



**FCC CFR47 PART 15 SUBPART E
INDUSTRY CANADA RSS-210 ISSUE 7
CLASS II PERMISSIVE CHANGE
CERTIFICATION TEST REPORT**

FOR

INTEL WIFI LINK 5300 SERIES

**FCC MODEL: 533AN_MMW
IC MODEL: 533ANMU**

**FCC ID: PD9533ANMU
IC: 1000M-533ANMU**

REPORT NUMBER: 08U11946-2A

ISSUE DATE: NOVEMBER 7, 2008

Prepared for
**INTEL CORPORATION
2111 N.E. 25th AVE
HILLSBORO, OR 97124-5961**

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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	09/29/08	Initial Issue	T. Chan
A	11/07/08	Added model numbers to section 5.3	A. Zaffar

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	5
4.1. <i>MEASURING INSTRUMENT CALIBRATION</i>	5
4.2. <i>MEASUREMENT UNCERTAINTY</i>	5
5. EQUIPMENT UNDER TEST	6
5.1. <i>DESCRIPTION OF EUT</i>	6
5.2. <i>MAXIMUM OUTPUT POWER</i>	6
5.3. <i>DESCRIPTION OF CLASS II CHANGE</i>	6
5.4. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	6
5.5. <i>SOFTWARE AND FIRMWARE</i>	6
5.6. <i>WORST-CASE CONFIGURATION AND MODE</i>	6
5.7. <i>DESCRIPTION OF TEST SETUP</i>	7
6. TEST AND MEASUREMENT EQUIPMENT	9
7. RADIATED TEST RESULTS	10
7.1. <i>LIMITS AND PROCEDURE</i>	10
7.2. <i>TRANSMITTER ABOVE 1 GHz (14 INCHES LAPTOP)</i>	11
7.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE LOWER 5.2 GHz BAND	11
7.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND.....	16
7.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND.....	21
7.3. <i>TRANSMITTER ABOVE 1 GHz (15 INCHES LAPTOP)</i>	26
7.3.1. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE LOWER 5.2 GHz BAND	26
7.3.2. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND.....	31
7.3.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND.....	36
7.4. <i>RECEIVER ABOVE 1 GHz</i>	41
7.5. <i>WORST-CASE BELOW 1 GHz</i>	42
8. AC POWER LINE CONDUCTED EMISSIONS	50
9. SETUP PHOTOS	57

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: INTEL CORPORATION
2111 NE 25TH AVENUE
HILLSBORO, OREGON 97124, USA

EUT DESCRIPTION: INTEL WIFI LINK 5300 SERIES

FCC MODEL: 533AN_MMW

IC MODEL: 533ANMU

SERIAL NUMBER: 14" LAPTOP (PK292009L0081500085);
15" LAPTOP (PK292009L0081500071)

DATE TESTED: JULY 02-14, and SEPTEMBER 27, 2008

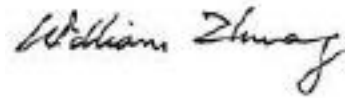
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:



THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

WILLIAM ZHUANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11n 3x3 Intel WiFi Link 5300 Series.
The radio module is manufactured by Intel Corporation.

5.2. MAXIMUM OUTPUT POWER

The test measurement passed within ± 0.5 dBm of the original output power.

5.3. DESCRIPTION OF CLASS II CHANGE

The change filed under this application is added PIFA antennas with 3x3 Module inside Portable Laptop (14 inch/Lenovo 3000 G430 and 15inch/Lenovo 3000 G530).

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 3.46 dBi for 2.4GHZ Band, 3.3 dBi for 5150-5350MHz band, 2.75 dBi for 5470-5725MHz band, and 2.31 dBi for 5.725 – 5850MHz band.

5.5. SOFTWARE AND FIRMWARE

The EUT test utility software used during testing was CRTU version 5.0.62.0

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power and less marginal from the previous table of summary results.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
14" Laptop	Lenovo	Lenovo 3000 G430	NA	DoC
15" Laptop	Lenovo	Lenovo 3000 G530	NA	DoC
AC Adapter	Lenovo	ADP-65YBB	36-001309-A01-	DoC

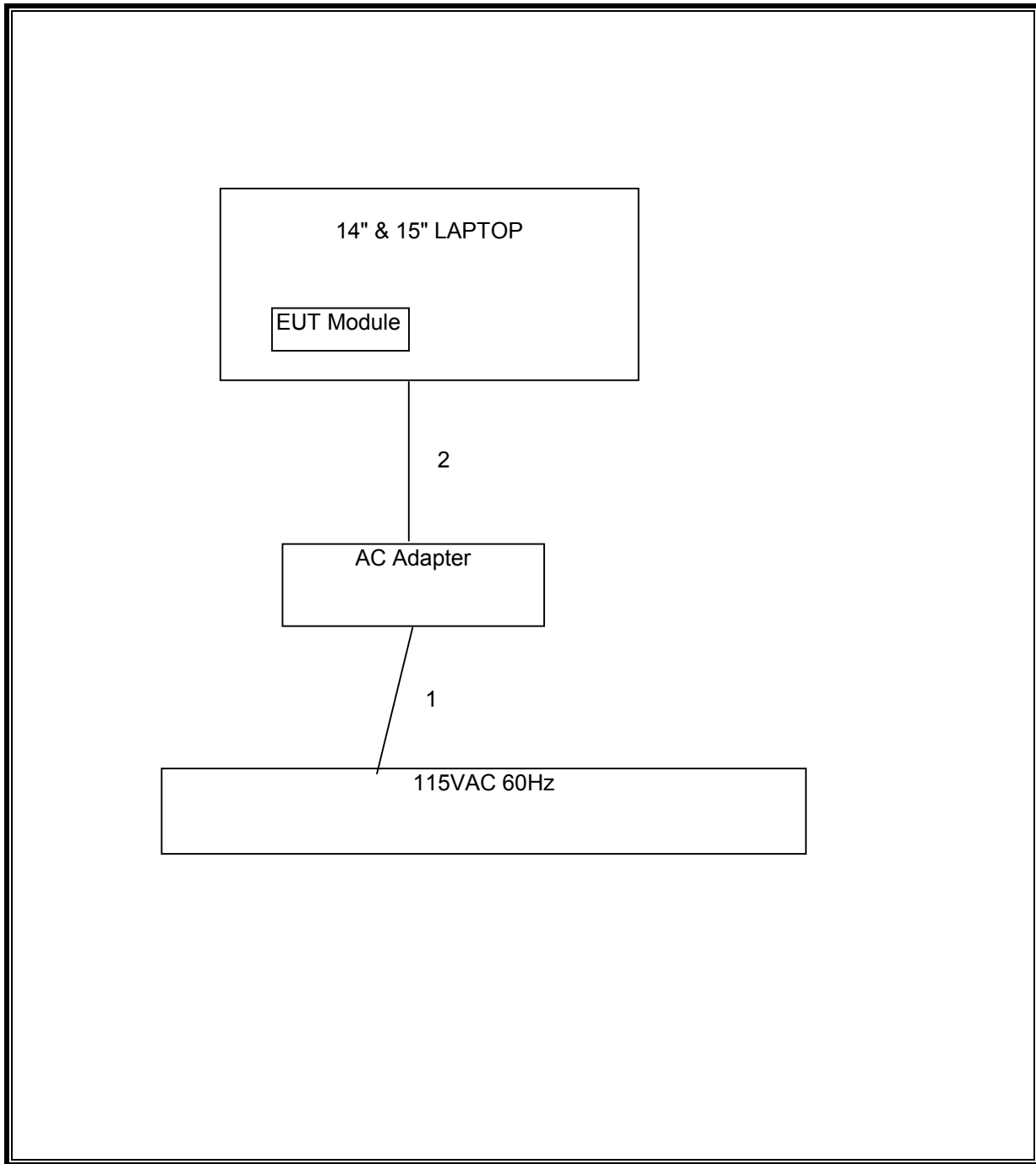
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Un-shielded	2m	N/A
2	DC	1	DC	Un-shielded	2m	N/A

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	5/2/2006	3/3/2009
Peak Power Meter	Agilent / HP	E4416A	C00963	2/14/2006	12/2/2008
Power Sensor	Agilent	E9327A	C00964	2/14/2006	12/2/2008
Antenna, Horn, 18 GHz	EMCO	3115	C00872	4/15/2007	4/15/2009
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	8/3/2007	9/27/2008
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	2/6/2007	6/12/2009
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	2/6/2007	6/12/2009
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	1/0/1900	2/11/2009
Preamplifier, 1300 MHz	Agilent / HP	8447D	NA	5/9/2007	5/9/2009
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	10/16/2006	1/27/2009
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	9/15/2006	10/25/2008
7.6 GHz High Pass Filter	Micro Tronics	HPM13350	N/A	N/A	N/A
5.75 - 5.8 Reject Filter	Micro Tronics	BRC13192	N/A	N/A	N/A

7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

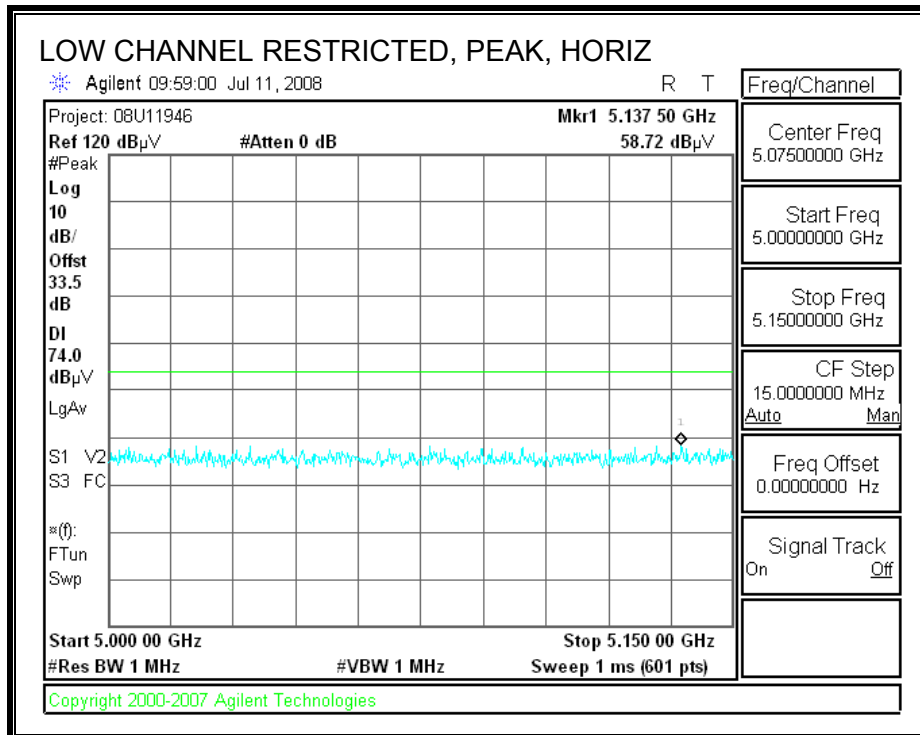
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

