



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

**CERTIFICATION TEST REPORT** 

# FOR

## GSM & W-CDMA Phone + BT

## MODEL NUMBER: LG440G

FCC ID: ZNFLG440G

## REPORT NUMBER: 12U14353-1, Revision B

ISSUE DATE: MAY 16, 2012

Prepared for LG ELECTRONICS MOBILECOMM U.S.A., INC. 1000 SYLVAN AVE. ENGLEWOOD CLIFFS, NJ 07632

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
	05/07/2012	Initial Issue	T. LEE
A	05/15/12	Updated Client address	A. Zaffar
В	05/16/12	Updated EUT description	A. Zaffar

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## **1. ATTESTATION OF TEST RESULTS**

COMPANY NAME:	LG ELECTRONICS MOBILECOMM U. 1000 SYLVAN AVE. ENGLEWOOD CLIFFS, NJ 07632	S.A., INC.
EUT DESCRIPTION:	GSM & W-CDMA Phone + BT	
MODEL:	LG440G	
<b>SERIAL NUMBER:</b> 203KPUU163102, 203KPKN163101		
DATE TESTED:	APRIL 5 – MAY 5, 2012	
	APPLICABLE STANDARDS	
ST	ANDARD	TEST RESULTS
CFR 47 P	art 15 Subpart C	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:

Ti Su

TIM LEE STAFF ENGINEER UL CCS Tested By:

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 GSM & W-CDMA Phone + BT

## 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)
2402 - 2480	Basic GFSK	9.96	9.91
2402 - 2480	Enhanced 8PSK	10.07	10.16

## 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 3.65 dBi.

## 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing KERNAL version 3.0.8

The test utility software used during testing was LA89601R120414A

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## 5.5. WORST-CASE CONFIGURATION AND MODE

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

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case data rates as provided by the client were: Based on the baseline scan, the worst-case data rates were:

GFSK DH5 mode QPSK 2-DH5 mode 8PSK 3-DH5 mode

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## 5.6. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

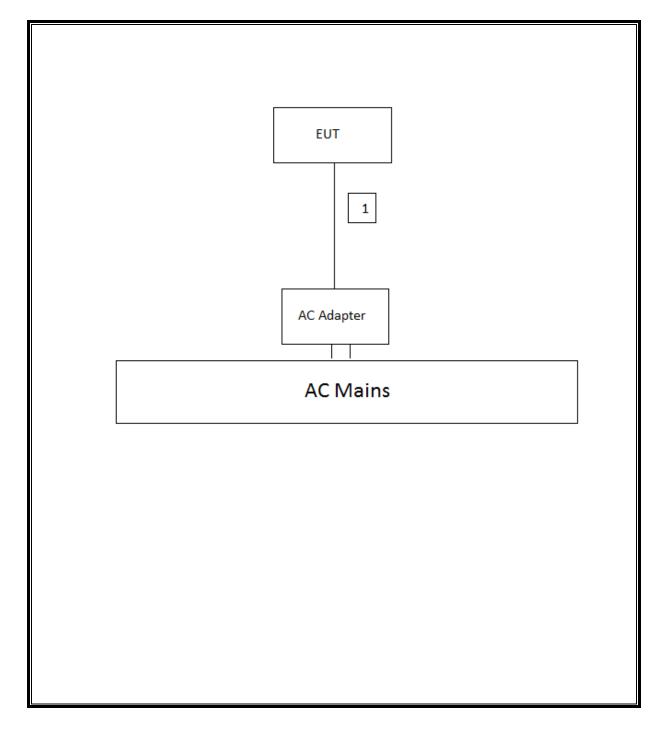
Support Equipment List					
Description Manufacturer Model Serial Number					
AC ADAPTER	LG ELECTRONICS	MCS-01WR	RA1Z0051473		

#### I/O CABLES

	I/O Cable List						
Cable	Port	# of identical	Connector	Cable Type	<b>Cable Length</b>	Remarks	
No		ports	Туре		(m)		
	DC		MINI USB	UN-SHELDED	1.0m	LG-DLC300 (BA21)	

#### TEST SETUP

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

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# 7. ANTENNA PORT TEST RESULTS

## 7.1. BASIC DATA RATE GFSK MODULATION

## 7.1.1. 20 dB AND 99% BANDWIDTH

### <u>LIMIT</u>

None; for reporting purposes only.

### TEST PROCEDURE

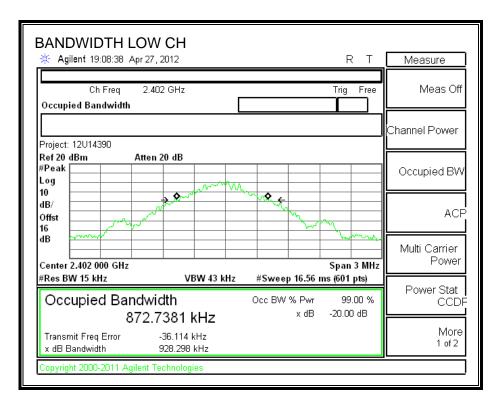
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

### <u>RESULTS</u>

Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	928.298	870.6885
Middle	2441	925.785	894.8859
High	2480	933.268	882.5364

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#### 20 dB BANDWIDTH



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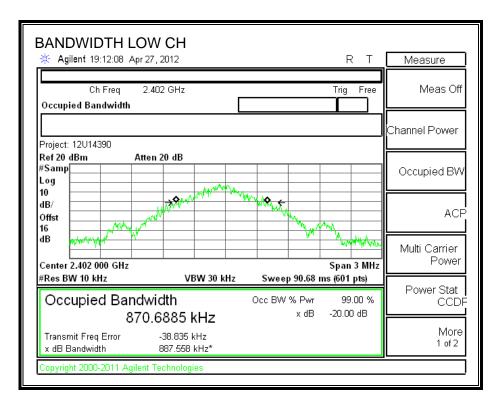
BANDWIDTH MID Agilent 19:07:31 Apr 27,	-		RТ	Measure
Ch Freq 2.44 Occupied Bandwidth	1 GHz		Trig Free	Meas Off
Project: 12U14390	_			Channel Power
Ref 20 dBm Atten #Peak				Occupied BW
10 dB/ Offst	A A A A A A A A A A A A A A A A A A A	mo to the second	~~	ACP
dB			Span 2 MHz	Multi Carrier Power
#Res BW 15 kHz	VBW 43 kHz	Sweep 12.8 i	Span 3 MHz ns (601 pts)	
Occupied Bandwig 866.9	dth )699 kHz	Occ BW % Pwr x dB		Power Stat CCDF
	-34.669 kHz 925.785 kHz			More 1 of 2
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BANDWIDTH HIGH	-			
🔆 Agilent 19:06:42 Apr 27, 2	012		RT	Measure
Ch Freq 2.48 Occupied Bandwidth	GHz		Trig Free	Meas Off
				Channel Power
Project: 12U14390				
Ref 20 dBm Atten 2 #Peak Log				Occupied BW
Offst				ACP
dB				Multi Carrier Power
Center 2.480 000 GHz			Span 3 MHz	Power
#Res BW 15 kHz	VBW 43 kHz	Sweep 12.8	ms (601 pts)	Power Stat
Occupied Bandwic		Occ BW % Pwr x dB	99.00 % -20.00 dB	
8/6.8	139 kHz	× 40	-20.00 dD	
	31.557 kHz 33.268 kHz			More 1 of 2
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#### 99% BANDWIDTH



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BANDWIDTH MID CH	R 1	Measure
Ch Freq 2.441 GHz Occupied Bandwidth	Trig Fre	Meas Off
Project: 12U14390		Channel Power
Ref 20 dBm Atten 20 dB #Samp	A. A	Occupied BW
Log 10 dB/ Offst 16 16 16 16 16 10 10 10 10 10 10 10 10 10 10		ACP
Center 2.441 000 GHz #Res BW 10 kHz VBW 3	Span 3 M kHz Sweep 90.68 ms (601 pts)	
Occupied Bandwidth 894.8859 kHz	Occ BW % Pwr 99.00 % x dB -20.00 dB	6 Power Stat CCDF
Transmit Freq Error-23.173 kHzx dB Bandwidth919.012 kHz*		More 1 of 2
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BANDWIDTH HIGH CH			RТ	Measure
Ch Freq 2.48 GHz Occupied Bandwidth			Trig Free	Meas Off
Project: 12U14390				Channel Power
Ref 20 dBm Atten 20 dB #Samp				Occupied BW
Log 10 dB/ Offst 16 10 10 10 10 10 10 10 10 10 10	M DAY CONTRACT	hand with any and a second sec		ACP
dB			Span 3 MHz	Multi Carrier Power
#Res BW 10 kHz VI Occupied Bandwidth	BW 30 kHz	Sweep 90.68	ms (601 pts) 99.00 %	Power Stat CCDF
882.5364	кНz	x dB		
Transmit Freq Error -39.978 × dB Bandwidth 888.156				More 1 of 2
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### 7.1.2. HOPPING FREQUENCY SEPARATION

### <u>LIMIT</u>

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

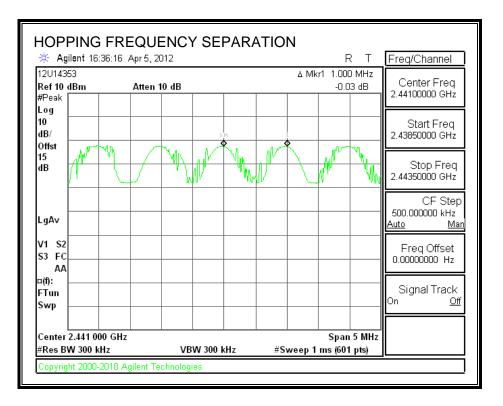
#### TEST PROCEDURE

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

#### RESULTS

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#### HOPPING FREQUENCY SEPARATION



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## 7.1.3. NUMBER OF HOPPING CHANNELS

### <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

### **RESULTS**

79 Channels observed.

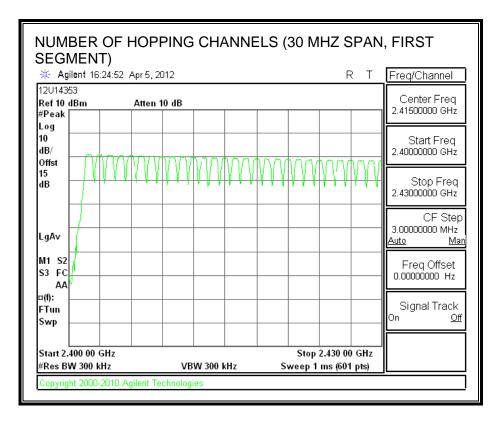
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### NUMBER OF HOPPING CHANNELS

