EMC Test Report
Application for Grant of Equipment Authorization
Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8
FCC Part 15 Subpart C

Intel Centrino Wireless-N 135, models 135BNHMW and 135BNHU

IC CERTIFICATION #:	1000M-135BNH and 1000M-135BNHU
FCC ID:	PD9135BNH and PD9135BNHU
APPLICANT:	Intel Corporation 100 Center Point Circle Suite 200 Columbia, SC 29210
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-3; 2845B-4, 2845B-5, 2845B-7
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PROGRAM MGR /
TECHNICAL REVIEWER:

David W. Bare
Chief Engineer

QUALITY ASSURANCE DELEGATE /
FINAL REPORT PREPARER:

David Guidotti
Senior Technical Writer

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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	10-7-2011	First release	
1	10-13-2011	Revised to correct typos in the test results summary	Dave Guidotti

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Intel Corporation model Intel Centrino Wireless-N 135, models 135BNHMW and 135BNHU, pursuant to the following rules:

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

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

ANSI C63.4:2003
FHSS test procedure DA 00-0705A1, March 2000

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.).

Testing was performed only on model Intel Centrino Wireless-N 135, models 135BNHMW and 135BNHU.

STATEMENT OF COMPLIANCE

The tested sample of Intel Corporation model Intel Centrino Wireless-N 135, models 135BNHMW and 135BNHU complied with the requirements of the following regulations:

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

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

The test results recorded herein are based on a single type test of Intel Corporation model Intel Centrino Wireless-N 135, models 135BNHMW and 135BNHU 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

FREQUENCY HOPPING SPREAD SPECTRUM (2400 – 2483.5 MHz, less than 75 channels)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247 (a) (1)	RSS 210 A8.1 (1)	20dB Bandwidth	Basic Rate: 965 kHz EDR: 1300 kHz	Channel spacing > 2/3rds 20dB BW	Complies
		Channel Separation	1 MHz		Complies
15.247 (a) (1) (ii)	RSS 210 A8.1 (4)	Number of Channels	Min 20 Max	15 or more	Complies
15.247 (a) (1) (ii)	RSS 210 A8.1 (4)	Channel Dwell Time (*average time of occupancy)*	0.4 seconds per 31.6 seconds for 79 channels	<0.4 second within a period of 0.4 x number of channels	Complies
15.247 (a) (1)	RSS 210 A8.1 (1)	Channel Utilization	The system uses the Bluetooth algorithm and, therefore, meets all requirements for channel utilization.	All channels shall, on average, be used equally	Complies
15.247 (b) (3)	RSS 210 A8.4 (2)	Output Power	Basic Rate: 7.2 dBm (0.005 W) EDR: 4.8 dBm (0.003 W) EIRP = 0.109 W Note 1	0.125 Watts (EIRP < 0.5W)	Complies
15.247(c)	RSS 210 A8.5	Spurious Emissions – 30MHz – 25GHz	All spurious emissions < -20dBc	< -20dBc	Complies
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 25GHz	47.0dBµV/m @ 2483.5MHz (-7.0dB)	15.207 in restricted bands, all others < -20dBc	Complies
15.247 (a) (1)	RSS 210 A8.1(2)	Receiver bandwidth	Refer to operational description	Shall match the channel bandwidth	Complies
Note 1: EIRP calculated using antenna gain of 3.2 dBi					

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 or integral antenna required	Complies
15.207	RSS GEN Table 4	AC Conducted Emissions	41.7dBµV @ 8.000MHz (-8.3dB)	Refer to page 17	Complies
15.109	RSS GEN 6.1 Table 2	Receiver spurious emissions	49.0dBµV/m @ 2320.0MHz (-5.0dB)	Refer to page 18	Complies
15.247 (b) (5) 15.407 (f)	RSS GEN 5.6 RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1	User Manual	Refer to page 11 of the user's manual	Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1	User Manual	Not applicable, antenna is integral to host systems.	Statement for products with detachable antenna	Complies
-	RSP 100 RSS GEN 4.6.1	99% Bandwidth	Basic: 889 kHz EDR: 1.19 MHz	Information only	N/A

MEASUREMENT UNCERTAINTIES

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

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

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Intel Centrino Wireless-N 135, models 135BNHMW and 135BNHU are PCIe Half Mini Card form factor IEEE 802.11b/g/n wireless network adapters that supports 1x1 (SISO) and a Bluetooth adapter that supports Basic Rate, Enhanced Data Rate and Low Energy modes of operation.
The device is sold under model numbers 135BNHMW and 135BNHU
Model numbers with FCC ID: PD9135BNHU and IC: 1000M-135BNHU are intended for end user installation and operate with a BiOS lock feature to ensure they can only be used in the appropriate host systems to prevent unauthorized operation. Other models are only intended for OEM factory installation.
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 7, 2011 and tested on September 12, 20, 21, 22 and 23, 2011. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Intel Corporation	135BNHMW	PCIe Half Mini Card form factor Bluetooth / IEEE 802.11b/g/n wireless network adapter	JBP: 00150096B4F5 DTS: 00150096B40F	PD9135BNH PD9135BNHU 1000M-135BNH
	135BNHU			1000M-135BNHU

ANTENNA SYSTEM

The EUT antenna is a a two-antenna PIFA antenna system – Shanghai Universe Communication Electron Co., Ltd for both chains. There is also an option to use a trace antenna etched onto the board for Chain B Bluetooth transmit operation.
The antenna connects to the EUT via a non-standard antenna connector, thereby meeting the requirements of FCC 15.203.

Band	Antenna Gain		Comment
	PIFA	Trace	
2400-2483.5	3.2 dBi	1dBi	

ENCLOSURE

The EUT has no enclosure. It is designed to be installed within the enclosure of a host computer.

MODIFICATIONS

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

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Dell	Latitude	Laptop	-	-
Intel	-	Extender board	-	-
Agilent	E3610A	Power Supply	-	-

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

Company	Model	Description	Serial Number	FCC ID
Netgear	GS108	Hub	GS16152CB035447	-

EUT INTERFACE PORTS

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

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
USB	Printer	USB	Shielded	2
Ethernet	Hub	CAT 5	Unshielded	10
USB / Test Fixture	Laptop	USB	Shielded	1
Ribbon / Test Fixture	Laptop	Multiwire	-	1
DC Power / Test Fixture	Power supply	2wire	-	1

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 – 802.11b, 802.11g, 802.11n (20 MHz channel bandwidth) and 802.11n (40MHz channel bandwidth).

The data rates used for all tests 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.

The PC was using the Intel test utility DRTU Version 1.5.3-0320 and the device driver was version 15.0.0.51.

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 3	769238	2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	211948	2845B-4	
Chamber 5	211948	2845B-5	
Chamber 7	A2LA accreditation	2845B-7	

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

CONDUCTED EMISSIONS CONSIDERATIONS

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

RADIATED EMISSIONS CONSIDERATIONS

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

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

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

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

INSTRUMENT CONTROL COMPUTER

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

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

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

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

FILTERS/ATTENUATORS

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

ANTENNAS

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

ANTENNA MAST AND EQUIPMENT TURNTABLE

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

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

INSTRUMENT CALIBRATION

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

TEST PROCEDURES

EUT AND CABLE PLACEMENT

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

CONDUCTED EMISSIONS

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

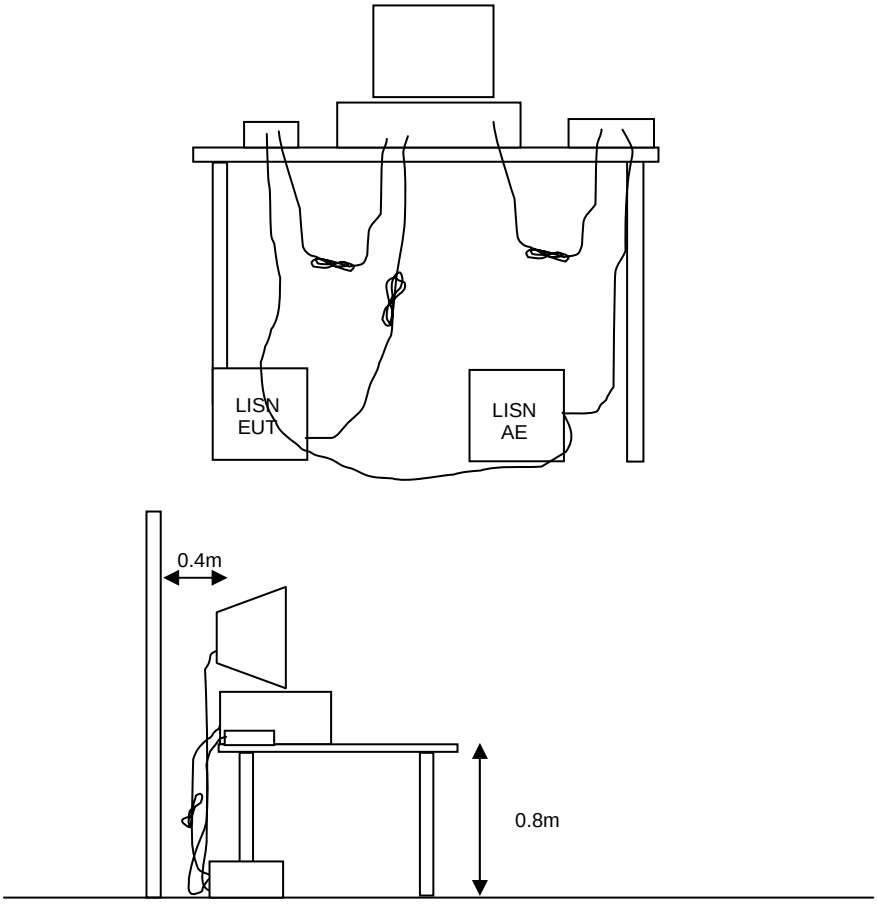


Figure 1 Typical Conducted Emissions Test Configuration

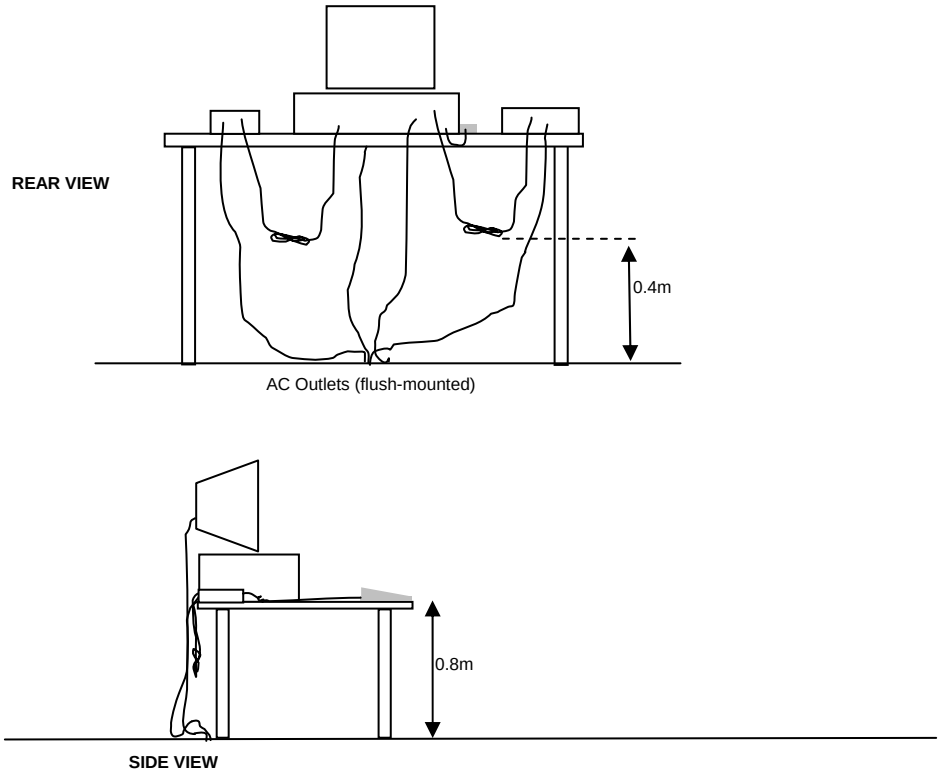
RADIATED EMISSIONS

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

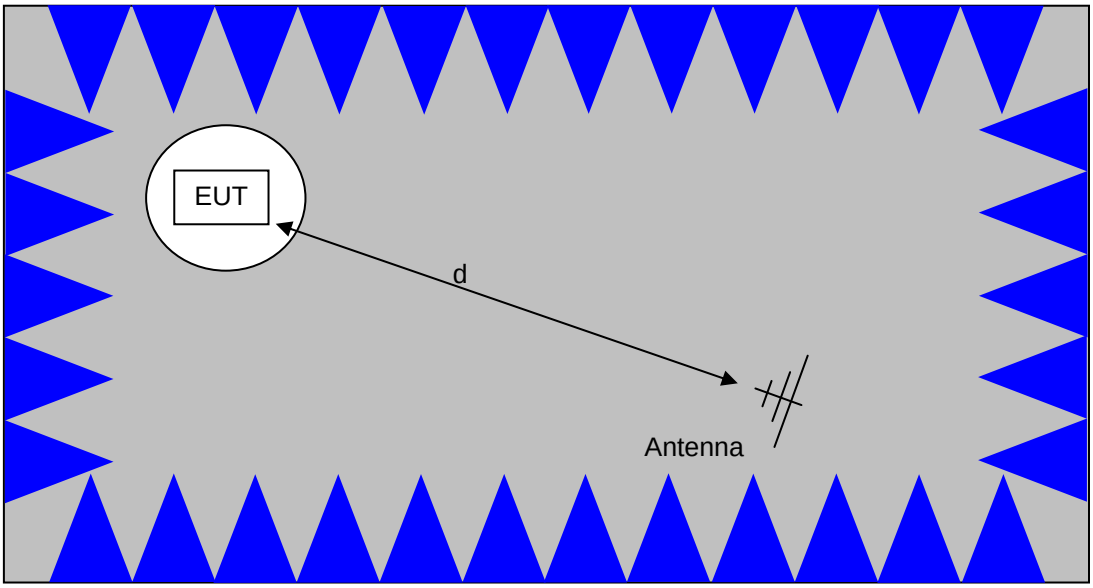
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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

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

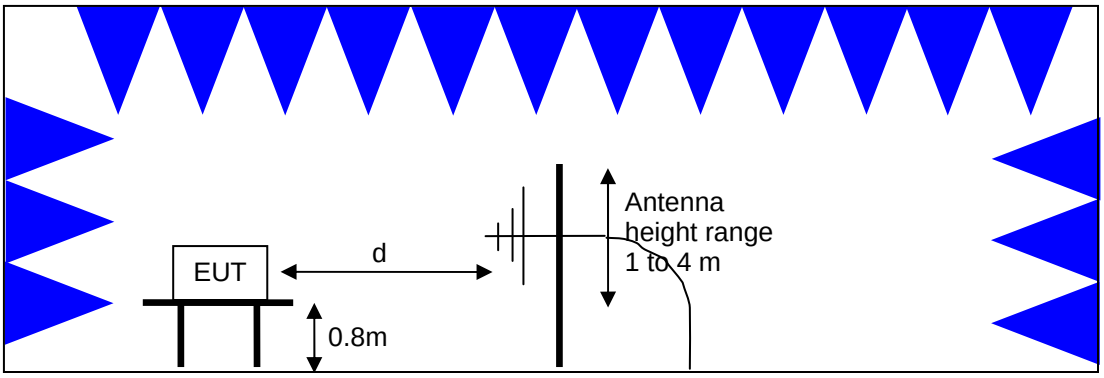


Typical Test Configuration for Radiated Field Strength Measurements



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

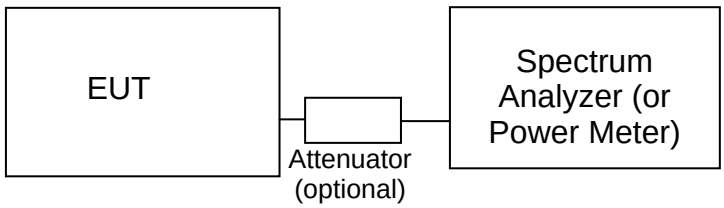
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

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



Test Configuration for Antenna Port Measurements

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

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

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

BANDWIDTH MEASUREMENTS

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

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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

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

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

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

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

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

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

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

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

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

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

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

OUTPUT POWER LIMITS – FHSS SYSTEMS

The table below shows the limits for output power based on the number of channels available for the hopping system.

Operating Frequency (MHz)	Number of Channels	Output Power
902 – 928	≥ 50	1 Watt (30 dBm)
902 – 928	25 to 49	0.25 Watts (24 dBm)
2400 – 2483.5	≥ 75	1 Watt (30 dBm)
2400 – 2483.5	< 75	0.125 Watts (21 dBm)
5725 – 5850	75	1 Watt (30 dBm)

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

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

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

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

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

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

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

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

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

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

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 - 6,500 MHz, 08-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012

Radiated Emissions, 1000 - 18,000 MHz, 09-Sep-11

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	8/9/2012

Radiated Emissions, 1,000 - 40,000 MHz, 12-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/11/2011
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	11/2/2011
Hewlett Packard	Head (Inc W1-W4, 1742 , 1743) Blue	84125C	1620	5/9/2012
A.H. Systems	Blue System Horn, 18-40GHz	SAS-574, p/n: 2581	2159	3/23/2012
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	12/29/2011
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2011

Radiated Emissions, 1000 - 40000 MHz, 12-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012
A.H. Systems	Blue System Horn, 18-40GHz	SAS-574, p/n: 2581	2159	3/23/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2011

Radiated Emissions, 1000 - 18,000 MHz, 15-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	8/15/2012

Radiated Emissions, 1000 - 40000MHz, 16-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	8/15/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2011

Radiated Emissions, 1000 - 40,000 MHz, 17-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due

EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/9/2012
Hewlett Packard	Head (Inc W1-W4, 1742 , 1743) Blue	84125C	1620	5/9/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/3/2012
A.H. Systems	Blue System Horn, 18-40GHz	SAS-574, p/n: 2581	2159	3/23/2012

Radiated Emissions, 1000 - 40000MHz, 20-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	8/2/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	8/15/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2249	10/11/2011

Radiated Emissions, 1000 - 10,000 MHz, 21-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/11/2011
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/3/2012
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/23/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	7/28/2012

Radiated Emissions, 30 - 1,000 MHz, 23-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	11/2/2011
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	5/17/2012
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	12/29/2011

Conducted Emissions - AC Power Ports, 23-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	LISN, 10 kHz-100 MHz, 25A	3825/2	1292	3/1/2012
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	4/21/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	11/2/2011
Fischer Custom Comm	LISN, 25A, 150kHz to 30MHz, 25 Amp,	FCC-LISN-50-25-2-09	2001	9/15/2012

Radio Antenna Port (Power and Spurious Emissions), 23-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	7/28/2012

Radiated Emissions, 30 - 40,000 MHz, 23-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/11/2011
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/23/2012
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	10/1/2011
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40)	8564E (84125C)	2415	7/28/2012

Purple

Radiated Emissions, 30 - 1,000 MHz, 26-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz - 22 GHz	8593EM	1319	11/22/2011
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	11/24/2011
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	6/24/2012
Com-Power Corp.	Preamplifier, 30-1000 MHz	PA-103	1632	4/29/2012

Conducted Emissions - AC Power Ports, 27-Sep-11

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	LISN, 10 kHz-100 MHz, 25A	3825/2	1292	3/1/2012
EMCO	LISN, 10 kHz-100 MHz	3825/2	1293	3/1/2012
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz - 22 GHz	8593EM	1319	11/22/2011
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	11/24/2011
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	4/21/2012

Radiated Emissions, 30 - 6,500 MHz, 29-Sep-11

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	2199	2/23/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	7/28/2012

Appendix B Test Data

T84548 Pages 26 - 79

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Emissions Standard(s):	FCC 15 B, 15.247, RSS 210	Class:	B
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Intel

Model

135BNHMW & 135BNHU

Date of Last Test: 9/29/2011

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

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

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or routed in overhead in the GR-1089 test configuration.

