



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

**FOR
802.11ag/Draft 802.11n WLAN PCI-E Mini Card
(Dell Pacino PP31L with BCM94322HM8L Inside)**

**MODEL NUMBER: BCM94322HM8L
FCC ID: QDS-BRCM1031
IC: 4324A-BRCM1031**

REPORT NUMBER: 08U11720-1A

ISSUE DATE: May 9, 2008

Prepared for

**BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA**

Prepared by

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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>
--	4-28-08	Initial Issue	Sunny Shih
A	5-9-08	1. Updated sec. 5.2 Description of class II permissive change. 2. Added Co-located MPE calculations	Sunny Shih

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

EUT DESCRIPTION: 802.11ag / Draft 802n WLAN PCI-E MINI CARD
(Dell Pacino PP31L with BCM94322HM8L Inside)

MODEL: BCM94322HM8L

SERIAL NUMBER: 240

DATE TESTED: APRIL 22 - 26, 2008

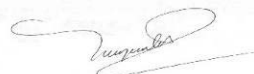
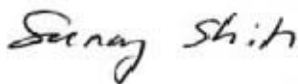
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C and Subpart E	Pass
RSS-210 Issue 7 Annex 8 and RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All expressions of Pass/Fail in this report are opinions expressed by CCS based on interpretations of the 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:



SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

VIEN TRAN
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 a Broadcom 802.11g WLAN PCI-E Mini Card installed inside Dell Pacino, model PP31L.

The radio module is manufactured by Broadcom and model number is BCM9432HM8L.

5.2. DESCRIPTION OF CLASS II CHANGE

The major changes filed under this application are:

- Adding portable platform, model Dell PP31L.
- Add co-location of UWB+BT module FCC ID: QDS-BRCM1035

Only the Radiated Emission and AC mains line conduction tests are performed.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes PIFA antennas, with the following maximum gain

Antenna tested	Manufacture	Model	f (MHz)	Main (dBi), Tx 1	MIMO (dBi), Tx 3 (Used as Aux)
<input type="checkbox"/>	Advance-Connectek, Inc (ACON)	AMP8P-700047	2412 - 2462	0.36	-0.54
			5725 - 5850	-1.43	0.88
<input checked="" type="checkbox"/>	Amphenol	QT0932-11-001-R (Tx1-2) & QT0932-11-004-R (Tx3)	2412 - 2462	1.98	-1.74
			5725 - 5850	3.23	-0.41

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was BCMWL5, rev. 4.170.75.0.

The test utility software used during testing was wl_tool, rev. 4.170 RC75.0.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each mode is determined to be as follows, based on original test report and CCS Test plan.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	PACINO	COP7C00031	N/A
AC Adapter	Dell	NADP-90KB A	TH-09T215-17971-292-00HX	N/A

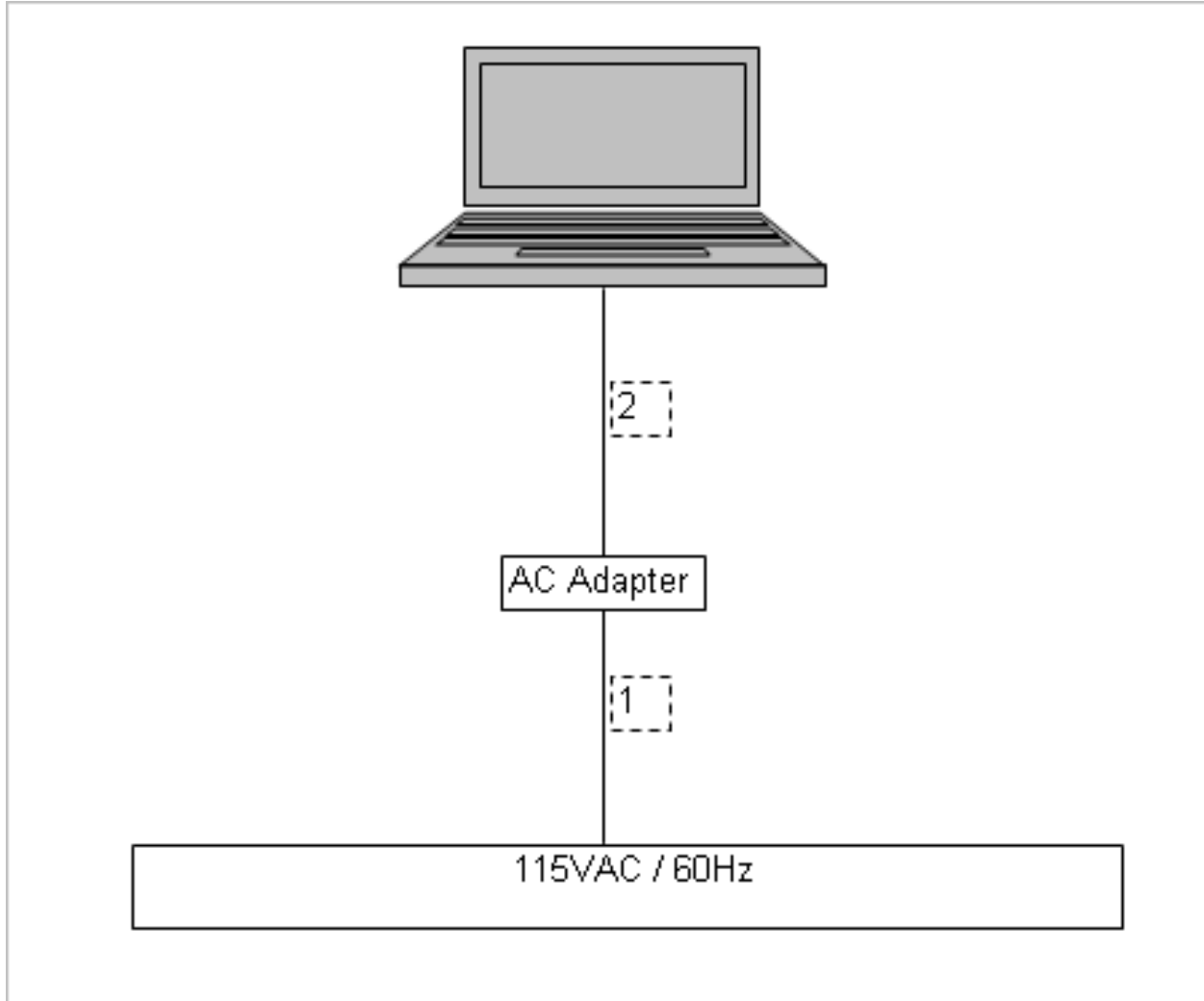
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115V	Unshielded	2.0m	N/A
2	DC	1	DC	Unshielded	2.0m	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
Antenna, Horn, 18 GHz	EMCO	3115	C00945	4/15/2008	4/15/2009
Bilog Antenna	Sunol Sciences	JB1	C01016	10/13/2007	10/13/2008
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	8/3/2007	9/27/2008
Preamplifier, 1300 MHz	Agilent / HP	8447D	C01064	5/9/2007	5/9/2008
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	2/6/2007	6/12/2008
Peak Power Meter	Agilent / HP	E4416A	C00963	2/14/2007	12/2/2008
Peak / Average Power Sensor	Agilent	E9327A	C00964	2/14/2007	12/2/2008
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	10/16/2007	1/27/2009
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	9/15/2006	9/15/2008
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	9/15/2006	9/15/2008
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	5/2/2006	8/7/2008

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.

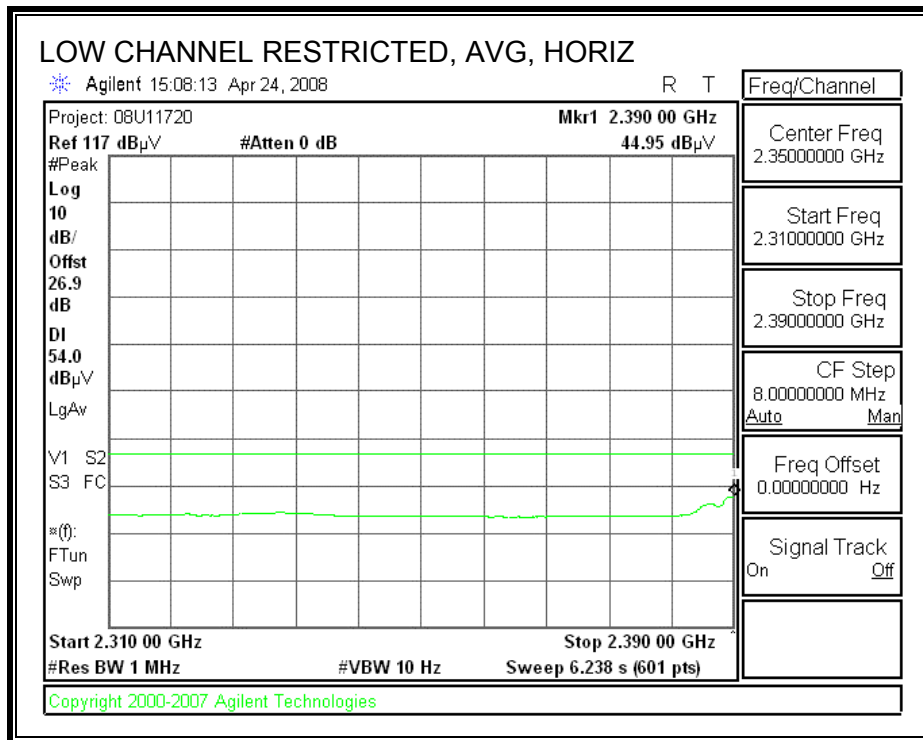
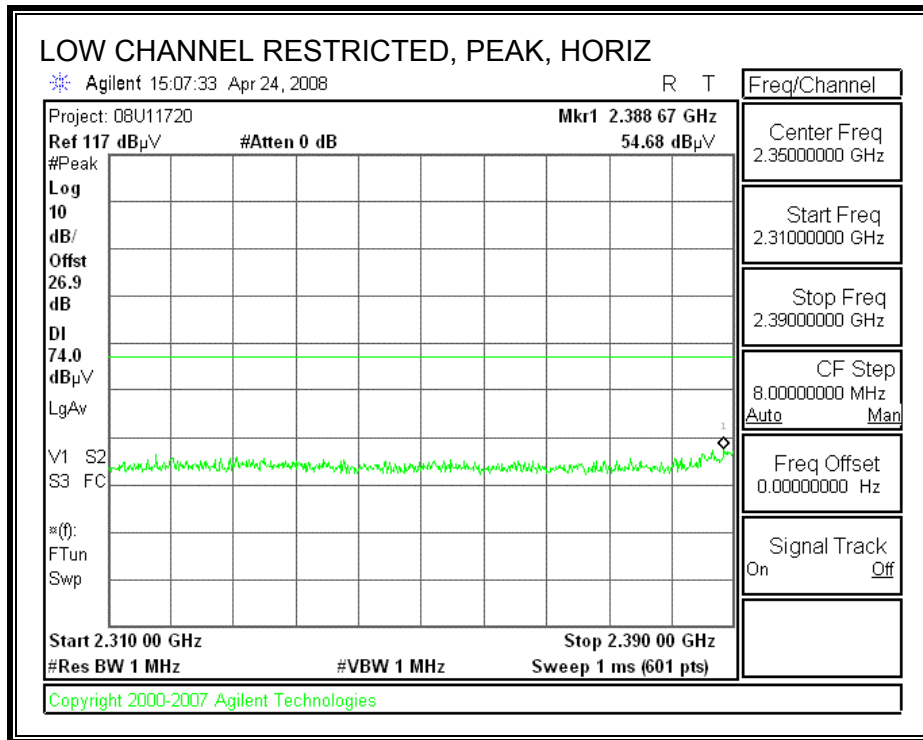
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

