

EMC Test Report
Information Technology Equipment
Class B Digital Device

FCC Part 15
Industry Canada ICES-003, Issue 5

Model: PBA5001

IC CERTIFICATION # 1000M-PBA5001

FCC ID: PD9PBA5001

COMPANY: Intel Mobile Communications
100 Center Point Circle Suite 200
Columbia, SC 29210

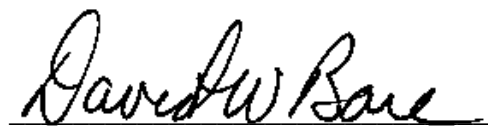
TEST SITE(S): National Technical Systems - Silicon Valley
41039 Boyce Road
Fremont, CA. 94538-2435

REPORT DATE: October 25, 2013

FINAL TEST DATES: October 14, 2013

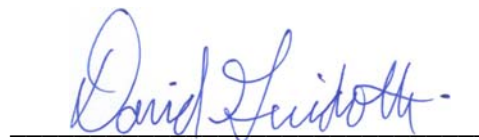
TOTAL NUMBER OF PAGES: 26

PROGRAM MGR /
TECHNICAL REVIEWER:



David W. Bare
Chief Engineer

QUALITY ASSURANCE DELEGATE /
FINAL REPORT PREPARER:



David Guidotti
Senior Technical Writer



National Technical Systems - Silicon Valley is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise. This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	October 25, 2013	First release	

TABLE OF CONTENTS

REVISION HISTORY	2
TABLE OF CONTENTS	3
SCOPE.....	4
OBJECTIVE	4
STATEMENT OF COMPLIANCE.....	5
DEVIATIONS FROM THE STANDARDS.....	5
INFORMATION TECHNOLOGY EQUIPMENT EMISSIONS TEST RESULTS	6
CONDUCTED EMISSIONS (MAINS PORT)	6
RADIATED EMISSIONS	6
MEASUREMENT UNCERTAINTIES.....	7
EQUIPMENT UNDER TEST (EUT) DETAILS.....	8
GENERAL.....	8
HIGHEST EUT INTERNAL SOURCE.....	8
ENCLOSURE.....	8
MODIFICATIONS	9
SUPPORT EQUIPMENT	9
EUT INTERFACE PORTS	9
EUT OPERATION	9
EMISSIONS TESTING	10
RADIATED AND CONDUCTED EMISSIONS.....	10
RADIATED EMISSIONS CONSIDERATIONS	10
CONDUCTED EMISSIONS CONSIDERATIONS	10
EMISSIONS MEASUREMENT INSTRUMENTATION.....	11
RECEIVER SYSTEM	11
INSTRUMENT CONTROL COMPUTER	11
LINE IMPEDANCE STABILIZATION NETWORK (LISN).....	11
IMPEDANCE STABILIZATION NETWORK (ISN)	11
FILTERS/ATTENUATORS	11
ANTENNAS.....	12
ANTENNA MAST AND EQUIPMENT TURNABLE.....	12
INSTRUMENT CALIBRATION.....	12
EMISSIONS TEST PROCEDURES	13
EUT AND CABLE PLACEMENT	13
CONDUCTED EMISSIONS (MAINS)	13
RADIATED EMISSIONS	14
General	14
Preliminary Scan.....	14
Final Maximization.....	15
SAMPLE CALCULATIONS	16
SAMPLE CALCULATIONS - CONDUCTED EMISSIONS	16
SAMPLE CALCULATIONS - RADIATED EMISSIONS.....	16
APPENDIX A TEST EQUIPMENT CALIBRATION DATA	17
APPENDIX B TEST DATA	18
END OF REPORT	26

SCOPE

Governments and standards organizations around the world have published requirements regarding the electromagnetic compatibility (EMC) of electronic equipment. Testing has been performed on the Intel Mobile Communications model PBA5001, pursuant to the following standards.