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

Ambient Conditions:

Temperature: 21.5 °C
Rel. Humidity: 41 %

Summary of Results

For Wi-Fi, only Chain A is used for Tx. For Bluetooth only chain B is used for Tx. Both chains are used for Rx for Wi-Fi and Bluetooth
MAC Address: 00150096B40F DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51 - Sample with PIFA antenna

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1	BT Basic 802.1b	2402MHz 2412MHz	7dBm 16.5dBm	5.9 16.6	Radiated Emissions, 1 - 10 GHz	FCC Part 15.209 / 15.247(c)	42.6dBµV/m @ 2251.7MHz (-11.4dB)
2	BT Basic 802.1b	2480MHz 2462MHz	7dBm 16.5dBm	6.4 16.7		FCC Part 15.209 / 15.247(c)	46.8dBµV/m @ 2500.0MHz (-7.2dB)
3	BT Basic 802.11g	2402MHz 2412MHz	7dBm 16.5dBm	5.9 16.6		FCC Part 15.209 / 15.247(c)	39.7dBµV/m @ 1457.6MHz (-14.3dB)
4	BT Basic 802.1g	2480MHz 2462MHz	7dBm 16.5dBm	6.4 16.8		FCC Part 15.209 / 15.247(c)	44.7dBµV/m @ 2299.8MHz (-9.3dB)
Wi-Fi mode for the following runs based on the worst case mode from runs 1 through 4							
5	BT Basic 802.1b	2402MHz 2437MHz	7dBm 16.5dBm	5.9 16.6	Radiated Emissions, 1 - 10 GHz	FCC Part 15.209 / 15.247(c)	53.8dBµV/m @ 2365.0MHz (-0.2dB)
6	BT Basic 802.1b	2440MHz 2412MHz	7dBm 16.5dBm	6.5 16.6		FCC Part 15.209 / 15.247(c)	42.2dBµV/m @ 2868.6MHz (-11.8dB)
7	BT Basic 802.11b	2440MHz 2462MHz	7dBm 16.5dBm	6.5 16.7		FCC Part 15.209 / 15.247(c)	44.4dBµV/m @ 2299.2MHz (-9.6dB)
8	BT Basic 802.11b	2480MHz 2437MHz	7dBm 16.5dBm	6.4 16.6		FCC Part 15.209 / 15.247(c)	42.2dBµV/m @ 2278.8MHz (-11.8dB)
Wi-Fi mode and channel and Bluetooth channel for the following run based on the worst case mode from runs 1 through 8							
9	BT EDR 802.1b	2402MHz 2437MHz	7dBm 16.5dBm	2.5 16.6	Radiated Emissions, 1 - 10 GHz	FCC Part 15.209 / 15.247(c)	50.2dBµV/m @ 2370.6MHz (-3.8dB)

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Run #1: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11b @ 2412, BT Basic @ 2402 MHz

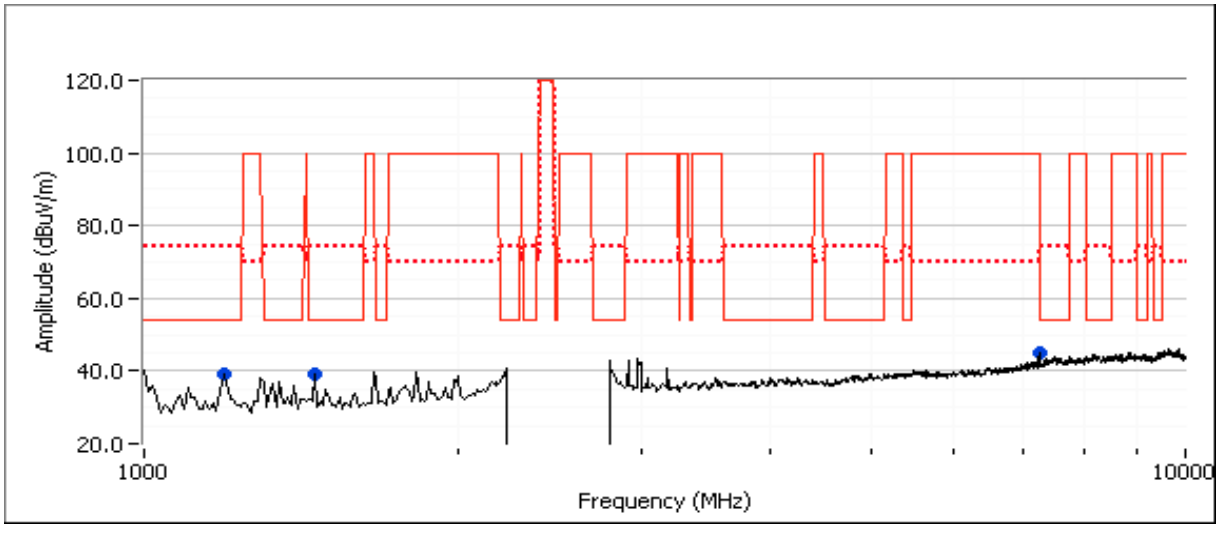
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
1200.190	39.2	V	54.0	-14.8	Peak	142	1.0	
1457.690	39.0	H	54.0	-15.0	Peak	159	1.0	
7237.170	44.9	V	70.0	-25.1	Peak	290	1.3	

Final measurements at 3m

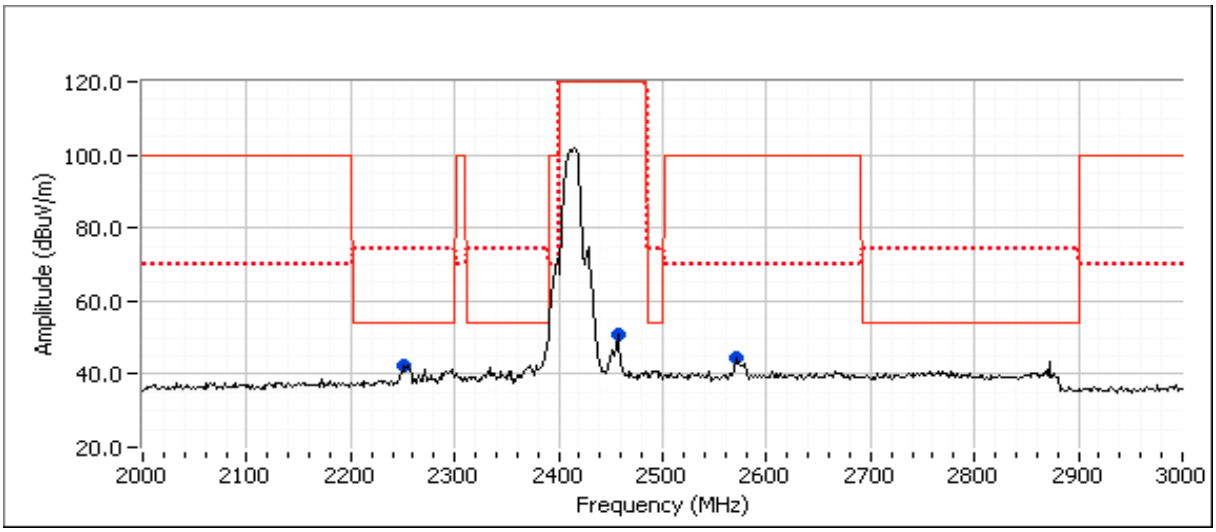
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1197.920	31.4	V	54.0	-22.6	AVG	138	1.0	RB 1 MHz;VB 10 Hz;Pk
1199.920	45.2	V	74.0	-28.8	PK	138	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	
2251.670	42.6	V	54.0	-11.4	Peak	181	1.0	
2456.670	51.1	V	NA	NA	Peak	181	1.0	
2571.670	44.4	V	54.0	-9.6	Peak	181	1.0	



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #2: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11b @ 2462, BT Basic @ 2480 MHz

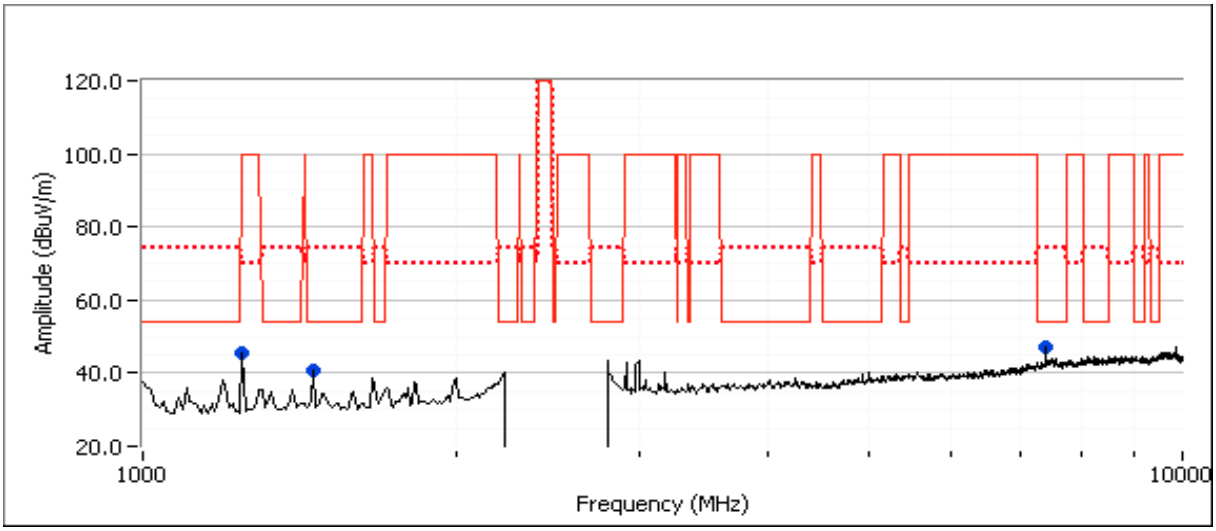
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
1232.450	45.4	V	54.0	-8.6	Peak	0	1.3	
1457.690	40.6	H	54.0	-13.4	Peak	171	1.0	
7396.030	47.1	V	54.0	-6.9	Peak	288	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	
7390.630	44.1	V	54.0	-9.9	AVG	287	1.8	RB 1 MHz;VB 10 Hz;Pk
7386.060	51.7	V	74.0	-22.3	PK	287	1.8	RB 1 MHz;VB 3 MHz;Pk



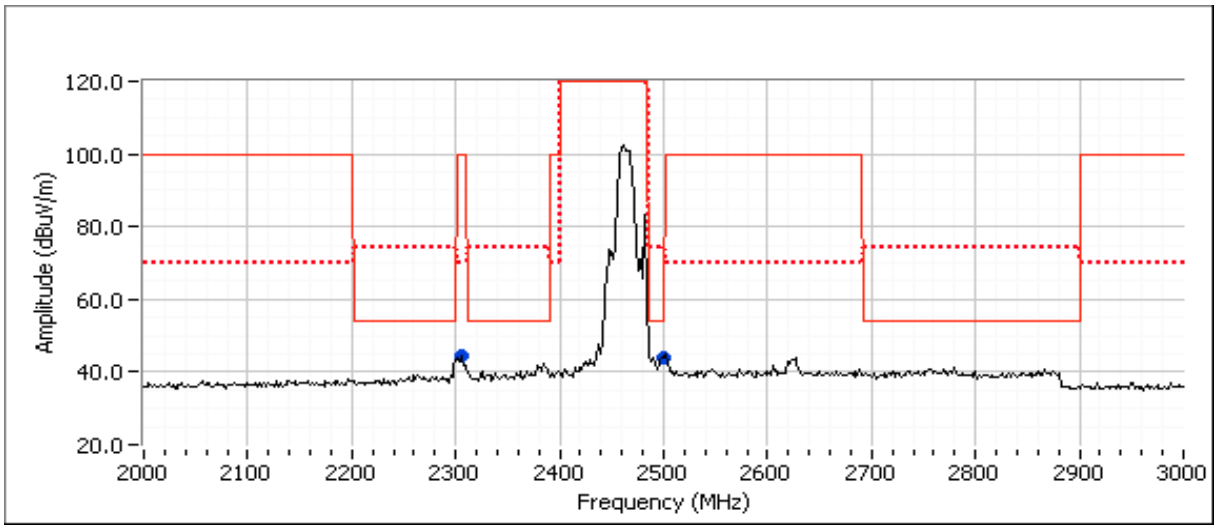
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	
2305.000	*44.7*	*V*	*54.0*	-9.3	*Peak*	*181*	*1.0*	
2500.000	*43.8*	*V*	*54.0*	-10.2	*Peak*	*181*	*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	
2500.000	46.8	H	54.0	-7.2	AVG	352	1.0	RB 1 MHz;VB 10 Hz;Pk
2497.750	55.2	H	74.0	-18.8	PK	352	1.0	RB 1 MHz;VB 3 MHz;Pk
2495.530	40.5	V	54.0	-13.5	AVG	263	1.1	RB 1 MHz;VB 10 Hz;Pk
2495.500	50.4	V	74.0	-23.6	PK	263	1.1	RB 1 MHz;VB 3 MHz;Pk
2299.750	44.8	H	54.0	-9.2	AVG	240	1.1	RB 1 MHz;VB 10 Hz;Pk
2299.980	53.9	H	74.0	-20.1	PK	240	1.1	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

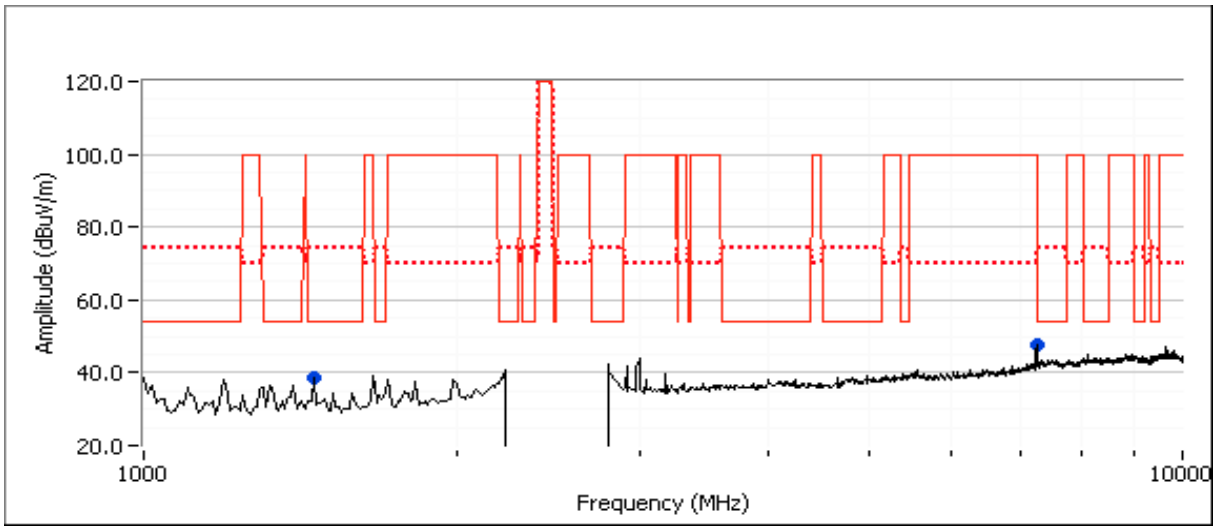
Run #3: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11g @ 2412, BT Basic @ 2402 MHz
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
1457.690	38.6	H	54.0	-15.4	Peak	160	1.3	
7238.670	47.6	V	54.0	-6.4	Peak	284	1.3	Signal not in 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	
1457.560	39.7	H	54.0	-14.3	AVG	168	1.0	RB 1 MHz;VB 10 Hz;Pk
1457.550	42.9	H	74.0	-31.1	PK	168	1.0	RB 1 MHz;VB 3 MHz;Pk



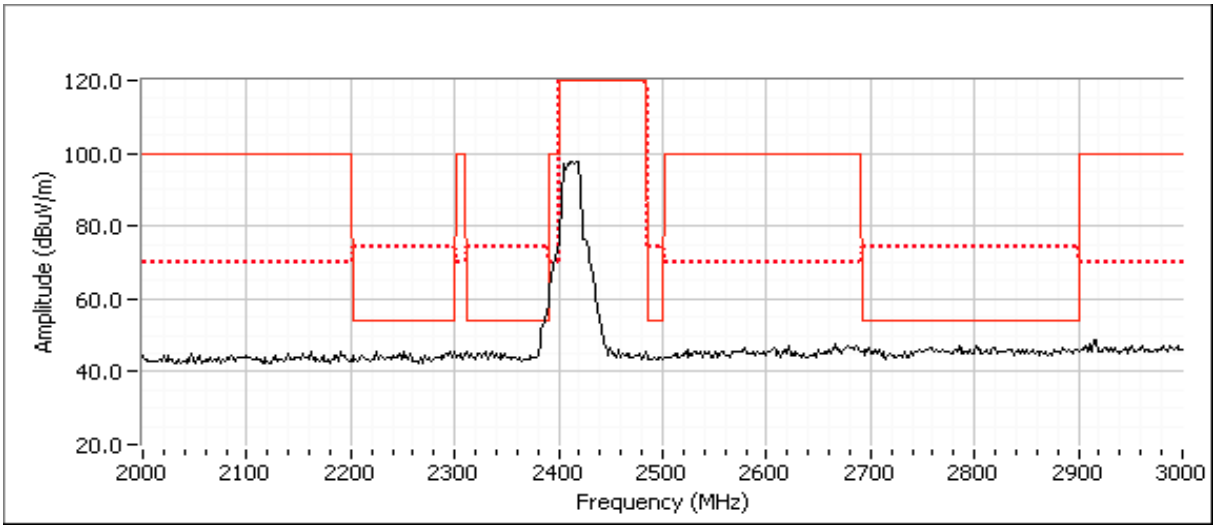
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	

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	



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #4: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11g @ 2462, BT Basic @ 2480 MHz

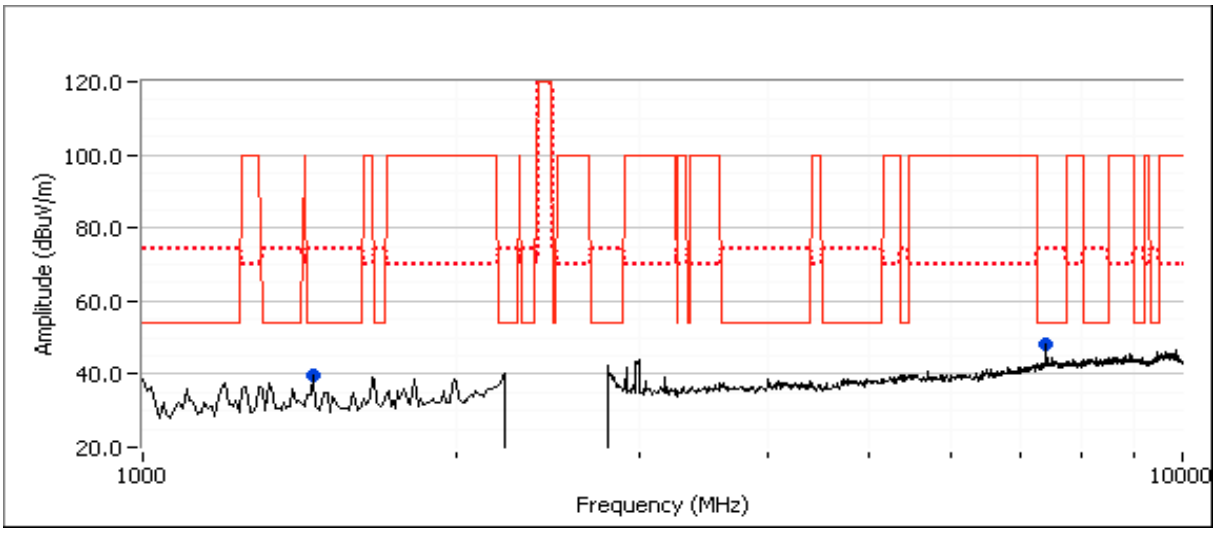
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
1457.690	39.5	H	54.0	-14.5	Peak	160	1.0	
7381.300	48.3	V	54.0	-5.7	Peak	282	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	
7385.270	43.1	V	54.0	-10.9	AVG	286	1.2	RB 1 MHz;VB 10 Hz;Pk
7387.830	55.0	V	74.0	-19.0	PK	286	1.2	RB 1 MHz;VB 3 MHz;Pk



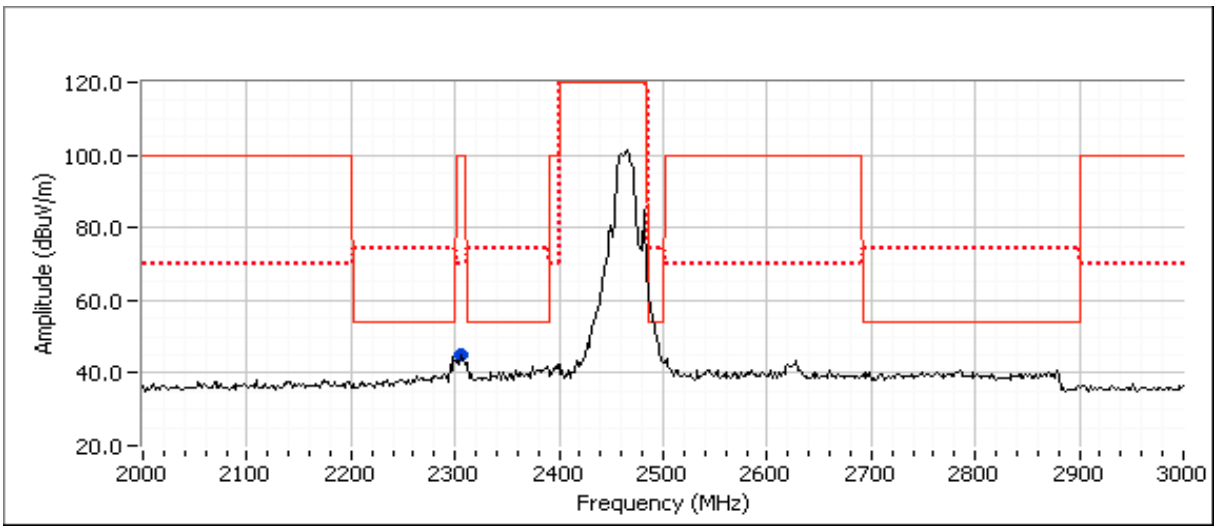
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	
2299.000	44.9	V	54.0	-9.1	Peak	179	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	
2299.750	44.7	H	54.0	-9.3	AVG	236	1.0	RB 1 MHz;VB 10 Hz;Pk
2298.580	54.6	H	74.0	-19.4	PK	236	1.0	RB 1 MHz;VB 3 MHz;Pk
2297.900	41.5	V	54.0	-12.5	AVG	253	1.2	RB 1 MHz;VB 10 Hz;Pk
2297.100	52.6	V	74.0	-21.4	PK	253	1.2	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #5: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11b @ 2437 MHz, BT Basic @ 2402 MHz

