

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

CERTIFICATION TEST REPORT

FOR

iPhone With GSM WCDMA 1xRTT/CDMA 1xEVDO Rev. A, Bluetooth EDR 2.1, Bluetooth 4.0 LE, and WiFi 802.11 bgn

MODEL NUMBER: A1387

FCC ID: BCG-E2430A IC: 579C-E2430A

REPORT NUMBER: 11U13896-2, Revision B

ISSUE DATE: SEPTEMBER 19, 2011

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

Prepared by COMPLIANCE CERTIFICATION SERVICES (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.	lssue Date	Revisions	Revised By
	08/25/11	Initial Issue	T. Chan
A	09/08/11	Revised EUT description	A. Zaffar
В	09/19/11	Revised section 8.4	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA, 95014, U.S.A.
EUT DESCRIPTION:	iPhone With GSM WCDMA 1xRTT/CDMA 1xEVDO Rev. A, Bluetooth EDR 2.1, Bluetooth 4.0 LE, and WiFi 802.11 bgn
MODEL:	A1387
SAMPLE TESTED:	BOM #1(D0415), BOM#2 (D0485), BOM #3(D0930)
SERIAL NUMBER:	C39G500HDRT3, C39G507FDRT1, C39G50APDRT1
DATE TESTED:	JULY 04 - AUGUST 16, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	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:

THU CHAN ENGINEERING MANAGER UL CCS

Tested By:

Chin Pany

CHIN PANG EMC ENGINEER UL CCS

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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, 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 <u>http://www.ccsemc.com</u>.

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%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The Apple iPhone, Model A1387, is a mobile phone with multimedia functions (music, application support, and video), cellular GSM, WCDMA-HSDPA & HSUPA, CDMA -1xRTT, EV-DO Rev 0 & Rev A radio, IEEE 802.11b/g/n radio and Bluetooth radio. This device measures 115.6 mm (4.55 inches) tall x 59.3 mm (2.33 inches) and 9.36 mm (0.368 inches) thick and weighs 140 grams (4.9 oz.). The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

BOM VARIANT 1

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2412 - 2462	802.11b	19.35	86.10
2412 - 2462	802.11g	25.27	336.51
2412 - 2462	802.11n	25.16	328.10

BOM VARIANT 2

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2412 - 2462	802.11b	19.17	82.60
2412 - 2462	802.11g	25.16	328.10
2412 - 2462	802.11n	24.92	310.46

BOM VARIANT 3

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2412 - 2462	802.11b	19.05	80.35
2412 - 2462	802.11g	25.25	334.97
2412 - 2462	802.11n	24.91	309.74

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA integrated antennas, with the peak gains of -1.5 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Broadcom 156_13

The EUT software installed during testing was 9A287.

5.5. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions below 1 GHz and Power line Conducted Emissions, the channel with the highest conducted output power was selected.

Worst-case data rates as provided by the manufacturer are: For 11b mode: 1Mbps For 11g mode: 6Mbps For 11n HT20: MCS0

EUT is a portable device that has three orientations; therefore X, Y and Z orientations have been investigated, and the worst case was found to be at X position.

Three sample units D0415 (BOM Variant 1), D0930 (BOM Variant 3) and D0485 (BOM Variant 2) were used to perform on full RF radiated and conducted tests, excepted bandwidth and PSD for both BOM Variant 3 and BOM Variant 2.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST					
Description	Manufacturer	Model	Serial Number		
AC Adaptor	Apple	A1344	N/A		

I/O CABLES (Conducted Setup)

	I/O CABLE LIST						
Cable	Port	# of	Connector	Cable	Cable	Remarks	
No.		Identical	Туре	Туре	Length		
		Ports					
1	AC	2	AC	unshielded	2m	N/A	
2	DC	1	DC	unshielded	1m	N/A	
3	Antenna	1	Spectrum Analyzer	unshielded	0.10m	N/A	

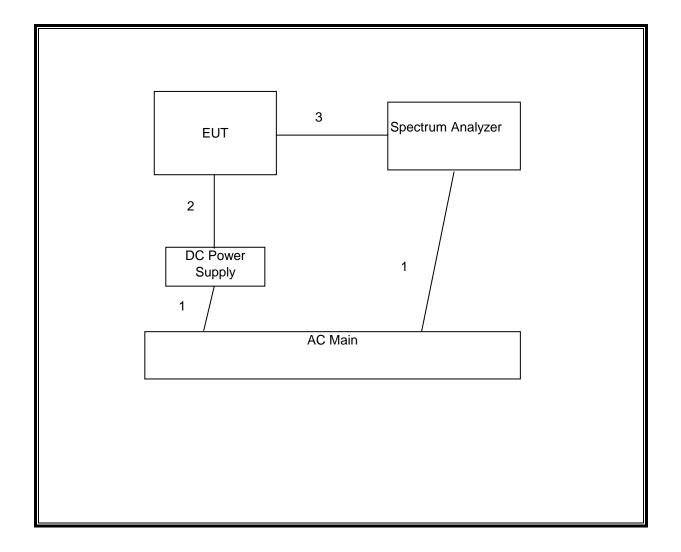
I/O CABLES (Radiated Setup)

	I/O CABLE LIST									
Cable No.	Port	# of Identical	Connector Type	Cable Type	Cable Length	Remarks				
		Ports								
1	AC	1	AC	unshielded	2m	N/A				
2	DC	1	DC	unshielded	1m	N/A				
3	Jack	1	Earphone	unshielded	0.5m	N/A				

TEST SETUP

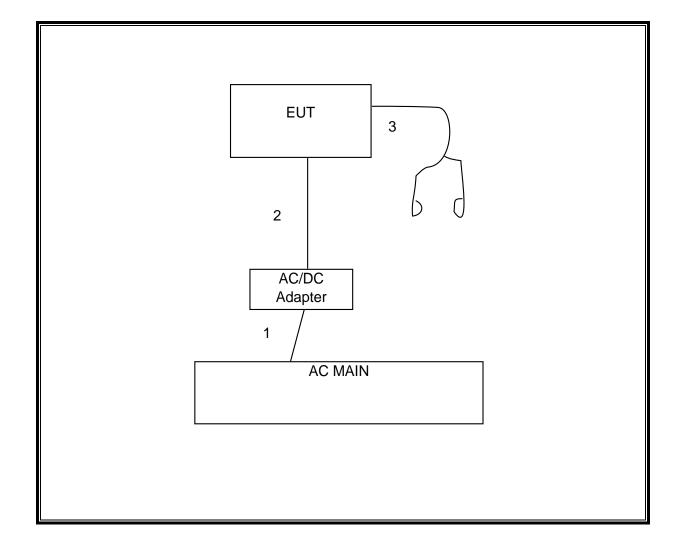
The EUT is a stand-alone device.

SETUP DIAGRAM FOR TESTS (CONDUCTED)



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SETUP DIAGRAM FOR TESTS (RADIATED)



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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					
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	05/11/12					
Antenna, Horn, 18 GHz	EMCO	3115	C00872	06/29/12					
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/16/12					
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/12					
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/12/12					
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	07/06/12					
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11					
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR					
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	01/07/12					
Peak Power Meter	Agilent / HP	E4416A	C00963	12/04/11					

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7. ANTENNA PORT TEST RESULTS

BOM VARIANT 1

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

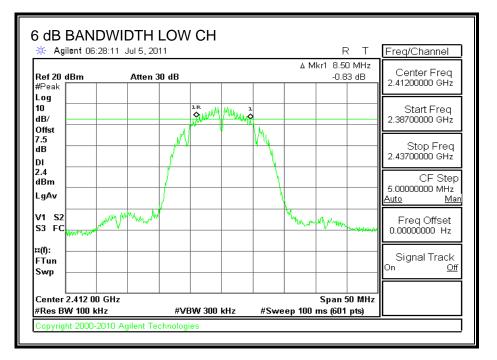
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.50	0.5
Middle	2437	8.58	0.5
High	2462	9.00	0.5

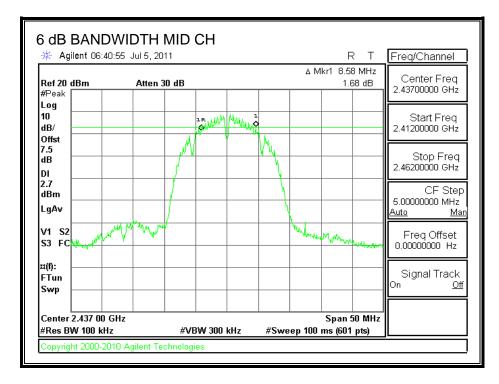
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BOM VARIANT 1

6 dB BANDWIDTH





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🔆 Agilent 06:	56:23 JUL5,2	011					F		Freq/Channel
Ref 20 dBm #Peak	Atten	30 dB				ΔM	kr1 9.00 -0.6) MHz 9 dB	Center Freq 2.46200000 GHz
Log 10 dB/			₽ ₽₩₩	Hung					Start Freq 2.43700000 GHz
Offst 7.5 dB		M			M				Stop Freq 2.48700000 GHz
DI 2.8 dBm					1				CF Step 5.0000000 MHz
LgAv V1 S2	www.	-			1	harmy	<u>м</u>		<u>Auto Mar</u> Freq Offset
S3 FC							· / ·•••••	WHERE AND AND A	0.00000000 Hz
FTun Swp									Signal Track On <u>Off</u>
Center 2.462 00 #Res BW 100 kl		#\/F	3W 300	kH7	#Swe	ep 100 i	Span (ms (601		

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7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

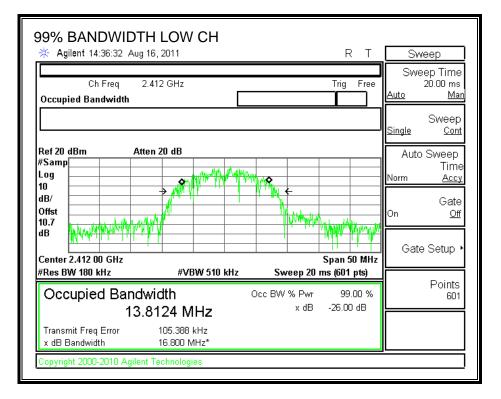
RESULTS

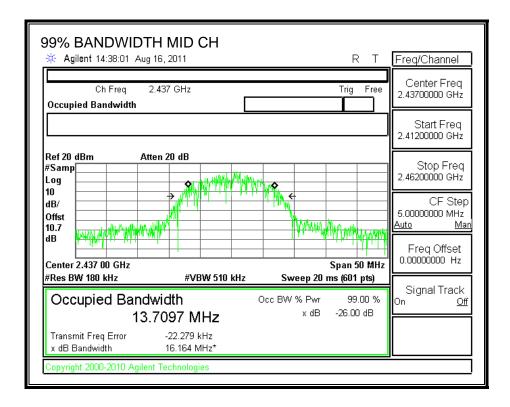
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	13.8124
Middle	2437	13.7097
High	2462	13.8294

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99% BANDWIDTH, CHAIN 1





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99% BANDWIDT			RТ	Sweep
Ch Freq 2 Occupied Bandwidth	.462 GHz		Trig Free	Sweep Tim 20.00 m <u>Auto M</u>
				Swee <u>Single Co</u>
Ref 20 dBm Attu #Samp Log 10	en 20 dB			Auto Sweep Tim Norm <u>Acc</u>
dB/ Offst 10.7 dB			AN TAMPANA	Gat On <u>O</u>
Center 2.462 00 GHz #Res BW 180 kHz	#VBW 510 kHz		Span 50 MHz	Gate Setup
Occupied Bandy 13.		Occ BW % Pwr		Point 60
Transmit Freq Error x dB Bandwidth	-194.743 kHz 16.916 MHz*			
Copyright 2000-2010 Agilen	: Technologies			

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7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

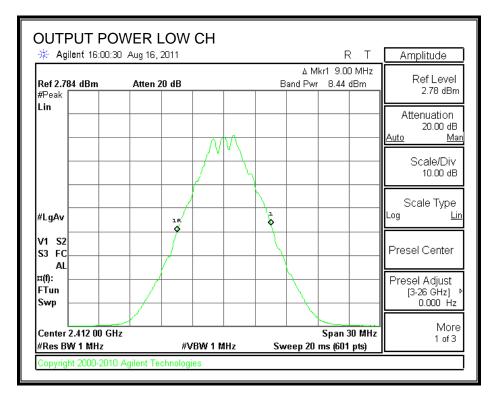
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

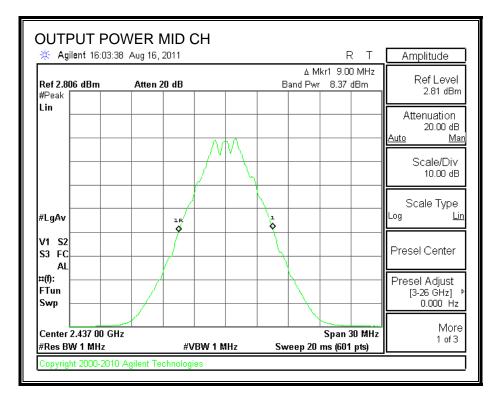
RESULTS

Channel	Frequency	Reading	Attenuator and	Total Power	Limit	Margin
	(MHz)	(dBm)	Cable Offset	(dBm)	(dBm)	(dB)
Low	2412	8.44	10.7	19.14	30	-10.86
Middle	2437	8.37	10.7	19.07	30	-10.93
High	2462	8.65	10.7	19.35	30	-10.65

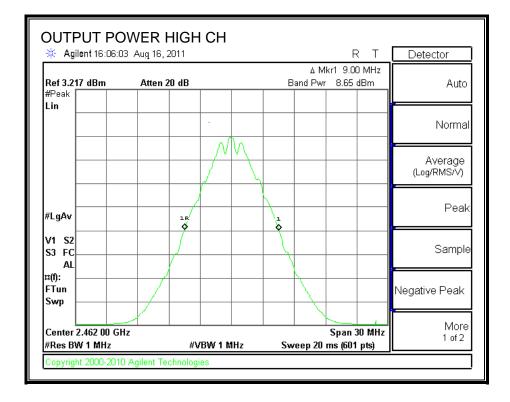
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OUTPUT POWER





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7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	17.15
Middle	2437	17.05
High	2462	17.10

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7.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

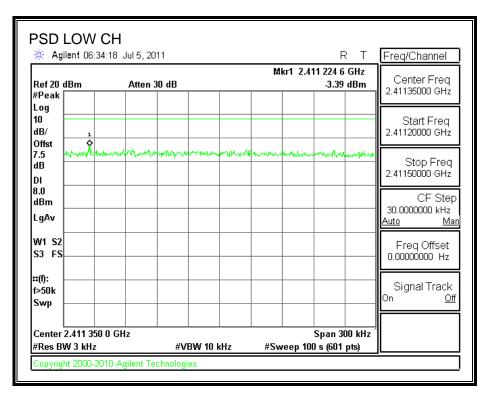
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

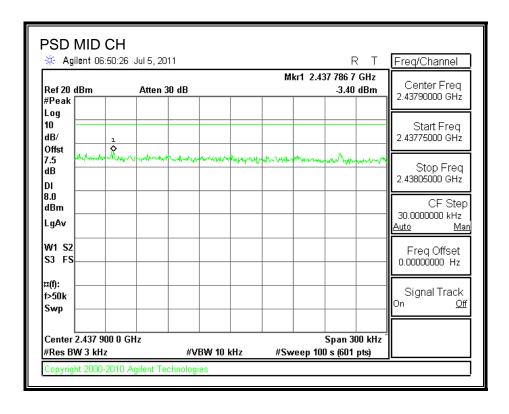
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	-3.39	8	-11.39
Middle	2437	-3.40	8	-11.40
High	2462	-3.05	8	-11.05

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POWER SPECTRAL DENSITY





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🔆 Agi	lent 07	:00:15 .	Jul 5, 20	11					F	? Т	Freq/Channel
Ref 20 o #Peak	lBm		Atten 3	0 dB			M	kr1 2.46	2 785 9 -3.05		Center Freq 2.46285000 GHz
Log 10 dB/			1								Start Freq 2.46270000 GHz
Offst 7.5 dB DI	y Ny Martina Na Martina	the store the	hondruð	eren er en er	nn an a	haran	warahiji	www.h	hartanta	New Manager Ma	Stop Freq 2.46300000 GHz
8.0 dBm											CF Step 30.0000000 kHz
LgAv W1 S2											<u>Auto Man</u> Freq Offset
S3 FS											0.000000000 Hz Signal Track
f>50k Swp											On <u>Off</u>
L Center : #Res B\			z	#VI	BW 10 I	dHz	#Sw	reep 100	Span 3() s (601		

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7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

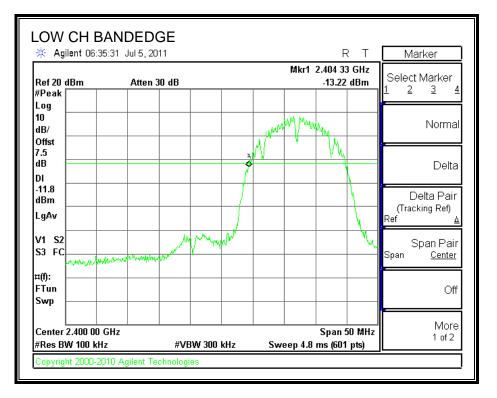
TEST PROCEDURE

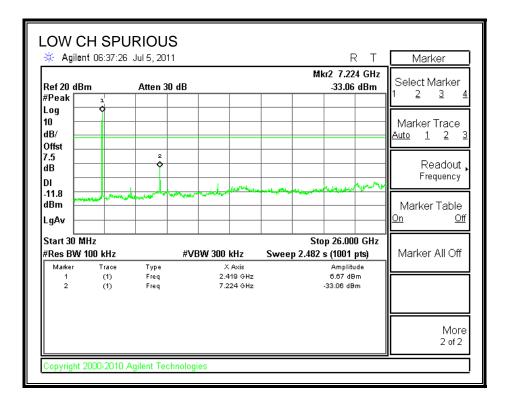
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

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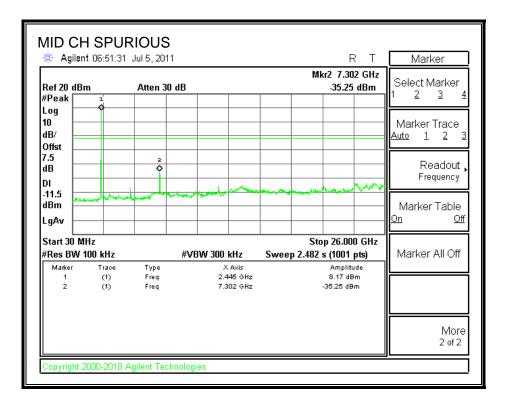
SPURIOUS EMISSIONS





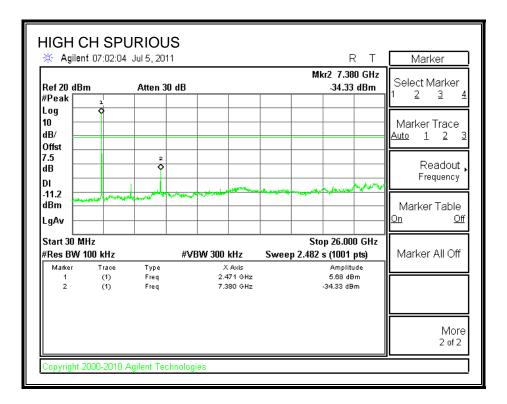
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MID CH REF # Agilent 06:50:4	-		R	Т	Freq/Channel
Ref 20 dBm #Peak	Atten 30 dB		Mkr1 2.436 00 8.48	GHz dBm	Center Freq 2.43700000 GHz
Log 10 dB/		WWY MUMMU			Start Freq 2.41200000 GHz
Offst 7.5 dB	M	<u> </u>			Stop Freq 2.46200000 GHz
DI -11.5 dBm					CF Step 5.0000000 MHz
LgAv V1 S2 S3 FC	v ~~		Manner man		<u>Auto Man</u> Freq Offset 0.0000000 Hz
¤(f): FTun Swp					Signal Track On <u>Off</u>
Center 2.437 00 GF		300 kHz S	Span 5		
#Res BW 100 kHz		300 kHz Sv	Span 5 veep 4.8 ms (601		



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		RT	Freq/Channel
Ref 20 dBm #Peak	Atten 30 dB	Mkr1 2.469 67 GHz -11.86 dBm	Center Freq 2.48350000 GHz
Log 10 dB/	4		Start Freq 2.45850000 GHz
Offst ^r 7.5 dB DI	<u>W.</u>		Stop Freq 2.50850000 GHz
-11.2 dBm LgAv			CF Step 5.0000000 MHz Auto Man
V1 S2 S3 FC	When my manufactures	and the second descent where the second descent	Freq Offset 0.00000000 Hz
¤(f): FTun Swp			Signal Track On <u>Off</u>
Center 2.483 50 GH #Res BW 100 kHz	z #VBW 300 kHz	Span 50 MHz Sweep 4.8 ms (601 pts)	



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7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

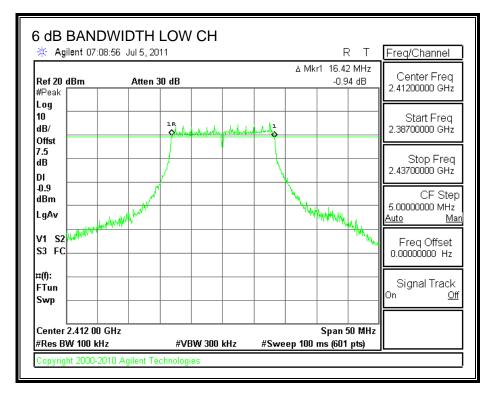
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

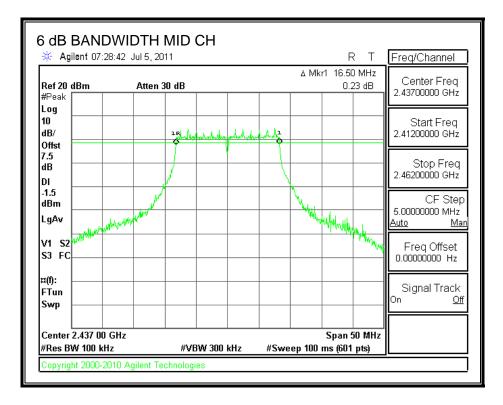
RESULTS

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	16.42	0.5
Middle	2437	16.50	0.5
High	2462	16.50	0.5

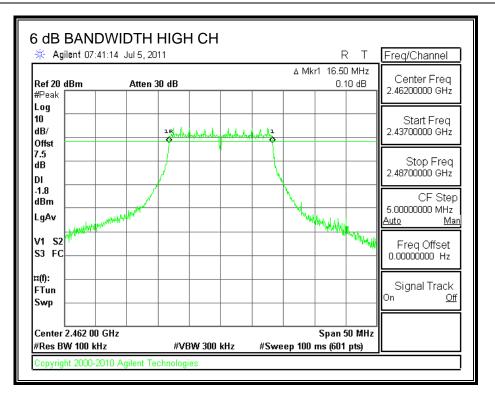
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6 dB BANDWIDTH





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7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

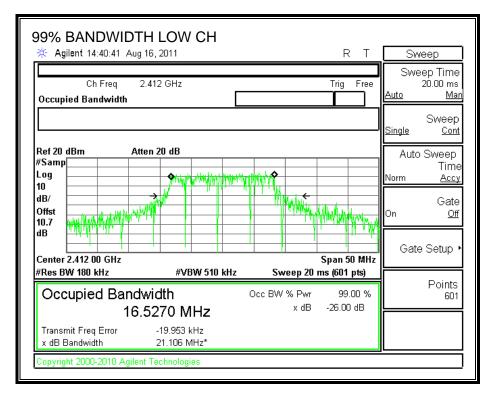
RESULTS

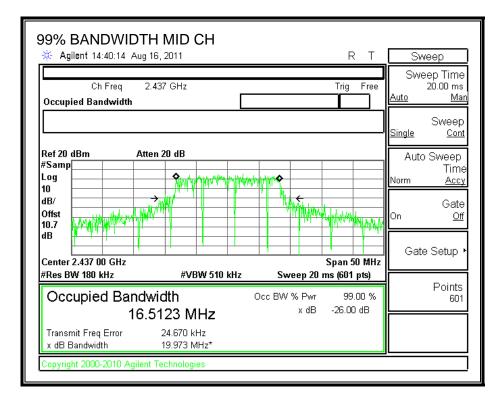
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	16.5270
Middle	2437	16.5123
High	2462	16.5109

