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

CERTIFICATION TEST REPORT

FOR

802.11n 1x1 PCIe Minicard Transceiver

FCC MODEL: AR5B95
IC MODEL: AR5B95-H

FCC ID: PPD-AR5B95-H
IC: 4104A-AR5B95H

REPORT NUMBER: 09U12855-1, Revision A

ISSUE DATE: NOVEMBER 02, 2009

Prepared for
ATHEROS COMMUNICATIONS, INC.
5480 GREAT AMERICA PARKWAY
SANTA CLARA, CA 95054, U.S.A.

Prepared by
COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/20/09	Initial Issue	T. Chan
A	11/02/09	Revised MPE Section	T. Chan

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ATHEROS COMMUNICATION, INC
5480 GREAT AMERICA PARKWAY
SANTA CLARA, CA 95054 USA

EUT DESCRIPTION: 802.11n 1x1 PCIe Minicard Transceiver

FCC MODEL: AR5B95

IC MODEL: AR5B95-H

SERIAL NUMBER: 518436-001 (SPS #)

DATE TESTED: OCTOBER 10-15, 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:

CHIN PANG
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 802.11n 1x1 PCIe Minicard transceiver.
The radio module is manufactured by Atheros Communications

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 HP tablet, model: HSTNN-I77C, and collocated with Bluetooth module, FCCID: QDS-BRCM1043.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of -0.35 dBi (with cable loss). Without cable loss, the antenna gain is 1.09dBi.

5.5. SOFTWARE AND FIRMWARE

The test utility and driver software used during testing was Devlib Revision 0.9 Build #19 Art_11n.

5.6. WORST-CASE CONFIGURATION AND MODE

The tests were performed on full test worst case channel with Winstron antenna installed since it has higher antenna gain, and some spot check with Yageo 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 on both antennas.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Laptop	HP	JIXI1.0	79816S103T
Laptop	HP	JIXI1.1	79816S106Q
AC Adapter	HP	PPP009H	F1-09072618090A

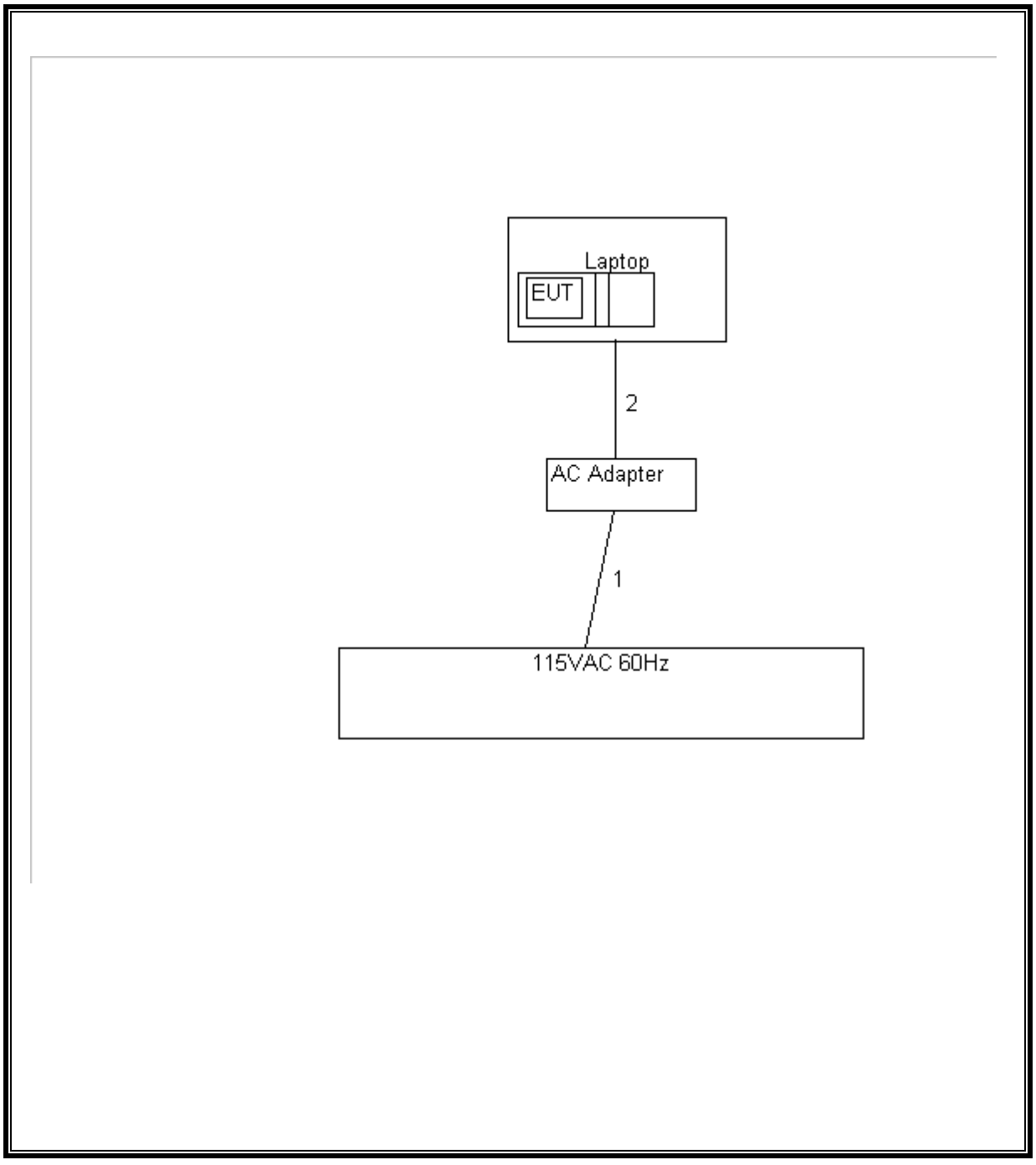
I/O CABLES

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

TEST SETUP

The EUT is installed in a host laptop computer via an extended card 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**
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	01/14/10
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	02/04/10
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	12/16/09
Antenna, Horn, 18 GHz	EMCO	3115	C00945	01/29/10
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
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	06/01/10
Peak Power Meter	Boonton	4541	C01186	01/19/10
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR
Peak Power Sensor	Boonton	57318	2411	02/02/10

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.

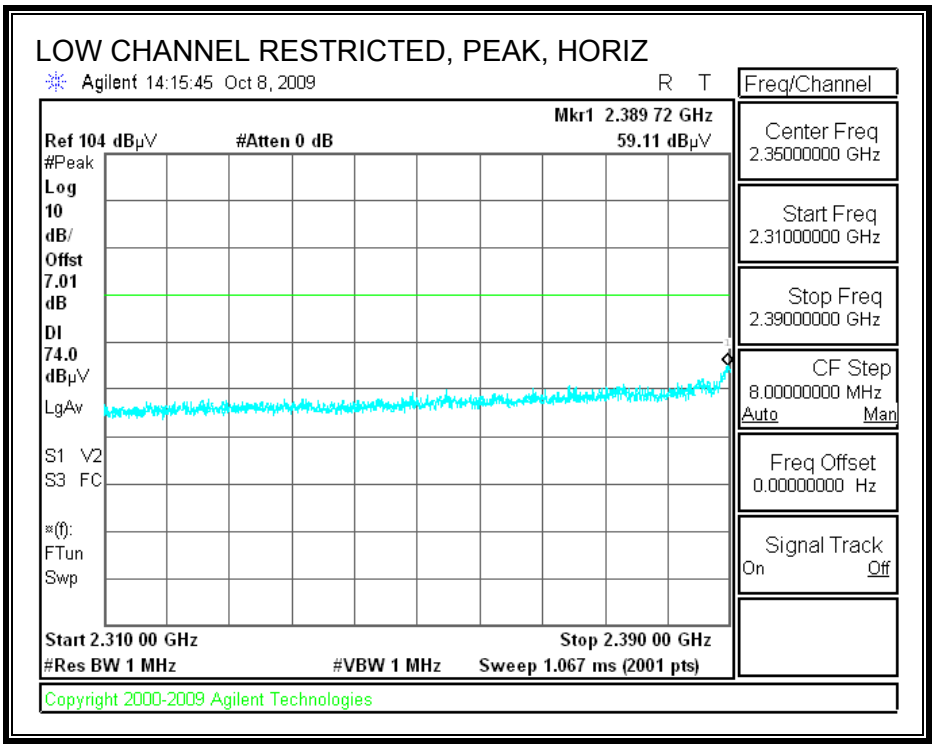
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

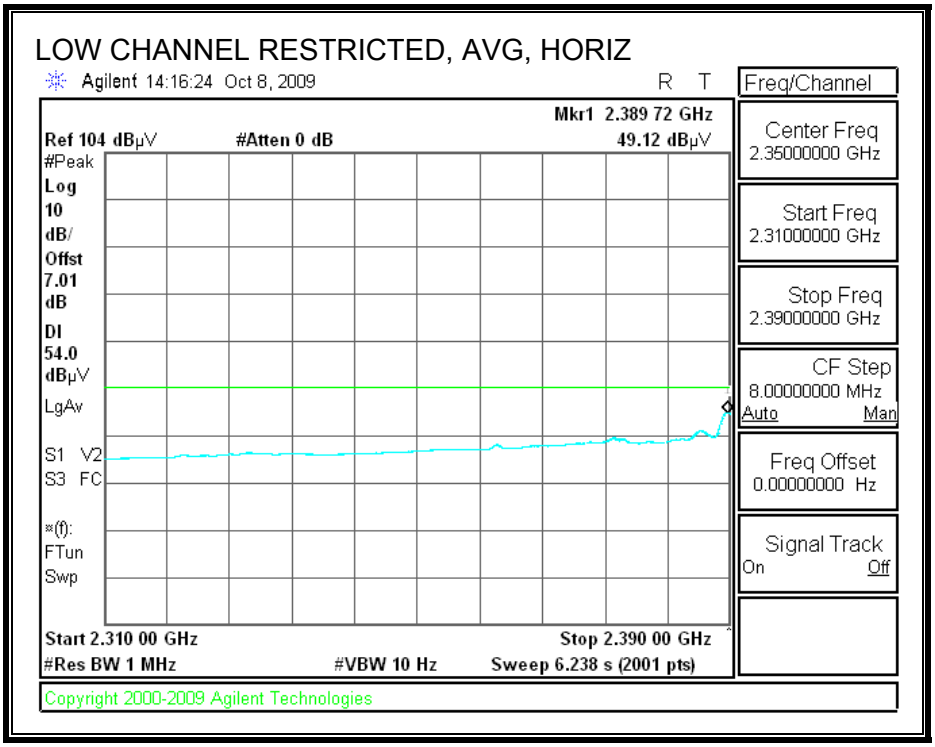
7.2. TRANSMITTER ABOVE 1 GHz

WINSTRON ANTENNA:

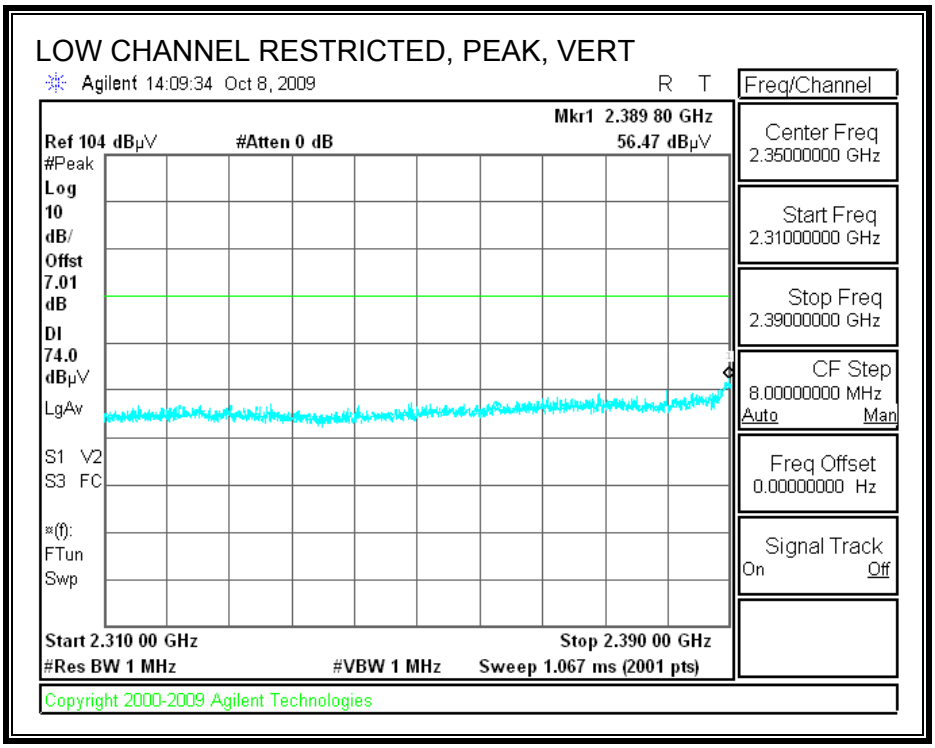
7.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

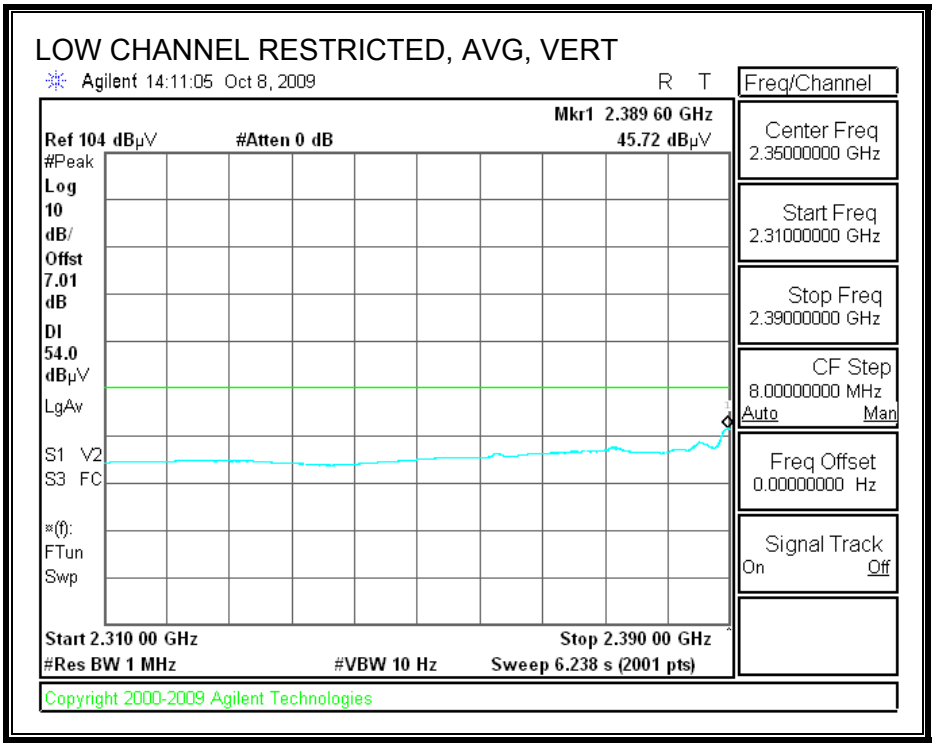
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



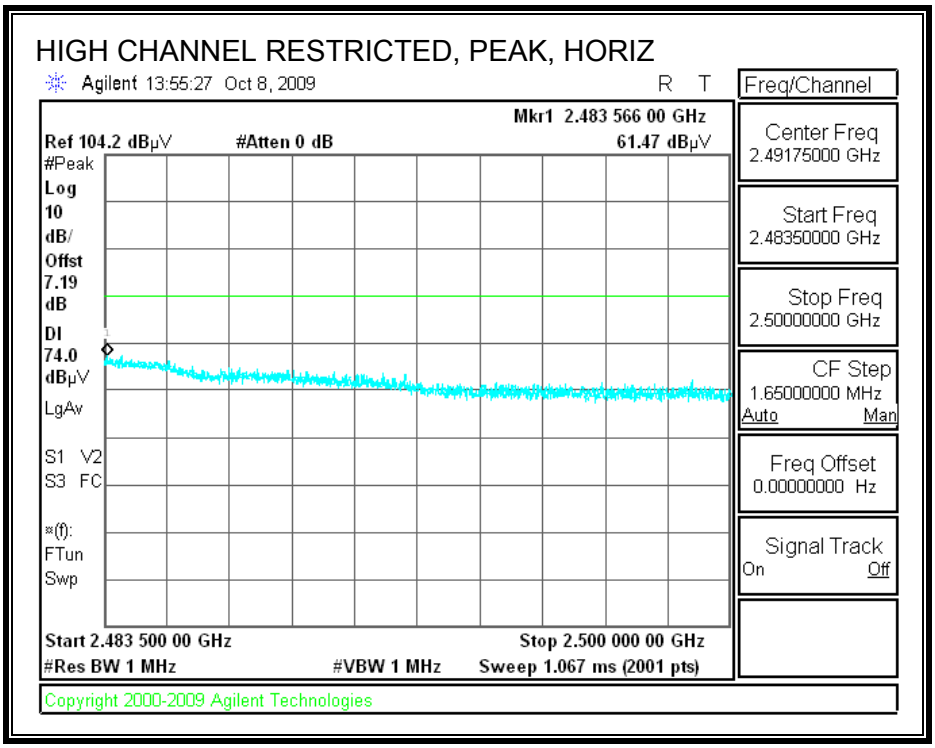


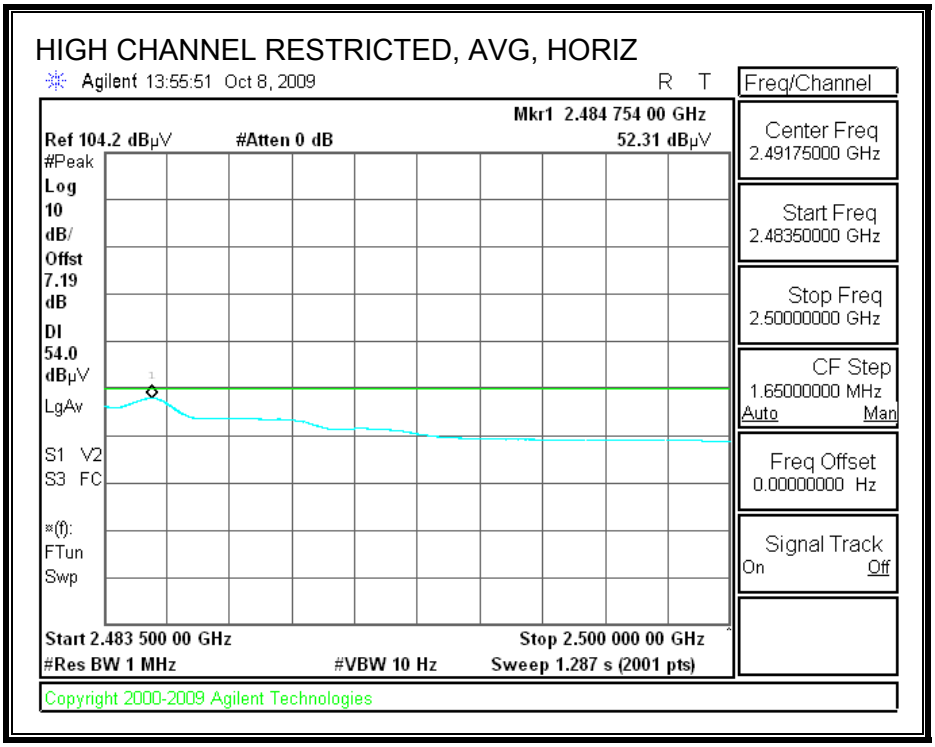
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



