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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C (15.247) DTS Specifications and Industry Canada RSS 210 Issue 5 for an Intentional Radiator on the Acer Incorporated Model: Acer Travelmate C110

FCC ID:	PU5MS2133
GRANTEE:	Acer Incorporated 21F 88, Sec. 1 Hsin Tai Wu R., Hsichih Taipei Hsien 221, Taiwan, R.O.C
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	June 5, 2003
FINAL TEST DATE:	May 22, May 23, May 24 and May 27, 2003

AUTHORIZED SIGNATORY: _____

Juan Martinez
Sr. EMC Engineer

ACCREDITED

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
Acer Travelmate C110

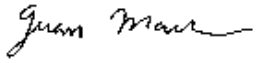
Manufacturer:
Acer Incorporated
21F 88, Sec. 1 Hsin Tai Wu Rd., Hsichih
Taipei Hsien 221, Taiwan, R.O.C.

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

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV2** Dated August 12, 2001
Departmental Acknowledgement Number: IC2845 **SV4** Dated July 19, 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 Sunnyvale, CA 94086 USA
Date:	June 5, 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.).

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Acer Incorporated model Acer Travelmate C110 pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and RSS-210 Issue 5 for licence-exempt low power devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 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 Acer Incorporated model Acer Travelmate C110 and therefore apply only to the tested sample. The sample was selected and prepared by Robert Paxman.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules and RSS-210 Issue 5 for license-exempt low power devices for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

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

SUMMARY OF RESULTS

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.247(a)	6.2.2(o)(b)	Digital Modulation	Systems uses Direct Sequence Spread Spectrum techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth	> 11.9 MHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	15.1 MHz	For information only	Complies
15.247 (b) (3)	6.2.2(o)(b)	Output Power, 2400 - 2483.5 MHz	16.6 dBm (0.046 Watts)	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	-5.3 dBm / MHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	6.2.2(o)(e1)	Antenna Port Spurious Emissions – 30MHz – 26GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209	-	Radiated Spurious Emissions – 30MHz – 26GHz	49.5 dBuV/m @ 2390.0 MHz (-4.5dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
-	7.0	Receiver Spurious Emissions – 30MHz – 26GHz	41.1 dBuV/m @ 4924.0MHz (-12.9dB) (Note 1)	Emissions from receiver must meet RSS 210 Table 3 limits	Complies
15.207	-	AC Conducted Emissions	43.1 dBuV @ 0.211 MHz (-9.9 dB)		Complies
-	6.6	AC Conducted Emissions	43.1 dBuV @ 0.211 MHz (-4.9 dB)		Complies
15.247 (b) (5)		RF Exposure Requirements	SAR Report		
15.203		RF Connector	The antenna is integral to the host device	Unique antenna connection required for user-installed applications.	Complies

Note 1: Radiated emissions below 1GHz measured as a part of the digital device measurements.

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 Acer Incorporated model Acer Travelmate C110 is a mini PCI Card dual band (802.11a and 802.11b) transceiver which is designed to be installed into Acer Laptop (Model: TravelMate C110). The Mini PCI was installed in such a laptop during testing.

The host laptop was treated as tabletop equipment during testing to simulate the end user environment. The electrical rating of the laptop is 120/240 V, 50/60 Hz, 5 Amps.

The sample was received on May 22, 2003 and tested on May 22, May 23, May 24 and May 27, 2003. The EUT and host system consisted of the following component(s):

Manufacturer/Model/Description	Serial Number	Proposed FCC ID #
Acer Travelmate C110 Laptop	-	PU5MS2133

ENCLOSURE

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

MODIFICATIONS

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

SUPPORT EQUIPMENT

The following support equipment was used during emissions testing.

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	Deskjet 3820	USB Printer	CN2451B1YS	DoC

EXTERNAL I/O CABLING

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
AC	120Vac outlet	3 prong	Unshielded	1.8

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. The laptop display was position in 90 degress configuration and tablet configuration during the radiated emission test.

ANTENNA REQUIREMENTS

The antenna will be place inside and located on the laptop display. To further insure compliance with 15.203, epoxy will be used to permanently glue the connectors to the MPCI card connector. This meets the requirements of FCC 15.203.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on May 22, May 23, May 24 and May 27, 2003at the Elliott Laboratories Open Area Test Site #2 & 4 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 Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

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

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. 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 peak power sensor are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

FILTERS/ATTENUATORS

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

ANTENNAS

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

ANTENNA MAST AND EQUIPMENT TURNTABLE

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

ANSI C63.4 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.

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

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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

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

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

where P is the eirp (Watts)

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

FCC 15.247 (a) and RSS 210 (o) OUTPUT POWER LIMITS

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

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

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

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

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

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

All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level.

FCC 15.205 AC POWER PORT CONDUCTED EMISSIONS LIMITS

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

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

RSS-210 SECTION 6.6 AC POWER PORT CONDUCTED EMISSIONS LIMITS

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

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

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - B = C$$

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, 13 dB may be subtracted from the quasi-peak level if it is determined that the emission is broadband in nature. If the signal level in the average mode is six dB or more below the signal level in the peak mode, the emission is classified as broadband.

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, 24-May-03
Engineer: volivas

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	773	12	3/18/03	3/18/04
Filtek	High Pass Filter, 1GHz	HP12/1000-5BA	956	12	3/11/03	3/11/04
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	12	2/28/03	2/28/04
Solar Electronics Co	LISN	8028-50-TS-24-BNC	904	12	6/19/02	6/19/03
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1321	12	3/31/03	3/31/04
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	12	1/24/03	1/24/04
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	1398	12	1/10/03	1/10/04
Hewlett Packard	Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	12	11/19/02	11/19/03
Rohde & Schwarz	Test Receiver, 0.009-30 MHz	ESH3	1316	12	12/6/02	12/6/03

Radiated Emissions, 30 - 40,000 MHz, 08-Jul-03
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Hewlett Packard	Microwave EMI test system (SA40, 30Hz - 40GHz), system 2	84125C	1410	12	4/2/03	4/2/04

Power Measurements, 08-Jul-03
Engineer: jmartinez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	12	4/3/03	4/3/04
Rohde & Schwarz	Power Sensor 100uW - 10 Watts	NRV-Z53	1236	12	8/15/02	8/15/03

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T51308_DTS 29 Pages
T51308_Digital 8 Pages

Elliott

EMC Test Data

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Emissions Spec:	FCC Part 15 B, C, & E, RSS-210	Class:	Radio
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Intel Corporation

Model

ACER Laptop w/ WM3B2100A

Date of Last Test: 5/27/2003

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Emissions Spec:	FCC Part 15 B, C, & E, RSS-210 is	Class:	Radio
Immunity Spec:	-	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 Acer Laptop (Model: TravelMate C110). 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
Acer	TravelMate C110	Laptop		PU5MS2133

Other EUT Details

The EUT is the mini PCI card installed into the host laptop.

EUT Enclosure

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

Modification History

Mod. #	Test	Date	Modification
1	-	-	None

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

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		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Emissions Spec:	FCC Part 15 B, C, & E, RSS-210 is	Class:	Radio
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
AC Port	120Vac outlet	Power Cord	Unshielded	1.8

Note: The Laptop ports were not connected as these are not required during the transmitter radiated emission test.

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. The laptop display was position in 90 degress configuration and tablet configuration during the radiated emission test.

For receive-mode tests the device was confiugred to receive only on the specified channel.

Preliminary tests demonstarted that the emissions below 1Ghz were independent of the mode (transmit versus receive) and of the channel selected. Radiated emissions in the 30 - 1000 MHz frequency range for receive and transmit modes were, therefore, covered by the digital device mode tests. these tests were perfromed with the device configured to transmit on the center channel of the 5.15 - 5.35 Ghz band (5.26 GHz).

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	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: 5/27/2003
Test Engineer: Marissa Faustino
Test Location: SVOATS #4

Config. Used: 1
Config Change: None
Host Unit Voltage 120V/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

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 47 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	6dB Bandwidth	15.247(a)	Pass	12 MHz
2	99% Bandwidth	15.247(b)	Pass	15.2MHz
3	Power Spectral Density (PSD)	15.247(d)	Pass	-5.3dBm
4	Out-of-Band	FCC Part 15.209 / 15.247(c)	Pass	Refer to plots

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

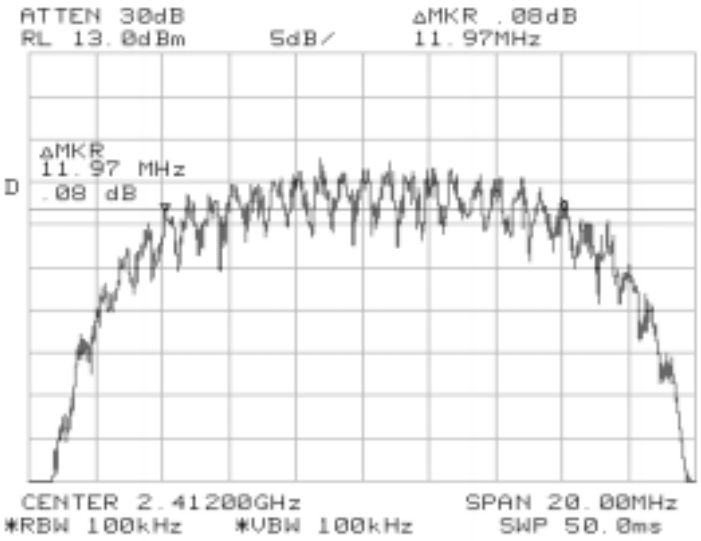
No deviations were made from the requirements of the standard.

