

# 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

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IC SITE REGISTRATION #: 2845B-4, 2845B-5, 2845B-7

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Test Report Report Date: March 19, 2012

# REVISION HISTORY

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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<br>Rule Part      | RSS<br>Rule Part    | Description  | Measured Value /<br>Comments  | Limit / Requirement  | Result   |
|-----------------------|---------------------|--|---|--|----------|
| 15.247(a)             | RSS 210<br>A8.2     | Digital Modulation                                   | Systems uses OFDM / DSSS techniques   | System must utilize<br>a digital<br>transmission<br>technology | Complies |
| 15.247 (a) (2)        | RSS 210<br>A8.2 (1) | 6dB Bandwidth  | b: 10.1 MHz<br>g: 16.23 MHz<br>HT20: 17.44 MHz<br>HT40: 36.55 MHz               | >500kHz  | Complies |
| 15.247 (b) (3)        | RSS 210<br>A8.2 (4) | Output Power<br>(multipoint systems)                 | b: 18.0 dBm<br>g: 17.2 dBm<br>HT20: 18.5 dBm<br>HT40: 11.7 dBm                  | 1Watt, EIRP limited to 4 Watts.                                | Complies |
| 15.247(d)             | RSS 210<br>A8.2 (2) | Power Spectral<br>Density                            | b: -4.7dBm/3kHz<br>g: 3.0 dBm/3kHz<br>HT20: 1.3 dBm/3kHz<br>HT40: -0.8 dBm/3kHz | 8dBm/3kHz  | Complies |
| 15.247(c)             | RSS 210<br>A8.5     | Antenna Port<br>Spurious Emissions<br>30MHz – 25 GHz | All emissions<br>< -30dBc   | < -30dBc Note 2  | Complies |
| 15.247(c) /<br>15.209 | RSS 210<br>A8.5     | Radiated Spurious<br>Emissions<br>30MHz – 25 GHz     | 53.9 dBµV/m @<br>4874.1 MHz (-0.1 dB)   | 15.207 in restricted<br>bands, all others<br><-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<br>Rule Part      | RSS<br>Rule Part              | Description  | Measured Value /<br>Comments  | Limit / Requirement  | Result   |
|-----------------------|-------------------------------|--|---|--|----------|
| 15.247(a)             | RSS 210<br>A8.2               | Digital Modulation                                     | Systems uses OFDM / DSSS techniques                                   | System must utilize<br>a digital<br>transmission<br>technology | Complies |
| 15.247 (a) (2)        | RSS 210<br>A8.2 (1)           | 6dB Bandwidth  | a: 16.25MHz<br>HT20: 17.25MHz<br>HT40: 36.4MHz                        | >500kHz  | Complies |
| 15.247 (b)            | RSS 210<br>A8.2 (4)           | Output Power (multipoint systems)                      | a: 25.0dBm<br>HT20: 24.7dBm<br>HT40: 25.0dBm<br>EIRP = 1.589 W Note 1 | 1Watt, EIRP limited to 4 Watts.                                | Complies |
| 15.247(d)             | RSS 210<br>A8.2 (2)           | Power Spectral<br>Density                              | a: 0.0 dBm/3kHz<br>HT20: 0.2 dBm/3kHz<br>HT40: -1.1 dBm/3kHz          | Maximum permitted is 8dBm/3kHz                                 | Complies |
| 15.247(c)             | RSS 210<br>A8.5               | Antenna Port<br>Spurious Emissions –<br>30MHz – 40 GHz | All spurious emissions < -20dBc                                       | <-30dBc Note 2   | Complies |
| 15.247(c) /<br>15.209 | RSS 210<br>A8.5<br>Table 2, 3 | Radiated Spurious<br>Emissions<br>30MHz – 40 GHz       | 53.8dBµV/m @<br>11568.9MHz (-0.2dB)                                   | 15.207 in restricted<br>bands, all others<br><-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<br>Part                | RSS<br>Rule part            | Description                 | Measured Value /<br>Comments  | Limit / Requirement                            | Result (margin) |
|---------------------------------|-----------------------------|-----------------------------|---|--|-----------------|
| 15.203                          | -                           | RF Connector                | EUT used integral antennas  | Unique or integral antenna required            | Complies        |
| 15.207                          | RSS GEN<br>Table 2          | AC Conducted<br>Emissions   | 52.4 dBμV @ 21.663<br>MHz (-7.6 dB)   | Refer to page 19                               | Complies        |
| 15.109                          | RSS GEN<br>7.2.3<br>Table 1 | Receiver spurious emissions | -   | -  | N/A             |
| 15.247 (b)<br>(5)<br>15.407 (f) | RSS 102                     | RF Exposure<br>Requirements | Refer to MPE<br>calculations in<br>Exhibit 11, RSS 102<br>declaration and User<br>Manual statements.  | Refer to OET 65,<br>FCC Part 1 and RSS<br>102  | Complies        |
| -                               | RSP 100<br>RSS GEN<br>7.1.5 | User Manual                 | -   | Statement required regarding non-interference  | Complies        |
| -                               | RSP 100<br>RSS GEN<br>7.1.5 | User Manual                 | Antennas are permanently attached   | Statement for products with detachable antenna | N/A             |
| -                               | RSP 100<br>RSS GEN<br>4.4.1 | 99% Bandwidth               | 2.4GHz:<br>802.11b: 14.4 MHz<br>802.11g: 17.1 MHz<br>802.11n20: 18.16<br>MHz<br>802.11n40: 36.64<br>MHz<br>5GHz:<br>a: 19.55MHz<br>HT20: 19.47MHz<br>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<br>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                      | $\pm 0.7 \text{ dB}$ |
| Conducted emission of transmitter       | dBm                 | 25 to 26500 MHz                     | $\pm 0.7 \text{ dB}$ |
| Conducted emission of receiver          | dBm                 | 25 to 26500 MHz                     | $\pm 0.7 \text{ dB}$ |
| Radiated emission (substitution method) | dBm                 | 25 to 26500 MHz                     | ± 2.5 dB             |
| Radiated emission (field strength)      | dBμV/m              | 25 to 1000 MHz<br>1000 to 40000 MHz | ± 3.6 dB<br>± 6.0 dB |
| Conducted Emissions (AC Power)          | dΒμV                | 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 | UniFi Pro | 802.11abgn   | Prototype     | SWX-UAPRO |
| Networks |           | Dual Band    |               |           |
|          |           | Access Point |               |           |

#### 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              | Cable(s)          |                        |           |
|------------------------|------------------------|-------------------|------------------------|-----------|
| 1 011                  | To                     | Description       | Shielded or Unshielded | Length(m) |
| Ethernet               | Pwr supply<br>PoE port | Cat 5             | Shielded               | 7         |
| Antenna                | External antenna       | Direct connection | NA                     | NA        |
| Pwr supply<br>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      | Registratio        | n Numbers | Location                     |  |
|-----------|--------------------|-----------|------------------------------|--|
| Site      | FCC                | Canada    | Location                     |  |
| Chamber 4 | 211948             | 2845B-4   | 41020 Dayras Band            |  |
| Chamber 5 | 211948             | 2845B-5   | 41039 Boyce Road<br>Fremont, |  |
| Chamber 7 | A2LA accreditation | 2845B-7   | CA 94538-2435                |  |

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.

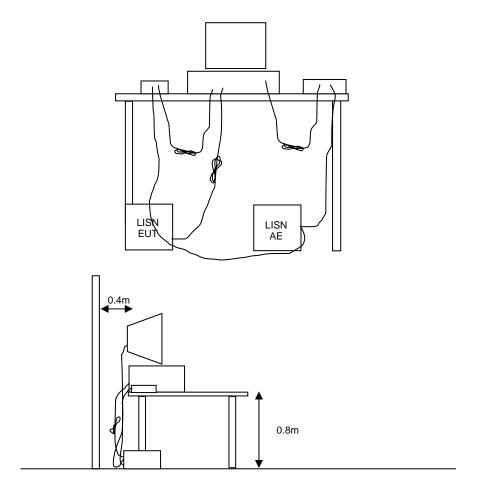
#### TEST PROCEDURES

#### 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** 

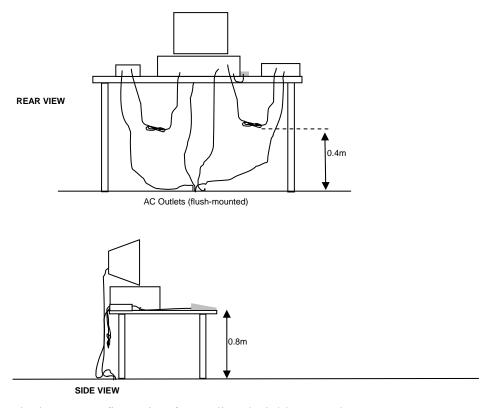
#### RADIATED EMISSIONS

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.

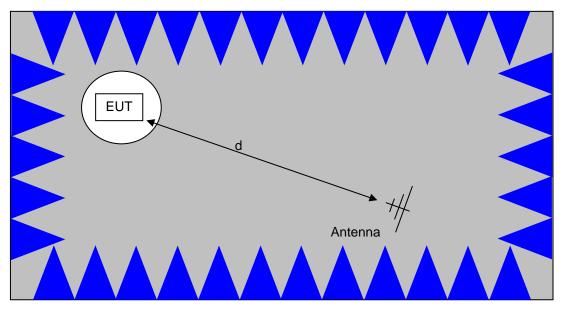
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

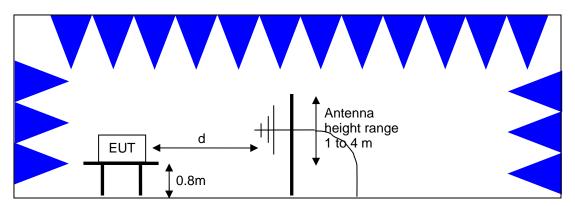


Typical Test Configuration for Radiated Field Strength Measurements



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.

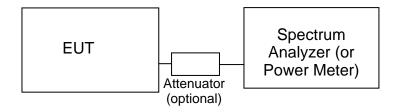
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



<u>Test Configuration for Radiated Field Strength Measurements</u> 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<br>Limit<br>(dBuV)  | Quasi Peak<br>Limit<br>(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<sup>1</sup> (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 <sub>KHz</sub> @ 300m | 67.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 300m |
| 0.490-1.705           | 24000/F <sub>KHz</sub> @ 30m | 87.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 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                |

<sup>&</sup>lt;sup>1</sup> 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 = 
$$\frac{1000000 \sqrt{30 P}}{d}$$
 microvolts per meter  
d  
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 | 2.4GHz Bandedges, 25-Jan-12        |                   |         |              |
| <u>Manufacturer</u>   | <u>Description</u>                 | <u>Model</u>      | Asset # | Cal Due      |
| EMCO                  | Antenna, Horn, 1-18 GHz            | 3115              | 1142    | 8/2/2012     |
|                       | (SA40-Red)                         |                   |         |              |
| Hewlett Packard       | SpecAn 9 kHz - 40 GHz, FT          | 8564E (84125C)    | 1393    | 8/9/2012     |
|                       | (SA40) Blue                        | ,                 |         |              |
|                       | ( )                                |                   |         |              |
| Radiated Emissions 1  | 1000 - 18,000 MHz, 26-Jan-12       |                   |         |              |
| Manufacturer          | Description                        | <u>Model</u>      | Asset # | Cal Due      |
| Hewlett Packard       | Microwave Preamplifier, 1-         | 8449B             | 263     | 12/9/2012    |
| riewiett i dokard     | 26.5GHz                            | 04400             | 200     | 12/0/2012    |
| EMCO                  | Antenna, Horn, 1-18 GHz            | 3115              | 487     | 7/6/2012     |
| Hewlett Packard       | SpecAn 30 Hz -40 GHz, SV           | 8564E (84125C)    | 1148    | 8/15/2012    |
| Hewlett Fackard       | (SA40) Red                         | 0304L (04123C)    | 1140    | 0/13/2012    |
| Micro-Tronics         | Band Reject Filter, 5150-5350      | BRC50703-02       | 1729    | 8/5/2012     |
| MICIO-TIOTICS         | MHz                                | BRC50703-02       | 1729    | 0/3/2012     |
|                       | IVITIZ                             |                   |         |              |
| Dedicted Englanters 4 | 1000 40 000 MHz 07 1 40            |                   |         |              |
|                       | 1000 - 18,000 MHz, 27-Jan-12       |                   |         | 0.15         |
| <u>Manufacturer</u>   | Description                        | Model             | Asset # | Cal Due      |
| Hewlett Packard       | Microwave Preamplifier, 1-         | 8449B             | 263     | 12/9/2012    |
|                       | 26.5GHz                            |                   |         |              |
| EMCO                  | Antenna, Horn, 1-18 GHz            | 3115              | 487     | 7/6/2012     |
| Hewlett Packard       | SpecAn 30 Hz -40 GHz, SV           | 8564E (84125C)    | 1148    | 8/15/2012    |
|                       | (SA40) Red                         |                   |         |              |
| Micro-Tronics         | Band Reject Filter, 5150-5350      | BRC50703-02       | 1729    | 8/5/2012     |
|                       | MHz                                |                   |         |              |
|                       |                                    |                   |         |              |
| Radio Antenna Port, 0 | 03-Feb-12                          |                   |         |              |
| Manufacturer          | Description                        | Model             | Asset # | Cal Due      |
| Agilent               | PSA, Spectrum Analyzer,            | E4446A            | 2139    | 2/14/2012    |
| J                     | (installed options, 111, 115, 123, |                   |         |              |
|                       | 1DS, B7J, HYX,                     |                   |         |              |
|                       | , ,                                |                   |         |              |
| Radio Antenna Port (F | Power and Spurious Emissions), (   | 03-Feb-12         |         |              |
| Manufacturer          | Description                        | Model             | Asset # | Cal Due      |
| Agilent               | PSA, Spectrum Analyzer,            | E4446A            | 2139    | 2/14/2012    |
| 9                     | (installed options, 111, 115, 123, |                   |         | _,, _ 0      |
|                       | 1DS, B7J, HYX,                     |                   |         |              |
|                       | 150, 570, 11170,                   |                   |         |              |
| Radiated Emissions 1  | 1000 - 18,000 MHz, 06-Feb-12       |                   |         |              |
| Manufacturer          | Description                        | <u>Model</u>      | Asset # | Cal Due      |
| EMCO                  | Antenna, Horn, 1-18 GHz            | 3115              | 487     | 7/6/2012     |
| Hewlett Packard       | Microwave Preamplifier, 1-         | 8449B             | 785     | 5/18/2012    |
| Hewiell Fackalu       | 26.5GHz                            | 0449B             | 700     | 3/10/2012    |
| Hewlett Packard       |                                    | 9564E (94495C)    | 1202    | 9/0/2012     |
| newiell Packard       | SpecAn 9 kHz - 40 GHz, FT          | 8564E (84125C)    | 1393    | 8/9/2012     |
| Ha Jatt Bard and      | (SA40) Blue                        | D/NI 0.4000 00000 | 4707    | 4.4/00/0040  |
| Hewlett Packard       | High Pass filter, 8.2 GHz (Purple  | P/N 84300-80039   | 1767    | 11/29/2012   |
|                       | System)                            | (84125C)          | 0000    | 40/4/0040    |
| Micro-Tronics         | Band Reject Filter, 2400-2500      | BRM50702-02       | 2238    | 10/4/2012    |
|                       | MHz                                | DD0=====          | 00.14   | 40/4/0040    |
| Micro-Tronics         | Band Reject Filter, 5725-5875      | BRC50705-02       | 2241    | 10/4/2012    |
|                       | MHz                                |                   |         |              |
|                       |                                    |                   |         |              |
|                       | 1000 - 18,000 MHz, 07-Feb-12       |                   |         |              |
| <u>Manufacturer</u>   | <u>Description</u>                 | <u>Model</u>      | Asset # | Cal Due      |
| EMCO                  | Antenna, Horn, 1-18 GHz            | 3115              | 487     | 7/6/2012     |
| Hewlett Packard       | Microwave Preamplifier, 1-         | 8449B             | 785     | 5/18/2012    |
| T'' DO (04.0          |                                    |                   |         | <b>-</b> - · |
| Eila: D96912          |                                    |                   |         | Daga 24      |

|                     |   | керо                        | rt Date: Mai | rcn 19, 2012                |
|---------------------|---|-----------------------------|--------------|-----------------------------|
|                     | 26.5GHz                                   |                             |              |                             |
| Hewlett Packard     | SpecAn 9 kHz - 40 GHz, FT<br>(SA40) Blue  | 8564E (84125C)              | 1393         | 8/9/2012                    |
| Hewlett Packard     | High Pass filter, 8.2 GHz (Purple System) | P/N 84300-80039<br>(84125C) | 1767         | 11/29/2012                  |
| Micro-Tronics       | Band Reject Filter, 2400-2500<br>MHz      | BRM50702-02                 | 2238         | 10/4/2012                   |
| Micro-Tronics       | Band Reject Filter, 5725-5875<br>MHz      | BRC50705-02                 | 2241         | 10/4/2012                   |
| Radiated Emissions  | 1000 - 26,500 MHz, 08-Feb-12              |                             |              |                             |
| Manufacturer        | Description                               | <u>Model</u>                | Asset #      | Cal Due                     |
| EMCO                | Antenna, Horn, 1-18 GHz                   | 3115                        | 487          | 7/6/2012                    |
| Hewlett Packard     | Microwave Preamplifier, 1-<br>26.5GHz     | 8449B                       | 785          | 5/18/2012                   |
| Hewlett Packard     | SpecAn 9 kHz - 40 GHz, FT<br>(SA40) Blue  | 8564E (84125C)              | 1393         | 8/9/2012                    |
| Hewlett Packard     | Head (Inc W1-W4, 1742 , 1743)<br>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<br>MHz      | BRM50702-02                 | 2249         | 10/11/2012                  |
|                     |   |                             |              |                             |
|                     | Power and Spurious Emissions),            |                             | _            |                             |
| <u>Manufacturer</u> | <u>Description</u>                        | Model                       | Asset #      | Cal Due                     |
| Hewlett Packard     | SpecAn 9 kHz - 40 GHz, FT<br>(SA40) Blue  | 8564E (84125C)              | 1393         | 8/9/2012                    |
|                     |   |                             |              |                             |
|                     | Power and Spurious Emissions),            |                             |              | 0.15                        |
| Manufacturer        | Description                               | <u>Model</u><br>ESIB40      | Asset #      | <u>Cal Due</u><br>12/9/2012 |
| Rohde & Schwarz     | EMI Test Receiver, 20 Hz-40<br>GHz        | (1088.7490.40)              | 2493         | 12/9/2012                   |
| Radiated Emissions  | 30 - 1,000 MHz, 15-Feb-12                 |                             |              |                             |
| Manufacturer        | Description                               | <u>Model</u>                | 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               | ESIB40                      | 2493         | 12/9/2012                   |
|                     | GHz                                       | (1088.7490.40)              |              |                             |
| Radiated Emissions, | 1,000 - 18,000 MHz, 02-Mar-12             |                             |              |                             |
| <u>Manufacturer</u> | Description                               | <u>Model</u>                | Asset #      | Cal Due                     |
| EMCO                | Antenna, Horn, 1-18 GHz                   | 3115                        | 1142         | 8/2/2012                    |
|                     | (SA40-Red)                                |                             |              |                             |
| Rohde & Schwarz     | EMI Test Receiver, 20 Hz-7 GHz            | ESIB7                       | 1756         | 4/6/2012                    |
| Hewlett Packard     | Microwave Preamplifier, 1-<br>26.5GHz     | 8449B                       | 2199         | 2/23/2013                   |
| Micro-Tronics       | Band Reject Filter, 2400-2500<br>MHz      | BRM50702-02                 | 2238         | 10/4/2012                   |
| Hewlett Packard     | SpecAn 9 kHz - 40 GHz, (SA40)<br>Purple   | 8564E (84125C)              | 2415         | 7/28/2012                   |
| Radiated Emissions  | 1000 - 18,000 MHz, 03-Mar-12              |                             |              |                             |
| Manufacturer        | Description                               | <u>Model</u>                | Asset #      | Cal Due                     |
| EMCO                | Antenna, Horn, 1-18 GHz                   | 3115                        | 1142         | 8/2/2012                    |
|                     | (SA40-Red)                                |                             |              |                             |
| Hewlett Packard     | Microwave Preamplifier, 1-<br>26.5GHz     | 8449B                       | 2199         | 2/23/2013                   |
| Micro-Tronics       | Band Reject Filter, 2400-2500             | BRM50702-02                 | 2238         | 10/4/2012                   |

Test Report Report Date: March 19, 2012

| Hewlett Packard     | MHz<br>SpecAn 9 kHz - 40 GHz, (SA40)<br>Purple | 8564E (84125C) | 2415    | 7/28/2012 |
|---------------------|--|----------------|---------|-----------|
|                     | - AC Power Ports, 12-Mar-12                    |                | _       |           |
| <u>Manufacturer</u> | <u>Description</u>                             | <u>Model</u>   | Asset # | Cal Due   |
| Robde & Schwarz     | FMI Test Receiver 20 Hz-7 GHz                  | FSIR7          | 1538    | 12/6/2012 |

| Nonac a Conwarz | LIVII TOST NOCCIVOI, 20 TIZ 7 OTIZ | LOIDI             | 1000 | 12/0/2012  |
|-----------------|------------------------------------|-------------------|------|------------|
| Rohde & Schwarz | Pulse Limiter                      | ESH3 Z2           | 1594 | 5/17/2012  |
| Fischer Custom  | LISN, 25A, 150kHz to 30MHz,        | FCC-LISN-50-25-2- | 2000 | 10/18/2012 |
| Comm            | 25 Amn                             | 00                |      |            |

Comm 25 Amp, 09

# Appendix B Test Data

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| <b>Ellio</b>           | tt<br>Frompany        | Ei               | MC Test Data |
|------------------------|-----------------------|------------------|--------------|
| 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:     | -            |

For The

# **Ubiquiti Networks**

Model

UniFi Pro

Date of Last Test: 3/16/2012

| EII | iott |
|-----|------|
|-----|------|

|           | An 2023 company       |                  |             |  |  |  |
|-----------|-----------------------|------------------|-------------|--|--|--|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |  |  |  |
| Model     | Model: UniFi Pro      |                  | T86160      |  |  |  |
| Model.    | OHITT FIO             | 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<br>Setting | Measured<br>Power | Test Performed                       | Limit                           | Result / Margin                       |
|-------|----------------|---------|------------------|-------------------|--------------------------------------|---------------------------------|---------------------------------------|
| 1a    | 802.11b        | low     | -                | -                 | Restricted Band Edge<br>(2390 MHz)   | FCC Part 15.209 /<br>15.247(c)  | 52.7 dBµV/m @ 2386.4<br>MHz (-1.3 dB) |
| 1b    | Chain<br>A+B+C | high    | -                | -                 | Restricted Band Edge<br>(2483.5 MHz) | FCC Part 15.209 /<br>15.247( c) | 52.2 dBµV/m @ 2487.7<br>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.



|           | An 2023 company       |                  |             |  |  |  |
|-----------|-----------------------|------------------|-------------|--|--|--|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |  |  |  |
| Model     | Model: UniFi Pro      |                  | T86160      |  |  |  |
| wouei.    | OHIFT FTO             | Account Manager: | Susan Pelzl |  |  |  |
| Contact:  | Jennifer Sanchez      |                  |             |  |  |  |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |  |  |  |

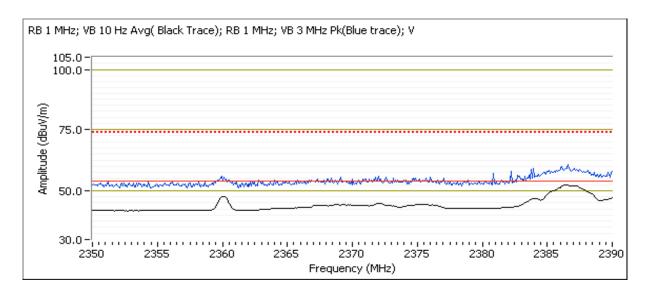
## Run #1: Radiated Spurious Emissions. Operating Mode: 802.11b

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

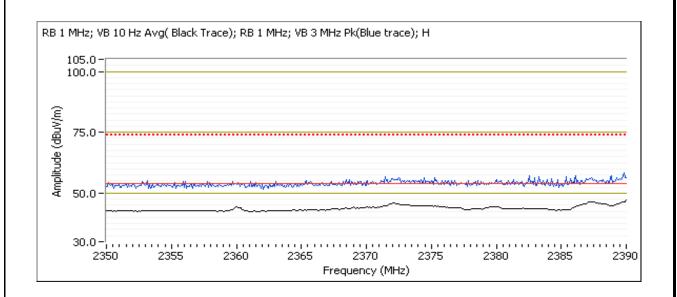
#### Run #1a: Low Channel @ 2412 MHz, 802.11b mode

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   | Н   | 54.0   | -7.0   | AVG       | 99      | 1.4    |          |
| 2387.110  | 55.8   | Н   | 74.0   | -18.2  | PK        | 99      | 1.4    |          |



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



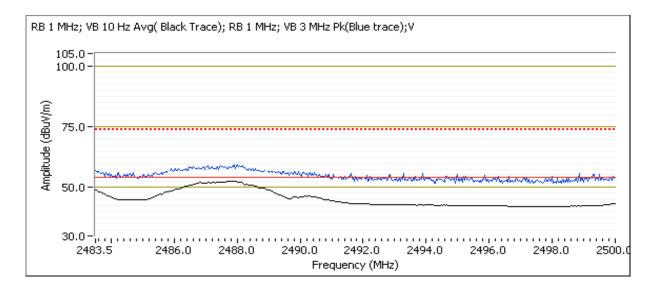


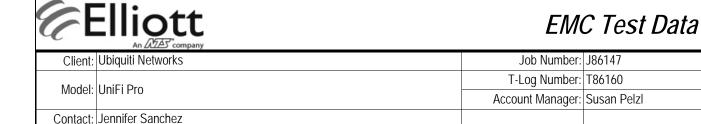
|           | All Diff. Company     |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | HniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFI PIO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

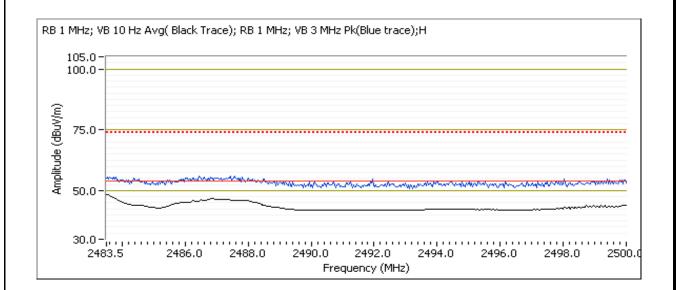
Run #1b: High Channel @ 2462 MHz, 802.11b Mode

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   | Н   | 54.0   | -5.7     | AVG       | 222     | 1.3    |          |
| 2483.500  | 55.6   | Н   | 74.0   | -18.4    | PK        | 222     | 1.3    |          |







Class: N/A

Standard: FCC 15.247/EN 300 328

| Elliott EMC Te. |                   |                    |             |
|-----------------|-------------------|--------------------|-------------|
| Client:         | Ubiquiti Networks | Job Number:        | J86147      |
| Model           | UniFi Pro         | T-Log Number:      | T86160      |
| iviouei.        | OHIFI PIO         | Account Manager: S | Susan Pelzl |
| Contact:        | Jennifer Sanchez  |                    |             |

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

Class: N/A

## **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**

Standard: FCC 15.247/EN 300 328

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<br>Setting | Measured<br>Power | Test Performed      | Limit             | Result / Margin      |
|--------|------|---------|------------------|-------------------|---------------------|-------------------|----------------------|
| 1a     | h    | low -   |                  | _                 | Radiated Emissions, | FCC Part 15.209 / | 53.3 dBµV/m @ 4824.0 |
| Tu     |      | 1011    |                  |                   | 1 - 26 GHz          | 15.247( c)        | MHz (-0.7 dB)        |
| 1b     | h    | center  | _                |                   | Radiated Emissions, | FCC Part 15.209 / | 53.9 dBµV/m @ 4874.1 |
| 10   1 | D    | Cernei  | -                | _                 | 1 - 26 GHz          | 15.247( c)        | MHz (-0.1 dB)        |
| 1c     | b    | high    |                  |                   | Radiated Emissions, | FCC Part 15.209 / | 53.1 dBµV/m @ 4924.1 |
| IC.    | b    | High    | -                | -                 | 1 - 26 GHz          | 15.247( c)        | 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

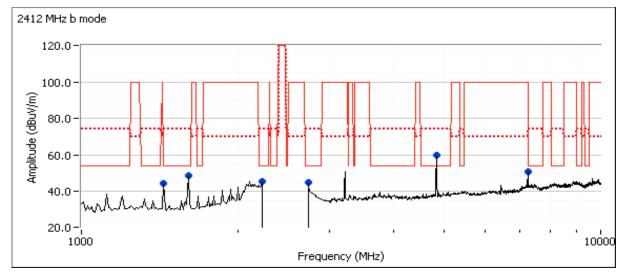
No radio related emissions detected below 1GHz.

