EMC Test Report

FCC Part 15 Subpart C
(Class II Permissive Change)

Model: Intel® Centrino® Advanced-N + WiMAX 6250, model 622ANXHMW

FCC ID:	PD9622ANXH E2K625ANXH
APPLICANT:	Intel Corporation 2111 NE 25th Avenue Hillsboro, OR 97124
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road. Fremont, CA. 94538-2435
REPORT DATE:	May 17, 2010
FINAL TEST DATES:	May 10, 2010

AUTHORIZED SIGNATORY:

Mark Briggs
Staff Engineer
Elliott Laboratories.

Testing Cert #2016-01

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	5/17/2010	First release	

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SCOPE

An electromagnetic emissions test has been performed on the Intel Corporation model Intel® Centrino® Advanced-N + WiMAX 6250, model 622ANXHMW, pursuant to the following rules:

FCC Part 15 Subpart C

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

ANSI C63.4:2003
FCC DTS Measurement Procedure KDB558074, March 2005

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

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

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

OBJECTIVE

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

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

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

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

STATEMENT OF COMPLIANCE

The tested sample of Intel Corporation model Intel® Centrino® Advanced-N + WiMAX 6250, model 622ANXHMW complied with the requirements of 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® Advanced-N + WiMAX 6250, model 622ANXHMW 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

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Preliminary measurements confirmed that the proposed change (change in FEM) does not affect the modulation, bandwidth or output power from the device. The original data submitted remains representative.	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth		>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)		1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density		8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz		< -30dBc Note 1	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.0dBµV/m @ 2483.5MHz (-1.0dB)	15.207 in restricted bands, all others <-30dBc Note 1	Complies

Note 1: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst) / RMS averaging over a time interval, as permitted under RSS 210 section A8.4(4).

DIGITAL TRANSMISSION SYSTEMS (5725-5850MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Preliminary measurements confirmed that the proposed change (change in FEM) does not affect the modulation, bandwidth or output power from the device. The original data submitted remains representative.	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth		>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)		1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density		8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz		< -30dBc Note 1	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	40.2dBµV/m @ 7500.0MHz (-13.8dB)	15.207 in restricted bands, all others <-30dBc Note 1	Complies

Note 1: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst) / RMS averaging over a time interval, as permitted under RSS 210 section A8.4(4).

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	The proposed change (change in FEM) does not affect the AC conducted emissions from the host device powering the module and does not require a change in the connector. The original data submitted remains representative.		
15.207	RSS GEN Table 2	AC Conducted Emissions			
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	The output power and system eirp remains unchanged. The original MPE evaluation remains valid.		

MEASUREMENT UNCERTAINTIES

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

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

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Intel Corporation model Intel® Centrino® Advanced-N + WiMAX 6250, model 622ANXHMW is a PCI express form factor (half-mini) card that is designed to provide a 2x2 802.11abgn and 1x2 802.16e interfaces for host systems such as laptop PCs. The electrical rating of the EUT is 3.3Vdc (via mini PCI bus).

The sample was received on May 10, 2010 and tested on May 10, 2010. The EUT consisted of the following component(s):

Company	Model	Description	MAC Address	FCC ID
Intel Corporation	622ANXHMW	2x2 802.11abgn PCIe card	0023150BB3C8	PD9622ANXH E2K625ANXH

ANTENNA SYSTEM

The antenna system used with the Intel Corporation 622ANXH was the Universe PIFA antenna, the same antenna used for the original FCC filing..

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 support equipment was used for spurious radiated emissions and all rf port measurements:

Company	Model	Description	Serial Number	FCC ID
Intel	None	PCIe test fixture		N/A
Dell	-	Laptop PC	Prototype	None
Topward	-	DC Supply		N/A

EUT INTERFACE PORTS

The I/O cabling configuration for spurious radiated emissions and all rf port measurements was:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Test fixture PCI	Laptop PCI	Ribbon Cable	Unshielded	0.8
Test fixture 3.3Vdc	Bench supply	2-wire	Unshielded	0.8

EUT OPERATION

During transmitter tests the EUT was being controlled by the Intel CRTU tool to operate in a continuous transmit mode on the top, bottom or center channel as required in each the modulation modes that represented the worst case mode for the out of band spurious emissions (away from the band edges) and the spurious emissions at the edges of the 2400-2483.5 MHz band for transmit chain B. Those modes were:

- Spurious emissions, device operating in the 2.4GHz band:
  - 802.11b mode at 1Mb/s
  - Note – spurious emissions in the worst case OFDM mode, 802.11g mode, were also evaluated on the center channel to confirm 802.11b mode was the worst case
- Spurious emissions, device operating in the 5GHz DTS band:
  - 802.11n20MHz, device operating at the maximum power per chain (16.5dBm) on both chains.
- Spurious emissions at the 2400-2483.5MHz band edges:
  - Restricted band edge at 2390MHz - 802.11n 20MHz mode and 802.11n 40MHz mode.
  - Restricted band edge at 2390MHz - 802.11g mode and 802.11n 40MHz mode.

The data rates of 1Mb/s for 802.11b, 6Mb/s for 802.11g, 6.5Mb/s for HT20 and 13.0Mb/s for HT40 modes were identified as the data rates having the highest output power in each mode during the original testing.

Testing was limited to evaluating Chain B as the proposed change only affected operation on chain B.

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 5	211948	2845B-5	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site contains 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.

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.

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.