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #1: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Graph reference #	Output Power (dBm)	Output Power (W)
Low	2412	100kHz	12	101	16.5	0.045
Mid	2437	100kHz	11.90	102	16.5	0.045
High	2462	100kHz	11.9	103	16.6	0.046

101



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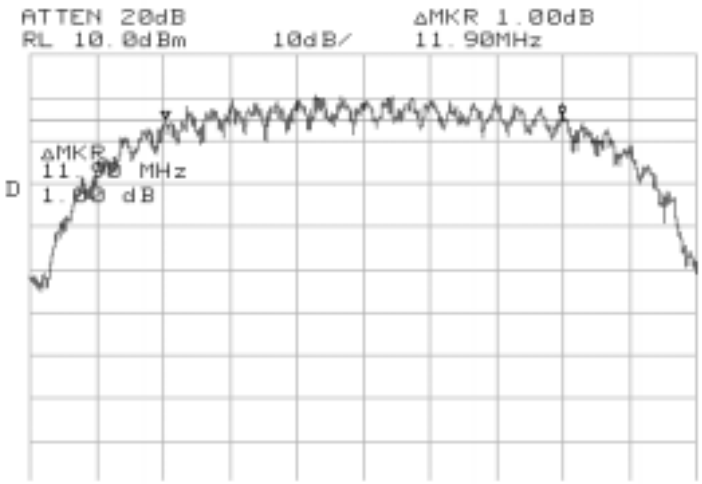
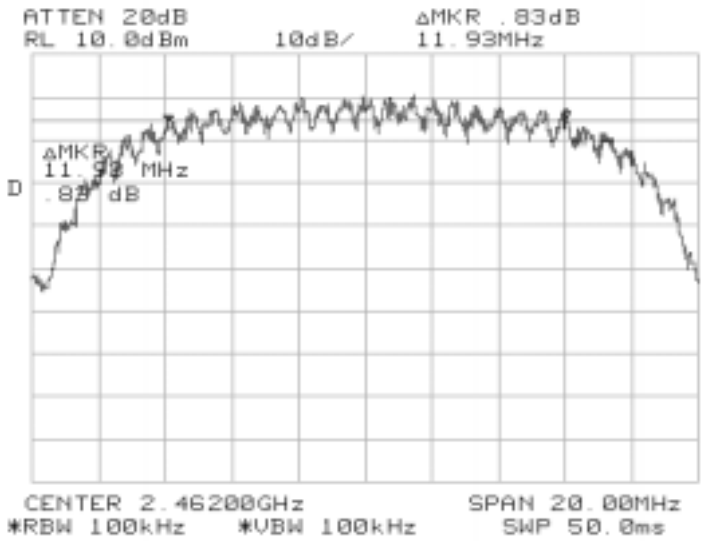
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

102



103

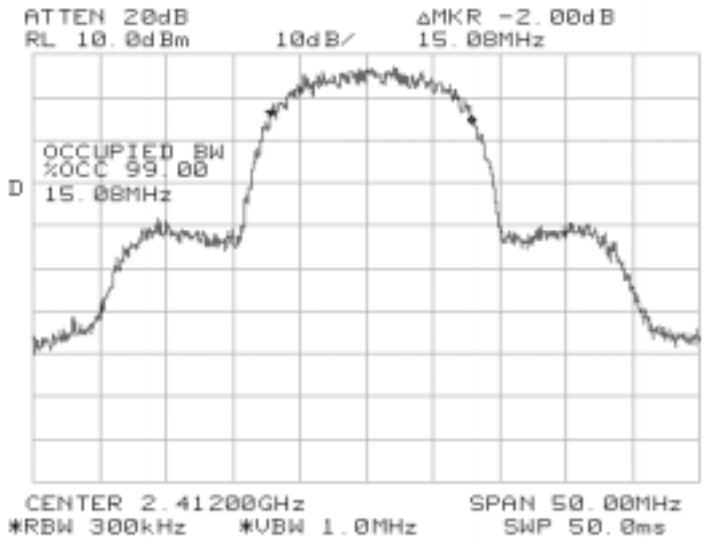


Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #2: 99% Signal Bandwidth

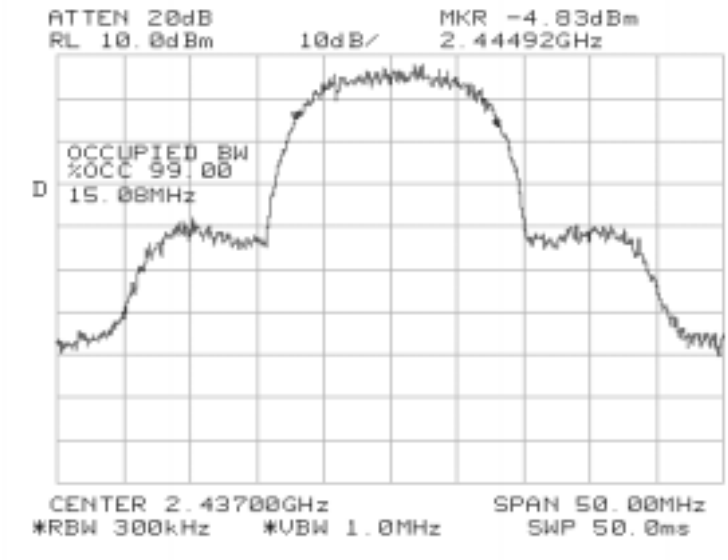
Channel	Frequency (MHz)	Resolution Bandwidth	99% Signal Bandwidth	Graph reference #
Low	2412	100kHz	15.1	201
Mid	2437	100kHz	15.1	202
High	2462	100kHz	15.1	203

201

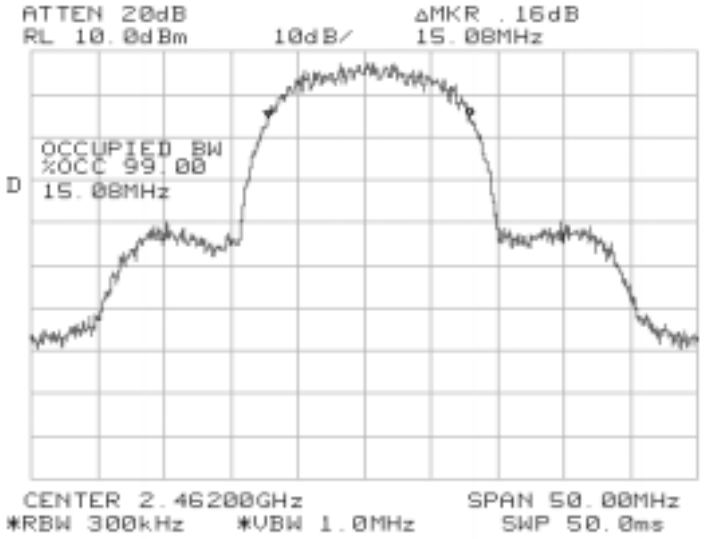


Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

202



203

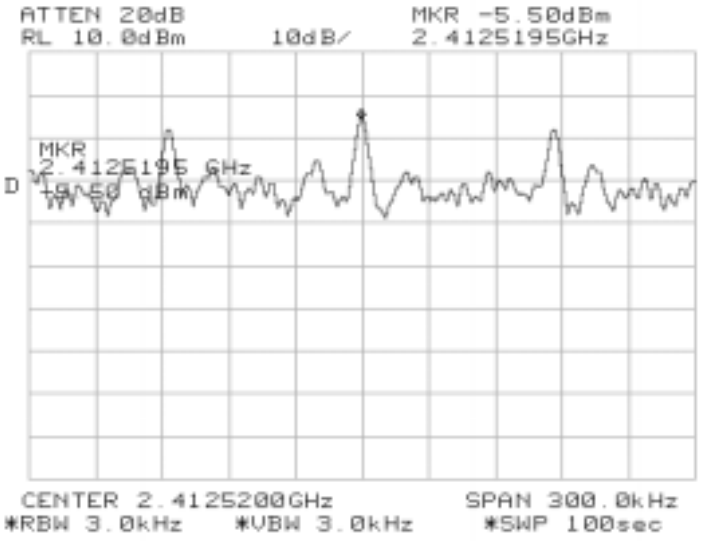


Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

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	-5.5	301
Mid	2437	3kHz	-5.3	302
High	2462	3kHz	-5.5	303