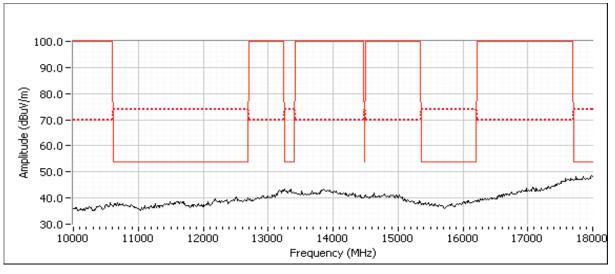
# Client: Ubiquiti Networks Client: Ubiquiti Networks Model: UniFi Pro Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 EMC Test Data Job Number: J86147 T-Log Number: T86160 Account Manager: Susan Pelzl Class: N/A

## 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





| E E                              |  | )tt        |              |               |            |     |        | EMO                | C Test Data                |  |
|----------------------------------|--|------------|--------------|---------------|------------|-----|--------|--------------------|----------------------------|--|
|                                  | Ubiquiti Netw  |            | (            | *             |            |     |        | Job Number: J86147 |                            |  |
| Madal                            | odel: UniFi Pro  |            |              |               |            |     |        | Log Number:        | T86160                     |  |
| Modei:                           |  |            |              |               |            |     |        | unt Manager:       | Susan Pelzl                |  |
| Contact:                         | Jennifer Sand  | <br>chez   | -            |               |            |     |        |                    |                            |  |
| Standard:                        | FCC 15.247/E   | EN 300 328 | ,            |               | Class: N/A |     |        |                    |                            |  |
| Spurious E                       | is Emissions Incy Level Pol 15.209 / 15.247 Detector Azimuth |            |              |               |            |     | Height | Comments           |                            |  |
| MHz                              | dBμV/m   | v/h        | Limit        | Margin        | Pk/QP/Avg  |     | meters |                    |                            |  |
| 1608.030                         | 49.9   | Н          | 54.0         | -4.1          | AVG        | 322 | 1.3    | RB 1 MHz;V         | 'B 10 Hz; <u>Pk</u>        |  |
| 1607.970                         | 50.9   | Н          | 74.0         | -23.1         | PK         | 322 | 1.3    | RB 1 MHz;V         | 'B 3 MHz;Pk                |  |
| 1439.980                         | 43.8   | V          | 54.0         | -10.2         | AVG        | 243 | 1.3    | RB 1 MHz;V         | 'B 10 Hz;Pk                |  |
| 1440.270                         | 46.7   | V          | 74.0         | -27.3         | PK         | 243 | 1.3    | RB 1 MHz;V         | B 3 MHz;Pk                 |  |
|                                  |  |            |              |               | Peak       | 123 | 1.0    | Note 2             |                            |  |
| 7233.450                         | 51.0   | V          | 54.0         | -3.0          | Peak       | 123 | 1.0    |                    |                            |  |
|                                  | 51.0<br>53.3   | V          | 54.0<br>54.0 | -3.0<br>-0.7  | AVG        | 200 | 1.0    | RB 1 MHz;V         | 'B 10 Hz;Pk                |  |
| 7233.450                         |  |            |              |               |            |     |        | RB 1 MHz;V         | /B 10 Hz;Pk<br>/B 3 MHz;Pk |  |
| 7233.450<br>4824.030<br>4824.050 | 53.3<br>55.0   | V<br>V     | 54.0<br>74.0 | -0.7<br>-19.0 | AVG        | 200 | 1.0    | RB 1 MHz;V         |                            |  |

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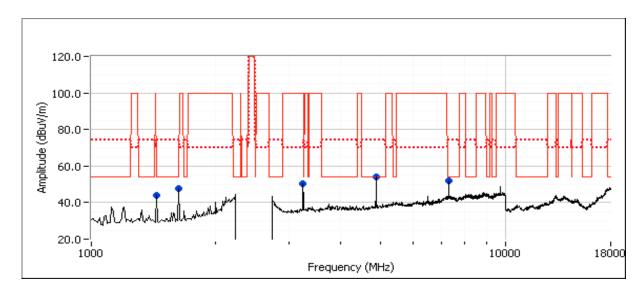
# EMC Test Data

| Client    | Ubiquiti Networks     | Job Number:      | 106147      |
|-----------|-----------------------|------------------|-------------|
| Cilent    | ondain networks       | Job Number.      | J00147      |
| Model:    | UniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFT FTO             | 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

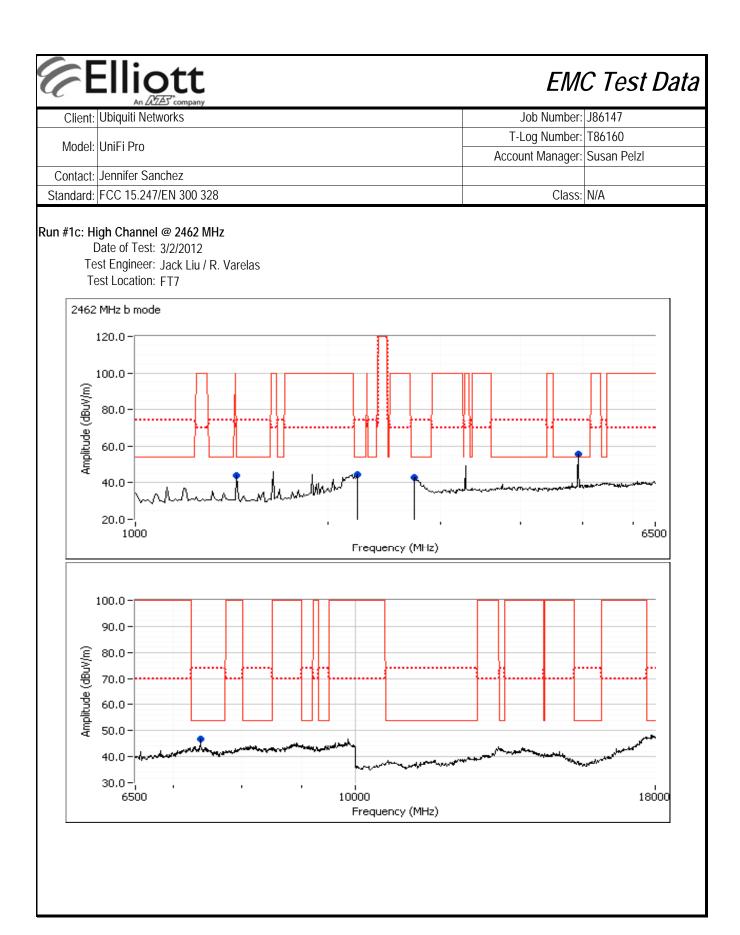


#### Spurious Emissions

| Spanious Ennocions |        |     |        |          |           |         |        |                      |
|--------------------|--------|-----|--------|----------|-----------|---------|--------|----------------------|
| 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   | Н   | 54.0   | -14.6    | AVG       | 293     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 7310.510           | 49.0   | Н   | 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   | Η   | 54.0   | -4.0     | AVG       | 212     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 3249.360           | 52.0   | Η   | 74.0   | -22.0    | PK        | 212     | 1.0    | RB 1 MHz;VB 3 MHz;Pk |
| 1624.720           | 47.7   | Н   | 54.0   | -6.3     | AVG       | 55      | 1.3    | RB 1 MHz;VB 10 Hz;Pk |
| 1624.690           | 49.1   | Н   | 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 significant emissions in this frequency range



| Client:                                      | Ubiquiti Netw           | orks            |               |                             |                              |                     |                         | Job Number:          | J86147                   |
|--|-------------------------|-----------------|---------------|-----------------------------|------------------------------|---------------------|-------------------------|----------------------|--------------------------|
|  |                         |                 |               |                             |                              |                     | T-                      | Log Number:          | T86160                   |
| Model:                                       | UniFi Pro               |                 |               |                             |                              |                     |                         | unt Manager:         |                          |
| Contact:                                     | Jennifer San            | chez            |               |                             |                              |                     |                         |                      |                          |
| Standard:                                    | FCC 15.247/             | EN 300 328      |               |                             |                              |                     |                         | Class:               | N/A                      |
| MHz  | Level<br>dBµV/m<br>43.7 | Pol<br>v/h<br>V | Limit<br>54.0 | / 15.247<br>Margin<br>-10.3 | Detector<br>Pk/QP/Avg<br>AVG | Azimuth degrees 243 | Height<br>meters<br>1.3 | Comments  RB 1 MHz;V | B 10 Hz;Pk               |
|  |                         |                 |               | J                           |                              | J                   |                         | RB 1 MHz;V           | B 10 Hz;Pk               |
| 1440.000                                     |                         | ١.,             | 74.0          | -27.9                       | PK                           | 243                 | 1.3                     | RB 1 MHz;V           | B 3 MHz;Pk               |
| 1439.750                                     | 46.1                    | V               |               |                             | 1                            |                     |                         |                      |                          |
| 1439.750<br>1924.060                         | 53.1                    | V               | 54.0          | -0.9                        | AVG                          | 206                 | 1.0                     | RB 1 MHz;V           |                          |
| 1440.000<br>1439.750<br>1924.060<br>1924.150 |                         | V<br>V          | 54.0<br>74.0  | -0.9<br>-19.3               | PK                           | 206                 | 1.0                     | RB 1 MHz;V           | B 3 MHz;Pk               |
| 439.750<br>1924.060                          | 53.1                    | V               | 54.0          | -0.9                        |                              |                     |                         |                      | B 3 MHz;Pk<br>B 10 Hz;Pk |

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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFIFIO              | 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<br>Setting | Measured<br>Power | Test Performed                       | Limit                           | Result / Margin                    |
|-------|------------------|---------|------------------|-------------------|--------------------------------------|---------------------------------|------------------------------------|
| 1a    | 802.11g<br>Chain | low     | -                | -                 | Restricted Band Edge<br>(2390 MHz)   | FCC Part 15.209 /<br>15.247( c) | 53.8dBµV/m @<br>2360.1MHz (-0.2dB) |
| 1b    | A+B+C            | high    | 111 1 - 1 - 1    |                   | Restricted Band Edge<br>(2483.5 MHz) | FCC Part 15.209 /<br>15.247( c) | 52.6dBµV/m @<br>2483.6MHz (-1.4dB) |
| 3a    | 802.11n20        | low     | -                | -                 | Restricted Band Edge<br>(2390 MHz)   | FCC Part 15.209 /<br>15.247( c) | 53.6dBµV/m @<br>2390.0MHz (-0.4dB) |
| 3b    | Chain<br>A+B+C   | high    | ,                | -                 | Restricted Band Edge<br>(2483.5 MHz) | FCC Part 15.209 /<br>15.247( c) | 53.5dBµV/m @<br>2483.6MHz (-0.5dB) |
| 4a    | 802.11n40        | low     | 1                | -                 | Restricted Band Edge<br>(2390 MHz)   | FCC Part 15.209 /<br>15.247(c)  | 52.9dBµV/m @<br>2389.7MHz (-1.1dB) |
| 4b    | Chain<br>A+B+C   | high    | -                | -                 | Restricted Band Edge<br>(2483.5 MHz) | FCC Part 15.209 /<br>15.247( c) | 53.7dBµV/m @<br>2483.5MHz (-0.3dB) |

| Client: Ubiquiti Networks  Model: UniFi Pro  Contact: Jennifer Sanchez  Standard: FCC 15.247/EN 300 328 | Job Number:<br>T-Log Number:<br>Account Manager: | J86147 |
|---|--|--------|
| Model: UniFi Pro  Contact: Jennifer Sanchez   | T-Log Number:                                    |        |
| Contact: Jennifer Sanchez   |  | T86160 |
|   |  |        |
| Standard: FCC 15 247/EN 300 328   |  |        |
| Jianuaru. I OO TJ.Z47/EN JUU JZU  | Class:   | N/A    |
| Modifications Made During Testing  lo modifications were made to the EUT during testing                 |  |        |
| Deviations From The Standard of deviations were made from the requirements of the standard.             |  |        |
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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Madalı    | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHIFIPIO              | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

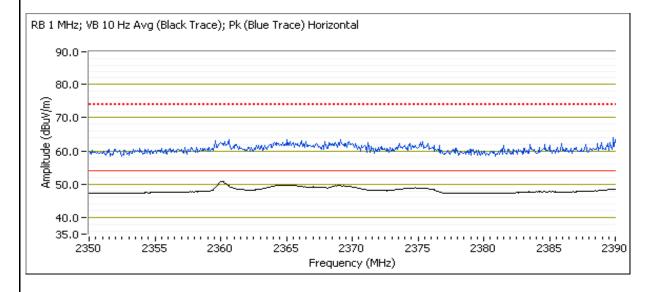
Run #1: Radiated Spurious Emissions. Operating Mode: 802.11g

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

| 2370 Will Z 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   | Н   | 54.0   | -0.2   | AVG       | 310     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 2360.070   | 63.2   | Н   | 74.0   | -10.8  | PK        | 310     | 1.1    | RB 1 MHz;VB 3 MHz;Pk |
| 2389.940   | 51.1   | Н   | 54.0   | -2.9   | AVG       | 310     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 2389.300   | 62.2   | Н   | 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 |



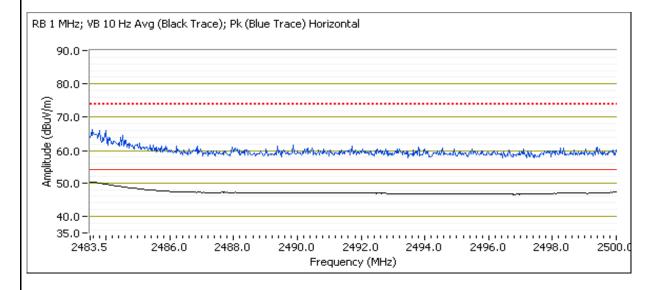


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|---------------------|-----------------------|------------------|-------------|--|--|--|--|
| Client:             | Ubiquiti Networks     | Job Number:      | J86147      |  |  |  |  |
| Model:              | HniEi Dro             | T-Log Number:    | T86160      |  |  |  |  |
|                     | OHIFIPIO              | 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   | Н   | 54.0   | -1.4     | AVG       | 248     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 2484.500  | 64.9   | Н   | 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 |





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

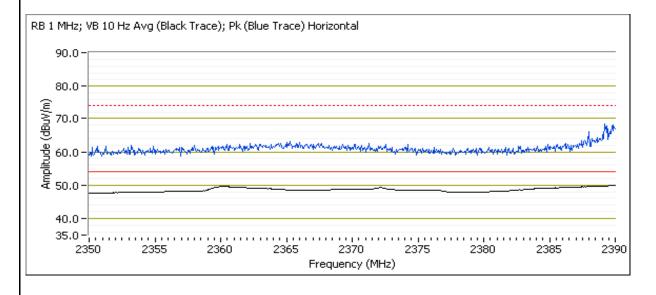
Run #3: Radiated Spurious Emissions. Operating Mode: 802.11n20

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

| 2370 WILL | una Lage 3 | igilai Kaala | ica i icia sii | crigiri  |           |         |        |                      |
|-----------|------------|--------------|----------------|----------|-----------|---------|--------|----------------------|
| 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       | Н            | 54.0           | -0.4     | AVG       | 304     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 2389.870  | 66.1       | Н            | 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 |



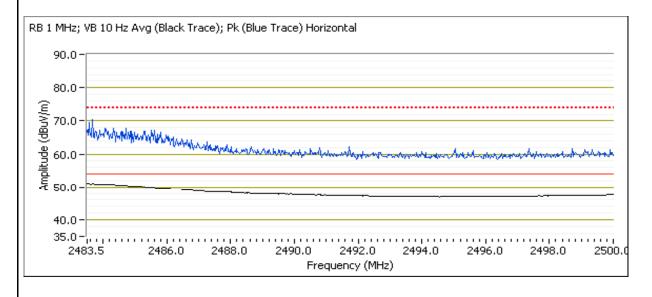


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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Madalı    | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHIFT PIO             | 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

| 2700.0 WII IZ | Dana Lage | Signal Raul | iatea i ieia e | nicigui  |           |         |        |                      |
|---------------|-----------|-------------|----------------|----------|-----------|---------|--------|----------------------|
| 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      | Н           | 54.0           | -0.5     | AVG       | 260     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 2484.370      | 66.8      | Н           | 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      | ٧           | 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      |
| Model.    | OHIFT FTO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

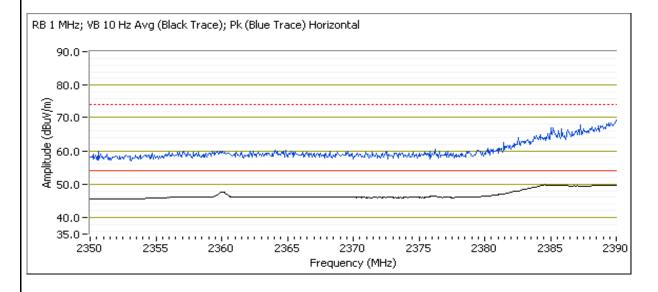
## Run #4: Radiated Spurious Emissions. Operating Mode: 802.11n40

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

| ZOTO WITTE | una Lage 3 | igilai Kaala | ica i icia oli | crigin   |           |         |        |                      |
|------------|------------|--------------|----------------|----------|-----------|---------|--------|----------------------|
| 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       | Н            | 54.0           | -1.1     | AVG       | 313     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 2390.000   | 67.3       | Н            | 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 |



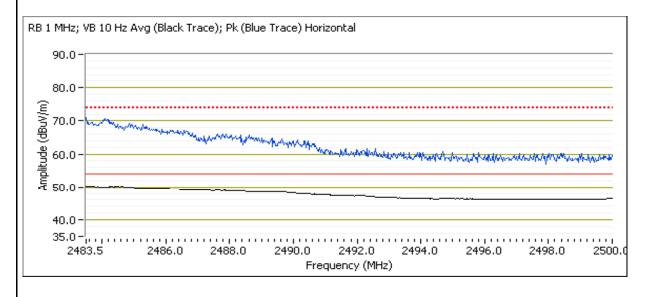


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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model     | UniFi Pro             | T-Log Number:    | T86160      |
| woden.    | OHIFIPIO              | 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

|           |        | <u> </u> |        | <u>g</u> |           |         |        |                      |
|-----------|--------|----------|--------|----------|-----------|---------|--------|----------------------|
| 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   | Н        | 54.0   | -0.3     | AVG       | 261     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 2483.940  | 70.1   | Н        | 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 |



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|----------|----------------------------|------------------|-------------|
| Client:  | Ubiquiti Networks          | Job Number:      | J86147      |
| Madalı   | UniFi Pro                  | T-Log Number:    | T86160      |
| Model.   | OHIFI PIO                  | Account Manager: | Susan Pelzl |
| Contact: | Jennifer Sanchez           |                  |             |

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

Class: N/A

## 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

Standard: FCC 15.247/EN 300 328

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

| Mode  | Channel   | Power<br>Setting   | Measured<br>Power  | Test Performed  | Limit   | Result / Margin   |  |  |  |
|---|-----------|--|--|---|---|---|--|--|--|
| reliminary measurements, center channel in each mode to determine worst-case mode. High and low channels for worst-case mode in |           |  |  |   |   |   |  |  |  |
| en evaluated  | <u>d.</u> |  |  |   |   |   |  |  |  |
| n   | center    | _  | _  | Radiated Emissions,   | FCC Part 15.209 /   | 53.0dBµV/m @  |  |  |  |
| 9   | CCITICI   |  |  | 1 - 26 GHz  | 15.247(c)   | 4877.0MHz (-1.0dB)  |  |  |  |
| NOU   | contor    |  |  | Radiated Emissions,   | FCC Part 15.209 /   | 52.9dBµV/m @  |  |  |  |
| IVZU  | CEITIEI   | -  | -  | 1 - 26 GHz  | 15.247(c)   | 7309.6MHz (-1.1dB)  |  |  |  |
| NAO   | contor    |  |  | Radiated Emissions,   | FCC Part 15.209 /   | 52.3dBµV/m @  |  |  |  |
| 1140  | Center    | -  | -  | 1 - 26 GHz  | 15.247(c)   | 7301.2MHz (-1.7dB)  |  |  |  |
| a   | low       |  |  | Radiated Emissions,   | FCC Part 15.209 /   | 47.5dBµV/m @  |  |  |  |
| y   | IOW       | -  | -  | 1 - 26 GHz  | 15.247(c)   | 1608.0MHz (-6.5dB)  |  |  |  |
| a   | high      |  |  | Radiated Emissions,   | FCC Part 15.209 /   | 45.3dBµV/m @  |  |  |  |
| У   | riigir    | -  | -  | 1 - 26 GHz  | 15.247( c)  | 2752.2MHz (-8.7dB)  |  |  |  |
|   | easuremen | easurements, center chen evaluated.  g center  N20 center  N40 center  g low | easurements, center channel in each en evaluated.  g center -  N20 center -  N40 center -  g low - | Mode Channel Setting Power easurements, center channel in each mode to de en evaluated.  g center | Mode Channel Setting Power Test Performed easurements, center channel in each mode to determine worst-case mode en evaluated.  g center Radiated Emissions, | Mode Channel Setting Power Test Performed Limit easurements, center channel in each mode to determine worst-case mode. High and low channels en evaluated.  g center - Radiated Emissions, 15.247(c)  N20 center - Radiated Emissions, 1-26 GHz 15.209 / 15.247(c)  N40 center - Radiated Emissions, 1-26 GHz 15.247(c)  Radiated Emissions, 1-26 GHz 15.247(c) |  |  |  |

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

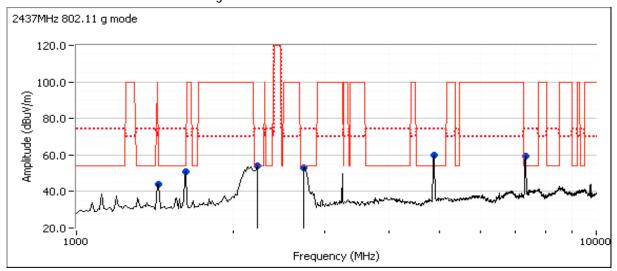
# EMC Test Data

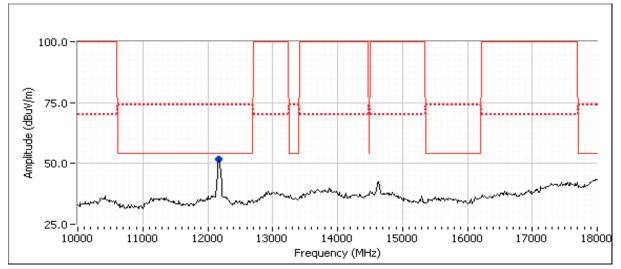
|           | An 2023 Company       |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Madalı    | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHIFIPIO              | 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

