



FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8
CLASS II PERMISSIVE CHANGE

CERTIFICATION TEST REPORT

FOR

802.11a/g/n 3x3 MIMO WLAN + BT COMBO PCI-E MINI CARD

MODEL NUMBER: BCM94331PCIEBT4

FCC ID: QDS-BRCM1055
IC: 4324A-BRCM1055

REPORT NUMBER: 11U14192-11

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Prepared for
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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: 802.11a/g/n 3x3 MIMO WLAN + BT Combo PCI-E Mini Card

MODEL: BCM94331PCIEBT4

SERIAL NUMBER: C8Y14660004DRK7EZ

DATE TESTED: FEBRUARY 7-20, 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:



FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:



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/g/n 3x3 MIMO WLAN + BT Combo PCI-E Mini Card with Low Energy mode (LE).

The radio module is manufactured by Broadcom.

5.2. MAXIMUM OUTPUT POWER

The measured average power values were within ± 0.5 dB of the original values. Refer to original report number "10U13492-3_FCC IC UNII WLAN Report" for exact output power values and for all antenna port results.

5.3. CLASS II PERMISSIVE CHANGE DESCRIPTION

The Bluetooth Low Energy functionality (BLE) is added to the Bluetooth chipset. The modified chipset is pin for pin compatible and the BT functionality, the maximum output power and frequencies of operation remain the same as the original approval.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes three 802.11agn antennas, with a maximum gain as below table;

2x2-ANTENNA

K90 GHz	Antenna Gain		Antenna Gain
	Ant 1 dBi	Ant 2 dBi	Combined dBi
5.2	6.02	5.96	9.00
5.3	6.80	6.17	9.51
5.6	7.06	6.26	9.69

3x3-ANTENNA

K90 GHz	Antenna Gain			Antenna Gain
	Ant 1 dBi	Ant 2 dBi	Ant 3 dBi	Combined dBi
5.2	6.02	5.96	5.50	10.60
5.3	6.80	6.17	5.59	10.99
5.6	7.06	6.26	5.97	11.23

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was WLTEST 5.100 RC98.3, version 5.100.98.17.

The EUT driver software installed during testing was Broadcom, rev. 5.100.98.17
The test utility software used during testing was BCM Internal, rev. 5.100.RC98.3.

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.

For radiated band edge measurements preliminary testing showed that the worst case was vertical polarization, so final measurements were performed with vertical polarization.

An investigation of the original report “10U13492-3_FCC IC UNII WLAN Report” was performed to find worst case radiated emissions data; spot test in this report is performed for those worst-case modes and channels.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	HP	DV6000	CNF6463KP7	DoC
AC Adapter	HP	PA-1650-02H	592C40CRGUBR9B	DoC
Adapter	Catalyst	MINI2EXP	BRCM2011-05	N/A
Adapter	Broadcom	BCM9433PCIEBT4HAD	1371750	N/A

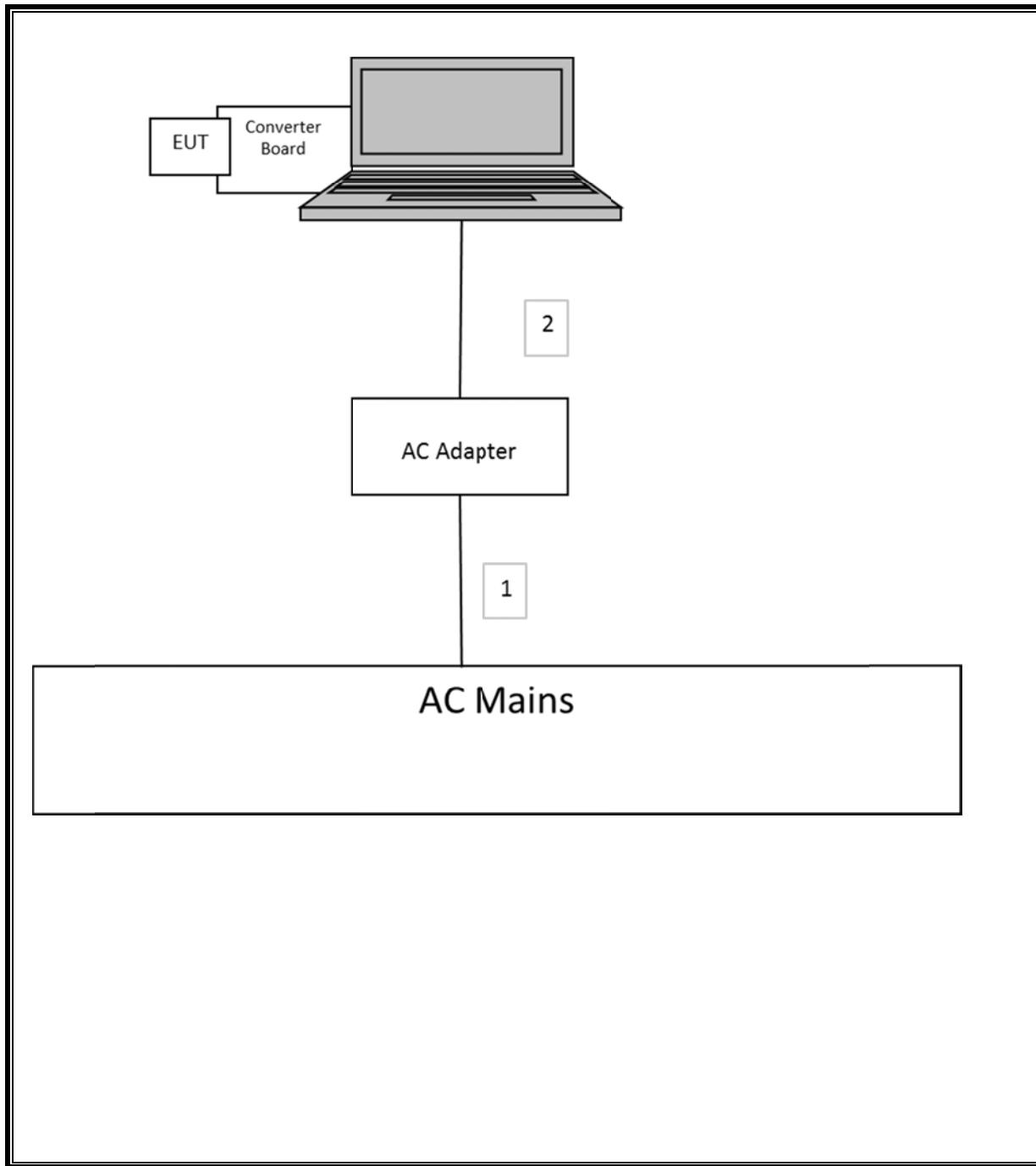
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Unshielded	1.5m	N/A
2	DC	1	DC	Unshielded	1.5m	Ferrite at laptop end

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST						
Description	Manufacturer	Model	Asset	Cal Date	Cal Due	
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	09/02/11	09/02/12	
ESA Spectrum Analyzer 9kHz-6.7GHz	Agilent / HP	E4404B		01/10/12	01/10/13	
Antenna, Horn, 18 GHz	EMCO	3115	C00872	09/20/11	09/20/12	
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	07/18/11	07/18/12	
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/11	12/13/13	
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/11	12/13/13	
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	07/28/11	07/28/12	
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/14/11	06/14/12	
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/02/11	08/02/12	

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

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
HT20 CDD MCS0	1.77	1.95	0.908	90.8%	0.42	0.565
HT20 SDM MCS16	0.62	0.75	0.821	82.1%	0.85	1.623
HT40 SISO	0.93	1.06	0.873	87.3%	0.59	1.079
HT40 CDD MCS0	0.86	1.03	0.834	83.4%	0.79	1.161
HT40 STBC MCS0	0.92	1.09	0.851	85.1%	0.70	1.082
HT40 SDM MCS21	0.07	0.27	0.244	24.4%	6.12	15.152

