



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

DUAL BAND PHONE WITH BT & WLAN

MODEL NUMBER: LG-P769, LGP769, P769

FCC ID: ZNFP769

REPORT NUMBER: 12U14516

ISSUE DATE: 2012-08-07

Prepared for
**LG ELECTRONICS USA
1000 SYLVAN AVENUE
ENGLEWOOD CLIFFS
NJ, 07632, USA**

Prepared by
**UL LLC
1285 WALT WHITMAN RD.
MELVILLE, NY 11747, U.S.A.
TEL: (631) 271-6200
FAX: (877) 854-3577**



NVLAP LAB CODE 100255-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	08/07/12	Initial Issue	M. Antola

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>7</i>
5.6. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>8</i>
6. TEST AND MEASUREMENT EQUIPMENT	10
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>16</i>
7.1.3. <i>NUMBER OF HOPPING CHANNELS.....</i>	<i>18</i>
7.1.4. <i>AVERAGE TIME OF OCCUPANCY</i>	<i>23</i>
7.1.5. <i>OUTPUT POWER</i>	<i>28</i>
7.1.6. <i>AVERAGE POWER.....</i>	<i>32</i>
7.1.7. <i>CONDUCTED SPURIOUS EMISSIONS.....</i>	<i>33</i>
7.2. <i>ENHANCED DATA RATE QPSK MODULATION.....</i>	<i>42</i>
7.2.1. <i>20 dB AND 99% BANDWIDTH</i>	<i>42</i>
7.2.2. <i>HOPPING FREQUENCY SEPARATION</i>	<i>46</i>
7.2.3. <i>NUMBER OF HOPPING CHANNELS.....</i>	<i>48</i>
7.2.4. <i>AVERAGE TIME OF OCCUPANCY</i>	<i>53</i>
7.2.5. <i>OUTPUT POWER</i>	<i>58</i>
7.2.6. <i>AVERAGE POWER.....</i>	<i>62</i>
7.2.7. <i>CONDUCTED SPURIOUS EMISSIONS.....</i>	<i>63</i>
7.3. <i>ENHANCED DATA RATE 8PSK MODULATION</i>	<i>72</i>
7.3.1. <i>20 dB AND 99% BANDWIDTH</i>	<i>72</i>
7.3.2. <i>HOPPING FREQUENCY SEPARATION</i>	<i>76</i>
7.3.3. <i>NUMBER OF HOPPING CHANNELS.....</i>	<i>78</i>
7.3.4. <i>AVERAGE TIME OF OCCUPANCY</i>	<i>83</i>
7.3.5. <i>OUTPUT POWER</i>	<i>88</i>

7.3.6.	AVERAGE POWER	92
7.3.7.	CONDUCTED SPURIOUS EMISSIONS	93
8.	RADIATED TEST RESULTS	102
8.1.	LIMITS AND PROCEDURE	102
8.2.	TRANSMITTER ABOVE 1 GHz	103
8.2.1.	BASIC DATA RATE GFSK MODULATION	103
8.2.2.	ENHANCED DATA RATE QPSK MODULATION	108
8.2.3.	ENHANCED DATA RATE 8PSK MODULATION	113
8.3.	WORST-CASE BELOW 1 GHz	118
9.	AC POWER LINE CONDUCTED EMISSIONS	120
10.	SETUP PHOTOS	124

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS USA
1000 SYLVAN AVENUE
ENGLEWOOD, NJ 07632, USA

EUT DESCRIPTION: DUAL BAND PHONE WITH BT & WLAN

MODEL: LG-P769, LGP769, P769

SERIAL NUMBER: 205KPYR203330 & 205KPCA203331

DATE TESTED: 2012-07-26 to 2012-08-07

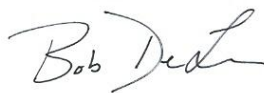
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL LLC. based on interpretations of these calculations. The results show that the equipment 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 by the referenced documents. This document may not be altered or revised in any way unless done so by UL LLC. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC. 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 By:

Tested By:



Bob DeLisi
WiSE Principal Engineer
UL LLC

Mike Antola
WiSE Project Lead
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4.2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/1002550.htm>.

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:

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

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	± 3.3 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.00 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth transceiver.

The radio module is manufactured by Broadcom with Chipset: BCM4330X.

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	10.12	10.28
2402 - 2480	Enhanced QPSK	8.00	6.31
2402 - 2480	Enhanced 8PSK	8.17	6.56

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of -0.45 dBi.

5.4. SOFTWARE AND FIRMWARE

The Baseband version was LGP769AT-00-V08_RevC-310-260-JUN-16-2012+0. The Kernel version was 3.0.21. The HW version was Rev.C.

The firmware installed in the EUT during testing was Version 4.0.4.

The EUT software version installed during testing LGP769-V08e.

The test utility software used during testing was WLAN Test.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

It was determined that DH5 produced the worse-case data rate and that the x-axis yielded the worse-case orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Travel Adapter	LG Electronics	MCS-02WR	RA250126368	N/A
Headphones	LG Electronics	N/A	N/A	N/A

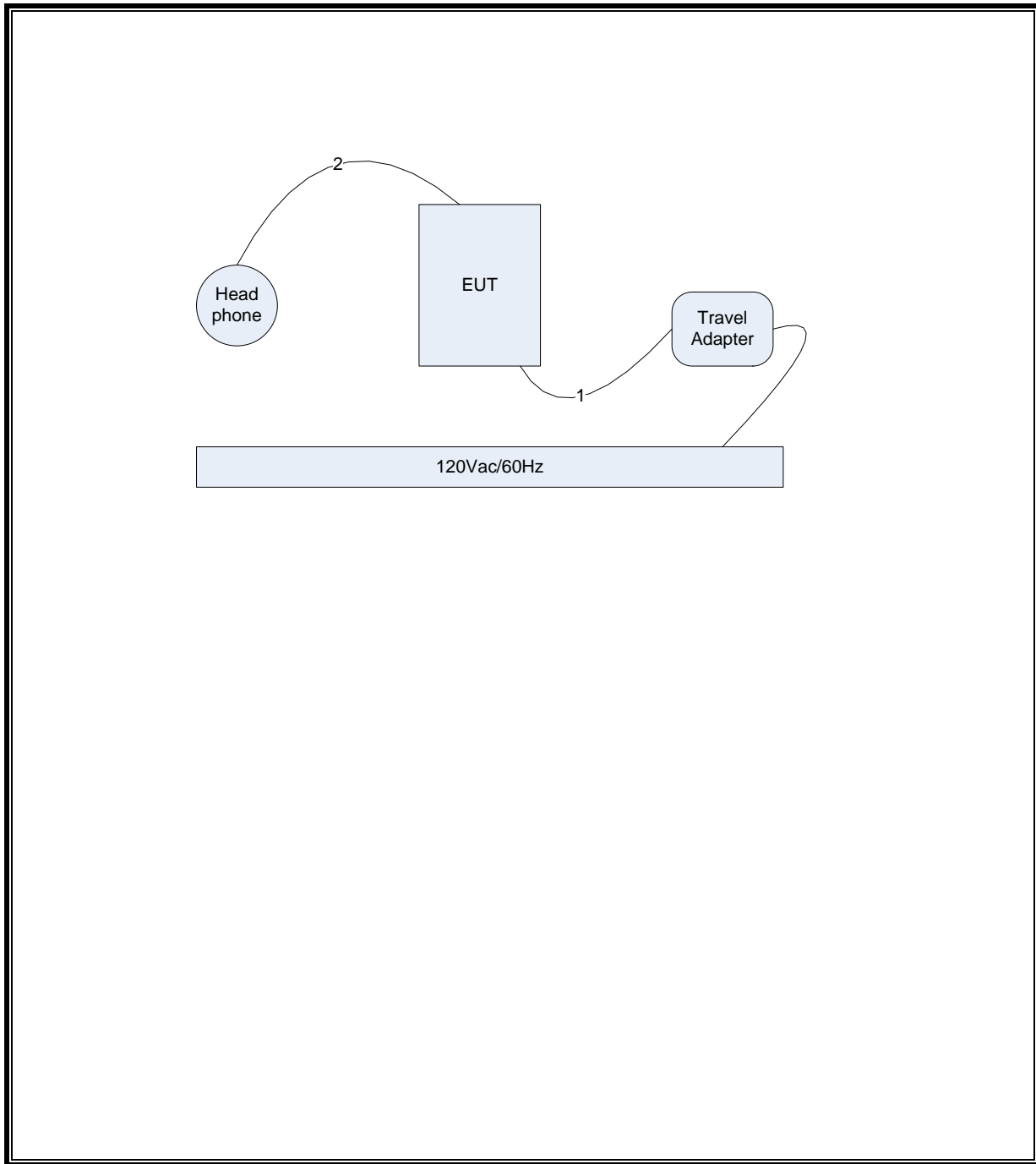
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	USB	1	USB	Shielded	<3M	
2	Headphone	1	Audio	Unshielded	<3M	

TEST SETUP

The EUT is a stand-alone device.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Radiated Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2012-01-30	2013-01-30
Bicon Antenna	Schaffner	VBA6106A	54	2012-04-10	2013-04-10
Log-P Antenna	Schaffner	UPA6109	44067	2012-05-16	2013-05-16
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-12-07	2012-12-07
Multimeter	Fluke	83III	ME5B-305	2012-02-01	2013-02-28
Above 1GHz (Band Optimized System)					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2012-03-06	2013-03-06
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	2008-03-28	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03	48106	2007-09-27	See * below
Horn Antenna (8-12 GHz)	ETS	3160-07	8933	2008-11-24	See * below
Horn Antenna (12-18 GHz)	ETS	3160-08	8932	2007-09-27	See * below
Horn Antenna (18-26.5 GHz)	ETS	3160-09	8947	2007-09-26	See * below
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-12-07	2012-12-07
Multimeter	Fluke	83III	ME5B-305	2012-02-01	2013-02-28
<p>* - Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration.</p> <p>* Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than $2D^2/\lambda$. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.</p>					

Conducted Antenna Port Tests					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Spectrum Analyzer	Agilent	E4446A	72822	2012-01-31	2013-02-28
Power Sensor	Rohde & Schwarz	NRP-Z81	73137	2011-09-27	2012-09-27
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43733	2012-03-13	2014-03-13
Multimeter	Fluke	83III	ME5B-305	2012-02-01	2013-02-28

Conducted Emissions - Mains					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESCI7	75141	2012-01-05	2013-01-05
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2012-02-03	2013-02-28
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.5	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2012-03-13	2014-03-13
Multimeter	Fluke	83III	ME5B-305	2012-02-01	2013-02-28

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.

