



AEGIS LABS INC.



Class II Permissive Change
Test Report
And Application for Grant of Equipment Authorization

Pertaining To:

EUT	FCC ID:
Dell Computer Corporation Notebook Computer, MN: PP10L	E2K24CLNS

Configuration
Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module, MN: WM3A2100

MEASUREMENTS PERFORMED IN ACCORDANCE WITH

Regulatory Standard(s)
47 CFR Part 15, Subpart C Section 15.247
Test Method: ANSI C63.4: 1992 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz



Certificate Number: 1111.01

APPLICANT:

Dell Computer Corporation
One Dell Way
Round Rock, TX 78682

Contact(s): Mr. Jason Limoges

PREPARED BY:

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Mr. Rick Candelas

	REPORT BODY	APPENDICES	TOTAL PAGES
		<i>A</i>	
PAGES	15	38	53

Test Report #: INTEL-030903F
Test Report Revision: None

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A	Test Data
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1.0 CERTIFICATION OF TEST DATA

Aegis Labs, Inc. operates as both a Nevada and California Corporation with no organizational or financial relationship with any company, institution, or private individual.

Testing and engineering functions provided by Aegis Labs are furnished through the use of part-time, full-time or consulting engineers with the appropriate qualifications to carry out their duties. The intended purpose of this test report is to describe the measurement procedure and to determine whether the equipment under test "EUT" complies with both the conducted and radiated limits. Limits for emissions testing are described under Subpart C of Part 15 of the FCC rules.

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the Equipment Under Test (EUT) under the requirements specified in the emissions standard as described below. The test results contained in this report are only representative of the test sample tested as described in Section 3.0 of this report. Certification of the EUT is required as a prerequisite to marketing as defined in Part 2 of the FCC Rules.

Prepared By:

09/03/03

**Rick Candelas
Staff Engineer
Aegis Labs, Inc.**

Date:

Report Approved By:

09/03/03

**Steve J. Kuiper
Quality Assurance Manager
Aegis Labs, Inc.**

Date:

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2.0 SUMMARY OF TEST RESULTS

The test results provided within this report, indicate that the EUT has been found to be in **COMPLIANCE** with the test specifications based upon the following RF compliance standards:

Pass/Fail determination is based upon the nominal values of the test data.

EMISSIONS STANDARD			
FCC Part 15 Section	Description	Results	Comments
15.247(a)(2)	The minimum 6dB bandwidth shall be at least 500 kHz.	PASSED	2.412 GHz = 12.50 MHz 2.437 GHz = 12.50 MHz 2.462 GHz = 12.67 MHz
15.247(b)(1)	The maximum peak output power of the intentional radiator shall not exceed 1 watt.	PASSED	2.412 GHz = 16.75 dBm (0.0473 W) 2.437 GHz = 16.67 dBm (0.0465 W) 2.462 GHz = 16.67 dBm (0.0466 W)
15.247(b)(4)	The intentional radiator shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines per Section 1.1307(b)(1).	PASSED	Refer to SAR test reports
15.247(c)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.	PASSED	Conducted spurious emissions < -20dBc (Refer to Data Sheets)
15.247(c)	Radiated emissions, which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). All others must be < -20dBc.	PASSED	-0.90 dB @ 2483.5 MHz (Horizontal Polarization)
15.247(d)	The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	PASSED	2.412 GHz = -7.67 dBm 2.437 GHz = -7.17 dBm 2.462 GHz = -8.00 dBm
15.207	AC Conducted Emissions	PASSED	-6.12dB @ 0.1800 MHz
CISPR22	Radiated Emissions (30-1000 MHz)	PASSED	-4.66 dB @ 143.83 MHz (Horizontal Polarization)

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3.0 ADMINISTRATIVE DATA AND TEST DESCRIPTION

DEVICE TESTED:	ITE Type: Dell Computer Corporation Notebook Computer Model Number(s): PP10L Serial Number: N/A FCC ID: E2K24CLNS
TEST DATE(S):	September 3-8, 2003
DATE EUT RECEIVED:	September 3, 2003
ORIGIN OF TEST SAMPLE(S):	Production Unit
RESPONSIBLE PARTY:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
CLIENT CONTACT:	Mr. Jason Limoges
MANUFACTURER:	Dell Computer Corporation
TEST LOCATION:	Aegis Labs, Inc. 32231 Trabuco Creek Road Trabuco Canyon, CA 92678 Conducted Site #2 Radiated Site #2
A2LA CERTIFICATE:	1111.01, Valid through February 28, 2004
PURPOSE OF TEST:	To demonstrate compliance with the relevant standards described in Section 2.0 of this report.
TEST(S) PERFORMED:	Refer to Table in Section 2.0 of this report.

All calibration vendors were responsible for certifying Aegis Labs, Inc. test equipment as per the manufacturer's specifications and that the equipment is calibrated using instruments and standards where the accuracy is traceable to the National Institute of Standards and Technology (NIST). Calibration of all test equipment conforms to ANSI/NCSL Z540-1 and ISO 10012-1 and/or ISO/IEC Guide 17025 compliance (Additionally, other pertinent test equipment will carry MIL-STD-45662A). All calibration documents are on file with Aegis Labs, Inc., with copies provided upon request.

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4.0 DESCRIPTION OF EUT

4.1 EUT Description

Equipment Under Test (EUT)	
Trade Name:	Dell Computer Corporation Notebook Computer MN: PP10L
Model Number:	PP10L tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module, MN: WM3A2100
Frequency Range:	2.412 – 2.462 GHz
Type of Transmission:	Direct Sequence Spread Spectrum
Transfer Rate:	1/2/5.5/11 Mbps
Number of Channels:	11
Modulation Type:	DBPSK, DQPSK, CCK
Antenna Type:	PIFA Triple Band Antenna
Antenna Gain (See Note 2):	Main = 1.51dBi (Wistron) & 2.90dBi (Yageo) Aux = 1.48dBi (Wistron) & 1.70 dBi (Yageo)
Transmit Output Power:	16 dBm (Typical) Please see Appendix I (Data Sheets) for actual output power.
Power Supply:	3.3VDC from computer MPCPI slot.
Number of External Test Ports Exercised:	2 Antenna Ports (1 Main & 1 Auxiliary)

The Dell Computer Corporation Notebook Computer MN: PP10L was tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module as an embedded 2.4 GHz Wireless Local Area Network Mini-PCI adapter. The Mini-PCI Type 3B form factor is designed for notebook computer systems where overall thickness must be kept to an absolute minimum and connect to antennas internal to the notebook computer. It is capable of a data rate of up to 11 Mbps.

NOTE 1: For a more detailed description, please refer to the manufacture's specifications or User's Manual.

NOTE 2: Refer to the antenna specifications for a further description of the antennas. Antennas will be professionally installed inside the laptop computer by the laptop vendor.

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4.1.1 Channel Number and Frequencies

Eleven channels are provided for the EUT.

Channel	Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462



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4.2 EUT Configuration

The EUT was set-up according to the ANSI C63.4: 1992 guidelines for emissions testing. All the appropriate test ports were exercised during both the pre-qualification and final evaluation scans.

The EUT was tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot and was connected to a set of Wistron NeWeb corp. triple band antennas via its main and auxiliary Ipex/Hirose antenna ports. Data can be found in Appendix A. Also a set of Yageo Multi band antennas were tested for and the data can also be found in Appendix A

The Dell Computer Corporation notebook computer series PP10L was connected to a Hewlett Packard printer, Logitech mouse, Dell LCD monitor, and Hayes modem via its parallel, USB, video, and serial ports respectively.

The EUT was transmitting on the channel stated in each test description at the maximum power.



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4.3 List of EUT, Sub-Assemblies, and Host Equipment

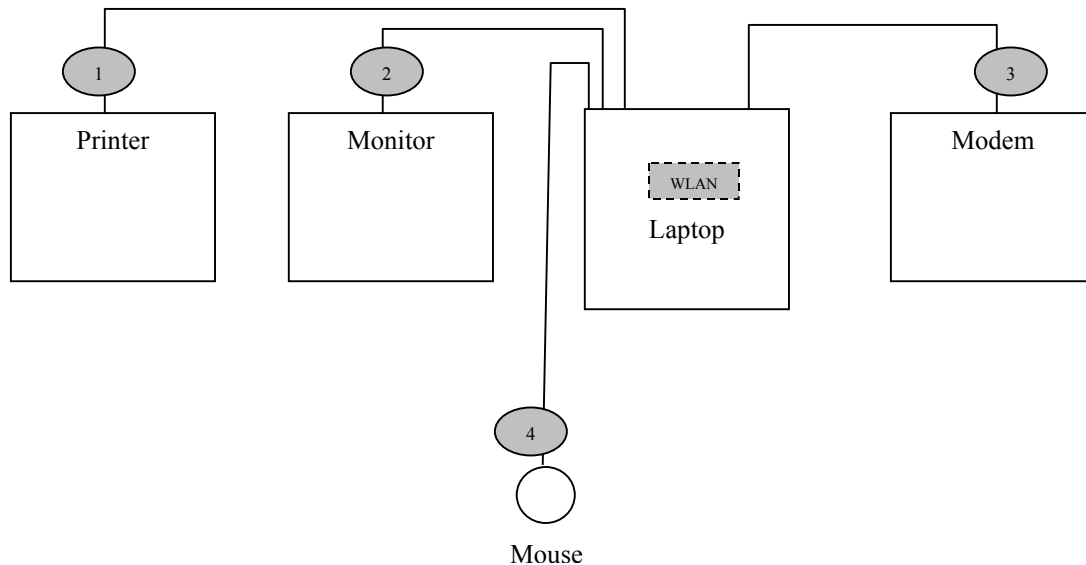
LIST OF EUT AND SUB-ASSEMBLIES			
Equipment Name	Manufacturer	Model Number	Serial Number
Notebook Computer	Dell Computer Corporation	PP10L	N/A
EUT Sub-Assemblies			
802.11b MiniPCI Type IIIB Wireless Module	Intel Corporation	WM3A2100	0004236FAAC3
Auxiliary Triple Band Antenna	Winstron NeWeb Corp.	EBB-Q	N/A
Main Triple Band Antenna	Winstron NeWeb Corp.	EBB-Q	N/A
Auxiliary Multi Band Antenna	Yageo	CAN4313 351	N/A
Main Multi Band Antenna	Yageo	CAN4313 351	N/A

HOST EQUIPMENT LIST			
Equipment Name	Manufacturer	Model Number	Serial Number
LCD Monitor	Dell	E151FPp	CN-06R644-47804-34R-LATL
Mouse	Logitech	M-BJ58	LNA22802012
Printer	Hewlett Packard	C8952A	CN29A1F0W0
Modem	Hayes	5362US	A02153623145

NOTE: All the power cords of the above support equipment are standard non-shielded, 1.8 meters long.



4.4 I/O Cabling Diagram and Description



- Cable 1: This is a 6-foot braid and foil shielded round cable connecting the Dell Computer Corporation notebook computer to the Hewlett Packard Printer. It has a metallic DB-25 type connector at the computer end and a metallic centronics type connector at the printer end. The cable is bundled to a length of one meter and the shield of the cable is grounded to the chassis of both devices via the connector shells.
- Cable 2: This is a 6-foot braid and foil shielded round cable connecting the Dell Computer Corporation notebook computer with the Dell LCD monitor. It has metallic DB-15 type connector at the computer end and is hardwired to the monitor. The cable is bundled to a length of one meter and the shield of the cable is grounded to the chassis of both devices via the connector shells.
- Cable 3: This is a 6-foot braid and foil shielded round cable connecting the Dell Computer Corporation notebook computer with the Hayes modem. It has metallic DB-9 type connector at the computer end and a metallic DB-25 type connector at the modem end. The cable is bundled to a length of one meter and the shield of the cable is grounded to the chassis of both devices via the connector shells.
- Cable 4: This is a 6-foot braid and foil shielded round cable connecting the Dell Computer Corporation notebook computer to the Logitech mouse. It has a metallic USB-B type connector at the computer end and is hardwired to the mouse. The shield of the cable is grounded to the chassis of the computer via the connector shell.