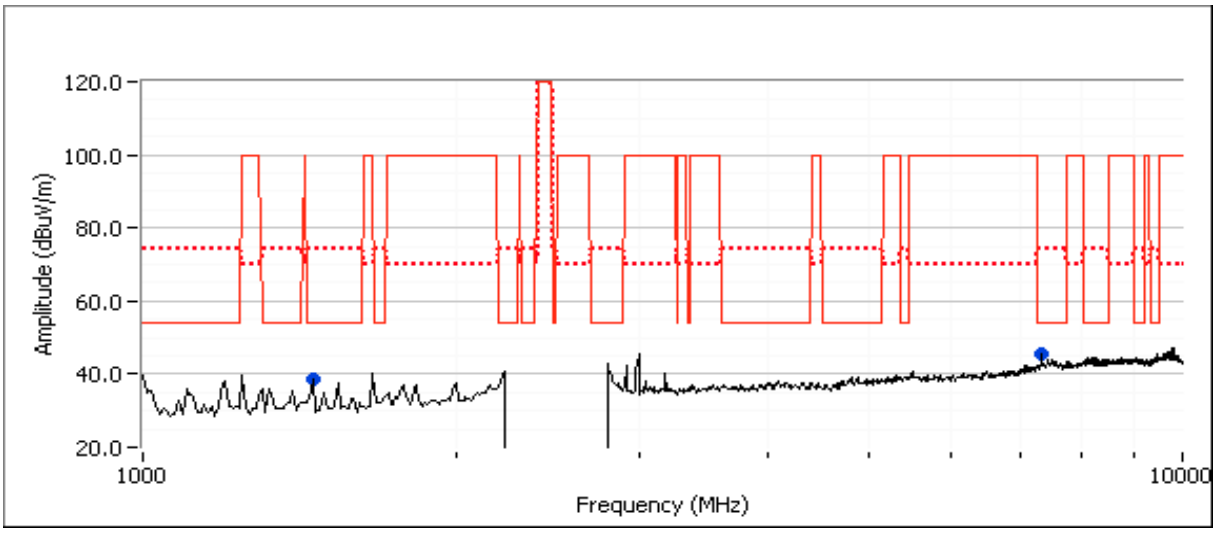
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
1457.690	38.6	H	54.0	-15.4	Peak	161	1.3	
7317.760	45.6	V	54.0	-8.4	Peak	283	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	
7313.760	43.2	V	54.0	-10.8	AVG	286	1.6	RB 1 MHz;VB 10 Hz;Pk
7307.060	51.1	V	74.0	-22.9	PK	286	1.6	RB 1 MHz;VB 3 MHz;Pk



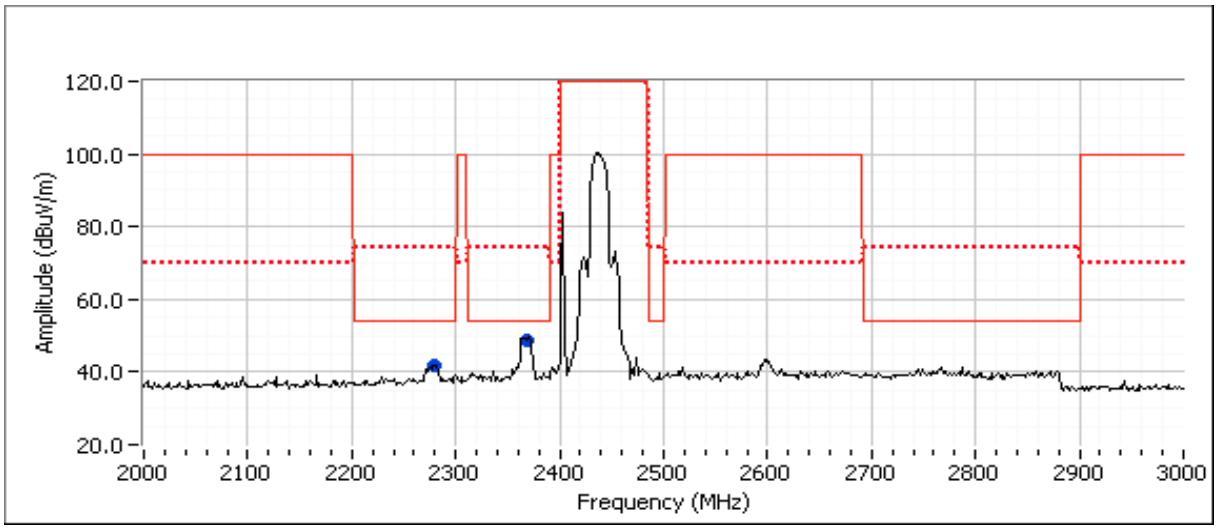
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	
2280.000	*42.0*	*V*	*54.0*	*-12.0*	*Peak*	*179*	*1.0*	
2368.330	*48.9*	*V*	*54.0*	*-5.1*	*Peak*	*179*	*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	
2364.960	53.8	H	54.0	-0.2	AVG	345	1.3	RB 1 MHz;VB 10 Hz;Pk
2367.630	58.9	H	74.0	-15.1	PK	345	1.3	RB 1 MHz;VB 3 MHz;Pk
2364.860	51.6	V	54.0	-2.4	AVG	86	1.1	RB 1 MHz;VB 10 Hz;Pk
2369.430	57.3	V	74.0	-16.7	PK	86	1.1	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #6: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11b @ 2412 MHz, BT Basic @ 2440 MHz

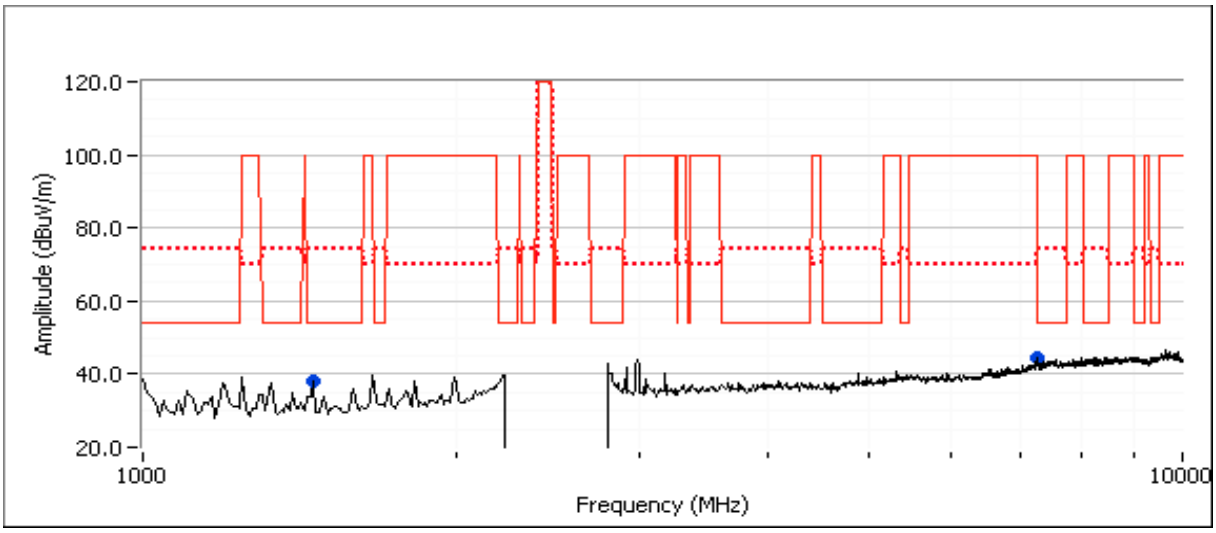
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
7237.170	44.6	V	54.0	-9.4	Peak	293	1.3	Signal not in restricted band
1457.690	38.3	H	54.0	-15.7	Peak	155	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	
1457.560	39.5	H	54.0	-14.5	AVG	163	1.0	RB 1 MHz;VB 10 Hz;Pk
1457.550	42.9	H	74.0	-31.1	PK	163	1.0	RB 1 MHz;VB 3 MHz;Pk



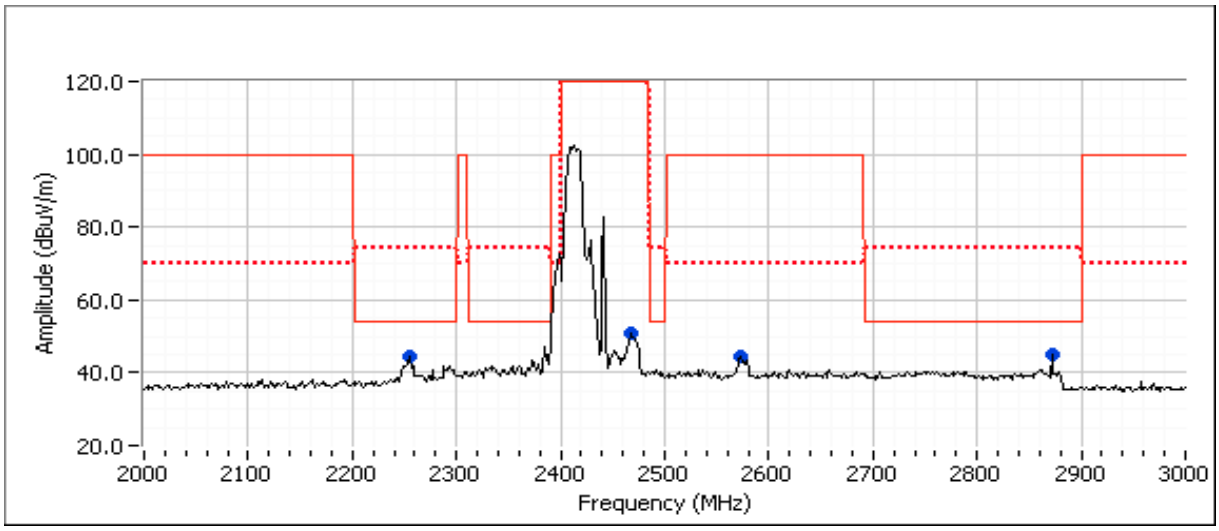
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	
2255.000	*44.4*	*V*	*54.0*	*-9.6*	*Peak*	*181*	*1.0*	
2466.670	*51.1*	*V*	*NA*	*NA*	*Peak*	*181*	*1.0*	
2573.330	*44.6*	*V*	*54.0*	*-9.4*	*Peak*	*181*	*1.0*	
2871.670	*45.2*	*V*	*54.0*	*-8.8*	*Peak*	*181*	*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	
2868.570	42.2	H	54.0	-11.8	AVG	235	1.0	RB 1 MHz;VB 10 Hz;Pk
2868.440	49.9	H	74.0	-24.1	PK	235	1.0	RB 1 MHz;VB 3 MHz;Pk
2253.670	41.9	H	54.0	-12.1	AVG	236	1.2	RB 1 MHz;VB 10 Hz;Pk
2251.470	51.6	H	74.0	-22.4	PK	236	1.2	RB 1 MHz;VB 3 MHz;Pk
2874.770	39.5	V	54.0	-14.5	AVG	271	1.0	RB 1 MHz;VB 10 Hz;Pk
2863.870	51.0	V	74.0	-23.0	PK	271	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #7: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11b @ 2462 MHz, BT Basic @ 2440 MHz

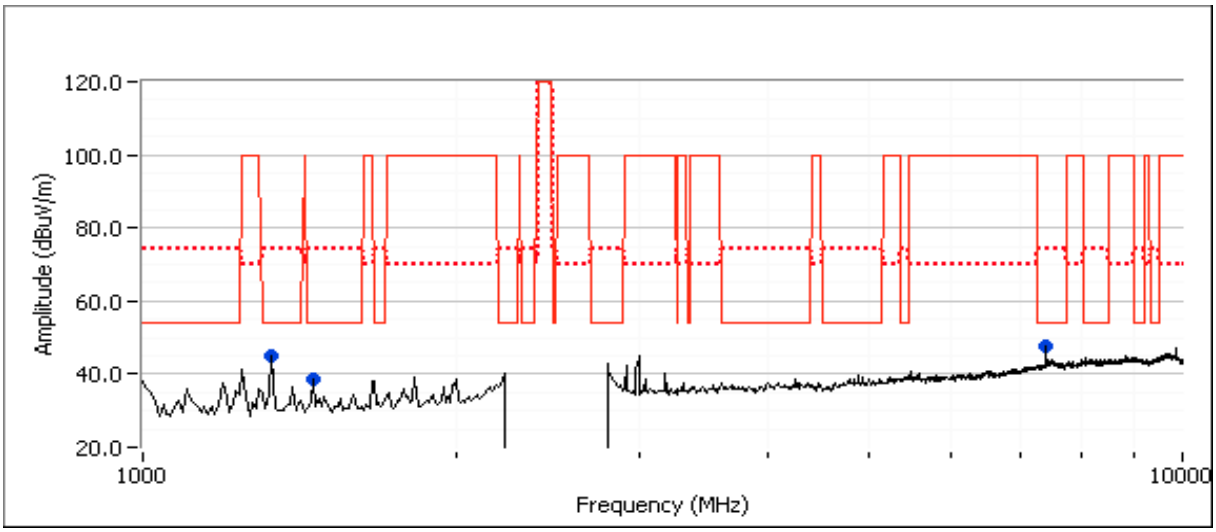
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
1328.830	44.9	V	54.0	-9.1	Peak	138	1.0	
1457.690	38.6	H	54.0	-15.4	Peak	163	1.0	
7385.110	47.8	V	54.0	-6.2	Peak	283	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	
7384.970	46.1	V	54.0	-7.9	AVG	284	1.7	RB 1 MHz;VB 10 Hz;Pk
7384.840	52.6	V	74.0	-21.4	PK	284	1.7	RB 1 MHz;VB 3 MHz;Pk
1328.200	29.3	V	54.0	-24.7	AVG	139	1.0	RB 1 MHz;VB 10 Hz;Pk
1332.160	47.1	V	74.0	-26.9	PK	139	1.0	RB 1 MHz;VB 3 MHz;Pk



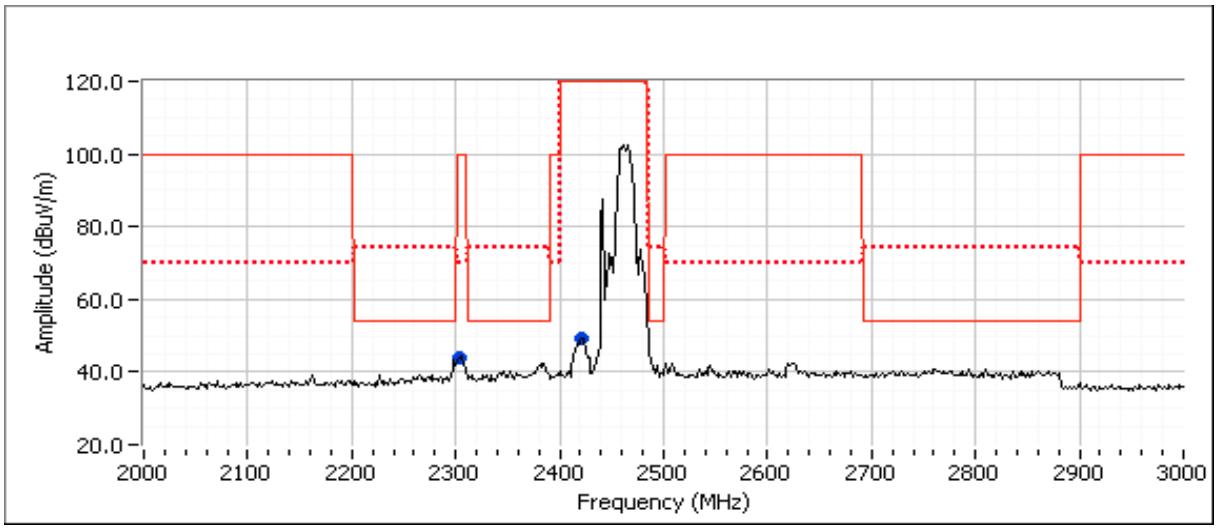
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	
2299.540	43.9	V	54.0	-10.1	Peak	182	1.0	
2421.670	49.5	V	NA	NA	Peak	182	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	
2299.230	44.4	H	54.0	-9.6	AVG	242	1.2	RB 1 MHz;VB 10 Hz;Pk
2299.540	53.3	H	74.0	-20.7	PK	242	1.2	RB 1 MHz;VB 3 MHz;Pk
2299.210	42.3	V	54.0	-11.7	AVG	272	1.2	RB 1 MHz;VB 10 Hz;Pk
2297.940	52.0	V	74.0	-22.0	PK	272	1.2	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #8: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11b @ 2437 MHz, BT Basic @ 2480 MHz

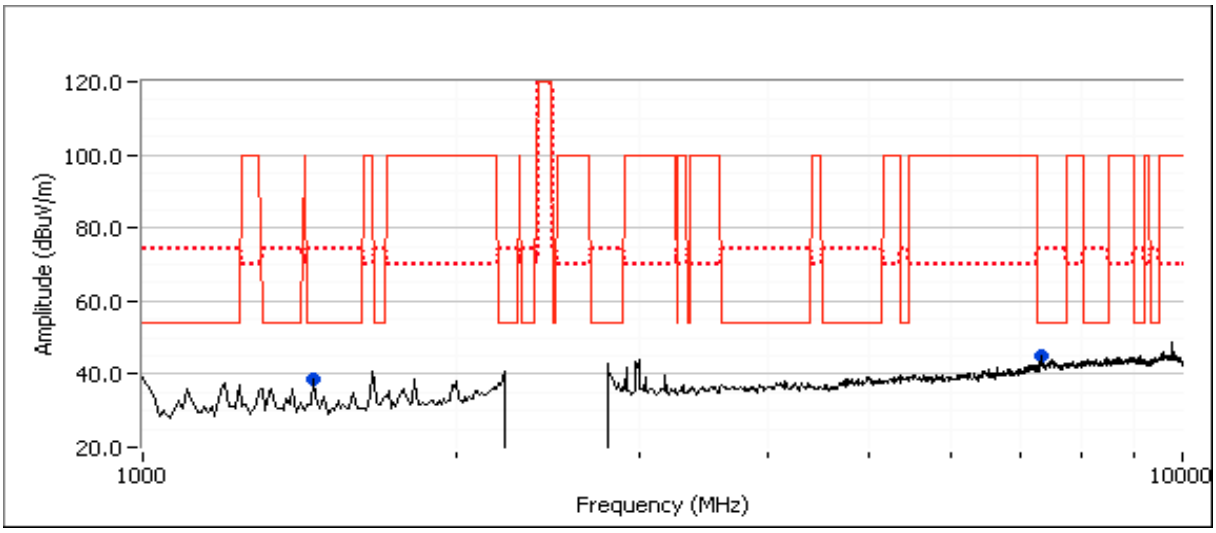
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
1457.690	38.8	H	54.0	-15.2	Peak	171	1.0	
7318.300	45.1	V	54.0	-8.9	Peak	285	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	
7313.730	44.3	V	54.0	-9.7	AVG	288	1.6	RB 1 MHz;VB 10 Hz;Pk
7315.100	51.5	V	74.0	-22.5	PK	288	1.6	RB 1 MHz;VB 3 MHz;Pk



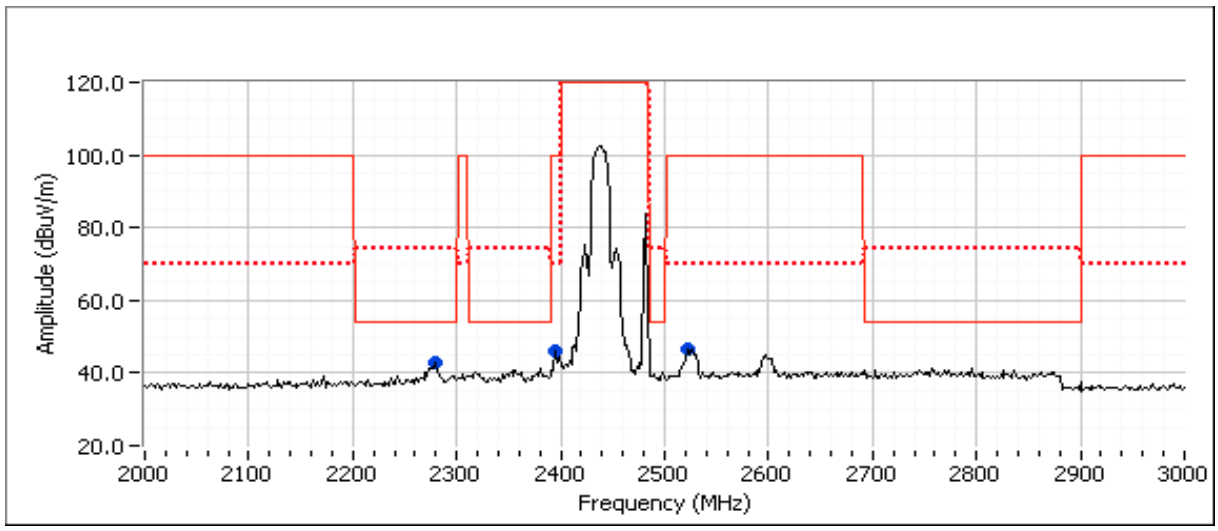
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	
2280.000	*42.7*	*V*	*54.0*	*-11.3*	*Peak*	*183*	*1.0*	
2395.000	*46.1*	*V*	*54.0*	*-7.9*	*Peak*	*183*	*1.0*	*signal not in restricted band*
2521.670	*46.4*	*V*	*54.0*	*-7.6*	*Peak*	*183*	*1.0*	*signal not in 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	
2278.830	42.2	H	54.0	-11.8	AVG	242	1.2	RB 1 MHz;VB 10 Hz;Pk
2279.600	51.2	H	74.0	-22.8	PK	242	1.2	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #9: Radiated Spurious Emissions, 1-10GHz. Operating Mode: 802.11b @ 2437 MHz, BT EDR @ 2402 MHz

