



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

LTE Phone Bluetooth, WLAN(2.4GHz & 5GHz) and NFC

MODEL NUMBER: VS980; LGVS980; LG-VS980

FCC ID: ZNFVS980

REPORT NUMBER: 13U15118-4, Revision C

ISSUE DATE: JULY 15, 2013

Prepared for

**LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVENUE
ENGLEWOOD CLIFFS, NJ 07632**

Prepared by

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



NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	06/28/13	Initial Issue	P. Kim
A	07/05/13	Updated Antenna Type and Antenna Gain	I. Netto
B	07/09/13	Updated administrative values and change report structure.	P. Kim
C	07/15/13	Update accessory information, Section 5.6 Description of Test Set Up - Support Equipment	P. Kim

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	6
4.1. <i>MEASURING INSTRUMENT CALIBRATION</i>	<i>6</i>
4.2. <i>SAMPLE CALCULATION</i>	<i>6</i>
4.3. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>6</i>
5. EQUIPMENT UNDER TEST	7
5.1. <i>DESCRIPTION OF EUT</i>	<i>7</i>
5.2. <i>MAXIMUM OUTPUT POWER.....</i>	<i>7</i>
5.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	<i>7</i>
5.4. <i>SOFTWARE AND FIRMWARE.....</i>	<i>7</i>
5.5. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	<i>8</i>
5.6. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>9</i>
6. TEST AND MEASUREMENT EQUIPMENT	11
7. ANTENNA PORT TEST RESULTS	12
7.1. <i>BASIC DATA RATE GFSK MODULATION.....</i>	<i>12</i>
7.1.1. <i>20 dB AND 99% BANDWIDTH</i>	<i>12</i>
7.1.2. <i>HOPPING FREQUENCY SEPARATION</i>	<i>19</i>
7.1.3. <i>NUMBER OF HOPPING CHANNELS.....</i>	<i>21</i>
7.1.4. <i>AVERAGE TIME OF OCCUPANCY</i>	<i>26</i>
7.1.5. <i>OUTPUT POWER</i>	<i>33</i>
7.1.6. <i>AVERAGE POWER.....</i>	<i>37</i>
7.1.7. <i>CONDUCTED SPURIOUS EMISSIONS.....</i>	<i>38</i>
7.2. <i>ENHANCED DATA RATE 8PSK MODULATION</i>	<i>47</i>
7.2.1. <i>20 dB AND 99% BANDWIDTH</i>	<i>47</i>
7.2.2. <i>OUTPUT POWER</i>	<i>54</i>
7.2.3. <i>AVERAGE POWER.....</i>	<i>58</i>
7.2.4. <i>CONDUCTED SPURIOUS EMISSIONS.....</i>	<i>59</i>
8. RADIATED TEST RESULTS.....	69
8.1. <i>LIMITS AND PROCEDURE.....</i>	<i>69</i>
8.2. <i>TRANSMITTER ABOVE 1 GHz.....</i>	<i>70</i>
8.2.1. <i>BASIC DATA RATE GFSK MODULATION</i>	<i>70</i>
8.2.2. <i>ENHANCED DATA RATE 8PSK MODULATION</i>	<i>87</i>
8.3. <i>WORST-CASE BELOW 1 GHz.....</i>	<i>104</i>
9. AC POWER LINE CONDUCTED EMISSIONS.....	107

10. SETUP PHOTOS111

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVENUE
ENGLEWOOD CLIFFS, NEW JERSEY 07632

EUT DESCRIPTION: GSM/CDMA/WCDMA + LTE Phone Bluetooth, WLAN (2.4GHz & 5GHz) and NFC

MODEL: VS980, LGVS980 and LG-VS980

SERIAL NUMBER: 99000250000211(CONDUCTED) AND
256691464000002160 (RADIATED)

DATE TESTED:

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 Verification Services Inc. By:

Tested By:



PHILIP KIM
EMC SUPERVISOR
UL Verification Services Inc.

STEVEN TRAN
WiSE LAB TECHNICIAN
UL Verification Services Inc.

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 Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsenc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a LTE Phone Bluetooth, WLAN(2.4GHz & 5GHz) and NFC

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	7.39	5.48
2402 - 2480	Enhanced 8PSK	7.45	5.56

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -1.05 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during was VS9800RA and firmware used was g2_vzw-userdebug 4.2.2 JDQ39B VS9800RA.1368678220.

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 Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	TEN PAO	MCS-04WT2	NA	NA
Earphone	I-SOUND	EAB62729001	N/A	N/A

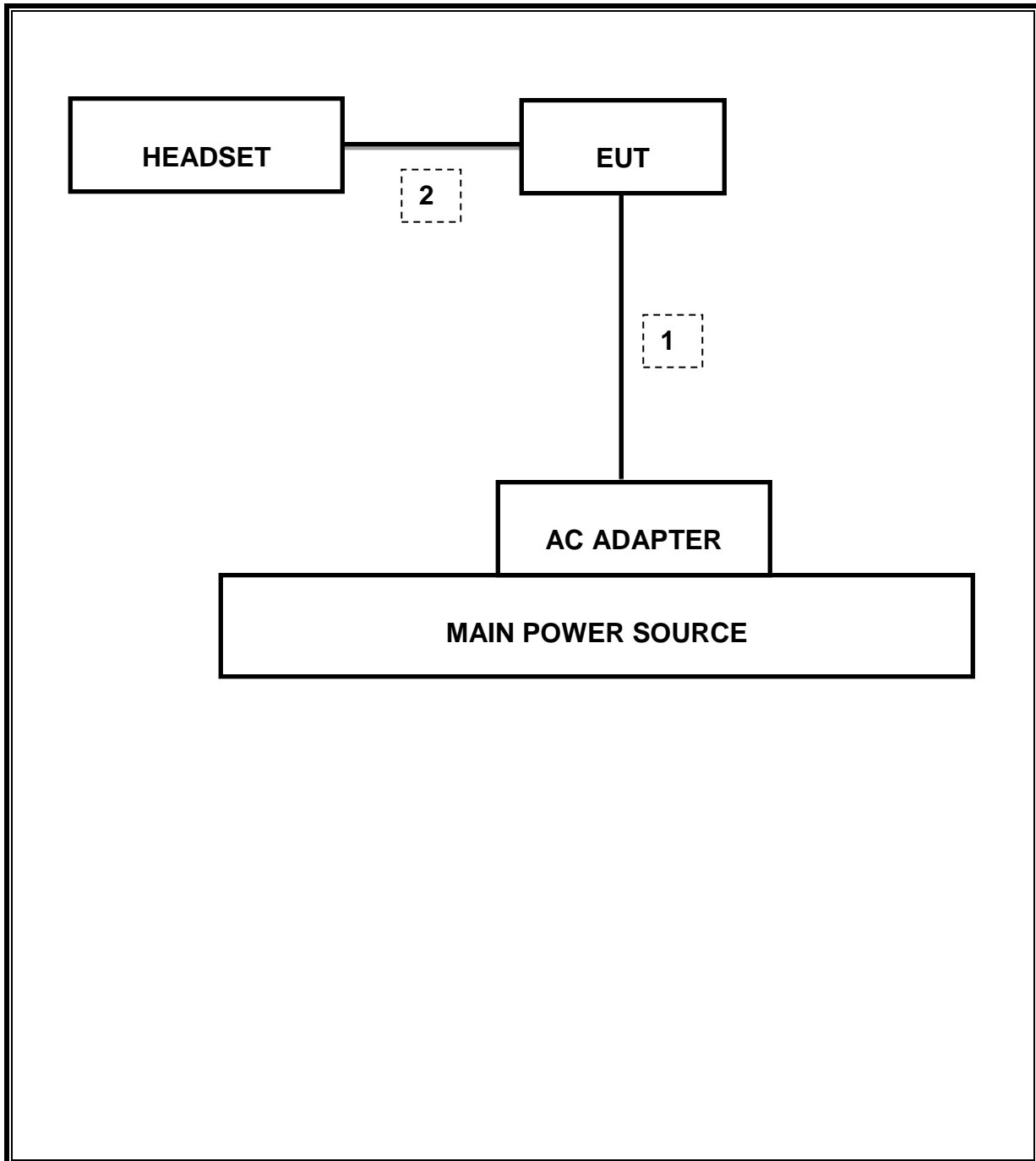
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests. EUT was set in the Hidden menu mode to enable BT communications.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	03/23/12	02/13/14
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/12	10/25/13
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/12	11/14/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/13	01/28/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/12	10/22/13
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/12	12/20/13
CBT Bluetooth Tester	R & S	CBT	None	05/15/12	05/15/13
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/12	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/12	12/13/13
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/13	01/14/14
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR	CNR

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

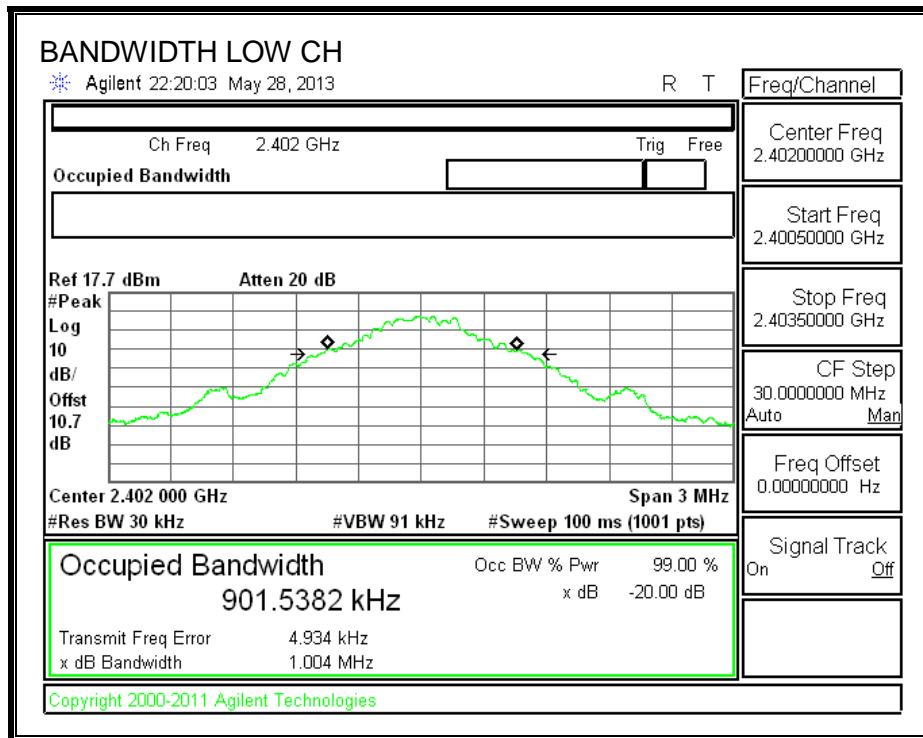
TEST PROCEDURE

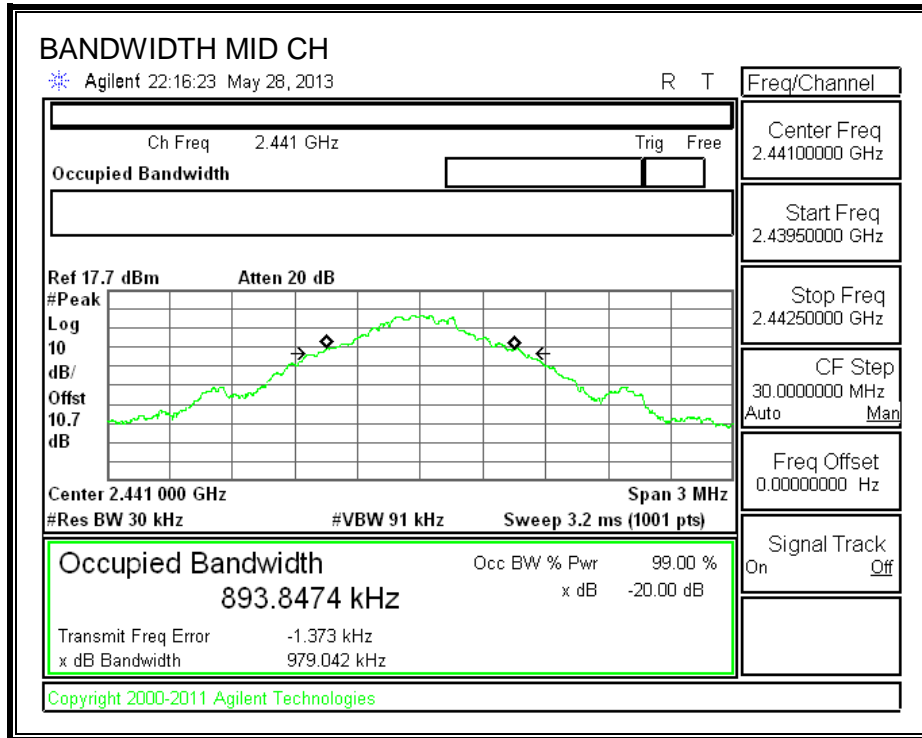
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

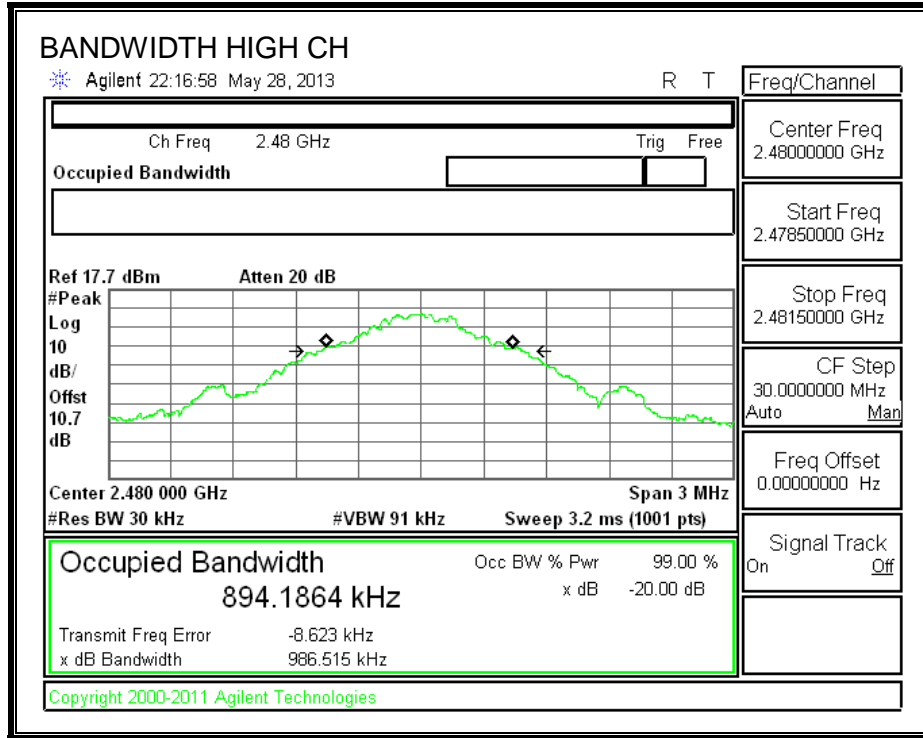
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1004	903.341
Middle	2441	979.042	904.3622
High	2480	986.515	905.3425

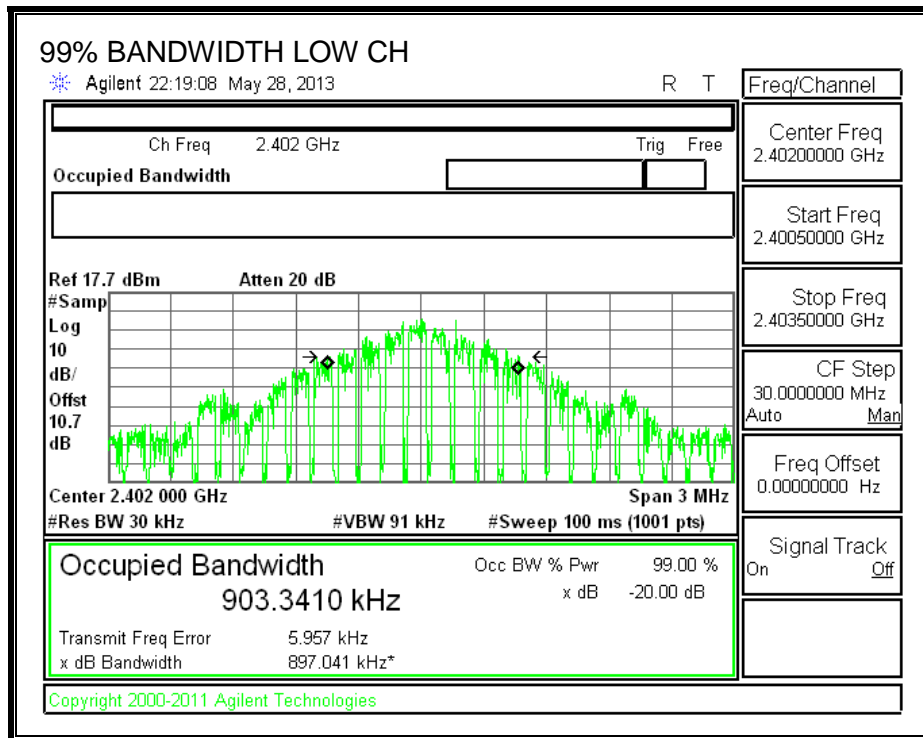
20 dB BANDWIDTH

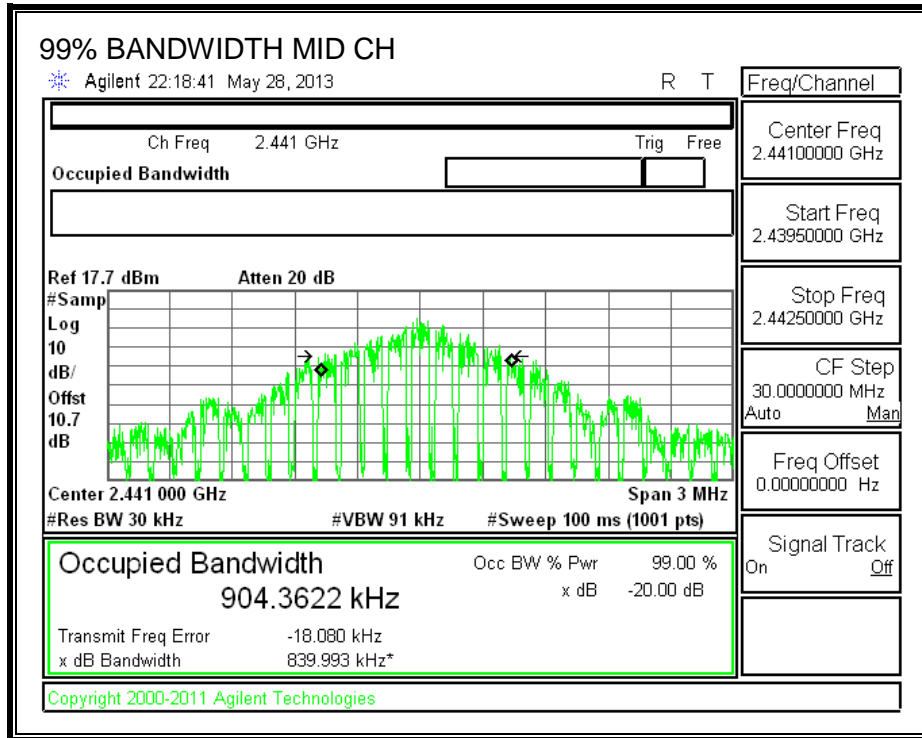


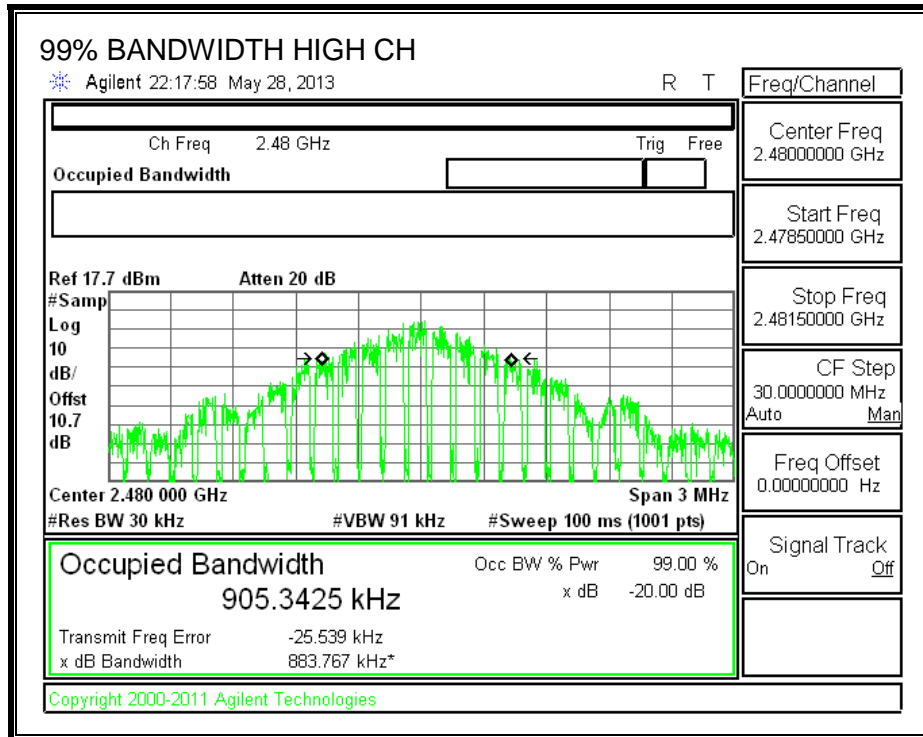




99% BANDWIDTH







7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

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 hopping channel, whichever is greater.

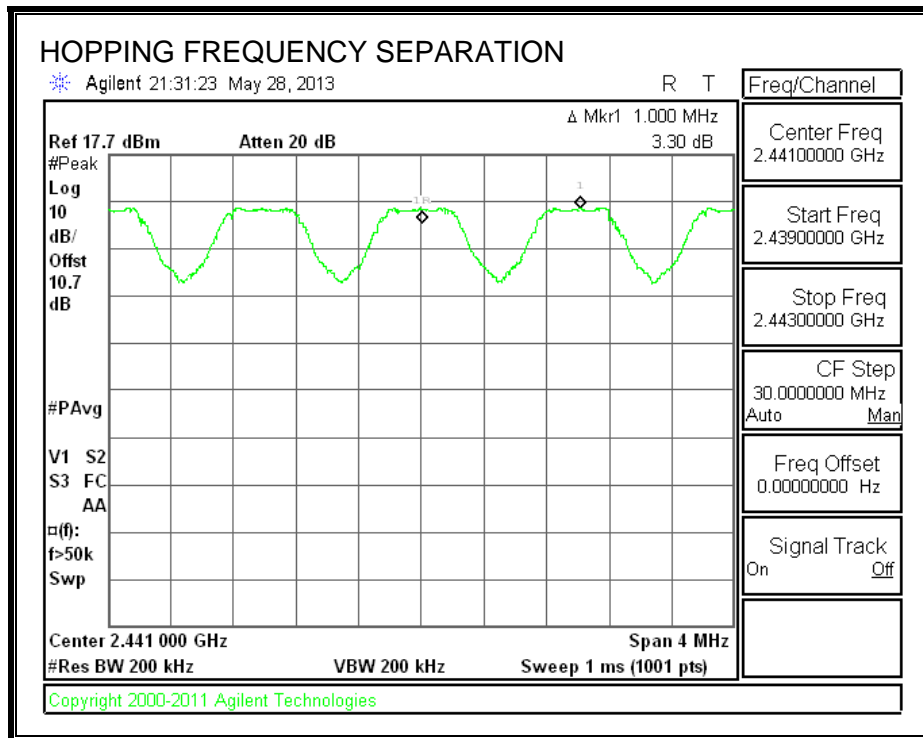
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

HOPPING FREQUENCY SEPARATION



7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

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 non-overlapping channels.