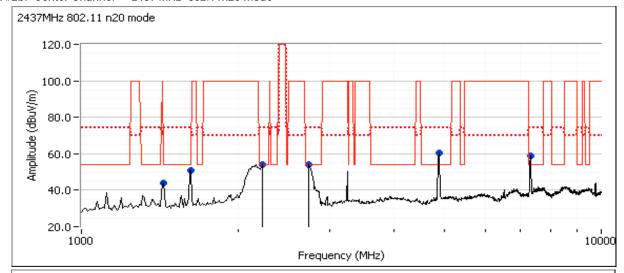


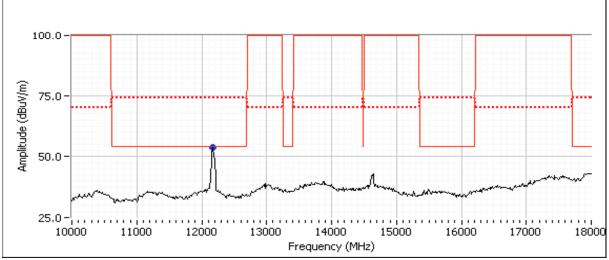


| Client:   | Ubiquiti Netv            | vorks          |                |               |                  | Job Number:   | J86147         |                 |                         |
|-----------|--------------------------|----------------|----------------|---------------|------------------|---------------|----------------|-----------------|-------------------------|
|           |                          |                |                | T-            | Log Number:      | T86160        |                |                 |                         |
| Model:    | el: UniFi Pro            |                |                |               |                  |               |                | unt Manager:    | Susan Pelzl             |
| Contact:  | Jennifer San             | ichez          |                |               |                  |               |                |                 |                         |
| Standard: | d: FCC 15.247/EN 300 328 |                |                |               |                  |               |                | Class:          | N/A                     |
|           |                          |                |                |               |                  |               |                |                 |                         |
| requency  | 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            |                 | /B 10 Hz;Pk             |
| 4877.130  | 63.7                     | V              | 74.0           | -10.3         | PK               | 0             | 1.5            |                 | /B 3 MHz;Pk             |
| 1624.730  | 50.4                     | V              | 54.0           | -3.6          | AVG              | 80            | 1.7            |                 | /B 10 Hz;Pk             |
| 1624.710  | 53.3                     | V              | 74.0           | -20.7         | PK               | 80            | 1.7            |                 | /B 3 MHz;Pk             |
| 2209.130  | 51.1                     | Н              | 54.0           | -2.9          | AVG              | 170           | 1.3            | RB 1 MHz;\      | /B 10 Hz;Pk             |
| 2209.130  | 61.9                     | Н              | 74.0           | -12.1         | PK               | 170           | 1.3            |                 | /B 3 MHz;Pk             |
| 2754.870  | 52.2                     | Н              | 54.0           | -1.8          | AVG              | 300           | 1.0            |                 | /B 10 Hz;Pk             |
| 2753.470  | 61.2                     | Н              | 74.0           | -12.8         | PK               | 300           | 1.0            |                 | /B 3 MHz;Pk             |
| 1439.990  | 43.6                     | V              | 54.0           | -10.4         | AVG              | 325           | 2.0            |                 | /B 10 Hz;Pk             |
| 1439.980  | 46.9                     | V              | 74.0           | -27.1         | PK               | 325           | 2.0            | RB 1 MHz;\      | /B 3 MHz;Pk             |
| 7312.310  | 51.2                     | V              | 54.0           | -2.8          | AVG              | 213           | 1.4            | RB 1 MHz;\      | /B 10 Hz;Pk             |
| 7311.930  | 67.2                     | V              | 74.0           | -6.8          | PK               | 213           | 1.4            | RB 1 MHz;\      | /B 3 MHz;Pk             |
| 2183.670  | 46.9                     | V              | 54.0           | -7.1          | AVG              | 102           | 1.2            | RB 1 MHz;\      | /B 10 Hz;Pk             |
| 2184.200  | 59.2                     | V              | 74.0           | -14.8         | PK               | 102           | 1.2            | RB 1 MHz;\      | /B 3 MHz;Pk             |
| ote 1:    | Ear amission             | e in restricte | nd hands the   | limit of 15.3 | 209 was used.    |               |                |                 |                         |
| ole I.    | For all other            | omissions t    | ho limit was   | sat 20dB ha   | low the level o  | of the fundam | ontal and n    | noacurod in 1   | 00kHz.Refer to RF p     |
| ote 2:    | measuremer               |                |                |               | low the level c  | n ine iunuan  | iciliai aliu i | ileasureu III-i | ooki iz.ixelel to ixi p |
|           |                          |                |                |               |                  |               |                | 1 11            |                         |
| lote 3:   |                          |                |                |               |                  |               | round the ca   | ard and its an  | tennas 20-50cm from     |
|           | device indica            | ated there w   | ere no signifo | cant emission | ns in this frequ | uency range   |                |                 |                         |

|           | Elliott<br>An ATAS company | EMO              | C Test Data |
|-----------|----------------------------|------------------|-------------|
|           | Ubiquiti Networks          | Job Number:      | J86147      |
| Model     | UniFi Pro                  | T-Log Number:    | T86160      |
| wouei.    | OHIFT PTO                  | 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

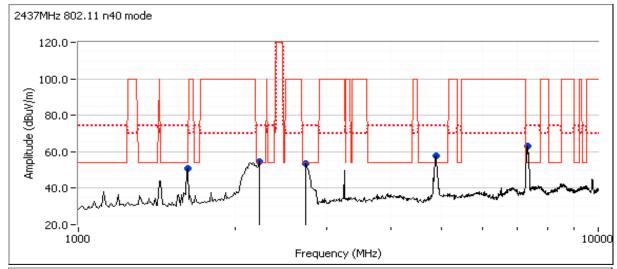


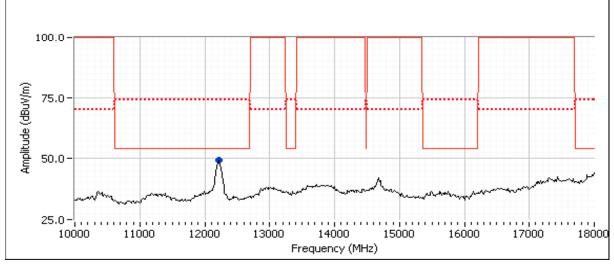


| Client:   | Ubiquiti Netw   | orks .       |                |               |                  | Job Number:  | J86147       |                 |                      |
|-----------|-----------------|--------------|----------------|---------------|------------------|--------------|--------------|-----------------|----------------------|
|           |                 |              |                |               |                  |              | T-           | Log Number:     | T86160               |
| Model:    | UniFi Pro       |              |                |               |                  |              | Acco         | unt Manager:    | Susan Pelzl          |
| Contact:  | Jennifer San    | chez         |                |               |                  |              |              |                 |                      |
| Standard: | FCC 15.247/     | EN 300 328   |                |               |                  |              |              | Class:          | N/A                  |
|           | 1               |              |                |               |                  |              |              |                 | -                    |
| requency  | 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;\      | /B 10 Hz;Pk          |
| 7310.500  | 65.6            | V            | 74.0           | -8.4          | PK               | 212          | 1.3          | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 4873.460  | 52.7            | V            | 54.0           | -1.3          | AVG              | 336          | 1.4          | RB 1 MHz;\      | /B 10 Hz;Pk          |
| 4872.460  | 63.1            | V            | 74.0           | -10.9         | PK               | 336          | 1.4          | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 1624.730  | 50.4            | Н            | 54.0           | -3.6          | AVG              | 132          | 1.3          | RB 1 MHz;\      | /B 10 Hz;Pk          |
| 1624.770  | 52.3            | Н            | 74.0           | -21.7         | PK               | 132          | 1.3          | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 1440.040  | 44.0            | V            | 54.0           | -10.0         | AVG              | 335          | 1.4          | RB 1 MHz;\      | /B 10 Hz;Pk          |
| 1440.100  | 46.8            | V            | 74.0           | -27.2         | PK               | 335          | 1.4          | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 2203.700  | 51.0            | Н            | 54.0           | -3.0          | AVG              | 130          | 1.0          | RB 1 MHz;\      | /B 10 Hz;Pk          |
| 2205.600  | 62.1            | Н            | 74.0           | -11.9         | PK               | 130          | 1.0          | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 2700.470  | 51.0            | Н            | 54.0           | -3.0          | AVG              | 299          | 1.0          | RB 1 MHz;\      | /B 10 Hz;Pk          |
| 2700.350  | 49.5            | Н            | 74.0           | -24.5         | PK               | 299          | 1.0          | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 12185.380 | 46.7            | V            | 54.0           | -7.3          | AVG              | 62           | 1.2          | RB 1 MHz;\      | /B 10 Hz;Pk          |
| 12186.980 | 57.5            | V            | 74.0           | -16.5         | PK               | 62           | 1.2          | RB 1 MHz;\      | /B 3 MHz;Pk          |
|           | ı               |              |                |               |                  |              |              |                 |                      |
| lote 1:   |                 |              |                |               |                  | For all othe | r emissions  | , the limit was | s set 30dB below the |
|           | level of the fu |              |                |               |                  |              |              |                 |                      |
| ote 2:    |                 |              |                |               | ngent restricte  |              |              |                 |                      |
| lote 3:   |                 |              |                |               |                  |              | round the ca | ard and its an  | tennas 20-50cm from  |
| ioto o.   | device indica   | ted there we | ere no sianifa | cant emission | ns in this frequ | jency range  |              |                 |                      |

|           | Eliott<br>An ATAS company | EMO              | C Test Data |
|-----------|---------------------------|------------------|-------------|
| Client:   | Ubiquiti Networks         | Job Number:      | J86147      |
| Madalı    | UniEi Dro                 | T-Log Number:    | T86160      |
| Model.    | UniFi Pro                 | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez          |                  |             |
| Standard: | FCC 15.247/EN 300 328     | Class:           | N/A         |
|           |                           |                  | I.          |

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





| Client:    | Ubiquiti Networks  EMC Test Da                  |                |                |              |                      |               |             |                  |                  |
|------------|---|----------------|----------------|--------------|----------------------|---------------|-------------|------------------|------------------|
|            |   |                |                |              | T-Log Number: T86160 |               |             |                  |                  |
| Model:     | UniFi Pro                                       |                |                |              |                      |               |             |                  |                  |
| Contact:   | Account Manager: Susan Pelzl : Jennifer Sanchez |                |                |              |                      |               |             |                  |                  |
|            | FCC 15.247/                                     |                |                |              |                      |               |             | Class:           | NI/A             |
| Statiualu. | 1 00 13.2477                                    | LIN 300 320    | 1              |              |                      |               |             | Class.           | IV/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;V       | /B 10 Hz;Pk      |
| 7304.140   | 65.7  | V              | 74.0           | -8.3         | PK                   | 206           | 1.7         | RB 1 MHz;V       | B 3 MHz;Pk       |
| 1624.710   | 49.5  | V              | 54.0           | -4.5         | AVG                  | 77            | 1.5         | RB 1 MHz;V       | /B 10 Hz;Pk      |
| 1624.710   | 53.2  | V              | 74.0           | -20.8        | PK                   | 77            | 1.5         | RB 1 MHz;V       | /B 3 MHz;Pk      |
| 2208.530   | 50.7  | Н              | 54.0           | -3.3         | AVG                  | 172           | 1.3         | RB 1 MHz;V       | /B 10 Hz;Pk      |
| 2210.000   | 63.1  | Н              | 74.0           | -10.9        | PK                   | 172           | 1.3         | RB 1 MHz;V       | /B 3 MHz;Pk      |
| 2754.200   | 50.0  | Н              | 54.0           | -4.0         | AVG                  | 302           | 1.0         | RB 1 MHz;V       | /B 10 Hz;Pk      |
| 2755.070   | 60.3  | Н              | 74.0           | -13.7        | PK                   | 302           | 1.0         | RB 1 MHz;V       | /B 3 MHz;Pk      |
| 4872.930   | 50.7  | V              | 54.0           | -3.3         | AVG                  | 334           | 1.1         | RB 1 MHz;V       | /B 10 Hz;Pk      |
| 4872.860   | 61.4  | V              | 74.0           | -12.6        | PK                   | 334           | 1.1         | RB 1 MHz;V       | /B 3 MHz;Pk      |
| 12232.840  | 43.0  | V              | 54.0           | -11.0        | AVG                  | 100           | 1.2         | RB 1 MHz;V       | /B 10 Hz;Pk      |
| 12233.980  | 56.1  | V              | 74.0           | -17.9        | PK                   | 100           | 1.2         | RB 1 MHz;V       | /B 3 MHz;Pk      |
|            | 1   |                |                |              |                      |               |             |                  |                  |
| ote 1:     |   |                |                |              |                      | For all other | r emissions | s, the limit was | s set 30dB below |
|            | level of the fu                                 |                |                |              |                      |               |             |                  |                  |
| ote 2:     | Signal is not                                   | in a restricte | ed band but t  | he more stri | ngent restricte      | ed band limit | was used.   |                  |                  |
| lata D.    | Scans made                                      | between 18     | 3 - 26GHz wit  | h the measu  | irement anten        | na moved ar   | ound the ca | ard and its and  | tennas 20-50cm   |
| ote 3:     | device indica                                   | ated there w   | ere no signifo | ant emission | ns in this freq      | uency range   |             |                  |                  |

# Elliott

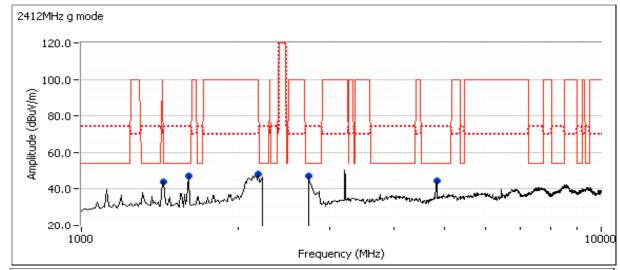
# EMC Test Data

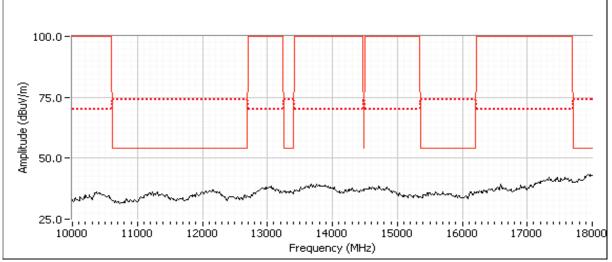
|           | An 2022 Company       |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model     | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHIFT PIO             | 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





| ez   300 328   Pol   v/h | 15.209 |  |  | _   | T-   | Job Number:<br>Log Number:<br>unt Manager:   | T86160   |
|--------------------------|--------|--|--|---|--|--|--|
| Pol v/h                  | 15.209 |  |  | _   |  | unt Manager:   |  |
| Pol v/h                  | 15.209 |  |  |   | ACCO   |  | Susan Peizi  |
| Pol v/h                  | 15.209 |  |  |   |  |  |  |
| Pol<br>v/h               | 15.209 |  |  |   |  |  |  |
| v/h                      | 15.209 |  |  |   |  | Class:   | N/A  |
| v/h                      | 15.209 |  |  |   |  |  |  |
|                          |        | / 15.247   | Detector   | Azimuth   | Height   | Comments   |  |
|                          | Limit  | Margin   | Pk/QP/Avg  | degrees   | meters   |  |  |
| Н                        | 54.0   | -6.5   | AVG  | 124   | 1.4  | RB 1 MHz;V   | 'B 10 Hz;Pk  |
| Н                        | 74.0   | -24.3  | PK   | 124   | 1.4  | RB 1 MHz;V   | 'B 3 MHz;Pk  |
| Н                        | 54.0   | -7.9   | AVG  | 120   | 1.0  | RB 1 MHz;V   | 'B 10 Hz;Pk  |
| Н                        | 74.0   | -19.1  | PK   | 120   | 1.0  | RB 1 MHz;V   | B 3 MHz;Pk   |
| Н                        | 54.0   | -11.0  | AVG  | 247   | 1.3  | RB 1 MHz;V   | 'B 10 Hz;Pk  |
| Н                        | 74.0   | -19.5  | PK   | 247   | 1.3  |  | · · · · · · · · · · · · · · · · · · ·  |
|                          | 54.0   | -9.5   |  | 344   | 1.1  |  |  |
|                          | 74.0   | -16.9  |  | 344   | 1.1  | ,  |  |
|                          | 54.0   | -9.2   |  | 339   | 1.4  |  |  |
| V                        | 74.0   | -26.8  | PK   | 339   | 1.4  | RB 1 MHz;V   | B 3 MHz;Pk   |
|                          | H<br>H | H 74.0<br>H 54.0<br>H 74.0<br>V 54.0<br>V 74.0<br>V 54.0 | H 74.0 -19.1<br>H 54.0 -11.0<br>H 74.0 -19.5<br>V 54.0 -9.5<br>V 74.0 -16.9<br>V 54.0 -9.2 | H 74.0 -19.1 PK<br>H 54.0 -11.0 AVG<br>H 74.0 -19.5 PK<br>V 54.0 -9.5 AVG<br>V 74.0 -16.9 PK<br>V 54.0 -9.2 AVG | H     74.0     -19.1     PK     120       H     54.0     -11.0     AVG     247       H     74.0     -19.5     PK     247       V     54.0     -9.5     AVG     344       V     74.0     -16.9     PK     344       V     54.0     -9.2     AVG     339 | H     74.0     -19.1     PK     120     1.0       H     54.0     -11.0     AVG     247     1.3       H     74.0     -19.5     PK     247     1.3       V     54.0     -9.5     AVG     344     1.1       V     74.0     -16.9     PK     344     1.1       V     54.0     -9.2     AVG     339     1.4 | H         74.0         -19.1         PK         120         1.0         RB 1 MHz;V           H         54.0         -11.0         AVG         247         1.3         RB 1 MHz;V           H         74.0         -19.5         PK         247         1.3         RB 1 MHz;V           V         54.0         -9.5         AVG         344         1.1         RB 1 MHz;V           V         74.0         -16.9         PK         344         1.1         RB 1 MHz;V           V         54.0         -9.2         AVG         339         1.4         RB 1 MHz;V |

# EMC Test Data Client: Ubiquiti Networks Job Number: J86147 T-Log Number: T86160 Model: UniFi Pro 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 2462MHz g mode 120.0 100.0 Amplitude (dBuV/m) 80.0 60.0 40.0 20.0-10000 1000 Frequency (MHz) 100.0 Amplitude (dBuV/m) 75.0 50.0 25.0 -10000 11000 12000 13000 14000 15000 16000 17000 18000

Frequency (MHz)

| Client:   | Ubiquiti Netw   | orks           |               |              |                 |               |             | Job Number:     | J86147               |
|-----------|-----------------|----------------|---------------|--------------|-----------------|---------------|-------------|-----------------|----------------------|
|           |                 |                |               |              | T-              | Log Number:   | T86160      |                 |                      |
| Model:    | UniFi Pro       |                |               |              |                 | unt Manager:  |             |                 |                      |
| Contact:  | Jennifer San    | chez           |               |              |                 |               |             | <u> </u>        |                      |
|           | FCC 15.247/     |                |               |              |                 |               |             | Class:          | N/A                  |
| Otaniaa 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;\      | /B 10 Hz;Pk          |
| 2746.630  | 55.6            | V              | 74.0          | -18.4        | PK              | 190           | 1.2         | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 1440.000  | 45.0            | V              | 54.0          | -9.0         | AVG             | 141           | 2.0         | RB 1 MHz;\      | /B 10 Hz;Pk          |
| 1439.870  | 47.2            | V              | 74.0          | -26.8        | PK              | 141           | 2.0         | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 4924.130  | 42.5            | V              | 54.0          | -11.5        | AVG             | 249           | 1.4         | RB 1 MHz;\      | /B 10 Hz;Pk          |
| 4924.600  | 53.8            | V              | 74.0          | -20.2        | PK              | 249           | 1.4         | RB 1 MHz;\      | /B 3 MHz;Pk          |
| 2208.400  | 45.2            | Н              | 54.0          | -8.8         | AVG             | 118           | 1.0         | RB 1 MHz;\      |                      |
| 2232.930  | 55.8            | Н              | 74.0          | -18.2        | PK              | 118           | 1.0         | RB 1 MHz;\      | /B 3 MHz;Pk          |
| lote 1:   |                 |                | •             |              |                 | For all other | r emissions | , the limit was | s set 30dB below the |
|           | level of the fu |                |               |              |                 |               |             |                 |                      |
| lote 2:   | Signal is not   | in a restricte | ed band but t | he more stri | ngent restricte | ed band limit | was used.   |                 |                      |

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|   |    |                |    |

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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | HaiEi Dro             | T-Log Number:    | T86160      |
|           | OHIFT FIO             | 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<br>Setting | Measured<br>Power | Test Performed      | Limit                          | Result / Margin      |
|-------|--------------|-----------------------------------|------------------|-------------------|---------------------|--------------------------------|----------------------|
| 1a    | 802.11g      | 2412MHz                           | 1                | 1                 | Radiated Emissions, | FCC Part 15.209 /              | 48.9 dBµV/m @ 1608.1 |
| Ia    | 802.11a      | & & & 1 - 18 G<br>2.11a 5745MHz 1 |                  | 1 - 18 GHz        | 15.247( c)          | MHz (-5.1 dB)                  |                      |
| 1b    | 802.11g      | 2462MHz                           | -                | -                 | Radiated Emissions, | FCC Part 15.209 /<br>15.247(c) | 47.2 dBµV/m @ 3282.8 |
| 10    | &<br>802.11a | &<br>5825MHz                      | -                | -                 | 1 - 18 GHz          | FCC Part 15.209 /<br>15.247(c) | MHz (-6.8 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.

#### 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.



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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model     | UniFi Pro             | T-Log Number:    | T86160      |
| wodei.    | OHIFI PIO             | 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

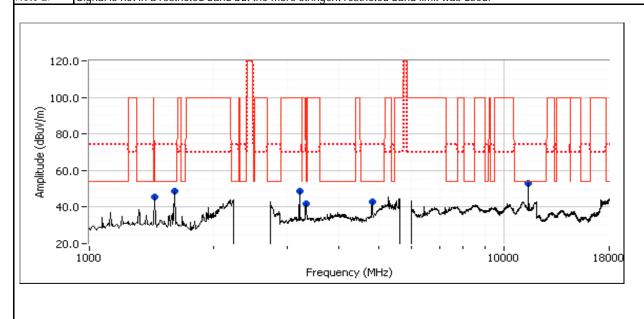
Test Location: FT7

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   | Н   | 54.0   | -5.1     | AVG       | 39      | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 1608.040  | 50.9   | Н   | 74.0   | -23.1    | PK        | 39      | 1.0    | RB 1 MHz;VB 3 MHz;Pk |
| 3332.950  | 39.1   | Н   | 54.0   | -14.9    | AVG       | 308     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 3333.530  | 50.7   | Н   | 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.





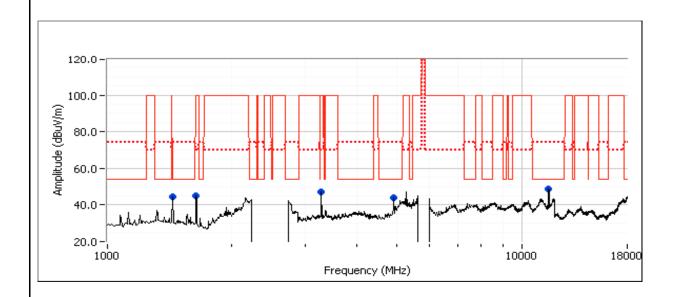
|           | All Dilles Company    |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Madalı    | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHITT FTO             | 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   | Н   | 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.



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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Madalı    | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHIFIPIO              | 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 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: None
Test Location: FT4 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:                |
|                 | • | 10.2 17 (d) | 1 033       | -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       |
| Λ               | Spurious emissions                      | 15.247(b)   | Pass        | All emissions below the |
|                 | Spanous emissions                       | 13.247(0)   | 1 433       | -30dBc limit            |

## Modifications Made During Testing

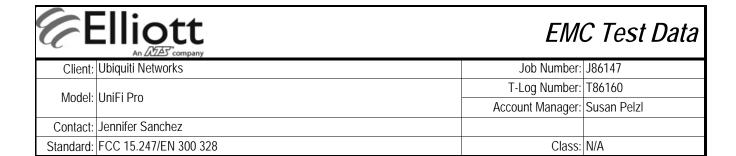
No modifications were made to the EUT during testing

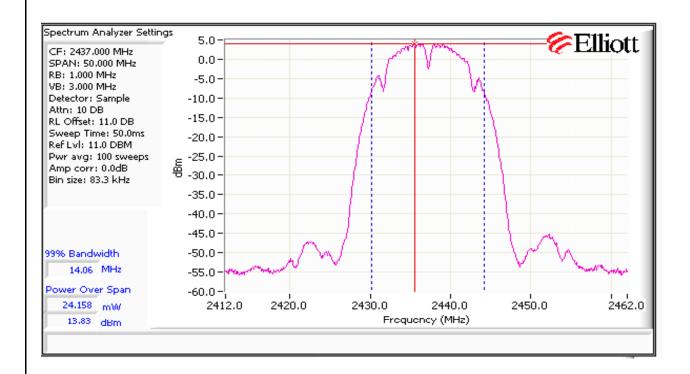
#### Deviations From The Standard

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

| Model                                     |                         |                                 |         |           |         | J                   | lob Number:  | J86147      |           |
|---|-------------------------|---------------------------------|---------|-----------|---------|---------------------|--------------|-------------|-----------|
| \/ \C\d\\\\\\\\                           |                         |                                 |         |           |         | T-L                 | og Number:   | T86160      |           |
| wouer. C                                  | JniFi Pro               |                                 |         |           | =       | Accou               | nt Manager:  | Susan Pelzl |           |
| Contact: J                                | Jennifer Sanchez        |                                 |         |           |         |                     |              |             |           |
| Standard: F                               | FCC 15.247/EN 300 32    | 28                              |         |           |         |                     | Class:       | N/A         |           |
| Trans                                     | smitted signal on chain | erating Mode:<br>n is coherent? |         |           |         |                     |              |             |           |
|   | 2412 MHz                | Chain 1                         | Chain 2 | Chain 3   | Chain 4 | Total Acros         | s All Chains | Lir         | nit       |
| Power Setting                             | r (dDm) Note 1          | - 10.0                          | -       | -         |         |                     |              |             |           |
| Output Power                              | i (udili)               | 12.2                            | 10.8    | 12.8<br>4 |         | 16.8 dBm<br>8.8 dBi | 0.048 W      | 27.2 dBm    | 0.528 V   |
| Antenna Gair<br>eirp (dBm) <sup>Not</sup> | 1 (QBI) **** = 1        | 16.2                            | 14.78   | 16.8      |         | 25.5 dBm            | 0.359 W      | Pa          | SS        |
| iip (ubiii)                               |                         | 10.2                            | 14.70   | 10.0      | ļ       | 23.3 UDIII          | 0.337 44     |             |           |
|   | 2437 MHz                | Chain 1                         | Chain 2 | Chain 3   | Chain 4 | Total Across        | s All Chains | Lir         | nit       |
| Power Setting                             |                         | -                               | -       | -         |         |                     |              |             |           |
| Output Power                              |                         | 13.8                            | 12.2    | 13.4      |         | 18.0 dBm            | 0.062 W      | 27.2 dBm    | 0.528 V   |
| Antenna Gair                              | n (dBi) Note 2          | 4                               | 4       | 4         |         | 8.8 dBi             |              | Pa          | SS        |
| eirp (dBm) <sup>Not</sup>                 | te 2                    | 17.8                            | 16.2    | 17.4      |         | 26.7 dBm            | 0.471 W      |             |           |
|   | 2462 MHz                | Chain 1                         | Chain 2 | Chain 3   | Chain 4 |                     |              |             |           |
| Power Setting                             |                         | -                               | -       | -         |         | Total Acros         | s All Chains | Lir         | nit       |
| Output Power                              | r (dBm) Note 1          | 13.6                            | 12.1    | 13.0      |         | 17.7 dBm            | 0.059 W      | 27.2 dBm    | 0.528 V   |
| Antenna Gair                              | n (dBi) Note 2          | 4                               | 4       | 4         |         | 8.8 dBi             |              | Pa          | cc        |
| eirp (dBm) <sup>Not</sup>                 | te 2                    | 17.6                            | 16.1    | 17        |         | 26.5 dBm            | 0.445 W      | ı a         | <b>33</b> |







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

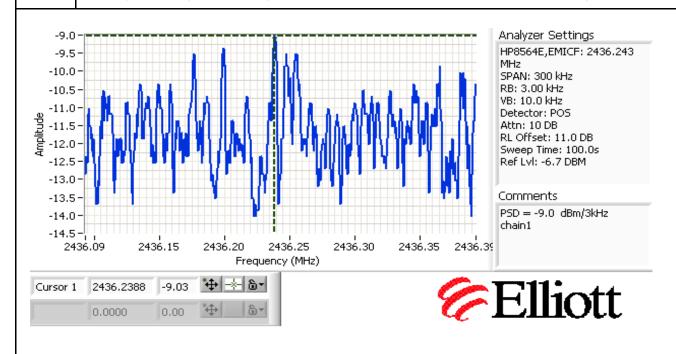
#### Run #2: Power spectral Density

#### 802.11b

| Power   | Frequency (MHz)    |         | PSD     | (dBm/3kHz | ) Note 1 |       | Limit    | Result  |
|---------|--------------------|---------|---------|-----------|----------|-------|----------|---------|
| Setting | rrequeriey (Wiriz) | Chain 1 | Chain 2 | Chain 3   | Chain 4  | Total | dBm/3kHz | rtosuit |
| 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.