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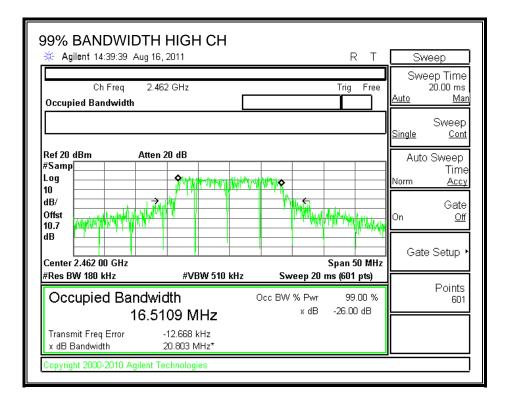
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99% BANDWIDTH





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7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

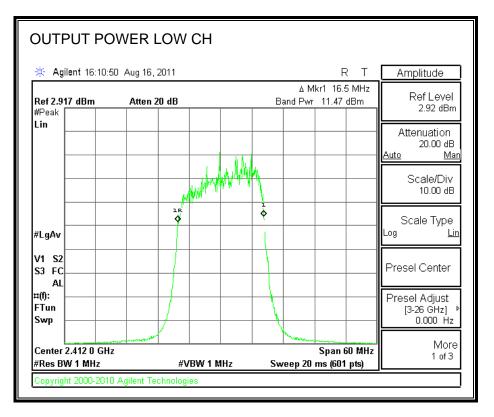
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

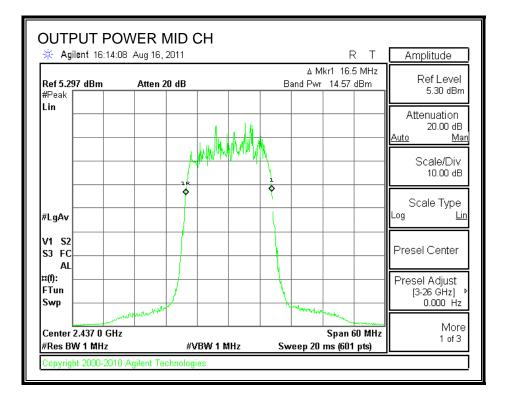
RESULTS

Channel	Frequency	Peak power	Attenuator and	Output	Limit	Margin
		Reading	Cable Offset	Power		
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	11.47	10.7	22.17	30	-7.83
Middle	2437	14.57	10.7	25.27	30	-4.73
High	2462	11.67	10.7	22.37	30	-7.63

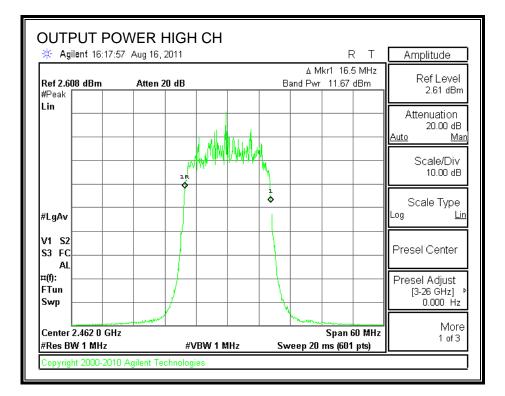
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OUTPUT POWER





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7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	14.00
Middle	2437	17.00
High	2462	14.00

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7.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

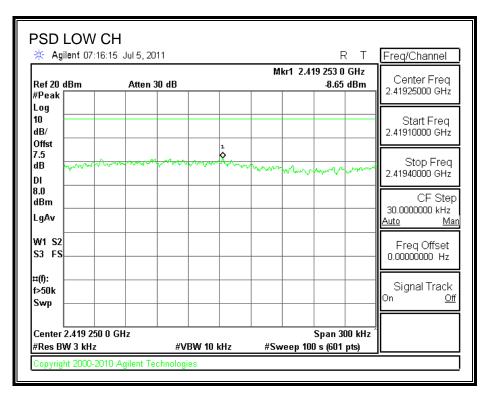
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

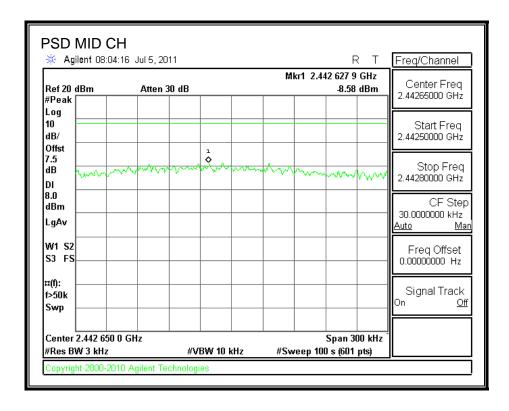
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	-8.65	8	-16.65
Middle	2437	-8.58	8	-16.58
High	2462	-8.62	8	-16.62

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POWER SPECTRAL DENSITY





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🔆 Agilent 07:	45:42 Jul 5, 2011			RT	Freq/Channel
Ref 20 dBm #Peak	Atten 30 c	B	Mkr1 2.	463 878 4 GHz -8.62 dBm	Center Freq 2.46390000 GHz
Log 10 dB/ Offst					Start Freq 2.46375000 GHz
7.5 dB DI	- Markana	and the second	man	Amarian	Stop Freq 2.46405000 GHz
8.0 dBm LgAv					CF Step 30.0000000 kHz <u>Auto Mar</u>
W1 S2 S3 FS					Freq Offset 0.00000000 Hz
¤(f): f>50k Swp					Signal Track On <u>Off</u>
Center 2.463 90 #Res BW 3 kHz		#VBW 10 kHz	#Sweep 1	Span 300 kHz 00 s (601 pts)	

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7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

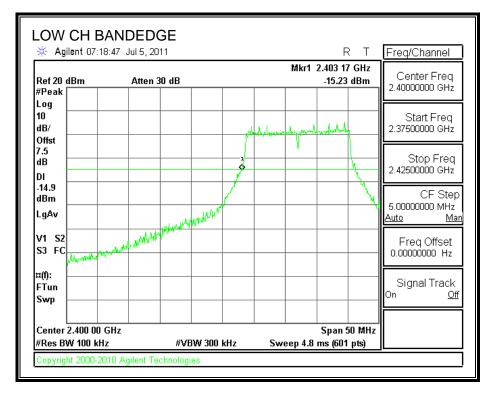
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

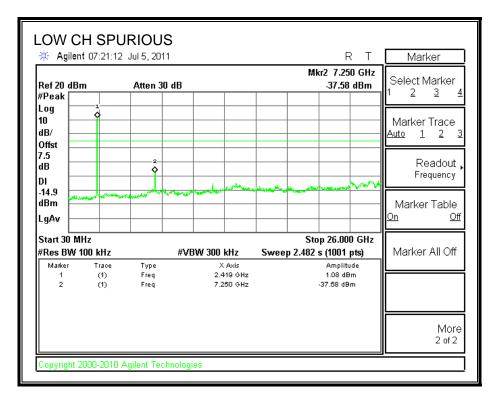
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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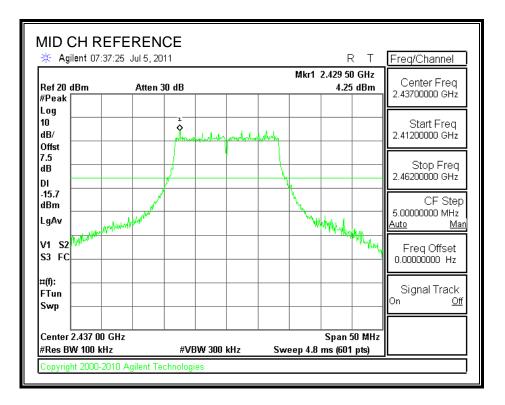
RESULTS

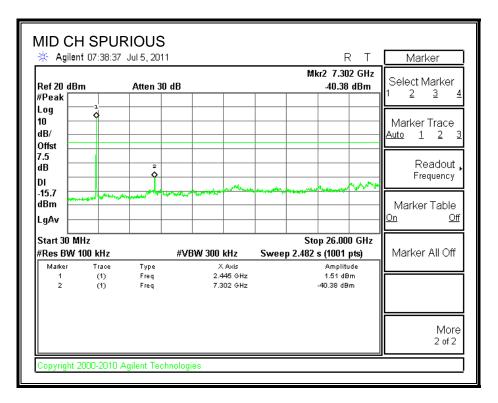
SPURIOUS EMISSIONS



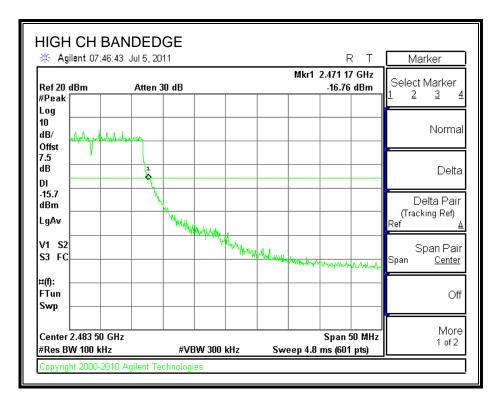


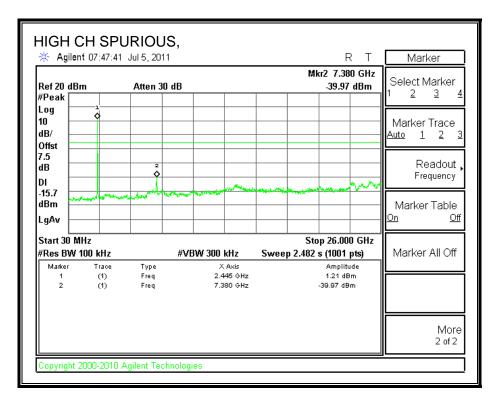
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7.3. 802.11n MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

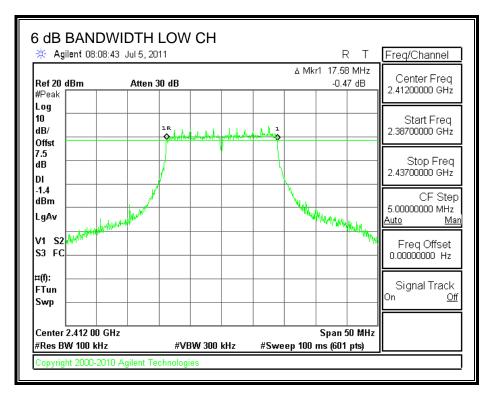
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

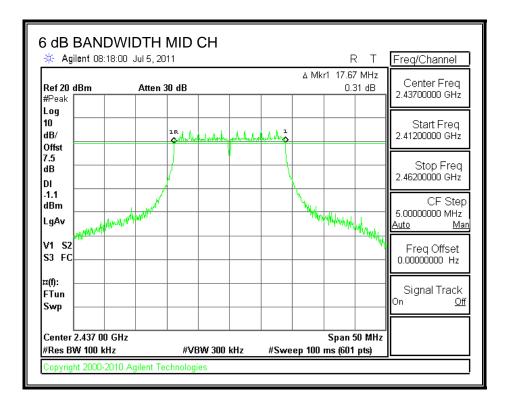
RESULTS

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	17.58	0.5
Middle	2437	17.67	0.5
High	2462	17.67	0.5

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6 dB BANDWIDTH





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🔆 Agilent 08:26:	53 Jul 5, 2011			RT	Freq/Channel
Ref 20 dBm #Peak	Atten 30 dB		∆ Mk	rr1 17.67 MHz -0.03 dB	Center Freq 2.46200000 GHz
Log 10 dB/	IR MAN	hard and a state of the	4.4.4. ¹		Start Freq 2.43700000 GHz
Offst 7.5 dB DI					Stop Freq 2.48700000 GHz
-1.9 dBm LgAv	Wenter Provide			atura k	CF Step 5.00000000 MHz Auto Mai
V1 S2 S3 FC				annin han annan ann	Freq Offset 0.00000000 Hz
¤(f): FTun Swp					Signal Track On <u>Off</u>
Center 2.462 00 G #Res BW 100 kHz		300 kHz	#Sweep 100	Span 50 MHz ms (601 pts)	

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7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

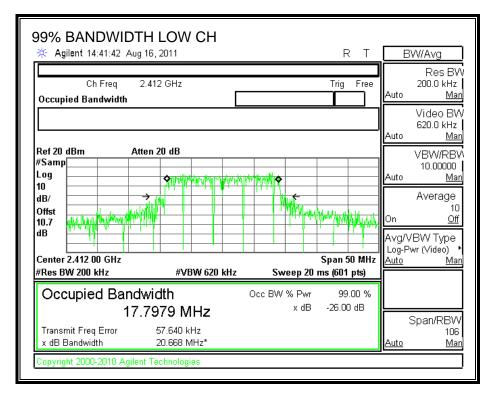
RESULTS

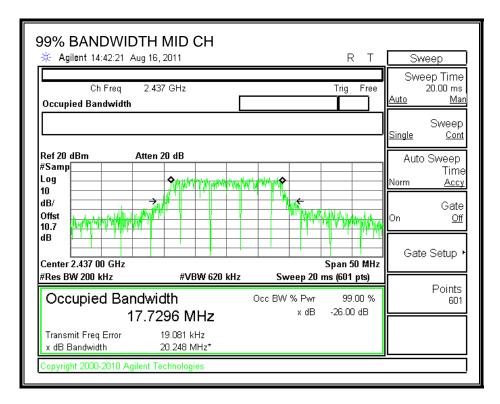
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	17.7979
Middle	2437	17.7296
High	2462	17.7905

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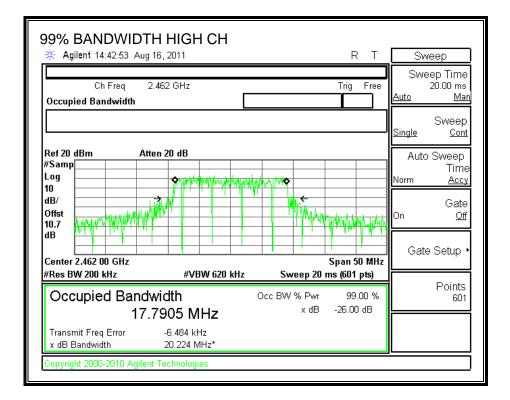
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99% BANDWIDTH





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7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

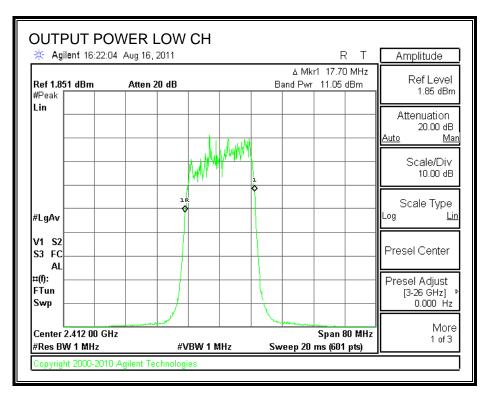
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

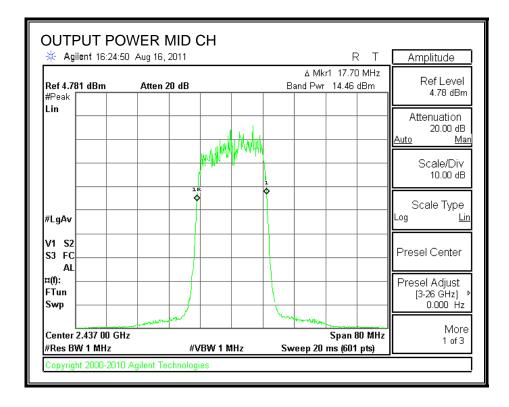
RESULTS

Channel	Frequency	Peak power	Attenuator and	Output	Limit	Margin
		Reading	Cable Offset	Power		
	(MHz)	(d Bm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	11.05	10.7	21.75	30	-8.25
Middle	2437	14.46	10.7	25.16	30	-4.84
High	2462	11.16	10.7	21.86	30	-8.14

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OUTPUT POWER





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	WER HIGH CH			
🔆 🔆 Agilent 16:27:3	32 Aug 16, 2011		RT	Amplitude
Ref 1.232 dBm #Peak	Atten 20 dB	Ba	∆ Mkr1 17.70 MHz nd Pwr 11.16 dBm	Ref Level 1.23 dBm
Lin		he had all a line		Attenuation 20.00 dB <u>Auto Man</u>
				Scale/Div 10.00 dB
#LgAv	*	*		_ Scale Type Log <u>Lin</u>
V1 S2 S3 FC				Presel Center
¤(f): FTun Swp				Presel Adjust [3-26 GHz] ▶ 0.000 Hz
Center 2.462 00 GI #Res BW 1 MHz	lz #VBW 1	MHz Swe	Span 80 MHa sep 20 ms (601 pts)	More 1 of 3
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7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	13.50
Middle	2437	17.00
High	2462	13.50

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7.3.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

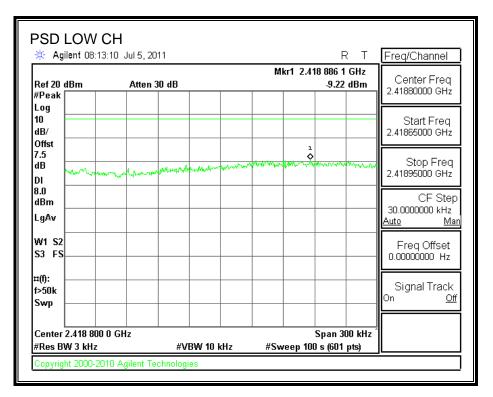
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

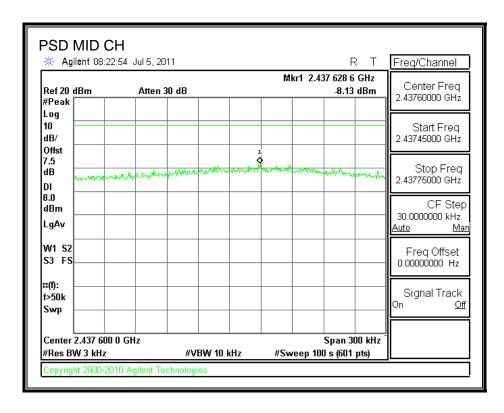
RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	-9.22	8	-17.22
Middle	2437	-8.13	8	-16.13
High	2462	-8.54	8	-16.54

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POWER SPECTRAL DENSITY





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🔆 Agilent 08:31	45 Jul 5, 2011			RΤ	Freq/Channel
Ref 20 dBm #Peak	Atten 30 dB		Mkr1 2.4	53 915 6 GHz -8.54 dBm	Center Freq 2.45390000 GHz
Log 10 dB/ Offst					Start Freq 2.45375000 GHz
7.5	ware and the second second		Constant and the second		Stop Freq 2.45405000 GHz
8.0 dBm LgAv					CF Step 30.0000000 kHz Auto Man
W1 S2 S3 FS					Freq Offset 0.00000000 Hz
¤(f): f>50k Swp					Signal Track On <u>Off</u>
Center 2.453 900 #Res BW 3 kHz		/BW 10 kHz	#Sweep 10	Span 300 kHz [°] 0 s (601 pts)	

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7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

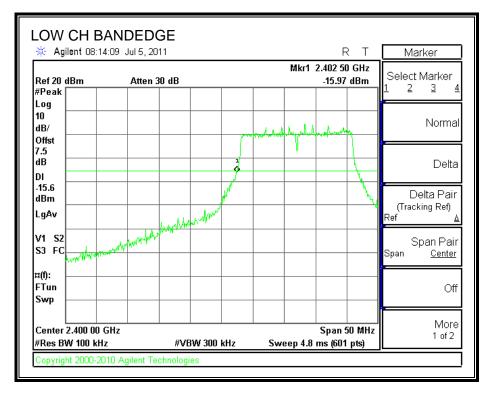
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

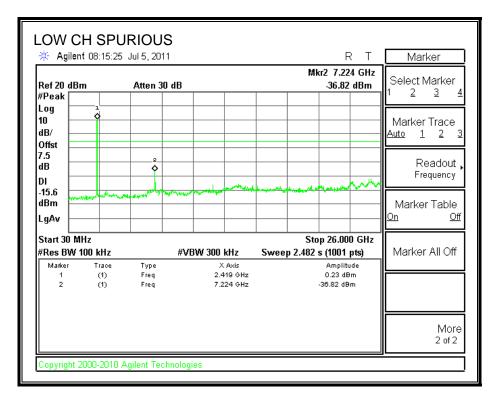
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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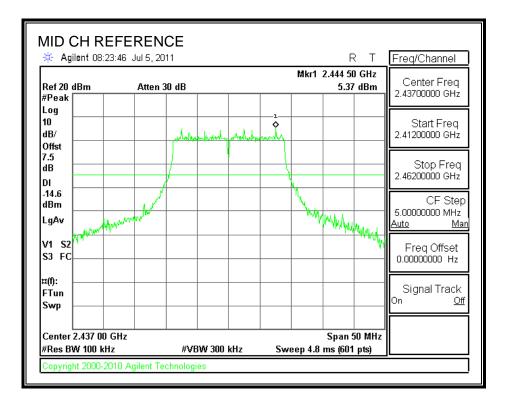
RESULTS

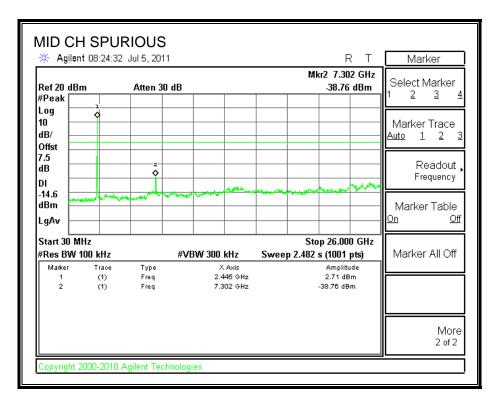
SPURIOUS EMISSIONS



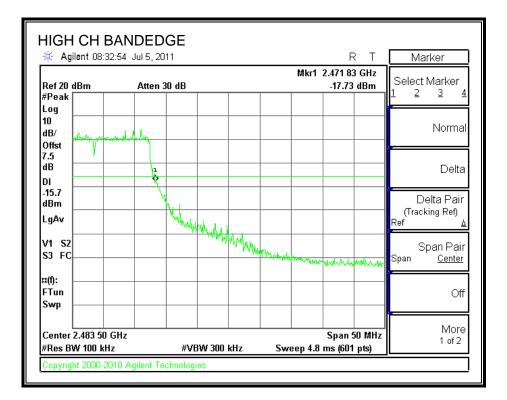


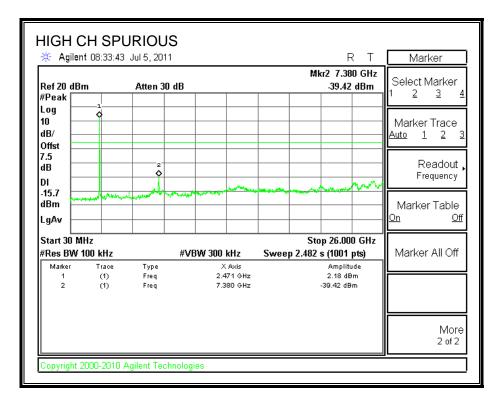
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BOM VARIANT 2

7.4. 802.11b LEGACY MODE IN THE 2.4 GHz BAND

7.4.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

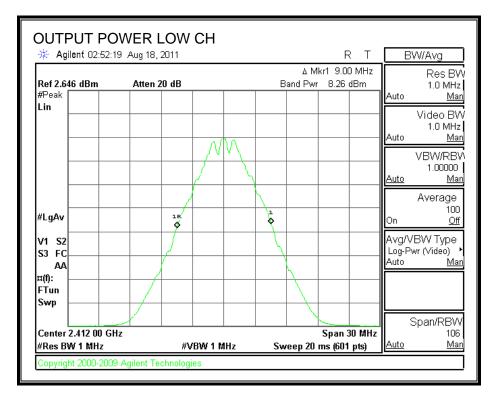
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

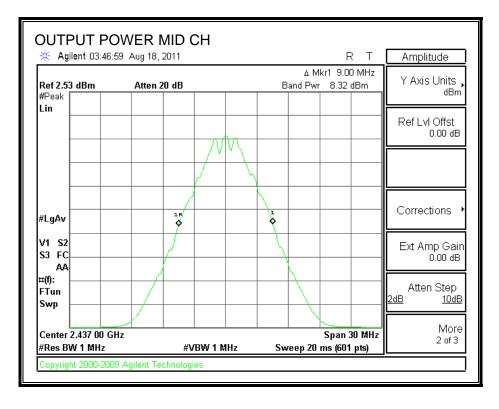
RESULTS

Channel	Frequency	Peak Power Meter	Attenuator and	Output	Limit	Margin
		Reading	Cable Offset	Power		
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	8.26	10.7	18.96	30	-11.04
Middle	2437	8.32	10.7	19.02	30	-10.98
High	2462	8.35	10.7	19.05	30	-10.95