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5.0 TEST EQUIPMENT AND TEST SETUPS

The test equipment settings and functions are selected using the guidance of ANSI C63.4-1992. All test equipment setups and operations during conducted and radiated emissions testing are in accordance with this reference document.

5.1 AC Power Line Conducted Emissions

During conducted emissions measurements, a spectrum analyzer was used as the measuring instrument along with a preselector and quasi-peak detector. A 10 dB attenuation pad was used for the protection of the spectrum analyzer input stage. The conducted emissions from the EUT in the frequency range from 150 kHz to 30 MHz were captured for graphical display through the use of automated LABVIEW EMI measurement software. All graphical readings were measured in the “Peak” mode only to reduce testing time. Upon completion of the graphical scan, the test lab personnel performed the conducted measurement scan manually using the spectrum analyzer front panel keys. All peak measurements coming within 3 dB of the limit line were “Averaged” and/or “Quasi-Peaked” and denoted appropriately in the EXCEL spreadsheet.

The Equipment Under Test (EUT) was configured as a system with peripherals connected, so that at least one interface port of each type is connected to one external peripheral when tested for conducted emissions according to ANSI C63.4: 1992. Excess power cord length was wrapped in a bundle 30 to 40 centimeters in length near the center of the cord. The EUT was tested in a tabletop configuration.

The emission readings for Line 1 and Line 2 are highlighted on the data sheets in Appendix A. The graphical scans only reflects peak readings while the tabulated data sheets reflect peak, average, and/or quasi-peak readings which ever applies.



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5.2 Spurious Radiated Emissions

A spectrum analyzer was used as the measuring instrumentation along with a preselector and quasi-peak-detector. The pre-amplifiers were used to increase the sensitivity of the instrument. The spectrum analyzer was used in the peak detector mode with the “max-hold” feature activated and in Positive Peak mode. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. The quasi-peak detector was used only for those readings, which are marked accordingly in the data sheet. The effective measurement bandwidth used for the radiated emissions test was 120 kHz for (30 MHz- 1000 MHz). The spectrum analyzer operated such that the modulation of the signal was filtered out to set the analyzer in linear mode. For testing beyond 1000 MHz a spectrum analyzer capable of taking reading above 1000 MHz was connected to the high frequency amplifier, where these measurement readings were taken with the transducer placed at a 3-meter test distance from the EUT.

The Open Area Test Sites (OATS) was used for radiated emission testing. These test sites are designed according to ANSI C63.4: 1992 and ANSI C63.7: 1992 guidelines. The Measurements were conducted in accordance with ANSI C63.4: 1992 and ANSI C63.7: 1992 requirements.

Broadband biconical, log periodic, and horn antennas were used as transducers during the measurement reading phase. The frequency spans were wide (30 MHz-88 MHz, 88 MHz- 216 MHz, 216 MHz- 300 MHz, and 300 MHz- 1000 MHz). After 1000 MHz the horn antenna was used to measure emissions. The emission readings in both horizontal and vertical polarities are highlighted on the data sheets in Appendix A.

5.3 Conducted Emissions at the Antenna Port

A spectrum analyzer or power meter was used as the measuring instrumentation along with an attenuator and/or filter connected to the EUT antenna port. The attenuator and filters are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission. . The instruments recorded the measured readings with the bandwidths (video and resolution) set in accordance with the FCC Rules and regulations.

The measured readings are on the data sheets in Appendix A.



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5.4 Test and Measurement Equipment Used

TEST EQUIPMENT USED					
Equipment Name	Manufacturer	Model Number	Serial Number	Calibration Due Date	Calibration Cycle
EMI Receiver - RF Section	Hewlett Packard	85462A	3325A00137	12/16/03	1 Year
EMI Receiver - RF Filter Section	Hewlett Packard	85460A	3330A00138	12/16/03	1 Year
Attenuator - 5W-10dB	Pasternack	PE7014-10	N/A	11/03/03	1 Year
LISN (EUT)	FCC	FCC-LISN-50-25-2	9931	02/20/04	1 Year
LISN (Access)	Com-Power	LI-200	12019	01/25/04	1 Year
LISN (Access)	Com-Power	LI-200	12018	01/25/04	1 Year
Spectrum Analyzer	Agilent	8564EC	4046A00387	02/28/04	2 Years
Preamplifier	Agilent	8449B	3008A01573	04/29/04	2 Years
High Pass Filter	Microwave Circuits, Inc.	H3G020G2	0301DC0132	04/29/04	2 Years
Antenna - Biconical	EMCO	3110	9108-1421	02/11/04	1 Year
Antenna - Log Periodic	EMCO	3148	4947	02/11/04	1 Year
1-18 GHz Antenna - Horn	EMCO	3115	2230	09/14/04	2 Years
18-26.5 GHz Antenna – Horn	Custom Microwave	H042	001	05/09/04	1 Year
Power Meter	Rohde & Schwarz	NRVS	DE30863	07/21/05	2 Years
Power Sensor	Leistungsmesskoph	NRV-Z5	844855/012	07/21/05	2 Years
Temperature/Humidity Monitor	Dickson	TH550	7255185	01/18/04	1 Year

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6.0 SAMPLE CALCULATIONS

If a preamplifier is used during the Radiated Emissions Testing, it is required that the amplifier gain be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna, cable and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the Automatic Mode of A.R.M.S. measurements, these considerations are automatically presented as a part of the printout. In the case of manual measurements and for greater efficiency and convenience, usage of the calibration correction factors in the Appendices is necessary to calculate the Corrected Meter Reading. These correlation factors for each meter reading, shall be modified to reflect these correlation factors at each frequency value so that the meter readings can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" (CML).

The equation shall be derived in the following manner:

$$\text{Corrected Meter Reading} = \text{Meter Reading} + F + C - G - D$$

Where, F = Antenna Factor

C = Cable Factor

G = Amplifier Gain

D = Distance Factor

Therefore, the equation for determining the Corrected Meter Reading Limit (CML) is:

$$\text{CML} = \text{Specification Limit} - F - C + G + D$$

For the manual mode of measurement, a table of corrected meter reading limits shall be used to permit immediate comparison of the meter reading to determine if the measured emission amplitude exceeded the specification limit at that specific frequency. There shall be two calculation sheets done, one for three meter and one for ten-meter measurement distances, where applicable. The correction factors for the antenna and the amplifier gain are attached in the Appendices.



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7.0 MODIFICATIONS AND RECOMMENDATIONS

No modifications were made to the EUT.



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APPENDIX A

TEST DATA

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AC POWER LINE CONDUCTED EMISSIONS TEST RESULTS

CLIENT:	Dell Computer Corporation	DATE:	09/08/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030903-06
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot.	TEMPERATURE:	22 C
		HUMIDITY:	45% RH
		TIME:	2:00 PM

Standard:	FCC CFR 47, Part 15.207
Description:	AC Power Line Conducted Emissions
Results:	Passes the conducted limits by -6.12@ 0.1800 MHz

Conducted Limits		
Frequency (MHz)	Quasi-Peak Limit (dBuV)	Average Limit (dBuV)
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

NOTE: During preliminary scans, there wasn't any difference which channel or data rate was used with the EUT; therefore only Channel 1 at a data rate of 1 Mbps was used for final testing. Also, the scan was only done with the Yageo set of antennas.

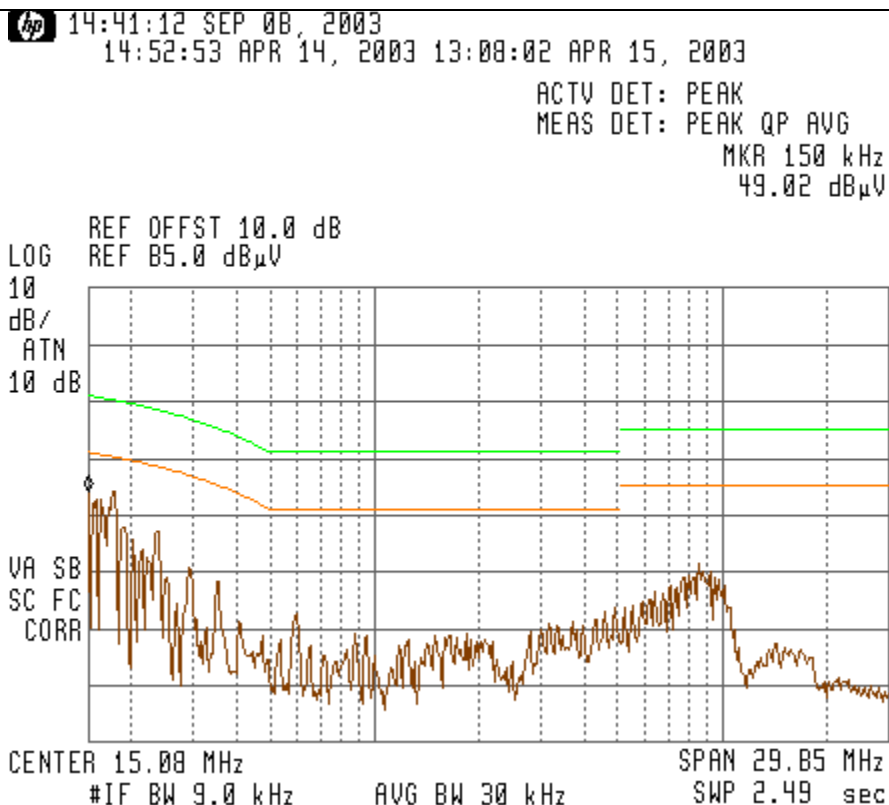
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AC Power Line Conducted Emissions Test Results (Continued)

CONDUCTED EMISSIONS – LINE 1						
Freq. (MHz)	Meter Reading (dBuV)	Detector (PK/QP/AV)	Average Limit (dBuV)	Average Delta(dB)	Quasi-Peak Limit (dBuV)	Quasi-Peak Delta(dB)
0.1500	49.02	PK	56.00	-6.98	66.00	-16.98
0.1600	47.77	PK	55.71	-7.94	65.71	-17.94
0.1800	49.02	PK	55.14	-6.12	65.14	-16.12
0.1900	42.79	PK	54.86	-12.07	64.86	-22.07
0.2400	42.00	PK	53.43	-11.43	63.43	-21.43
8.5600	36.29	PK	50.00	-13.71	60.00	-23.71