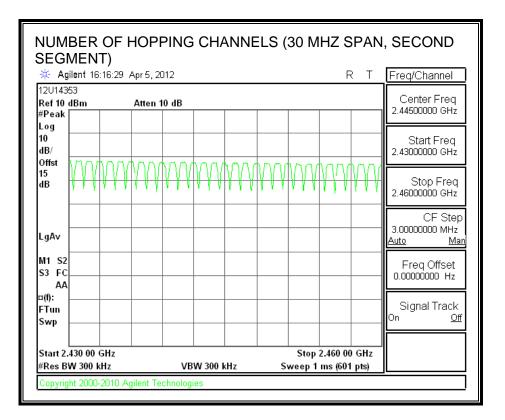
	NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)						
🔆 Agilent 16:31:3	34 Apr 5, 2012			RΤ	Freq/Channel		
12∪14353 Ref 10 dBm #Peak	Atten 10 dB				Center Freq 2.44000000 GHz		
Log 10 dB/ Offst		WORD MAN GAR LA AGO TO			Start Freq 2.39000000 GHz		
dB	, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	un din din din din din din din din din di			Stop Freq 2.49000000 GHz		
LgAv					CF Step 10.0000000 MHz <u>Auto Man</u>		
M1 S2 S3 FC AA				horrow	Freq Offset 0.00000000 Hz		
¤(f): FTun Swp					Signal Track On <u>Off</u>		
Start 2.390 00 GHz    Stop 2.490 00 GHz      #Res BW 300 kHz    VBW 300 kHz    Sweep 1.36 ms (601 pts)							
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	NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)										
🔆 Agi		'	Apr 5, 20	12					R	Т	Freq/Channel
12U143 Ref 10( #Peak			Atten 1	0 dB							Center Freq 2.47500000 GHz
Log 10 dB/											Start Freq 2.4600000 GHz
Offst 15 dB	W	YYY	M	YW	M	M	¥η				Stop Freq 2.4900000 GHz
LgA∨											CF Step 3.00000000 MHz <u>Auto Man</u>
M1 S2 S3 FC AA								Lan	mummed	- un france	Freq Offset 0.00000000 Hz
¤(f): FTun Swp											Signal Track On <u>Off</u>
	Start 2.460 00 GHz    Stop 2.490 00 GHz      #Res BW 300 kHz    VBW 300 kHz    Sweep 1 ms (601 pts)										
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## 7.1.4. AVERAGE TIME OF OCCUPANCY

### <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels \* 0.4 s) is equal to 10 \* (# of pulses in 3.16 s) \* pulse width.

### <u>RESULTS</u>

Time Of Occupancy = 10 \* xx pulses \* yy msec = zz msec

### GFSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.3833	32	0.123	0.4	-0.277
DH3	1.642	14	0.230	0.4	-0.170
DH5	2.867	12	0.344	0.4	-0.056

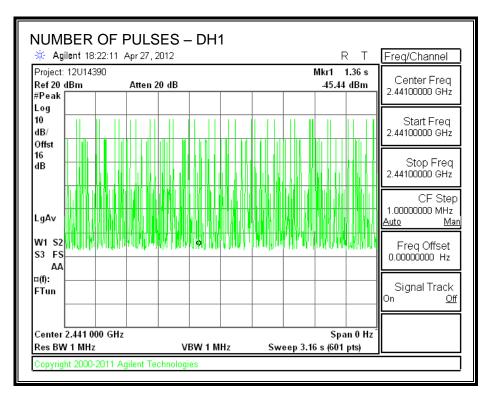
### PULSE WIDTH - DH1

PULS												_		
🔆 Agi				A	pr 27 , 2	2012						F		Marker
Project: Ref 20 #Peak			390		Atten 2	20 dB					∆ Mk		.3 µs 93 dB	Select Marker 1 <u>2 3</u> 4
Log 10 dB/							1							Normal
Offst 16 dB	1) ¢	9 <b>1</b> 1	MA	Дľ	n ry	WT	<b>///^</b>	,						Delta
LgAv														Delta Pair (Tracking Ref) Ref <u>∆</u>
W1 S2 S3 VS AA	phron.							Mu	Minda	alle allan	Sall Un	Myrthingu	Murth	Span Pair <sub>Span <u>Center</u></sub>
¤(f): FTun								יקינ		Markilar .	<b>WA</b> . AIL A		· • • • •	Off
Center Res BW				lz		v	/BW	/ 1 M	Hz	S	weep 1		n0Hz pts)	More 1 of 2
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#### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



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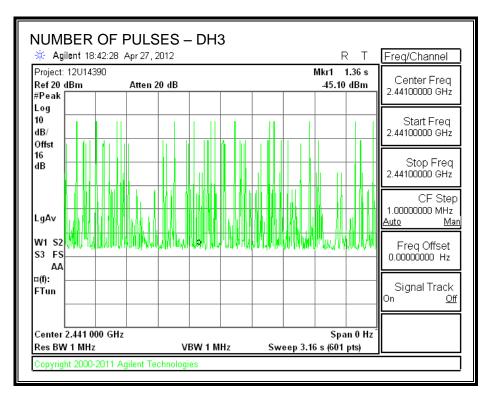
#### PULSE WIDTH – DH3

🔆 Agilent 18:44:	19 Apr 27, 2012			RΤ	Freq/Channel
Project: 12U14390 <b>Ref 20 dBm</b> #Peak	Atten 20 dB		∆ Mkr	1 1.642 ms -0.02 dB	Center Freq 2.44100000 GHz
Log 1R 10 Q. 1B/ Offst					Start Freq 2.44100000 GHz
IG IB					Stop Freq 2.44100000 GHz
LgAv					CF Step 1.00000000 MHz <u>Auto Ma</u> i
W1 S2 S3 VS AA		ส่งประการสารการสารสารสารสารสารสารสารสารสารสารสารสารสา	Arriter Algeria	the fear land the state of the	Freq Offset 0.00000000 Hz
a(f): FTun					Signal Track On <u>Off</u>
Center 2.441 000 ( Res BW 1 MHz		VBW 1 MHz	Sweep 5 n	Span 0 Hz ns (601 pts)	

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#### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH3



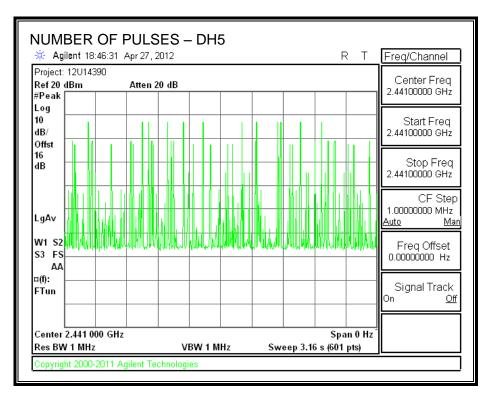
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### PULSE WIDTH – DH5

PULSE WID				RТ	Freq/Channel
Project: 12U14390 Ref 20 dBm #Peak	Atten 20 dB		∆ Mkr1	Center Freq 2.44100000 GHz	
Log 10 dB/			1		Start Freq 2.44100000 GHz
Offst 0 16 dB			v-•		Stop Freq 2.44100000 GHz
LgAv					CF Step 1.0000000 MHz <u>Auto Man</u>
W1 S2 S3 VS			Warth Jack Martin	alata ana ana ana ana ana ana ana ana ana	Freq Offset 0.00000000 Hz
¤(f): FTun					Signal Track On <u>Off</u>
Center 2.441 000 G Res BW 1 MHz		SW 1 MHz	Sweep 5 ms	Span 0 Hz ; (601 pts)	
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#### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH5



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## 7.1.5. OUTPUT POWER

### <u>LIMIT</u>

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

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

#### TEST PROCEDURE

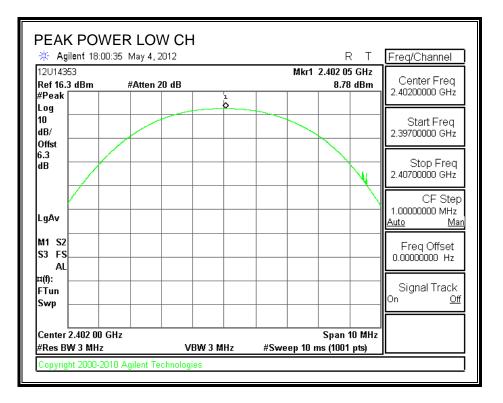
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

### <u>RESULTS</u>

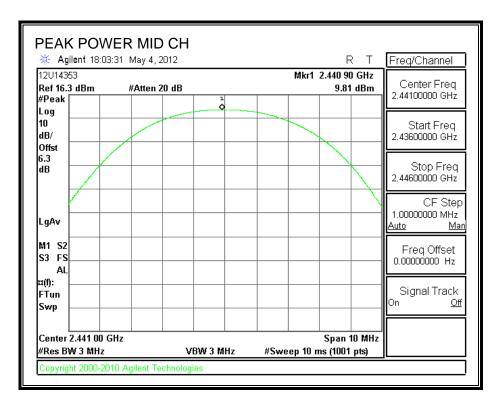
Channel	Frequency	Output Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2402	8.78	30	-21.22
Middle	2441	9.81	30	-20.19
High	2480	9.96	30	-20.04

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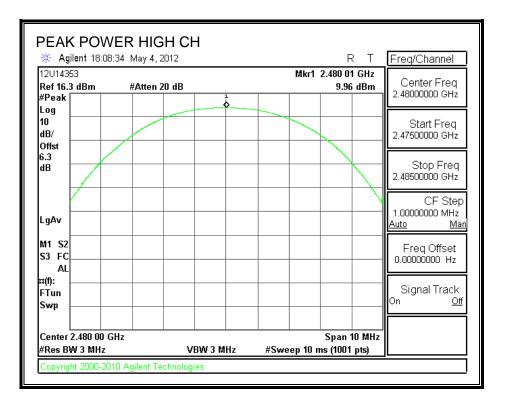
### **OUTPUT POWER**