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

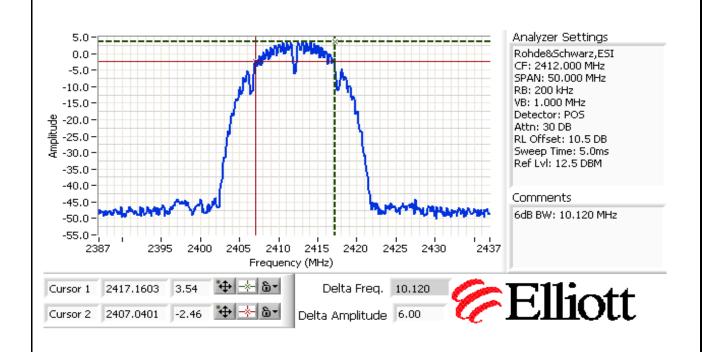
## Run #3: Signal Bandwidth

802.11b

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

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

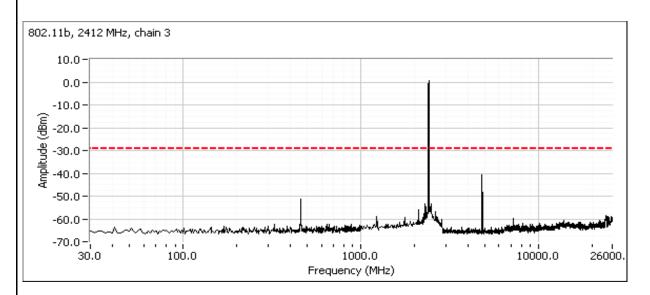


| un #4: Out of Band Spurious Emissions ode: 802.11b  Power Setting Per Chain #1 #2 #3  2412 -30 Pass 2437 -30 Pass 2462 -30 Pass   | Account Manager:   Susan Pelz  | Account Manager:   Susan Pelz  | Account Manager:   Susan Pelz   | Account Manager:   Susan Pelz   | Client: | Ubiquiti Netw | vorks                                   |                 |       | Job Number:   |            |
|---|--|--|---|---|---------|---------------|---|-----------------|-------|---------------|------------|
| Account Manager: Susan Pelz   | Account Manager: Susan Pelz  | Account Manager: Susan Pelz  | Account Manager:   Susan Pelz   | Account Manager: Susan Pelz   | Model:  | UniFi Pro     |   |                 |       |               |            |
| Standard:   FCC 15.247/EN 300 328   Class:   N/A  | Standard: FCC 15.247/EN 300 328         Class: N/A           un #4: Out of Band Spurious Emissions ode: 802.11b           Power Setting Per Chain         Frequency (MHz)         Limit         Result           -         -         -         -         30         Pass           -         -         -         2412         -30         Pass           -         -         -         2437         -30         Pass           -         -         -         2462         -30         Pass | Standard: FCC 15.247/EN 300 328         Class: N/A           un #4: Out of Band Spurious Emissions ode: 802.11b           Power Setting Per Chain         Frequency (MHz)         Limit         Result           -         -         -         -         30         Pass           -         -         -         2412         -30         Pass           -         -         -         2437         -30         Pass           -         -         -         2462         -30         Pass | Standard:   FCC 15.247/EN 300 328   Class:   N/A     In #4: Out of Band Spurious Emissions   Ode: 802.11b     Power Setting Per Chain   Frequency (MHz)   Limit   Result     #1   | Standard:   FCC 15.247/EN 300 328   Class:   N/A     m #4: Out of Band Spurious Emissions   Inde: 802.11b     Power Setting Per Chain   Frequency (MHz)   Limit   Result     #1 |         |               |   |                 | Acc   | ount Manager: | Susan Pela |
| un #4: Out of Band Spurious Emissions ode: 802.11b  Power Setting Per Chain #1 #2 #3 Frequency (MHz)  2412 -30 Pass 2437 -30 Pass 2462 -30 Pass   | un #4: Out of Band Spurious Emissions ode: 802.11b  Power Setting Per Chain #1 #2 #3  2412 -30 Pass 2437 -30 Pass 2462 -30 Pass  | un #4: Out of Band Spurious Emissions ode: 802.11b  Power Setting Per Chain #1 #2 #3  2412 -30 Pass 2437 -30 Pass 2462 -30 Pass  | Power Setting Per Chain   | Power Setting Per Chain   |         |               |   |                 |       | Class         | NI/A       |
| ode: 802.11b           Power Setting Per Chain         Frequency (MHz)         Limit         Result           -         -         -         -30         Pass           -         -         -         -30         Pass           -         < | ode: 802.11b           Power Setting Per Chain         Frequency (MHz)         Limit         Result           -         -         -         2412         -30         Pass           -         -         -         2437         -30         Pass           -         -         -         2462         -30         Pass  | ode: 802.11b           Power Setting Per Chain         Frequency (MHz)         Limit         Result           -         -         -         2412         -30         Pass           -         -         -         2437         -30         Pass           -         -         -         2462         -30         Pass  | Power Setting Per Chain #1 #2 #3  2412 -30 Pass 2437 -30 Pass 2462 -30 Pass   | Power Setting Per Chain #1 #2 #3  2412 -30 Pass 2437 -30 Pass 2462 -30 Pass   |         |               |   |                 |       | Class.        | IN/A       |
| #1 #2 #3 #4 Prequency (VIII2) Emit Result  2412 -30 Pass  2437 -30 Pass  2462 -30 Pass  | #1 #2 #3 #4 Prequency (VIII2) Emit Result  2412 -30 Pass  2437 -30 Pass  2462 -30 Pass   | #1 #2 #3 #4 Prequency (VIII2) Emit Result  2412 -30 Pass  2437 -30 Pass  2462 -30 Pass   | #1 #2 #3 *** Prequency (WHZ) Ellint Result  2412 -30 Pass  2437 -30 Pass  2462 -30 Pass   | #1 #2 #3 #4 Frequency (WHZ) Ellint Result  2412 -30 Pass  2437 -30 Pass  2462 -30 Pass  |         |               | Julious Elilissions                     |                 |       |               |            |
| -     -     -     -30     Pass   | -     -     -     -30     Pass  | -     -     -     -30     Pass  | -     -       - <td>-     -     -     -30     Pass       -     -     -     -30     Pass       -     -     -     -30     Pass       -     -     -     -30     Pass</td> <td>#1</td> <td></td> <td>g Per Chain<br/>#3</td> <td>Frequency (MHz)</td> <td>Limit</td> <td>Res</td> <td>sult</td> | -     -     -     -30     Pass                                   | #1      |               | g Per Chain<br>#3                       | Frequency (MHz) | Limit | Res           | sult       |
| 2462 -30 Pass   | Pass   | Pass   | 2462 -30 Pass   | 2462 -30 Pass   |         | 1             | All Ill Ill Ill Ill Ill Ill Ill Ill Ill |                 |       |               |            |
|   |  |  |   | Automotiv   |         | -             |   |                 |       |               |            |
| ote 1: Measured on each chain individually  | ote 1: Measured on each chain individually   | ote 1: Measured on each chain individually   | Measured on each chain individually  Measured on each chain individually  | te 1: Measured on each chain individually   | -       | -             | -                                       | 2462            | -30   | Pa            | ISS        |
|   |  |  |   |   | ote I:  | IMeasureu or  | n each chain individually               |                 |       |               |            |
|   |  |  |   |   | ite 1:  | Jiweasureu oi | n each chain individually               |                 |       |               |            |

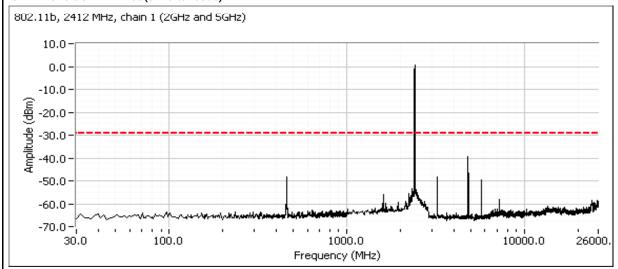
# EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A 802.11b Plots for low channel, power setting(s) = 6 2GHz Tx only 802.11b, 2412 MHz, chain 1 10.0-0.0 -10.0-20.0 -30.0 -40.0 -40.0 -40.0 -50.0 -60.0 -70.0= 10000.0 26000 30.0 100.0 1000.0 Frequency (MHz) 802.11b, 2412 MHz, chain 2 0.0 -10.0 -20.0 --30.0 --40.0 --50.0 --20.0 -60.0 -70.0 -\ 26000. 100.0 1000.0 10000.0 30.0 Frequency (MHz)



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

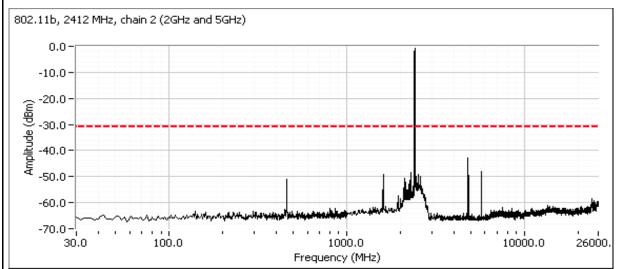


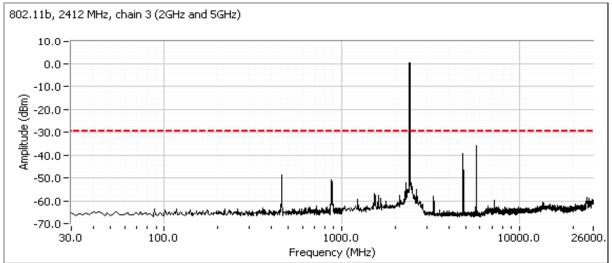
#### 2GHz Tx and 5GHz Tx Plot (Simultaneous)





|           | · · · · · · · · · · · · · · · · · · · |                  |             |
|-----------|---------------------------------------|------------------|-------------|
| 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         |



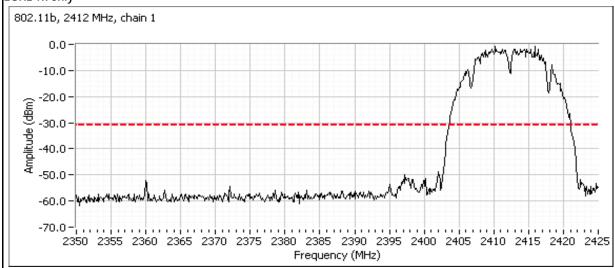


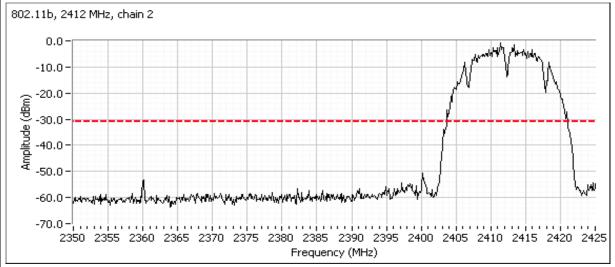


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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniFi Pro             | T-Log Number:    | T86160      |
|           |                       | 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.

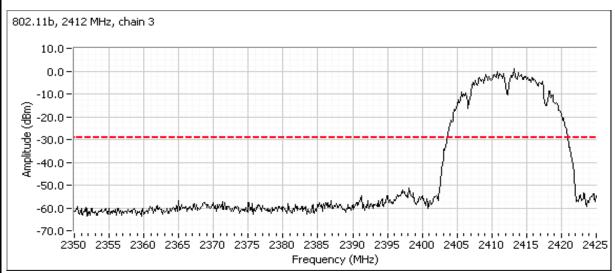
#### 2GHz Tx only



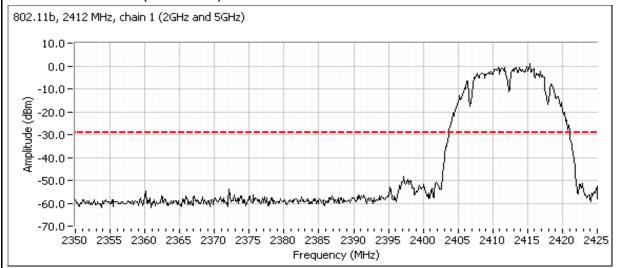




|           | All 2022 Company      |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | HaiEi Dro             | T-Log Number:    | T86160      |
|           | OHIFT PTO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

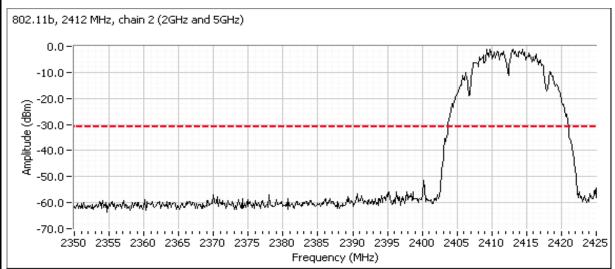


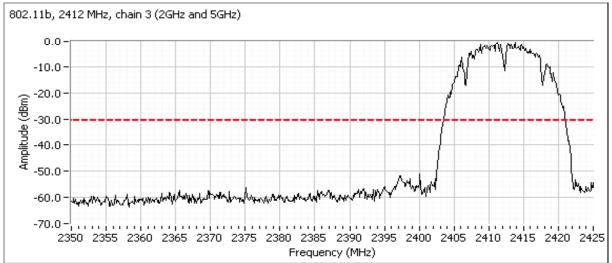
#### 2GHz Tx and 5GHz Tx Plot (Simultaneous)





|           | All 2022 Company      |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | HaiEi Dro             | T-Log Number:    | T86160      |
|           | OHIFT PTO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

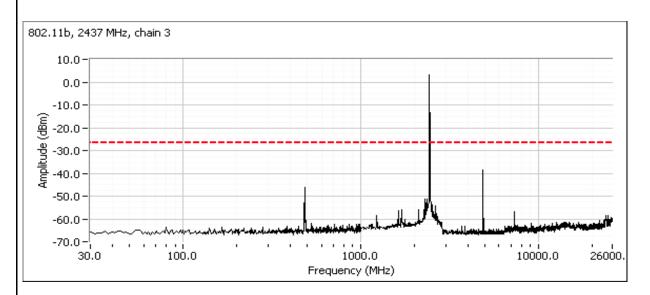




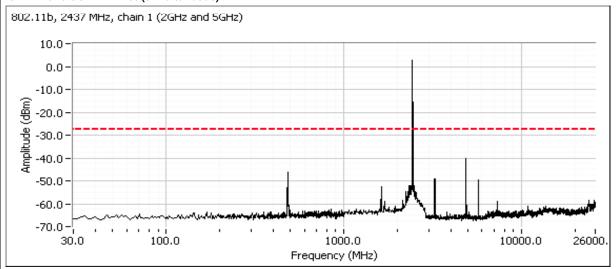
## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A Plots for center channel, power setting(s) = 7 2GHz Tx only 802.11b, 2437 MHz, chain 1 10.0 0.0 -10.0 (mgp) -20.0 -30.0 -40.0 -50. -50.0 -60.0 -70.0 -¦ 10000.0 26000. 30.0 100.0 1000.0 Frequency (MHz) 802.11b, 2437 MHz, chain 2 10.0-0.0 -10.0 -10.0 -40.0 -50.0 -60.0 -70.0 -¦ 10000.0 26000. 30.0 100.0 1000.0 Frequency (MHz)



|           | All Diffe Company     |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | HniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFI PIO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

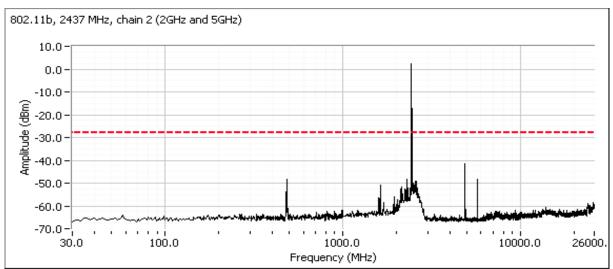


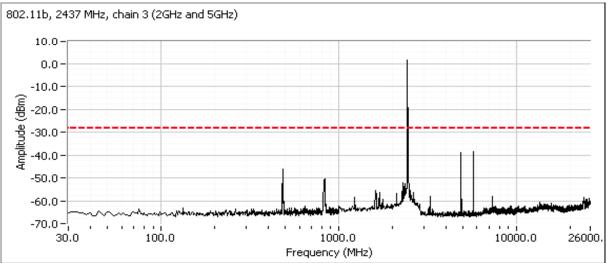
#### 2GHz Tx and 5GHz Tx Plot (Simultaneous)





|           | All Diffe Company     |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | HniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFI PIO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |



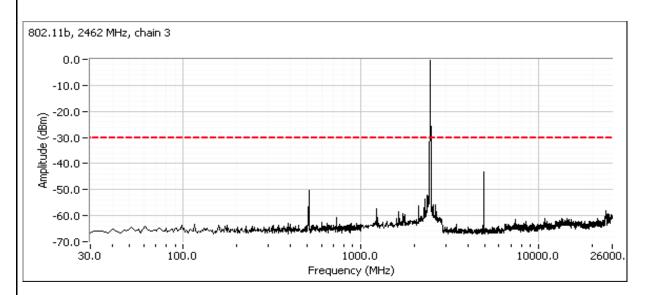


|                         | Elliott An OFF company  Libiquiti Networks | EM   | C Test                    |
|-------------------------|--|--|---------------------------|
| Client:                 | Ubiquiti Networks                          | Job Number   | : J86147                  |
|                         | UniFi Pro                                  | T-Log Number:  |                           |
|                         |  | Account Managers   | Susan Pelzl               |
|                         | Jennifer Sanchez                           |  |                           |
| Standard:               | FCC 15.247/EN 300 328                      | Class  | N/A                       |
| Hz Tx on                | Plots for high channel, power setting(s    | <u>s) = 6</u>  |                           |
| 802.11Ь,                | 2462 MHz, chain 1                          |  |                           |
| 10.0                    | ,-   |  |                           |
| 0.0                     | ,-   |  |                           |
| -10.0                   | ,-   |  |                           |
| 출 -20.0                 | 1-   |  |                           |
| 호<br>-30.0              |  |  |                           |
| -20.0<br>-30.0<br>-40.0 | )-   |  |                           |
| -₹<br>-50.0             |  |  |                           |
| -60.0                   | )-   | "\   |                           |
| -70.0                   | )-   | The property of the same of th |                           |
|                         | 30.0 100.0 1000.0 Frequency (MHz)          | 10000.0  | 26000.                    |
|                         |  |  |                           |
|                         | 2462 MHz, chain 2                          |  |                           |
| 10.0                    |  |  |                           |
| 0.0                     |  |  |                           |
| 10.0                    | 1-   |  |                           |
| Amplitude (dBm) -30.0   | ,-   |  |                           |
| ම් -30.0                | ,-   | <b>}</b>   |                           |
| हैं -40.0               | ı <b>-</b>                                 |  |                           |
| -50.0                   | , - <u> </u>                               |  |                           |
| -50,0                   |  | 7  | - 44                      |
| -60.0                   | 1-   |  | the state of the state of |

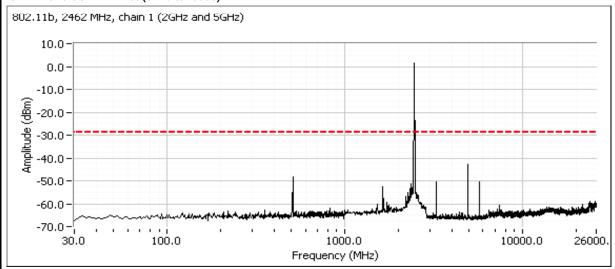
Frequency (MHz)



|           | All Diffe Company     |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | HniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFI PIO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |



#### 2GHz Tx and 5GHz Tx Plot (Simultaneous)



## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A 802.11b, 2462 MHz, chain 2 (2GHz and 5GHz) 10.0 0.0 -10.0 -10.05 -20.09 -30.00 -40.00 -50.0 -60.0 -70.0 <sup>-1</sup> 1000.0 10000.0 26000. 30.0 100.0 Frequency (MHz) 802.11b, 2462 MHz, chain 3 (2GHz and 5GHz) 10.0-0.0 -10.0 -10.05 -20.05 -30.06 -40.06 -50.0 -60.0 -70.0 -[ 30.0 100.0 1000.0 10000.0 26000.

Frequency (MHz)

|           | Elliott EMC Test      |                  |             |  |
|-----------|-----------------------|------------------|-------------|--|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |  |
| Model     | UniFi Pro             | T-Log Number:    | T86160      |  |
| Model.    |                       | 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 Config. Used: 1
Test Engineer: Rafael Varelas/Jack Liu Config Change: None
Test Location: FT7/FT5 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

| 2 Power spectral Density (PSD) 15.247(d) Pass n20: 1.3 dBm/3kHz n40: -0.8 dBm/3kHz  3 Minimum 6dB Bandwidth 15.247(a) Pass 802.11g: 16.23 MHz  | - · · · · · · · · · · · · · · · · · · · |                              |           |             |  |
|--|---|------------------------------|-----------|-------------|--|
| 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 | Run #                                   | Test Performed               | Limit     | Pass / Fail | Result / Margin  |
| 1 Output Power 15.247(b) Pass 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 n40: -0. | Chain A + B + C                         |                              |           |             |  |
| 2 Power spectral Density (PSD) 15.247(d) Pass n20: 1.3 dBm/3kHz n40: -0.8 dBm/3kHz  3 Minimum 6dB Bandwidth 15.247(a) Pass 802.11g: 16.23 MHz  | 1                                       | Output Power                 | 15.247(b) | Pass        | 802.11n20: 18.2 dBm  |
| 3 Minimum 6dB Bandwidth 15.247(a) Pass 802.11n20: 17.44 MHz  | 2                                       | Power spectral Density (PSD) | 15.247(d) | Pass        |  |
|  | 3                                       | Minimum 6dB Bandwidth        | 15.247(a) | Pass        | 802.11g: 16.23 MHz<br>802.11n20: 17.44 MHz<br>802.11n40: 36.55 MHz |

|           | Ellic                 | ott<br>As company  |           |     | EM           | C Test Data   |  |
|-----------|-----------------------|--------------------|-----------|-----|--------------|---|--|
|           | Ubiquiti Net          |                    |           |     | Job Number:  | J86147  |  |
| Madalı    | HniEi Dro             |                    |           | T-L | og Number:   | T86160  |  |
| Model:    | Model: UniFi Pro      |                    |           |     | ınt Manager: | Susan Pelzl   |  |
| Contact:  | Jennifer Sar          | nchez              |           |     |              |   |  |
| Standard: | FCC 15.247/EN 300 328 |                    |           |     | Class: N/A   |   |  |
|           |                       |                    |           |     |              |   |  |
| 3         |                       | 99% Bandwidth      | RSS       | GEN | Pass         | 802.11g: 17.1 MHz<br>802.11n20: 18.16 MHz<br>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.

