*EMC Test Report*

*Industry Canada RSS-Gen Issue 2 / RSS 210 Issue 7*
*FCC Part 15, Subpart E*

*Model: Intel® Centrino® Advanced-N 6230 (model 62230HMW)*

| | |
|---|---|
| IC CERTIFICATION #: | 1000M-62230ANH and 1000M-62230ANHU |
| FCC ID: | PD962230ANH and PD962230ANHU |
| APPLICANT: | Intel Corporation<br>100 Center Point Circle Suite 200<br>Columbia, SC 29210 |
| TEST SITE(S): | Elliott Laboratories<br>41039 Boyce Road.<br>Fremont, CA. 94538-2435 |
| IC SITE REGISTRATION #: | 2845B-4, 2845B-7 |
| REPORT DATE: | October 11, 2010 |
| FINAL TEST DATES: | September 22, 23, 24, 27, 28, 30, October 4, and 5, 2010 |

AUTHORIZED SIGNATORY:

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Elliott Laboratories

A2LA ACCREDITED
Testing Cert #2016.01

## *REVISION HISTORY*

| Rev# | Date | Comments | Modified By |
|---|---|---|---|
| - | 10-11-2010 | First release | |

## *TABLE OF CONTENTS*

## *SCOPE*

An electromagnetic emissions test has been performed on the Intel Corporation model Intel® Centrino® Advanced-N 6230 (model 62230HMW), pursuant to the following rules:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15, Subpart E requirements for UNII Devices (using FCC DA 02-2138, August 30, 2002)

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

ANSI C63.4:2003
FCC UNII test procedure 2002-08 DA-02-2138, August 2002

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

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

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

## *OBJECTIVE*

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

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

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

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

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

## *STATEMENT OF COMPLIANCE*

The tested sample of Intel Corporation model Intel® Centrino® Advanced-N 6230 (model 62230HMW) complied with the requirements of the following regulations:

RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15, Subpart E requirements for UNII Devices

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

The test results recorded herein are based on a single type test of Intel Corporation model Intel® Centrino® Advanced-N 6230 (model 62230HMW) and therefore apply only to the tested sample. The sample was selected and prepared by Steve Hackett of Intel Corporation.

## *DEVIATIONS FROM THE STANDARDS*

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

## *TEST RESULTS SUMMARY*

### *UNII / LELAN DEVICES*

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

| FCC Rule Part | RSS Rule Part | Description | Measured Value / Comments | Limit / Requirement | Result |
|---|---|---|---|---|---|
| 15.407(e) | | Indoor operation only | Intended for indoor hosts only | N/A | Complies |
| 15.407(a) (2) | | 26dB Bandwidth | > 20MHz | N/A – limits output power if < 20MHz | N/A |
| 15.407 (a) (1) | A9.2(1) | Output Power | 802.11a: 42 mW<br>n20MHz: 45 mW<br>n40MHz: 44 mW<br>(Max eirp: 95.5mW) | 17dBm | Complies |
| 15.407 (a) (1) | - | Power Spectral Density | 3.7 dBm/MHz | 4 dBm/MHz | Complies |
| - | A9.5 (2) | | | 6.4 dBm/MHz | Complies |

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

| FCC Rule Part | RSS Rule Part | Description | Measured Value / Comments | Limit / Requirement | Result (margin) |
|---|---|---|---|---|---|
| 15.407(a) (2) | | 26dB Bandwidth | > 20MHz | N/A – limits output power if < 20MHz | N/A |
| 15.407(a) (2) | A9.2(2) | Output Power | 802.11a: 44 mW<br>n 20MHz: 46 mW<br>n40MHz: 40 mW<br>(Max eirp: 102.3mW) | 17dBm<br>(50mW) | Complies |
| 15.407(a) (2) | - | Power Spectral Density | 4.0 dBm/MHz | 11 dBm/MHz | Complies |
| - | A9.2(2) / A9.5 (2) | Power Spectral Density | | 11 dBm / MHz[1] | Complies |

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

| FCC Rule Part | RSS Rule Part | Description | Measured Value / Comments | Limit / Requirement | Result (margin) |
|---|---|---|---|---|---|
| 15.407(a) (2) | | 26dB Bandwidth | > 20MHz | N/A – limits output power if < 20MHz | N/A |
| 15.407(a) (2) | A9.2(2) | Output Power | 802.11a: 45 mW<br>n 20MHz: 44 mW<br>n40MHz: 44 mW<br>(Max eirp: 134.9mW) | 24 dBm / 250mW<br>(eirp < 30dBm) | Complies |
| 15.407(a) (2)) | | Power Spectral Density | 4.2 dBm/MHz | 11 dBm/MHz | Complies |
| | A9.2(2) / A9.5 (2) | Power Spectral Density | | 11 dBm / MHz[2] | Complies |
| KDB 443999 | A9 | Non-operation in 5600 – 5650 MHz sub band | Device cannot operate in the 5600 – 5650 MHz band – client device with passive scanning in this band. | | Complies |

[1] Reduced from 11dBm because highest value exceeded the average value by more than 3dB
[2] Reduced from 11dBm because highest value exceeded the average value by more than 3dB

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

| FCC Rule Part | RSS Rule Part | Description | Measured Value / Comments | Limit / Requirement | Result |
|---|---|---|---|---|---|
| 15.407 | A9.5a | Modulation | Digital Modulation is used | Digital modulation is required | Complies |
| 15.407(b) (5) / 15.209 | A9.3 | Spurious Emissions below 1GHz | 41.2dBµV/m @ 662.52MHz | Refer to page 24 | Complies (-4.8dB) |
| 15.407(b) (5) / 15.209 | A9.3 | Spurious Emissions above 1GHz | 53.0dBµV/m @ 5460.0MHz | | Complies (-1.0dB) |
| 15.407(a)(6) | - | Peak Excursion Ratio | 9.9 dB | < 13dB | Complies |
| | A9.5 (3) | Channel Selection | Spurious emissions tested at outermost channels in each band | Device was tested on the top, bottom and center channels in each band | Complies |
| 15 | | | Measurements on three channels in each band | | Complies |
| 15.407 (c) | A9.5(4) | Operation in the absence of information to transmit | Operation is discontinued in the absence of information (Operational Description page 9) | Device shall automatically discontinue operation in the absence of information to transmit | Complies |
| 15.407 (g) | A9.5 (5) | Frequency Stability | Frequency stability is better than 20ppm (Operational Description page 9) | Signal shall remain in-band. | Complies |
| 15.407 (h2) | A9.4 | Dynamic frequency Selection (device without radar detection) | Refer to separate test report | | |
| | A9.9g | User Manual information | Refer to pages 11 and 12 of the user's manual | Warning about satellite systems | Complies |

*GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS*

| FCC Rule Part | RSS Rule part | Description | Measured Value / Comments | Limit / Requirement | Result (margin) |
|---|---|---|---|---|---|
| 15.203 | - | RF Connector | Unique | Integral or unique connector required | Complies |
| 15.109 | RSS GEN 7.2.3 Table 1 | Receiver spurious emissions | 41.2dBµV/m @ 662.52MHz | Refer to page 22 | Complies (-4.8dB) |
| 15.207 | RSS GEN Table 2 | AC Conducted Emissions | 40.6dBµV @ 14.758MHz | Refer to page 21 | Complies (-9.4dB) |
| 15.247 (b) (5) 15.407 (f) | RSS 102 | RF Exposure Requirements | Refer to MPE calculations, RSS 102 declaration and User Manual pages 8, 12 | Refer to OET 65, FCC Part 1 and RSS 102 | Complies |
| - | RSP 100 RSS GEN 7.1.5 | User Manual | Refer to pages 11 and 12 of the user's manual | Statement required regarding non-interference | Complies |
| - | RSP 100 RSS GEN 7.1.5 | User Manual | Not applicable, antenna is integral to host systems. | Statement for products with detachable antenna | N/A |
| - | RSP 100 RSS GEN 4.4.1 | 99% Bandwidth | 802.11a: 17.1 MHz n20MHz: 18.1 MHz n40MHz: 36.4 MHz | Information only | N/A |

*ADDITIONAL MEASUREMENTS*

As both Bluetooth and 802.11 transmissions can occur simultaneously, radiated spurious measurements were made with both Bluetooth and 802.11 devices transmitting simultaneously.

| FCC Rule Part | RSS Rule part | Description | Measured Value / Comments | Limit / Requirement | Result (margin) |
|---|---|---|---|---|---|
| 15.2109 | RSS 210 | Spurious emissions | 45.1dBµV/m @ 11199.8MHz | 15.209 in restricted bands, all others < -20dBc | Complies (-8.9dB) |
| Signal was actually second harmonic of 802.11 signal and not an inter-modulation product, but this was the highest level signal observed with both Bluetooth and Wi-Fi transmitters operational simultaneously. | | | | | |

*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 Intel Corporation model Intel® Centrino® Advanced-N 6230 (model 62230HMW) is a PCIe half mini card form factor Bluetooth/IEEE 802.11a/b/g/n wireless network adapter. The card supports MIMO (2x2) for 802.11n modes and MISO (1x2) for 802.11a/b/g modes. Bluetooth only operation mode is a 1x1. When Bluetooth is operational then 802.11b/g/n modes operate as SISO (1x1). 802.11a/n modes still operate as MIMO (2x2) with Bluetooth operational.

The card is sold under two different FCC/IC ID numbers (see table below). The ID's ending in "U" are intended to allow user install conditions and host systems must be provided with a BIOS locking feature that prevents installation of unauthorized devices.

For radio testing purposes the card was installed in a test fixture that exposed all sides of the card. For digital device testing for certification under equipment code JBP the card was installed inside a laptop PC.

The sample was received on September 13, 2010 and tested on September 22, 23, 24, 27, 28, 30, October 4, and 5, 2010. The EUT consisted of the following component(s):

| Manufacturer | Model | Description | MAC Address | FCC ID and Canada UPN |
|---|---|---|---|---|
| Intel Corporation | 62230ANHMW | PCIe Half Mini Card form factor Bluetooth / IEEE 802.11a/b/g/n wireless network adapter | 00150079AD10 | PD962230ANH<br>PD962230ANHU<br>1000M-62230ANH |
| | 62230ANHU | | | 1000M-62230ANHU |

### *ANTENNA SYSTEM*

The EUT antenna is a two-antenna PIFA antenna system – Shanghai Universe Communication Electron Co., Ltd. The antenna connects to the EUT via a non-standard antenna connector, thereby meeting the requirements of FCC 15.203.

### *ENCLOSURE*

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host computer or system.

### *MODIFICATIONS*

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

*SUPPORT EQUIPMENT*

The following equipment was used as support equipment for testing:

| Company | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Intel Corporation | - | Test Fixture | D9164573K0B0 | N/A |
| DELL | Latitude D520 | Laptop PC | HM9383J | N/A |
| Agilent | E3610A | DC Supply | MY4001740 | N/A |

*EUT INTERFACE PORTS*

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

| Port | Connected To | Cable(s) | | |
|---|---|---|---|---|
| | | Description | Shielded or Unshielded | Length(m) |
| Laptop USB | Fixture USB | USB cable | Shielded | |
| Laptop Mini PCI | Fixture PCIe | Ribbon | unshielded | |
| DC Power | Fixture DC power | 2-wire | unshielded | |

*EUT OPERATION*

The EUT was installed into a test fixture that exposed all sides of the card. The test fixture interfaced to a laptop computer and dc power supply. The laptop computer was used to configure the EUT to continuously transmit at a specified output power or continuously receive on the channel specified in the test data. For transmit mode measurements the system was configured to operate in each of the available operating modes – 802.11a, 802.11b, 802.11g, 802.11n (20 MHz channel bandwidth) and 802.11n (40MHz channel bandwidth), Bluetooth 1Mb/s and Bluetooth 3Mb/s. In addition radiated spurious tests were repeated with the device operating in both Bluetooth and 802.11 modes to determine if any spurious emissions due to inter-modulation products were created.

The data rates used when evaluating the WiFi transmitter were the lowest data rates for each 802.11 mode – 1Mb/s for 802.11b, 6Mb/s for 802.11a and 802.11g, 6.5MB/s for 802.11n (20MHz), and 13 Mb/s for 802.11n (40MHz). The device operates at its maximum output power at the lowest data rate (this was confirmed through separate measurements – refer to test data for actual measurements).

The field strength at the band edges was evaluated for each mode and on each chain individually on the lowest and highest channels at the rated power for the channel under test. Where the power at the edge channels was lower than the power at the center channels additional measurements were made at the adjacent channels. MIMO and SISO modes were fully evaluated.

Spurious emissions measurements at frequencies away from the band edges were made at the highest power rating for the band in each mode. For 802.11n modes both chains were active (MIMO mode) but with each chain at the highest power rating per chain (MIMO power setting) to cover both modes of operation at the same time.

Bluetooth operation was evaluated at both 1Mb/s and 3Mb/s data rates. 2Mb/s data rate was found, through preliminary testing, to produce emissions similar to those for 3Mb/s.

Receiver spurious emissions in 802.11 modes were evaluated in single chain and multi-chain modes. Bluetooth receiver spurious were evaluated for single chain only as MISO is not supported for Bluetooth.

The PC was using the Intel test utility DRTU Version 1.2.12-0197 and the device driver was version 14.0.0.39.

## *TEST SITE*

### *GENERAL INFORMATION*

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

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

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

### *CONDUCTED EMISSIONS CONSIDERATIONS*

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

### *RADIATED EMISSIONS CONSIDERATIONS*

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

## *MEASUREMENT INSTRUMENTATION*

### *RECEIVER SYSTEM*

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

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

### *INSTRUMENT CONTROL COMPUTER*

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

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

### *LINE IMPEDANCE STABILIZATION NETWORK (LISN)*

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

*FILTERS/ATTENUATORS*

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

*ANTENNAS*

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

*ANTENNA MAST AND EQUIPMENT TURNTABLE*

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

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

*INSTRUMENT CALIBRATION*

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

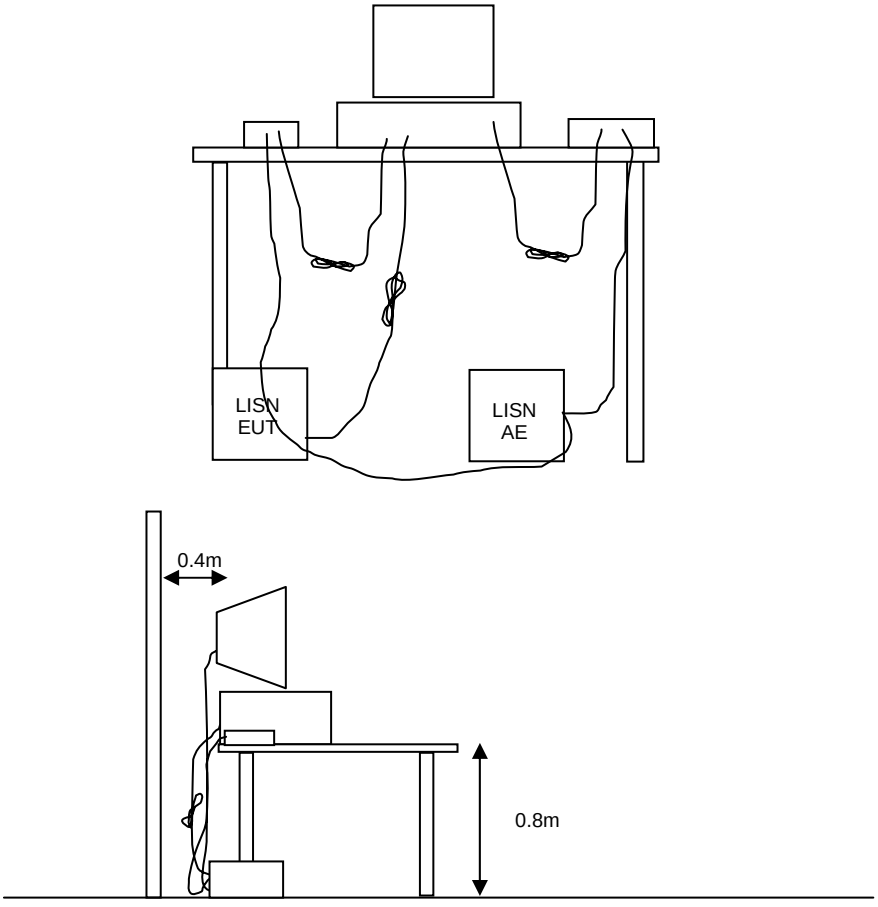
## *TEST PROCEDURES*

### *EUT AND CABLE PLACEMENT*

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

### *CONDUCTED EMISSIONS*

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



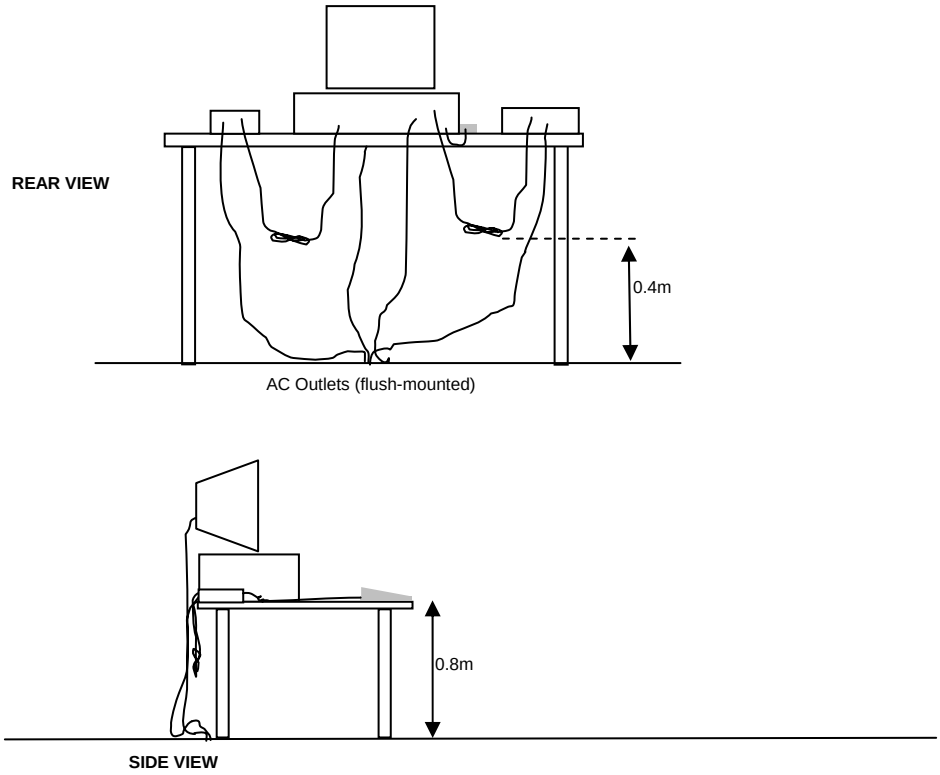
*RADIATED EMISSIONS*

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

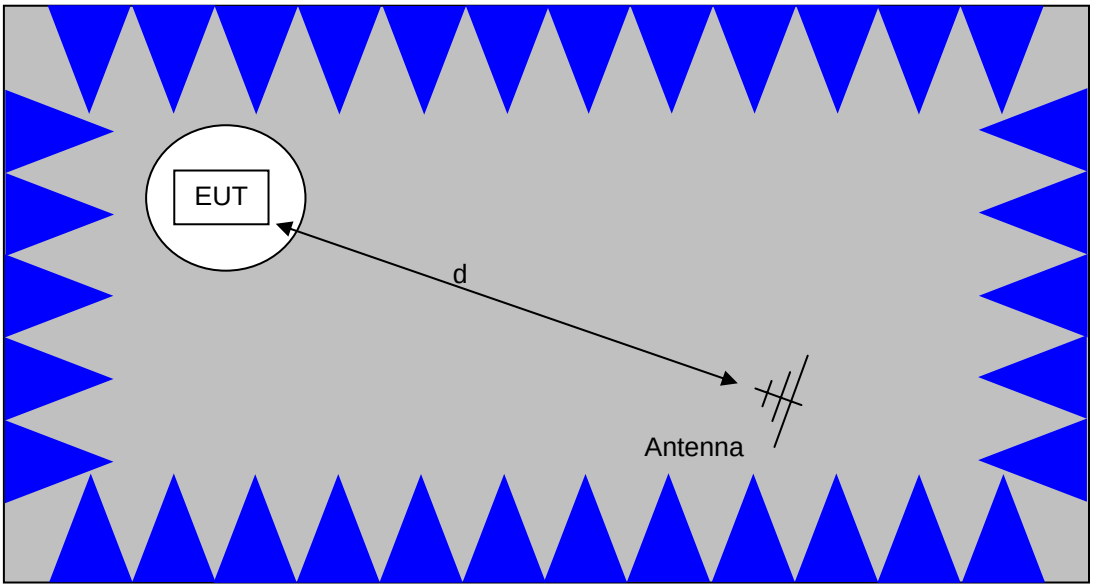
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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

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

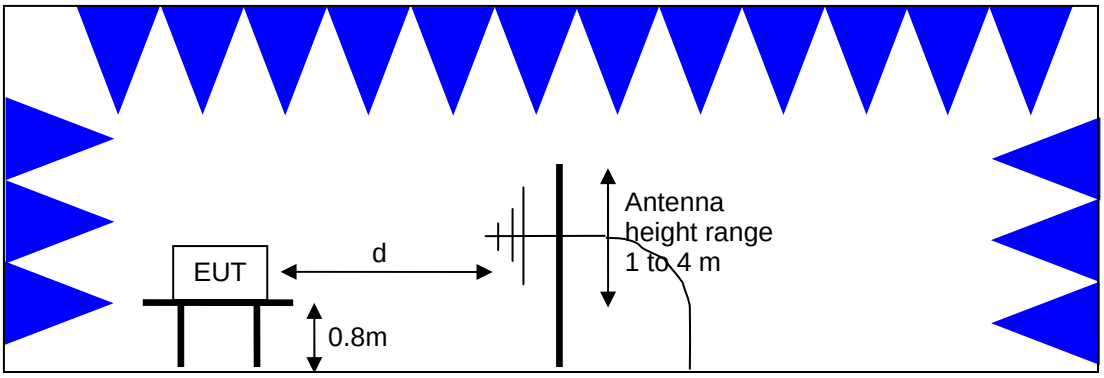



Typical Test Configuration for Radiated Field Strength Measurements




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

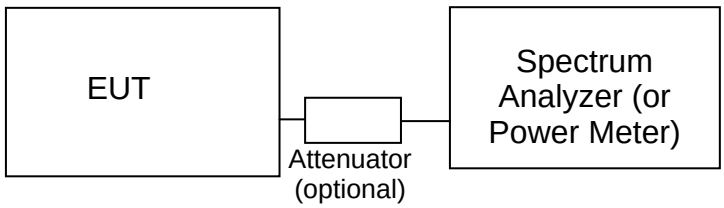
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.




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

*CONDUCTED EMISSIONS FROM ANTENNA PORT*

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




Test Configuration for Antenna Port Measurements

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

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

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

*BANDWIDTH MEASUREMENTS*

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

*SPECIFICATION LIMITS AND SAMPLE CALCULATIONS*

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

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

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

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

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

*GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS*

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

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

*RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS*

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

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

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

*FCC 15.407 (a) OUTPUT POWER LIMITS*

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

| Operating Frequency (MHz) | Output Power | Power Spectral Density |
|---|---|---|
| 5150 – 5250 | 50mW (17 dBm) | 4 dBm/MHz |
| 5250 – 5350 | 250 mW (24 dBm) | 11 dBm/MHz |
| 5725 – 5825 | 1 Watts (30 dBm) | 17 dBm/MHz |

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

The peak excursion envelope is limited to 13dB.

*OUTPUT POWER LIMITS –LELAN DEVICES*

The table below shows the limits for output power and output power density defined by RSS 210. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

| Operating Frequency (MHz) | Output Power | Power Spectral Density |
|---|---|---|
| 5150 – 5250 | 200mW (23 dBm) eirp | 10 dBm/MHz eirp |
| 5250 – 5350 | 250 mW (24 dBm)[4]<br>1W (30dBm) eirp | 11 dBm/MHz |
| 5470 – 5725 | 250 mW (24 dBm)[5]<br>1W (30dBm) eirp | 11 dBm/MHz |
| 5725 – 5825 | 1 Watts (30 dBm)<br>4W eirp | 17 dBm/MHz |

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

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

[4] If EIRP exceeds 500mW the device must employ TPC
[5] If EIRP exceeds 500mW the device must employ TPC

*SPURIOUS EMISSIONS LIMITS –UNII and LELAN DEVICES*

The spurious emissions limits for signals below 1GHz are the FCC/RSS-GEN general limits. For emissions above 1GHz, signals in restricted bands are subject to the FCC/RSS GEN general limits. All other signals have a limit of –27dBm/MHz, which is a field strength of 68.3dBuV/m/MHz at a distance of 3m. This is an average limit so the peak value of the emission may not exceed –7dBm/MHz (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.

*SAMPLE CALCULATIONS - CONDUCTED EMISSIONS*

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

$$R_r - S = M$$

where:

$R_r$ = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

*SAMPLE CALCULATIONS - RADIATED EMISSIONS*

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

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

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

where:

$F_d$ = Distance Factor in dB

$D_m$ = Measurement Distance in meters

$D_s$ = Specification Distance in meters

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

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$R_r$ = Receiver Reading in dBuV/m

$F_d$ = Distance Factor in dB

$R_c$ = Corrected Reading in dBuV/m

$L_s$ = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

*SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION*

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

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

where P is the eirp (Watts)

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

# *Appendix A Test Equipment Calibration Data*

**Radiated Emissions, 1000 - 40,000 MHz, 22-Sep-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 487 | 7/6/2012 |
| Hewlett Packard | Microwave Preamplifier, 1-26.5GHz | 8449B | 870 | 6/25/2011 |
| Micro-Tronics | Band Reject Filter, 5725-5875 MHz | BRC50705-02 | 1728 | 2/1/2011 |
| Hewlett Packard | SpecAn 9 kHz - 40 GHz, (SA40) Purple | 8564E (84125C) | 1771 | 8/26/2011 |
| Hewlett Packard | Head (Inc W1-W4, 1946, 1947) Purple | 84125C | 1772 | 5/6/2011 |
| A.H. Systems | Blue System Horn, 18-40GHz | SAS-574, p/n: 2581 | 2159 | 3/18/2011 |

**Radio Antenna Port (Bandedge), 23-Sep-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 786 | 12/11/2011 |
| Hewlett Packard | SpecAn 9 kHz - 40 GHz, FT (SA40) Blue | 8564E (84125C) | 1393 | 4/14/2011 |

**5GHz Bandedges, 23-Sep-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 786 | 12/11/2011 |
| Hewlett Packard | SpecAn 9 kHz - 40 GHz, FT (SA40) Blue | 8564E (84125C) | 1393 | 4/14/2011 |

**UNII Spurious Emissions, 27-Sep-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| Hewlett Packard | Microwave Preamplifier, 1-26.5GHz | 8449B | 263 | 12/15/2010 |
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 786 | 12/11/2011 |
| Narda West | High Pass Filter, 8 GHz | HPF 180 | 821 | 3/29/2011 |
| Hewlett Packard | SpecAn 9 kHz - 40 GHz, FT (SA40) Blue | 8564E (84125C) | 1393 | 4/14/2011 |
| Micro-Tronics | Band Reject Filter, 5470-5725 MHz | BRC50704-02 | 1730 | 9/3/2011 |

**UNII Bandedge, MIMO, 28-Sep-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 786 | 12/11/2011 |
| Rohde & Schwarz | Power Meter, Single Channel | NRVS | 1290 | 10/22/2010 |
| Hewlett Packard | SpecAn 9 kHz - 40 GHz, FT (SA40) Blue | 8564E (84125C) | 1393 | 4/14/2011 |
| Rohde & Schwarz | Power Sensor 100 uW - 10 Watts | NRV-Z53 | 1555 | 2/5/2011 |
| Rohde & Schwarz | Attenuator, 20 dB , 50 ohm, 10W, DC-18 GHz | 20dB, 10W, Type N | 1556 | 2/5/2011 |

**Conducted Emissions - AC Power Ports, 28-Sep-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| Rohde & Schwarz | Pulse Limiter | ESH3 Z2 | 372 | 2/3/2011 |
| Solar Electronics | LISN | 8028-50-TS-24-BNC support | 904 | 3/2/2011 |
| EMCO | LISN, 10 kHz-100 MHz | 3825/2 | 1292 | 3/12/2011 |
| Hewlett Packard | EMC Spectrum Analyzer, 9 KHz - 22 GHz | 8593EM | 1319 | 10/19/2010 |
| Rohde & Schwarz | Test Receiver, 9 kHz-2750 MHz | ESCS 30 | 1337 | 11/11/2010 |

**Radiated Emissions, 30 - 1,000 MHz, 28-Sep-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| Hewlett Packard | EMC Spectrum Analyzer, 9 KHz - 22 GHz | 8593EM | 1319 | 10/19/2010 |
| Rohde & Schwarz | Test Receiver, 9 kHz-2750 MHz | ESCS 30 | 1337 | 11/11/2010 |
| Sunol Sciences | Biconilog, 30-3000 MHz | JB3 | 1548 | 6/24/2012 |
| Com-Power Corp. | Preamplifier, 30-1000 MHz | PAM-103 | 2234 | 5/19/2011 |

**RE, Wi-Fi & BT Simultaneous Tx, 30-Sep-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| Hewlett Packard | Microwave Preamplifier, 1-26.5GHz | 8449B | 263 | 12/15/2010 |
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 786 | 12/11/2011 |
| Rohde & Schwarz | Power Meter, Single Channel | NRVS | 1290 | 10/22/2010 |
| Hewlett Packard | SpecAn 9 kHz - 40 GHz, FT (SA40) Blue | 8564E (84125C) | 1393 | 4/14/2011 |
| Rohde & Schwarz | Power Sensor 100 uW - 10 Watts | NRV-Z53 | 1555 | 2/5/2011 |
| Rohde & Schwarz | Attenuator, 20 dB , 50 ohm, 10W, DC-18 GHz | 20dB, 10W, Type N | 1556 | 2/5/2011 |
| Micro-Tronics | Band Reject Filter, 2400-2500 MHz | BRM50702-02 | 1683 | 8/10/2011 |

**Radiated Emissions, 04,05,06-Oct-10**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| Rohde & Schwarz | Power Meter, Single Channel | NRVS | 1290 | 10/22/2010 |
| Rohde & Schwarz | Power Sensor 100 uW - 10 Watts | NRV-Z53 | 1555 | 2/5/2011 |
| EMCO | Antenna, Horn, 1-18 GHz | 3115 | 1561 | 6/22/2012 |
| Hewlett Packard | SpecAn 9 kHz - 40 GHz, (SA40) Purple | 8564E (84125C) | 1771 | 8/26/2011 |

# *Appendix B Test Data*

| | |
|---|---|
| T80540<br>AC Conducted Emissions<br>Radiated Spurious Emissions | 84 Pages |
| T80759<br>Antenna Port Measurements | 59 Pages |
| T80540<br>Radiated Spurious Emissions – simultaneous transmissions from Bluetooth and Wi-Fi transceivers | 30 Pages |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | - |
| Emissions Standard(s): | FCC 15.247 | Class: | B |
| Immunity Standard(s): | - | Environment: | - |

# EMC Test Data

For The

# Intel Corporation

Model

**Intel® Centrino® Advanced-N 6230**

Date of Last Test: 10/6/2010

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | 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: 9/28/2010
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Config. Used: Modular Test
Config Change: None
Host Unit Voltage 120V/60Hz

## General Test Configuration

The test fixture 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.

## Ambient Conditions:

Temperature: 21.9 °C
Rel. Humidity: 42 %

## Summary of Results

**MAC Address: 00150079AD1A DRTU Tool Version 1.2.12-0197 Driver version 14.0.0.39**

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | CE, AC Power,120V/60Hz | RSS 210 / 15.207 | Pass | 40.6dBµV @ 14.758MHz (-9.4dB) |

## Modifications Made During Testing

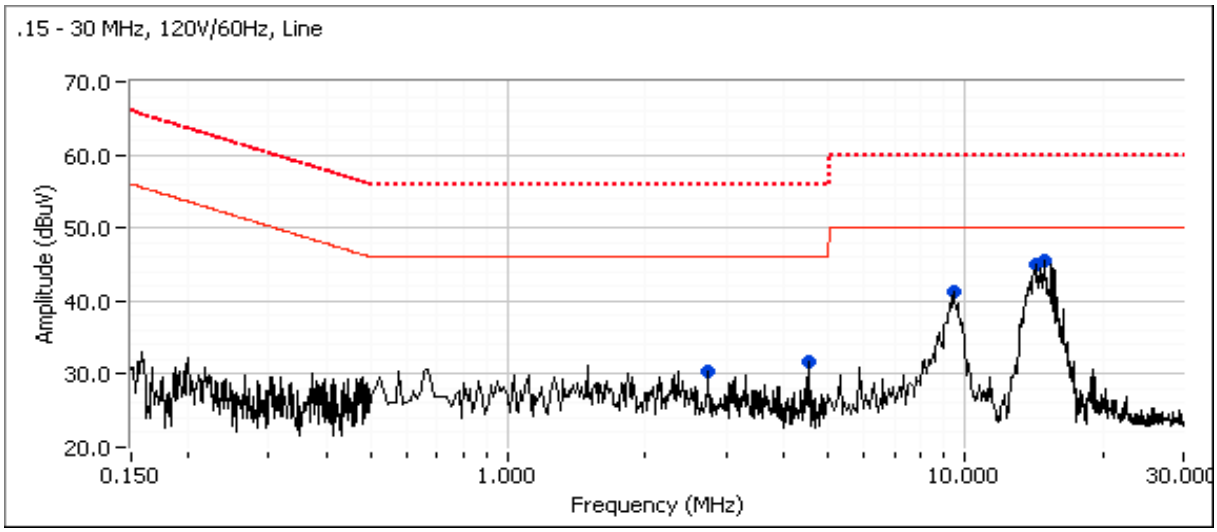
No modifications were made to the EUT during testing

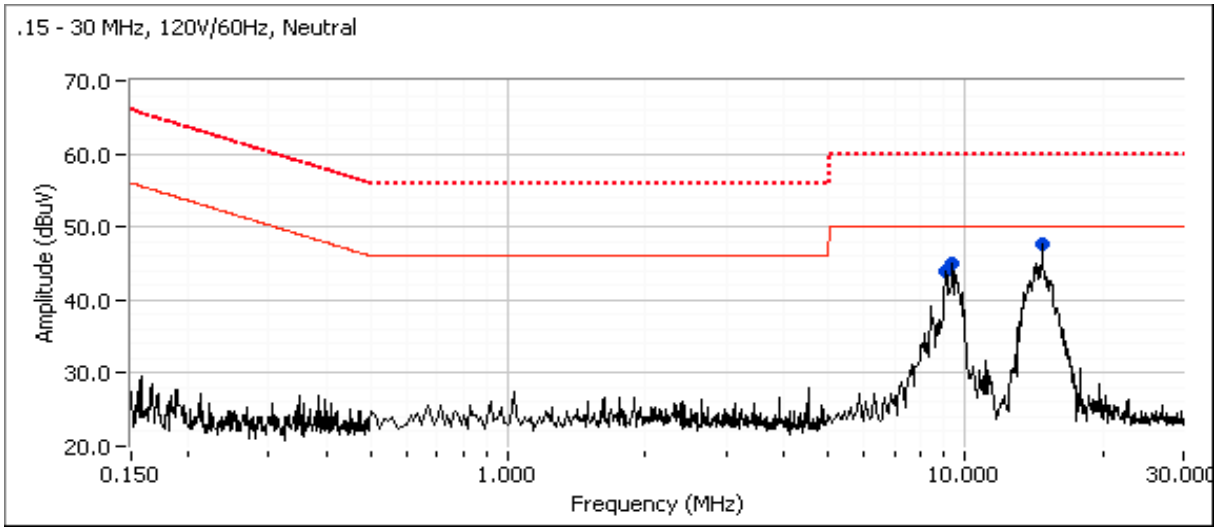
## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | B |

**Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/50Hz**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | B |

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

| Frequency | Level | AC | Class B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| *2.739* | *30.4* | Line 1 | *46.0* | *-15.6* | *Peak* | |
| *4.528* | *31.8* | Line 1 | *46.0* | *-14.2* | *Peak* | |
| 9.571 | 41.2 | Line 1 | 50.0 | -8.8 | Peak | |
| 14.272 | 44.9 | Line 1 | 50.0 | -5.1 | Peak | |
| 14.925 | 45.4 | Line 1 | 50.0 | -4.6 | Peak | |
| 9.073 | 44.0 | Neutral | 50.0 | -6.0 | Peak | |
| 9.336 | 44.9 | Neutral | 50.0 | -5.1 | Peak | |
| 14.758 | 47.7 | Neutral | 50.0 | -2.3 | Peak | |

**Final quasi-peak and average readings**

| Frequency | Level | AC | Class B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| **14.758** | **40.6** | Neutral | 50.0 | **-9.4** | AVG | AVG (0.100s) |
| 14.272 | 40.1 | Line 1 | 50.0 | -9.9 | AVG | AVG (0.100s) |
| 14.925 | 35.7 | Line 1 | 50.0 | -14.3 | AVG | AVG (0.100s) |
| 14.272 | 44.8 | Line 1 | 60.0 | -15.2 | QP | QP (1.000s) |
| 9.336 | 34.6 | Neutral | 50.0 | -15.4 | AVG | AVG (0.100s) |
| 14.758 | 44.6 | Neutral | 60.0 | -15.4 | QP | QP (1.000s) |
| 9.073 | 32.7 | Neutral | 50.0 | -17.3 | AVG | AVG (0.100s) |
| 9.571 | 32.6 | Line 1 | 50.0 | -17.4 | AVG | AVG (0.100s) |
| 14.925 | 42.4 | Line 1 | 60.0 | -17.6 | QP | QP (1.000s) |
| 9.073 | 39.9 | Neutral | 60.0 | -20.1 | QP | QP (1.000s) |
| 9.336 | 39.7 | Neutral | 60.0 | -20.3 | QP | QP (1.000s) |
| 9.571 | 37.9 | Line 1 | 60.0 | -22.1 | QP | QP (1.000s) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | B |

# Radiated Emissions 30-1000 MHz, Wireless Module (FCC 15.247/RSS 210)

***(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: 9/28/2010
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Config. Used: Modular Test
Config Change: None
Host Unit Voltage 120V/60Hz

## General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

## Ambient Conditions:

Temperature: 21.9 °C
Rel. Humidity: 42 %

## Summary of Results

**MAC Address: 00150079AD1A DRTU Tool Version 1.2.12-0197 Driver version 14.0.0.39**

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | Radiated Emissions 30 - 1000 MHz | FCC 15.209 / RSS 210 | Pass | 41.2dBµV/m @ 662.52MHz (-4.8dB) |

**Note - preliminary measurements indicated that the radiated emissions from the combination of test fixture and EUT were not affected by the modules operating frequency or mode (transmit versus receive mode). The system was therefore evaluated against the most stringent set of limits from FCC 15.247, FCC 15E and RSS 210 with the device operating at max power (16.5dBm) on Chain A at 2437MHz, 802.11b mode and max power (7dBm) on the top channel in Bluetooth mode (1Mb/s data**

## Modifications Made During Testing

No modifications were made to the EUT during testing

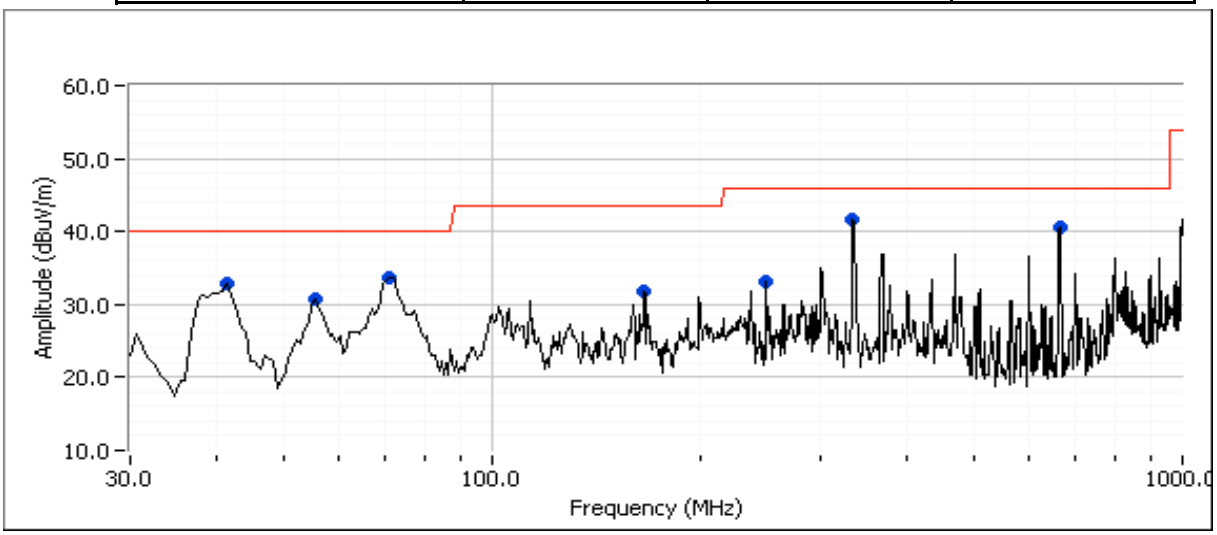
## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | B |

**Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz**
**Configured to TX , 802.11b 16.5dBm on each chain (settings 23.5) on channel 6, Bluetooth 7dBm, 1Mb/s (settings 8.0)**

| Frequency Range | Test Distance | Limit Distance | Extrapolation Factor |
|---|---|---|---|
| 30 - 1000 MHz | 3 | 3 | 0.0 |




**Preliminary peak readings captured during pre-scan**

| Frequency | Level | Pol | FCC 15.209 / RSS 210 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 39.869 | 33.0 | V | 40.0 | -7.0 | Peak | 185 | 2.5 | |
| 55.317 | 30.8 | V | 40.0 | -9.2 | Peak | 333 | 1.0 | |
| 70.276 | 33.6 | V | 40.0 | -6.4 | Peak | 40 | 1.0 | |
| 166.249 | 31.8 | V | 43.5 | -11.7 | Peak | 202 | 1.0 | |
| 250.000 | 33.1 | H | 46.0 | -12.9 | Peak | 154 | 1.5 | |
| 299.217 | 36.3 | H | 46.0 | -9.7 | Peak | 172 | 1.0 | |
| 332.857 | 41.7 | H | 46.0 | -4.3 | Peak | 116 | 1.0 | |
| 662.560 | 40.5 | V | 46.0 | -5.5 | Peak | 44 | 1.0 | |

**Maximized quasi-peak readings (includes manipulation of EUT interface cables)**

| Frequency | Level | Pol | FCC 15.209 / RSS 210 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 662.515 | 41.2 | V | 46.0 | -4.8 | QP | 44 | 1.0 | QP (1.000s) |
| 332.857 | 36.9 | H | 46.0 | -9.1 | QP | 116 | 1.0 | QP (1.000s) |
| 39.869 | 29.7 | V | 40.0 | -10.3 | QP | 185 | 2.5 | QP (1.000s) |
| 70.276 | 29.3 | V | 40.0 | -10.7 | QP | 40 | 1.0 | QP (1.000s) |
| 55.317 | 27.1 | V | 40.0 | -12.9 | QP | 333 | 1.0 | QP (1.000s) |
| 166.249 | 27.3 | V | 43.5 | -16.2 | QP | 202 | 1.0 | QP (1.000s) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

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

## Summary of Results

**MAC Address: 00150079AD1A DRTU Tool Version 1.2.12-0197 New tool from 9/14 Driver version 14.0.0.39**

| Run # | Mode | Channel | Power Setting | Measured Power | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| Run #1 | n40 Chain A | #38 5190MHz | 16.5 | **12.5** | Restricted Band Edge at 5150 MHz | 15.209 | 52.5dBµV/m @ 5150.0MHz (-1.5dB) |
| Run #1 | n40 Chain A | #62 5310MHz | 16.5 | **11.5** | Restricted Band Edge at 5350 MHz | 15.209 | 52.2dBµV/m @ 5350.0MHz (-1.8dB) |
| Run #1 | n40 Chain A | #102 5510MHz | 16.5 | **15.8** | Restricted Band Edge at 5460 MHz | 15.209 | 53.0dBµV/m @ 5460.0MHz (-1.0dB) |
| | | | | | Band Edge at 5470 MHz | 15 E | 60.5dBµV/m @ 5470.0MHz (-7.8dB) |
| Run #1 | n40 Chain A | #134 5670MHz | 16.5 | 16.5 | Band Edge at 5725 MHz | 15 E | 47.6dBµV/m @ 5725.0MHz (-20.7dB) |
| Run # 2 | n20 Chain A | #36 5180MHz | 16.5 | **15.9** | Restricted Band Edge at 5150 MHz | 15.209 | 51.6dBµV/m @ 5150.0MHz (-2.4dB) |
| Run # 2 | n20 Chain A | #64 5320MHz | 16.5 | 16.7 | Restricted Band Edge at 5350 MHz | 15.209 | 48.7dBµV/m @ 5350.0MHz (-5.3dB) |
| Run # 2 | n20 Chain A | #100 5500MHz | 16.5 | 16.7 | Restricted Band Edge at 5460 MHz | 15.209 | 44.3dBµV/m @ 5460.0MHz (-9.7dB) |
| | | | | | Band Edge at 5470 MHz | 15 E | 50.4dBµV/m @ 5470.0MHz (-17.9dB) |
| Run # 2 | n20 Chain A | #140 5700MHz | 16.5 | 16.7 | Band Edge at 5725 MHz | 15 E | 54.6dBµV/m @ 5725.0MHz (-13.7dB) |
| Run # 3 | 802.11a Chain A | #36 5180MHz | 16.5 | 16.5 | Restricted Band Edge at 5150 MHz | 15.209 | 50.1dBµV/m @ 5150.0MHz (-3.9dB) |
| Run # 3 | 802.11a Chain A | #64 5320MHz | 16.5 | 16.7 | Restricted Band Edge at 5350 MHz | 15.209 | 48.5dBµV/m @ 5350.0MHz (-5.5dB) |
| Run # 3 | 802.11a Chain A | #100 5500MHz | 16.5 | 16.6 | Restricted Band Edge at 5460 MHz | 15.209 | 44.2dBµV/m @ 5459.9MHz (-9.8dB) |
| | | | | | Band Edge at 5470 MHz | 15 E | 50.7dBµV/m @ 5470.0MHz (-17.6dB) |
| Run # 3 | 802.11a Chain A | #140 5700MHz | 16.5 | 16.7 | Band Edge at 5725 MHz | 15 E | 51.1dBµV/m @ 5725.0MHz (-17.2dB) |

Note - the target and measured power are average powers (measured with average power sensor) and are used for reference purposes only. Power is set using " **GAIN CONTROL**" mode in the DRTU tool.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

## Test Specific Details

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

## General Test Configuration

The EUT ws installed into a test fixture such that the EUT was exposed (i.e. outside of a host PC).
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

## Ambient Conditions:

| | | |
|---|---|---|
| Rel. Humidity: | 15 - 55 | % |
| Temperature: | 18 - 25 | °C |

## Modifications Made During Testing

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

## Marker Delta Measurements

Three sets of marker deltas are measured using the following settings: RB=VB=100kHz; RB=1MHz,VB=1MHz; RB=1MHz, VB=10Hz.
Marker deltas are made conducted (analyzer connected to EUT rf port a 20dB pad) for single chain operation.
The fundamental field strength is always measured at a 3m test distance.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1, Band Edge Field Strength - n40, Chain A**
**Run #1a, EUT on Channel #38 5190MHz - n40, Chain A**

Date of Test: 9/22/2010 Test Location: FT Chamber#7
Test Engineer: Joseph Cadigal Config Change: none

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 12.5 | 21.0 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5193.000 | 90.9 | V | - | - | AVG | 184 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5193.670 | 98.7 | V | - | - | PK | 184 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5193.070 | 91.3 | H | - | - | AVG | 304 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5191.400 | 99.2 | H | - | - | PK | 304 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

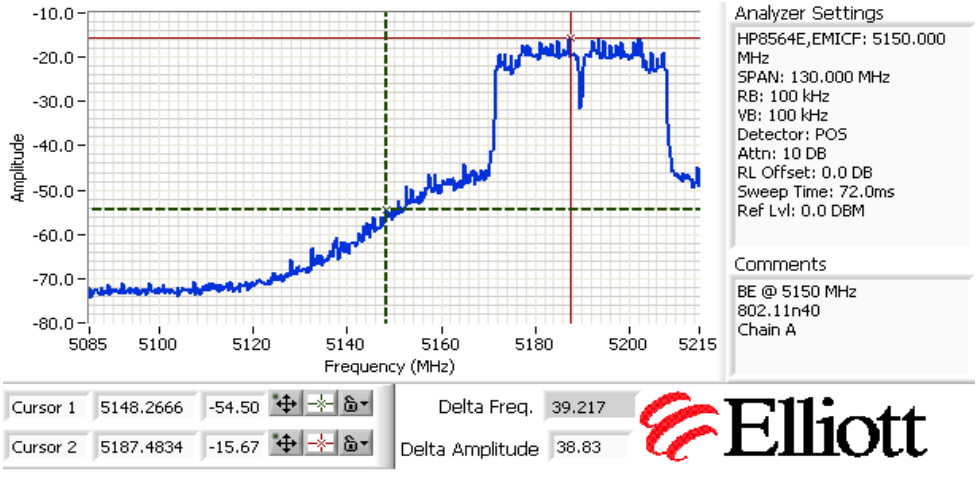
***5150 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 99.2 | 98.7 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 91.3 | 90.9 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **38.8** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 60.4 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 52.5 dBuV/m | | |

| | Margin | Level | Limit | Detector |
|---|---|---|---|---|
| *Delta Marker - 1MHz/1MHz:* | -1.5 | 52.5 | 54 | Avg |
| *Delta Marker - 1MHz/10Hz:* | -13.6 | 60.4 | 74 | Pk |

| | | |
|---|---|---|
| Calculated Band-Edge Measurement (Peak): | 65.2 dBuV/m | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 53.0 dBuV/m | Using 100kHz delta value |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5150.000** | **52.5** | - | 54.0 | **-1.5** | Avg | - | - | Using 100kHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1b, EUT on Channel #62 5310MHz - n40, Chain A**

Date of Test: 9/22/2010 Test Location: FT Chamber #7

Test Engineer: Joseph Cadigal Config Change: none

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 11.5 | 21.0 |

***Fundamental Signal Field Strength***

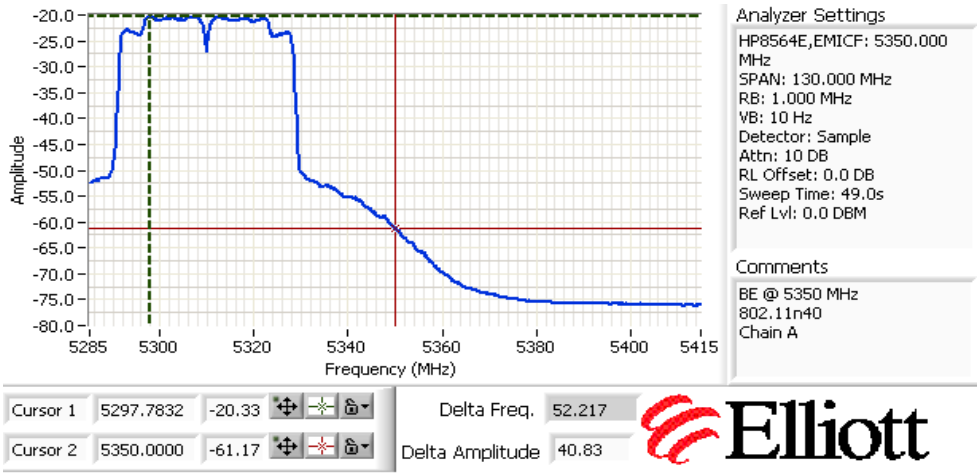
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5312.730 | 89.4 | V | - | - | AVG | 305 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5316.870 | 97.2 | V | - | - | PK | 305 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5307.000 | 93.0 | H | - | - | AVG | 305 | 1.3 | RB 1 MHz;VB 10 Hz;Pk |
| 5303.670 | 101.1 | H | - | - | PK | 305 | 1.3 | RB 1 MHz;VB 3 MHz;Pk |

***5350 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 101.1 | 97.2 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 93.0 | 89.4 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *39.5 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 61.6 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 53.5 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *36.2 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **40.8** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 64.9 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 52.2 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -1.8 | 52.2 | 54 | Avg |
| -12.4 | 61.6 | 74 | Pk |

| 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** | - | 54.0 | **-1.8** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1c, EUT on Channel #102 5510MHz - n40, Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 15.8 | 28.5 |

***Fundamental Signal Field Strength***

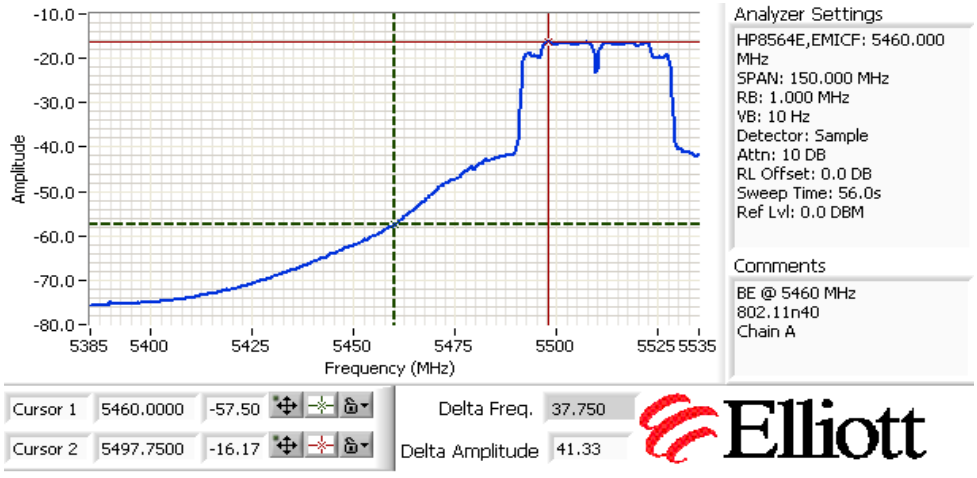
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5513.130 | 94.2 | V | - | - | AVG | 177 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5517.330 | 102.5 | V | - | - | PK | 177 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5497.530 | 94.3 | H | - | - | AVG | 224 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5497.270 | 102.7 | H | - | - | PK | 224 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

***5460 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 102.7 | 102.5 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 94.3 | 94.2 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *40.0 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 62.7 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 54.3 dBuV/m | | |

| | | Margin | Level | Limit | Detector |
|---|---|---|---|---|---|
| *Delta Marker - 1MHz/1MHz:* | *35.5 dB* | -1.0 | 53.0 | 54 | Avg |
| *Delta Marker - 1MHz/10Hz:* | ***41.3*** *dB* | -11.3 | 62.7 | 74 | Pk |
| Calculated Band-Edge Measurement (Peak): | 67.2 dBuV/m | Using 100kHz delta value | | | |
| Calculated Band-Edge Measurement (Avg): | 53.0 dBuV/m | Using 1MHz delta value | | | |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5460.000** | **53.0** | - | 54.0 | **-1.0** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

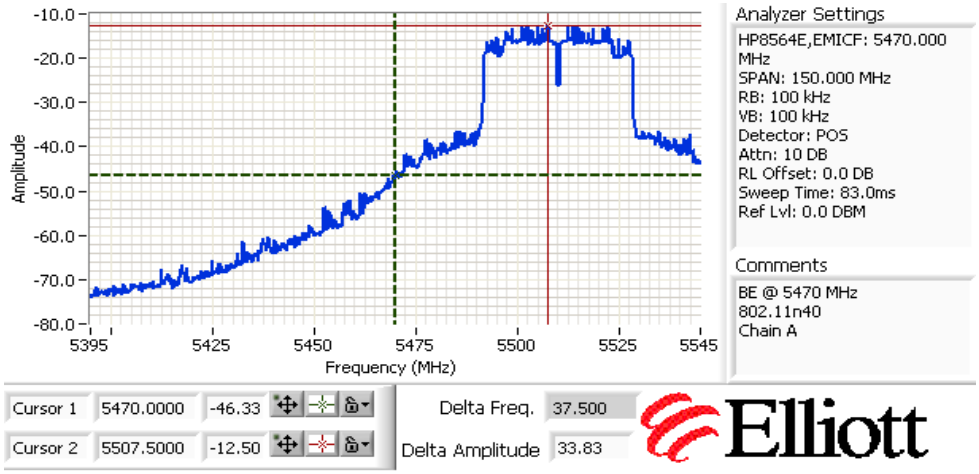
***5470 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 102.7 | 102.5 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 94.3 | 94.2 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **33.8** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 68.9 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 60.5 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *31.0 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | *33.7 dB* | | |
| Calculated Band-Edge Measurement (Peak): | 71.7 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 60.6 dBuV/m | | Using 100kHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -7.8 | 60.5 | 68.3 | Avg |
| -19.4 | 68.9 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5470.000** | **60.5** | - | 68.3 | **-7.8** | Avg | - | - | Using 100kHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1d, EUT on Channel #134 5670MHz - n40, Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.5 | 29.5 |

***Fundamental Signal Field Strength***

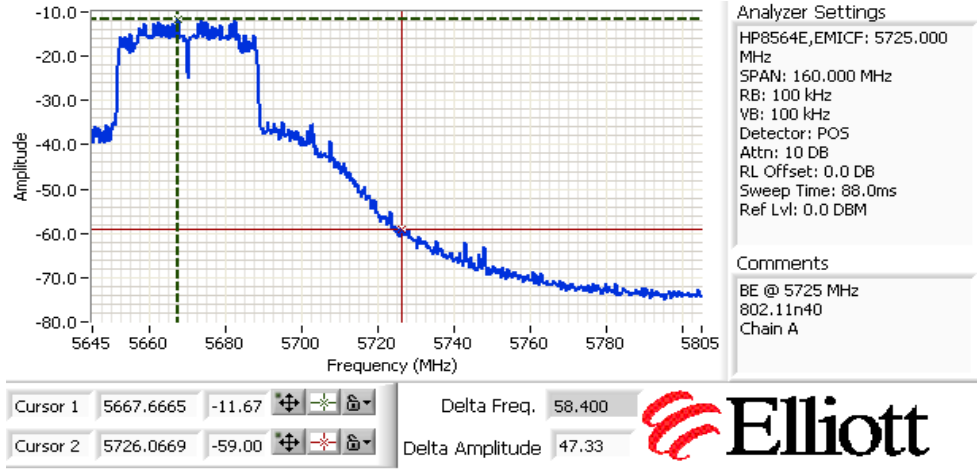
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5657.730 | 94.9 | V | - | - | AVG | 209 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5657.800 | 103.4 | V | - | - | PK | 209 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5661.930 | 93.8 | H | - | - | AVG | 346 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5664.000 | 102.3 | H | - | - | PK | 346 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

***5725 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 102.3 | 103.4 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 93.8 | 94.9 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **47.3** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 56.1 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 47.6 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *42.2 dB* | | -20.7 47.6 68.3 Avg |
| *Delta Marker - 1MHz/10Hz:* | *46.7 dB* | | -32.2 56.1 88.3 Pk |
| Calculated Band-Edge Measurement (Peak): | 61.2 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 48.2 dBuV/m | | Using 100kHz delta value |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5725.000** | **47.6** | - | 68.3 | **-20.7** | Avg | - | - | Using 100kHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2, Band Edge Field Strength - n20, Chain A**
**Run # 2a, EUT on Channel #36 5180MHz - n20, Chain A**

Date of Test: 9/22/2010 Test Location: FT Chamber#7
Test Engineer: Joseph Cadigal Config Change: none

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 15.9 | 24.5 |

***Fundamental Signal Field Strength***

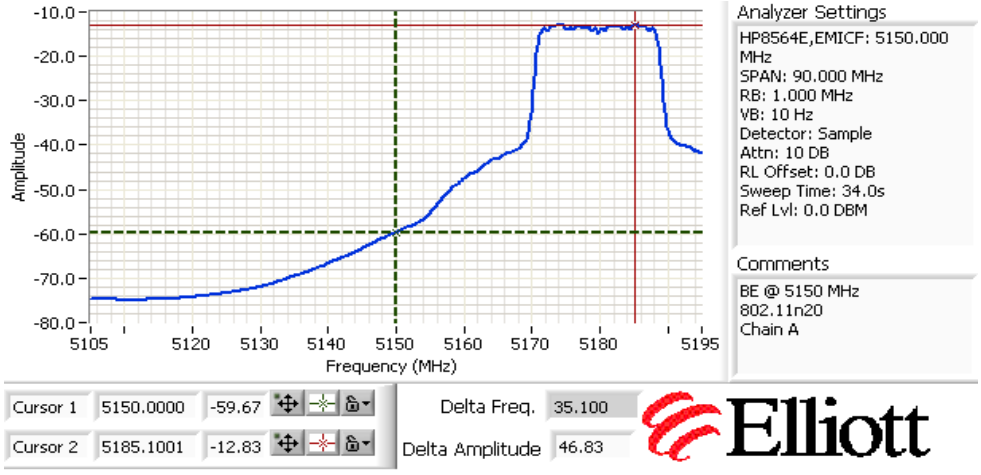
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5173.030 | 96.3 | V | - | - | AVG | 183 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5173.270 | 104.4 | V | - | - | PK | 183 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5173.070 | 98.4 | H | - | - | AVG | 305 | 1.4 | RB 1 MHz;VB 10 Hz;Pk |
| 5174.530 | 106.7 | H | - | - | PK | 305 | 1.4 | RB 1 MHz;VB 3 MHz;Pk |

***5150 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 106.7 | 104.4 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.4 | 96.3 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *46.5 dB* | | <- this can only be used if band edge signal is |
| Calculated Band-Edge Measurement (Peak): | 60.2 dBuV/m | | highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Avg): | 51.9 dBuV/m | | |

| | Margin | Level | Limit | Detector |
|---|---|---|---|---|
| *Delta Marker - 1MHz/1MHz:* | *41.0 dB* | -2.4 | 51.6 | 54 | Avg |
| *Delta Marker - 1MHz/10Hz:* | **46.8** *dB* | -13.8 | 60.2 | 74 | Pk |
| Calculated Band-Edge Measurement (Peak): | 65.7 dBuV/m | Using 100kHz delta value | | | |
| Calculated Band-Edge Measurement (Avg): | 51.6 dBuV/m | Using 1MHz delta value | | | |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5150.000** | **51.6** | - | 54.0 | **-2.4** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2b, EUT on Channel #64 5320MHz - n20, Chain A**

Date of Test: 9/22/2010 Test Location: FT Chamber #7

Test Engineer: Joseph Cadigal Config Change: none

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.7 | 26.5 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5313.130 | 95.5 | V | - | - | AVG | 163 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5315.200 | 103.5 | V | - | - | PK | 163 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5313.070 | 98.7 | H | - | - | AVG | 348 | 1.4 | RB 1 MHz;VB 10 Hz;Pk |
| 5312.930 | 106.5 | H | - | - | PK | 348 | 1.4 | RB 1 MHz;VB 3 MHz;Pk |

***5350 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 106.5 | 103.5 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.7 | 95.5 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *50.0 dB* | | <- this can only be used if band edge signal is |
| Calculated Band-Edge Measurement (Peak): | 56.5 dBuV/m | | highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Avg): | 48.7 dBuV/m | | |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -5.3 | 48.7 | 54 | Avg |
| -17.5 | 56.5 | 74 | Pk |

| | | |
|---|---|---|
| *Delta Marker - 1MHz/1MHz:* | *41.7 dB* | |
| *Delta Marker - 1MHz/10Hz:* | *50.0 dB* | |
| Calculated Band-Edge Measurement (Peak): | 64.8 dBuV/m | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 48.7 dBuV/m | Using 1MHz delta value |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5350.000** | **48.7** | - | 54.0 | **-5.3** | Avg | - | - | Using 1MHz delta value |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2c, EUT on Channel #100 5500MHz - n20, Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.7 | 28.0 |

***Fundamental Signal Field Strength***

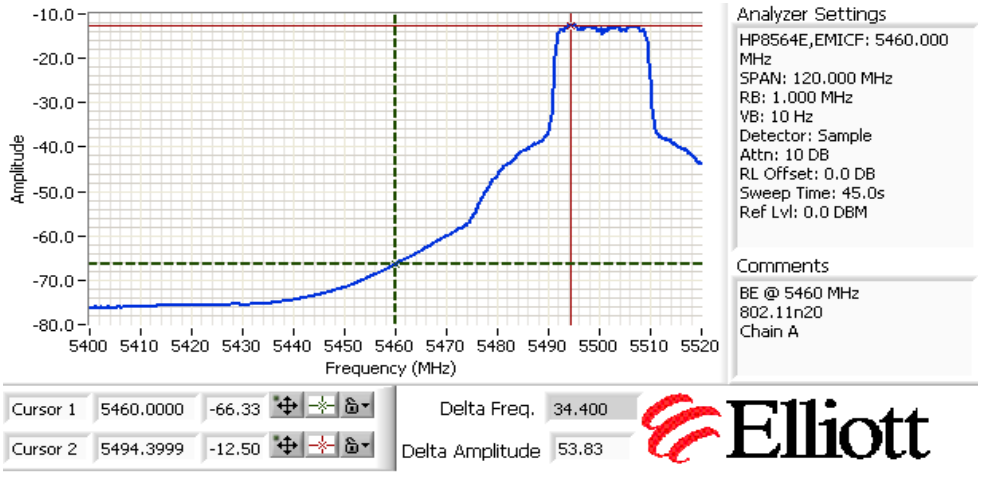
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5506.830 | 95.8 | V | - | - | AVG | 42 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5507.700 | 104.0 | V | - | - | PK | 42 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5493.170 | 98.1 | H | - | - | AVG | 224 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5493.230 | 106.1 | H | - | - | PK | 224 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

***5460 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 106.1 | 104.0 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.1 | 95.8 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *53.5 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 52.6 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 44.6 dBuV/m | | |

| | | Margin | Level | Limit | Detector |
|---|---|---|---|---|---|
| *Delta Marker - 1MHz/1MHz:* | *45.8 dB* | -9.7 | 44.3 | 54 | Avg |
| *Delta Marker - 1MHz/10Hz:* | **53.8** *dB* | -21.4 | 52.6 | 74 | Pk |
| Calculated Band-Edge Measurement (Peak): | 60.3 dBuV/m | Using 100kHz delta value | | | |
| Calculated Band-Edge Measurement (Avg): | 44.3 dBuV/m | Using 1MHz delta value | | | |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5460.000** | **44.3** | - | 54.0 | **-9.7** | Avg | - | - | Using 1MHz delta value |



# EMC Test Data

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

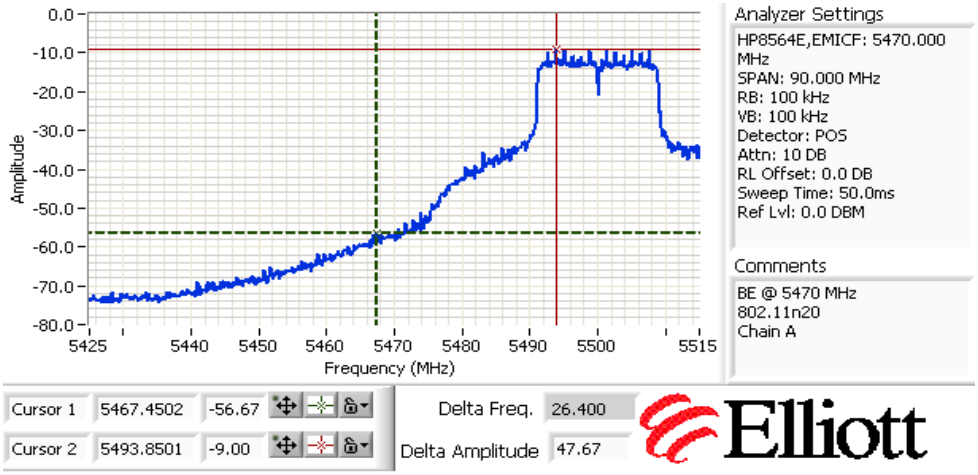
***5470 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 106.1 | 104.0 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.1 | 95.8 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **47.7** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 58.4 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 50.4 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *41.7 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | *47.2 dB* | | |
| Calculated Band-Edge Measurement (Peak): | 64.4 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 50.9 dBuV/m | | Using 100kHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -17.9 | 50.4 | 68.3 | Avg |
| -29.9 | 58.4 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5470.000** | **50.4** | - | 68.3 | **-17.9** | Avg | - | - | Using 100kHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2d, EUT on Channel #140 5700MHz - n20, Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.7 | 29.0 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5693.000 | 95.9 | V | - | - | AVG | 212 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5693.170 | 104.4 | V | - | - | PK | 212 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5705.430 | 95.5 | H | - | - | AVG | 302 | 1.4 | RB 1 MHz;VB 10 Hz;Pk |
| 5706.430 | 103.8 | H | - | - | PK | 302 | 1.4 | RB 1 MHz;VB 3 MHz;Pk |

