



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

FOR

**Broadcom 802.11g WLAN PCI-E Mini Card
(Tested inside of Dell PP15S)**

MODEL NUMBER: BCM94312HMG

FCC ID: QDS-BRCM1030

IC: 4324A-BRCM1030

REPORT NUMBER: 08U11947-1, Revision B

ISSUE DATE: AUGUST 18, 2008

Prepared for

BROADCOM CORPORATION

190 MATHILDA PLACE

SUNNYVALE, CA 94086, U.S.A.

Prepared by

COMPLIANCE CERTIFICATION SERVICES

47173 BENICIA STREET

FREMONT, CA 94538, U.S.A.

TEL: (510) 771-1000

FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
---	07/29/08	Initial Issue	Sunny Shih
B	08/18/08	Revised MPE Section	T. Chan

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	4
2. TEST METHODOLOGY.....	5
3. FACILITIES AND ACCREDITATION.....	5
4. CALIBRATION AND UNCERTAINTY.....	5
4.1. <i>MEASURING INSTRUMENT CALIBRATION.....</i>	<i>5</i>
4.2. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>5</i>
5. EQUIPMENT UNDER TEST	6
5.1. <i>DESCRIPTION OF EUT.....</i>	<i>6</i>
5.2. <i>DESCRIPTION OF CLASS II PERMISSIVE CHANGE.....</i>	<i>6</i>
5.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS.....</i>	<i>6</i>
5.4. <i>SOFTWARE AND FIRMWARE.....</i>	<i>7</i>
5.5. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	<i>7</i>
5.6. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>7</i>
6. TEST AND MEASUREMENT EQUIPMENT	9
7. RADIATED TEST RESULTS.....	10
7.1. <i>LIMITS AND PROCEDURE.....</i>	<i>10</i>
7.2. <i>TRANSMITTER ABOVE 1 GHz.....</i>	<i>11</i>
7.2.1. <i>802.11b MODE</i>	<i>11</i>
7.2.2. <i>802.11g MODE</i>	<i>16</i>
7.3. <i>RECEIVER ABOVE 1 GHz.....</i>	<i>25</i>
7.4. <i>WORST-CASE BELOW 1 GHz.....</i>	<i>26</i>
8. AC POWER LINE CONDUCTED EMISSIONS.....	28
9. MAXIMUM PERMISSIBLE EXPOSURE.....	31
SETUP PHOTOS.....	35

1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Broadcom 802.11g WLAN PCI-E Mini Card
(Tested inside of Dell PP15S)

MODEL: BCM94312HMG

SERIAL NUMBER: P201

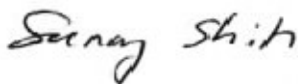
DATE TESTED: JULY 16 - 19, 2008

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	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:



SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



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 PC-E Mini Card and installed inside Dell PP15S portable laptop.

The radio module is manufactured by Broadcom.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major changes filed under this application are:

Change #1: Adding portable platform, Dell PP15S.

Change #2: Adding co-location with BT module FCC ID: QDS-BRCM1033.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes PIFA antennas, with the following maximum gain

No	Antenna Manufacturer	Antenna type	Model number	Max Peak gain (2.4GHz)	Comments
1	GALTRONICS	PIFA	06-7015-03 (MAIN) 06-7016-03 (AUX)	TX2 0.18dBi(H)	Dell PP15S
2	GALTRONICS	PIFA	06-7015-03 (MAIN) 06-7016-03 (AUX)	TX2 -1.84dBi(H)	Dell PP15S
3*	GALTRONICS	PIFA	06-7018-03 (MAIN) 06-7031-03 (AUX)	TX2 0.66dBi(V)	Dell PP15S
4	Tyco Electronics	PIFA	2023987-1(TX1) 2023987-1(TX2)	TX2 0.04dBi(H)	Dell PP15S
5	Tyco Electronics	PIFA	2023987-1(TX1) 2023986-1(TX2)	TX2 -0.98dBi(V)	Dell PP15S
6	Tyco Electronics	PIFA	2023989-1(TX1) 2023988-1(TX2)	TX1 -1.17dBi(H)	Dell PP15S

*: Antenna under testing.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 4.170.86.0.

The test utility software used during testing was wl_tool, rev. 4.170.RC86.0.

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 07U11426.

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	PP15S	2102291500004	DoC
AC Adapter	Dell	PA-1450-01D	CN-0GM456-71615-7CP-0021	N/A

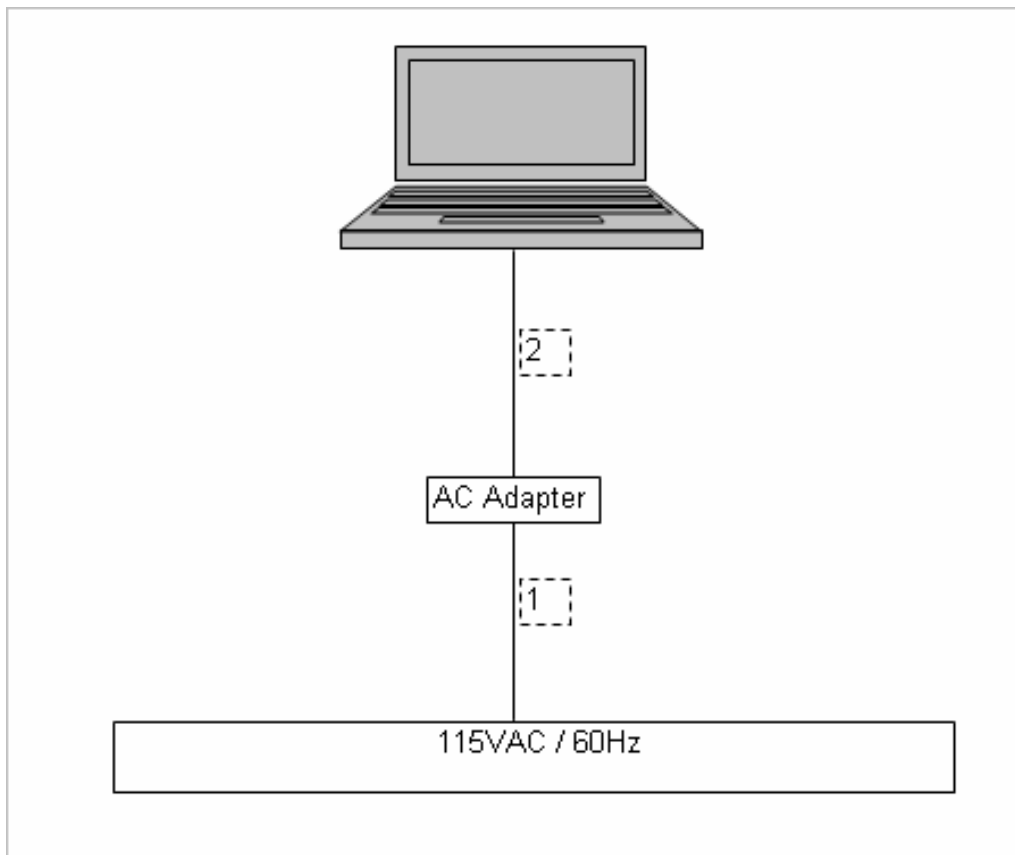
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115V	Unshielded	1.5m	N/A
2	DC	1	DC	Unshielded	1.5m	Ferrite on Laptop's end

TEST SETUP

The EUT is installed inside 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	5/9/2008	5/9/2009
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	2/6/2008	6/12/2009
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.

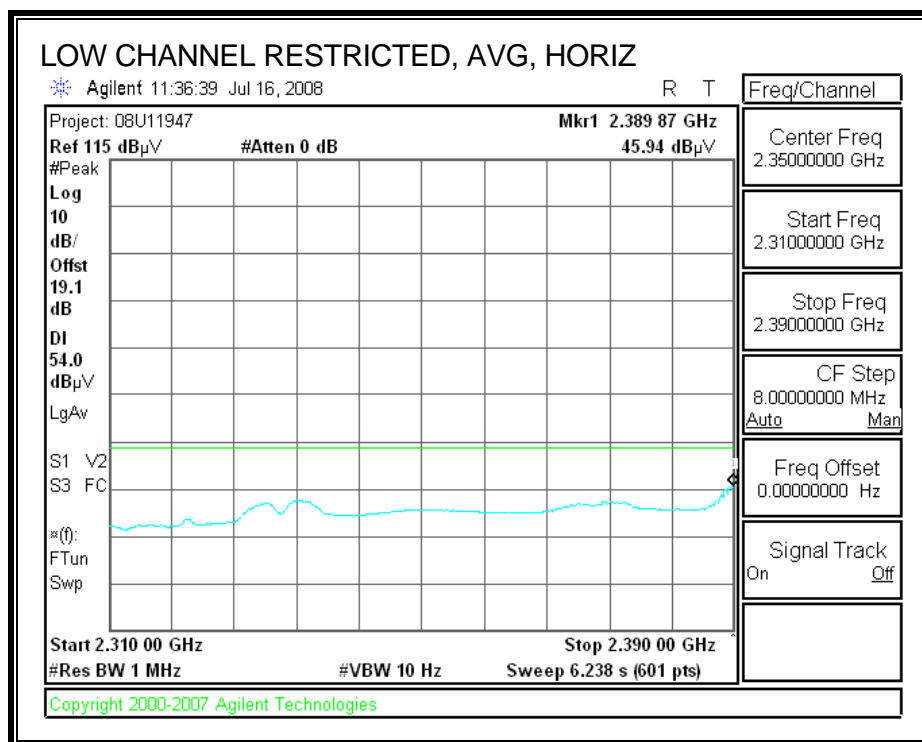
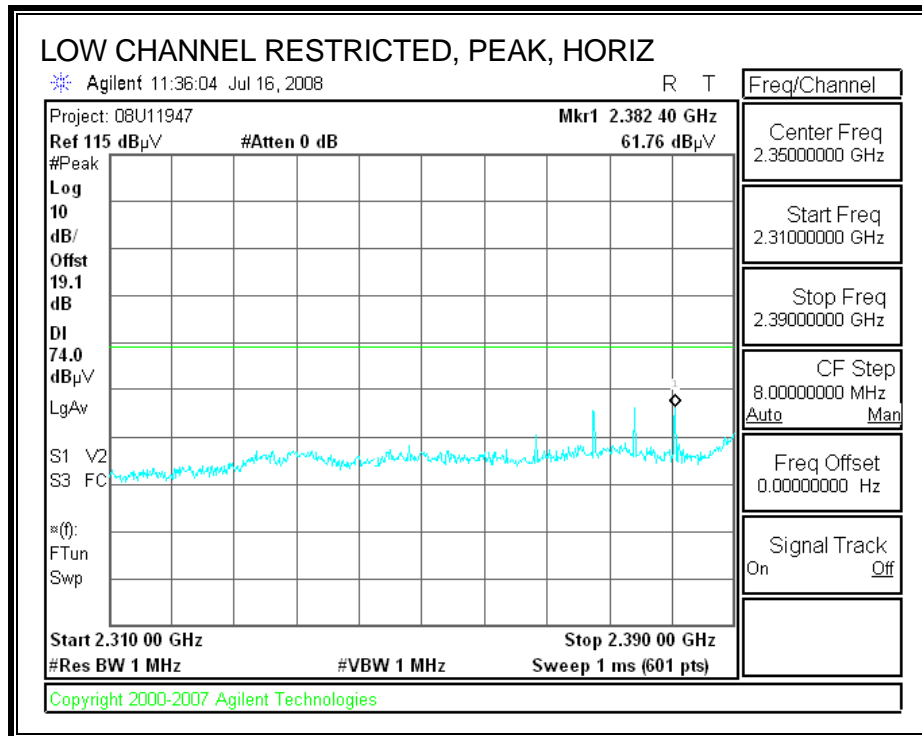
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The 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.