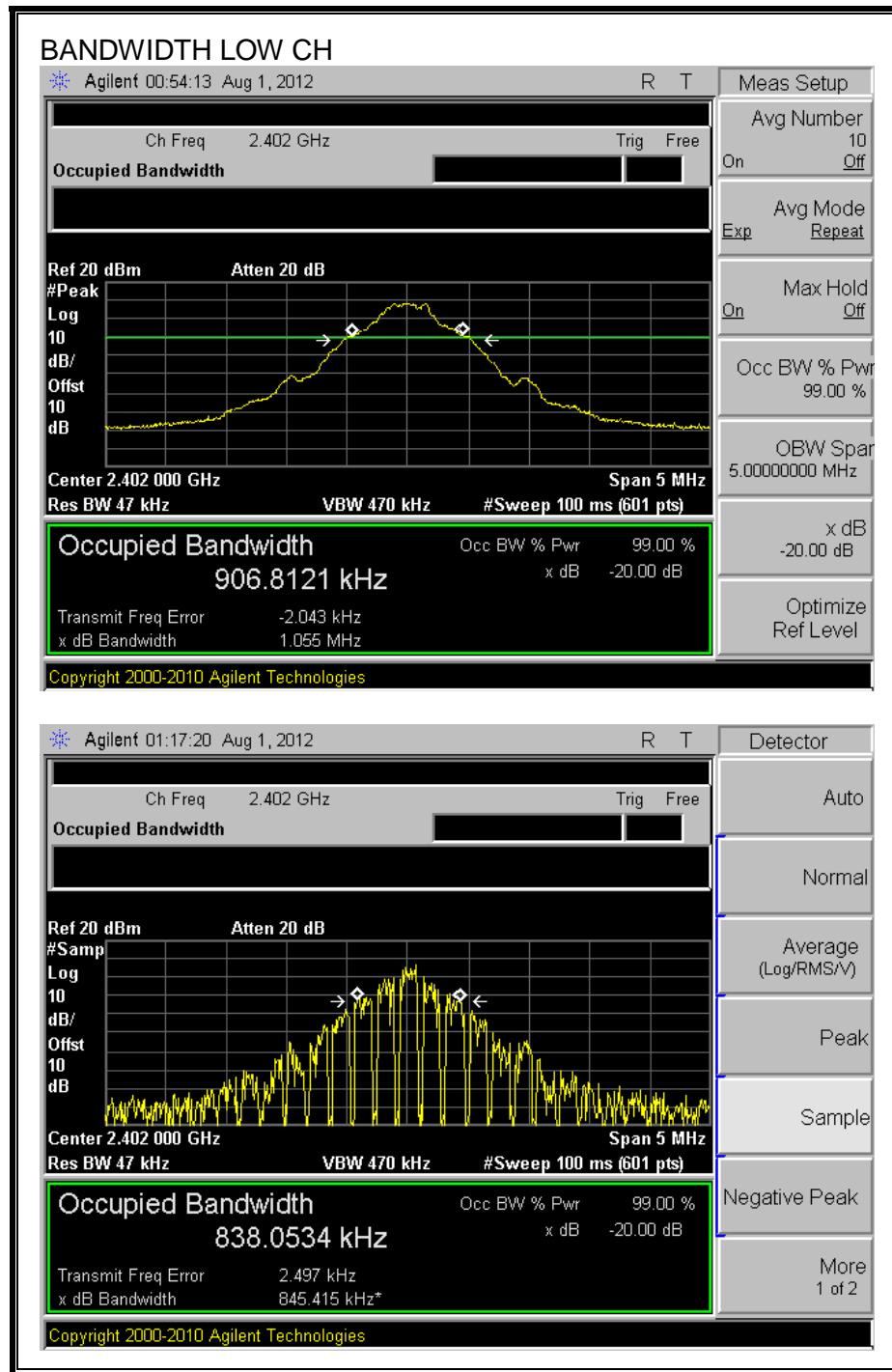
TEST PROCEDURE

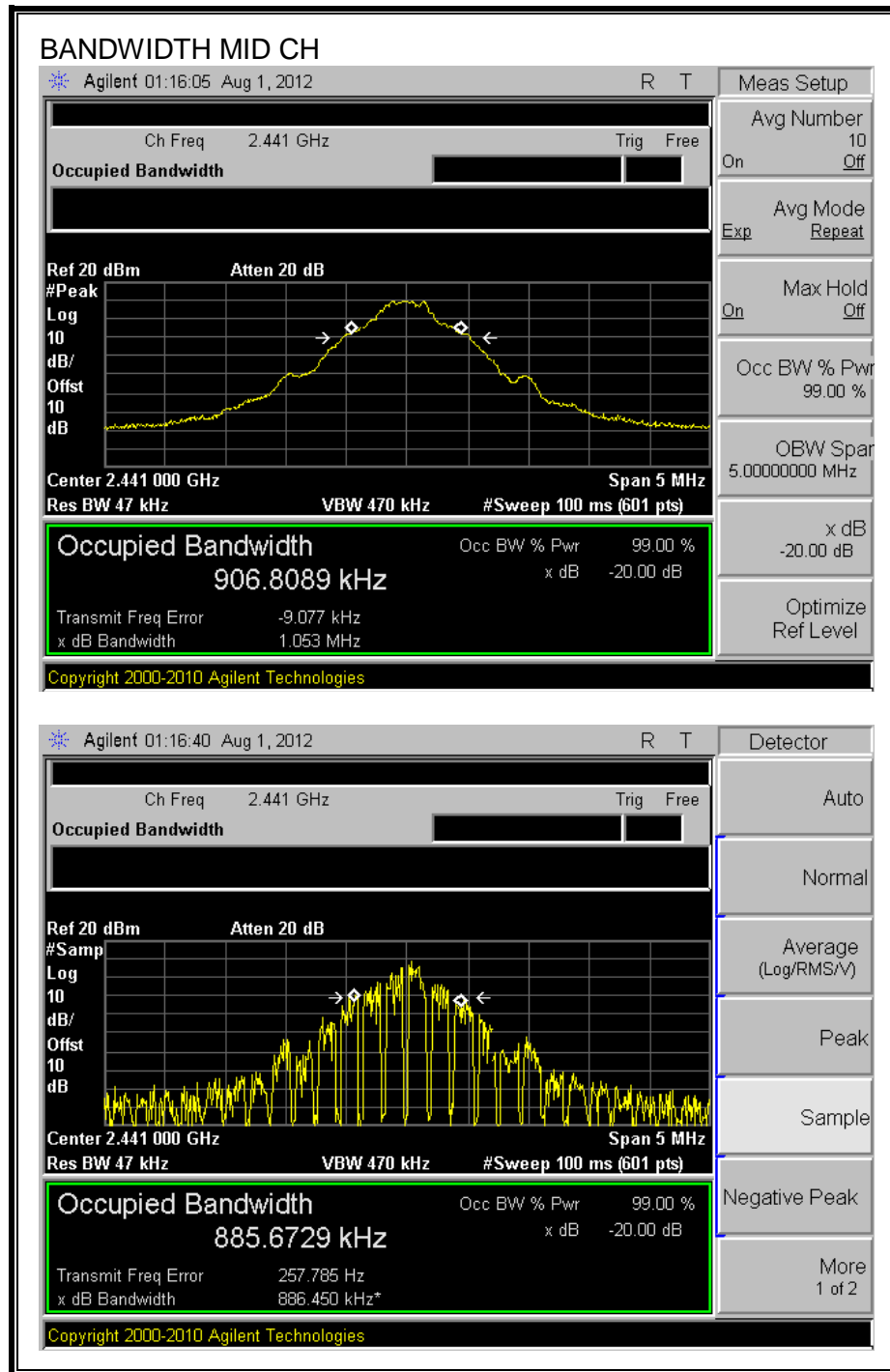
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

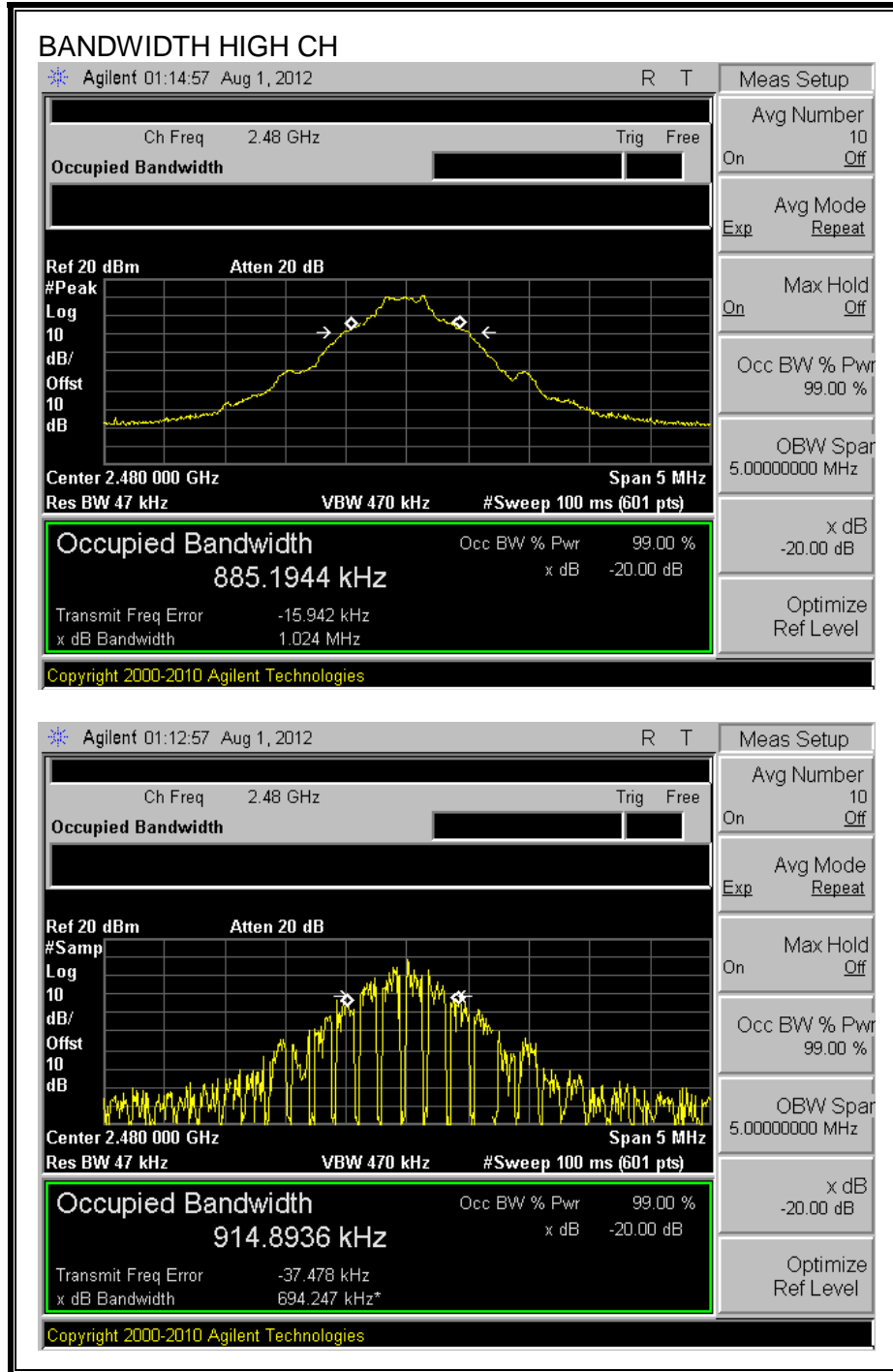
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1055	838
Middle	2441	1053	886
High	2480	1024	915

20 dB AND 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.

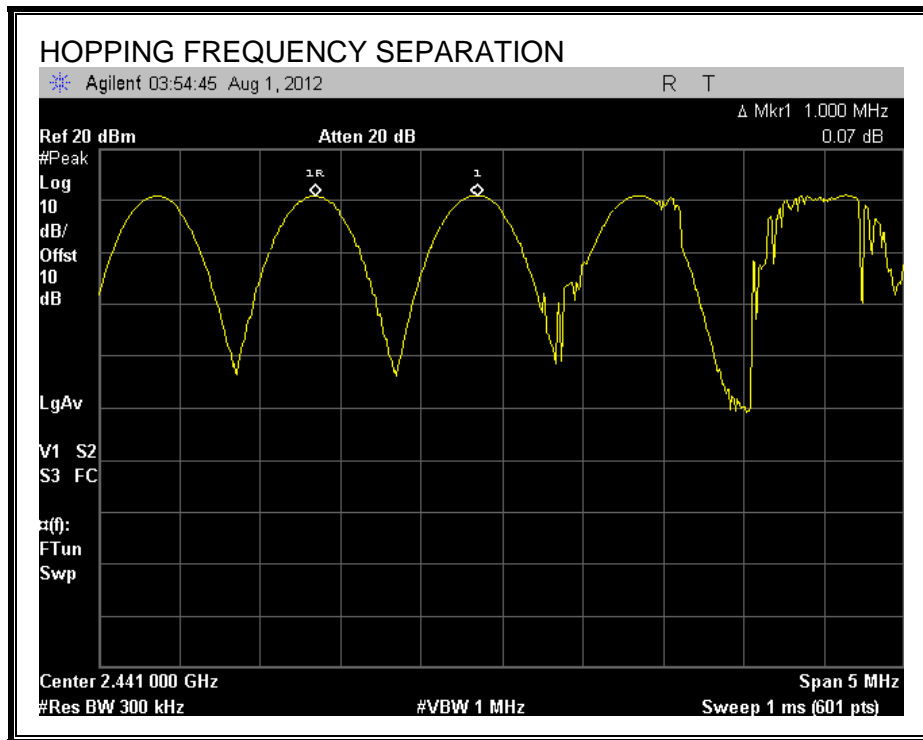
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the span and the VBW is set to \geq the RBW. 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.