Standard	Title	Standard Date
FCC Part 15, Subpart B	Radio Frequency Devices	October 2012 as Amended
ICES-003, Issue 5	Information Technology Equipment (ITE) – Limits and methods of measurement	August 2012

All measurements and evaluations have been in accordance with these specifications, test procedures, and measurement guidelines as outlined in National Technical Systems - Silicon Valley test procedures, and in accordance with the standards referenced above.

OBJECTIVE

The objective of Intel Mobile Communications is to verify compliance with FCC and Canada's requirements for digital devices.

STATEMENT OF COMPLIANCE

The tested sample of Intel Mobile Communications model PBA5001 complied with the requirements of:

Standard/Regulation	Equipment Type/Class	Standard Date
Subpart B of Part 15 of the FCC Rules (CFR title 47)	Class B	2011 as amended
ICES-003, Issue 5	Class B	2012

As specified in Section 15.101 of FCC Part 15, unintentional radiators shall be authorized prior to the initiation of marketing. Based on the description of the EUT, the following criteria per Section 15.101 of FCC Part 15 were applied to the EUT:

Type of device	Equipment authorization required
Class B personal computers and peripherals	Declaration of Conformity or Certification [Certification is sought]

The test results recorded herein are based on a single type test of the Intel Mobile Communications model PBA5001 and therefore apply only to the tested sample(s). The sample was selected and prepared by Steve Hackett of Intel Mobile Communications.

Maintenance of compliance is the responsibility of the company. Any modification of the product that could result in increased emissions or susceptibility should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different enclosure, different line filter or power supply, harnessing and/or interface cable changes, etc.).

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

INFORMATION TECHNOLOGY EQUIPMENT EMISSIONS TEST RESULTS

The following emissions tests were performed on the Intel Mobile Communications model PBA5001. The measurements were extracted from the data recorded during testing and represent the highest-amplitude emissions relative to the specification limits. The complete test data is provided in the appendices of this report.

CONDUCTED EMISSIONS (MAINS PORT)

Frequency Range Operating Voltage	Standard/Section	Requirement	Measurement	Margin	Status
0.15-30 MHz, 120 V, 60 Hz	FCC § 15.107(a) (Class B)	0.15-0.5 MHz: 66-56 dBµV QP 56-46 dBµV Av 0.5-5.0 MHz: 56 dBµV QP 46 dBµV Av 5.0-30.0 MHz: 60 dBµV QP 50 dBµV Av	43.6 dBµV @ 1.918 MHz	-12.4 dB	Complied

RADIATED EMISSIONS

Frequency Range	Standard/Section	Requirement	Measurement	Margin	Status
30-1000 MHz	FCC §15.109(g) Class B	30-230 MHz, 30 dBµV/m 230-1000 MHz, 37 dBµV/m (10 m limit)	35.2 dBµV/m @479.99 MHz	-10.8 dB	Complied
1000-40000 MHz	FCC §15.109(a) Class B	54.0 dBµV/m Av 74.0 dBµV/m Pk (3 m limit)	The EUT does not contain any devices that tune above 108MHz.		

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below were calculated using the approach described in CISPR 16-4-2:2003 using a coverage factor of $k=2$, which gives a level of confidence of approximately 95%. The levels were found to be below levels of CISPR and therefore no adjustment of the data for measurement uncertainty is required.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Conducted Emissions	dBuV or dBuA	150 kHz – 30 MHz	± 2.2 dB
Radiated Electric Field	dBuV/m	30-1000 MHz	± 3.6 dB
		1000-40,000 MHz	± 6.0 dB

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

The Intel Mobile Communications model PBA5001 is an IEEE 802.11a/b/g/n/ac + BT 4.0 wireless network adapter module that supports 2x2 (MIMO) and 1x1 (SISO) operation and Bluetooth operation in Basic Rate, Enhanced Data Rate and Low Energy modes.

For radio testing purposes the card was installed in a test fixture that exposed all sides of the card. For digital device testing for certification under equipment code JBP the card was installed in a test fixture that exposed all sides of the card.