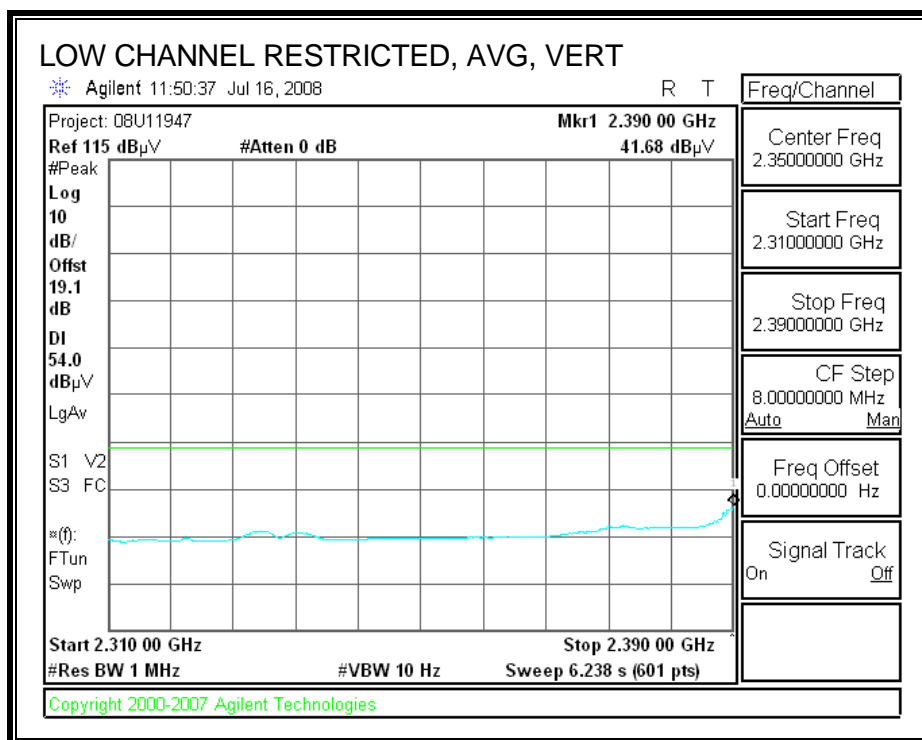
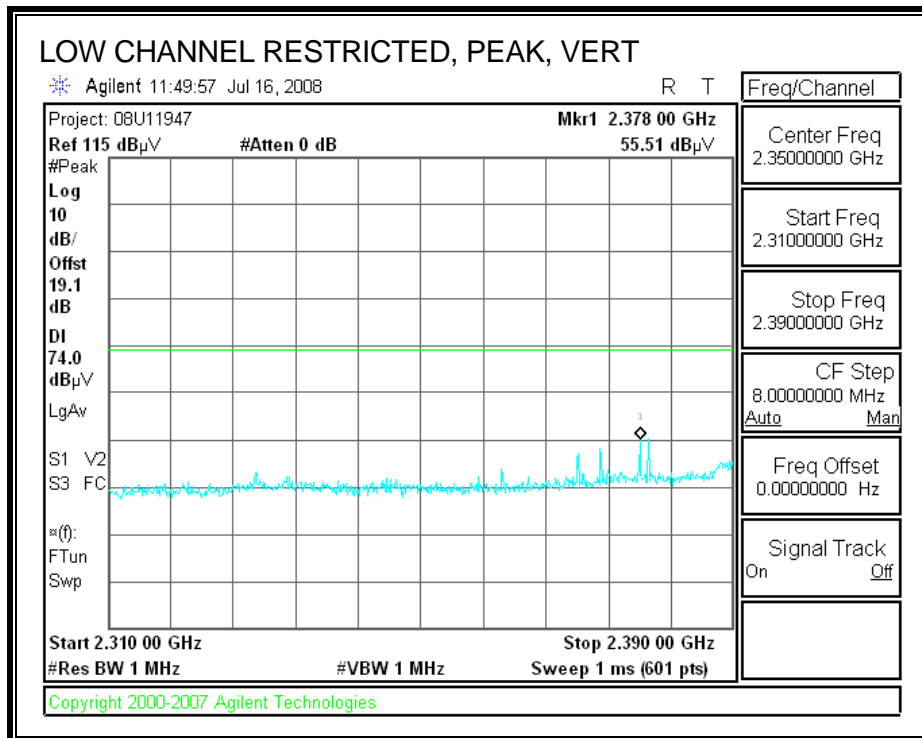
7.2. TRANSMITTER ABOVE 1 GHz

7.2.1. 802.11b MODE

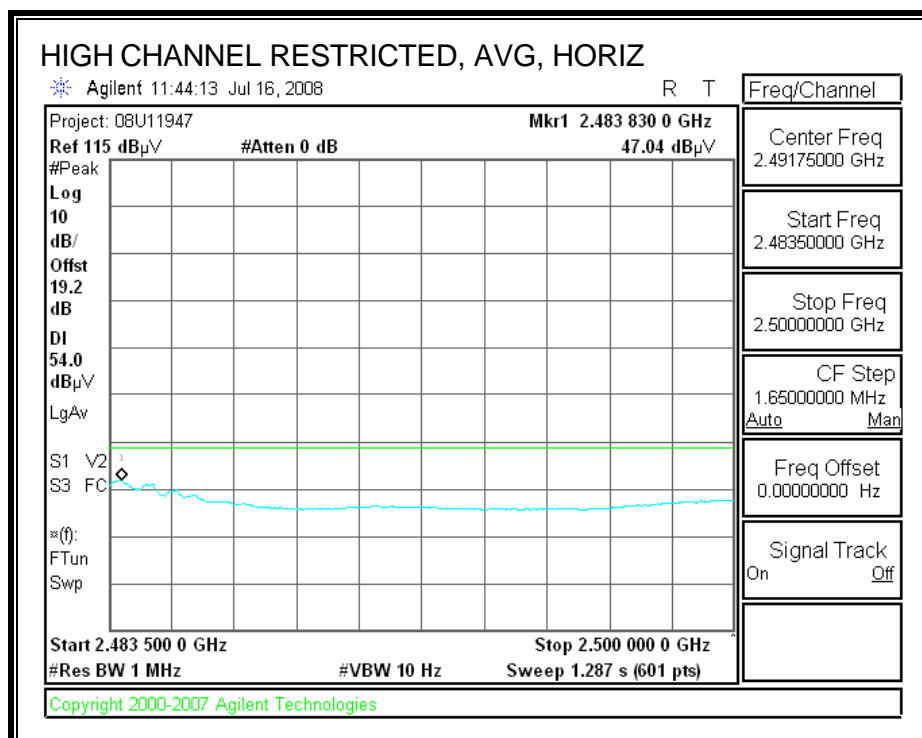
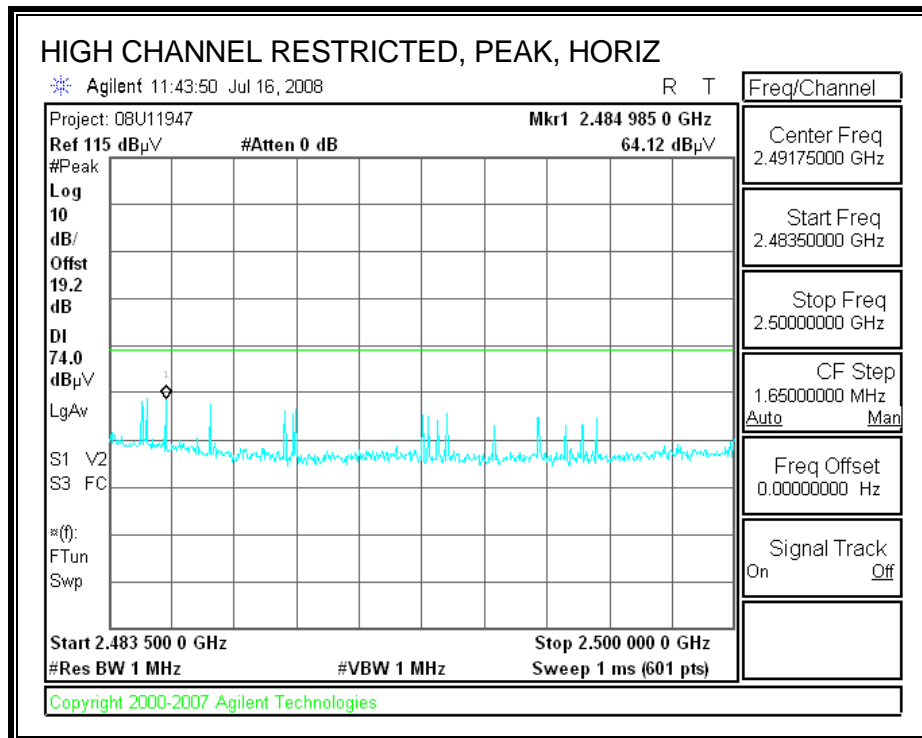
RESTRICTED BANDEDGE (LOW CHANNEL 1, HORIZONTAL)



