

*Electromagnetic Emissions Test Report  
and  
Application for Grant of Equipment Authorization  
pursuant to*

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

*Intel Corporation  
Model: 512BG\_MW*

UPN: 1000M-512BGM

FCC ID: PD9512BGM


GRANTEE: Intel Corporation  
2111 N.E. 25th Ave.  
Hillsboro, OR 97124

TEST SITE: Elliott Laboratories, Inc.  
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REPORT DATE: June 11, 2008

TEST DATES: March 14 – June 6, 2008

AUTHORIZED SIGNATORY:

  
\_\_\_\_\_  
Mark Briggs  
Principal Engineer



Testing Cert #2016-01

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**REVISION HISTORY**

Rev #	Date	Comments	Modified By
1	June 11, 2008	Initial Release	David Guidotti

**TABLE OF CONTENTS**

**COVER PAGE.....1**

**REVISION HISTORY .....2**

**TABLE OF CONTENTS .....3**

**SCOPE.....5**

**OBJECTIVE.....5**

**STATEMENT OF COMPLIANCE.....6**

**TEST RESULTS SUMMARY .....7**

    DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHZ) .....7

    GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS .....8

**MEASUREMENT UNCERTAINTIES.....8**

**EQUIPMENT UNDER TEST (EUT) DETAILS.....9**

    GENERAL.....9

    ANTENNA SYSTEM .....9

    ENCLOSURE.....10

    MODIFICATIONS.....10

    SUPPORT EQUIPMENT.....10

    EUT INTERFACE PORTS .....10

    EUT OPERATION.....10

**TEST SITE.....11**

    GENERAL INFORMATION.....11

    CONDUCTED EMISSIONS CONSIDERATIONS .....11

    RADIATED EMISSIONS CONSIDERATIONS .....11

**MEASUREMENT INSTRUMENTATION .....12**

    RECEIVER SYSTEM .....12

    INSTRUMENT CONTROL COMPUTER .....12

    LINE IMPEDANCE STABILIZATION NETWORK (LISN) .....12

    FILTERS/ATTENUATORS .....13

    ANTENNAS.....13

    ANTENNA MAST AND EQUIPMENT TURNTABLE.....13

    INSTRUMENT CALIBRATION.....13

**TEST PROCEDURES .....14**

    EUT AND CABLE PLACEMENT .....14

    CONDUCTED EMISSIONS.....14

    RADIATED EMISSIONS .....14

    RADIATED EMISSIONS.....15

    BANDWIDTH MEASUREMENTS .....17

    SPECIFICATION LIMITS AND SAMPLE CALCULATIONSMAY 28 .....18

    GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS .....18

    RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS .....19

    OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS.....19

    TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS AND DTS SYSTEMS.....19

    SAMPLE CALCULATIONS - CONDUCTED EMISSIONS .....20

    SAMPLE CALCULATIONS - RADIATED EMISSIONS .....21

    SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION .....22

*TABLE OF CONTENTS (Continued)*

*EXHIBIT 1: Test Equipment Calibration Data..... 1*  
*EXHIBIT 2: Test Measurement Data..... 2*

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## SCOPE

An electromagnetic emissions test has been performed on the Intel Corporation model 512AN\_MMW (MMC) pursuant to the following rules:

Industry Canada RSS-Gen Issue 2  
RSS 210 Issue 7 “Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment”  
FCC Part 15 Subpart 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

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.

The test results recorded herein are based on a single type test of the Intel Corporation model 512AN\_MMW (MMC) and therefore apply only to the tested sample. The sample was selected and prepared under the authority of Robert Paxman of Intel.

## OBJECTIVE

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

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

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

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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 512AN\_MMW (MMC) complied with the requirements of the following regulations:

- Industry Canada RSS-Gen Issue 2
- RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
- FCC Part 15 Subpart C

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.).

**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	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	b: 9.8 MHz g: 16.6 MHz	>500kHz	Complies
	RSP100	99% Bandwidth	b: 13.8 MHz g: 17.1 MHz	Information only	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	<b>b: 19.6 dBm</b> (0.091 W) g: 17.0 dBm EIRP = 0.19 W <sup>Note1</sup>	1 Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	b: -3.2dBm/3kHz g: -7.3dBm/3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All spurious emissions < -30dBc	< -30dBc <sup>Note 2</sup>	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 1000MHz – 25 GHz <b>Note 3</b>	53.0 dBuV/m @ 2483.6 MHz (802.11b Ethertronic Antenna)	15.207 in restricted bands, all others <-30dBc <sup>Note 2</sup>	Complies (-1.0dB)

Note 1: EIRP calculated using antenna gain of 3.2 dBi and is calculated for the highest power of all modes.

Note 2: 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).

Note 3: Spurious emissions below 1GHz were independent of operating channel and operating mode (transmit versus receive). Measurements for radiated emissions below 1GHz are therefore reported for receive mode only.

**GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS**

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Module uses a unique connector	Unique connector	Complies
-	RSS GEN 7.2.3	Receiver spurious emissions 30MHz – 18 GHz	43.4dB $\mu$ V/m @ 108.287MHz <b>Note 1</b>	RSS GEN Table 1	Complies (-0.1dB)
15.207	RSS GEN Table 2	AC Conducted Emissions	21.4dB $\mu$ V @ 24.000MHz	Refer to standard	Complies (-28.6dB)
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to separate MPE calculations, RSS 102 declaration and User Manual statements	Refer to OET 65, FCC Part 1 and RSS 102	Complies
	RSP 100 RSS GEN 7.1.5	User Manual	Statements are included	Statement required regarding non-interference	Complies
	RSP 100 RSS GEN 7.1.5	User Manual	Not applicable, module will be used in host systems that use integral, non-detachable antennas	Statement required regarding detachable antenna	N/A

**Note 1:** Spurious emissions below 1GHz were independent of operating mode and dominated by emissions from the test fixture. The highest emission above 1GHz in MISO receive mode was 50.5dB $\mu$ V/m @ 3000.3MHz (3.5dB below the limit) and in SISO receive mode the worst case was 50.1dB $\mu$ V/m @ 3000.3MHz (3.9dB below the limit).

**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	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	$\pm 2.4$
Radiated Emissions	0.015 to 30	$\pm 3.0$
Radiated Emissions	30 to 1000	$\pm 3.6$
Radiated Emissions	1000 to 40000	$\pm 6.0$



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**EQUIPMENT UNDER TEST (EUT) DETAILS****GENERAL**

The Intel Corporation model 512BG\_MMW is a 1x1/2x1 SISO/MISO 802.11bg radio module that is designed to be installed in laptops. The module supports 802.11b and 802.11g protocols in the 2400 – 2483.5 MHz band with a single transmit chain and the hardware can support single- or dual-receive chains. The card is identical to the 512AN\_MMW module that also supports 802.11n operation in the 2.4GHz band and 802.11a and 802.11n in the 5150 – 5250 MHz, 5250 – 5350 MHz, 5470 – 5725 MHz and 5725 – 5850 MHz bands. The only difference between the two cards is EEPROM programming and label markings/content.

The data in this test report was taken on a model 512AN\_MMW module as representative of the rf characteristics for the feature-reduced 512BG\_MMW.

For testing purposes, and in accordance with requirements for evaluating a device for modular approvals, the EUT was installed onto an extender card that was connected into a PC. The EUT was outside of the PC's enclosure. The electrical rating of the EUT is 3.3 Volts DC, 0.5 Amps.

The sample was received on March 14, 2008, configured with the Ethertronics magnetic dipole antenna and tested on March 14, March 17, March 18, March 24, April 8, April 10, April 11, April 14, April 16 and April 21, 2008. Additional testing was performed on May 28, May 29, May 30 and June 6, 2008 with the device configured with the Universe PIFA antenna.

The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Intel Corporation	512AN_MMW	802.11abgn 1x2 MISO module	-	PD9512ANH

**ANTENNA SYSTEM**

The antenna connects to the EUT via a non-standard U.FL antenna connector, thereby meeting the requirements of FCC 15.203. The EUT was evaluated with each transceiver chain connected to the following antennas:

- Ethertronics MPC8 Module antenna which is based on a magnetic dipole design. The nominal antenna gain is 3dBi in the 2.4GHz band and 5dBi in the 5GHz bands
- Universe Technology antenna which is based on a PIFA design. The nominal antenna gain is 3.2 dBi in the 2.4GHz band, 3.6dBi in the 5150-5250 MHz band, 3.7dBi in 5250-5350MHz band, 4.8dBi in the 5470 – 5725 MHz band and 5dBi in the 5725 – 5850MHz band.

**ENCLOSURE**

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

**MODIFICATIONS**

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

**SUPPORT EQUIPMENT**

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

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	-	Laptop PC	Prototype	-

No remote support equipment was used during 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)
DC power port	DC power source	Multi connect	Unshielded	0.3
PCI Extender	Laptop	Multi connect	Unshielded	0.3
Antenna port 1	Antenna	u.FL	Shielded	0.2
Antenna port 2	Antenna	u.FL	Shielded	0.2

**EUT OPERATION**

During transmitter-related testing the EUT was configured to transmit continuously in each of the various modulation modes (802.11a, 802.11b, 802.11g and 802.11n). Preliminary testing determined the data rates with the highest power and power spectral density to be evaluated for the formal testing, as detailed in the table below.

Mode	Active Chains	1 Chain	2 Chains
	802.11b		1Mb/s
802.11g		6 MBs	

Spurious receiver emissions were measured with the device tuned to the center channel in each operating band. Measurements were made on both single chain modes (SISO modes with one, then the other chain active) and in MISO mode (with both chains active simultaneously).

## **TEST SITE**

### **GENERAL INFORMATION**

Final test measurements were taken on March 14, March 17, March 18, March 24, April 8, April 10, April 11, April 14, April 16, April 21, May 28, May 29, May 30 and June 6, 2008 at the Elliott Laboratories semi anechoic chambers 3, 4 and 5 located at 41039 Boyce Road, Fremont, California 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.

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 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 requirements of ANSI C63.4:2003.

### **CONDUCTED EMISSIONS CONSIDERATIONS**

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

### **RADIATED EMISSIONS CONSIDERATIONS**

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

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## 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. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

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

### INSTRUMENT CONTROL COMPUTER

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

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

### LINE IMPEDANCE STABILIZATION NETWORK (LISN)

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

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*FILTERS/ATTENUATORS*

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

*ANTENNAS*

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

*ANTENNA MAST AND EQUIPMENT TURNTABLE*

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

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

*INSTRUMENT CALIBRATION*

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

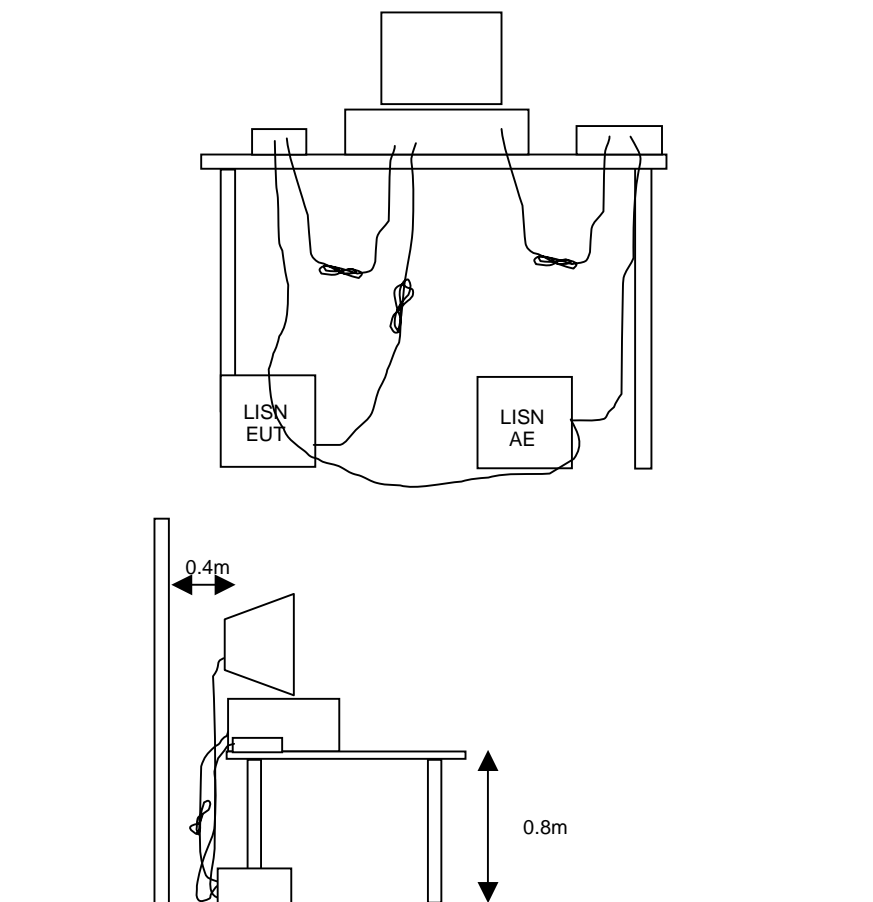
## TEST PROCEDURES

### EUT AND CABLE PLACEMENT

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

### CONDUCTED EMISSIONS

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



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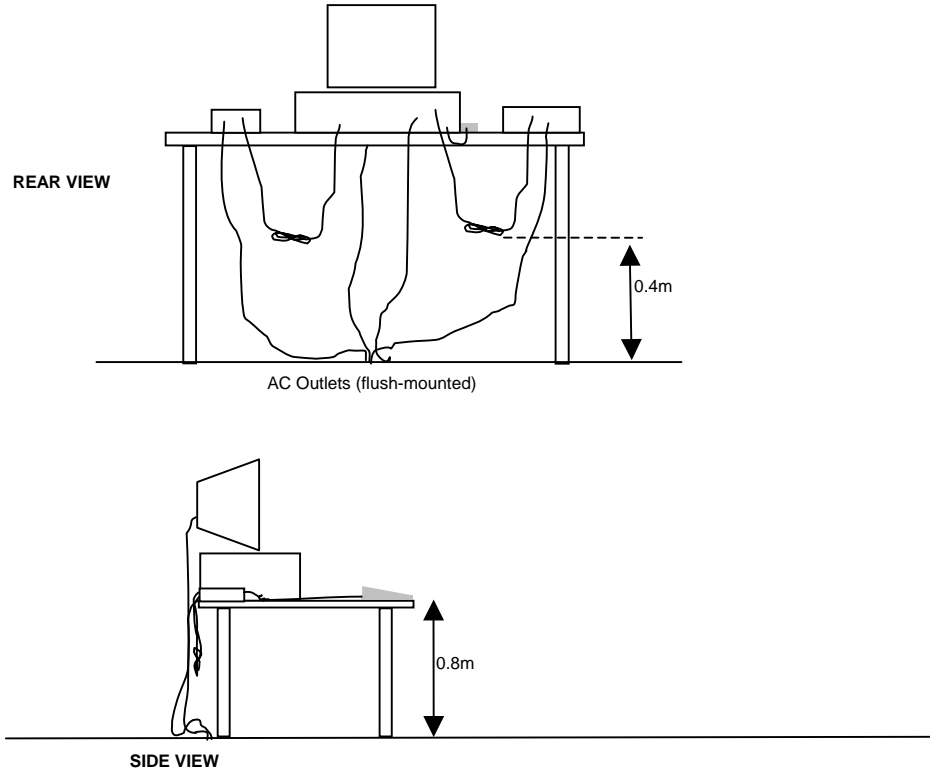
**RADIATED EMISSIONS**

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.

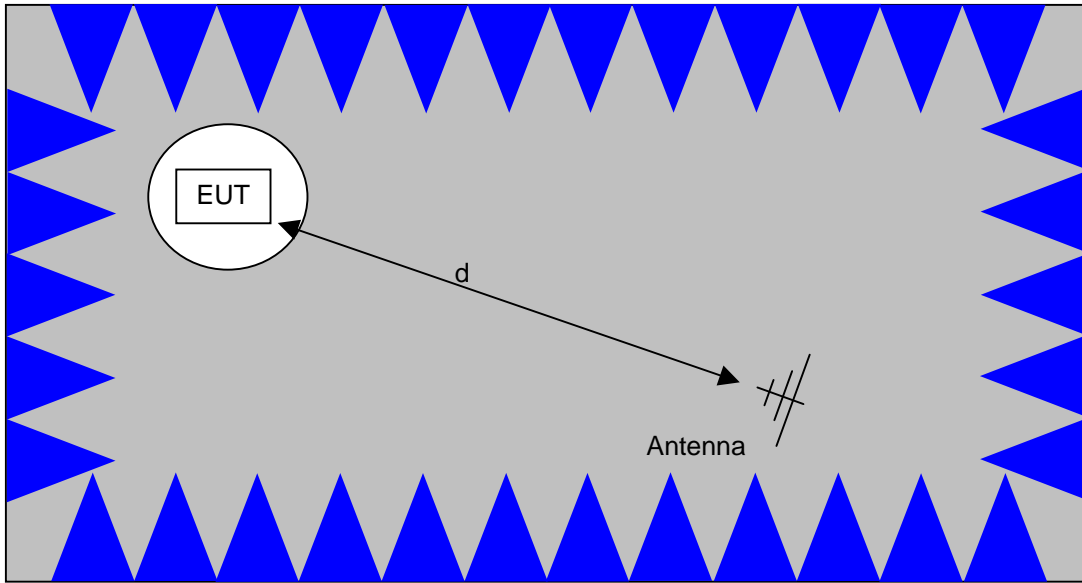
Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna 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 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



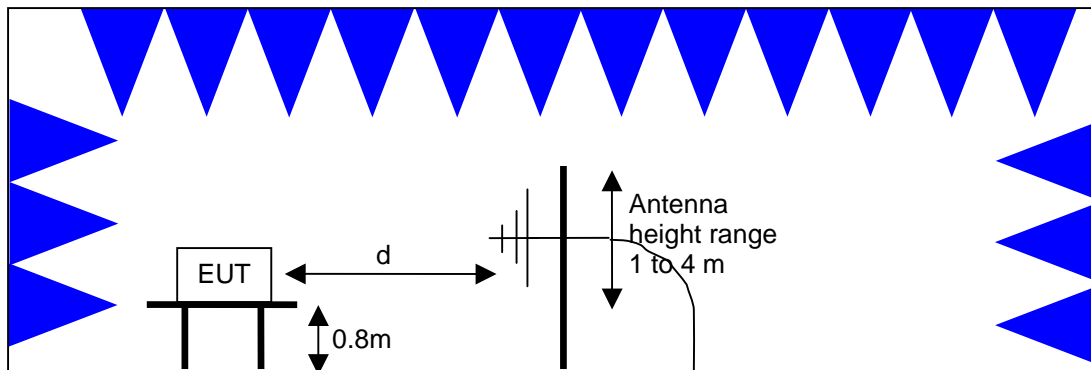
Typical Test Configuration for Radiated Field Strength Measurements





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

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



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

**BANDWIDTH MEASUREMENTS**

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

**SPECIFICATION LIMITS AND SAMPLE CALCULATIONS** May 28

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<sup>1</sup> (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	$2400/F_{\text{KHz}} @ 300\text{m}$	$67.6-20*\log_{10}(F_{\text{KHz}}) @ 300\text{m}$
0.490-1.705	$24000/F_{\text{KHz}} @ 30\text{m}$	$87.6-20*\log_{10}(F_{\text{KHz}}) @ 30\text{m}$
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

<sup>1</sup> The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

**RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS**

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

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

**OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS**

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 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (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.

**TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS**

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

---

**SAMPLE CALCULATIONS - CONDUCTED EMISSIONS**

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

$$R_r - S = M$$

where:

$R_r$  = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

---

**SAMPLE CALCULATIONS - RADIATED EMISSIONS**

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

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

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

where:

$$F_d = \text{Distance Factor in dB}$$

$$D_m = \text{Measurement Distance in meters}$$

$$D_s = \text{Specification Distance in meters}$$

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:

$$F_d = 40 * \text{LOG}_{10} (D_m/D_s)$$

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:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

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**SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION**

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

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

where P is the eirp (Watts)

***EXHIBIT 1: Test Equipment Calibration Data***

3 Pages

**Radiated Emissions, 1000 - 18,000 MHz, 10-Apr-08****Engineer: Joseph Cadigal**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	16-Apr-08
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-May-08
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	17-Dec-08

**Radiated Emissions, 30 - 26,500 MHz, 16-Apr-08****Engineer: jcaizzi**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	11-Jul-08
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	06-Nov-08

**Radiated Emissions, 30 - 26,500 MHz, 17-Apr-08****Engineer: bjing**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	11-Jul-08
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	06-Nov-08

**Conducted Emissions - AC Power Ports, 21-Apr-08****Engineer: Peter Sales**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	22-Feb-09
EMCO	LISN, 10 kHz-100 MHz	3825/2	1293	15-Feb-09
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1593	11-May-08
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	04-Dec-08

**Radiated Emissions, 30 - 1,000 MHz, 21-Apr-08****Engineer: Peter Sales**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Com-Power Corp.	Preamplifier, 30-1000 MHz	PA-103	1543	12-Nov-08
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1549	23-May-09
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	04-Dec-08



**Radiated Emissions, 30 - 6,500 MHz (Band-edge ), 29-May-08****Engineer: Ben Jing**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-Jun-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	06-Nov-08

**Radiated Emissions, 1000 - 26,500 MHz, 30-May-08****Engineer: Ben Jing**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	07-Jun-08
EMCO	Antenna, Horn, 18-26.5 GHz (SA40-Blue)	3160-09 (84125C)	1387	18-Feb-09
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
Hewlett Packard	Head (Inc W1-W4, 1742 , 1743) Blue	84125C	1620	22-Feb-09
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1731	17-Oct-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	06-Nov-08

**Radiated Emissions, 30 - 26,500 MHz, 30-May-08****Engineer: jcaizzi**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	07-Jun-08
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	1728	17-Oct-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	06-Nov-08

**, 31-May-08****Engineer: Ben Jing**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	07-Jun-08
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	1728	17-Oct-08
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	1729	17-Oct-08

**, 31-May-08****Engineer: Ben Jing**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
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**Radiated Emissions, 30 - 18,000 MHz, 31-May-08****Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	07-Jun-08
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	1728	17-Oct-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	06-Nov-08

**Radiated Emissions, 30 - 18,000 MHz, 31-May-08****Engineer: bjing**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	07-Jun-08
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	06-Nov-08

**Radiated Emissions, 1000 - 18,000 MHz, 06-Jun-08****Engineer: Ben Jing**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	28-May-09
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	07-Jul-08
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	17-Dec-08

**Radio Antenna Port (Power and Spurious Emissions), 11-Apr-08**

Engineer: jcaizzi

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	12-Jul-08
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	17-Dec-08
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz, 50ohms	NRV-Z51	1797	21-Aug-08

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**Radio Antenna Port (Power and Spurious Emissions), 14-Apr-08**

Engineer: Suhaila Khushzad

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	12-Jul-08
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	17-Dec-08

***EXHIBIT 2: Test Measurement Data***

T71036 (DTS rf port measurements)	20 Pages
T71040 (Radiated measurements with Ethertronics antenna, AC conducted emissions)	28 Pages
T71831 (Radiated measurements with Universe antenna)	13 Pages



*EMC Test Data*

Client:	Intel	Job Number:	J70979
Model:	512AN_MMW, 512BG_MMW	T-Log Number:	T71036
		Account Manager:	Dean Eriksen
Contact:	Robert Paxman		-
Emissions Standard(s):	FCC 15.247 / RSS -210 RF Port	Class:	DTS
Immunity Standard(s):	-	Environment:	-

## EMC Test Data - RF Port DTS Measurements

For The

**Intel**

Model

512AN\_MMW, 512BG\_MMW

Date of Last Test: 4/14/2008

Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen

### RSS 210 and FCC 15.247 Power Measurement Summary

The table below compares the measured output power (measured using the UNII test method) with the power measured using an average power meter and is for reference purposes.