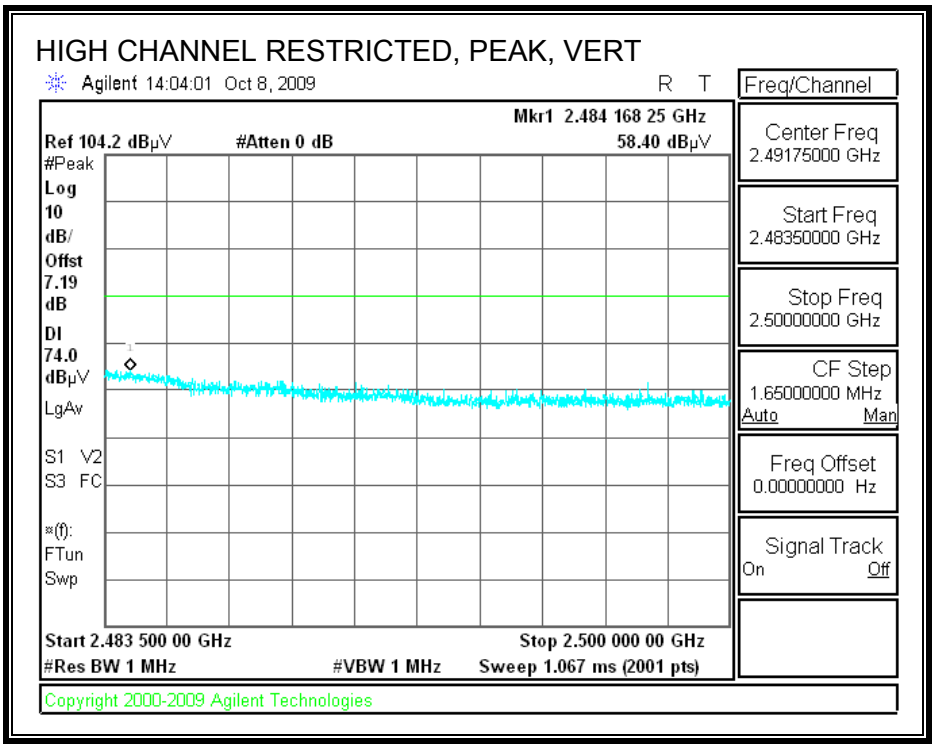


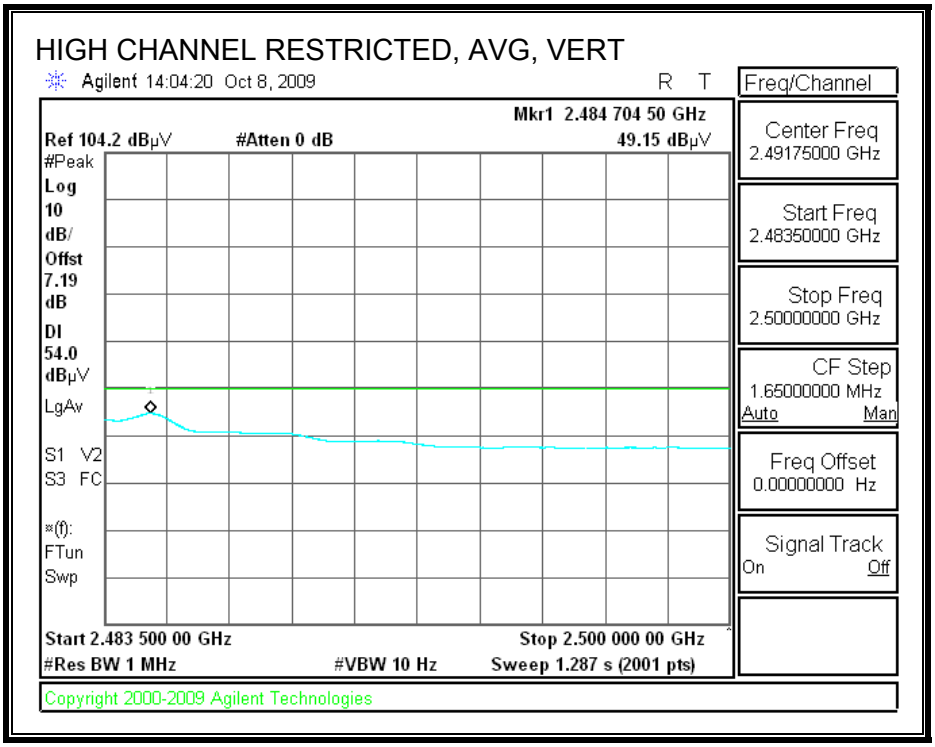
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Can Ming Chung
Date: 10/17/08
Project #: 09U12855
Company: Atheros Communication Inc
EUT Description: Eut inside the laptop
Test Target: FCC 15.247
Mode Oper: TX_B mode with WNC Antenna

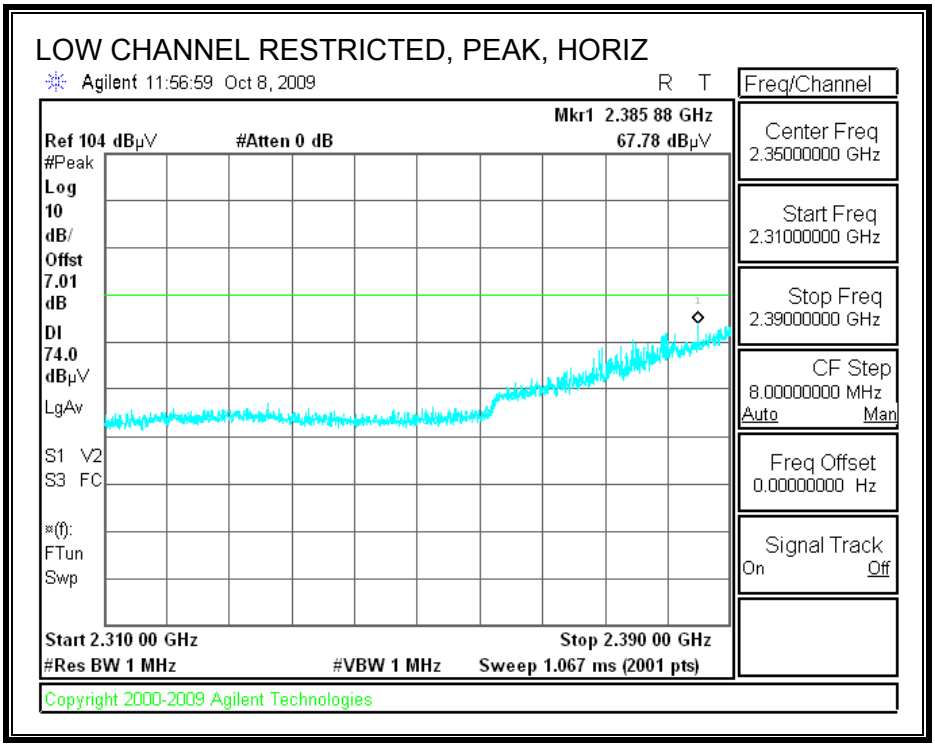
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

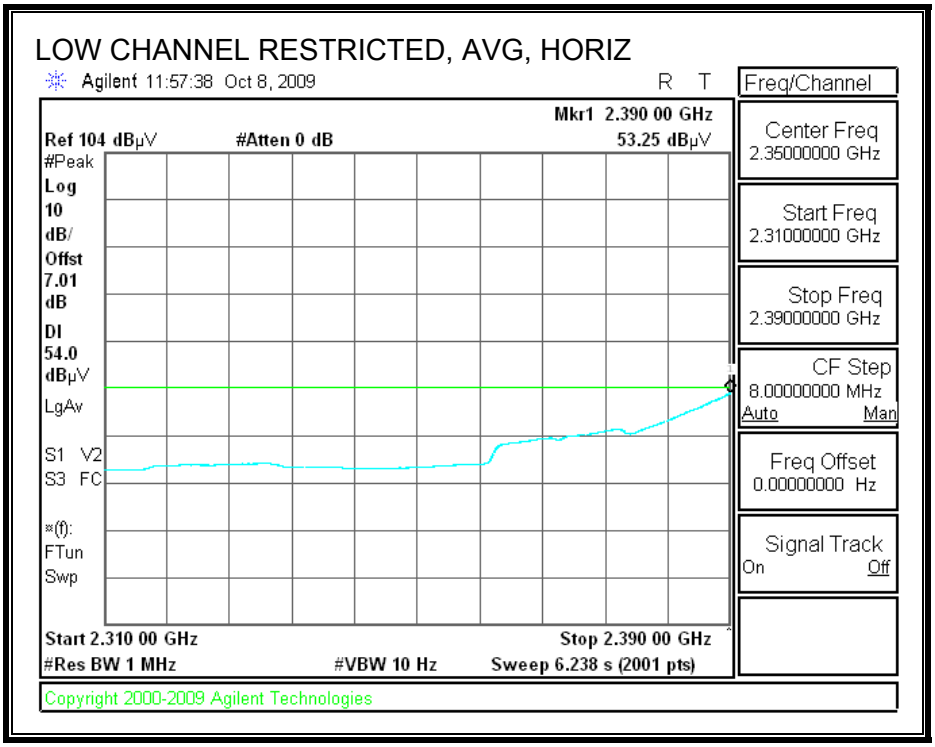
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch													
4.824	3.0	38.4	32.8	5.8	-34.8	0.0	0.0	42.1	74.0	-31.9	H	P	H
4.824	3.0	25.8	32.8	5.8	-34.8	0.0	0.0	29.5	54.0	-24.5	H	A	H
4.824	3.0	37.9	32.8	5.8	-34.9	0.0	0.0	41.7	74.0	-32.3	V	P	V
4.824	3.0	25.3	32.8	5.8	-34.9	0.0	0.0	29.1	54.0	-24.9	V	A	V
Mid Ch													
4.874	3.0	39.4	32.8	5.8	-34.9	0.0	0.0	36.3	54.0	-17.7	H	A	H
4.874	3.0	32.5	32.8	5.8	-34.9	0.0	0.0	43.7	74.0	-30.3	H	P	H
4.874	3.0	39.9	32.8	5.8	-34.9	0.0	0.0	35.7	54.0	-18.3	H	A	H
4.874	3.0	31.9	32.8	7.3	-34.7	0.0	0.0	46.1	74.0	-27.9	H	P	H
7.311	3.0	38.3	35.2	7.3	-34.7	0.0	0.0	34.1	54.0	-19.9	H	A	H
7.311	3.0	26.3	35.2	8.6	-35.0	0.0	0.0	48.9	74.0	-25.1	H	P	H
4.874	3.0	39.5	32.8	5.8	-34.9	0.0	0.0	43.3	74.0	-30.7	V	P	H
4.874	3.0	28.8	32.8	5.8	-34.9	0.0	0.0	32.6	54.0	-21.4	V	A	H
4.874	3.0	38.7	32.8	5.8	-34.9	0.0	0.0	42.5	74.0	-31.5	V	P	V
4.874	3.0	28.7	32.8	5.8	-34.9	0.0	0.0	32.4	54.0	-21.6	V	A	V
7.311	3.0	37.5	35.2	7.3	-34.7	0.0	0.0	45.3	74.0	-28.7	V	P	V
7.311	3.0	25.4	35.2	7.3	-34.7	0.0	0.0	33.2	54.0	-20.8	V	A	V
12.185	3.0	34.3	38.6	9.8	-32.4	0.0	0.0	50.3	74.0	-23.7	V	P	V
12.185	3.0	22.0	38.6	9.8	-32.4	0.0	0.0	38.0	54.0	-16.0	V	A	V
High Ch													
4.924	3.0	37.7	32.8	5.9	-34.9	0.0	0.0	41.5	74.0	-32.5	H	P	H
4.924	3.0	27.2	32.8	5.9	-34.9	0.0	0.0	31.1	54.0	-22.9	H	A	H
7.386	3.0	38.3	35.3	7.3	-34.6	0.0	0.0	46.2	74.0	-27.8	H	P	H
7.386	3.0	24.8	35.3	7.3	-34.6	0.0	0.0	32.8	54.0	-21.2	H	A	H
4.924	3.0	37.9	32.8	5.9	-34.9	0.0	0.0	41.7	74.0	-32.3	V	P	V
4.924	3.0	25.6	32.8	5.9	-34.9	0.0	0.0	29.4	54.0	-24.6	V	A	V
7.386	3.0	36.8	35.3	7.3	-34.6	0.0	0.0	44.8	74.0	-29.2	V	P	V
7.386	3.0	24.8	35.3	7.3	-34.6	0.0	0.0	32.8	54.0	-21.2	V	A	V

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

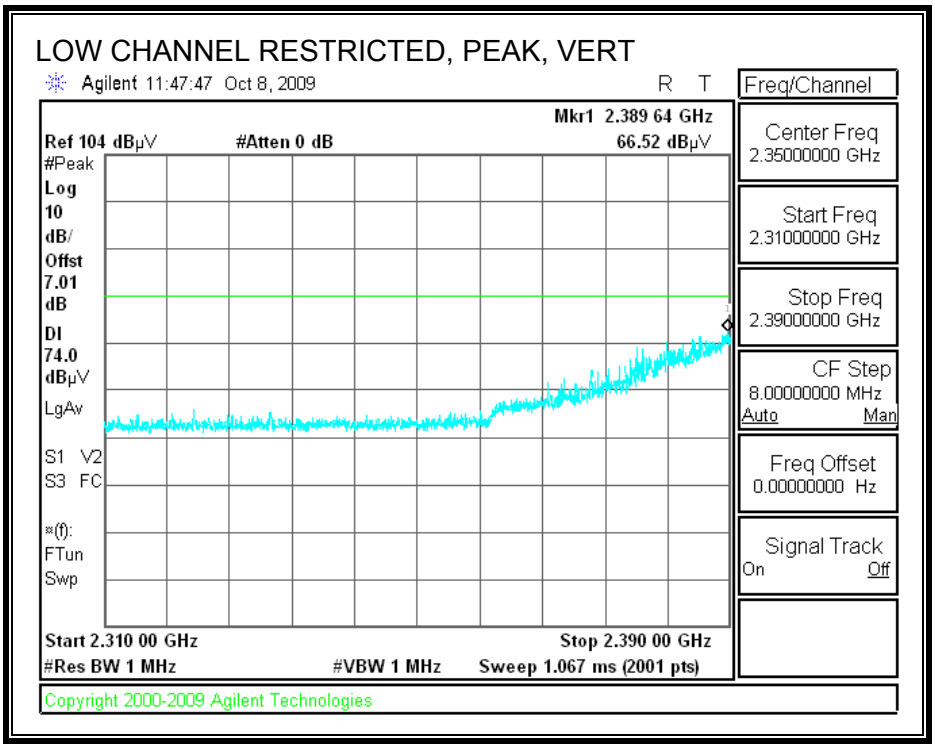
7.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

