

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

**CERTIFICATION TEST REPORT** 

FOR

Cellular/PCS CDMA and LTE PHONE with Bluetooth and WLAN

MODEL NUMBER: LS840, LG-LS840, LGLS840\*

FCC ID: ZNFLS840

REPORT NUMBER: 11U14124-3

**ISSUE DATE: NOVEMBER 21, 2011** 

Prepared for LG ELECTRONICS MOBILECOMM U.S.A., INC. 10101 OLD GROVE ROAD SAN DIEGO, CA 92131

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

\*The models covered by this report are identical

NVLAP LAB CODE 200065-0

Rev.	Issue Date	Revisions	Revised By
	11/21/11	Initial Issue	

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REPORT NO: 11U14124-3	DATE: NOVEMBER 21, 2011
EUT: Cellular/PCS CDMA and LTE PHONE with Bluetooth and WLAN	FCC ID: ZNFLS840
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### **1. ATTESTATION OF TEST RESULTS**

COMPANY NAME:	LG ELECTRONICS MOBILECOMM U.S.A., INC. 10101 OLD GROVE ROAD SAN DIEGO, CA 92131
EUT DESCRIPTION:	Cellular/PCS CDMA and LTE PHONE with Bluetooth and WLAN
MODEL:	LS840, LG-LS840, LGLS840
SERIAL NUMBER:	74000549, 74000556, 74000559
DATE TESTED:	OCTOBER 31 ~ NOVEMBER 3, 2011
<b></b>	

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:

Tested By:

DAVE WEAVER EMC SUPERVISOR UL CCS

TOM CHEN 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%.

# 5. EQUIPMENT UNDER TEST

# 5.1. DESCRIPTION OF EUT

The EUT is a smart phone with the feature of PCS/CDMA and LTE PHONE with BLUETOOTH AND WLAN.

The radio module is manufactured by Broadcom.

## 5.2. MAXIMUM OUTPUT POWER

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

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2412 - 2462	802.11b	14.85	30.55
2412 - 2462	802.11g	11.50	14.13
2412 - 2462	802.11n HT20 SISO	10.25	10.59

# 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Direct Printed Antenna with a maximum peak gain of -1.69 dBi.

# 5.4. SOFTWARE AND FIRMWARE

The EUT software installed during testing was LS840Z06

The test utility software used during testing was WiFi FCC Test.

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### 5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to the channel with highest output power.

For the fundamental investigation, since the EUT is a portable device that has three orientations; X, Y and Z orientations have been investigated, also with AC/DC adapter, and earphone, and the worst case was found to be at X orientation with AC/USB adapter and earphone.

Worst-case data rates used based on an input from the client were as follows:

802.11b mode: 1 Mbps 802.11g mode: 6 Mbps 802.11n mode: MCS0

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## 5.6. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST					
Description Manufacturer Model Serial Number FCC ID					
AC Adapter	LG Electronics	MCS-02WS	SA14258000036	N/A	
Ear Phone	LG Electronics	N/A	N/A	N/A	

#### I/O CABLES

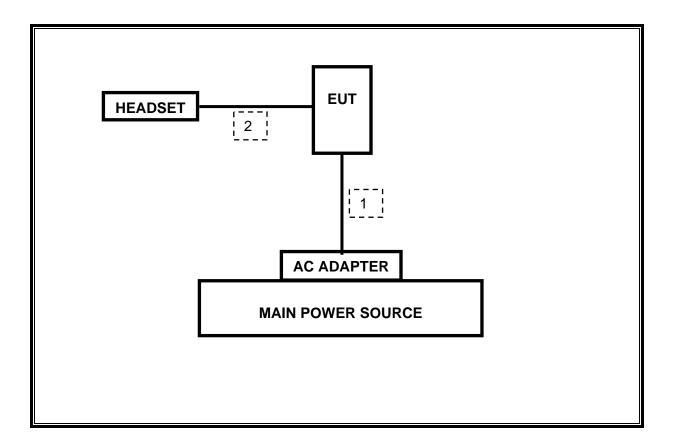
	I/O CABLE LIST							
Cable No.	Port	# of Identica Ports	Connector Type	Cable Type	Cable Length	Remarks		
1	DC	1	MINI USB	Un-Shielded	1.0m	External ferrite added		
2	AUDIO	1	MINI JACK	Un-Shielded	1.0m	Volume control on cable		

### TEST SETUP

The EUT is a stand-alone device and was tested with AC/USB adapter and earphone.

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#### SETUP DIAGRAM FOR TESTS



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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	C01012	09/02/12		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	07/18/12		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	01/27/12		
Antenna, Horn, 18 GHz	EMCO	3115	C00872	09/20/12		
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/16/12		
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR		
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	08/11/12		
P-Seies single channel Power	Agilent / HP	N1911A		08/04/12		
Peak / Average Power Sensor	Agilent / HP	E9323A		08/04/12		
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		

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# 7. ANTENNA PORT TEST RESULTS

# 7.1. 802.11b MODE IN THE 2.4 GHz BAND

### 7.1.1.6 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

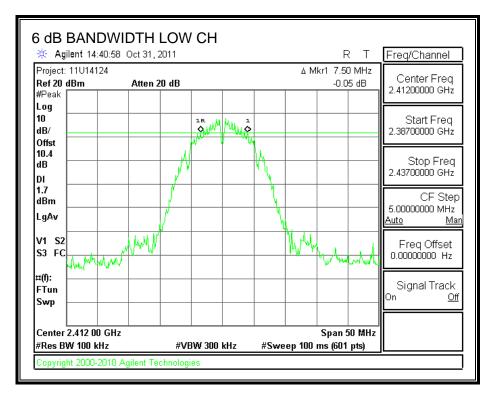
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

### <u>RESULTS</u>

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	7.50	0.5
Middle	2437	7.08	0.5
High	2462	7.50	0.5

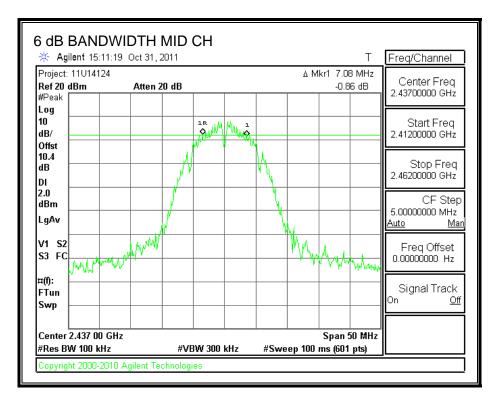
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#### 6 dB BANDWIDTH

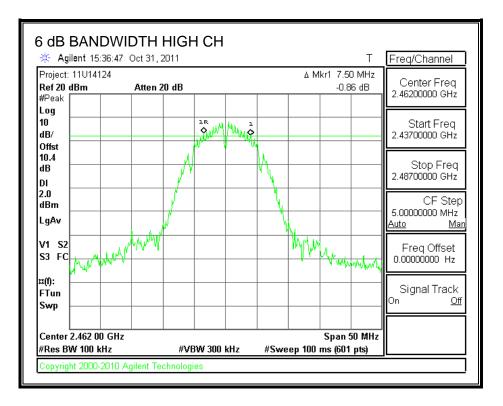


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### 7.1.2. 99% BANDWIDTH

### <u>LIMITS</u>

None; for reporting purposes only.

#### TEST PROCEDURE

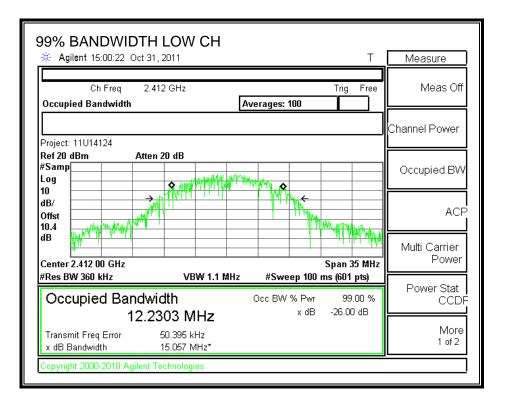
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

#### RESULTS

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	12.2303
Middle	2437	12.1868
High	2462	12.2644

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#### 99% BANDWIDTH



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Agilent 15:16:01 Oct 31	, 2011		Т	Measure
Ch Freq 2.4 Occupied Bandwidth	37 GHz	Averages: 100	Trig Free	Meas Off
	Ľ			Channel Power
¥Samp	20 dB			Occupied BM
10 dB/ Offst 10.4			Mana Marine	AC
dB Center 2.437 00 GHz #Res BW 360 kHz		HC	Span 35 MHz	Multi Carrier Power
Occupied Bandwi		#Sweep 100 r Occ BW % Pwr x dB	99.00 %	Power Stat CCD
12.1 Transmit Freq Error x dB Bandwidth	868 MHz 35.802 kHz 15.056 MHz*	× 40	-20.00 00	More 1 of 2

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Agilent 15:38:23 Oct 31	, 2011		Т	Measure
Ch Freq 2.4 Occupied Bandwidth	62 GHz	Averages: 100	Trig Free	Meas Off
				Channel Power
¥Samp				Occupied BW
10 dB/ Offst 10.4 dB			Ale way - water provides	AC
Center 2.462 00 GHz			Span 35 MHz	Multi Carrier Power
Res BW 360 kHz	VBW 1.1 MHz	#Sweep 100		Power Stat
Occupied Bandw 12.2	an 644 MHz	UCC BVV % PWF xdB		CCD
Transmit Freq Error x dB Bandwidth	23.978 kHz 15.104 MHz*			More 1 of 2

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### 7.1.3. OUTPUT POWER

### <u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

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

### TEST PROCEDURE

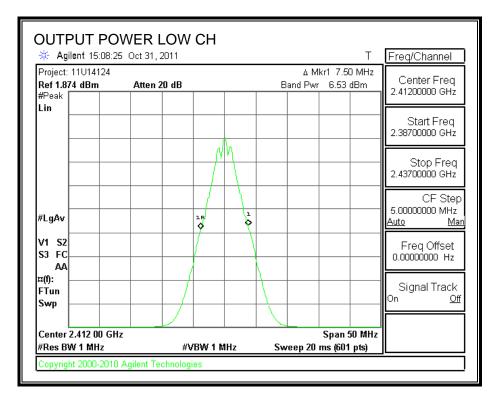
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

#### **RESULTS**

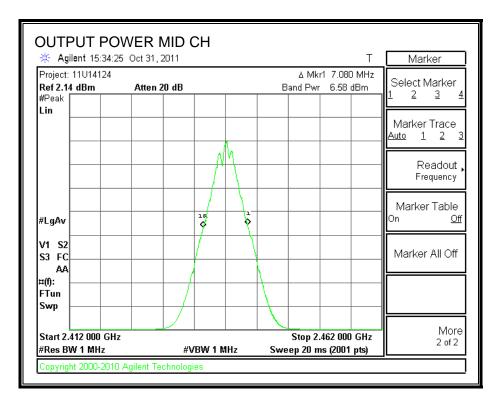
Channel	Frequency	Peak Power Attenuator and		Output	Limit	Margin
		Reading	Cable Offset	Power		
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	6.35	10.4	16.75	30	-13.25
Middle	2437	6.58	10.4	16.98	30	-13.02
High	2462	6.80	10.4	17.20	30	-12.80