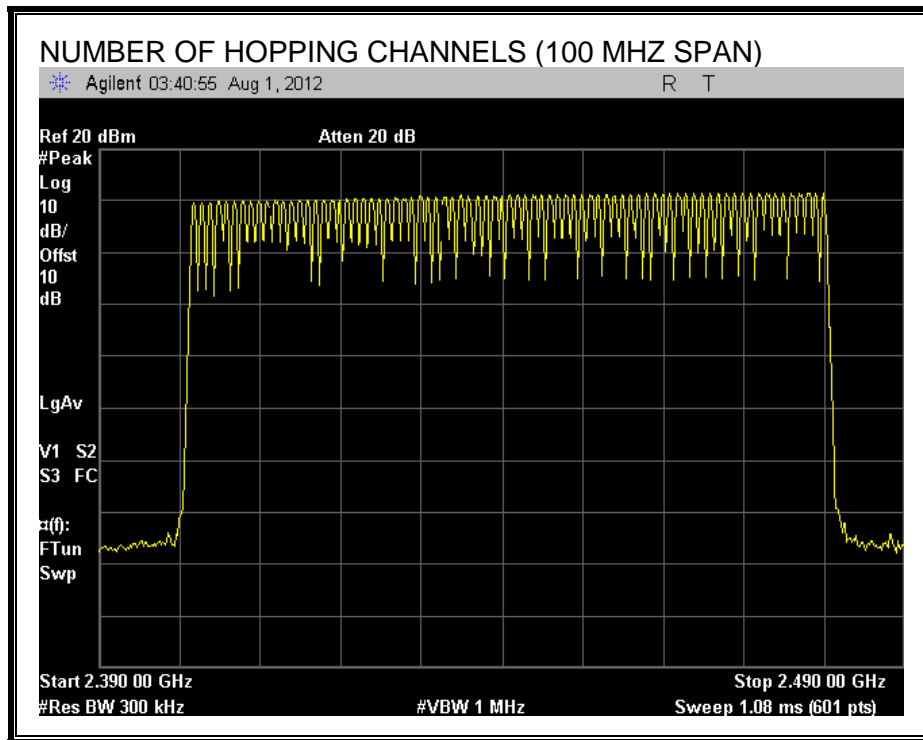
TEST PROCEDURE

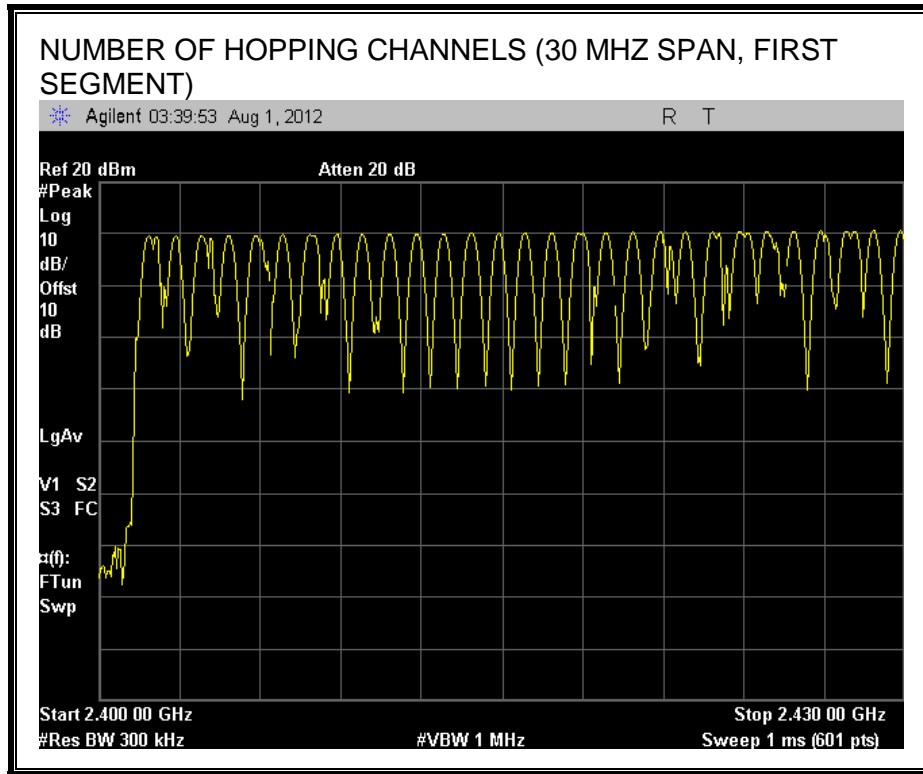
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

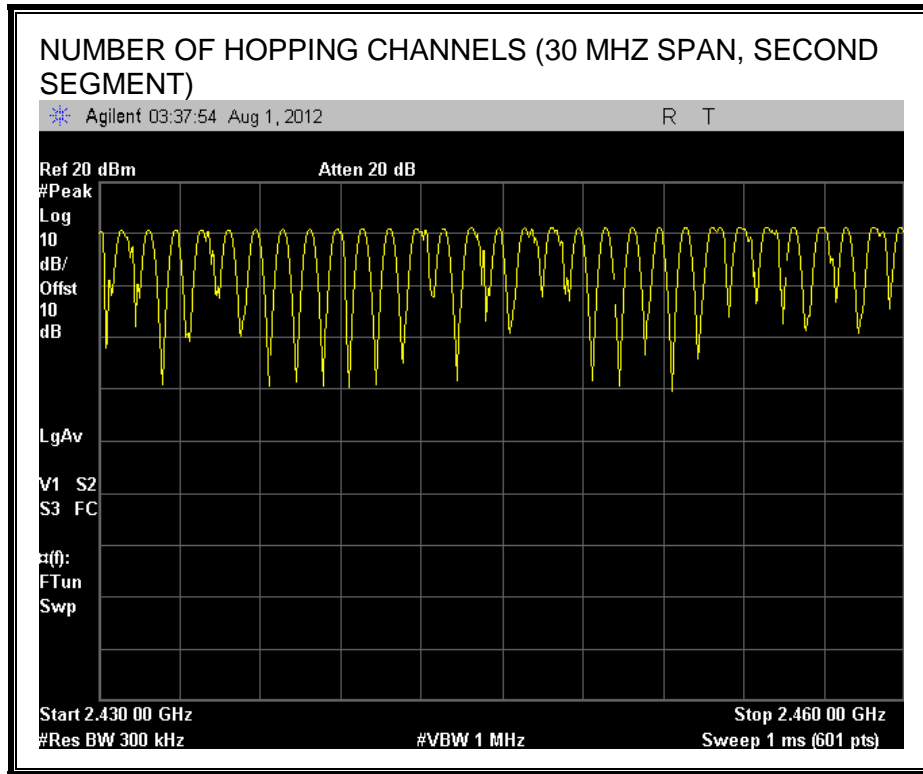
RESULTS

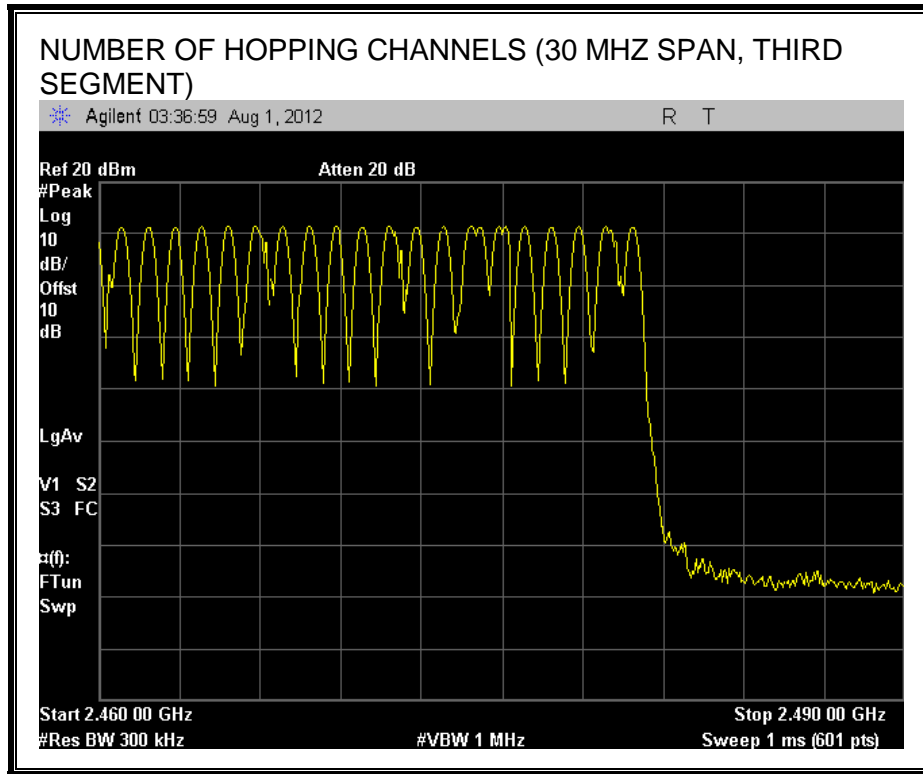
79 Channels observed.

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 * (# of pulses in 3.16 s) * pulse width.

