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# *Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C Specifications for an Intentional Radiator on the Intel Corporation Model: WM3B2100A*

| | |
|---|---|
| FCC ID: | PD9WM3B2100A |
| GRANTEE: | Intel Corporation<br>2300 Corporate Center Drive<br>Thousand Oaks, CA 91320 |
| TEST SITE: | Elliott Laboratories, Inc.<br>684 W. Maude Avenue<br>Sunnyvale, CA 94086 |
| REPORT DATE: | April 29, 2003 |
| FINAL TEST DATE: | April 23 and April 24, 2003 |
| AUTHORIZED SIGNATORY: | Juan Martinez<br>Sr. EMC Engineer |

ACCREDITED

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## *TABLE OF CONTENTS*

## *DECLARATIONS OF COMPLIANCE*

Equipment Name and Model:
WM3B2100A

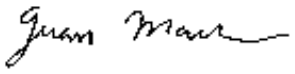
Manufacturer:
Intel Corporation
2300 Corporate Center Drive
Thousand Oaks, Ca 91320

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

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV3** Dated July 30, 2001

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



| | |
|---|---|
| Signature | _____ |
| Name | Juan Martinez |
| Title | Sr. EMC Engineer |
| Company | Elliott Laboratories Inc. |
| Address | 684 W. Maude Ave<br>Sunnyvale, CA 94086<br>USA |
| Date: | April 29, 2003 |

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

## *SCOPE*

An electromagnetic emissions test has been performed on the Intel Corporation model WM3B2100A pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

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

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

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

The test results recorded herein are based on a single type test of the Intel Corporation model WM3B2100A and therefore apply only to the tested sample. The sample was selected and prepared by Robert Paxman of Intel Corporation

## *OBJECTIVE*

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

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units which are subsequently manufactured.

## *STATEMENT OF COMPLIANCE*

The tested sample of Intel Corporation model WM3B2100A complied with the requirements of Subpart C of Part 15 of the FCC Rules for low power intentional radiators.

Maintenance of FCC 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.).

## *SUMMARY OF RESULTS*

| FCC Part 15 Section | RSS 210 Section | Description | Measured Value | Comments | Result |
|---|---|---|---|---|---|
| 15.247(a) | | | Systems uses Direct Sequence Spread Spectrum techniques | System must utilize a digital transmission technology | Complies |
| 15.247 (a) (2) | | 6dB Bandwidth | 13.15 MHz | Minimum allowed is 500kHz | Complies |
| | RSP 100 | 99% Bandwidth | 16.5 MHz | Minimum allowed is 500kHz | Complies |
| 15.247 (b) (3) | 6.2.2(o)(b) | Output Power, 2400 - 2483.5 MHz | 16.6 dBm (0.0447 Watts) EIRP = .071 W | Multi-point applications: Maximum permitted is 1Watt, with EIRP limited to 4 Watts. | Complies |
| 15.247(d) | 6.2.2(o)(b) | Power Spectral Density | -16.29 dBm / MHz | Maximum permitted is 8dBm/3kHz | Complies |
| 15.247(c) | 6.2.2(o)(e1) | Spurious Emissions – Antenna Conducted 30MHz – 25GHz | All spurious emissions < -20dBc | All spurious emissions < -20dBc. | Complies |
| | 6.2.2(o)(e1) | Radiated Spurious Emissions 30MHz – 25GHz | All spurious emissions < -20dBc | Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207 | Complies |
| 15.247(c) / 15.209 | | Radiated Spurious Emissions 30MHz – 25GHz | 52.9 dBuV/m @ 4824 MHz (-1.2 dB) | Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc | Complies |
| 15.207 | | AC Conducted Emissions | 50.5dBuV @ .174 MHz (-14.2dB) | Conducted emissions from the AC power port must meet the limits set forth in 15.207 | Complies |
| 15.247 (b) (5) | | RF Exposure Requirements | MPE Caculation | | |
| 15.203 | | RF Connector | Unique antenna connection required for user-installed applications. Standard rf connectors permitted for professionally installed systems. | Integral antenna or specialized connector required | Complies |
| | 6.2.2(o)(b) | Processing Gain | | Requirement has been removed | |

EIRP calculated using antenna gain of dBi (0) for the Hitachi Antennas and dBi (2) for the Ethetronics Antennas.

***MEASUREMENT UNCERTAINTIES***

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

| Measurement Type | Frequency Range (MHz) | Calculated Uncertainty (dB) |
|---|---|---|
| Conducted Emissions | 0.15 to 30 | ± 2.4 |
| Radiated Emissions | 30 to 1000 | ± 3.6 |

## *EQUIPMENT UNDER TEST (EUT) DETAILS*

### *GENERAL*

The Intel Corporation model WM3B2100A is a mini PCI Card dual band (802.11a and 802.11b) transceiver which is designed to be installed into a laptop PC and connect to antennas mounted in the screen of the laptop. The Mini PCI was tested outside the host system. The host laptop was treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the Host Systerm is 120/240 V, 50/60 Hz, 5 Amps.

The sample was received on April 23, 2003 and tested on April 23 and April 24, 2003. The EUT consisted of the following component(s):

| Manufacturer/Model/Description | Serial Number | Proposed FCC ID # |
|---|---|---|
| Intel Corporation WM3B2100A Mini PCI card | DEB | PD9WM3B2100A |

### *OTHER EUT DETAILS*

Ethertronics Antenna at 2.4 Ghz has a gain of 2 dBi and at 5 Ghz a gain of 5 dBi.
Hitachi Antenna at 2.4 Ghz and at 5 Ghz a gain of 0 dBi.
Antennas will be installed inside at the topside of the display screen of the Laptop. The Laptop vendors will professionally install the antennas.

### *ENCLOSURE*

The EUT contains it's own shield made out of aluminum. It measures approximately 6 cm wide by 2 cm deep by 4.5 cm high.

### *MODIFICATIONS*

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

### *SUPPORT EQUIPMENT*

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

| Manufacturer | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Hewlett Packard | Pavilion 500 | PC | MX21111561 | DoC |
| Dell | 828FI | Monitor | 22794E28CJ29 | DoC |
| Compaq | SK-2800 | Keyboard | B1C800BCPHVV9Q | GYUR66SK |
| Hewlett Packard | P813I | Mouse | K020215557 | DoC |

No remote support equipment was used during testing.

***EUT INTERFACE PORTS***

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

| | | | | |
|---|---|---|---|---|
| EUT Tx | Antenna #1 | Antenna Cable | Shielded | 0.5 |
| EUT Rx | Antenna #2 | Antenna Cable | Shielded | 0.5 |
| Host PC, Keyboard | Keyboard | Keyboard Cable | Shielded | 1.0 |
| Host PC, AC Input | AC Power Source | IEC Power Cord | Unshielded | 2.0 |
| Host PC, Mouse | Mouse | Mouse Cable | Shielded | 1.0 |
| Monitor, AC Input | AC Power Source | IEC Power Cord | Unshielded | 2.0 |

***EUT OPERATION DURING TESTING***

The EUT was transmitting on the channel stated in each test description at the maximum power. The transmission was continuous at 6Mb/s for 802.11a mode and at 1Mb/s in 802.11b mode. These data rates produce the highest power spectral density in their respective modes.
For measurements of radiated emissions above 1GHz host laptop's screen was in the down position to reduce any effects it might have on the antenna-related emissions. The EUT was tested with two different antennas (Ethertronics and Hitachi). The antennas were mounted to the top edge of a sheet of glass with a metal backing. The glass and metal simulated the actual implementation of the antennas in a laptop system.

## *TEST SITE*

### *GENERAL INFORMATION*

Final test measurements were taken on April 23 and April 24, 2003 at the Elliott Laboratories Open Area Test Site #3 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

### *CONDUCTED EMISSIONS CONSIDERATIONS*

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

### *RADIATED EMISSIONS CONSIDERATIONS*

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

## *MEASUREMENT INSTRUMENTATION*

RECEIVER SYSTEM

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

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

### *INSTRUMENT CONTROL COMPUTER*

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

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

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

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

***POWER METER***

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

***FILTERS/ATTENUATORS***

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

***ANTENNAS***

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

***ANTENNA MAST AND EQUIPMENT TURNTABLE***

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

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

***INSTRUMENT CALIBRATION***

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

## *TEST PROCEDURES*

### *EUT AND CABLE PLACEMENT*

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

### *CONDUCTED EMISSIONS*

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

### *RADIATED EMISSIONS*

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

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

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

***CONDUCTED EMISSIONS FROM ANTENNA PORT***

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

## *SPECIFICATION LIMITS AND SAMPLE CALCULATIONS*

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

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

***CONDUCTED EMISSIONS SPECIFICATION LIMITS, SECTION 15.207***

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

***RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.209***

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

***SAMPLE CALCULATIONS - CONDUCTED EMISSIONS***

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

$$R_r - B = C$$

and

$$C - S = M$$

where:

$R_r$ = Receiver Reading in dBuV

B = Broadband Correction Factor*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

* Broadband Level - Per ANSI C63.4, if the amplitude measured in the quasi-peak mode is at least 6 dB higher than the amplitude measured in the average mode, the level measured in the quasi-peak mode may be reduced by 13 dB before comparing it to the limit.