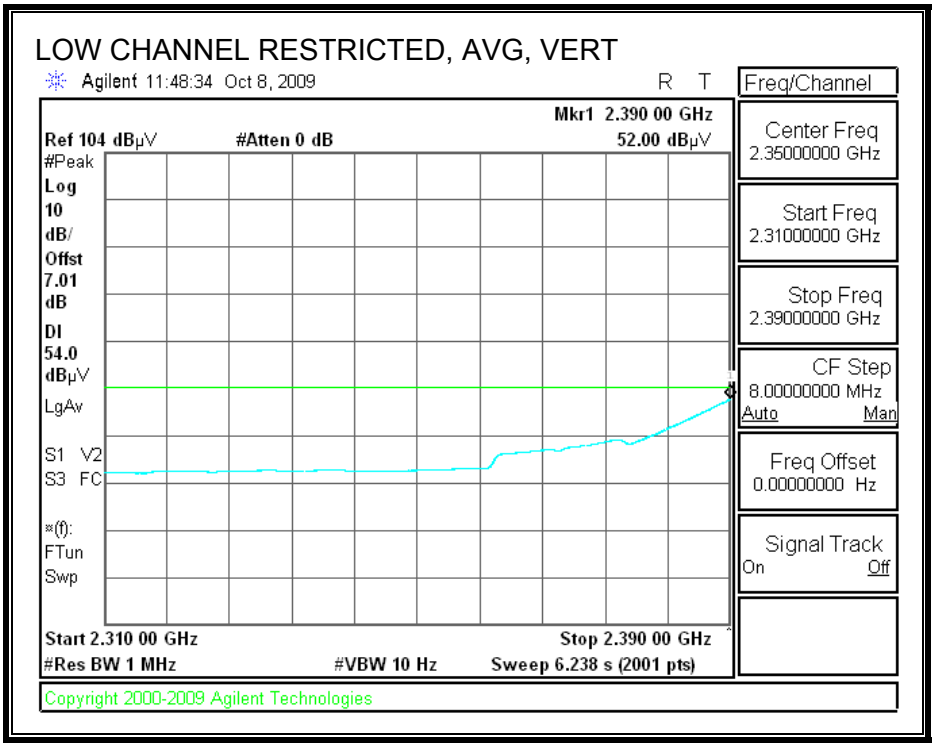
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



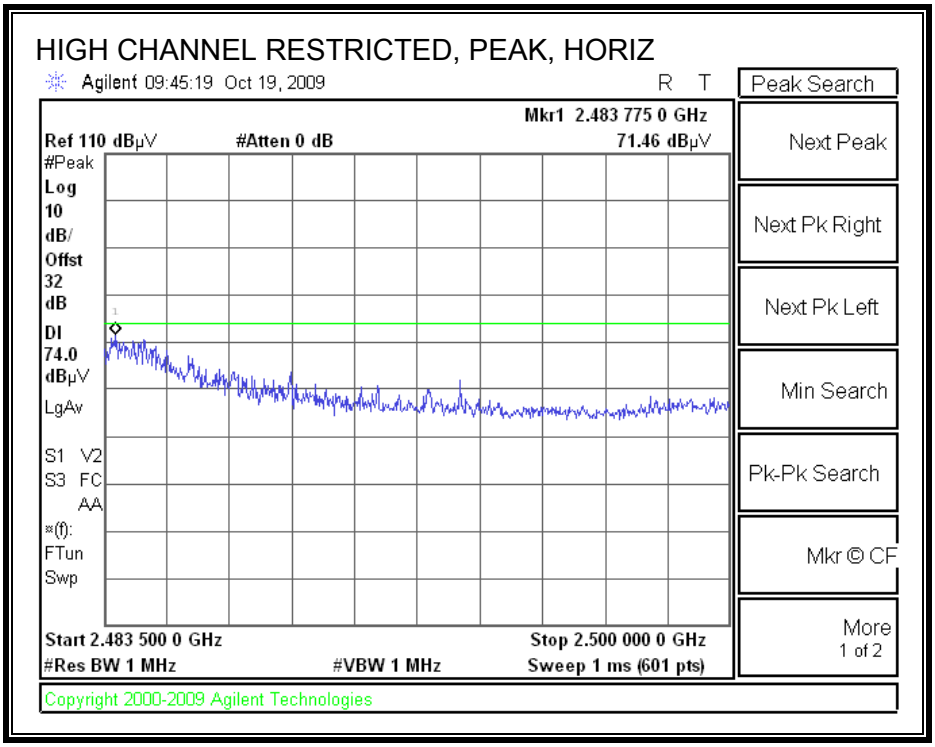


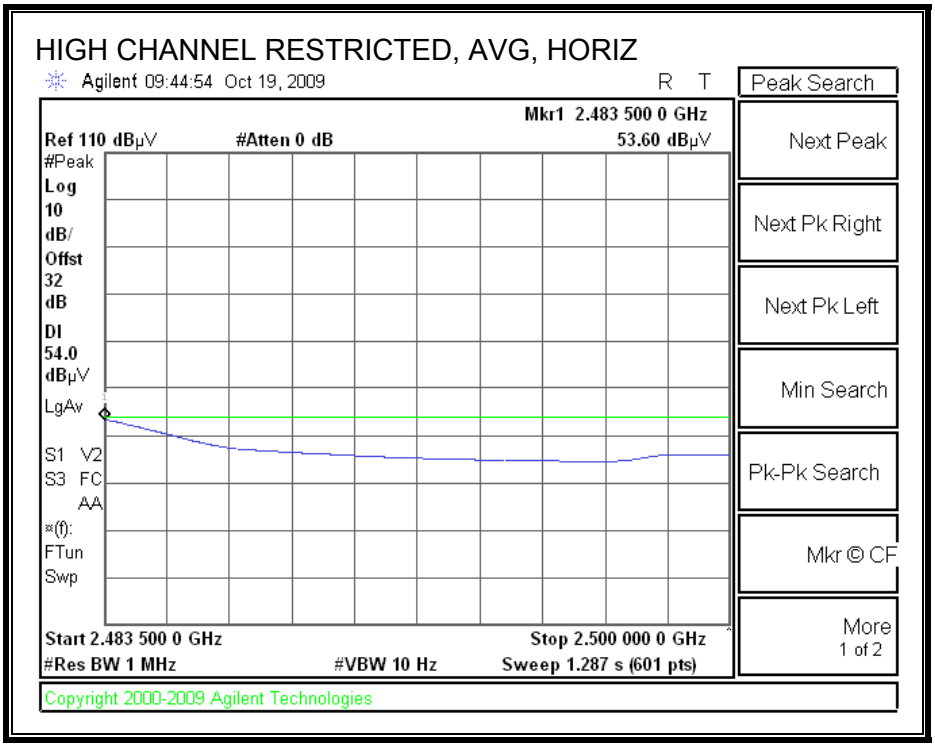
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



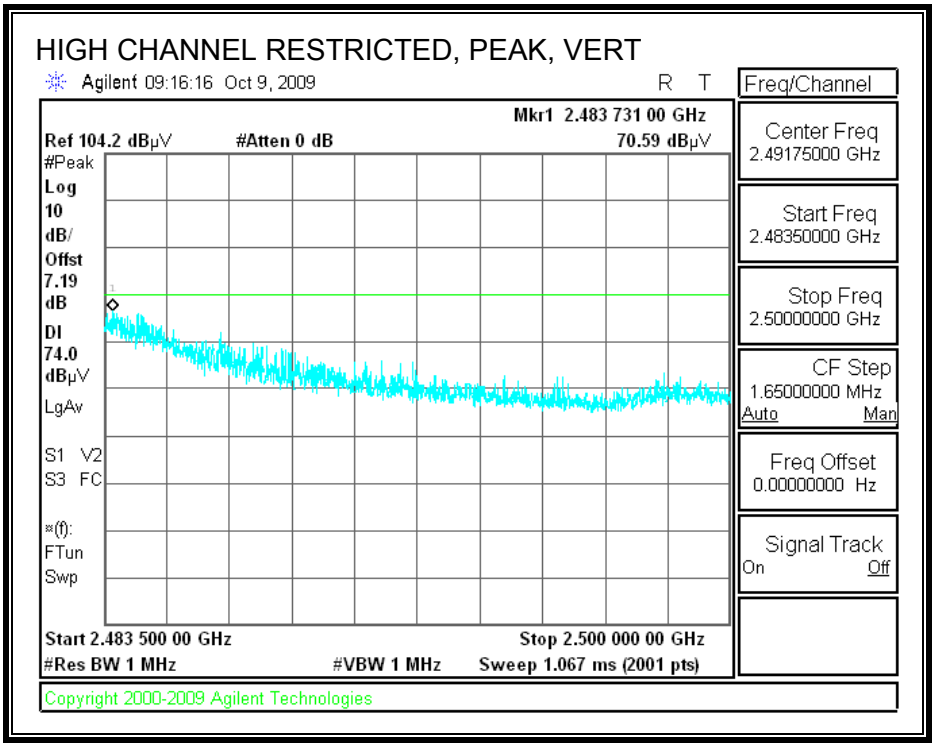


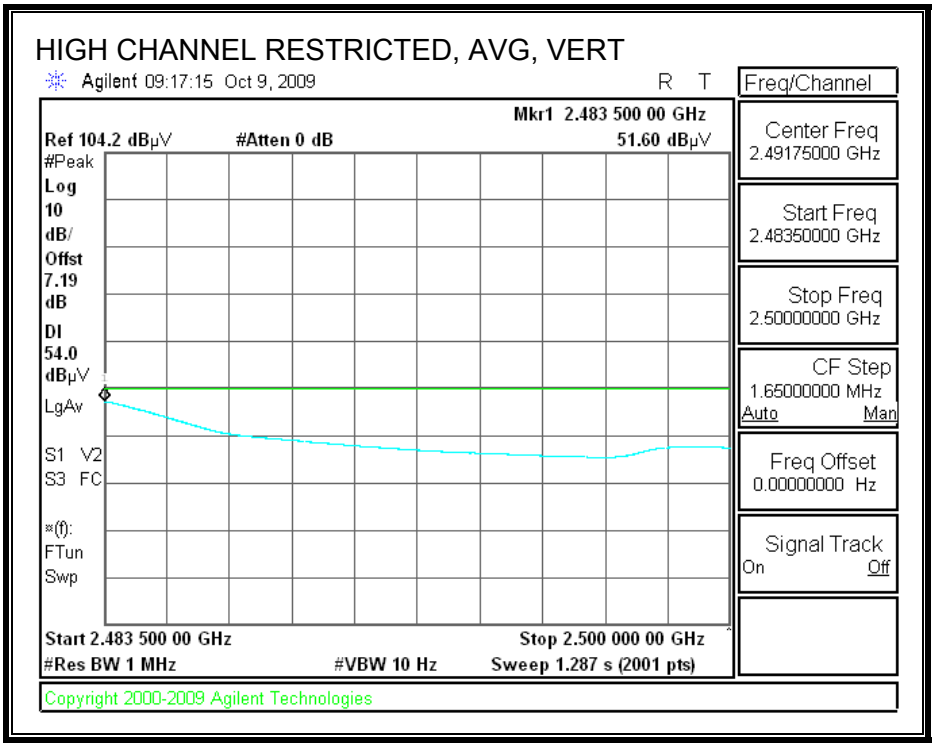
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Can Ming Chung
Date: 10/17/08
Project #: 09U12855
Company: Atheros Communication Inc
EUT Description: Eut inside the laptop
Test Target: FCC 15.247
Mode Oper: TX_G mode with WNC Antenna

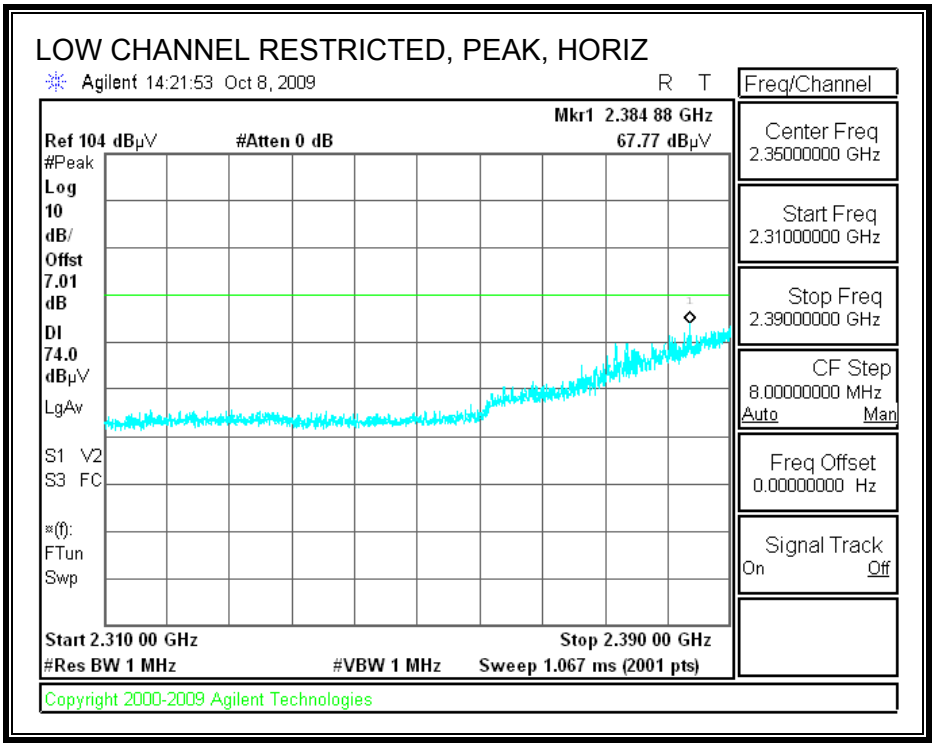
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

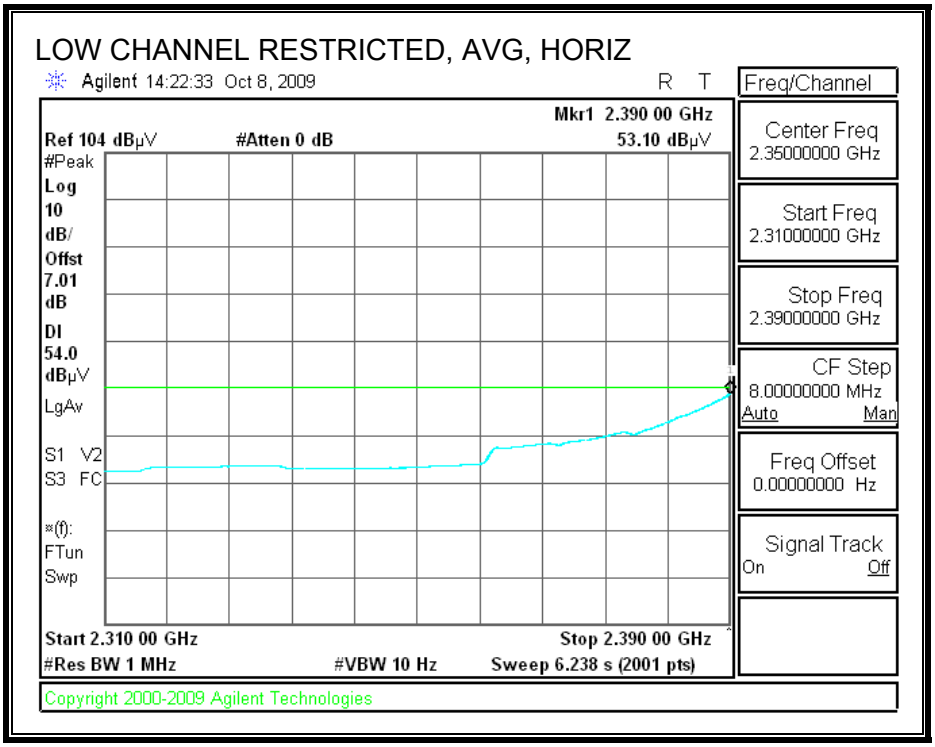
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch													
4.824	3.0	46.0	32.8	5.8	-34.8	0.0	0.0	49.7	74.0	-24.3	V	P	V
4.824	3.0	29.0	32.8	5.8	-34.8	0.0	0.0	32.7	54.0	-21.3	V	A	V
4.824	3.0	46.1	32.8	5.8	-34.8	0.0	0.0	49.8	74.0	-24.2	H	P	H
4.824	3.0	29.6	32.8	5.8	-34.8	0.0	0.0	33.3	54.0	-20.7	H	A	H
Mid Ch													
4.874	3.0	48.1	32.8	5.8	-34.9	0.0	0.0	51.9	74.0	-22.1	H	P	H
4.874	3.0	31.7	32.8	5.8	-34.9	0.0	0.0	35.5	54.0	-18.5	H	A	H
7.311	3.0	41.0	35.2	7.3	-34.7	0.0	0.0	48.8	74.0	-25.2	H	P	H
7.311	3.0	27.8	35.2	7.3	-34.7	0.0	0.0	35.6	54.0	-18.4	H	A	H
4.874	3.0	44.3	32.8	5.8	-34.9	0.0	0.0	48.1	74.0	-25.9	V	P	V
4.874	3.0	29.0	32.8	5.8	-34.9	0.0	0.0	32.8	54.0	-21.2	V	A	V
7.311	3.0	40.5	35.2	7.3	-34.7	0.0	0.0	48.3	74.0	-25.7	V	P	V
7.311	3.0	26.4	35.2	7.3	-34.7	0.0	0.0	34.3	54.0	-19.7	V	A	V
High Ch													
4.924	3.0	39.2	32.8	5.9	-36.5	0.0	0.0	41.5	74.0	-32.5	V	P	V
4.924	3.0	27.1	32.8	5.9	-36.5	0.0	0.0	29.4	54.0	-24.6	V	A	V
7.386	3.0	44.4	35.3	7.3	-36.2	0.0	0.0	50.8	74.0	-23.2	V	P	V
7.386	3.0	30.3	35.3	7.3	-36.2	0.0	0.0	36.7	54.0	-17.3	V	A	V
4.924	3.0	42.6	32.8	5.9	-36.5	0.0	0.0	44.9	74.0	-29.1	H	P	H
4.924	3.0	28.8	32.8	5.9	-36.5	0.0	0.0	31.0	54.0	-23.0	H	A	H
7.386	3.0	46.5	35.3	7.3	-36.2	0.0	0.0	52.9	74.0	-21.1	H	P	H
7.386	3.0	31.6	35.3	7.3	-36.2	0.0	0.0	38.0	54.0	-16.0	H	A	H