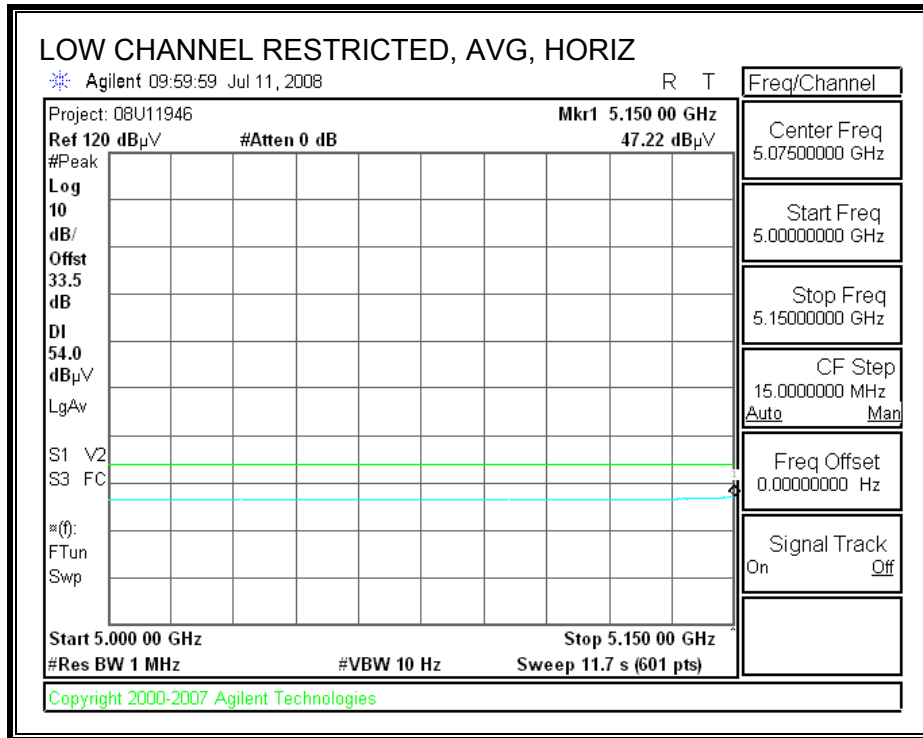
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

7.2. TRANSMITTER ABOVE 1 GHz (14 INCHES LAPTOP)

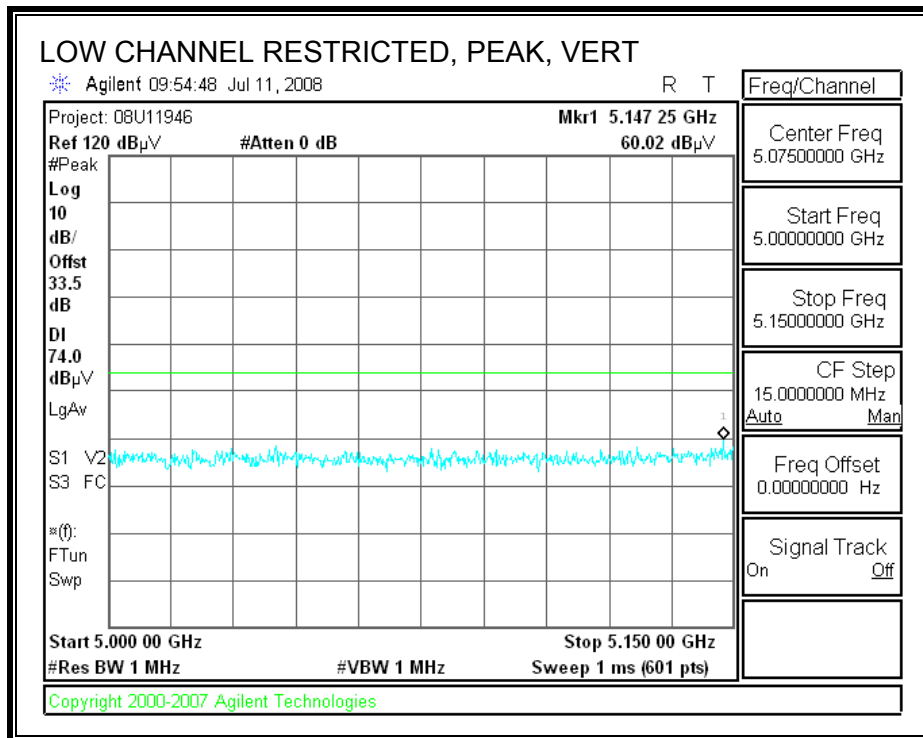
7.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE LOWER 5.2 GHz BAND

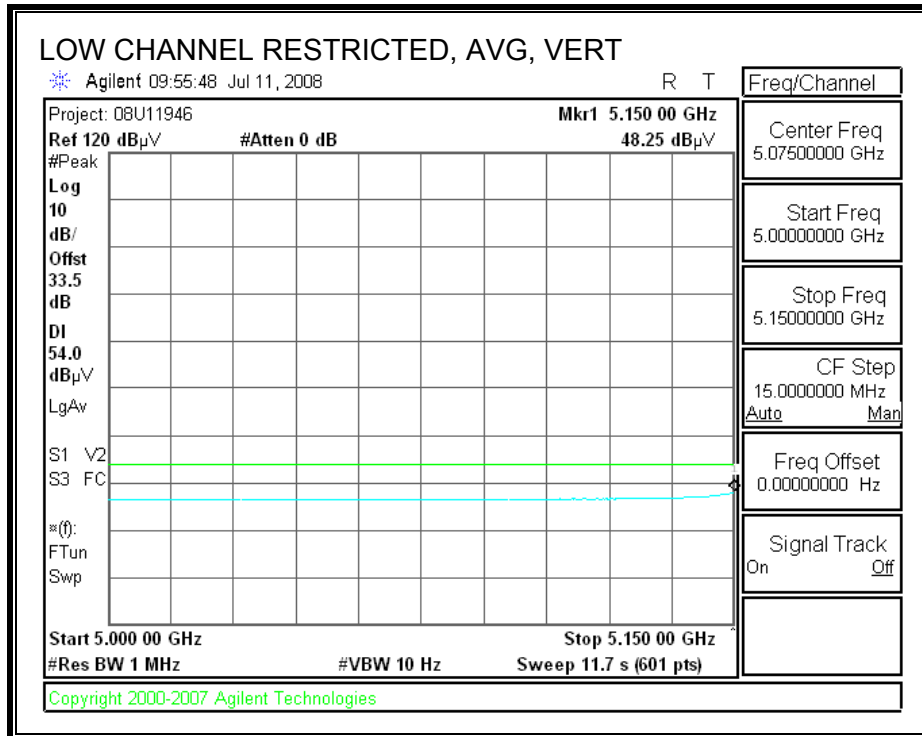
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN C





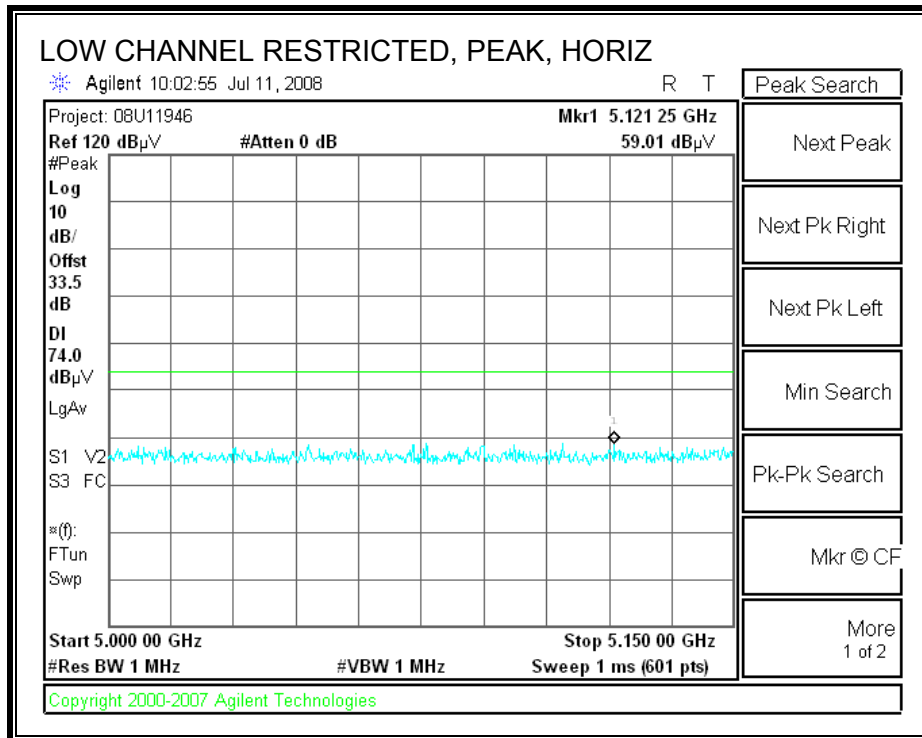
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL), CHAIN C



