



**FCC CFR47 PART 15 SUBPART E  
INDUSTRY CANADA RSS-210 ISSUE 8  
CLASS II PERMISSIVE CHANGE  
CERTIFICATION TEST REPORT**

**FOR**

**802.11a/b/g/n WLAN + Bluetooth PCI-E Mini Card**

**MODEL NUMBER: BCM943228HMB**

**FCC ID: QDS-BRCM1058  
IC: 4324A-BRCM1058**

**REPORT NUMBER: 12U14229-1**

**ISSUE DATE: MARCH 22, 2012**

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**NVLAP LAB CODE 200065-0**

Revision History

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** BROADCOM CORPORATION  
190 MATHILDA PLACE  
SUNNYVALE, CA 94086, UNITED STATES

**EUT DESCRIPTION:** 802.11a/b/g/n WLAN + Bluetooth PCI-E Mini Card

**MODEL:** BCM943228HMB

**SERIAL NUMBER:** 74DE2B3448FE (P305)

**DATE TESTED:** 02/11/2012, 02/13/2012, 02/16-02/17/2012, and 02/20/2012

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

Compliance Certification Services (UL 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 UL 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL 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 UL CCS By:

Tested By:



THU CHAN  
ENGINEERING MANAGER  
UL CCS



DAVID GARCIA  
EMC ENGINEER  
UL CCS

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, ANSI C63.10-2009, RSS-GEN Issue 3, and RSS-210 Issue 8.

## 3. FACILITIES AND ACCREDITATION

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

UL 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 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 802.11a/b/g/n WLAN + Bluetooth PCI-E Mini Card.

The radio module is manufactured by Broadcom.

### 5.2. MAXIMUM OUTPUT POWER

The measured average power values were within  $\pm 0.5$  dB of the original values. Refer to original report number "11U13795-2A FCC IC UNII WLAN Report" for exact output power values and for all antenna port results.

### 5.3. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The change filed under this application is the addition of an alternate monopole antenna.

### 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes antennas with maximum gains as a function of frequency as given in the following table:

Antenna Type	Peak Gain (dBi)					Comments
	2400-2483.5MHz	5150-5250MHz	5250-5350MHz	5470-5725MHz	5725-5850MHz	
802.11g/g/n WLAN	3.9	5.6	5.6	4.2	4.2	Original authorization
Monopole	1.21	2.15	2.06	1.62	1.36	Class 2 Permissive Change

### 5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.100.82.54.

The test utility software used during testing was BCM Internal, rev. 5.100.RC82.54.

## **5.6. WORST-CASE CONFIGURATION AND MODE**

The EUT was tested as an external module installed in a test jig board connected to a host Laptop PC.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

All final tests in the 802.11a Legacy mode were made at 6 Mb/s.

All final tests in the 802.11n 20 MHz CDD/SDM mode were made at MCS0.

All final tests in the 802.11n 40 MHz CDD/SDM mode were made at MCS0.

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power, that was determined to be 11n HT40 mode, mid channel.

The antennas were oriented to provide worst case radiated emissions. X, Y and Z antenna positions were tested to determine worst case emissions. The antennas in the Y position was determined to be the worst case orientation and provided the highest levels of emissions.



## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	Lenovo	G560	CBD6427441	DoC
AC Adapter	Lenovo	PA-1650-56LC	11S36001651ZZH0008KCMA	DoC
Mini PC Adapter	Catalyst	MINI2EXP	Suhail 02	N/A

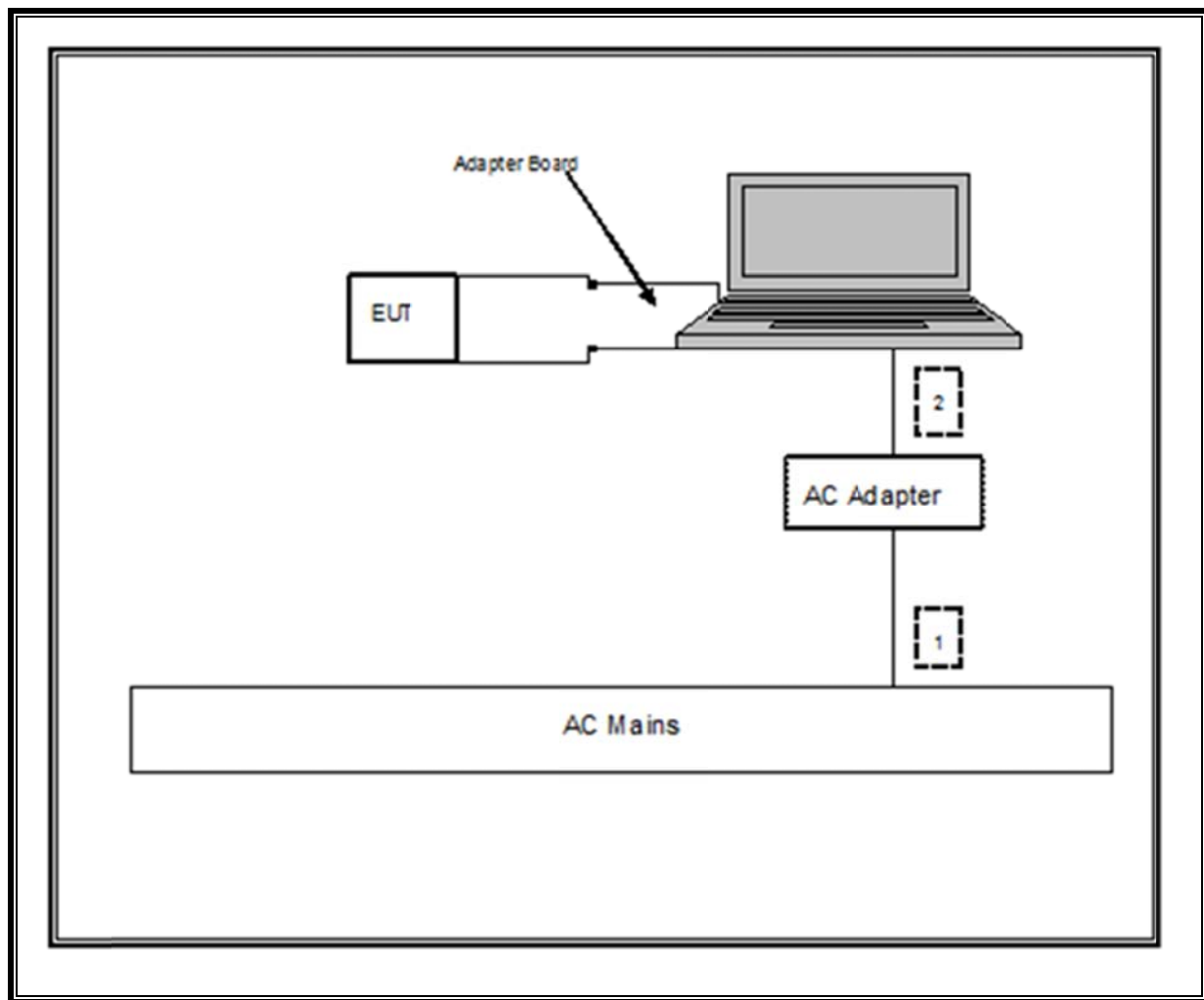
### I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identic Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Unshielded	1.0m	Detachable. 3C/18AWG.
2	DC	1	DC	Unshielded	1.8m	Non-detachable. Ferrite loaded at laptop end of cable.

### TEST SETUP

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

**SETUP DIAGRAM FOR TESTS**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	7/16/2012
Antenna, Horn, 18 GHz	EMCO	3115	C00945	6/29/2012
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	7/28/2012
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	2/16/2013
EMI Receiver, 6.5GHz	Agilent / HP	85462A		2/23/2013
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	11/11/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	7/12/2012
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02679	CNR
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02680	CNR
Reject Filter, 5.47-5.725 GHz	Micro-Tronics	BRC13191	N02678	CNR
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR
Highpass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02601	CNR

## **6.1. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS**

### **LIMITS**

None; for reporting purposes only.

### **PROCEDURE**

KDB 789033 Zero-Span Spectrum Analyzer Method.

#### **6.1.1. ON TIME AND DUTY CYCLE RESULTS**

<b>Mode</b>	<b>ON Time B (msec)</b>	<b>Period (msec)</b>	<b>Duty Cycle x (linear)</b>	<b>Duty Cycle (%)</b>	<b>Duty Cycle Correction Factor (dB)</b>	<b>1/B Minimum VBW (kHz)</b>
802.11a 20 MHz	1.925	2.100	0.917	91.7%	0.38	0.519
802.11n HT20	1.920	2.305	0.833	83.3%	0.79	0.521
802.11n HT40	0.867	1.403	0.618	61.8%	2.09	1.154

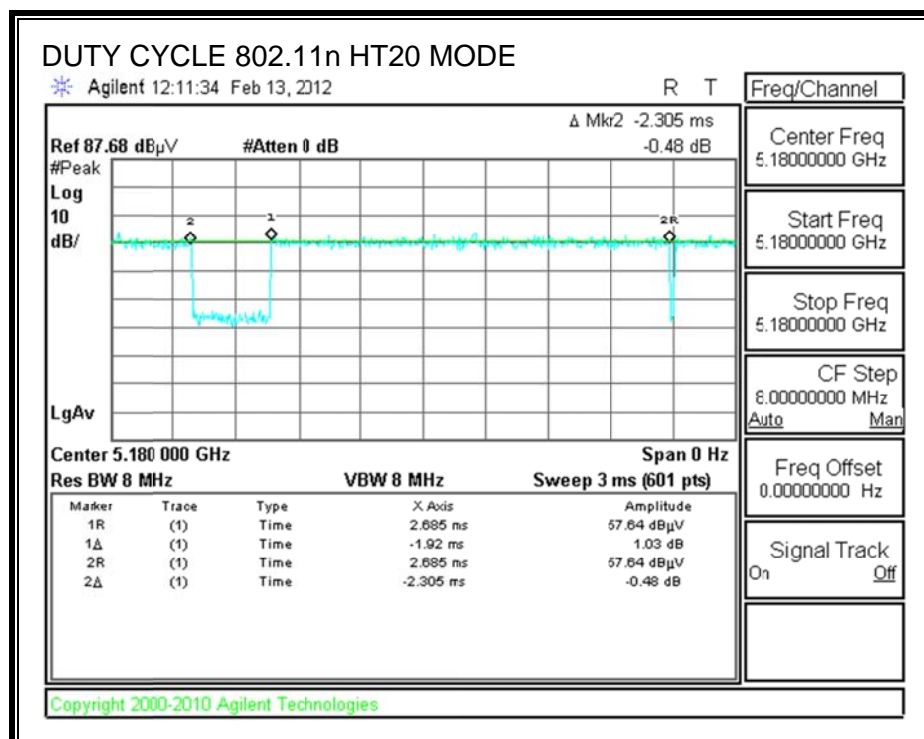
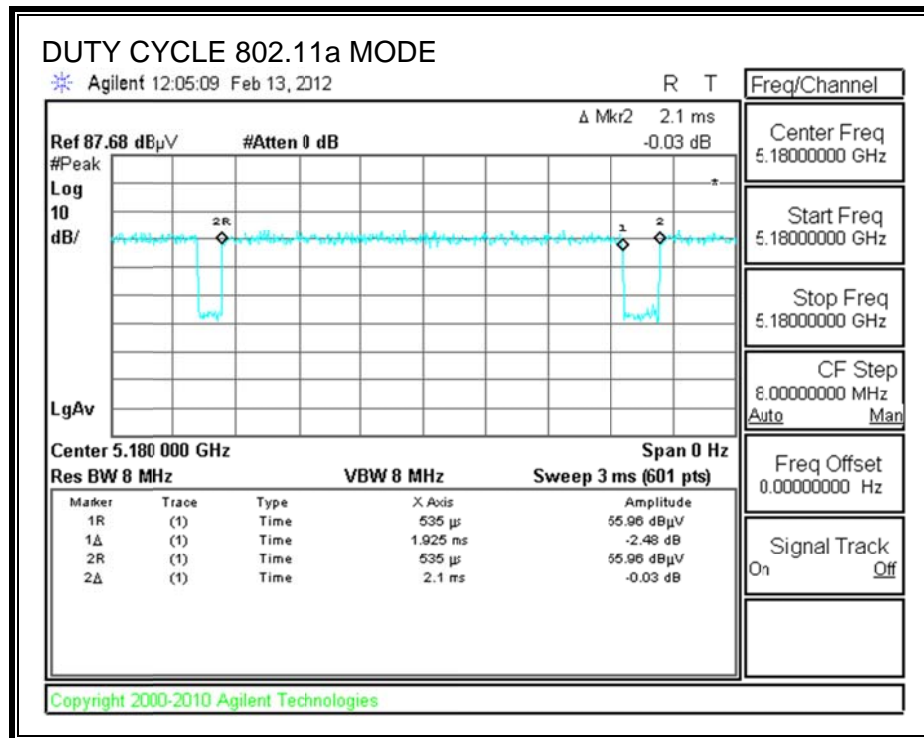
#### **6.1.2. MEASUREMENT METHOD FOR POWER AND PPSD**

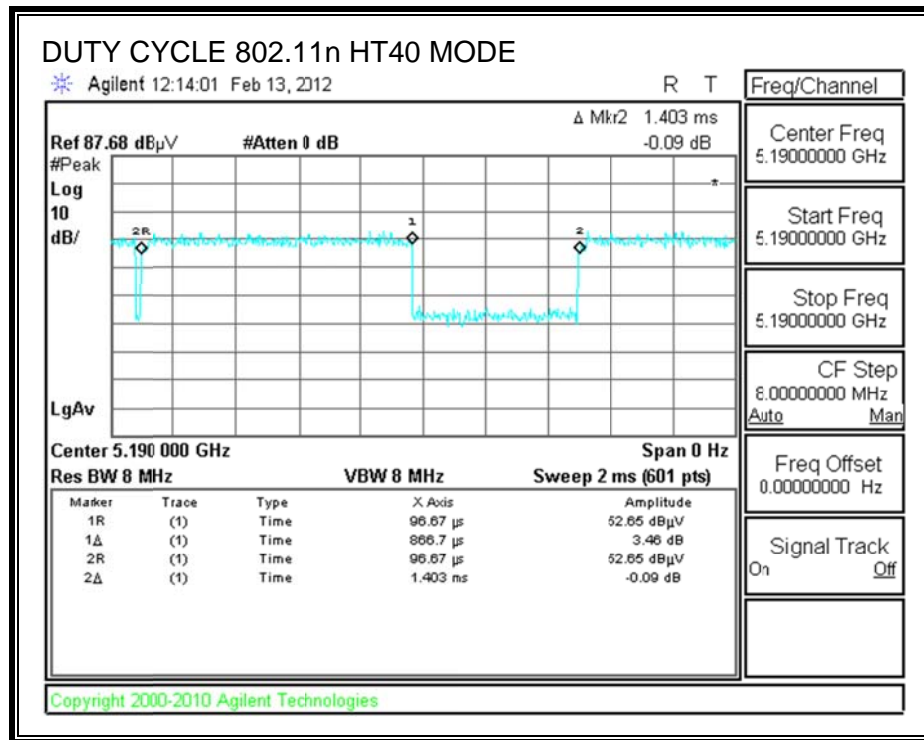
The Duty Cycle is less than 98% and not consistent therefore KDB 789033 Method SA-3 Alternative with Power RMS Averaging is used.

#### **6.1.3. MEASUREMENT METHOD FOR AVERAGE SPURIOUS EMISSIONS ABOVE 1 GHz**

The Duty Cycle is less than 98% and not consistent therefore KDB 789033 Method VB with Power RMS Averaging is used.