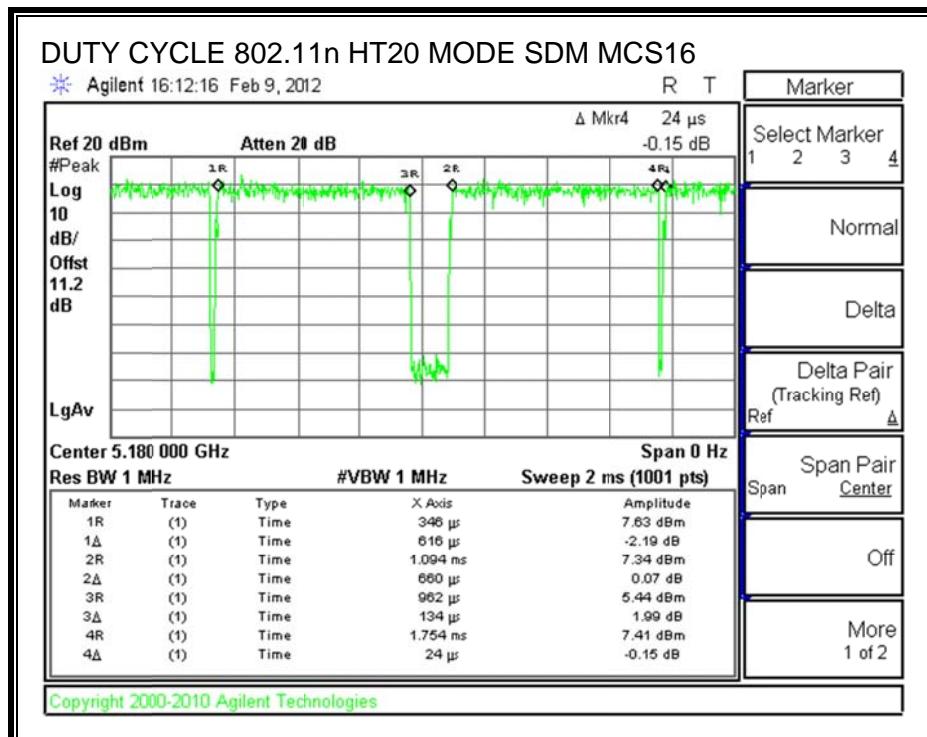
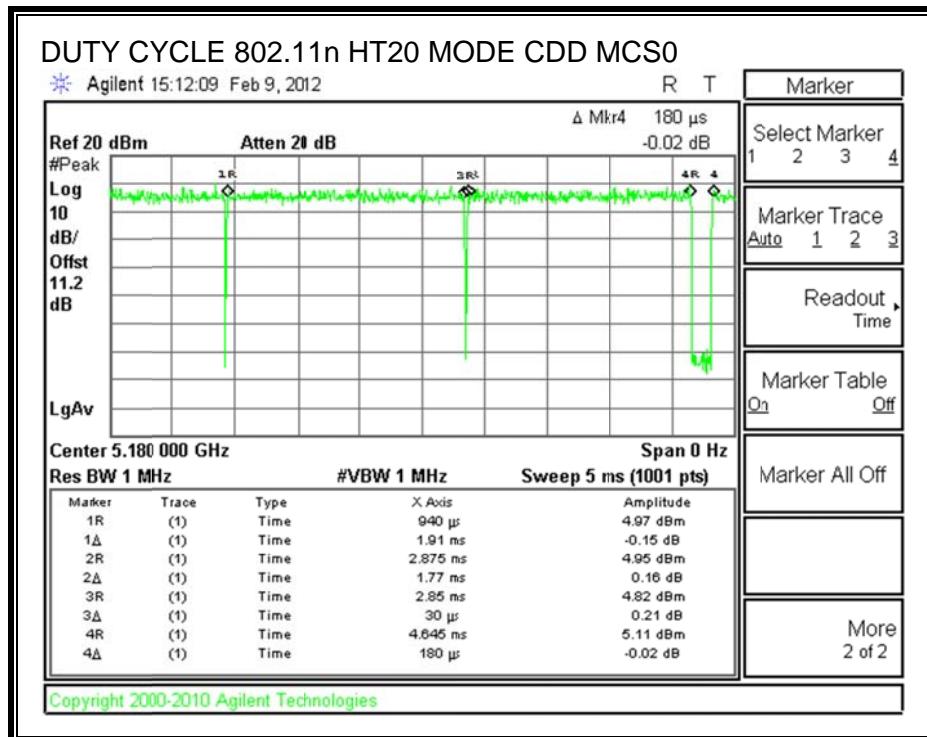
6.1.2. MEASUREMENT METHOD FOR POWER AND PPSD

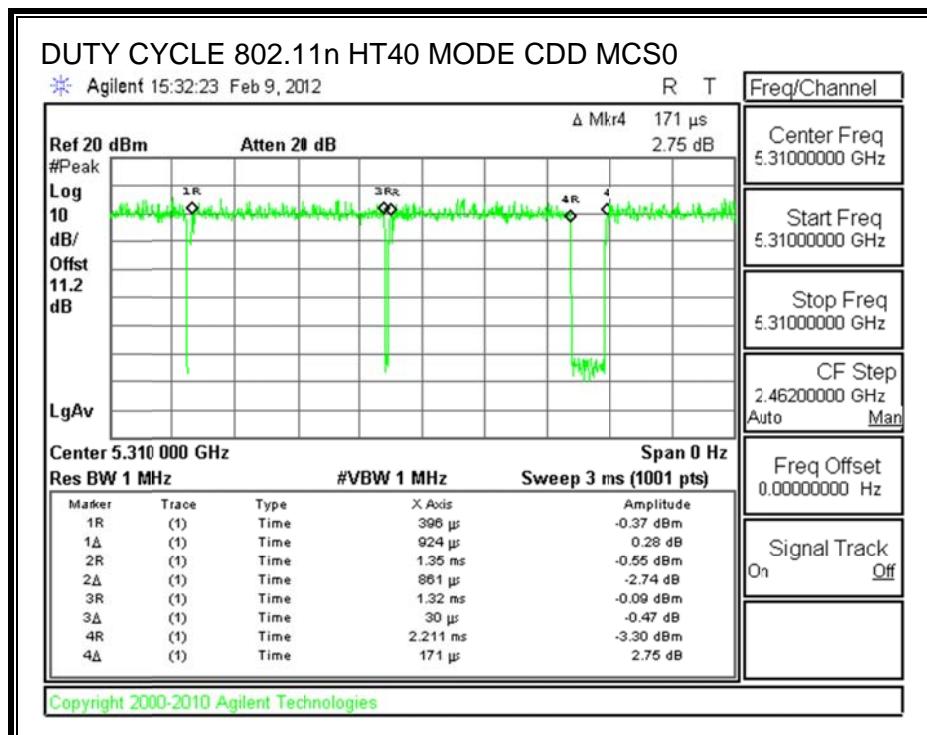
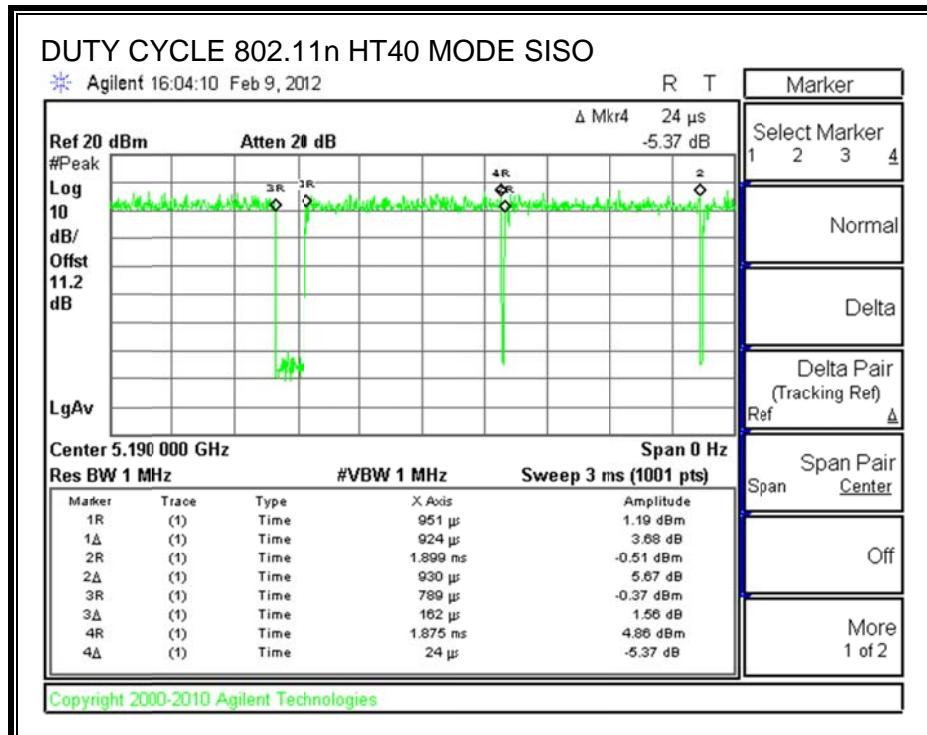
The Duty Cycle is less than 98% and not consistent therefore KDB 789033 Method SA-3 Alternative with Power RMS Averaging is used.