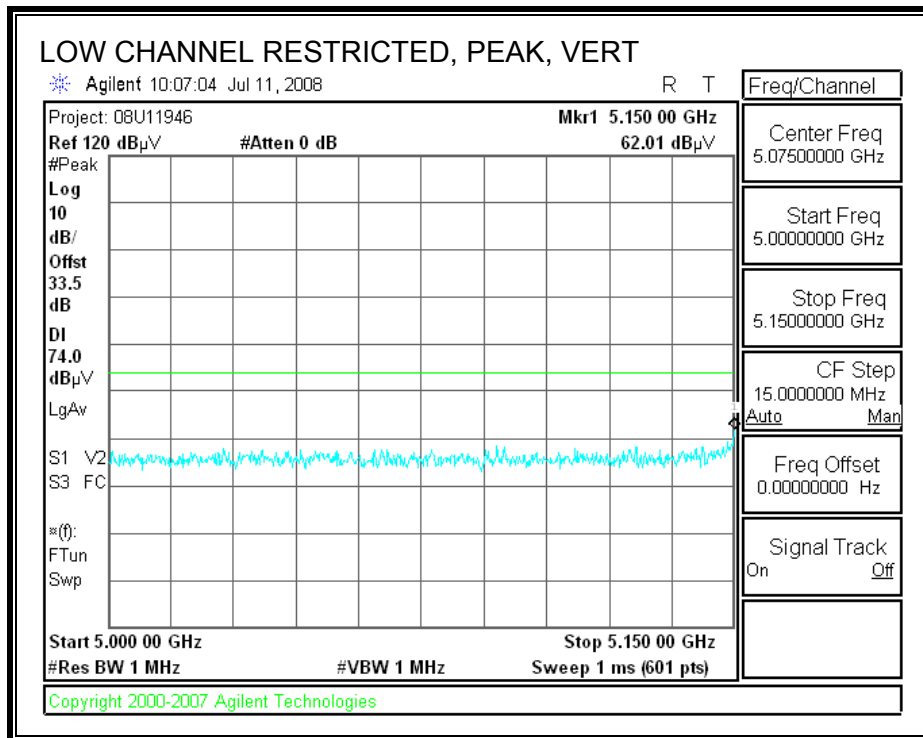


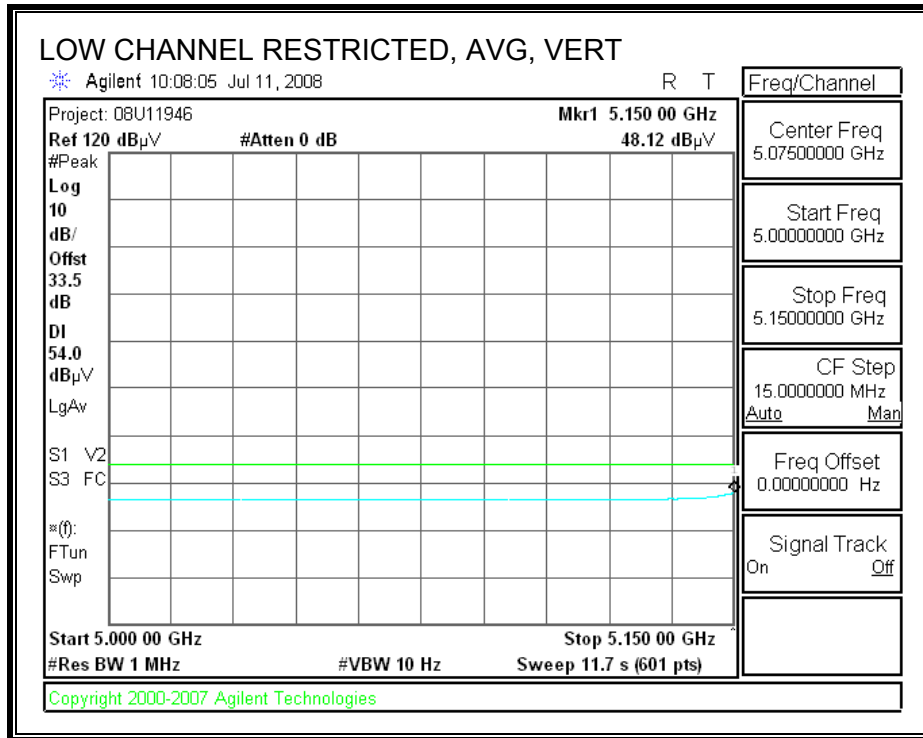
7.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN C



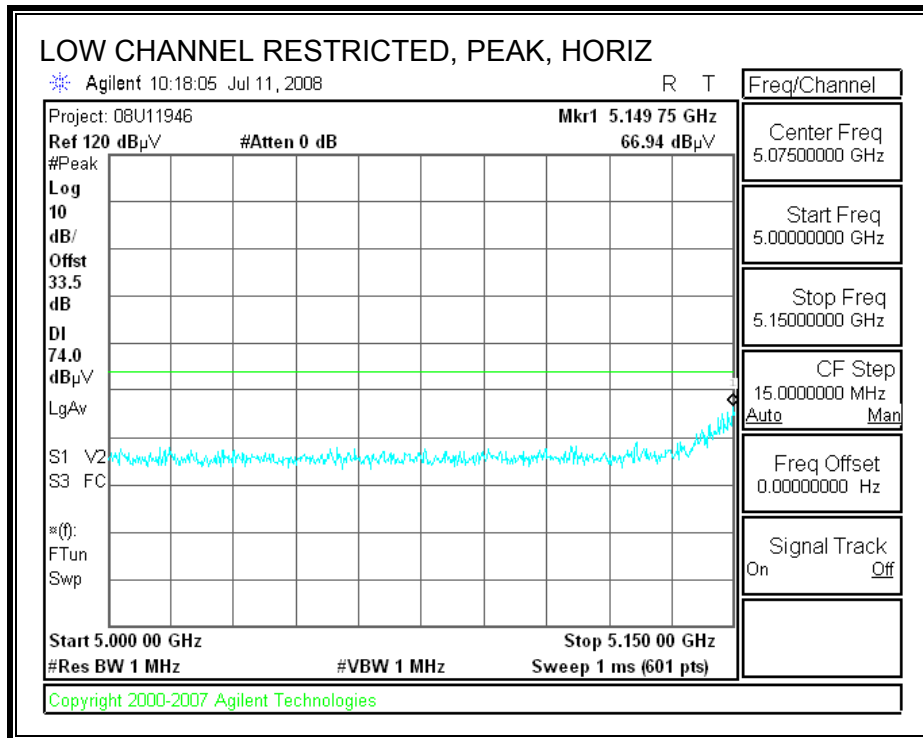
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL), CHAIN C

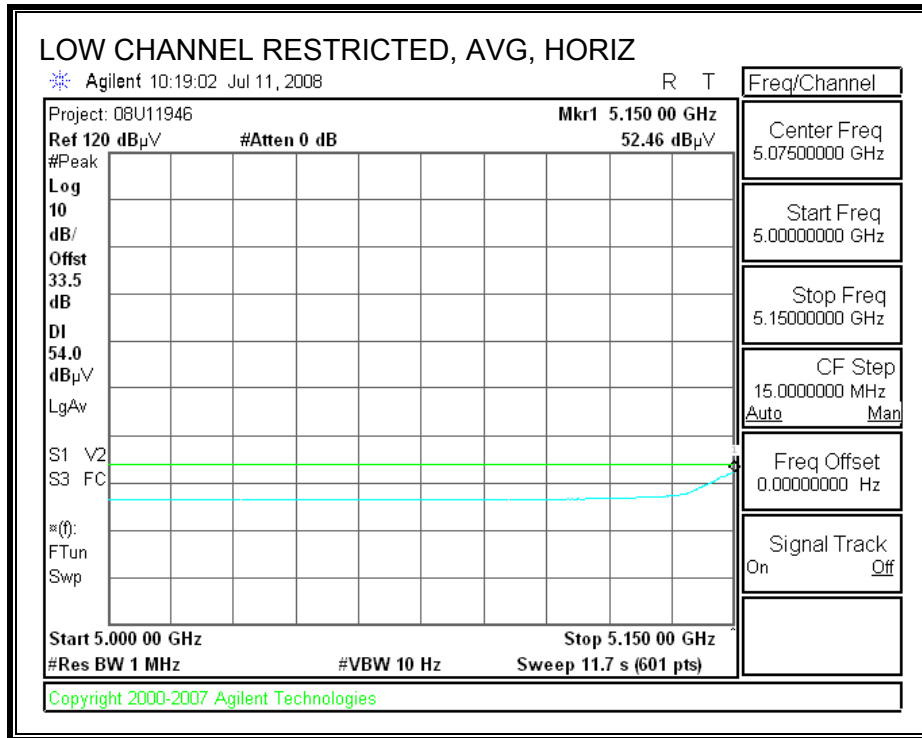




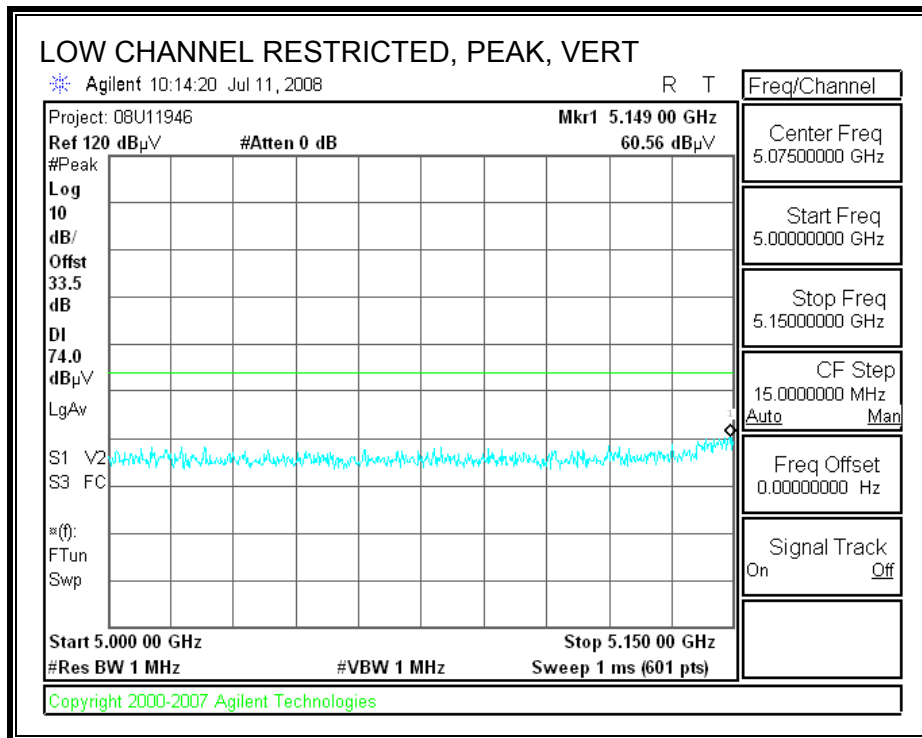
7.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

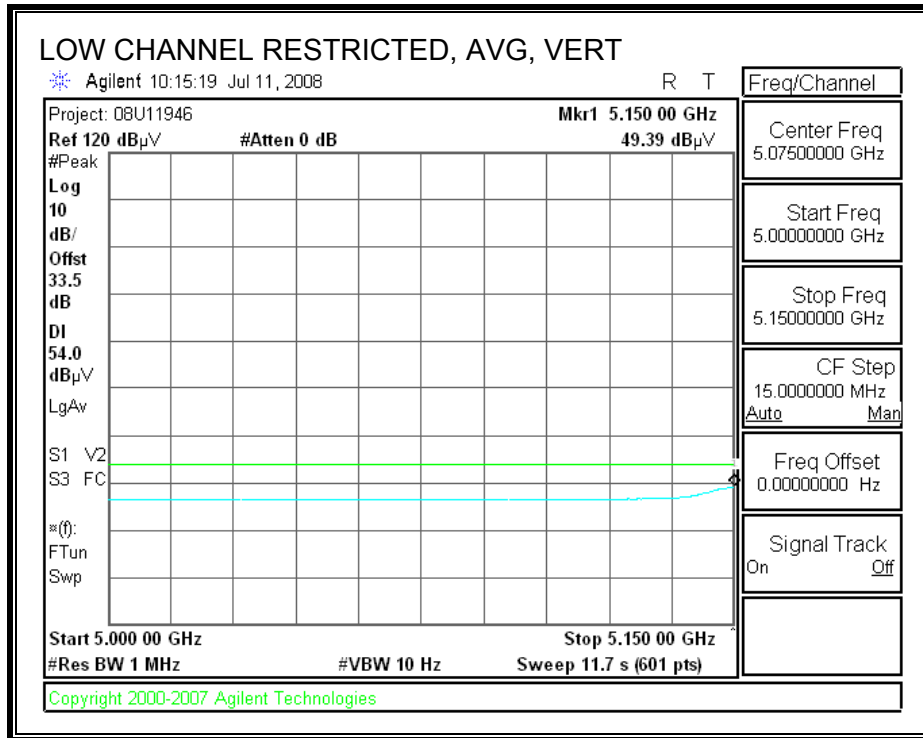
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN A