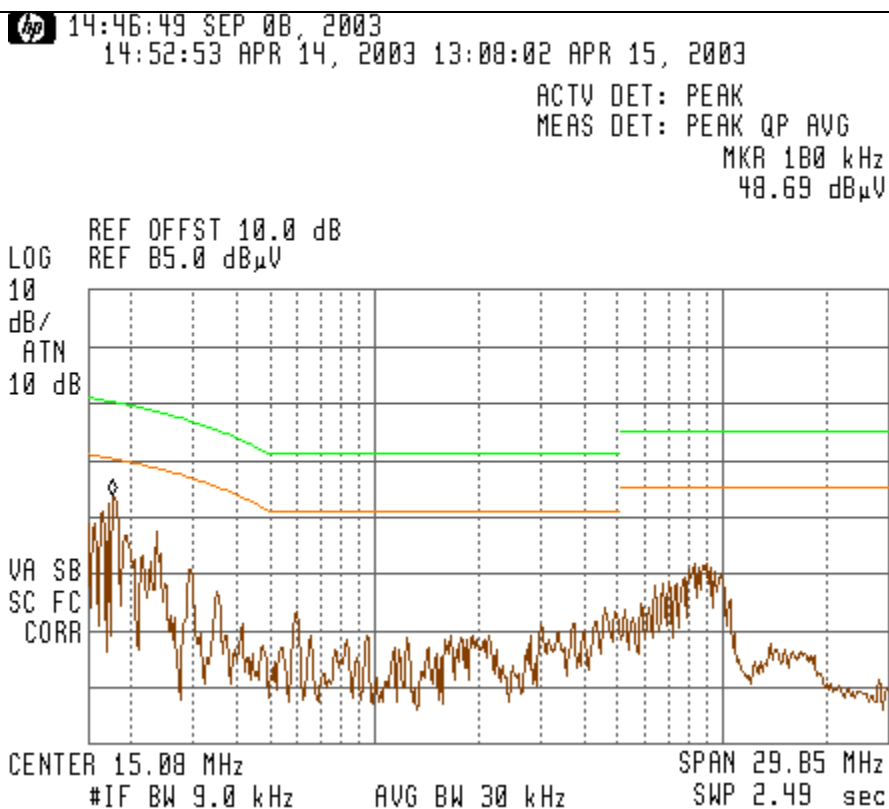
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AC Power Line Conducted Emissions Test Results (Continued)

CONDUCTED EMISSIONS - LINE 2						
Freq. (MHz)	Meter Reading (dBuV)	Detector (PK/QP/AV)	Average Limit (dBuV)	Average Delta(dB)	Quasi-Peak Limit (dBuV)	Quasi-Peak Delta(dB)
0.1600	43.66	PK	55.71	-12.05	65.71	-22.05
0.1700	47.17	PK	55.43	-8.26	65.43	-18.26
0.1800	48.69	PK	55.14	-6.45	65.14	-16.45
0.2000	41.79	PK	54.57	-12.78	64.57	-22.78
0.2400	42.37	PK	53.43	-11.06	63.43	-21.06
8.3100	36.66	PK	50.00	-13.34	60.00	-23.34



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SPURIOUS RADIATED EMISSIONS TEST RESULTS

CLIENT:	Dell Computer Corporation	DATE:	09/08/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030903-05
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot.	TEMPERATURE:	23 C
		HUMIDITY:	45% RH
		TIME:	8:00 AM

Standard:	CISPR22
Description:	Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Sec. 15.209. (Using CISPR22 Class B Limits)
Results:	Passes the radiated limits by -4.66@ 143.83 MHz (Vertical antenna polarization)

Radiated Limits	
Frequency (MHz)	Quasi-Peak Limit (dBuV) @ 10m
30-230	30
230-1000	37

NOTE: During preliminary scans, there wasn't any difference which channel or data rate was used with the EUT; therefore only Channel 1 at a data rate of 1 Mbps was used for final testing. Also, the scan was only done with the Yageo set of antennas.

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Spurious Radiated Emissions Test Results (Continued)

RADIATED EMISSIONS - Horizontal Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
62.05	13.42	400	0				1.22	6.18	18.38	30.00	-11.62
143.83	11.93	400	135				1.90	15.31	25.34	30.00	-4.66
265.27	5.66	400	90				2.80	17.06	19.92	37.00	-17.08
300.01	9.78	300	90				2.90	14.30	21.18	37.00	-15.82
310.47	7.54	300	45				2.96	15.10	19.67	37.00	-17.33
330.03	6.11	300	45				3.08	15.96	18.99	37.00	-18.01
432.05	9.08	250	45				3.63	16.41	21.86	37.00	-15.14
RADIATED EMISSIONS – Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
62.88	15.52	100	0				1.23	7.26	21.55	30.00	-8.45
78.91	11.86	100	90				1.39	8.47	18.94	30.00	-11.06
144.21	9.89	100	135				1.90	14.58	22.57	30.00	-7.43
300.01	5.09	100	0				2.90	14.30	16.49	37.00	-20.51
310.46	10.90	100	225				2.96	15.09	23.03	37.00	-13.97
332.00	8.45	100	180				3.09	15.86	21.22	37.00	-15.78

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Spurious Radiated Emissions Test Results (Continued)

CLIENT:	Dell Computer Corporation	DATE:	09/06/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030903
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot using the Yageo antennas.	TEMPERATURE:	25 C
		HUMIDITY:	39% RH
		TIME:	8:00 AM

Standard:	FCC CFR 47, Part 15.247(c)
Description:	Radiated emissions, which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). All others must be < -20dBc.
Results:	Passes the radiated limits by – 4.90 @ 2483.5 MHz (Vertical antenna polarization)

Unwanted Spurious Emissions Limits			
Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m) (Emissions in the restricted bands)	Field Strength (dBm/MHz) (Emissions outside the restricted bands)
Above 960	500	54.00 (Average) 74.00 (Peak)	< -20 dBc

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Fundamental Measurements at Channels 1, 6, & 11
With Yageo Antennas
Aegis Labs, Inc. File #: INTEL-030903-03*

RADIATED EMISSIONS - Horizontal Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
2412.00	76.33	100	225				2.99	29.22	108.54		
2412.00				72.67	A		2.99	29.22	104.88		
2437.00	78.67	100	135				3.05	29.27	110.99		
2462.00	75.83	100	135				3.11	29.32	108.26		
2462.00				71.67	A		3.11	29.32	104.10		

RADIATED EMISSIONS – Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
2412.00	74.00	150	225				2.99	29.42	106.41		
2412.00				70.67	A		2.99	29.42	103.08		
2437.00	73.00	100	225				3.05	29.47	105.52		
2462.00	74.00	100	135				3.11	29.52	106.63		
2462.00				70.67	A		3.11	29.52	103.30		

NOTE: Fundamental signals measured to calculate the band edge field strengths using the “Marker Delta Method”.

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Band Edge Field Strength Calculations at Channels 1 & 11
With Yageo Antennas
Aegis Labs, Inc. File #: INTEL-030903-03*

RADIATED EMISSIONS - Horizontal Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
2390.00									54.54	74.00	-19.46
2390.00					A				48.38	54.00	-5.62
2483.50									56.26	74.00	-17.74
2483.50					A				49.10	54.00	-4.90

RADIATED EMISSIONS – Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
2390.00									52.41	74.00	-21.59
2390.00					A				46.58	54.00	-7.42
2483.50									54.63	74.00	-19.37
2483.50					A				48.30	54.00	-5.70

NOTE: The “Band Edge Field Strength” was calculated using the “Fundamental” and “Conducted Band Edge” measurements per the “Marker-Delta Method” with the following formula:

$$BE = F_m - \Delta m$$

Where

BE = Band Edge Field Strength

F_m = Measured Fundamental (Peak or Average)

Δm = Measured Conducted Band Edge Delta (Peak or Average)

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements
"Continuous Transmit Mode"
With Yageo Antennas
Aegis Labs, Inc. File #: INTEL-030903-04*

RADIATED EMISSIONS - Horizontal Antenna Polarization

Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
EUT in Continuous Transmit Mode on Channel 1 (2.412 GHz)											
4823.89	43.17	100	135			36.16	4.06	34.10	45.17	74.00	-28.83
4823.89				32.83	A	36.16	4.06	34.10	34.83	54.00	-19.17
7237.36	43.33	100	225			36.54	5.10	36.86	48.75	74.00	-25.25
7237.36				42.00	A	36.54	5.10	36.86	47.42	54.00	-6.58
1000.00	58.67	100	180			37.29	1.60	24.90	47.88	74.00	-26.12
1000.00				43.00	A	37.29	1.60	24.90	32.21	54.00	-21.79
1365.20	47.83	100	180			36.98	2.00	26.21	39.07	74.00	-34.93
1365.20				36.33	A	36.98	2.00	26.21	27.57	54.00	-26.43
EUT in Continuous Transmit Mode on Channel 6 (2.437 GHz)											
4873.89	41.67	100	225			36.20	4.10	34.27	43.84	74.00	-30.16
4873.89				27.83	A	36.20	4.10	34.27	30.00	54.00	-24.00
7310.64	43.17	100	225			36.59	5.10	36.79	48.47	74.00	-25.53
7310.64				30.33	A	36.59	5.10	36.79	35.63	54.00	-18.37
1000.00	51.17	100	90			37.29	1.60	24.90	40.38	74.00	-33.62
1000.00				44.83	A	37.29	1.60	24.90	34.04	54.00	-19.96
1359.67	48.00	100	180			37.02	2.00	26.19	39.17	74.00	-34.83
1359.67				33.33	A	37.02	2.00	26.19	24.50	54.00	-29.50
EUT in Continuous Transmit Mode on Channel 11 (2.462 GHz)											
4923.94	41.33	100	180			36.24	4.14	34.44	43.67	74.00	-30.33
4923.94				29.00	A	36.24	4.14	34.44	31.34	54.00	-22.66
7386.51	44.67	100	225			36.63	5.10	36.71	49.85	74.00	-24.15
7386.51				30.83	A	36.63	5.10	36.71	36.01	54.00	-17.99
1000.00	60.33	100	135			37.29	1.60	24.90	49.54	74.00	-24.46
1000.00				44.83	A	37.29	1.60	24.90	34.04	54.00	-19.96
1365.11	50.33	100	180			36.98	2.00	26.21	41.57	74.00	-32.43
1365.11				36.50	A	36.98	2.00	26.21	27.74	54.00	-26.26

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

Spurious Emissions Measurements
“Continuous Transmit Mode”
With Yageo Antennas
Aegis Labs, Inc. File #: INTEL-030903-04

RADIATED EMISSIONS - Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
EUT in Continuous Transmit Mode on Channel 1 (2.412 GHz)											
4823.83	43.50	100	225			36.16	4.06	34.07	45.47	74.00	-28.53
4823.83				33.17	A	36.16	4.06	34.07	35.14	54.00	-18.86
7235.70	43.33	100	180			36.54	5.10	36.76	48.65	74.00	-25.35
7235.70				31.17	A	36.54	5.10	36.76	36.49	54.00	-17.51
1000.00	61.33	100	45			37.29	1.60	25.00	50.64	74.00	-23.36
1000.00				44.00	A	37.29	1.60	25.00	33.31	54.00	-20.69
1365.74	46.83	100	225			36.97	2.00	26.24	38.10	74.00	-35.90
1365.74				34.00	A	36.97	2.00	26.24	25.27	54.00	-28.73
EUT in Continuous Transmit Mode on Channel 6 (2.437 GHz)											
4874.09	41.50	100	270			36.20	4.10	34.22	43.62	74.00	-30.38
4874.09				28.67	A	36.20	4.10	34.22	30.79	54.00	-23.21
7312.97	45.17	100	180			36.59	5.10	36.71	50.39	74.00	-23.61
7312.97				31.83	A	36.59	5.10	36.71	37.05	54.00	-16.95
1000.00	64.33	100	0			37.29	1.60	25.00	53.64	74.00	-20.36
1000.00				49.83	A	37.29	1.60	25.00	39.14	54.00	-14.86
1362.63	48.00	100	135			37.00	2.00	26.23	39.23	74.00	-34.77
1362.63				33.17	A	37.00	2.00	26.23	24.40	54.00	-29.60
EUT in Continuous Transmit Mode on Channel 11 (2.462 GHz)											
4923.99	42.33	100	270			36.24	4.14	34.37	44.60	74.00	-29.40
4923.99				29.83	A	36.24	4.14	34.37	32.10	54.00	-21.90
7386.21	43.67	100	270			36.63	5.10	36.67	48.81	74.00	-25.19
7386.21				31.00	A	36.63	5.10	36.67	36.14	54.00	-17.86
1000.00	61.67	100	45			37.29	1.60	25.00	50.98	74.00	-23.02
1000.00				47.33	A	37.29	1.60	25.00	36.64	54.00	-17.36
1365.38	47.50	100	180			36.98	2.00	26.24	38.77	74.00	-35.23
1365.38				34.33	A	36.98	2.00	26.24	25.60	54.00	-28.40