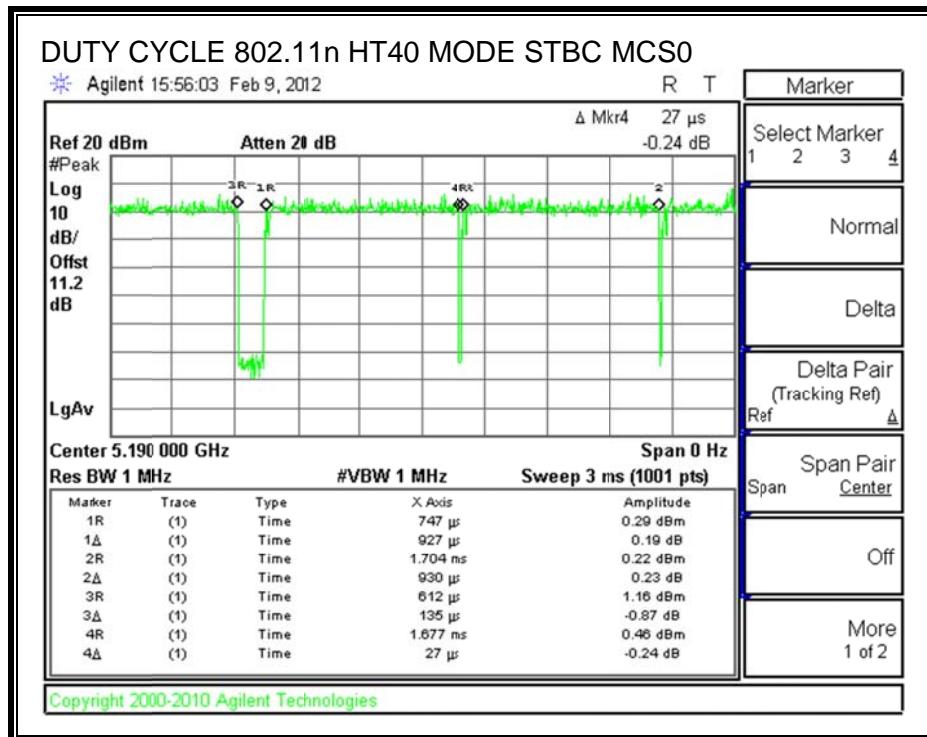
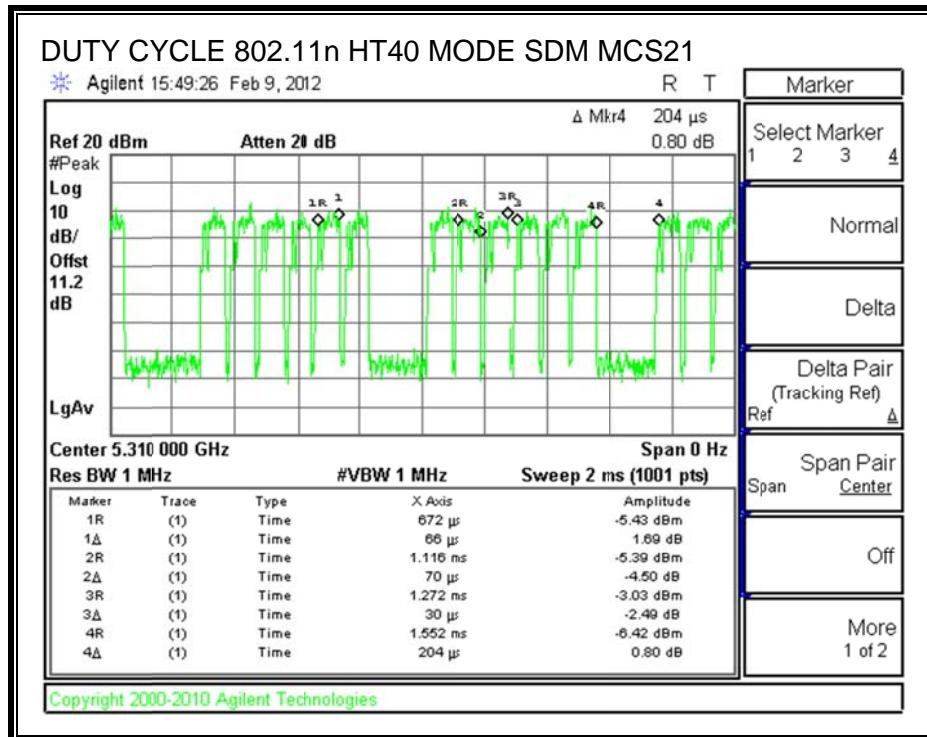
6.1.3. MEASUREMENT METHOD FOR AVG SPURIOUS EMISSIONS > 1 GHz

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.

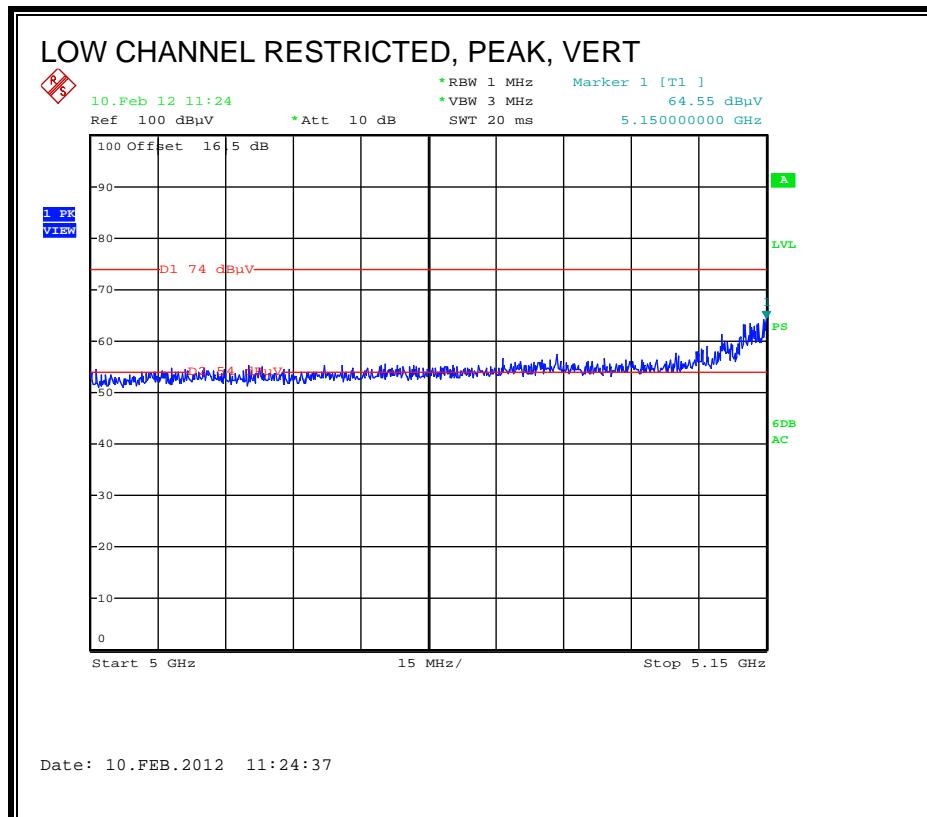
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

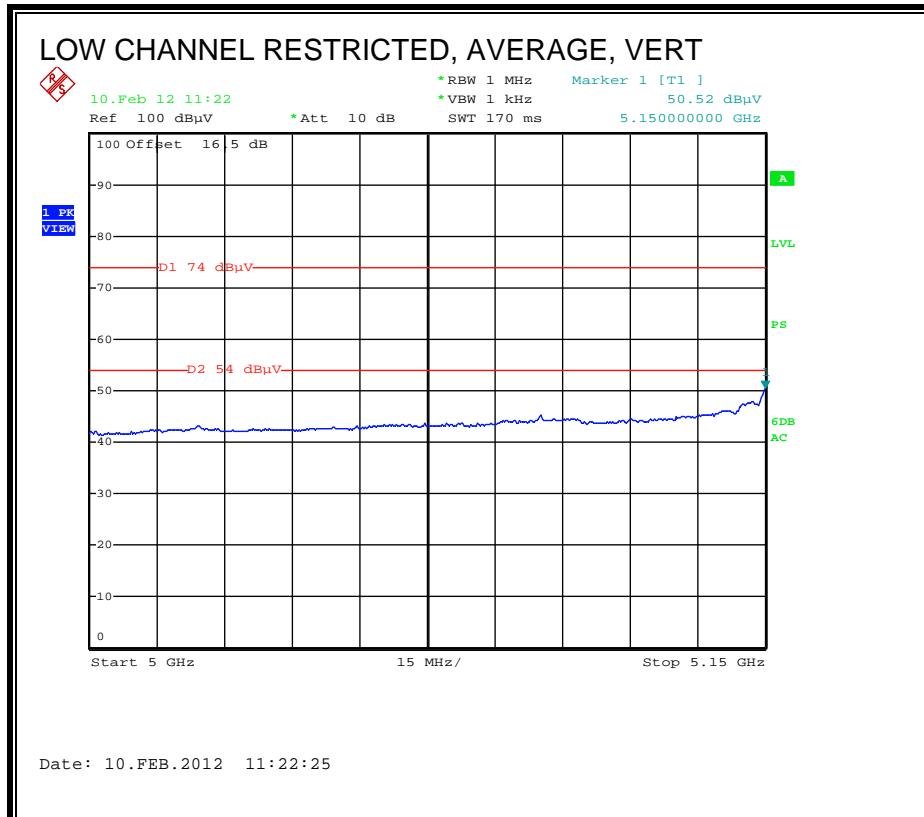
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

7.2. TRANSMITTER ABOVE 1 GHz

7.2.1. TX ABOVE 1 GHz 802.11n HT20 3TX, 5.2 GHz BAND, CDD MCS0

RESTRICTED BANDEDGE (LOW CHANNEL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber															
Company: Broadcom Project #: 11U14192 Date: 2/13/2012 Test Engineer: D. Garcia Configuration: Laptop PC, EUT on Test Board, antenna apparatus Mode: HT203x3 CDD MCS0															
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit							
T60; S/N: 2238 @3m		T34 HP 8449B						FCC 15.205							
Hi Frequency Cables															
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF		Reject Filter		Peak Measurements REW=VBW=1MHz					
3' cable 22807700		12' cable 22807600		20' cable 22807500				R_001		Average Measurements RBW=1MHz ; VBW=10Hz					
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
HT20 3x3 CDD MCS0; CH 48 = 5240MHz															
15.720	3.0	34.7	21.7	38.4	13.1	-31.9	0.0	0.0	54.3	41.3	74	54	-19.7	-12.7	V
15.720	3.0	33.5	21.7	38.4	13.1	-31.9	0.0	0.0	53.0	41.3	74	54	-21.0	-12.7	H
Rev. 07.08.1:															
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											