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.

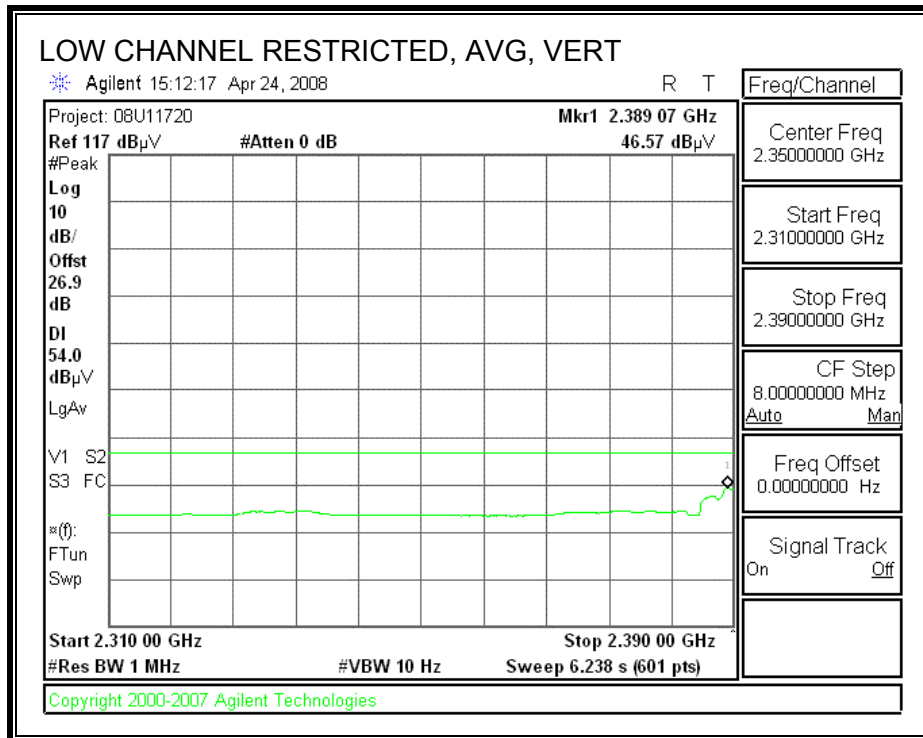
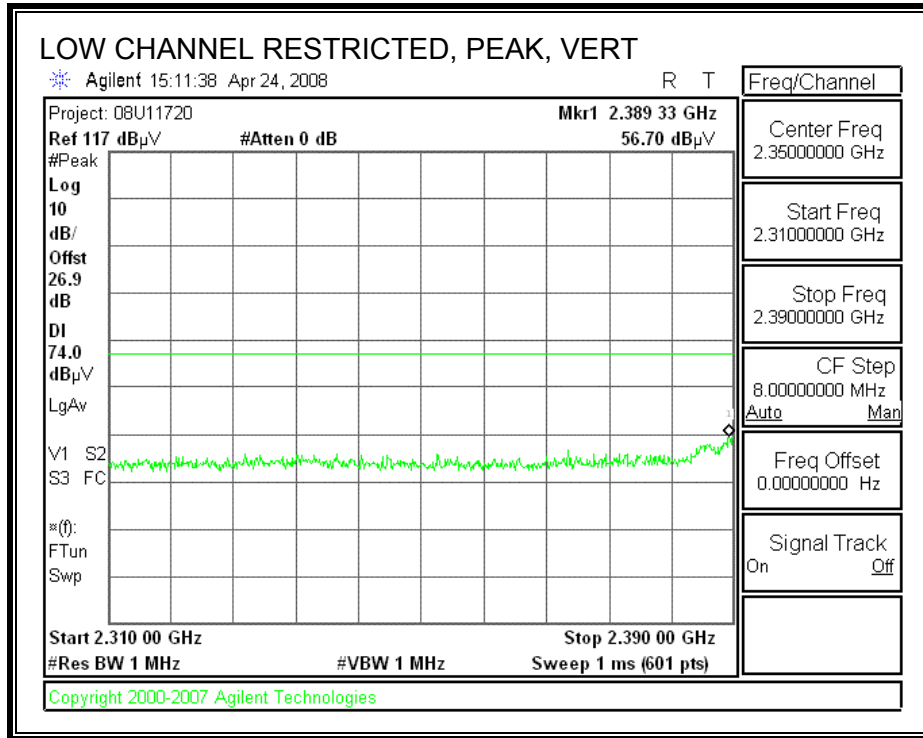
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 5 GHz band.

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.

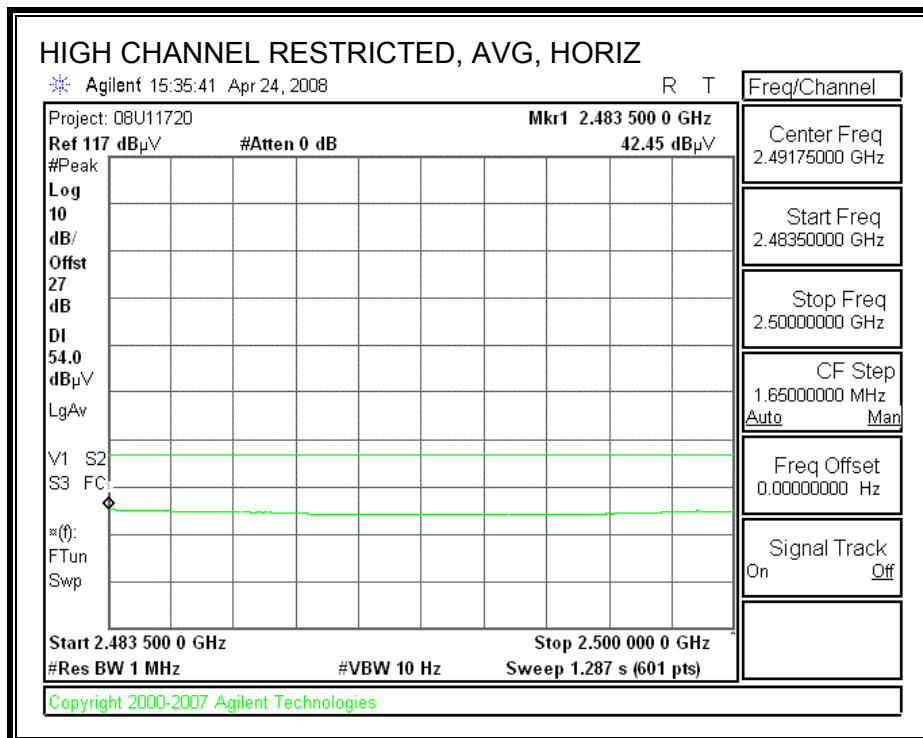
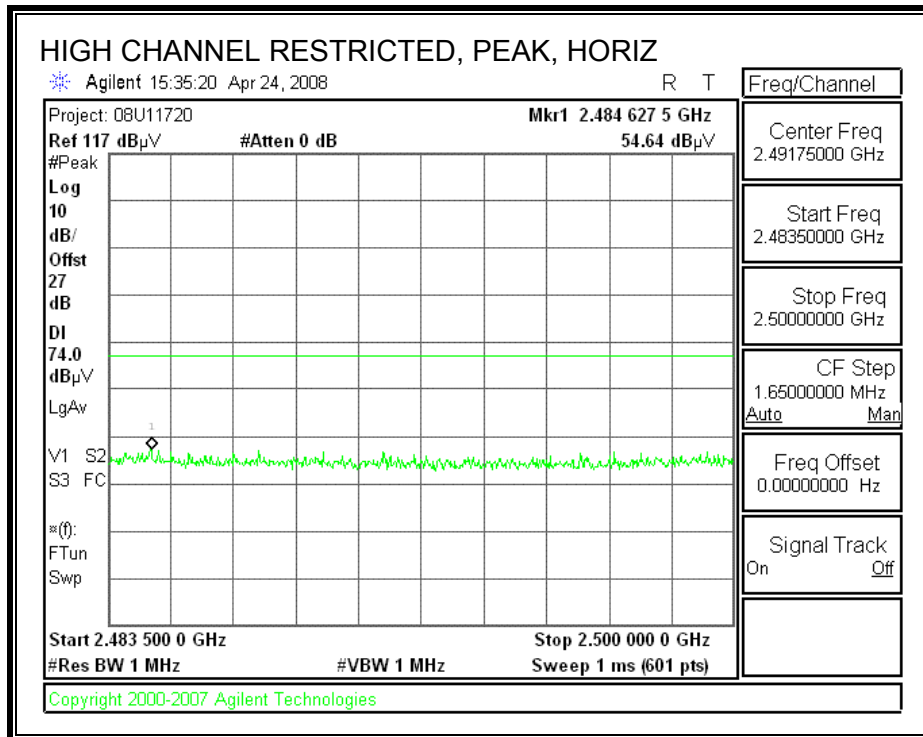
7.1.1. 802.11b MODE
RESTRICTED BANDEDGE (LOW CHANNEL 1, HORIZONTAL)



