



**AEGIS LABS INC.**

## Test Report

Pertaining To:

Equipment Under Test	Model Number	Serial Number
Intel PRO/Wireless 3945ABG Network Connection	WM3945ABG	00B11A295CVD26965002

### *MEASUREMENTS PERFORMED IN ACCORDANCE WITH*

#### **International Regulatory Standard(s)**

**FCC CFR 47, PART 15 SUBPART B CLASS B**



Certificate Number: 1111.01

**PREPARED FOR:**

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**PREPARED BY:**

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Test Report #: INTEL-050903F

Test Report Revision: N/A

	REPORT BODY	APPENDICES				TOTAL PAGES
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	
PAGES	27	6	5	3	4	45

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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 by RF technicians and engineers with accredited qualifications and training credentials to carry out their duties. The object of this report is to present test results which shall prove that the conducted and radiated emission levels of the EUT are within the acceptable limits as specified under Section 2.0 pertaining to indexed items 1-5 of this report.

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 global emissions standard as described below. However, the format and contents contained within this report do not reflect all the information required for agency submittals when certification for equipment authorization is mandatory. The entity and/or person(s) for which this report has been prepared acknowledge that such a report in its entirety has been recognized for verification purposes only. The test results contained in this report are only representative of the test sample tested as described in Section 6.0 of this report

The following countries shall accept this report as evidence that an accredited commercial EMC laboratory has properly tested the EUT and that the information contained herein can be used for application to the appropriate agency for which certification or approval is required. This information may be used by the manufacturer to make a self-declaration that this equipment can be marketed to the countries that recognize national laws that meet the conditions of a (1) Mutual Recognition Agreements, (2) EMC Directive or (3) equivalent bi-lateral agreement. The test results provided within this report, indicate that the information technology equipment has been found to be in **COMPLIANCE** with the test specifications based upon the following global RF compliance standards:

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

EMISSIONS STANDARD	CLASS	TEST RESULTS
FCC CFR 47, Part 15 Subpart B	B	PASSED

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## 2.0 SUMMARY OF REGULATORY LIMITS

Index	Regulatory Standard	<sup>1</sup> Class A Equipment Test Limits		Results
1	<b>CONDUCTED EMISSIONS:</b> Federal Communications Commission PART 15 INDUSTRY CANADA, ICES-003	0.15 MHz - 0.499 MHz	66.0 dBuV (QP), 56.0 dBuV (AVG)	PASSED
		0.50 MHz – 4.999 MHz	56.0 dBuV (QP), 46.0 dBuV (AVG)	
		5.00 MHz – 30.00 MHz	60.0 dBuV (QP), 50.0 dBuV (AVG)	
2	<b>RADIATED EMISSIONS:</b> Federal Communications Commission PART 15 INDUSTRY CANADA, ICES-003	<sup>2</sup> 30.0 MHz - 230.0 MHz 230.0 MHz - 1000.0 MHz	30.0 dBuV (QP) 37.0 dBuV (QP)	PASSED

<sup>1</sup> Equipment that complies with these limits is subject to use in only commercial environments.

<sup>2</sup> The Rx Antenna and EUT were spaced 10m apart on the Open Area Test Site.

<sup>3</sup> The Rx Antenna and EUT were spaced 3m apart on the Open Area Test Site.



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### 3.0 DEFINITIONS

digital device: An unintentional radiator (device or system) that uses digital techniques and generates and uses timing signals or pulses at a rate in excess of 9000 pulses (cycles) per second; inclusive of telephone equipment that uses digital techniques or any device or system that generates and uses RF energy for the purpose of performing data processing functions, such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval, or transfer (FCC 47CFR Part 15).

electromagnetic disturbance: Any electromagnetic phenomena that may degrade the performance of a device, piece of equipment, or system, or adversely affect living or inert matter.

equipment under test: A device or system being evaluated for compliance that is representative of a product to be marketed.

host: A device to which other devices (peripherals) are connected and that generally controls those devices.

incidental radiator: A device that produces RF energy during the course of its operation, although the device is not intentionally designed to generate or emit RF energy. Examples of incidental radiators are dc motors, mechanical light switches and so on.

normalized site attenuation: Site attenuation divided by the antenna factors of the radiating and receiving antennas (all in linear units)

reference ground plane: A conducting flat surface or plate that is used as a common reference point for circuit returns and electric or signal potentials and that reflects electromagnetic waves.

tabletop device: A device designed to be placed and normally operated on the raised surface of a table, e.g., most personal computers.

unintentional radiator: A device that generates RF energy for use within the device, or that sends RF signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction. (FCC 47CFR Part 15).

circuit power factor: the circuit power factor is the ratio of the measured active input power to the product of the supply voltage (r.m.s.) and the supply current (r.m.s.)

active power: the mean value, taken over one period, of the instantaneous power. Note: the active input power is the active power measured at the input supply terminals of the equipment under test.

total harmonic current: the total r.m.s. value of the harmonic current components of orders 2 to 40.

partial odd harmonic current: the total r.m.s. value of the odd harmonic current components of orders 21 to 39.

voltage fluctuation: series of changes of r.m.s. voltage evaluated as a single value for each successive half-period between zero crossing of the source voltage.

flicker: impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.

r.m.s. voltage shape: the time function of the r.m.s. voltage, evaluated as a single value for each successive half period between zero-crossings or the source voltage

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#### 4.0 APPROVAL SIGNATURES

**Prepared By:**

  
**Johnny Candelas**  
Test Technician  
Aegis Labs, Inc.

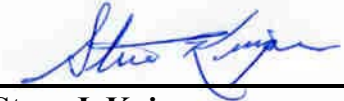
**09/23/05**  
**Date:**

**Reviewed By:**

  
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Lab Manager  
Aegis Labs, Inc.

**09/23/05**  
**Date:**

**Report Approved By:**

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

**09/23/05**  
**Date:**



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## 5.0 ADMINISTRATIVE DATA AND TEST DESCRIPTION

DEVICE TESTED:	ITE Type: Intel PRO/Wireless 3945ABG Network Connection Model Number(s): WM3945ABG Serial Number: 00B11A295CVD26965002
DATE EUT RECEIVED:	June 22 <sup>nd</sup> , 2005
TEST DATE(S):	July 26- September 7, 2005
ORIGIN OF TEST SAMPLE(S):	Production Sample
EQUIPMENT CLASS:	EUT tested as CLASS B device.
RESPONSIBLE PARTY:	Intel Corporation 2111 NE 25 <sup>th</sup> Avenue Hillsboro, Oregon 97124
CLIENT CONTACT:	Mr. Robert Paxman
MANUFACTURER:	Intel Corporation
TEST LOCATION:	Aegis Labs, Inc. 32231 Trabuco Creek Road Trabuco Canyon, CA 92678 Conducted Site #2 Radiated Site #2
A2LA CERTIFICATE:	A2LA Certificate Number: 1111.01, Valid through February 28, 2006
PURPOSE OF TEST:	To demonstrate compliance with the standards as described in Sections 1.0 & 2.0 of this report.
UNCERTAINTY BUDGET:	Proficiency Testing and Uncertainty Calculations for all tests indicated in this report have been conducted in accordance with ISO 17025:1999 requirements Section 5.5.4, 5.5.1 and 5.9. Uncertainty Budgets and Proficiency Test results available upon request.
STATEMENT OF CALIBRATION:	All accredited equipment calibrations were performed by Liberty Labs, Inc. and World Cal. with typical calibration uncertainty estimates derived from ISO Guide to the determination of uncertainties with a Coverage Factor of k=2 for 95% level of confidence.