The sample was received on September 18, 2013 and tested on October 14, 2013. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Intel Mobile Communications	PBA5001	PCIe Half Mini Card form factor Bluetooth / IEEE 802.11a/b/g/n/ac wireless network adapter	001500DC7B25	PD9PBA5001

HIGHEST EUT INTERNAL SOURCE

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. The highest internal source determines the frequency range of test for radiated emissions.

The highest internal source of the EUT was declared to be less than 108 MHz.

Based on the declared highest internal source, the upper frequency range of measurement for the current project were:

FCC Part 15, Subpart B

Highest Internal Source (MHz)	Upper Frequency Range of Measurement (MHz)	Applicability
Below 1.705	30	
1.705 – 108	1000	X
108 – 500	2000	
500 – 1000	5000	
Above 1000	5th harmonic of the highest internal source or 40 GHz, whichever is lower	

ENCLOSURE

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

MODIFICATIONS

No modifications were made to the EUT during the time the product was at National Technical Systems - Silicon Valley.

SUPPORT EQUIPMENT

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

Company	Model	Description	Serial Number	FCC ID
Dell	Latitude E5400	Host laptop	GFZW54J	-
HP	C6490A	Printer	MY3883K42P	-

The following equipment was used as remote support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Netgear	GS108	Gigabit Ethernet Switch	2162073S00ACF	-

EUT INTERFACE PORTS

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

Additional on Support Equipment

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
Ethernet (host)	Switch	Cat 5	Unshielded	10.0
USB	Printer	Multiwire	Shielded	1.0
Laptop DC	AC Adapter	Two wire	Unshielded	1.5
AC Adapter	AC Mains	Three wire	Unshielded	1.5

EUT OPERATION

During emissions testing the EUT was enabled in the host laptop, which was running a scrolling H pattern. The host was connected to an active printer, though no print jobs were being done.

EMISSIONS TESTING**RADIATED AND CONDUCTED EMISSIONS**

Final test measurements were taken at the National Technical Systems - Silicon Valley Anechoic Chambers listed below. The test sites contain separate areas for radiated and conducted emissions testing. The sites conform to the requirements of ANSI C63.4: 2009 *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* and CISPR 16-1-4:2007 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are registered with the VCCI and are on file with the FCC and Industry Canada.

Site	Registration Numbers			Location
	VCCI	FCC	Canada	
Chamber 4	A-0169	A2LA Accredited	IC 2845B-4	41039 Boyce Road Fremont, CA 94538-2435

RADIATED EMISSIONS CONSIDERATIONS

Radiated emissions measurements were made with the EUT powered from a supply voltage within the expected tolerances of each nominal operating voltage/frequency for each geographical regions covered by the scope of the standards referenced in this report.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions tests are performed in conformance with ANSI C63.4, CISPR 22, and Subpart B of Part 15 of FCC Rules for Digital Devices.

Mains port measurements are made with the EUT connected to the public power network through nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

EMISSIONS MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1:2006 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7 GHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

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

INSTRUMENT CONTROL COMPUTER

Measurements are converted to the field strength at an antenna or voltage developed at the LISN (or ISN) measurement port, which is then compared directly with the appropriate specification limit under software control of the test receivers and spectrum analyzers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

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

IMPEDANCE STABILIZATION NETWORK (ISN)

Telecommunication port conducted emission measurements utilize an Impedance Stabilization Network with a 150-ohm termination impedance and specific longitudinal conversion loss as the voltage monitoring point. This network provides for calibrated radio-frequency noise measurements by the design of the internal circuitry on the EUT and measurement ports, respectively. For current measurements, a current probe with a uniform frequency response and less than 1-ohm insertion impedance is used.

FILTERS/ATTENUATORS

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

ANTENNAS

A bilog antenna or combination of biconical and log periodic antennas are used to cover the range from 30 MHz to 1000 MHz. Narrowband tuned dipole antennas may be used over the entire 30 to 1000 MHz frequency range for precision measurements of field strength. Above 1000 MHz, horn antennas are used. The antenna calibration factors are included in site factors that are programmed into the test receivers or data collection software.