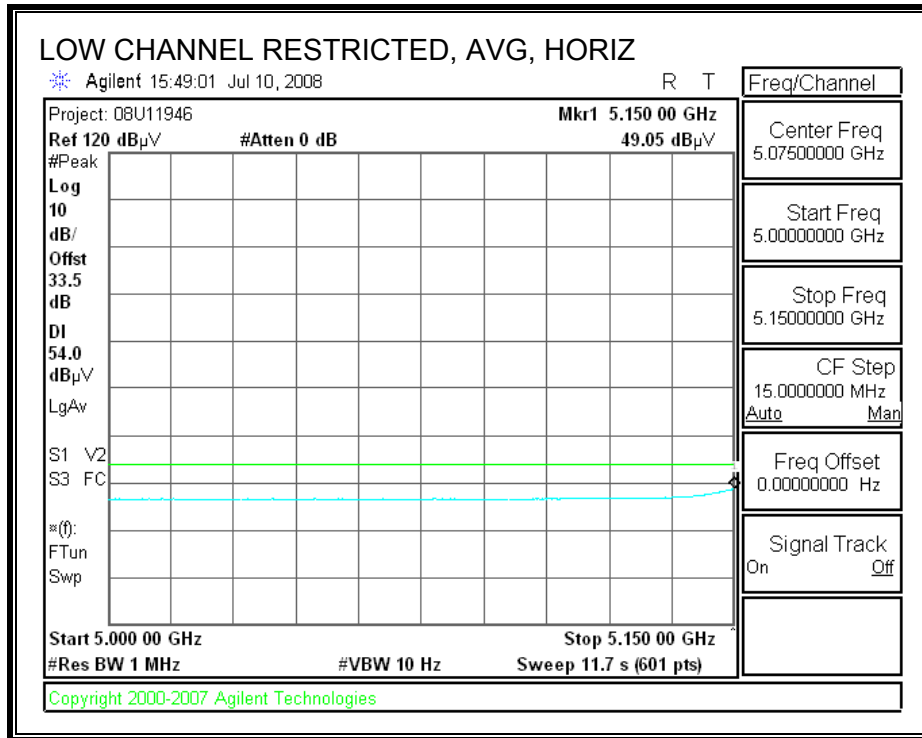




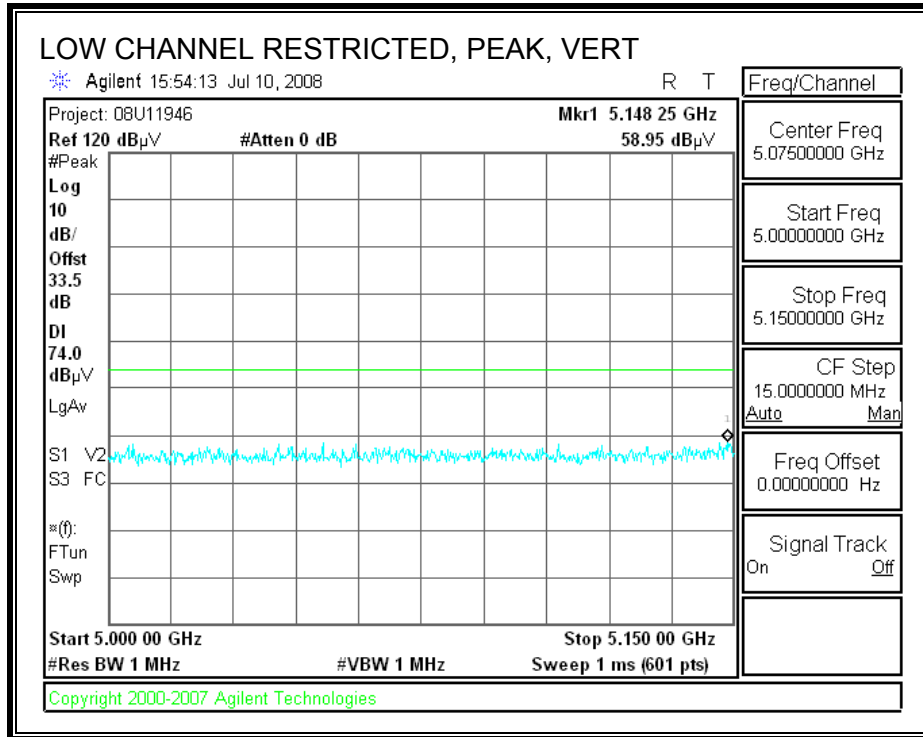
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL), CHAIN A

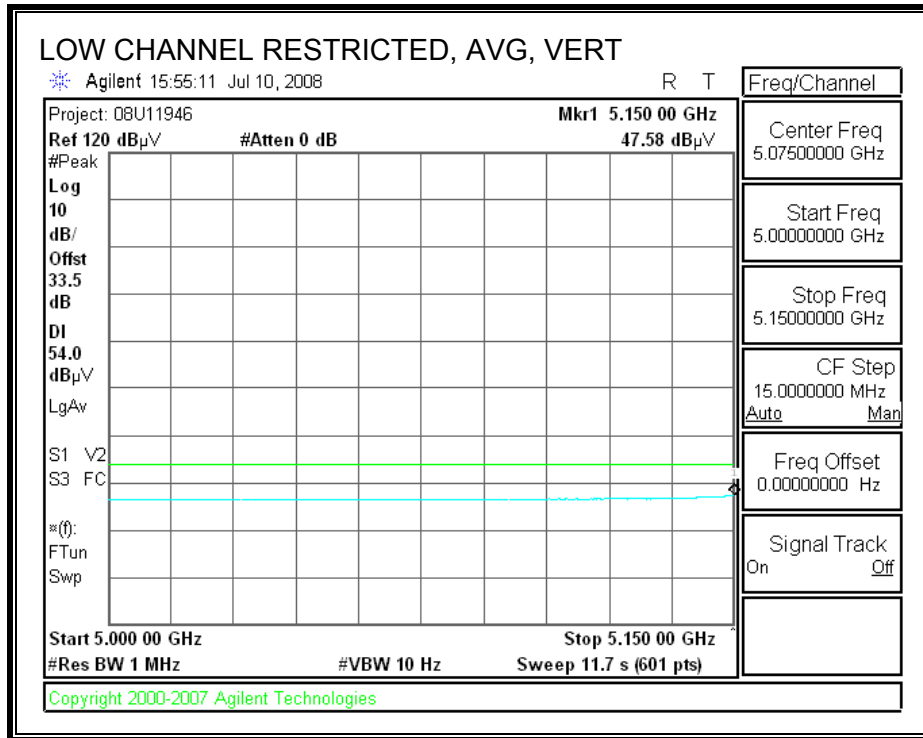






RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: Intel
 Project #: 08U11946
 Date: 7/14/2008
 Test Engineer: William Zhuang
 Configuration: Laptop stand alone
 Mode: 5.2GHz Tx On

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
Thanh 177079008		C-5m Chamber		R_002	Average Measurements RBW=1MHz; VBW=10Hz

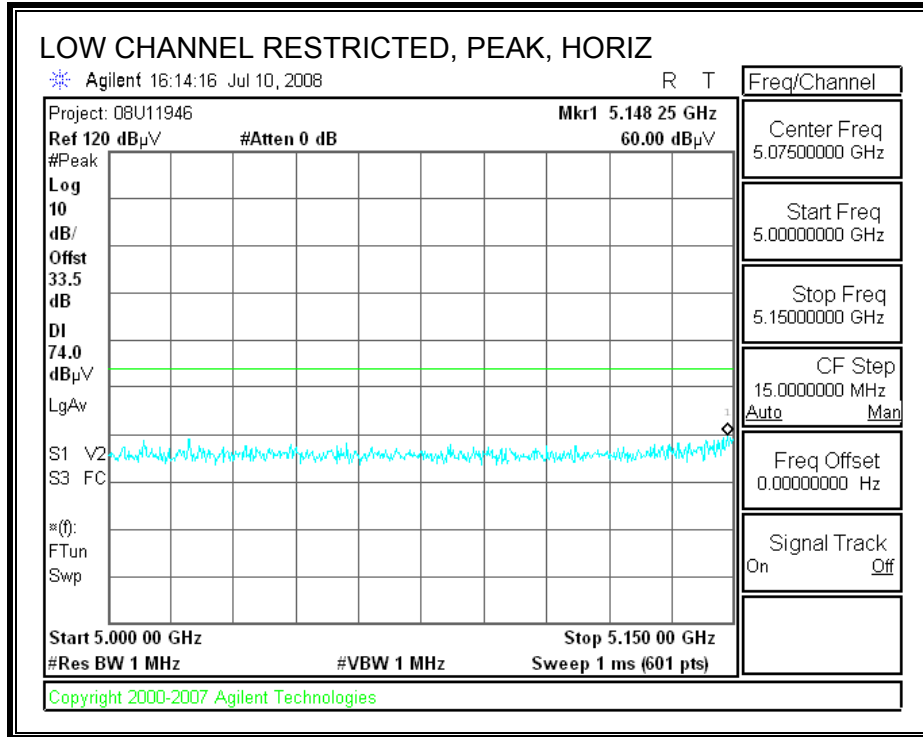
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
a Mode, Low Ch. 5180MHz, Chain A															
15.540	3.0	42.9	29.8	38.0	0.8	-32.2	0.0	0.0	49.4	36.3	74	54	-24.6	-17.7	V
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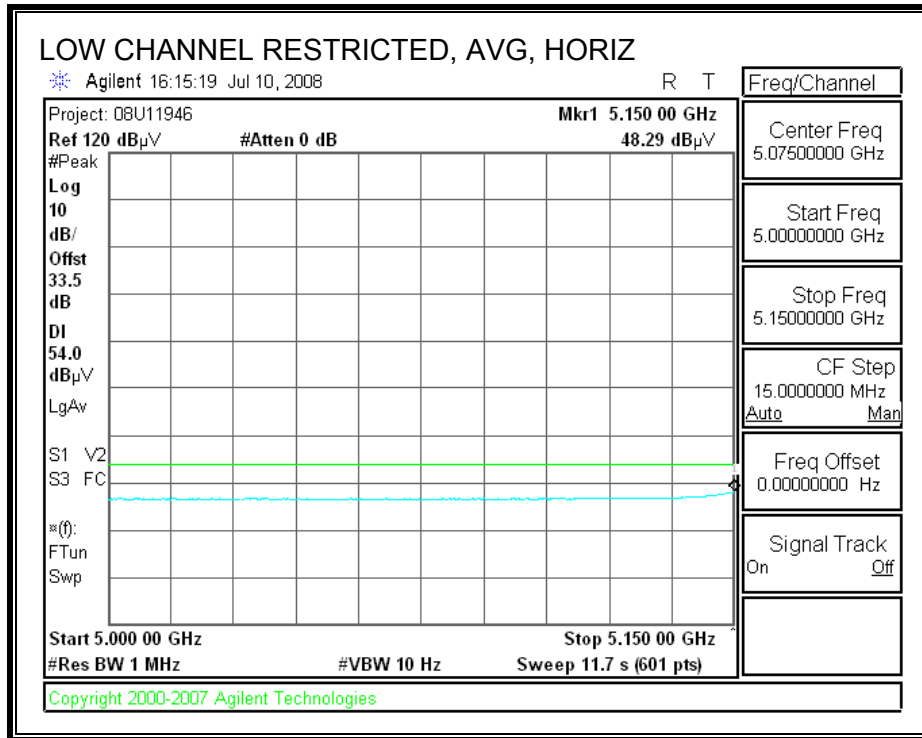
Rev. 4.12.7