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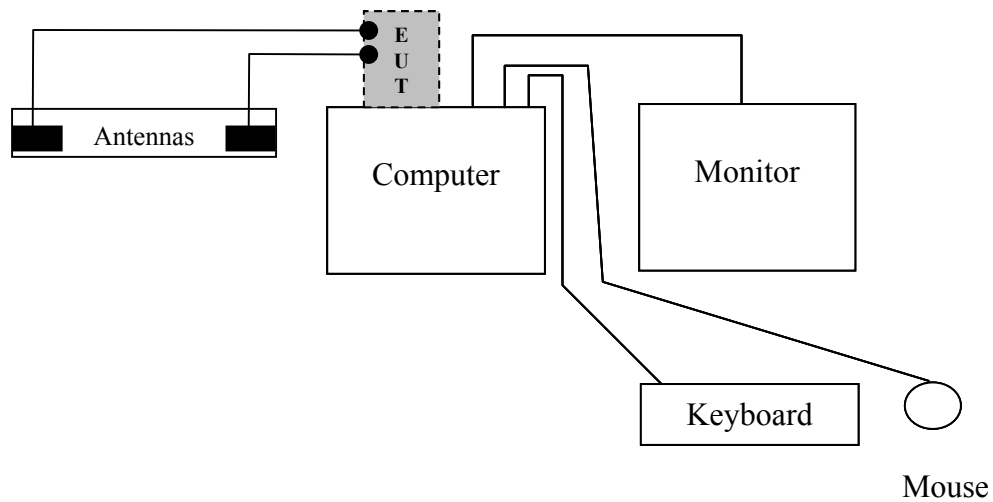




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## 6.0 DESCRIPTION OF EUT CONFIGURATION

### 6.1 Arrangement and Location of EUT and Host Equipment



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## 6.2 EUT Description and Configuration

### Equipment Under Test (EUT): Intel PRO/Wireless 3945ABG Network Connection

Test Software & Firmware:	Intel Corporation Software (GRTT Ver. 1.1.1)
Number of External Test Ports Exercised	2 Antenna Ports
Power Supply Voltage applied to EUT during qualification measurements	Conducted: 120VAC Radiated: 120VAC
AC Line Filter: Type, Make, Model Number(s), & Manufacturer:	None Identified
Crystal Oscillator(s): Location & Frequency:	N/A

#### 6.2.1 Product Description

The Intel PRO/Wireless 3945ABG Network Connection is an embedded 802.11a/b/g network adapter operating in the 2.4 GHz and 5 GHz spectrums. The EUT is based on the Mini Card form factor designed to meet the space and size requirements for thin and light notebook PCs. It is capable of a data rate of up to 52 Mbps.



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### 6.2.2 EUT Configuration

The EUT was set-up according to the ANSI C63.4: 2003 guidelines for emissions testing. For emissions testing the EUT (Intel PRO/Wireless 3945ABG Network Connection, Model Number(s): WM3945ABG) had antennas connected to its antenna ports.

The EUT was tested installed in the Mini PCI-E slot of the host computer as a modular device using a PCI extender board to extend the EUT outside the computer chassis. The EUT was then connected to a set of antennas via its Main and AUX antenna ports. Data for a set of Ethertronics antennas can be found in Appendix A (Data Sheets)

The low, middle, and high channels were tested in 802.11a, b, & g modes. Also, the EUT was tested once transmitting from the MAIN antenna port and once transmitting from the AUX antenna port. The EUT was placed in either continuous transmit or continuous receive mode by a program provided by the manufacturer (GRTT *Version 1.1.1*).



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### 6.3 List of EUT, Sub-Assemblies, and Host Equipment

#### Equipment Under Test

Manufacturer	Description	Model Number	Serial Number
Intel Corporation	Intel PRO/Wireless 3945ABG Network Connection	WM3945ABG	00B11A295CVD2696 5002

#### EUT Sub-Assemblies

Manufacturer	Description	Model Number	Serial Number
Ethertronics	Main Multi Band Antenna	MPCI01001	N/A
Ethertronics	Auxiliary Multi Band Antenna	MPCI01001	N/A

#### Host Equipment List

Manufacturer	Description	Model Number	Serial Number
Intel	Computer	Generic	IZTGVV4312035
Compaq	Monitor	610	712BC060B526
Logitech	Keyboard	Y-BF37	MCTZ5200581
Logitech	Mouse	M-BJ58	PMA32715049

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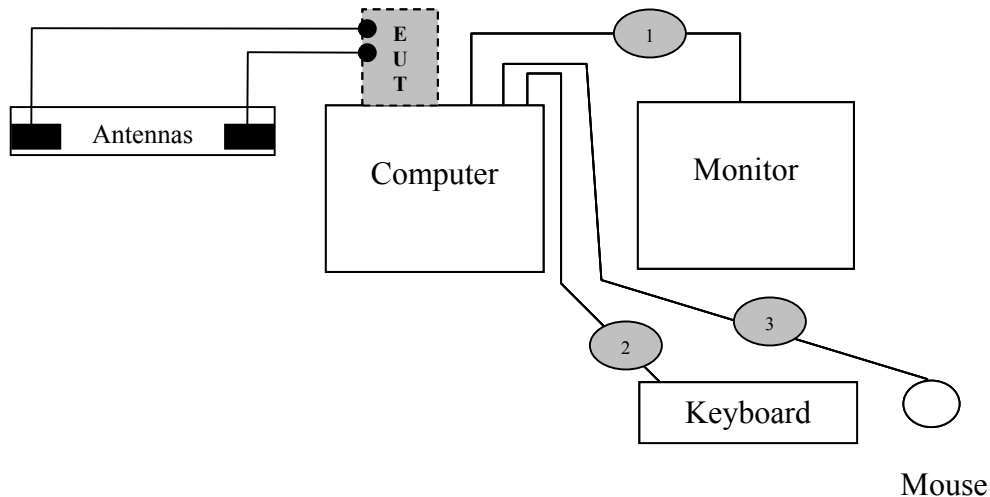
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## 6.4 I/O Cabling Diagram and Description



- Cable 1: This is a 6-foot braid and foil shielded round cable connecting the host computer with the 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 2: This is a 6-foot braid and foil shielded round cable connecting the host computer to the keyboard. It has a metallic 6-pin mini din type connector at the computer end and is hardwired to the keyboard. The shield of the cable is grounded to the chassis of the computer via the connector shell.
- Cable 3: This is a 6-foot braid and foil shielded round cable connecting the host computer to the mouse. It has a metallic 6-pin mini din 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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## 6.5 List of Accessory / Host Equipment – Power Cables

### MAXIMUM *POWER CABLE* CONFIGURATION OF EUT AND ACCESSORY / HOST EQUIPMENT

Power Cable FROM Equipment to “PO or PS”	CABLE DESCRIPTION	LENGT H (m)	SHIELDED? FERRITE? LOCATION?
<i>PO/PS: Abbreviation for Power Outlet or Power Strip (PO/PS)</i>			
EUT	N/A	N/A	N/A
Host Computer	Generic, bundled to 1 meter for conducted testing only	1.5	N/A
Monitor	Generic	1.5	N/A
Keyboard	N/A	N/A	N/A
Mouse	N/A	N/A	N/A

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## 6.6 EMC Test Software and Hardware Measurement Equipment

TEST SOFTWARE AND LAB EQUIPMENT LIST					
Equipment Name	Manufacturer	Model Number	Serial Number	Calibration Due Date	Calibration Cycle
Spectrum Analyzer	Agilent	8565EC	3946A00245	07/29/06	1 Year
Preamp	Aegis Preamplifier	Aegis-Oats1-1-18	001	07/27/06	1 Year
2.4 GHz Notch Filter	Micro-Tronics	BRM50702-02	003	04/21/06	1 Year
5.15-5.35 GHz Notch Filter	Microwave Circuits	N0452502	3173-01	06/27/06	1 Year
5.725-5.850 GHz Notch Filter	Microwave Circuits	N0257881	3173-01	06/27/06	1 Year
Horn Antenna	ETS	DRG 3117	29614	07/23/06	1 Year
Antenna - 18-26.5 GHz Pre-amplified Horn	Aegis Labs, Inc.	H042	SLK-35-3W	11/04/05	1 Year
Antenna - 26.5-40 GHz Pre-amplified Horn	Aegis Labs, Inc.	H028	GM1260-10	11/04/05	1 Year
Cable	Semflex	60637	S1L29BFS1348	04/11/06	1 Year
Temperature/Humidity Monitor	Dickson	TH550	7255185	N/A	N/A
Power Meter	Anritsu	ML2487A	6K00001785	04/12/06	1 Year
Wide Bandwidth Sensor	Anritsu	MA2491A	31193	04/12/06	1 Year
12dB Attenuator	Narda	4779-12	203	08/06/06	1 Year
Antenna - Biconical	EMCO	3110	9108-1421	05/17/06	1 Year
Antenna - Log Periodic	EMCO	3148	4947	05/11/06	1 Year
LISN (EUT)	FCC	FCC-LISN-50-25-2	9931	02/06/06	1 Year
LISN (Access)	Com-Power	LI-200	12019	07/05/07	1 Year
LISN (Access)	Com-Power	LI-200	12018	07/05/07	1 Year

