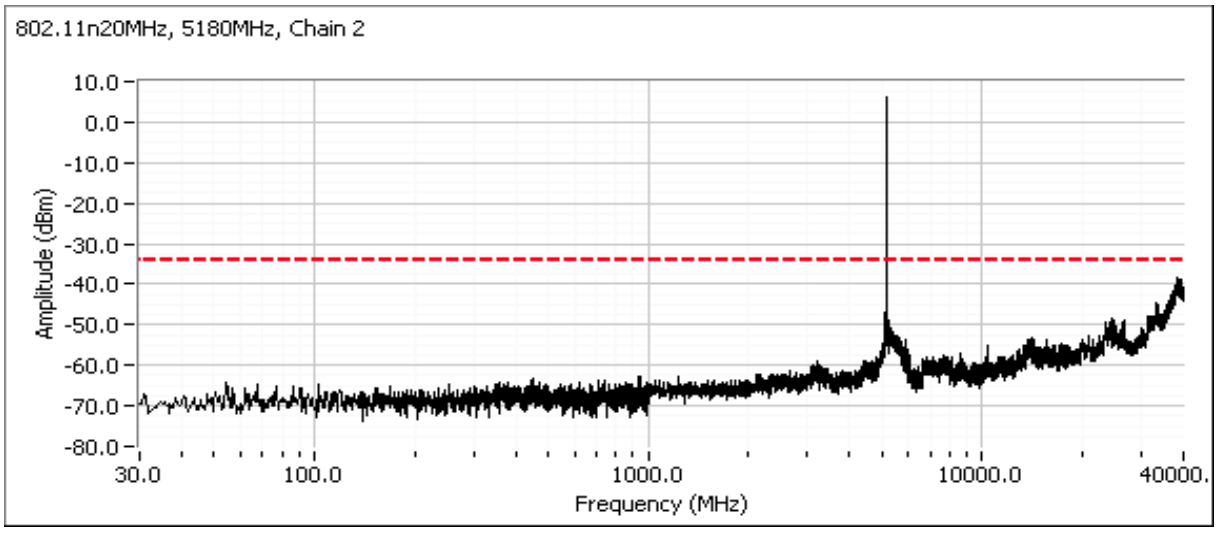


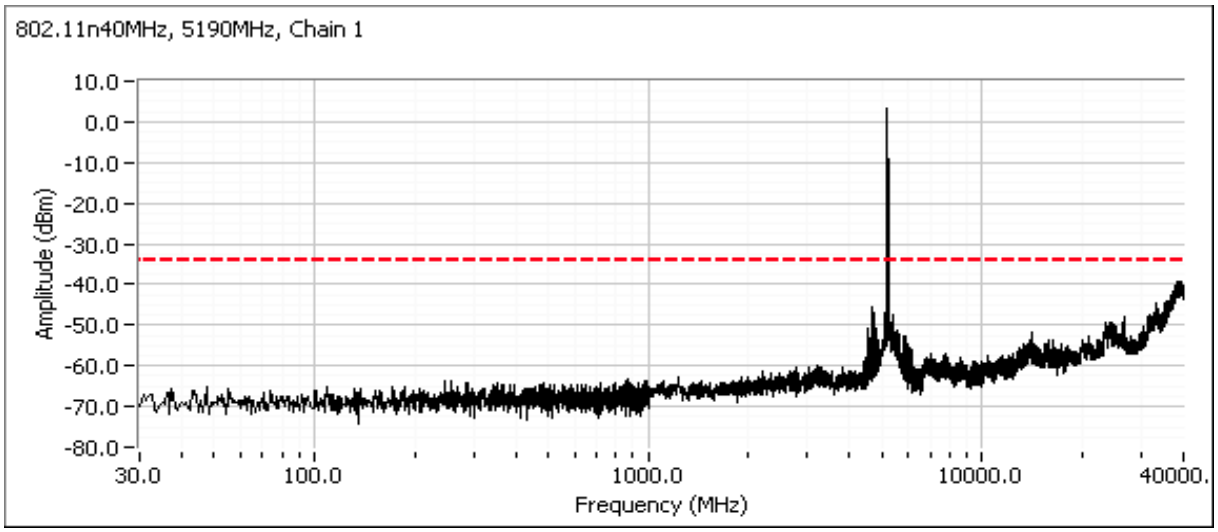
Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