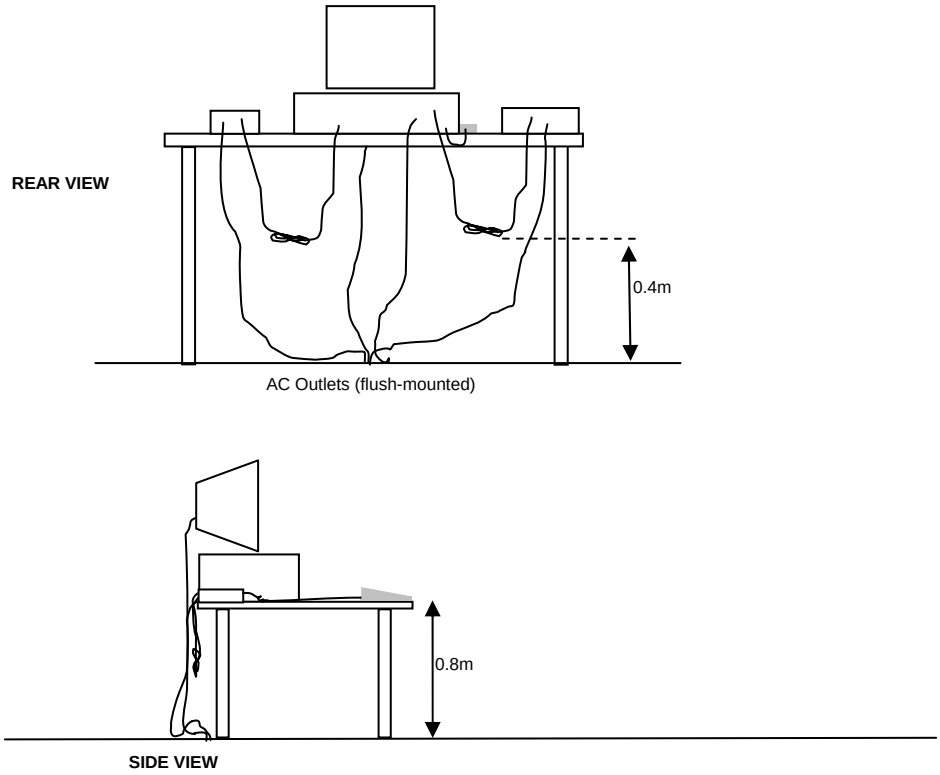
RADIATED EMISSIONS

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.

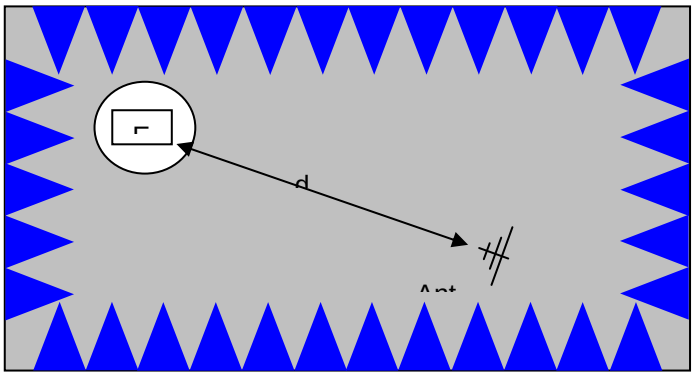
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

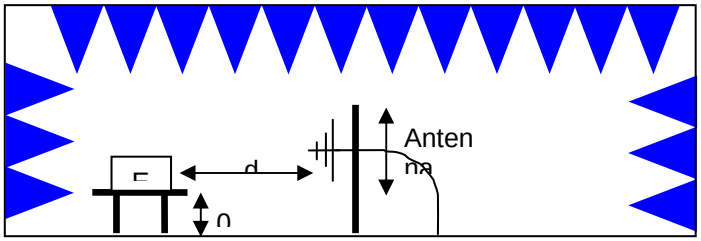
When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



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



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

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:

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

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).

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

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

Appendix A Test Equipment Calibration Data

Radiated Emissions, 1000 - 18,000 MHz, 12-May-10

Manufacturer	Description	Model	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/2/2010
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	4/14/2011
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	9/17/2010

Note preliminary testing indicated no significant radiated emissions above 18GHz.

Appendix B Test Data

T79268 13 Pages

Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		Mark Briggs
Emissions Standard(s):	FCC 15.247 / RSS 210	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Intel

Model

622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B

Date of Last Test: 5/11/2010

Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 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 engineering evaluation testing of the EUT with respect to the specification listed above.

Summary of Results

MAC Address: 0023150BB3C8 (Wimax = 001DE130AC05) CRTU Tool Version 5.199.36.9999 Driver version 13.0.0.112

Run #	Mode	Channel	Target Power	Measured Power	Test Performed	Limit	Result / Margin
Measurements for spurious emissions away from the band edges, 2.4GHz band, worst case mode (802.11b)							
Run # 1	802.11b Chain B	#1 2412MHz	11.5	11.7	Radiated Emissions 1 - 10 GHz (Preliminary testing indicated emissions > 10GHz were at least 20dB below the limit)	FCC 15.209 / 15.247	50.8dBµV/m @ 4824.0MHz (-3.2dB)
		#6 2437MHz	11.5	11.6			52.4dBµV/m @ 4874.0MHz (-1.6dB)
		#11 2462MHz	8.5	8.6			47.9dBµV/m @ 4924.0MHz (-6.1dB)
Spot check on 802.11g mode to confirm 802.11b is worst case							
Run #2	802.11g Chain B	#6 2437MHz	16.5	16.8			47.9dBµV/m @ 4924.0MHz (-6.1dB)
Measurements for spurious emissions, 5.7GHz band, worst case mode (802.11n20, both chains active)							
Run # 3	n20 Chain A+B	#149 5745MHz	A: 16.5 B: 16.5	16.5 16	Radiated Emissions, 1 - 18 GHz (Preliminary testing indicated emissions > 10GHz were at least 20dB below the limit)	FCC 15.209 / 15.247	37.1dBµV/m @ 1329.8MHz (-16.9dB)
		#157 5785MHz	A: 16.5 B: 16.5	16.6 16.1			40.2dBµV/m @ 7500.0MHz (-13.8dB)
		#165 5825MHz	A: 16.5 B: 16.5	16.5 16.4			40.0dBµV/m @ 7500.0MHz (-14.0dB)
Measurements for spurious emissions at the band edges, 2.4GHz band, worst case 20MHz mode and 40MHz mode (802.11b)							
Run # 4	g Chain B	#1 2412MHz			Restricted Band Edge at 2400 MHz	15.209	n20 is worst case on low channel
		#11 2462MHz	16.0	16.2	Restricted Band Edge at 2483.5 MHz	15.209	51.4dBµV/m @ 2483.5MHz (-2.6dB)
Run # 5	n20 Chain B	#1 2412MHz	14.6	14.7	Restricted Band Edge at 2400 MHz	15.209	49.1dBµV/m @ 2390.0MHz (-4.9dB)
		#11 2462MHz			Restricted Band Edge at 2483.5 MHz	15.209	802.11g is worst case on high channel
Run # 6	n40 Chain B	#3 2422MHz	10.8	10.9	Restricted Band Edge at 2400 MHz	15.209	45.4dBµV/m @ 2389.8MHz (-8.6dB)
		#9 2452MHz	14.6	14.9	Restricted Band Edge at 2483.5 MHz	15.209	53.0dBµV/m @ 2483.5MHz (-1.0dB)

Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

General Test Configuration

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

Ambient Conditions:

Temperature: 18.7 °C
Rel. Humidity: 35 %

Marker Delta Measurements

Three sets of marker deltas are measured using the following settings: RB=VB=100kHz; RB=1MHz,VB=1MHz; RB=1MHz, VB=10Hz.
Typically only the plot showing the largest delta is included in the test data to keep file sizes to a minimum.
Marker deltas are made conducted (analyzer connected to EUT rf port a 20dB pad) for single chain operation.