***SAMPLE CALCULATIONS - RADIATED EMISSIONS***

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

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

where:

$F_d$ = Distance Factor in dB

$D_m$ = Measurement Distance in meters

$D_s$ = Specification Distance in meters

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$R_r$ = Receiver Reading in dBuV/m

$F_d$ = Distance Factor in dB

$R_c$ = Corrected Reading in dBuV/m

$L_s$ = Specification Limit in dBuV/m

$M$ = Margin in dB Relative to Spec

# *EXHIBIT 1: Test Equipment Calibration Data*

1 Page

**Conducted and Radiated Emissions, 25-Apr-03**
**Engineer: volivas**

| Manufacturer | Description | Model # | Assett # | Cal interval | Last Calibrated | Cal Due |
|---|---|---|---|---|---|---|
| Elliott Laboratories | FCC / CISPR LISN | LISN-4, OATS | 362 | 12 | 4/19/02 | 4/30/03 |
| EMCO | Biconical Antenna, 30-300 MHz | 3110B | 1320 | 12 | 6/3/02 | 6/3/03 |
| EMCO | Horn Antenna, D. Ridge 1-18GHz | 3115 | 1242 | 12 | 10/9/02 | 10/9/03 |
| EMCO | Log Periodic Antenna, 0.2-2 GHz | 3148 | 1347 | 12 | 10/30/02 | 10/30/03 |
| Rohde & Schwarz | Pulse Limiter | ESH3 Z2 | 372 | 12 | 7/18/02 | 7/18/03 |
| Rohde & Schwarz | Test Receiver, 0.009-30 MHz | ESH3 | 274 | 12 | 1/24/03 | 1/24/04 |
| Rohde & Schwarz | Test Receiver, 20-1300MHz | ESVP | 213 | 12 | 7/22/02 | 7/22/03 |

**Radiated Emissions, 1 - 40,000 GHz, 28-Apr-03**
**Engineer: jmartinez**

| Manufacturer | Description | Model # | Assett # | Cal interval | Last Calibrated | Cal Due |
|---|---|---|---|---|---|---|
| Hewlett Packard | High Pass filter, 3.5GHz | 84300-80038 | 1157 | 18 | 3/1/02 | 9/1/03 |
| Hewlett Packard | High Pass filter, 8.2GHz | P/N-84300-80039 | 1156 | 12 | 4/17/03 | 4/17/04 |
| EMCO | Horn Antenna, D. Ridge 1-18GHz | 3115 | 786 | 12 | 2/28/03 | 2/28/04 |
| Hewlett Packard | Microwave EMI test system (SA40, 9kHz - 40GHz) | 84125C | 1149 | 12 | 3/12/03 | 3/12/04 |
| Hewlett Packard | Microwave Preamplifier, 1-26.5GHz | 8449B | 785 | 12 | 1/24/03 | 1/24/04 |
| Rohde & Schwarz | Power Meter, Single Channel | NRVS | 1290 | 12 | 4/8/03 | 4/8/04 |
| Rohde & Schwarz | Power Sensor 100uW - 10 Watts | NRV-Z53 | 1236 | 12 | 8/15/02 | 8/15/03 |
| Hewlett Packard | Spectrum Analyzer, 9KHz - 26.5GHz | 8563E | F1202LB | 12 | 9/27/02 | 9/27/03 |

# *EXHIBIT 2: Test Data Log Sheets*

**ELECTROMAGNETIC EMISSIONS**

**TEST LOG SHEETS**

**AND**

**MEASUREMENT DATA**

T50976_DTS 26 Pages
T50976_Digital 8 Pages

Elliott

# EMC Test Data

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Proj Eng: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Emissions Spec: | FCC Part 15 B, C, and E, RSS- | Class: | Radio |
| Immunity Spec: | N/A | Environment: | - |

# EMC Test Data

For The

## Intel Corporation

Model

**WM3B2100A**

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Proj Eng: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Emissions Spec: | FCC Part 15 B, C, and E, RSS-21( | Class: | Radio |
| Immunity Spec: | N/A | Environment: | - |

# EUT INFORMATION

## General Description

The EUT is a mini PCI Card dual band (802.11a and 802.11b) transceiver which is designed to be installed into a laptop PC and connect to antennas mounted in the screen of the laptop. The Mini PCI was tested outside the host system. The host laptop was treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the laptop is 120/240 V, 50/60 Hz, 5 Amps.

## Equipment Under Test

| Manufacturer | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Intel Corporation | WM3B2100A | Mini PCI card | DEB | PD9WM3B2100A |

## Antenna

Ethertronics Antenna at 2.4 Ghz has a gain of 2 dBi and at 5 Ghz a gain of 5 dBi.
Hitachi Antenna at 2.4 Ghz and at 5 Ghz a gain of 0 dBi.
Antennas will be installed inside at the topside of the display screen of the Laptop. The Laptop vendors will professionally install the antennas.

## EUT Enclosure

The EUT contains it's own shield made out of aluminum. It measures approximately 6 cm wide by 2 cm deep by 4.5 cm high.

## Modification History

| Mod. # | Test | Date | Modification |
|---|---|---|---|
| 1 | | | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Proj Eng: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Emissions Spec: | FCC Part 15 B, C, and E, RSS-21( | Class: | Radio |
| Immunity Spec: | N/A | Environment: | - |

# Test Configuration #1

## Local Support Equipment

| Manufacturer | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Hewlett Packard | Pavilion 500 | PC | MX21111561 | DoC |
| Dell | 828FI | Monitor | 22794E28CJ29 | DoC |
| Compaq | SK-2800 | Keyboard | B1C800BCPHVV9Q | GYUR66SK |
| Hewlett Packard | P813I | Mouse | K020215557 | DoC |

## Remote Support Equipment

| Manufacturer | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| None | | | | |

## Interface Cabling and Ports

| | | | | |
|---|---|---|---|---|
| EUT Tx | Antenna #1 | Antenna Cable | Shielded | 0.5 |
| EUT Rx | Antenna #2 | Antenna Cable | Shielded | 0.5 |
| Host PC, Keyboard | Keyboard | Keyboard Cable | Shielded | 1.0 |
| Host PC, AC Input | AC Power Source | IEC Power Cord | Unshielded | 2.0 |
| Host PC, Mouse | Mouse | Mouse Cable | Shielded | 1.0 |
| Monitor, AC Input | AC Power Source | IEC Power Cord | Unshielded | 2.0 |

## EUT Operation During Emissions Testing (Radio)

The EUT was transmitting on the channel stated in each test description at the maximum power. The transmission was continuous at 6Mb/s for 802.11a mode and at 1Mb/s in 802.11b mode. These data rates produce the highest power spectral density in their respective modes.

For measurements of radiated emissions above 1GHz host laptop's screen was in the down position to reduce any effects it might have on the antenna-related emissions. The EUT was tested with two different antennas (Ethertronics and Hitachi). The antennas were mounted to the top edge of a sheet of glass with a metal backing. The glass and metal simulated the actual implementation of the antennas in a laptop system.

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# EMC Test Data

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

## Receiver Emission RSS-210 issue 5

### Test Specifics

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

| | | | |
|---|---|---|---|
| Date of Test: | 4/23/03 | Config. Used: | 1 |
| Test Engineer: | jgonzalez | Config Change: | None |
| Test Location: | SVOATS #3 | EUT Voltage: | 120V / 60Hz |

### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing.
On the OATS, the measurement antenna was located 3m from the EUT for the frequency range 1 - 18 GHz.

### Ambient Conditions:

| | |
|---|---|
| Temperature: | 11 °C |
| Rel. Humidity: | 98 % |

### Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1-6 | RE, 1000 - 18000 MHz, Maximized Emissions | RSS210 RX Mode (Hitachi) | Pass | Refer to individual Runs |
| 1-6 | RE, 1000 - 18000 MHz, Maximized Emissions | RSS210 RX Mode (Ethertronics) | Pass | Refer to individual Runs |

### Modifications Made During Testing:

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

**Run #1: Maximized readings, 1000 - 18000 MHz**
**Hitachi**
**Mode A (5.180GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 3453.000 | 49.9 | H | 60.0 | -10.1 | Avg | 176 | 1.0 | |
| 13813.000 | 44.6 | H | 60.0 | -15.4 | Avg | 200 | 1.0 | |
| 6906.000 | 43.3 | V | 60.0 | -16.7 | Avg | 134 | 1.0 | |
| 17266.000 | 41.9 | V | 60.0 | -18.1 | Avg | 321 | 1.0 | |
| 10354.000 | 41.3 | V | 60.0 | -18.7 | Avg | 0 | 1.0 | |
| 6906.000 | 40.5 | H | 60.0 | -19.5 | Avg | 200 | 1.0 | |
| 3453.000 | 38.5 | V | 60.0 | -21.5 | Avg | 10 | 1.0 | |
| 10360.000 | 36.3 | H | 60.0 | -23.7 | Avg | 132 | 1.0 | |

**Run #2: Maximized readings, 1000 - 18000 MHz**
**Hitachi**
**Mode A (5.260GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 7013.000 | 44.0 | H | 60.0 | -16.0 | Avg | 187 | 1.0 | |
| 3506.000 | 42.8 | H | 60.0 | -17.2 | Avg | 321 | 1.0 | |
| 7013.000 | 42.5 | V | 60.0 | -17.5 | Avg | 234 | 1.0 | |
| 3506.000 | 41.8 | V | 60.0 | -18.2 | Avg | 0 | 1.0 | |
| 10519.000 | 41.1 | V | 60.0 | -18.9 | Avg | 360 | 1.0 | |