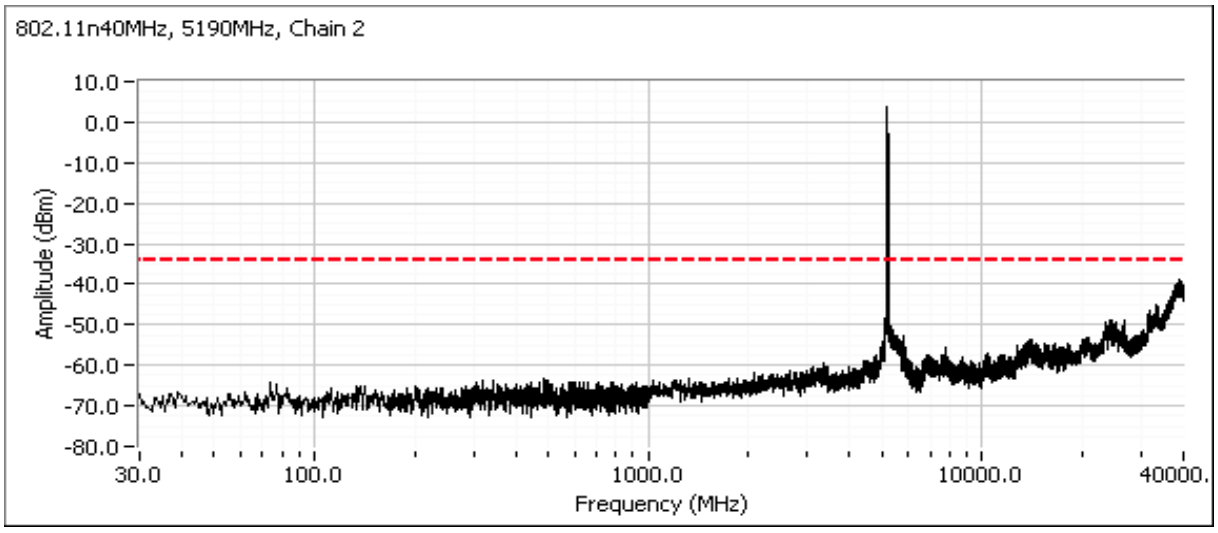


Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A

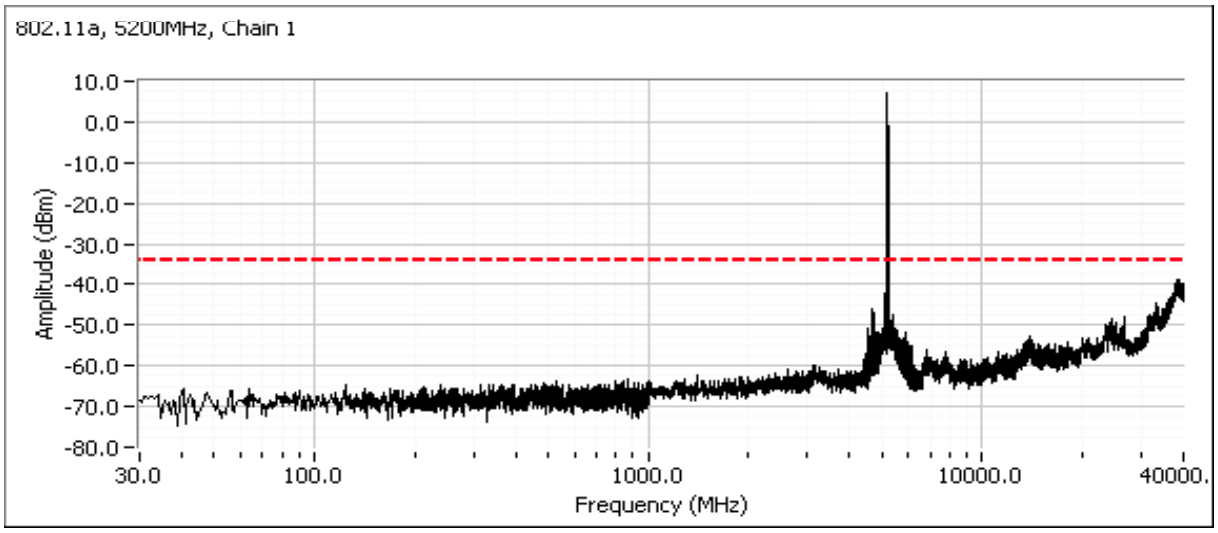




Client:	Ubiquiti Networks	Job Number:	J86147
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