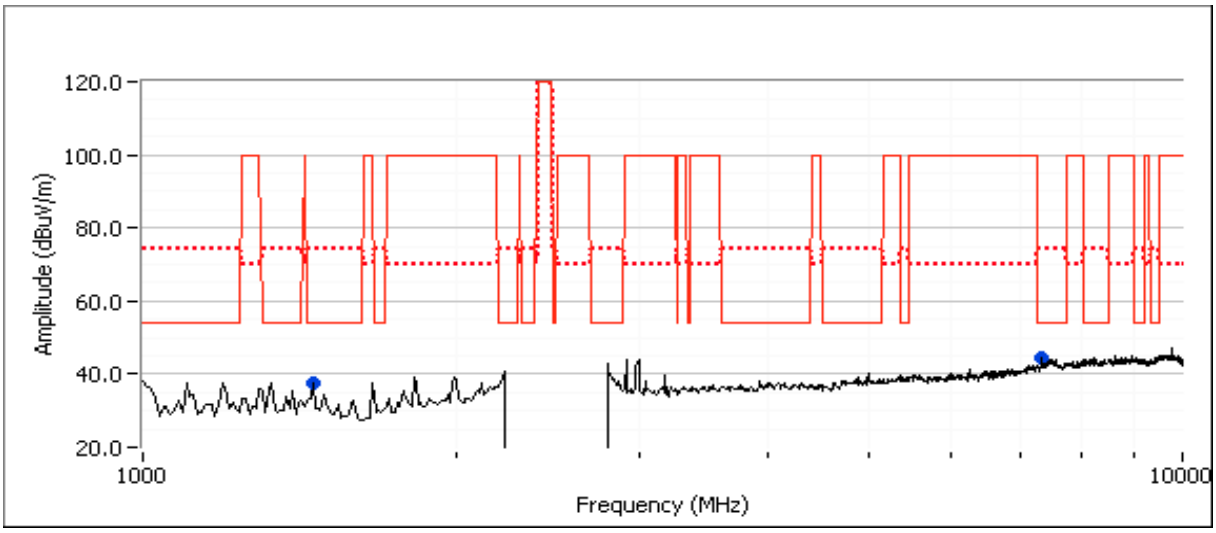
Date of Test: 9/20/2011
Test Engineer: Rafael Varelas
Test Location: FT Chamber #3

Preliminary Spurious Emissions excluding allocated band (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	
1458.330	37.8	H	54.0	-16.2	Peak	159	1.0	
7311.000	44.5	V	54.0	-9.5	Peak	288	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	
7315.560	44.4	V	54.0	-9.6	AVG	288	1.6	RB 1 MHz;VB 10 Hz;Pk
7314.930	52.1	V	74.0	-21.9	PK	288	1.6	RB 1 MHz;VB 3 MHz;Pk



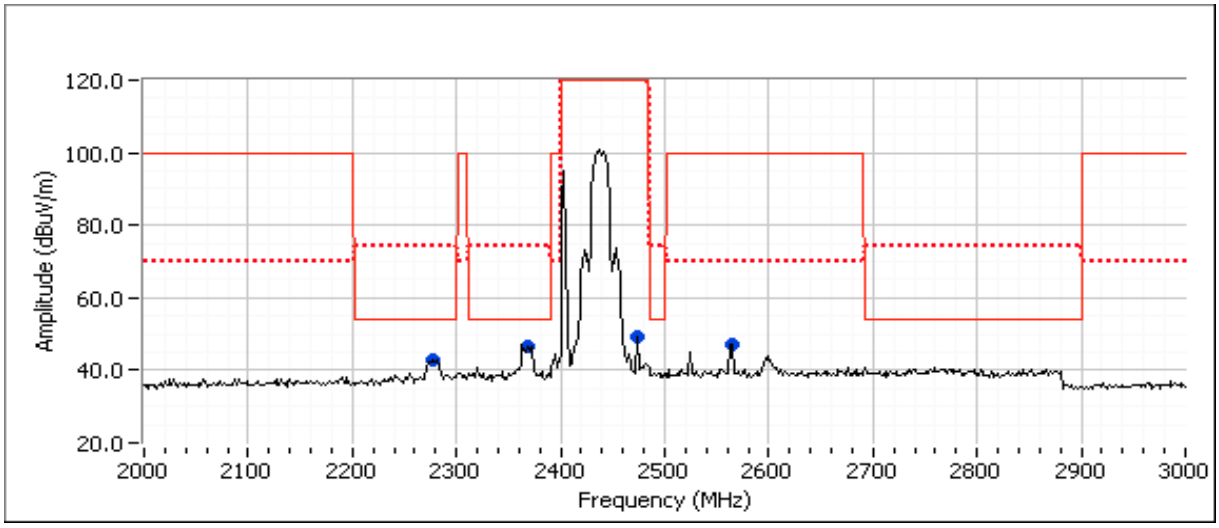
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Preliminary Spurious Emissions at 20cm from 2-3 GHz (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	
2276.670	*43.0*	*V*	*54.0*	*-11.0*	*Peak*	*179*	*1.0*	
2368.330	*46.4*	*V*	*54.0*	*-7.6*	*Peak*	*179*	*1.0*	
2473.330	*49.4*	*V*	*NA*	*NA*	*Peak*	*179*	*1.0*	
2565.000	*47.1*	*V*	*54.0*	*-6.9*	*Peak*	*179*	*1.0*	*Signal not in 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	
2370.600	50.2	H	54.0	-3.8	AVG	345	1.0	RB 1 MHz;VB 10 Hz;Pk
2369.230	57.8	H	74.0	-16.2	PK	345	1.0	RB 1 MHz;VB 3 MHz;Pk
2278.370	42.0	H	54.0	-12.0	AVG	243	1.2	RB 1 MHz;VB 10 Hz;Pk
2278.500	51.1	H	74.0	-22.9	PK	243	1.2	RB 1 MHz;VB 3 MHz;Pk
2370.460	46.3	V	54.0	-7.7	AVG	88	1.1	RB 1 MHz;VB 10 Hz;Pk
2365.900	54.3	V	74.0	-19.7	PK	88	1.1	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

RSS 210 Radiated Spurious Emissions (Bluetooth Receive Mode)

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 - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Measured Power	Test Performed	Limit	Result / Margin
MAC Address: 00150096B40F DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51 - Sample with PIFA antenna							
1	Receive PIFA	2441			Radiated Emissions, 1 - 40 GHz	RSS 210	36.8dBµV/m @ 2332.1MHz (-17.2dB)
MAC Address: 00150096C325 DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51 - Sample with integral antenna							
2	Receive Trace	2441	-	-	Radiated Emissions, 1 - 40 GHz	RSS 210	49.0dBµV/m @ 2320.0MHz (-5.0dB)

Ambient Conditions:

Temperature: 18-25 °C
Rel. Humidity: 30-40 %

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

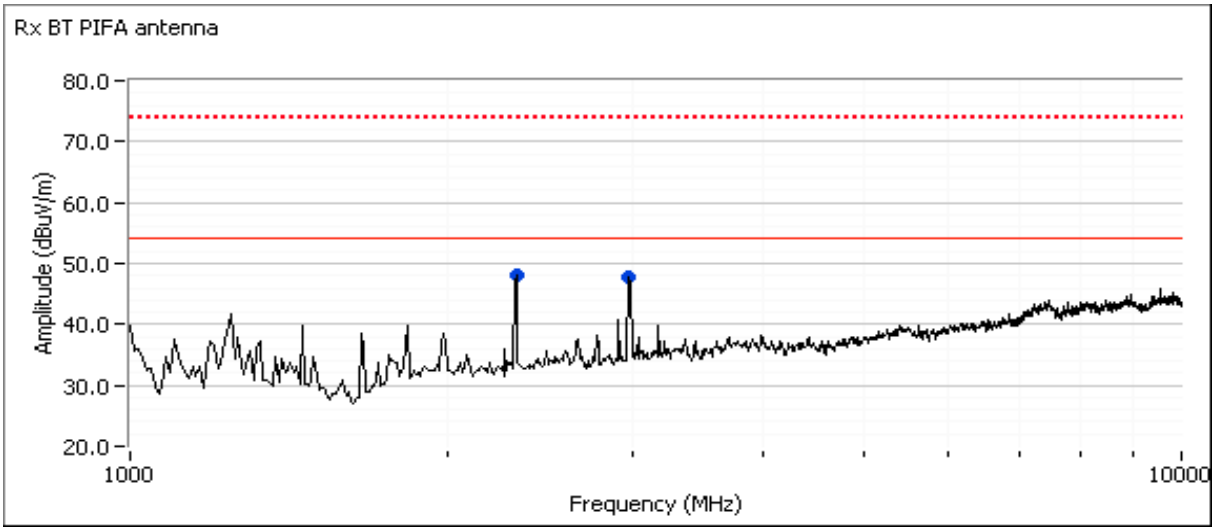
Run #1: Radiated Spurious Emissions, 1000 - 40,000 MHz. Operating Mode: Receive Mode, Bluetooth, PIFA Antenna

Date of Test: 9/21/2011 Test Location: FT Chamber #4

Test Engineer: Joseph Cadigal

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2332.120	36.8	V	54.0	-17.2	AVG	43	1.0	RB 1 MHz;VB 10 Hz;Pk
2331.060	54.6	V	74.0	-19.4	PK	43	1.0	RB 1 MHz;VB 3 MHz;Pk
2981.310	32.6	V	54.0	-21.4	AVG	150	1.0	RB 1 MHz;VB 10 Hz;Pk
2980.420	49.3	V	74.0	-24.7	PK	150	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	Scans made between 10 - 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	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #2: Radiated Spurious Emissions 1,000 - 40,000 MHz. Operating Mode: Receive Mode, Bluetooth, Trace Antenna

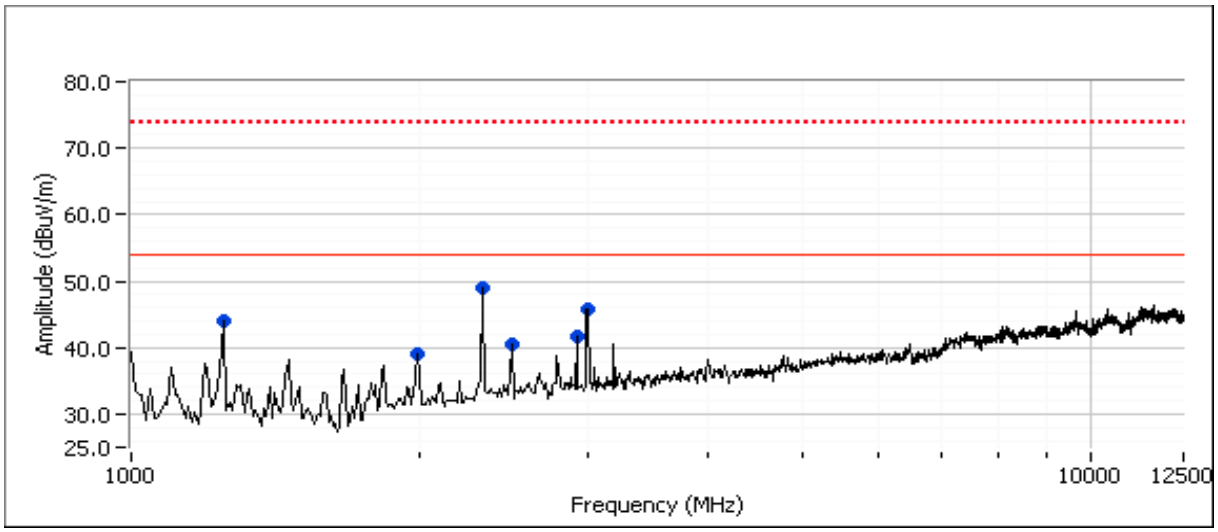
Date of Test: 9/23/2011 Test Location: FT Chamber #4

Test Engineer: M. Birgani

MAC Address: 00150096C325 DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51 - Sample with integral antenna

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	49.0	V	54.0	-5.0	Peak	198	1.3	Peak reading vs. average limit
2989.170	45.7	V	54.0	-8.3	Peak	147	1.0	Peak reading vs. average limit
1247.500	44.1	H	54.0	-9.9	Peak	235	1.5	Peak reading vs. average limit
2915.830	41.8	H	54.0	-12.2	Peak	225	1.2	Peak reading vs. average limit
2494.170	40.6	H	54.0	-13.4	Peak	149	1.0	Peak reading vs. average limit
1990.000	39.1	V	54.0	-14.9	Peak	207	1.3	Peak reading vs. average limit

Note 1:	Scans made between 12.5 - 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	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

RSS 210 and FCC 15.247 (FHSS) Radiated Spurious Emissions (Bluetooth FHSS)

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.

Ambient Conditions:

Temperature: 18 - 25 °C

Rel. Humidity: 30 - 45 %

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	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

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

Target power for Bluetooth is max power without exceeding 7dBm for both integral and PIFA antennas

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
MAC Address: 00150096B40F DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51 - Sample with PIFA antenna							
1a	Basic rate 1Mb/s	2402	8	6.1	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	42.3dBµV/m @ 2389.6MHz (-11.7dB)
			8	6.1	Radiated Emissions, 1 -40 GHz	FCC Part 15.209 / 15.247(c)	43.2dBµV/m @ 1233.2MHz (-10.8dB)
1b		2441	8	6.6	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	43.0dBµV/m @ 1457.8MHz (-11.0dB)
1c		2480	8	6.4	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	42.8dBµV/m @ 2483.5MHz (-11.2dB)
			8	6.4	Radiated Emissions, 1 -40 GHz	FCC Part 15.209 / 15.247(c)	42.7dBµV/m @ 1457.6MHz (-11.3dB)
2a	EDR 3Mb/s	2402	8	2.6	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	42.3dBµV/m @ 2389.9MHz (-11.7dB)
			8	2.6	Radiated Emissions, 1 -40 GHz	FCC Part 15.209 / 15.247(c)	
2b		2441	8	3.4	Radiated Emissions, 1 -40 GHz	FCC Part 15.209 / 15.247(c)	42.9dBµV/m @ 1457.6MHz (-11.1dB)
2c		2480	8	3.0	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	43.0dBµV/m @ 2483.5MHz (-11.0dB)
			8	3.0	Radiated Emissions, 1 -40 GHz	FCC Part 15.209 / 15.247(c)	
MAC Address: 00150096C325 DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51 - Sample with integral antenna							
3a	Worst case (EDR)	2402	8		Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	42.1dBµV/m @ 2382.9MHz (-11.9dB)
3b	Worst case (EDR)	2480	8		Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	47.0dBµV/m @ 2483.5MHz (-7.0dB)
4a	Worst case Mode from runs 1 and 2 (Basic)	2402	8		Radiated Emissions, 1 -40 GHz	FCC Part 15.209 / 15.247(c)	46.8dBµV/m @ 2980.0MHz (-7.2dB)
4b		2441	8		Radiated Emissions, 1 -40 GHz	FCC Part 15.209 / 15.247(c)	45.3dBµV/m @ 2998.3MHz (-8.7dB)
4c		2480	8		Radiated Emissions, 1 -40 GHz	FCC Part 15.209 / 15.247(c)	45.5dBµV/m @ 2998.3MHz (-8.5dB)

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #1: Radiated Spurious Emissions, 1000 - 40,000 MHz. Operating Mode:Basic rate, 1Mb/s

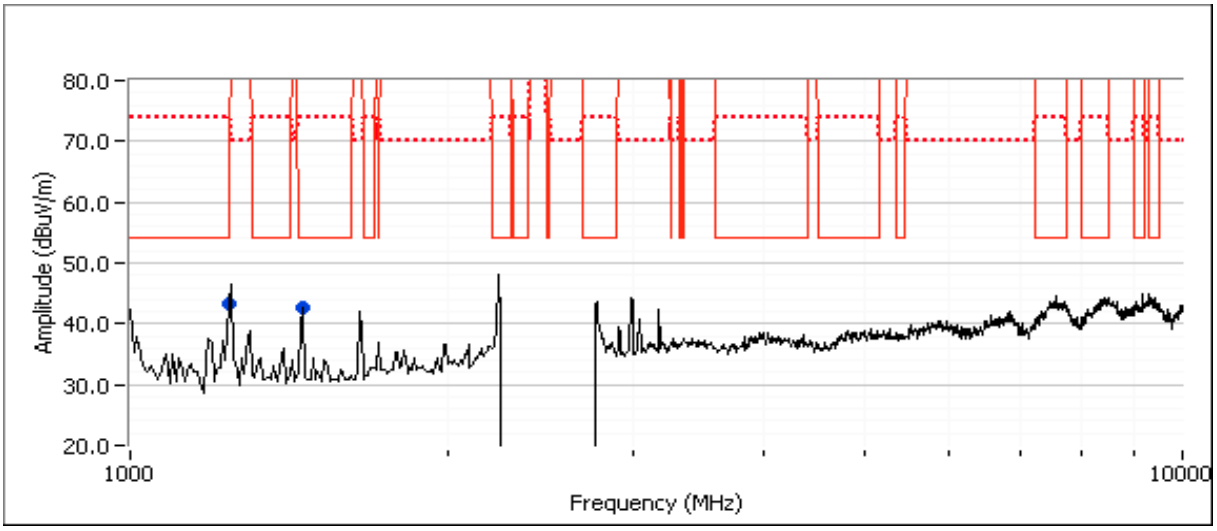
Date of Test: 9/12/2011 Test Location: FT Chamber #4

Test Engineer: David Bare

Run #1a: Low Channel @ 2402 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.560	42.3	V	54.0	-11.7	AVG	72	1.2	POS; RB 1 MHz; VB: 10 Hz
2388.850	55.3	V	74.0	-18.7	PK	72	1.2	POS; RB 1 MHz; VB: 10 MHz
2387.980	42.2	H	54.0	-11.8	AVG	246	1.5	POS; RB 1 MHz; VB: 10 Hz
2387.280	55.5	H	74.0	-18.5	PK	246	1.5	POS; RB 1 MHz; VB: 10 MHz



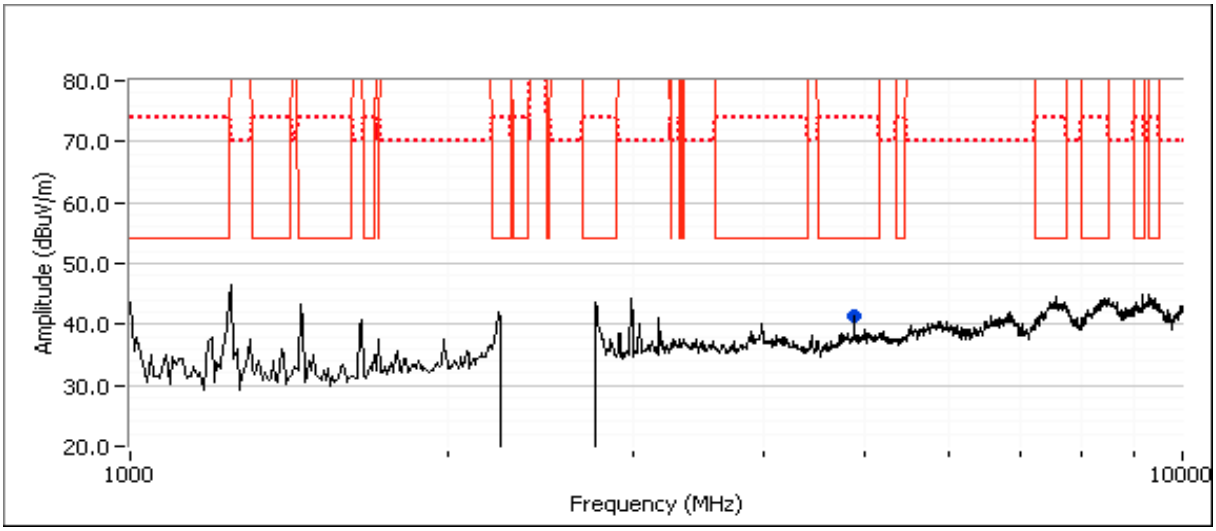
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1233.210	43.2	H	54.0	-10.8	Peak	104	1.0	Peak reading vs. average limit
1457.620	42.6	H	54.0	-11.4	Peak	133	1.0	Peak reading vs. average limit

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Emissions not in restricted bands are measured as antenna conducted and compared to the out of band power limit.
Note 3:	Scans made between 10 - 40GHz with the measurement antenna moved around the card and its antennas 10-20cm from the device indicated there were no signifcant emissions in this frequency range. 19.696GHz was visable at 10cm but not above the noise floor of the measurment system 1 meter away. This emission does not change with Tx frequency.

