Elliott Laboratories Inc.
www.elliottlabs.com
684 West Maude Avenue
Sunnyvale, CA 94086-3518
408-245-7800 Phone
408-245-3499 Fax

Electromagnetic Emissions Test Report and Application for Class II Permissive Change pursuant to FCC Part 15, Subpart C (15.247) DTS Specifications, FCC Part 15, Subpart E (UNII Devices) and Industry Canada RSS 210 Issue 5 (LELEAN Devices) on the Intel Corporation Model: WM3B2915ABG

FCC ID:	PD9WM3B2915ABG
UPN:	1000M-3B2915
GRANTEE:	Intel Corporation 13280 Evening Creek Drive San Diego, CA 92128
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	August 8, 2005
FINAL TEST DATE:	July 30 and August 3, 2005
AUTHORIZED SIGNATORY:	Juan Martinez Senior EMC Engineer

ACCREDITED
2016-01

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
WM3B2915ABG

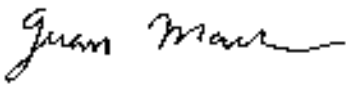
Manufacturer:
Intel Corporation
13280 Evening Creek Drive
San Diego, CA 92128

Tested to applicable standards:
RSS-210, Issue 5, November 2001 (Low Power License-Exempt Radiocommunication Devices)
FCC Part 15.247 (DTS)
FCC Part 15 Subpart E (UNII Devices)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC 4549-4 Dated July 19, 2003

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4:2003 as detailed in section 5.3 of RSS-210, Issue 5); and that the equipment performed in accordance with the data submitted in this report.



Signature	
Name	Juan Martinez
Title	Senior EMC Engineer
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	August 8, 2005

Maintenance of compliance with the above standards 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.).

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

SCOPE

An electromagnetic emissions test has been performed on the Intel Corporation model WM3B2915ABG pursuant to Subparts C and E of Part 15 of FCC Rules for Unlicensed National Information Infrastructure (UNII) devices and RSS-210 Issue 5 for licence-exempt local area network (LELAN) devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4:2003 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC 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.

The test results recorded herein are based on a single type test of the Intel Corporation model WM3B2915ABG and therefore apply only to the tested sample. The sample was selected and prepared by Robert Paxman of Intel Corporation

OBJECTIVE

The primary objective of the manufacturer is compliance with Subparts C and E of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their 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.

SUMMARY OF RESULTS

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.247(a)	6.2.2(o)(b)	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (b) (3)	6.2.2(o)(b)	Output Power, 2400 - 2483.5 MHz (802.11b)	17.3 dBm (Peak)	Multi-point applications: Maximum permitted is 1Watt, with EIRP limited to 4 Watts.	Complies
15.247 (b) (3) 15.247 (b) (4) (i)	6.2.2(o)(b)	Output Power, 2400 - 2483.5 MHz (802.11g)	24.2 dBm (Peak) 15.3 dBm (Avg) **(Note 1)**	Multi-point applications: Maximum permitted is 1Watt, with EIRP limited to 4 Watts.	Complies
15.247 (b) (3) 15.247 (b) (4) (i)	6.2.2(o)(b)	Output Power, 5725 - 5850 MHz	17.7dBm (Avg), 23.16 dBm (Peak); **(Note 1)**	Multi-point applications: Maximum permitted is 1Watt, with EIRP limited to 4 Watts.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions – 30MHz –26.5GHz	50.9dBuV/m @ 11651 MHz (-3.1dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.247 (b) (5)		RF Exposure Requirements	MPE Calculation		
15.203		RF Connector	Hirose connector (Antennas will be installed inside laptops)	Standard rf connectors permitted for professionally installed systems	Complies

Note 1: Original report states average and peak power. Due to the inconsistency in the measured peak power (Using peak power meter and UNII power measurement method), the average power was measured and matched it with the original powers that were reported in the original application. Then measured the peak power and recorded the results.

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
Operation in the 5.15 – 5.25 GHz Band				
15.407 (d)		As the device operates in the 5.15 – 5.25 GHz band the antenna must be integral to the device.	Antenna Gain = 4.31 dBi The antenna is integral	COMPLIES
15.407(a) (1)	6.2.2 q1 (i)	Output Power	10.8dBm (Avg), 16.6dBm (Peak); Note 1	COMPLIES
15.407(b) (2)	6.2.2 q1 (ii)	Spurious Emissions above 1GHz	48.7dBuV/m @ 10359 MHz (-5.3dB)	COMPLIES
Operation in the 5.25 – 5.35 GHz Band Note: The device is not restricted to indoor use only, therefore the spectral density of spurious emissions in the 5.15 – 5.25 GHz band were limited to the power spectral limit of –27dBm/MHz as detailed in FCC 15.407(b)(2) and RSS 210 6.2.2 q1 (ii)				
		Maximum Antenna Gain	Antenna Gain = 4.2 dBi The antenna is integral	COMPLIES
15.407(a) (2)	6.2.2 q1 (ii)	Output Power	16.6dBm (Avg), 21.2dBm (Peak); Note 1	COMPLIES
15.407(b) (2)	6.2.2 q1 (ii)	Spurious Emissions above 1GHz	48.7dBuV/m @ 10359 MHz (-5.3dB)	COMPLIES
General requirements for all bands				
15.407 (f)	6.2.2 q(iv)(g)	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11	COMPLIES

Note 1: Original report states average and peak power. Due to the inconsistency in the measured peak power (Using peak power meter and UNII power measurement method), the average power was measured and matched it with the original powers that were reported in the original application. Then measured the peak power and recorded the results.

MEASUREMENT UNCERTAINTIES

ISO Guide 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	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Intel Corporation model WM3B2915ABG is a 802.11/ab/g wireless that is designed to connect to PC. Normally, the EUT would be placed on a tabletop during operation. The EUT was, therefore, treated as tabletop equipment during testing to simulate the end-user environment. The EUT is powered via the PC.

The sample was received on July 30, 2005 and tested on July 30 and August 3, 2005. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Intel	WM3B2915ABG	802.11a/b/g card	N/A	PD9WM3B2915ABG

ENCLOSURE

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

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the emission specifications.

SUPPORT EQUIPMENT

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

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	Pavilian a300n	Computer	MXK3391864	-
Hewlett Packard	M042KG	Mouse	030870136	-
Hewlett Packard	5183	Keyboard	BF3339165	E5XKB5183
Samsung	151S R	Monitor	GG15H4JTB04858E	-

No equipment was used as remote support equipment for emissions testing.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Main Ant	Antenna	Coax	Shielded	0.25

EUT OPERATION DURING TESTING

The EUT was transmitting continuously on either the low, middle, and high.

ANTENNA REQUIREMENTS

As the device is intended to operate in the 5.15 – 5.25 GHz band an integral antenna as detailed in 15.407 (d) and RSS-210 6.2.2(q1) (i) is required. The antenna for the device is an integral antenna to the end product.

PROPOSED MODIFICATION DETAILS

The only modification proposed is the addition of a new antenna. Refer to the exhibit "FCC Class II Letter".

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on July 30 and August 3, 2005 at the Elliott Laboratories Anechoic Chamber# 4 located at 41039 Boyce Road, Fremont, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. 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 FCC requirements.

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. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 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.

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.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde and 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.

POWER METER

A power meter and **peak** power sensor are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

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 biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

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.

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

CONDUCTED EMISSIONS

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

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

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. 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. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements are performed 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.

Measurement bandwidths (video and resolution) are set in accordance with FCC procedures for the type of radio being tested.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions from the AC power port are given in units of microvolts, the limits for radiated electric field emissions are given in units of microvolts per meter at a specified test distance and the output power limits are given in temrs of Watts, milliwatts or dBm. 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.

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp) the following formula is used to determine the field strength limit in terms of microvolts per meter at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \text{ v } 30 \text{ P}}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For reference, converting the voltage and electric field strength specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. Conversion of power specification limits from linear units (in milliwatts) to decibel form (in dBm) is accomplished by taking the base ten logarithm, then multiplying by 10.

FCC 15.407 (a)and RSS 210 (o) OUTPUT POWER LIMITS

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

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watts (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watts (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watts (30 dBm)	8 dBm/3kHz

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

FCC 15.407 (a) OUTPUT POWER LIMITS

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

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

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

RS-210 6.2.2(q1) OUTPUT POWER LIMITS

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

Operating Frequency (MHz)	Output Power	Power Spectral Density
5150 - 5250	200mW (23 dBm)	10 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

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

RSS 210 (o) AND FCC 15.247 TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands detailed in Part 15.205 and for all spurious emissions from the receiver are:

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

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).

RS 210 (q1) and FCC 15E TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS

The table below shows the limits for unwanted (spurious) emissions falling in the restricted bands detailed in Part 15.205 and Industry Canada RSS-210 Table 2.

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

The table below shows the limits for unwanted (spurious) emissions outside of the restricted bands above 1GHz.

Operating Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength At 3m (dBuV/m)
5150 - 5250	-27 dBm	68.3 dBuV/m
5250 - 5350	-27 dBm (note 1)	68.3 dBuV/m
5725 – 5825	-27 dBm (note 2)	68.3 dBuV/m
	-17 dBm (note 3)	78.3 dBuV/m

Note 1: If operation is restricted to indoor use only then emissions in the band 5.15 – 5.25 GHz must meet the power spectral density limits for the intentional signals detailed in RSS 210 and FCC Subpart E for devices operating in the 5.15 – 5.25 Ghz band.
Note 2: Applies to spurious signals separated by more than 10 MHz from the allocated band.
Note 3: Applies to spurious signals within 10 MHz of the allocated band.