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

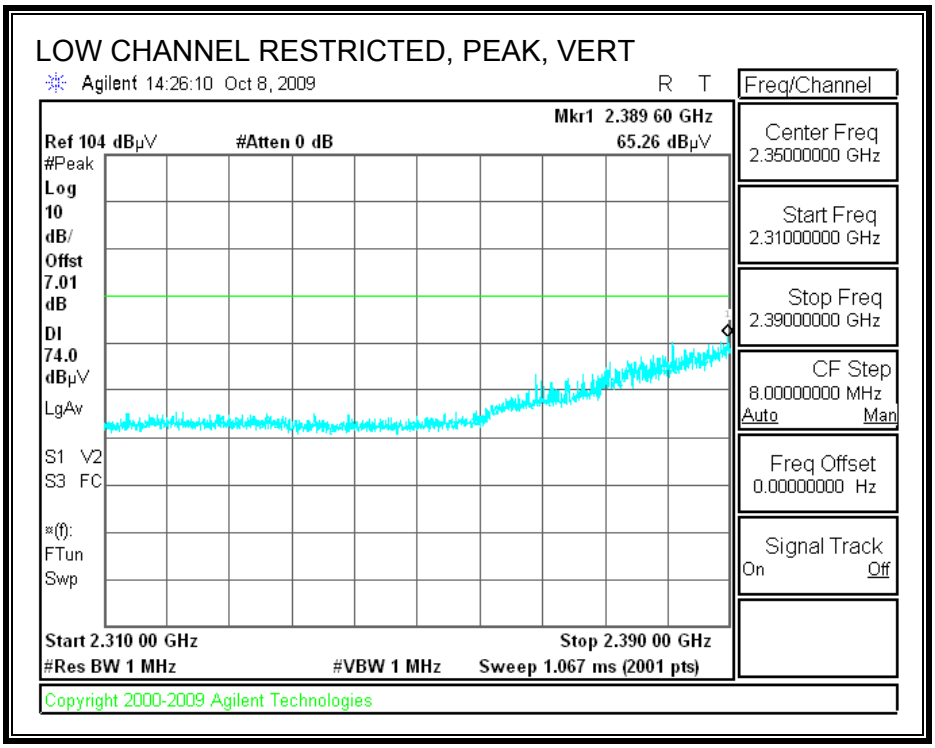
7.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

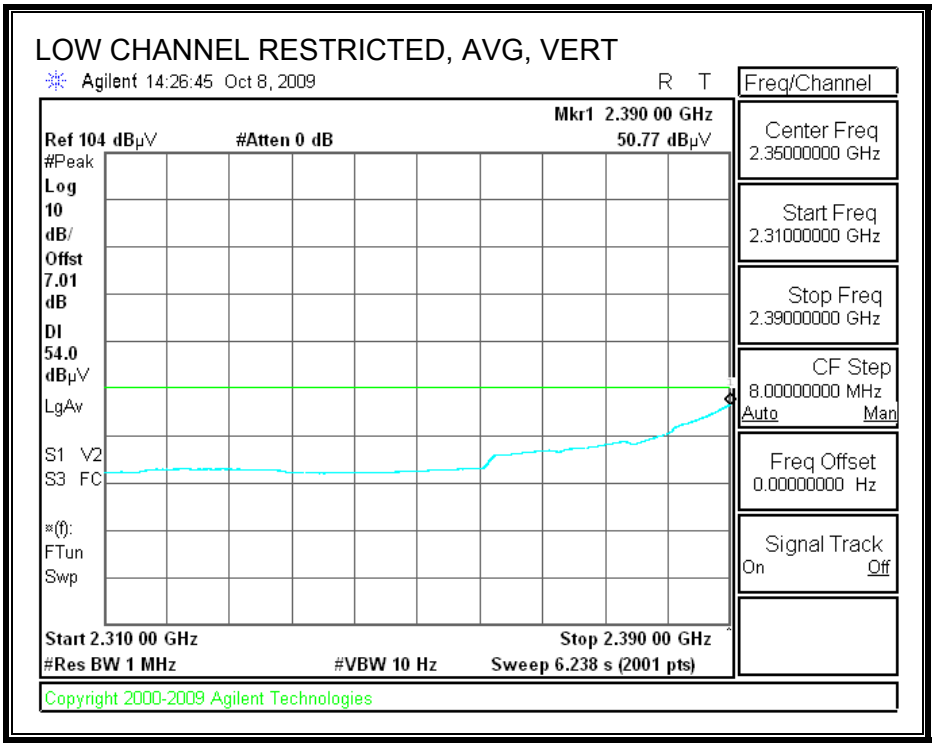
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



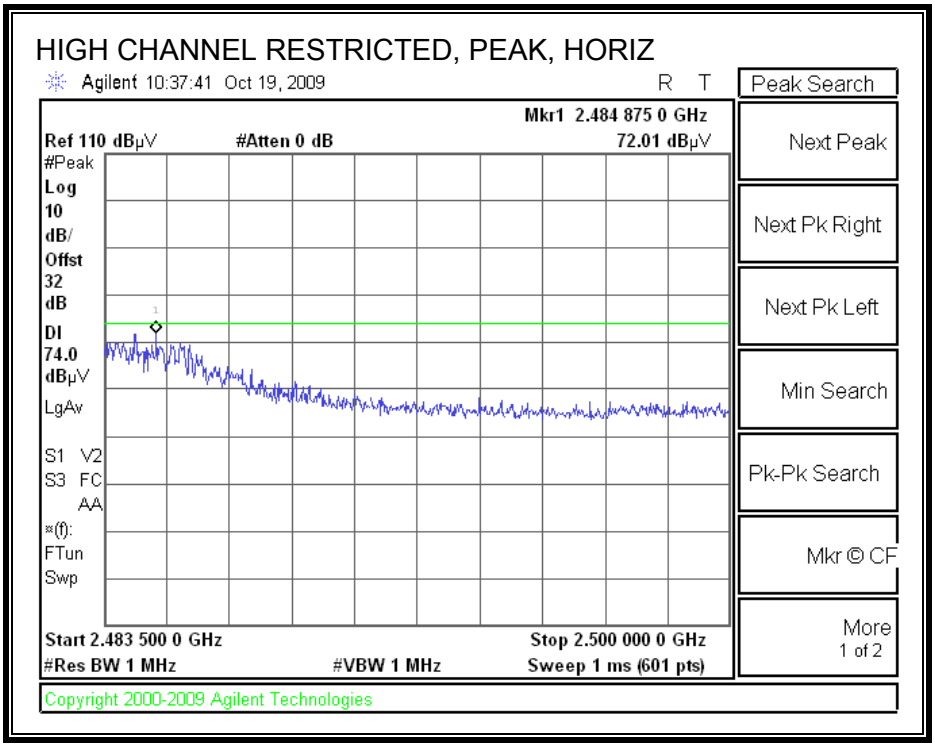


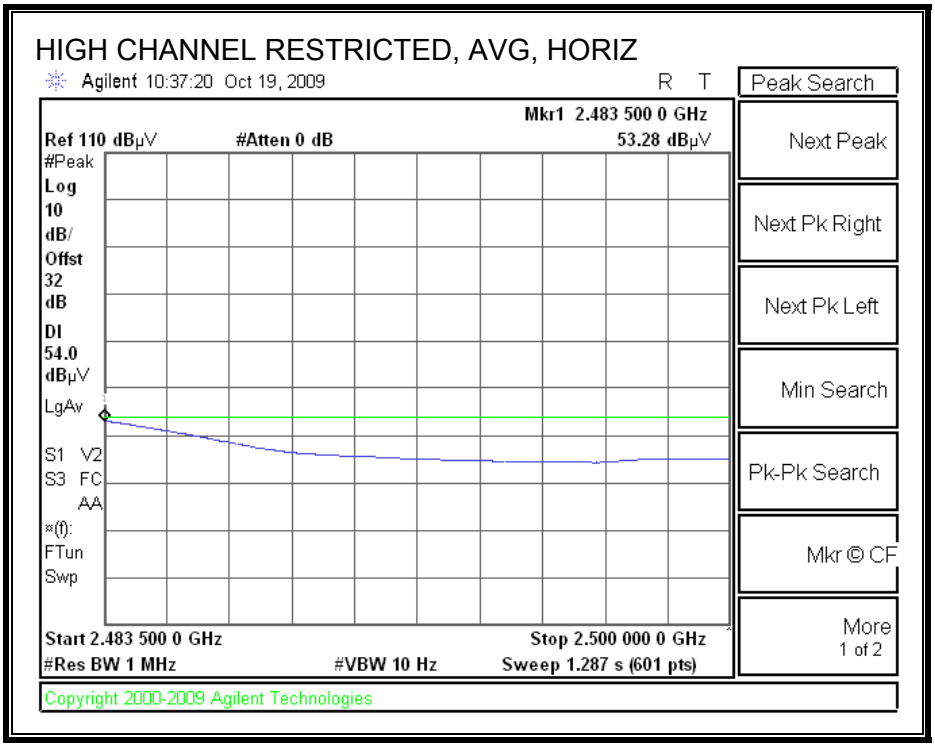
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



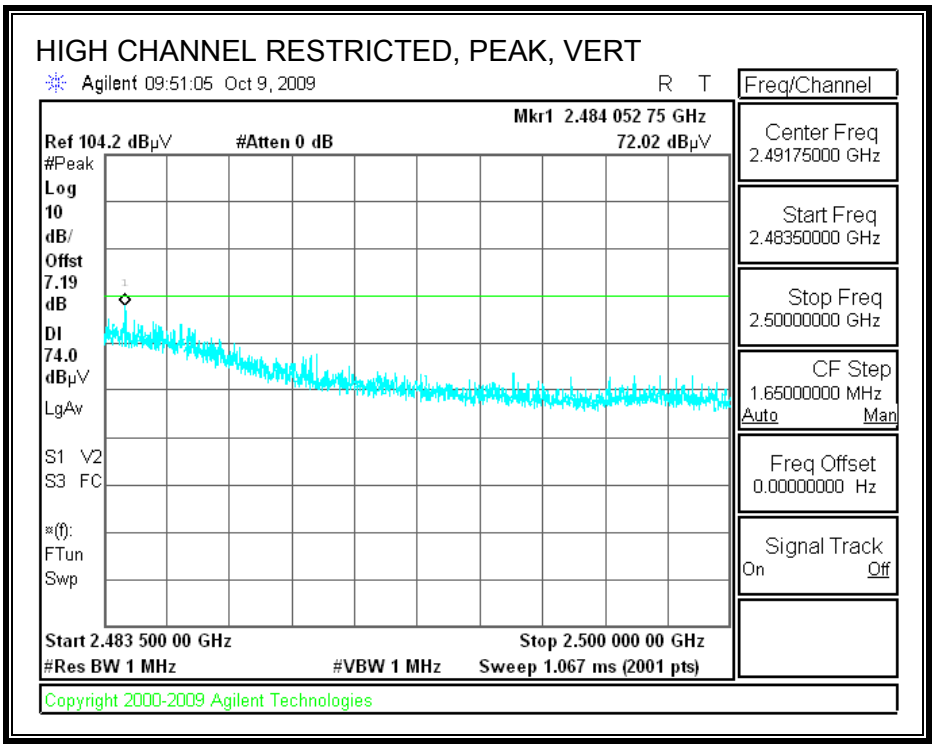


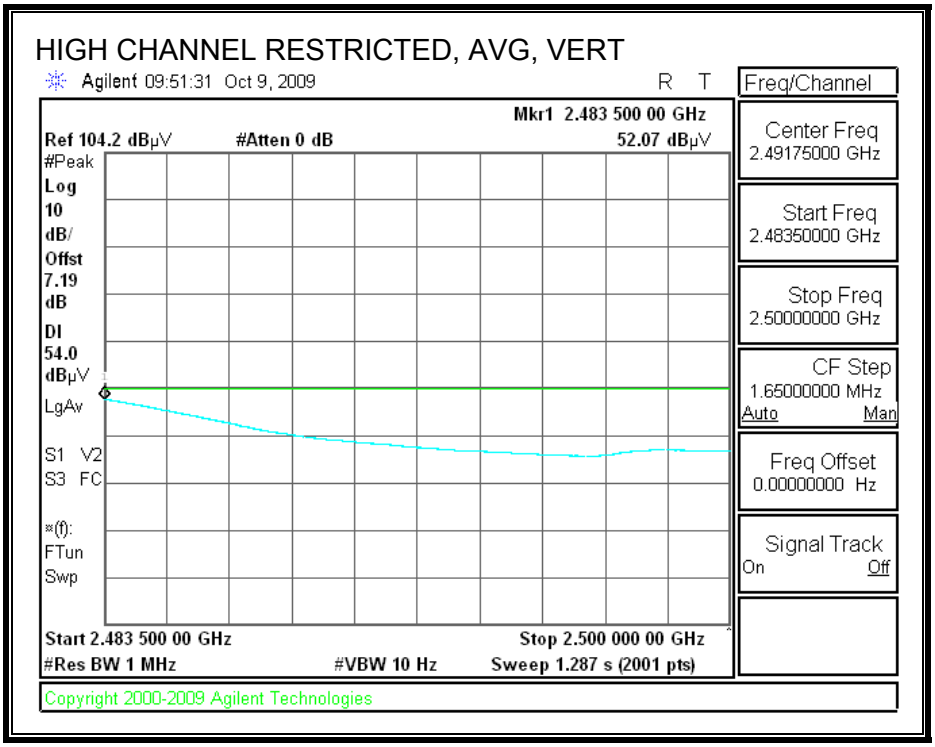
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Can Ming Chung
Date: 10/17/08
Project #: 09U12855
Company: Atheros Communication Inc
EUT Description: Eut inside the laptop
Test Target: FCC 15.247
Mode Oper: TX_Ht 20 mode

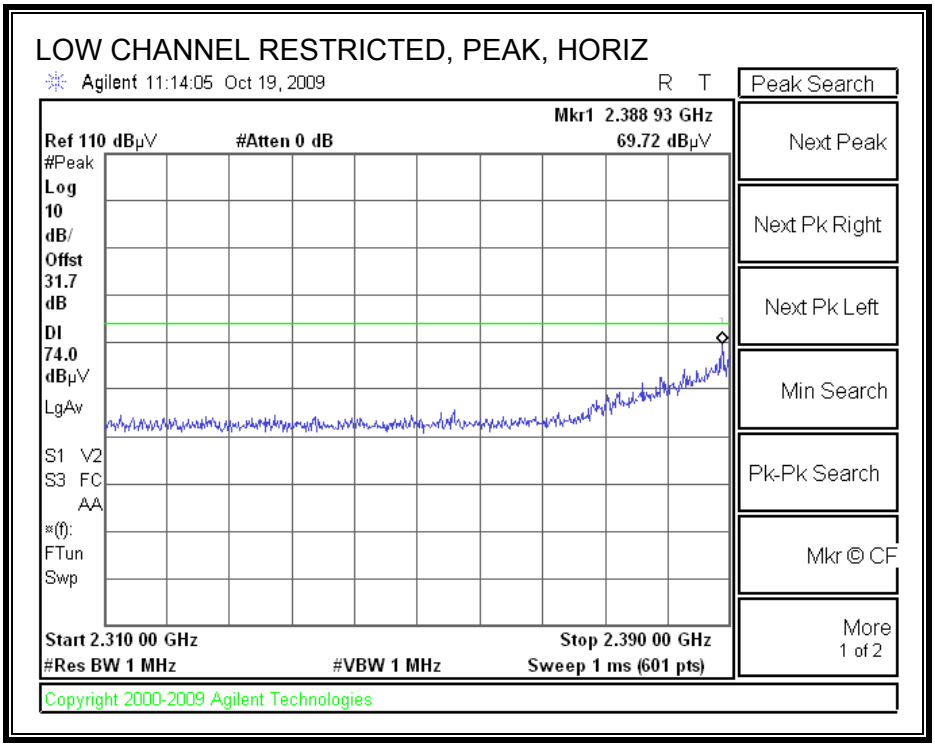
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