**802.11b**

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP <sup>Note 2</sup>		Average Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
20.5	2412, Chain A	19.6	91.2	3.2	Pass	22.8	0.191	19.1	81.3
18	2437, Chain A	17.4	55.0	3.2	Pass	20.6	0.115	16.8	47.9
22.5	2462, Chain A	19.6	91.2	3.2	Pass	22.8	0.191	19.5	89.1

**802.11g**

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP <sup>Note 2</sup>		Average Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
20	2412, Chain A	14.1	25.7	3.2	Pass	17.3	0.054	14.5	28.2
23	2437, Chain A	17.0	49.8	3.2	Pass	20.2	0.104	17.0	50.1
20.5	2462, Chain A	13.3	21.4	3.2	Pass	16.5	0.045	14.0	25.1

Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

**RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements  
Power, PSD, Bandwidth and Spurious - 802.11b**

**Test Specific Details**

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

Date of Test: 4/11/2008

Config. Used: 1

Test Engineer: John Caizzi & Joseph Cadigal

Config Change: None

Test Location: FTEMC2

EUT Voltage:

**General Test Configuration**

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

**Ambient Conditions:**                      Temperature:            25 °C  
     Rel. Humidity:         30 %

**Summary of Results**

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	19.6 dBm
2	Power spectral Density (PSD)	15.247(d)	Pass	-3.2 dBm/3kHz / 11.2 dB
3	6dB Bandwidth	15.247(a)	Pass	9.75 MHz
3	99% Bandwidth	RSS GEN	-	13.8MHz
4	Spurious Emissions	15.247	Pass	< -30dBc

**Modifications Made During Testing**

No modifications were made to the EUT during testing

**Deviations From The Standard**

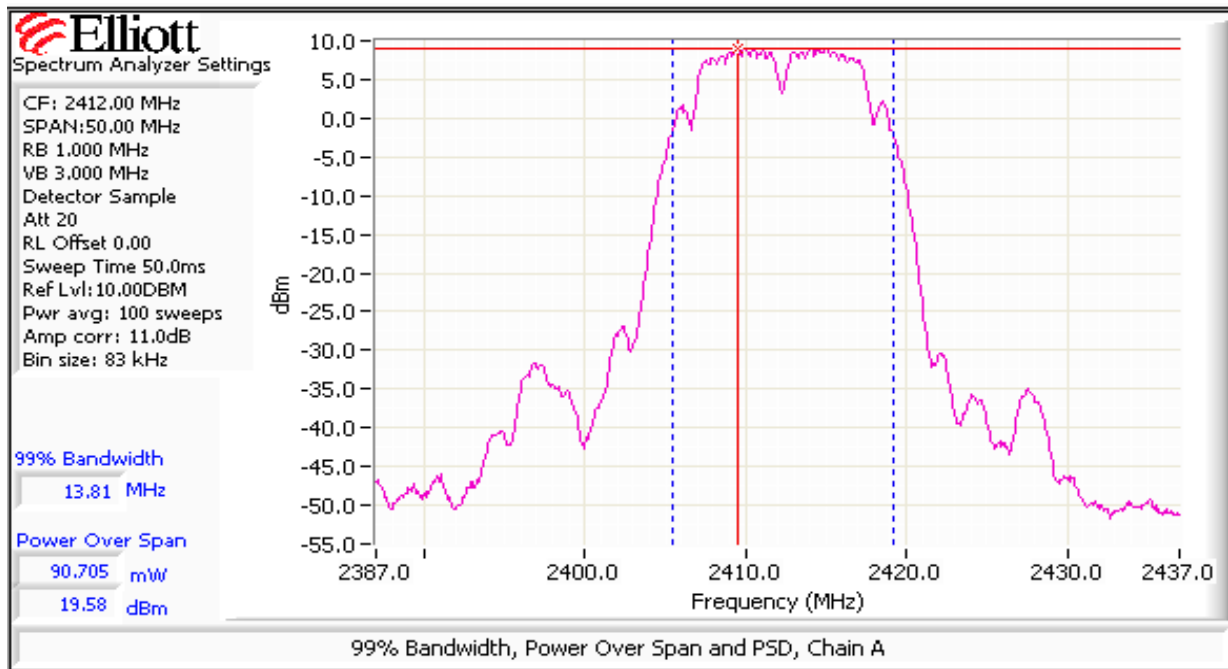
No deviations were made from the requirements of the standard.

Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

Run #1: Output Power

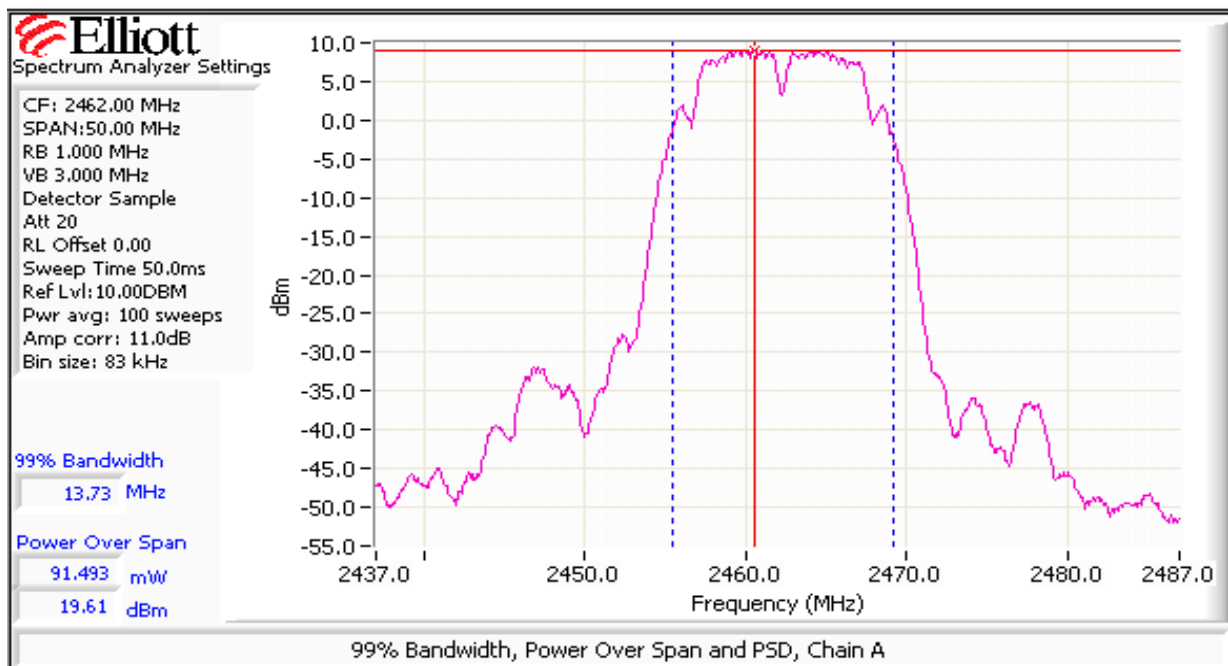
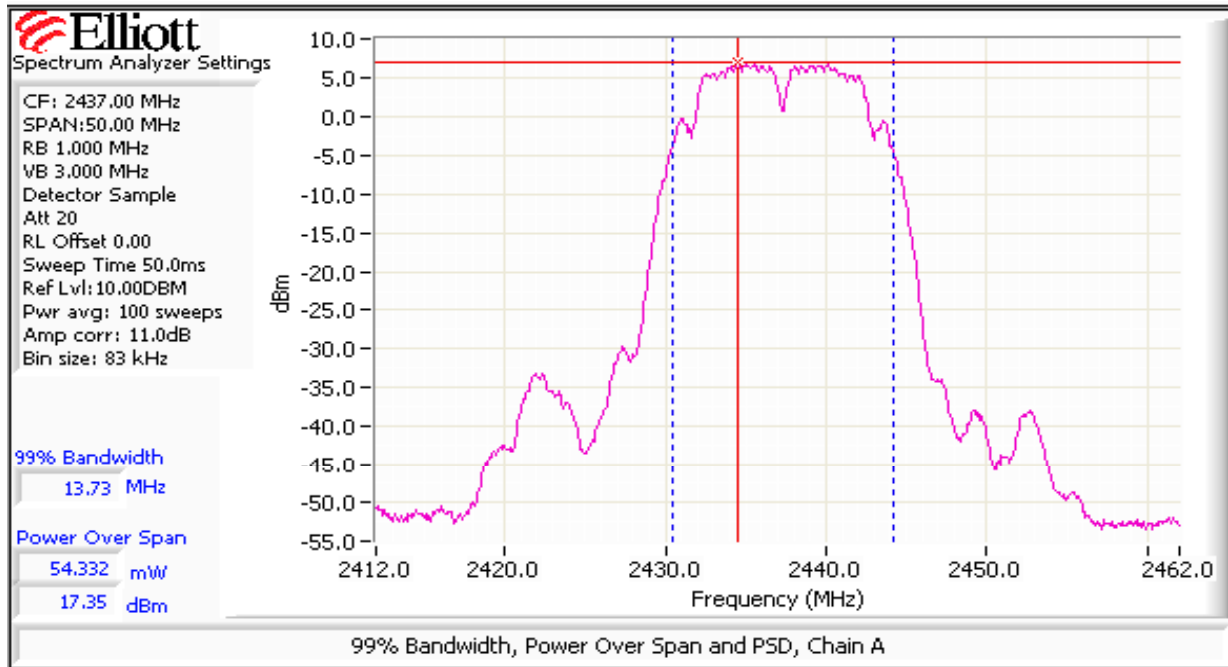
Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP <sup>Note 2</sup>		Output Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
20.5	2412, Chain A	19.6	91.2	3.2	Pass	22.8	0.191	19.1	81.3
18	2437, Chain A	17.4	55.0	3.2	Pass	20.6	0.115	16.8	47.9
22.5	2462, Chain A	19.6	91.2	3.2	Pass	22.8	0.191	19.5	89.1

- Note 1: Output power measured using a spectrum analyzer (see plots below):  
 RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz. **Spurious limit is -30dBc because this method was used.**  
 The output power limit is 30dBm.
- Note 2: Power setting - the software power setting used during testing, included for reference only.
- Note 3: Power measured using average power sensor and is included for manufacturer's reference only.



Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

### Run #1: Output Power



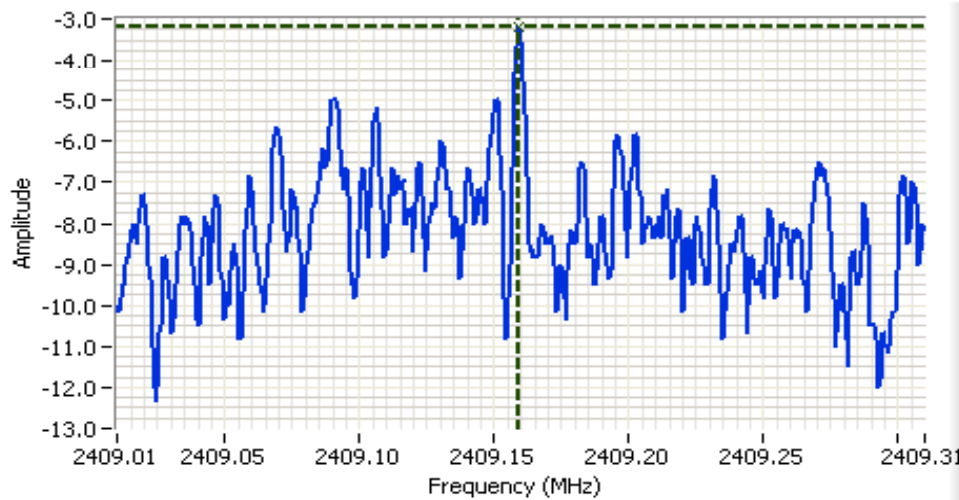


Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

Run #2: Power spectral Density

Power Setting	Frequency (MHz)	PSD	Limit	Result
		(dBm/3kHz) <sup>Note 1</sup>	dBm/3kHz	
20.5	2412, Chain A	-3.2	8.0	Pass
18	2437, Chain A	-7.0	8.0	Pass
22.5	2462, Chain A	-5.3	8.0	Pass

Note 1: Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.



**Analyzer Settings**

HP8564E,EMI  
 CF: 2409.16 MHz  
 SPAN:300 kHz  
 RB 3.00 kHz  
 VB 10.00 kHz  
 Detector POS  
 Att 20  
 RL Offset 11.00  
 Sweep Time 100.0s  
 Ref Lvl:21.00DBM

**Comments**

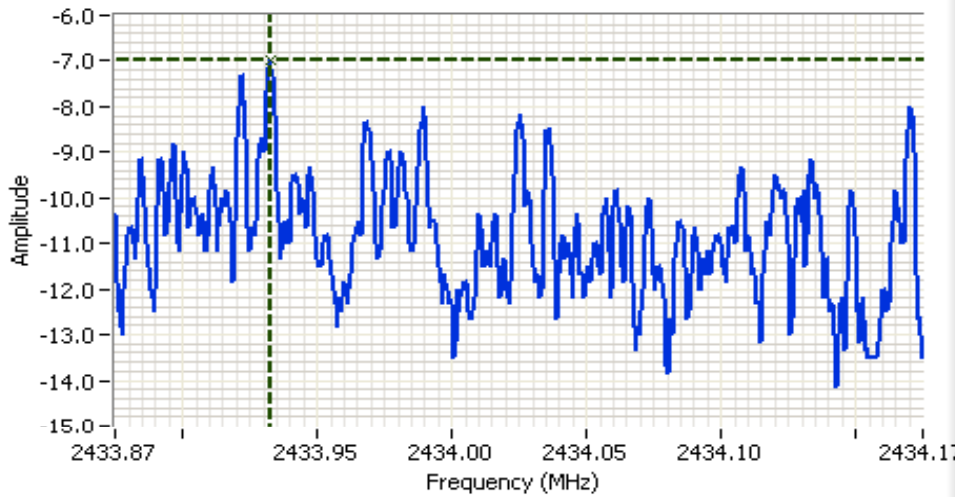
PSD: -3.17 dBm/3 kHz  
 2412 MHz  
 802.11b

Cursor 1	2409.1594	-3.17	
	0.0000	0.00	



Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

### Run #2: Power spectral Density

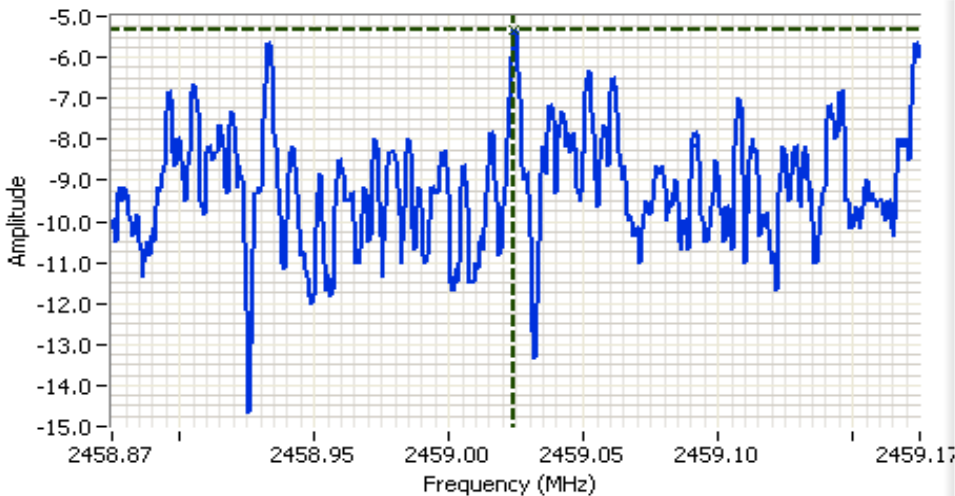
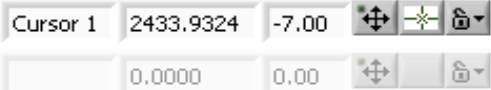


#### Analyzer Settings

HP8564E,EMI  
 CF: 2434.02 MHz  
 SPAN:300 kHz  
 RB 3.00 kHz  
 VB 10.00 kHz  
 Detector POS  
 Att 20  
 RL Offset 11.00  
 Sweep Time 100.0s  
 Ref Lvl:21.00DBM

#### Comments

PSD: -7.00 dBm/3kHz  
 2437 MHz  
 8U2.11b

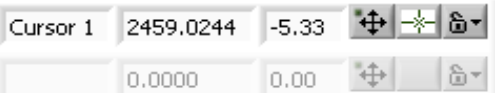


#### Analyzer Settings

HP8564E,EMI  
 CF: 2459.02 MHz  
 SPAN:300 kHz  
 RB 3.00 kHz  
 VB 10.00 kHz  
 Detector POS  
 Att 20  
 RL Offset 11.00  
 Sweep Time 100.0s  
 Ref Lvl:21.00DBM

#### Comments

PSD: -5.33 dBm/3kHz  
 2462 MHz  
 802.11b

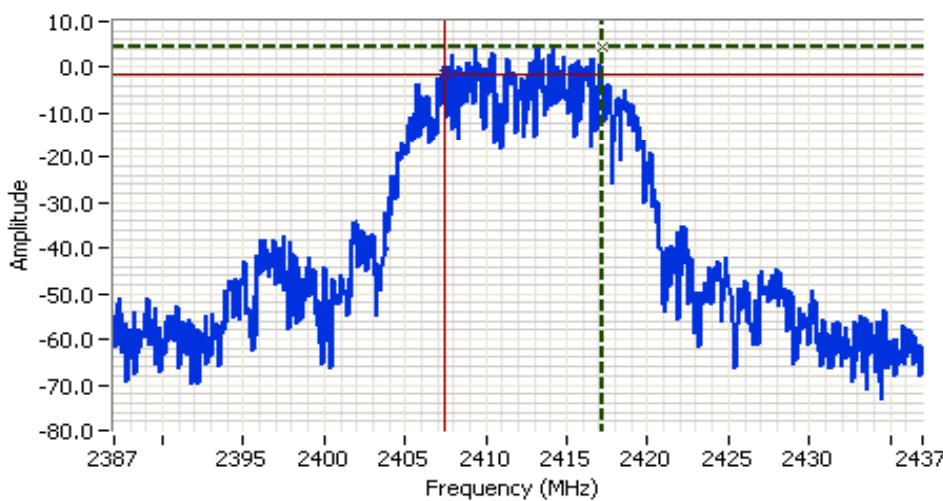


Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz)	
			6dB	99%
20.5	2412, Chain A	100 kHz	9.75	13.8
18	2437, Chain A	100 kHz	11	13.7
22.5	2462, Chain A	100 kHz	9.92	13.7

- Note 1: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB
- Note 2: Center channel of Chains B and C measured to verify no significant difference in signal bandwidth from Chain A.



**Analyzer Settings**

HP8564E,EMI  
 CF: 2412.00 MHz  
 SPAN:50.00 MHz  
 RB 100 kHz  
 VB 100 kHz  
 Detector Sample  
 Att 20  
 RL Offset 11.00  
 Sweep Time 50.0ms  
 Ref Lvl:21.00DBM

**Comments**

6dB Bandwidth: 9.750 MHz  
 2412 MHz  
 802.11b

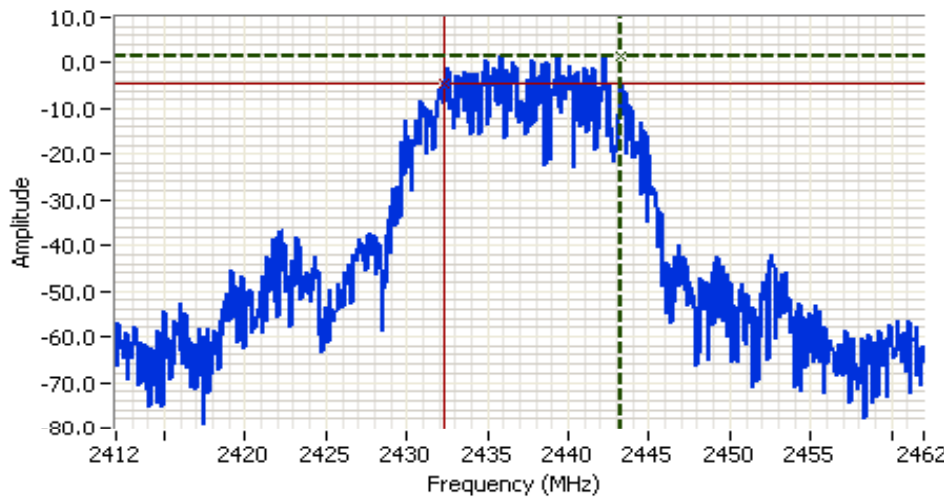
Cursor 1	2417.1667	4.67	
Cursor 2	2407.4167	-1.33	

Delta Freq. 9.750  
 Delta Amplitude 6.00



Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

### Run #3: Signal Bandwidth



**Analyzer Settings**

HP8564E,EMI  
 CF: 2437.00 MHz  
 SPAN:50.00 MHz  
 RB 100 kHz  
 VB 100 kHz  
 Detector Sample  
 Att 20  
 RL Offset 11.00  
 Sweep Time 50.0ms  
 Ref Lvl:21.00DBM

**Comments**

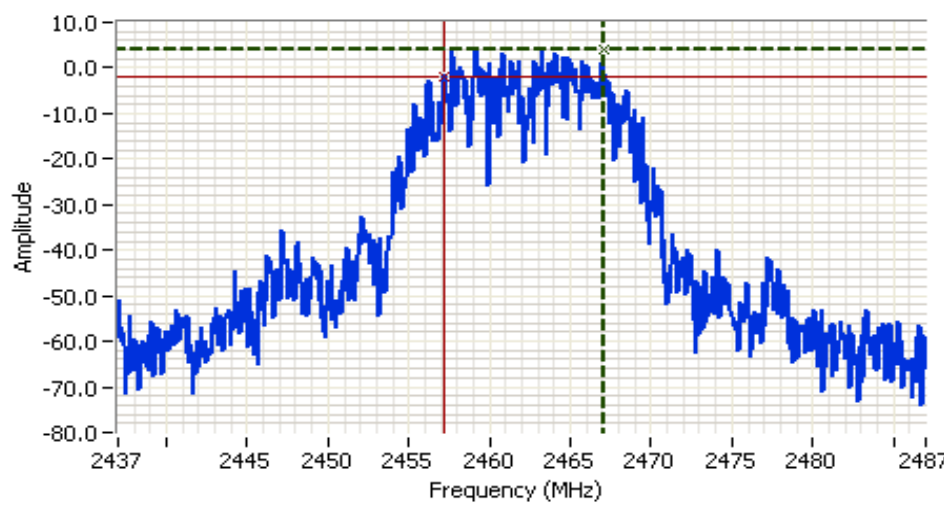
6dB Bandwidth: 11.000 MHz  
 2437 MHz  
 802.11b

Cursor 1 2443.2500 1.50 ⊕ ⊖ 🔒

Cursor 2 2432.2500 -4.50 ⊕ ⊖ 🔒

Delta Freq. 11.000

Delta Amplitude 6.00



**Analyzer Settings**

HP8564E,EMI  
 CF: 2462.00 MHz  
 SPAN:50.00 MHz  
 RB 100 kHz  
 VB 100 kHz  
 Detector Sample  
 Att 20  
 RL Offset 11.00  
 Sweep Time 50.0ms  
 Ref Lvl:21.00DBM