RS 210 Table 3 RECEIVE MODE SPURIOUS RADIATED EMISSIONS LIMITS

The table below shows the limits for unwanted (spurious) emissions from the receiver as detailed in table 3of RSS 210:

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
960 to 1610	500	54.0
Above 1610	1000	60.0

FCC 15.205 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in FCC Part 15.205.

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

RSS-210 SECTION 6.6 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in Industry Canada RSS-210 section 6.6.

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

C = Corrected 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, 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

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

EXHIBIT 1: Test Equipment Calibration Data

1 Page

, 01-Aug-05
Engineer: Mehran Birgani

Manufacturer	Description	Model #	Asset #	Cal Due
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	868	20-Apr-06
Hewlett Packard	EMC Spectrum Analyzer, 9KHz-26.5GHz	8593EM	1141	10-Jun-06
Hewlett Packard	High Pass filter, 8.2GHz	P/N 84300-80039 (84125C)	1392	12-May-06
Miteq	Preamplifier, 1-18GHz	AFS44	1715	21-Dec-05

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T 60672 31 Pages

Elliott

EMC Test Data

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Emissions Spec:	FCC 15.247 & 15.401	Class:	-
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Intel Corporation

Model

WM3B2915ABG Permissive Change w/ Sony Antenna

Date of Last Test: 7/29/2005

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Emissions Spec:	FCC 15.247 & 15.401	Class:	-
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The WM3B2915ABG is a 802.11/ab/g wireless that is designed to connect to PC. Normally, the EUT would be placed on a tabletop during operation. The EUT was, therefore, treated as tabletop equipment during testing to simulate the end-user environment. The EUT is powered via the PC.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Intel	WM3B2915ABG	802.11a/b/g card		PD9FJ3B2915ABG

Other EUT Details

IC ID: 1000M-FJ2915

EUT Antenna

The EUT antenna is an Sony P/N 81.EDT15.001
The antenna is integral to the device
2412 - 2462 MHz, Gain = 2.1 dBi
5150 - 5350 MHz, Gain = 4.3 dBi
5725 - 5825 MHz, Gain = 4.2 dBi

EUT Enclosure

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

Modification History

Mod. #	Test	Date	Modification
1			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Emissions Spec:	FCC 15.247 & 15.401	Class:	-
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	Pavilian a300n	Computer	MXK3391864	-
Hewlett Packard	M042KG	Mouse	030870136	-
Hewlett Packard	5183	Keyboard	BF3339165	E5XKB5183
Samsung	151S R	Monitor	GG15H4JTB04858E	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

EUT Operation During Emissions Tests

The EUT was transmitting continuously on either the low, middle, and high.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Radiated Emissions

Test Specifics

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

Date of Test: 8/3/2005
Test Engineer: Rafael varelas & Jmartinez
Test Location: Fremont Chamber #4
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

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

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

Ambient Conditions:

Temperature: 18 °C
Rel. Humidity: 41 %

Run#	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15E	Pass	Refer to run
2	RE, 30 - 26500 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	48.7dBuV/m (271uV/m) @ 10359 MHz (-5.3dB)
3	RE, 1000 - 18000 MHz - Rx Spurious Emissions	RSS-210	Pass	50.2dBuV/m (324.7uV/m) @ 7013.37MHz (-9.8dB)

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.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #1a: Output Power

4.3 dBi

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	EIRP (W)	
36	5180	10.9	0.012	0.033	Pwr setting = 9.5
51	5240	10.8	0.012	0.032	Pwr setting = 10.5
52	5260	16.6	0.046	0.123	Pwr setting = 16.0
64	5320	16.4	0.044	0.117	Pwr setting = 18.0

Note 1	Used Average Power Meter.
Note 2	Original report states average and peak power. Due to the inconsistency in the measured peak power (Using peak power meter and UNII power measurement method), the average power was measured and matched it with the original powers that were reported in the original application. Then measured the peak power and recorded the results.

Run #1b: Output Power

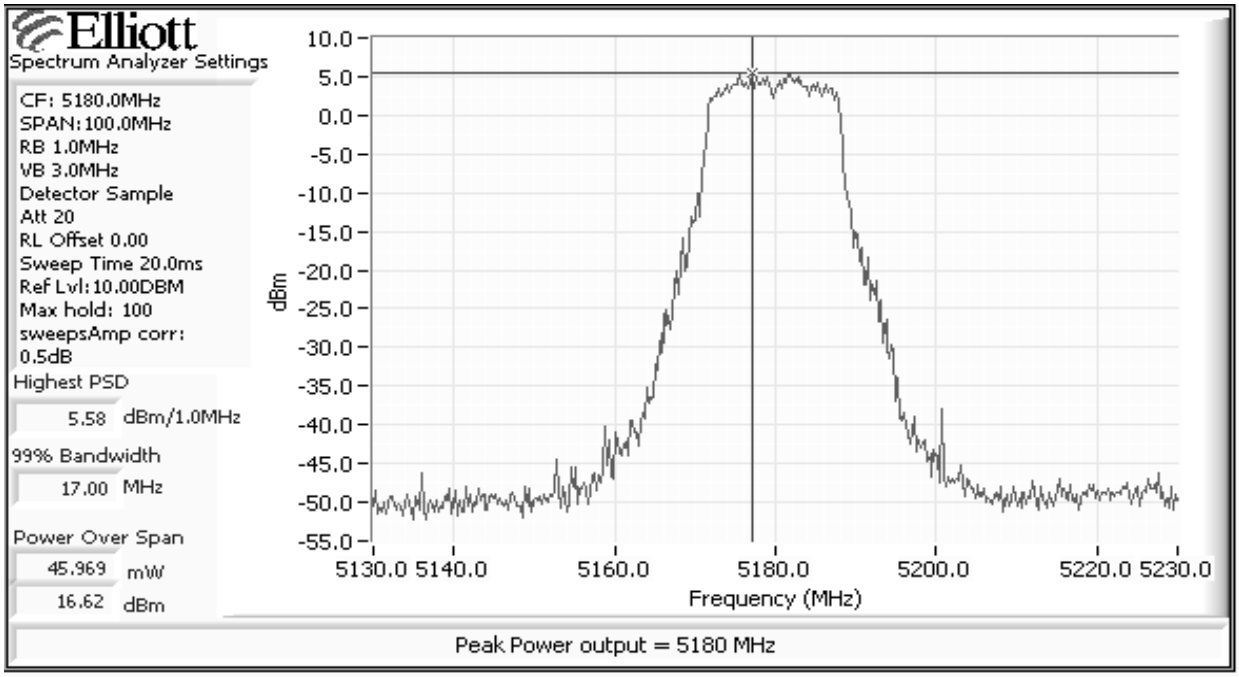
4.3 dBi

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	EIRP (W)	
36	5180	16.9	0.049	0.132	Pwr setting = 9.5
51	5240	16.6	0.046	0.123	Pwr setting = 10.5
52	5260	21.1	0.129	0.347	Pwr setting = 16.0
64	5320	20.8	0.120	0.324	Pwr setting = 18.0

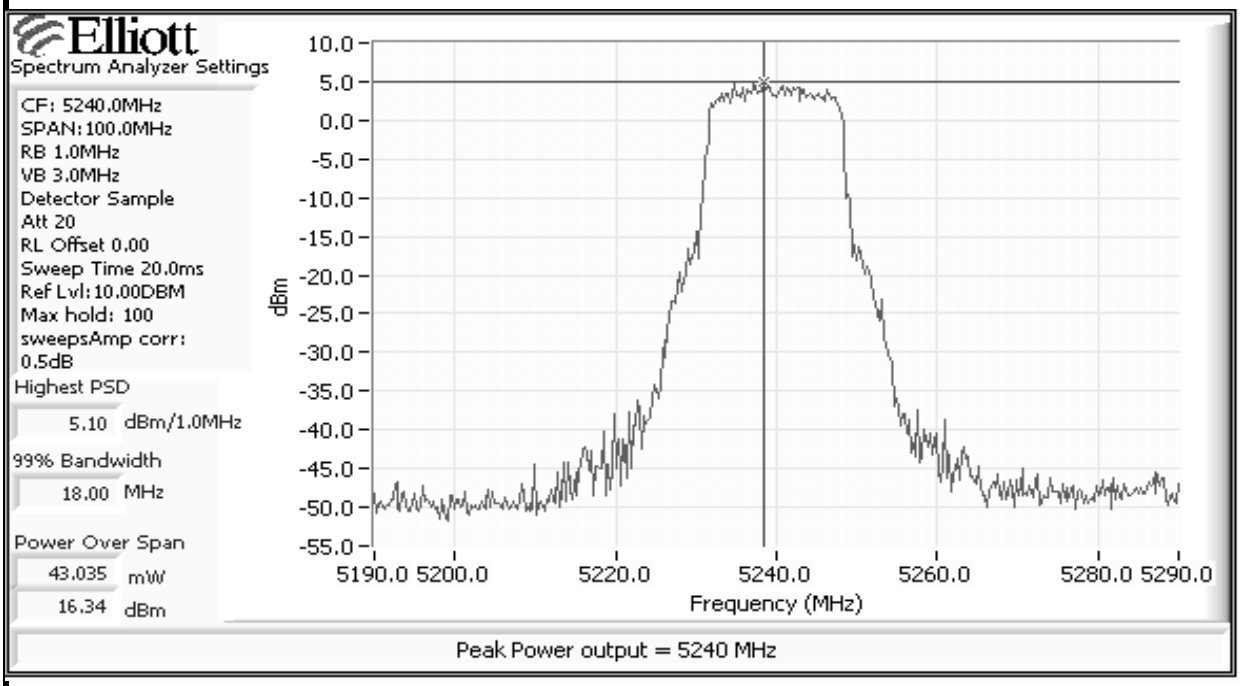
Note 1	Used Peak Power Meter.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