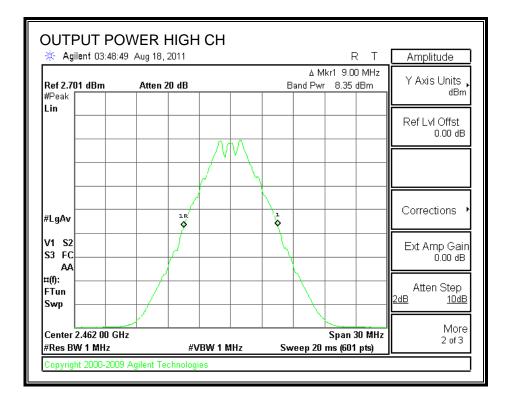
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OUTPUT POWER





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7.4.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power	
	(MHz)	(dBm)	
Low	2412	16.97	
Middle	2437	17.00	
High	2462	17.02	

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7.4.3. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

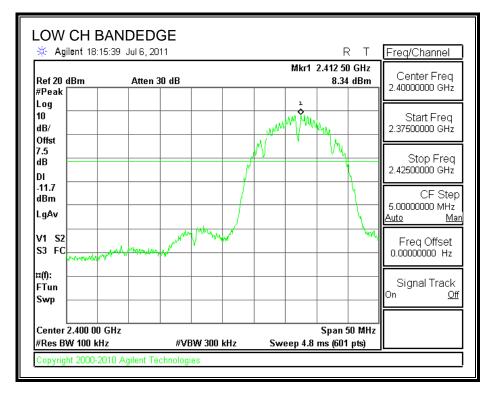
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

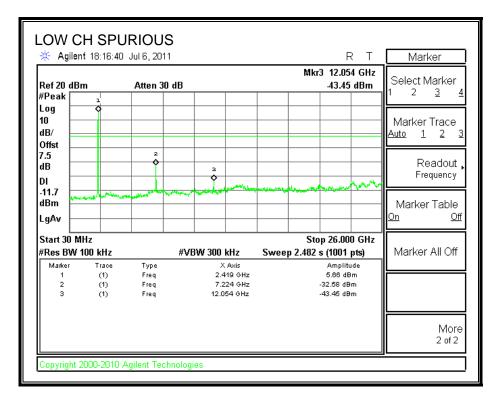
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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RESULTS

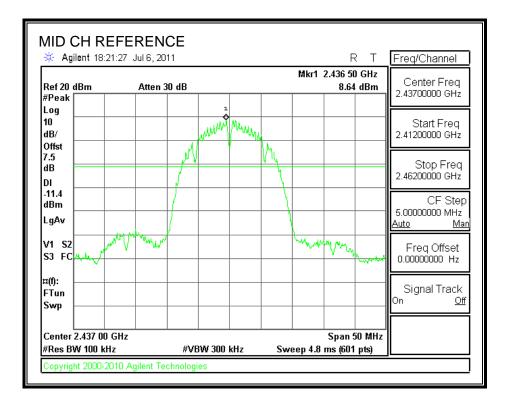
SPURIOUS EMISSIONS

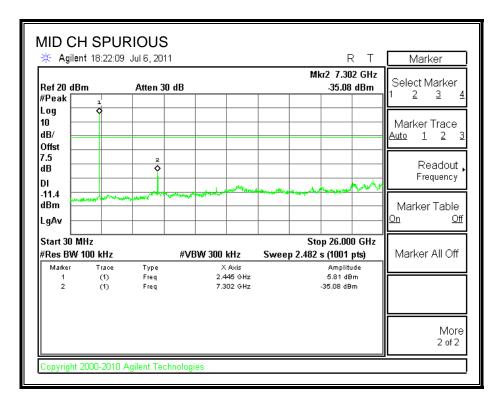




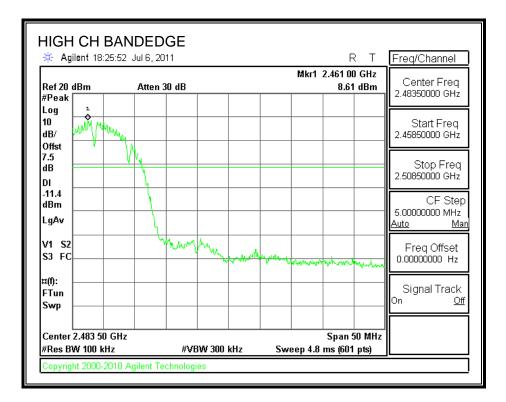
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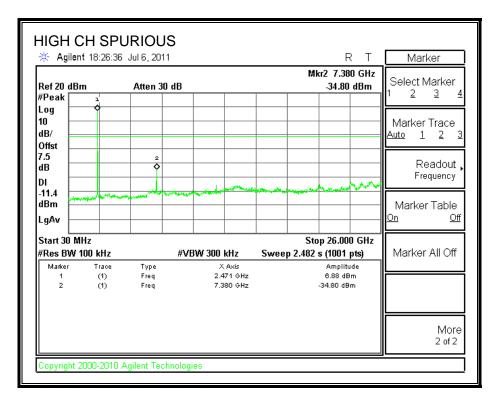
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7.5. 802.11g MODE IN THE 2.4 GHz BAND

7.5.1. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

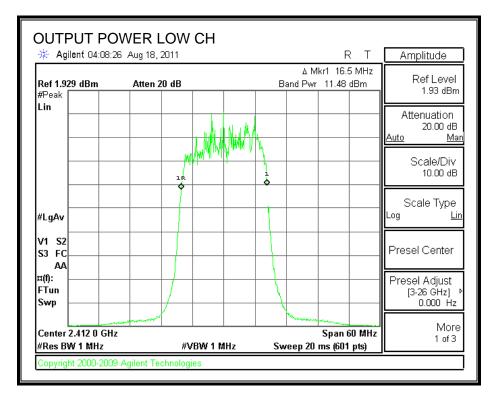
TEST PROCEDURE

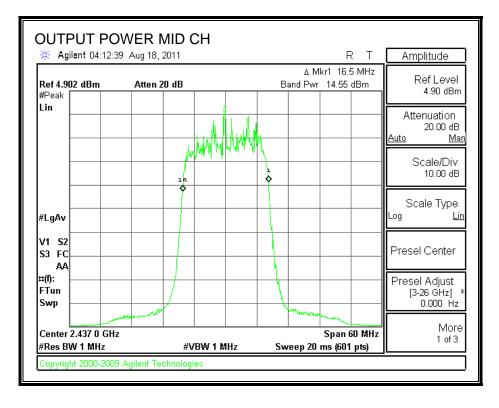
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

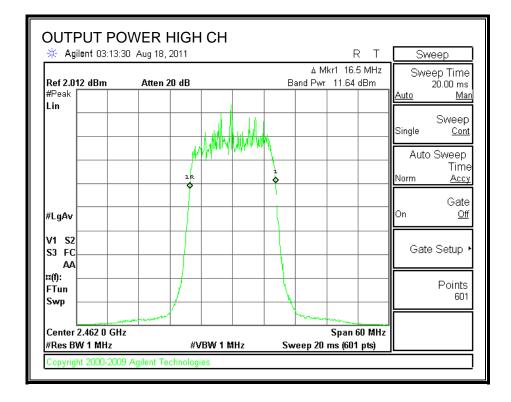
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.48	10.7	22.18	30	-7.82
Middle	2437	14.55	10.7	25.25	30	-4.75
High	2462	11.64	10.7	22.34	30	-7.66

OUTPUT POWER





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7.5.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	13.98
Middle	2437	16.96
High	2462	14.00

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7.5.3. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

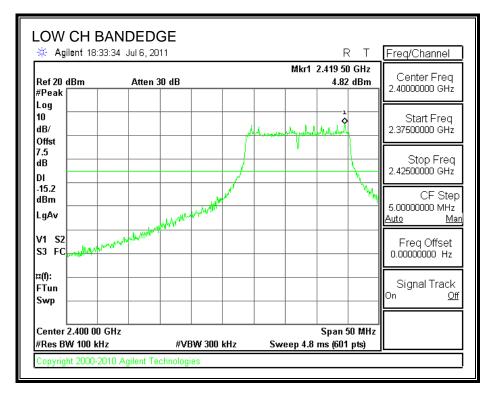
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

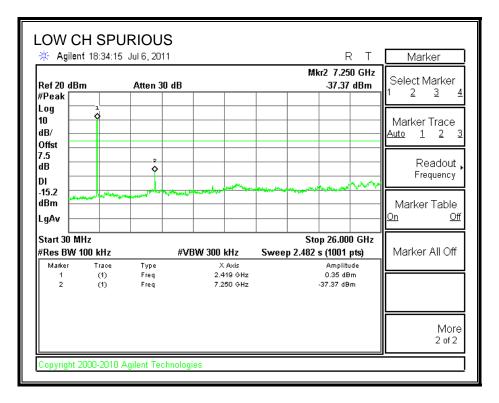
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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RESULTS

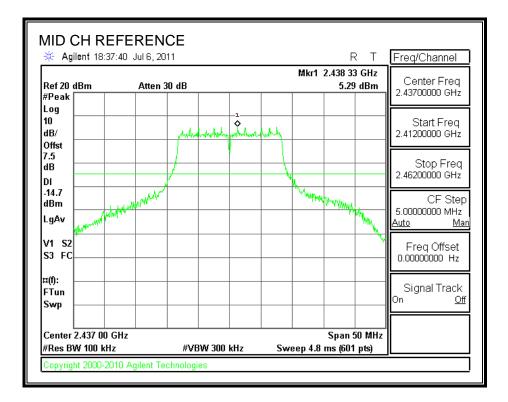
SPURIOUS EMISSIONS

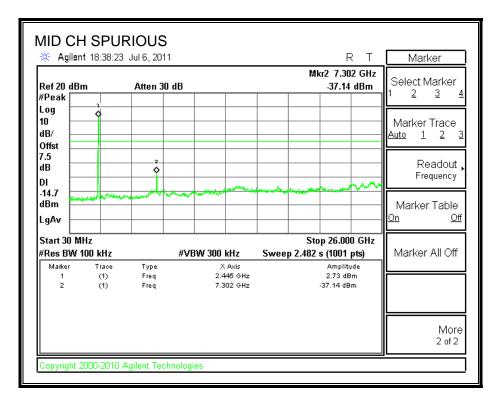




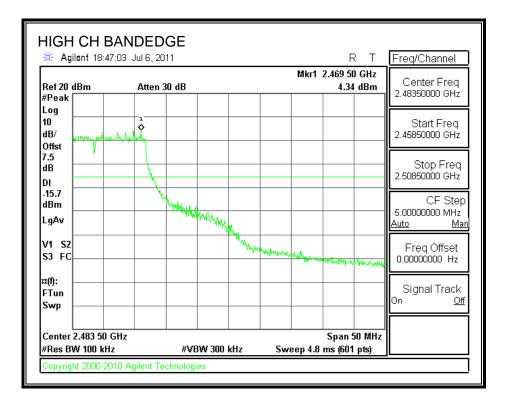
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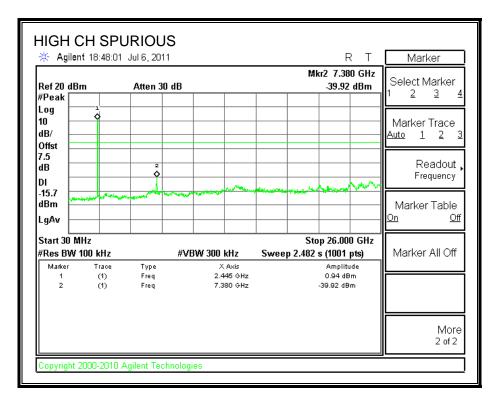
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7.6. 802.11n MODE IN THE 2.4 GHz BAND

7.6.1. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

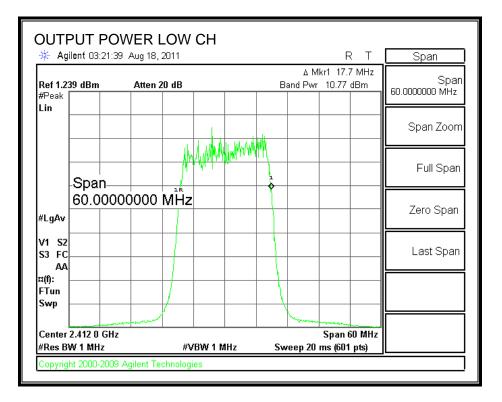
TEST PROCEDURE

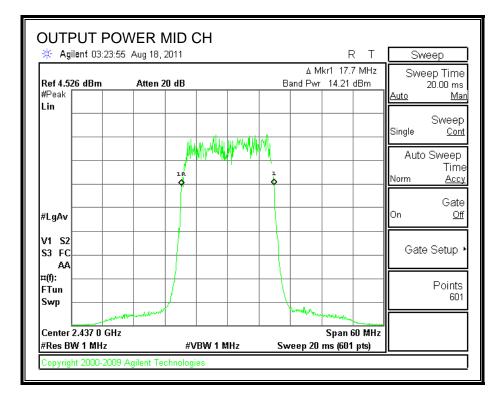
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

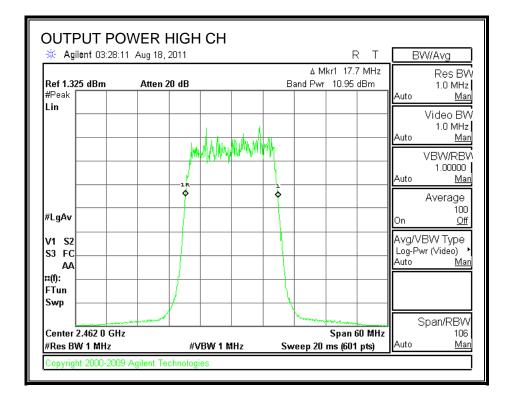
Channel	Frequency	Peak Power Reading	Attenuator and Cable Offset	Output Power	Limit	Margin
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	10.77	10.7	21.47	30	-8.53
Middle	2437	14.21	10.7	24.91	30	-5.09
High	2462	10.95	10.7	21.65	30	-8.35

OUTPUT POWER





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7.6.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	13.48
Middle	2437	17.00
High	2462	13.50

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7.6.3. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

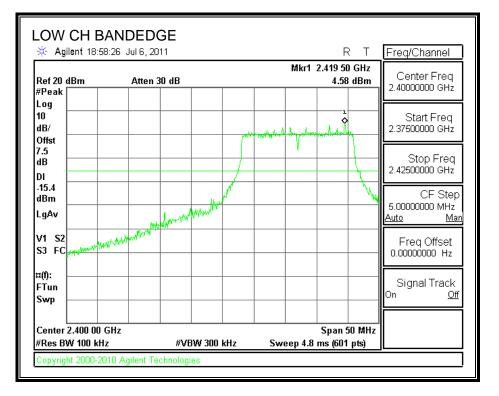
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

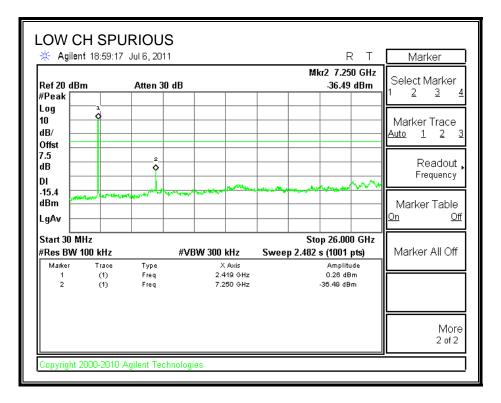
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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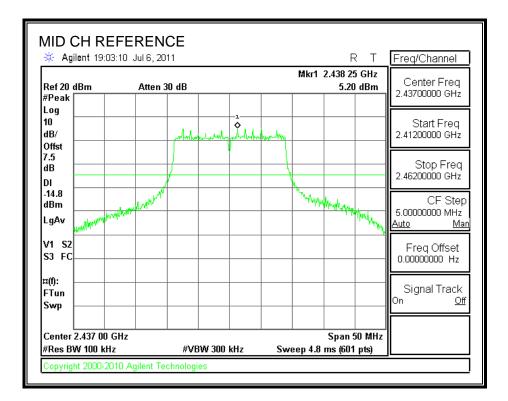
RESULTS

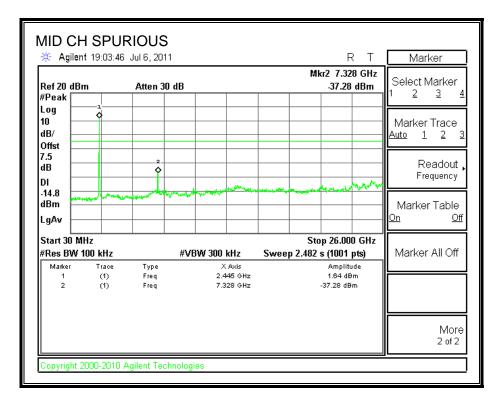
SPURIOUS EMISSIONS



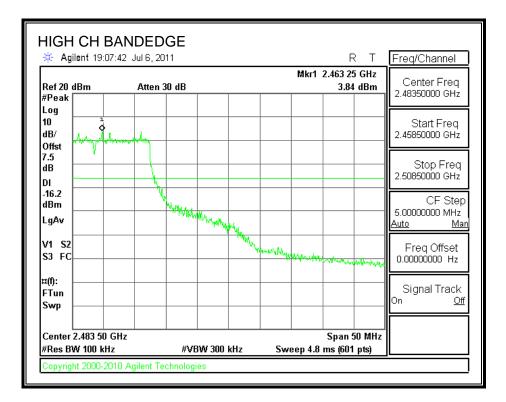


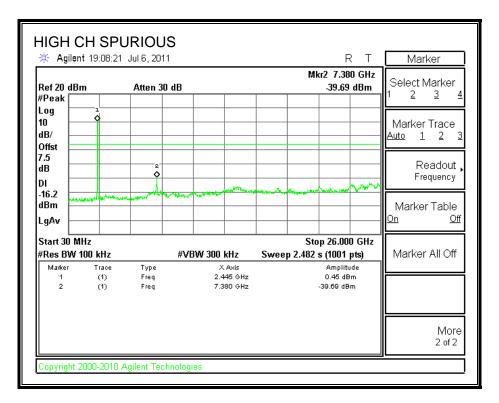
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BOM VARIANT 3

7.7. 802.11b LEGACY MODE IN THE 2.4 GHz BAND

7.7.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

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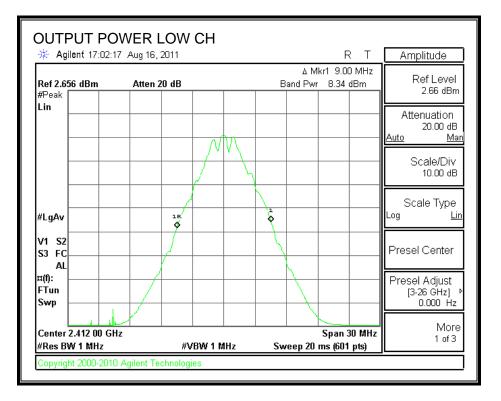
RESULTS

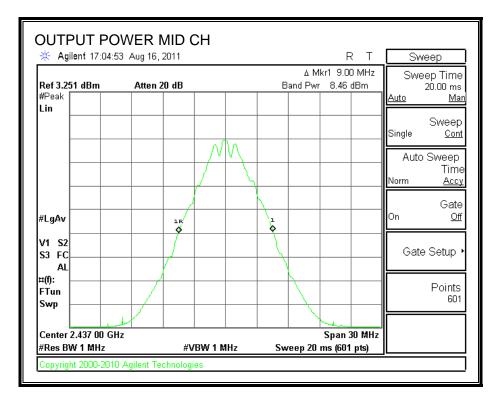
Channel	Frequency	Peak Power	Attenuator and	Output	Limit	Margin
		Reading	Cable Offset	Power		
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	8.34	10.7	19.04	30	-10.96
Middle	2437	8.46	10.7	19.16	30	-10.84
High	2462	8.47	10.7	19.17	30	-10.83

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OUTPUT POWER





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🔆 Agilent 17:06:0		ICH			RΤ	Amplitude
Ref 2.941 dBm #Peak	Atten 20 dB		E		(r1 9.00 MHz 8.47 dBm	Ref Level 2.94 dBm
Lin						Attenuation 20.00 dB Auto Man
						Scale/Div 10.00 dB
#LgAv	lR Ø		1			. Scale Type Log <u>Lin</u>
V1 S2 S3 FC AL						Presel Center
#L #(f): FTun Swp						Presel Adjust [3-26 GHz] ♪ 0.000 Hz
Center 2.462 00 GH #Res BW 1 MHz		/BW 1 MHz	Sv	veep 20 r	Span 30 MHz ns (601 pts)	More 1 of 3

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7.7.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	17.00
Middle	2437	17.10
High	2462	17.05

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7.7.3. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

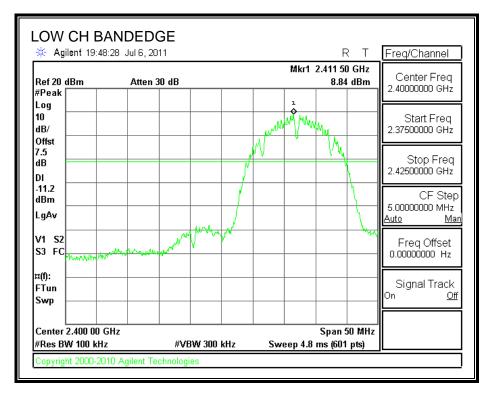
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

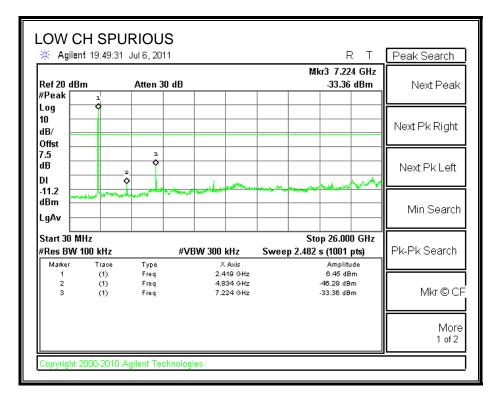
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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RESULTS

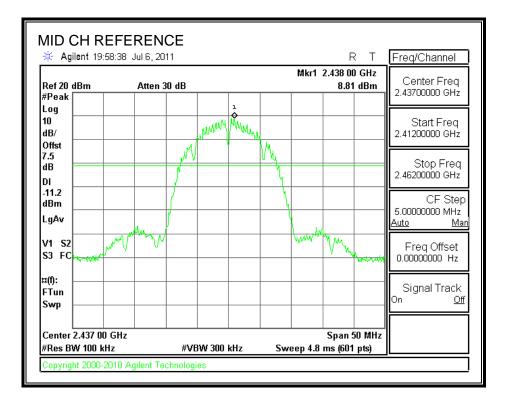
SPURIOUS EMISSIONS

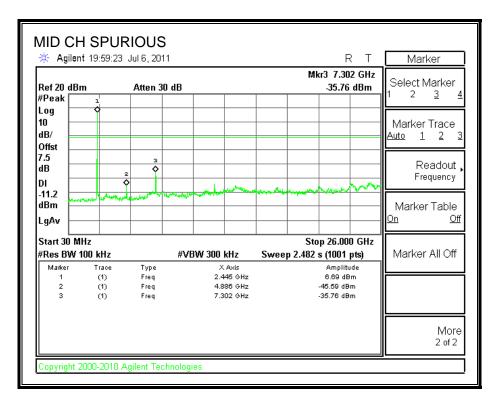




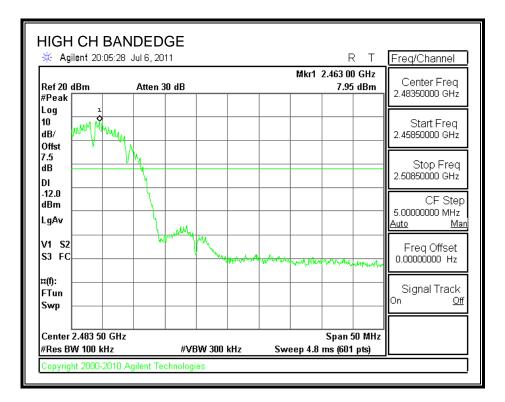
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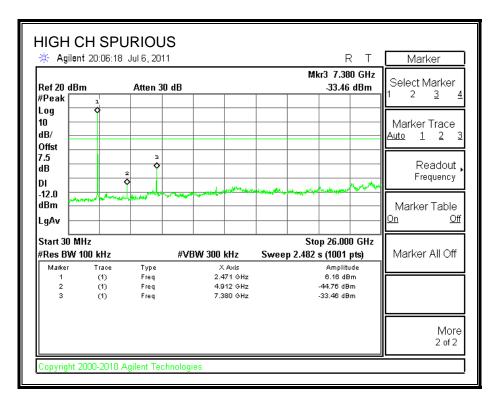
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7.8. 802.11g MODE IN THE 2.4 GHz BAND