|                         | Elliott An ATAS company  |                       |              |               |                |                  | EMO          | C Test      | Data    |
|-------------------------|--|-----------------------|--------------|---------------|----------------|------------------|--------------|-------------|---------|
| Client:                 | Ubiquiti Networks  |                       |              |               |                |                  | Job Number:  | J86147      |         |
| Model.                  | UniFi Pro  |                       |              |               |                |                  | og Number:   |             |         |
|                         |  |                       |              |               |                | Accou            | nt Manager:  | Susan Pelzl |         |
|                         | Jennifer Sanchez   |                       |              |               |                |                  |              |             |         |
| Standard:               | FCC 15.247/EN 300 32   | 8                     |              |               |                |                  | Class:       | N/A         |         |
|                         | nsmitted signal on chain 2412 MHz  | is coherent?  Chain 1 | Yes Chain 2  | Chain 3       | Chain 4        | Total Acros      | s All Chains | Lir         | nit     |
| Power Setti             | ng <sup>Note 3</sup>   | <u> </u>              | -            | -             |                |                  |              |             |         |
| Output Pow              | ver (dBm) Note 1   | 11.4                  | 9.94         | 12.2          |                | 16.0 dBm         | 0.040 W      | 27.2 dBm    | 0.528 W |
| Antenna Ga              | nin (dBi) Note 2   | 4                     | 4            | 4             |                | 8.8 dBi          | 0.202.W/     | Pa          | SS      |
| eirp (dBm) <sup>n</sup> | VOIC 2   | 15.4                  | 13.94        | 16.2          |                | 24.8 dBm         | 0.303 W      |             |         |
| Power Setti             | 2462 MHz   | Chain 1               | Chain 2      | Chain 3       | Chain 4        | Total Acros      | s All Chains | Lir         | nit     |
| Output Pow              |  | 12.9                  | 12.3         | 12.2          |                | 17.2 dBm         | 0.053 W      | 27.2 dBm    | 0.528 W |
| Antenna Ga              | ain (dBi) Note 2   | 4                     | 4            | 4             |                | 8.8 dBi          |              |             |         |
| eirp (dBm) <sup>1</sup> | Vote 2   | 16.9                  | 16.3         | 16.2          |                | 26.0 dBm 0.400 W |              | Pa          | 22      |
|                         | Output power measured  |                       |              |               |                |                  |              |             |         |
| Note 1:                 | averaging on (transmitte<br>equivalent to method 1   | of DA-02-213          | 8A1 for U-NI | l devices). S | Spurious limit | becomes -30      | dBc.         |             |         |
| 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   |                       |              |               |                |                  |              |             |         |
|                         | 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  |               |             |             |                | J                                | lob Number:  | J86147      |         |
|-------------------------|--|---------------|-------------|-------------|----------------|----------------------------------|--------------|-------------|---------|
| Madal                   |  |               |             |             |                |                                  | .og Number:  | T86160      |         |
| Model:                  | el: UniFi Pro  |               |             |             |                |                                  | nt Manager:  | Susan Pelzl |         |
| Contact:                | Jennifer Sanchez   |               |             |             |                |                                  |              |             |         |
| Standard:               | FCC 15.247/EN 300 32   | 8             |             |             |                |                                  | Class:       | N/A         |         |
|                         | Output Power - Chain A<br>Opensmitted signal on chain  | erating Mode: | Yes         |             |                |                                  |              |             |         |
|                         | 2412 MHz   | Chain 1       | Chain 2     | Chain 3     | Chain 4        | Total Acros                      | s All Chains | Limit       |         |
| Power Setti             |  | 13.75         | 12.04       | 14.23       |                | 18.2 dBm                         | 0.066 W      | 27.2 dBm    | 0.528 W |
|                         | output Power (dBm) Note 1<br>ntenna Gain (dBi) Note 2  |               | 4           | 4           |                | 8.8 dBi                          | 0.000 W      | ı           |         |
| eirp (dBm) <sup>r</sup> | Note 2   | 17.75         | 16.04       | 18.23       |                | 27.0 dBm 0.499                   |              | Pass        |         |
|                         | 2462 MHz   | Chain 1       | Chain 2     | Chain 3     | Chain 4        |                                  |              |             |         |
| Power Setti             |  | -             | -           | -           |                | Lotal Acros                      | s All Chains | Lir         | nit     |
| Output Pow              | er (dBm) Note 1  | 13.28         | 11.98       | 12.74       |                | 17.5 dBm                         | 0.056 W      | 27.2 dBm    | 0.528 W |
| Antenna Ga              | nin (dBi) Note 2   | 4             | 4           | 4           |                | 8.8 dBi                          |              | Pa          | ISS     |
| eirp (dBm) Note 2       |  | 17.28         | 15.98       | 16.74       |                | 26.2 dBm                         | 0.421 W      |             |         |
| Note 1:                 | Output power measured averaging on (transmitte equivalent to method 1  | ed signal was | continuous) | and power i | ntegration ove | er 50 <b>MHz</b> (o <sub>l</sub> | otion #2, me |             |         |
| 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. |               |             |             |                |                                  |              |             |         |



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|------------------|-----------------------|------------------|-------------|--|--|
| Client:          | Ubiquiti Networks     | Job Number:      | J86147      |  |  |
| Model:           | LiniEi Dro            | T-Log Number:    | T86160      |  |  |
|                  | OHIFI PIO             | 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

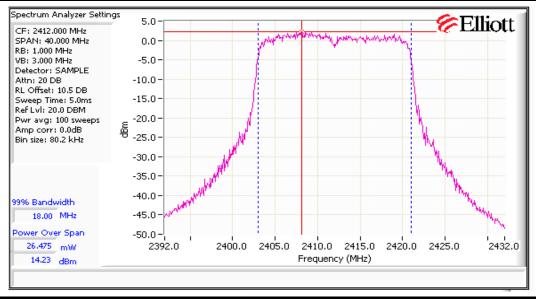
| 2422 MHz                        | Chain 1 | Chain 2 | Chain 3 | Cham 4 | Total Acros             | c All Chains | Lie      | nit     |
|---------------------------------|---------|---------|---------|--------|-------------------------|--------------|----------|---------|
| Power Setting <sup>Note 3</sup> | -       | -       | -       |        | Total Across All Chains |              | Limit    |         |
| 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                 |              | Pa       | 22      |
| eirp (dBm) Note 2               | 10.93   | 9.4     | 11.05   |        | 20.1 dBm                | 0.101 W      | Га       | 33      |

| 2452 MHz                        | Chain 1 | Chain 2 | Chain 3 | Chain 4 | Total Acros             | c All Chaine | Lir      | nit     |
|---------------------------------|---------|---------|---------|---------|-------------------------|--------------|----------|---------|
| Power Setting <sup>Note 3</sup> | -       | 1       | -       |         | Total Across All Chains |              | Limit    |         |
| 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                 |              | Do       | 22      |
| eirp (dBm) Note 2               | 11.03   | 10.16   | 11.47   |         | 20.5 dBm                | 0.111 W      | Pass     |         |

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.



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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Madalı    | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHIFT PIO             | 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   |                                     |         | DOD     | / ID /01.11 | Note 1  |       | Limit    |       |
|---------|-------------------------------------|---------|---------|-------------|---------|-------|----------|-------|
| Powei   | L Francisco (MILE) L PSD (QBM/3KHZ) |         |         | LIIIIII     | Result  |       |          |       |
| Setting | Trequency (WITZ)                    | Chain 1 | Chain 2 | Chain 3     | Chain 4 | Total | dBm/3kHz | Nesun |
| -       | 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       |         | -72   | 8.0      | Pass  |

#### 802.11n20

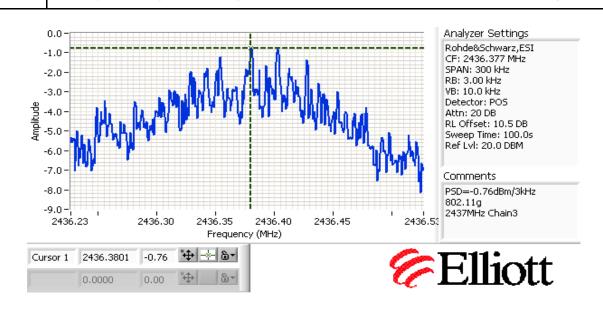
| Power<br>Setting | Frequency (MHz) | Chain 1 | PSD<br>Chain 2 | (dBm/3kHz<br>Chain 3 | Note 1 | Total | Limit<br>dBm/3kHz | Result |
|------------------|-----------------|---------|----------------|----------------------|--------|-------|-------------------|--------|
| -                | 2412            | -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<br>Setting | Frequency (MHz) | Chain 1 | PSD<br>Chain 2 | (dBm/3kHz<br>Chain 3 | Note 1 | Total | Limit<br>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.



| Model: UniFi Pro   | Model: UniFi Pro   |                  | Ubiquiti Netv | works  |  |              |                | Job Number:                                       | : J86147      |
|--|--|------------------|---------------|--|--|--------------|----------------|---|---------------|
| Account Manager   Susan Petalandard   FCC 15.247/EN 300 328   Class: N/A     #3: Signal Bandwidth   Frequency (MHz)   Bandwidth   66B   99%   Comments   | Account Manager: Susan   Account Manager: Susan  | Madal            | UniEi Dro     |  |  |              |                | T-Log Number:                                     | T86160        |
| Class   NA   National  | Standard:   FCC 15.247/EN 300 328   Class:   N/A   | Model            | UIIIFI PIU    |  |  |              |                | Account Manager:                                  | Susan Pelz    |
| Power   Frequency (MHz)   Resolution   Bandwidth (MHz)   Comments  | Power   Frequency (MHz)   Bandwidth   Bandwidth (MHz)   Comments   |                  |               |  |  |              |                |   |               |
| Power   Setting   Frequency (MHz)   Resolution   Bandwidth (MHz)   Setting   Frequency (MHz)   Bandwidth   6dB   99%   Comments  | Power   Frequency (MHz)   Resolution   Bandwidth (MHz)   Comments  | Standard         | FCC 15.247    | /EN 300 328                                      |  |              |                | Class:  | : N/A         |
| Power   Setting   Frequency (MHz)   Bandwidth   MHz   Gab   99%   Comments   | Power   Setting   Frequency (MHz)   Resolution   Bandwidth (MHz)   6dB   99%   7   2412   200kHz   16.43   17.1   7   2437   200kHz   17.54   18.16   See power plots for 99% bandwidth (MHz)   8   2412   200kHz   17.54   18.16   See power plots for 99% bandwidth   16   2437   200kHz   17.44   18.16   VB=3MHz   (RB=11   VB=3MHz)   200kHz   17.44   18.16   VB=3MHz   (RB=11   VB=3MHz)   2.5   2422   500kHz   36.71   36.64   See power plots for 99% bandwidth   6dB   99%   2.5   2422   500kHz   36.55   36.64   See power plots for 99% bandwidth   6dB   99%   2.5   2452   500kHz   36.55   36.64   VB=3MHz   2.5   2452   250kHz   36.55   36.64   VB=3MHz   2.5   2452   250kHz   36.55   36.64   VB=3MHz   2.5   2452   250kHz   36.55   36.64   VB=3MHz   2.5     |                  | gnal Bandwi   | idth   |  |              |                |   |               |
| Setting  | Setting  | 2.11g            | Dower         |  | Pasalution                                       | Randwid      | Hth (MHz)      | T   |               |
| 7 2412 200kHz 16.23 17.1 See power plots for 99% bandwidth 17 2437 200kHz 16.43 17.2 measurement (RB=1MHz 7 2462 200kHz 16.43 17.1 VB=3MHz)  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) Bandwidth 16 2437 200kHz 17.54 18.16 See power plots for 99% bandwidth 16 2437 200kHz 17.44 18.16 measurement (RB=1MHz)  7 2462 200kHz 17.44 18.16 wB=3MHz)  11n40  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) VB=3MHz)  11n40  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) VB=3MHz)  2.5 2422 500kHz 36.71 36.64 See power plots for 99% bandwidth 16 2437 500kHz 36.55 36.64 WB=3MHz)  et : Measured on a single chain et : | 7 2412 200kHz 16.23 17.1 See power plots for 99% bandw measurement (RB=11 7 2437 200kHz 16.43 17.2 measurement (RB=11 7 2462 200kHz 16.43 17.1 VB=3MHz)  02.11n20  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) 6dB 99% Setting 16 2437 200kHz 17.54 18.16 See power plots for 99% bandw measurement (RB=11 7 2462 200kHz 17.44 18.16 VB=3MHz)  02.11n40  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) WB=3MHz)  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) Setting 2.5 2422 500kHz 36.71 36.64 See power plots for 99% bandw measurement (RB=11 2.5 2.5 2452 500kHz 36.55 36.64 VB=3MHz)  Idle 1: Measured on a single chain lote 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  Analyzer Settings Rohde&Schwarz,ESI CF: 2412.000 MHz SPAN: 50.000 MHz RB: 200 btz VB: 1.000 MHz VB: 1.000 MHz SPAN: 50.000 MHz VB: 1.0000 MHz SPAN: 50.000 MHz VB: 1.0000 MHz SPAN: 50.000  |                  |               | Frequency (MHz)                                  |  |              |                | Comments  |               |
| 17   | 17   |                  | _             | 2412   |  |              |                | See nower plots for 99%                           | handwidth     |
| Total Power   Frequency (MHz)   Resolution   Bandwidth (MHz)   Setting   Setting   Resolution   Bandwidth (MHz)   Setting   Resolution   Bandwidth (MHz)   Setting   Setting   Setting   Resolution   Setting   Setting   Total   Setting   Setting   Total   Total   Setting   Total   Tota   | 7 2462 200kHz 16.43 17.1 VB=3MHz)  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) 6dB 99% 16.43 17.54 18.16 See power plots for 99% bandwidth 7 2462 200kHz 17.54 18.16 measurement (RB=11) 7 2462 200kHz 17.44 18.16 WB=3MHz)  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) (MHz) VB=3MHz)  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) 6dB 99% 2.5 2422 500kHz 36.71 36.64 See power plots for 99% bandwidth 6dB 99% 2.5 2452 500kHz 36.55 36.64 measurement (RB=11) 2.5 2452 500kHz 36.55 36.64 WB=3MHz)  Ote 1: Measured on a single chain ote 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  Solution Bandwidth (MHz) See power plots for 99% bandwidth (MHz) Comments 6dB 99% Comments 6dB |                  |               |  |  |              |                |   |               |
| Power Setting Frequency (MHz) Resolution Bandwidth (MHz) Comments  8 2412 200kHz 17.54 18.16 Measurement (RB=1MHz)  16 2437 200kHz 17.44 18.16 VB=3MHz)  1.11n40  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) VB=3MHz)  2.11n40  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) VB=3MHz)  2.5 2422 500kHz 36.71 36.64 See power plots for 99% bandwidth 16 2437 500kHz 36.55 36.64 WB=3MHz)  16 2437 500kHz 36.55 36.64 WB=3MHz)  17 2452 500kHz 36.55 36.64 VB=3MHz  18 25 2452 500kHz 36.55 36.64 VB=3MHz  19 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  19 30 4 Analyzer Settings Rohde&Schwarz, ESI CF: 2412.000 MHz SPAN; 50.000 MHz RB: 200 kHz WB: 1.000 MHz SPAN; 50.000 MHz RB: 200 kHz WB: 1.000 MHz SPAN; 50.000 MHz RB: 200 kHz WB: 1.000 MHz SPAN; 50.000 MHz RB: 200 kHz WB: 1.000 MHz SPAN; 50.000 | Power   Setting   Frequency (MHz)   Resolution   Bandwidth (MHz)   Comments  |                  |               |  |  |              |                |   | (IVD= HVILIZ) |
| Power   Setting   Frequency (MHz)   Resolution   Bandwidth (MHz)   Comments  | Power   Setting   Frequency (MHz)   Resolution   Bandwidth (MHz)   Comments  | 2.11n20          | ,             |  | 2001112  | 10.10        | . , , , ,      |   |               |
| Setting   Frequency (MHz)   Bandwidth   6dB   99%   Comments   | Setting   Frequency (MHz)   Bandwidth   6dB   99%   Comments   |                  | Power         | From: (MIL-)                                     | Resolution                                       | Bandwid      | dth (MHz)      | 0   |               |
| 8 2412 200kHz 17.54 18.16 See power plots for 99% bandwidth 16 2437 200kHz 17.44 18.16 measurement (RB=1MHz 7 2462 200kHz 17.44 18.16 VB=3MHz)  Power Setting Frequency (MHz) Resolution Bandwidth (MHz) Setting 2.5 2422 500kHz 36.71 36.64 See power plots for 99% bandwidth 16 2437 500kHz 36.55 36.64 See power plots for 99% bandwidth measurement (RB=1MHz 2.5 2.5 2452 500kHz 36.55 36.64 VB=3MHz)  et 1: Measured on a single chain et 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0   | 8  |                  |               | Frequency (MHZ)                                  |  |              |                | Comments  |               |
| 16   | 16   |                  | 8             | 2412   | 200kHz   | 17.54        | 18.16          | See power plots for 99%                           | bandwidth     |
| Power Setting Frequency (MHz) Resolution Bandwidth (MHz) Comments  2.5 2422 500kHz 36.71 36.64 See power plots for 99% bandwidth 16 2437 500kHz 36.55 36.64 measurement (RB=1MHz 2.5 2.5 2452 500kHz 36.55 36.64 VB=3MHz)  e 1: Measured on a single chain e 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0   | Power   Frequency (MHz)   Resolution   Bandwidth (MHz)   Comments  |                  | 16            | 2437   | 200kHz   | 17.44        | 18.16          |   | (RB=1MHz      |
| Power   Setting   Frequency (MHz)   Resolution   Bandwidth (MHz)   Comments  | Power   Setting   Frequency (MHz)   Resolution   Bandwidth (MHz)   6dB   99%   2.5   2422   500kHz   36.71   36.64   See power plots for 99% bandwidth   16   2437   500kHz   36.55   36.64   Measurement   (RB=11   2.5   2452   500kHz   36.55   36.64   VB=3MHz)   See power plots for 99% bandwidth measurement   (RB=11   2.5   2452   500kHz   36.55   36.64   VB=3MHz)   See power plots for 99% bandwidth measurement   (RB=11   2.5   2452   500kHz   36.55   36.64   VB=3MHz)   See power plots for 99% bandwidth measurement   (RB=11   2.5   2   |                  | 7             | 2462   | 200kHz   | 17.44        | 18.16          | VB=3MHz)  | ,             |
| Setting  | Setting  | 2.11n40          |               |  |  |              |                |   |               |
| Setting   Seting   Setting   Setti   | Setting   Sandwidth   Sandwi   |                  | Power         | Fraguancy (MHz)                                  | Resolution                                       | Bandwid      | dth (MHz)      | Comments  |               |
| 16 2437 500kHz 36.55 36.64 measurement (RB=1MHz 2.5 2452 500kHz 36.55 36.64 VB=3MHz)  e 1: Measured on a single chain e 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0 -  | 16 2437 500kHz 36.55 36.64 measurement (RB=11 2.5 2452 500kHz 36.55 36.64 VB=3MHz)  tel: Measured on a single chain 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0 -   |                  |               | . 3  |  |              |                |   |               |
| 2.5 2452 500kHz 36.55 36.64 VB=3MHz)  e 1: Measured on a single chain e 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0 -  | 2.5 2452 500kHz 36.55 36.64 VB=3MHz)  te 1: Measured on a single chain  99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0 -   |                  |               |  |  |              | 36.64          | See power plots for 99%                           | bandwidth     |
| e 1: Measured on a single chain e 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0  | Measured on a single chain   |                  |               |  |  |              |                | measurement                                       | (RB=1MHz      |
| e 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0 -  | ## 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  ### Analyzer Settings Rohde&Schwarz,ESI CF: 2412,000 MHz SPAN: 50,000 MHz RB: 200 kHz VB: 1,000 MHz Detector: POS Attn: 20 DB RL Offset: 10.5 DB Sweep Time: 5.0ms Ref Lvl: 20.0 DBM  ### Comments Comments   |                  | 2.5           | 2452   | 500kHz   | 36.55        | 36.64          | VB=3MHz)  |               |
| e 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0 -  | te 2: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB  5.0 -   | ło 1.            | Magazirada    | n a cinala ahain                                 |  |              |                |   |               |
| 5.0 -  | 5.0 -  |                  |               | 0  | anco with DSS                                    | CEN with     | DR \ 1% of     | the chan and VR > 2vDR                            |               |
| 0.0 -  | 0.0 -  | ne z:            | 99% Dariuwi   | ulli illeasureu ili accoru                       | ance with RSS                                    | GEN, WILL    | KD > 1% UI     | the span and VD > 3XKD                            |               |
| 0.0 -  | 0.0 -  | 5.0-             |               |  |  |              |                | Analyzer Sett                                     | tinas         |
| -5.010.015.020.020.030.035.040.045.050.02387   | -5.010.015.015.015.020.025.0 -   |                  |               | JULY MA  | والمام ليطي المالية                              | W.           |                |   | _             |
| -10.015.020.020.025.030.035.040.045.050.02387  | -10.015.0  |                  |               | *  | T  |              |                | CF: 2412.000                                      | MHz           |
| -15.020.020.025.030.035.040.045.050.02387  | -15.0 -  9 -20.0 -  25.0 -  4 -25.0 -  -35.0 -  -40.0 -  -45.0 -   |                  |               | l l  |  | 1            |                |   | MHz           |
| 25.0 - 25 | Attn: 20 DB RL Offset: 10.5 DB Sweep Time: 5.0ms Ref Lvl: 20.0 DBM  Comments  Comments   |                  |               |  |  | - 71         |                |   | z             |
| -35.040.045.050.055.02387 2395 2400 2405 2410 2415 2420 2425 2430 2437   | -35,0 -<br>-40,0 -<br>-45,0 -  | e -20.0-         |               |  |  | 11           |                |   | 5             |
| -35.040.045.050.055.02387 2395 2400 2405 2410 2415 2420 2425 2430 2437   | -35.0 -<br>-40.0 -<br>-45.0 -  | ∋<br>≣ -25.0-    |               |  |  | 1 1          |                |   | 5 DB          |
| -35.040.045.050.055.02387 2395 2400 2405 2410 2415 2420 2425 2430 2437   | -35.0 -<br>-40.0 -<br>-45.0 -  | -30.0-<br>-30.0- |               | <i>yd</i>  |  | ! <b>"</b> \ |                |   |               |
| -40.045.050.055.0 - 2387 2395 2400 2405 2410 2415 2420 2425 2430 2437  | -40.0 -<br>-45.0 -   |                  |               | J.   |  |              | <b>\</b>       | Ref Lvl: 20.0 [                                   | DBM           |
| -45.050.055.0 - 2387 2395 2400 2405 2410 2415 2420 2425 2430 2437 Comments 6dB BW: 16.232 MHz  | -45.0 - Comments   |                  |               | /  |  |              | N <sub>L</sub> |   |               |
| -50.0 - 6dB BW: 16.232 MHz<br>-55.0 - 2387 2395 2400 2405 2410 2415 2420 2425 2430 2437  | ANT CHO DULL 10 DOD MULE   |                  |               |  |  |              |                | Comments  |               |
| -55.0 - 2387 2395 2400 2405 2410 2415 2420 2425 2430 2437  |  |                  | 3 Pd          |  |  |              |                | 6dB BW: 16.2                                      | 32 MHz        |
| 2387 2395 2400 2405 2410 2415 2420 2425 2430 2437  | -55,0-   |                  |               | <del>                                     </del> | <del>                                     </del> |              |                | <del>                                      </del> |               |
| Frequency (MHz)  | 2387 2395 2400 2405 2410 2415 2420 2425 2430 2437  |                  |               |  |  | 2420 242     | 5 2430         | 2437  |               |
|  | Frequency (MHz)  |                  |               | _  | Johnsy (MHa)                                     |              |                |   |               |

| Client                   | Ubiquiti Netv | vorks     |   |                   |            | Job Number:      | J86147     |
|--------------------------|---------------|-----------|---|-------------------|------------|------------------|------------|
| Model                    | UniFi Pro     |           |   |                   |            | T-Log Number:    |            |
|                          |               |           |   |                   |            | Account Manager: | Susan Pelz |
|                          | Jennifer San  |           |   |                   |            |                  |            |
|                          | FCC 15.247/   |           |   |                   |            | Class:           | N/A        |
| Run #4:  O<br>Mode: 802. | ut of Band Sp | ourious E | missions  |                   |            |                  |            |
| node. 002.               | Power Settin  | g Per Cha | ain   | Fraguency (MIII-) | Limit      | Do               | o. It      |
| #1                       | #2            | #3        | ₩¥  | Frequency (MHz)   | Limit      |                  | sult       |
| -                        | -             | -         |   | 2412              | -30        |                  | ISS        |
| -                        | -             | -         | _   | 2437<br>2462      | -30<br>-30 |                  | ISS<br>ISS |
| /lode: 802.              |               |           |   | 2402              | -30        | 1 0              | 133        |
|                          | Power Settin  | g Per Cha | ain   | Frequency (MHz)   | Limit      | Pa               | sult       |
| #1                       | #2            | #3        | #4  |                   |            |                  |            |
| -                        | -             | -         | _   | 2412<br>2437      | -30<br>-30 |                  | ISS<br>ISS |
|                          | -             |           | <del>-                                     </del> | 2462              | -30        |                  | iss<br>ISS |
| /lode: 802.              | 11n40         |           |   | 2.102             |            |                  |            |
|                          | Power Settin  |           |   | Frequency (MHz)   | Limit      | Re               | sult       |
| #1                       | #2            | #3        | # <b>4</b>  | 2422              | -30        |                  | ISS        |
| -                        | -             | -         |   | 2437              | -30        |                  | ISS        |
| -                        | -             | -         |   | 2452              | -30        |                  | ISS        |
|                          |               |           |   |                   |            | -                |            |
| lote 1:                  | Measured or   | ı each ch | ain individually                                  |                   |            |                  |            |

## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A 802.11g Plots for low channel 802.11g, 2412MHz, Chain 1 0.0 -10.0--20.09 -30.09 -40.09 -50.09 -50.0 · -60.0 -70.0 1000.0 26000 10000.0 100.0 30.0 Frequency (MHz) 802.11g, 2412MHz, Chain 2 0.0 -10.0 -20.0 Amplitude (dBm) -30.0 -40.0 -50.0 ·

-60.0

30.0

100.0

1000.0

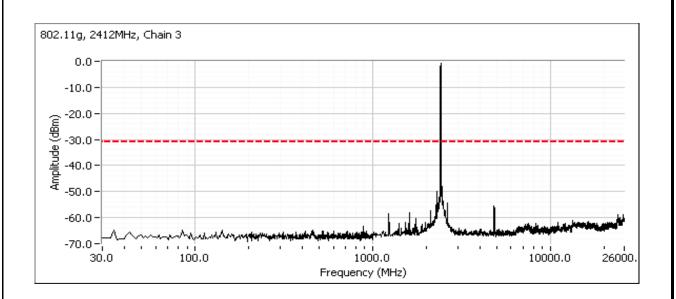
Frequency (MHz)

10000.0

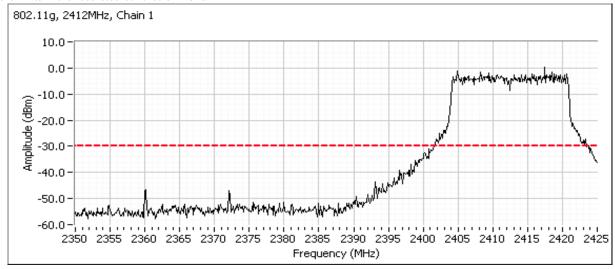
26000



|       | Time State of the |                  |             |
|-------|---|------------------|-------------|
| CI    | ent: Ubiquiti Networks  | Job Number:      | J86147      |
| M     | del: UniFi Pro  | T-Log Number:    | T86160      |
| IVIC  | del. Offiri Pio   | Account Manager: | Susan Pelzl |
| Con   | act: Jennifer Sanchez   |                  |             |
| Stand | ard: FCC 15.247/EN 300 328  | Class:           | N/A         |