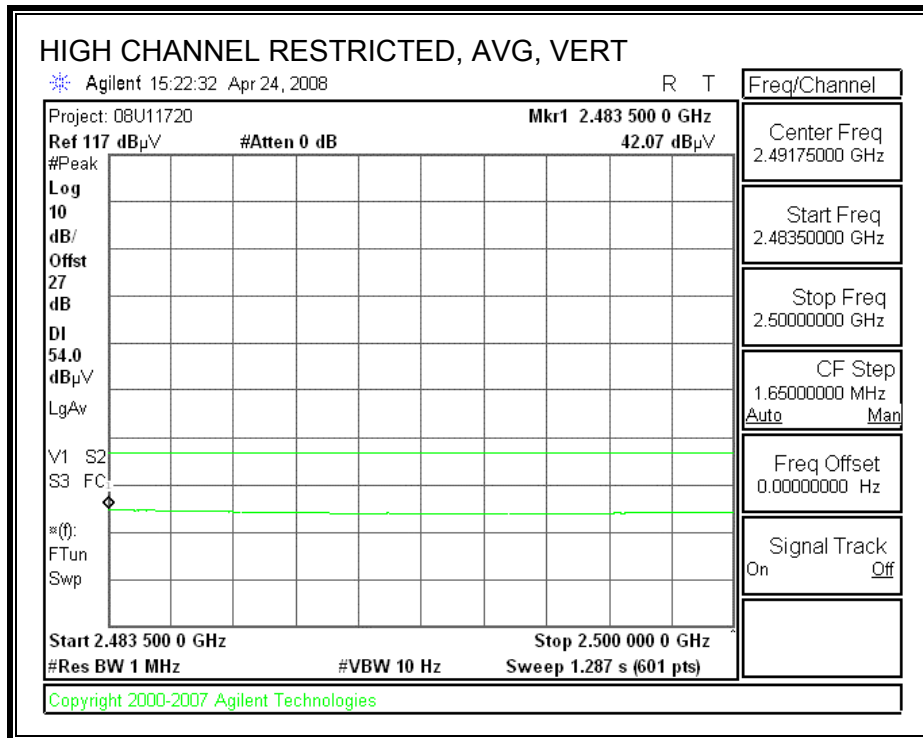
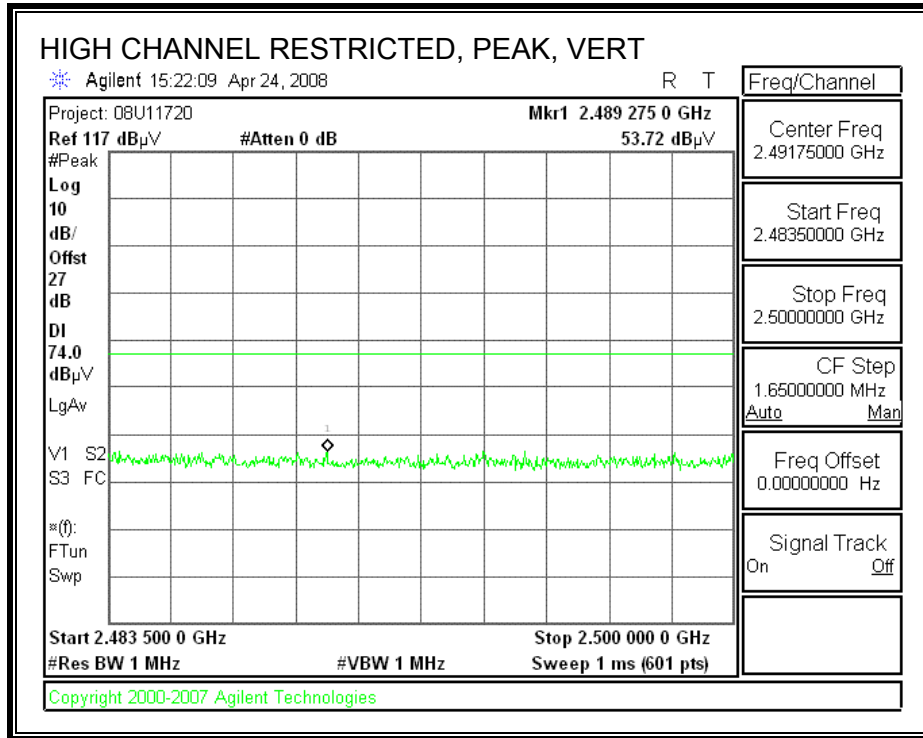
RESTRICTED BANDEDGE (LOW CHANNEL 1, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL 11, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL 11, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom
 Project #: 08U11720
 Date: 4/24/2008
 Test Engineer: Vien Tran
 Configuration: EUT insides Pacino laptop
 Mode: Tx 11b Mode_2.4 GHz Band

Test Equipment:

Horn 1-18GHz T120; S/N: 29310 @3m	Pre-amplifer 1-26GHz T144 Miteq 3008A00931	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit FCC 15.209
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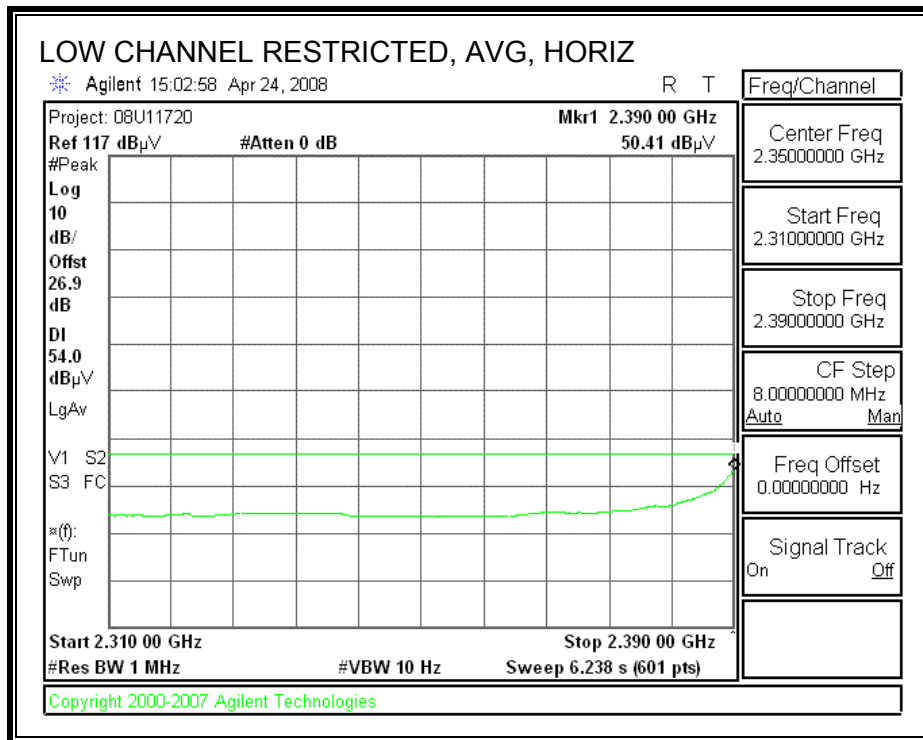
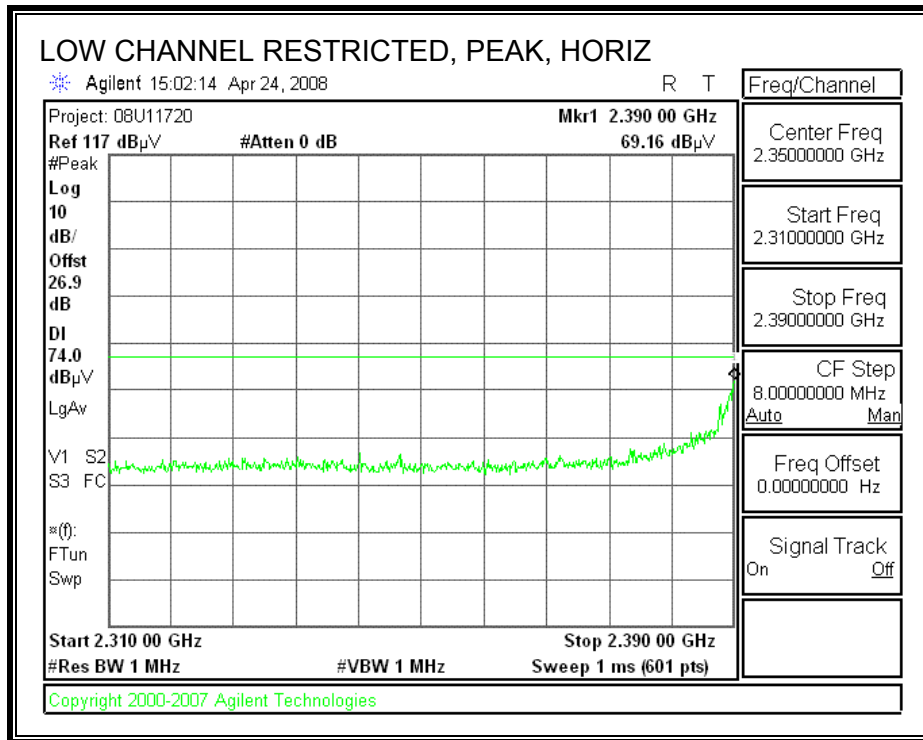
Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable A-5m Chamber	HPF HPF_4.6GHz	Reject Filter	<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz
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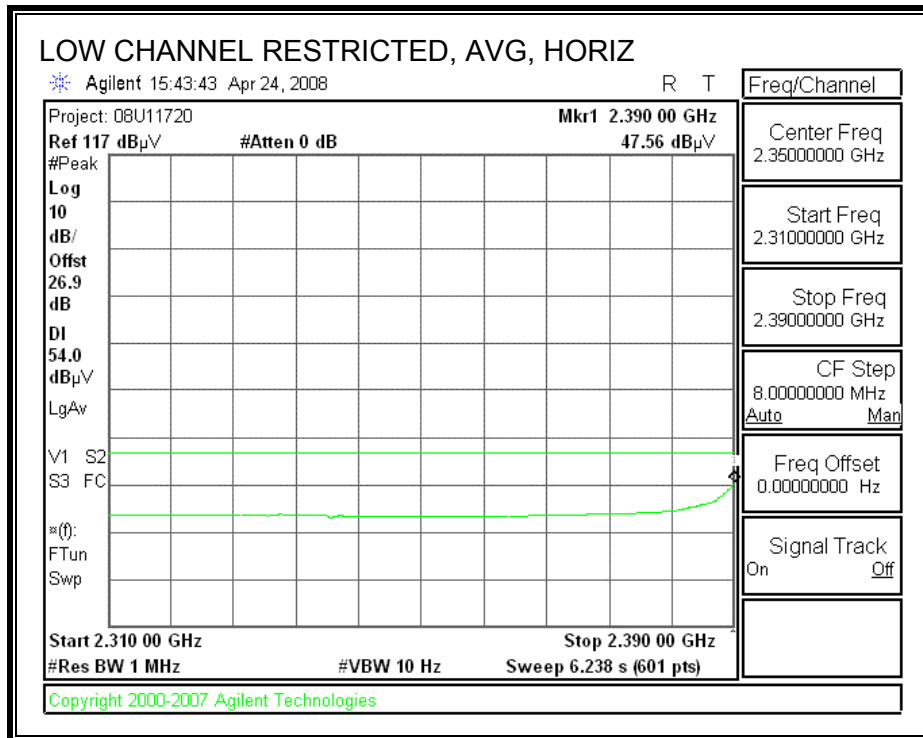
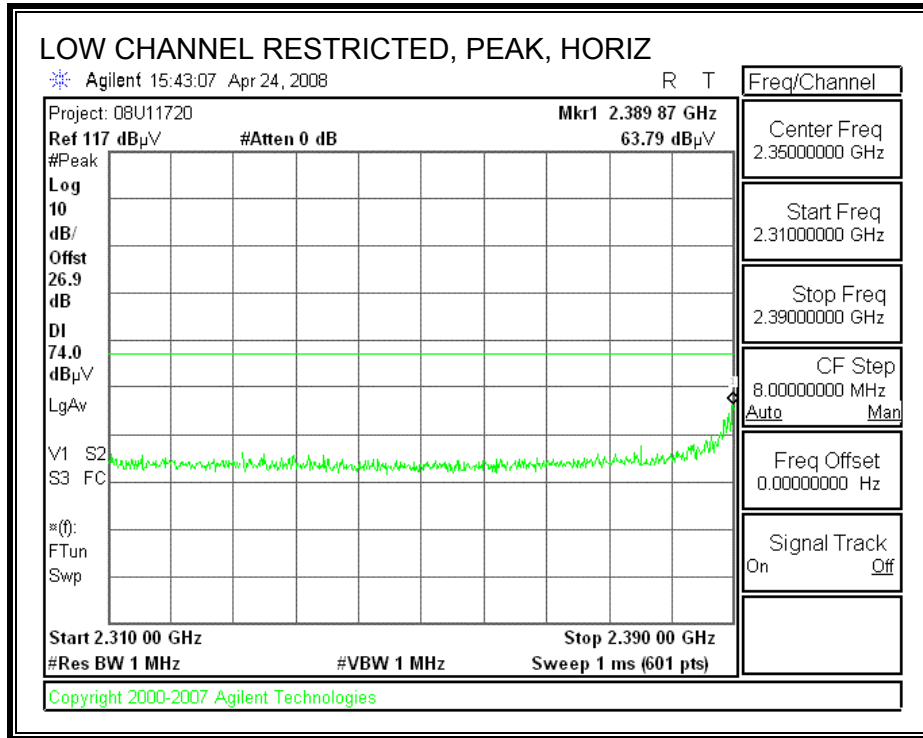
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH, 2412 MHz															
4.824	3.0	43.5	39.7	32.3	6.9	-36.5	0.0	2.4	48.6	44.8	74	54	-25.4	-9.2	V
4.824	3.0	45.4	41.6	32.3	6.9	-36.5	0.0	2.4	50.5	46.7	74	54	-23.5	-7.3	H

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		

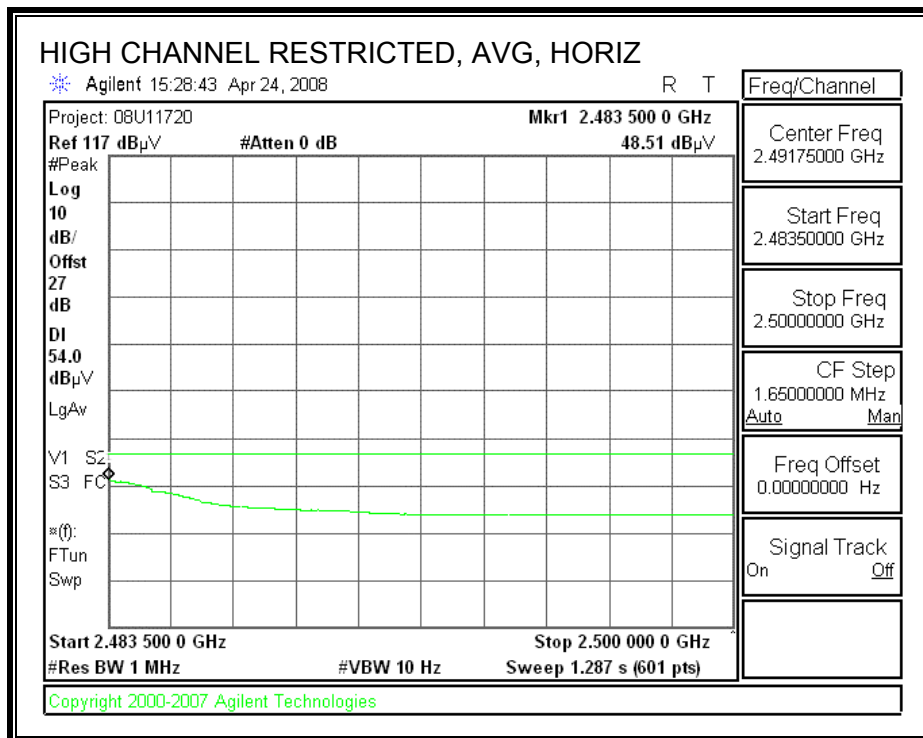
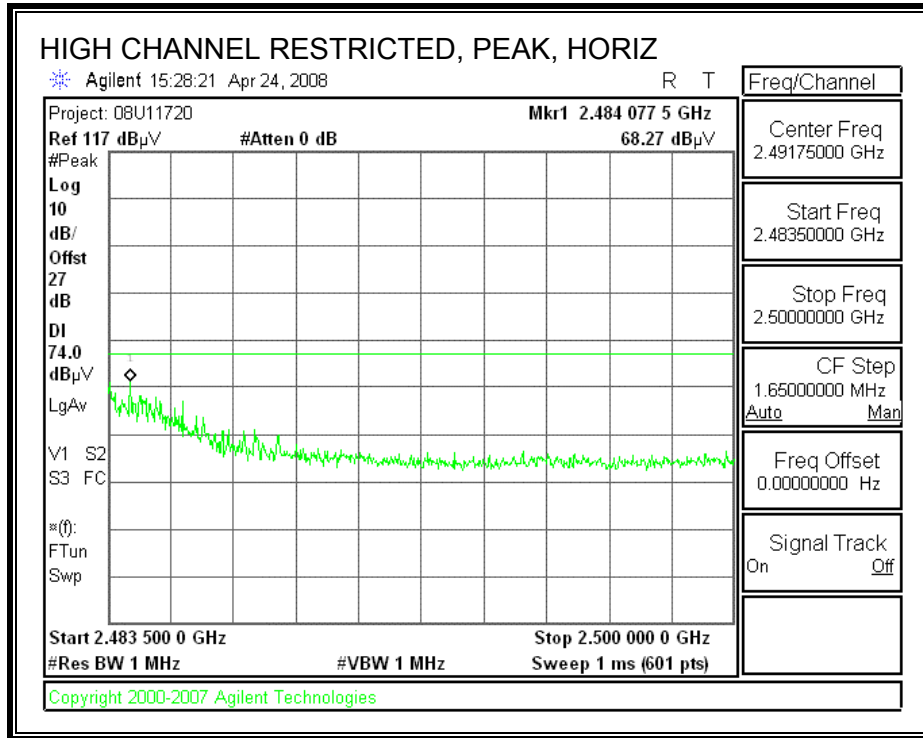
7.1.2. 802.11g MODE
RESTRICTED BANDEDGE (LOW CHANNEL 1, HORIZONTAL)