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements
"Continuous Receive Mode"
With Yageo Antennas
Aegis Labs, Inc. File #: INTEL-030903-04*

RADIATED EMISSIONS - Horizontal Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
EUT in Continuous Receive Mode on Channel 1 (2.412 GHz)											
1000.00	60.00	100	180			37.29	1.60	24.90	49.21	74.00	-24.79
1000.00				44.00	A	37.29	1.60	24.90	33.21	54.00	-20.79
1326.40	50.33	100	135			37.05	2.00	26.08	41.35	74.00	-32.65
1326.40				34.33	A	37.05	2.00	26.08	25.35	54.00	-28.65
EUT in Continuous Receive Mode on Channel 6 (2.437 GHz)											
1000.00	50.67	100	90			37.29	1.60	24.90	39.88	74.00	-34.12
1000.00				43.67	A	37.29	1.60	24.90	32.88	54.00	-21.12
1327.73	53.50	100	135			37.06	2.00	26.08	44.52	74.00	-29.48
1327.73				35.00	A	37.06	2.00	26.08	26.02	54.00	-27.98
EUT in Continuous Receive Mode on Channel 11 (2.462 GHz)											
1000.00	59.67	100	135			37.29	1.60	24.90	48.88	74.00	-25.12
1000.00				43.50	A	37.29	1.60	24.90	32.71	54.00	-21.29
1327.33	51.00	100	90			37.05	2.00	26.08	42.02	74.00	-31.98
1327.33				35.33	A	37.05	2.00	26.08	26.35	54.00	-27.65

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

Spurious Emissions Measurements
“Continuous Receive Mode”
With Yageo Antennas
Aegis Labs, Inc. File #: INTEL-030903-04

RADIATED EMISSIONS - Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
EUT in Continuous Receive Mode on Channel 1 (2.412 GHz)											
1000.00	62.67	100	45			37.29	1.60	25.00	51.98	74.00	-22.02
1000.00				45.83	A	37.29	1.60	25.00	35.14	54.00	-18.86
1328.36	55.50	100	270			37.06	2.00	26.12	46.56	74.00	-27.44
1328.36				40.00	A	37.06	2.00	26.12	31.06	54.00	-22.94
EUT in Continuous Receive Mode on Channel 6 (2.437 GHz)											
1000.00	63.67	100	0			37.29	1.60	25.00	52.98	74.00	-21.02
1000.00				48.00	A	37.29	1.60	25.00	37.31	54.00	-16.69
1329.88	55.30	100	225			37.06	2.00	26.12	46.36	74.00	-27.64
1329.88				39.83	A	37.06	2.00	26.12	30.89	54.00	-23.11
EUT in Continuous Receive Mode on Channel 11 (2.462 GHz)											
1000.00	62.33	100	45			37.29	1.60	25.00	51.64	74.00	-22.36
1000.00				48.17	A	37.29	1.60	25.00	37.48	54.00	-16.52
1327.64	55.00	100	270			37.06	2.00	26.11	46.06	74.00	-27.94
1327.64				40.83	A	37.06	2.00	26.11	31.89	54.00	-22.11

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

CLIENT:	Dell Computer Corporation	DATE:	09/06/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030904
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot using the Wistron antennas.	TEMPERATURE:	27 C
		HUMIDITY:	40% RH
		TIME:	8:00 AM

Standard:	FCC CFR 47, Part 15.247(c)
Description:	Radiated emissions, which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). All others must be < -20dBc.
Results:	Passes the radiated limits by – 0.90 @ 2483.5 MHz (Horizontal antenna polarization)

Unwanted Spurious Emissions Limits			
Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m) (Emissions in the restricted bands)	Field Strength (dBm/MHz) (Emissions outside the restricted bands)
Above 960	500	54.00 (Average) 74.00 (Peak)	< -20 dBc

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Fundamental Measurements at Channels 1, 6, & 11
With Wistron NeWeb Corporation Antennas
Aegis Labs, Inc. File #: INTEL-030904-03*

RADIATED EMISSIONS - Horizontal Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
2412.00	76.67	100	135				2.99	29.22	108.88		
2412.00				73.00	A		2.99	29.22	105.21		
2437.00	78.00	100	135				3.05	29.27	110.32		
2462.00	78.33	100	135				3.11	29.32	110.76		
2462.00				74.50	A		3.11	29.32	106.93		

RADIATED EMISSIONS – Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
2412.00	73.33	125	270				2.99	29.42	105.74		
2412.00				69.67	A		2.99	29.42	102.08		
2437.00	73.50	200	135				3.05	29.47	106.02		
2462.00	72.00	100	135				3.11	29.52	104.63		
2462.00				68.50	A		3.11	29.52	101.13		

NOTE: Fundamental signals measured to calculate the band edge field strengths using the “Marker Delta Method”.

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Band Edge Field Strength Calculations at Channels 1 & 11
With Wistron NeWeb Corporation Antennas
Aegis Labs, Inc. File #: INTEL-030904-03*

RADIATED EMISSIONS - Horizontal Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
2390.00									26.38	74.00	-47.62
2390.00					A				50.54	54.00	-3.46
2483.50									59.10	74.00	-14.90
2483.50					A				53.10	54.00	-0.90

RADIATED EMISSIONS – Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
2390.00									53.24	74.00	-20.76
2390.00					A				47.41	54.00	-6.59
2483.50									52.97	74.00	-21.03
2483.50					A				47.30	54.00	-6.70

NOTE: The “Band Edge Field Strength” was calculated using the “Fundamental” and “Conducted Band Edge” measurements per the “Marker-Delta Method” with the following formula:

$$BE = F_m - \Delta m$$

Where

BE = Band Edge Field Strength

F_m = Measured Fundamental (Peak or Average)

Δm = Measured Conducted Band Edge Delta (Peak or Average)

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements
"Continuous Transmit Mode"
With Wistron NeWeb Corporation Antennas
Aegis Labs, Inc. File #: INTEL-030904-04*

RADIATED EMISSIONS - Horizontal Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
EUT in Continuous Transmit Mode on Channel 1 (2.412 GHz)											
4823.90	43.00	100	135			36.16	4.06	34.10	45.00	74.00	-29.00
4823.90				31.83	A	36.16	4.06	34.10	33.83	54.00	-20.17
7238.00	47.83	100	135			36.54	5.10	36.86	53.25	74.00	-20.75
7238.00				39.50	A	36.54	5.10	36.86	44.92	54.00	-9.08
1000.00	49.67	100	0			37.29	1.60	24.90	38.88	74.00	-35.12
1000.00				35.50	A	37.29	1.60	24.90	24.71	54.00	-29.29
1329.67	51.50	100	90			37.06	2.00	26.09	42.53	74.00	-31.47
1329.67				37.33	A	37.06	2.00	26.09	28.36	54.00	-25.64
EUT in Continuous Transmit Mode on Channel 6 (2.437 GHz)											
4873.99	41.17	100	180			36.20	4.10	34.27	43.34	74.00	-30.66
4873.99				30.17	A	36.20	4.10	34.27	32.34	54.00	-21.66
7308.53	45.17	100	135			36.59	5.10	36.79	50.48	74.00	-23.52
7308.53				33.83	A	36.59	5.10	36.79	39.14	54.00	-14.86
1000.00	51.17	100	0			37.29	1.60	24.90	40.38	74.00	-33.62
1000.00				36.83	A	37.29	1.60	24.90	26.04	54.00	-27.96
1359.67	49.67	100	90			37.02	2.00	26.19	40.84	74.00	-33.16
1359.67				35.17	A	37.02	2.00	26.19	26.34	54.00	-27.66
EUT in Continuous Transmit Mode on Channel 11 (2.462 GHz)											
4923.94	43.33	100	180			36.24	4.14	34.44	45.67	74.00	-28.33
4923.94				33.67	A	36.24	4.14	34.44	36.01	54.00	-17.99
7383.17	43.67	100	225			36.63	5.10	36.72	48.86	74.00	-25.14
7383.17				29.33	A	36.63	5.10	36.72	34.52	54.00	-19.48
1000.00	50.33	100	0			37.29	1.60	24.90	39.54	74.00	-34.46
1000.00				36.33	A	37.29	1.60	24.90	25.54	54.00	-28.46
1365.11	49.33	100	90			36.98	2.00	26.21	40.57	74.00	-33.43
1365.11				36.00	A	36.98	2.00	26.21	27.24	54.00	-26.76

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements
"Continuous Transmit Mode"
With Wistron NeWeb Corporation Antennas
Aegis Labs, Inc. File #: INTEL-030904-04*

RADIATED EMISSIONS - Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
EUT in Continuous Transmit Mode on Channel 1 (2.412 GHz)											
4824.02	43.67	100	90			36.16	4.06	34.07	45.64	74.00	-28.36
4824.02				31.83	A	36.16	4.06	34.07	33.80	54.00	-20.20
7232.57	46.50	100	135			36.54	5.10	36.76	51.82	74.00	-22.18
7232.57				37.50	A	36.54	5.10	36.76	42.82	54.00	-11.18
1000.00	50.00	100	45			37.29	1.60	25.00	39.31	74.00	-34.69
1000.00				36.00	A	37.29	1.60	25.00	25.31	54.00	-28.69
1329.17	53.17	100	225			37.06	2.00	26.12	44.23	74.00	-29.77
1329.17				40.17	A	37.06	2.00	26.12	31.23	54.00	-22.77
EUT in Continuous Transmit Mode on Channel 6 (2.437 GHz)											
4874.02	42.83	100	135			36.20	4.10	34.22	44.95	74.00	-29.05
4874.02				32.50	A	36.20	4.10	34.22	34.62	54.00	-19.38
7308.47	44.17	100	135			36.59	5.10	36.71	49.40	74.00	-24.60
7308.47				31.00	A	36.59	5.10	36.71	36.23	54.00	-17.77
1000.00	49.33	100	45			37.29	1.60	25.00	38.64	74.00	-35.36
1000.00				38.33	A	37.29	1.60	25.00	27.64	54.00	-26.36
1362.63	49.00	100	225			37.00	2.00	26.23	40.23	74.00	-33.77
1362.63				38.17	A	37.00	2.00	26.23	29.40	54.00	-24.60
EUT in Continuous Transmit Mode on Channel 11 (2.462 GHz)											
4924.11	43.67	100	90			36.24	4.14	34.37	45.94	74.00	-28.06
4924.11				34.83	A	36.24	4.14	34.37	37.10	54.00	-16.90
7389.61	44.33	100	225			36.63	5.10	36.67	49.46	74.00	-24.54
7389.61				30.17	A	36.63	5.10	36.67	35.30	54.00	-18.70
1000.00	51.33	100	45			37.29	1.60	25.00	40.64	74.00	-33.36
1000.00				40.33	A	37.29	1.60	25.00	29.64	54.00	-24.36
1365.38	48.50	100	225			36.98	2.00	26.24	39.77	74.00	-34.23
1365.38				40.00	A	36.98	2.00	26.24	31.27	54.00	-22.73

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements
"Continuous Receive Mode"
With Wistron NeWeb Corporation Antennas
Aegis Labs, Inc. File #: INTEL-030904-04*

RADIATED EMISSIONS - Horizontal Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
EUT in Continuous Receive Mode on Channel 1 (2.412 GHz)											
1000.00	50.00	100	0			37.29	1.60	24.90	39.21	74.00	-34.79
1000.00				36.33	A	37.29	1.60	24.90	25.54	54.00	-28.46
1326.40	52.33	100	90			37.05	2.00	26.08	43.35	74.00	-30.65
1326.40				35.00	A	37.05	2.00	26.08	26.02	54.00	-27.98
EUT in Continuous Receive Mode on Channel 6 (2.437 GHz)											
1000.00	48.67	100	0			37.29	1.60	24.90	37.88	74.00	-36.12
1000.00				43.33	A	37.29	1.60	24.90	32.54	54.00	-21.46
1327.73	52.50	100	90			37.06	2.00	26.08	43.52	74.00	-30.48
1327.73				34.67	A	37.06	2.00	26.08	25.69	54.00	-28.31
EUT in Continuous Receive Mode on Channel 11 (2.462 GHz)											
1000.00	53.67	100	0			37.29	1.60	24.90	42.88	74.00	-31.12
1000.00				39.00	A	37.29	1.60	24.90	28.21	54.00	-25.79
1327.33	52.00	100	90			37.05	2.00	26.08	43.02	74.00	-30.98
1327.33				34.17	A	37.05	2.00	26.08	25.19	54.00	-28.81

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AEGIS LABS INC.