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #1b: Center Channel @ 2441 MHz



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1457.790	43.0	H	54.0	-11.0	Peak	129	1.0	Peak reading vs. average limit
1233.160	42.8	V	54.0	-11.2	Peak	341	1.0	Peak reading vs. average limit
4881.840	41.5	V	54.0	-12.5	Peak	186	1.0	Peak reading vs. average limit
1457.560	41.9	H	54.0	-12.1	AVG	127	1.0	RB 1 MHz;VB 10 Hz;Pk
1457.560	44.7	H	74.0	-29.3	PK	127	1.0	RB 1 MHz;VB 3 MHz;Pk

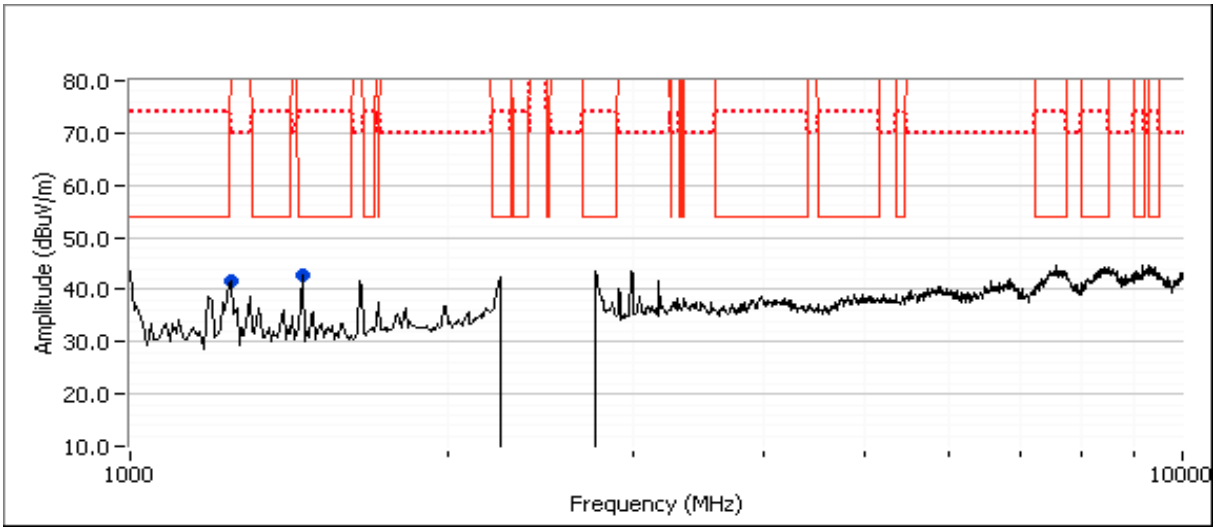
Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Emissions not in restricted bands are measured as antenna conducted and compared to the out of band power limit.
Note 3:	The emissions at 1233 and 1457 MHz do not change when the EUT Tx frequency is changed or the Tx is stopped.

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #1c: High Channel @ 2480 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	42.8	V	54.0	-11.2	AVG	284	1.2	POS; RB 1 MHz; VB: 10 Hz
2484.330	56.0	V	74.0	-18.0	PK	284	1.2	POS; RB 1 MHz; VB: 10 MHz
2483.500	42.7	H	54.0	-11.3	AVG	201	1.0	POS; RB 1 MHz; VB: 10 Hz
2484.740	55.7	H	74.0	-18.3	PK	201	1.0	POS; RB 1 MHz; VB: 10 MHz



Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1457.570	42.7	H	54.0	-11.3	Peak	135	1.0	Peak reading vs. average limit
1233.360	41.7	V	54.0	-12.3	Peak	19	1.0	Peak reading vs. average limit

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Emissions not in restricted bands are measured as antenna conducted and compared to the out of band power limit.

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #2: Radiated Spurious Emissions, 1000 - 40,000 MHz. Operating Mode: EDR, 3Mb/s

Date of Test: 9/12/2011 Test Location: FT Chamber #4

Test Engineer: David Bare

Run #2a: Low Channel @ 2402 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

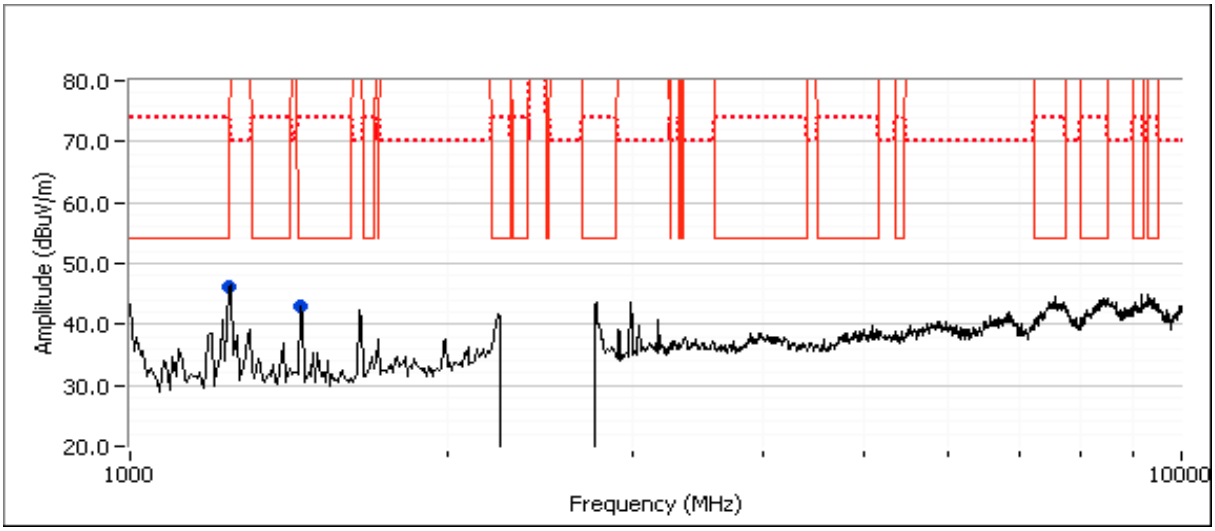
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.930	42.3	V	54.0	-11.7	AVG	72	1.2	POS; RB 1 MHz; VB: 10 Hz
2389.800	57.3	V	74.0	-16.7	PK	72	1.2	POS; RB 1 MHz; VB: 10 MHz
2390.000	42.3	H	54.0	-11.7	AVG	246	1.5	POS; RB 1 MHz; VB: 10 Hz
2389.910	54.9	H	74.0	-19.1	PK	246	1.5	POS; RB 1 MHz; VB: 10 MHz

Run #2b: Center Channel @ 2441 MHz

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1457.590	42.9	H	54.0	-11.1	Peak	130	1.0	Peak reading vs. average limit
1234.430	42.2	H	54.0	-11.8	Peak	146	1.0	Peak reading vs. average limit

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Emissions not in restricted bands are measured as antenna conducted and compared to the out of band power limit.
Note 3:	The emissions at 1233 and 1457 MHz do not change when the EUT Tx frequency is changed or the Tx is stopped.



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

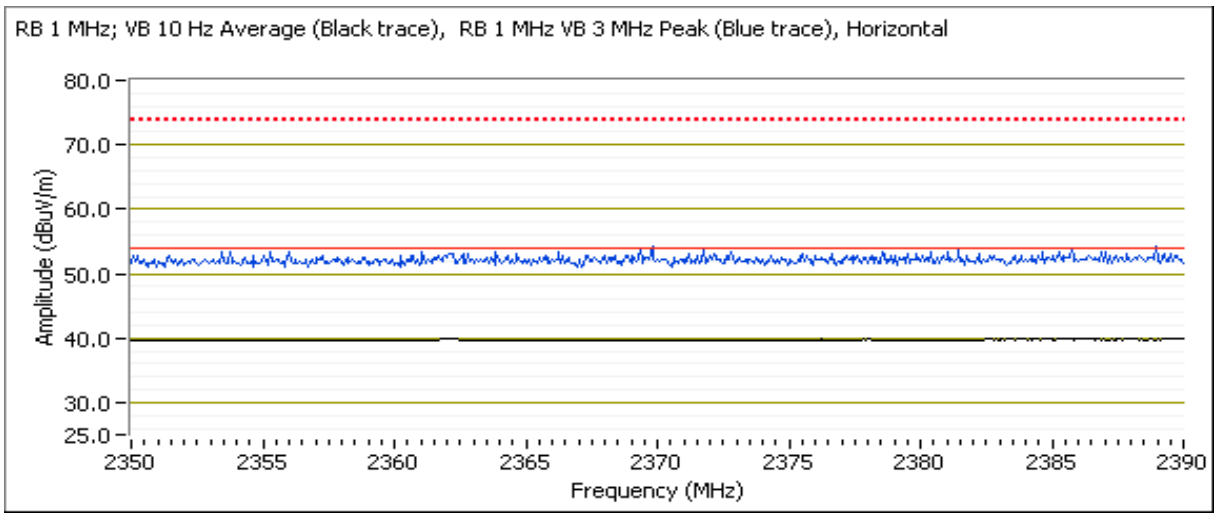
Run #2c: High Channel @ 2480 MHz
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.510	43.0	V	54.0	-11.0	AVG	285	1.2	POS; RB 1 MHz; VB: 10 Hz
2483.690	56.1	V	74.0	-17.9	PK	285	1.2	POS; RB 1 MHz; VB: 10 MHz
2483.510	42.9	H	54.0	-11.1	AVG	201	1.0	POS; RB 1 MHz; VB: 10 Hz
2484.830	56.0	H	74.0	-18.0	PK	201	1.0	POS; RB 1 MHz; VB: 10 MHz

Run #3: Radiated Spurious Emissions, Band Edges. Integrated Trace Antenna, Operating Mode: EDR
Date of Test: 9/23/2011 Test Location: FT Chamber #4
Test Engineer: M. Birgani
MAC Address: 00150096C325 DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51 - Sample with integral antenna

Run #3a: Low Channel @ 2402 MHz, Mode: WORST CASE FROM RUNS 1 and 2 (EDR)
Band Edge Signal Field Strength - Direct measurement of 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	
2382.930	42.1	H	54.0	-11.9	AVG	235	1.0	RB 1 MHz;VB 10 Hz;Pk
2362.070	41.9	V	54.0	-12.1	AVG	84	1.0	RB 1 MHz;VB 10 Hz;Pk
2378.800	53.9	H	74.0	-20.1	PK	235	1.0	RB 1 MHz;VB 3 MHz;Pk
2375.530	53.7	V	74.0	-20.3	PK	84	1.0	RB 1 MHz;VB 3 MHz;Pk

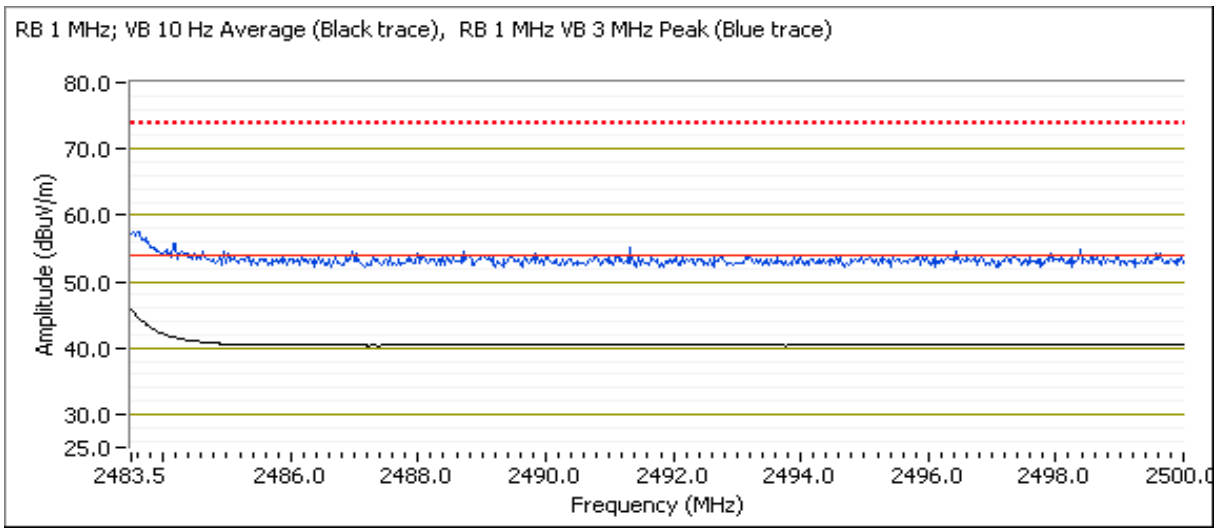


Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #3b: High Channel @ 2480 MHz, Mode: WORST CASE FROM RUNS 1 and 2 (EDR)

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	47.0	H	54.0	-7.0	AVG	129	1.0	RB 1 MHz;VB 10 Hz;Pk
2483.500	42.5	V	54.0	-11.5	AVG	302	1.0	RB 1 MHz;VB 10 Hz;Pk
2483.640	56.8	H	74.0	-17.2	PK	129	1.0	RB 1 MHz;VB 3 MHz;Pk
2483.580	52.5	V	74.0	-21.5	PK	302	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #4: Radiated Spurious Emissions, 1-40GHz. Integrated Trace Antenna, Operating Mode: Basic

Date of Test: 9/23/2011 Test Location: FT Chamber #4

Test Engineer: M. Birgani

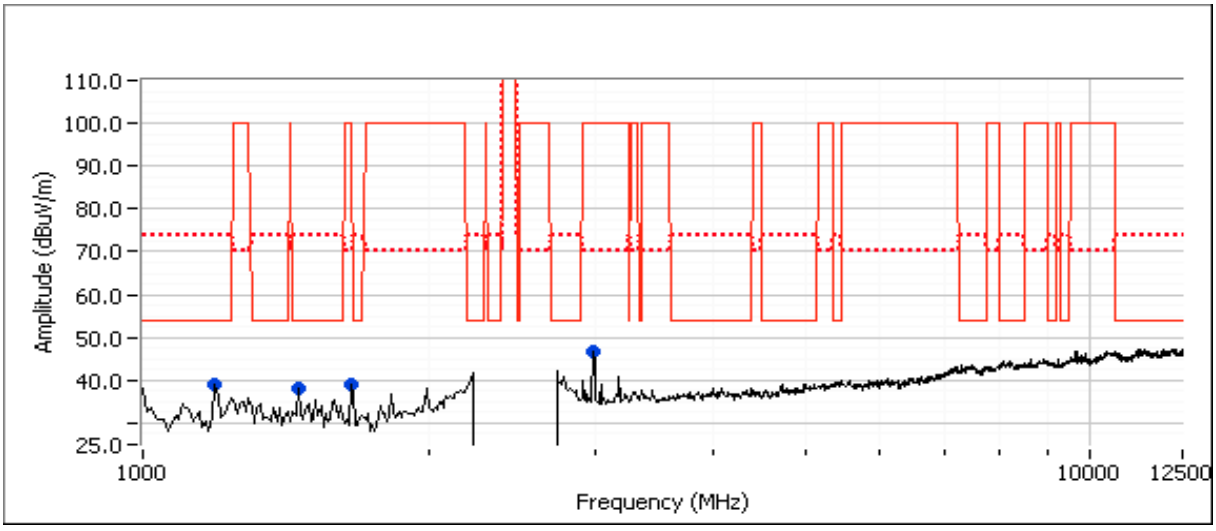
MAC Address: 00150096C325 DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51 - Sample with integral antenna

Run #4a: Low Channel @ 2402 MHz

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2980.000	46.8	V	54.0	-7.2	Peak	152	1.0	Peak reading vs. average limit
1660.000	39.0	V	54.0	-15.0	Peak	204	1.0	Peak reading vs. average limit
1192.500	38.8	H	54.0	-15.2	Peak	76	1.0	Peak reading vs. average limit
1458.330	38.2	H	54.0	-15.8	Peak	136	1.6	Peak reading vs. average limit

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Emissions not in restricted bands are measured as antenna conducted and compared to the out of band power limit.
Note 3:	Scans made between 10 - 40GHz with the measurement antenna moved around the card and its antennas 10-20cm from the device indicated there were no signifcant emissions in this frequency range. 19.696GHz was visable at 10cm but not above the noise floor of the measurment system 1 meter away. This emission does not change with Tx frequency.



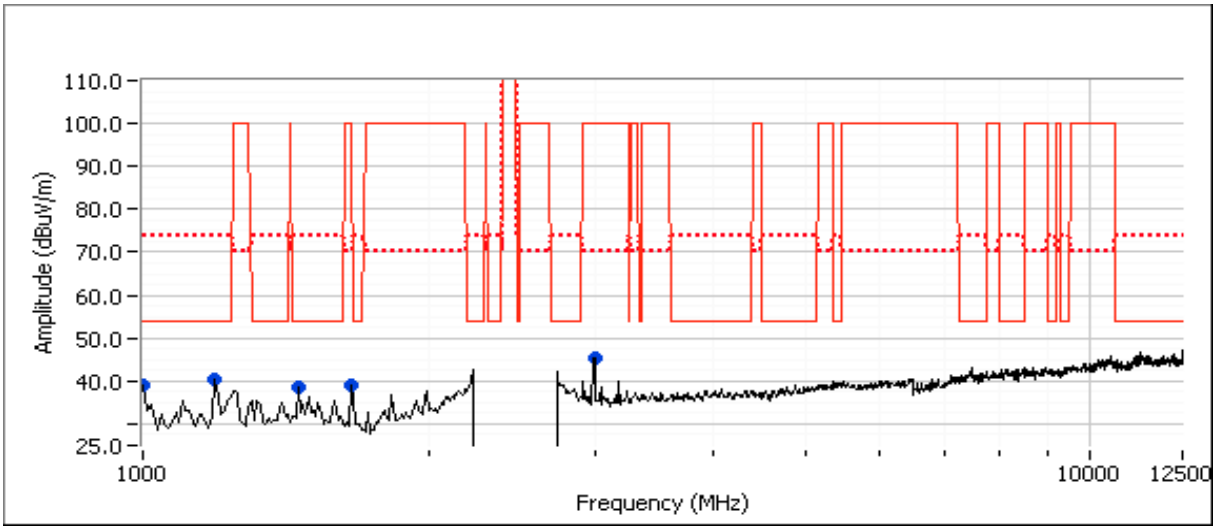
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #4b: Center Channel @ 2441 MHz

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2998.330	45.3	V	54.0	-8.7	Peak	158	1.0	Peak reading vs. average limit
1192.500	40.2	H	54.0	-13.8	Peak	75	1.0	Peak reading vs. average limit
1660.000	39.0	V	54.0	-15.0	Peak	200	1.0	Peak reading vs. average limit
1000.000	39.0	V	54.0	-15.0	Peak	180	2.5	Peak reading vs. average limit
1458.330	38.7	H	54.0	-15.3	Peak	139	1.6	Peak reading vs. average limit

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



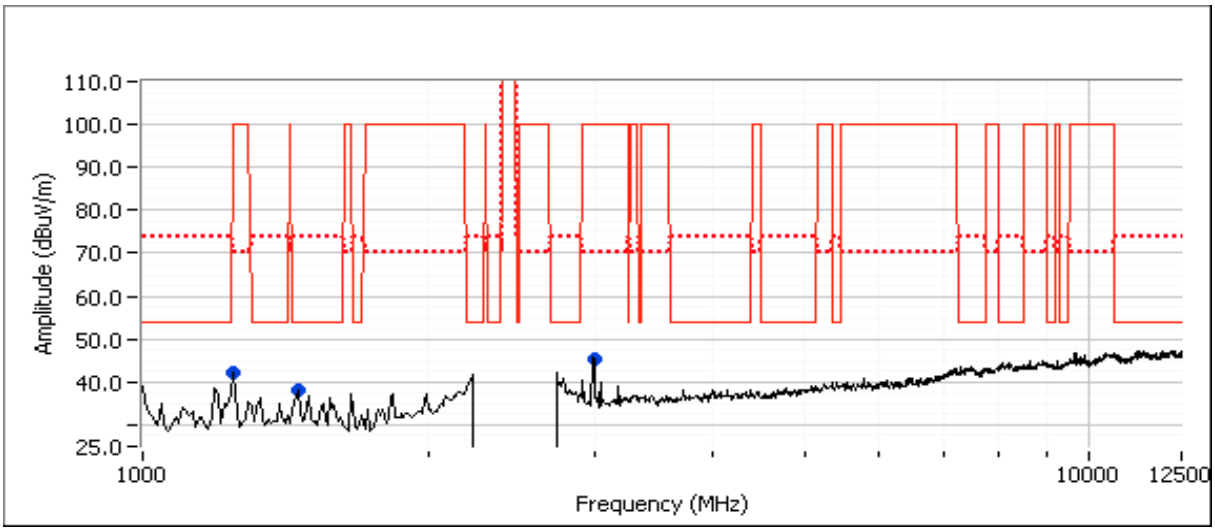
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #4c: High Channel @ 2480 MHz

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2998.330	45.5	V	54.0	-8.5	Peak	133	1.0	Peak reading vs. average limit
1247.500	42.1	V	54.0	-11.9	Peak	76	1.3	Peak reading vs. average limit
1458.330	38.3	H	54.0	-15.7	Peak	144	1.6	Peak reading vs. average limit

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

FCC 15.247 FHSS - Power, Bandwidth and Conducted Spurious Emissions

Test Specific Details

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

General Test Configuration

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

Unless stated otherwise the EUT was operating such that it constantly hopped on either the low, center or high channels.