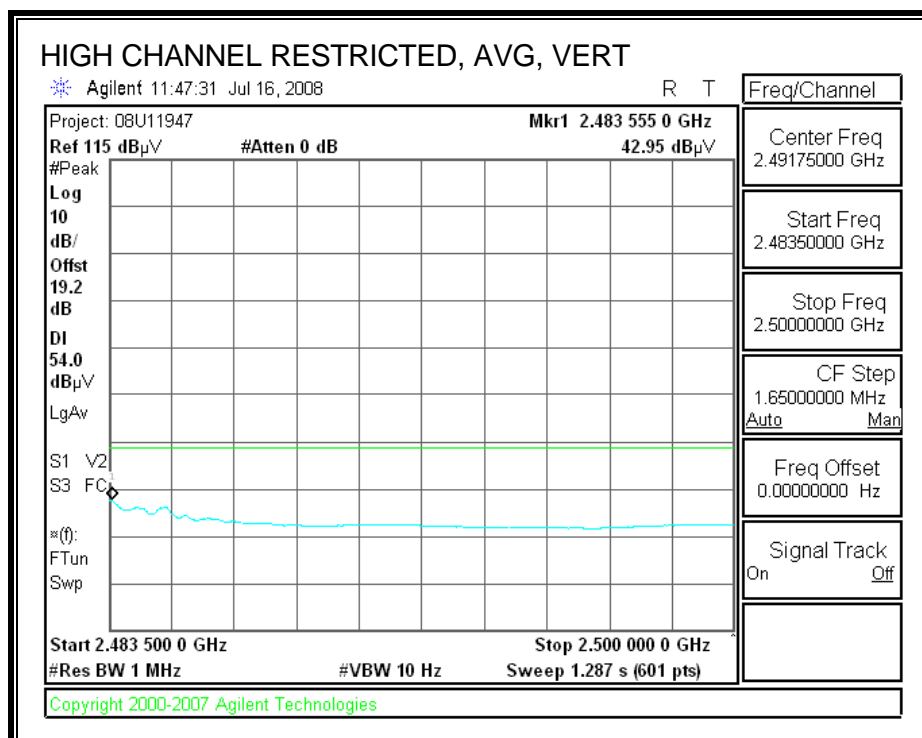
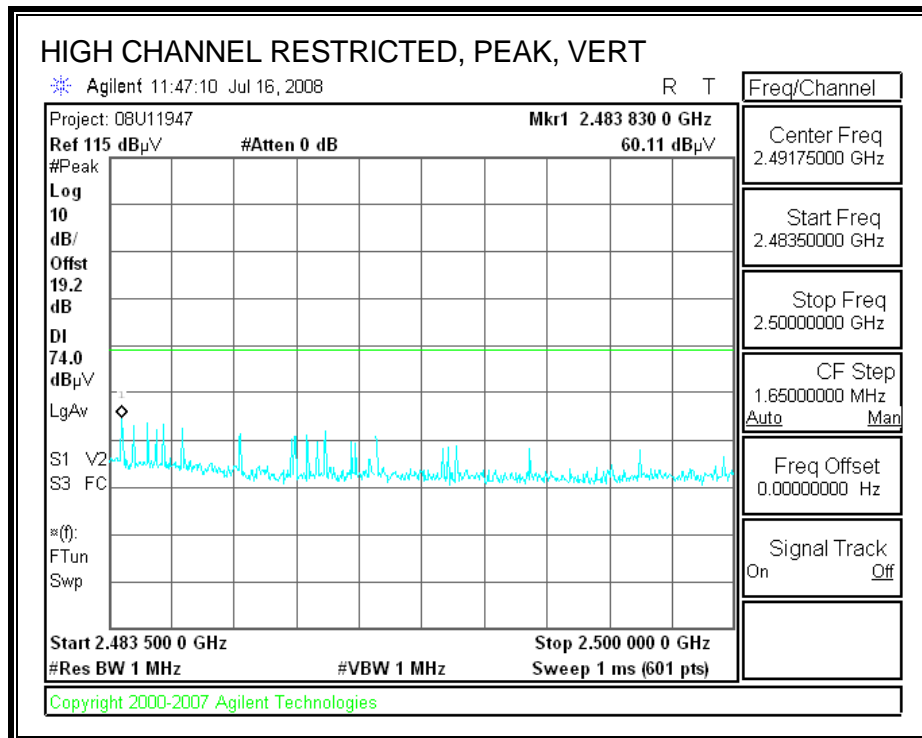
RESTRICTED BANDEDGE (LOW CHANNEL 1, VERTICAL)



RESTRICTED BANEDGE (HIGH CHANNEL 11, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL 11, VERTICAL)

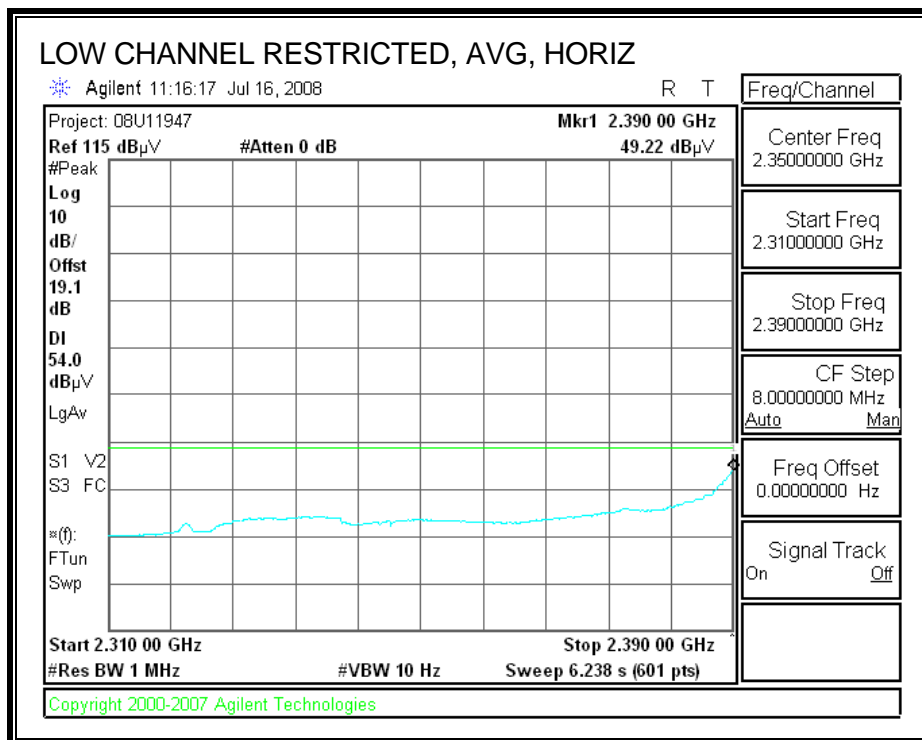
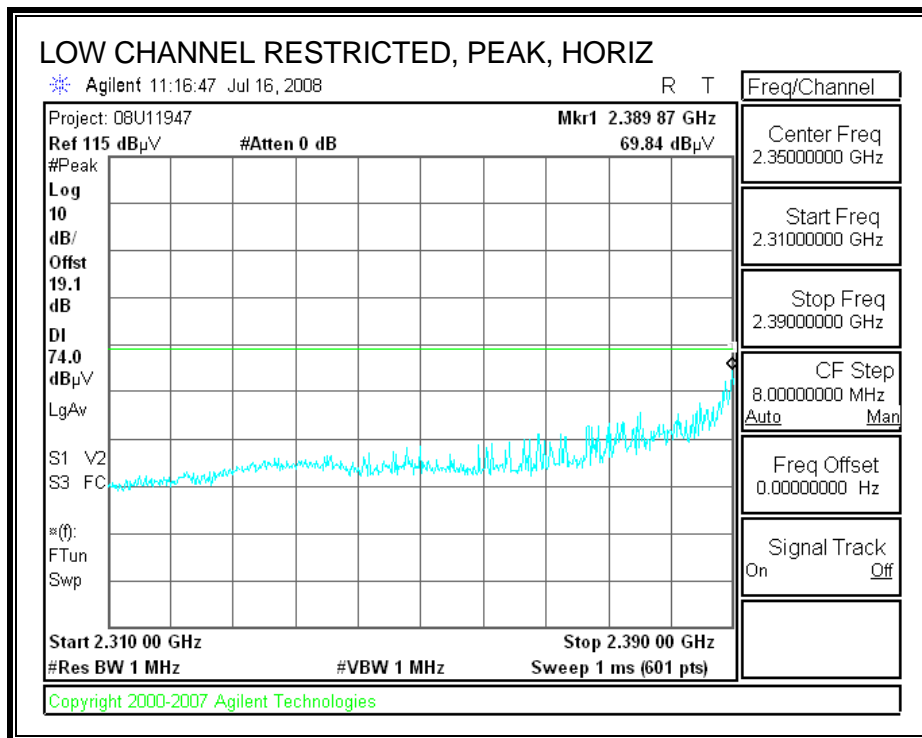