Spurious Radiated Emissions Test Results (Continued)

Spurious Emissions Measurements
“Continuous Receive Mode”
With Wistron NeWeb Corporation Antennas
Aegis Labs, Inc. File #: INTEL-030904-04

RADIATED EMISSIONS - Vertical Antenna Polarization											
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (degrees)	Quasi pk or AVG (dBuV)		Preamp Factor (dB)	Cable Factor (dB)	Ant. Factor (dB)	Corrected Reading (dBuV)	Limits (dBuV)	Diff (dB) +=FAIL
EUT in Continuous Receive Mode on Channel 1 (2.412 GHz)											
1000.00	55.67	100	45			37.29	1.60	25.00	44.98	74.00	-29.02
1000.00				44.33	A	37.29	1.60	25.00	33.64	54.00	-20.36
1328.36	56.50	100	225			37.06	2.00	26.12	47.56	74.00	-26.44
1328.36				39.83	A	37.06	2.00	26.12	30.89	54.00	-23.11
EUT in Continuous Receive Mode on Channel 6 (2.437 GHz)											
1000.00	58.67	100	45			37.29	1.60	25.00	47.98	74.00	-26.02
1000.00				46.33	A	37.29	1.60	25.00	35.64	54.00	-18.36
1329.88	54.30	100	225			37.06	2.00	26.12	45.36	74.00	-28.64
1329.88				38.93	A	37.06	2.00	26.12	29.99	54.00	-24.01
EUT in Continuous Receive Mode on Channel 11 (2.462 GHz)											
1000.00	57.33	100	45			37.29	1.60	25.00	46.64	74.00	-27.36
1000.00				48.00	A	37.29	1.60	25.00	37.31	54.00	-16.69
1327.64	52.00	100	225			37.06	2.00	26.11	43.06	74.00	-30.94
1327.64				39.83	A	37.06	2.00	26.11	30.89	54.00	-23.11

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AEGIS LABS INC.

CONDUCTED BAND EDGE MEASUREMENTS

CLIENT:	Dell Computer Corporation	DATE:	09/03/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030903-02a
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot.	TEMPERATURE:	28 C
		HUMIDITY:	55% RH
		TIME:	5:00 PM

Standard:	FCC CFR 47, Part 15.247C
Description:	Conducted band edge plots for use in calculating the emissions within a restricted band near the operating band using the "Marker Delta Method".
Results:	For signals in the restricted bands immediately above and below the 2.412 to 2.462 GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was then applied to the average and peak field strength of the intentional signal to calculate the field strength of the unintentional signals.

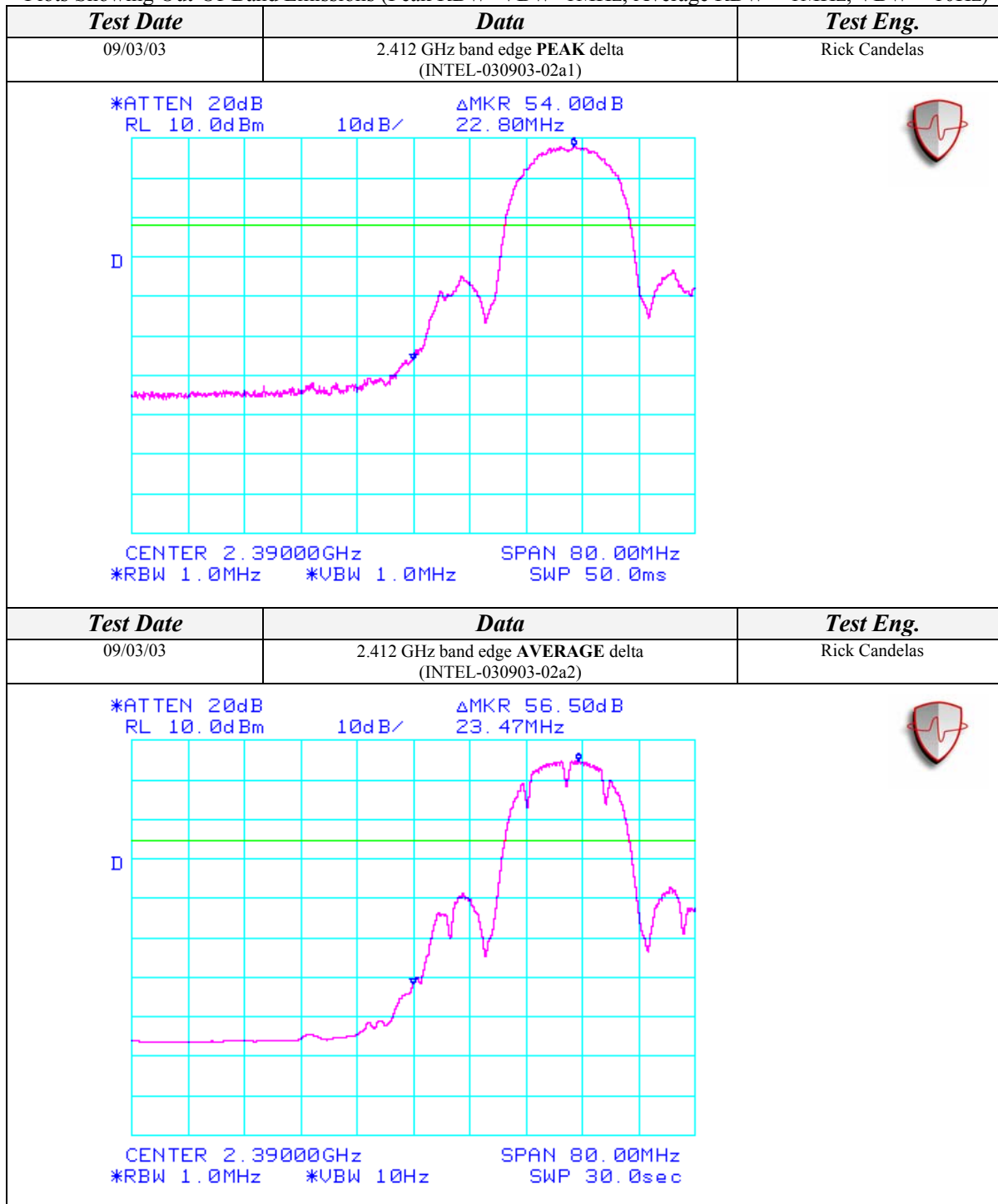
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AEGIS LABS INC.

Conducted Band Edge Measurements (Continued)

Plots Showing Out-Of-Band Emissions (Peak RBW=VBW=1MHz; Average RBW = 1MHz, VBW = 10Hz)



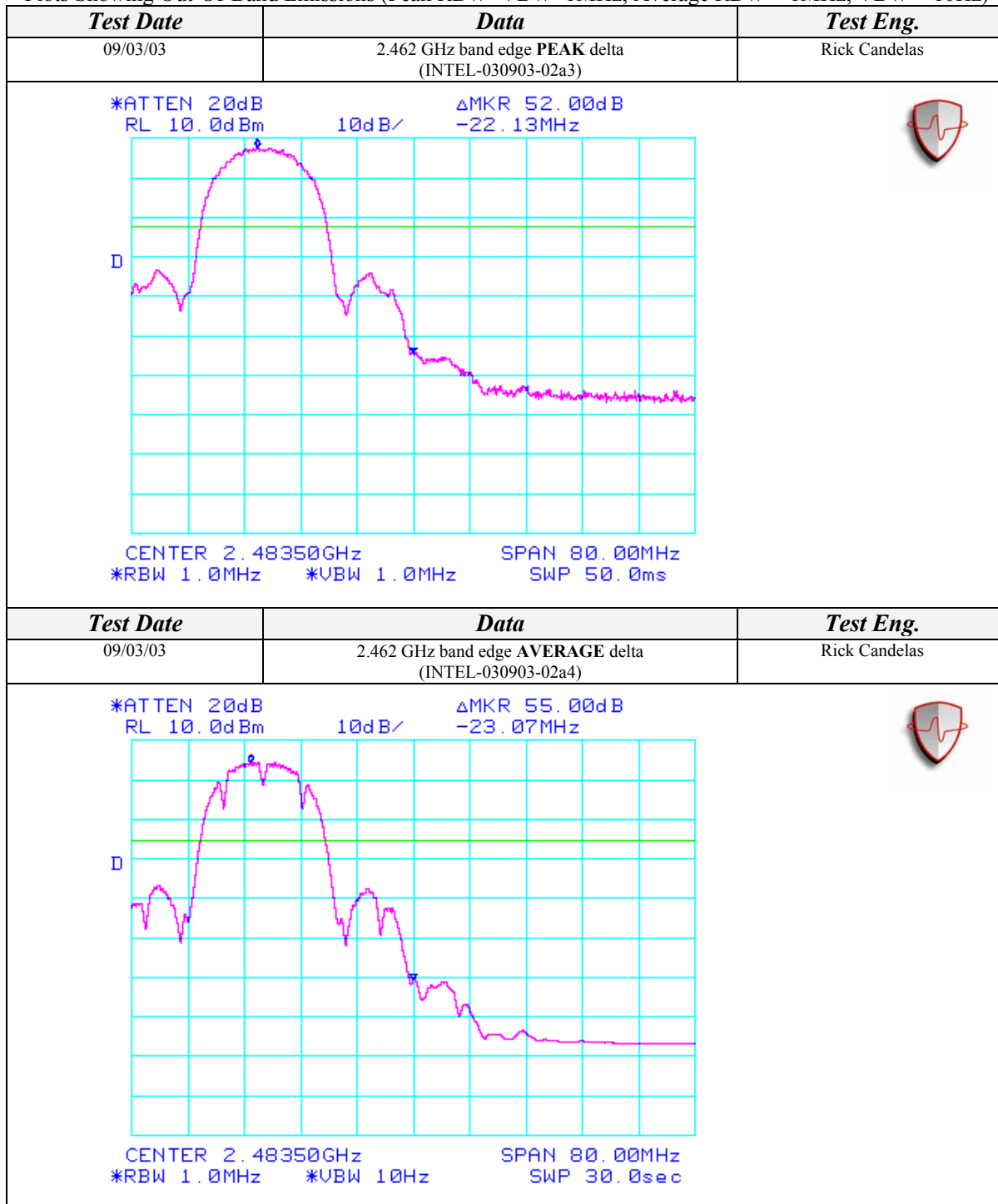
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AEGIS LABS INC.