ANTENNA MAST AND EQUIPMENT TURNABLE

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

ANSI C63.4 and CISPR 22 specify that the test height above ground for table-mounted devices shall be 80 centimeters. Floor-mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material up to 12-mm thick if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

EMISSIONS TEST PROCEDURES

EUT AND CABLE PLACEMENT

The standards require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst-case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4 and CISPR 22, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS (MAINS)

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest-amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak-mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord. Emissions that have peak values close to the specification limit are also measured in the quasi-peak and average detection modes to determine compliance except when the amplitude of the emission when measured with the quasi-peak detector is more than 10 dB below the specification limit for average measurements. In this case only quasi-peak measurements are performed.

RADIATED EMISSIONS**General**

FCC Part 15 references the test methods of ANSI C63.4-2003 (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) for emissions measurements. However FCC Public Notice DA 09-2478 (released on November 25, 2009) clarifies measurements made to determine compliance may be performed using the test methods of either the 2003 or 2009 version of the ANSI C63.4 document.

For the current project, the test methods of ANSI C63.4-2009 were used. As the two versions of ANSI C63.4 specify different usage of floor absorbers during radiated emissions testing, the table below has been included for clarification:

Frequency Range	ANSI C63.4-2003	ANSI C63.4-2009
30-1000 MHz	No floor absorbers used	No floor absorbers used
Above 1000 MHz	No floor absorbers used	"Free space" test environment with floor absorbers placed between antenna and EUT in accordance with CISPR 16-1-4

Radiated emissions measurements are performed in two phases, preliminary scan and final maximization.

Preliminary Scan

A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one or more of these with the antenna polarized vertically and one or more of these are performed with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied as necessary to determine the highest emission relative to the limit.

Note that for the frequency range of 1-6 GHz in the "free space" test environment, CISPR 22 allows the antenna to be set at fixed height equal to the center height of the EUT, except for cases where additional scans are necessary with the antenna height adjusted up and down to ensure the measurement antenna illuminates the entire height of the EUT. However, in cases where a single "free space" test is performed in the 1-6 GHz frequency to simultaneously meet the requirements of FCC Part 15 (ANSI C63.4-2009 test methods) and CISPR 22, the antenna height is by default varied since required by ANSI C63.4.

In the frequency range of 30-1000 MHz, a speaker (with demodulation) is provided in the receiver to aid in discriminating between EUT and ambient emissions if required. Other possible methods for discriminating between EUT and ambient emissions involve scanning with near-field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final Maximization

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

Final measurements in the frequency range of 30-1000 MHz are made using a quasi-peak detector and compared to the quasi-peak limit. Final measurements above 1 GHz are made using average and peak detectors and compared to the average and peak limits respectively.

When testing above 1 GHz, the receive antenna is restricted to a maximum height of 2.5 m. Maximum emissions are found within this restricted range because emission levels decrease over distance and as the antenna is raised above 2.5 m, the distance from the EUT increases. As a result of the increased measurement distance, at antenna heights above 2.5 m, lower emission levels are measured as compared to emissions levels measured at antenna heights at 2.5 m and below. Final measurements are captured at 3 meters test distance except in cases where a closer test distance is required due to noise-floor considerations of the test-and-measurement equipment.

For measurements above 1 GHz every effort is made to ensure the EUT remains within the cone of radiation of the measurement antenna (i.e. 3 dB beam-width of the antenna). This may include rotating the product and/or angling the measurement antenna.

SAMPLE CALCULATIONS**SAMPLE CALCULATIONS - CONDUCTED EMISSIONS**

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

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

Appendix A Test Equipment Calibration Data**Radiated Emissions, 30 - 1,000 MHz, 14-Oct-13**

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	8/9/2014
Com-Power	Preamplifier, 30-1000 MHz	PA-103	1632	7/6/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	6/8/2014

Conducted Emissions - AC Power Ports, 14-Oct-13

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	LISN, 10 kHz-100 MHz	3825/2	1293	2/14/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	6/8/2014
Com-Power	9KHz-30MHz, 50uH, 15Aac, 10Adc, max	LI-215A	2671	5/24/2014

