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# *EMC Test Report*

## *Application for Grant of Equipment Authorization*

## *FCC Part 15, Subpart E (April 2014 Rules)*

## *Model: SR1420*

| | |
|---|---|
| FCC ID: | 2AAAS-CE02 |
| APPLICANT: | Vivint Wireless<br>3945 Freedom Circle, Suite 150<br>Santa Clara, CA 95054 |
| TEST SITE(S): | National Technical Systems - Silicon Valley<br>41039 Boyce Road.<br>Fremont, CA. 94538-2435 |
| REPORT DATE: | November 7, 2014 |
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| FINAL TEST DATES: | August 20, September 8, 10, 11, 12 and 15, 2014 |
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A2LA ACCREDITED
Testing Cert #0214.26

## REVISION HISTORY

| Rev# | Date | Comments | Modified By |
|---|---|---|---|
| 1 | November 7, 2014 | First release | |
| 2 | November 20, 2014 | Correct Referenced Power limits, clarification on operating mode | MEH |

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## SCOPE

An electromagnetic emissions test has been performed on the Vivint Wireless model SR1420, pursuant to the following rules:

FCC Part 15, Subpart E requirements for UNII Devices (April 2014)

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 National Technical Systems - Silicon Valley test procedures:

ANSI C63.10-2009
FCC General UNII Test Procedures KDB789033

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.

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 Vivint Wireless model SR1420 complied with the requirements of the following regulations:

FCC Part 15, Subpart E requirements for UNII Devices

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

The test results recorded herein are based on a single type test of Vivint Wireless model SR1420 and therefore apply only to the tested sample. The sample was selected and prepared by Venkat Kalkunte of Vivint Wireless.

## DEVIATIONS FROM THE STANDARDS

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

## TEST RESULTS SUMMARY

*UNII / LELAN DEVICES*

**Operation in the 5.15 – 5.25 GHz Band**

| FCC Rule Part | Description | Measured Value / Comments | Limit / Requirement[1] | Result |
|---|---|---|---|---|
| 15.407(a)(1)(iv)- | Output Power | n40: 19.7dBm (93.3mW) | 24 dBm / 250mW (eirp < 30dBm) | Complies |
| | Power Spectral Density | n40: 3.6dBm/MHz | 11 dBm/MHz | Complies |

**Operation in the 5.25 – 5.35 GHz Band**

| FCC Rule Part | Description | Measured Value / Comments | Limit / Requirement[1] | Result (margin) |
|---|---|---|---|---|
| 15.407(a) (2) | 26dB Bandwidth | 43.3MHz | N/A – limits output power if < 20MHz | N/A |
| 15.407(a) (2) | Output Power | n40: 20.9dBm (123.9mW)<br>max eirp = 29.9dBm | 24 dBm / 250mW (eirp < 30dBm) | Complies |
| | Power Spectral Density | n40: 4.8dBm/MHz | 11 dBm/MHz | Complies |

**Operation in the 5.47 – 5.725 GHz Band**

| FCC Rule Part | Description | Measured Value / Comments | Limit / Requirement[1] | Result (margin) |
|---|---|---|---|---|
| 15.407(a) (2) | 26dB Bandwidth | 36.9MHz | N/A – limits output power if < 20MHz | N/A |
| 15.407(a) (2) | Output Power | n40: 20.9dBm (123.4mW)<br>max eirp = 29.9dBm | 24 dBm / 250mW (eirp < 30dBm) | Complies |
| | Power Spectral Density | n40: 5.5dBm/MHz | 11 dBm/MHz | Complies |

**Operation in the 5.725 – 5.850 GHz Band**

| FCC Rule Part | Description | Measured Value / Comments | Limit / Requirement[1] | Result (margin) |
|---|---|---|---|---|
| 15.407(a) (3) / 15.407(e) | 6dB Bandwidth | 35.6 MHz | >500kHz | N/A |
| 15.407(a) (3) | Output Power | n40: 23.6dBm (228.7mW)<br>max eirp = 32.6dBm | 30 dBm / 1000W (eirp < 36dBm) | Complies |
| | Power Spectral Density | n40: 7.5 dBm/MHz | 30dBm/500kHz (27dBm/MHz) | Complies |

[1] Power and PSD limits for devices with effective antenna gain <6dBi. Refer to test data for the final power and PSD limits.

**Requirements for all U-NII/LELAN bands**

| FCC Rule Part | Description | Measured Value / Comments | Limit / Requirement | Result |
|---|---|---|---|---|
| 15.407 | Modulation | Digital Modulation is used | Digital modulation is required | Complies |
| 15.407(b) / 15.209 | Spurious Emissions | 53.7 dBµV/m @ 5149.8 MHz (-0.3 dB) | Refer to page 20 | Complies |
| 15.407 (c) | Operation in the absence of information to transmit | Operation is discontinued in the absence of information | Device shall automatically discontinue operation in the absence of information to transmit | Complies |
| 15.407(g) | Frequency Stability | Frequency stability is better than 10ppm | Signal shall remain within the allocated band | Complies |
| 15.407(h)(1) | Transmit Power Control | TCP mechanism is discussed in the Operational Description | The U-NII device shall have the capability to operate with a mean EIRP value lower than 24dBm (250mW) | Complies |
| 15.407(h)(2) | Dynamic frequency Selection (device without radar detection) | Refer to separate test report, reference R96414 | Channel move time < 10s<br>Channel closing transmission time < 260ms | Complies |

*GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS*

| FCC Rule Part | RSS Rule part | Description | Measured Value / Comments | Limit / Requirement | Result (margin) |
|---|---|---|---|---|---|
| 15.203 | | RF Connector | Antenna is integral | Unique or integral antenna required | Complies |
| 15.207 | | AC Conducted Emissions | 60.0 dBµV @ 0.151 MHz (-5.9 dB) | Refer to page 19 | Complies |
| 15.109 | | Receiver spurious emissions | N/A – receiver tunes above 960MHz | | |
| 15.407(f) | | RF Exposure Requirements | Refer to MPE calculations in separate exhibit, RSS 102 declaration and User Manual statements. | Refer to OET 65, FCC Part 1 and RSS 102 | Complies |

*MEASUREMENT UNCERTAINTIES*

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

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

## EQUIPMENT UNDER TEST (EUT) DETAILS

### GENERAL

The Vivint Wireless model SR1420 is a 5GHz 802.11 4x4 client device. The EUT would normally be pole or wall mounted. For testing, it was placed on a tabletop. The EUT is powered via POE connection.

The sample was received on August 5, 2014 and tested on August 20, September 8, 10, 11, 12 and 15, 2014. The EUT consisted of the following component(s):

| Company | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Vivint Wireless | 1420 | 5GHz 802.11 4x4 radio | C7105S1140200BT | 2AAAS-CE02 |

### OTHER EUT DETAILS

The following EUT details should be noted:
5GHz only, all bands (new rules)
40MHz only, with MCS8 (2 spatial streams) minimum data rates
4x4 operation only
Non-point-to-point
Beamforming (2 pairs) supported
Antenna: 6dBi panel
Outdoor Use
Client Device

### ANTENNA SYSTEM

The antenna system consists of 4 element panel antenna integral to the device.

### ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 31.5 cm wide by 10 cm deep by 31.5 cm high.

### MODIFICATIONS

The following modification was made to the EUT during the time the product was at National Technical Systems - Silicon Valley:

1. For radiated emissions, FerriShield (www.leadertechinc.com) - cable clamp TC28B0617; placed on the etherent cable between external port and internal pcb

Modification made to comply with 15B requirements. Present during all testing.

*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 |
|---|---|---|---|---|
| - | PSE802G | POE Injector | - | - |
| Acer | Aspire 5735 | Laptop Computer | LXAU59X265903089 BE2000 | - |

*EUT INTERFACE PORTS*

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

| Port | Connected To | Cable(s) | | |
|---|---|---|---|---|
| | | Description | Shielded or Unshielded | Length(m) |
| POE | POE Injector | CAT5 | Unshielded | |
| USB | Not Connected | - | - | - |

Additional on Support Equipment

| Port | Connected To | Cable(s) | | |
|---|---|---|---|---|
| | | Description | Shielded or Unshielded | Length(m) |
| POE Injector | Laptop | CAT5 | Unshielded | |

*EUT OPERATION*

During emissions testing the EUT was configured to continuously transmit at the noted channel and power level. All transmissions were 4Tx with beamforming active.

## 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 | Designation / Registration Numbers | | Location |
|---|---|---|---|
| | FCC | Canada | |
| Chamber 4 | US0027 | 2845B-4 | 41039 Boyce Road<br>Fremont,<br>CA 94538-2435 |
| Chamber 5 | US0027 | 2845B-5 | |

ANSI C63.4 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.

### CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.10. 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 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

## 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 C63.10 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 as specified in ANSI C63.4. 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 C63.10, and the worst-case orientation is used for final measurements.

### CONDUCTED EMISSIONS

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

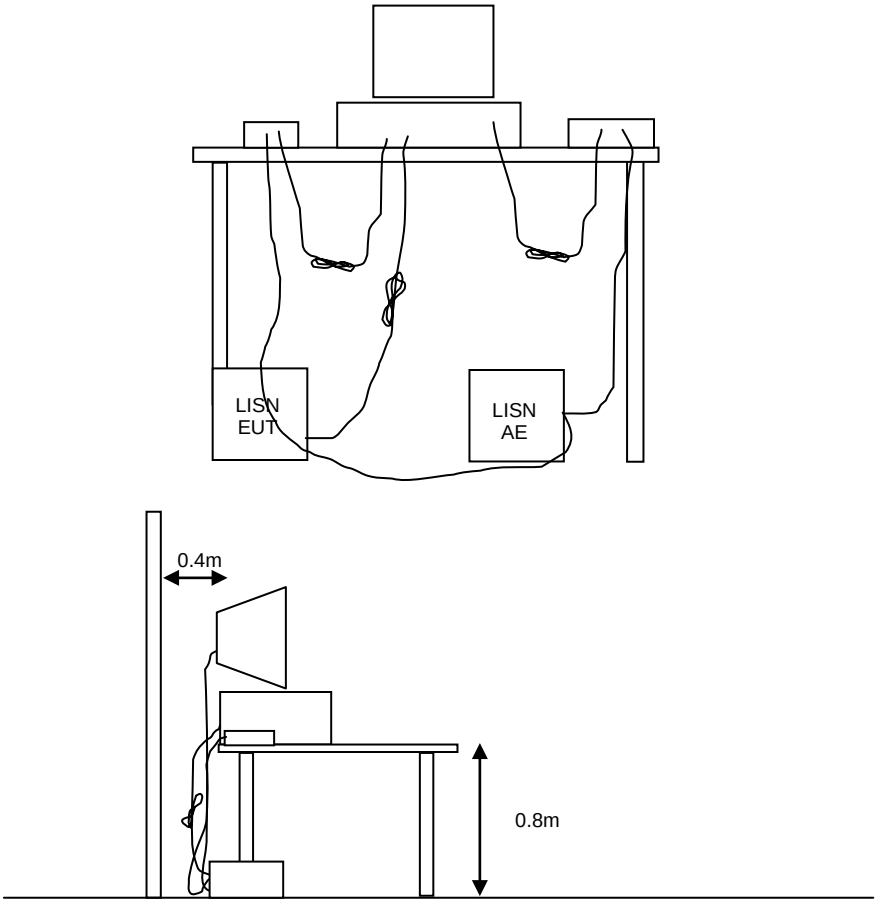



**Figure 1 Typical Conducted Emissions Test Configuration**

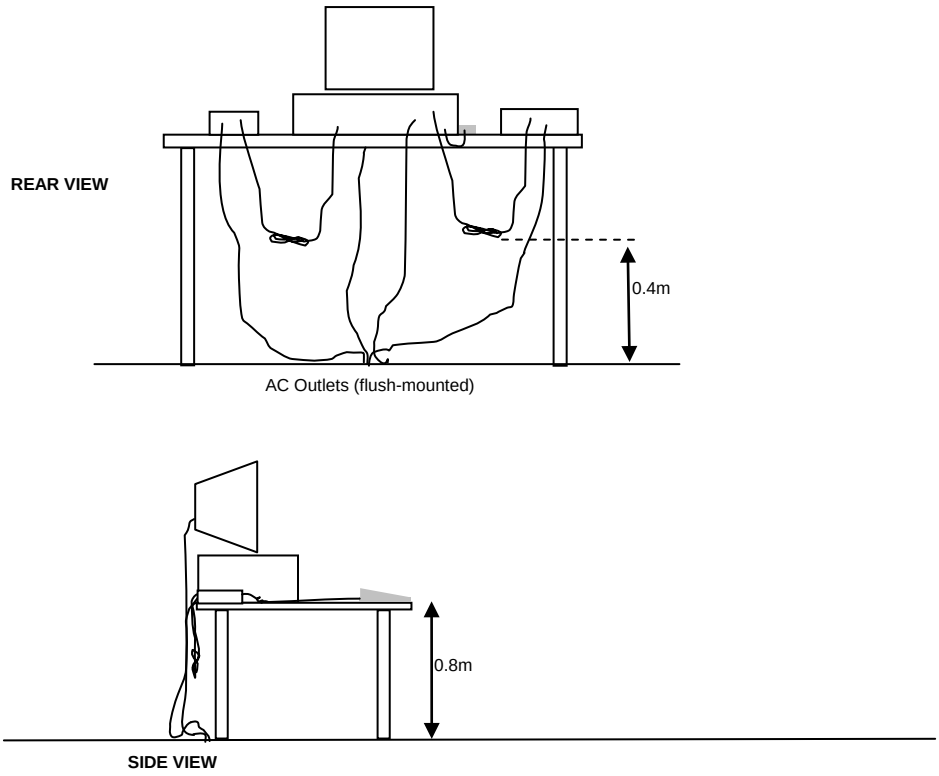
*RADIATED EMISSIONS*

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

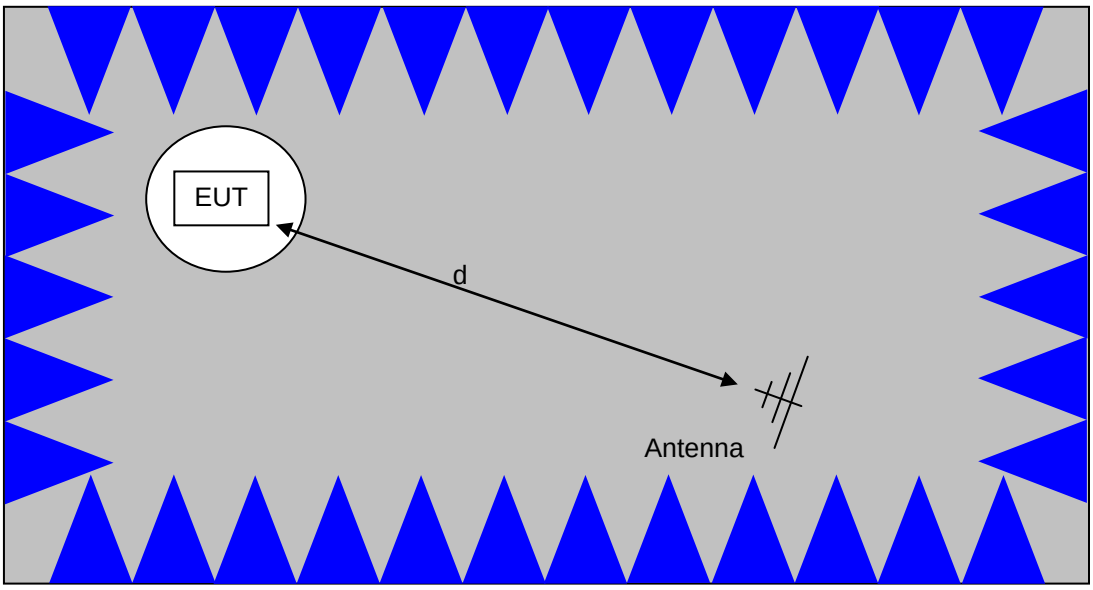
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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

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

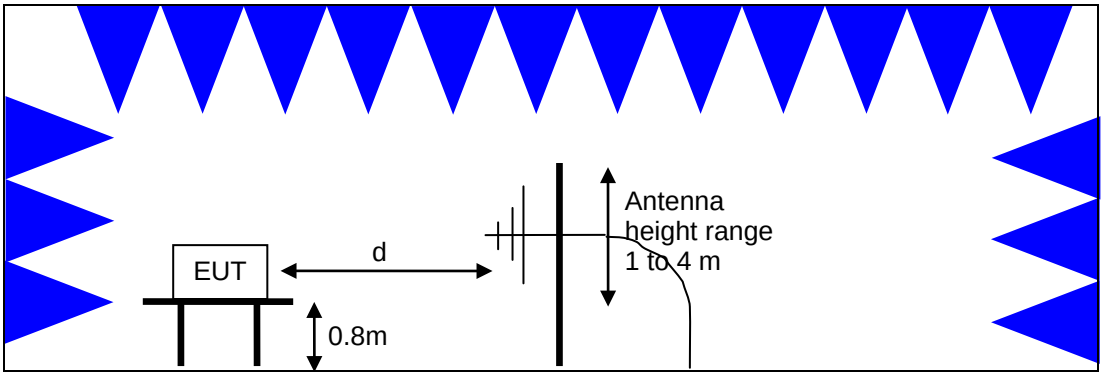



Typical Test Configuration for Radiated Field Strength Measurements




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

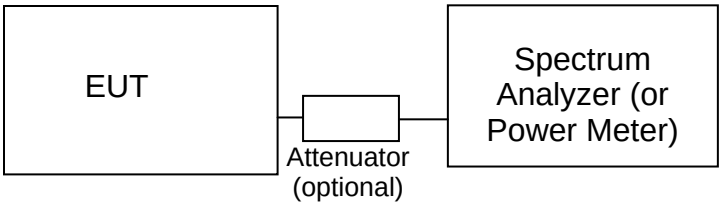
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.




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

*CONDUCTED EMISSIONS FROM ANTENNA PORT*

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




Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and NTS Silicon Valley'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, 26dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10 and RSS GEN.