## 6.1.4. DUTY CYCLE PLOTS





## 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.

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; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

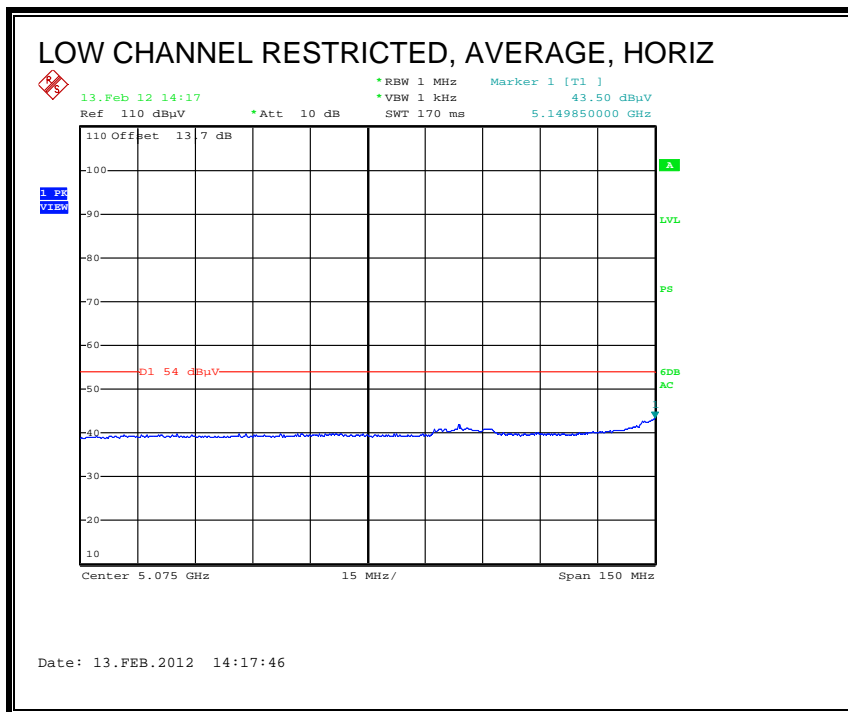
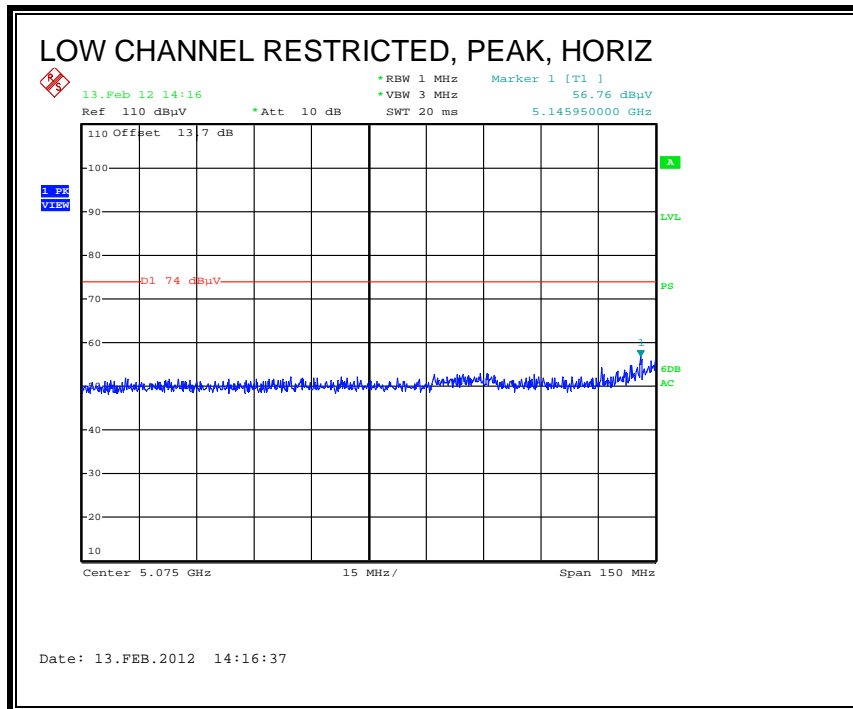
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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

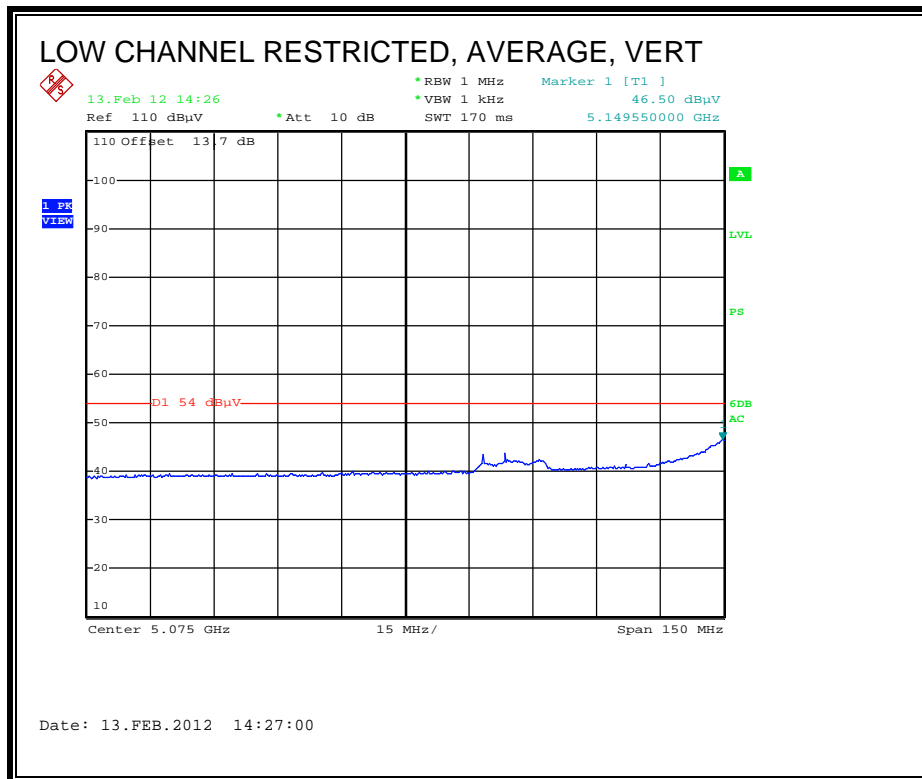
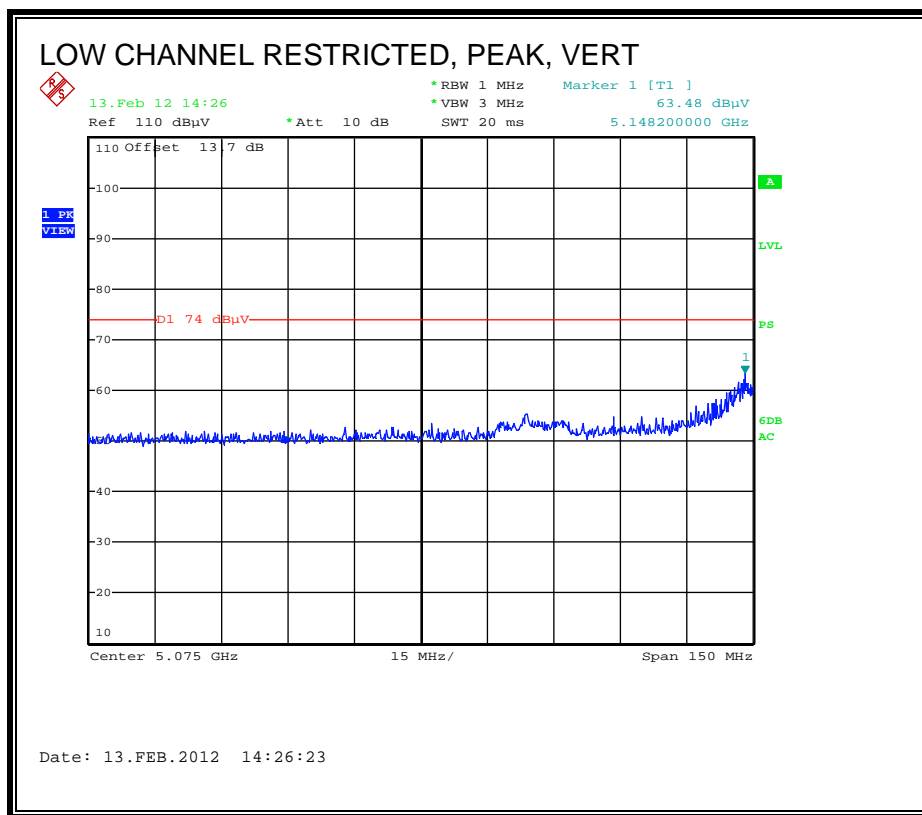
## 7.2. TRANSMITTER ABOVE 1 GHz

### 7.2.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND

#### RESTRICTED BANDEDGE (LOW CHANNEL)







## HARMONICS AND SPURIOUS EMISSIONS

### High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber A

Test Engr: Dennis Huang  
Date: 02/17/12  
Project #: 12U14229  
Company: Broadcom  
Test Target: FCC 15.205  
Mode Oper: 802.11a Tx

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	

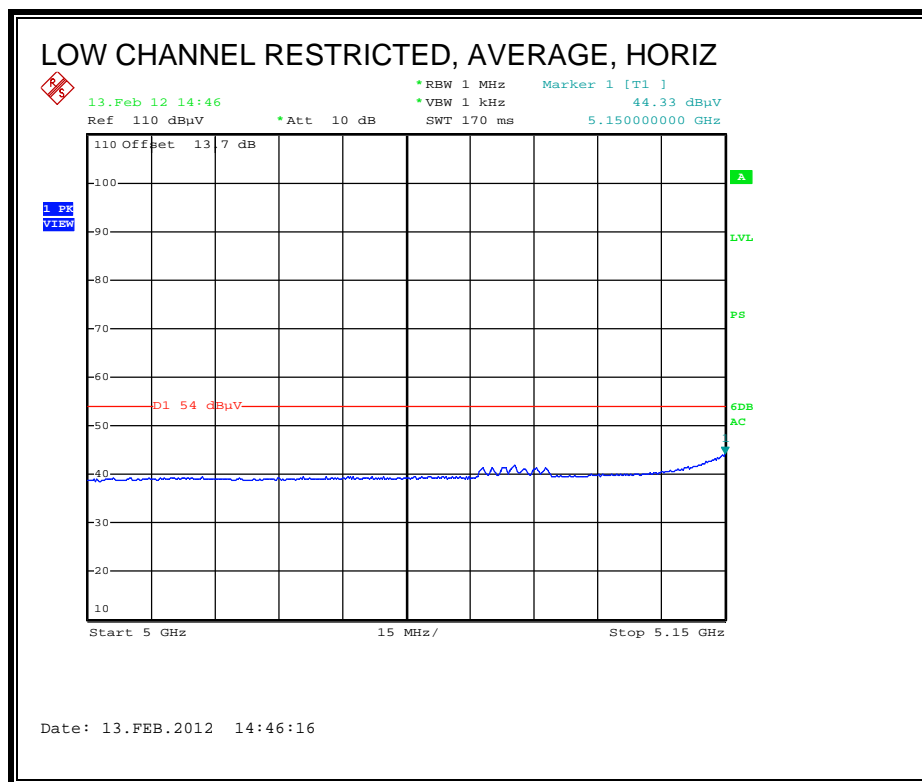
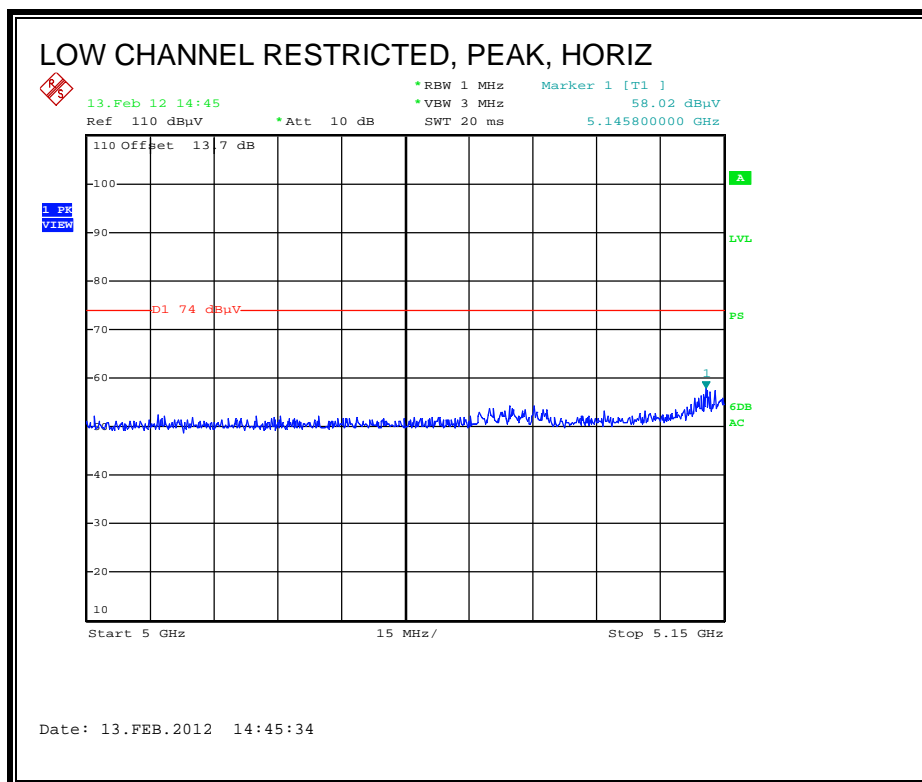
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel - 5180MHz															
15.540	3.0	36.5	39.0	11.3	-34.8	0.0	0.7	52.8	74.0	-21.2	V	P	198.6	217.8	
15.540	3.0	26.2	39.0	11.3	-34.8	0.0	0.7	42.5	54.0	-11.5	V	A	198.6	217.8	
15.540	3.0	36.3	39.0	11.3	-34.8	0.0	0.7	52.6	74.0	-21.4	H	P	112.3	140.7	
15.540	3.0	26.0	39.0	11.3	-34.8	0.0	0.7	42.2	54.0	-11.8	H	A	112.3	140.7	
Mid Channel - 5200MHz															
15.600	3.0	35.9	38.8	11.4	-34.8	0.0	0.7	52.0	74.0	-22.0	V	P	137.6	190.9	
15.600	3.0	25.4	38.8	11.4	-34.8	0.0	0.7	41.5	54.0	-12.5	V	A	137.6	190.9	
15.600	3.0	35.2	38.8	11.4	-34.8	0.0	0.7	51.3	74.0	-22.7	H	P	112.1	91.2	
15.600	3.0	25.3	38.8	11.4	-34.8	0.0	0.7	41.4	54.0	-12.6	H	A	112.1	91.2	
High Channel - 5240MHz															
15.720	3.0	35.6	38.4	11.4	-34.7	0.0	0.7	51.5	74.0	-22.5	V	P	118.5	255.8	
15.720	3.0	25.8	38.4	11.4	-34.7	0.0	0.7	41.6	54.0	-12.4	V	A	118.5	255.8	
15.720	3.0	35.6	38.4	11.4	-34.7	0.0	0.7	51.5	74.0	-22.5	H	P	126.6	227.1	
15.720	3.0	25.4	38.4	11.4	-34.7	0.0	0.7	41.2	54.0	-12.8	H	A	126.6	227.1	

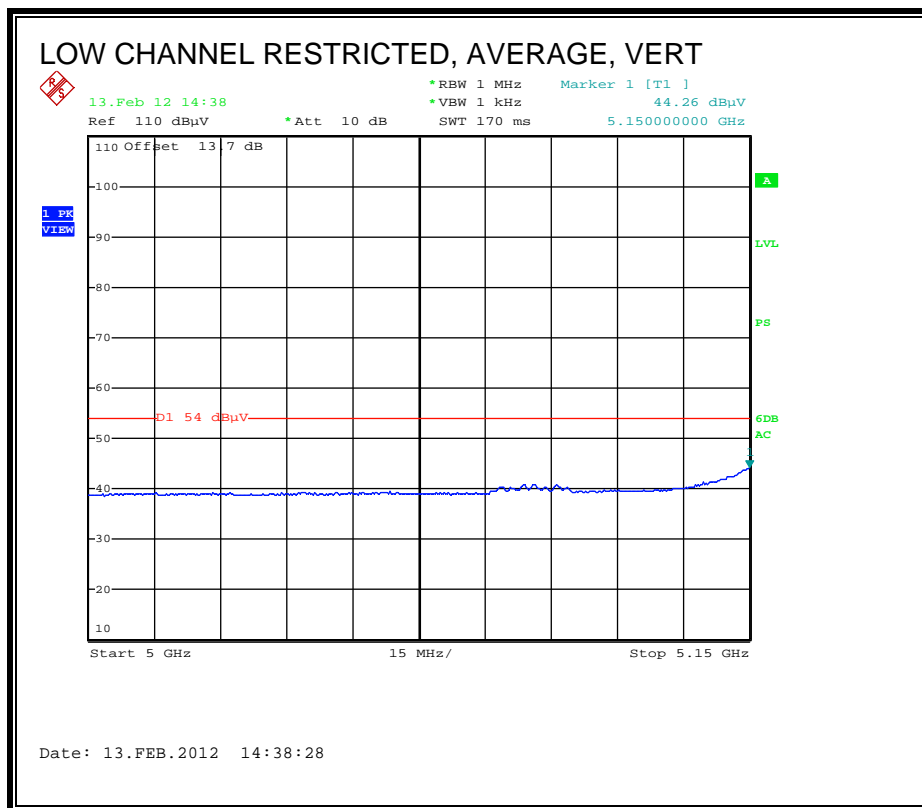
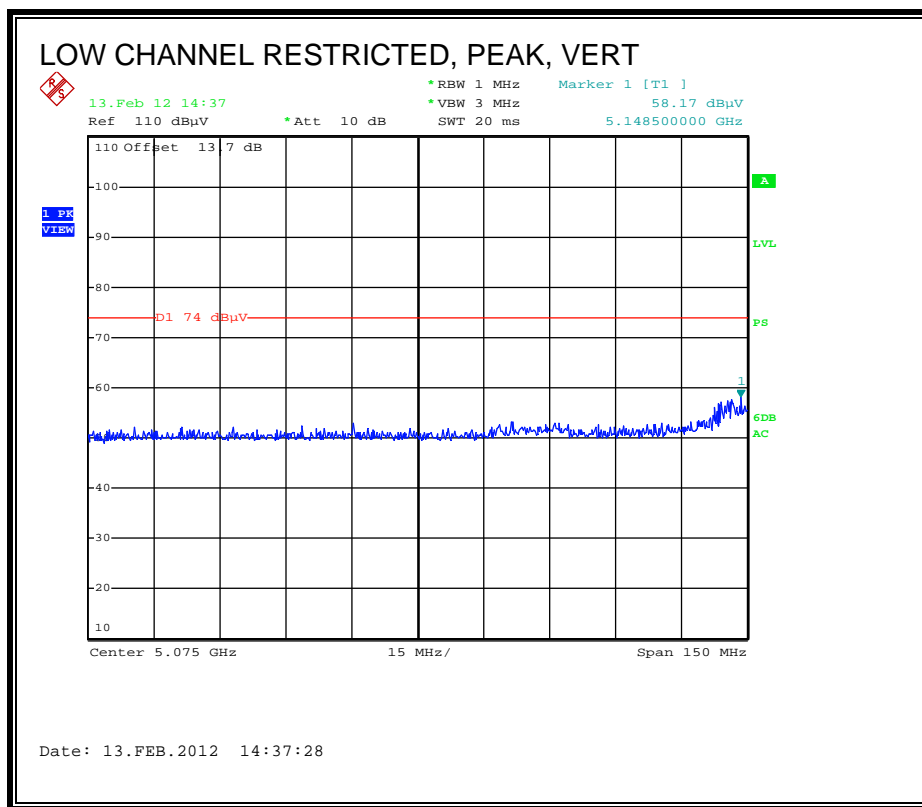
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Note: No other emissions were detected above the system noise floor.