**Comments**

6dB BW: 9.917 MHz  
 802.11b  
 Chain A

Cursor 1 2467.0833 4.17 ⊕ ⊖ 🔒

Cursor 2 2457.1667 -1.83 ⊕ ⊖ 🔒

Delta Freq. 9.917

Delta Amplitude 6.00



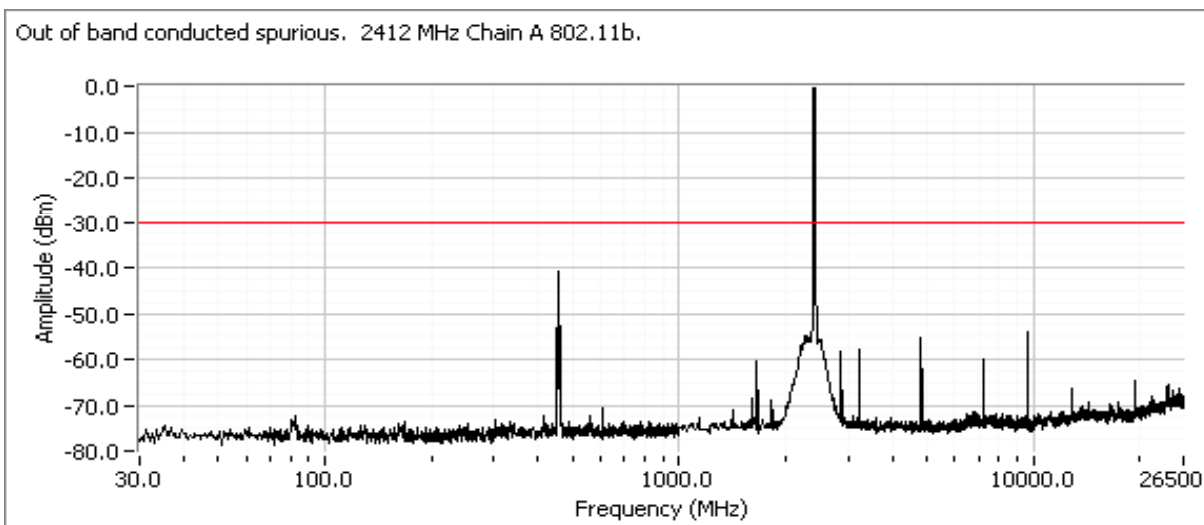
Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

**Run #4: Out of Band Spurious Emissions**

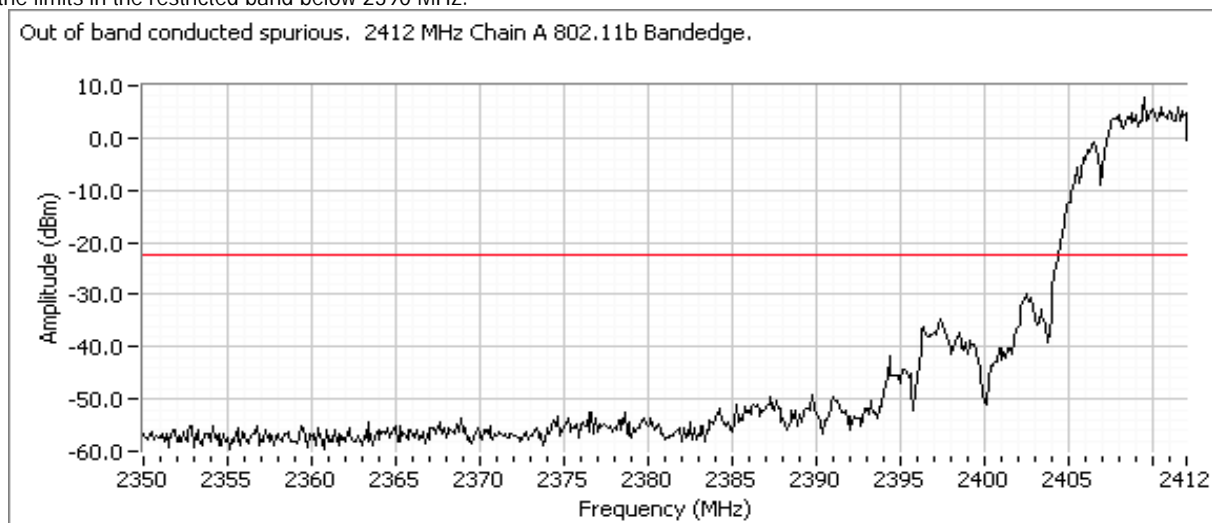
All measured using RB = 100kHz, VB = 300kHz.

Frequency (MHz)	Limit	Result
2412, Chain A	-30dBc	Pass
2437, Chain A	-30dBc	Pass
2462, Chain A	-30dBc	Pass

Plot for low channel, Chain A power setting = 20.5



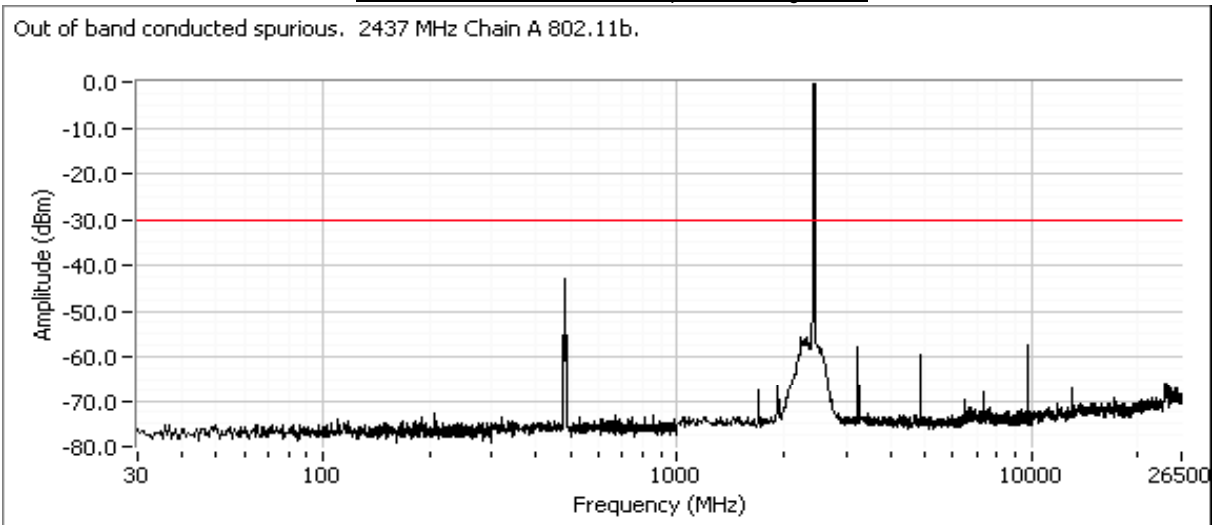
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



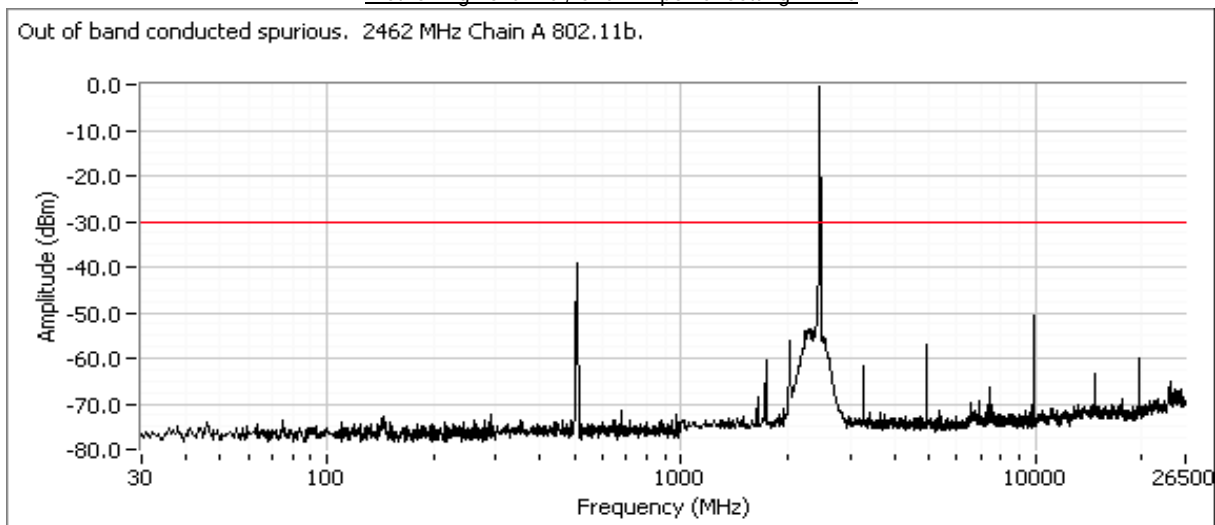
Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

**Run #4: Out of Band Spurious Emissions**

Plot for center channel, Chain A power setting = 18.0



Plot for high channel, Chain A power setting = 22.0



Client:	Intel	Job Number:	J70979
Model:	512AN_MMW, 512BG_MMW	T-Log Number:	T71036
		Account Manager:	Dean Eriksen
Contact:	Robert Paxman		
Standard:	FCC 15.247 / RSS -210 RF Port	Class:	N/A

## RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements Power, PSD, Bandwidth and Spurious - 802.11g

### Test Specific Details

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

Date of Test: 4/14/2008

Config. Used: 1

Test Engineer: Suhaila Khushzad & John Caizzi

Config Change: None

Test Location: FT Lab #1

EUT Voltage: Powered From Host System

### General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

**Ambient Conditions:**                      Temperature:            21 °C  
   Rel. Humidity:         39 %

### Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	17dBm(49.8mW)
2	Power spectral Density (PSD)	15.247(d)	Pass	-7.3 dBm/3kHz
3	6dB Bandwidth	15.247(a)	Pass	16.6 MHz
3	99% Bandwidth	RSS GEN	-	17.1 MHz
4	Antenna Conducted - Out of Band Spurious	15.247(b)	Pass	All emissions below the -30dBc limit

### Modifications Made During Testing

No modifications were made to the EUT during testing

### Deviations From The Standard

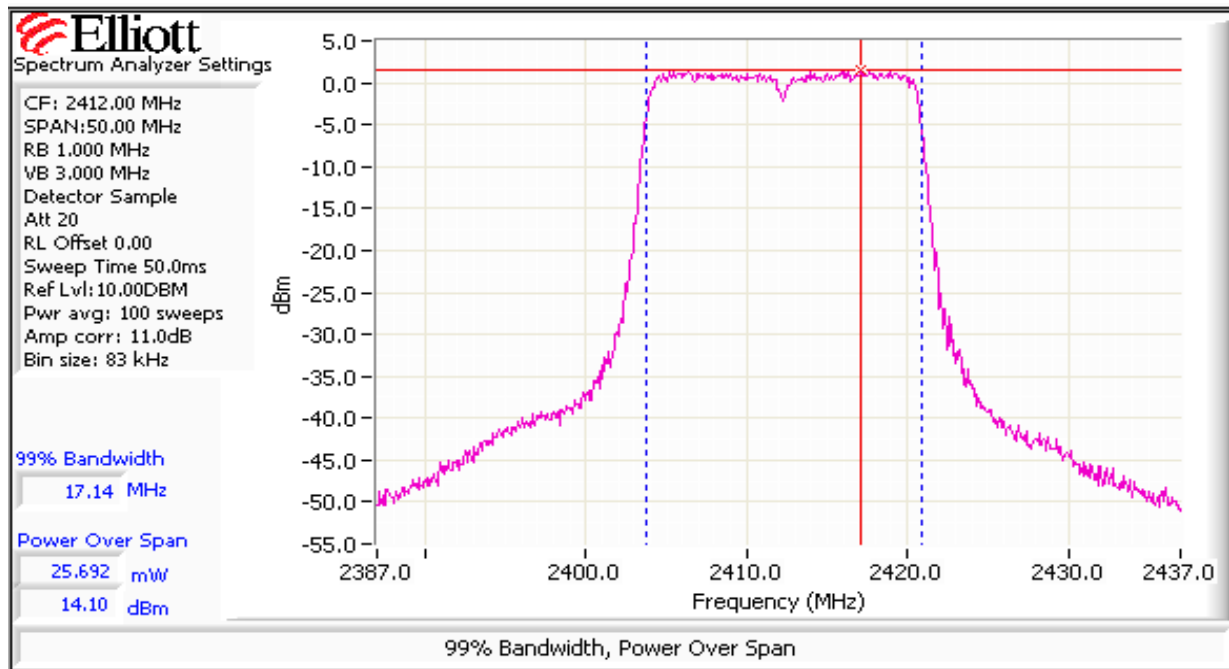
No deviations were made from the requirements of the standard.

Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

### Run #1: Output Power

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP <sup>Note 2</sup>		Output Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
20	2412, Chain A	14.1	25.7	3.2	Pass	17.3	0.054	14.5	28.2
23	2437, Chain A	17.0	49.8	3.2	Pass	20.2	0.104	17.0	50.1
20.5	2462, Chain A	13.3	21.4	3.2	Pass	16.5	0.045	14.0	25.1

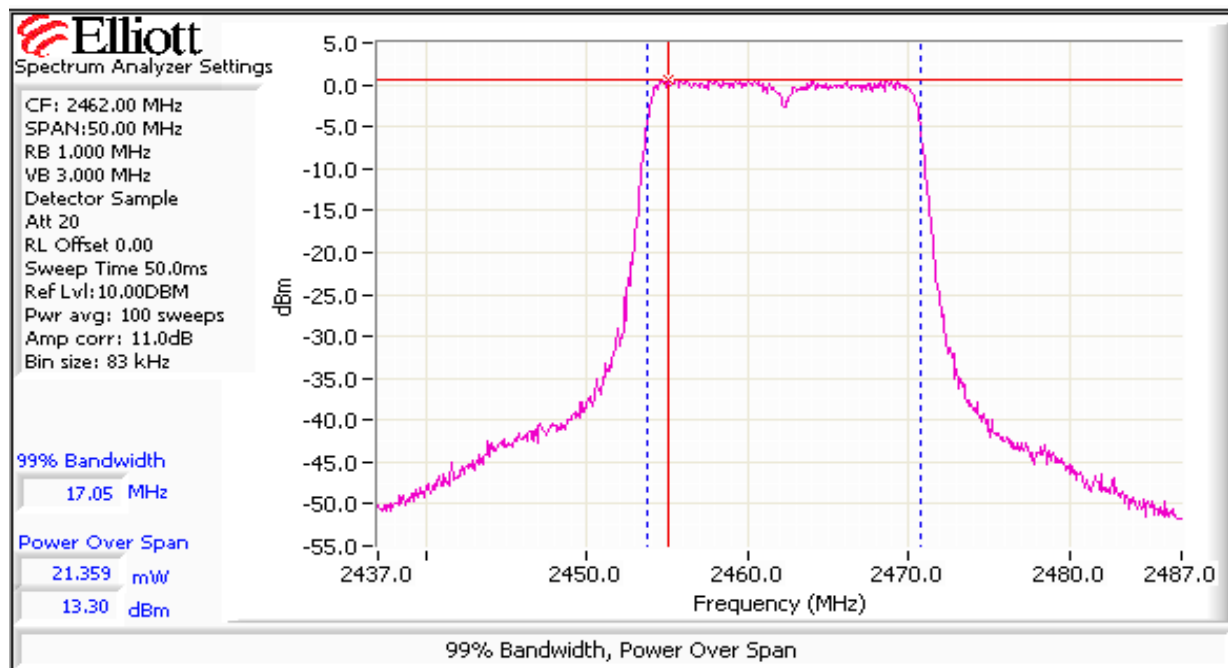
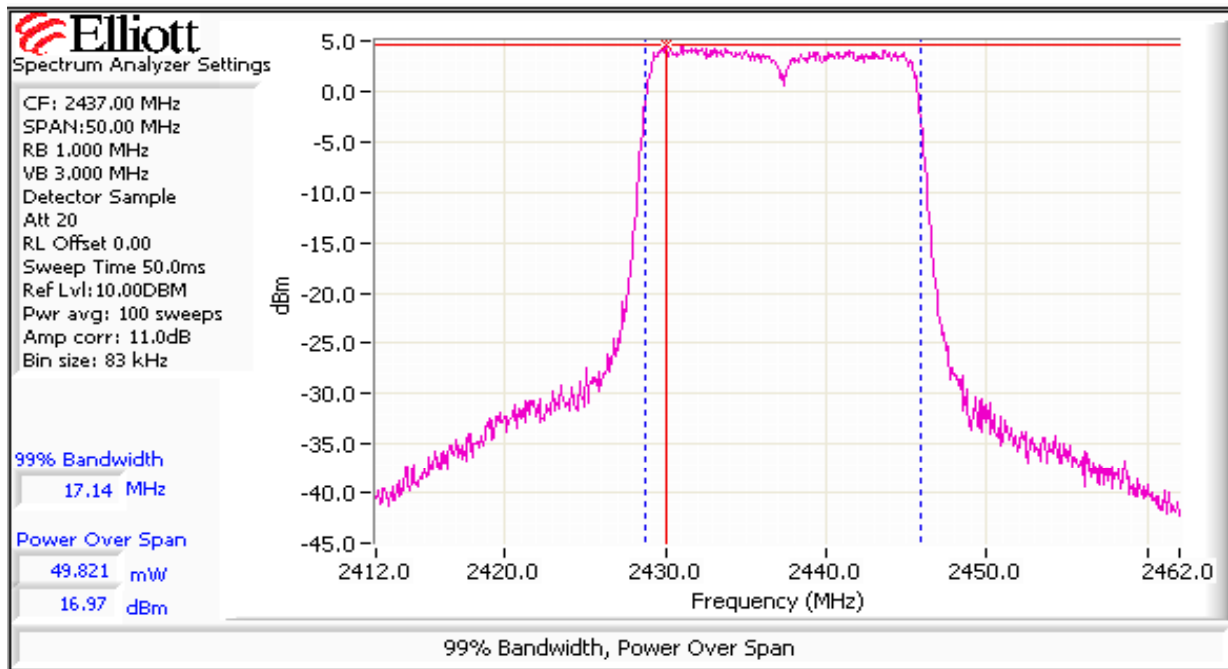
Note 1:	Output power measured using a spectrum analyzer (see plots below): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz. <b>Spurious limit is -30dBc because this method was used.</b> The output power limit is 30dBm.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Power measured using average power sensor and is included for manufacturer's reference only.





Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

### Run #1: Output Power

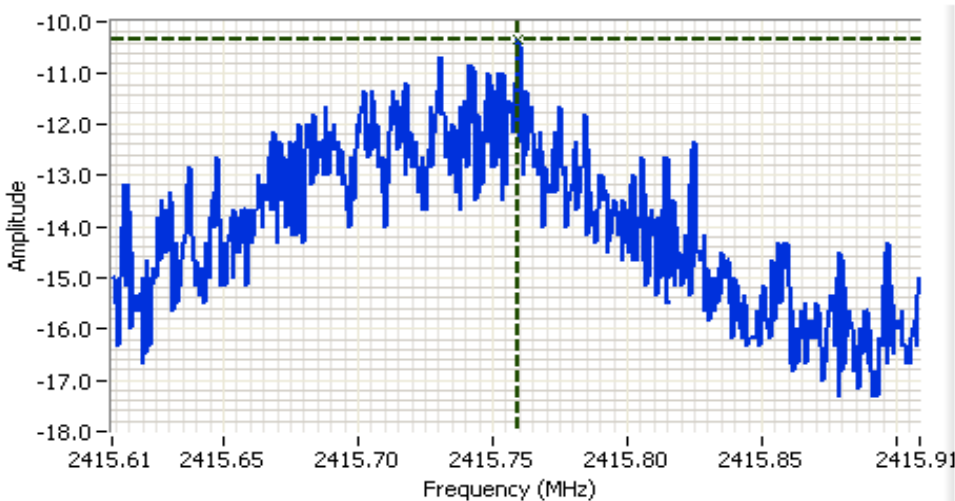


Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

Run #2: Power spectral Density

Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/3kHz) <sup>Note 1</sup>		
20	2412, Chain A	-7.3	8.0	Pass
23	2437, Chain A	-7.3	8.0	Pass
20.5	2462, Chain A	-11.2	8.0	Pass

Note 1: Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.





**Analyzer Settings**

HP8564E,EMI  
 CF: 2415.76 MHz  
 SPAN:300 kHz  
 RB 3.00 kHz  
 VB 10.00 kHz  
 Detector POS  
 Att 20  
 RL Offset 11.00  
 Sweep Time 100.0s  
 Ref Lvl:21.00DBM

**Comments**

PSD: -7.33dBm/3kHz  
 2412 MHz  
 g Mode

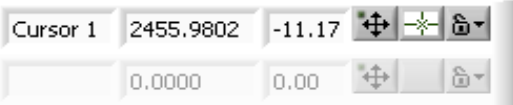
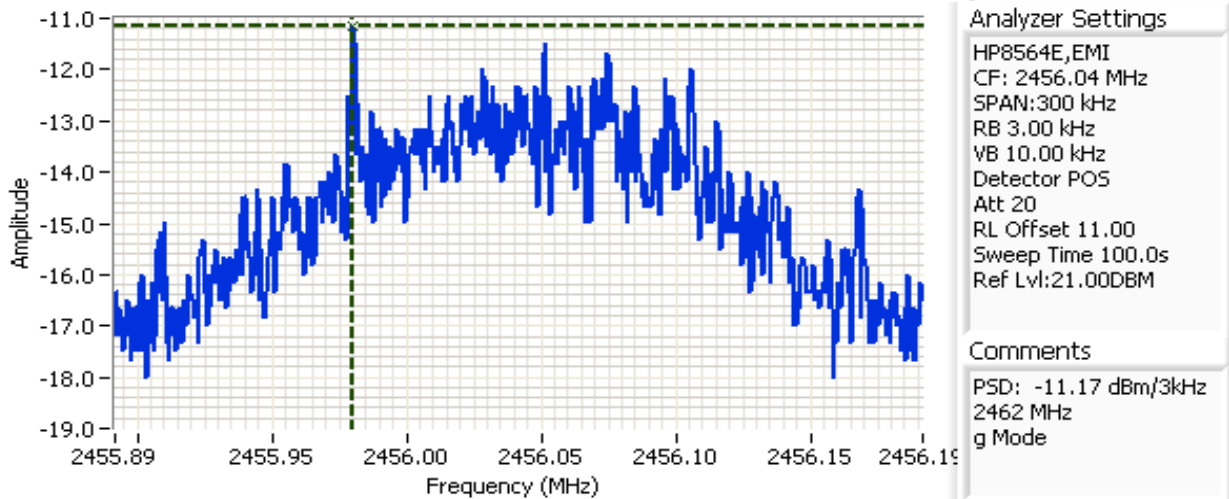
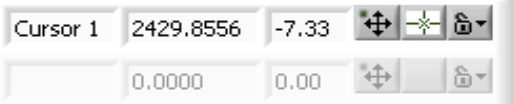
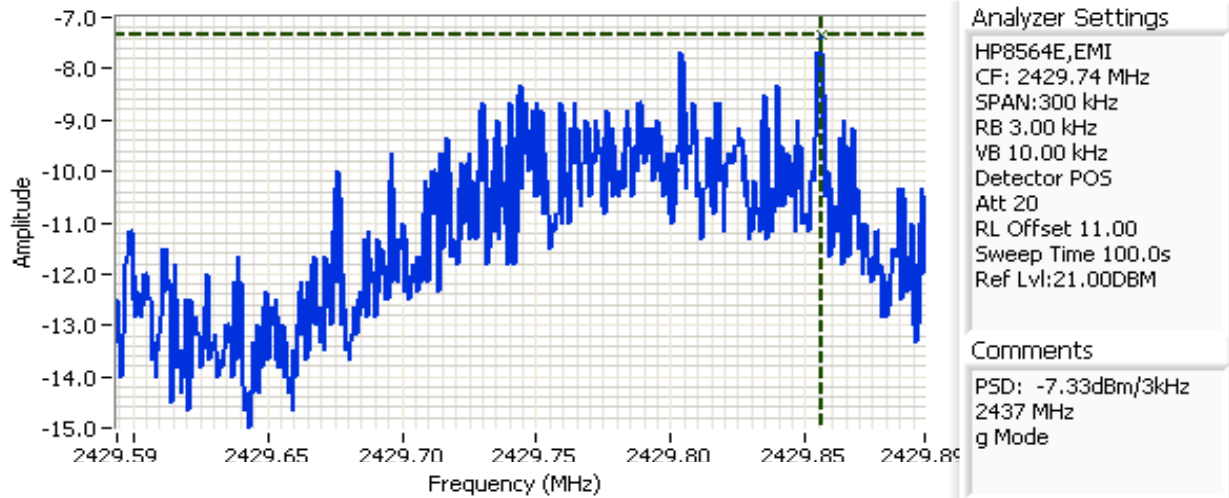
Cursor 1    2415.7595    -10.33    

                 0.0000    0.00    



Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

### Run #2: Power spectral Density

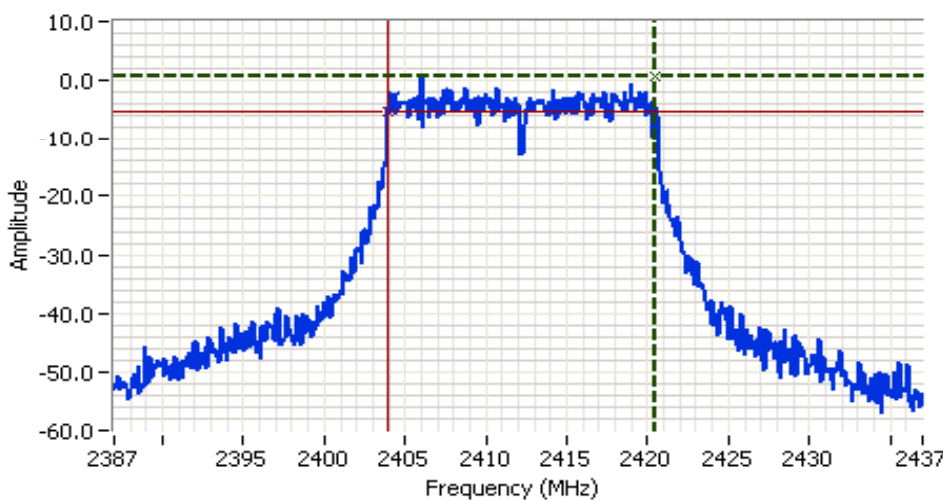


Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz)	
			6dB	99%
20	2412, Chain A	100kHz	16.6	17.1
23	2437, Chain A	100kHz	16.5	17.1
20.5	2462, Chain A	100kHz	16.6	17.1

- Note 1: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB
- Note 2: Center channel of Chains B and C measured to verify no significant difference in signal bandwidth from Chain A.