7.8.1. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

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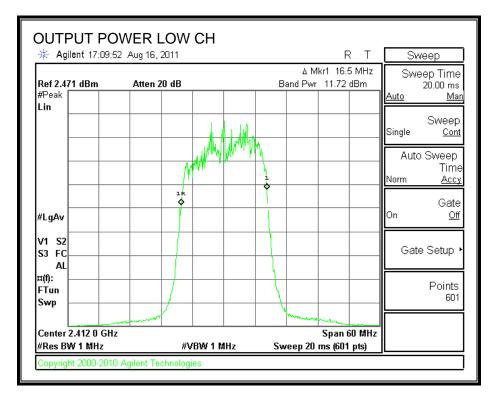
RESULTS

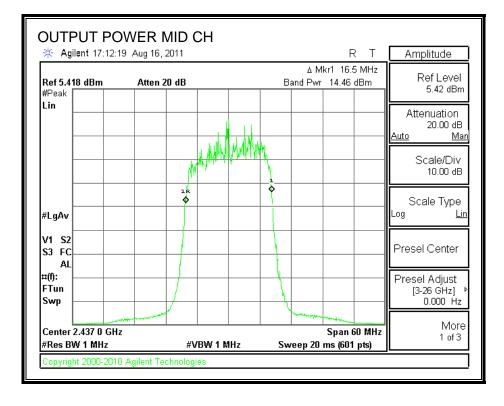
Channel	Frequency	Peak Power	Attenuator and	Output	Limit	Margin
		Reading	Cable Offset	Power		
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	11.72	10.7	22.42	30	-7.58
Middle	2437	14.46	10.7	25.16	30	-4.84
High	2462	11.68	10.7	22.38	30	-7.62

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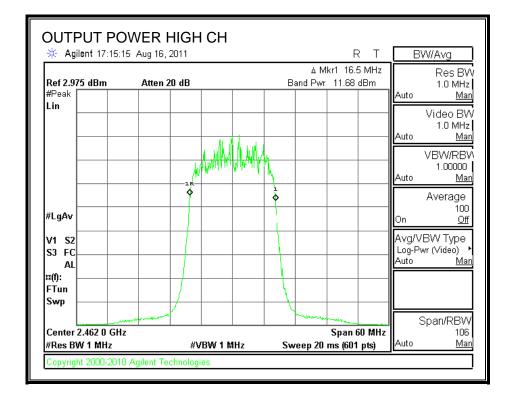
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OUTPUT POWER





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7.8.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	14.00
Middle	2437	17.15
High	2462	14.00

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7.8.3. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

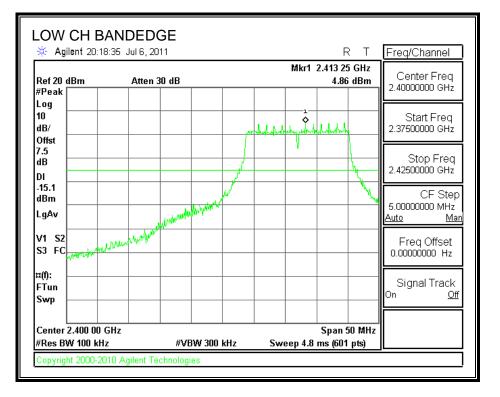
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

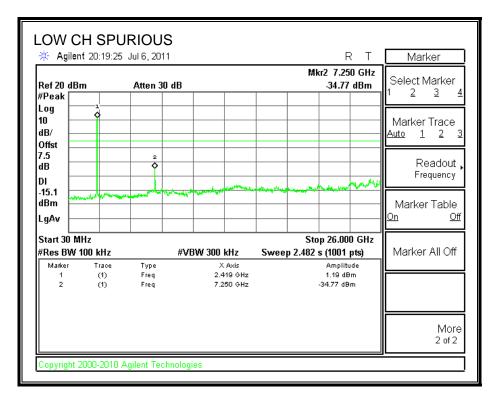
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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RESULTS

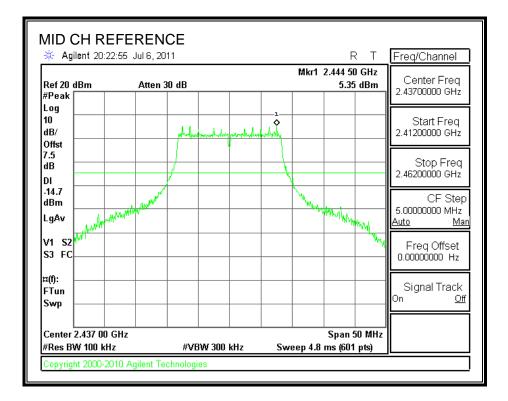
SPURIOUS EMISSIONS

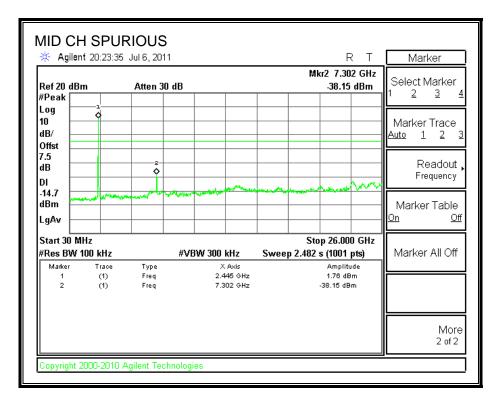




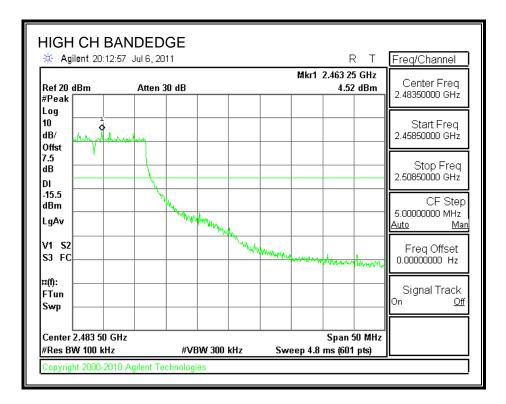
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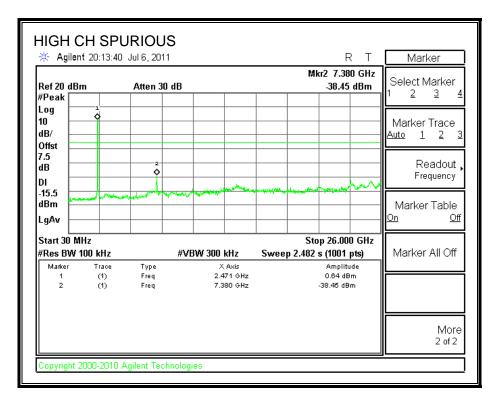
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7.9. 802.11n MODE IN THE 2.4 GHz BAND

7.9.1. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum effective legacy gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

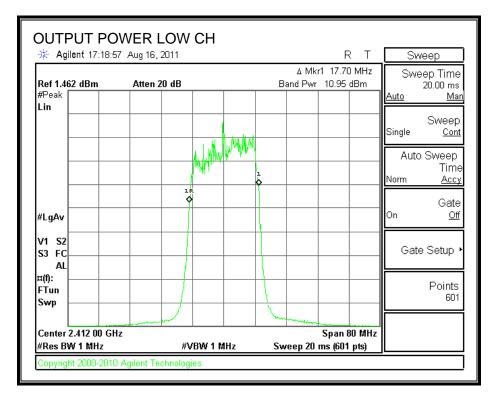
TEST PROCEDURE

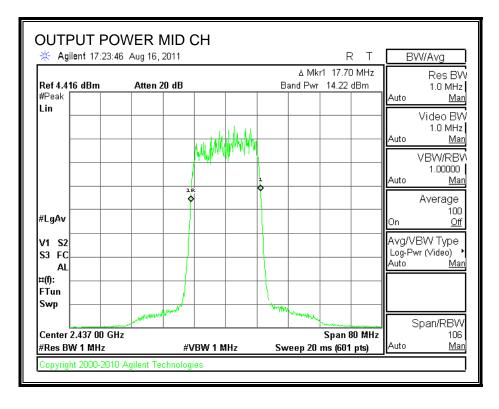
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

<u>RESULTS</u>

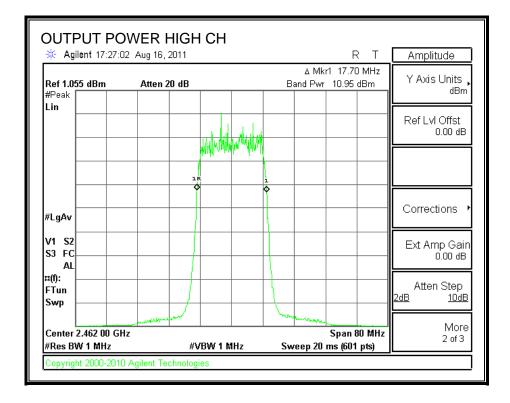
Channel	Frequency	Peak Power	Attenuator and	Output	Limit	Margin
		Reading	Cable Offset	Power		
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	10.95	10.7	21.65	30	-8.35
Middle	2437	14.22	10.7	24.92	30	-5.08
High	2462	10.95	10.7	21.65	30	-8.35

OUTPUT POWER





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7.9.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	13.50
Middle	2437	17.05
High	2462	13.50

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7.9.3. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

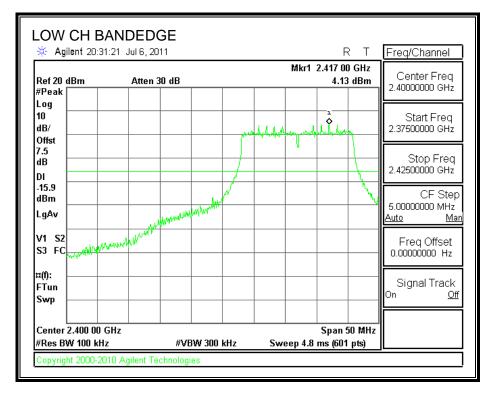
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

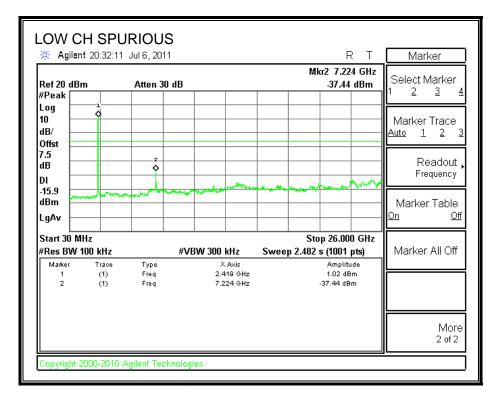
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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RESULTS

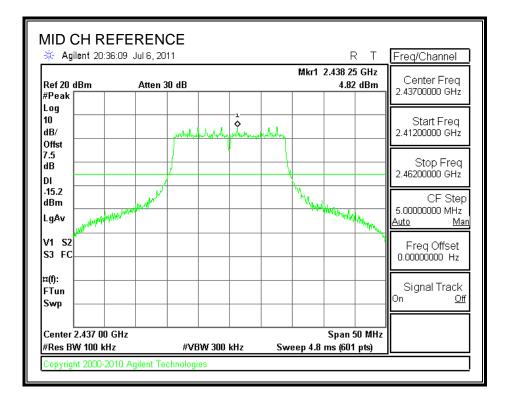
SPURIOUS EMISSIONS

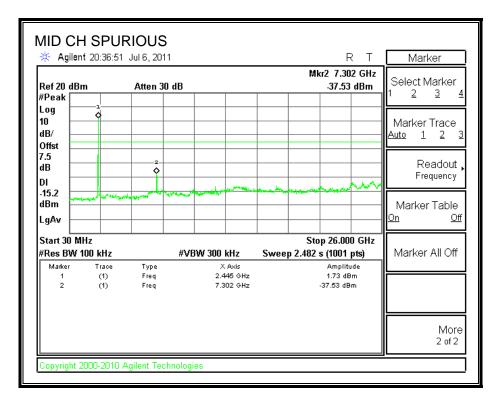




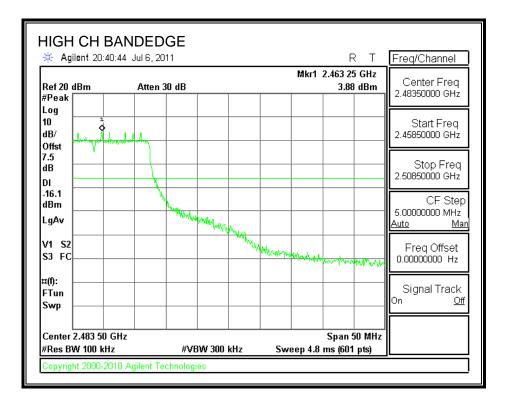
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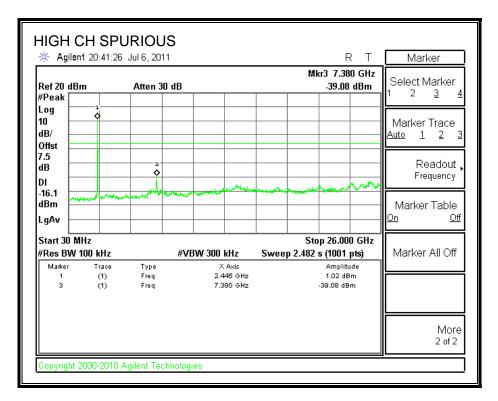
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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

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.

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

For 5.8 GHz band, 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.

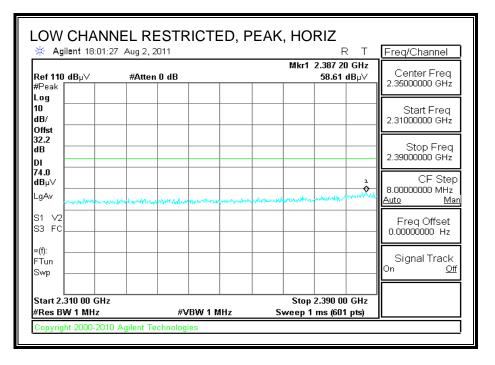
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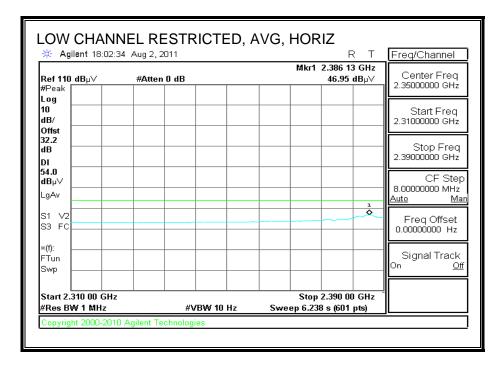
8.2. TRANSMITTER ABOVE 1 GHz

BOM VARIANT 1

8.2.1. 802.11b MODE IN THE 2.4 GHz BAND

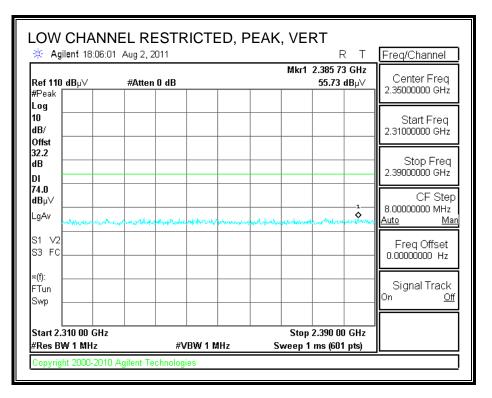
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

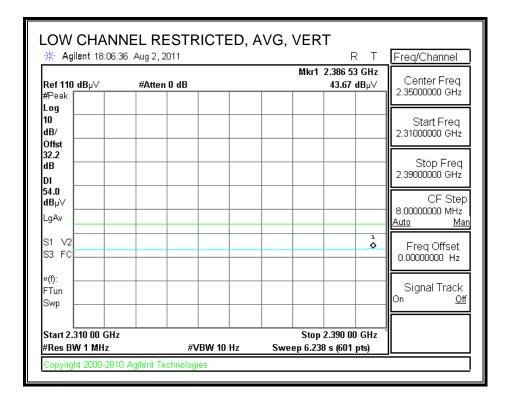




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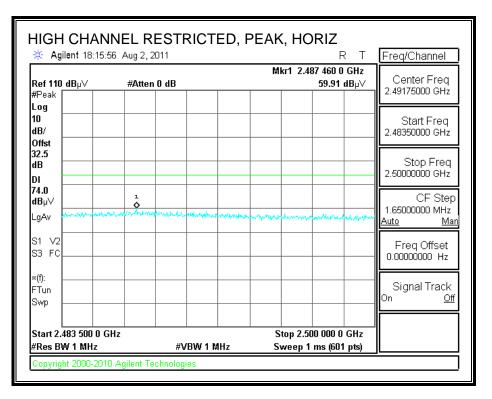
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

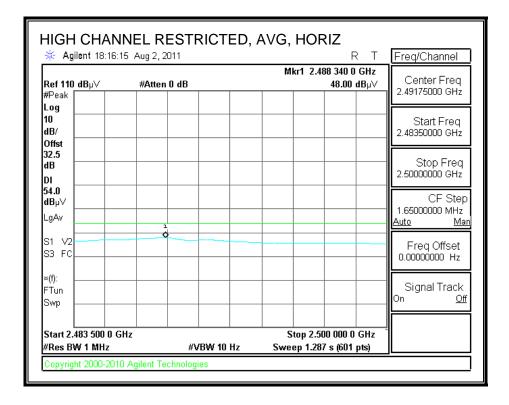




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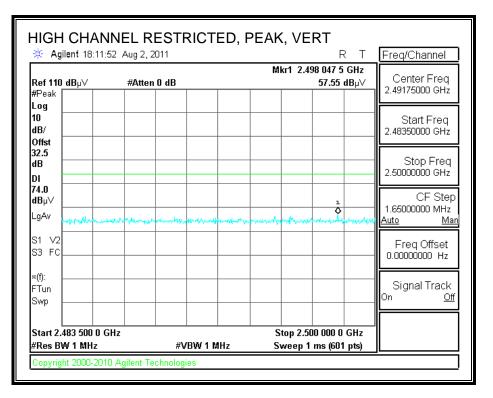
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

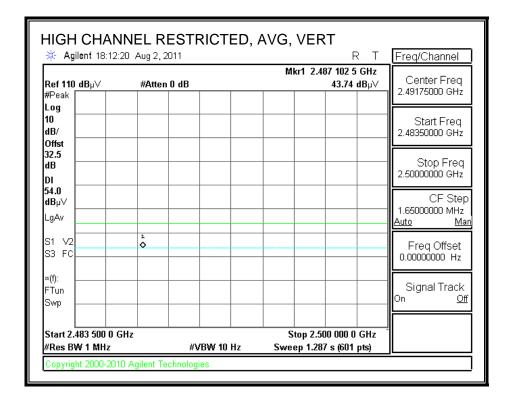




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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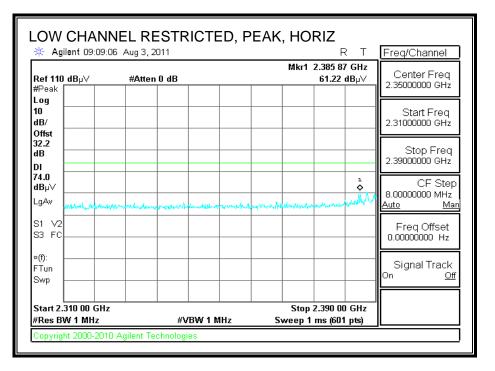
HARMONICS AND SPURIOUS EMISSIONS

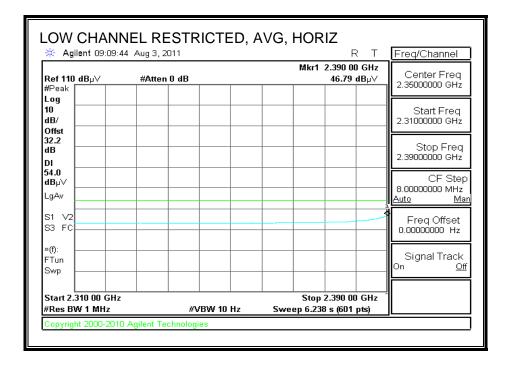
Test Engr Date: Project #:		Chin Pang 08-04-11 11U13896	:											
Company														
Test Targ	et:	FCC 15.24	7											
Mode Op	er:	TX, b mode BOM Vari												
	f	Measuremer	at Freque	ncy	Amp	Preamp (Gain			Average	Field Stren	gth Limit		
	Dist Distance to Antenna					Distance								
	Read Analyzer Reading					-		trength @		-	75. Average			
	AF	Antenna Fa	ctor		Peak	Calculate			ength	Margin v	rs. Peak Lii	nit		
CL Cable Loss					HPF	F High Pass Filter								
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Согт.	Limit	Margin	Ant. Pol.	Det.	Notes	
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP		
Low Ch, 2					0.10					10.5				
4.824	3.0	49.8	33.2	6.3	-34.8	0.0	0.0	54.4	74.0	-19.6	H	P		
4.824 4.824	3.0 3.0	47.6 49.3	33.2 33.2	6.3 6.3	-34.8 -34.8	0.0 0.0	0.0 0.0	52.2 53.9	54.0 74.0	-1.8 -20.1	H V	A P		
4.824 4.824	3.0	49.3 47.3	33.2	6.3	-34.8	0.0	0.0	53.9 52.0	74.0 54.0	-20.1	v V	A P		
			ļ								_			
Mid Ch, 2	••••••••••••••••••	· · · · · · · · · · · · · · · · · · ·			0.10									
4.874	3.0	49.2	33.2	6.3	-34.8	0.0	0.0	54.0	74.0	-20.0 -2.6	V	P		
4.874 7.311	3.0 3.0	46.6 37.3	33.2 36.2	6.3 8.5	-34.8	0.0 0.0	0.0 0.0	51.4 47.0	54.0 74.0	-2.6	V V	A P		
7.311	3.0	25.1	36.2	0.5 8.5	-34.9	0.0	0.0	34.9	74.0 54.0	-19.1	v V	A		
4.874	3.0	49.9	33.2	6.3	-34.8	0.0	0.0	54.6	74.0	-19.4	Ĥ	P		
4.874	3.0	47.3	33.2	6.3	-34.8	0.0	0.0	52.0	54.0	-2.0	H	A		
7.311	3.0	37.0	36.2	8.5	-34.9	0.0	0.0	46.8	74.0	-27.2	H	Р		
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	Н	A		
High Ch,	2462M	l Hz												
4.924	3.0	49.4	33.3	6.3	-34.8	0.0	0.0	54.2	74.0	-19.8	Н	Р		
4.924	3.0	46.9	33.3	6.3	-34.8	0.0	0.0	51.7	54.0	- 2.3	H	A		
7.386	3.0	37.4	36.3	8.5	-34.9	0.0	0.0	47.3	74.0	- 26.7	H	Р		
7.386	3.0	24.8	36.3	8.5	-34.9	0.0	0.0	34.7	54.0	-19.3	H	A		
4.924 4.924	3.0 3.0	49.5	33.3	6.3	-34.8	0.0	0.0	54.3	74.0 54.0	-19.7	V V	P		
4.924 7.386	3.0	47.2 37.0	33.3 36.3	6.3 8.5	-34.8 -34.9	0.0 0.0	0.0 0.0	52.1 46.9	54.U 74.0	-1.9 -27.1	v V	A P		
7.386	3.0	24.8	36.3	8.5	-34.9	0.0	0.0	34.7	54.0	-19.3	v	A		
			<u>.</u>								-			
_														
Rev. 4.1.2					_		_	_						
	other e	missions we	re detec	ted a	bove the	system r	noise f	floor.						