Center channel, 5150 - 5250 MHz Band



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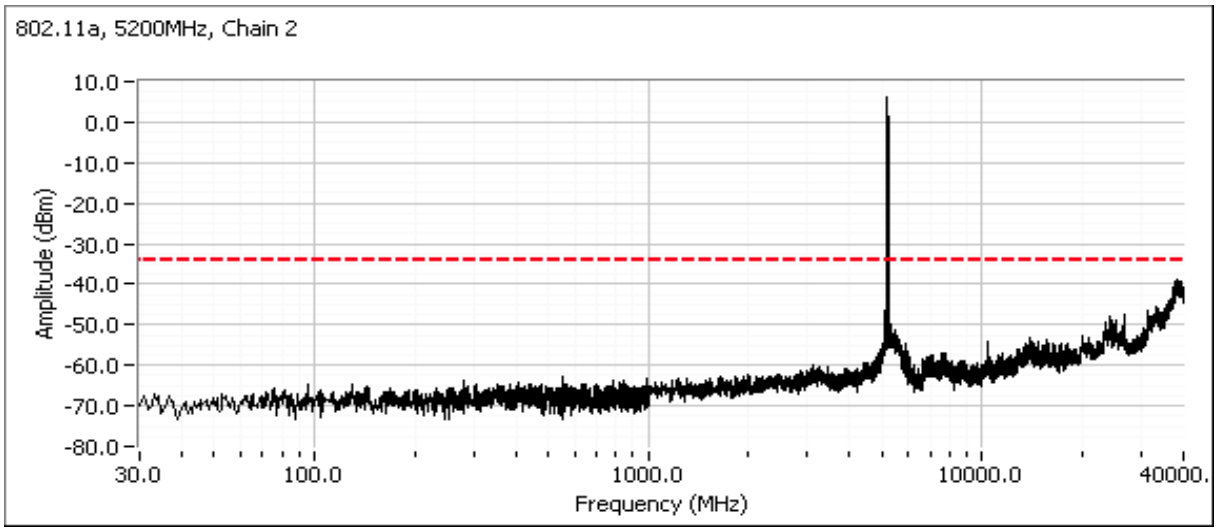
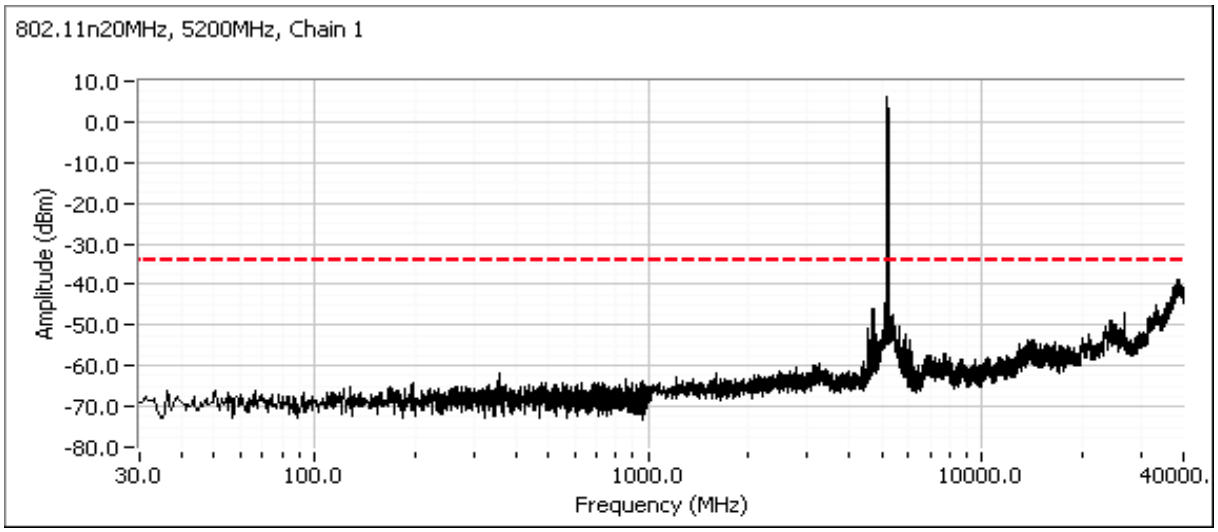
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A