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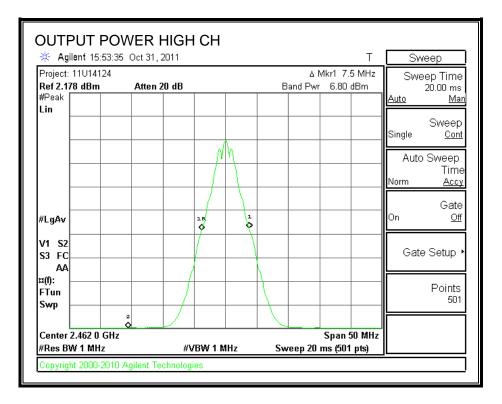
#### **OUTPUT POWER**



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### 7.1.4. AVERAGE POWER

#### <u>LIMITS</u>

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

#### **RESULTS**

The cable assembly insertion loss of 10 dB (including 10 dB pad and 0.4 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	14.50
Middle	2437	14.60
High	2462	14.85

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### 7.1.5. POWER SPECTRAL DENSITY

### <u>LIMITS</u>

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

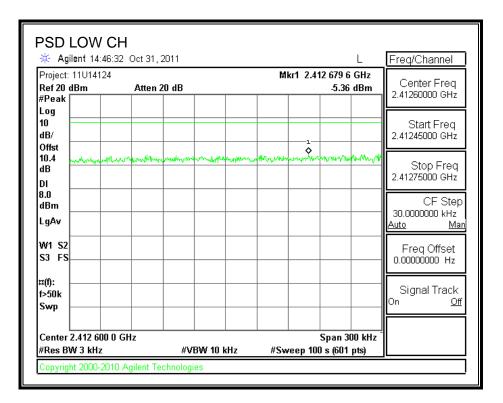
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

#### <u>RESULTS</u>

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	-5.36	8	-13.36
Middle	2437	-5.71	8	-13.71
High	2462	-4.48	8	-12.48

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#### POWER SPECTRAL DENSITY



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PSD MID C		11		L	Freq/Channel
Project: 11U1412 Ref 20 dBm #Peak	4 Atten 20	dB	Mkr1 2.43	36 410 9 GHz -5.71 dBm	Center Freq 2.43650000 GHz
Log 10 dB/ Offst					Start Freq 2.43635000 GHz
	ware hope and	merander	where and an arriver and	1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	Stop Freq 2.43665000 GHz
8.0 dBm					CF Step 30.0000000 kHz
LgAv W1 S2 S3 FS					Auto Mar Freq Offset 0.00000000 Hz
¤(f): f>50k Swp					Signal Track On <u>Off</u>
Center 2.436 500 #Res BW 3 kHz	0 GHz	#VBW 10 kHz	#Sweep 10	Span 300 kHz <sup>°</sup> 0 s (601 pts)	

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<u> </u>			Oct 31, 2	2011				kr1 2.46	2 205 2		Freq/Channel
Project: Ref 20 #Peak		124	Atten 2	0 dB				KF1 2.40		dBm	Center Freq 2.46275000 GHz
Log 10 dB/ Offst							1				Start Freq 2.46260000 GHz
dist 10.4 dB DI	www.	114 martin	an a	on an	n.Newsty	Munu	will sound of	ytenisty	whenhow	mm	Stop Freq 2.46290000 GHz
8.0 dBm											CF Step 30.0000000 kHz
LgAv											<u>Auto Ma</u>
W1 S2 S3 FS AA											Freq Offset 0.00000000 Hz
¤(f): f>50k Swp											Signal Track <sup>On <u>Off</u></sup>
Center #Res B			z	#VI	BW 10 k	άHz	#Sw	/eep 100	Span 3( ) s <i>(</i> 601		

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### 7.1.6. CONDUCTED SPURIOUS EMISSIONS

### <u>LIMITS</u>

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

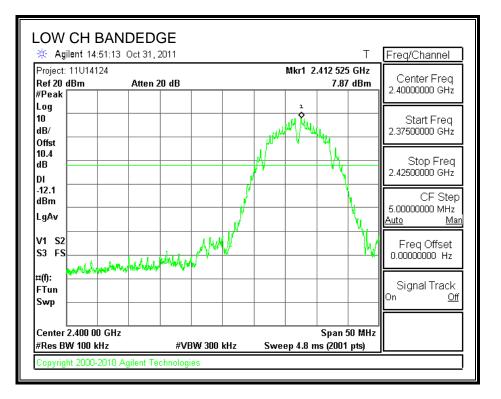
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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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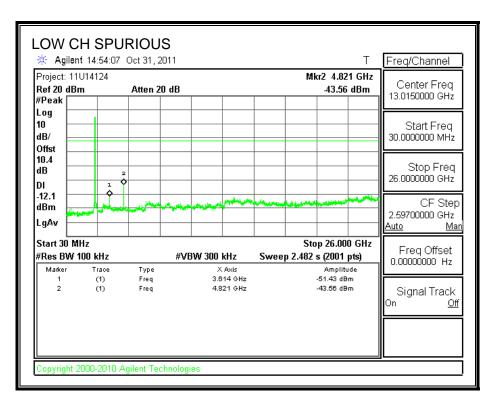
### **RESULTS**

#### SPURIOUS EMISSIONS, LOW CHANNEL



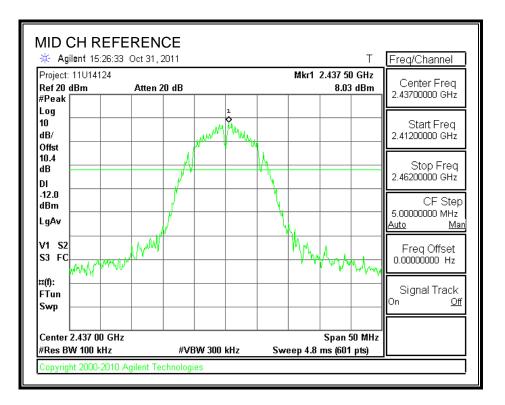
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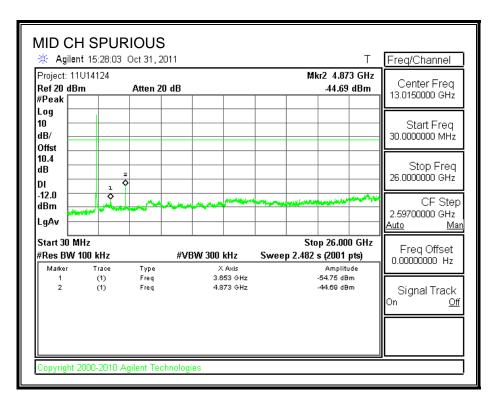


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#### SPURIOUS EMISSIONS, MID CHANNEL

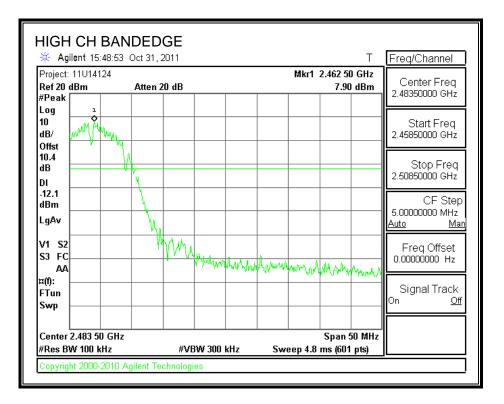


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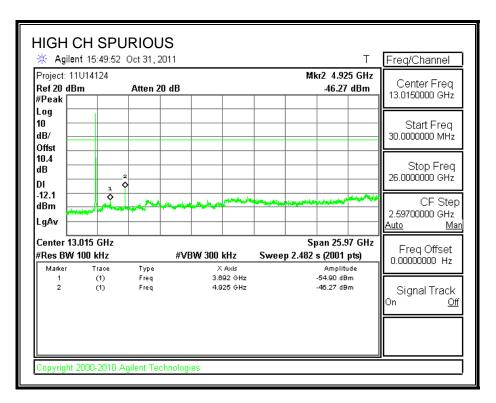
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#### SPURIOUS EMISSIONS, HIGH CHANNEL



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#### 802.11g MODE IN THE 2.4 GHz BAND 7.2.

### 7.2.1. 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**

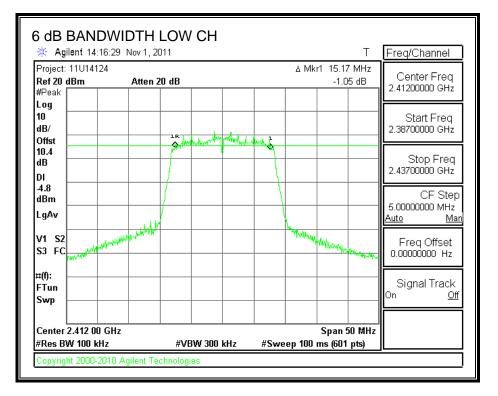
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

#### **RESULTS**

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	15.17	0.5
Middle	2437	15.17	0.5
High	2462	15.33	0.5

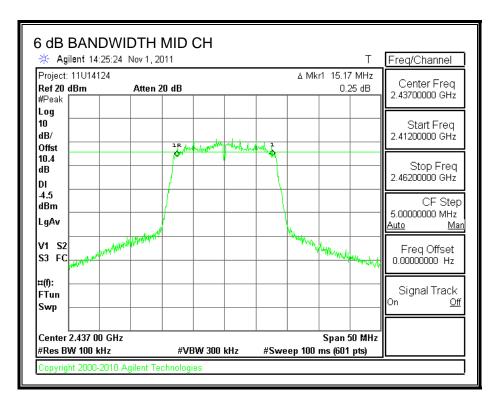
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#### 6 dB BANDWIDTH

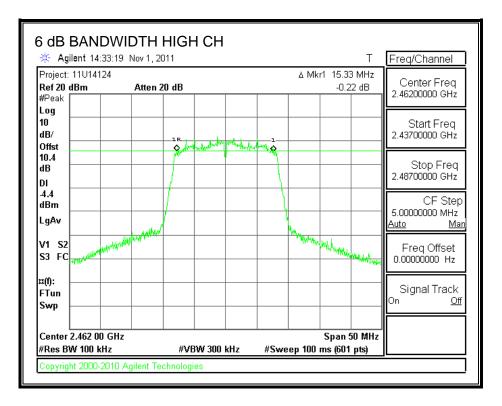


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## 7.2.2. 99% BANDWIDTH

## <u>LIMITS</u>

None; for reporting purposes only.