## 7.2.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.2 GHz BAND

### RESTRICTED BANDEDGE (LOW CHANNEL)





## HARMONICS AND SPURIOUS EMISSIONS

### High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber A

Test Engr: Dennis Huang  
Date: 02/17/12  
Project #: 12U14229  
Company: Broadcom  
Test Target: FCC 15.205  
Mode Oper: 802.11n HT20 Tx

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

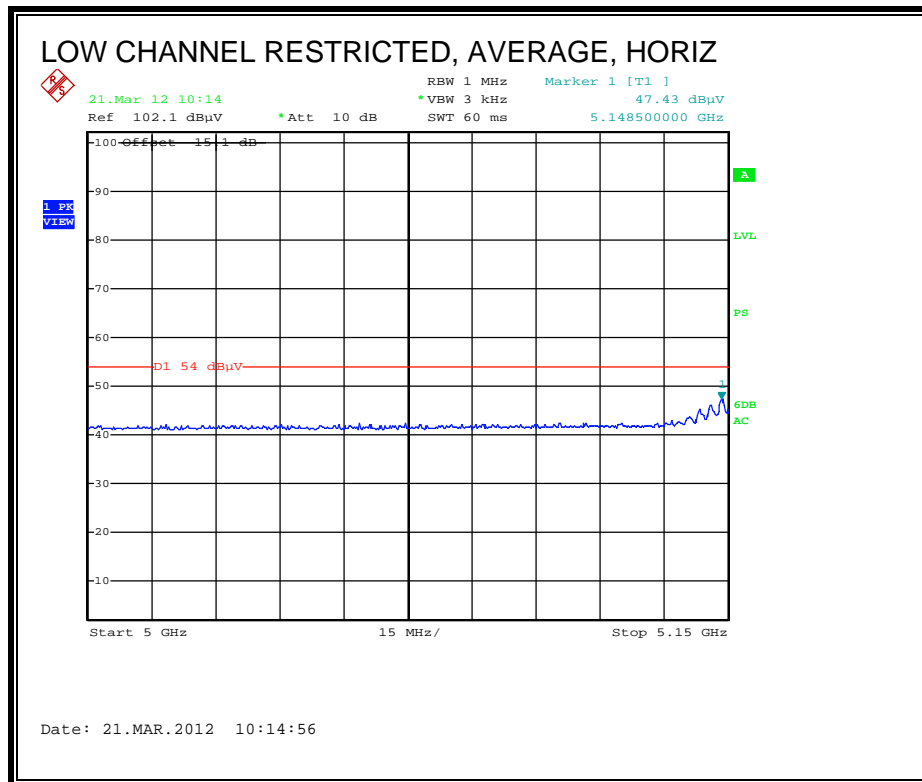
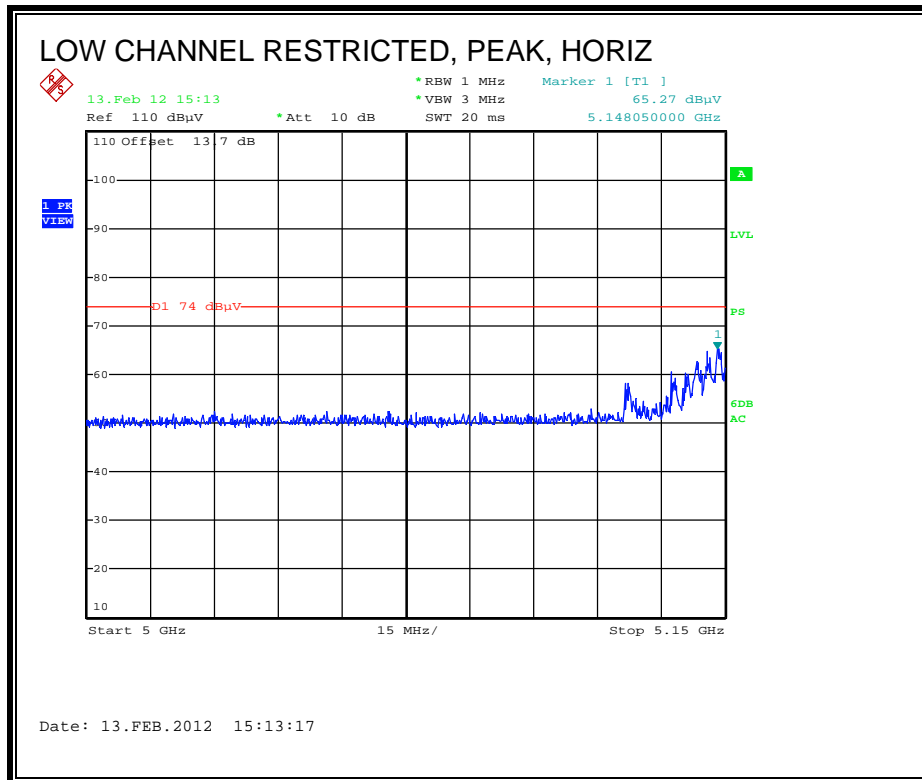
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
<b>Low Channel - 5180MHz</b>															
15.540	3.0	36.0	39.0	11.3	-34.8	0.0	0.7	52.3	74.0	-21.7	V	P	189.2	67.3	
15.540	3.0	25.8	39.0	11.3	-34.8	0.0	0.7	42.0	54.0	-12.0	V	A	189.2	67.3	
15.540	3.0	36.9	39.0	11.3	-34.8	0.0	0.7	53.1	74.0	-20.9	H	P	101.0	235.1	
15.540	3.0	25.8	39.0	11.3	-34.8	0.0	0.7	42.1	54.0	-11.9	H	A	101.0	235.1	
<b>Mid Channel - 5200MHz</b>															
15.600	3.0	36.4	38.8	11.4	-34.8	0.0	0.7	52.5	74.0	-21.5	V	P	126.8	202.8	
15.600	3.0	25.3	38.8	11.4	-34.8	0.0	0.7	41.4	54.0	-12.6	V	A	126.8	202.8	
15.600	3.0	35.7	38.8	11.4	-34.8	0.0	0.7	51.8	74.0	-22.2	H	P	153.2	358.4	
15.600	3.0	25.3	38.8	11.4	-34.8	0.0	0.7	41.4	54.0	-12.6	H	A	153.2	358.4	
<b>High Channel - 5240MHz</b>															
15.720	3.0	35.8	38.4	11.4	-34.7	0.0	0.7	51.7	74.0	-22.3	V	P	160.7	167.7	
15.720	3.0	25.6	38.4	11.4	-34.7	0.0	0.7	41.4	54.0	-12.6	V	A	160.7	167.7	
15.720	3.0	35.7	38.4	11.4	-34.7	0.0	0.7	51.5	74.0	-22.5	H	P	128.7	221.6	
15.720	3.0	25.5	38.4	11.4	-34.7	0.0	0.7	41.3	54.0	-12.7	H	A	128.7	221.6	

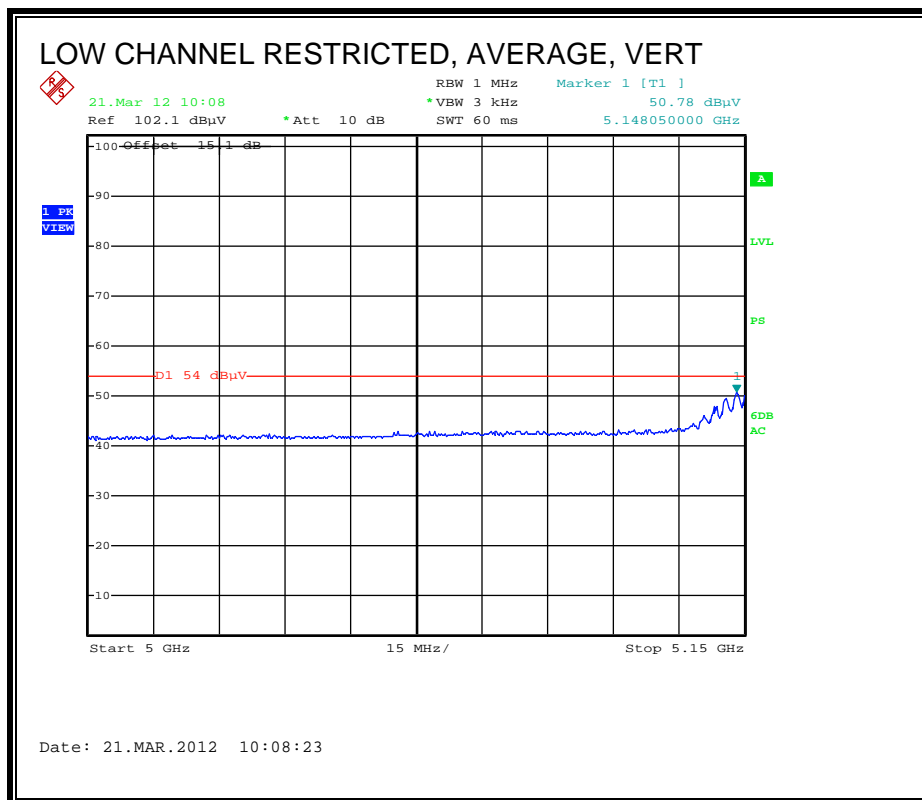
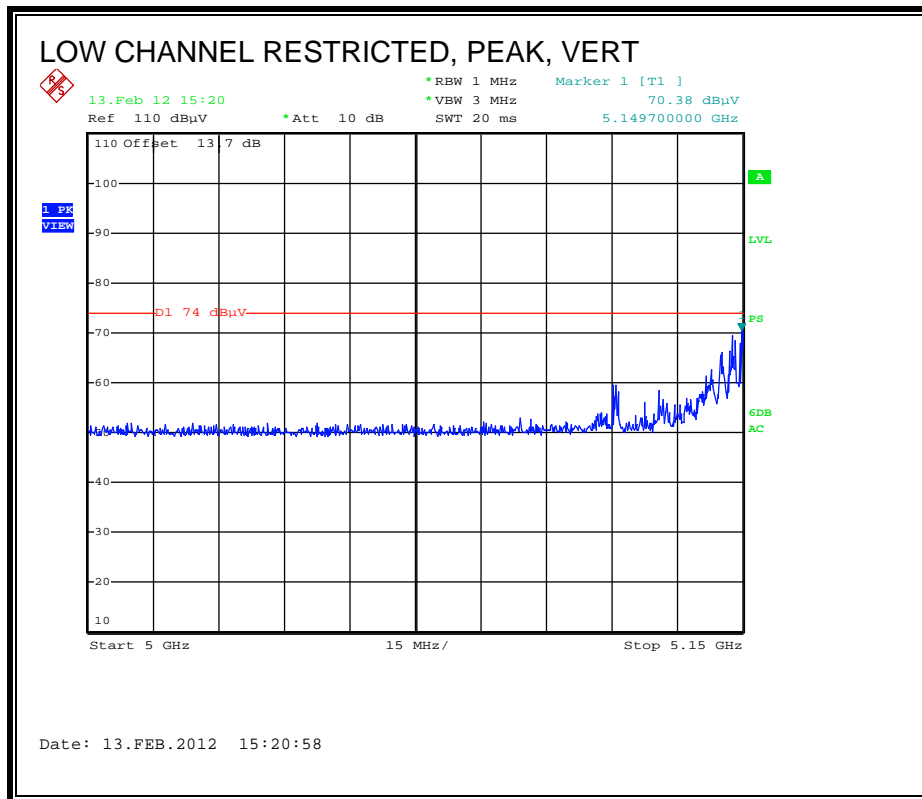
Rev. 4.1.2.7

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

### 7.2.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.2 GHz BAND

#### RESTRICTED BANDEDGE (LOW CHANNEL)





## HARMONICS AND SPURIOUS EMISSIONS

### High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber A

Test Engr: Dennis Huang  
Date: 02/17/12  
Project #: 12U14229  
Company: Broadcom  
Test Target: FCC 15.205  
Mode Oper: 802.11n HT40 Tx

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	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel - 5190MHz															
15.570	3.0	35.0	38.9	11.4	-34.8	0.0	0.7	51.2	74.0	-22.8	V	P	197.2	172.6	
15.570	3.0	24.9	38.9	11.4	-34.8	0.0	0.7	41.1	54.0	-12.9	V	A	197.2	172.6	
15.570	3.0	35.3	38.9	11.4	-34.8	0.0	0.7	51.4	74.0	-22.6	H	P	131.6	73.3	
15.570	3.0	25.0	38.9	11.4	-34.8	0.0	0.7	41.2	54.0	-12.8	H	A	131.6	73.3	
High Channel - 5230MHz															
15.690	3.0	35.7	38.5	11.4	-34.7	0.0	0.7	51.6	74.0	-22.4	V	P	199.9	344.7	
15.690	3.0	25.9	38.5	11.4	-34.7	0.0	0.7	41.9	54.0	-12.1	V	A	199.9	344.7	
15.690	3.0	35.7	38.5	11.4	-34.7	0.0	0.7	51.6	74.0	-22.4	H	P	178.3	280.2	
15.690	3.0	25.9	38.5	11.4	-34.7	0.0	0.7	41.9	54.0	-12.1	H	A	178.3	280.2	

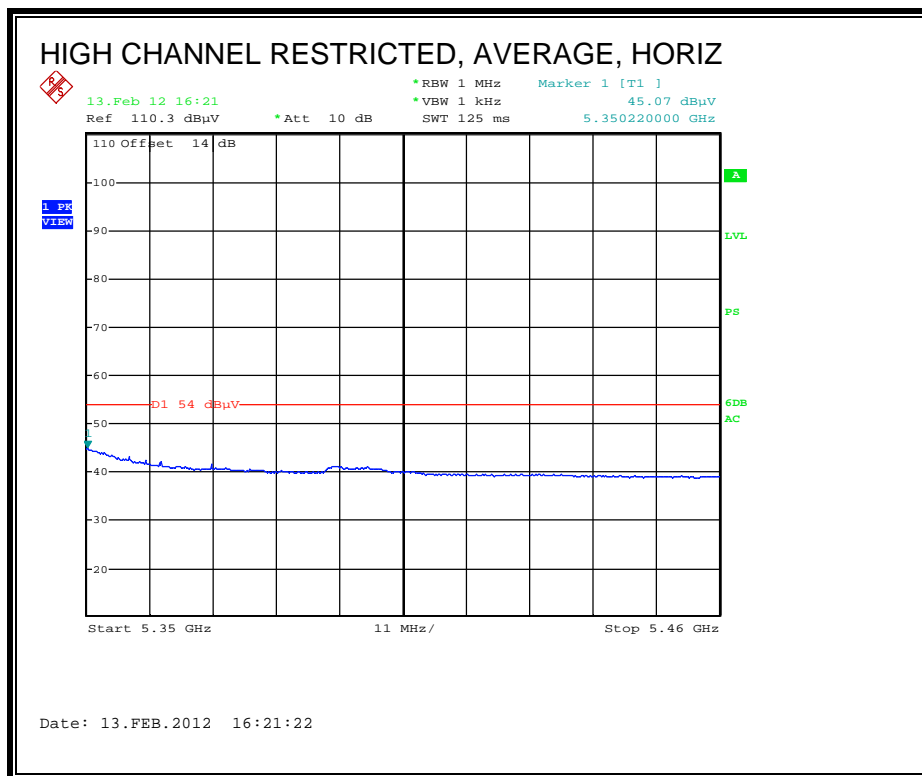
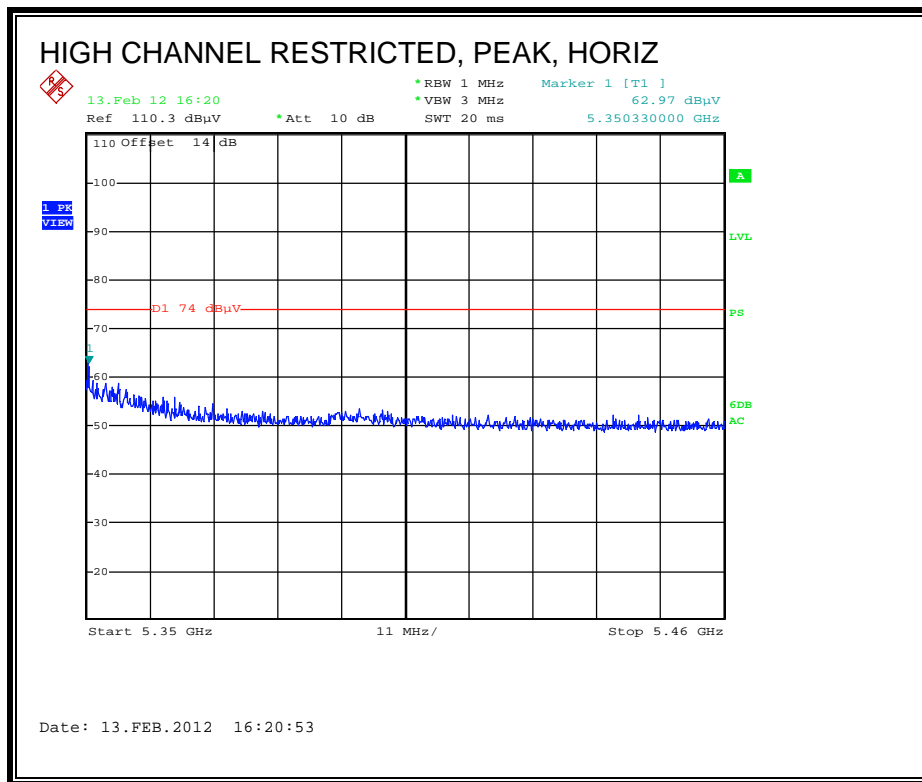
Rev. 4.1.2.7