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8.2.2. 802.11g MODE IN THE 2.4 GHz BAND

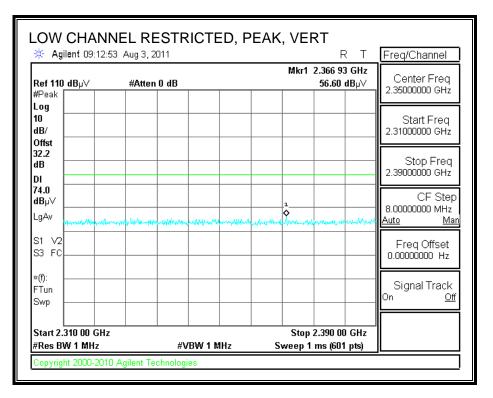
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

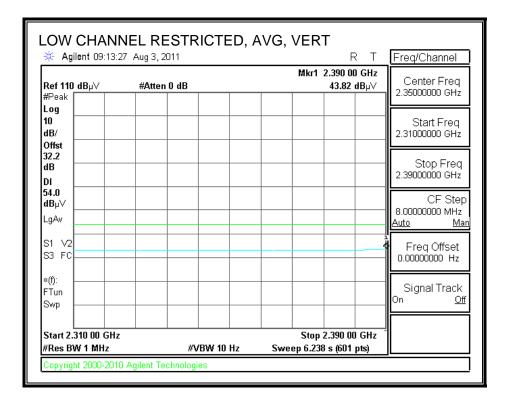




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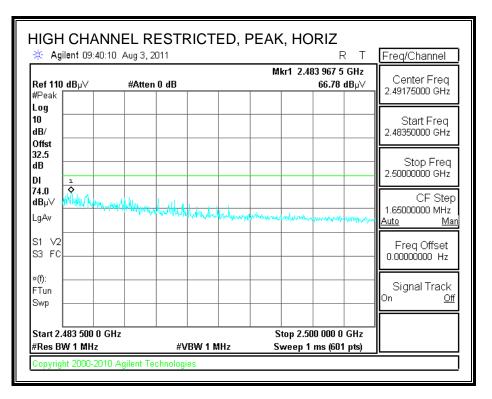
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

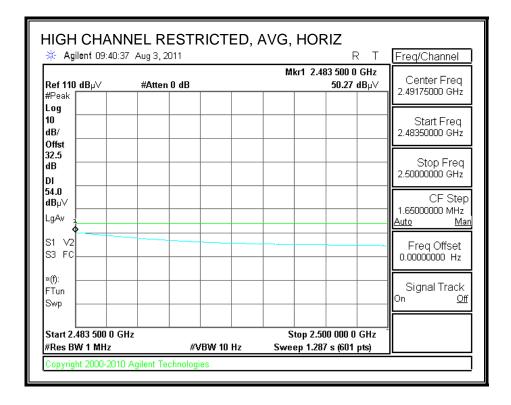




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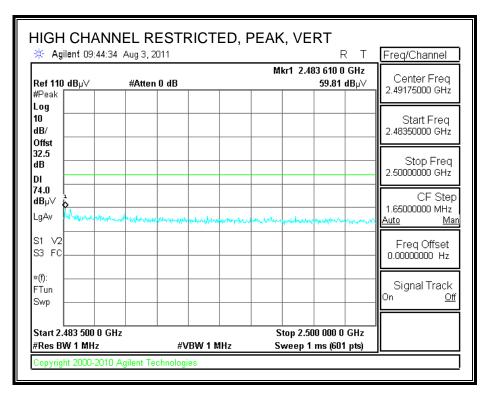
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

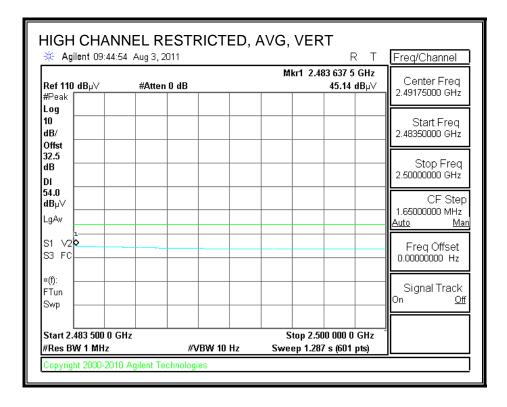




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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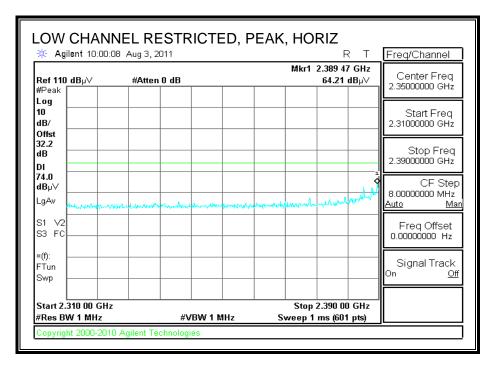
HARMONICS AND SPURIOUS EMISSIONS

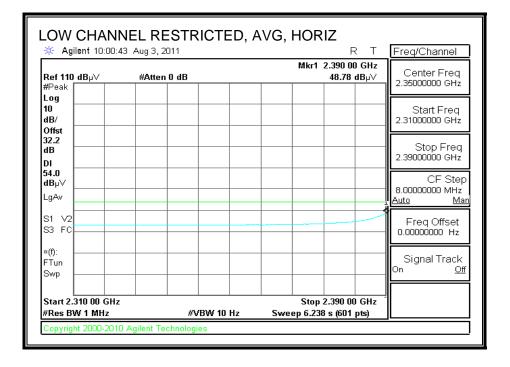
lency meas	sureme	nt											
n Services,	, Fremo	ont 5m Chan	nber										
Cest Engr:		Chin Pang	_										
Date: 08-04-11 Project #: 11U13896													
Company:		Apple											
est Target:		FCC 15.24	7										
lode Oper:		TX, g mode											
out opti		BOM Variar											
	f	irement Fre	• •		-	reamp Ga			-		ıgth Limit		
	Dist	ance to Ant				Correct to				eld Streng			
	Read		-		-	ield Stren;			-	vs. Avera	-		
	AF	ntenna Fact				Peak Fiel		ngth	Margi	n vs. Peal	: Limit		
	CL	Cable Loss			HPF	h Pass Fil	ter						
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Сћ, 2412М				ļ		ļ							
4.824	3.0	45.5	33.2	6.3	-34.8	0.0	0.0	50.1	74.0	-23.9	V	Р	
4.824	3.0	31.8	33.2	6.3	-34.8	0.0	0.0	36.4	54.0	-17.6	V.	A	
4.824	3.0 3.0	47.9 34.0	33.2 33.2	6.3 6.3	-34.8	0.0	0.0	52.6 38.7	74.0	-21.4	H H	P A	
4.824	J.U	34.0	33.2	0.3	-34.8	0.0	0.0	38./	54.0	-15.3	п	A	
сь, 2437M	Hz												
4.874	3.0	46.7	33.2	6.3	-34.8	0.0	0.0	51.4	74.0	-22.6	v	Р	
4.874	3.0	33.3	33.2	6.3	-34.8	0.0	0.0	38.0	54.0	-16.0	V	A	
7.311	3.0	38.2	36.2	8.5	-34.9	0.0	0.0	48.0	74.0	-26.0	V	Р	
7.311	3.0	25.0	36.2	8.5	-34.9	0.0	0.0	34.8	54.0	-19.2	V	A	
4.874	3.0	47.7	33.2	6.3	-34.8	0.0	0.0	52.5	74.0	-21.5	H	Р	
4.874	3.0	34.8	33.2	6.3	-34.8	0.0	0.0	39.5	54.0	-14.5	H	A	
7.311	3.0	38.0	36.2	8.5	-34.9	0.0	0.0	47.8	74.0	-26.2	H	P	
7.311	3.0	24.6	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
Ch, 2462N	1Hz												
4.924	3.0	42.4	33.3	6.3	-34.8	0.0	0.0	47.2	74.0	-26.8	v	Р	
4.924	3.0	30.0	33.3	6.3	-34.8	0.0	0.0	34.8	54.0	-19.2	V	A	
7.386	3.0	37.7	36.3	8.5	-34.9	0.0	0.0	47.5	74.0	-26.5	V	Р	
7.386	3.0	25.1	36.3	8.5	-34.9	0.0	0.0	35.0	54.0	- 19.0	V	A	
	3.0	42.4	33.3	6.3	-34.8	0.0	0.0	47.2	74.0	- 26.8	H	Р	
4.924		29.8	33.3	6.3	-34.8	0.0	0.0	34.6	54.0	-19.4	H	A	
4.924 4.924	3.0		36.3	8.5	-34.9	0.0	0.0	47.2 34.9	74.0 54.0	-26.8 -19.1	H H	P A	
4.924 4.924 7.386	3.0	37.3		0.5	: 34 C						н		
4.924 4.924		25.0	36.3	8.5	-34.9	0.0	0.0	J467	~ 70 V				

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8.2.3. 802.11n MODE IN THE 2.4 GHz BAND

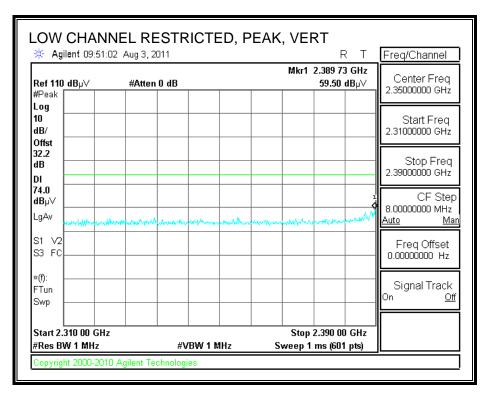
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

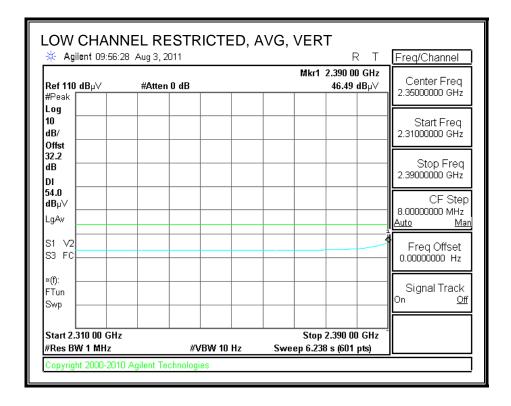




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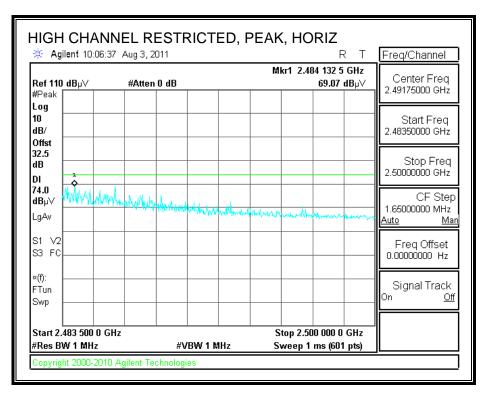
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

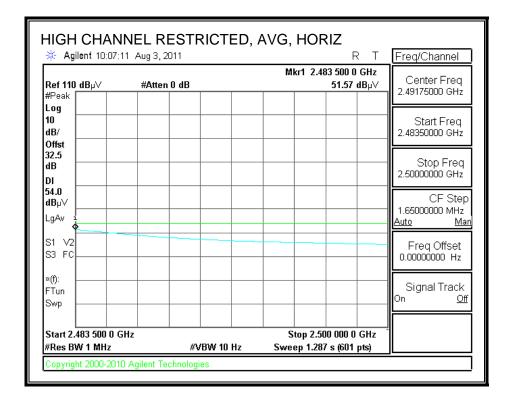




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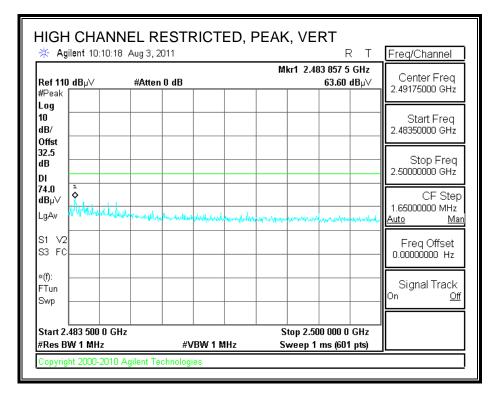
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

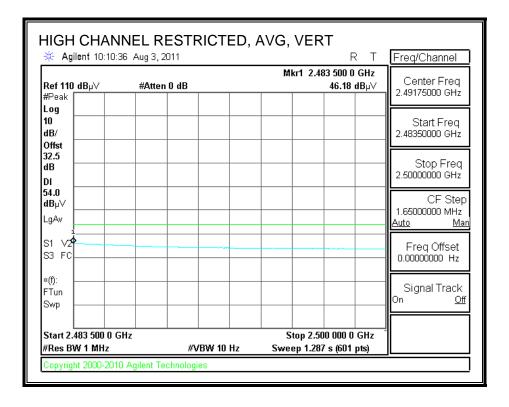




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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HARMONICS AND SPURIOUS EMISSIONS

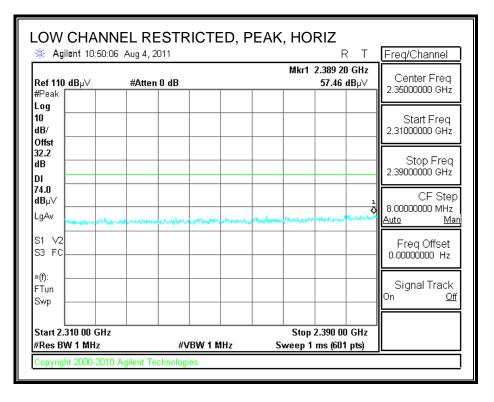
	et: er:	Apple FCC 15.247 TX, 802.11n BOM Varia											
	f Dist Read AF CL	Measurement Distance to A Analyzer Rea Antenna Fact Cable Loss	intenna ding	ÿ	Avg Peak	Calculate	Correc Field S d Peak	trength @ : Field Stre)3 m	Peak Fie Margin v	Field Stren; ld Strength s. Average s. Peak Lir	Limit Limit	
f	Dist	Read	AF	CL	HPF Amp	High Pas		Согт.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB		dBuV/m	۵B	V/H	P/A/QP	
Low Ch,	2412MH	lz.											
4.824	3.0	38.8	33.2	6.3	-34.8	0.0	0.0	43.5	74.0	-30.5	V	P	
1.824	3.0	26.3	33.2	6.3	-34.8	0.0	0.0	30.9	54.0	-23.1	<u>v</u>	A	
4.824 4.824	3.0	39.3 26.7	33.2 33.2	6.3 6.3	-34.8 -34.8	0.0 0.0	0.0 0.0	44.0 31.3	74.0 54.0	-30.0 -22.7	H H	P A	
Mid Ch, 2		1				0.0							
4.874	3.0	47.0	33.2	6.3	-34.8	0.0	0.0	51.7	74.0	-22.3	V	P	
4.874	3.0	33.3	33.2	6.3	-34.8	0.0	0.0	38.0	54.0	-16.0	V	<u>A</u>	
7.311	3.0	44.7	36.2	8.5 8.5	-34.9 -34.9	0.0	0.0	54.4	74.0 54.0	-19.6	V V	P	
7.311 4.874	3.0	33.3 48.6	36.2 33.2	6.3	-34.9	0.0 0.0	0.0 0.0	43.0 53.3	54.0 74.0	-11.0 -20.7	ч Н	A P	
4.874	3.0	35.1	33.2	6.3	-34.8	0.0	0.0	39.8	54.0	-14.2	H	Å	
7.311	3.0	39.7	36.2	8.5	-34.9	0.0	0.0	49.5	74.0	-24.5	H	P	
7.311	3.0	29.2	36.2	8.5	-34.9	0.0	0.0	39.0	54.0	-15.0	H	A	
High Ch,	2462M	Hz											
4.924	3.0	41.4	33.3	6.3	-34.8	0.0	0.0	46.2	74.0	- 27.8	V	P	
4.924	3.0	28.7	33.3	6.3	-34.8	0.0	0.0	33.5	54.0	-20.5	V	A	
7.386 7.386	3.0 3.0	37.6 24.7	36.3 36.3	8.5 8.5	-34.9 -34.9	0.0 0.0	0.0 0.0	47.5 34.6	74.0 54.0	-26.5 -19.4	v v	P A	
4.924	3.0	38.1	33.3	6.3	-34.9	0.0	0.0	34.0 42.9	54.0 74.0	-19.4	v H	P	
	3.0	25.5	33.3	6.3	-34.8	0.0	0.0	30.4	54.0	-23.7	H	Ā	
4.924		37.5	36.3	8.5	-34.9	0.0	0.0	47.4	74.0	-26.6	H	Р	
	3.0			8.5	-34.9	0.0	0.0	34.5	54.0	-19.5	H	A	
4.924 7.386 7.386	3.0 3.0	24.6	36.3	0.7				• • • • • • • • • • • • • • • • • • • •	••••••••••••••••••••••••••••••••				

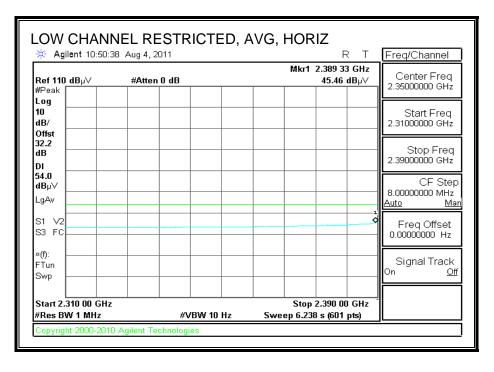
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BOM VARIANT 2

8.2.4. 802.11b MODE IN THE 2.4 GHz BAND

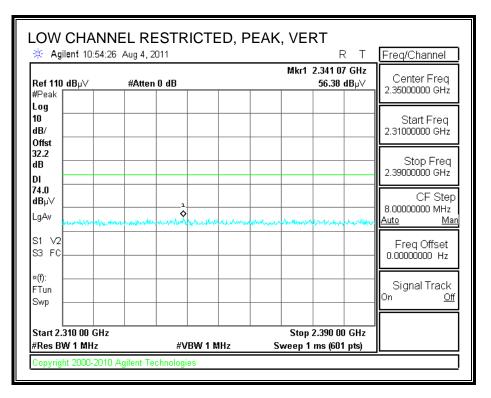
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

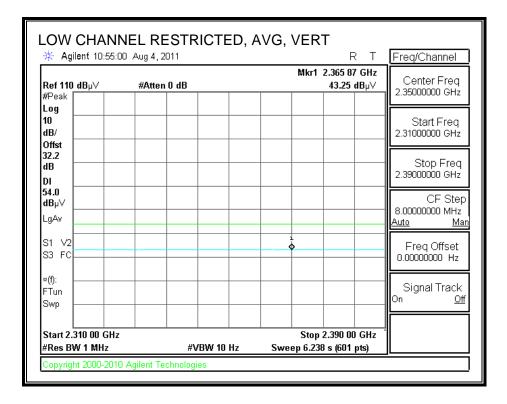




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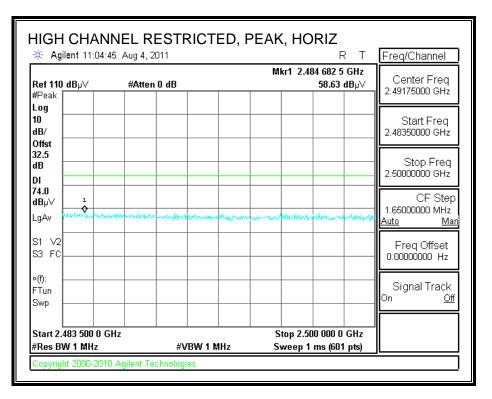
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

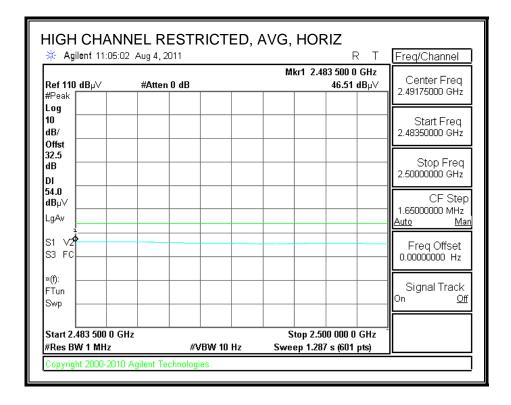




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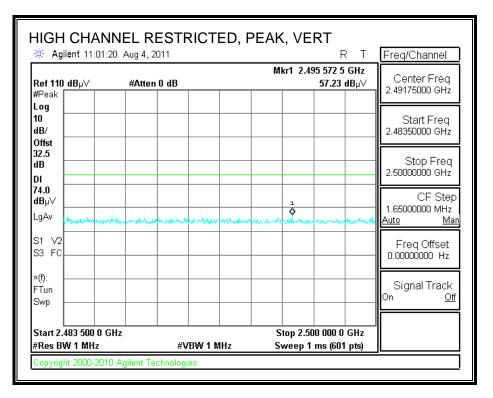
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

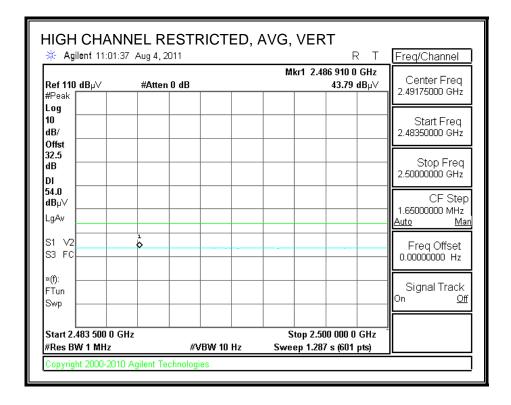




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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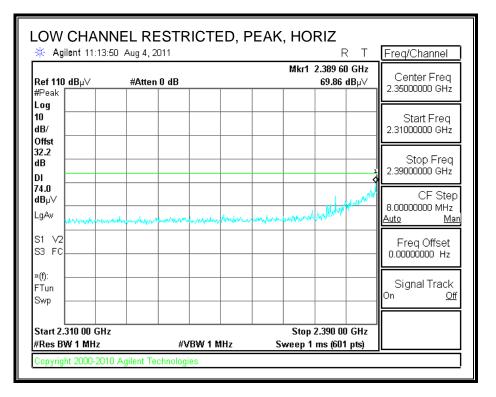
HARMONICS AND SPURIOUS EMISSIONS

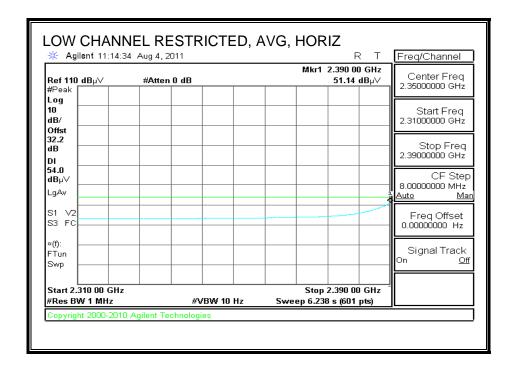
-		Measuremo tification S		Frem	ont 5m	Chamber	r						
Test Eng	•	Chin Pan	9										
Date:	•	08-04-11											
Project #													
Company		11U13896 Apple											
Test Targ													
Mode Op		FCC 15.24 b mode, T											
			.,										
	f	Measureme	ent Frequ	ency	Amp	Preamp (Gain			Average	Field Stren	gth Limit	
	Dist	Distance to	Antenn	a	D Corr	Distance	Correc	t to 3 me	ters	Peak Fie	ld Strength	Limit	
	Read	Analyzer F	-		Avg	Average	Field S	trength @	3 m	Margin	rs. Average	Limit	
	AF	Antenna F			Peak	Calculate	d Peak	Field Stre	ngth	Margin	rs. Peak Li	mit	
	CL	Cable Loss			HPF	High Pas	s Filter	:					
f	Dist	Read	AF	CL	Amp	D Corr		Corr.	Limit		Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch,		·····			ļ								
4.824	3.0	38.6	33.2	6.3	-34.8	0.0	0.0	43.2	74.0	-30.8	H	Р	
4.824	3.0	26.5	33.2	6.3	-34.8	0.0	0.0	31.1	54.0	-22.9	H	A	
4.824	3.0	37.8	33.2	6.3	-34.8	0.0	0.0	42.4	74.0	-31.6	V	P	
4.824	3.0	27.4	33.2	6.3	-34.8	0.0	0.0	32.0	54.0	-22.0	v	A	
Mid Ch,													
4.874	3.0	38.0	33.2	6.3	-34.8	0.0	0.0	42.7	74.0	-31.3	H	Р	
4.874	3.0	26.0	33.2	6.3	-34.8	0.0	0.0	30.8	54.0	-23.2	H	Ā	
7.311	3.0	37.3	36.2	8.5	-34.9	0.0	0.0	47.0	74.0	-27.0	H	Р	
7.311	3.0	24.7	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	H	A	
4.874	3.0	37.8	33.2	6.3	-34.8	0.0	0.0	42.5	74.0	-31.5	V	Р	
4.874	3.0	26.7	33.2	6.3	-34.8	0.0	0.0	31.4	54.0	-22.6	V	A	
7.311	3.0	36.7	36.2	8.5	-34.9	0.0	0.0	46.4	74.0	-27.6	V	Р	
7.311	3.0	24.6	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	V	A	
High Ch			32.2	63	340			40.7	7/0		TT		
4.924 4.924	3.0 3.0	37.7 25.3	33.3 33.3	6.3 6.3	-34.8 -34.8	0.0 0.0	0.0 0.0	42.5 30.2	74.0 54.0	-31.5 -23.8	H H	P A	
4.924 7.386	3.0	25.3 36.9	36.3	0.3 8.5	-34.8	0.0	0.0	30.2 46.8	54.0 74.0	-23.8	п Н	P P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
4.924	3.0	38.2	33.3	6.3	-34.8	0.0	0.0	43.0	74.0	-31.0	v	P	
4.924	3.0	27.8	33.3	6.3	-34.8	0.0	0.0	32.6	54.0	-21.4	v	Â	
7.386	3.0	36.7	36.3	8.5	-34.9	0.0	0.0	46.6	74.0	-27.4	V	Р	
7.386	3.0	24.5	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	
					ļ								
Rev. 4.1.2	2.7												
Note: No	other e	missions w	ere dete	cted :	above th	e system	noise	floor.					
						ř							