## TEST PROCEDURE

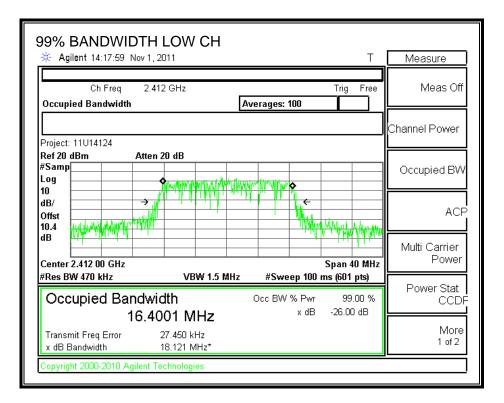
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

#### RESULTS

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	16.4001
Middle	2437	16.3946
High	2462	16.3812

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#### 99% BANDWIDTH



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Agilent 14:26:38 Nov 1, 201	1	Т	Measure
Ch Freq 2.437 ( Occupied Bandwidth	GHz Averages: 100	Trig Free	Meas Of
	<u> </u>		Channel Power
Project: 11U14124 Ref 20 dBm Atten 20 ¥Samp			Occupied BV
10 dB/ Offst 10.4 dB			AC
dB Center 2.437 00 GHz		Span 40 MHz	Multi Carrier Powe
¥Res BW 470 kHz	#VBW 1.5 MHz #Sweep 1	00 ms (601 pts)	
Occupied Bandwidt 16 394		wr 99.00 % dB -26.00 dB	Power Stat CCD
Transmit Freq Error 21	.438 kHz .119 MHz*		More 1 of 2

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* Agilent 14:34:24 Nov 1	, 2011		Т	Measure
Ch Freq 2. Occupied Bandwidth	462 GHz	Averages: 100	Trig Free	Meas Of
Duraita ata 441.14.440.4				Channel Power
¥Samp	n 20 dB			Occupied BV
10 dB/ → Offst 10.4 Ann Ann Ann Ann Ann Ann Ann Ann Ann An		t the second se	WHI WI WI WI	AC
dB			Span 40 MHz	Multi Carrier Power
Res BW 470 kHz	VBW 1.5 MI	lz #Sweep 100 i	ns (601 pts)	
Occupied Bandw 16.3	vidth 812 MHz	Occ BW % Pwr x dB	99.00 % -26.00 dB	Power Stat CCD
Transmit Freq Error x dB Bandwidth	10.531 kHz 18.175 MHz*			More 1 of 2

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# 7.2.3. OUTPUT POWER

## <u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

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

## TEST PROCEDURE

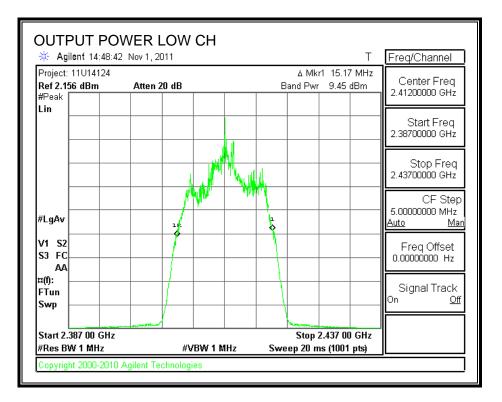
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

## **RESULTS**

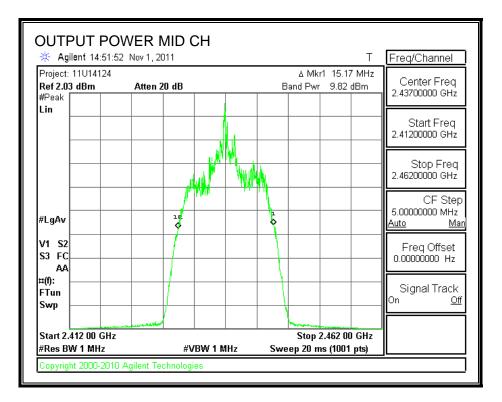
Channel	Frequency	Peak Power Reading	Attenuator and Cable Offset	Output Power	Limit	Margin
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	9.45	10.4	19.85	30	-10.15
Middle	2437	9.82	10.4	20.22	30	-9.78
High	2462	9.89	10.4	20.29	30	-9.71

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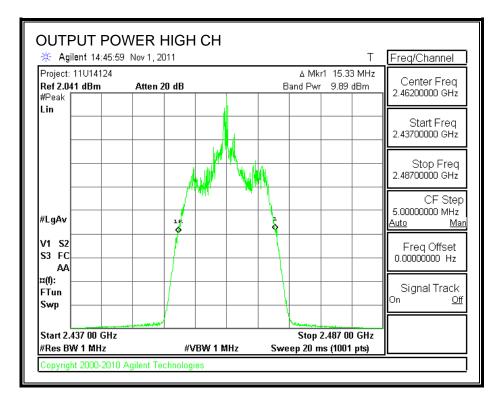
## **OUTPUT POWER**



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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 10 dB (including 10 dB pad and 0.4 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	11.10
Middle	2437	11.25
High	2462	11.50

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# 7.2.5. POWER SPECTRAL DENSITY

## <u>LIMITS</u>

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

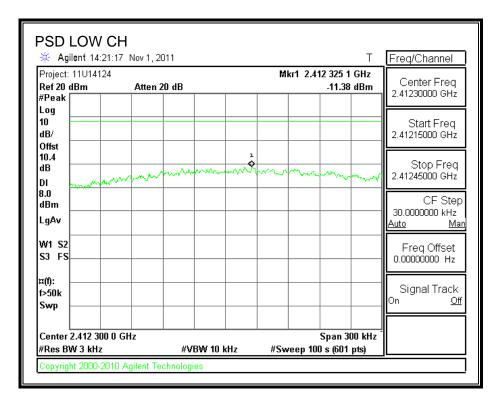
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

## **RESULTS**

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	-11.38	8	-19.38
Middle	2437	-10.84	8	-18.84
High	2462	-11.82	8	-19.82

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#### POWER SPECTRAL DENSITY

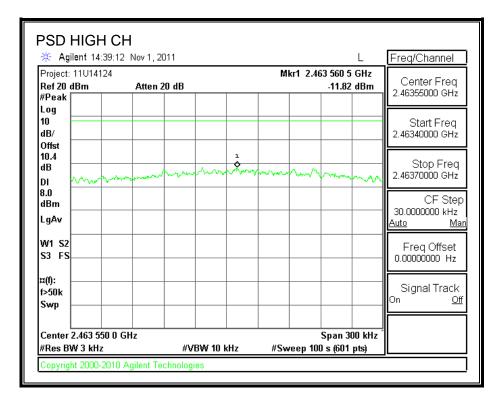


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· •	lent 14:29:44	NOV 1, 2011							Freq/Channel
Ref 20 c #Peak [	11U14124 IBm	Atten 20 d	B		MI	kr1 2.43	6 357 3 -10.84		Center Freq 2.43640000 GHz
Log 10 dB/ Offst									Start Freq 2.43625000 GHz
10.4 dB DI	m	h	1 Annon	man	~~\#~~	v	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Stop Freq 2.43655000 GHz
8.0 dBm LgAv									CF Step 30.0000000 kHz <u>Auto Ma</u>
W1 S2 S3 FS									Freq Offset 0.00000000 Hz
¤(f): f>50k Swp									Signal Track On <u>Off</u>
	2.436 400 0 G N 3 kHz	Hz	#VBW 10		#514	reep 100	Span 30		

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# 7.2.6. CONDUCTED SPURIOUS EMISSIONS

## <u>LIMITS</u>

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

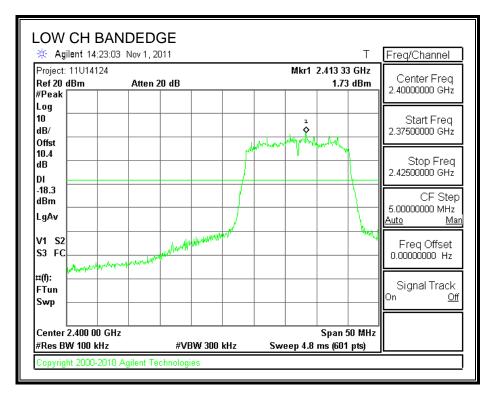
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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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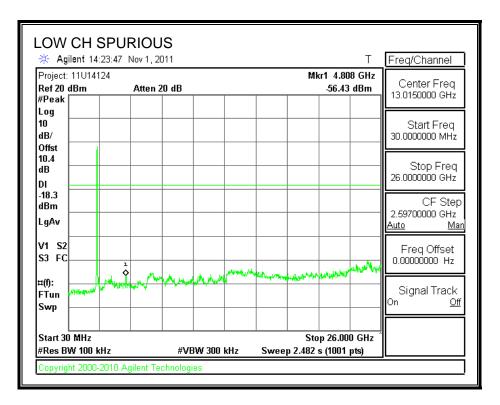
## **RESULTS**

#### SPURIOUS EMISSIONS, LOW CHANNEL



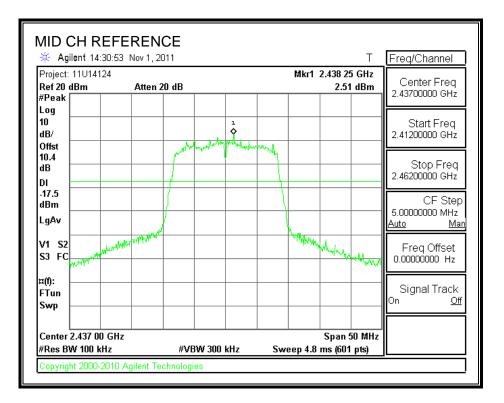
COMPLIANCE CERTIFICATION SERVICES (UL CCS)FORM NO: CCSUP4701D47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of UL CCS.

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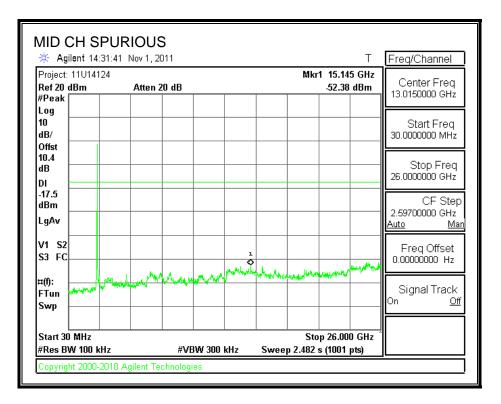


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#### SPURIOUS EMISSIONS, MID CHANNEL

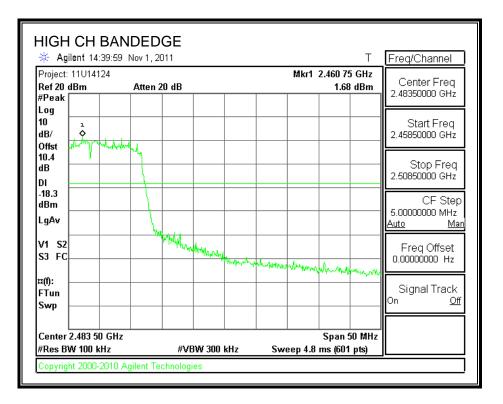


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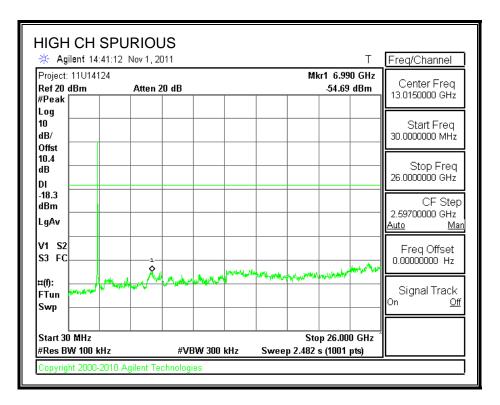
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#### SPURIOUS EMISSIONS, HIGH CHANNEL



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# 7.3. 802.11n HT20 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