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## 6.7 Operating Modes

### 6.7.1 Conducted and Radiated Emissions

The EUT was configured in a mode consistent with its operation by the end-user. The EUT (Intel PRO/Wireless 3945ABG Network Connection, Model Number(s): WM3945ABG) was exercised continuously by a test program provided by Intel Corporation, which exercised all the appropriate ports. The EUT operated continuously during all facets of testing.

All final peak, quasi-peak or average measurements and or levels were recorded using the following software and peripherals as follows:

I/O PORT (S) / ACCESSORY EQUIPMENT EXERCISED DURING TESTING		
Peripherals or Components	Intel Corporation Software	
	<sup>3</sup> Passive	<sup>4</sup> Active
EUT		√
Host Computer		√
Monitor		√
Keyboard	√	
Mouse	√	

<sup>3</sup> For the purposes of this report, ACTIVE refers to any device or component that will receive, transmit or pass through data without the need for the user to manually activate the device.

<sup>4</sup> For the purpose of this report, PASSIVE refers to any device tested that is idle of any data transmission and functions primarily as “dummy” termination.





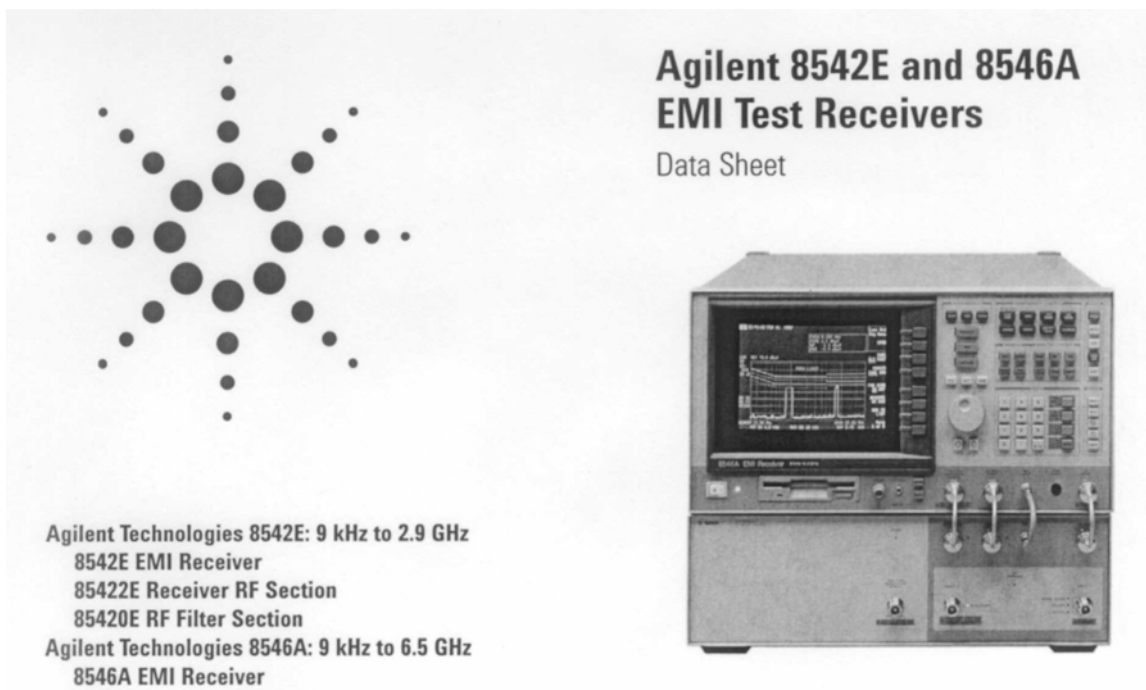
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## 7.0 TEST EQUIPMENT SETTINGS AND FUNCTIONS (RF Emissions)

### 7.1 Test Equipment “State of the Instrument for Conducted Emission Measurements”

Conducted Test:

SITE #1 & #2: The Agilent EMI 8546A Receiver Series is a high-performance test receiver especially designed for making commercial EMI (Electro-Magnetic Interference) measurements. It fully conforms to the receiver standards described in CISPR (Comite' International Special Des Perturbations Radioelectriques) Publication 16, C.I.S.P.R. Specification for Radio Interference Measuring Apparatus and Measurement Methods. This type of receiver is used for making measurements according to various governmental standards, such as FCC, EN and VCCI regulations. The HP 8546A tunes from 9kHz. To 6.5 GHz. making it suitable for testing a wide variety of products including but not limited to intentional and unintentional radiators.



### HP 8546A Standard Test Configurations

MENU LABEL Start/Stop Frequency	IF Bandwidth	Averaging Bandwidth	Reference Level
9 kHz-150 kHz	200 Hz. CISPR	300 Hz	70 dBuV
150 kHz – 30 MHz	9 kHz CISPR	30 kHz	75 dBuV
30 MHz – 300 MHz	120 kHz CISPR	300 kHz	80 dBuV
200 MHz – 1 GHz.	120 kHz CISPR	300 kHz	80 dBuV

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## 7.1 Test Equipment “State of the Instrument for Conducted Emission Measurements” (Continued)

User-defined test parameters based upon the previous table were loaded into the instrument for pre-qualification and qualification testing. The peak, quasi-peak and/or average detector were used according to Section 4.2. For testing performed between 150 kHz and 30 MHz, the EMI Receiver performed a swept frequency measurement with the following EMI Receiver settings:

Function	Setting
REF OFFST	10.0 dB
REF	85.0 dBuV
ATTEN	10 dB
IF BW	9.0 kHz
AVG BW	30 kHz
SWP	2.49 SEC
SPAN	30 MHz
ACTIVE DETECTOR	PK

In reference to the LISN used during testing, the 1uF capacitor in combination with the 50uH inductor is the filter that isolated the mains from the EUT. Consequently, the 50uH inductor isolated the noise generated by the EUT from the mains. The 0.1uV couples the noise generated by the EUT to the EMI Receiver. At frequencies above 150 kHz, the EUT signals are presented with a 50-ohm impedance. The purpose of using the transient limiter is to protect the input of the EMI Receiver from large transients when connected to the LISN. The transient limiter incorporates a limiter, high pass filter, and an attenuator. Lastly, a low loss 50-ohm cable was connected between the transient limiter and LISN.

After the swept frequency scan was performed for both L1 and L2 the six highest readings against the Reference Level were recorded in the data sheet along with a snapshot image of the sweep scan.

Upon completion of the swept frequency scan, the six highest peaks against the reference level were re-measured in manual mode and recorded in the Microsoft Windows Excel “.xls.” spreadsheet.