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8.2.5. 802.11g MODE IN THE 2.4 GHz BAND

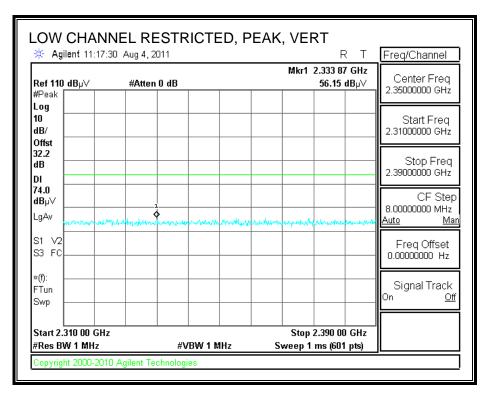
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

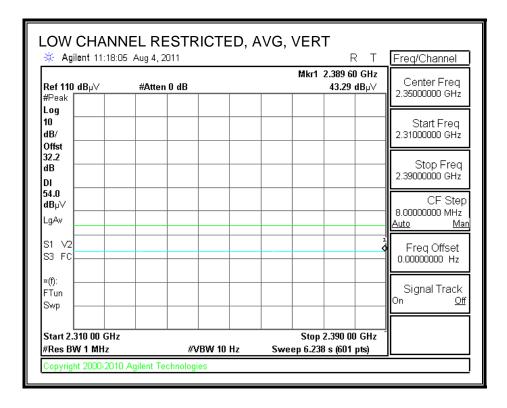




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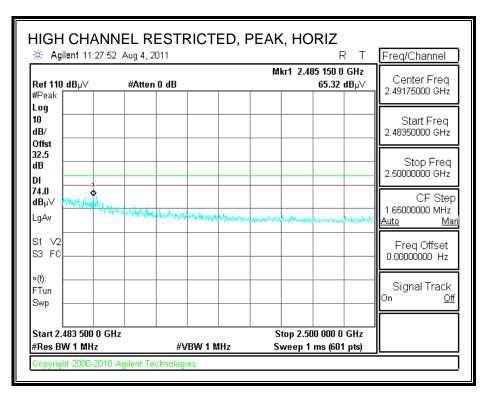
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

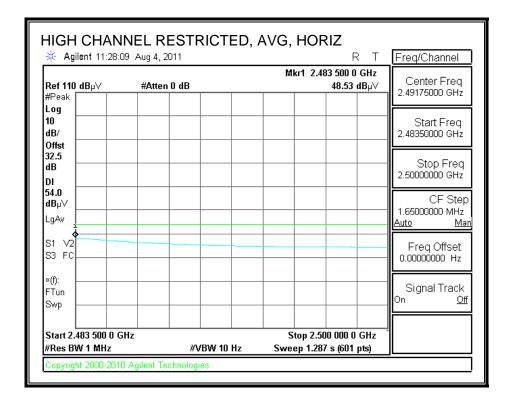




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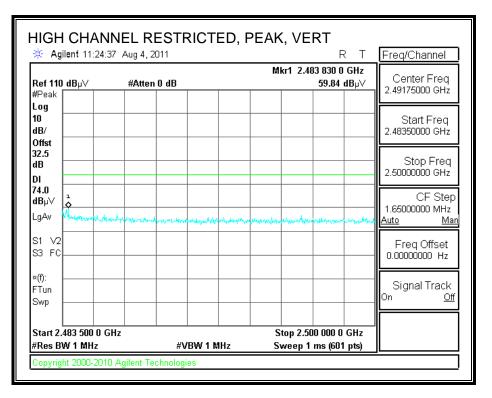
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

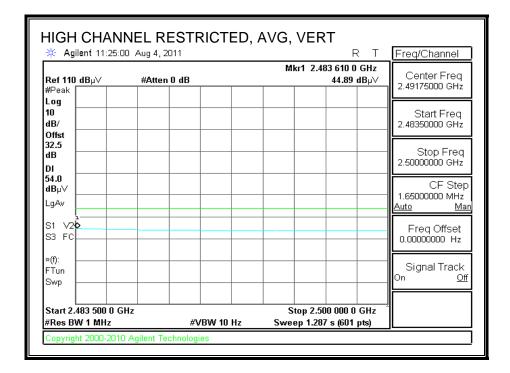




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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HARMONICS AND SPURIOUS EMISSIONS

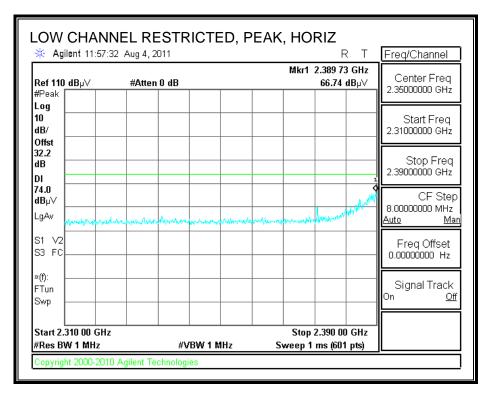
Fest Engr	•	Chin Par	ıg										
Date: 08-04-11 Project #: 11U13896 Company: Apple Test Target: FCC 15.247													
Test Targ													
Mode Op	er:	TX, g mod BOM Vai											
	f	Measurem	ent Freq	iency	Amp	Preamp (Gain			Average	Field Stren	gth Limit	
	Dist	Distance t		na		Distance					ld Strength		
	Read	Analyzer l	-		Avg	-		trength @	<i>,</i>	-	rs. Average		
	AF CL	Antenna F Cable Los:			Peak HPF	Calculate High Pas		: Field Str :	ength	Margin v	rs. Peak Lii	mit	
f	Dist	Read	AF	CL	Атр	D Corr		Corr.			Ant. Pol.	Det	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/n	dBuV/m	dB	V/H	P/A/QP	
Low Ch,													
4.824	3.0	38.1	33.2	6.3	-34.8	0.0	0.0	42.7	74.0	-31.3	V.	P	
4.824	3.0	25.6	33.2	6.3	-34.8	0.0	0.0	30.2	54.0 74.0	-23.8	V u	A	
4.824 4.824	3.0 3.0	37.9 25.5	33.2 33.2	6.3 6.3	-34.8 -34.8	0.0 0.0	0.0 0.0	42.5 30.2	74.0 54.0	-31.5 -23.8	H H	P A	
	3.0	£7.7	2.2.2	U.J	-346	0.0	0.0		2-hU	-4.3.0			
Mid Ch, 2	2437MH		•		1				•				
4.874	3.0	37.6	33.2	6.3	-34.8	0.0	0.0	42.4	74.0	-31.6	V	Р	
4.874	3.0	25.3	33.2	6.3	-34.8	0.0	0.0	30.0	54.0	-24.0	V	A	
7.311	3.0	36.8	36.2	8.5	-34.9	0.0	0.0	46.6	74.0	-27.4	V	P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	
4.874	3.0	36.8	33.2	6.3	-34.8	0.0	0.0	41.6	74.0	-32.4	H	P	
4.874	3.0	25.3	33.2	6.3	-34.8	0.0	0.0	30.0	54.0	-24.0	H	A	
7.311	3.0	36.8	36.2	8.5	-34.9	0.0	0.0	46.6	74.0	-27.4	H	P	
7.311	3.0	24.6	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
High Ch,	2462M	.i	-					-					
4.924	3.0	37.7	33.3	6.3	-34.8	0.0	0.0	42.5	74.0	-31.5	v	Р	
4.924	3.0	25.3	33.3	6.3	-34.8	0.0	0.0	30.1	54.0	-23.9	v	Ā	
7.386	3.0	36.5	36.3	8.5	-34.9	0.0	0.0	46.4	74.0	-27.6	V	P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	- 19.7	V	A	
4.924	3.0	38.2	33.3	6.3	-34.8	0.0	0.0	43.0	74.0	- 31.0	H	P	
4.924	3.0	25.3	33.3	6.3	-34.8	0.0	0.0	30.1	54.0	-23.9	H	A	
7.386	3.0	36.8	36.3	8.5	-34.9	0.0	0.0	46.7	74.0	-27.3	H	P	
7.386	3.0	24.3	36.3	8.5	-34.9	0.0	0.0	34.2	54.0	-19.8	H	A	
D 413	:				:	1				1			
Rev. 4.1.2								e floor.					

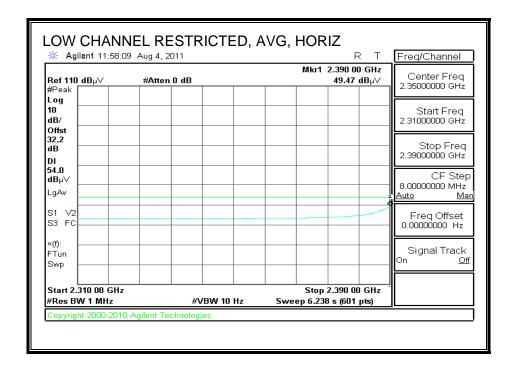
COMPLIANCE CERTIFICATION SERVICES (UL CCS)FORM NO: CCSUP4701D47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of UL CCS.

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8.2.6. 802.11n MODE IN THE 2.4 GHz BAND

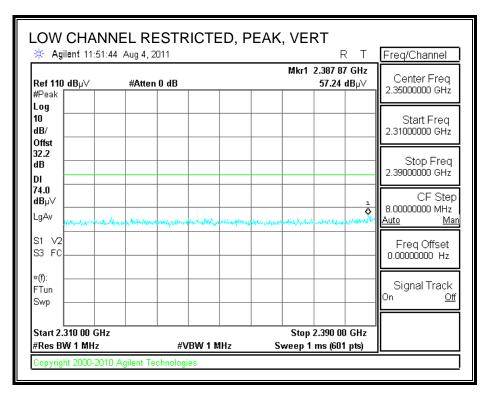
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

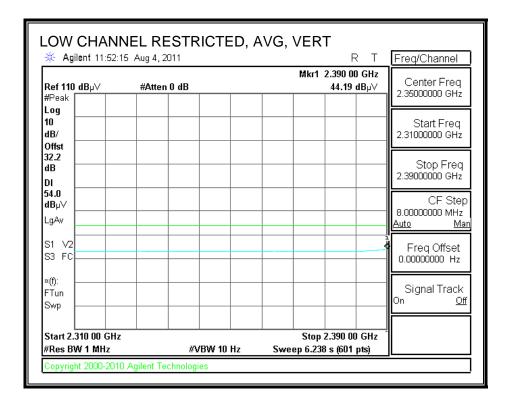




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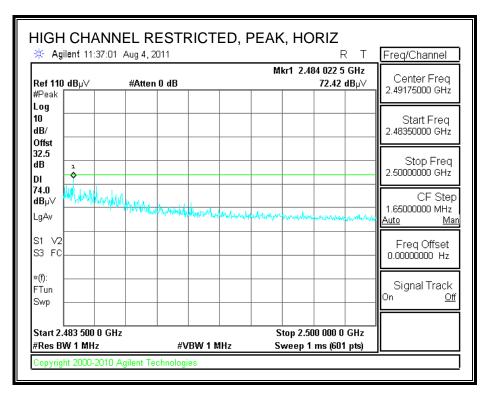
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

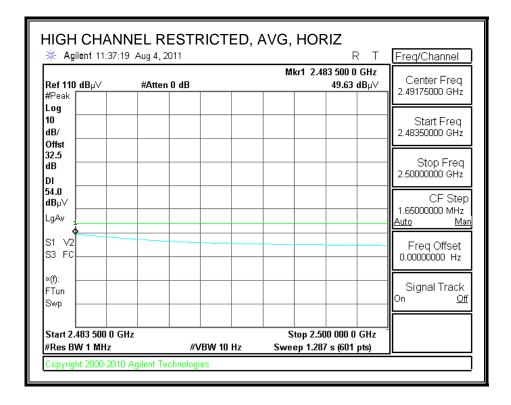




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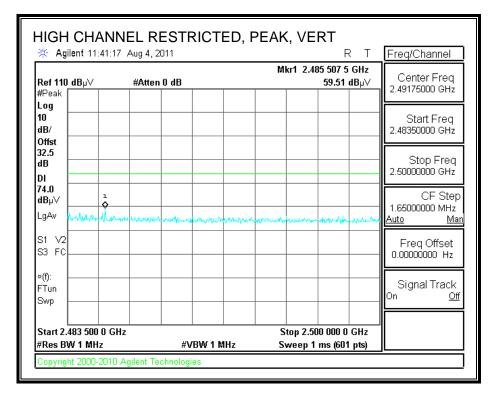
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

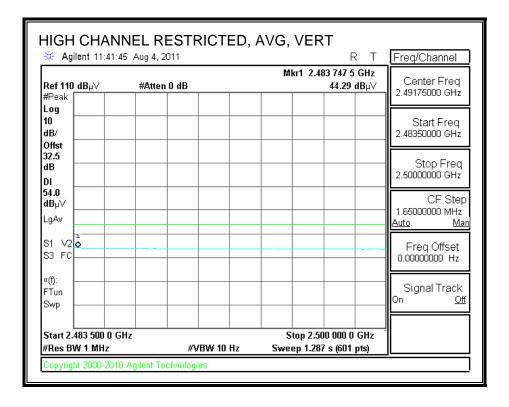




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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HARMONICS AND SPURIOUS EMISSIONS

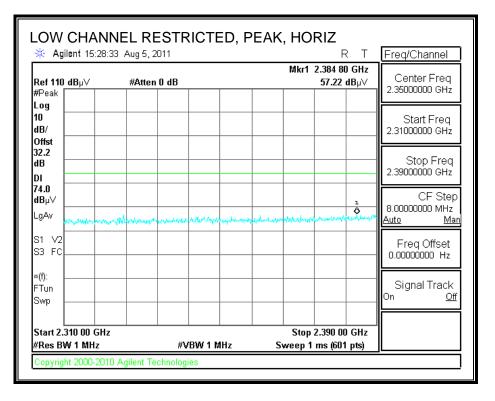
-													
Test Engr		Chin Pa	•										
Date:		08-04-11											
Project #		11U1389	6										
Company		Apple											
Test Targ		FCC 15.2											
Mode Op	er:	TX, 802.1 BOM Va											
	f	Measuren	ant Freq	uency	Amp	Preamp (Gain			Average	Field Stren	gth Limit	
	Dist	Distance [·]	to Anten	na	D Corr	Distance	Correc	ct to 3 me	ters	Peak Fie	ld Strength	Limit	
	Read	Analyzer	Reading		Avg	Average	Field S	trength @	3 m	Margin v	rs. Average	Limit	
	AF	Antenna			Peak	Calculate	d Peal	r Field Str	ength	Margin v	rs. Peak Li	mit	
	CL	Cable Los	is		HPF	High Pas	s Filter	r					
f	Dist	Read	AF	CL	Amp	D Corr		1	Limit		Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch, 1		~~~~~											
4.824	3.0	37.5	33.2	6.3	-34.8	0.0	0.0	42.1	74.0	-31.9	H	Р	
4.824	3.0	24.8	33.2	6.3	-34.8	0.0	0.0	29.4	54.0	-24.6	H	A	
4.824	3.0	37.2	33.2	6.3	-34.8	0.0	0.0	41.8	74.0	-32.2	V	Р	
4.824	3.0	24.8	33.2	6.3	-34.8	0.0	0.0	29.4	54.0	-24.6	v	A	
Mid Ch, 2		-											
4.874	3.0	37.3	33.2	6.3	-34.8	0.0	0.0	42.1	74.0	-31.9	н	Р	
4.874	3.0	25.4	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	H	Å	
7.311	3.0	37.2	36.2	8.5	-34.9	0.0	0.0	47.0	74.0	-27.0	H	P	
7.311	3.0	24.7	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	H	A	
4.874	3.0	39.5	33.2	6.3	-34.8	0.0	0.0	44.2	74.0	-29.8	V	Р	
4.874	3.0	25.4	33.2	6.3	-34.8	0.0	0.0	30.1	54.0	- 23.9	V	A	
7.311	3.0	37.5	36.2	8.5	-34.9	0.0	0.0	47.2	74.0	-26.8	V	P	
7.311	3.0	24.7	36.2	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	V	A	
		<u></u>										ļ	
High Ch,		· · · · · · · · · · · · · · · · · · ·							.				
4.924	3.0	37.7	33.3	6.3	-34.8	0.0	0.0	42.5	74.0	-31.5	H	P	
4.924	3.0	25.4	33.3	6.3	-34.8	0.0	0.0	30.2	54.0 74.0	-23.8	H	A	
7.386 7.386	3.0 3.0	36.8 24.5	36.3 36.3	8.5 8.5	-34.9 -34.9	0.0 0.0	0.0 0.0	46.7	74.0 54.0	-27.3	H H	P A	
7.380 4.924	3.0	24.5 38.6	33.3	8.5 6.3	-34.9	0.0	0.0 0.0	34.4 43.4	54.0 74.0	-19.6 -30.6	л V	A P	
4.924 4.924	3.0	38.0 25.5	33.3	6.3	-34.8	0.0	0.0	43.4	74.0 54.0	-30.0 -23.7	v V	P A	
7.386	3.0	36.7	36.3	8.5	-34.9	0.0	0.0	46.6	54.0 74.0	-27.4	v	P	
7.386	3.0	24.5	36.3	8.5	-34.9	0.0	0.0	34.4	54.0	-19.6	v	Ā	
											•		

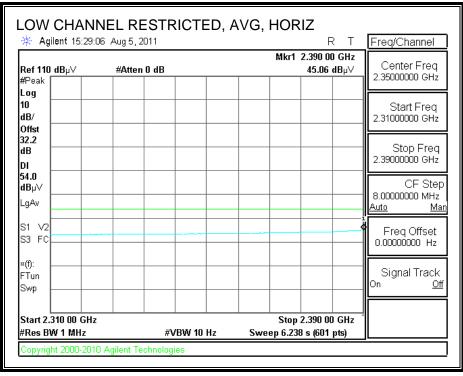
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BOM VARIANT 3

8.2.7. 802.11b MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



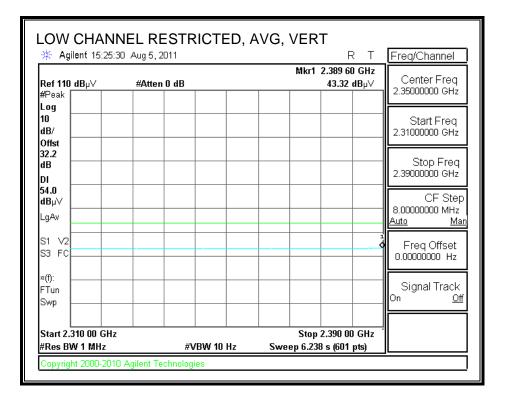


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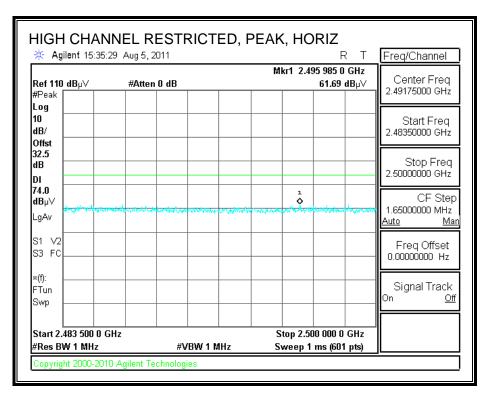
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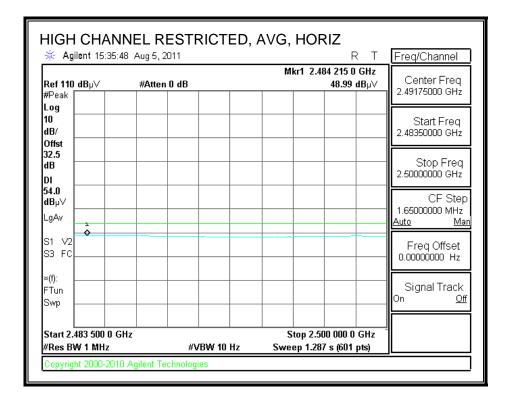
):					0.000000000 Hz Signal Track
1 V2	alla ferran and an	ferst W/VI.Wardanakhritaran	and a second	alu-antoina that a	Freq Offset
I.0 3μ∨ 1Av	1				CF Ste 8.0000000 MHz
8.2 B					Stop Freq 2.3900000 GHz
0g) 3/					Start Freq 2.31000000 GHz
ef110 dBµ∨ [⊃] eak	#Atten 0 dB		50	6.80 dBµ∨	Center Freq 2.35000000 GHz



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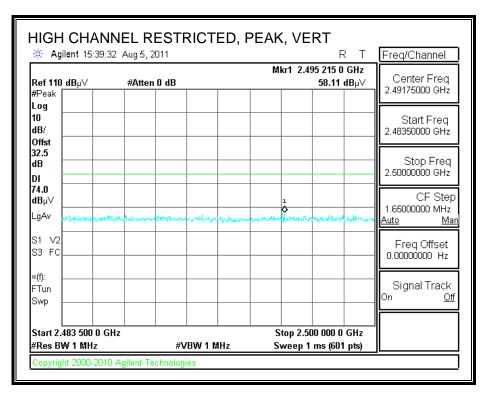
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

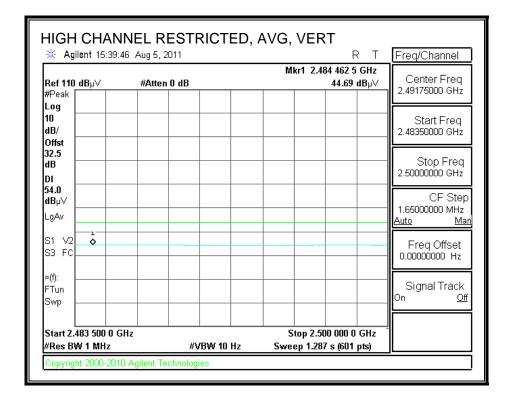




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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HARMONICS AND SPURIOUS EMISSIONS