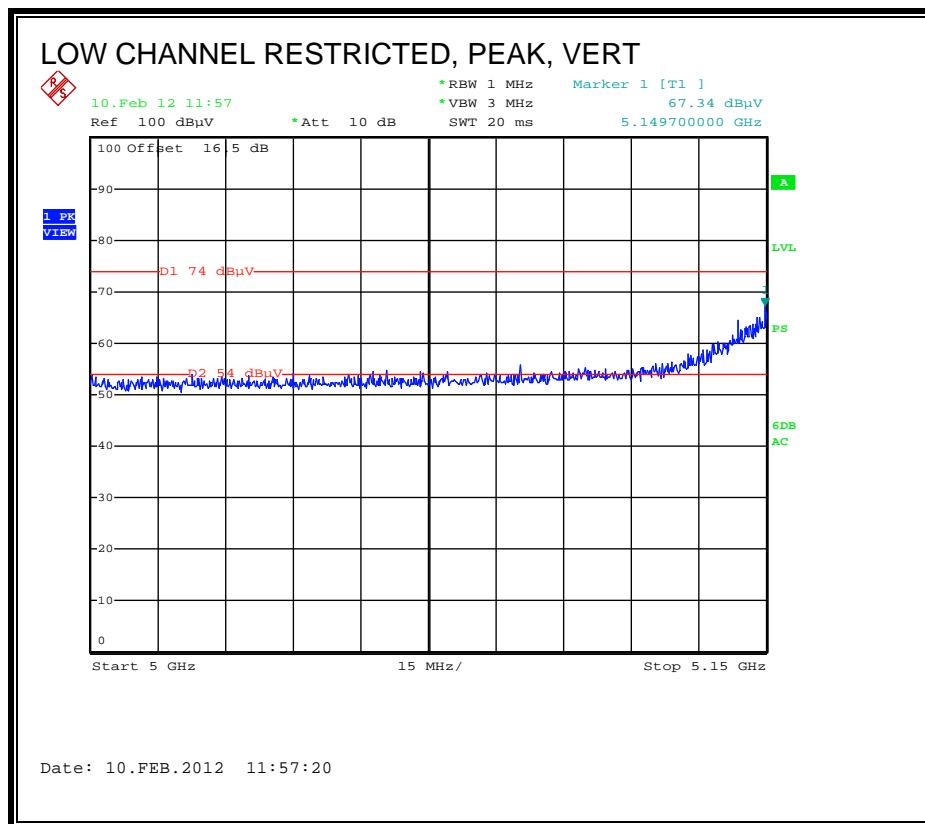
7.2.2. TX ABOVE 1 GHz 802.11n HT20 3TX, 5.2 GHz BAND, SDM MCS21

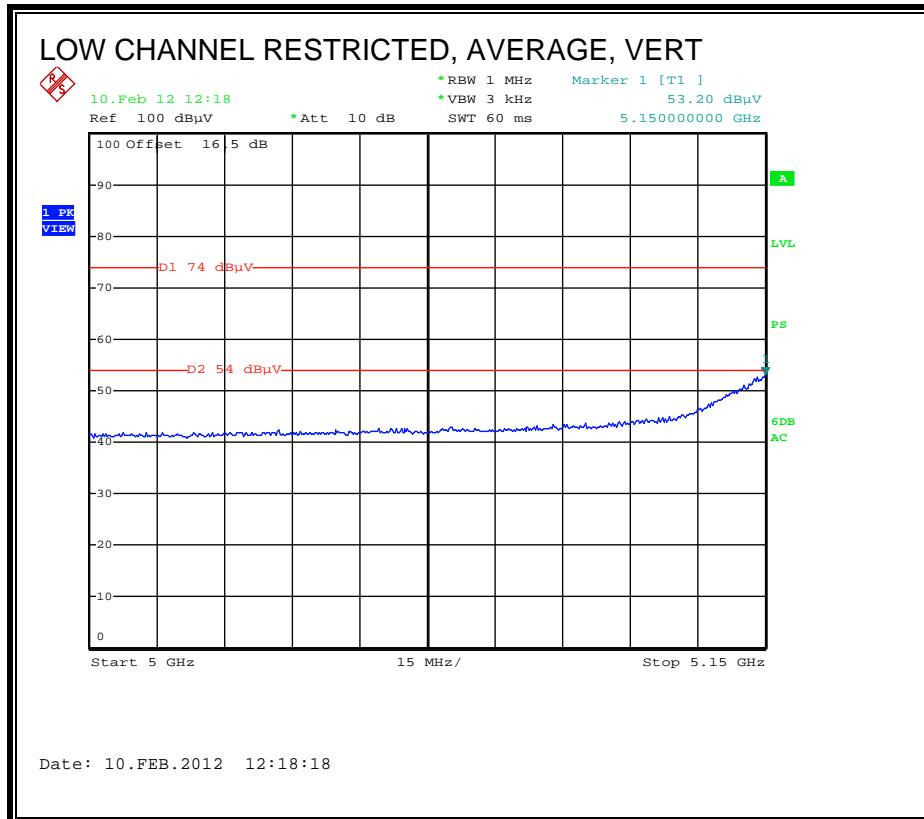
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber															
Company: Broadcom Project #: 11U14192 Date: 2/13/2012 Test Engineer: D. Garcia Configuration: Laptop PC, EUT on Test Board, antenna apparatus Mode: HT20x3 SDM MCS16															
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz					Limit				
T60; S/N: 2238 @3m		T34 HP 8449B									FCC 15.205				
Hi Frequency Cables															
3' cable 22807700		12' cable 22807600		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	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)
HT20 3x3 SDM MCS16; CH 36 = 5180 MHz															
15.540	3.0	34.1	22.2	39.1	13.0	-31.9	0.0	0.0	54.2	42.3	74	54	-19.8	-11.7	V
15.540	3.0	34.2	22.1	39.1	13.0	-31.9	0.0	0.0	54.3	42.2	74	54	-19.7	-11.8	H
Rev. 07.08.1															
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														

7.2.3. TX ABOVE 1 GHz 802.11n HT40 1TX, 5.2 GHz BAND, SISO

RESTRICTED BANDEDGE (LOW CHANNEL)





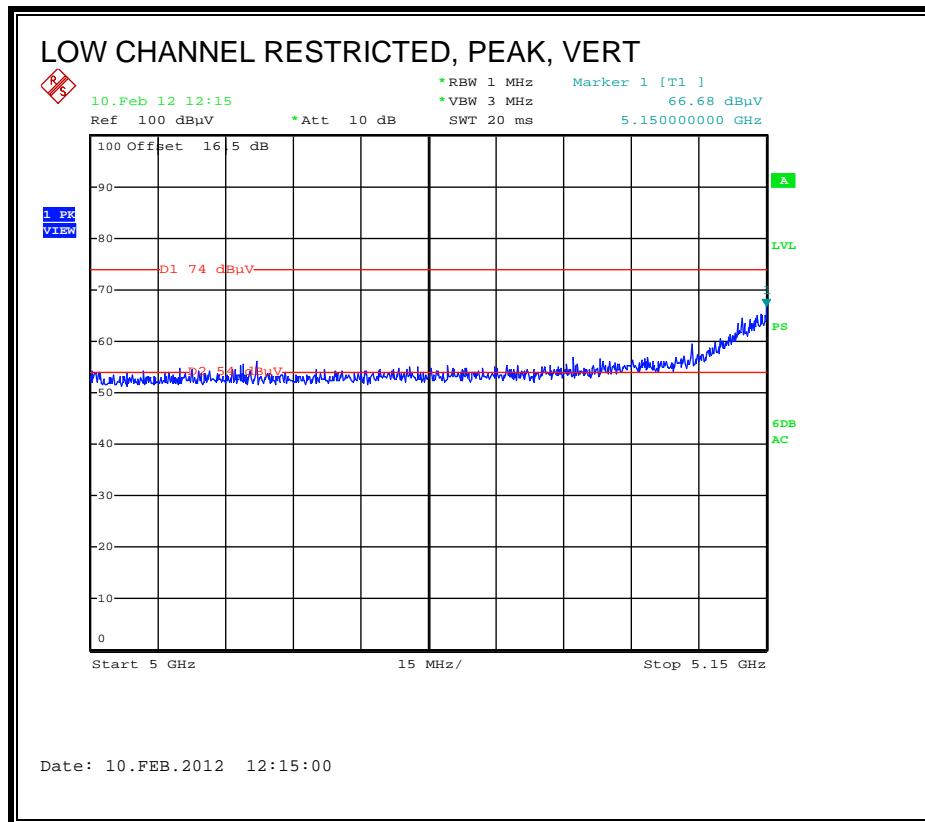
7.2.4. TX ABOVE 1 GHz 802.11n HT40 3TX, 5.2 GHz BAND, CDD MCS0

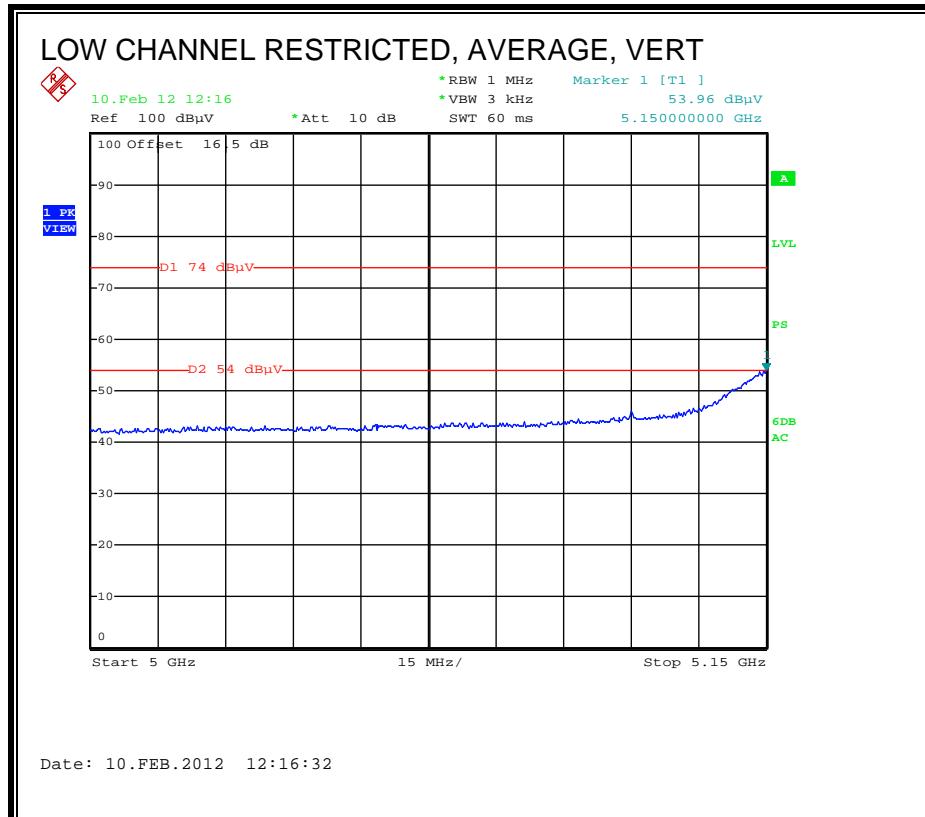
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber															
<u>Test Equipment:</u>															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz					Limit				
T60; S/N: 2238 @3m		T34 HP 8449B									FCC 15.205				
Hi Frequency Cables															
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF			Reject Filter		<u>Peak Measurements</u> REW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz				
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
HT40 3x3 CDD MCS0; CH 46 = 5230MHz															
15.690	3.0	34.4	21.8	38.5	13.0	-31.9	0.0	0.0	54.1	41.4	74	54	-19.9	-12.6	V
15.690	3.0	33.9	21.7	38.5	13.0	-31.9	0.0	0.0	53.6	41.4	74	54	-20.4	-12.6	H
Rev. 07.08.1!															
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										