Conducted Band Edge Measurements (Continued)

Plots Showing Out-Of-Band Emissions (Peak RBW=VBW=1MHz; Average RBW = 1MHz, VBW = 10Hz)



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AEGIS LABS INC.

PEAK TRANSMIT POWER

CLIENT:	Dell Computer Corporation	DATE:	09/03/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030903-01
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot.	TEMPERATURE:	21 C
		HUMIDITY:	49% RH
		TIME:	8:00 AM

Standard:	FCC CFR 47, Part 15.247(b)(1)
Description:	The maximum peak output power of the intentional radiator shall not exceed 1 watt.
Results:	0.0473 W @ 2.412 GHz 0.0465 W @ 2.437 GHz 0.0466 W @ 2.462 GHz

Peak Transmit Power Limits	
Frequency (MHz)	Output Power (W)
2412-2462	1

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AEGIS LABS INC.

Peak Transmit Power (Continued)

Frequency (MHz)	Rate (Mbps)	Power (dBm)	Cable Factor (dB)	Power Corrected (dBm)	Power (mW)
2412.00	1	16.60	0.15	16.75	47.32
2412.00	5.5	16.13	0.15	16.28	42.46
2412.00	11	16.05	0.15	16.20	41.69
2437.00	1	16.52	0.15	16.67	46.45
2437.00	5.5	16.02	0.15	16.17	41.40
2437.00	11	15.91	0.15	16.06	40.36
2462.00	1	16.53	0.15	16.68	46.56
2462.00	5.5	16.05	0.15	16.20	41.69
2462.00	11	15.95	0.15	16.10	40.74



AEGIS LABS INC.

6 dB EMISSIONS BANDWIDTH

CLIENT:	Dell Computer Corporation	DATE:	09/03/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030903-02b
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot.	TEMPERATURE:	25 C
		HUMIDITY:	68% RH
		TIME:	7:00 PM

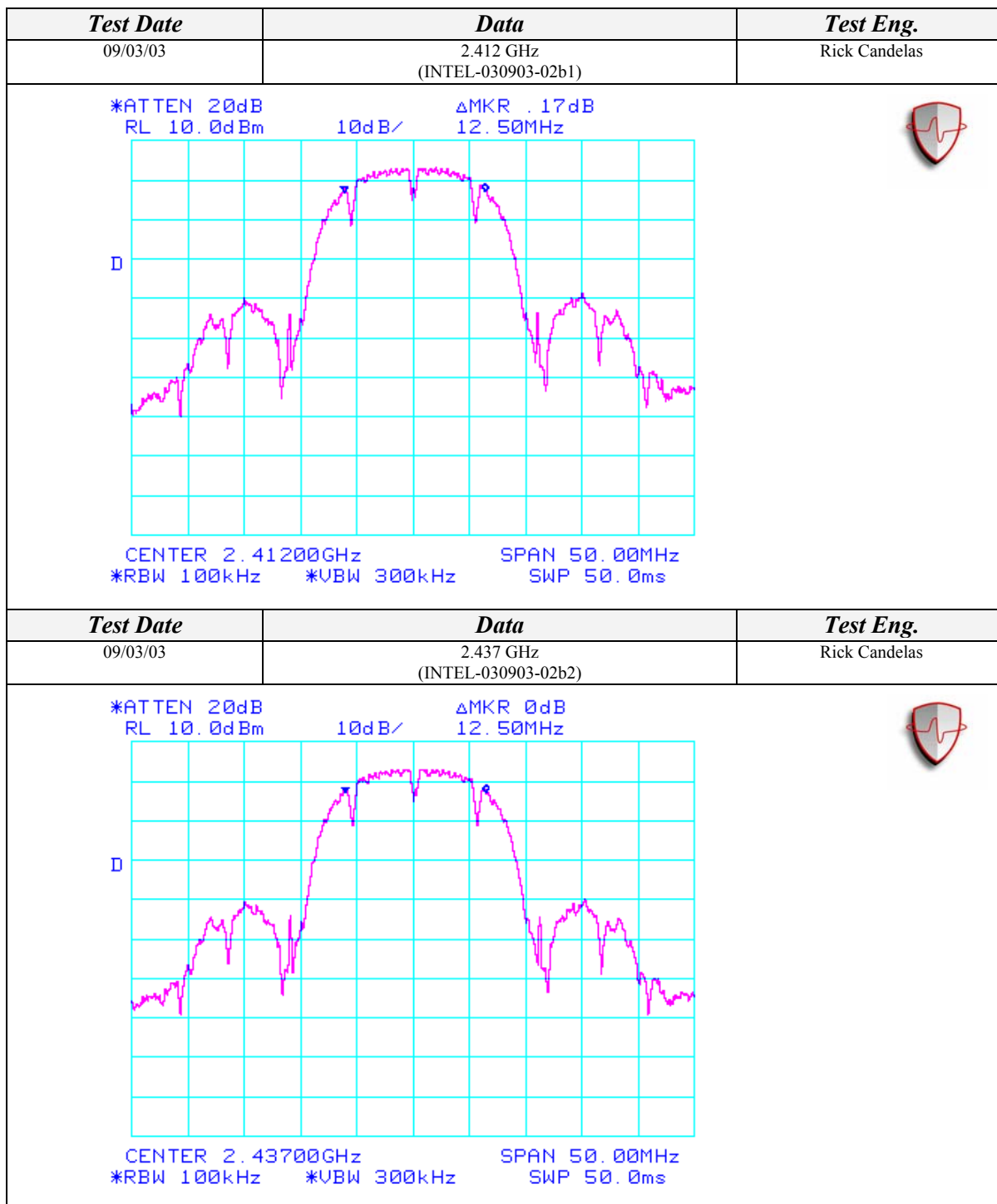
Standard:	FCC CFR 47, Part 15.247(a)(2)
Description:	The minimum 6 dB bandwidth shall be at least 500 kHz.
Results:	12.50 MHz @ 2.412 GHz 12.50 MHz @ 2.437 GHz 12.67 MHz @ 2.462 GHz

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AEGIS LABS INC.

6 dB Emissions Bandwidth (Continued)

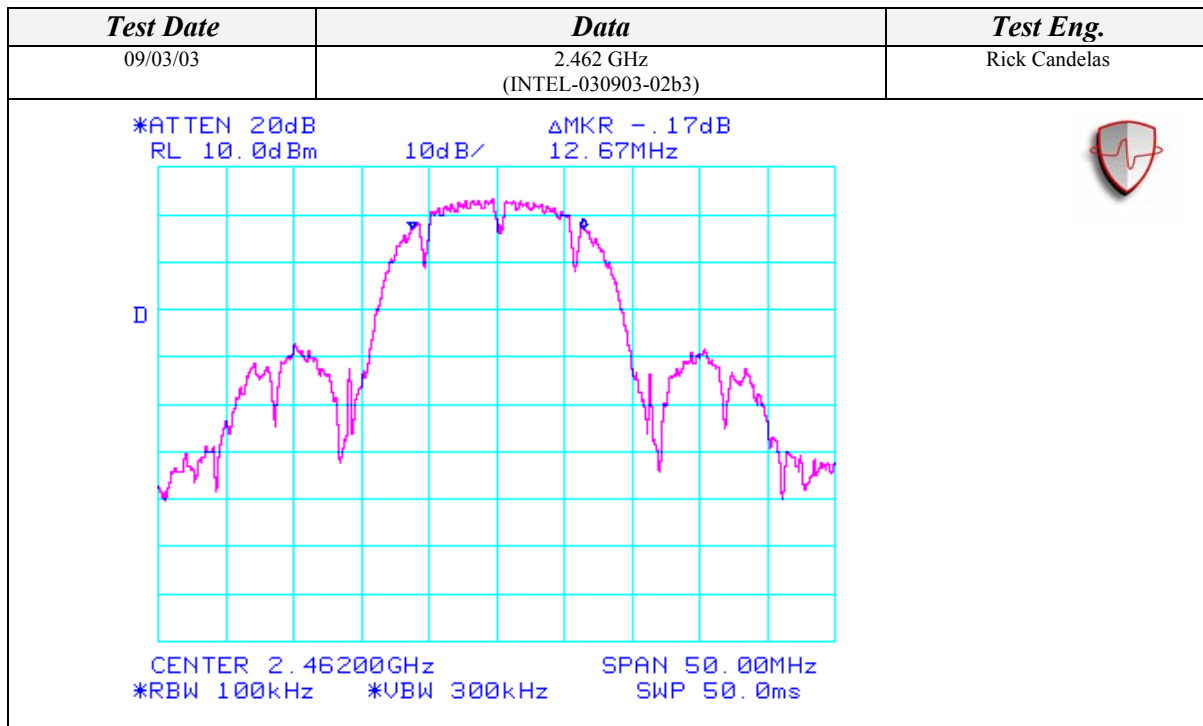


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AEGIS LABS INC.

6 dB Emissions Bandwidth (Continued)





AEGIS LABS INC.

PEAK POWER SPECTRAL DENSITY

CLIENT:	Dell Computer Corporation	DATE:	09/03/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030903-02c
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot.	TEMPERATURE:	23 C
		HUMIDITY:	55% RH
		TIME:	8:00 PM

Standard:	FCC CFR 47, Part 15.247(d)
Description:	The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
Results:	-7.67 dBm @ 2.412 GHz -7.17 dBm @ 2.437 GHz -8.00 dBm @ 2.462 GHz

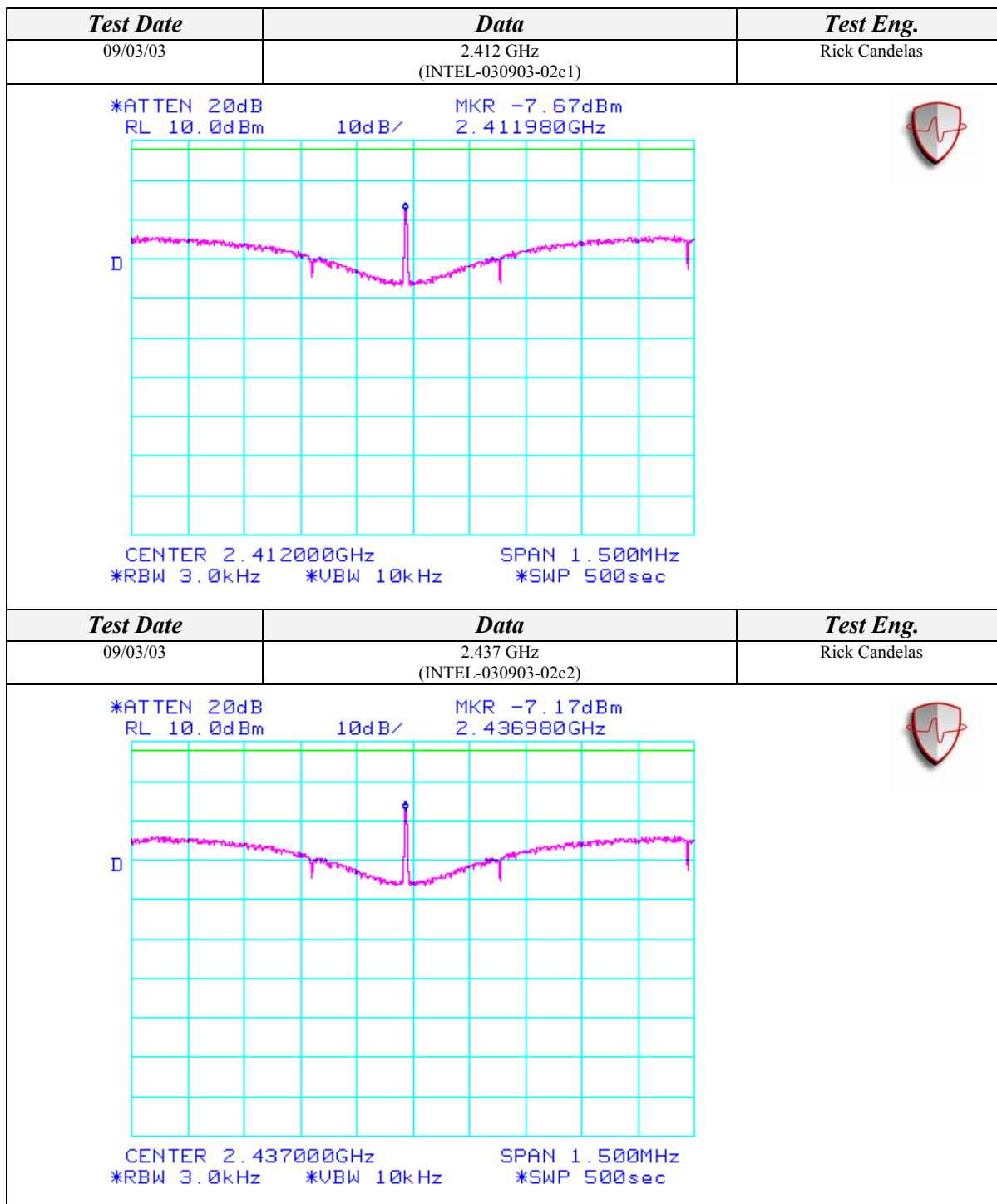
Peak Power Spectral Density Limits	
Frequency (MHz)	Limit (dBm)
2412-2462	8