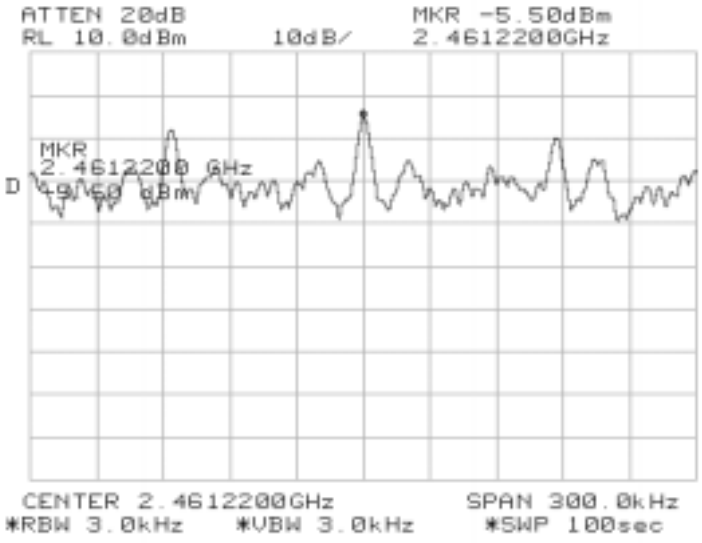
301



Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

302

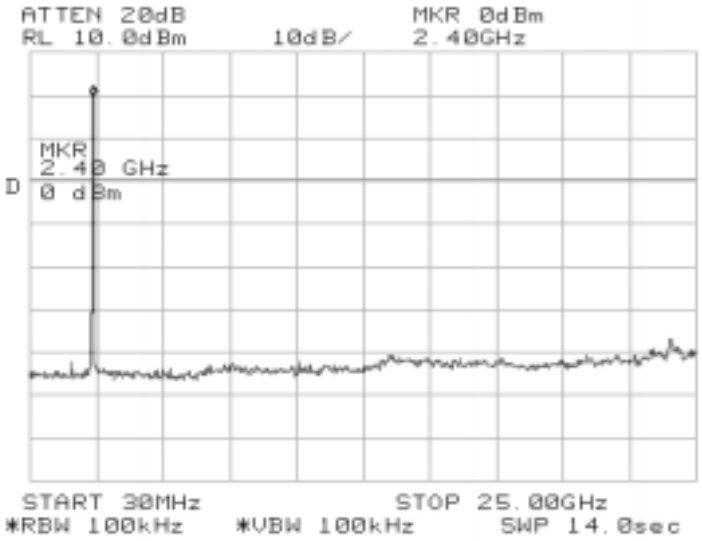
303



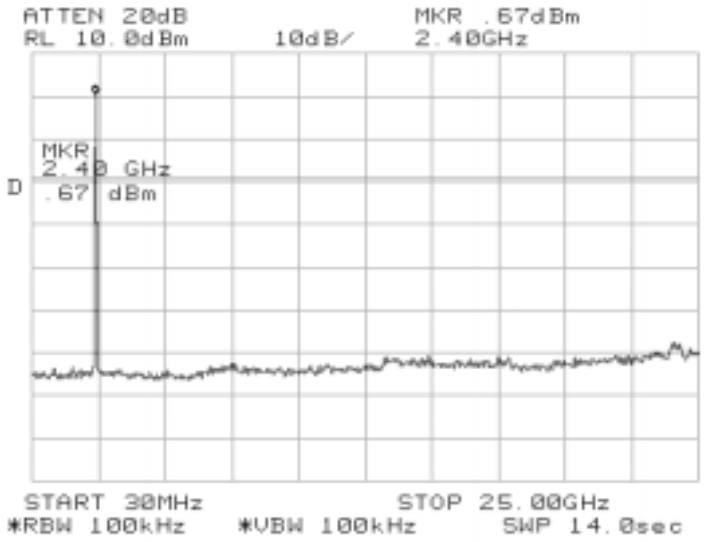
Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #4: Out-of-Band

Low Channel

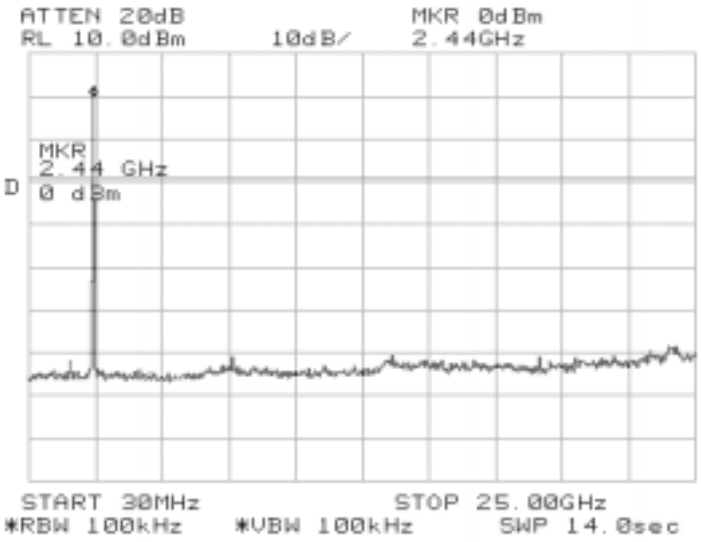


Middle Channel



Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

High Channel



Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Radiated Emissions - DTS TX Mode

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: 5/22/2003
Test Engineer: Rafael
Test Location: SVOATS #4

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

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

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

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

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

Ambient Conditions:

Temperature: 17 °C
Rel. Humidity: 77 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-4.5dB @ 2390.02390

Modifications Made During Testing:

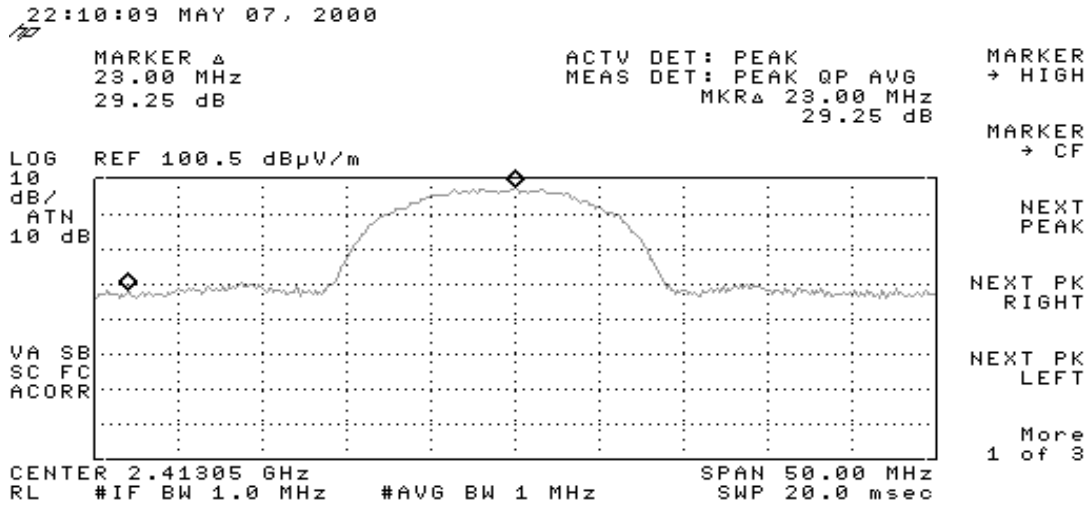
No modifications were made to the EUT during testing

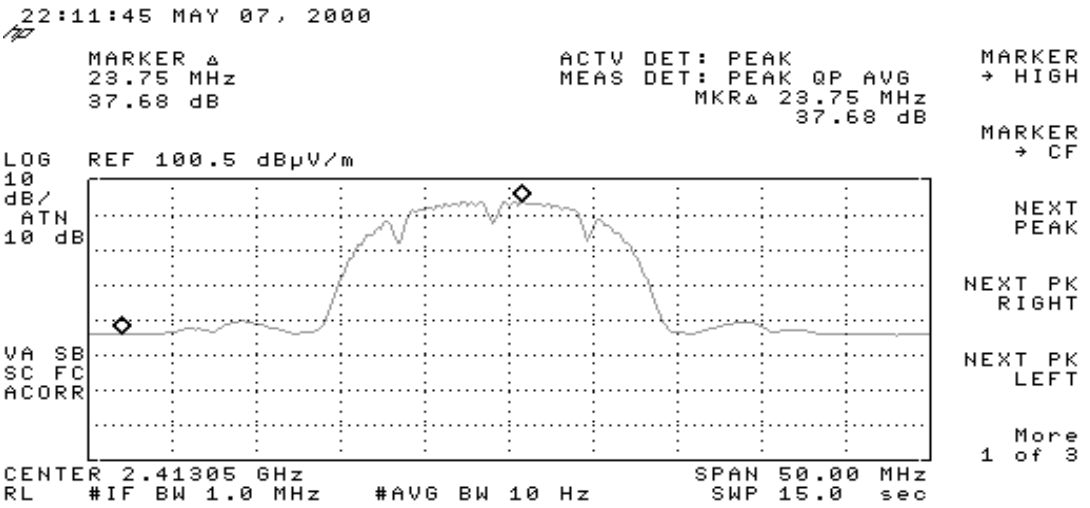
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Bandedge - HORIZONTAL, Low Channel