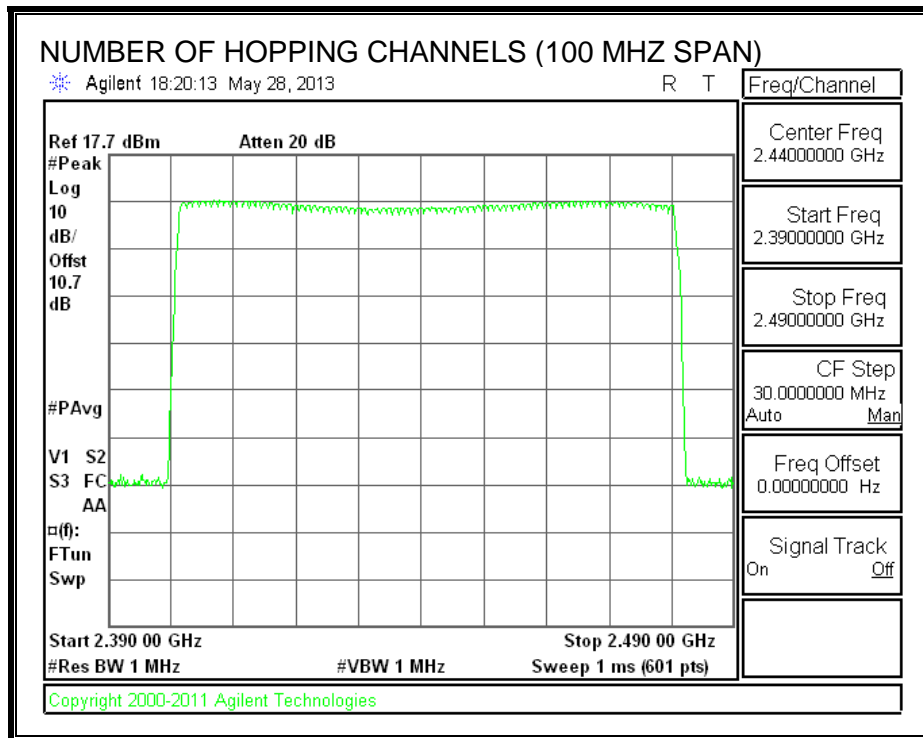
TEST PROCEDURE

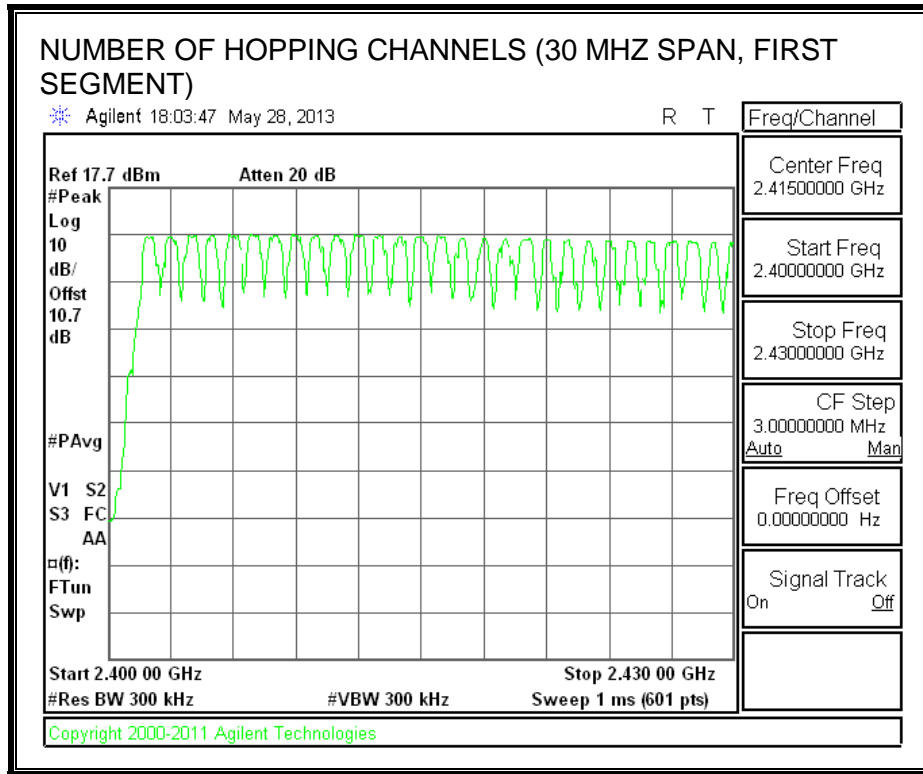
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

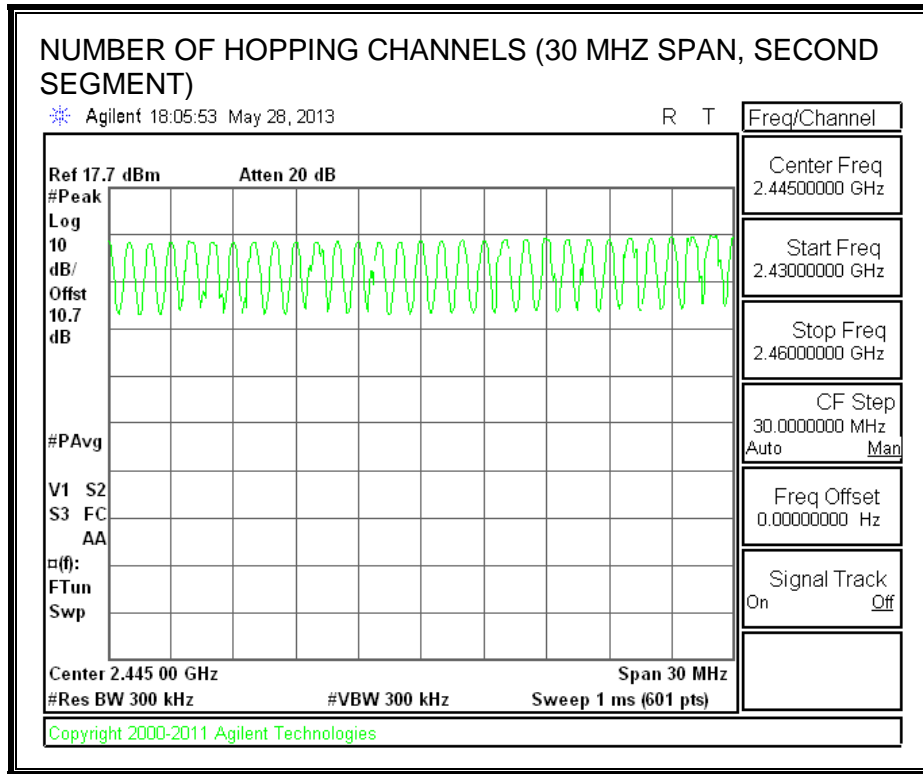
RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS







7.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

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.

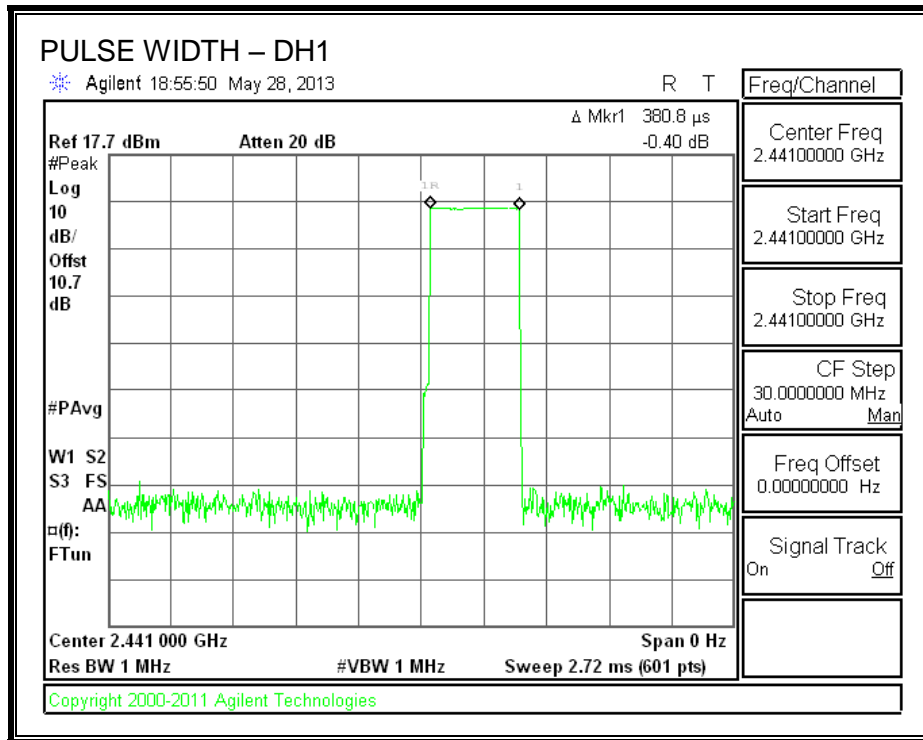
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{ pulse width}$.

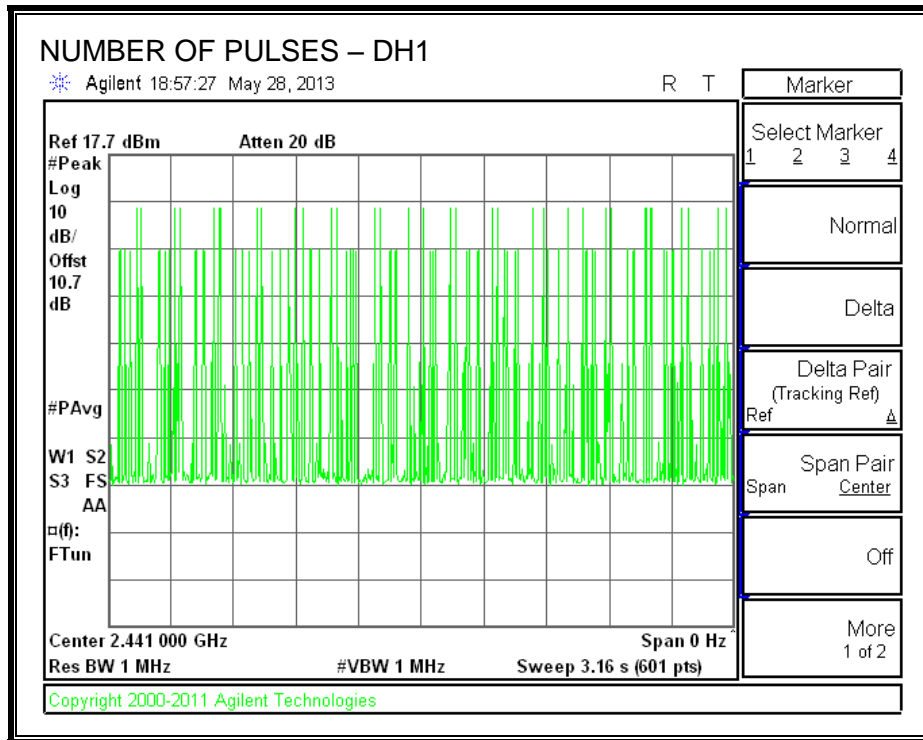
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.3808	34	0.129	0.4	-0.271
DH3	1.63	20	0.326	0.4	-0.074
DH5	2.883	13	0.375	0.4	-0.025
GFSK AFH Mode					
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.3808	64	0.244	0.4	-0.156
DH3	1.63	21	0.342	0.4	-0.058
DH5	2.883	13	0.375	0.4	-0.025

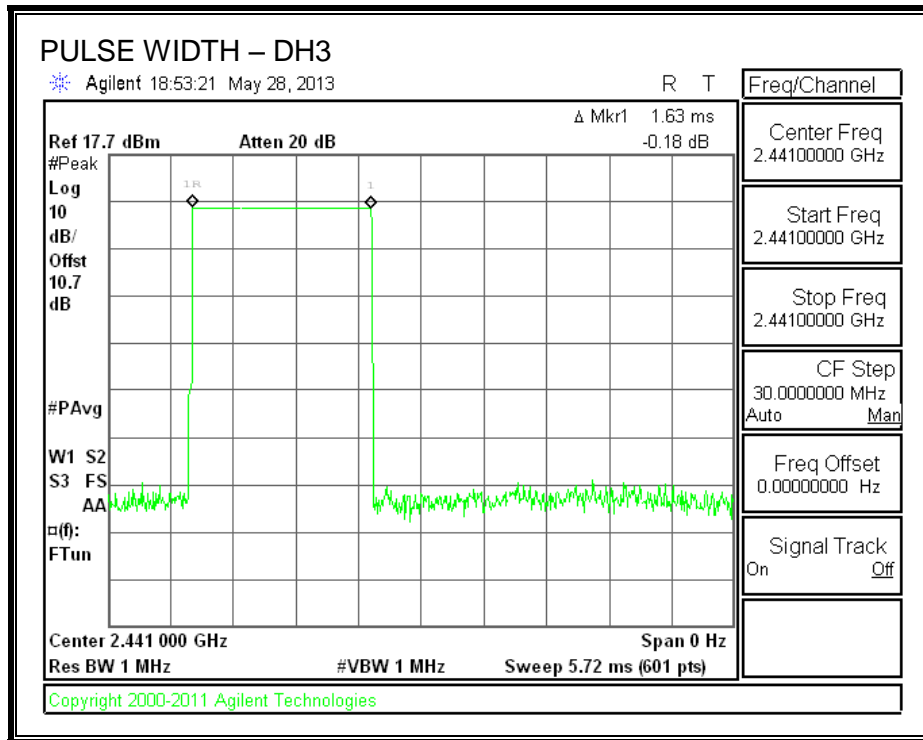
PULSE WIDTH - DH1



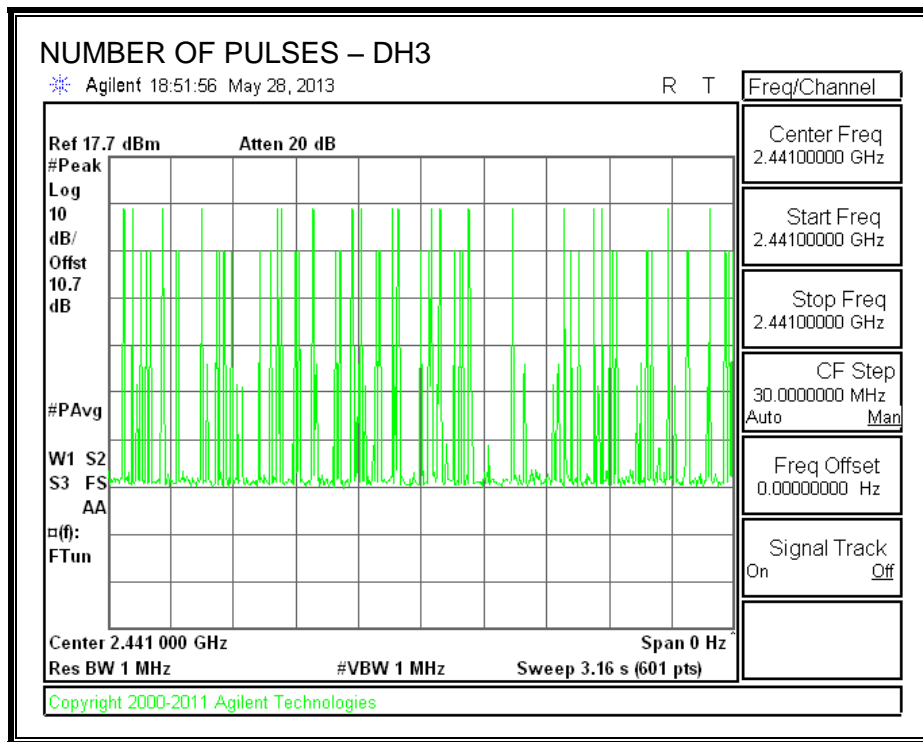
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



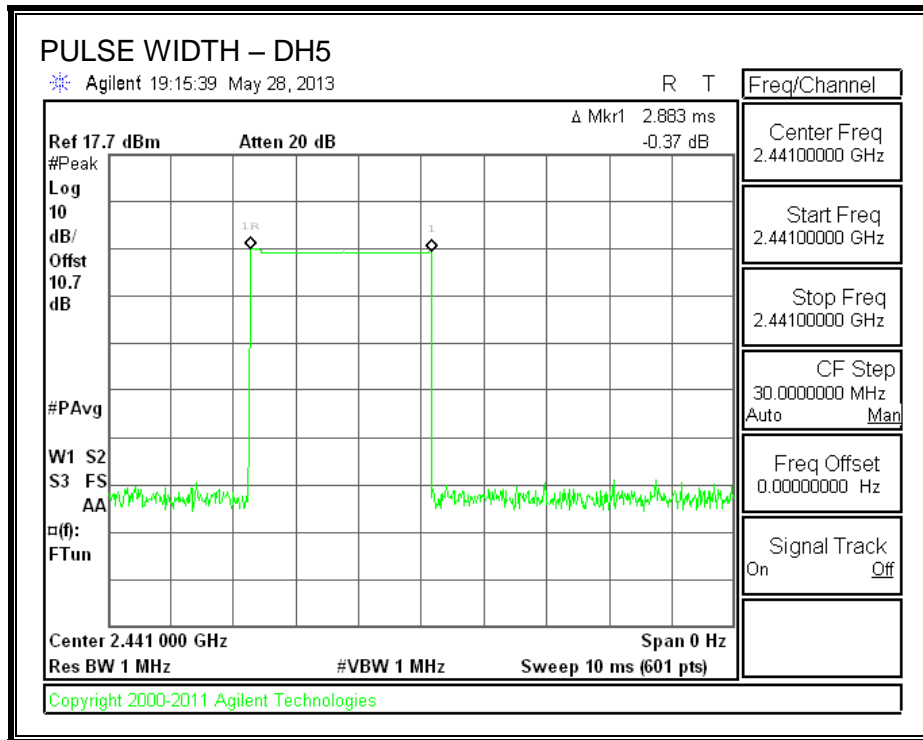
PULSE WIDTH – DH3



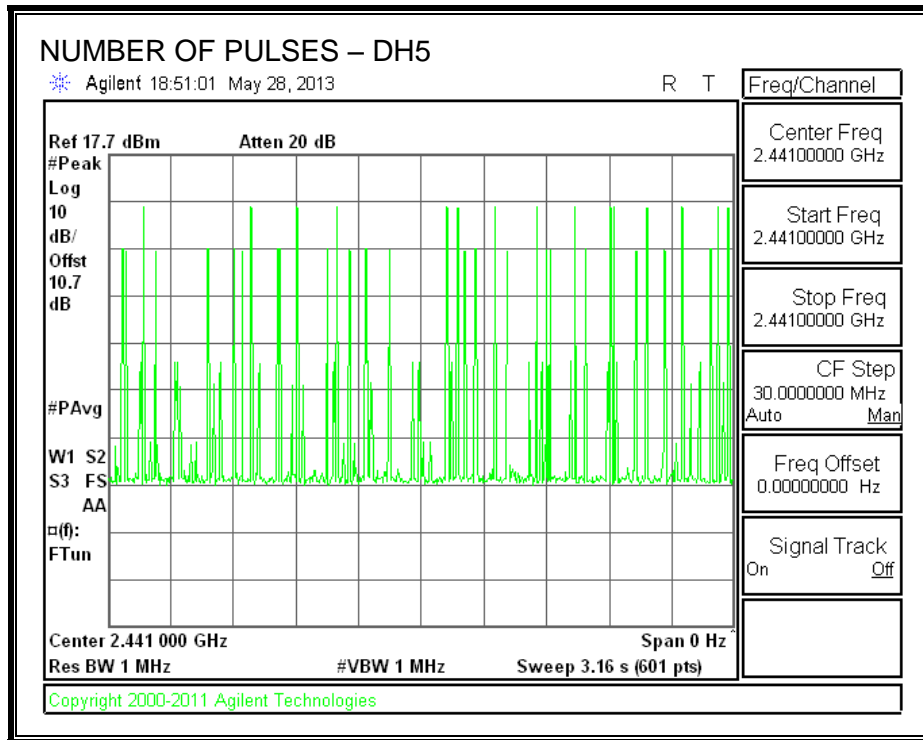
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.1.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

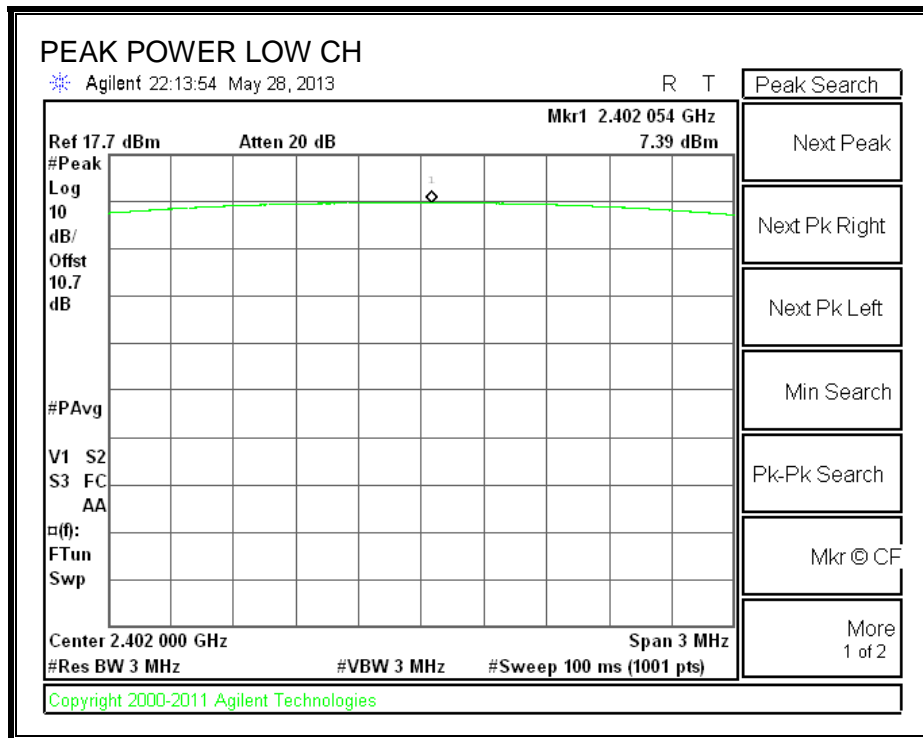
TEST PROCEDURE

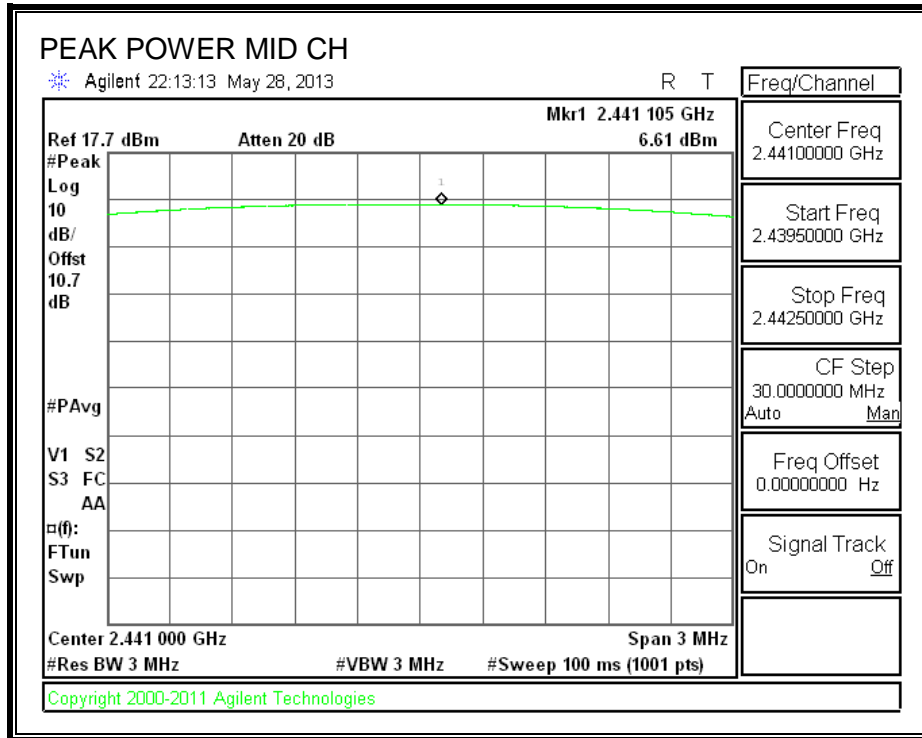
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

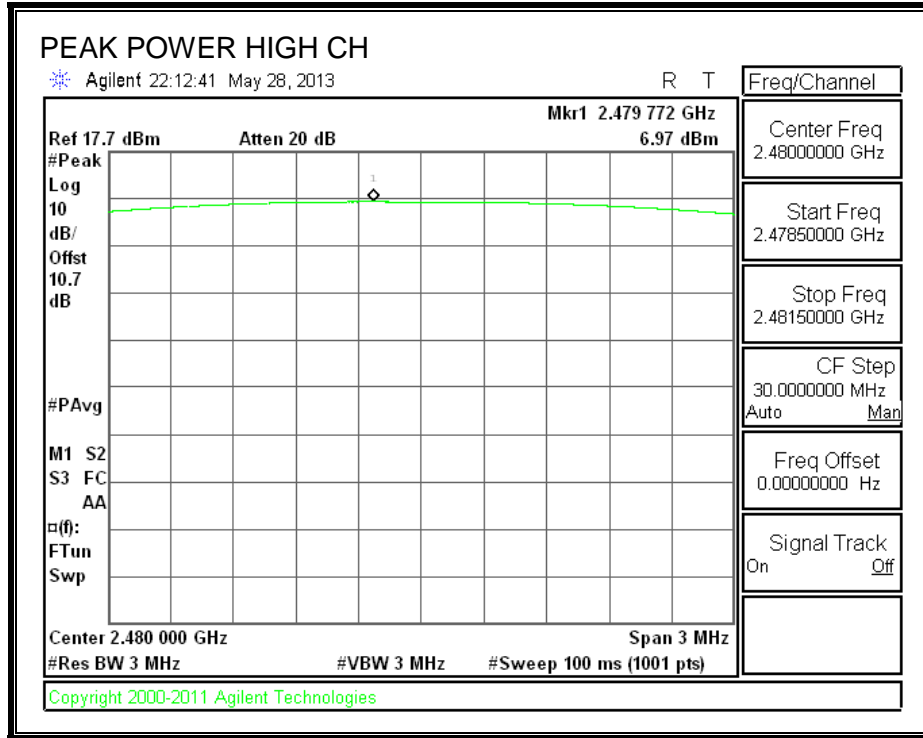
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.39	21	-13.61
Middle	2441	6.61	21	-14.39
High	2480	6.97	21	-14.03

OUTPUT POWER







7.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 0 dB was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.00
Middle	2441	7.30
High	2480	7.30