Ambient Conditions:

Temperature: 18-23 °C
Rel. Humidity: 30-40 %

Summary of Results

MAC: 00150096B40F DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	PASS	Basic Rate: 7.2 dBm (0.005 W) EDR: 4.8 dBm (0.003 W)
2	20dB Bandwidth	15.247(a)	PASS	Basic Rate: 965 kHz EDR: 1300 kHz
2	99% bandwidth	15.247(a)	PASS	Basic Rate: 889 kHz EDR: 1188 kHz
3	Channel Spacing	15.247(a)	PASS	1 MHz
3	Channel Occupancy	15.247(a)	PASS	Device complies with the Bluetooth 2 specifications with a minimum of 20 hopping channels
3	Number of Channels	15.247(a)	PASS	
5	Conducted Spurious	15.247(a)	PASS	All emissions more than 20dB below the highest in-band signal level.

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	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Run #1: Output Power

Date of Test: 9/22/2011 Test Location: FT Chamber#4

Test Engineer: M. Birgani

For frequency hopping systems in the 2400-2483.5 MHz band employing less than 75 channels the maximum allowed output power is 0.125 watts.

Maximum antenna gain: 3.2 dBi

Mode	Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
Basic Rate	Low	2402	1 MHz	6.3	0.0043	0.0089
	Mid	2441	1 MHz	7.2	0.0052	0.0109
	High	2480	1 MHz	7.0	0.0050	0.0105
EDR	Low	2402	1 MHz	3.8	0.0024	0.0050
	Mid	2441	1 MHz	4.8	0.0030	0.0064
	High	2480	1 MHz	4.5	0.0028	0.0059

Run #2: Bandwidth, Channel Occupancy, Spacing and Number of Channels

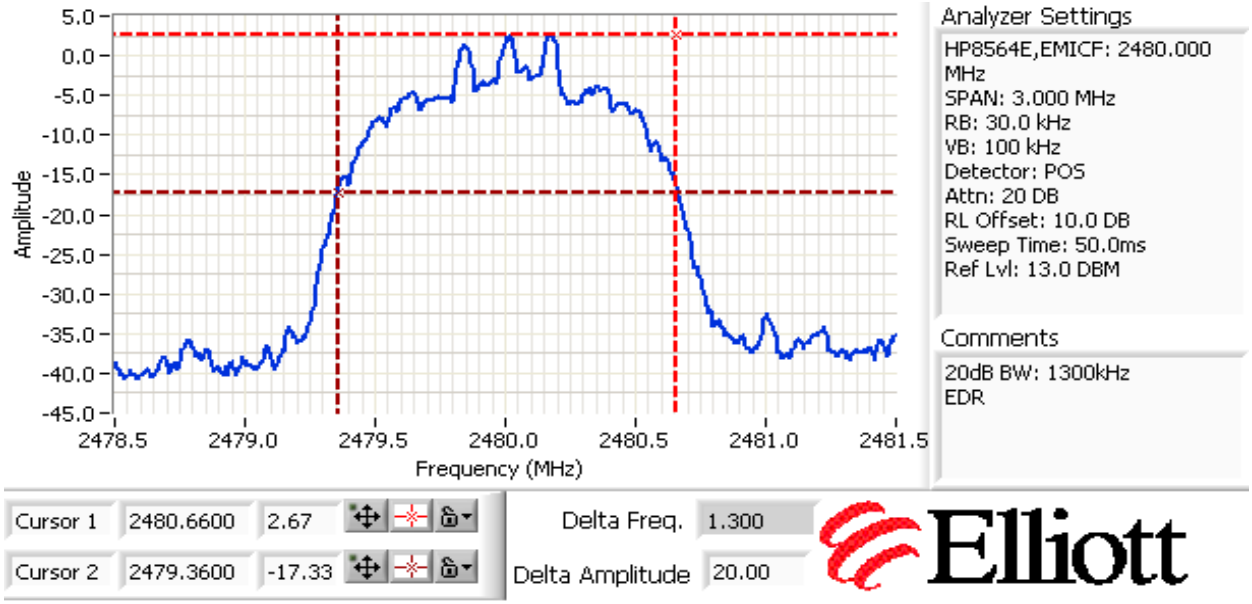
Date of Test: 9/22/2011 Test Location: FT Chamber#4

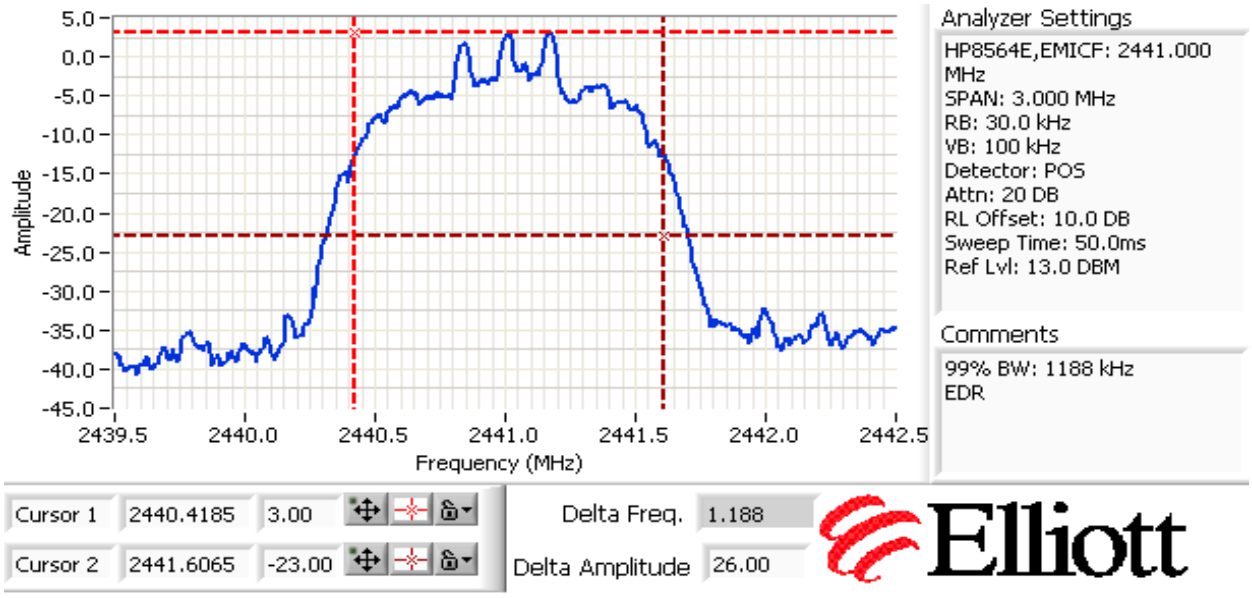
Test Engineer: M. Birgani

Mode	Channel	Frequency (MHz)	Resolution Bandwidth	20dB Bandwidth (kHz)	Resolution Bandwidth	99% Bandwidth (kHz)
Basic Rate	Low	2402	30 kHz	960	30 kHz	879
	Mid	2441	30 kHz	965	30 kHz	889
	High	2480	30 kHz	965	30 kHz	889
EDR	Low	2402	30 kHz	1295	30 kHz	1178
	Mid	2441	30 kHz	1300	30 kHz	1188
	High	2480	30 kHz	1300	30 kHz	1188

Note 1:	20dB bandwidth measured using RB = 30kHz, VB = 100kHz (VB > RB)
Note 2:	99% bandwidth measured using RB = 30kHz, VB = 100kHz VB >=3RB)

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A





Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

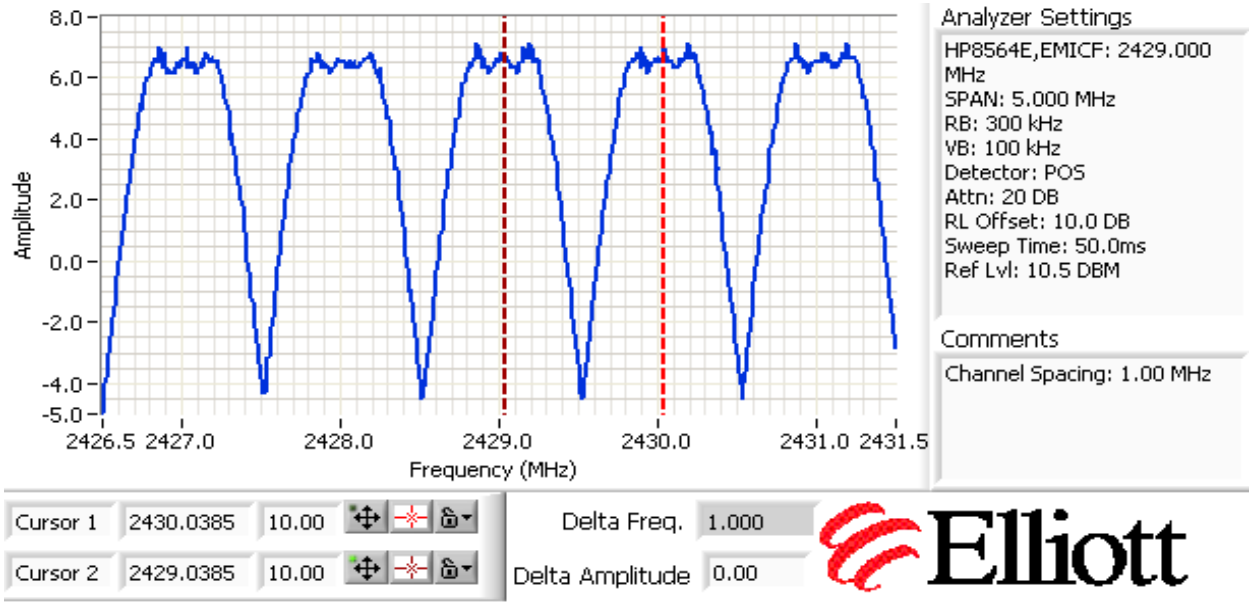
Channel Spacing

Channel Spacing: 1000.0 kHz
20dB Bandwidth: 1300 kHz

The channel spacing was measured in Basic rate mode with hopping enabled - see plot below showing channel spacing:
The channel spacing shall be greater than 2/3 Times the widest 20dB bandwidth as the ouput power is <0.125W.

Number of channels: 79 Max 20 Min (AFH enabled)

The number of channels was measured in Basic rate mode with hopping enabled with both the maximum (all) channels enabled and with the minimum number of channels enabled. The system shall employ a minimum of 15 hopping channels.



Run #4: Channel Occupancy and Number of Channels

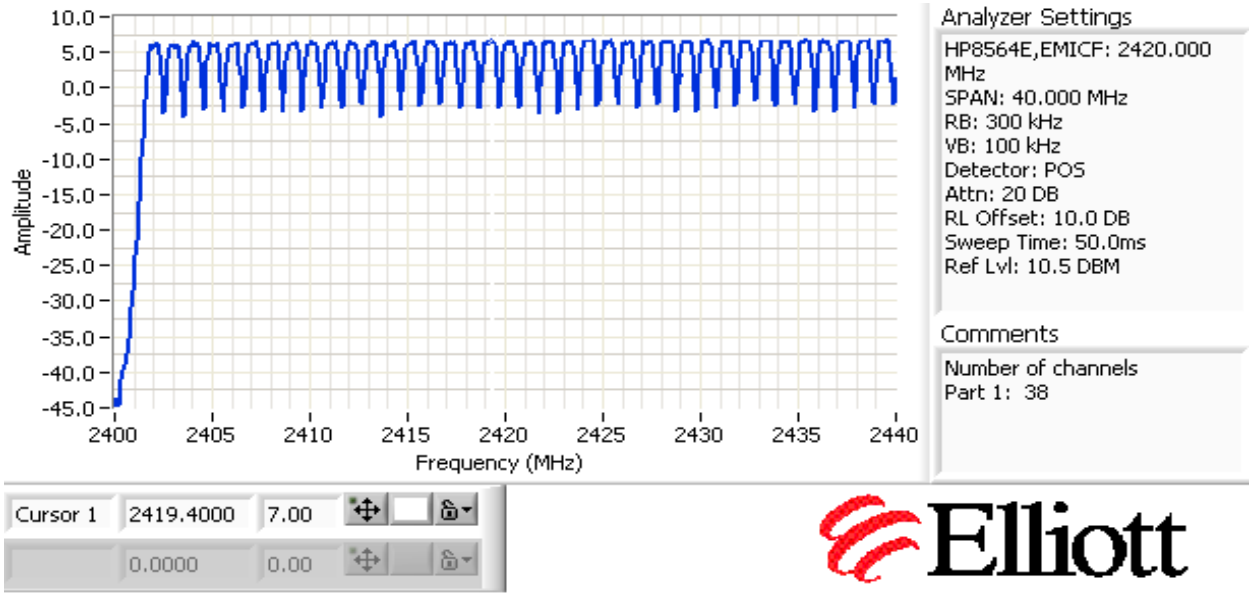
Requirement: Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

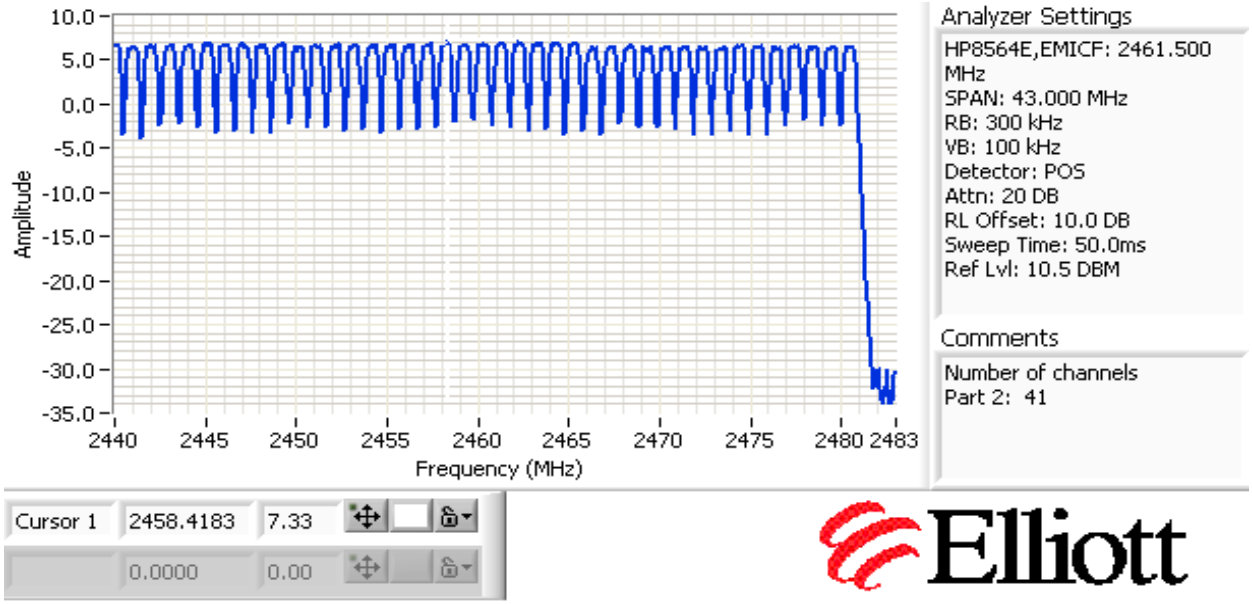
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. (Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.)

The device complies with the Bluetooth protocol and employs a minimum of 20 of the available 79 hopping channels when employing adaptove frequency hopping and all 79 channels when not. Channels are selected in a speudo random manner to ensure, on average, all channels are used equally.

The hopping rate is 1600 hops per second although any new channel may be used for a single hop slot, 3 hop slots or 5 hop slots. The dwell time per channel is, therefore either 0.625ms (single slot), 1.875ms (three slot) or 3.125ms (five slot). The average time of occupancy will not exceed 0.4s in any time interval of 0.4s mutliplied by the number of channels being used.

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A





Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

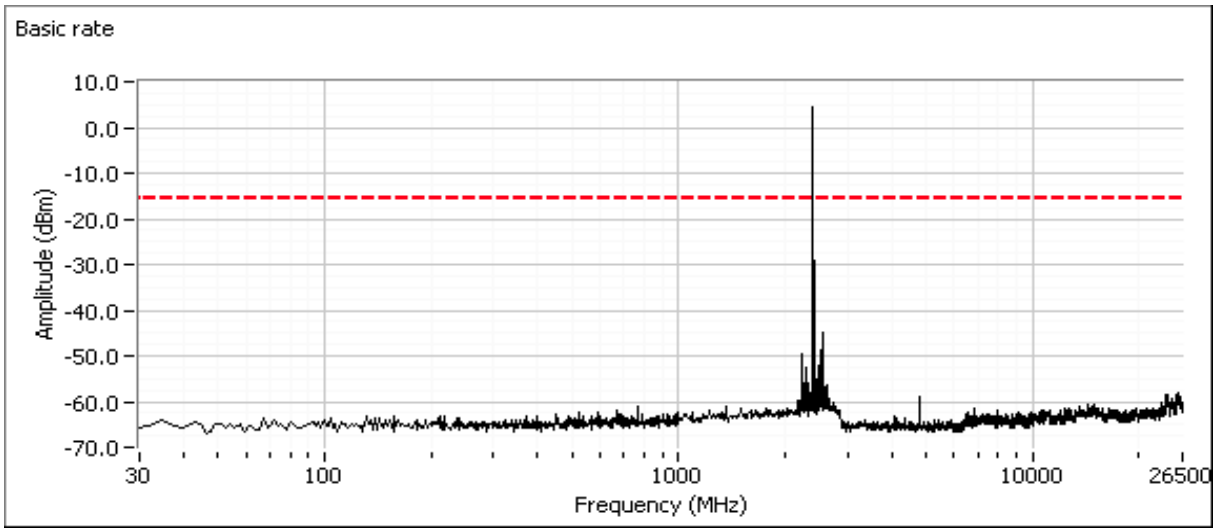
Run #4: Antenna Conducted Spurious Emissions, 30 - 26500 MHz.

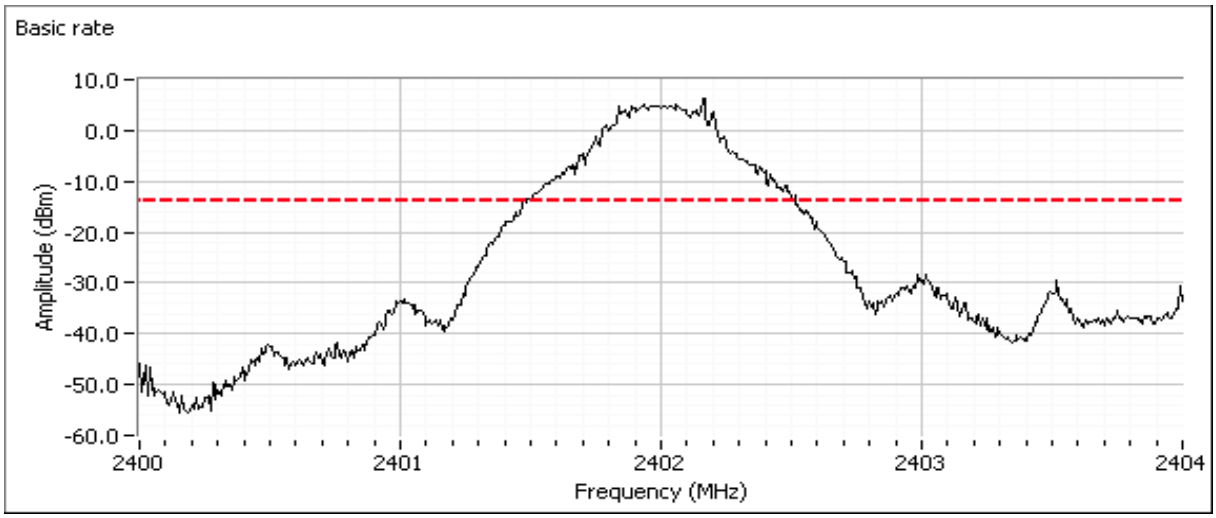
Date of Test: 9/22/2011 Test Location: FT Chamber#4

Test Engineer: M. Birgani

Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level with the hopping feature disabled. Addiitonal plots with hopping enabled at the band edges.