**Analyzer Settings**

HP8564E,EMI  
 CF: 2412.00 MHz  
 SPAN:50.00 MHz  
 RB 100 kHz  
 VB 100 kHz  
 Detector Sample  
 Att 20  
 RL Offset 11.00  
 Sweep Time 50.0ms  
 Ref Lvl:21.00DBM

**Comments**

6dB Bandwidth:  
 16.58 MHz  
 g Mode

Cursor 1 2420.5000 0.67

Cursor 2 2403.9167 -5.33

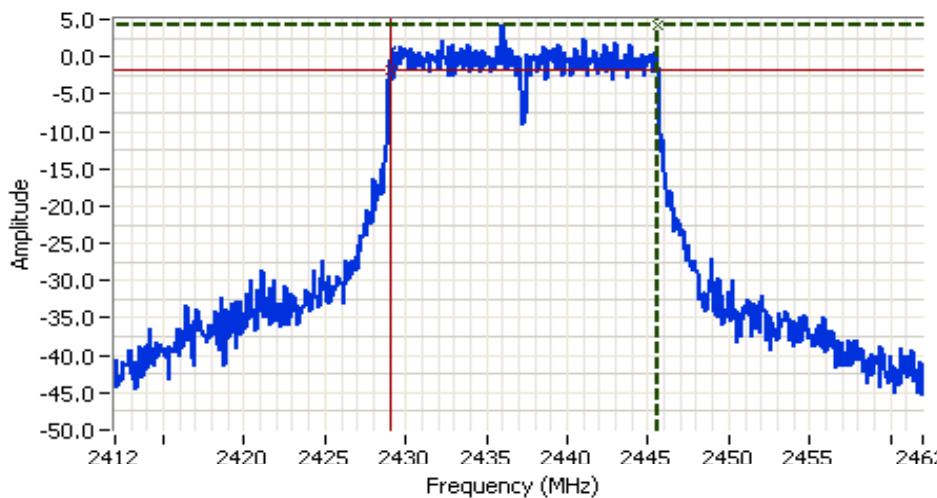
Delta Freq. 16.58

Delta Amplitude 6.00



Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
Contact: Robert Paxman	Account Manager: Dean Eriksen
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

### Run #3: Signal Bandwidth

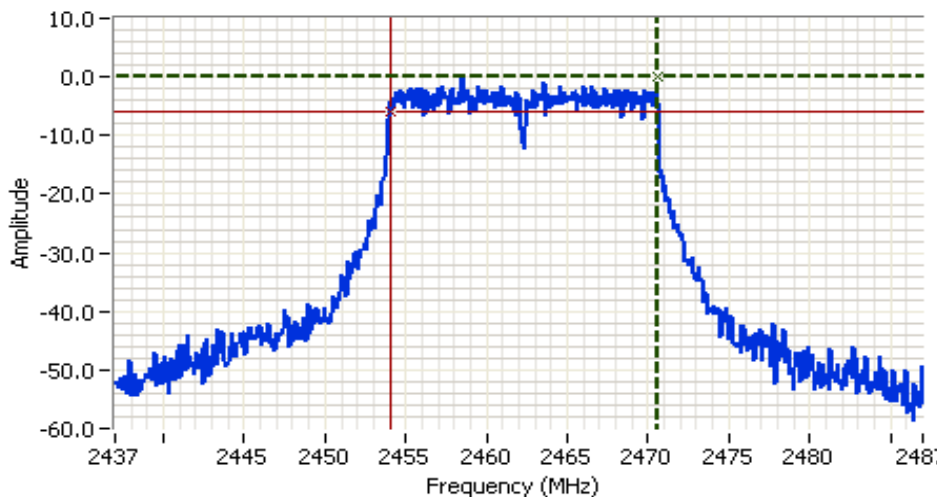


**Analyzer Settings**  
 HP8564E,EMI  
 CF: 2437.00 MHz  
 SPAN:50.00 MHz  
 RB 100 kHz  
 VB 100 kHz  
 Detector Sample  
 Att 20  
 RL Offset 11.00  
 Sweep Time 50.0ms  
 Ref Lvl:21.00DBM

**Comments**  
 6dB Bandwidth:  
 16.50 MHz  
 g Mode

Cursor 1 2445.5833 4.33  
 Cursor 2 2429.0833 -1.67

Delta Freq. 16.50  
 Delta Amplitude 6.00



**Analyzer Settings**  
 HP8564E,EMI  
 CF: 2462.00 MHz  
 SPAN:50.00 MHz  
 RB 100 kHz  
 VB 100 kHz  
 Detector Sample  
 Att 20  
 RL Offset 11.00  
 Sweep Time 50.0ms  
 Ref Lvl:21.00DBM

**Comments**  
 6dB Bandwidth:  
 16.58 MHz  
 g Mode

Cursor 1 2470.5833 0.00  
 Cursor 2 2454.0000 -6.00

Delta Freq. 16.58  
 Delta Amplitude 6.00

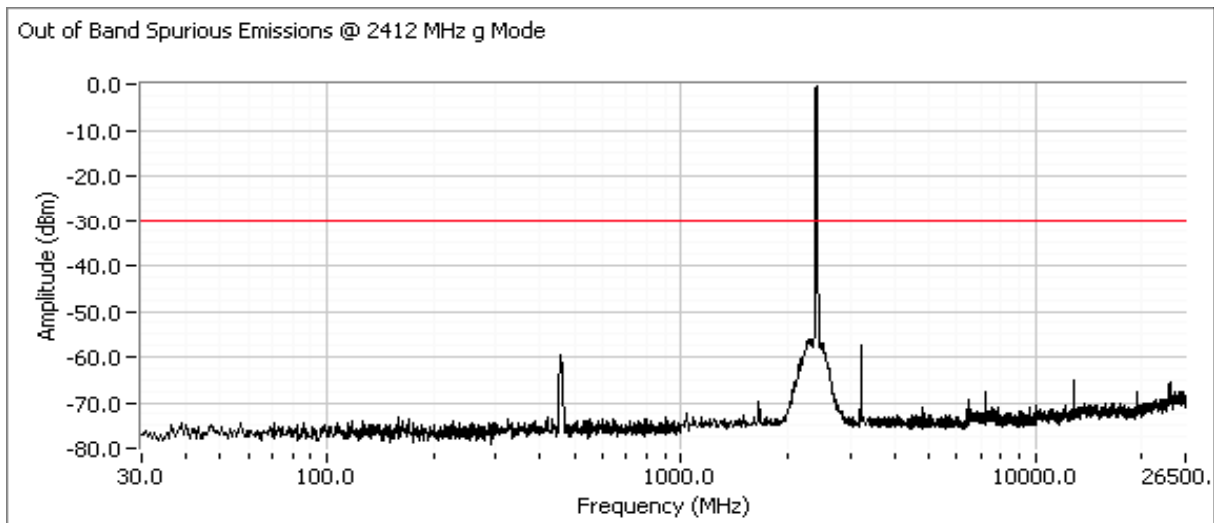


Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

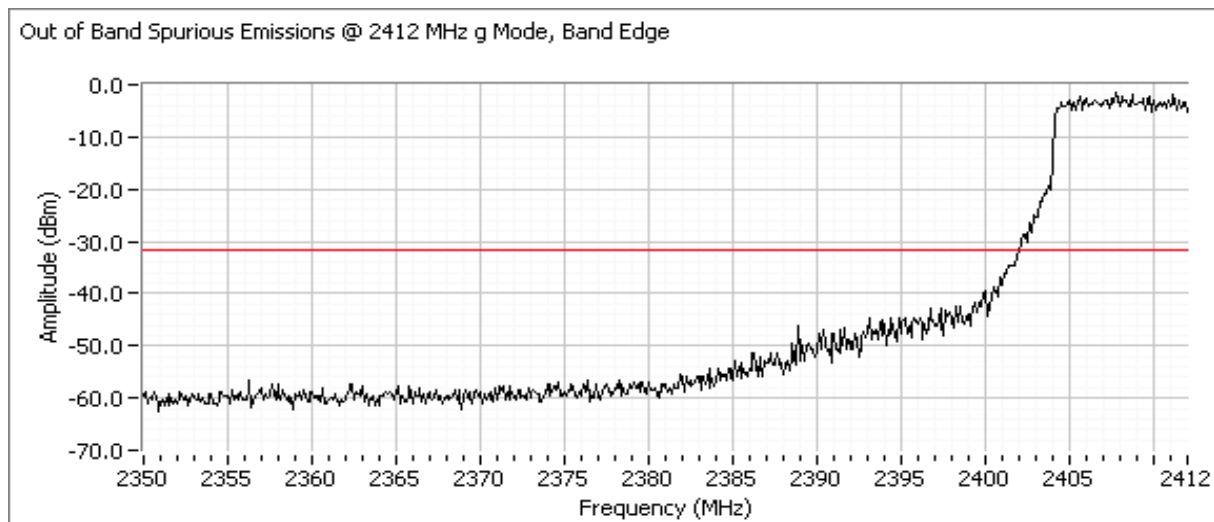
Run #4: Out of Band Spurious Emissions  
 All measured using RB = 100kHz, VB = 300kHz.

Frequency (MHz)	Limit	Result
2412, Chain A	-30dBc	Pass
2437, Chain A	-30dBc	Pass
2462, Chain A	-30dBc	Pass

Plots for low channel, Chain A power setting(s) = 20



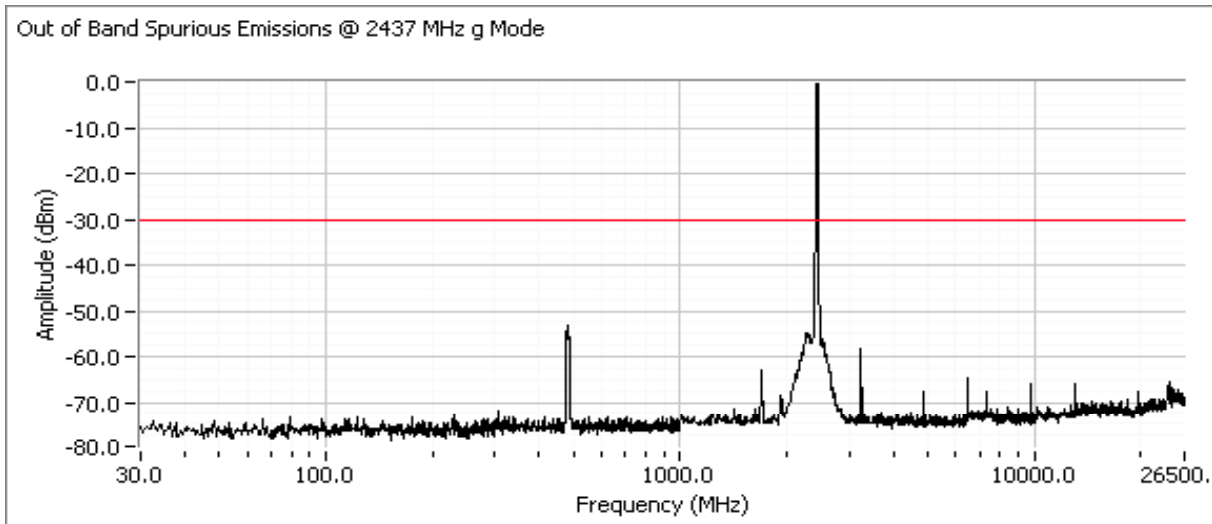
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



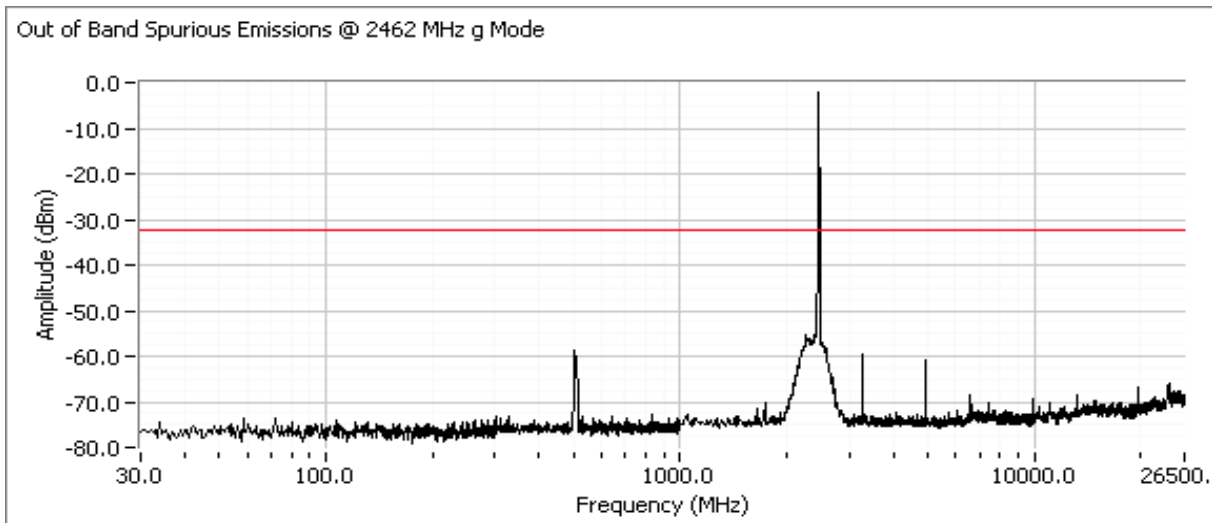
Client: Intel	Job Number: J70979
Model: 512AN_MMW, 512BG_MMW	T-Log Number: T71036
	Account Manager: Dean Eriksen
Contact: Robert Paxman	
Standard: FCC 15.247 / RSS -210 RF Port	Class: N/A

**Run #4: Out of Band Spurious Emissions**

Plots for center channel, Chain A power setting(s) = 23



Plots for high channel, Chain A power setting(s) = 20.5





*EMC Test Data*

Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71040
Contact:	Robert Paxman	Account Manager:	Briggs / Eriksen
Emissions Standard(s):	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	DTS
Immunity Standard(s):	-	Environment:	-

**EMC Test Data - DTS Radiated Emissions  
and AC Conducted Emissions**

For The

**Intel**

Model

512an MMW

Date of Last Test: 4/21/2008



Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
	Account Manager: Briggs / Eriksen
Contact: Robert Paxman	
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

## Conducted Emissions

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

### Test Specific Details

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

Date of Test: 4/21/2008	Config. Used: 1
Test Engineer: Peter Sales	Config Change: None
Test Location: Fremont Chamber #5	Host Unit Voltage 120V/60Hz

### General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

<b>Ambient Conditions:</b>	Temperature:	20 °C
	Rel. Humidity:	37 %

### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	FCC 15.109 / FCC 15.209 / RSS 210	Pass	21.4dBμV @ 24.000MHz (-28.6dB)

### Modifications Made During Testing

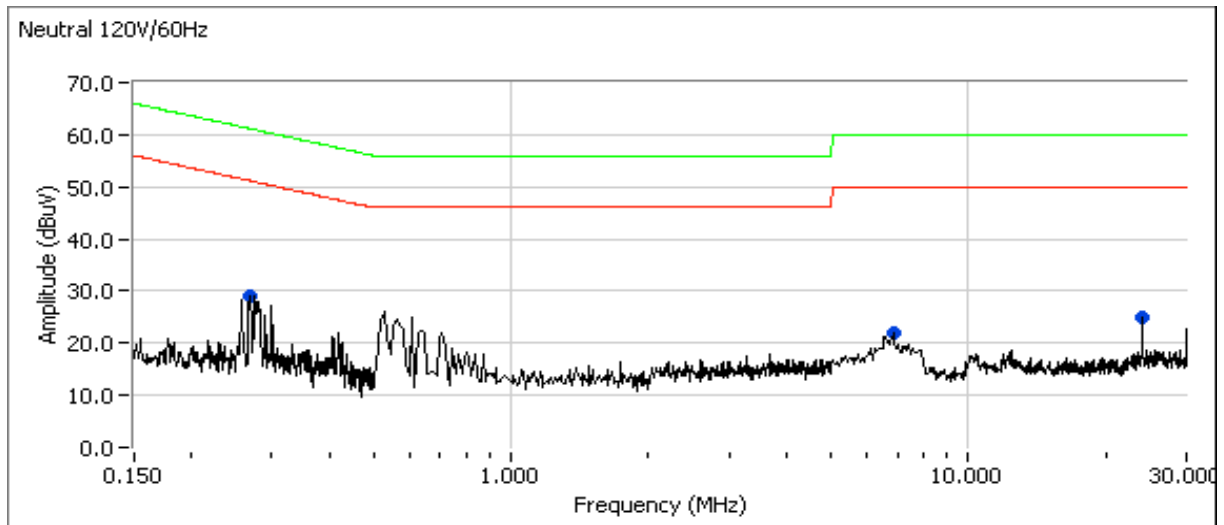
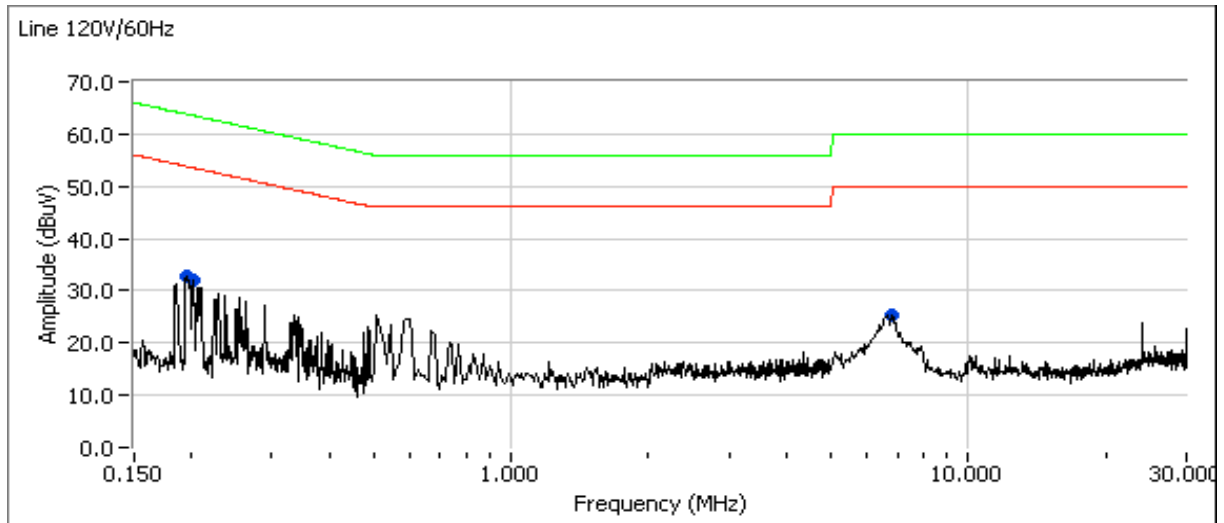
No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

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



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



*EMC Test Data*

Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71040
Contact:	Robert Paxman	Account Manager:	Briggs / Eriksen
Standard:	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	DTS

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

Frequency MHz	Level dB $\mu$ V	AC Line	FCC 15.109/15.209 Limit   Margin		Detector QP/Ave	Comments
0.195	32.9	Line 1	53.8	-20.9	Peak	
0.201	31.9	Line 1	53.5	-21.6	Peak	
0.269	29.0	Neutral	51.2	-22.2	Peak	
6.801	25.5	Line 1	50.0	-24.5	Peak	
24.000	24.9	Neutral	50.0	-25.1	Peak	
6.826	21.9	Neutral	50.0	-28.1	Peak	