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

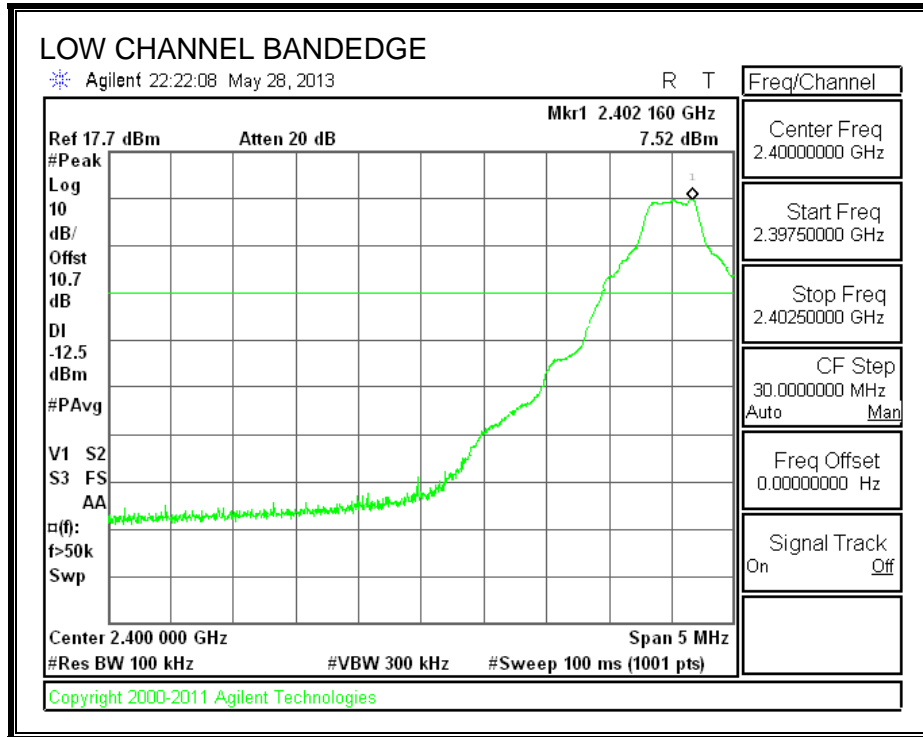
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

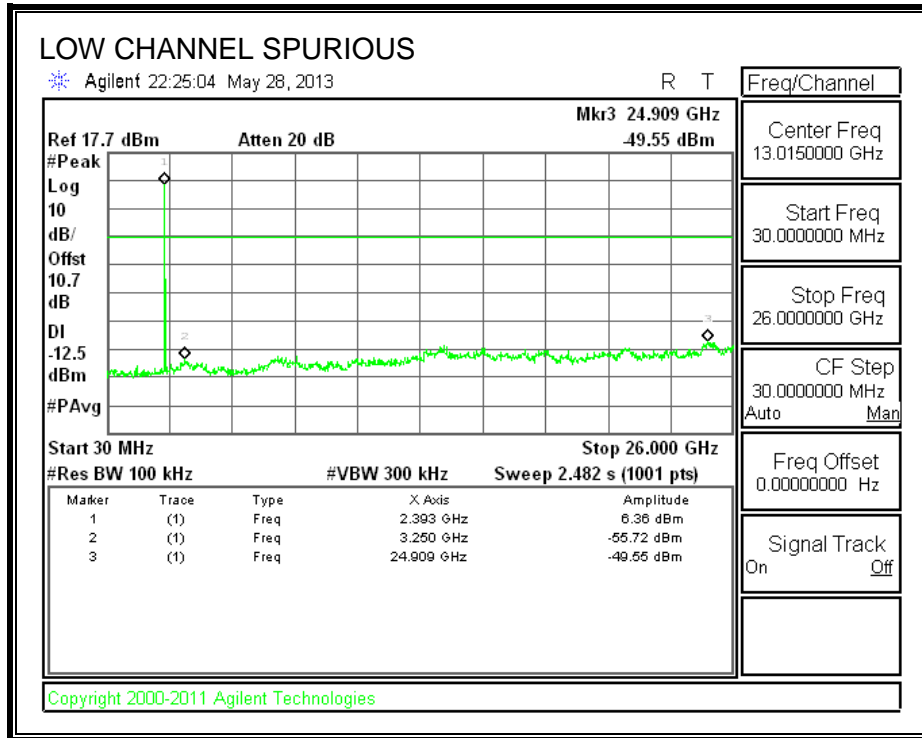
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

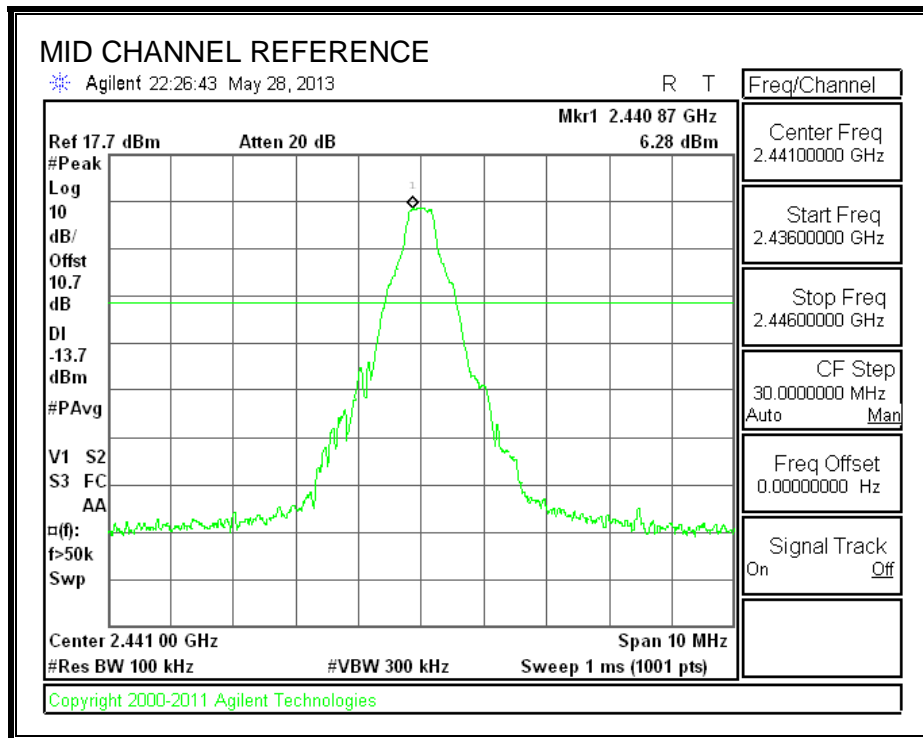
RESULTS

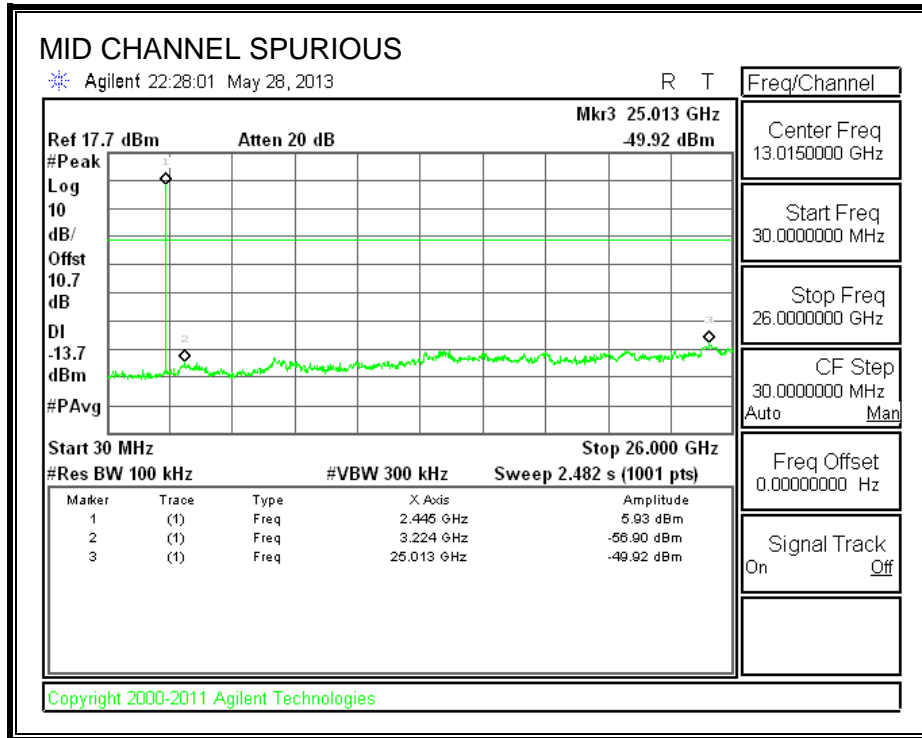
SPURIOUS EMISSIONS, LOW CHANNEL



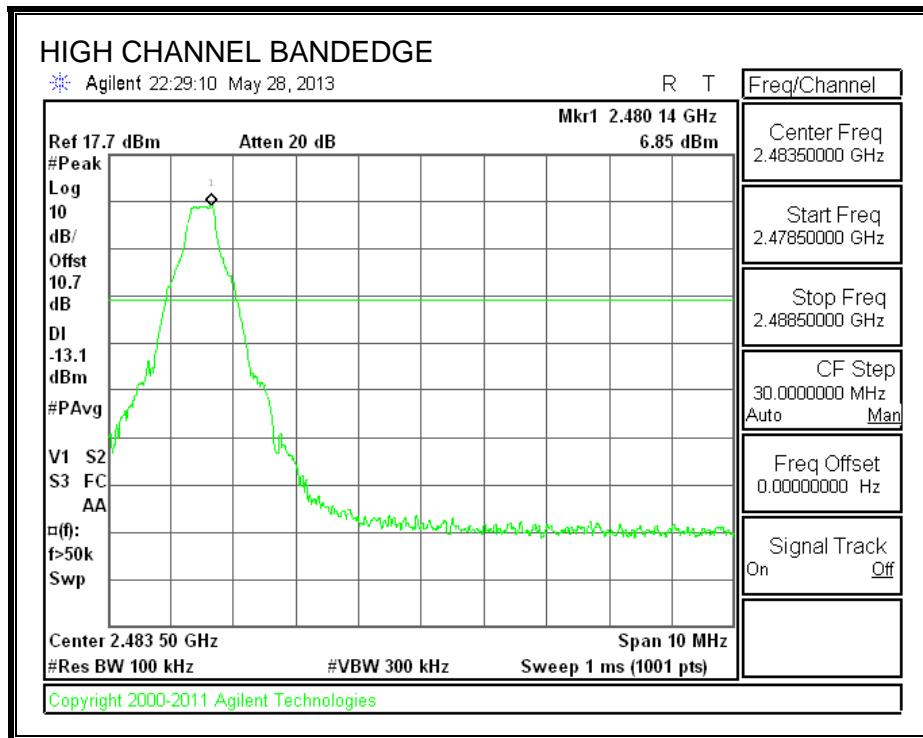


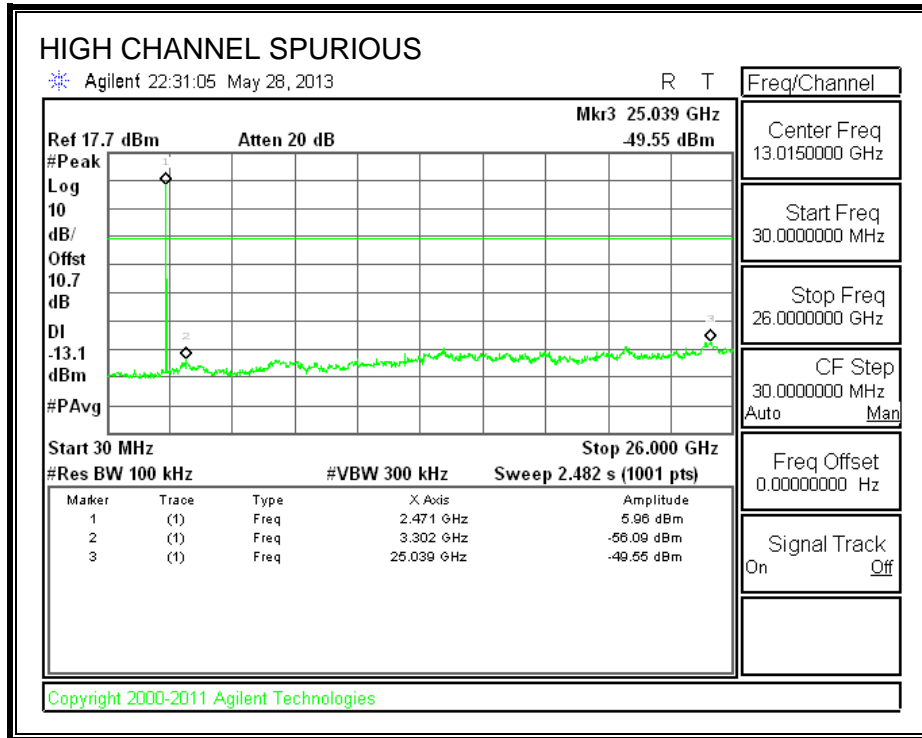
SPURIOUS EMISSIONS, MID CHANNEL



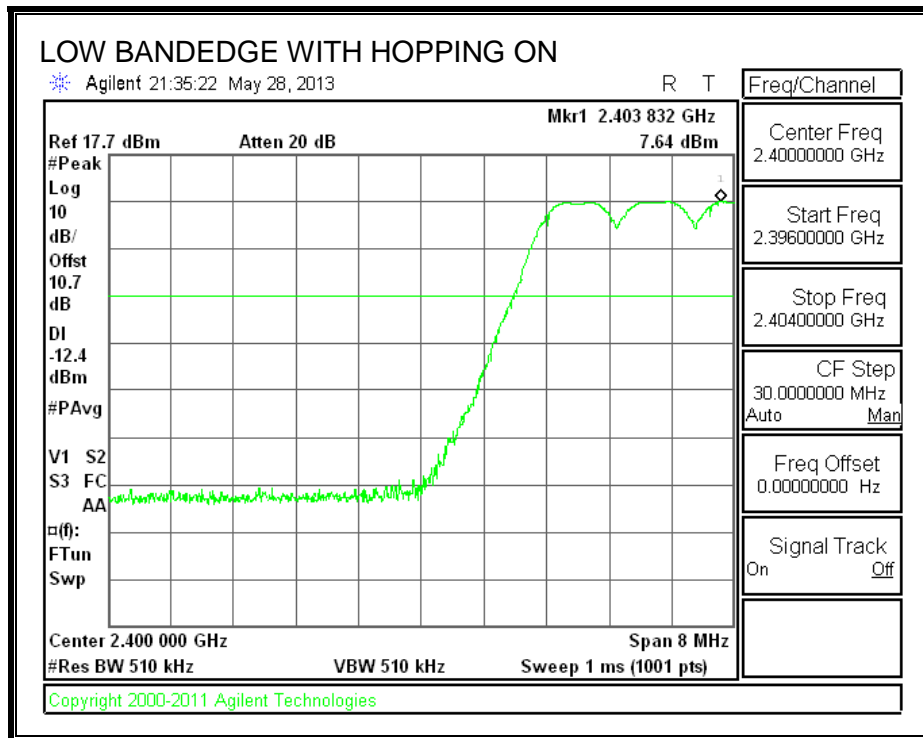


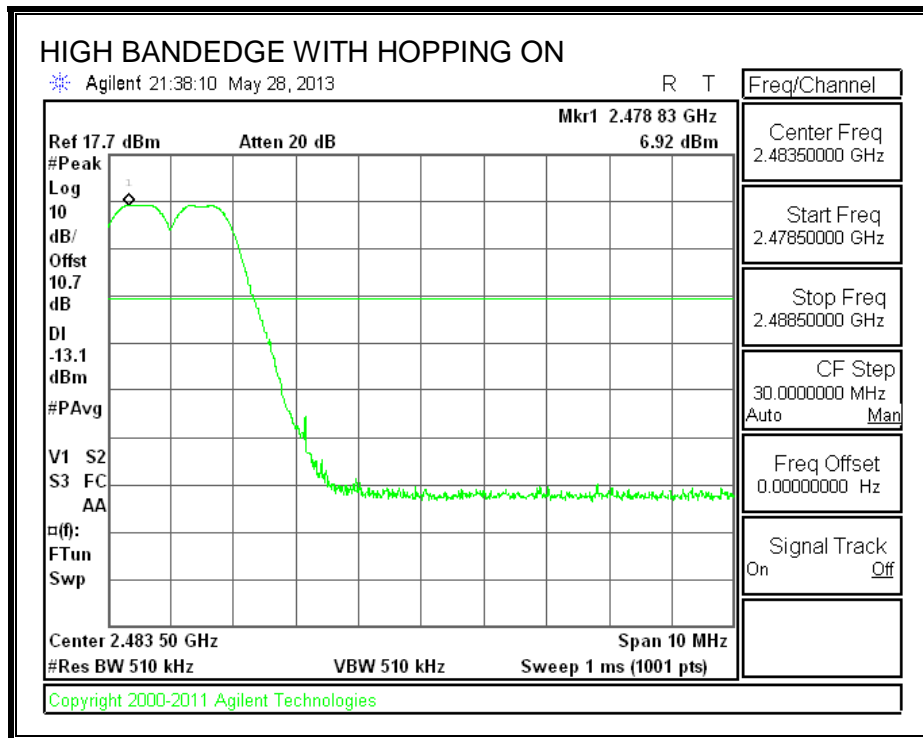
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

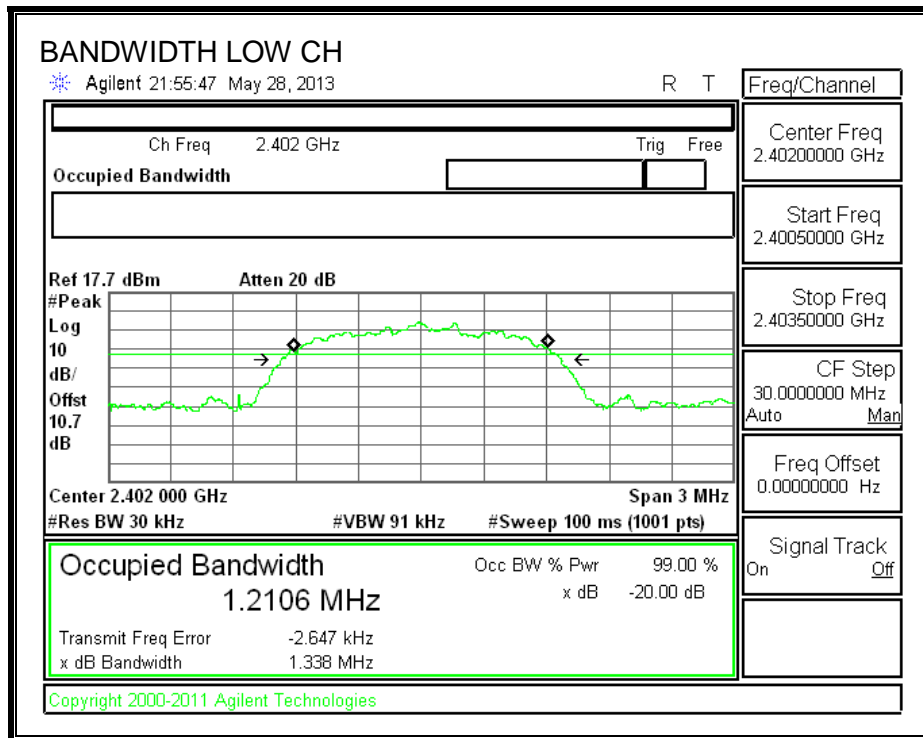
TEST PROCEDURE

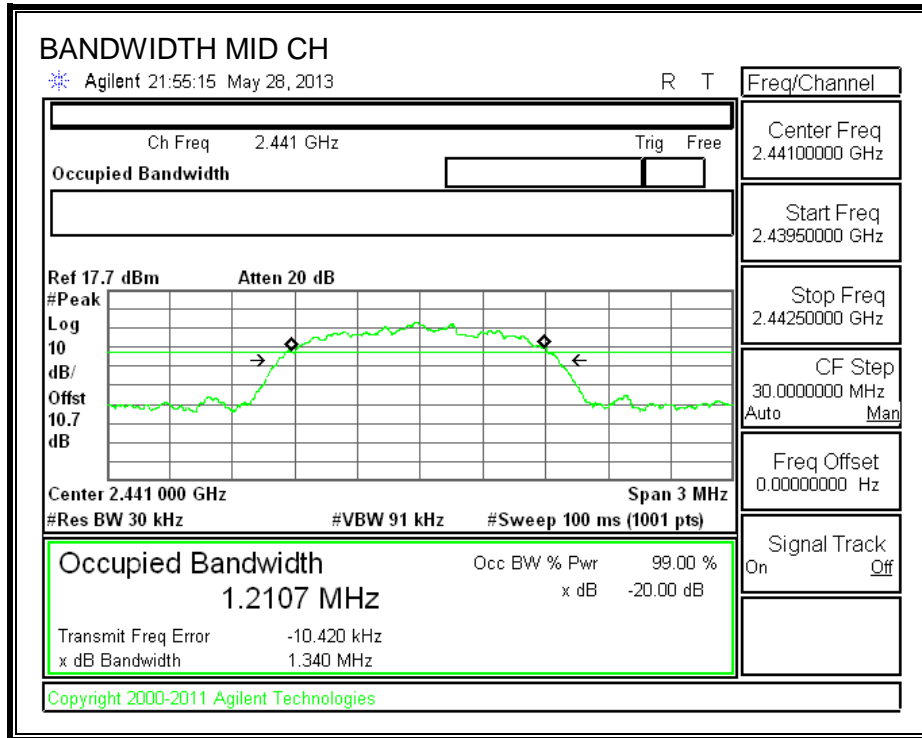
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

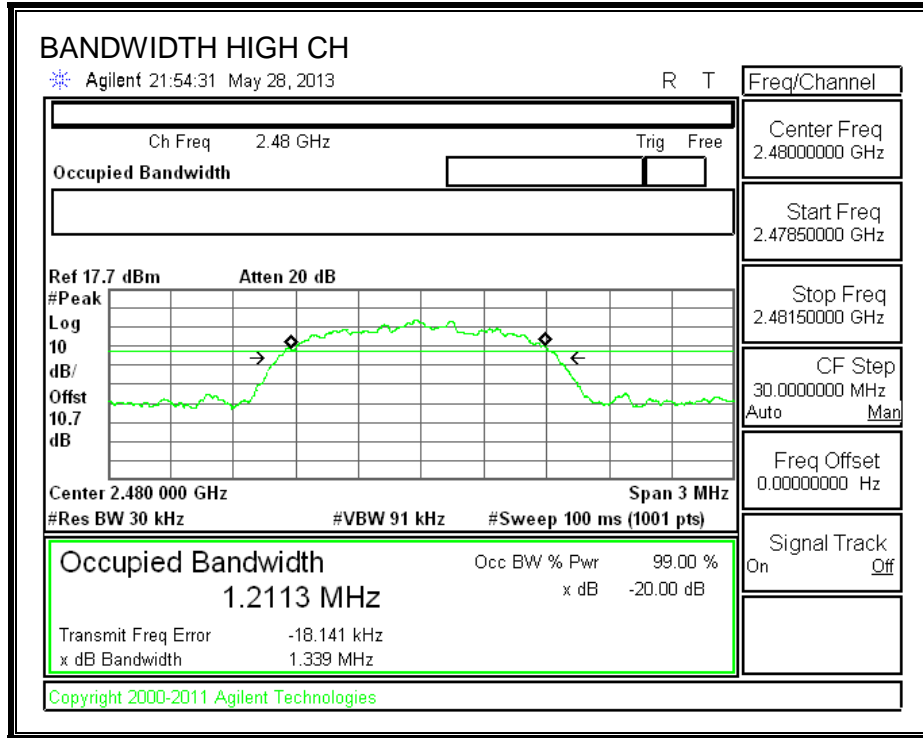
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1338	1221.1
Middle	2441	1340	1238.5
High	2480	1339	1234.8