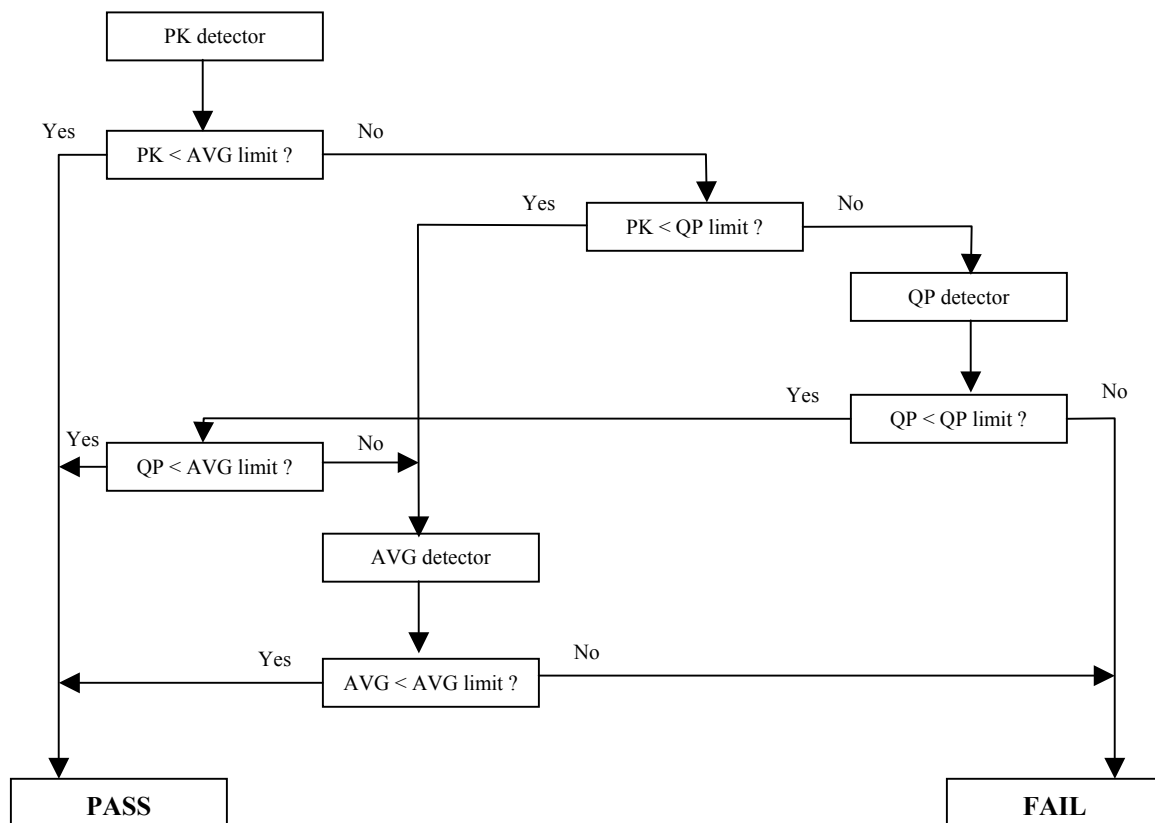
The graphical scans in Appendix A only reflect peak readings while the tabulated data sheets reflect either peak, average, and/or quasi-peak measurements.

Upon completion of the swept frequency scan, the six highest peaks against the reference level were re-measured in manual mode and recorded in the Microsoft Windows Excel “.xls.” spreadsheet.

The graphical scans in Appendix A only reflect peak readings while the tabulated data sheet reflects either peak, average, and/or quasi-peak measurements.



## 7.2 Decision Tree for Peak Detector Measurements



PK – Peak  
QP – Quasi-Peak  
AVG – Average



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### 7.3 Test Equipment “State of the Instrument for Radiated Emission Measurements”

Radiated Test: (30 MHz. – 1000 MHz.)

SITE #1 & SITE #2: The Agilent EMI 8546A Receiver and 8568B/85460A/85685A Series Receiver(s) were independently certified to meet the CISPR-16 requirements by the German BZT (Bundesamt für Zulassungen der Telekommunikation, the German Appeals Office for Telecommunications). Additionally the receiver characteristics were verified/calibrated by an independent third party ISO 17025-calibration laboratory. Because of the added complexity of the open-air ambient environment, which can interfere with the device under test, the receiver in conjunction with a low ambient environment facility and trained personnel were an excellent combination to ensure accurate and repeatable measurements. Specifically, to make an accurate measurement when necessary, the receiver was placed in linear mode and caution was exercised to ensure that the receiver was not in saturation at the front-end mixer because of potential large narrowband or broadband emissions. A useful overload detection scheme was employed to alert the measurement technician of any overload conditions in all frequency ranges and in all modes of receiver operation. The advanced overload detection and measurement scheme were “auto ranged” or automatically put in enough attenuation prior to the first mixer to measure the signal in non-overload conditions. However, the ambient noise floor level of the Aegis Labs Open Area Test Sites (OATS) is substantially lower than most thereby requiring little attention to be paid to the overload condition.

The receiving (Rx) antenna(s) was placed 10m from the nearest side of the EUT facing the Rx antenna. The EUT (if floor-standing) was placed directly on the flush-mounted 360 degree rotating turntable. The EUT (if table-top) was placed directly on an 80cm high non-metallic table, and the table was placed on the rotating turntable. During the initial EMI scan, all the suspect frequencies, i.e.; harmonics, broadband signals were checked with the Rx broadband antennas in both vertical and horizontal polarities. The biconical Rx and log periodic Rx antennas were used from 30 MHz. – 299.99 MHz. and from 300 MHz. – 999.99 MHz.

Upon completion of all harmonic and broadband measurements, the balances of any remaining frequencies were checked between 30 MHz. – 999.99 MHz. Any signals appearing within 20 dB of the classification limit A or B were measured. Each signal was maximized by first rotating the turntable at least 360 degrees and recording the azimuth in the data sheet. Lastly, the Rx antenna was raised and/or lowered to maximize the signal elevation. If the measured signal was obtained using the peak detector and that signal appeared within 3 dB of the regulatory limit line, then the same signal was re-measured using the quasi-peak detector on the EMI receiver. Both meter readings if necessary were recorded on the data sheet. In the case of measuring around ambient signals several methods were employed to ensure accuracy including but not limited to using the “Signal Substitution Method” with the Rx antenna placed at 3m from the EUT, the “Marker Delta Method” or a “Logarithmic Calculation Method” for either broadband or narrowband signals.

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#### 7.4 Conducted Emissions Test Setup

The Equipment Under Test (EUT) shall be 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 C63.4-2003. The EUT shall have a minimum of at least one test configuration identified on the Engineering Data Sheets of said report. These are either in a tabletop setup as shown on following page or in a freestanding configuration as required for floor-standing systems. The test data shall be collected using the appropriate EMI Receiver System as described in Section 4.1.

The Conducted Test for tabletop configurations shall be performed on 2 each galvanized sheets measuring 10mm thickness X 8.0 FT.X 10.0 FT. situated in a vertical and horizontal position diagramed in Section 7.5 of this report. The horizontal-conducting plane extends at least 1.5 meters beyond the all four sides of the EUT. For tabletop equipment, a non-metallic table rests on top of the ground plane extending 40 cm from and parallel to the vertical plane.

The EUT shall be powered through an appropriate Line Impedance Stabilization Network (LISN), bonded to the ground plane as described in ANSI C63.4-2003. The LISN power shall be isolated from other filtered power via an additional filter to ensure that RFI from the auxiliary instrumentation or support equipment does not influence the readings obtained. The power input cables to the LISN and the EMI equipment shall be arranged so that they will not influence the measurement results. Any excess power cord shall be folded back and forth to form a 30-cm non-inductive bundle. When applicable the telecom port of the EUT shall be connected to the accessory equipment via a two balanced telecom pairs ISN, which is bonded to the horizontal ground plane as described in CISPR22. The Automated Aegis/LabView Software (ALVS) measurement system was located outside the sphere during the test.