**Run #3: Maximized readings, 1000 - 18000 MHz**
**Hitachi**
**Mode A (5.320GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 7092.000 | 43.4 | V | 60.0 | -16.6 | Avg | 111 | 1.0 | |
| 3546.000 | 41.9 | V | 60.0 | -18.1 | Avg | 200 | 1.0 | |
| 3546.000 | 41.3 | H | 60.0 | -18.7 | Avg | 89 | 1.0 | |
| 7092.000 | 42.3 | H | 60.0 | -17.7 | Avg | 203 | 1.0 | |
| 10630.000 | 41.9 | H | 60.0 | -18.1 | Avg | 0 | 1.0 | |
| 10630.000 | 39.1 | V | 60.0 | -20.9 | Avg | 349 | 1.0 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

**Run #4: Maximized readings, 1000 - 18000 MHz**
**Hitachi**
**Mode B (2.412GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2412.000 | 27.2 | H | 60.0 | -32.8 | Avg | 312 | 1.0 | |
| 4823.000 | 40.8 | H | 60.0 | -19.2 | Avg | 154 | 1.0 | |
| 4823.000 | 41.2 | V | 60.0 | -18.8 | Avg | 18 | 1.0 | |

**Run #5: Maximized readings, 1000 - 18000 MHz**
**Hitachi**
**Mode B (2.437GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4873.000 | 39.0 | V | 60.0 | -21.0 | Avg | 300 | 1.0 | |

**Run #6: Maximized readings, 1000 - 18000 MHz**
**Hitachi**
**Mode B (2.462GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2462.000 | 33.7 | V | 60.0 | -26.3 | Avg | 0 | 1.0 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

**Run #1: Maximized readings, 1000 - 18000 MHz**
**Ethertronics**
**Mode A (5.180GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 3453.000 | 46.7 | V | 60.0 | -13.3 | Avg | 22 | 1.0 | |
| 6906.000 | 39.8 | V | 60.0 | -20.2 | Avg | 134 | 1.0 | |
| 13813.000 | 40.1 | V | 60.0 | -19.9 | Avg | 100 | 1.0 | |
| 3453.000 | 38.4 | H | 60.0 | -21.6 | Avg | 321 | 1.0 | |
| 10359.000 | 39.7 | H | 60.0 | -20.3 | Avg | 300 | 1.0 | |

**Run #2: Maximized readings, 1000 - 18000 MHz**
**Ethertronics**
**Mode A (5.260GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 3506.000 | 40.3 | V | 60.0 | -19.7 | Avg | 321 | 1.0 | |
| 7012.000 | 39.7 | V | 60.0 | -20.3 | Avg | 179 | 1.0 | |
| 17530.000 | 43.1 | V | 60.0 | -16.9 | Avg | 37 | 1.0 | |
| 3506.000 | 42.0 | H | 60.0 | -18.0 | Avg | 98 | 1.0 | |
| 7012.000 | 39.1 | H | 60.0 | -20.9 | Avg | 0 | 1.0 | |
| 10518.000 | 38.7 | H | 60.0 | -21.3 | Avg | 360 | 1.0 | |

**Run #3: Maximized readings, 1000 - 18000 MHz**
**Ethertronics**
**Mode A (5.320GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 3546.000 | 39.7 | V | 60.0 | -20.3 | Avg | 134 | 1.0 | |
| 7092.000 | 39.7 | V | 60.0 | -20.3 | Avg | 231 | 1.0 | |
| 10638.000 | 40.7 | V | 60.0 | -19.3 | Avg | 347 | 1.0 | |
| 3546.000 | 38.7 | H | 60.0 | -21.3 | Avg | 300 | 1.0 | |
| 10638.000 | 41.2 | H | 60.0 | -18.8 | Avg | 1 | 1.0 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

**Run #4: Maximized readings, 1000 - 18000 MHz**
**Ethertronics**
**Mode B (2.412GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2412.000 | 29.7 | V | 60.0 | -30.3 | Avg | 346 | 1.0 | |

**Run #5: Maximized readings, 1000 - 18000 MHz**
**Ethertronics**
**Mode B (2.437GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4873.000 | 37.8 | H | 60.0 | -22.2 | Avg | 321 | 1.0 | |

**Run #6: Maximized readings, 1000 - 18000 MHz**
**Ethertronics**
**Mode B (2.462GHz)**

| Frequency | Level | Pol | RSS210 Rx Mode | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2462.000 | 36.7 | V | 60.0 | -23.3 | Avg | 134 | 1.0 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

# DTS 15.247 Antenna Conducted Emission

## Test Specifics

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

| | | | |
|---|---|---|---|
| Date of Test: | 4/25/03 | Config. Used: | 1 |
| Test Engineer: | jmartinez | Config Change: | None |
| Test Location: | SVOATS #3 | Host Unit Voltage | 120Vac, 60Hz |

## General Test Configuration

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

## Ambient Conditions:

| | |
|---|---|
| Temperature: | 11 °C |
| Rel. Humidity: | 98 % |

## Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | 6dB Bandwidth | 15.247(a) | Pass | 13.15 MHz |
| 2 | Output Power | 15.247(b) | Pass | 16.6 |
| 3 | Power Spectral Density (PSD) | 15.247(d) | Pass | -16.29 |
| 4 | Out-of-Band | FCC Part 15.209 / 15.247( c) | Pass | Refer to plots |
| 5 | Bandedge | 15.247( c) | N/A | Refer to plots |

## Modifications Made During Testing:

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

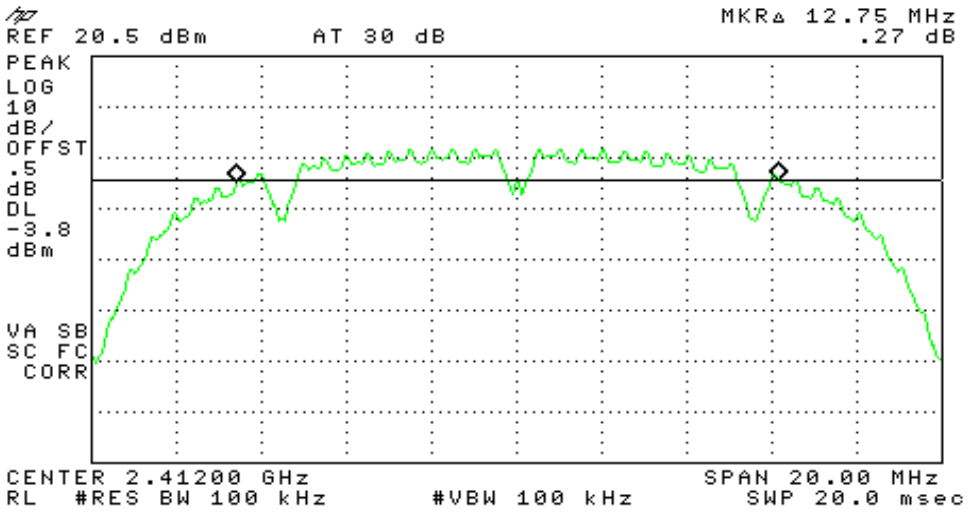
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**Run #1: Signal Bandwidth**

| Channel | Frequency (MHz) | Resolution Bandwidth | 6dB Signal Bandwidth | Graph reference # |
|---|---|---|---|---|
| Low | 2412 | 100kHz | 12.75 | 101 |
| Mid | 2437 | 100kHz | 12.80 | 102 |
| High | 2462 | 100kHz | 13.15 | 103 |

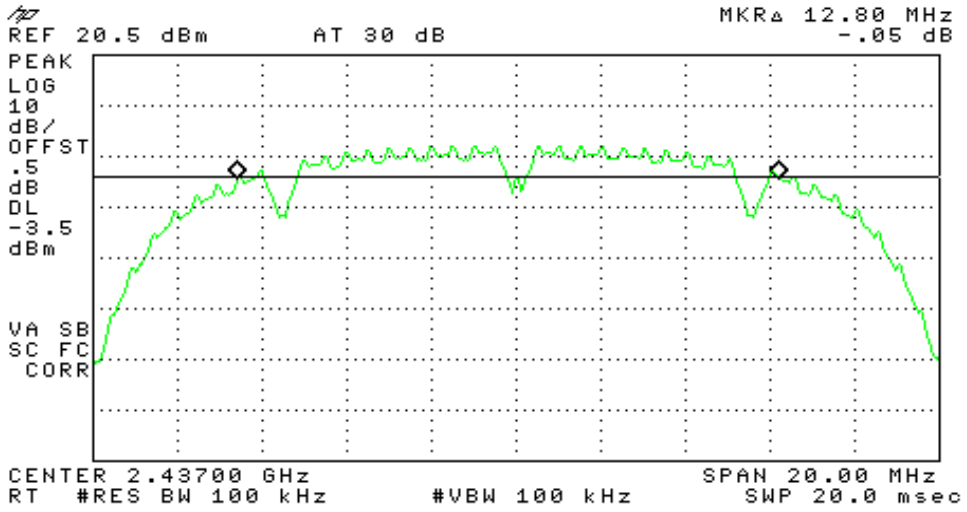
| | |
|---|---|
| Note 1: | Add note here |
| Note 2: | |