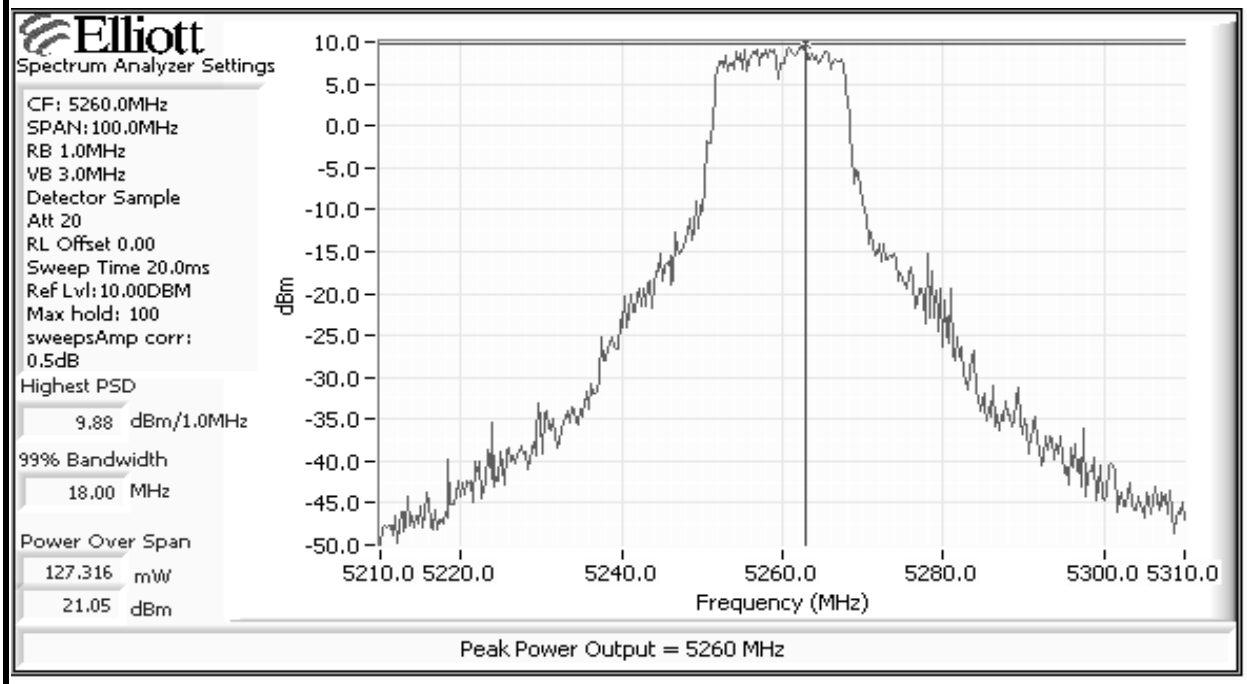
Run #1c: Output Power



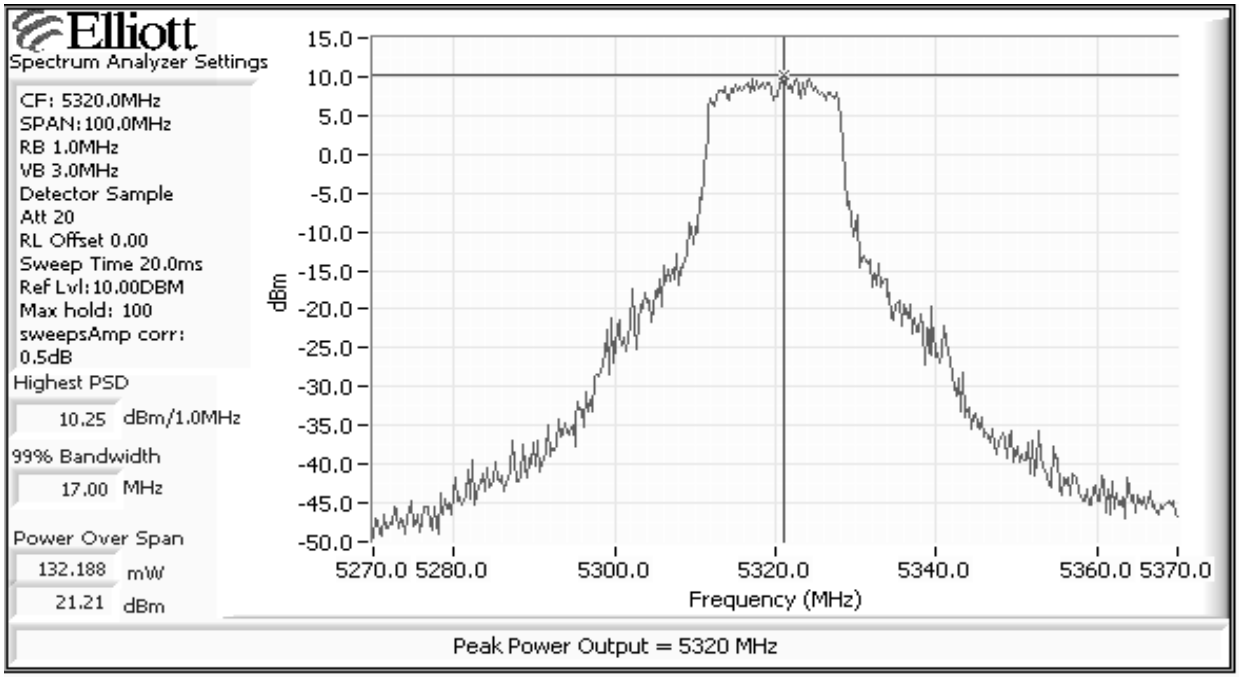
Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A



Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

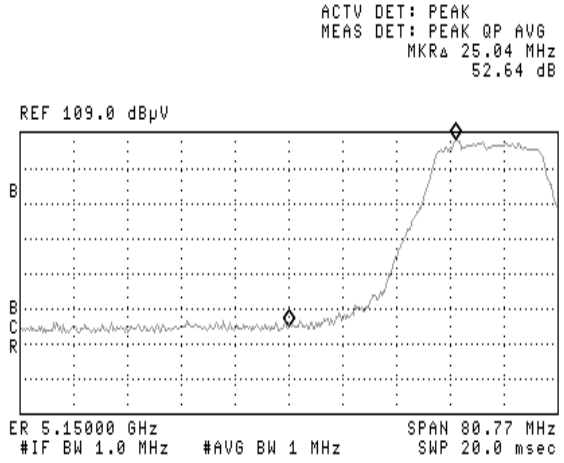


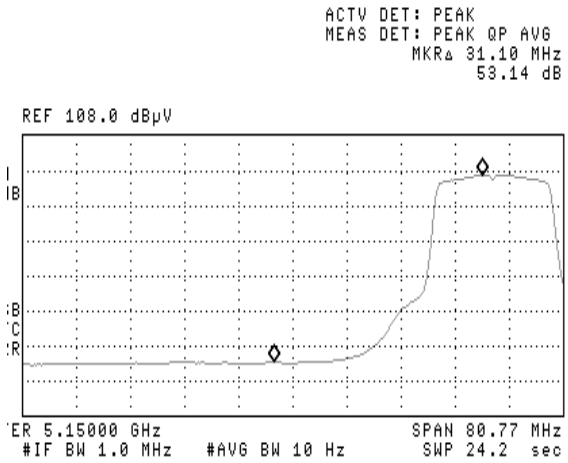
Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A



Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #2a: Radiated Spurious Emissions, 30 - 26500 MHz. Low Channel @ 5180 MHz





	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	101.15	101.06	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	92.65	92.98	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	52.64 dB		
Delta Marker - Average	53.14 dB		
Calculated Band-Edge Measurement:	48.51 dBuV/m		Peak
Calculated Band-Edge Measurement:	39.84 dBuV/m		Average

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	48.5	-	74.0	-25.5	Pk	-	-	Note 2
5150.000	39.8	-	54.0	-14.2	Avg	-	-	Note 2

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Other Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10359.96	43.5	V	54.0	-10.5	AVG	154	1.3	
10359.96	50.1	V	74.0	-23.9	PK	154	1.3	
10359.89	48.7	H	54.0	-5.3	AVG	158	1.0	
10359.89	53.0	H	74.0	-21.0	PK	158	1.0	
15538.68	40.5	H	54.0	-13.5	AVG	100	1.0	
15538.68	53.1	H	74.0	-20.9	PK	100	1.0	
15540.63	40.6	V	54.0	-13.4	AVG	290	1.0	
15540.63	52.3	V	74.0	-21.7	PK	290	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

Run #2b: Radiated Spurious Emissions, 30 - 26500 MHz. Channel @ 5260 MHz

Other Spurious Radiated Emissions:

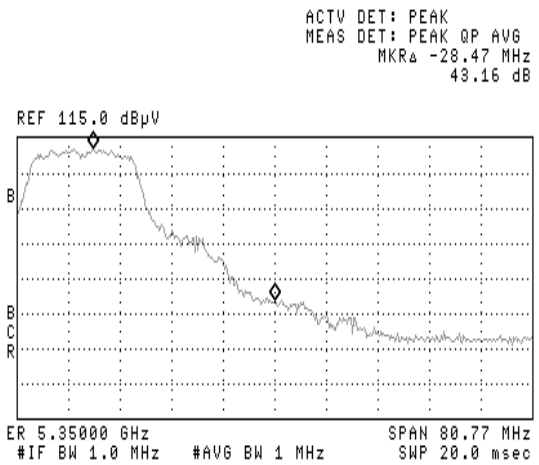
Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10639.93	40.2	V	54.0	-13.8	AVG	118	2.0	
10639.93	49.5	V	74.0	-24.5	PK	118	2.0	
15966.04	43.7	V	54.0	-10.3	AVG	120	1.0	
15966.04	56.8	V	74.0	-17.2	PK	120	1.0	
10639.89	41.4	H	54.0	-12.6	AVG	108	1.0	
10639.89	50.1	H	74.0	-23.9	PK	108	1.0	
15960.68	43.8	H	54.0	-10.2	AVG	148	1.0	
15960.68	56.0	H	74.0	-18.0	PK	148	1.0	

