FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7
CLASS II PERMISSIVE CHANGE

CERTIFICATION TEST REPORT

FOR

INTEL 1000 SERIES WIFI CARD
(TESTED INSIDE OF LENOVO THINKPAD X200/X201 TABLET SERIES)

FCC MODEL NUMBER: 112BNHMW
IC MODEL NUMBER: 112BNHU

FCC ID: PD9112BNHU
IC: 1000M-112BNHU

REPORT NUMBER: 09U12794-1

ISSUE DATE: SETEMBER 18, 2009

Prepared for
INTEL CORPORATION
2111 N. E. 25TH AVENUE
HILLSBORO, OR 97124, U.S.A.

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	09/18/09	Initial Issue	T. Chan

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: INTEL CORPORATION
2111 N. E. 25TH AVENUE
HILLSBORO, OR 97124, U.S.A.

EUT DESCRIPTION: INTEL 1000 SERIES WIFI CARD ((TESTED INSIDE OF LENOVO THINKPAD X200/X201 TABLET SERIES)

FCC MODEL: 112BNHMW

IC MODEL: 112BNHU

SERIAL NUMBER: N/A

DATE TESTED: SEPTEMER 13-XX, 2009

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	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. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

THU CHAN
EMC MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

MENGISTU MEKURIA
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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11b/g/n transceiver Intel Wi-Fi card 1000 Series.

The radio module is manufactured by Intel Corporation.

5.2. MAXIMUM OUTPUT POWER

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

5.3. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is adding portable tablet Lenovo ThinkPad X200/X201 Tablet Series.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of -0.39 dBi.

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was CRTU version 5.10.25.0.

5.6. WORST-CASE CONFIGURATION AND MODE

The tests were performed on full test worst case channel with ACON antenna installed since it has higher antenna gain, and some spot check with Wistron antenna since it has same type but lower gain antenna.

The worst-case channel is determined as the channel with the highest output power.

The worst-case also investigated for X, Y, Z, and mobile orientation of the support laptop. Mobile position was turned out as worst-case orientation.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
LAPTOP	LENOVO	X201 TABLET	R9-09BIN 09/07	DoC
AC/DC	LENOVO	42T4421	11S42T4420Z1ZF3C976523	DoC

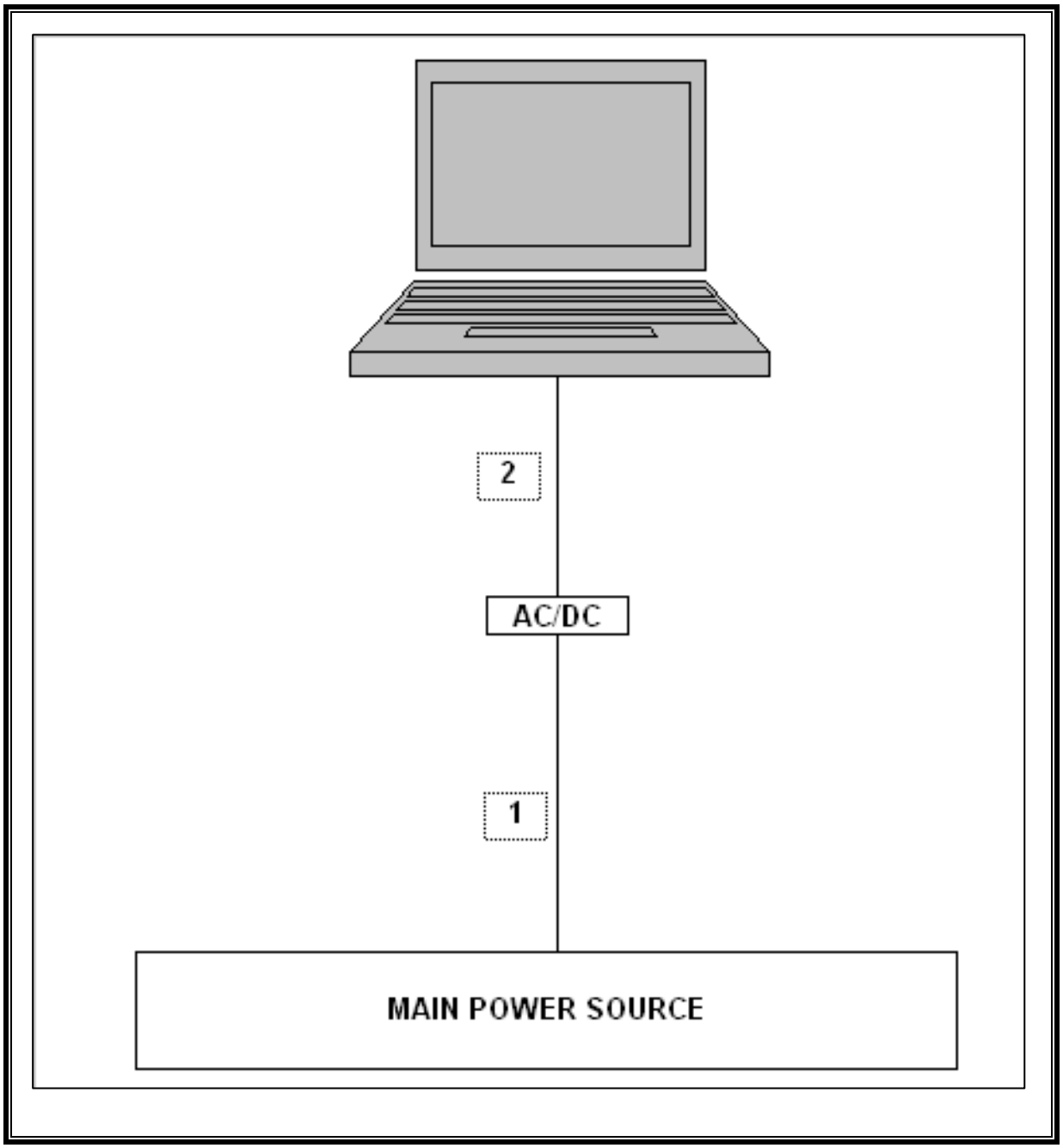
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	AC	Un-Shielded	1.0 m	N/A
2	DC	1	DC	Un-Shielded	2.0 m	Ferrite at one End

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 Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	08/24/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/09
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	12/16/09
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	02/04/10
Antenna, Horn, 18 GHz	EMCO	3115	C00945	01/29/10
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/10
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR

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 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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

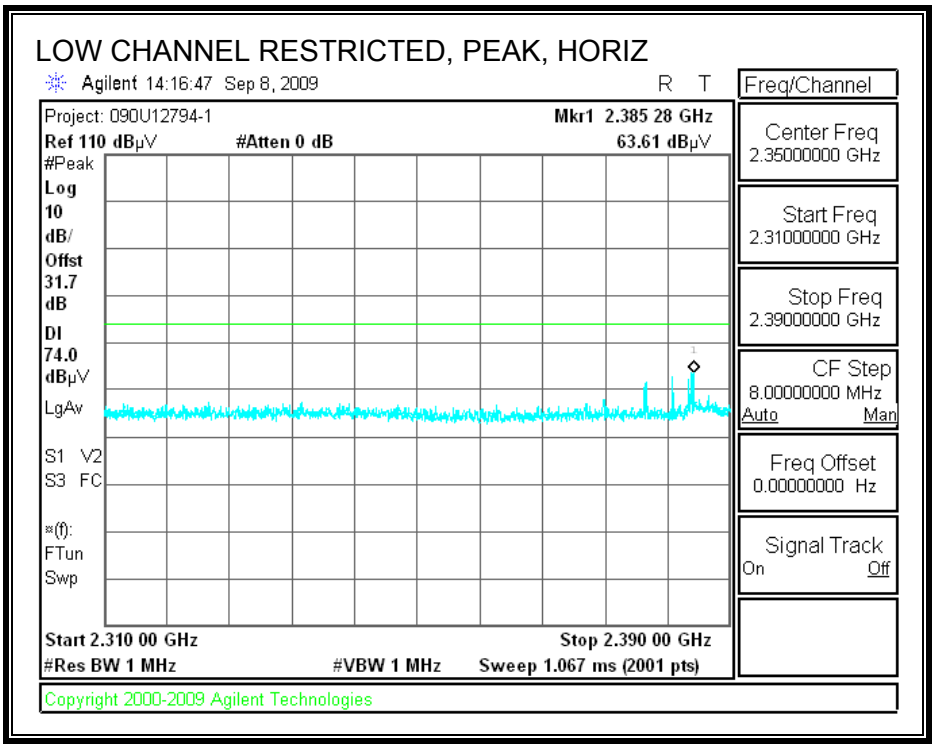
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

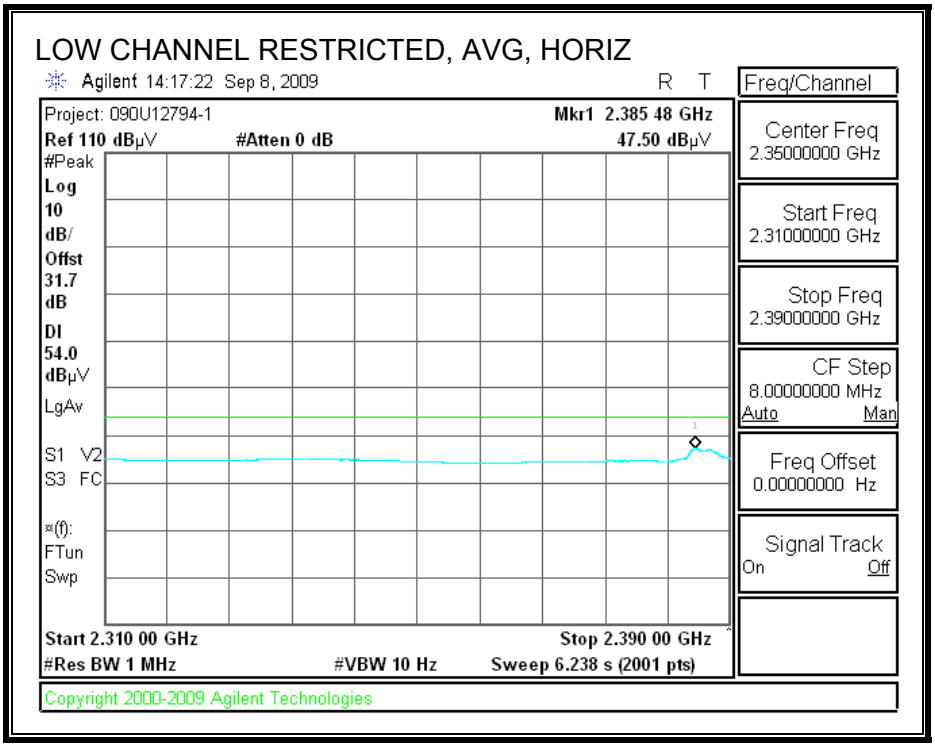
RESULT

7.2. TRANSMITTER ABOVE 1 GHz (ACON ANTENNA)

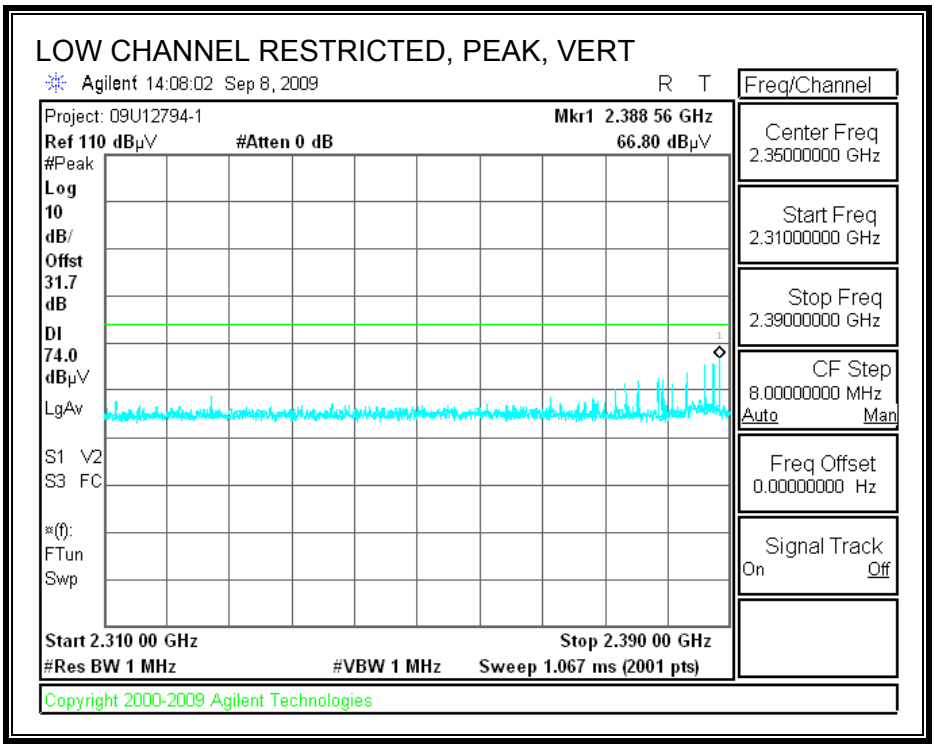
7.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

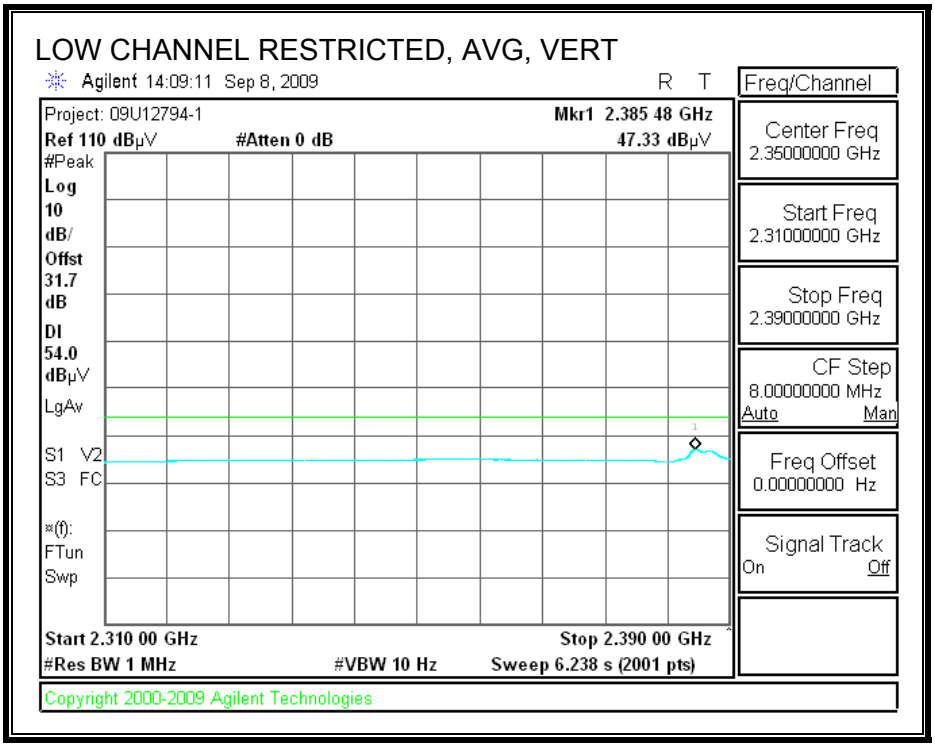
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