**101**

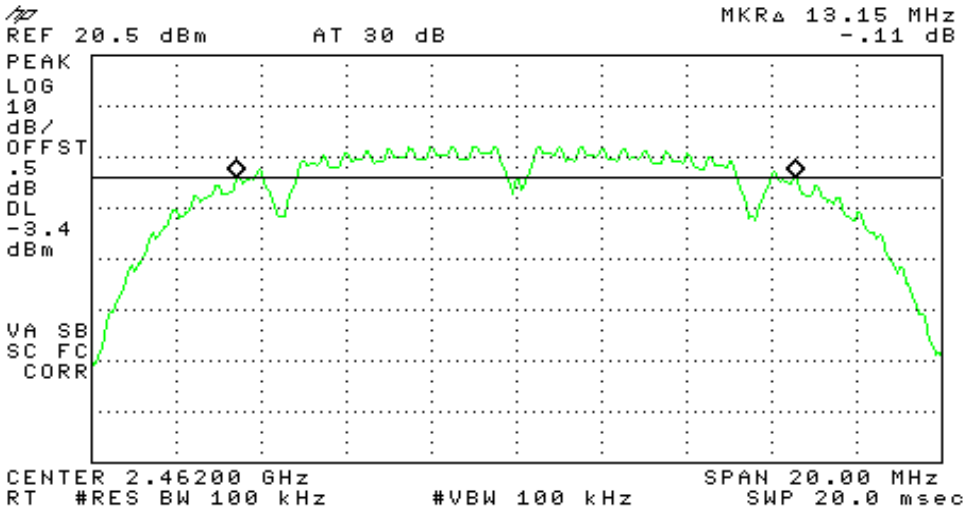


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**102**




**103**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**Run #2: Output Power**

| Channel | Frequency | Power | Rate | Antenna | Step | Gain | Bias | scale |
|---|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | (Mb/s) | | | | | |
| 1 | 2412 | 16.5 | 11 | 1 | 0 | 11 | 36 | 12 |
| 6 | 2437 | 16.5 | 11 | 1 | 0 | 11 | 36 | 12 |
| 11 | 2462 | 16.6 | 11 | 1 | 0 | 11 | 36 | 12 |

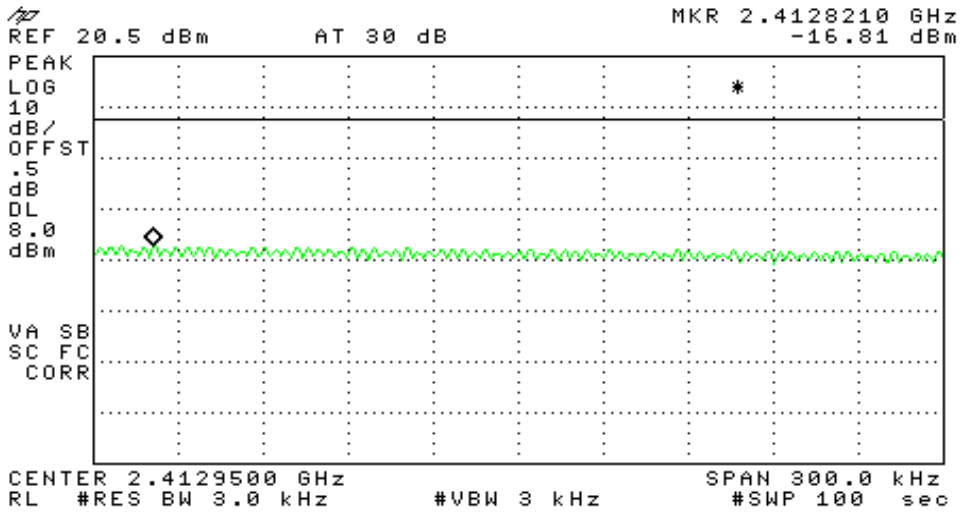
| | |
|---|---|
| Note 1: | Add note here |
| Note 2: | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**Run #3: Power Spectral Density**

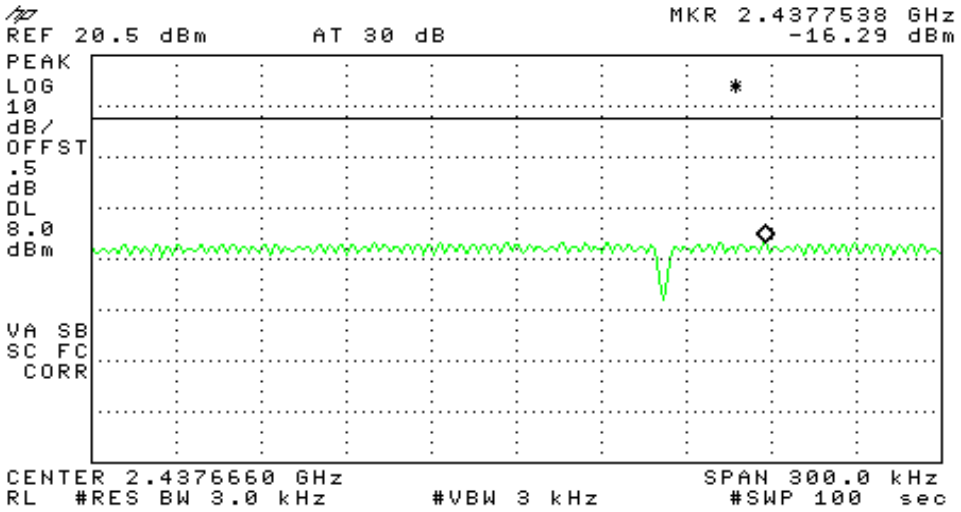
| Channel | Frequency (MHz) | Res BW | P.S.D. (averaged over 1 second in a 3kHz bandwidth) | Graph reference # |
|---|---|---|---|---|
| Low | 2412 | 3kHz | -16.81 | 201 |
| Mid | 2437 | 3kHz | -16.29 | 202 |
| High | 2462 | 3kHz | -17.68 | 203 |