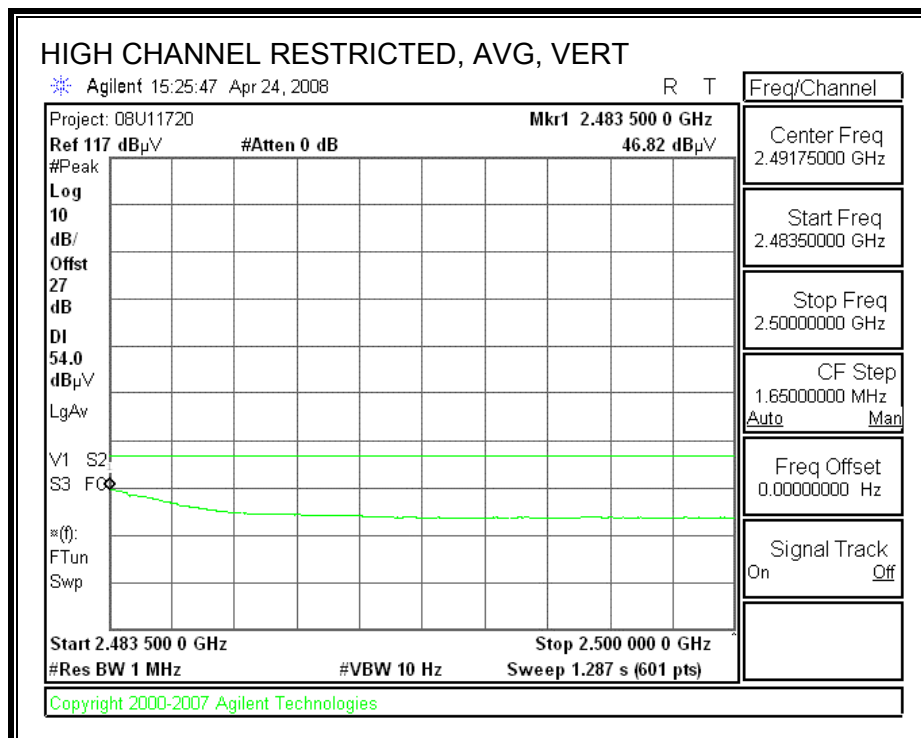
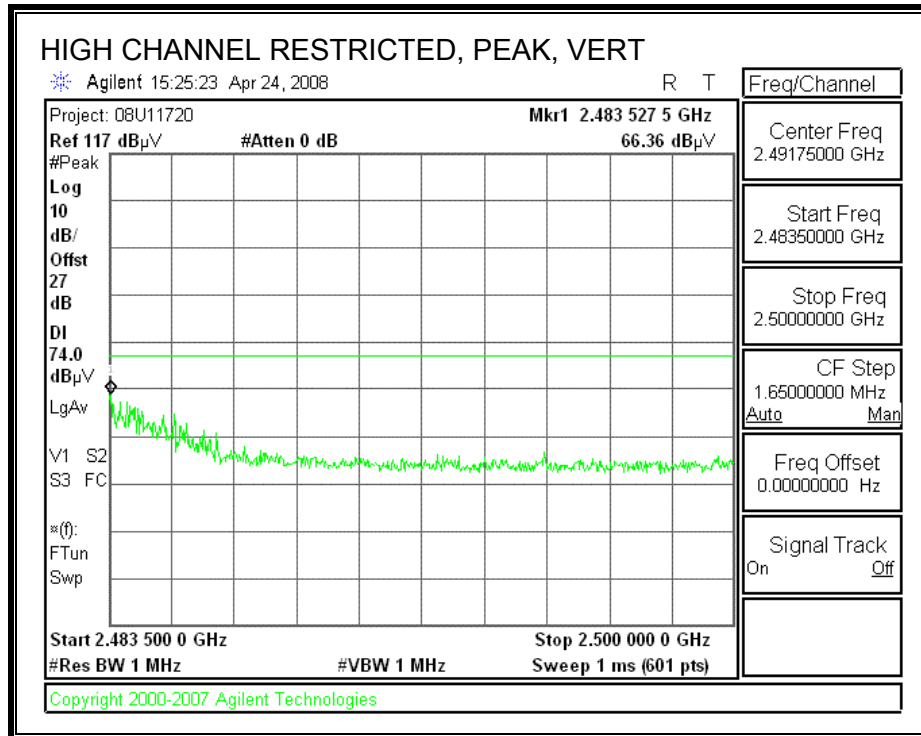
RESTRICTED BANDEDGE (LOW CHANNEL1, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL 11, HORIZONTAL)

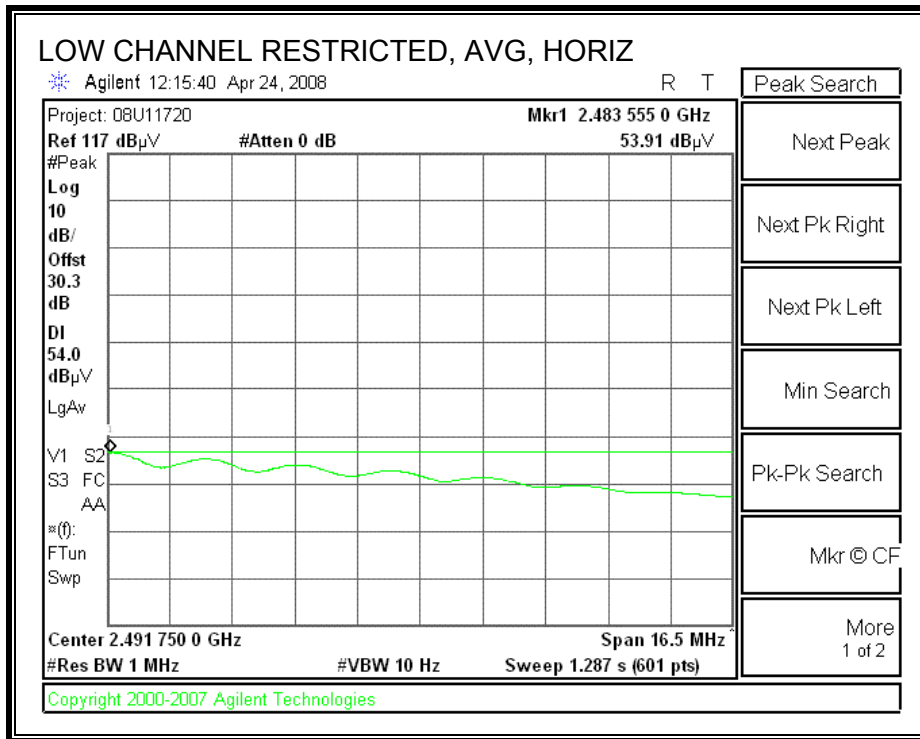
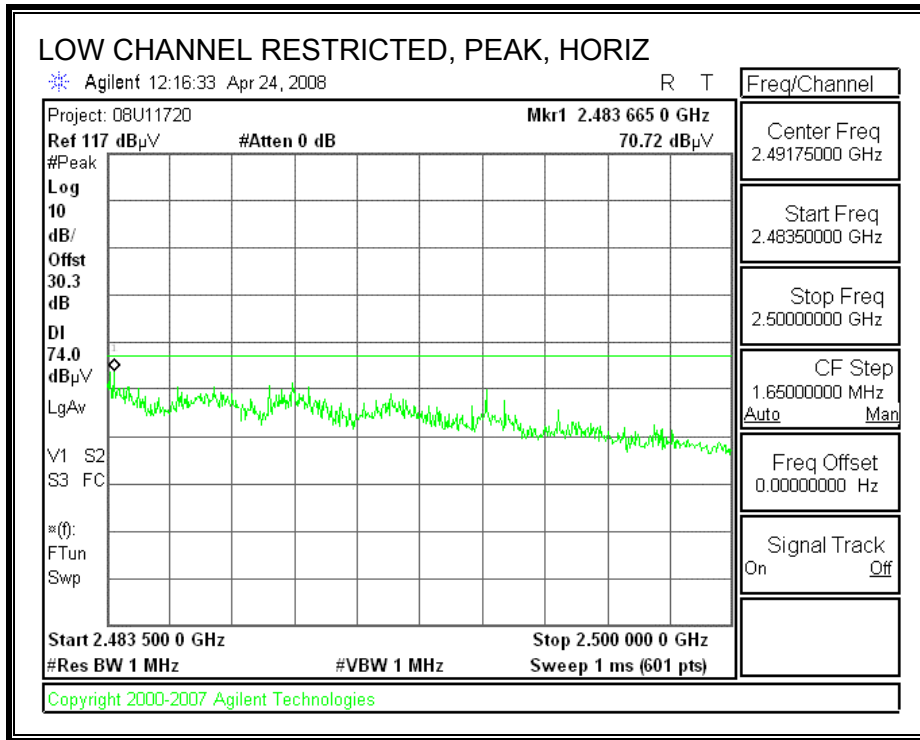


RESTRICTED BANDEDGE (HIGH CHANNEL 11, VERTICAL)