HARMONICS AND SPURIOUS EMISSIONS

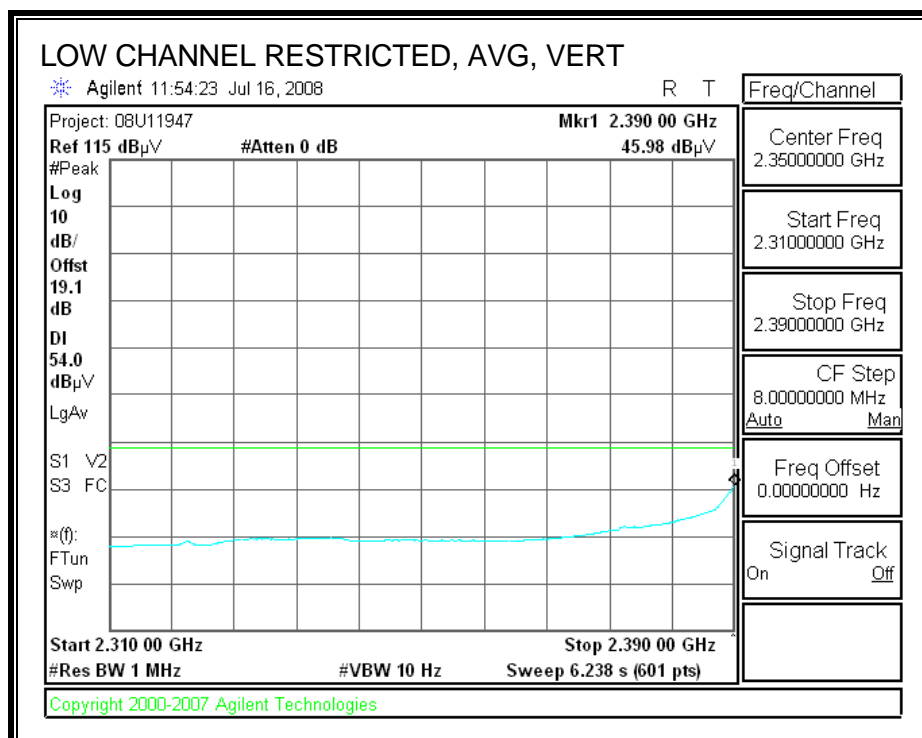
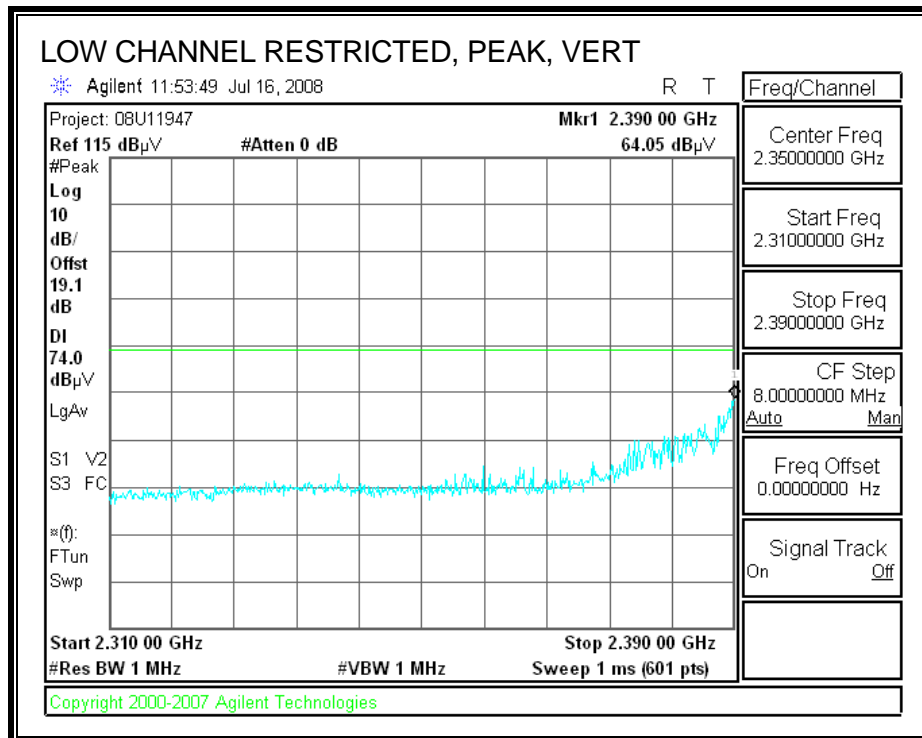
High Frequency Measurement Compliance Certification Services, 3 Meter_C Chamber																	
Company:		Broadcom															
Project #:		08U11947															
Date:		7/16/2008															
Test Engineer:		Vien Tran															
Configuration:		EUT installed inside Dell Minicooper Portable Laptop															
Mode:		Tx 11b															
Test Equipment:																	
Horn 1-18GHz			Pre-amplifer 1-26GHz			Pre-amplifer 26-40GHz			Horn > 18GHz			Limit					
T60; S/N: 2238 @3m			T34 HP 8449B									FCC 15.205					
Hi Frequency Cables																	
2 foot cable			3 foot cable			12 foot cable			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz		
			Thanh 187215003			Ninous 208946002			HPF_4.0GHz								
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)		
LOW CHANNEL, 2412MHz																	
4.824	3.0	42.7	32.3	33.0	2.5	-34.8	0.0	0.6	44.0	33.6	74	54	-30.0	-20.4	H		
12.060	3.0	41.0	31.9	37.4	4.0	-32.5	0.0	0.9	50.8	41.7	74	54	-23.2	-12.3	H		
4.824	3.0	44.9	36.7	33.0	2.5	-34.8	0.0	0.6	46.2	38.0	74	54	-27.8	-16.0	V		
12.060	3.0	43.8	32.9	37.4	4.0	-32.5	0.0	0.9	53.6	42.7	74	54	-20.4	-11.3	V		
MID CHANNEL, 2437 MHz																	
4.874	3.0	44.9	33.7	33.1	2.6	-34.8	0.0	0.6	46.3	35.1	74	54	-27.7	-18.9	H		
7.311	3.0	43.1	32.1	35.5	3.4	-34.1	0.0	0.6	48.5	37.5	74	54	-25.5	-16.5	H		
4.874	3.0	50.4	45.8	33.1	2.6	-34.8	0.0	0.6	51.8	47.2	74	54	-22.2	-6.8	V		
7.311	3.0	44.8	33.3	35.5	3.4	-34.1	0.0	0.6	50.2	38.7	74	54	-23.8	-15.3	V		
HIGH CHANNEL, 2462 MHz																	
4.924	3.0	44.2	33.0	33.1	2.6	-34.8	0.0	0.6	45.7	34.5	74	54	-28.3	-19.5	H		
7.386	3.0	43.8	32.1	35.6	3.5	-34.1	0.0	0.6	49.4	37.7	74	54	-24.6	-16.3	H		
4.924	3.0	48.0	42.9	33.1	2.6	-34.8	0.0	0.6	49.5	44.4	74	54	-24.5	-9.6	V		
7.386	3.0	44.6	33.0	35.6	3.5	-34.1	0.0	0.6	50.2	38.6	74	54	-23.8	-15.4	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										

7.2.2. 802.11g MODE
Channel 1, 2412MHz

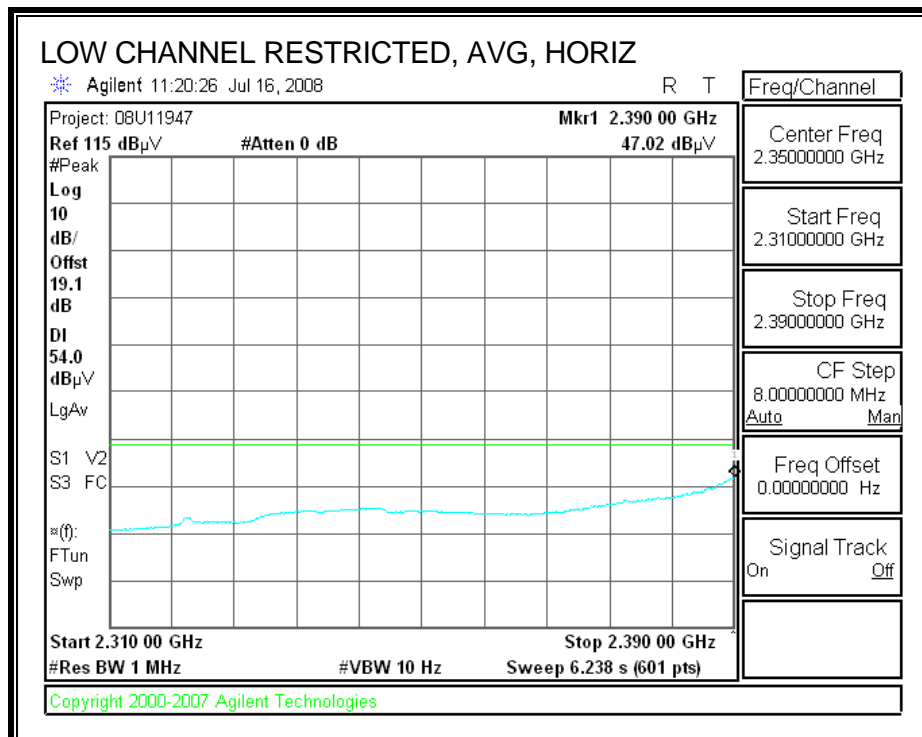
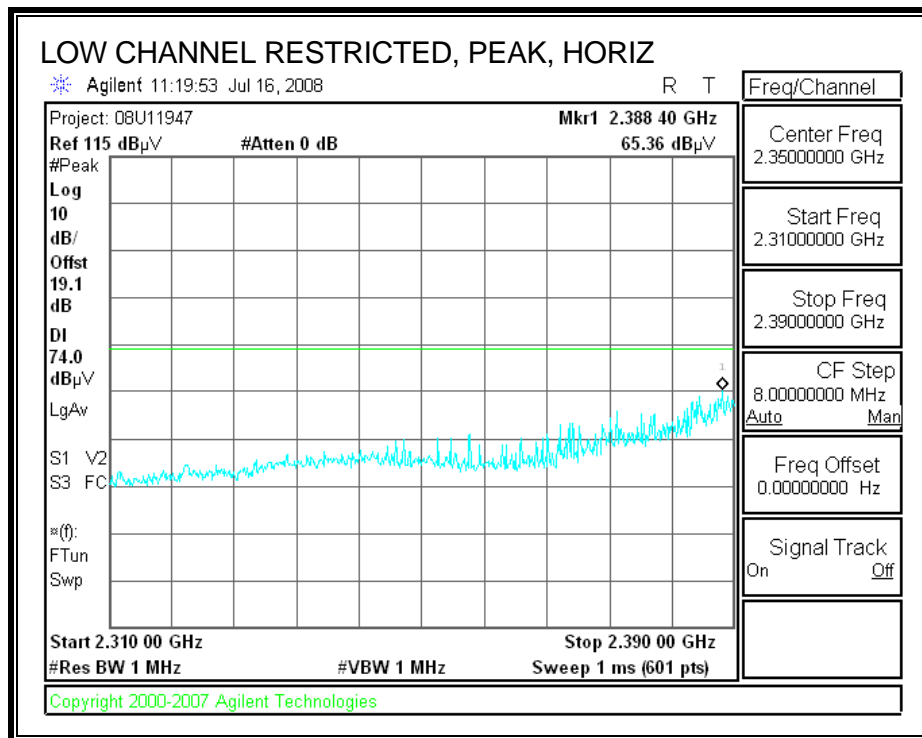
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