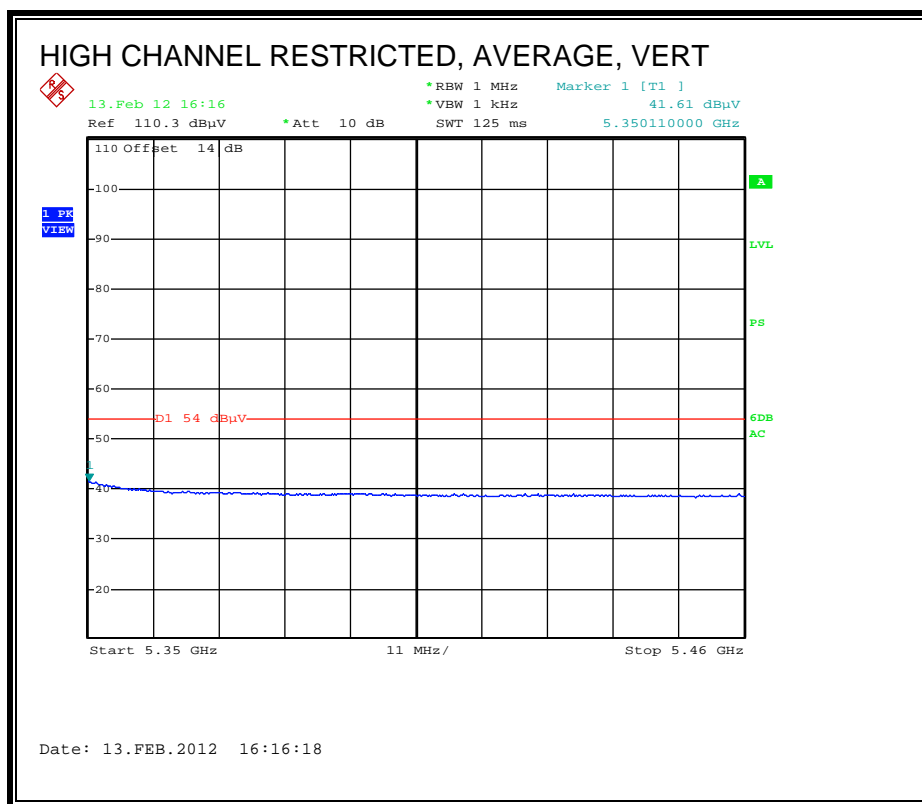
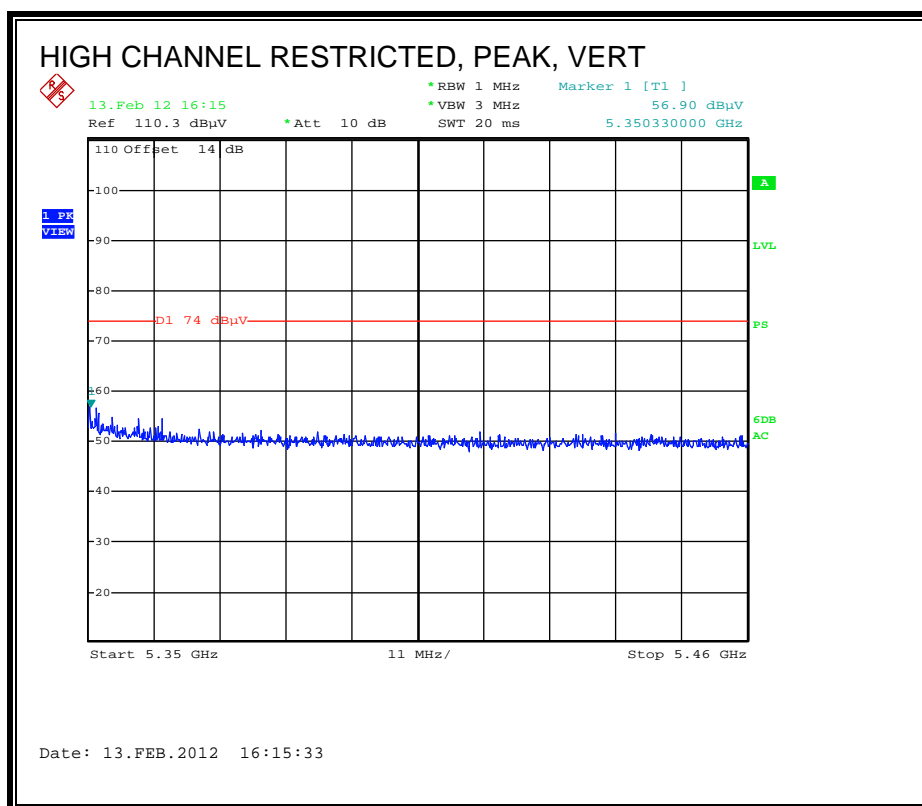
Note: No other emissions were detected above the system noise floor.



## 7.2.4. TX ABOVE 1 GHz 802.11a MODE IN THE 5.3 GHz BAND

### RESTRICTED BANDEDGE (HIGH CHANNEL)





**HARMONICS AND SPURIOUS EMISSIONS**
**High Frequency Measurement**  
**Compliance Certification Services, Fremont 5m Chamber A**

Test Engr: Dennis Huang  
 Date: 02/14/12  
 Project #: 12U14229  
 Company: BroadCom  
 Test Target: FCC 15.205  
 Mode Oper: 802.11 a Tx

f Measurement Frequency Amp Peamp 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

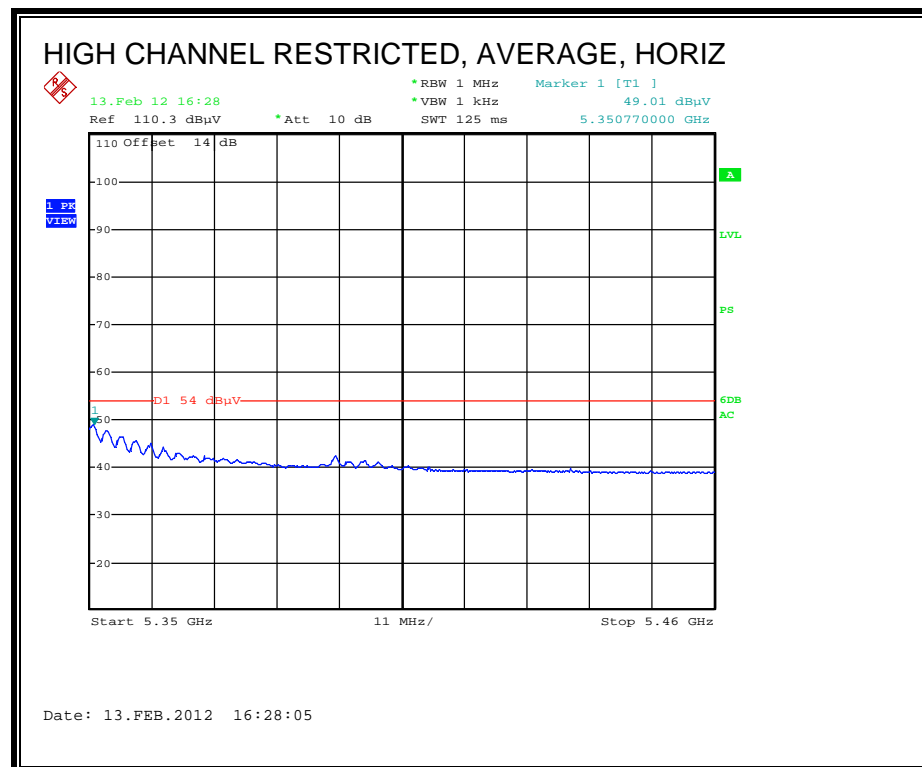
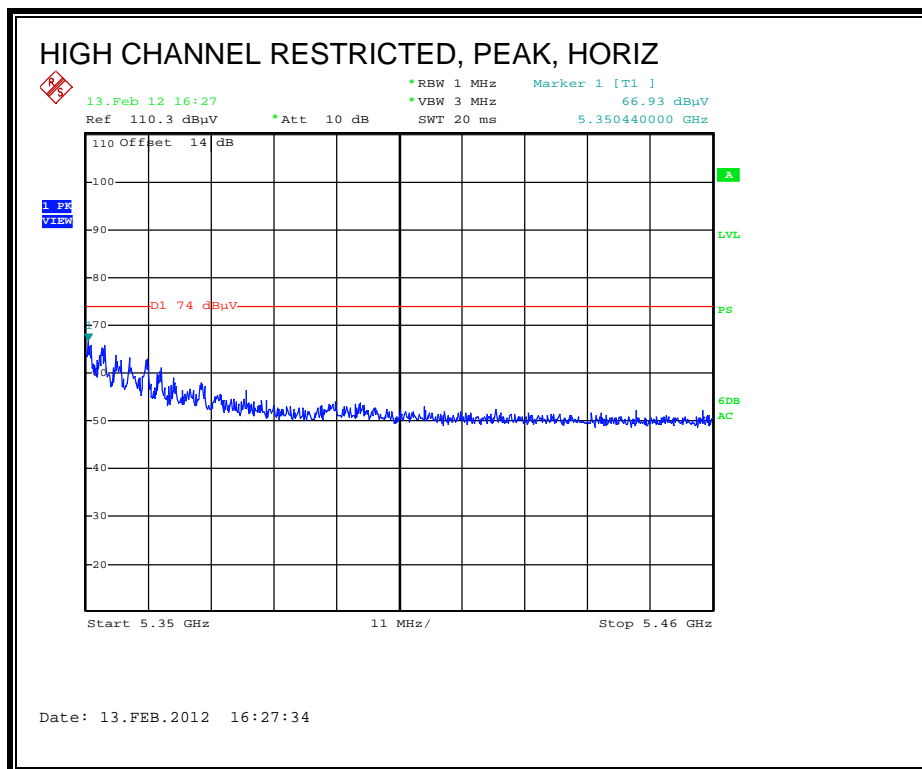
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
<b>Low Channel - 5260MHz</b>															
15.780	3.0	41.9	38.2	11.5	-34.6	0.0	0.7	57.6	74.0	-16.4	V	P	107.0	53.3	
15.780	3.0	31.5	38.2	11.5	-34.6	0.0	0.7	47.2	54.0	-6.8	V	A	107.0	53.3	
15.780	3.0	36.1	38.2	11.5	-34.6	0.0	0.7	51.8	74.0	-22.2	H	P	102.4	82.5	
15.780	3.0	29.1	38.2	11.5	-34.6	0.0	0.7	44.8	54.0	-9.2	H	A	102.4	82.5	
<b>Mid Channel - 5300MHz</b>															
10.600	3.0	49.4	38.3	9.0	-36.6	0.0	0.8	60.9	74.0	-13.1	V	P	156.1	53.9	
10.600	3.0	38.9	38.3	9.0	-36.6	0.0	0.8	50.4	54.0	-3.6	V	A	156.1	53.9	
10.600	3.0	41.6	38.3	9.0	-36.6	0.0	0.8	53.1	74.0	-20.9	H	P	133.3	264.0	
10.600	3.0	31.0	38.3	9.0	-36.6	0.0	0.8	42.5	54.0	-11.5	H	A	133.3	264.0	
15.900	3.0	39.2	37.8	11.5	-34.6	0.0	0.7	54.7	74.0	-19.3	V	P	111.0	50.5	
15.900	3.0	29.5	37.8	11.5	-34.6	0.0	0.7	44.9	54.0	-9.1	V	A	111.0	50.5	
15.900	3.0	36.4	37.8	11.5	-34.6	0.0	0.7	51.9	74.0	-22.1	H	P	100.3	74.8	
15.900	3.0	27.2	37.8	11.5	-34.6	0.0	0.7	42.7	54.0	-11.3	H	A	100.3	74.8	
<b>High Channel - 5320MHz</b>															
10.640	3.0	51.1	38.3	9.1	-36.6	0.0	0.8	62.7	74.0	-11.3	V	P	140.8	58.2	
10.640	3.0	39.5	38.3	9.1	-36.6	0.0	0.8	51.0	54.0	-3.0	V	A	140.8	58.2	
10.640	3.0	39.2	38.3	9.1	-36.6	0.0	0.8	50.7	74.0	-23.3	H	P	114.4	262.6	
10.640	3.0	28.5	38.3	9.1	-36.6	0.0	0.8	40.0	54.0	-14.0	H	A	114.4	262.6	
15.960	3.0	37.5	37.6	11.5	-34.5	0.0	0.7	52.8	74.0	-21.2	V	P	147.6	218.0	
15.960	3.0	26.5	37.6	11.5	-34.5	0.0	0.7	41.9	54.0	-12.1	V	A	147.6	218.0	
15.960	3.0	36.2	37.6	11.5	-34.5	0.0	0.7	51.6	74.0	-22.4	H	P	116.7	63.4	
15.960	3.0	26.1	37.6	11.5	-34.5	0.0	0.7	41.4	54.0	-12.6	H	A	116.7	63.4	

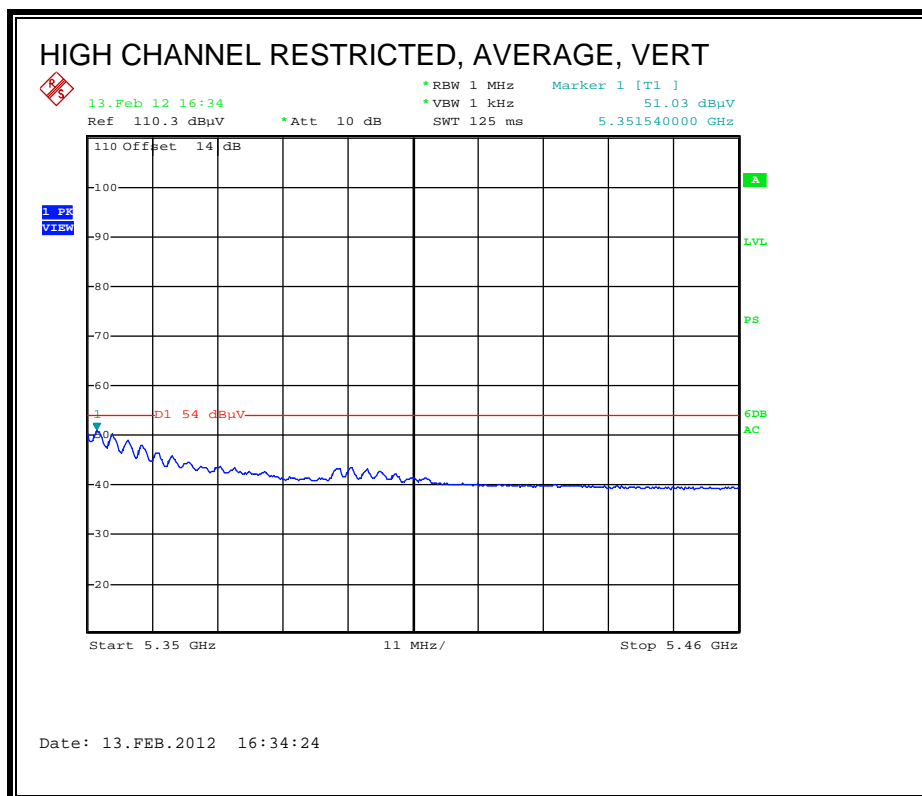
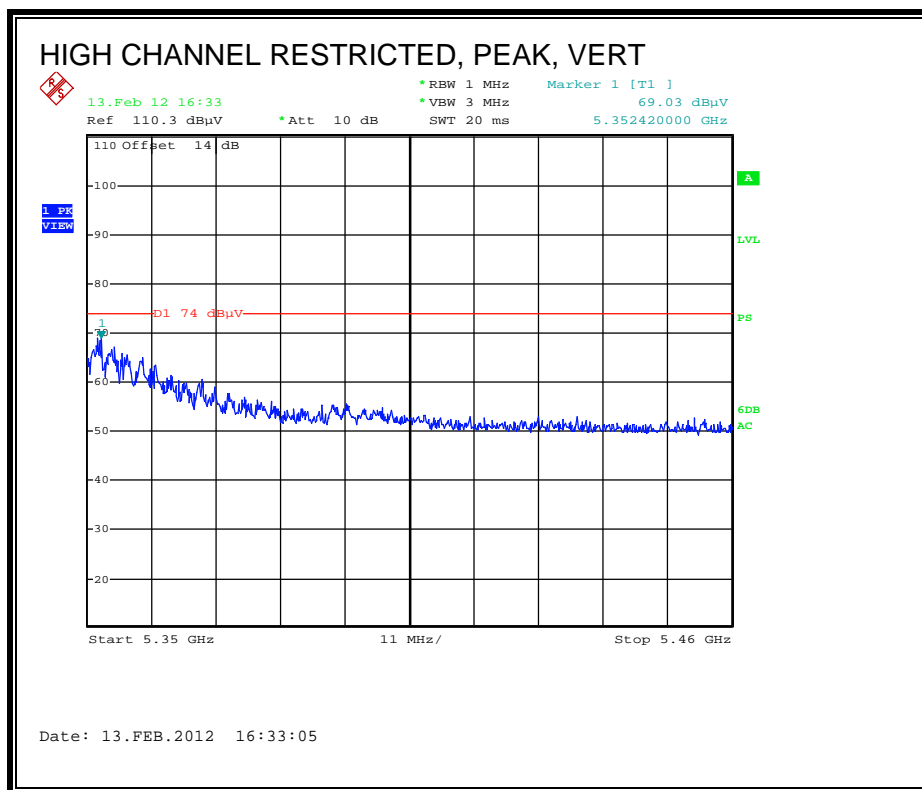
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Note: No other emissions were detected above the system noise floor.