Appendix B Test Data

T93372 Pages 19 – 25



EMC Test Data

Client:	Intel Corporation	Job Number:	J93358
Product	PBA5001	T-Log Number:	T93372
		Project Manager:	Christine Krebill
Contact:	Steve Hackett	Project Coordinator:	-
Emissions Standard(s):	FCC Part 15.247, 15.407	Class:	B
Immunity Standard(s):	-	Environment:	Radio

EMC Test Data

For The

Intel Corporation

Product

PBA5001

Date of Last Test: 10/24/2013

Client:	Intel Corporation	Job Number:	J93358
Model:	PBA5001	T-Log Number:	T93372
Contact:	Steve Hackett	Project Manager:	Christine Krebill
Standard:	FCC Part 15.247, 15.407	Project Coordinator:	-
		Class:	N/A

Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

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

Date of Test: 10/14/2013
 Test Engineer: Joseph Cadigal
 Test Location: Chamber 4

Config. Used: JBP
 Config Change: none
 Host Unit Voltage 120V/60Hz

General Test Configuration

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

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

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

Ambient Conditions:

Temperature: 23 °C
 Rel. Humidity: 33 %

Summary of Results

MAC Address: 00:15:00:DC:7B:25, EUT installed in Laptop

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	FCC Class B	Eval	Refer to individual run
2	Radiated Emissions 30 - 1000 MHz, Maximized	FCC Class B	Pass	35.2 dBµV/m @ 479.99 MHz (-10.8 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

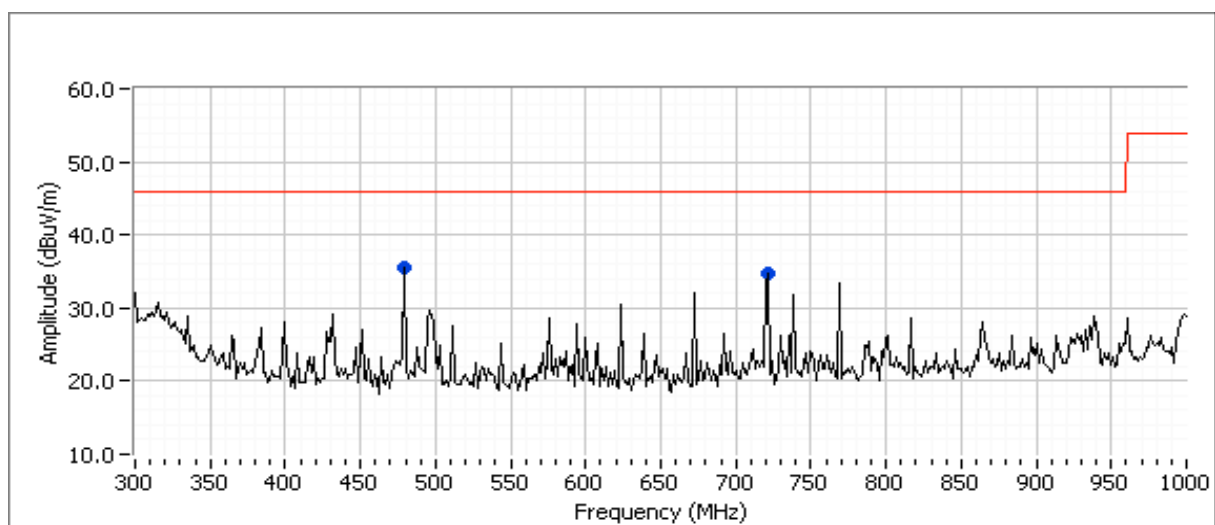
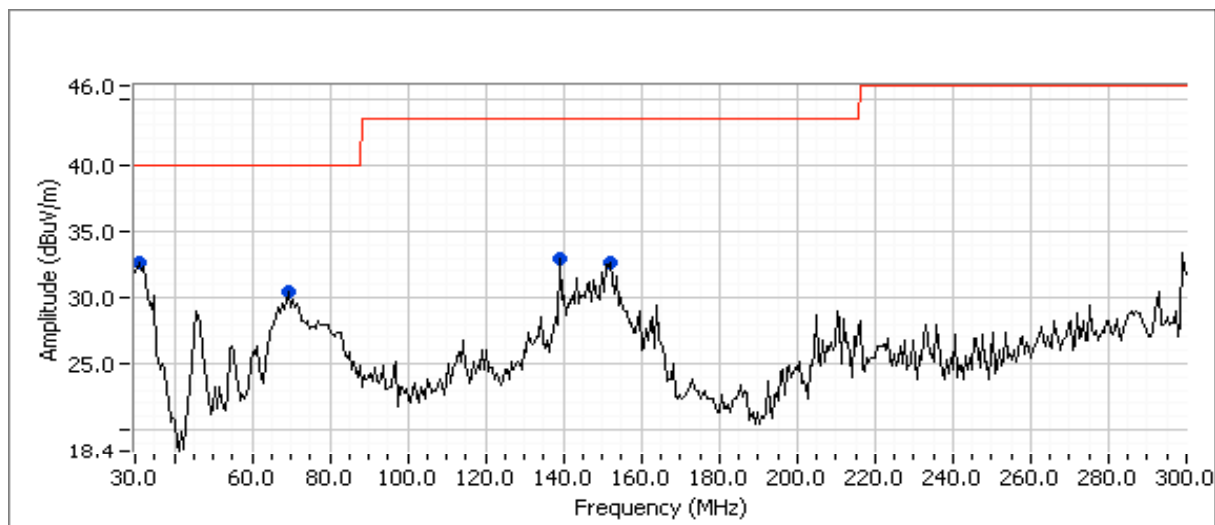
No deviations were made from the requirements of the standard.