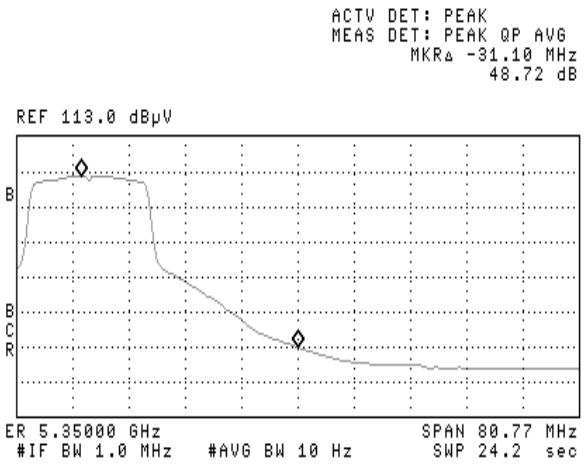
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

EMC Test Data

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #2c: Radiated Spurious Emissions, 30 - 26500 MHz. High Channel @ 5320 MHz





	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	104.79	104.9	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	96.45	96.56	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	43.16 dB		
Delta Marker - Average	48.72 dB		
Calculated Band-Edge Measurement:	61.74 dBuV/m		Peak
Calculated Band-Edge Measurement:	47.84 dBuV/m		Average

Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.000	61.7	-	74.0	-12.3	Pk	-	-	Note 2
5350.000	47.8	-	54.0	-6.2	Avg	-	-	Note 2

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

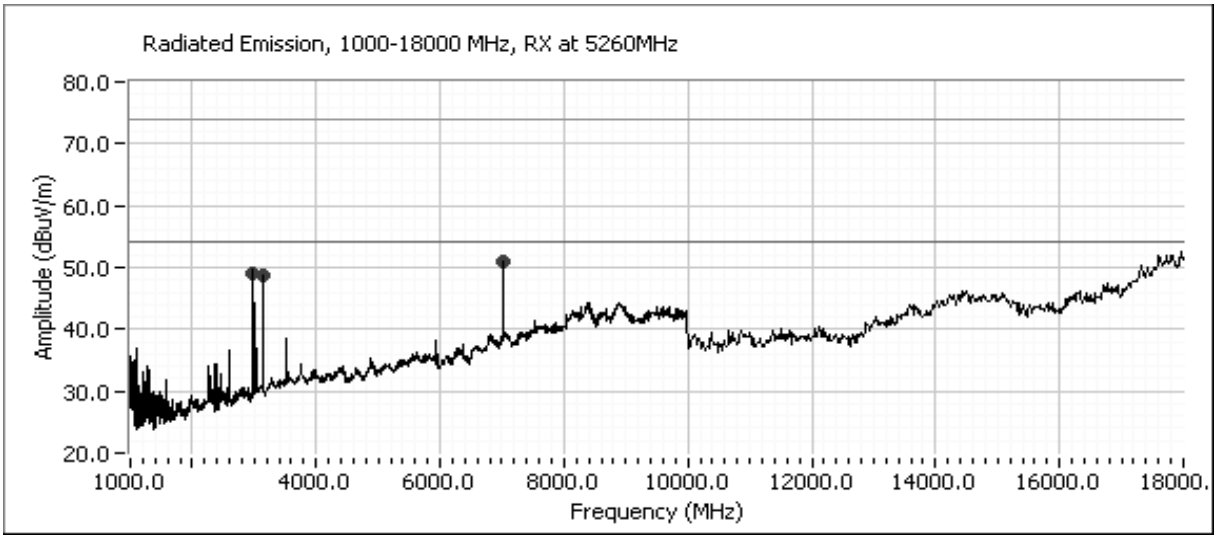
Other Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10639.93	40.2	V	54.0	-13.8	AVG	118	2.0	
10639.93	49.5	V	74.0	-24.5	PK	118	2.0	
15966.04	43.7	V	54.0	-10.3	AVG	120	1.0	
15966.04	56.8	V	74.0	-17.2	PK	120	1.0	
10639.89	41.4	H	54.0	-12.6	AVG	108	1.0	
10639.89	50.1	H	74.0	-23.9	PK	108	1.0	
15960.68	43.8	H	54.0	-10.2	AVG	148	1.0	
15960.68	56.0	H	74.0	-18.0	PK	148	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #3: Radiated Rx Spurious Emissions, 1000 - 18000 MHz. Middle Channel @ 5260 MHz



Frequency	Level	Pol	RSS-210 Rx		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7013.260	52.8	H	80.0	-27.3	PK	144	2.0	
7013.260	50.2	H	60.0	-9.8	AVG	144	2.0	
7013.260	49.1	V	80.0	-31.0	PK	170	1.0	
7013.260	45.3	V	60.0	-14.7	AVG	170	1.0	
10519.87	43.3	H	60.0	-16.7	AVG	152	1.4	
3506.670	41.0	H	60.0	-19.0	AVG	188	1.0	
10519.87	49.3	H	80.0	-30.7	PK	152	1.4	
3506.670	45.3	H	80.0	-34.7	PK	188	1.0	

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

FCC 15.247 DTS - Spurious Emissions (802.11a)

Test Specifics

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

Date of Test: 8/3/2005
Test Engineer: Jmartinez
Test Location: Fremont Chamber #4
Config. Used: 1
Config Change: None
Host Unit Voltage 120V/60Hz

General Test Configuration

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

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

Ambient Conditions:

Temperature: 18 °C
Rel. Humidity: 48 %

Run#	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247	Pass	Refer to run
2	RE, 30 - 26500 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	50.9dBuV/m (351.2uV/m) @ 11651 MHz (-3.1dB)
3	RE, 1000 - 18000 MHz - Rx Spurious Emissions	RSS-210	Pass	50.7dBµV/m (344.0µV/m) @ 7013.3MHz (-9.3dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

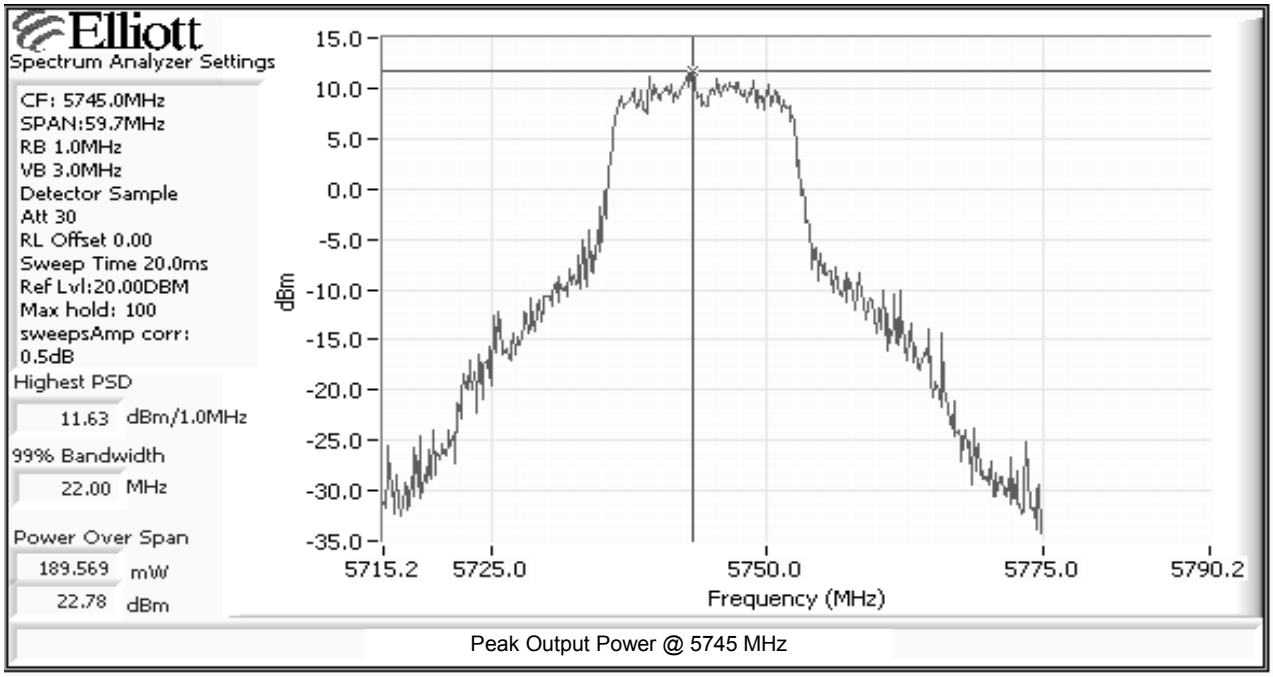
Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #1: Output Power