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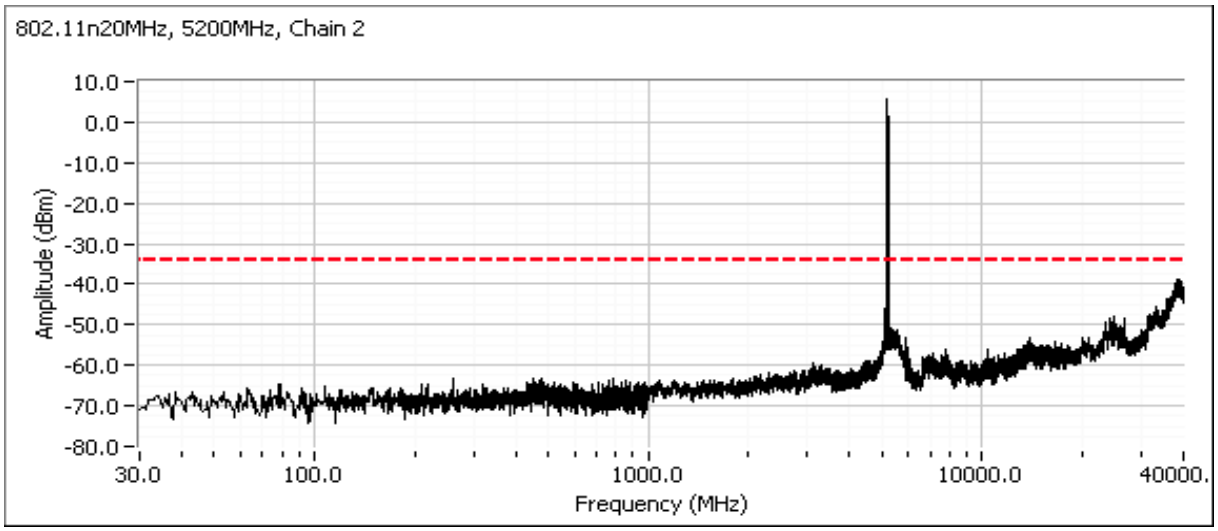
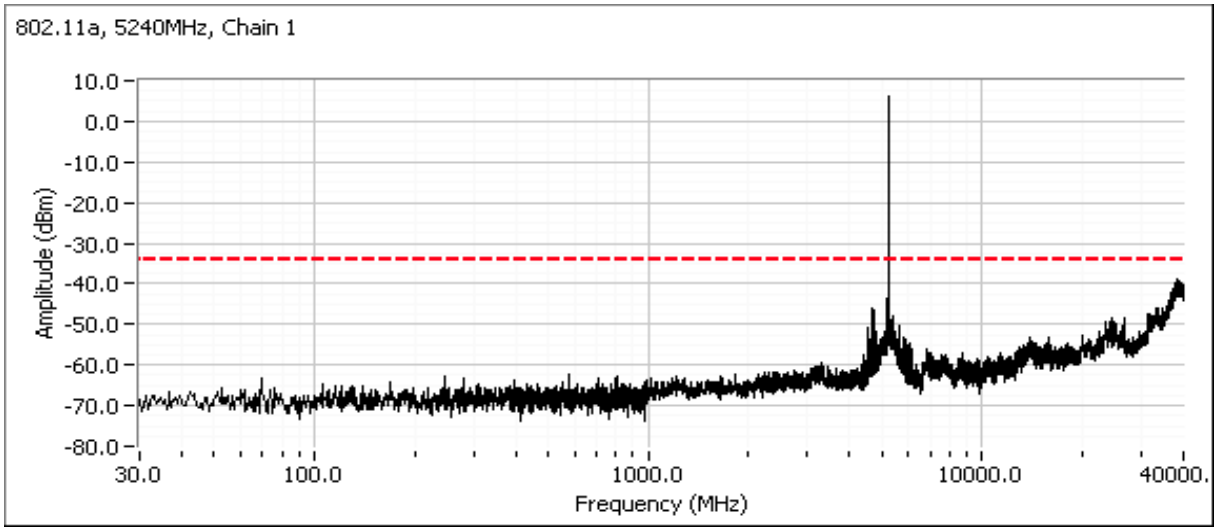
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