Client:	Intel Corporation	Job Number:	J93358
Model:	PBA5001	T-Log Number:	T93372
Contact:	Steve Hackett	Project Manager:	Christine Krebill
Standard:	FCC Part 15.247, 15.407	Project Coordinator:	-
		Class:	N/A

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

EUT is a PC peripheral, host PC configured with two external peripheral devices of different I/O protocols, FCC H-Pattern running.

Test Parameters for Preliminary Scan(s)			
Frequency Range	Prescan Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0



Client:	Intel Corporation	Job Number:	J93358
Model:	PBA5001	T-Log Number:	T93372
Contact:	Steve Hackett	Project Manager:	Christine Krebill
Standard:	FCC Part 15.247, 15.407	Project Coordinator:	-
		Class:	N/A

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
479.994	35.4	V	46.0	-10.6	Peak	34	1.0	
139.268	33.0	V	43.5	-10.5	Peak	82	1.0	
152.197	32.7	V	43.5	-10.8	Peak	95	1.0	
69.175	30.4	V	40.0	-9.6	Peak	121	1.5	
719.986	34.7	V	46.0	-11.3	Peak	286	1.0	
31.371	32.6	V	40.0	-7.4	Peak	353	1.0	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
479.994	35.2	V	46.0	-10.8	QP	32	1.0	QP (1.00s)
139.268	24.0	V	43.5	-19.5	QP	84	1.0	QP (1.00s)
152.197	25.0	V	43.5	-18.5	QP	96	1.0	QP (1.00s)
69.175	24.1	V	40.0	-15.9	QP	122	1.5	QP (1.00s)
719.986	34.8	V	46.0	-11.2	QP	288	1.0	QP (1.00s)
31.371	26.3	V	40.0	-13.7	QP	354	1.0	QP (1.00s)

Run #2: Maximized Readings From Run #1

Test Parameters for Maximized Reading(s)			
Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
479.994	35.2	V	46.0	-10.8	QP	32	1.0	QP (1.00s)
719.986	34.8	V	46.0	-11.2	QP	288	1.0	QP (1.00s)
31.371	26.3	V	40.0	-13.7	QP	354	1.0	QP (1.00s)
69.175	24.1	V	40.0	-15.9	QP	122	1.5	QP (1.00s)
152.197	25.0	V	43.5	-18.5	QP	96	1.0	QP (1.00s)
139.268	24.0	V	43.5	-19.5	QP	84	1.0	QP (1.00s)