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### 7.1.6. AVERAGE POWER

### <u>LIMIT</u>

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

#### **RESULTS**

The cable assembly insertion loss of 0.88 dB (including 0 dB pad and 0.88 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	8.60
Middle	2441	9.10
High	2480	9.00

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# 7.1.7. CONDUCTED SPURIOUS EMISSIONS

# **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

# 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.

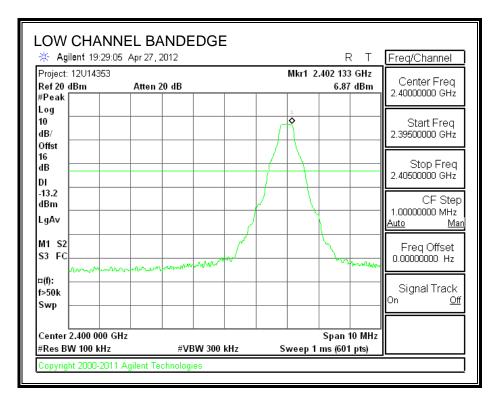
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

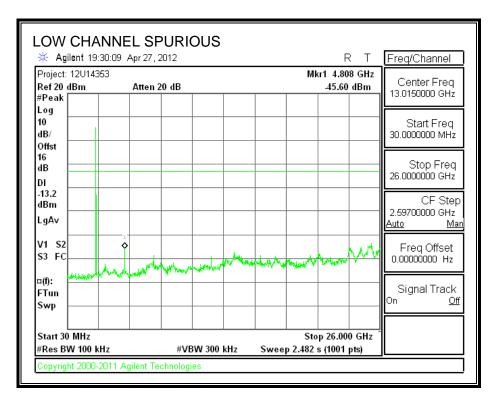
# <u>RESULTS</u>

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## SPURIOUS EMISSIONS, LOW CHANNEL

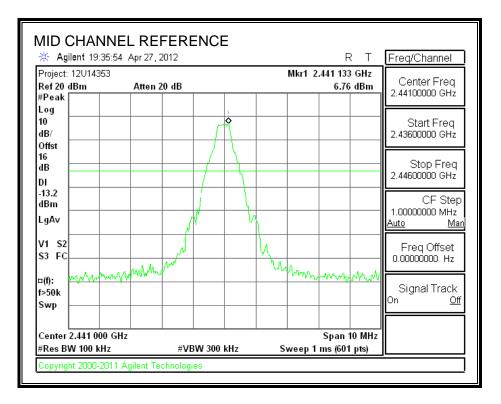


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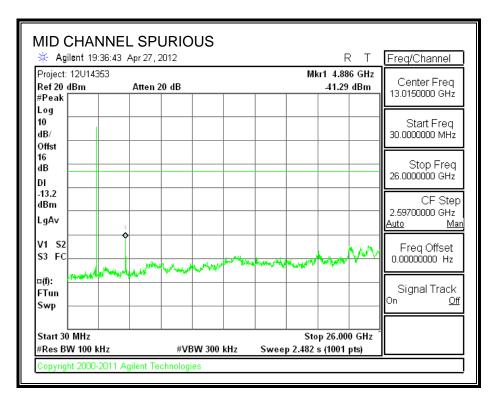
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## SPURIOUS EMISSIONS, MID CHANNEL



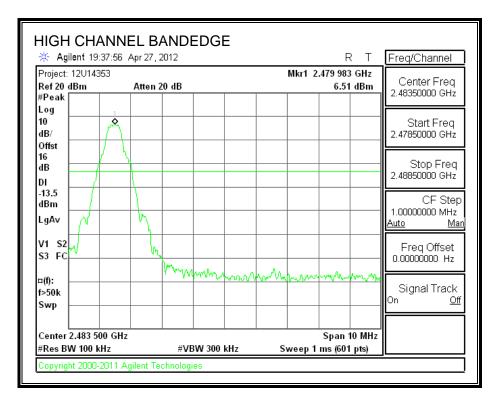
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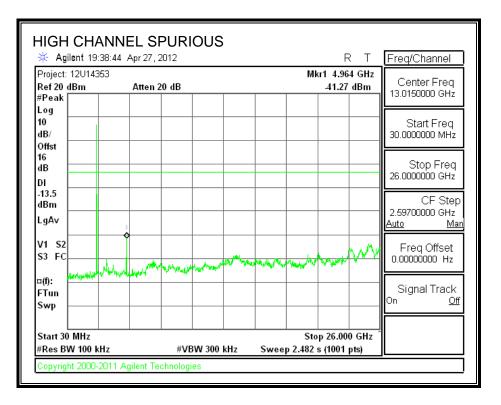


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## SPURIOUS EMISSIONS, HIGH CHANNEL

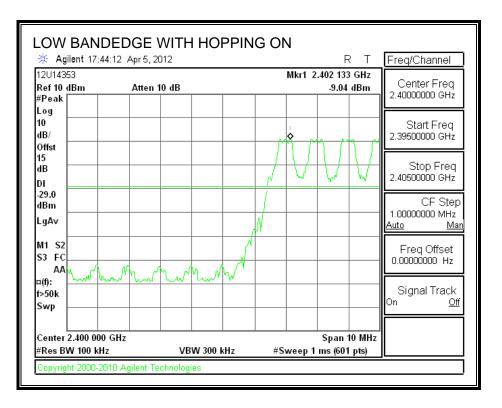


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## SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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🔆 Agilent 17:	49:33 Ap	r 5, 2012					R	Т	Freq/Channel
12U14353 Ref 10 dBm #Peak	Δ	tten 10 dB				Mkr1 2	.478 967 -13.98		Center Freq 2.48350000 GHz
Log 10 dB/ Offst 🗢									Start Freq 2.47850000 GHz
Offist 15 dB DI	M								Stop Freq 2.48850000 GHz
-34.0 / / dBm LgA∨									CF Step 1.00000000 MHz <u>Auto Man</u>
M1 S2 S3 FC		M							Freq Offset 0.00000000 Hz
¤(f): f>50k Swp		www	min	ww	~~~~		m	mhr	Signal Track On <u>Off</u>
Center 2.483 50 #Res BW 100 k			VBW 300	kHz	#S1	weep 1	Span 1 ms (601		

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# 7.2. ENHANCED DATA RATE 8PSK MODULATION

# 7.2.1. 20 dB AND 99% BANDWIDTH

# <u>LIMIT</u>

None; for reporting purposes only.

# TEST PROCEDURE

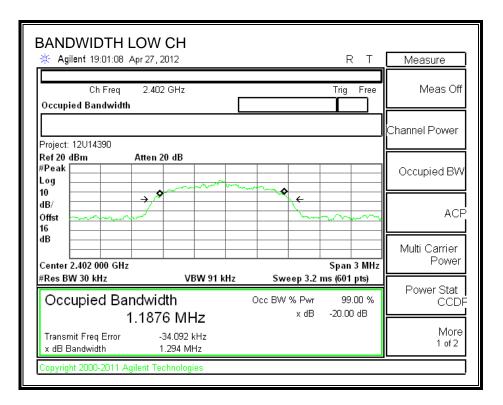
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

## **RESULTS**

Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	2402	1.294	1.1965
Middle	2441	1.308	1.1987
High	2480	1.312	1.1975

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#### 20 dB BANDWIDTH



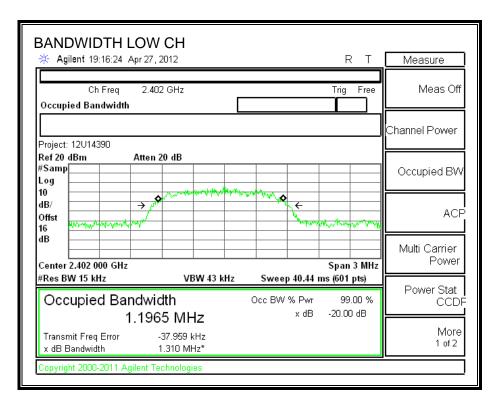
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BANDWIDTH MID C			RТ	Measure
Ch Freq 2.441 Occupied Bandwidth	GHz		Trig Free	Meas Off
Project: 12U14390				Channel Power
Ref 20 dBm Atten 2 #Peak Log	) dB			Occupied BW
10 dB/ Offst 16		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	ACP
dB			Span 3 MHz	Multi Carrier Power
#Res BW 30 kHz	VBW 91 kHz	Sweep 3.2		
Occupied Bandwid	th 7 MHz	Occ BW % Pwr x dB	99.00 % -20.00 dB	Power Stat CCDF
	11.100 kHz 308 MHz			More 1 of 2
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BANDWIDTH HIGI	-		RТ	Measure
In the second se	2012			
Ch Freq 2.44 Occupied Bandwidth	3 GHz		Trig Free	Meas Off
				Channel Power
Project: 12U14390				
#Peak	20 dB			Occupied BW
10 dB/ Offst → /		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		ACP
dB				Multi Carrier
Center 2.480 000 GHz	· · · ·	· · ·	Span 3 MHz	Power
#Res BW 30 kHz	VBW 91 kHz	Sweep 3.2	ms (601 pts)	
Occupied Bandwi		Occ BW % Pwr x dB	99.00 % -20.00 dB	Power Stat CCDF
1.180	63 MHz	X 0D	-20.00 ab	
Transmit Freq Error x dB Bandwidth	-35.230 kHz 1.312 MHz			More 1 of 2
Copyright 2000-2011 Agilent T	echnologies			

#### 99% BANDWIDTH



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BANDWIDTH MID CH	Measure
Ch Freq 2.441 GHz Trig Free Occupied Bandwidth	Meas Off
Project: 12U14390	Channel Power
Ref 20 dBm Atten 20 dB #Samp	Occupied BW
$ \begin{array}{c c} Log \\ 10 \\ dB \\ \hline \\ Offst \\ 16 \\ \end{array} $	ACP
	Multi Carrier Power
Center 2.441 000 GHz    Span 3 MHz      #Res BW 15 kHz    VBW 43 kHz    Sweep 40.44 ms (601 pts)	
Occupied Bandwidth    Occ BW % Pwr    99.00 %      1.1987 MHz    × dB    -20.00 dB	Power Stat CCDF
Transmit Freq Error -38.056 kHz x dB Bandwidth 1.318 MHz*	More 1 of 2
Copyright 2000-2011 Agilent Technologies	