7.2.5. TX ABOVE 1 GHz 802.11n HT40 3TX, 5.2 GHz BAND, STBC MCS0

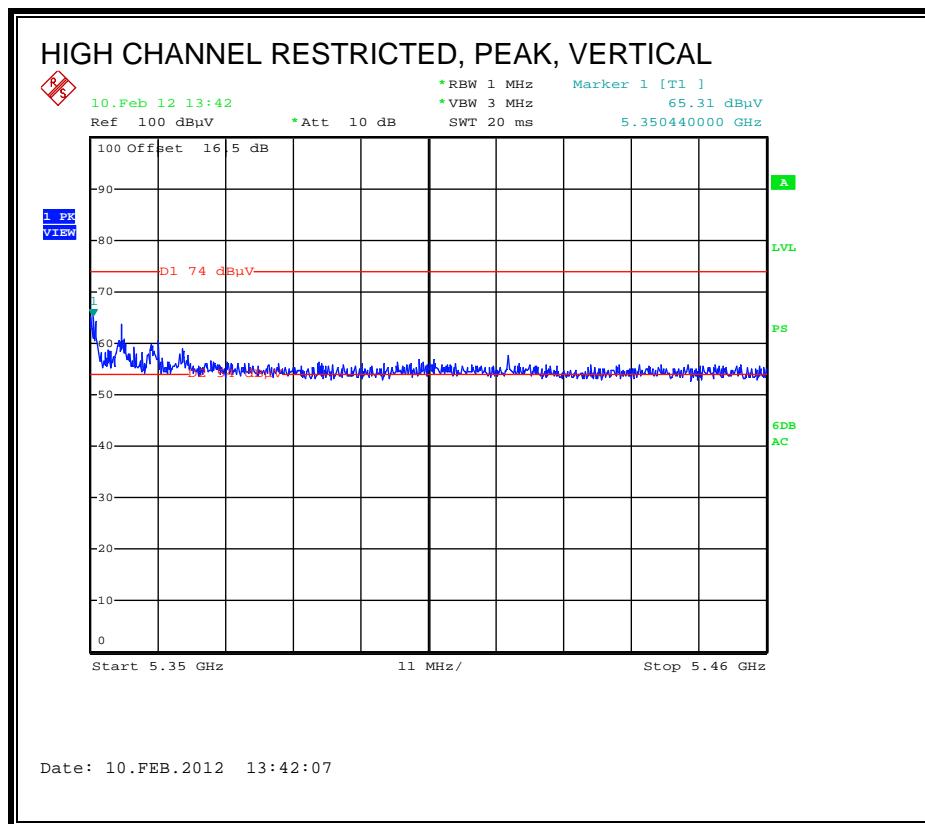
RESTRICTED BANDEDGE (LOW CHANNEL)

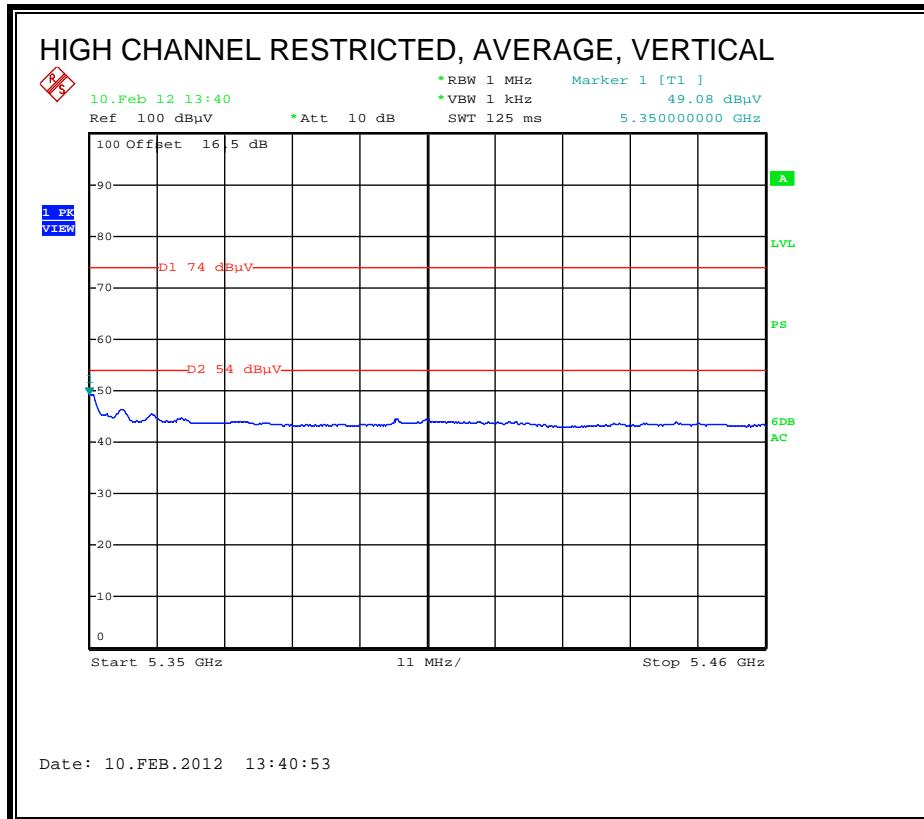




7.2.6. TX ABOVE 1 GHz 802.11n HT20 3TX, 5.3 GHz BAND, CDD MCS0

RESTRICTED BANDEDGE (HIGH CHANNEL)