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AEGIS LABS INC.

Peak Power Spectral Density (Continued)

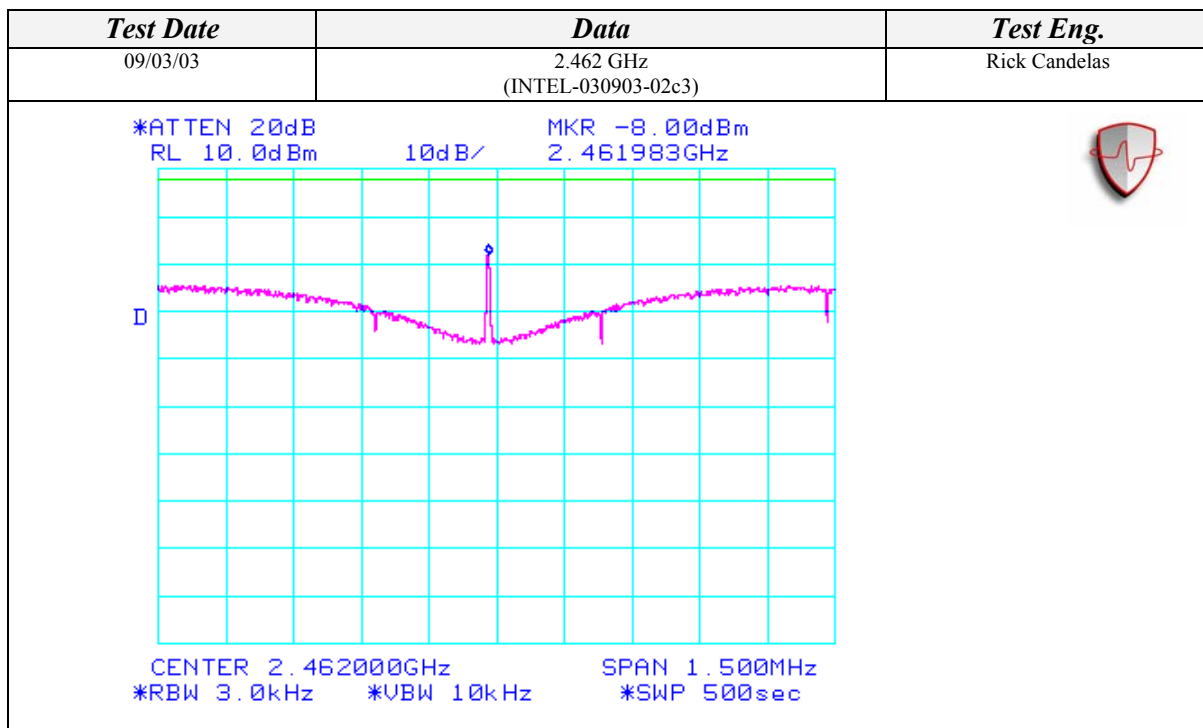


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AEGIS LABS INC.

Peak Power Spectral Density (Continued)





AEGIS LABS INC.

CONDUCTED OUT OF BAND EMISSIONS

CLIENT:	Dell Computer Corporation	DATE:	09/03/03
EUT:	Notebook Computer	PROJECT NUMBER:	INTEL-030903-02d
MODEL NUMBER:	PP10L	TEST ENGINEER:	Rick Candelas
SERIAL NUMBER:	NONE	SITE #:	2
CONFIGURATION:	Tested with an Intel 802.11b MiniPCI Type IIIA Wireless Module installed in its mini PCI slot.	TEMPERATURE:	20 C
		HUMIDITY:	60% RH
		TIME:	9:00 PM

Standard:	FCC CFR 47, Part 15.407(b)(1) and 15.407(b)(2)
Description:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

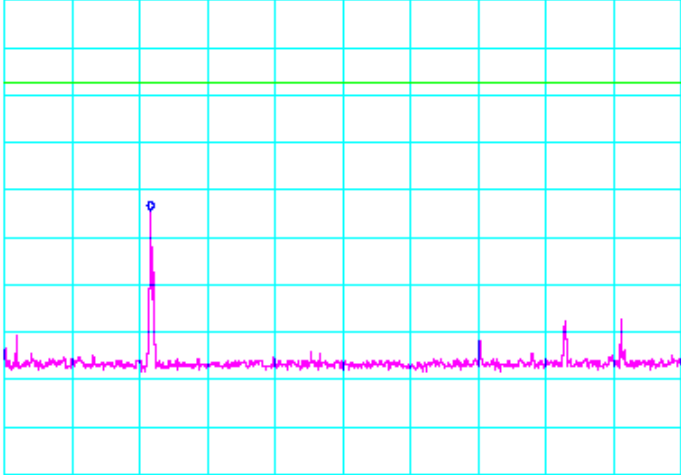
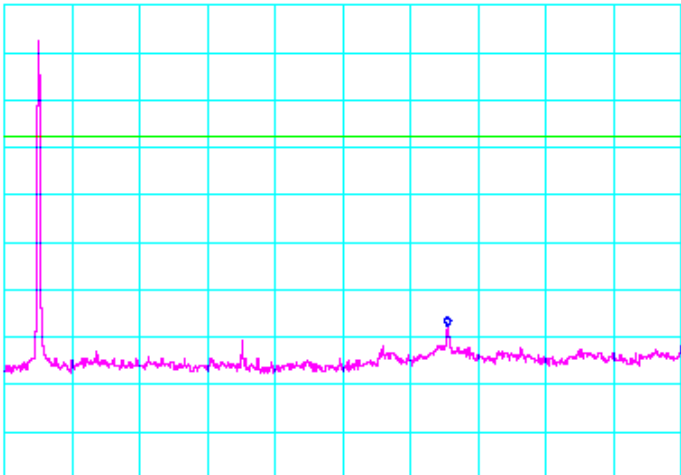
Test Results Summary			
Plot	Channel Frequency (MHz)	Data	Results
INTEL-030903-07d01	2412	30MHz – 2GHz	See Plots
INTEL-030903-07d02		2GHz – 10GHz	See Plots
INTEL-030903-07d03		10GHz – 20GHz	See Plots
INTEL-030903-07d04		20GHz – 26.5GHz	See Plots
INTEL-030903-07d05	2437	30MHz – 2GHz	See Plots
INTEL-030903-07d06		2GHz – 10GHz	See Plots
INTEL-030903-07d07		10GHz – 20GHz	See Plots
INTEL-030903-07d08		20GHz – 26.5GHz	See Plots
INTEL-030903-07d09	2462	30MHz – 2GHz	See Plots
INTEL-030903-07d10		2GHz – 10GHz	See Plots
INTEL-030903-07d11		10GHz – 20GHz	See Plots
INTEL-030903-07d12		20GHz – 26.5GHz	See Plots

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AEGIS LABS INC.

Conducted Out Of Band Emissions (Continued)

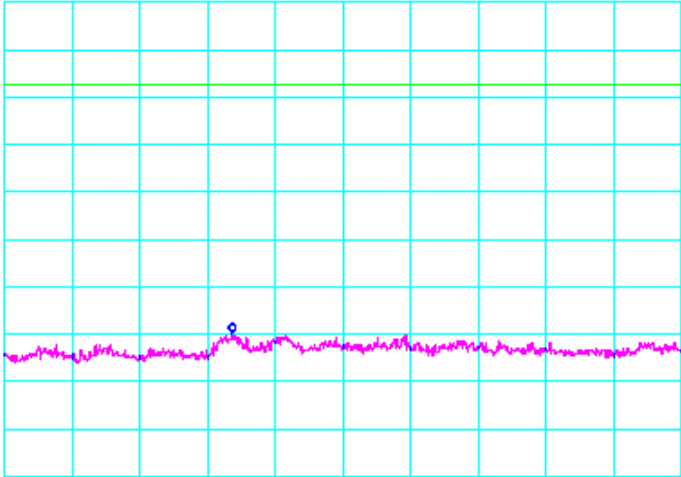
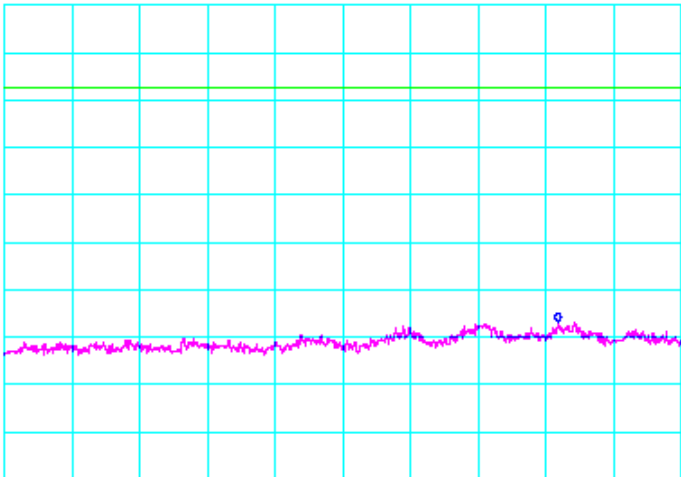
Test Date	Data	Test Eng.
09/03/03	2.412 GHz (INTEL-030903-02d01)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -44.33dBm 457MHz  START 30MHz STOP 2.000GHz *RBW 100kHz *VBW 300kHz SWP 1.10sec		
Test Date	Data	Test Eng.
09/03/03	2.412 GHz (INTEL-030903-02d02)	Rick Candelas
*ATTEN 20dB RL 10.0dBm 10dB/ MKR -57.67dBm 7.240GHz  START 2.000GHz STOP 10.000GHz *RBW 100kHz *VBW 300kHz SWP 4.40sec		

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AEGIS LABS INC.