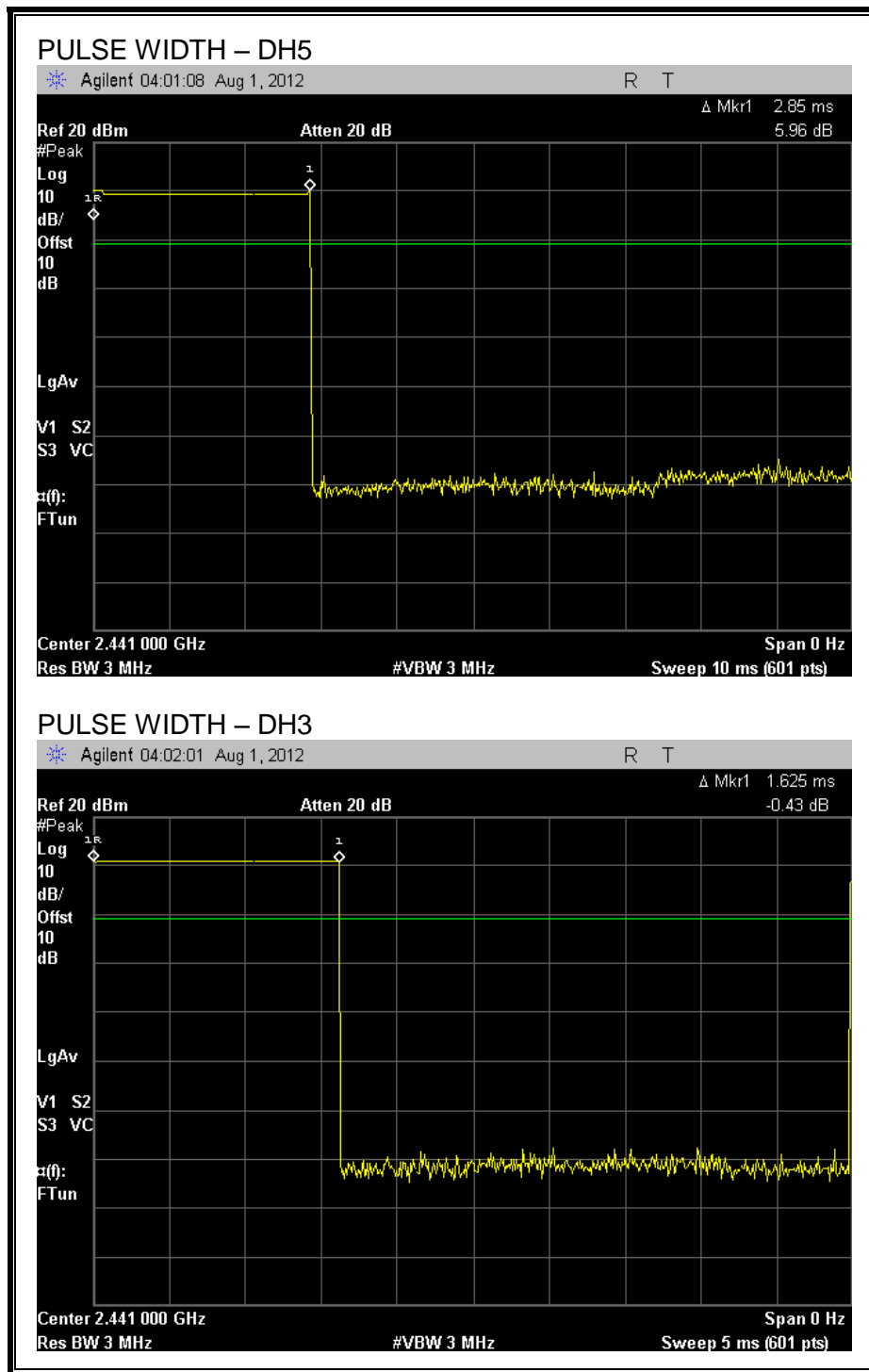
RESULTS

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

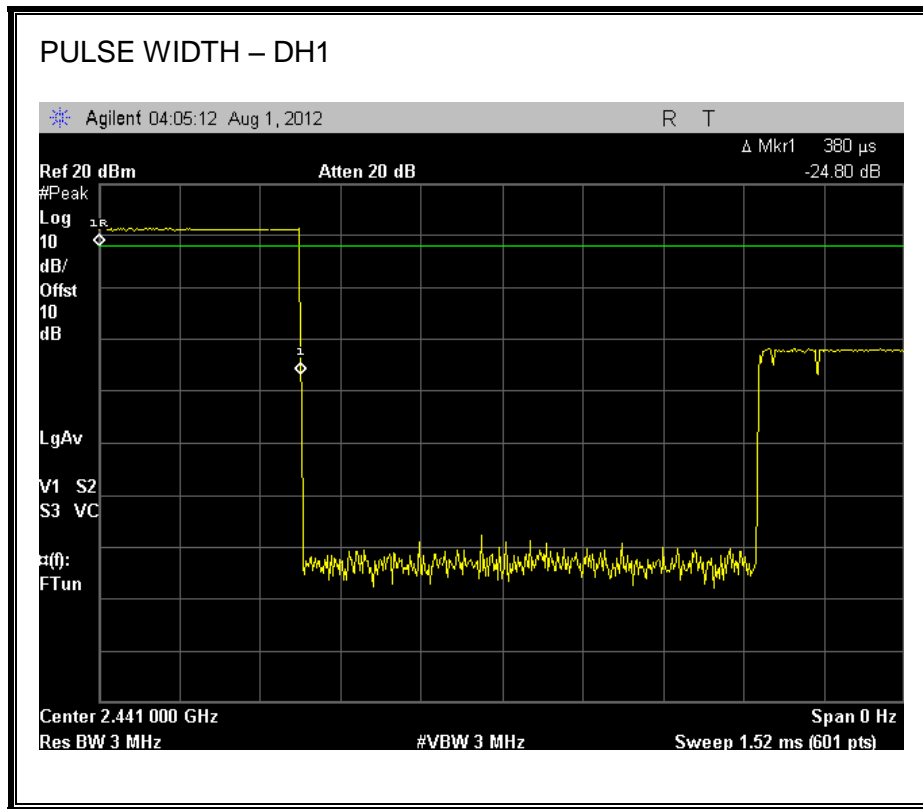
GFSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	2.85	10	0.285	0.4	0.115
DH3	1.625	14	0.228	0.4	0.173
DH5	0.38	32	0.122	0.4	0.278

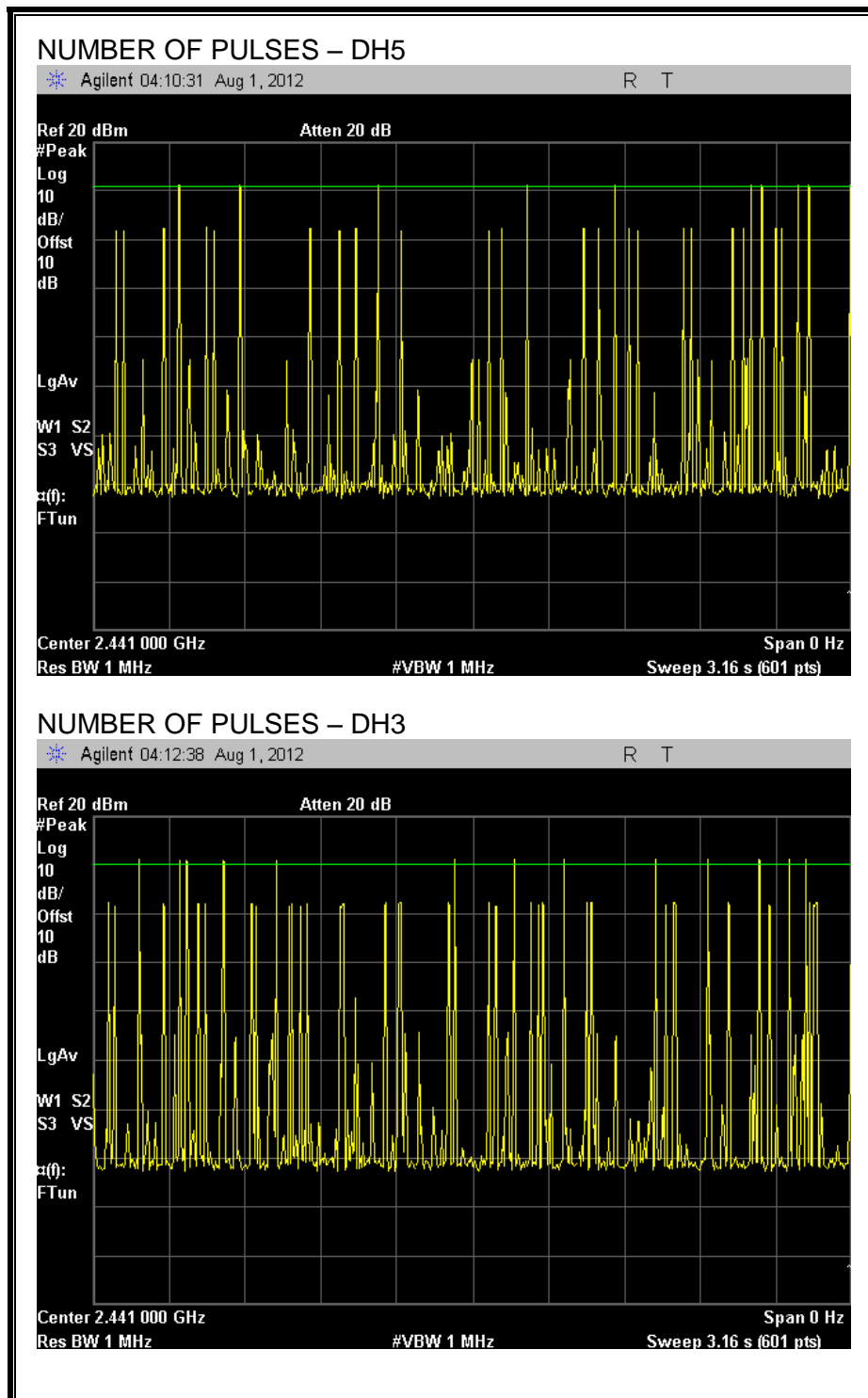
PULSE WIDTH



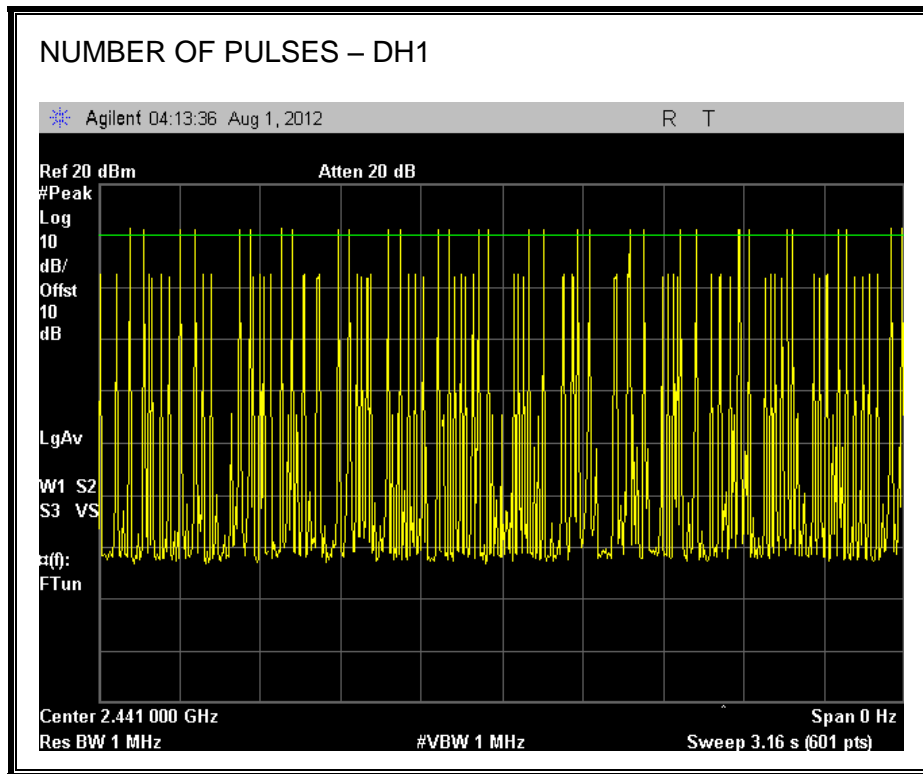
PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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 and channel separation is \geq two thirds the 20 dB BW or \geq 25 kHz, therefore the limit is 20.9 dBm.

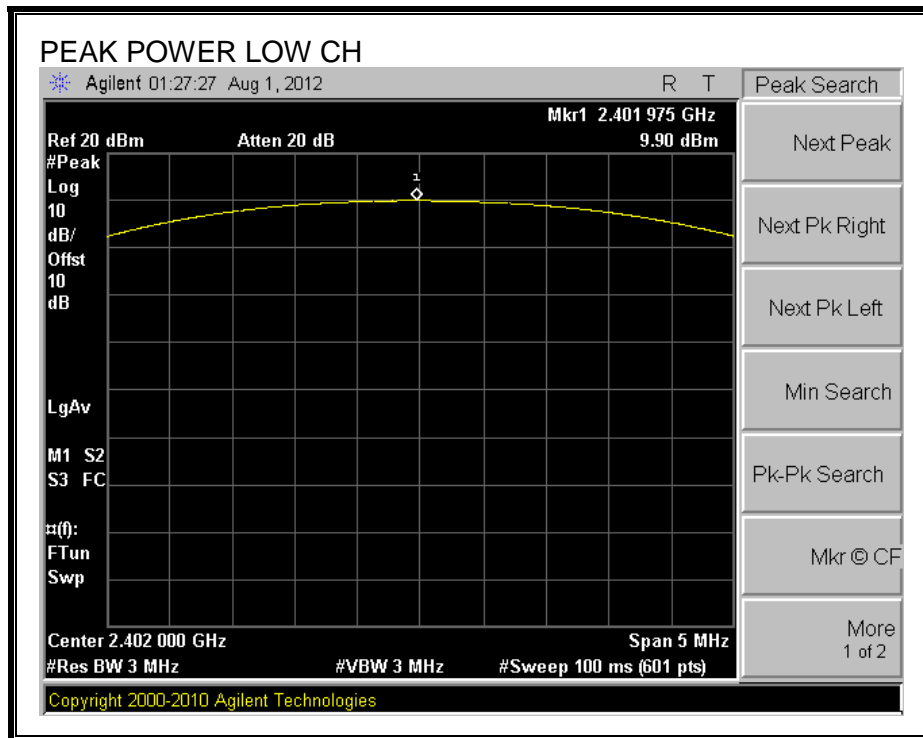
TEST PROCEDURE

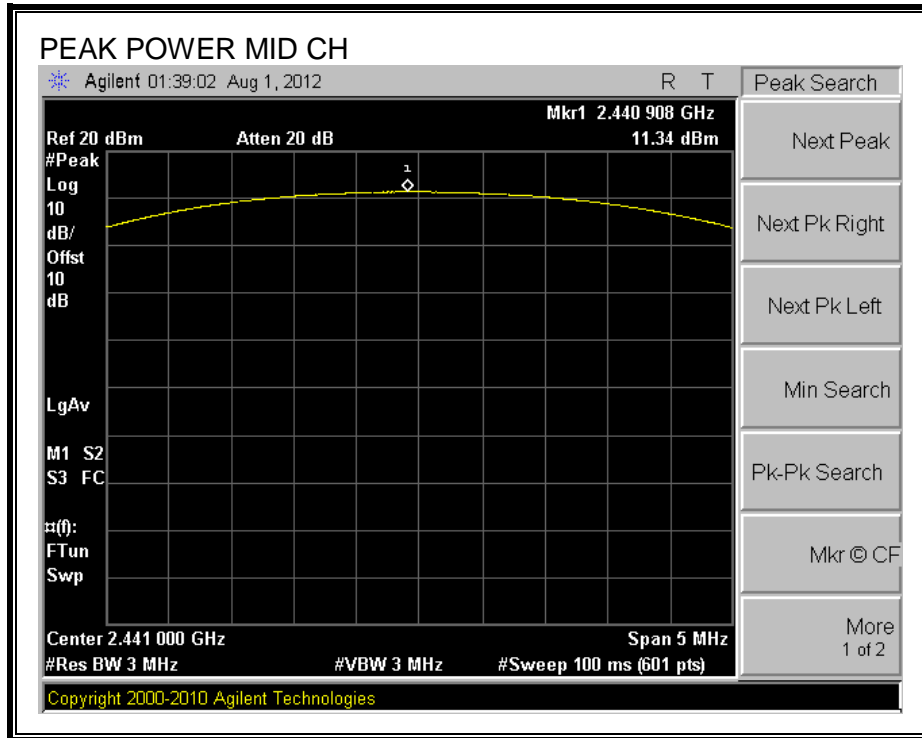
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