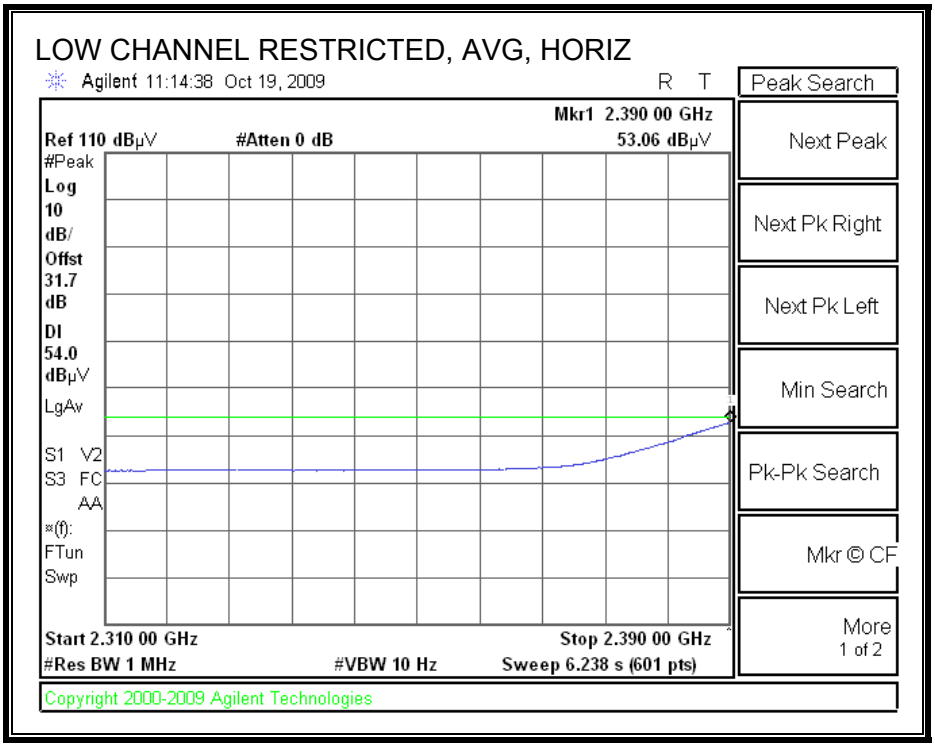
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch													
4.824	3.0	48.1	32.8	5.8	-36.5	0.0	0.0	50.2	74.0	-23.8	H	P	H
4.824	3.0	30.6	32.8	5.8	-36.5	0.0	0.0	32.7	54.0	-21.4	H	A	H
4.824	3.0	42.5	32.8	5.8	-36.5	0.0	0.0	44.6	74.0	-29.4	V	P	V
4.824	3.0	27.4	32.8	5.8	-36.5	0.0	0.0	29.5	54.0	-24.5	V	A	V
Mid Ch													
4.874	3.0	43.3	32.8	5.8	-36.5	0.0	0.0	45.5	74.0	-28.5	V	P	V
4.874	3.0	28.9	32.8	5.8	-36.5	0.0	0.0	31.0	54.0	-23.0	V	A	V
7.311	3.0	41.1	35.2	7.3	-36.2	0.0	0.0	47.3	74.0	-26.7	V	P	V
7.311	3.0	27.7	35.2	7.3	-36.2	0.0	0.0	34.0	54.0	-20.1	V	A	V
4.874	3.0	47.3	32.8	5.8	-36.5	0.0	0.0	49.4	74.0	-24.6	H	P	H
4.874	3.0	32.4	32.8	5.8	-36.5	0.0	0.0	34.6	54.0	-19.4	H	A	H
7.311	3.0	42.5	35.2	7.3	-36.2	0.0	0.0	48.7	74.0	-25.3	H	P	H
7.311	3.0	29.0	35.2	7.3	-36.2	0.0	0.0	35.2	54.0	-18.8	H	A	H
High Ch													
4.924	3.0	39.4	32.8	5.9	-36.5	0.0	0.0	41.7	74.0	-32.3	V	P	V
4.924	3.0	26.4	32.8	5.9	-36.5	0.0	0.0	28.6	54.0	-25.4	V	A	V
7.386	3.0	46.0	35.3	7.3	-36.2	0.0	0.0	52.4	74.0	-21.6	V	P	V
7.386	3.0	31.1	35.3	7.3	-36.2	0.0	0.0	37.5	54.0	-16.5	V	A	V
4.924	3.0	41.5	32.8	5.9	-36.5	0.0	0.0	43.7	74.0	-30.3	H	P	H
4.924	3.0	28.7	32.8	5.9	-36.5	0.0	0.0	31.0	54.0	-23.0	H	A	H
7.386	3.0	42.9	35.3	7.3	-36.2	0.0	0.0	49.3	74.0	-24.7	H	P	H
7.386	3.0	29.5	35.3	7.3	-36.2	0.0	0.0	35.9	54.0	-18.1	H	A	H

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

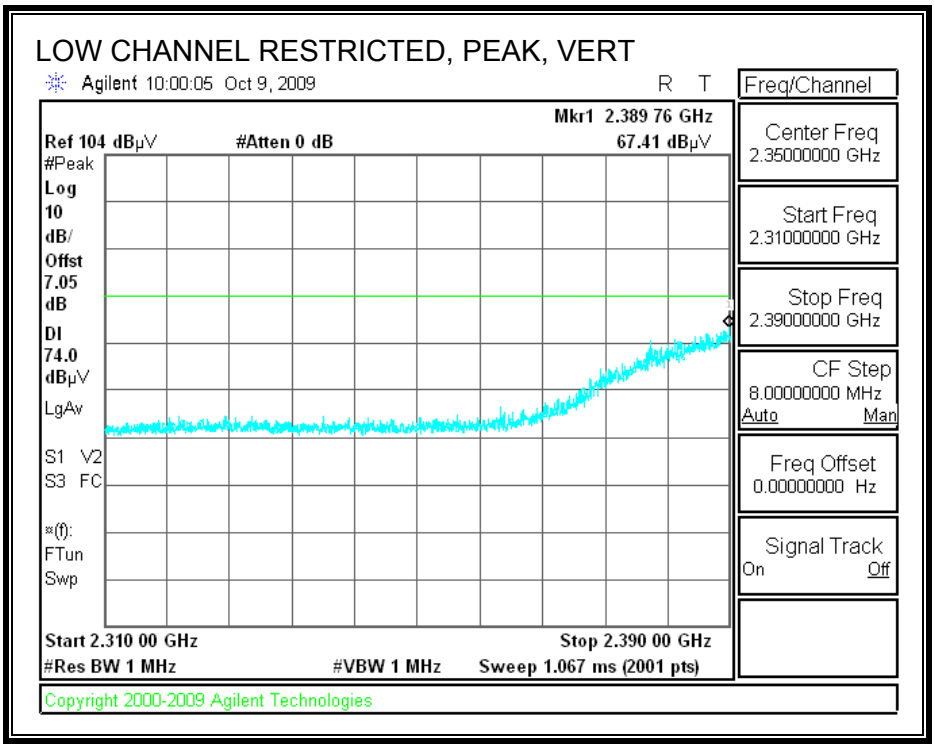
7.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

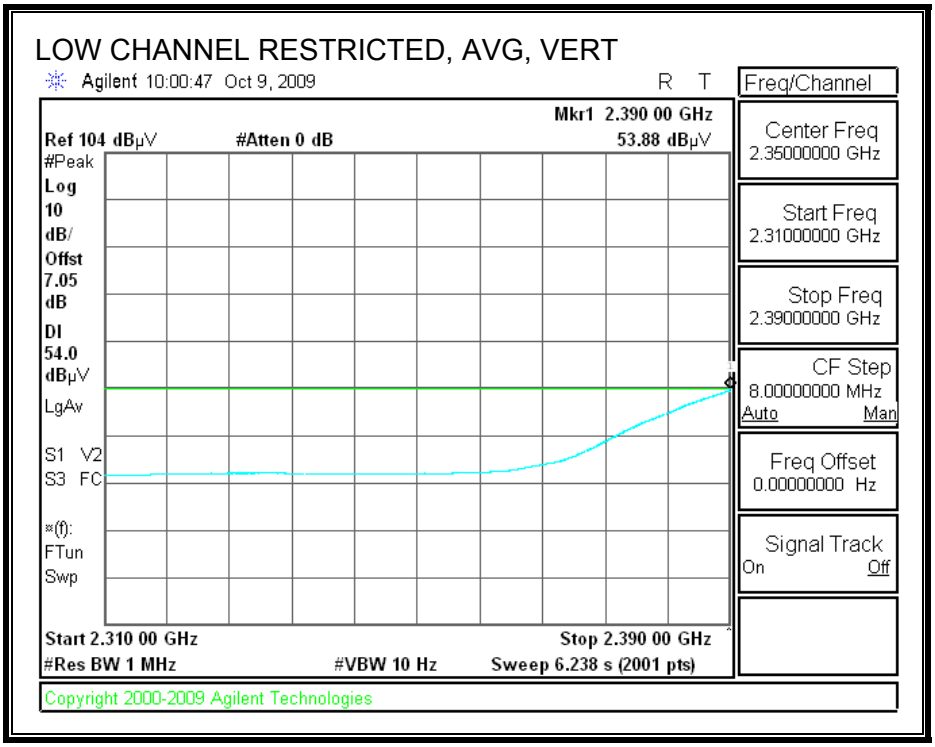
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



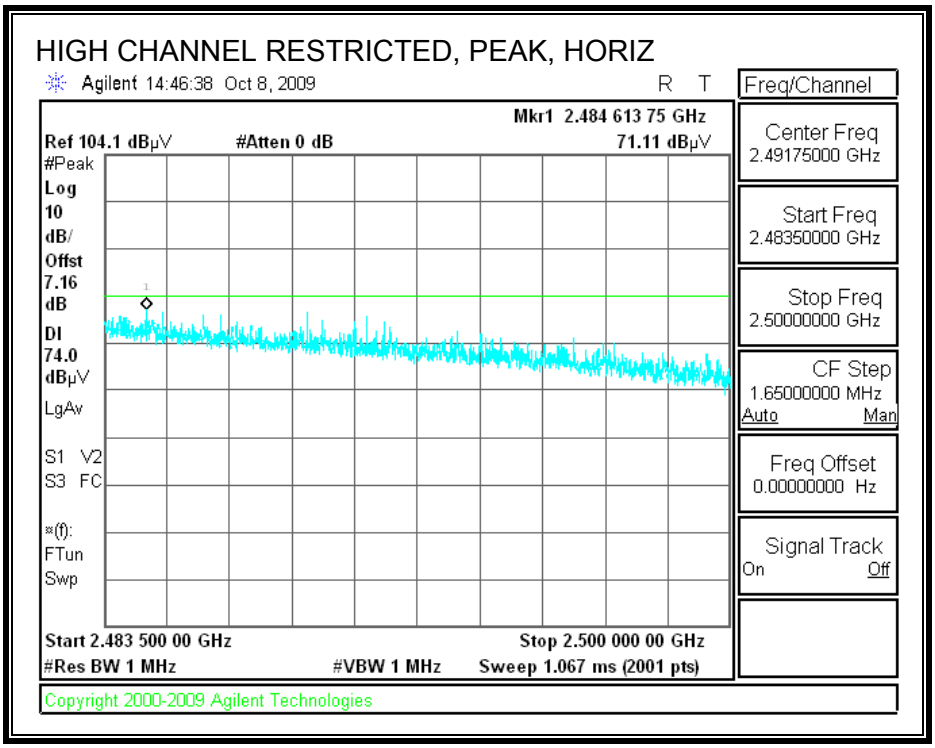


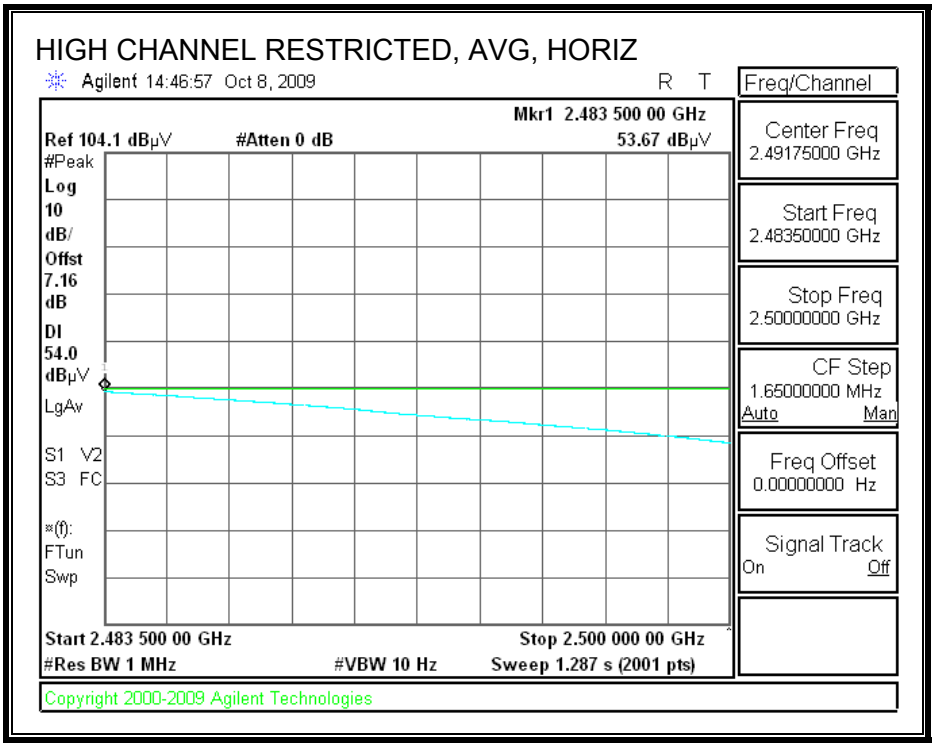
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



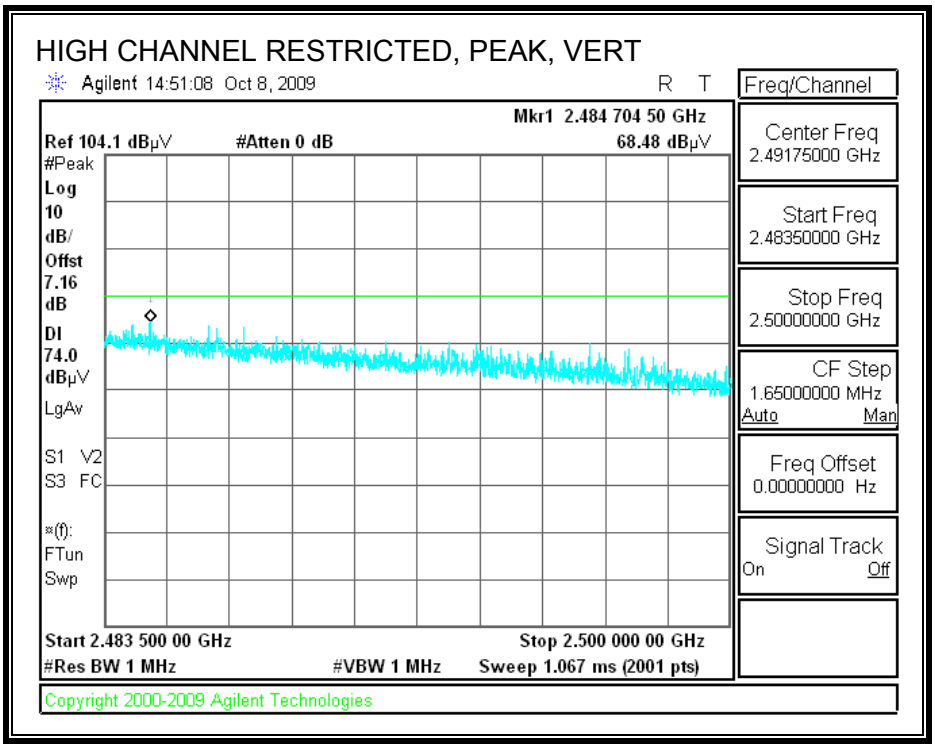


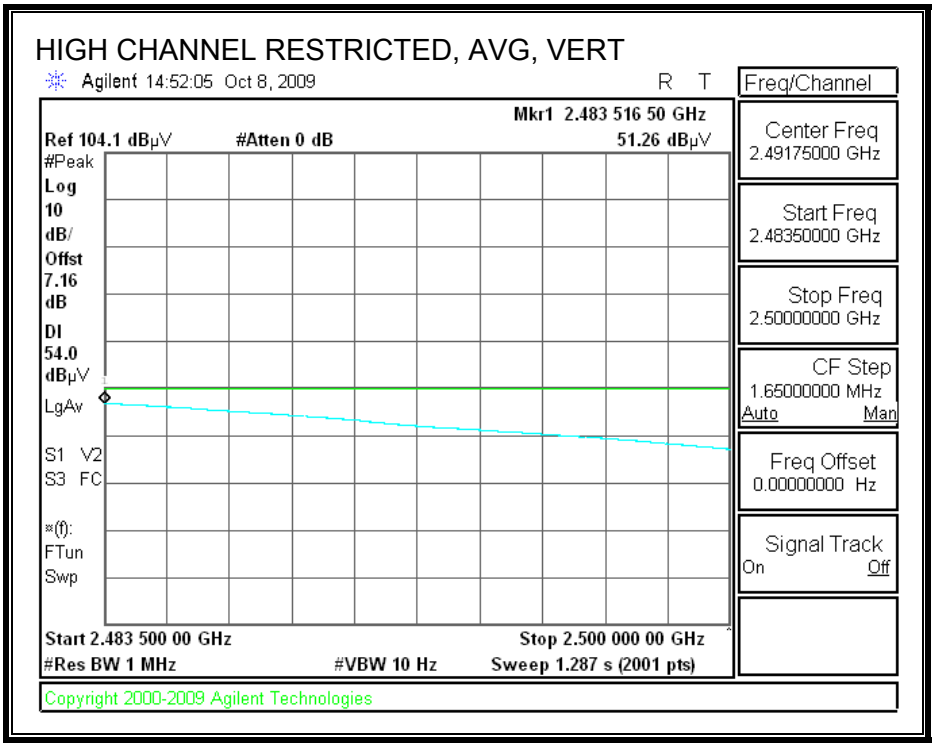
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Can Ming Chung
Project #: 09U12855
Date: 10/13/2009
Test Engineer: Can Ming Chung
Configuration: Eut inside of Laptop
Mode: Tx_Ht40 Mode with WNC Antenna