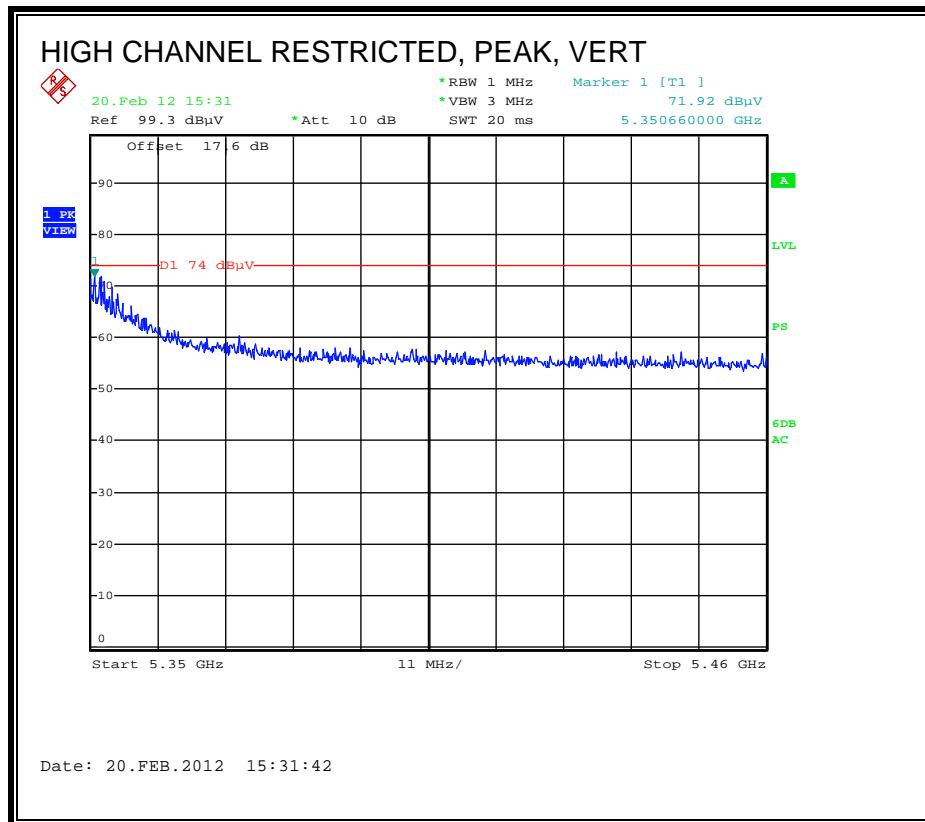


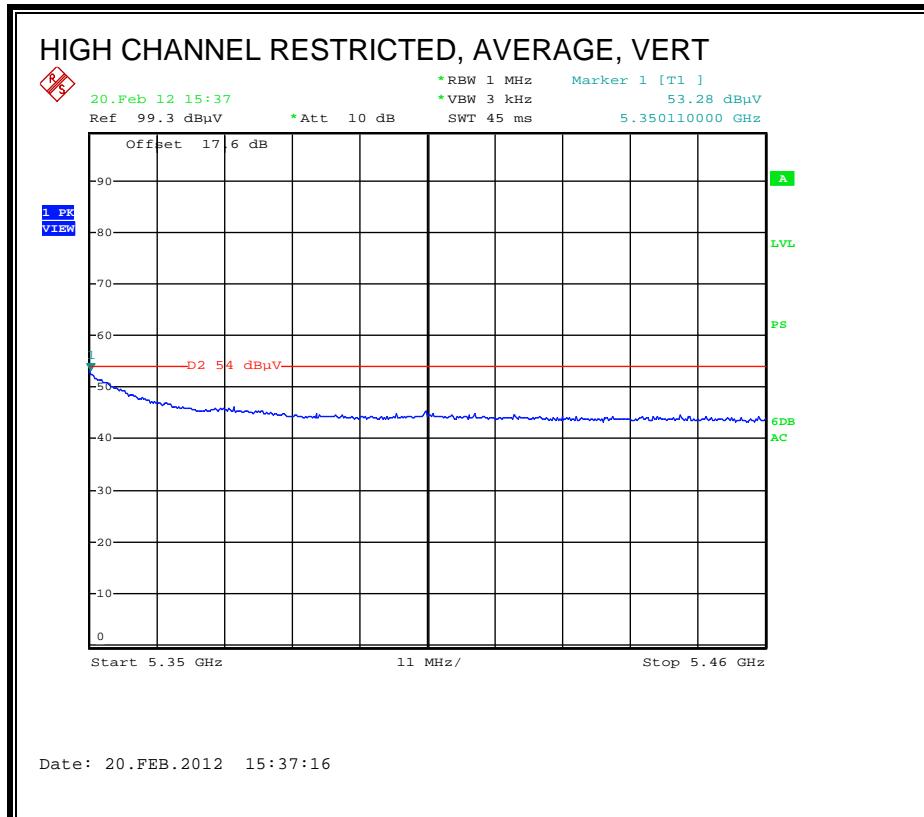
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber																
Company: Broadcom		Project #: 11U14192		Date: 2/13/2012		Test Engineer: D. Garcia		Configuration: Laptop PC, EUT on Test Board, antenna apparatus		Mode: HT203x3 CDD MCS0						
Test Equipment:																
Hom 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit								
T60; S/N: 2238 @3m		T34 HP 8449B						FCC 15.205								
Hi Frequency Cables																
3' cable 22807700		12' cable 22807600		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				R_001								
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)	
HT20 3x3 CDD MCS0; CH 52 = 5260MHz																
15.780	3.0	34.2	21.8	38.2	13.1	-31.9	0.0	0.0	53.7	41.2	74	54	-20.3	-12.8	V	
15.780	3.0	33.9	21.8	38.2	13.1	-31.9	0.0	0.0	53.3	41.2	74	54	-20.7	-12.8	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											

7.2.7. TX ABOVE 1 GHz 802.11n HT40 1TX, 5.3 GHz BAND, SISO

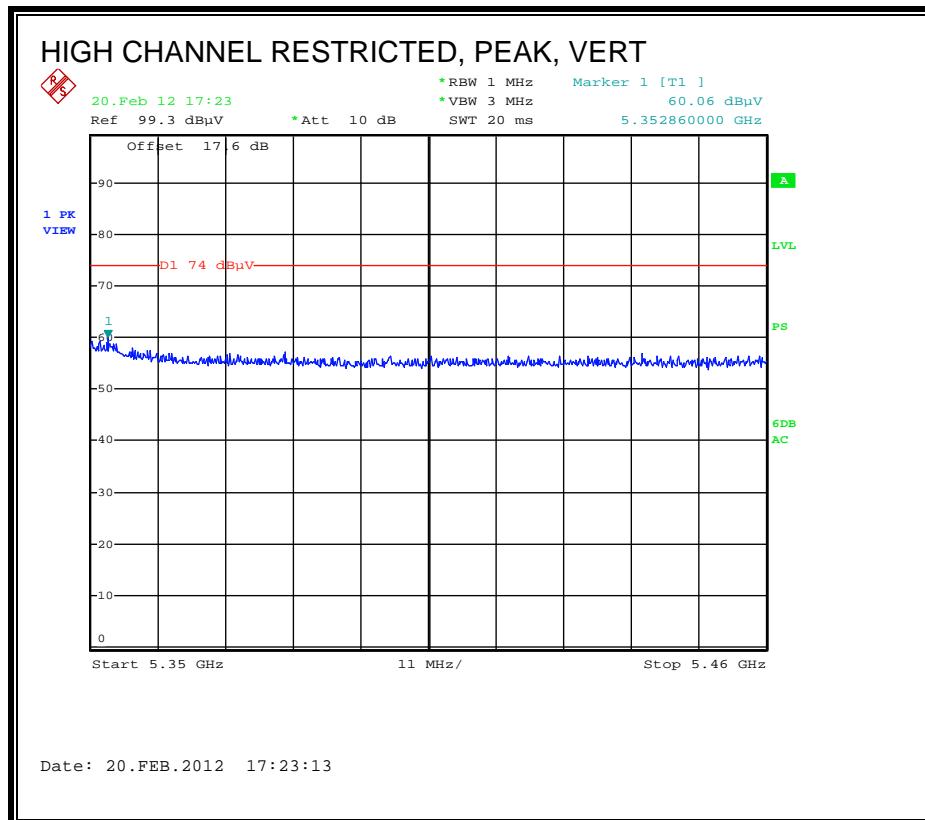
RESTRICTED BANEDGE (HIGH CHANNEL)

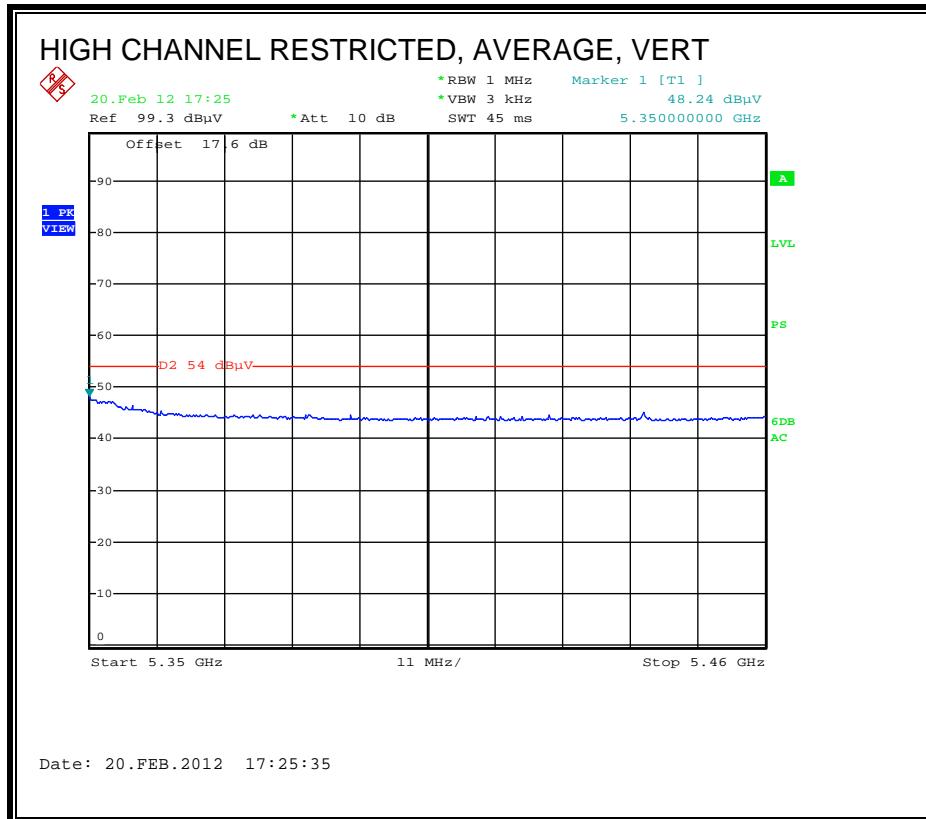




7.2.8. TX ABOVE 1 GHz 802.11n HT40 3TX, 5.3 GHz BAND, CDD MCS0

RESTRICTED BANEDGE (HIGH CHANNEL)