*SPECIFICATION LIMITS AND SAMPLE CALCULATIONS*

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

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

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

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

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

*GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS*

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

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

*FCC 15.407 (a) OUTPUT POWER LIMITS*

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

| Operating Frequency (MHz) | Output Power | Power Spectral Density |
|---|---|---|
| 5150 – 5250 (client devices) | 250 mW (24 dBm) | 11 dBm/MHz |
| 5250 – 5350 | 250 mW (24 dBm) | 11 dBm/MHz |
| 5725 – 5825 | 1 Watts (30 dBm) | 17 dBm/MHz |

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

The peak excursion envelope is limited to 13dB.

*SPURIOUS EMISSIONS LIMITS –UNII and LELAN DEVICES*

The spurious emissions limits for signals below 1GHz are the FCC/RSS-GEN general limits. For emissions above 1GHz, signals in restricted bands are subject to the FCC/RSS GEN general limits. All other signals have a limit of –27dBm/MHz, which is a field strength of 68.3dBuV/m/MHz at a distance of 3m. For devices operating in the 5725-5850Mhz bands under the LELAN/UNII rules, the limit within 10MHz of the allocated band is increased to –17dBm/MHz.

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

### SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - S = M$$

where:

$R_r$ = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

### SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

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

where:

$F_d$ = Distance Factor in dB

$D_m$ = Measurement Distance in meters

$D_s$ = Specification Distance in meters

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

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$R_r$ = Receiver Reading in dBuV/m

$F_d$ = Distance Factor in dB

$R_C$ = Corrected Reading in dBuV/m

$L_S$ = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

*SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION*

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

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

where P is the eirp (Watts)

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

# Appendix A Test Equipment Calibration Data

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| **Conducted Emissions - AC Power Ports, 20-Aug-14** | | | | |
| EMCO | LISN, 10 kHz-100 MHz, 25A | 3825/2 | 1292 | 2/13/2015 |
| Rohde & Schwarz | Pulse Limiter | ESH3 Z2 | 1594 | 5/15/2015 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-7 GHz | ESIB7 | 1630 | 6/21/2015 |
| **Radiated Emissions, 1,000 - 12,000 MHz, 8, 10-Sep-14** | | | | |
| Hewlett Packard | Microwave Preamplifier, 1-26.5GHz | 8449B | 785 | 10/31/2014 |
| Hewlett Packard | SpecAn 30 Hz -40 GHz, SV (SA40) Red | 8564E (84125C) | 1148 | 9/14/2014 |
| Micro-Tronics | Band Reject Filter, 5150-5350 MHz | BRC50703-02 | 2239 | 9/18/2014 |
| Micro-Tronics | Band Reject Filter, 5470-5725 MHz | BRC50704-02 | 2240 | 9/18/2014 |
| Micro-Tronics | Band Reject Filter, 5725-5875 MHz | BRC50705-02 | 2241 | 9/18/2014 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-40 GHz | ESIB40 (1088.7490.40) | 2493 | 1/11/2015 |
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 2870 | 8/20/2015 |
| **Radiated Emissions, 1,000 - 12,000 MHz, 11-Sep-14** | | | | |
| Hewlett Packard | Microwave Preamplifier, 1-26.5GHz | 8449B | 785 | 10/31/2014 |
| Hewlett Packard | SpecAn 30 Hz -40 GHz, SV (SA40) Red | 8564E (84125C) | 1148 | 9/14/2014 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-7 GHz | ESIB7 | 1630 | 6/21/2015 |
| Micro-Tronics | Band Reject Filter, 5150-5350 MHz | BRC50703-02 | 2239 | 9/18/2014 |
| Micro-Tronics | Band Reject Filter, 5470-5725 MHz | BRC50704-02 | 2240 | 9/18/2014 |
| Micro-Tronics | Band Reject Filter, 5725-5875 MHz | BRC50705-02 | 2241 | 9/18/2014 |
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 2870 | 8/20/2015 |
| **Radio Antenna Port (Power and Spurious Emissions), 12-Sep-14** | | | | |
| Agilent Technologies | PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX, | E4446A | 2139 | 4/8/2015 |
| **Radio Antenna Port (Power and Spurious Emissions), 15-Sep-14** | | | | |
| Agilent Technologies | PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX, | E4446A | 2139 | 4/8/2015 |
| **Radiated Emissions, 30 - 1,000 MHz, 15-Sep-14** | | | | |
| Sunol Sciences | Biconilog, 30-3000 MHz | JB3 | 1549 | 5/30/2015 |
| Com-Power | Preamplifier, 30-1000 MHz | PA-103 | 1632 | 7/6/2015 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-40 GHz | ESIB40 (1088.7490.40) | 2493 | 1/11/2015 |

# *Appendix B Test Data*

T95948 Pages 25 - 70

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Product | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Emissions Standard(s): | FCC 15.B / 15.407 (New Rules) | Class: | B |
| Immunity Standard(s): | - | Environment: | - |

# EMC Test Data

For The

# Vivint Wireless

Product

SR1420 (4x4 5GHz 802.11 Client)

Date of Last Test: 9/29/2014

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

# RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

## Test Specific Details

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

## General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

## Ambient Conditions:

Temperature: 24 °C
Rel. Humidity: 38 %

## Modifications Made During Testing

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

## Summary of Results

| Run # | Mode | Channel | Target Power Setting | Passing Power Setting | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| 1 | n40 | 38 - 5190MHz | 21 | 15 | Restricted Band Edge at 5150 MHz | 15.209 | 53.7 dBµV/m @ 5149.8 MHz (-0.3 dB) |
| | n40 | 46 - 5230MHz | 21 | 21 | Restricted Band Edge at 5150 MHz | 15.209 | 51.3 dBµV/m @ 5150.0 MHz (-2.7 dB) |
| | n40 | 54 - 5270MHz | 21 | 21 | Restricted Band Edge at 5350 MHz | 15.209 | 47.8 dBµV/m @ 5430.0 MHz (-6.2 dB) |
| | n40 | 62 - 5310MHz | 21 | 15 | Restricted Band Edge at 5350 MHz | 15.209 | 52.2 dBµV/m @ 5350.0 MHz (-1.8 dB) |
| 2 | n40 | 102 - 5510MHz | 21 | 14 | Restricted Band Edge at 5460 MHz | 15.209 | 48.8 dBµV/m @ 5460.0 MHz (-5.2 dB) |
| | n40 | | | | Band Edge 5460 - 5470 MHz | 15E | 66.7 dBµV/m @ 5467.9 MHz (-1.6 dB) |
| | n40 | 110 - 5550MHz | 21 | 21 | Restricted Band Edge at 5460 MHz | 15.209 | 47.7 dBµV/m @ 5458.9 MHz (-6.3 dB) |
| | n40 | | | | Band Edge 5460 - 5470 MHz | 15E | 65.1 dBµV/m @ 5465.5 MHz (-3.2 dB) |
| | n40 | 134 - 5670MHz | 21 | 19 | Band Edge 5725MHz | 15E | 66.5 dBµV/m @ 5725.6 MHz (-1.8 dB) |
| 3 | n40 | 151 - 5755MHz | 21 | 15 | Band Edge 5725MHz | 15E | 67.3 dBµV/m @ 5710.1 MHz (-1.0 dB) |
| | n40 | 159 - 5795MHz | 21 | 20 | Band Edge 5850MHz | 15E | 65.8 dBµV/m @ 5863.3 MHz (-2.5 dB) |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

| Mode | Data Rate | Duty Cycle (x) | Constant DC? | T (ms) | Pwr Cor Factor* | Lin Volt Cor Factor** | Min VBW for FS (Hz) |
|---|---|---|---|---|---|---|---|
| n40 | MCS8 | 0.90 | Yes | 2 | 0.4360509 | 0.8721018 | 500 |

## Sample Notes

Sample S/N: C7105S1140200BT with ferrite
Driver: 5.1.25
Antenna: 6dBi

## Procedure Comments:

Measurements performed in accordance with FCC KDB 789033
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

## Measurement Specific Notes:

| | |
|---|---|
| Note 1: | For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m) (or -17dBm/MHz eirp (78.3dBuV/m)). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector). Per KDB 789033 D02 G) 2) (c), compliance can be demonstrated by meeing the average and peak limits of 15.209, as an alternative. |
| Note 3: | Emission has duty cycle < 98%, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 * 1/DC traces, measurement corrected by Linear Voltage correction factor |
| Note 6: | Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabluar results for final measurements. |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

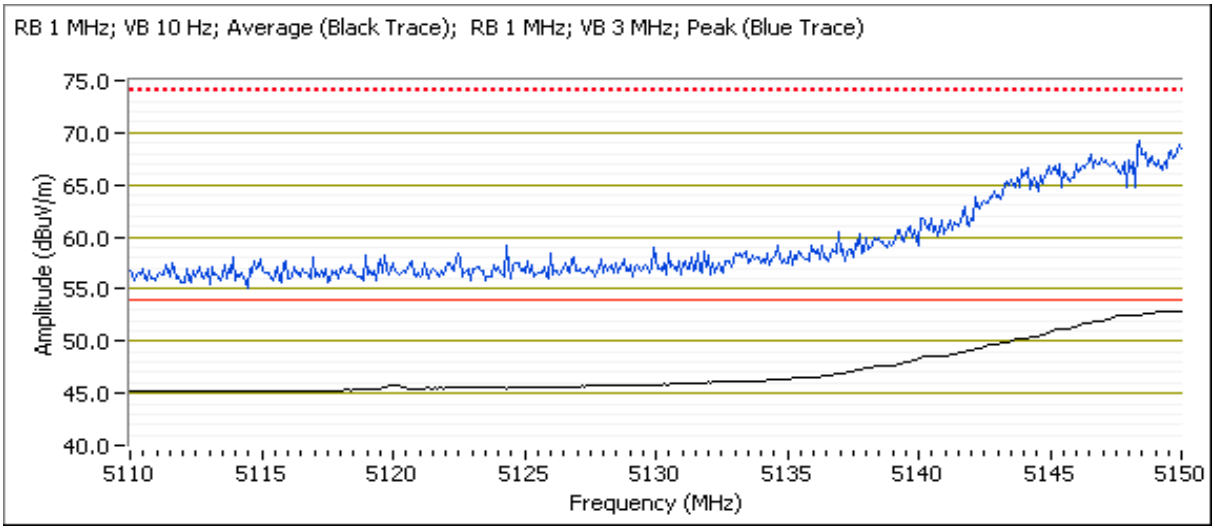
Run #1: Radiated Bandedge Measurements, 5150-5250MHz

Date of Test: 09/08/14 Config. Used: 1
Test Engineer: Mehran Birgani Config Change: Hight 1.6m
Test Location: FT Chamber# 5 EUT Voltage: POE

Channel: 38 - 5190 MHz Mode: n40 Power Setting: 15
Tx Chain: 4Tx Data Rate: 0

*5150 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5149.760 | 53.7 | V | 54.0 | -0.3 | AVG | 262 | 2.0 | Note 3, POS; RB 1 MHz; VB: 10 Hz |
| 5150.000 | 52.0 | H | 54.0 | -2.0 | AVG | 270 | 1.8 | Note 3, POS; RB 1 MHz; VB: 10 Hz |
| 5147.600 | 68.7 | V | 74.0 | -5.3 | PK | 262 | 2.0 | POS; RB 1 MHz; VB: 3 MHz |
| 5145.350 | 66.2 | H | 74.0 | -7.8 | PK | 270 | 1.8 | POS; RB 1 MHz; VB: 3 MHz |

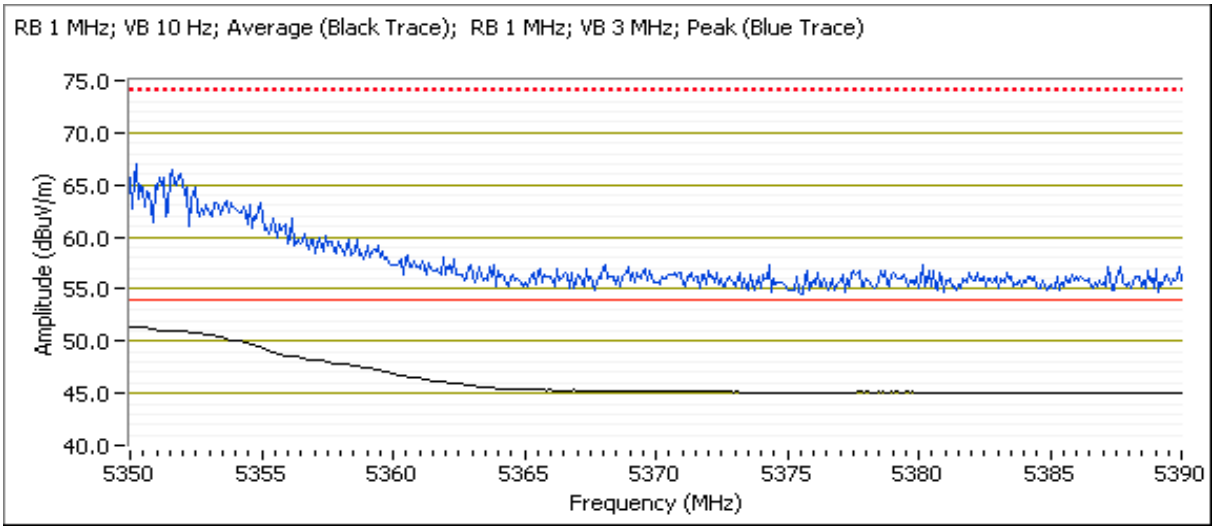


| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Channel: 62 - 5310MHz Mode: n40 Power Setting: 15
Tx Chain: 4Tx Data Rate: 0

*5350 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5350.000 | 52.2 | V | 54.0 | -1.8 | AVG | 264 | 1.9 | Note 3, POS; RB 1 MHz; VB: 10 Hz |
| 5350.000 | 49.6 | H | 54.0 | -4.4 | AVG | 272 | 1.7 | Note 3, POS; RB 1 MHz; VB: 10 Hz |
| 5350.080 | 66.3 | V | 74.0 | -7.7 | PK | 264 | 1.9 | POS; RB 1 MHz; VB: 3 MHz |
| 5352.400 | 62.5 | H | 74.0 | -11.5 | PK | 272 | 1.7 | POS; RB 1 MHz; VB: 3 MHz |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Date of Test: 09/11/14
Test Engineer: Jack Liu
Test Location: FT Chamber# 4

Config. Used: 1
Config Change: Hight 1.6m
EUT Voltage: POE

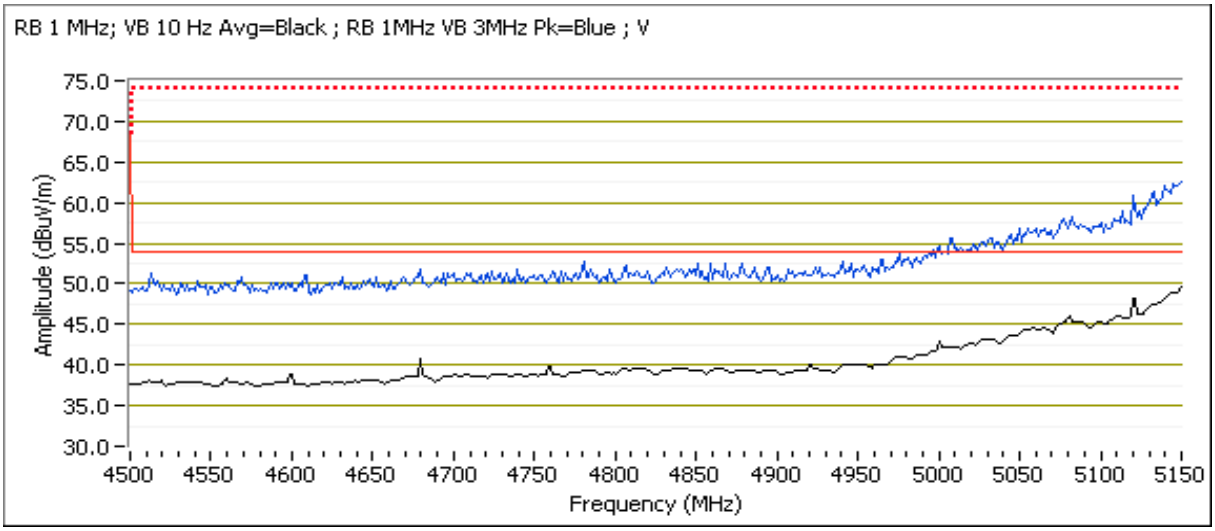
Channel: 46 - 5230 MHz
Tx Chain: 4Tx

Mode: n40
Data Rate: MCS8

Power Setting: 21

*5150 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5150.000 | 51.3 | V | 54.0 | -2.7 | AVG | 339 | 1.4 | Note3; POS; RB 1 MHz; VB: 10 Hz |
| 5149.840 | 64.4 | V | 74.0 | -9.6 | PK | 339 | 1.4 | POS; RB 1 MHz; VB: 3 MHz |
| 5150.000 | 48.4 | H | 54.0 | -5.6 | AVG | 346 | 1.7 | Note3; POS; RB 1 MHz; VB: 10 Hz |
| 5147.400 | 59.8 | H | 74.0 | -14.2 | PK | 346 | 1.7 | POS; RB 1 MHz; VB: 3 MHz |