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BANDWIDTH HIG	Н СН			
🔆 Agilent 19:14:44 Apr 27	, 2012		RT	Measure
Ch Freq 2.4	B GHz		Trig Free	Meas Off
Occupied Bandwidth				
				Channel Power
Project: 12U14390				
#Samp	20 dB			Occupied BW
Log	And the second second second	nor the state		
dB/ →/ Offst ///////////////////////////////////			Mary Mr. Row of Mary Mary	ACF
dB				Multi Carrier
Center 2.480 000 GHz			Span 3 MHz	Power
#Res BW 15 kHz	VBW 43 kHz	Sweep 40.44	•	
Occupied Bandwi		Occ BW % Pwr		Power Stat CCDF
1.19	75 MHz	x dB	-20.00 dB	
Transmit Freq Error x dB Bandwidth	-31.982 kHz 1.275 MHz*			More 1 of 2
Copyright 2000-2011 Agilent T	echnologies			IL
[				

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# 7.2.2. HOPPING FREQUENCY SEPARATION

# <u>LIMIT</u>

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

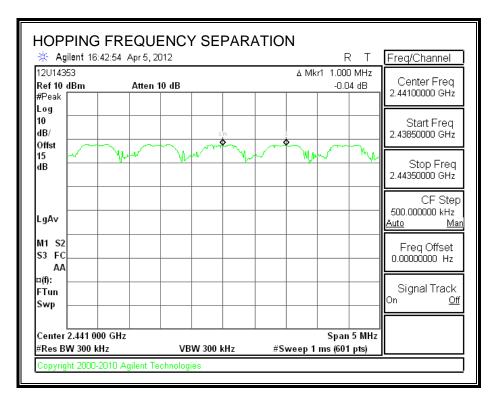
### TEST PROCEDURE

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

## RESULTS

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### HOPPING FREQUENCY SEPARATION



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# 7.2.3. NUMBER OF HOPPING CHANNELS

# <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

## TEST PROCEDURE

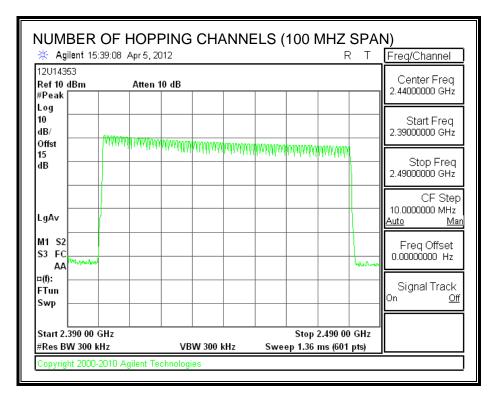
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

# **RESULTS**

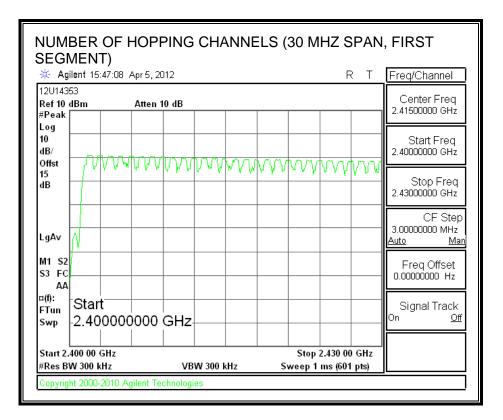
79 Channels observed.

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## NUMBER OF HOPPING CHANNELS



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Agilent 18	55:57	Apr 5, 2L	J12						R Τ	Freq/Channel
4353 0 dBm		Atten 1	0 dB							Center Freq
k										
										Start Freq 2.43000000 GHz
M	WW	WW	ww	VVV	VVV	VVV	γvγ	VVV	VVV	Stop Fred
										2.46000000 GHz
										CF Ste 3.00000000 MH; Auto M
2										Freq Offset
с <u> </u>										0.00000000 Hz
										Signal Track
										on <u>c</u>

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NUMB SEGM			HOPF	PING	CHA	NNE	ELS (	30 N	IHZ S	SPAN	I, THIRD
🔆 Agiler		'	Apr 5 , 20	112						ς τ	Freq/Channel
12U14353 Ref 10 dB #Peak			Atten 1	0 dB							Center Freq 2.47500000 GHz
Log 10 dB/											Start Freq 2.46000000 GHz
Offst 15 ∐ dB	<u> </u>	ΛΛΛ	vvγ	νvγ	vvv	VVV	M				Stop Freq 2.49000000 GHz
LgAv											CF Step 3.0000000 MHz <u>Auto Man</u>
M1 S2 S3 FC AA								1 Law	- Allen and		Freq Offset 0.00000000 Hz
¤(f): FTun Swp											Signal Track On <u>Off</u>
Start 2.46 #Res BW				VB	W 300 I	Hz	S	-	2.490 0 ms (60		
Copyright	2000-2	010 Ag	jilent Teo	chnologi	es			-			

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# 7.2.4. AVERAGE TIME OF OCCUPANCY

# <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

## TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels \* 0.4 s) is equal to 10 \* (# of pulses in 3.16 s) \* pulse width.

# <u>RESULTS</u>

Time Of Occupancy = 10 \* xx pulses \* yy msec = zz msec

# 8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.39	32	0.125	0.4	-0.275
DH3	1.642	17	0.279	0.4	-0.121
DH5	2.883	8	0.231	0.4	-0.169

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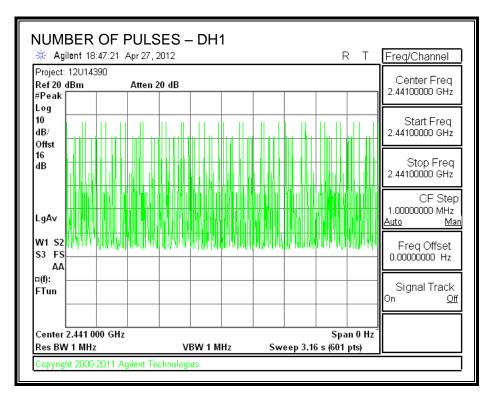
# PULSE WIDTH - DH1

PULSE WIDT			
Agilent 18:52:46	Apr 27, 2012	R T ∆ Mkr1 390 µs	Freq/Channel
Ref 20 dBm #Peak	Atten 20 dB	-1.13 dB	Center Freq 2.44100000 GHz
Log 10 dB/ Offst			Start Freq 2.44100000 GHz
16 dB			Stop Freq 2.44100000 GHz
LgAv .			CF Step 1.0000000 MHz <u>Auto Man</u>
W1 S2 S3 VS AA	the strange when the strange	- WWW WWWWWWWWWWWWWWWW	Freq Offset 0.00000000 Hz
r(f): FTun			Signal Track On <u>Off</u>
Center 2.441 000 GH Res BW 1 MHz	z VBW 1 MHz	Span 0 Hz Sweep 2 ms (601 pts)	
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#### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



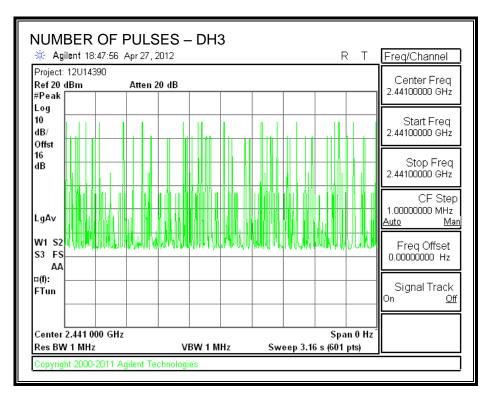
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# PULSE WIDTH – DH3

🔆 Agiler			Apr 27 , 2	012					۵ Mk	R	T 2 ms	Freq/Channel
Project: 12 Ref 20 dB #Peak		90	Atten 2	0 dB	_					-1.07		Center Freq 2.44100000 GHz
Log1 10 dB/ Offst	.R Ор	1987-TV-198-1848	********		>							Start Freq 2.44100000 GHz
dB												Stop Freq 2.44100000 GHz
LgAv												CF Step 1.00000000 MHz <u>Auto Man</u>
W1 S2 S3 VS AA					1	hoventur	olanda ya	at front state and front	<del>n hallo de la c</del> harlach	p. M	kentlererte	Freq Offset 0.00000000 Hz
¤(f): FTun												Signal Track On <u>Off</u>
Center 2.4 Res BW 1		0 GHz			v	BW 1 M	Hz	s	weep 5	-	n 0 Hz pts)	

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#### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH3



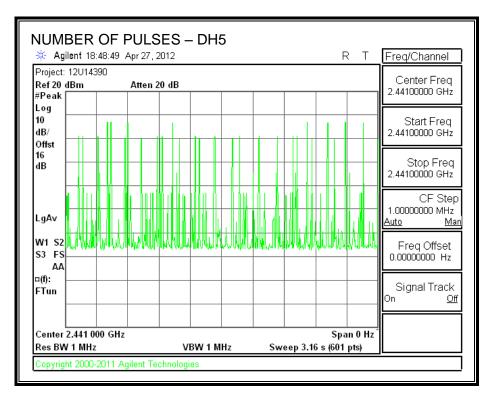
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## PULSE WIDTH – DH5

W1 S2 S3 VS AA ¤(f):			hhlitet	40°\$*5\$  ~4776	at the second second	₽₩₩₩₩	14000 AV	unitedaptiv	ptheredday	Freq Offset 0.00000000 Hz Signal Track
LgAv										CF Step 1.00000000 MHz <u>Auto Mar</u>
16 dB										Stop Freq 2.44100000 GHz
Log 10 dB/ Offst	1R \$\mathcal{P}_1		\$ •							Start Freq 2.44100000 GHz
<b>Ref 20</b> #Peak	12U14390 dBm	Atten 2	20 dB				∆ Mk		33 ms 5 dB	Center Freq 2.44100000 GHz

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#### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH5



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# 7.2.5. OUTPUT POWER

# <u>LIMIT</u>

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

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

## TEST PROCEDURE

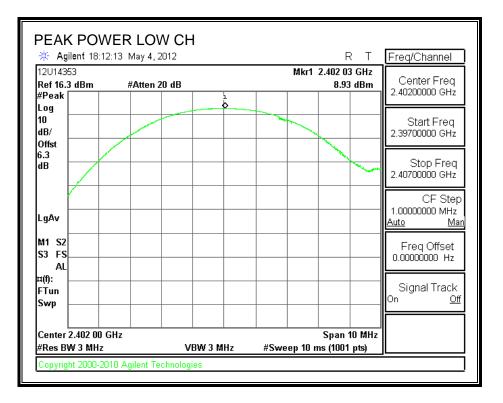
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