Antenna Gain: 4.2 dBi

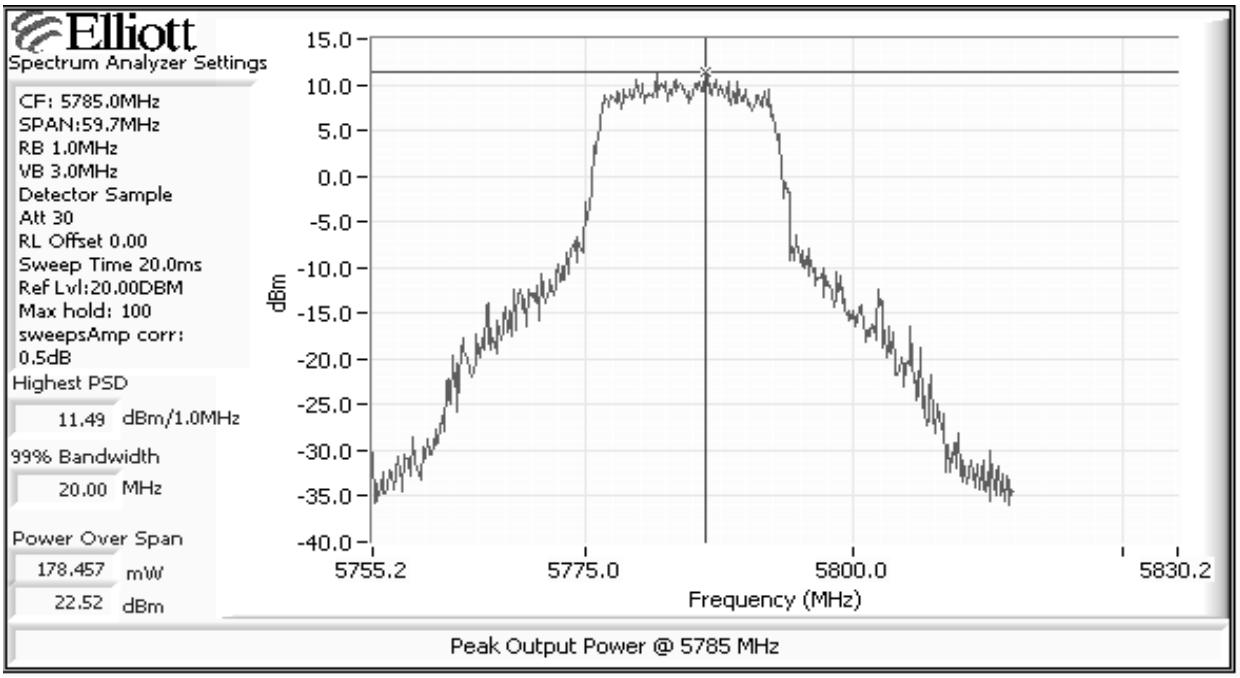
Frequency (MHz)	Output Power dBm Measured	Power (Watts)	Settings	Comment
5745	17.7	0.0589	20.5	Note 1
5785	17.3	0.0537	20.0	Note 1
5825	17.5	0.0562	20.5	Note 1

Note 1	Used Average Power Meter.
Note 2	Original report states average and peak power. Due to the inconsistency in the measured peak power (Using peak power meter and UNII power measurement method), the average power was measured and matched it with the original powers that were reported in the original application. Then measured the peak power and recorded the results.

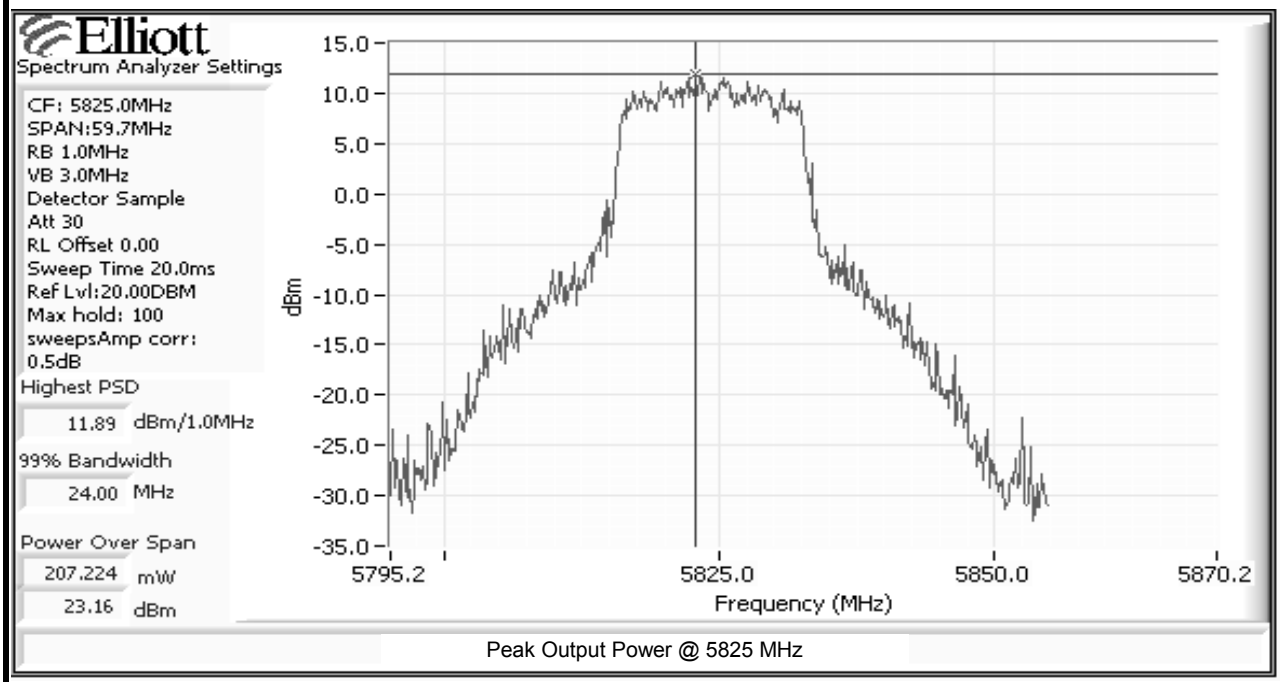


Peak Output Power @ 5745 MHz

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A



Peak Output Power @ 5785 MHz



Peak Output Power @ 5825 MHz

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #2a: Radiated Spurious Emissions, 30 - 26500 MHz. Low Channel @ 5745 MHz

Other 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	
11493.59	43.9	V	54.0	-10.1	AVG	139	1.0	
11493.59	56.0	V	74.0	-18.0	PK	139	1.0	
17237.18	50.2	V	68.3	-18.1	AVG	259	1.0	
11494.04	49.2	H	54.0	-4.8	AVG	85	1.0	
11494.04	61.1	H	74.0	-12.9	PK	85	1.0	
17239.23	54.6	H	68.3	-13.8	AVG	88	1.2	

Note 1: For emissions in restricted bands, the limit of 15.209 was used.

Run #2b: Radiated Spurious Emissions, 30 - 26500 MHz. Center Channel @ 5785 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11569.93	40.1	V	54.0	-13.9	AVG	140	1.5	
11569.93	49.7	V	74.0	-24.3	PK	140	1.5	
17355.86	50.5	V	68.3	-17.8	AVG	116	1.2	
11569.87	44.9	H	54.0	-9.1	AVG	138	1.0	
11569.87	53.3	H	74.0	-20.7	PK	138	1.0	
17355.51	51.3	H	68.3	-17.0	AVG	148	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

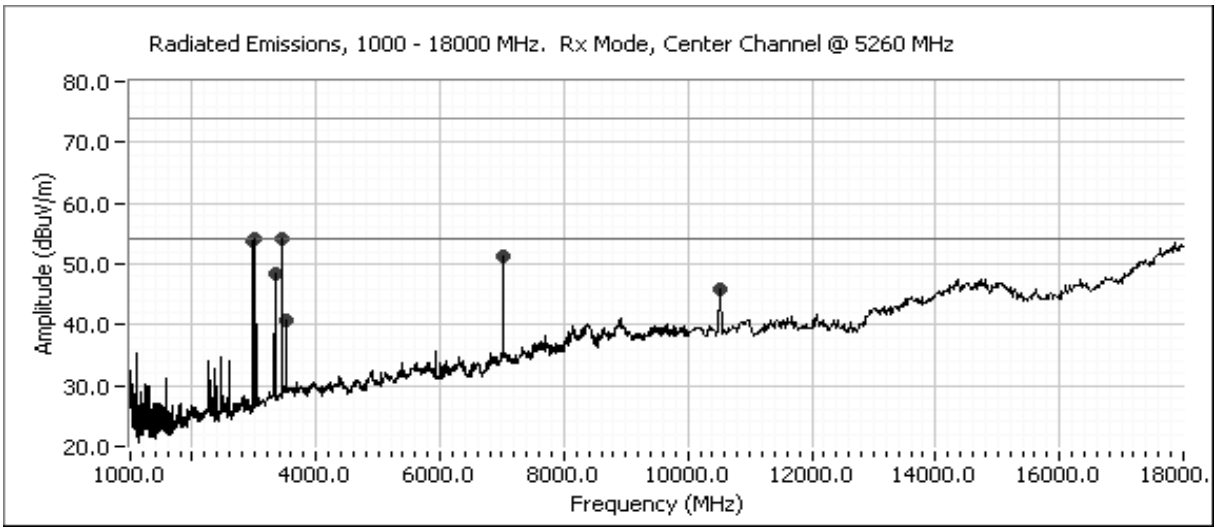
Run #2c: Radiated Spurious Emissions, 30 - 26500 MHz. High Channel @ 5825 MHz

Other 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	
11650.68	44.4	V	54.0	-9.6	AVG	136	1.0	
11650.68	56.8	V	74.0	-17.2	PK	136	1.0	
17471.09	48.3	V	68.3	-20.0	AVG	114	1.0	
11651.33	50.9	H	54.0	-3.1	AVG	118	1.5	
11651.33	62.9	H	74.0	-11.1	PK	118	1.5	
17471.94	50.0	H	68.3	-18.3	AVG	148	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.