Run # 1, Radiated Spurious Emissions, 1-26GHz, 802.11b, Chain B

Date of Test: 5/10/2010 Test Location: FT Chamber #5
Test Engineer: Rafael Varelas / Joseph Cadigal Config Change: none

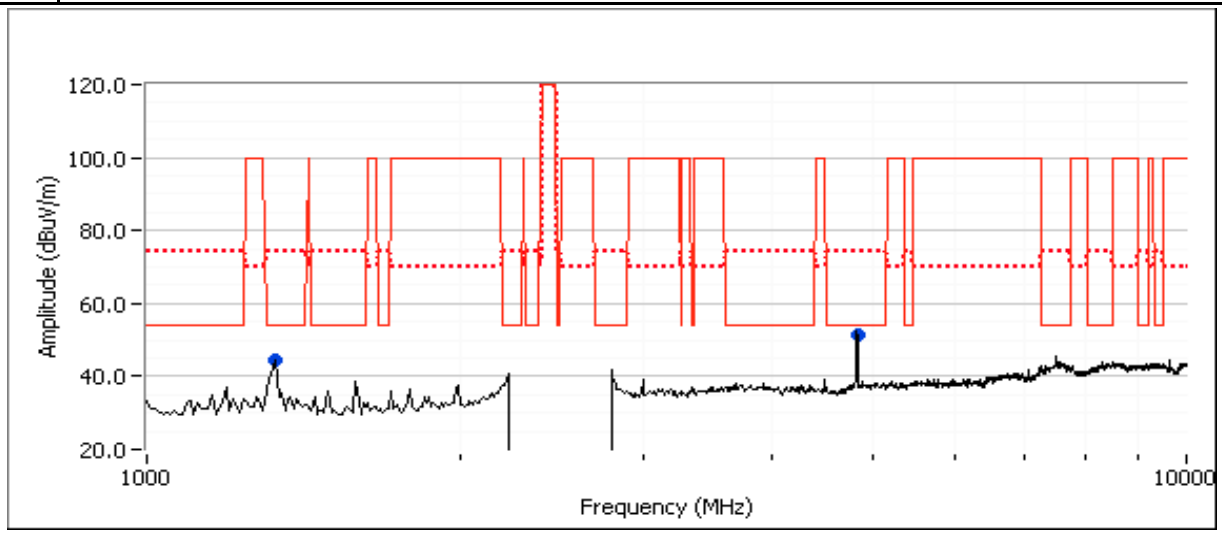
Run # 1a, EUT on Channel #1 2412MHz - 802.11b, Chain B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain B	11.5	11.7	18.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4824.010	50.8	V	54.0	-3.2	AVG	209	1.0	RB 1 MHz; VB: 10 Hz
1329.970	35.2	V	54.0	-18.8	AVG	102	1.6	RB 1 MHz; VB: 10 Hz
4824.030	53.0	V	74.0	-21.0	PK	209	1.0	RB 1 MHz; VB: 1 MHz
1331.180	52.8	V	74.0	-21.2	PK	102	1.6	RB 1 MHz; VB: 1 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.



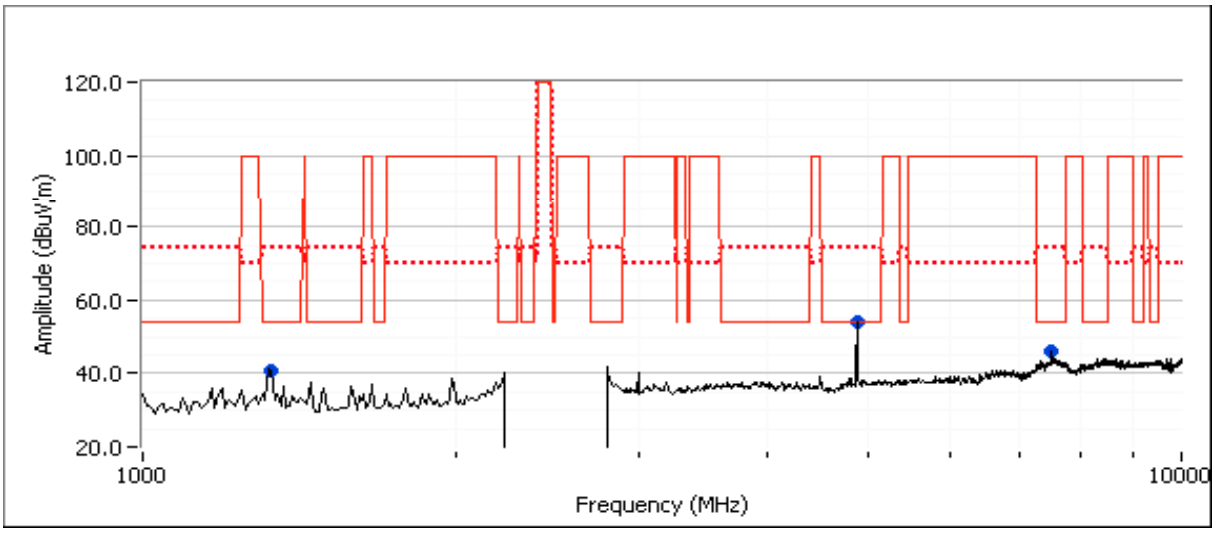
Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 1b: , EUT on Channel #6 2437MHz - 802.11b, Chain B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain B	11.5	11.6	18.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.000	52.4	V	54.0	-1.6	AVG	253	1.0	RB 1 MHz; VB: 10 Hz
7500.040	42.5	V	54.0	-11.5	AVG	85	1.0	RB 1 MHz; VB: 10 Hz
4873.950	54.2	V	74.0	-19.8	PK	253	1.0	RB 1 MHz; VB: 1 MHz
1328.390	31.5	V	54.0	-22.5	AVG	259	1.3	RB 1 MHz; VB: 10 Hz
7500.160	50.8	V	74.0	-23.2	PK	85	1.0	RB 1 MHz; VB: 1 MHz
1328.160	49.0	V	74.0	-25.0	PK	259	1.3	RB 1 MHz; VB: 1 MHz



Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

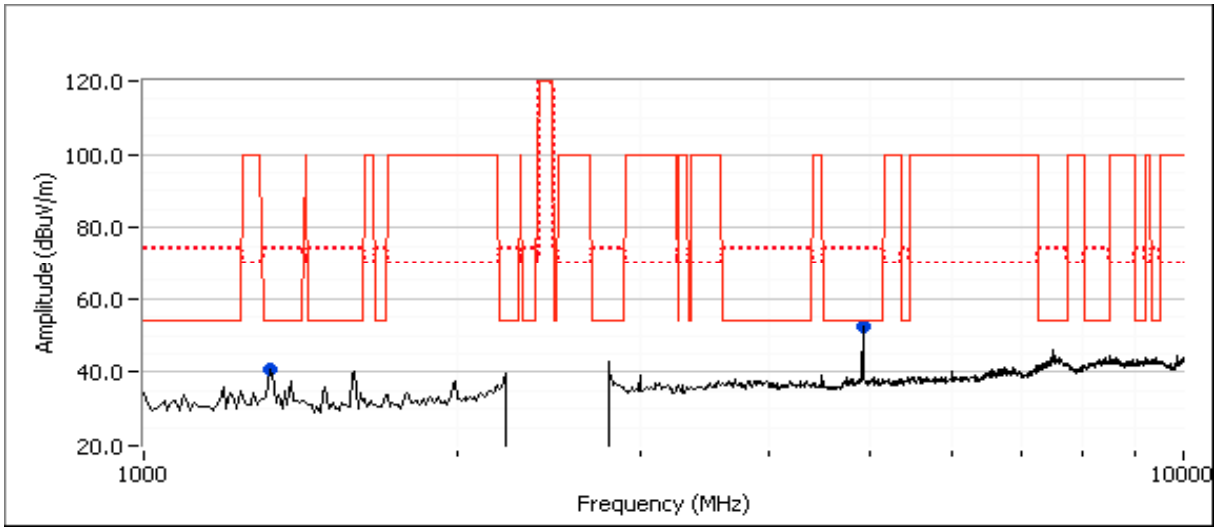
Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 1c: , EUT on Channel #11 2462MHz - 802.11b, Chain B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain B	8.5	8.6	15.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4924.000	47.9	V	54.0	-6.1	AVG	302	1.0	RB 1 MHz; VB: 10 Hz
1329.740	33.5	V	54.0	-20.5	AVG	121	1.3	RB 1 MHz; VB: 10 Hz
4924.000	50.7	V	74.0	-23.3	PK	302	1.0	RB 1 MHz; VB: 1 MHz
1331.080	48.1	V	74.0	-25.9	PK	121	1.3	RB 1 MHz; VB: 1 MHz



Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run #2, Radiated Spurious Emissions, 1-26GHz, 802.11g, Chain B

Date of Test: 5/10/2010 Test Location: FTChamber#5

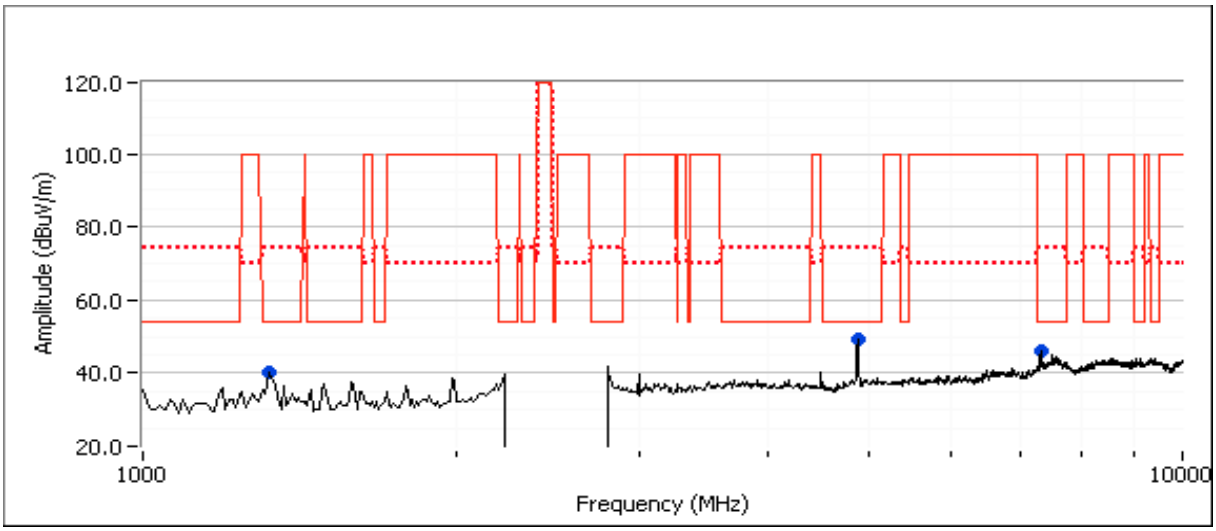
Test Engineer: Joseph Cafigal Config Change: none

Run #2a, EUT on Channel #6 2437MHz - 802.11g, Chain B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain B	16.5	16.8	27.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.050	42.1	V	54.0	-11.9	AVG	304	1.0	RB 1 MHz; VB: 10 Hz
7312.950	41.2	V	54.0	-12.8	AVG	171	1.9	RB 1 MHz; VB: 10 Hz
1330.380	58.4	V	74.0	-15.6	PK	250	1.3	RB 1 MHz; VB: 1 MHz
1329.680	35.8	V	54.0	-18.2	AVG	250	1.3	RB 1 MHz; VB: 10 Hz
7311.400	54.6	V	74.0	-19.4	PK	171	1.9	RB 1 MHz; VB: 1 MHz
4874.400	53.9	V	74.0	-20.1	PK	304	1.0	RB 1 MHz; VB: 1 MHz



Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 3, Radiated Spurious Emissions, 1-40GHz, n20, Chain A+B