High channel, 5150 - 5250 MHz Band



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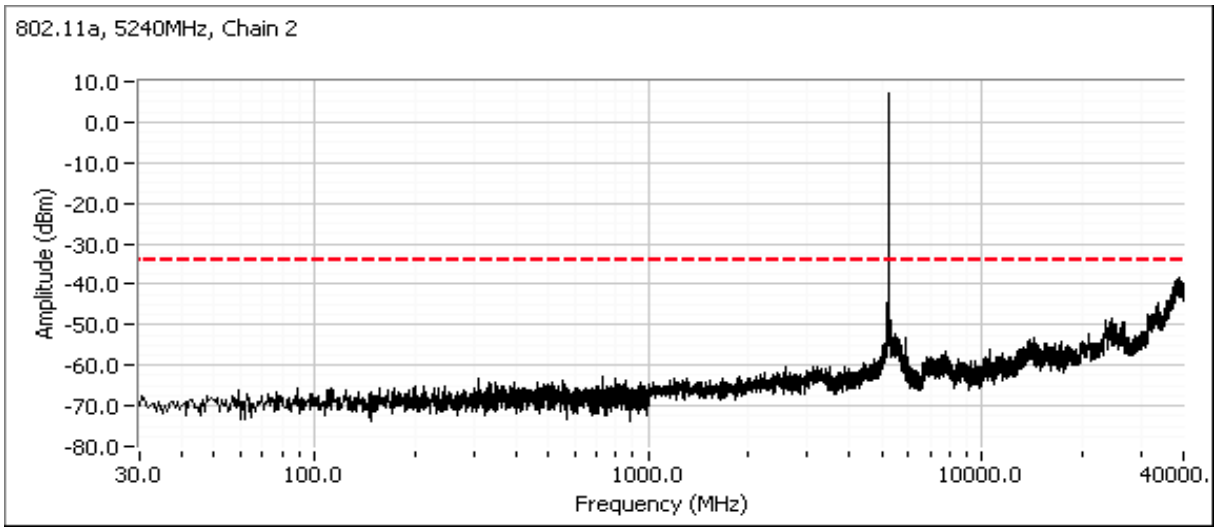
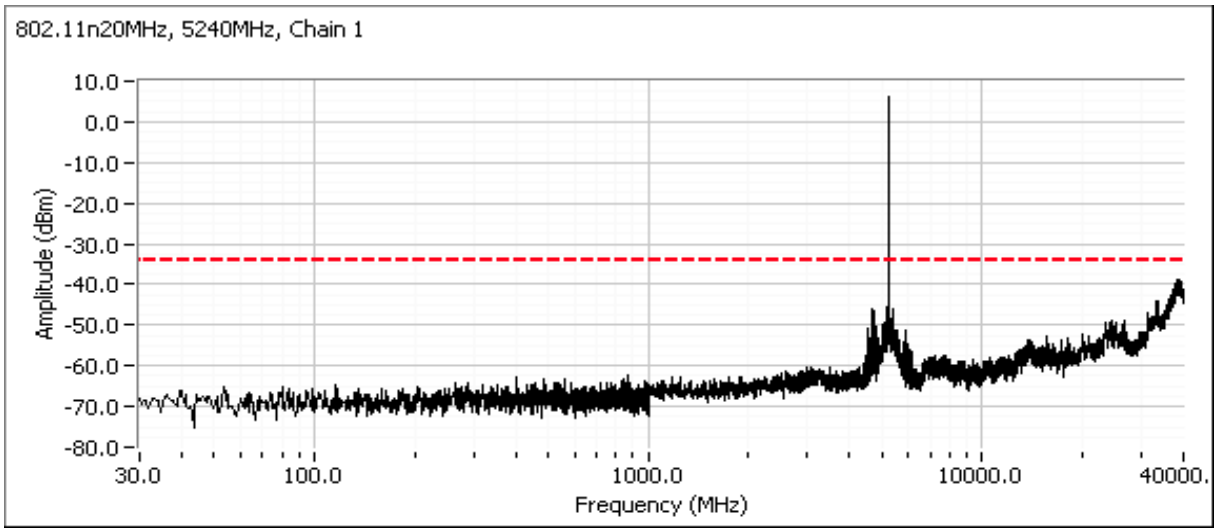
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A