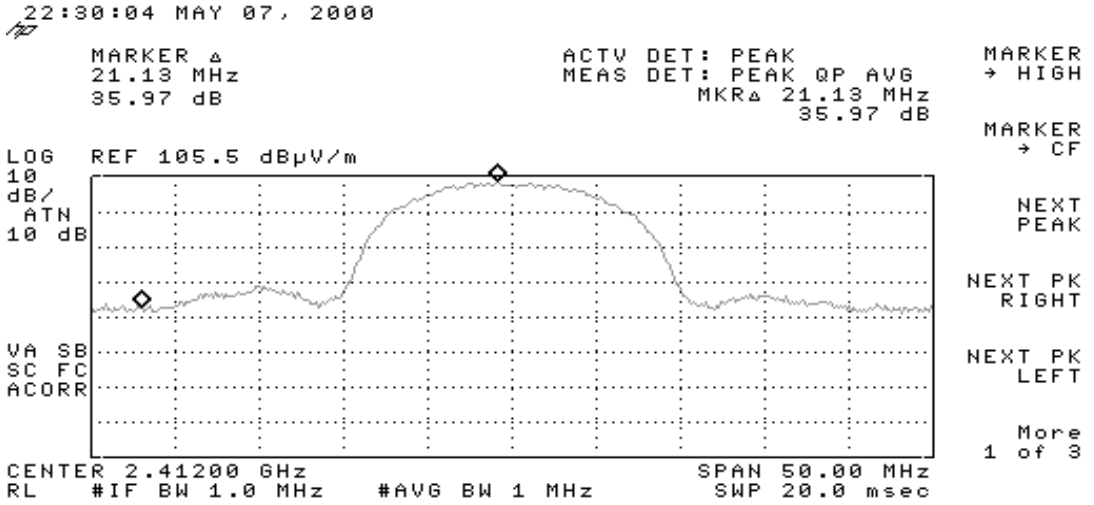


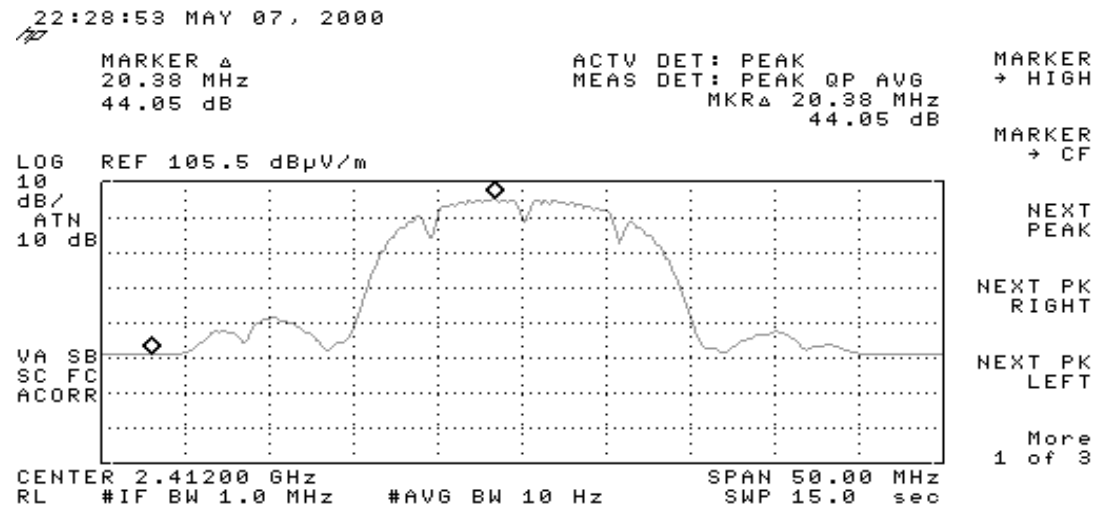


EMC Test Data

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

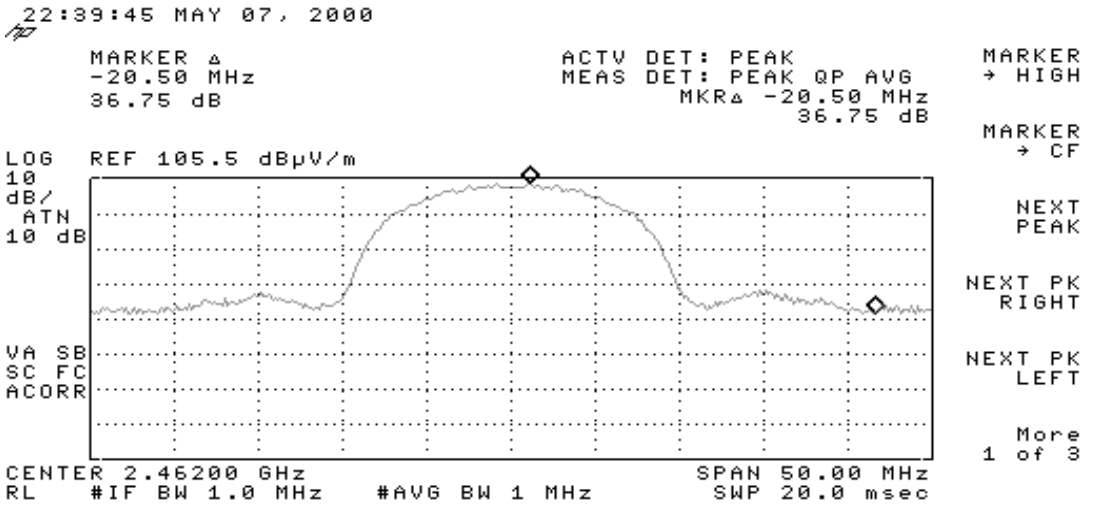
Bandedge - Vertical, Low channel

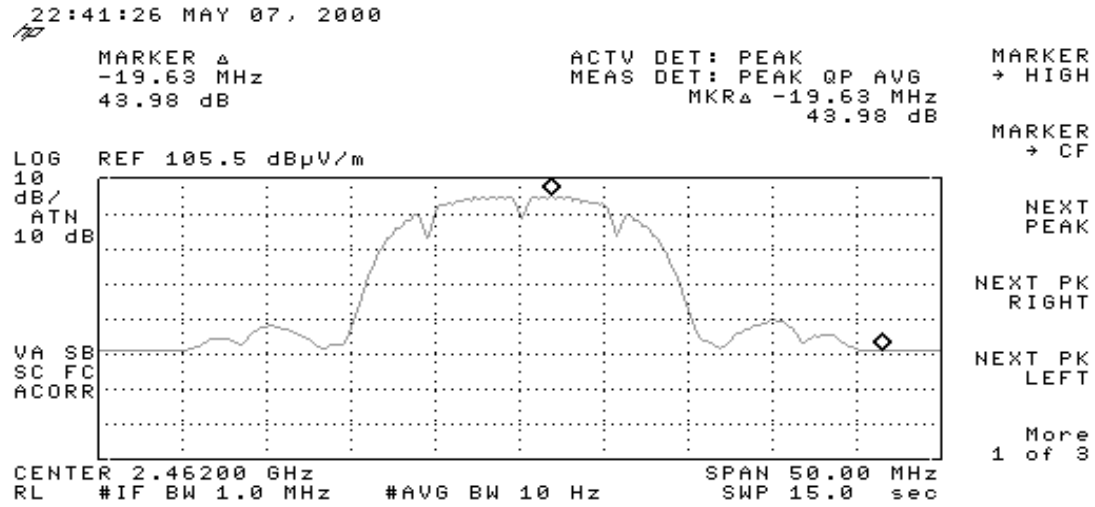




Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

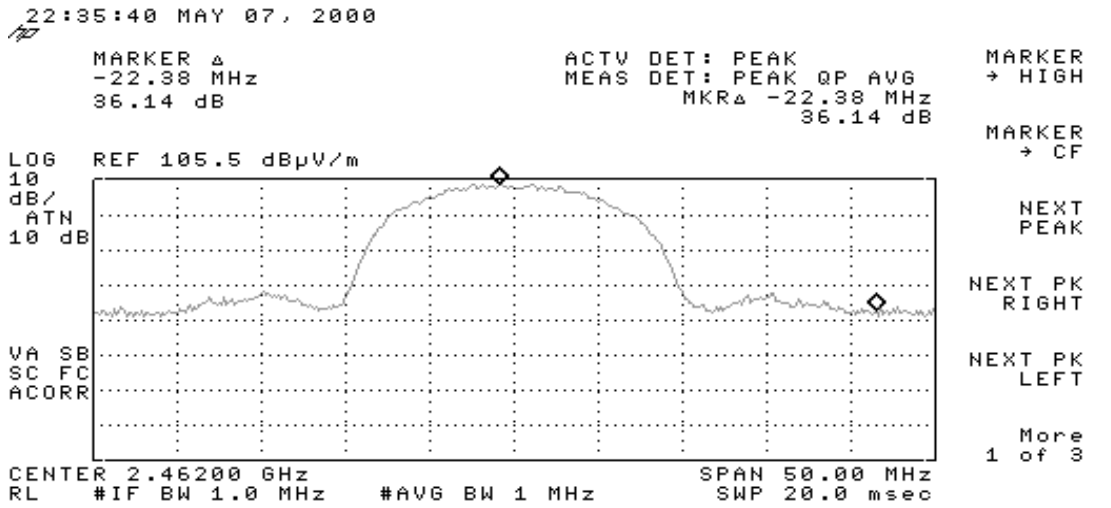
Bandedge - HORIZONTAL, High Channel

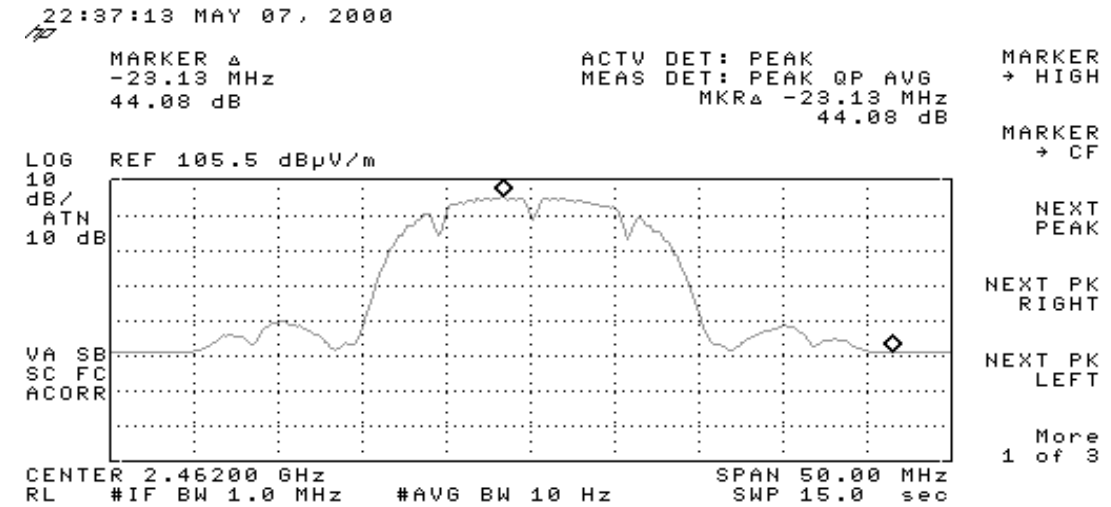




Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Bandedge - VERTICAL, High Channel





Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #1a: Radiated Spurious Emissions
EUT placed on Tablet mode
Fundamental signal measurements (to calculate the band edge field strengths):

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2412.000	91.1	h	-	-	Pk	300	2.3	RBW = VBW = 1 MHz
2412.000	87.2	h	-	-	Avg	300	2.3	RBW = 1MHz, VBW = 10Hz
2412.000	95.3	v	-	-	Pk	320	1.0	RBW = VBW = 1 MHz
2412.000	91.7	v	-	-	Avg	320	1.0	RBW = 1MHz, VBW = 10Hz
2462.000	96.4	h	-	-	Pk	260	1.9	RBW = VBW = 1 MHz
2462.000	93.2	h	-	-	Avg	260	1.9	RBW = 1MHz, VBW = 10Hz
2462.000	96.3	v	-	-	Pk	230	1.9	RBW = VBW = 1 MHz
2462.000	92.3	v	-	-	Avg	230	1.9	RBW = 1MHz, VBW = 10Hz
2437.000	94.1	h	-	-	Pk	330	1.7	RBW = VBW = 1 MHz
2437.000	90.4	h	-	-	Avg	330	1.7	RBW = 1MHz, VBW = 10Hz
2437.000	96.0	v	-	-	Pk	230	1.8	RBW = VBW = 1 MHz
2437.000	92.3	v	-	-	Avg	230	1.8	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	
2390.000	61.9	h	74.0	-12.2	Pk			
2390.000	49.5	h	54.0	-4.5	Avg			
2390.000	59.3	v	74.0	-14.7	Pk			
2390.000	47.6	v	54.0	-6.4	Avg			
2483.500	59.7	h	74.0	-14.4	Pk			
2483.500	49.2	h	54.0	-4.8	Avg			
2483.500	60.2	v	74.0	-13.8	Pk			
2483.500	48.2	v	54.0	-5.8	Avg			

Elliott

EMC Test Data

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #1b: Radiated Spurious Emissions, Low Channel @ 2412 MHz
Gain=11, Bias=33, Scale=13, Power Out=16.5dBm

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	36.7	h	54.0	-17.3	Avg	135	1.6	