Date of Test: 5/10/2010 Test Location: FTChamber#5

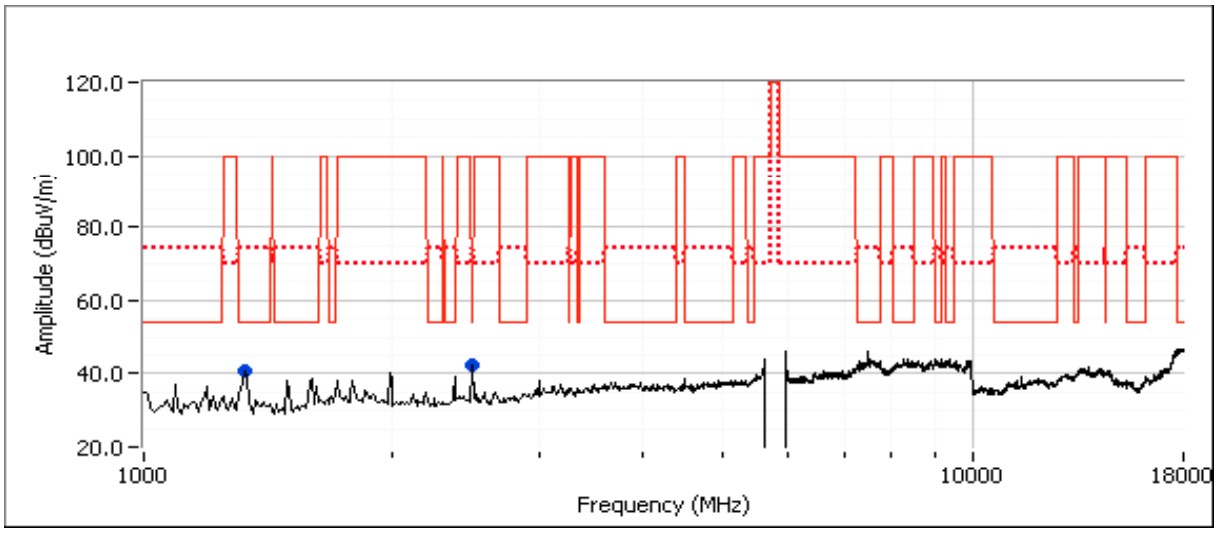
Test Engineer: Joseph Cadigal Config Change: none

Run # 3a, EUT on Channel Low - n20, Chain A+B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain A+B	16.5, 16.5	16.5	25.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1329.800	37.1	V	54.0	-16.9	AVG	107	1.6	RB 1 MHz; VB: 10 Hz
1329.890	56.2	V	74.0	-17.8	PK	107	1.6	RB 1 MHz; VB: 1 MHz
2497.150	32.7	V	54.0	-21.3	AVG	93	1.0	RB 1 MHz; VB: 10 Hz
2498.890	49.7	V	74.0	-24.3	PK	93	1.0	RB 1 MHz; VB: 1 MHz



Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

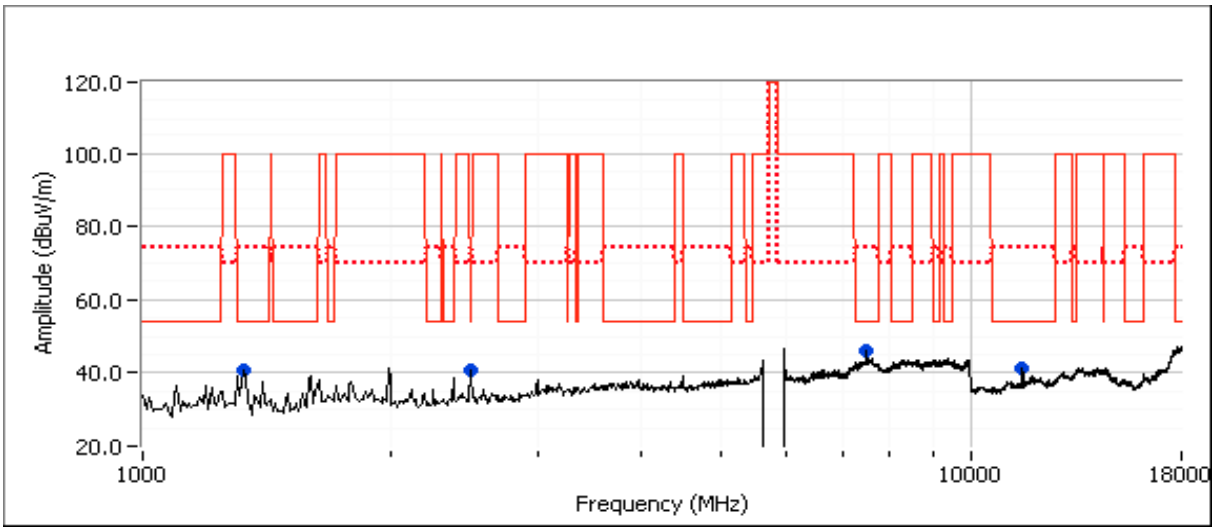
Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 3b: , EUT on Channel Center - n20, Chain A+B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain A+B	16.5, 16.5	16.6	26.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7500.020	40.2	V	54.0	-13.8	AVG	271	1.0	RB 1 MHz; VB: 10 Hz
1328.730	36.9	V	54.0	-17.1	AVG	112	1.3	RB 1 MHz; VB: 10 Hz
11568.680	35.8	V	54.0	-18.2	AVG	162	1.9	RB 1 MHz; VB: 10 Hz
1327.360	55.0	V	74.0	-19.0	PK	112	1.3	RB 1 MHz; VB: 1 MHz
2497.710	31.6	V	54.0	-22.4	AVG	89	1.0	RB 1 MHz; VB: 10 Hz
7500.270	50.1	V	74.0	-23.9	PK	271	1.0	RB 1 MHz; VB: 1 MHz
2497.830	48.5	V	74.0	-25.5	PK	89	1.0	RB 1 MHz; VB: 1 MHz
11569.910	48.2	V	74.0	-25.8	PK	162	1.9	RB 1 MHz; VB: 1 MHz



Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

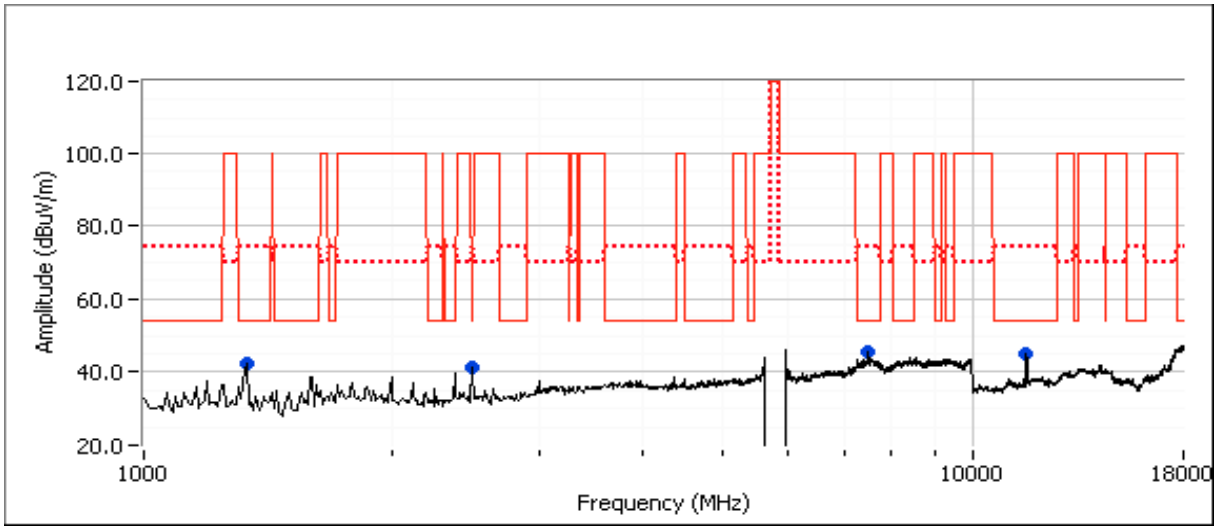
Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 3c: , EUT on Channel High - n20, Chain A+B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain A+B	16.5, 16.5	16.5	27.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7499.980	40.0	V	54.0	-14.0	AVG	208	1.0	RB 1 MHz; VB: 10 Hz
11650.190	32.7	H	54.0	-21.3	AVG	242	1.3	RB 1 MHz; VB: 10 Hz
7499.790	49.4	V	74.0	-24.6	PK	208	1.0	RB 1 MHz; VB: 1 MHz
1331.460	29.3	V	54.0	-24.7	AVG	266	1.0	RB 1 MHz; VB: 10 Hz
1329.920	45.5	V	74.0	-28.5	PK	266	1.0	RB 1 MHz; VB: 1 MHz
11650.290	45.3	H	74.0	-28.7	PK	242	1.3	RB 1 MHz; VB: 1 MHz
2486.090	38.0	V	74.0	-36.0	PK	103	1.0	RB 1 MHz; VB: 1 MHz
2483.500	26.1	V	100.0	-73.9	AVG	103	1.0	RB 1 MHz; VB: 10 Hz



Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -30dBc for peak measurements in a measurement bandwidth of 100kHz.

Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 4, Band Edge Field Strength - g, Chain B

Date of Test: 5/10/2010 Test Location: FTChamber#5

Test Engineer: Joseph Cadigal Config Change: none

Run # 4b, EUT on Channel #11 2462MHz - g, Chain B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain B	16.0	16.2	27.5

Fundamental Signal Field Strength

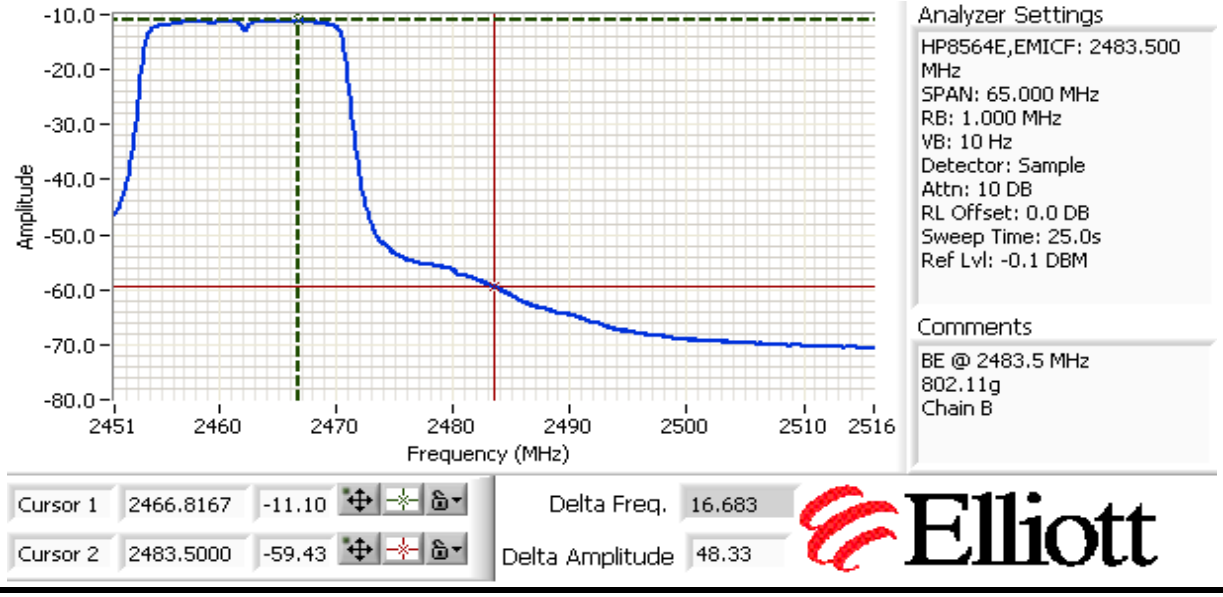
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2467.270	95.4	V	-	-	AVG	102	1.0	RB 1 MHz; VB: 10 Hz
2466.270	103.2	V	-	-	PK	102	1.0	RB 1 MHz; VB: 1 MHz
2466.800	99.7	H	-	-	AVG	48	1.0	RB 1 MHz; VB: 10 Hz
2466.330	107.7	H	-	-	PK	48	1.0	RB 1 MHz; VB: 1 MHz

2483.5 MHz Band Edge Signal Radiated Field Strength - Marker Delta

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	107.7	103.2	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	99.7	95.4	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - 100kHz	*44.5 dB*		<- this can only be used if band edge signal is highest within 2MHz of band edge.
Calculated Band-Edge Measurement (Peak):	63.2 dBuV/m		
Calculated Band-Edge Measurement (Avg):	55.2 dBuV/m		

		Margin	Level	Limit	Detector
Delta Marker - 1MHz/1MHz:	*39.0 dB*	-2.6	51.4	54	Avg
Delta Marker - 1MHz/10Hz:	48.3 dB	-10.8	63.2	74	Pk
Calculated Band-Edge Measurement (Peak):	68.7 dBuV/m	Using 100kHz delta value			
Calculated Band-Edge Measurement (Avg):	51.4 dBuV/m	Using 1MHz delta value			