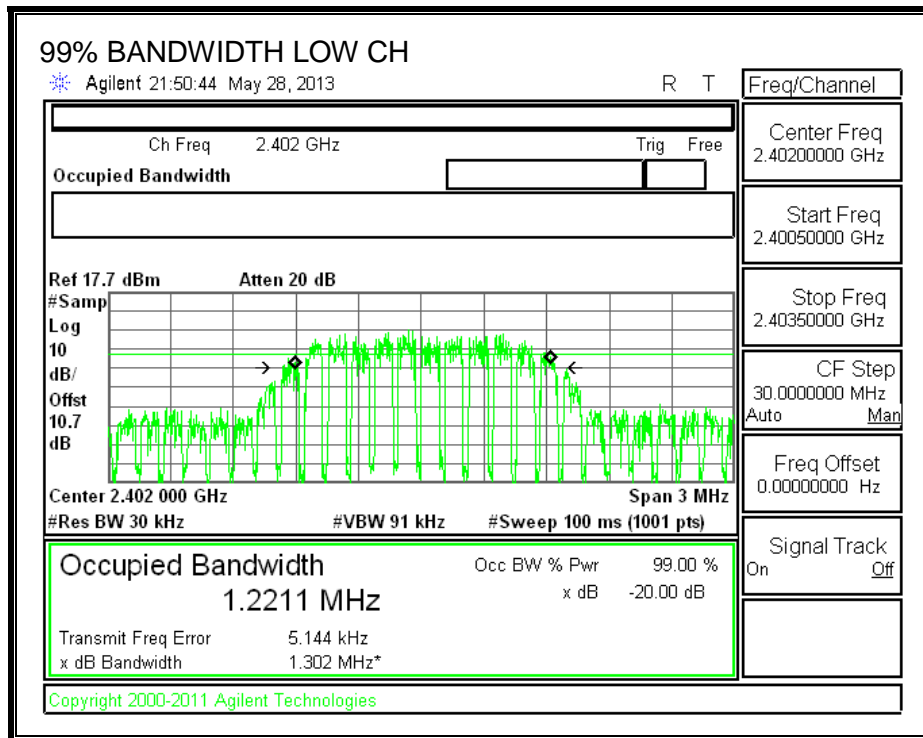
20 dB BANDWIDTH

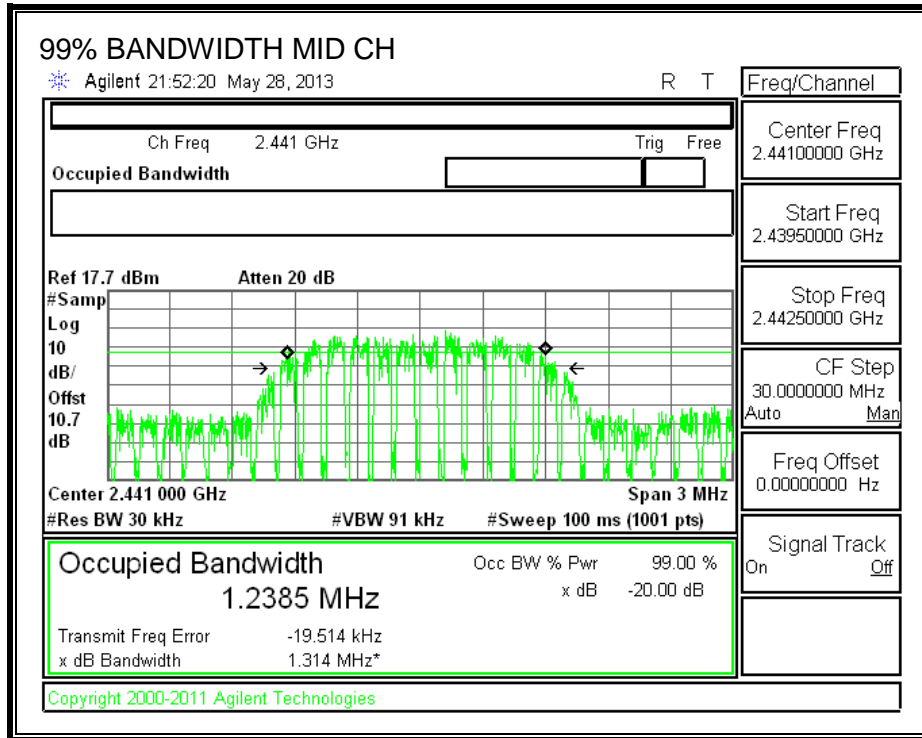


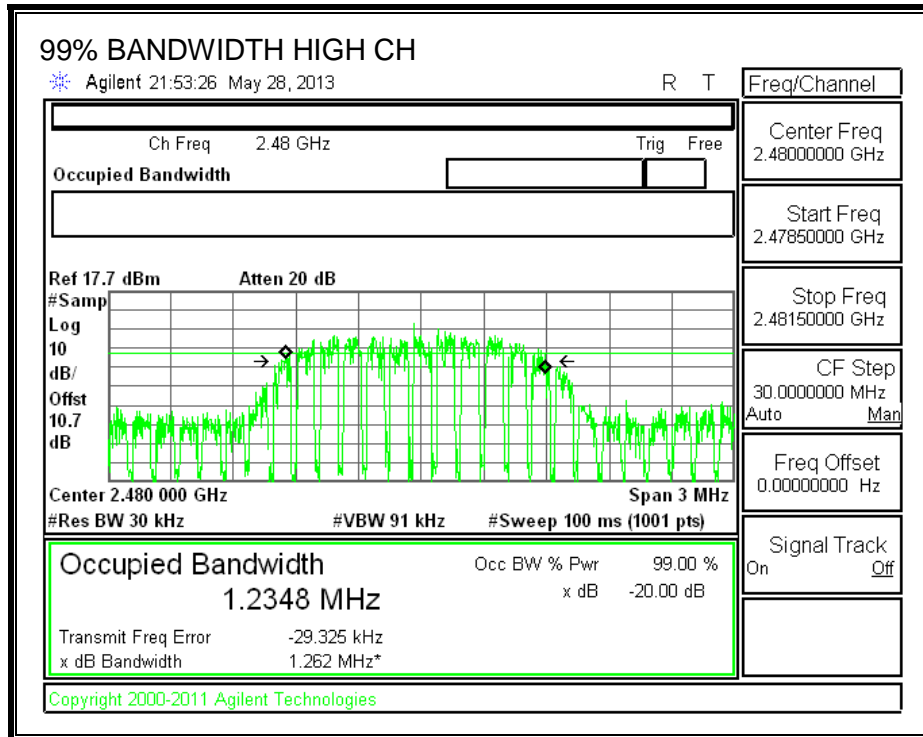




99% BANDWIDTH







7.2.2. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

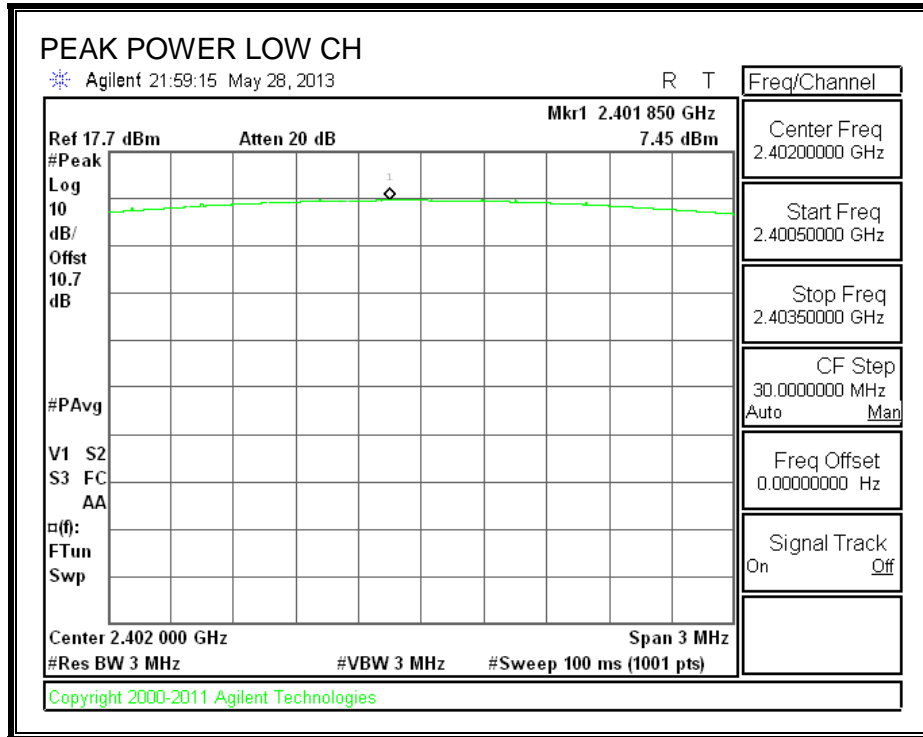
TEST PROCEDURE

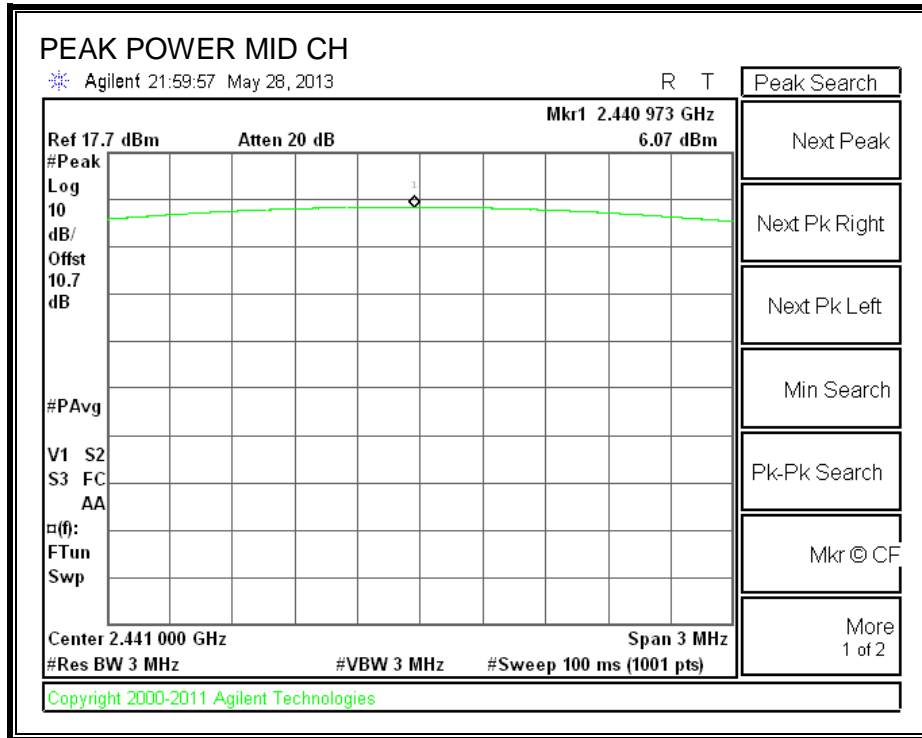
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

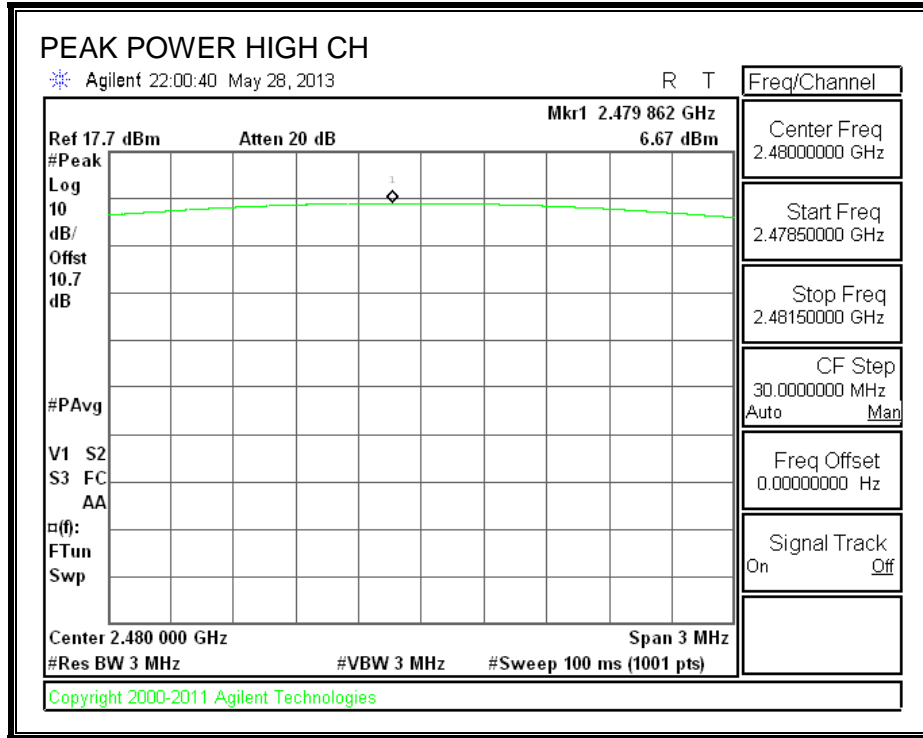
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.45	21	-13.55
Middle	2441	6.07	21	-14.93
High	2480	6.67	21	-14.33

OUTPUT POWER







7.2.3. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 0 dB was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.60
Middle	2441	4.80
High	2480	5.50

7.2.4. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

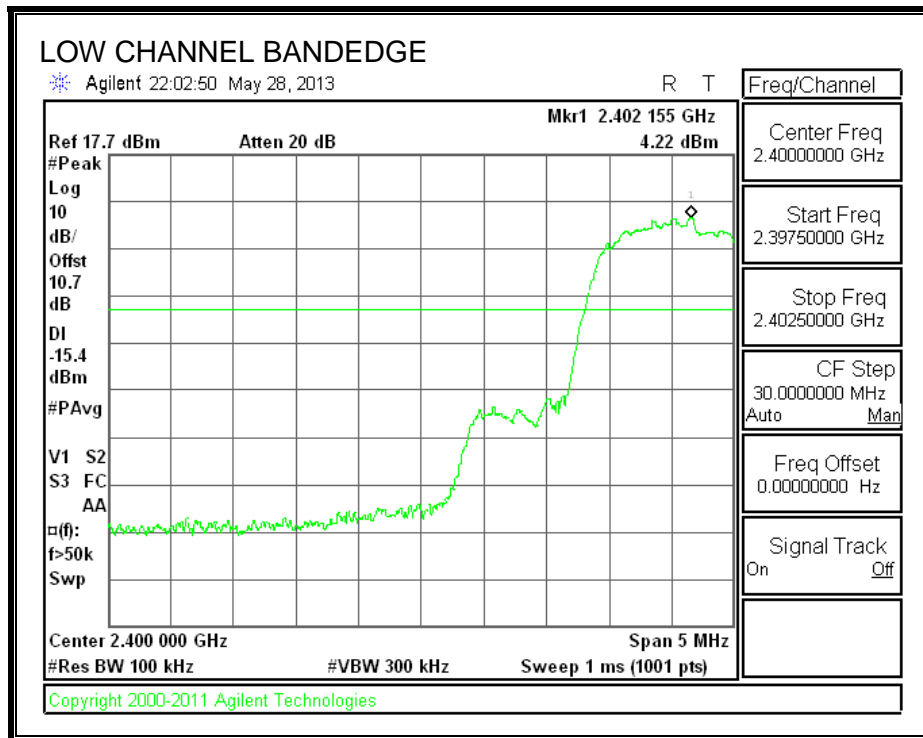
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

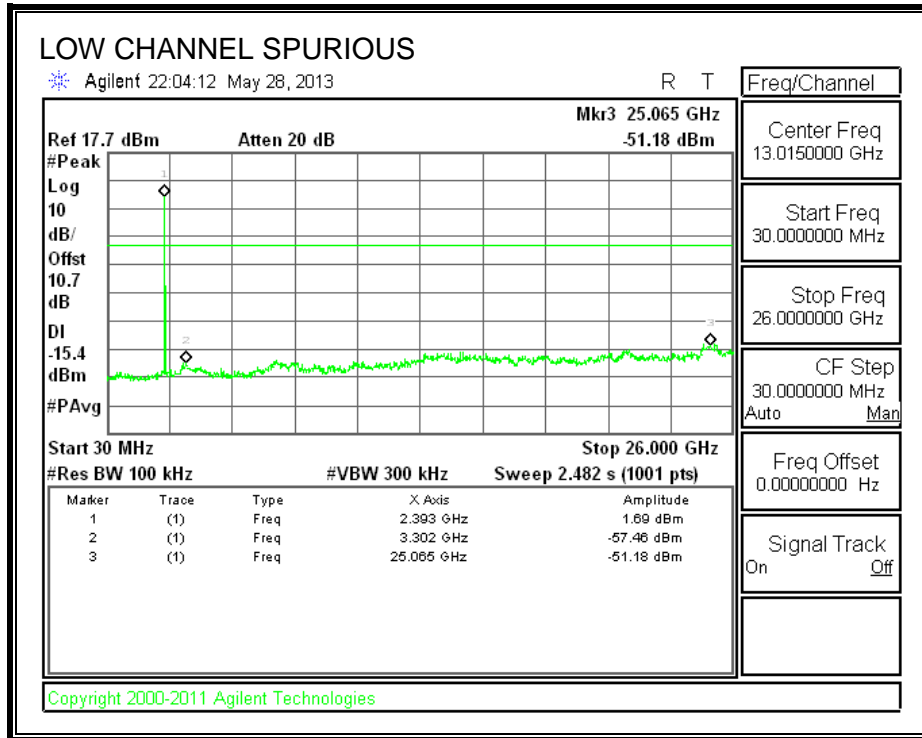
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

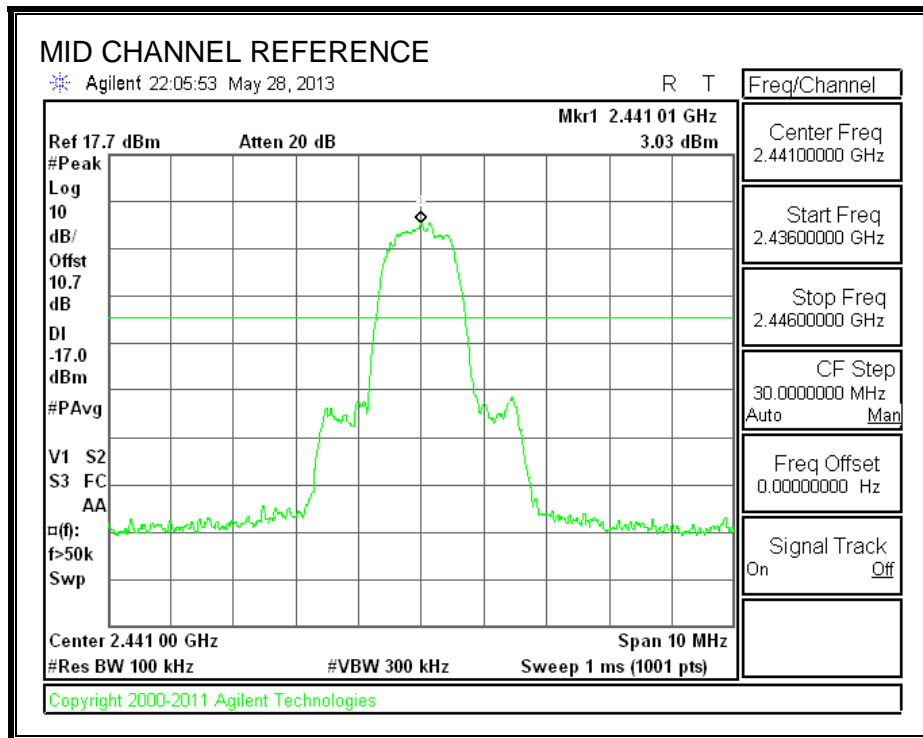
RESULTS

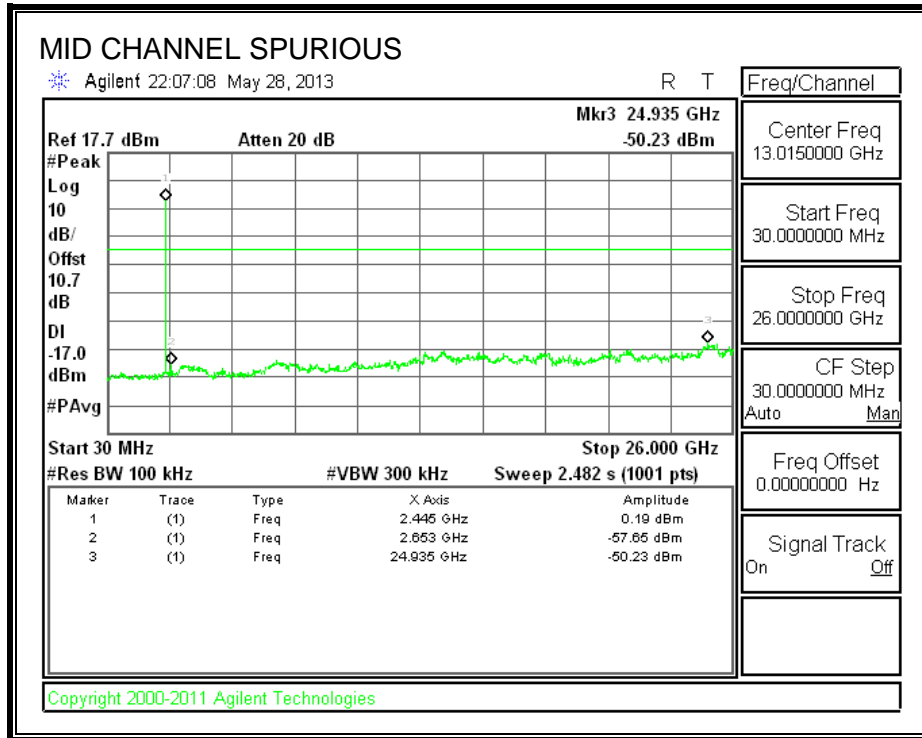
SPURIOUS EMISSIONS, LOW CHANNEL



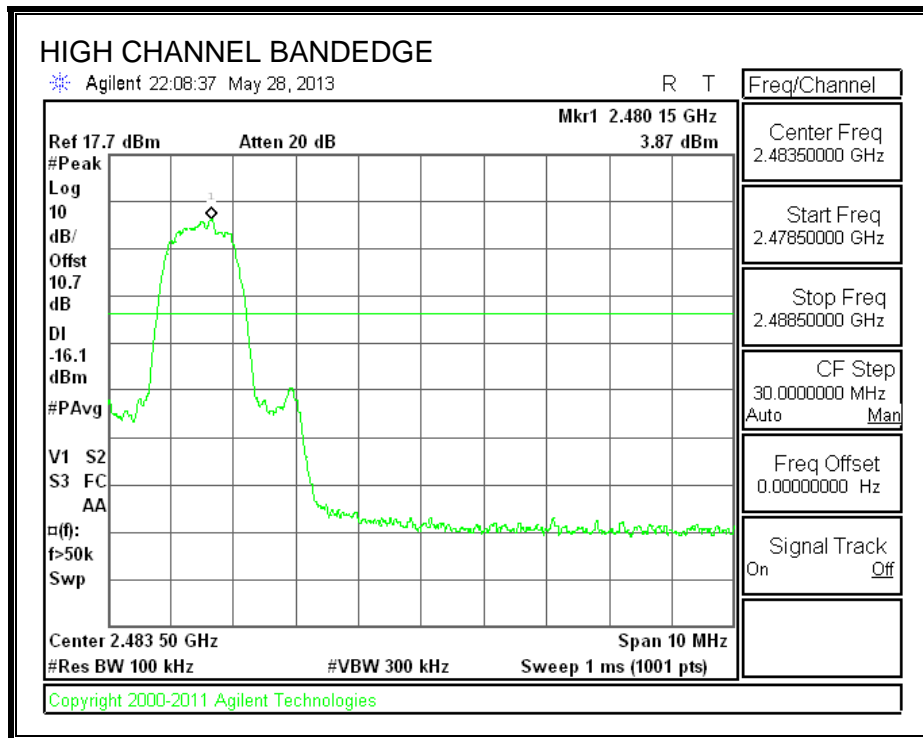


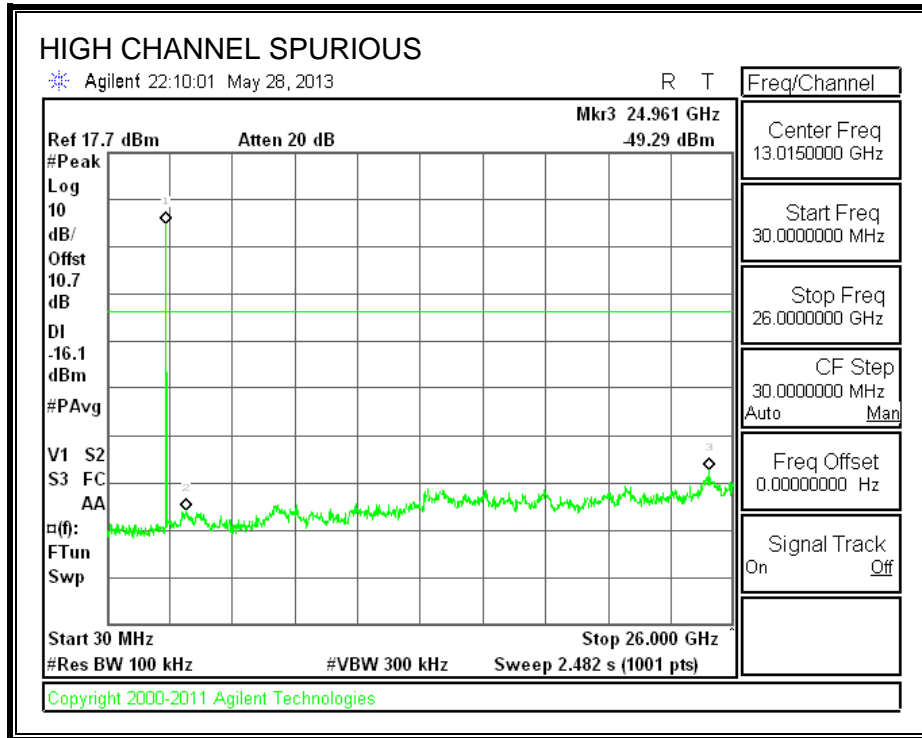
SPURIOUS EMISSIONS, MID CHANNEL



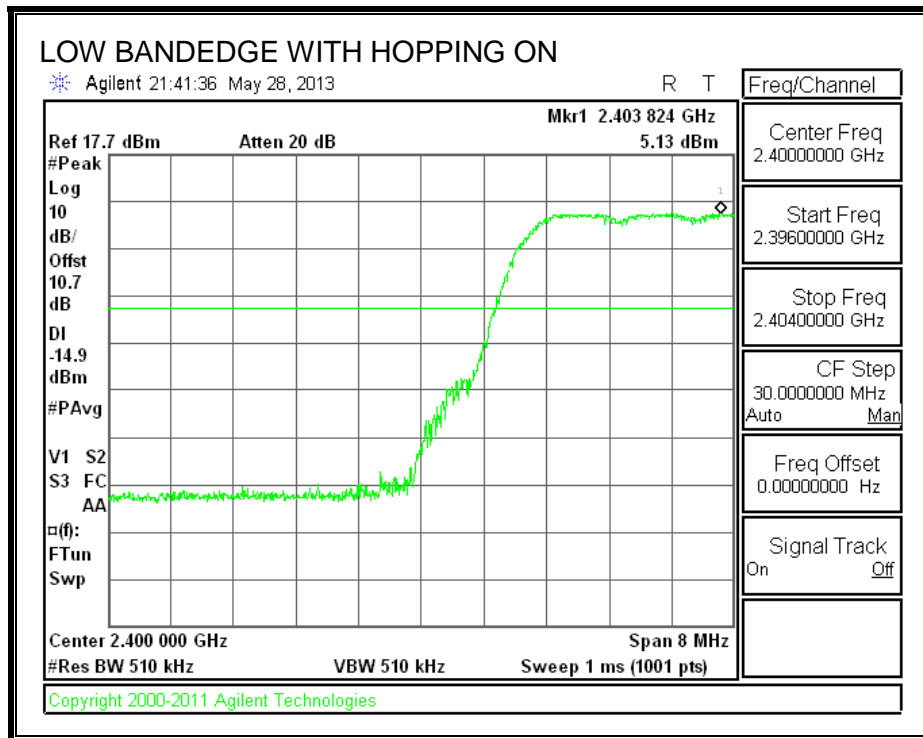


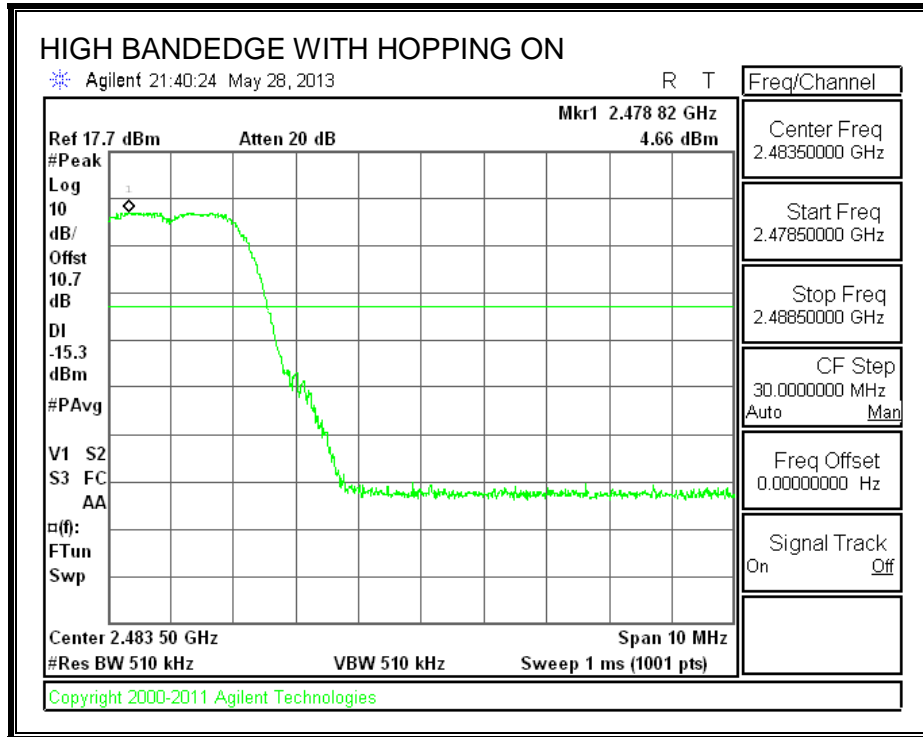
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