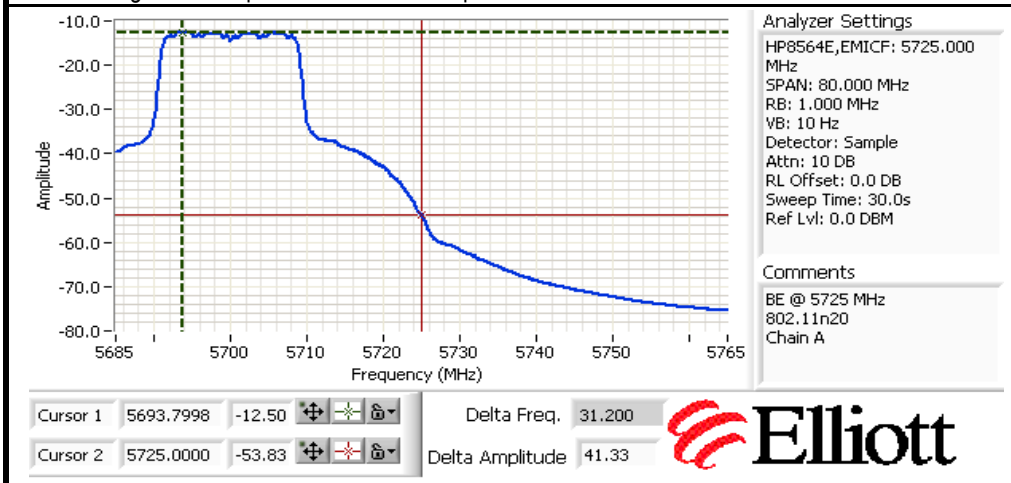
***5725 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 103.8 | 104.4 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 95.5 | 95.9 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *39.3 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 65.1 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 56.6 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *34.2 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **41.3** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 70.2 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 54.6 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -13.7 | 54.6 | 68.3 | Avg |
| -23.2 | 65.1 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5725.000** | **54.6** | - | 68.3 | **-13.7** | Avg | - | - | Using 1MHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3, Band Edge Field Strength - 802.11a, Chain A**
**Run # 3a, EUT on Channel #36 5180MHz - 802.11a, Chain A**

Date of Test: 9/23/2010 Test Location: FT#7
Test Engineer: Mark H Config Change: none

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.5 | 24.5 |

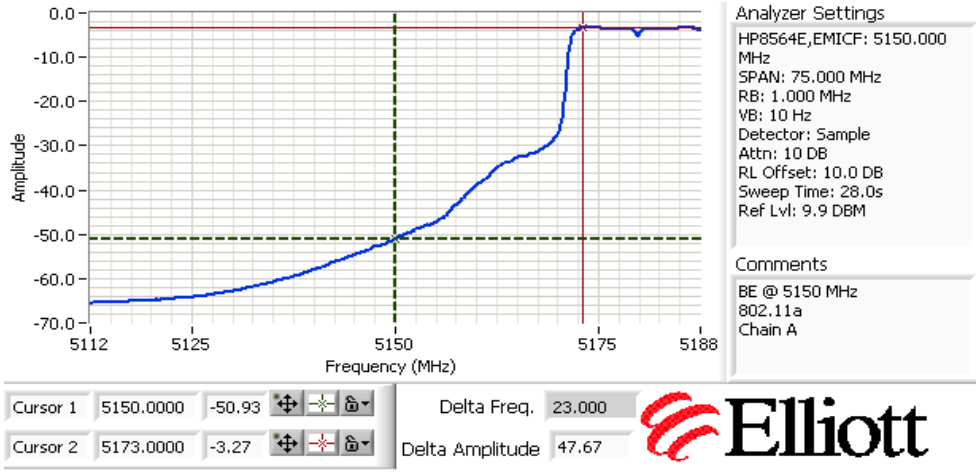
***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5186.830 | 97.0 | V | - | - | AVG | 192 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5186.800 | 105.0 | V | - | - | PK | 192 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5173.030 | 97.8 | H | - | - | AVG | 342 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5173.630 | 105.8 | H | - | - | PK | 342 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

***5150 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 105.8 | 105.0 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 97.8 | 97.0 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *47.6 dB* | | <- this can only be used if band edge signal is |
| Calculated Band-Edge Measurement (Peak): | 58.2 dBuV/m | | highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Avg): | 50.2 dBuV/m | | Margin / Level / Limit / Detector |
| *Delta Marker - 1MHz/1MHz:* | *42.7 dB* | | -3.9 / 50.1 / 54 / Avg |
| *Delta Marker - 1MHz/10Hz:* | ***47.7*** *dB* | | -15.8 / 58.2 / 74 / Pk |
| Calculated Band-Edge Measurement (Peak): | 63.1 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 50.1 dBuV/m | | Using 1MHz delta value |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5150.000 | 50.1 | - | 54.0 | **-3.9** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3b, EUT on Channel #64 5320MHz - 802.11a, Chain A**

Date of Test: 9/23/2010 Test Location: FT#7

Test Engineer: Mark H Config Change: none

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.7 | 26.0 |

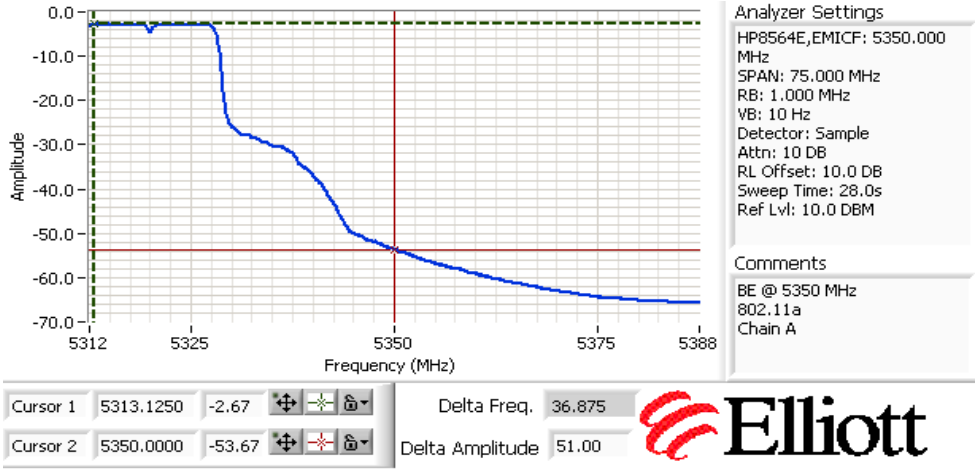
***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5313.100 | 94.8 | V | - | - | AVG | 148 | 1.3 | RB 1 MHz;VB 10 Hz;Pk |
| 5313.770 | 102.9 | V | - | - | PK | 148 | 1.3 | RB 1 MHz;VB 3 MHz;Pk |
| 5313.170 | 99.5 | H | - | - | AVG | 307 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5313.370 | 107.9 | H | - | - | PK | 307 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

***5350 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 107.9 | 102.9 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 99.5 | 94.8 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *50.5 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 57.4 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 49.0 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *45.5 dB* | | -5.5 48.5 54 Avg |
| *Delta Marker - 1MHz/10Hz:* | **51.0** *dB* | | -16.6 57.4 74 Pk |
| Calculated Band-Edge Measurement (Peak): | 62.4 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 48.5 dBuV/m | | Using 1MHz delta value |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5350.000 | 48.5 | - | 54.0 | **-5.5** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3c, EUT on Channel #100 5500MHz - 802.11a, Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.6 | 27.5 |

***Fundamental Signal Field Strength***

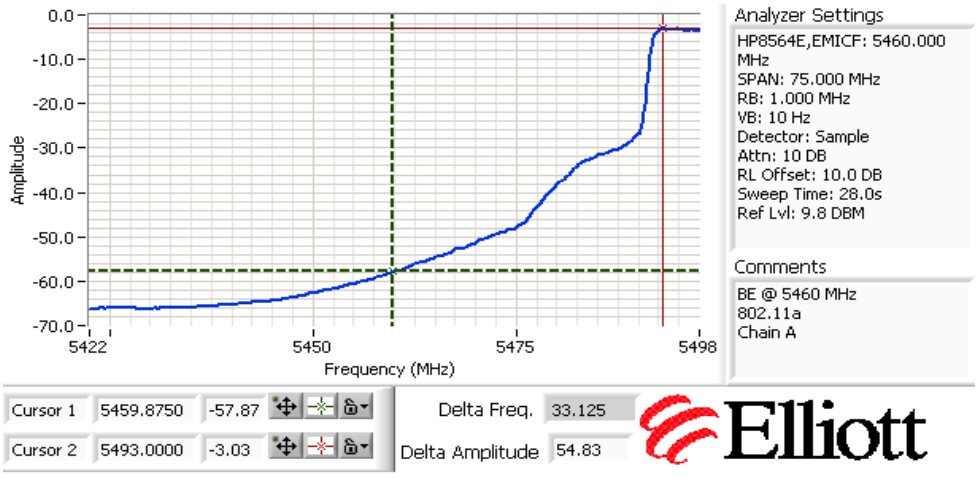
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5492.970 | 98.7 | V | - | - | AVG | 177 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5493.730 | 106.7 | V | - | - | PK | 177 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5493.200 | 99.0 | H | - | - | AVG | 225 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5492.900 | 107.2 | H | - | - | PK | 225 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

***5460 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 107.2 | 106.7 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 99.0 | 98.7 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *51.7 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 55.5 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 47.3 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *48.5 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **54.8** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 58.7 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 44.2 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -9.8 | 44.2 | 54 | Avg |
| -18.5 | 55.5 | 74 | Pk |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5459.870 | 44.2 | - | 54.0 | **-9.8** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

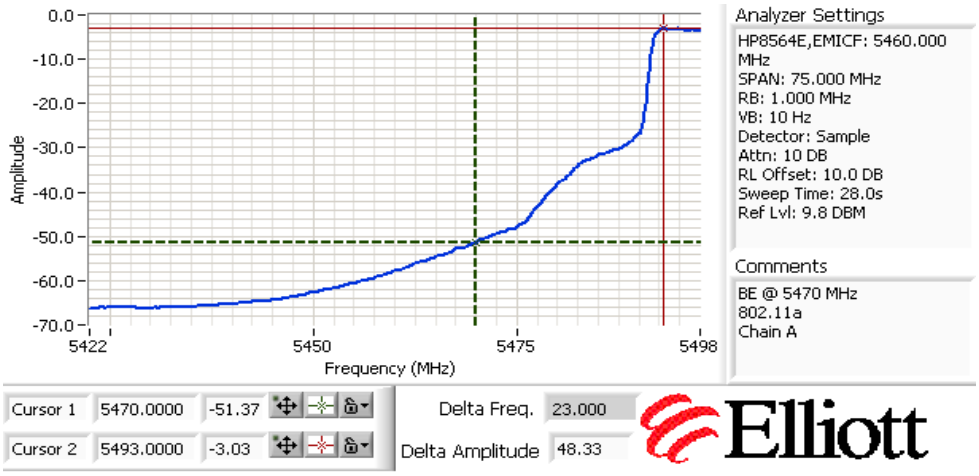
***5470 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 107.2 | 106.7 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 99.0 | 98.7 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *46.7 dB* | | <- this can only be used if band edge signal is |
| Calculated Band-Edge Measurement (Peak): | 60.5 dBuV/m | | highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Avg): | 52.3 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *42.5 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | ***48.3*** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 64.7 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 50.7 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -17.6 | 50.7 | 68.3 | Avg |
| -27.8 | 60.5 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5470.000 | 50.7 | - | 68.3 | **-17.6** | Avg | - | - | Using 1MHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3d, EUT on Channel #140 5700MHz - 802.11a, Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.7 | 28.5 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5693.070 | 97.4 | V | - | - | AVG | 200 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5693.030 | 105.7 | V | - | - | PK | 200 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5693.200 | 95.6 | H | - | - | AVG | 230 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5694.230 | 105.0 | H | - | - | PK | 230 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

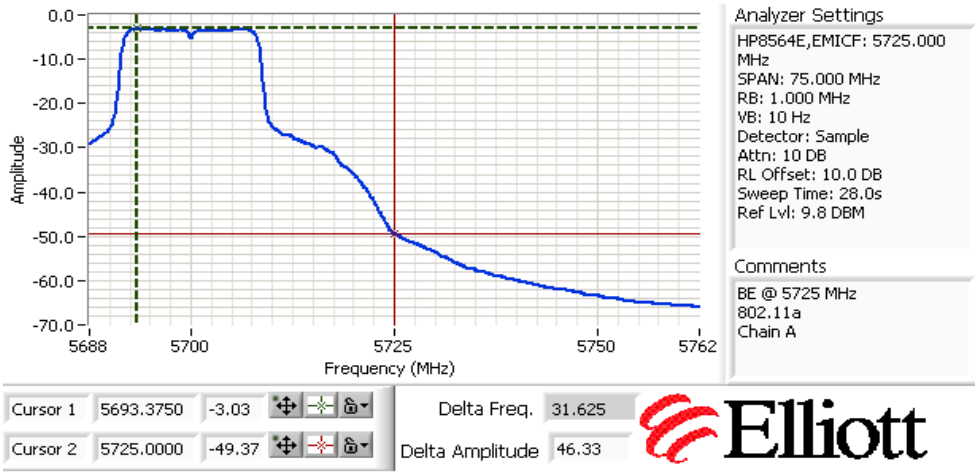
***5725 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 105.0 | 105.7 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 95.6 | 97.4 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *44.5 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 61.2 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 52.9 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *34.8 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **46.3** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 70.9 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 51.1 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -17.2 | 51.1 | 68.3 | Avg |
| -27.1 | 61.2 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5725.000 | 51.1 | - | 68.3 | **-17.2** | Avg | - | - | Using 1MHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

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

## Summary of Results

**MAC Address: 00150079AD1A DRTU Tool Version 1.2.12-0197 New tool from 9/14 Driver version 14.0.0.39**

| Run # | Mode | Channel | Power Setting | Measured Power | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| Run #1 | n40 Chain B | #38 5190MHz | 16.5 | **13.1** | Restricted Band Edge at 5150 MHz | 15.209 | 52.8dBµV/m @ 5148.7MHz (-1.2dB) |
| | n40 Chain B | #62 5310MHz | 16.5 | **13.0** | Restricted Band Edge at 5350 MHz | 15.209 | 51.8dBµV/m @ 5350.0MHz (-2.2dB) |
| | n40 Chain B | #102 5510MHz | 16.5 | **15.7** | Restricted Band Edge at 5460 MHz | 15.209 | 51.4dBµV/m @ 5460.0MHz (-2.6dB) |
| | | | | | Band Edge at 5470 MHz | 15 E | 57.8dBµV/m @ 5468.3MHz (-10.5dB) |
| | n40 Chain B | #134 5670MHz | 16.5 | 16.6 | Band Edge at 5725 MHz | 15 E | 50.3dBµV/m @ 5725.0MHz (-18.0dB) |
| Run # 2 | n20 Chain B | #36 5180MHz | 16.5 | 16.7 | Restricted Band Edge at 5150 MHz | 15.209 | 52.4dBµV/m @ 5150.0MHz (-1.6dB) |
| | n20 Chain B | #64 5320MHz | 16.5 | 16.6 | Restricted Band Edge at 5350 MHz | 15.209 | 48.1dBµV/m @ 5350.0MHz (-5.9dB) |
| | n20 Chain B | #100 5500MHz | 16.5 | 16.7 | Restricted Band Edge at 5460 MHz | 15.209 | 46.0dBµV/m @ 5459.8MHz (-8.0dB) |
| | | | | | Band Edge at 5470 MHz | 15 E | 52.3dBµV/m @ 5469.8MHz (-16.0dB) |
| | n20 Chain B | #140 5700MHz | 16.5 | 16.6 | Band Edge at 5725 MHz | 15 E | 56.7dBµV/m @ 5725.0MHz (-11.6dB) |
| Run # 3 | 802.11a Chain B | #36 5180MHz | 16.5 | 16.5 | Restricted Band Edge at 5150 MHz | 15.209 | 51.0dBµV/m @ 5149.3MHz (-3.0dB) |
| | 802.11a Chain B | #64 5320MHz | 16.5 | 16.8 | Restricted Band Edge at 5350 MHz | 15.209 | 46.6dBµV/m @ 5350.0MHz (-7.4dB) |
| | 802.11a Chain B | #100 5500MHz | 16.5 | 16.7 | Restricted Band Edge at 5460 MHz | 15.209 | 44.6dBµV/m @ 5460.0MHz (-9.4dB) |
| | | | | | Band Edge at 5470 MHz | 15 E | 50.8dBµV/m @ 5470.0MHz (-17.5dB) |
| | 802.11a Chain B | #140 5700MHz | 16.5 | 16.7 | Band Edge at 5725 MHz | 15 E | 50.8dBµV/m @ 5725.0MHz (-17.5dB) |

Note - the target and measured power are average powers (measured with average power sensor) and are used for reference purposes only. Power is set using " **GAIN CONTROL**" mode in the DRTU tool.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

## Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the

## General Test Configuration

The EUT ws installed into a test fixture such that the EUT was exposed (i.e. outside of a host PC).
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

## Ambient Conditions:

Rel. Humidity: 15 - 55 %
Temperature: 18 - 25 °C

## Modifications Made During Testing

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

## Marker Delta Measurements

Three sets of marker deltas are measured using the following settings: RB=VB=100kHz; RB=1MHz,VB=1MHz; RB=1MHz, VB=10Hz.
Marker deltas are made conducted (analyzer connected to EUT rf port a 20dB pad) for single chain operation.
The fundamental field strength is always measured at a 3m test distance.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1, Band Edge Field Strength - n40, Chain B**

Date of Test: 9/23/2010 Test Location: Chamber #7

Test Engineer: Mehran Birgani Config Change: None

**Run #1a, EUT on Channel #38 5190MHz - n40, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 13.1 | 20.5 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5202.330 | 91.7 | V | - | - | AVG | 324 | 1.0 | |
| 5197.330 | 99.8 | V | - | - | PK | 324 | 1.0 | |
| 5177.530 | 92.2 | H | - | - | AVG | 114 | 1.0 | |
| 5187.670 | 100.6 | H | - | - | PK | 114 | 1.0 | |

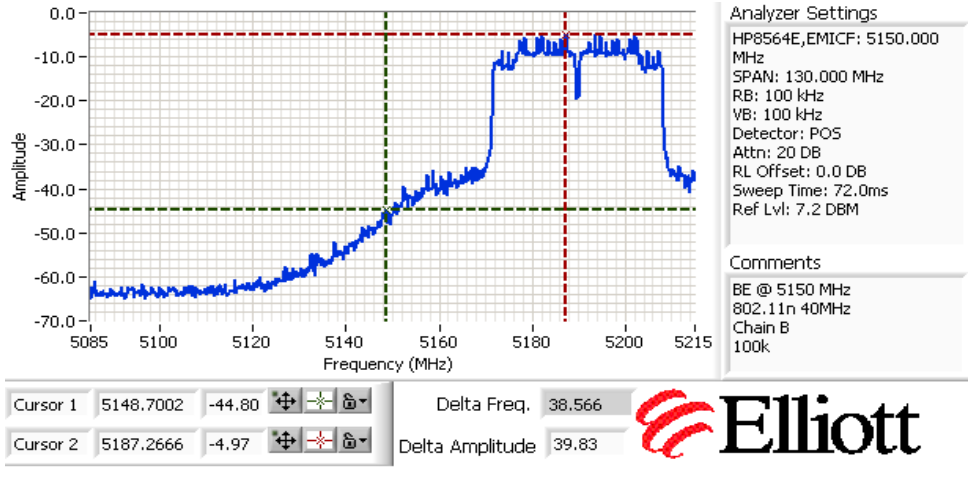
***5150 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 100.9 | 99.8 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 92.6 | 91.7 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **39.8** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 61.1 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 52.8 dBuV/m | | |

| | Margin | Level | Limit | Detector |
|---|---|---|---|---|
| *Delta Marker - 1MHz/1MHz:* | -1.2 | 52.8 | 54 | Avg |
| *Delta Marker - 1MHz/10Hz:* | -12.9 | 61.1 | 74 | Pk |

| | | |
|---|---|---|
| Calculated Band-Edge Measurement (Peak): | 66.4 dBuV/m | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 53.9 dBuV/m | Using 100kHz delta value |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5148.700** | **52.8** | - | 54.0 | **-1.2** | Avg | - | - | Using 100kHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1b, EUT on Channel #62 5310MHz - n40, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 13.0 | 21.5 |

***Fundamental Signal Field Strength***

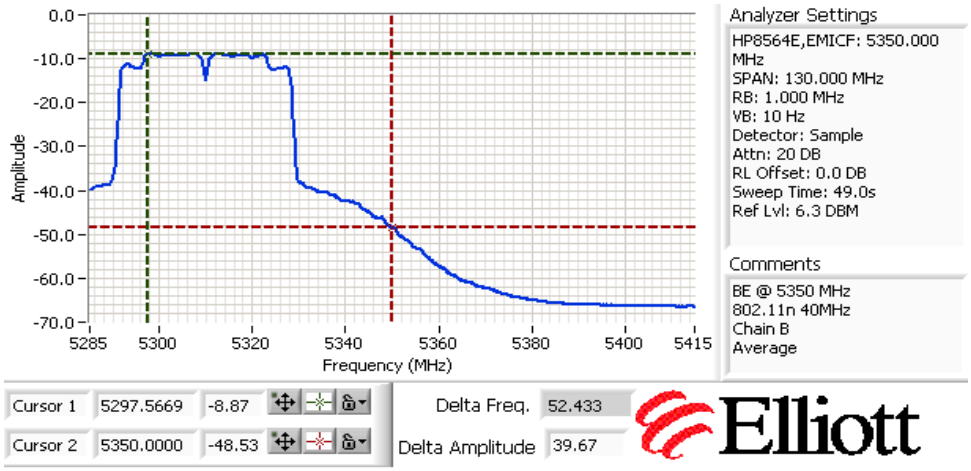
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5313.000 | 91.5 | V | - | - | AVG | 306 | 1.0 | |
| 5302.200 | 99.6 | V | - | - | PK | 306 | 1.0 | |
| 5307.000 | 89.6 | H | - | - | AVG | 258 | 1.0 | |
| 5308.530 | 97.9 | H | - | - | PK | 258 | 1.0 | |

***5350 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 97.9 | 99.6 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 89.6 | 91.5 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *39.3 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 60.3 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 52.2 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *36.7 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **39.7** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 62.9 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 51.8 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -2.2 | 51.8 | 54 | Avg |
| -13.7 | 60.3 | 74 | Pk |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5350.000** | **51.8** | - | 54.0 | **-2.2** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1c, EUT on Channel #102 5510MHz - n40, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 15.7 | 26.5 |

***Fundamental Signal Field Strength***

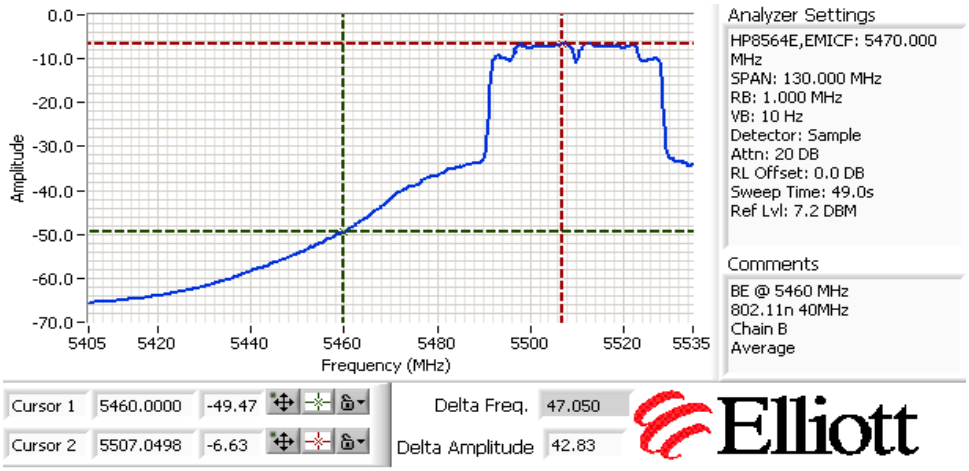
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5497.600 | 92.6 | V | - | - | AVG | 265 | 1.0 | |
| 5497.270 | 101.3 | V | - | - | PK | 265 | 1.0 | |
| 5513.130 | 94.2 | H | - | - | AVG | 110 | 1.0 | |
| 5508.000 | 102.3 | H | - | - | PK | 110 | 1.0 | |

***5460 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 102.3 | 101.3 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 94.2 | 92.6 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *41.2 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 61.1 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 53.0 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *38.7 dB* | | -2.6 |
| *Delta Marker - 1MHz/10Hz:* | **42.8** *dB* | | -12.9 |
| Calculated Band-Edge Measurement (Peak): | 63.6 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 51.4 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -2.6 | 51.4 | 54 | Avg |
| -12.9 | 61.1 | 74 | Pk |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5460.000** | **51.4** | - | 54.0 | **-2.6** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

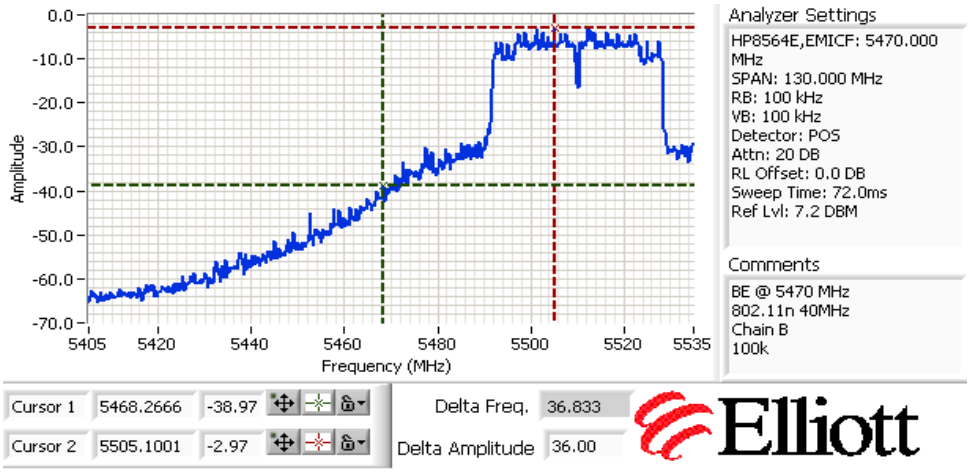
***5470 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 102.3 | 101.3 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 93.8 | 92.6 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **36.0** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 66.3 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 57.8 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *32.7 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | *35.3 dB* | | |
| Calculated Band-Edge Measurement (Peak): | 69.6 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 58.5 dBuV/m | | Using 100kHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -10.5 | 57.8 | 68.3 | Avg |
| -22.0 | 66.3 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5468.266** | **57.8** | - | 68.3 | **-10.5** | Avg | - | - | Using 100kHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1d, EUT on Channel #134 5670MHz - n40, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.6 | 30.0 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5682.330 | 95.6 | V | - | - | AVG | 305 | 1.0 | |
| 5667.800 | 104.3 | V | - | - | PK | 305 | 1.0 | |
| 5657.870 | 94.1 | H | - | - | AVG | 106 | 1.0 | |
| 5662.200 | 103.1 | H | - | - | PK | 106 | 1.0 | |

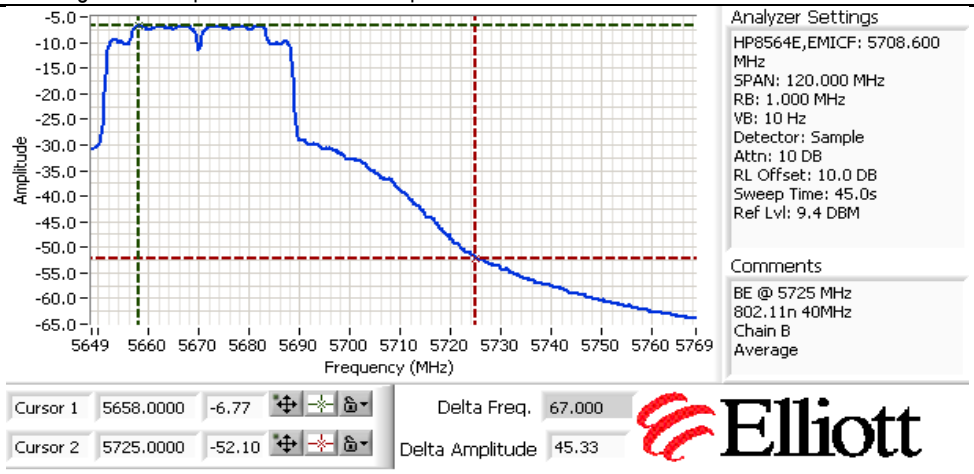
***5725 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 103.1 | 104.3 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 94.1 | 95.6 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *45.2 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 59.1 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 50.4 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *40.8 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **45.3** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 63.5 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 50.3 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -18.0 | 50.3 | 68.3 | Avg |
| -29.2 | 59.1 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5725.000** | **50.3** | - | 68.3 | **-18.0** | Avg | - | - | Using 1MHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2, Band Edge Field Strength - n20, Chain B**

Date of Test: 9/23/2010 Test Location: Chamber #7

Test Engineer: Mehran Birgani Config Change: None

**Run # 2a, EUT on Channel #36 5180MHz - n20, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.7 | 25.0 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5185.330 | 99.1 | V | - | - | AVG | 313 | 1.0 | |
| 5186.200 | 107.3 | V | - | - | PK | 313 | 1.0 | |
| 5172.800 | 98.2 | H | - | - | AVG | 112 | 1.0 | |
| 5174.000 | 106.5 | H | - | - | PK | 112 | 1.0 | |

***5150 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

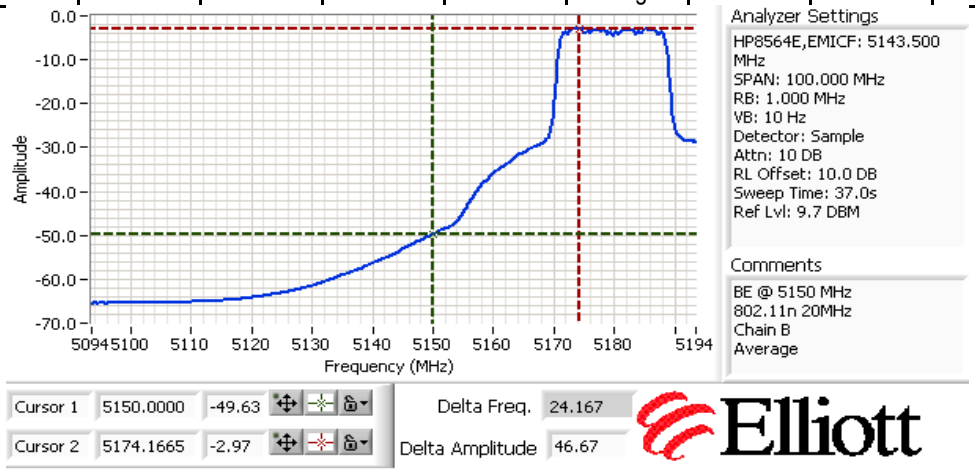
| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 106.5 | 107.3 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.2 | 99.1 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *45.8 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 61.5 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 53.3 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *41.5 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **46.7** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 65.8 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 52.4 dBuV/m | | |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -1.6 | 52.4 | 54 | Avg |
| -12.5 | 61.5 | 74 | Pk |

Using 100kHz delta value

Using 1MHz delta value

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5150.000** | **52.4** | - | 54.0 | **-1.6** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2b, EUT on Channel #64 5320MHz - n20, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.6 | 26.0 |

***Fundamental Signal Field Strength***

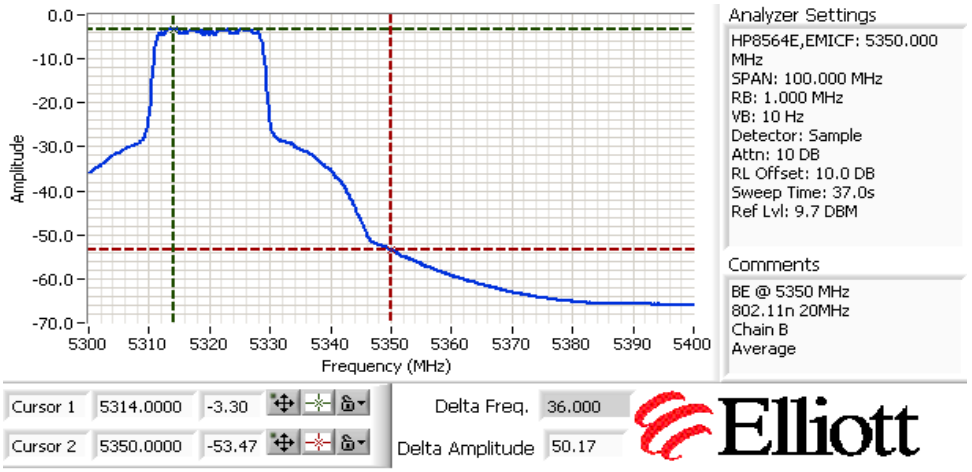
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5313.270 | 97.9 | V | - | - | AVG | 278 | 1.0 | |
| 5313.670 | 106.3 | V | - | - | PK | 278 | 1.0 | |
| 5313.370 | 98.3 | H | - | - | AVG | 150 | 1.0 | |
| 5315.230 | 106.5 | H | - | - | PK | 150 | 1.0 | |

***5350 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 106.5 | 106.3 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.3 | 97.9 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *50.0 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 56.5 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 48.3 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *41.8 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **50.2** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 64.7 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 48.1 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -5.9 | 48.1 | 54 | Avg |
| -17.5 | 56.5 | 74 | Pk |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5350.000** | **48.1** | - | 54.0 | **-5.9** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2c, EUT on Channel #100 5500MHz - n20, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.7 | 28.0 |

***Fundamental Signal Field Strength***

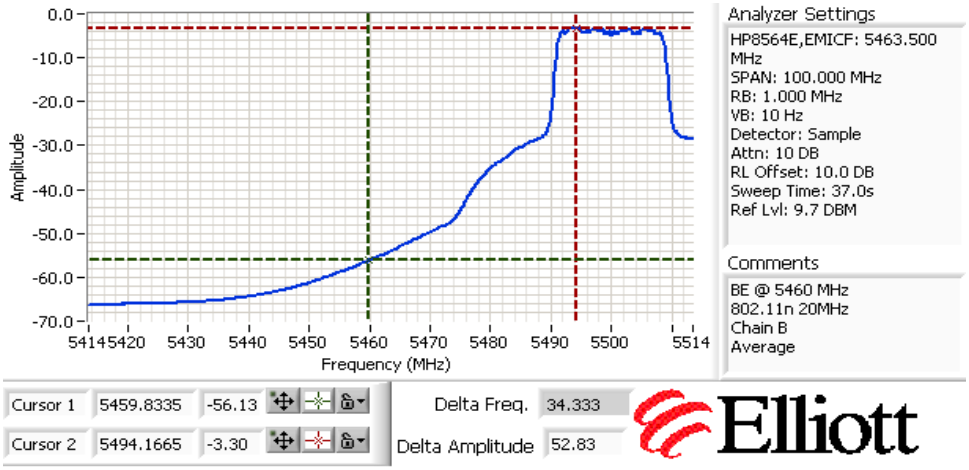
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5492.970 | 96.4 | V | - | - | AVG | 265 | 1.0 | |
| 5493.200 | 105.3 | V | - | - | PK | 265 | 1.0 | |
| 5492.900 | 98.8 | H | - | - | AVG | 109 | 1.0 | |
| 5493.100 | 107.6 | H | - | - | PK | 109 | 1.0 | |

***5460 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 107.6 | 105.3 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.8 | 96.4 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *52.8 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 54.8 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 46.0 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *45.2 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | *52.8 dB* | | |
| Calculated Band-Edge Measurement (Peak): | 62.4 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 46.0 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -8.0 | 46.0 | 54 | Avg |
| -19.2 | 54.8 | 74 | Pk |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5459.834** | **46.0** | - | 54.0 | **-8.0** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

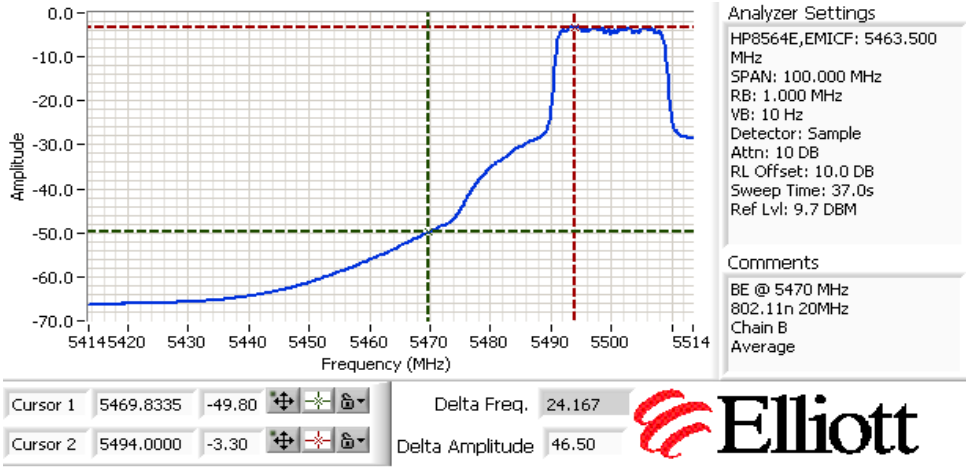
***5470 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 107.6 | 105.3 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.8 | 96.4 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *46.3 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 61.3 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 52.5 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *46.7 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | ***46.5*** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 60.9 dBuV/m | | Using 1MHz delta value |
| Calculated Band-Edge Measurement (Avg): | 52.3 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -16.0 | 52.3 | 68.3 | Avg |
| -27.4 | 60.9 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5469.834** | **52.3** | - | 68.3 | **-16.0** | Avg | - | - | Using 1MHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2d, EUT on Channel #140 5700MHz - n20, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.6 | 29.0 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5692.970 | 98.0 | V | - | - | AVG | 306 | 1.0 | |
| 5694.700 | 106.5 | V | - | - | PK | 306 | 1.0 | |
| 5693.130 | 96.2 | H | - | - | AVG | 97 | 1.0 | |
| 5693.630 | 104.7 | H | - | - | PK | 97 | 1.0 | |

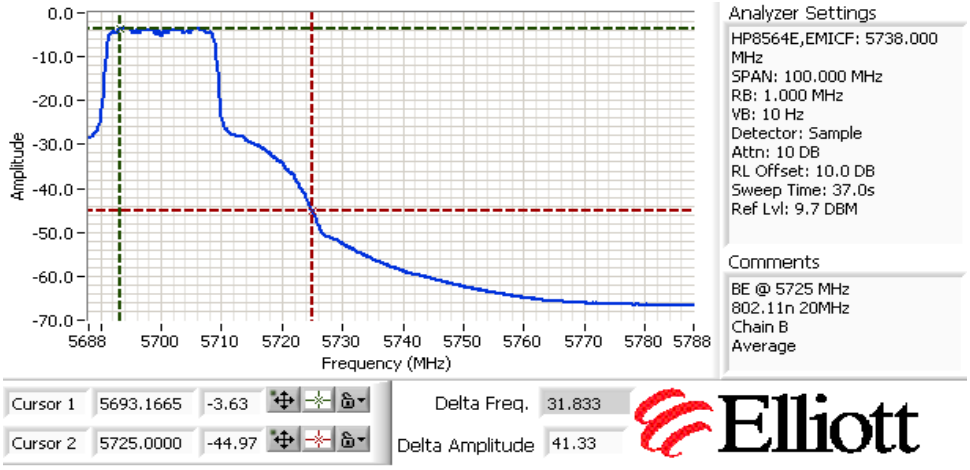
***5725 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 104.7 | 106.5 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 96.2 | 98.0 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *39.2 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 67.3 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 58.8 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *34.0 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **41.3** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 72.5 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 56.7 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -11.6 | 56.7 | 68.3 | Avg |
| -21.0 | 67.3 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5725.000** | **56.7** | - | 68.3 | **-11.6** | Avg | - | - | Using 1MHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3, Band Edge Field Strength - 802.11a, Chain B**
**Run # 3a, EUT on Channel #36 5180MHz - 802.11a, Chain B**

Date of Test: 9/23/2010 Test Location: Chamber #7
Test Engineer: Mehran Birgani Config Change: None

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.5 | 24.5 |

***Fundamental Signal Field Strength***

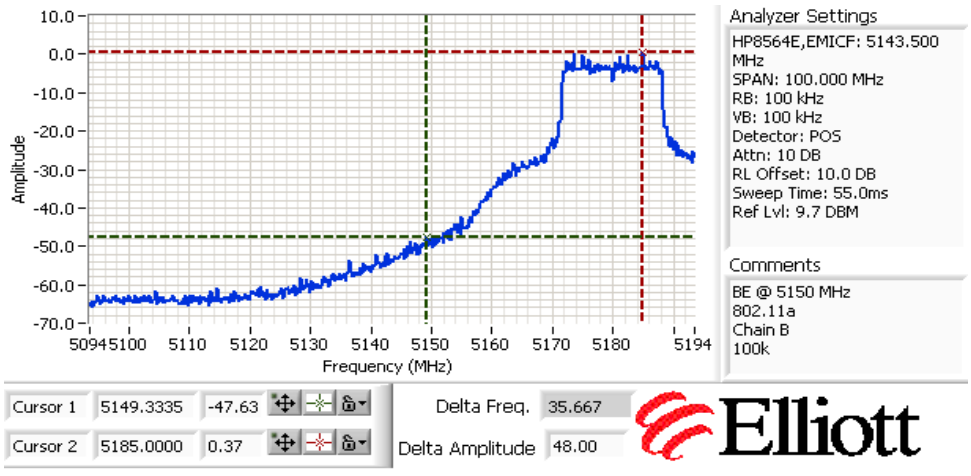
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5186.530 | 98.7 | V | - | - | AVG | 314 | 1.0 | |
| 5186.100 | 106.7 | V | - | - | PK | 314 | 1.0 | |
| 5172.970 | 99.0 | H | - | - | AVG | 108 | 1.0 | |
| 5174.070 | 107.6 | H | - | - | PK | 108 | 1.0 | |

***5150 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 107.6 | 106.7 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 99.0 | 98.7 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **48.0** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 59.6 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 51.0 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *42.7 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | *47.8 dB* | | |
| Calculated Band-Edge Measurement (Peak): | 64.9 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 51.2 dBuV/m | | Using 100kHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -3.0 | 51.0 | 54 | Avg |
| -14.4 | 59.6 | 74 | Pk |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5149.334** | **51.0** | - | 54.0 | **-3.0** | Avg | - | - | Using 100kHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3b, EUT on Channel #64 5320MHz - 802.11a, Chain B**

Date of Test: 9/23/2010 Test Location: FT #7

Test Engineer: Mark Hill Config Change: none

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.8 | 25.5 |

***Fundamental Signal Field Strength***

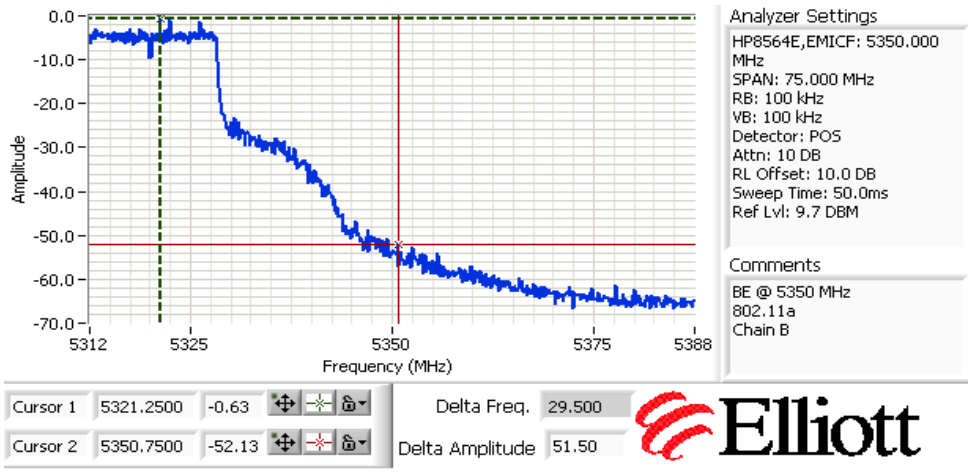
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5313.070 | 97.9 | V | - | - | AVG | 306 | 1.0 | |
| 5313.800 | 106.2 | V | - | - | PK | 306 | 1.0 | |
| 5313.030 | 98.1 | H | - | - | AVG | 148 | 1.0 | |
| 5313.700 | 106.4 | H | - | - | PK | 148 | 1.0 | |

***5350 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 106.4 | 106.2 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 98.1 | 97.9 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **51.5** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 54.9 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 46.6 dBuV/m | | |

| | | Margin | Level | Limit | Detector |
|---|---|---|---|---|---|
| *Delta Marker - 1MHz/1MHz:* | *45.0 dB* | -7.4 | 46.6 | 54 | Avg |
| *Delta Marker - 1MHz/10Hz:* | *51.2 dB* | -19.1 | 54.9 | 74 | Pk |
| Calculated Band-Edge Measurement (Peak): | 61.4 dBuV/m | Using 100kHz delta value | | | |
| Calculated Band-Edge Measurement (Avg): | 46.9 dBuV/m | Using 100kHz delta value | | | |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5350.000 | 46.6 | - | 54.0 | **-7.4** | Avg | - | - | Using 100kHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3c, EUT on Channel #100 5500MHz - 802.11a, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.7 | 27.5 |

***Fundamental Signal Field Strength***

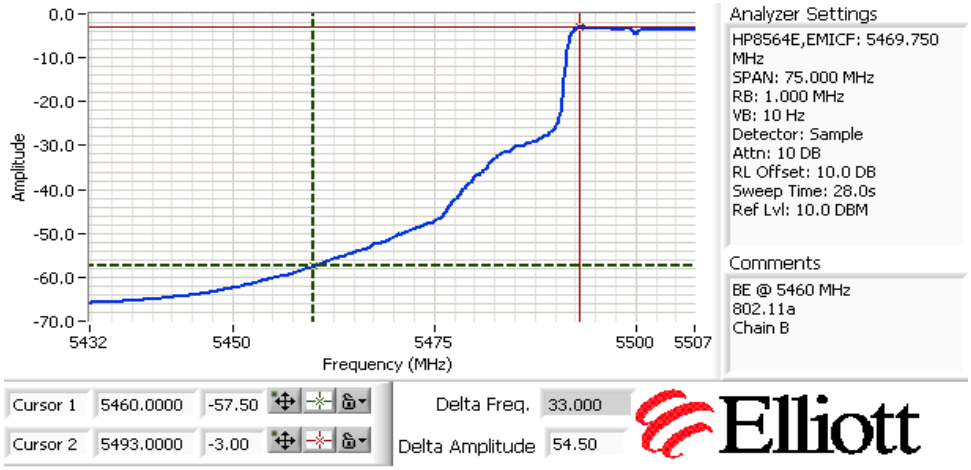
| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5492.930 | 96.0 | V | - | - | AVG | 265 | 1.0 | |
| 5493.700 | 104.1 | V | - | - | PK | 265 | 1.0 | |
| 5493.070 | 99.1 | H | - | - | AVG | 110 | 1.0 | |
| 5493.530 | 107.4 | H | - | - | PK | 110 | 1.0 | |

***5460 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 107.4 | 104.1 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 99.1 | 96.0 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *54.3 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 53.1 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 44.8 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *46.8 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **54.5** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 60.6 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 44.6 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -9.4 | 44.6 | 54 | Avg |
| -20.9 | 53.1 | 74 | Pk |

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5460.000 | 44.6 | - | 54.0 | **-9.4** | Avg | - | - | Using 1MHz delta value |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

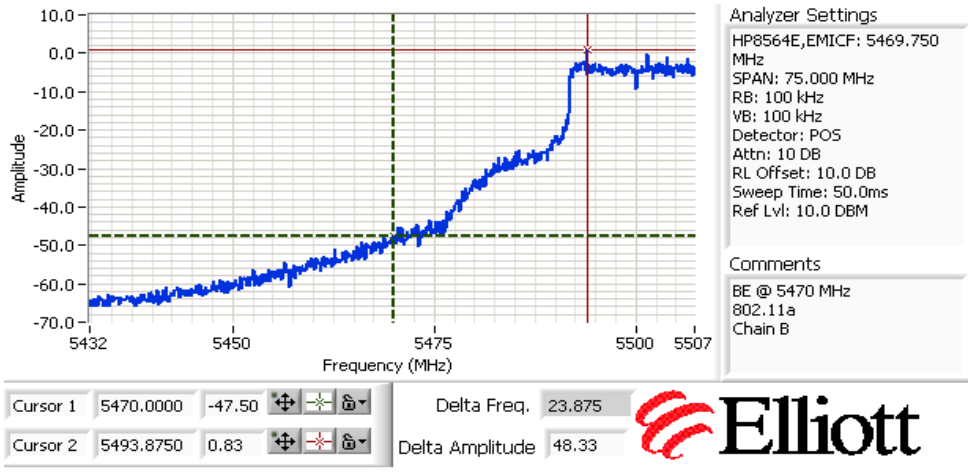
***5470 MHz Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 107.4 | 104.1 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 99.1 | 96.0 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | **48.3** *dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 59.1 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 50.8 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *43.7 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | *47.8 dB* | | |
| Calculated Band-Edge Measurement (Peak): | 63.7 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 51.3 dBuV/m | | Using 100kHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -17.5 | 50.8 | 68.3 | Avg |
| -29.2 | 59.1 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5470.000 | 50.8 | - | 68.3 | **-17.5** | Avg | - | - | Using 100kHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3d, EUT on Channel #140 5700MHz - 802.11a, Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.7 | 28.5 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5693.130 | 96.1 | V | - | - | AVG | 186 | 1.1 | |
| 5693.730 | 104.7 | V | - | - | PK | 186 | 1.1 | |
| 5693.070 | 97.1 | H | - | - | AVG | 100 | 1.6 | |
| 5693.800 | 105.6 | H | - | - | PK | 100 | 1.6 | |

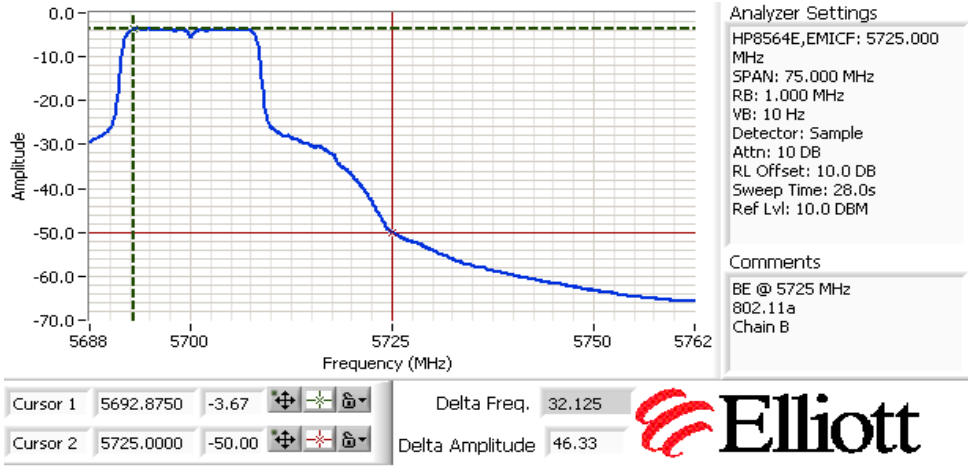
***5725 MHz Restricted Band Edge Signal Radiated Field Strength - Marker Delta***

| | H | V | |
|---|---|---|---|
| Fundamental emission level @ 3m in **1MHz RBW:** | 105.6 | 104.7 | Peak Measurement (RB=VB=1MHz) |
| Fundamental emission level @ 3m in **1MHz RBW:** | 97.1 | 96.1 | Average Measurement (RB=1MHz, VB=10Hz) |
| *Delta Marker - 100kHz* | *44.0 dB* | | <- this can only be used if band edge signal is highest within 2MHz of band edge. |
| Calculated Band-Edge Measurement (Peak): | 61.6 dBuV/m | | |
| Calculated Band-Edge Measurement (Avg): | 53.1 dBuV/m | | |
| *Delta Marker - 1MHz/1MHz:* | *39.2 dB* | | |
| *Delta Marker - 1MHz/10Hz:* | **46.3** *dB* | | |
| Calculated Band-Edge Measurement (Peak): | 66.4 dBuV/m | | Using 100kHz delta value |
| Calculated Band-Edge Measurement (Avg): | 50.8 dBuV/m | | Using 1MHz delta value |

| Margin | Level | Limit | Detector |
|---|---|---|---|
| -17.5 | 50.8 | 68.3 | Avg |
| -26.7 | 61.6 | 88.3 | Pk |

| Frequency | Level | Pol | FCC 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **5725.000** | **50.8** | - | 68.3 | **-17.5** | Avg | - | - | Using 1MHz delta value |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

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

## Summary of Results

**MAC Address: 00150079AD1A DRTU Tool Version 1.2.12-0197 New tool from 9/14 Driver version 14.0.0.39**

| Run # | Mode | Channel | Power Setting | Measured Power | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| Run #1 | n40 Chain A+B | #38 5190MHz | A: 13.5 B: 13.5 | **A: 10.8 B: 10.7** | Restricted Band Edge at 5150 MHz | 15.209 | **52.7dBµV/m @ 5150.0MHz (-1.3dB)** |
| Run #1 | n40 Chain A+B | #62 5310MHz | A: 13.5 B: 13.5 | **A: 13.0 B: 12.9** | Restricted Band Edge at 5350 MHz | 15.209 | 52.7dBµV/m @ 5350.1MHz (-1.3dB) |
| Run #1 | n40 Chain A+B | #102 5510MHz | A: 13.5 B: 13.5 | A: 13.5 B: 13.5 | Restricted Band Edge at 5460 MHz | 15.209 | 52.3dBµV/m @ 5457.5MHz (-1.7dB) |
| | | | | | Band Edge at 5470 MHz | 15 E | 55.3dBµV/m @ 5470.0MHz (-13.0dB) |
| Run #1 | n40 Chain A+B | #134 5670MHz | A: 13.5 B: 13.5 | A: 13.5 B: 13.5 | Band Edge at 5725 MHz | 15 E | 51.0dBµV/m @ 5744.8MHz (-17.3dB) |
| Run # 2 | n20 Chain A+B | #36 5180MHz | A: 13.5 B: 13.5 | A: 13.5 B: 13.5 | Restricted Band Edge at 5150 MHz | 15.209 | 51.0dBµV/m @ 5149.3MHz (-3.0dB) |
| Run # 2 | n20 Chain A+B | #64 5320MHz | A: 13.5 B: 13.5 | A: 13.5 B: 13.5 | Restricted Band Edge at 5350 MHz | 15.209 | 50.3dBµV/m @ 5350.4MHz (-3.7dB) |
| Run # 2 | n20 Chain A+B | #100 5500MHz | A: 13.5 B: 13.5 | A: 13.5 B: 13.5 | Restricted Band Edge at 5460 MHz | 15.209 | 50.3dBµV/m @ 5457.9MHz (-3.7dB) |
| | | | | | Band Edge at 5470 MHz | 15 E | 50.8dBµV/m @ 5469.5MHz (-17.5dB) |
| Run # 2 | n20 Chain A+B | #140 5700MHz | A: 13.5 B: 13.5 | A: 13.5 B: 13.5 | Band Edge at 5725 MHz | 15 E | 51.1dBµV/m @ 5725.0MHz (-17.2dB) |

Note - the target and measured power are average powers (measured with average power sensor) and are used for reference purposes only. Power is set using " **GAIN CONTROL**" mode in the DRTU tool.

## Test Specific Details

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

## General Test Configuration

The EUT ws installed into a test fixture such that the EUT was exposed (i.e. outside of a host PC).
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

## Ambient Conditions:

| | |
|---|---|
| Rel. Humidity: | 15 - 55 % |
| Temperature: | 18 - 25 °C |

## Modifications Made During Testing

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1, Band Edge Field Strength - n40, Chain A+B**
**Run #1a, EUT on Channel #38 5190MHz - n40, Chain A+B**

Date of Test: 9/27/2010 Test Location: FT Chamber#7
Test Engineer: Rafael Varelas Config Change: none

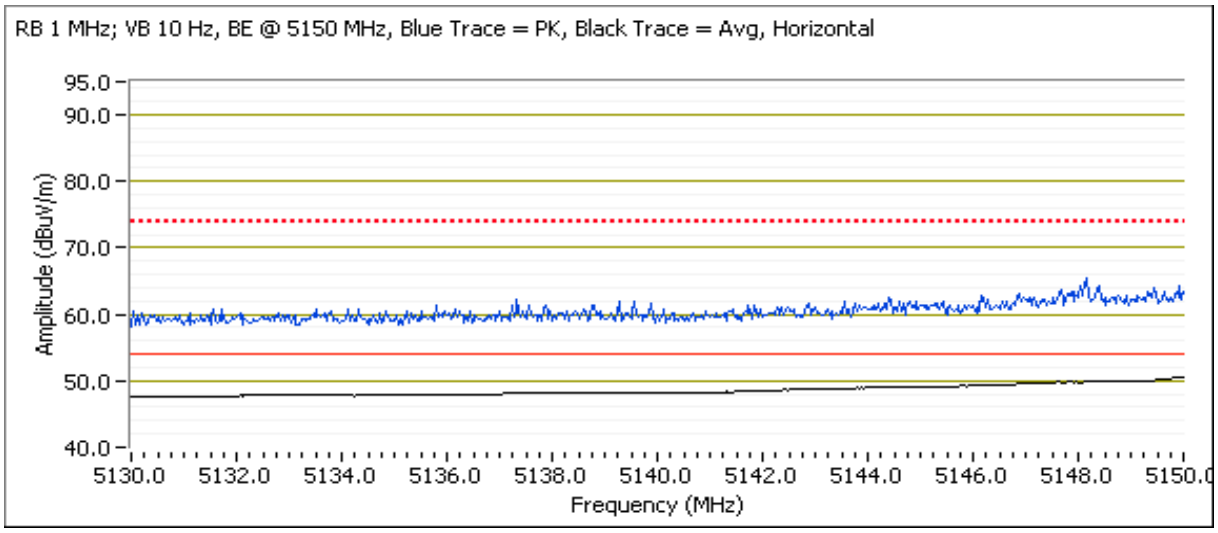
| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 13.5 | 13.5 | | 16.5 | 10.8 | 10.7 | | 13.8 | 23.5/22.5 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5192.470 | 89.1 | V | - | - | AVG | 183 | 1.2 | RB 1 MHz;VB 10 Hz;Pk |
| 5182.270 | 99.2 | V | - | - | PK | 183 | 1.2 | RB 1 MHz;VB 3 MHz;Pk |
| 5192.470 | 91.5 | H | - | - | AVG | 114 | 1.1 | RB 1 MHz;VB 10 Hz;Pk |
| 5193.930 | 100.9 | H | - | - | PK | 114 | 1.1 | RB 1 MHz;VB 3 MHz;Pk |

***5150 MHz Band Edge Signal Radiated Field Strength - Direct Measurement***

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5149.980 | 52.7 | H | 54.0 | -1.3 | AVG | 111 | 1.2 | RB 1 MHz;VB 10 Hz;Pk |
| 5148.620 | 65.1 | H | 74.0 | -8.9 | PK | 111 | 1.2 | RB 1 MHz;VB 3 MHz;Pk |
| 5149.920 | 52.5 | V | 54.0 | -1.5 | AVG | 183 | 1.2 | RB 1 MHz;VB 10 Hz;Pk |
| 5149.420 | 64.0 | V | 74.0 | -10.0 | PK | 183 | 1.2 | RB 1 MHz;VB 3 MHz;Pk |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1b, EUT on Channel #62 5310MHz - n40, Chain A+B**

Date of Test: 9/27/2010 Test Location: FT Chamber#7

Test Engineer: Rafael Varelas Config Change: none

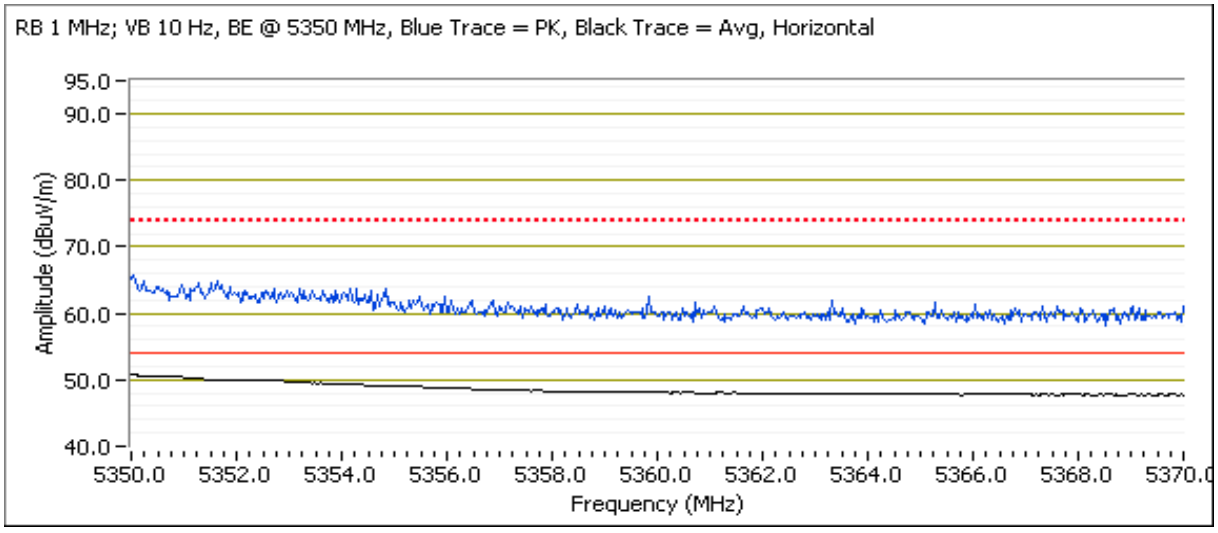
| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 13.5 | 13.5 | | 16.5 | 13.0 | 12.9 | | 16.0 | 27.0/26.5 |

***Fundamental Signal Field Strength***

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5312.530 | 92.4 | H | - | - | AVG | 118 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5313.130 | 102.6 | H | - | - | PK | 118 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5307.130 | 91.4 | V | - | - | AVG | 207 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5302.330 | 101.3 | V | - | - | PK | 207 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

***5350 MHz Band Edge Signal Radiated Field Strength - Direct Measurement***

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5350.060 | 52.7 | H | 54.0 | -1.3 | AVG | 112 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 5350.620 | 65.6 | H | 74.0 | -8.4 | PK | 112 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 5350.000 | 52.0 | V | 54.0 | -2.0 | AVG | 150 | 1.3 | RB 1 MHz;VB 10 Hz;Pk |
| 5351.480 | 65.0 | V | 74.0 | -9.0 | PK | 150 | 1.3 | RB 1 MHz;VB 3 MHz;Pk |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1c, EUT on Channel #102 5510MHz - n40, Chain A+B**

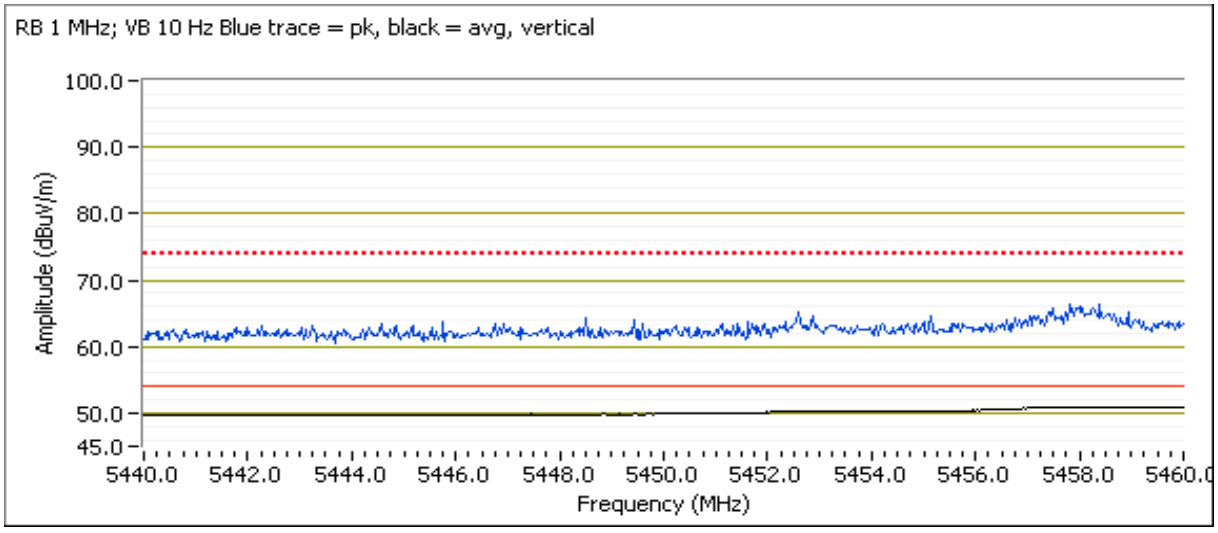
| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 13.5 | 13.5 | | 16.5 | 13.5 | 13.5 | | 16.5 | 28.5 / 28.0 |

**Fundamental Signal Field Strength**

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5512.400 | 92.1 | H | 112.3 | -20.2 | AVG | 108 | 1.18 | |
| 5517.930 | 102.2 | H | 132.3 | -30.1 | PK | 108 | 1.18 | |
| 5513.130 | 91.7 | V | 112.3 | -20.6 | AVG | 155 | 1.17 | |
| 5513.870 | 101.5 | V | 132.3 | -30.8 | PK | 155 | 1.17 | |

**5460 MHz Band Edge Signal Radiated Field Strength - Direct Measurement**

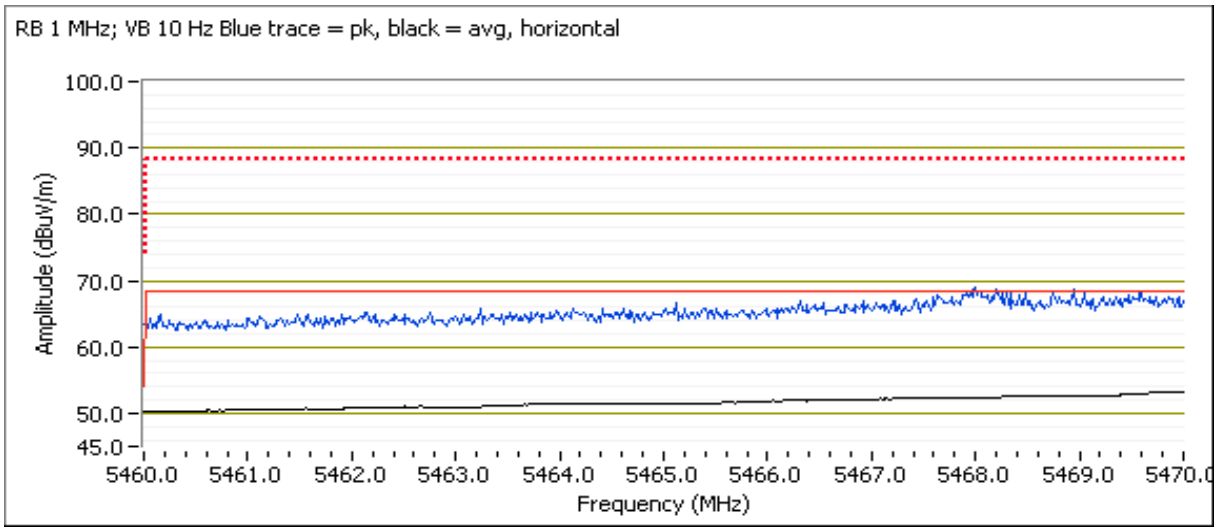
| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5457.500 | 52.3 | V | 54.0 | -1.7 | AVG | 158 | 1.41 | |
| 5457.670 | 65.0 | V | 74.0 | -9.0 | PK | 158 | 1.41 | |
| 5458.670 | 52.1 | H | 54.0 | -1.9 | AVG | 110 | 1.17 | |
| 5457.900 | 64.6 | H | 74.0 | -9.4 | PK | 110 | 1.17 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**5470 MHz Band Edge Signal Radiated Field Strength - Direct Measurement**

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5469.950 | 55.3 | H | 68.3 | -13.0 | AVG | 111 | 1.13 | |
| 5469.730 | 67.0 | H | 88.3 | -21.3 | PK | 111 | 1.13 | |
| 5469.870 | 55.0 | V | 68.3 | -13.3 | AVG | 158 | 1.41 | |
| 5467.120 | 67.6 | V | 88.3 | -20.7 | PK | 158 | 1.41 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