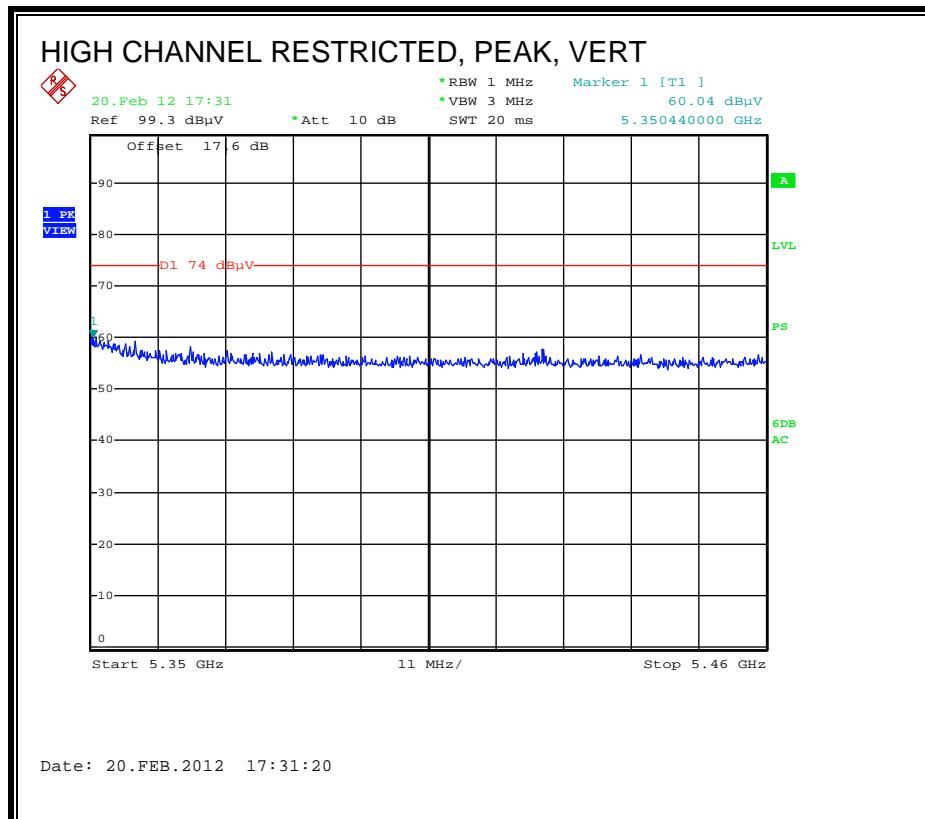


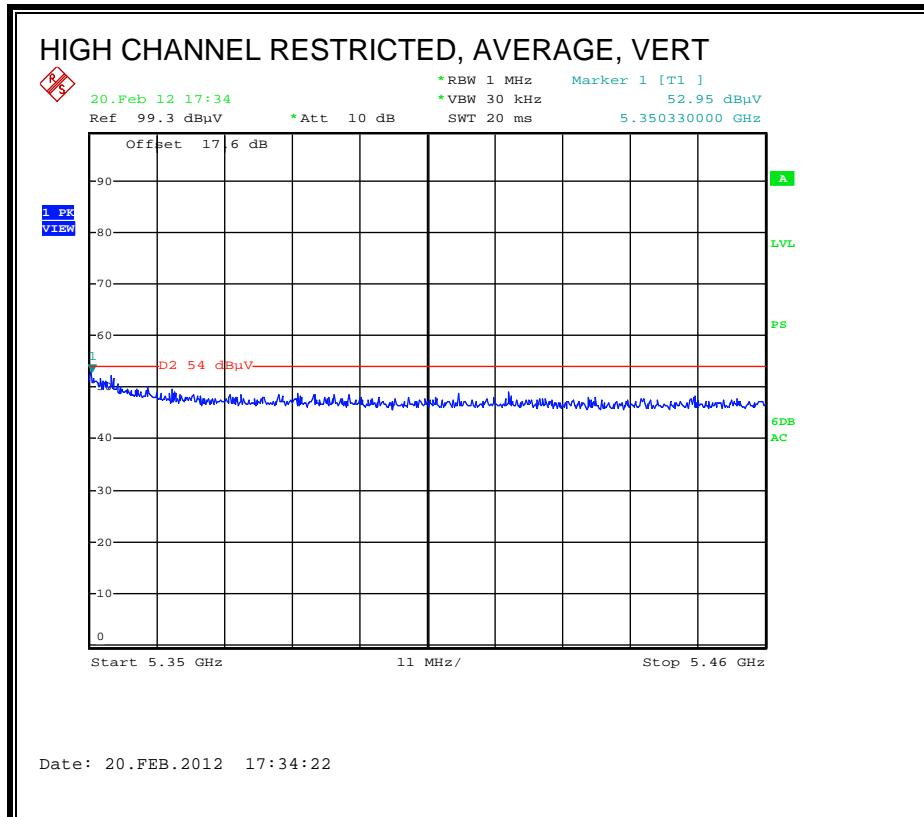
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber																					
Company: Broadcom		Project #: 11U14192		Date: 2/13/2012		Test Engineer: D. Garcia		Configuration: Laptop PC, EUT on Test Board, antenna apparatus		Mode: HT403x3 CDD MCS0		Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit	
T60; S/N: 2238 @3m		T34 HP 8449B																		FCC 15.205	
Hi Frequency Cables																					
3' cable 22807700		12' cable 22807600		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								R.001									
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)						
HT40 3x3 CDD MCS0; CH 60 = 5300MHz																					
10.600	3.0	33.9	22.1	38.4	9.9	-32.5	0.0	0.0	49.7	37.9	74	54	-24.3	-16.1		V					
15.900	3.0	34.2	21.7	37.8	13.2	-31.8	0.0	0.0	53.3	40.8	74	54	-20.7	-13.2		V					
10.600	3.0	33.7	22.1	38.4	9.9	-32.5	0.0	0.0	49.5	37.9	74	54	-24.5	-16.1		H					
15.900	3.0	34.0	21.7	37.8	13.2	-31.8	0.0	0.0	53.1	40.8	74	54	-20.9	-13.2		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																

7.2.9. TX ABOVE 1 GHz 802.11n HT40 3TX, 5.3 GHz BAND, SDM MCS21

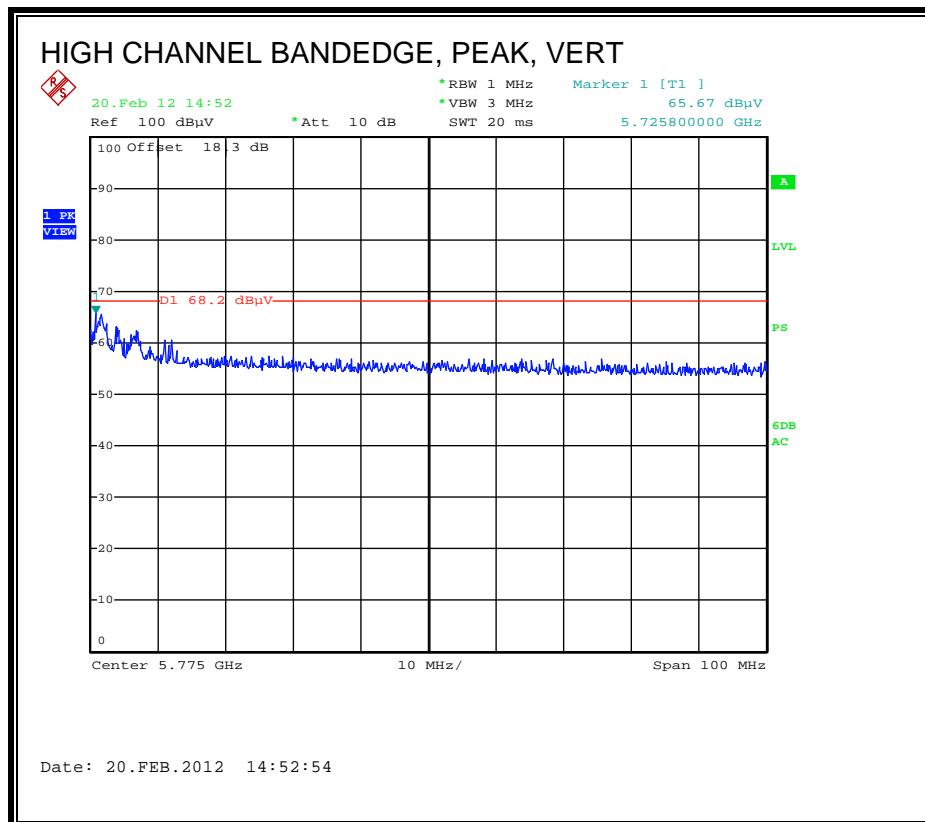
RESTRICTED BANDEDGE (HIGH CHANNEL)





**7.2.10. TX ABOVE 1 GHz 802.11n HT20 3TX, 5.6 GHz BAND, CDD
MCS0**

AUTHORIZED BANDEDGE (HIGH CHANNEL)