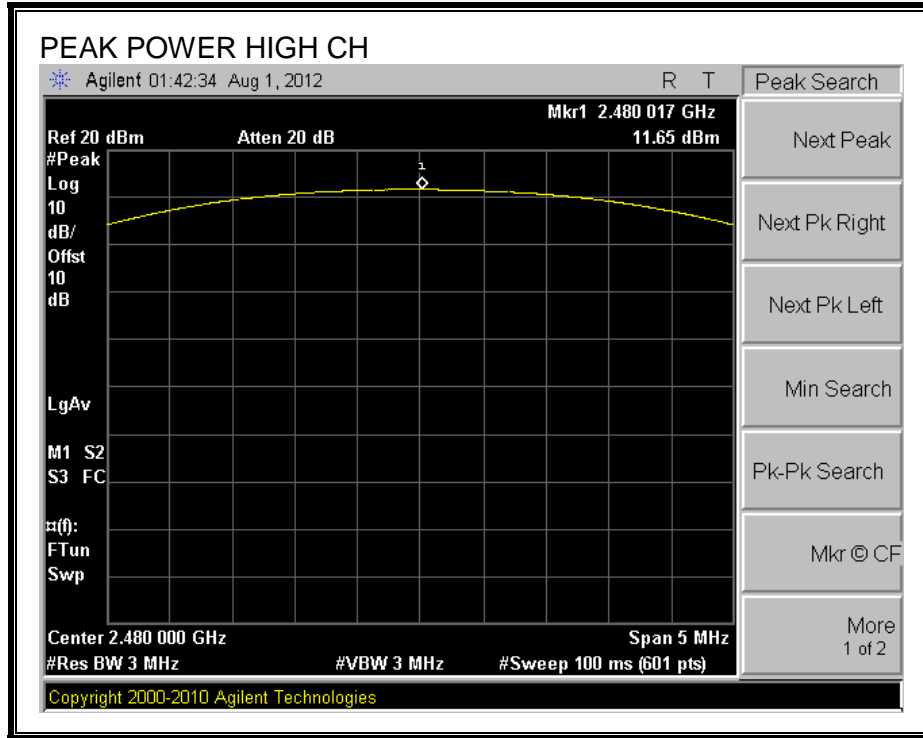
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.90	20.9	-11.00
Middle	2441	11.34	20.9	-9.56
High	2480	11.65	20.9	-9.25

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 10 dB (including 10 dB pad and 0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.46
Middle	2441	9.73
High	2480	10.12

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

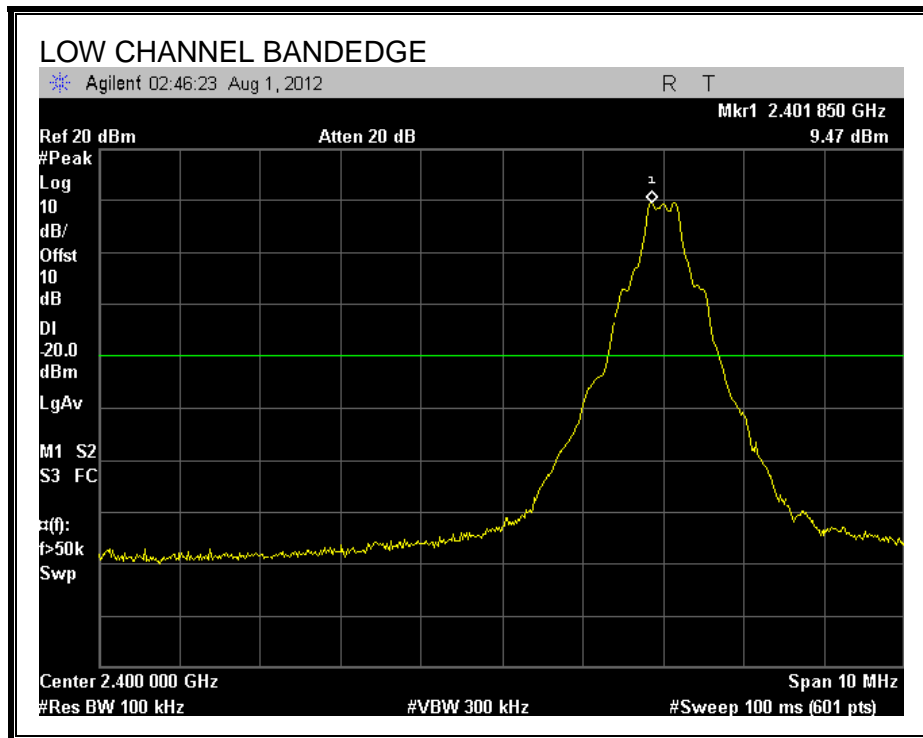
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

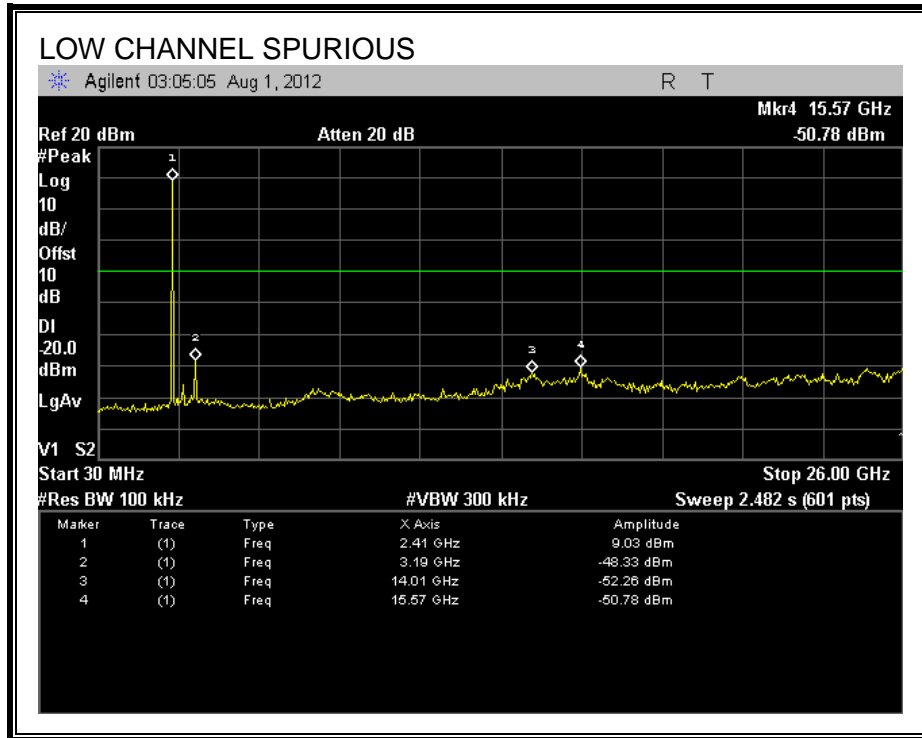
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