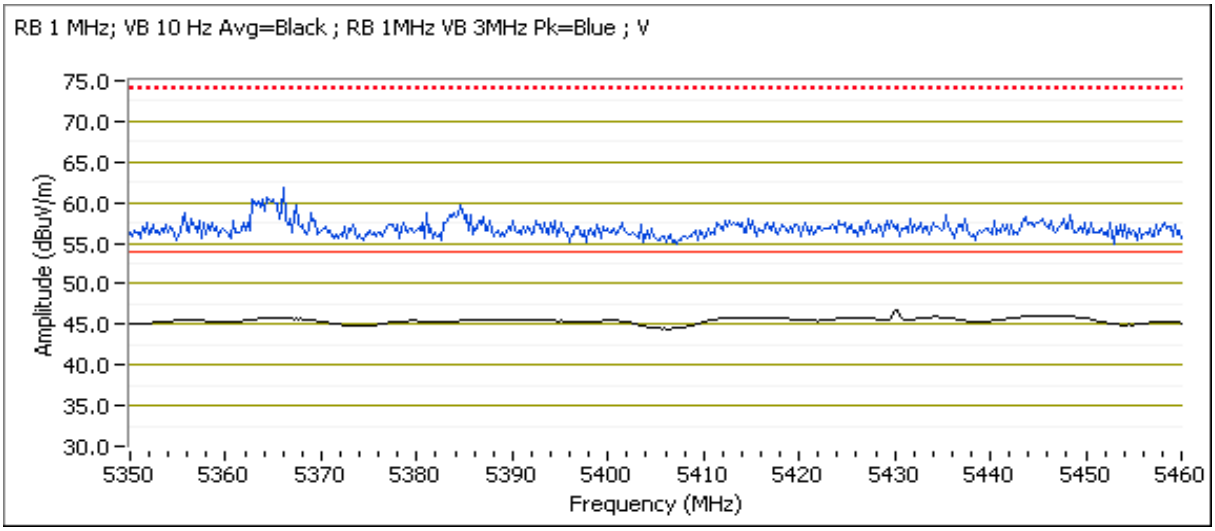


| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Channel: 54 - 5270MHz Mode: n40 Power Setting: 21
Tx Chain: 4Tx Data Rate: MCS8

*5350 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5430.020 | 47.8 | V | 54.0 | -6.2 | AVG | 0 | 1.6 | Note3; POS; RB 1 MHz; VB: 10 Hz |
| 5447.210 | 62.4 | V | 74.0 | -11.6 | PK | 0 | 1.6 | POS; RB 1 MHz; VB: 3 MHz |
| 5350.000 | 45.4 | H | 54.0 | -8.6 | AVG | 350 | 1.9 | Note3; POS; RB 1 MHz; VB: 10 Hz |
| 5414.150 | 56.9 | H | 74.0 | -17.1 | PK | 350 | 1.9 | POS; RB 1 MHz; VB: 3 MHz |



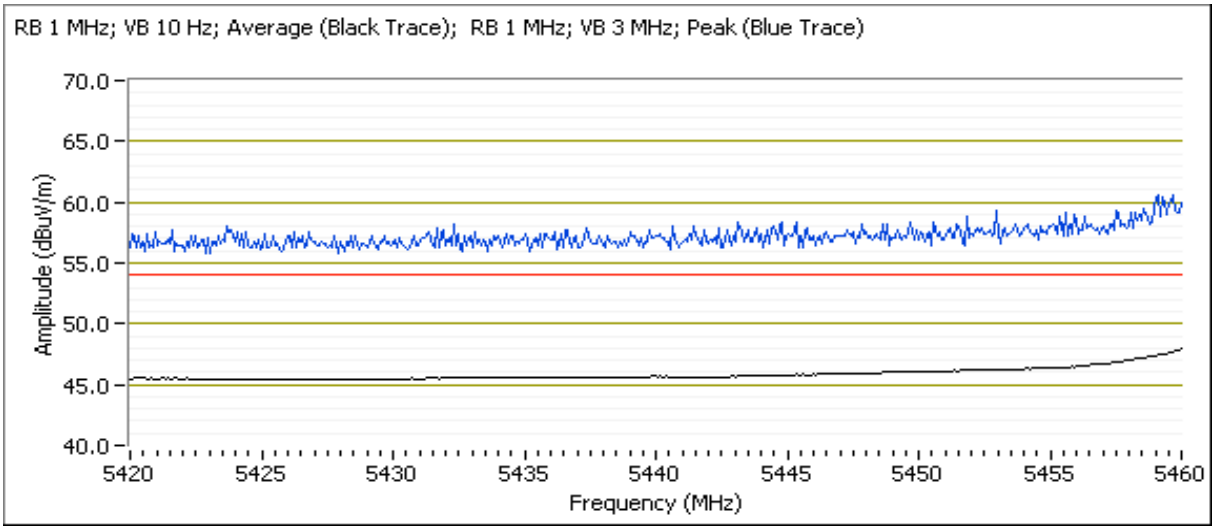
| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Run #2: Radiated Bandedge Measurements, 5470-5725MHz

Channel: 102 - 5510MHz Mode: n40 Power Setting: 14
Tx Chain: 4Tx Data Rate: MCS8

*5460 MHz Band Edge Signal Radiated Field Strength*

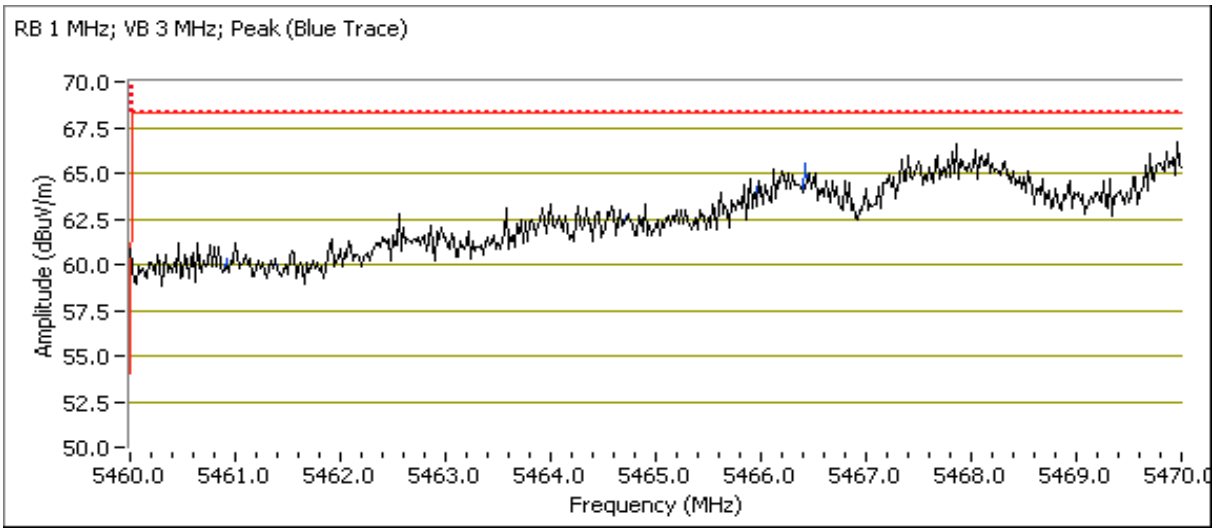
| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5460.000 | 48.8 | V | 54.0 | -5.2 | AVG | 264 | 1.9 | Note3, POS; RB 1 MHz; VB: 10 Hz |
| 5460.000 | 46.8 | H | 54.0 | -7.2 | AVG | 260 | 1.8 | Note3, POS; RB 1 MHz; VB: 10 Hz |
| 5451.740 | 60.6 | V | 74.0 | -13.4 | PK | 264 | 1.9 | POS; RB 1 MHz; VB: 3 MHz |
| 5444.690 | 58.1 | H | 74.0 | -15.9 | PK | 260 | 1.8 | POS; RB 1 MHz; VB: 3 MHz |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

*5470 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | 15.E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5467.920 | 66.7 | V | 68.3 | -1.6 | PK | 264 | 1.9 | |
| 5466.230 | 63.5 | H | 68.3 | -4.8 | PK | 260 | 1.8 | |

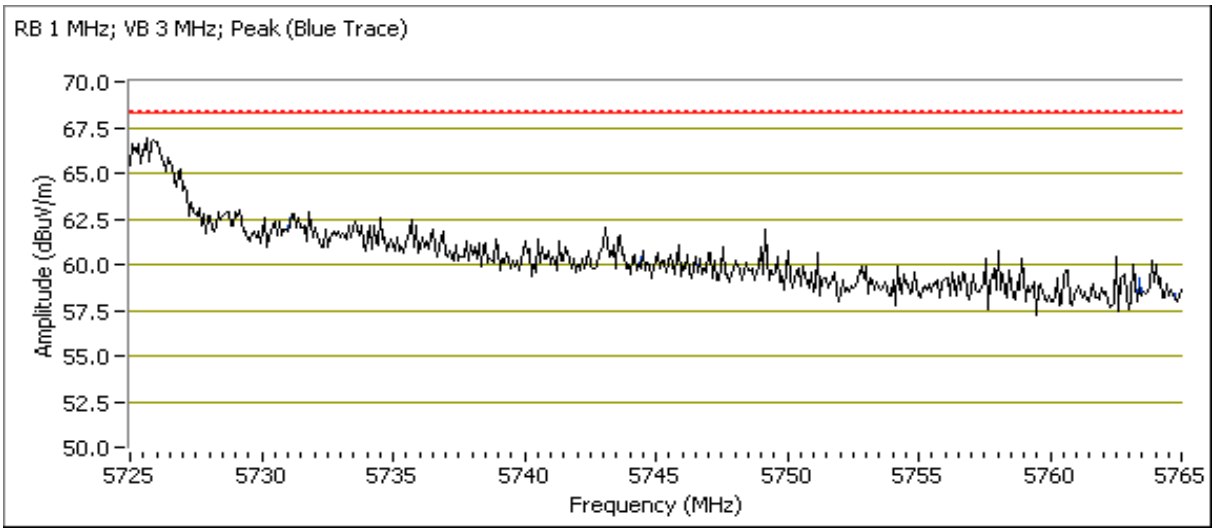


| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Channel: 134 - 5670MHz Mode: n40 Power Setting: 19
Tx Chain: 4Tx Data Rate: MCS8

*5725 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | 15.E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5725.560 | 66.5 | V | 68.3 | -1.8 | PK | 260 | 1.8 | POS; RB 1 MHz; VB: 3 MHz |
| 5726.680 | 61.6 | H | 68.3 | -6.7 | PK | 270 | 2.0 | POS; RB 1 MHz; VB: 3 MHz |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Date of Test: 09/11/14
Test Engineer: Jack Liu
Test Location: FT Chamber# 4

Config. Used: 1
Config Change: Hight 1.6m
EUT Voltage: POE

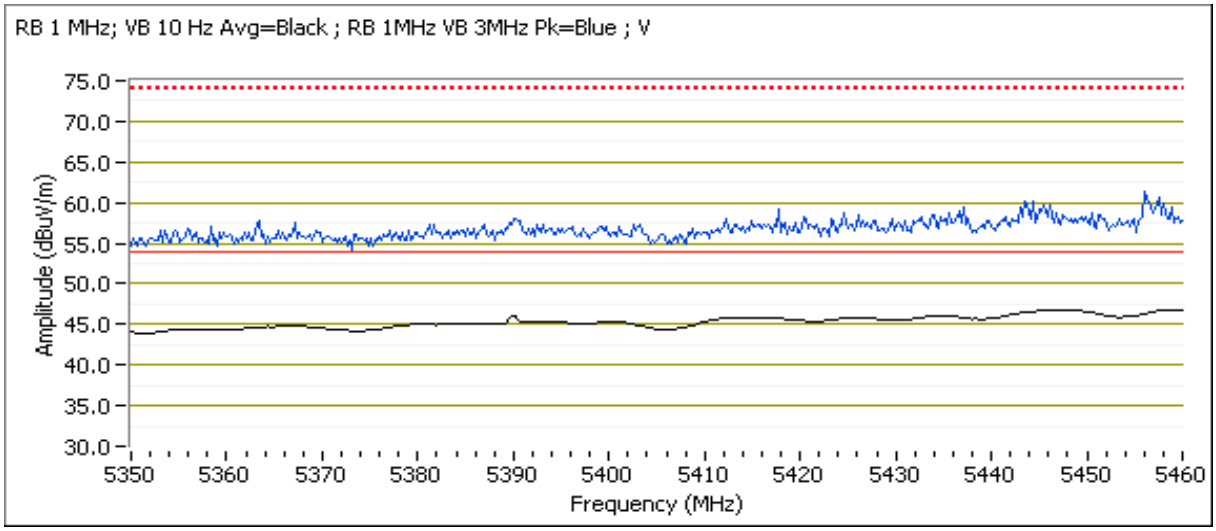
Channel: 110 - 5550MHz
Tx Chain: 4Tx

Mode: n40
Data Rate: MCS8

Power Setting: 21

*5460 MHz Band Edge Signal Radiated Field Strength*

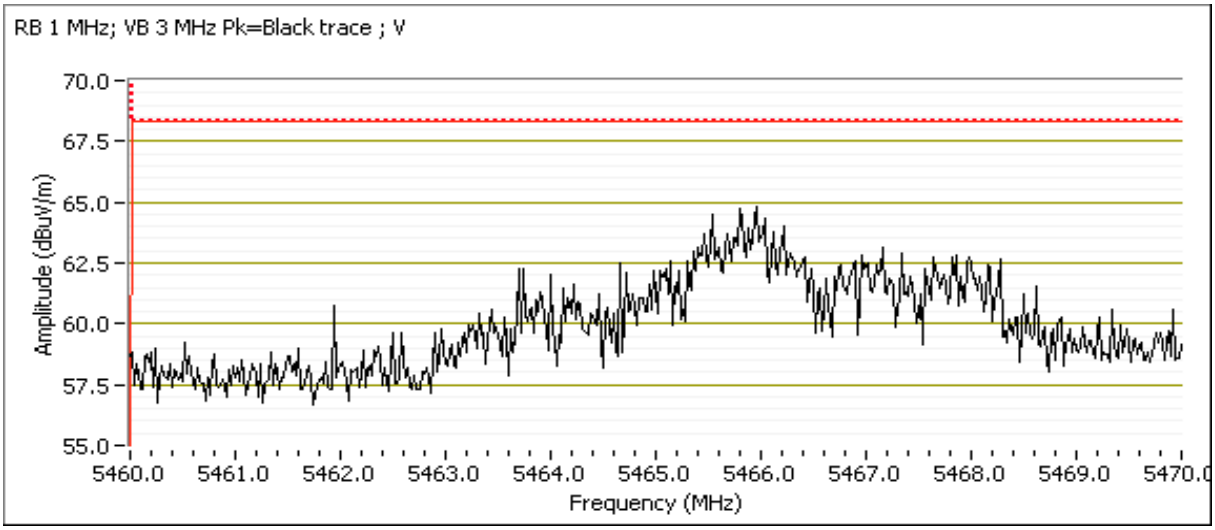
| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5458.900 | 47.7 | V | 54.0 | -6.3 | AVG | 354 | 1.7 | Note3; POS; RB 1 MHz; VB: 10 Hz |
| 5442.360 | 60.1 | V | 74.0 | -13.9 | PK | 354 | 1.7 | POS; RB 1 MHz; VB: 3 MHz |
| 5460.000 | 45.2 | H | 54.0 | -8.8 | AVG | 0 | 1.7 | Note3; POS; RB 1 MHz; VB: 10 Hz |
| 5459.340 | 59.5 | H | 74.0 | -14.5 | PK | 0 | 1.7 | POS; RB 1 MHz; VB: 3 MHz |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

*5470 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | 15.E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5465.510 | 65.1 | V | 68.3 | -3.2 | PK | 0 | 1.6 | POS; RB 1 MHz; VB: 3 MHz |
| 5468.960 | 60.5 | H | 68.3 | -7.8 | PK | 352 | 1.7 | POS; RB 1 MHz; VB: 3 MHz |



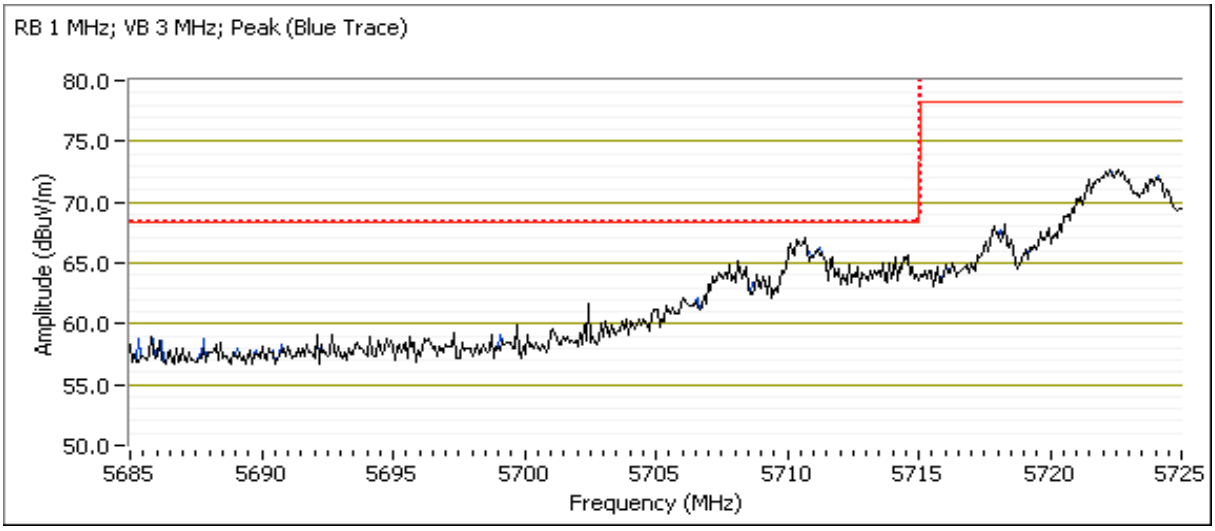
| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Run #3: Radiated Bandedge Measurements, 5725-5850MHz

Channel: 151 - 5755MHz Mode: n40 Power Setting: 15
Tx Chain: 4Tx Data Rate: MCS8

*5725 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | 15.E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5710.070 | 67.3 | V | 68.3 | -1.0 | PK | 264 | 1.5 | POS; RB 1 MHz; VB: 3 MHz |
| 5722.150 | 73.2 | V | 78.3 | -5.1 | PK | 264 | 1.5 | POS; RB 1 MHz; VB: 3 MHz |
| 5711.030 | 62.3 | H | 68.3 | -6.0 | PK | 268 | 1.9 | POS; RB 1 MHz; VB: 3 MHz |
| 5719.150 | 67.6 | H | 98.3 | -30.7 | PK | 268 | 1.9 | POS; RB 1 MHz; VB: 3 MHz |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Date of Test: 09/10/14
Test Engineer: Jack Liu
Test Location: FT Chamber# 5