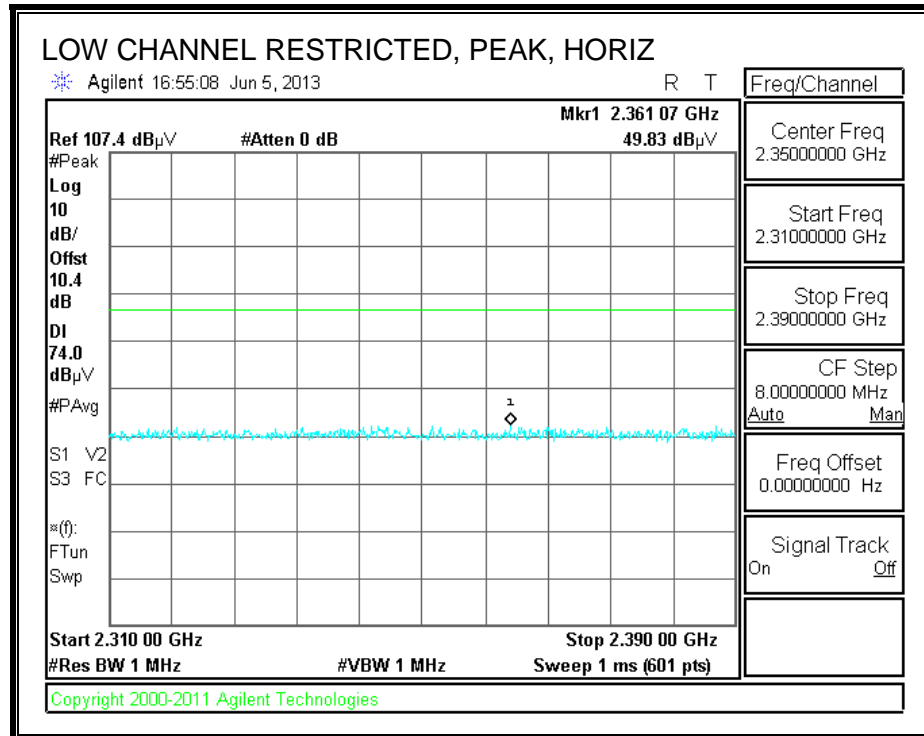
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

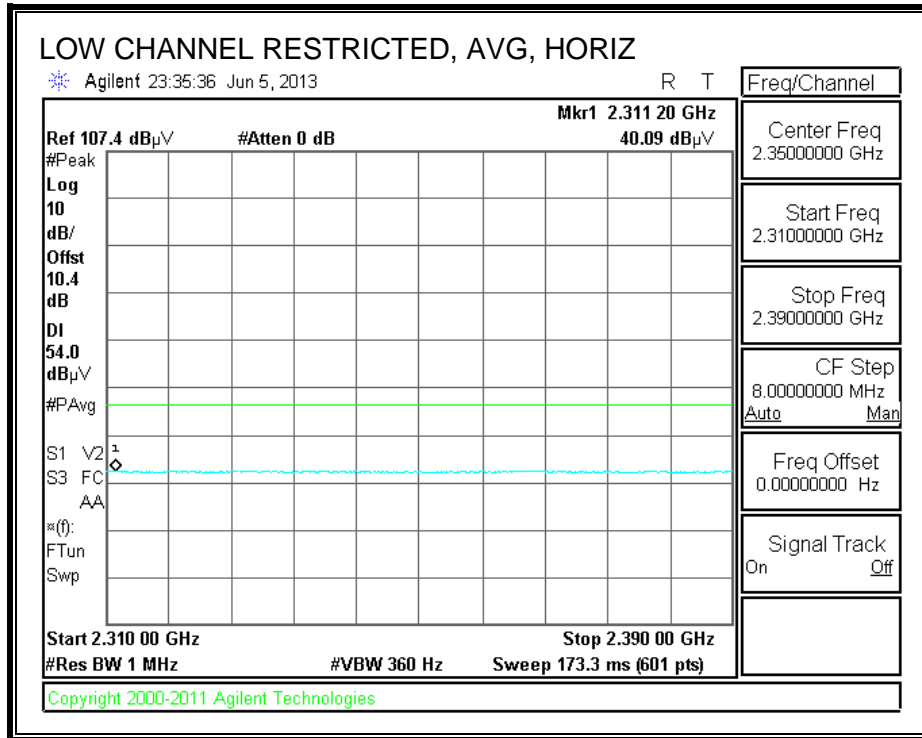
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

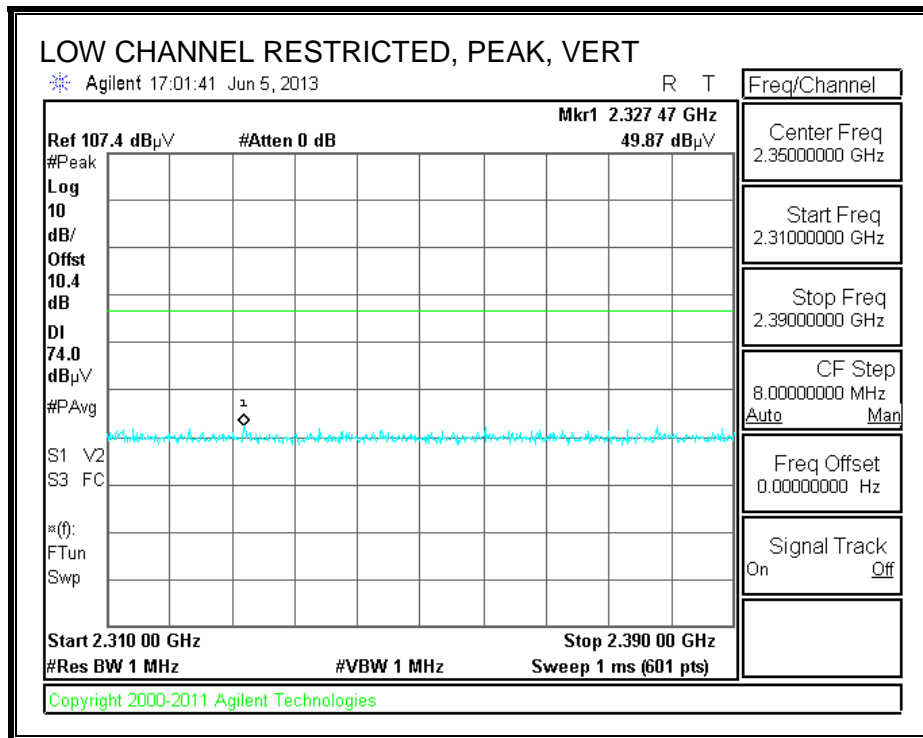
8.2.1. BASIC DATA RATE GFSK MODULATION

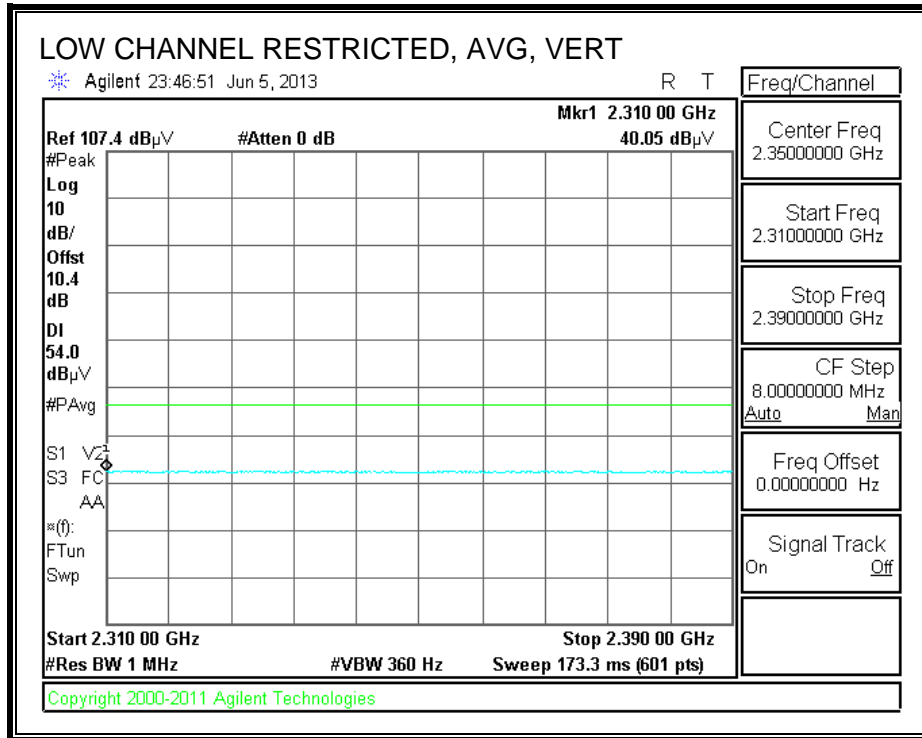
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



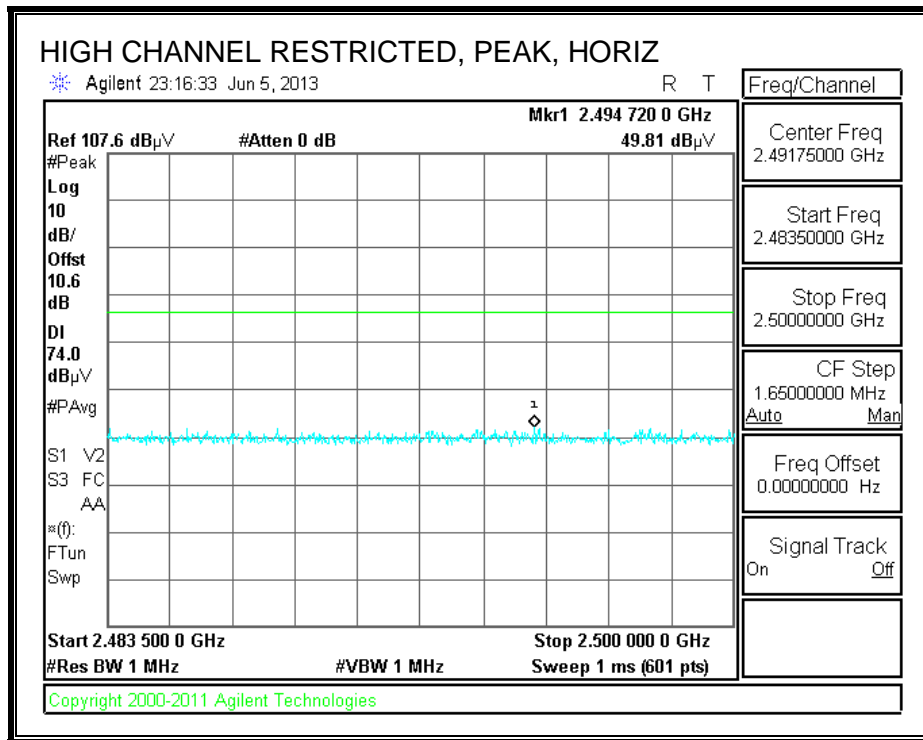


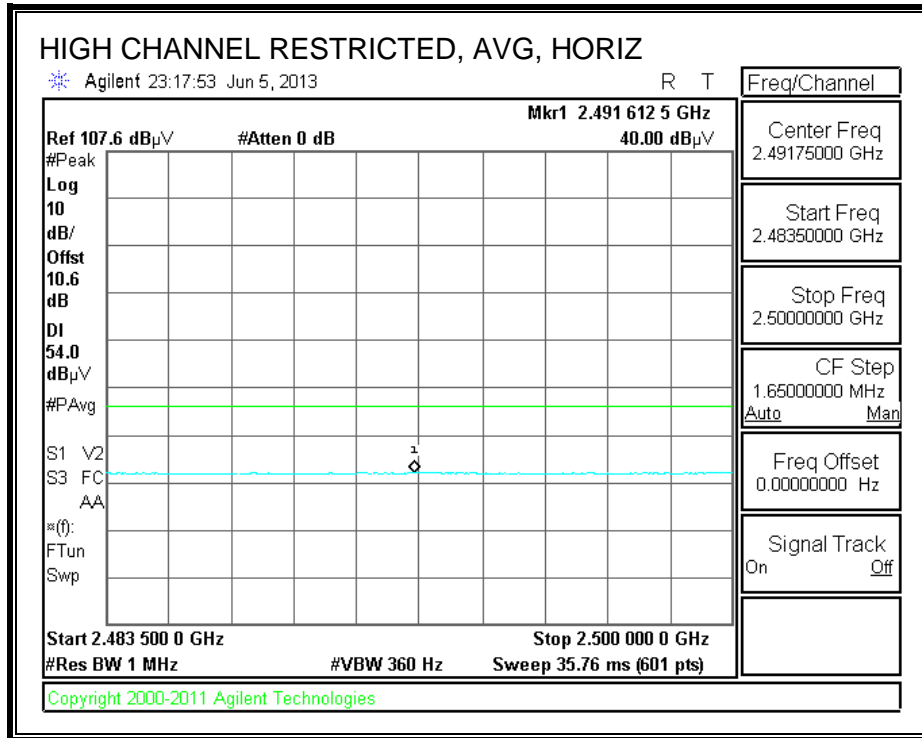
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



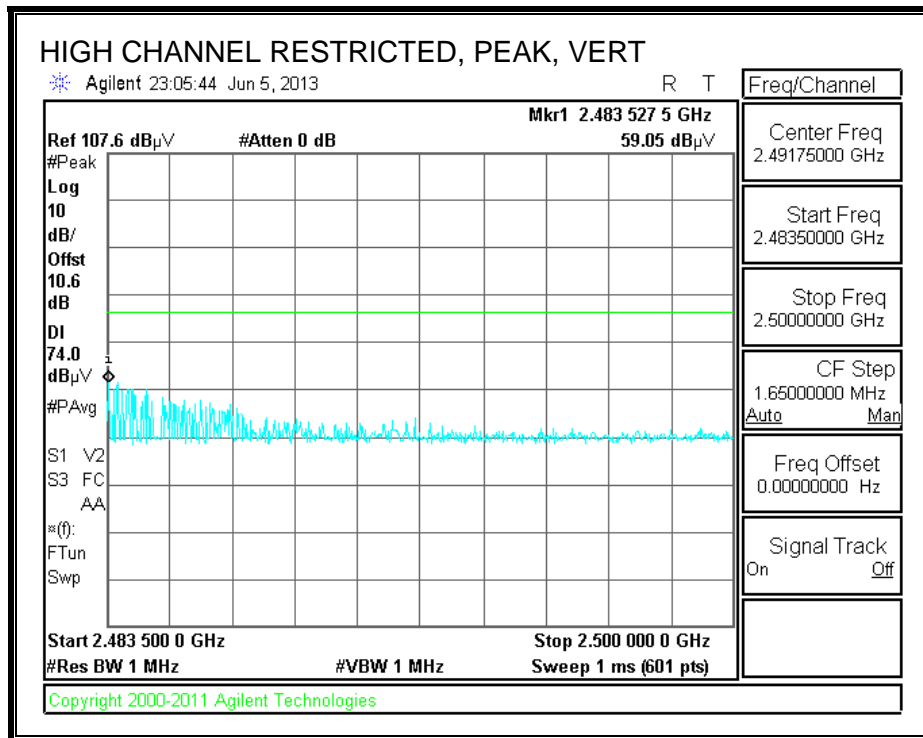


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



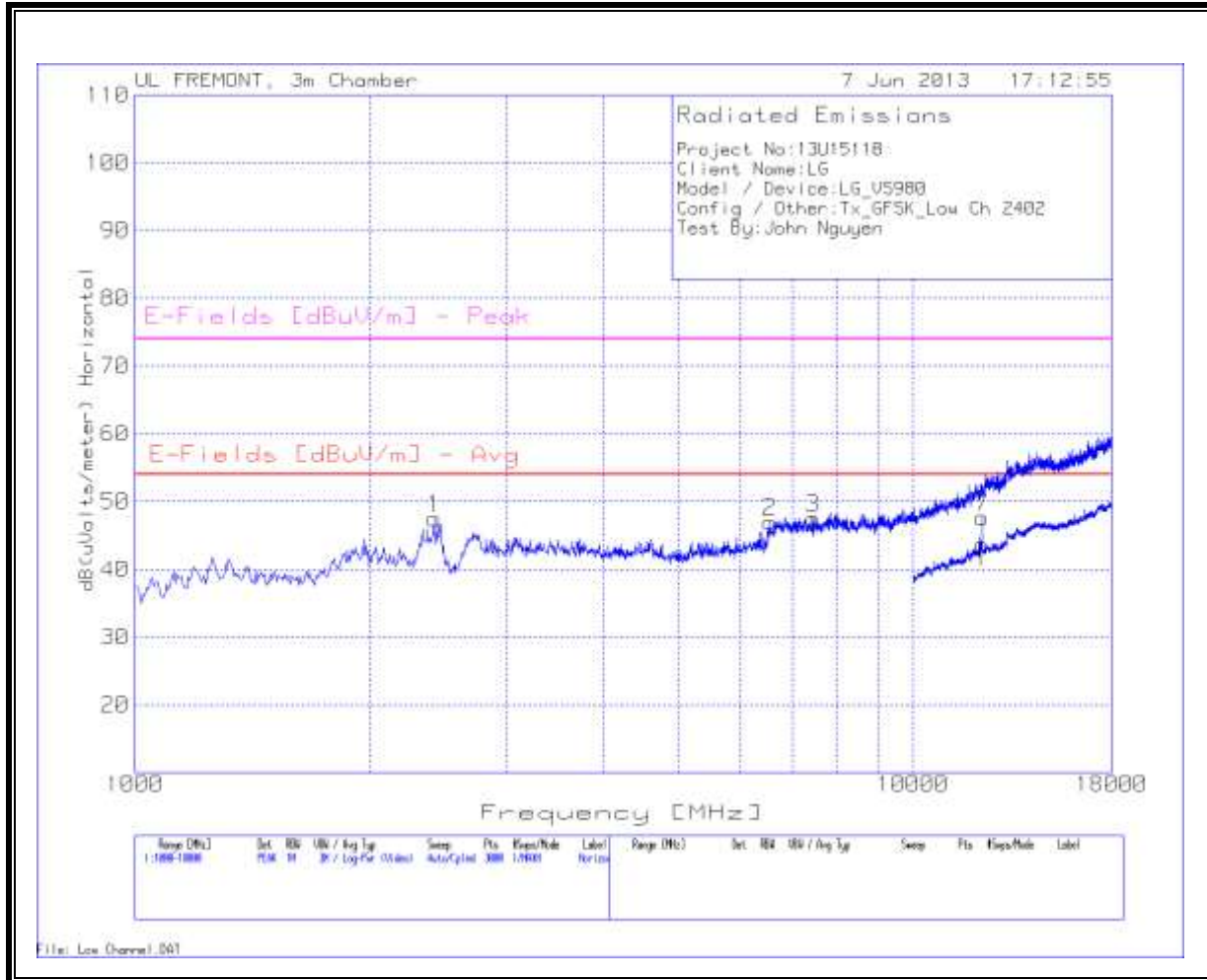


RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)