### 7.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.3 GHz BAND

#### RESTRICTED BANDEDGE (HIGH CHANNEL)





**HARMONICS AND SPURIOUS EMISSIONS**
**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber A

Test Engr: Dennis Huang  
 Date: 02/14/12  
 Project #: 12U14229  
 Company: BroadCom  
 Test Target: FCC 15.205  
 Mode Oper: 802.11n HT20 Tx

f Measurement Frequency Amp Peamp 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

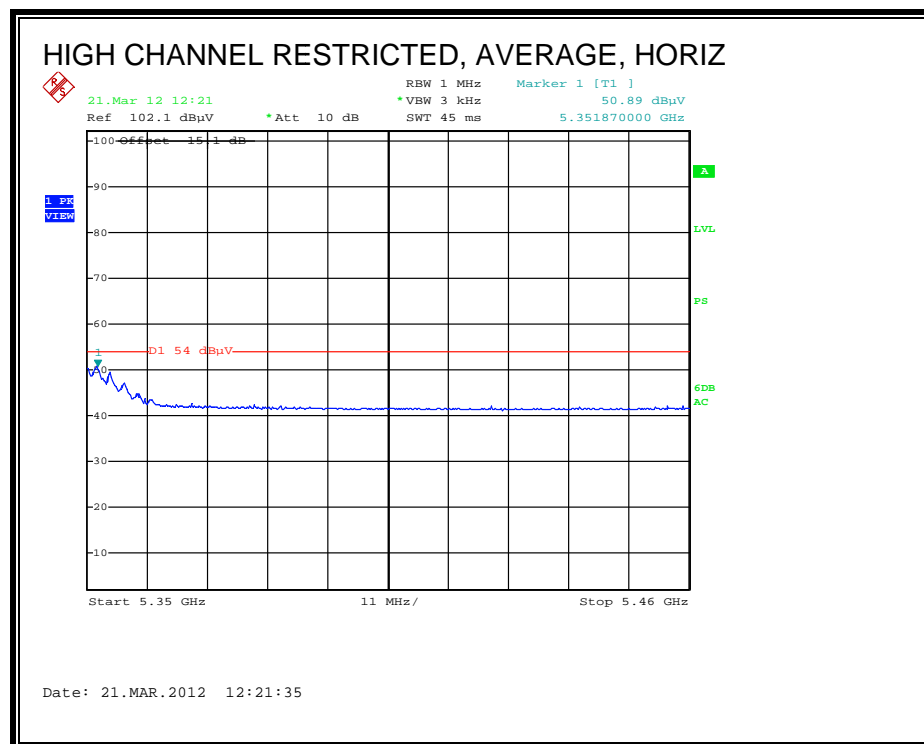
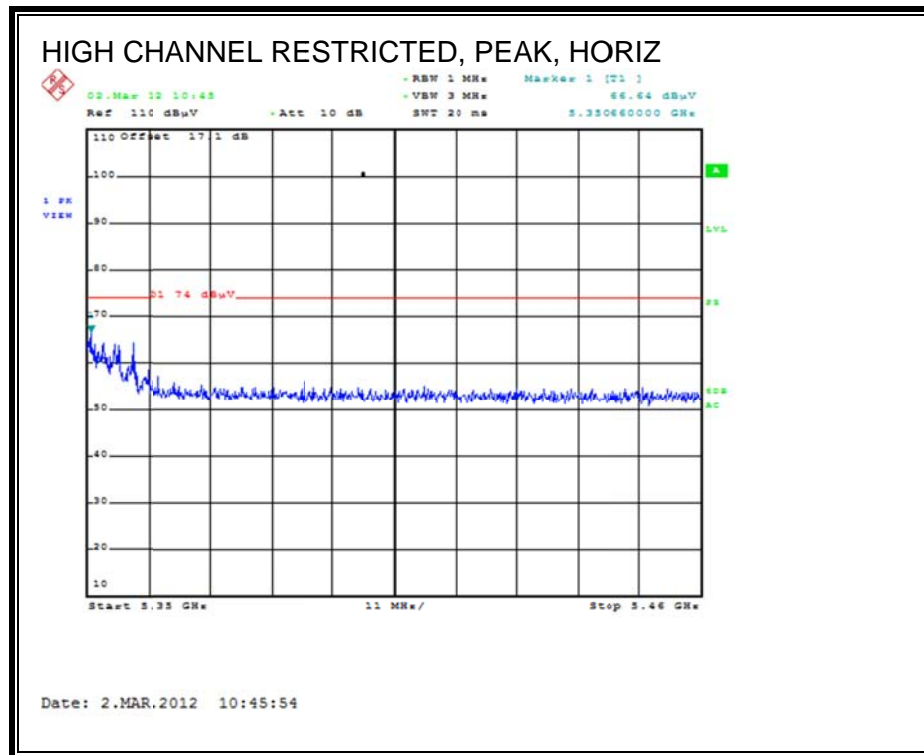
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
<b>Low Channel - 5260MHz</b>															
15.780	3.0	38.7	38.2	11.5	-34.6	0.0	0.7	54.4	74.0	-19.6	V	P	170.0	45.3	
15.780	3.0	29.0	38.2	11.5	-34.6	0.0	0.7	44.8	54.0	-9.2	V	A	170.0	45.3	
15.780	3.0	36.7	38.2	11.5	-34.6	0.0	0.7	52.5	74.0	-21.5	H	P	149.2	358.0	
15.780	3.0	26.9	38.2	11.5	-34.6	0.0	0.7	42.6	54.0	-11.4	H	A	149.2	358.0	
<b>Mid Channel - 5300MHz</b>															
10.600	3.0	51.8	38.3	9.0	-36.6	0.0	0.8	63.2	74.0	-10.8	V	P	143.6	54.1	
10.600	3.0	42.2	38.3	9.0	-36.6	0.0	0.8	53.7	54.0	-0.3	V	A	143.6	54.1	
10.600	3.0	40.5	38.3	9.0	-36.6	0.0	0.8	52.0	74.0	-22.0	H	P	137.5	262.6	
10.600	3.0	31.4	38.3	9.0	-36.6	0.0	0.8	42.8	54.0	-11.2	H	A	137.5	262.6	
15.900	3.0	41.9	37.8	11.5	-34.6	0.0	0.7	57.3	74.0	-16.7	V	P	115.9	44.7	
15.900	3.0	32.0	37.8	11.5	-34.6	0.0	0.7	47.4	54.0	-6.6	V	A	115.9	44.7	
15.900	3.0	38.1	37.8	11.5	-34.6	0.0	0.7	53.5	74.0	-20.5	H	P	141.6	66.5	
15.900	3.0	28.5	37.8	11.5	-34.6	0.0	0.7	44.0	54.0	-10.0	H	A	141.6	66.5	
<b>High Channel - 5320MHz</b>															
10.640	3.0	48.5	38.3	9.1	-36.6	0.0	0.8	60.0	74.0	-14.0	V	P	144.4	60.0	
10.640	3.0	38.5	38.3	9.1	-36.6	0.0	0.8	50.0	54.0	-4.0	V	A	144.4	60.0	
10.640	3.0	40.0	38.3	9.1	-36.6	0.0	0.8	51.5	74.0	-22.5	H	P	109.4	263.8	
10.640	3.0	29.7	38.3	9.1	-36.6	0.0	0.8	41.2	54.0	-12.8	H	A	109.4	263.8	
15.960	3.0	37.9	37.6	11.5	-34.5	0.0	0.7	53.2	74.0	-20.8	V	P	111.9	104.5	
15.960	3.0	28.5	37.6	11.5	-34.5	0.0	0.7	43.8	54.0	-10.2	V	A	111.9	104.5	
15.960	3.0	37.3	37.6	11.5	-34.5	0.0	0.7	52.7	74.0	-21.3	V	P	101.0	101.3	
15.960	3.0	27.2	37.6	11.5	-34.5	0.0	0.7	42.6	54.0	-11.4	V	A	101.0	101.3	

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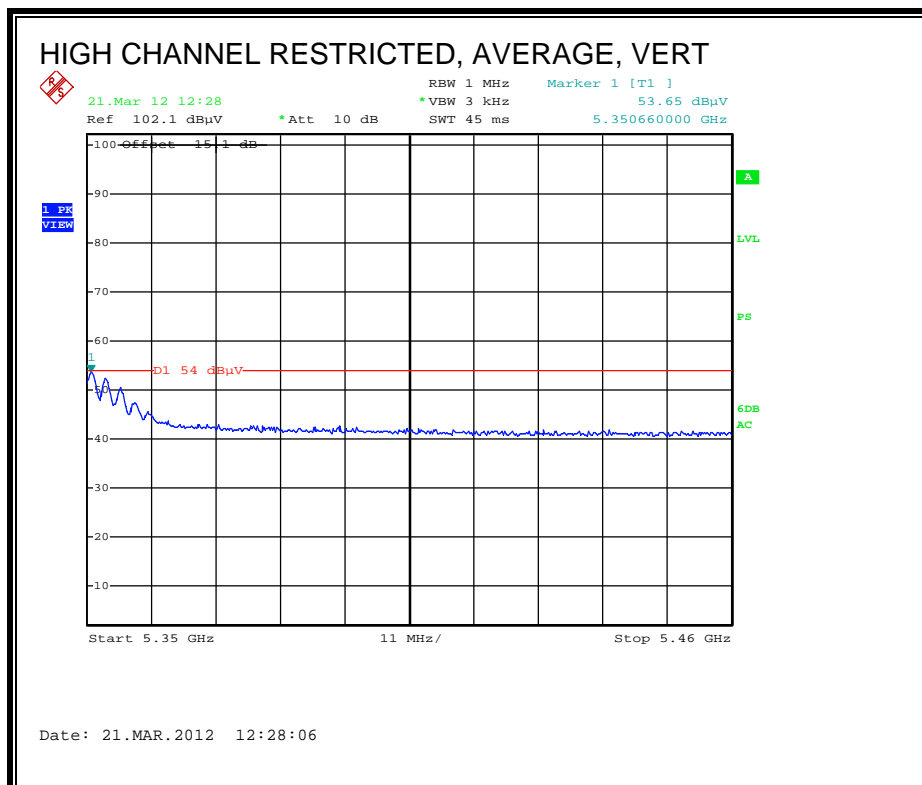
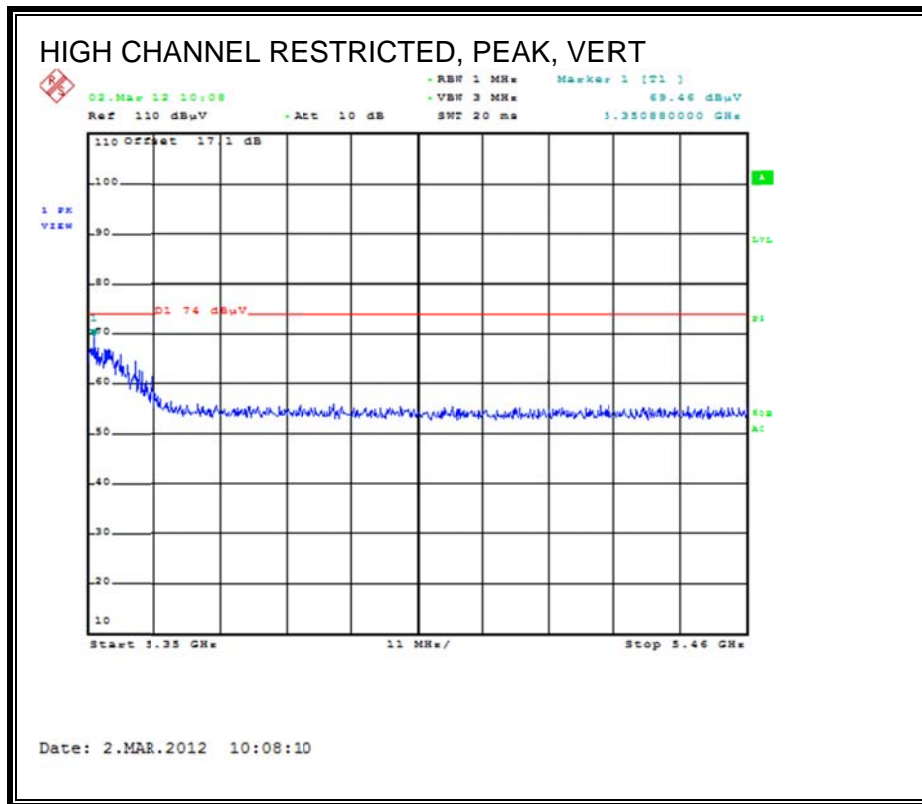
Note: No other emissions were detected above the system noise floor.

## 7.4. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.3 GHz BAND

### RESTRICTED BANDEDGE (HIGH CHANNEL)









**HARMONICS AND SPURIOUS EMISSIONS****High Frequency Measurement**

Compliance Certification Services, Fremont 5m Chamber A

Test Engr: Dennis Huang  
 Date: 02/14/12  
 Project #: 12U14229  
 Company: BroadCom  
 Test Target: FCC 15.205  
 Mode Oper: 802.11n HT40 Tx

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	

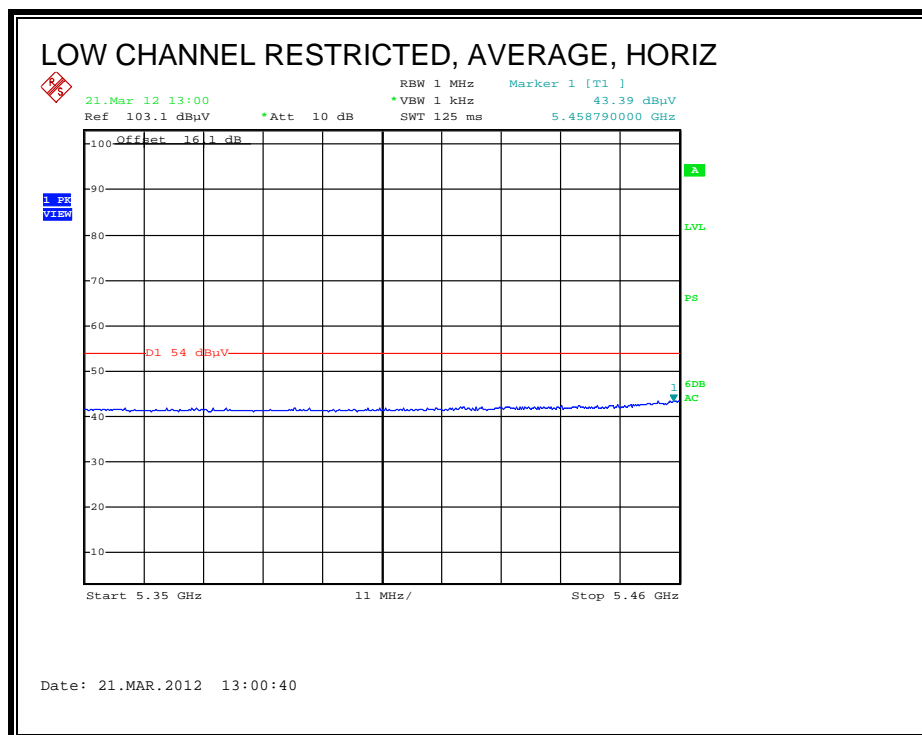
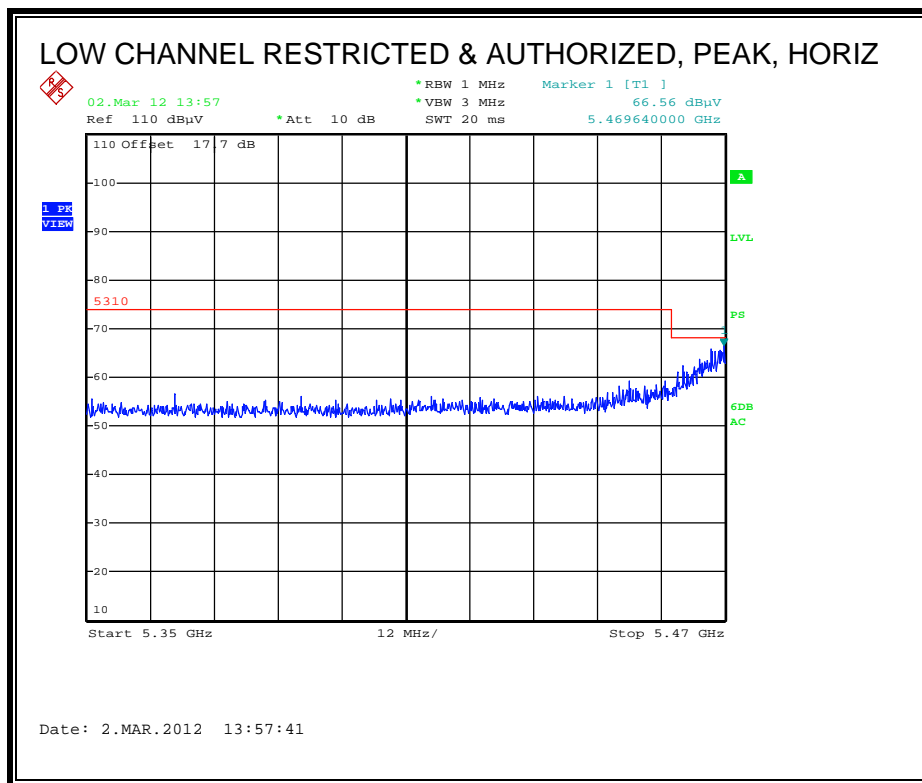
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
<b>Low Channel - 5270MHz</b>															
15.810	3.0	37.4	38.1	11.5	-34.6	0.0	0.7	53.0	74.0	-21.0	V	P	199.3	268.2	
15.810	3.0	28.2	38.1	11.5	-34.6	0.0	0.7	43.8	54.0	-10.2	V	A	199.3	268.2	
15.810	3.0	39.5	38.1	11.5	-34.6	0.0	0.7	55.1	74.0	-18.9	H	P	101.0	105.1	
15.810	3.0	29.6	38.1	11.5	-34.6	0.0	0.7	45.2	54.0	-8.8	H	A	101.0	105.1	
<b>High Channel - 5310MHz</b>															
10.620	3.0	39.8	38.3	9.1	-36.6	0.0	0.8	51.3	74.0	-22.7	V	P	154.8	62.6	
10.620	3.0	39.8	38.3	9.1	-36.6	0.0	0.8	51.3	54.0	-2.7	V	A	154.8	62.6	
10.620	3.0	39.4	38.3	9.1	-36.6	0.0	0.8	50.9	74.0	-23.1	V	P	178.2	57.7	
10.620	3.0	39.8	38.3	9.1	-36.6	0.0	0.8	51.3	54.0	-2.7	V	A	178.2	57.7	
15.930	3.0	37.0	37.7	11.5	-34.5	0.0	0.7	52.4	74.0	-21.6	V	P	197.7	155.7	
15.930	3.0	26.4	37.7	11.5	-34.5	0.0	0.7	41.8	54.0	-12.2	V	A	197.7	155.7	
15.930	3.0	36.3	37.7	11.5	-34.5	0.0	0.7	51.7	74.0	-22.3	H	P	175.7	156.7	
15.930	3.0	26.3	37.7	11.5	-34.5	0.0	0.7	41.7	54.0	-12.3	H	A	175.7	156.7	

