FCC CFR47 PART 15 SUBPART E
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT
CLASS II PERMISSIVE CHANGE

FOR

802.11 a/b/g/n 3X3 MIMO WLAN + BT Mini Card inside a host laptop

MODEL NUMBER: BCM94331CSAX

FCC ID: QDS-BRCM1062
IC: 4324A-BRCM1062

REPORT NUMBER: 12U14483-2, Revision A

ISSUE DATE: AUGUST 2, 2012

Prepared for

APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A

Prepared by

UL CCS
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/17/2012	Original	T. LEE
A	08/02/12	Updated model number	A. Zaffar

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA, 95014, U.S.A.

EUT DESCRIPTION: 802.11 a/b/g/n 3X3 MIMO WLAN + BT Mini Card inside a host laptop

MODEL: BCM94331CSAX

SERIAL NUMBER: 630

DATE TESTED: JULY 9 ~ 15, 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

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:

TIM LEE
STAFF ENGINEER
UL CCS

Tested By:

TOM CHEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, 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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n WLAN + Bluetooth PCI-E Custom Combination Card.

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 “11U14154-7A FCC IC UNII WLAN” 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 has the following changes.

- Adding a certificated module in a portable host

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

	604-0131 Wi-Fi1	604-0131 Wi-Fi2	604-0131 Wi-Fi3 & Bluetooth
	Peak Gain (includes cable loss)	Peak Gain (includes cable loss)	Peak Gain (includes cable loss)
Freq [GHz]			
2.4 – 2.484	2.47	2.64	4.82
5.15 – 5.25	4.18	4.22	4.63
5.25 – 5.35	3.35	3.44	3.01
5.50 – 5.70	3.32	2.41	4.63
5.725 – 5.85	3.56	3.68	4.31

Antenna to module Mapping
WF1 - ch2
WF2 - ch0
WF3 - ch1

5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.106.98.42.
The test utility software used during testing was BCM Internal, rev. 5.106.RC98.42.

5.6. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Based on the manufacturer's attestation that the nominal output power is reduced as the data rate increases, the data rates tested represent the highest power and worst-case with respect to EMC performance.

The following worst-case data rates were used.

802.11a Legacy mode, 6 Mb/s.
802.11n 20 MHz CDD/SDM mode, MCS0.
802.11n 40 MHz CDD/SDM mode, MCS0.

DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

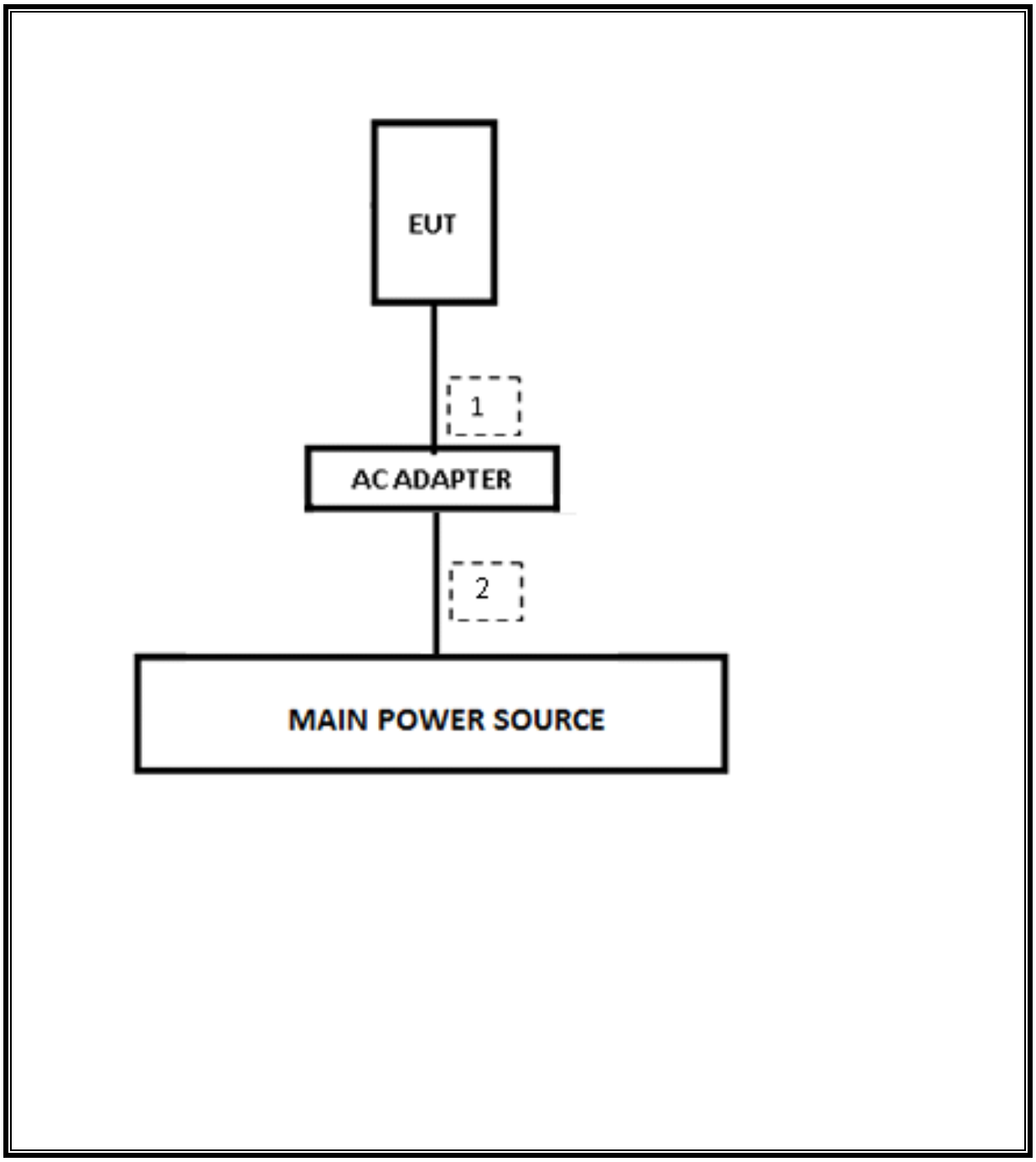
Support Equipment List			
Description	**Manufacturer**	**Model**	**Serial Number**
AC ADAPTER	Apple	PA-1850-7A1	1674

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	DC JACK	UN-SHELDED	1.5m	
2	AC	1	AC	UN-SHELDED	1.5m	N/A

TEST SETUP

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**
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/13
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	11/11/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/13
Horn Antenna, 26.5 GHz	ARA	MWH-1826/B	C00589	07/28/13
Horn Antenna, 40 GHz	ARA	MWH-2640/B	C00981	05/10/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	03/14/13
Reject Filter, 2.0-2.9 GHz	Micro-Tronics	BRM50702	N02684	CNR
High Pass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	CNR
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	04/09/13
Peak Power Meter	Agilent	N1911A	1260847C	08/04/12
Peak Power Sensor	Agilent	E9323A	1244073F	08/04/12
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Highpass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	CNR
EMI Test Receiver, 30MHz	R & S	ESHS 20	N02396	08/19/13
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	12/13/12

7. ANTENNA PORT TEST RESULTS

7.1. DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

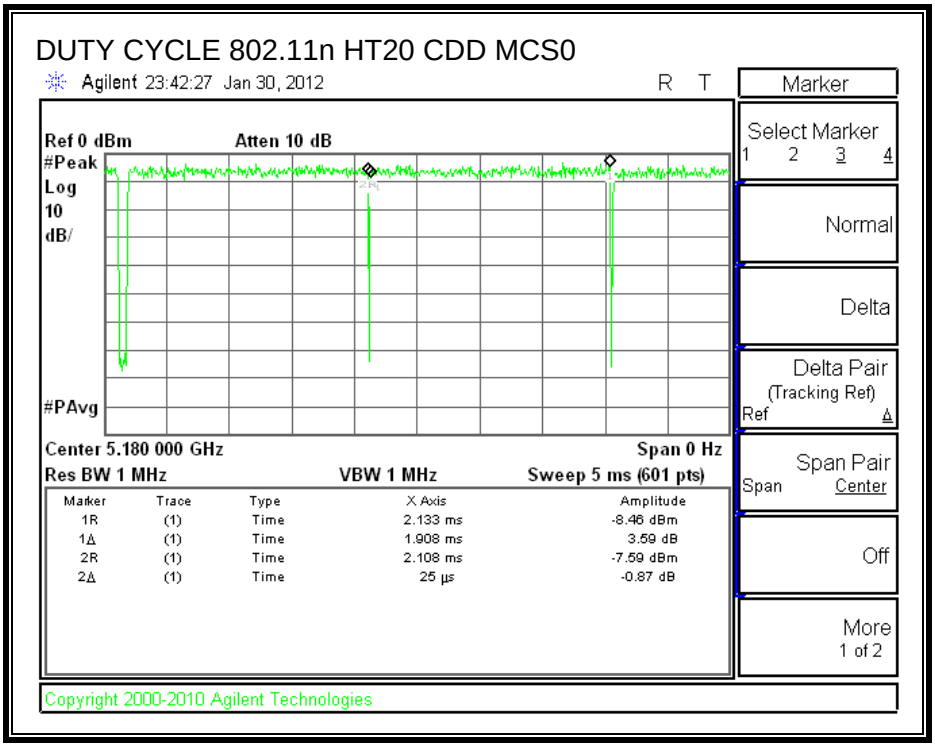
PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