Config. Used: 1
Config Change: Hight 1.6m
EUT Voltage: POE

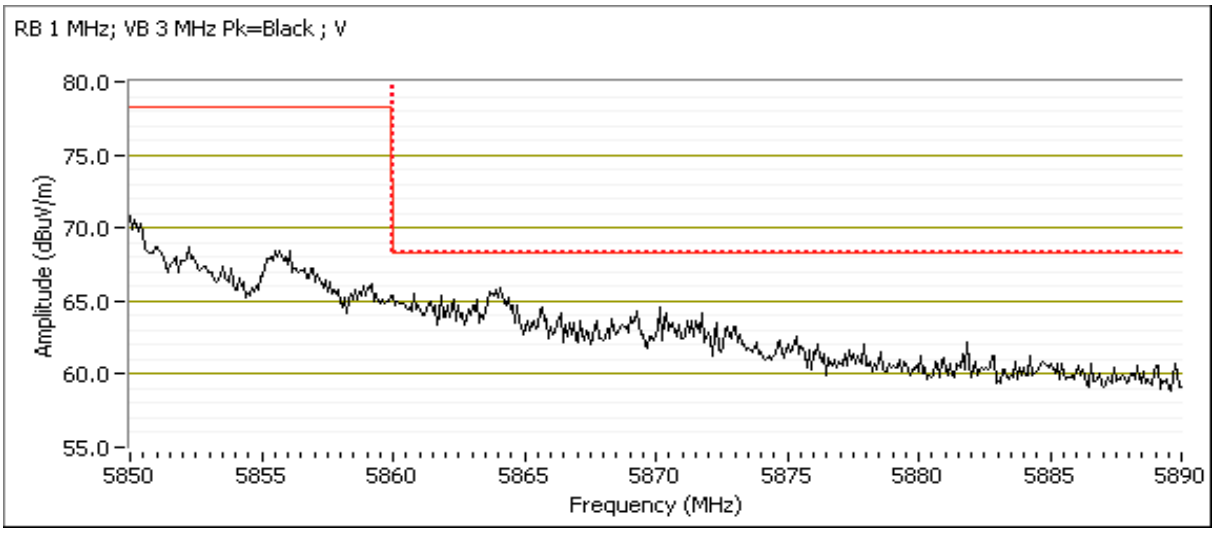
Channel: 159 - 5795MHz
Tx Chain: 4Tx

Mode: n40
Data Rate: MCS8

Power Setting: 20

*5850 MHz Band Edge Signal Radiated Field Strength*

| Frequency | Level | Pol | 15.E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5863.310 | 65.8 | V | 68.3 | -2.5 | PK | 0 | 1.5 | POS; RB 1 MHz; VB: 3 MHz |
| 5850.080 | 71.4 | V | 78.3 | -6.9 | PK | 0 | 1.5 | POS; RB 1 MHz; VB: 3 MHz |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

# RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

## Test Specific Details

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

## General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

## Ambient Conditions:

Temperature: 23 °C
Rel. Humidity: 40 %

## Summary of Results

| Run # | Mode | Channel | Target Power Setting | Passing Power Setting | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| 1 | n40 | 38 - 5190MHz | 21 | 21 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 64.7 dBµV/m @ 10380.7 MHz (-3.6 dB) |
| | n40 | 46 - 5230MHz | 21 | 21 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 67.1 dBµV/m @ 10467.1 MHz (-1.2 dB) |
| 2 | n40 | 54 - 5270MHz | 21 | 21 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 53.3 dBµV/m @ 5433.3 MHz (-0.7 dB) |
| | n40 | 62 - 5310MHz | 21 | 15 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 43.9 dBµV/m @ 1000.0 MHz (-10.1 dB) |
| 3 | n40 | 102 - 5510MHz | 21 | 14 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 48.2 dBµV/m @ 7346.7 MHz (-5.8 dB) |
| | n40 | 110 - 5510MHz | 21 | 21 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 50.6 dBµV/m @ 7400.0 MHz (-3.4 dB) |
| | n40 | 142- 5710MHz | 21 | 21 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 51.2 dBµV/m @ 11420.0 MHz (-2.8 dB) |
| 4 | n40 | 151 - 5755MHz | 21 | 15 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 48.3 dBµV/m @ 7673.4 MHz (-5.7 dB) |
| | n40 | 159 - 5795MHz | 21 | 21 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 49.8 dBµV/m @ 11588.4 MHz (-4.2 dB) |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | 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.

## Procedure Comments:

Measurements performed in accordance with FCC KDB 789033
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

| Mode | Data Rate | Duty Cycle (x) | Constant DC? | T (ms) | Pwr Cor Factor* | Lin Volt Cor Factor** | Min VBW for FS (Hz) |
|---|---|---|---|---|---|---|---|
| n40 | MCS8 | 0.90 | Yes | 2 | 0.4360509 | 0.8721018 | 500 |

## Sample Notes

Sample S/N: C7105S1140200BT with ferrite
Driver: 5.1.25
Antenna: 6dBi

## Measurement Specific Notes:

| | |
|---|---|
| Note 1: | For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector). Per KDB 789033 2) c) (i), compliance can be demonstrated by meeing the average and peak limits of 15.209, as an alternative. |
| Note 3: | Emission has duty cycle < 98%, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 * 1/DC traces, measurement corrected by Linear Voltage correction factor |
| Note 6: | Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabluar results for final measurements. |

## Notes:

Preliminary testing showed no radio related emissions below 1GHz.

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

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

Date of Test: 09/10/14 Config. Used: 1

Test Engineer: Jack Liu Config Change: Hight 1.6m

Test Location: FT Chamber# 5 EUT Voltage: POE

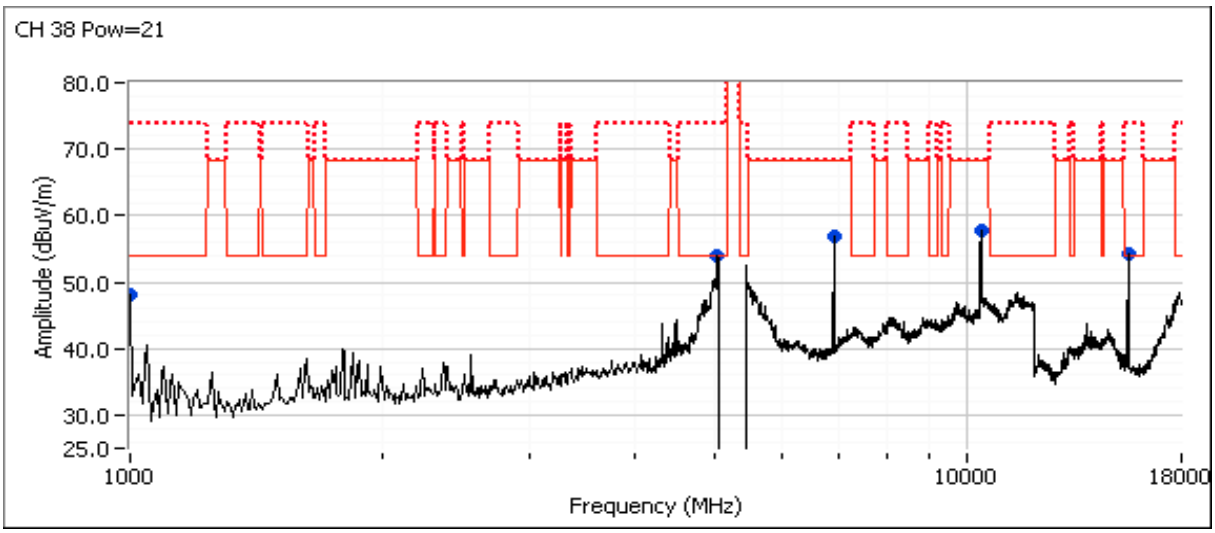
Run #1a:

Channel: 38 Mode: n40 Power Setting: 21

Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 10380.700 | 64.7 | H | 68.3 | -3.6 | PK | 202 | 1.6 | RB 1 MHz;VB 3 MHz;Peak |
| 5005.130 | 49.7 | V | 54.0 | -4.3 | AVG | 3 | 1.9 | RB 1 MHz;VB 10 Hz;Peak |
| 15570.200 | 49.0 | H | 54.0 | -5.0 | AVG | 223 | 1.9 | Note 3;RB 1 MHz;VB 10 Hz;Peak |
| 1000.040 | 46.7 | H | 54.0 | -7.3 | AVG | 217 | 1.9 | RB 1 MHz;VB 10 Hz;Peak |
| 6920.100 | 59.2 | V | 68.3 | -9.1 | PK | 360 | 1.2 | RB 1 MHz;VB 3 MHz;Peak |
| 15565.370 | 63.1 | H | 74.0 | -10.9 | PK | 223 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |
| 5020.930 | 63.0 | V | 74.0 | -11.0 | PK | 3 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |
| 1000.000 | 50.2 | H | 74.0 | -23.8 | PK | 217 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

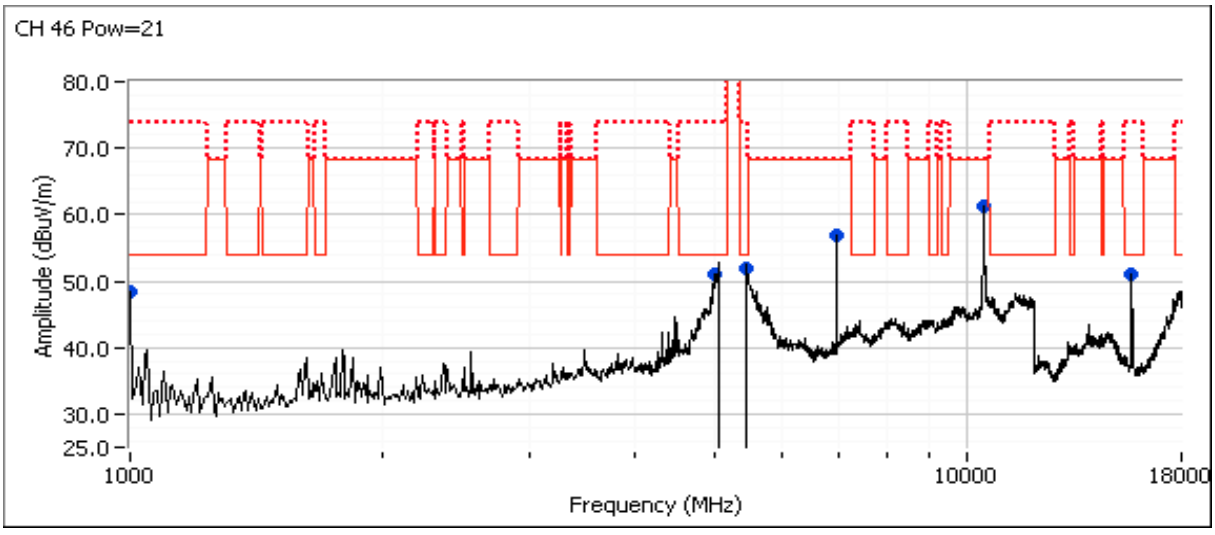
Run #1b:

Channel: 46 Mode: n40 Power Setting: 21

Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 10467.070 | 67.1 | H | 68.3 | -1.2 | PK | 168 | 2.5 | RB 1 MHz;VB 3 MHz;Peak |
| 15695.400 | 49.2 | H | 54.0 | -4.8 | AVG | 93 | 1.8 | RB 1 MHz;VB 10 Hz;Peak |
| 5430.020 | 47.8 | V | 54.0 | -6.2 | AVG | 0 | 1.6 | Note3; POS; RB 1 MHz; VB: 10 Hz |
| 1000.060 | 46.3 | H | 54.0 | -7.7 | AVG | 231 | 1.9 | RB 1 MHz;VB 10 Hz;Peak |
| 6973.320 | 59.9 | V | 68.3 | -8.4 | PK | 8 | 1.1 | RB 1 MHz;VB 3 MHz;Peak |
| 5447.210 | 62.4 | V | 74.0 | -11.6 | PK | 0 | 1.6 | POS; RB 1 MHz; VB: 3 MHz |
| 15675.470 | 59.5 | H | 74.0 | -14.5 | PK | 93 | 1.8 | RB 1 MHz;VB 3 MHz;Peak |
| 1000.030 | 50.5 | H | 74.0 | -23.5 | PK | 231 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Run #2, Radiated Spurious Emissions, 1,000 - 40,000 MHz. Operation in the 5250-5350 MHz Band

Date of Test: 09/10/14 Config. Used: 1

Test Engineer: M. Birgani Config Change: Hight 1.6m

Test Location: FT Chamber# 5 EUT Voltage: POE

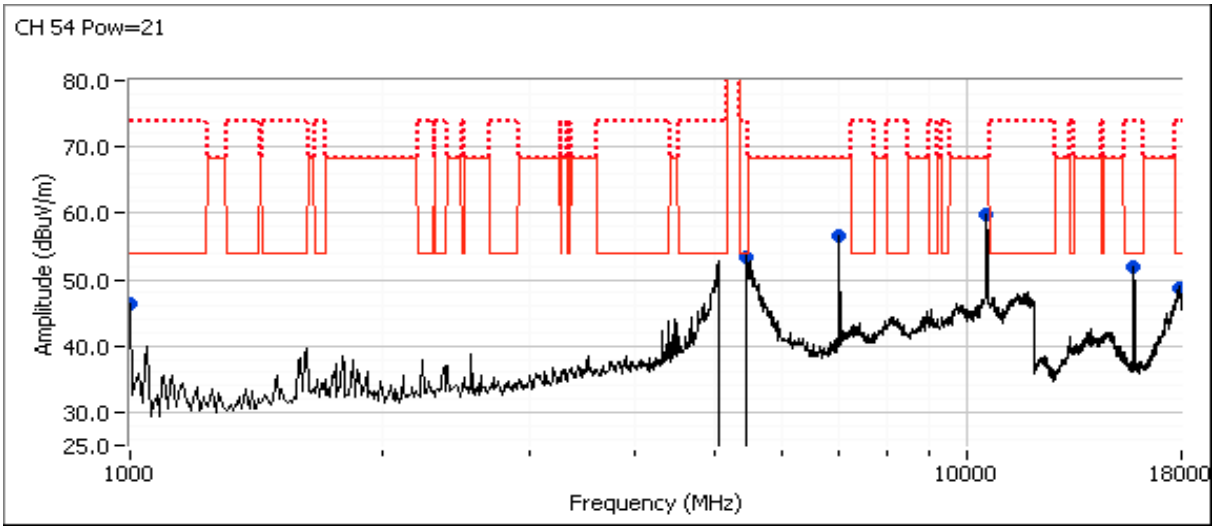
Run #2a:

Channel: 54 Mode: n40 Power Setting: 21

Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5433.330 | 53.3 | V | 54.0 | -0.7 | Peak | 5 | 1.6 | Done with BE measurment |
| 10542.270 | 66.8 | H | 68.3 | -1.5 | PK | 199 | 1.5 | RB 1 MHz;VB 3 MHz;Peak |
| 1000.060 | 46.5 | H | 54.0 | -7.5 | AVG | 241 | 2.0 | RB 1 MHz;VB 10 Hz;Peak |
| 15797.420 | 45.5 | H | 54.0 | -8.5 | AVG | 45 | 2.0 | Note 3;RB 1 MHz;VB 10 Hz;Peak |
| 7026.680 | 59.3 | V | 68.3 | -9.0 | PK | 10 | 1.3 | RB 1 MHz;VB 3 MHz;Peak |
| 15803.620 | 58.4 | H | 74.0 | -15.6 | PK | 45 | 2.0 | RB 1 MHz;VB 3 MHz;Peak |
| 1000.030 | 50.7 | H | 74.0 | -23.3 | PK | 241 | 2.0 | RB 1 MHz;VB 3 MHz;Peak |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

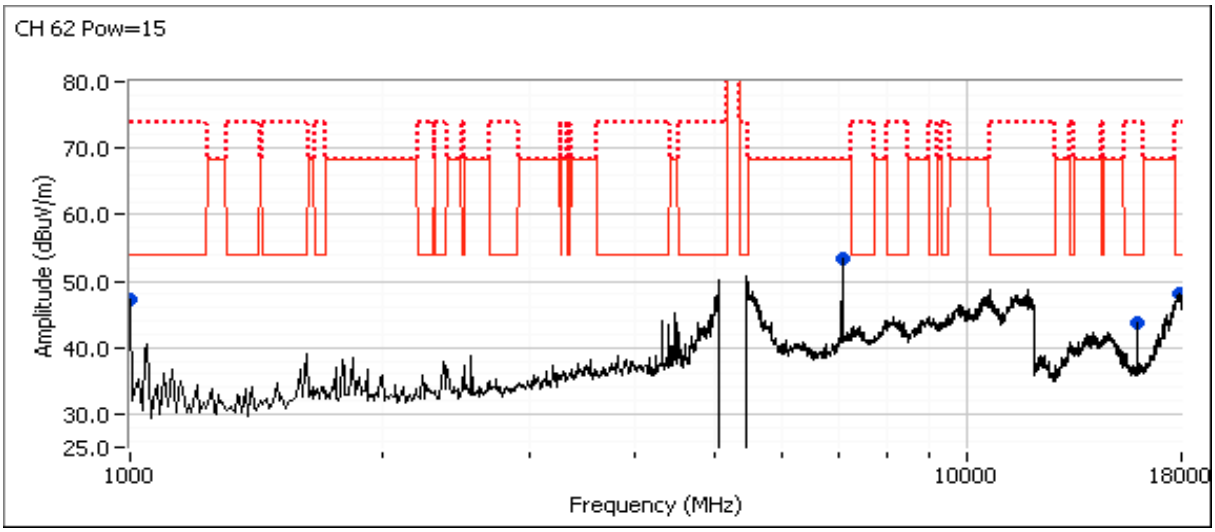
Run #2b:

Channel: 62 Mode: n40 Power Setting: 15

Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 1000.020 | 43.9 | H | 54.0 | -10.1 | AVG | 216 | 2.4 | RB 1 MHz;VB 10 Hz;Peak |
| 15930.000 | 43.7 | H | 54.0 | -10.3 | Peak | 191 | 1.9 | Peak reading w/ average limit |
| 7079.990 | 56.9 | V | 68.3 | -11.4 | PK | 11 | 1.3 | RB 1 MHz;VB 3 MHz;Peak |
| 1000.220 | 48.3 | H | 74.0 | -25.7 | PK | 216 | 2.4 | RB 1 MHz;VB 3 MHz;Peak |
| 17870.000 | 48.2 | V | 54.0 | -5.8 | Peak | 15 | 2.5 | Noise Floor |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Run #3, Radiated Spurious Emissions, 1,000 - 40,000 MHz. Operation in the 5470-5725 MHz Band

Date of Test: 09/10/14 Config. Used: 1

Test Engineer: M. Birgani Config Change: Hight 1.6m

Test Location: FT Chamber# 5 EUT Voltage: POE

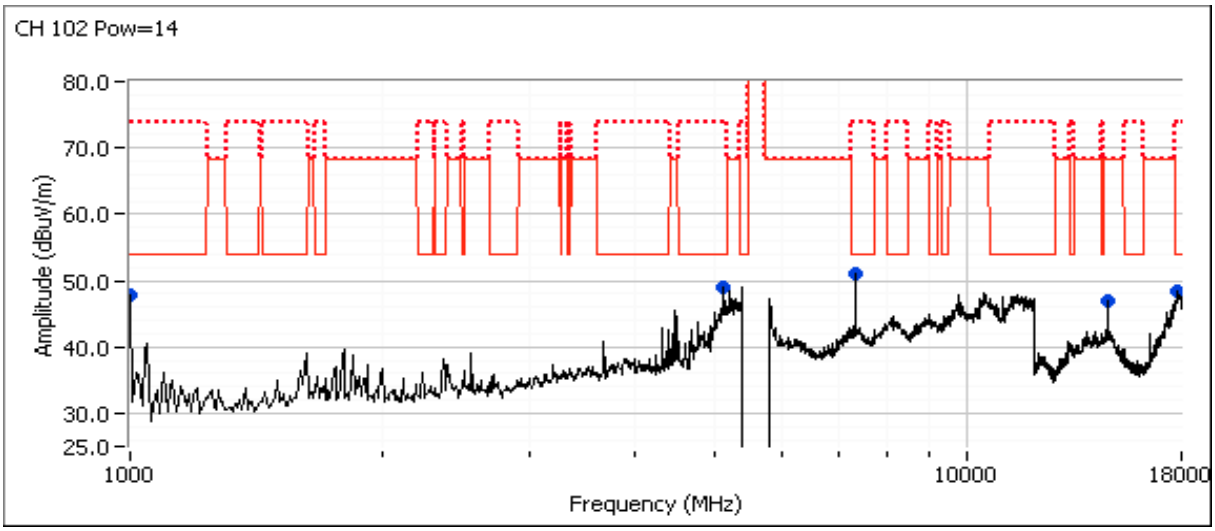
Run #3a:

Channel: 102 Mode: n40 Power Setting: 14

Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 7346.690 | 48.2 | H | 54.0 | -5.8 | AVG | 44 | 1.7 | RB 1 MHz;VB 10 Hz;Peak |
| 5120.140 | 46.9 | V | 54.0 | -7.1 | AVG | 360 | 1.7 | RB 1 MHz;VB 10 Hz;Peak |
| 1000.020 | 43.9 | H | 54.0 | -10.1 | AVG | 216 | 2.4 | RB 1 MHz;VB 10 Hz;Peak |
| 7347.000 | 55.3 | H | 74.0 | -18.7 | PK | 44 | 1.7 | RB 1 MHz;VB 3 MHz;Peak |
| 5119.800 | 55.3 | V | 74.0 | -18.7 | PK | 360 | 1.7 | RB 1 MHz;VB 3 MHz;Peak |
| 1000.220 | 48.3 | H | 74.0 | -25.7 | PK | 216 | 2.4 | RB 1 MHz;VB 3 MHz;Peak |
| 14690.000 | 46.8 | V | 68.3 | -21.5 | Peak | 159 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |
| 17790.000 | - | V | - | - | Peak | - | - | RB 1 MHz;VB 3 MHz;Peak |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |

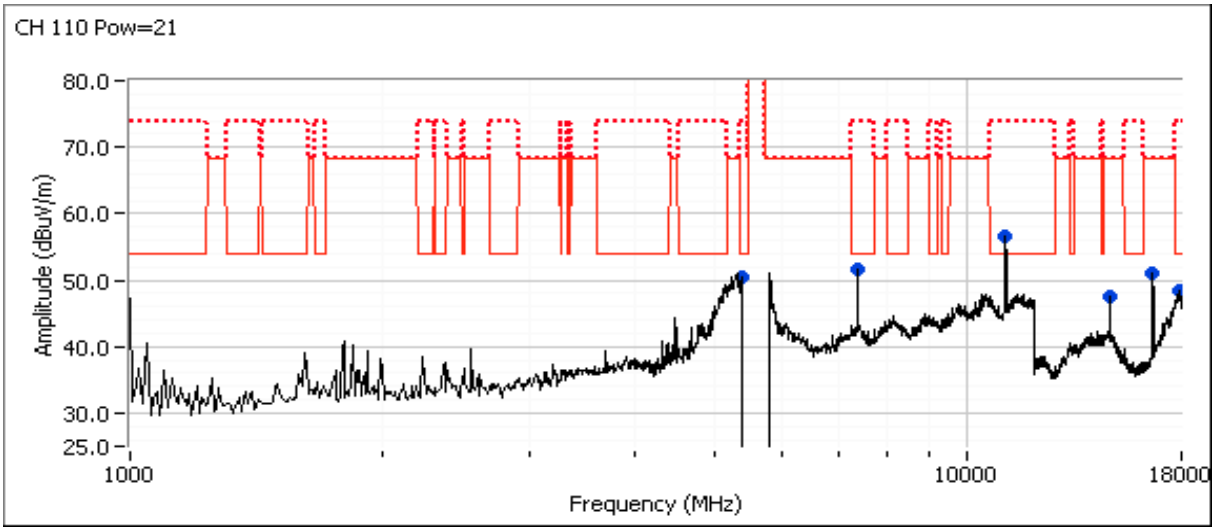


| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Run #3b:
Channel: 110 Mode: n40 Power Setting: 21
Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 7400.040 | 50.6 | V | 54.0 | -3.4 | AVG | 335 | 1.1 | RB 1 MHz;VB 10 Hz;Peak |
| 11099.000 | 50.2 | H | 54.0 | -3.8 | AVG | 210 | 1.2 | RB 1 MHz;VB 10 Hz;Peak |
| 11096.670 | 63.4 | H | 74.0 | -10.6 | PK | 210 | 1.2 | RB 1 MHz;VB 3 MHz;Peak |
| 7399.870 | 56.5 | V | 74.0 | -17.5 | PK | 335 | 1.1 | RB 1 MHz;VB 3 MHz;Peak |
| 16640.000 | 51.0 | H | 68.3 | -17.3 | Peak | 145 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |
| 14800.000 | 47.5 | H | 68.3 | -20.8 | Peak | 182 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |
| 17850.000 | - | V | - | - | Peak | - | - | Noise Floor |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

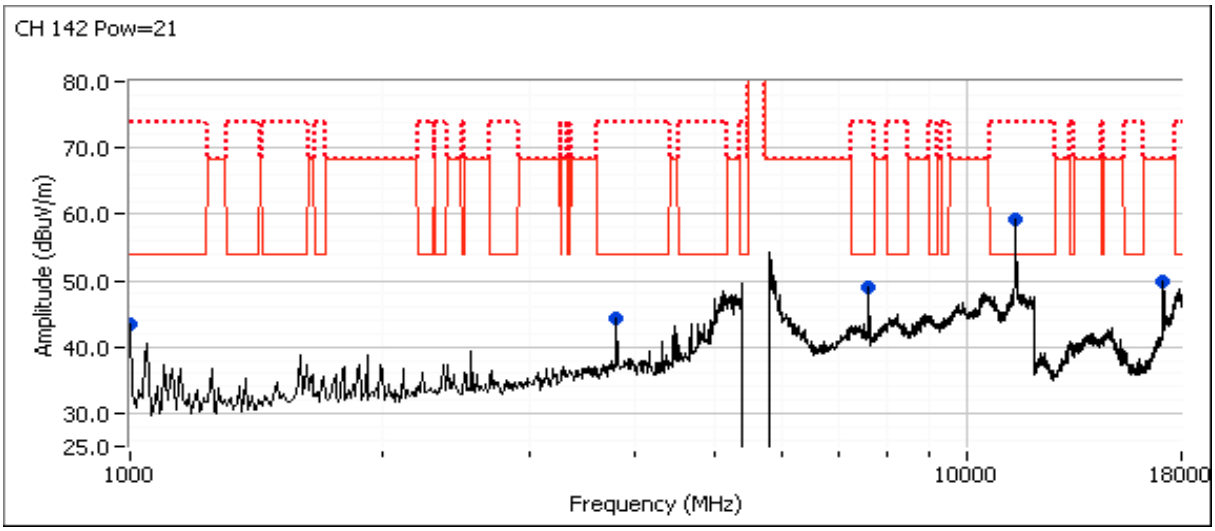
Run #3c:

Date of Test: 09/11/14 Config. Used: 1
Test Engineer: Jack Liu Config Change: Hight 1.6m
Test Location: FT Chamber# 5 EUT Voltage: POE

Channel: 142 Mode: n40 Power Setting: 21
Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 11420.000 | 51.2 | H | 54.0 | -2.8 | AVG | 202 | 1.6 | RB 1 MHz;VB 10 Hz;Peak |
| 7613.380 | 48.1 | V | 54.0 | -5.9 | AVG | 123 | 2.3 | RB 1 MHz;VB 10 Hz;Peak |
| 3806.630 | 44.2 | V | 54.0 | -9.8 | AVG | 307 | 2.3 | RB 1 MHz;VB 10 Hz;Peak |
| 11410.700 | 63.9 | H | 74.0 | -10.1 | PK | 202 | 1.6 | RB 1 MHz;VB 3 MHz;Peak |
| 1000.070 | 41.5 | H | 54.0 | -12.5 | AVG | 219 | 2.2 | RB 1 MHz;VB 10 Hz;Peak |
| 17110.000 | 50.0 | H | 68.3 | -18.3 | Peak | 206 | 1.6 | RB 1 MHz;VB 3 MHz;Peak |
| 7613.270 | 54.7 | V | 74.0 | -19.3 | PK | 123 | 2.3 | RB 1 MHz;VB 3 MHz;Peak |
| 3806.630 | 50.3 | V | 74.0 | -23.7 | PK | 307 | 2.3 | RB 1 MHz;VB 3 MHz;Peak |
| 999.930 | 46.6 | H | 74.0 | -27.4 | PK | 219 | 2.2 | RB 1 MHz;VB 3 MHz;Peak |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Run #4, Radiated Spurious Emissions, 1,000 - 40,000 MHz. Operation in the 5725-5850 MHz Band

Date of Test: 09/08/14 Config. Used: 1

Test Engineer: Mehran Birgani Config Change: Hight 1.6m

Test Location: FT Chamber# 5 EUT Voltage: POE

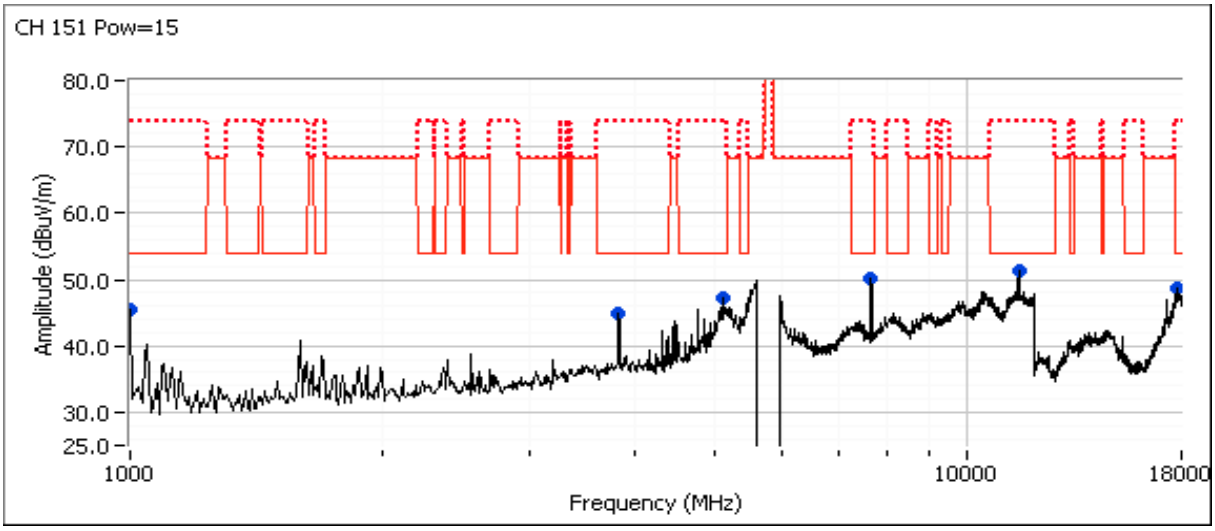
Run #4a:

Channel: 151 Mode: n40 Power Setting: 15

Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 7673.400 | 48.3 | V | 54.0 | -5.7 | AVG | 123 | 2.5 | RB 1 MHz;VB 10 Hz;Peak |
| 11509.980 | 47.2 | H | 54.0 | -6.8 | AVG | 193 | 1.8 | RB 1 MHz;VB 10 Hz;Peak |
| 1000.010 | 44.2 | H | 54.0 | -9.8 | AVG | 135 | 1.9 | RB 1 MHz;VB 10 Hz;Peak |
| 5120.000 | 43.7 | V | 54.0 | -10.3 | AVG | 262 | 1.7 | Note 3,RB 1 MHz;VB 10 Hz;Peak |
| 3836.700 | 40.9 | V | 54.0 | -13.1 | AVG | 266 | 1.7 | RB 1 MHz;VB 10 Hz;Peak |
| 11509.750 | 58.2 | H | 74.0 | -15.8 | PK | 193 | 1.8 | RB 1 MHz;VB 3 MHz;Peak |
| 7673.340 | 54.0 | V | 74.0 | -20.0 | PK | 123 | 2.5 | RB 1 MHz;VB 3 MHz;Peak |
| 5119.820 | 50.6 | V | 74.0 | -23.4 | PK | 262 | 1.7 | RB 1 MHz;VB 3 MHz;Peak |
| 1000.040 | 47.6 | H | 74.0 | -26.4 | PK | 135 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |
| 3836.740 | 45.6 | V | 74.0 | -28.4 | PK | 266 | 1.7 | RB 1 MHz;VB 3 MHz;Peak |
| 17810.000 | - | V | - | - | Peak | 100 | 1.3 | Noise Floor |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |

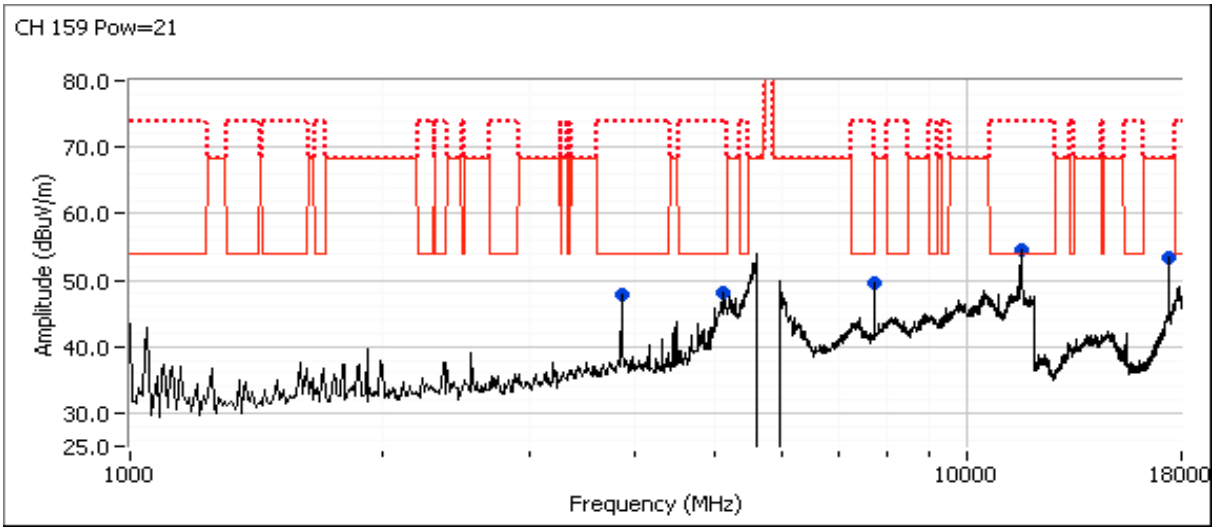


| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Run #4b:
Channel: 159 Mode: n40 Power Setting: 21
Tx Chain: 4Tx Data Rate: MCS8