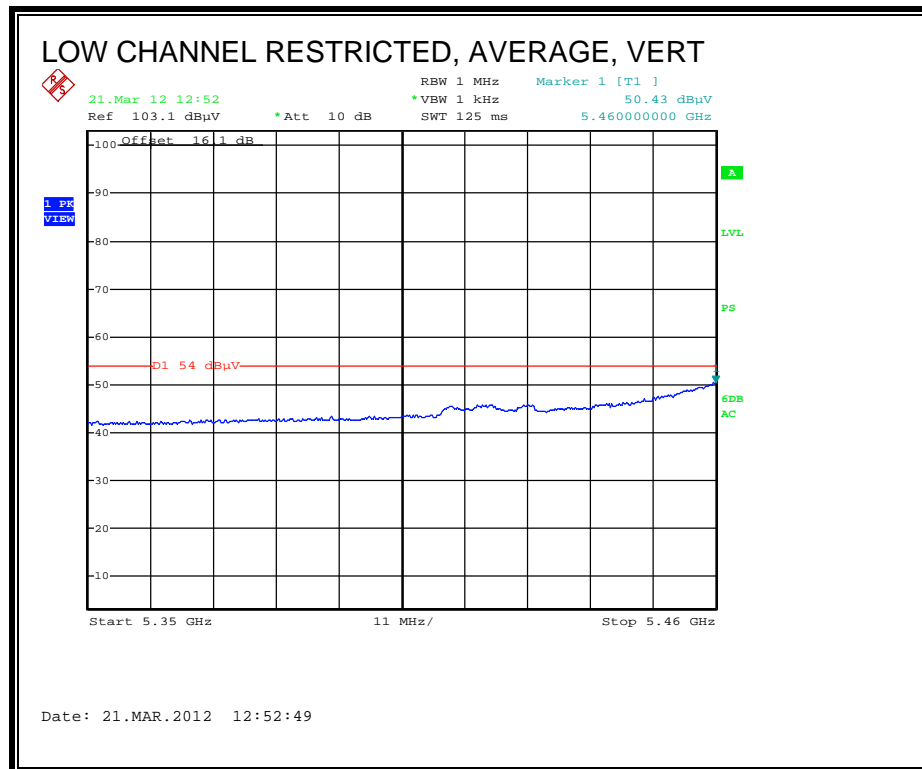
Rev. 4.1.2.7

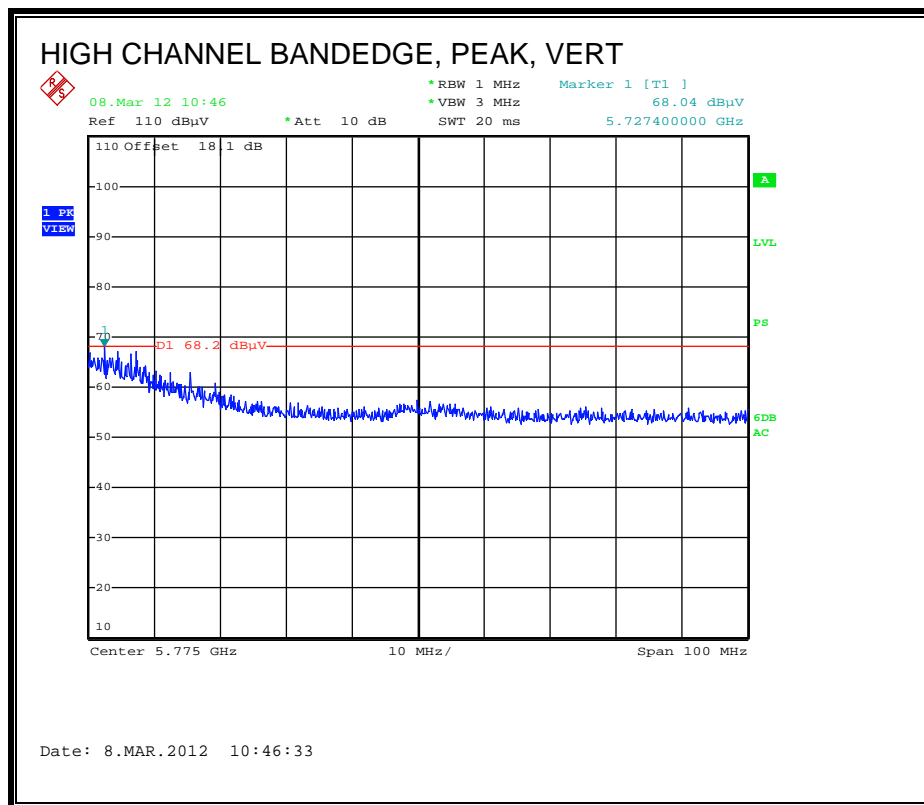
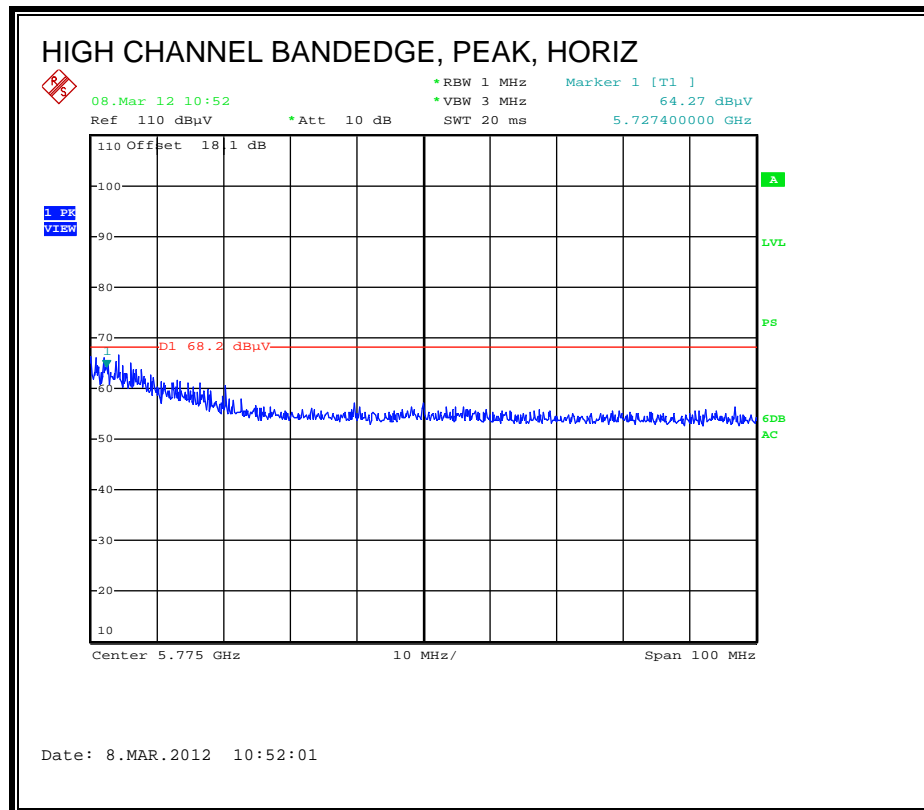
Note: No other emissions were detected above the system noise floor.

## 7.5. TX ABOVE 1 GHz 802.11a MODE IN THE 5.6 GHz BAND

### RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)





**AUTHORIZED BANDEDGE (HIGH CHANNEL)**

**HARMONICS AND SPURIOUS EMISSIONS**
**High Frequency Measurement**  
**Compliance Certification Services, Fremont 5m Chamber A**

Test Engr: Dennis Huang  
 Date: 02/14/12  
 Project #: 12U14229  
 Company: BroadCom  
 Test Target: FCC 15.205  
 Mode Oper: 802.11a Tx

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

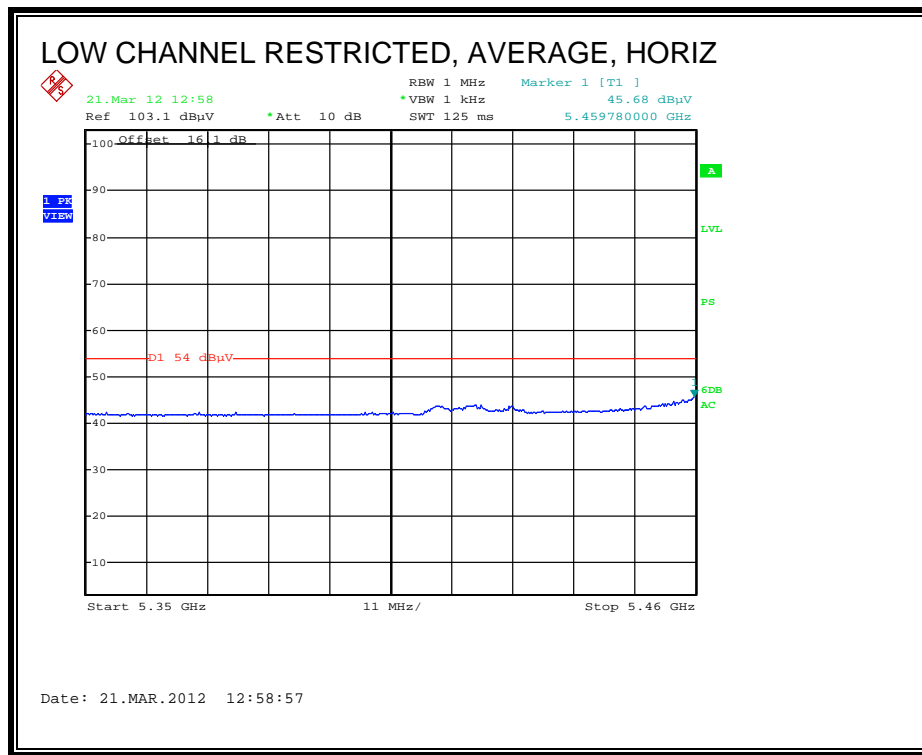
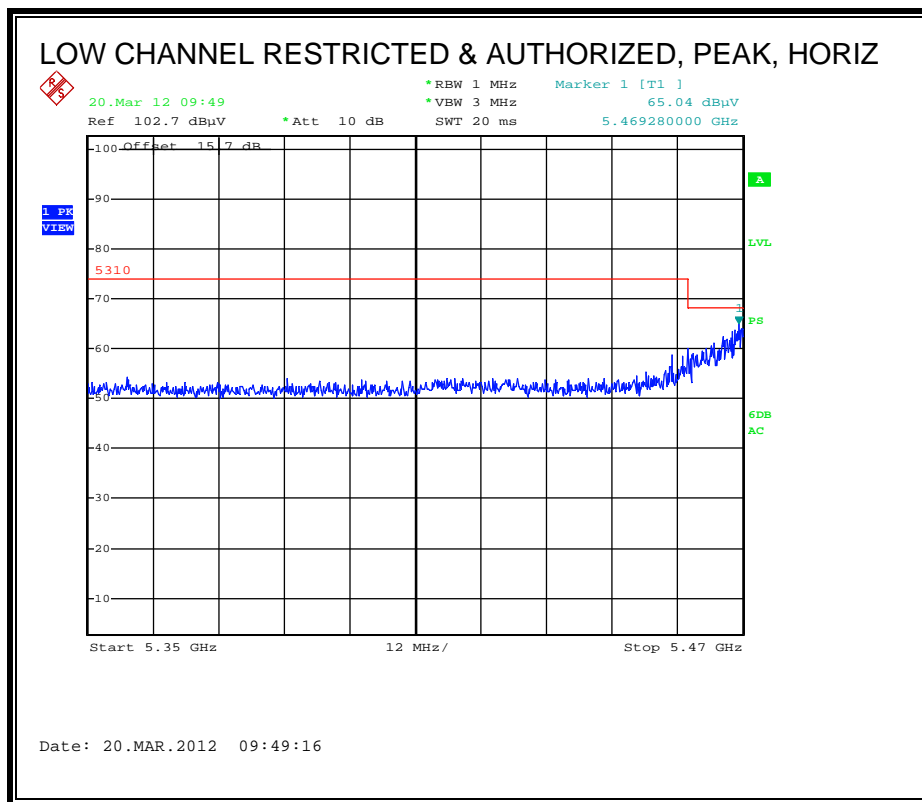
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
<b>Low Channel - 5500MHz</b>															
11.000	3.0	52.8	38.4	9.2	-36.3	0.0	0.7	64.9	74.0	-9.1	V	P	139.1	236.8	
11.000	3.0	41.9	38.4	9.2	-36.3	0.0	0.7	54.0	54.0	0.0	V	A	139.1	236.8	
11.000	3.0	41.9	38.4	9.2	-36.3	0.0	0.7	54.0	74.0	-20.0	H	P	140.4	166.5	
11.000	3.0	31.3	38.4	9.2	-36.3	0.0	0.7	43.4	54.0	-10.6	H	A	140.4	166.5	
<b>Mid Channel - 5580MHz</b>															
11.160	3.0	51.4	38.5	9.3	-36.1	0.0	0.7	63.8	74.0	-10.2	V	P	151.0	32.1	
11.160	3.0	40.2	38.5	9.3	-36.1	0.0	0.7	52.6	54.0	-1.4	V	A	151.0	32.1	
11.160	3.0	40.5	38.5	9.3	-36.1	0.0	0.7	52.9	74.0	-21.1	H	P	123.8	353.2	
11.160	3.0	30.1	38.5	9.3	-36.1	0.0	0.7	42.6	54.0	-11.4	H	A	123.8	353.2	
<b>High Channel - 5700MHz</b>															
11.400	3.0	47.4	38.7	9.4	-35.9	0.0	0.7	60.4	74.0	-13.6	V	P	150.4	33.1	
11.400	3.0	37.3	38.7	9.4	-35.9	0.0	0.7	50.2	54.0	-3.8	V	A	150.4	33.1	
11.400	3.0	40.6	38.7	9.4	-35.9	0.0	0.7	53.6	74.0	-20.4	H	P	149.0	0.7	
11.400	3.0	30.4	38.7	9.4	-35.9	0.0	0.7	43.4	54.0	-10.6	H	A	149.0	0.7	

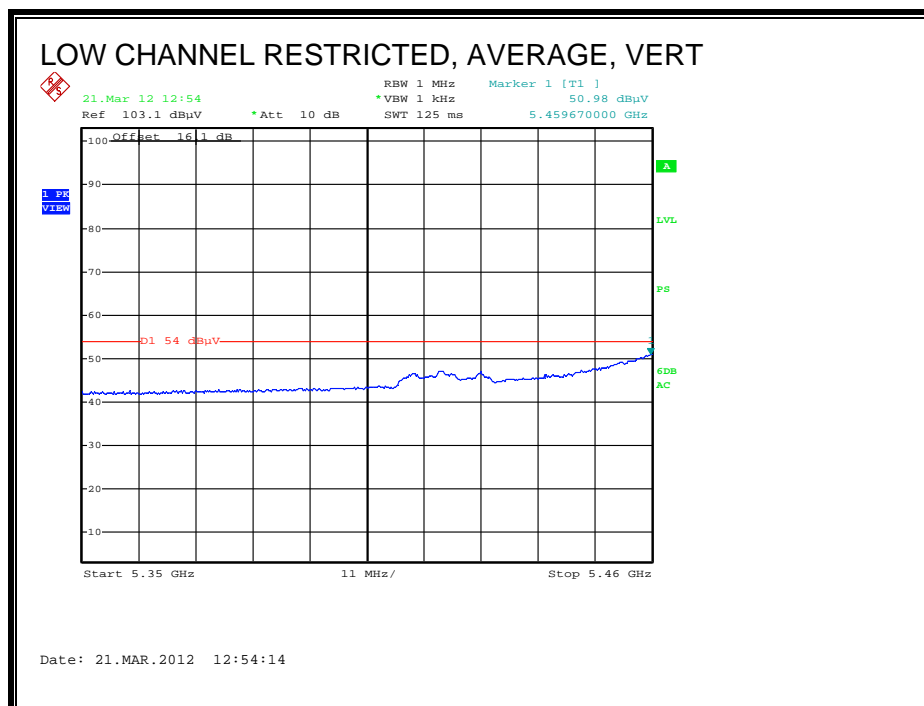
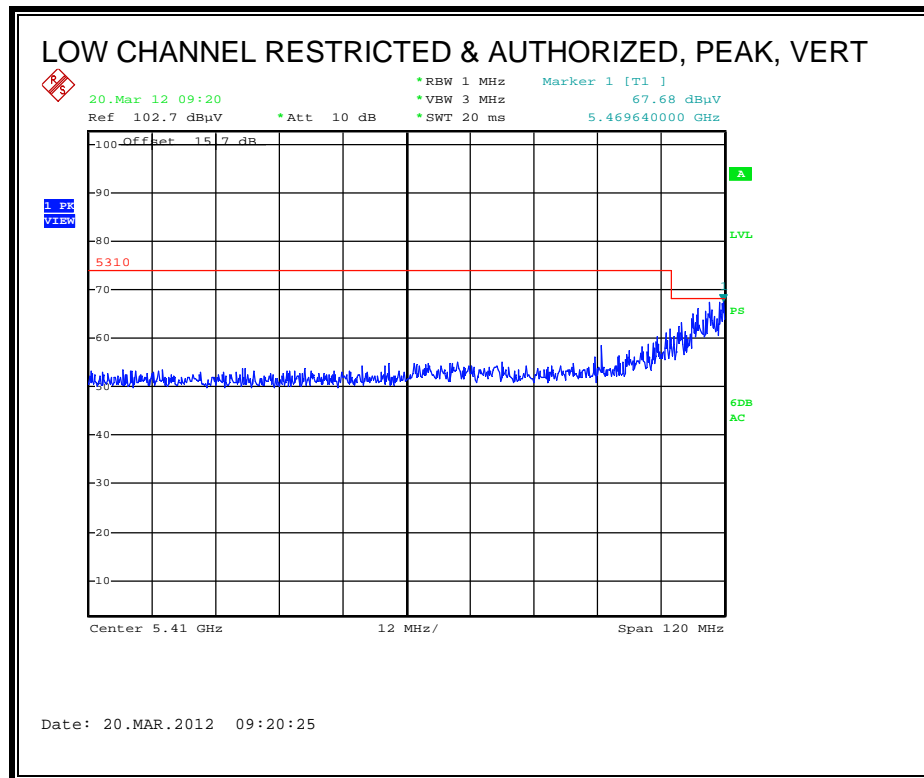
Rev. 4.1.2.7