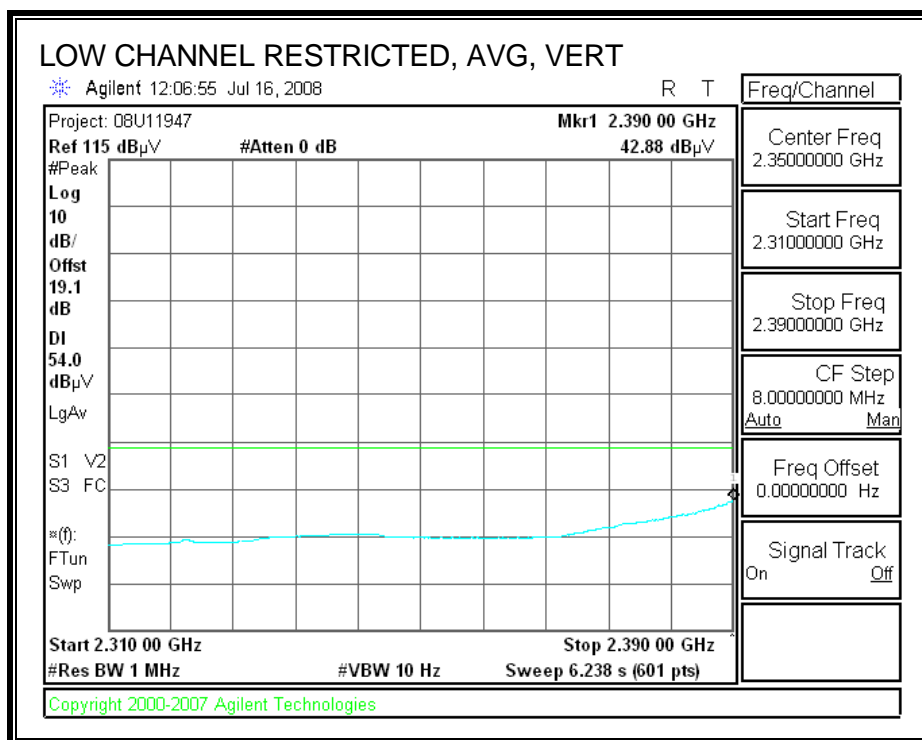
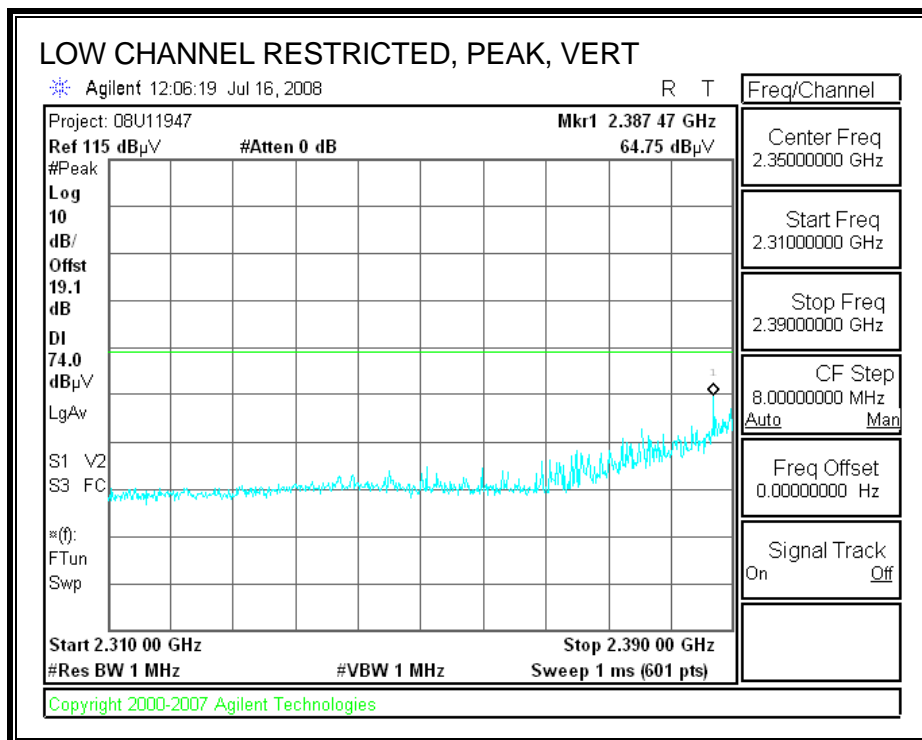
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



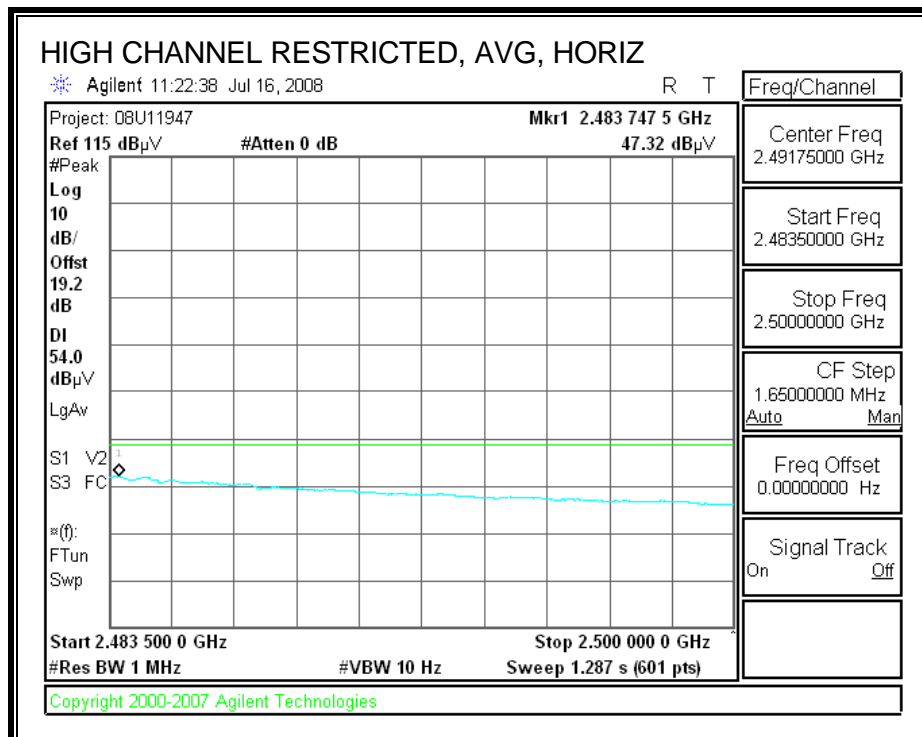
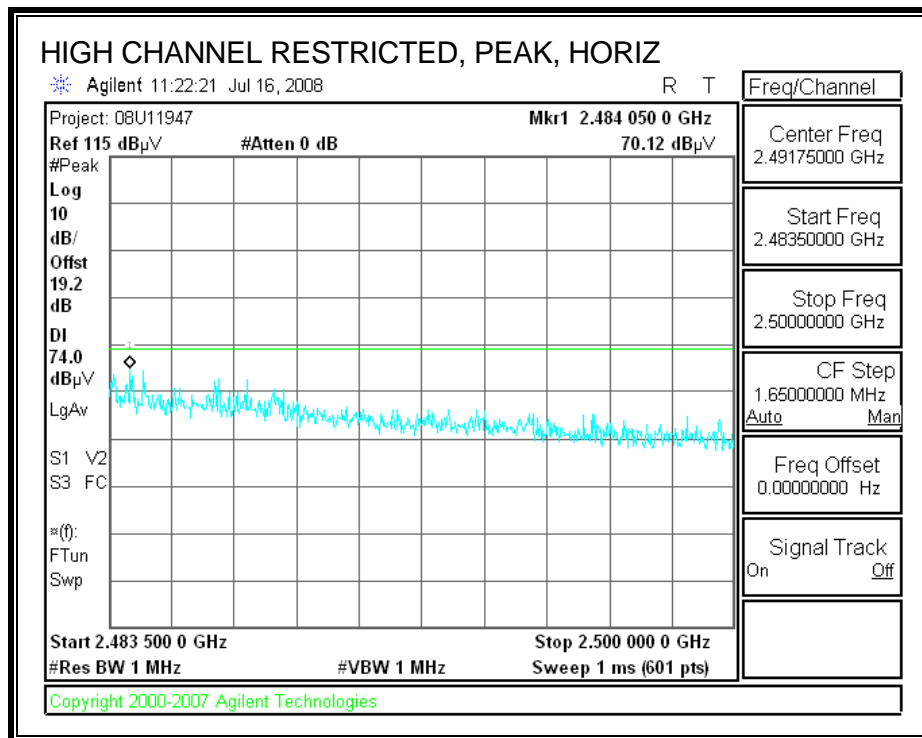
Channel 2, 2417MHz
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