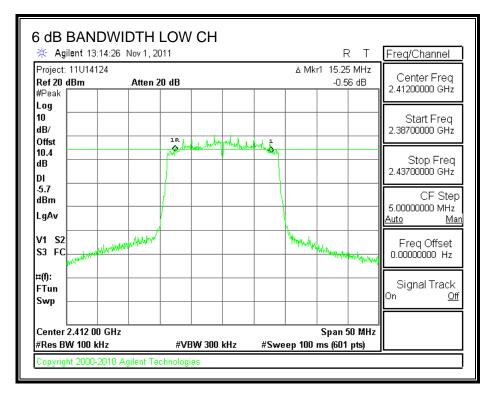
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

## **RESULTS**

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	15.25	0.5
Middle	2437	15.17	0.5
High	2462	15.17	0.5

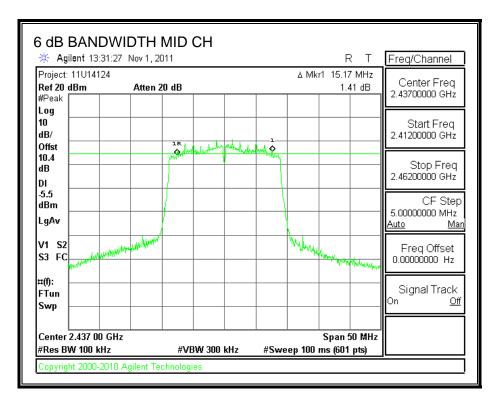
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#### 6 dB BANDWIDTH

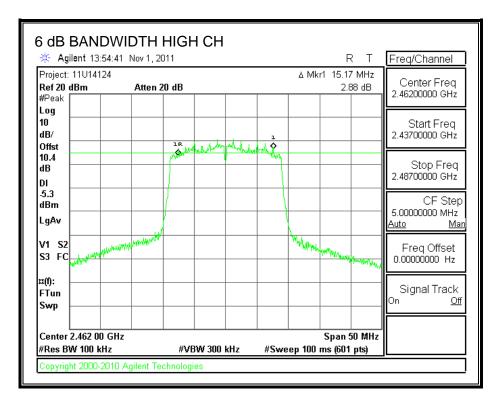


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## 7.3.2. 99% BANDWIDTH

## <u>LIMITS</u>

None; for reporting purposes only.

## TEST PROCEDURE

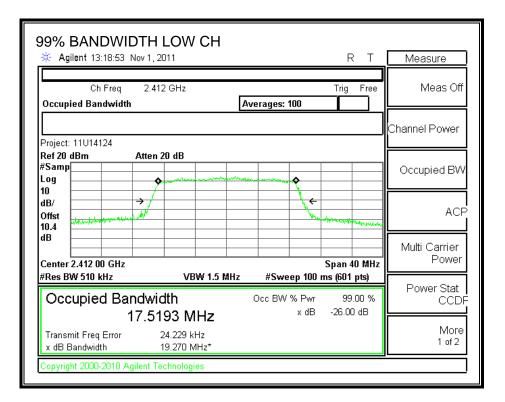
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

#### **RESULTS**

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	17.5193
Middle	2437	17.5622
High	2462	17.5765

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#### 99% BANDWIDTH



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Agilent 13:35:24 Nov 1, 2	011		RT	Measure
Ch Freq 2.43 Occupied Bandwidth	7 GHz	Averages: 100	Trig Free	Meas Off
				Channel Power
Project: 11U14124 Ref 20 dBm Atten : #Samp Log				Occupied BV
10 dB/ Offst 10.4 dB			din 2 4	AC
dB			Span 40 MHz	Multi Carrier Power
¥Res BW 510 kHz	VBW 1.5 MH	lz #Sweep 100 r	· .	Davis Otat
Occupied Bandwig 17.56	dth 522 MHz	Occ BW % Pwr x dB	99.00 % -26.00 dB	Power Stat CCD
Transmit Freq Error	29.257 kHz 18.833 MHz*			More 1 of 2

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🔆 Agilent 13:56:12 Nov 1, 2	2011		RT	Measure
Ch Freq 2.48 Occupied Bandwidth	i2 GHz	verages: 100	Trig Free	Meas Of
				Channel Power
Project: 11U14124 Ref 20 dBm Atten /Samp	20 dB			Occupied BV
10 JB/ → Offst 10.4 JB			1791.444.444.444.	AC
dB			Span 40 MHz	Multi Carrier Powei
Kes BW 510 kHz	VBW 1.5 MHz	#Sweep 100 r	· ·	
Occupied Bandwi 17.57	dth <sup>7</sup> 65 MHz	Occ BW % Pwr x dB		Power Stat CCD
Transmit Freq Error	16.748 kHz 18.816 MHz*			More 1 of 2

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# 7.3.3. OUTPUT POWER

## <u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

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

## TEST PROCEDURE

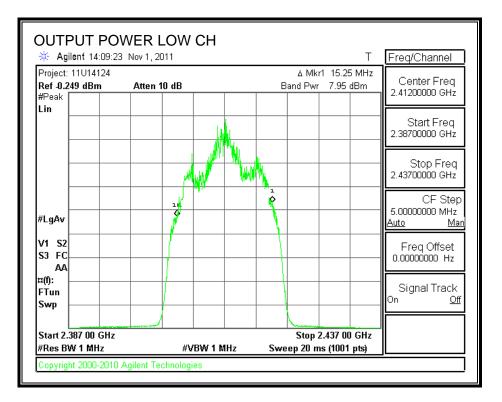
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

## RESULTS

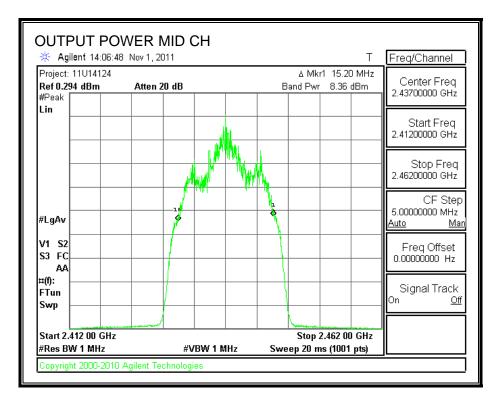
Channel	Frequency	Peak Power	Attenuator and	Output	Limit	Margin
		Reading	Cable Offset	Power		
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	7.95	10.4	18.35	30	-11.65
Middle	2437	8.36	10.4	18.76	30	-11.24
High	2462	8.5	10.4	18.90	30	-11.10

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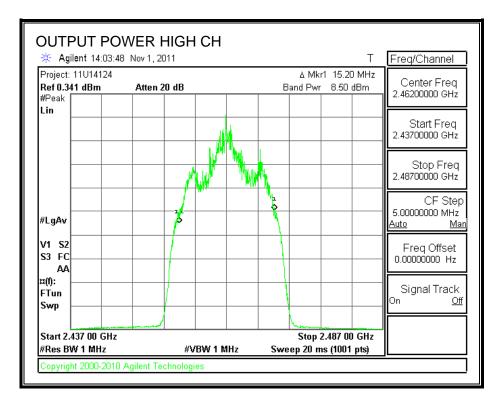
## **OUTPUT POWER**



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# 7.3.4. AVERAGE POWER

## <u>LIMITS</u>

None; for reporting purposes only.

## TEST PROCEDURE

The transmitter output is connected to a power meter.

#### **RESULTS**

The cable assembly insertion loss of 10 dB (including 10 dB pad and 0.4 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	9.90
Middle	2437	10.05
High	2462	10.25

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# 7.3.5. POWER SPECTRAL DENSITY

## <u>LIMITS</u>

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.

#### <u>RESULTS</u>

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	-12.62	8	-20.62
Middle	2437	-12.32	8	-20.32
High	2462	-12.20	8	-20.20

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#### POWER SPECTRAL DENSITY

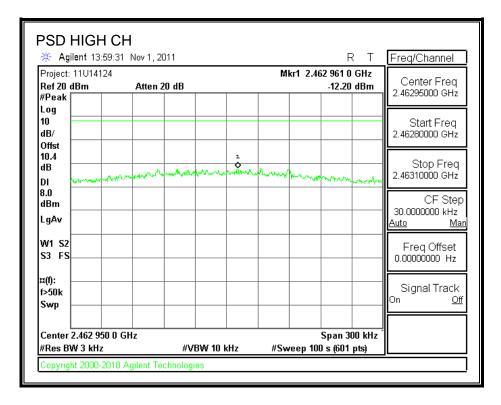
🔆 Agilent 13:25:	33 Nov 1, 2011			RT	Freq/Channel
Project: 11U14124 Ref 20 dBm #Peak	Atten 20 dB		Mkr1 2.	411 358 8 GHz -12.62 dBm	Center Freq 2.41140000 GHz
Log 10 dB/ Offst					Start Freq 2.41125000 GHz
10.4	1 Anna Angelon ann Angel	rim was shown	Mrs - man portion	mannam	Stop Freq 2.41155000 GHz
8.0 dBm					CF Step 30.0000000 kHz Auto Mai
W1 S2 S3 FS					Freq Offset 0.00000000 Hz
¤(f): f>50k Swp					Signal Track On <u>Off</u>
Center 2.411 400 0 #Res BW 3 kHz		3W 10 kHz	#Sween 1	Span 300 kHz 100 s (601 pts)	

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	VID CH								
🔆 Agil	ent 13:40:08	5 Nov 1, 2011					F	S T	Freq/Channel
Ref 20 d #Peak	11U14124   <b>Bm</b>	Atten 20 d	IB		MI	kr1 2.43	6 358 8 -12.32		Center Freq 2.43640000 GHz
Log 10 dB/ Offst									Start Freq 2.43625000 GHz
10.4 dB DI	for and	when	1 My alon	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	the water	walking	m.n.n.m	nathre	Stop Freq 2.43655000 GHz
8.0 dBm LgAv									CF Step 30.0000000 kHz <u>Auto Man</u>
W1 S2 S3 FS									Freq Offset 0.00000000 Hz
¤(f): f>50k Swp -									Signal Track On <u>Off</u>
Center 2 #Res BV	2.436 400 0 0 V 3 kHz	GHz	#VBW 10	kHz	#Sw	eep 100	Span 3 ) s (601		
Copyrigh	t 2000-2010	Agilent Techn	ologies						_

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# 7.3.6. CONDUCTED SPURIOUS EMISSIONS

## <u>LIMITS</u>

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

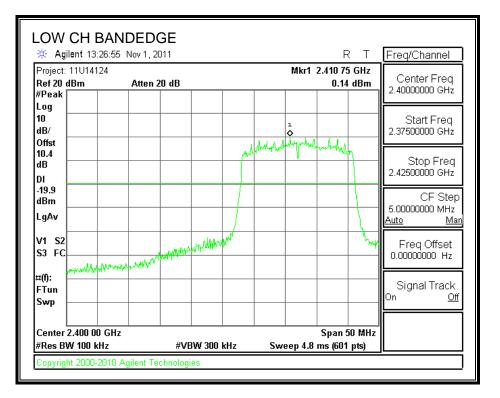
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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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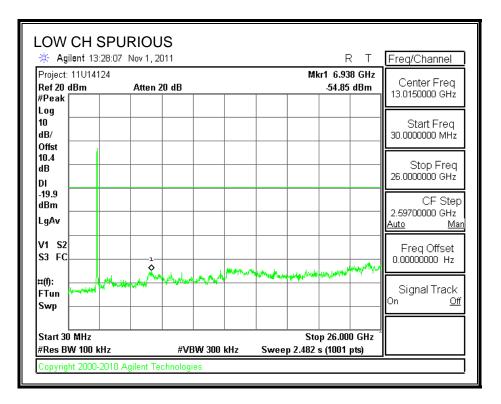
## **RESULTS**