**Final quasi-peak and average readings**

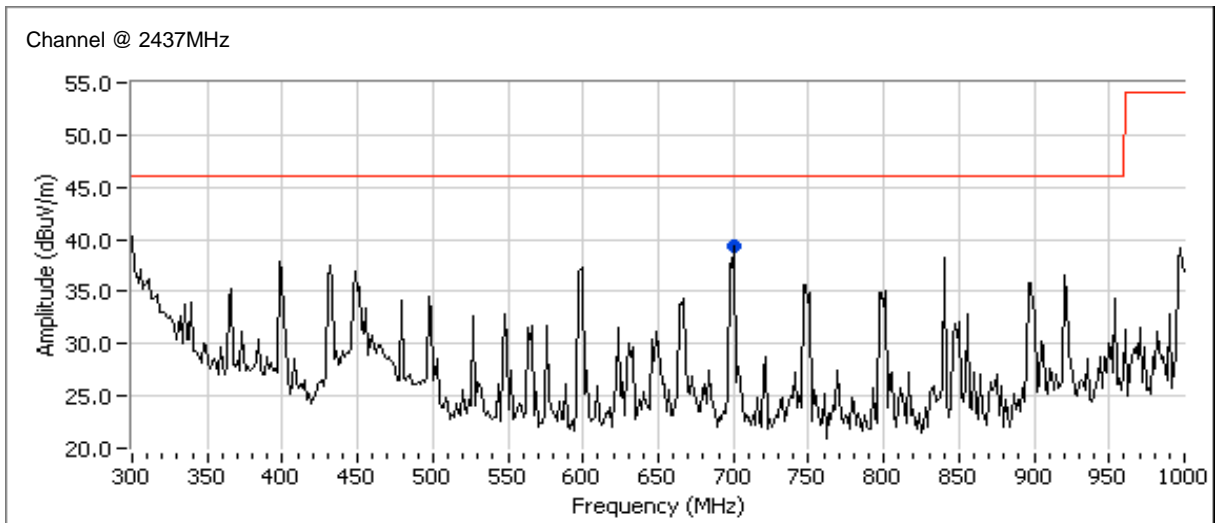
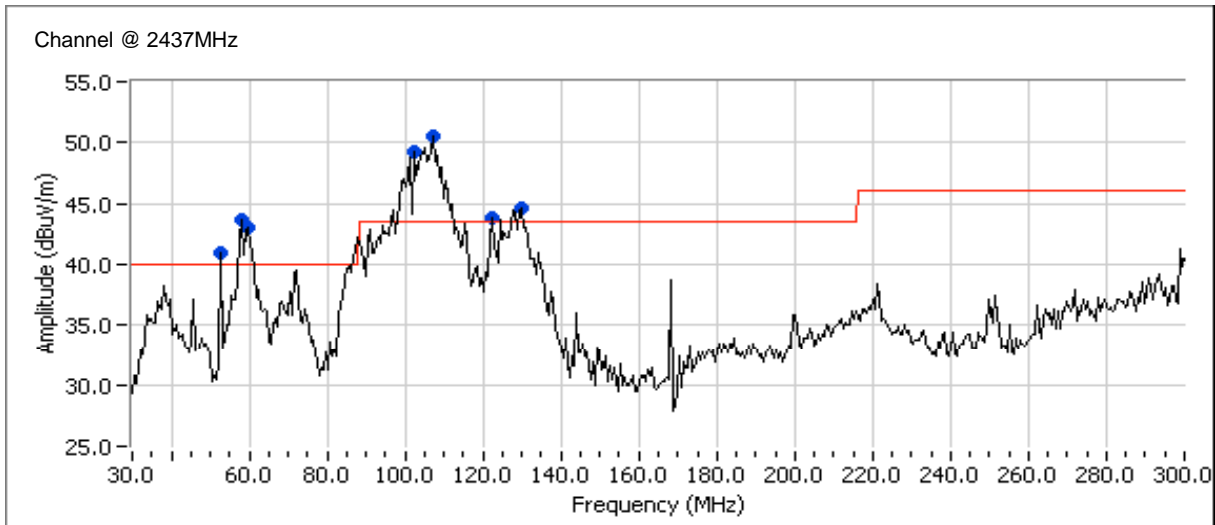
Frequency MHz	Level dB $\mu$ V	AC Line	FCC 15.109/15.209 Limit   Margin		Detector QP/Ave	Comments
24.000	21.4	Neutral	50.0	-28.6	AVG	
6.801	16.7	Line 1	50.0	-33.3	AVG	
24.000	23.4	Neutral	60.0	-36.6	QP	
0.195	26.0	Line 1	63.8	-37.8	QP	
6.801	22.2	Line 1	60.0	-37.8	QP	
0.201	25.4	Line 1	63.6	-38.2	QP	
6.826	10.5	Neutral	50.0	-39.5	AVG	
0.269	21.0	Neutral	61.1	-40.1	QP	
0.269	10.5	Neutral	51.1	-40.6	AVG	
0.195	10.9	Line 1	53.8	-42.9	AVG	
0.201	10.7	Line 1	53.6	-42.9	AVG	
6.826	15.4	Neutral	60.0	-44.6	QP	



Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

Run #1: Preliminary Radiated Emissions, 30-1000 MHz

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

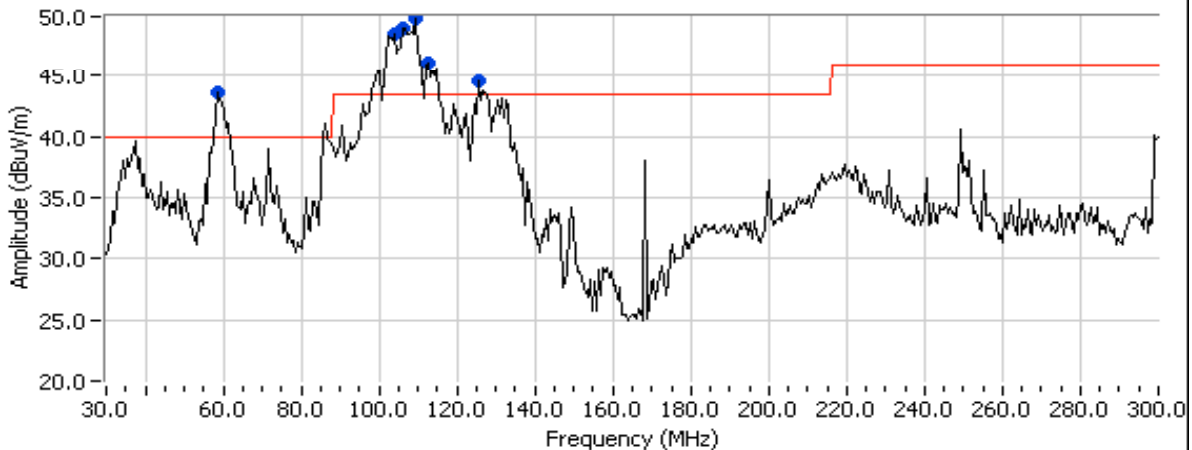


Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

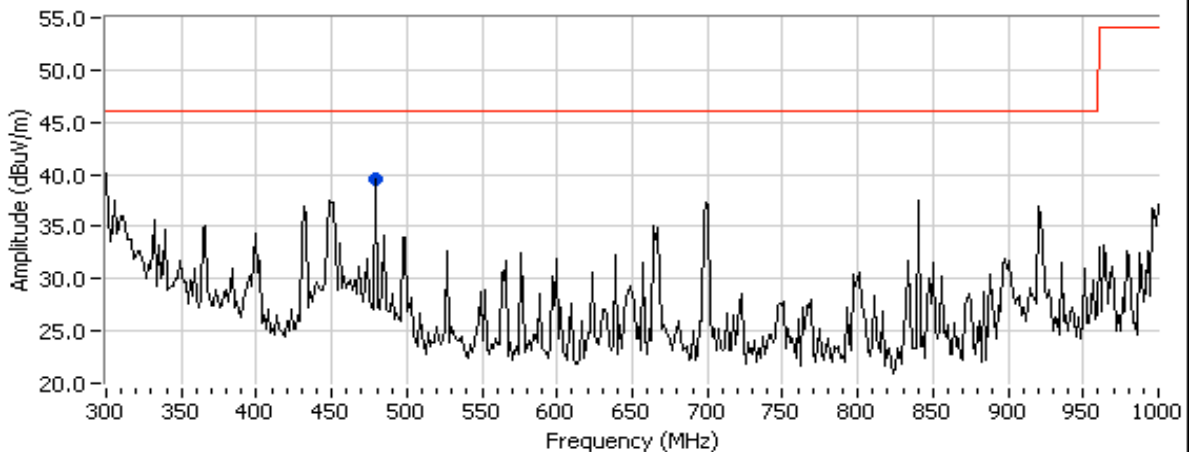
**Run #1a Receiver tuned to 2437 MHz, all chains active**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209/RSS 210		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
108.287	43.4	H	43.5	-0.1	QP	24	2.5	
101.489	39.9	H	43.5	-3.6	QP	38	3.0	
58.620	36.4	V	40.0	-3.6	QP	129	2.5	
58.789	34.1	V	40.0	-5.9	QP	274	1.0	
128.792	37.0	H	43.5	-6.5	QP	166	2.5	
123.411	35.4	H	43.5	-8.1	QP	129	2.5	
698.557	33.3	H	46.0	-12.7	QP	116	1.5	
53.878	21.9	V	40.0	-18.1	QP	292	2.0	

Channel @ 5785MHz



Channel @ 5785MHz

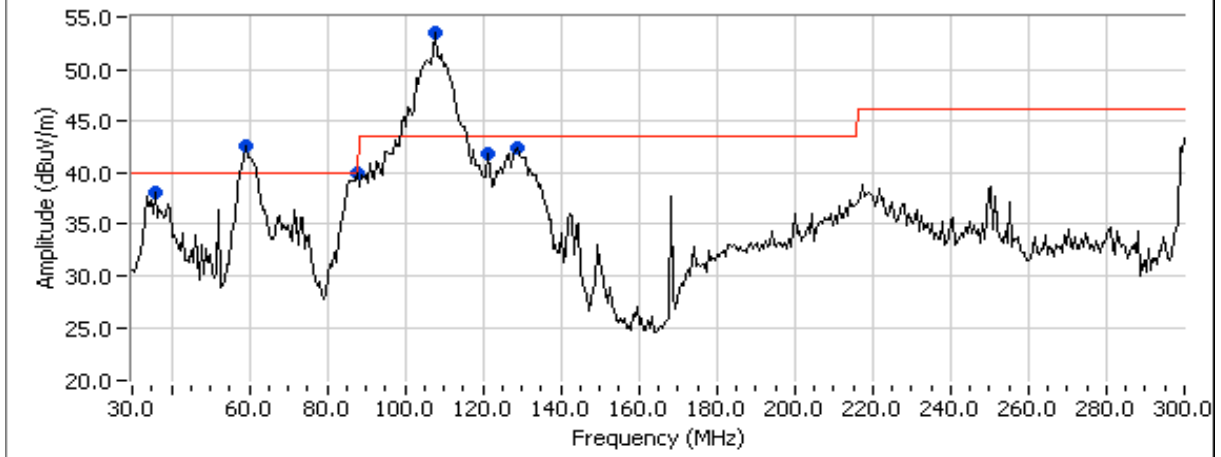


Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

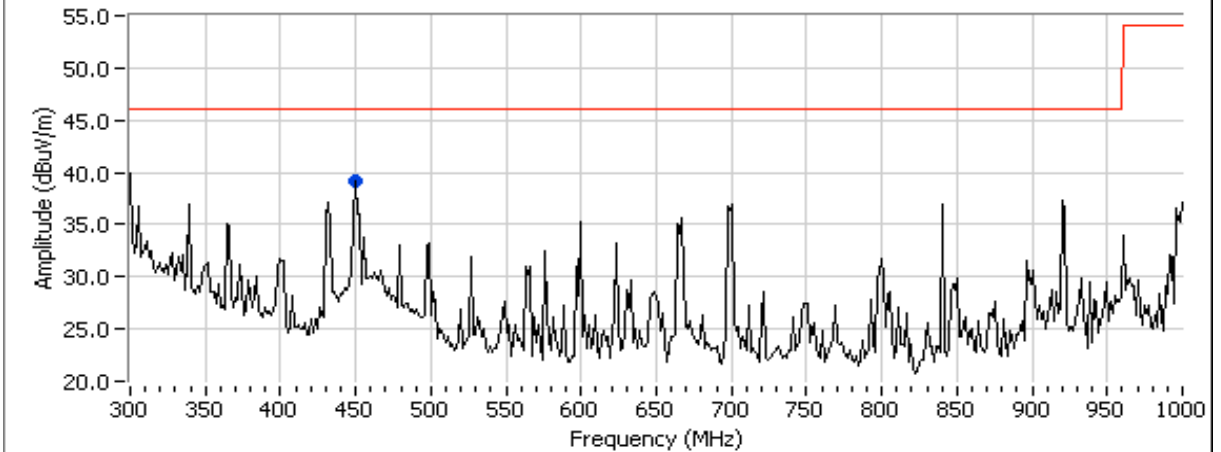
Run #1b Receiver tuned to 5785 MHz, all chains active

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	FCC 15.209/RSS 210		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
104.631	42.8	H	43.5	-0.7	QP	22	2.5	
107.984	42.1	H	43.5	-1.4	QP	227	2.5	
107.692	41.3	H	43.5	-2.2	QP	222	3.5	
58.992	37.6	H	40.0	-2.4	QP	194	3.5	
112.043	39.4	H	43.5	-4.1	QP	209	3.5	
126.749	36.6	H	43.5	-6.9	QP	141	1.5	
480.005	29.8	H	46.0	-16.2	QP	163	2.5	

Channel @ 2437MHz



Channel @ 2437MHz





*EMC Test Data*

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

**Run #1c Transmitter tuned to 2437 MHz, 802.11b mode**

Frequency	Level	Pol	FCC 15.209/RSS 210		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
107.030	41.7	H	43.5	-1.8	QP	7	3.0	
59.474	31.8	H	40.0	-8.2	QP	211	3.0	
130.034	35.2	V	43.5	-8.3	QP	120	1.5	
87.308	29.3	H	40.0	-10.7	QP	16	2.5	
34.981	29.3	V	40.0	-10.7	QP	38	1.0	
449.923	33.2	H	46.0	-12.8	QP	205	1.0	
122.018	29.3	V	43.5	-14.2	QP	268	1.0	

Note 1: Scans demonstrate that the emissions below 1GHz independent of the transmitter's operating frequency and mode (tx, Rx, modulation)

**Run #2: Maximized Readings From Run #1**

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

Frequency	Level	Pol	FCC 15.209/RSS 210		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
58.620	36.4	V	40.0	-3.6	QP	129	2.5	
58.789	34.1	V	40.0	-5.9	QP	274	1.0	
101.489	39.9	H	43.5	-3.6	QP	38	3.0	
<b>108.287</b>	<b>43.4</b>	<b>H</b>	<b>43.5</b>	<b>-0.1</b>	QP	24	2.5	
123.411	35.4	H	43.5	-8.1	QP	129	2.5	
128.792	37.0	H	43.5	-6.5	QP	166	2.5	

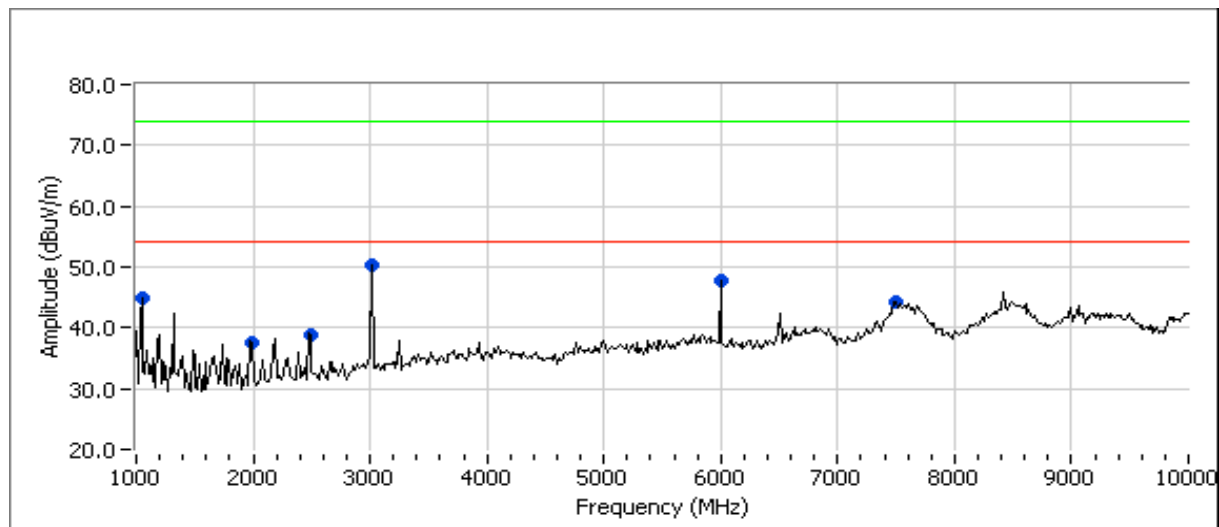


Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

**Run #3: Maximized readings, 1000 - 8000 MHz, Single Receiver Active**  
**Receiver Tuned to 2437 MHz - Single chain active**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	RSS GEN		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1047.520	27.6	V	54.0	-26.4	AVG	205	1.3	
1991.590	29.8	V	54.0	-24.2	AVG	212	1.3	
2490.190	33.5	V	54.0	-20.5	AVG	179	1.0	
<b>3000.310</b>	<b>50.1</b>	<b>V</b>	<b>54.0</b>	<b>-3.9</b>	AVG	202	1.0	
6000.750	43.7	V	54.0	-10.3	AVG	246	1.6	
7566.920	37.8	H	54.0	-16.2	AVG	318	1.0	
1047.520	44.6	V	74.0	-29.4	PK	205	1.3	
1991.590	45.3	V	74.0	-28.7	PK	212	1.3	
2490.190	50.3	V	74.0	-23.7	PK	179	1.0	
3000.310	54.5	V	74.0	-19.5	PK	202	1.0	
6000.750	49.6	V	74.0	-24.4	PK	246	1.6	
7566.920	49.2	H	74.0	-24.8	PK	318	1.0	

Note 1: Above 1 GHz, the limit is for an average measurement. In addition, the peak value of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.



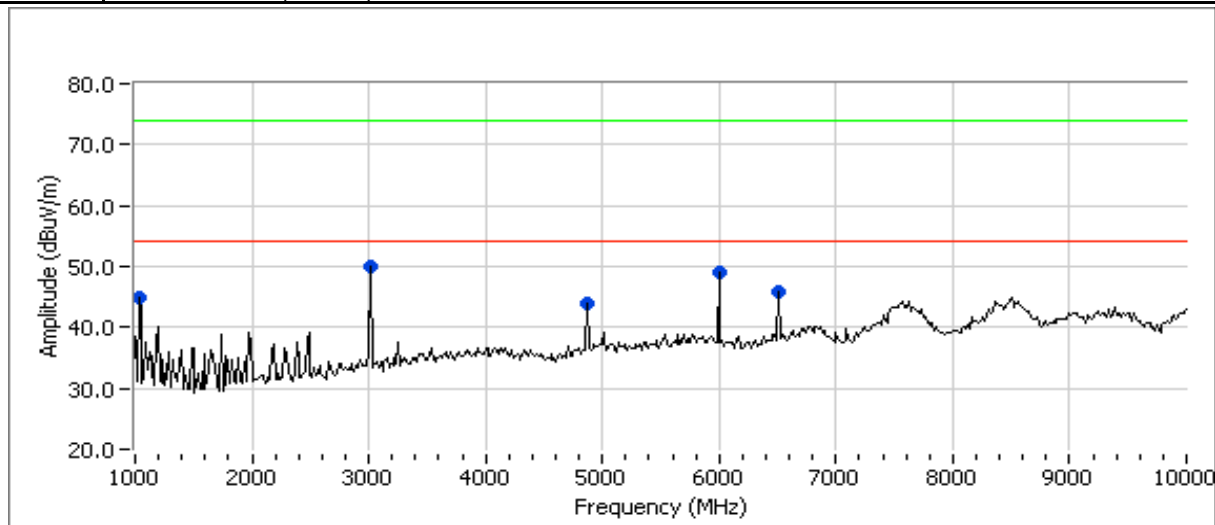
Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

**Run #4: Maximized readings, 1000 - 18000 MHz, All Receivers Active**

**Receiver Tuned to 2437 MHz - All chains active**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	RSS GEN		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1056.082	29.2	H	54.0	-24.8	AVG	297	1.0	
<b>3000.330</b>	<b>50.5</b>	<b>V</b>	<b>54.0</b>	<b>-3.5</b>	AVG	270	1.0	
4873.980	44.1	V	54.0	-9.9	AVG	153	1.5	
6000.700	48.6	V	54.0	-5.4	AVG	263	1.5	
6498.670	45.8	V	54.0	-8.2	AVG	193	1.0	
12997.200	42.6	V	54.0	-11.4	AVG	177	1.0	
1056.082	38.1	H	74.0	-35.9	PK	297	1.0	
3000.330	53.8	V	74.0	-20.2	PK	270	1.0	
4873.980	47.8	V	74.0	-26.2	PK	153	1.5	
6000.700	52.9	V	74.0	-21.1	PK	263	1.5	
6498.670	49.8	V	74.0	-24.2	PK	193	1.0	
12997.200	47.7	V	74.0	-26.3	PK	177	1.0	

Note 1: Above 1 GHz, the limit is for an average measurement. In addition, the peak value of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.





Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71040
		Account Manager:	Briggs / Eriksen
Contact:	Robert Paxman		
Standard:	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	N/A

**Run #1: Radiated Spurious Emissions, Band Edges. Operating Mode: 802.11b - Chain A**

Date of Test: 3/14/2008  
 Test Engineer: Ben Jing  
 Test Location: FT Chamber # 4

**Run #1a: Low Channel @ 2412 MHz**

Power Setting: GC = 20.5      Average power: 18.8 dBm (for reference purposes)

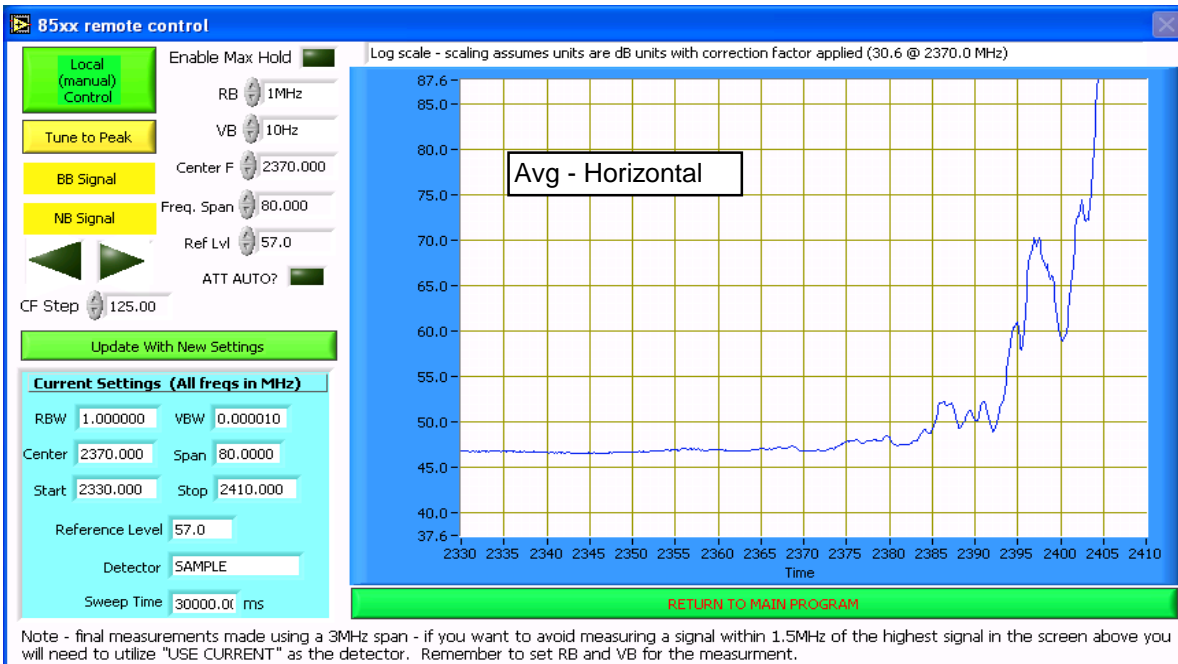
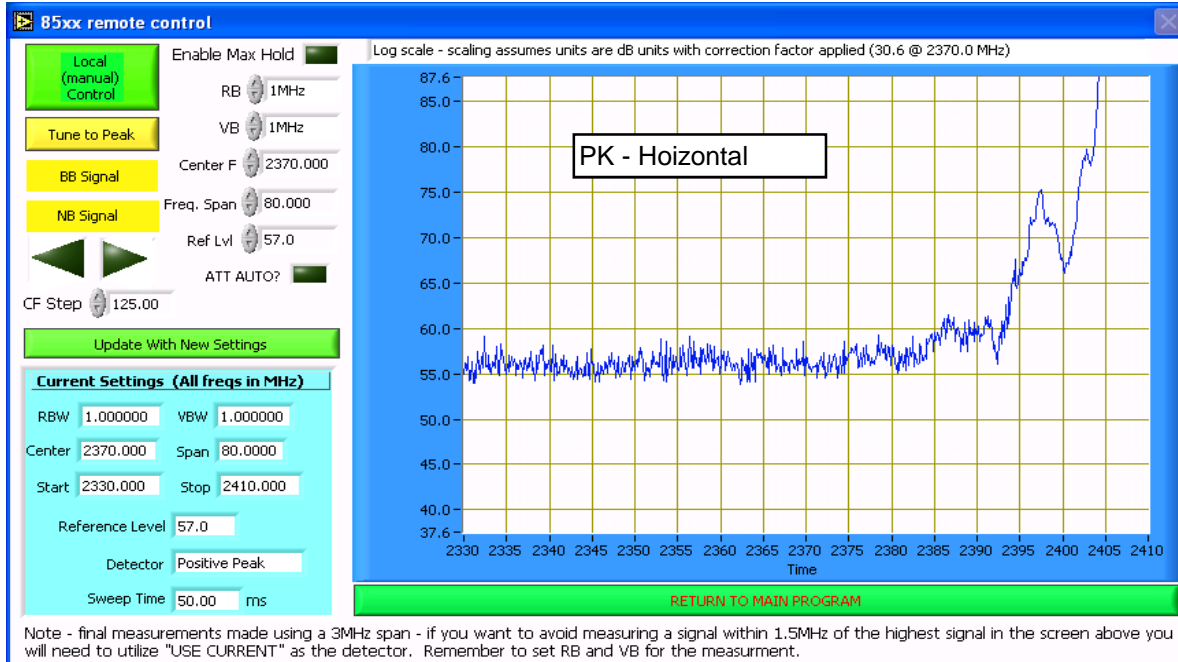
**Fundamental Signal Field Strength:** Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2410.590	100.7	V	-	-	AVG	161	1.0	RB = 1MHz, VB = 10Hz
2410.590	103.7	V	-	-	PK	161	1.0	RB = VB = 1MHz
2411.490	109.8	H	-	-	AVG	248	1.0	RB = 1MHz, VB = 10Hz
2411.490	112.8	H	-	-	PK	248	1.0	RB = VB = 1MHz

**Band Edge Signal Field Strength**

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.450	62.8	H	74.0	-11.2	PK	249	1.0	GC = 20.5 , AP = 18.8
2389.220	51.6	H	54.0	-2.4	AVG	249	1.0	GC = 20.5 , AP = 18.8
Measurements below for reference only								
2389.450	60.5	H	74.0	-13.5	PK	247	1.0	GC = 17.5 , AP = 16.7
2389.750	48.0	H	54.0	-6.0	AVG	247	1.0	GC = 17.5 , AP = 16.7
2389.950	61.5	H	74.0	-12.5	PK	244	1.0	GC = 19.5 , AP = 18.3
2389.300	49.4	H	54.0	-4.6	AVG	249	1.0	GC = 19.5 , AP = 18.3
2389.300	63.1	H	74.0	-10.9	PK	249	1.0	GC = 21 , AP = 19.4
2389.170	53.4	H	54.0	-0.6	AVG	249	1.0	GC = 21 , AP = 19.4

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A



Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71040
		Account Manager:	Briggs / Eriksen
Contact:	Robert Paxman		
Standard:	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	N/A

**Run #1b: High Channel @ 2462 MHz**

Power Setting: GC = 22.5      Average power: 19.6 dBm (for reference purposes)

**Fundamental Signal Field Strength:** Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2463.130	109.0	H	-	-	AVG	246	1.0	RB = 1MHz, VB = 10Hz
2463.130	112.0	H	-	-	PK	246	1.0	RB = VB = 1MHz
2461.190	103.3	V	-	-	AVG	213	1.0	RB = 1MHz, VB = 10Hz
2461.190	106.2	V	-	-	PK	213	1.0	RB = VB = 1MHz

**Band Edge Signal Field Strength**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.530	63.4	H	74.0	-10.6	PK	245	1.0	GC = 22.5 , AP = 19.6
2483.650	53.0	H	54.0	-1.0	AVG	245	1.0	GC = 22.5 , AP = 19.6
Measurements below for reference only								
2483.520	60.6	H	74.0	-13.4	PK	244	1.0	GC = 18.5 , AP = 16.5
2483.550	47.3	H	54.0	-6.7	AVG	247	1.0	GC = 18.5 , AP = 16.5
2483.650	61.4	H	74.0	-12.6	PK	245	1.0	GC = 20.5 , AP = 17.9
2483.510	48.3	H	54.0	-5.7	AVG	245	1.0	GC = 20.5 , AP = 17.9

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
	Account Manager: Briggs / Eriksen
Contact: Robert Paxman	
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

**RSS 210 and FCC 15.247 (DTS, 2400 - 2483.5 MHz)  
Radiated Spurious Emissions, 1 - 26GHz 802.11b Mode**

**Test Specific Details**

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

Date of Test: 03/18/2008	Config. Used: 1
Test Engineer: Ben Jing	Config Change: None
Test Location: FT Chamber # 4	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. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane.

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

**Ambient Conditions:**                      Temperature:                      20 °C  
    Rel. Humidity:                      39 %

**Summary of Results**

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11b Chain A	1 (2412)	GC = 20.5	AP = 18.8	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247( c)	53.6dBµV/m @ 3000.3MHz (-24.5dB)
1b	802.11b Chain A	6 (2437)	GC = 18.5	AP = 16.7	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247( c)	53.2dBµV/m @ 6498.8MHz (-20.5dB)
1c	802.11b Chain A	11 (2462)	GC = 22.5	AP = 19.6	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247( c)	53.0dBµV/m @ 3000.4MHz (-23.8dB)

**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	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
	Account Manager: Briggs / Eriksen
Contact: Robert Paxman	
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

Run #1: Radiated Spurious Emissions, 1000 - 26000 MHz. Operating Mode: 802.11b Chain A

Run #1a: Low Channel @ 2412 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2411.230	101.6	V	-	-	Pk	88	1.0	RB = VB = 100kHz
2411.000	108.1	H	-	-	Pk	245	1.0	RB = VB = 100kHz

Fundamental emission level @ 3m in 100kHz RBW:	108.1	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	78.1	dB $\mu$ V/m

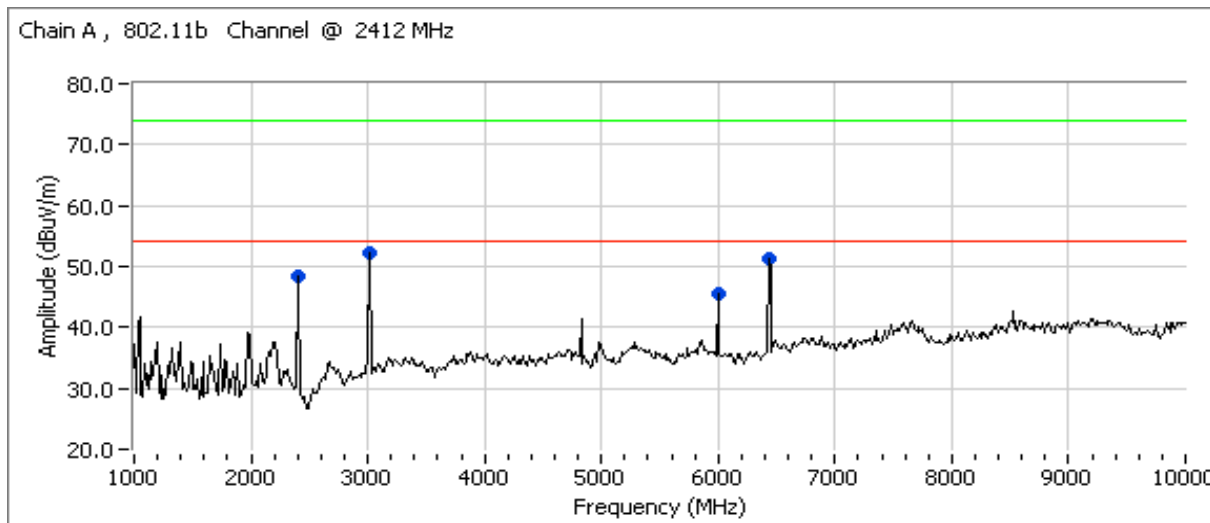
Limit is -30dBc (UNII power measurement)

Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
3000.340	53.6	V	78.1	-24.5	PK	279	1.0	Note 2
6000.750	50.6	V	78.1	-27.5	PK	163	1.0	Note 2
6432.110	52.7	V	78.1	-25.4	PK	167	1.0	Note 2
12863.990	49.0	V	78.1	-29.1	PK	191	1.0	Note 2

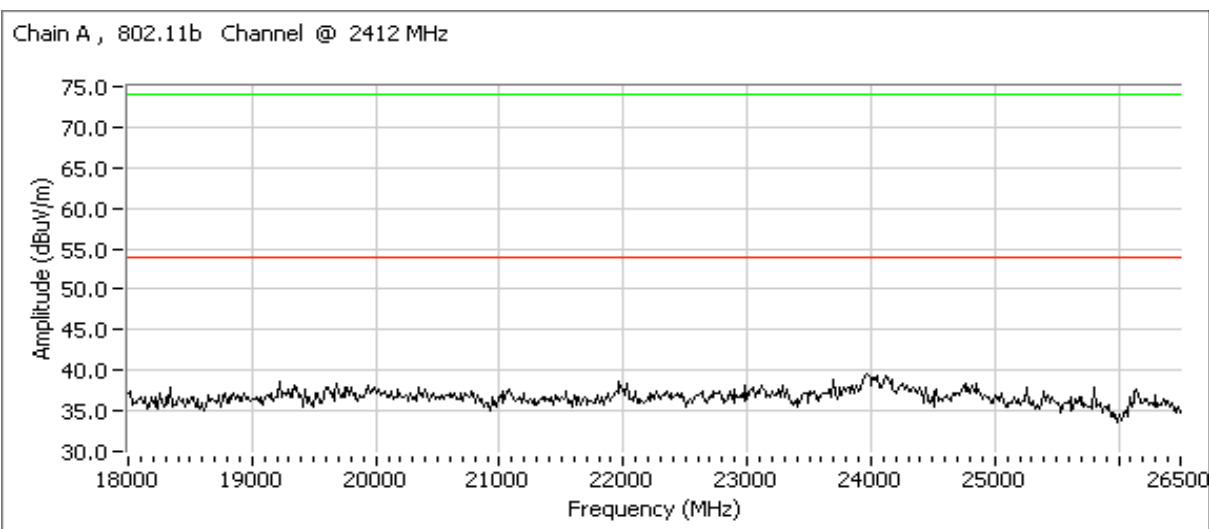
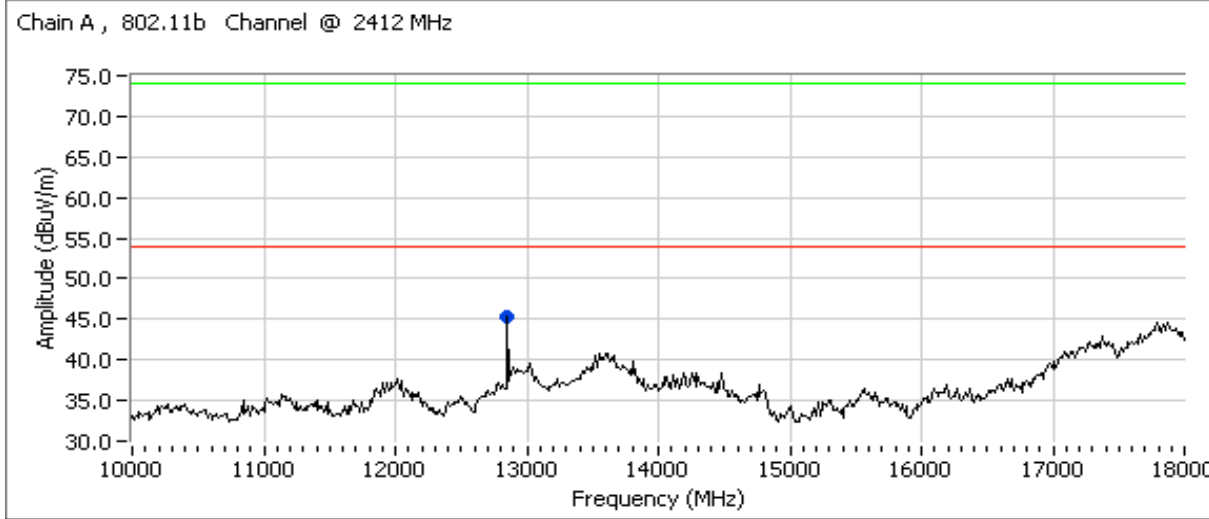
Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Note 2: Signal is not in a restricted band.





Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A



Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

**Run #1b: Center Channel @ 2437 MHz**

**Fundamental Signal Field Strength:** Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2436.530	101.4	V	-	-	Pk	230	1.0	RB = VB = 100kHz
2437.520	103.7	H	-	-	Pk	254	1.0	RB = VB = 100kHz

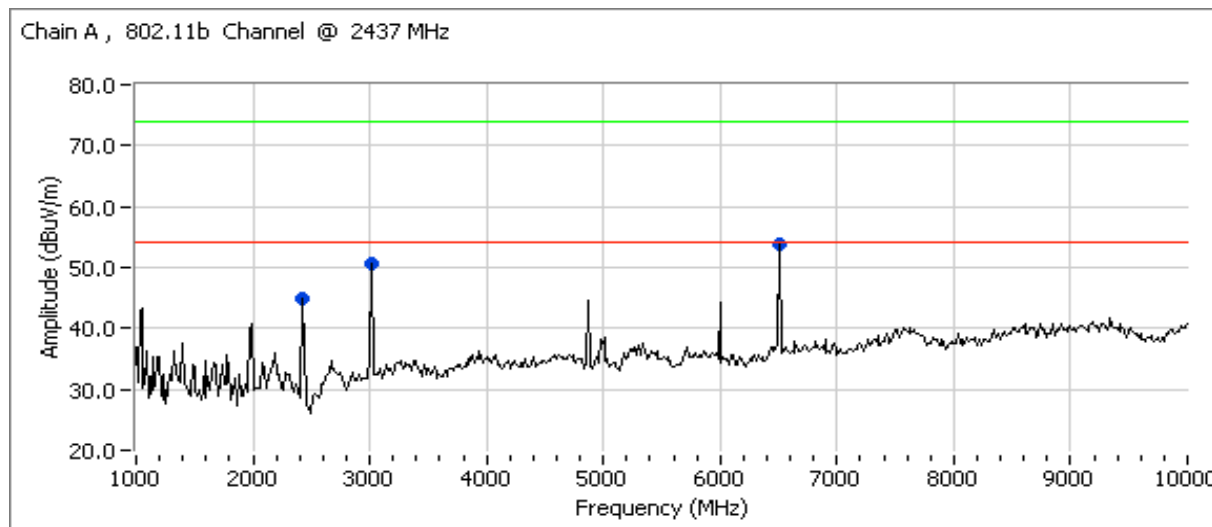
Fundamental emission level @ 3m in 100kHz RBW:	103.7	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	73.7	dB $\mu$ V/m

Limit is -30dBc (UNII power measurement)

**Spurious Emissions**

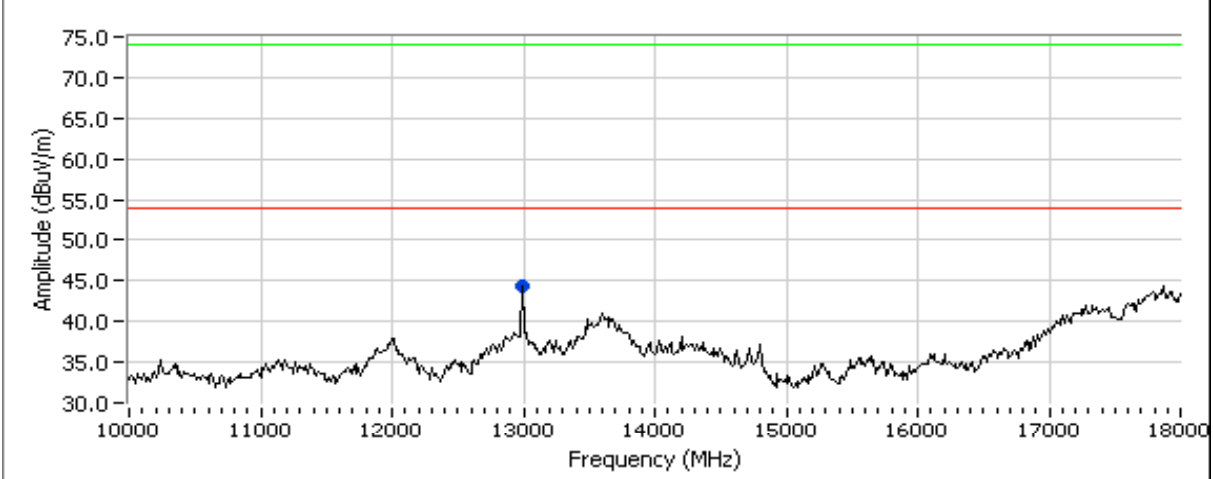
Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
3000.350	52.9	V	73.7	-20.8	PK	276	1.0	Note 2
6498.790	53.2	V	73.7	-20.5	PK	126	1.0	Note 2
12997.330	46.8	V	73.7	-26.9	PK	205	1.0	Note 2

- Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
- Note 2: Signal is not in a restricted band.

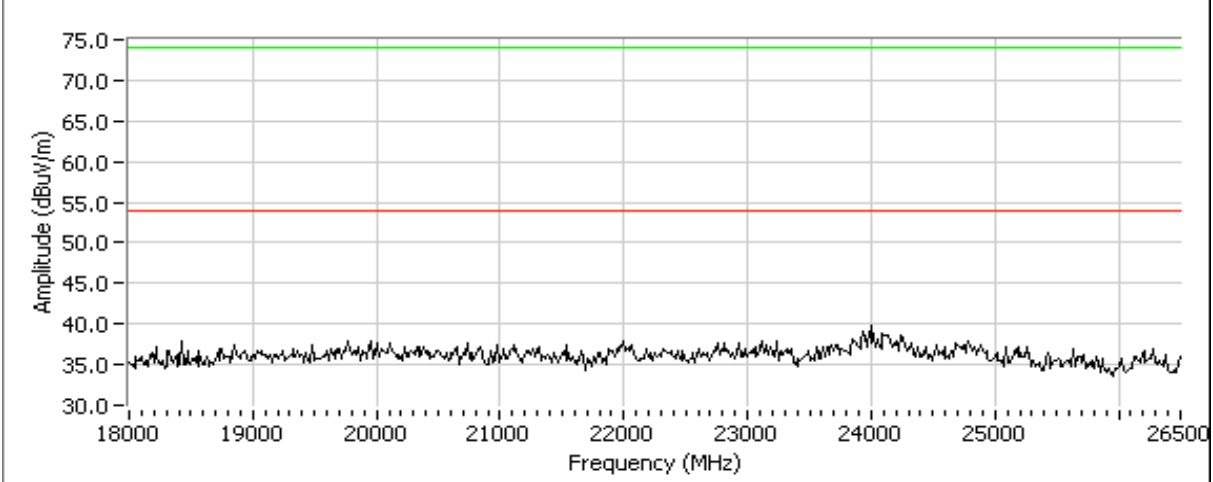


Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

Chain A , 802.11b Channel @ 2437 MHz



Chain A , 802.11b Channel @ 2437 MHz



Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

**Run #1c: High Channel @ 2462 MHz**

**Fundamental Signal Field Strength:** Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2460.980	101.2	V	-	-	Pk	93	1.0	RB = VB = 100kHz
2462.510	106.8	H	-	-	Pk	237	1.0	RB = VB = 100kHz

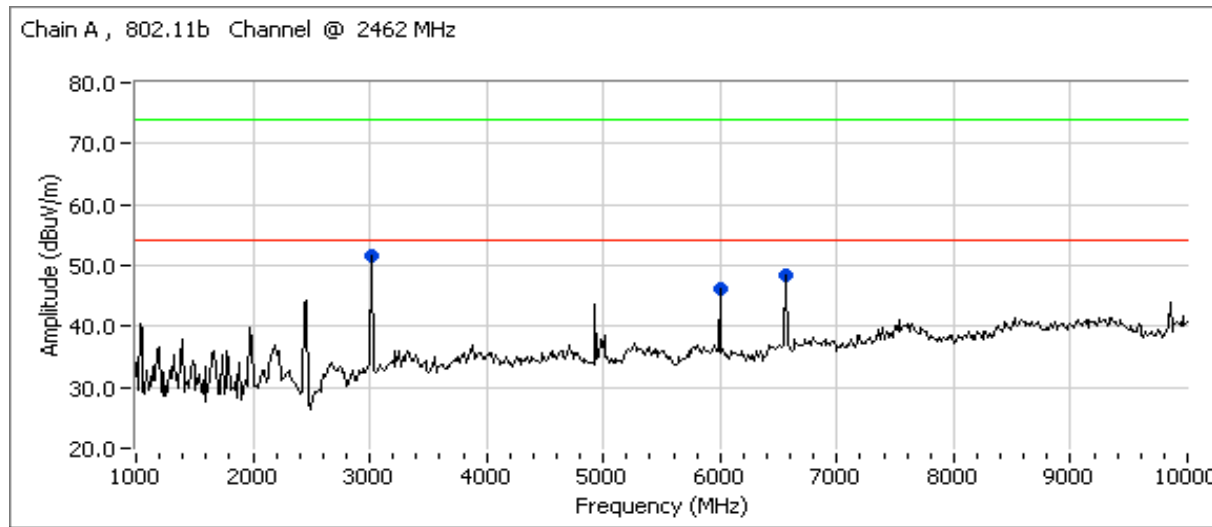
Fundamental emission level @ 3m in 100kHz RBW:	106.8	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	76.8	dB $\mu$ V/m

Limit is -30dBc (UNII power measurement)

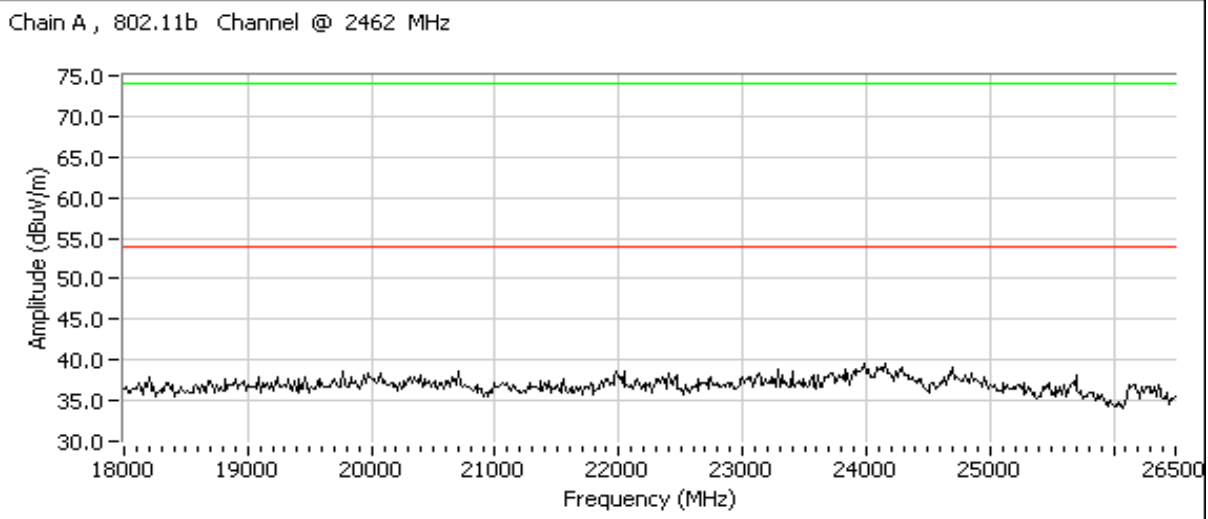
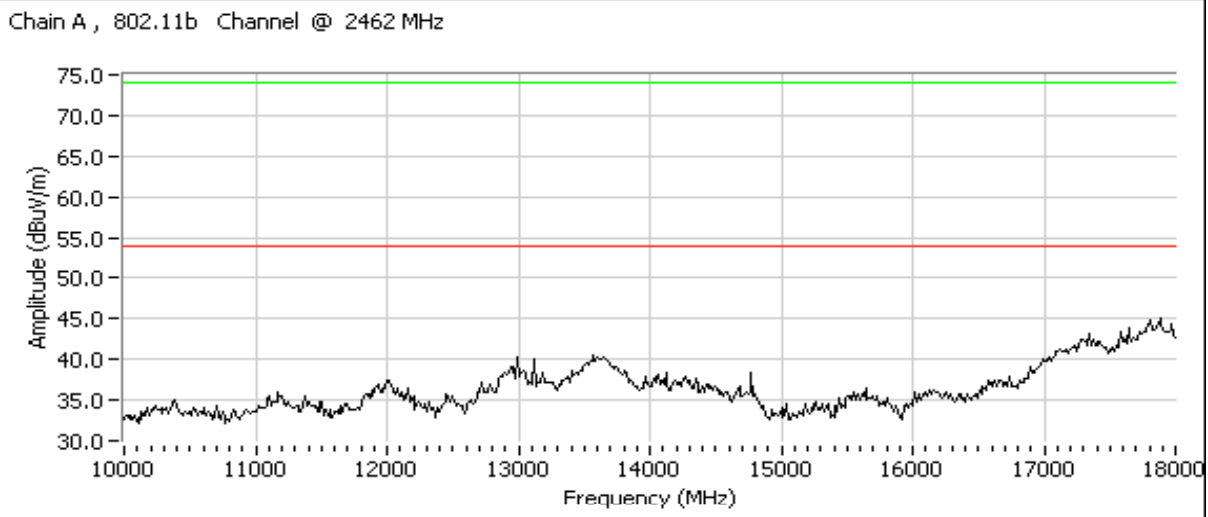
**Spurious Emissions**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
3000.380	53.0	V	76.8	-23.8	PK	280	1.0	Note 2
6000.720	51.2	V	76.8	-25.6	PK	272	1.3	Note 2
6565.300	50.8	V	76.8	-26.0	PK	173	1.0	Note 2

- Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
- Note 2: Signal is not in a restricted band.



Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A



Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71040
Contact:	Robert Paxman	Account Manager:	Briggs / Eriksen
Standard:	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	N/A

## RSS 210 and FCC 15.247 (DTS, 2400 - 2483.5 MHz) Radiated Spurious Emissions - Band Edge 802.11g Mode

### Test Specific Details

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

Date of Test: 3/14/2008  
Test Engineer: Ben Jing  
Test Location: FT 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. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane.

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

**Ambient Conditions:**  
Temperature: 19 °C  
Rel. Humidity: 40 %

### Summary of Results

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11g Chain A	1 2412MHz	GC = 20	14.5 dBm	Band Edge radiated field strength	FCC Part 15.209 / 15.247( c)	52.5 dBuV/m @ 2389.9 MHz (-1.5dB)
1b	802.11g Chain A	11 2462MHz	GC = 20.5	14 dBm	Band Edge radiated field strength	FCC Part 15.209 / 15.247( c)	70.2 dBuV/m @ 2483.6 MHz (-3.8dB)

### 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	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

**Run #1: Radiated Spurious Emissions, Band Edges. Operating Mode: 802.11g - Chain A**

**Run #1a: Low Channel @ 2412 MHz**

Power Setting: GC = 20      Average power: 14.5 dBm (for reference purposes)

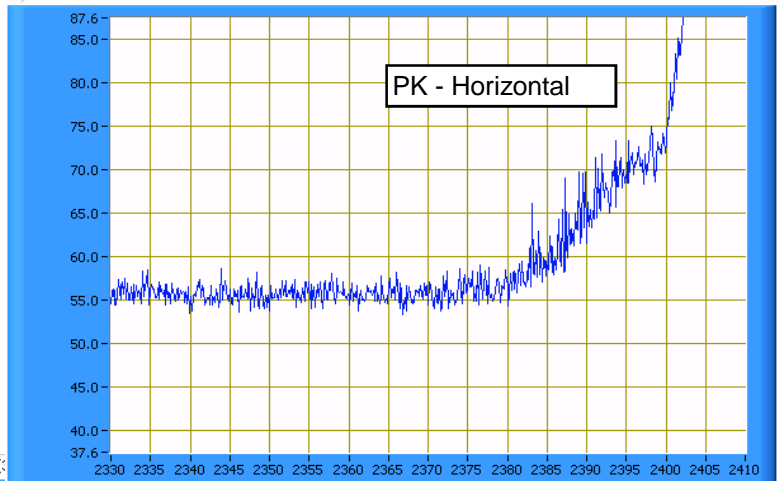
**Fundamental Signal Field Strength:** Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
2413.160	105.4	H	54.0	51.4	AVG	249	1.0	RB = 1MHz, VB = 10Hz
2413.160	113.8	H	74.0	39.8	PK	249	1.0	RB = VB = 1MHz
2410.980	98.8	V	54.0	44.8	AVG	157	1.0	RB = 1MHz, VB = 10Hz
2410.980	106.9	V	74.0	32.9	PK	157	1.0	RB = VB = 1MHz

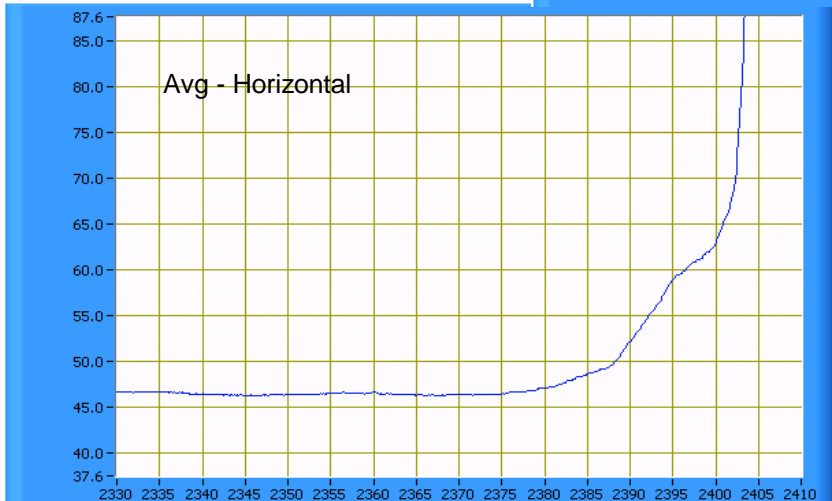
**Band Edge Signal Field Strength**

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
2389.980	72.0	H	74.0	-2.0	PK	248	1.0	GC = 20.0 , AP = 14.5
2389.950	52.5	H	54.0	-1.5	AVG	248	1.0	GC = 20.0 , AP = 14.5

Log scale - scaling assumes units are dB units with correction factor applied (30.6 @ 2370.0 MHz)



Log scale - scaling assumes units are dB units with correction factor applied (



Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

### Run #1b: High Channel @ 2462 MHz

Power Setting: GC = 20.5      Average power: 14 dBm (for reference purposes)

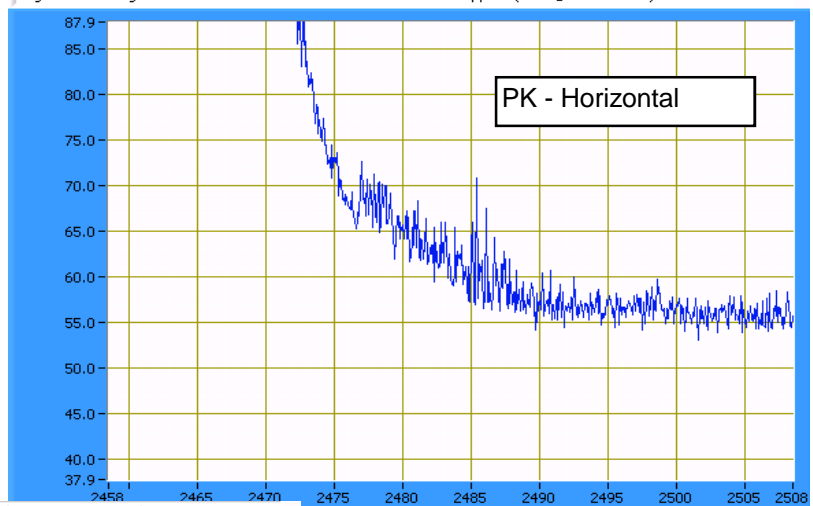
**Fundamental Signal Field Strength:** Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2463.480	105.2	H	54.0	51.2	AVG	250	1.0	RB = 1MHz, VB = 10Hz
2463.480	113.1	H	74.0	39.1	PK	250	1.0	RB = VB = 1MHz
2460.700	99.0	V	54.0	45.0	AVG	213	1.0	RB = 1MHz, VB = 10Hz
2460.700	107.5	V	74.0	33.5	PK	213	1.0	RB = VB = 1MHz

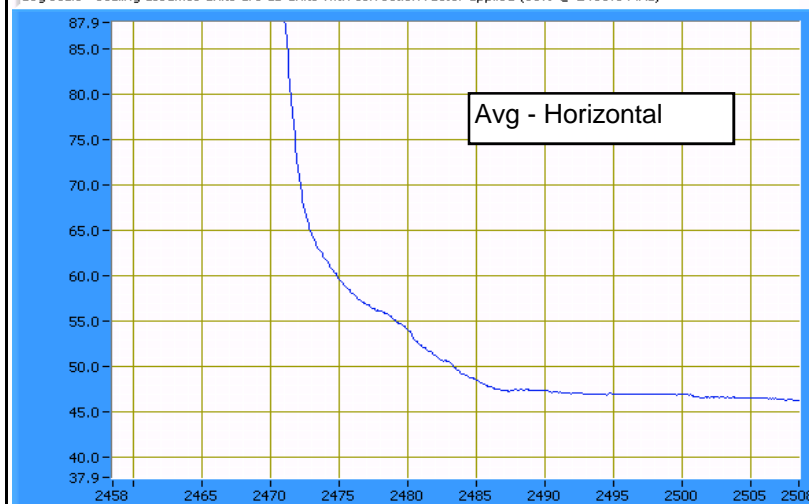
### Band Edge Signal Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.690	70.2	H	74.0	-3.8	PK	251	1.0	GC = 20.5 , AP = 14
2483.560	49.7	H	54.0	-4.3	AVG	251	1.0	GC = 20.5 , AP = 14

Log scale - scaling assumes units are dB units with correction factor applied (30.9 @ 2483.5 MHz)



Log scale - scaling assumes units are dB units with correction factor applied (30.9 @ 2483.5 MHz)





Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
	Account Manager: Briggs / Eriksen
Contact: Robert Paxman	
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

**RSS 210 and FCC 15.247 (DTS, 2400 - 2483.5 MHz)  
Radiated Spurious Emissions, 1 - 26GHz 802.11g Mode**

**Test Specific Details**

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

Date of Test: 03/18/2008	Config. Used: 1
Test Engineer: Ben Jing	Config Change: None
Test Location: FT Chamber # 4	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. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane.

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

**Ambient Conditions:**

Temperature:	20 °C
Rel. Humidity:	39 %

**Summary of Results**

Note - center channel measurements on 802.11n mode had similar but slightly higher emissions (-18.0dB) than 802.11g mode so top/bottom channels for 802.11g mode were not performed and measurements were made on 802.11n20 MHz mode top/bottom channels.

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1b	802.11g Chain A	6 (2437)	GC = 23	AP = 16.7	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	54.5dBµV/m @ 6498.7MHz (-18.2dB)

**Modifications Made During Testing**

No modifications were made to the EUT during testing

**Deviations From The Standard**

No deviations were made from the requirements of the standard.

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

**Run #1: Radiated Spurious Emissions, 1000 - 26000 MHz. Operating Mode: 802.11g Chain A**

Run #1a and 1c (Low- and high-channel) were not performed, 802.11n was worst case based on center channel measurements

**Run #1b: Center Channel @ 2437 MHz**

**Fundamental Signal Field Strength:** Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2435.740	99.3	V	-	-	Pk	123	1.0	RB = VB = 100kHz
2438.260	102.7	H	-	-	Pk	250	1.0	RB = VB = 100kHz

Fundamental emission level @ 3m in 100kHz RBW:	102.7	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	72.7	dB $\mu$ V/m

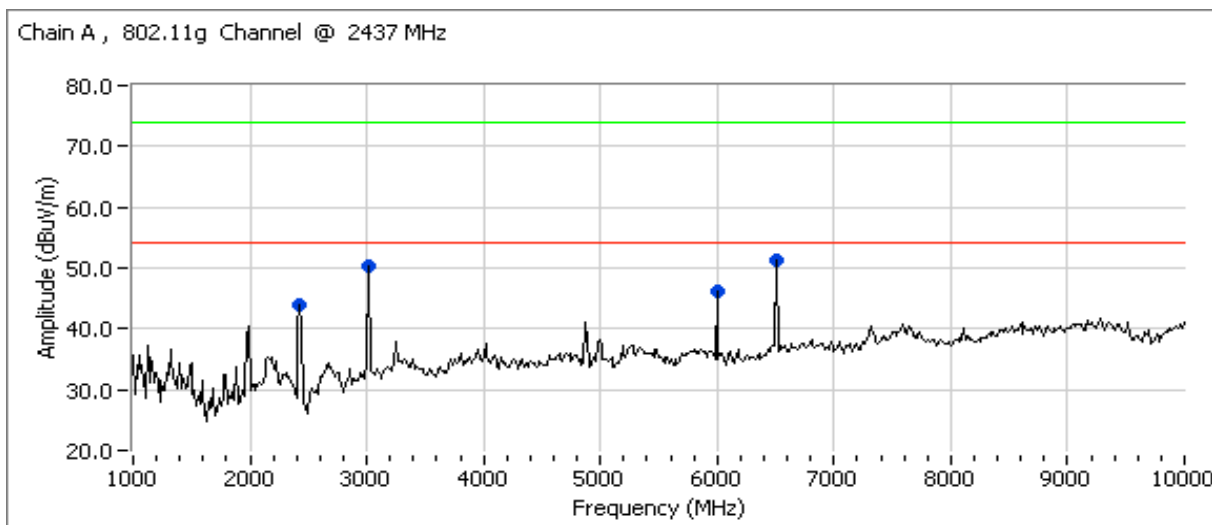
Limit is -30dBc (UNII power measurement)

**Spurious Emissions**

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
3000.370	53.3	V	72.7	-19.4	PK	280	1.0	Note 2
6000.810	50.3	V	72.7	-22.4	PK	162	1.0	Note 2
6498.650	54.5	V	72.7	-18.2	PK	346	1.3	Note 2
12997.360	48.0	V	72.7	-24.7	PK	188	1.0	Note 2

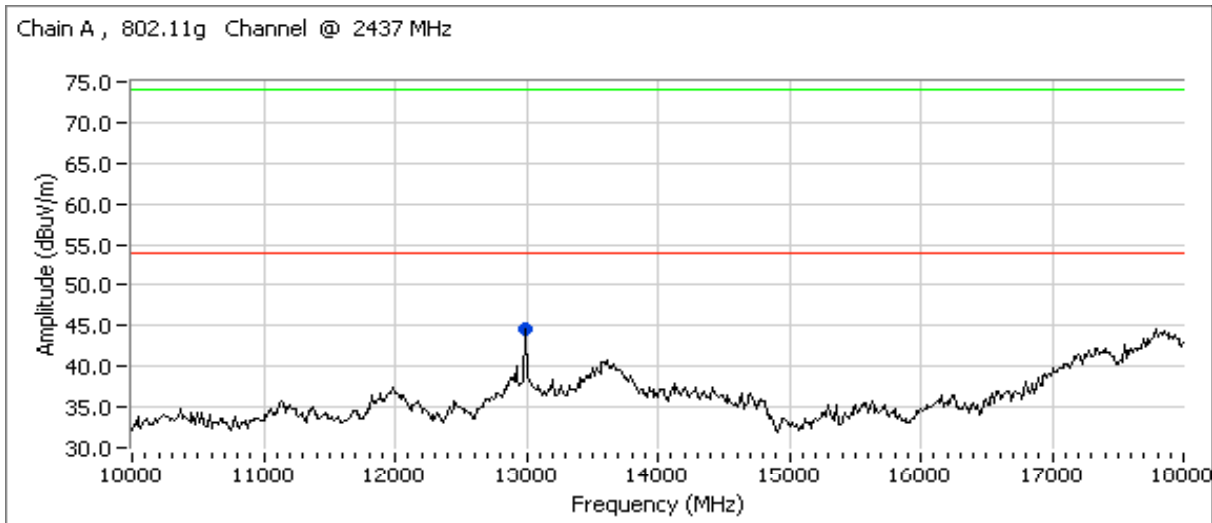
Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.

Note 2: Signal is in a restricted band.

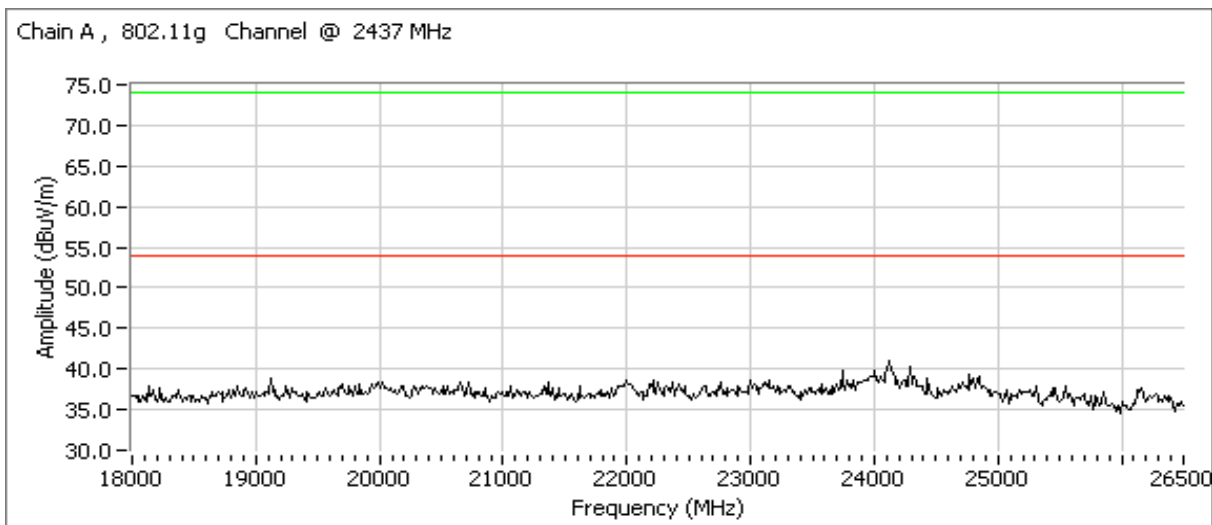


Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71040
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

Chain A , 802.11g Channel @ 2437 MHz



Chain A , 802.11g Channel @ 2437 MHz





*EMC Test Data*

Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71831
		Account Manager:	Briggs / Eriksen
Contact:	Robert Paxman		-
Emissions Standard(s):	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	DTS
Immunity Standard(s):	-	Environment:	-

**EMC Test Data - DTS Radiated Emissions  
Universe Technology PIFA Antenna**

For The

**Intel**

Model

512an MMW

Date of Last Test: 6/10/2008



# EMC Test Data

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71831
	Account Manager: Briggs / Eriksen
Contact: Robert Paxman	
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

## Receiver Spurious Emissions, 1 - 18 GHz

### Test Specific Details

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

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 emissions testing.