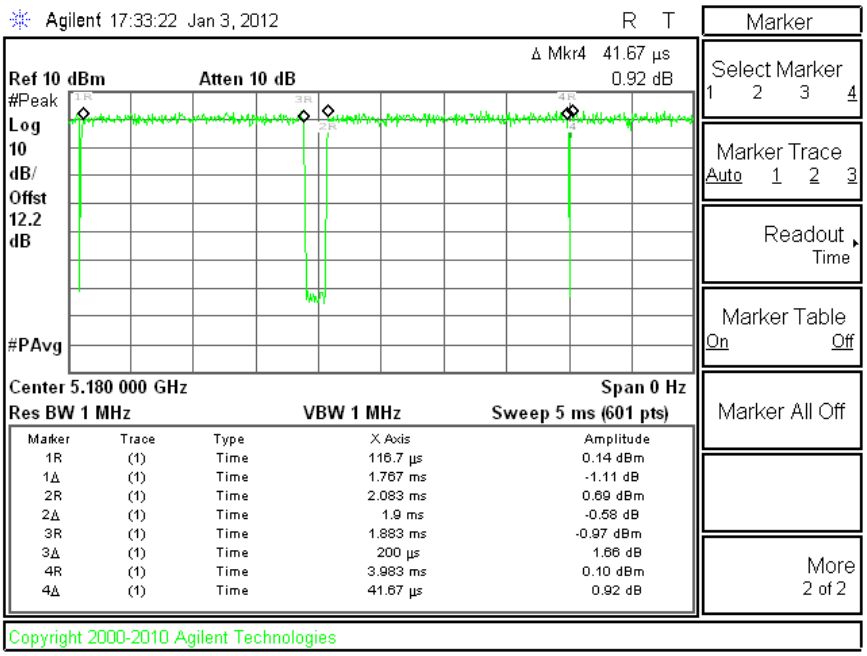
7.1.1. DUTY CYCLE AND ON TIME RESULTS

Mode	ON Time B (usec)	OFF Time (usec)	Period (usec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (Hz)
802.11n HT20 CDD MCS0	1908	25	1933	0.987	98.7%	0.06	524
802.11n HT20 STBC MCS0	1767	200	1967	0.898	89.8%	0.47	566
802.11n HT40 STBC MCS0	833	292	1125	0.741	74.1%	1.30	1,200

7.1.2. DUTY CYCLE PLOTS

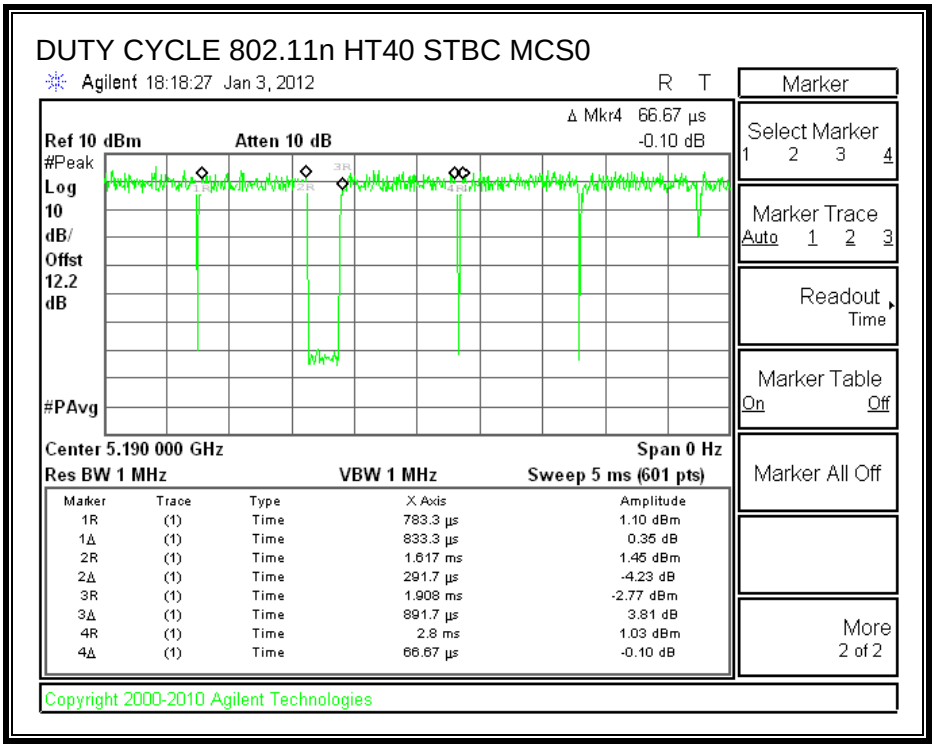


DUTY CYCLE 802.11n HT20 STBC MCS0



Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	116.7 µs	0.14 dBm
1Δ	(1)	Time	1.767 ms	-1.11 dB
2R	(1)	Time	2.083 ms	0.69 dBm
2Δ	(1)	Time	1.9 ms	-0.58 dB
3R	(1)	Time	1.883 ms	-0.97 dBm
3Δ	(1)	Time	200 µs	1.66 dB
4R	(1)	Time	3.983 ms	0.10 dBm
4Δ	(1)	Time	41.67 µs	0.92 dB

DUTY CYCLE 802.11n HT40 STBC MCS0



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

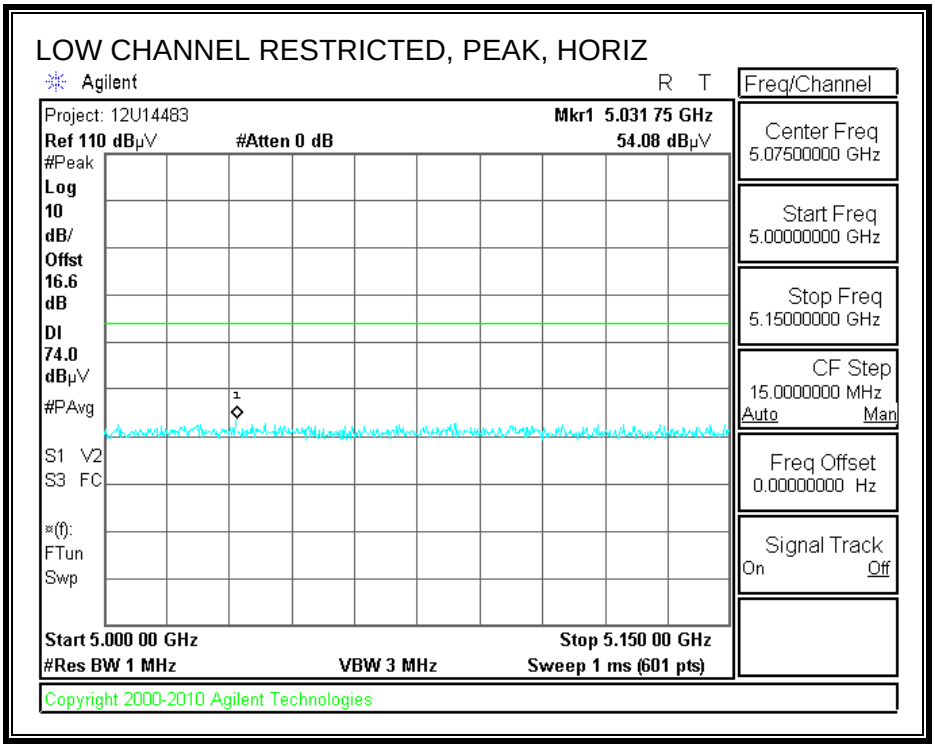
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

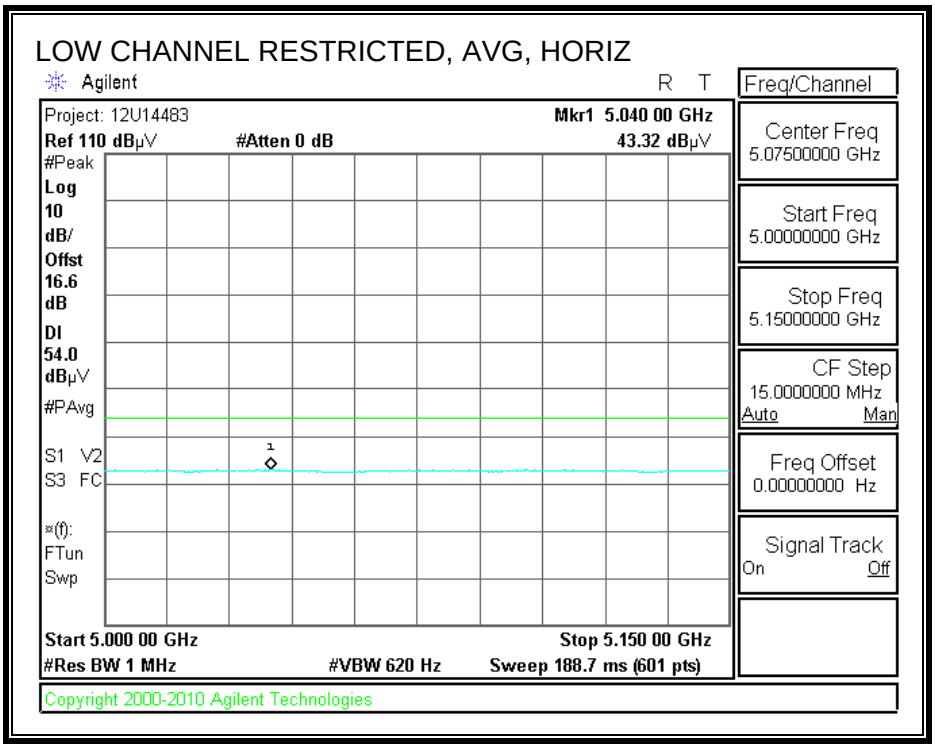
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