#### SPURIOUS EMISSIONS, LOW CHANNEL



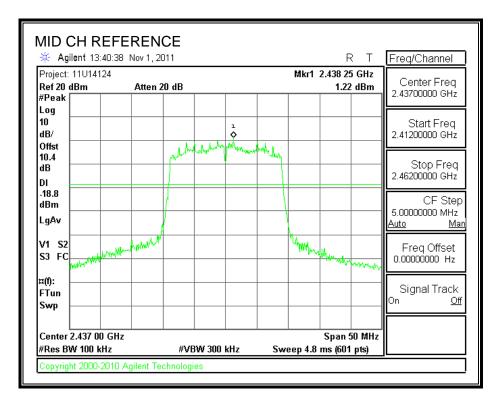
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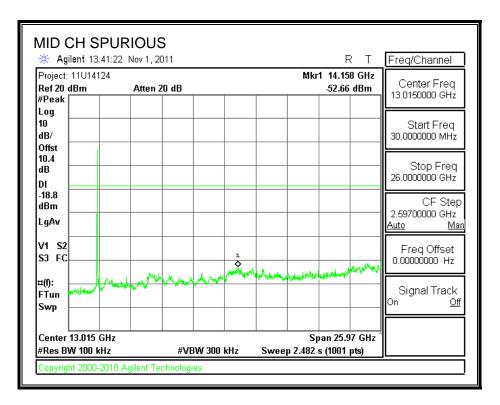


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#### SPURIOUS EMISSIONS, MID CHANNEL

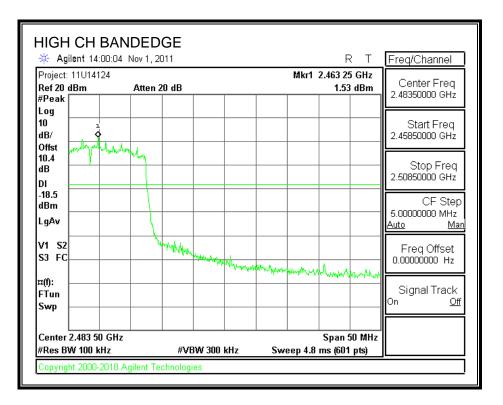


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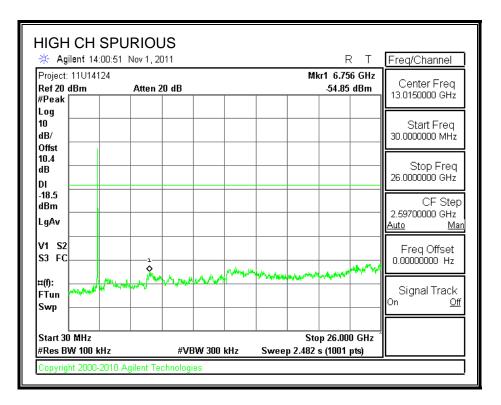
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#### SPURIOUS EMISSIONS, HIGH CHANNEL



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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.

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

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

# 8.2.1. TX ABOVE 1 GHz FOR 802.11b 1TX MODE IN THE 2.4 GHz BAND

#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

Agilent 18:44:38 Nov 1, 2	011		RT	Freq/Channel
oject:11U14124 e <b>f103.1 dB</b> µ∨ #Atten <sup>9</sup> eak	0 dB		89 47 GHz 7.27 dBµ∨	Center Freq 2.35000000 GHz
9g 3/				Start Freq 2.31000000 GHz
ifst 14 3				Stop Fred 2.39000000 GH;
.0 βμγ Av	y mary and marked	would weight any weight the	man gamme	CF Ste 8.00000000 MH: Auto M
1 V2 3 FC				Freq Offset 0.00000000 Hz
): Tun wp				Signal Tracl On <u>(</u>
art 2.310 00 GHz Res BW 1 MHz	#VBW 1 MHz	Stop 2.3 Sweep 1 ms	90 00 GHz	

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LOW CHANN		TED, A	AVG, HOR	IZ	
🔆 Agilent 18:45:27	Nov 1, 2011			RT	Freq/Channel
Project: 11∪14124 <b>Ref 103.1 dB</b> µ∨ #Peak	#Atten 0 dB		Mkr1	2.389 47 GHz 46.28 dBµ∨	Center Freq 2.35000000 GHz
Log 10 dB/ Offst					Start Freq 2.31000000 GHz
6.14 dB DI					Stop Freq 2.39000000 GHz
<b>54.0</b> dBµ∨ LgAv				1	CF Step 8.0000000 MHz <u>Auto Man</u>
S1 V2 S3 FC					Freq Offset 0.00000000 Hz
×(f): FTun Swp					Signal Track <sup>On <u>Off</u></sup>
Start 2.310 00 GHz #Res BW 1 MHz	#VBW	' 10 Hz	Stop Sweep 6.23	2.390 00 GHz 8 s (601 pts)	
Copyright 2000-2010 A	Agilent Technologies				

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## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

Agilent 18:40:		D, PEAK, VERT	T Freq/Channel
roject: 11∪14124 ef 103.1 dBµ∨ <sup>Peak</sup>	#Atten 0 dB	Mkr1 2.389 87 GF 49.14 dBµ	Contor From.
0g 1 3/			Start Freq 2.31000000 GHz
14 3			Stop Freq 2.39000000 GHz
l.0 3μ∨ I <sup>Av</sup>		not on provide state of the sta	CF Step 8.00000000 MHz MAUTO Ma
1 V2 3 FC			Freq Offset 0.00000000 Hz
f): Гun wp			Signal Track On <u>Of</u>
art 2.310 00 GH; Res BW 1 MHz	//////////////////////////////////////	Stop 2.390 00 GH Hz Sweep 1 ms (601 pts	

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Agilent 18:40:57	' NUVI,2011			RT	Freq/Channel
roject: 11U14124			Mkr1	2.389 47 GHz	Center Freq
<b>ef 103.1 dB</b> µ∀ Peak	#Atten 0 dB			37.73 dBµ∨	2.35000000 GHz
og					
ı T					Start Freq
3/					2.31000000 GHz
ffst					II
14					Stop Freq
-					2.39000000 GHz
L.O.					
 Bu∨					CF Step
iAv					8.0000000 MHz
,					Auto Ma
1 \(\sigma_2\)					Freq Offset
3 FC			<u> </u>		0.00000000 Hz
f):					Signal Track
Tun					
wp					
tart 2.310 00 GHz enter 2.350 00 GHz	z	I I	Stop	2.390 00 GHz Span 80 MHz	
Res BW 1 MHz		#VBW 10 Hz	Sweep 6.23	3 s <i>(</i> 601 pts)	

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# **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

🔆 Agilent 18:49:	INEL RESTR 58 Nov 1, 2011	,	,	RТ	Freq/Channel
Project: 11∪14124 <b>Ref 103.3 dB</b> µ∨ ÆPeak	#Atten 0 dB		Mkr1 2.484 6/ 58	27 5 GHz .53 dBµ∨	Center Freq 2.49175000 GHz
.og 0 IB/ Dffst					Start Freq 2.48350000 GHz
Jinst Ji.36 IB					Stop Freq 2.5000000 GHz
4.0 IBµ∨ ∽	the providence of the	he a charles the fighter that the	غەرجالىلىتەر بىرىمىغىغانىغانىر بىرىغ	neyleyekeyyed haarsoon	CF Step 1.65000000 MHz Auto Mar
31 V2 33 FC					Freq Offset 0.00000000 Hz
(f): Tun Wp					Signal Track On <u>Off</u>
Start 2.483 500 0 0 Res BW 1 MHz		BW 1 MHz	Stop 2.500 Of Sweep 1 ms		

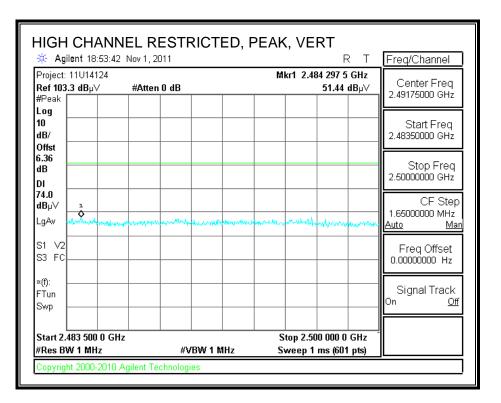
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HIGH CHANN		D, AVG, HORIZ	Freq/Channel
Project: 11U14124 <b>Ref 103.3 dB</b> µ∨ #Peak	#Atten 0 dB	Mkr1 2.483 830 0 GHz 47.38 dBµ∀	Center Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
6.36 dB DI			Stop Freq 2.5000000 GHz
54.0 dBµ∨ LgAv ♀			CF Step 1.65000000 MHz <u>Auto Man</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 10 H	Stop 2.500 000 0 GHz z Sweep 1.287 s (601 pts)	
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#### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



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HIGH CHANNEL R ☆ Agilent 18:54:07 Nov 1, 2		AVG, VERT	Freq/Channel
Project: 11∪14124 <b>Ref 103.3 dB</b> µV <b>#Atte</b> #Peak	n 0 dB	Mkr1 2.485 370 0 GHz 39.50 dBµ∀	Center Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
6.36 dB DI			Stop Freq 2.5000000 GHz
54.0 dBµV LgAv			CF Step 1.65000000 MHz <u>Auto Ma</u>
S1 V2			Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.500 000 0 GHz Sweep 1.287 s (601 pts)	