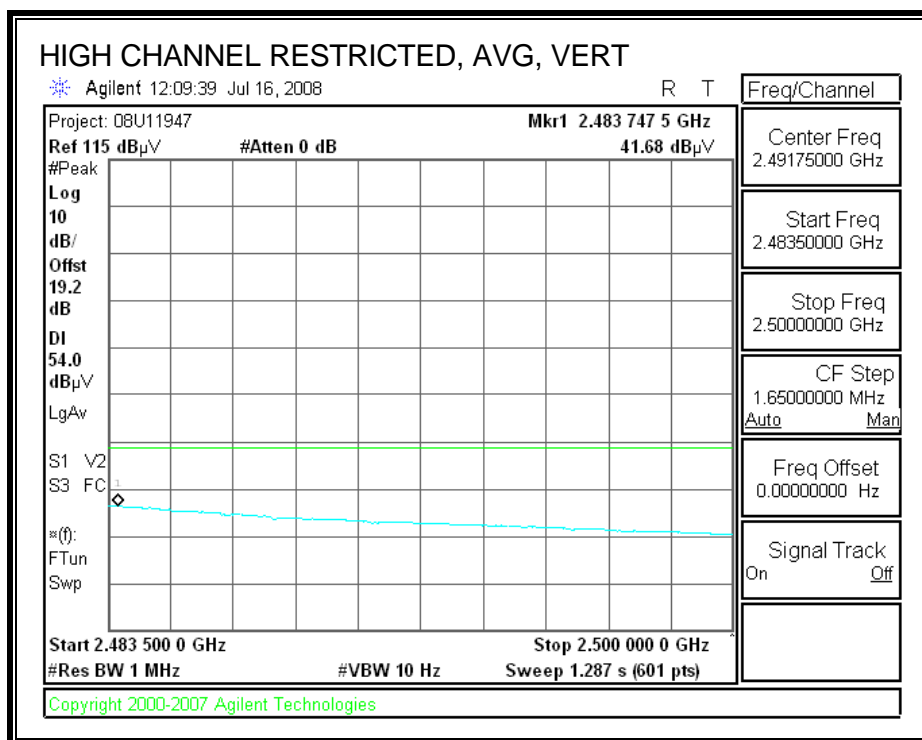
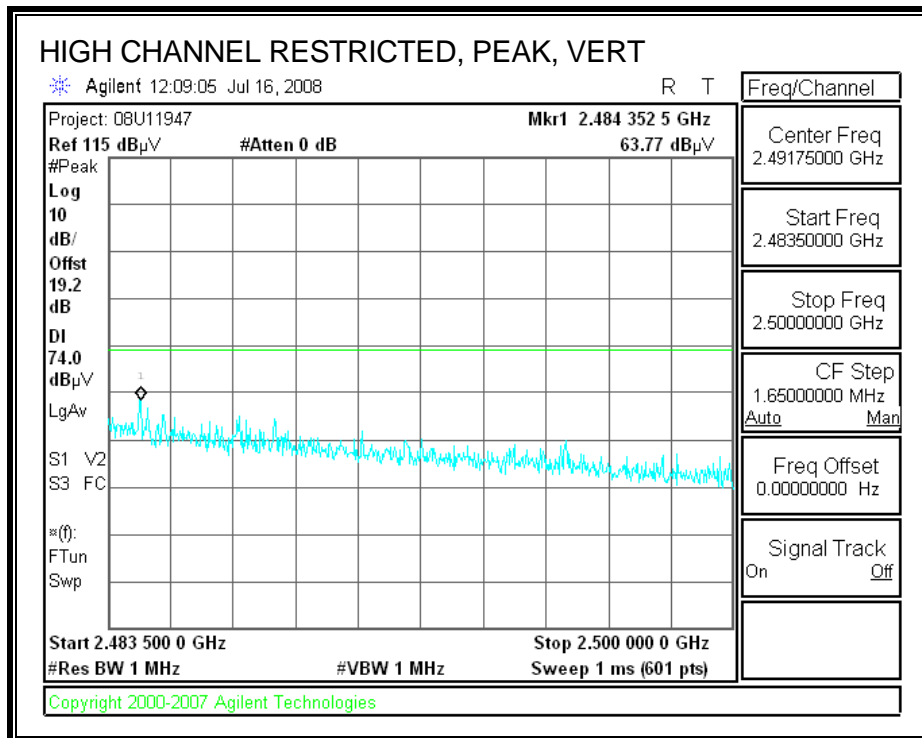
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



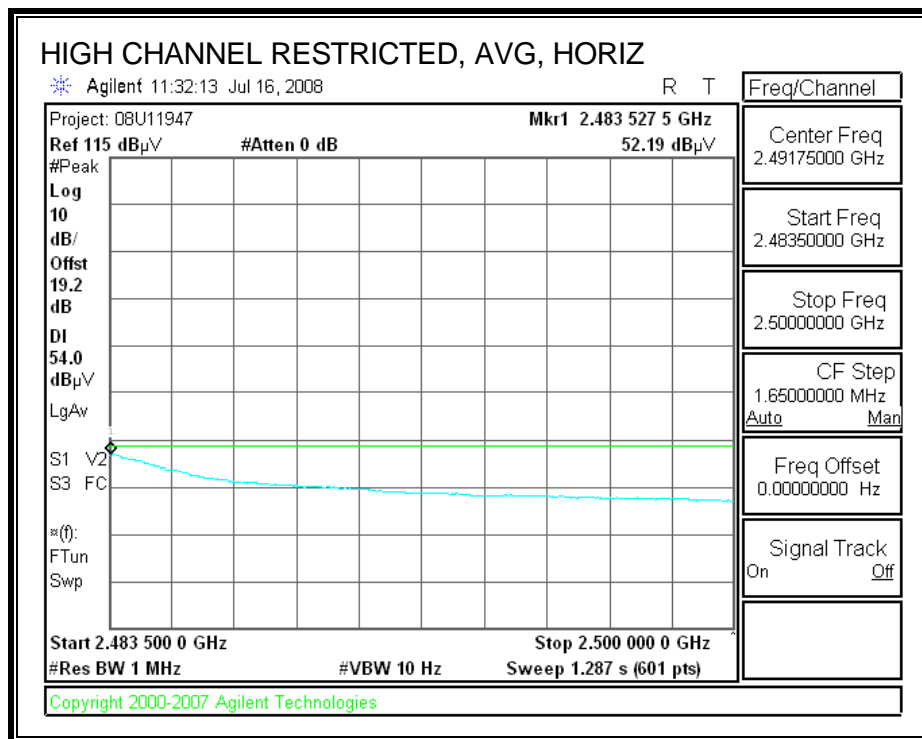
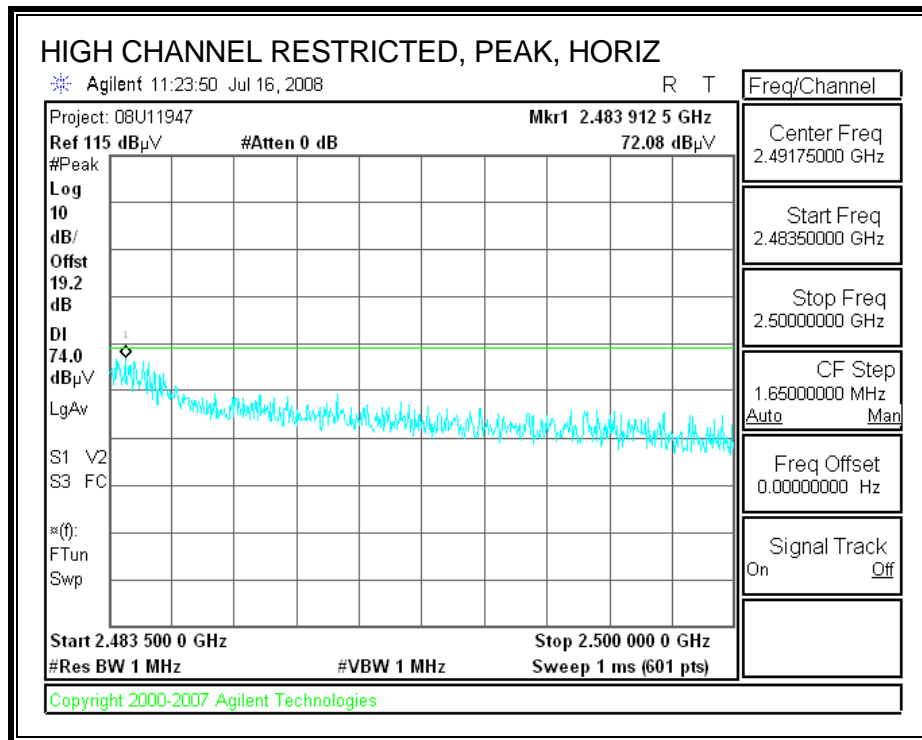
Channel 10, 2457MHz
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