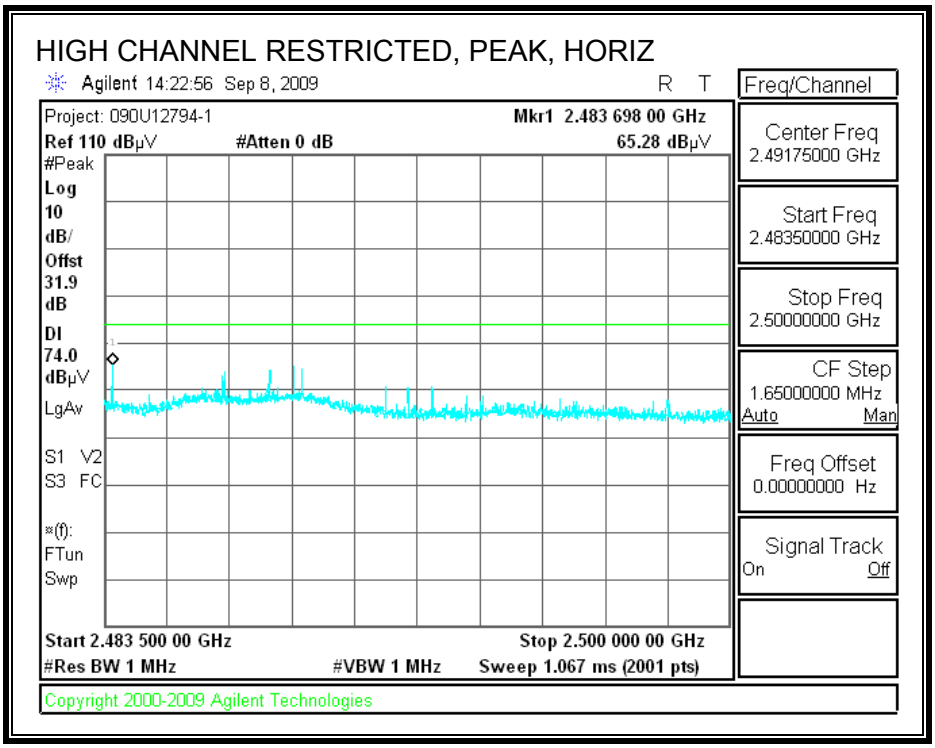


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

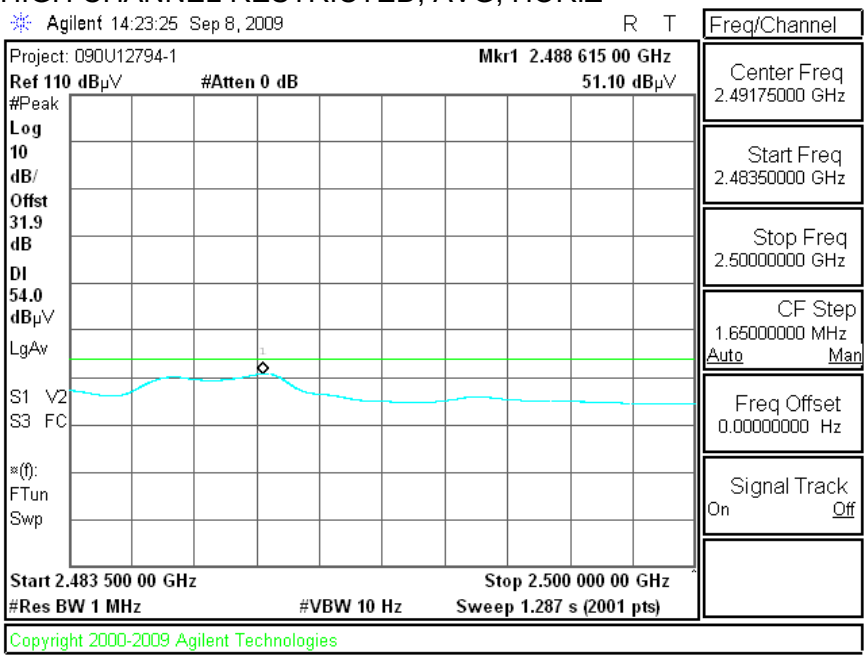




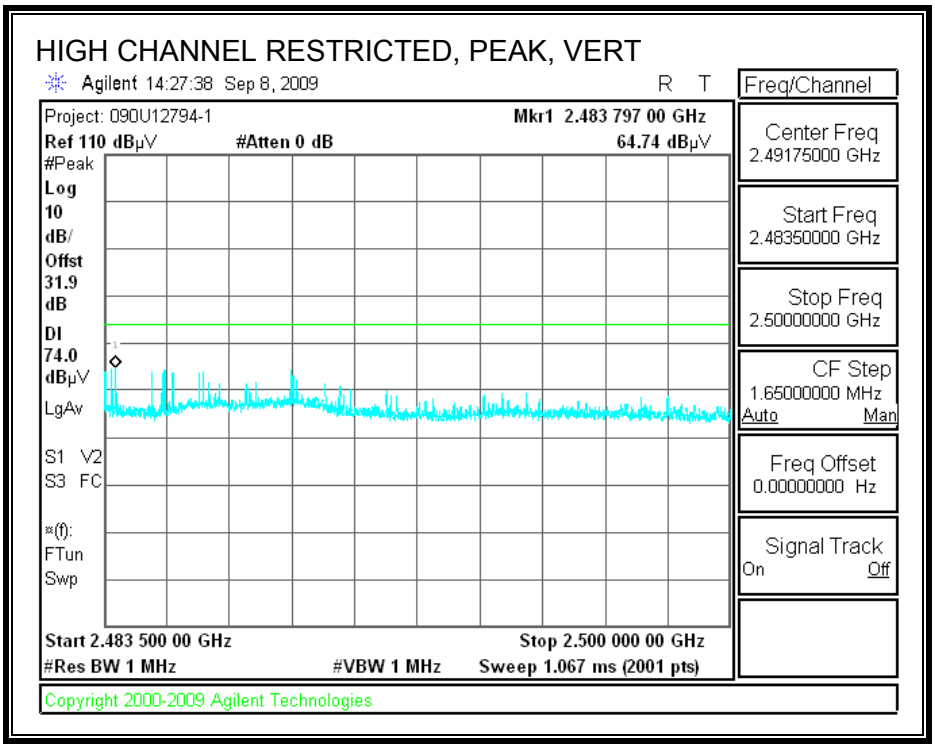
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

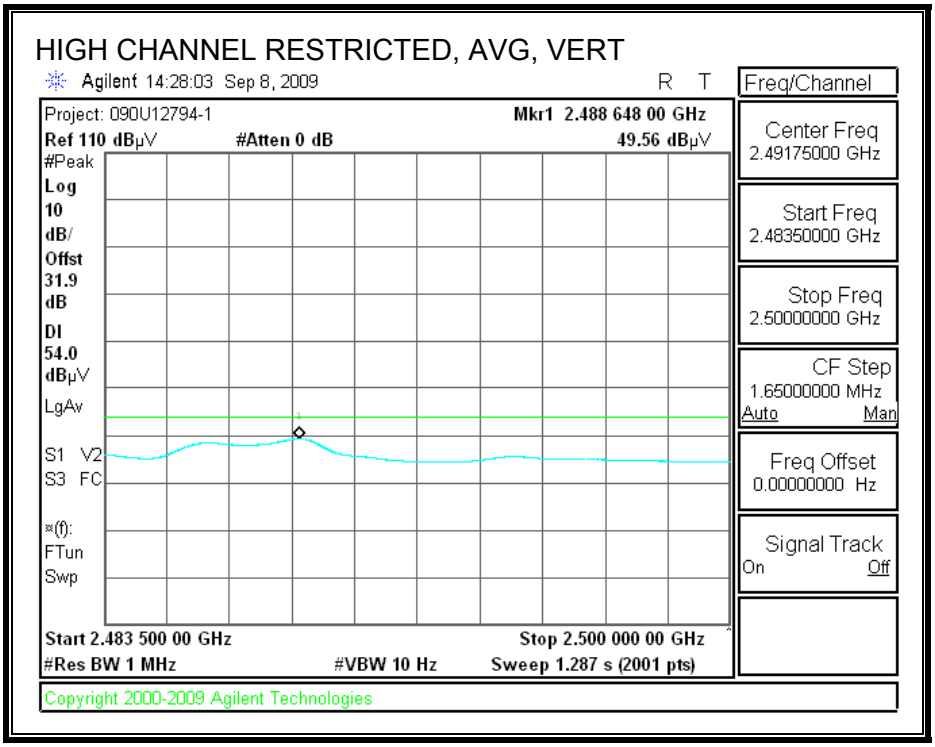


HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: MENGISTU MEKURIA
Date: 10/17/08
Project #: 09U12794
Company: INTEL CORPORATIONS
EUT Description: INTEL 1000 SERIES WIFI MODULE INSIDE LENOVO CARAMEL-3 TABLET LAPTOP
EUT M/N: 112BNHMW
Test Target: FCC PART 15.247/RSS210
Mode Oper: TX, b MODE

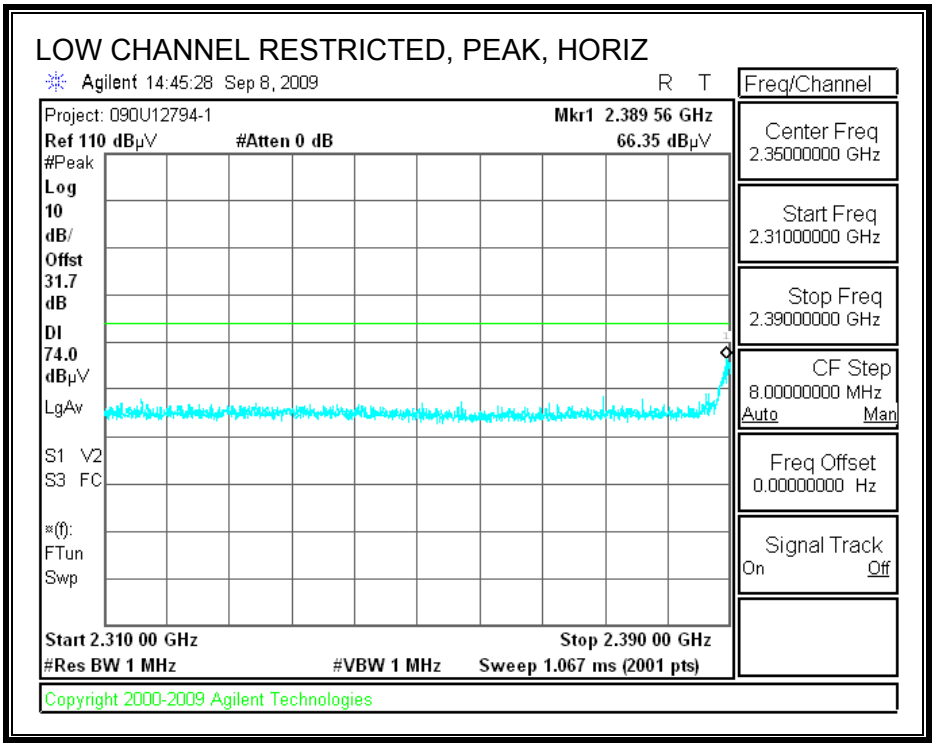
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

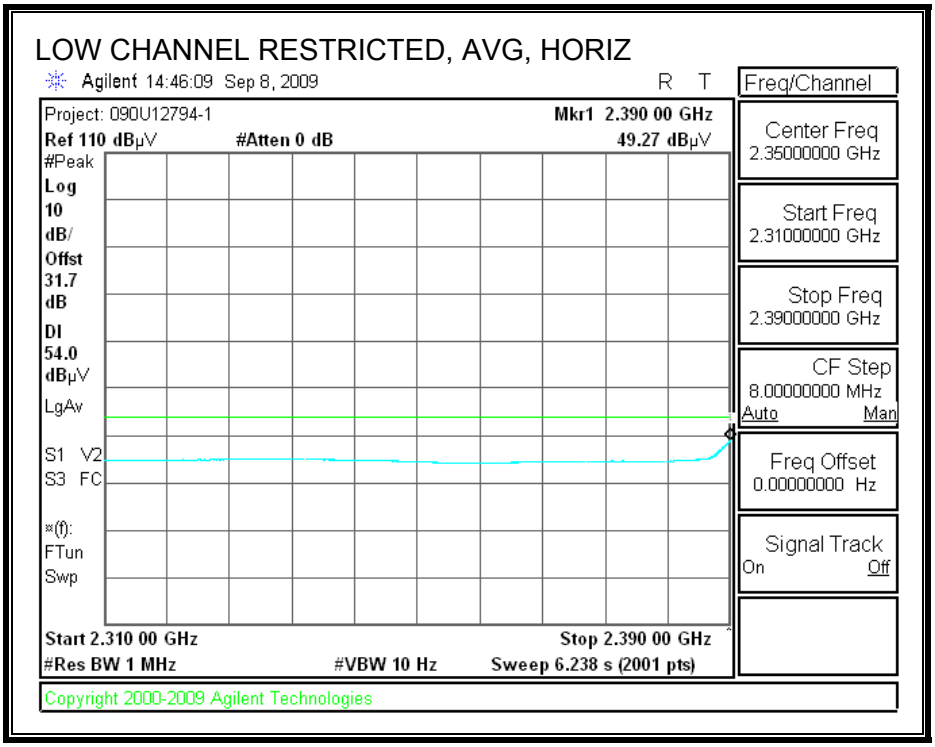
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel (2412.00 MHz)															
4.824	3.0	41.7	33.0	5.8	-36.5	0.0	0.0	44.0	74.0	-30.0	V	P	101.3	152.7	
4.824	3.0	33.8	33.0	5.8	-36.5	0.0	0.0	36.2	54.0	-17.8	V	A	101.3	152.7	
7.236	3.0	38.8	35.2	7.2	-36.2	0.0	0.0	45.0	74.0	-29.0	V	P	109.1	54.1	
7.236	3.0	26.2	35.2	7.2	-36.2	0.0	0.0	32.4	54.0	-21.6	V	A	109.1	54.1	
4.824	3.0	40.4	33.0	5.8	-36.5	0.0	0.0	42.8	74.0	-31.2	H	P	100.2	65.1	
4.824	3.0	29.3	33.0	5.8	-36.5	0.0	0.0	31.7	54.0	-22.3	H	A	100.2	65.1	
7.236	3.0	37.7	35.2	7.2	-36.2	0.0	0.0	43.9	74.0	-30.1	H	P	183.0	260.9	
7.236	3.0	25.2	35.2	7.2	-36.2	0.0	0.0	31.4	54.0	-22.6	H	A	183.0	260.9	
Mid Channel (2437.00 MHz)															
4.874	3.0	43.3	33.1	5.8	-36.5	0.0	0.0	45.7	74.0	-28.3	V	P	100.0	115.1	
4.874	3.0	38.0	33.1	5.8	-36.5	0.0	0.0	40.5	54.0	-13.5	V	A	100.0	115.1	
7.311	3.0	39.1	35.3	7.3	-36.2	0.0	0.0	45.4	74.0	-28.6	V	P	159.3	23.2	
7.311	3.0	28.0	35.3	7.3	-36.2	0.0	0.0	34.3	54.0	-19.7	V	A	159.3	23.2	
4.874	3.0	41.2	33.1	5.8	-36.5	0.0	0.0	43.7	74.0	-30.3	H	P	100.0	67.1	
4.874	3.0	33.4	33.1	5.8	-36.5	0.0	0.0	35.8	54.0	-18.2	H	A	100.0	67.1	
7.311	3.0	38.0	35.3	7.3	-36.2	0.0	0.0	44.3	74.0	-29.7	H	P	215.3	338.5	
7.311	3.0	25.7	35.3	7.3	-36.2	0.0	0.0	32.0	54.0	-22.0	H	A	215.3	338.5	
Hi Channel (2462.00 MHz)															
4.924	3.0	44.5	33.1	5.9	-36.5	0.0	0.0	47.0	74.0	-27.0	V	P	102.5	117.2	
4.924	3.0	39.7	33.1	5.9	-36.5	0.0	0.0	42.2	54.0	-11.8	V	A	102.5	117.2	
7.386	3.0	38.1	35.4	7.3	-36.2	0.0	0.0	44.6	74.0	-29.4	V	P	157.5	3.5	
7.386	3.0	25.8	35.4	7.3	-36.2	0.0	0.0	32.3	54.0	-21.7	V	A	157.5	3.5	
4.924	3.0	41.2	33.1	5.9	-36.5	0.0	0.0	43.8	74.0	-30.2	H	P	100.4	316.1	
4.924	3.0	34.1	33.1	5.9	-36.5	0.0	0.0	36.7	54.0	-17.3	H	A	100.4	316.1	
7.386	3.0	37.6	35.4	7.3	-36.2	0.0	0.0	44.1	74.0	-29.9	H	P	126.3	312.7	
7.386	3.0	25.4	35.4	7.3	-36.2	0.0	0.0	31.9	54.0	-22.1	H	A	126.3	312.7	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

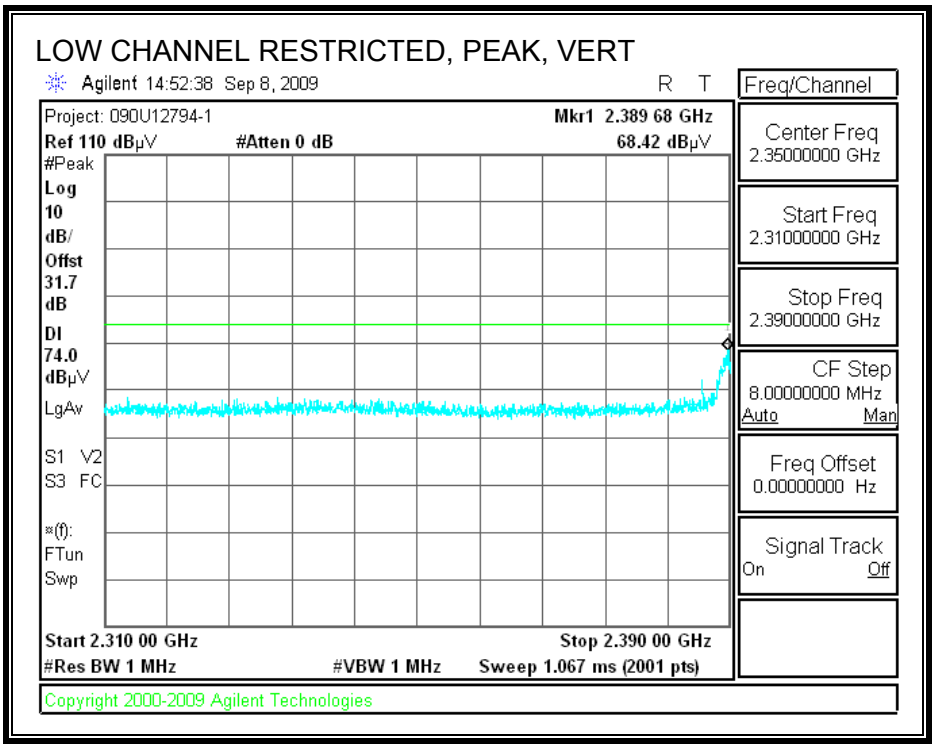
7.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

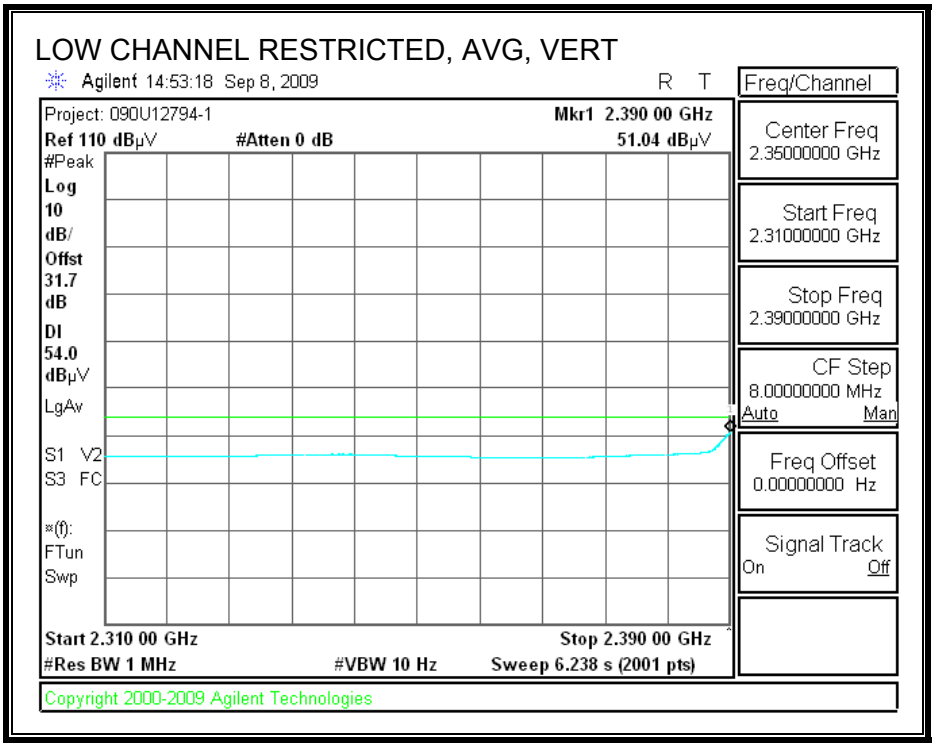
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