Page 92 of 132

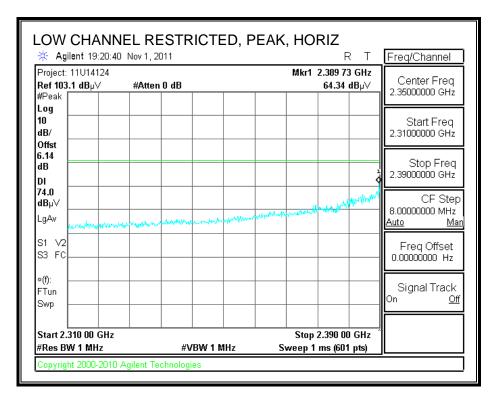
#### HARMONICS AND SPURIOUS EMISSIONS

Complia	nce Cer	tification	Service	s, Fre	mont 51	n Chamb	er						
Test Engi													
Date: 11/02/11													
Project #		1101412	4										
Company	<b>/:</b>	LG											
Test Targ	et:	FCC Cla	ass B										
Mode Op	er:	802.11b,	TX mod	e									
	f	Measuren	nent Fred	piency	7 Amp	Preamp (	Gain			Average	Field Stren;	gth Limit	
	Dist	Distance	to Anter	ma	D Corr	Distance	Correc	t to 3 me	ters	Peak Fie	ld Strength	Limit	
	Read	Analyzer	Reading		Avg	Average	Average Field Strength @ 3 m			Margin v	rs. Average	Limit	
	AF	Antenna	Factor		Peak	Calculate	d Peak	Field Stre	ngth	Margin v	rs. Peak Liz	nit	
	CL	Cable Los	55		HPF	High Pas	s Filter	:					
f	Dist	Read	AF	CL	Атр	D Corr		Согт.	Limit	-	Ant. Pol.	Det.	Notes
CHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
2412 MH				ļ									
4.824	3.0	36.6	33.1	5.8	-34.8	0.0	0.0	40.7	74.0	-33.3	H	P	
4.824	3.0	25.2	33.1	5.8	-34.8	0.0	0.0	29.3	54.0	-24.8	H	<u>A</u>	
4.824	3.0	39.3	33.1	5.8	-34.8	0.0	0.0	43.4	74.0	-30.6	<u>V</u>	P	
4.824 2437 MH	3.0	32.5	33.1	5.8	-34.8	0.0	0.0	36.6	54.0	-17.4	v	A	
437 MII 4.874	3.0	38.8	33.2	5.8	-34.8	0.0	0.0	42.9	74.0	-31.1	v	P	
4.874	3.0	30.9	33.2	5.8	-34.8	0.0	0.0	35.1	54.0	-18.9	v	A	
7.311	3.0	35.6	36.3	7.3	-34.1	0.0	0.0	45.0	74.0	-29.0	v	P	
7.311	3.0	23.5	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	v	Ā	
2437 MH	z 11b				·					<u></u>			
4.874	3.0	37.6	33.2	5.8	-34.8	0.0	0.0	41.8	74.0	-32.2	н	P	
4.874	3.0	27.1	33.2	5.8	-34.8	0.0	0.0	31.3	54.0	-22.7	H	A	
7.311	3.0	36.8	36.3	7.3	-34.1	0.0	0.0	46.2	74.0	- <b>27.8</b>	H	P	
7.311	3.0	23.5	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	H	A	
2462 MH													
4.924	3.0	36.3	33.2	5.9	-34.8	0.0	0.0	40.6	74.0	-33.4	H	P	
4.924	3.0	24.5	33.2	5.9	-34.8	0.0	0.0	28.8	54.0	-25.2	H	<u>A</u>	
7.386	3.0	35.4	36.4	7.3	-34.1	0.0	0.0	45.0	74.0	-29.0	H	P	
7.386	3.0	22.9	36.4	7.3	-34.1	0.0	0.0	32.5	54.0	-21.5	H	A	
2462 MH 4.924	z 11b 3.0	38.5	33.2	5.9	-34.8	0.0	0.0	42.7	74.0	-31.3	v	Р	
4.924 4.924	3.0	38.5 28.1	33.2	5.9 5.9	-34.8	0.0	0.0	42.7	74.0 54.0	-31.3 -21.6	v	A	
	3.0	34.9	36.4	7.3	-34.1	0.0	0.0	32.4 44.5	₽4.0 74.0	-21.0	v	P	
	3.0	22.8	36.4	7.3	-34.1	0.0	0.0	32.4	54.0	-21.6	v	A	
7.386 7.386													

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# 8.2.2. TX ABOVE 1 GHz FOR 802.11g 1TX MODE IN THE 2.4 GHz BAND

## **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**



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Project: 11U14124 Ref 103.1 dBµV #Atte			Freq/Channel
#Peak	en 0 dB	Mkr1 2.390 00 GHz 46.45 dBµ∨	Center Freq 2.35000000 GHz
Log			Start Freq 2.31000000 GHz
dB DI			Stop Freq 2.39000000 GHz
54.0 dBµ∨ LgAv			CF Step 8.00000000 MHz Auto Man
S1 V2			Freq Offset 0.00000000 Hz
*(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.390 00 GHz Sweep 6.238 s (601 pts)	

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## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

Agilent 19:24:		FED, PE		RТ	Freq/Channel
oject: 11∪14124 e <b>f 103.1 dB</b> µ∨ <sup>P</sup> eak	#Atten 0 dB		Mkr1 2.389 53.14	20 GHz I dBµ∨	Center Freq 2.35000000 GHz
) g 					Start Freq 2.31000000 GHz
14 3					Stop Freq 2.39000000 GHz
.0 3µ∨  Аv	Brander and the state of the second	and all data march	and the second states of the	1 Annut	CF Step 8.00000000 MHz <u>Auto Ma</u>
I V2 3 FC					Freq Offset 0.00000000 Hz
f): Tun Vp					Signal Track On <u>Of</u>
art 2.310 00 GHz Res BW 1 MHz	#VBW 1	I MHz	Stop 2.390 ( Sweep 1 ms (6)		

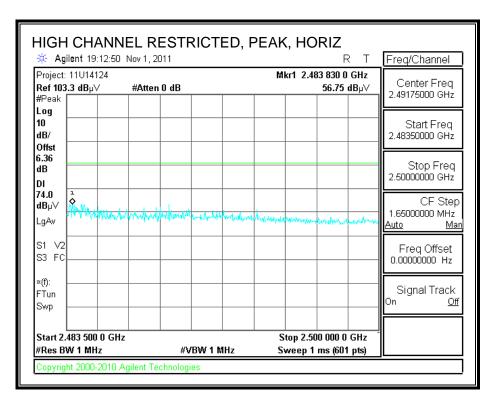
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🗧 Agilent 19:25				RT	Freq/Channel
Project: 11U14124 <b>Ref 103.1 dB</b> µ∨ ∕Peak	#Atten (	l dB	Mkr1	2.390 00 GHz 39.74 dBµ∨	Center Freq 2.35000000 GHz
.og 0  B/					Start Freq 2.3100000 GHz
.14  B					Stop Freq 2.39000000 GHz
01 4.0 ΙΒμ∀					CF Ster 8.0000000 MHz
gAv					Auto Ma
31 V2					Freq Offset 0.00000000 Hz
(f): Tun Wp					Signal Track On <u>O</u> f
Start 2.310 00 GH Res BW 1 MHz	z	#VBW 10 Hz	Stop Sweep 6.23	2.390 00 GHz	~

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#### **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



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HIGH CHANN		TED, AVG,	HORIZ	Freq/Channel
Project: 11U14124 <b>Ref 103.3 dB</b> µ∨ #Peak	#Atten 0 dB	M	kr1 2.483 500 0 GHz 40.79 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/ Offst				Start Freq 2.48350000 GHz
6.36 dB				Stop Freq 2.50000000 GHz
54.0 dBµ∨ LgAw				CF Step 1.6500000 MHz <u>Auto Man</u>
S1 V2 S3 FC				Freq Offset 0.00000000 Hz
≈(f): FTun Swp				Signal Track On <u>Off</u>
Start 2.483 500 0 GF #Res BW 1 MHz	lz #VBW		top 2.500 000 0 GHz ep 1.287 s (601 pts)	
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# **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**

Agilent 19:07:	28 Nov 1, 2011			RT	Freq/Channel
ject: 11U14124 f <b>103.3 dB</b> µ∨ eak	#Atten 0 dB		Mkr1 2.48	3 912 5 GHz 54.37 dBµ∀	Center Freq 2.49175000 GHz
3					Start Freq 2.48350000 GHz
δ					Stop Frec 2.5000000 GHz
	holmen Wirold wiron Adresson	MT-a, had Wight (mit quart	montellite	un matter free state the state	CF Ste 1.6500000 MHz Auto M:
V2 FC					Freq Offset 0.00000000 Hz
: in					Signal Track On <u>O</u>
irt 2.483 500 0 ( es BW 1 MHz		V 1 MHz	•	0 000 0 GHz ms (601 pts)	

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Agilent 19:10:0			ML 4 2	R T	Freq/Channel
oject: 11U14124 ef 103.3 dBµ∨ Peak	#Atten 0 dB		MKF1 2.4	483 500 0 GHz 39.16 dBµ∨	Center Freq 2.49175000 GHz
9g 1 3/					Start Freq 2.48350000 GHz
ifst 36 3					Stop Freq 2.5000000 GHz
.0 3µ∀					CF Ste 1.65000000 MHz
AV					Auto M Freq Offset
3 FC					0.00000000 Hz
vp					Signal Track On <u>O</u>
art 2.483 500 0 G Res BW 1 MHz		VBW 10 Hz	•	500 000 0 GHz 37 s (601 pts)	ļ

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#### HARMONICS AND SPURIOUS EMISSIONS

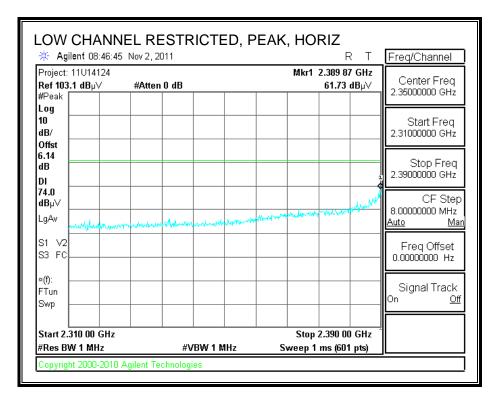
-		Measuren tification		s, Fre	mont 51	n Chamb	er						
Test Eng	r:	Tom Che	en										
Date:		11/02/11											
Project #		11U1412	4										
Company	y:	LG											
Test Targ	;et:	FCC Cla	ass B										
Mode Op	er:	802.11g,	TX mod	le									
	f	Measuren	nent Fred	piency	7 Amp	Preamp (	Gain			Average	Field Stren	gth Limit	
	Dist	Distance	to Anter	ına	D Corr	Distance	Correc	t 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	Factor		Peak	Calculate	d Peak	Field Stre	ngth	Margin v	rs. Peak Lii	nit	
	CL	Cable Los	55		HPF	High Pas	s Filter	:					
f	Dist	Read	AF	CL	Атр	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	
2412 MH	z 11g												
4.824	3.0	37.1	33.1	5.8	-34.8	0.0	0.0	41.2	74.0	-32.8	H	Р	
4.824	3.0	24.4	33.1	5.8	-34.8	0.0	0.0	28.5	54.0	-25.5	H	A	
4.824	3.0	37.3	33.1	5.8	-34.8	0.0	0.0	41.4	74.0	-32.6	V	P	
4.824	3.0	24.4	33.1	5.8	-34.8	0.0	0.0	28.5	54.0	-25.5	V	Α	
2437 MH							~ ~						
4.874	3.0 3.0	37.1 24.8	33.2	5.8	-34.8	0.0 0.0	0.0 0.0	41.3 29.0	74.0 54.0	-32.7	H H	P	
4.874 7.311	3.0	35.5	33.2 36.3	5.8 7.3	-34.0	0.0	0.0	45.0	54.0 74.0	-25.0 -29.0	п Н	A P	
7.311	3.0	23.4	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-23.0	H	A	
2437 MH									~ 10				
4.874	3.0	37.6	33.2	5.8	-34.8	0.0	0.0	41.8	74.0	-32.2	v	Р	
4.874	3.0	24.9	33.2	5.8	-34.8	0.0	0.0	29.1	54.0	-24.9	v	Ā	
7.311	3.0	36.0	36.3	7.3	-34.1	0.0	0.0	45.5	74.0	-28.5	V	Р	
7.311	3.0	23.5	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	V	A	
2462 MH	z 11g			Į									
4.924	3.0	36.2	33.2	5.9	-34.8	0.0	0.0	40.4	74.0	- <b>33.6</b>	H	Р	
4.924	3.0	24.1	33.2	5.9	-34.8	0.0	0.0	28.4	54.0	-25.6	H	A	
7.386	3.0	35.3	36.4	7.3	-34.1	0.0	0.0	44.9	74.0	-29.1	H	Р	
7.386	3.0	23.1	36.4	7.3	-34.1	0.0	0.0	32.7	54.0	-21.3	H	A	
2462 MH	····						~ ~				<b></b>		
	3.0	37.2	33.2	5.9	-34.8	0.0	0.0	41.5	74.0	-32.5	V	P	
	3.0	24.1	33.2	5.9	-34.8	0.0	0.0	28.4	54.0	-25.6	V	A	
4.924 4.924 7.204		36.0	36.4	7.3	-34.1	0.0	0.0	45.7	74.0	-28.4	V	P	
	3.0 3.0	23.0	36.4	7.3	-34.1	0.0	0.0	32.7	54.0	-21.3	v	A	