Run #3: Radiated Rx Spurious Emissions, 1000 - 18000 MHz. Middle Channel @ 5260 MHz



Frequency	Level	Pol	RSS-210 Rx		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7013.320	50.7	H	60.0	-9.3	AVG	152	1.0	
10519.87	41.3	H	60.0	-18.7	AVG	152	1.4	
3506.670	41.1	H	60.0	-18.9	AVG	188	1.0	
7013.320	53.2	H	80.0	-26.8	PK	152	1.0	
10519.87	48.3	H	80.0	-31.8	PK	152	1.4	
3506.670	45.1	H	80.0	-34.9	PK	188	1.0	

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

FCC 15.247 DTS - Spurious Emissions (802.11b)

Test Specifics

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: 7/30/2005
Test Engineer: Jmartinez
Test Location: Fremont Chamber #4
Config. Used: 1
Config Change: None
Host Unit Voltage 120V/60Hz

General Test Configuration

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

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

Ambient Conditions:

Temperature: 18 °C
Rel. Humidity: 48 %

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 1000 - 25000 MHz Spurious Emissions in Restricted Bands	FCC Part 15.209 / 15.247(c)	Pass	44.3dBµV/m (163.1µV/m) @ 4924.0MHz (-9.8dB)
2	Output Power	15.247(b)	Pass	Refer to run
3	Receiver Emissions	RSS-210	Pass	53.9dBuV/m (496 uV/m) @ 6498.73MHz (-6.1dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

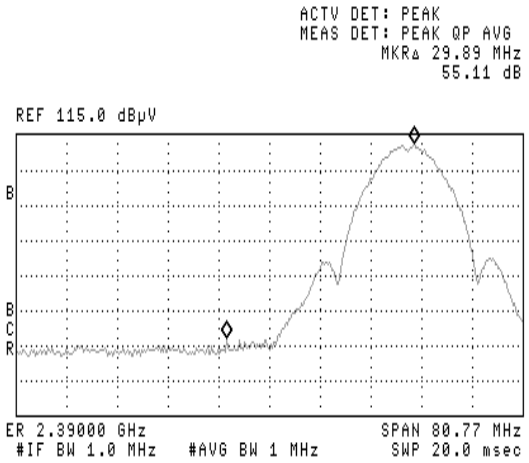
No deviations were made from the requirements of the standard.

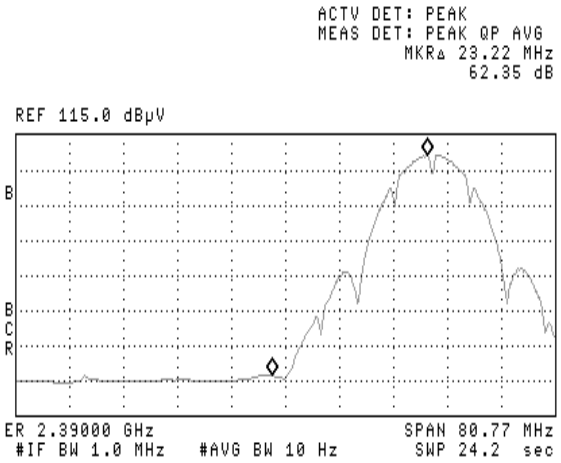
EMC Test Data

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #1a: Radiated Spurious Emissions, 1000 - 25000 MHz. Low Channel @ 2412 MHz
Gain Setting - 15.5

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	104.52	102.95	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	101.42	99.71	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	55.11 dB		
Delta Marker - Average	62.35 dB		
Calculated Band-Edge Measurement:	49.41 dBuV/m		Peak
Calculated Band-Edge Measurement:	39.07 dBuV/m		Average





Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4824.090	35.3	V	54.0	-18.7	AVG	284	1.2	
4824.090	41.9	V	74.0	-32.1	PK	284	1.2	
7237.134	38.8	V	54.0	-15.2	AVG	248	1.0	
7237.134	46.0	V	74.0	-28.0	PK	248	1.0	
4823.888	34.8	H	54.0	-19.2	AVG	186	1.5	
4823.888	41.2	H	74.0	-32.8	PK	186	1.5	
7235.386	35.1	H	54.0	-18.9	AVG	84	1.0	
7235.386	44.8	H	74.0	-29.2	PK	84	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #1b: Radiated Spurious Emissions, 1000 - 25000 MHz. Center Channel @ 2437 MHz
Gain Setting - 17.0

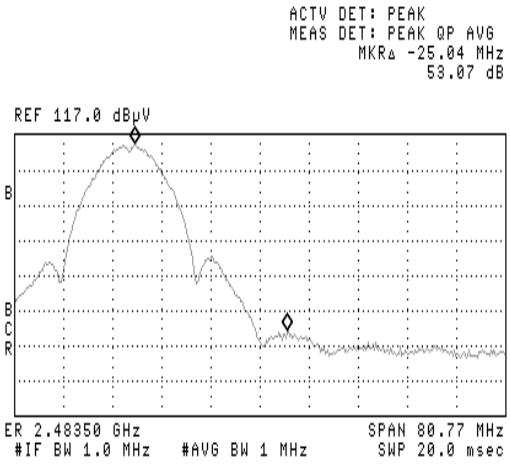
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4873.939	40.0	V	54.0	-14.1	AVG	267	1.0	
4873.939	45.0	V	74.0	-29.0	PK	267	1.0	
7309.740	39.7	V	54.0	-14.3	AVG	210	1.1	
7309.740	47.1	V	74.0	-26.9	PK	210	1.1	
4873.962	37.9	H	54.0	-16.1	AVG	78	1.3	
4873.962	43.1	H	74.0	-30.9	PK	78	1.3	
7310.180	35.8	H	54.0	-18.2	AVG	78	1.0	
7310.180	44.6	H	74.0	-29.4	PK	78	1.0	

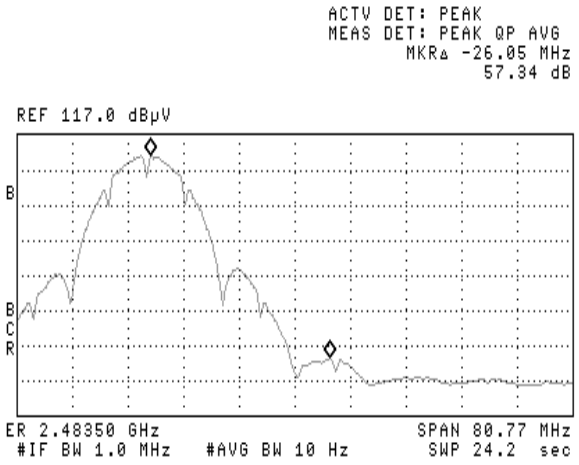
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #1c: Radiated Spurious Emissions, 1000 - 25000 MHz. High Channel @ 2462 MHz
Gain Setting - 17

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	103.23	106.19	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	99.95	103.1	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	53.07 dB		
Delta Marker - Average	57.34 dB		
Calculated Band-Edge Measurement:	53.12 dBuV/m		Peak
Calculated Band-Edge Measurement:	45.76 dBuV/m		Average





Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4923.950	44.3	V	54.0	-9.8	AVG	251	1.1	2nd Harmonics
4923.950	48.0	V	74.0	-26.0	PK	251	1.1	2nd Harmonics
7385.180	38.2	V	54.0	-15.8	AVG	257	1.1	3rd Harmonic
7385.180	46.0	V	74.0	-28.0	PK	257	1.1	3rd Harmonic
4923.958	39.8	H	54.0	-14.2	AVG	211	1.0	2nd Harmonics
4923.958	44.8	H	74.0	-29.2	PK	211	1.0	2nd Harmonics
7386.590	35.6	H	54.0	-18.4	AVG	135	1.0	3rd Harmonic
7386.590	44.8	H	74.0	-29.2	PK	135	1.0	3rd Harmonic

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 level of the fundamental.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #2: Output Power

Maximum antenna gain: 2.1 dBi

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	EIRP (W)
Low	2412	15.3	0.0339	0.0550
Mid	2437	16.8	0.0479	0.0776
High	2462	17.3	0.0537	0.0871

Note 1:	Output power measured using a peak power meter
Note 2	Original report states average and peak power. Due to the inconsistency in the measured peak power (Using peak power meter and UNII power measurement method), the average power was measured and matched it with the original powers that were reported in the original application. Then measured the peak power and recorded the results.