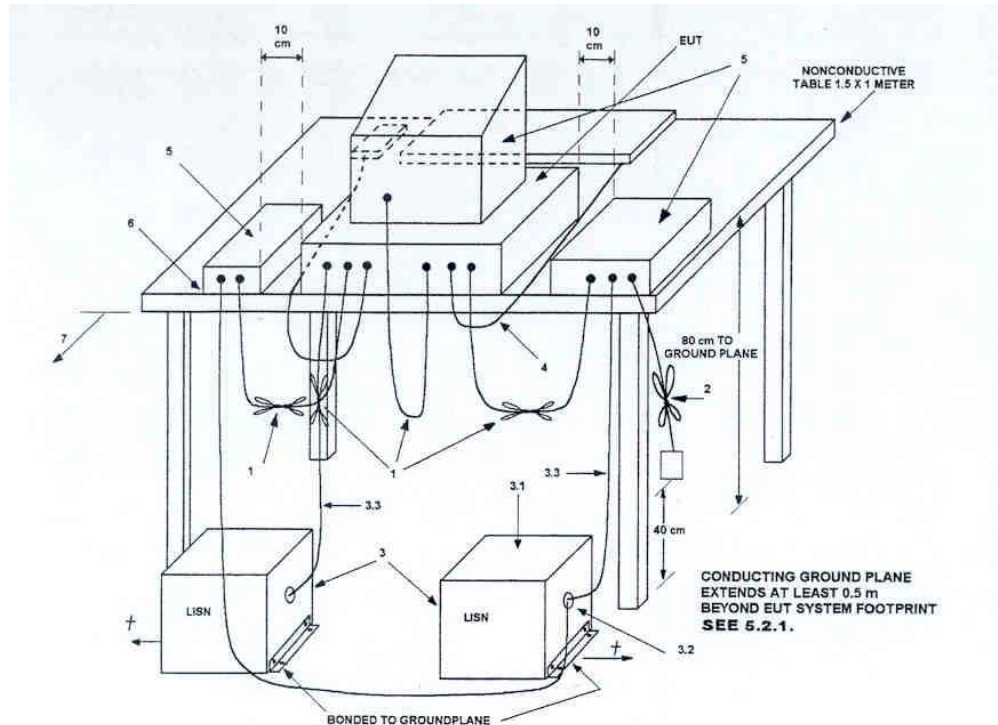
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*Revision Number: N/A*



## 7.5 Conducted Emissions Site Diagram



### LEGEND:

- 1) Interconnecting cables that hang closer than 40 cm to the groundplane shall be folded back and forth in the center forming a bundle 30 to 40 cm long (see 6.1.4 and 11.2.4).
- 2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m (see 6.1.4).
- 3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50  $\Omega$ . LISN can be placed on top of, or immediately beneath, reference groundplane (see 5.2.3 and 7.2.1).
  - 3.1) All other equipment powered from additional LISN(s).
  - 3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
  - 3.3) LISN at least 80 cm from nearest part of EUT chassis.
- 4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use (See 6.2.1.3 and 11.2.4).
- 5) Non-EUT components of EUT system being tested (see also Figure 13).
- 6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop (see 6.2.1.1 and 6.2.1.2).
- 7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the groundplane (see 5.2.2 for options).

**Figure 10a—Test arrangement for conducted emissions**





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## 7.6 Radiated Emissions Test Setup

The Open Area Test Sites (OATS) shall be used for radiated emission testing. These test sites are designed according to ANSI C63.4-2003 and ANSI C63.7-1992 guidelines. The OATS facilities are periodically tested using a calibrated field site source with the resultant test data compiled into a statistical data based used to check the integrity of the test site measurements.

The Measurement procedure shall be in accordance with ANSI C63.4-2003 and ANSI C63.7-1992 requirements. The EUT shall be placed in the prescribed spot of the OATS, (either atop the turntable, or atop the ground plane) where applicable. The following page refers to the setup depicting a typical test configuration; exact EUT set-up is detailed in the Engineering Data Sheets. The turntable shall rotate a minimum of 360 deg. to obtain the highest emissions. During rotation the antenna (s), supported by the mast array shall also be raised and lowered at the test personnel's discretion to identify the maximum energy lobe. See diagram on following page for graphical representation.

For short and permanently connected conductors who cannot be extended by the user with commercially available cables, the EUT shall be tested only with the manufacturer's furnished cables.

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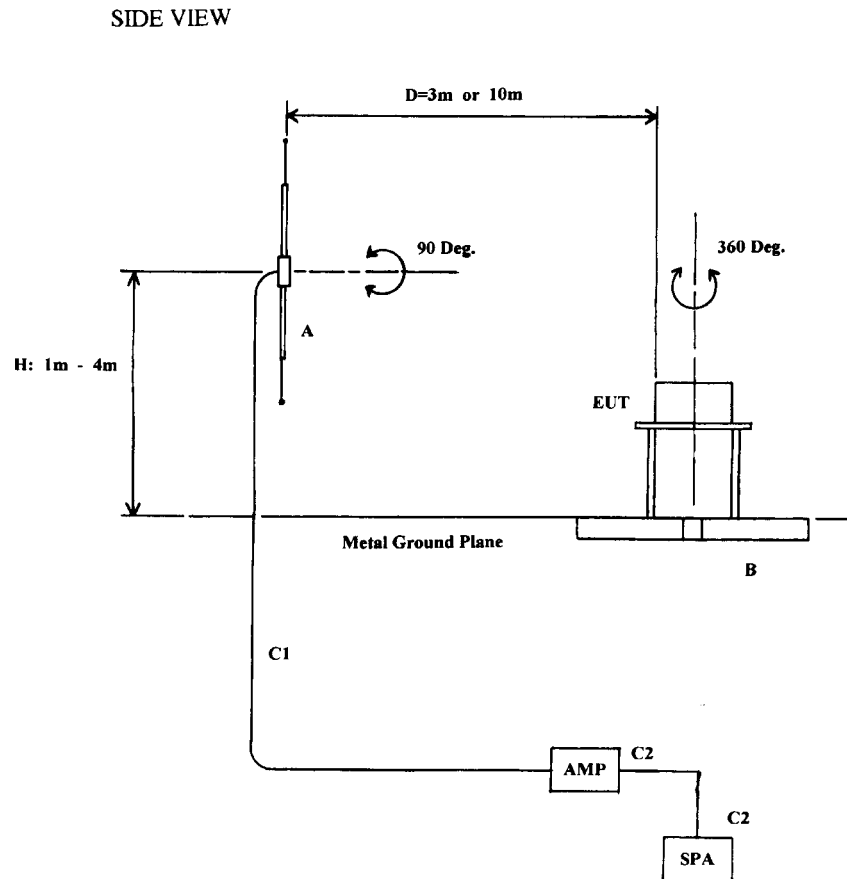
*Report Number: INTEL-050903F*

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## 7.7 Radiated Emissions Site Diagram - Side View and Plan View



**Legend:**

AMP = Amplifier

SPA = Spectrum Analyzer

D = Distance Between EUT and Antenna

A = Closest Antenna Element to EUT.

B = Turntable Flush with Ground Plane.

C1 = Heliax High Freq. Low Loss Cable.

C2 = Belden Low Frequency Coax Cable.