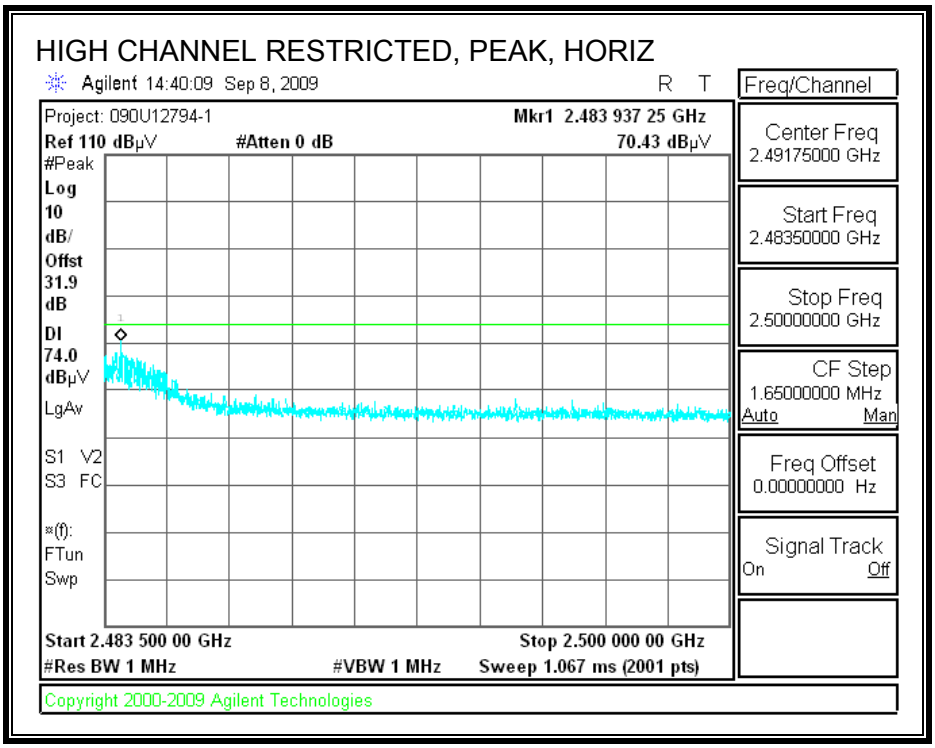


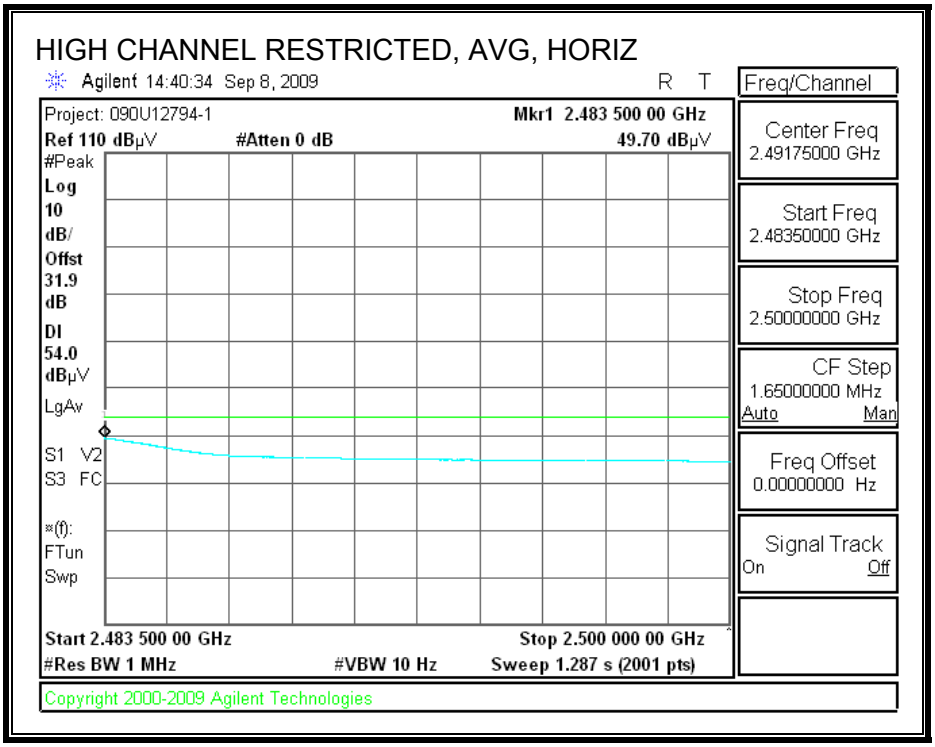
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



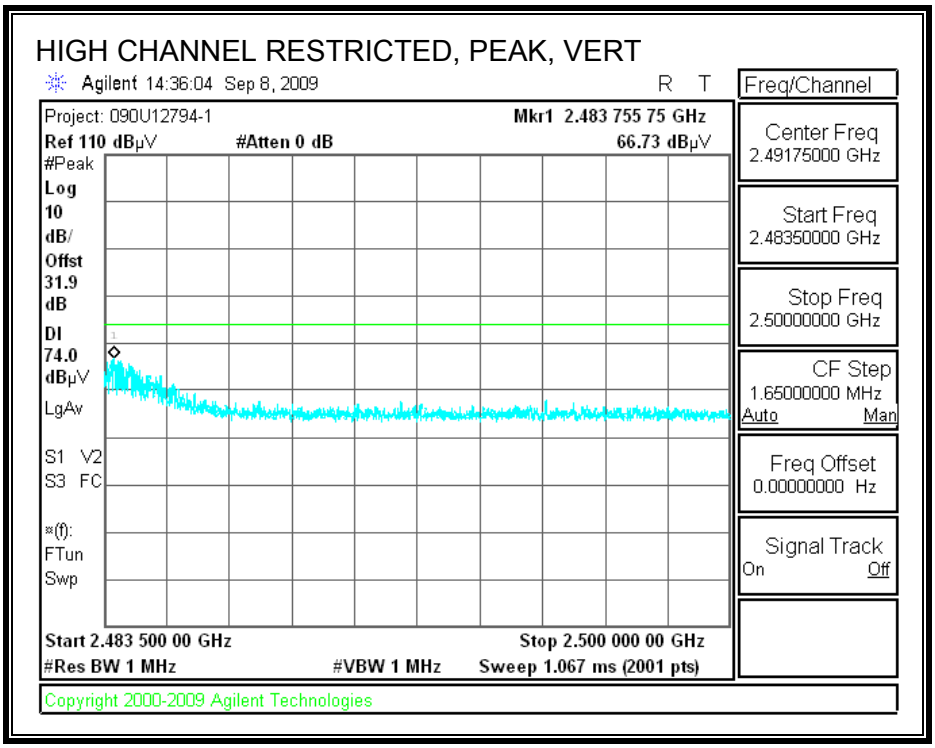


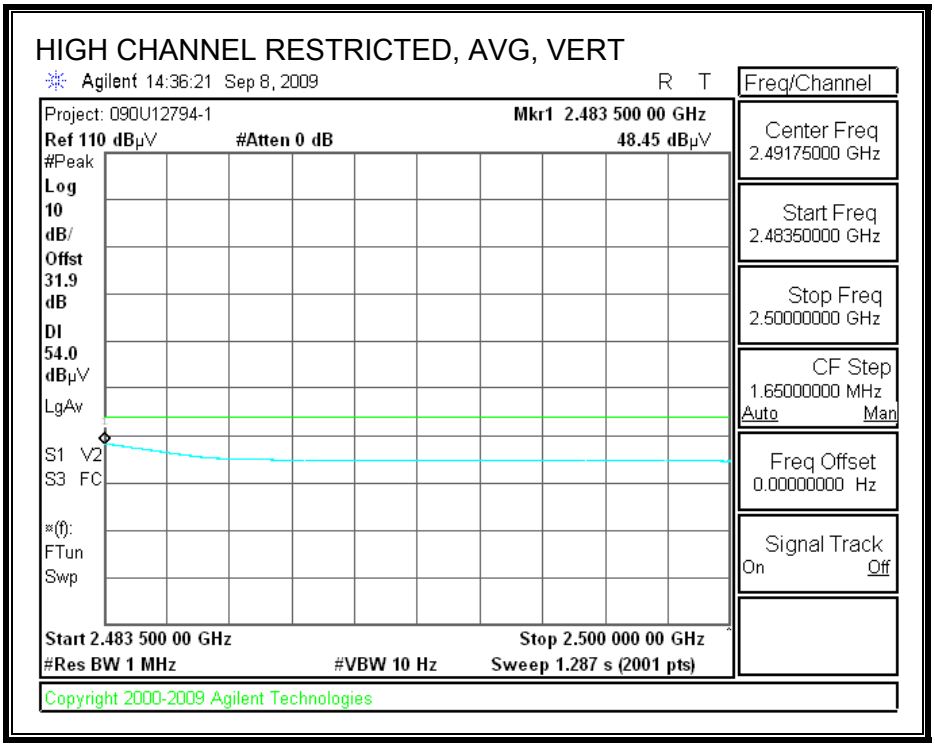
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

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EUT M/N: 112BNHMW
Test Target: FCC PART 15.247/RSS210
Mode Oper: TX, g MODE

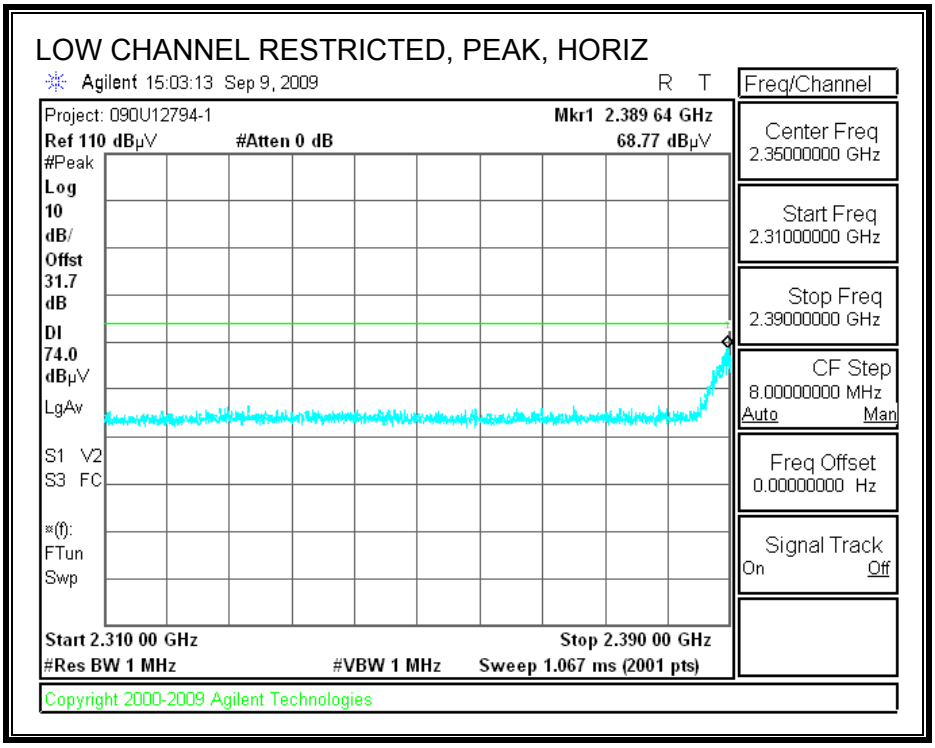
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

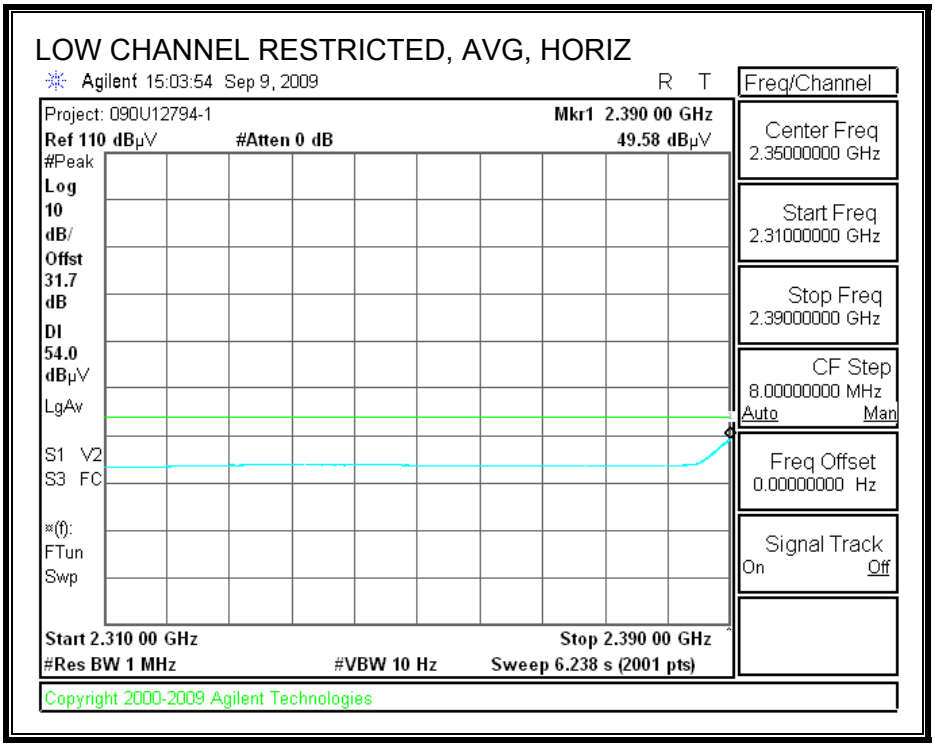
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel (2412.00 MHz) 1															
4.824	3.0	38.8	33.0	5.8	-36.5	0.0	0.0	41.1	74.0	-32.9	V	P	130.3	31.1	
4.824	3.0	26.4	33.0	5.8	-36.5	0.0	0.0	28.8	54.0	-25.2	V	A	130.3	31.1	
7.236	3.0	38.0	35.2	7.2	-36.2	0.0	0.0	44.2	74.0	-29.8	V	P	219.3	34.5	
7.236	3.0	25.2	35.2	7.2	-36.2	0.0	0.0	31.4	54.0	-22.6	V	A	219.3	34.5	
4.824	3.0	39.3	33.0	5.8	-36.5	0.0	0.0	41.7	74.0	-32.3	H	P	198.7	146.0	
4.824	3.0	26.3	33.0	5.8	-36.5	0.0	0.0	28.7	54.0	-25.3	H	A	198.7	146.0	
7.236	3.0	37.1	35.2	7.2	-36.2	0.0	0.0	43.2	74.0	-30.8	H	P	114.3	216.9	
7.236	3.0	25.2	35.2	7.2	-36.2	0.0	0.0	31.3	54.0	-22.7	H	A	114.3	216.9	
Mid Channel (2437.00 MHz)															
4.874	3.0	41.5	33.1	5.8	-36.5	0.0	0.0	43.9	74.0	-30.1	V	P	103.7	115.2	
4.874	3.0	28.2	33.1	5.8	-36.5	0.0	0.0	30.6	54.0	-23.4	V	A	103.7	115.2	
7.311	3.0	37.5	35.3	7.3	-36.2	0.0	0.0	43.9	74.0	-30.1	V	P	100.7	79.6	
7.311	3.0	25.7	35.3	7.3	-36.2	0.0	0.0	32.1	54.0	-21.9	V	A	100.7	79.6	
4.874	3.0	38.4	33.1	5.8	-36.5	0.0	0.0	40.9	74.0	-33.1	H	P	115.6	3.0	
4.874	3.0	26.0	33.1	5.8	-36.5	0.0	0.0	28.4	54.0	-25.6	H	A	115.6	3.0	
7.311	3.0	37.7	35.3	7.3	-36.2	0.0	0.0	44.1	74.0	-29.9	H	P	188.0	133.6	
7.311	3.0	25.6	35.3	7.3	-36.2	0.0	0.0	31.9	54.0	-22.1	H	A	188.0	133.6	
Hi Channel (2462.00 MHz)															
4.924	3.0	38.5	33.1	5.9	-36.5	0.0	0.0	41.0	74.0	-33.0	V	P	189.9	261.0	
4.924	3.0	26.2	33.1	5.9	-36.5	0.0	0.0	28.8	54.0	-25.2	V	A	189.9	261.0	
7.386	3.0	37.6	35.4	7.3	-36.2	0.0	0.0	44.1	74.0	-29.9	V	P	124.8	257.2	
7.386	3.0	25.4	35.4	7.3	-36.2	0.0	0.0	31.9	54.0	-22.1	V	A	124.8	257.2	
4.924	3.0	38.4	33.1	5.9	-36.5	0.0	0.0	40.9	74.0	-33.1	H	P	151.1	116.5	
4.924	3.0	26.2	33.1	5.9	-36.5	0.0	0.0	28.7	54.0	-25.3	H	A	151.1	116.5	
7.386	3.0	38.6	35.4	7.3	-36.2	0.0	0.0	45.1	74.0	-28.9	H	P	152.8	282.3	
7.386	3.0	25.3	35.4	7.3	-36.2	0.0	0.0	31.8	54.0	-22.2	H	A	152.8	282.3	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