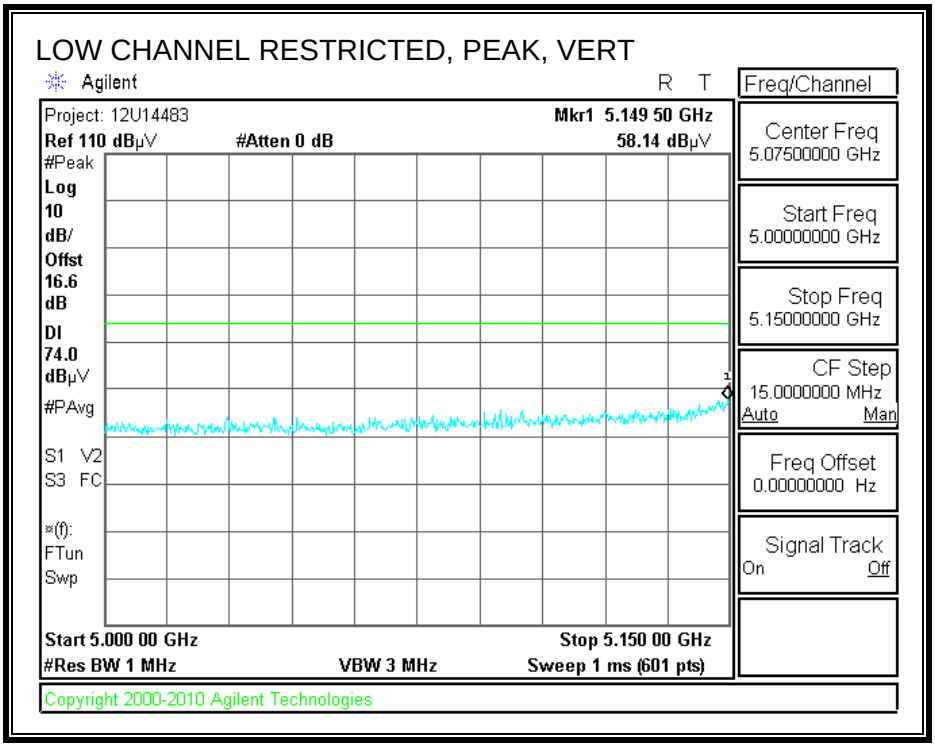
8.2.1. TX ABOVE 1 GHz, 802.11n 3TX HT20, 5.2 GHz BAND, CDD MCS0

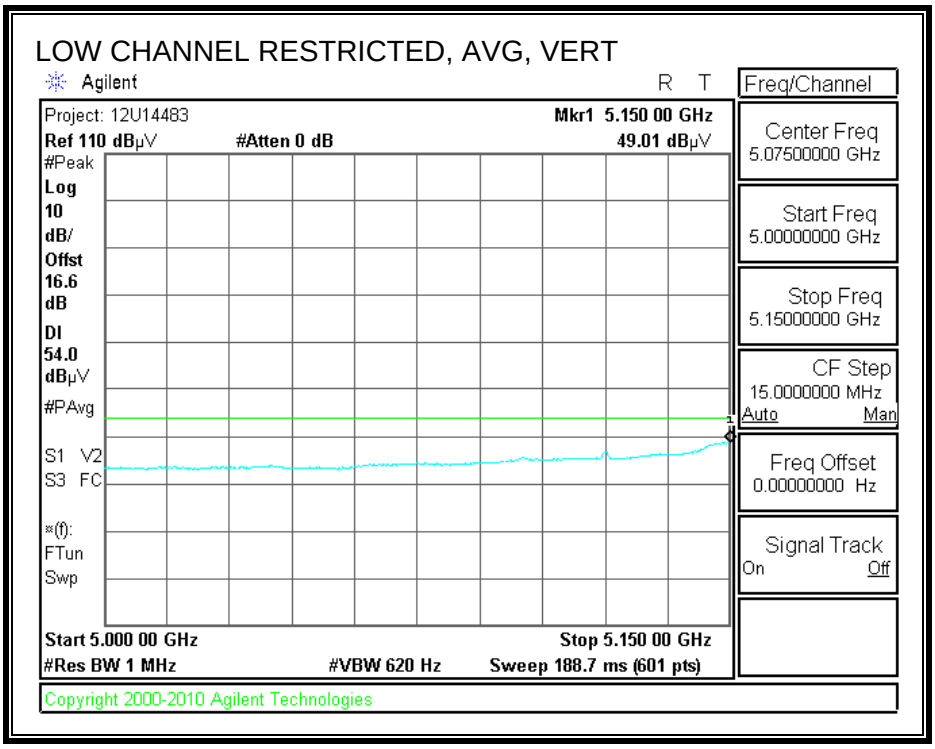
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: TomChen
Date: 07/13/12
Project #: 12U14483
Company: Apple Inc.
Test Target: FCC Class B
Mode Oper: 802.11n HT20 3TX CDD

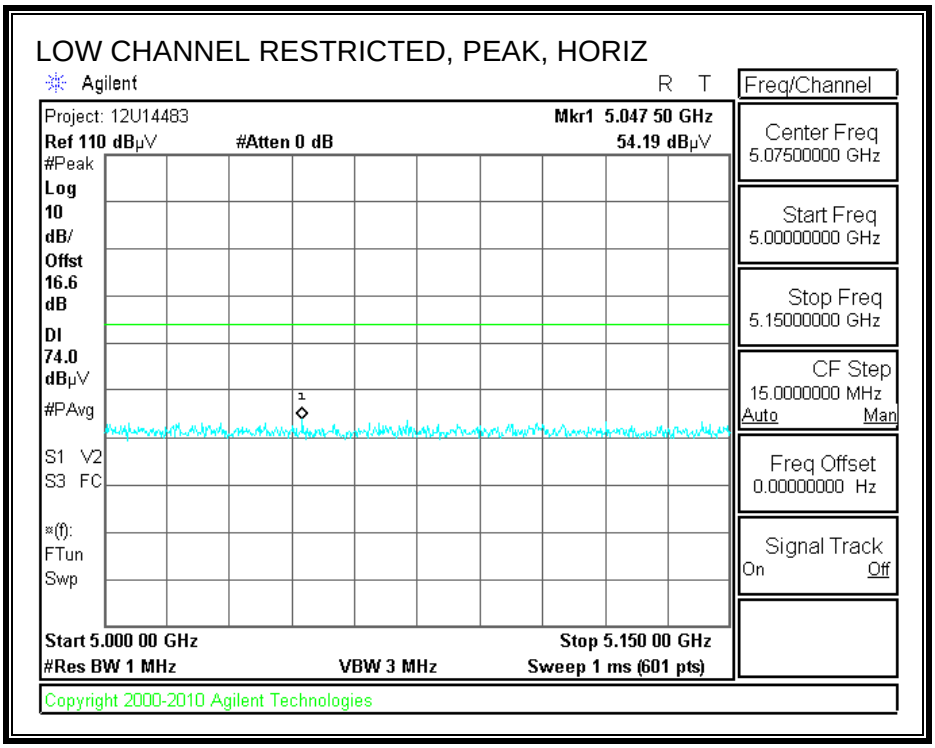
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

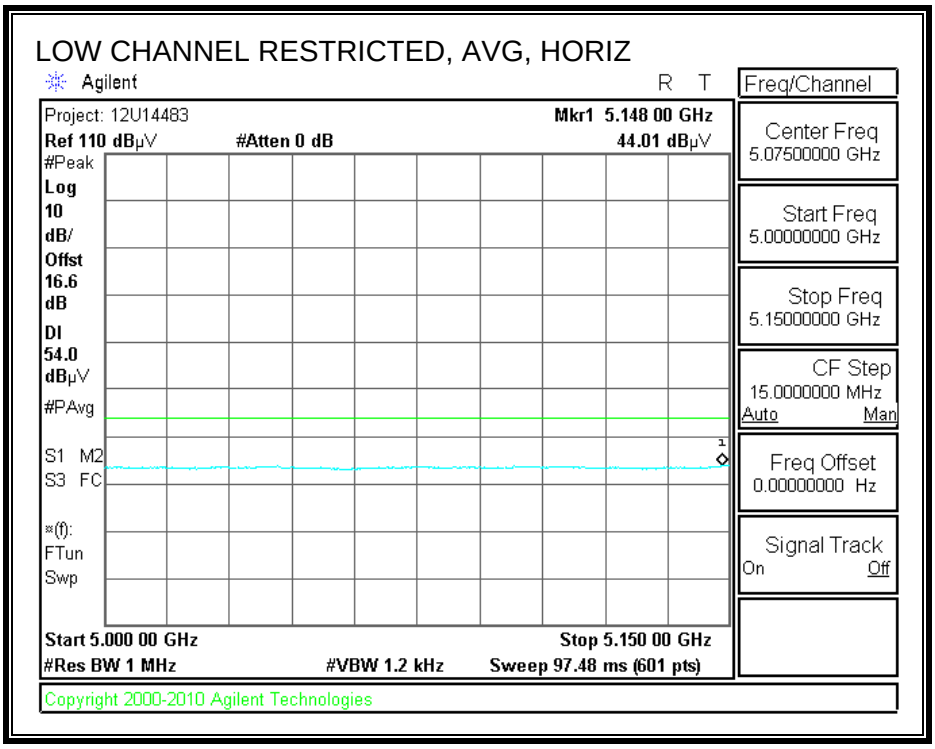
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5180 MHz HT20													
15.540	3.0	35.1	39.1	13.0	-31.9	0.0	0.7	55.9	74.0	-18.1	V	P	
15.540	3.0	25.1	39.1	13.0	-31.9	0.0	0.7	45.9	54.0	-8.1	V	A	
15.540	3.0	35.2	39.1	13.0	-31.9	0.0	0.7	56.0	74.0	-18.0	H	P	
15.540	3.0	25.0	39.1	13.0	-31.9	0.0	0.7	45.8	54.0	-8.2	H	A	
5200 MHz HT20													
15.600	3.0	34.8	38.8	13.0	-31.9	0.0	0.7	55.5	74.0	-18.5	H	P	
15.600	3.0	24.5	38.8	13.0	-31.9	0.0	0.7	45.1	54.0	-8.9	H	A	
15.600	3.0	35.0	38.8	13.0	-31.9	0.0	0.7	55.7	74.0	-18.3	V	P	
15.600	3.0	24.5	38.8	13.0	-31.9	0.0	0.7	45.1	54.0	-8.9	V	A	
5240 MHz HT20													
15.720	3.0	34.9	38.4	13.1	-31.9	0.0	0.7	55.2	74.0	-18.8	V	P	
15.720	3.0	24.4	38.4	13.1	-31.9	0.0	0.7	44.7	54.0	-9.3	V	A	
15.720	3.0	34.4	38.4	13.1	-31.9	0.0	0.7	54.8	74.0	-19.2	H	P	
15.720	3.0	24.3	38.4	13.1	-31.9	0.0	0.7	44.7	54.0	-9.3	H	A	