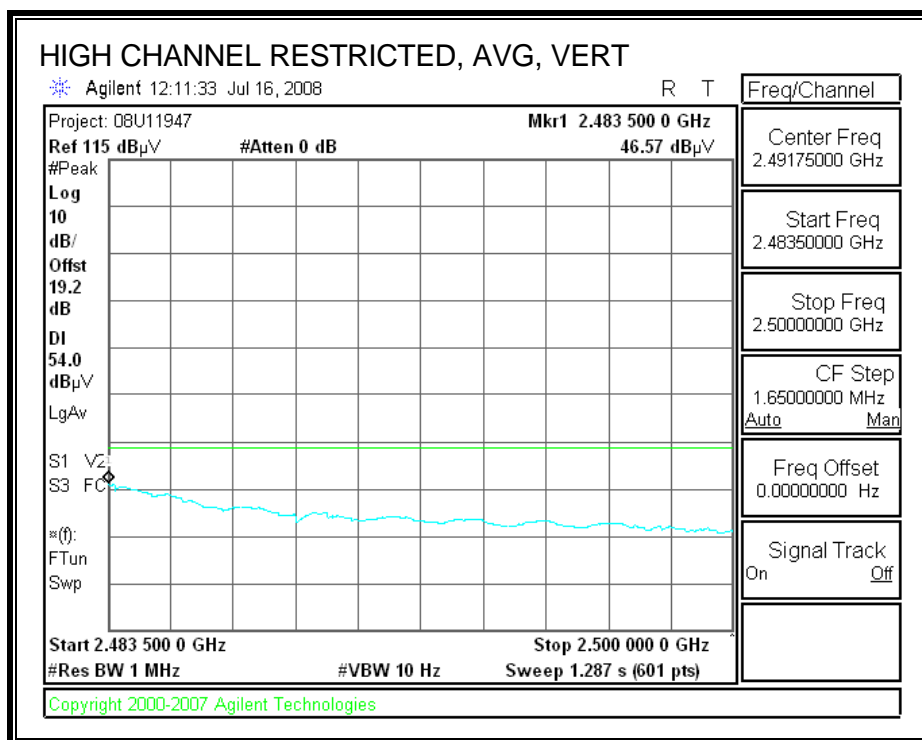
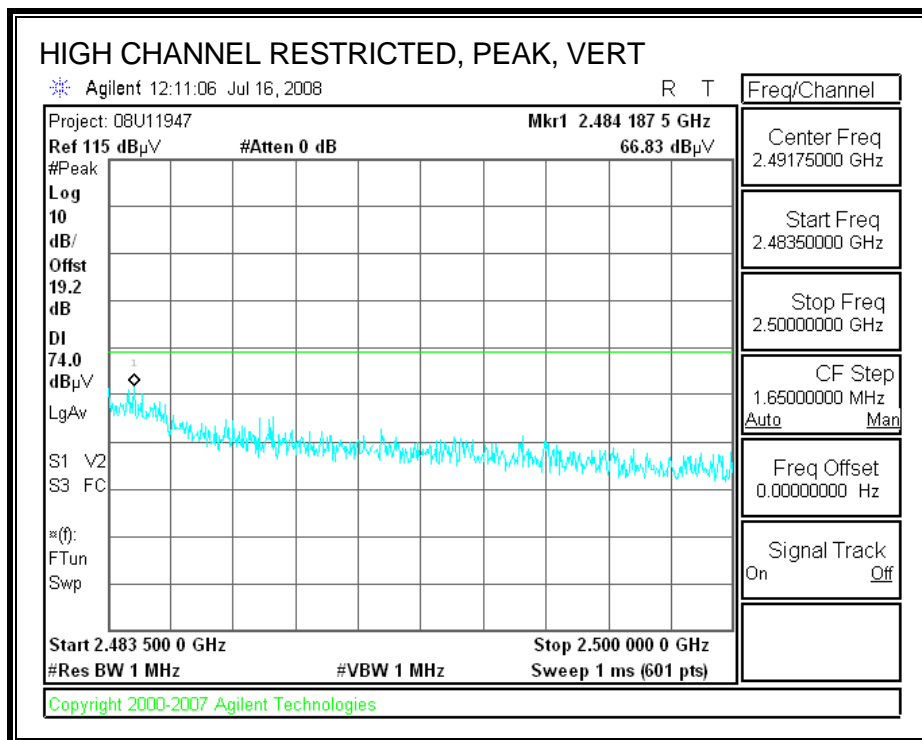
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Channel 11, 2462MHz
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, 3 Meter_C Chamber																
Company:		Broadcom														
Project #:		08U11947														
Date:		7/16/2008														
Test Engineer:		Vien Tran														
Configuration:		EUT installed inside Dell Minicooper Portable Laptop														
Mode:		Tx 11g														
Test Equipment:																
Horn 1-18GHz			Pre-amplifer 1-26GHz			Pre-amplifer 26-40GHz			Horn > 18GHz			Limit				
T60; S/N: 2238 @3m			T34 HP 8449B									FCC 15.205				
Hi Frequency Cables																
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz			
			Thanh 187215003			Ninous 208946002			HPF_4.0GHz				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)	
LOW CHANNEL, 2412MHz																
4.824	3.0	43.2	31.3	33.0	2.5	-34.8	0.0	0.6	44.5	32.6	74	54	-29.5	-21.4	H	
12.060	3.0	41.9	30.5	37.4	4.0	-32.5	0.0	0.9	51.7	40.3	74	54	-22.3	-13.7	H	
4.824	3.0	45.4	32.2	33.0	2.5	-34.8	0.0	0.6	46.7	33.5	74	54	-27.3	-20.5	V	
12.060	3.0	43.0	31.9	37.4	4.0	-32.5	0.0	0.9	52.8	41.7	74	54	-21.2	-12.3	V	
MID CHANNEL, 2437 MHz																
4.874	3.0	44.5	32.8	33.1	2.6	-34.8	0.0	0.6	45.9	34.2	74	54	-28.1	-19.8	H	
7.311	3.0	42.1	31.3	35.5	3.4	-34.1	0.0	0.6	47.5	36.7	74	54	-26.5	-17.3	H	
4.874	3.0	50.7	37.3	33.1	2.6	-34.8	0.0	0.6	52.1	38.7	74	54	-21.9	-15.3	V	
7.311	3.0	44.8	32.9	35.5	3.4	-34.1	0.0	0.6	50.2	38.3	74	54	-23.8	-15.7	V	
HIGH CHANNEL, 2462 MHz																
4.924	3.0	43.7	32.0	33.1	2.6	-34.8	0.0	0.6	45.2	33.5	74	54	-28.8	-20.5	H	
7.386	3.0	43.0	31.0	35.6	3.5	-34.1	0.0	0.6	48.6	36.6	74	54	-25.4	-17.4	H	
4.924	3.0	46.1	33.2	33.1	2.6	-34.8	0.0	0.6	47.6	34.7	74	54	-26.4	-19.3	V	
7.386	3.0	44.2	32.5	35.6	3.5	-34.1	0.0	0.6	49.8	38.1	74	54	-24.2	-15.9	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									

7.3. RECEIVER ABOVE 1 GHz

High Frequency Measurement																	
Compliance Certification Services, 3 Meter_C Chamber																	
Company:		Broadcom															
Project #:		08U11947															
Date:		7/16/2008															
Test Engineer:		Vien Tran															
Configuration:		EUT installed inside Dell Minicooper Portable Laptop															
Mode:		Rx Mode															
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T60; S/N: 2238 @3m			T34 HP 8449B									RX RSS 210					
Hi Frequency Cables																	
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz				
			Thanh 187215003			Ninous 208946002											
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
1.230	3.0	52.2	39.7	26.0	1.6	-37.9	0.0	0.0	41.9	29.4	74	54	-32.1	-24.6	H		
1.330	3.0	57.0	42.4	26.3	1.7	-37.8	0.0	0.0	47.1	32.5	74	54	-26.9	-21.5	H		
1.597	3.0	41.1	35.5	26.9	1.8	-37.4	0.0	0.0	32.4	26.8	74	54	-41.6	-27.2	H		
1.230	3.0	51.1	38.3	26.0	1.6	-37.9	0.0	0.0	40.8	28.0	74	54	-33.2	-26.0	H		
1.330	3.0	57.0	41.5	26.3	1.7	-37.8	0.0	0.0	47.1	31.6	74	54	-26.9	-22.4	V		
1.597	3.0	40.0	34.7	26.9	1.8	-37.4	0.0	0.0	31.3	26.0	74	54	-42.7	-28.0	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										

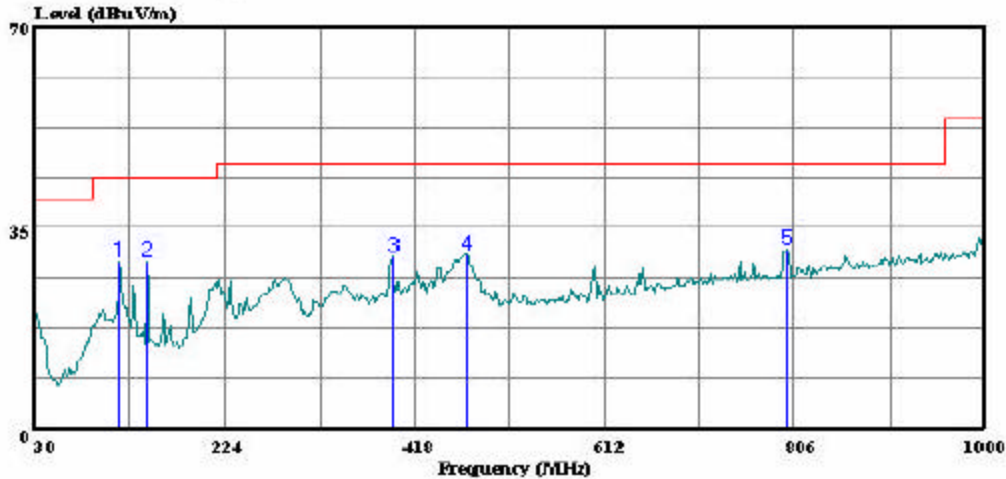
7.4. WORST-CASE BELOW 1 GHz
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL DATA



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

Data#: 2 File#: 08u11947.emi Date: 07-17-2008 Time: 11:26:56



Trace: 1

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
 Test Operator: Vien Tran
 Project #: 08U11947
 Company: Broadcom
 Configuration: EUT installed inside Dell Minicooper
 : laptop
 Mode : Continuous Tx
 Target: FCC Class B

Page: 1

	Freq	Read	Limit	Over		
	MHz	Level	Factor	Level	Line	Limit Remark
		dBuV	dB	dBuV/m	dBuV/m	dB
1	116.330	45.88	-16.82	29.06	43.50	-14.44 Peak
2	145.430	46.08	-17.10	28.98	43.50	-14.52 Peak
3	395.690	41.67	-11.75	29.92	46.00	-16.08 Peak
4	471.350	39.75	-9.47	30.28	46.00	-15.72 Peak
5	798.240	34.55	-3.48	31.07	46.00	-14.93 Peak

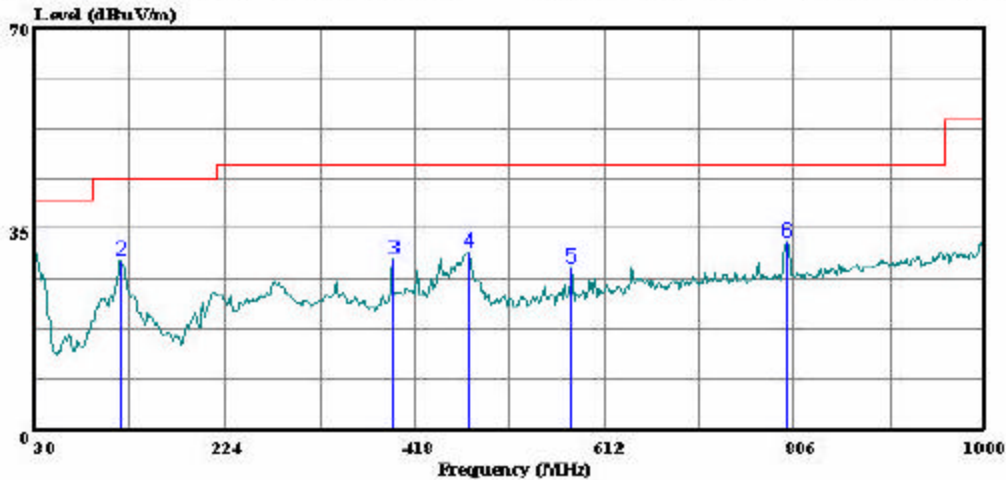
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL DATA