**201**

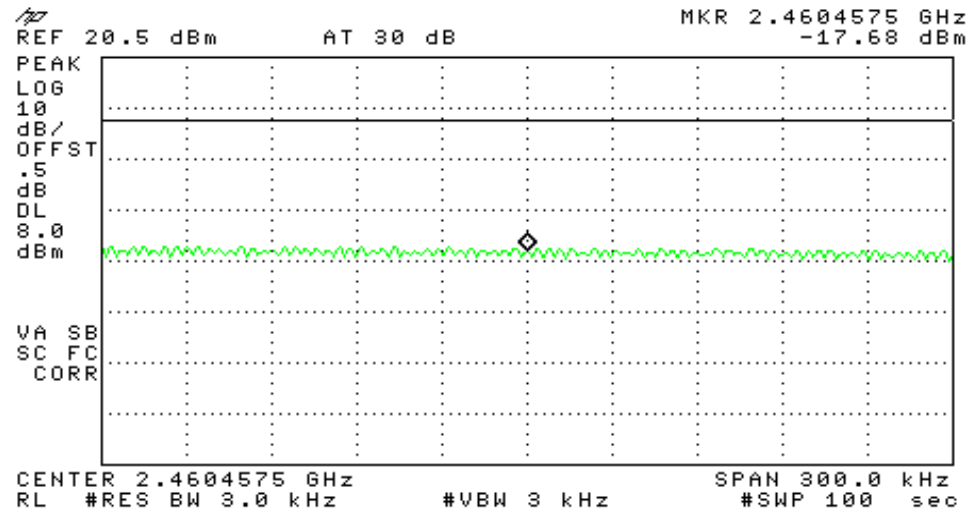


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**202**



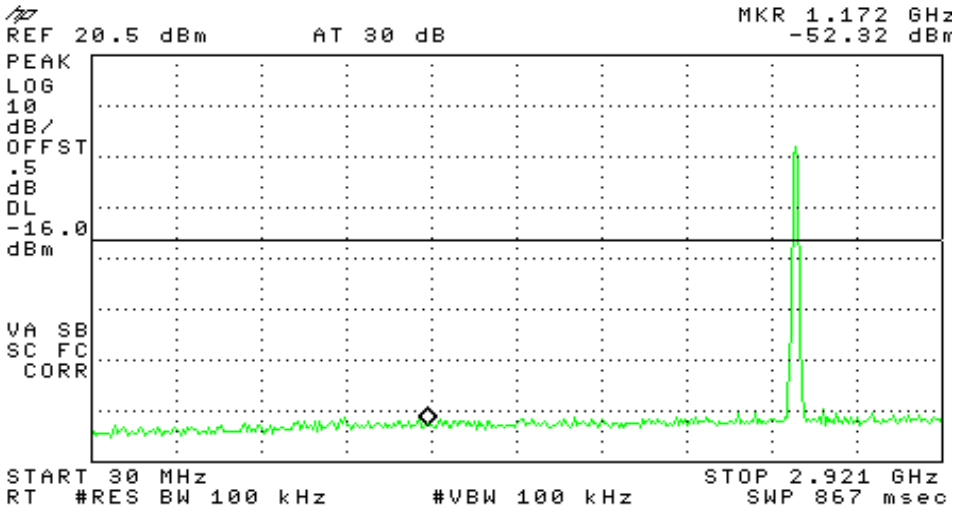

**203**

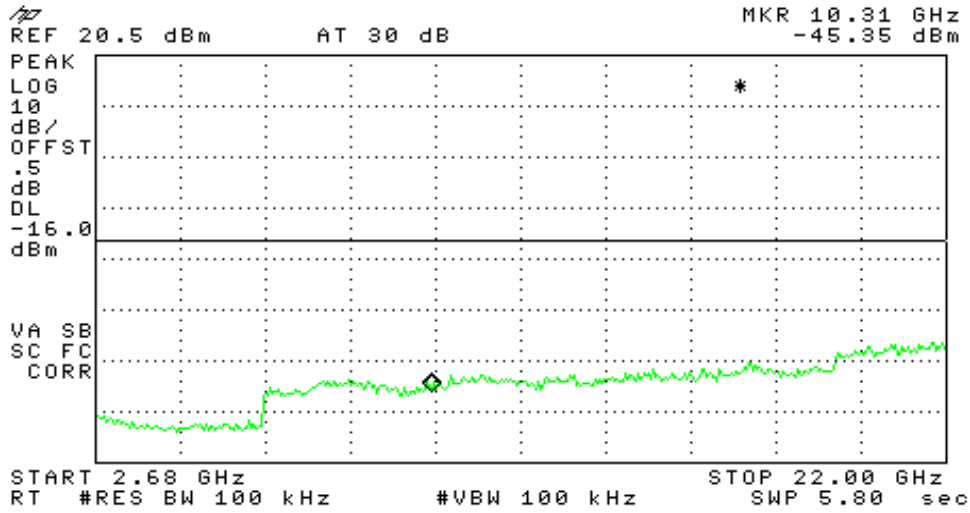


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**Run #4: Out-of-Band**

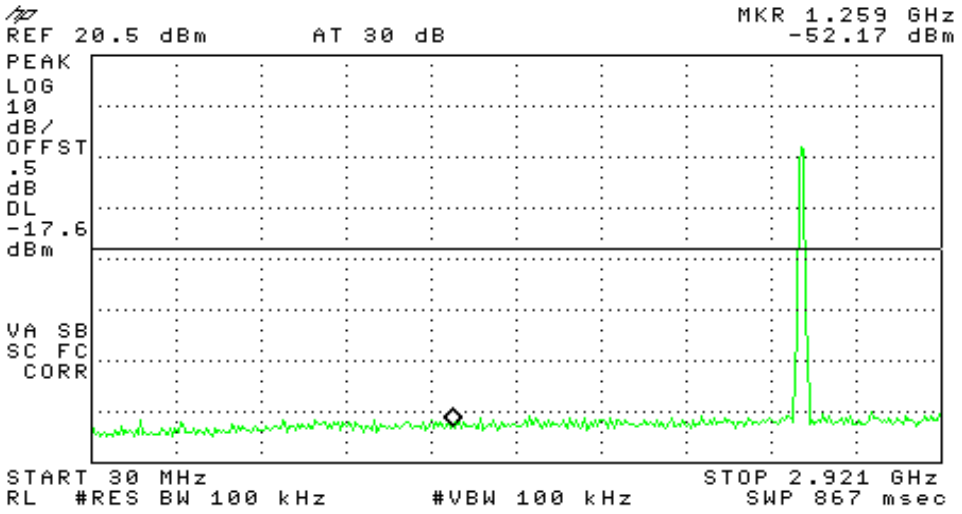
**Low Channel**

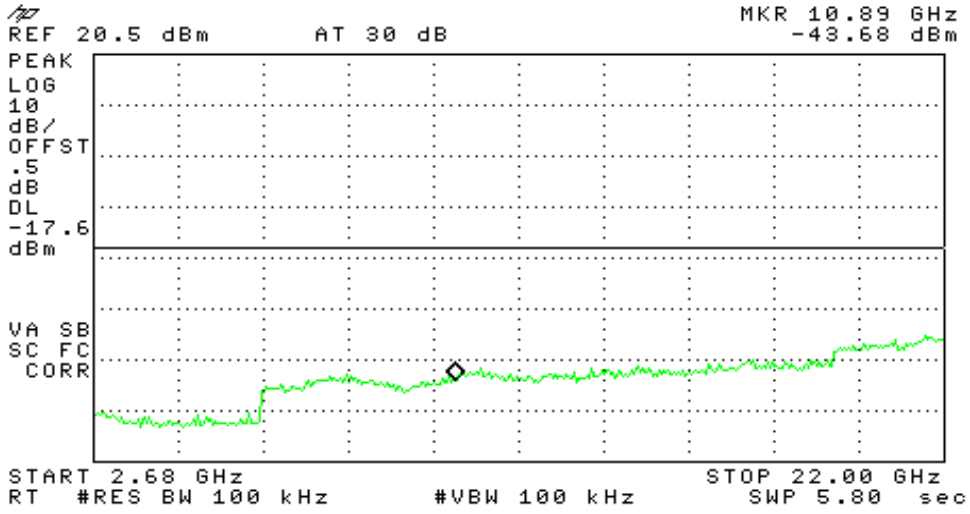


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

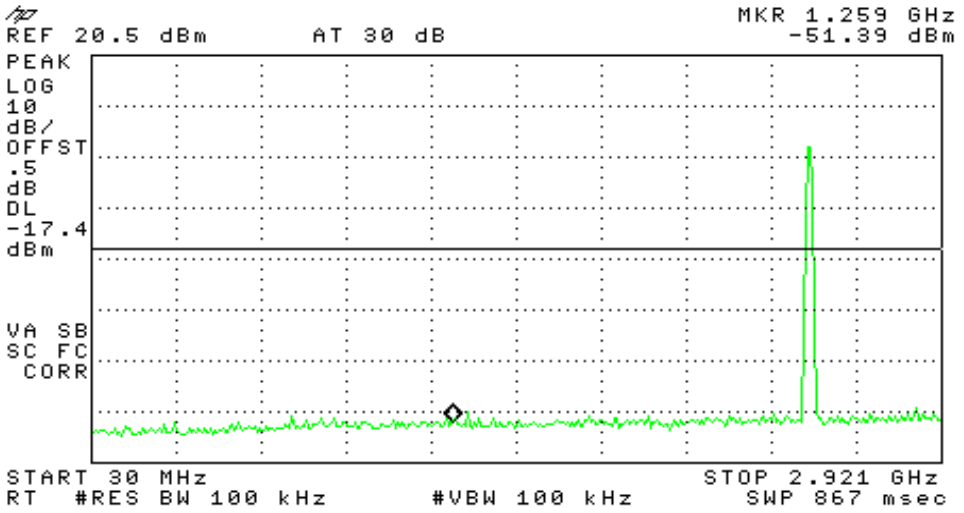
**Middle Channel**

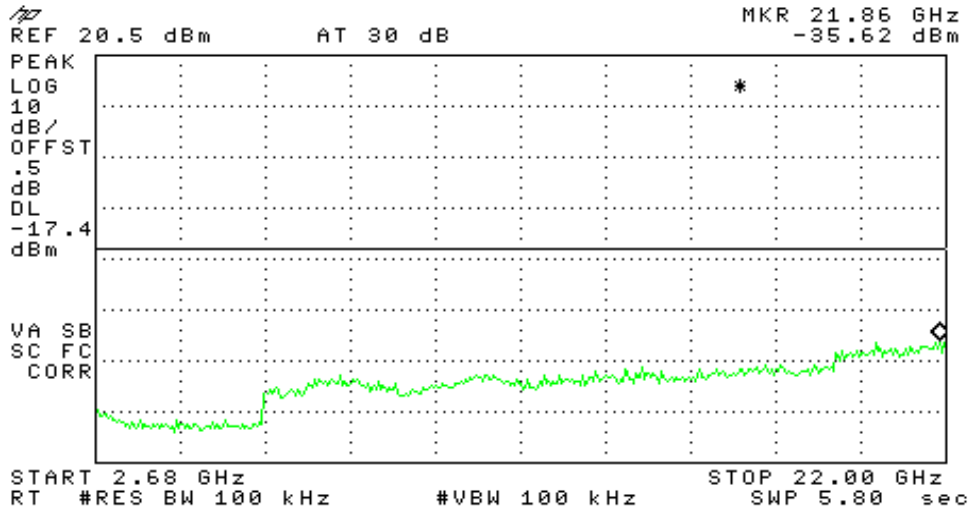


| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

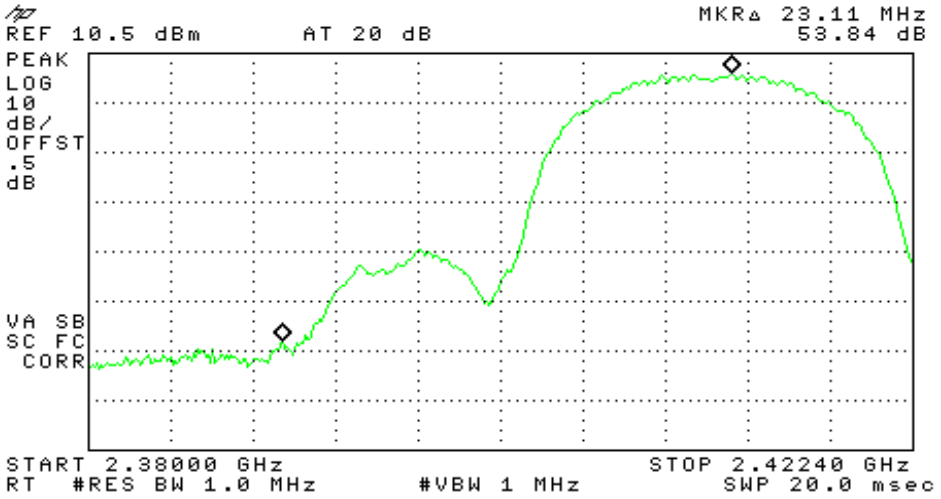
**High Channel**

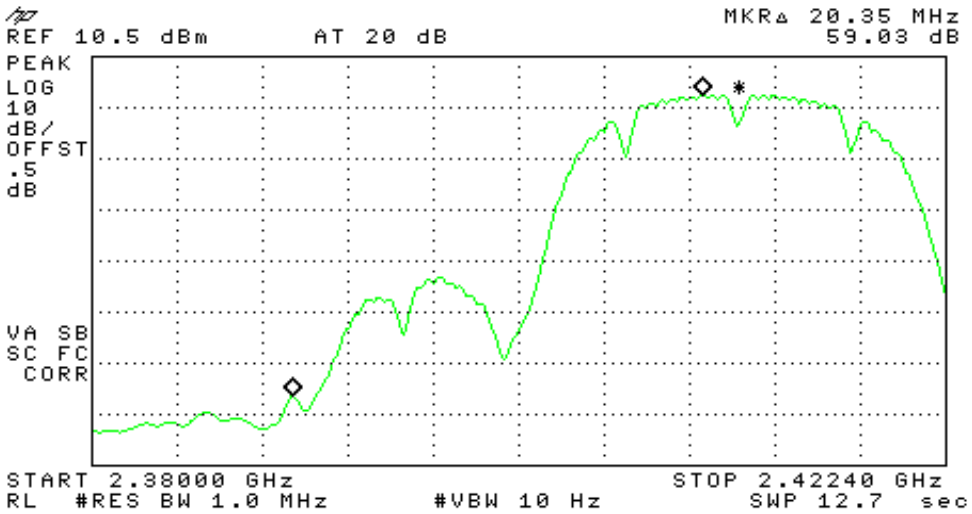


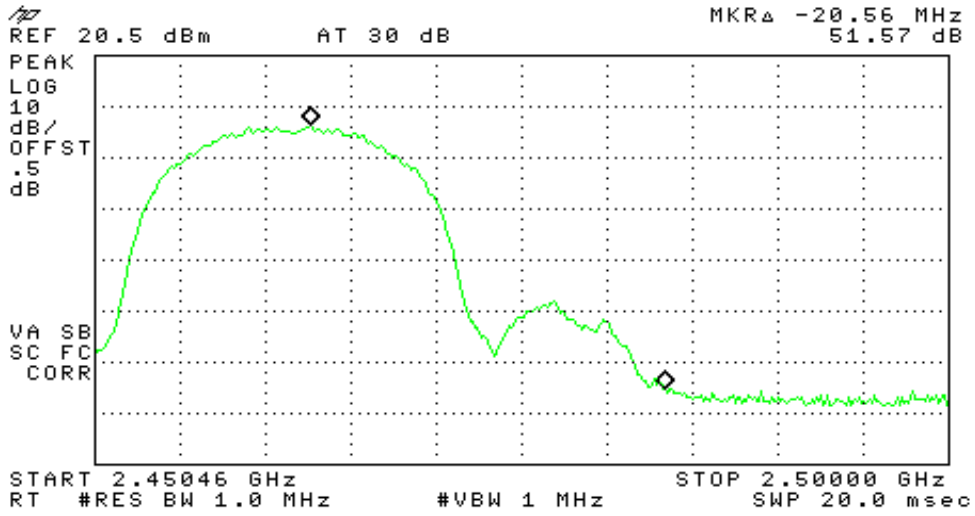
| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

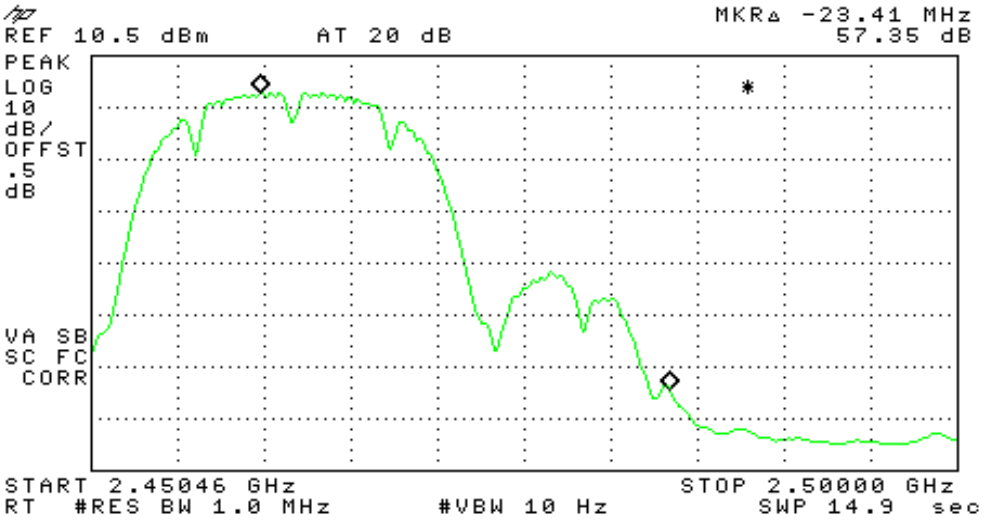
**Run #5: Bandedge**



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

# Radiated Emissions

## Test Specifics

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

| | | | |
|---|---|---|---|
| Date of Test: | 4/27/03 | Config. Used: | 1 |
| Test Engineer: | jmartinez | Config Change: | None |
| Test Location: | SVOATS #3 | Host Unit Voltage | 120Vac, 60Hz |

## General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

## Ambient Conditions:

Temperature: 13°C
Rel. Humidity: 91%

## Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | RE, 30 - 24,000 MHz - Spurious Emissions | FCC Part 15.209 / 15.247( c) | Pass | -1.1dB @ 4824.04824 |
| 2 | RE, 30 - 24,000 MHz - Spurious Emissions | FCC Part 15.209 / 15.247( c) | Pass | -4.1dB @ 4874.04874 |

## Modifications Made During Testing:

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**Run #1: Radiated Spurious Emissions, 30 - 24,000 MHz (Hitachi Antenna)**

**Fundamental signal measurements (to calculate the band edge field strengths):**

| Frequency | Level | Pol | 15.209 / 15.407 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2412.0 | 101.0 | v | - | - | Pk | - | - | RBW = VBW = 1 MHz |
| 2412.0 | 97.9 | v | - | - | Avg | - | - | RBW = 1MHz, VBW = 10Hz |
| 2412.0 | 104.2 | h | - | - | Pk | - | - | RBW = VBW = 1 MHz |
| 2412.0 | 100.5 | h | - | - | Avg | - | - | RBW = 1MHz, VBW = 10Hz |
| 2462.0 | 99.3 | v | - | - | Pk | - | - | RBW = VBW = 1 MHz |
| 2462.0 | 95.1 | v | - | - | Avg | - | - | RBW = 1MHz, VBW = 10Hz |
| 2462.0 | 102.1 | h | - | - | Pk | - | - | RBW = VBW = 1 MHz |
| 2462.0 | 98.5 | h | - | - | Avg | - | - | RBW = 1MHz, VBW = 10Hz |