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

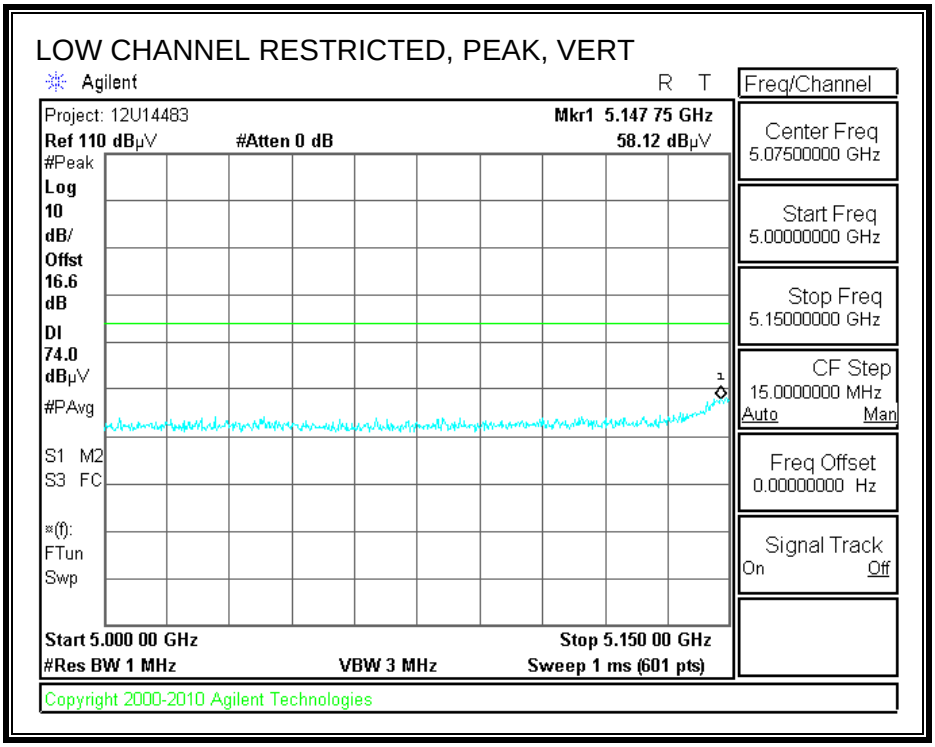
8.2.2. TX ABOVE 1 GHz, 802.11n HT40 3TX, 5.2 GHz BAND, CDD MCS0

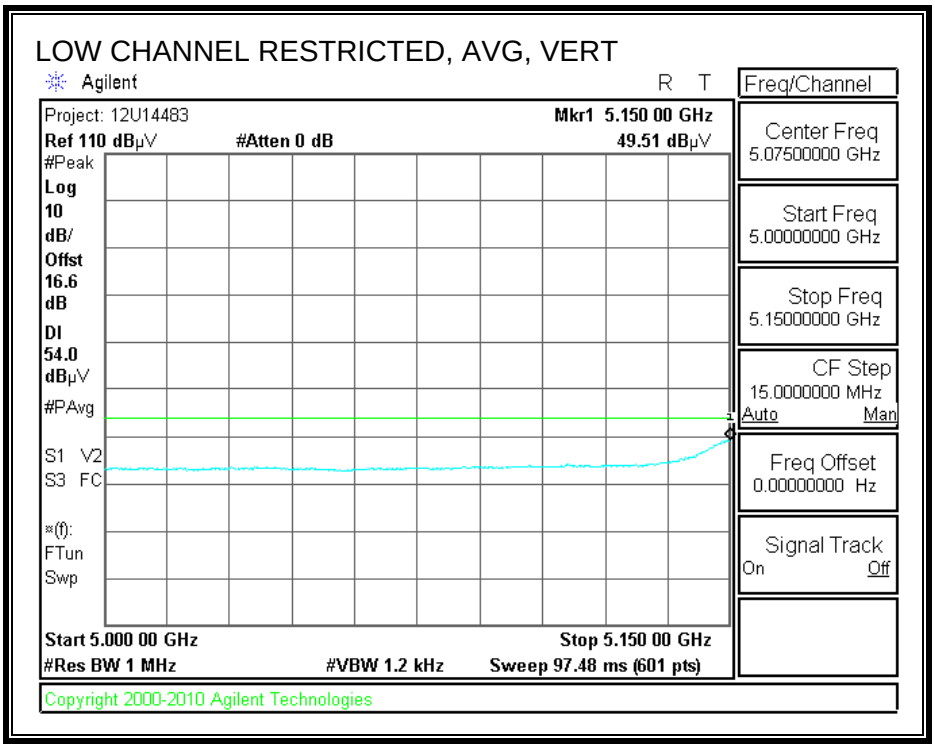
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: TomChen
Date: 07/13/12
Project #: 12U14483
Company: Apple Inc.
Test Target: FCC Class B
Mode Oper: 802.11n HT40 3TX CDD

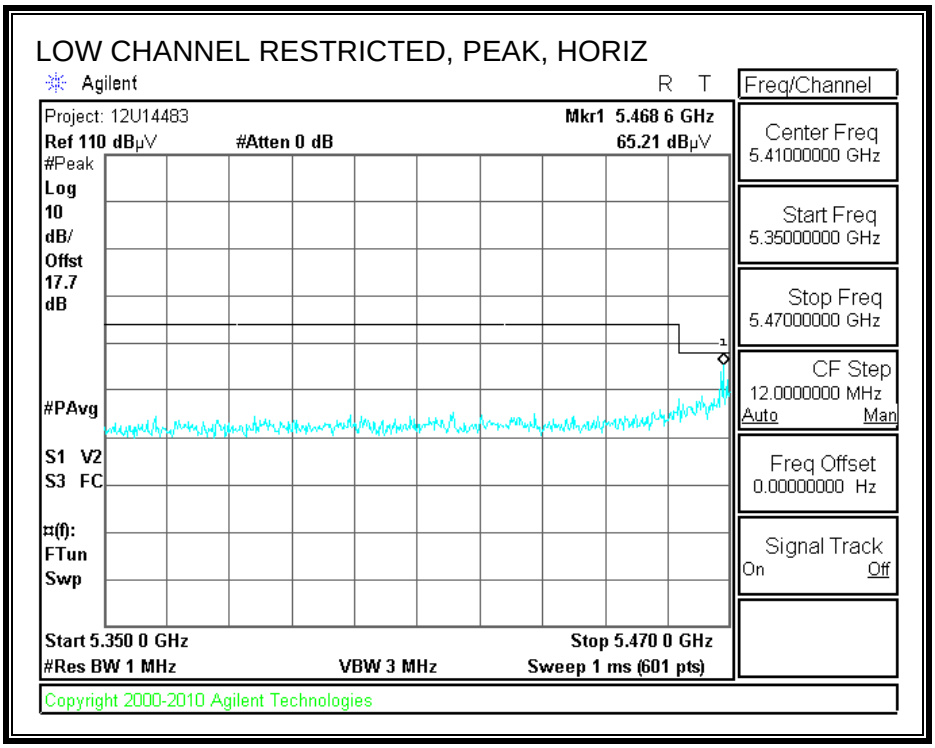
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

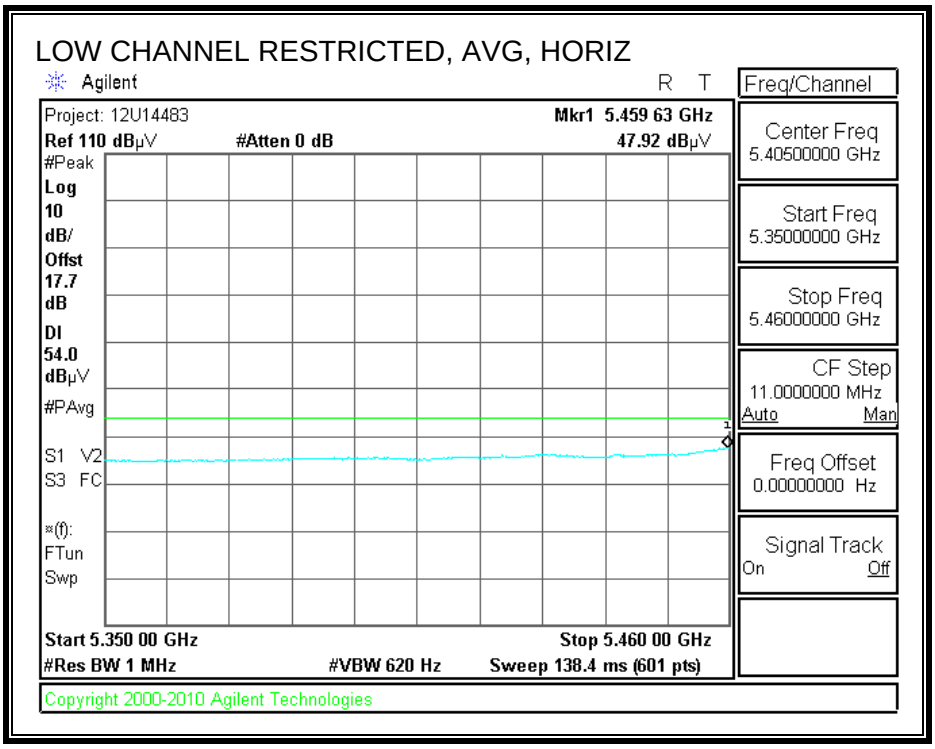
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5190 MHz HT40													
15.570	3.0	36.2	38.9	13.0	-31.9	0.0	0.7	56.9	74.0	-17.1	V	P	
15.570	3.0	25.7	38.9	13.0	-31.9	0.0	0.7	46.4	54.0	-7.6	V	A	
15.570	3.0	35.3	38.9	13.0	-31.9	0.0	0.7	56.0	74.0	-18.0	H	P	
15.570	3.0	25.6	38.9	13.0	-31.9	0.0	0.7	46.4	54.0	-7.6	H	A	
5230 MHz HT40													
15.690	3.0	35.6	38.5	13.0	-31.9	0.0	0.7	56.0	74.0	-18.0	H	P	
15.690	3.0	25.5	38.5	13.0	-31.9	0.0	0.7	45.9	54.0	-8.1	H	A	
15.690	3.0	34.9	38.5	13.0	-31.9	0.0	0.7	55.3	74.0	-18.7	V	P	
15.690	3.0	25.6	38.5	13.0	-31.9	0.0	0.7	46.0	54.0	-8.0	V	A	