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

Data#: 4 File#: 08u11947.emi Date: 07-17-2008 Time: 11:40:08



Trace: 3

Ref Trace:

Condition: FCC CLASS-B VERTICAL
 Test Operator: Vien Tran
 Project #: 08U11947
 Company: Broadcom
 Configuration: EUT installed inside Dell Minicooper
 : laptop
 Mode: Continuous Tx
 Target: FCC Class B

Page: 1

	Read			Limit	Over	
Peak	Level	Factor	Level	Line	Limit	Remark
	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	42.41	-10.79	31.62	40.00	-8.38 Peak
2	117.300	45.90	-16.61	29.30	43.50	-14.20 Peak
3	395.690	41.50	-11.75	29.75	46.00	-16.25 Peak
4	473.290	40.24	-9.43	30.81	46.00	-15.19 Peak
5	577.080	35.63	-7.60	28.03	46.00	-17.97 Peak
6	798.240	36.31	-3.48	32.83	46.00	-13.17 Peak

8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

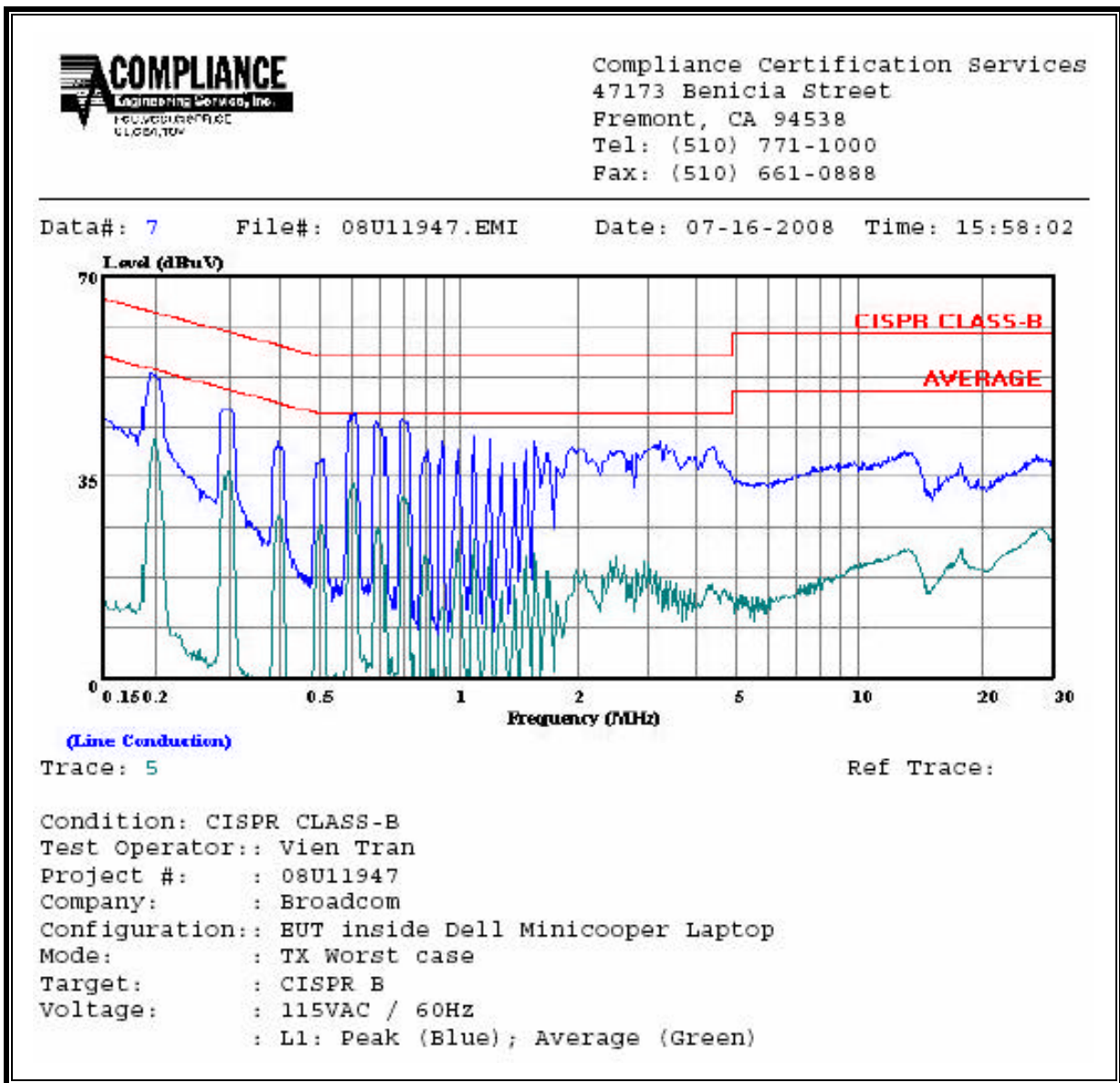
ANSI C63.4

RESULTS

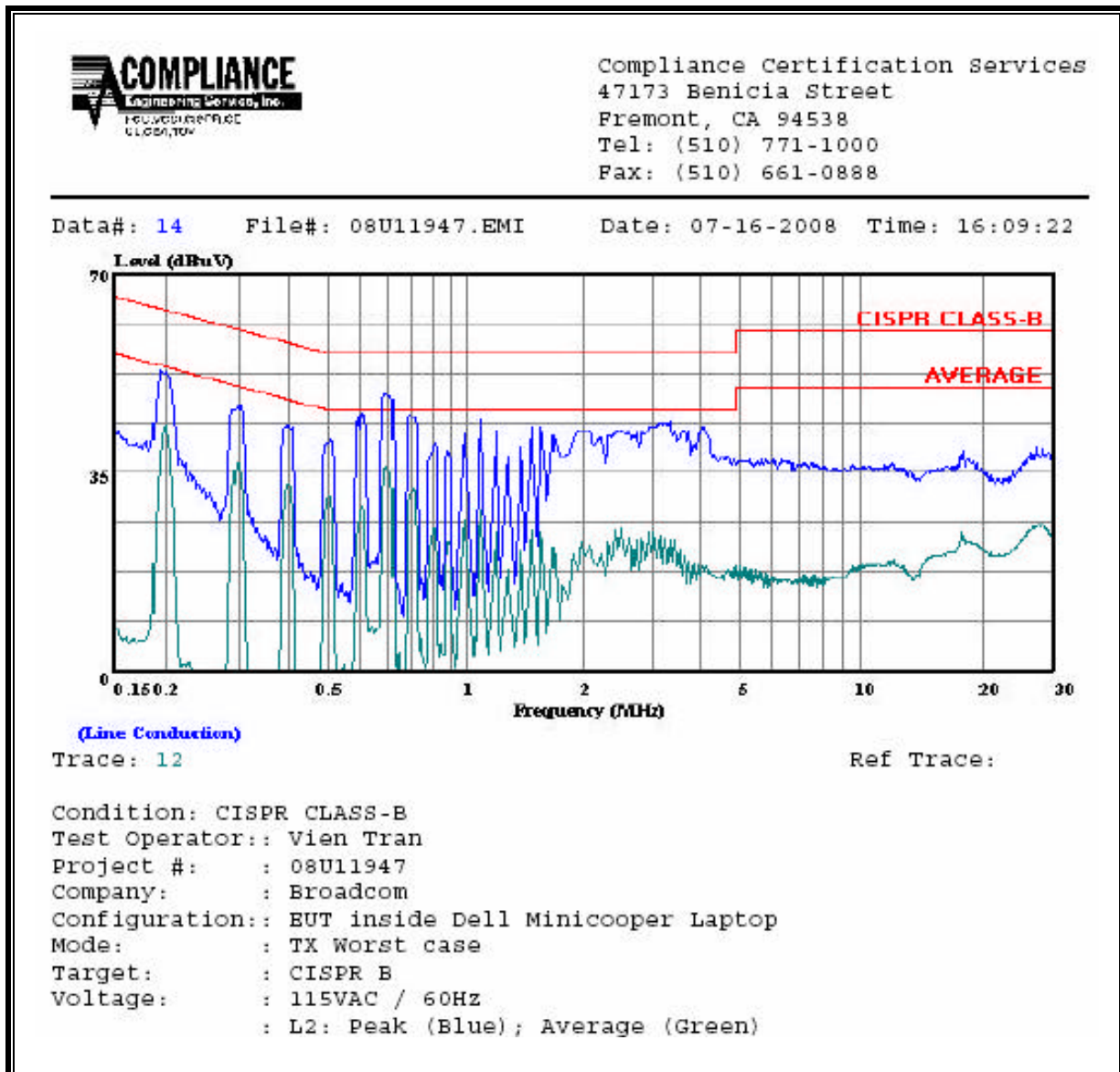
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Class (dB)	Limit QP	FCC B AV	Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.20	52.88	--	41.60	0.00	63.61	53.61	-10.73	-12.01	L1
0.69	45.69	--	33.69	0.00	56.00	46.00	-10.31	-12.31	L1
28.00	38.68	--	25.85	0.00	60.00	50.00	-21.32	-24.15	L1
0.20	52.54	--	43.33	0.00	63.61	53.61	-11.07	-10.28	L2
0.69	48.77	--	36.15	0.00	56.00	46.00	-7.23	-9.85	L2
28.00	39.29	--	25.64	0.00	60.00	50.00	-20.71	-24.36	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



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/ <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.

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

LIMITS

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

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

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	6.07	3.15			
WLAN	2.4 GHz	23.05	0.66			
Combined				20.0	0.05	0.48