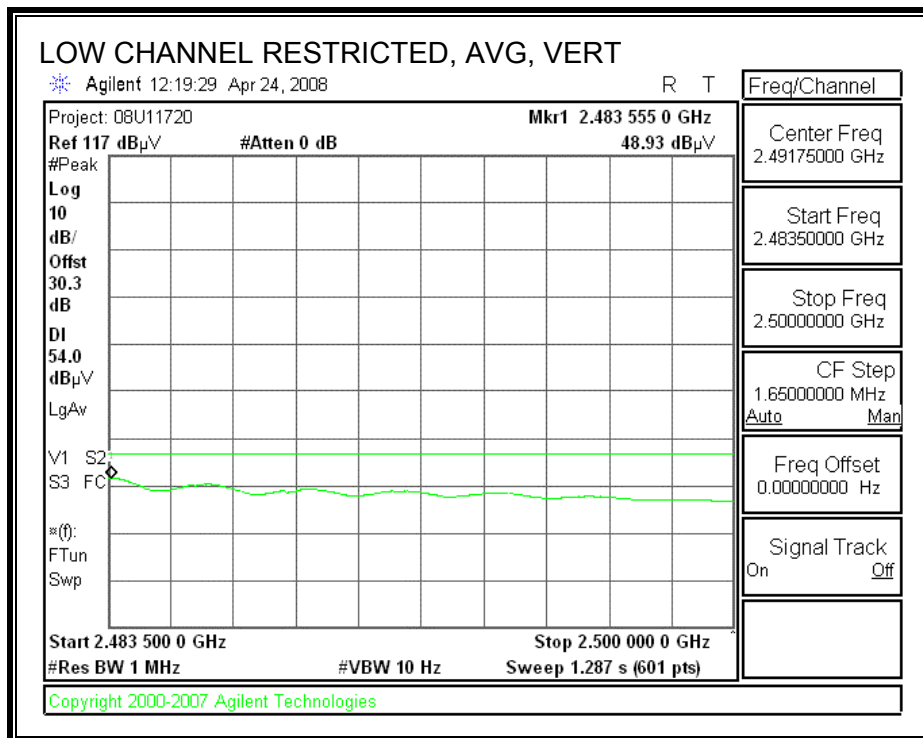
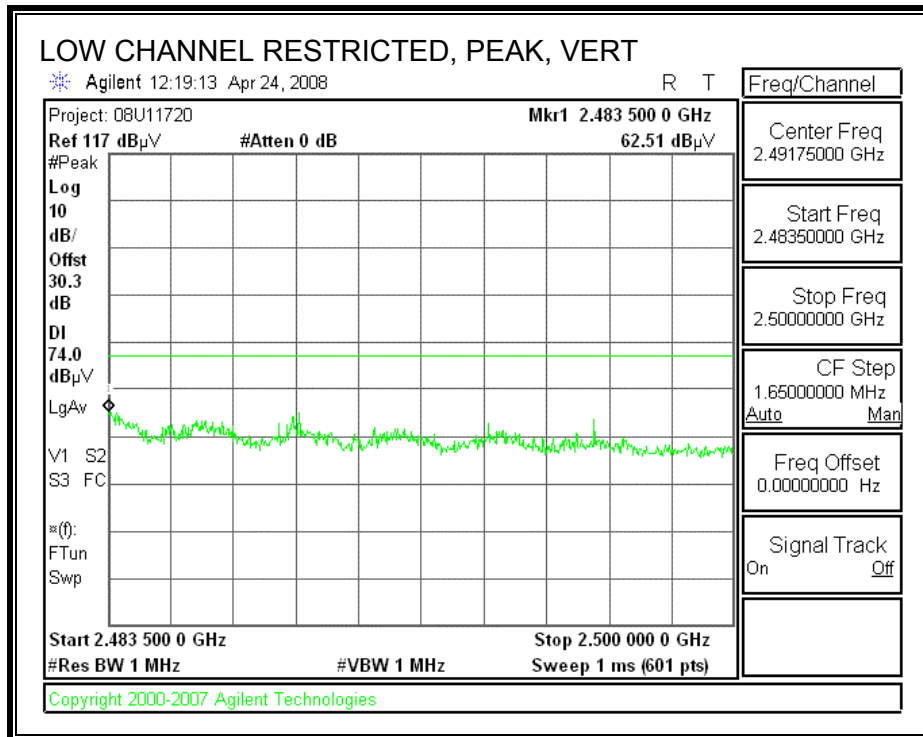


7.1.3. 802.11n HT40 MODE IN THE 2.4 GHz BAND

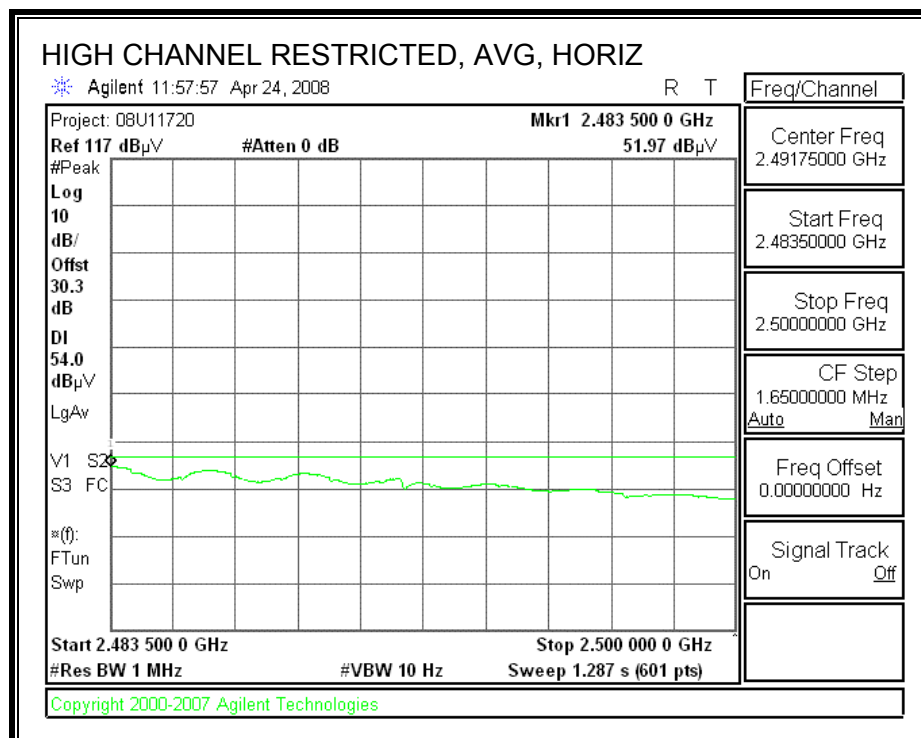
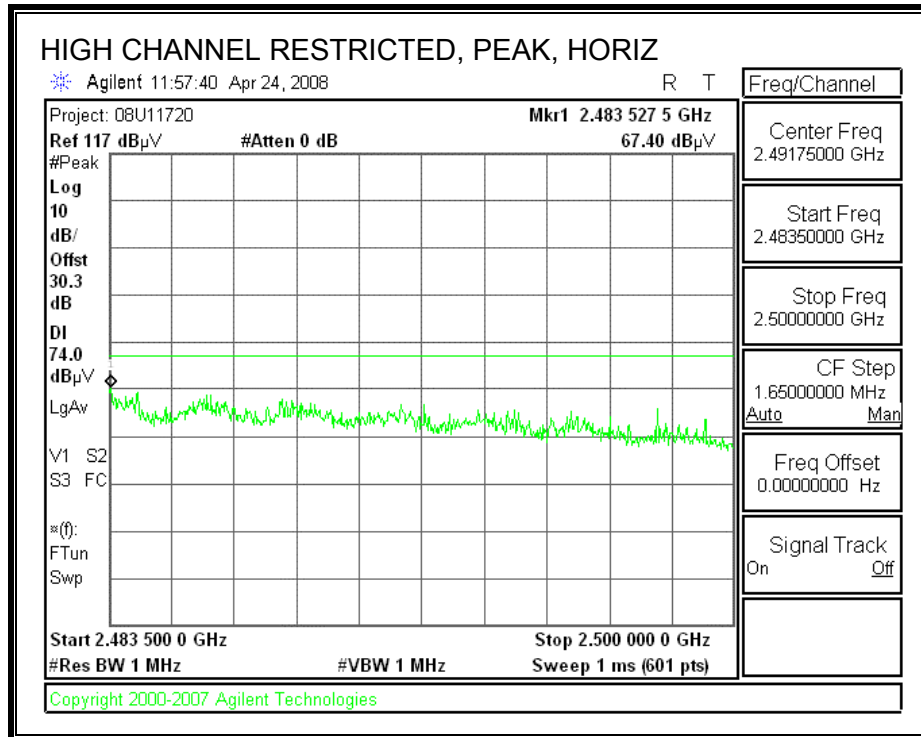
RESTRICTED BANDEDGE (HIGH CHANNEL 8, HORIZONTAL)



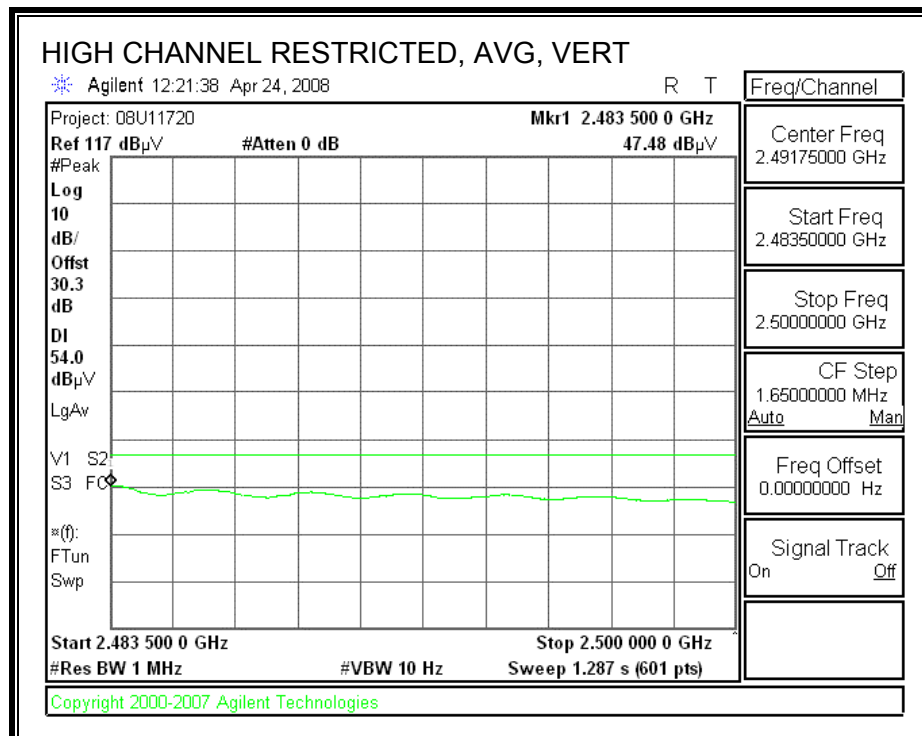
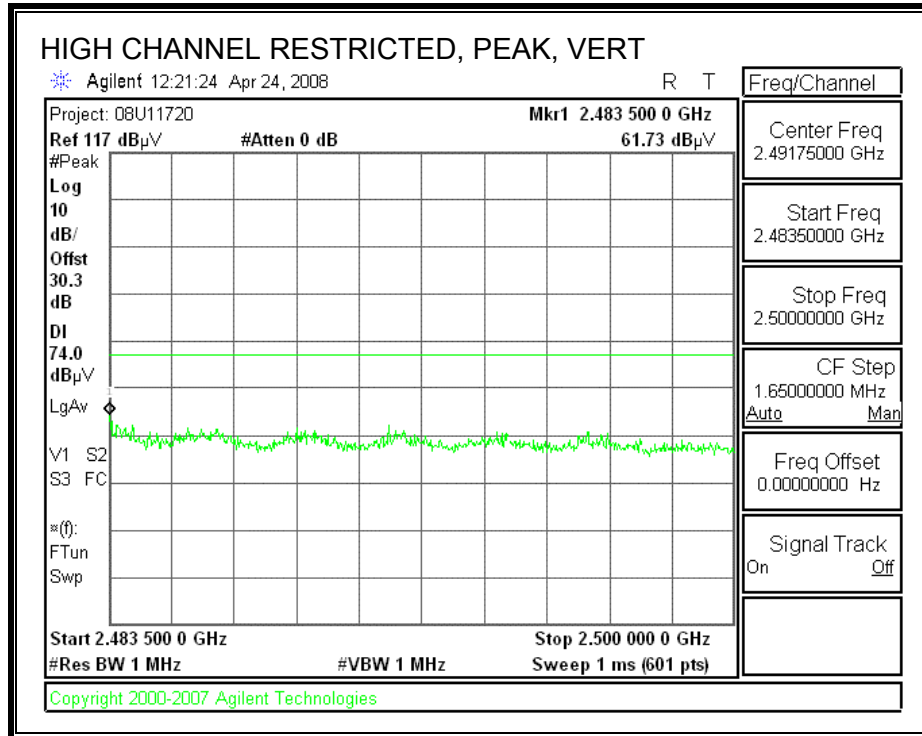
RESTRICTED BANDEDGE (HIGH CHANNEL 8, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL 9, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL 9, VERTICAL)