Run #3: Radiated Rx Spurious Emissions, 1000 - 12500 MHz. Middle Channel @ 2347 MHz

Frequency	Level	Pol	RSS-210 Rx		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
6498.518	42.5	V	60.0	-17.5	AVG	128	1.0	
6498.518	46.4	V	80.0	-33.6	PK	128	1.0	
6498.653	53.9	H	60.0	-6.1	AVG	123	1.0	
6498.653	55.4	H	80.0	-24.6	PK	123	1.0	

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

FCC 15.247 DTS - Spurious Emissions (802.11g)

Test Specifics

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: 7/30/2005
Test Engineer: Jmartinez
Test Location: Fremont Chamber #4
Config. Used: 1
Config Change: None
Host Unit Voltage 120V/60Hz

General Test Configuration

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

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

Ambient Conditions:

Temperature: 18 °C
Rel. Humidity: 48 %

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 1000 - 25000 MHz Spurious Emissions in Restricted Bands	FCC Part 15.209 / 15.247(c)	Pass	46.8dBuV/m (218.8uV/m) @ 7386.87MHz (-7.2dB)
2	Output Power	15.247(b)	Pass	Refer to run
3	Receiver Emissions	RSS-210	Pass	49.1dBµV/m (285.1µV/m) @ 9747.9MHz (-10.9dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

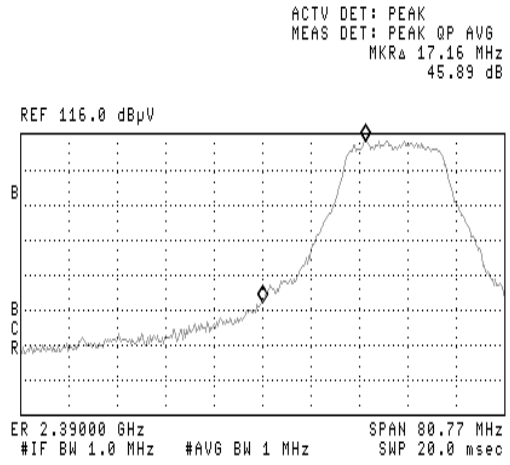
Deviations From The Standard

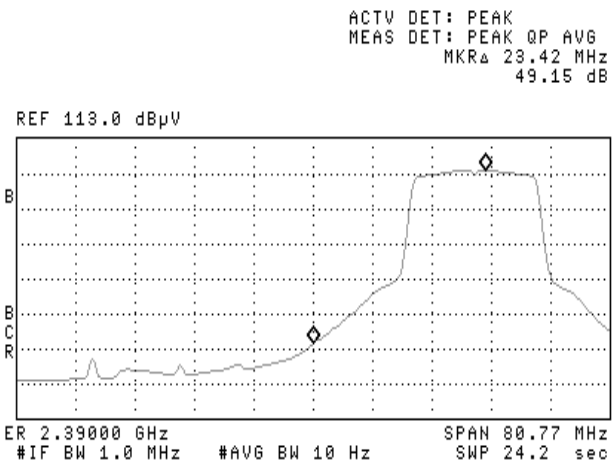
No deviations were made from the requirements of the standard.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #1a: Radiated Spurious Emissions, 1000 - 25000 MHz. Low Channel @ 2412 MHz
Gain Setting - 15.5

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	102.15	103.1	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	94.43	94.3	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	45.89 dB		
Delta Marker - Average	49.15 dB		
Calculated Band-Edge Measurement:	57.21 dBuV/m		Peak
Calculated Band-Edge Measurement:	45.28 dBuV/m		Average





Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
4822.910	28.4	V	54.0	-25.6	AVG	211	1.0	2nd Harmonics
4822.910	39.2	V	74.0	-34.8	PK	211	1.0	2nd Harmonics
4824.040	28.4	H	94.0	-65.6	AVG	140	1.0	2nd Harmonics
4824.040	39.3	H	114.0	-74.7	PK	140	1.0	2nd Harmonics

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #1b: Radiated Spurious Emissions, 1000 - 25000 MHz. Center Channel @ 2437 MHz
Gain Setting - 16.0

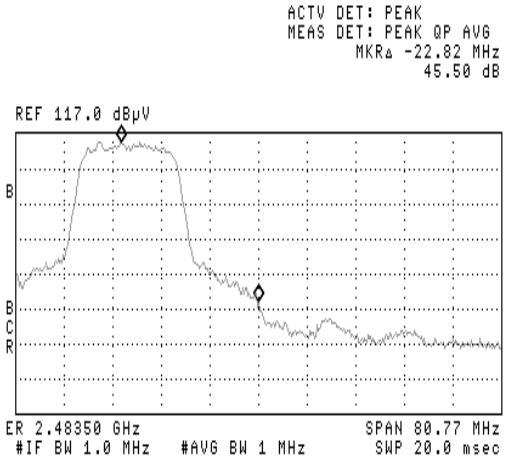
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4873.890	29.3	H	54.0	-24.7	AVG	181	1.0	2nd Harmonics
4873.890	40.9	H	74.0	-33.1	PK	181	1.0	2nd Harmonics
4873.920	29.8	V	54.0	-24.2	AVG	230	1.0	2nd Harmonics
4873.920	40.1	V	74.0	-33.9	PK	230	1.0	2nd Harmonics
7310.670	31.8	V	54.0	-22.2	AVG	360	1.0	3rd Harmonics
7310.670	42.7	V	74.0	-31.3	PK	360	1.0	3rd Harmonics
7311.465	31.8	H	54.0	-22.2	AVG	220	1.0	3rd Harmonics
7311.465	43.4	H	74.0	-30.6	PK	220	1.0	3rd Harmonics

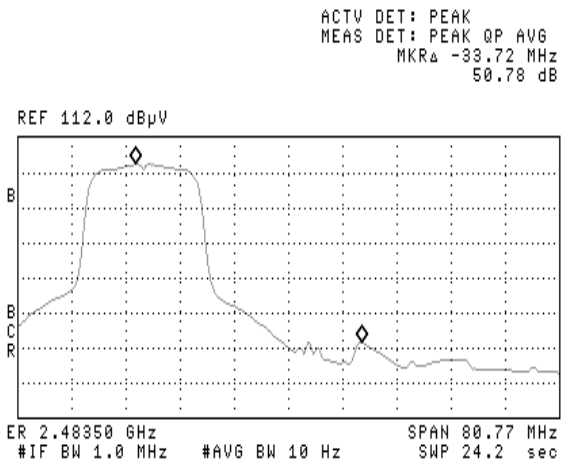
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #1c: Radiated Spurious Emissions, 1000 - 25000 MHz. High Channel @ 2462 MHz
Gain Setting - 17.0

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	102.55	104.96	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	95.15	97.58	Average Measurement (RB=1MHz, VB=10Hz)
Delta Marker - Peak	45.5 dB		
Delta Marker - Average	50.78 dB		
Calculated Band-Edge Measurement:	59.46 dBuV/m		Peak
Calculated Band-Edge Measurement:	46.8 dBuV/m		Average





Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4923.730	30.4	H	54.0	-23.6	AVG	157	1.0	2nd Harmonics
4923.730	40.9	H	74.0	-33.1	PK	157	1.0	2nd Harmonics
4923.295	30.1	V	54.0	-23.9	AVG	228	1.0	2nd Harmonics
4923.295	41.4	V	74.0	-32.6	PK	228	1.0	2nd Harmonics
7385.985	31.9	V	54.0	-22.1	AVG	185	1.0	3rd Harmonic
7385.985	45.0	V	74.0	-29.0	PK	185	1.0	3rd Harmonic
7386.758	31.5	H	54.0	-22.5	AVG	360	1.0	3rd Harmonic
7386.758	42.2	H	74.0	-31.8	PK	360	1.0	3rd Harmonic

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 level of the fundamental.

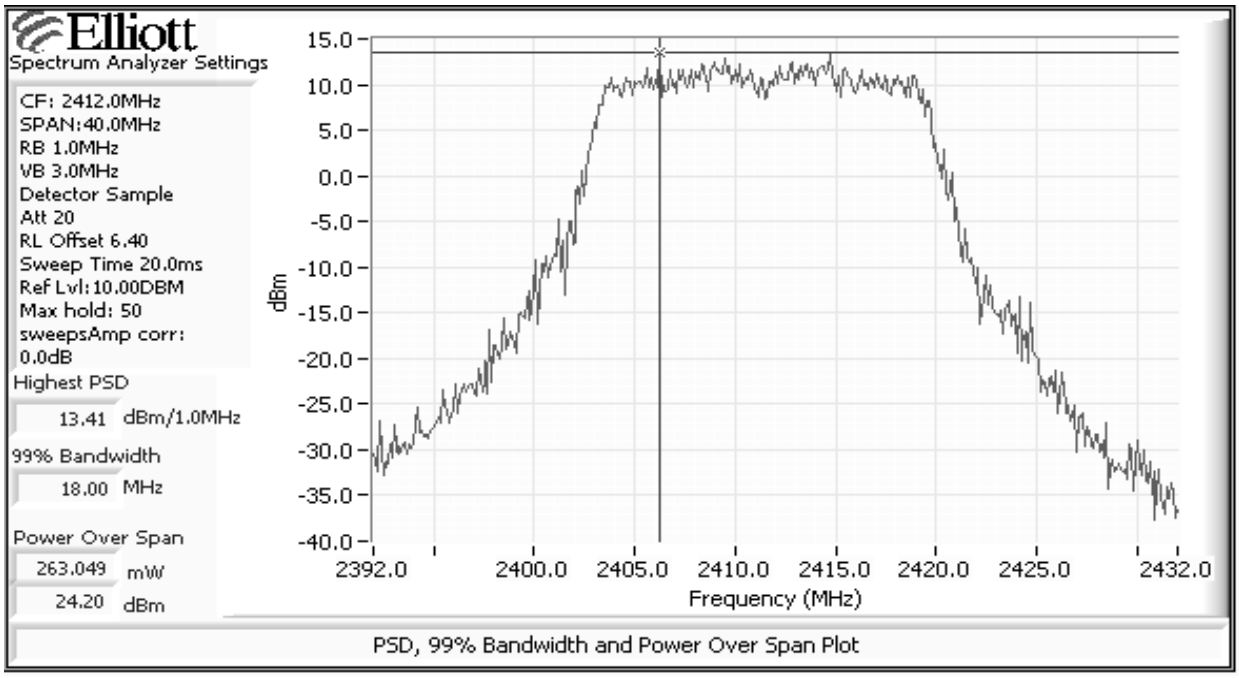
Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #2: Output Power