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

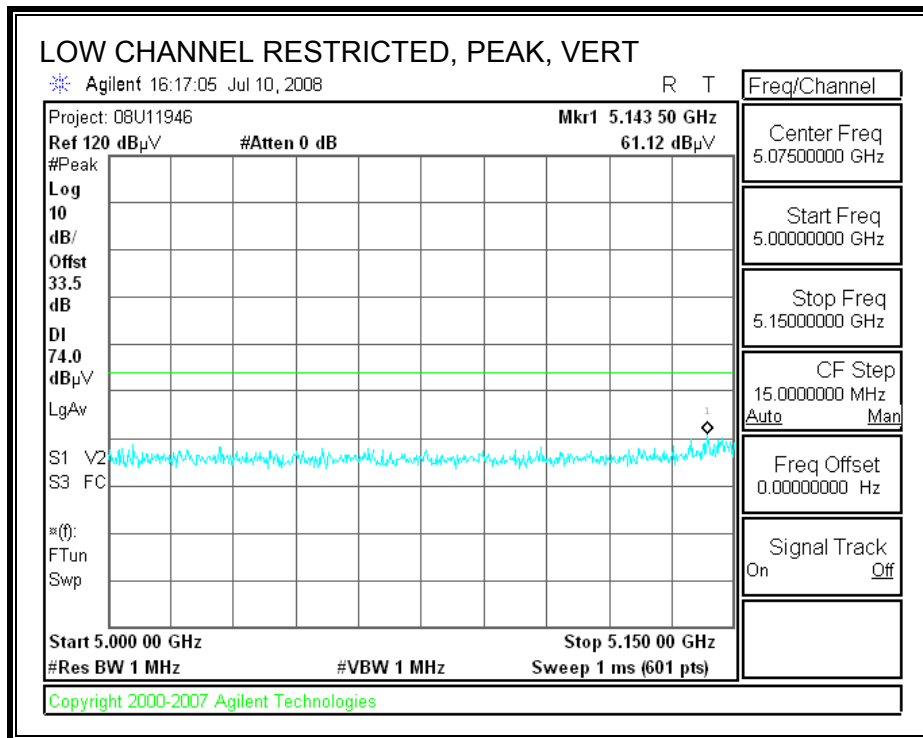
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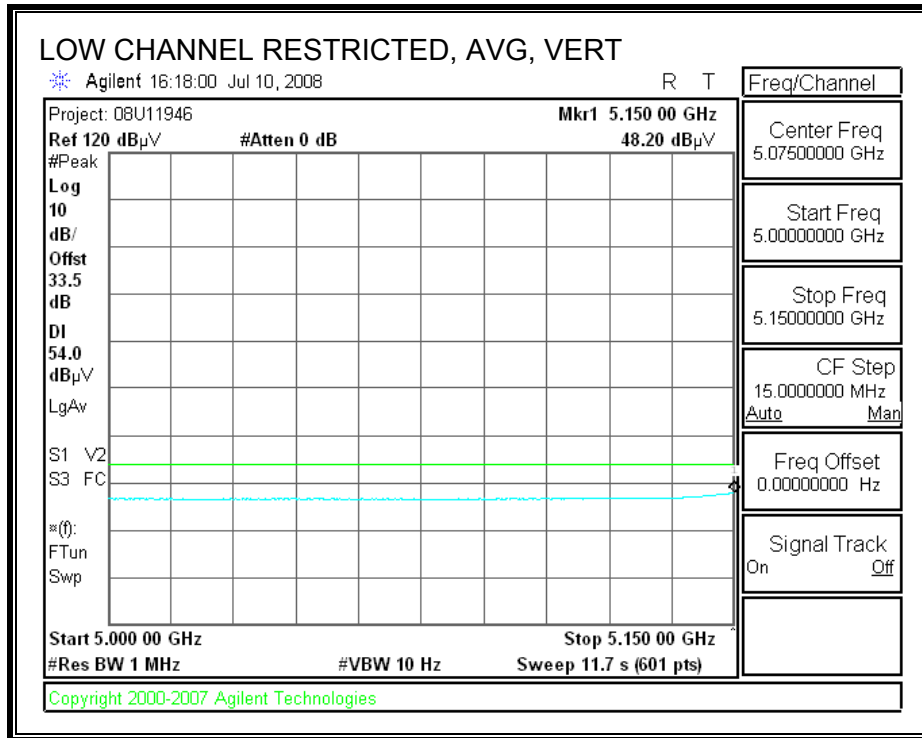
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN C





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



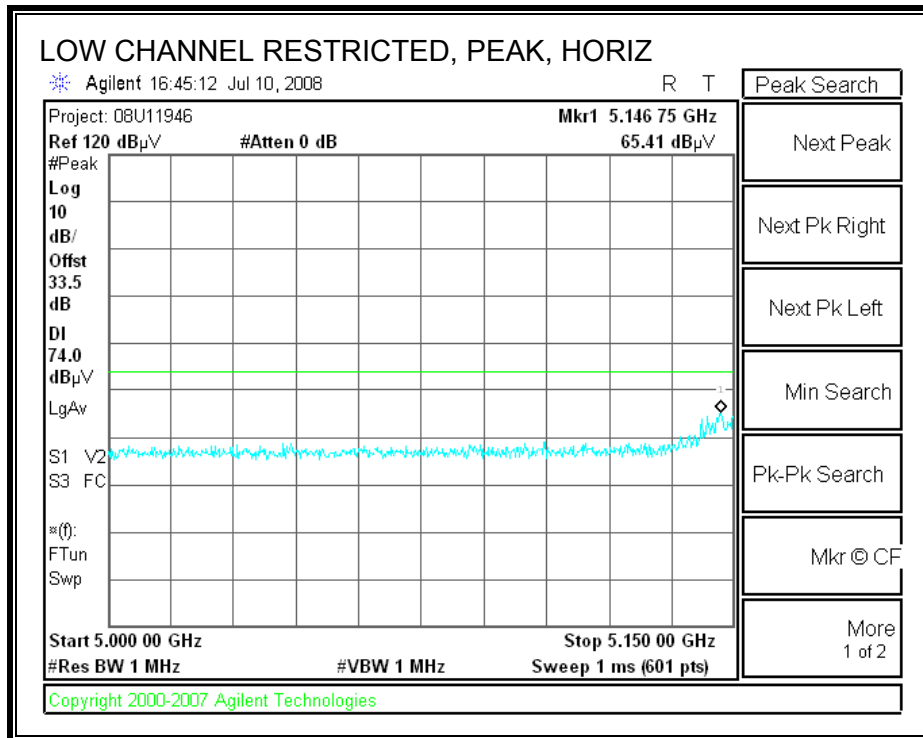


HARMONICS AND SPURIOUS EMISSIONS

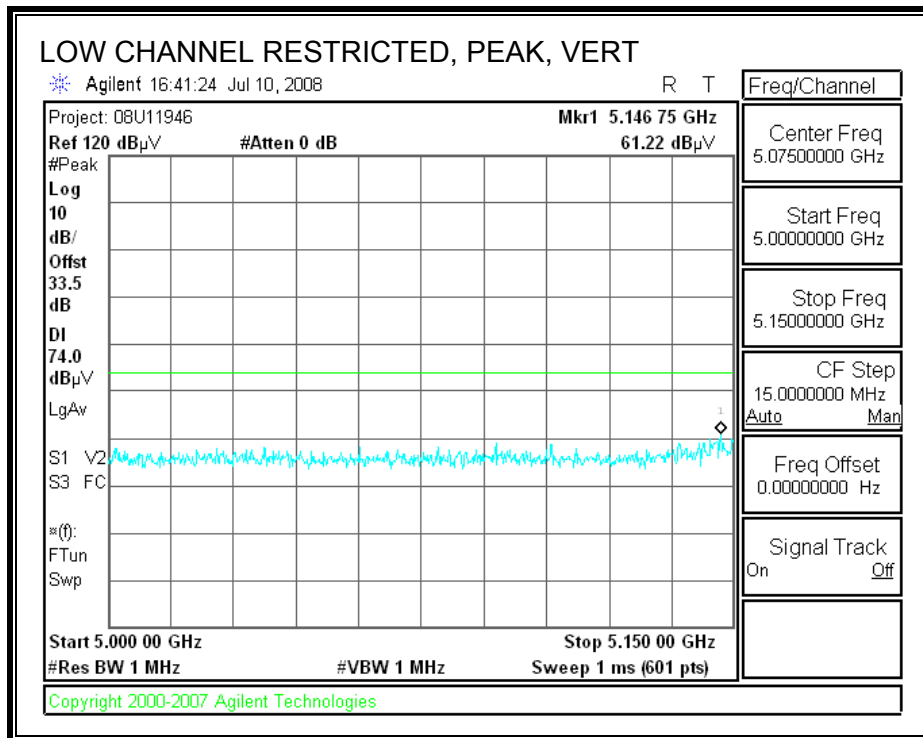
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AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit																																																																																																																															
CL	Cable Loss	HPF	High Pass Filter																																																																																																																																	

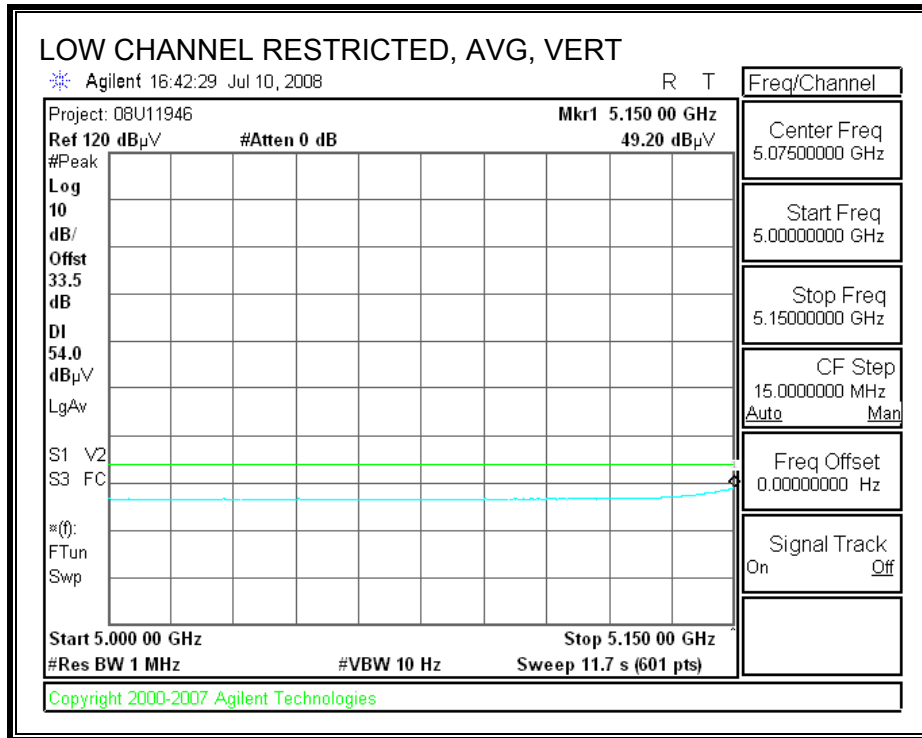
7.3.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN A