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 11588.400 | 49.8 | H | 54.0 | -4.2 | AVG | 173 | 1.7 | RB 1 MHz;VB 10 Hz;Peak |
| 7726.690 | 49.5 | H | 54.0 | -4.5 | AVG | 130 | 1.4 | RB 1 MHz;VB 10 Hz;Peak |
| 5120.140 | 45.8 | V | 54.0 | -8.2 | AVG | 359 | 1.6 | RB 1 MHz;VB 10 Hz;Peak |
| 11590.470 | 63.4 | H | 74.0 | -10.6 | PK | 173 | 1.7 | RB 1 MHz;VB 3 MHz;Peak |
| 17390.000 | 53.3 | H | 68.3 | -15.0 | Peak | 159 | 1.9 | RB 1 MHz;VB 3 MHz;Peak |
| 5120.140 | 55.4 | V | 74.0 | -18.6 | PK | 359 | 1.6 | RB 1 MHz;VB 3 MHz;Peak |
| 7726.900 | 54.6 | H | 74.0 | -19.4 | PK | 130 | 1.4 | RB 1 MHz;VB 3 MHz;Peak |

| | |
|---|---|
| Note: | Scans made between 18 - 40 GHz 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 |
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements. |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

# RSS-210 (LELAN) and FCC 15.407(UNII)
# Antenna Port Measurements
## Power, PSD, Peak Excursion, Bandwidth and Spurious Emissions

### Test Specific Details

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

### General Test Configuration

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

### Ambient Conditions:

Temperature: 24 °C
Rel. Humidity: 40 %

### Modifications Made During Testing

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

## Summary of Results

| Run # | Test Performed | Limit | Pass / Fail | Result / Margin |
|---|---|---|---|---|
| 1 | Power, 5150 - 5250MHz | 15.407(a) (1) (iv) | Pass | n40: 19.7dBm (93.3mW) |
| 1 | PSD, 5150 - 5250MHz | 15.407(a) (1) (iv) | Pass | n40: 3.6dBm/MHz |
| 1 | Power, 5250 - 5350MHz | 15.407(a) (2) | Pass | n40: 20.9dBm (123.9mW) |
| 1 | PSD, 5250 - 5350MHz | 15.407(a) (2) | Pass | n40: 4.8dBm/MHz |
| 1 | Max EIRP 5250 - 5350MHz | TPC required if EIRP≥ 500mW (27dBm). EIRP ≥ 200mW (23dBm) DFS threshold = -64dBm. | Pass | EIRP = 29.9dBm (987mW) |
| 1 | Power, 5470 - 5725MHz | 15.407(a) (2) | Pass | n40: 20.9dBm (123.4mW) |
| 1 | PSD, 5470 - 5725MHz | 15.407(a) (2) | Pass | n40: 5.5dBm/MHz |
| 1 | Max EIRP 5470 - 5725MHz | TPC required if EIRP≥ 500mW (27dBm). EIRP ≥ 200mW (23dBm) DFS threshold | Pass | EIRP = 29.9dBm (982mW) |
| 1 | Power, 5725 - 5850MHz | 15.407(a) (3) | Pass | n40: 23.6dBm (228.7mW) |
| 1 | PSD, 5725 - 5850MHz | 15.407(a) (3) | Pass | n40: 7.5dBm/MHz |
| 1 | 26dB Bandwidth | 15.407 (Information only) | - | n40: 36.9MHz (min across all bands) |
| 2 | Minimum 6dB Bandwidth for UNII3 band | 15.407(e) | Pass | n40: 35.6MHz |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Note:

1. Antenna port number defined

Port JE09 -Test port 0 ; Port JE10 -Test port 1 ; Port JE11 -Test port 2 ; Port JE12 -Test port 3

2. All the measurements measured at the end of the internal cable

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

## Procedure Comments:

Measurements performed in accordance with FCC KDB 789033 D01 v01r03, dated April 8, 2013

| Mode | Data Rate | Duty Cycle (x) | Constant DC? | T (ms) | Pwr Cor Factor* | Lin Volt Cor Factor** | Min VBW for FS (Hz) |
|---|---|---|---|---|---|---|---|
| n40 | MCS8 | 0.90 | Yes | 2 | 0.4360509 | 0.8721018 | 500 |

## Sample Notes

Sample S/N: C7105S1140200BT
Driver: 5.1.25

Antenna Gain Information

| Freq | Antenna Gain (dBi) / Chain | | | | BF | MultiChain Legacy | CDD | Sectorized / Xpol | Dir G (PWR) | Dir G (PSD) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | | | | | | |
| 5150-5250 | 6 | 6 | 6 | 6 | Yes | No | Yes | No | 9.0 | 9.0 |
| 5250-5350 | 6 | 6 | 6 | 6 | Yes | No | Yes | No | 9.0 | 9.0 |
| 5470-5725 | 6 | 6 | 6 | 6 | Yes | No | Yes | No | 9.0 | 9.0 |
| 5725-5850 | 6 | 6 | 6 | 6 | Yes | No | Yes | No | 9.0 | 9.0 |

For devices that support CDD modes

Min # of spatial streams: 2 MCS8 is the lowest rate supported
Max # of spatial streams: 4

| | |
|---|---|
| Notes: | BF = beamforming mode supported, Multichain Legacy = 802.11 legacy data rates supported for multichain transmissions, CDD = Cyclic Delay Diversity (or Cyclic Shift Diversity) modes supported, Sectorized / Xpol = antennas are sectorized or cross polarized. |
| Notes: | Dir G (PWR) = total gain (Gant + Array Gain) for power calculations; GA (PSD) = total gain for PSD calculations based on FCC KDB 662911. Depending on the modes supported, the Array Gain value for power could be different from the PSD value. |
| Notes: | Array gain for power/psd calculated per KDB 662911 D01, v02r01. Spatial Multiplexing with Nant=4, Nss=2, for worse case condition. Array gain = 10*log(4/2) = 3dB. |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

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

| | |
|---|---|
| Note 1: | Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, # of points in sweep ≥ 2*span/RBW, Sample or RMS detector, power averaging on and power integration and adjusted for duty cycle. (method SA-2 of KDB 789033). |
| Note 2: | Measured using the same analyzer settings used for output power. |
| Note 4: | 99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB |
| Note 5: | For MIMO systems the total output power and total PSD are calculated form the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power. |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Date of Test: 09/12/14
Test Engineer: J. Liu, M. Birgani
Test Location: FT Lab 4A

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

MIMO Device - 5150-5250 MHz Band - FCC

Mode: n40

Max EIRP (mW): 743.26

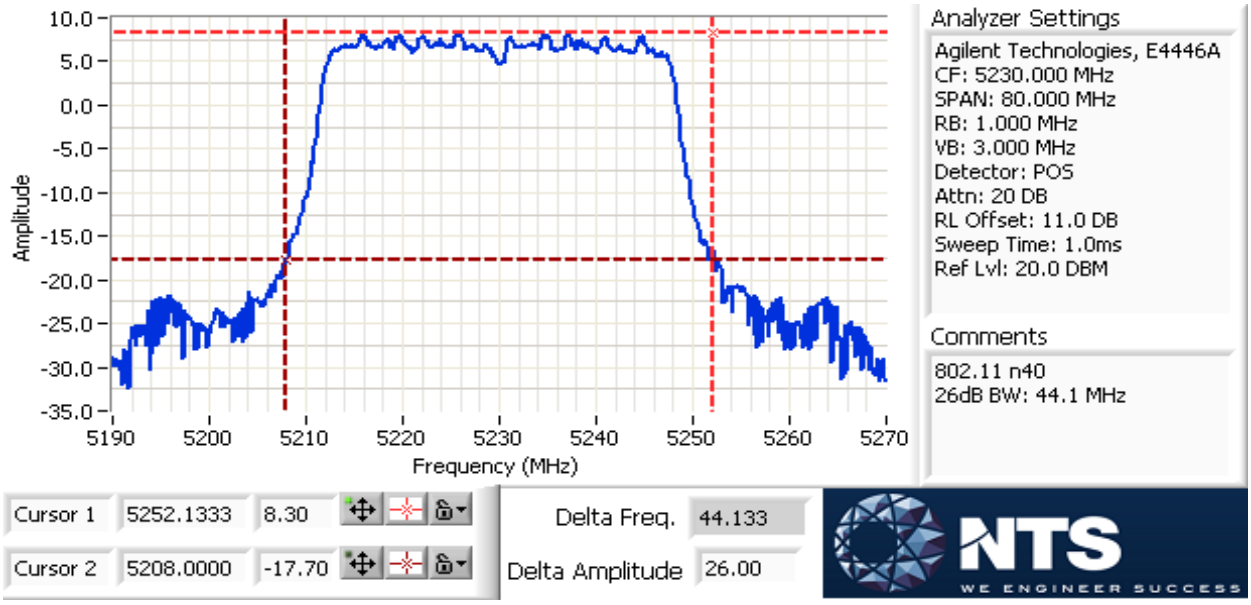
| Frequency (MHz) | Chain | Software Setting | 26dB BW (MHz) | Duty Cycle % | Power[1] dBm | Total Power mW | Total Power dBm | FCC Limit dBm | Max Power (W) | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 5190 | 0 | 15 | 43.1 | 90 | 13.6 | 93.3 | 19.7 | 21.0 | 0.093 | Pass |
| | 2 | | | | 13.3 | | | | | |
| | 3 | | | | 13.1 | | | | | |
| | 1 | | | | 12.8 | | | | | |
| 5230 | 0 | 16 | 44.1 | 90 | 14.1 | 92.7 | 19.7 | 21.0 | | Pass |
| | 2 | | | | 13.9 | | | | | |
| | 3 | | | | 13.9 | | | | | |
| | 1 | | | | 9.1 | | | | | |

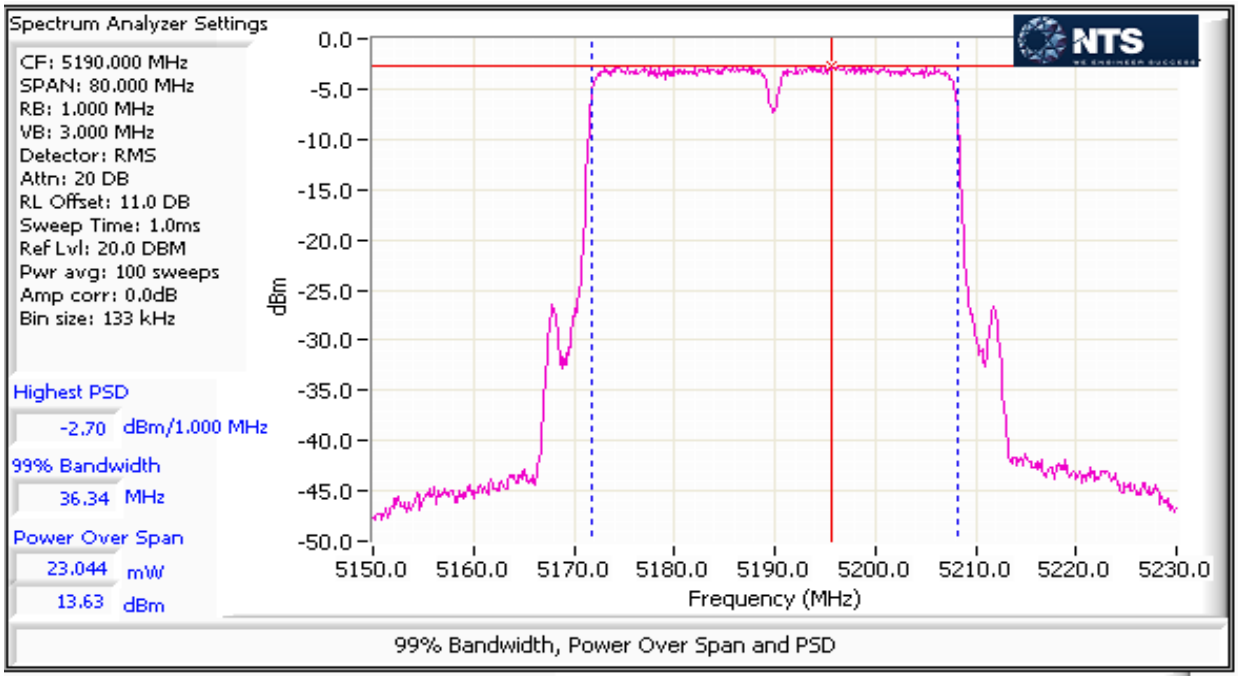
5150-5250 PSD - FCC

Mode: n40

| Frequency (MHz) | Chain | Software Setting | 99% BW (MHz) | Duty Cycle % | PSD dBm/MHz | Total PSD[1] mW/MHz | Total PSD[1] dBm/MHz | FCC Limit dBm/MHz | IC Limit dBm/MHz | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 5190 | 0 | 15 | 36.3 | 90 | -2.7 | 2.3 | 3.6 | 8.0 | - | Pass |
| | 2 | | | | -2.6 | | | | | |
| | 3 | | | | -3.2 | | | | | |
| | 1 | | | | -3.3 | | | | | |
| 5230 | 0 | 16 | 36.3 | 90 | -2.0 | 2.3 | 3.6 | 8.0 | - | Pass |
| | 2 | | | | -2.1 | | | | | |
| | 3 | | | | -2.1 | | | | | |
| | 1 | | | | -6.9 | | | | | |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Date of Test: 09/12/14 Config. Used: 1
Test Engineer: M. Birgani Config Change: None
Test Location: FT Lab 4A EUT Voltage: PoE

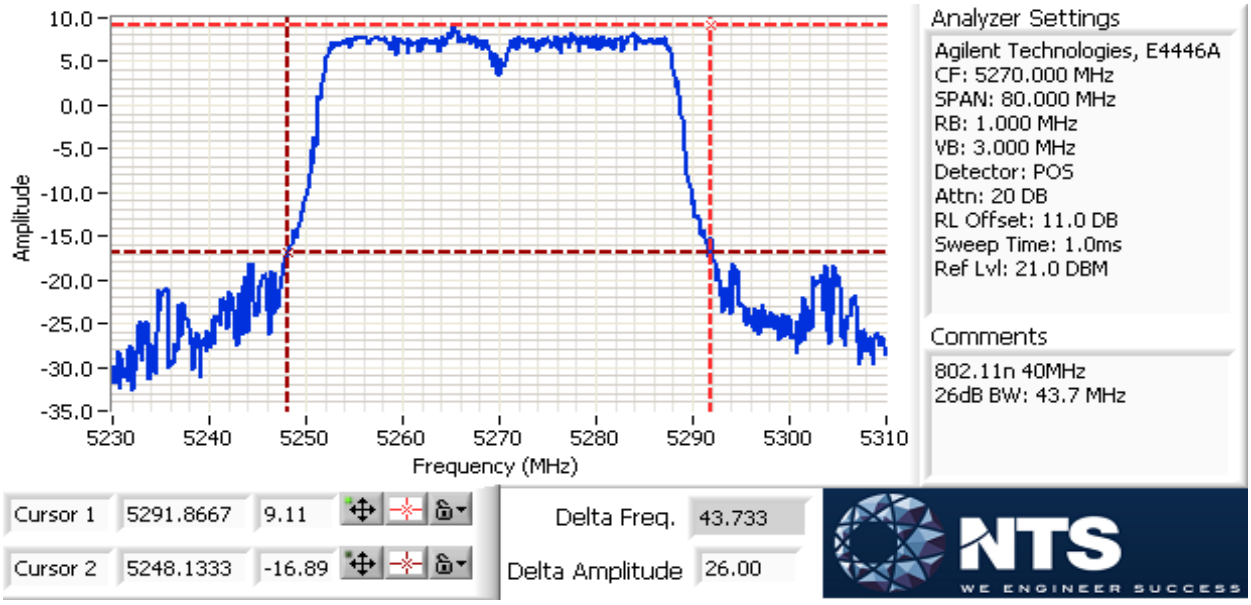
MIMO Device - 5250-5350 MHz Band - FCC
Mode: n40 Max EIRP (mW): 986.9

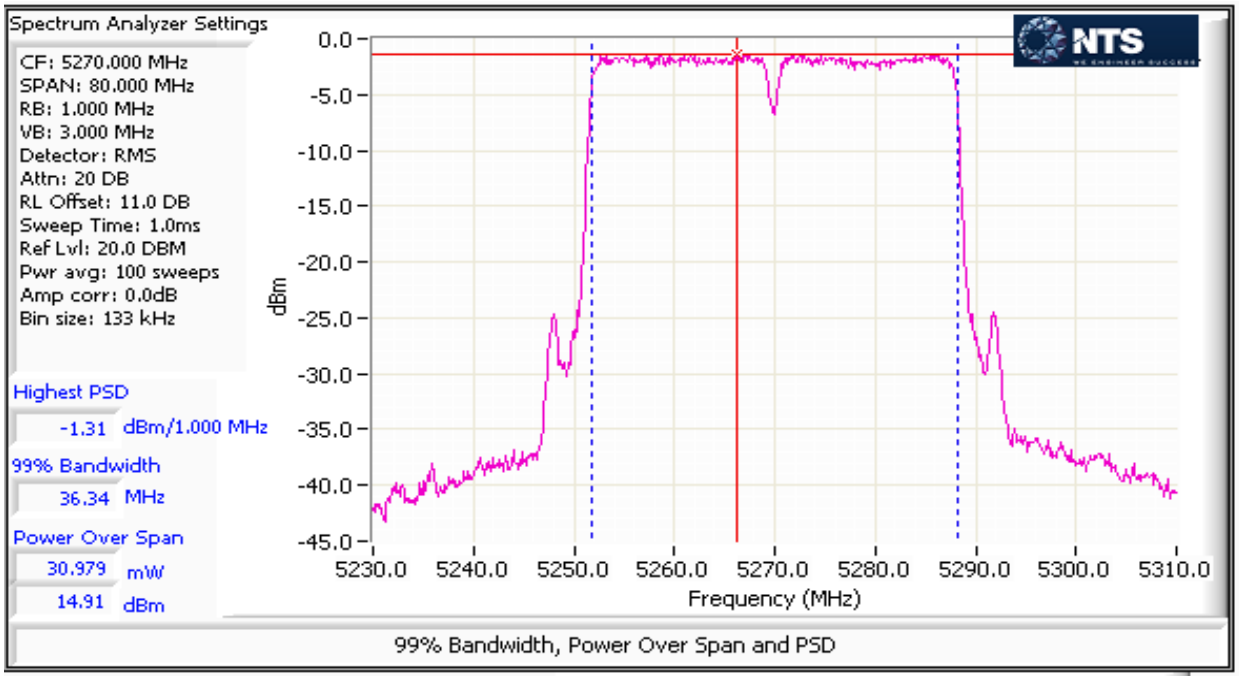
| Frequency (MHz) | Chain | Software Setting | 26dB BW (MHz) | Duty Cycle % | Power dBm | Total Power[1] mW | Total Power[1] dBm | FCC Limit dBm | Max Power (W) | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 5270 | 0 | 17 | 43.7 | 90 | 14.9 | 123.9 | 20.9 | 21.0 | 0.124 | Pass |
| | 2 | | | | 14.5 | | | | | |
| | 3 | | | | 14.5 | | | | | |
| | 1 | | | | 13.8 | | | | | |
| 5310 | 0 | 15 | 43.3 | 90 | 13.9 | 96.9 | 19.9 | 21.0 | | Pass |
| | 2 | | | | 13.2 | | | | | |
| | 3 | | | | 13.2 | | | | | |
| | 1 | | | | 13.2 | | | | | |