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

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)
Low Ch															
4.844	3.0	40.1	28.3	32.8	5.8	-36.5	0.0	0.0	42.2	30.4	74	54	-31.8	-23.6	H
7.266	3.0	39.3	27.2	35.1	7.2	-36.2	0.0	0.0	45.4	33.3	74	54	-28.6	-20.7	H
4.844	3.0	41.0	28.3	32.8	5.8	-36.5	0.0	0.0	43.1	30.5	74	54	-30.9	-23.5	V
7.266	3.0	39.7	27.3	35.1	7.2	-36.2	0.0	0.0	45.8	33.4	74	54	-28.2	-20.6	V
Mid Ch															
4.874	3.0	40.3	27.2	32.8	5.8	-36.5	0.0	0.0	42.5	29.4	74	54	-31.5	-24.6	H
7.311	3.0	39.2	26.3	35.2	7.3	-36.2	0.0	0.0	45.4	32.6	74	54	-28.6	-21.4	H
4.874	3.0	39.2	26.2	32.8	5.8	-36.5	0.0	0.0	41.4	28.4	74	54	-32.6	-25.6	V
7.311	3.0	39.5	27.4	35.2	7.3	-36.2	0.0	0.0	45.7	33.6	74	54	-28.3	-20.4	V
High Ch															
4.904	3.0	39.5	28.3	32.8	5.9	-36.5	0.0	0.0	41.7	30.5	74	54	-32.3	-23.5	H
7.356	3.0	38.7	27.2	35.3	7.3	-36.2	0.0	0.0	45.0	33.5	74	54	-29.0	-20.5	H
4.904	3.0	39.5	27.3	32.8	5.9	-36.5	0.0	0.0	41.7	29.6	74	54	-32.3	-24.4	V
7.356	3.0	38.5	27.2	35.3	7.3	-36.2	0.0	0.0	44.8	33.5	74	54	-29.2	-20.5	V

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		

YAGEO ANTENNA:

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

HARMONICS AND SPURIOUS EMISSIONS (WORST CASE)

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Can Ming Chung
Project #: 09U12855
Date: 10/13/2009
Test Engineer: Can Ming Chung
Configuration: Eut inside of Laptop
Mode: Tx_B_Mode_spot check

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A005(			FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

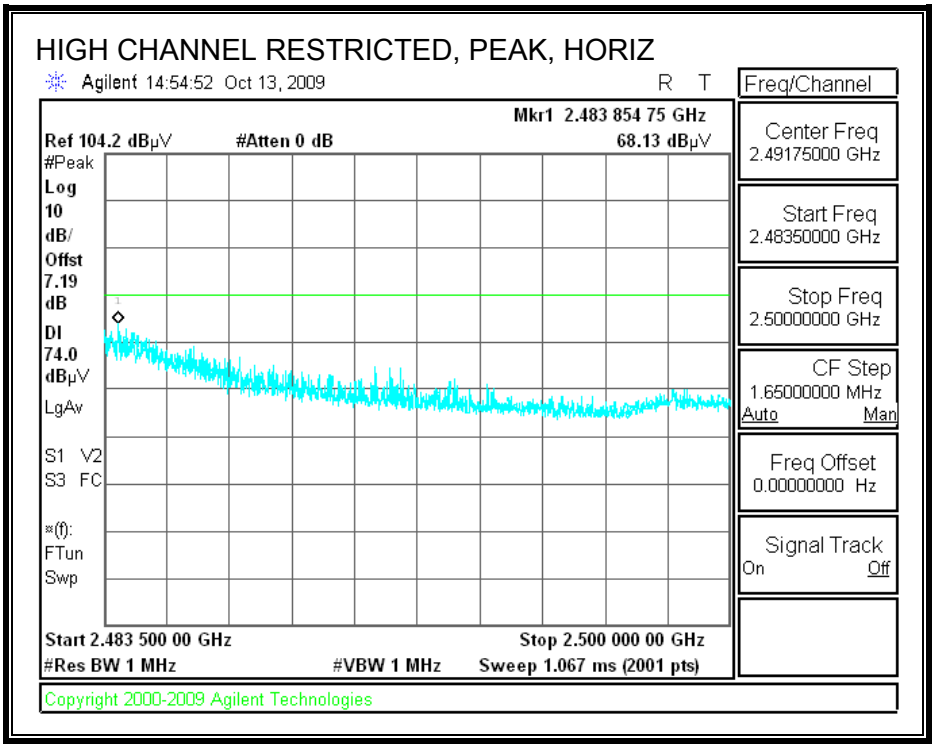
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Mid Ch															
4.870	3.0	43.4	41.3	32.8	5.8	-34.9	0.0	0.0	47.2	45.1	74	54	-26.8	-8.9	H
7.311	3.0	39.2	28.1	35.2	7.3	-34.7	0.0	0.0	47.0	35.9	74	54	-27.0	-18.1	H
9.740	3.0	41.5	37.7	37.2	8.6	-35.0	0.0	0.0	52.2	48.4	74	54	-21.8	-5.6	H
12.180	3.0	36.1	25.0	38.6	9.8	-32.4	0.0	0.0	52.0	41.0	74	54	-22.0	-13.0	H
4.870	3.0	43.5	39.6	32.8	5.8	-34.9	0.0	0.0	47.3	43.4	74	54	-26.7	-10.6	V
7.311	3.0	38.3	28.2	35.2	7.3	-34.7	0.0	0.0	46.1	36.0	74	54	-27.9	-18.0	V
9.748	3.0	42.0	38.1	37.2	8.6	-35.0	0.0	0.0	52.7	48.8	74	54	-21.3	-5.2	V
12.184	3.0	34.9	24.9	38.6	9.8	-32.4	0.0	0.0	50.9	40.9	74	54	-23.1	-13.1	V

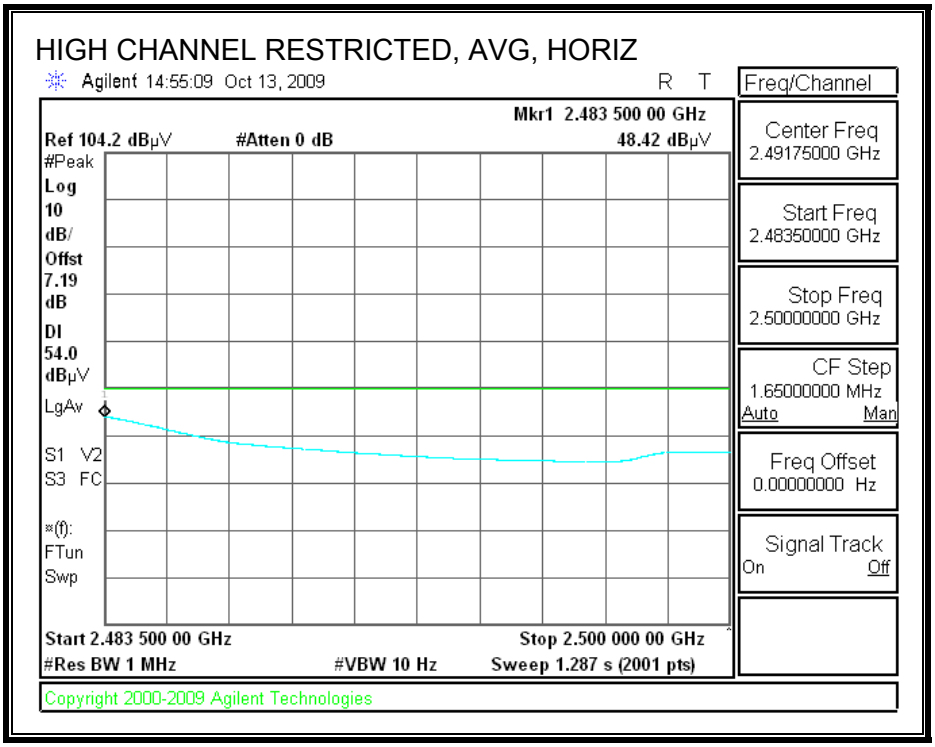
Rev. 11.10.08

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		

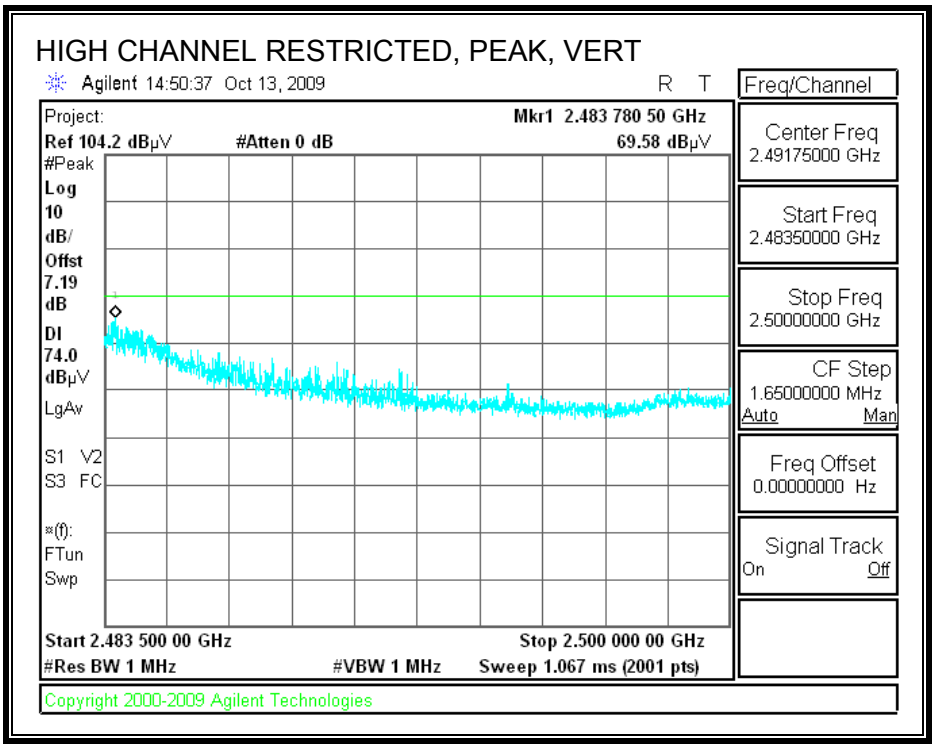
7.2.6. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

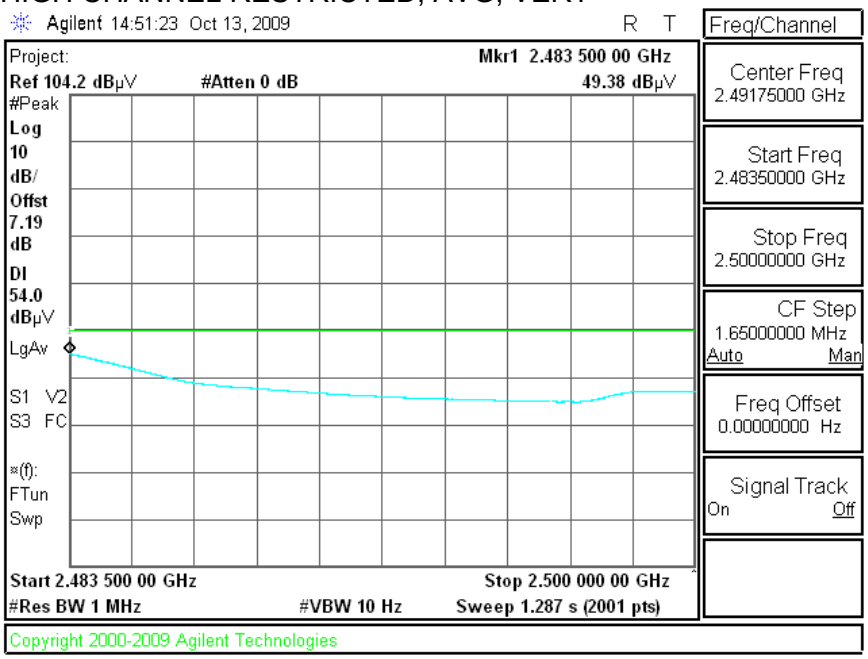




RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

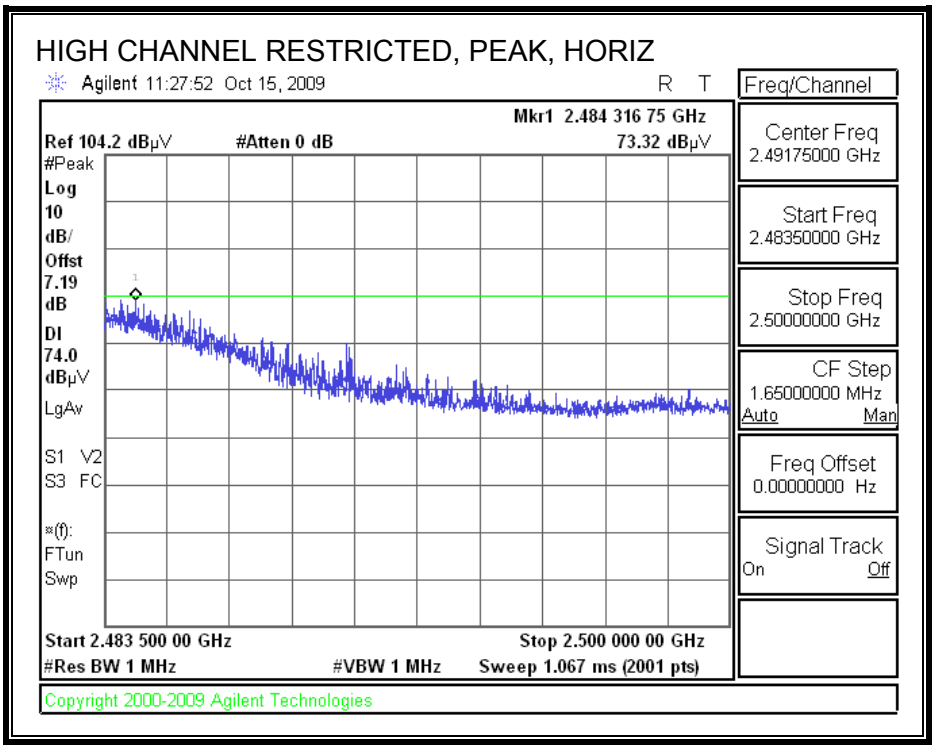


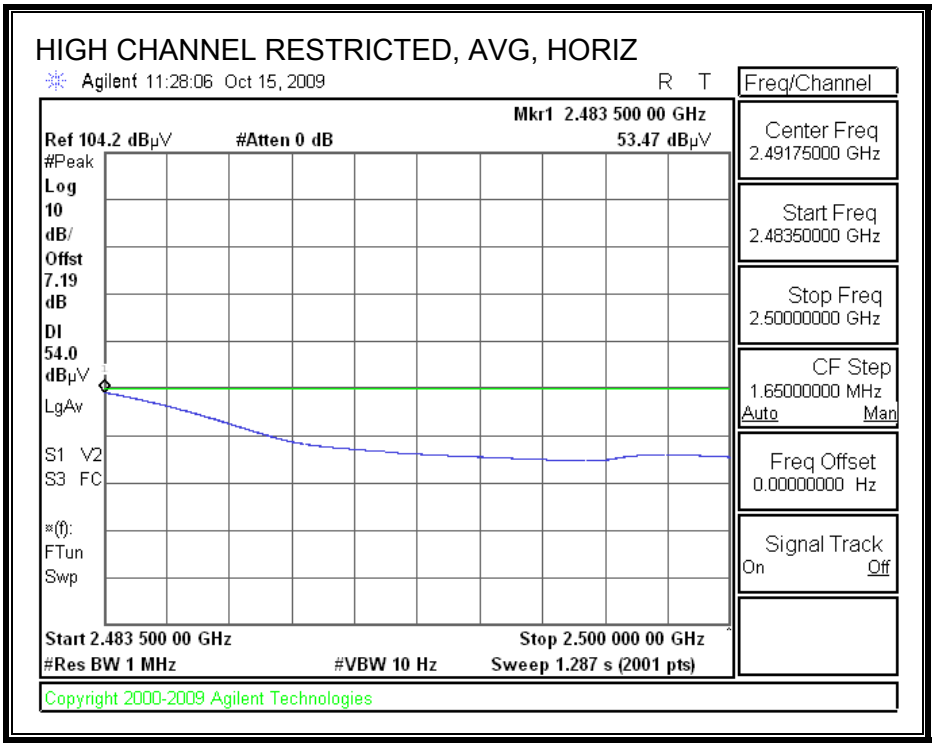
HIGH CHANNEL RESTRICTED, AVG, VERT



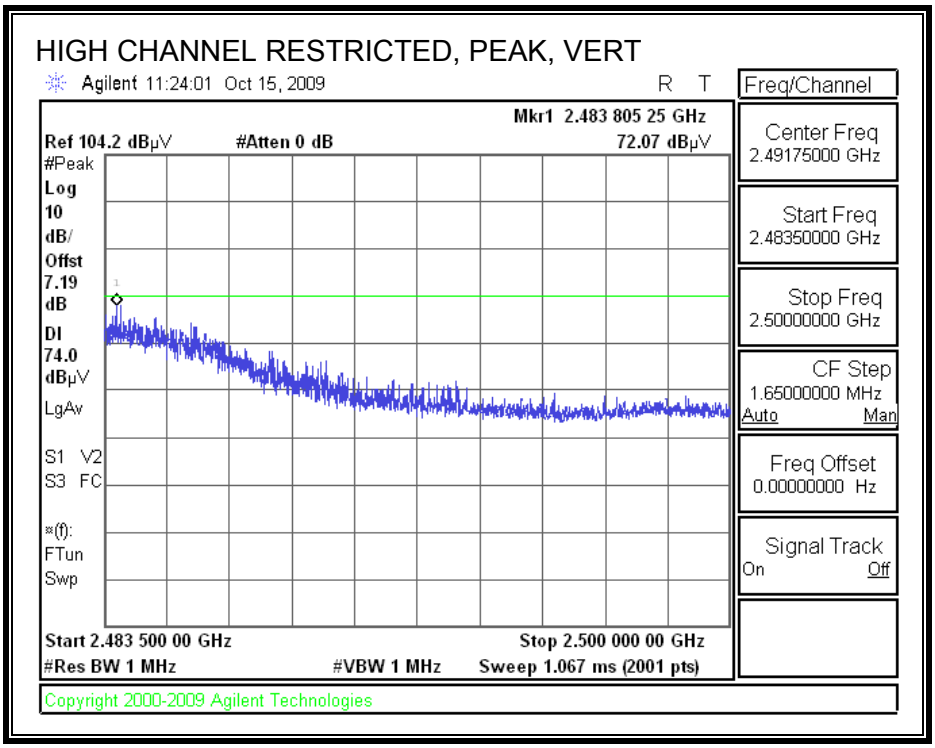
7.2.7. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