**Band Edge Field Strength Calculations**

| Frequency | Level | Pol | 15.209 / 15.407 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2390.0 | 47.2 | v | 74.0 | -26.8 | Pk | - | - | Note 1 |
| 2390.0 | 38.9 | v | 54.0 | -15.1 | Avg | - | - | Note 1 |
| 2390.0 | 50.3 | h | 74.0 | -23.7 | Pk | - | - | Note 1 |
| 2390.0 | 41.5 | h | 54.0 | -12.5 | Avg | - | - | Note 1 |
| 2483.5 | 47.7 | v | 74.0 | -26.3 | Pk | - | - | Note 2 |
| 2483.5 | 37.8 | v | 54.0 | -16.3 | Avg | - | - | Note 2 |
| 2483.5 | 50.5 | h | 74.0 | -23.5 | Pk | - | - | Note 2 |
| 2483.5 | 41.2 | h | 54.0 | -12.8 | Avg | - | - | Note 2 |

| | |
|---|---|
| Note 1: | EUT operating on the lowest channel available in the 5.15 - 5.25 MHz band. Signal level calculated using the relative measurements in run #5 (-53.84 dBc for peak and -59.03 dBc for average) applied to the highest peak and verage field strength measurements of the fundamental signal level. |
| Note 2: | EUT operating on highest channel available in the 5.25 - 5.35 MHz band. Signal level calculated using the relative measurements in run #5 (-51.57 dBc for peak and -57.35 dBc for average) applied to the highest peak and average field strength measurements of the fundamental signal level. |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**Low Channel @ 2412 MHz**

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4824.000 | 55.8 | v | 74.0 | -18.2 | Pk | 210 | 1.2 | Note 1 |
| 4824.000 | 52.9 | v | 54.0 | -1.2 | Avg | 210 | 1.2 | Note 1 |
| 7236.000 | 47.1 | v | 54.0 | -6.9 | Pk | 210 | 1.2 | Note 3 |
| 4824.000 | 52.2 | h | 74.0 | -21.8 | Pk | 260 | 1.2 | Note 1 |
| 4824.000 | 47.2 | h | 54.0 | -6.8 | Avg | 260 | 1.2 | Note 1 |
| 7236.000 | 49.1 | h | 54.0 | -4.9 | Pk | 260 | 1.2 | Note 3 |

| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental. |
| Note 2: | No other emission detected after the third harmonic 20-dB of the limit. |
| Note 3: | Peak Reading, average limit. |

**Center Channel @ 2437 MHz**

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4874.000 | 58.1 | v | 74.0 | -15.9 | Pk | 215 | 1.0 | Note 1 |
| 4874.000 | 52.8 | v | 54.0 | -1.2 | Avg | 215 | 1.0 | Note 1 |
| 7311.000 | 47.8 | v | 54.0 | -6.2 | Pk | 215 | 1.0 | Note 3 |
| 4874.000 | 54.5 | h | 74.0 | -19.5 | Pk | 255 | 1.0 | Note 1 |
| 4874.000 | 50.5 | h | 54.0 | -3.5 | Avg | 255 | 1.0 | Note 1 |
| 7311.000 | 46.9 | h | 54.0 | -7.1 | Pk | 255 | 1.0 | Note 3 |

| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental. |
| Note 2: | No other emission detected after the third harmonic 20-dB of the limit. |
| Note 3: | Peak Reading, average limit. |