MIMO Device 5250-5350 PSD - FCC
Mode: n40

| Frequency (MHz) | Chain | Software Setting | 99% BW (MHz) | Duty Cycle % | PSD dBm/MHz | Total PSD[1] mW/MHz | Total PSD[1] dBm/MHz | FCC Limit dBm/MHz | IC Limit dBm/MHz | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 5270 | 0 | 17 | 36.3 | 90 | -1.3 | 3.0 | 4.8 | 8.0 | - | Pass |
| | 2 | | | | -1.7 | | | | | |
| | 3 | | | | -1.7 | | | | | |
| | 1 | | | | -2.3 | | | | | |
| 5310 | 0 | 15 | 36.3 | 90 | -2.2 | 2.4 | 3.8 | 8.0 | - | Pass |
| | 2 | | | | -2.8 | | | | | |
| | 3 | | | | -3.0 | | | | | |
| | 1 | | | | -3.0 | | | | | |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Date of Test: 9/12/2014 and 9/15/2014 Config. Used: 1
Test Engineer: M. Birgani Config Change: None
Test Location: FT Lab 4A EUT Voltage: PoE

MIMO Device - 5470-5725 MHz Band - FCC
Mode: n40 Max EIRP (mW): 982.6

| Frequency (MHz) | Chain | Software Setting | 26dB BW (MHz) | Duty Cycle % | Power dBm | Total Power[1] mW | Total Power[1] dBm | FCC Limit dBm | Max Power (W) | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 5510 | 0 | 14 | 43.2 | 90 | 12.7 | 74.6 | 18.7 | 21.0 | 0.123 | Pass |
| | 2 | | | | 11.6 | | | | | |
| | 3 | | | | 12.0 | | | | | |
| | 1 | | | | 12.6 | | | | | |
| 5550 | 0 | 16 | 43.7 | 90 | 15.0 | 119.9 | 20.8 | 21.0 | | Pass |
| | 2 | | | | 13.9 | | | | | |
| | 3 | | | | 14.2 | | | | | |
| | 1 | | | | 14.0 | | | | | |
| 5670 | 0 | 16 | 43.5 | 90 | 14.0 | 112.1 | 20.5 | 21.0 | | Pass |
| | 2 | | | | 13.8 | | | | | |
| | 3 | | | | 13.9 | | | | | |
| | 1 | | | | 14.4 | | | | | |
| 802.11ac 40MHz UNII-2ext | | | | | | | | | | |
| 5710 | 0 | 17 | 36.9 | 90 | 14.5 | 123.4 | 20.9 | 21.0 | | Pass |
| | 2 | | | | 14.4 | | | | | |
| | 3 | | | | 14.4 | | | | | |
| | 1 | | | | 14.5 | | | | | |
| UNII-3 | | | | | | | | | | |
| 5710 | 0 | 17 | 10.9 | 90 | 3.8 | 10.2 | 10.1 | 18.4 | | Pass |
| | 2 | | | | 2.7 | | | | | |
| | 3 | | | | 4.5 | | | | | |
| | 1 | | | | 3.3 | | | | | |

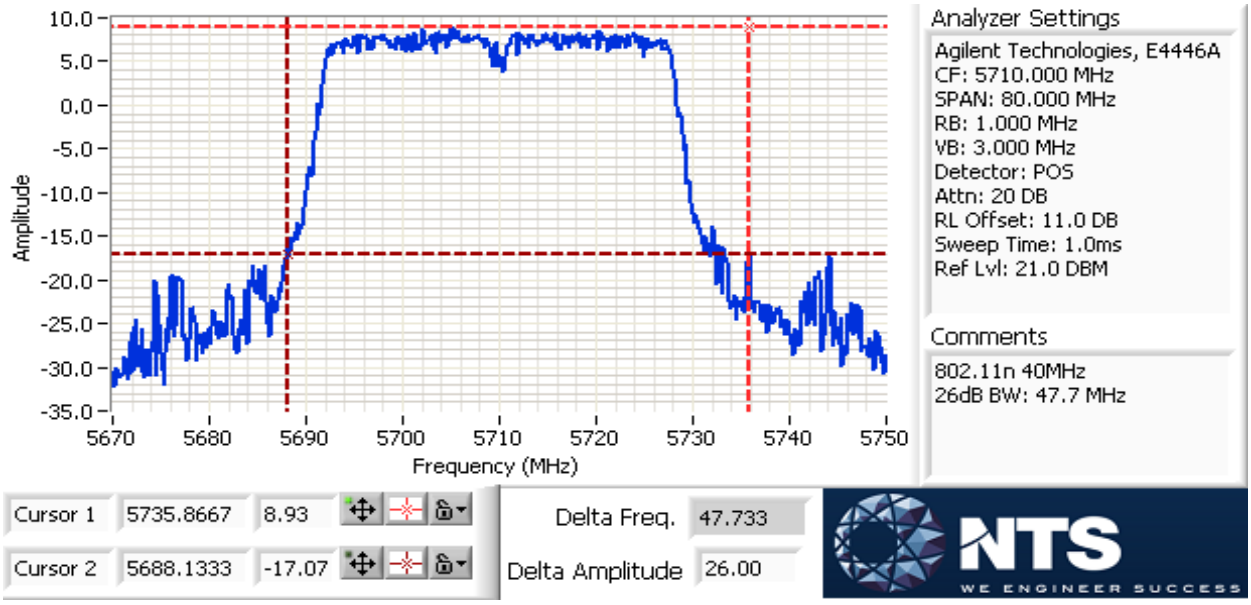
| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

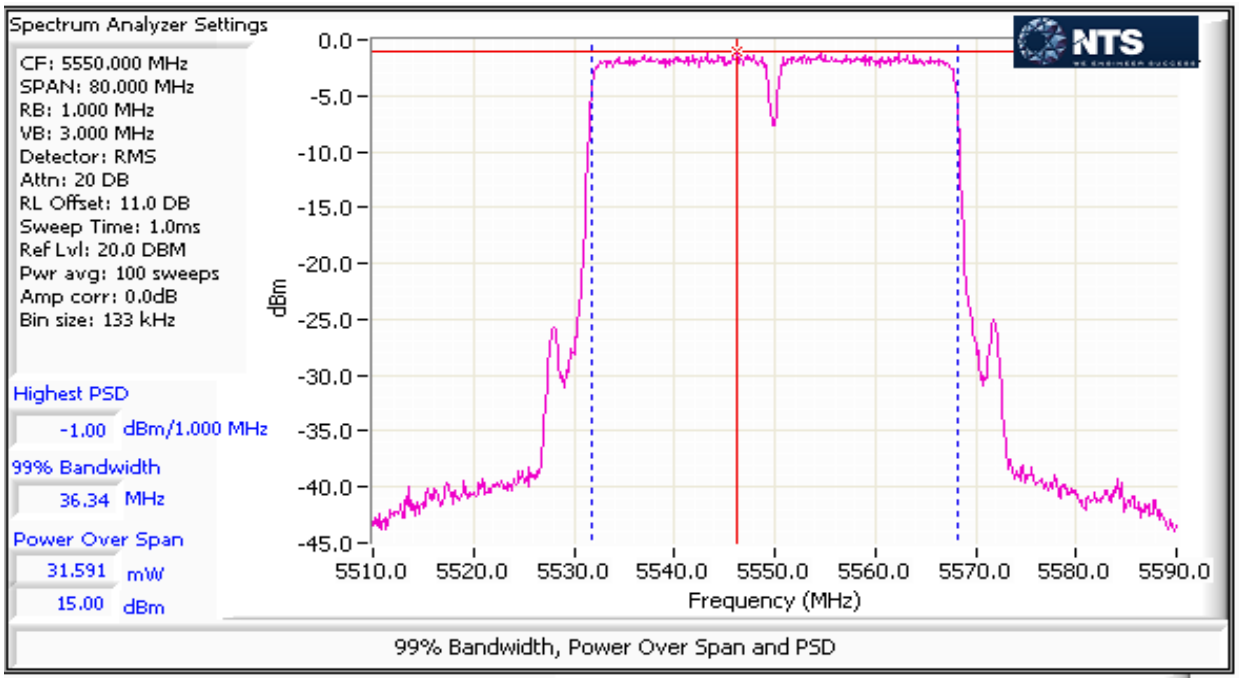
MIMO Device 5470-5725 PSD - FCC

Mode: n40

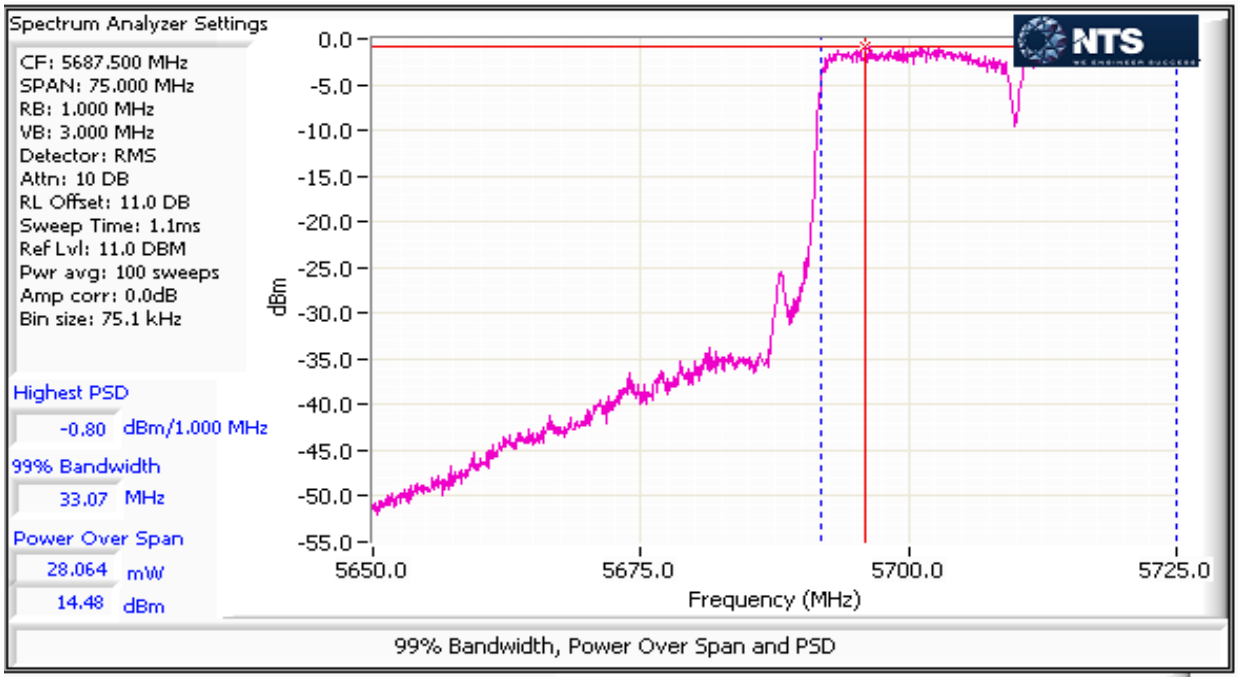
| Frequency (MHz) | Chain | Software Setting | 99% BW (MHz) | Duty Cycle % | PSD dBm/MHz | Total PSD[1] mW/MHz | Total PSD[1] dBm/MHz | FCC Limit dBm/MHz | IC Limit dBm/MHz | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 5510 | 0 | 14 | 36.3 | 90 | -3.5 | 1.8 | 2.5 | 8.0 | - | Pass |
| | 2 | | | | -4.6 | | | | | |
| | 3 | | | | -4.2 | | | | | |
| | 1 | | | | -3.6 | | | | | |
| 5550 | 0 | 16 | 36.3 | 90 | -1.0 | 2.9 | 4.7 | 8.0 | - | Pass |
| | 2 | | | | -2.3 | | | | | |
| | 3 | | | | -2.0 | | | | | |
| | 1 | | | | -2.0 | | | | | |
| 5670 | 0 | 16 | 36.3 | 90 | -2.1 | 2.7 | 4.3 | 8.0 | - | Pass |
| | 2 | | | | -2.4 | | | | | |
| | 3 | | | | -2.4 | | | | | |
| | 1 | | | | -1.9 | | | | | |
| 802.11ac 40MHz UNII-2ext | | | | | | | | | | |
| 5710 | 0 | 17 | 28.3 | 90 | -0.8 | 3.6 | 5.6 | 8.0 | - | Pass |
| | 2 | | | | -1.2 | | | | | |
| | 3 | | | | -1.0 | | | | | |
| | 1 | | | | -0.7 | | | | | |
| UNII-3 | | | | | | | | | | |
| 5710 | 0 | 17 | 8.6 | 90 | -1.7 | 2.8 | 4.5 | 8.0 | - | Pass |
| | 2 | | | | -3.1 | | | | | |
| | 3 | | | | -1.1 | | | | | |
| | 1 | | | | -2.4 | | | | | |

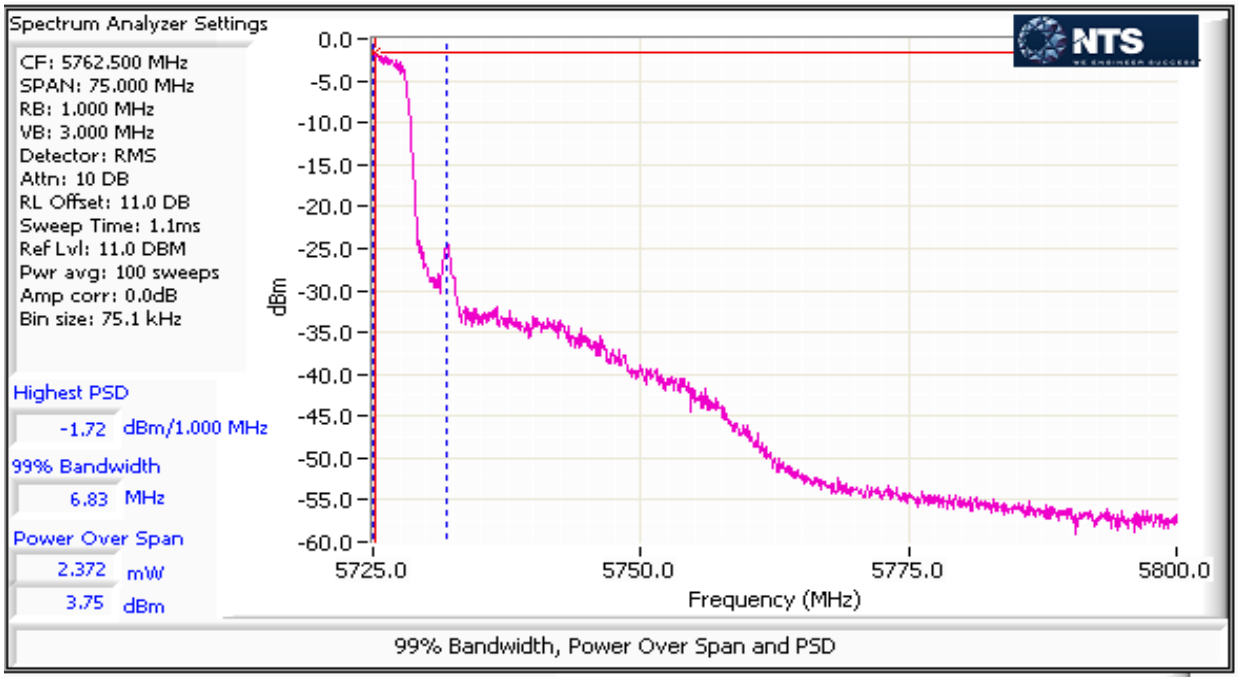
| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Date of Test: 09/12/14
Test Engineer: Jack Liu
Test Location: FT Lab 4A