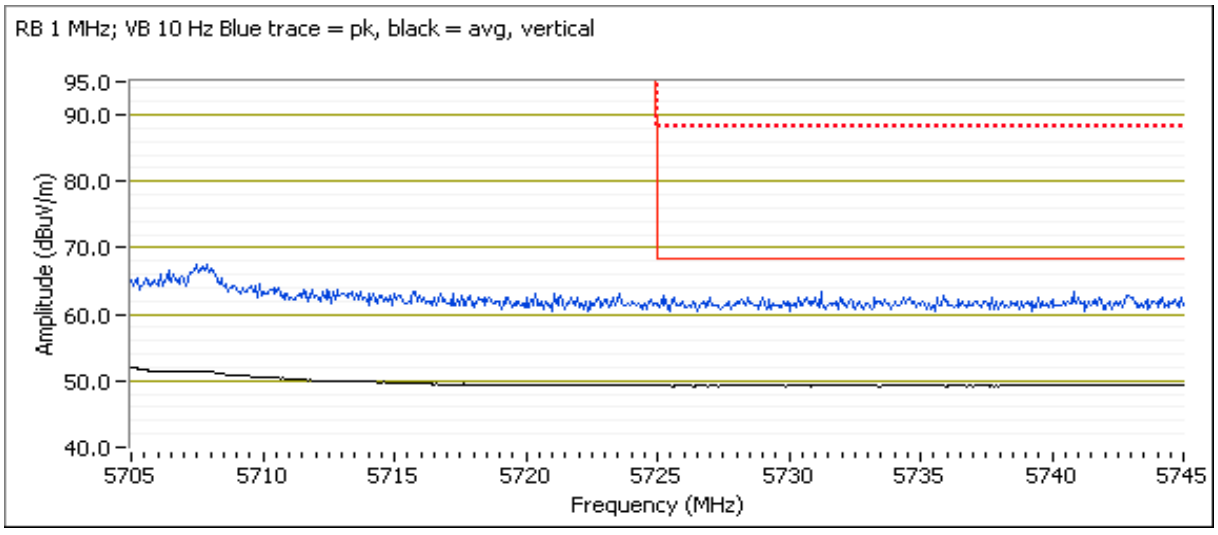
**Run #1d, EUT on Channel #134 5670MHz - n40, Chain A+B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 13.5 | 13.5 | | 16.5 | 13.5 | 13.5 | | 16.5 | 29.5 / 29.0 |

**5725 MHz Band Edge Signal Radiated Field Strength - Direct Measurement**

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5744.830 | 51.0 | V | 68.3 | -17.3 | AVG | 87 | 1.90 | |
| 5727.670 | 62.2 | V | 88.3 | -26.1 | PK | 87 | 1.90 | |
| 5730.470 | 51.0 | H | 68.3 | -17.3 | AVG | 312 | 2.07 | |
| 5733.400 | 61.7 | H | 88.3 | -26.6 | PK | 312 | 2.07 | |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2, Band Edge Field Strength - n20, Chain A+B**
**Run # 2a, EUT on Channel #36 5180MHz - n20, Chain A+B**

Date of Test: 9/28/2010 Test Location: FT7
Test Engineer: John Caizzi Config Change: none

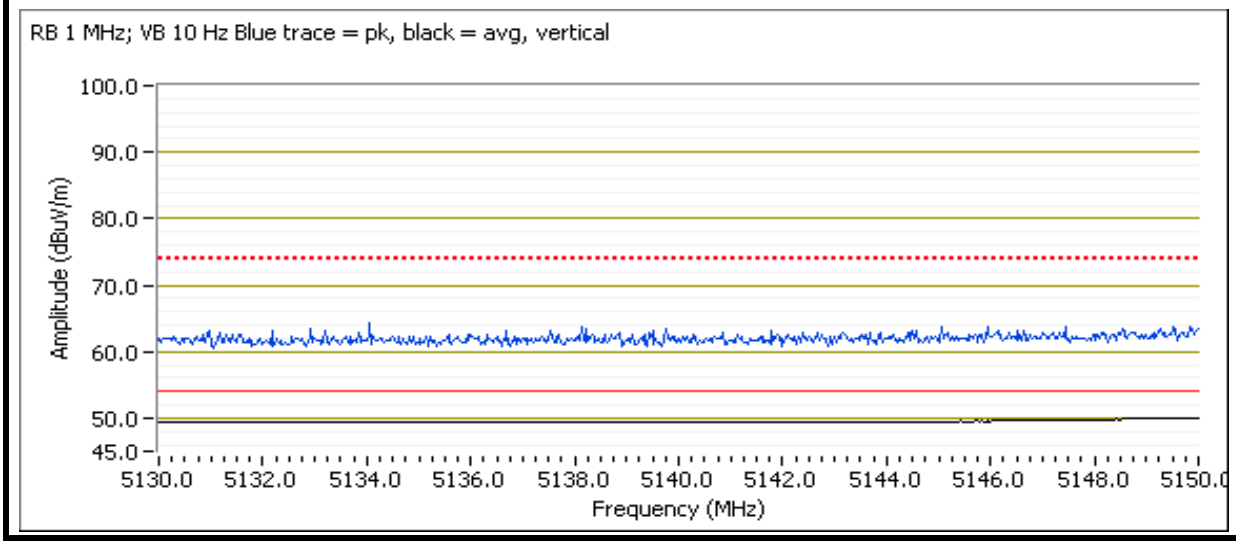
| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 13.5 | 13.5 | | 16.5 | 13.5 | 13.5 | | 16.5 | 25.0 / 24.0 |

**Fundamental Signal Field Strength**

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5185.930 | 95.0 | V | 105.3 | -10.3 | AVG | 156 | 1.25 | |
| 5182.470 | 105.1 | V | 125.3 | -20.2 | PK | 156 | 1.25 | |
| 5187.330 | 95.6 | H | 105.3 | -9.7 | AVG | 108 | 1.16 | |
| 5185.800 | 105.5 | H | 125.3 | -19.8 | PK | 108 | 1.16 | |

**5150 MHz Band Edge Signal Radiated Field Strength - Direct Measurement**

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5149.270 | 51.0 | V | 54.0 | -3.0 | AVG | 142 | 1.48 | |
| 5149.800 | 62.1 | V | 74.0 | -11.9 | PK | 142 | 1.48 | |
| 5149.030 | 50.8 | H | 54.0 | -3.2 | AVG | 256 | 1.27 | |
| 5143.900 | 61.9 | H | 74.0 | -12.1 | PK | 256 | 1.27 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

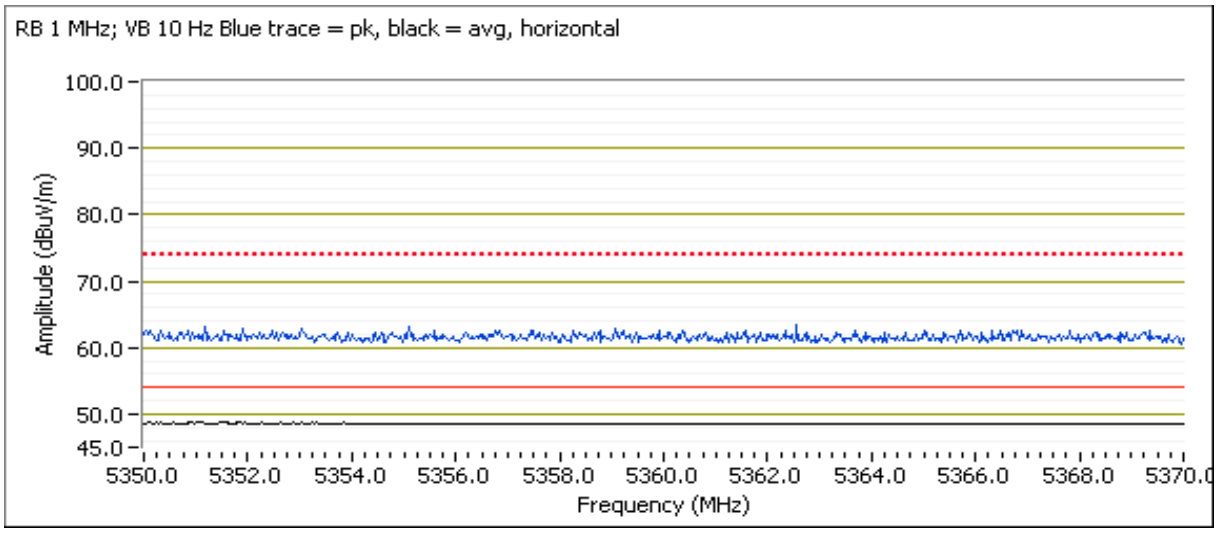
**Run # 2b, EUT on Channel #64 5320MHz - n20, Chain A+B**

Date of Test: 9/28/2010 Test Location: FT7
Test Engineer: John Caizzi Config Change: none

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 13.5 | 13.5 | | 16.5 | 13.5 | 13.5 | | 16.5 | 25.5 / 24.5 |

**5350 MHz Band Edge Signal Radiated Field Strength - Direct Measurement**

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5350.400 | 50.3 | H | 54.0 | -3.7 | AVG | 123 | 1.41 | |
| 5350.970 | 61.0 | H | 74.0 | -13.0 | PK | 123 | 1.41 | |
| 5355.830 | 50.1 | V | 54.0 | -3.9 | AVG | 240 | 2.25 | |
| 5353.170 | 61.9 | V | 74.0 | -12.1 | PK | 240 | 2.25 | |



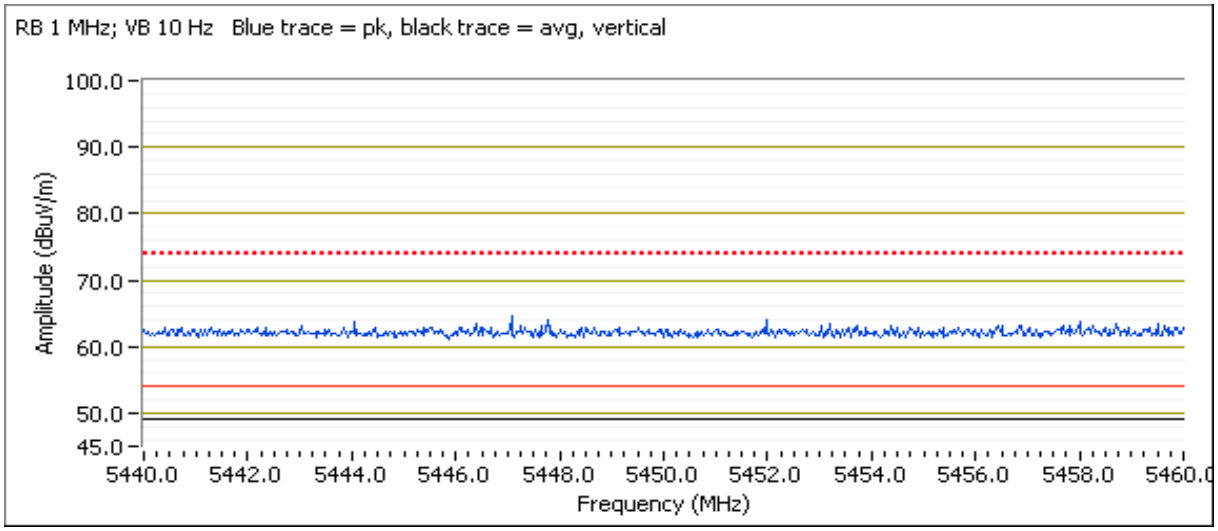
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2c, EUT on Channel #100 5500MHz - n20, Chain A+B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 13.5 | 13.5 | | 16.5 | 13.5 | 13.5 | | 16.5 | 28.0 / 28.0 |

**5460 MHz Band Edge Signal Radiated Field Strength - Direct Measurement**

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5457.930 | 50.3 | V | 54.0 | -3.7 | AVG | 0 | 1.31 | |
| 5449.370 | 62.6 | V | 74.0 | -11.4 | PK | 0 | 1.31 | |
| 5448.700 | 50.3 | H | 54.0 | -3.7 | AVG | 358 | 2.11 | |
| 5447.830 | 61.5 | H | 74.0 | -12.5 | PK | 358 | 2.11 | |

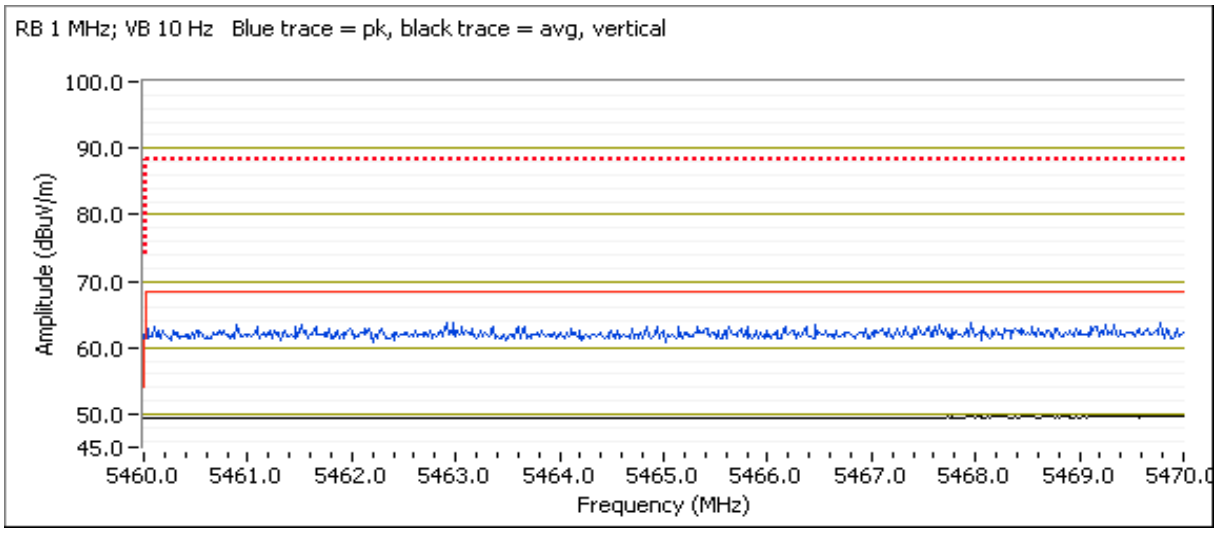


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**5470 MHz Band Edge Signal Radiated Field Strength - Direct Measurement**

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5469.530 | 50.8 | V | 68.3 | -17.5 | AVG | 0 | 1.31 | |
| 5465.030 | 62.3 | V | 88.3 | -26.0 | PK | 0 | 1.31 | |
| 5467.400 | 50.5 | H | 68.3 | -17.8 | AVG | 358 | 2.11 | |
| 5461.680 | 61.7 | H | 88.3 | -26.6 | PK | 358 | 2.11 | |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

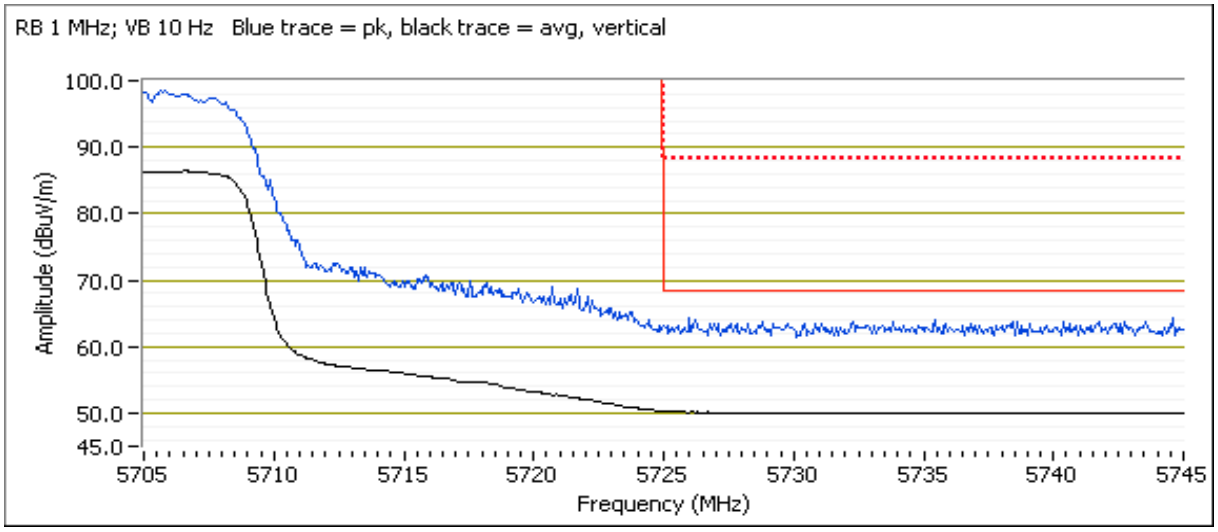
**Run # 2d, EUT on Channel #140 5700MHz - n20, Chain A+B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 13.5 | 13.5 | | 16.5 | 13.5 | 13.5 | | 16.5 | 29.0 / 29.0 |

**5725 MHz Band Edge Signal Radiated Field Strength - Direct Measurement**

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5725.000 | 51.1 | V | 68.3 | -17.2 | AVG | 342 | 1.21 | |
| 5736.230 | 62.4 | V | 88.3 | -25.9 | PK | 342 | 1.21 | |
| 5725.170 | 51.1 | H | 68.3 | -17.2 | AVG | 50 | 1.68 | |
| 5735.600 | 62.1 | H | 88.3 | -26.2 | PK | 50 | 1.68 | |

Note - average limit is equivalent to -27dBm eirp.



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

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

## Summary of Results

**MAC Address: 00150079AD1A DRTU Tool Version 1.2.12-0197 New tool from 9/14 Driver version 14.0.0.39**

| Run # | Mode | Channel | Target power | Measured Power | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| Scans on center channel in all three OFDM modes in each operatintg band were used to determine the worst case. Note that for n20 and n40 mode the output power was set to 16.5dBm per chain, the maximum power per chain in MIMO mode would be 13.5dBm, however as the single chain power could be 16.5dBm the scans were run at the higher single-chain power level but with both chains active to cover both MIMO and MISO modes. | | | | | | | |
| Run #1 (5150-5250MHz Band) | 802.11a Chain A | #40 5200MHz | 16.5 | 16.5 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 41.7dBµV/m @ 1192.6MHz (-12.3dB) |
| | 802.11a Chain B | #40 5200MHz | 16.5 | 16.6 | | | 41.5dBµV/m @ 1192.6MHz (-12.5dB) |
| | n20 Chain A+B | #40 5200MHz | A: 16.5 B: 16.5 | A: 16.7 B: 16.6 | | | 41.2dBµV/m @ 1192.4MHz (-12.8dB) |
| | n40 Chain A+B | #38 5190MHz | A: 16.5 B: 16.5 | A: 16.6 B: 16.6 | | | **44.1dBµV/m @ 1192.6MHz (-9.9dB)** |
| | Worst case mode - top and bottom channels. As the worst case mode was 802.11n 40MHz 5180MHz with no "low channel" 5180 MHz in n20 mode was evaluated for the low channel and n40 5230MHz evaluated as high channel. | | | | | | |
| | n20 / n40 Chain A+B | #38 5180MHz | A: 16.5 B: 16.5 | A: 16.6 B: 16.6 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 33.0dBµV/m @ 2323.1MHz (-21.0dB) |
| | | #46 5230MHz | A: 16.5 B: 16.5 | A: 16.5 B: 16.6 | | | 43.0dBµV/m @ 2323.9MHz (-11.0dB) |
| Run #2 (5250-5350MHz Band) | 802.11a Chain A | #60 5300MHz | 16.5 | 16.6 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 43.4dBµV/m @ 1192.5MHz (-10.6dB) |
| | 802.11a Chain B | #60 5300MHz | 16.5 | 16.6 | | | 43.5dBµV/m @ 1192.5MHz (-10.5dB) |
| | n20 Chain A+B | #60 5300MHz | A: 16.5 B: 16.5 | A: 16.7 B: 16.6 | | | 37.0dBµV/m @ 2322.7MHz (-17.0dB) |
| | n40 Chain A+B | #62 5310MHz | A: 16.5 B: 16.5 | A: 16.6 B: 16.6 | | | 37.8dBµV/m @ 2331.5MHz (-16.2dB) |
| | Worst case mode (802.11a) - top and bottom channels. | | | | | | |
| | 802.11a Chain A | #52 5260MHz | 16.5 | 16.6 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 42.5dBµV/m @ 2325.4MHz (-11.5dB) |
| | | #48 5320MHz | 16.5 | 16.5 | | | 41.4dBµV/m @ 2331.9MHz (-12.6dB) |
| | 802.11a Chain B | #52 5260MHz | 16.5 | 16.7 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 41.4dBµV/m @ 2331.5MHz (-12.6dB) |
| | | #48 5320MHz | 16.5 | 16.7 | | | 41.2dBµV/m @ 2331.7MHz (-12.8dB) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

| Run # | Mode | Channel | Target power | Measured Power | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| Run #3 (5470-5725MHz Band) | 802.11a Chain A | #116 5580MHz | 16.5 | 16.6 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 37.3dBµV/m @ 2322.9MHz (-16.7dB) |
| | 802.11a Chain B | #116 5580MHz | 16.5 | 16.6 | | | 37.6dBµV/m @ 2323.2MHz (-16.4dB) |
| | n20 Chain A+B | #116 5580MHz | A: 16.5 B: 16.6 | A: 16.6 B: 16.6 | | | 41.8dBµV/m @ 2323.0MHz (-12.2dB) |
| | n40 Chain A+B | #110 5550MHz | A: 16.5 B: 16.5 | A: 16.5 B: 16.5 | | | 43.7dBµV/m @ 1192.6MHz (-10.3dB) |
| | Worst case mode - top and bottom channels. | | | | | | |
| | n40 Chain A+B | #102 5510MHz | A: 16.5 B: 16.5 | A: 16.5 B: 16.5 | Radiated Emissions, 1 - 40 GHz | FCC 15.209 / 15 E | 42.5dBµV/m @ 1192.6MHz (-11.5dB) |
| | | #134 5670MHz | A: 16.5 B: 16.5 | A: 16.6 B: 16.6 | | | 45.3dBµV/m @ 11399.4MHz (-8.7dB) |
| **Receive mode** | | | | | | | |
| Run #4 | Receive Chain A, Chain B, Chain A+B | #40 5200MHz | Chain A | - | Radiated Emissions, 1 - 18 GHz | RSS 210 | 40.7dBµV/m @ 2324.2MHz (-13.3dB) |
| | | | Chain B | - | | | **41.0dBµV/m @ 2322.8MHz (-13.0dB)** |
| | | | Chain A+B | - | | | 38.4dBµV/m @ 2330.0MHz (-15.6dB) |
| | | #60 5300MHz | Chain A | - | Radiated Emissions, 1 - 18 GHz | RSS 210 | 38.1dBµV/m @ 2986.3MHz (-15.9dB) |
| | | | Chain B | - | | | 38.0dBµV/m @ 2331.7MHz (-16.0dB) |
| | | | Chain A+B | - | | | 35.8dBµV/m @ 2986.4MHz (-18.2dB) |
| | | #116 5580MHz | Chain A | - | Radiated Emissions, 1 - 18 GHz | RSS 210 | 39.2dBµV/m @ 2322.7MHz (-14.8dB) |
| | | | Chain B | - | | | 38.5dBµV/m @ 2988.2MHz (-15.5dB) |
| | | | Chain A+B | - | | | 39.4dBµV/m @ 2326.2MHz (-14.6dB) |

Note - the target and measured power are average powers (measured with average power sensor) and are used for reference purposes only. Power is set using " **GAIN CONTROL**" mode in the DRTU tool.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

## Test Specific Details

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

## General Test Configuration

The EUT ws installed into a test fixture such that the EUT was exposed (i.e. outside of a host PC).
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

## Ambient Conditions:

| | |
|---|---|
| Rel. Humidity: | 15 - 55 % |
| Temperature: | 18 - 25 °C |

## Modifications Made During Testing

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

**Run #1, Radiated Spurious Emissions, 1-40GHz, Center Channl 5150-5250MHz - 802.11a, n20, n40, Chain A, B**

| | | | |
|---|---|---|---|
| Date of Test: | 9/24/2010 | Test Location: | Chamber #7 |
| Test Engineer: | Mehran Birgani | Config Change: | None |

For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm eirp (68.3dBuV/m @3m). As the power measured is average power this is considered an average limit so the peak limit would be 88.3dBuV/m at 3m.

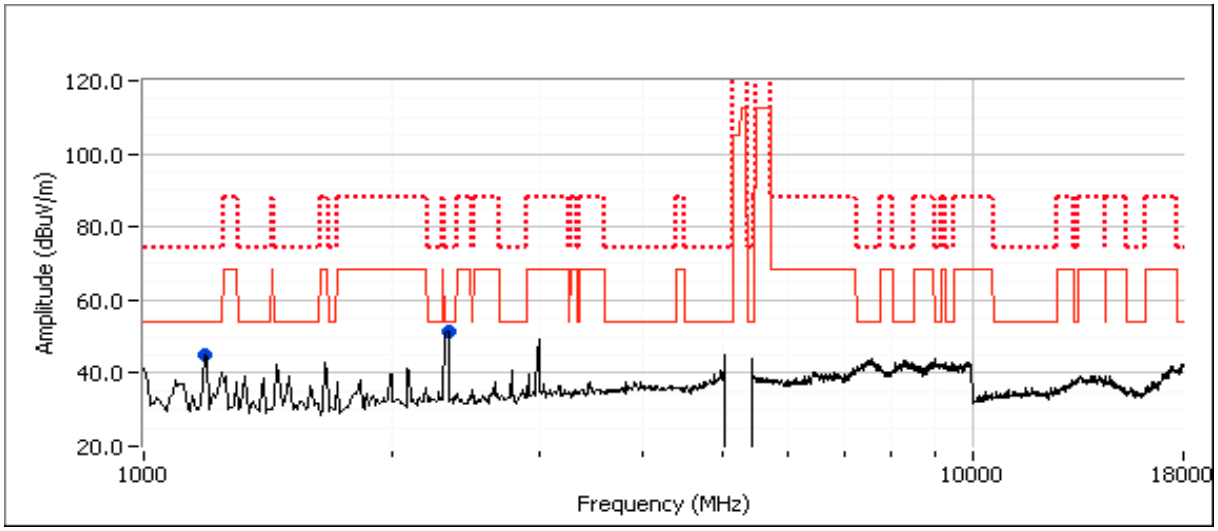
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1a: Channel #40 5200MHz - 802.11a,Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.5 | 25.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **1192.550** | **41.7** | V | 54.0 | **-12.3** | AVG | 154 | 1.0 | |
| 2331.440 | 40.7 | V | 54.0 | -13.3 | AVG | 39 | 1.0 | |
| 2329.470 | 58.1 | V | 74.0 | -15.9 | PK | 39 | 1.0 | |
| 1192.680 | 44.2 | V | 74.0 | -29.8 | PK | 154 | 1.0 | |



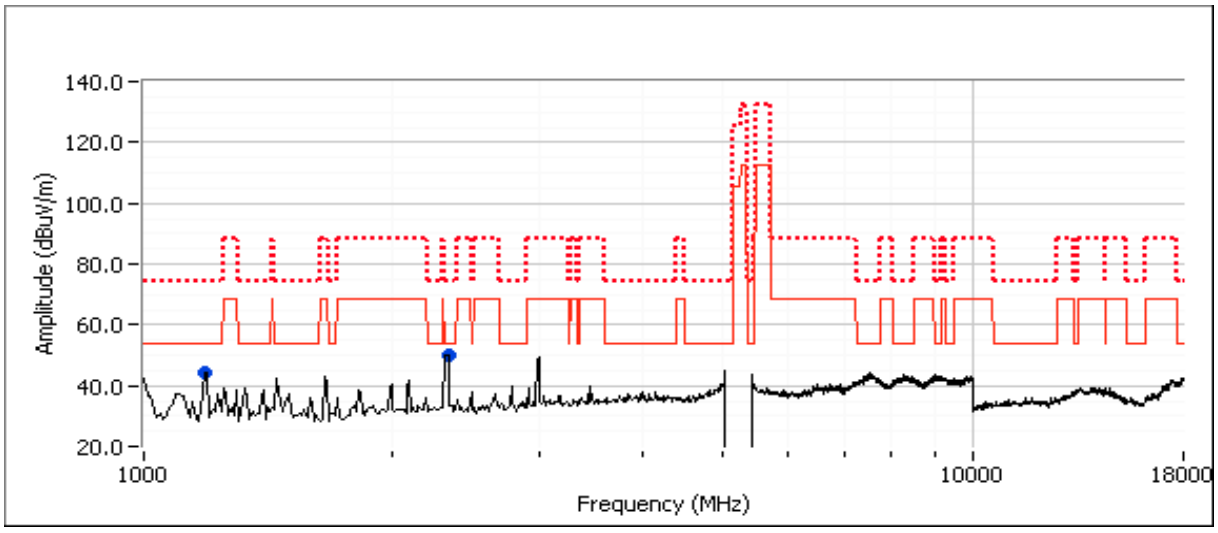
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1b: Channel #40 5200MHz - 802.11a,Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.6 | 24.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **1192.550** | **41.5** | V | 54.0 | **-12.5** | AVG | 156 | 1.0 | |
| 2322.890 | 41.2 | V | 54.0 | -12.8 | AVG | 229 | 1.0 | |
| 2321.830 | 58.6 | V | 74.0 | -15.4 | PK | 229 | 1.0 | |
| 1192.650 | 44.2 | V | 74.0 | -29.8 | PK | 156 | 1.0 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1c: Channel #40 5200MHz - 802.11n20,Chain A + B**

Date of Test: 9/24/2010 Test Location: Chamber #7

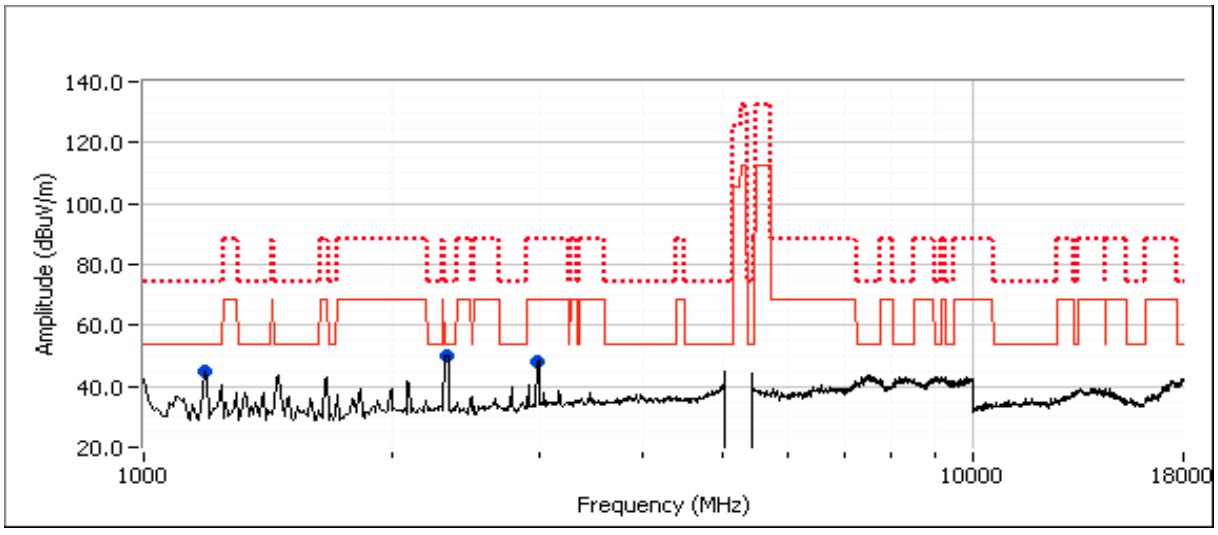
Test Engineer: Joseph Cadigal Config Change: None

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.7 | 16.6 | | 19.7 | 31.0, 29.5 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **1192.370** | **41.2** | V | 54.0 | **-12.8** | AVG | 83 | 2.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2331.510 | 36.7 | V | 54.0 | -17.3 | AVG | 35 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2331.590 | 53.3 | V | 74.0 | -20.7 | PK | 35 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2986.200 | 38.6 | V | 68.3 | -29.7 | AVG | 126 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 1192.490 | 44.0 | V | 74.0 | -30.0 | PK | 83 | 2.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2985.070 | 56.4 | V | 88.3 | -31.9 | PK | 126 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

| | |
|---|---|
| Note 2: | Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range |



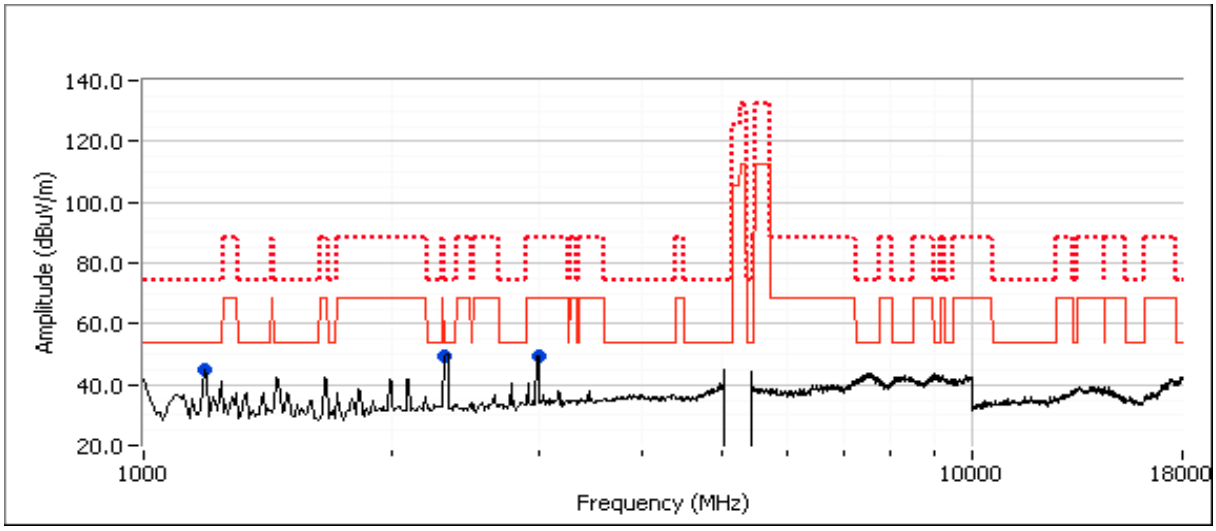
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1d: Channel #38 5190MHz - 802.11n40, Chain A+B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.6 | 16.6 | | 19.6 | 32.0, 31.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **1192.560** | **44.1** | V | 54.0 | **-9.9** | AVG | 110 | 2.0 | |
| 2331.690 | 36.0 | V | 54.0 | -18.0 | AVG | 69 | 1.0 | |
| 2333.200 | 52.7 | V | 74.0 | -21.3 | PK | 69 | 1.0 | |
| 1192.540 | 46.0 | V | 74.0 | -28.0 | PK | 110 | 2.0 | |
| 2986.650 | 40.0 | V | 68.3 | -28.3 | AVG | 140 | 1.0 | |
| 2985.230 | 57.8 | V | 88.3 | -30.5 | PK | 140 | 1.0 | |



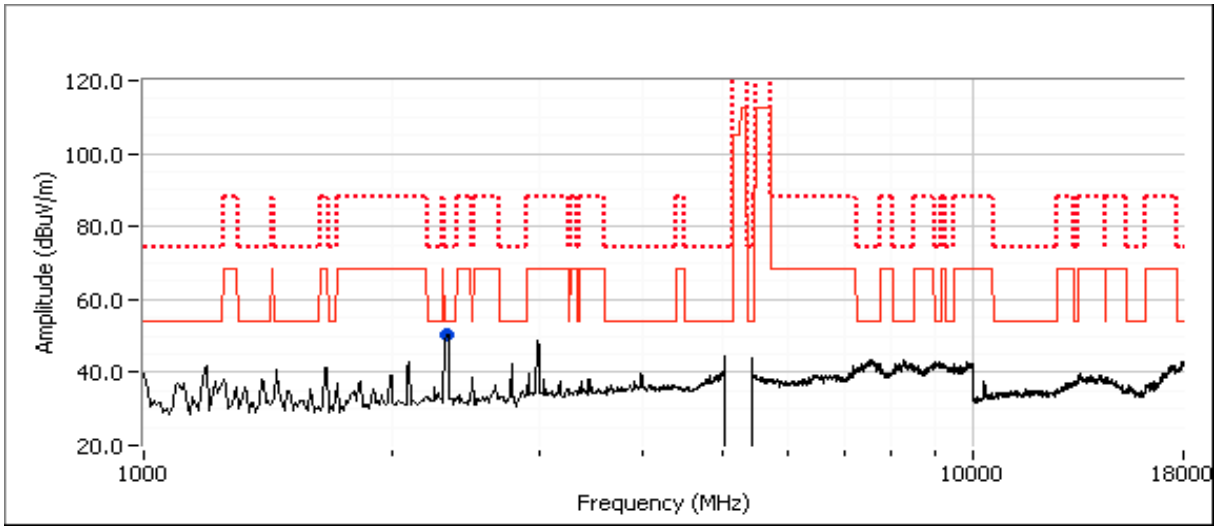
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1e: Channel #36 5180MHz - 802.11n20,Chain A + B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.6 | 16.6 | | 19.6 | 32.0, 31.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2323.110** | **33.0** | V | 54.0 | **-21.0** | AVG | 4 | 2.5 | |
| 2321.980 | 48.7 | V | 74.0 | -25.3 | PK | 4 | 2.5 | |



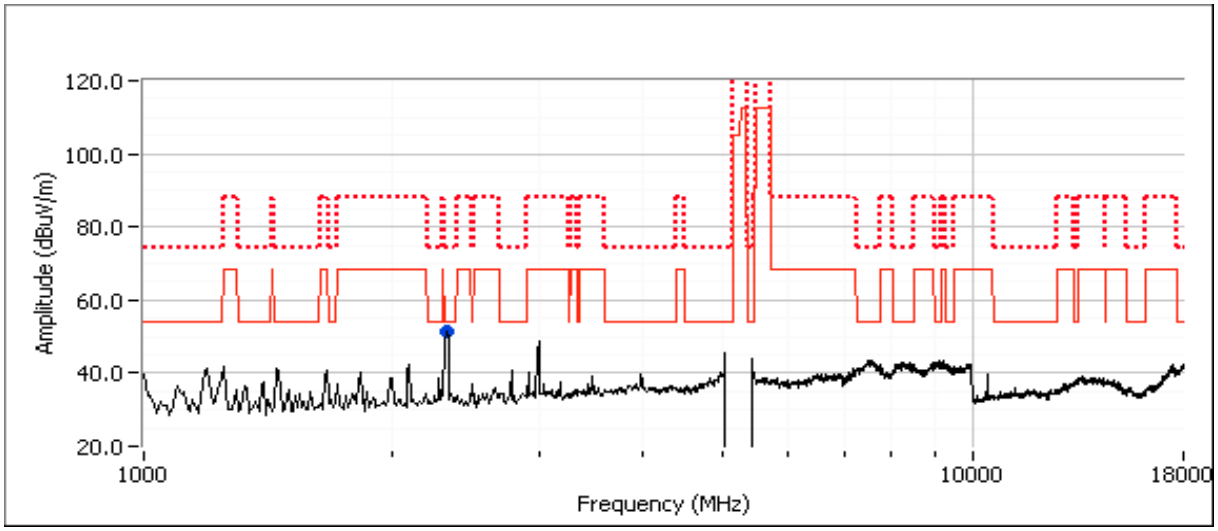
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1f: Channel #46 5230MHz - 802.11n40,Chain A + B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.5 | 16.6 | | 19.6 | 33.0, 32.5 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2323.940** | **43.0** | V | 54.0 | **-11.0** | AVG | 6 | 1.0 | |
| 2323.640 | 60.7 | V | 74.0 | -13.3 | PK | 6 | 1.0 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2, Radiated Spurious Emissions, 1-40GHz, Center Channel 5250-5350MHz - 802.11a, n20, n40, Chain A, B**

Date of Test: 9/23/2010 Test Location: FT Chamber#7

Test Engineer: Joseph Cadigal Config Change: none

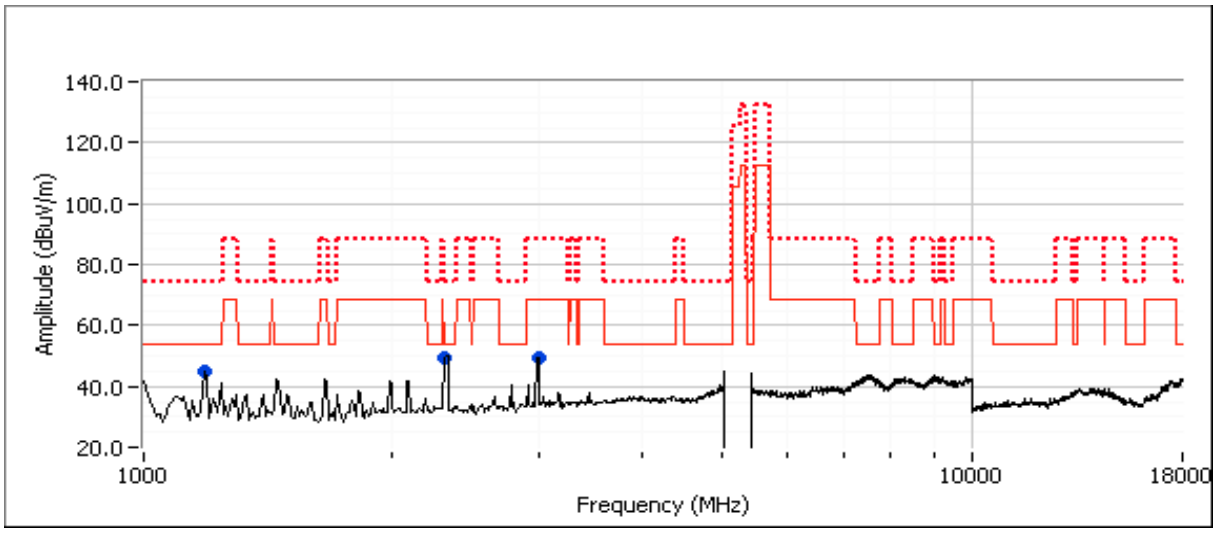
For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm eirp (68.3dBuV/m @3m). As the power measured is average power this is considered an average limit so the peak limit would be 88.3dBuV/m at 3m.

**Run #2a: Channel #60 5300MHz - 802.11a,Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.6 | 26.5 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **1192.530** | **43.4** | V | 54.0 | **-10.6** | AVG | 110 | 2.0 | |
| 2331.800 | 36.4 | V | 54.0 | -17.6 | AVG | 69 | 1.0 | |
| 2331.510 | 52.9 | V | 74.0 | -21.1 | PK | 69 | 1.0 | |
| 1192.570 | 45.9 | V | 74.0 | -28.1 | PK | 110 | 2.0 | |
| 2986.370 | 40.1 | V | 68.3 | -28.2 | AVG | 140 | 1.0 | |
| 2985.090 | 58.0 | V | 88.3 | -30.3 | PK | 140 | 1.0 | |



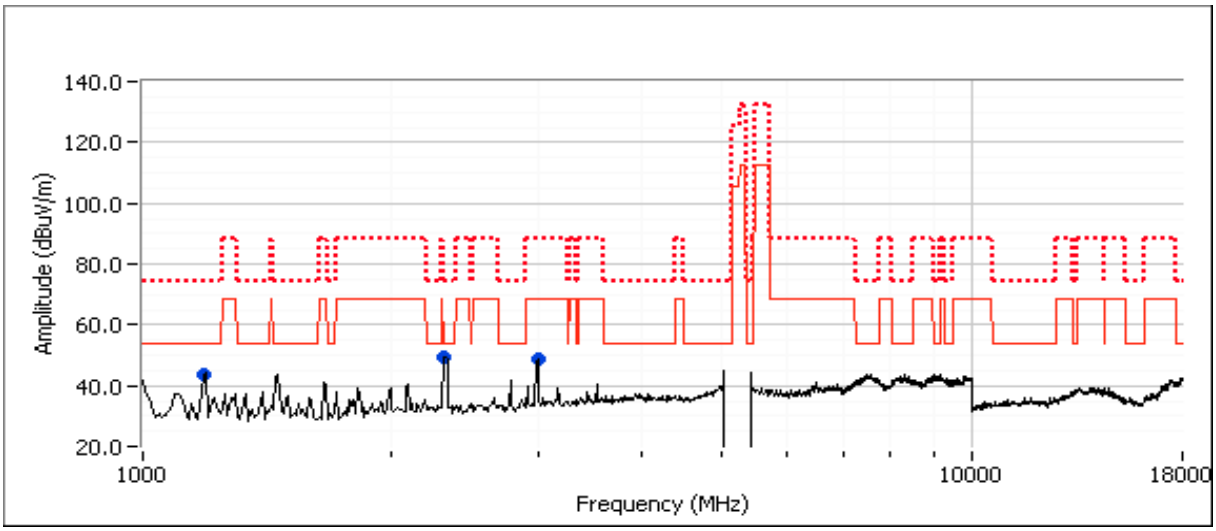
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2b: Channel #60 5300MHz - 802.11a,Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.6 | 25.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **1192.540** | **43.5** | V | 54.0 | **-10.5** | AVG | 109 | 2.0 | |
| 2331.670 | 36.4 | V | 54.0 | -17.6 | AVG | 46 | 1.0 | |
| 2333.090 | 53.9 | V | 74.0 | -20.1 | PK | 46 | 1.0 | |
| 1192.560 | 45.6 | V | 74.0 | -28.4 | PK | 109 | 2.0 | |
| 2997.550 | 38.1 | V | 68.3 | -30.2 | AVG | 147 | 1.0 | |
| 2997.160 | 55.4 | V | 88.3 | -32.9 | PK | 147 | 1.0 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

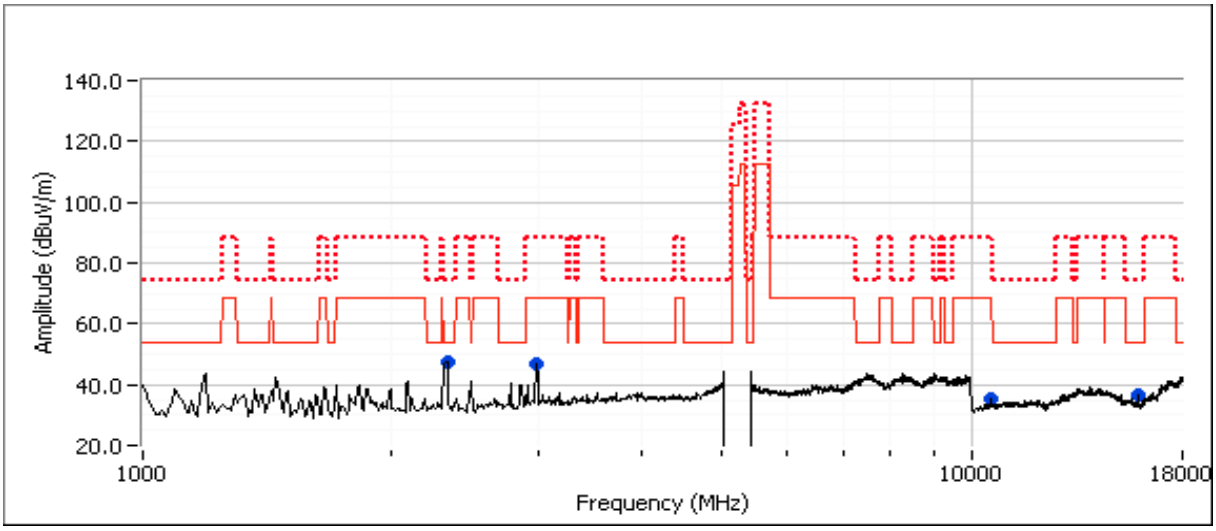
**Run #2c: Channel #60 5300MHz - 802.11n20,Chain A + B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.7 | 16.6 | | 19.7 | 31.0, 31.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2331.980** | **34.0** | V | 54.0 | **-20.0** | AVG | 49 | 1.0 | |
| 2333.120 | 50.2 | V | 74.0 | -23.8 | PK | 49 | 1.0 | |
| 10638.470 | 27.5 | V | 54.0 | -26.5 | AVG | 208 | 1.0 | |
| 2998.360 | 38.7 | V | 68.3 | -29.6 | AVG | 144 | 1.0 | |
| 2998.010 | 56.6 | V | 88.3 | -31.7 | PK | 144 | 1.0 | |
| 10639.790 | 39.4 | V | 74.0 | -34.6 | PK | 208 | 1.0 | |

| | |
|---|---|
| Note 2: | Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range |



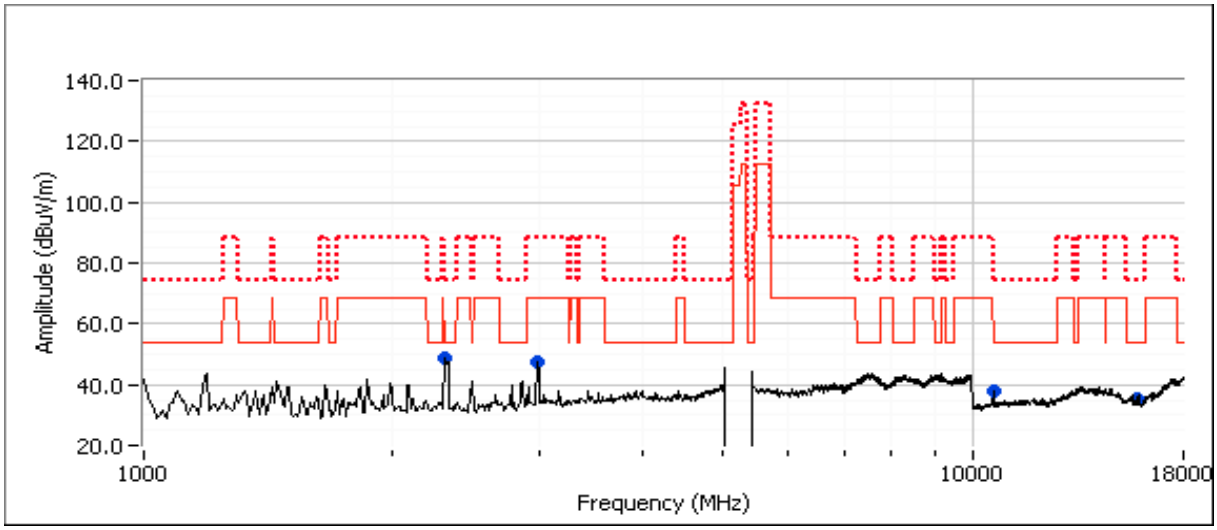
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2d: Channel #62 5310MHz - 802.11n40, Chain A+B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.6 | 16.6 | | 19.6 | 31.0, 32.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2322.700** | **37.0** | V | 54.0 | **-17.0** | AVG | 211 | 1.5 | |
| 2323.190 | 54.2 | V | 74.0 | -19.8 | PK | 211 | 1.5 | |
| 15903.550 | 32.8 | V | 54.0 | -21.2 | AVG | 170 | 1.0 | |
| 10611.870 | 27.7 | V | 54.0 | -26.3 | AVG | 284 | 1.0 | |
| 15904.060 | 44.2 | V | 74.0 | -29.8 | PK | 170 | 1.0 | |
| 2986.430 | 38.4 | V | 68.3 | -29.9 | AVG | 148 | 1.0 | |
| 2986.550 | 55.7 | V | 88.3 | -32.6 | PK | 148 | 1.0 | |
| 10612.410 | 38.5 | V | 74.0 | -35.5 | PK | 284 | 1.0 | |



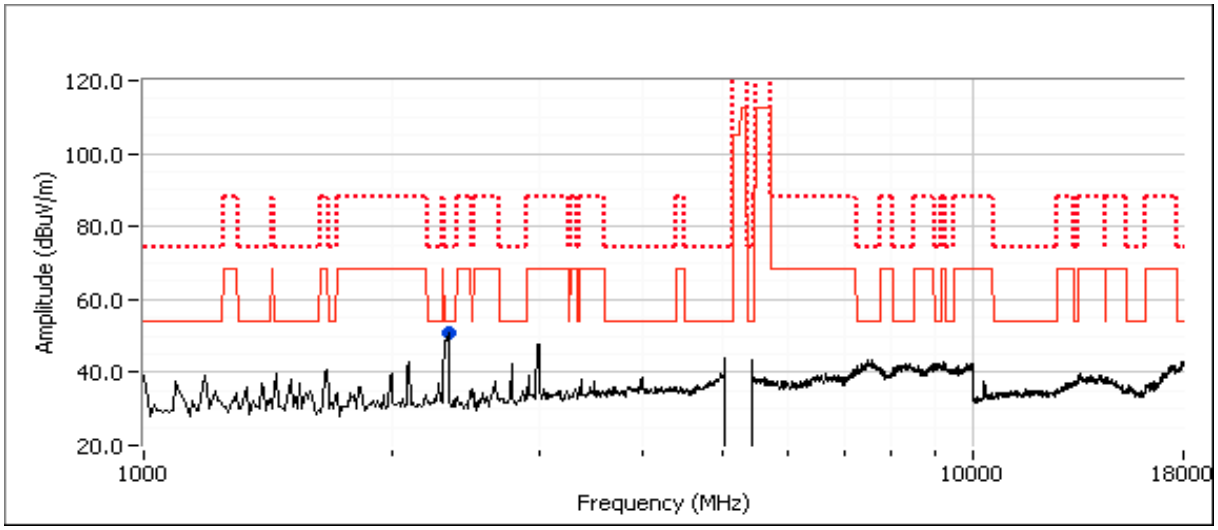
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2e: Channel #52 5260MHz - 802.11a,Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.6 | 26.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2325.400** | **42.5** | V | 54.0 | **-11.5** | AVG | 46 | 1.0 | |
| 2322.200 | 60.7 | V | 74.0 | -13.3 | PK | 46 | 1.0 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2f: Channel #64 5320MHz - 802.11a,Chain A**

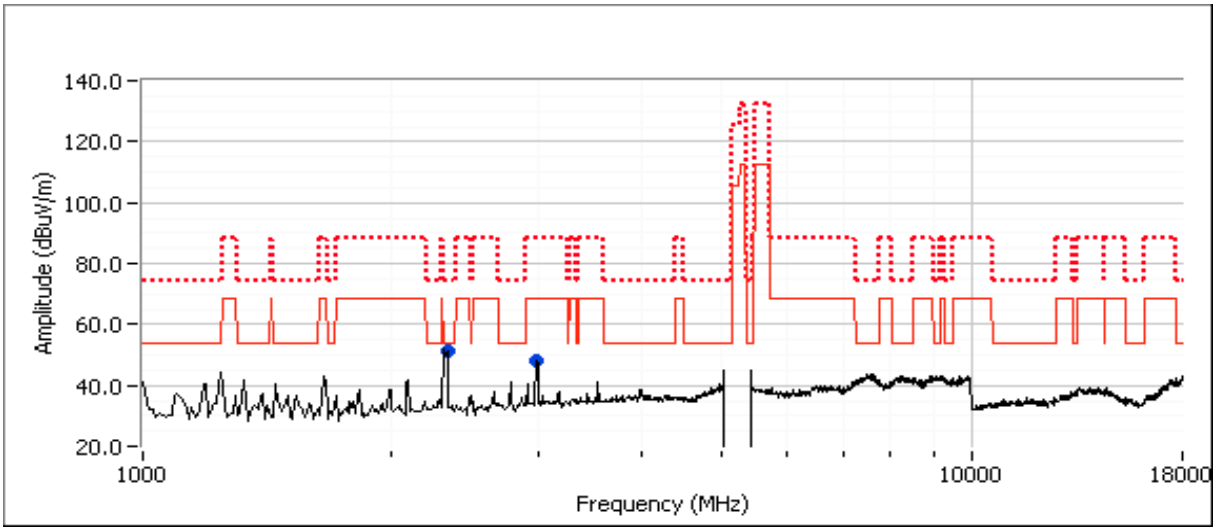
Date of Test: 9/24/2010 Test Location: FT Chamber#7

Test Engineer: Joseph Cadigal Config Change: none

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.5 | 26.5 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2331.900** | **41.4** | V | 54.0 | **-12.6** | AVG | 43 | 1.0 | |
| 2332.100 | 59.1 | V | 74.0 | -14.9 | PK | 43 | 1.0 | |
| 2986.210 | 36.2 | V | 68.3 | -32.1 | AVG | 165 | 1.0 | |
| 2985.370 | 52.8 | V | 88.3 | -35.5 | PK | 165 | 1.0 | |



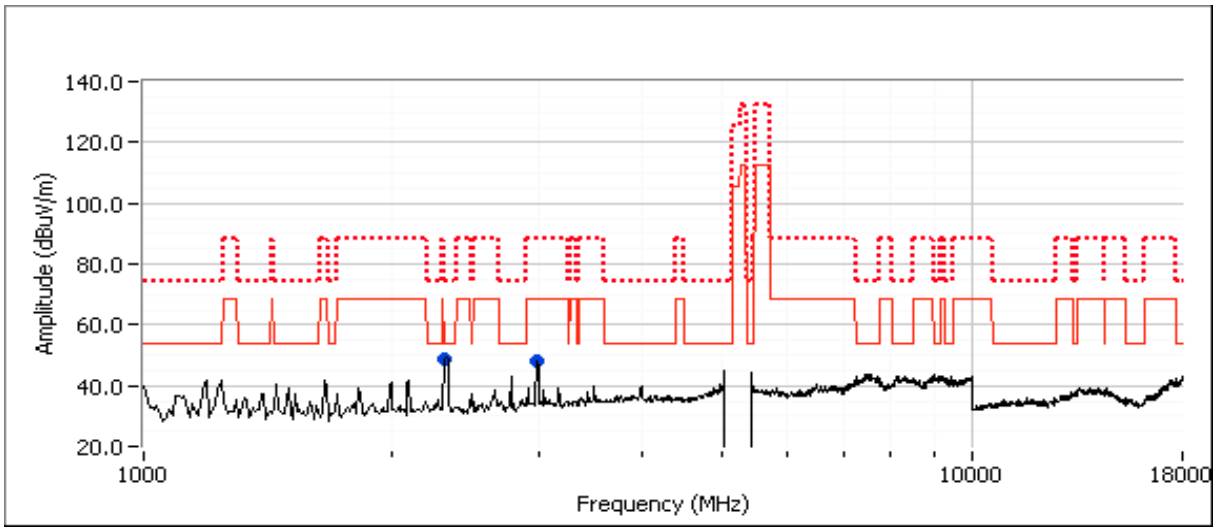
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2g: Channel #52 5260MHz - 802.11a,Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.7 | 26.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2331.500** | **41.4** | V | 54.0 | **-12.6** | AVG | 50 | 1.0 | |
| 2331.760 | 59.8 | V | 74.0 | -14.2 | PK | 50 | 1.0 | |
| 2993.500 | 39.5 | V | 68.3 | -28.8 | AVG | 154 | 1.0 | |
| 2991.850 | 56.5 | V | 88.3 | -31.8 | PK | 154 | 1.0 | |



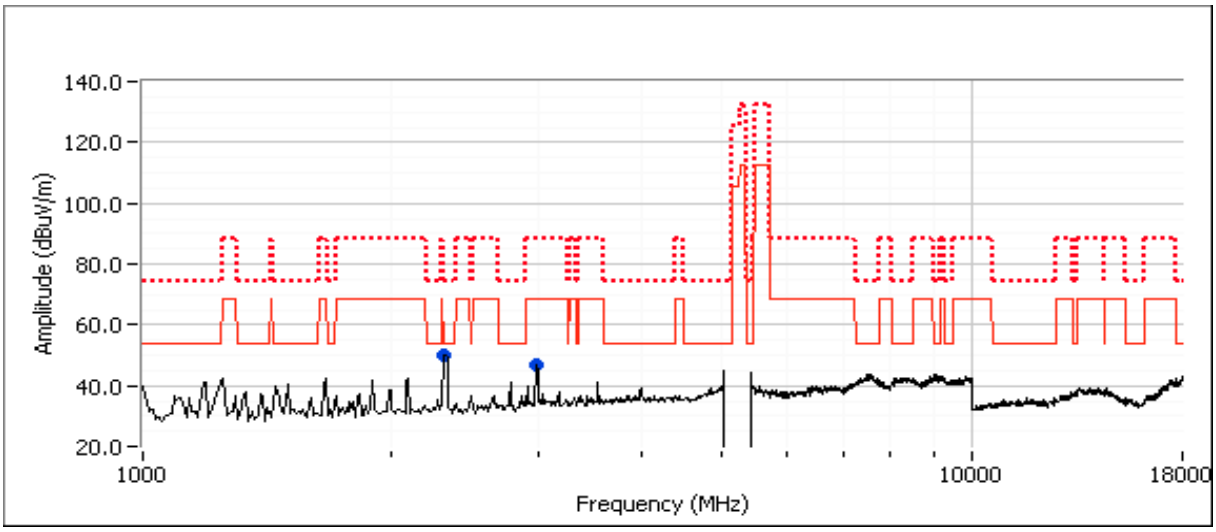
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2h: Channel #64 5320MHz - 802.11a,Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.7 | 26.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2331.650** | **41.2** | V | 54.0 | **-12.8** | AVG | 45 | 1.0 | |
| 2331.850 | 59.0 | V | 74.0 | -15.0 | PK | 45 | 1.0 | |
| 2986.300 | 40.1 | V | 68.3 | -28.2 | AVG | 148 | 1.0 | |
| 2984.910 | 57.8 | V | 88.3 | -30.5 | PK | 148 | 1.0 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #3, Radiated Spurious Emissions, 1-40GHz, Center Channel 5470-5725MHz - 802.11a, n20, n40, Chain A, B**

Date of Test: 9/24/2010 Test Location: FT Chamber#7

Test Engineer: Joseph Cadigal Config Change: none

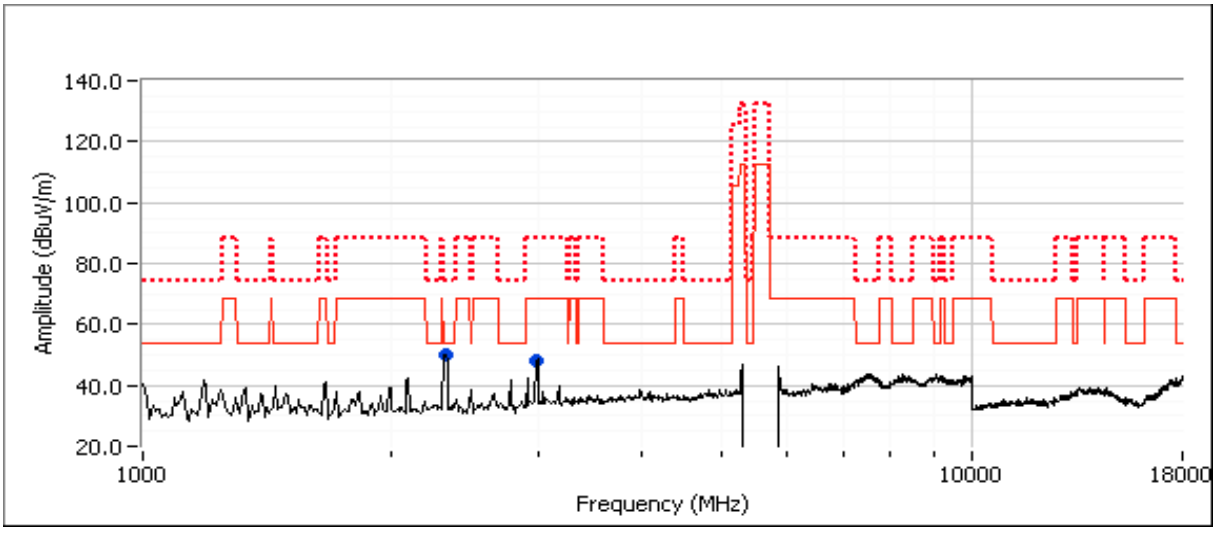
For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm eirp (68.3dBuV/m @3m). As the power measured is average power this is considered an average limit so the peak limit would be 88.3dBuV/m at 3m.