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

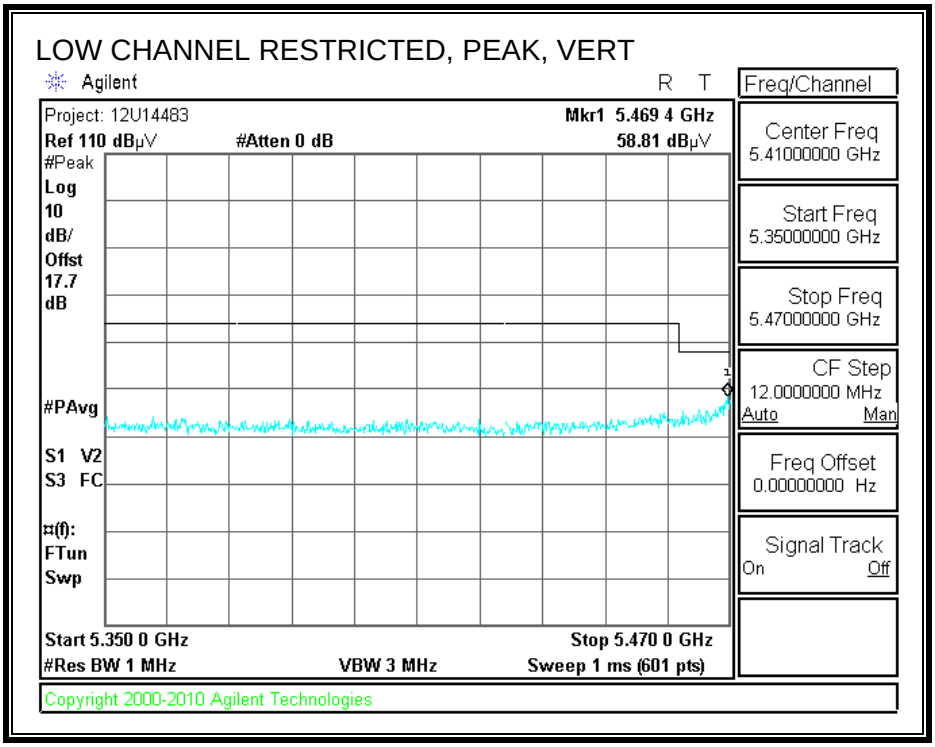
8.2.3. TX ABOVE 1 GHz, 802.11n HT20 3TX, 5.6 GHz BAND, CDD MCS0

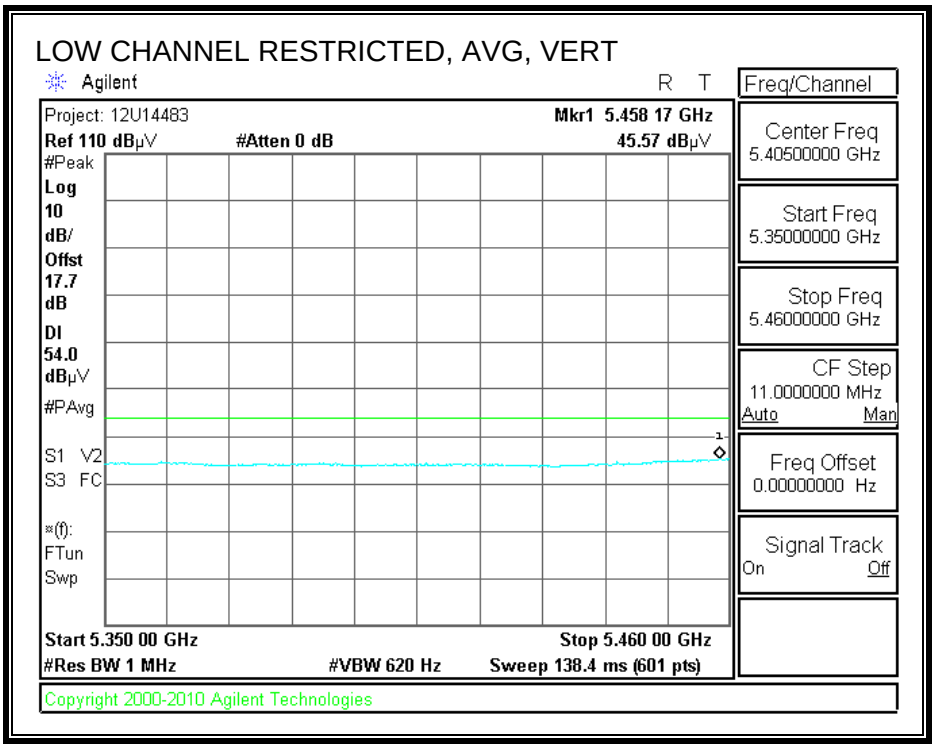
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



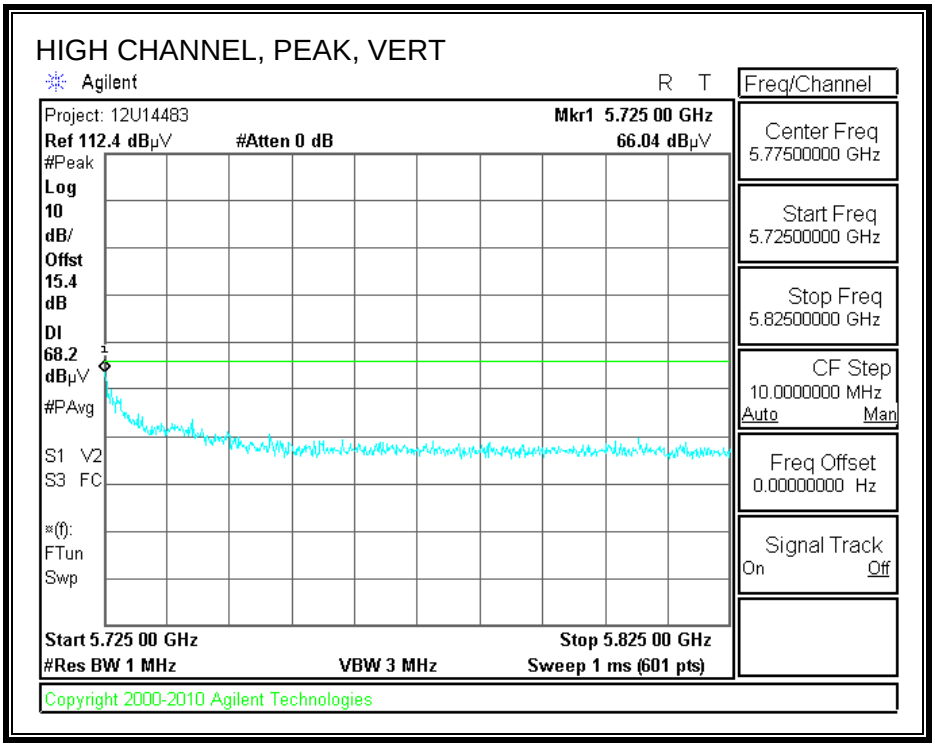


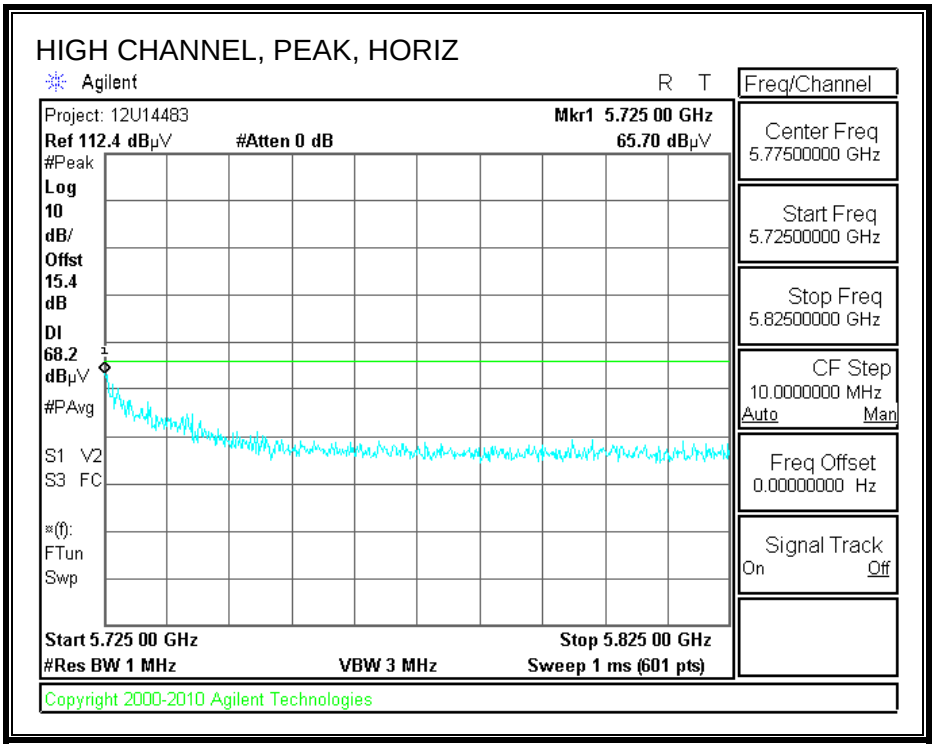
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: TomChen
Date: 07/13/12
Project #: 12U14483
Company: Apple Inc.
Test Target: FCC Class B
Mode Oper: 802.11n HT20 3TX CDD