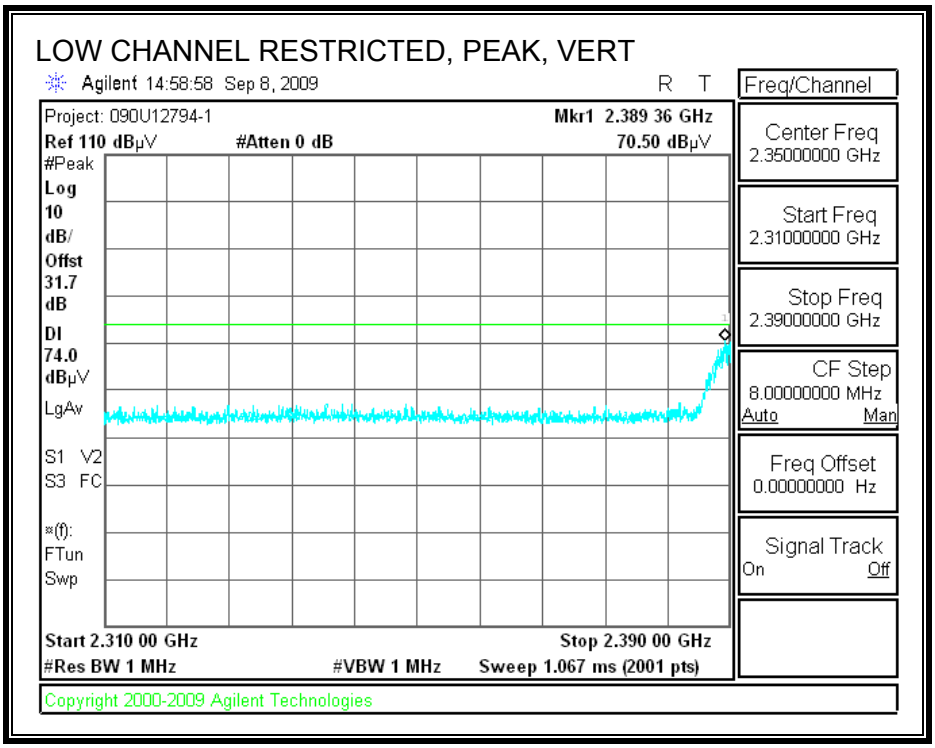
7.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

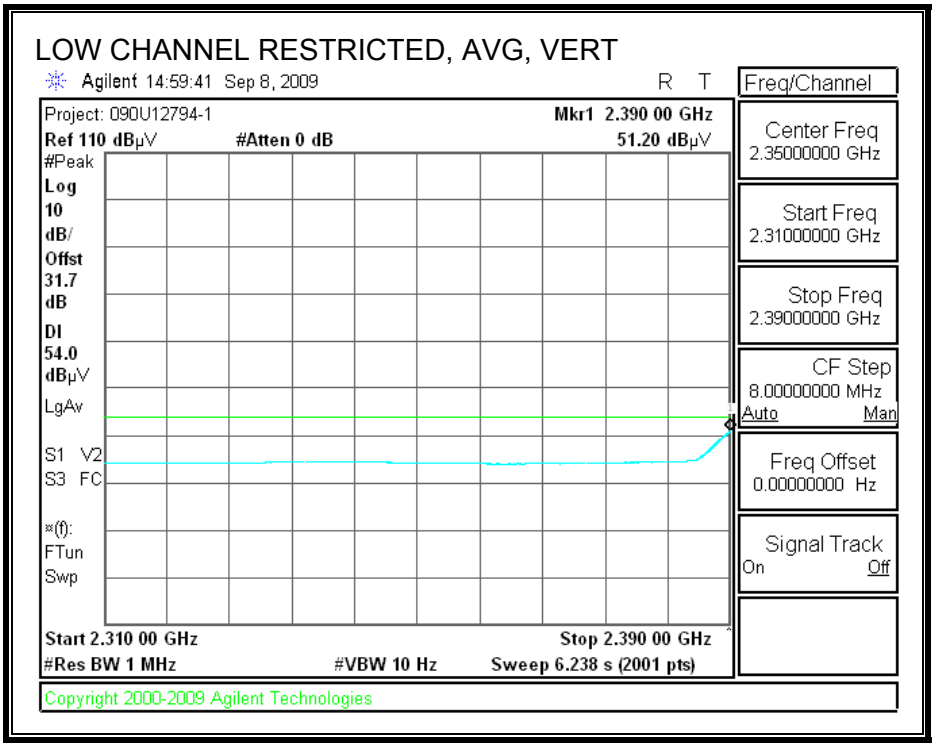
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



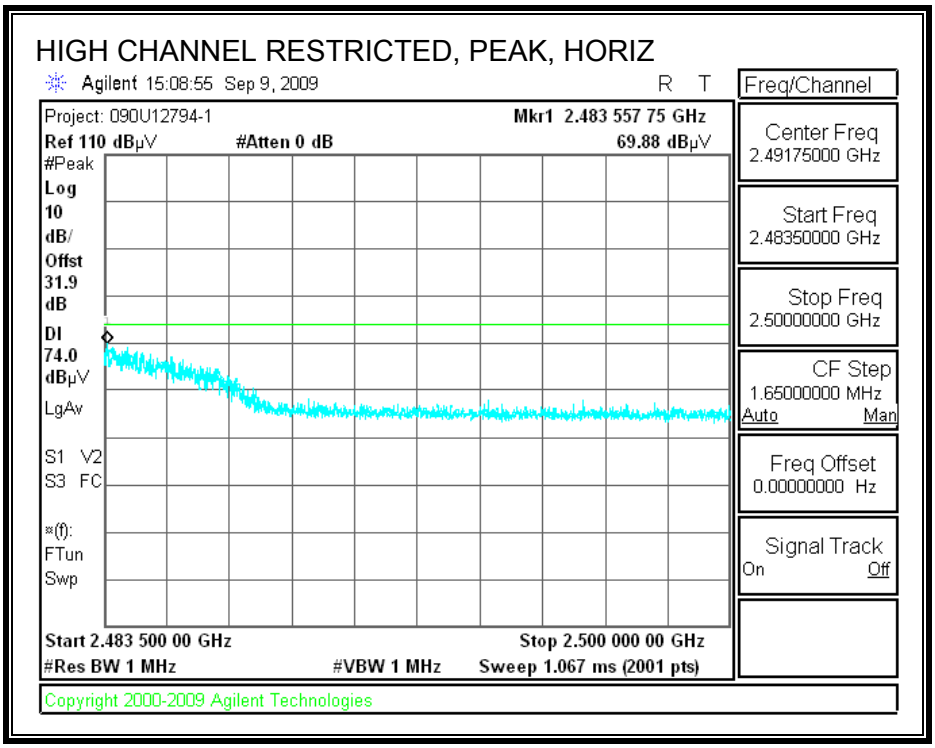


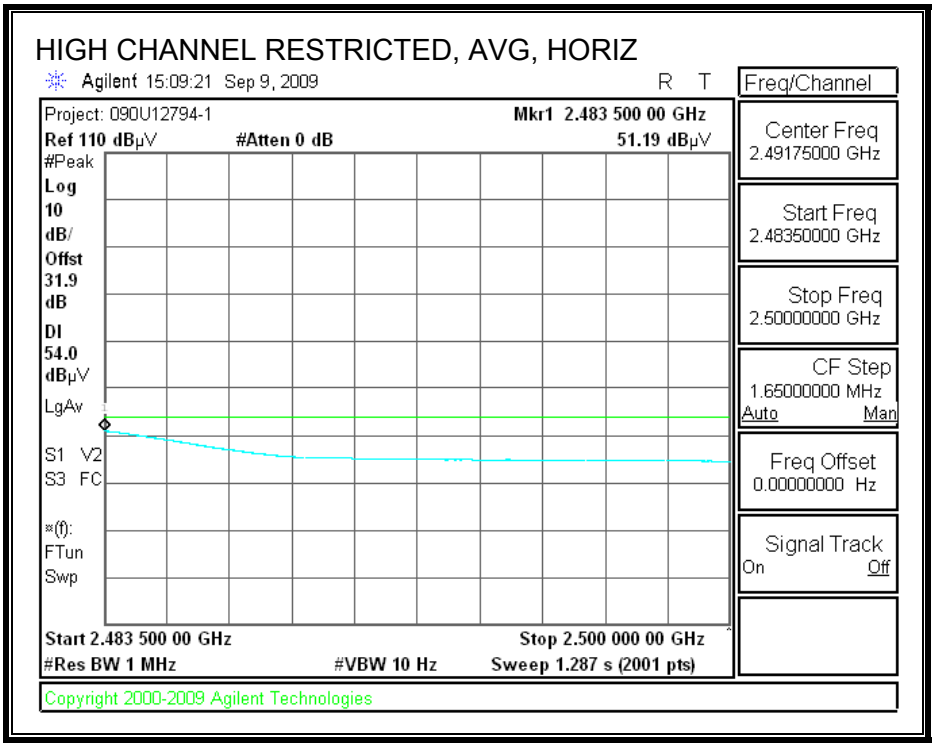
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



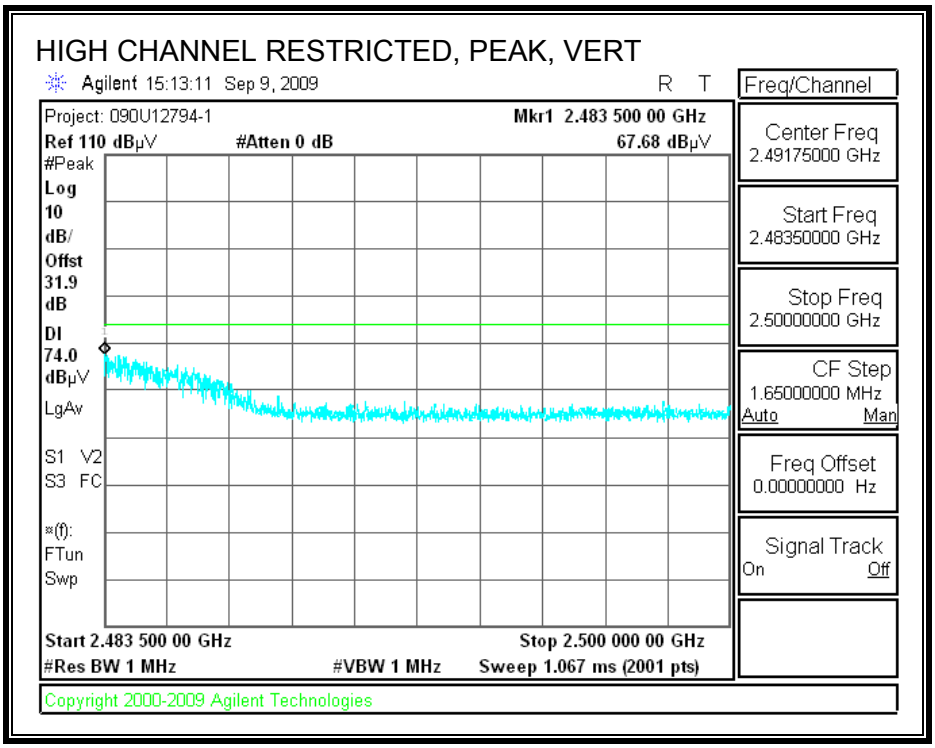


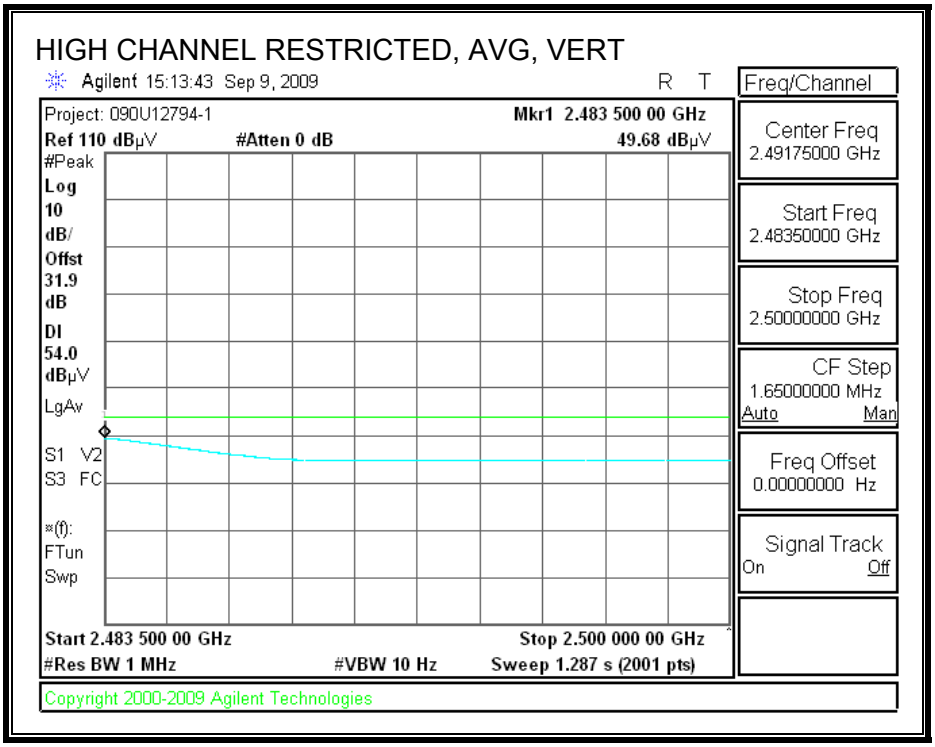
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: MENGISTU MEKURIA
Date: 10/17/08
Project #: 09U12794
Company: INTEL CORPORATIONS
EUT Description: INTEL 1000 SERIES WIFI MODULE INSIDE LENOVO CARAMEL-3 TABLET LAPTOP
EUT M/N: 112BNHMW
Test Target: FCC PART 15.247/RSS210
Mode Oper: TX, HT20 MODE

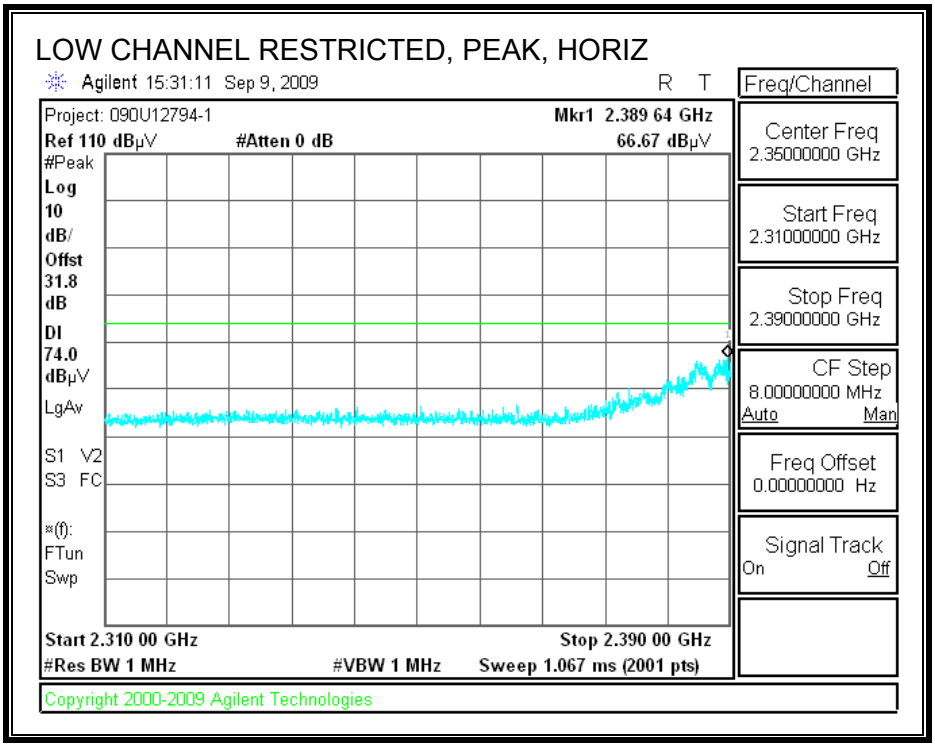
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