4824.000	49.4	v	74.0	-24.6	Pk	20	1.0	
4824.000	48.9	h	74.0	-25.1	Pk	135	1.6	
7236.000		v/h	-	-	-			Noise Floor
9648.000		v/h	-	-	-			Noise Floor
12060.000		v/h	-	-	-			Noise Floor

Run #1c: Radiated Spurious Emissions, Center Channel @ 2437 MHz
Gain=11, Bias=36, Scale=13, Power Out=16.5dBm

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	41.3	v	54.0	-12.7	Avg	180	2.0	
4874.000	37.1	h	54.0	-16.9	Avg	120	1.6	
4874.000	50.8	v	74.0	-23.2	Pk	180	2.0	
4874.000	48.6	h	74.0	-25.4	Pk	120	1.6	
7311.000		v/h	-	-	-			Noise Floor
9748.000		v/h	-	-	-			Noise Floor
12185.000		v/h	-	-	-			Noise Floor

Run #1d: Radiated Spurious Emissions, High Channel @ 2462 MHz
Gain=11, Bias=32, Scale=13, Power Out=16.6dBm

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	38.5	v	54.0	-15.5	Avg	15	1.6	
4924.000	38.2	h	54.0	-15.8	Avg	115	2.0	
4924.000	49.6	v	74.0	-24.4	Pk	15	1.6	
4924.000	49.2	h	74.0	-24.8	Pk	115	2.0	
7386.000		v/h	-	-	-			Noise Floor
9848.000		v/h	-	-	-			Noise Floor
12310.000		v/h	-	-	-			Noise Floor

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental. For signals below the noise floor, the noise floor is at least 15dB below the average limit.

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Radiated Emissions - DTS Tx Mode

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: 5/22/2003
Test Engineer: Rafael
Test Location: SVOATS #4
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

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

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

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

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

Ambient Conditions:

Temperature: 17 °C
Rel. Humidity: 77 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-4.9dB @ 2390.02390

Modifications Made During Testing:

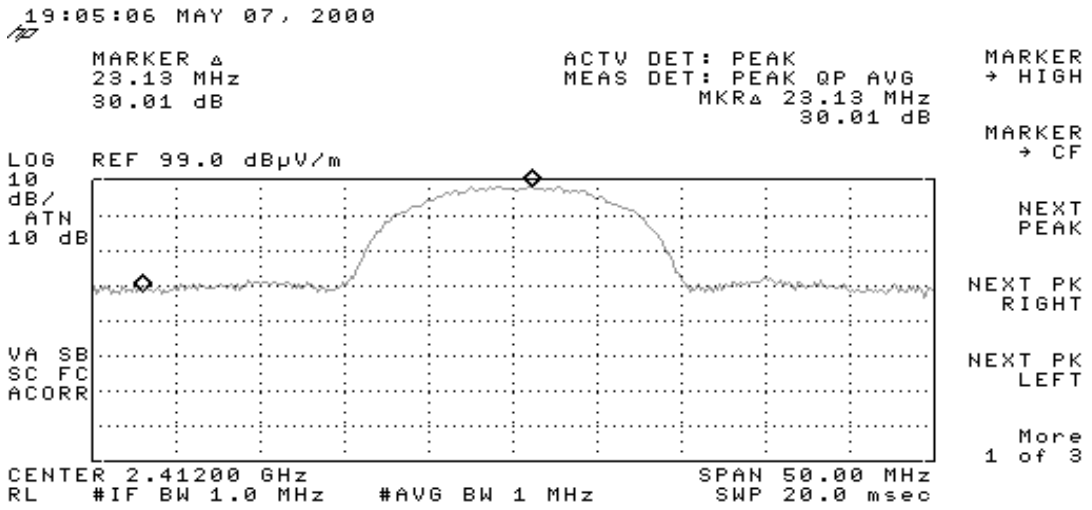
No modifications were made to the EUT during testing

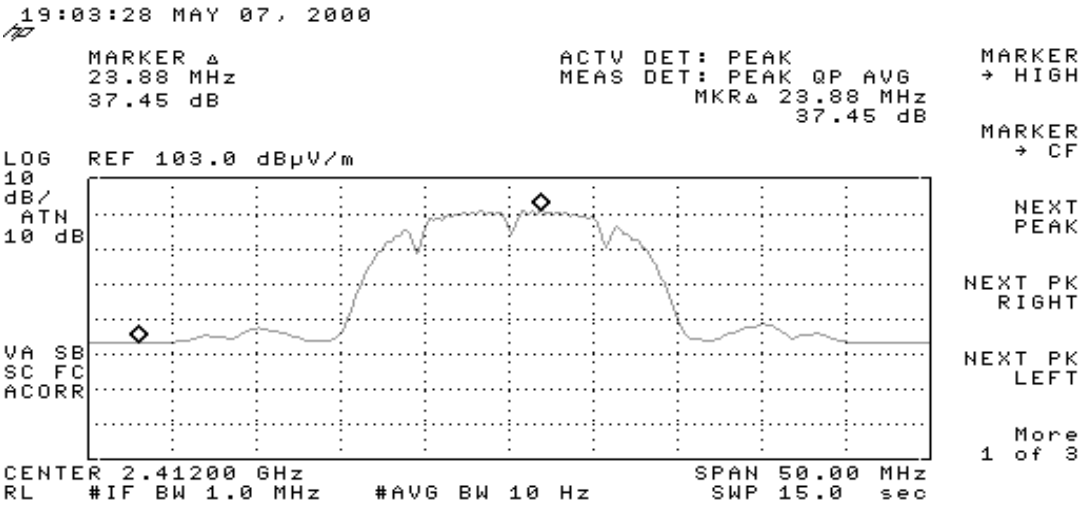
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