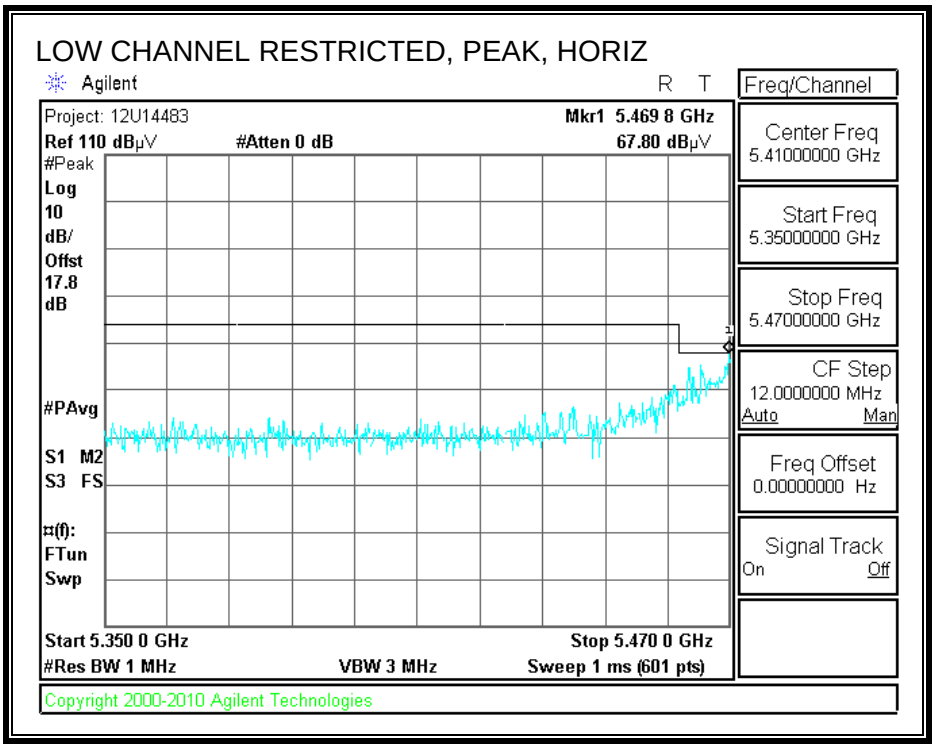
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

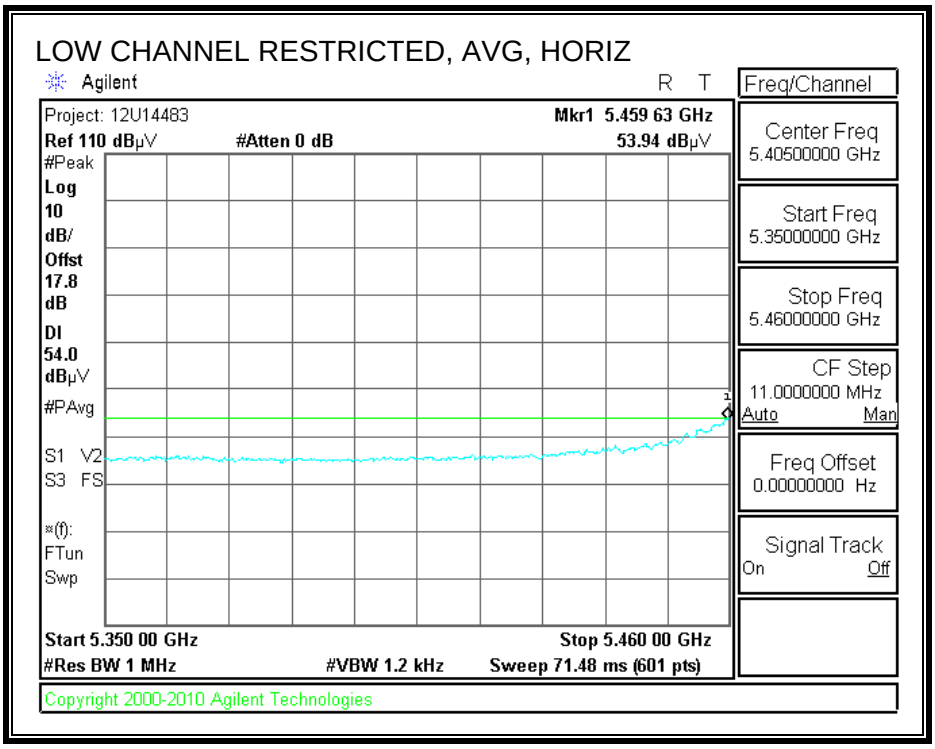
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5500 MHz HT20													
11.000	3.0	35.8	38.4	10.5	-33.6	0.0	0.7	51.9	74.0	-22.1	V	P	
11.000	3.0	25.9	38.4	10.5	-33.6	0.0	0.7	41.9	54.0	-12.1	V	A	
11.000	3.0	35.5	38.4	10.5	-33.6	0.0	0.7	51.5	74.0	-22.5	H	P	
11.000	3.0	25.3	38.4	10.5	-33.6	0.0	0.7	41.4	54.0	-12.6	H	A	
5580 MHz HT20													
11.160	3.0	35.1	38.5	10.7	-33.4	0.0	0.7	51.7	74.0	-22.3	V	P	
11.160	3.0	25.2	38.5	10.7	-33.4	0.0	0.7	41.8	54.0	-12.2	V	A	
11.160	3.0	34.8	38.5	10.7	-33.4	0.0	0.7	51.4	74.0	-22.6	H	P	
11.160	3.0	25.1	38.5	10.7	-33.4	0.0	0.7	41.7	54.0	-12.3	H	A	
5700 MHz HT20													
11.400	3.0	34.4	38.8	11.1	-33.2	0.0	0.7	51.8	74.0	-22.2	H	P	
11.400	3.0	24.8	38.8	11.1	-33.2	0.0	0.7	42.2	54.0	-11.8	H	A	
11.400	3.0	37.4	38.8	11.1	-33.2	0.0	0.7	54.8	74.0	-19.2	V	P	
11.400	3.0	27.9	38.8	11.1	-33.2	0.0	0.7	45.3	54.0	-8.7	V	A	

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

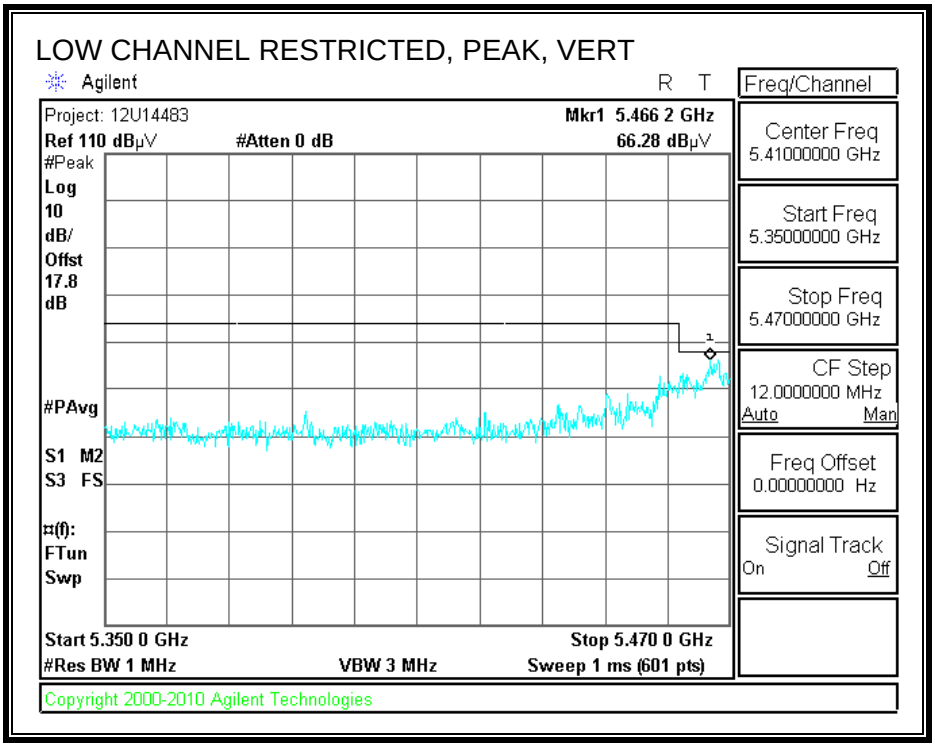
8.2.4. TX ABOVE 1 GHz, 802.11n HT40 3TX, 5.6 GHz BAND, CDD MCS0