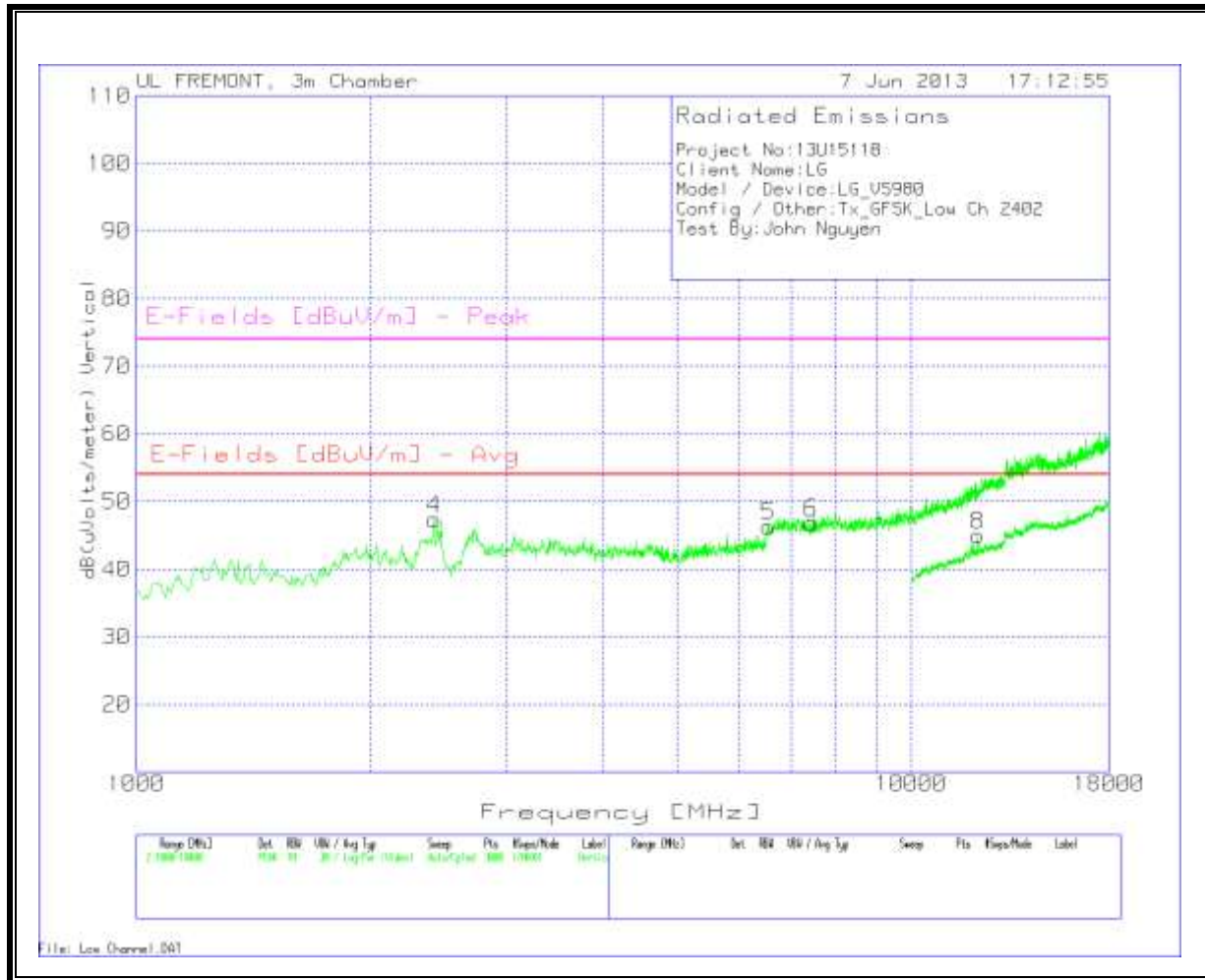


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



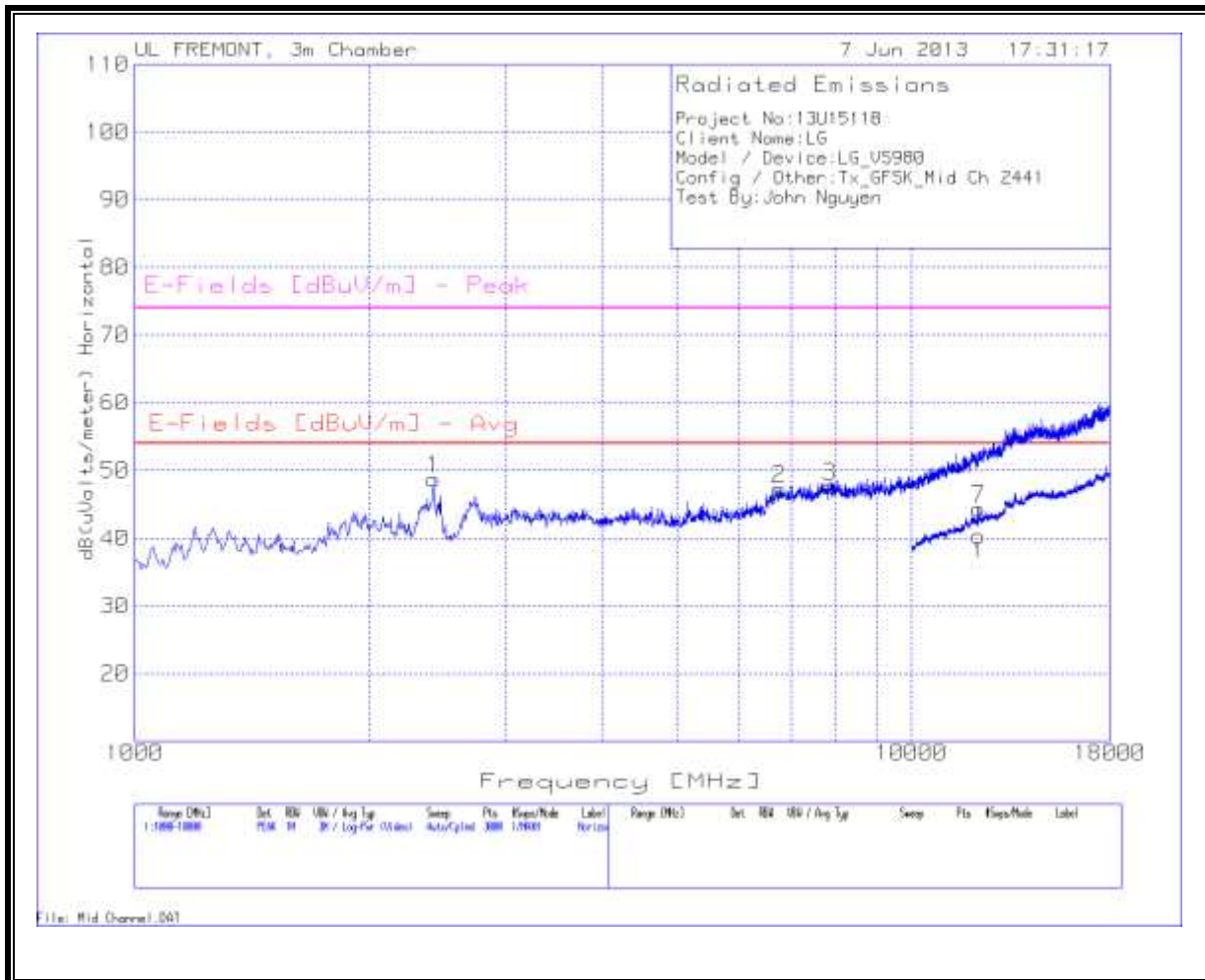
VERTICAL



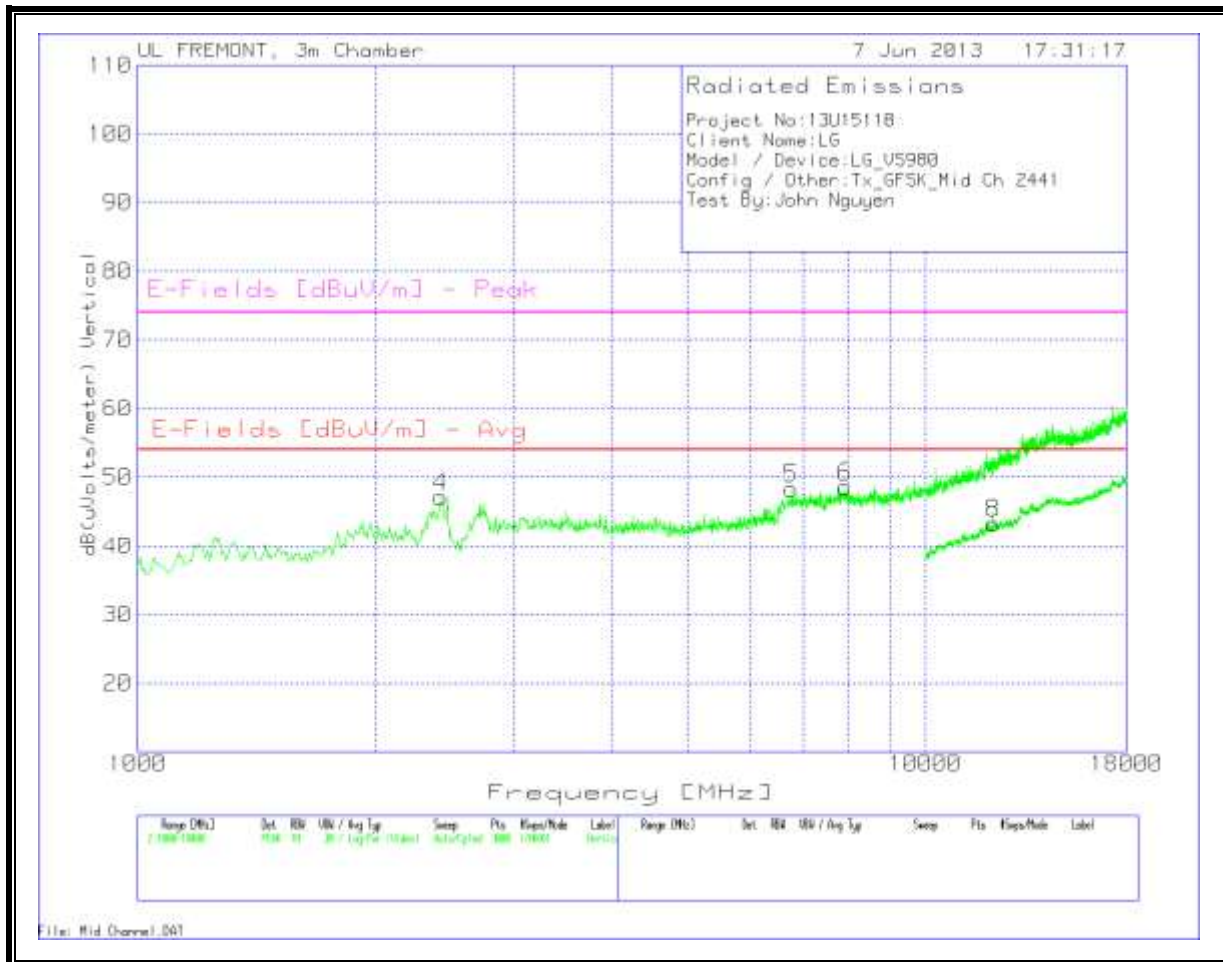
LOW CHANNEL DATA

Project No:13U15118												
Client Name:LG												
Model / Device:LG_VS980												
Config / Other:Tx_GFSK_Low Ch 2402												
Test By:John Nguyen												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts /meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 1000 - 18000MHz												
1	2421.386	44.14	PK	32.2	-29.7	0.9	0	47.54	53.97	-6.43	74	-26.46
2	6538.308	34.84	PK	35.6	-23.6	0.2	0	47.04	53.97	-6.93	74	-26.96
3	7444.37	34.55	PK	35.7	-23	0.3	0	47.55	53.97	-6.42	74	-26.45
Vertical 1000 - 18000MHz												
4	2421.386	44.02	PK	32.2	-29.7	0.9	0	47.42	53.97	-6.55	74	-26.58
5	6538.308	34.12	PK	35.6	-23.6	0.2	0	46.32	53.97	-7.65	74	-27.68
6	7427.382	33.83	PK	35.7	-23	0.3	0	46.83	53.97	-7.14	74	-27.17
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts /meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 10000 - 18000MHz												
7	12258.871	26.87	PK	39	-18.7	0.5	0	47.67	53.97	-6.3	74	-26.33
Vertical 10000 - 18000MHz												
8	12186.907	24.34	PK	39.1	-18.9	0.5	0	45.04	53.97	-8.93	74	-28.96
PK - Peak detector												
QP - Quasi-Peak detector												

MID CHANNEL
 HORIZONTAL



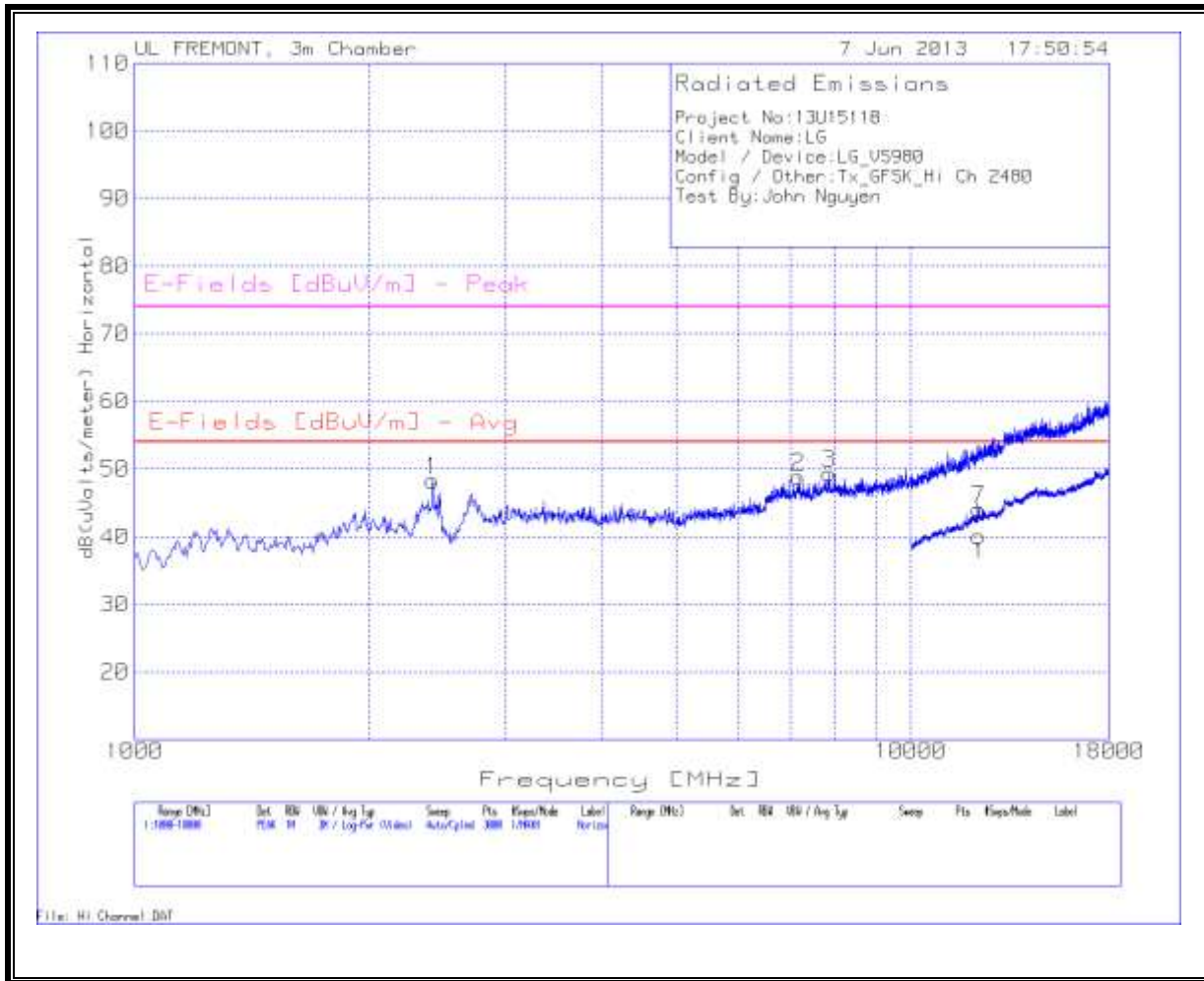
VERTICAL



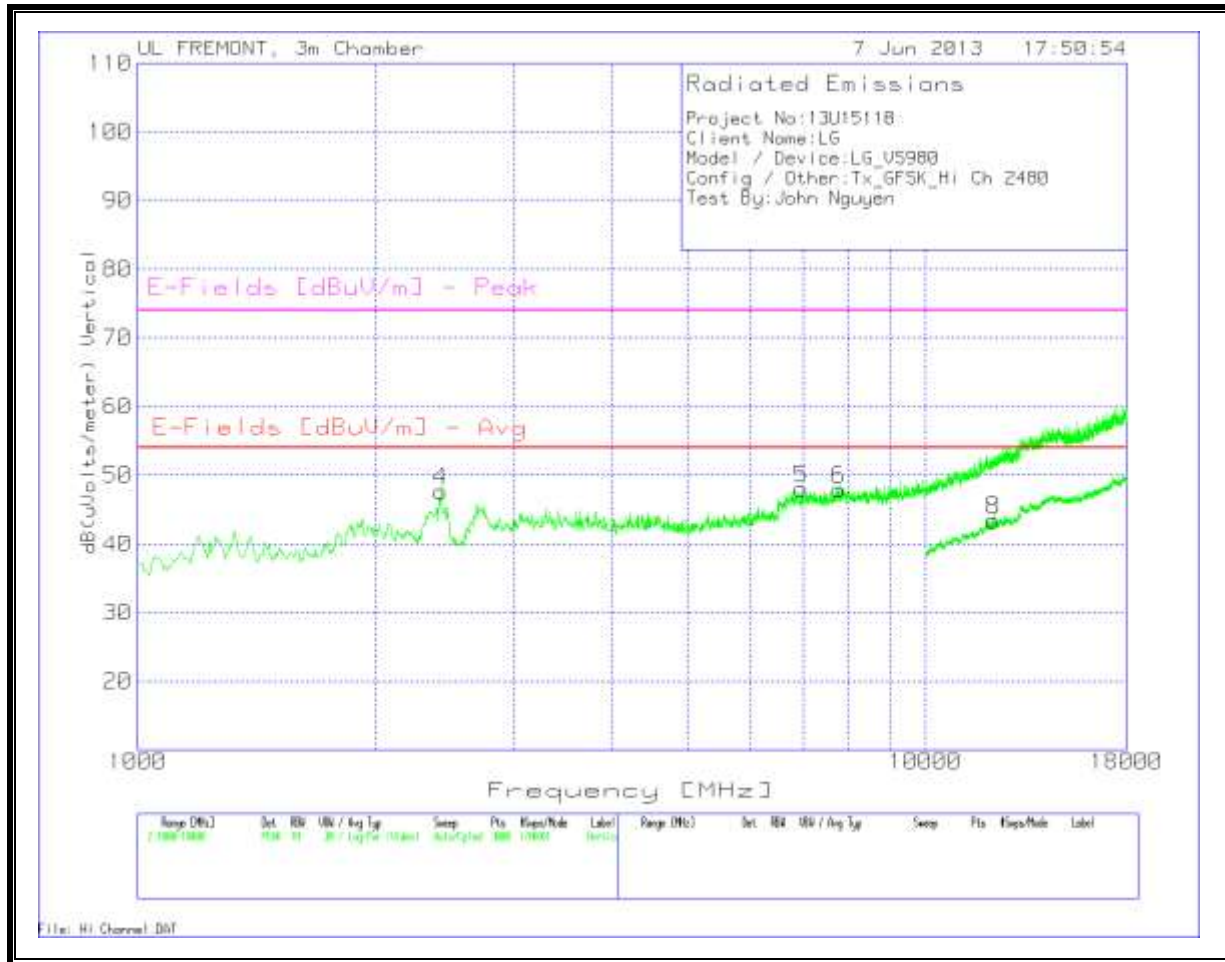
MID CHANNEL DATA

Project No:13U15118												
Client Name:LG												
Model / Device:LG_VS980												
Config / Other:Tx_GFSK_Mid Ch 2441												
Test By:John Nguyen												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts /meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 1000 - 18000MHz												
1	2421.386	45.37	PK	32.2	-29.7	0.9	0	48.77	53.97	-5.2	74	-25.23
2	6764.823	34.63	PK	35.6	-23.3	0.3	0	47.23	53.97	-6.74	74	-26.77
3	7835.11	34.26	PK	35.8	-22.7	0.3	0	47.66	53.97	-6.31	74	-26.34
Vertical 1000 - 18000MHz												
4	2421.386	43.73	PK	32.2	-29.7	0.9	0	47.13	53.97	-6.84	74	-26.87
5	6764.823	35.74	PK	35.6	-23.3	0.3	0	48.34	53.97	-5.63	74	-25.66
6	7903.065	35.1	PK	35.8	-22.6	0.3	0	48.6	53.97	-5.37	74	-25.4
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts /meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 10000 - 18000MHz												
7	12198.901	23.62	PK	39.1	-18.9	0.5	0	44.32	53.97	-9.65	74	-29.68
Vertical 10000 - 18000MHz												
8	12198.901	22.54	PK	39.1	-18.9	0.5	0	43.24	53.97	-10.73	74	-30.76
PK - Peak detector												
QP - Quasi-Peak detector												

HIGH CHANNEL
 HORIZONTAL



VERTICAL

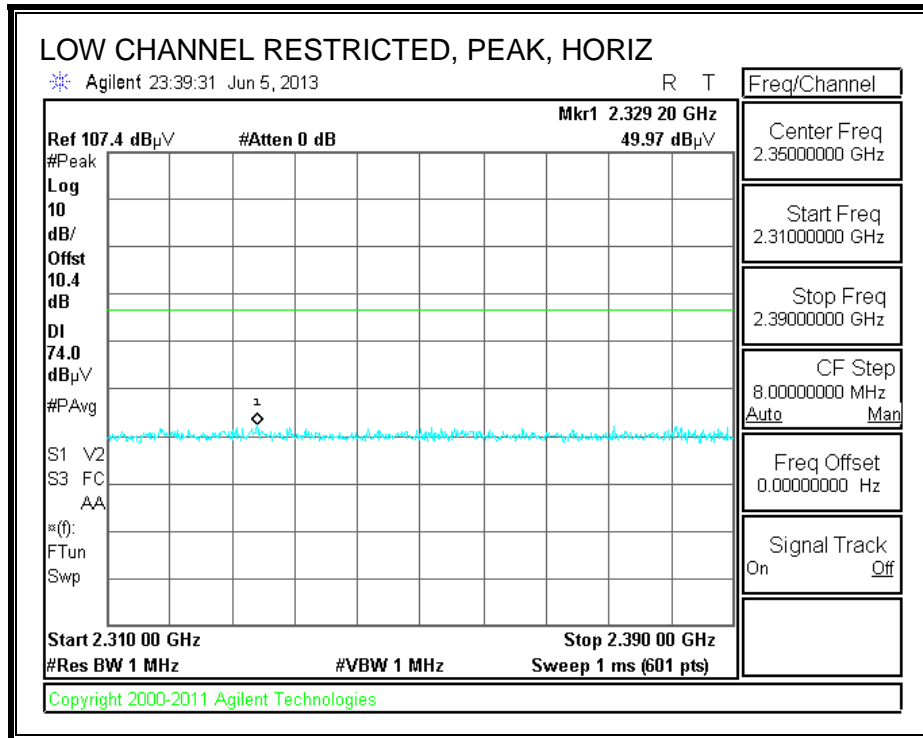


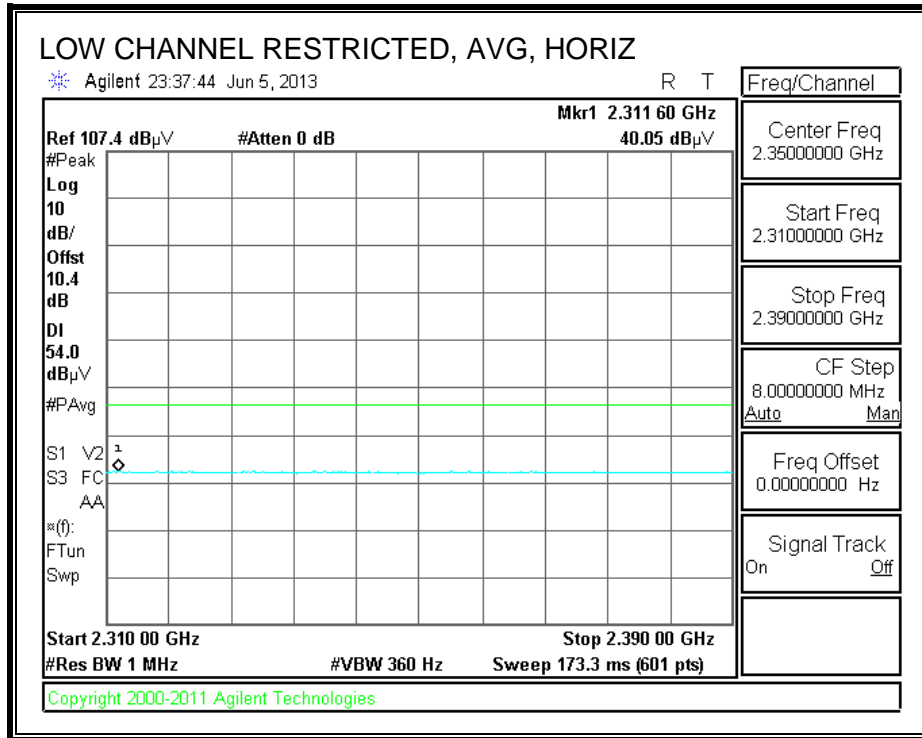
HIGH CHANNEL DATA

Project No:13U15118												
Client Name:LG												
Model / Device:LG_VS980												
Config / Other:Tx_GFSK_Hi Ch 2480												
Test By:John Nguyen												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 1000 - 18000MHz												
1	2415.723	44.97	PK	32.1	-29.7	0.9	0	48.27	53.97	-5.7	74	-25.73
2	7161.226	36.09	PK	35.6	-23.1	0.3	0	48.89	53.97	-5.08	74	-25.11
3	7835.11	35.97	PK	35.8	-22.7	0.3	0	49.37	53.97	-4.6	74	-24.63
Vertical 1000 - 18000MHz												
4	2421.386	44.22	PK	32.2	-29.7	0.9	0	47.62	53.97	-6.35	74	-26.38
5	6963.025	35.4	PK	35.6	-23.2	0.2	0	48	53.97	-5.97	74	-26
6	7761.492	34.6	PK	35.8	-22.7	0.2	0	47.9	53.97	-6.07	74	-26.1
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 10000 - 18000MHz												
7	12242.879	23.1	PK	39	-18.7	0.7	0	44.1	53.97	-9.87	74	-29.9
Vertical 10000 - 18000MHz												
8	12204.898	22.52	PK	39.1	-18.8	0.6	0	43.42	53.97	-10.55	74	-30.58
Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)	Azimuth [Degs]
Horizontal 1000 - 18000MHz												
7843.87	24.41	VB1	35.8	-22.7	0.3	1	38.81	53.97	-15.16	74	-35.19	134
PK - Peak detector												
QP - Quasi-Peak detector												
Av - Average detector												

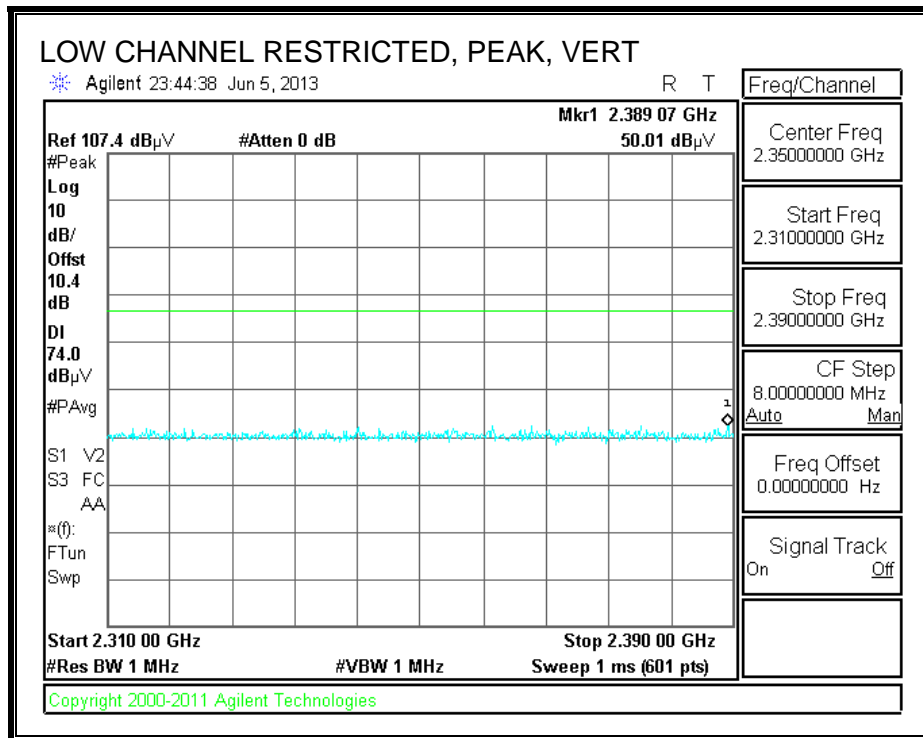
8.2.2. ENHANCED DATA RATE 8PSK MODULATION