# <u>RESULTS</u>

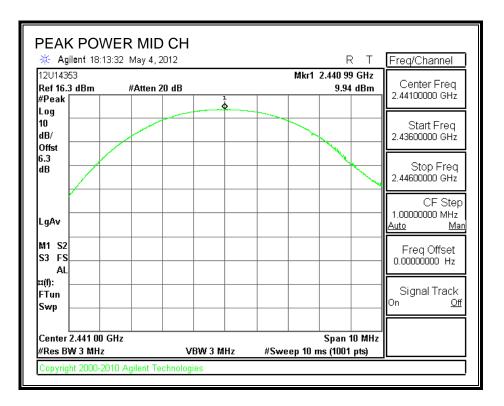
Channel	Frequency	Output Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2402	8.93	30	-21.07
Middle	2441	9.94	30	-20.06
High	2480	10.07	30	-19.93

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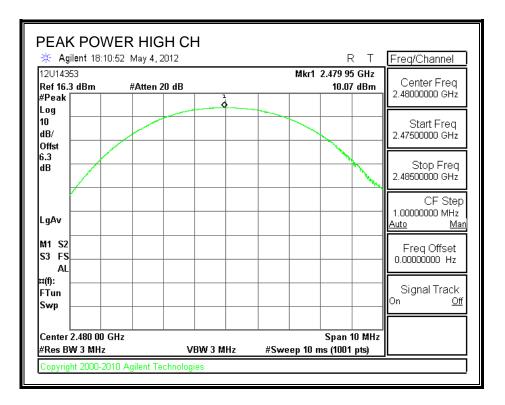
## **OUTPUT POWER**



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# 7.2.6. AVERAGE POWER

# <u>LIMIT</u>

None; for reporting purposes only.

## TEST PROCEDURE

The transmitter output is connected to a power meter.

## **RESULTS**

The cable assembly insertion loss of 0.88 dB (including 0 dB pad and 0.88 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	8.70
Middle	2441	9.10
High	2480	9.00

# 7.2.7. CONDUCTED SPURIOUS EMISSIONS

# **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

# 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.

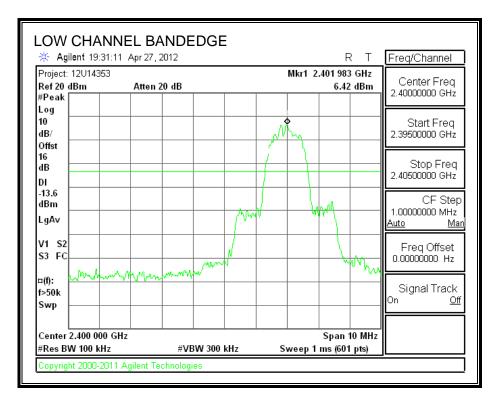
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

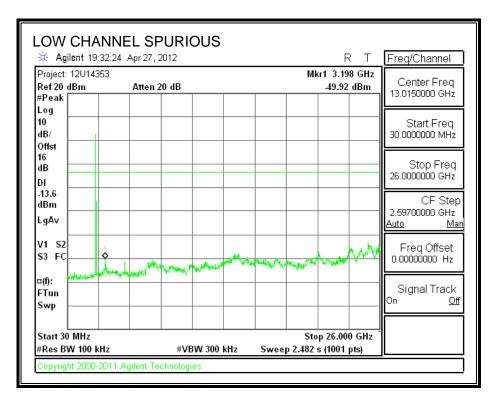
# <u>RESULTS</u>

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#### SPURIOUS EMISSIONS, LOW CHANNEL

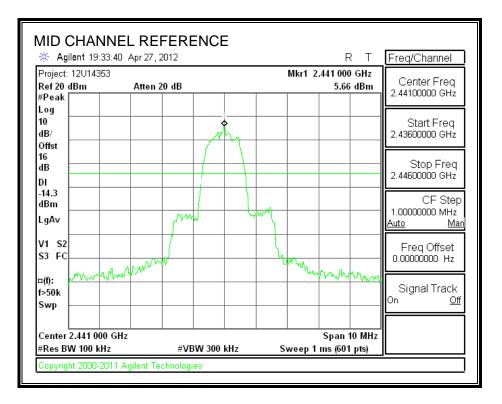


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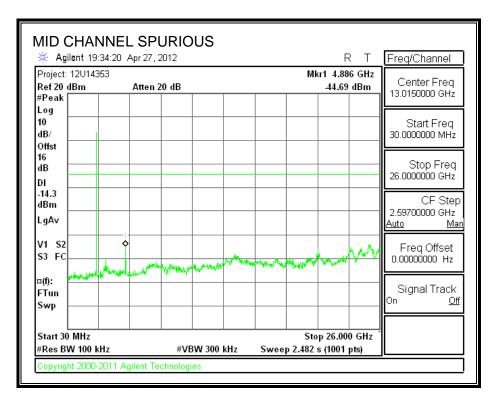


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#### SPURIOUS EMISSIONS, MID CHANNEL

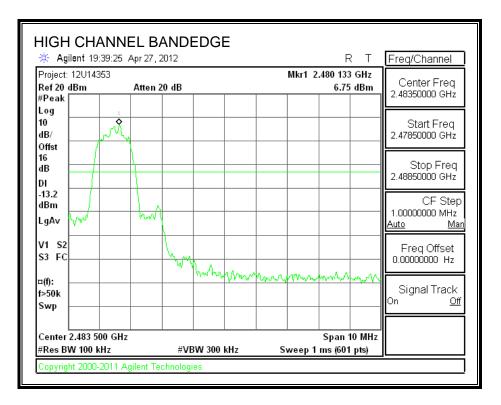


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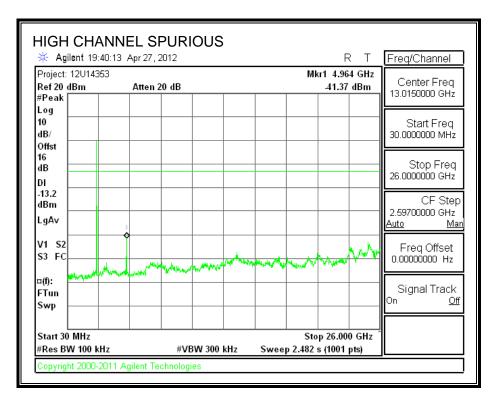


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#### SPURIOUS EMISSIONS, HIGH CHANNEL

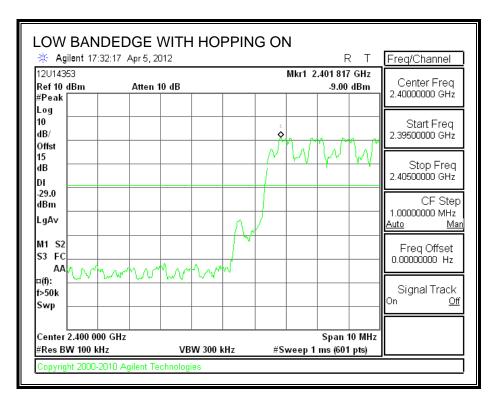


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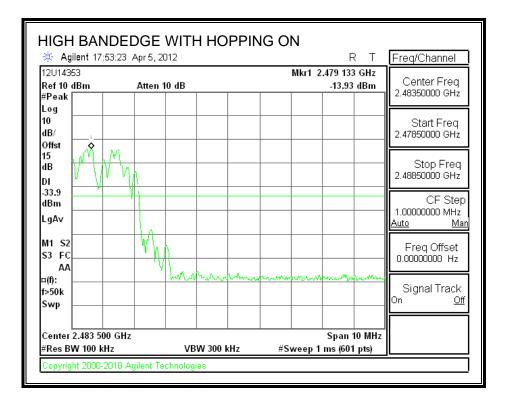


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#### SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



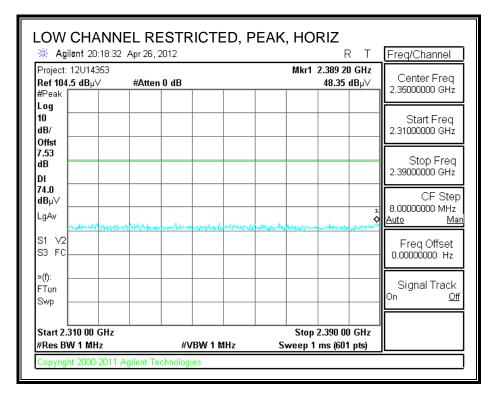
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# 7.2.8. BASIC DATA RATE GFSK MODULATION

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



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K Agilent 20:19:		D, AVG, HORIZ	Freq/Channel
Project: 12U14353 <b>Ref 104.5 dB</b> µ∀ #Peak	#Atten 0 dB	Mkr1 2.388 93 GHz 37.03 dBµ∀	Center Freq 2.35000000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
7.53 dB			Stop Freq 2.3900000 GHz
54.0 4Bµ∨ _qAv			CF Step 8.00000000 MHz Auto Mai
51 V2 53 FC			
*(f): =Tun Swp			Signal Track
Start 2.310 00 GH: #Res BW 1 MHz	z #VBW 10 I	Stop 2.390 00 GHz 1z Sweep 6.238 s (601 pts)	Ì

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

Agilent 20:29:	20 Apr 26, 2012	RT	Freq/Channel
roject: 12U14353 l <b>ef 104.5 dB</b> µ∨ Peak	#Atten 0 dB	Mkr1 2.328 53 GHz 48.18 dBµ∨	Center Freq 2.35000000 GHz
og D B/			Start Freq 2.31000000 GHz
153			Stop Freq 2.3900000 GHz
4.0 Βμ∨ gAv		and and the second s	CF Step 8.00000000 MHz <u>Auto Ma</u>
1 V2 3 FC			Freq Offset 0.00000000 Hz
(f): Tun wp			Signal Track On <u>Of</u>
tart 2.310 00 GHz Res BW 1 MHz	#VBW 1 MHz	Stop 2.390 00 GHz Sweep 1 ms (601 pts)	