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

MIMO Device - 5725-580 MHz Band - FCC

Mode: n40 Max EIRP (mW): 1820.5777

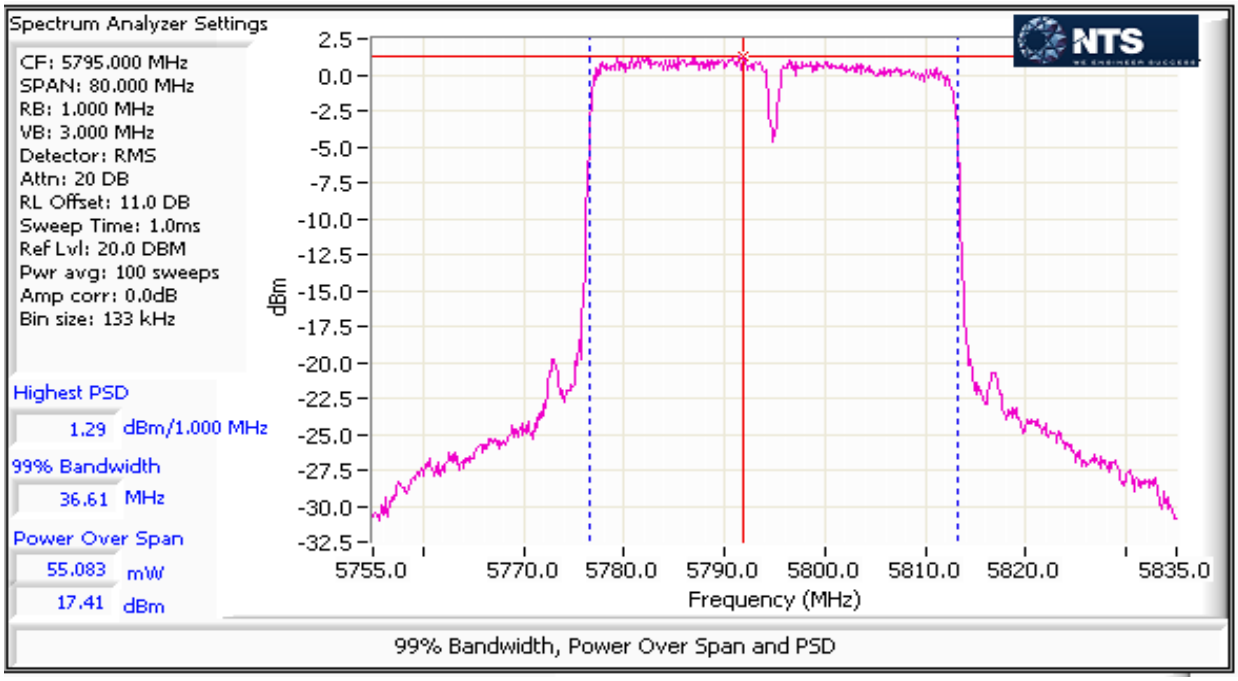
| Frequency (MHz) | Chain | Software Setting | 6dB BW (MHz) | Duty Cycle % | Power dBm | Total Power[1] mW | Total Power[1] dBm | FCC Limit dBm | Max Power (W) | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 5755 | 0 | 15 | 35.6 | 90 | 13.0 | 84.6 | 19.3 | 27.0 | 0.229 | Pass |
| | 2 | | | | 12.6 | | | | | |
| | 3 | | | | 12.9 | | | | | |
| | 1 | | | | 12.7 | | | | | |
| 5795 | 0 | 20 | 35.6 | 90 | 17.4 | 228.7 | 23.6 | 27.0 | | Pass |
| | 2 | | | | 17.0 | | | | | |
| | 3 | | | | 17.3 | | | | | |
| | 1 | | | | 16.7 | | | | | |

MIMO Device 5725-5850 PSD - FCC

Mode: n40

| Frequency (MHz) | Chain | Software Setting | 99% BW (MHz) | Duty Cycle % | PSD dBm/MHz | Total PSD[1] mW/MHz | Total PSD[1] dBm/MHz | FCC Limit dBm/MHz | IC Limit dBm/MHz | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 5755 | 0 | 15 | 36.34 | 90 | -3.0 | 2.1 | 3.2 | 27.0 | - | Pass |
| | 2 | | | | -3.5 | | | | | |
| | 3 | | | | -3.4 | | | | | |
| | 1 | | | | -3.3 | | | | | |
| 5795 | 0 | 20 | 36.61 | 90 | 1.3 | 5.7 | 7.5 | 27.0 | - | Pass |
| | 2 | | | | 0.9 | | | | | |
| | 3 | | | | 1.3 | | | | | |
| | 1 | | | | 0.8 | | | | | |

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |

Run #2: Bandwidth Measurements

Date of Test: 09/12/14
Test Engineer: Jack Liu
Test Location: FT Lab 4A

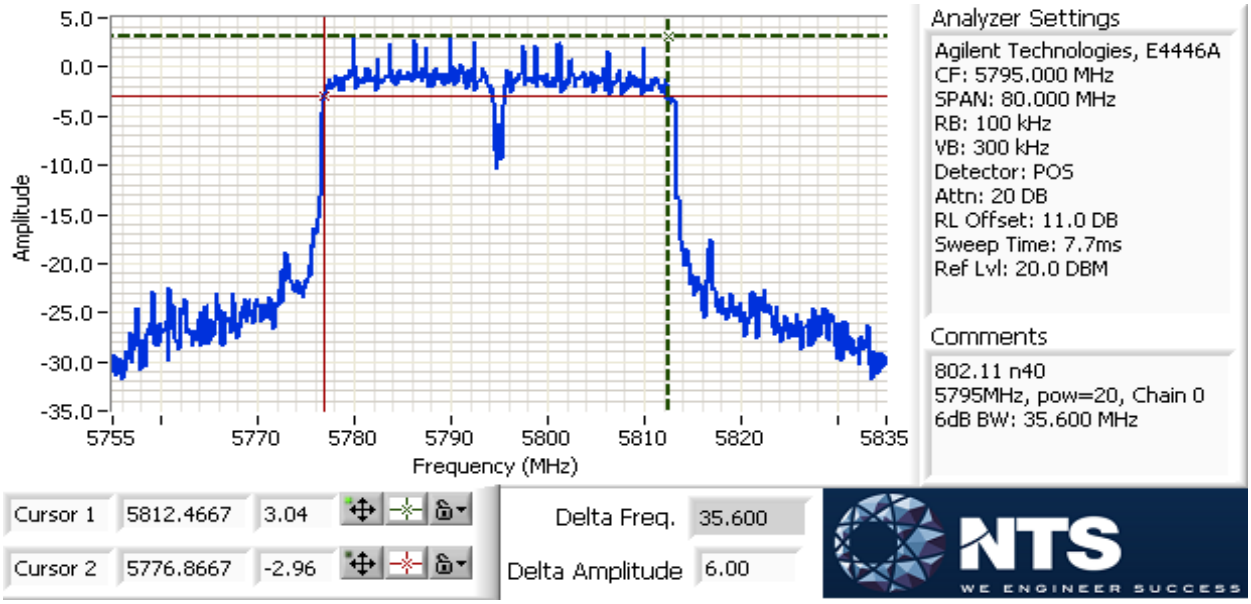
Config. Used: 1
Config Change: None
EUT Voltage: PoE

Mode: HT40

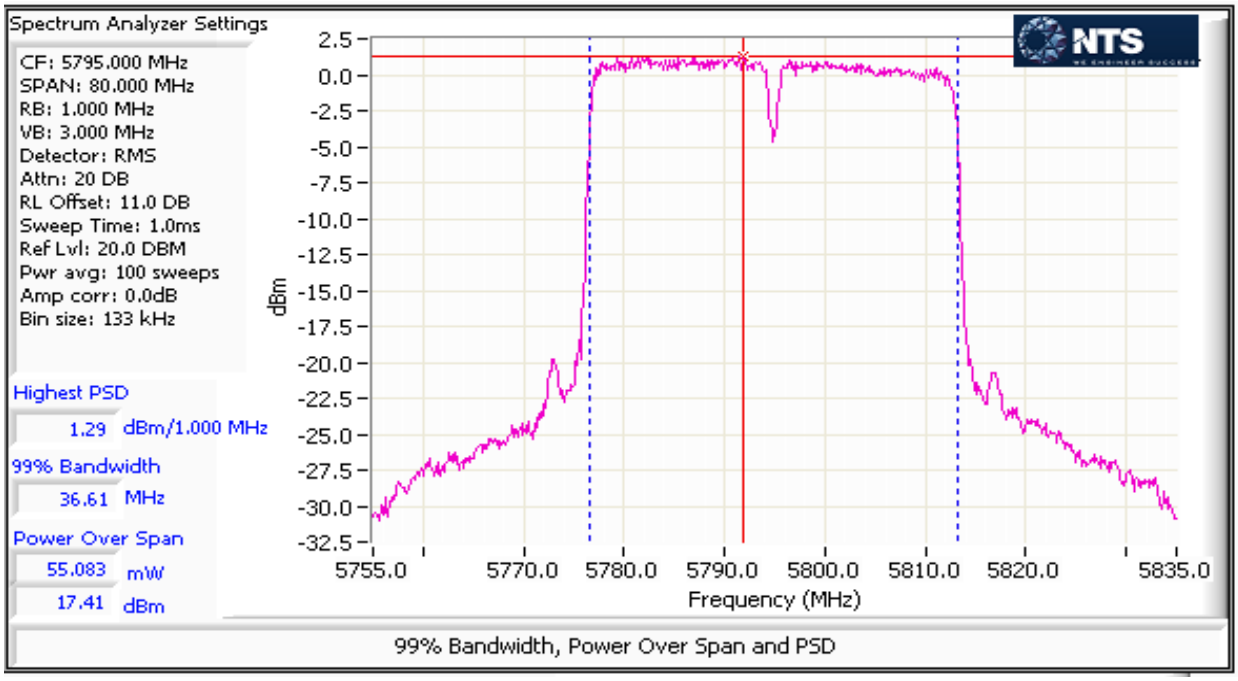
5725-5850MHz band (UNII3)

| Power Setting | Frequency (MHz) | Bandwidth (MHz) | | RBW Setting (MHz) | |
|---|---|---|---|---|---|
| | | 6dB | 99% | 6dB | 99% |
| 15 | 5755 | 35.6 | 36.3 | 0.1 | 1.0 |
| 20 | 5795 | 35.6 | 36.6 | 0.1 | 1.0 |

| | |
|---|---|
| Note 1: | 6dB BW: RBW=100kHz, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time.<br>99% BW: RBW=1-5% of of 99%BW, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time. |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | B |

# Conducted Emissions

*(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)*

## Test Specific Details

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

Date of Test: 8/20/2014
Test Engineer: Jack Liu
Test Location: Fremont Chamber #4

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

## 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: 24 °C
Rel. Humidity: 38 %

## Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | CE, AC Power,120V/60Hz | 15.207 | Pass | 60.0 dBµV @ 0.151 MHz (-5.9 dB) |

## Modifications Made During Testing

FerriShield (www.leadertechinc.com) - cable clamp TC28B0617; placed on the etherent cable between external port and internal pcb

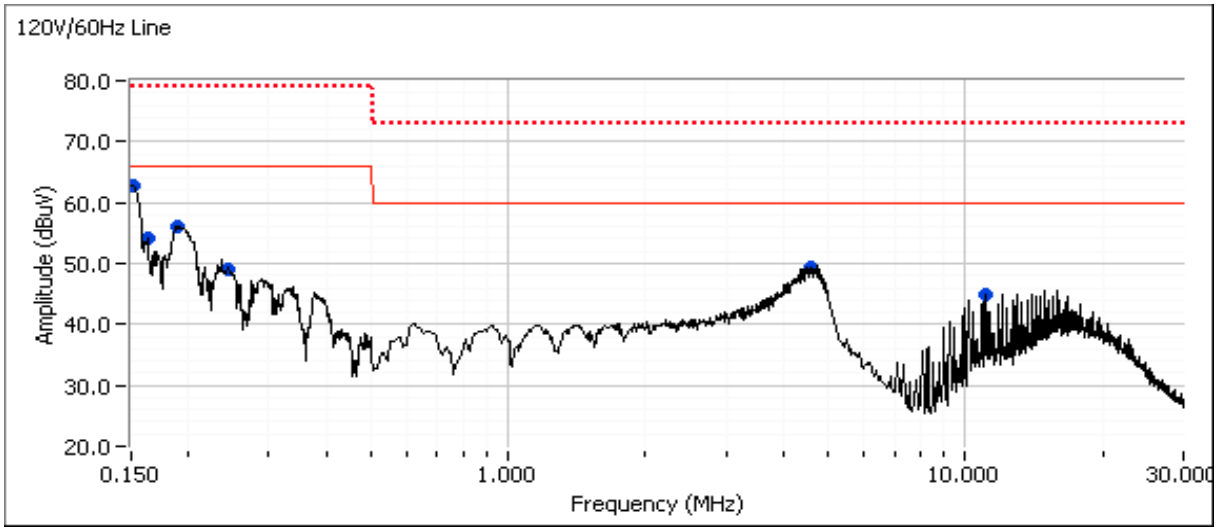
## Deviations From The Standard

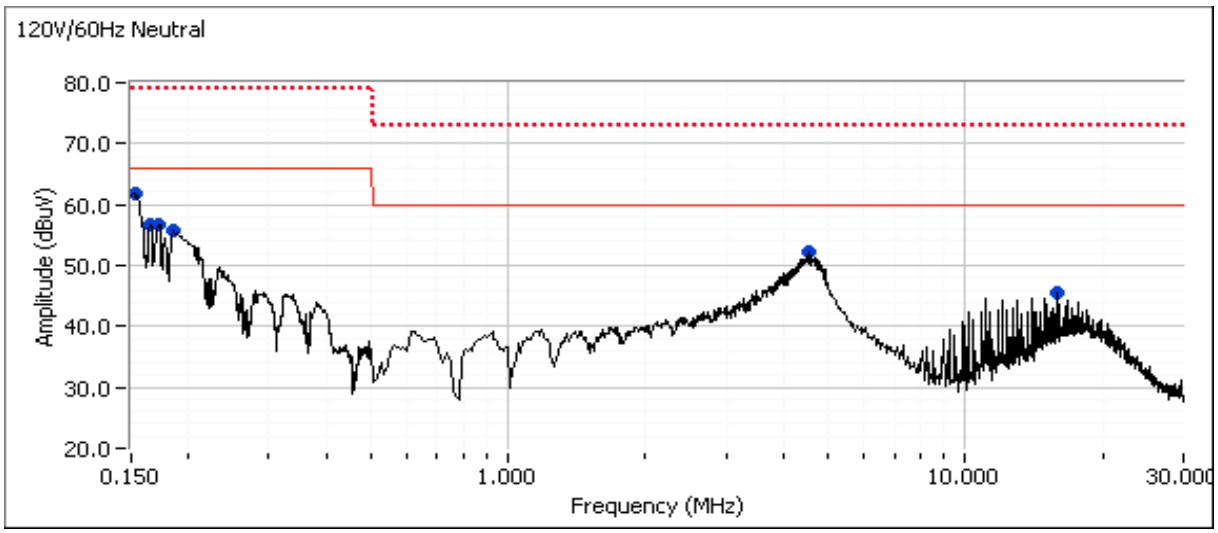
No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | B |

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
EUT transmitting on channel 134 at power setting 18.

Plots show FCC 15.107 Class A limits - Tabular data compared to 15.207 limits



| | | | |
|---|---|---|---|
| Client: | Vivint Wireless | Job Number: | J95684 |
| Model: | SR1420 (4x4 5GHz 802.11 Client) | T-Log Number: | T95948 |
| | | Project Manager: | Christine Krebill |
| Contact: | Venkat Kalkunte | Project Coordinator: | - |
| Standard: | FCC 15.B / 15.407 (New Rules) | Class: | B |

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

| Frequency | Level | AC | 15.207 | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 11.114 | 45.0 | Line | 50.0 | -5.0 | Average | |
| 4.617 | 49.3 | Line | 46.0 | 3.3 | Average | |
| 0.151 | 62.8 | Line | 56.0 | 6.8 | Average | |
| 0.190 | 56.0 | Line | 54.0 | 2.0 | Average | |
| 0.244 | 49.2 | Line | 52.0 | -2.8 | Average | |
| 0.162 | 54.1 | Line | 55.4 | -1.3 | Average | |
| 0.153 | 61.8 | Neutral | 55.9 | 5.9 | Average | |
| 0.167 | 56.8 | Neutral | 55.1 | 1.7 | Average | |
| 0.172 | 56.6 | Neutral | 54.9 | 1.7 | Average | |
| 0.187 | 55.6 | Neutral | 54.2 | 1.4 | Average | |
| 4.551 | 52.2 | Neutral | 46.0 | 6.2 | Average | |
| 15.838 | 45.6 | Neutral | 50.0 | -4.4 | Average | |

Final quasi-peak and average readings

| Frequency | Level | AC | 15.207 | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 0.151 | 60.0 | Line | 65.9 | -5.9 | QP | QP (1.00s) |
| 11.114 | 43.9 | Line | 50.0 | -6.1 | Average | AVG (0.10s) |
| 4.551 | 39.3 | Neutral | 46.0 | -6.7 | Average | AVG (0.10s) |
| 4.551 | 47.8 | Neutral | 56.0 | -8.2 | QP | QP (1.00s) |
| 15.838 | 41.7 | Neutral | 50.0 | -8.3 | Average | AVG (0.10s) |
| 0.153 | 57.3 | Neutral | 65.8 | -8.5 | QP | QP (1.00s) |
| 4.617 | 36.4 | Line | 46.0 | -9.6 | Average | AVG (0.10s) |
| 0.190 | 54.0 | Line | 64.0 | -10.0 | QP | QP (1.00s) |
| 4.617 | 45.7 | Line | 56.0 | -10.3 | QP | QP (1.00s) |
| 0.186 | 52.0 | Neutral | 64.2 | -12.2 | QP | QP (1.00s) |
| 0.151 | 41.6 | Line | 55.9 | -14.3 | Average | AVG (0.10s) |
| 0.190 | 39.3 | Line | 54.0 | -14.7 | Average | AVG (0.10s) |
| 11.114 | 44.9 | Line | 60.0 | -15.1 | QP | QP (1.00s) |
| 0.244 | 45.9 | Line | 62.0 | -16.1 | QP | QP (1.00s) |
| 15.838 | 43.7 | Neutral | 60.0 | -16.3 | QP | QP (1.00s) |
| 0.162 | 48.5 | Line | 65.4 | -16.9 | QP | QP (1.00s) |
| 0.153 | 37.7 | Neutral | 55.8 | -18.1 | Average | AVG (0.10s) |
| 0.186 | 34.5 | Neutral | 54.2 | -19.7 | Average | AVG (0.10s) |
| 0.167 | 45.1 | Neutral | 65.1 | -20.0 | QP | QP (1.00s) |
| 0.244 | 31.8 | Line | 52.0 | -20.2 | Average | AVG (0.10s) |
| 0.172 | 44.4 | Neutral | 64.9 | -20.5 | QP | QP (1.00s) |
| 0.162 | 24.7 | Line | 55.4 | -30.7 | Average | AVG (0.10s) |
| 0.167 | 22.9 | Neutral | 55.1 | -32.2 | Average | AVG (0.10s) |
| 0.172 | 22.5 | Neutral | 54.9 | -32.4 | Average | AVG (0.10s) |

*End of Report*

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