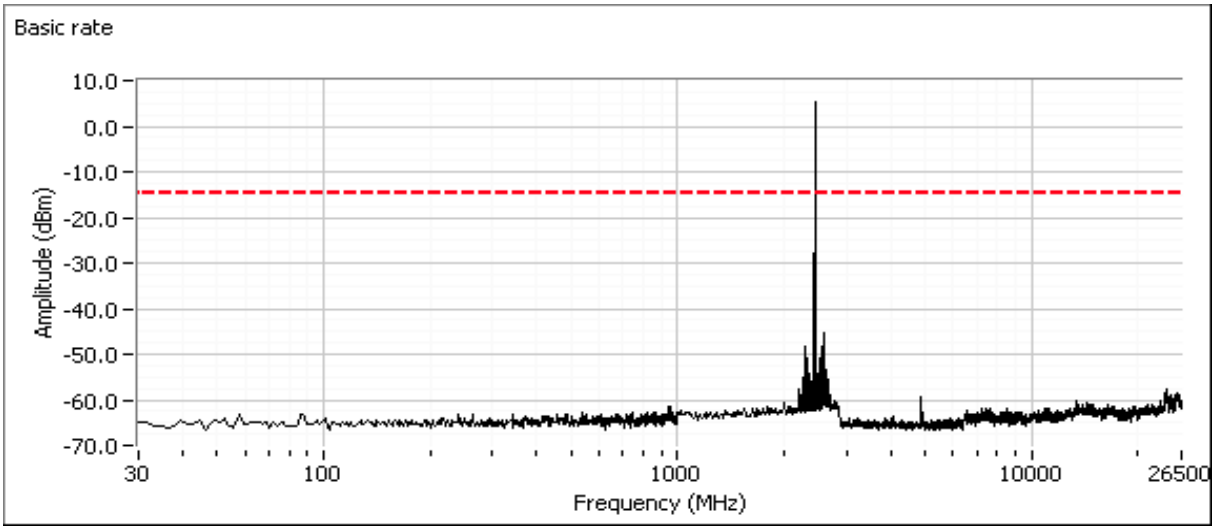
Low channel -Basic Rate



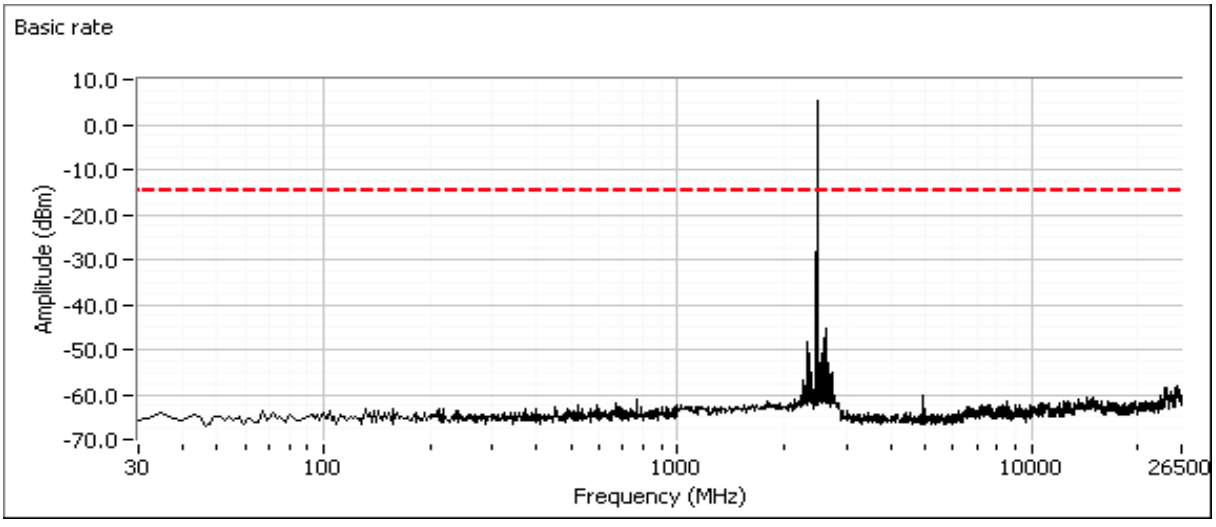


Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

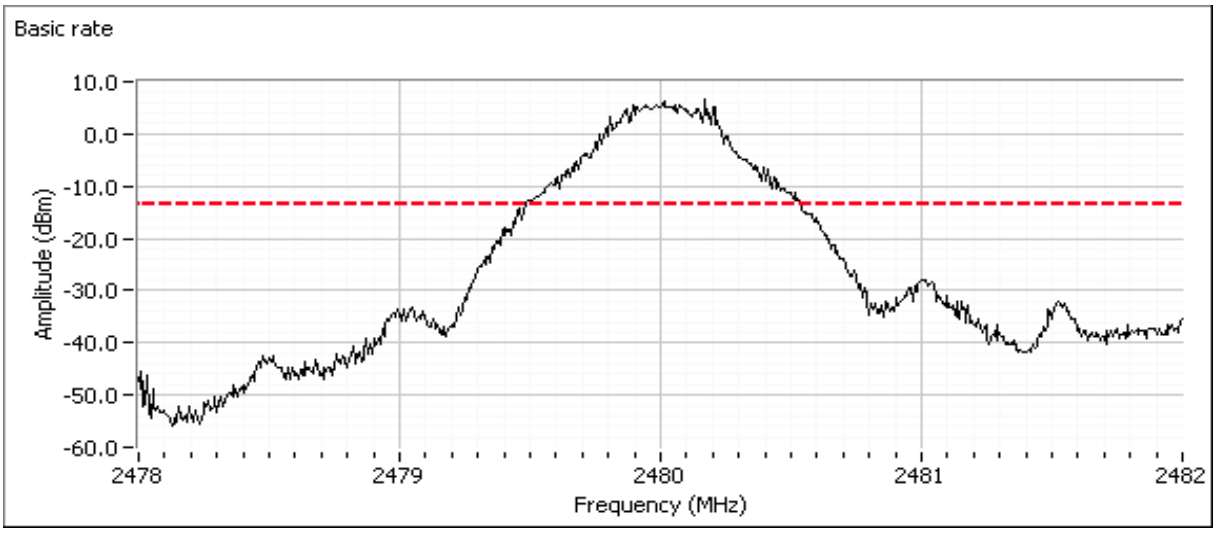
Center channel - Basic Rate



High channel - Basic Rate

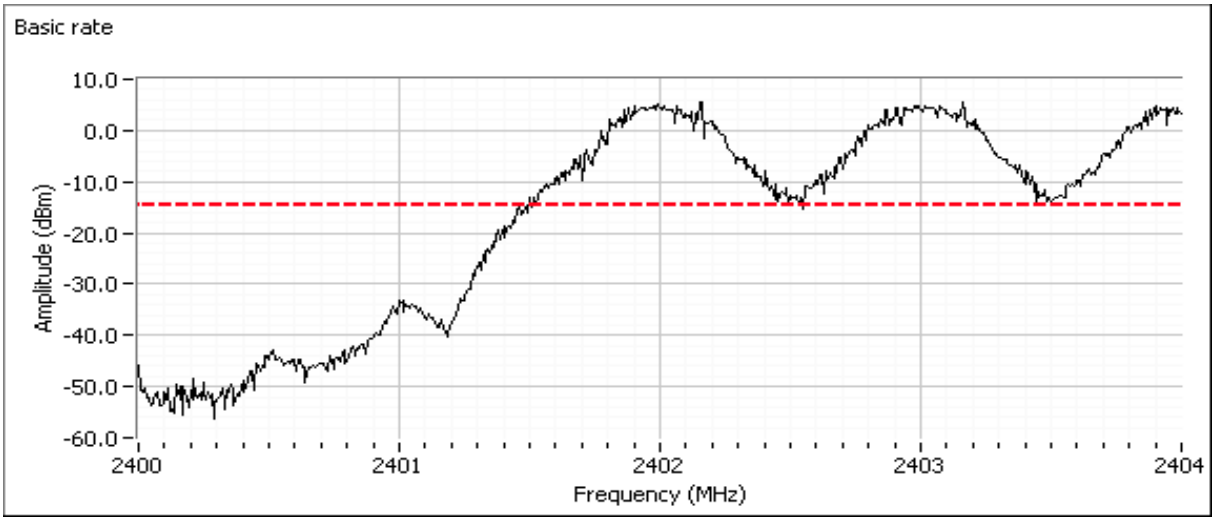


Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A



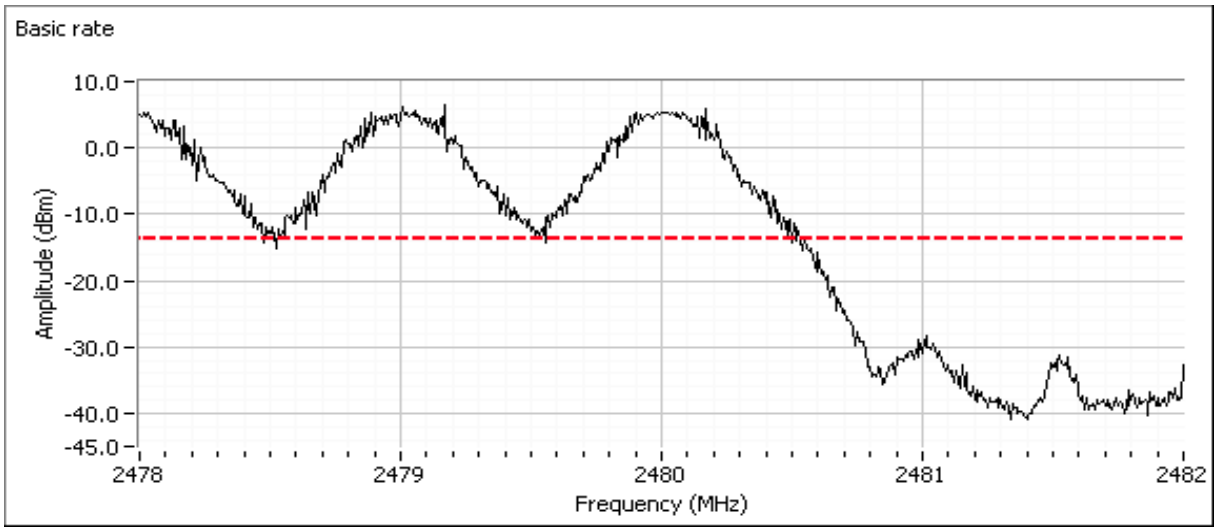
Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level with the hopping feature enabled to show compliance with the -20dBc requirement at the allocated band edge. The spectrum analyzer is left in max hold mode until the trace stabilizes.

Low channel, hopping enabled - Basic Rate

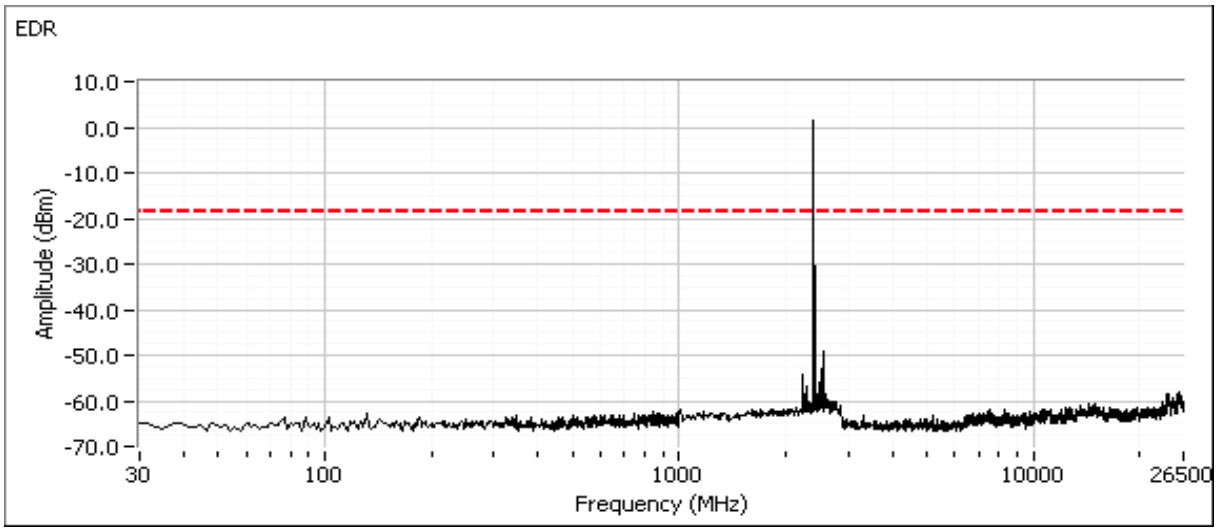


Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

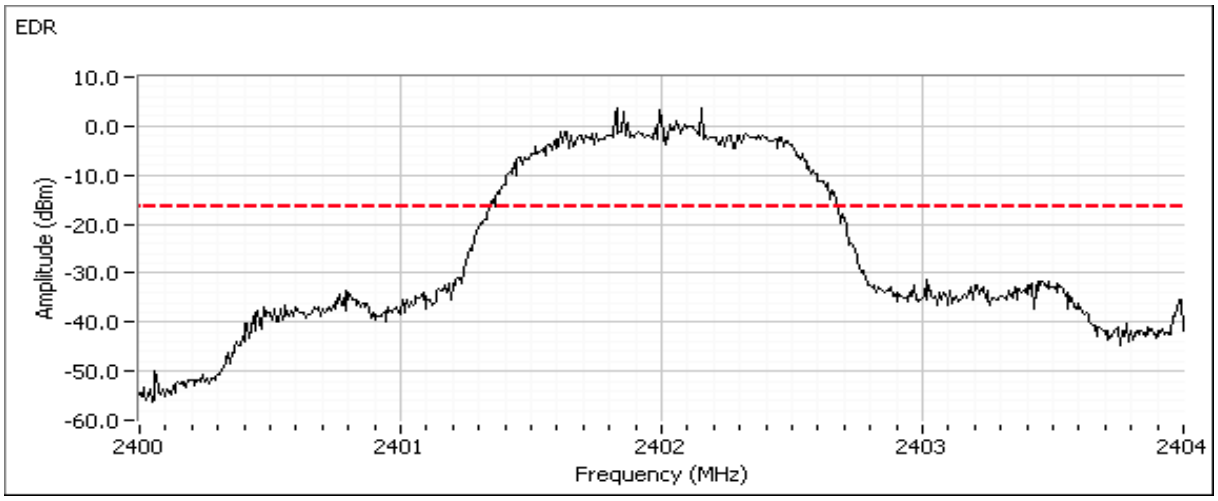
High channel, hopping enabled - Basic Rate



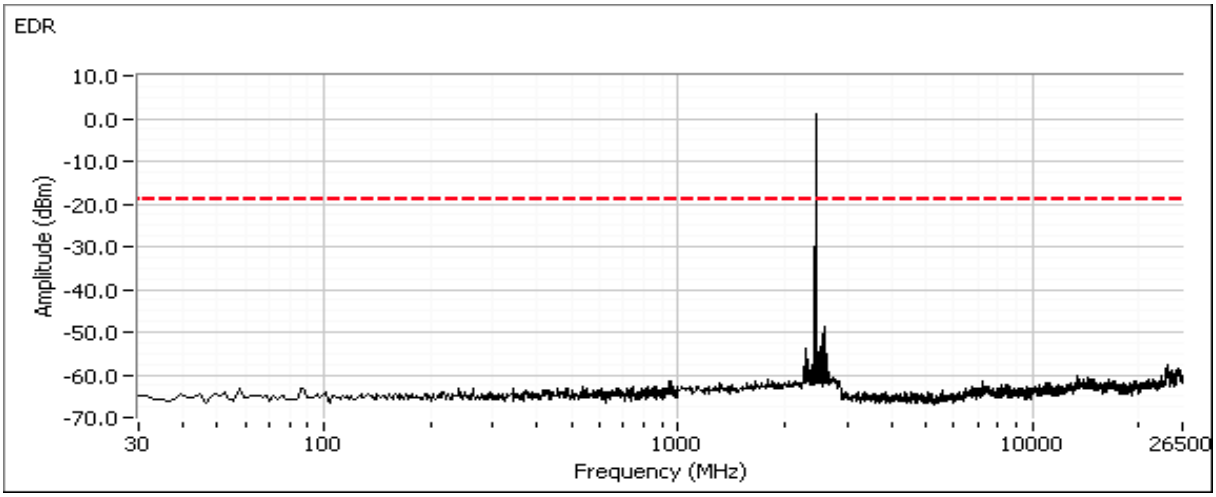
Low channel -EDR (3Mb/s)



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

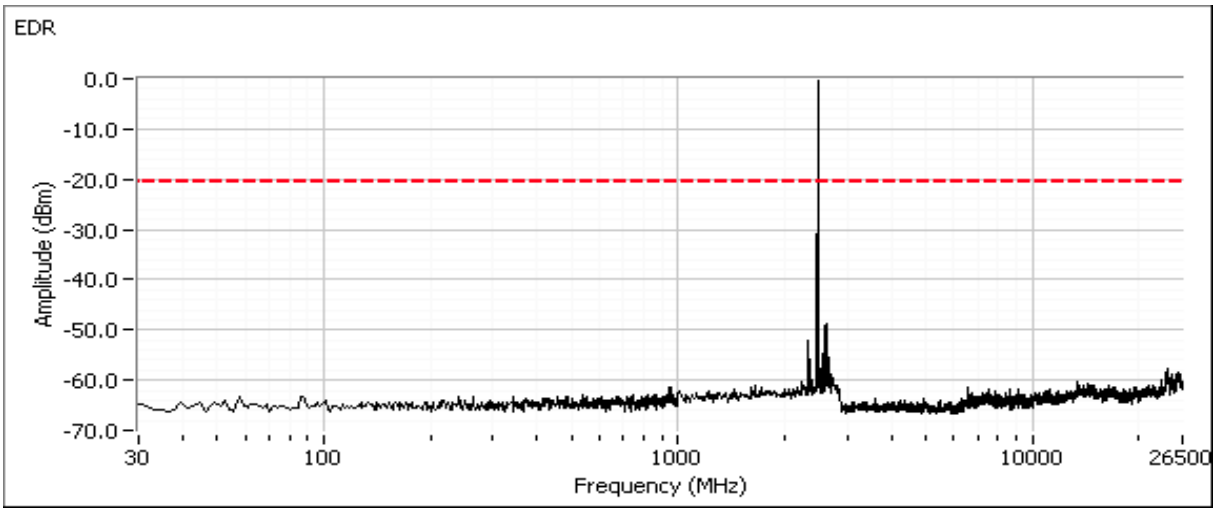


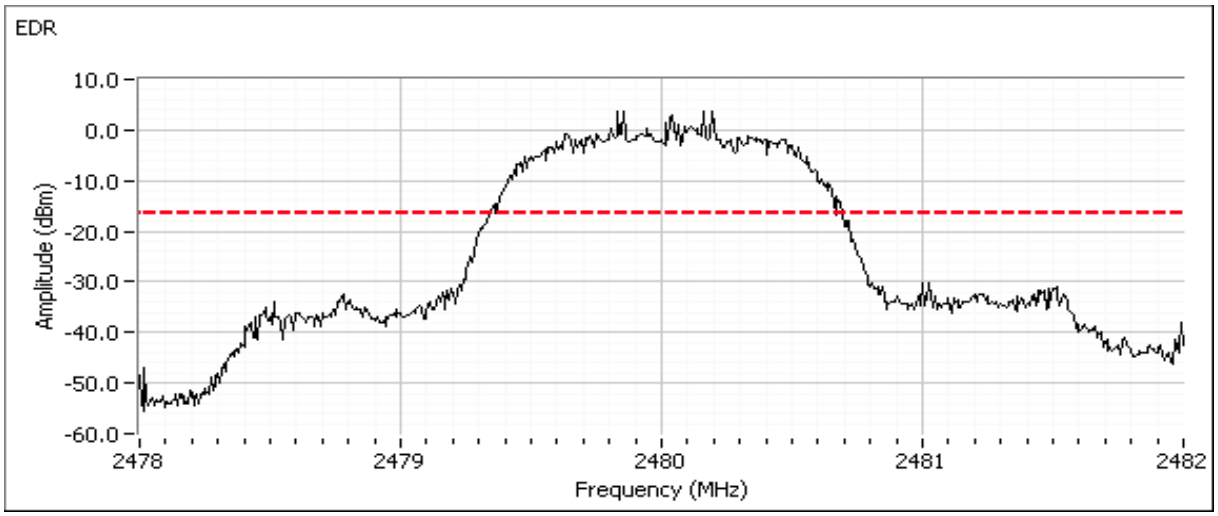
Center channel - EDR (3Mb/s)



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

High channel - EDR (3Mb/s)

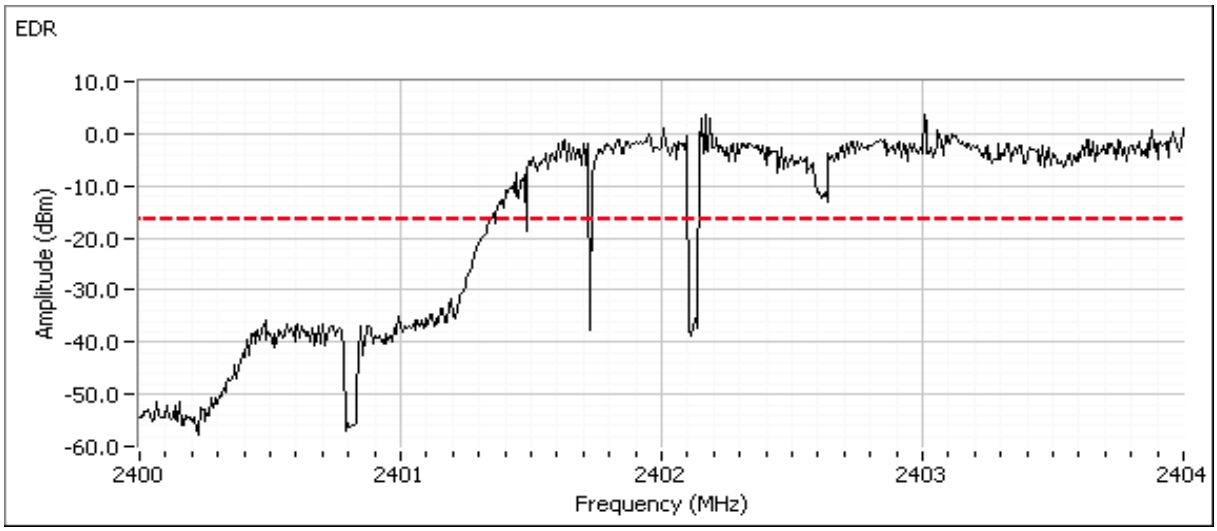




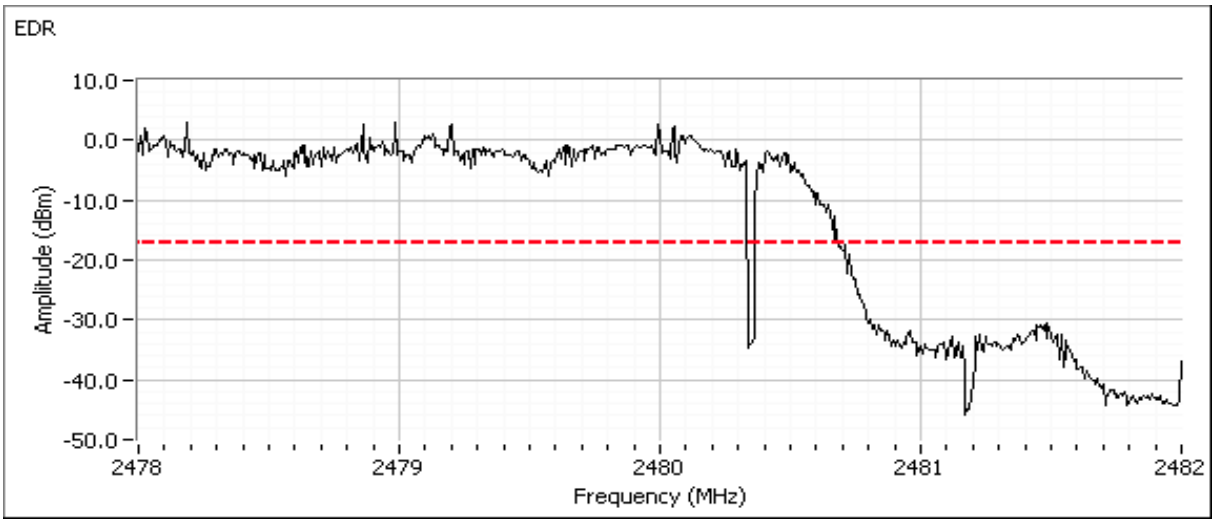
Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level with the hopping feature enabled to show compliance with the -20dBc requirement at the allocated band edge. The spectrum analyzer is left in max hold mode until the trace stabilizes.