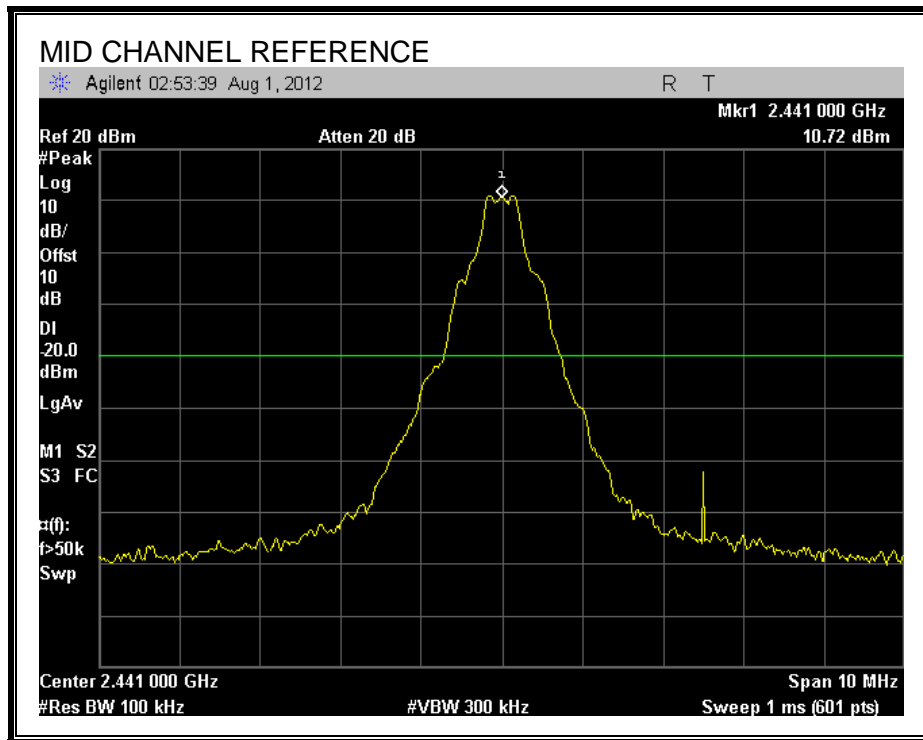
RESULTS

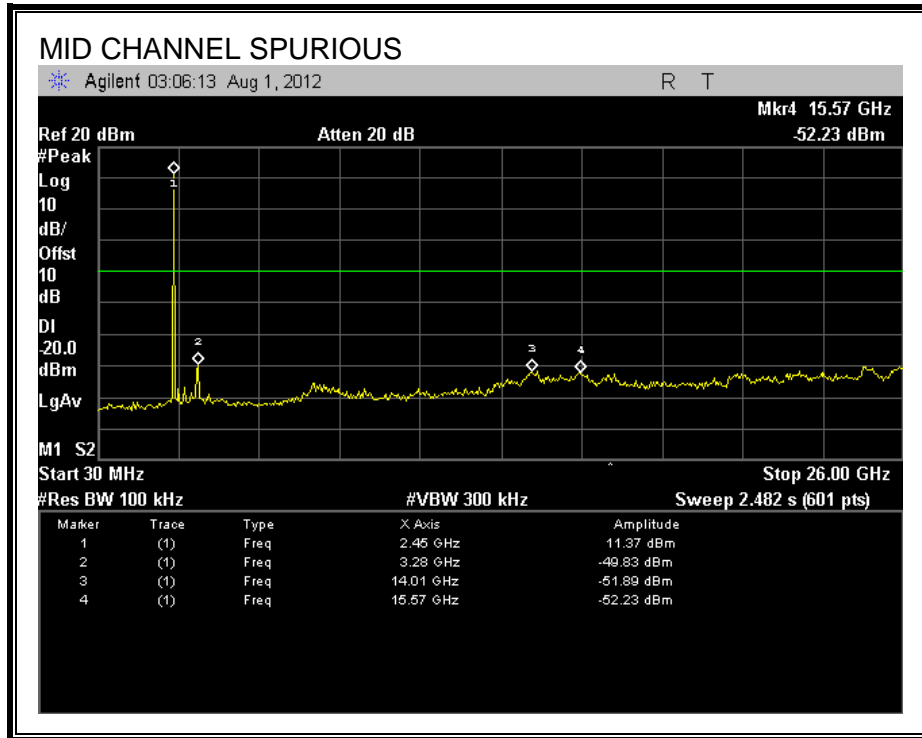
SPURIOUS EMISSIONS, LOW CHANNEL



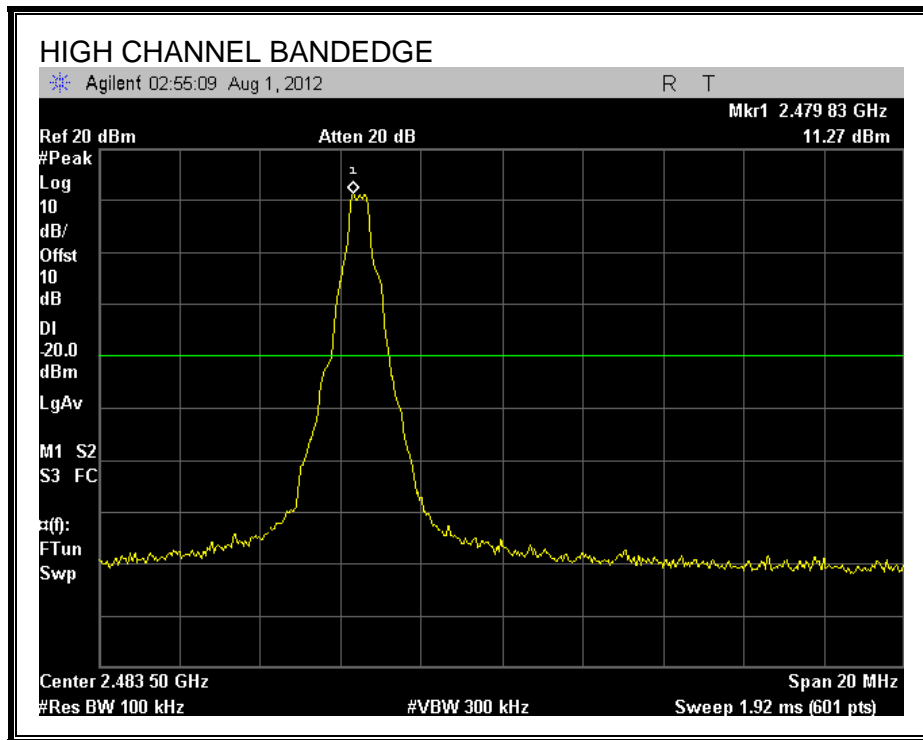


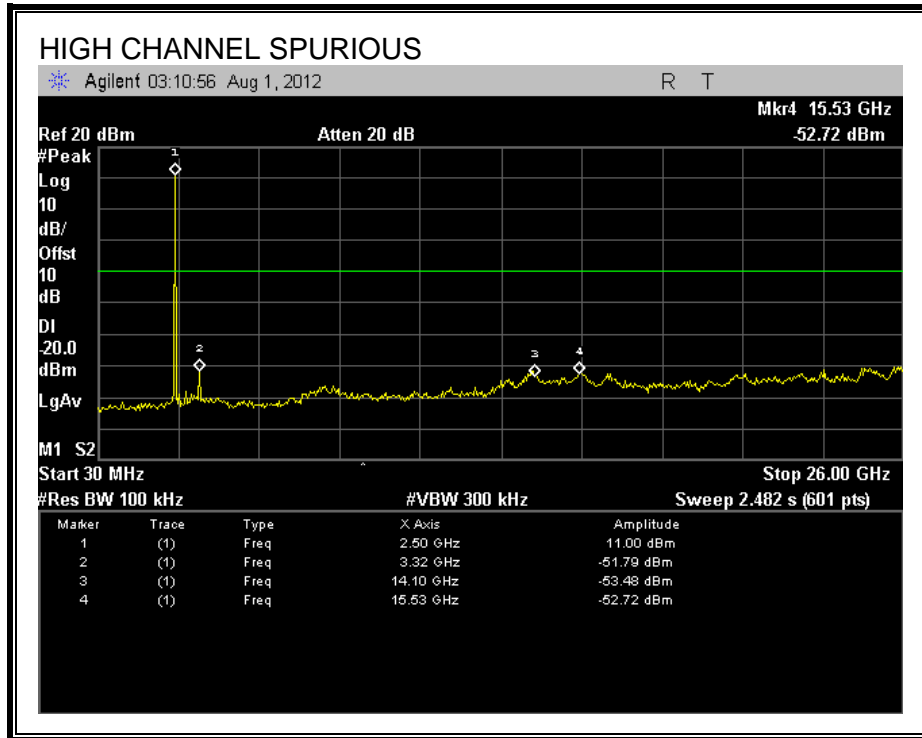
SPURIOUS EMISSIONS, MID CHANNEL



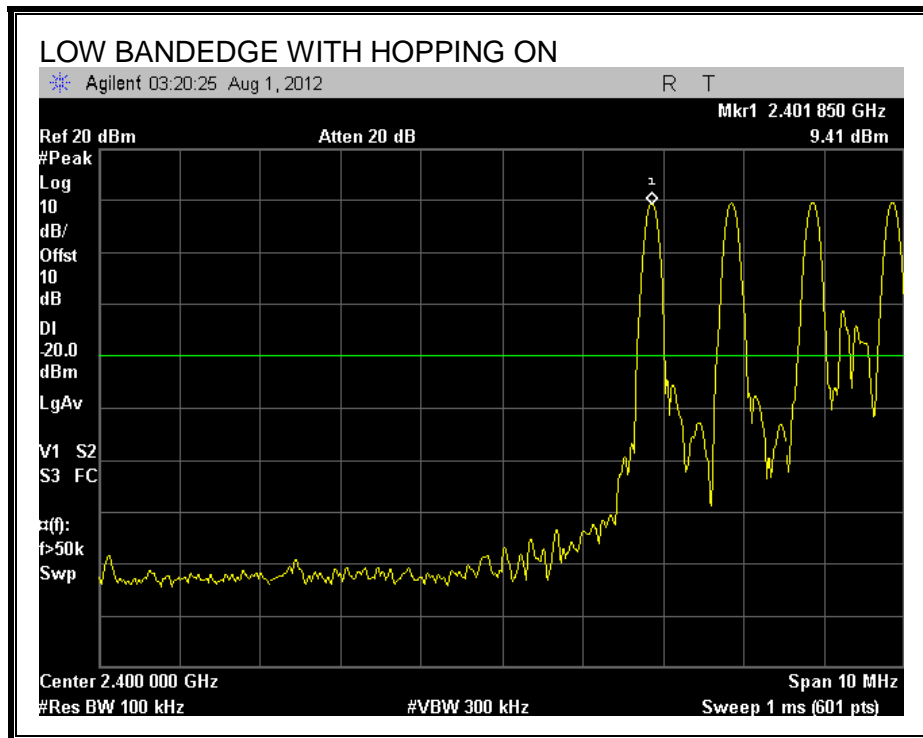


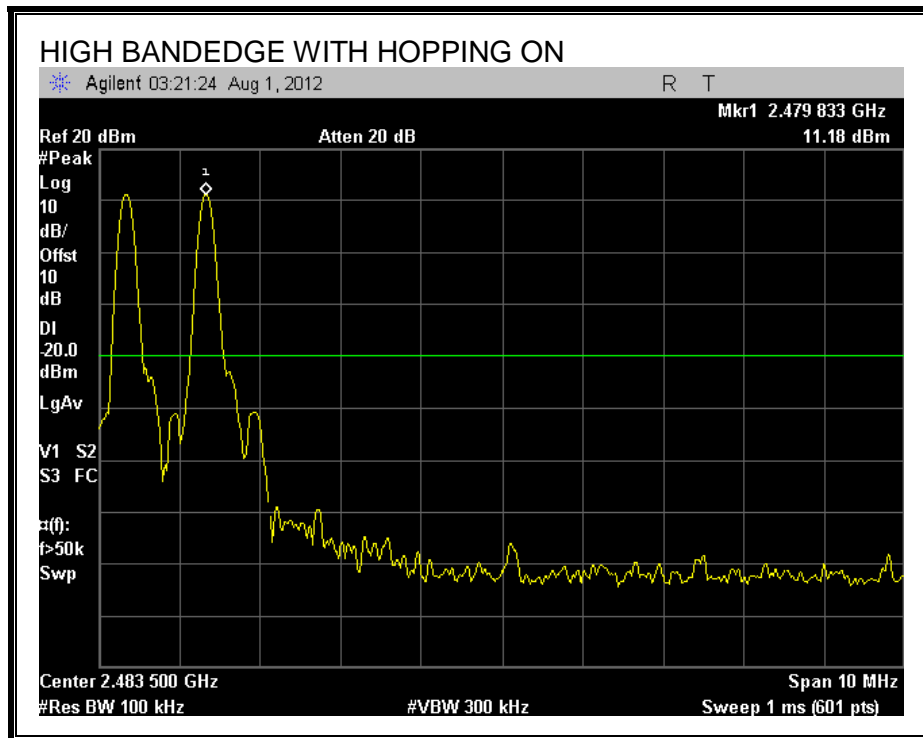
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