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	51.4	-	54.0	-2.6	Avg	-	-	Using 1MHz delta value



Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 5, Band Edge Field Strength - n20, Chain B

Date of Test: 5/10/2010 Test Location: FTChamber#5

Test Engineer: Joseph Cadigal Config Change: none

Run # 5a, EUT on Channel #1 2412MHz - n20, Chain B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain B	14.6	14.7	26.0

Fundamental Signal Field Strength

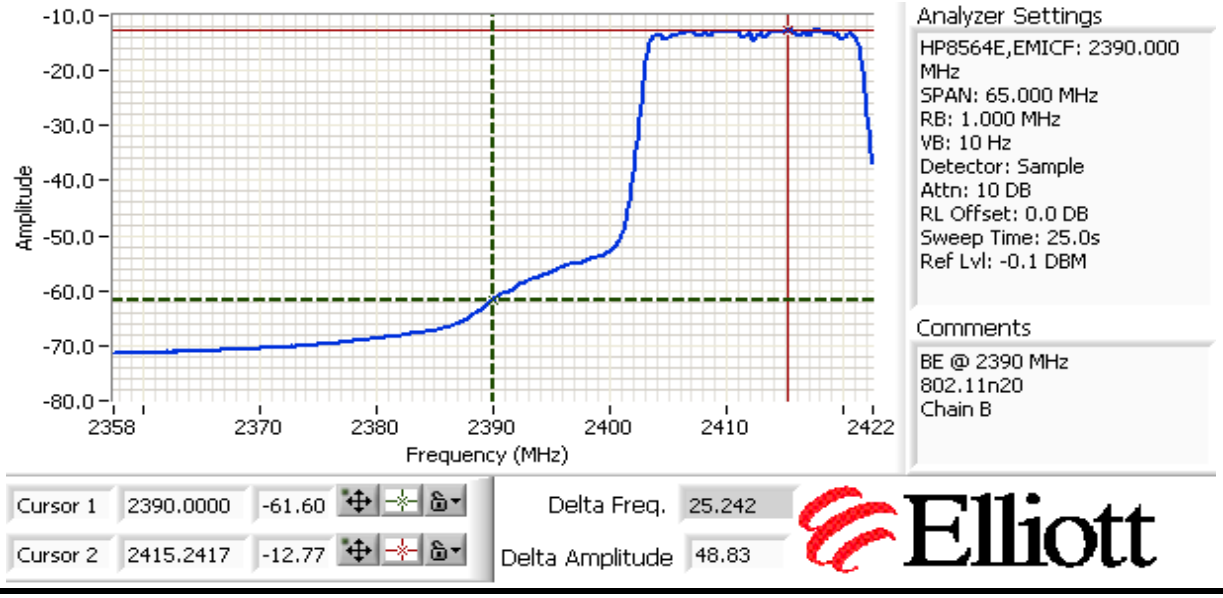
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2413.470	97.9	H	-	-	AVG	22	1.0	RB 1 MHz; VB: 10 Hz
2409.000	106.1	H	-	-	PK	22	1.0	RB 1 MHz; VB: 1 MHz
2410.730	94.7	V	-	-	AVG	101	1.1	RB 1 MHz; VB: 10 Hz
2407.130	103.1	V	-	-	PK	101	1.1	RB 1 MHz; VB: 1 MHz

2390 MHz Band Edge Signal Radiated Field Strength - Marker Delta

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	106.1	103.1	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	97.9	94.7	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - 100kHz	*48.0 dB*		<- this can only be used if band edge signal is highest within 2MHz of band edge.
Calculated Band-Edge Measurement (Peak):	58.1 dBuV/m		
Calculated Band-Edge Measurement (Avg):	49.9 dBuV/m		
Delta Marker - 1MHz/1MHz:	*43.2 dB*		
Delta Marker - 1MHz/10Hz:	48.8 dB		
Calculated Band-Edge Measurement (Peak):	62.9 dBuV/m		Using 100kHz delta value
Calculated Band-Edge Measurement (Avg):	49.1 dBuV/m		Using 1MHz delta value

Margin	Level	Limit	Detector
-4.9	49.1	54	Avg
-15.9	58.1	74	Pk

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2390.000	49.1	-	54.0	-4.9	Avg	-	-	Using 1MHz delta value



Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 6, Band Edge Field Strength - n40, Chain B

Date of Test: 5/10/2010 Test Location: FTChamber#5

Test Engineer: Joseph Cadigal Config Change: none

Run # 6a, EUT on Channel #3 2422MHz - n40, Chain B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain B	10.8	10.9	22.0

Fundamental Signal Field Strength

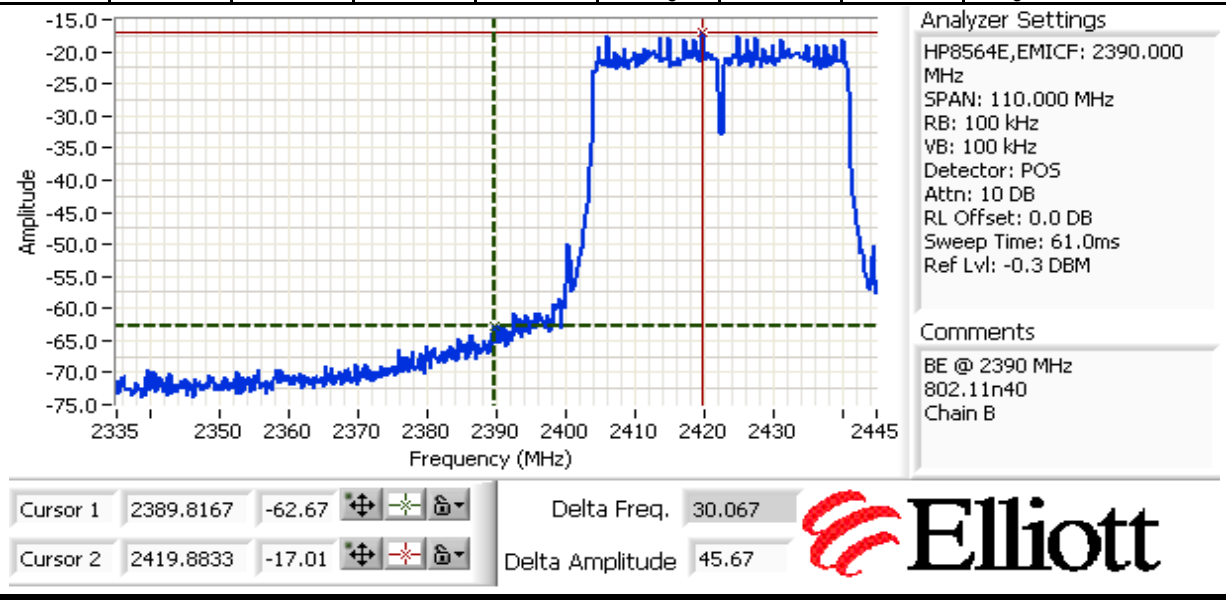
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2412.530	91.1	H	-	-	AVG	26	1.0	RB 1 MHz; VB: 10 Hz
2411.870	99.1	H	-	-	PK	26	1.0	RB 1 MHz; VB: 1 MHz
2411.000	87.9	V	-	-	AVG	99	1.1	RB 1 MHz; VB: 10 Hz
2412.000	96.1	V	-	-	PK	99	1.1	RB 1 MHz; VB: 1 MHz