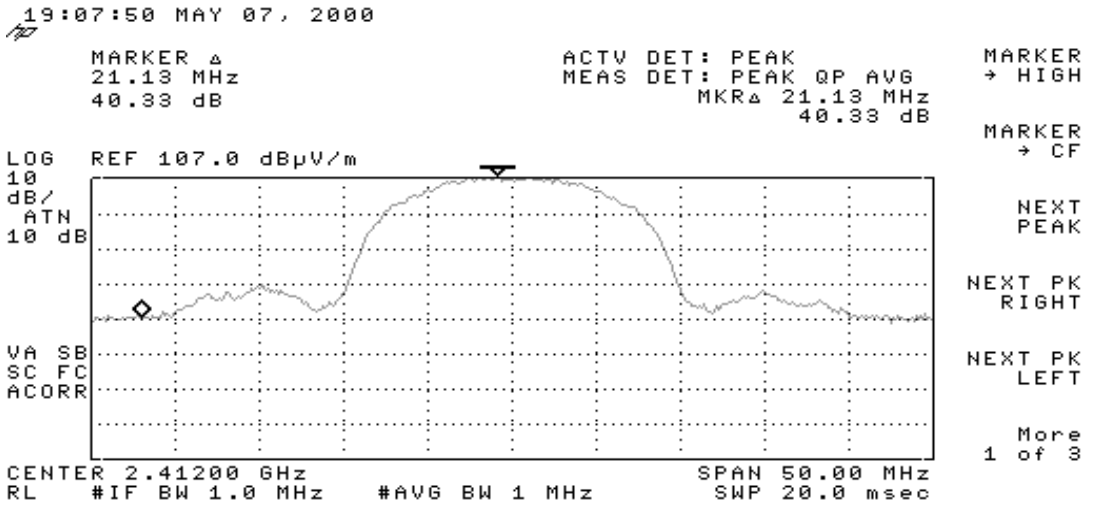
Bandedge - HORIZONTAL, Low Channel

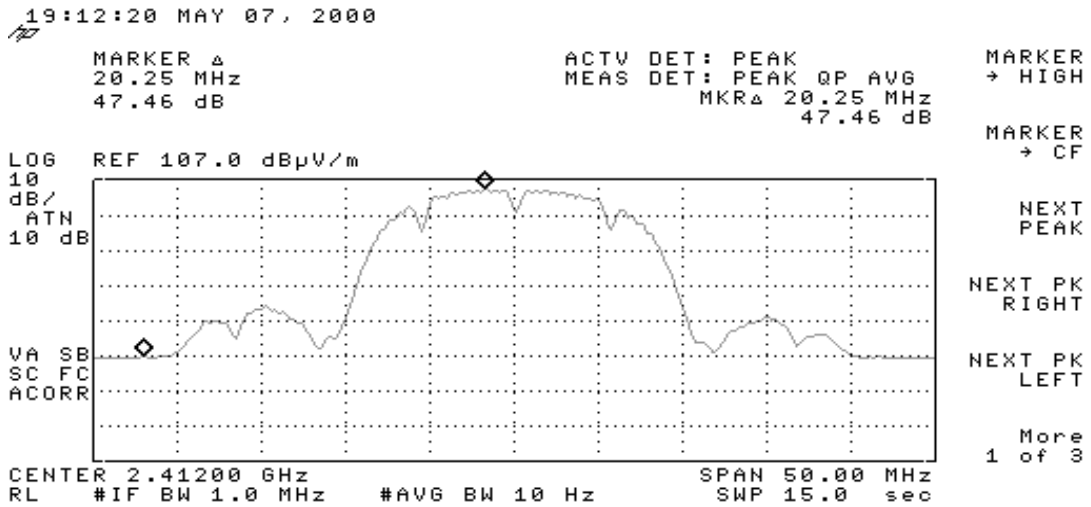




Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

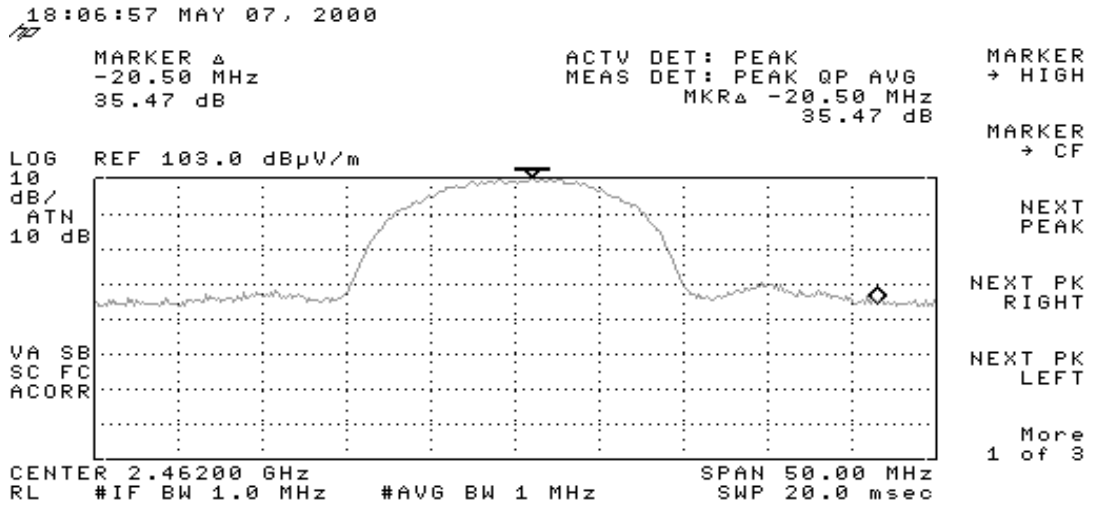
Bandedge - Vertical, Low channel

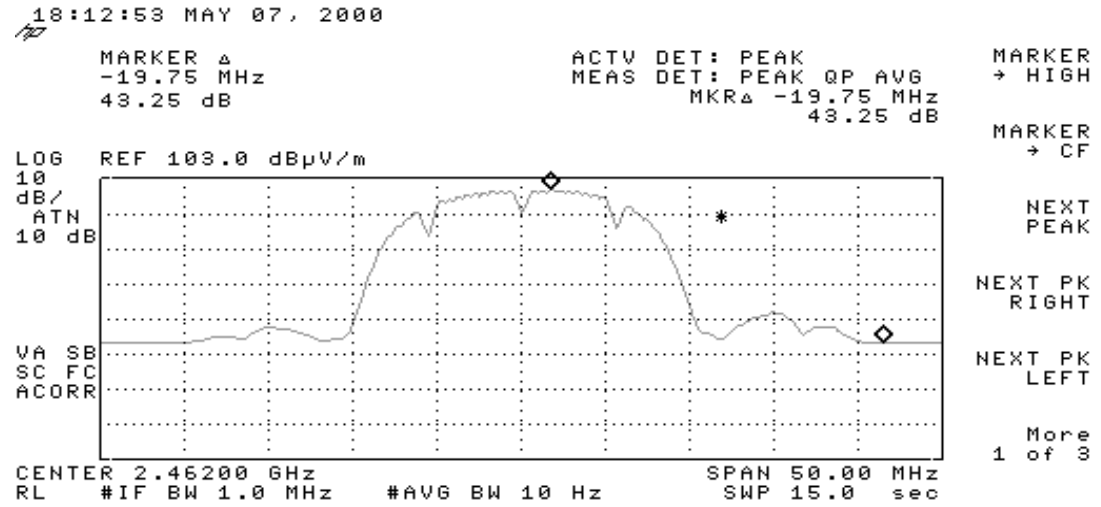




Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

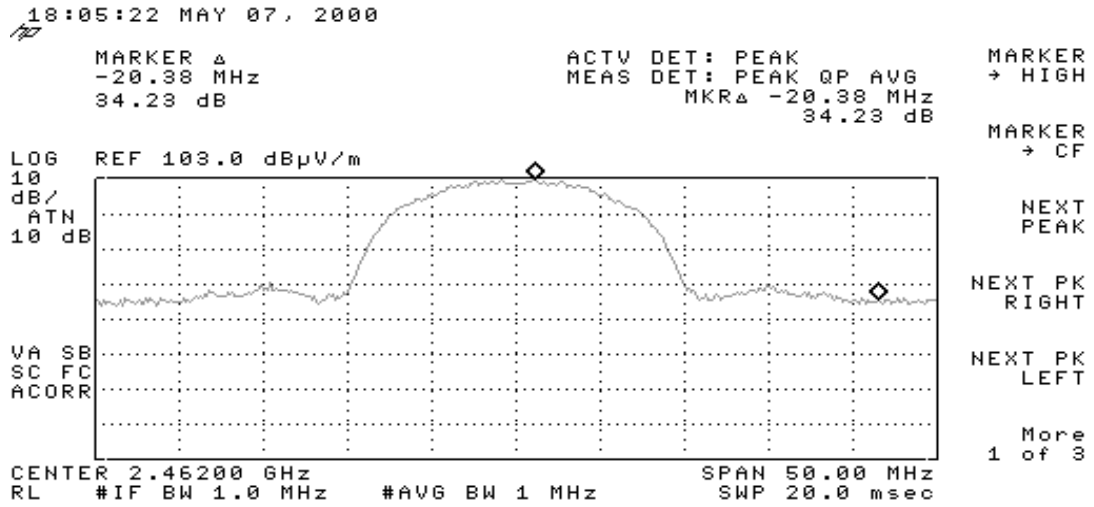
Bandedge - HORIZONTAL, High Channel

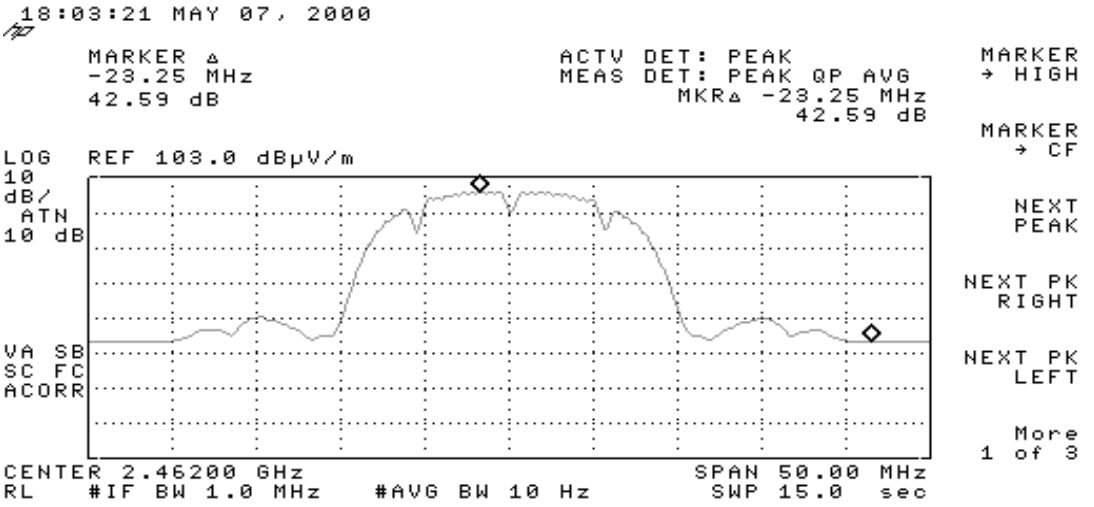




Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Bandedge - VERTICAL, High Channel





Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #1a: Radiated Spurious Emissions
EUT placed at 90 degrees mode

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

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2412.000	90.5	h	-	-	Pk	20	1.1	RBW = VBW = 1 MHz
2412.000	86.6	h	-	-	Avg	20	1.1	RBW = 1MHz, VBW = 10Hz
2412.000	89.3	v	-	-	Pk	190	1.2	RBW = VBW = 1 MHz
2412.000	85.0	v	-	-	Avg	190	1.2	RBW = 1MHz, VBW = 10Hz
2462.000	93.6	h	-	-	Pk	65	1.9	RBW = VBW = 1 MHz
2462.000	90.0	h	-	-	Avg	65	1.9	RBW = 1MHz, VBW = 10Hz
2462.000	92.4	v	-	-	Pk	300	1.4	RBW = VBW = 1 MHz
2462.000	88.4	v	-	-	Avg	300	1.4	RBW = 1MHz, VBW = 10Hz
2437.000	92.6	h	-	-	Pk	55	1.9	RBW = VBW = 1 MHz
2437.000	88.7	h	-	-	Avg	55	1.9	RBW = 1MHz, VBW = 10Hz
2437.000	96.1	v	-	-	Pk	185	1.2	RBW = VBW = 1 MHz
2437.000	92.1	v	-	-	Avg	185	1.2	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	
2390.000	60.5	h	74.0	-13.5	Pk			
2390.000	49.2	h	54.0	-4.9	Avg			
2390.000	49.0	v	74.0	-25.0	Pk			
2390.000	37.5	v	54.0	-16.5	Avg			
2483.500	58.1	h	74.0	-15.9	Pk			
2483.500	46.8	h	54.0	-7.3	Avg			
2483.500	58.2	v	74.0	-15.8	Pk			
2483.500	45.8	v	54.0	-8.2	Avg			

Elliott

EMC Test Data

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #1b: Radiated Spurious Emissions, Low Channel @ 2412 MHz
Gain=11, Bias=33, Scale=13, Power Out=16.5dBm

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	41.7	h	54.0	-12.3	Avg	140	1.7	
4824.000	39.3	v	54.0	-14.7	Avg	185	1.0	
4824.000	50.8	h	74.0	-23.2	Pk	140	1.7	
4824.000	49.6	v	74.0	-24.4	Pk	185	1.0	
7236.000		v/h	-	-	-			Noise Floor
9648.000		v/h	-	-	-			Noise Floor
12060.000		v/h	-	-	-			Noise Floor

Run #1c: Radiated Spurious Emissions, Center Channel @ 2437 MHz
Gain=11, Bias=36, Scale=13, Power Out=16.5dBm

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	40.0	h	54.0	-14.0	Avg	140	1.9	
4874.000	39.8	v	54.0	-14.2	Avg	180	2.0	
4874.000	50.0	h	74.0	-24.0	Pk	140	1.9	
4874.000	49.5	v	74.0	-24.5	Pk	180	2.0	
7311.000		v/h	-	-	-			Noise Floor