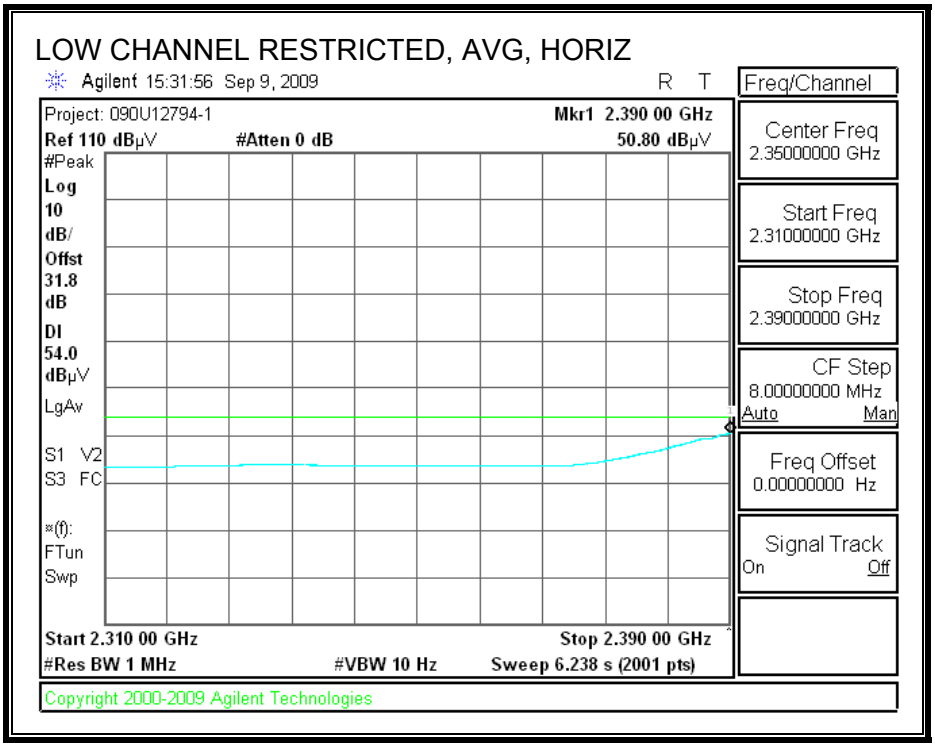
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel (2412.00 MHz)															
4.824	3.0	38.8	33.0	5.8	-36.5	0.0	0.0	41.2	74.0	-32.8	V	P	144.1	138.1	
4.824	3.0	26.4	33.0	5.8	-36.5	0.0	0.0	28.7	54.0	-25.3	V	A	144.1	138.1	
7.236	3.0	37.9	35.2	7.2	-36.2	0.0	0.0	44.0	74.0	-30.0	V	P	165.2	239.3	
7.236	3.0	25.2	35.2	7.2	-36.2	0.0	0.0	31.4	54.0	-22.6	V	A	165.2	239.3	
4.824	3.0	38.7	33.0	5.8	-36.5	0.0	0.0	41.0	74.0	-33.0	H	P	124.8	337.2	
4.824	3.0	26.4	33.0	5.8	-36.5	0.0	0.0	28.7	54.0	-25.3	H	A	124.8	337.2	
7.236	3.0	37.3	35.2	7.2	-36.2	0.0	0.0	43.5	74.0	-30.5	H	P	139.4	304.4	
7.236	3.0	25.2	35.2	7.2	-36.2	0.0	0.0	31.3	54.0	-22.7	H	A	139.4	304.4	
Mid Channel (2437.00 MHz)															
4.874	3.0	40.5	32.8	5.8	-36.5	0.0	0.0	42.7	74.0	-31.3	V	P	100.7	117.6	
4.874	3.0	28.1	32.8	5.8	-36.5	0.0	0.0	30.3	54.0	-23.7	V	A	100.7	117.6	
7.311	3.0	38.2	35.2	7.3	-36.2	0.0	0.0	44.4	74.0	-29.6	V	P	168.6	219.1	
7.311	3.0	25.6	35.2	7.3	-36.2	0.0	0.0	31.8	54.0	-22.2	V	A	168.6	219.1	
4.874	3.0	38.9	32.8	5.8	-36.5	0.0	0.0	41.1	74.0	-32.9	H	P	103.1	350.3	
4.874	3.0	26.4	32.8	5.8	-36.5	0.0	0.0	28.5	54.0	-25.5	H	A	103.1	350.3	
7.311	3.0	37.9	35.2	7.3	-36.2	0.0	0.0	44.2	74.0	-29.8	H	P	217.7	2.2	
7.311	3.0	25.6	35.2	7.3	-36.2	0.0	0.0	31.8	54.0	-22.2	H	A	217.7	2.2	
HI Channel (2462 MHz)															
4.924	3.0	38.2	32.8	5.9	-36.5	0.0	0.0	40.5	74.0	-33.5	V	P	174.6	97.0	
4.924	3.0	26.3	32.8	5.9	-36.5	0.0	0.0	28.5	54.0	-25.5	V	A	174.6	97.0	
7.386	3.0	38.1	35.3	7.3	-36.2	0.0	0.0	44.5	74.0	-29.5	V	P	222.1	70.3	
7.386	3.0	25.3	35.3	7.3	-36.2	0.0	0.0	31.7	54.0	-22.3	V	A	222.1	70.3	
4.924	3.0	38.3	32.8	5.9	-36.5	0.0	0.0	40.6	74.0	-33.4	H	P	109.4	330.7	
4.924	3.0	26.2	32.8	5.9	-36.5	0.0	0.0	28.5	54.0	-25.5	H	A	109.4	330.7	
7.386	3.0	37.5	35.3	7.3	-36.2	0.0	0.0	43.9	74.0	-30.1	H	P	246.2	1.8	
7.386	3.0	25.3	35.3	7.3	-36.2	0.0	0.0	31.7	54.0	-22.3	H	A	246.2	1.8	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

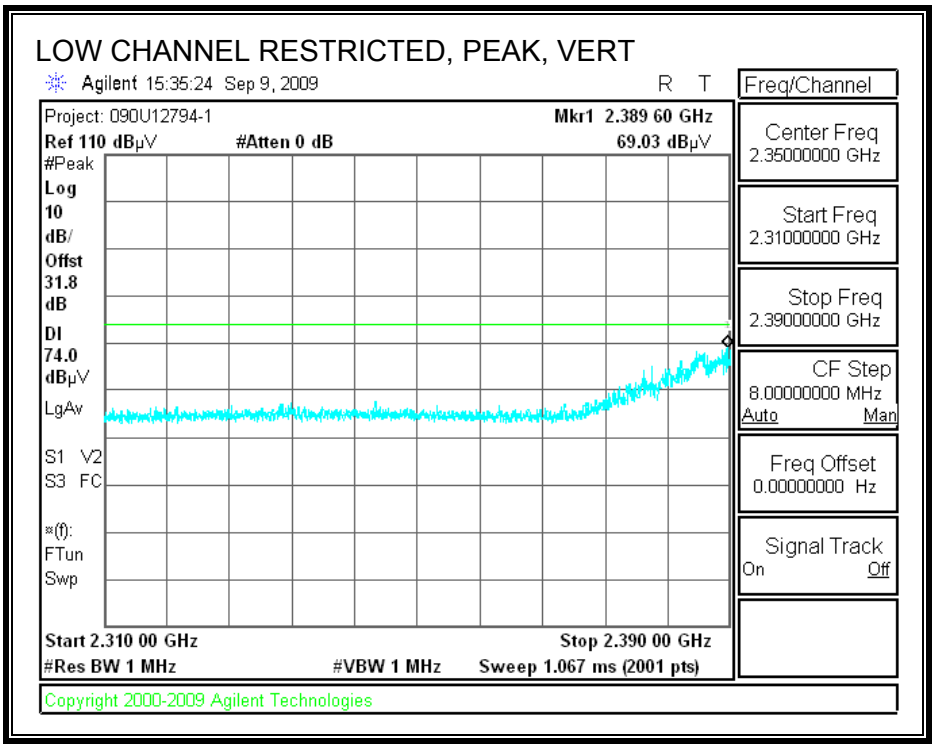
7.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

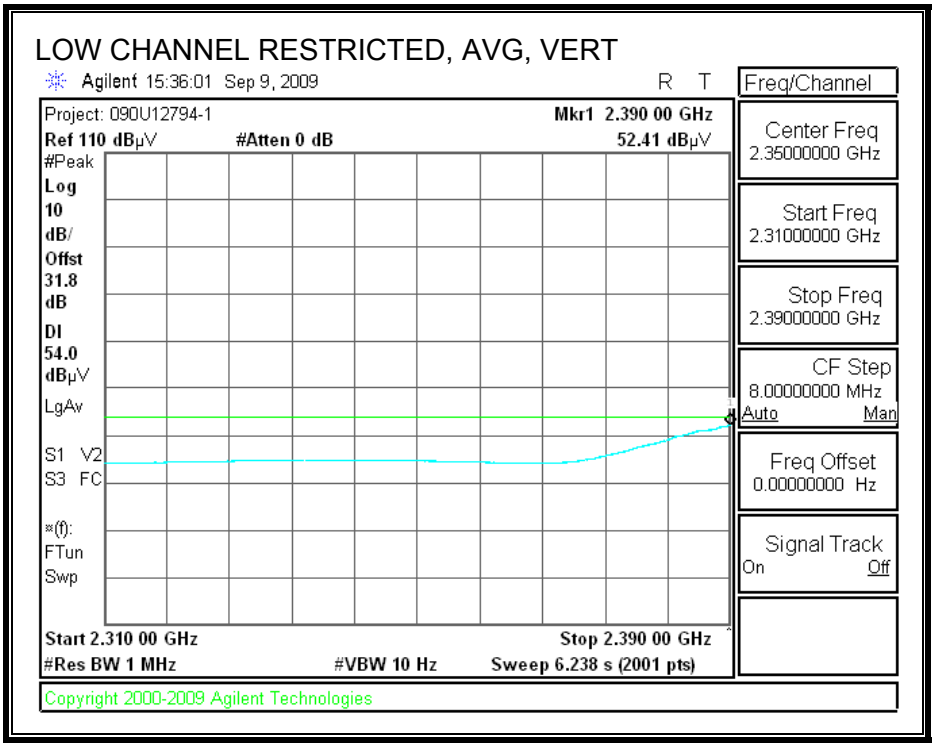
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



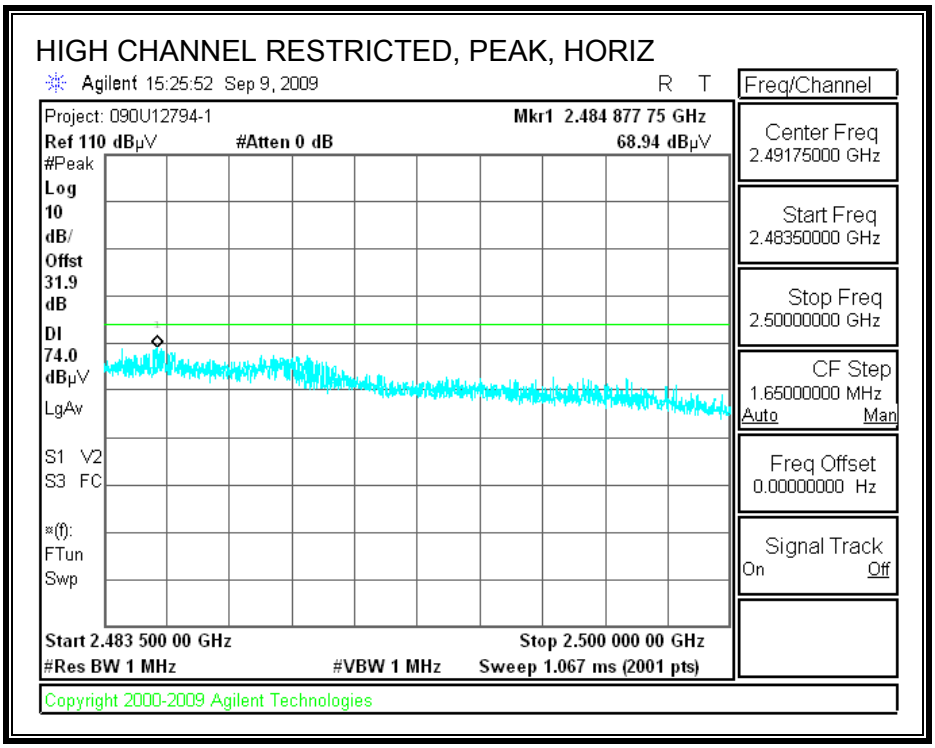


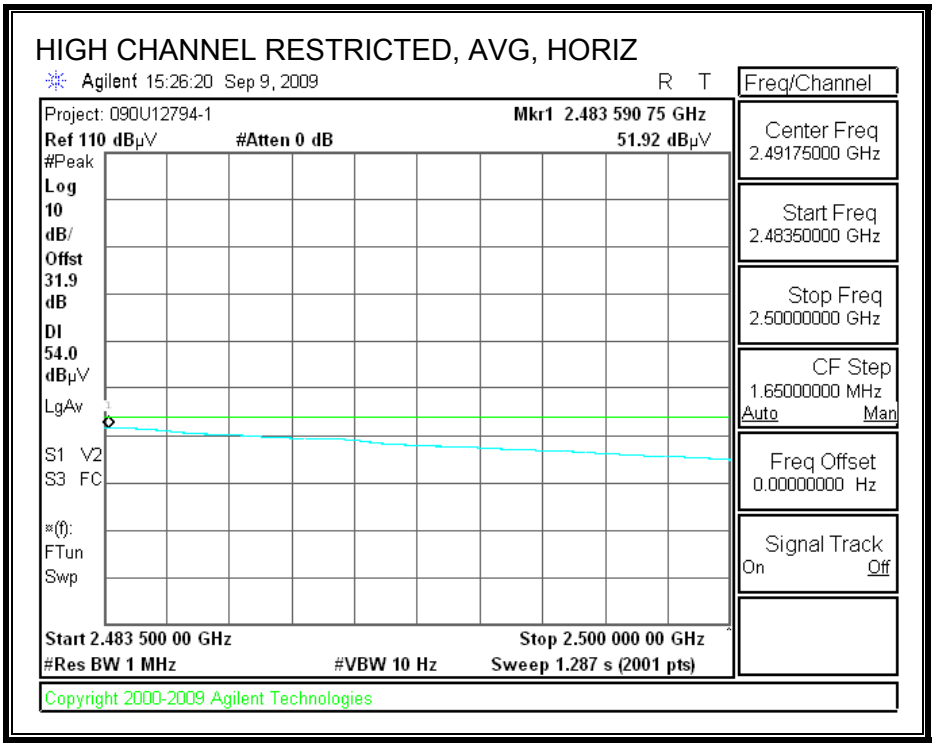
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



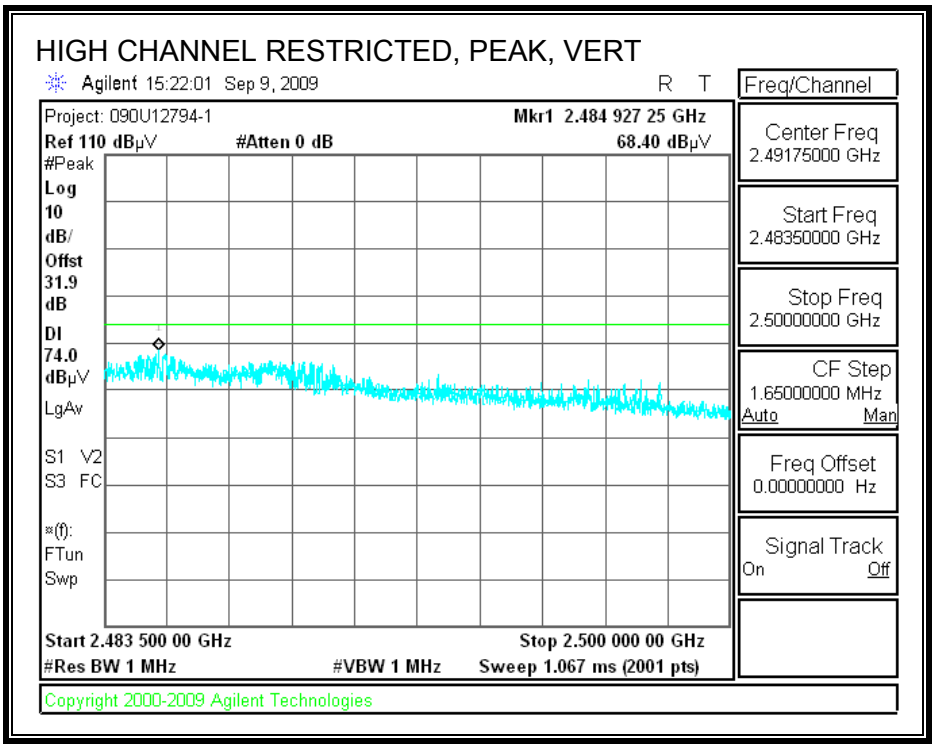


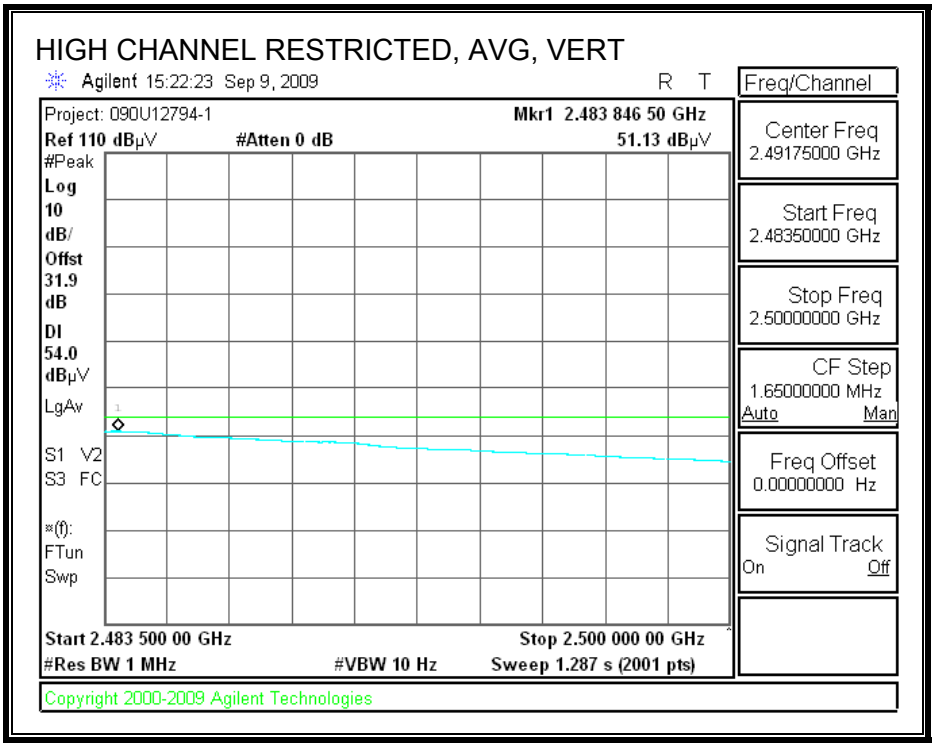
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: MENGISTU MEKURIA
Date: 10/17/08
Project #: 09U12794
Company: INTEL CORPORATIONS
EUT Description: INTEL 1000 SERIES WIFI MODULE INSIDE LENOVO CARAMEL-3 TABLET LAPTOP
EUT M/N: 112BNHMW
Test Target: FCC PART 15.247/RSS210
Mode Oper: TX, HT40 MODE