Client:	Intel Corporation	Job Number:	J93358
Model:	PBA5001	T-Log Number:	T93372
Contact:	Steve Hackett	Project Manager:	Christine Krebill
Standard:	FCC Part 15.247, 15.407	Project Coordinator:	-
		Class:	B

Conducted Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

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

Date of Test: 10/14/2013
 Test Engineer: John Caizzi
 Test Location: Fremont Chamber #4

Config. Used: JBP
 Config Change: none
 Host Unit Voltage 120V/60Hz

General Test Configuration

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

Ambient Conditions:
 Temperature: 23 °C
 Rel. Humidity: 33 %

Summary of Results

MAC Address: 00:15:00:DC:7B:25, EUT installed in Laptop

Run #	Test Performed	Limit	Result	Margin
2	CE, AC Power, 120V/60Hz	Class B	Pass	43.6 dBμV @ 1.918 MHz (-12.4 dB)

Modifications Made During Testing

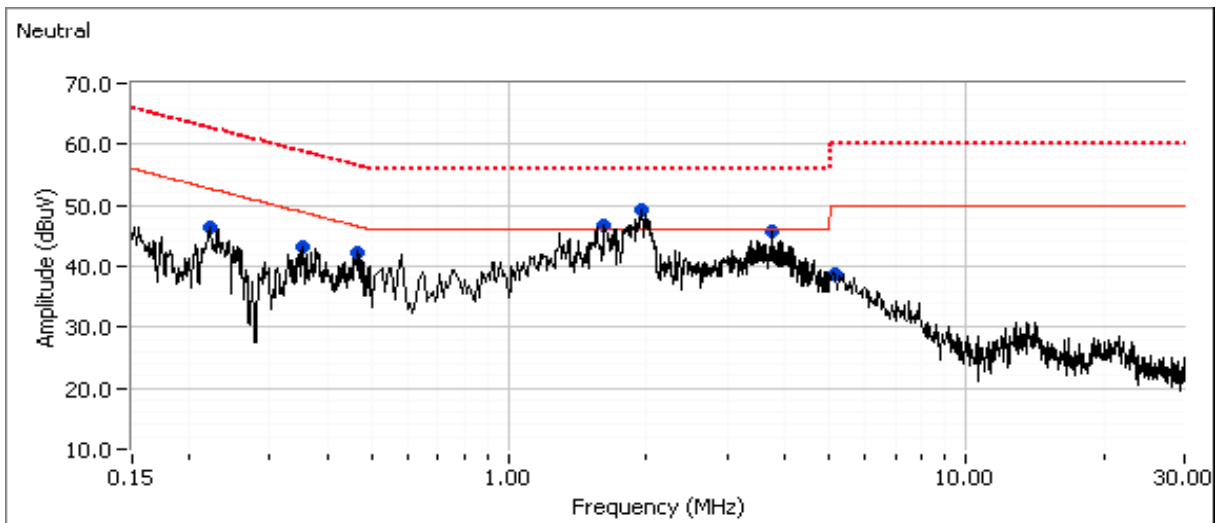
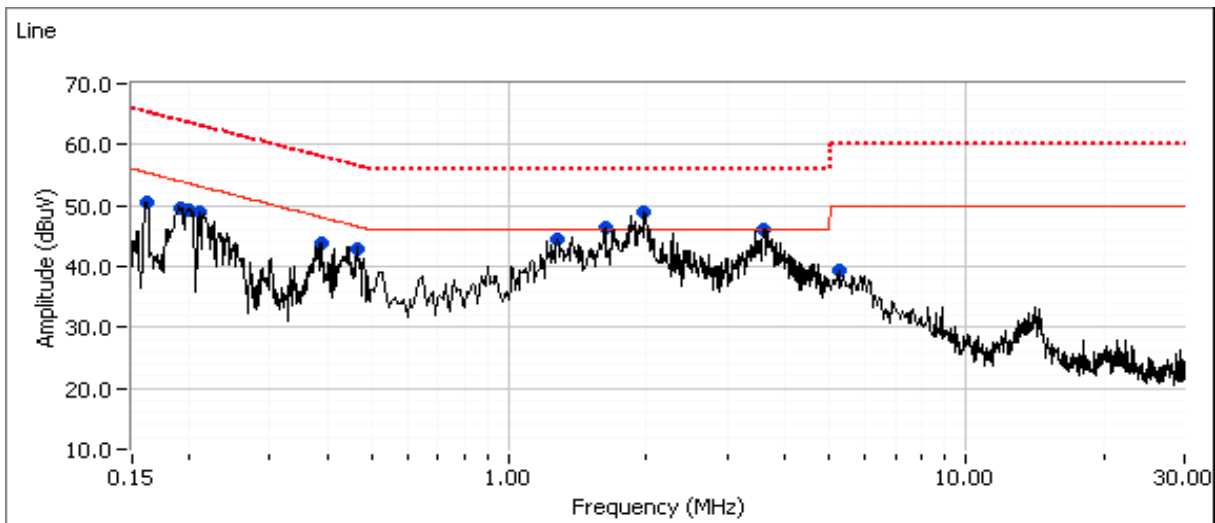
No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Intel Corporation	Job Number:	J93358
Model:	PBA5001	T-Log Number:	T93372
Contact:	Steve Hackett	Project Manager:	Christine Krebill
Standard:	FCC Part 15.247, 15.407	Project Coordinator:	-
		Class:	B