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





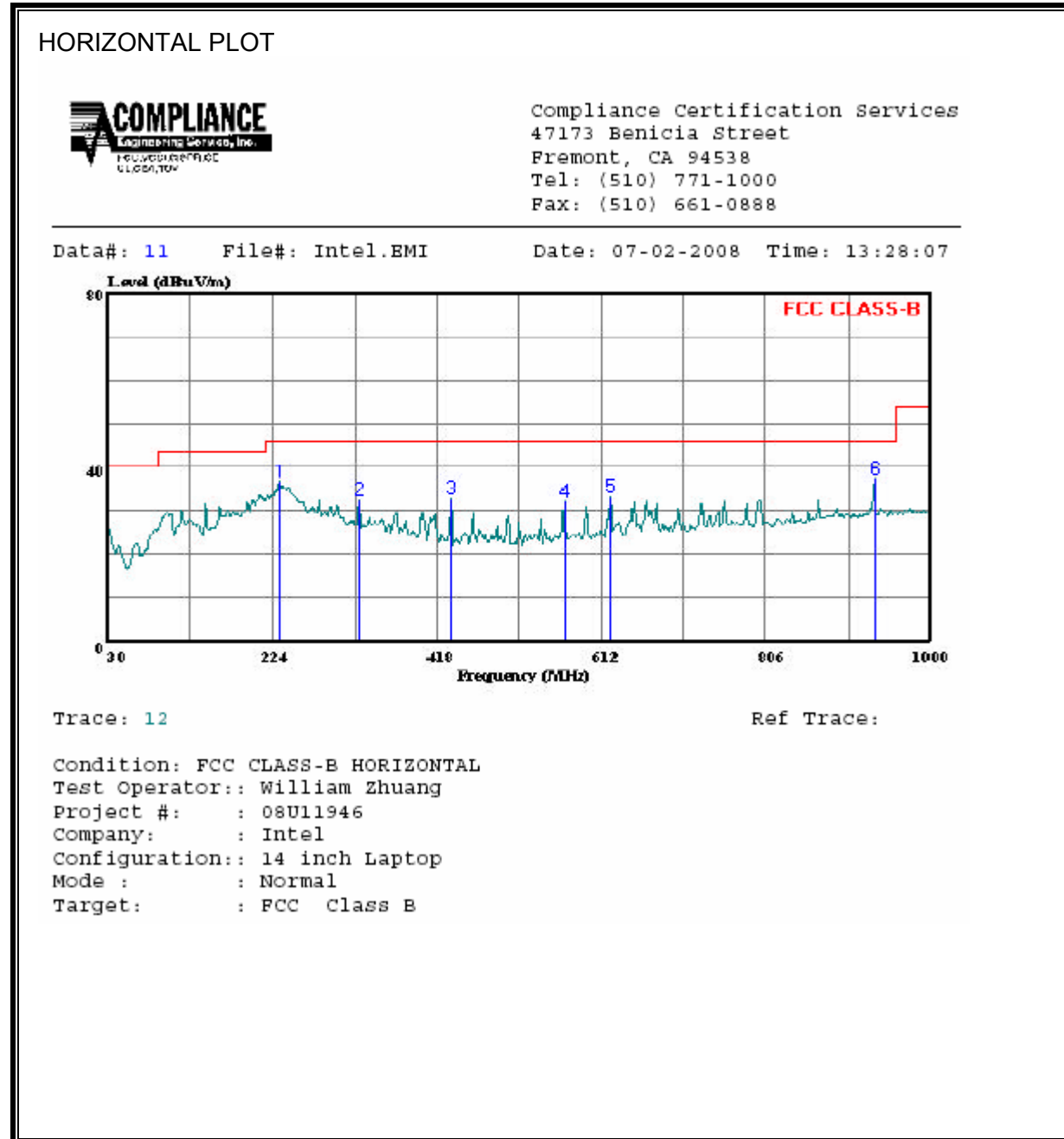
7.4. RECEIVER ABOVE 1 GHz

Note: No emissions were found within above 1GHz of 20dB below the system noise.

7.5. WORST-CASE BELOW 1 GHz

14 NCHES LAPTOP

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



HORIZONTAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	232.730	49.89	-13.22	36.67	46.00	-9.33	Peak
2	324.880	42.64	-9.97	32.67	46.00	-13.33	Peak
3	434.490	41.19	-8.27	32.92	46.00	-13.08	Peak
4	567.380	38.29	-6.16	32.13	46.00	-13.87	Peak
5	623.640	38.60	-5.35	33.25	46.00	-12.75	Peak
6	934.040	37.80	-0.40	37.40	46.00	-8.60	Peak

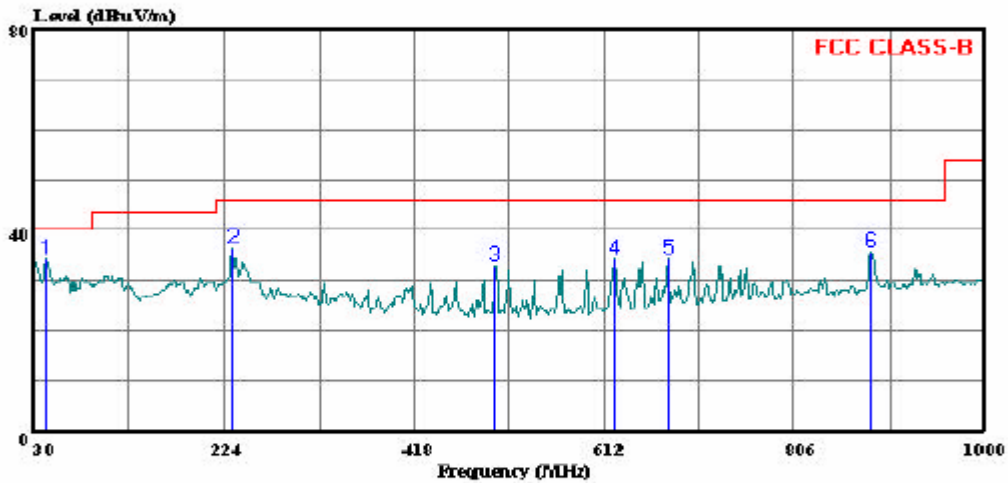
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: Intel.EMI Date: 07-18-2008 Time: 20:34:03



Trace: 13

Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator:: William Zhuang
Project #: : 08U11946
Company: : Intel
Configuration:: 14 Inch Laptop
Mode : : Normal
Target: : FCC Class B

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	42.610	47.27	-13.12	34.15	40.00	-5.85	Peak
2	232.730	49.47	-13.22	36.25	46.00	-9.75	Peak
3	499.480	40.12	-7.19	32.93	46.00	-13.07	Peak
4	623.640	39.55	-5.35	34.20	46.00	-11.80	Peak
5	676.990	38.63	-4.42	34.21	46.00	-11.79	Peak
6	885.540	36.81	-1.18	35.63	46.00	-10.37	Peak

15 INCHES LAPTOP

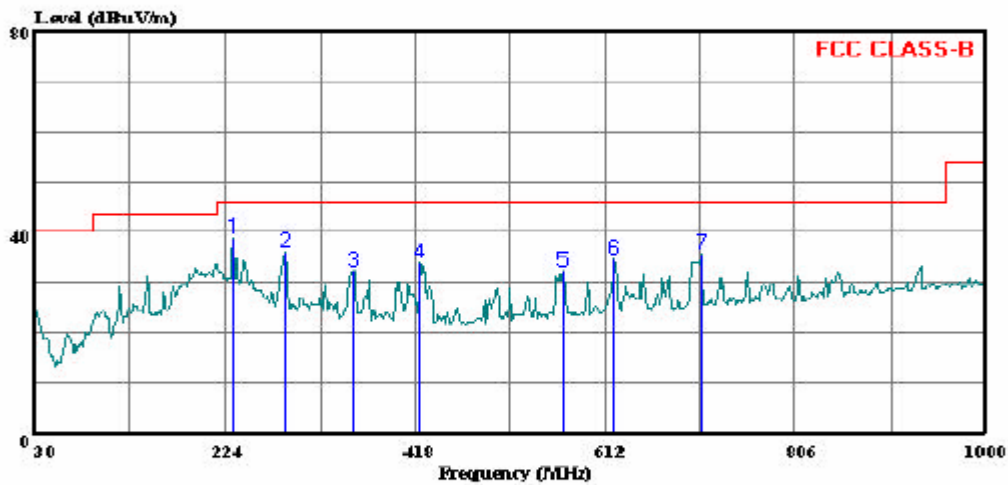
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 15 File#: Intel.EMI Date: 07-02-2008 Time: 13:43:51



Trace: 16

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: William Zhuang
Project #: 08U11946
Company: Intel
Configuration: 15 Inch Laptop
Mode: Normal
Target: CISPR Class B

HORIZONTAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	232.730	51.91	-13.22	38.69	46.00	-7.31	Peak
2	286.080	47.22	-11.14	36.08	46.00	-9.92	Peak
3	353.980	41.71	-9.53	32.18	46.00	-13.82	Peak
4	421.880	42.27	-8.45	33.82	46.00	-12.18	Peak
5	567.380	38.45	-6.16	32.29	46.00	-13.71	Peak
6	620.730	39.81	-5.35	34.46	46.00	-11.54	Peak
7	710.940	39.63	-3.83	35.80	46.00	-10.20	Peak

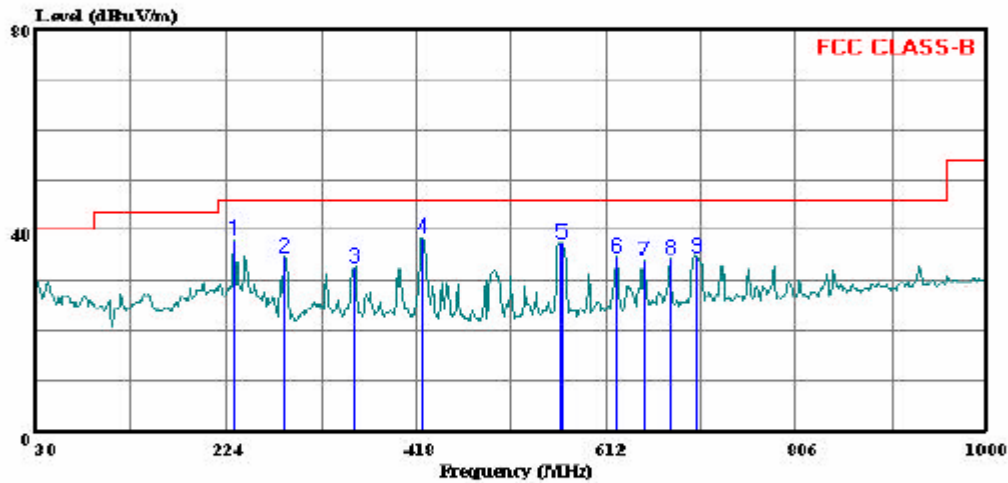
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 17 File#: Intel.EMI Date: 07-02-2008 Time: 13:52:10



Trace: 18

Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator:: William Zhuang
Project #: : 08U11946
Company: : Intel
Configuration:: 15 Inch Laptop
Mode : : Normal
Target: : FCC Class B

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	232.730	51.15	-13.22	37.93	46.00	-8.07	Peak
2	284.140	45.87	-11.23	34.64	46.00	-11.36	Peak
3	353.980	42.08	-9.53	32.55	46.00	-13.45	Peak
4	424.790	47.00	-8.41	38.59	46.00	-7.41	Peak
5	565.440	43.67	-6.16	37.51	46.00	-8.49	Peak
6	623.640	39.85	-5.35	34.50	46.00	-11.50	Peak
7	649.830	38.88	-4.97	33.91	46.00	-12.09	Peak
8	676.990	38.68	-4.42	34.26	46.00	-11.74	Peak
9	704.150	38.62	-3.89	34.73	46.00	-11.27	Peak