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

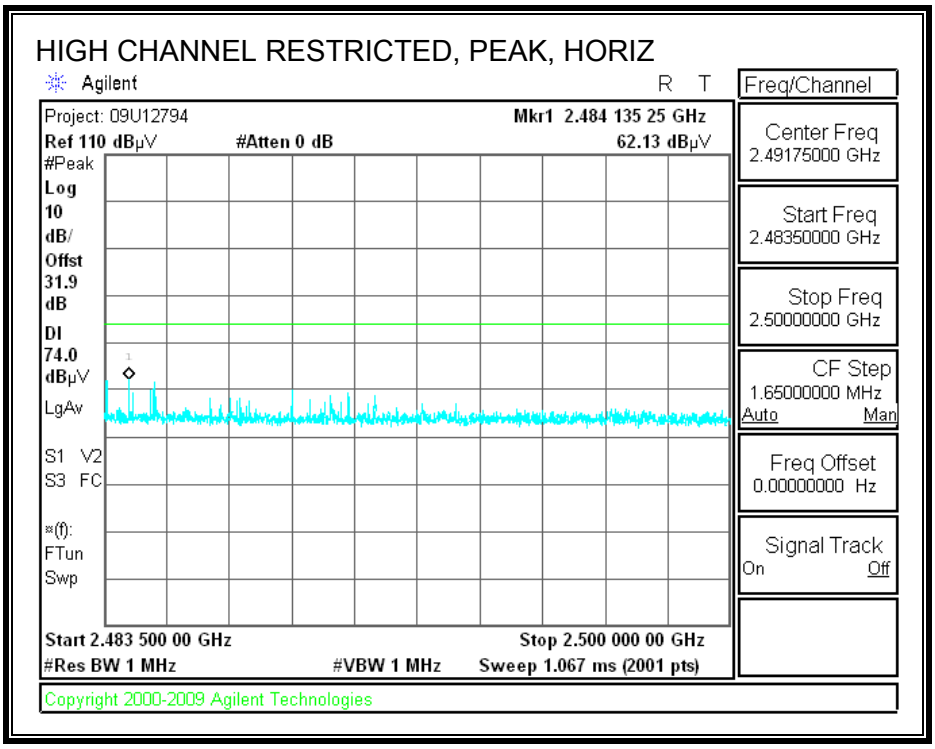
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel (2422 MHz)															
4.844	3.0	38.7	32.8	5.8	-36.5	0.0	0.0	40.8	74.0	-33.2	V	P	130.9	99.0	
4.844	3.0	26.2	32.8	5.8	-36.5	0.0	0.0	28.4	54.0	-25.6	V	A	130.9	99.0	
7.266	3.0	37.2	35.1	7.2	-36.2	0.0	0.0	43.4	74.0	-30.6	V	P	233.3	241.5	
7.266	3.0	25.4	35.1	7.2	-36.2	0.0	0.0	31.6	54.0	-22.4	V	A	233.3	241.5	
4.844	3.0	38.2	32.8	5.8	-36.5	0.0	0.0	40.3	74.0	-33.7	H	P	249.6	189.5	
4.844	3.0	26.3	32.8	5.8	-36.5	0.0	0.0	28.4	54.0	-25.6	H	A	249.6	189.5	
7.266	3.0	37.3	35.1	7.2	-36.2	0.0	0.0	43.5	74.0	-30.6	H	P	141.3	206.9	
7.266	3.0	25.4	35.1	7.2	-36.2	0.0	0.0	31.6	54.0	-22.4	H	A	141.3	206.9	
Mid Channel (2437 MHz)															
4.874	3.0	38.8	32.8	5.8	-36.5	0.0	0.0	41.0	74.0	-33.0	V	P	106.3	76.6	
4.874	3.0	26.0	32.8	5.8	-36.5	0.0	0.0	28.2	54.0	-25.8	V	A	106.3	76.6	
7.311	3.0	38.0	35.2	7.3	-36.2	0.0	0.0	44.2	74.0	-29.8	V	P	238.0	3.7	
7.311	3.0	25.5	35.2	7.3	-36.2	0.0	0.0	31.7	54.0	-22.3	V	A	238.0	3.7	
4.874	3.0	39.2	32.8	5.8	-36.5	0.0	0.0	41.4	74.0	-32.6	H	P	233.3	256.1	
4.874	3.0	26.0	32.8	5.8	-36.5	0.0	0.0	28.1	54.0	-25.9	H	A	233.3	256.1	
7.311	3.0	38.2	35.2	7.3	-36.2	0.0	0.0	44.4	74.0	-29.6	H	P	245.4	52.3	
7.311	3.0	25.5	35.2	7.3	-36.2	0.0	0.0	31.7	54.0	-22.3	H	A	245.4	52.3	
Hi Channel (2452 MHz)															
4.904	3.0	38.5	32.8	5.9	-36.5	0.0	0.0	40.8	74.0	-33.2	V	P	244.0	169.2	
4.904	3.0	26.2	32.8	5.9	-36.5	0.0	0.0	28.4	54.0	-25.6	V	A	244.0	169.2	
7.356	3.0	38.3	35.3	7.3	-36.2	0.0	0.0	44.6	74.0	-29.4	V	P	188.0	218.3	
7.356	3.0	25.4	35.3	7.3	-36.2	0.0	0.0	31.7	54.0	-22.3	V	A	188.0	218.3	
4.904	3.0	38.7	32.8	5.9	-36.5	0.0	0.0	41.0	74.0	-33.0	H	P	104.1	181.8	
4.904	3.0	26.2	32.8	5.9	-36.5	0.0	0.0	28.4	54.0	-25.6	H	A	104.1	181.8	
7.356	3.0	37.6	35.3	7.3	-36.2	0.0	0.0	43.9	74.0	-30.1	H	P	248.9	178.2	
7.356	3.0	25.3	35.3	7.3	-36.2	0.0	0.0	31.7	54.0	-22.3	H	A	248.9	178.2	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

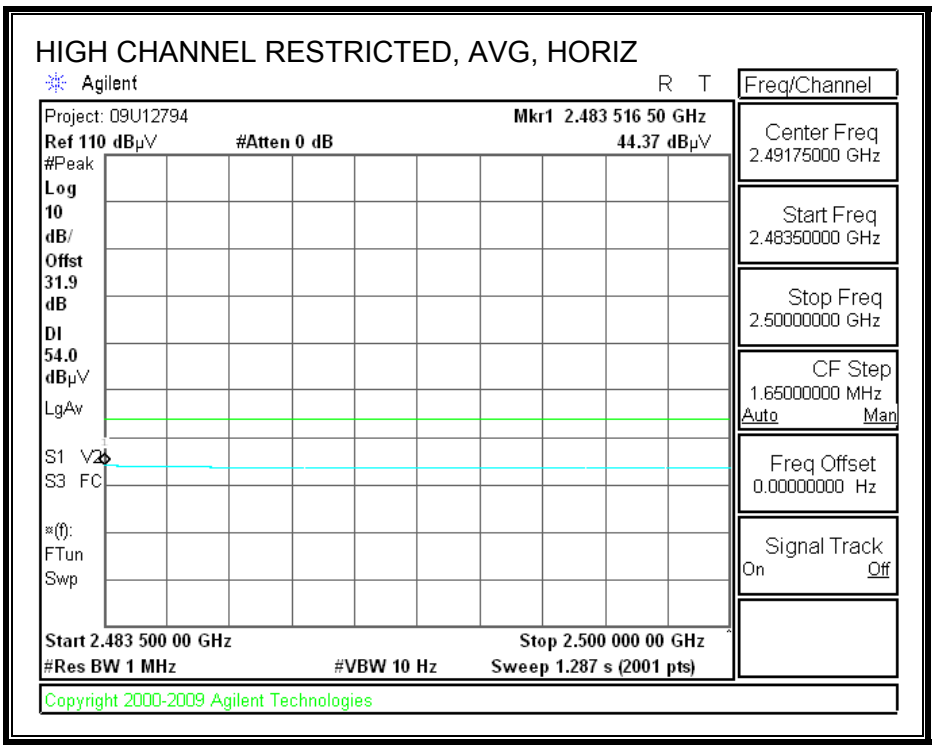
7.3. TRANSMITTER ABOVE 1 GHz (WISTRON ANTENNA)

7.3.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

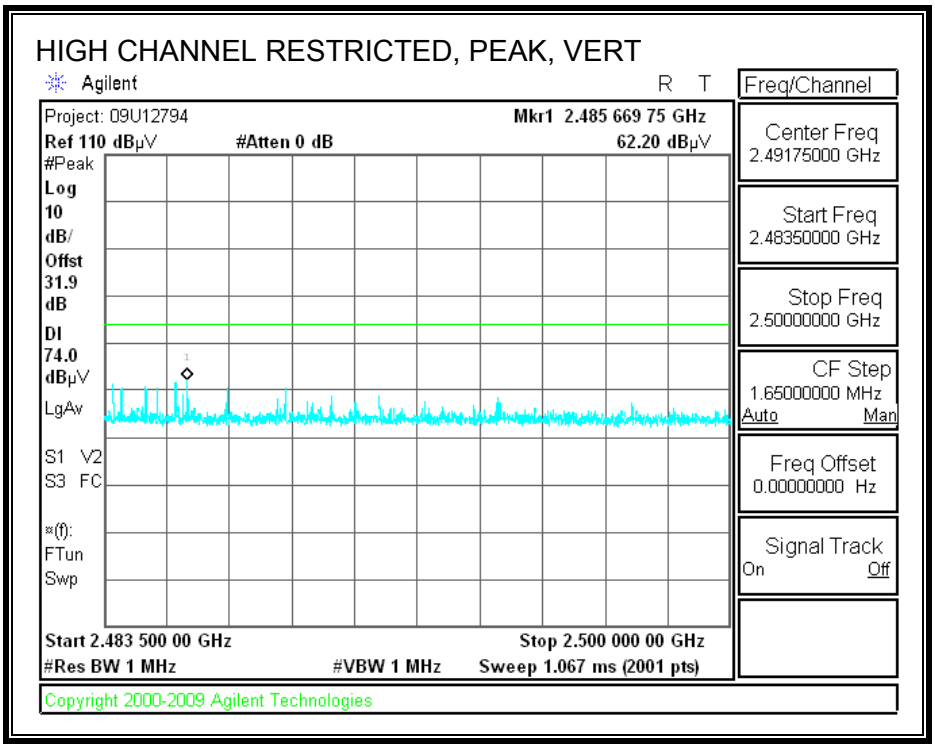
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



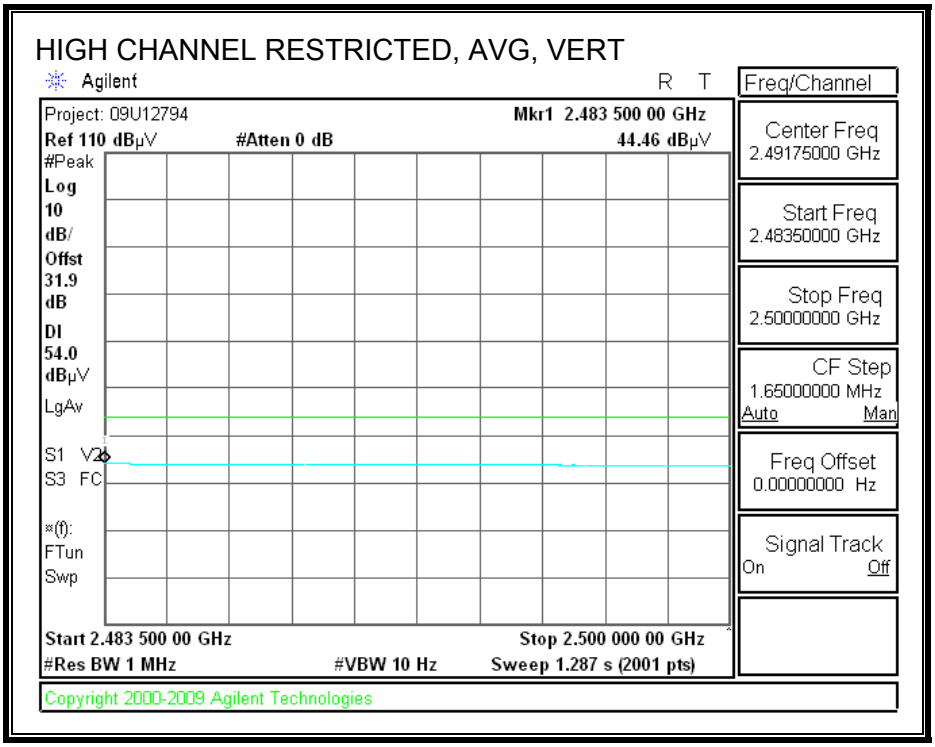
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

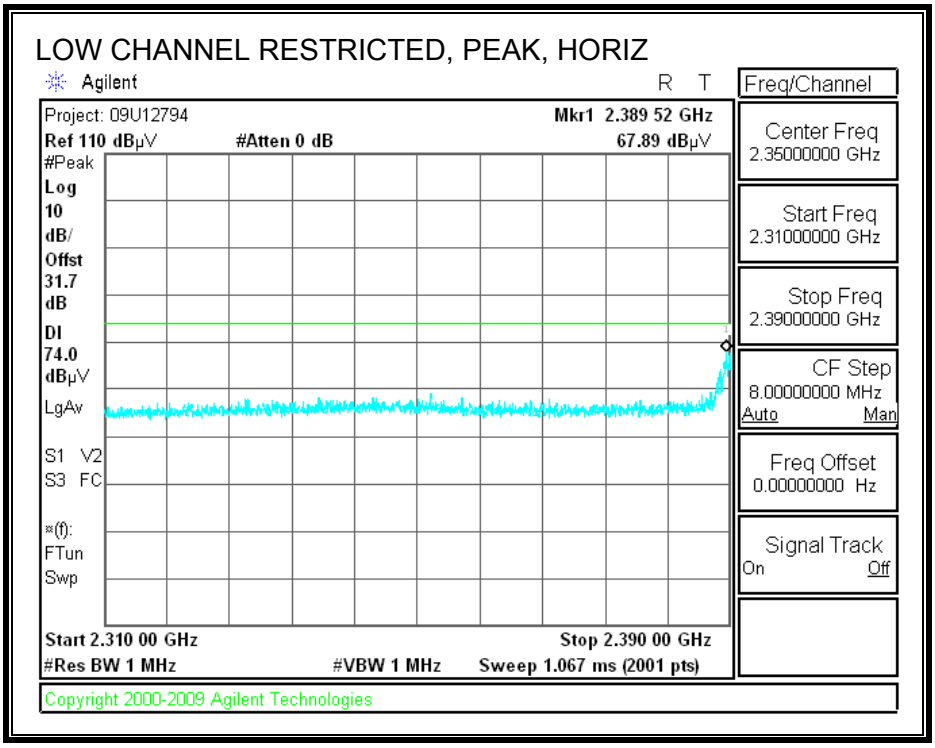


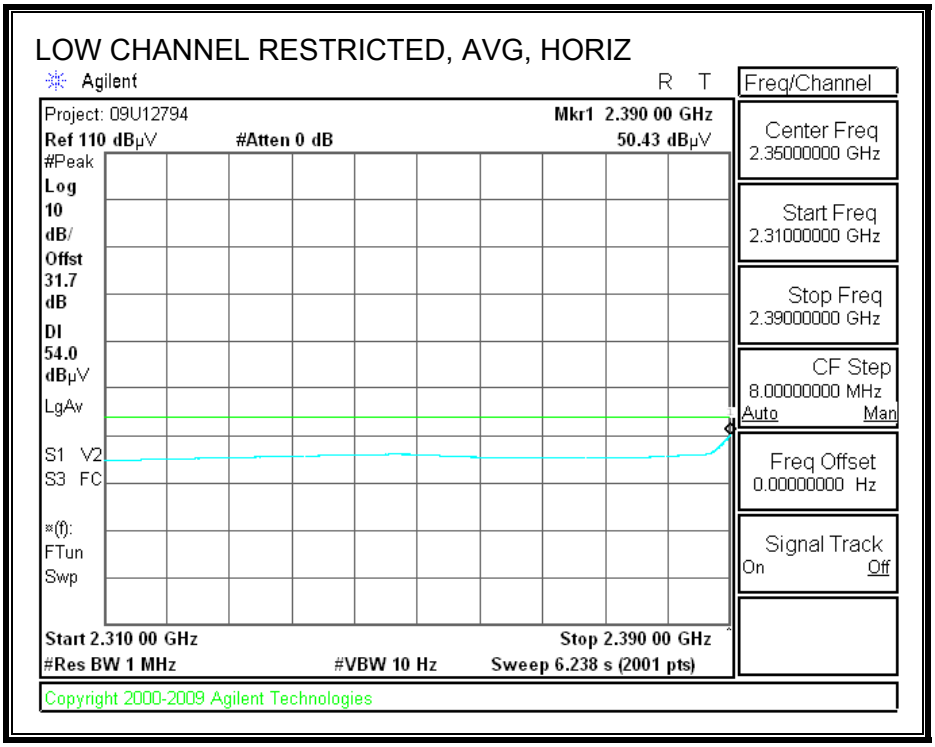
HIGH CHANNEL RESTRICTED, AVG, VERT



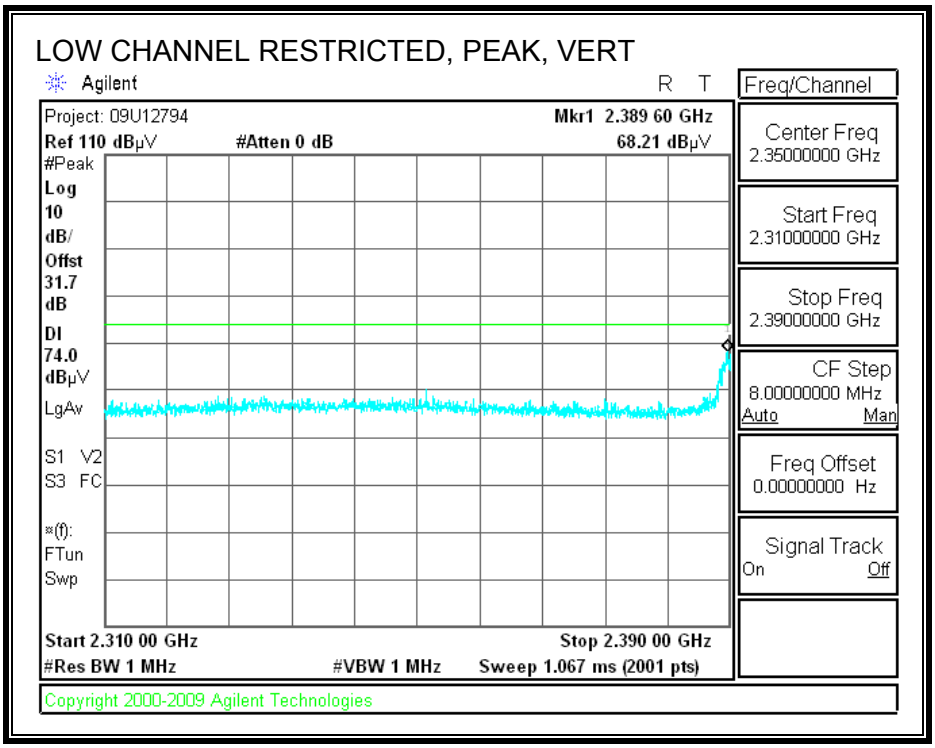
7.3.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