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

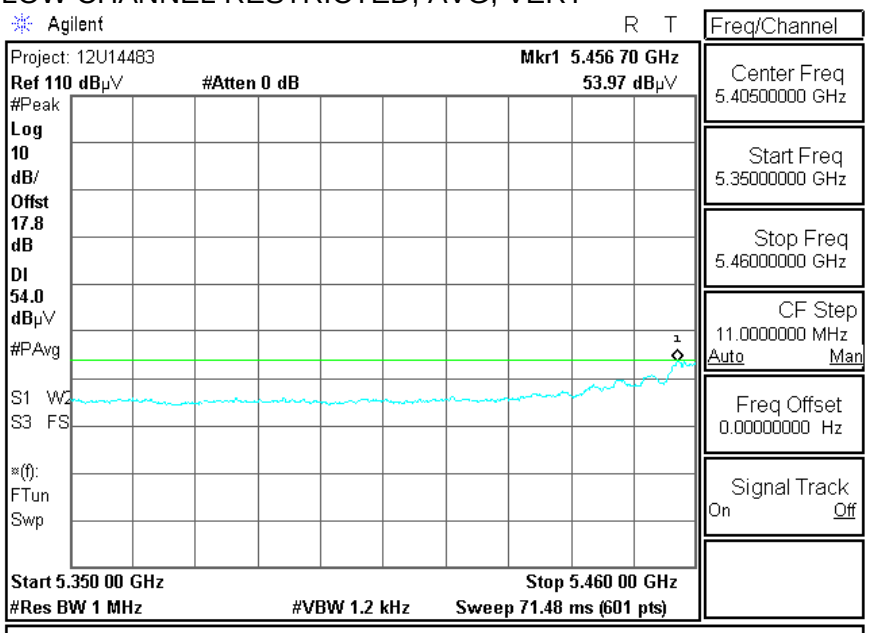




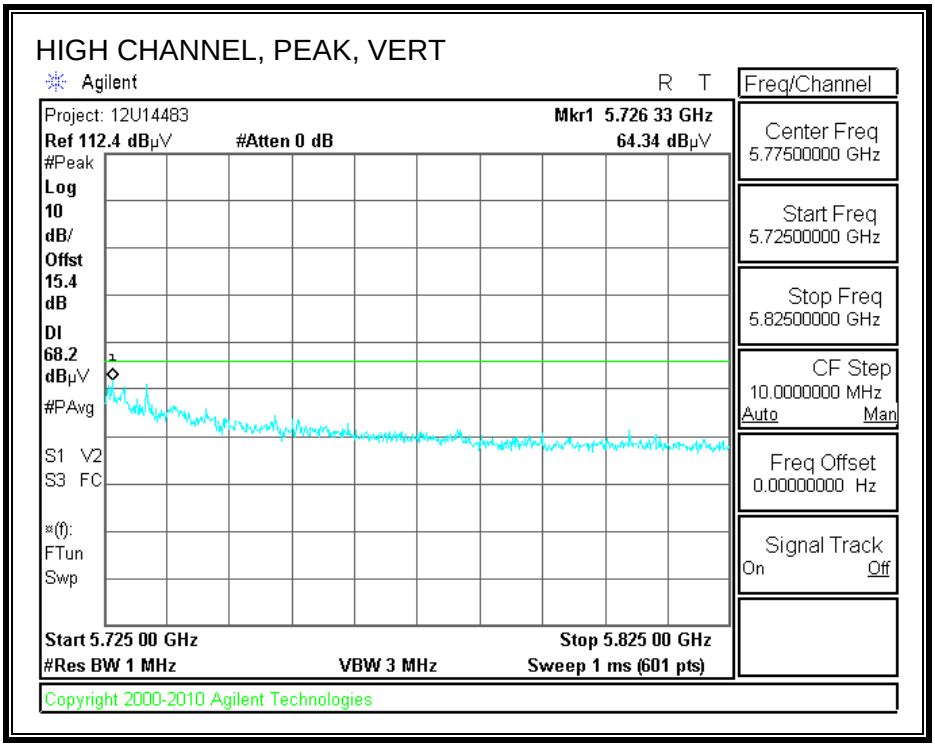
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

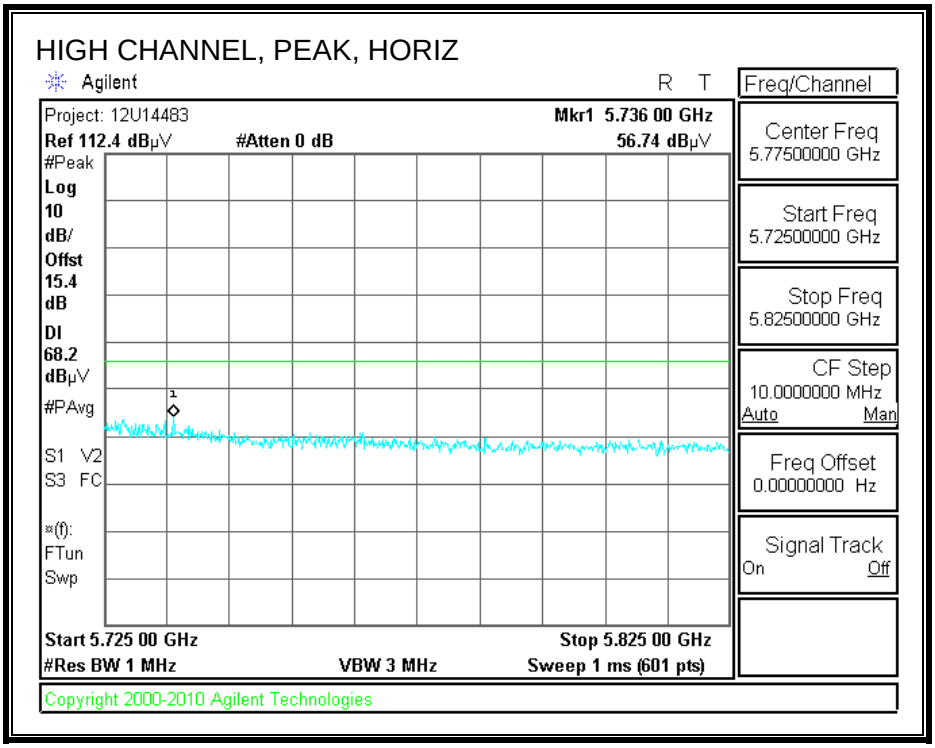


LOW CHANNEL RESTRICTED, AVG, VERT



AUTHORIZED BANDEDGE (HIGH CHANNEL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: TomChen
Date: 07/13/12
Project #: 12U14483
Company: Apple Inc.
Test Target: FCC Class B
Mode Oper: 802.11n HT40 3TX CDD

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

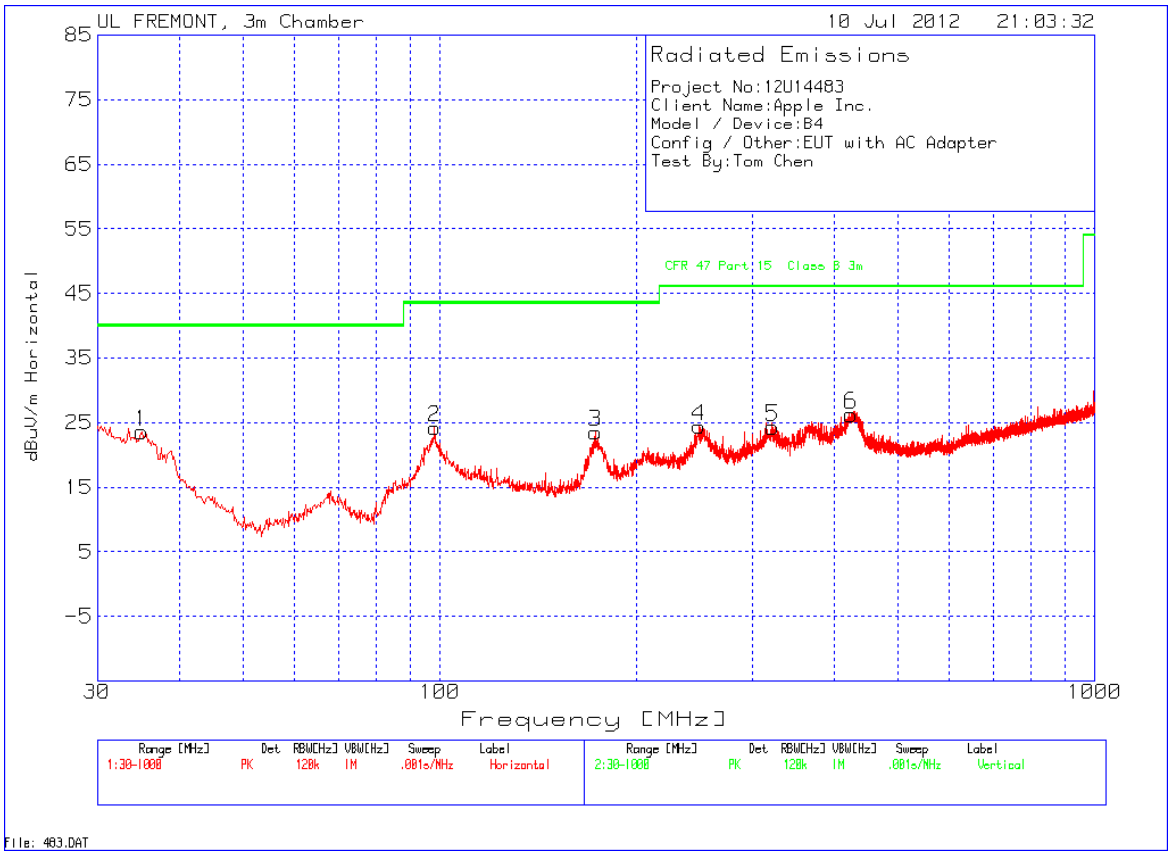
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5510 MHz HT40													
11.020	3.0	35.3	38.4	10.5	-33.6	0.0	0.7	51.4	74.0	-22.6	V	P	
11.020	3.0	25.9	38.4	10.5	-33.6	0.0	0.7	42.0	54.0	-12.0	V	A	
11.020	3.0	35.9	38.4	10.5	-33.6	0.0	0.7	52.0	74.0	-22.0	H	P	
11.020	3.0	26.0	38.4	10.5	-33.6	0.0	0.7	42.1	54.0	-11.9	H	A	
5550 MHz HT40													
11.100	3.0	36.1	38.5	10.6	-33.5	0.0	0.7	52.5	74.0	-21.5	H	P	
11.100	3.0	25.9	38.5	10.6	-33.5	0.0	0.7	42.3	54.0	-11.7	H	A	
11.100	3.0	35.1	38.5	10.6	-33.5	0.0	0.7	51.5	74.0	-22.5	V	P	
11.100	3.0	25.8	38.5	10.6	-33.5	0.0	0.7	42.2	54.0	-11.8	V	A	
5670 MHz HT40													
11.340	3.0	35.1	38.7	11.0	-33.2	0.0	0.7	52.3	74.0	-21.7	V	P	
11.340	3.0	25.9	38.7	11.0	-33.2	0.0	0.7	43.1	54.0	-10.9	V	A	
11.340	3.0	34.3	38.7	11.0	-33.2	0.0	0.7	51.5	74.0	-22.5	H	P	
11.340	3.0	25.0	38.7	11.0	-33.2	0.0	0.7	42.2	54.0	-11.8	H	A	