H = Minimum to Maximum Antenna Height

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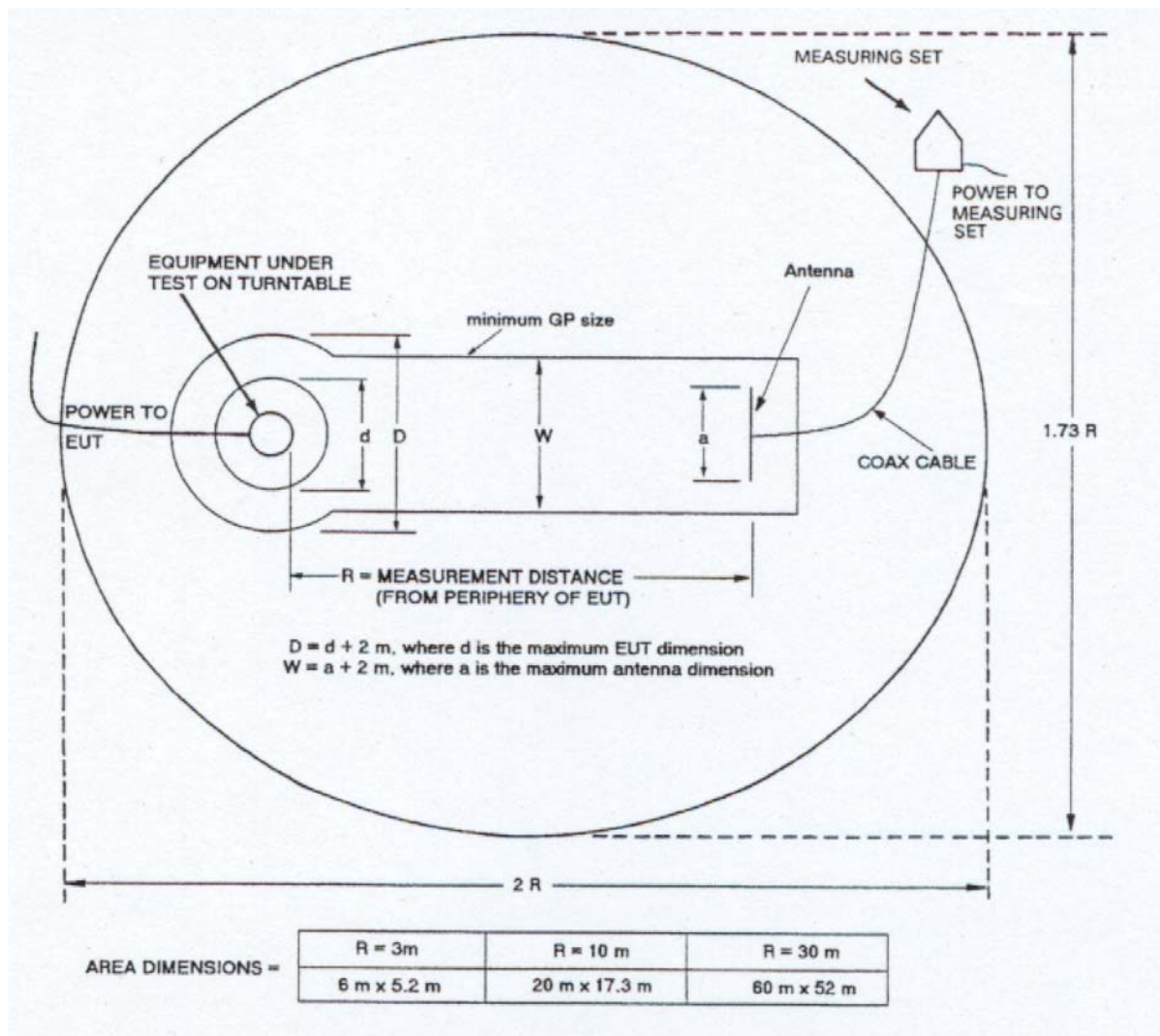
Revision Number: N/A





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## 7.7 Radiated Emissions Site Diagram – Side View and Plan View (Continued)



Note: Aegis Labs Open Area Test Sites exceed the  $2R$  Frensel Ellipse measurement zone as defined under ANSI C63.4: 2003 to minimize possible reflection issues from surrounding structures.

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**AEGIS LABS INC.**

## **8.0 MODIFICATIONS AND RECOMMENDATIONS**

1. No modifications were made.

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## 9.0 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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## **APPENDIX A**

### ***TEST DATA***

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## CONDUCTED EMISSIONS TEST RESULTS

<b>CLIENT:</b>	Intel Corporation	<b>DATE:</b>	09/06/05
<b>EUT:</b>	Intel PRO/Wireless 3945ABG Network Connection	<b>PROJECT NUMBER:</b>	INTEL-050901
<b>MODEL NUMBER:</b>	WM3945ABG	<b>TEST ENGINEER:</b>	JC/RJ
<b>SERIAL NUMBER:</b>	00B11A295CVD26965002	<b>SITE #:</b>	2
<b>CONFIGURATION:</b>	Tested installed in the host computer's mini PCI slot.	<b>TEMPERATURE:</b>	34 C
		<b>HUMIDITY:</b>	14% RH
		<b>TIME:</b>	1:45 PM

<b>Description:</b>	Conducted RF Emissions (150 kHz – 30 MHz)
<b>Results:</b>	<b>PASSED</b> LINE 1 and LINE 2 FCC Class B Limits

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## Conducted Emissions Test Results (Continued)

### 120VAC (INTEL-050901-03)

FCC CLASS B 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)
0.1800	38.82	PK	55.14	-16.32	65.14	-26.32
0.5900	36.14	PK	46.00	-9.86	56.00	-19.86
0.6600	36.12	PK	46.00	-9.88	56.00	-19.88
7.9300	39.76	PK	50.00	-10.24	60.00	-20.24
9.4700	39.32	PK	50.00	-10.68	60.00	-20.68
10.4000	39.67	PK	50.00	-10.33	60.00	-20.33



13:07:54 SEP 06, 2005

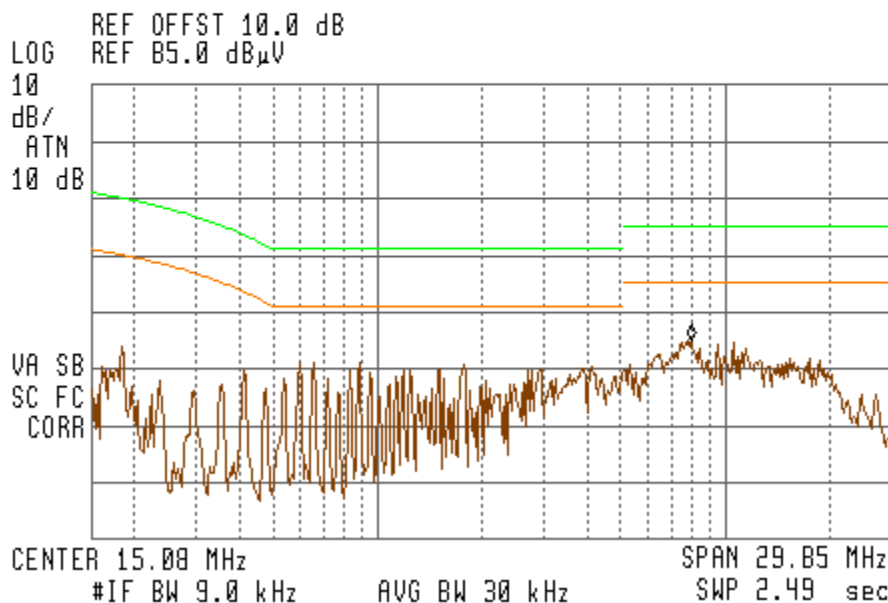
14:52:53 APR 14, 2003 11:58:46 SEP 23, 2004

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 7.93 MHz

39.76 dBuV



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AEGIS LABS INC.

## Conducted Emissions Test Results (Continued)

### 120VAC (INTEL-050901-03)

FCC CLASS B 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	34.48	PK	55.71	-21.23	65.71	-31.23
0.1800	34.57	PK	55.14	-20.57	65.14	-30.57
1.7700	33.88	PK	46.00	-12.12	56.00	-22.12
7.9300	39.99	PK	50.00	-10.01	60.00	-20.01
11.4200	38.87	PK	50.00	-11.13	60.00	-21.13
17.3500	37.55	PK	50.00	-12.45	60.00	-22.45



12:59:31 SEP 06, 2005

14:52:53 APR 14, 2003 11:58:46 SEP 23, 2004

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 1.77 MHz

33.88 dBuV

LOG REF OFFST 10.0 dB  
10 REF 85.0 dBuV

dB/  
ATN  
10 dB

VA SB  
SC FC  
CORR

CENTER 15.00 MHz

#IF BW 9.0 kHz

AVG BW 30 kHz

SPAN 29.85 MHz

SWP 2.49 sec

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AEGIS LABS INC.