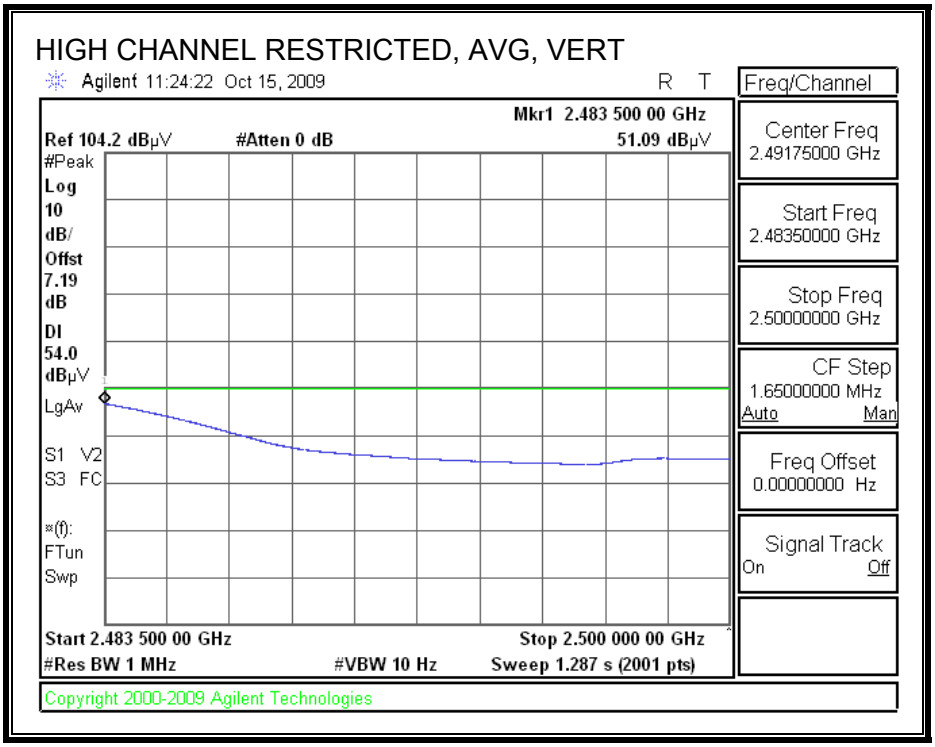
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





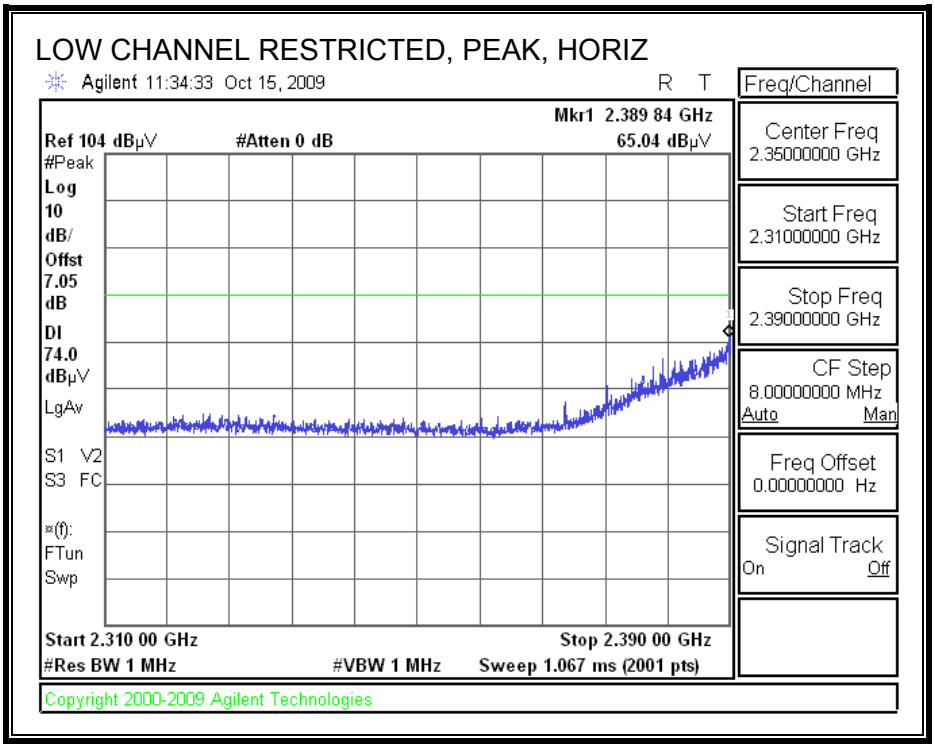
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

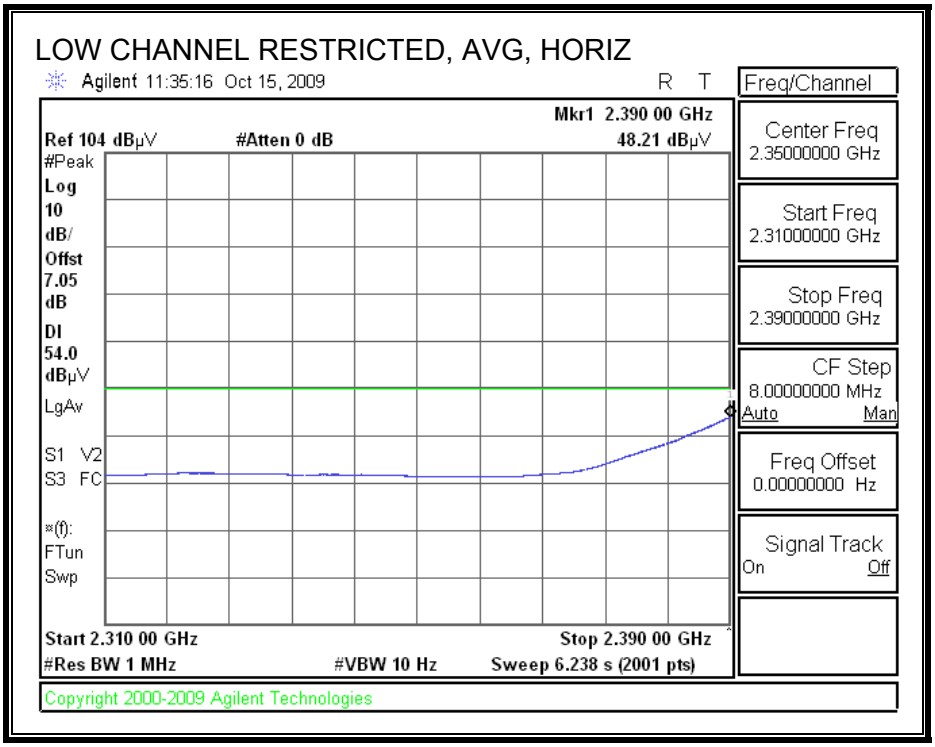




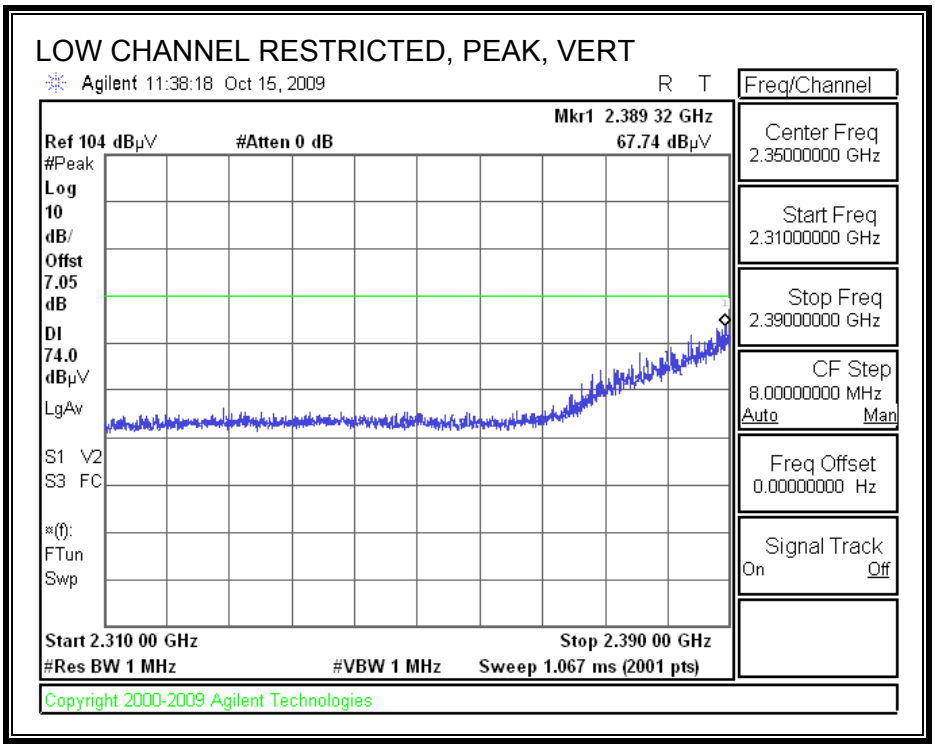
7.2.8. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

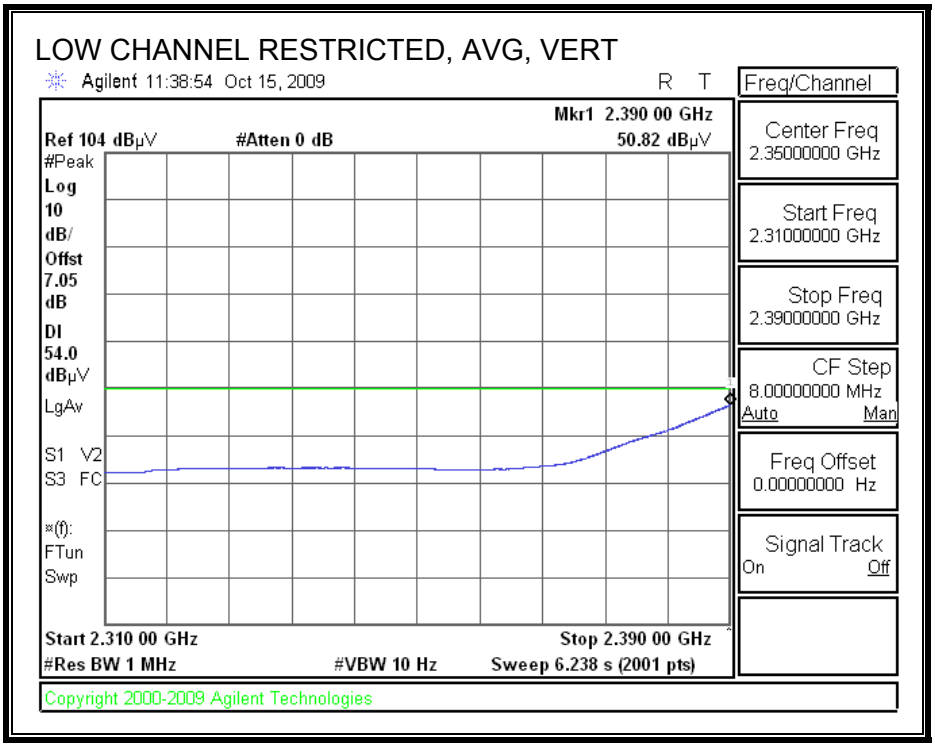
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





7.3. RECEIVER ABOVE 1 GHz

WINSTRON ANTENNA

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Can Ming Chung
Project #: 09U12855
Date: 10/13/2009
Test Engineer: Can Ming Chung
Configuration: Eut inside of Laptop
Mode: Rx_Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			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)
Mid Ch															
1.580	3.0	55.3	35.0	26.4	3.0	-37.5	0.0	0.0	47.2	27.0	74	54	-26.8	-27.0	H
2.000	3.0	47.4	32.2	27.8	3.5	-36.9	0.0	0.0	41.7	26.6	74	54	-32.3	-27.4	H
7.580	3.0	39.3	27.5	35.8	7.4	-34.0	0.0	0.0	48.4	36.7	74	54	-25.6	-17.3	H
1.590	3.0	58.0	36.5	26.4	3.0	-37.4	0.0	0.0	50.0	28.5	74	54	-24.0	-25.5	V
2.394	3.0	50.2	33.8	28.0	3.8	-36.3	0.0	0.0	45.8	29.4	74	54	-28.2	-24.6	V
7.523	3.0	38.4	26.5	35.7	7.4	-34.0	0.0	0.0	47.5	35.6	74	54	-26.5	-18.4	V

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		

YAGEO ANTENNA

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Can Ming Chung
Project #: 09U12855
Date: 10/13/2009
Test Engineer: Can Ming Chung
Configuration: Eut inside of Laptop
Mode: Rx_Mode_Yageo Antenna

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			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)
Mid Ch															
1.594	3.0	55.8	36.6	26.4	3.0	-37.4	0.0	0.0	47.9	28.6	74	54	-26.1	-25.4	H
1.990	3.0	45.9	30.8	27.8	3.4	-36.9	0.0	0.0	40.2	25.1	74	54	-33.8	-28.9	H
2.391	3.0	49.6	31.4	28.0	3.8	-36.3	0.0	0.0	45.1	26.9	74	54	-28.9	-27.1	H
1.596	3.0	59.5	37.3	26.5	3.0	-37.4	0.0	0.0	51.6	29.3	74	54	-22.4	-24.7	V
1.991	3.0	50.5	31.9	27.8	3.4	-36.9	0.0	0.0	44.8	26.2	74	54	-29.2	-27.8	V
2.385	3.0	50.2	31.3	28.0	3.8	-36.3	0.0	0.0	45.8	26.8	74	54	-28.2	-27.2	V

Rev. 11.10.08

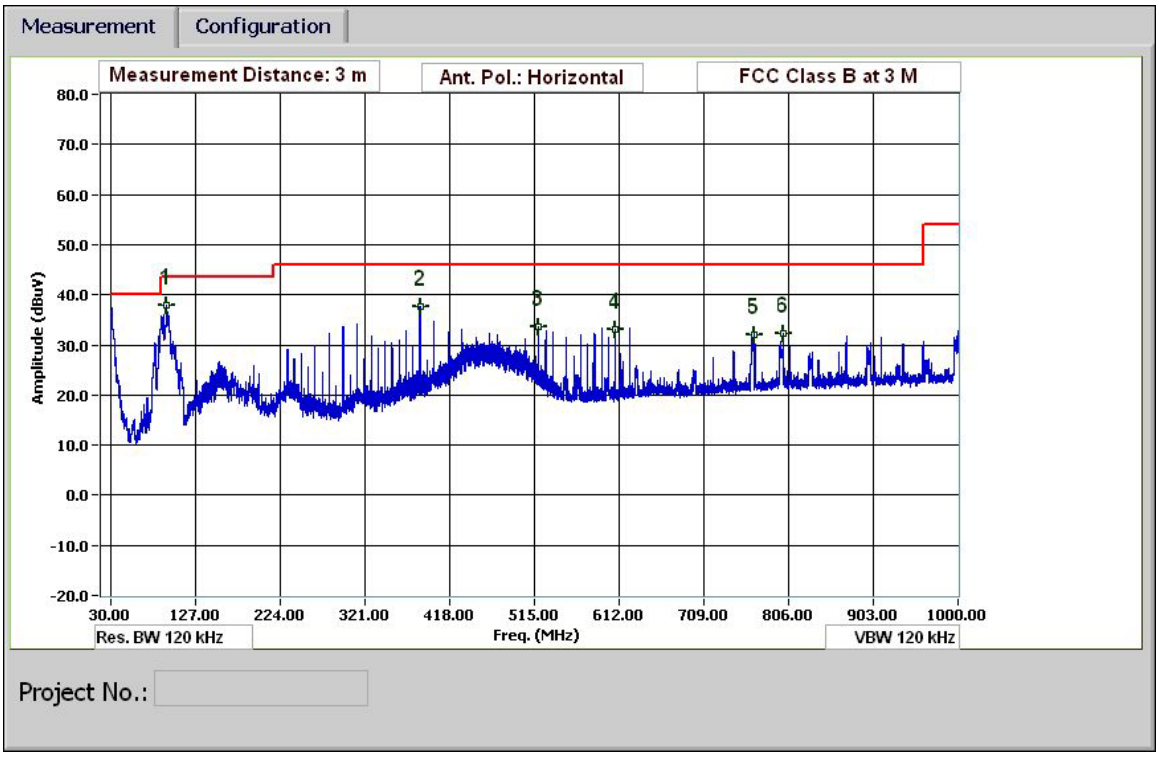
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