7.2. ENHANCED DATA RATE QPSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

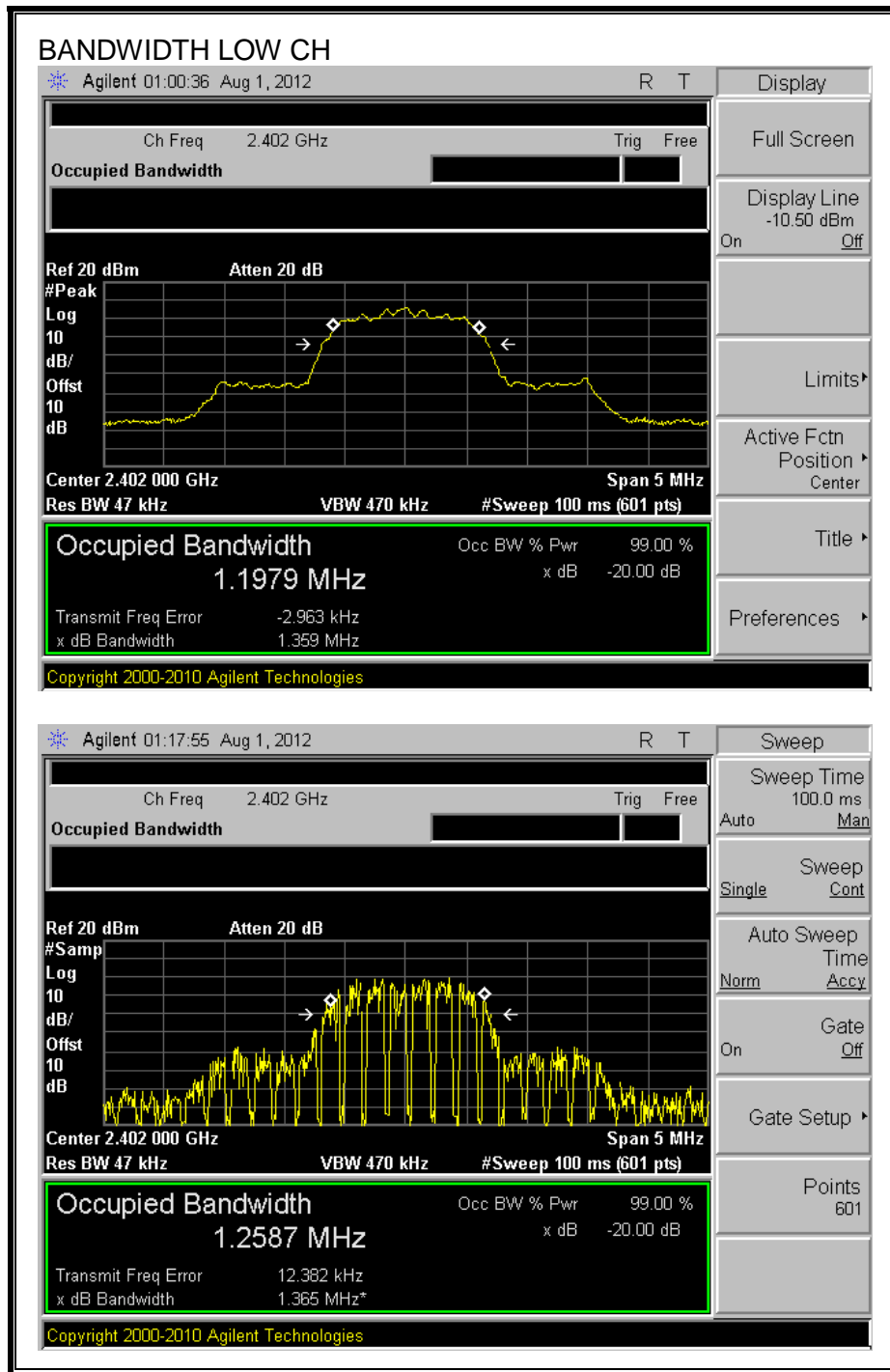
TEST PROCEDURE

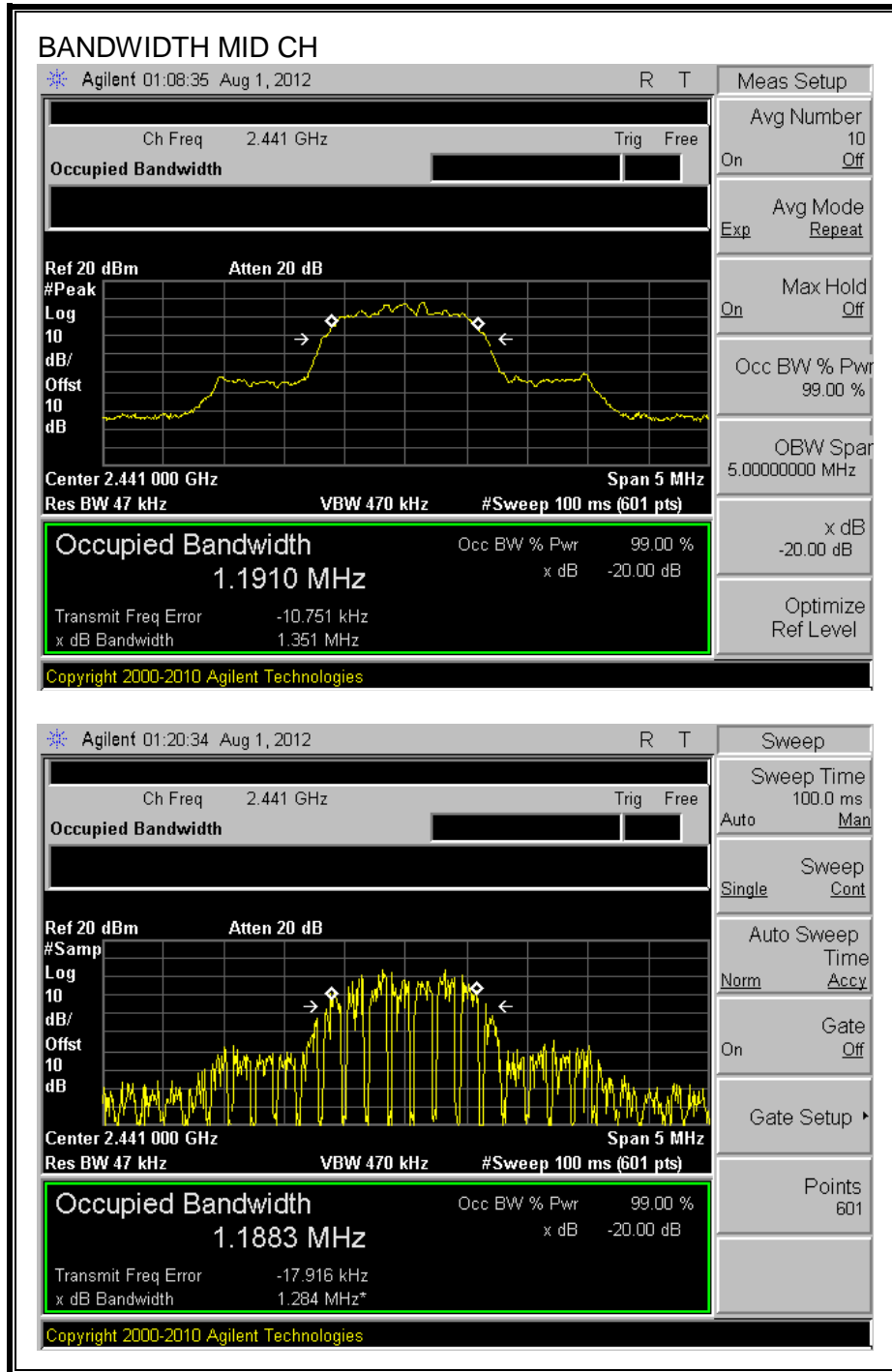
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

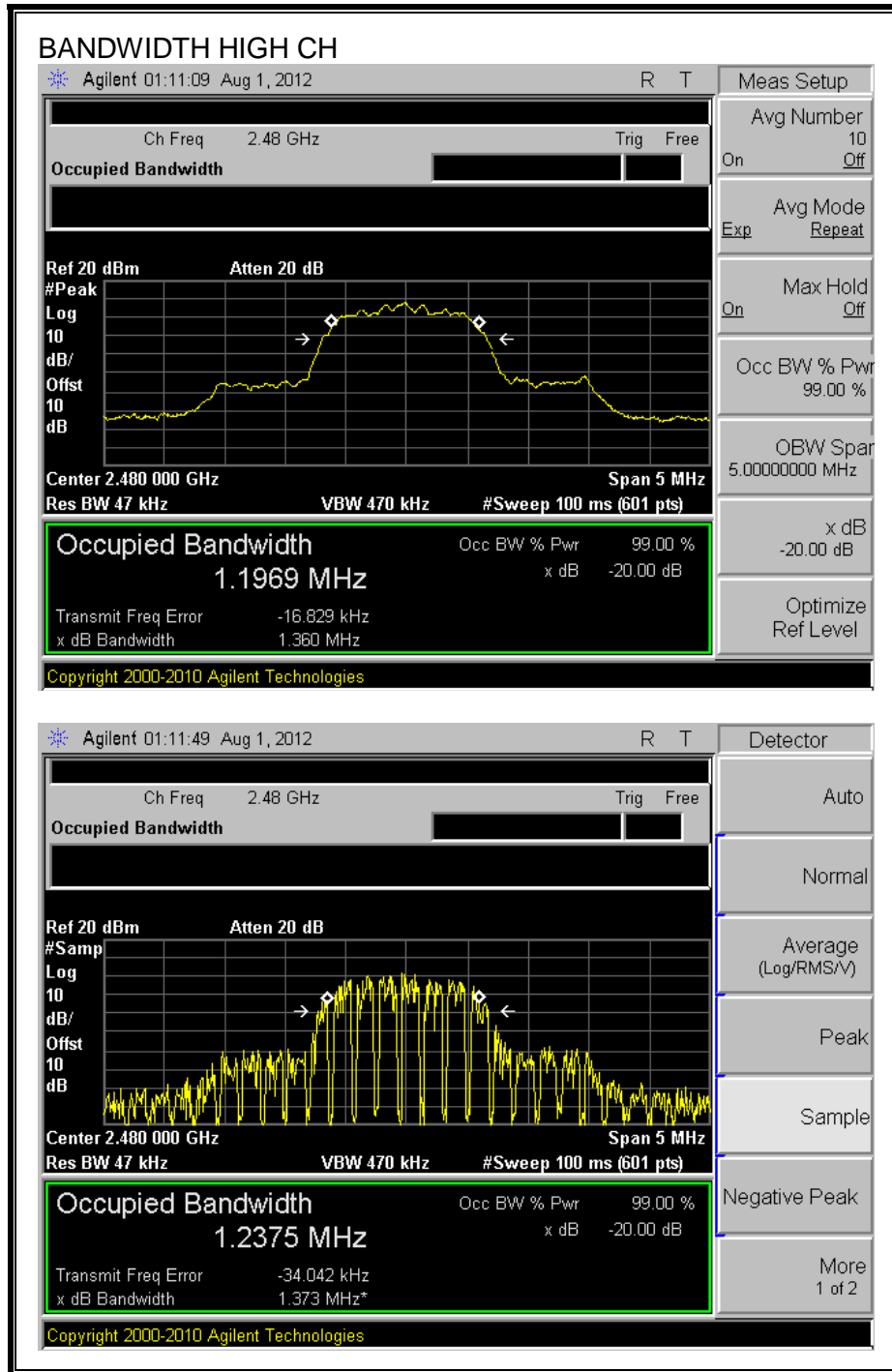
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1359	1259
Middle	2441	1351	1188
High	2480	1360	1238

20 dB AND 99% BANDWIDTH







7.2.2. 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.

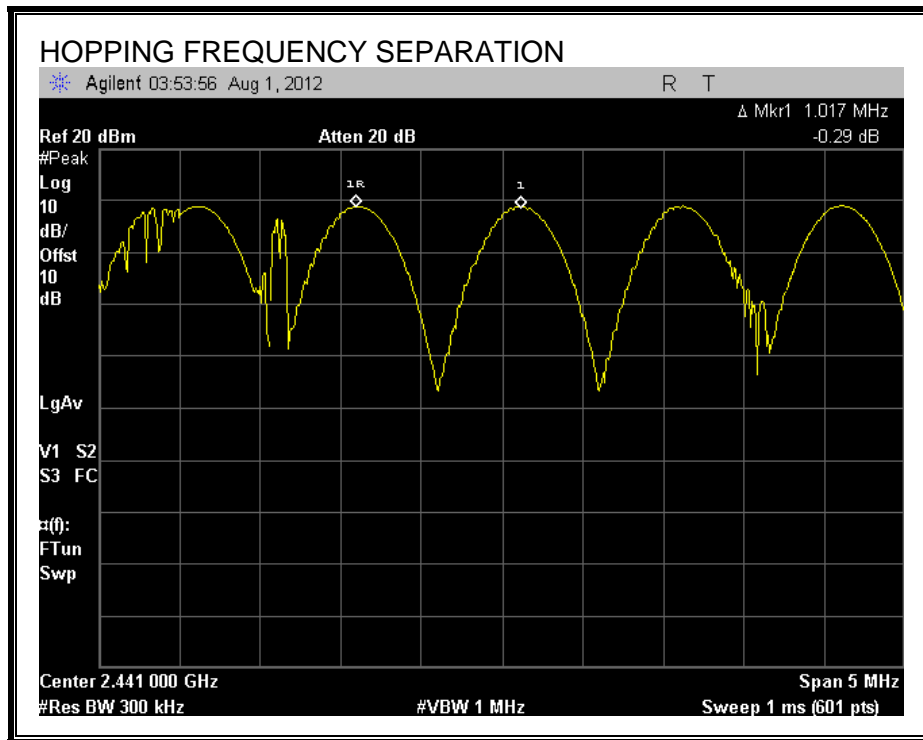
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.2.3. 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.