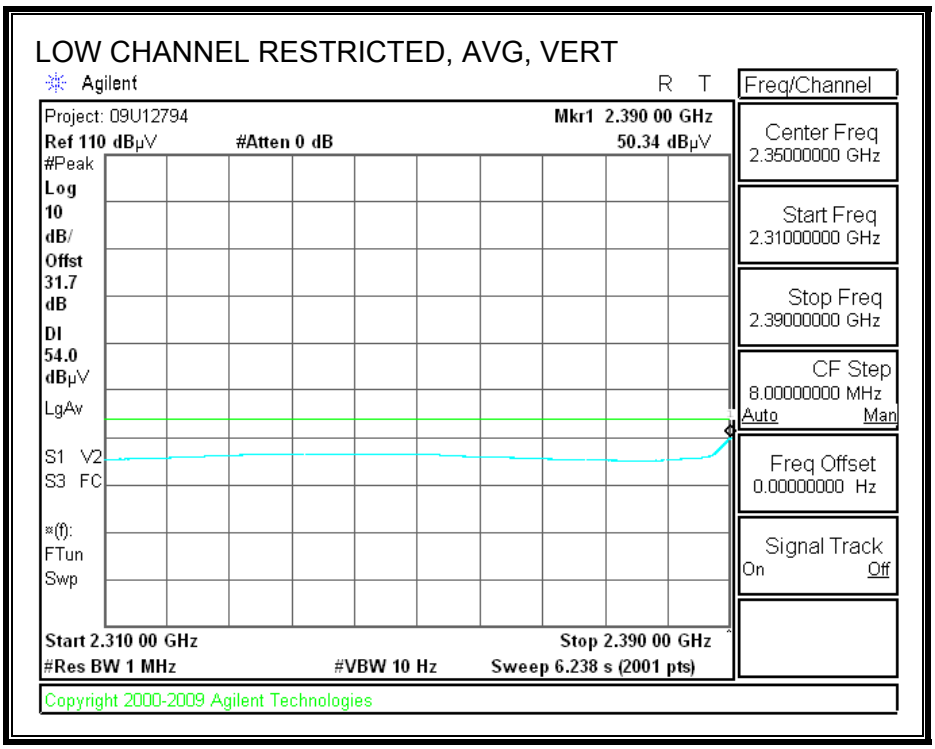




RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

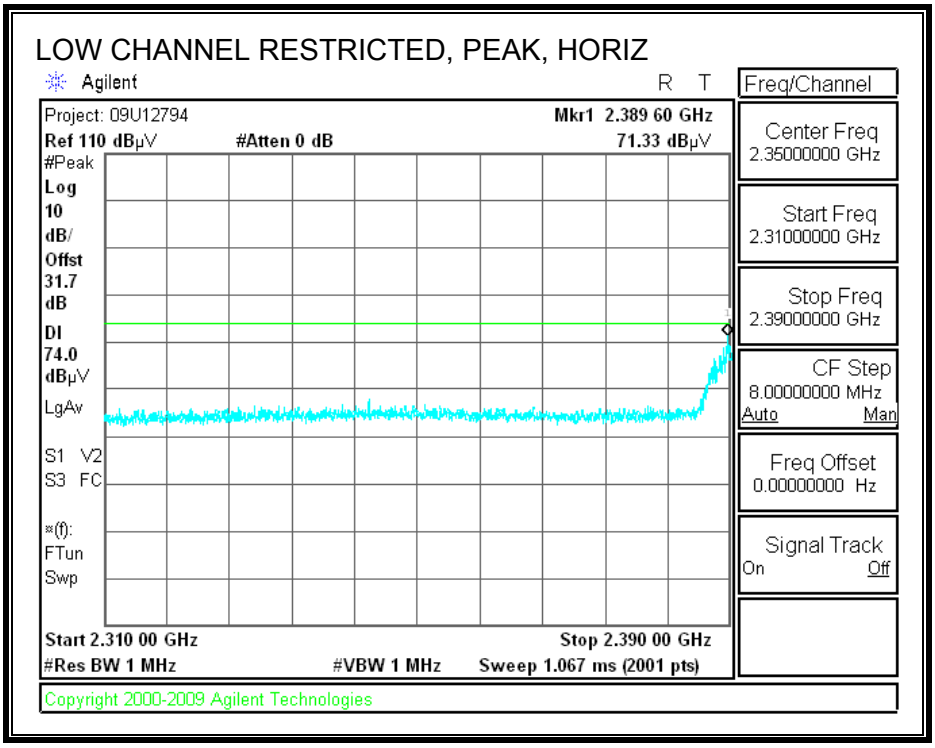


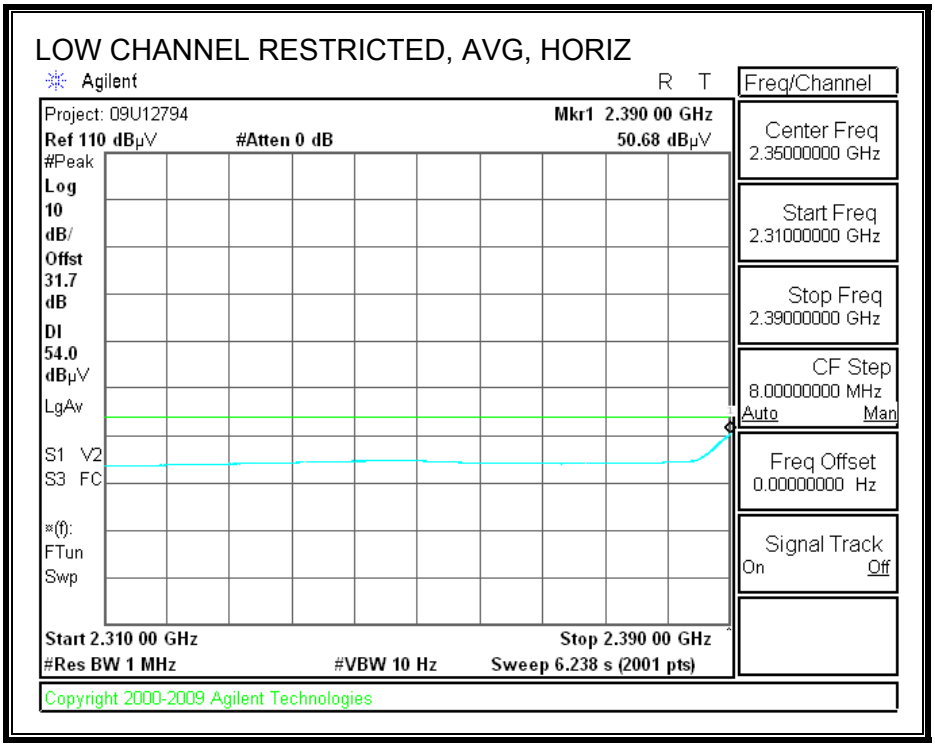
LOW CHANNEL RESTRICTED, AVG, VERT



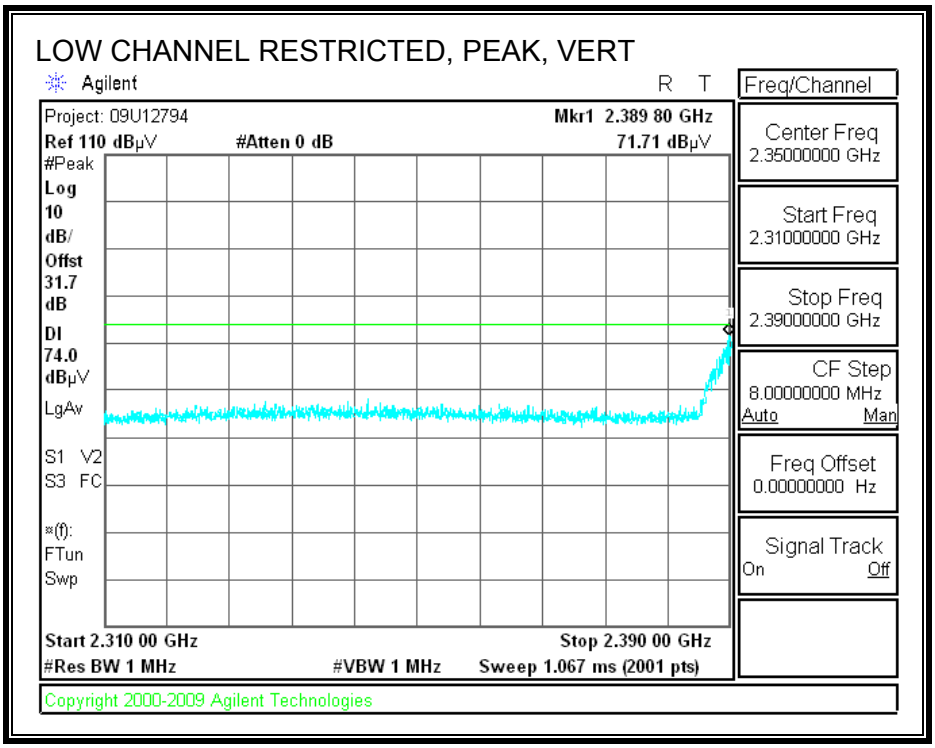
7.3.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

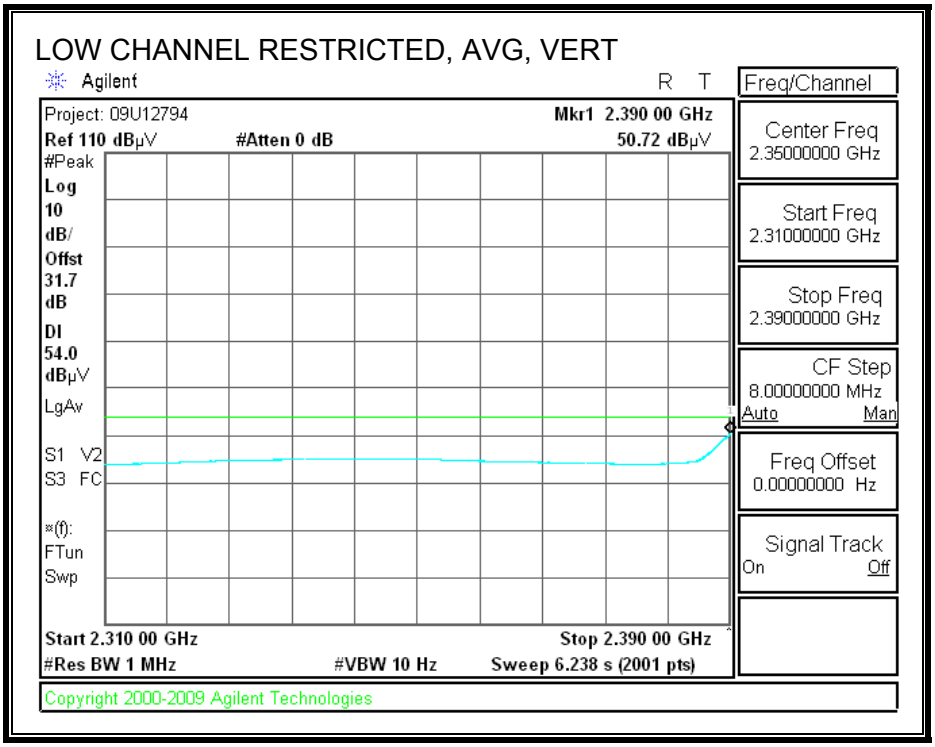
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





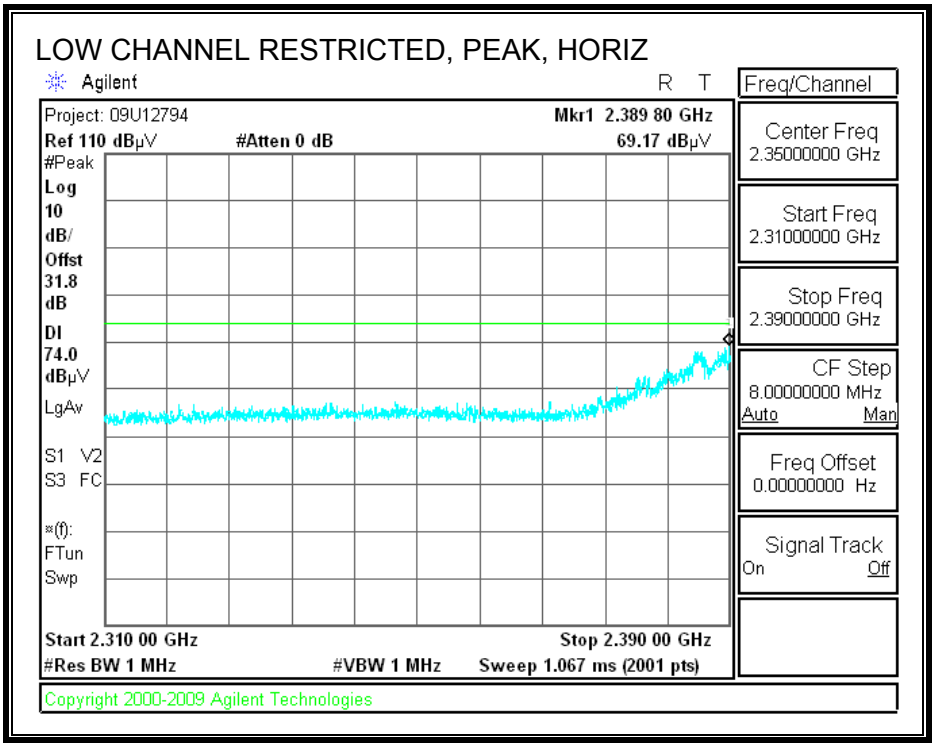
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



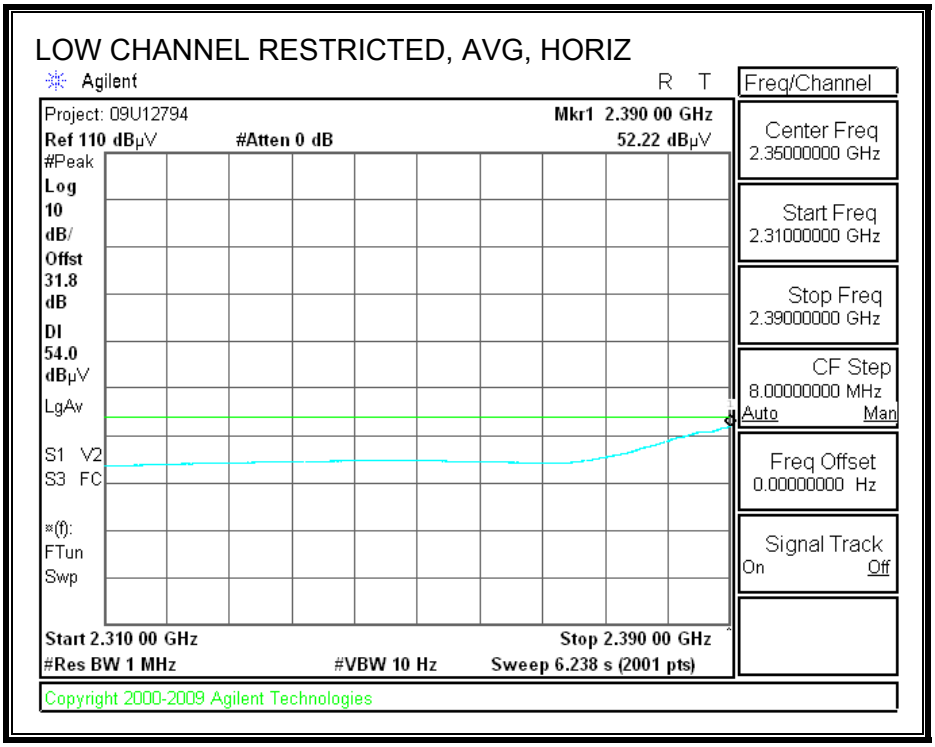


7.3.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

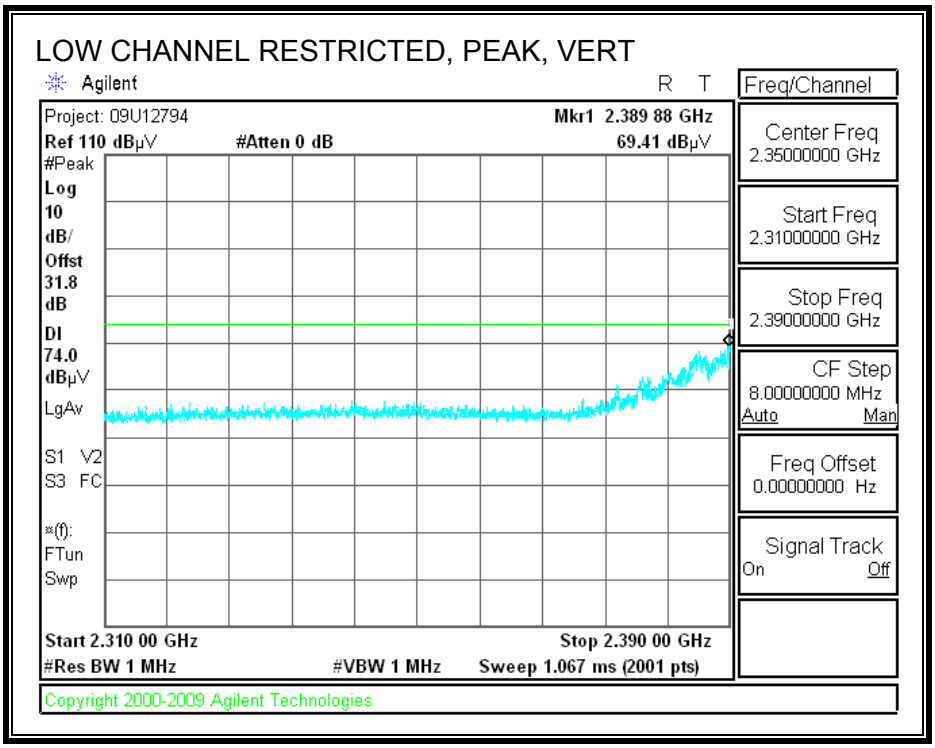
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