Lest Engr: Chin Pang 08-05-11 Project #: 11/013956 Company: Apple Lest Target: Foc 15.247 Mode Oper: Bronde, TX BOM Variant 3 f Measurement Frequency Dist Distance to Antenna Read Antgrave Reading Antyzer Reading Area Array area Analyzer Reading Area Array area Average Field Strength (b) 3 m Average Field Strength Limit Peak Field Strength Limit f Measurement Frequency CL Arg Average Field Strength (b) 3 m Average Limit Margin vs. Average Limit AF Antenna Factor CL Peak Calculated Peak Field Strength Margin vs. Average Limit Margin vs. Peak Limit f Dist Read AF CL Amp D Corr Time Corr. Limit Margin vs. Average Limit diate dB dB dB dB dB dB Margin vs. Verage Limit Margin vs. Peak Limit f Dist Read AfF CL Amp D Corr Time Margin vs. Verage Limit k324 3.0 45.1 33.2 6.3 34.8 0.0 0.0 46.6 74.0 27.2	-		Measureme tification Se		Fremo	nt 5m (hamber							
Date: 98-96-11 Project #: 11U13896 Company: Apple Test Target: Fc: 15.247 Mode Oper: BonWariant 3 f Measurement Frequency Amp Preamp Gain Average Field Strength Limit Read Analyzer Reading Arg Arg Average Field Strength Limit Margin vs. Average Limit Read Analyzer Reading Arg Arg Average Field Strength Limit Margin vs. Average Limit CL Cable Loss HPF High Pass Filter Arg Arg Average Field Strength Margin vs. Peak Limit f Dist Read AB CL Amp D Corr Fits Corr. Limit Margin vs. Neakage Notes f Dist Read AF CL Amp D Corr Fits Corr. Limit Margin vs. Neakage Notes d242 3.0 37.7 33.2 6.3 -34.8 0.0 0.0 46.3 74.0 -27.2 V P 4824 3.0 34.8 0.0 0.0 <th>-</th> <th></th>	-													
Project #: 11U13896 Company: Apple Test Target: Fee 15:247 Mode Oper: B mode, TX BOM Variant 3 Preamp Gain Average Field Strength Limit Dist Distance to Antenna D Ocor Distance Correct to 3 meters Average Field Strength Limit Read Analyzer Reading Average Field Strength $@ 3$ m Margin vs. Average Limit Margin vs. Peak Limit CL Calculated Peak Field Strength $@ 3$ m Margin vs. Peak Limit Peak Field Strength Limit CL Calculated Peak Field Strength $@ 3$ m Margin vs. Peak Limit Peak Limit CL Calculated Peak Field Strength $@ 3$ m Margin vs. Peak Limit Peak GHz Obst Read AB AB BB BB BW/m BuV/m Margin vs. Peak Limit Low Ch, 2412MHz Image Image Image Image Image Image K624 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 46.8 74.0 -23.0 H P Low Ch, 2412MHz Image Image Image Image	-		-	5										
Company: Apple Test Target: Ker IS.247 Boode, TX Boode, TX BOM Variant 3 Annow Preamp Gain Average Field Strength Limit Dist Distance to Antenna Ang Preamp Gain Average Field Strength Limit Read Analyzer Reading Arg Arg Average Field Strength Limit Margin vs. Average Limit Read Analyzer Reading Arg Arg Arg Arg Arg Arge Arge Viewage Field Strength Limit Margin vs. Average Limit CL Cable Loss HPF High Pass Filter Margin vs. Peak Limit Margin vs. Peak Limit Low Ch, 2412MHz Image AB AB D Corr Thr Corr. Limit Margin vs. Peak Limit 4824 3.0 41.4 33.2 6.3 -34.8 0.0 0.0 46.0 71.0 Y A 4824 3.0 41.4 33.2 6.3 -34.8 0.0 0.0 46.0 11.7 V A														
Test Target: Fc 15.247 Mode Oper: B mode, TX BOW Variant 3 f Measurement Frequency Dist Amp Dist Preamp Gain D Corr Average Field Strength Limit D Corr Average Field Strength Limit Peak Field Strength Limit Margin vs. Average Limit Read Analyzer Reading AF Antenna Factor Peak Cabculated Peak Field Strength Margin vs. Average Limit f Dist Read AF CL Amp CL D Corr Limit Margin vs. Average Limit f Dist Read AF CL Amp B BB D Corr Limit Margin vs. Average Limit f Dist Read AF CL Amp B BB D Corr Limit Margin vs. Average Limit f Dist Read AF CL Amp B BB D Corr Limit Margin vs. Peak Limit f Dist Read AF CL Amp B B D Corr Limit Margin vs. Peak Limit f Oto AF O Corr Margin vs. Average Limit Notes f Oto AF CL Amp Oto Corr Limit <th>-</th> <th></th>	-													
Brode, TX BOM Variant 3 f Measurement Frequency Dist Amp Distance to Antenna Area Analyzer Reading AF Amp Antenna Factor Cabulated Peak Antenna Factor Cabulated Site and Site an														
BOM Variant 3 f Measurement Frequency Dist Amp Distance to Antenna Read Preamp Analyzer Reading Analyzer Reading AF Amp Antenna Factor Cable Loss Preamp D Corr Hug Distance Correct to 3 meters Average Field Strength @ 3 m Average Field Strength @ 3 m Average Field Strength Average Limit Margin vs. Average Limit Margin vs. Average Limit f Dist Read AF CL Margin VS. Average Limit Margin vs. Average Limit f Dist Read AF CL Margin VS. Peak Limit Margin vs. Peak Limit f Dist Read AF CL Margin VS. Verage Field Strength Margin vs. Peak Limit f Onto dBu V DB DB D Corr BB Eds Corr Limit MBuV/m dBuV/m Margin vs. Peak Limit 4824 3.0 42.1 33.2 6.3 34.8 0.0 0.0 46.8 74.0 -27.2 V P 4824 3.0 34.1 33.2 6.3 34.8 0.0 0.0 46.3 74.0 -28.6 V P 4824	-													
Dist Distance to Antenna D Corr Distance Correct to 3 meters Peak Field Strength Limit Arabyzer Reading Avg Avgrage Field Strength @ 3 m Margin vs. Average Limit Margin vs. Average Limit AF Antenna Factor Peak Calculated Peak Field Strength Margin vs. Average Limit Margin vs. Average Limit f Dist Read AF CL Amg Door Fitz Corr. Limit Margin vs. Average Limit Margin vs. Peak Limit f Dist (m) dB/m dB DO Corr Fitz Corr. Limit Margin vs. Peak Limit Margin vs. Peak Limit 4824 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 46.8 74.0 -27.2 V P 4824 3.0 35.7 33.2 6.3 -34.8 0.0 0.0 46.0 -13.7 H A 4824 3.0 45.7 33.2 6.3 -34.8 0.0 0.0 46.9 54.0 -7.1 </th <th>mode Op</th> <th>er:</th> <th></th>	mode Op	er:												
Read AF CL Analyzer Reading Atema Factor CL Avg Antema Factor Cable Loss Avg Peak HPF Average Field Strength @ 3 m Cable Cabe Field Strength Margin vs. Average Limit Margin vs. Peak Limit f Dist Cm Read BbwV AF BbwV CL Amp BbwV D Corr BB File Limit Margin vs. Average Limit Margin vs. Peak Limit f Dist Cm Read BbwV AF BB CL Amp BB D Corr BB File Limit Margin vs. Average Limit f Dist Cm Read (m) AF BB CL Amp BB D Corr BB File Limit Margin vs. Average Limit ds24 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 46.8 74.0 -27.2 V P 4824 3.0 31.7 33.2 6.3 -34.8 0.0 0.0 46.3 74.0 -23.6 V P 4824 3.0 45.7 33.2 6.3 -34.8 0.0 0.0 46.9 54.0 -7.1 V A <tr< td=""><td></td><td>f</td><td>Measuremer</td><td>nt Freque</td><td>ncy</td><td>Amp</td><td>Preamp (</td><td>Gain</td><td></td><td></td><td>Average</td><td>Field Stren</td><td>gth Limit</td><td></td></tr<>		f	Measuremer	nt Freque	ncy	Amp	Preamp (Gain			Average	Field Stren	gth Limit	
AF CL Antenna Factor Cabe Loss Peak HPF Calculated Peak Field Strength High Pass Filter Margin vs. Peak Limit f Dist CHz Read (m) AF BBuV CL Anp AB D Corr BB Filter Margin vs. Peak Limit f Dist (m) Read BBuV AF BB CL Anp AB D Corr BB Limit AB Margin vs. Peak Limit Low Ch, 2412MHz Image		Dist	Distance to	Antenna	L	$D\operatorname{Corr}$	Distance	Correc	rt to 3 me	ters	Peak Fie	ld Strength	Limit	
CL Cable Loss HPF High Pass Filter f Dist (m) Read dB/m AF dB CL dB Amp dB D Corr dB Fitr dB Corr. dB Limit dB Margin dB Ant. Pol. Det. B Det. P/A/QP Notes Low Ch, 2412MHz -		Read	Analyzer Ro	eading		Avg	Average	Field S	trength @	3 m	Margin v	75. Average	Limit	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				ctor						ength	Margin v	rs. Peak Lii	mit	
CHz (m) dB/m dB dB dB dB dB dB dB V/m dB V/H P/A/QP Low Ch, 2412MHz 30. 42.1 33.2 6.3 -34.8 0.0 0.0 46.8 74.0 -27.2 V P 4.824 3.0 37.7 33.2 6.3 -34.8 0.0 0.0 42.3 54.0 -11.7 V A 4.824 3.0 31.4 3.34.8 0.0 0.0 46.0 74.0 -28.0 H P 4.824 3.0 35.7 33.2 6.3 -34.8 0.0 0.0 46.0 74.0 -23.6 V P 4.874 3.0 45.7 33.2 6.3 -34.8 0.0 0.0 46.9 54.0 -7.1 V A 7.311 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 47.0 -26.2 H P		CL	Cable Loss			HPF	High Pas	s Filter	:					
Low Ch, 2412MHz C 4.824 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 46.8 74.0 -27.2 V P 4.824 3.0 37.7 33.2 6.3 -34.8 0.0 0.0 42.3 54.0 -11.7 V A 4.824 3.0 41.4 33.2 6.3 -34.8 0.0 0.0 46.0 74.0 -28.0 H P 4.824 3.0 35.7 33.2 6.3 -34.8 0.0 0.0 46.0 74.0 -28.0 H P 4.824 3.0 35.7 33.2 6.3 -34.8 0.0 0.0 40.3 54.0 -13.7 H A Mid Ch, 2437MHz - <td></td> <td>Notes</td>														Notes
4.824 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 46.8 74.0 -27.2 V P 4.824 3.0 37.7 33.2 6.3 -34.8 0.0 0.0 42.3 54.0 -11.7 V A 4.824 3.0 41.4 33.2 6.3 -34.8 0.0 0.0 46.0 74.0 -28.0 H P 4.824 3.0 35.7 33.2 6.3 -34.8 0.0 0.0 46.0 74.0 -28.0 H P 4.824 3.0 45.7 33.2 6.3 -34.8 0.0 0.0 40.3 54.0 -13.7 H A Mid Ch, 2437MHz				dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
4.824 3.0 37.7 33.2 6.3 -34.8 0.0 0.0 42.3 54.0 -11.7 V A 4.824 3.0 41.4 33.2 6.3 -34.8 0.0 0.0 46.0 74.0 -28.0 H P 4.824 3.0 35.7 33.2 6.3 -34.8 0.0 0.0 40.3 54.0 -13.7 H A 4.824 3.0 45.7 33.2 6.3 -34.8 0.0 0.0 40.3 54.0 -13.7 H A 4.874 3.0 45.7 33.2 6.3 -34.8 0.0 0.0 50.4 74.0 -23.6 V P 4.874 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 48.2 74.0 -23.6 V P 7.311 3.0 38.4 36.2 8.5 -34.9 0.0 0.0 43.4 54.0 -10.6 H A 7.311 3.0 38.6 33.2 6.3 -34.8			· · · · · · · · · · · · · · · · · · ·			ļ <u>.</u>	ļ							
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Mid Ch, 2437MHz Image: Solution of the second system of the second			•		o	*	¢	þ			· • · · · · · · · · · · · · · · · · · ·	¢		
4.874 3.0 45.7 33.2 6.3 -34.8 0.0 0.0 50.4 74.0 -23.6 V P 4.874 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 46.9 54.0 -7.1 V A 7.311 3.0 38.4 36.2 8.5 -34.9 0.0 0.0 48.2 74.0 -25.8 V P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 48.2 74.0 -25.8 V P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 43.5 54.0 -19.5 V A 4.874 3.0 43.1 33.2 6.3 -34.8 0.0 0.0 43.4 54.0 -10.6 H A 7.311 3.0 38.1 36.2 8.5 -34.9 0.0 0.0 43.4 54.0 -19.6 H A 7.311 3.0 24.7 36.2 8.5 -34.9								0.0		~ 769	-1.3.1	**		
4.874 3.0 45.7 33.2 6.3 -34.8 0.0 50.4 74.0 -23.6 V P 4.874 3.0 42.1 33.2 6.3 -34.8 0.0 0.0 46.9 54.0 -7.1 V A 7.311 3.0 38.4 36.2 8.5 -34.9 0.0 0.0 48.2 74.0 -25.8 V P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 48.2 74.0 -25.8 V P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 48.2 74.0 -26.2 H P 4.874 3.0 38.6 33.2 6.3 -34.8 0.0 0.0 43.4 54.0 -10.6 H A 7.311 3.0 38.1 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0	Mid Ch.	2437MH	z			<u></u>		•••••			÷	•		
7.311 3.0 38.4 36.2 8.5 -34.9 0.0 0.0 48.2 74.0 -25.8 V P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 34.5 54.0 -19.5 V A 4.874 3.0 43.1 33.2 6.3 -34.8 0.0 0.0 47.8 74.0 -26.2 H P 4.874 3.0 38.6 33.2 6.3 -34.8 0.0 0.0 43.4 54.0 -10.6 H A 7.311 3.0 38.1 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 38.1 36.2 8.5 -34.9 0.0 $0.47.8$ 74.0 -26.2 H P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 54.0 -19.6 H A High Ch, 2462MHz 3.0 47.9 33				33.2	6.3	-34.8	0.0	0.0	50.4	74.0	-23.6	V	P	
7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 34.5 54.0 -19.5 V A 4.874 3.0 43.1 33.2 6.3 -34.8 0.0 0.0 47.8 74.0 -26.2 H P 4.874 3.0 38.6 33.2 6.3 -34.8 0.0 0.0 43.4 54.0 -10.6 H A 7.311 3.0 38.1 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 38.1 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 34.4 54.0 -19.6 H A 7.311 3.0 24.7 36.3 6.3 -34.8 0.0 0.0 54.0 -19.6 H A High Ch, 2462MHz 3.0 <td< td=""><td>4.874</td><td>3.0</td><td>42.1</td><td>33.2</td><td>6.3</td><td>-34.8</td><td>0.0</td><td>0.0</td><td>46.9</td><td>54.0</td><td>-7.1</td><td>V</td><td>A</td><td></td></td<>	4.874	3.0	42.1	33.2	6.3	-34.8	0.0	0.0	46.9	54.0	-7.1	V	A	
4.874 3.0 43.1 33.2 6.3 -34.8 0.0 0.0 47.8 74.0 -26.2 H P 4.874 3.0 38.6 33.2 6.3 -34.8 0.0 0.0 43.4 54.0 -10.6 H A 7.311 3.0 38.1 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 34.4 54.0 -19.6 H A High Ch, 2462MHz	7.311		• • • • • • • • • • • • • • • • • • • •	36.2	8.5	-34.9	0.0	þ	48.2		·	\$	·····	
4.874 3.0 38.6 33.2 6.3 -34.8 0.0 0.0 43.4 54.0 -10.6 H A 7.311 3.0 38.1 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 34.4 54.0 -19.6 H A High Ch, 2462MHz			• • • • • • • • • • • • • • • • • • • •		¢	¢	¢	þ			• • • • • • • • • • • • • • • • • • • •	¢		
7.311 3.0 38.1 36.2 8.5 -34.9 0.0 0.0 47.8 74.0 -26.2 H P 7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 34.4 54.0 -19.6 H A High Ch, 2462MHz			•		\$	*	¢	þ			·	\$	·····	
7.311 3.0 24.7 36.2 8.5 -34.9 0.0 0.0 34.4 54.0 -19.6 H A High Ch, 2462MHz			. .		¢	¢	¢	þ				¢		
High Ch, 2462MHz Image: Character of the state of the st			•			¢	¢				·	å	·····	
4.924 3.0 47.9 33.3 6.3 -34.8 0.0 0.0 52.7 74.0 -21.3 V P 4.924 3.0 45.2 33.3 6.3 -34.8 0.0 0.0 50.0 54.0 -4.0 V A 7.386 3.0 37.3 36.3 8.5 -34.9 0.0 0.0 47.2 74.0 -26.8 V P 7.386 3.0 24.9 36.3 8.5 -34.9 0.0 0.0 34.7 54.0 -19.3 V A 4.924 3.0 45.3 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -26.8 V P 4.924 3.0 45.3 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -23.9 H P 4.924 3.0 41.5 33.3 6.3 -34.8 0.0 0.0 46.3 54.0 -7.7 H A 7.386 3.0 37.1 36.3 8.5 -34.9		3.0	£44.7	20.2	0.7	-34.9		0.0	34.4	24.0	-17.0		A	
4.924 3.0 47.9 33.3 6.3 -34.8 0.0 0.0 52.7 74.0 -21.3 V P 4.924 3.0 45.2 33.3 6.3 -34.8 0.0 0.0 50.0 54.0 -4.0 V A 7.386 3.0 37.3 36.3 8.5 -34.9 0.0 0.0 47.2 74.0 -26.8 V P 7.386 3.0 24.9 36.3 8.5 -34.9 0.0 0.0 34.7 54.0 -19.3 V A 4.924 3.0 45.3 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -26.8 V P 4.924 3.0 45.3 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -23.9 H P 4.924 3.0 41.5 33.3 6.3 -34.8 0.0 0.0 46.3 54.0 -7.7 H A 7.386 3.0 37.1 36.3 8.5 -34.9	High Ch	2462M	.i	1										
4.924 3.0 45.2 33.3 6.3 -34.8 0.0 0.0 50.0 54.0 -4.0 V A 7.386 3.0 37.3 36.3 8.5 -34.9 0.0 0.0 47.2 74.0 -26.8 V P 7.386 3.0 24.9 36.3 8.5 -34.9 0.0 0.0 34.7 54.0 -19.3 V A 4.924 3.0 45.3 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -23.9 H P 4.924 3.0 41.5 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -23.9 H P 4.924 3.0 41.5 33.3 6.3 -34.8 0.0 0.0 46.3 54.0 -7.7 H A 7.386 3.0 37.1 36.3 8.5 -34.9 0.0 0.0 47.0 74.0 -27.0 H P	····· M ······		· · · · · · · · · · · · · · · · · · ·	33.3	6.3	-34.8	0.0	0.0	52.7	74.0	-21.3	v	Р	
7.386 3.0 37.3 36.3 8.5 -34.9 0.0 0.0 47.2 74.0 -26.8 V P 7.386 3.0 24.9 36.3 8.5 -34.9 0.0 0.0 34.7 54.0 -19.3 V A 4.924 3.0 45.3 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -23.9 H P 4.924 3.0 41.5 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -23.9 H P 4.924 3.0 41.5 33.3 6.3 -34.8 0.0 0.0 46.3 54.0 -7.7 H A 7.386 3.0 37.1 36.3 8.5 -34.9 0.0 0.0 47.0 74.0 -27.0 H P					o	*	¢	þ			·	å	·····	
4.924 3.0 45.3 33.3 6.3 -34.8 0.0 0.0 50.1 74.0 -23.9 H P 4.924 3.0 41.5 33.3 6.3 -34.8 0.0 0.0 46.3 54.0 -7.7 H A 7.386 3.0 37.1 36.3 8.5 -34.9 0.0 0.0 47.0 74.0 -27.0 H P		3.0	37.3		\$	*	0.0	0.0		74.0	- 26.8	V		
4.924 3.0 41.5 33.3 6.3 -34.8 0.0 0.0 46.3 54.0 -7.7 H A 7.386 3.0 37.1 36.3 8.5 -34.9 0.0 0.0 47.0 74.0 -27.0 H P					۵	¢	¢	þ				¢	· · · · · · · · · · · · · · · · · · ·	
7.386 3.0 37.1 36.3 8.5 -34.9 0.0 0.0 47.0 74.0 -27.0 H P			•		\$	*	¢					¢	·····	
					••••••	*	¢	b				¢		
(.380 3.0 24.7 30.3 8.5 -34.9 0.0 0.0 34.6 54.0 -19.4 H A					\$	*	¢					\$	·····	
	/.380	3.0	24.7	30.3	8.5	-34.9	U.U	U.U	34.0	ə4.U	-19.4	п	A	
						ł								
			missione 114	ere dete	ted o	hove the	eveten	nnice	floor					
Rev. 4.1.2.7 Note: No other emissions were detected shows the system noise floor	1.010.140	JUICT C	WISSIOUS WI		acu a	NOVE LIE	, ayatent .	10136						
Note: No other emissions were detected above the system noise floor.														

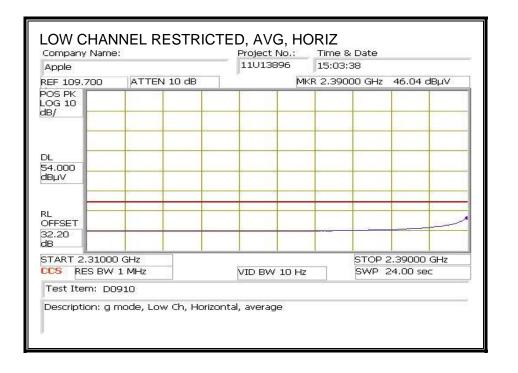
COMPLIANCE CERTIFICATION SERVICES (UL CCS)FORM NO: CCSUP4701D47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of UL CCS.