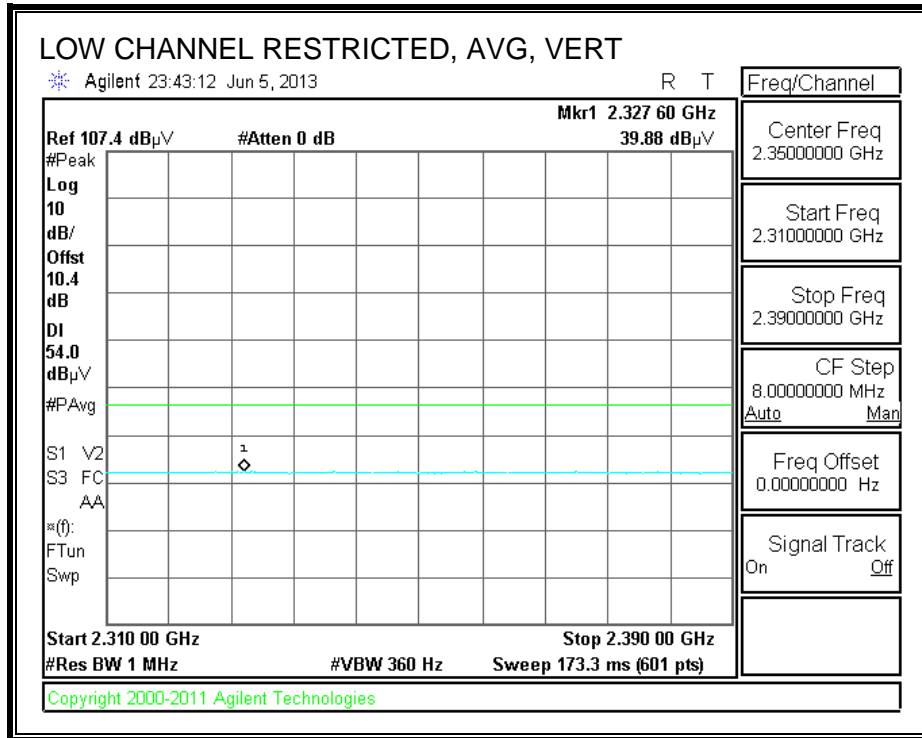
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



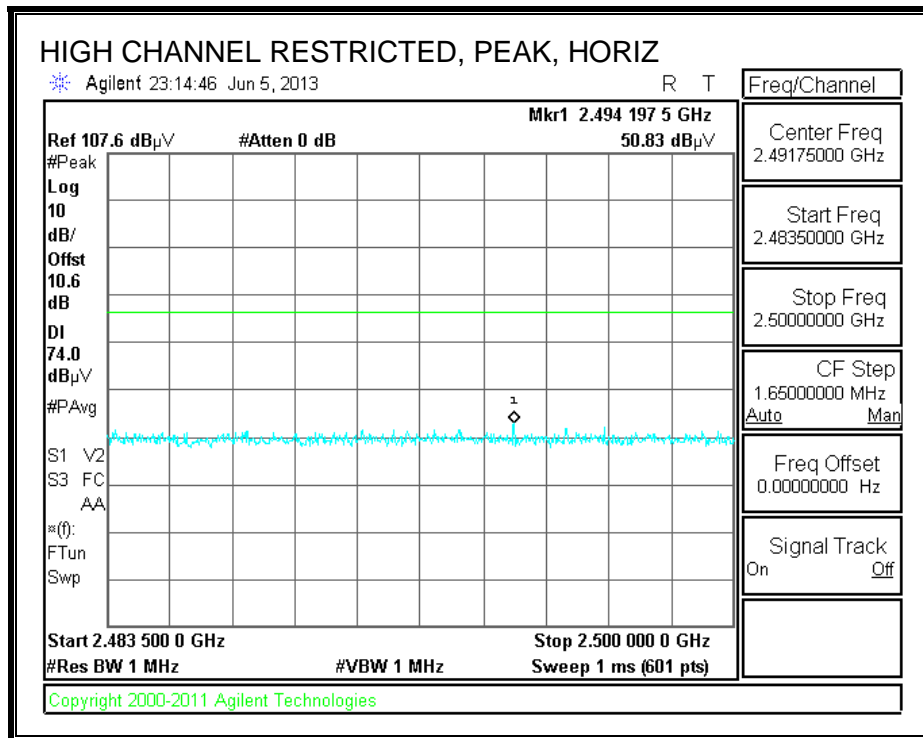


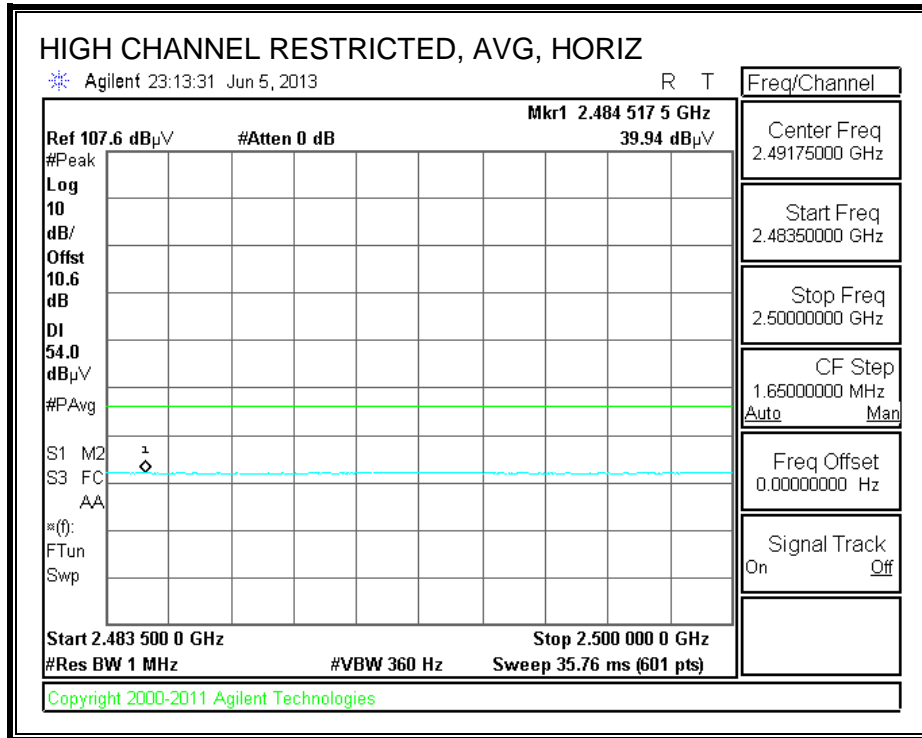
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



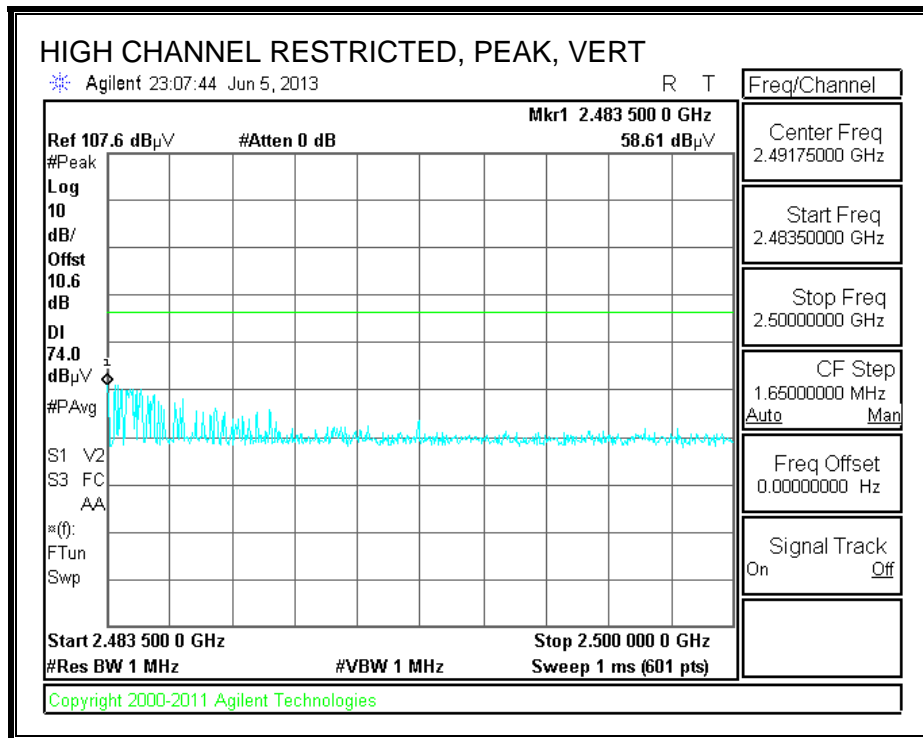


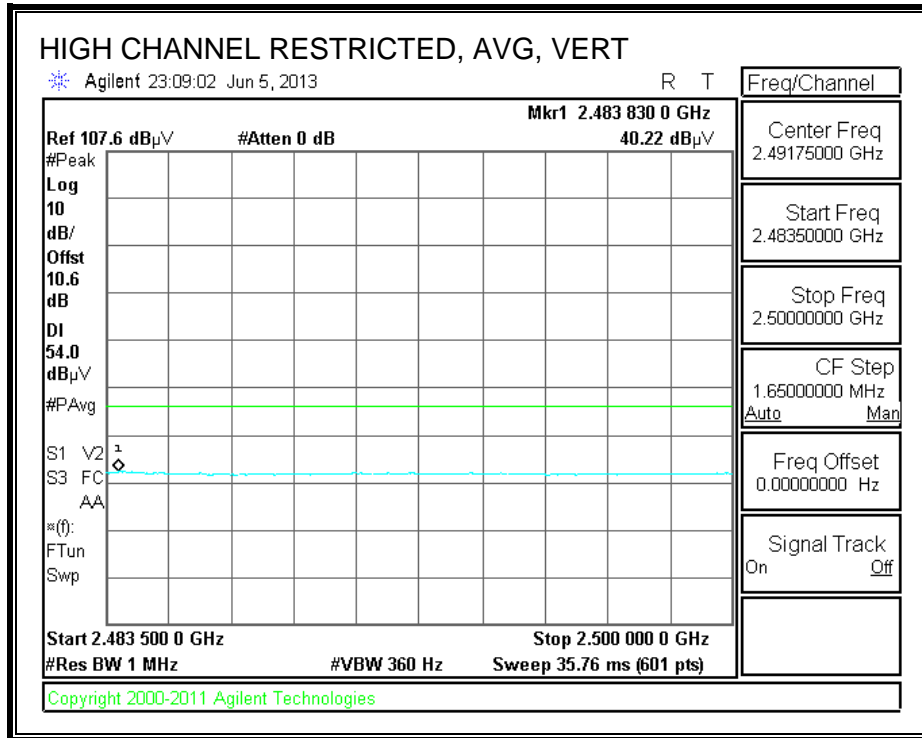
RESTRICTED BANEDGE (HIGH CHANNEL, HORIZONTAL)





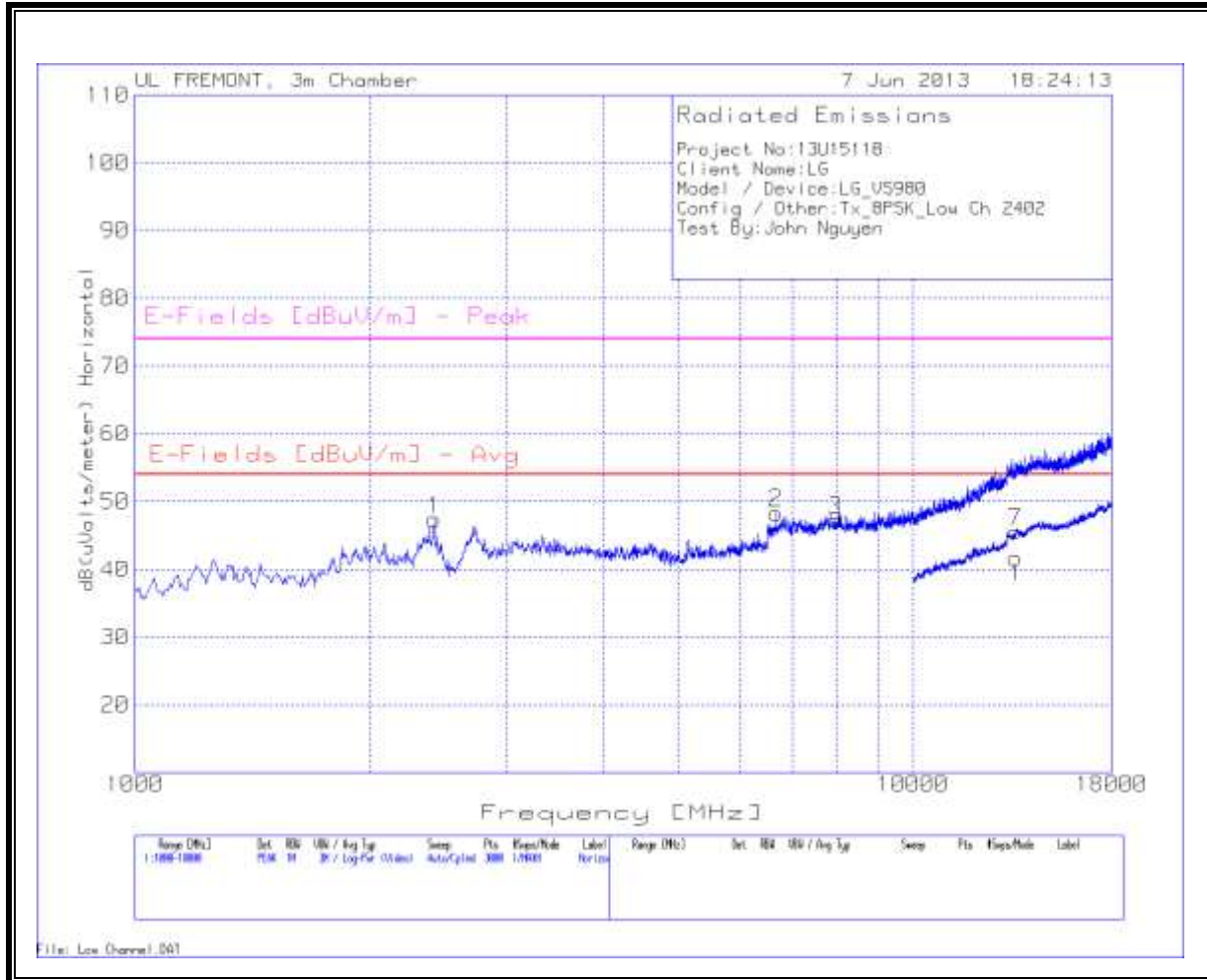
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



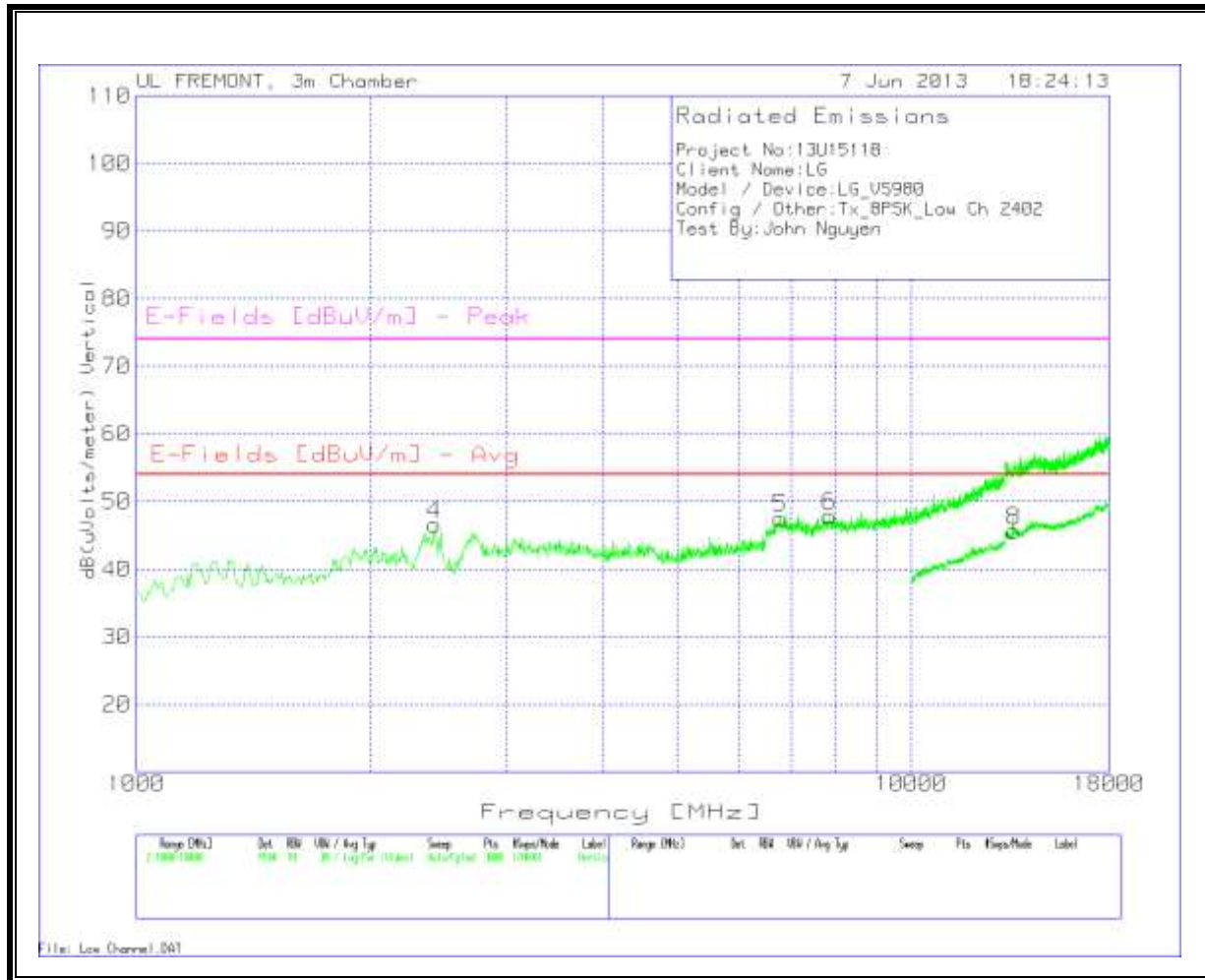


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



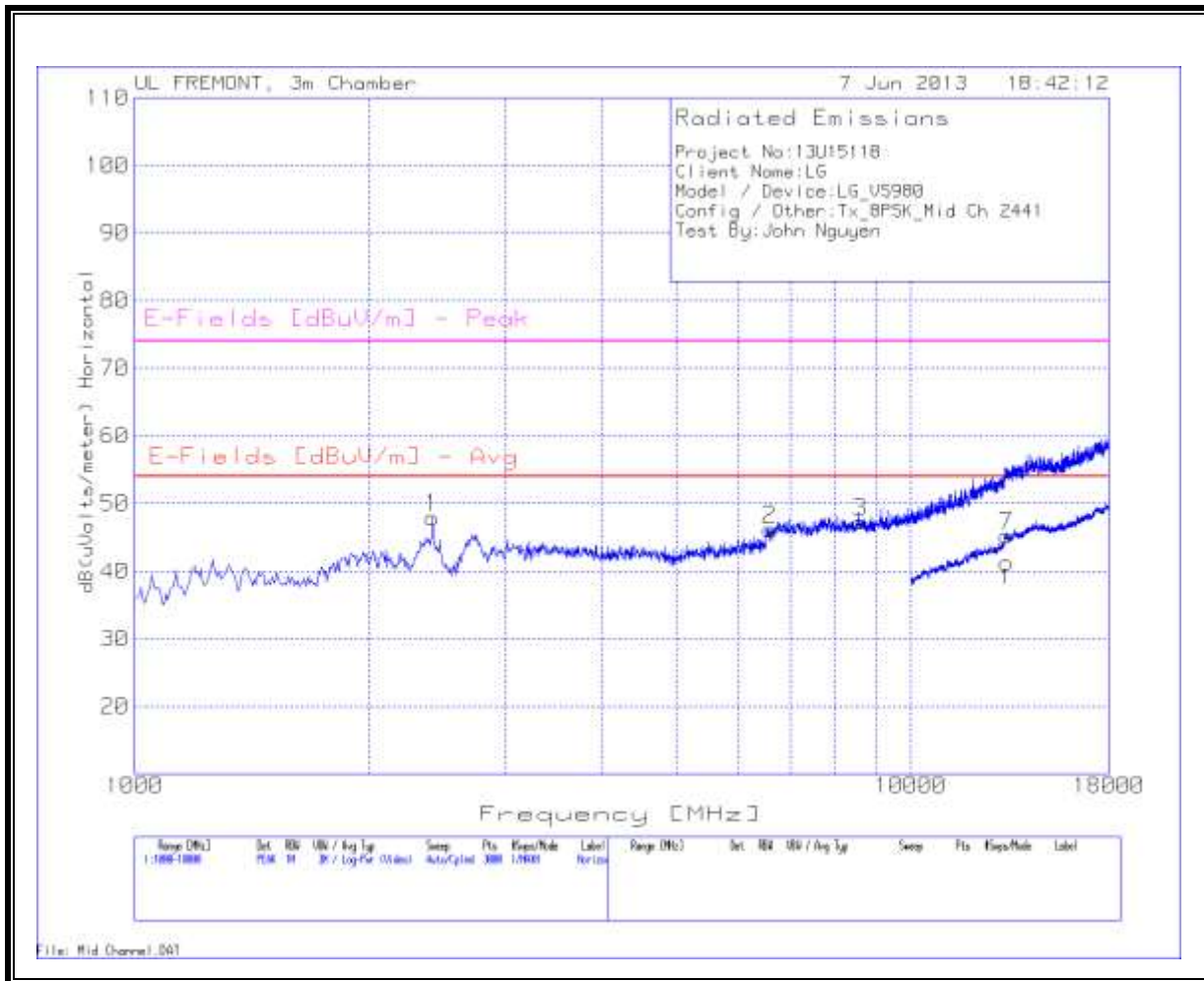
VERTICAL



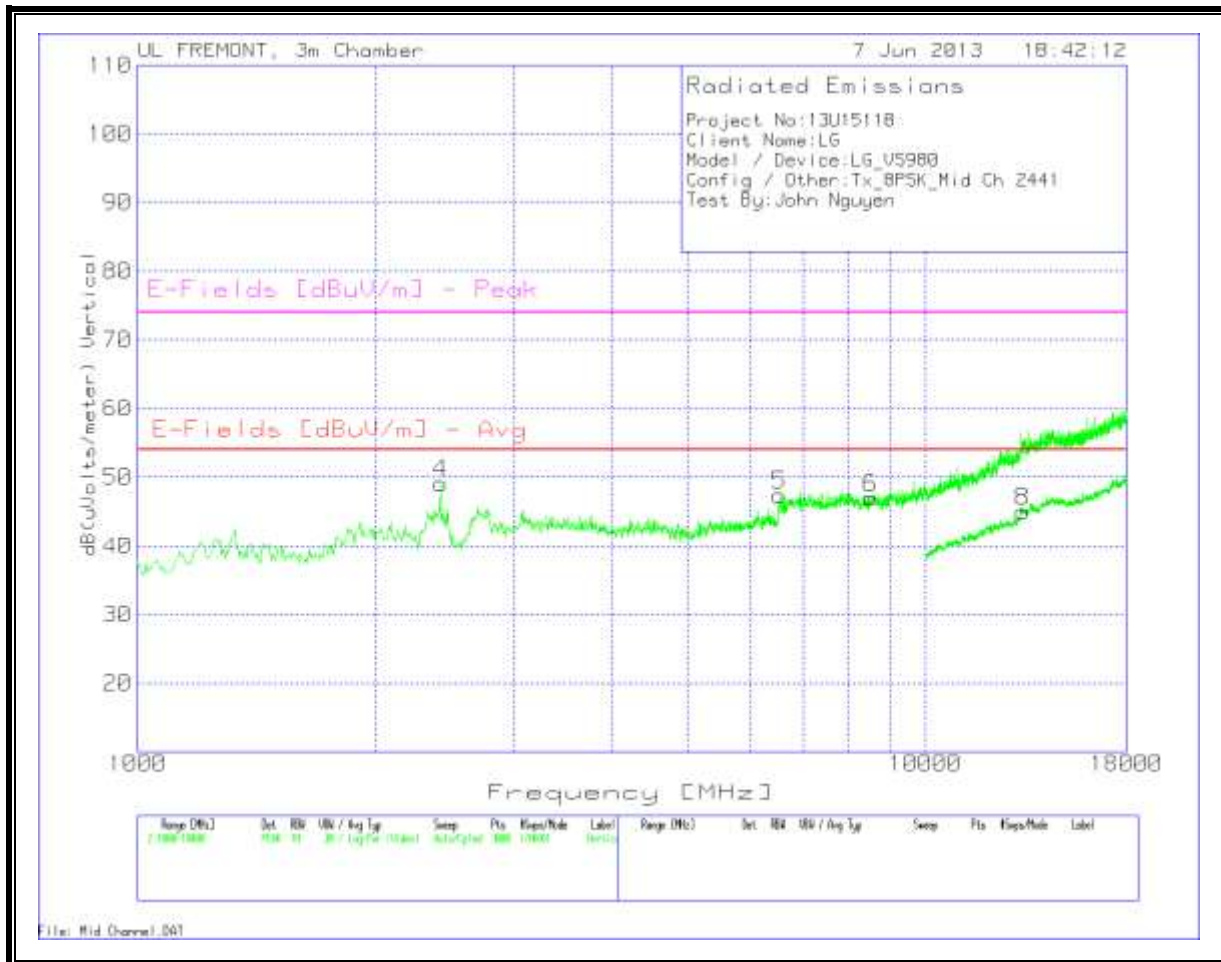
LOW CHANNEL DATA

Project No:13U15118												
Client Name:LG												
Model / Device:LG_VS980												
Config / Other:Tx_8PSK_Low Ch 2402												
Test By:John Nguyen												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 1000 - 18000MHz												
1	2421.386	43.93	PK	32.2	-29.7	0.9	0	47.33	53.97	-6.64	74	-26.67
2	6668.554	35.86	PK	35.6	-23.4	0.3	0	48.36	53.97	-5.61	74	-25.64
3	7954.031	33.75	PK	35.8	-22.5	0.2	0	47.25	53.97	-6.72	74	-26.75
Vertical 1000 - 18000MHz												
4	2421.386	43.22	PK	32.2	-29.7	0.9	0	46.62	53.97	-7.35	74	-27.38
5	6770.486	34.9	PK	35.6	-23.3	0.3	0	47.5	53.97	-6.47	74	-26.5
6	7846.436	34.51	PK	35.8	-22.7	0.3	0	47.91	53.97	-6.06	74	-26.09
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 10000 - 18000MHz												
7	13546.227	22.6	PK	38.9	-16.3	0.4	0	45.6	53.97	-8.37	74	-28.4
Vertical 10000 - 18000MHz												
8	13590.205	22.62	PK	38.9	-16.2	0.4	0	45.72	53.97	-8.25	74	-28.28
PK - Peak detector												
QP - Quasi-Peak detector												