**Run #3a: Channel #116 5580MHz - 802.11a,Chain A**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.6 | 28.5 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2322.920** | **37.3** | V | 54.0 | **-16.7** | AVG | 0 | 2.0 | |
| 2321.940 | 54.6 | V | 74.0 | -19.4 | PK | 0 | 2.0 | |
| 2998.360 | 37.4 | V | 68.3 | -30.9 | AVG | 160 | 1.0 | |
| 2998.080 | 54.2 | V | 88.3 | -34.1 | PK | 160 | 1.0 | |



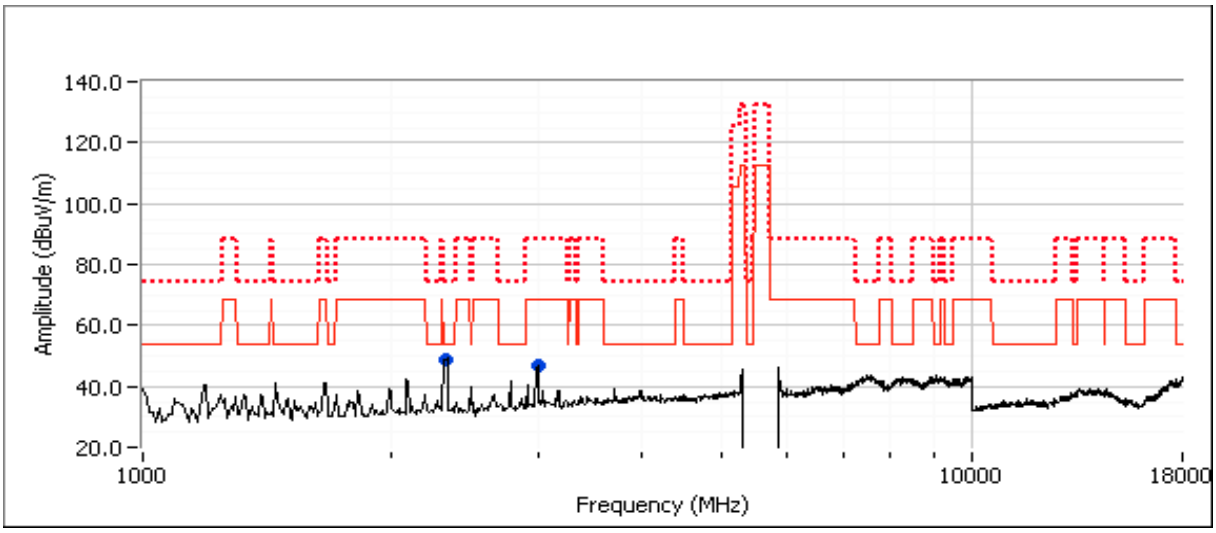
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #3b: Channel #116 5580MHz - 802.11a,Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain B | 16.5 | 16.6 | 28.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2323.180** | **37.6** | V | 54.0 | **-16.4** | AVG | 211 | 1.5 | |
| 2323.420 | 55.1 | V | 74.0 | -18.9 | PK | 211 | 1.5 | |
| 2986.210 | 35.7 | V | 68.3 | -32.6 | AVG | 165 | 1.0 | |
| 2984.950 | 52.6 | V | 88.3 | -35.7 | PK | 165 | 1.0 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

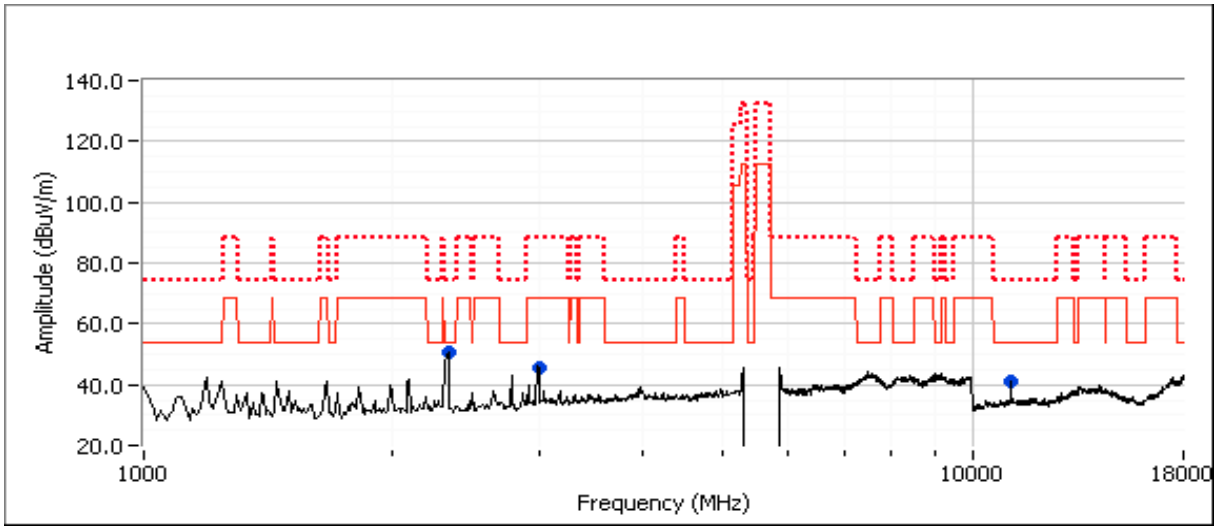
**Run #3c: Channel #116 5580MHz - 802.11n20,Chain A + B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.6 | 16.6 | | 19.6 | 33.0, 33.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2323.030** | **41.8** | V | 54.0 | **-12.2** | AVG | 0 | 1.0 | |
| 2321.940 | 59.4 | V | 74.0 | -14.6 | PK | 0 | 1.0 | |
| 2998.100 | 36.3 | V | 68.3 | -32.0 | AVG | 161 | 1.0 | |
| 2998.270 | 53.2 | V | 88.3 | -35.1 | PK | 161 | 1.0 | |
| 11141.110 | 28.9 | V | 54.0 | -25.1 | AVG | 197 | 1.5 | |
| 11140.800 | 40.0 | V | 74.0 | -34.0 | PK | 197 | 1.5 | |

| | |
|---|---|
| Note 2: | Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

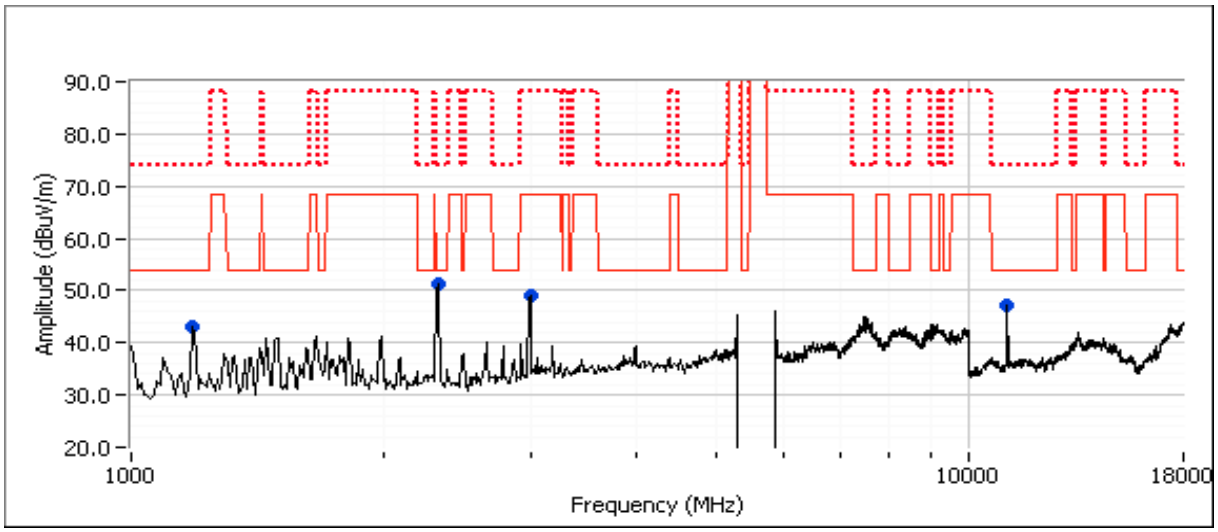
**Run #3d: Channel #110 5550MHz - 802.11n40, Chain A+B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.5 | 16.5 | | 19.5 | 34.5, 33.5 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 11100.270 | 42.6 | V | 54.0 | -11.4 | AVG | 162 | 2.0 | |
| 11107.330 | 53.3 | V | 74.0 | -20.7 | PK | 162 | 2.0 | |
| 1192.550 | 43.7 | V | 54.0 | -10.3 | AVG | 213 | 1.1 | |
| 1192.500 | 46.0 | V | 74.0 | -28.0 | PK | 213 | 1.1 | |
| 2325.400 | 41.7 | V | 54.0 | -12.3 | AVG | 3 | 1.0 | |
| 2330.600 | 59.8 | V | 74.0 | -14.2 | PK | 3 | 1.0 | |

| | |
|---|---|
| Note 1 | Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range |



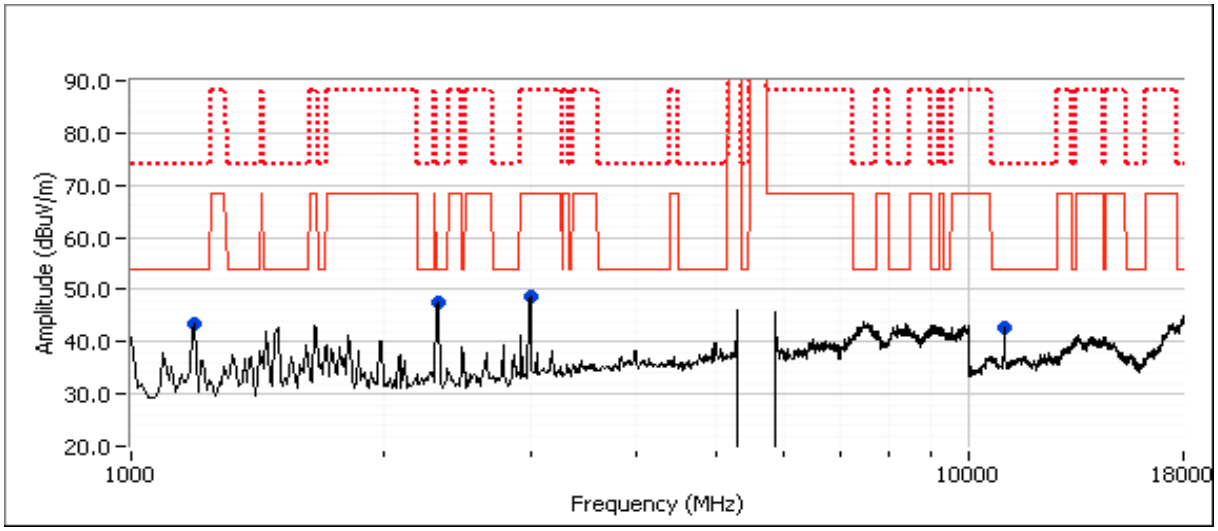
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #3e: Channel #102 5510 MHz - 802.11n40, Chain A + B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.5 | 16.5 | | 19.5 | 33.0, 34.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **1192.570** | **42.5** | V | 54.0 | **-11.5** | AVG | 216 | 1.1 | |
| 2331.900 | 41.4 | V | 54.0 | -12.6 | AVG | 3 | 1.0 | |
| 2993.010 | 39.6 | V | 68.3 | -28.7 | AVG | 151 | 1.0 | |
| 11006.310 | 40.1 | V | 54.0 | -13.9 | AVG | 162 | 1.1 | |
| 1192.440 | 44.8 | V | 74.0 | -29.2 | PK | 216 | 1.1 | |
| 2331.230 | 59.5 | V | 74.0 | -14.5 | PK | 3 | 1.0 | |
| 2993.210 | 57.0 | V | 88.3 | -31.3 | PK | 151 | 1.0 | |
| 11006.310 | 50.9 | V | 74.0 | -23.1 | PK | 162 | 1.1 | |



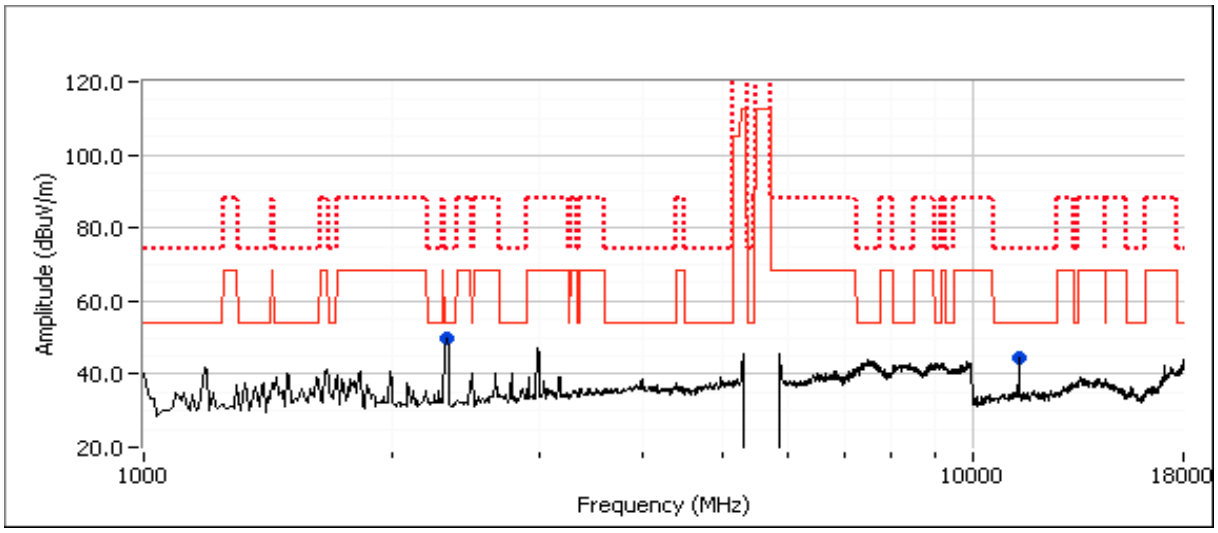
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #3f: Channel #140 5700MHz - 802.11n20,Chain A + B**

| | Power Settings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target (dBm) | | | | Measured (dBm) | | | | Software Setting |
| Chain | A | B | C | Total | A | B | C | Total | |
| | 16.5 | 16.5 | | 19.5 | 16.6 | 16.6 | | 19.6 | 35.5, 35.0 |

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2330.740 | 40.6 | V | 54.0 | -13.4 | AVG | 0 | 1.0 | |
| **11399.380** | **45.3** | V | 54.0 | **-8.7** | AVG | 169 | 1.0 | |
| 2323.910 | 58.0 | V | 74.0 | -16.0 | PK | 0 | 1.0 | |
| 11400.380 | 56.2 | V | 74.0 | -17.8 | PK | 169 | 1.0 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4, Radiated Spurious Emissions, 1-40GHz, Receive, Chain A, B, A+B**

Date of Test: 9/27/2010 Test Location: Chamber #7

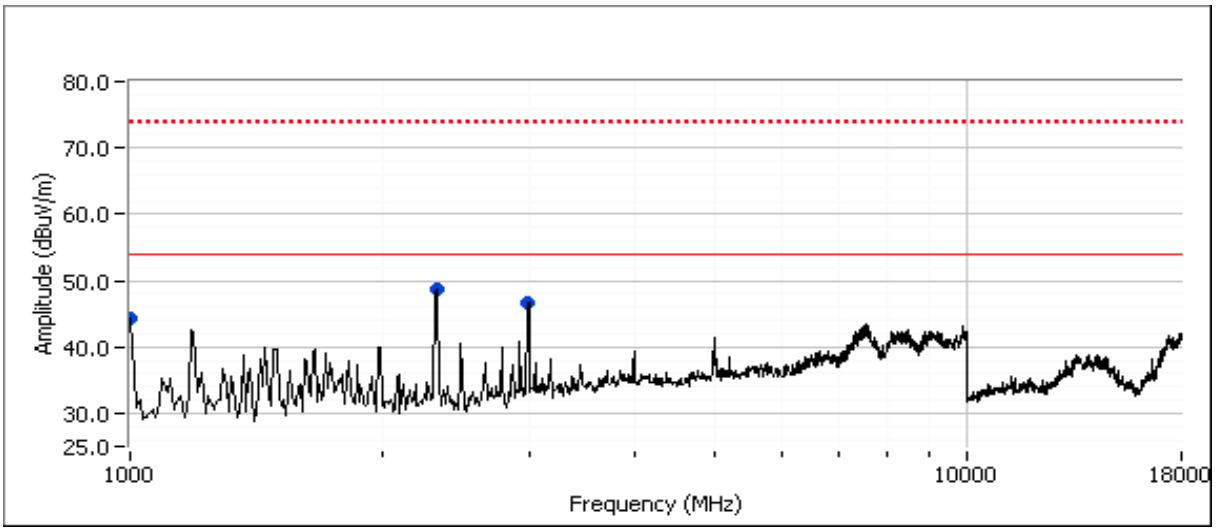
Test Engineer: Mehran Birgani Config Change: None

For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm eirp (68.3dBuV/m @3m). As the power measured is average power this is considered an average limit so the peak limit would be 88.3dBuV/m at 3m.

**Run #4a: EUT on Channel #40 5200MHz - Receive, Chain A**

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 1000.010 | 34.4 | V | 54.0 | -19.6 | AVG | 120 | 1.0 | |
| **2324.150** | **40.7** | V | 54.0 | **-13.3** | AVG | 293 | 1.0 | |
| 2998.610 | 39.1 | V | 54.0 | -14.9 | AVG | 128 | 1.0 | |
| 1000.030 | 50.9 | V | 74.0 | -23.1 | PK | 120 | 1.0 | |
| 2322.000 | 58.4 | V | 74.0 | -15.6 | PK | 293 | 1.0 | |
| 2999.650 | 57.4 | V | 74.0 | -16.6 | PK | 128 | 1.0 | |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4b: EUT on Channel #40 5200MHz - Receive, Chain B**

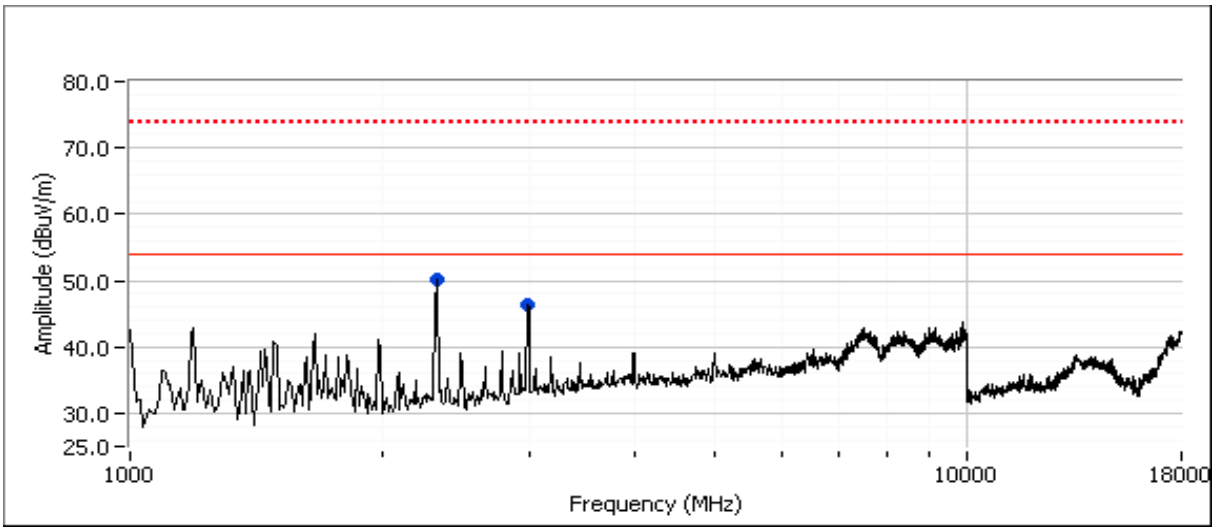
Date of Test: 9/27/2010 Test Location: Chamber #7

Test Engineer: Joseph Cadigal Config Change: None

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2322.830** | **41.0** | V | 54.0 | **-13.0** | AVG | 352 | 1.0 | |
| 2997.670 | 39.3 | V | 54.0 | -14.7 | AVG | 133 | 1.0 | |
| 2324.360 | 58.8 | V | 74.0 | -15.2 | PK | 352 | 1.0 | |
| 2990.270 | 57.1 | V | 74.0 | -16.9 | PK | 133 | 1.0 | |

| | |
|---|---|
| Note 1: | Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range |

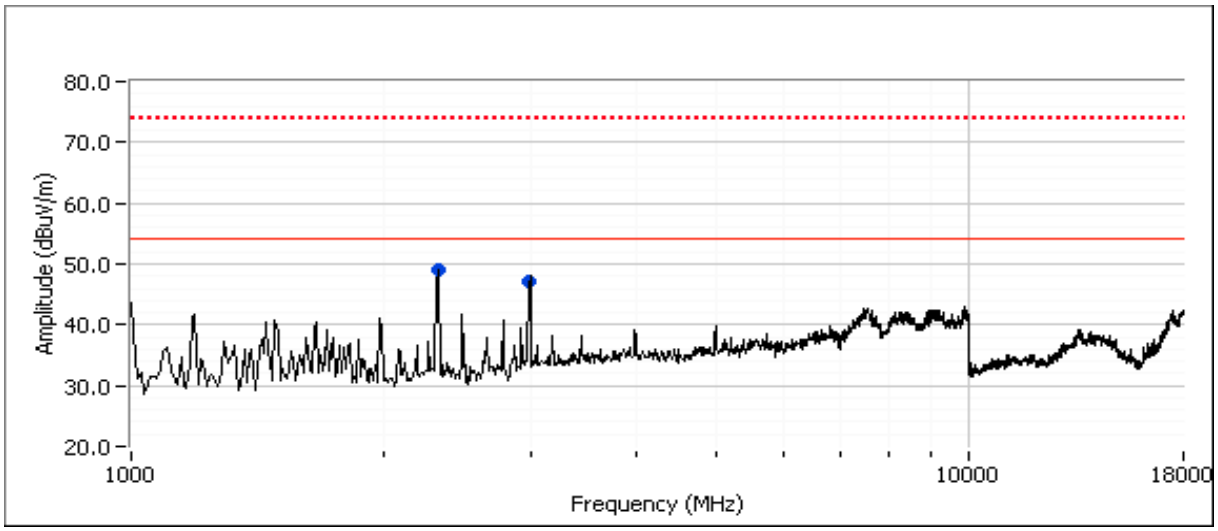


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4c: EUT on Channel #40 5200MHz - Receive, Chain A+B**

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2330.020** | **38.4** | V | 54.0 | **-15.6** | AVG | 300 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2986.600 | 37.9 | V | 54.0 | -16.1 | AVG | 156 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2329.650 | 55.5 | V | 74.0 | -18.5 | PK | 300 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2986.310 | 55.2 | V | 74.0 | -18.8 | PK | 156 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

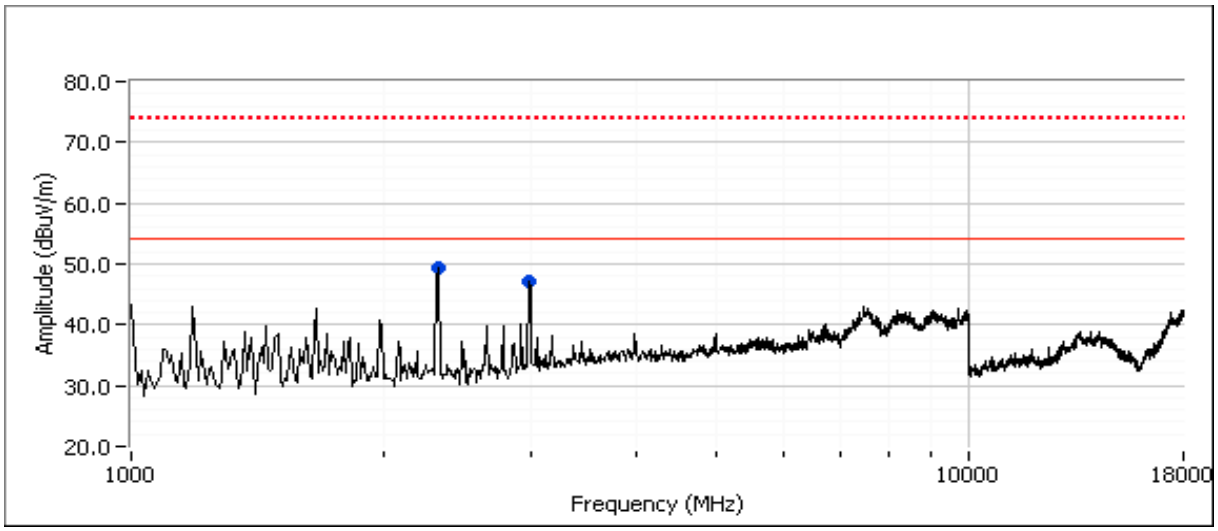


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4d: EUT on Channel #60 5300MHz - Receive, Chain A**

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2986.300** | **38.1** | V | 54.0 | **-15.9** | AVG | 158 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2986.500 | 55.2 | V | 74.0 | -18.8 | PK | 158 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2331.850 | 33.7 | V | 54.0 | -20.3 | AVG | 357 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2333.040 | 49.7 | V | 74.0 | -24.3 | PK | 357 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |



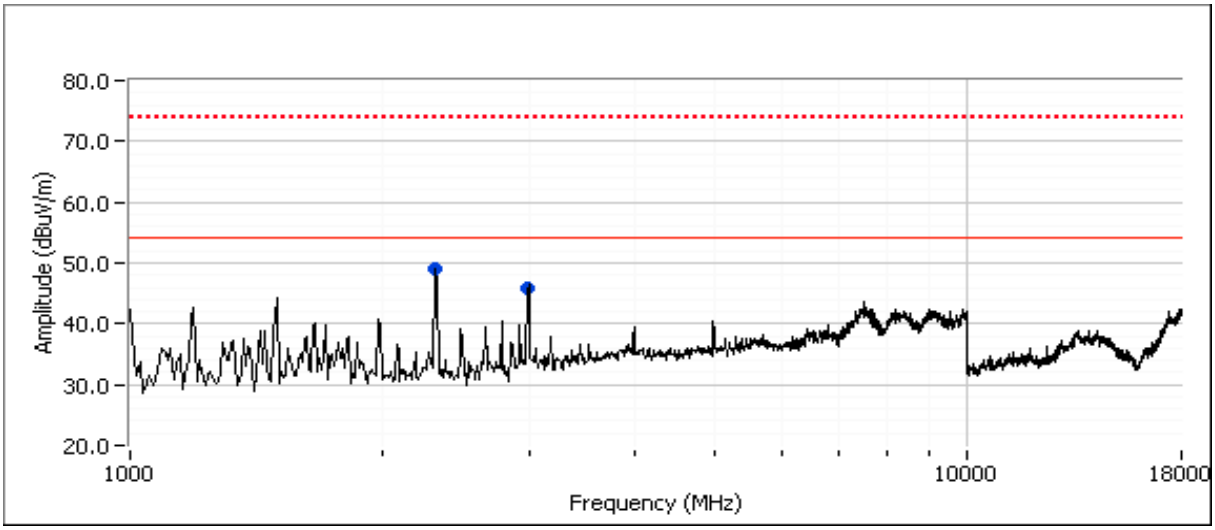
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4e: EUT on Channel #60 5300MHz - Receive, Chain B**

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2331.700** | **38.0** | V | 54.0 | **-16.0** | AVG | 305 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2987.140 | 37.9 | V | 54.0 | -16.1 | AVG | 129 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2987.250 | 55.7 | V | 74.0 | -18.3 | PK | 129 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2329.570 | 54.8 | V | 74.0 | -19.2 | PK | 305 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

| | |
|---|---|
| Note 1: | Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range |

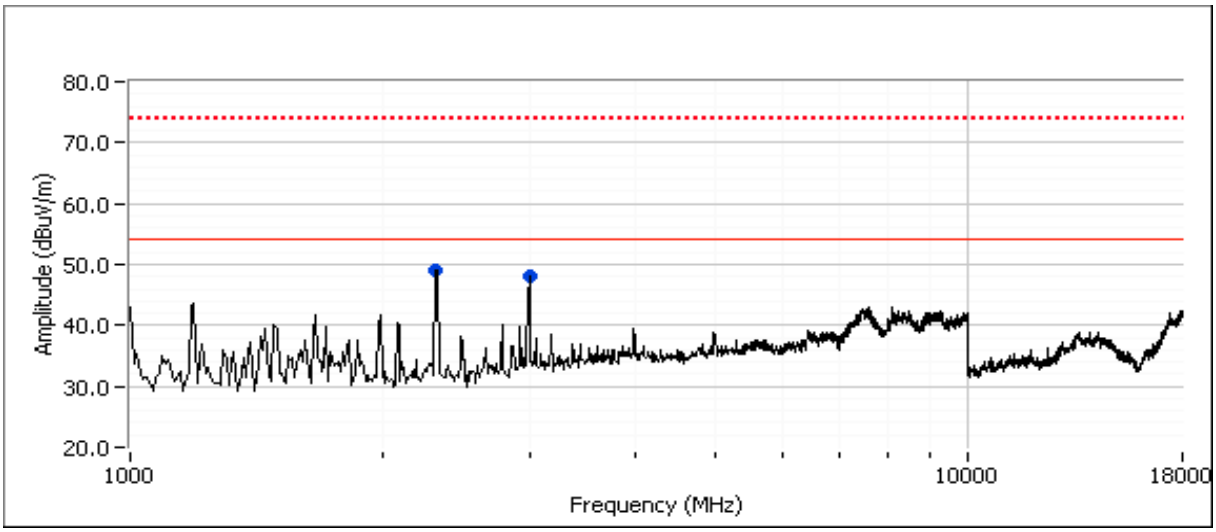


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4f: EUT on Channel #60 5300MHz - Receive, Chain A+B**

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2986.410** | **35.8** | V | 54.0 | **-18.2** | AVG | 115 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2331.380 | 34.5 | V | 54.0 | -19.5 | AVG | 287 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2985.560 | 53.0 | V | 74.0 | -21.0 | PK | 115 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2332.050 | 50.8 | V | 74.0 | -23.2 | PK | 287 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

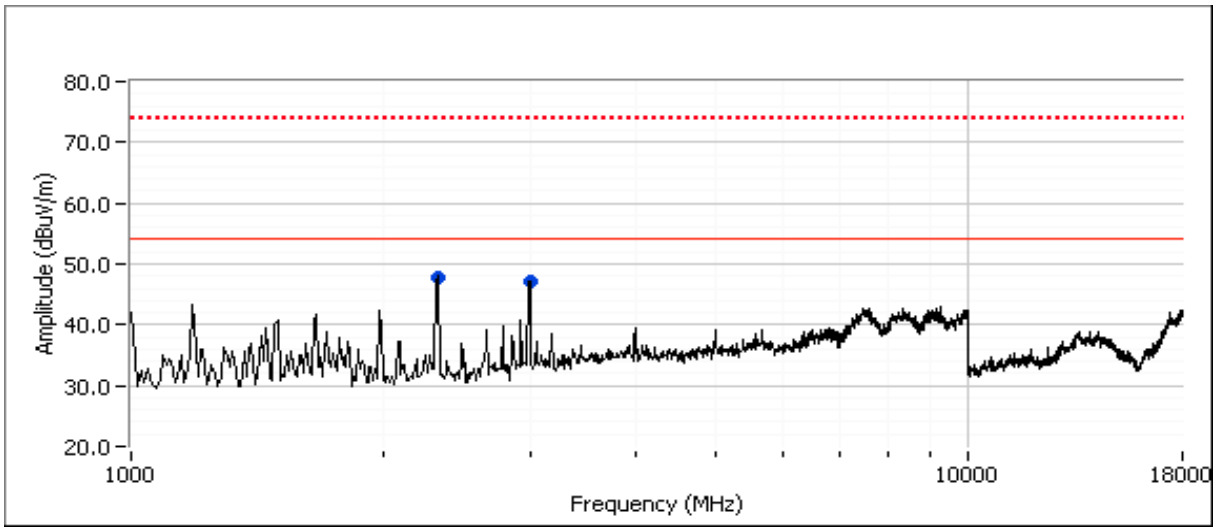


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4g: EUT on Channel #116 5580MHz - Receive, Chain A**

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2322.670** | **39.2** | V | 54.0 | **-14.8** | AVG | 55 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2986.530 | 38.5 | V | 54.0 | -15.5 | AVG | 140 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2985.190 | 56.2 | V | 74.0 | -17.8 | PK | 140 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2323.290 | 56.2 | V | 74.0 | -17.8 | PK | 55 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

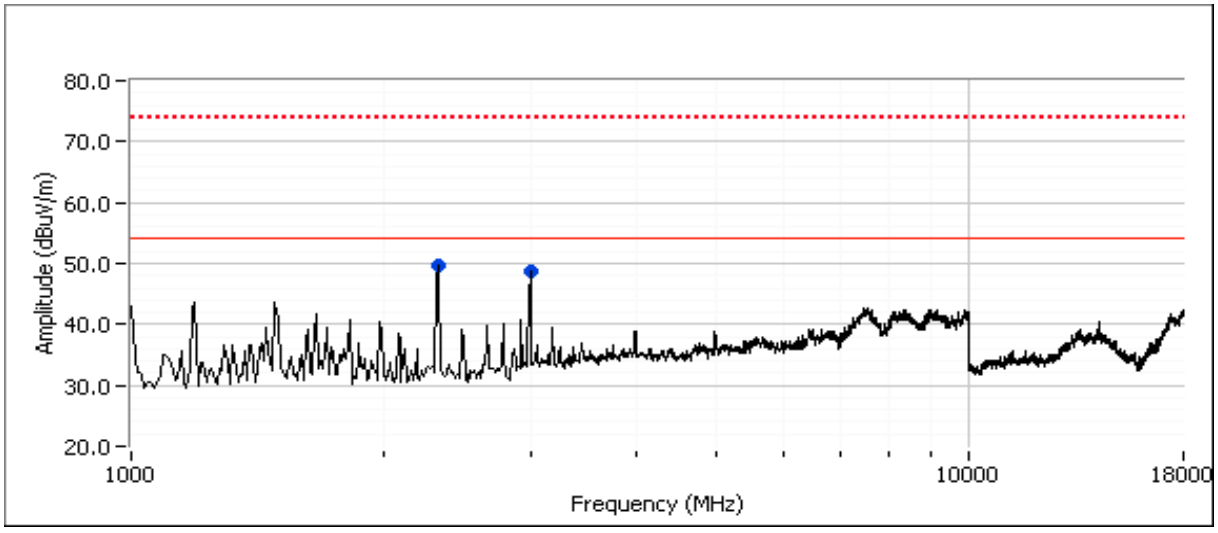


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4h: EUT on Channel #116 5580MHz - Receive, Chain B**

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2988.240** | **38.5** | V | 54.0 | **-15.5** | AVG | 127 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2328.890 | 37.0 | V | 54.0 | -17.0 | AVG | 304 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2988.680 | 56.2 | V | 74.0 | -17.8 | PK | 127 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2328.820 | 53.4 | V | 74.0 | -20.6 | PK | 304 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

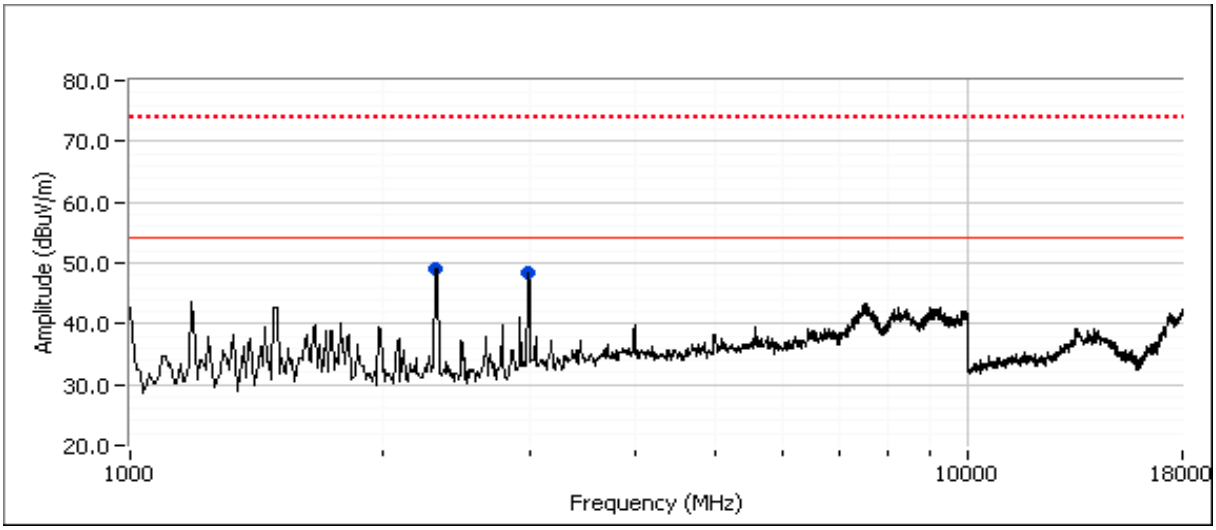


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #4i: EUT on Channel #116 5580MHz - Receive, Chain A+B**

***Spurious Radiated Emissions:***

| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **2326.230** | **39.4** | V | 54.0 | **-14.6** | AVG | 300 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2998.560 | 38.6 | V | 54.0 | -15.4 | AVG | 154 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2326.780 | 56.7 | V | 74.0 | -17.3 | PK | 300 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2999.970 | 55.8 | V | 74.0 | -18.2 | PK | 154 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | - |
| Emissions Standard(s): | FCC 15.247 | Class: | B |
| Immunity Standard(s): | - | Environment: | - |

# EMC Test Data

For The

# Intel Corporation

Model

**Intel® Centrino® Advanced-N 6230**

Date of Last Test:

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

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

## Test Specific Details

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

Date of Test: 10/4/2010
Test Engineer: Rafael Varelas
Test Location: FT Lab #4

Config. Used: 1
Config Change: none
Host Unit Voltage 120V/60Hz

## Summary of Results - Chain A

| Run # | Test Performed | Limit | Pass / Fail | Result / Margin |
|---|---|---|---|---|
| 1 | Power, 5150 - 5250MHz | 15.407(a) (1), (2) | Pass | 802.11a: 42 mW<br>802.11n 20MHz: 45 mW<br>802.11n n40MHz: 44 mW |
| 1 | PSD, 5150 - 5250MHz | 15.407(a) (1), (2) | Pass | 802.11a: 3.9 dBm/MHz<br>802.11n 20MHz: 3.7 dBm/MHz<br>802.11n n40MHz: 1.1 dBm/MHz |
| 1 | Power, 5250 - 5350MHz | 15.407(a) (1), (2) | Pass | 802.11a: 44 mW<br>802.11n 20MHz: 46 mW<br>802.11n n40MHz: 40 mW |
| 1 | PSD, 5250 - 5350MHz | 15.407(a) (1), (2) | Pass | 802.11a: 4.0 dBm/MHz<br>802.11n 20MHz: 3.9 dBm/MHz<br>802.11n n40MHz: 0.8 dBm/MHz |
| 1 | Power, 5470 - 5725MHz | 15.407(a) (1), (2) | Pass | 802.11a: 45 mW<br>802.11n 20MHz: 44 mW<br>802.11n n40MHz: 44 mW |
| 1 | PSD, 5470 - 5725MHz | 15.407(a) (1), (2) | Pass | 802.11a: 4.2 dBm/MHz<br>802.11n 20MHz: 3.5 dBm/MHz<br>802.11n n40MHz: 1.4 dBm/MHz |
| 1 | 26dB Bandwidth | 15.407<br>(Information only) | - | > 20MHz for all modes |
| 1 | 99% Bandwidth | RSS 210<br>(Information only) | N/A | 802.11a: 17.1 MHz<br>802.11n 20MHz: 18.1 MHz<br>802.11n n40MHz: 36.4 MHz |
| 2 | Peak Excursion Envelope | 15.407(a) (6)<br>13dB | Pass | 9.6dB |
| 3 | Antenna Conducted - Out of Band Spurious | 15.407(b)<br>-27dBm/MHz | Pass | All emissions below the -27dBm/MHz limit |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

## 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: | 22.4 °C |
| Rel. Humidity: | 39 % |

## 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: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1: Bandwidth, Output Power and Power Spectral Density - Single Chain Systems**

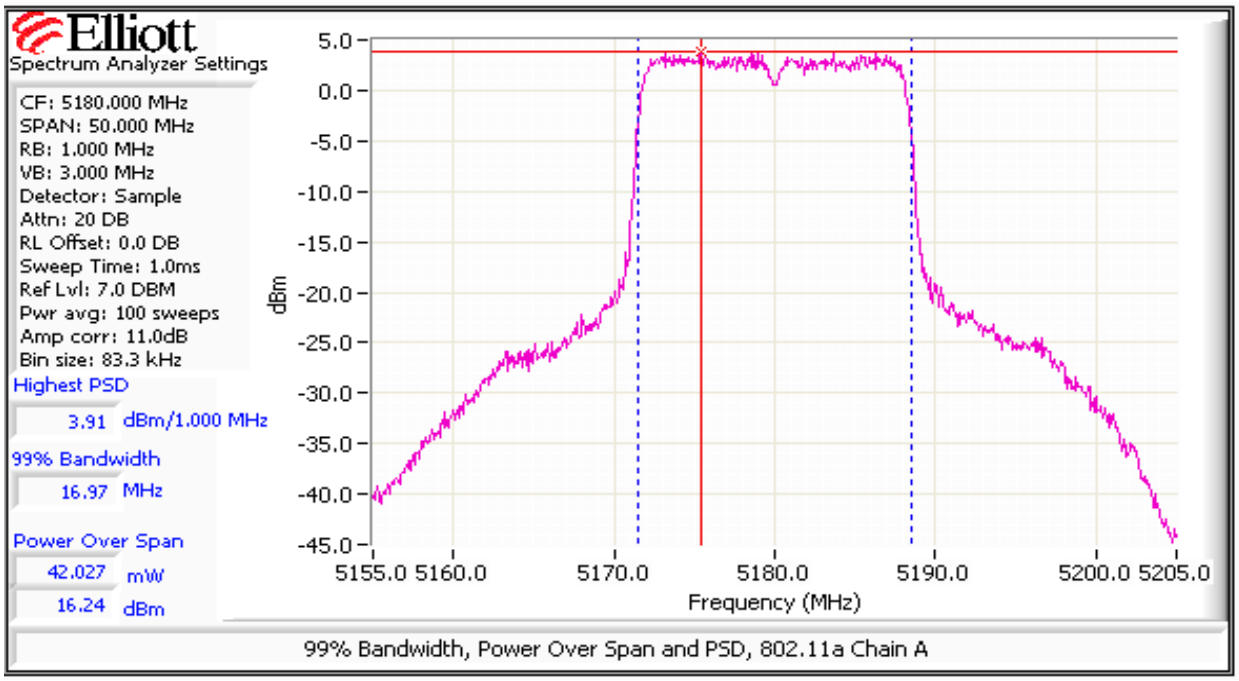
| | |
|---|---|
| Note 1: | Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over **80** MHz (method 1 of DA-02-2138A1). |
| Note 2: | Measured using the same analyzer settings used for output power. |
| Note 3: | For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB. |
| Note 4: | 99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB |

**Single Chain Operation, 5150-5250MHz Band**

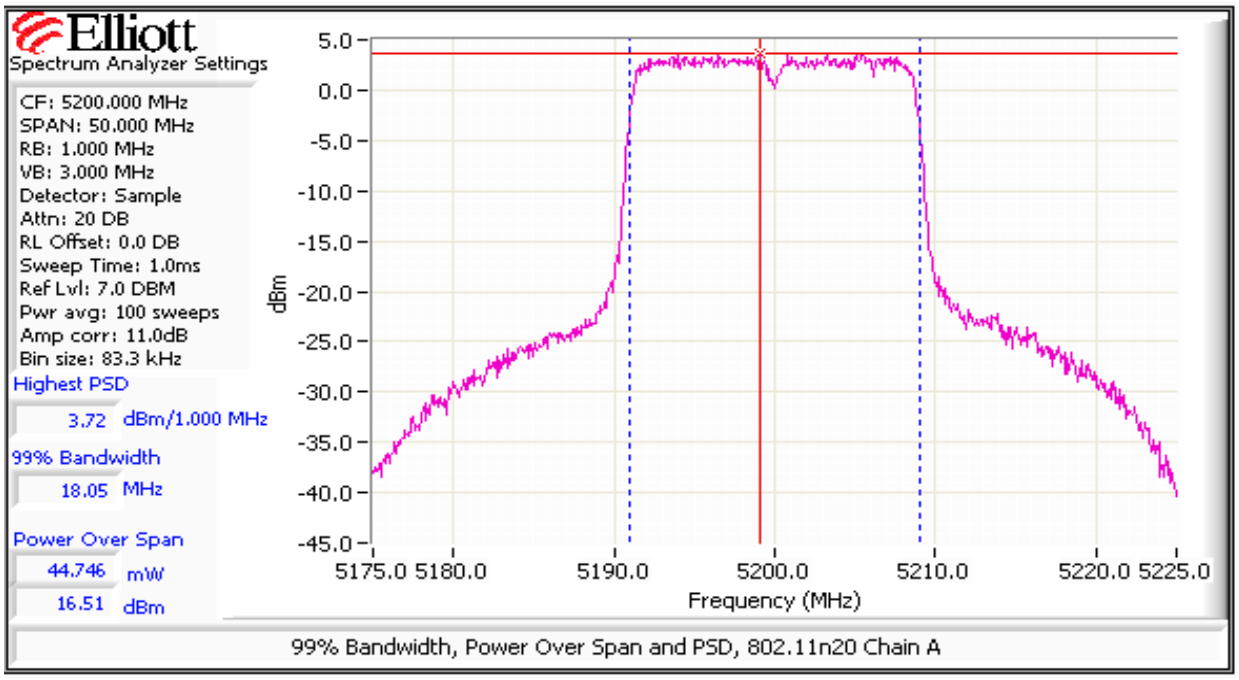
Antenna Gain (dBi): 3.6 EIRP: 95.5 mW 19.8 dBm

| Frequency (MHz) | Software Setting | Bandwidth | | Output Power[1] dBm | | Power (Watts) | PSD[2] dBm/MHz | | | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 26dB | 99%[4] | Measured | Limit | | Measured | FCC Limit | RSS Limit[3] | |
| **802.11a** | | | | | | | | | | |
| 5180 | 24.5 | 32.8 | 17.0 | 16.2 | 17.0 | 0.042 | 3.9 | 4.0 | 6.4 | Pass |
| 5200 | 24.5 | 33.2 | 17.0 | 16.2 | 17.0 | 0.042 | 3.7 | 4.0 | 6.4 | Pass |
| 5240 | 24.5 | 33.7 | 17.0 | 15.9 | 17.0 | 0.039 | 3.4 | 4.0 | 6.4 | Pass |
| **802.11n 20MHz** | | | | | | | | | | |
| 5180 | 24.0 | 30.8 | 18.1 | 15.9 | 17.0 | 0.039 | 3.0 | 4.0 | 6.4 | Pass |
| 5200 | 25.0 | 36.2 | 18.1 | 16.5 | 17.0 | 0.045 | 3.7 | 4.0 | 6.4 | Pass |
| 5240 | 25.5 | 36.6 | 18.1 | 16.4 | 17.0 | 0.044 | 3.6 | 4.0 | 6.4 | Pass |
| **802.11n 40MHz** | | | | | | | | | | |
| 5190 | 21.0 | 39.3 | 36.3 | 12.8 | 17.0 | 0.019 | -2.5 | 4.0 | 6.4 | Pass |
| 5230 | 26.0 | 52.0 | 36.3 | 16.4 | 17.0 | 0.044 | 1.1 | 4.0 | 6.4 | Pass |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

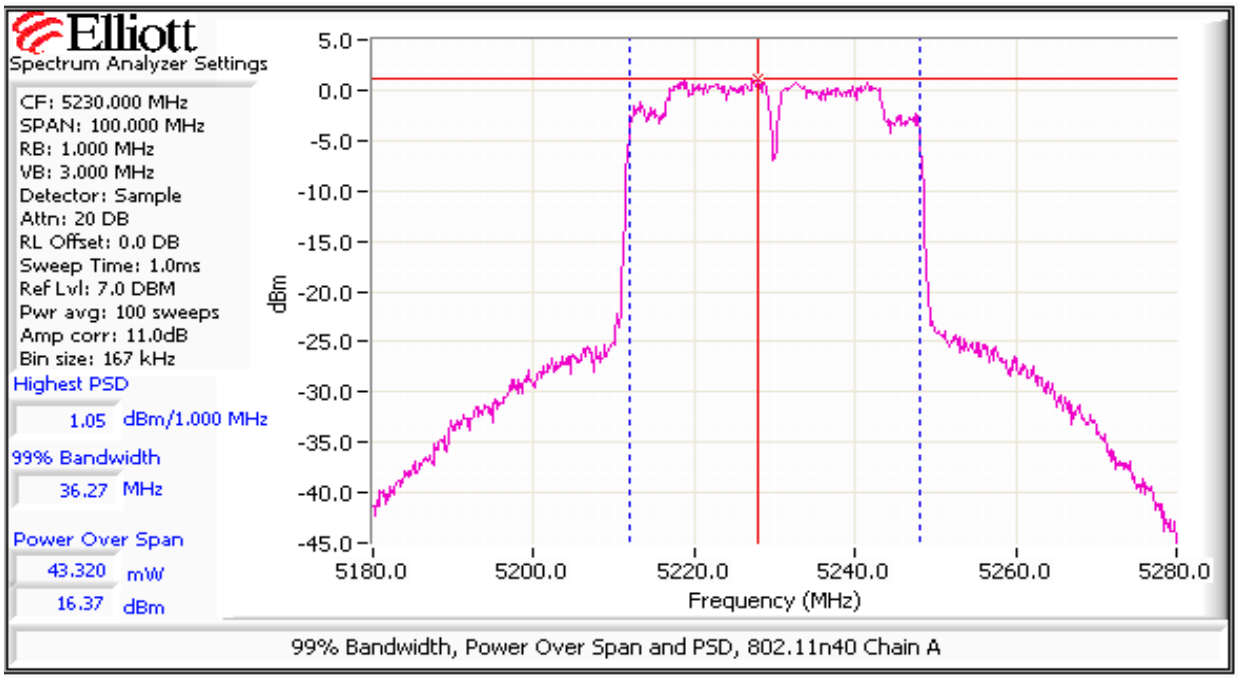



99% Bandwidth, Power Over Span and PSD, 802.11a Chain A




99% Bandwidth, Power Over Span and PSD, 802.11n20 Chain A

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

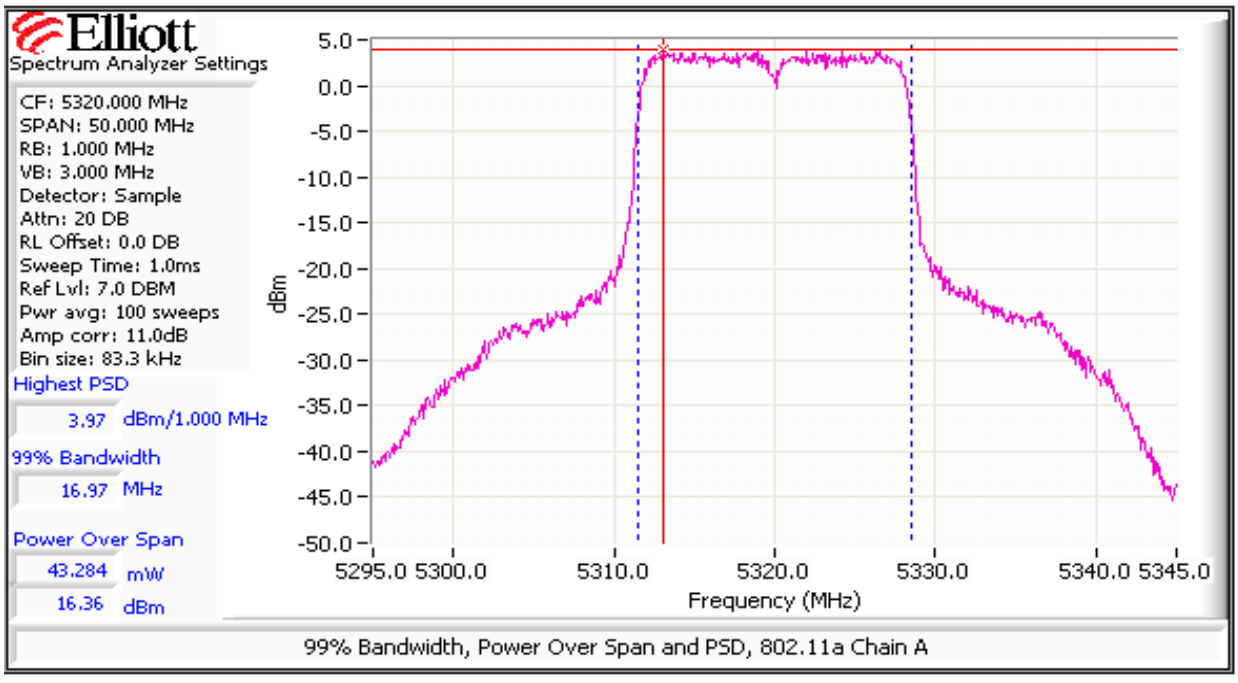


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

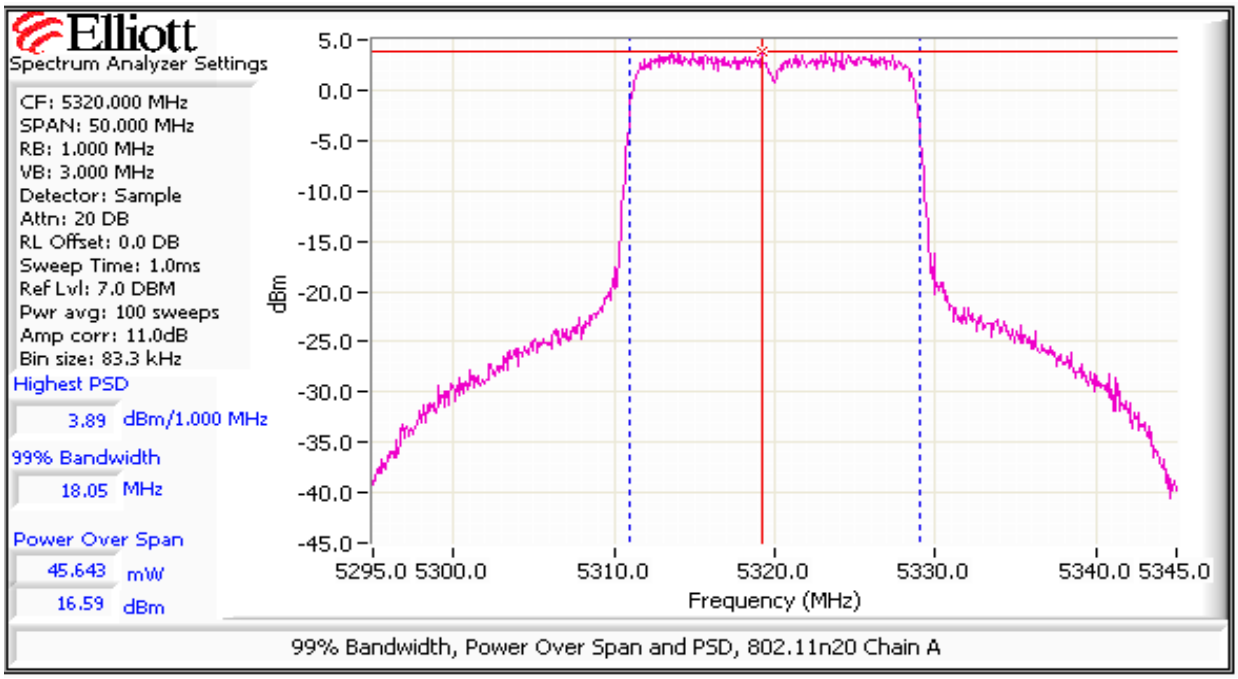
**Single Chain Operation, 5250-5350 MHz Band**

Antenna Gain (dBi): 3.7 EIRP: 102.3 mW 20.1 dBm

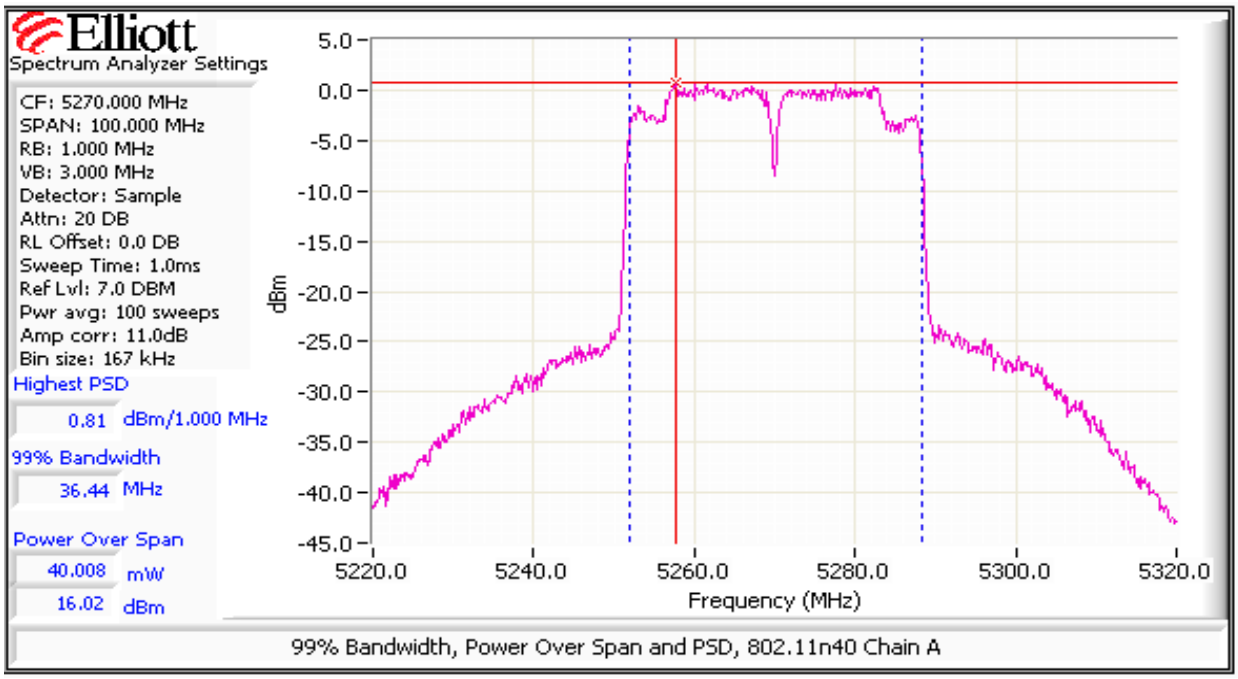
| Frequency (MHz) | Software Setting | Bandwidth 26dB | Bandwidth 99%[4] | Output Power[1] dBm Measured | Output Power[1] dBm Limit | Power (Watts) | PSD[2] dBm/MHz Measured | PSD[2] dBm/MHz FCC Limit | PSD[2] dBm/MHz RSS Limit[3] | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| **802.11a** | | | | | | | | | | |
| 5260 | 25.0 | 32.5 | 17.0 | 15.9 | 24.0 | 0.039 | 3.6 | 11.0 | 11.0 | Pass |
| 5300 | 25.5 | 35.3 | 17.0 | 16.3 | 24.0 | 0.043 | 4.0 | 11.0 | 11.0 | Pass |
| 5320 | 25.5 | 34.4 | 17.0 | 16.4 | 24.0 | 0.044 | 4.0 | 11.0 | 11.0 | Pass |
| **802.11n 20MHz** | | | | | | | | | | |
| 5260 | 25.5 | 35.8 | 18.1 | 16.1 | 24.0 | 0.041 | 3.4 | 11.0 | 11.0 | Pass |
| 5300 | 26.0 | 36.8 | 18.1 | 16.6 | 24.0 | 0.046 | 3.7 | 11.0 | 11.0 | Pass |
| 5320 | 26.0 | 34.9 | 18.1 | 16.6 | 24.0 | 0.046 | 3.9 | 11.0 | 11.0 | Pass |
| **802.11n 40MHz** | | | | | | | | | | |
| 5270 | 26.5 | 62.3 | 36.4 | 16.0 | 24.0 | 0.040 | 0.8 | 11.0 | 11.0 | Pass |
| 5310 | 20.5 | 39.3 | 36.1 | 11.5 | 24.0 | 0.014 | -3.8 | 11.0 | 11.0 | Pass |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |




99% Bandwidth, Power Over Span and PSD, 802.11n20 Chain A



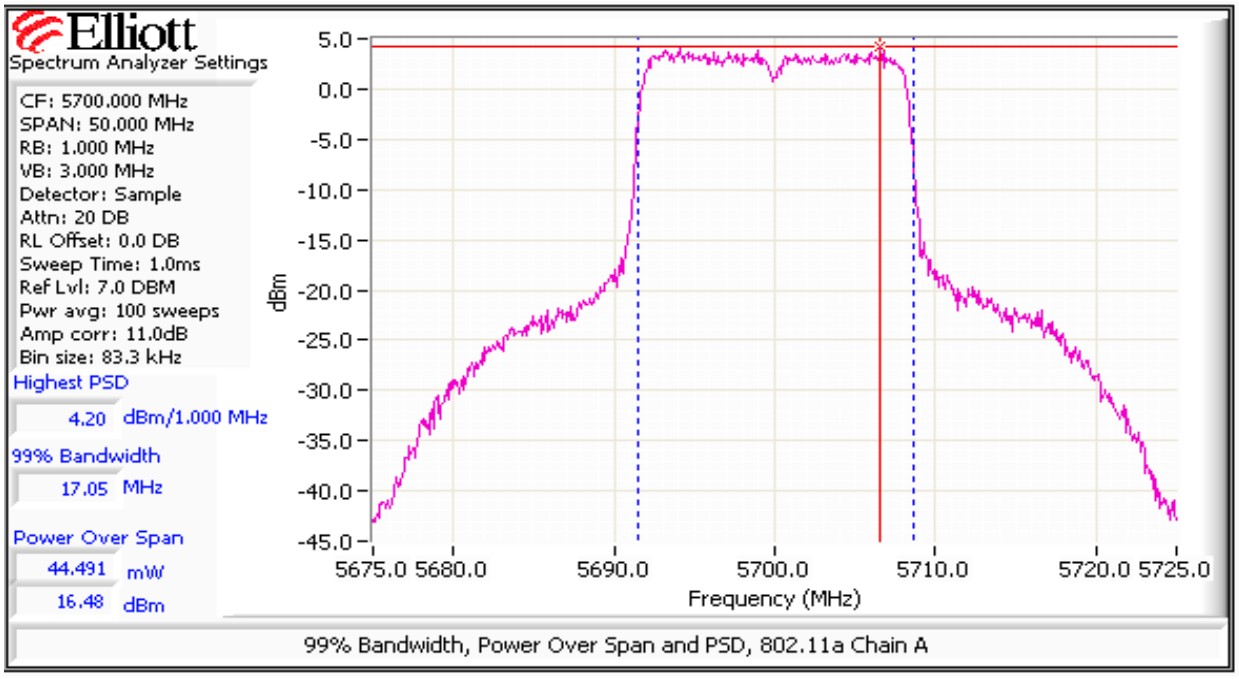

99% Bandwidth, Power Over Span and PSD, 802.11n40 Chain A

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

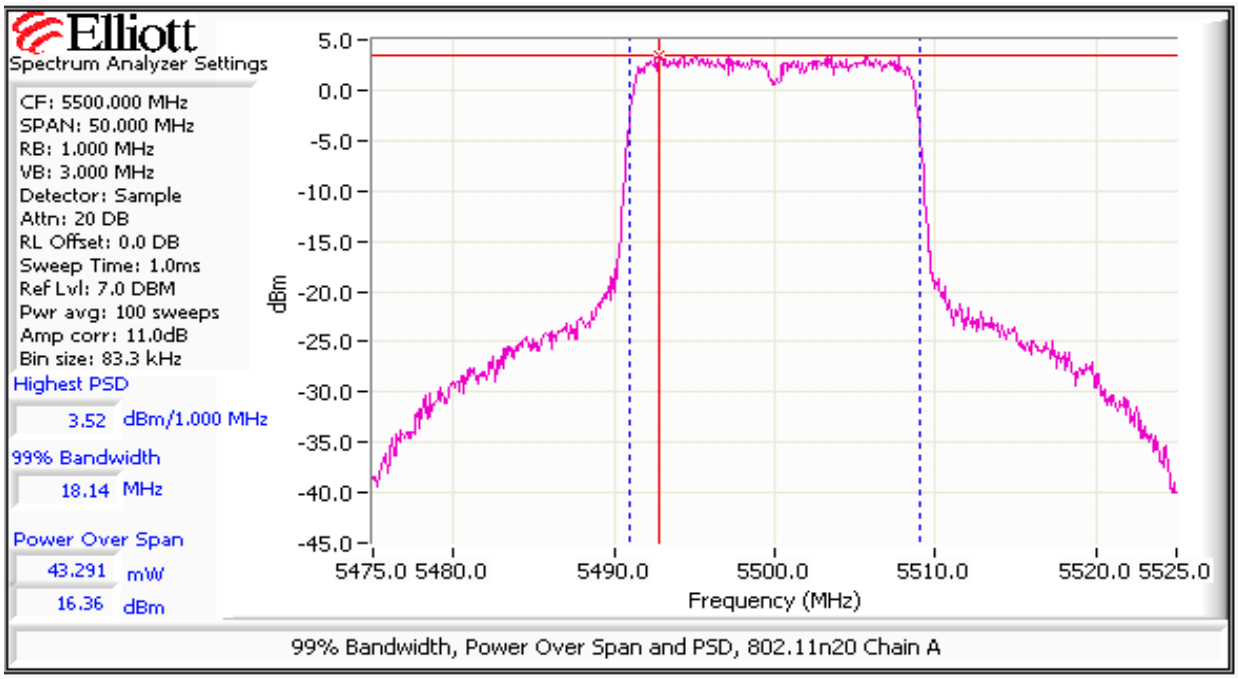
**Single Chain Operation, 5470- 5725 MHz Band**

Antenna Gain (dBi): 4.8 EIRP: 134.9 mW 21.3 dBm

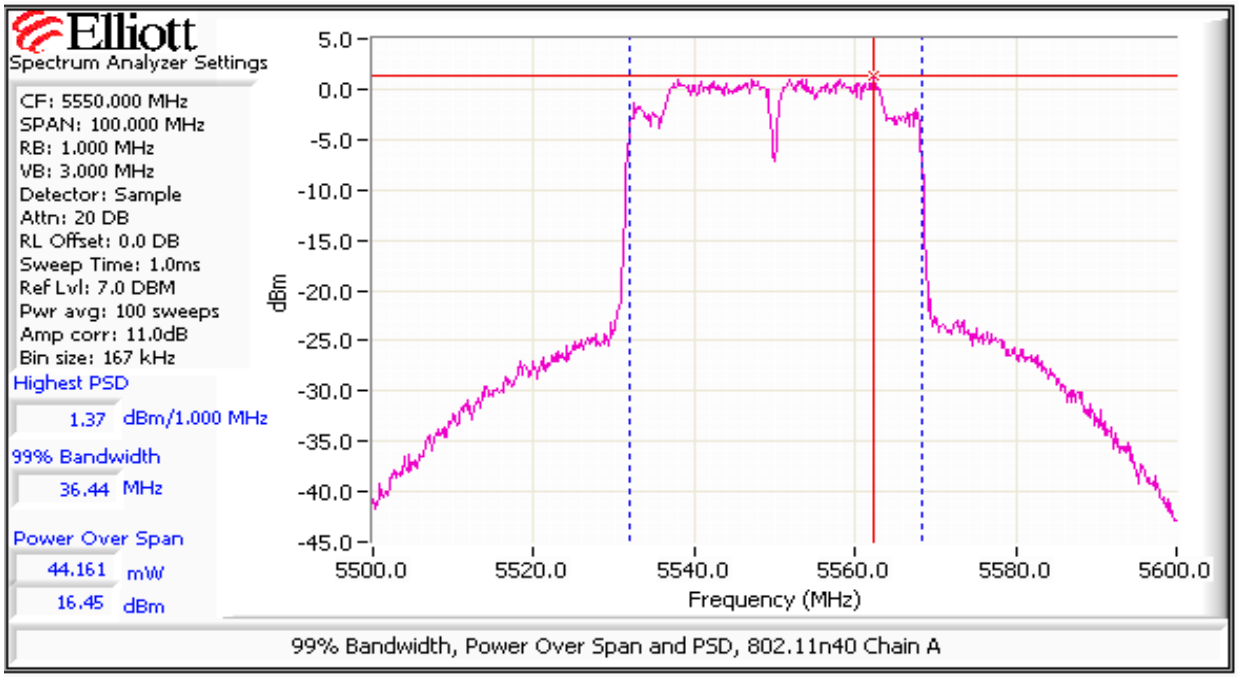
| Frequency (MHz) | Software Setting | Bandwidth 26dB | Bandwidth 99%[4] | Output Power[1] dBm Measured | Output Power[1] dBm Limit | Power (Watts) | PSD[2] dBm/MHz Measured | PSD[2] dBm/MHz FCC Limit | PSD[2] dBm/MHz RSS Limit[3] | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| **802.11a** | | | | | | | | | | |
| 5500 | 27.5 | 33.5 | 17.0 | 16.4 | 24.0 | 0.044 | 3.9 | 11.0 | 11.0 | Pass |
| 5580 | 28.0 | 35.6 | 17.0 | 16.5 | 24.0 | 0.045 | 3.8 | 11.0 | 11.0 | Pass |
| 5700 | 28.5 | 35.0 | 17.1 | 16.5 | 24.0 | 0.045 | 4.2 | 11.0 | 11.0 | Pass |
| **802.11n 20MHz** | | | | | | | | | | |
| 5500 | 27.5 | 36.0 | 18.1 | 16.4 | 24.0 | 0.044 | 3.5 | 11.0 | 11.0 | Pass |
| 5580 | 28.0 | 36.6 | 18.1 | 16.4 | 24.0 | 0.044 | 3.5 | 11.0 | 11.0 | Pass |
| 5700 | 28.5 | 39.1 | 18.1 | 16.3 | 24.0 | 0.043 | 3.4 | 11.0 | 11.0 | Pass |
| **802.11n 40MHz** | | | | | | | | | | |
| 5510 | 27.5 | 53.7 | 36.3 | 15.5 | 24.0 | 0.035 | 0.3 | 11.0 | 11.0 | Pass |
| 5550 | 29.0 | 60.0 | 36.4 | 16.5 | 24.0 | 0.045 | 1.4 | 11.0 | 11.0 | Pass |
| 5670 | 29.5 | 67.8 | 36.4 | 16.4 | 24.0 | 0.044 | 1.2 | 11.0 | 11.0 | Pass |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |




99% Bandwidth, Power Over Span and PSD, 802.11n20 Chain A




99% Bandwidth, Power Over Span and PSD, 802.11n40 Chain A

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2: Peak Excursion Measurement**

**802.11a: Device meets the requirement for the peak excursion**

| Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | Value | Limit | (MHz) | Value | Limit | (MHz) | Value | Limit |
| 5180 | 7.8 | 13.0 | 5260 | 7.7 | 13.0 | 5500 | 7.9 | 13.0 |
| 5200 | 8.0 | 13.0 | 5300 | 8.1 | 13.0 | 5580 | 8.0 | 13.0 |
| 5240 | 8.3 | 13.0 | 5320 | 7.8 | 13.0 | 5700 | 7.5 | 13.0 |

**n 20MHz: Device meets the requirement for the peak excursion**

| Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | Value | Limit | (MHz) | Value | Limit | (MHz) | Value | Limit |
| 5180 | 9.1 | 13.0 | 5260 | 9.0 | 13.0 | 5500 | 7.9 | 13.0 |
| 5200 | 7.9 | 13.0 | 5300 | 8.5 | 13.0 | 5580 | 8.1 | 13.0 |
| 5240 | 8.2 | 13.0 | 5320 | 8.6 | 13.0 | 5700 | 8.5 | 13.0 |

**n 40MHz: Device meets the requirement for the peak excursion**

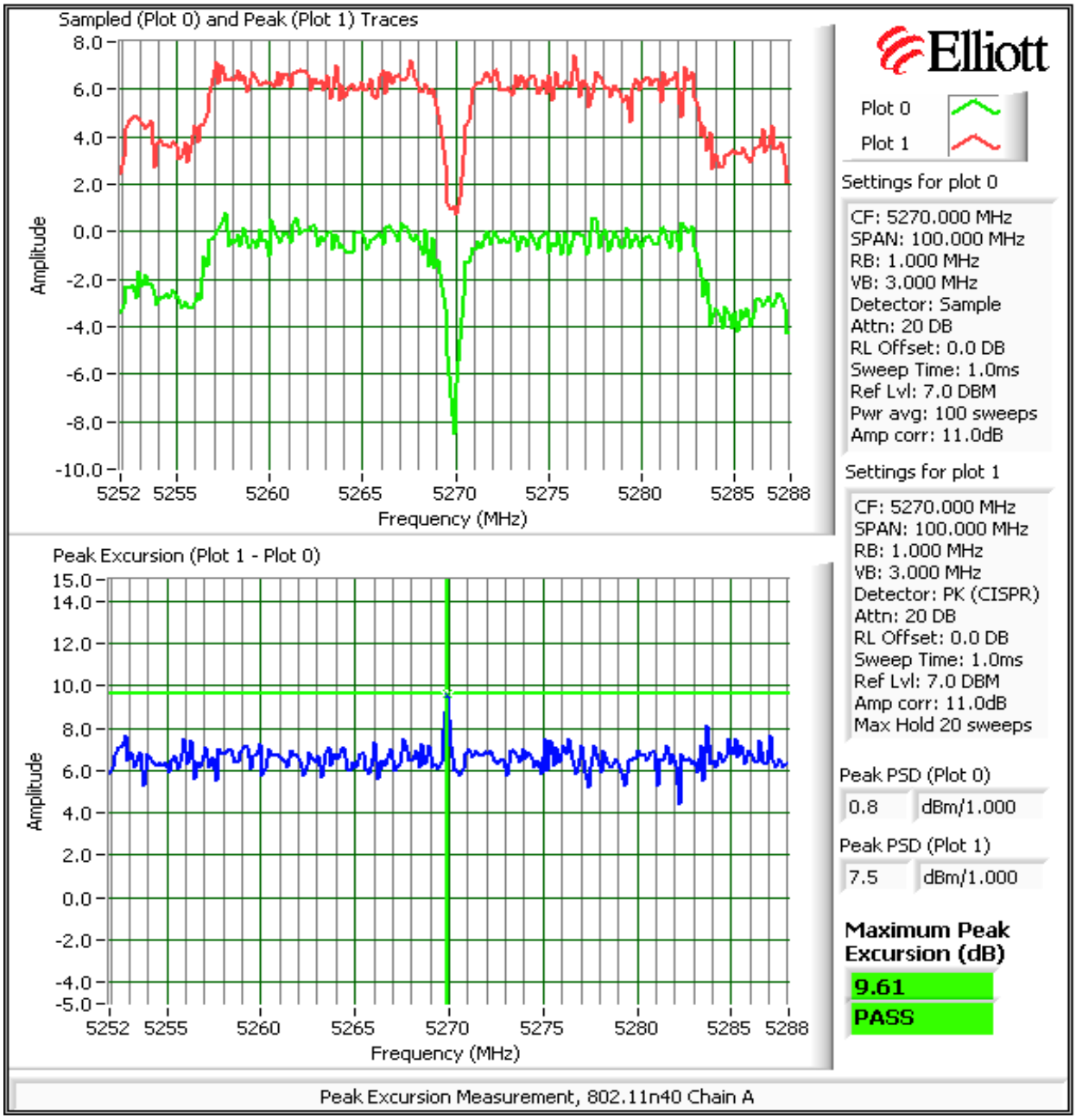
| Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | Value | Limit | (MHz) | Value | Limit | (MHz) | Value | Limit |
| 5190 | 8.4 | 13.0 | 5270 | 9.6 | 13.0 | 5510 | 8.4 | 13.0 |
| 5230 | 8.2 | 13.0 | 5310 | 9.4 | 13.0 | 5550 | 8.0 | 13.0 |
| | | | | | | 5670 | 8.7 | 13.0 |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Plots Showing Peak Excursion**