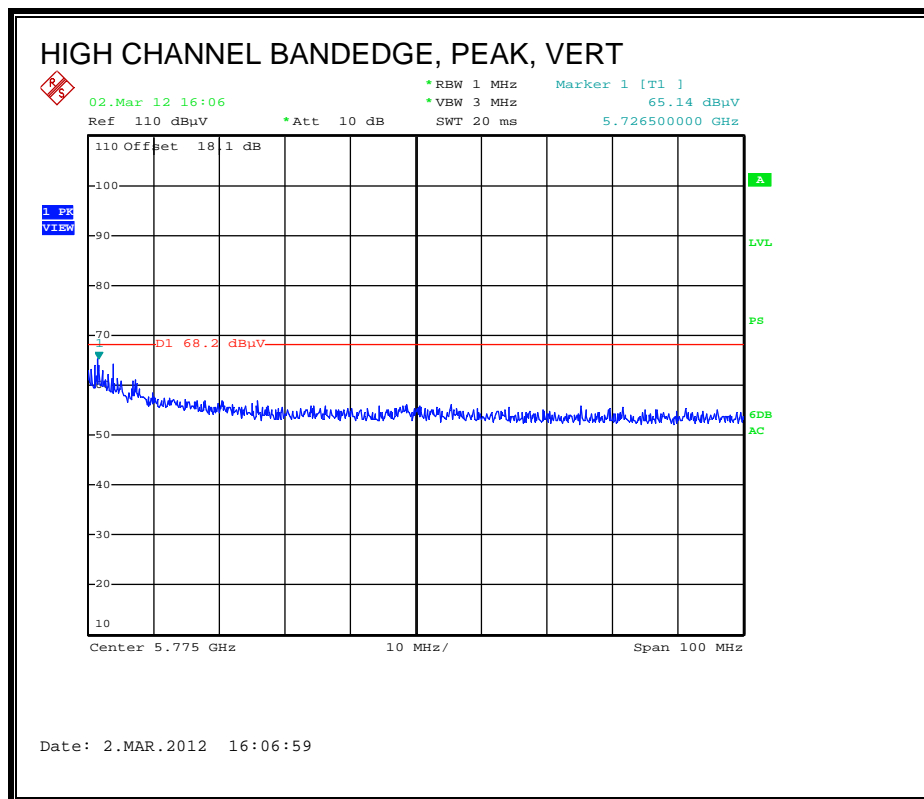
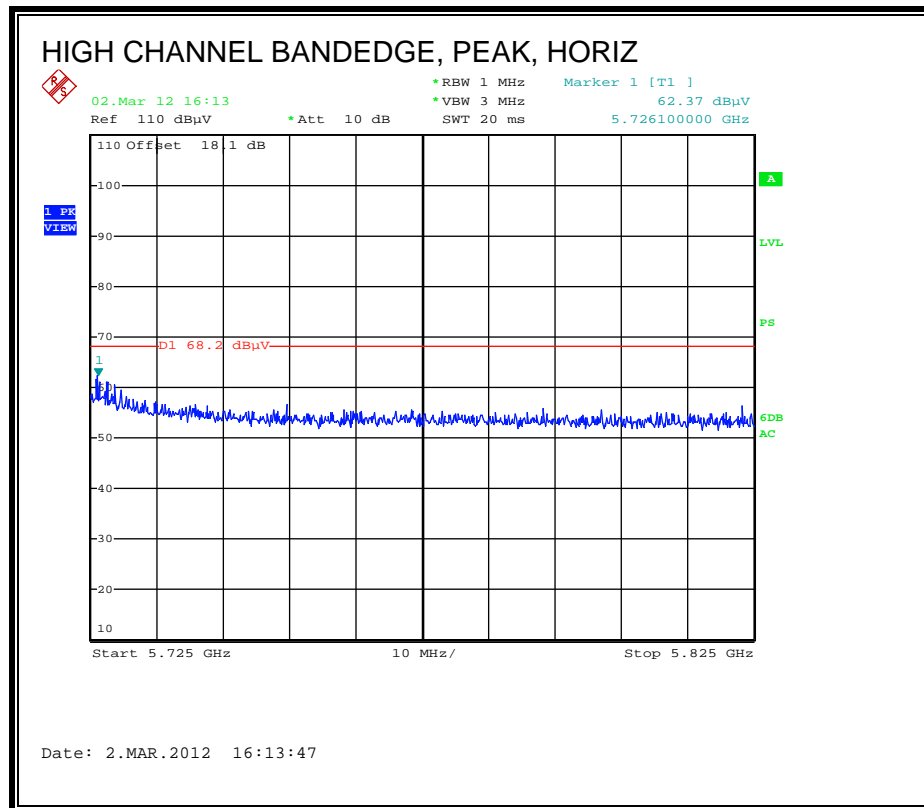
Note: No other emissions were detected above the system noise floor.

## 7.6. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.6 GHz BAND

### RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)





**AUTHORIZED BANDEDGE (HIGH CHANNEL)**



**HARMONICS AND SPURIOUS EMISSIONS**
**High Frequency Measurement**  
**Compliance Certification Services, Fremont 5m Chamber A**

Test Engr: Dennis Huang  
 Date: 02/14/12  
 Project #: 12U14229  
 Company: BroadCom  
 Test Target: FCC 15.205  
 Mode Oper: 802.11n HT20 Tx

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

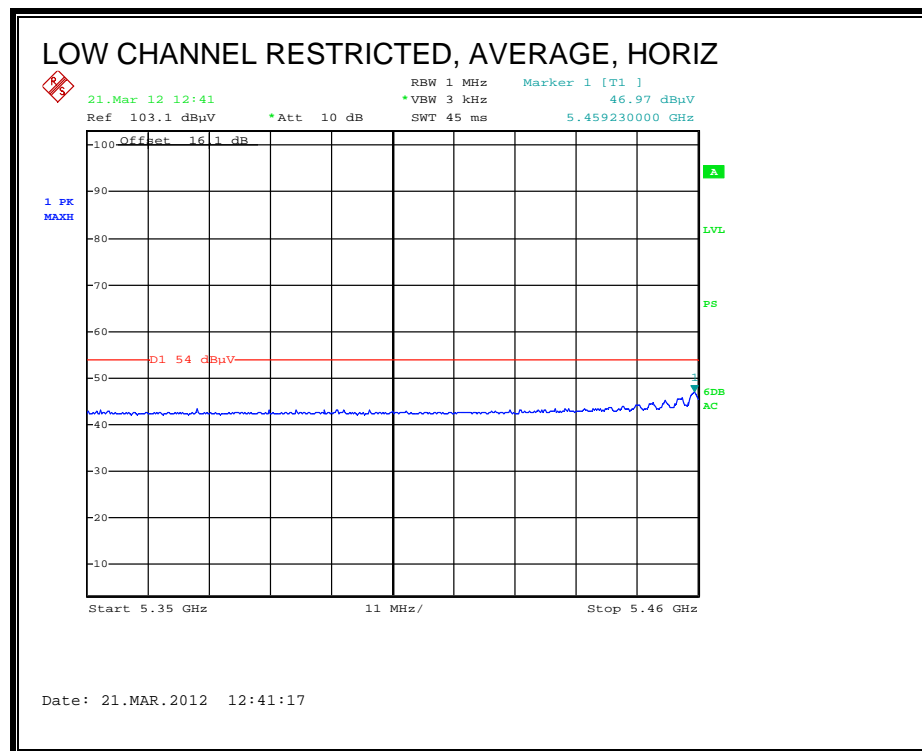
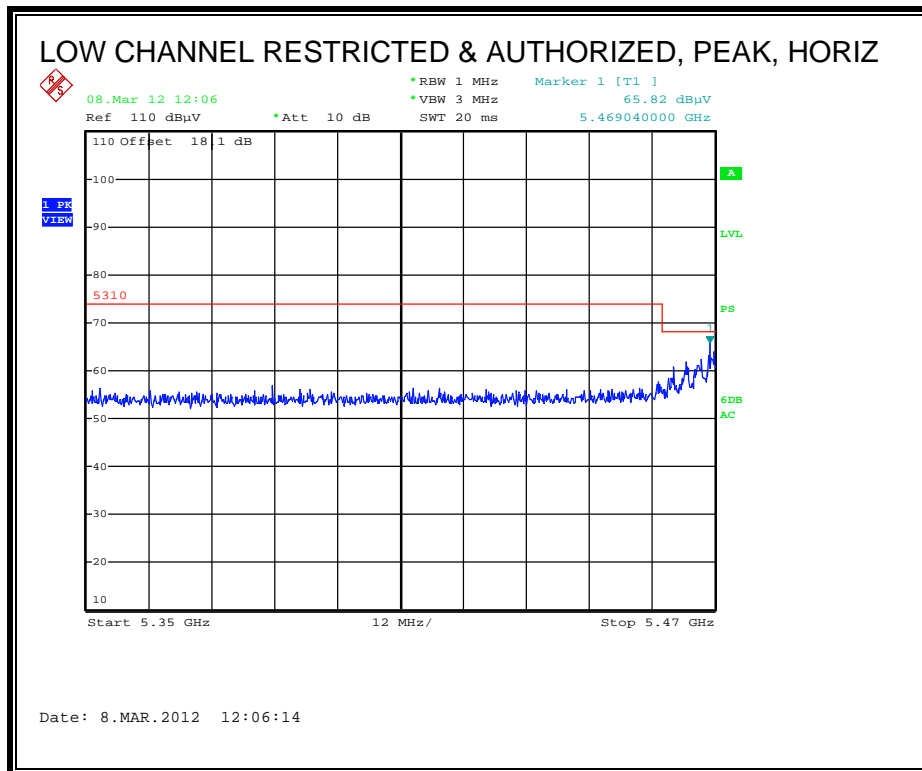
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
<b>Low Channel - 5500MHz</b>															
11.000	3.0	51.3	38.4	9.2	-36.3	0.0	0.7	63.4	74.0	-10.6	V	P	133.5	40.6	
11.000	3.0	41.3	38.4	9.2	-36.3	0.0	0.7	53.3	54.0	-0.7	V	A	133.5	40.6	
11.000	3.0	40.7	38.4	9.2	-36.3	0.0	0.7	52.7	74.0	-21.3	H	P	105.6	351.2	
11.000	3.0	30.8	38.4	9.2	-36.3	0.0	0.7	42.8	54.0	-11.2	H	A	105.6	351.2	
<b>Mid Channel - 5580MHz</b>															
11.160	3.0	49.7	38.5	9.3	-36.1	0.0	0.7	62.1	74.0	-11.9	V	P	146.2	44.6	
11.160	3.0	40.1	38.5	9.3	-36.1	0.0	0.7	52.5	54.0	-1.5	V	A	146.2	44.6	
11.160	3.0	40.6	38.5	9.3	-36.1	0.0	0.7	53.0	74.0	-21.0	H	P	114.4	353.6	
11.160	3.0	30.3	38.5	9.3	-36.1	0.0	0.7	42.7	54.0	-11.3	H	A	114.4	353.6	
<b>High Channel - 5700MHz</b>															
11.400	3.0	41.2	38.7	9.4	-35.9	0.0	0.7	54.2	74.0	-19.8	V	P	142.8	57.0	
11.400	3.0	30.7	38.7	9.4	-35.9	0.0	0.7	43.7	54.0	-10.3	V	A	142.8	57.0	
11.400	3.0	36.0	38.7	9.4	-35.9	0.0	0.7	49.0	74.0	-25.0	H	P	165.3	84.6	
11.400	3.0	26.4	38.7	9.4	-35.9	0.0	0.7	39.3	54.0	-14.7	H	A	165.3	84.6	

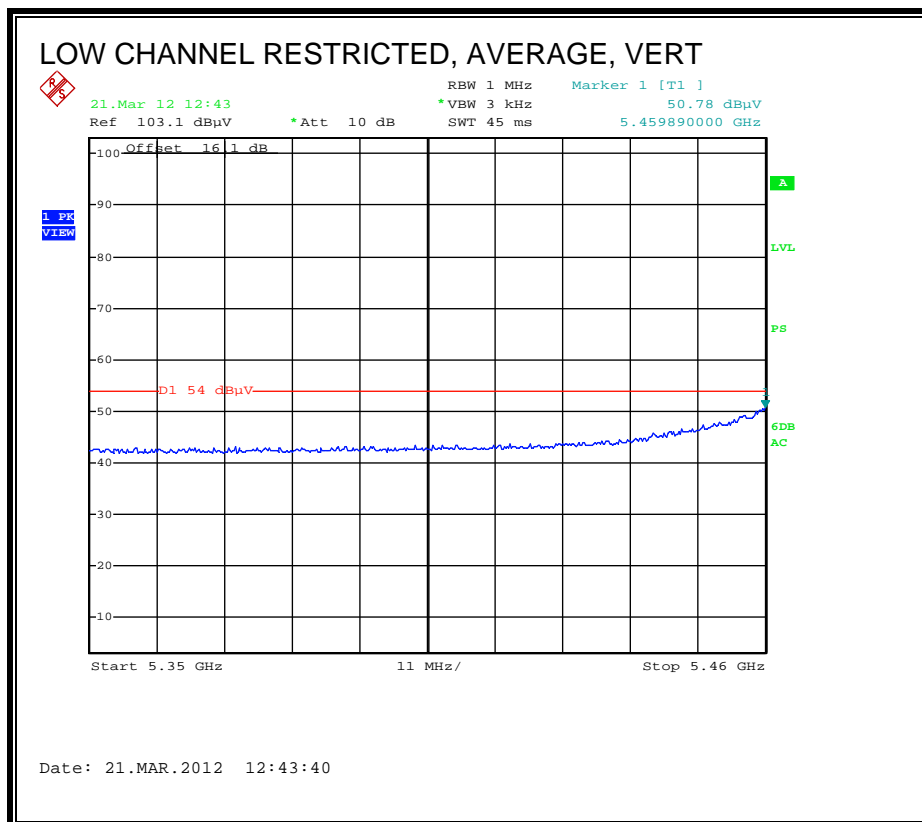
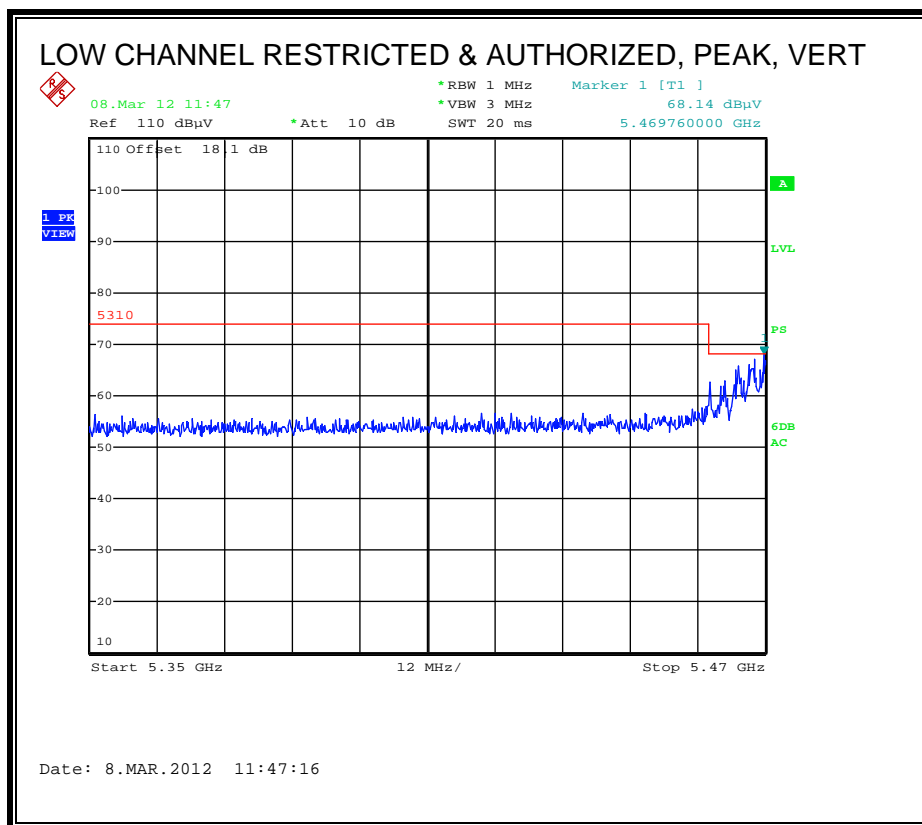
Rev. 4.1.2.7