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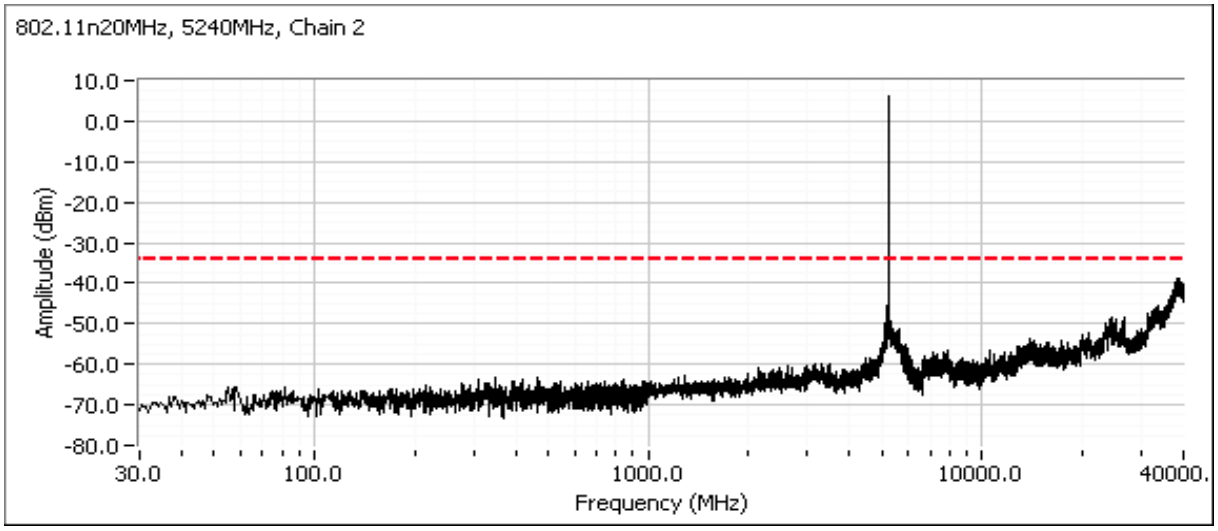
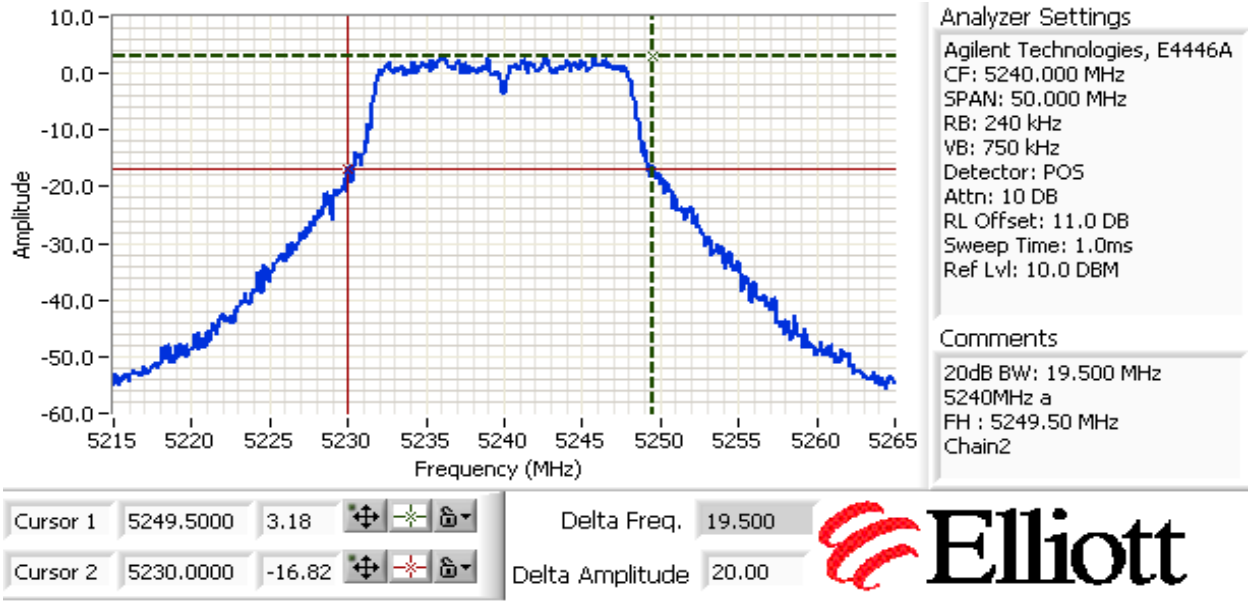
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