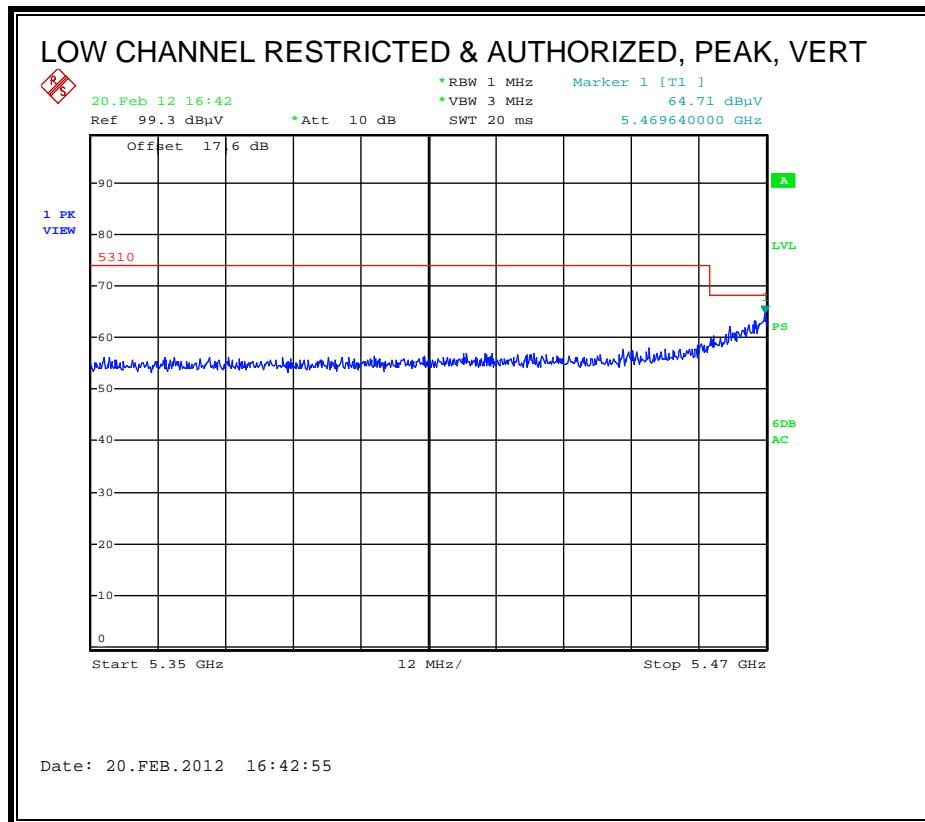


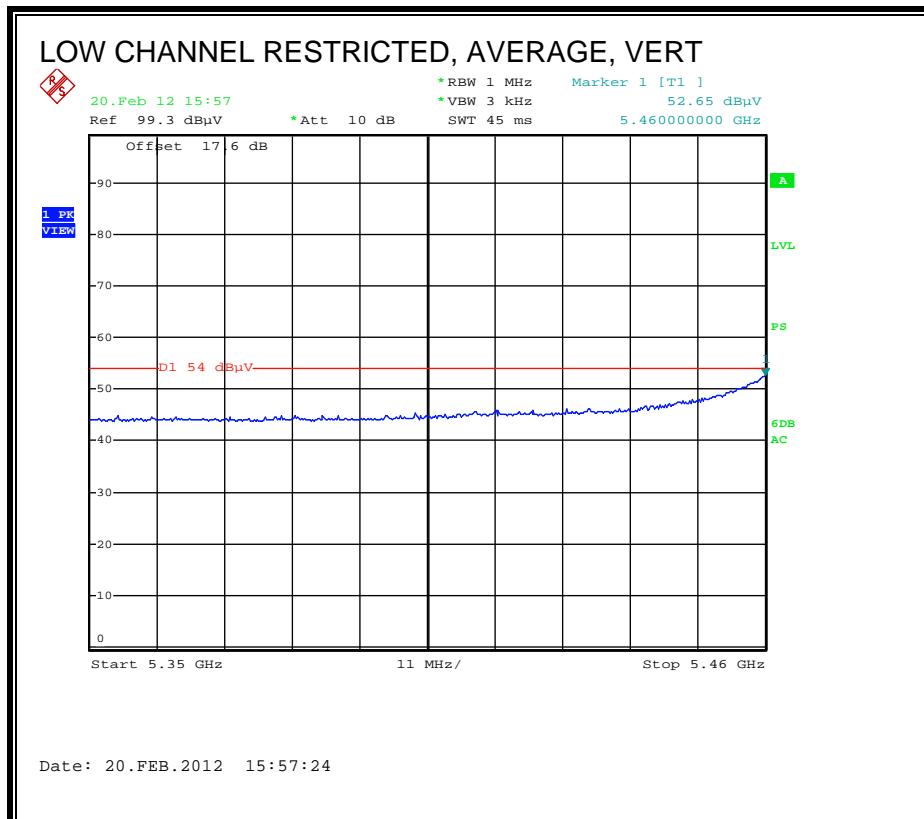
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber															
Company: Broadcom Project #: 11U14192 Date: 2/13/2012 Test Engineer: D. Garcia Configuration: Laptop PC, EUT on Test Board, antenna apparatus Mode: HT203x3 CDD MCS0															
Test Equipment:															
Hom 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz				Limit								
T60; S/N: 2238 @3m	T34 HP 8449B						FCC 15.205								
Hi Frequency Cables															
3' cable 22807700	12' cable 22807600	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			R_001										
f	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)
HT20 3x3 CDD MCS0; CH 100 = 5500 MHz															
11.000	3.0	42.3	29.2	38.4	10.5	-32.4	0.0	0.0	58.7	45.6	74	54	-15.3	-8.4	V
11.000	3.0	34.8	23.3	38.4	10.5	-32.4	0.0	0.0	51.2	39.7	74	54	-22.8	-14.3	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										

7.2.11. TX ABOVE 1 GHz 802.11n HT40 1TX, 5.6 GHz BAND, SISO

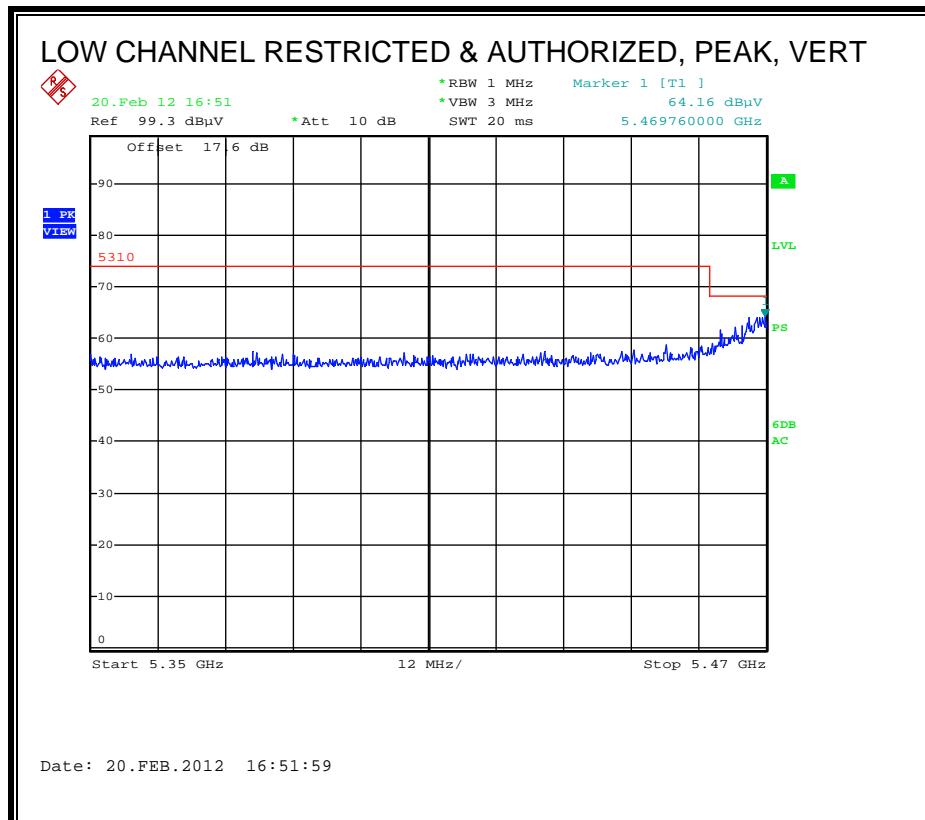
RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

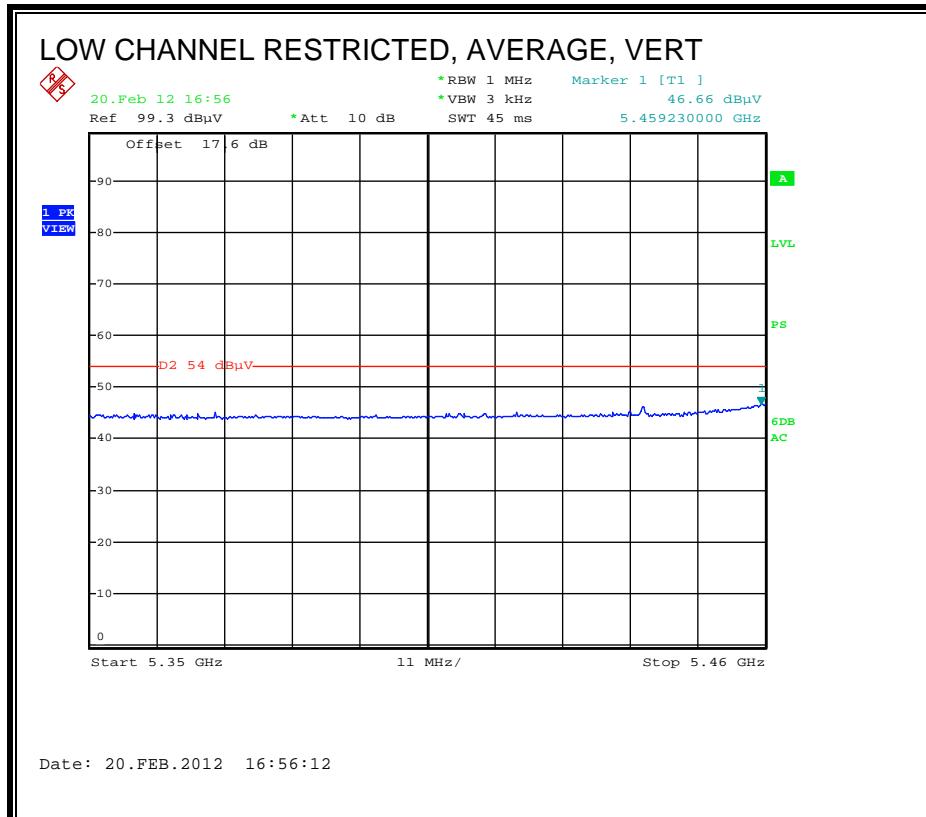




**7.2.12. TX ABOVE 1 GHz 802.11n HT40 3TX, 5.6 GHz BAND, CDD
MCS0**

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber															
Company: Broadcom Project #: 11U14192 Date: 2/13/2012 Test Engineer: D. Garcia Configuration: Laptop PC, EUT on Test Board, antenna apparatus Mode: HT40 3x3 CDD MCS0															
Test Equipment:															
Hom 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz					Limit							
T60; S/N: 2238 @3m	T34 HP 8449B							FCC 15.205							
Hi Frequency Cables															
3' cable 22807700	12' cable 22807600	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				R_001									
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)
HT40 3x3 CDD MCS0; CH 140 = 5700 MHz															
11.400	3.0	33.5	21.2	38.8	11.1	-32.4	0.0	0.0	51.0	38.6	74	54	-23.0	-15.4	V
11.400	3.0	33.9	21.3	38.8	11.1	-32.4	0.0	0.0	51.4	38.8	74	54	-22.6	-15.2	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												

**7.2.13. TX ABOVE 1 GHz 802.11n HT40 3TX, 5.6 GHz BAND, SDM
MCS21**

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