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

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



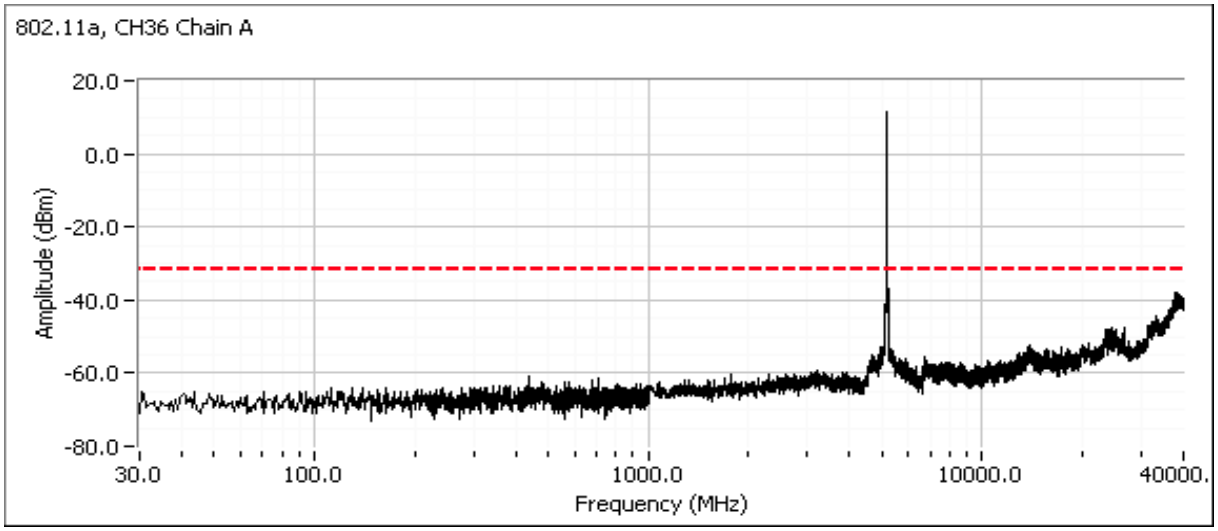
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #3: Out Of Band Spurious Emissions - Antenna Conducted**
**802.11a**

| | | | |
|---|---|---|---|
| Maximum Antenna Gain: | 4.8 | dBi | (worst case for all 3 bands) |
| Spurious Limit: | -27.0 | dBm/MHz eirp | |
| Limit Used On Plots [Note 1]: | **-31.8** | dBm/MHz | Average Limit (RB=1MHz, VB=10Hz) |
| | **-11.8** | dBm/MHz | Peak Limit (RB=VB=1MHz) |

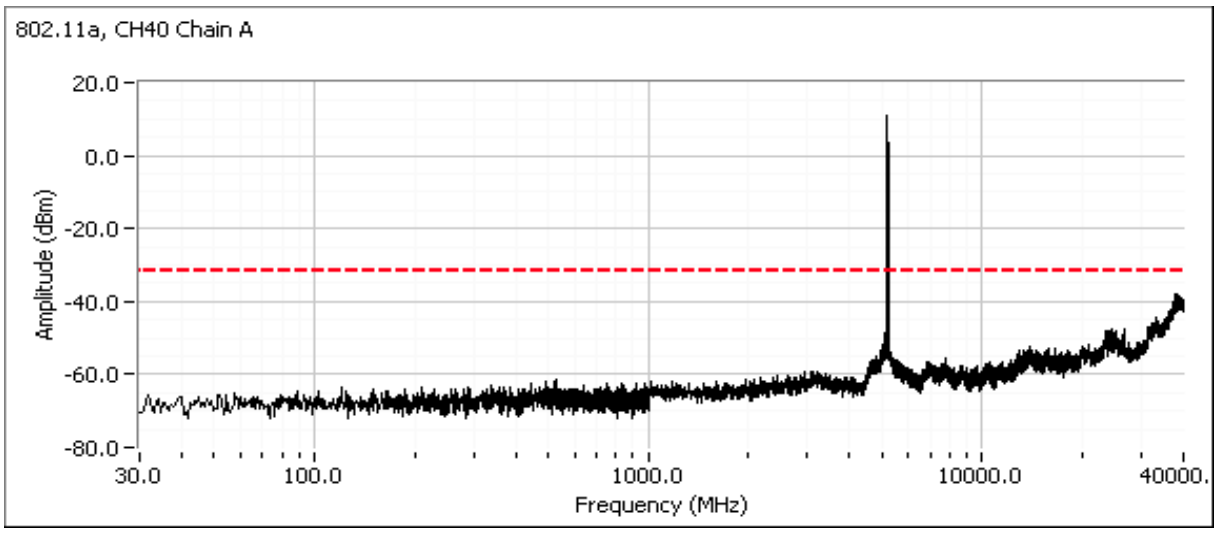
**Plots Showing Out-Of-Band - 802.11a Mode Emissions (RBW=VBW=1MHz)**

**Low channel, 5150 - 5250 MHz Band - 802.11a Mode**
Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

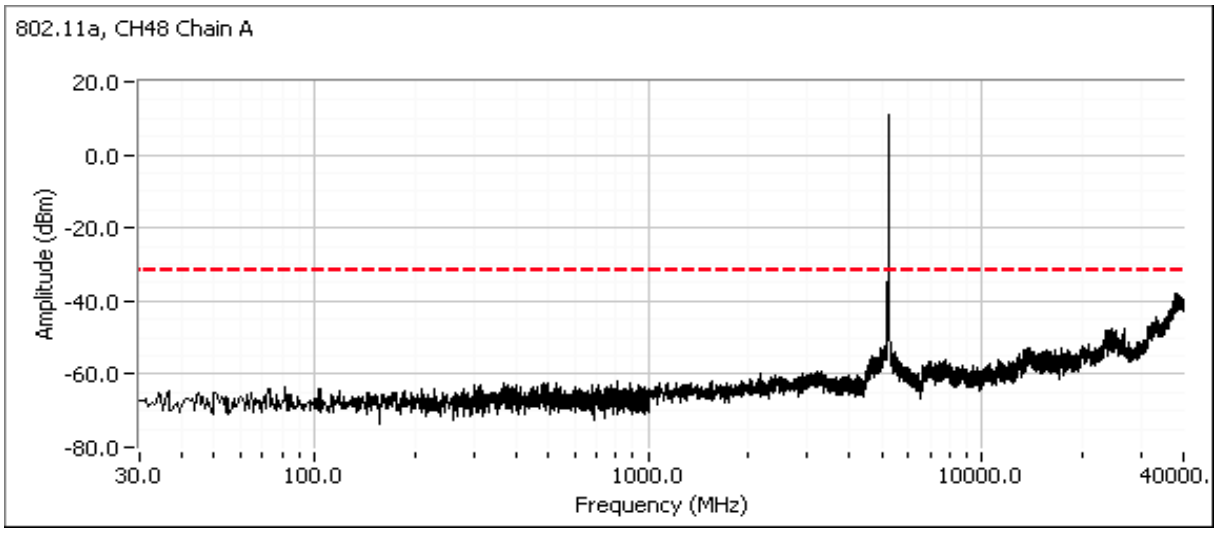


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Center channel, 5150 - 5250 MHz Band - 802.11a Mode**

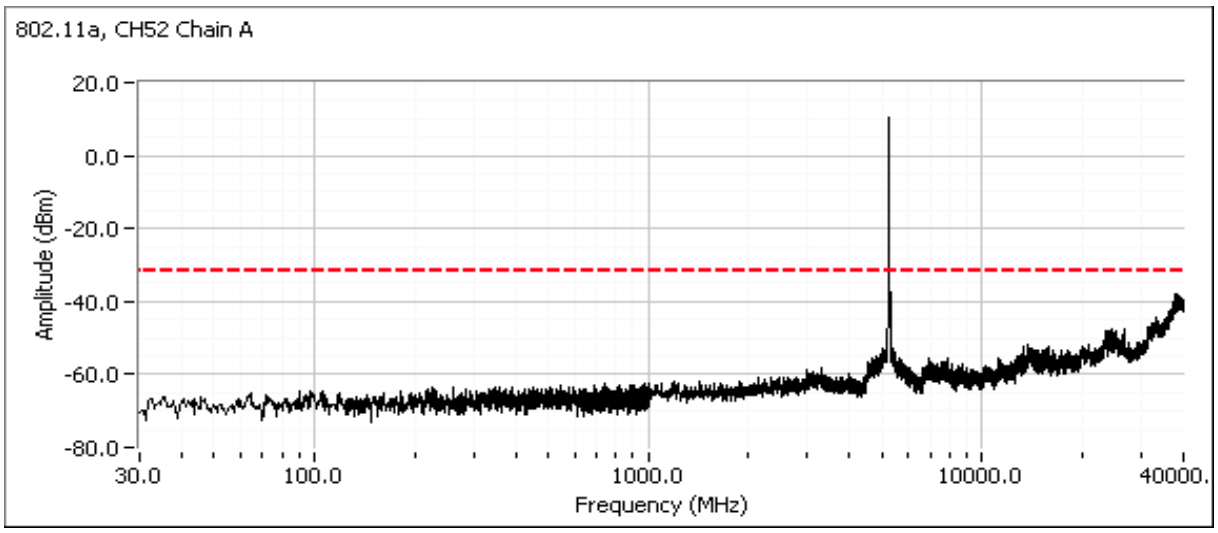



**High channel, 5150 - 5250 MHz Band - 802.11a Mode**

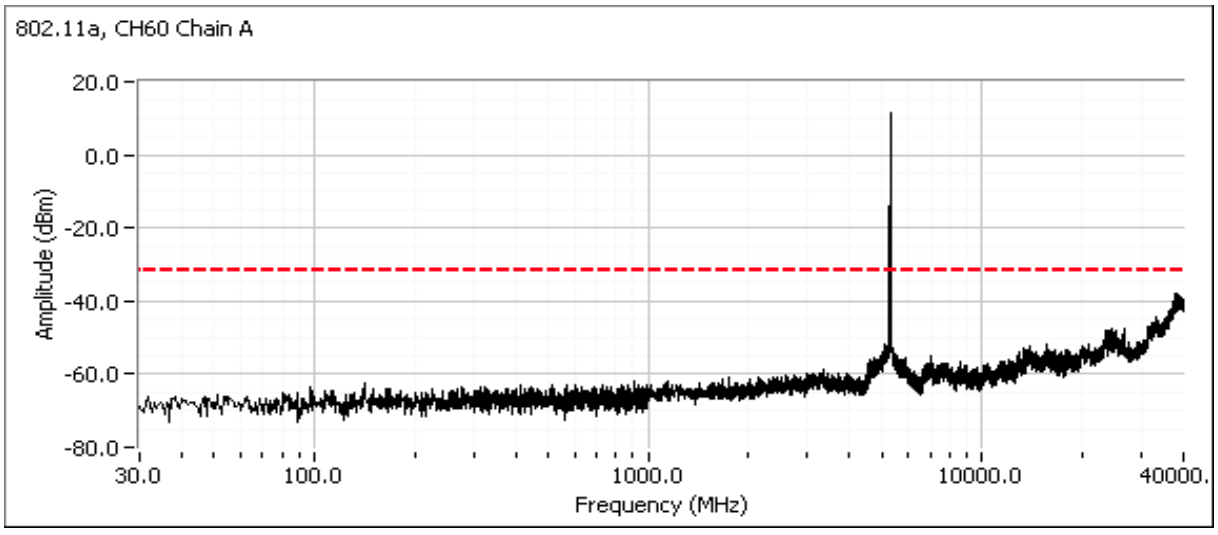


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5250 - 5350 MHz Band - 802.11a Mode**



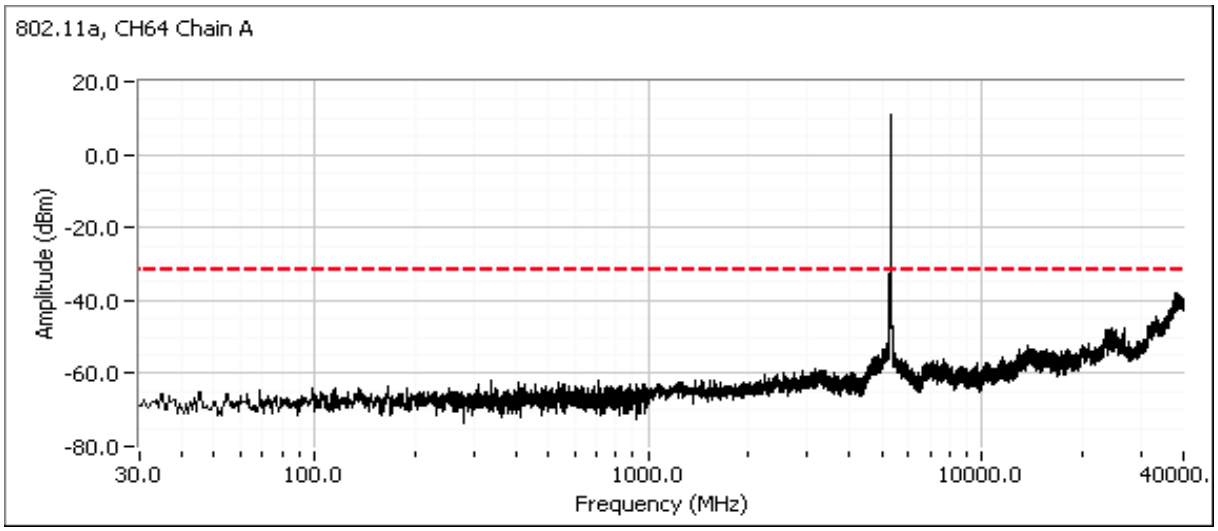

**Center channel, 5250 - 5350 MHz Band - 802.11a Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

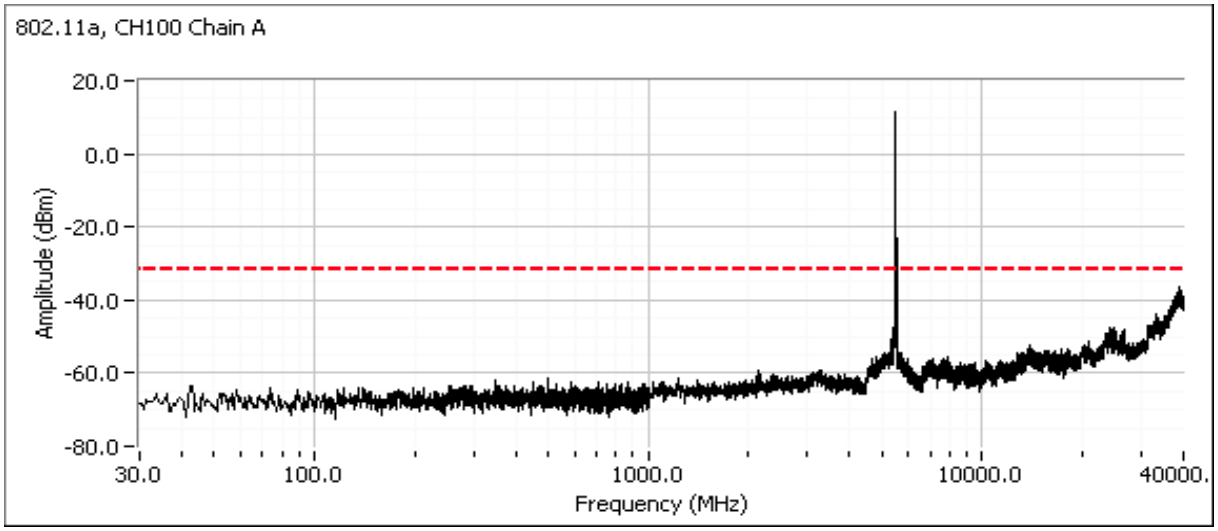
**High channel, 5250 - 5350 MHz Band - 802.11a Mode**

Compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.



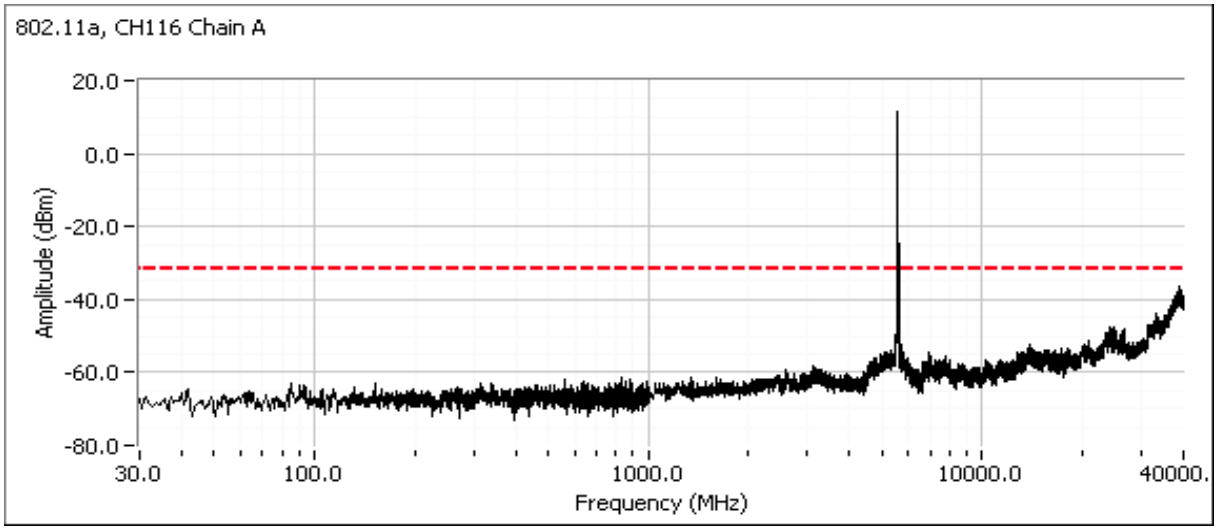

**Low channel, 5470 - 5725 MHz Band - 802.11a Mode**

Compliance with the radiated limits for the restricted band below 5460 MHz is demonstrated through the radiated emissions tests.

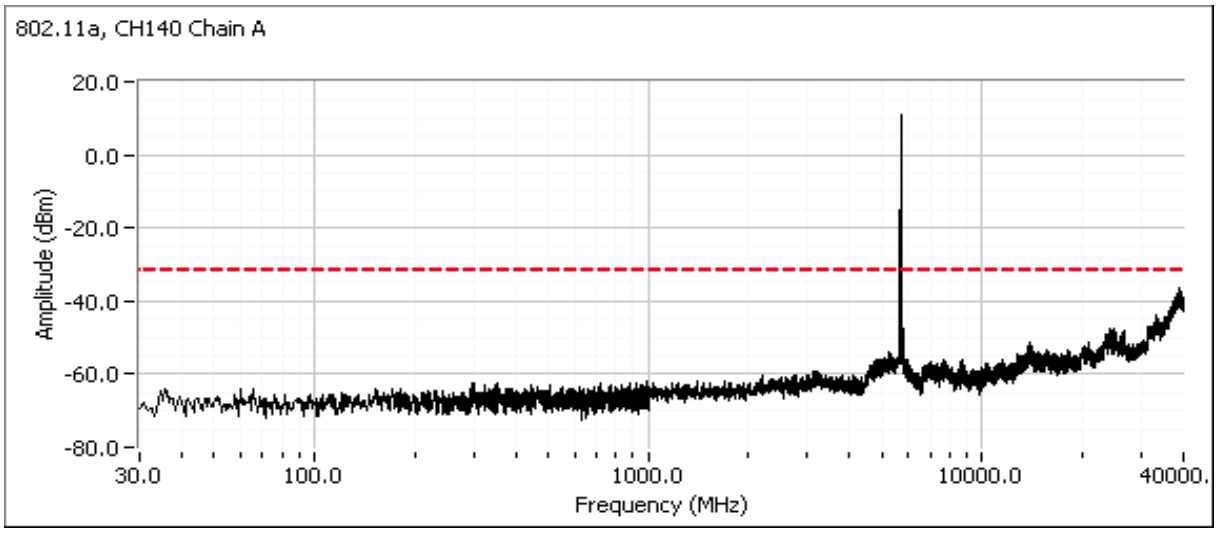


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Center channel, 5470 - 5725 MHz Band - 802.11a Mode (20Mhz channel use 5580 MHz, 40MHz channel use 5550 MHz)**




**High channel, 5470 - 5725 MHz Band - 802.11a Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**802.11n Modes - n 20MHz**

**MIMO Devices:** Antenna gain used is the effective gain calculated in the power section of this data sheet. The plots were obtained with all chains transmitting simultaneously and connected to the analyzer via a combiner. Unused ports of the combiner were terminated in the appropriate load (50 ohms).

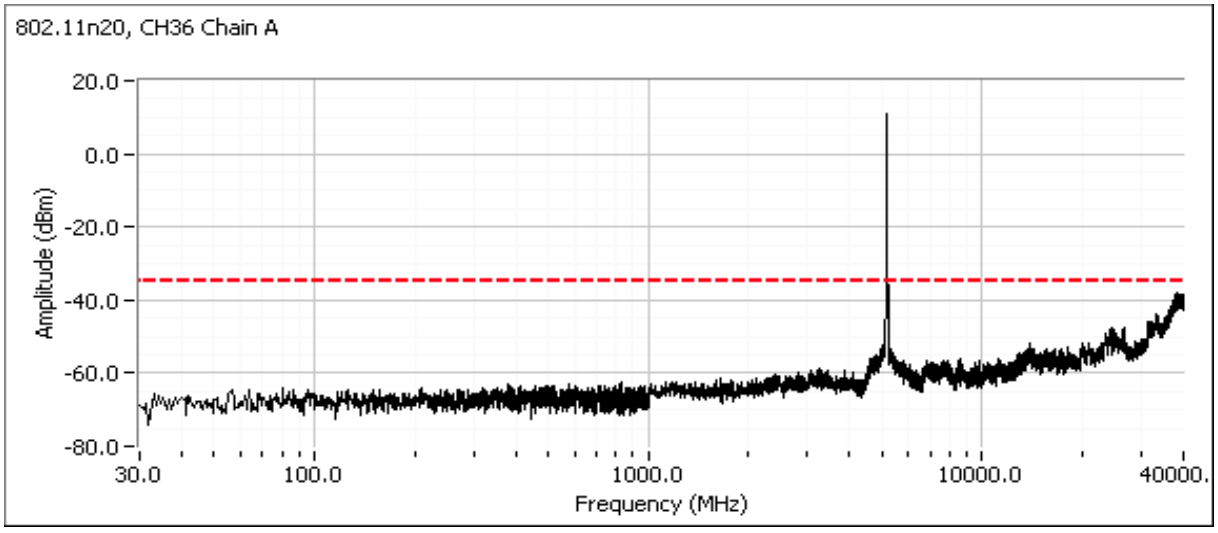
| | | | |
|---|---|---|---|
| Number of transmit chains: | 2 | | |
| Maximum Antenna Gain: | 4.8 | dBi | (worst case for all 3 bands) |
| Spurious Limit: | -27.0 | dBm/MHz eirp | |
| Limit Used On Plots [Note 1]: | **-34.8** | dBm/MHz | Average Limit (RB=1MHz, VB=10Hz) |
| | **-14.8** | dBm/MHz | Peak Limit (RB=VB=1MHz) |

| | |
|---|---|
| Note 1: | The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements for signals more than 50MHz from the bands and that are close to the limit are made to determine compliance as the antenna gain is not known at these frequencies. |
| Note 2: | All spurious signals below 1GHz are measured during the radiated emissions test. |

**Plots Showing Out-Of-Band - 802.11n - 20MHz Mode Emissions (RBW=VBW=1MHz)**

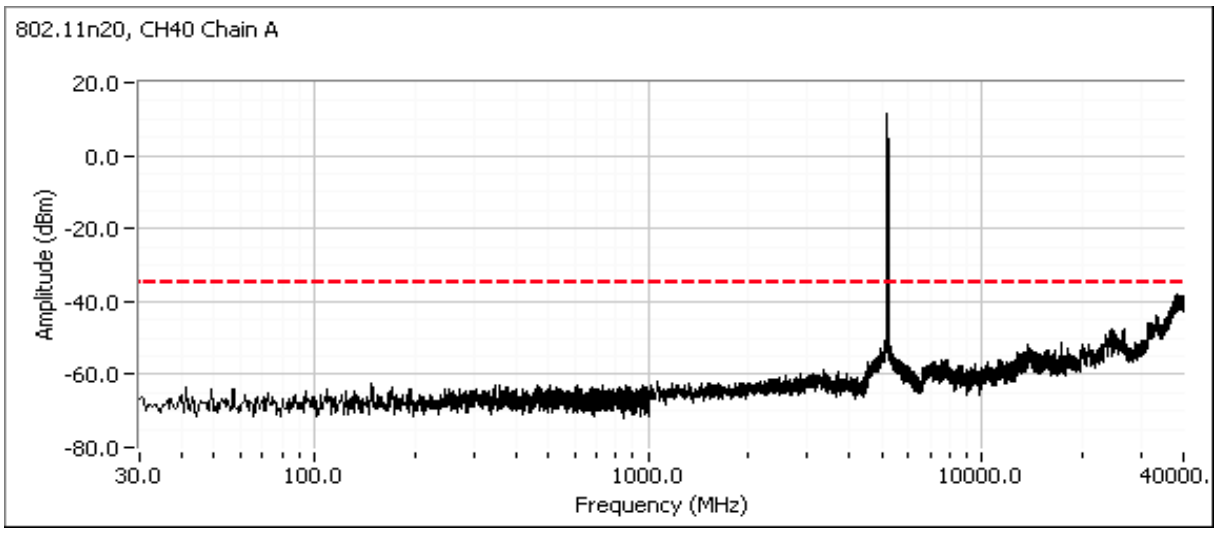
**Low channel, 5150 - 5250 MHz Band - 802.11n - 20MHz Mode**

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

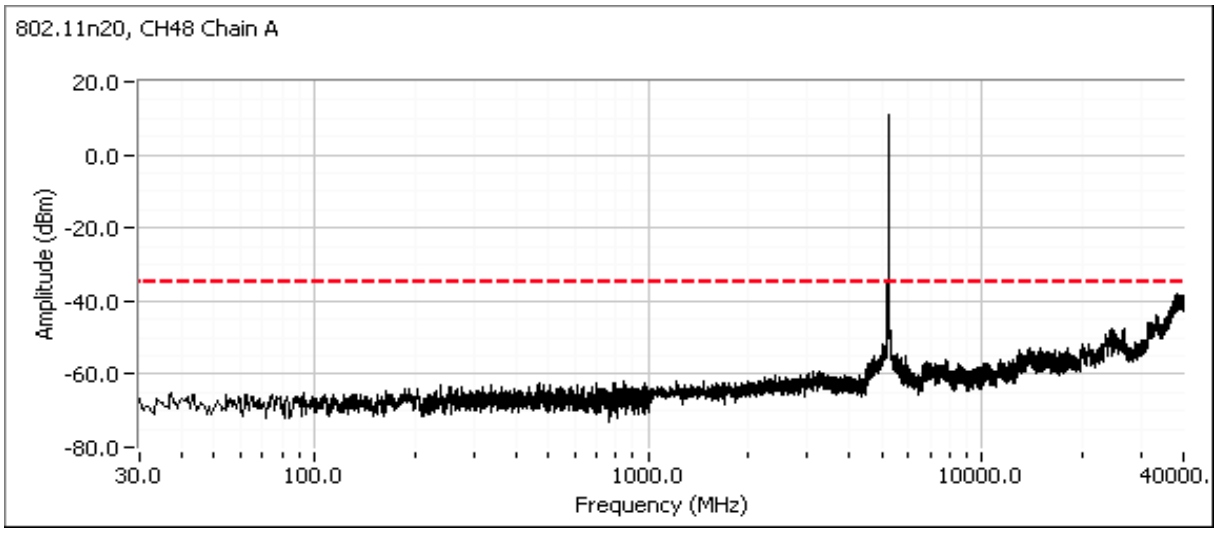


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Center channel, 5150 - 5250 MHz Band - 802.11n - 20MHz Mode**

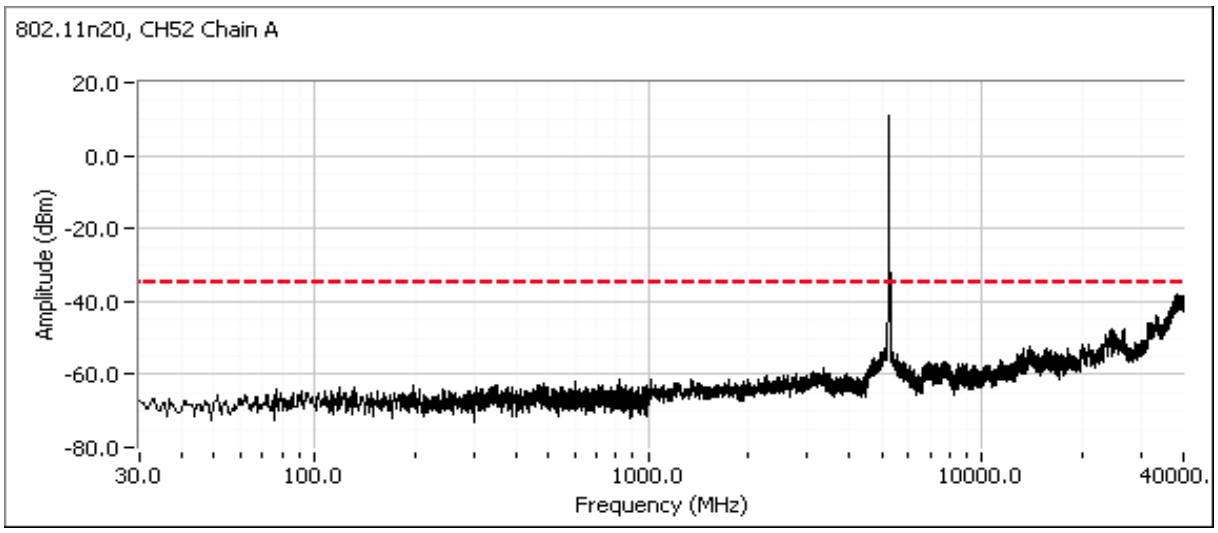



**High channel, 5150 - 5250 MHz Band - 802.11n - 20MHz Mode**

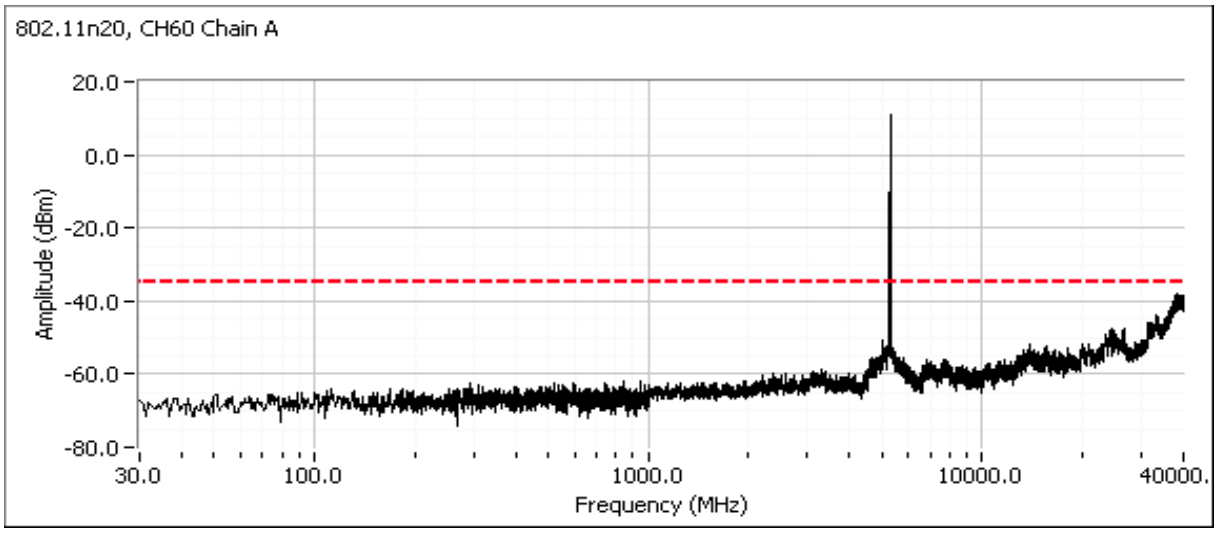


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5250 - 5350 MHz Band - 802.11n - 20MHz Mode**



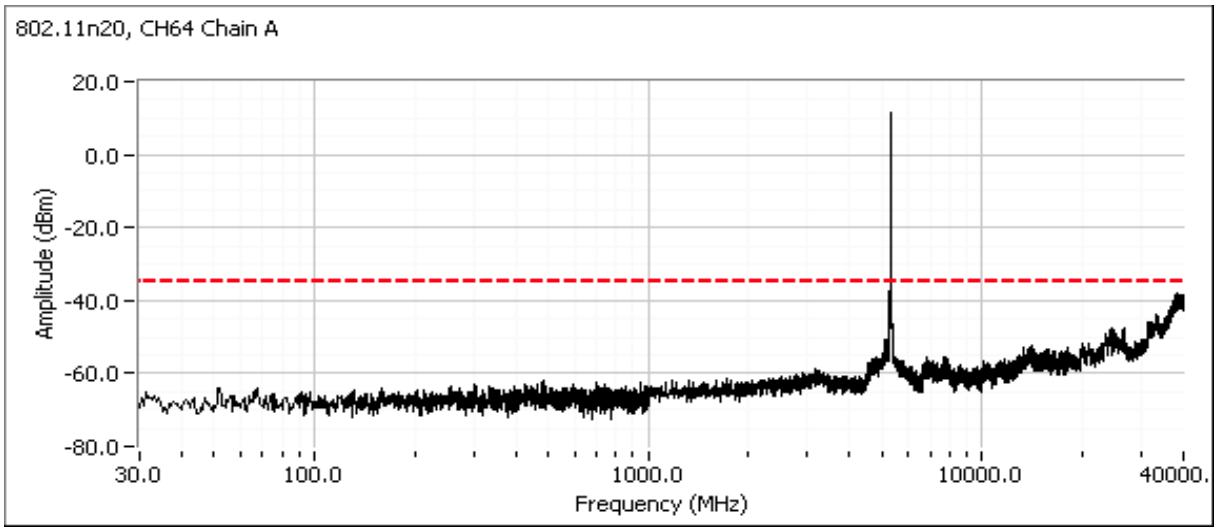

**Center channel, 5250 - 5350 MHz Band - 802.11n - 20MHz Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

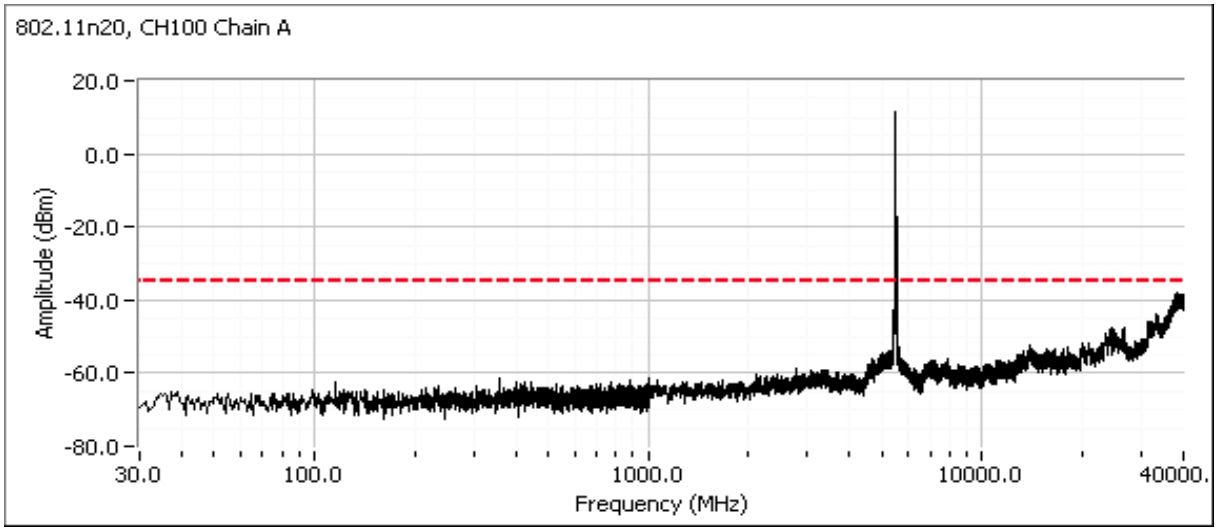
**High channel, 5250 - 5350 MHz Band - 802.11n - 20MHz Mode**

Compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.



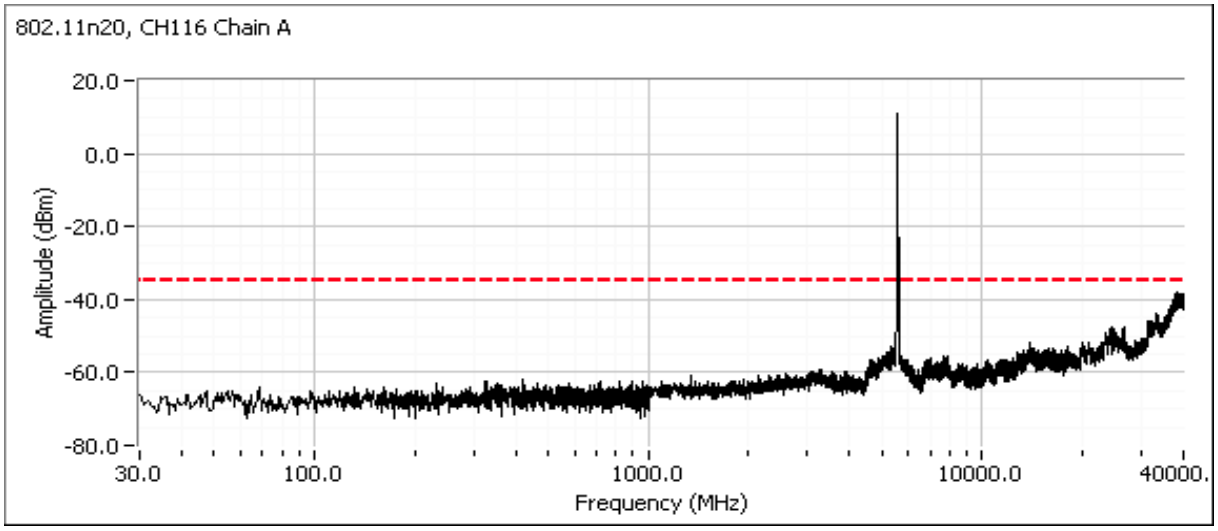

**Low channel, 5470 - 5725 MHz Band - 802.11n - 20MHz Mode**

Compliance with the radiated limits for the restricted band below 5460 MHz is demonstrated through the radiated emissions tests.

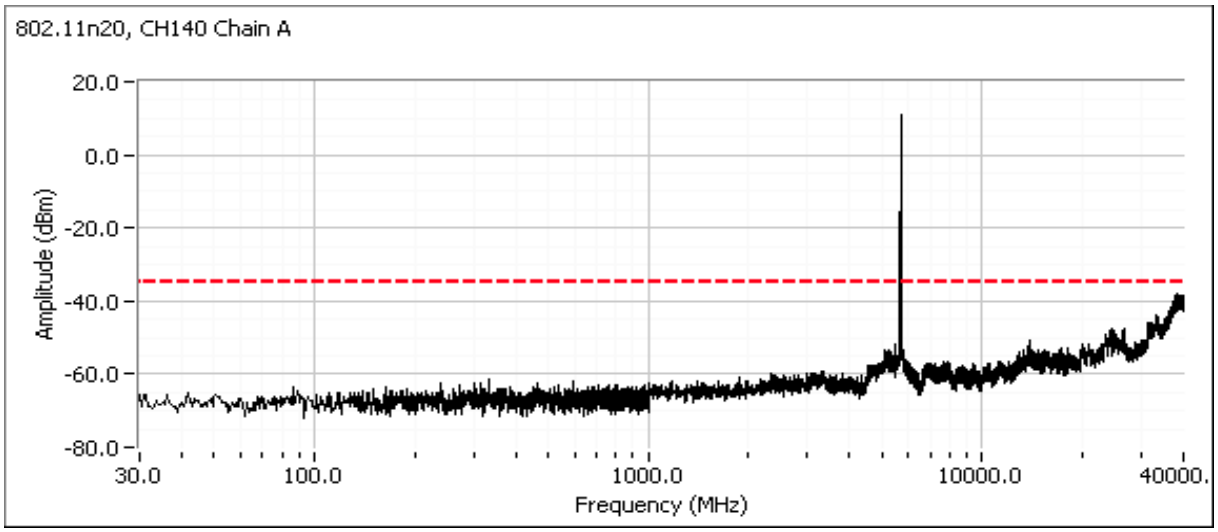


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Center channel, 5470 - 5725 MHz Band - 802.11n - 20MHz Mode (use 5580 MHz)**




**High channel, 5470 - 5725 MHz Band - 802.11n - 20MHz Mode**

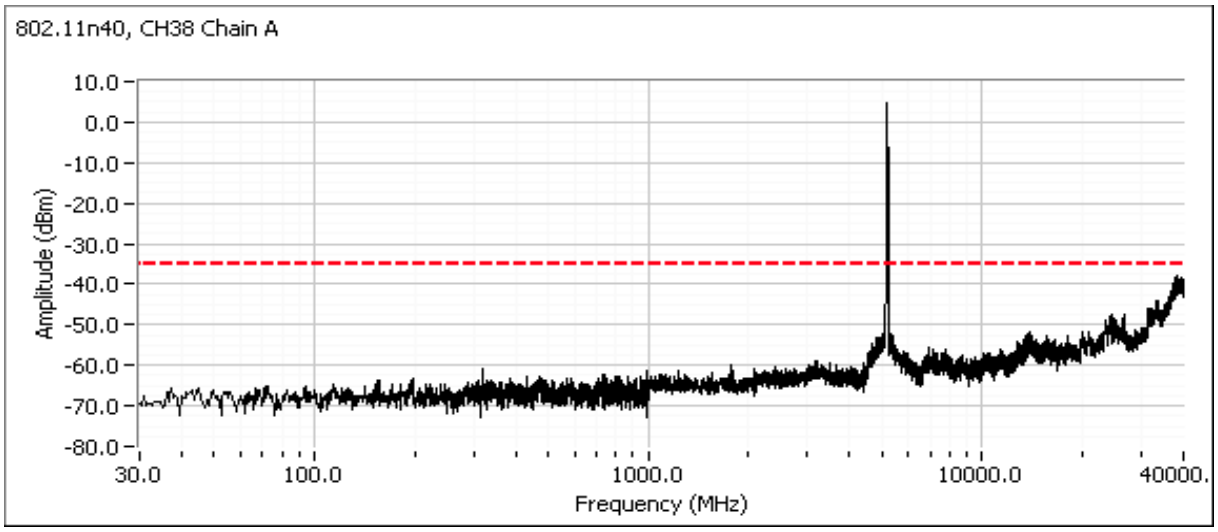


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

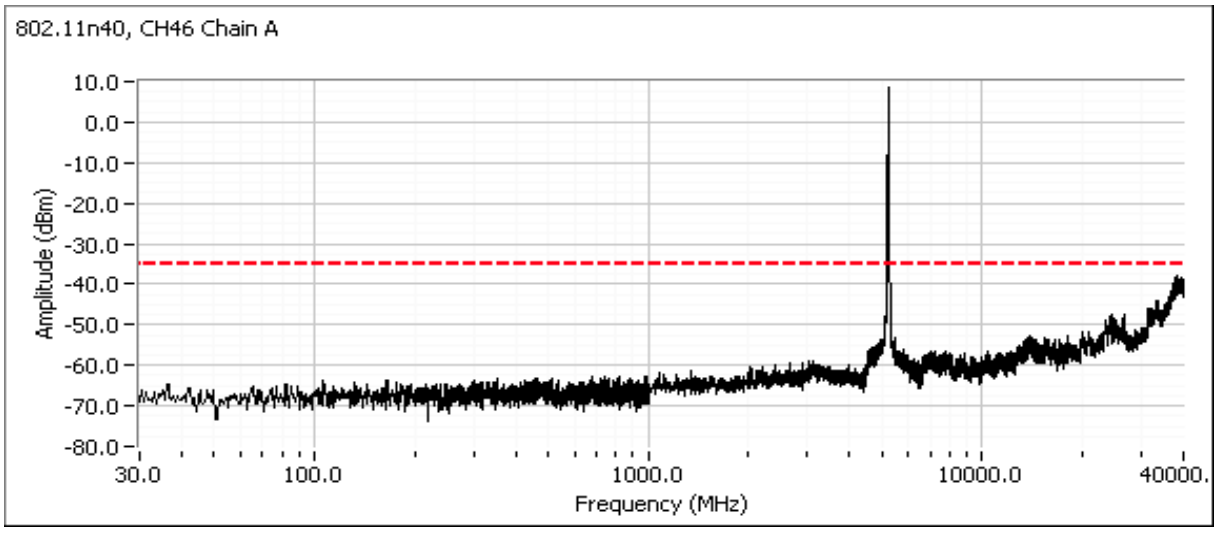
**Plots Showing Out-Of-Band - 802.11n - 40MHz Mode Emissions (RBW=VBW=1MHz)**

**Low channel, 5150 - 5250 MHz Band - 802.11n - 40MHz Mode**

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

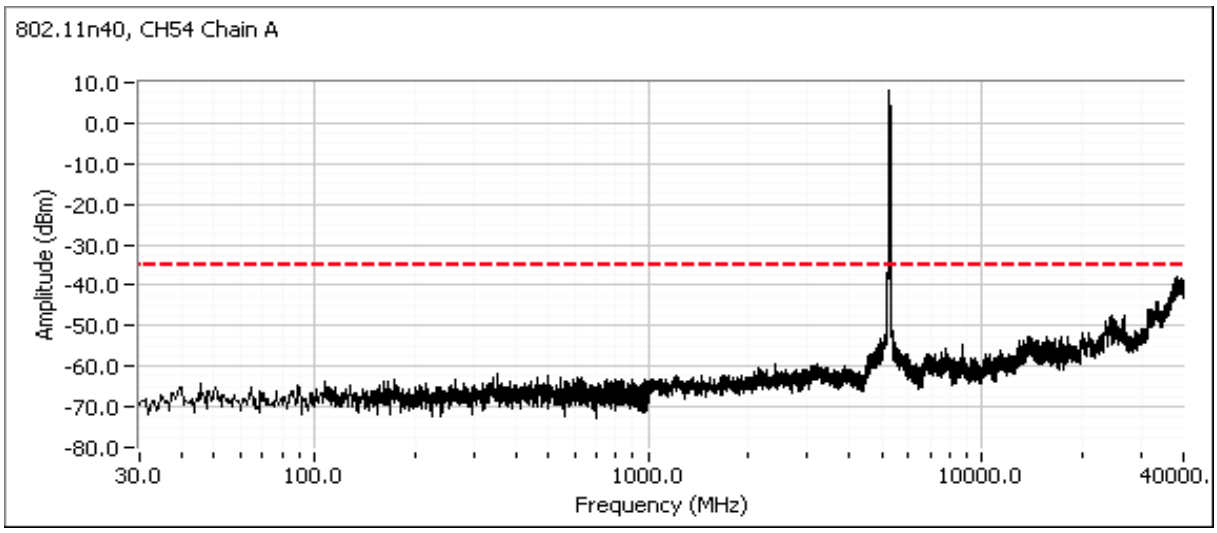



**High channel, 5150 - 5250 MHz Band - 802.11n - 40MHz Mode**



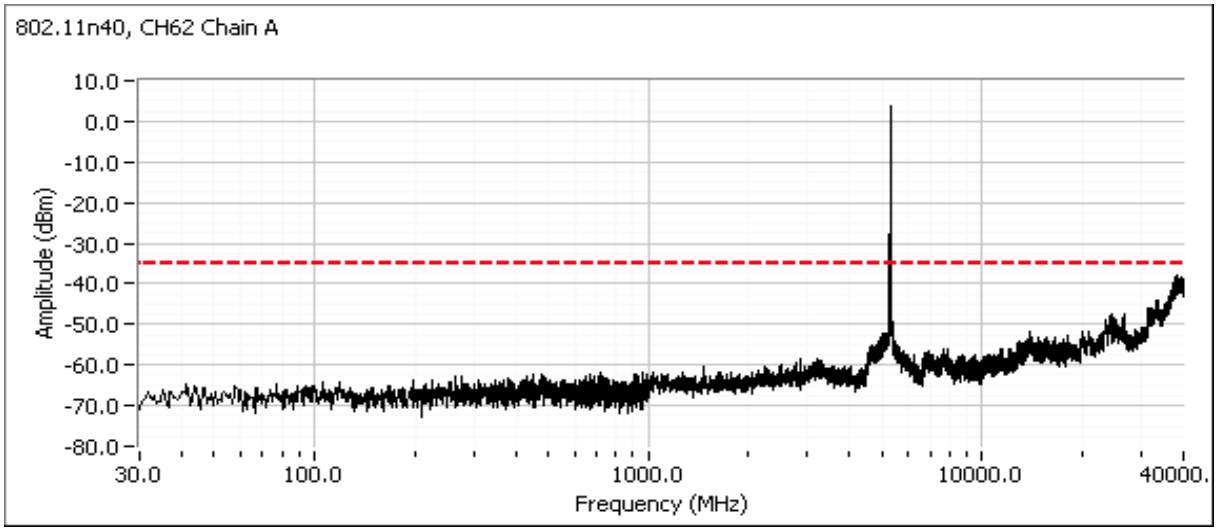
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5250 - 5350 MHz Band - 802.11n - 40MHz Mode**




**High channel, 5250 - 5350 MHz Band - 802.11n - 40MHz Mode**

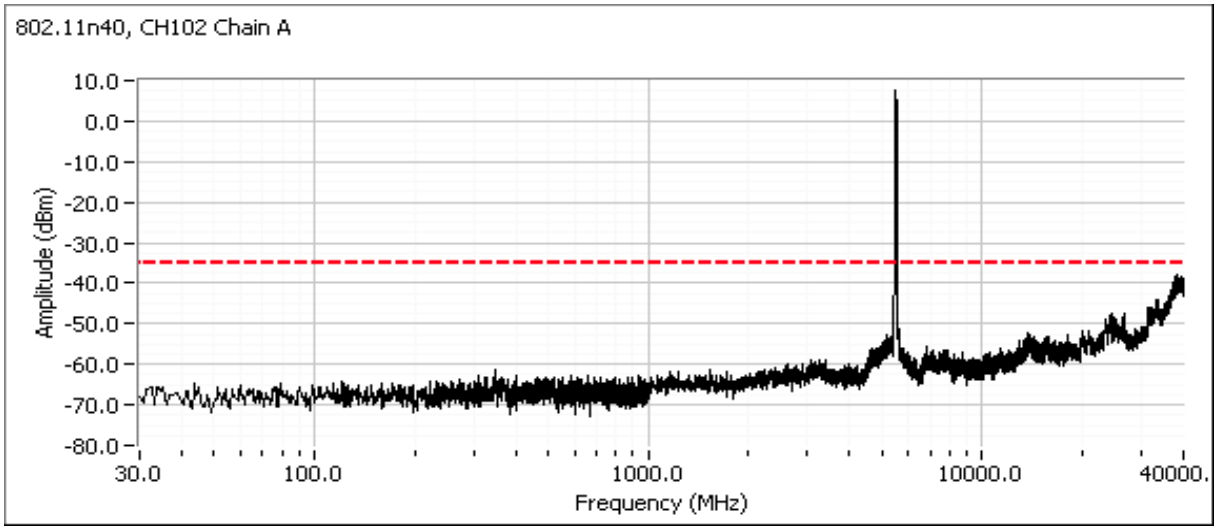
Compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.



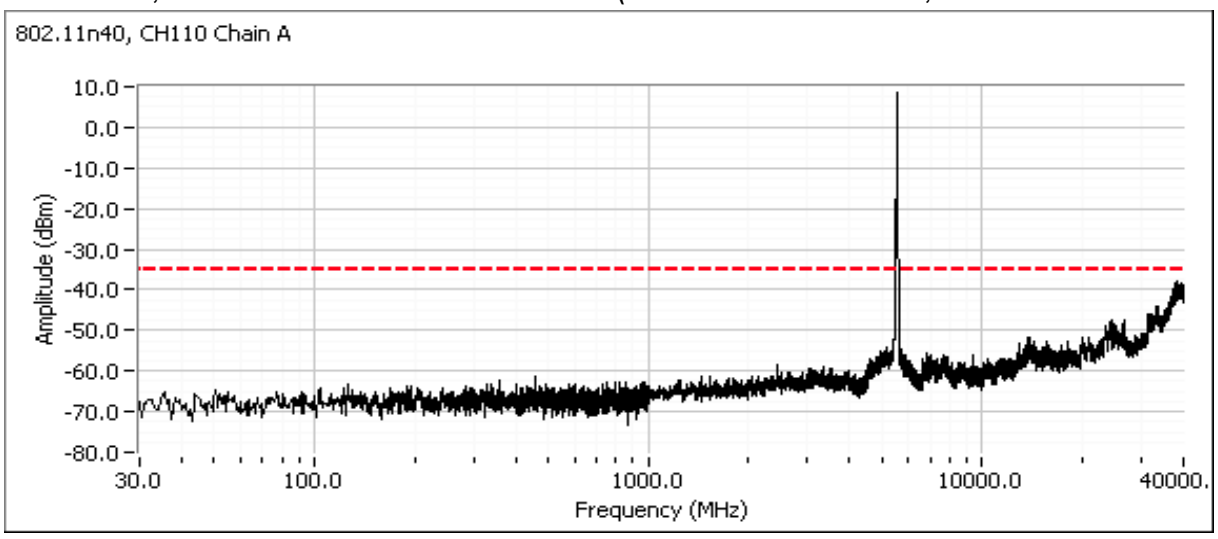
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5470 - 5725 MHz Band - 802.11n - 40MHz Mode**

Compliance with the radiated limits for the restricted band below 5460 MHz is demonstrated through the radiated emissions tests.

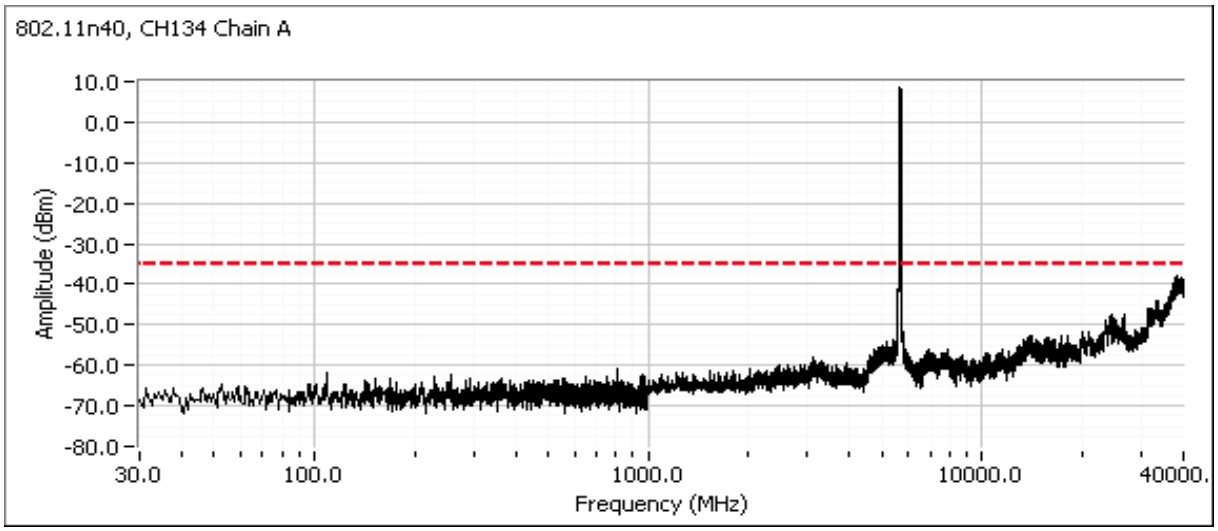



**Center channel, 5470-5725MHz Band - 802.11n 40MHz Mode (20MHz channel use 5580MHz, 40MHz channel use 5550MHz)**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**High channel, 5470 - 5725 MHz Band - 802.11n - 40MHz Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

# RSS-210 (LELAN) and FCC 15.407(UNII)
# Antenna Port Measurements - Chain B
# 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.

## Summary of Results - Chain B

| Run # | Test Performed | Limit | Pass / Fail | Result / Margin |
|---|---|---|---|---|
| 1 | Power, 5150 - 5250MHz | 15.407(a) (1), (2) | PASS | 802.11a: 39 mW<br>802.11n 20MHz: 40 mW<br>802.11n n40MHz: 38 mW |
| 1 | PSD, 5150 - 5250MHz | 15.407(a) (1), (2) | PASS | 802.11a: 3.6 dBm/MHz<br>802.11n 20MHz: 3.4 dBm/MHz<br>802.11n n40MHz: 0.6 dBm/MHz |
| 1 | Power, 5250 - 5350MHz | 15.407(a) (1), (2) | PASS | 802.11a: 39 mW<br>802.11n 20MHz: 37 mW<br>802.11n n40MHz: 33 mW |
| 1 | PSD, 5250 - 5350MHz | 15.407(a) (1), (2) | PASS | 802.11a: 3.4 dBm/MHz<br>802.11n 20MHz: 2.8 dBm/MHz<br>802.11n n40MHz: 0.1 dBm/MHz |
| 1 | Power, 5470 - 5725MHz | 15.407(a) (1), (2) | PASS | 802.11a: 37 mW<br>802.11n 20MHz: 37 mW<br>802.11n n40MHz: 38 mW |
| 1 | PSD, 5470 - 5725MHz | 15.407(a) (1), (2) | PASS | 802.11a: 3.1 dBm/MHz<br>802.11n 20MHz: 3.1 dBm/MHz<br>802.11n n40MHz: 0.5 dBm/MHz |
| 1 | 26dB Bandwidth | 15.407<br>(Information only) | - | > 20MHz for all modes |
| 1 | 99% Bandwidth | RSS 210<br>(Information only) | N/A | 802.11a: 17.1 MHz<br>802.11n 20MHz: 18.1 MHz<br>802.11n n40MHz: 36.4 MHz |
| 2 | Peak Excursion Envelope | 15.407(a) (6)<br>13dB | PASS | 9.9dB |
| 3 | Antenna Conducted - Out of Band Spurious | 15.407(b)<br>-27dBm/MHz | PASS | All emissions below the -27dBm/MHz limit |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

## 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: 18-23 °C
Rel. Humidity: 40-50 %

## 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.

Date of Test: 10/4/2010
Test Location: Lab #4
Test Engineer: John Caizzi
Test Engineer: Mehran Birgani
Test Engineer: Joseph Cadigal
Test Engineer: Rafael Varelas

Config. Used: -
Config Change: -
Host Unit Voltage 120V/60Hz

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #1: Bandwidth, Output Power and Power Spectral Density - Single Chain Systems**

| | |
|---|---|
| Note 1: | Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 100MHz for 802.11n 40MHz and 50MHz for 802.11a and 802.11n 20MHz (method 1 of DA-02-2138A1). |
| Note 2: | Measured using the same analyzer settings used for output power. |
| Note 3: | For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB. |
| Note 4: | 99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB |

**Single Chain Operation, 5150-5250MHz Band**

Antenna Gain (dBi): 3.6 EIRP: 89.1 mW 19.5 dBm

| Frequency (MHz) | Software Setting | Bandwidth 26dB | Bandwidth 99%[4] | Output Power[1] dBm Measured | Output Power[1] dBm Limit | Power (Watts) | PSD[2] dBm/MHz Measured | PSD[2] dBm/MHz FCC Limit | PSD[2] dBm/MHz RSS Limit[3] | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| **802.11a** | | | | | | | | | | |
| 5180 | 24.0 | 32.5 | 17.0 | **15.9** | 17.0 | 0.039 | 3.6 | 4.0 | 6.4 | Pass |
| 5200 | 24.0 | 31.4 | 17.0 | 15.8 | 17.0 | 0.038 | 3.2 | 4.0 | 6.4 | Pass |
| 5240 | 24.5 | 32.4 | 17.0 | 15.7 | 17.0 | 0.037 | 3.4 | 4.0 | 6.4 | Pass |
| **802.11n 20MHz** | | | | | | | | | | |
| 5180 | 24.5 | 27.9 | 18.1 | **16.0** | 17.0 | 0.040 | 3.2 | 4.0 | 6.4 | Pass |
| 5200 | 24.5 | 36.5 | 18.1 | 16.0 | 17.0 | 0.040 | 3.4 | 4.0 | 6.4 | Pass |
| 5240 | 25.0 | 35.6 | 18.1 | 15.9 | 17.0 | 0.039 | 3.2 | 4.0 | 6.4 | Pass |
| **802.11n 40MHz** | | | | | | | | | | |
| 5190 | 21.0 | 39.3 | 36.3 | 12.7 | 17.0 | 0.019 | -2.7 | 4.0 | 6.4 | Pass |
| 5230 | 26.0 | 54.8 | 36.4 | **15.8** | 17.0 | 0.038 | 0.6 | 4.0 | 6.4 | Pass |

**Single Chain Operation, 5250-5350 MHz Band**

Antenna Gain (dBi): 3.7 EIRP: 91.2 mW 19.6 dBm

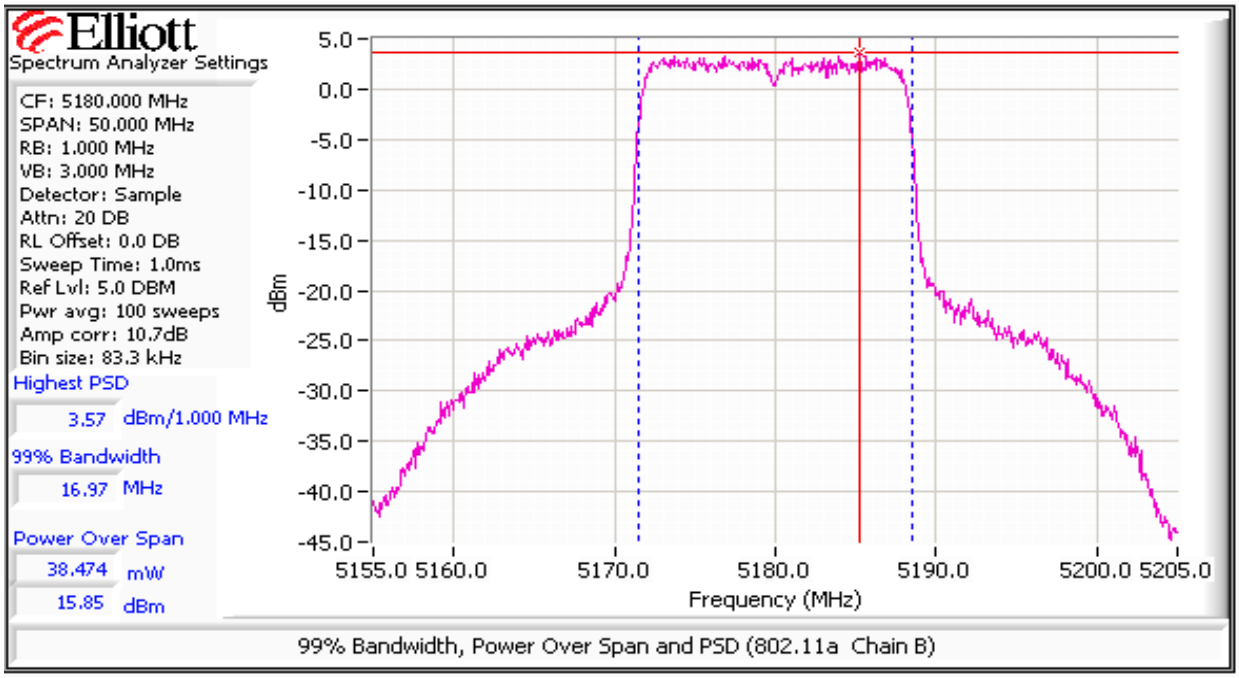
| Frequency (MHz) | Software Setting | Bandwidth 26dB | Bandwidth 99%[4] | Output Power[1] dBm Measured | Output Power[1] dBm Limit | Power (Watts) | PSD[2] dBm/MHz Measured | PSD[2] dBm/MHz FCC Limit | PSD[2] dBm/MHz RSS Limit[3] | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| **802.11a** | | | | | | | | | | |
| 5260 | 24.5 | 29.4 | 17.0 | 15.3 | 24.0 | 0.034 | 2.8 | 11.0 | 11.0 | Pass |
| 5300 | 25.0 | 29.2 | 17.0 | 15.4 | 24.0 | 0.035 | 3.1 | 11.0 | 11.0 | Pass |
| 5320 | 25.5 | 23.8 | 17.0 | **15.9** | 24.0 | 0.039 | 3.4 | 11.0 | 11.0 | Pass |
| **802.11n 20MHz** | | | | | | | | | | |
| 5260 | 25.0 | 34.1 | 18.1 | 15.4 | 24.0 | 0.035 | 2.8 | 11.0 | 11.0 | Pass |
| 5300 | 25.0 | 30.9 | 18.1 | 15.3 | 24.0 | 0.034 | 2.8 | 11.0 | 11.0 | Pass |
| 5320 | 25.5 | 30.8 | 18.1 | **15.7** | 24.0 | 0.037 | 2.8 | 11.0 | 11.0 | Pass |
| **802.11n 40MHz** | | | | | | | | | | |
| 5270 | 26.0 | 53.2 | 36.4 | **15.2** | 24.0 | 0.033 | 0.1 | 11.0 | 11.0 | Pass |
| 5310 | 22.0 | 39.4 | 36.1 | 12.4 | 24.0 | 0.017 | -2.4 | 11.0 | 11.0 | Pass |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

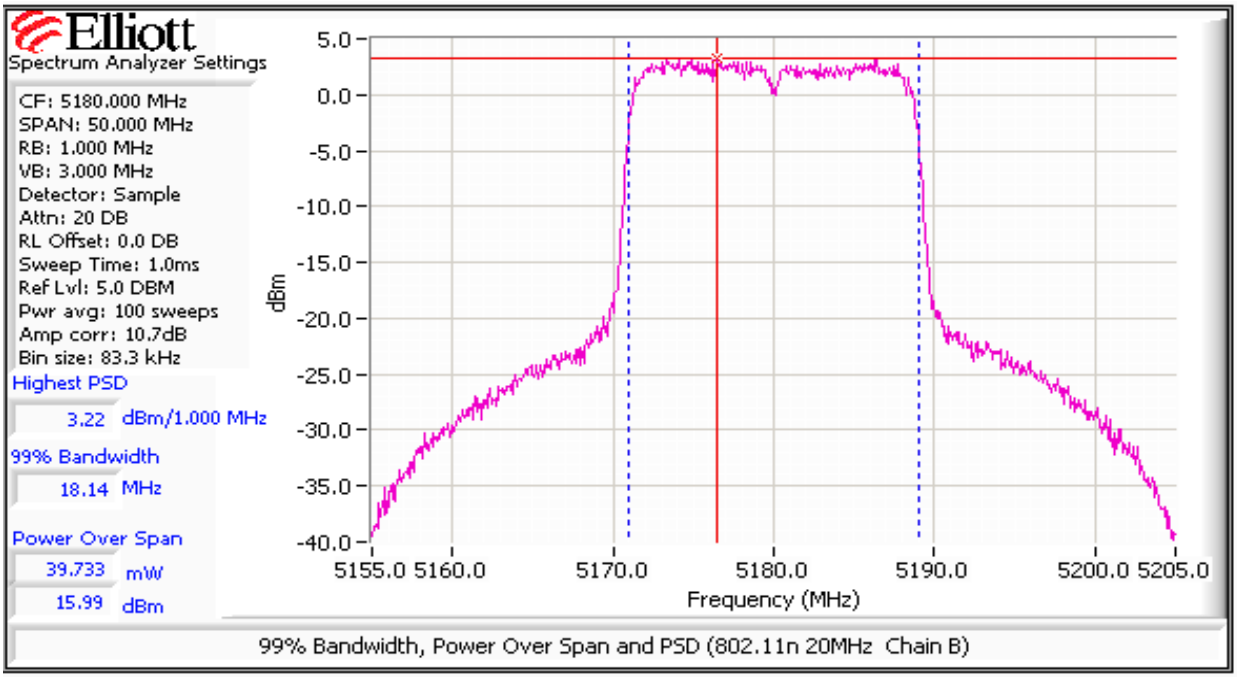
**Single Chain Operation, 5470- 5725 MHz Band**