20dBc at 5250MHz



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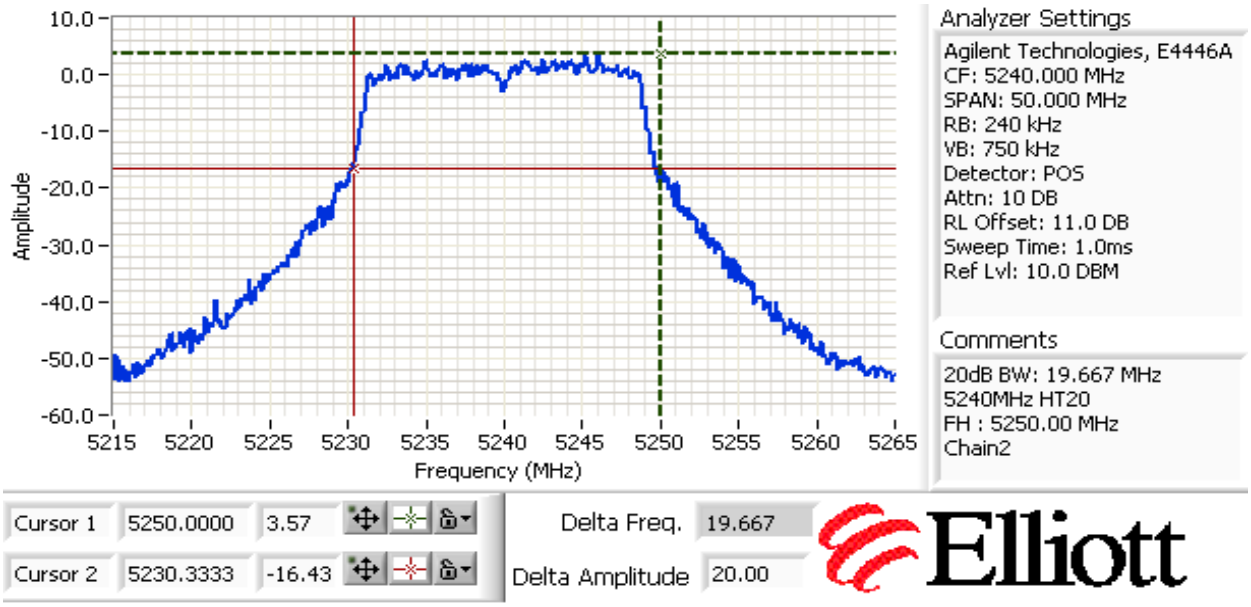
Model:	UniFi Pro	T-Log Number:	T86160
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	FCC 15.247/EN 300 328	Class:	N/A



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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:	-