9748.000		v/h	-	-	-			Noise Floor
12185.000		v/h	-	-	-			Noise Floor

Run #1d: Radiated Spurious Emissions, High Channel @ 2462 MHz
Gain=11, Bias=32, Scale=13, Power Out=16.6dBm

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	40.7	v	54.0	-13.3	Avg	190	1.9	
4924.000	39.4	h	54.0	-14.6	Avg	210	1.6	
4924.000	50.3	v	74.0	-23.7	Pk	190	1.9	
4924.000	50.1	h	74.0	-23.9	Pk	210	1.6	
7386.000		v/h	-	-	-			Noise Floor
9848.000		v/h	-	-	-			Noise Floor
12310.000		v/h	-	-	-			Noise Floor

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental. For signals below the noise floor, the noise floor is at least 15dB below the average limit.

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Radiated Emissions - DTS Rx Mode

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: 5/27/2003
Test Engineer: Rafael
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was located on the turntable for radiated spurious emissions testing.

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

Ambient Conditions:

Temperature: 18 °C
Rel. Humidity: 73 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1a - 1c	RE, 30 - Radiated Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-12.9dB @ 4924.0MHz

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:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #1a: Radiated Spurious Emissions, Low Channel @ 2412 MHz
80211b, Receiver Mode

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1368.000	40.4	h	54.0	-13.6	Avg	300	1.8	
4824.000	40.0	h	54.0	-14.0	Avg	150	1.1	
4824.000	39.9	v	54.0	-14.1	Avg	200	1.3	
1368.000	38.1	v	54.0	-15.9	Avg	15	1.9	
1000.000	30.5	h	54.0	-23.5	Avg	150	1.4	
4824.000	50.2	h	74.0	-23.8	Pk	150	1.1	
4824.000	50.0	v	74.0	-24.0	Pk	200	1.3	
1000.000	28.4	v	54.0	-25.6	Avg	135	1.8	
1368.000	47.7	h	74.0	-26.3	Pk	300	1.8	
1368.000	45.8	v	74.0	-28.2	Pk	15	1.9	
1000.000	45.6	h	74.0	-28.4	Pk	150	1.4	
1000.000	42.4	v	74.0	-31.6	Pk	135	1.8	

Run #1b: Radiated Spurious Emissions, Center Channel @ 2437 MHz
80211b, Receiver Mode

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1368.000	40.7	h	54.0	-13.3	Avg	300	1.8	
4874.000	39.9	v	54.0	-14.1	Avg	190	1.8	
4874.000	38.1	h	54.0	-15.9	Avg	215	1.5	
1368.000	37.5	v	54.0	-16.5	Avg	0	1.9	
4874.000	50.7	v	74.0	-23.3	Pk	190	1.8	
1000.000	29.7	h	54.0	-24.3	Avg	215	1.1	
4874.000	49.4	h	74.0	-24.6	Pk	215	1.5	
1000.000	28.5	v	54.0	-25.5	Avg	120	1.8	
1368.000	47.9	h	74.0	-26.1	Pk	300	1.8	
1368.000	45.5	v	74.0	-28.5	Pk	0	1.9	
1000.000	44.9	h	74.0	-29.1	Pk	215	1.1	
1000.000	42.3	v	74.0	-31.7	Pk	120	1.8	