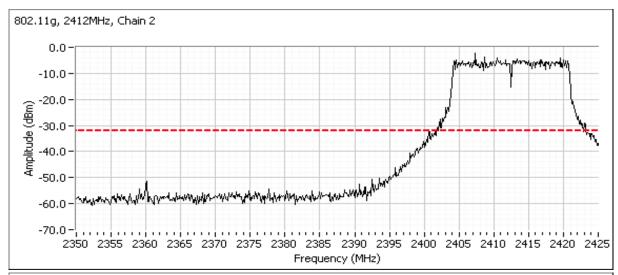


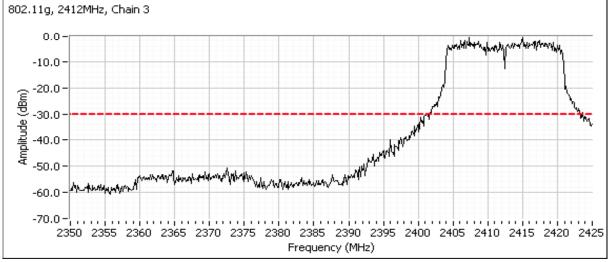
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

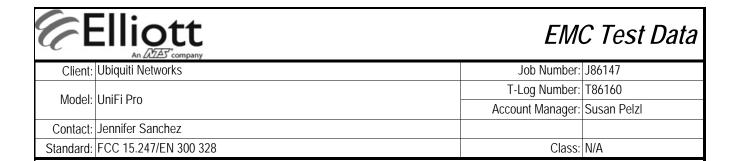




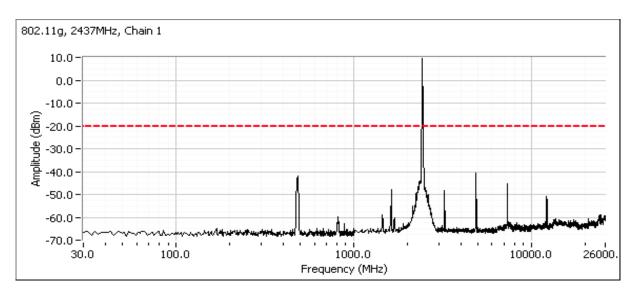
|           | All BLES company      |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHIFT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

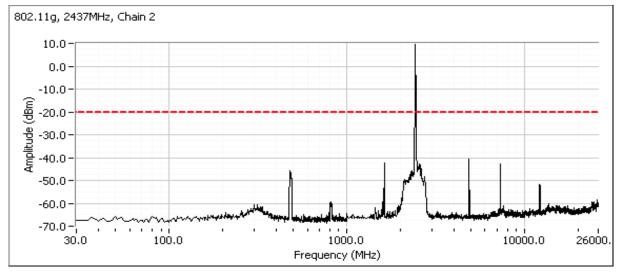






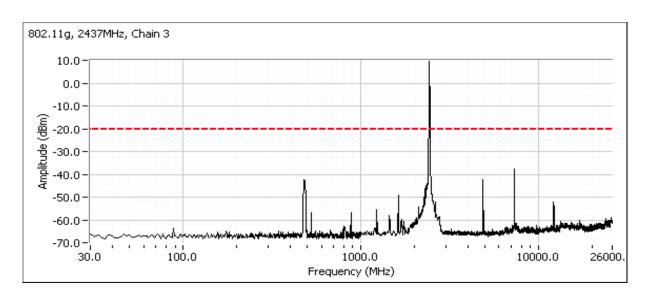
#### Plots for center channel



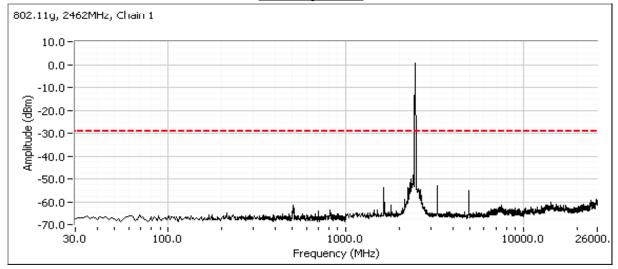




| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
|-----------|-----------------------|------------------|-------------|
| Model     | UniFi Pro             | T-Log Number:    | T86160      |
| Model.    | OHIFIPIO              | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer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



### Plots for high channel



## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A 802.11g, 2462MHz, Chain 2 0.0 -10.0-20.0° (48m) -30.0° (40.0° -50.0° -50.0 -60.0 -70.0 = 26000 100.0 1000.0 10000.0 30.0 Frequency (MHz) 802.11g, 2462MHz, Chain 3 0.0 -10.0-20.0 Amplitude (dBm) -30.0 -40.0 -50.0 -60.0 -70.0 -[

1000.0

Frequency (MHz)

100.0

30.0

10000.0

26000

## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A 802.11n20 Plots for low channel 802.11n20, 2412MHz, Chain 1 0.0 -10.0 -20.0° (dgm) -30.0° (dgm) -40.0° -50.0° -50.0 -60.0--70.0 -<sup>K</sup> 26000 30.0 100.0 1000.0 10000.0 Frequency (MHz) 802.11n20, 2412MHz, Chain 2 0.0 -10.0 -20.05 -30.06 -40.05 -50.06 -50.0° -60.0

-70.0-

30.0

100.0

| | | 1000.0

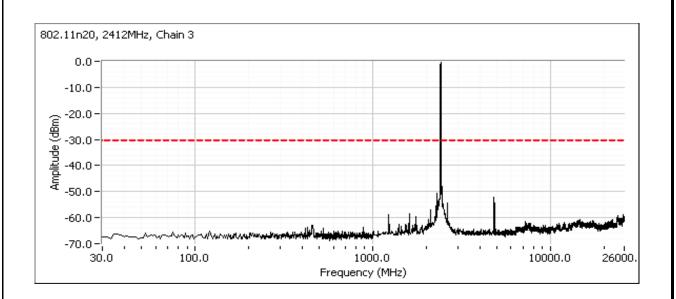
Frequency (MHz)

26000

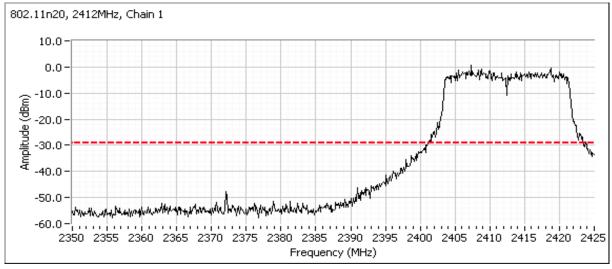
10000.0



|        | Time State of the |                  |             |
|--------|---|------------------|-------------|
| CI     | ent: Ubiquiti Networks  | Job Number:      | J86147      |
| Model: | UniFi Pro   | T-Log Number:    | T86160      |
|        |   | Account Manager: | Susan Pelzl |
| Con    | act: Jennifer Sanchez   |                  |             |
| Stand  | ard: FCC 15.247/EN 300 328  | Class:           | N/A         |

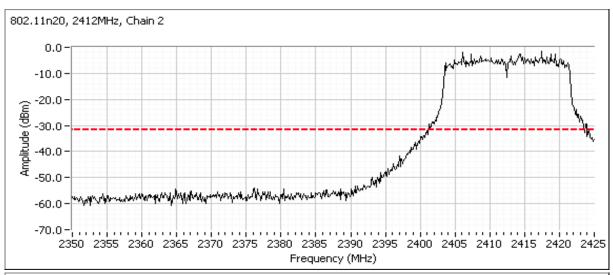


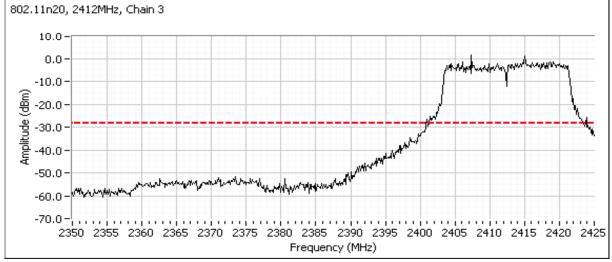
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.





|        | Time State of the |                  |             |
|--------|---|------------------|-------------|
| CI     | ent: Ubiquiti Networks  | Job Number:      | J86147      |
| Model: | UniFi Pro   | T-Log Number:    | T86160      |
|        |   | Account Manager: | Susan Pelzl |
| Con    | act: Jennifer Sanchez   |                  |             |
| Stand  | ard: FCC 15.247/EN 300 328  | Class:           | N/A         |





## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A Plots for center channel 802.11n20, 2437MHz, Chain 1 10.0 0.0 -10.0--20.0 -30.0 -40.0 -40.0 -40.0 -50.0 -60.0 -70.0 -\ 100.0 10000.0 26000 30.0 1000.0 Frequency (MHz) 802.11n20, 2437MHz, Chain 2 10.0 0.0 -10.0 -20.0 -30.0 -40.0 · -50.0 -60.0-

-70.0 -¦

30.0

100.0

1000.0

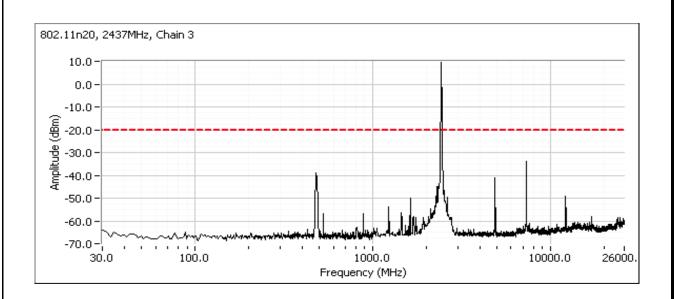
Frequency (MHz)

26000.

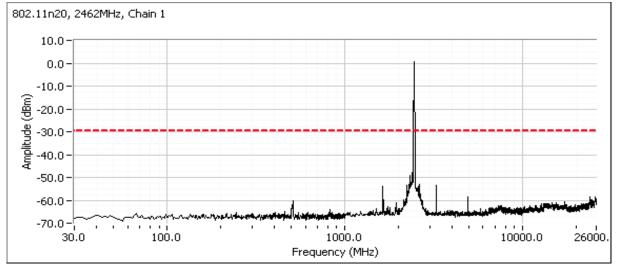
10000.0



| 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

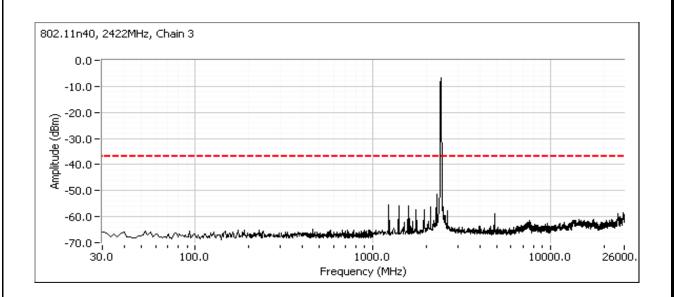


## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A 802.11n20, 2462MHz, Chain 2 0.0 -10.0-20.0° (48m) -30.0° (40.0° -50.0° -50.0 -60.0 -70.0 = 100.0 26000 30.0 1000.0 10000.0 Frequency (MHz) 802.11n20, 2462MHz, Chain 3 0.0 -10.0-20.0 Amplitude (dBm) -30.0 -40.0 -50.0 -60.0 -70.0 - r 10000.0 30.0 100.0 1000.0 26000 Frequency (MHz)

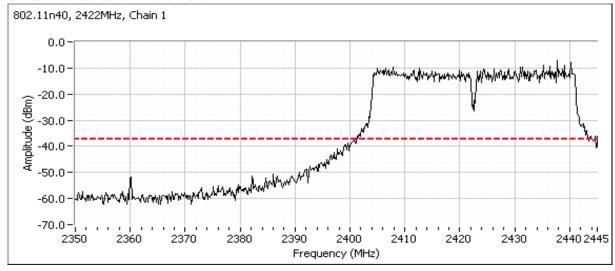
## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A 802.11n40 Plots for low channel, 802.11n40, 2422MHz, Chain 1 0.0 -10.0--20.0 Amplitude (dBm) -30.0 -40.0 -50.0 -60.0--70.0 -¦ 1000.0 26000 30.0 100.0 10000.0 Frequency (MHz) 802.11n40, 2422MHz, Chain 2 0.0 -10.0 -20.0 --30.0 --50.0 --50.0 -50.0 -60.0 -70.0 -100.0 1000.0 30.0 10000.0 26000 Frequency (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         |

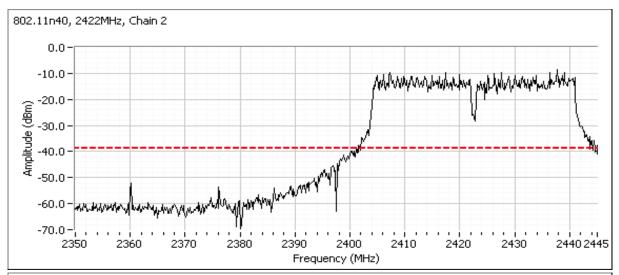


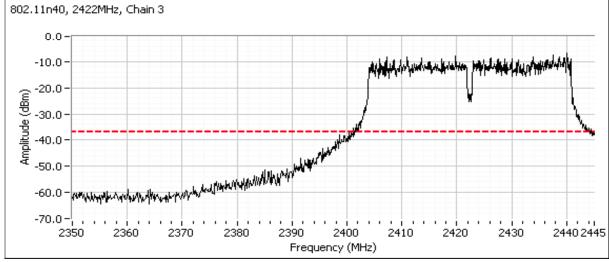
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



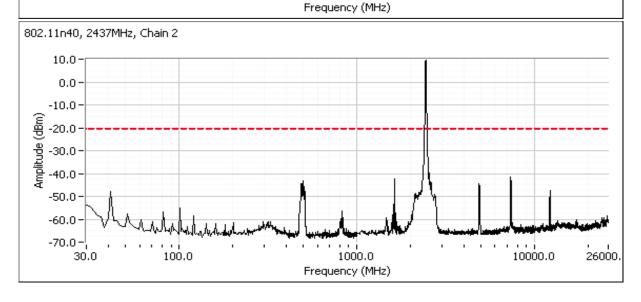


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|-----------|-----------------------|------------------|-------------|
| Client    | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniFi Pro             | T-Log Number:    | T86160      |
|           |                     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



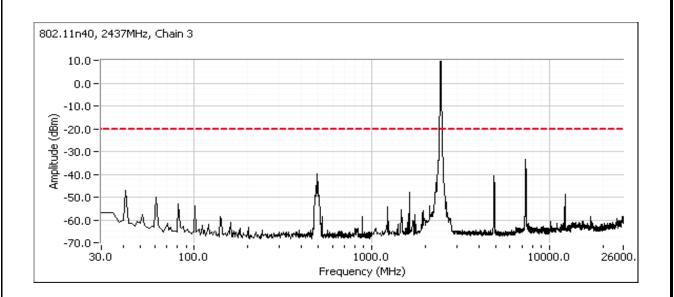


## EMC Test Data Job Number: J86147 Client: Ubiquiti Networks T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A Plots for center channel 802.11n40, 2437MHz, Chain 1 10.0 0.0 -10.0 -20.0 -30.0 -40.0 -40.0 -40.0 -40.0 -50.0° -60.0 -70.0 -10000.0 26000 100.0 1000.0 30.0

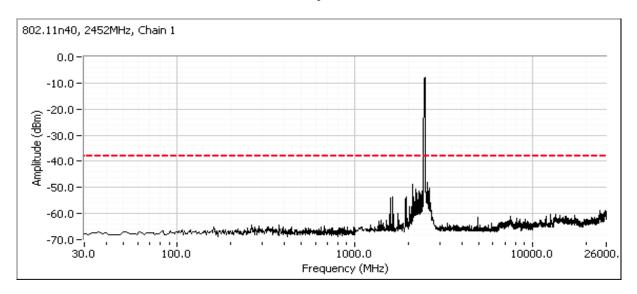




| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
|-----------|-----------------------|------------------|-------------|
| Model:    | UniFi Pro             | T-Log Number:    | T86160      |
|           |                       | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer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

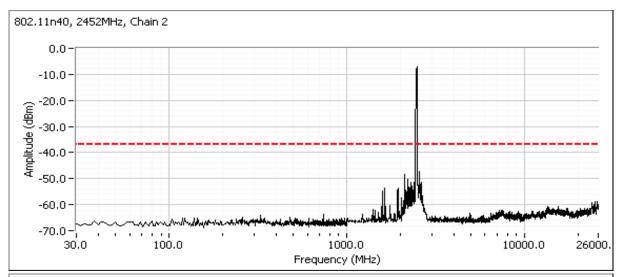


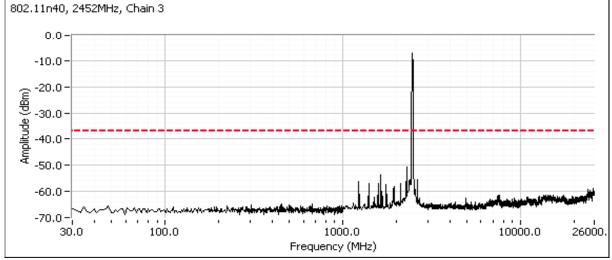
## Plots for high channel,





|           | · · · · · · · · · · · · · · · · · · · |                  |             |
|-----------|---------------------------------------|------------------|-------------|
| 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         |





| Elliott EMC Test |                       |                  |             |
|------------------|-----------------------|------------------|-------------|
| Client:          | Ubiquiti Networks     | Job Number:      | J86147      |
| Madalı           | UniCi Dro             | T-Log Number:    | T86160      |
| Model:           | OHIFI PIO             | 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 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: None
Test Location: FT4 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<br>802.11n20: 18.5 dBm<br>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.

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|-----------|-----------------------|------------------|-------------|
| 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 <sup>Note 3</sup> | -       | -       | 1       |         | Total Across All Chains |         | Limit    |         |
| 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                 |         | Do       | cc      |
| eirp (dBm) Note 2               | 16      | 15.1    | 17.5    |         | 25.9 dBm                | 0.385 W | Pass     |         |

| 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 <b>MHz</b> (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc. |
|---------|---|
|         | 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.  |

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|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFT FTO             | 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 Acros             | c All Chaine | Lir      | nit     |
|---------------------------------|---------|---------|---------|---------|-------------------------|--------------|----------|---------|
| Power Setting <sup>Note 3</sup> | -       | 1       | 1       |         | Total Across All Chains |              | Limit    |         |
| 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                 |              | Pa       | cc      |
| eirp (dBm) Note 2               | 17.8    | 16.5    | 18.6    |         | 27.3 dBm                | 0.532 W      | га       | 33      |

|         | 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 <b>MHz</b> (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc. |
|---------|---|
|         | 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      |
|-----------|-----------------------|------------------|-------------|
| Madal     | UniFi Pro             | T-Log Number:    | T86160      |
| wouei.    | OHIFI PIO             | 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 Acros             | c All Chains | Lie      | nit     |
|---------------------------------|---------|---------|---------|---------|-------------------------|--------------|----------|---------|
| Power Setting <sup>Note 3</sup> | -       | -       | 1       |         | Total Across All Chains |              | Limit    |         |
| 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                 |              | Pa       | 22      |
| eirp (dBm) Note 2               | 10.4    | 9.7     | 12      |         | 20.4 dBm                | 0.108 W      | Га       | 33      |

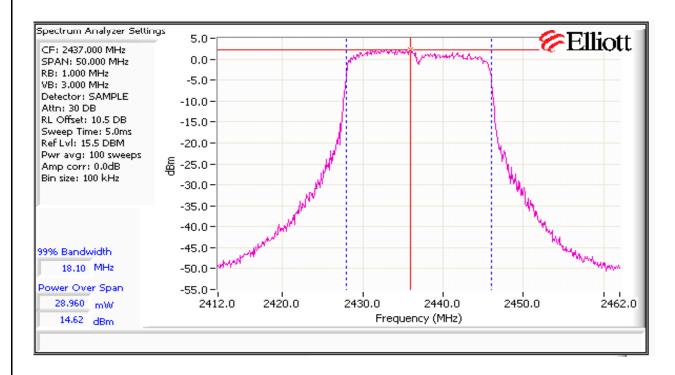
Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.

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

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.



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| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFIFIO              | 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<br>Setting | Measured<br>Power | Test Performed      | Limit             | Result / Margin       |                   |              |
|-------|--------------|---------|------------------|-------------------|---------------------|-------------------|-----------------------|-------------------|--------------|
| 1a    | 802.11a      | low     |                  |                   | Radiated Emissions, | FCC Part 15.209 / | 52.1dBµV/m @          |                   |              |
| Та    | 002.114      | IOVV    | _                | _                 | 1 - 40GHz           | 15.247( c)        | 11488.2MHz (-1.9dB)   |                   |              |
| 1b    | 802.11a      | center  |                  |                   | Radiated Emissions, | FCC Part 15.209 / | 53.8dBµV/m @          |                   |              |
| 10    | 002.114      | Certici | -                | -                 | 1 - 40GHz           | 15.247( c)        | 11568.9MHz (-0.2dB)   |                   |              |
| 1c    | 802.11a      | high    |                  |                   | Radiated Emissions, | FCC Part 15.209 / | 49.8dBµV/m @          |                   |              |
| 10    | 002.114      | High    | -                | -                 | 1 - 40GHz           | 15.247( c)        | 11649.9MHz (-4.2dB)   |                   |              |
| 2a    | 2a 802.11n20 | low     | low              | low               |                     |                   | Radiated Emissions,   | FCC Part 15.209 / | 52.3dBµV/m @ |
| Za    | 002.111120   |         | -                | _                 | 1 - 40GHz           | 15.247( c)        | 11488.3MHz (-1.7dB)   |                   |              |
| 2b    | 802.11n20    | center  |                  |                   | Radiated Emissions, | FCC Part 15.209 / | 51.9dBµV/m @          |                   |              |
| 20    | 002.111120   | Certici | -                | -                 | 1 - 40GHz           | 15.247( c)        | 11568.6MHz (-2.1dB)   |                   |              |
| 2c    | 802.11n20    | high    |                  |                   | Radiated Emissions, | FCC Part 15.209 / | 51.9dBµV/m @          |                   |              |
| 20    | 002.111120   | High    | -                | -                 | 1 - 40GHz           | 15.247( c)        | 11568.6MHz (-2.1dB)   |                   |              |
| 3a    | 802.11n40    | low     |                  |                   | Radiated Emissions, | FCC Part 15.209 / | 48.2 dBµV/m @         |                   |              |
| Ja    | 002.111140   | IOW     |                  |                   | 1 - 40GHz           | 15.247( c)        | 11588.8 MHz (-5.8 dB) |                   |              |
| 3b    | 802.11n40    | high    |                  |                   | Radiated Emissions, | FCC Part 15.209 / | 48.9 dBµV/m @         |                   |              |
| 30    | 002.111140   | riigii  |                  | -                 | 1 - 40GHz           | 15.247( c)        | 11504.7 MHz (-5.1 dB) |                   |              |

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|---------------|---|------------------|------------|
| Client: Ubiq  | An AZES* company  uiti Networks   | Job Number:      | J86147     |
| Model: UniF   |   | T-Log Number:    |            |
| Contact: Jenn | ifer Sanchez  | Account Manager: | Susan Peiz |
|               | 15.247/EN 300 328   | Class:           | N/A        |
| modifications | Made During Testing were made to the EUT during testing om The Standard |                  |            |
|               | re made from the requirements of the standard.                          |                  |            |
|               |   |                  |            |
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| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | LiniEi Dro            | T-Log Number:    | T86160      |
|           | OHIFI PIO             | 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

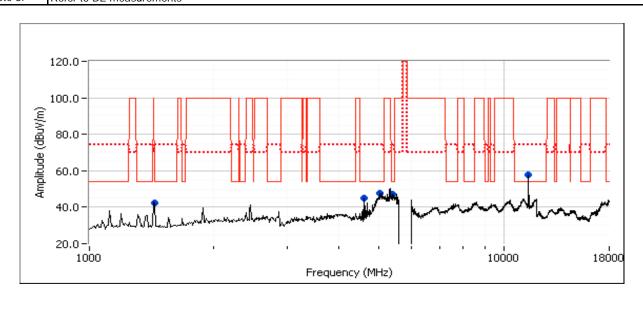
#### Run #1a: Low Channel @ 5745 MHz

#### 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   | Н   | 54.0   | -14.0    | AVG       | 296     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 4599.900  | 45.8   | Н   | 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   | Н   | 54.0   | -6.5     | Peak      | 308     | 1.3    | Note 3               |
| 5390.830  | 47.1   | Н   | 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.