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# 8.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 1TX MODE IN THE 2.4 GHz BAND

#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**



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LOW CHANN		TED, A	AVG, H		RТ	Freq/Channel
Project: 11U14124 <b>Ref 103.1 dB</b> µV #Peak	#Atten 0 dB			Mkr1 2.390 (		Center Freq 2.3500000 GHz
Log 10 dB/ Offst						Start Freq 2.31000000 GHz
dB DI						Stop Freq 2.39000000 GHz
54.0 dBµ∨ LgAv						CF Step 8.00000000 MHz Auto Man
S1 V2 S3 FC						Freq Offset 0.00000000 Hz
×(f): FTun Swp						Signal Track On <u>Off</u>
Start 2.310 00 GHz #Res BW 1 MHz	#VBW	10 Hz	Sweep	Stop 2.390 ( 6.238 s (601		
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## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

🔆 Agilent 08:59:	NEL RESTRIC 08 Nov 2, 2011	5120,127	R	T Freq/Channel
Project: 11∪14124 <b>Ref 103.1 dB</b> µ∨ #Peak	#Atten 0 dB		Mkr1 2.388 80 G 57.55 dB	iHz Contor From
_og 10 1B/ Offst				Start Freq 2.31000000 GHz
5.14 IB DI				Stop Freq 2.39000000 GHz
′4.0 ΙΒμ∨ _gAv	ter terre versor and a start strategy of	and the state of the second	wyounderwood	CF Step 8.0000000 MHz <u>Auto Mar</u>
S1 V2 33 FC				Freq Offset 0.00000000 Hz
(f): :Tun Swp				Signal Track
Start 2.310 00 GH; Res BW 1 MHz	-	W 1 MHz	Stop 2.390 00 G Sweep 1 ms (601 p	

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	50 Nov 2, 2011			R T	Freq/Channel
roject: 11U14124 <b>ef 103.1 dB</b> µ∨ ⊇eak	#Atten 0 dE	•	Mkr1	2.390 00 GHz 41.34 dBµ∨	Center Freq 2.35000000 GHz
og ) B/					Start Freq 2.31000000 GHz
.14 B					Stop Freq 2.39000000 GHz
I 4.0 Bµ∀					CF Ster
gAv					Auto Ma
1 V2 3 FC					Freq Offset 0.00000000 Hz
(f): Tun wp					Signal Track
tart 2.310 00 GHz			Ston	2.390 00 GHz	ļ

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# **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

HIGH CHANNEL R Agilent 09:20:25 Nov 2, 2	,	PEAK, HORIZ	Freq/Channel
Project: 11∪14124 <b>Ref 103.3 dB</b> µ∀ <b>#Atter</b> #Peak	0 dB	Mkr1 2.487 707 5 GHz 58.25 dBµ∨	Center Freq 2.49175000 GHz
.og			Start Freq 2.48350000 GHz
5.36 JB DI			Stop Freq 2.50000000 GHz
<sup>7</sup> 4.0 <sup>1</sup> Bµ√ d <sup>(rd</sup> <sub>2</sub> , t <sub>h</sub> ) <sub>t</sub> d <sub>(rd, t</sub> , t <sub>h</sub> ) <sub>t</sub> d <sub>(rd, th</sub> ) <sub>t</sub> d <sub>(rd, th</sub> )	<sup>ที่</sup> เหลืออง <sup>1</sup> พระส <sup>ุม</sup> าร์ จำองไปประชุที่ให้พูดอย่างปร	<mark>ตามหารสถุประวาณสาวสถุปฏิประบ</mark> าทการสาว	CF Step 1.65000000 MHz <u>Auto Mar</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
(f): -Tun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 GHz {Res BW 1 MHz	#VBW 1 MHz	Stop 2.500 000 0 GHz Sweep 1 ms (601 pts)	

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HIGH CHANNE		TED, A	AVG, H	ORIZ R T	Freq/Channel
Project: 11U14124 <b>Ref 103.3 dB</b> µ∨ #Peak	#Atten 0 dB		Mkr1	2.483 500 0 GHz 42.92 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/ Offst					Start Freq 2.48350000 GHz
6.36 dB					Stop Freq 2.5000000 GHz
54.0 dBµ√ LgAw					CF Step 1.65000000 MHz <u>Auto Man</u>
S1 V2 S3 FC					Freq Offset 0.00000000 Hz
×(f): FTun Swp					Signal Track On <u>Off</u>
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW *	10 Hz	•	2.500 000 0 GHz 1.287 s (601 pts)	
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## **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**

Agilent 09:11:0	4 Nov 2, 2011			RT	Freq/Channel
roject: 11∪14124 ef 103.3 dBµ∨ Peak	#Atten 0 dB		Mkr1 2.48	5 782 5 GHz 53.47 dBµ∨	Center Freq 2.49175000 GHz
og 1 3/					Start Freq 2.48350000 GHz
36					Stop Freq 2.5000000 GHz
l.0 βμ∀ ☆ <sub>I</sub> Av <sup>™</sup> ι/₩Η/(\.	the when the man we	withour work they	-	and and a state of the state of	CF Step 1.6500000 MHz <u>Auto Ma</u>
1 V2 3 FC					Freq Offset 0.00000000 Hz
f): Гип мр					Signal Track <sup>On <u>Of</u></sup>
tart 2.483 500 0 G Res BW 1 MHz		1 MHz	•	0 000 0 GHz ms (601 pts)	

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Agilent 09:12:			ML 4 3 4	00.450.0.011-	Freq/Channel
roject: 11U14124 <b>ef 103.3 dB</b> µ∨ Peak	#Atten 0 d	B	MKF1 2.4	99 450 0 GHz 39.52 dBµ∨	Center Freq 2.49175000 GHz
og D B/					Start Freq 2.48350000 GHz
36 B					Stop Freq 2.5000000 GHz
4.0 Βμ∨					CF Ste 1.6500000 MHz
gAv 1 V2 3 FC				1 •	<u>Auto M</u> Freq Offset 0.00000000 Hz
(f): Tun wp					Signal Track
tart 2.483 500 0 ( Res BW 1 MHz	GHz	#VBW 10 Hz	Stop 2.5 Sweep 1.28	00 000 0 GHz	

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## HARMONICS AND SPURIOUS EMISSIONS

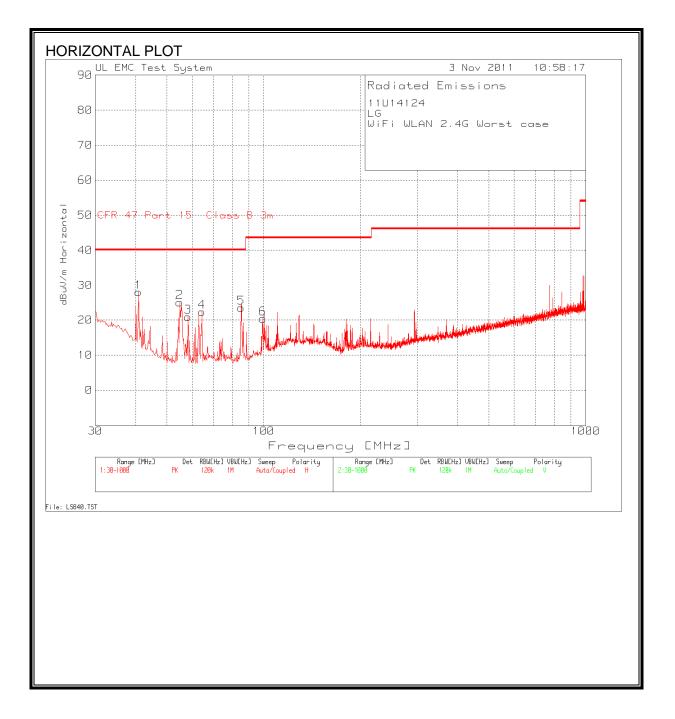
-		Measuren tification		s, Fre	mont 51	n Chamb	er						
Fest Eng		Tom Che											
Date:		11/02/11	/02/11										
Project #: 11U14124													
Company	y:	LG											
Test Targ	et:	FCC Cla	ass B										
Mode Op	er:	802.11n	HT20, T	X moo	le								
	f	Measuren	nent Freq	piency	Amp	Preamp (	Gain			Average	Field Stren	gth Limit	
	Dist	Distance	to Anter	ma	D Corr	Distance	Correc	t to 3 me	ters	Peak Fie	ld Strength	Limit	
	Read	Analyzer	Reading		Avg	Average	Field S	trength @	3 m	Margin v	Average	Limit	
	AF	Antenna	Factor		Peak	Calculate	d Peak	Field Stre	ngth	Margin v	rs. Peak Lii	mit	
	CL	Cable Los	55		HPF	High Pas	s Filter	:	-	-			
f	Dist	Read	AF	CL	Атр	D Corr		Corr.			Ant. Pol.		Notes
CHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
2412 MH				ļ						ļ			
4.824	3.0	37.5	33.1	5.8	-34.8	0.0	0.0	41.6	74.0	-3 <b>2.4</b>	V	Р	
4.824	3.0	24.5	33.1	5.8	-34.8	0.0	0.0	28.6	54.0	-25.4	V	A	
4.824	3.0	37.5	33.1	5.8	-34.8	0.0	0.0	41.6	74.0	-32.4	H	Р	
4.824 2437 MH	3.0	24.4	33.1	5.8	-34.8	0.0	0.0	28.5	54.0	-25.5	H	A	
2437 MLF 4.874	3.0	37.0	33.2	5.8	-34.8	0.0	0.0	41.2	74.0	-32.8	v	Р	
4.874	3.0	24.7	33.2	5.8	-34.8	0.0	0.0	28.9	74.0 54.0	-32.0	v	A	
7.311	3.0	36.0	36.3	7.3	-34.1	0.0	0.0	45.5	74.0	-28.5	v	P	
7.311	3.0	23.4	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	v	Ā	
2437 MH	z HT20									<u></u>			
4.874	3.0	37.2	33.2	5.8	-34.8	0.0	0.0	41.4	74.0	-32.6	H	Р	
4.874	3.0	24.9	33.2	5.8	-34.8	0.0	0.0	29.0	54.0	-25.0	H	A	
7.311	3.0	36.5	36.3	7.3	-34.1	0.0	0.0	45.9	74.0	- <b>28.1</b>	H	Р	
7.311	3.0	23.4	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	H	A	
2462 MH				ļ									
4.924	3.0	36.2	33.2	5.9	-34.8	0.0	0.0	40.5	74.0	-33.5	H	Р	
4.924	3.0	24.2	33.2	5.9	-34.8	0.0	0.0	28.4	54.0	-25.6	H	A	
7.386	3.0	35.9	36.4	7.3	-34.1	0.0	0.0	45.5	74.0	-28.5	H	P	
7.386	3.0	23.0	36.4	7.3	-34.1	0.0	0.0	32.6	54.0	-21.4	H	A	
2462 MH		300			240			40.0	740		TT		
4 0 0 4	3.0 3.0	36.6 24.1	33.2 33.2	5.9 5.9	-34.8 -34.8	0.0 0.0	0.0 0.0	40.8 28.3	74.0 54.0	-33.2 -25.7	v v	P	
	: 3.0	24.1 34.9	36.4	7.3	-34.8	0.0	0.0	28.3 44.5	54.0 74.0	-25.7	v V	A P	
4.924	30			· ()	: -3%1	; 0.0	0.0	44.2	(4.U	: -47.2		F	
4.924 4.924 7.386 7.386	3.0 3.0	22.8	36.4	7.3	-34.1	0.0	0.0	32.4	54.0	-21.6	v	A	