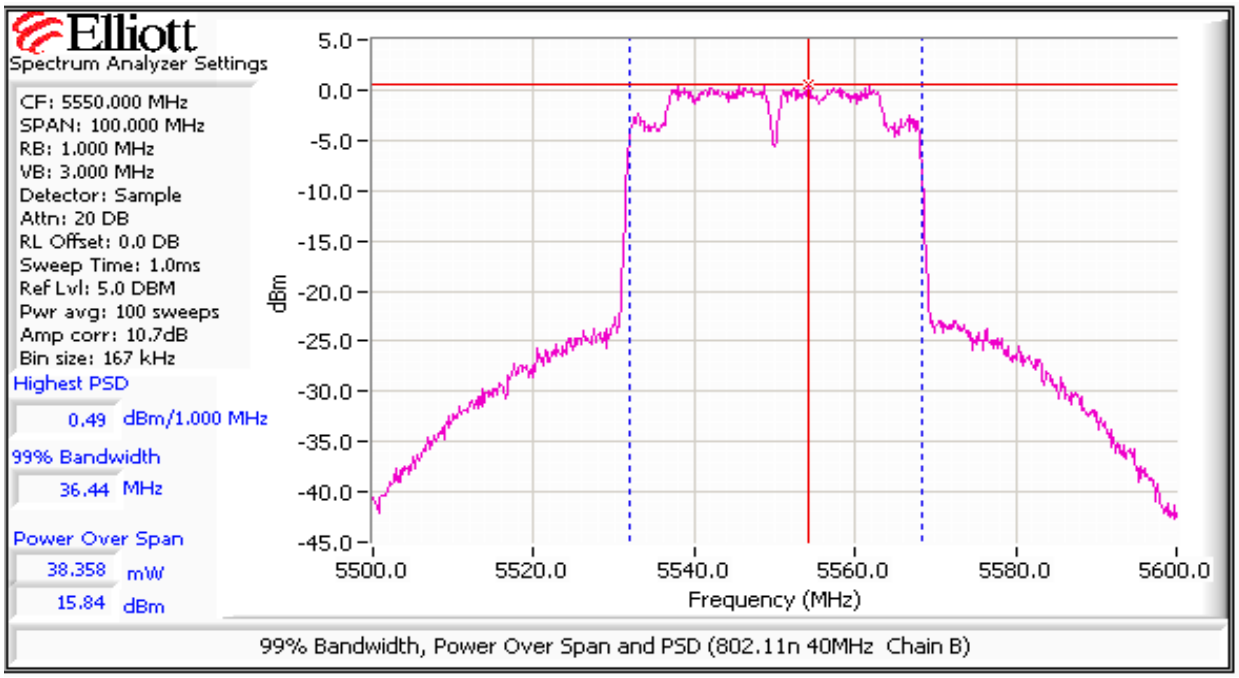
Antenna Gain (dBi): 4.8 EIRP: 112.2 mW 20.5 dBm

| Frequency (MHz) | Software Setting | Bandwidth 26dB | Bandwidth 99%[4] | Output Power[1] dBm Measured | Output Power[1] dBm Limit | Power (Watts) | PSD[2] dBm/MHz Measured | PSD[2] dBm/MHz FCC Limit | PSD[2] dBm/MHz RSS Limit[3] | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| **802.11a** | | | | | | | | | | |
| 5500 | 27.5 | 29.6 | 17.0 | 15.6 | 24.0 | 0.036 | 3.0 | 11.0 | 11.0 | Pass |
| 5580 | 28.0 | 32.9 | 17.1 | **15.7** | 24.0 | 0.037 | 3.0 | 11.0 | 11.0 | Pass |
| 5700 | 28.5 | 31.8 | 17.1 | 15.5 | 24.0 | 0.035 | 3.1 | 11.0 | 11.0 | Pass |
| **802.11n 20MHz** | | | | | | | | | | |
| 5500 | 27.5 | 36.8 | 18.1 | 15.6 | 24.0 | 0.036 | 2.9 | 11.0 | 11.0 | Pass |
| 5580 | 28.0 | 36.1 | 18.1 | **15.7** | 24.0 | 0.037 | 3.1 | 11.0 | 11.0 | Pass |
| 5700 | 28.5 | 36.0 | 17.1 | 15.5 | 24.0 | 0.035 | 3.1 | 11.0 | 11.0 | Pass |
| **802.11n 40MHz** | | | | | | | | | | |
| 5510 | 27.5 | 53.4 | 36.3 | 14.8 | 24.0 | 0.030 | -0.4 | 11.0 | 11.0 | Pass |
| 5550 | 29.0 | 59.2 | 36.4 | **15.8** | 24.0 | 0.038 | 0.5 | 11.0 | 11.0 | Pass |
| 5670 | 29.5 | 55.8 | 36.4 | 15.6 | 24.0 | 0.036 | 0.2 | 11.0 | 11.0 | Pass |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #2: Peak Excursion Measurement**

**802.11a: Device meets the requirement for the peak excursion**

| Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | Value | Limit | (MHz) | Value | Limit | (MHz) | Value | Limit |
| 5180 | **8.6** | 13.0 | 5260 | 8.0 | 13.0 | 5500 | 8.1 | 13.0 |
| 5200 | 8.2 | 13.0 | 5300 | 8.5 | 13.0 | 5580 | 7.6 | 13.0 |
| 5240 | 7.7 | 13.0 | 5320 | 8.1 | 13.0 | 5700 | 8.3 | 13.0 |

**n 20MHz: Device meets the requirement for the peak excursion**

| Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | Value | Limit | (MHz) | Value | Limit | (MHz) | Value | Limit |
| 5180 | 7.8 | 13.0 | 5260 | 8.6 | 13.0 | 5500 | 7.9 | 13.0 |
| 5200 | **9.9** | 13.0 | 5300 | 8.1 | 13.0 | 5580 | 7.8 | 13.0 |
| 5240 | 9.3 | 13.0 | 5320 | 7.9 | 13.0 | 5700 | 8.3 | 13.0 |

**n 40MHz: Device meets the requirement for the peak excursion**

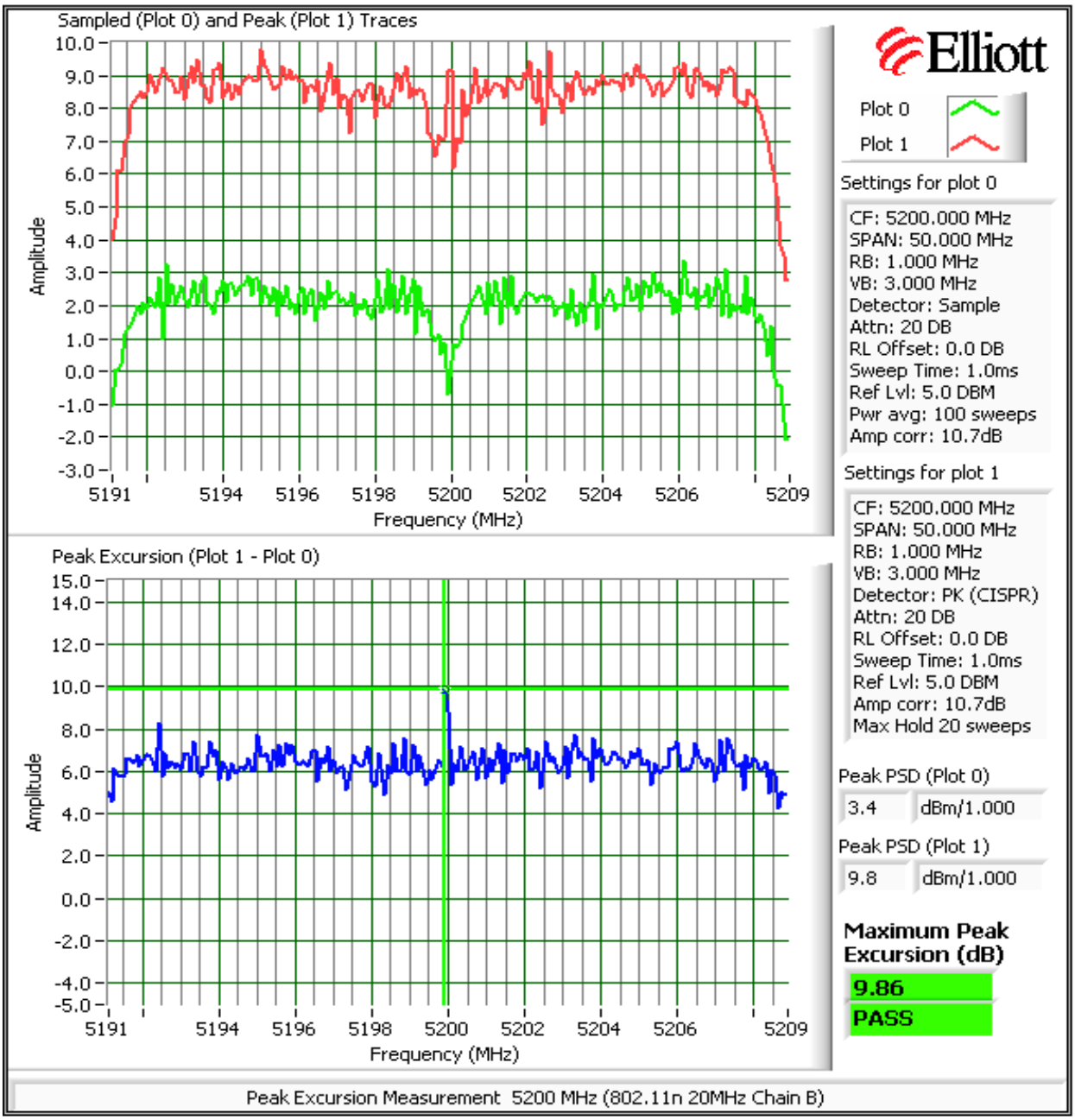
| Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | | Freq | Peak Excursion(dB) | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | Value | Limit | (MHz) | Value | Limit | (MHz) | Value | Limit |
| 5190 | **9.1** | 13.0 | 5270 | 8.1 | 13.0 | 5510 | 8.7 | 13.0 |
| 5230 | 9.0 | 13.0 | 5310 | 8.3 | 13.0 | 5550 | 8.5 | 13.0 |
| | | | | | | 5670 | 8.8 | 13.0 |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Plots Showing Peak Excursion**

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

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



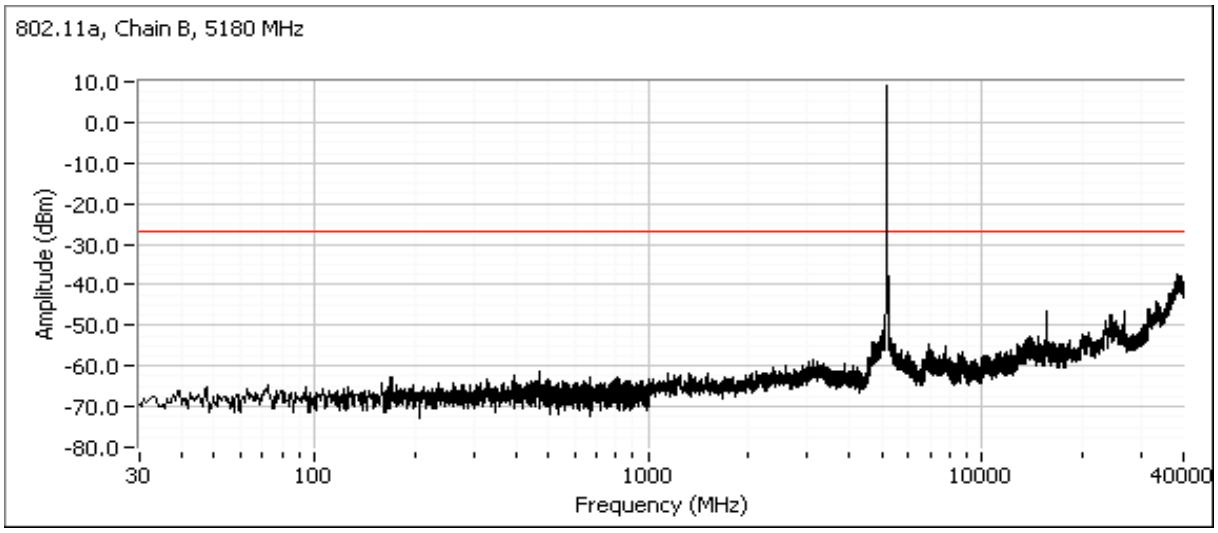
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run #3: Out Of Band Spurious Emissions - Antenna Conducted**
**802.11a**

| | | | |
|---|---|---|---|
| Maximum Antenna Gain: | 4.8 | dBi | (worst case for all 3 bands) |
| Spurious Limit: | -27.0 | dBm/MHz eirp | |
| Limit Used On Plots [Note 1]: | **-31.8** | dBm/MHz | Average Limit (RB=1MHz, VB=10Hz) |
| | **-11.8** | dBm/MHz | Peak Limit (RB=VB=1MHz) |

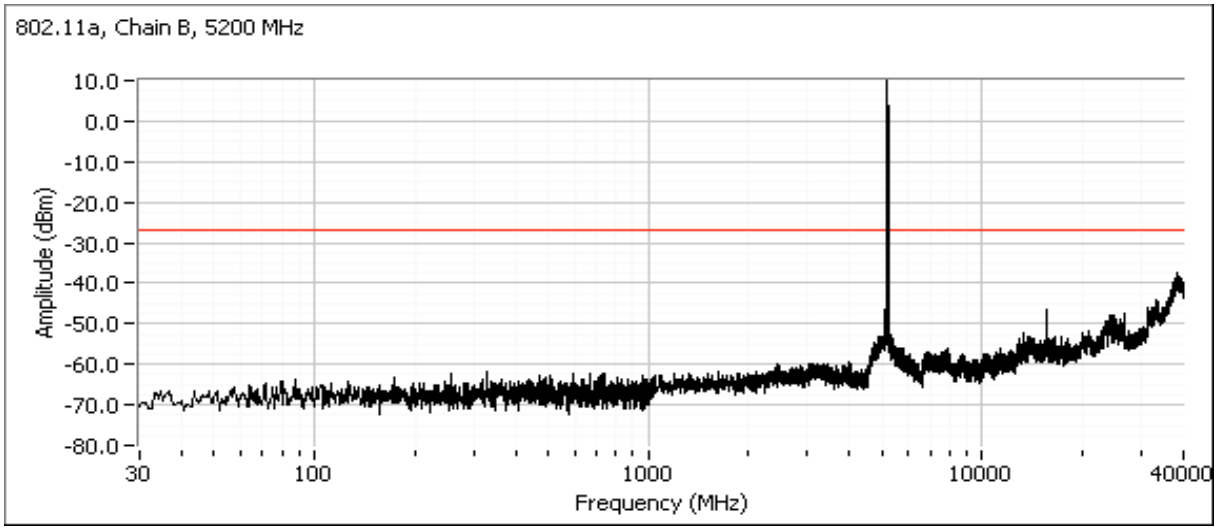
**Plots Showing Out-Of-Band - 802.11a Mode Emissions (RBW=VBW=1MHz)**

**Low channel, 5150 - 5250 MHz Band - 802.11a Mode**
Compliance with the radiated limits for the restricted band immediately below 5150MHz is demonstrated through the radiated emissions tests.

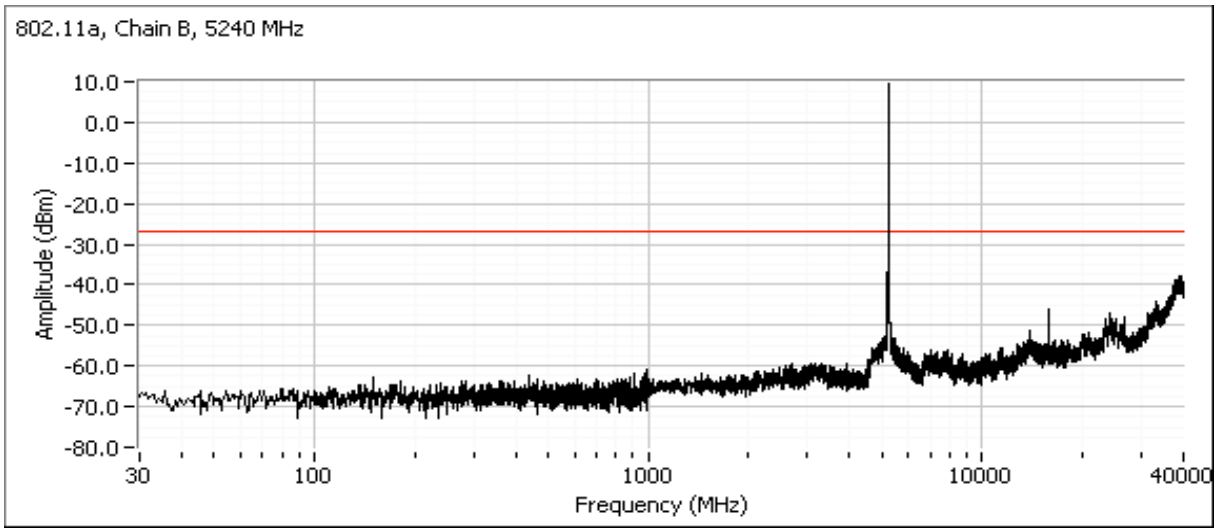


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Center channel, 5150 - 5250 MHz Band - 802.11a Mode**

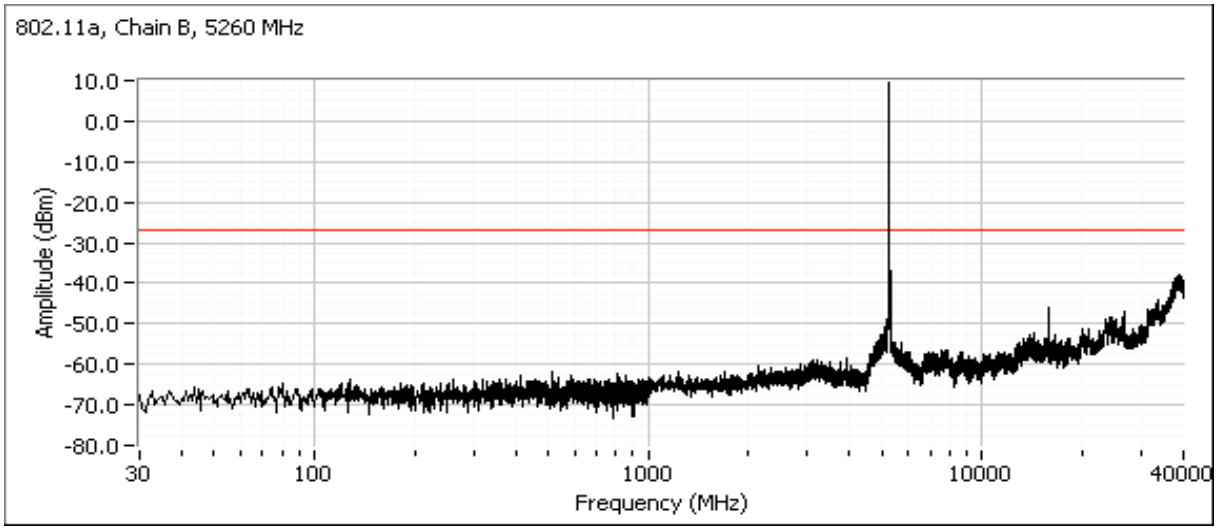



**High channel, 5150 - 5250 MHz Band - 802.11a Mode**

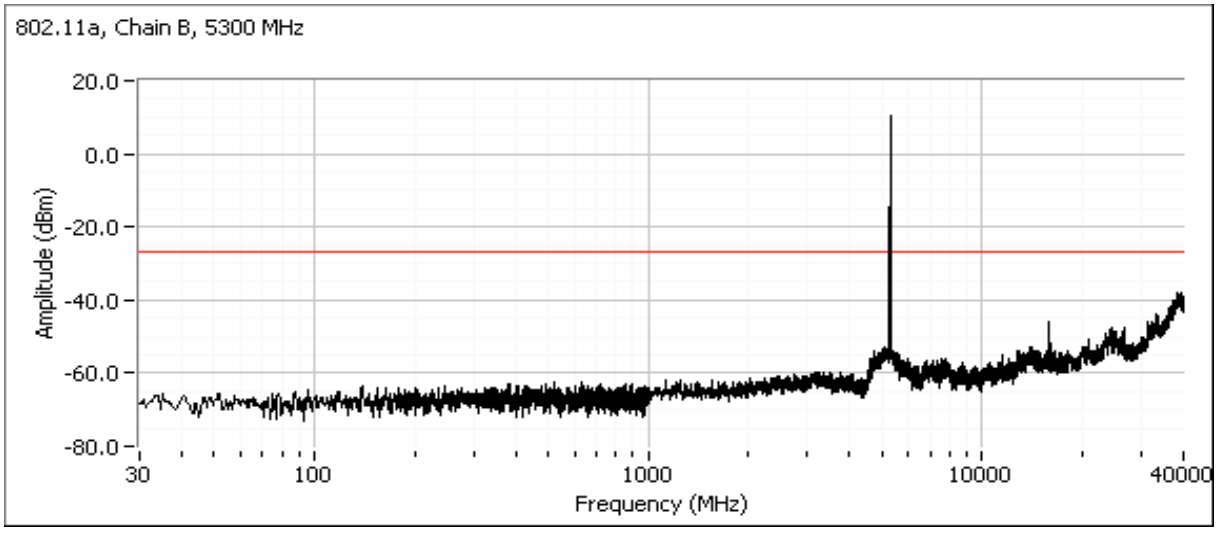


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5250 - 5350 MHz Band - 802.11a Mode**



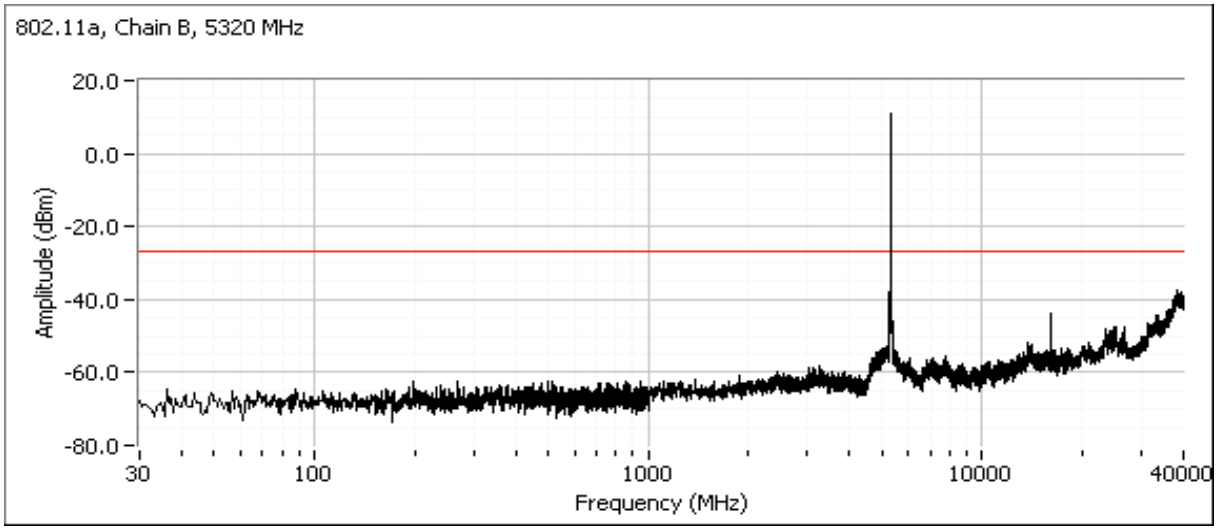

**Center channel, 5250 - 5350 MHz Band - 802.11a Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

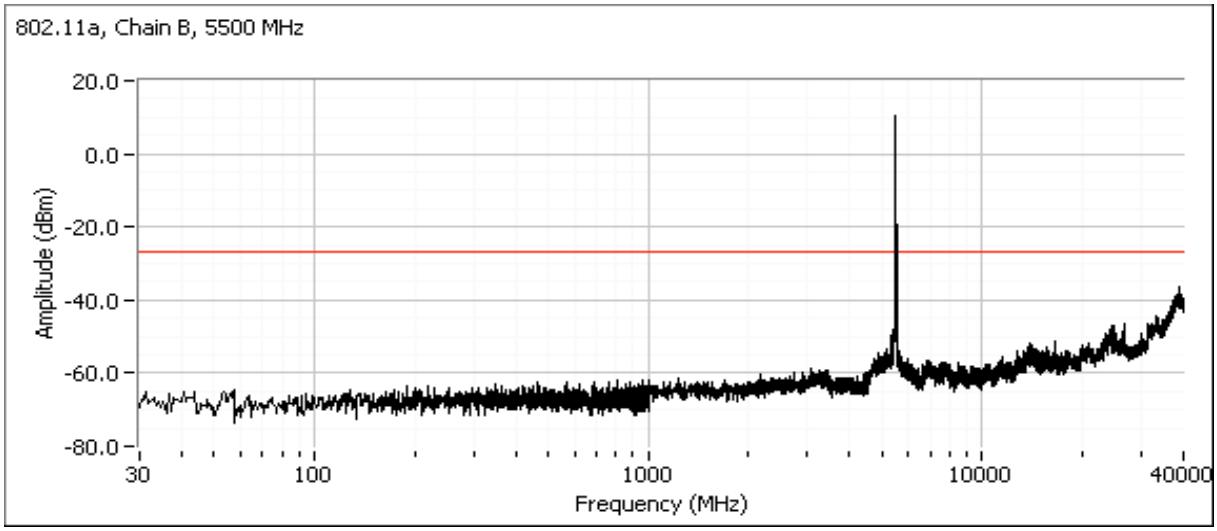
**High channel, 5250 - 5350 MHz Band - 802.11a Mode**

Compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.



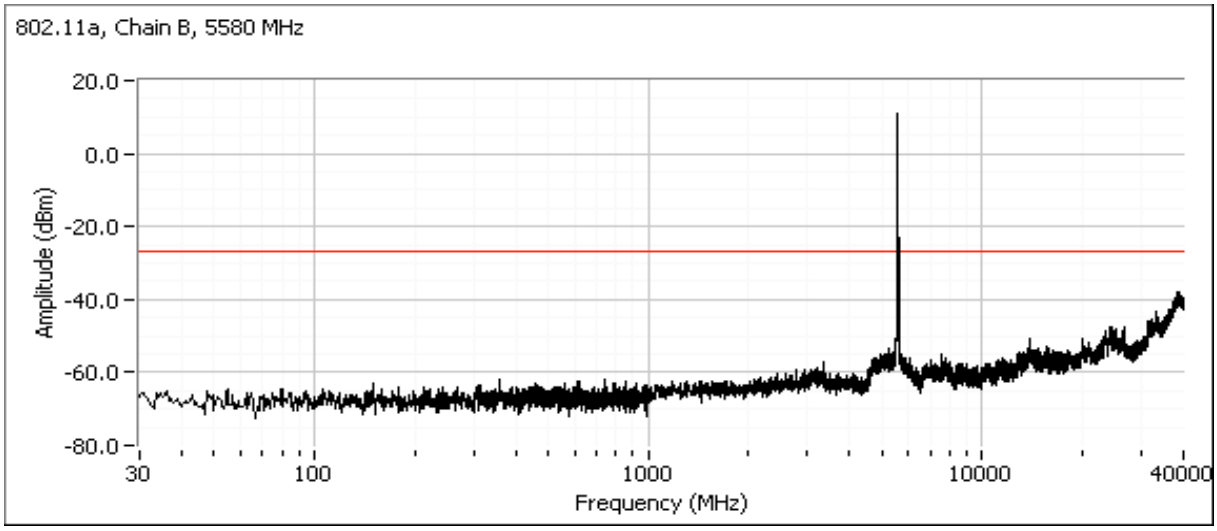

**Low channel, 5470 - 5725 MHz Band - 802.11a Mode**

Compliance with the radiated limits for the restricted band below 5460 MHz is demonstrated through the radiated emissions tests.

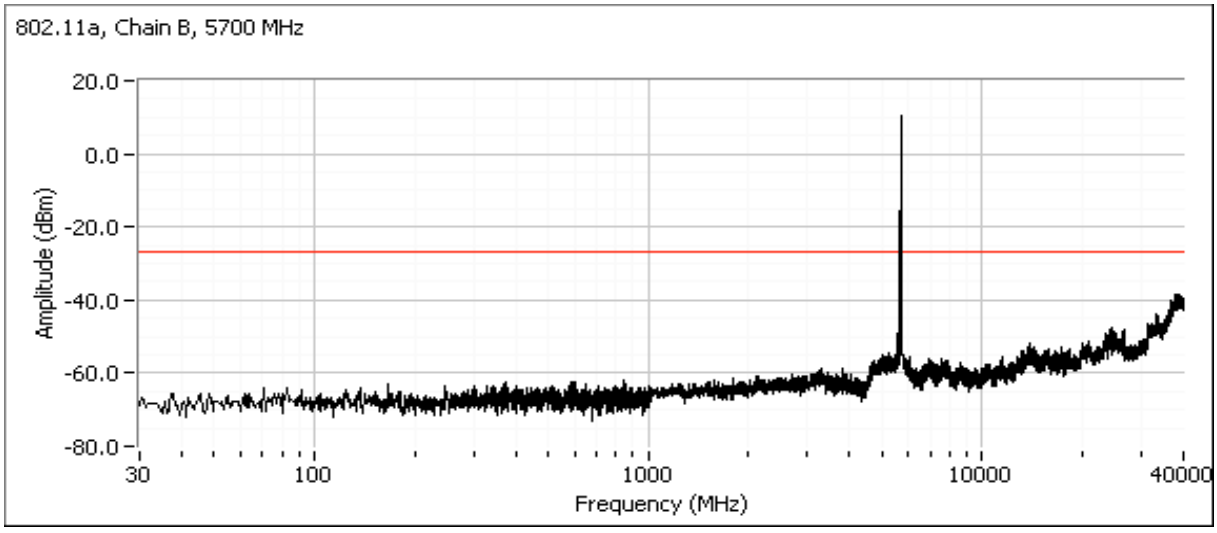


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Center channel, 5470 - 5725 MHz Band - 802.11a Mode (20MHz channel use 5580 MHz, 40MHz channel use 5550 MHz)**




**High channel, 5470 - 5725 MHz Band - 802.11a Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**802.11n Modes - n 20MHz**

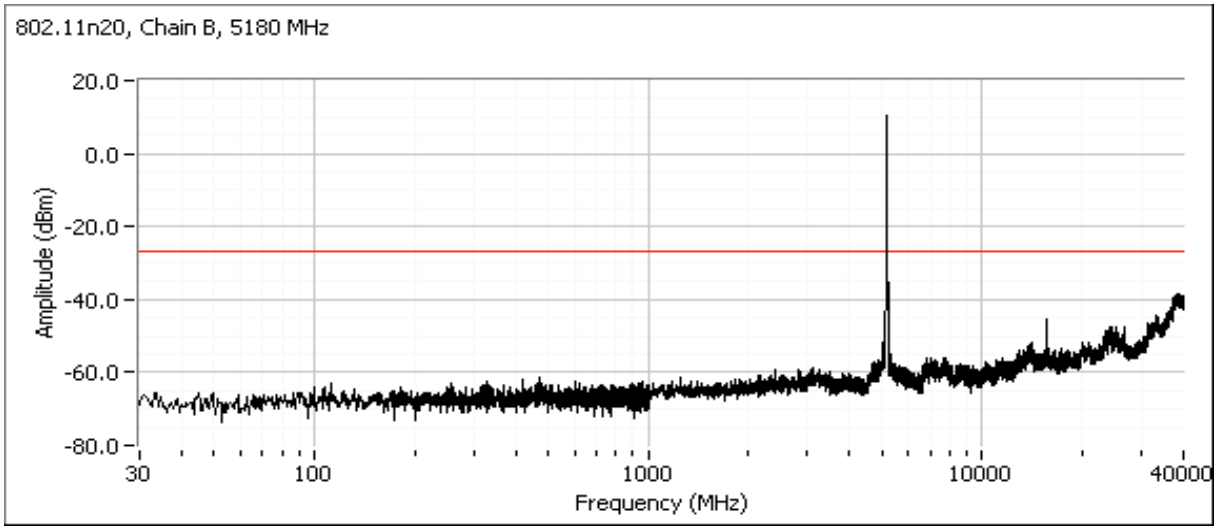
| | | | |
|---|---|---|---|
| Number of transmit chains: | 2 | | |
| Maximum Antenna Gain: | 4.8 | dBi | (worst case for all 3 bands) |
| Spurious Limit: | -27.0 | dBm/MHz eirp | |
| Limit Used On Plots [Note 1]: | **-34.8** | dBm/MHz | Average Limit (RB=1MHz, VB=10Hz) |
| | **-14.8** | dBm/MHz | Peak Limit (RB=VB=1MHz) |

| | |
|---|---|
| Note 1: | The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements for signals more than 50MHz from the bands and that are close to the limit are made to determine compliance as the antenna gain is not known at these frequencies. |
| Note 2: | All spurious signals below 1GHz are measured during the radiated emissions test. |

**Plots Showing Out-Of-Band - 802.11n - 20MHz Mode Emissions (RBW=VBW=1MHz)**

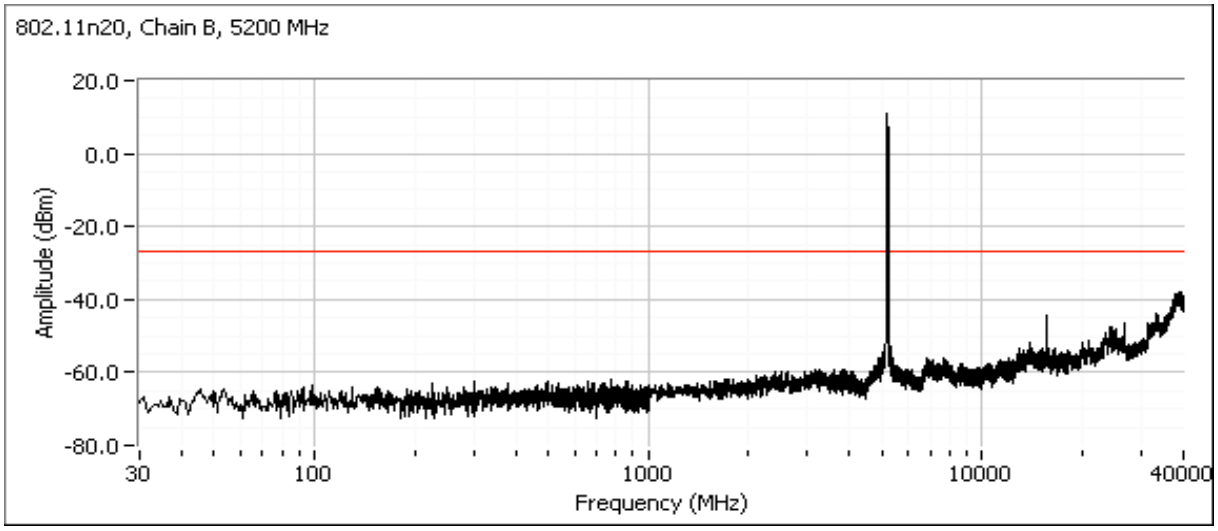
**Low channel, 5150 - 5250 MHz Band - 802.11n - 20MHz Mode**

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

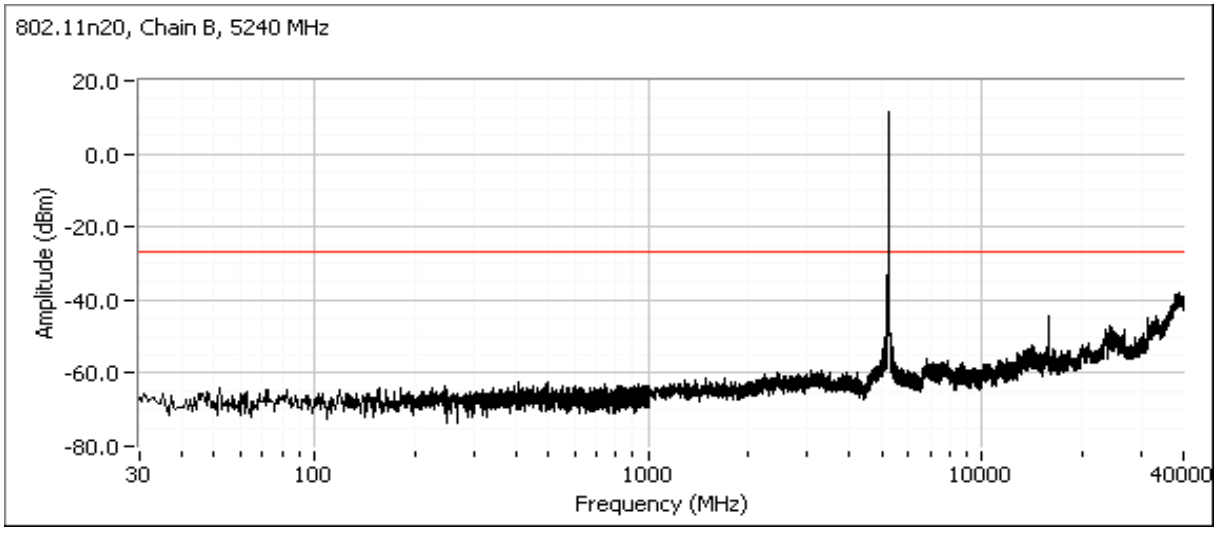


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Center channel, 5150 - 5250 MHz Band - 802.11n - 20MHz Mode**

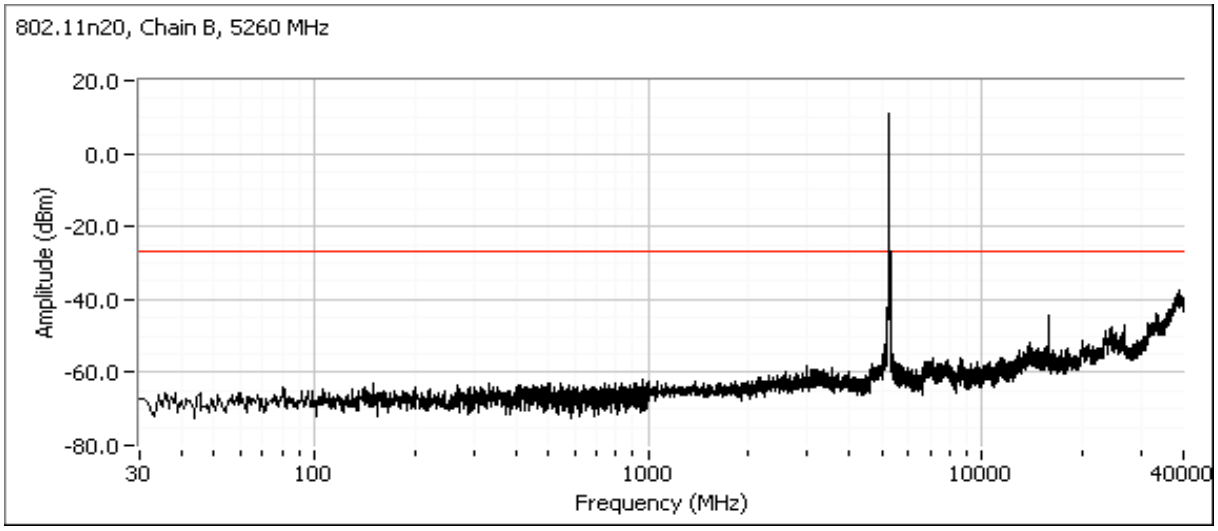



**High channel, 5150 - 5250 MHz Band - 802.11n - 20MHz Mode**

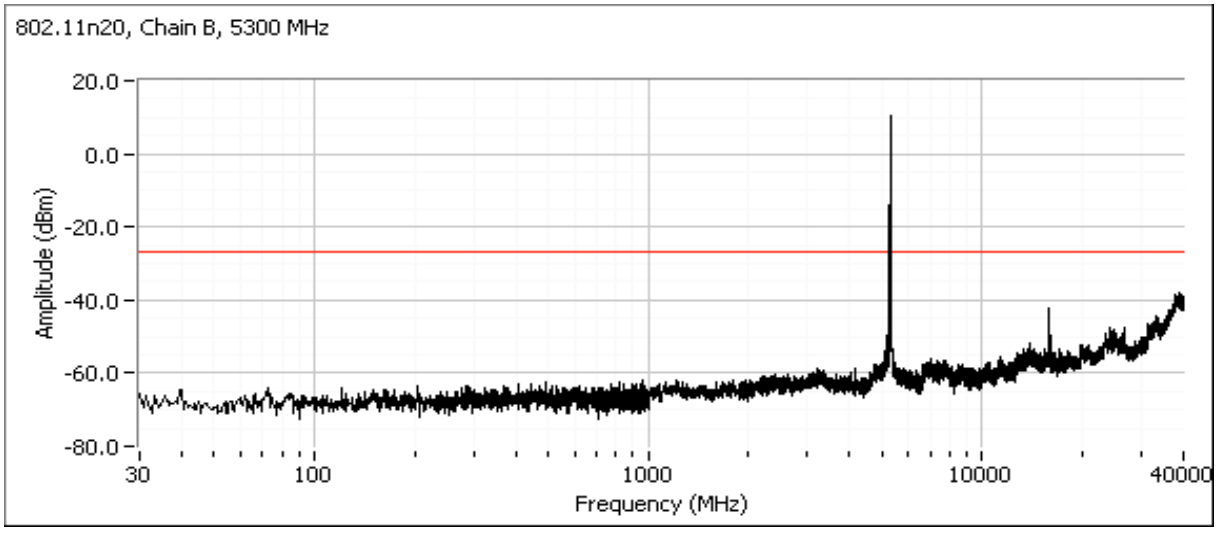


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5250 - 5350 MHz Band - 802.11n - 20MHz Mode**



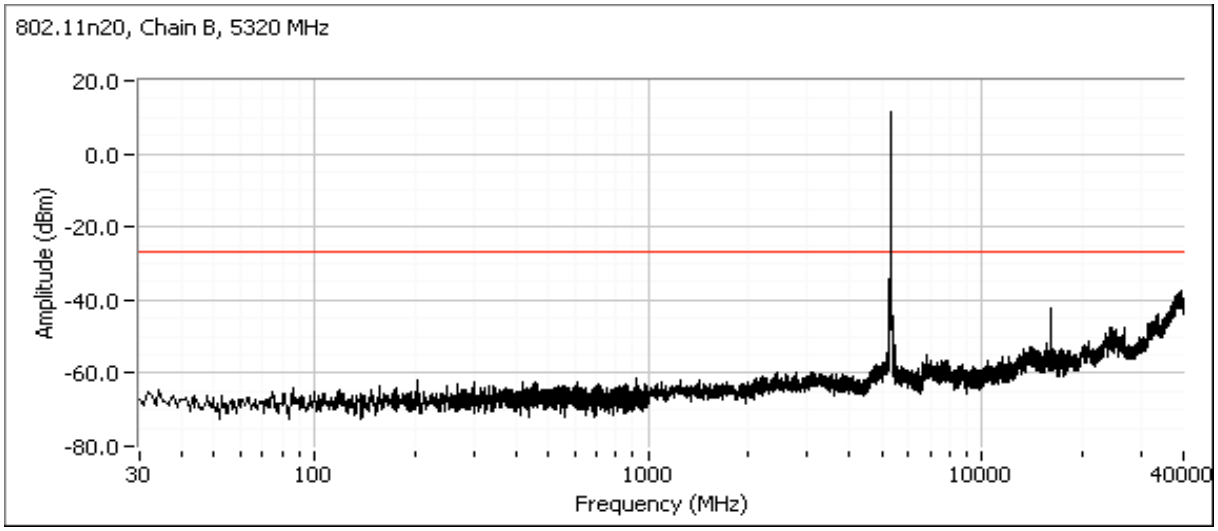

**Center channel, 5250 - 5350 MHz Band - 802.11n - 20MHz Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**High channel, 5250 - 5350 MHz Band - 802.11n - 20MHz Mode**

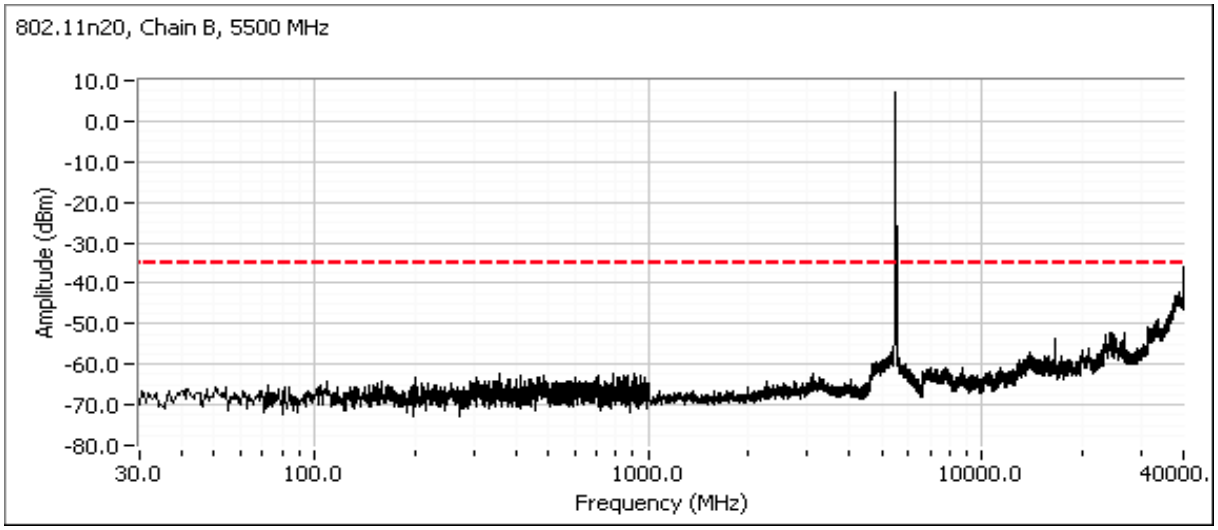
Compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.

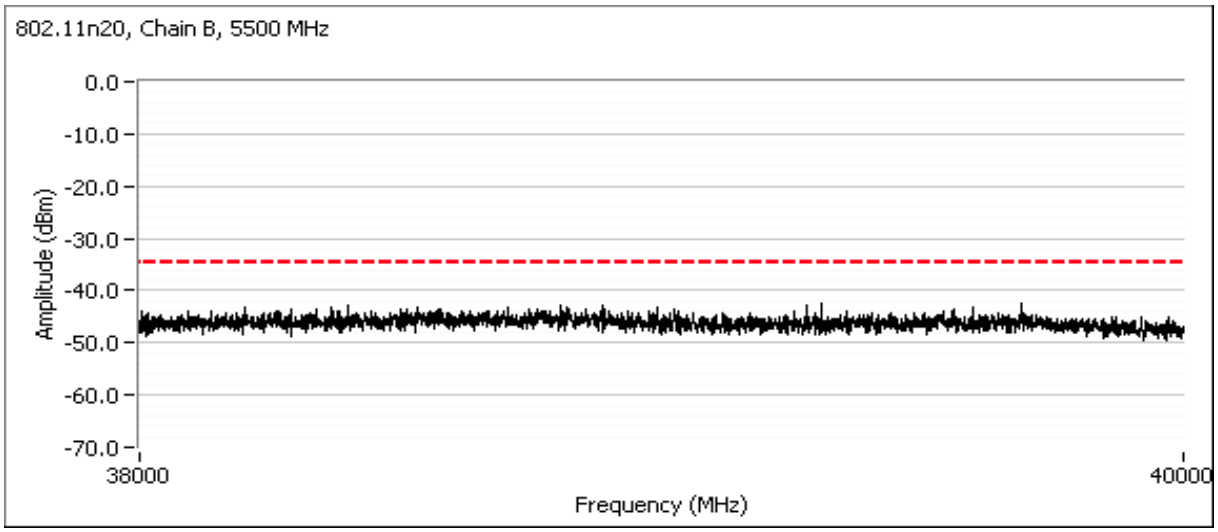


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5470 - 5725 MHz Band - 802.11n - 20MHz Mode**

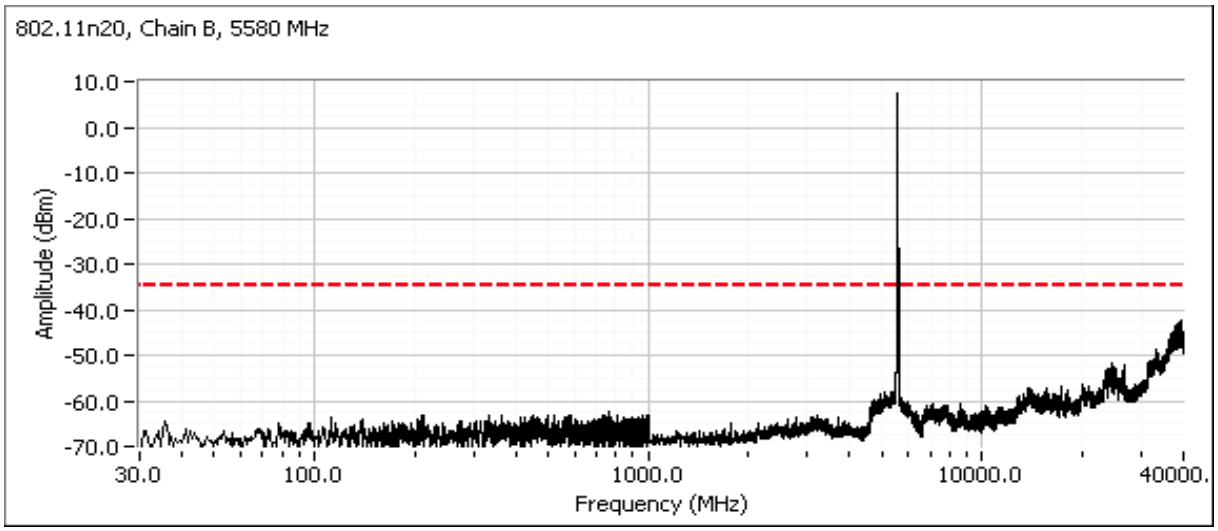
Compliance with the radiated limits for the restricted band below 5460 MHz is demonstrated through the radiated emissions tests.



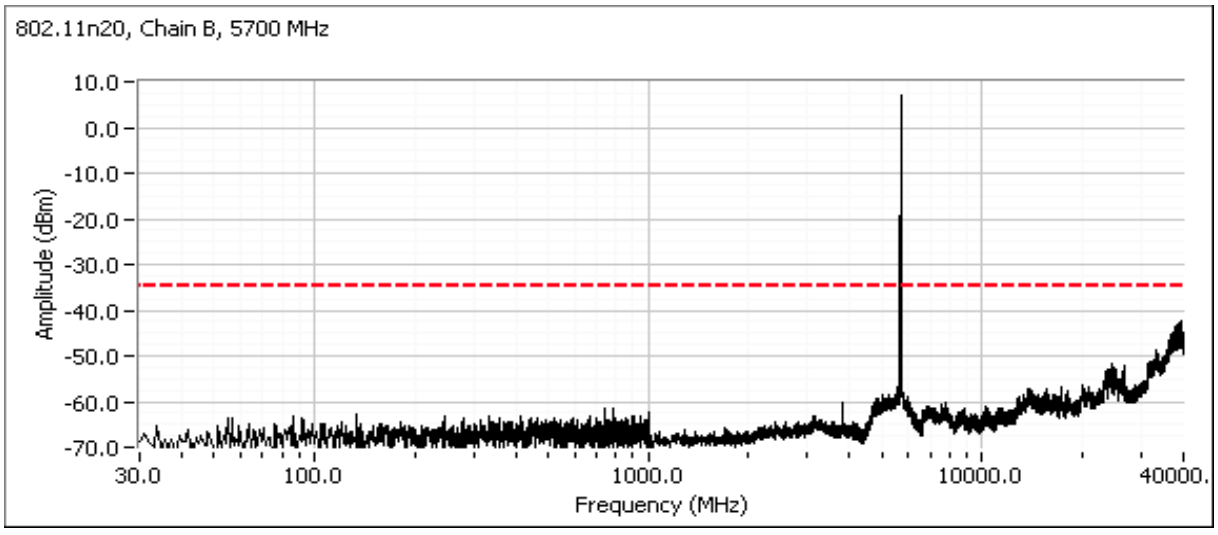



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Center channel, 5470 - 5725 MHz Band - 802.11n - 20MHz Mode**




**High channel, 5470 - 5725 MHz Band - 802.11n - 20MHz Mode**

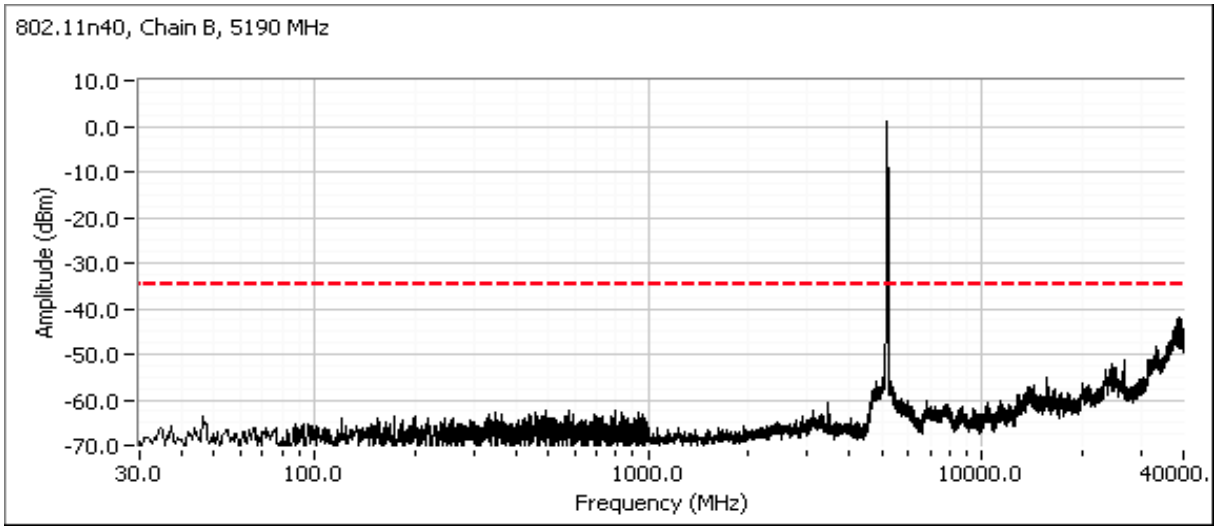


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

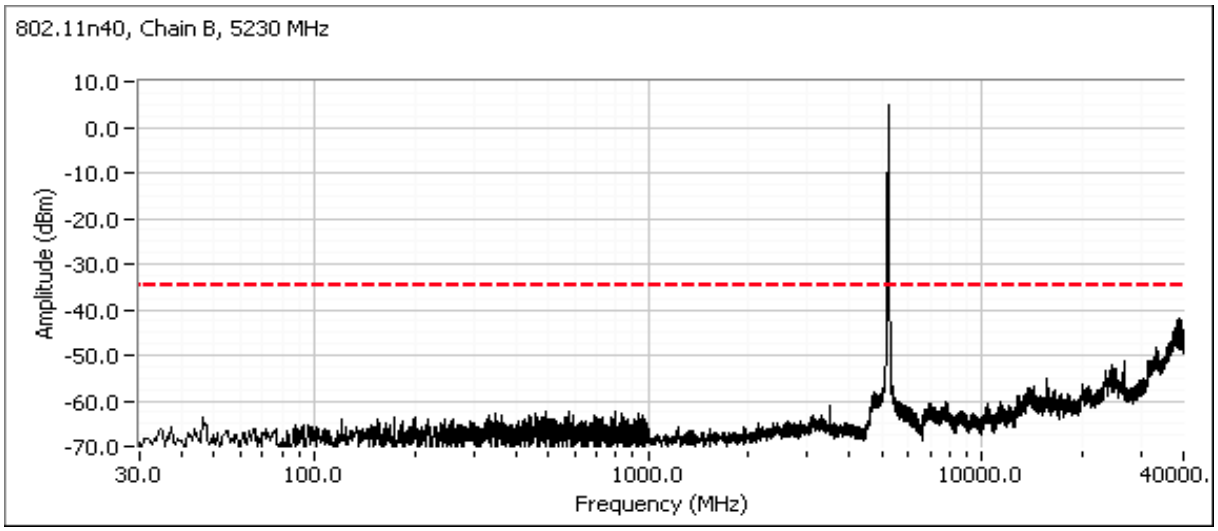
**Plots Showing Out-Of-Band - 802.11n - 40MHz Mode Emissions (RBW=VBW=1MHz)**

**Low channel, 5150 - 5250 MHz Band - 802.11n - 40MHz Mode**

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

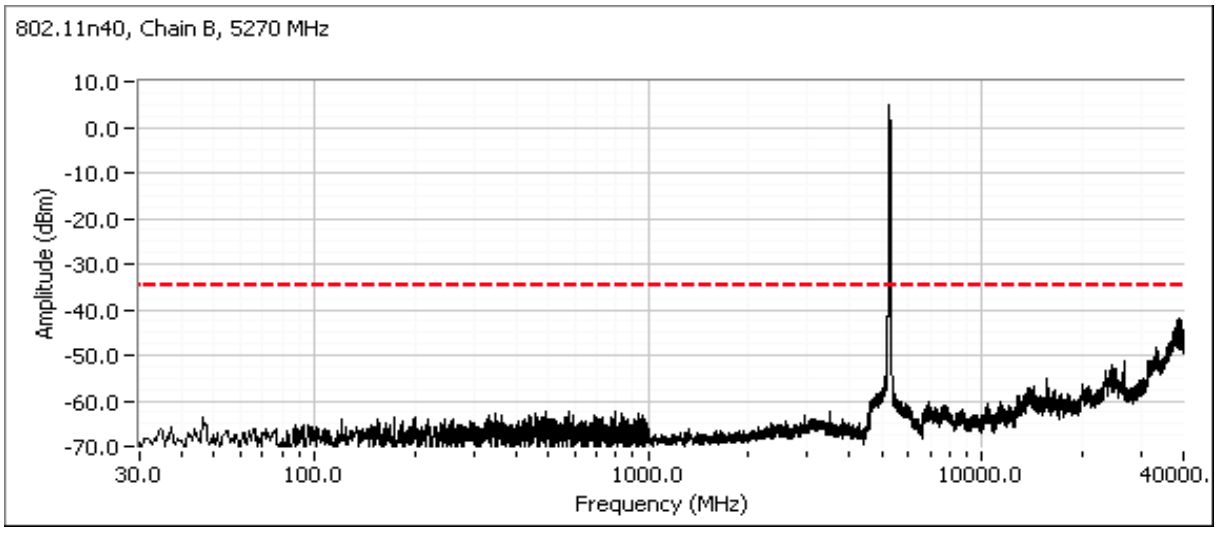



**High channel, 5150 - 5250 MHz Band - 802.11n - 40MHz Mode**



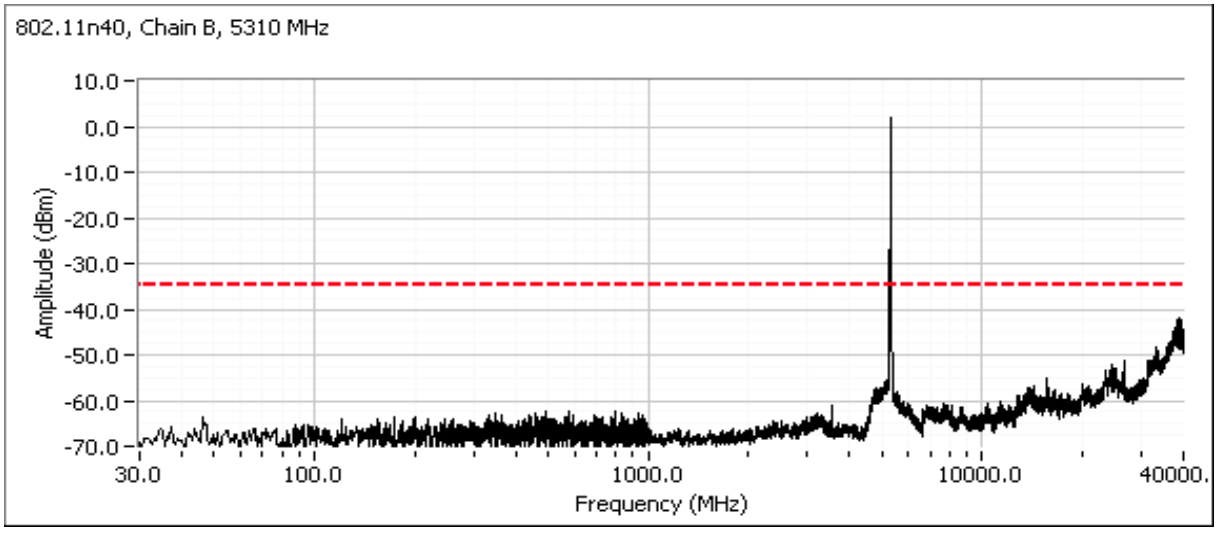
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5250 - 5350 MHz Band - 802.11n - 40MHz Mode**




**High channel, 5250 - 5350 MHz Band - 802.11n - 40MHz Mode**

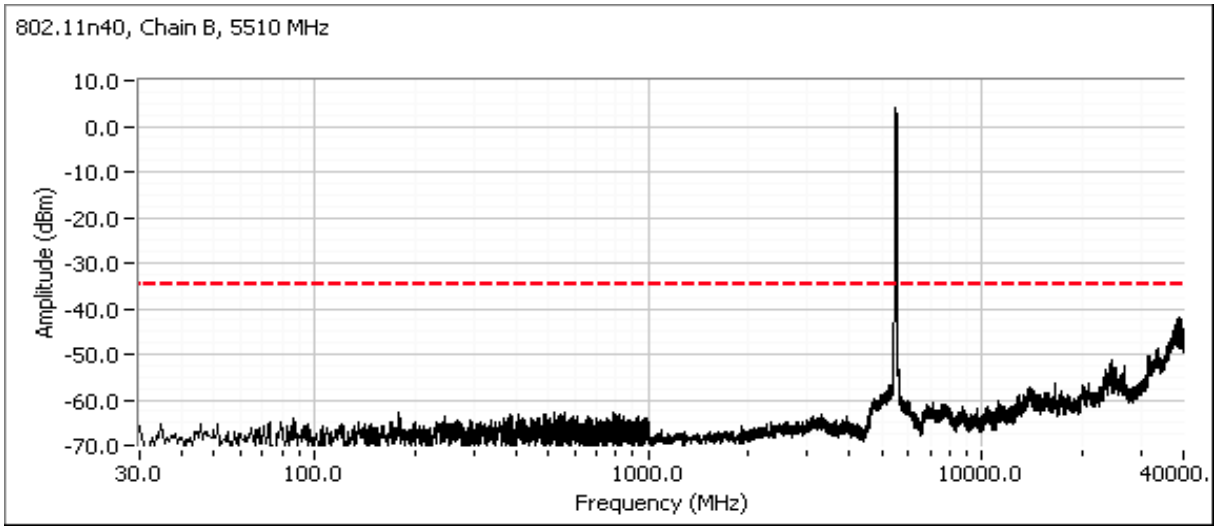
Compliance with the radiated limits for the restricted band immediately above 5350MHz is demonstrated through the radiated emissions tests.



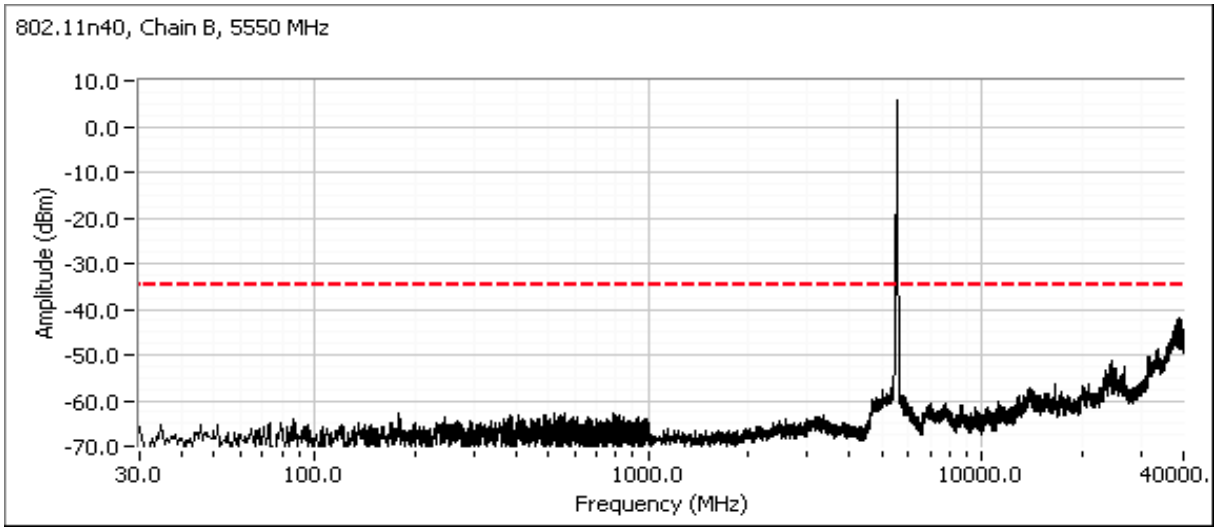
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Low channel, 5470 - 5725 MHz Band - 802.11n - 40MHz Mode**

Compliance with the radiated limits for the restricted band below 5460 MHz is demonstrated through the radiated emissions tests.

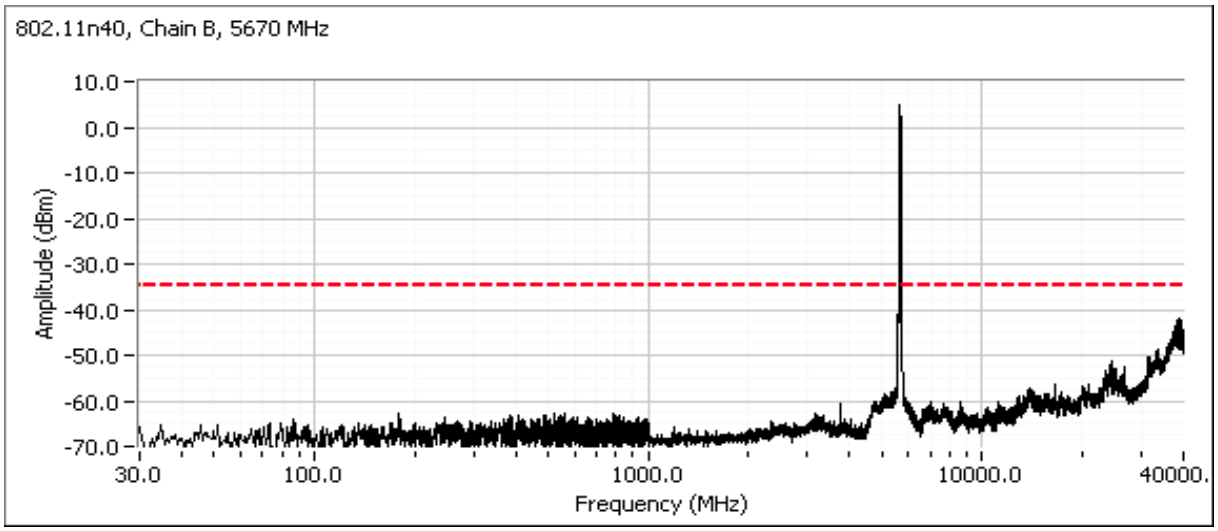



**Center channel, 5470-5725MHz Band, 802.11n 40MHz Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**High channel, 5470 - 5725 MHz Band - 802.11n - 40MHz Mode**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

# RSS-210 (LELAN) and FCC 15.407(UNII)
# Antenna Port Measurements - MIMO Mode (Chain A+B)
### Power, PSD, Peak Excursion, Bandwidth and Spurious Emissions

## Test Specific Details

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

Date of Test: 10/5/2010
Test Engineer: Rafael Varelas
Test Location: FT Lab #4

Config. Used: 1
Config Change: none
Host Unit Voltage 120V/60Hz

## Summary of Results

| Run # | Test Performed | Limit | Pass / Fail | Result / Margin |
|---|---|---|---|---|
| 1 | Power, 5150 - 5250MHz | 15.407(a) (1), (2) | Pass | 802.11n 20MHz: 42.8 mW<br>802.11n n40MHz: 43.3 mW |
| 1 | PSD, 5150 - 5250MHz | 15.407(a) (1), (2) | Pass | 802.11n 20MHz: 3.6 dBm/MHz<br>802.11n n40MHz: 1.5 dBm/MHz |
| 1 | Power, 5250 - 5350MHz | 15.407(a) (1), (2) | Pass | 802.11n 20MHz: 39.9 mW<br>802.11n n40MHz: 36 mW |
| 1 | PSD, 5250 - 5350MHz | 15.407(a) (1), (2) | Pass | 802.11n 20MHz: 3.4 dBm/MHz<br>802.11n n40MHz: 0.4 dBm/MHz |
| 1 | Power, 5470 - 5725MHz | 15.407(a) (1), (2) | Pass | 802.11n 20MHz: 39.5 mW<br>802.11n n40MHz: 41.8 mW |
| 1 | PSD, 5470 - 5725MHz | 15.407(a) (1), (2) | Pass | 802.11n 20MHz: 3.6 dBm/MHz<br>802.11n n40MHz: 1.2 dBm/MHz |
| 1 | 26dB Bandwidth | 15.407<br>(Information only) | - | > 20MHz for all modes (refer to single chain data) |
| 1 | 99% Bandwidth | RSS 210<br>(Information only) | N/A | Refer to single chain data |
| 2 | Peak Excursion Envelope | 15.407(a) (6)<br>13dB | | Refer to single chain data |
| 3 | Antenna Conducted - Out of Band Spurious | 15.407(b)<br>-27dBm/MHz | | Refer to single chain data |

## 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.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

## Ambient Conditions:

Temperature: 22.4 °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.