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OW CHANN	NEL RESTRICTEI 9 Apr 26, 2012	D, AVG, VERT	Freq/Channel
Project: 12U14353 <b>Ref 104.5 dB</b> µ∨ #Peak	#Atten 0 dB	Mkr1 2.389 07 GHz 36.37 dBµ∨	Center Freq 2.35000000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
7.53 dB DI			Stop Freq 2.3900000 GHz
54.0 dBµ∨ LgAv			CF Step 8.0000000 MHz <u>Auto Man</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
«(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 10 H	Stop 2.390 00 GHz z Sweep 6.238 s (601 pts)	

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

Agilent 12:19:30 Agilent	) Apr 28, 2012			RΤ	Freq/Channel
'roject: 12∪14353 t <b>ef 104.7 dB</b> µ∨ Peak	#Atten 0 dB		Mkr1 2.492 5	850 0 GHz 4.42 dBµ∨	Center Freq 2.49175000 GHz
og O B/					Start Freq 2.48350000 GHz
.75 B					Stop Freq 2.5000000 GHz
<b>4.0</b> Βμ∨ gAv ₩ <i>μμ-λη</i> νηγμημικη		1 Martin Martine Marti	himmedican	u-marter Manager	CF Step 1.6500000 MHz <u>Auto Ma</u>
11 V2 3 FC					Freq Offset 0.00000000 Hz
(f): Tun wp					Signal Track On <u>Of</u>
itart 2.483 500 0 GF Res BW 1 MHz		V 1 MHz	Stop 2.500 Sweep 1 m		

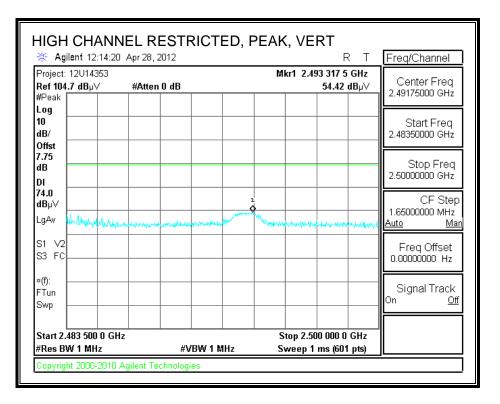
COMPLIANCE CERTIFICATION SERVICES (UL CCS)FORM NO: CCSUP4701F47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of UL CCS.

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🔆 Agilent 12:19:4	9 Apr 28, 2012			RT	Freq/Channel
Project: 12U14353 <b>Ref 104.7 dB</b> µ∨ #Peak	#Atten 0 dB		Mkr1 2.	493 042 5 GHz 45.08 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/ Offst					Start Freq 2.48350000 GHz
7.75 dB					Stop Freq 2.5000000 GHz
54.0 #Bµ∨					CF Step 1.6500000 MHz
_gAv					<u>Auto Mar</u>
51 V2 53 FC					Freq Offset 0.00000000 Hz
*(f): =Tun Swp					Signal Track On <u>Off</u>
Start 2.483 500 0 G #Res BW 1 MHz		W 10 Hz	•	500 000 0 GHz 87 s (601 pts)	

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## RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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🔆 Agilent 12:14:	40 Apr 28, 2012			RT	Freq/Channel
Project: 12U14353 <b>Ref 104.7 dB</b> µ∨ ÆPeak	#Atten 0 dB		Mkr1 2	2.493 015 0 GHz 45.34 dBµ∀	Center Freq 2.49175000 GHz
.og 0 IB/ Offst					Start Freq 2.48350000 GHz
7.75 IB					Stop Freq 2.5000000 GHz
i4.0 IBµ∨ .gAv		1			CF Step 1.6500000 MHz <u>Auto Ma</u>
S1 V2 S3 FC		<b>~</b>			Freq Offset 0.00000000 Hz
i(f): :Tun Swp					Signal Track On <u>Off</u>
Start 2.483 500 0 ( Res BW 1 MHz		3W 10 Hz	•	2.500 000 0 GHz 287 s (601 pts)	

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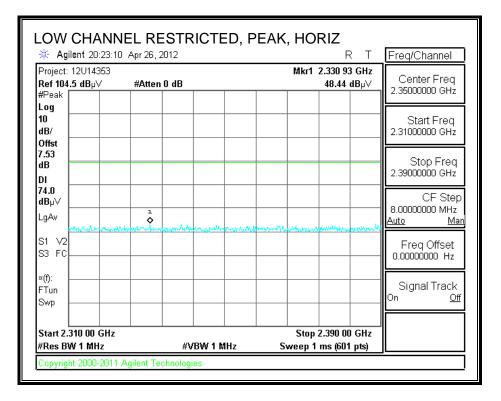
#### HARMONICS AND SPURIOUS EMISSIONS

Test Engr:  Tom Chen    Date:  05/04/12    Project #:  12U14353    Company:  LG Electrnoics    Test Target:  FCC Class B    Mode Oper:  BT , GFSK TX mode		ode											
	f	Measuren	nent Fred	wency	Amp	Preamp (	Gain			Average	Field Stren	eth Limit	
	- Dist	Distance				Distance		et to 3 me	eters	_	ld Strength	-	
	Read	Analyzer			Avg			trength @			s. Average		
	AF	Antenna	-		Peak	-		Field Str	·	-	rs. Peak Li		
	CL	Cable Los	35		HPF	High Pas			-	-			
f	Dist	Read	AF	CL	Amp	D Corr		Corr.			Ant. Pol.		Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
2402MHz													
4.804	3.0	56.0	33.4	6.2	-35.5	0.0	0.0	60.1	74.0	-13.9	H	P	
4.804	3.0	48.2	33.4	6.2	-35.5	0.0	0.0	52.3	54.0	- <mark>8.3</mark>	H	A	
4.804	3.0	60.0	33.4	6.2	-35.5	0.0	0.0	64.1	74.0	-9,9	V	P	
4.804	3.0	51.6	33.4	6.2	-35.5	0.0	0.0	55.7	54.0	-4.8	V	A	
					-35.5	0.0	0.0	52.7	74.0	-21.3	v	P	
2441MHz		18.1	22 5	67		: 0.0	0.0		/4.0	-21.0	v	<b></b>	
2441MHz 4.882	3.0	48.4	33.5	6.2 6.2	<b>*</b>	¢	0.0	44.4	54.0	-16.2	V	A	
2441MHz 4.882 4.882	3.0 3.0	40.1	33.5	6.2	-35.5	0.0	0.0	44.4 48.9	54.0 74.0	-16.2 -25.1	V H	A P	
2441MHz 4.882 4.882 4.882	3.0 3.0 3.0	40.1 44.7	33.5 33.5	6.2 6.2	-35.5 -35.5	0.0 0.0	0.0	48.9	74.0	- <b>25.1</b>	H	P	
2441MHz 4.882 4.882 4.882 4.882 4.882	3.0 3.0 3.0 3.0	40.1	33.5	6.2 6.2	-35.5	0.0							
2441MHz 4.882 4.882 4.882	3.0 3.0 3.0 3.0	40.1 44.7	33.5 33.5	6.2 6.2 6.2	-35.5 -35.5	0.0 0.0	0.0	48.9	74.0	- <b>25.1</b>	H	P	
2441MHz 4.882 4.882 4.882 4.882 4.882 4.882 2480MHz	3.0 3.0 3.0 3.0 GFSK	40.1 44.7 36.7	33.5 33.5 33.5	6.2 6.2 6.2	-35.5 -35.5 -35.5	0.0 0.0 0.0	0.0 0.0	48.9 41.0	74.0 54.0	-25.1 -19.6	H H	P A	
2441MHz 4.882 4.882 4.882 4.882 4.882 4.882 2480MHz 4.960	3.0 3.0 3.0 3.0 GFSK 3.0	40.1 44.7 36.7 50.8	33.5 33.5 33.5 33.5 33.6	6.2 6.2 6.2 6.3	-35.5 -35.5 -35.5 -35.5	0.0 0.0 0.0	0.0 0.0 0.0	48.9 41.0 55.1	74.0 54.0 74.0	-25.1 -19.6 -18.9	H H H	P A P	

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# 7.2.9. ENHANCED DATA RATE 8PSK MODULATION

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



COMPLIANCE CERTIFICATION SERVICES (UL CCS) 47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of UL CCS.

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🔆 Agilent 20:23	NEL RESTRICTE 47 Apr 26, 2012	, , , R T	Freq/Channel
Project: 12U14353 <b>Ref 104.5 dB</b> µ∨ #Peak <b> </b>	#Atten 0 dB	Mkr1 2.388 93 GHz 36.27 dBμ∀	Center Freq 2.35000000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
dB			Stop Freq 2.39000000 GHz
54.0 dBµ∨			CF Step 8.0000000 MHz
LgAv 51 V2 53 FC		^	<u>Auto Mar</u> Freq Offset 0.00000000 Hz
«(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.310 00 GH ¥Res BW 1 MHz	z #VBW 10 F	Stop 2.390 00 GHz Iz Sweep 6.238 s (601 pts)	

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

Agilent 20:27:	09 Apr 26, 2012	R T Freq/Channel
Project: 12U14353 <b>tef 104.5 dB</b> µ∨ Peak	#Atten 0 dB	Mkr1 2.388 80 GHz 48.30 dBµ∀ 2.35000000 GHz
og 0  B/		Start Freq 2.31000000 GHz
.53  B		Stop Fred 2.3900000 GHz
4.0  Вµ∨ gAv		CF Ste
3 FC		Freq Offset 0.00000000 Hz
(f): Tun Swp		Signal Track
itart 2.310 00 GHz Res BW 1 MHz	 ⊻ #VBW 1 MH:	Stop 2.390 00 GHz Sweep 1 ms (601 pts)

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	NEL RESTRICTE		
Agilent 20:27:5	1 Apr 26, 2012	R T	Freq/Channel
Project: 12U14353 <b>Ref 104.5 dB</b> µ∨ #Peak	#Atten 0 dB	Mkr1 2.388 93 GHz 35.91 dBµ∨	Center Freq 2.35000000 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 <u>Auto Mar</u>
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 I	Stop 2.390 00 GHz Hz Sweep 6.238 s (601 pts)	
	Agilent Technologies		]