Elliott

EMC Test Data

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	N/A

Run #1c: Radiated Spurious Emissions, High Channel @ 2462 MHz
80211b, Receiver Mode

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	41.1	v	54.0	-12.9	Avg	190	1.0	
1368.000	39.8	h	54.0	-14.2	Avg	15	1.8	
4924.000	38.2	h	54.0	-15.8	Avg	145	1.8	
1368.000	37.7	v	54.0	-16.3	Avg	20	2.0	
4924.000	50.9	v	74.0	-23.1	Pk	190	1.0	
1000.000	29.8	h	54.0	-24.2	Avg	220	1.2	
4924.000	49.4	h	74.0	-24.6	Pk	145	1.8	
1000.000	27.4	v	54.0	-26.6	Avg	130	1.9	
1368.000	47.3	h	74.0	-26.7	Pk	15	1.8	
1368.000	45.8	v	74.0	-28.2	Pk	20	2.0	
1000.000	44.5	h	74.0	-29.5	Pk	220	1.2	
1000.000	42.3	v	74.0	-31.7	Pk	130	1.9	

Elliott

EMC Test Data

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Emissions Spec:	FCC Part 15 B, C, & E, RSS-210	Class:	Radio
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Intel Corporation

Model

ACER Laptop w/ WM3B2100A

Date of Last Test: 5/27/2003

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Emissions Spec:	FCC Part 15 B, C, & E, RSS-210 is	Class:	Radio
Immunity Spec:	-	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 Acer Laptop (Model: TravelMate C110). 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
Acer	TravelMate C110	Laptop		PU5MS2133

Other EUT Details

The EUT is the mini PCI card installed into the host laptop.

EUT Enclosure

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

Modification History

Mod. #	Test	Date	Modification
1	-	-	None

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

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Emissions Spec:	FCC Part 15 B, C, & E, RSS-210 is	Class:	Radio
Immunity Spec:	-	Environment:	-

Test Configuration #2

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	Deskjet 3820	USB Printer	CN2451B1YS	

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
AC	120Vac outlet	3 prong	Unshielded	1.8

Note: Only a serial device was connected. No parrallel ports available. This test was with minimum systerm setup only.

EUT Operation During Emissions (Digital)

The transmitter was set to operate on the center channel of the 5.15 - 5.35 Ghz ban (preliminary testing demonstarted that the radiated emissions below 1Ghz were independent of operating channel). The laptop was confiugred to display a scrolling "H" patter on its diplay. Emissions below 1Ghz were measured with the laptop screen vertical as this confiugration produced the highest levels of emissions.

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	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: 5/23/2003
Test Engineer: volivas
Test Location: SVOATS #2

Config. Used: 2
Config Change: none
EUT Voltage: 230V/50Hz

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: 14 °C
Rel. Humidity: 83 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 -1000 MHz, Preliminary Scan	EN55022B	Eval	-4.0dB @ 673.917MHz
2	RE, 30 - 1000MHz, Maximized Emissions	EN55022B	Pass	-4.0dB @ 673.917MHz
3	RE, 30 - 1000MHz, Maximized Emissions	FCC B	Pass	-10.8dB @ 234.135MHz
4	RE, 1000 - 2000 MHz, Maximized Emissions	FCC B	Pass	-12.9dB @ 1370.0MHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	Radio

Deviations From The Standard

No deviations were made from the requirements of the standard.

Run #1: Preliminary Radiated Emissions, 30-1000 MHz
Acer (5230)

Frequency	Level	Pol	EN55022 B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
673.917	33.0	H	37.0	-4.0	QP	250	4.0	
234.135	32.5	V	37.0	-4.5	QP	64	1.0	
228.035	24.4	V	30.0	-5.6	QP	144	1.0	
228.024	22.3	H	30.0	-7.7	QP	224	3.7	
223.806	21.5	H	30.0	-8.5	QP	290	3.4	
223.806	21.2	V	30.0	-8.8	QP	202	1.0	
669.842	28.0	H	37.0	-9.0	QP	91	1.0	Note 1
225.992	20.7	H	30.0	-9.3	QP	292	4.0	
432.060	26.9	V	37.0	-10.1	QP	218	1.0	
912.126	25.6	V	37.0	-11.4	QP	83	1.0	
224.007	18.5	H	30.0	-11.5	QP	274	1.0	
669.842	25.2	V	37.0	-11.8	QP	200	1.0	Note 1
217.845	17.4	H	30.0	-12.6	QP	160	1.0	
32.002	14.0	V	30.0	-16.0	QP	320	1.0	
32.579	13.8	V	30.0	-16.2	QP	0	1.0	
588.393	19.8	H	37.0	-17.2	QP	82	1.0	
331.857	19.4	H	37.0	-17.6	QP	44	2.5	
584.318	19.4	H	37.0	-17.6	QP	350	1.0	
329.820	13.4	H	37.0	-23.6	QP	332	4.0	

Note 1:	Antenna brought into 3M and the measurement extrapolated to 10M by subtracting 10.5dB from the reading.

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	
673.917	33.0	H	37.0	-4.0	QP	250	4.0	EUT+AMBIENT
234.135	32.5	V	37.0	-4.5	QP	64	1.0	
228.035	24.4	V	30.0	-5.6	QP	144	1.0	
228.024	22.3	H	30.0	-7.7	QP	224	3.7	
223.806	21.5	H	30.0	-8.5	QP	290	3.4	
223.806	21.2	V	30.0	-8.8	QP	202	1.0	

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	Class:	Radio

Run #3: Maximized Readings From Run #1 tested to FCC B limit

Measurements made at 3m per FCC requirements.

Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
234.135	35.2	V	46.0	-10.8	QP	360	1.0	
228.024	34.8	H	46.0	-11.2	QP	124	1.0	
223.806	33.7	H	46.0	-12.3	QP	305	1.0	
228.035	31.1	V	46.0	-14.9	QP	0	1.0	
673.917	30.4	H	46.0	-15.6	QP	344	1.0	EUT+AMBIENT
223.806	29.7	V	46.0	-16.3	QP	75	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	
1370.000	41.1	H	54.0	-12.9	Avg	150	1.8	
1370.000	40.5	V	54.0	-13.5	Avg	166	1.0	
2000.000	37.2	V	54.0	-16.8	Avg	360	1.0	
2000.000	37.1	H	54.0	-16.9	Avg	360	1.0	
1137.500	33.5	V	54.0	-20.5	Avg	83	1.0	
1137.500	31.6	H	54.0	-22.4	Avg	0	1.0	
2000.000	50.0	V	74.0	-24.0	Pk	360	1.0	
1370.000	49.9	H	74.0	-24.1	Pk	150	1.8	
1370.000	49.9	V	74.0	-24.1	Pk	166	1.0	
2000.000	49.4	H	74.0	-24.6	Pk	360	1.0	
1137.500	49.2	V	74.0	-24.8	Pk	83	1.0	
1137.500	43.9	H	74.0	-30.1	Pk	0	1.0	

Client:	Intel Corporation	Job Number:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	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: 5/23/2003
Test Engineer: volivas
Test Location: SVOATS #2

Config. Used: 2
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: 14 °C
Rel. Humidity: 83 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	EN55022 B	Pass	-6.9dB @ 0.498MHz
2	CE, AC Power,120V/60Hz	EN55022 B	Pass	-9.9dB @ 0.211MHz

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:	J51307
Model:	ACER Laptop w/ WM3B2100A	T-Log Number:	T51308
		Account Manager:	Robert Holt
Contact:	Robert Paxman		
Spec:	FCC Part 15 B, C, & E, RSS-210 issue 5	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	
0.498	39.1	Line 1	46.0	-6.9	AV	
0.214	44.5	Neutral	53.0	-8.5	AV	
0.281	41.2	Neutral	50.7	-9.5	AV	
1.064	36.0	Neutral	46.0	-10.0	AV	
0.214	42.6	Line 1	53.0	-10.4	AV	
0.214	50.7	Neutral	63.0	-12.3	QP	
0.281	46.5	Neutral	60.7	-14.2	QP	
0.214	48.2	Line 1	63.0	-14.8	QP	
0.498	41.1	Line 1	56.0	-14.9	QP	
1.064	36.9	Neutral	56.0	-19.1	QP	
1.053	7.3	Line 1	46.0	-38.7	AV	
1.053	15.1	Line 1	56.0	-40.9	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	
0.211	43.1	Neutral	53.0	-9.9	AV	
0.209	41.5	Line 1	53.2	-11.7	AV	
0.211	50.6	Neutral	63.0	-12.4	QP	
0.426	34.7	Line 1	47.3	-12.6	AV	
0.284	36.9	Neutral	50.7	-13.8	AV	
0.284	36.4	Line 1	50.7	-14.3	AV	
0.209	48.5	Line 1	63.2	-14.7	QP	
0.349	32.8	Neutral	49.0	-16.2	AV	
0.284	43.8	Neutral	60.7	-16.9	QP	
0.284	42.0	Line 1	60.7	-18.7	QP	
0.426	38.1	Line 1	57.3	-19.2	QP	
0.349	37.1	Neutral	59.0	-21.9	QP	