7.1.4. 802.11a MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: Brodecom
 Project #: 08U11720
 Date: 4/24/2008
 Test Engineer: Vien Tran
 Configuration: EUT insides Pacino laptop
 Mode: Tx 11a Legacy Mode_5.8 GHz Band

Test Equipment:

Horn 1-18GHz T120; S/N: 29310 @3m	Pre-amplifier 1-26GHz T144 Miteq 3008A00931	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit FCC 15.205
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Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable A-5m Chamber	HPF HPF_7.6GHz	Reject Filter	Peak Measurements REBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz
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f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr 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, 5785 MHz															
11.570	3.0	40.8	28.9	36.4	11.7	-35.8	0.0	0.7	53.9	42.0	74	54	-20.1	-12.0	H
11.570	3.0	39.3	27.9	36.4	11.7	-35.8	0.0	0.7	52.4	41.0	74	54	-21.6	-13.0	V

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		

7.1.5. 802.11n HT20 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Company:		Broadcom														
Project #:		08U11720														
Date:		4/24/2008														
Test Engineer:		Vien Tran														
Configuration:		EUT insides Pacino laptop														
Mode:		Tx 11n HT20 Mode_5.8 GHz Band														
Test Equipment:																
Horn 1-18GHz			Pre-amplifer 1-26GHz			Pre-amplifer 26-40GHz			Horn > 18GHz			Limit				
T120; S/N: 29310 @3m			T144 Miteq 3008A00931									FCC 15.205				
Hi Frequency Cables																
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter		<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz			
						A-5m Chamber			HPF_7.6GHz							
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)	
MID CH, 5785 MHz																
11.570	3.0	40.4	28.7	36.4	11.7	-35.8	0.0	0.7	53.5	41.8	74	54	-20.5	-12.2	H	
11.570	3.0	39.1	27.7	36.4	11.7	-35.8	0.0	0.7	52.2	40.8	74	54	-21.8	-13.2	V	
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									

7.1.6. 802.11n HT40 MODE IN THE 5.8 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Company:		Broadcom														
Project #:		08U11720														
Date:		4/24/2008														
Test Engineer:		Vien Tran														
Configuration:		EUT insides Pacino laptop														
Mode:		Tx 11n HT40 Mode_5.8 GHz Band														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T120; S/N: 29310 @3m			T144 Miteq 3008A00931									FCC 15.205				
Hi Frequency Cables																
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter		<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz			
						A-5m Chamber			HPF_7.6GHz							
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, 5755 MHz																
11.510	3.0	42.0	30.1	36.4	11.6	-35.8	0.0	0.7	55.0	43.1	74	54	-19.0	-10.9	H	
11.510	3.0	40.5	29.1	36.4	11.6	-35.8	0.0	0.7	53.5	42.1	74	54	-20.5	-11.9	V	
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. RECEIVER ABOVE 1 GHz

7.2.1. 40 MHz BANDWIDTH IN THE 2.4 GHz BAND

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Company:		Broadcom														
Project #:		08U11720														
Date:		4/25/2008														
Test Engineer:		Vien Tran														
Configuration:		EUT insides Pacino laptop														
Mode:		Rx Mode														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T120; S/N: 29310 @3m			T144 Miteq 3008A00931									RX RSS 210				
Hi Frequency Cables																
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz			
						A5m Chamber							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	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
1.498	3.0	54.5	49.6	27.6	3.6	-38.8	0.0	0.0	46.9	42.0	74	54	-27.1	-12.0	H	
2.995	3.0	48.2	32.8	31.2	5.3	-37.4	0.0	0.0	47.4	32.0	74	54	-26.6	-22.0	H	
1.498	3.0	54.7	49.7	27.6	3.6	-38.8	0.0	0.0	47.1	42.1	74	54	-26.9	-11.9	V	
2.995	3.0	50.0	36.5	31.2	5.3	-37.4	0.0	0.0	49.2	35.7	74	54	-24.8	-18.3	V	
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									

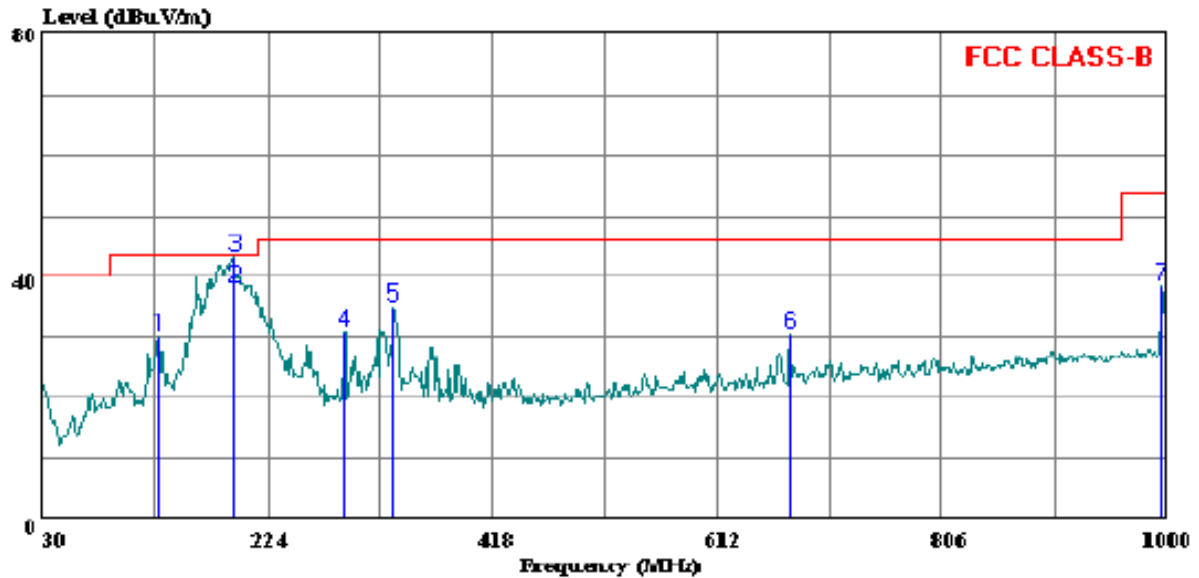
7.3. WORST-CASE BELOW 1 GHz

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



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

Data#: 6 File#: 08U11720_pacino.EMI Date: 04-25-2008 Time: 15:12:21



Trace: 3

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
 Test Operator:: Vien Tran
 Project #: : 08U11720
 Company: : Broadcom
 Configuration:: EUT in Pacino laptop Amphenol antenna
 Mode : : Normal
 Target: : FCC Class B

Page: 1

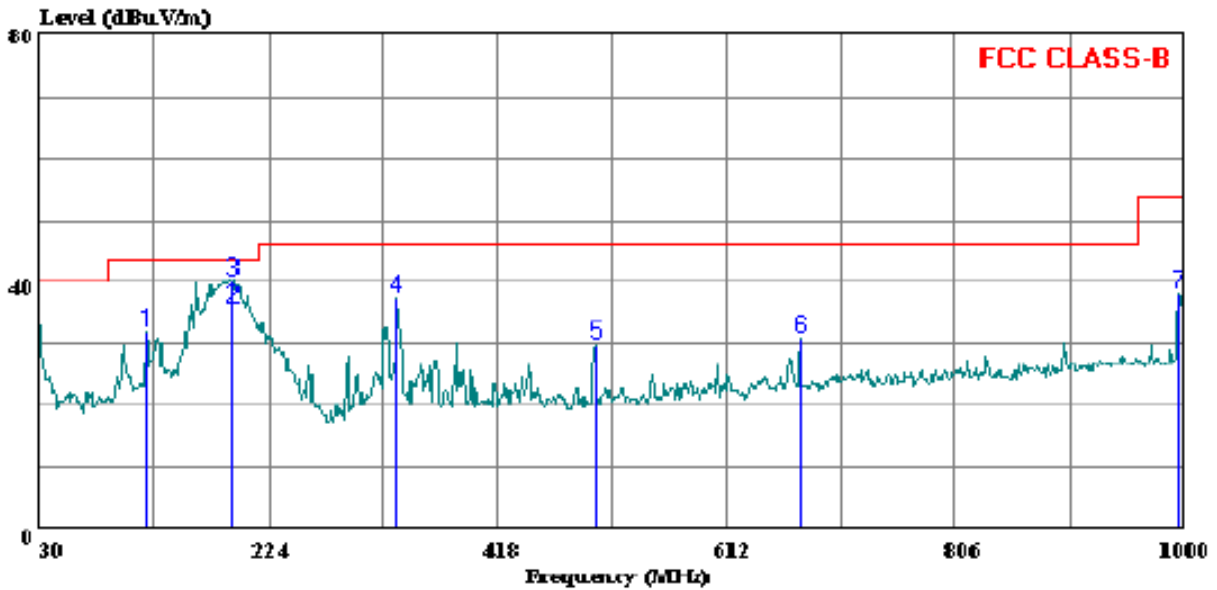
	Freq	Read		Limit	Over	
	MHz	Level	Factor	Level	Line	Limit
		dBuV	dB	dBuV/m	dBuV/m	dB
1	129.910	46.67	-16.58	30.08	43.50	-13.42
2	194.900	55.87	-17.78	38.09	43.50	-5.41
3	194.900	61.17	-17.78	43.38	43.50	-0.12
4	289.960	46.83	-16.17	30.67	46.00	-15.33
5	331.670	49.83	-14.98	34.86	46.00	-11.14
6	675.050	39.17	-8.85	30.31	46.00	-15.69
7	996.120	41.50	-2.91	38.59	54.00	-15.41