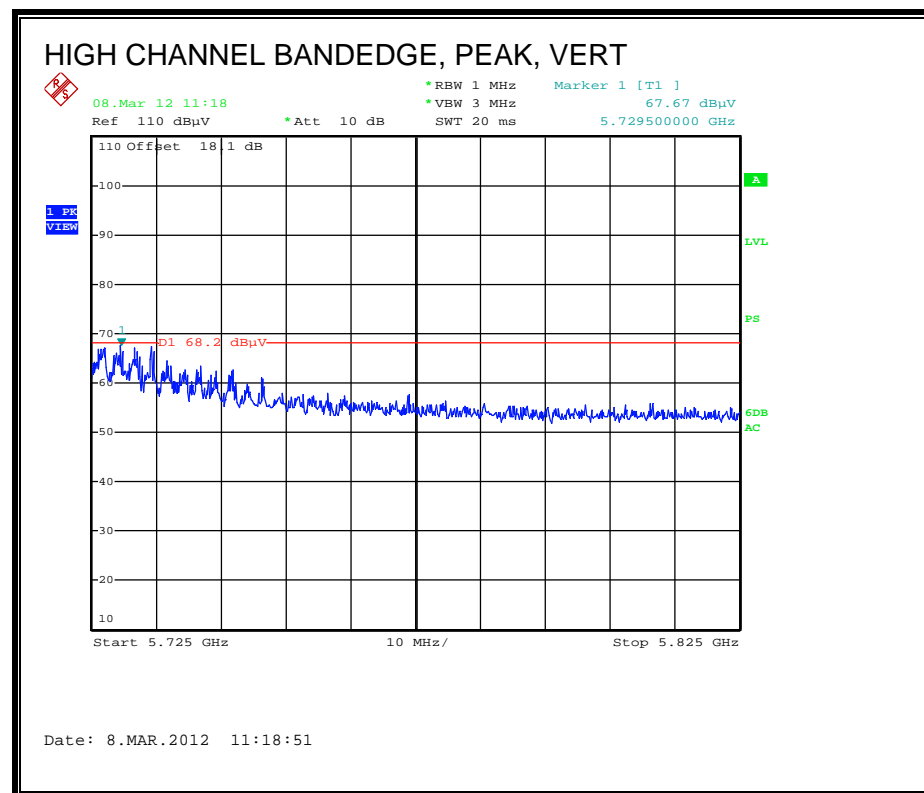
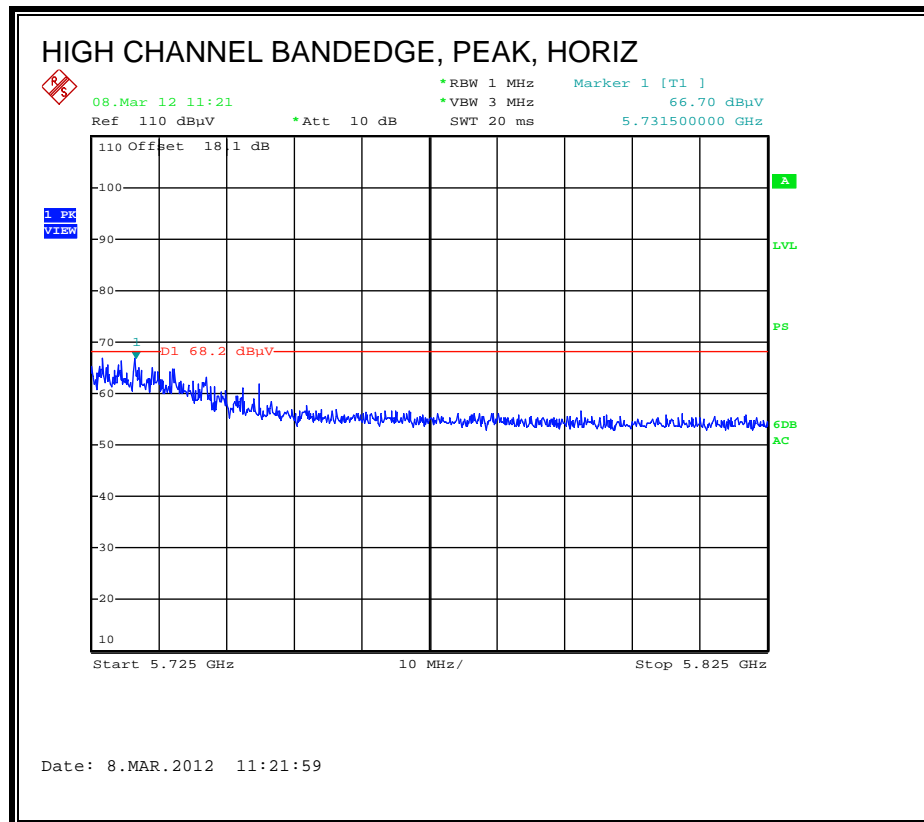
Note: No other emissions were detected above the system noise floor.

## 7.7. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.6 GHz BAND

### RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)





**AUTHORIZED BANDEDGE (HIGH CHANNEL)**

**HARMONICS AND SPURIOUS EMISSIONS**
**High Frequency Measurement**  
**Compliance Certification Services, Fremont 5m Chamber A**

Test Engr: Dennis Huang  
 Date: 02/14/12  
 Project #: 12U14229  
 Company: BroadCom  
 Test Target: FCC 15.205  
 Mode Oper: 802.11n HT40 Tx

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	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
<b>Low Channel - 5510MHz</b>															
11.020	3.0	44.5	38.4	9.2	-36.3	0.0	0.7	56.6	74.0	-17.4	V	P	141.8	60.7	
11.020	3.0	33.9	38.4	9.2	-36.3	0.0	0.7	46.1	54.0	-8.0	V	A	141.8	60.7	
11.020	3.0	36.4	38.4	9.2	-36.3	0.0	0.7	48.5	74.0	-25.5	H	P	181.9	37.1	
11.020	3.0	26.8	38.4	9.2	-36.3	0.0	0.7	38.9	54.0	-15.1	H	A	181.9	37.1	
<b>Mid Channel - 5550MHz</b>															
11.100	3.0	49.5	38.5	9.3	-36.2	0.0	0.7	61.8	74.0	-12.2	V	P	150.3	41.3	
11.100	3.0	40.8	38.5	9.3	-36.2	0.0	0.7	53.1	54.0	-0.9	V	A	150.3	41.3	
11.100	3.0	39.2	38.5	9.3	-36.2	0.0	0.7	51.5	74.0	-22.5	H	P	153.5	351.5	
11.100	3.0	29.4	38.5	9.3	-36.2	0.0	0.7	41.7	54.0	-12.3	H	A	153.5	351.5	
<b>High Channel - 5670MHz</b>															
11.340	3.0	45.9	38.7	9.4	-36.0	0.0	0.7	58.7	74.0	-15.3	V	P	135.6	57.7	
11.340	3.0	36.7	38.7	9.4	-36.0	0.0	0.7	49.5	54.0	-4.5	V	A	135.6	57.7	
11.340	3.0	37.5	38.7	9.4	-36.0	0.0	0.7	50.3	74.0	-23.7	H	P	133.9	60.6	
11.340	3.0	28.9	38.7	9.4	-36.0	0.0	0.7	41.7	54.0	-12.3	H	A	133.9	60.6	

Rev. 4.1.2.7

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

## 7.8. RECEIVER ABOVE 1 GHz

### 7.8.1. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH

#### SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber-A																
Company:		BroadCom														
Project #:		12U14229														
Date:		2/17/2012														
Test Engineer:		Dennis Huang														
Configuration:		EUT with Support Laptop PC														
Mode:		Rx HT20														
<b>Test Equipment:</b>																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T73; S/N: 6717 @3m			T144 Miteq 3008A00911									RX RSS 210				
<b>Hi Frequency Cables</b>																
3' cable 22807700			12' cable 22807630			20' cable 22807500			HPF			Reject Filter			Peak Measurements REW=VBW=1MHz	
3' cable 22807700			12' cable 22807600			20' cable 22807500									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	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
1.245	3.0	69.5	40.9	24.7	3.0	-38.5	0.0	0.0	58.8	30.2	74	54	-15.2	-23.8	V	
1.250	3.0	63.1	36.5	24.8	3.0	-38.5	0.0	0.0	52.4	25.8	74	54	-21.6	-28.2	H	
2.492	3.0	61.4	37.2	28.9	4.4	-36.9	0.0	0.0	57.8	33.6	74	54	-16.2	-20.4	V	
2.492	3.0	60.7	37.9	28.9	4.4	-36.9	0.0	0.0	57.1	34.3	74	54	-16.9	-19.7	H	
Rev. 07.08.11																
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												



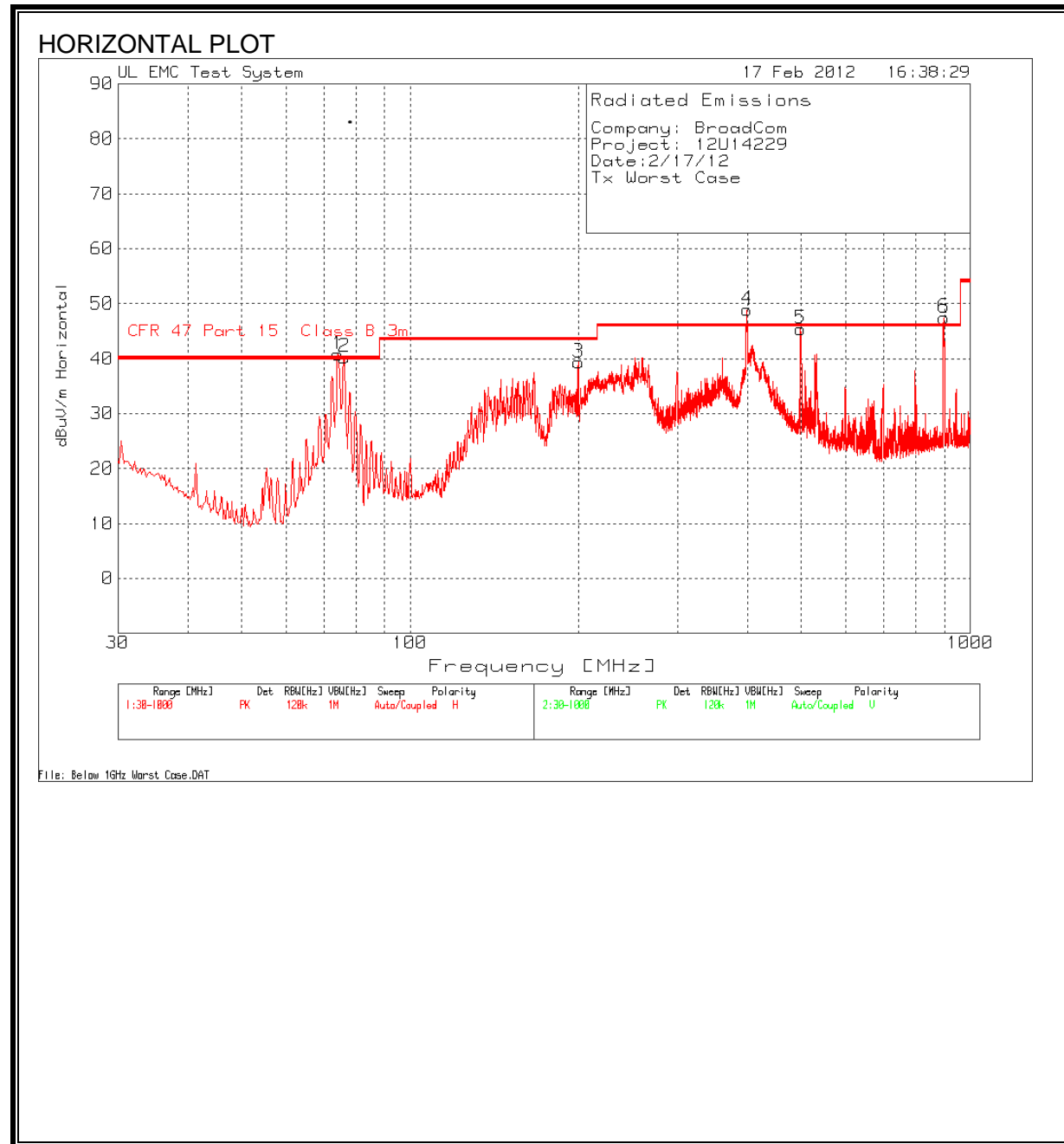
## 7.8.2. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH

### SPURIOUS EMISSIONS

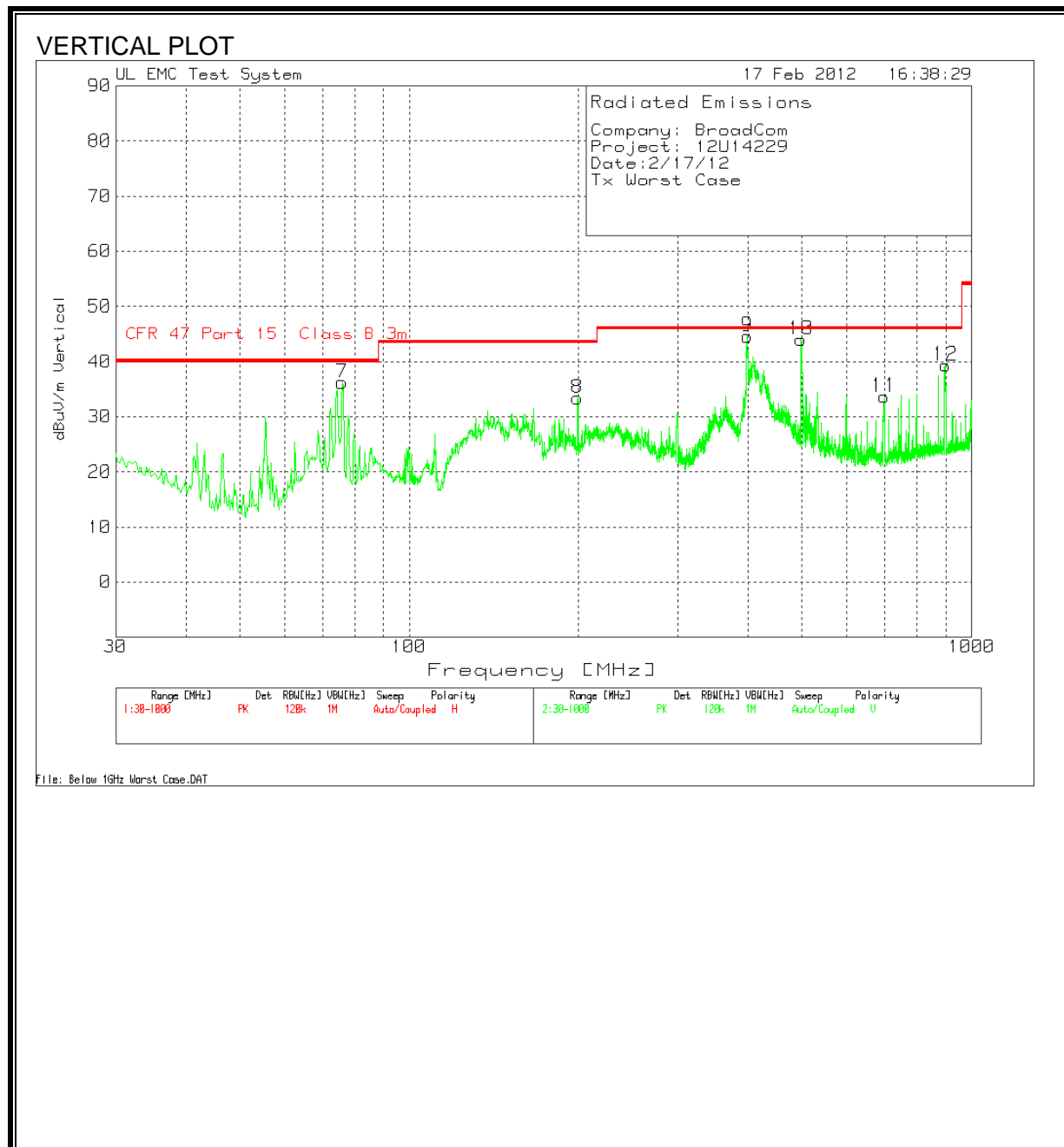
High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber-A																	
Company:		BroadCom															
Project #:		12U1-229															
Date:		2/17/2012															
Test Engineer:		Dennis Huang															
Configuration:		EUT with Support Laptop PC															
Mode:		Rx HT40															
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T73; S/N: 6717 @3m			T144 Miteq 3008A00911									RX RSS 210					
Hi Frequency Cables																	
3' cable 22807700			12' cable 22807630			20' cable 22807500			HPF			Reject Filter			Peak Measurements REW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz		
3' cable 22807700			12' cable 22807600			20' cable 22807500											
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)		
1.245	3.0	70.5	40.9	24.7	3.0	-38.5	0.0	0.0	59.8	30.2	74	54	-14.2	-23.8	V		
1.250	3.0	64.0	37.1	24.8	3.0	-38.5	0.0	0.0	53.3	26.4	74	54	-20.7	-27.6	H		
2.492	3.0	62.1	38.4	28.9	4.4	-36.9	0.0	0.0	58.6	34.8	74	54	-15.4	-19.2	V		
2.492	3.0	61.4	38.0	28.9	4.4	-36.9	0.0	0.0	57.9	34.4	74	54	-16.1	-19.6	H		
Rev. 07.08.11																	
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										

## 7.9. WORST-CASE BELOW 1 GHz

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





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

# HORIZONTAL & VERTICAL DATA

Company:		Broadcom							
Project:		12U14229							
Date:		2/17/2012							
Mode		Tx Worst Case							
Test Engineer:		Dennis Huang							
Range 1 30 - 1000MHz									
Test Frequency	Meter Reading	Detector	25MHz-1GHz ChmbrA Amplified.TX [cB]	5m A T122 Bilog below 1GHz.TXT [dB]	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
74.1966	60.21	PK	-27.1	7.7	40.81	40	0.81	200	Horz
74.095	59.3	QP	-27.1	7.7	39.9	40	-0.1	201	Horz
76.1351	59.75	PK	-27.1	7.6	40.25	40	0.25	200	Horz
75.992	59.4	QP	-27.1	7.6	39.9	40	-0.1	201	Horz
199.8082	53.51	PK	-26.2	12	39.31	43.5	-4.19	100	Horz
399.6623	59.29	PK	-25.3	14.9	48.89	46	2.89	100	Horz
399.725	55.36	QP	-25.3	14.9	44.96	46	-1.04	101	Horz
497.9416	53.61	PK	-24.9	16.7	45.41	46	-0.59	200	Horz
899.3945	48.94	PK	-23.4	21.9	47.44	46	1.44	100	Horz
899.394	46.11	QP	-23.4	21.9	44.61	46	-1.39	101	Horz
75.9412	55.74	PK	-27.1	7.6	36.24	40	-3.76	400	Vert
199.0328	47.68	PK	-26.2	11.9	33.38	43.5	-10.12	200	Vert
399.6623	55.01	PK	-25.3	14.9	44.61	46	-1.39	100	Vert
497.7478	52.21	PK	-24.9	16.7	44.01	46	-1.99	100	Vert
699.5404	37.32	PK	-23.3	19.6	33.62	46	-12.38	200	Vert
899.5883	40.8	PK	-23.4	21.9	39.3	46	-6.7	100	Vert