## RADIATED EMISSIONS TEST RESULTS

<b>CLIENT:</b>	Intel Corporation	<b>DATE:</b>	09/06/05
<b>EUT:</b>	Intel PRO/Wireless 3945ABG Network Connection	<b>PROJECT NUMBER:</b>	INTEL-050901
<b>MODEL NUMBER:</b>	WM3945ABG	<b>TEST ENGINEER:</b>	JC
<b>SERIAL NUMBER:</b>	00B11A295CVD26965002	<b>SITE #:</b>	2
<b>CONFIGURATION:</b>	Tested installed in the host computer's mini PCI slot.	<b>TEMPERATURE:</b>	21 C
		<b>HUMIDITY:</b>	45% RH
		<b>TIME:</b>	8:30 AM

<b>Description:</b>	Radiated RF Emissions (30 MHz – 1000 MHz)
<b>Results:</b>	<b>PASSED</b> Horizontal and Vertical Antenna Polarizations FCC Class B Limits

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## Radiated Emissions Test Results (Continued)

### 120VAC (INTEL-050901-02)

CLASS B RADIATED EMISSIONS - Horizontal Antenna Polarization								
Measurements Were Taken 10m away from EUT								
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (Degrees)	Quasi Pk Or AVG (dBuV)		Corrected Reading (dBuV/m)	Limits (dBuV/m)	Diff (dB) +=FAIL
64.02	10.22	400	315			19.22	30.00	-10.78
136.03	6.40	400	180			22.68	30.00	-7.32
166.52	8.54	400	225			26.34	30.00	-3.66
199.27	6.83	400	180			26.01	30.00	-3.99
240.01	9.22	400	180			29.32	37.00	-7.68
336.03	9.60	350	225			27.88	37.00	-9.12
375.02	9.71	300	225			27.86	37.00	-9.14
CLASS B RADIATED EMISSIONS - Vertical Antenna Polarization								
Measurements Were Taken 10m away from EUT								
Freq. (MHz)	Meter Reading (dBuV)	Antenna Height (cm)	Azimuth (Degrees)	Quasi Pk Or AVG (dBuV)		Corrected Reading (dBuV/m)	Limits (dBuV/m)	Diff (dB) +=FAIL
61.26	16.51	100	90			25.25	30.00	-4.75
120.04	12.70	100	135			26.61	30.00	-3.39
147.63	10.12	100	180			26.58	30.00	-3.42
216.01	8.31	100	135	6.06	Q	25.99	30.00	-4.01
280.02	5.84	100	180			28.44	37.00	-8.56
336.02	6.09	100	315			24.81	37.00	-12.19
384.01	7.81	100	270			27.06	37.00	-9.94

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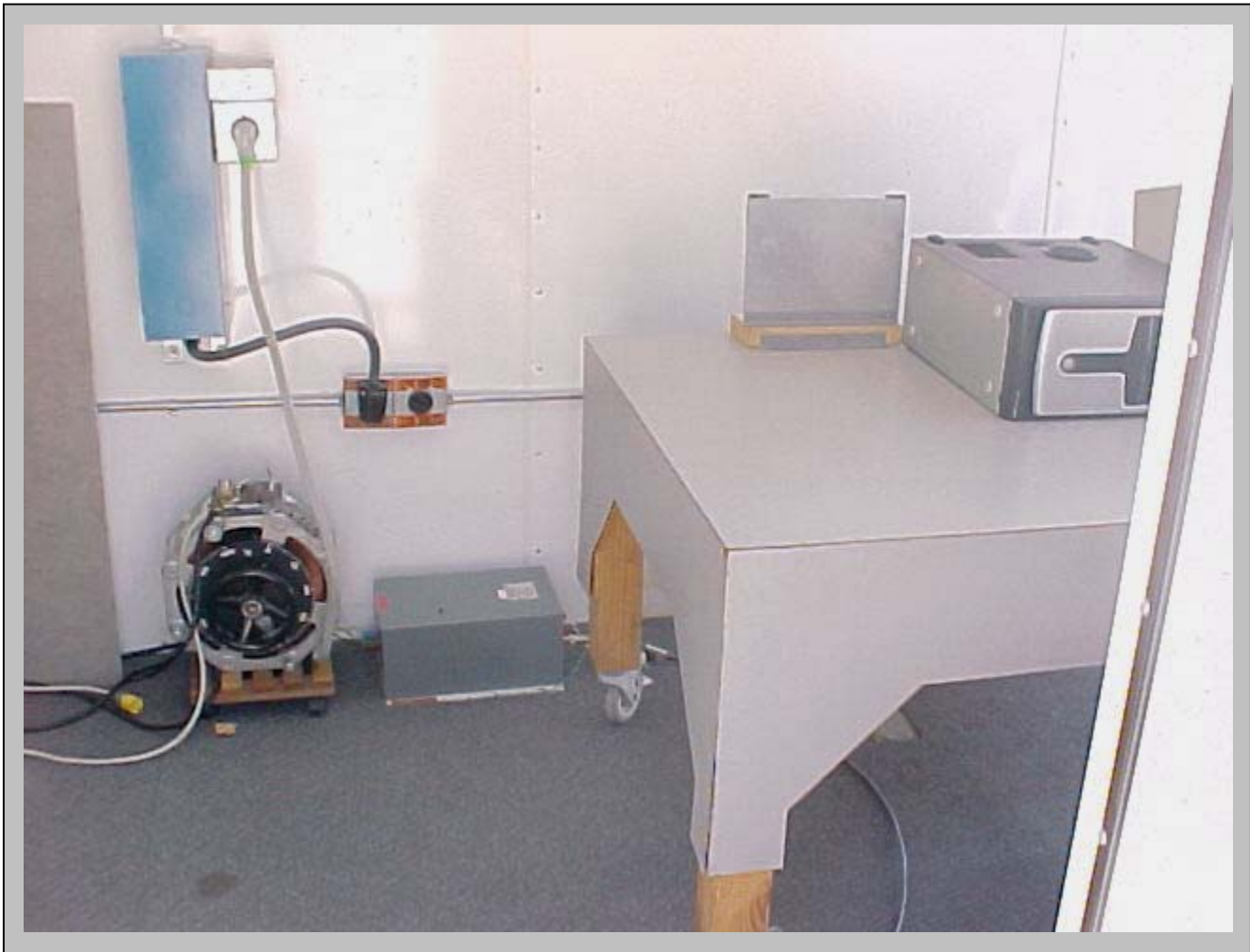
## **APPENDIX B**

# ***PHOTOGRAPHS – TEST SETUPS***

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## CONDUCTED EMISSIONS – FRONT VIEW

FOR

*EUT: Intel PRO/Wireless 3945ABG Network Connection*  
*MODEL NUMBER: WM3945ABG*

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*Revision Number: N/A*



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## CONDUCTED EMISSIONS – REAR VIEW

FOR

*EUT: Intel PRO/Wireless 3945ABG Network Connection*  
*MODEL NUMBER: WM3945ABG*

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## **RADIATED EMISSIONS – FRONT VIEW**

FOR

*EUT: Intel PRO/Wireless 3945ABG Network Connection*  
*MODEL NUMBER: WM3945ABG*

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## **RADIATED EMISSIONS – REAR VIEW**

FOR

*EUT: Intel PRO/Wireless 3945ABG Network Connection*  
*MODEL NUMBER: WM3945ABG*

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**AEGIS LABS INC.**

## **APPENDIX C**

# ***CALIBRATION CORRECTION TABLE***

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**Calibration Correction Table**