Elliott

# EMC Test Data

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**High Channel @ 2462 MHz**

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4924.000 | 55.7 | v | 74.0 | -18.4 | Pk | 210 | 1.0 | Note 1 |
| 4924.000 | 52.2 | v | 54.0 | -1.8 | Avg | 210 | 1.0 | Note 1 |
| 7386.000 | 47.8 | v | 54.0 | -6.2 | Pk | 133 | 1.0 | Note 3 |
| 4924.000 | 50.5 | h | 74.0 | -23.5 | Pk | 250 | 1.1 | Note 1 |
| 4924.000 | 45.5 | h | 54.0 | -8.5 | Avg | 250 | 1.1 | Note 1 |
| 7386.000 | 49.5 | h | 54.0 | -4.5 | Pk | 260 | 1.1 | Note 3 |

| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental. |
| Note 2: | No other emission detected after the third harmonic 20-dB of the limit. |
| Note 3: | Peak Reading, average limit. |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**Run #2: Radiated Spurious Emissions, 30 - 24,000 MHz (Ethorthronics Antenna)**

**Fundamental signal measurements (to calculate the band edge field strengths):**

| Frequency | Level | Pol | 15.209 / 15.407 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2412.0 | 101.5 | v | - | - | Pk | - | - | RBW = VBW = 1 MHz |
| 2412.0 | 97.9 | v | - | - | Avg | - | - | RBW = 1MHz, VBW = 10Hz |
| 2412.0 | 107.5 | h | - | - | Pk | - | - | RBW = VBW = 1 MHz |
| 2412.0 | 103.4 | h | - | - | Avg | - | - | RBW = 1MHz, VBW = 10Hz |
| 2462.0 | 104.3 | v | - | - | Pk | - | - | RBW = VBW = 1 MHz |
| 2462.0 | 99.4 | v | - | - | Avg | - | - | RBW = 1MHz, VBW = 10Hz |
| 2462.0 | 108.5 | h | - | - | Pk | - | - | RBW = VBW = 1 MHz |
| 2462.0 | 105.0 | h | - | - | Avg | - | - | RBW = 1MHz, VBW = 10Hz |

**Band Edge Field Strength Calculations**

| Frequency | Level | Pol | 15.209 / 15.407 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 2390.0 | 47.7 | v | 74.0 | -26.3 | Pk | - | - | Note 1 |
| 2390.0 | 38.9 | v | 54.0 | -15.1 | Avg | - | - | Note 1 |
| 2390.0 | 53.6 | h | 74.0 | -20.4 | Pk | - | - | Note 1 |
| 2390.0 | 44.3 | h | 54.0 | -9.7 | Avg | - | - | Note 1 |
| 2483.5 | 52.7 | v | 74.0 | -21.3 | Pk | - | - | Note 2 |
| 2483.5 | 42.0 | v | 54.0 | -12.0 | Avg | - | - | Note 2 |
| 2483.5 | 56.9 | h | 74.0 | -17.1 | Pk | - | - | Note 2 |
| 2483.5 | 47.7 | h | 54.0 | -6.3 | Avg | - | - | Note 2 |

| | |
|---|---|
| Note 1: | EUT operating on the lowest channel available in the 5.15 - 5.25 MHz band. Signal level calculated using the relative measurements in run #5 (-53.84 dBc for peak and -59.03 dBc for average) applied to the highest peak and verage field strength measurements of the fundamental signal level. |
| Note 2: | EUT operating on highest channel available in the 5.25 - 5.35 MHz band. Signal level calculated using the relative measurements in run #5 (-51.57 dBc for peak and -57.35 dBc for average) applied to the highest peak and average field strength measurements of the fundamental signal level. |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**Low Channel @ 2412 MHz**

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4824.000 | 51.8 | v | 74.0 | -22.2 | Pk | 210 | 1.4 | Note 1 |
| 4824.000 | 46.8 | v | 54.0 | -7.2 | Avg | 210 | 1.4 | Note 1 |
| 7236.000 | 48.6 | v | 54.0 | -5.5 | Pk | 130 | 1.4 | Note 3 |
| 4824.000 | 48.1 | h | 74.0 | -25.9 | Pk | 260 | 1.2 | Note 1 |
| 4824.000 | 46.5 | h | 54.0 | -7.5 | Avg | 260 | 1.2 | Note 1 |
| 7236.000 | 48.5 | h | 54.0 | -5.5 | Pk | 260 | 1.2 | Note 3 |

| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental. |
| Note 2: | No other emission detected after the third harmonic 20-dB of the limit. |
| Note 3: | Peak Reading, average limit. |

**Center Channel @ 2437 MHz**

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4874.000 | 53.7 | v | 74.0 | -20.3 | Pk | 220 | 1.1 | Note 1 |
| 4874.000 | 49.9 | v | 54.0 | -4.1 | Avg | 220 | 1.1 | Note 1 |
| 7311.000 | 46.5 | v | 54.0 | -7.5 | Pk | 220 | 1.1 | Note 3 |
| 4874.000 | 48.6 | h | 74.0 | -25.4 | Pk | 220 | 1.2 | Note 1 |
| 4874.000 | 39.9 | h | 54.0 | -14.1 | Avg | 220 | 1.2 | Note 1 |
| 7311.000 | 49.5 | h | 54.0 | -4.5 | Pk | 220 | 1.2 | Note 3 |

| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental. |
| Note 2: | No other emission detected after the third harmonic 20-dB of the limit. |
| Note 3: | Peak Reading, average limit. |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | N/A |

**High Channel @ 2462 MHz**

| Frequency | Level | Pol | 15.209 / 15.247 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 4924.000 | 52.9 | v | 74.0 | -21.1 | Pk | 175 | 1.4 | Note 1 |
| 4924.000 | 49.5 | v | 54.0 | -4.5 | Avg | 175 | 1.4 | Note 1 |
| 7386.000 | 48.9 | v | 54.0 | -5.1 | Pk | 154 | 1.1 | Note 3 |
| 4924.000 | 49.9 | h | 74.0 | -24.1 | Pk | 180 | 1.2 | Note 1 |
| 4924.000 | 44.4 | h | 54.0 | -9.6 | Avg | 180 | 1.2 | Note 1 |
| 7386.000 | 49.7 | h | 54.0 | -4.3 | Pk | 180 | 1.2 | Note 3 |

| | |
|---|---|
| Note 1: | For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental. |
| Note 2: | No other emission detected after the third harmonic 20-dB of the limit. |
| Note 3: | Peak Reading, average limit. |

Elliott

# EMC Test Data

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Proj Eng: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Emissions Spec: | FCC Part 15 B, C, and E, RSS- | Class: | Radio |
| Immunity Spec: | N/A | Environment: | - |

# EMC Test Data

For The

## Intel Corporation

Model

**WM3B2100A**

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Proj Eng: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Emissions Spec: | FCC Part 15 B, C, and E, RSS-21( | Class: | Radio |
| Immunity Spec: | N/A | Environment: | - |

# EUT INFORMATION

## General Description

The EUT is a mini PCI Card dual band (802.11a and 802.11b) transceiver which is designed to be installed into a laptop PC and connect to antennas mounted in the screen of the laptop. The Mini PCI was tested outside the host system. The host laptop was treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the laptop is 120/240 V, 50/60 Hz, 5 Amps.

## Equipment Under Test

| Manufacturer | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Intel Corporation | WM3B2100A | Mini PCI card | DEB | PD9WM3B2100A |

## Antenna

Ethertronics Antenna at 2.4 Ghz has a gain of 2 dBi and at 5 Ghz a gain of 5 dBi.
Hitachi Antenna at 2.4 Ghz and at 5 Ghz a gain of 0 dBi.
Antennas will be installed inside at the topside of the display screen of the Laptop. The Laptop vendors will professionally install the antennas.

## EUT Enclosure

The EUT contains it's own shield made out of aluminum. It measures approximately 6 cm wide by 2 cm deep by 4.5 cm high.

## Modification History

| Mod. # | Test | Date | Modification |
|---|---|---|---|
| 1 | | | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Proj Eng: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Emissions Spec: | FCC Part 15 B, C, and E, RSS-21( | Class: | Radio |
| Immunity Spec: | N/A | Environment: | - |

# Test Configuration #2

## Local Support Equipment

| Manufacturer | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Hewlett Packard | Pavilion 500 | PC | MX21111561 | DoC |
| Dell | 828FI | Monitor | 22794E28CJ29 | DoC |
| Compaq | SK-2800 | Keyboard | B1C800BCPHVV9Q | GYUR66SK |
| Hewlett Packard | P813I | Mouse | K020215557 | DoC |
| 3Com | Pilot1000 | PDA | 604719G68390 | MQ90001 |
| Hewlett Packard | 2225C | Printer | 2714540166 | DSI6XU2225 |

## Remote Support Equipment

| Manufacturer | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| None | | | | |

## Interface Cabling and Ports

| | | | | |
|---|---|---|---|---|
| EUT Tx | Antenna #1 | Antenna Cable | Shielded | 0.5 |
| EUT Rx | Antenna #2 | Antenna Cable | Shielded | 0.5 |
| Host PC, Keyboard | Keyboard | Keyboard Cable | Shielded | 1.0 |
| Host PC, AC Input | AC Power Source | IEC Power Cord | Unshielded | 2.0 |
| Host PC, Mouse | Mouse | Mouse Cable | Shielded | 1.0 |
| Host PC, COM Port | PDA | HotSync Cable | Shielded | 1.0 |
| Host PC, Parallel Port | Printer | Parallel Cable | Shielded | 1.0 |
| Monitor, AC Input | AC Power Source | IEC Power Cord | Unshielded | 2.0 |

## EUT Operation During Emissions Testing (Radio)

The EUT was transmitting on the middle channel stated at the maximum power. The worst case mode from 802.11b or 802.11a was picked from the pre-scan in chamber# 2.