Conducted Out Of Band Emissions (Continued)

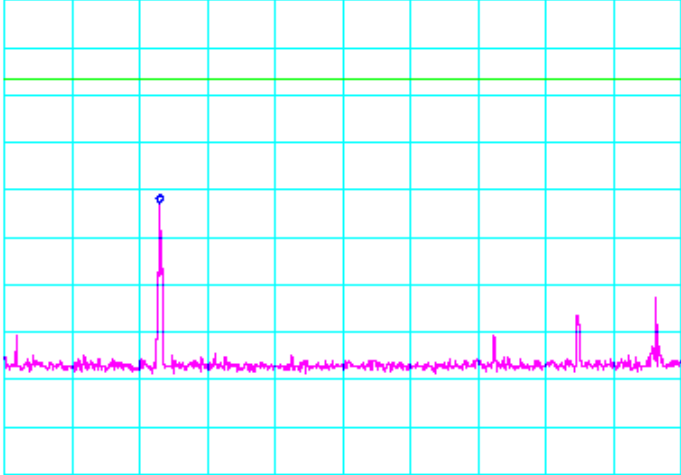
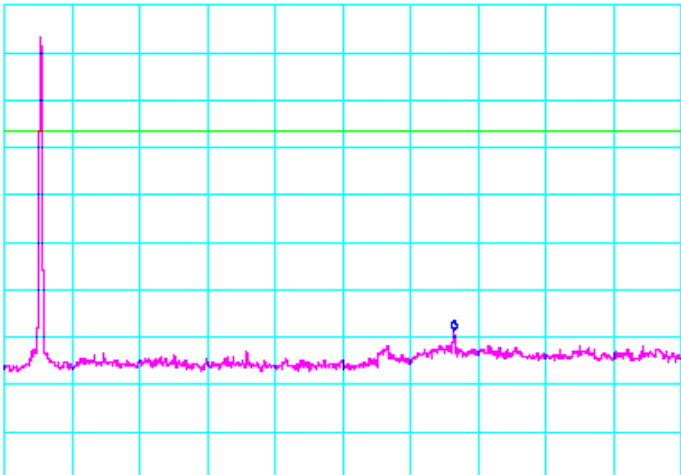
Test Date	Data	Test Eng.
09/03/03	2.412 GHz (INTEL-030903-02d03)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -69.67dBm 13.37GHz  START 10.00GHz STOP 20.00GHz *RBW 100kHz *VBW 300kHz SWP 5.50sec 		
Test Date	Data	Test Eng.
09/03/03	2.412 GHz (INTEL-030903-02d04)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -66.83dBm 25.319GHz  START 20.000GHz STOP 26.500GHz *RBW 100kHz *VBW 300kHz SWP 3.60sec 		

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AEGIS LABS INC.

Conducted Out Of Band Emissions (Continued)

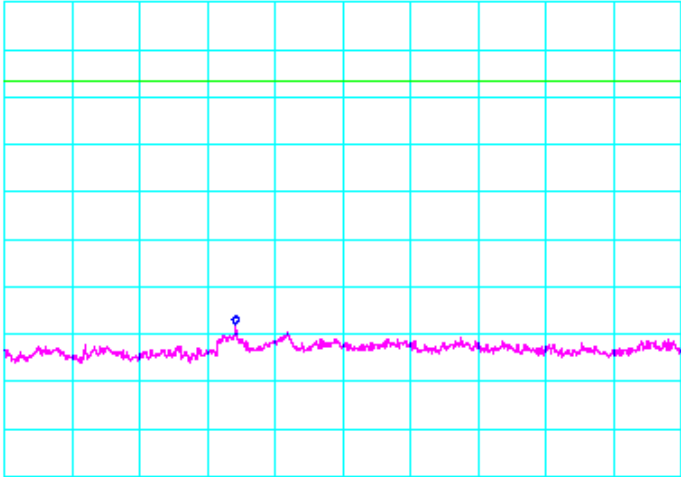
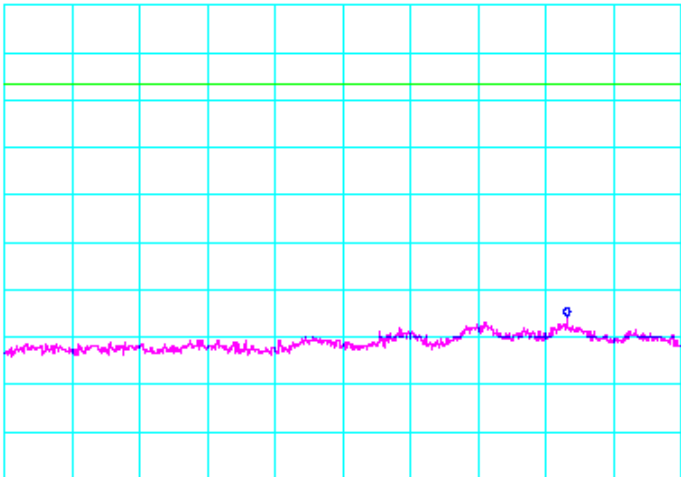
Test Date	Data	Test Eng.
09/03/03	2.437 GHz (INTEL-030903-02d05)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -42.83dBm 483MHz  START 30MHz STOP 2.000GHz *RBW 100kHz *VBW 300kHz SWP 1.10sec		
Test Date	Data	Test Eng.
09/03/03	2.437 GHz (INTEL-030903-02d06)	Rick Candelas
*ATTEN 20dB RL 10.0dBm 10dB/ MKR -58.67dBm 7.320GHz  START 2.000GHz STOP 10.000GHz *RBW 100kHz *VBW 300kHz SWP 4.40sec		

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AEGIS LABS INC.

Conducted Out Of Band Emissions (Continued)

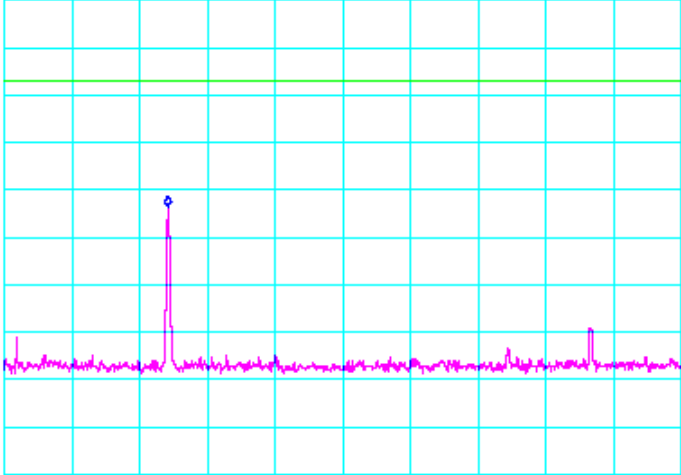
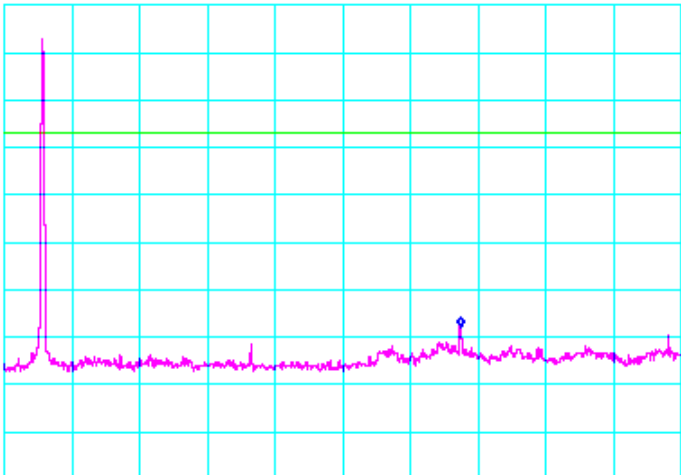
Test Date	Data	Test Eng.
09/03/03	2.437 GHz (INTEL-030903-02d07)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -68.00dBm 13.42GHz  START 10.00GHz STOP 20.00GHz *RBW 100kHz *VBW 300kHz SWP 5.50sec 		
Test Date	Data	Test Eng.
09/03/03	2.437 GHz (INTEL-030903-02d08)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -65.67dBm 25.406GHz  START 20.000GHz STOP 26.500GHz *RBW 100kHz *VBW 300kHz SWP 3.60sec 		

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AEGIS LABS INC.

Conducted Out Of Band Emissions (Continued)

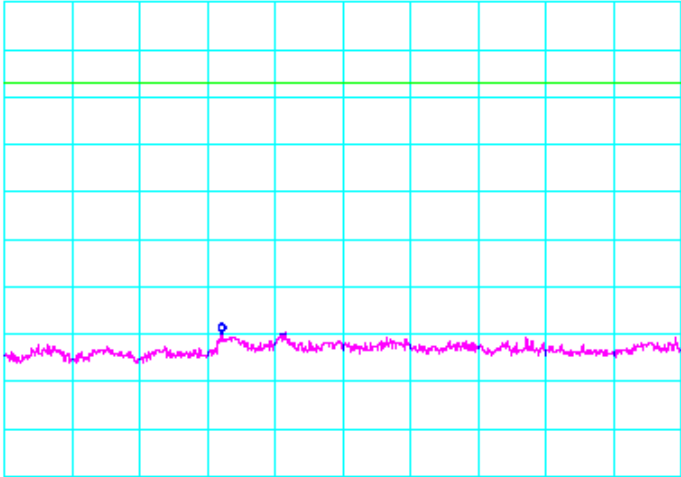
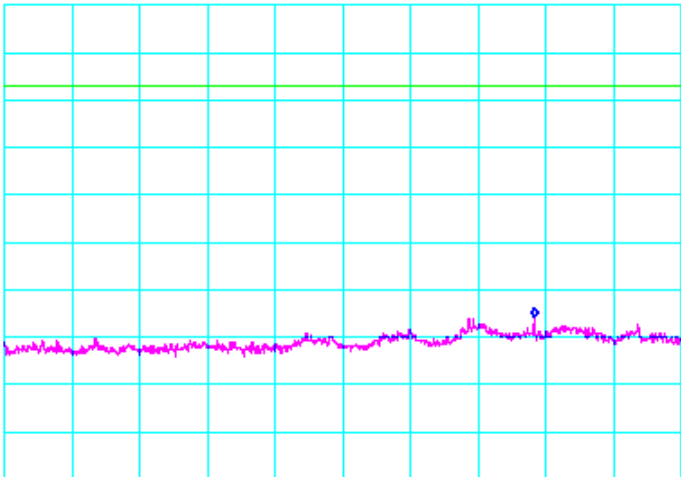
Test Date	Data	Test Eng.
09/03/03	2.462 GHz (INTEL-030903-02d09)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -43.50dBm 506MHz  START 30MHz STOP 2.000GHz *RBW 100kHz *VBW 300kHz SWP 1.10sec 		
Test Date	Data	Test Eng.
09/03/03	2.462 GHz (INTEL-030903-02d10)	Rick Candelas
*ATTEN 20dB RL 10.0dBm 10dB/ MKR -57.83dBm 7.400GHz  START 2.000GHz STOP 10.000GHz *RBW 100kHz *VBW 300kHz SWP 4.40sec 		

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AEGIS LABS INC.

Conducted Out Of Band Emissions (Continued)

Test Date	Data	Test Eng.
09/03/03	2.462 GHz (INTEL-030903-02d11)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -69.67dBm 13.22GHz  START 10.00GHz STOP 20.00GHz *RBW 100kHz *VBW 300kHz SWP 5.50sec		
Test Date	Data	Test Eng.
09/03/03	2.462 GHz (INTEL-030903-02d12)	Rick Candelas
*ATTEN 10dB RL 0dBm 10dB/ MKR -65.83dBm 25.092GHz  START 20.000GHz STOP 26.500GHz *RBW 100kHz *VBW 300kHz SWP 3.60sec		

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