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

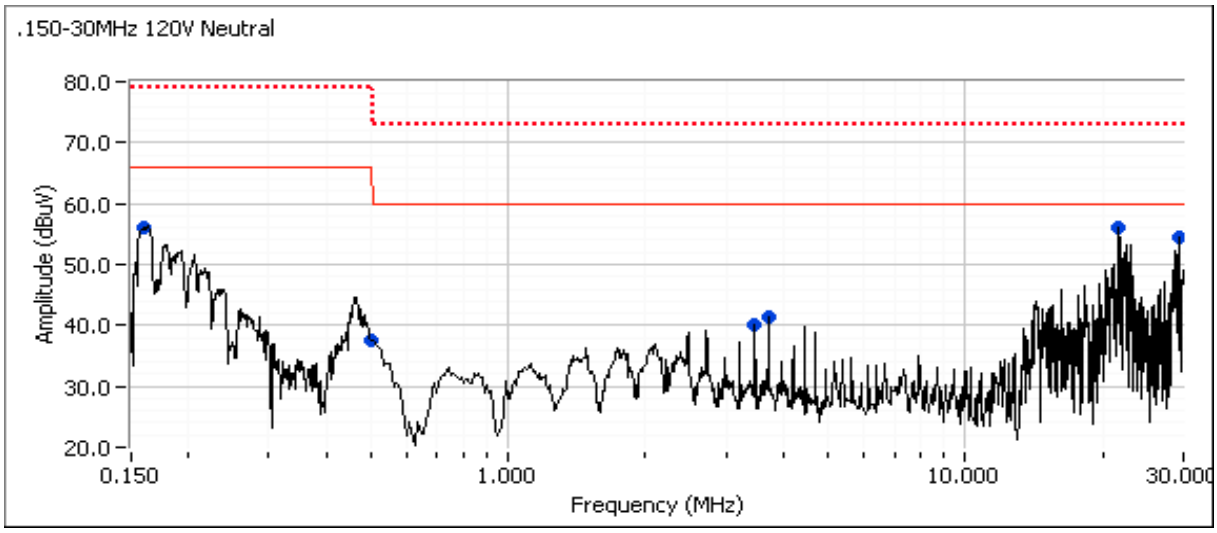
No modifications were made to the EUT during testing

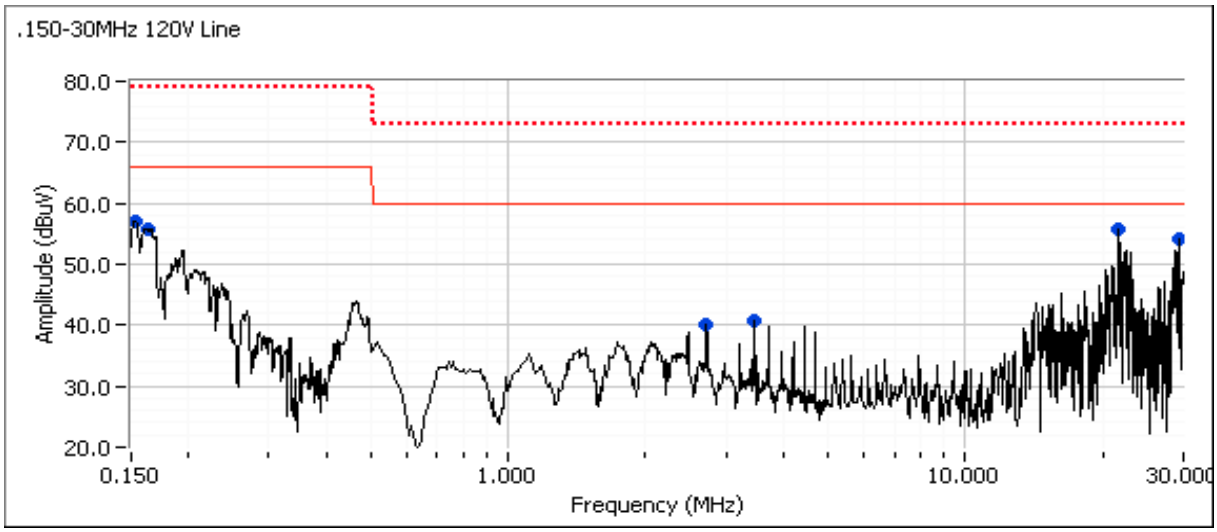
Deviations From The Standard

No deviations were made from the requirements of the standard.

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:	-

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





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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.