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## 8.3. WORST-CASE BELOW 1 GHz

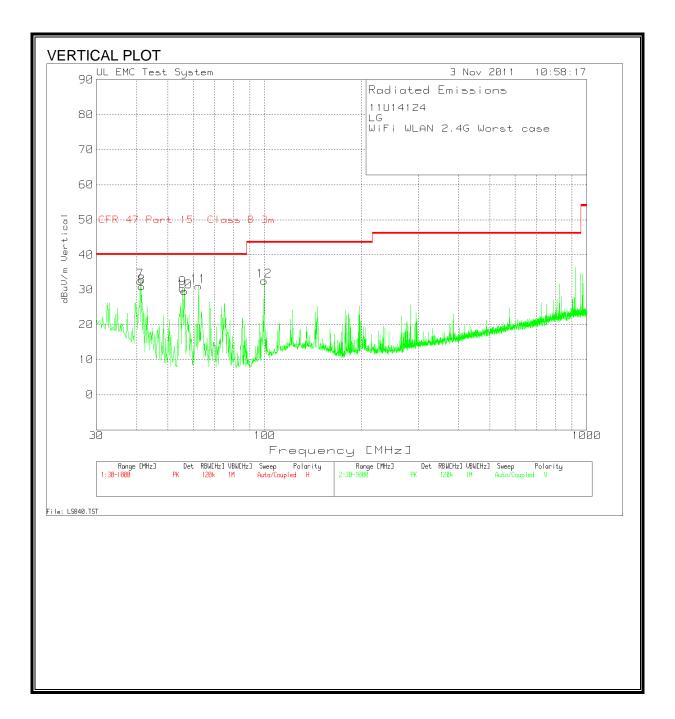
## SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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



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11U14124, I LG	2 3040									
WiFi WLAN	1 2.4G Wor	rst case								
Test Frequency	Meter Reading		below 1GHz.TXT	PreAmp	5m A T122 Bilog below 1GHz.TXT IdBl		CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
40.8553			<b>[ub]</b> 0.7				40			Horz
54.8122			0.8				40			Horz
58.1075			0.8				40			Horz
64.3106	41.68	PK	0.8	-28.2	8	22.28	40	-17.72	300	Horz
85.052	43.28	PK	1	-28.2	7.4	23.48	40	-16.52	200	Horz
99.3965	37.74	PK	1.1	-28.2	9.8	20.44	43.5	-23.06	100	Horz
	Meter		below 1GHz.TXT	PreAmp below	5m A T122 Bilog below 1GHz.TXT		CFR 47 Part 15 Class B 2m	Maruin	Height	Palaritu
Frequency 41.0492			[dB] 0.7	1GHz.TXT [dB] -28.3			Class B 3m 40		[cm] 200	Polarity ∀ert
41.4369			0.7							Vent
55.5875			0.8			30.35				Vent
56.3629			0.8							Vert
			0.8				40			Vert
62.1783		PK	1.1					-		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 Limit (dBuV)			
	Quasi-peak	Average		
0.15-0.5	66 to 56	56 to 46 *		
0.5-5	56	46		
5-30	60	50		

\* Decreases with the logarithm of the frequency.

## TEST PROCEDURE

ANSI C63.4

## **RESULTS**

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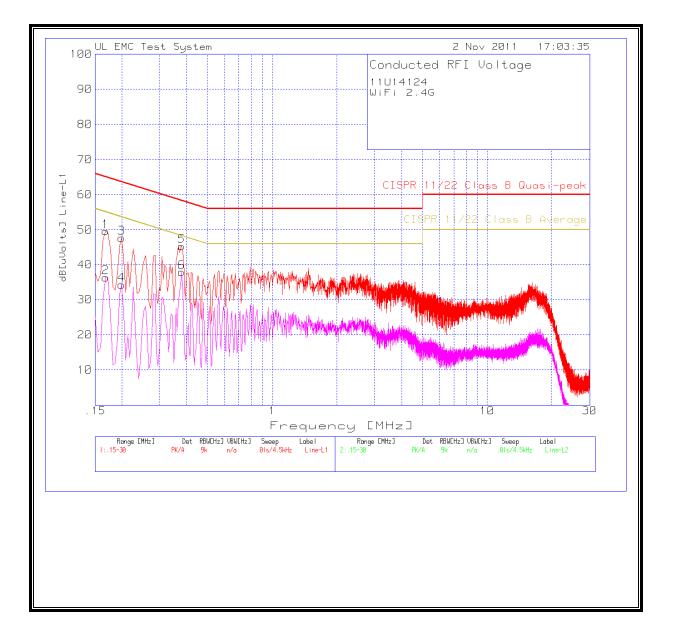
## **6 WORST EMISSIONS**

Line-L1.15	- 30MHz								
				Conducted		CISPR 11/22		CISPR 11/22	
Test	Meter			Emission	dB[uVolt	Class B		Class B	
Frequency	Reading	Detector	LISN [dB]	Cable [dB]	s]	Quasi-peak	Margin	Average	Margin
0.168	49.58	РК	0	0	49.58	65.1	-15.52	55.1	-5.52
0.168	36.27	Av	0	0	36.27	-	-	55.1	-18.83
0.1995	47.65	РК	0	0	47.65	63.6	-15.95	53.6	-5.95
0.1995	34.21	Av	0	0	34.21	-	-	53.6	-19.39
0.3795	45.37	РК	0	0	45.37	58.3	-12.93	48.3	-2.93
0.3795	37.83	Av	0	0	37.83	-	-	48.3	-10.47
Line-L2.15	- 30MHz								
				Conducted		CISPR 11/22		CISPR 11/22	
Test	Meter			Emission	dB[uVolt	Class B		Class B	
Frequency	Reading	Detector	LISN [dB]	Cable [dB]	s]	Quasi-peak	Margin	Average	Margin
0.1635	48.04	РК	0	0	48.04	65.3	-17.26	55.3	-7.26
0.1635	34.05	Av	0	0	34.05	-	-	55.3	-21.25
0.195	46.02	РК	0	0	46.02	63.8	-17.78	53.8	-7.78
0.195	29.93	Av	0	0	29.93	-	-	53.8	-23.87
0.3795	43.32	РК	0	0	43.32	58.3	-14.98	48.3	-4.98
0.3795	30.48	Av	0	0	30.48	-	-	48.3	-17.82

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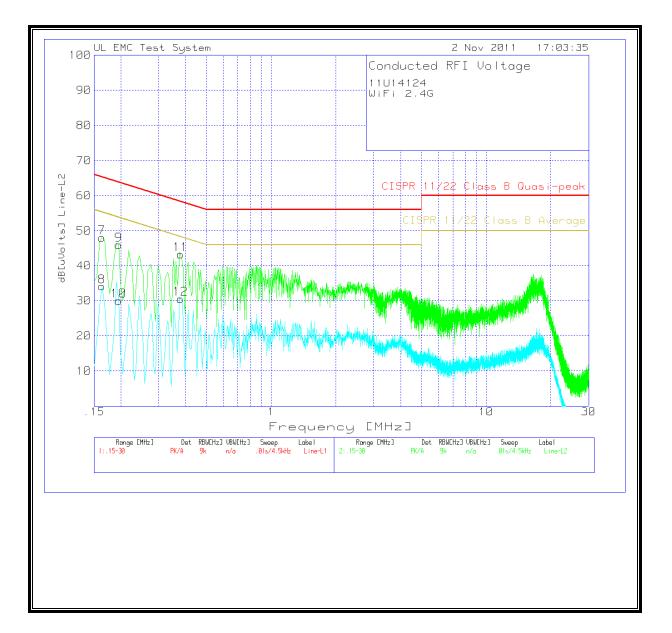
## LINE 1 RESULTS



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## LINE 2 RESULTS



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#### MAXIMUM PERMISSIBLE EXPOSURE 10.

## FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Lim	its for Occupational	I/Controlled Exposu	res	
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1 <i>8</i> 42/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f2) 1.0 f/300	6 6 6
	for General Populati	ion/Uncontrolled Exp	oosure	0
0.3–1.34	614 824 <i>/</i> f	1.63 2.19/f	*(100) *(180/f <sup>2</sup> )	30 30

#### TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

#### TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
30–300 300–1500	27.5	0.073	0.2 f/1500	30 30
1500-100,000			1.0	30

f = frequency in MHz

f = frequency in MHz \* = Plane-wave equivalent power density NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occu-pational/controlled limits apply provided he or she is made aware of the potential for exposure. NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be ex-posed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure.

exposure or can not exercise control over their exposure.

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## IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

## Table 5

# Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m <sup>2</sup> )	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/f	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> <sup>0.5</sup>	0.0042f <sup>0.5</sup>	f/150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 /f <sup>1.2</sup>
150 000–300 000	0.158f <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> f <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> f	616 000 /f <sup>1.2</sup>

\* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.

- 2. A power density of 10 W/m<sup>2</sup> is equivalent to 1 mW/cm<sup>2</sup>.
- A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

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## **EQUATIONS**

Power density is given by:

S = EIRP / (4 \* Pi \* D^2)

where

S = Power density in W/m^2 EIRP = Equivalent Isotropic Radiated Power in W D = Separation distance in m

Power density in units of W/m<sup>2</sup> is converted to units of mWc/m<sup>2</sup> by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 \* Pi \* S))

where

D = Separation distance in m EIRP = Equivalent Isotropic Radiated Power in W S = Power density in W/m^2

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power \* Gain product (in linear units) of each transmitter.

Total EIRP = (P1 \* G1) + (P2 \* G2) + ... + (Pn \* Pn)

where

Px = Power of transmitter xGx = Numeric gain of antenna x

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

## LIMITS

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

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

## **RESULTS**

(MPE distance equals 20 cm)

Band	Mode	Separation	Output	Antenna	IC Power	FCC Power
		Distance	Power	Gain	Density	Density
		(m)	(dBm)	(dBi)	(W/m^2)	(mW/cm^2)
2.4 GHz	WLAN	0.20	14.85	-1.69	0.04	0.004