8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
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.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

14 INCHES LAPTOP

6 WORST EMISSIONS

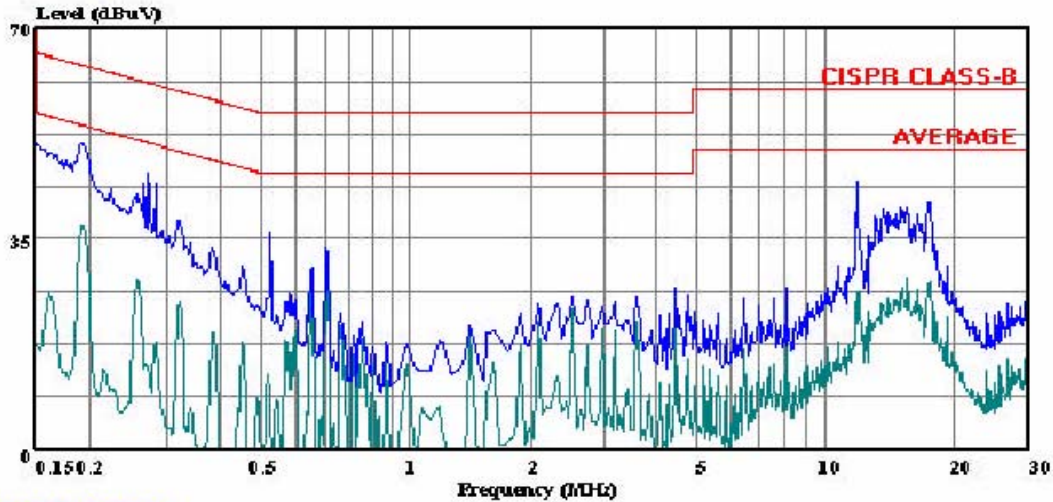
CONDUCTED EMISSIONS DATA (115VAC 60Hz)										
Freq. (MHz)	Reading			Class (dB)	Limit QP	FCC B		Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)			AV	QP (dB)	AV (dB)		
0.19	50.81	--	37.15	0.00	63.95	53.95	-13.14	-16.80	L1	
12.00	44.50	--	26.40	0.00	60.00	50.00	-15.50	-23.60	L1	
17.66	41.28	--	28.54	0.00	60.00	50.00	-18.72	-21.46	L1	
0.29	52.16	--	21.76	0.00	60.41	50.41	-8.25	-28.65	L2	
12.00	44.60	--	26.16	0.00	60.00	50.00	-15.40	-23.84	L2	
17.66	42.26	--	27.76	0.00	60.00	50.00	-17.74	-22.24	L2	
6 Worst Data										

LINE 1 RESULTS



Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: EMI-Intel.EMI Date: 07-02-2008 Time: 15:20:09



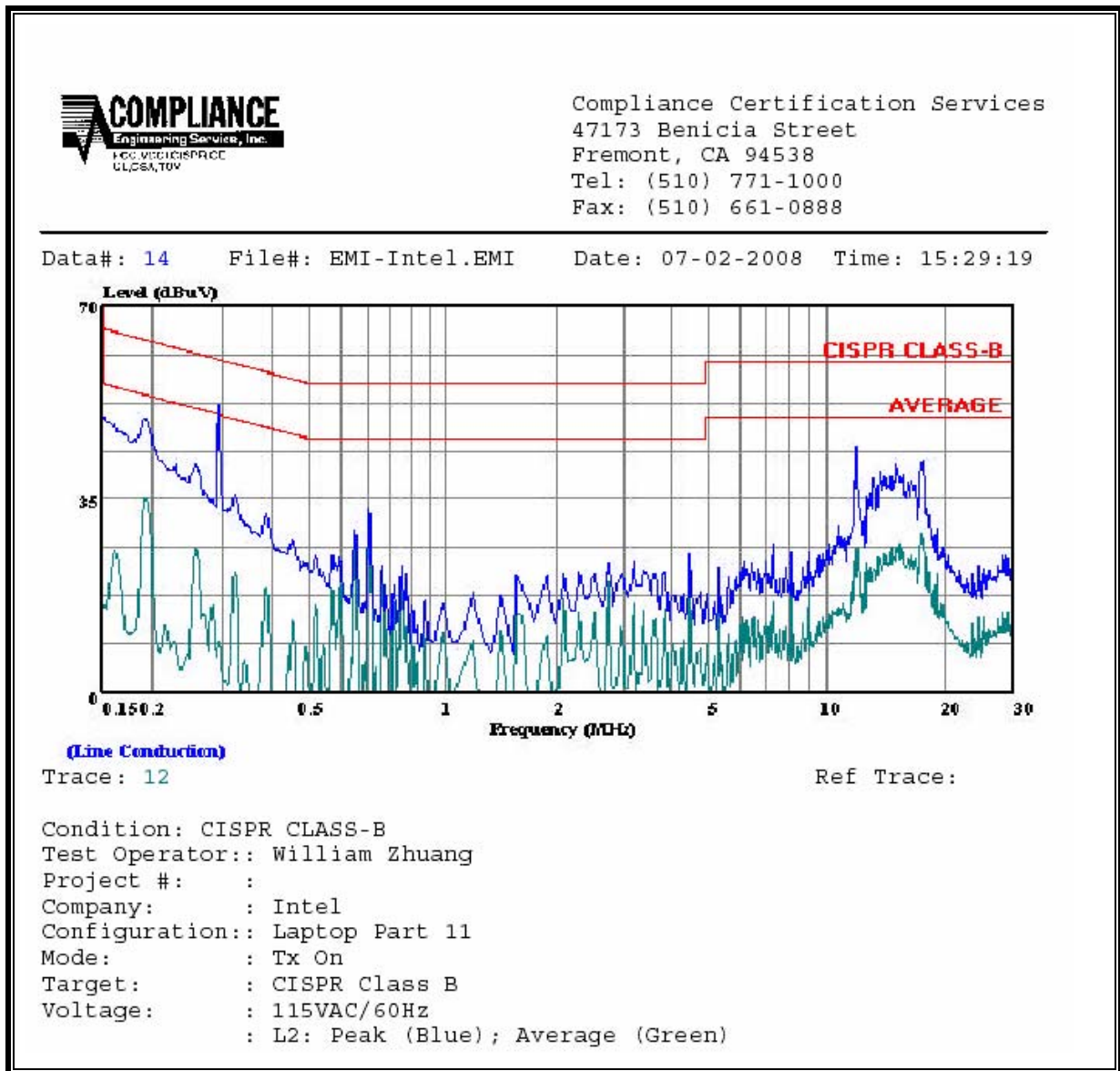
(Line Conduction)

Trace: 5

Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: William Zhuang
Project #: :
Company: : Intel
Configuration:: laptop only, Part 11
Mode: : Tx On
Target: : CISPR Class B
Voltage: : 115VAC/60Hz
: L1: Peak (Blue); Average (Green)

LINE 2 RESULTS

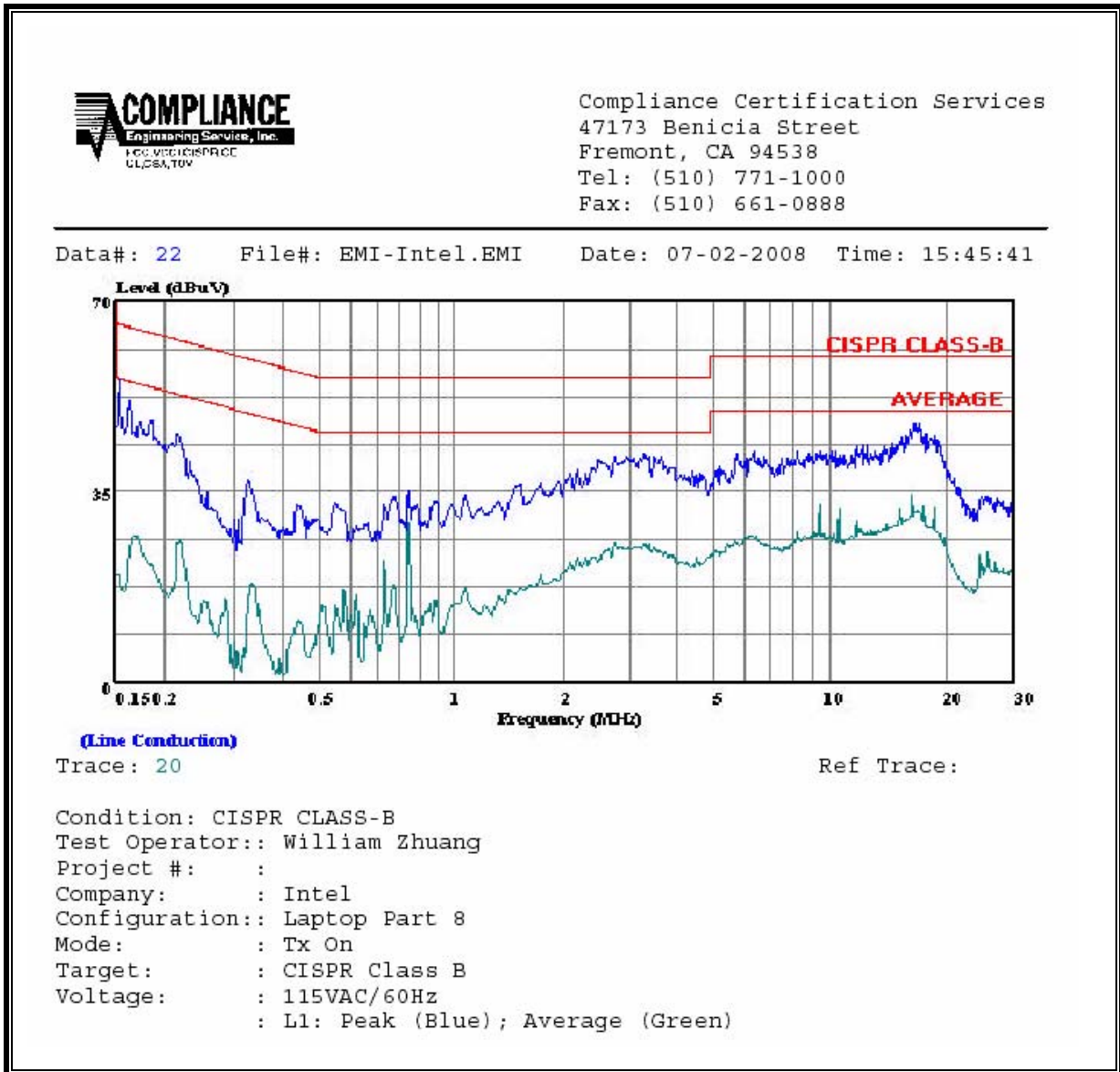


15 INCHES LAPTOP

6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Class	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	55.67	--	26.97	0.00	65.94	55.94	-10.27	-28.97	L1
0.16	51.88	--	29.42	0.00	65.31	55.31	-13.43	-25.89	L1
16.75	47.50	--	34.50	0.00	60.00	50.00	-12.50	-15.50	L1
0.16	49.07	--	25.49	0.00	65.41	55.41	-16.34	-29.92	L2
16.40	47.60	--	31.21	0.00	60.00	50.00	-12.40	-18.79	L2
18.43	46.63	--	29.38	0.00	60.00	50.00	-13.37	-20.62	L2
6 Worst Data									