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

| | |
|---|---|
| Note 1: | Output power measured using a peak power meter |
| Note 1: | Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over bandwidth > EBW (method 1 of DA-02-2138A1). |
| Note 2: | Measured using the same analyzer settings used for output power. |
| Note 3: | For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB. |
| Note 4: | 99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB |
| Note 5: | For MIMO systems the total output power and total PSD are calculated form the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power. |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**MIMO Device - 5150-5250 MHz Band**

| | Chain 1 | Chain 2 | Chain 3 | Coherent | Effective[5] | EIRP (mW) | EIRP (dBm) |
|---|---|---|---|---|---|---|---|
| Antenna Gain (dBi): | 3.6 | 3.6 | | No | 3.6 | 98.0 | 19.9 |

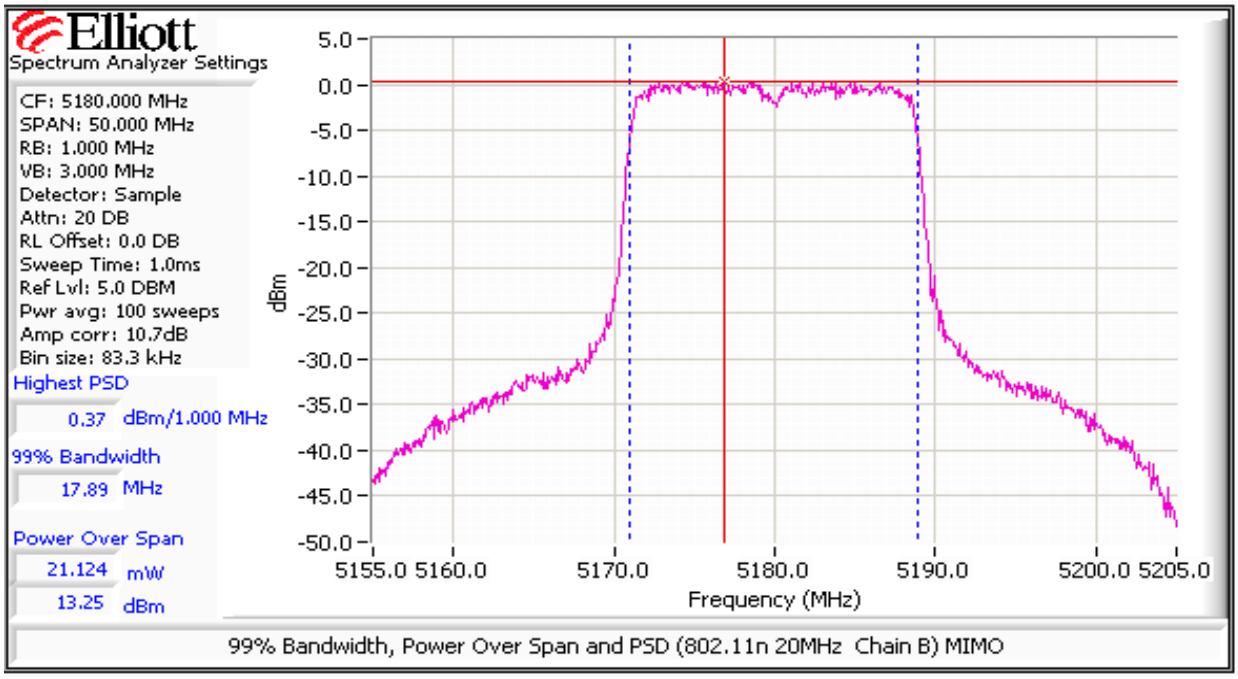
**Power**

| Frequency (MHz) | Software Setting | 26dB BW (MHz) | Measured Output Power[1] dBm | | | Total | | Limit (dBm) | Max Power (W) | Pass or Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chain 1 | Chain 2 | Chain 3 | mW | dBm | | | |
| ***20MHz Mode*** | | | | | | | | | | |
| 5180 | 26.0/25.5 | 21.3 | 13.3 | 13.3 | | 42.8 | 16.3 | 17.0 | 0.043 | PASS |
| 5200 | 26.0/25.5 | 21.2 | 13.2 | 13.2 | | 41.8 | 16.2 | 17.0 | | PASS |
| 5240 | 26.0/25.5 | 21.0 | 13.0 | 12.9 | | 39.5 | 16.0 | 17.0 | | PASS |
| ***40MHz Mode*** | | | | | | | | | | |
| 5190 | 23.5/23.0 | 39.0 | 10.0 | 10.8 | | 22.0 | 13.4 | 17.0 | 0.043 | PASS |
| 5230 | 27.5/27.0 | 41.8 | 13.4 | 13.3 | | 43.3 | 16.4 | 17.0 | | PASS |

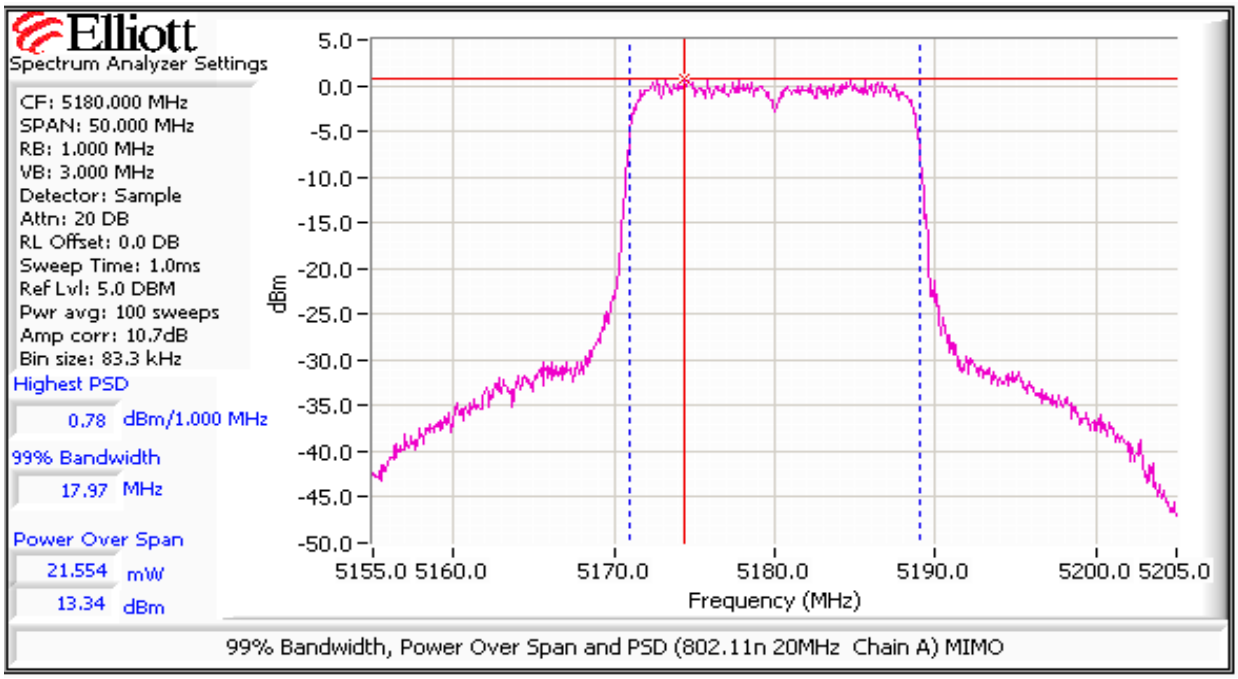
**PSD**

| Frequency (MHz) | 99%[4] BW | Total Power | PSD[2] dBm/MHz | | | Total PSD | | Limit | | Pass or Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chain 1 | Chain 2 | Chain 3 | mW/MHz | dBm/MHz | FCC | RSS 210[3] | |
| ***20MHz Mode*** | | | | | | | | | | |
| 5180 | 18.0 | 16.3 | 0.8 | 0.4 | | 2.3 | 3.6 | 4.0 | 6.4 | PASS |
| 5200 | 18.0 | 16.2 | 0.5 | 0.6 | | 2.3 | 3.6 | 4.0 | 6.4 | PASS |
| 5240 | 18.0 | 16.0 | 0.4 | 0.5 | | 2.2 | 3.5 | 4.0 | 6.4 | PASS |
| ***40MHz Mode*** | | | | | | | | | | |
| 5190 | 36.3 | 13.4 | -4.9 | -4.5 | | 0.7 | -1.7 | 4.0 | 6.4 | PASS |
| 5230 | 36.3 | 16.4 | -1.6 | -1.5 | | 1.4 | 1.5 | 4.0 | 6.4 | PASS |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

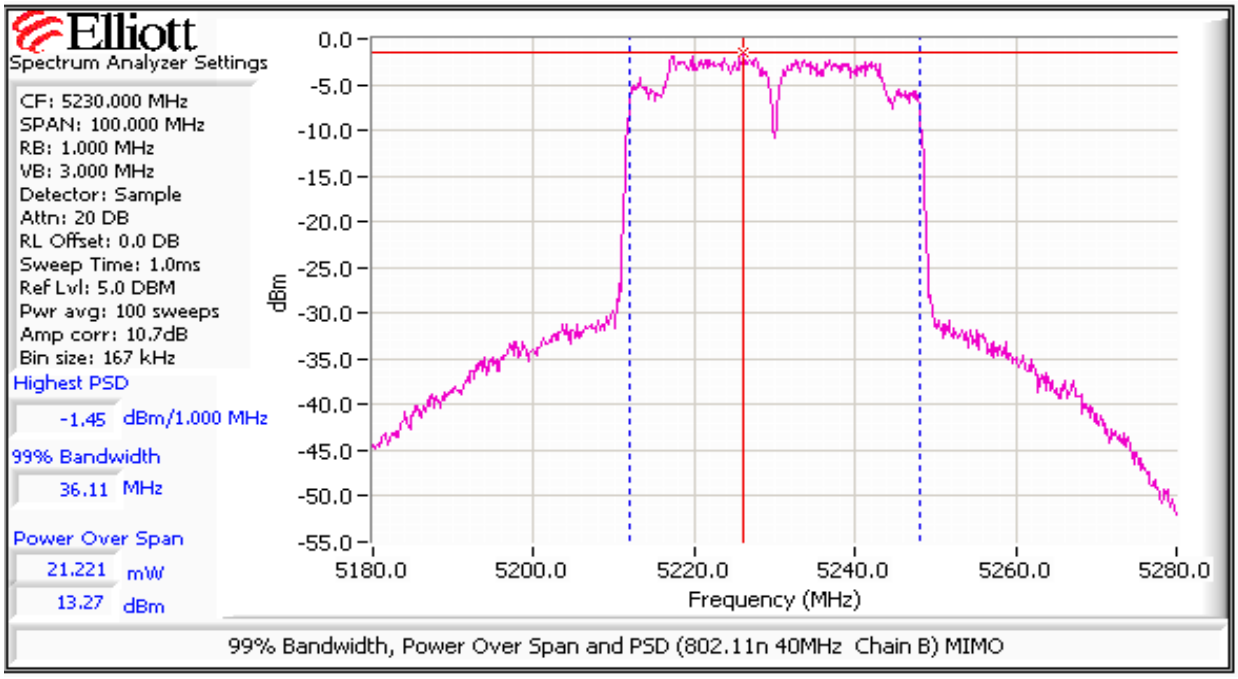


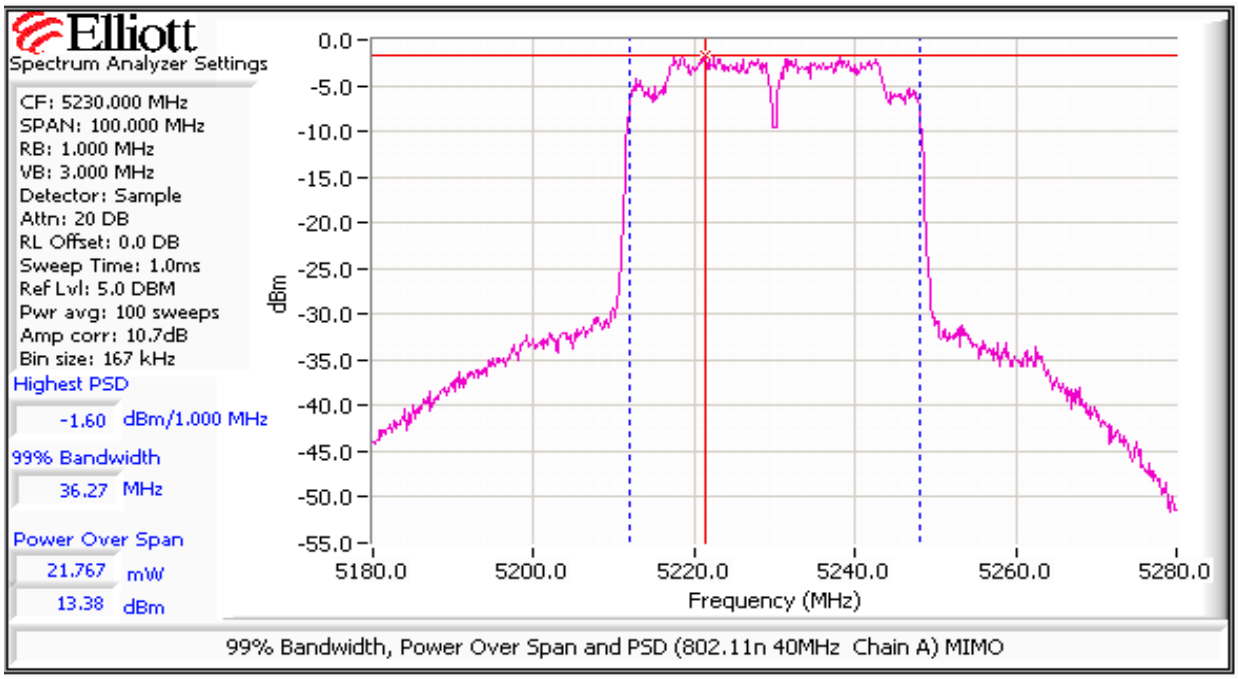

99% Bandwidth, Power Over Span and PSD (802.11n 20MHz Chain B) MIMO




99% Bandwidth, Power Over Span and PSD (802.11n 20MHz Chain A) MIMO

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**MIMO Device - 5250-5350 MHz Band**

| | Chain 1 | Chain 2 | Chain 3 | Coherent | Effective[5] | EIRP (mW) | EIRP (dBm) |
|---|---|---|---|---|---|---|---|
| Antenna Gain (dBi): | 3.7 | 3.7 | | No | 3.7 | 93.6 | 19.7 |

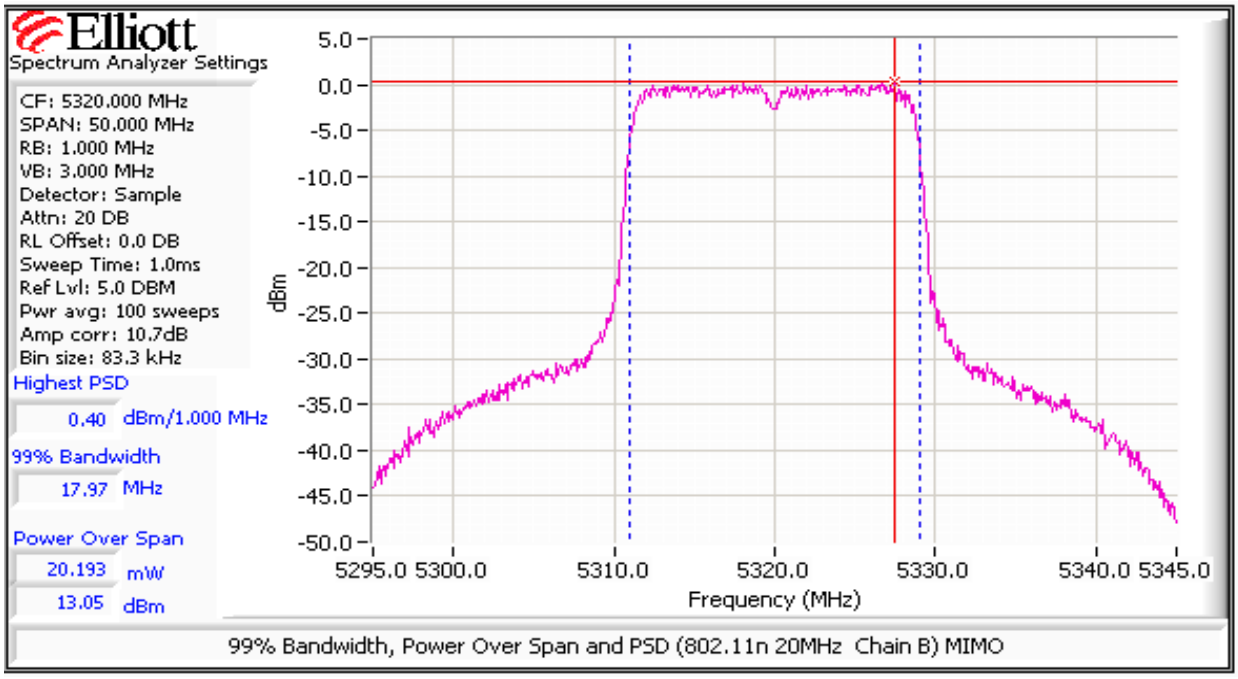
**Power**

| Frequency (MHz) | Software Setting | 26dB BW (MHz) | Measured Output Power[1] dBm | | | Total | | Limit (dBm) | Max Power (W) | Pass or Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chain 1 | Chain 2 | Chain 3 | mW | dBm | | | |
| ***20MHz Mode*** | | | | | | | | | | |
| 5260 | 26.0/25.5 | 21.3 | 12.7 | 12.5 | | 36.4 | 15.6 | 24.0 | 0.040 | PASS |
| 5300 | 26.5/26.0 | 21.3 | 13.2 | 12.6 | | 39.1 | 15.9 | 24.0 | | PASS |
| 5320 | 26.5/26.5 | 21.7 | 12.9 | 13.1 | | 39.9 | 16.0 | 24.0 | | PASS |
| ***40MHz Mode*** | | | | | | | | | | |
| 5270 | 27.5/27.0 | 40.3 | 12.6 | 12.5 | | 36.0 | 15.6 | 24.0 | 0.036 | PASS |
| 5310 | 27.0/26.5 | 39.0 | 12.4 | 12.3 | | 34.4 | 15.4 | 24.0 | | PASS |

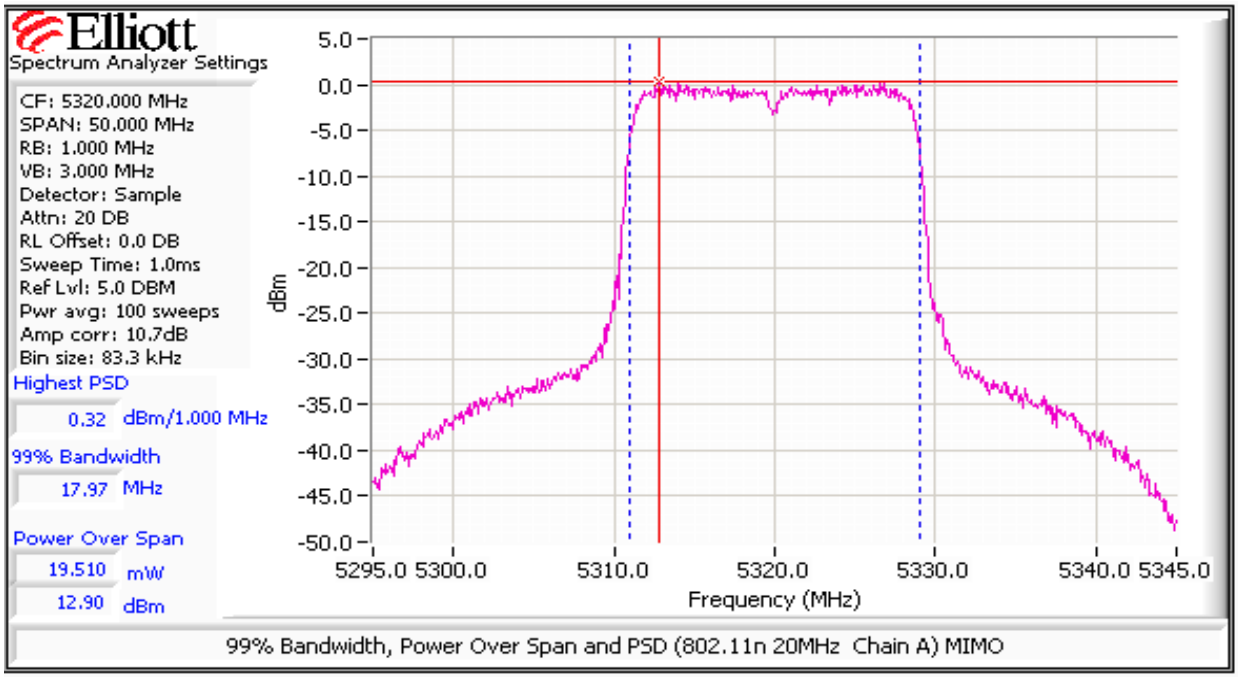
**PSD**

| Frequency (MHz) | 99%[4] BW | Total Power | PSD[2] dBm/MHz | | | Total PSD | | Limit | | Pass or Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chain 1 | Chain 2 | Chain 3 | mW/MHz | dBm/MHz | FCC | RSS 210[3] | |
| ***20MHz Mode*** | | | | | | | | | | |
| 5260 | 18.0 | 15.6 | 0.0 | -0.1 | | 2.0 | 3.0 | 11.0 | 11.0 | PASS |
| 5300 | 18.0 | 15.9 | 0.4 | -0.1 | | 2.1 | 3.2 | 11.0 | 11.0 | PASS |
| 5320 | 18.0 | 16.0 | 0.3 | 0.4 | | 2.2 | 3.4 | 11.0 | 11.0 | PASS |
| ***40MHz Mode*** | | | | | | | | | | |
| 5270 | 36.3 | 15.6 | -2.7 | -2.5 | | 1.1 | 0.4 | 11.0 | 11.0 | PASS |
| 5310 | 36.1 | 15.4 | -2.6 | -3.0 | | 1.1 | 0.2 | 11.0 | 11.0 | PASS |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

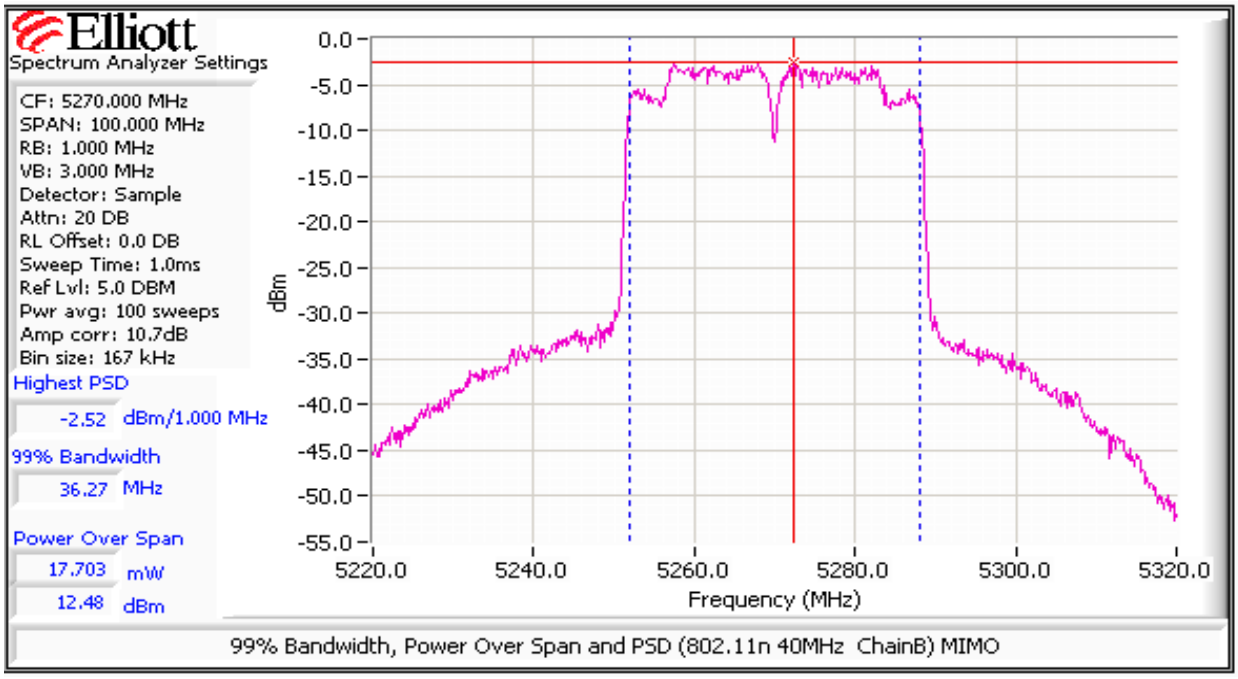


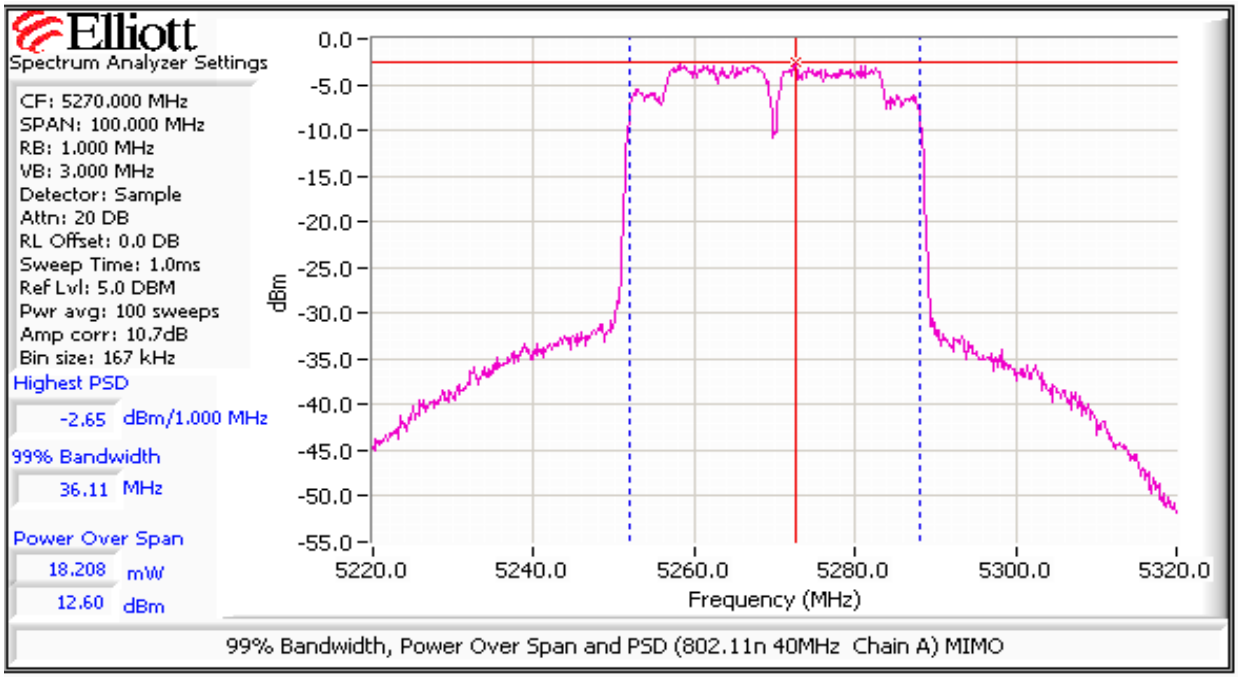

99% Bandwidth, Power Over Span and PSD (802.11n 20MHz Chain B) MIMO




99% Bandwidth, Power Over Span and PSD (802.11n 20MHz Chain A) MIMO

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**MIMO Device - 5470-5725 MHz Band**

| | Chain 1 | Chain 2 | Chain 3 | Coherent | Effective[5] | EIRP (mW) | EIRP (dBm) |
|---|---|---|---|---|---|---|---|
| Antenna Gain (dBi): | 4.8 | 4.8 | | No | 4.8 | 119.3 | 20.8 |

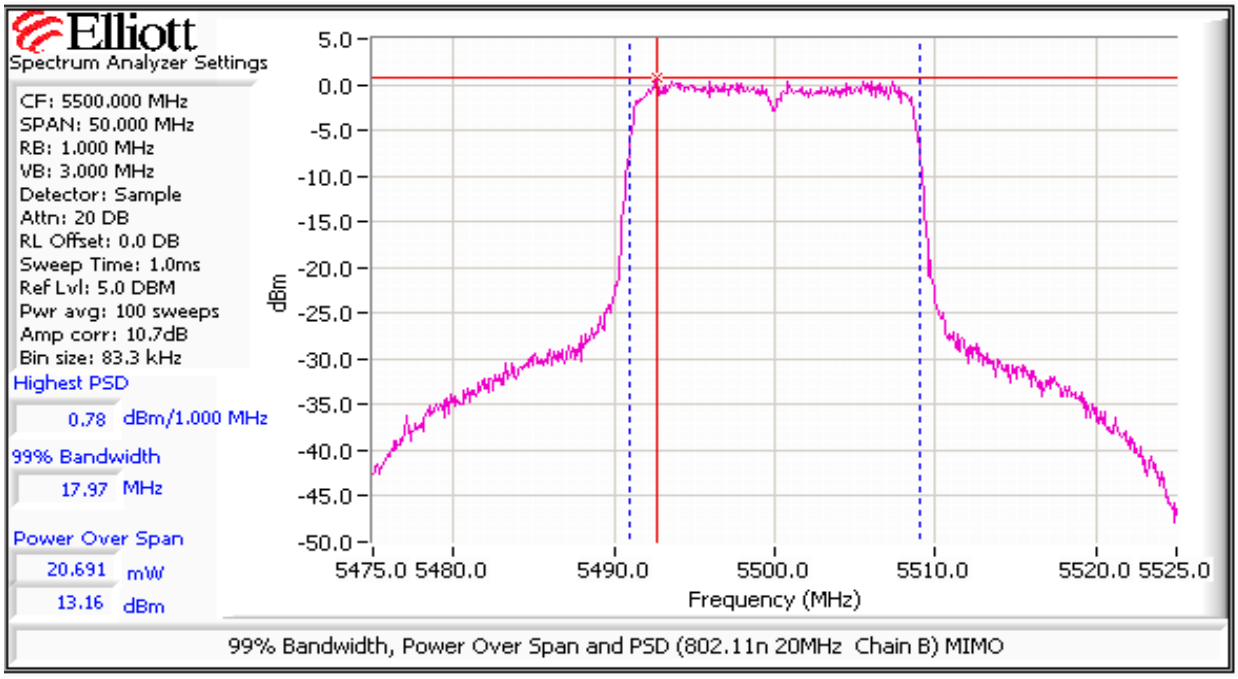
**Power**

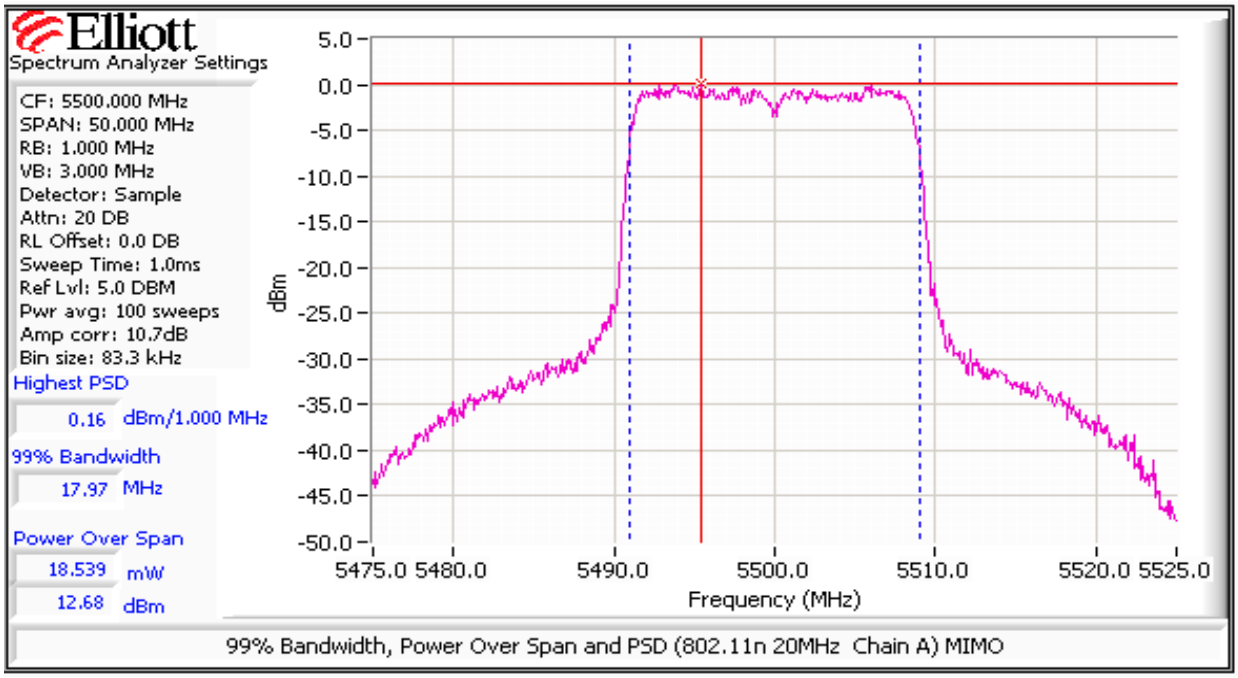
| Frequency (MHz) | Software Setting | 26dB BW (MHz) | Measured Output Power[1] dBm | | | Total | | Limit (dBm) | Max Power (W) | Pass or Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chain 1 | Chain 2 | Chain 3 | mW | dBm | | | |
| ***20MHz Mode*** | | | | | | | | | | |
| 5500 | 28.5/28.5 | 24.0 | 12.7 | 13.2 | | 39.5 | 16.0 | 24.0 | 0.040 | PASS |
| 5580 | 29.0/29.0 | 23.1 | 12.7 | 13.2 | | 39.5 | 16.0 | 24.0 | | PASS |
| 5700 | 29.5/29.0 | 21.1 | 12.4 | 12.4 | | 34.8 | 15.4 | 24.0 | | PASS |
| ***40MHz Mode*** | | | | | | | | | | |
| 5510 | 30.0/29.5 | 42.3 | 13.1 | 13.0 | | 40.4 | 16.1 | 24.0 | 0.042 | PASS |
| 5550 | 30.5/30.0 | 50.2 | 13.2 | 13.2 | | 41.8 | 16.2 | 24.0 | | PASS |
| 5670 | 30.5/30.0 | 39.0 | 12.6 | 12.8 | | 37.3 | 15.7 | 24.0 | | PASS |

**PSD**

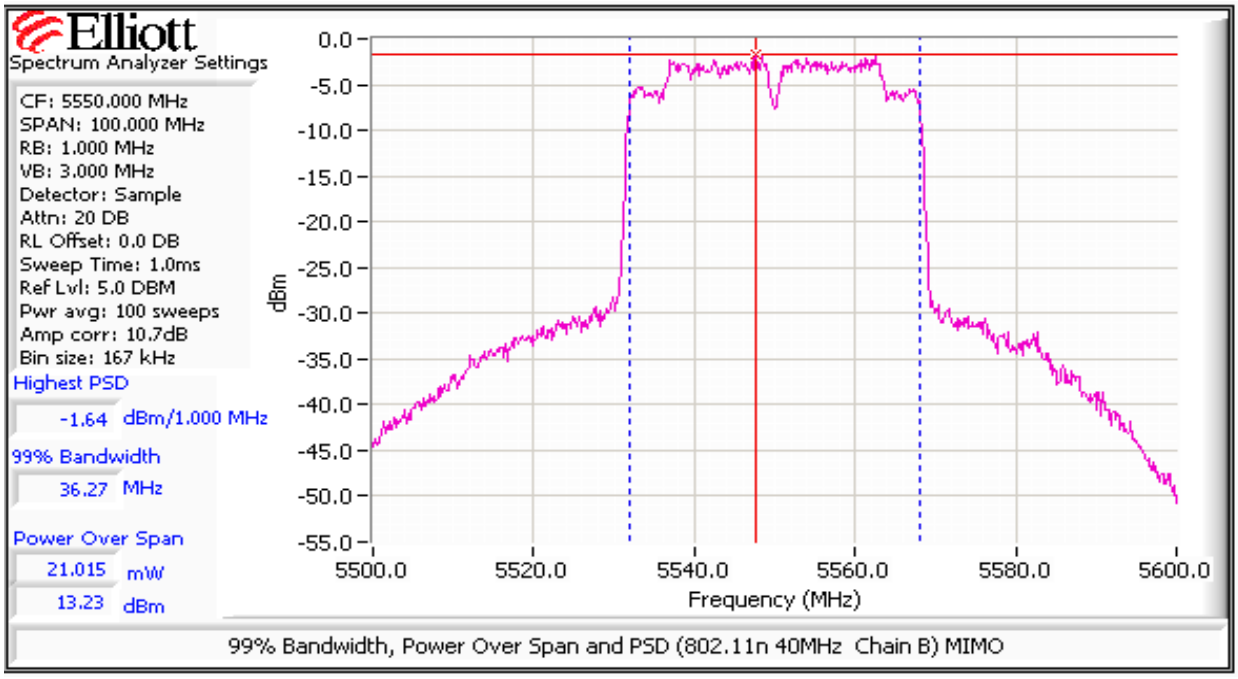
| Frequency (MHz) | 99%[4] BW | Total Power | PSD[2] dBm/MHz | | | Total PSD | | Limit | | Pass or Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chain 1 | Chain 2 | Chain 3 | mW/MHz | dBm/MHz | FCC | RSS 210[3] | |
| ***20MHz Mode*** | | | | | | | | | | |
| 5500 | 18.0 | 16.0 | 0.2 | 0.8 | | 2.2 | 3.5 | 11.0 | 11.0 | PASS |
| 5580 | 18.0 | 16.0 | 0.3 | 0.9 | | 2.3 | 3.6 | 11.0 | 11.0 | PASS |
| 5700 | 18.0 | 15.4 | -0.2 | -0.3 | | 1.9 | 2.8 | 11.0 | 11.0 | PASS |
| ***40MHz Mode*** | | | | | | | | | | |
| 5510 | 36.3 | 16.1 | -2.0 | -2.0 | | 1.3 | 1.0 | 11.0 | 11.0 | PASS |
| 5550 | 36.3 | 16.2 | -2.0 | -1.6 | | 1.3 | 1.2 | 11.0 | 11.0 | PASS |
| 5670 | 36.3 | 15.7 | -2.7 | -2.5 | | 1.1 | 0.4 | 11.0 | 11.0 | PASS |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

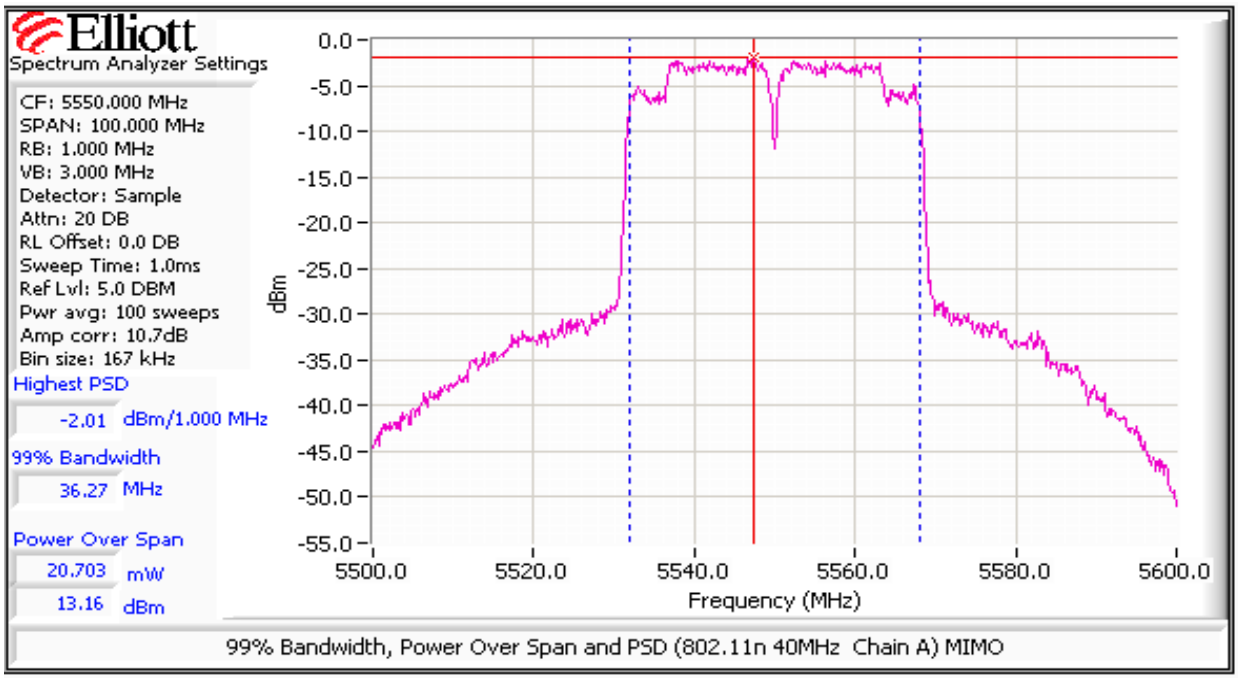


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80759 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |




99% Bandwidth, Power Over Span and PSD (802.11n 40MHz Chain B) MIMO




99% Bandwidth, Power Over Span and PSD (802.11n 40MHz Chain A) MIMO

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | - |
| Emissions Standard(s): | FCC 15.247 | Class: | B |
| Immunity Standard(s): | - | Environment: | - |

# EMC Test Data

For The

# Intel Corporation

Model

**Intel® Centrino® Advanced-N 6230**

Date of Last Test: 10/6/2010

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

# RSS 210 and FCC 15.247 (DSS) Radiated Spurious Emissions 802.11bgn and Bluetooth - Transmitter Mode

## Test Specific Details

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

## General Test Configuration

The EUT was installed into a test fixture such that the EUT was exposed (i.e. outside of a host PC).
For conducted emissions testing the measurement antenna port.

## Summary of Results

**For Bluetooth:** Tx is chain B, Rx is chain B. **For WiFi**, only Chain A is used for transmit in the 2.4GHz band, both chains used in 5GHz bands.

**MAC Address: 00150079AD1A DRTU Tool Version 1.2.12-0197 New tool from 9/14 Driver version 14.0.0.39**

| Run # | Mode | Channel | Target Power | Measured Power | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| 1 | BT **1Mb/s** 802.11b | 2402MHz 2412MHz | 7dBm 16.5dBm | 4.4 16.5 | Radiated Emissions 1- 10 GHz | FCC 15.247 | 48.0dBµV/m @ 4824.0MHz (-6.0dB) |
| 2 | BT **1Mb/s** 802.11b | 2480MHz 2462MHz | 7dBm 16.5dBm | 5.3 16.6 | | FCC 15.247 | **48.4dBµV/m @ 2360.0MHz (-5.6dB)** |
| 3 | BT **1Mb/s** 802.11g | 2402MHz 2412MHz | 7dBm 16.5dBm | 4.4 16.3 | | FCC 15.247 | 46.0dBµV/m @ 2281.9MHz (-8.0dB) |
| 4 | BT **1Mb/s** 802.11g | 2480MHz 2462MHz | 7dBm 16.5dBm | 5.3 16.9 | | FCC 15.247 | 46.6dBµV/m @ 2360.0MHz (-7.4dB) |
| WiFi mode for the following runs based on worst case mode from runs 1 through 4 | | | | | | | |
| 5 | BT **1Mb/s** 802.11b | 2402MHz 2437MHz | 7dBm 16.5dBm | 4.3 16.6 | Radiated Emissions 1- 10 GHz | FCC 15.247 | 46.8dBµV/m @ 2282.0MHz (-7.2dB) |
| 6 | BT **1Mb/s** 802.11b | 2440MHz 2412MHz | 7dBm 16.5dBm | 5.4 16.5 | | FCC 15.247 | **49.3dBµV/m @ 2320.0MHz (-4.7dB)** |
| 7 | BT **1Mb/s** 802.11b | 2440MHz 2462MHz | 7dBm 16.5dBm | 5.4 16.6 | Radiated Emissions 1- 10 GHz | FCC 15.247 | 47.8dBµV/m @ 2320.0MHz (-6.2dB) |
| 8 | BT **1Mb/s** 802.11b | 2480MHz 2437MHz | 7dBm 16.5dBm | 5.1 16.6 | | FCC 15.247 | 48.9dBµV/m @ 2360.0MHz (-5.1dB) |
| WiFi mode and channel and Bluetooth channel based on the worst case mode from runs 1 through 8 | | | | | | | |
| 9 | BT **3Mb/s** 802.11b | 2440 MHz 2412 MHz | 7dBm 16.5dBm | 1.4 16.5 | Radiated Emissions 1- 10 GHz | FCC 15.247 | **46.4dBµV/m @ 2383.9MHz (-7.6dB)** |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

WiFi mode - 802.11n 20MHz with both chains active at 16.5dBm per chain, center channel in each 5GHz band. Bluetooth on center channel, 1Mb/s mode

| Run # | Mode | Channel | Target Power | Measured Power | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| 10 | BT **1Mb/s** 802.11n20 | 2440MHz 5200MHz | 7dBm 16.5/16.5 | 5.4 16.6/16.7 | Radiated Emissions 1- 15 GHz | FCC 15.247 | 41.9dBµV/m @ 2280.0MHz (-12.1dB) |
| 11 | BT **1Mb/s** 802.11n20 | 2440MHz 5300MHz | 7dBm 16.5/16.5 | 5.4 16.7/16.5 | | FCC 15.247 | 37.2dBµV/m @ 10600.0MHz (-16.8dB) |
| 12 | BT **1Mb/s** 802.11n20 | 2440MHz 5600MHz | 7dBm 16.5/16.5 | 5.4 16.5/16.5 | | FCC 15.247 | **45.1dBµV/m @ 11199.8MHz (-8.9dB)** |
| 13 | BT **1Mb/s** 802.11n20 | 2440MHz 5785MHz | 7dBm 16.5/16.5 | 5.4 16.5/16.7 | | FCC 15.247 | 44.7dBµV/m @ 11570.7MHz (-9.3dB) |

## Modifications Made During Testing

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

## Notes:

Bluetooth uses a frequency hopping algorithm that means that the device, during normal operation, is only on a specific channel for a short period of time. The average correction factor is calculated as follows:

A maximum length packet has a duration of 5 time slots.
The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms.
With a minimum of 20 hopping channels a channel will not be used more than 4 times in any 100ms period.
The maximum dwell time in a 100ms period is 4 x 3.125ms = 12.5ms.
The average correction factor is, therefore, 20log(12.5/100) =-18dB

As this is a hopping radio the correction factor can be applied to the average value of the signal provided the average value was measured with the device continuously transmitting. DA 00-0705 permits the use of the average correction on the **measured average** value for frequency hopping radios.

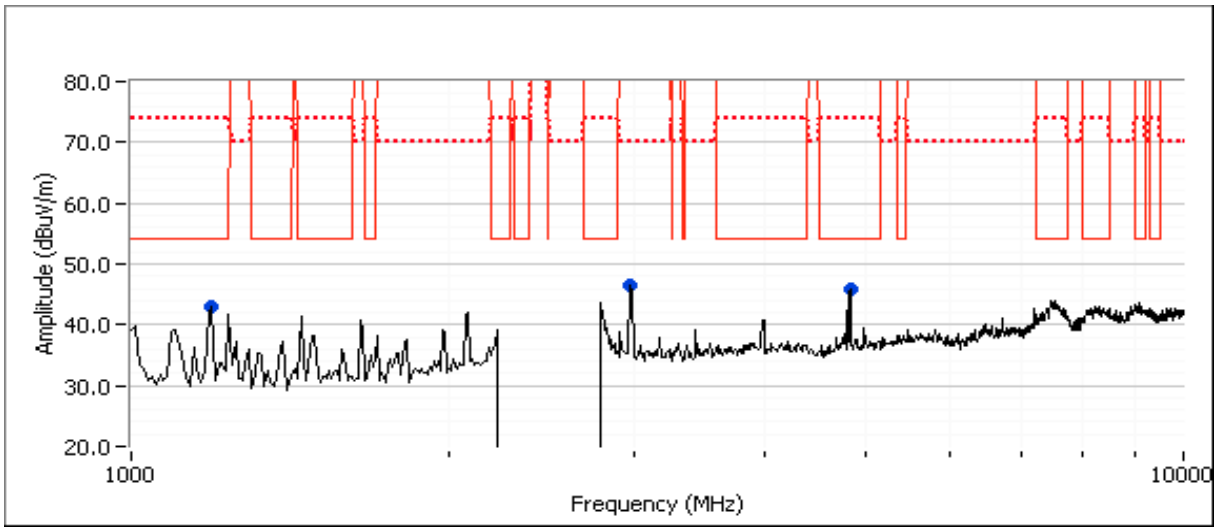
All measurements in this data sheet do not include the average correction factor.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 1, Rainbow Peak 2x2: 1-10GHz, 802.11b @ 2412 MHz Chain A, BT Basic Rate @ 2402 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.5 | 24.5 |
| Chain B | 7.0 | 4.4 | 8.0 |

**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *4822.500* | *46.0* | *V* | *54.0* | *-8.0* | *Peak* | *154* | *1.0* | |
| *1192.500* | *42.9* | *V* | *54.0* | *-11.1* | *Peak* | *82* | *1.5* | |
| *2980.000* | *46.4* | *V* | *70.0* | *-23.6* | *Peak* | *154* | *1.0* | |

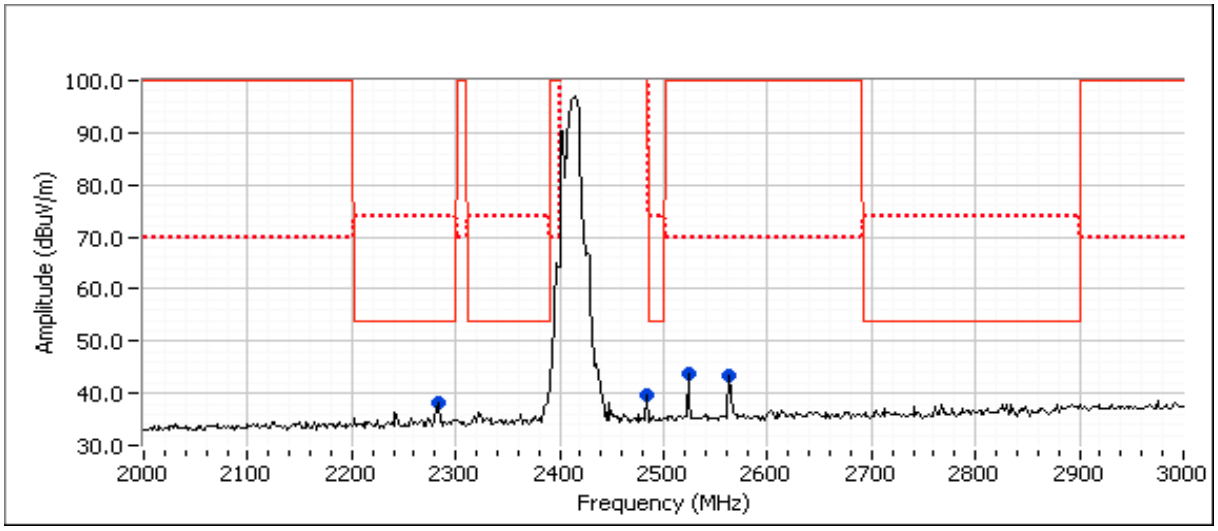
**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4824.000 | 48.0 | V | 54.0 | -6.0 | AVG | 153 | 1.16 | |
| 4823.900 | 50.8 | V | 74.0 | -23.2 | PK | 153 | 1.16 | |
| 1192.530 | 42.9 | V | 54.0 | -11.1 | AVG | 92 | 1.64 | |
| 1192.550 | 45.6 | V | 74.0 | -28.4 | PK | 92 | 1.64 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2283.330* | *38.3* | *H* | *54.0* | *-15.7* | *Peak* | *321* | *1.0* | |
| *2483.330* | *39.8* | *H* | *120.0* | *-80.2* | *Peak* | *4* | *1.0* | In band |
| *2523.330* | *43.6* | *H* | *70.0* | *-26.4* | *Peak* | *0* | *1.0* | Non-restricted band |
| *2563.330* | *43.4* | *H* | *70.0* | *-26.6* | *Peak* | *212* | *1.0* | Non-restricted band |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2281.900 | 46.0 | H | 54.0 | -8.0 | AVG | 69 | 2.18 | Note 2 |
| 2282.130 | 55.6 | H | 74.0 | -18.4 | PK | 69 | 2.18 | Note 2 |

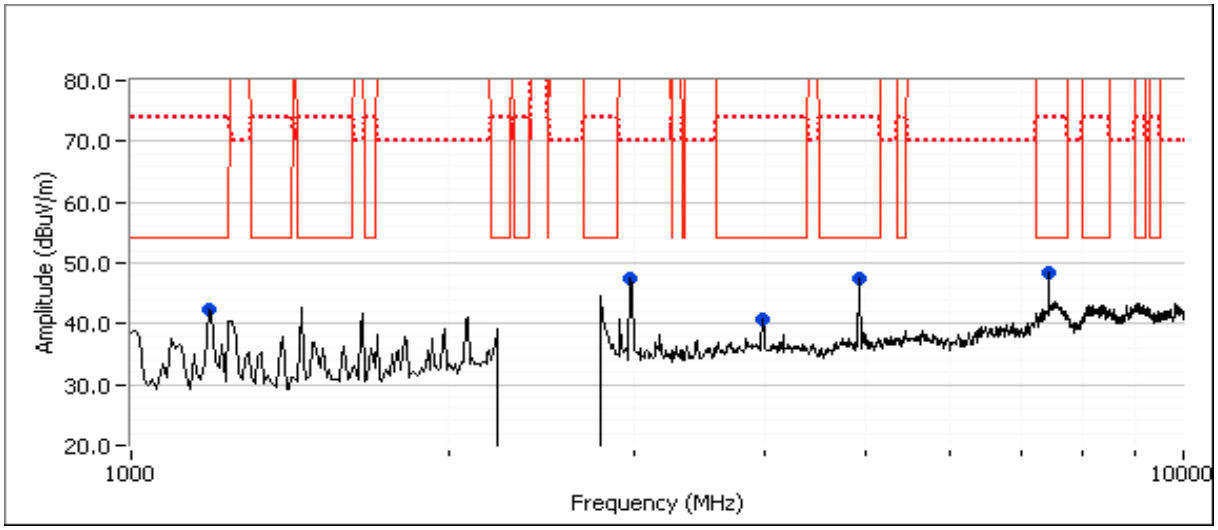
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 2, Rainbow Peak 2x2: 1-10GHz, 802.11b @ 2462 MHz Chain A, BT Basic Rate @ 2480 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.6 | 23.5 |
| Chain B | 7.0 | 5.3 | 8.0 |

**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *7439.170* | *48.3* | *V* | *54.0* | *-5.7* | *Peak* | *167* | *2.0* | |
| *4914.170* | *47.5* | *V* | *54.0* | *-6.5* | *Peak* | *209* | *2.5* | |
| *1183.330* | *42.3* | *V* | *54.0* | *-11.7* | *Peak* | *97* | *2.0* | |
| *3979.170* | *40.8* | *V* | *54.0* | *-13.2* | *Peak* | *146* | *1.0* | |
| *2980.000* | *47.4* | *V* | *70.0* | *-22.6* | *Peak* | *153* | *1.0* | |

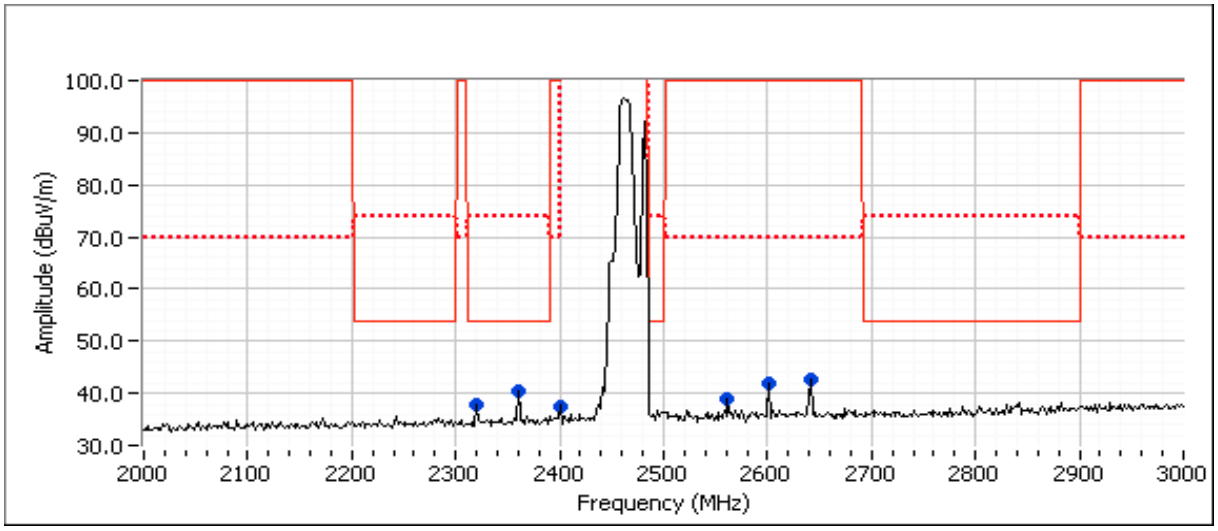
**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **4924.000** | **46.8** | V | 54.0 | **-7.2** | AVG | 212 | 2.48 | |
| 7439.940 | 46.5 | V | 54.0 | -7.5 | AVG | 166 | 2.00 | |
| 4923.890 | 50.0 | V | 74.0 | -24.0 | PK | 212 | 2.48 | |
| 7440.500 | 53.1 | V | 74.0 | -20.9 | PK | 166 | 2.00 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2320.000* | *37.9* | *H* | *54.0* | *-16.1* | *Peak* | *185* | *1.0* | |
| *2360.000* | *40.3* | *H* | *54.0* | *-13.7* | *Peak* | *338* | *1.0* | |
| *2400.000* | *37.4* | *H* | *70.0* | *-32.6* | *Peak* | *352* | *1.0* | Non-restricted band |
| *2561.670* | *39.1* | *H* | *70.0* | *-30.9* | *Peak* | *75* | *1.0* | Non-restricted band |
| *2601.670* | *42.1* | *H* | *70.0* | *-27.9* | *Peak* | *144* | *1.0* | Non-restricted band |
| *2641.670* | *42.5* | *H* | *70.0* | *-27.5* | *Peak* | *147* | *1.0* | Non-restricted band |

**Final measurements at 3m**

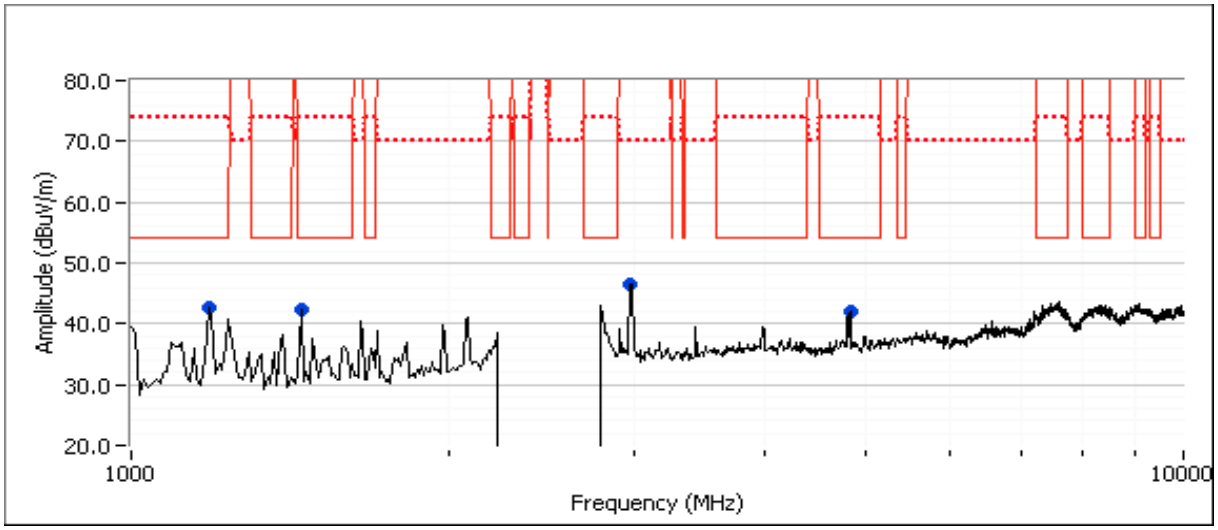
| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2320.070 | 46.3 | H | 54.0 | -7.7 | AVG | 345 | 1.25 | Note 2 |
| 2319.830 | 56.6 | H | 74.0 | -17.4 | PK | 345 | 1.25 | Note 2 |
| 2360.020 | 48.4 | H | 54.0 | -5.6 | AVG | 70 | 1.27 | Note 2 |
| 2360.000 | 57.2 | H | 74.0 | -16.8 | PK | 70 | 1.27 | Note 2 |

| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 3, Rainbow Peak 2x2: 1-10GHz, 802.11g @ 2412 MHz Chain A, BT Basic Rate @ 2402 MHz Chain B**
**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.3 | 31.0 |
| Chain B | 7.0 | 4.4 | 8.0 |




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *1183.330* | *42.8* | *V* | *54.0* | *-11.2* | *Peak* | *102* | *2.0* | |
| *1449.170* | *42.5* | *H* | *54.0* | *-11.5* | *Peak* | *138* | *1.5* | |
| *4822.500* | *42.1* | *V* | *54.0* | *-11.9* | *Peak* | *283* | *2.0* | |
| *2980.000* | *46.4* | *V* | *70.0* | *-23.6* | *Peak* | *153* | *1.0* | |

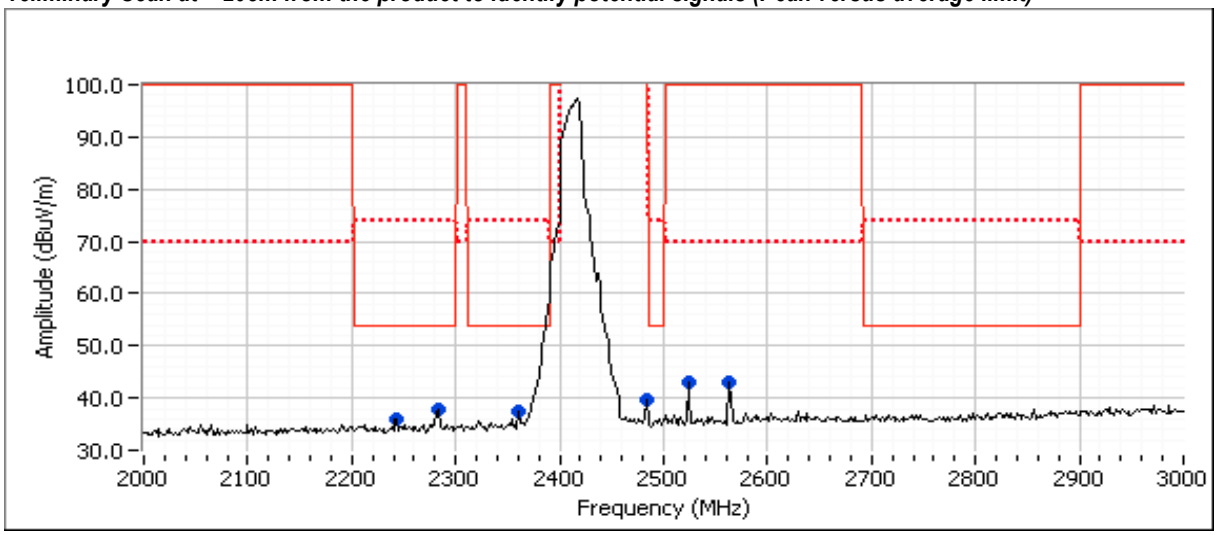
**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 1457.590 | 43.2 | H | 54.0 | -10.8 | AVG | 132 | 1.33 | |
| 1457.600 | 45.4 | H | 74.0 | -28.6 | PK | 132 | 1.33 | |
| 1192.560 | 42.5 | V | 54.0 | -11.5 | AVG | 89 | 1.99 | |
| 1192.600 | 44.8 | V | 74.0 | -29.2 | PK | 89 | 1.99 | |
| 4823.900 | 40.7 | V | 54.0 | -13.3 | AVG | 153 | 1.18 | |
| 4826.970 | 52.1 | V | 74.0 | -21.9 | PK | 153 | 1.18 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2243.330* | *36.1* | *V* | *54.0* | *-17.9* | *Peak* | *42* | *1.0* | |
| *2283.330* | *37.7* | *H* | *54.0* | *-16.3* | *Peak* | *306* | *1.0* | |
| *2360.000* | *37.3* | *H* | *54.0* | *-16.7* | *Peak* | *358* | *1.0* | |
| *2483.330* | *39.6* | *H* | *120.0* | *-80.4* | *Peak* | *10* | *1.0* | *In-band* |
| *2523.330* | *43.2* | *H* | *70.0* | *-26.8* | *Peak* | *31* | *1.0* | *Non-restricted band* |
| *2563.330* | *43.1* | *H* | *70.0* | *-26.9* | *Peak* | *20* | *1.0* | *Non-restricted band* |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2241.910 | 45.2 | V | 54.0 | -8.8 | AVG | 163 | 1.42 | Note 2 |
| 2241.860 | 55.3 | V | 74.0 | -18.7 | PK | 163 | 1.42 | Note 2 |
| 2281.910 | 46.0 | H | 54.0 | -8.0 | AVG | 70 | 2.27 | Note 2 |
| 2281.960 | 55.5 | H | 74.0 | -18.5 | PK | 70 | 2.27 | Note 2 |
| 2362.170 | 44.9 | H | 54.0 | -9.1 | AVG | 66 | 1.19 | Note 2 |
| 2361.080 | 55.1 | H | 74.0 | -18.9 | PK | 66 | 1.19 | Note 2 |

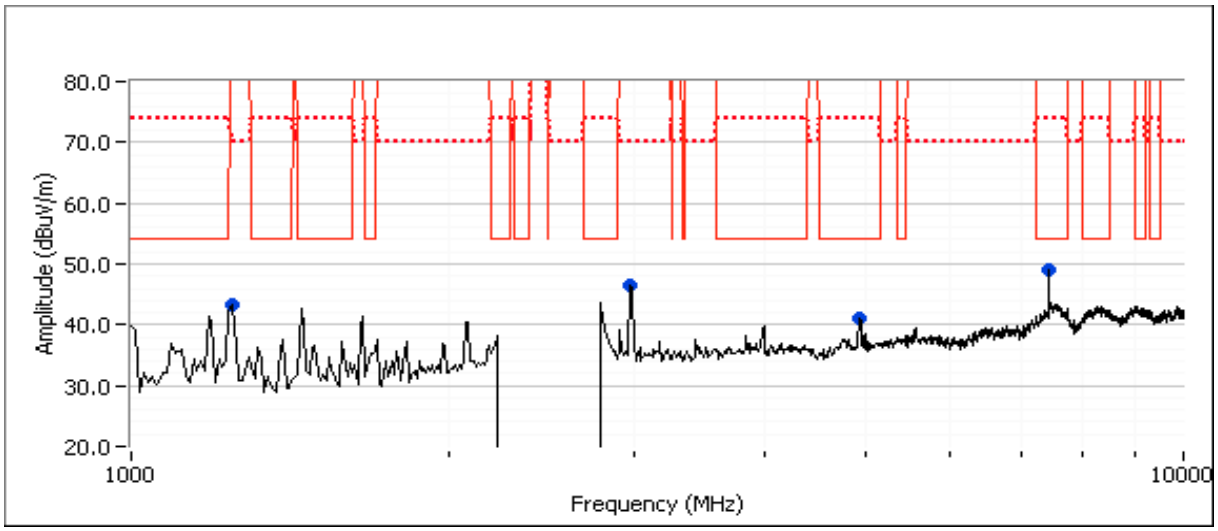
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 4, Rainbow Peak 2x2: 1-10GHz, 802.11g @ 2462 MHz Chain A, BT Basic Rate @ 2480 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.9 | 29.5 |
| Chain B | 7.0 | 5.3 | 8.0 |