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



Compliance Certification Services
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 Fremont, CA 94538
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Data#: 12 File#: 08U11720_pacino.EMI Date: 04-25-2008 Time: 15:31:16



Trace: 9

Ref Trace:

Condition: FCC CLASS-B VERTICAL
 Test Operator: Vien Tran
 Project #: 08U11720
 Company: Broadcom
 Configuration: EUT in Pacino laptop Amphenol antenna
 Mode: Normal
 Target: FCC Class B

Page: 1

	Freq	Read		Level	Limit	Over	
	MHz	Level	Factor	dBuV/m	dBuV/m	Limit	Remark
		dBuV	dB			dB	
1	120.210	48.50	-16.73	31.77	43.50	-11.73	Peak
2	192.960	53.80	-17.97	35.83	43.50	-7.67	QP
3	192.960	58.00	-17.97	40.03	43.50	-3.47	Peak
4	331.670	52.33	-14.98	37.36	46.00	-8.64	Peak
5	500.450	41.00	-11.31	29.69	46.00	-16.31	Peak
6	675.050	39.83	-8.85	30.98	46.00	-15.02	Peak
7	996.120	41.17	-2.91	38.26	54.00	-15.74	Peak

8. 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/ <i>f</i>	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042 <i>f</i> ^{0.5}	<i>f</i> /150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 / <i>f</i> ^{1.2}
150 000–300 000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616 000 / <i>f</i> ^{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/m² is equivalent to 1 mW/cm².
 3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E = Field Strength in Volts/meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power Density in milliwatts/square centimeter

Combining equations, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

$$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S}$$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

Rearranging terms to calculate the power density at a specific distance yields

$$S = 0.0795 * 10^{((P + G) / 10)} / (d^2)$$

The power density in units of mW/cm² is converted to units of W/m² by multiplying by a factor of 10.

CO-LOCATED MPE CALCULATIONS for Mobile configuration

For multiple colocated transmitters operating simultaneously the total power density can be calculated by summing the Power * Gain product (in linear units) of each transmitter.

yields

$$d = 0.282 * \sqrt{((P1 * G1) + (P2 * G2) + \dots + (Pn * Gn)) / S}$$

where

- d = distance in cm
- Px = Power of transmitter x in mW
- Gx = Numeric gain of antenna x
- S = Power Density in mW/cm²

In the table below, Power and Gain are entered in units of dBm and dBi respectively, then converted to their linear forms for the purpose of the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²
 From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

RESULTS

(MPE distance equals 20 cm)

Mode	Band	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)	FCC Power Density (mW/cm ²)	IC Power Density (W/m ²)
Bluetooth	2.4 GHz	0.70	3.15			
WLAN	2.4 GHz	22.00	1.98			
Combined				20.0	0.05	0.50

Mode	Band	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)	FCC Power Density (mW/cm ²)	IC Power Density (W/m ²)
Bluetooth	2.4 GHz	0.70	3.15			
WLAN	5.8 GHz	19.90	3.23			
Combined				20.0	0.04	0.41

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

9. 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

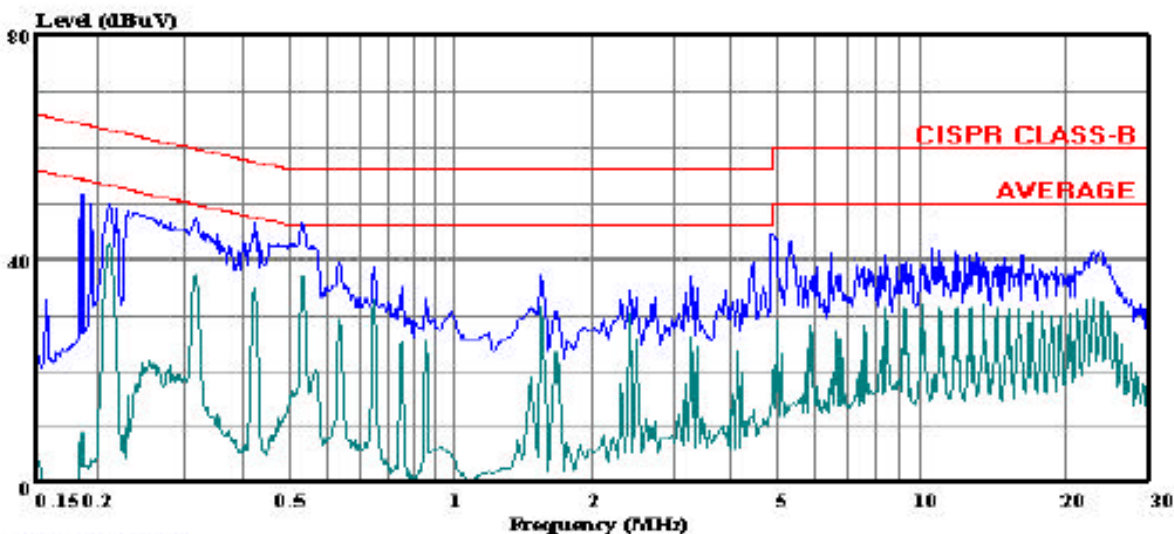
CONDUCTED EMISSIONS DATA (115VAC 60Hz)										
Freq. (MHz)	Reading			Class (dB)	Limit QP	FCC_B		Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)			AV	QP (dB)	AV (dB)		
0.21	48.93	--	41.19	0.00	63.13	53.13	-14.20	-11.94	L1	
0.53	43.01	--	37.70	0.00	56.00	46.00	-12.99	-8.30	L1	
23.02	44.51	--	36.71	0.00	60.00	50.00	-15.49	-13.29	L1	
0.21	49.38	--	42.72	0.00	63.13	53.13	-13.75	-10.41	L2	
0.53	45.57	--	36.90	0.00	56.00	46.00	-10.43	-9.10	L2	
23.02	41.23	--	33.31	0.00	60.00	50.00	-18.77	-16.69	L2	
6 Worst Data										

LINE 1 RESULTS



Compliance Certification Services
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Data#: 17 File#: 08U11720_Pacino.EMI Date: 04-25-2008 Time: 16:36:43



(Line Conduction)

Trace: 15

Ref Trace:

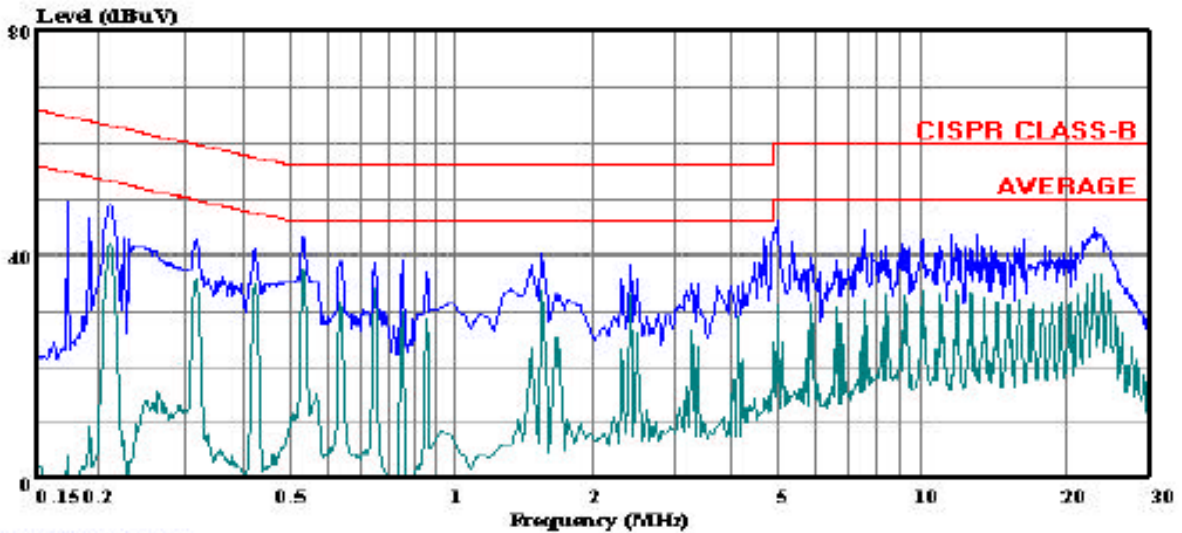
Condition: CISPR CLASS-B
Test Operator:: Vien Tran
Project #: : 0811720
Company: : BroadCom Cotporation
Configuration:: EUT in Pacino w/ Amphenol antenna
Mode: : TX worst case
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: Line 1: Peak (Blue); Average (Green)

LINE 2 RESULTS



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Fax: (510) 661-0888

Data#: 24 File#: 08U11720_Pacino.EMI Date: 04-25-2008 Time: 16:42:45



(Line Conduction) Trace: 22 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Vien Tran
Project #: 0811720
Company: BroadCom Cotporation
Configuration:: EUT in Pacino w/ Amphenol antenna
Mode: TX worst case
Target: FCC Class B
Voltage: 115VAC / 60Hz
: Line 2: Peak (Blue) ; Average (Green)