Freq	Index		Cable Loss 10m	Horz. Ant 10m	Total	Vert. Ant 10m	Total
30.00	0.00		0.80	18.60	-19.40	17.90	-18.70
40.00	1.00		1.00	15.60	-16.60	14.10	-15.10
50.00	2.00		1.10	11.80	-12.90	10.50	-11.60
60.00	3.00		1.20	8.40	-9.60	7.70	-8.90
70.00	4.00		1.30	6.80	-8.10	6.30	-7.60
80.00	5.00		1.40	6.60	-8.00	6.70	-8.10
90.00	6.00		1.50	8.40	-9.90	8.30	-9.80
100.00	7.00		1.60	10.20	-11.80	9.70	-11.30
110.00	8.00		1.70	11.80	-13.50	10.60	-12.30
120.00	9.00		1.80	13.20	-15.00	12.10	-13.90
130.00	10.00		1.90	14.20	-16.10	13.40	-15.30
140.00	11.00		1.90	14.50	-16.40	14.10	-16.00
150.00	12.00		1.90	15.10	-17.00	14.70	-16.60
160.00	13.00		2.00	15.50	-17.50	14.20	-16.20
170.00	14.00		2.07	15.90	-17.97	16.00	-18.07
180.00	15.00		2.10	16.50	-18.60	16.70	-18.80
190.00	16.00		2.20	16.70	-18.90	18.00	-20.20
200.00	17.00		2.30	16.90	-19.20	17.50	-19.80
225.00	18.00		2.50	17.30	-19.80	17.50	-20.00
250.00	19.00		2.80	17.50	-20.30	18.50	-21.30
275.00	20.00		2.80	19.10	-21.90	19.60	-22.40
299.99	21.00		2.90	19.50	-22.40	20.50	-23.40
300.00	22.00		2.90	13.50	-16.40	14.50	-17.40
325.00	23.00		3.05	15.30	-18.35	16.00	-19.05
350.00	24.00		3.20	15.00	-18.20	15.10	-18.30
375.00	25.00		3.35	14.80	-18.15	16.10	-19.45
400.00	26.00		3.50	14.90	-18.40	15.40	-18.90
425.00	27.00		3.60	15.20	-18.80	15.50	-19.10

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**Calibration Correction Table (Continued)**

Freq	Index	Amp	Cable Loss 10m	Horz. Ant 10m	Total	Vert. Ant 10m	Total
450.00	28.00		3.70	16.10	-19.80	17.70	-21.40
475.00	29.00		3.85	18.10	-21.95	17.40	-21.25
500.00	30.00		4.00	18.30	-22.30	17.60	-21.60
525.00	31.00		4.05	18.30	-22.35	18.40	-22.45
550.00	32.00		4.10	18.80	-22.90	18.90	-23.00
575.00	33.00		4.20	18.50	-22.70	17.90	-22.10
600.00	34.00		4.30	18.20	-22.50	19.80	-24.10
625.00	35.00		4.35	18.30	-22.65	19.60	-23.95
650.00	36.00		4.40	20.40	-24.80	19.50	-23.90
675.00	37.00		4.40	20.80	-25.20	20.60	-25.00
700.00	38.00		4.40	21.30	-25.70	21.10	-25.50
725.00	39.00		4.55	22.30	-26.85	21.50	-26.05
750.00	40.00		4.70	21.20	-25.90	21.90	-26.60
775.00	41.00		4.80	20.80	-25.60	21.70	-26.50
800.00	42.00		4.90	21.90	-26.80	22.10	-27.00
825.00	43.00		4.90	21.20	-26.10	22.50	-27.40
850.00	44.00		4.90	23.00	-27.90	22.00	-26.90
875.00	45.00		5.05	21.70	-26.75	22.30	-27.35
900.00	46.00		5.20	22.70	-27.90	22.90	-28.10
925.00	47.00		5.25	23.60	-28.85	23.20	-28.45
950.00	48.00		5.30	23.20	-28.50	22.90	-28.20
975.00	49.00		5.35	23.60	-28.95	23.50	-28.85
1000.00	50.00		5.40	23.40	-28.80	22.60	-28.00

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**AEGIS LABS INC.**

## **APPENDIX D**

# ***ACCREDITATION CERTIFICATES***



AEGIS LABS INC.



THE AMERICAN  
ASSOCIATION  
FOR LABORATORY  
ACCREDITATION

## ACCREDITED LABORATORY

A2LA has accredited

**AEGIS LABS, INC.**  
Trabuco Canyon, CA

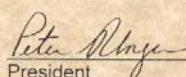
for technical competence in the field of

### Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing.

Presented this 28<sup>th</sup> day of May 2004.



  
President

For the Accreditation Council  
Certificate Number 1111-01  
Valid to February 28, 2006

For tests or types of tests to which this accreditation applies,  
please refer to the laboratory's Electrical Scope of Accreditation.



AEGIS LABS INC.

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999

AEGIS LABS, INC.<sup>1</sup>  
32231 Trabuco Creek Road  
Trabuco Canyon, CA 92678  
Steve Kuiper Phone: 949-459-7886

ELECTRICAL (EMC)

Valid To: February 28, 2006

Certificate Number: 1111-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

<u>Technology</u>	<u>Test Method(s)</u>
Conducted Emissions Measurements 150 kHz. – 30 MHz. Radiated Emissions Measurements 30 MHz. - 40 GHz.	CFR 47, FCC Part 15 (ANSI C63.4: 1992), EN55022: 1994 / A1: 1995 / A2: 1997 EN55011:1998; IEC CISPR11: 2003, CISPR 13, CISPR 22:1997; AS/NZS 3548 CISPR 22:2002, SS IEC CISPR22, VCCI V-3/2003.04, CNS13438 1997, ICES- 003, RSS-210, SS IEC CISPR22, ANSI/TIA/EIA 603A- 2001, AS/NSZ 4771:2000, EN61000-6-3:2001, EN61000-6-4:2001, SI 961-6-1:2002
Product Family Generic Standards	EN50081-1: 1992, EN50081-2: 1993, EN50082-1: 1997, EN50130-4: 1995/A1, EN55020:1994/A11/A12/A13/A14 EN55024: 1994/A1: 2001, EN55103-1: 1996, EN55103- 2:1996, EN61000-6-1: 2001, EN61000-6-2: 1999/2001 EN61000-4-3: 2001, EN61000-6-4: 2001, EN300 328- 1: v1.2.2, 1.3.1, EN300-328-2: v1.1.1, 1.2.1, EN301 489-17, IEC60601-1-2 (up to 1 GHz), EN61326:1997 A1/A2, EN50091-2:1995, EN50130-4:1995 A1,EN300 386:2003
Radiated Emissions Measurements (H-Field 30Hz-30 MHz)	CFR 47, FCC Part 18 (ANSI C63.4: 1992)
Electrostatic Discharge Immunity <sup>2</sup>	IEC61000-4-2 1995 A1: 1998 / A2: 2000
Radiated Immunity <sup>2</sup> (Radiated E-field 10kHz to 1.0 GHz)	IEC61000-4-3: A1:1998, A2, 2000, 2002
Electrical Fast Transient/Burst Immunity <sup>2</sup>	IEC61000-4-4: 1995 A1: 2000 & A2: 2001



Surge Immunity & Voltage Spikes <sup>2</sup>	IEC61000-4-5: 1995 A1: 2000, 2001, ITU-T K.20
Conducted Immunity <sup>2</sup>	IEC61000-4-6: 1996 A1: 2000, 2001, 2003
Power Frequency Magnetic Field Immunity <sup>2</sup>	IEC61000-4-8: 1993 A1: 2000, 2001
Voltage Dips, Short Interruptions <sup>2</sup>	IEC61000-4-11: 1994 A1: 2000
Harmonic Current Emissions <sup>2</sup>	EN61000-3-2: 2000
Voltage Fluctuations and Flicker <sup>2</sup>	EN61000-3-3: 1995, A1:2001

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<sup>1</sup> This accreditation covers testing performed at the main laboratory listed above, and the satellite laboratory located at 23091 Antonio Parkway, Suite 310, Rancho Santa Margarita, CA 92688.

<sup>2</sup> Immunity (Susceptibility) testing is performed at the satellite laboratory located at 23091 Antonio Parkway, Suite 310, Rancho Santa Margarita, CA 92688.