2390 MHz Band Edge Signal Radiated Field Strength - Marker Delta

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	99.1	96.1	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	91.1	87.9	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - 100kHz	45.7 *dB*		<- this can only be used if band edge signal is highest within 2MHz of band edge.
Calculated Band-Edge Measurement (Peak):	53.4 dBuV/m		
Calculated Band-Edge Measurement (Avg):	45.4 dBuV/m		
Delta Marker - 1MHz/1MHz:	*44.0 dB*		
Delta Marker - 1MHz/10Hz:	*45.3 dB*		
Calculated Band-Edge Measurement (Peak):	55.1 dBuV/m		Using 100kHz delta value
Calculated Band-Edge Measurement (Avg):	45.8 dBuV/m		Using 100kHz delta value

Margin	Level	Limit	Detector
-8.6	45.4	54	Avg
-20.6	53.4	74	Pk

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.816	45.4	-	54.0	-8.6	Avg	-	-	Using 100kHz delta value



Client:	Intel	Job Number:	J78792
Model:	622ANXHMW (Kilmer Peak) with Anadigics FEM Chain B	T-Log Number:	T79268
		Account Manager:	Christine Krebill
Contact:	Steve Hackett		
Standard:	FCC 15.247 / RSS 210	Class:	N/A

Run # 6b, EUT on Channel #9 2452MHz - n40, Chain B

	Power Settings		
	Target (dBm)	Measured (dBm)	Software Setting
Chain B	14.6	14.9	26.5

Fundamental Signal Field Strength

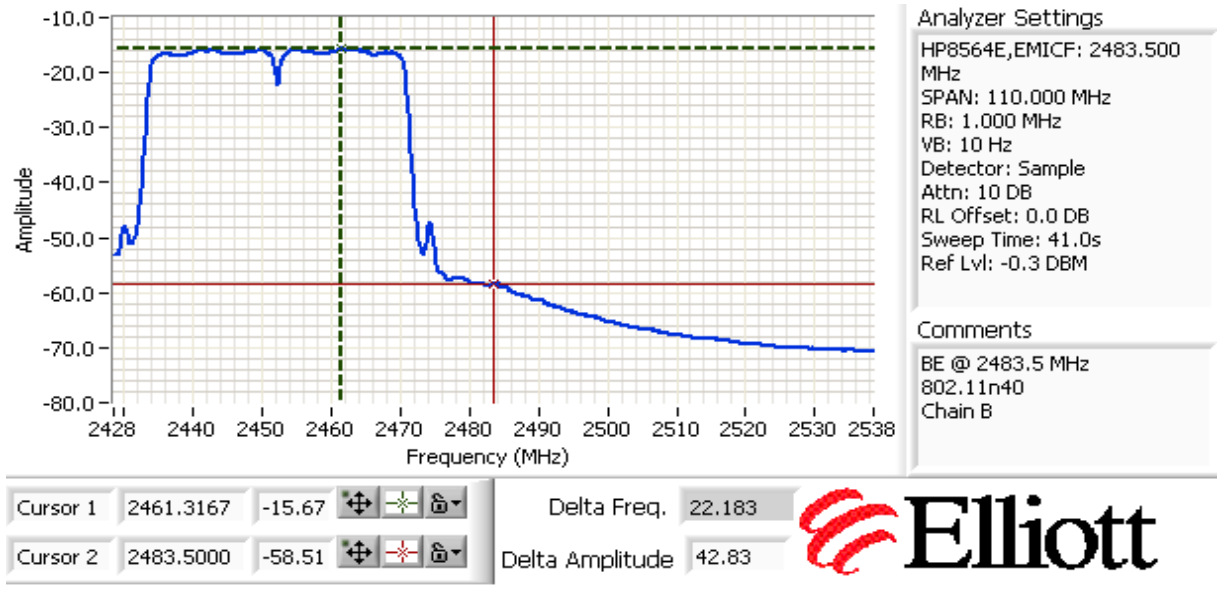
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2441.070	95.8	H	-	-	AVG	50	1.0	RB 1 MHz; VB: 10 Hz
2442.200	104.0	H	-	-	PK	50	1.0	RB 1 MHz; VB: 1 MHz
2441.130	91.3	V	-	-	AVG	106	1.0	RB 1 MHz; VB: 10 Hz
2441.470	98.9	V	-	-	PK	106	1.0	RB 1 MHz; VB: 1 MHz

2483.5 MHz Band Edge Signal Radiated Field Strength - Marker Delta

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	104.0	98.9	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	95.8	91.3	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - 100kHz	*38.0 dB*		<- this can only be used if band edge signal is highest within 2MHz of band edge.
Calculated Band-Edge Measurement (Peak):	66.0 dBuV/m		
Calculated Band-Edge Measurement (Avg):	57.8 dBuV/m		

		Margin	Level	Limit	Detector
Delta Marker - 1MHz/1MHz:	*34.2 dB*	-1.0	53.0	54	Avg
Delta Marker - 1MHz/10Hz:	42.8 dB	-8.0	66.0	74	Pk
Calculated Band-Edge Measurement (Peak):	69.8 dBuV/m	Using 100kHz delta value			
Calculated Band-Edge Measurement (Avg):	53.0 dBuV/m	Using 1MHz delta value			

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	53.0	-	54.0	-1.0	Avg	-	-	Using 1MHz delta value



Appendix C Photographs of Test Configurations

Uploaded as a Separate Exhibit