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8.2.8. 802.11g MODE IN THE 2.4 GHz BAND

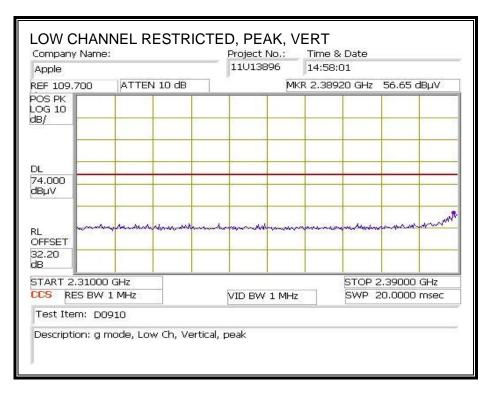
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

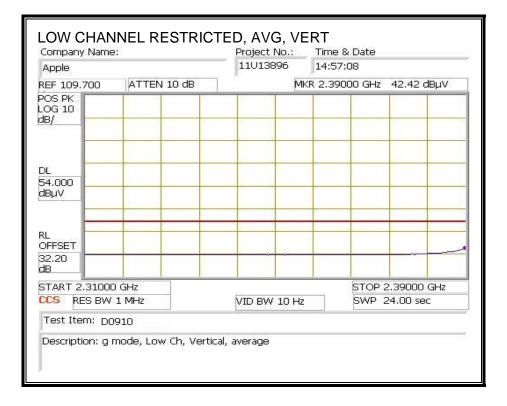
LOW CHANNEL RESTRICTED, PEAK, HORIZ Project No.: Time & Date Company Name: 11U13896 15:02:18 Apple MKR 2.39000 GHz 63.71 dBµV ATTEN 10 dB REF 109.700 POS PK LOG 10 dB/ DL 74.000 dBµV Andrew RL. OFFSET 32.20 dB START 2.31000 GHz STOP 2.39000 GHz CCS RES BW 1 MHz VID BW 1 MHz SWP 20.0000 msec Test Item: D0910 Description: g mode, Low Ch, Horizontal, peak



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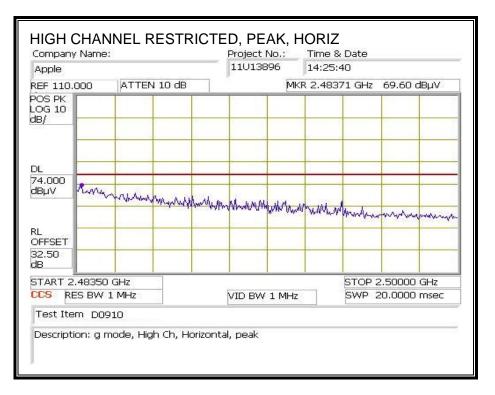
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

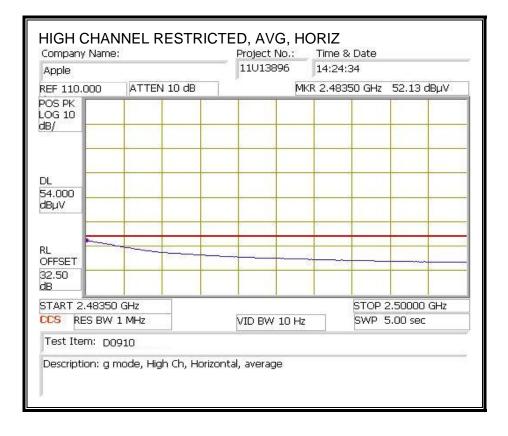




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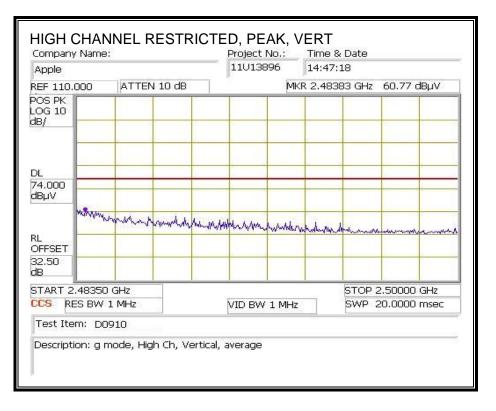
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

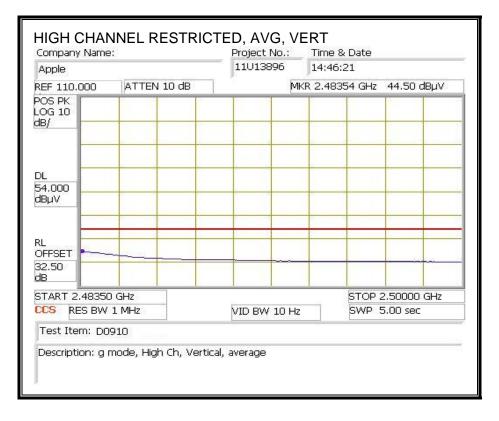




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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HARMONICS AND SPURIOUS EMISSIONS

lest Engr	•	Chin Pa	ng										
Date:		08-05-11											
Project #		11U1389	6										
Company		Apple											
Fest Targ		FCC 15.3											
Mode Op	er:	TX, g mo	de										
	f	Measuren	uent Freg	uency	Amp	Preamp	Gain			Average	Field Stren	gth Limit	
	Dist	Distance (to Anten	na	D Corr	Distance	Correc	rt to 3 me	ters	Peak Fie	ld Strength	Limit	
	Read	Analyzer	Reading		Avg	Average	Field S	trength @	3 m	Margin	rs. Average	Limit	
	AF	Antenna I			Peak	Calculate	d Peak	: Field Str	ength	Margin	rs. Peak Li	mit	
	CL	Cable Los	5		HPF	High Pas	s Filter	r					
f	Dist	Read	AF	CL	Amp	D Corr		Corr.	Limit		Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch, 1 4.824	2412MLH 3.0	38.5	33.2	6.3	-34.8	0.0	0.0	43.1	74.0	-30.9	н	Р	
1.824	3.0	25.6	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	H	A	
1.824	3.0	38.0	33.2	6.3	-34.8	0.0	0.0	42.7	74.0	-31.3	v	P	
4.824	3.0	25.6	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	V	A	
Mid Ch, 2													
1.874	3.0	40.0	33.2	6.3	-34.8	0.0	0.0	44.7	74.0	-29.3	H	Р	
4.874 1.311	3.0 3.0	27.4 36.9	33.2 36.2	6.3 8.5	-34.8 -34.9	0.0	0.0 0.0	32.2 46.7	54.0 74.0	-21.8 -27.3	H H	A P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
1.874	3.0	39.5	33.2	6.3	-34.8	0.0	0.0	44.2	74.0	-29.8	V	Р	
4.874	3.0	26.9	33.2	6.3	-34.8	0.0	0.0	31.7	54.0	-22.3	V	A	
.311	3.0	36.7	36.2	8.5	-34.9	0.0	0.0	46.5	74.0	-27.5	V	Р	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	
	0.4/015		•					•					
ligh Ch, 1.924	2462ML 3.0	11z 39.1	33.3	6.3	-34.8	0.0	0.0	43.9	74.0	-30.1	н	Р	
1.924 1.924	3.0	26.8	33.3	6.3	-34.8	0.0	0.0	43.5	74.0 54.0	-22.4	H H	r A	
.386	3.0	37.2	36.3	8.5	-34.9	0.0	0.0	47.1	74.0	-26.9	H	P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
1.924	3.0	37.8	33.3	6.3	-34.8	0.0	0.0	42.6	74.0	-31.4	V	Р	
1.924	3.0	25.3	33.3	6.3	-34.8	0.0	0.0	30.1	54.0	-23.9	V	A	
	3.0	36.5	36.3	8.5	-34.9	0.0	0.0	46.4	74.0	-27.6	V	P	
7.386 7.386		24.4	36.3	8.5	-34.9	0.0	0.0	34.2	54.0	-19.8	V	A	

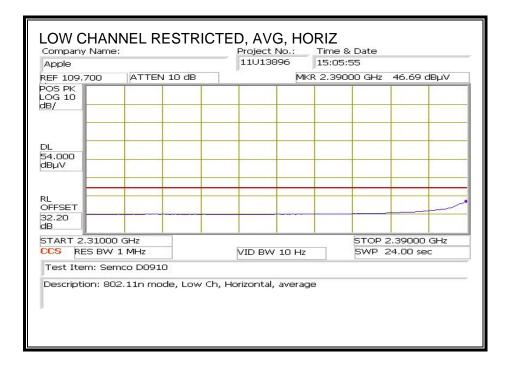
COMPLIANCE CERTIFICATION SERVICES (UL CCS)FORM NO: CCSUP4701D47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of UL CCS.

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8.2.9. 802.11n MODE IN THE 2.4 GHz BAND

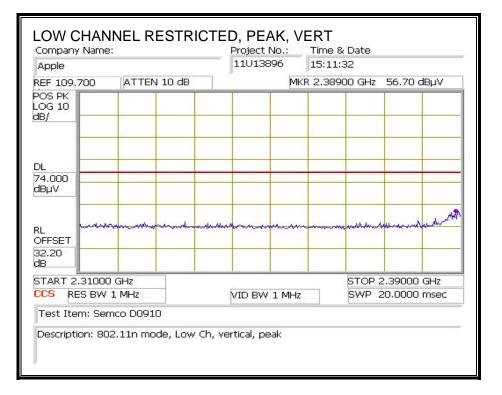
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

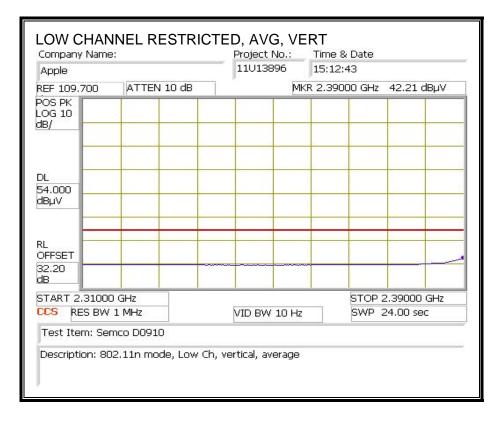
LOW CHANNEL RESTRICTED, PEAK, HORIZ Project No.: Time & Date Company Name: 11U13896 15:06:49 Apple REF 109.700 ATTEN 10 dB MKR 2.39000 GHz 64.36 dBµV POS PK LOG 10 dB/ DL 74.000 dBµV In hunger approximate RL OFFSET 32.20 dB. START 2.31000 GHz STOP 2.39000 GHz CCS RES BW 1 MHz VID BW 1 MHz SWP 20.0000 msec Test Item: Semco D0910 Description: 802.11n mode, Low Ch, Horizontal, peak



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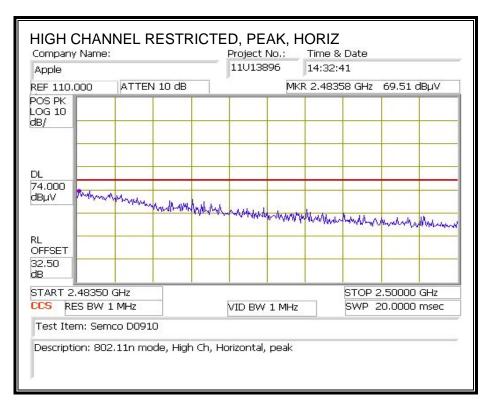
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

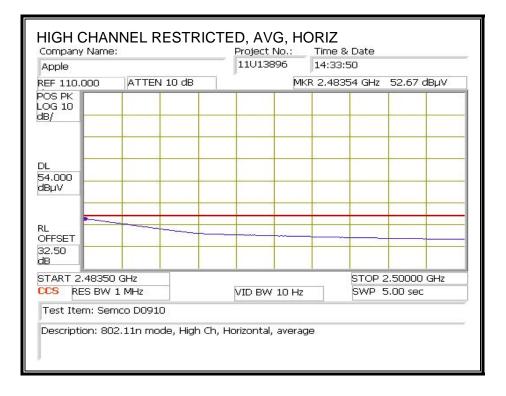




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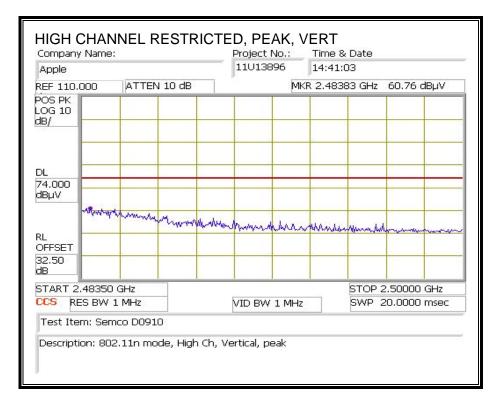
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

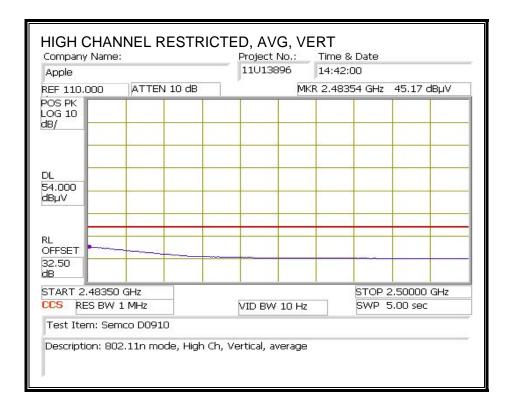




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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





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HARMONICS AND SPURIOUS EMISSIONS

-		tification S											
Fest Engr	•	Chin Pana	S										
Date: Project #:		08-05-11 11U13896											
гтојест #: Сотрању		Apple											
Company Test Targ		FCC 15.24	17										
Mode Op		802.11n, T											
avec of		BOM Vari											
	f	Measureme	nt Freque	ency	Amp	Preamp (Gain			Average	Field Stren	gth Limit	
	Dist	Distance to	Antenn	a -	$D \ Corr$	Distance	Correc	rt to 3 me	ters	Peak Fie	ld Strength	Limit	
	Read	Analyzer R	eading		Avg	Average	Field S	trength @	3 m	Margin v	75. Average	Limit	
	AF	Antenna Fa	actor		Peak	Calculate	d Peak	Field Stre	ength	Margin	rs. Peak Lii	mit	
	CL	Cable Loss			HPF	High Pas	s Filter	r					
f	Dist	Read	AF	CL	Amp	D Corr		Согт.	Limit		Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch, 2													
4.824	3.0	37.5	33.2	6.3	-34.8	0.0	0.0	42.1	74.0	-31.9	V	P	
4.824	3.0	25.5	33.2	6.3	-34.8	0.0	0.0	30.2	54.0	-23.9	V	A	
4.824 4.824	3.0 3.0	38.5 25.6	33.2 33.2	6.3 6.3	-34.8 -34.8	0.0 0.0	0.0 0.0	43.2 30.3	74.0 54.0	-30.8 -23.7	H H	P A	
4.014	3.0	47.0	33.2	0.3	-34.0	0.0	0.0	30.3	24W	-43.7	п	A	
Mid Ch, 2	2437MH	.i				••••••							
4.874	3.0	40.1	33.2	6.3	-34.8	0.0	0.0	44.9	74.0	-29.1	V	Р	
4.874	3.0	27.8	33.2	6.3	-34.8	0.0	0.0	32.5	54.0	-21.5	V	A	
7.311	3.0	36.6	36.2	8.5	-34.9	0.0	0.0	46.4	74.0	-27.6	V	Р	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	V	A	
4.874	3.0	40.4	33.2	6.3	-34.8	0.0	0.0	45.1	74.0	-28.9	H	Р	
4.874	3.0	27.1	33.2	6.3	-34.8	0.0	0.0	31.8	54.0	-22.2	H	A	
7.311	3.0	37.3	36.2	8.5	-34.9	0.0	0.0	47.1	74.0	-26.9	H	P	
7.311	3.0	24.5	36.2	8.5	-34.9	0.0	0.0	34.2	54.0	-19.8	H	A	
High Ch,	246230												
пі <u>е</u> п с.п., 4.924	3.0	42.5	33.3	6.3	-34.8	0.0	0.0	47.3	74.0	-26.7	v	Р	
4.924	3.0	29.9	33.3	6.3	-34.8	0.0	0.0	34.7	54.0	-19.3	v	A	
7.386	3.0	36.2	36.3	8.5	-34.9	0.0	0.0	46.1	74.0	-27.9	v	P	
7.386	3.0	24.3	36.3	8.5	-34.9	0.0	0.0	34.2	54.0	-19.8	V	Ā	
4.924	3.0	40.3	33.3	6.3	-34.8	0.0	0.0	45.2	74.0	-28.8	H	P	
4.924	3.0	27.0	33.3	6.3	-34.8	0.0	0.0	31.8	54.0	-22.2	H	A	
7.386	3.0	37.1	36.3	8.5	-34.9	0.0	0.0	47.0	74.0	- 27.0	H	P	
7.386	3.0	24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	A	
					ļ	ļ							
	1		1					1					
7.386 Rev. 4.1.2		24.4	36.3	8.5	-34.9	0.0	0.0	34.3	54.0	-19.7	H	Α	

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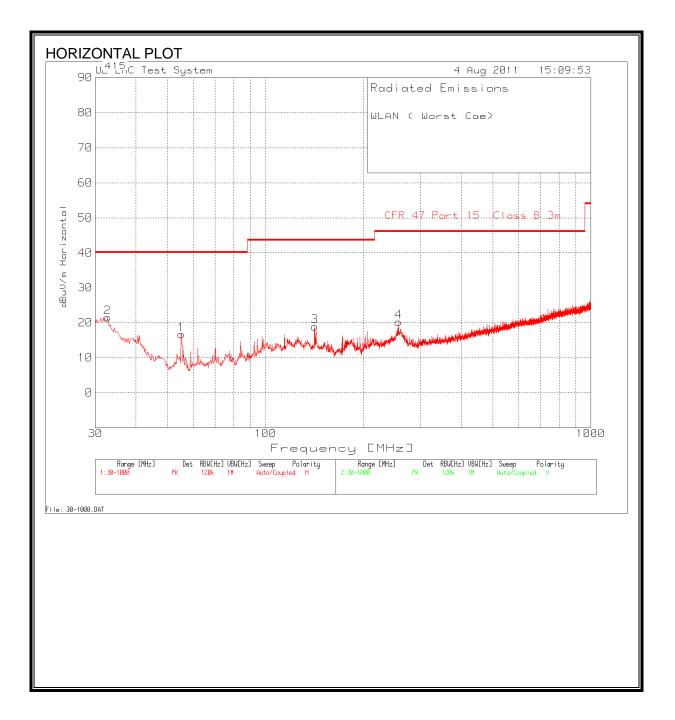
8.3. RECEIVER ABOVE 1 GHz

8.3.1. RX ABOVE 1 GHz FOR 20 MHz BANDWIDTH IN THE 2.4 GHz BAND

ombi	-		/ Measuren Services, Fi		5m ('h	amher-l	R								
ompan roject ate: est En	ıy:		Apple 11U13896 2011-8-5 Chin Pang EUT with AC				D								
lode:			RX mode (W			ршоне									
	uipmen	<u>t:</u> 18GHz	Pre o	mplifer	1 260	24-	Dre om	nlifer	26-40GH	-	Ца	orn > 18G	11-		Limit
	S/N: 324			Agilent 3			rie-aii	piner		-	nu	100		-	RX RSS 210
3' (quency Ca cable 2 able 228	2807700		able 22		000 •	20' ca 20' cab		807500		HPF	Re	ject Filter	RBV Avera	<u>: Measurements</u> W=VBW=1MHz ge Measurements
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		IMHz; VBW=10Hz Notes (V/H)
508	3.0	44.0	31.5	31.4	53	-35.0	۵0	0.0	45.6	33.1	74	54	-28.4	-20.9	Н
917 520 917	3.D 3.D 3.D	48.0 45.0 55.0	37.4 34.2 42.5	32.0 31.4 32.0	5.6 5.3 5.6	-34.9 -35.0 -34.9	0.0 0.0 0.0	۵0 ۵0 ۵0	50.8 46.7 57.8	40.2 35.9 45.3	74 74 74	54 54 54	-23.2 -27.3 -16.2	-13.8 -18.1 -8.7	H V V
ev. 07.08 iote: No (other em f Dist		.eading actor		m noise	Amp	Average	Corre Field : ed Peal	ct to 3 mete Strength @ c Field Stre	3 m		Pk Lim Avg Mar	Peak Field Margin vs.	ield Strength I Strength Li Average Li Peak Limit	mit mit

8.4. WORST-CASE BELOW 1 GHz

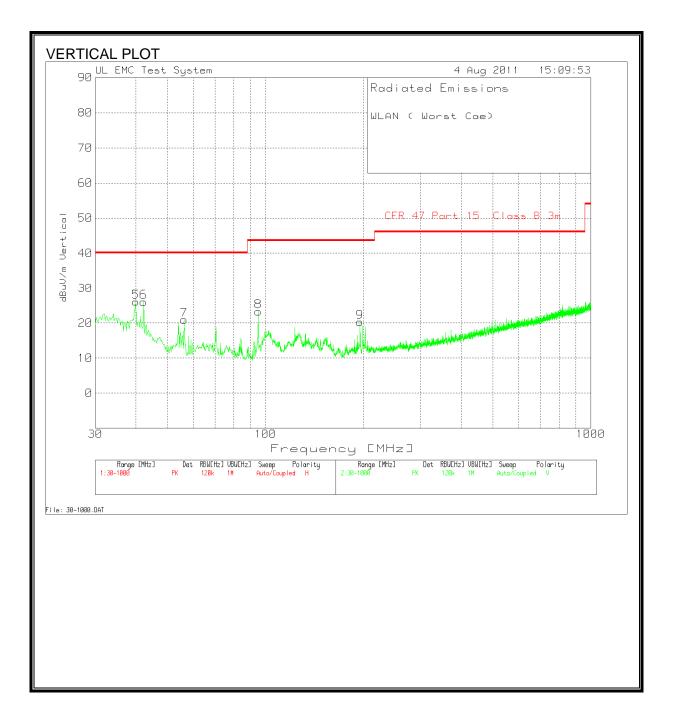
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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



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Range 1 30 -	- 1000MHz									
Frequency MHz	Reading dBuV	Detector	Cable Loss dB	Amplifier Gain dB	Antenna Factor dB/m	Corrected Reading dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
55.1998	37.01	РК	1.1	-29.4	7.9	16.61	40	-23.39	300	Horz
32.7138	30.92	PK	0.9	-29.5	19.1	21.42	40	-18.58	100	Horz
141.6547	33.24	PK	1.7	-29.2	13.1	18.84	43.5	-24.66	300	Horz
256.6047	34.64	РК	2.2	-28.7	12	20.14	46	-25.86	100	Horz
Range 2 30 -	- 1000MHz									
Frequency MHz	Reading dBuV	Detector	Cable Loss dB	Amplifier Gain dB	r Antenna Factor dB/m	Corrected Reading dBuV/m	Limit dBuV/m	Margin dB	Height [cm]	Polarity
39.8861	40.39	РК	0.9	-29.4	14.2	26.09	40	-13.91	100	Vert
42.2122	41.71	РК	1	-29.4	12.7	26.01	40	-13.99	100	Vert
56.1691	41.3	PK	1.1	-29.4	7.9	20.9	40	-19.1	100	Vert
94.9381	42.4	PK	1.4	-29.3	8.8	23.3	43.5	-20.2	100	Vert
195.3497	35.65	РК	1.9	-28.9	11.6	20.25	43.5	-23.25	100	Vert

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9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

Decreases with the logarithm of the frequency.

TEST PROCEDURE

ANSI C63.4

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RESULTS

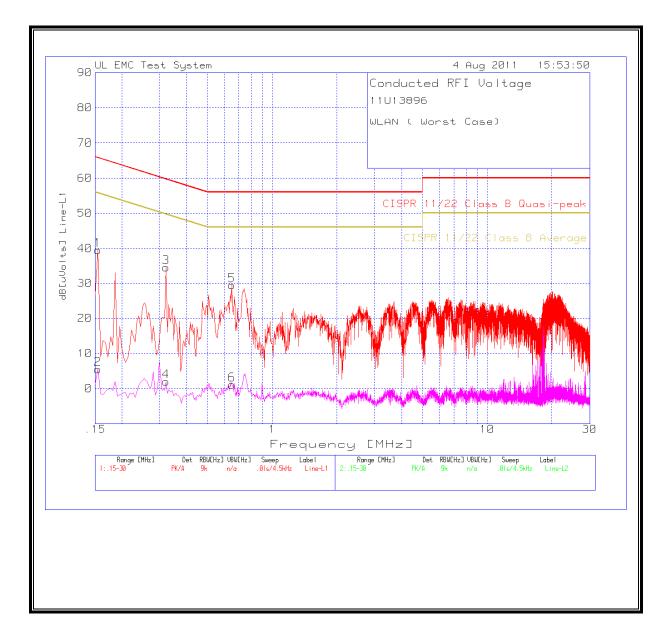
6 WORST EMISSIONS

<u>WLAN</u>

Line-L1 .	15 - 30MH	Iz							
Frequency	Reading	Detector	LISN [dB]	Cable [d	dB[uVolts]	CISPR B Qp	Margin	CISPR B Avg	Margin
0.1545	39.54	PK	0	0	39.54	65.8	-26.26	55.8	-16.26
0.1545	5.45	Av	0	0	5.45	-	-	55.8	-50.35
0.321	34.59	PK	0	0	34.59	59.7	-25.11	49.7	-15.11
0.321	2.01	Av	0	0	2.01	-	-	49.7	-47.69
0.6495	29.46	PK	0	0	29.46	56	-26.54	46	-16.54
0.6495	1.09	Av	0	0	1.09	-	-	46	-44.91
Line-L2 .	15 - 30MH	łz							
Frequency	Reading	Detector	LISN [dB]	Cable [d	dB[uVolts]	CISPR B Qp	Margin	CISPR B Avg	Margin
0.1725	38.1	PK	0	0	38.1	64.8	-26.7	54.8	-16.7
0.1725	5.04	Av	0	0	5.04	_	-	54.8	-49.76
0.1995	29.81	PK	0	0	29.81	63.6	-33.79	53.6	-23.79
0.1995	1.4	Av	0	0	1.4	-	-	53.6	-52.2
0.744	31.03	PK	0	0	31.03	56	-24.97	46	-14.97
0.744	6.5	Av	0	0	6.5	-	-	46	-39.5

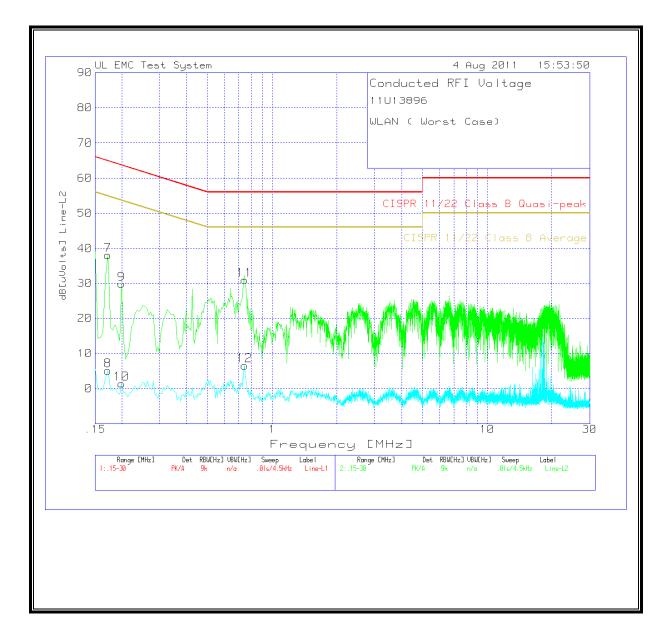
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LINE 1 RESULTS



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LINE 2 RESULTS



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