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

Agilent 12:21:3	1 Apr 28, 2012		F	R T	Freq/Channel
roject: 12U14353 t <b>ef 104.7 dB</b> µ∨ Peak	#Atten 0 dB		Mkr1 2.493 097 5 54.03	5 GHz dBµ∨	Center Freq 2.49175000 GHz
og 0 B/					Start Freq 2.48350000 GHz
B					Stop Freq 2.50000000 GHz
<b>4.0</b> Βμ∨ gAv <sup>4</sup> uMhrulαγeewdy	monanterenteration	1	<sup>Ya</sup> lamanan da da Mariji ya wa	anon m	CF Step 1.65000000 MHz <u>Auto Ma</u>
11 V2 13 FC					Freq Offset 0.00000000 Hz
(f): Tun wp					Signal Track On <u>Of</u>
itart 2.483 500 0 GH Res BW 1 MHz		W 1 MHz	Stop 2.500 000 0 Sweep 1 ms (60		

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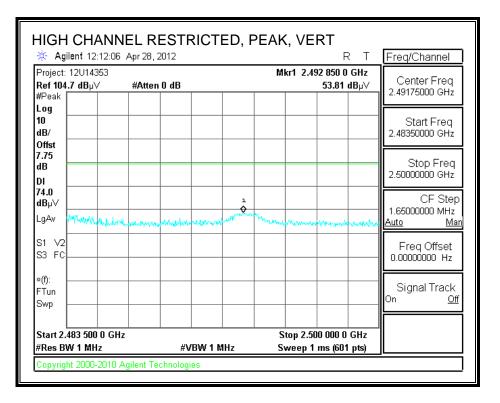
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S1 V2 S3 FC				Freq Offset 0.00000000 Hz
54.0 dBµ∨ _gAv		1 2		CF Step 1.6500000 MHz <u>Auto Mar</u>
Offst 7.75 dB DI				- Stop Freq 2.5000000 GHz
Log 10 dB/				Start Freq 2.48350000 GHz
Project: 12U14353 <b>Ref 104.7 dB</b> µ∨ #Peak	#Atten 0 dB	Mkr1 2	2.493 097 5 GHz 43.20 dBµ∨	Center Freq 2.49175000 GHz

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

FCC ID: ZNFLG440G



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Agilent 12:12:2	29 Apr 28, 2012			R T	Freq/Channel		
Project: 12U14353 <b>tef 104.7 dB</b> µ∨ Peak	#Atten 0 dB		Mkr1 2	2.493 015 0 GHz 43.34 dBµ∨	Center Freq 2.49175000 GHz		
og 0 IB/					Start Freq 2.48350000 GHz		
IB					Stop Freq 2.5000000 GHz		
<b>4.0</b>  Βμ√ gAv		1			CF Step 1.6500000 MHz <u>Auto Ma</u>		
11 V2					Freq Offset 0.00000000 Hz		
(f): Tun Swp					Signal Track On <u>Off</u>		
itart 2.483 500 0 G Res BW 1 MHz		W 10 Hz	•	2.500 000 0 GHz 287 s (601 pts)			

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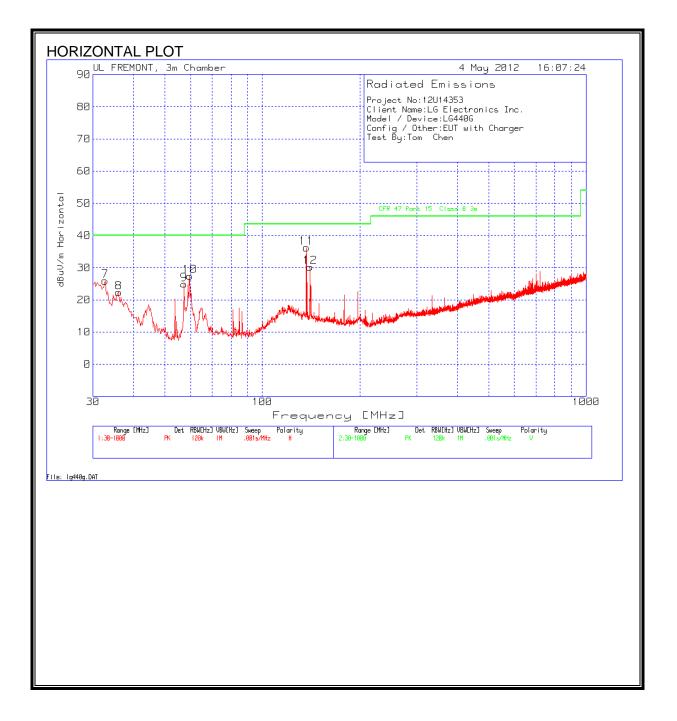
#### HARMONICS AND SPURIOUS EMISSIONS

			ode									
	Measurem	nent Frec	quency	Amp	Preamp (	Gain			Average	Field Stren	gth Limit	
list				-	-		t to 3 me	ters	-		-	
ead	Analyzer	Reading		Avg	Average I	Field St	trength @	3 m	Margin v	s. Average	Limit	
F	Antenna l	Factor		Peak	Calculate	d Peak	Field Stre	ngth	Margin v	rs. Peak Lir	nit	
L	Cable Los	15		HPF	High Pas	s Filter		-	-			
Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
PSK												
3.0	49.2	33.1	6.8	-34.1	0.0	0.0	55.0	74.0	-19.0	H	P	X pos
3.0	38.8	33.1	6.8	-34.1	0.0	0.0	44.6	54.0	-15.9	H	A	X pos
3.0	57.9	33.1	6.8	-34.1	0.0	0.0	63.7	74.0	-10.3	V	P	X pos
3.0	45.6	33.1	6.8	-34.1	0.0	0.0	51.4	54.0	-9.2	V	A	X pos
PSK					ļ							
	Q		¢	·	oo							X pos
	¢		¢	·	oo				· • · · · · · · · · · · · · · · · · · ·			X pos
	¢		•••••••	••••••••••••••••••	oo						P	X pos
	43.0	33.2	6.8	-34.0	0.0	0.0	48.9	54.0	-11.6	H	A	X pos
	59.0	22.0	< 0	24.0	0.0	0.0	65.0	74.0		ш	D	X pos
		<b>&amp;</b>					¢					
		<b>\$</b>					¢				n P	X pos X pos
		¢					¢					X pos
	ead F L Dist (m) SK 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	ist Distance aad Analyzer F Antenna L Cable Los Dist Read (m) dBuV SK 3.0 49.2 3.0 38.8 3.0 57.9 3.0 45.6 SK 3.0 61.0 3.0 45.6 SK 3.0 61.0 3.0 48.8 3.0 54.1 3.0 43.0 SK 3.0 58.9 3.0 46.9 3.0 60.3 3.0 47.9 Her emissions	ist    Distance to Anternad      Analyzer Reading    Antenna Factor      Cable Loss    Cable Loss      Dist    Read    AF      (m)    dBuV    dB/m      SK    3.0    49.2    33.1      3.0    49.2    33.1    3.0    57.9    33.1      3.0    57.9    33.1    3.0    57.9    33.1      3.0    45.6    33.1    3.0    58.8    33.2      3.0    61.0    33.2    3.0    54.1    33.2      3.0    58.9    33.2    3.0    46.9    33.2      3.0    58.9    33.2    3.0    46.9    33.2      3.0    60.3    33.2    3.0    47.9    33.2	ist Distance to Antenna Analyzer Reading F Antenna Factor Cable Loss Dist Read AF CL (m) dBuV dB/m dB SK 3.0 49.2 33.1 6.8 3.0 38.8 33.1 6.8 3.0 57.9 33.1 6.8 3.0 45.6 33.1 6.8 3.0 61.0 33.2 6.8 3.0 48.8 33.2 6.8 3.0 54.1 33.2 6.8 3.0 48.8 33.2 6.8 3.0 54.1 33.2 6.8 3.0 54.1 33.2 6.8 3.0 48.8 33.2 6.8 3.0 54.1 33.2 6.9 3.0 46.9 33.2 6.9 3.0 46.9 33.2 6.9 3.0 60.3 33.2 6.9 3.0 47.9 33.2 6.9	aad    Analyzer Reading    Avg      F    Antenna Factor    Peak      L    Cable Loss    HPF      Dist    Read    AF    CL    Amp      (m)    dBuV    dB/m    dB    dB      SK          3.0    49.2    33.1    6.8    -34.1      3.0    38.8    33.1    6.8    -34.1      3.0    57.9    33.1    6.8    -34.1      3.0    61.0    33.2    6.8    -34.0      3.0    61.0    33.2    6.8    -34.0      3.0    54.1    33.2    6.8    -34.0      3.0    54.1    33.2    6.9    -34.0      3.0    58.9    33.2    6.9    -34.0      3.0    58.9    33.2    6.9    -34.0      3.0    60.3    33.2    6.9    -34.0      3.0    47.9    33.2    6.9    -34.0	ist    Distance to Antenna    D Corr    Distance      aad    Analyzer Reading    Avg    Average      F    Antenna Factor    Peak    Calculate      L    Cable Loss    HPF    High Pas      Dist    Read    AF    CL    Amp    D Corr      (m)    dBuV    dB/m    dB    dB    dB      SK	ist    Distance to Antenna    D Corr    Distance Correct      aad    Analyzer Reading    Avg    Average Field St      F    Antenna Factor    Peak    Calculated Peak      Cable Loss    HPF    High Pass Filter      Dist    Read    AF    CL    Amp    D Corr    Fltr      (m)    dBuV    dB/m    dB    dB    dB    dB    dB      SK	ist    Distance to Antenna    D Corr    Distance Correct to 3 me      aad    Analyzer Reading    Avg    Average Field Strength @      F    Antenna Factor    Peak    Calculated Peak Field Strength @      L    Cable Loss    HPF    High Pass Filter      Dist    Read    AF    CL    Amp    D Corr    Fltr    Corr.      (m)    dBuV    dB/m    dB    dB    dB    dB    dB    dB    U/m      SK	ist    Distance to Antenna    D Corr    Distance Correct to 3 meters      aad    Analyzer Reading    Avg    Average Field Strength @ 3 m      F    Antenna Factor    Peak    Calculated Peak Field Strength      Cable Loss    HPF    High Pass Filter      Dist    Read    AF    CL    Amp    D Corr    Fltr    Corr    Limit      (m)    dBuV    dB/m    dB    dB    dB    dB    dBuV/m dBuV/m      SK	ist    Distance to Antenna    D Corr    Distance Correct to 3 meters    Peak Fie      aad    Analyzer Reading    Avg    Average Field Strength @ 3 m    Margin v      F    Antenna Factor    Peak    Calculated Peak Field Strength    Margin v      Cable Loss    HPF    High Pass Filter    Margin v    Margin v      Dist    Read    AF    CL    Amp    D Corr    Fltr    Corr.    Limit    Margin v      0ist    Read    AF    CL    Amp    D Corr    Fltr    Corr.    Limit    Margin v      3.0    49.2    33.1    6.8    -34.1    0.0    0.0    55.0    74.0    -19.0      3.0    45.6    33.1    6.8    -34.1    0.0    0.0    63.7    74.0    -10.3      3.0    57.9    33.1    6.8    -34.0    0.0    0.0    51.4    54.0    -9.2      SK	ist    Distance to Antenna    D Corr    Distance Correct to 3 meters    Peak Field Strength    Margin vs. Average      aad    Analyzer Reading    Avg    Average Field Strength @ 3 m    Margin vs. Average      F    Antenna Factor    Peak    Calculated Peak Field Strength    Margin vs. Average      L    Cable Loss    HPF    High Pass Filter    Margin vs. Peak Lir      Dist    Read    AF    CL    Amp    D Corr    Fltr    Corr.    Limit    Margin vs. Peak Lir      Dist    Read    AF    CL    Amp    D Corr    Fltr    Corr.    Limit    Margin vs. Peak Lir      Atterna    dB    dB    dB    dB    dBuV/m dBuV/m    dB    V/H      SK	ist  Distance to Antenna  D Corr  Distance Correct to 3 meters  Peak Field Strength Limit    aad  Analyzer Reading  Avg  Average Field Strength @ 3 m  Margin vs. Average Limit    F  Antenna Factor  Peak  Calculated Peak Field Strength  Margin vs. Peak Limit    Cable Loss  HPF  High Pass Filter  Margin vs. Peak Limit  Margin vs. Peak Limit    Oist  Read  AF  CL  Amp  D Corr  Fltr  Corr.  Limit  Margin vs. Peak Limit    Margin vs.  AB  dB  dB  Corr.  Limit  Margin vs. Peak Limit    SK