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	N/A

Low channel, hopping enabled - EDR (3Mb/s)



High channel, hopping enabled - EDR (3Mb/s)



Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	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: 9/22/2011
Test Engineer: M. Birgani
Test Location: FT Chamber #4

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

General Test Configuration

The host system 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: 17-23 °C
Rel. Humidity: 30-40 %

Summary of Results

MAC: 00150096B40F DRTU Tool Version 1.5.3-0320 Driver version 15.0.0.51

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	Class B	PASS	41.7dBµV @ 8.000MHz (-8.3dB)

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.

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	B

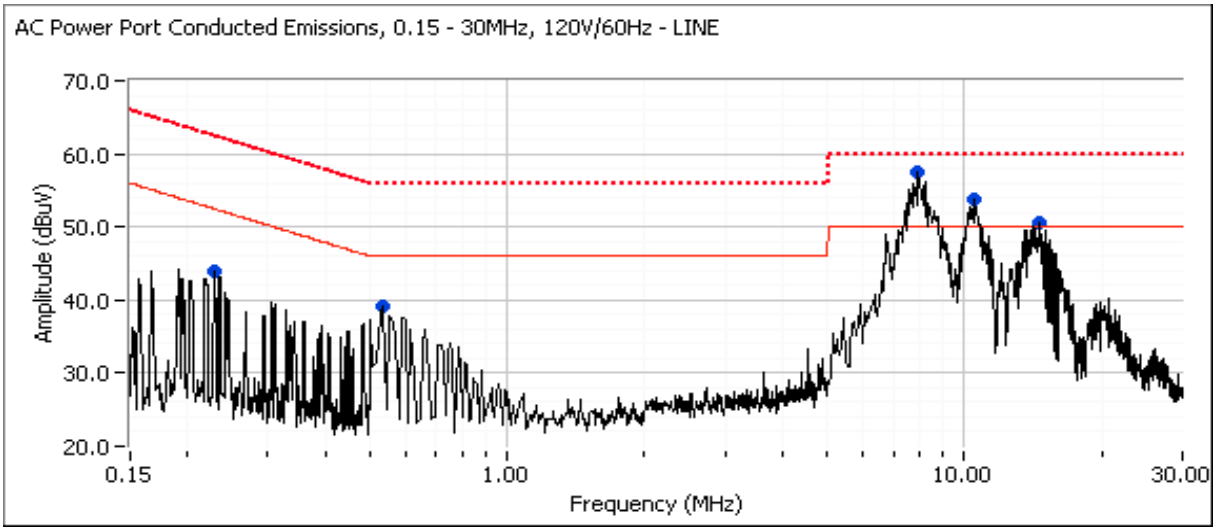
Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

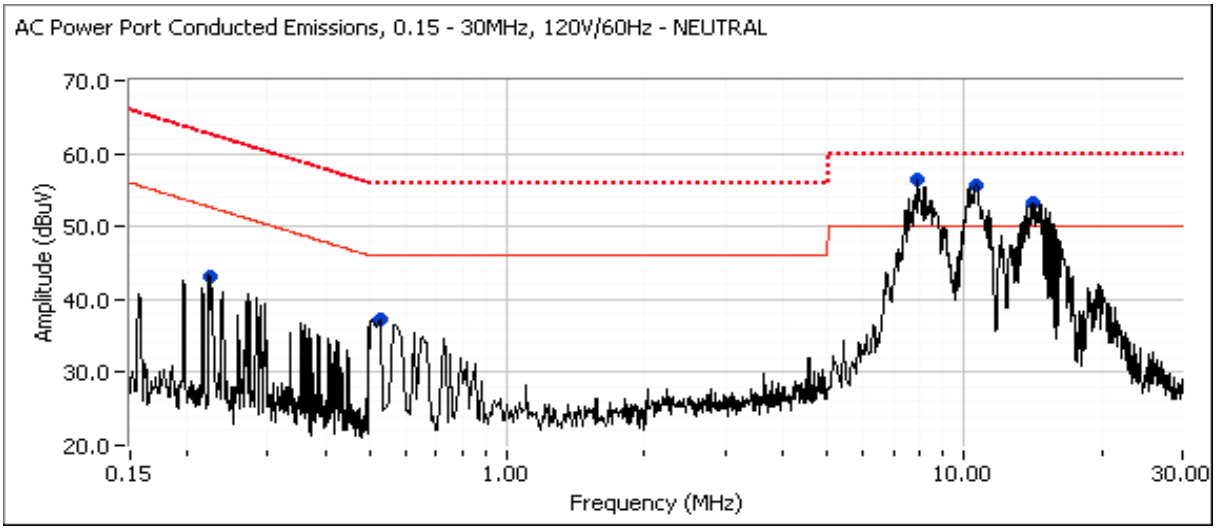
Note: The module was transmitting at 2437 MHz (Wi-Fi) at 17dBm and 2440 MHz (Bluetooth) at maximum level.

Final quasi-peak and average readings

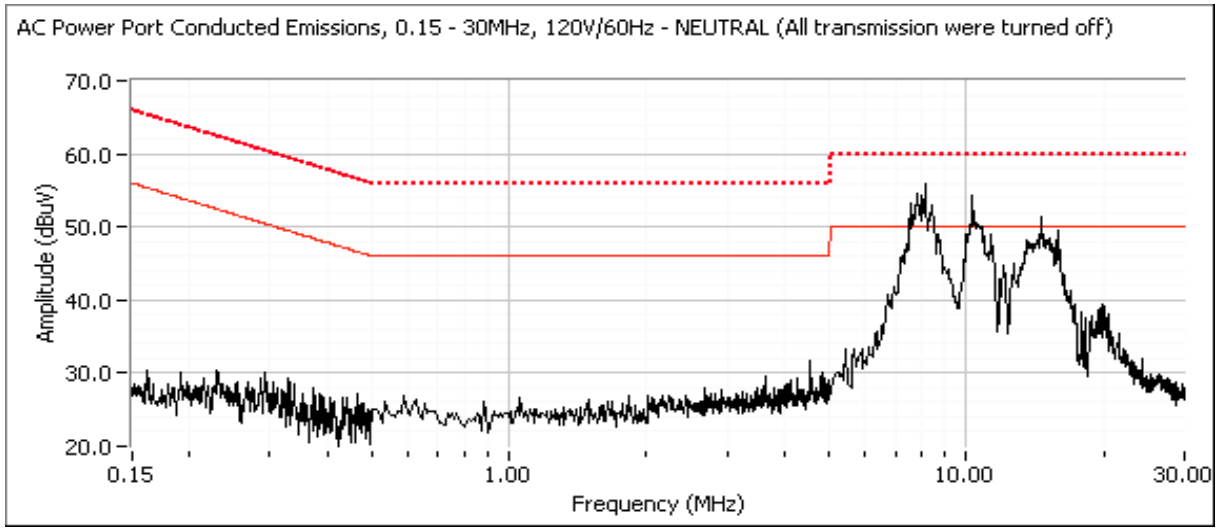
Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
8.000	41.7	Line	50.0	-8.3	AVG	AVG (0.10s)
8.000	40.5	Neutral	50.0	-9.5	AVG	AVG (0.10s)
10.733	37.4	Neutral	50.0	-12.6	AVG	AVG (0.10s)
8.000	46.2	Line	60.0	-13.8	QP	QP (1.00s)
8.000	45.6	Neutral	60.0	-14.4	QP	QP (1.00s)
14.149	35.0	Neutral	50.0	-15.0	AVG	AVG (0.10s)
10.342	34.5	Line	50.0	-15.5	AVG	AVG (0.10s)
10.733	43.6	Neutral	60.0	-16.4	QP	QP (1.00s)
14.633	33.5	Line	50.0	-16.5	AVG	AVG (0.10s)
10.342	41.0	Line	60.0	-19.0	QP	QP (1.00s)
14.149	40.3	Neutral	60.0	-19.7	QP	QP (1.00s)
14.633	38.9	Line	60.0	-21.1	QP	QP (1.00s)
0.555	19.8	Line	56.0	-36.2	QP	QP (1.00s)
0.549	19.8	Neutral	56.0	-36.2	QP	QP (1.00s)
0.228	26.2	Line	62.5	-36.3	QP	QP (1.00s)
0.224	26.4	Neutral	62.7	-36.3	QP	QP (1.00s)
0.555	4.5	Line	46.0	-41.5	AVG	AVG (0.10s)
0.549	4.3	Neutral	46.0	-41.7	AVG	AVG (0.10s)
0.228	10.1	Line	52.5	-42.4	AVG	AVG (0.10s)
0.224	10.0	Neutral	52.7	-42.7	AVG	AVG (0.10s)

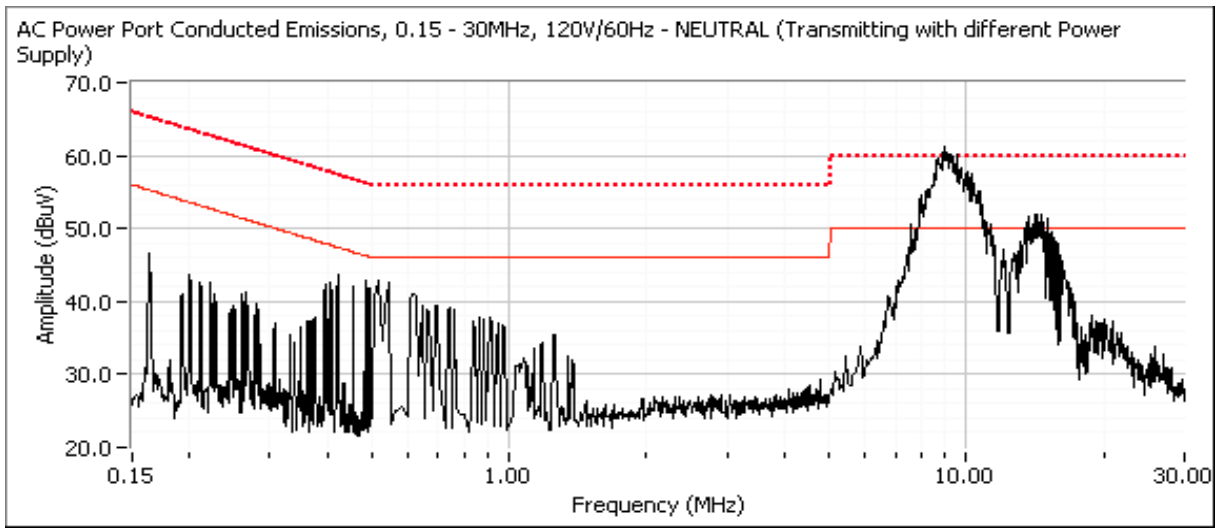
Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	B





Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	B





Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	B

Radiated Emissions - Module

(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: 9/22/2011
Test Engineer: M. Birgani
Test Location: FT Chamber #4

Config. Used: 1
Config Change: -
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: 17-22 °C
Rel. Humidity: 30-40 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1a - 802.11b	Radiated Emissions 30 - 1000 MHz, Preliminary	15.209 / 15.247 RSS 210	PASS	44.0dBµV/m @ 662.49MHz (Margin: -2.0dB)
1b - Bluetooth	Radiated Emissions 30 - 1000 MHz, Preliminary	15.209 / 15.247 RSS 210	PASS	45.2dBµV/m @ 662.47MHz (Margin: -0.8dB)
2 - Worst Case	Radiated Emissions 30 - 1000 MHz, Maximized	15.209 / 15.247 RSS 210	PASS	45.2dBµV/m @ 662.47MHz (Margin: -0.8dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

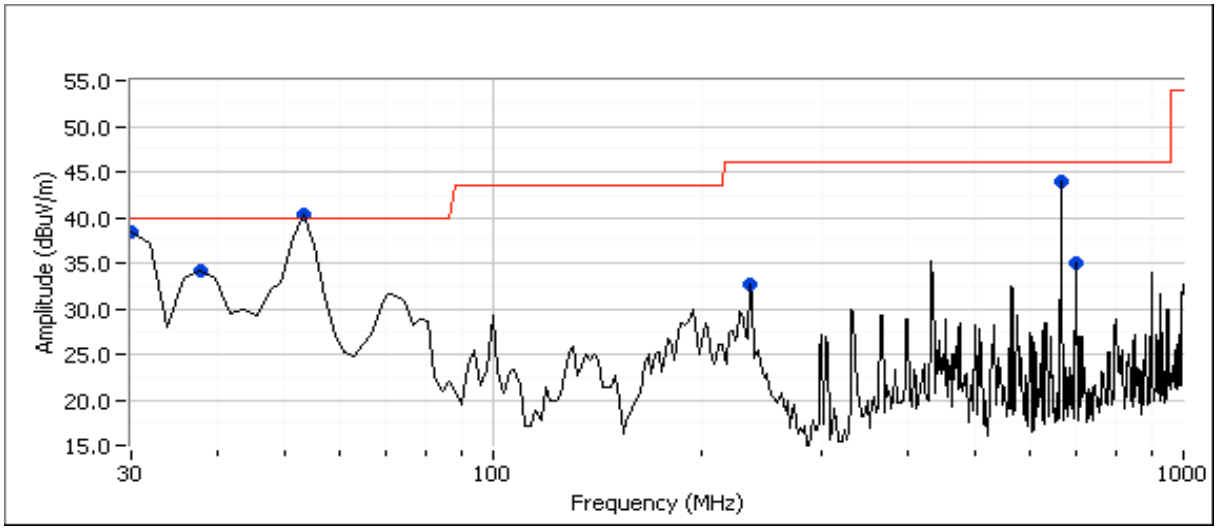
Deviations From The Standard

No deviations were made from the requirements of the standard.

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

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	B

Run #1a: Preliminary Radiated Emissions, 30 - 1000 MHz, EUT at 2437MHz, 802.11b Mode (16.5dBm)



Preliminary peak readings captured during pre-scan

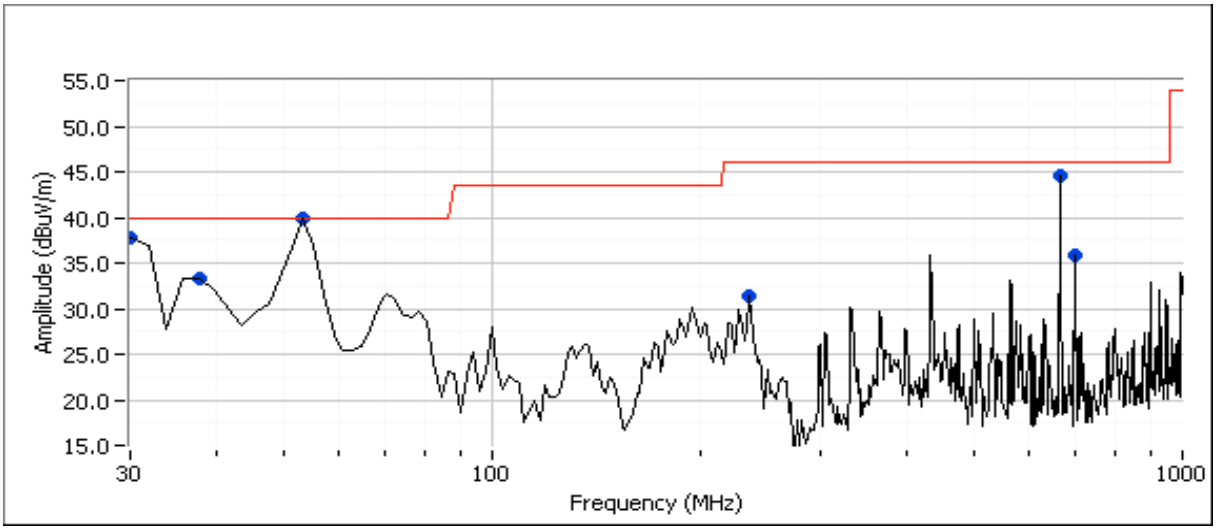
Frequency	Level	Pol	FCC 15.209 / RSS 210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
54.406	40.3	V	40.0	0.3	Peak	360	1.0	
31.915	38.5	H	40.0	-1.5	Peak	244	1.0	
662.492	43.9	H	46.0	-2.1	Peak	79	1.5	
32.984	34.2	V	40.0	-5.8	Peak	88	1.0	
699.970	34.9	H	46.0	-11.1	Peak	224	1.0	
236.587	32.7	V	46.0	-13.3	Peak	136	1.0	

Preliminary quasi-peak readings (no 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	
662.492	44.0	H	46.0	-2.0	QP	83	1.2	QP (1.00s)
31.915	29.5	H	40.0	-10.5	QP	253	1.0	QP (1.00s)
699.970	34.7	H	46.0	-11.3	QP	214	1.0	QP (1.00s)
32.984	26.3	V	40.0	-13.7	QP	80	1.0	QP (1.00s)
236.587	31.7	V	46.0	-14.3	QP	135	1.0	QP (1.00s)
54.406	25.3	V	40.0	-14.7	QP	5	1.0	QP (1.00s)

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	B

Run #1b: Preliminary Radiated Emissions, 30 - 1000 MHz, EUT at 2440MHz, Bluetooth Basic Rate



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	
30.000	37.8	H	40.0	-2.2	Peak	246	1.0	
37.047	33.4	V	40.0	-6.6	Peak	326	1.0	
55.475	40.0	V	40.0	0.0	Peak	42	1.0	
237.073	31.4	V	46.0	-14.6	Peak	114	1.0	
662.473	44.5	H	46.0	-1.5	Peak	82	1.5	
699.990	35.9	H	46.0	-10.1	Peak	221	1.0	

Preliminary quasi-peak readings (no 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	
662.468	45.2	H	46.0	-0.8	Peak	91	1.1	QP (1.00s)
699.990	34.9	H	46.0	-11.1	Peak	223	1.0	QP (1.00s)
55.470	26.3	V	40.0	-13.7	Peak	44	1.0	QP (1.00s)
237.073	31.0	V	46.0	-15.0	Peak	112	1.0	QP (1.00s)
30.012	22.8	H	40.0	-17.2	Peak	266	1.0	QP (1.00s)
37.047	19.4	V	40.0	-20.6	Peak	300	1.0	QP (1.00s)

Client:	Intel	Job Number:	J84264
Model:	135BNHMW & 135BNHU	T-Log Number:	T84548
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15 B, 15.247, RSS 210	Class:	B

Run #2: Maximized Readings From Run #1

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	
662.468	45.2	H	46.0	-0.8	Peak	82	1.5	
699.990	34.9	H	46.0	-11.1	Peak	221	1.0	
55.470	26.3	V	40.0	-13.7	Peak	42	1.0	
236.587	31.7	V	46.0	-14.3	QP	135	1.0	
32.984	26.3	V	40.0	-13.7	QP	80	1.0	
31.915	29.5	H	40.0	-10.5	QP	253	1.0	

End of Report

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