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

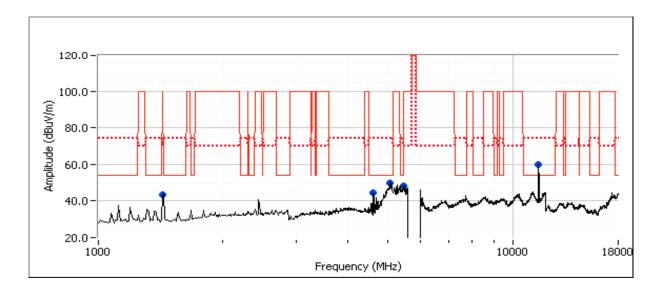
#### Run #1b: Center Channel @ 5785 MHz

#### 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   | Н   | 54.0   | -7.8     | AVG       | 293     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 4600.040  | 49.2   | Н   | 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   | Н   | 54.0   | -4.1     | Peak      | 313     | 1.0    | Note 3               |
| 5445.830  | 48.0   | Н   | 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.





| o.,       | THE WALL I            | 1.1.811          | 10/447      |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model     | UniFi Pro             | T-Log Number:    | T86160      |
| iviouei.  | OHIFT FTO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

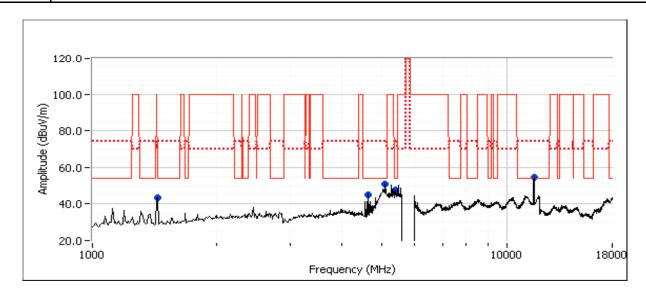
#### Run #1c: High Channel @ 5825 MHz

#### 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   | Н   | 54.0   | -7.8     | AVG       | 295     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 4640.020  | 50.1   | Н   | 74.0   | -23.9    | PK        | 295     | 1.0    | RB 1 MHz;VB 3 MHz;Pk |
| 5097.500  | 50.6   | Н   | -      | -        | Peak      | 287     | 1.0    | Note 3               |
| 5390.830  | 47.7   | Н   | -      | -        | 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.





|           | An ZAZZZ company      |                  |                       |
|-----------|-----------------------|------------------|-----------------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147                |
| Model     | UniFi Pro             | T-Log Number:    | T86160                |
| iviouei.  | OHIFI PIO             | Account Manager: | T86160<br>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

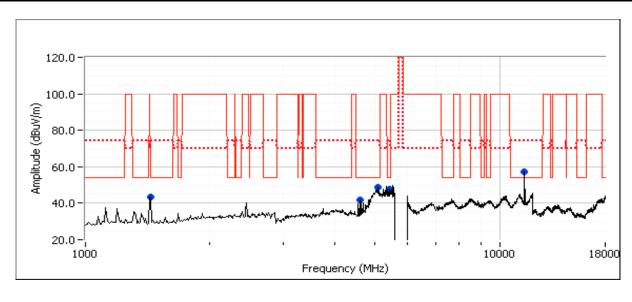
#### Run #2a: Low Channel @ 5745 MHz

#### 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   | Н   | 54.0   | -8.4     | AVG       | 289     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 4600.140  | 48.8   | Н   | 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   | Н   | 54.0   | -5.4     | Peak      | 285     | 1.0    | Note 3               |
| 5436.670  | 47.9   | Н   | 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.





| o.,       | THE WALL I            | 1.1.811          | 10/447      |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model     | UniFi Pro             | T-Log Number:    | T86160      |
| iviouei.  | OHIFT FTO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

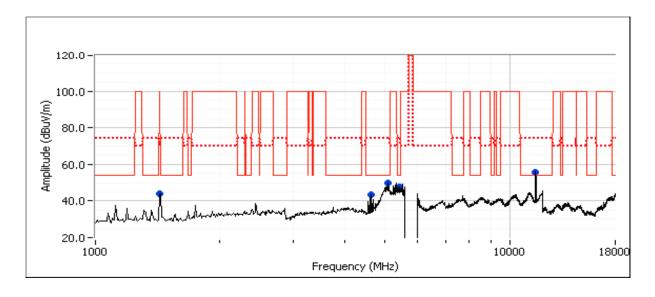
#### Run #2b: Center Channel @ 5785 MHz

#### 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   | Н   | 54.0   | -4.2     | Peak      | 287     | 1.0    | Note 3               |
| 5436.670  | 47.4   | Н   | 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.





| o.,       | THE WALL I            | 1.1.811          | 10/447      |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model     | UniFi Pro             | T-Log Number:    | T86160      |
| iviouei.  | OHIFT FTO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

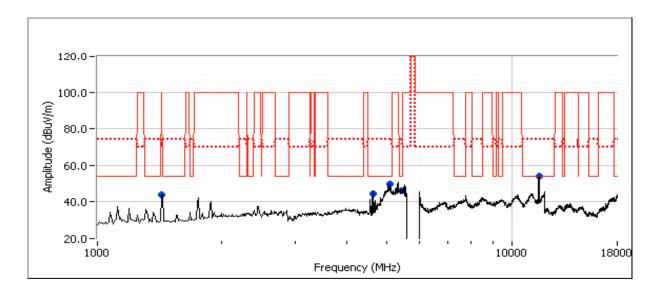
#### Run #2c: High Channel @ 5825 MHz

#### 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   | Н   | 54.0   | -10.9    | AVG       | 274     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 4640.020  | 48.2   | Н   | 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   | Н   | 54.0   | -4.4     | Peak      | 285     | 1.0    | Note 3               |
| 5427.500  | 45.9   | Н   | 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.





|           | An 2023 Company       |                  |                       |
|-----------|-----------------------|------------------|-----------------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147                |
| Model     | UniFi Pro             | T-Log Number:    | T86160                |
| Model.    | OHIFIPIO              | Account Manager: | T86160<br>Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |                       |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A                   |

#### Run #3a: Low Channel @ 5755 MHz

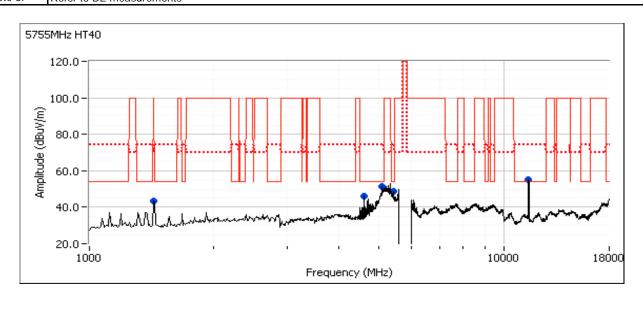
Date of Test: 2/6/2012 Test Engineer: Jack Liu Test Location: FT Chamber #7

#### Spurious Emissions:

| oparious Ei | 1113310113. |     |        |          |           |         |        |                      |
|-------------|-------------|-----|--------|----------|-----------|---------|--------|----------------------|
| 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        | Н   | 54.0   | -18.4    | AVG       | 0       | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 4599.940    | 43.2        | Н   | 74.0   | -30.8    | PK        | 0       | 1.0    | RB 1 MHz;VB 3 MHz;Pk |
| 5104.000    | 48.0        | Н   | 54.0   | -6.0     | AVG       | 318     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 5104.790    | 56.5        | Н   | 74.0   | -17.5    | PK        | 318     | 1.0    | RB 1 MHz;VB 3 MHz;Pk |
| 5456.010    | 44.7        | Н   | 54.0   | -9.3     | AVG       | 317     | 1.1    | RB 1 MHz;VB 10 Hz;Pk |
| 5455.850    | 54.4        | Н   | 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.





| An DCZES company |                       |                  |             |  |  |
|------------------|-----------------------|------------------|-------------|--|--|
| Client:          | Ubiquiti Networks     | Job Number:      | J86147      |  |  |
| Madali           | UniFi Pro             | T-Log Number:    | T86160      |  |  |
| woder.           | OHIFI PIO             | Account Manager: | Susan Pelzl |  |  |
| Contact:         | Jennifer Sanchez      |                  |             |  |  |
| Standard:        | FCC 15.247/EN 300 328 | Class:           | N/A         |  |  |

#### Run #3b: High Channel @ 5795 MHz

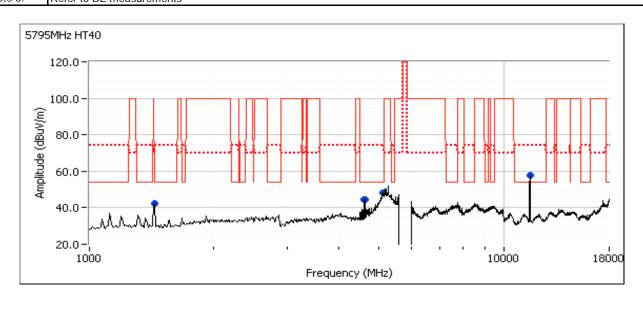
Date of Test: 2/6/2012 Test Engineer: Jack Liu Test Location: FT Chamber #7

#### Spurious Emissions:

| opanicas Li |        |     |        |          |           |         |        |                      |
|-------------|--------|-----|--------|----------|-----------|---------|--------|----------------------|
| 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   | Н   | 54.0   | -12.9    | AVG       | 303     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 4600.040    | 46.2   | Н   | 74.0   | -27.8    | PK        | 303     | 1.0    | RB 1 MHz;VB 3 MHz;Pk |
| 4640.020    | 45.7   | Н   | 54.0   | -8.3     | AVG       | 305     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 4640.100    | 49.8   | Н   | 74.0   | -24.2    | PK        | 305     | 1.0    | RB 1 MHz;VB 3 MHz;Pk |
| 5104.000    | 47.3   | Н   | 54.0   | -6.7     | AVG       | 320     | 1.0    | RB 1 MHz;VB 10 Hz;Pk |
| 5104.140    | 56.6   | Н   | 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.



|         | Eliott An ATAS company |
|---------|------------------------|
| Client: | Ubiquiti Networks      |
| Model:  | l IniFi Pro            |

|           | An Daz company        |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFT PTO             | 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 Config. Used: 1 Config Change: None Test Engineer: Jack Liu / R. Varelas EUT Voltage: 48V POE Test Location: Fremont EMC Lab #4

#### 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:

20.4 °C Temperature: Rel. Humidity: 35 %

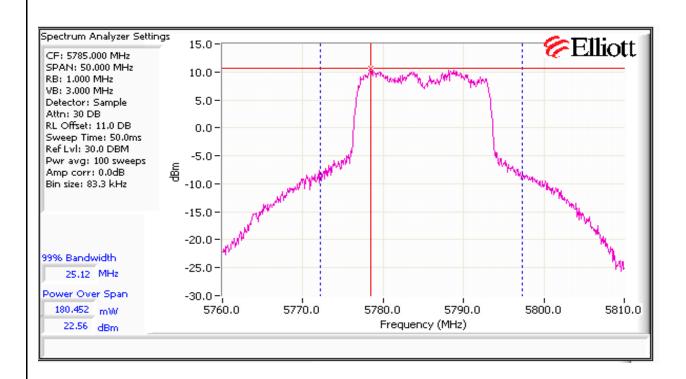
#### Summary of Results

| Run # | Pwr setting | Avg Pwr | Test Performed               | Limit     | Pass / Fail | Result / Margin                                 |
|-------|-------------|---------|------------------------------|-----------|-------------|---|
| 1     | 25          |         | Output Power                 | 15.247(b) | Pass        | a: 25.0dBm<br>HT20: 24.7dBm<br>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<br>HT20: 17.25MHz<br>HT40: 36.4MHz  |
| 3     | 25          |         | 99% Bandwidth                | RSS GEN   | Pass        | a: 19.55MHz<br>HT20: 19.47MHz<br>HT40: 50.32MHz |
| 4     | 25          |         | Spurious emissions           | 15.247(b) | Pass        | All emissions are below<br>the -30dBc limit     |

| Elliott  An MAS company  Client Ubiquiti Notworks                                       | EM               | C Test Data |
|---|------------------|-------------|
| Client: Ubiquiti Networks   | Job Number:      | J86147      |
|   | T-Log Number:    |             |
| Model: UniFi Pro  | Account Manager: |             |
| 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.                          |                  |             |
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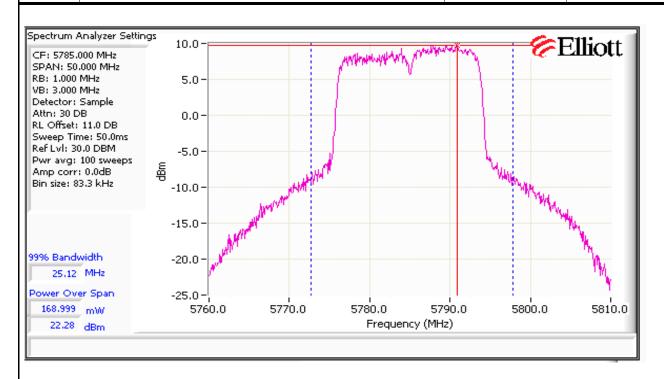
| Clicit                  | Elliott  An ATAS company  : Ubiquiti Networks |                                  |         |         |         | J           | lob Number:     | J86147      |         |
|-------------------------|---|----------------------------------|---------|---------|---------|-------------|-----------------|-------------|---------|
| Model                   | : UniFi Pro                                   |                                  |         |         |         | T-L         | og Number:      | T86160      |         |
| Model                   | : UIIIFI PIO                                  |                                  |         |         |         | Accou       | nt Manager:     | Susan Pelzl |         |
| Contact                 | : Jennifer Sanchez                            |                                  |         |         |         |             |                 |             |         |
| Standard                | : FCC 15.247/EN 300 3                         | 28                               |         |         |         |             | Class:          | N/A         |         |
| Run #1: O               | output Power - Chain A                        | ı + B                            |         |         |         |             |                 |             |         |
|                         |   |                                  | 000 11  |         |         |             |                 |             |         |
| t <b>un 1a</b> :<br>Tra | O<br>ansmitted signal on chai                 | perating Mode:<br>n is coherent? |         |         |         |             |                 |             |         |
| 110                     | ansmitted signal on that                      | II IS CONCICITE:                 | 103     |         |         |             |                 |             |         |
|                         | 5745 MHz                                      | Chain 1                          | Chain 2 | Chain 3 | Cham 4  | Total Acros | s All Chains    | Lir         | nit     |
| ower Sett               |   | -                                | -       |         |         |             |                 |             |         |
| utput Pov               | ver (dBm) Note 1                              | 17.05                            | 17.42   |         |         | 20.2 dBm    | 0.106 W         | 29.0 dBm    | 0.792 \ |
| ntenna G                | ain (dBi) Note 2                              | 4                                | 4       |         |         | 7.0 dBi     | 0.522.14/       | Pa          | SS      |
| irp (dBm)               | Note 2  | 21.05                            | 21.42   |         |         | 27.3 dBm    | 0.532 W         |             |         |
|                         | 5785 MHz                                      | Chain 1                          | Chain 2 | Chain 3 | Chain 4 | Talal Assas | . All Objection | 1.2.        | . 9     |
| ower Sett               | ing <sup>Note 3</sup>                         | -                                | -       |         |         | Total Acros | S All Chains    | Lir         | mı      |
| utput Pov               | ver (dBm) Note 1                              | 21.26                            | 22.56   |         |         | 25.0 dBm    | 0.314 W         | 29.0 dBm    | 0.792 \ |
| ntenna G                | ain (dBi) <sup>Note 2</sup>                   | 4                                | 4       |         |         | 7.0 dBi     |                 | Pa          | 22      |
| irp (dBm)               | Note 2  | 25.26                            | 26.56   |         |         | 32.0 dBm    | 1.577 W         | 10          |         |
|                         | 5825 MHz                                      | Chain 1                          | Chain 2 | Chain 3 | Chain 4 | Takal Assas | a All Obaina    | 1:-         | !1      |
| ower Sett               | ing <sup>Note 3</sup>                         | -                                | -       |         |         | Total Acros | s all Chains    | Lir         | nii     |
| utput Pov               | ver (dBm) Note 1                              | 19.78                            | 21.46   |         |         | 23.7 dBm    | 0.235 W         | 29.0 dBm    | 0.792 \ |
| ntenna G                | ain (dBi) <sup>Note 2</sup>                   | 4                                | 4       |         |         | 7.0 dBi     |                 | Pa          | cc      |
| / · \                   | Note 2  | 23.78                            | 25.46   |         |         | 30.7 dBm    | 1.181 W         | 1 0         | 33      |

|           | Elliott<br>An AZAS company | EM               | C Test Data |
|-----------|----------------------------|------------------|-------------|
| Client:   | Ubiquiti Networks          | Job Number:      | J86147      |
| Madalı    | UniFi Pro                  | T-Log Number:    | T86160      |
| Model.    |                            | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez           |                  |             |
| Standard: | FCC 15.247/EN 300 328      | Class:           | N/A         |

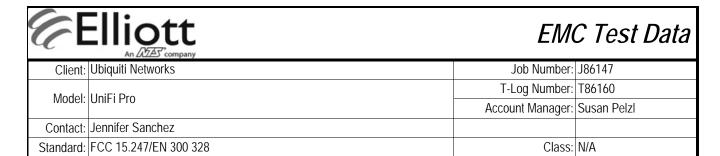


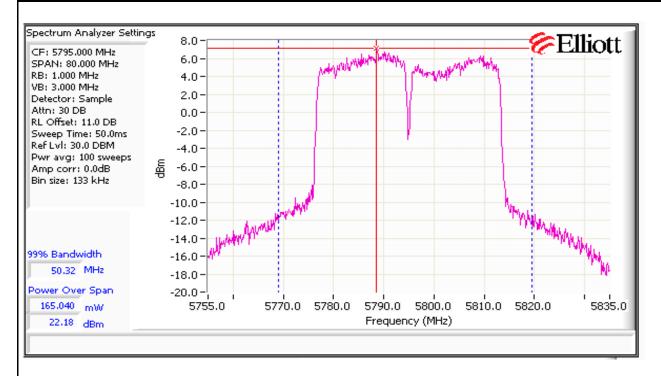
|   | Elliott  |  |   |                 |                             | EMO                  | C Test Data           |
|---|--|--|---|-----------------|-----------------------------|----------------------|-----------------------|
| Client                                      | Ubiquiti Networks                              |  |   |                 |                             | lob Number:          | J86147                |
| Model Herri Do                              |  |  |   | T-Log Number:   |                             | T86160               |                       |
| Model: UniFi Pro                            |  |  |   |                 |                             | nt Manager:          | Susan Pelzl           |
| Contact:                                    | : Jennifer Sanchez                             |  |   |                 |                             |                      |                       |
| Standard:                                   | FCC 15.247/EN 300 32                           | 28   |   |                 |                             | Class:               | N/A                   |
| Run 1b:<br>Tra                              | Op<br>Insmitted signal on chair                | erating Mode:<br>n is coherent?                                      |   | 20              |                             |                      |                       |
|   | 5745 MHz                                       | Chain 1  | Chain 2   | Chain 3 Chain 4 | Tatal Assas                 | a All Obaina         | Limeli                |
| Power Setti                                 | ng <sup>Note 3</sup>                           | -  | _   |                 | Total Acros                 | s All Chains         | Limit                 |
| <b>Dutput Pow</b>                           | ver (dBm) Note 1                               | 16.99  | 16.5  |                 | 19.8 dBm                    | 0.095 W              | 29.0 dBm  0.792 W     |
| Antenna Ga                                  | ain (dBi) <sup>Note 2</sup>                    | 4  | 4   |                 | 7.0 dBi                     |                      | Pass                  |
| eirp (dBm) <sup>r</sup>                     | Note 2   | 20.99  | 20.5  |                 | 26.8 dBm                    | 0.476 W              | 1 033                 |
|   | 5785 MHz                                       | Chain 1  | Chain 2   | Chain 3 Chain 4 | Total Across All Chains     |                      | Limit                 |
|   | ower Setting <sup>Note 3</sup>                 |  | -   |                 |                             |                      |                       |
| 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 eirp (dBm) Note 2 |  | 4  | 4   |                 | 7.0 dBi                     | 1 407 W              | Pass                  |
| eirp (dBm)                                  |  | 25.03  | 26.28   |                 | 31.7 dBm                    | 1.486 W              |                       |
| 5825 MHz                                    |  | Chain 1  | Chain 2   | Chain 3 Chain 4 |                             | 411.01.1             | Limit                 |
| Power Setti                                 | ower Setting <sup>Note 3</sup>                 |  | -   |                 | Total Acros                 | s All Chains         | Limit                 |
| <b>Dutput Pow</b>                           | ver (dBm) Note 1                               | 20.16  | 21.16   |                 | 23.7 dBm                    | 0.234 W              | 29.0 dBm 0.792 W      |
| Antenna Ga                                  | ain (dBi) <sup>Note 2</sup>                    | 4  | 4   |                 | 7.0 dBi                     |                      | Pass                  |
| eirp (dBm) <sup>r</sup>                     | Note 2   | 24.16  | 25.16   |                 | 30.7 dBm                    | 1.177 W              | Pass                  |
| Note 1:                                     | averaging on (transmitt equivalent to method 1 | ted signal was<br>of DA-02-213<br>between chains<br>wer and the effo | continuous)<br>8A1 for U-N<br>s the effective<br>ective anten |                 | er 50 MHz (o<br>becomes -30 | ption #2, me<br>dBc. | thod 1 in KDB 558074, |
| Note 3:                                     |  |  |   | ICAC ANIV       |                             |                      |                       |

|           | Elliott<br>An DZES company | EM               | EMC Test Data |  |  |
|-----------|----------------------------|------------------|---------------|--|--|
| Client:   | Ubiquiti Networks          | Job Number:      | J86147        |  |  |
| Madalı    | UniFi Pro                  | T-Log Number:    | T86160        |  |  |
| Model.    |                            | Account Manager: | Susan Pelzl   |  |  |
| Contact:  | Jennifer Sanchez           |                  |               |  |  |
| Standard: | FCC 15.247/EN 300 328      | Class:           | N/A           |  |  |



| 3110111.                              | Ubiquiti Networks  |  |   |  |                                  |   | lob Number:  | J86147               |
|---------------------------------------|--|--|---|--|----------------------------------|---|--------------|----------------------|
|                                       |  |  |   |  |                                  |   | og Number:   |                      |
| Model: UniFi Pro                      |  |  |   |  |                                  |   | •            | Susan Pelzl          |
| Contact: Jennifer Sanchez             |  |  |   |  |                                  |   |              |                      |
| Standard:                             | FCC 15.247/EN 300 328  | }  |   |  |                                  |   | Class:       | N/A                  |
| <b>lun 1c</b> :<br>Trar               | Opensmitted signal on chain  | erating Mode:<br>is coherent?                                      |   | 10   |                                  |   |              |                      |
|                                       | 5755 MHz   | Chain 1  | Chain 2   | Chain 3  | Chain 4                          | Total Across All Chains                                 |              | Limit                |
| ower Settir                           | ng (dPm) Note 1  | - 10 /   | - 11 4  |  |                                  |   |              |                      |
| utput Powe                            | er (udili)   | 12.6<br>4  | 11.4<br>4   |  |                                  | 15.1 dBm<br>7.0 dBi                                     | 0.032 W      | 29.0 dBm   0.792 \   |
| intenna Gal<br>irp (dBm) <sup>N</sup> | in (dBi) Note 2<br>lote 2  | 16.6   | 15.4  |  |                                  | 22.1 dBm  | 0.161 W      | Pass                 |
| iip (dbiii)                           |  | 10.0   | 10.1  |  |                                  | 22.1 45.11  | 0.1011       |                      |
|                                       | 5795 MHz   | Chain 1  | Chain 2   | Chain 3  | Chain 4                          | Total Across All Chains                                 |              | Limit                |
| ower Settir                           | ng (dPm) Note 1  | - 21.70  | -<br>22.18  |  |                                  |   |              |                      |
| utput Powe                            | er (dBm) <sup>Note 2</sup><br>in (dBi) <sup>Note 2</sup>   | 21.79  | 22.18<br>4  |  |                                  | 25.0 dBm<br>7.0 dBi                                     | 0.316 W      | 29.0 dBm   0.792 \   |
| irp (dBm) <sup>N</sup>                | lit (UBI)<br>lote 2  | 25.79  | 26.18   |  |                                  | 32.0 dBm  | 1.589 W      | Pass                 |
| Note 1:<br>Note 2:                    | Output power measured averaging on (transmitted equivalent to method 1 of As there is coherency be product of the total power The power setting is pro | ed signal was<br>of DA-02-2138<br>etween chains<br>er and the effe | continuous)<br>BA1 for U-N<br>s the effective<br>ective anten | and power in<br>II devices). S<br>ve antenna ga<br>na gain | itegration over<br>purious limit | er <b>80 MHz</b> (o <sub>l</sub><br>becomes <b>-3</b> 0 | otion #2, me | thod 1 in KDB 558074 |







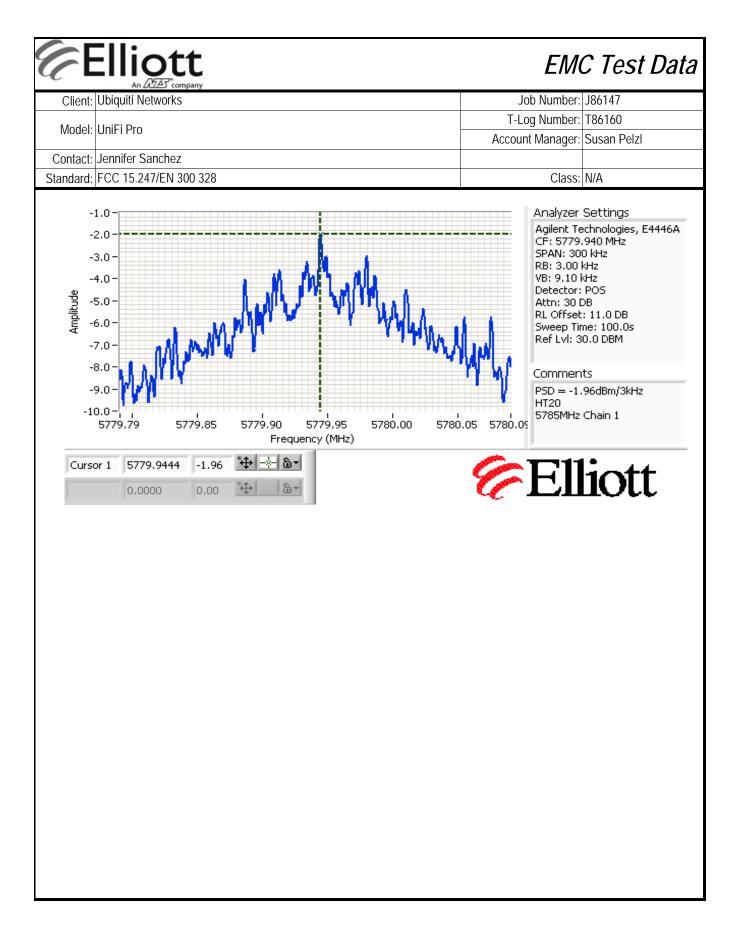
| o.,       | THE WALL I            | 1.1.811          | 10/447      |
|-----------|-----------------------|------------------|-------------|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFT FTO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer Sanchez      |                  |             |
| Standard: | FCC 15.247/EN 300 328 | Class:           | N/A         |

#### Run #2: Power spectral Density

| Power<br>Setting | Frequency (MHz) | Chain 1 | PSD<br>Chain 2 | O (dBm/3kHz) Note 1<br>Chairl 3 Chain 4 | Total | Limit<br>dBm/3kHz | Result |
|------------------|-----------------|---------|----------------|---|-------|-------------------|--------|
| Setting          | F74F -          |         |                | Chair 9 Chair 4                         |       | 1                 | Б.     |
| -                | 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.