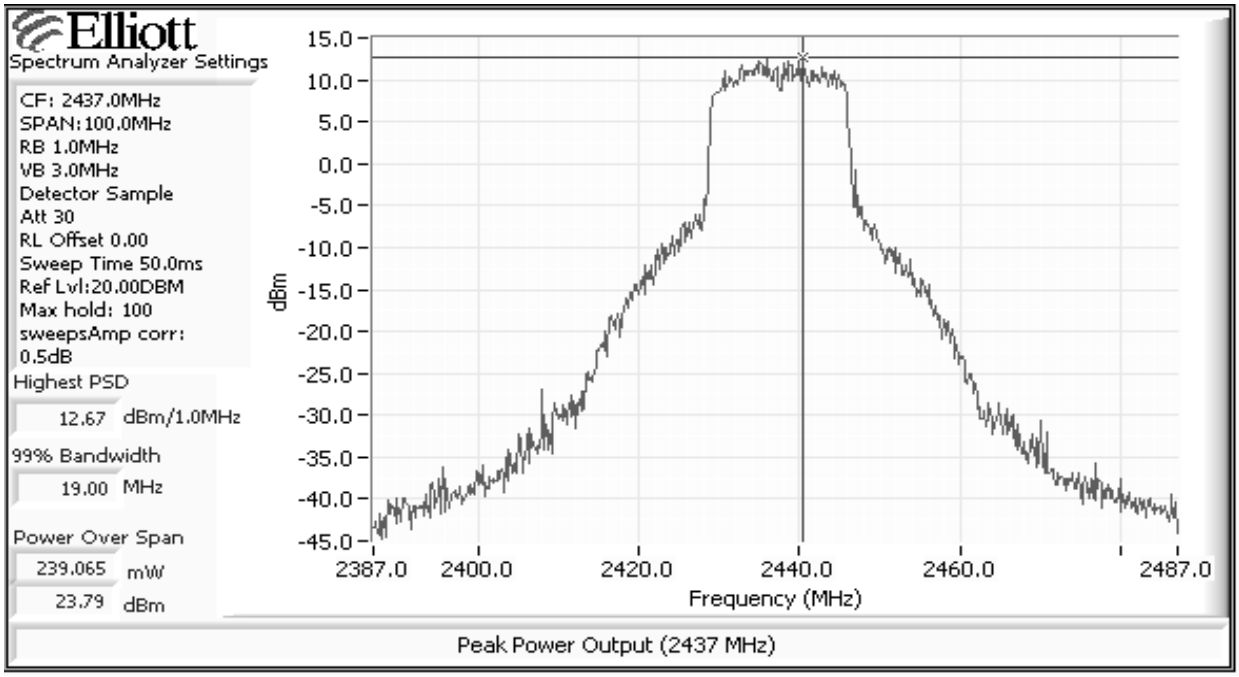
Maximum antenna gain: 2.1 dBi

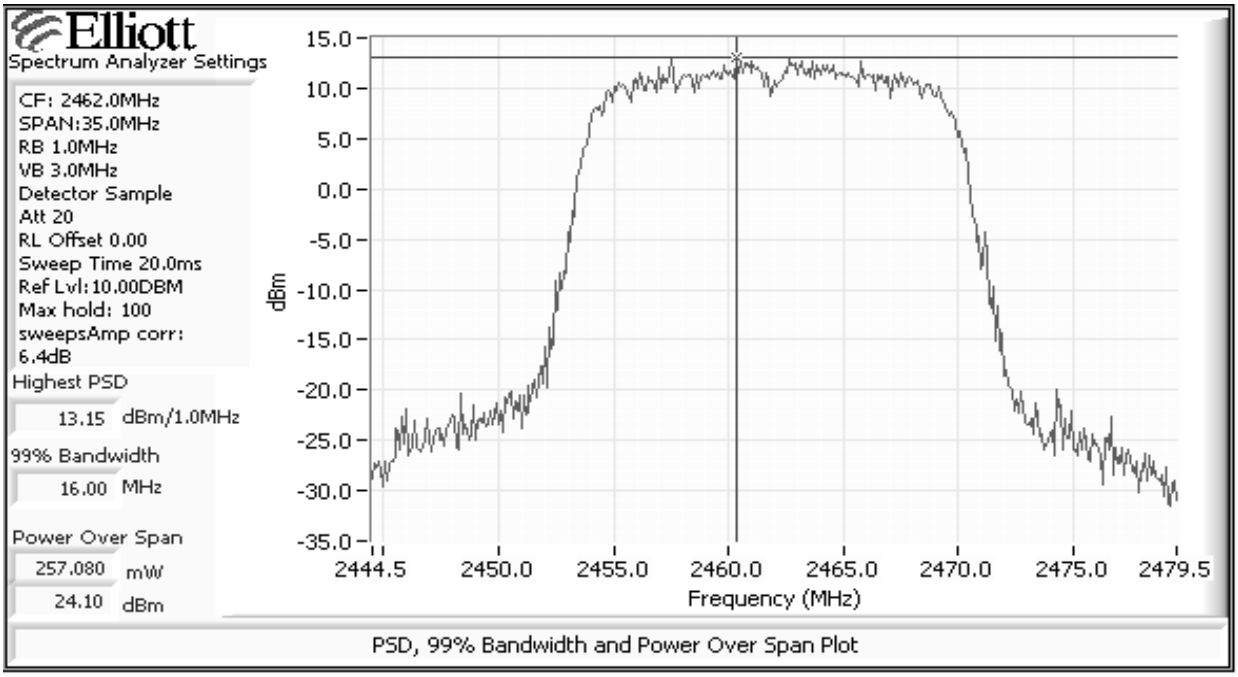
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	EIRP (W)
Low	2412	15.1	0.0327	0.0530
Mid	2437	15.3	0.0339	0.0550
High	2462	15.2	0.0331	0.0537

Note 1:	Output power measured using an average power meter
Note 2	Original report states average and peak power. Due to the inconsistency in the measured peak power (Using peak power meter & UNII power measurement method), the average power was measured and matched it with the original powers that were reported in the original application. Then measured the peak power and recorded the results.



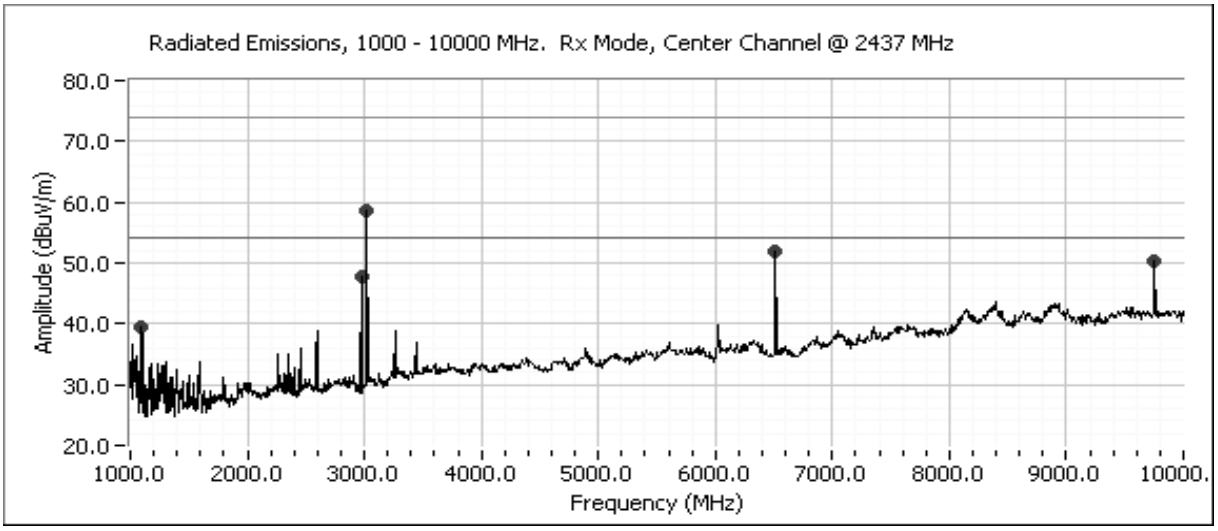
Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A





Client:	Intel Corporation	Job Number:	J60632
Model:	WM3B2915ABG Permissive Change w/ Sony Antenna	T-Log Number:	T60672
		Account Manager:	Nesha Lambert
Contact:	Robert Paxman		
Spec:	FCC 15.247 & 15.401	Class:	N/A

Run #3: Radiated Emissions, 1000 - 10000 MHz. Rx Mode, Center Channel @ 2437 MHz



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
9747.910	49.1	H	60.0	-10.9	AVG	149	1.0	
3008.250	49.0	H	60.0	-11.0	AVG	0	1.0	
6498.658	48.9	H	60.0	-11.1	AVG	143	1.0	
9747.910	52.9	H	80.0	-27.1	PK	149	1.0	
6498.658	51.4	H	80.0	-28.6	PK	143	1.0	
3008.250	50.4	H	80.0	-29.6	PK	0	1.0	
1093.730	28.8	H	60.0	-31.2	AVG	153	1.0	
1093.730	45.9	H	80.0	-34.1	PK	153	1.0	
2968.060	23.9	H	60.0	-36.1	AVG	11	2.0	
2968.060	35.4	H	80.0	-44.6	PK	11	2.0	

EXHIBIT 3: Test Configuration Photographs

2 Pages

EXHIBIT 4: Proposed FCC ID Label & Label Location

Unchanged from original application

EXHIBIT 5: Detailed Photographs of Intel Corporation Model WM3B2915ABGConstruction

Unchanged from original application

EXHIBIT 6: Operator's Manual for Intel Corporation Model WM3B2915ABG

Unchanged from original application

EXHIBIT 7: Block Diagram of Intel Corporation Model WM3B2915ABG

Unchanged from original application

EXHIBIT 8: Schematic Diagrams for Intel Corporation Model WM3B2915ABG

Unchanged from original application

EXHIBIT 9: Theory of Operation for Intel Corporation Model WM3B2915ABG

Unchanged from original application

EXHIBIT 10: Advertising Literature

Unchanged from original application

EXHIBIT 11: RF Exposure Information

2 Pages