MID CHANNEL
 HORIZONTAL



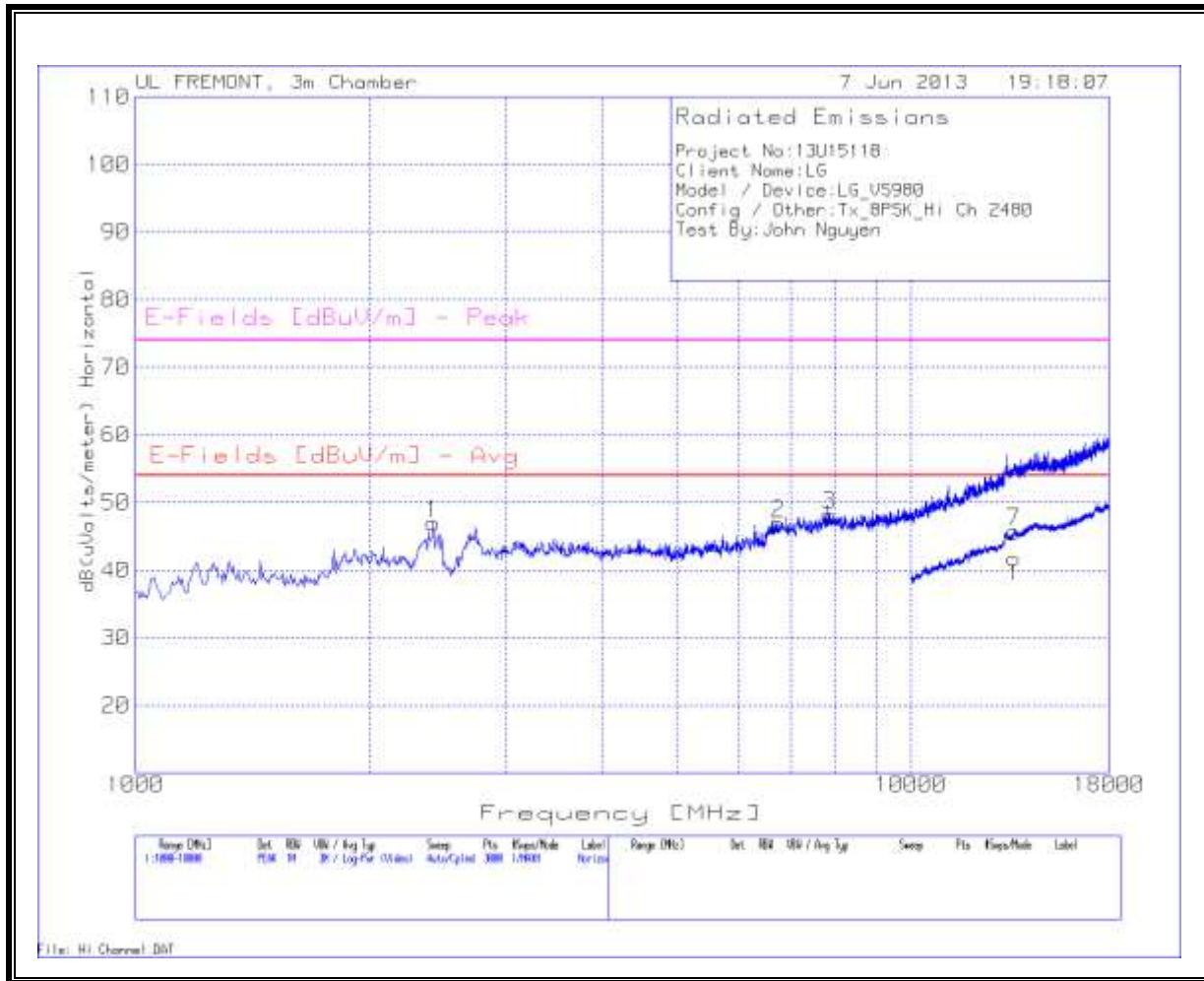
VERTICAL



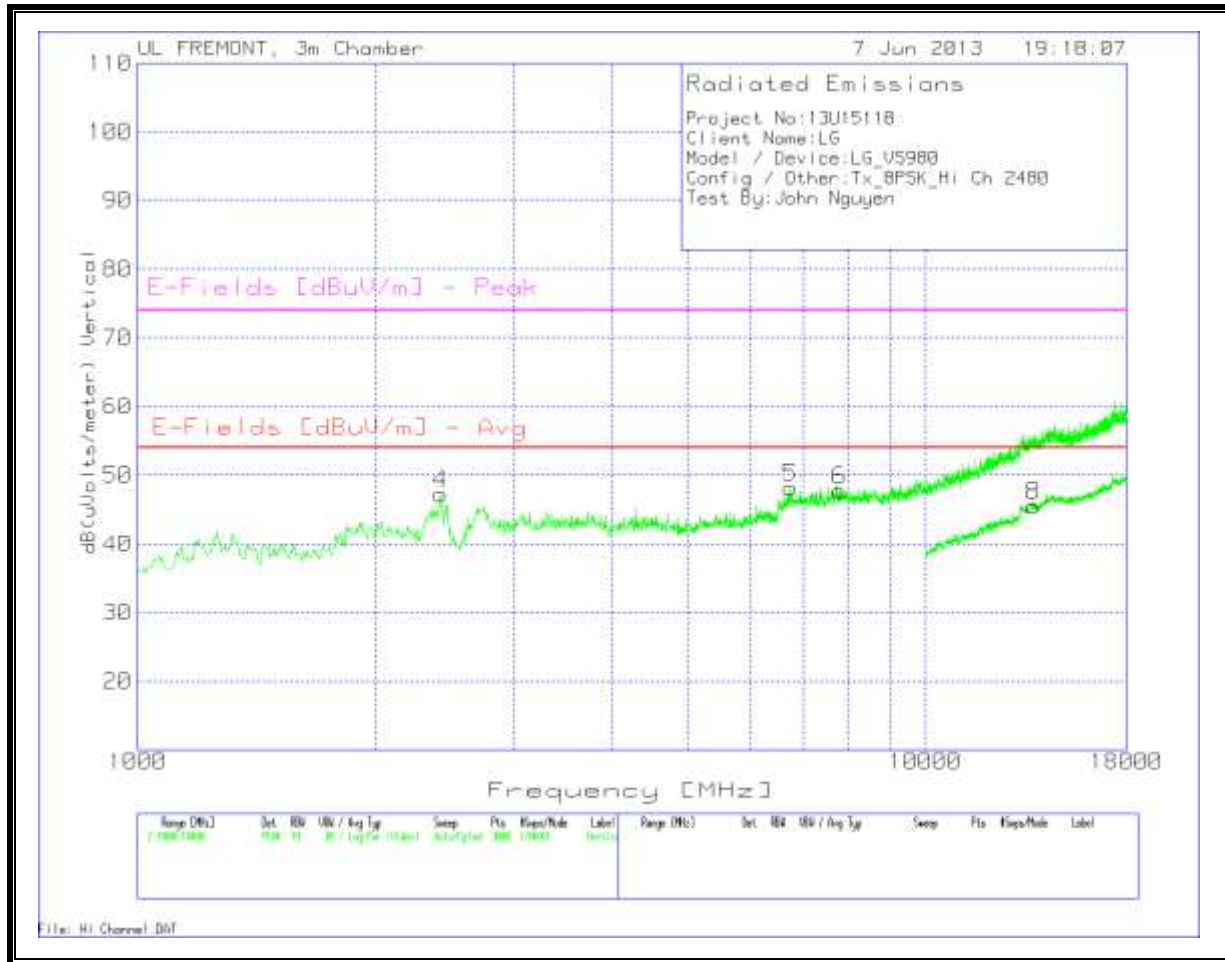
MID CHANNEL DATA

Project No:13U15118												
Client Name:LG												
Model / Device:LG_VS980												
Config / Other:Tx_8PSK_Mid Ch 2441												
Test By:John Nguyen												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts /meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 1000 - 18000MHz												
1	2415.723	44.63	PK	32.1	-29.7	0.9	0	47.93	53.97	-6.04	74	-26.07
2	6583.611	33.85	PK	35.6	-23.5	0.3	0	46.25	53.97	-7.72	74	-27.75
3	8610.926	33.22	PK	35.8	-22.1	0.4	0	47.32	53.97	-6.65	74	-26.68
Vertical 1000 - 18000MHz												
4	2421.386	45.71	PK	32.2	-29.7	0.9	0	49.11	53.97	-4.86	74	-24.89
5	6532.645	35.25	PK	35.6	-23.6	0.2	0	47.45	53.97	-6.52	74	-26.55
6	8525.983	33.03	PK	35.8	-22.1	0.3	0	47.03	53.97	-6.94	74	-26.97
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uVolts /meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 10000 - 18000MHz												
7	13278.361	22.44	PK	39.1	-16.7	0.4	0	45.24	53.97	-8.73	74	-28.76
Vertical 10000 - 18000MHz												
8	13278.361	22.26	PK	39.1	-16.7	0.4	0	45.06	53.97	-8.91	74	-28.94
PK - Peak detector												
QP - Quasi-Peak detector												

HIGH CHANNEL
 HORIZONTAL



VERTICAL

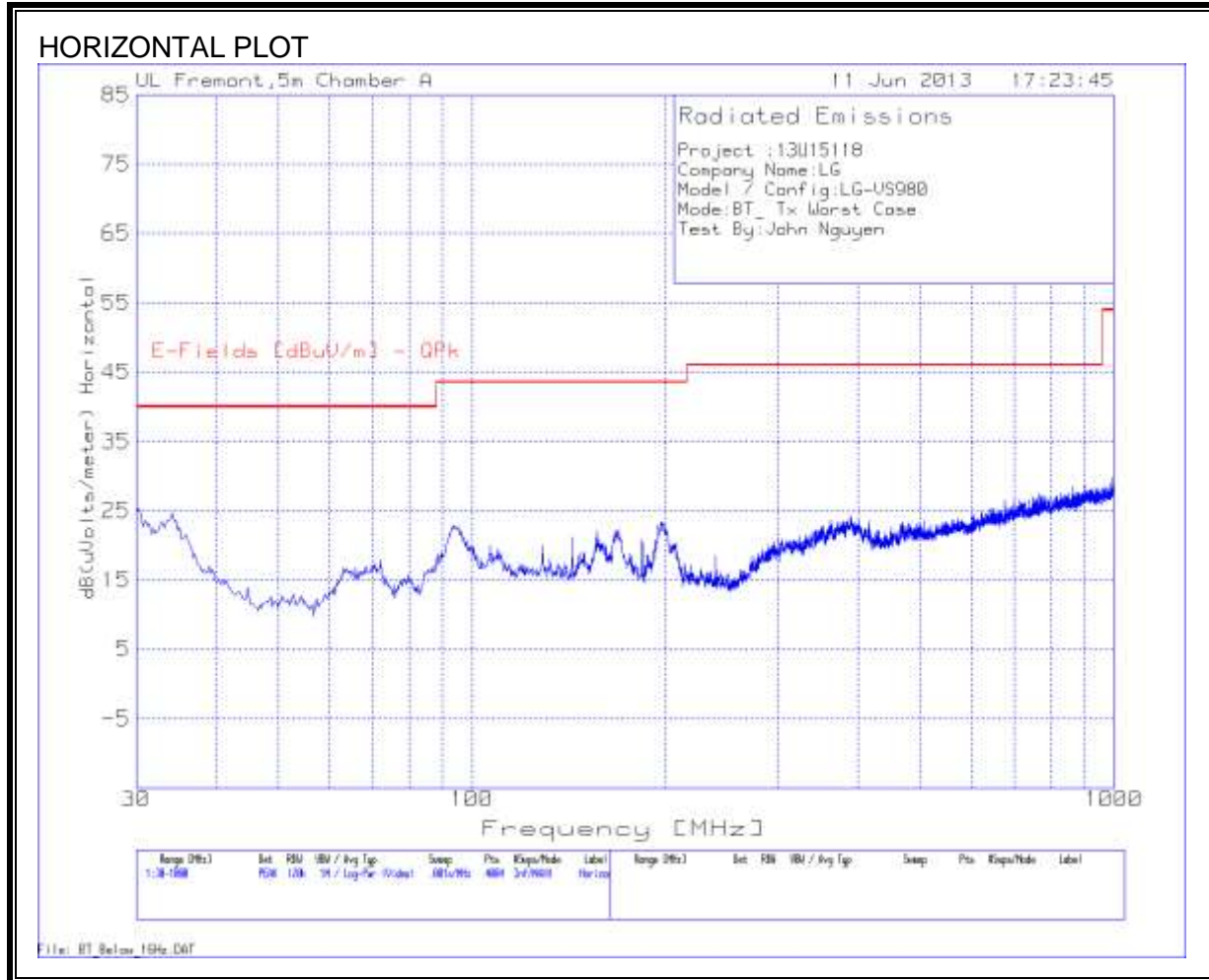


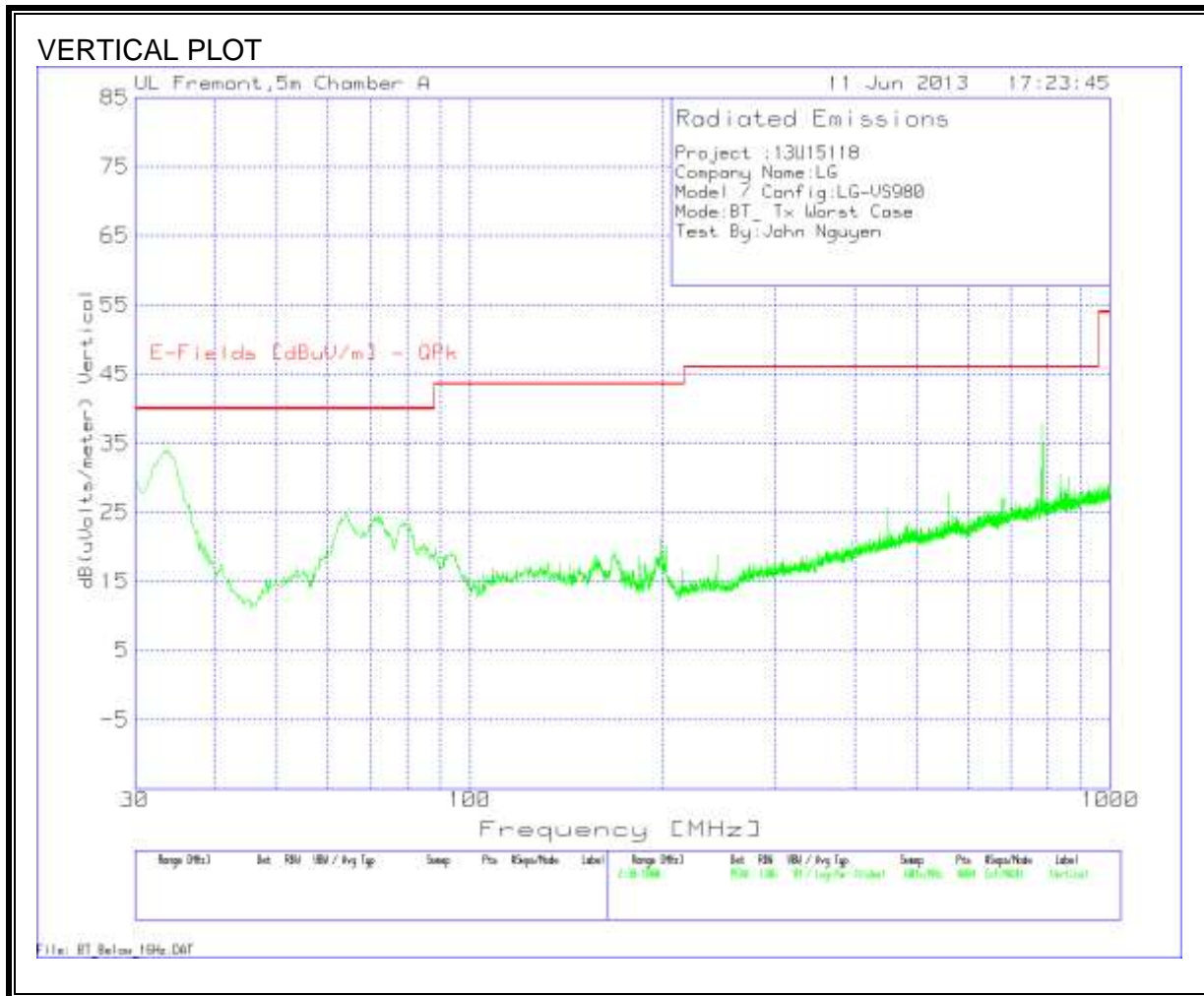
HIGH CHANNEL DATA

Project No:13U15118												
Client Name:LG												
Model / Device:LG_VS980												
Config / Other:Tx_8PSK_Hi Ch 2480												
Test By:John Nguyen												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uV/s/meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 1000 - 18000MHz												
1	2415.723	43.63	PK	32.1	-29.7	0.9	0	46.93	53.97	-7.04	74	-27.07
2	6747.835	34.25	PK	35.6	-23.3	0.3	0	46.85	53.97	-7.12	74	-27.15
3	7840.773	34.81	PK	35.8	-22.7	0.3	0	48.21	53.97	-5.76	74	-25.79
Vertical 1000 - 18000MHz												
4	2421.386	43.89	PK	32.2	-29.7	0.9	0	47.29	53.97	-6.68	74	-26.71
5	6736.509	35.59	PK	35.6	-23.3	0.3	0	48.19	53.97	-5.78	74	-25.81
6	7772.818	34.47	PK	35.8	-22.7	0.2	0	47.77	53.97	-6.2	74	-26.23
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	DC Corr [dB]	dB(uV/s/meter)	E-Fields [dBuV/m] Avg	Margin (dB)	E-Fields [dBuV/m] Peak	Margin (dB)
Horizontal 10000 - 18000MHz												
7	13590.205	22.61	PK	38.9	-16.2	0.4	0	45.71	53.97	-8.26	74	-28.29
Vertical 10000 - 18000MHz												
8	13722.139	22.29	PK	38.8	-16	0.4	0	45.49	53.97	-8.48	74	-28.51
PK - Peak detector												
QP - Quasi-Peak detector												

8.3. WORST-CASE BELOW 1 GHz

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





DATA

Project :13U15118										
Company Name:LG										
Model / Config:LG-VS980										
Mode:BT_ Tx Worst Case										
Test By:John Nguyen										
Marker No.	Test Frequency	Meter Reading	Detector	T185 Antenna Factor dB/m	T64 preamp/cable loss [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] QPk	Margin (dB)	Height [cm]	Polarity
Horizontal 30 - 1000MHz										
1	34.1194	34.21	PK	18.1	-27.6	24.71	40	-15.29	400	Horz
2	197.8054	37.48	PK	12	-26.2	23.28	43.52	-20.24	100	Horz
3	784.0944	28.95	PK	21.2	-23	27.15	46.02	-18.87	100	Horz
Vertical 30 - 1000MHz										
4	33.8771	43.28	PK	18.3	-27.6	33.98	40	-6.02	200	Vert
5	64.1669	44.6	PK	7.6	-27.3	24.9	40	-15.1	200	Vert
6	782.8828	39.46	PK	21.2	-22.9	37.76	46.02	-8.26	200	Vert
PK - Peak detector										
QP - Quasi-Peak detector										

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

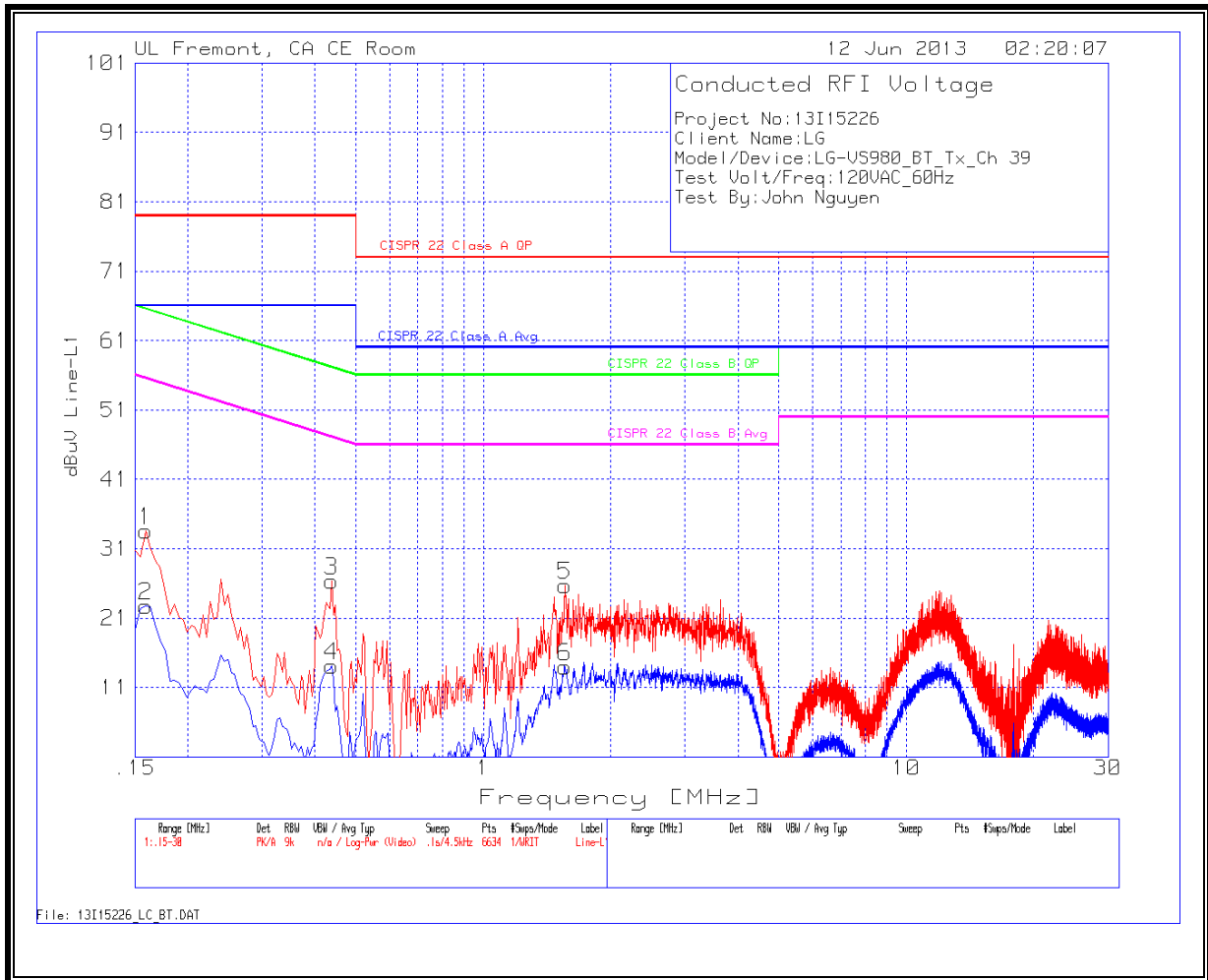
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

6 WORST EMISSIONS

Project No:13I15226														
Client Name:LG														
Model/Device:LG-VS980_BT_Tx_Ch 39														
Test Volt/Freq:120VAC_60Hz														
Test By:John Nguyen														
Marker No.	Test Frequency	Meter Reading	Detector	T24 IL L1.TXT	LC Cables 1&3.TXT	dBuV	CISPR 22 Class B QP	Margin	CISPR 22 Class B Avg	Margin	CISPR 22 Class A QP	Margin	CISPR 22 Class A Avg	Margin
Line-L1 .15 - 30MHz														
1	0.159	33.47	PK	0.1	0	33.57	65.5	-31.93	55.5	-21.93	79	-45.43	66	-32.43
2	0.159	22.67	Av	0.1	0	22.77	65.5	-42.73	55.5	-32.73	79	-56.23	66	-43.23
3	0.438	26.24	PK	0.1	0	26.34	57.1	-30.76	47.1	-20.76	79	-52.66	66	-39.66
4	0.438	14.06	Av	0.1	0	14.16	57.1	-42.94	47.1	-32.94	79	-64.84	66	-51.84
5	1.5585	25.47	PK	0.1	0.1	25.67	56	-30.33	46	-20.33	73	-47.33	60	-34.33
6	1.5585	13.74	Av	0.1	0.1	13.94	56	-42.06	46	-32.06	73	-59.06	60	-46.06
Line-L2 .15 - 30MHz														
7	0.1635	34.89	PK	0.1	0	34.99	65.3	-30.31	55.3	-20.31	79	-44.01	66	-31.01
8	0.1635	23.9	Av	0.1	0	24	65.3	-41.3	55.3	-31.3	79	-55	66	-42
9	0.249	30.73	PK	0.1	0	30.83	61.8	-30.97	51.8	-20.97	79	-48.17	66	-35.17
10	0.249	19.76	Av	0.1	0	19.86	61.8	-41.94	51.8	-31.94	79	-59.14	66	-46.14
11	0.438	28.09	PK	0.1	0	28.19	57.1	-28.91	47.1	-18.91	79	-50.81	66	-37.81
12	0.438	18.62	Av	0.1	0	18.72	57.1	-38.38	47.1	-28.38	79	-60.28	66	-47.28
PK - Peak detector														
QP - Quasi-Peak detector														

LINE 1 RESULTS



LINE 2 RESULTS