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

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

**Ambient Conditions:** Temperature: 23 °C  
 Rel. Humidity: 36 %

### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1a - RX chain A @ 2437 MHz	RE, 1000 - 18000 MHz, Maximized Emissions	RSS GEN	Pass	43.7dBµV/m @ 6498.7MHz (-10.3dB)
2a - RX chain B @ 2437 MHz	RE, 1000 - 18000 MHz, Maximized Emissions	RSS GEN	Pass	47.8dBµV/m @ 6498.7MHz (-6.2dB)
3a - RX chain A + B @ 2437 MHz	RE, 1000 - 18000 MHz, Maximized Emissions	RSS GEN	Pass	45.9dBµV/m @ 6498.6MHz (-8.1dB)

### 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	Job Number: J70979
Model: 512an MMW	T-Log Number: T71831
	Account Manager: Briggs / Eriksen
Contact: Robert Paxman	
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

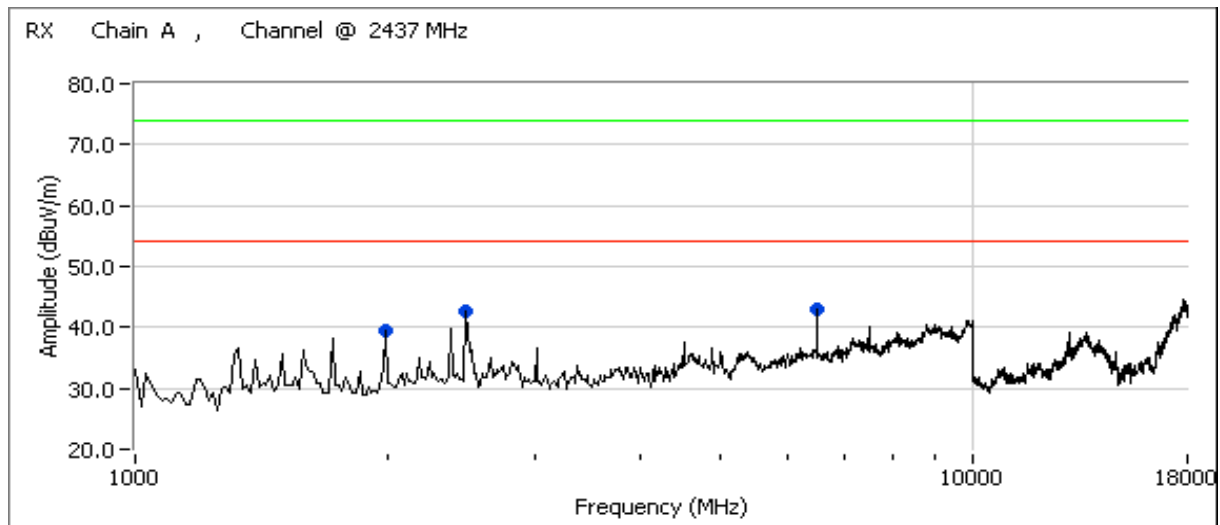
Date of Test: 6/6/2008  
 Test Engineer: Ben Jing  
 Test Location: FT Chamber # 5

Note 1: Above 1 GHz, the limit is for an average measurement. In addition, the peak value of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

Run #1: Maximized readings, 1000 - 18000 MHz, Receiver single Chain A active

Run # 1a : Receiver Tuned to 2437 MHz -- Chain A active

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	RSS GEN		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1991.920	30.3	V	54.0	-23.7	AVG	88	1.0	
2490.070	28.3	V	54.0	-25.7	AVG	99	1.6	
<b>6498.670</b>	<b>43.7</b>	<b>V</b>	<b>54.0</b>	<b>-10.3</b>	AVG	201	1.3	
1991.920	48.6	V	74.0	-25.4	PK	88	1.0	
2490.070	46.3	V	74.0	-27.7	PK	99	1.6	
6498.670	47.4	V	74.0	-26.6	PK	201	1.3	





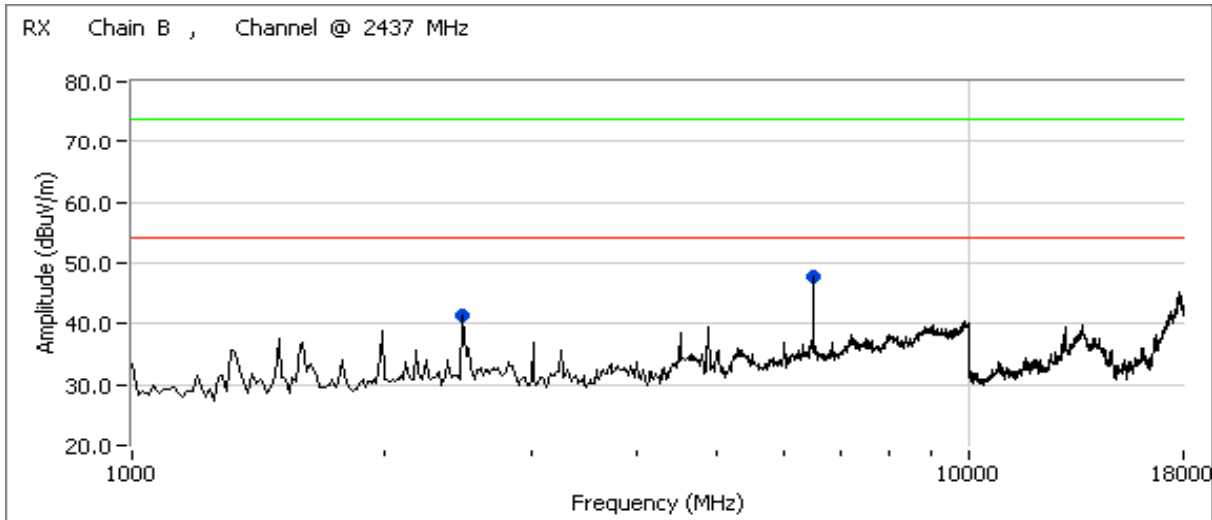
# EMC Test Data

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71831
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

Run #2: Maximized readings, 1000 - 18000 MHz, Receiver single Chain B active

Run # 2a : Receiver Tuned to 2437 MHz -- Chain B active

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	RSS GEN		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2490.160	30.1	V	54.0	-23.9	AVG	77	1.6	
<b>6498.670</b>	<b>47.8</b>	<b>V</b>	<b>54.0</b>	<b>-6.2</b>	AVG	208	1.0	
2490.160	49.2	V	74.0	-24.8	PK	77	1.6	
6498.670	50.7	V	74.0	-23.3	PK	208	1.0	





# EMC Test Data

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71831
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: DTS

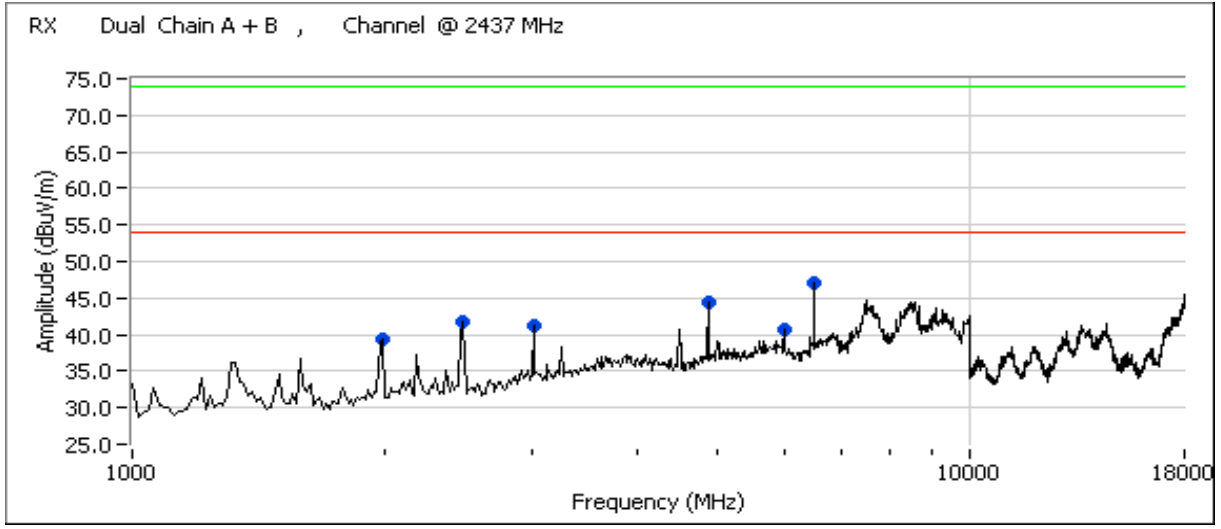
Date of Test: 5/31/2008  
 Test Engineer: Ben Jing  
 Test Location: FT Chamber # 5

Note 1: Above 1 GHz, the limit is for an average measurement. In addition, the peak value of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

**Run #3: Maximized readings, 1000 - 18000 MHz, Receiver All Chain Active**

**Run # 3a : Receiver Tuned to 2437 MHz - Dual Chain A + B active**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	RSS GEN		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1996.800	34.9	V	54.0	-19.1	AVG	183	1.0	
2490.040	29.9	H	54.0	-24.1	AVG	303	2.0	
3000.060	39.1	V	54.0	-14.9	AVG	261	1.0	
4874.000	44.6	V	54.0	-9.4	AVG	162	1.5	
6000.040	38.8	V	54.0	-15.2	AVG	221	1.0	
6498.580	45.9	V	54.0	-8.1	AVG	124	1.0	
1996.800	45.2	V	74.0	-28.8	PK	183	1.0	
2490.040	48.7	H	74.0	-25.3	PK	303	2.0	
3000.060	44.6	V	74.0	-29.4	PK	261	1.0	
4874.000	48.3	V	74.0	-25.7	PK	162	1.5	
6000.040	46.8	V	74.0	-27.2	PK	221	1.0	
6498.580	49.5	V	74.0	-24.5	PK	124	1.0	





Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71831
		Account Manager:	Briggs / Eriksen
Contact:	Robert Paxman		
Standard:	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	N/A

**RSS 210 and FCC 15.247 (DTS, 2400 - 2483.5 MHz)  
Radiated Spurious Emissions 802.11b Mode**

**Test Specific Details**

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

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. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane.

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

**Ambient Conditions:**                      Temperature:            22 °C  
   Rel. Humidity:         36 %

**Summary of Results**

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11b Chain A	1 2412MHz	21.5	18.8 dBm	Band Edge radiated field strength	FCC Part 15.209 / 15.247(c)	46.5dBµV/m @ 2385.9MHz (-7.5dB)
			21.5		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	46.1 dBuV/m @ 6431.9 MHz (-7.9dB)
1b	802.11b Chain A	6 2437MHz	19.5	16.7 dBm	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	47.4 dBuV/m @ 6498.6 MHz (-6.6dB)
1c	802.11b Chain A	11 2462MHz	23.0	19.6 dBm (note)	Band Edge radiated field strength	FCC Part 15.209 / 15.247(c)	46.3dBµV/m @ 2484.8MHz (-7.7dB)
			22.5		Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	53.0 dBuV/m @ 7388.3 MHz (-1.0dB)

Note : for channel 11 ( 2462 MHz ) radiated emissions test , the power setting GC = 22.5 , measured power AP = 19.2 dBm .

**Modifications Made During Testing**

No modifications were made to the EUT during testing

**Deviations From The Standard**

No deviations were made from the requirements of the standard.

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71831
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

### Run #1: Radiated Spurious Emissions, Band Edges. Operating Mode: 802.11b - Chain A

Date of Test: 5/28/2008 and 5/29/2008  
 Test Engineer: Ben Jing  
 Test Location: FT Chamber # 5

### Run #1a: Low Channel @ 2412 MHz

Power Setting: 21.5 Average power: 18.8 dBm (for reference purposes)

### Fundamental Signal Field Strength: Peak value measured in 100kHz

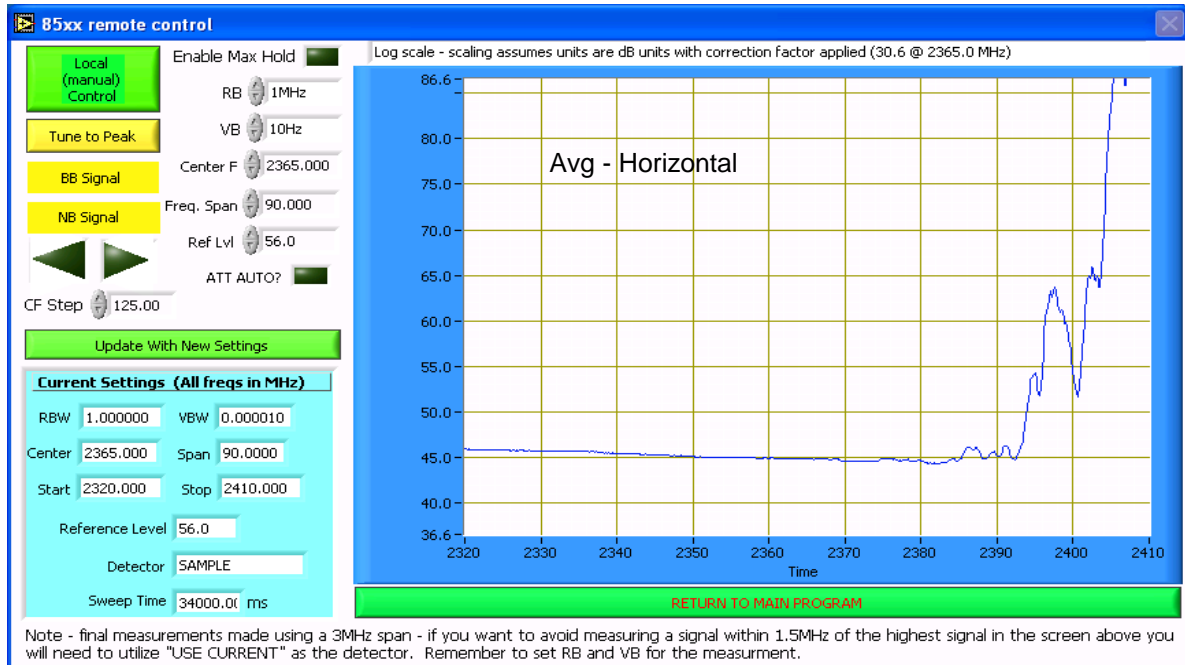
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2410.990	99.4	V	-	-	Pk	164	1.0	
2411.500	98.3	H	-	-	Pk	236	1.0	

Fundamental emission level @ 3m in 100kHz RBW:	99.4	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	69.4	dB $\mu$ V/m

Limit is -30dBc (UNII power measurement)

### Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2385.920	46.5	H	54.0	-7.5	Avg	230	1.0	GC = 21.5
2385.990	45.4	V	54.0	-8.6	Avg	169	1.0	GC = 21.5
2387.150	58.7	H	74.0	-15.3	PK	228	1.0	GC = 21.5
2389.800	57.4	V	74.0	-16.6	Pk	166	1.0	GC = 21.5



Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71831
Contact:	Robert Paxman	Account Manager:	Briggs / Eriksen
Standard:	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	N/A

**Spurious Emissions**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4823.910	43.6	V	54.0	-10.4	AVG	165	1.5	
4823.910	48.3	V	74.0	-25.7	PK	165	1.5	
6431.860	50.1	V	69.4	-19.3	PK	120	1.5	Note 2
7238.730	44.7	V	54.0	-9.3	AVG	56	1.5	
7238.730	51.7	V	74.0	-22.3	PK	56	1.5	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
- Note 2: Signal is not in a restricted band, measurement bandwidth is **100kHz**.

**Run #1b: Center Channel @ 2437 MHz**

**Fundamental Signal Field Strength:** Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2437.980	96.7	V	-	-	Pk	200	1.0	RB = VB = 100kHz
2436.470	91.5	H	-	-	Pk	6	1.0	RB = VB = 100kHz

Fundamental emission level @ 3m in 100kHz RBW:	96.7	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	66.7	dB $\mu$ V/m

Limit is -30dBc (UNII power measurement)

**Spurious Emissions**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4873.950	42.2	V	54.0	-11.8	AVG	200	1.0	
4873.950	47.1	V	74.0	-26.9	PK	200	1.0	
6498.610	51.2	V	66.7	-15.5	PK	111	1.5	Note 2
7313.830	46.4	V	54.0	-7.6	AVG	51	1.5	
7313.830	52.8	V	74.0	-21.2	PK	51	1.5	
9747.880	50.3	V	66.7	-16.4	PK	217	2.0	Note 2

- Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
- Note 2: Signal is not in a restricted band, measurement bandwidth is **100kHz**.

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71831
	Account Manager: Briggs / Eriksen
Contact: Robert Paxman	
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

### Run #1c: High Channel @ 2462 MHz

Power Setting: 23.0 Average power: 19.6 dBm (for reference purposes)

### Fundamental Signal Field Strength: Peak value measured in 100kHz

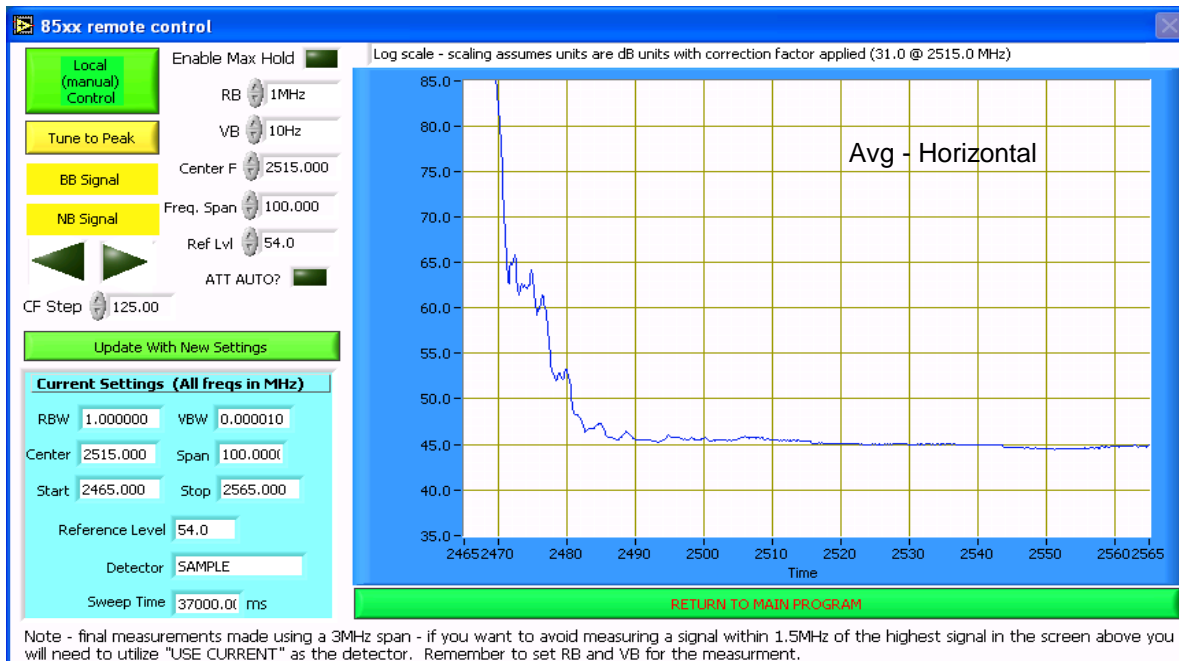
Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2461.010	100.0	V	-	-	Pk	179	1.0	
2462.990	101.6	H	-	-	Pk	158	1.0	

Fundamental emission level @ 3m in 100kHz RBW:	101.6	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	71.6	dB $\mu$ V/m

Limit is -30dBc (UNII power measurement)

### Band Edge Signal Field Strength

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2484.750	46.3	H	54.0	-7.7	Avg	161	1.0	GC = 23.0
2484.760	45.9	V	54.0	-8.1	Avg	177	1.0	GC = 23.0
2484.830	59.1	H	74.0	-14.9	PK	156	1.0	GC = 23.0
2484.920	57.2	V	74.0	-16.8	PK	145	1.0	GC = 23.0



Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71831
Contact:	Robert Paxman	Account Manager:	Briggs / Eriksen
Standard:	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	N/A

**Spurious Emissions ( GC = 22.5 , AP = 19.2 dBm )**

Frequency MHz	Level dB $\mu$ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4923.950	43.1	V	54.0	-10.9	AVG	173	1.5	
4923.950	48.4	V	74.0	-25.6	PK	173	1.5	
6565.240	51.2	V	71.6	-20.4	PK	171	1.0	Note 2
7388.310	53.0	V	54.0	-1.0	AVG	264	2.0	
7388.310	58.2	V	74.0	-15.8	PK	264	2.0	
9847.880	54.9	V	71.6	-16.7	PK	83	1.5	Note 2

- Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
- Note 2: Signal is not in a restricted band, measurement bandwidth is 100kHz.

Client:	Intel	Job Number:	J70979
Model:	512an MMW	T-Log Number:	T71831
		Account Manager:	Briggs / Eriksen
Contact:	Robert Paxman		
Standard:	RSS 210 / FCC 15.247 DTS (Radiated)	Class:	N/A

**RSS 210 and FCC 15.247 (DTS, 2400 - 2483.5 MHz)  
Radiated Spurious Emissions - Band Edge 802.11g Mode**

**Test Specific Details**

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

Date of Test: 5/28/2008	Config. Used: 1
Test Engineer: Ben Jing	Config Change: None
Test Location: FT Chamber # 5	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. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane.

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

**Ambient Conditions:**                      Temperature:                      22 °C  
    Rel. Humidity:                      36 %

**Summary of Results**

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11g Chain A	1 2412MHz	20 . 5	14.5 dBm	Band Edge radiated field strength	FCC Part 15.209 / 15.247( c)	<b>47.4dBµV/m @ 2389.9MHz (-6.6dB)</b>
					Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247( c)	Covered by n20 mode measurements
1b	802.11g Chain A	6 2437MHz			Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247( c)	Covered by n20 mode measurements
1c	802.11g Chain A	11 2462MHz	21 . 5	14 dBm	Band Edge radiated field strength	FCC Part 15.209 / 15.247( c)	<b>45.7dBµV/m @ 2483.6MHz (-8.3dB)</b>
					Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247( c)	Covered by n20 mode measurements

**Modifications Made During Testing**

No modifications were made to the EUT during testing

**Deviations From The Standard**

No deviations were made from the requirements of the standard.

Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71831
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

Run #1: Radiated Spurious Emissions, Band Edges. Operating Mode: 802.11g - Chain A

Run #1a: Low Channel @ 2412 MHz

Power Setting: 20.5 Average power: 14.5 dBm (for reference purposes)

Fundamental Signal Field Strength: Peak value measured in 100kHz

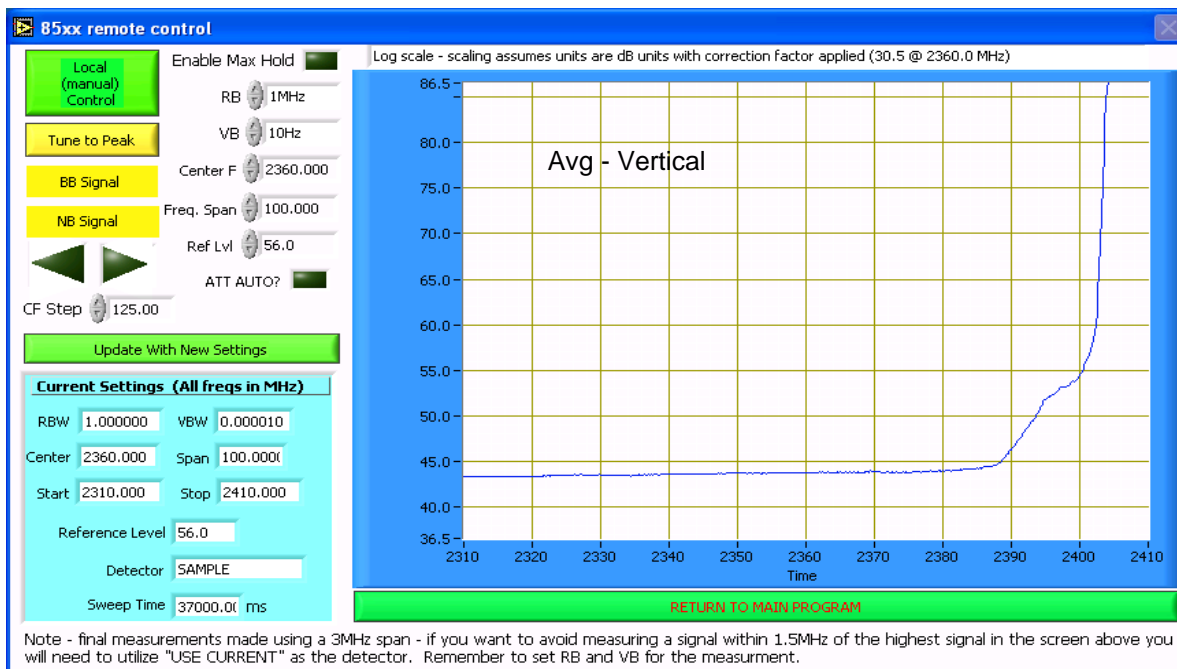
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2410.750	92.9	V	-	-	PK	140	1.0	
2410.730	88.4	H	-	-	PK	295	1.0	

Fundamental emission level @ 3m in 100kHz RBW:	92.9	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	62.9	dB $\mu$ V/m

Limit is -30dBc (UNII power measurement)

### Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.870	47.4	V	54.0	-6.6	Avg	140	1.0	GC = 20.5
2389.910	45.3	H	54.0	-8.7	Avg	294	1.0	GC = 20.5
2389.660	60.6	H	74.0	-13.4	PK	288	1.0	GC = 20.5
2389.810	65.5	V	74.0	-8.5	PK	140	1.0	GC = 20.5



Client: Intel	Job Number: J70979
Model: 512an MMW	T-Log Number: T71831
Contact: Robert Paxman	Account Manager: Briggs / Eriksen
Standard: RSS 210 / FCC 15.247 DTS (Radiated)	Class: N/A

### Run #1b: High Channel @ 2462 MHz

Power Setting: 21.5 Average power: 14 dBm (for reference purposes)

### Fundamental Signal Field Strength: Peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2460.710	93.5	V	-	-	PK	128	1.0	
2463.280	89.9	H	-	-	PK	152	1.0	

Fundamental emission level @ 3m in 100kHz RBW:	93.5	dB $\mu$ V/m
Limit for emissions outside of restricted bands:	63.5	dB $\mu$ V/m

Limit is -30dBc (UNII power measurement)

### Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.550	45.7	H	54.0	-8.3	Avg	157	1.0	GC = 21.5
2483.550	65.0	V	74.0	-9.0	Pk	126	1.0	GC = 21.5
2483.560	45.7	V	54.0	-8.3	Avg	145	1.0	GC = 21.5
2483.580	63.5	H	74.0	-10.5	Pk	159	1.0	GC = 21.5