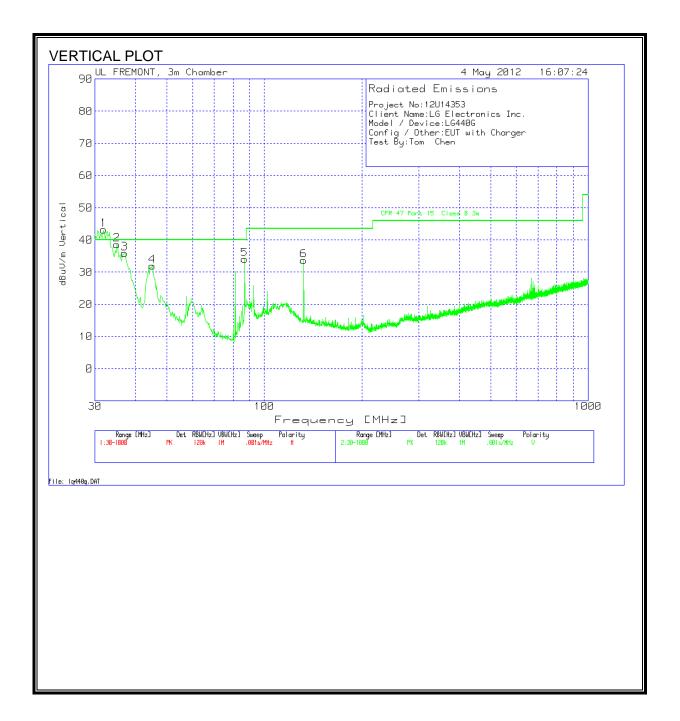
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# 7.3. WORST-CASE BELOW 1 GHz

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



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



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Project No:			/		[]	[]			
Client Name						]			
Model / Dev Config / Oth			/						
		In Charger					'		
Test by Ton	Test By:Tom Chen						('		
Horizontal 3	30 - 1000M/	Hz							
	<u> </u>		25MHz-1GHz	[/	!	CFR 47 Part	('		
Test	Meter	1	Chambr 3m	Antenna	1 1	15 Class B	1 '	Height	
Frequency	Reading	Detector	Amplified (dB)	T185 (dB)	dBuV/m	3m	Margin	[cm]	Polarity
32.7138	34.2	PK	-27.5	19.2	25.9	40	-14.1	301	Horz
36.0092	32.94	PK	-27.4	16.8	22.34	40	-17.66	100	Horz
57.3321	45.12	PK	-27.2	7	24.92	40	-15.08	400	Horz
59.6583	47.43	PK	-27.2	7.2	27.43	40	-12.57	400	Horz
136.8086			-26.5						Horz
140.2978	43.6	PK	-26.5	13.1	30.2	43.5	-13.3	400	Horz
Vertical 30 -	- 1000MHz								
			25MHz-1GHz	[]	<sup>†</sup>	CFR 47 Part			
Test	Meter	1	Chambr 3m	Antenna	1 1	15 Class B	1 '	Height	
Frequency	Reading	Detector	1	T185 (dB)	dBuV/m	3m	1		Polarity
32.0419	44.98	QP	-27.5	19.8	37.28	40	-2.72	107	Vert
35.1288	+ +		-27.4	17.3			-7.17	+ +	Vert
36.9784			-27.4	16	35.91	40	-4.09		Vert
45.1199			-27.4					+ +	Vert
86.9904			-27						Vert
132.3501	46.77	PK	-26.5	13.4	33.67	43.5	-9.83	201	Vert

# 8. AC POWER LINE CONDUCTED EMISSIONS

# <u>LIMITS</u>

FCC §15.207 (a)

RSS-Gen 7.2.2

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

\* Decreases with the logarithm of the frequency.

# TEST PROCEDURE

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

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

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

# **RESULTS**

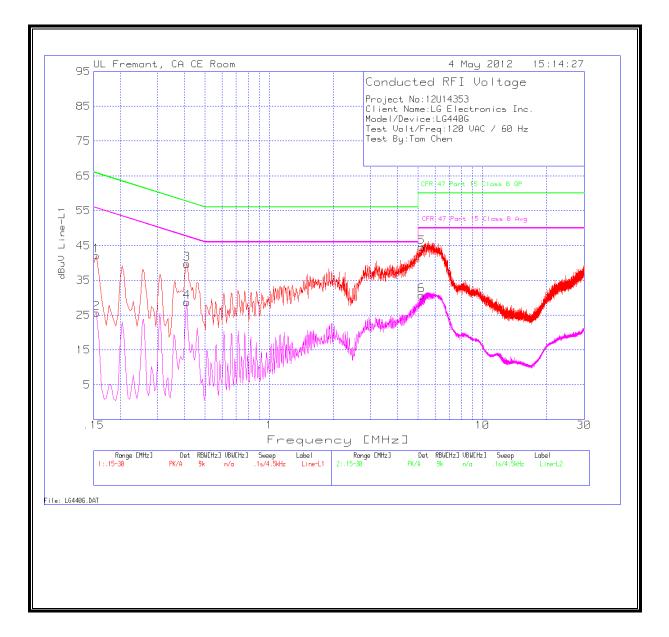
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# **6 WORST EMISSIONS**

Project No:	12U14353								
Client Nam		onics Inc.							
Model/Device:LG440G									
Test Volt/Freq:120 VAC / 60 Hz									
Test By:Ton		-,							
Line-L1 .15 - 30MHz									
			T24 IL	LC Cables		CFR 47 Part		CFR 47 Part	
Test	Meter		L1.TXT	1&3.TXT		15 Class B		15 Class B	
Frequency	Reading	Detector	(dB)	(dB)	dBuV	QP	Margin	Avg	Margin
0.1545	42.02	РК	0.1	0	42.12	65.8	-23.68	55.8	-13.68
0.1545	25.48	Av	0.1	0	25.58	65.8	-40.22	55.8	-30.22
0.411	39.63	РК	0.1	0	39.73	57.6	-17.87	47.6	-7.87
0.411	28.66	Av	0.1	0	28.76	57.6	-28.84	47.6	-18.84
5.199	44.26	РК	0.1	0.1	44.46	60	-15.54	50	-5.54
5.199	30.45	Av	0.1	0.1	30.65	60	-29.35	50	-19.35
Line-L2.15	- 30MHz								
			T24 IL	LC Cables		CFR 47 Part		CFR 47 Part	
Test	Meter		L2.TXT	2&3.TXT		15 Class B		15 Class B	
Frequency	Reading	Detector	(dB)	(dB)	dBuV	QP	Margin	Avg	Margin
0.1545	21.86	РК	0.1	0	21.96	65.8	-43.84	55.8	-33.84
0.1545	0.41	Av	0.1	0	0.51	65.8	-65.29	55.8	-55.29
0.4155	26.2	РК	0.1	0	26.3	57.5	-31.2	47.5	-21.2
0.4155	11.34	Av	0.1	0	11.44	57.5	-46.06	47.5	-36.06
5.2305	27.23	РК	0.1	0.1	27.43	60	-32.57	50	-22.57
5.2305	12.62	Av	0.1	0.1	12.82	60	-47.18	50	-37.18

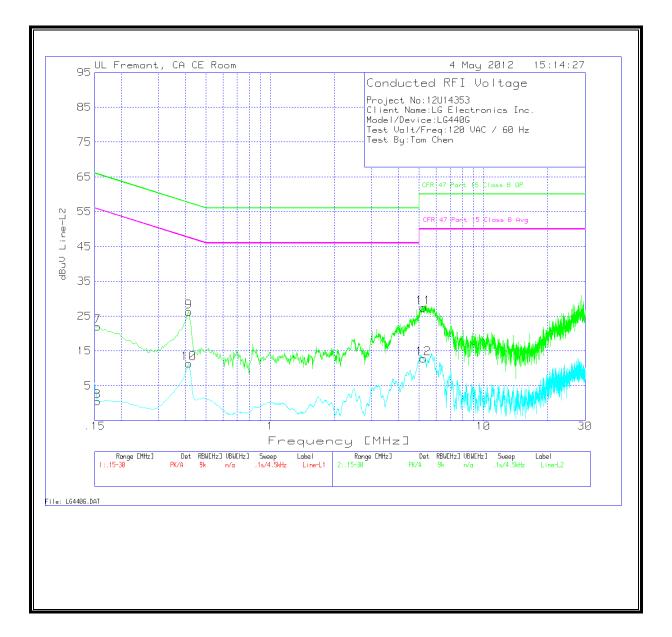
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# LINE 1 RESULTS



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# LINE 2 RESULTS



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