LINE 1 RESULTS

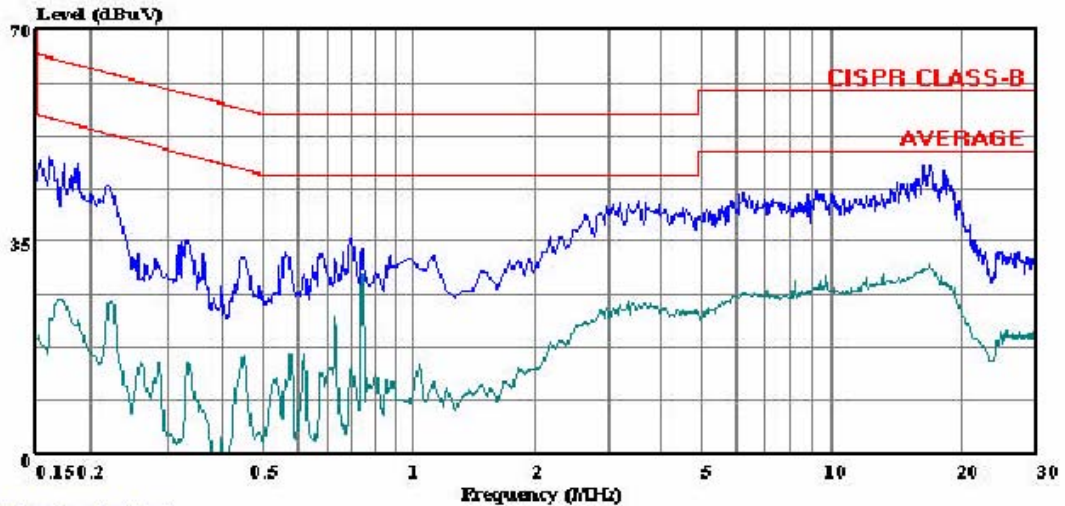


LINE 2 RESULTS



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Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 29 File#: EMI-Intel.EMI Date: 07-02-2008 Time: 15:53:06



(Line Conduction)

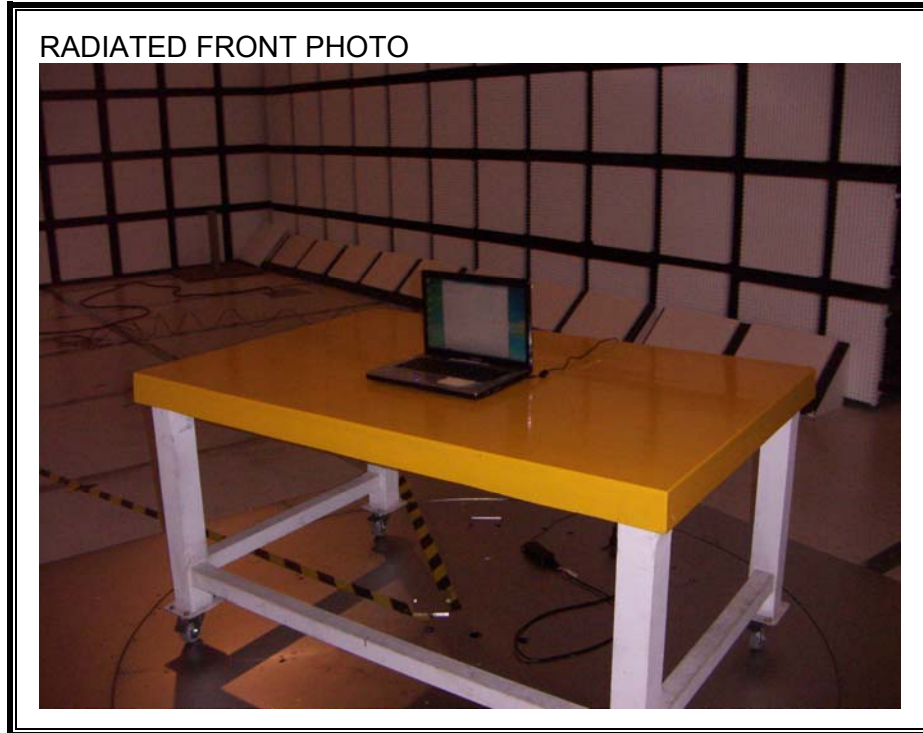
Trace: 27

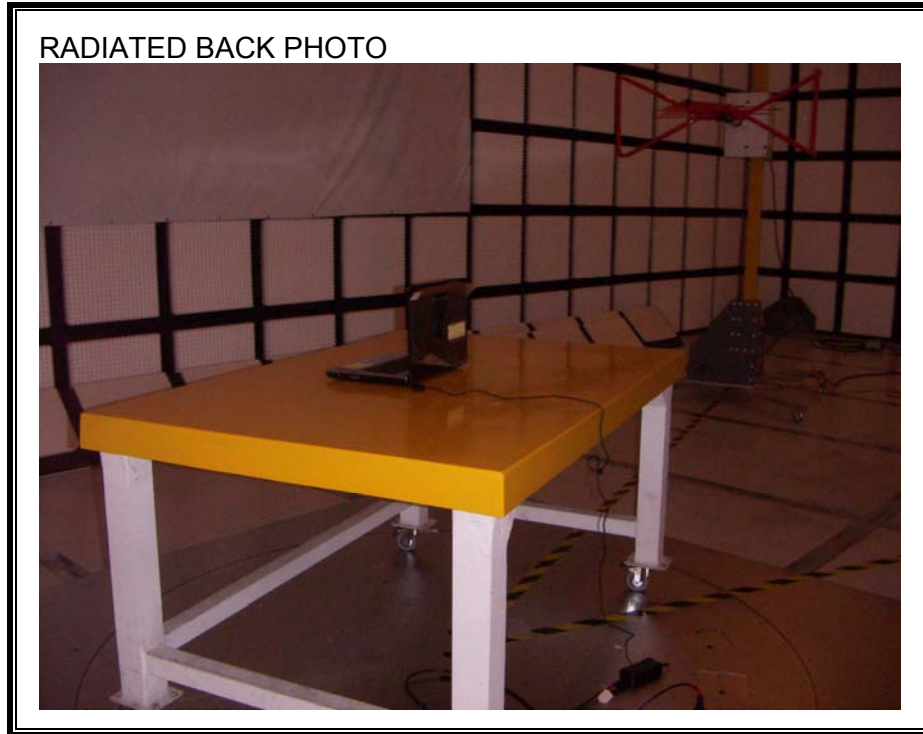
Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: William Zhuang
Project #: :
Company: : Intel
Configuration:: Laptop Part 8
Mode: : Tx On
Target: : CISPR Class B
Voltage: : 115VAC/60Hz
: L2: Peak (Blue); Average (Green)

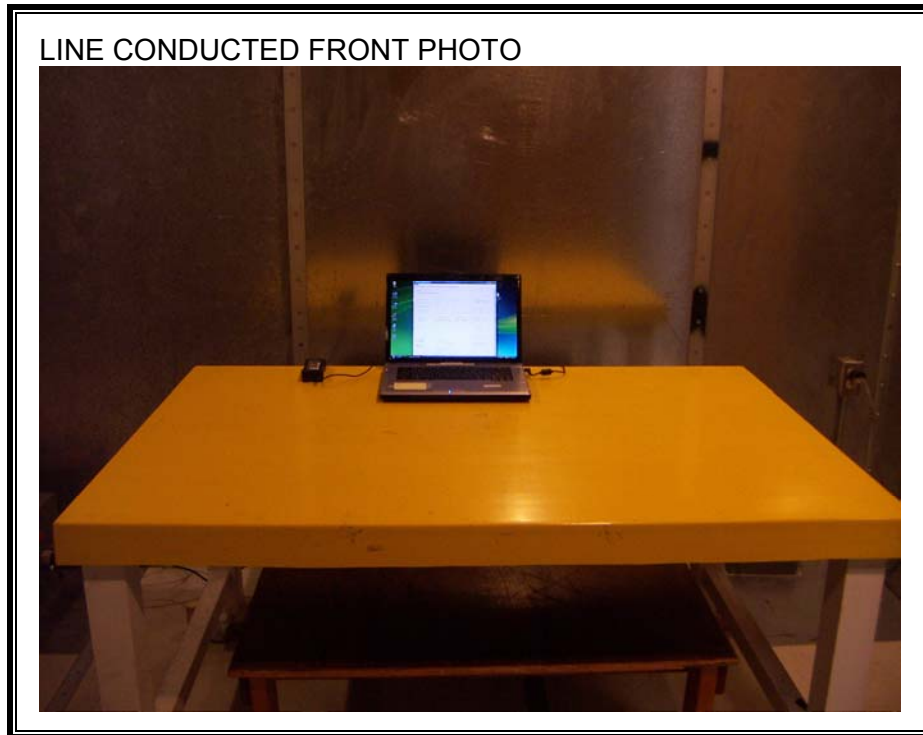
9. SETUP PHOTOS

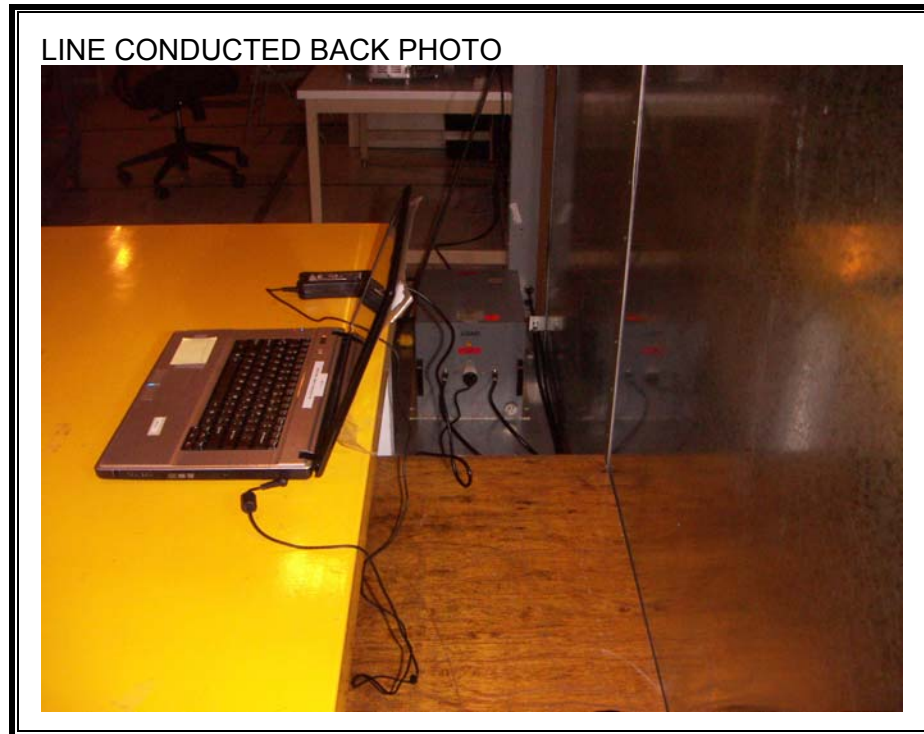
RADIATED RF MEASUREMENT SETUP





POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP





END OF REPORT