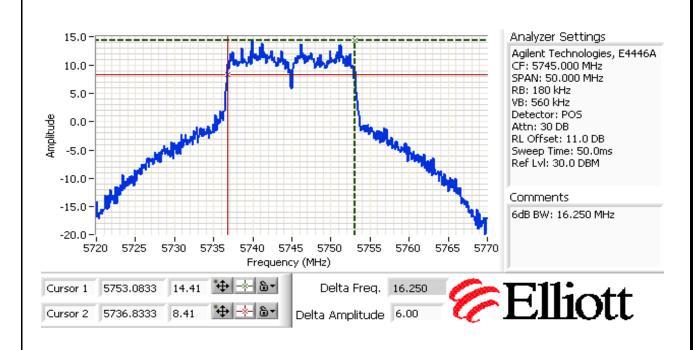
|           | All Dales company     |                  |             |  |  |
|-----------|-----------------------|------------------|-------------|--|--|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |  |  |
| Model:    | UniFi Pro             | T-Log Number:    | T86160      |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

Run #3: Signal Bandwidth

| Power   | Frequency (MHz)     | Resolution | Bandwid | lth (MHz) | Comments                          |
|---------|---------------------|------------|---------|-----------|-----------------------------------|
| Setting | i requericy (wiriz) | Bandwidth  | 6dB     | 99%       | Confinents                        |
| -       | 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 |
| -       | 5785 - HT20         | 180kHz     | 17.25   | 25.12     | measurement (RB=1MHz, VB=3MHz)    |
| -       | 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

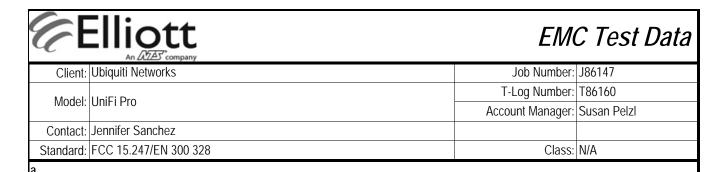


| Elliott An ANTAS company |                       | EMO              | EMC Test Data |  |  |
|--------------------------|-----------------------|------------------|---------------|--|--|
|                          | Ubiquiti Networks     | Job Number:      | J86147        |  |  |
| Model                    | UniFi Pro             | T-Log Number:    | T86160        |  |  |
| iviouei.                 |                       | Account Manager: | Susan Pelzl   |  |  |
| Contact:                 | Jennifer Sanchez      |                  |               |  |  |
| Standard:                | FCC 15.247/EN 300 328 | Class:           | N/A           |  |  |

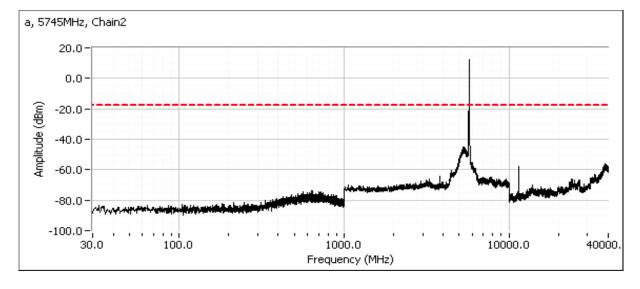
### Run #4: Out of Band Spurious Emissions

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

| Note 1: | Measured on each chain individually |
|---------|-------------------------------------|
|         |                                     |



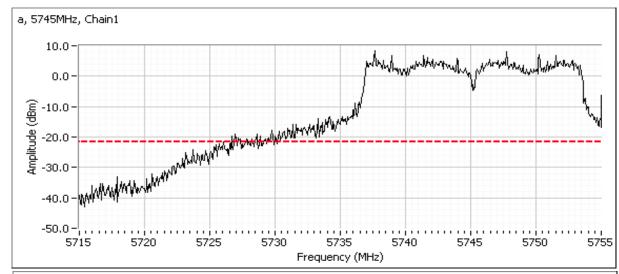
## 

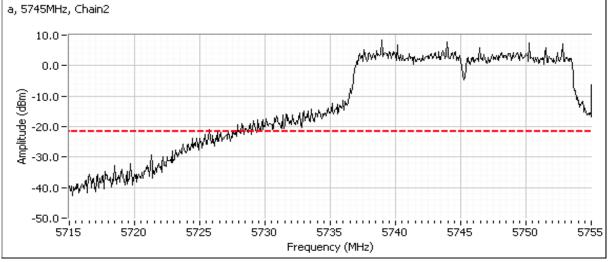




|           | All DEES company      |                  |             |  |  |
|-----------|-----------------------|------------------|-------------|--|--|
| Client    | Ubiquiti Networks     | Job Number:      | J86147      |  |  |
| Model:    | UniFi Pro             | T-Log Number:    | T86160      |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

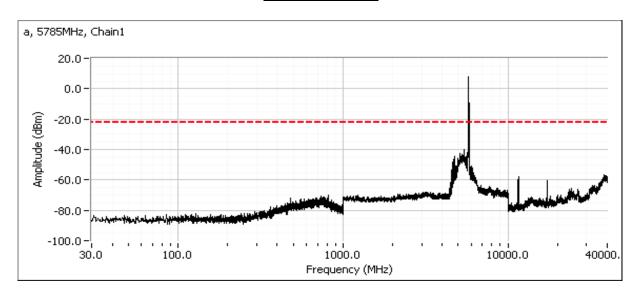
Additional plot from 5715 - 5755 MHz showing compliance with -30dBc at the band edge.

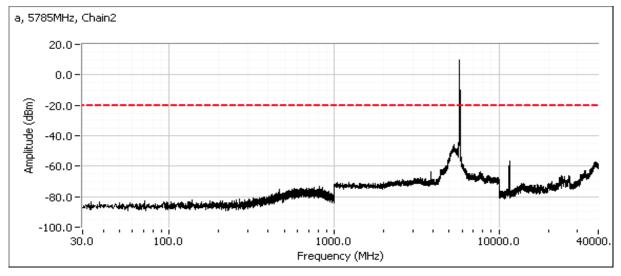




|           | Eliott<br>An AZAS company | EMC Test Data    |             |  |
|-----------|---------------------------|------------------|-------------|--|
| Client:   | Ubiquiti Networks         | Job Number:      | J86147      |  |
| Madalı    | UniFi Pro                 | T-Log Number:    | T86160      |  |
| Model.    |                           | Account Manager: | Susan Pelzl |  |
| Contact:  | Jennifer Sanchez          |                  |             |  |
| Standard: | FCC 15.247/EN 300 328     | Class:           | N/A         |  |
|           |                           |                  |             |  |

#### Plots for center channel



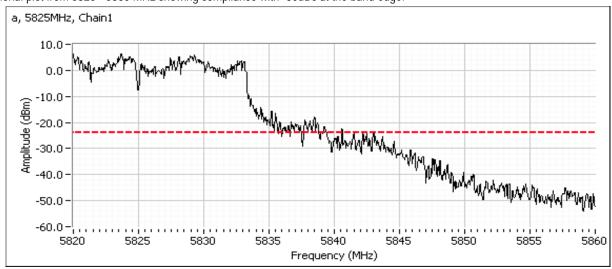


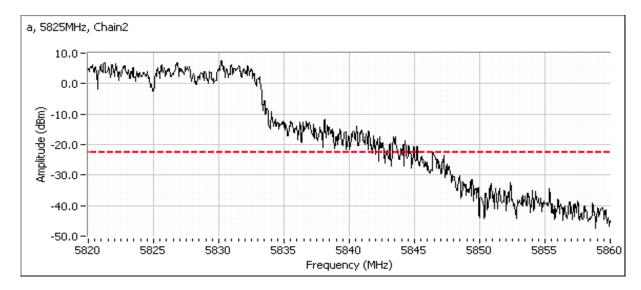
### EMC Test Data Client: Ubiquiti Networks Job Number: J86147 T-Log Number: T86160 Model: UniFi Pro Account Manager: Susan Pelzl Contact: Jennifer Sanchez Standard: FCC 15.247/EN 300 328 Class: N/A Plots for high channel a, 5825MHz, Chain1 20.0-0.0 Amplitude (dBm) -40.0 -60.0 -100.0 -\ 40000. 30.0 100.0 1000.0 10000.0 Frequency (MHz) a, 5825MHz, Chain2 20.0-0.0 Amplitude (dBm) -20.0 -40.0 -60.0 -80.0 -100.0 -40000. 1000.0 10000.0 100.0 30.0 Frequency (MHz)



|          | The state of the s |                  |             |  |  |
|----------|--|------------------|-------------|--|--|
| Clien    | : 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.

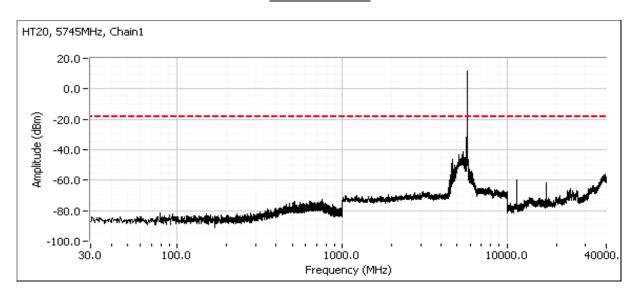


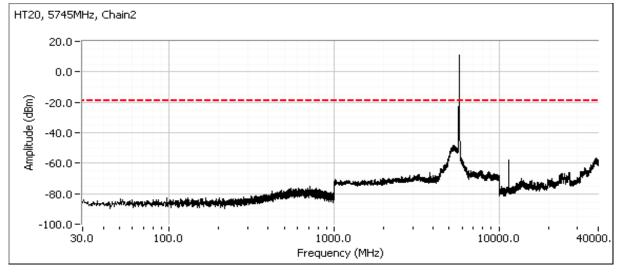


|           | Elliott<br>An ATAS company | EM               | EMC Test Data |  |  |
|-----------|----------------------------|------------------|---------------|--|--|
| Client:   | Ubiquiti Networks          | Job Number:      | J86147        |  |  |
| Model     | UniFi Pro                  | T-Log Number:    | T86160        |  |  |
| Model.    |                            | Account Manager: | Susan Pelzl   |  |  |
| Contact:  | Jennifer Sanchez           |                  |               |  |  |
| Standard: | FCC 15.247/EN 300 328      | Class:           | N/A           |  |  |

#### HT20

#### Plots for low channel

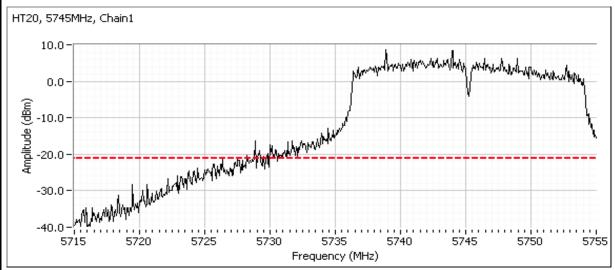


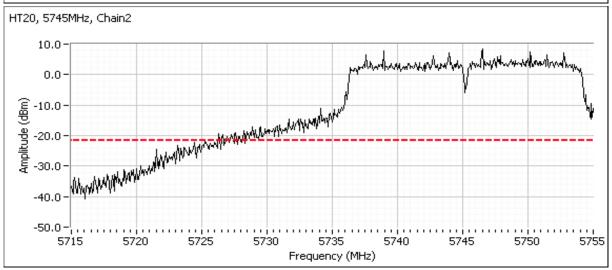


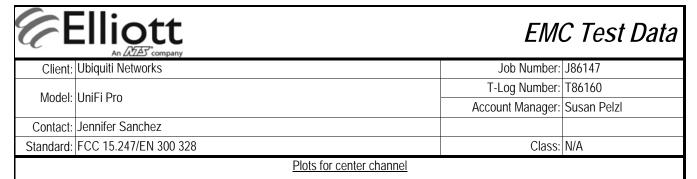


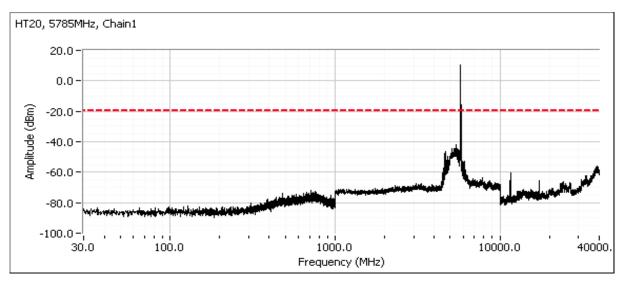
|           | An DOZE company       |                  |             |  |
|-----------|-----------------------|------------------|-------------|--|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |  |
| Model:    | UniFi Pro             | T-Log Number:    | T86160      |  |
|   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

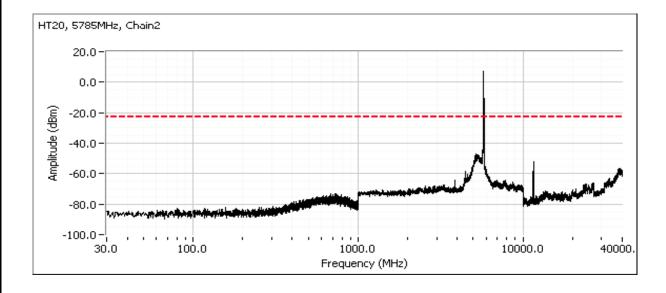
Additional plot from 5820 - 5860 MHz showing compliance with -30dBc at the band edge.

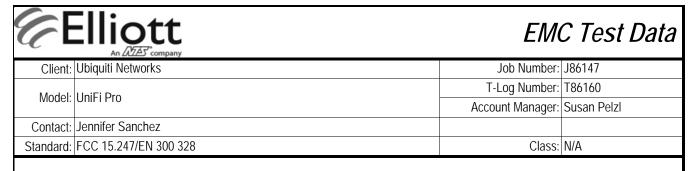




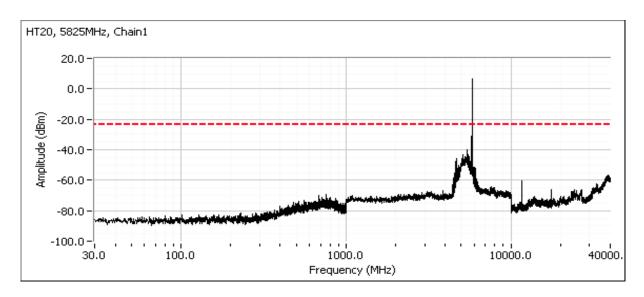


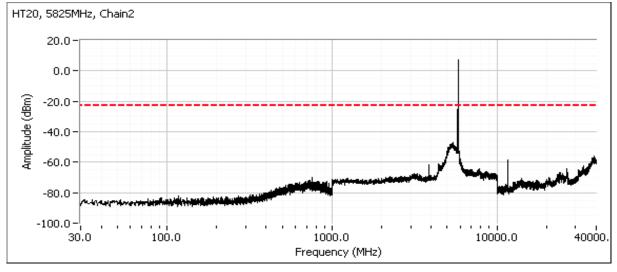






#### Plots for high channel

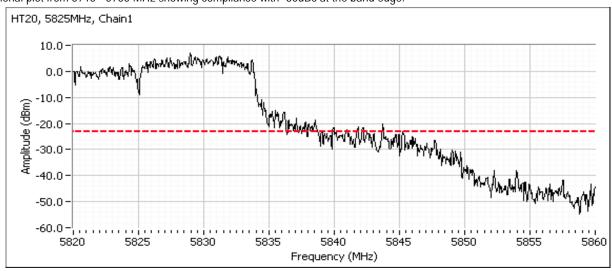


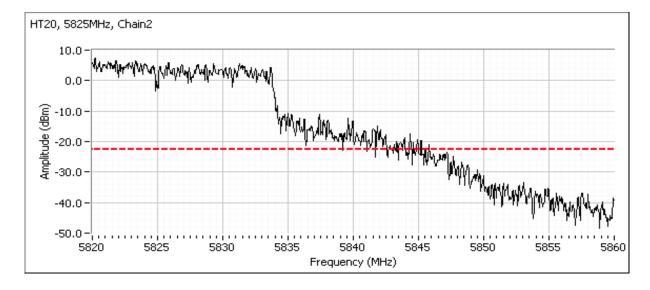




|           | All Dazzo Company     |                  |             |
|-----------|-----------------------|------------------|-------------|
| Client    | Ubiquiti Networks     | Job Number:      | J86147      |
| Model:    | UniFi Pro             | T-Log Number:    | T86160      |
|           |                       | 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.

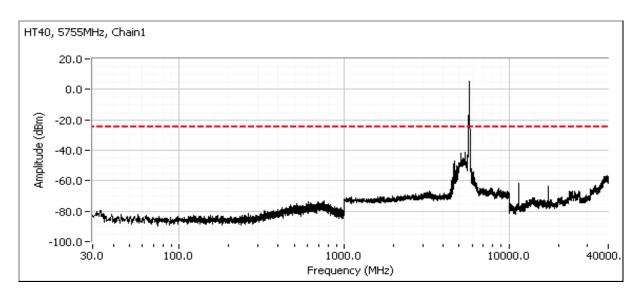


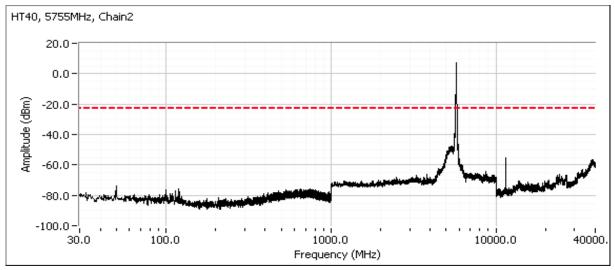


|           | Eliott<br>An DIAS company | EMC Test Data    |             |  |
|-----------|---------------------------|------------------|-------------|--|
| Client:   | Ubiquiti Networks         | Job Number:      | J86147      |  |
| Model     | UniFi Pro                 | T-Log Number:    | T86160      |  |
| Model.    |                           | Account Manager: | Susan Pelzl |  |
| Contact:  | Jennifer Sanchez          |                  |             |  |
| Standard: | FCC 15.247/EN 300 328     | Class:           | N/A         |  |

#### HT40

#### Plots for low channel

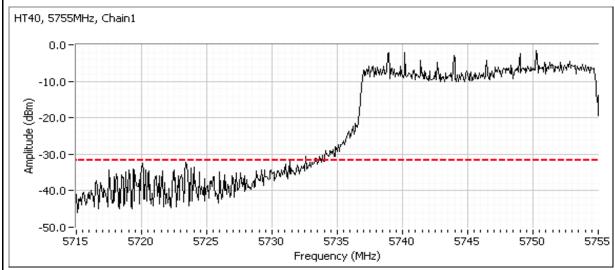


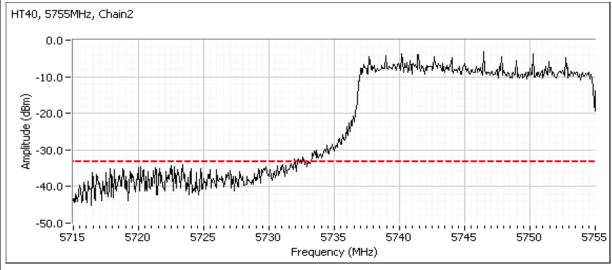


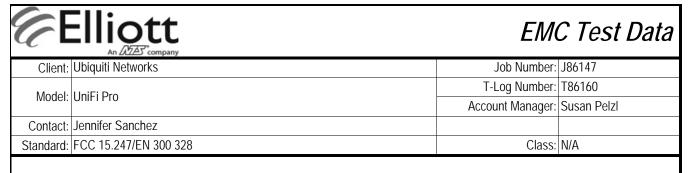


| Till Ball. S Company |                       |                  |             |  |
|----------------------|-----------------------|------------------|-------------|--|
| Client:              | Ubiquiti Networks     | Job Number:      | J86147      |  |
| Model:               | UniEi Dro             | T-Log Number:    | T86160      |  |
|                      | OHIFT PIO             | Account Manager: | Susan Pelzl |  |
| Contact:             | Jennifer Sanchez      |                  |             |  |
| Standard:            | FCC 15.247/EN 300 328 | Class:           | N/A         |  |

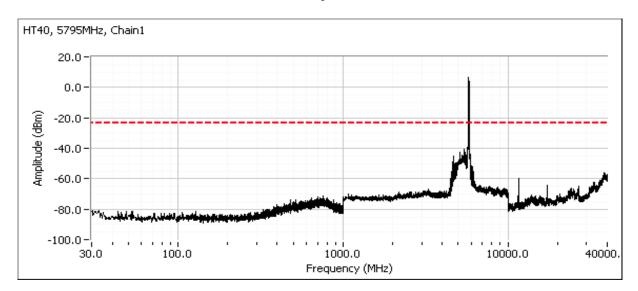
Additional plot from 5715 - 5755 MHz showing compliance with -30dBc at the band edge.

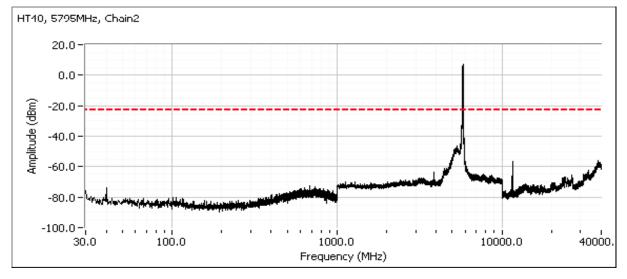






#### Plots for high channel

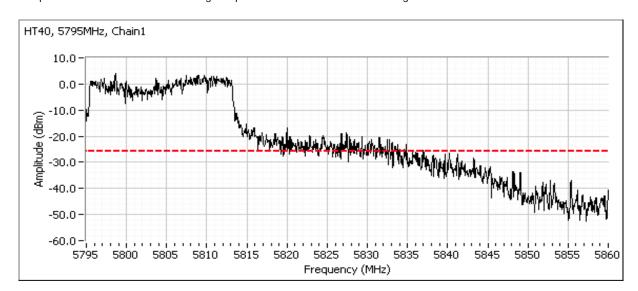


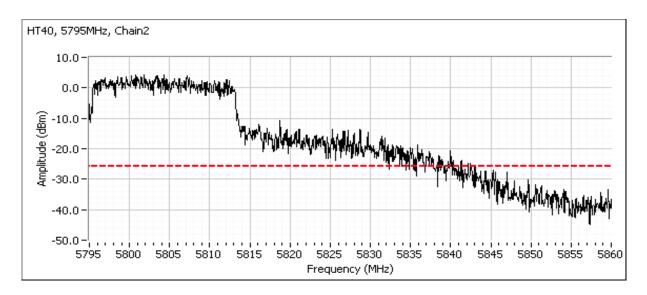




| Client:   | Ubiquiti Networks     | Job Number:      | J86147      |
|-----------|-----------------------|------------------|-------------|
| Model:    | UniEi Dro             | T-Log Number:    | T86160      |
|           | OHIFI PIO             | Account Manager: | Susan Pelzl |
| Contact:  | Jennifer 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.





|           | An OZAS company       | EMO              | EMC Test Data |  |  |
|-----------|-----------------------|------------------|---------------|--|--|
| Client:   | Ubiquiti Networks     | Job Number:      | J86147        |  |  |
| Model     | UniFi Pro             | T-Log Number:    | T86160        |  |  |
| iviouei.  |                       | Account Manager: | Susan Pelzl   |  |  |
| Contact:  | Jennifer Sanchez      |                  |               |  |  |
| Standard: | FCC 15 247/FN 300 328 | Class.           | _             |  |  |

#### **Conducted Emissions**

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

#### **Test Specific Details**

C[11: - 44

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 Config. Used: 1
Test Engineer: Joseph Cadigal Config Change: none
Test Location: Fremont Chamber #4 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

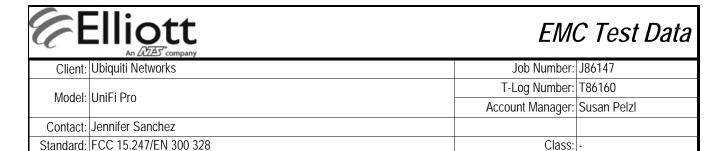
| Run # | Test Performed         | Limit   | Result | Margin                           |
|-------|------------------------|---------|--------|----------------------------------|
| 2     | CE, AC Power,120V/60Hz | Class A | Pass   | 52.4 dBµV @ 21.663 MHz (-7.6 dB) |

#### Modifications Made During Testing

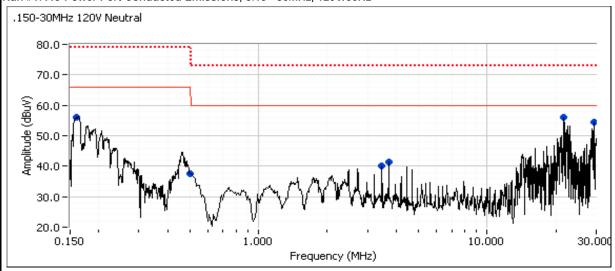
No modifications were made to the EUT during testing

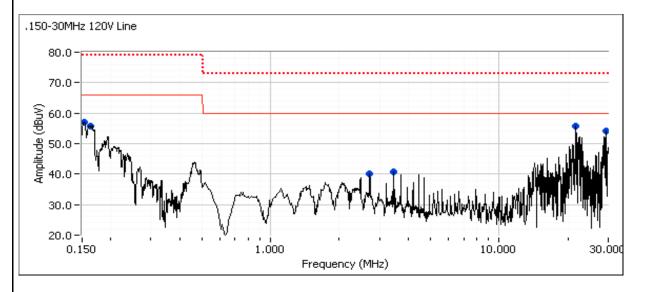
#### Deviations From The Standard

No deviations were made from the requirements of the standard.



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





|                  | Ellig        | ott               |              |                |            |                          | EM               | C Test Data |
|------------------|--------------|-------------------|--------------|----------------|------------|--------------------------|------------------|-------------|
| Client:          | Ubiquiti Net | works             |              |                |            |                          | Job Number:      | J86147      |
|                  | -            |                   |              |                |            |                          | T-Log Number:    | T86160      |
| Model:           | UniFi Pro    |                   |              |                |            |                          | Account Manager: |             |
| Contact:         | Jennifer Sa  | nchez             |              |                |            |                          |                  |             |
| Standard:        | FCC 15.247   | 7/EN 300 328      |              |                |            |                          | Class:           | -           |
| Preliminary      | peak readi   | ngs capture       | d during pre | -scan (peak    | readings v | s. average limi          | it)              |             |
| Frequency        | Level        | AC                |              | ss A           | Detector   | Comments                 |                  |             |
| MHz              | dΒμV         | 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       |                          |                  |             |
|                  |              | verage readi      |              |                |            | Τ                        |                  |             |
| Frequency        | Level        | AC                | Clas         | 1              | Detector   | Comments                 |                  |             |
| MHz              | dBμV         | Line              | Limit        | Margin         | QP/Ave     | 11/0 (0.10.)             |                  |             |
| 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<br>55.5 | Neutral           | 73.0         | -17.0          | QP<br>QP   | QP (1.00s)<br>QP (1.00s) |                  |             |
| 21.663<br>29.236 | 54.0         | Line 1            | 73.0<br>73.0 | -17.5<br>-19.0 | QP<br>QP   | QP (1.00s)               |                  |             |
| 29.236           | 54.0         | Neutral<br>Line 1 | 73.0         | -19.0          | QP<br>QP   | QP (1.00s)               |                  |             |
| 0.153            | 55.1         | Line 1            | 79.0         | -19.0          | QP         | QP (1.00s)               |                  |             |
| 0.160            | 54.7         | Neutral           | 79.0         | -23.9          | QP<br>QP   | QP (1.00s)               |                  |             |
| 0.163            | 54.0         | Line 1            | 79.0         | -24.3          | 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         | -20.4          | 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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