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



Client:	Intel Corporation	Job Number:	J93358
Model:	PBA5001	T-Log Number:	T93372
Contact:	Steve Hackett	Project Manager:	Christine Krebill
Standard:	FCC Part 15.247, 15.407	Project Coordinator:	-
		Class:	B

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

Frequency MHz	Level dBμV	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
1.926	49.0	Line	46.0	3.0	Peak	
1.665	46.3	Line	46.0	0.3	Peak	
3.636	46.2	Line	46.0	0.2	Peak	
1.290	44.6	Line	46.0	-1.4	Peak	
0.465	43.0	Line	46.6	-3.6	Peak	
0.210	49.0	Line	53.2	-4.2	Peak	
0.191	49.7	Line	54.0	-4.3	Peak	
0.388	43.7	Line	48.1	-4.4	Peak	
0.200	49.1	Line	53.6	-4.5	Peak	
0.161	50.5	Line	55.4	-4.9	Peak	
5.301	39.4	Line	50.0	-10.6	Peak	
1.918	49.4	Neutral	46.0	3.4	Peak	
1.695	46.7	Neutral	46.0	0.7	Peak	
3.780	45.7	Neutral	46.0	-0.3	Peak	
0.468	42.2	Neutral	46.6	-4.4	Peak	
0.355	43.3	Neutral	48.8	-5.5	Peak	
0.222	46.5	Neutral	52.8	-6.3	Peak	
5.150	38.8	Neutral	50.0	-11.2	Peak	

Final quasi-peak and average readings

Frequency MHz	Level dBμV	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
1.926	31.1	Line	46.0	-14.9	AVG	
1.926	42.9	Line	56.0	-13.1	QP	
1.665	30.9	Line	46.0	-15.1	AVG	
1.665	40.7	Line	56.0	-15.3	QP	
3.636	29.9	Line	46.0	-16.1	AVG	
3.636	40.0	Line	56.0	-16.0	QP	
1.290	28.2	Line	46.0	-17.8	AVG	
1.290	39.7	Line	56.0	-16.3	QP	
0.465	25.7	Line	46.6	-20.9	AVG	
0.465	38.7	Line	56.6	-17.9	QP	
1.918	31.8	Neutral	46.0	-14.2	AVG	
1.918	43.6	Neutral	56.0	-12.4	QP	
1.695	30.9	Neutral	46.0	-15.1	AVG	
1.695	42.2	Neutral	56.0	-13.8	QP	
3.780	27.2	Neutral	46.0	-18.8	AVG	
3.780	36.6	Neutral	56.0	-19.4	QP	

End of Report

This page is intentionally blank and marks the last page of this test report.