7.4. WORST-CASE BELOW 1 GHz

WINSTRON ANTENNA

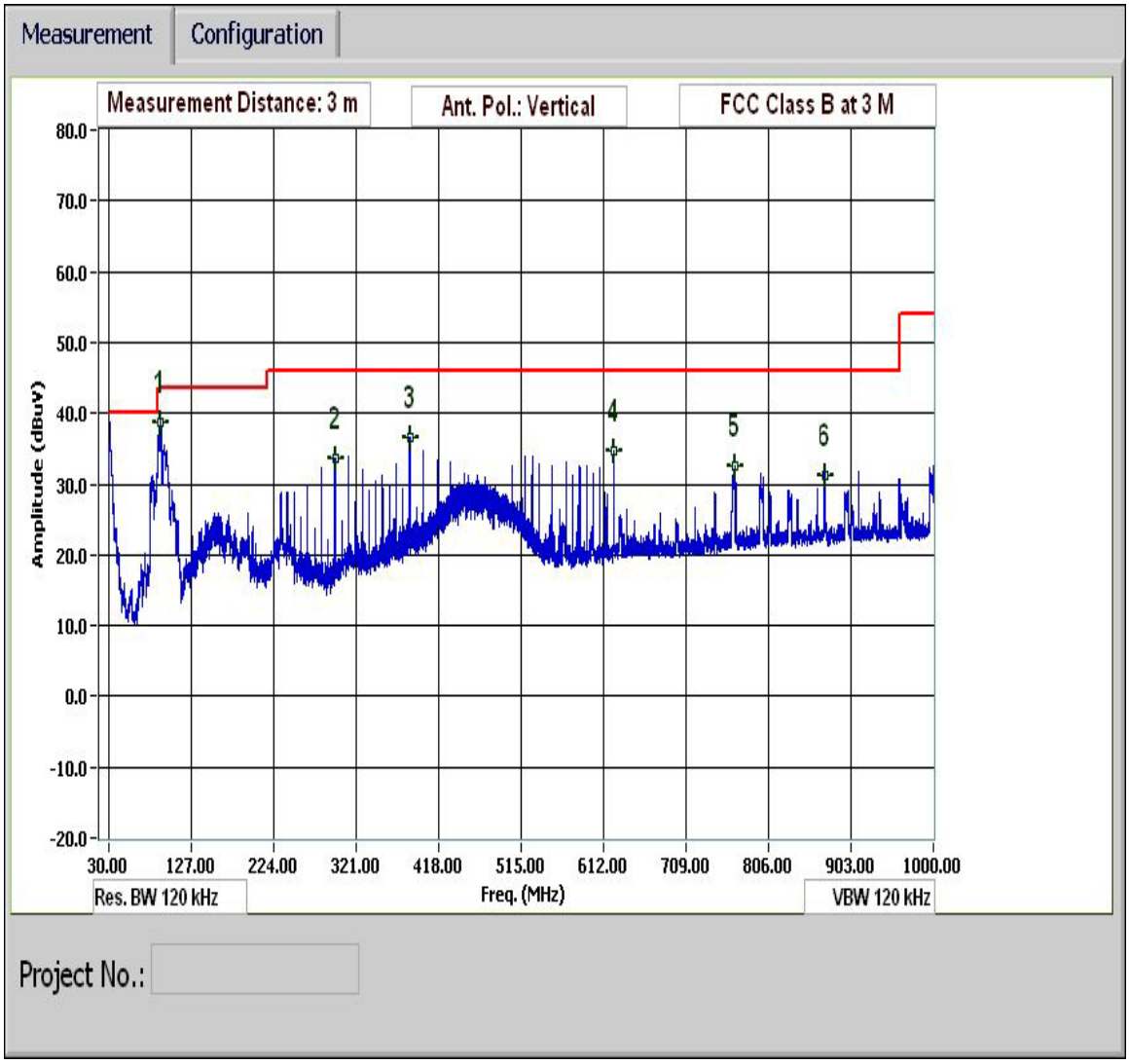
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



VERTICAL & HORIZONTAL DATA

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

Test Engr: Can Ming Chung
Date: 10/17/08
Project #: 09U12855
Company: Atheros Communication Inc
EUT Description: Eut inside the laptop
Test Target: FCC 15.247
Mode Oper: TX_Worst Case

f	Measurement Frequency	Amp	Preamp Gain
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

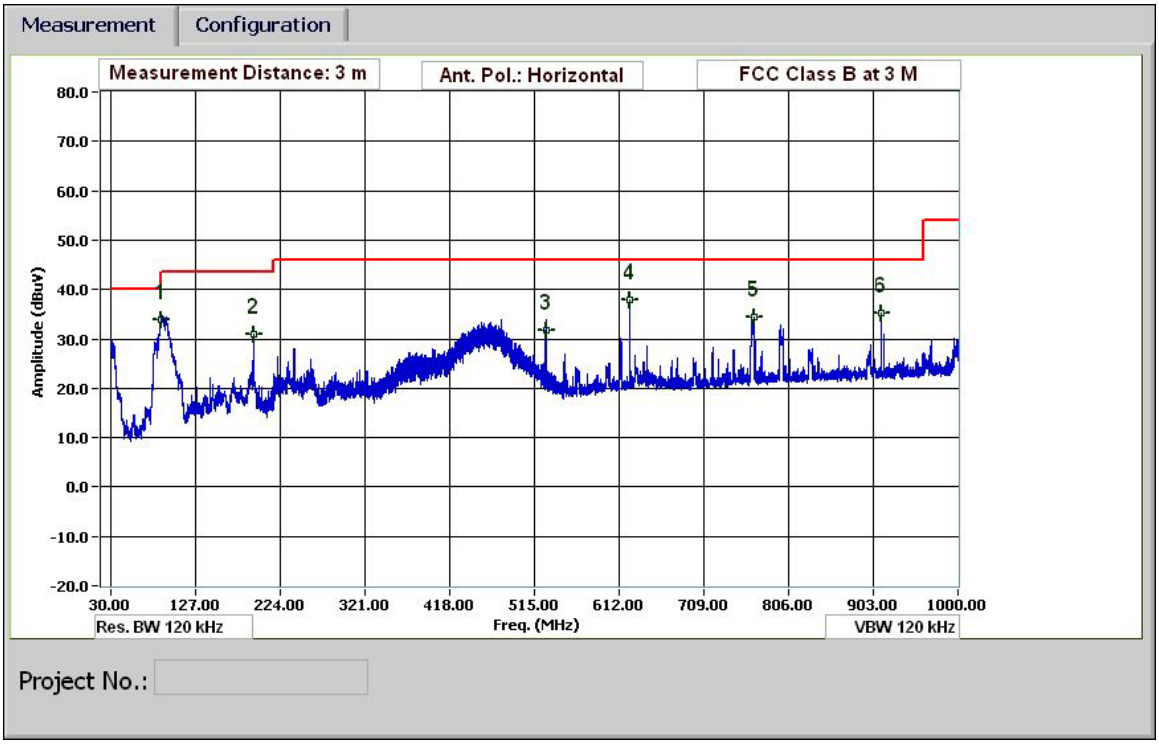
Margin — Margin vs. Limit

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
90.963	3.0	58.5	7.8	0.8	28.3	0.0	0.0	38.8	43.5	-4.7	V	P	
296.051	3.0	46.9	13.3	1.5	28.1	0.0	0.0	33.5	46.0	-12.5	V	P	
384.015	3.0	48.2	14.7	1.8	28.1	0.0	0.0	36.5	46.0	-9.5	V	P	
624.024	3.0	41.0	18.7	2.3	27.4	0.0	0.0	34.6	46.0	-11.4	V	P	
766.590	3.0	36.9	20.5	2.6	27.4	0.0	0.0	32.6	46.0	-13.4	V	P	
872.675	3.0	34.5	21.6	2.8	27.7	0.0	0.0	31.2	46.0	-14.8	V	P	
93.843	3.0	56.8	8.5	0.9	28.3	0.0	0.0	37.8	43.5	-5.7	H	P	
384.015	3.0	49.2	14.7	1.8	28.1	0.0	0.0	37.6	46.0	-8.4	H	P	
519.980	3.0	42.3	17.1	2.1	27.8	0.0	0.0	33.7	46.0	-12.3	H	P	
608.064	3.0	39.7	18.5	2.3	27.5	0.0	0.0	33.0	46.0	-13.0	H	P	
766.590	3.0	36.4	20.5	2.6	27.4	0.0	0.0	32.1	46.0	-13.9	H	P	
799.952	3.0	36.2	21.0	2.6	27.4	0.0	0.0	32.3	46.0	-13.7	H	P	

YAGEO ANTENNA

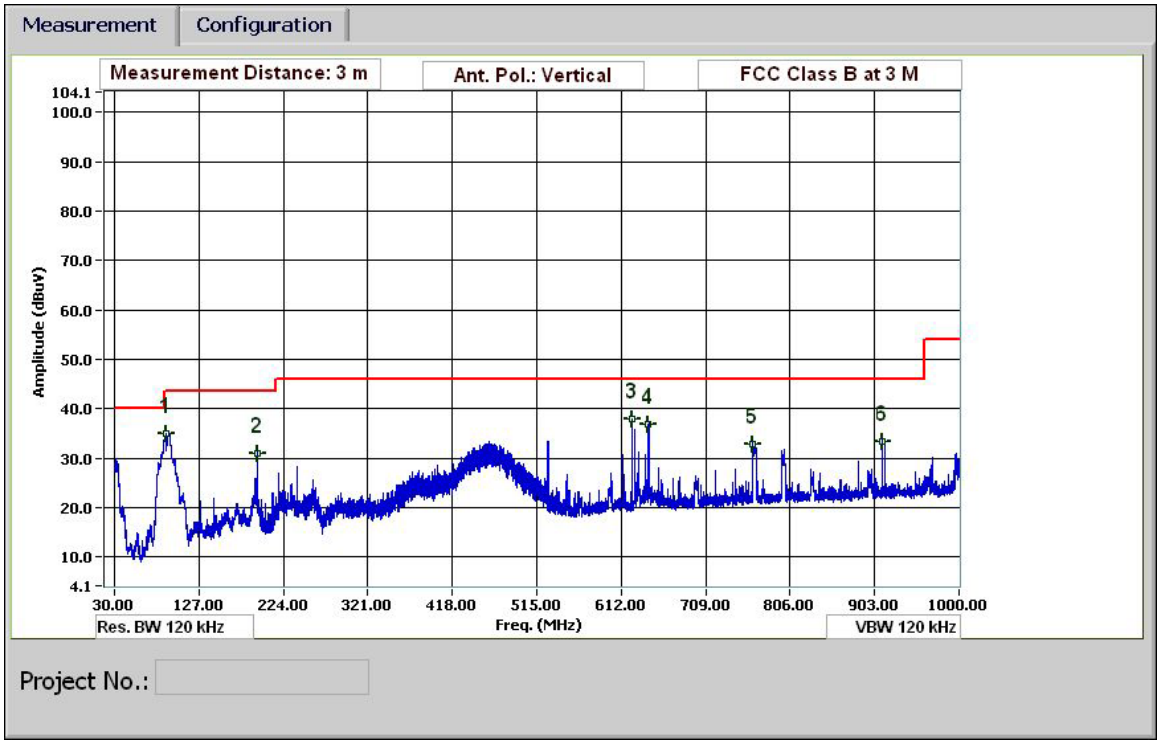
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



VERTICAL & HORIZONTAL DATA

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

Test Engr: Can Ming Chung
Date: 10/17/08
Project #: 09U12855
Company: Atheros Communication Inc
EUT Description: Eut inside the laptop
Test Target: FCC 15.247
Mode Oper: TX_Worst Case_Yageo Antenna

f	Measurement Frequency	Amp	Preamp Gain
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

Margin Margin vs. 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
87.602	3.0	53.9	7.5	0.8	28.3	0.0	0.0	33.8	40.0	-6.2	H	P	
193.807	3.0	46.3	11.6	1.2	28.2	0.0	0.0	30.9	43.5	-12.6	H	P	
527.901	3.0	40.3	17.2	2.1	27.7	0.0	0.0	31.8	46.0	-14.2	H	P	
624.024	3.0	44.4	18.7	2.3	27.4	0.0	0.0	38.0	46.0	-8.0	H	P	
766.470	3.0	38.7	20.5	2.6	27.4	0.0	0.0	34.4	46.0	-11.6	H	P	
912.036	3.0	38.1	21.9	2.8	27.8	0.0	0.0	35.1	46.0	-10.9	H	P	
88.682	3.0	54.8	7.5	0.8	28.3	0.0	0.0	34.8	43.5	-8.7	V	P	
193.807	3.0	46.4	11.6	1.2	28.2	0.0	0.0	31.0	43.5	-12.5	V	P	
624.024	3.0	44.4	18.7	2.3	27.4	0.0	0.0	37.9	46.0	-8.1	V	P	
642.745	3.0	43.0	18.9	2.3	27.4	0.0	0.0	36.9	46.0	-9.1	V	P	
763.110	3.0	37.2	20.5	2.6	27.4	0.0	0.0	32.9	46.0	-13.1	V	P	
911.916	3.0	36.5	21.9	2.8	27.8	0.0	0.0	33.5	46.0	-12.5	V	P	

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

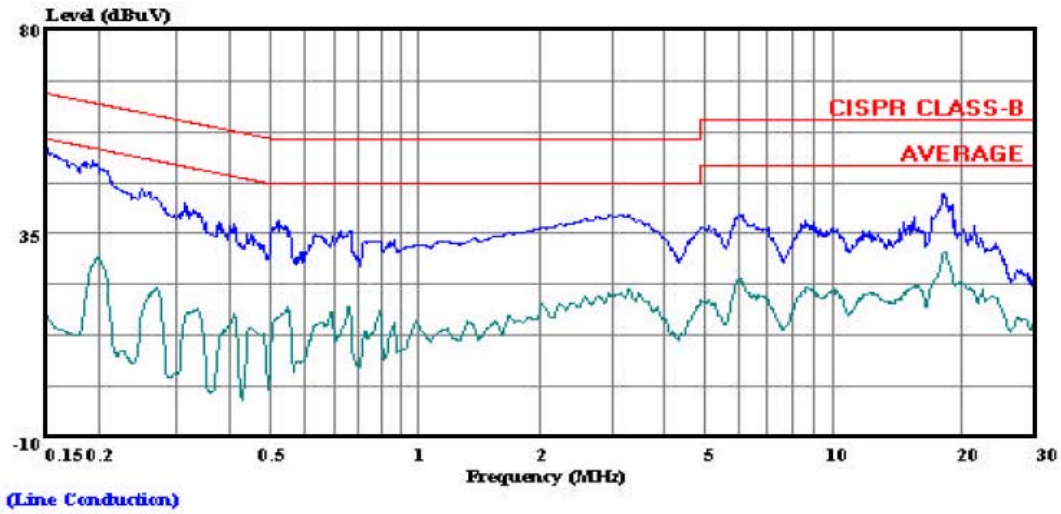
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_A	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.19	51.12	--	29.84	0.00	63.95	53.95	-12.83	-24.11	L1
3.22	39.09	--	22.37	0.00	56.00	46.00	-16.91	-23.63	L1
18.33	43.18	--	30.68	0.00	60.00	50.00	-16.82	-19.32	L1
0.20	50.66	--	30.24	0.00	63.82	53.82	-13.16	-23.58	L2
3.22	37.53	--	20.67	0.00	56.00	46.00	-18.47	-25.33	L2
21.04	42.36	--	31.38	0.00	60.00	50.00	-17.64	-18.62	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#: 09U12855.EMI Date: 10-13-2009 Time: 20:05:44



(Line Conduction)

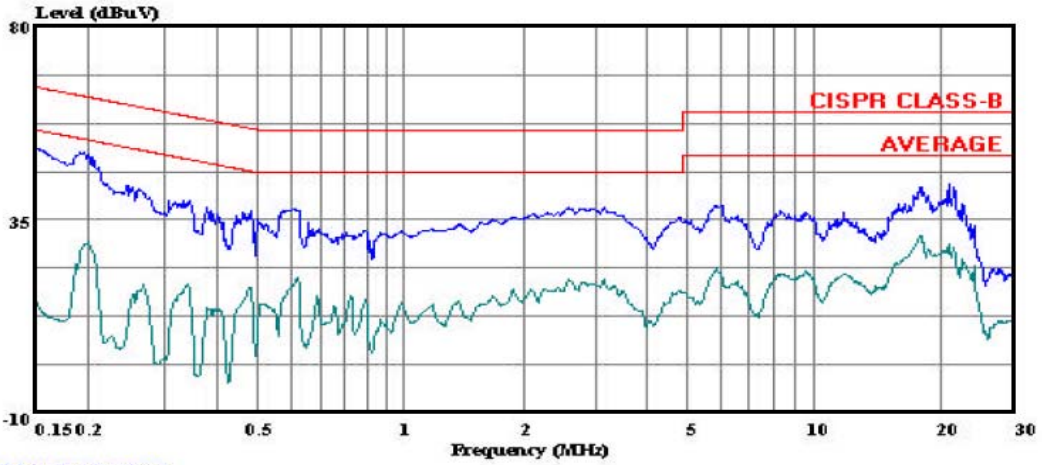
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Can Ming Chung
Project #: : 09U12855
Company: : Atheros Communications
EUT Description:: EUT inside the laptop
Mode: : Tx_mode (Worst Case)
Target: : FCC CLASS B
Voltage: : 115V/50Hz
: 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#: 09U12855.EMI Date: 10-13-2009 Time: 20:20:32



(Line Conduction)

Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Can Ming Chung
Project #: : 09U12855
Company: : Atheros Communications
EUT Description:: EUT inside the laptop
Mode: : Tx_mode (Worst Case)
Target: : FCC CLASS B
Voltage: : 115V/50Hz
: L2 Peak (Blue) , Average (Green)

9. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

D = Separation distance in m
EIRP = Equivalent Isotropic Radiated Power in W
S = Power density in W/m^2

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

Source-based time-averaged EIRP = (DC / 100) * EIRP

where

DC = Duty Cycle in %, as applicable
EIRP = Equivalent Isotropic Radiated Power in W

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)

where

Px = Power of transmitter x
Gx = Numeric gain of antenna x

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply, a fraction of the exposure limit is established for each band, such that the sum of the fractions is less than or equal to one.

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

CO-LOCATED RESULTS

(MPE distance equals 20 cm, limit is the same for all bands)

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz	Bluetooth		4.27	1.87	100		
2.4 GHz	WLAN		25.28	-0.35	100		
Combined		0.20				0.63	0.063