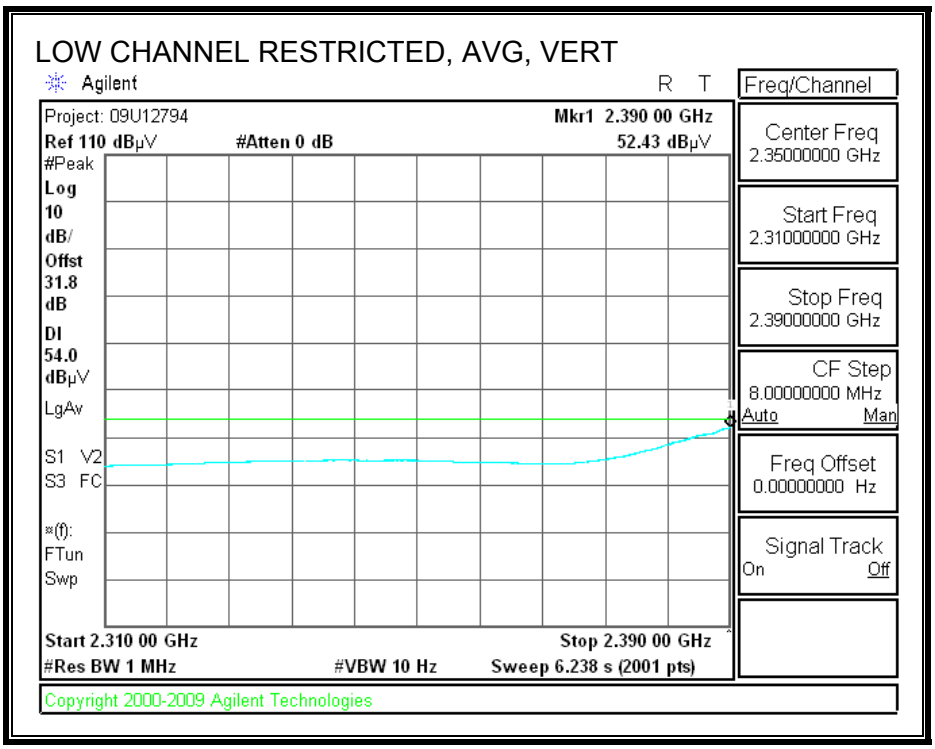
LOW CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



LOW CHANNEL RESTRICTED, AVG, VERT



7.4. WORST CASE RECEIVER ABOVE 1 GHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:	INTEL CONPORATION
Project #:	09U12794
Date:	9/13/2009
Test Engineer:	MENGISTU MEKURIA
Configuration:	INTEL 1000 SERIES WIFI MODULE INSIDE LENOVO CARAMEL-3 TABLET LAPTOP
Mode:	RX MODE

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
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	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.064	3.0	50.4	37.4	24.1	2.4	-39.4	0.0	0.0	37.5	24.5	74	54	-36.5	-29.5	H
1.604	3.0	52.8	33.6	25.9	3.1	-38.6	0.0	0.0	43.1	23.9	74	54	-30.9	-30.1	H
1.692	3.0	49.0	33.5	26.2	3.1	-38.5	0.0	0.0	39.8	24.3	74	54	-34.2	-29.7	H
1.240	3.0	66.7	35.5	24.7	2.6	-39.1	0.0	0.0	54.9	23.7	74	54	-19.1	-30.3	V
1.632	3.0	63.8	36.5	26.0	3.1	-38.6	0.0	0.0	54.3	27.0	74	54	-19.7	-27.0	V
2.132	3.0	60.5	34.6	27.5	3.6	-37.9	0.0	0.0	53.7	27.8	74	54	-20.3	-26.2	V
2.720	3.0	48.5	36.9	29.2	4.1	-37.4	0.0	0.0	44.3	32.8	74	54	-29.7	-21.2	V
3.996	3.0	47.8	29.7	32.2	5.2	-36.6	0.0	0.0	48.6	30.5	74	54	-25.4	-23.5	V
															H
															H

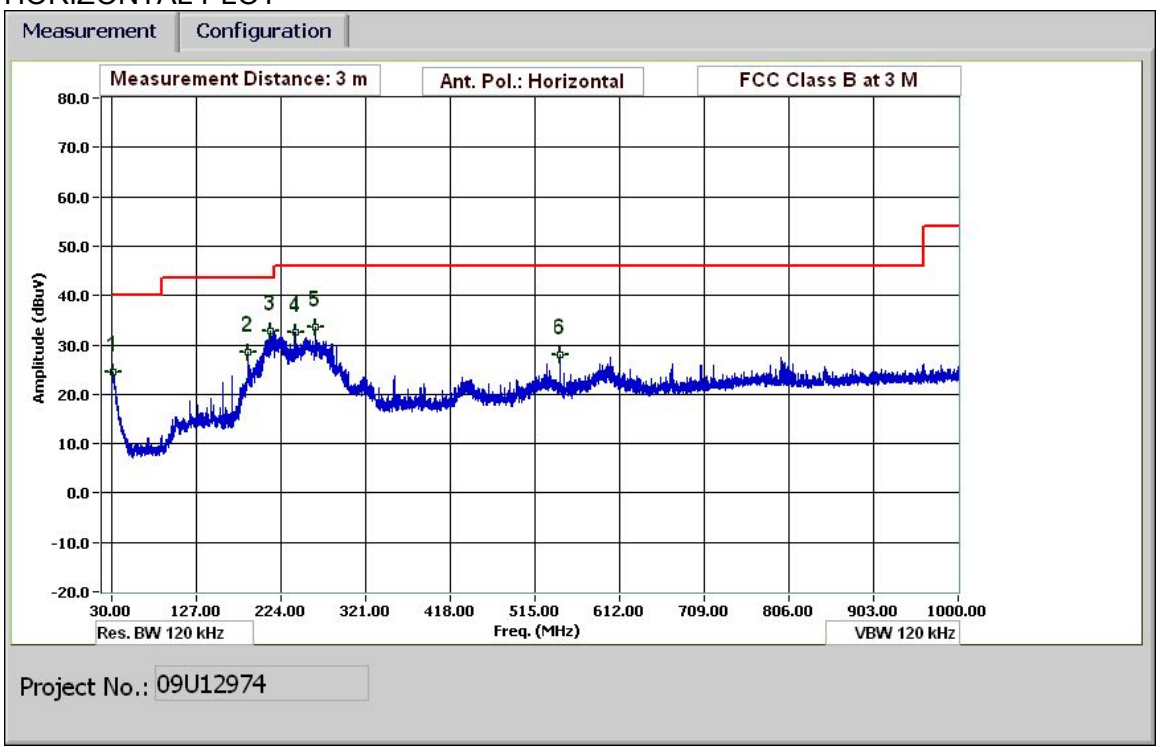
Rev. 11.10.08

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		

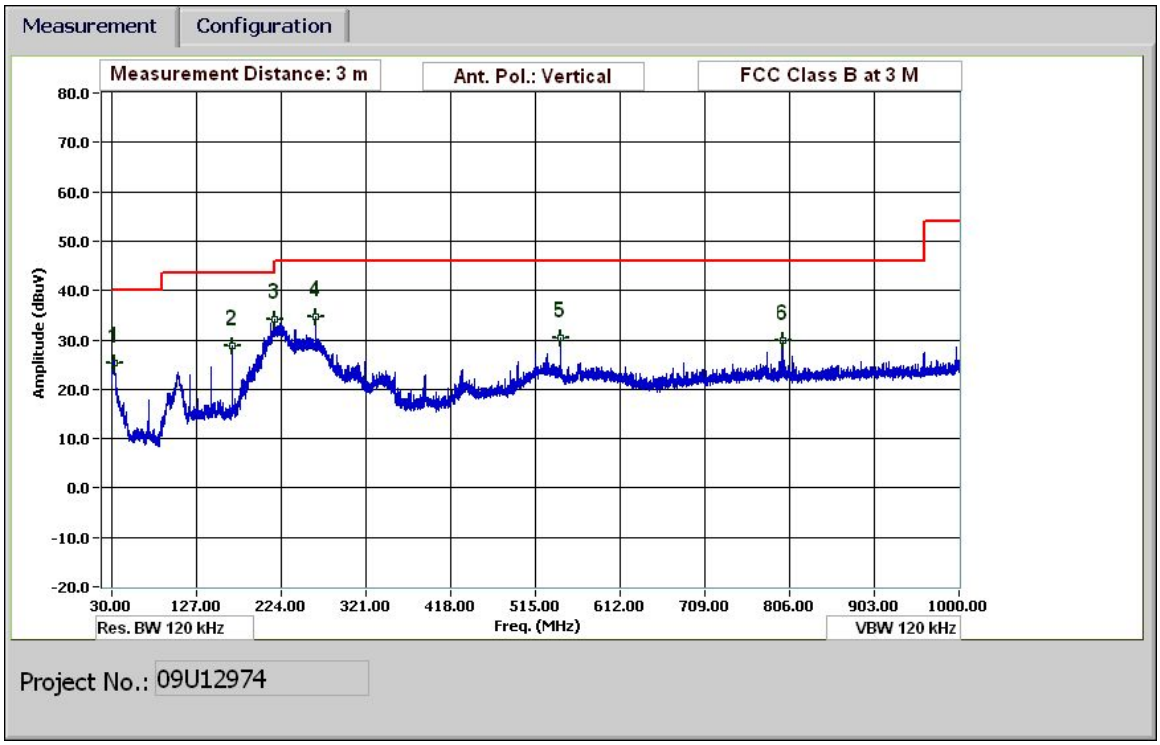
7.5. WORST CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: MENGISTU MEKURIA
Date: 10/13/08
Project #: 09U12794
Company: INTEL CORPORATIONS
EUT Description: INTEL 1000 SERIES WIFI MODULE INSIDE LENOVO CARAMEL-3 TABLET LAPTOP
EUT M/N: 112BNHMW
Test Target: FCC PART 15.247/RSS210
Mode Oper: TX, Worst Case

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
33.000	3.0	34.3	18.8	0.5	28.4	0.0	0.0	25.2	40.0	-14.8	V	P	
168.006	3.0	44.8	11.0	1.2	28.2	0.0	0.0	28.7	43.5	-14.8	V	P	
216.008	3.0	49.1	11.9	1.3	28.2	0.0	0.0	34.1	46.0	-11.9	V	P	
264.010	3.0	49.3	12.2	1.4	28.2	0.0	0.0	34.7	46.0	-11.3	V	P	
544.101	3.0	38.6	17.5	2.1	27.7	0.0	0.0	30.5	46.0	-15.5	V	P	
798.512	3.0	33.7	20.9	2.6	27.4	0.0	0.0	29.8	46.0	-16.2	V	P	
31.920	3.0	33.1	19.3	0.5	28.4	0.0	0.0	24.5	40.0	-15.5	H	P	
186.126	3.0	44.2	11.3	1.2	28.2	0.0	0.0	28.4	43.5	-15.1	H	P	
212.288	3.0	47.7	11.9	1.3	28.2	0.0	0.0	32.7	43.5	-10.8	H	P	
240.009	3.0	47.6	11.8	1.3	28.2	0.0	0.0	32.6	46.0	-13.4	H	P	
264.010	3.0	48.1	12.2	1.4	28.2	0.0	0.0	33.6	46.0	-12.4	H	P	
544.101	3.0	36.0	17.5	2.1	27.7	0.0	0.0	27.9	46.0	-18.1	H	P	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

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

ANSI C63.4

RESULTS

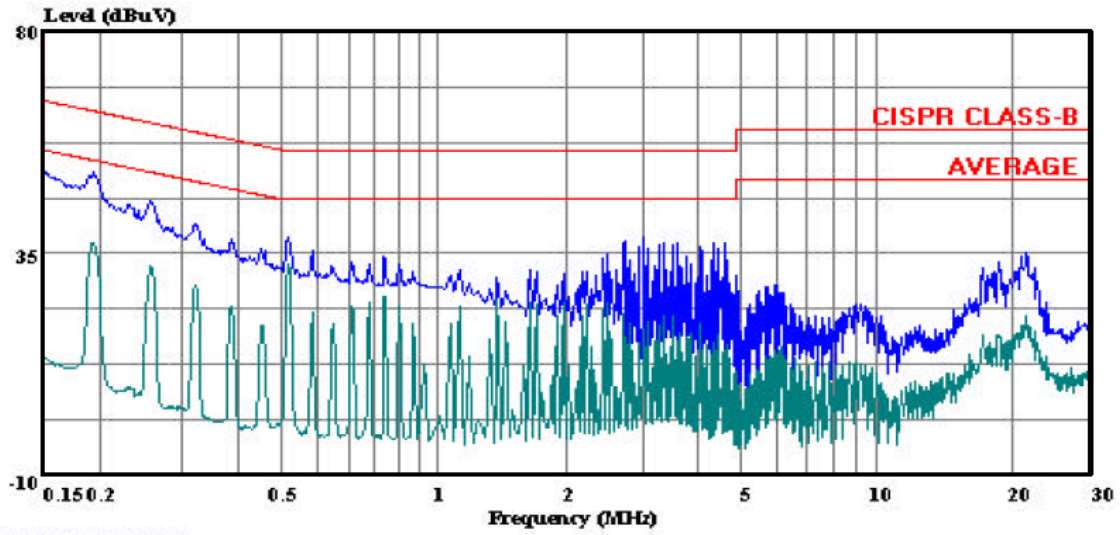
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.19	51.42	--	37.21	0.00	63.91	53.91	-12.49	-16.70	L1
0.26	45.87	--	32.64	0.00	61.56	51.56	-15.69	-18.92	L1
0.52	38.24	--	32.99	0.00	56.00	46.00	-17.76	-13.01	L1
0.19	49.97	--	35.08	0.00	63.99	53.99	-14.02	-18.91	L2
0.26	44.36	--	28.17	0.00	61.50	51.50	-17.14	-23.33	L2
0.52	37.82	--	29.73	0.00	56.00	46.00	-18.18	-16.27	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#: 09U12794_LC.EMI Date: 09-10-2009 Time: 15:00:49



(Line Conduction)

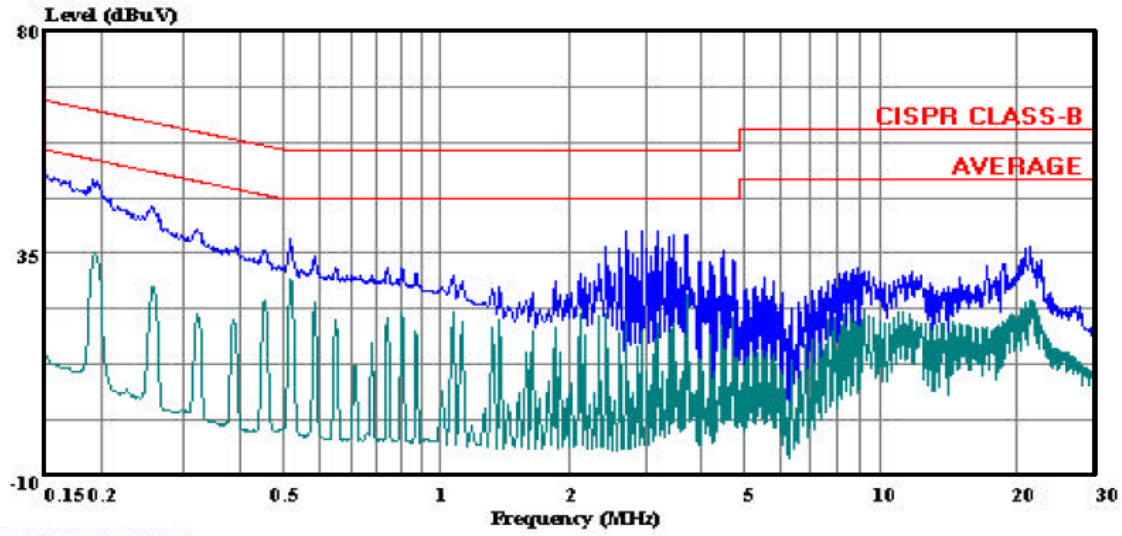
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Mengistu Mekuria
Project #: : 09U12794
Company: : Intel
EUT Description:: Module 802.11bgn 1x2
Mode: : TX Worst Case 2.4GHz_Acon Antenna
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: L1: Peak (Blue) , Average (Green)

LINE 2 RESULTS

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

Data#: 14 File#: 09U12794_LC.EMI Date: 09-10-2009 Time: 15:10:48



(Line Conduction)

Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Mengistu Mekuria
Project #: : 09U12794
Company: : Intel
EUT Description:: Module 802.11bgn 1x2
Mode: : TX Worst Case 2.4GHz_Acon Antenna
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: L2: Peak (Blue) , Average (Green)