**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *7439.170* | *49.2* | *V* | *54.0* | *-4.8* | *Peak* | *174* | *1.5* | |
| *4923.330* | *41.1* | *V* | *54.0* | *-12.9* | *Peak* | *181* | *2.5* | |
| *2980.000* | *46.6* | *V* | *70.0* | *-23.4* | *Peak* | *160* | *1.0* | |
| *1247.500* | *43.4* | *H* | *70.0* | *-26.6* | *Peak* | *152* | *1.5* | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 7440.020 | 45.8 | V | 54.0 | -8.2 | AVG | 178 | 1.52 | |
| 7439.570 | 52.7 | V | 74.0 | -21.3 | PK | 178 | 1.52 | |

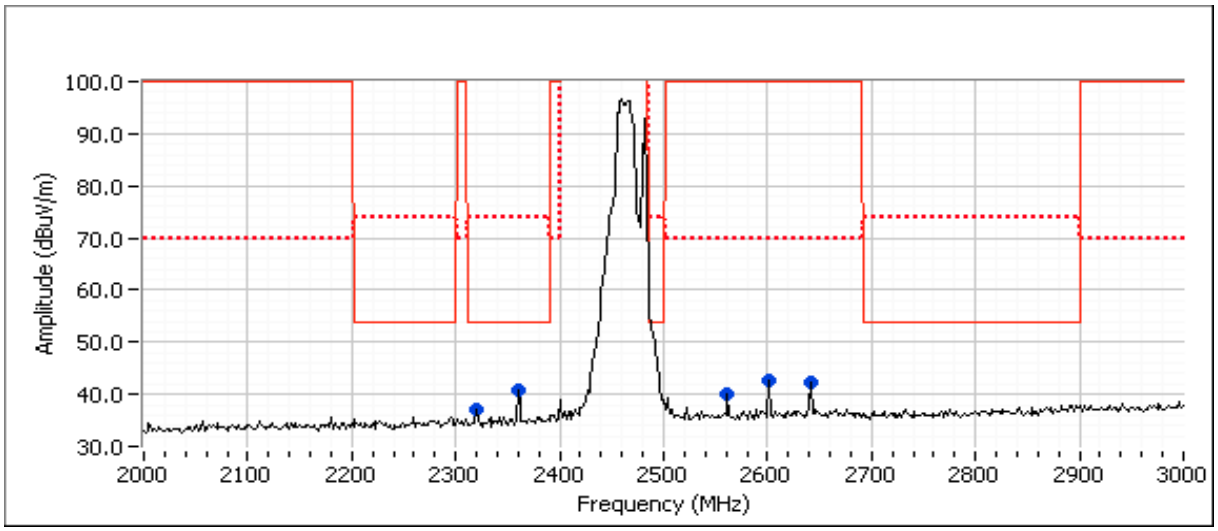
*Note: 7440MHz is directly related to the Bluetooth signal and was observed during the Bluetooth only* spurious measurements.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2320.000* | *37.2* | *H* | *54.0* | *-16.8* | *Peak* | *317* | *1.0* | |
| *2360.000* | *40.7* | *H* | *54.0* | *-13.3* | *Peak* | *347* | *1.0* | |
| *2561.670* | *39.9* | *H* | *70.0* | *-30.1* | *Peak* | *205* | *1.0* | *Non-restricted band* |
| *2601.670* | *42.6* | *H* | *70.0* | *-27.4* | *Peak* | *144* | *1.0* | *Non-restricted band* |
| *2641.670* | *42.4* | *H* | *70.0* | *-27.6* | *Peak* | *173* | *1.0* | *Non-restricted band* |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2324.470 | 44.5 | H | 54.0 | -9.5 | AVG | 236 | 1.0 | |
| **2360.040** | **46.6** | H | 54.0 | **-7.4** | AVG | 326 | 1.0 | |
| 2323.600 | 57.6 | H | 74.0 | -16.4 | PK | 236 | 1.0 | |
| 2359.450 | 56.2 | H | 74.0 | -17.8 | PK | 326 | 1.0 | |

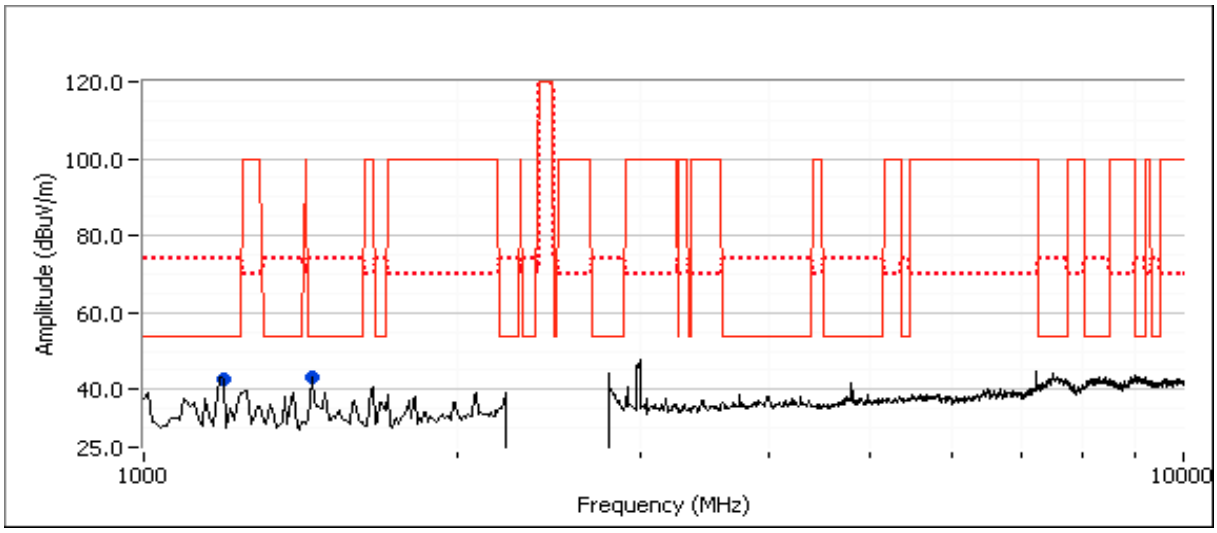
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |
| Note 3: | Signal is present when Bluetooth is disabled (powered off) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 5, Rainbow Peak 2x2: 1-10GHz, 802.11b @ 2437 MHz Chain A, BT Basic Rate @ 2402 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.6 | 23.5 |
| Chain B | 7.0 | 4.3 | 8.0 |

**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**
**Preamplifier and notch filter used for these scans**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 1457.620 | 43.2 | H | 54.0 | -10.8 | Peak | 130 | 1.5 | |
| 1199.820 | 42.6 | V | 54.0 | -11.4 | Peak | 96 | 2.0 | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 1200.140 | 40.1 | V | 54.0 | -13.9 | AVG | 100 | 2.0 | |
| **1457.570** | **43.0** | H | 54.0 | **-11.0** | AVG | 127 | 1.4 | |
| 1199.950 | 44.7 | V | 74.0 | -29.3 | PK | 100 | 2.0 | |
| 1457.490 | 45.1 | H | 74.0 | -28.9 | PK | 127 | 1.4 | |

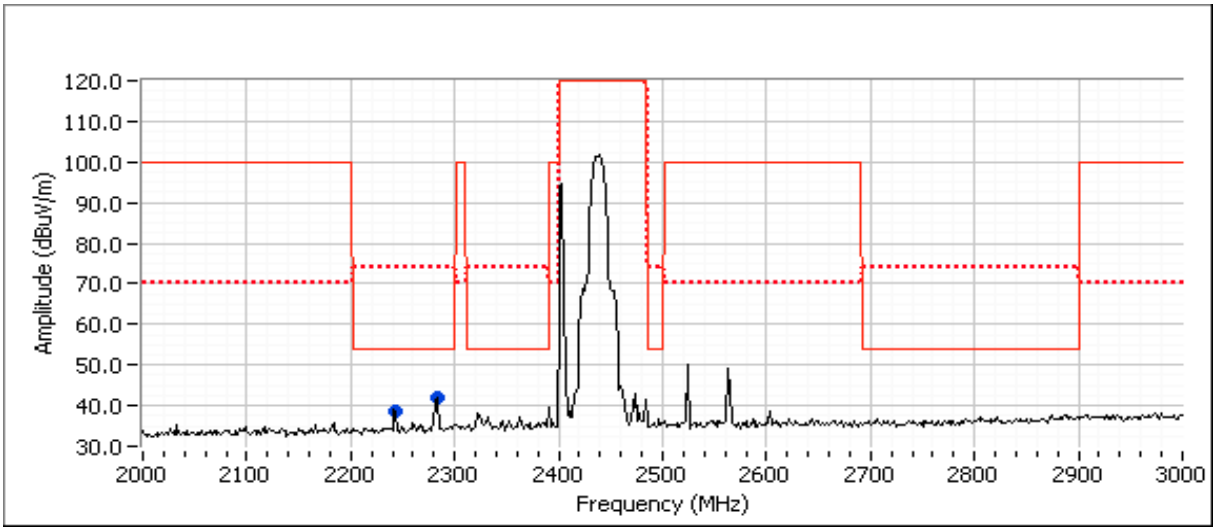
*Note: 4804MHz is directly related to the Bluetooth signal and was observed during the Bluetooth only* spurious measurements.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2283.330* | *41.8* | *V* | *54.0* | *-12.2* | *Peak* | *180* | *1.0* | *5* |
| *2243.330* | *38.7* | *V* | *54.0* | *-15.3* | *Peak* | *180* | *1.0* | *5* |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2281.990 | 46.8 | H | 54.0 | -7.2 | AVG | 70 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2282.150 | 56.7 | H | 74.0 | -17.3 | PK | 70 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2242.060 | 46.7 | H | 54.0 | -7.3 | AVG | 68 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2241.580 | 56.3 | H | 74.0 | -17.7 | PK | 68 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2282.000 | 45.9 | V | 54.0 | -8.1 | AVG | 105 | 1.2 | RB 1 MHz;VB 10 Hz;Pk |
| 2282.210 | 56.1 | V | 74.0 | -17.9 | PK | 105 | 1.2 | RB 1 MHz;VB 3 MHz;Pk |

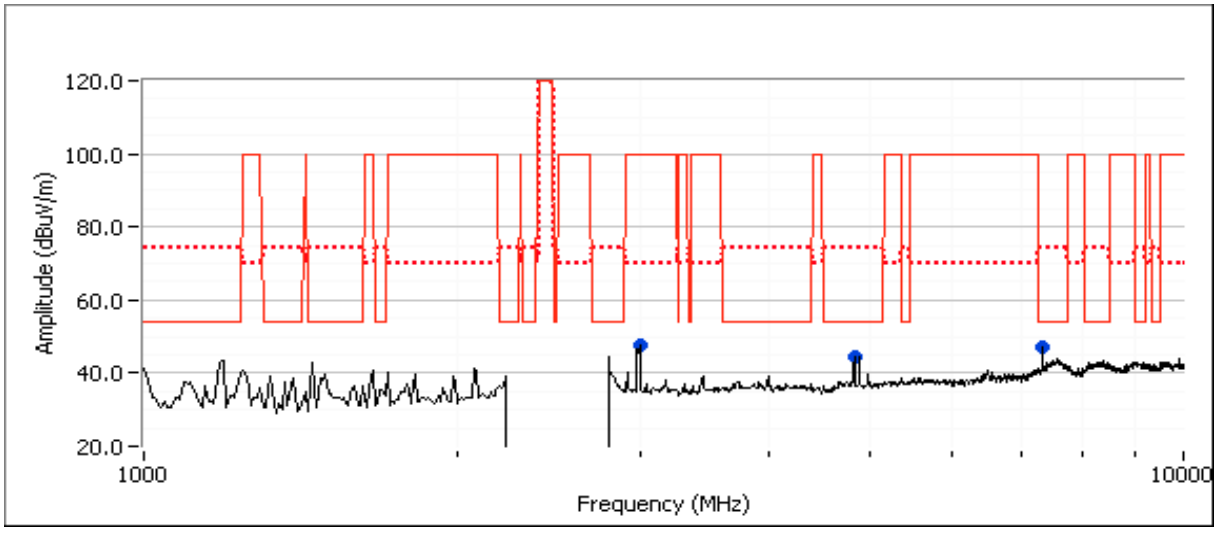
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |
| Note 3: | Signal is present when Bluetooth is disabled (powered off) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 6, Rainbow Peak 2x2: 1-10GHz, 802.11b @ 2412 MHz Chain A, BT Basic Rate @ 2440 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.5 | 23.5 |
| Chain B | 7.0 | 5.4 | 8.0 |

**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**
**Preamplifier and notch filter used for these scans**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2998.330* | *47.9* | *V* | *70.0* | *-22.1* | *Peak* | *141* | *1.0* | |
| 4823.990 | 44.6 | V | 54.0 | -9.4 | Peak | 149 | 1.0 | |
| 7316.670 | *47.1* | *V* | *54.0* | *-6.9* | *Peak* | *165* | *1.9* | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4823.980 | 44.9 | V | 54.0 | -9.1 | AVG | 149 | 1.3 | RB 1 MHz;VB 10 Hz;Pk |
| 4823.900 | 48.4 | V | 74.0 | -25.6 | PK | 149 | 1.3 | RB 1 MHz;VB 3 MHz;Pk |
| 7319.940 | 43.6 | V | 54.0 | -10.4 | AVG | 170 | 2.0 | RB 1 MHz;VB 10 Hz;Pk |
| 7319.350 | 51.4 | V | 74.0 | -22.6 | PK | 170 | 2.0 | RB 1 MHz;VB 3 MHz;Pk |

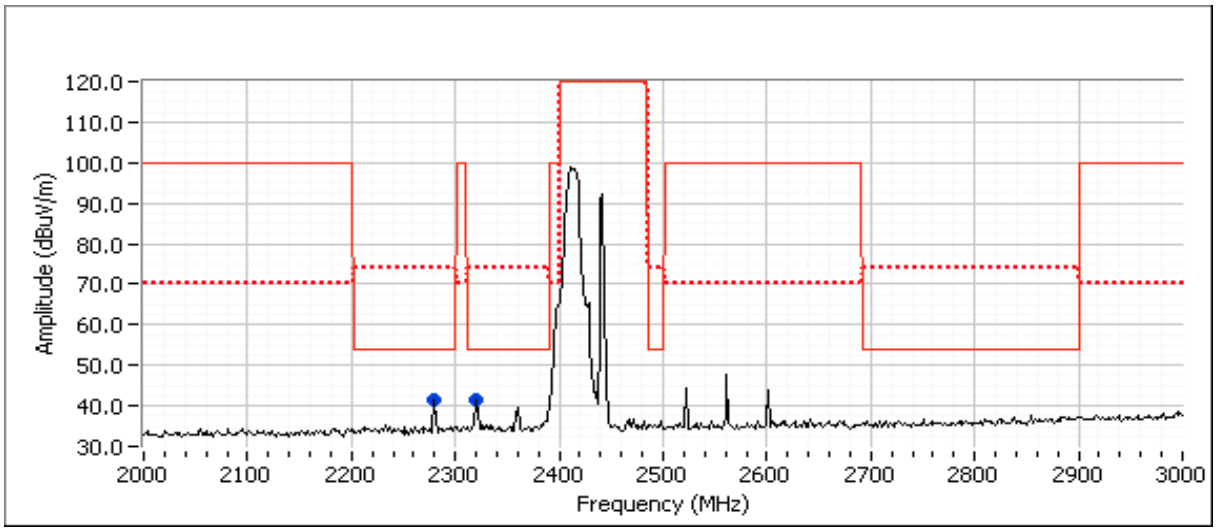
*Note: 7320 MHz is directly related to the Bluetooth signal and was observed during the Bluetooth only spurio* us measurements.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2320.000 | 40.1 | - | 54.0 | -13.9 | Peak | 180 | 1.0 | |
| 2280.000 | 39.0 | - | 54.0 | -15.0 | Peak | 180 | 1.0 | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2319.970 | 49.3 | H | 54.0 | -4.7 | AVG | 70 | 1.2 | RB 1 MHz;VB 10 Hz;Pk |
| 2319.990 | 57.3 | H | 74.0 | -16.7 | PK | 70 | 1.2 | RB 1 MHz;VB 3 MHz;Pk |
| 2279.960 | 46.8 | H | 54.0 | -7.2 | AVG | 70 | 1.9 | RB 1 MHz;VB 10 Hz;Pk |
| 2279.780 | 55.9 | H | 74.0 | -18.1 | PK | 70 | 1.9 | RB 1 MHz;VB 3 MHz;Pk |
| 2319.980 | 46.7 | V | 54.0 | -7.3 | AVG | 104 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2319.800 | 56.2 | V | 74.0 | -17.8 | PK | 104 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

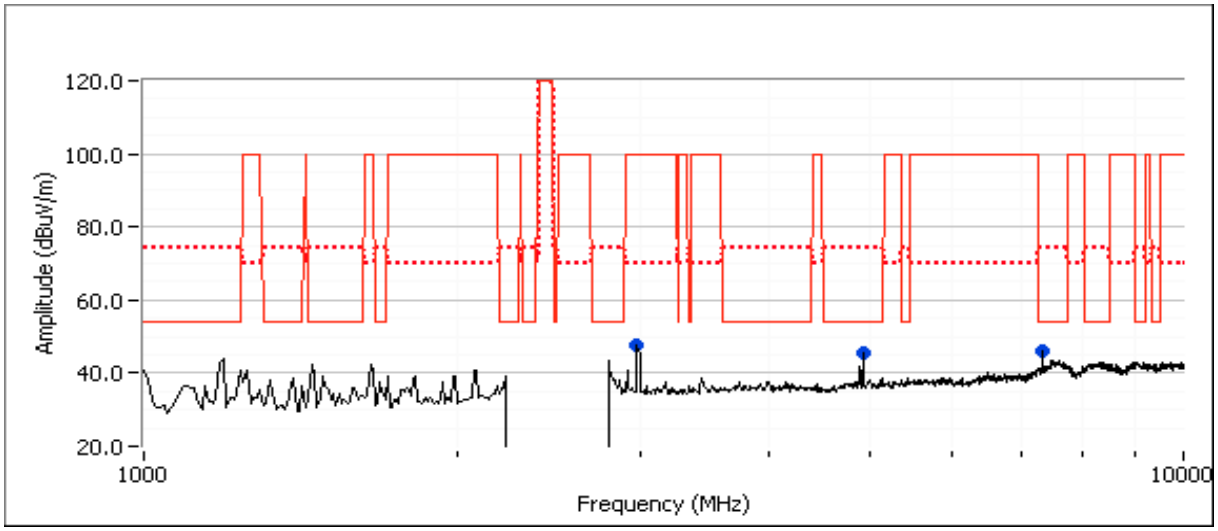
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |
| Note 3: | Signal is present when Bluetooth is disabled (powered off) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 7, Rainbow Peak 2x2: 1-10GHz, 802.11b @ 2462 MHz Chain A, BT Basic Rate @ 2440 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.6 | 23.5 |
| Chain B | 7.0 | 5.4 | 8.0 |

**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**
**Preamplifier and notch filter used for these scans**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2980.000* | *47.7* | *V* | *70.0* | *-22.3* | *Peak* | *141* | *1.0* | |
| 4923.860 | 45.3 | V | 54.0 | -8.7 | Peak | 166 | 1.6 | |
| *7322.500* | *46.3* | *V* | *54.0* | *-7.7* | *Peak* | *182* | *1.6* | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4923.980 | 47.6 | V | 54.0 | -6.4 | AVG | 166 | 1.7 | RB 1 MHz;VB 10 Hz;Pk |
| 4923.940 | 50.3 | V | 74.0 | -23.7 | PK | 166 | 1.7 | RB 1 MHz;VB 3 MHz;Pk |
| 7320.050 | 41.2 | V | 54.0 | -12.8 | AVG | 201 | 2.0 | RB 1 MHz;VB 10 Hz;Pk |
| 7320.180 | 49.5 | V | 74.0 | -24.5 | PK | 201 | 2.0 | RB 1 MHz;VB 3 MHz;Pk |

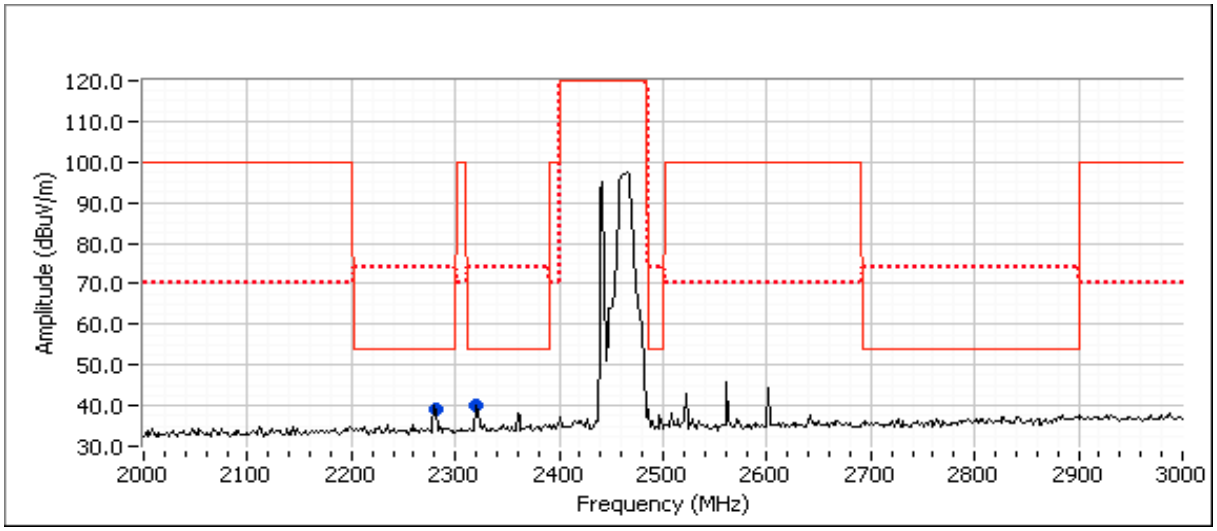
*Note: 7320 MHz is directly related to the Bluetooth signal and was observed during the Bluetooth only spurio* us measurements.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2320.000 | 40.1 | H | 54.0 | -13.9 | Peak | 180 | 1.0 | |
| 2288.500 | 39.0 | H | 54.0 | -15.0 | Peak | 180 | 1.0 | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2319.980 | 47.8 | H | 54.0 | -6.2 | AVG | 72 | 1.2 | |
| 2279.930 | 46.7 | H | 54.0 | -7.3 | AVG | 69 | 1.0 | |
| 2320.040 | 45.8 | V | 54.0 | -8.2 | AVG | 100 | 1.0 | |
| 2279.930 | 45.2 | V | 54.0 | -8.8 | AVG | 101 | 1.0 | |
| 2320.230 | 57.3 | H | 74.0 | -16.7 | PK | 72 | 1.2 | |
| 2284.230 | 56.0 | H | 74.0 | -18.0 | PK | 69 | 1.0 | |
| 2324.580 | 55.8 | V | 74.0 | -18.2 | PK | 100 | 1.0 | |
| 2280.470 | 55.3 | V | 74.0 | -18.7 | PK | 101 | 1.0 | |

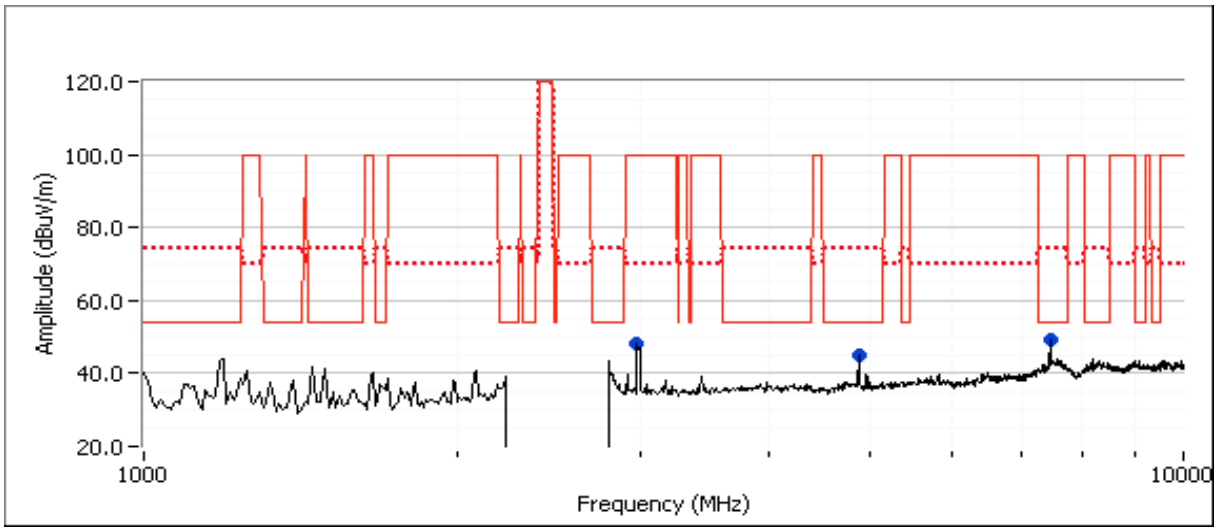
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |
| Note 3: | Signal is present when Bluetooth is disabled (powered off) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 8, Rainbow Peak 2x2: 1-10GHz, 802.11b @ 2437 MHz Chain A, BT Basic Rate @ 2480 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.6 | 23.5 |
| Chain B | 7.0 | 5.1 | 8.0 |

**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**
**Preamplifier and notch filter used for these scans**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2980.000* | *48.4* | *V* | *70.0* | *-21.6* | *Peak* | *148* | *1.0* | |
| 4873.880 | 45.0 | V | 54.0 | -9.0 | Peak | 148 | 1.3 | |
| *7439.170* | *49.5* | *V* | *54.0* | *-4.5* | *Peak* | *166* | *2.2* | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4874.020 | 45.2 | V | 54.0 | -8.8 | AVG | 146 | 1.2 | RB 1 MHz;VB 10 Hz;Pk |
| 4874.030 | 49.0 | V | 74.0 | -25.0 | PK | 146 | 1.2 | RB 1 MHz;VB 3 MHz;Pk |
| 7440.000 | 44.9 | V | 54.0 | -9.1 | AVG | 167 | 1.5 | RB 1 MHz;VB 10 Hz;Pk |
| 7440.270 | 52.2 | V | 74.0 | -21.8 | PK | 167 | 1.5 | RB 1 MHz;VB 3 MHz;Pk |

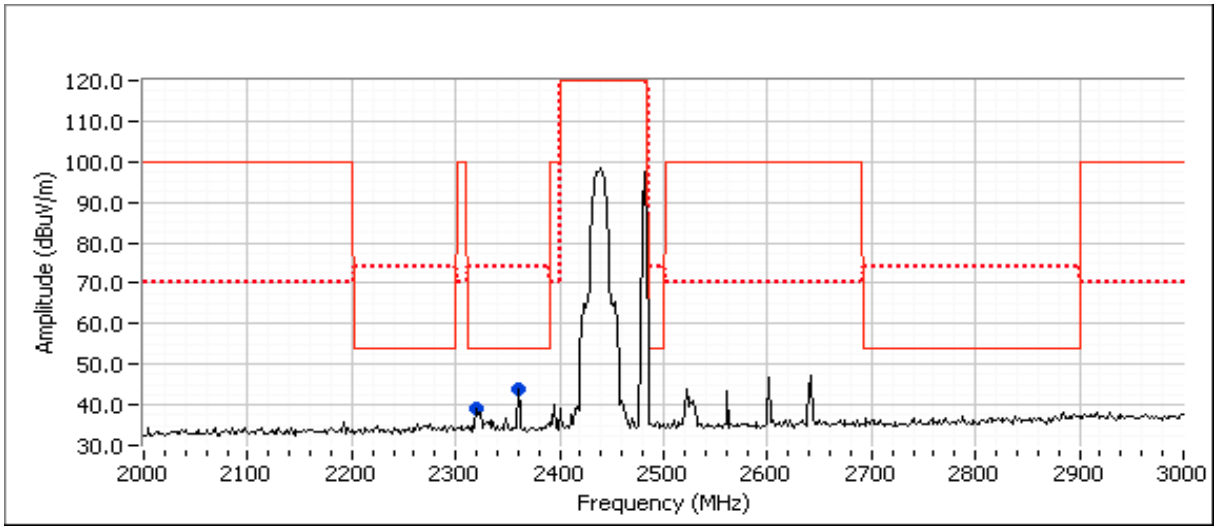
*Note: 7320 MHz is directly related to the Bluetooth signal and was observed during the Bluetooth only spurio* us measurements.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2360.000 | 43.8 | - | 54.0 | -10.2 | Peak | 180 | 1.0 | |
| 2320.000 | 39.2 | - | 54.0 | -14.8 | Peak | 180 | 1.0 | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2360.020 | 48.9 | H | 54.0 | -5.1 | AVG | 328 | 1.0 | |
| 2319.980 | 47.9 | H | 54.0 | -6.1 | AVG | 69 | 1.3 | |
| 2359.980 | 46.7 | V | 54.0 | -7.3 | AVG | 107 | 1.0 | |
| 2320.040 | 45.7 | V | 54.0 | -8.3 | AVG | 104 | 1.0 | |
| 2320.230 | 57.3 | H | 74.0 | -16.7 | PK | 69 | 1.3 | |
| 2360.430 | 56.7 | V | 74.0 | -17.3 | PK | 107 | 1.0 | |
| 2360.100 | 56.6 | H | 74.0 | -17.4 | PK | 328 | 1.0 | |
| 2324.580 | 55.6 | V | 74.0 | -18.4 | PK | 104 | 1.0 | |

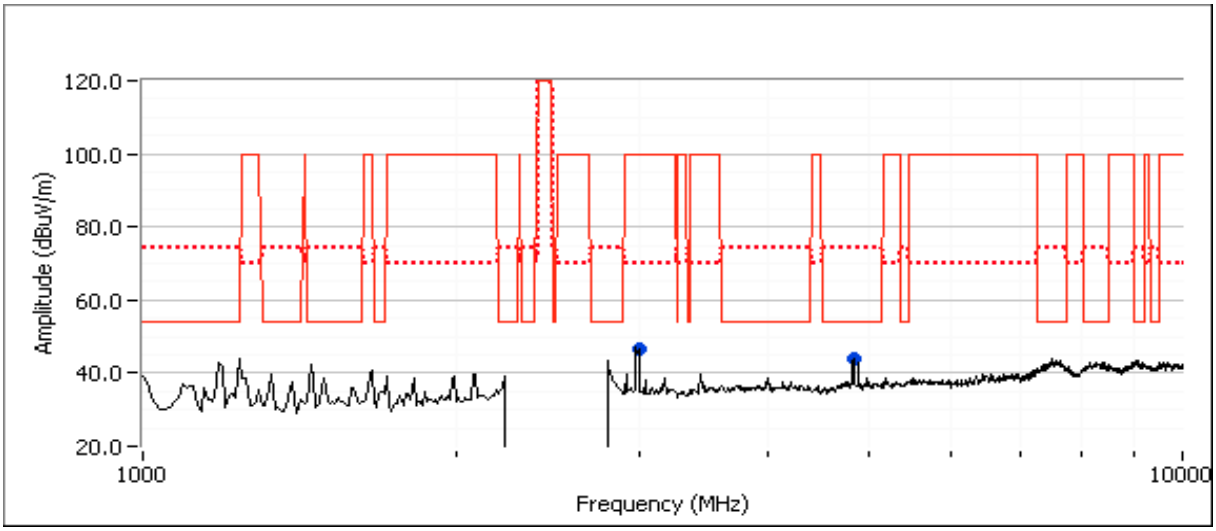
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |
| Note 3: | Signal is present when Bluetooth is disabled (powered off) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 9, Rainbow Peak 2x2: 1-10GHz, 802.11b @ 2412 MHz Chain A, BT EDR @ 2440 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| Chain A | 16.5 | 16.5 | 23.5 |
| Chain B | 7.0 | 1.4 | 8.0 |

**Spurious Radiated Emissions, 1 - 10GHz excluding the allocated band:**
**Preamplifier and notch filter used for these scans**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2998.330* | *46.7* | *V* | *70.0* | *-23.3* | *Peak* | *130* | *1.0* | |
| 4823.990 | 44.0 | V | 54.0 | -10.0 | Peak | 134 | 1.6 | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4824.030 | 43.1 | V | 54.0 | -10.9 | AVG | 131 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 4823.990 | 47.7 | V | 74.0 | -26.3 | PK | 131 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |

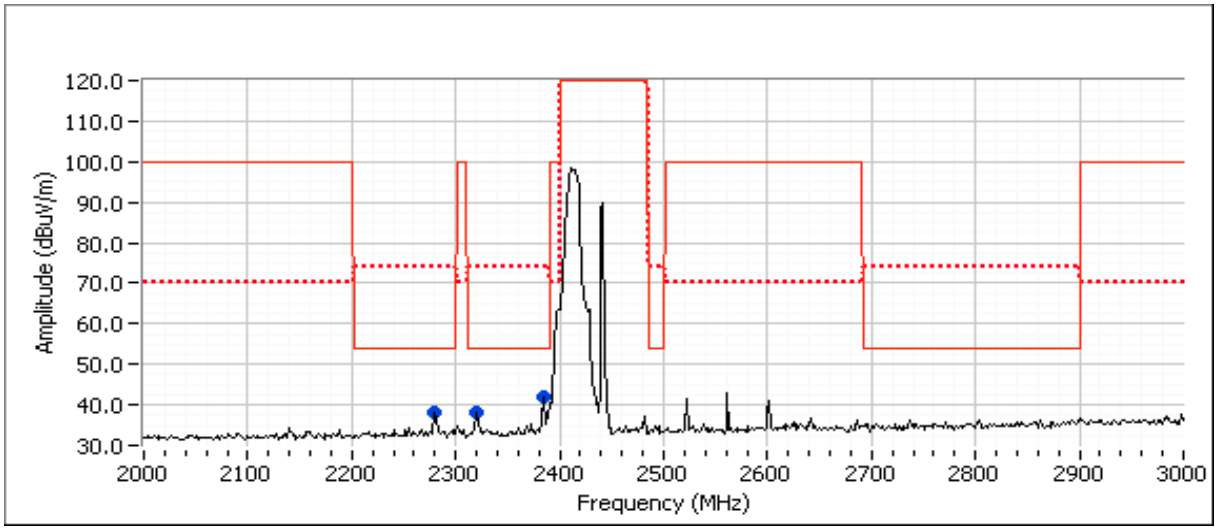
*Note: 4924 MHz is directly related to the WiFi (802.11b) signal and was observed during the 802.11b mode spurious m* easurements.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 2 - 3GHz**

***Preliminary Scan at ~ 20cm from the product to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**




**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *2385.000* | *42.2* | *V* | *54.0* | *-11.8* | *Peak* | *192* | *1.0* | |
| *2320.000* | *38.2* | *V* | *54.0* | *-15.8* | *Peak* | *192* | *1.0* | |
| *2280.000* | *38.2* | *V* | *54.0* | *-15.8* | *Peak* | *192* | *1.0* | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2383.860 | 46.4 | H | 54.0 | -7.6 | AVG | 350 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2384.460 | 59.4 | H | 74.0 | -14.6 | PK | 350 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2319.970 | 46.4 | H | 54.0 | -7.6 | AVG | 3 | 1.1 | RB 1 MHz;VB 10 Hz;Pk |
| 2320.330 | 56.0 | H | 74.0 | -18.0 | PK | 3 | 1.1 | RB 1 MHz;VB 3 MHz;Pk |
| 2279.900 | 44.6 | H | 54.0 | -9.4 | AVG | 68 | 1.0 | RB 1 MHz;VB 10 Hz;Pk |
| 2279.060 | 55.4 | H | 74.0 | -18.6 | PK | 68 | 1.0 | RB 1 MHz;VB 3 MHz;Pk |
| 2384.170 | 45.9 | V | 54.0 | -8.1 | AVG | 205 | 1.5 | RB 1 MHz;VB 10 Hz;Pk |
| 2386.600 | 59.7 | V | 74.0 | -14.3 | PK | 205 | 1.5 | RB 1 MHz;VB 3 MHz;Pk |

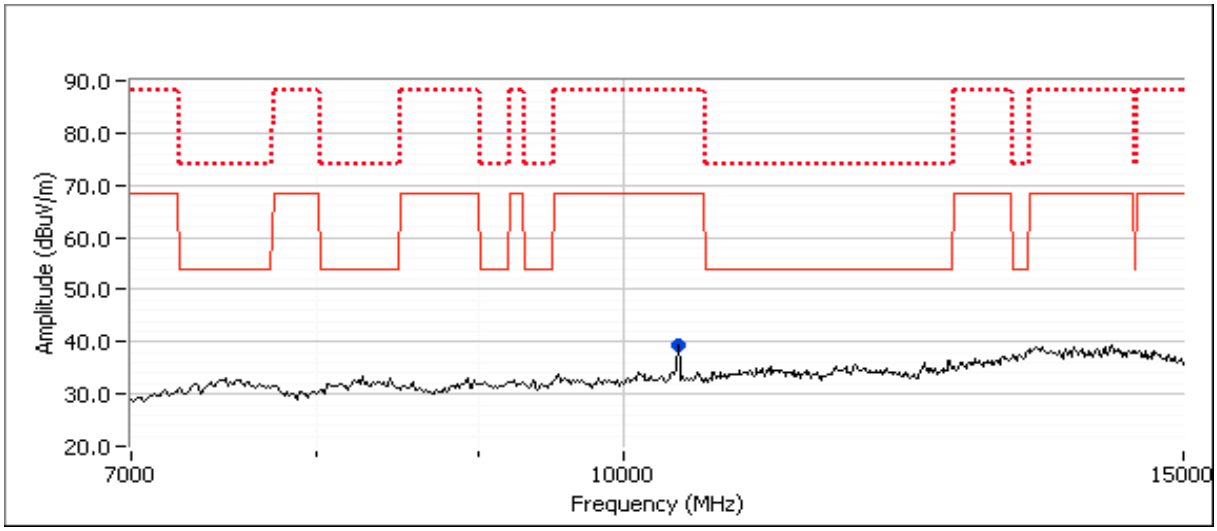
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |
| Note 3: | Signal is present when Bluetooth is disabled (powered off) |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 10, Rainbow Peak 2x2: 1-15GHz, 802.11n20 @ 5200 MHz Chain A and B, BT Basic Rate @ 2440 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| WiFi A | 16.5 | 16.6 | 31.5 |
| WiFi B | 16.5 | 16.7 | 30.5 |
| Bluetooth | 7.0 | 5.4 | 8.0 |

**Spurious Radiated Emissions, 7 - 15GHz:**
**Preamplifier and high pass filter used for these scans**



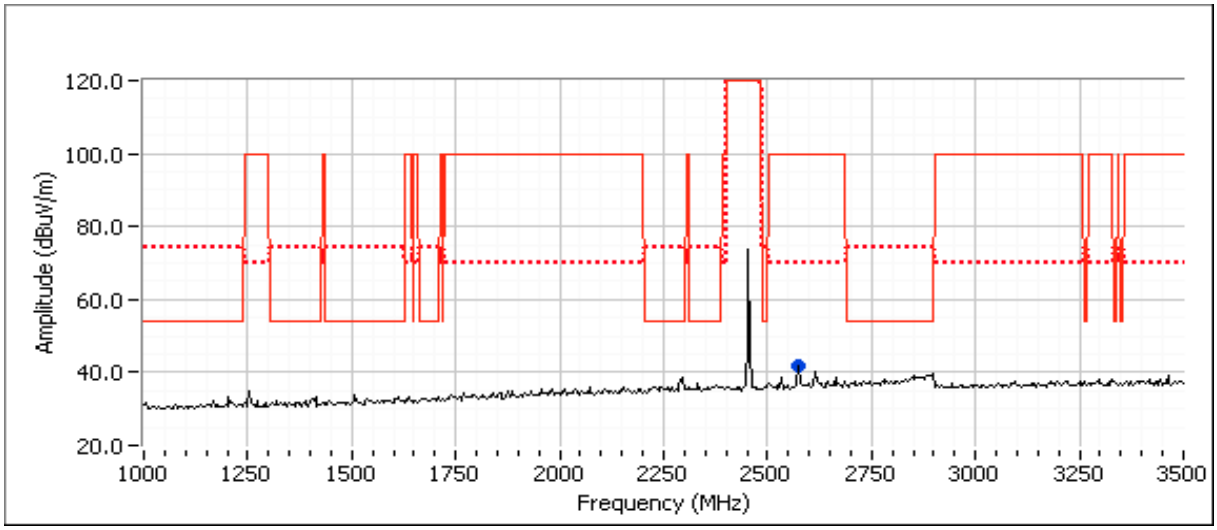

***Preliminary Measurements (Peak versus average limit)***

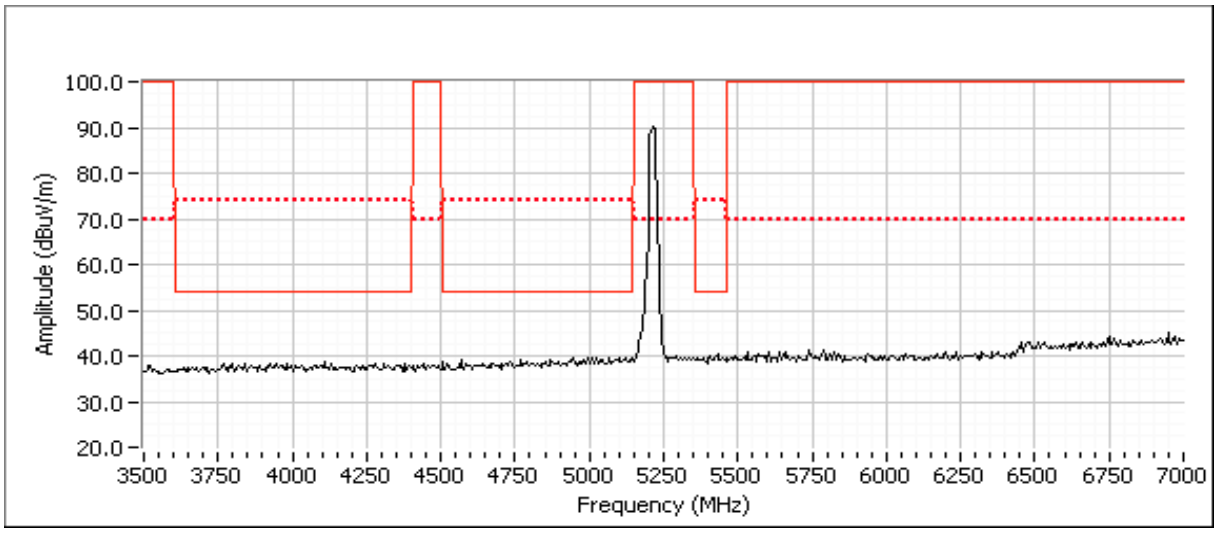
| Frequency | Level | Pol | 15.209/15.247/15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| *10400.000* | *39.4* | *V* | *68.3* | *-28.9* | *Peak* | *198* | *1.3* | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 1 - 7GHz (Scans from 1 - 3.5GHz and 3.5 - 7GHz)**

***Preliminary Scan at ~ 20cm from the product (card and antenna) to identify potential signals (Peak versus average limit)***



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 1 - 7GHz (Scans from 1 - 3.5GHz and 3.5 - 7GHz)**

**Preliminary measurements at ~ 20cm, RB=1MHz, VB=100kHz**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2560.000 | 40.1 | V | 100.0 | -59.9 | Peak | 360 | 1.0 | |

**Final measurements at 3m**

| Frequency | Level | Pol | 15.209/15.247 | | Detector | Azimuth | Height | Comments | |
|---|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | | |
| **2280.000** | **41.9** | H | 54.0 | **-12.1** | AVG | 0 | 1.2 | RB 1 MHz;VB 10 Hz;Pk | Note 2 |
| 2320.000 | 41.7 | V | 54.0 | -12.3 | AVG | 77 | 1.3 | RB 1 MHz;VB 10 Hz;Pk | Note 2 |
| 2360.000 | 39.6 | V | 54.0 | -14.4 | AVG | 77 | 1.2 | RB 1 MHz;VB 10 Hz;Pk | Note 2 |
| 2320.000 | 39.4 | H | 54.0 | -14.6 | AVG | 206 | 1.3 | RB 1 MHz;VB 10 Hz;Pk | Note 2 |
| 2360.000 | 38.1 | H | 54.0 | -15.9 | AVG | 39 | 1.2 | RB 1 MHz;VB 10 Hz;Pk | Note 2 |
| 2280.000 | 37.8 | V | 54.0 | -16.2 | AVG | 140 | 1.0 | RB 1 MHz;VB 10 Hz;Pk | Note 2 |
| 2320.000 | 55.0 | V | 74.0 | -19.0 | PK | 77 | 1.3 | RB 1 MHz;VB 3 MHz;Pk | Note 2 |
| 2560.000 | 50.6 | H | 70.0 | -19.4 | PK | 168 | 1.4 | RB 1 MHz;VB 3 MHz;Pk | Note 2 |
| 2560.000 | 46.9 | V | 70.0 | -23.1 | PK | 216 | 1.9 | RB 1 MHz;VB 3 MHz;Pk | Note 2 |
| 2280.000 | 46.8 | H | 74.0 | -27.2 | PK | 0 | 1.2 | RB 1 MHz;VB 3 MHz;Pk | Note 2 |
| 2320.000 | 46.2 | H | 74.0 | -27.8 | PK | 206 | 1.3 | RB 1 MHz;VB 3 MHz;Pk | Note 2 |
| 2360.000 | 45.4 | V | 74.0 | -28.6 | PK | 77 | 1.2 | RB 1 MHz;VB 3 MHz;Pk | Note 2 |
| 2360.000 | 44.3 | H | 74.0 | -29.7 | PK | 39 | 1.2 | RB 1 MHz;VB 3 MHz;Pk | Note 2 |
| 2280.000 | 44.0 | V | 74.0 | -30.0 | PK | 140 | 1.0 | RB 1 MHz;VB 3 MHz;Pk | Note 2 |
| 2560.000 | 46.3 | H | 100.0 | -53.7 | AVG | 168 | 1.4 | RB 1 MHz;VB 10 Hz;Pk | Note 2 |
| 2560.000 | 40.5 | V | 100.0 | -59.5 | AVG | 216 | 1.9 | RB 1 MHz;VB 10 Hz;Pk | Note 2 |

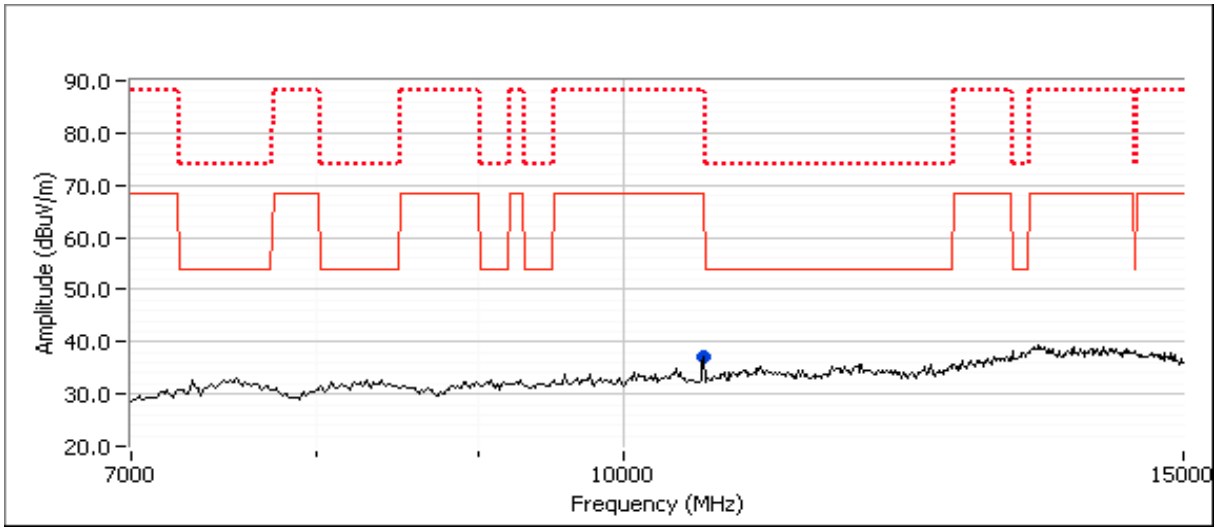
| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz. |
| Note 2: | Signal is only present when Bluetooth is enabled, average correction for hopping occupancy could be applied |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 11, Rainbow Peak 2x2: 1-15GHz, 802.11n20 @ 5300 MHz Chain A and B, BT Basic Rate @ 2440 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| WiFi A | 16.5 | 16.7 | 32.0 |
| WiFi B | 16.5 | 16.5 | 31.0 |
| Bluetooth | 7.0 | 5.4 | 8.0 |

**Spurious Radiated Emissions, 7 - 15GHz:**
**Preamplifier and high pass filter used for these scans**




***Preliminary Measurements (Peak versus average limit)***

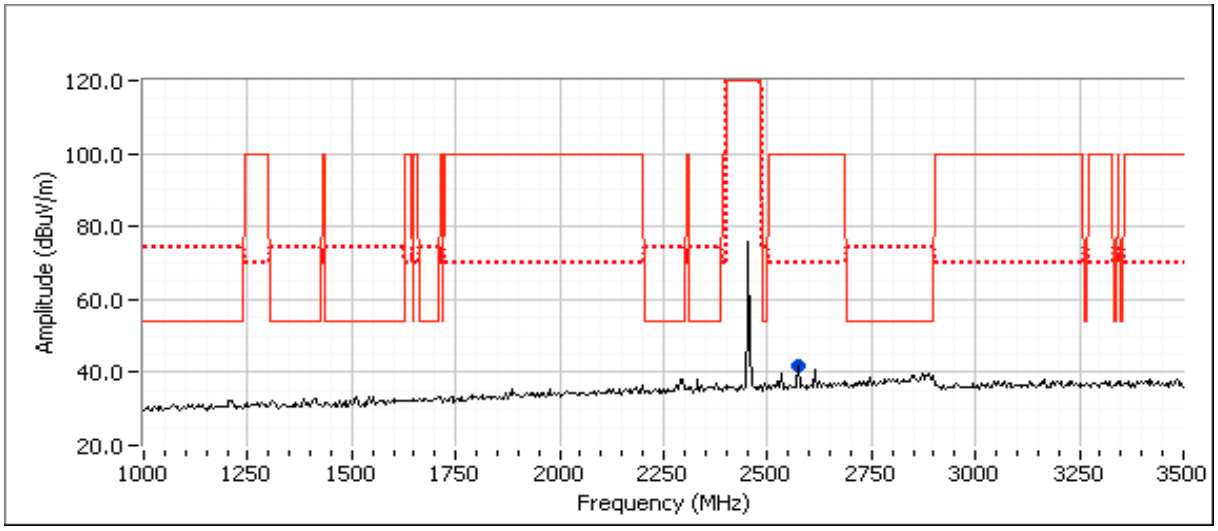
| Frequency | Level | Pol | 15.209/15.247/15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| ***10600.000*** | ***37.2*** | *V* | *54.0* | ***-16.8*** | *Peak* | *182* | *1.0* | |

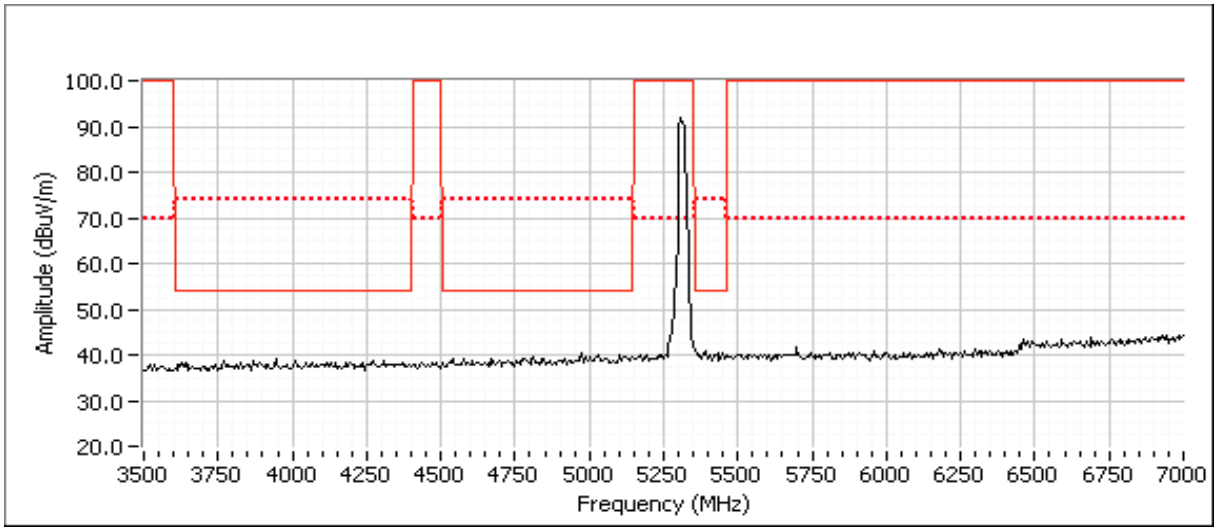
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 1 - 7GHz (Scans from 1 - 3.5GHz and 3.5 - 7GHz)**

***Preliminary Scan at ~ 20cm from the product (card and antenna) to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**



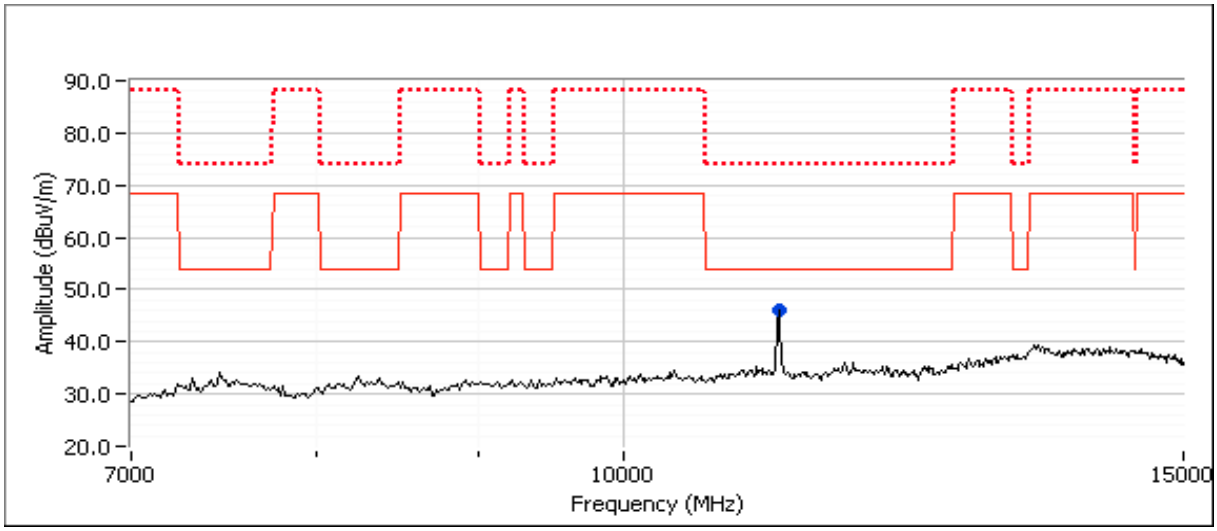

| | |
|---|---|
| Note 1: | The emissions observed above the noise floor are the same as those observed with the Wi-Fi radio at 5200 MHz (Run 10) and are unaffected when the Wi-Fi radio is disabled (powered off). Additional measurements were therefore not necessary. |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 12, Rainbow Peak 2x2: 1-15GHz, 802.11n20 @ 5600 MHz Chain A and B, BT Basic Rate @ 2440 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| WiFi A | 16.5 | 16.5 | 34.0 |
| WiFi B | 16.5 | 16.5 | 34.0 |
| Bluetooth | 7.0 | 5.4 | 8.0 |

**Spurious Radiated Emissions, 7 - 15GHz:**
**Preamplifier and high pass filter used for these scans**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247/15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 11200.340 | 46.0 | V | 54.0 | -8.0 | Peak | 188 | 1.0 | |

**Final measurements at 3m**

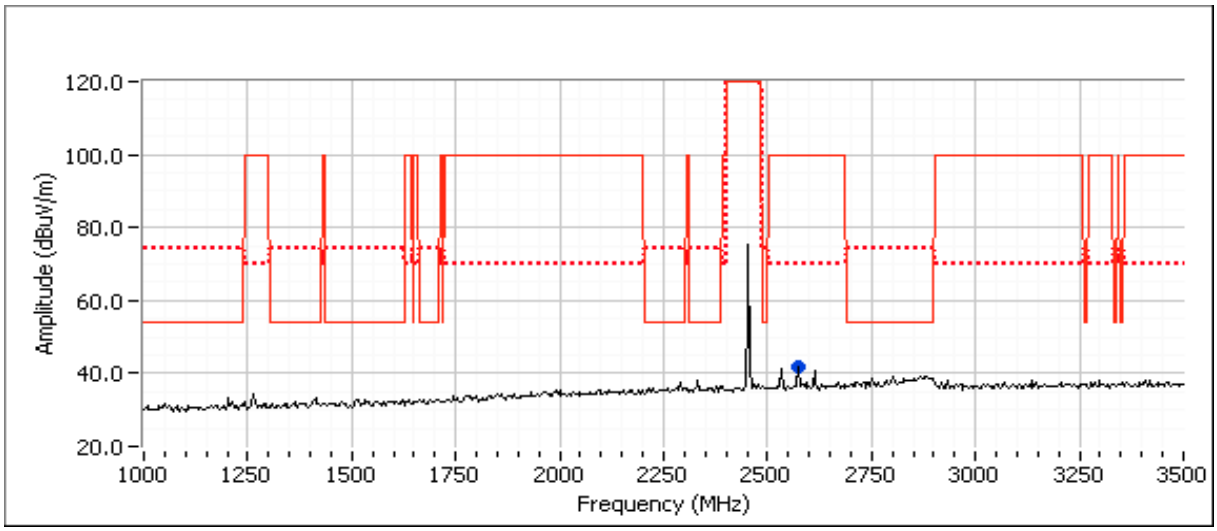
| Frequency | Level | Pol | 15.209/15.247/15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **11199.810** | **45.1** | V | 54.0 | **-8.9** | AVG | 157 | 1.9 | RB 1 MHz;VB 10 Hz;Pk |
| 11200.110 | 61.2 | V | 74.0 | -12.8 | PK | 157 | 1.9 | RB 1 MHz;VB 3 MHz;Pk |

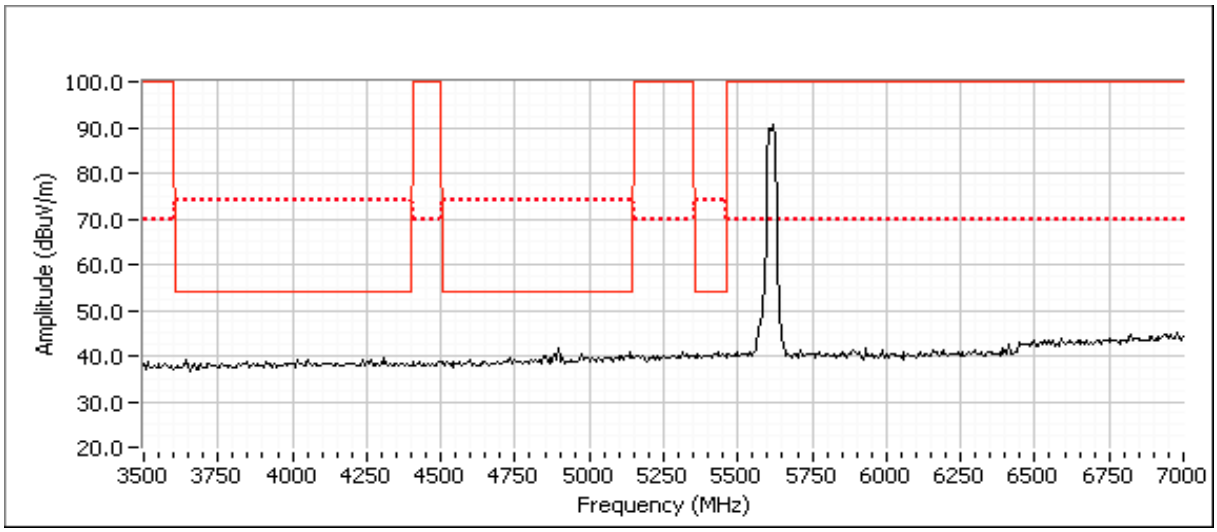
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 1 - 7GHz (Scans from 1 - 3.5GHz and 3.5 - 7GHz)**

***Preliminary Scan at ~ 20cm from the product (card and antenna) to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**



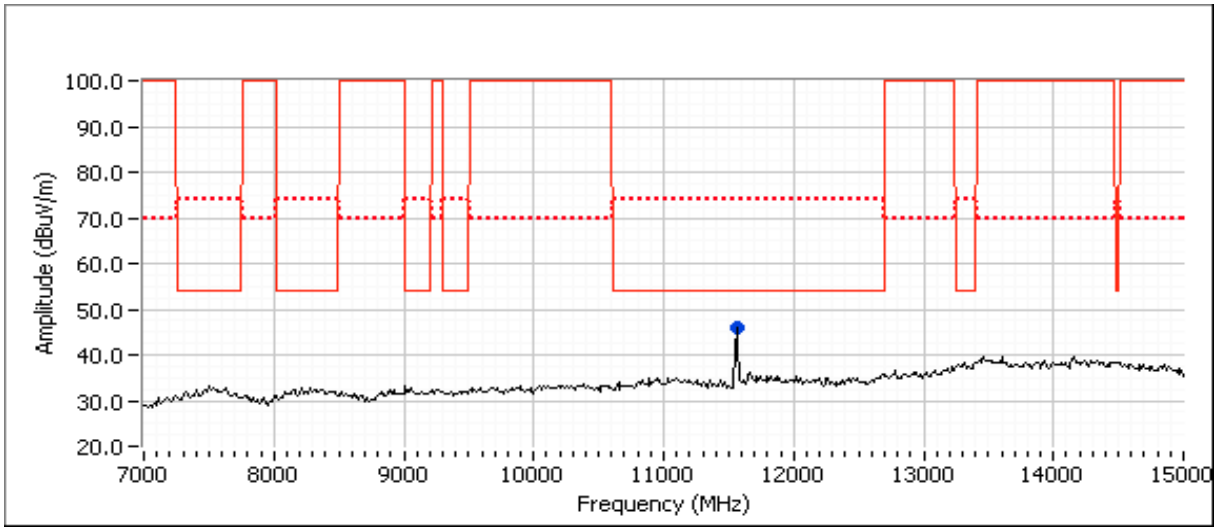

| | |
|---|---|
| Note 1: | The emissions observed above the noise floor are the same as those observed with the Wi-Fi radio at 5200 MHz (Run 10) and are unaffected when the Wi-Fi radio is disabled (powered off). Additional measurements were therefore not necessary. |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Run # 13, Rainbow Peak 2x2: 1-15GHz, 802.11n20 @ 5785 MHz Chain A and B, BT Basic Rate @ 2440 MHz Chain B**

| | Power Settings | | |
|---|---|---|---|
| | Target (dBm) | Measured (dBm) | Software Setting |
| WiFi A | 16.5 | 16.5 | 35.0 |
| WiFi B | 16.5 | 16.7 | 34.5 |
| Bluetooth | 7.0 | 5.4 | 8.0 |

**Spurious Radiated Emissions, 7 - 15GHz:**
**Preamplifier and high pass filter used for these scans**




***Preliminary Measurements (Peak versus average limit)***

| Frequency | Level | Pol | 15.209/15.247/15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 11570.410 | 45.9 | V | 54.0 | -8.1 | Peak | 187 | 1.0 | |

**Final measurements at 3m**

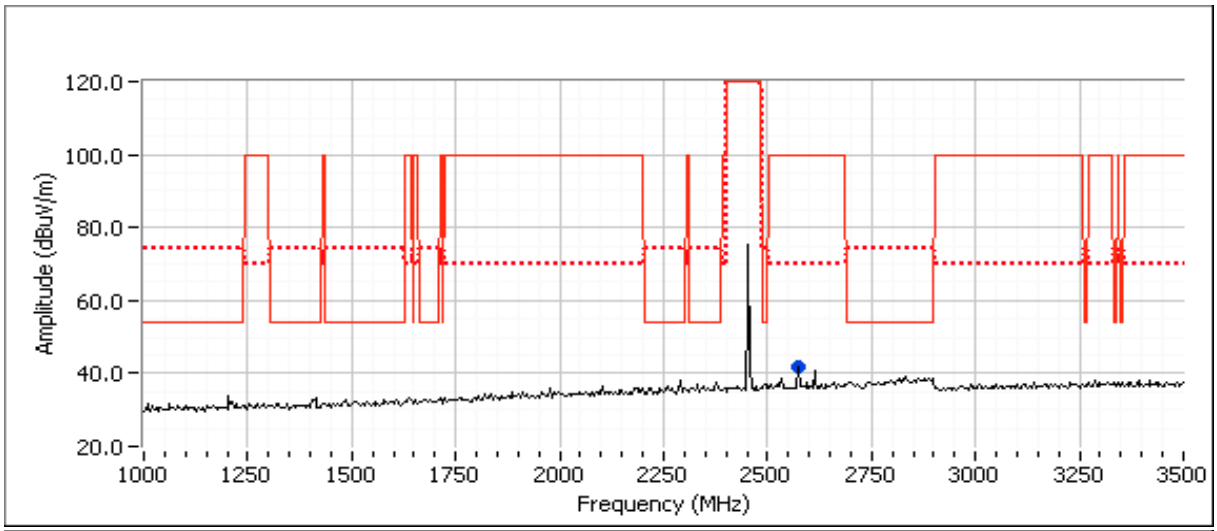
| Frequency | Level | Pol | 15.209/15.247/15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| **11570.680** | **44.7** | V | 54.0 | **-9.3** | AVG | 192 | 1.4 | RB 1 MHz;VB 10 Hz;Pk |
| 11570.280 | 57.8 | V | 74.0 | -16.2 | PK | 192 | 1.4 | RB 1 MHz;VB 3 MHz;Pk |

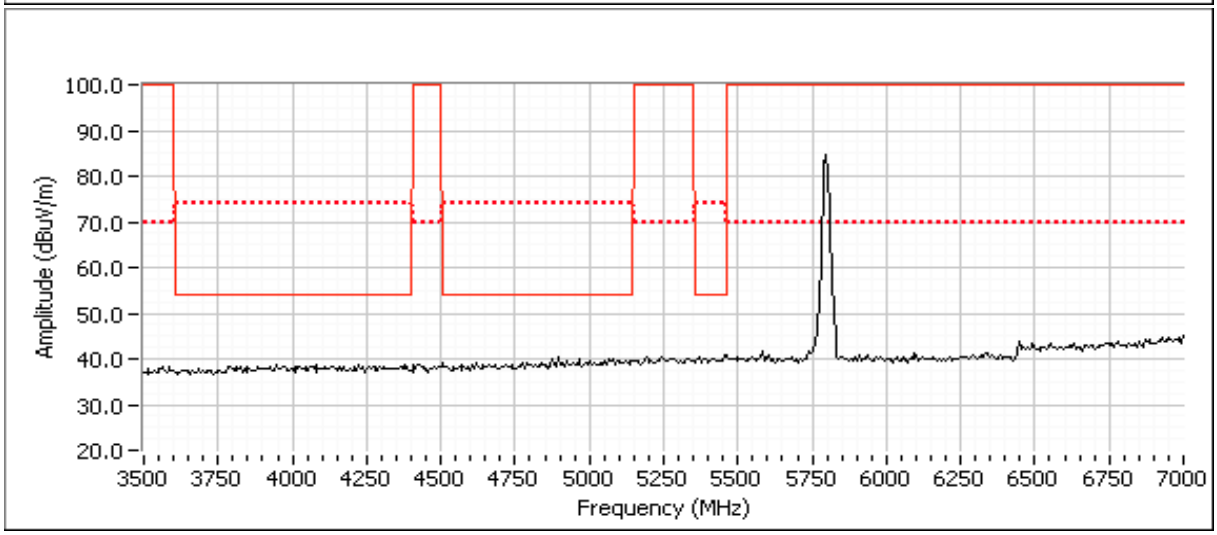
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J80398 |
| Model: | Intel® Centrino® Advanced-N 6230 | T-Log Number: | T80540 |
| | | Account Manager: | Christine Krebill |
| Contact: | Steve Hackett | | |
| Standard: | FCC 15.247 | Class: | N/A |

**Spurious Radiated Emissions, 1 - 7GHz (Scans from 1 - 3.5GHz and 3.5 - 7GHz)**

***Preliminary Scan at ~ 20cm from the product (card and antenna) to identify potential signals (Peak versus average limit)***

**No preamplifier used for these scans**




| | |
|---|---|
| Note 1: | The emissions observed above the noise floor are the same as those observed with the Wi-Fi radio at 5200 MHz (Run 10) and are unaffected when the Wi-Fi radio is disabled (powered off). Additional measurements were therefore not necessary. |