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

8.3. WORST-CASE BELOW 1 GHz

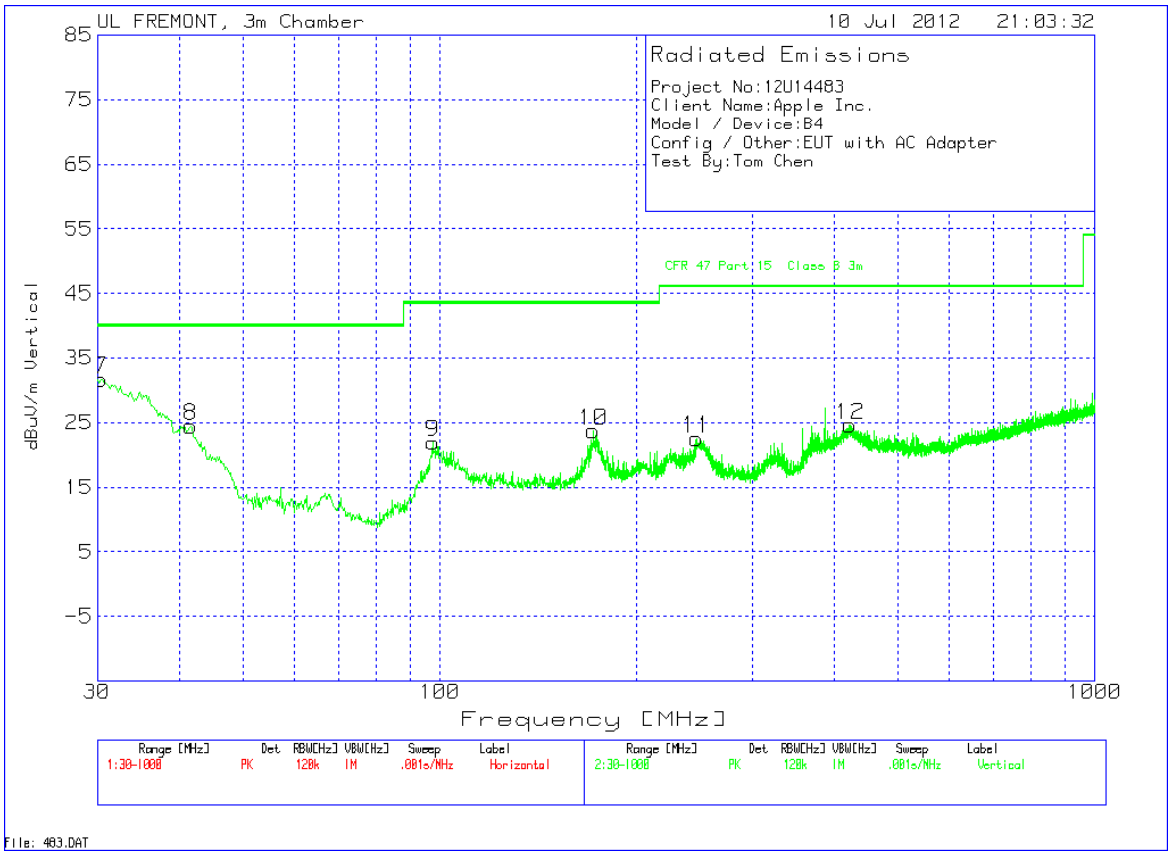
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:12U14483
Client Name:Apple Inc.
Model / Device:B4
Config / Other:EUT with AC Adapter
Test By:Tom Chen

Horizontal 30 - 1000MHz

Test Frequency	Meter Reading	Detector	25MHz-1GHz Chambr 3m Amplified (dB)	Antenna T185 (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Polarity
35.04	33.69	PK	-27.5	17.4	23.59	40	-16.41	Horz
98.2334	41.8	PK	-26.9	9.3	24.2	43.5	-19.3	Horz
172.8637	38.41	PK	-26.1	11.2	23.51	43.5	-19.99	Horz
249.2386	38.34	PK	-25.4	11.5	24.44	46	-21.56	Horz
322.1243	35.84	PK	-25.3	13.8	24.34	46	-21.66	Horz
424.6683	35.55	PK	-25.7	16.4	26.25	46	-19.75	Horz

Vertical 30 - 1000MHz

Test Frequency	Meter Reading	Detector	25MHz-1GHz Chambr 3m Amplified (dB)	Antenna T185 (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Polarity
30.3877	38.33	PK	-27.5	20.9	31.73	40	-8.27	Vert
41.6307	39.29	PK	-27.4	12.6	24.49	40	-15.51	Vert
97.6519	39.65	PK	-26.9	9.2	21.95	43.5	-21.55	Vert
171.5068	38.45	PK	-26.1	11.4	23.75	43.5	-19.75	Vert
246.7186	36.34	PK	-25.4	11.6	22.54	46	-23.46	Vert
423.3114	34.04	PK	-25.7	16.3	24.64	46	-21.36	Vert

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

6 WORST EMISSIONS

Project No:12U14483
Client Name:Apple Inc.
Model/Device:B4
Test Volt/Freq:120 VAC / 60Hz
Test By:Tom Chen

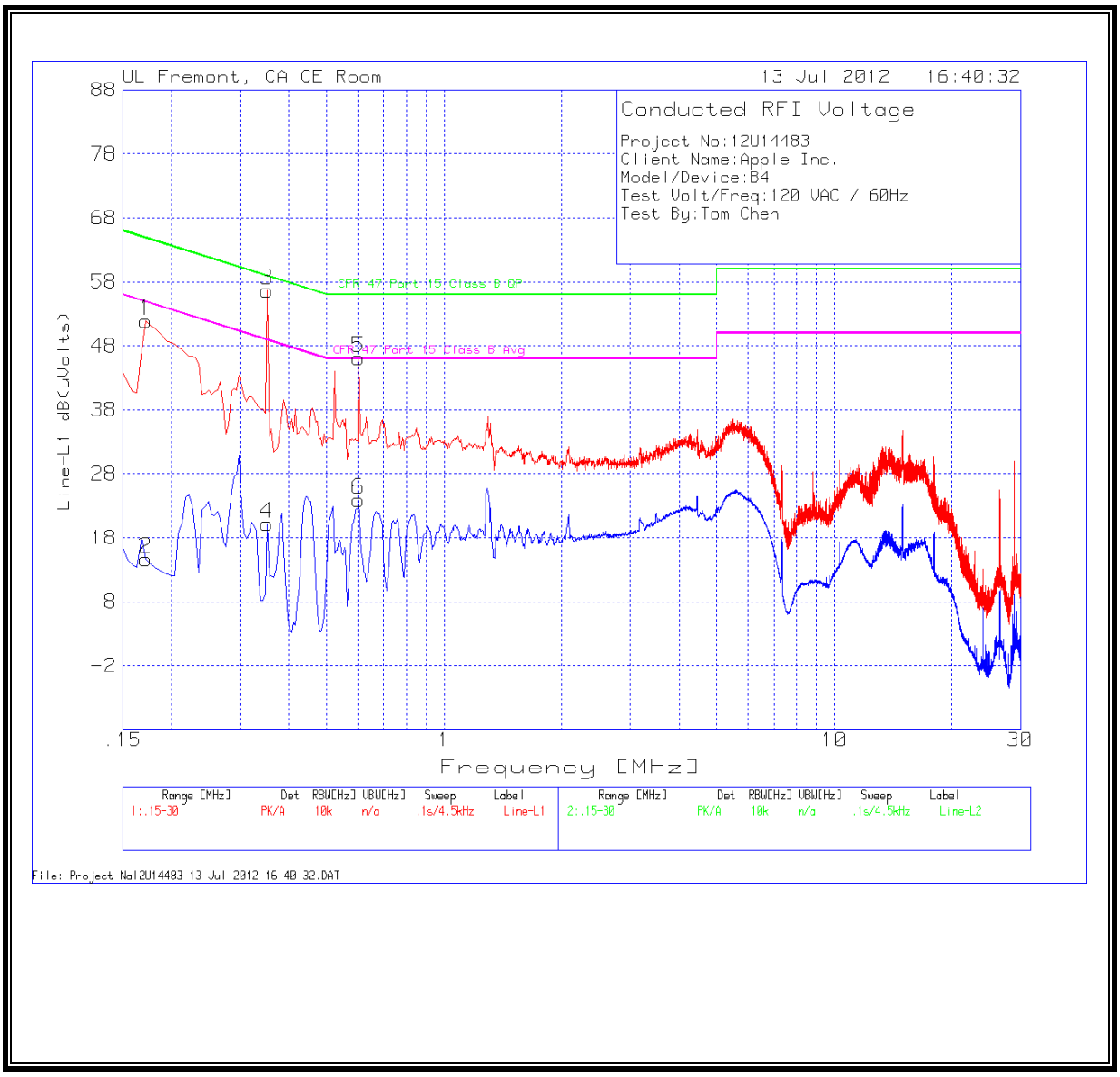
Line-L1 .15 - 30MHz

Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.1725	51.83	PK	0.1	0	51.93	64.8	-12.87	-	-
0.1725	14.51	Av	0.1	0	14.61	-	-	54.8	-40.19
0.3525	56.54	PK	0.1	0	56.64	58.9	-2.26	-	-
0.3525	20.14	Av	0.1	0	20.24	-	-	48.9	-28.66
0.6045	46.01	PK	0.1	0	46.11	56	-9.89	-	-
0.6045	23.84	Av	0.1	0	23.94	-	-	46	-22.06

Line-L2 .15 - 30MHz

Test Frequency	Meter Reading	Detector	T24 IL L2.TXT (dB)	LC Cables 2&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.2085	46.3	PK	0.1	0	46.4	63.3	-16.9	-	-
0.2085	29.6	Av	0.1	0	29.7	-	-	53.3	-23.6
0.357	38.74	PK	0.1	0	38.84	58.8	-19.96	-	-
0.357	32.35	Av	0.1	0	32.45	-	-	48.8	-16.35
0.501	32.23	PK	0.1	0	32.33	56	-23.67	-	-
0.501	25.67	Av	0.1	0	25.77	-	-	46	-20.23

LINE 1 RESULTS



LINE 2 RESULTS