For measurements of radiated emissions below 1GHz and AC conducted emissions, the host laptop was connected to two peripherals (PDA and Printer) and had a scrolling 'H' pattern displayed on the screen. The laptop screen was open and the antenna located behind the laptop screen.

Elliott

# EMC Test Data

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

## Radiated Emissions

### Test Specifics

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

Date of Test: 4/25/03
Test Engineer: volivas
Test Location: SVOATS #3

Config. Used: 2
Config Change: none
EUT Voltage: 120V/60Hz

### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing.
On the OATS, the measurement antenna was located 10 meters from the EUT for the measurement range 30 - 1000 MHz and 3m from the EUT for the frequency range 1 - 2 GHz.
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.
Note, for testing above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

### Ambient Conditions:

Temperature: 11 °C
Rel. Humidity: 80 %

### Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | RE, 30 -1000 MHz, Preliminary Scan | EN55022 B | Eval | -2.4dB @ 99.990MHz |
| 2 | RE, 30 - 1000MHz, Maximized Emissions | EN55022 B | Pass | -1.7dB @ 99.990MHz |
| 3 | RE, 1000 - 2000 MHz, Maximized Emissions | FCC B | Pass | -6.6dB @ 1796.0MHz |

### 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.

Elliott

# EMC Test Data

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

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

| Frequency | Level | Pol | EN55022 B | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 99.990 | 27.6 | V | 30.0 | -2.4 | QP | 288 | 1.0 | |
| 99.990 | 26.7 | H | 30.0 | -3.3 | QP | 15 | 4.0 | |
| 33.340 | 25.3 | V | 30.0 | -4.7 | QP | 300 | 1.0 | |
| 66.800 | 20.8 | V | 30.0 | -9.2 | QP | 134 | 1.0 | |
| 800.935 | 26.7 | H | 37.0 | -10.3 | QP | 205 | 2.1 | |
| 719.880 | 26.3 | V | 37.0 | -10.7 | QP | 0 | 1.0 | |
| 997.600 | 25.4 | H | 37.0 | -11.6 | QP | 84 | 1.0 | |
| 997.600 | 25.4 | V | 37.0 | -11.6 | QP | 360 | 1.0 | |
| 299.970 | 25.1 | V | 37.0 | -11.9 | QP | 360 | 1.0 | |
| 33.410 | 17.2 | H | 30.0 | -12.8 | QP | 149 | 1.3 | |
| 336.020 | 23.2 | V | 37.0 | -13.8 | QP | 326 | 1.0 | |
| 81.140 | 15.3 | H | 30.0 | -14.7 | QP | 337 | 1.0 | |
| 719.880 | 22.2 | H | 37.0 | -14.8 | QP | 316 | 1.0 | |
| 800.935 | 22.1 | V | 37.0 | -14.9 | QP | 36 | 1.0 | |
| 85.220 | 14.2 | V | 30.0 | -15.8 | QP | 92 | 1.0 | |
| 80.910 | 14.1 | V | 30.0 | -15.9 | QP | 331 | 1.0 | |
| 299.970 | 20.6 | H | 37.0 | -16.4 | QP | 360 | 2.0 | |
| 738.805 | 20.4 | H | 37.0 | -16.6 | QP | 360 | 1.0 | |
| 738.805 | 20.4 | V | 37.0 | -16.6 | QP | 324 | 1.0 | |
| 166.730 | 12.7 | H | 30.0 | -17.3 | QP | 126 | 1.1 | |
| 287.970 | 19.7 | H | 37.0 | -17.3 | QP | 289 | 1.0 | |
| 233.500 | 15.8 | V | 37.0 | -21.2 | QP | 0 | 1.0 | |
| 234.460 | 14.0 | H | 37.0 | -23.0 | QP | 300 | 1.0 | |
| 336.020 | 13.2 | H | 37.0 | -23.8 | QP | 360 | 4.0 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

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

| Frequency | Level | Pol | EN55022 B | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 99.990 | 28.3 | V | 30.0 | -1.7 | QP | 288 | 1.0 | |
| 99.990 | 27.3 | H | 30.0 | -2.7 | QP | 15 | 4.0 | |
| 33.340 | 25.5 | V | 30.0 | -4.5 | QP | 300 | 1.0 | |
| 66.800 | 20.8 | V | 30.0 | -9.2 | QP | 134 | 1.0 | |
| 800.935 | 26.7 | H | 37.0 | -10.3 | QP | 205 | 2.1 | |
| 719.880 | 26.3 | V | 37.0 | -10.7 | QP | 0 | 1.0 | |

**Run #3: Maximized readings, 1000 - 2000 MHz**

Measurements made at 3m per FCC requirements.

| Frequency | Level | Pol | FCC Class B | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 1796.000 | 47.4 | V | 54.0 | -6.6 | Avg | 360 | 1.0 | |
| 1949.810 | 47.3 | V | 54.0 | -6.7 | Avg | 0 | 1.0 | |
| 1303.000 | 37.1 | H | 54.0 | -16.9 | Avg | 100 | 1.0 | |
| 1948.810 | 56.2 | V | 74.0 | -17.8 | Pk | 0 | 1.0 | |
| 1064.190 | 34.0 | H | 54.0 | -20.0 | Avg | 300 | 1.0 | |
| 1481.940 | 33.3 | V | 54.0 | -20.7 | Avg | 360 | 1.0 | |
| 2012.130 | 32.6 | H | 54.0 | -21.4 | Avg | 295 | 1.0 | |
| 1303.000 | 52.6 | H | 74.0 | -21.4 | Pk | 100 | 1.0 | |
| 1796.000 | 51.5 | V | 74.0 | -22.5 | Pk | 360 | 1.0 | |
| 1064.190 | 46.4 | H | 74.0 | -27.6 | Pk | 300 | 1.0 | |
| 1481.940 | 45.7 | V | 74.0 | -28.3 | Pk | 360 | 1.0 | |
| 2012.130 | 45.3 | H | 74.0 | -28.7 | Pk | 295 | 1.0 | |

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

# Conducted Emissions - Power Ports

## Test Specifics

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

Date of Test: 4/25/03
Test Engineer: volivas
Test Location: SVOATS #3

Config. Used: 1
Config Change: none
EUT Voltage: Refer to individual run

## General Test Configuration

For tabletop equipment, the EUT host system was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment.

## Ambient Conditions:

Temperature: 11 °C
Rel. Humidity: 80 %

## Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | CE, AC Power, 230V/50Hz | EN55022 B | Pass | -11.7dB @ 0.190MHz |
| 2 | CE, AC Power,120V/60Hz | EN55022 B | Pass | -14.2dB @ 0.174MHz |

## Modifications Made During Testing:

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Intel Corporation | Job Number: | J50404 |
| Model: | WM3B2100A | T-Log Number: | T50976 |
| | | Account Manager: | Mark Briggs |
| Contact: | Robert Paxman | | |
| Spec: | FCC Part 15 B, C, and E, RSS-210 | Class: | Radio |

**Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz**

| Frequency | Level | AC | EN55022 B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 0.190 | 42.3 | Neutral | 54.0 | -11.7 | AV | |
| 0.190 | 48.7 | Neutral | 64.0 | -15.3 | QP | |
| 0.199 | 45.1 | Line 1 | 63.6 | -18.5 | QP | |
| 0.199 | 33.2 | Line 1 | 53.6 | -20.4 | AV | |
| 0.409 | 25.8 | Line 1 | 47.6 | -21.8 | AV | |
| 0.284 | 27.4 | Neutral | 50.7 | -23.3 | AV | |
| 0.284 | 32.4 | Neutral | 60.7 | -28.3 | QP | |
| 0.409 | 26.8 | Line 1 | 57.6 | -30.8 | QP | |
| 9.663 | 15.0 | Line 1 | 50.0 | -35.0 | AV | |
| 10.664 | 22.7 | Neutral | 60.0 | -37.3 | QP | |
| 10.664 | 10.6 | Neutral | 50.0 | -39.4 | AV | |
| 9.663 | 16.4 | Line 1 | 60.0 | -43.6 | QP | |

**Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz**

| Frequency | Level | AC | EN55022 B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 0.174 | 50.5 | Neutral | 64.7 | -14.2 | QP | |
| 0.190 | 39.7 | Line 1 | 54.0 | -14.3 | AV | |
| 0.190 | 48.7 | Line 1 | 64.0 | -15.3 | QP | |
| 0.301 | 29.5 | Neutral | 50.1 | -20.6 | AV | |
| 0.304 | 28.3 | Line 1 | 50.1 | -21.8 | AV | |
| 0.174 | 30.9 | Neutral | 54.7 | -23.8 | AV | |
| 0.304 | 32.9 | Line 1 | 60.1 | -27.2 | QP | |
| 0.301 | 32.2 | Neutral | 60.1 | -27.9 | QP | |
| 15.814 | 22.9 | Neutral | 60.0 | -37.1 | QP | |
| 15.814 | 11.9 | Neutral | 50.0 | -38.1 | AV | |
| 16.128 | 10.7 | Line 1 | 50.0 | -39.3 | AV | |
| 16.128 | 19.9 | Line 1 | 60.0 | -40.1 | QP | |