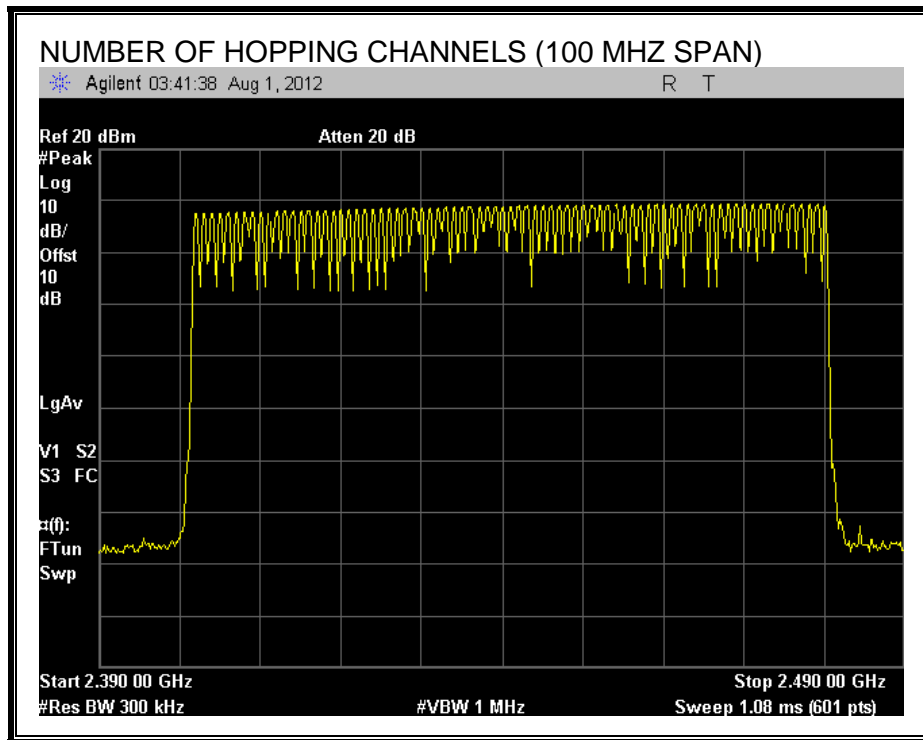
TEST PROCEDURE

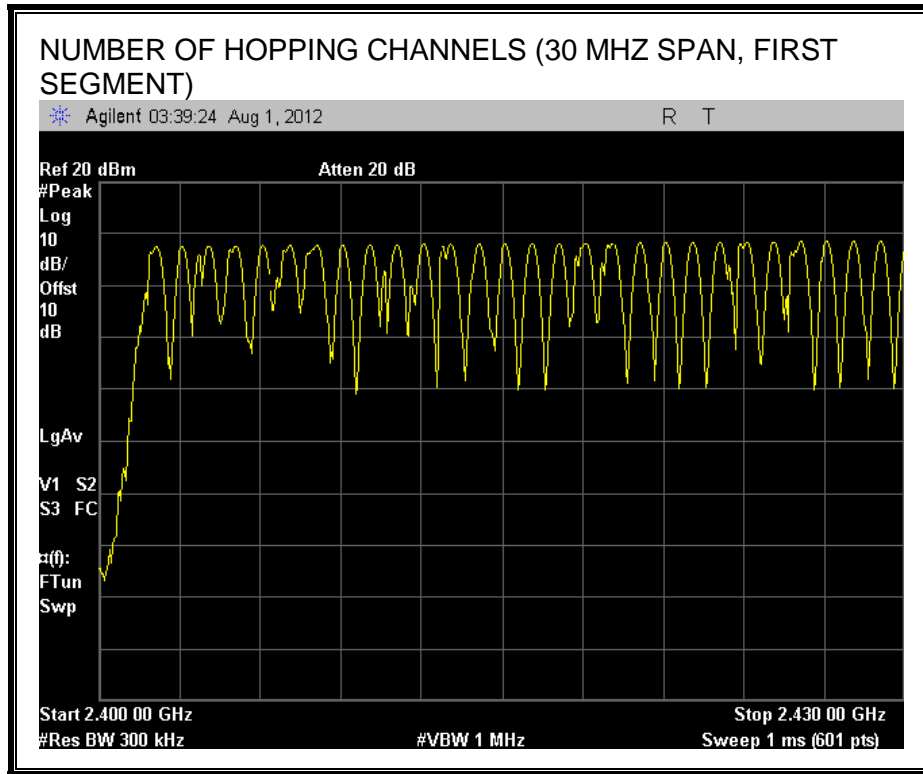
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

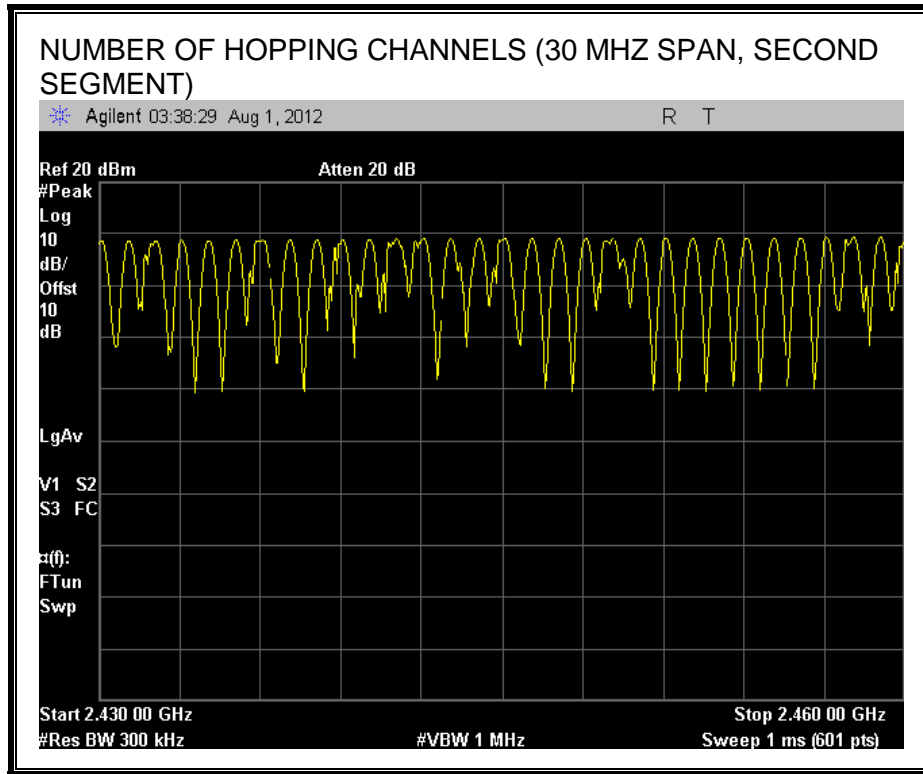
RESULTS

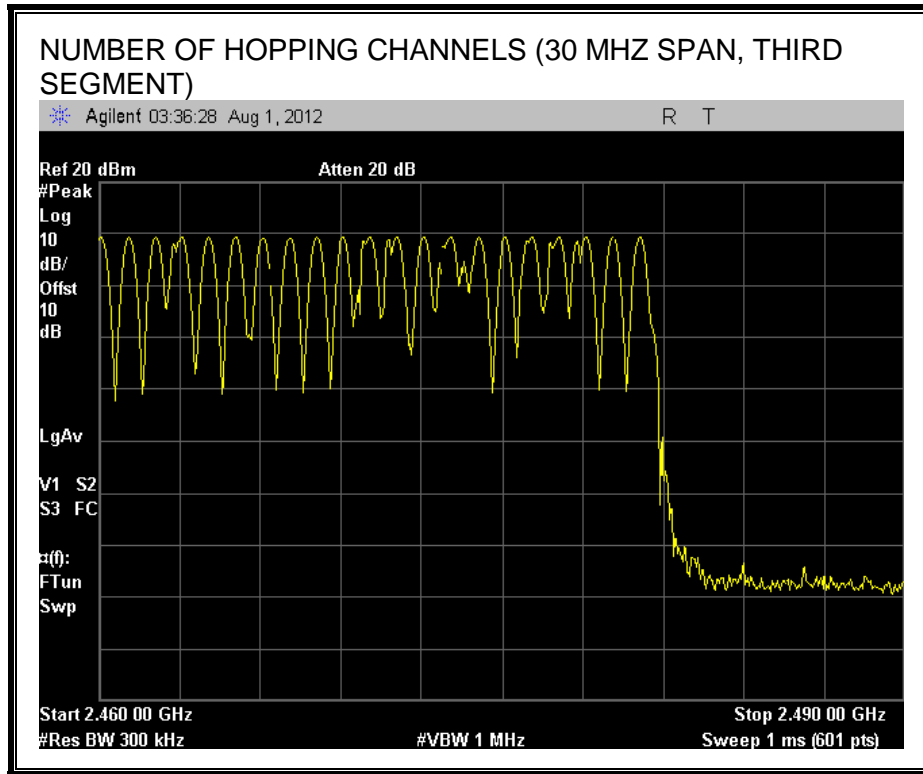
79 Channels observed.

NUMBER OF HOPPING CHANNELS









7.2.4. 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 $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

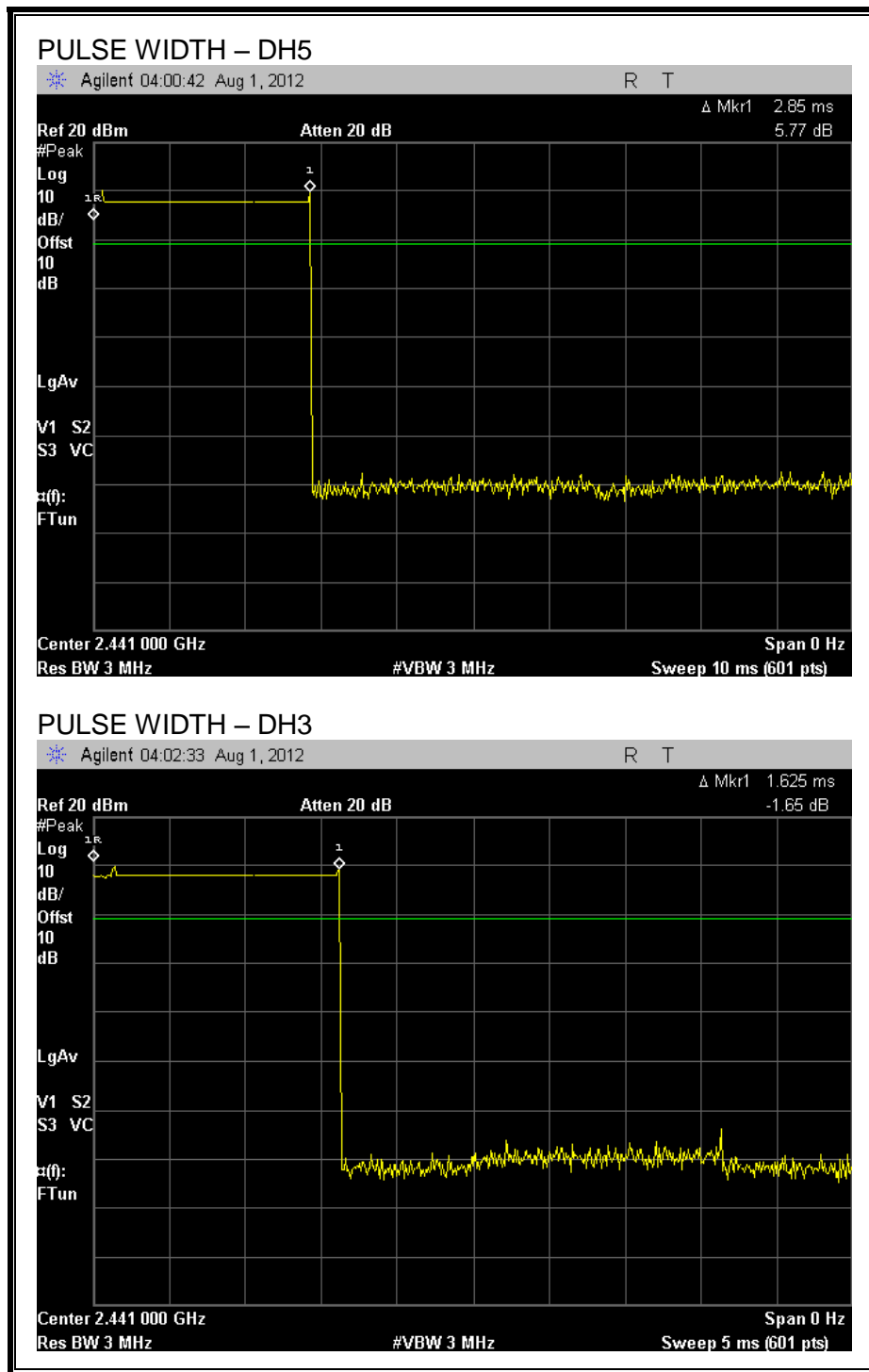
RESULTS

Time Of Occupancy = $10 * xx \text{ pulses} * yy \text{ msec} = zz \text{ msec}$

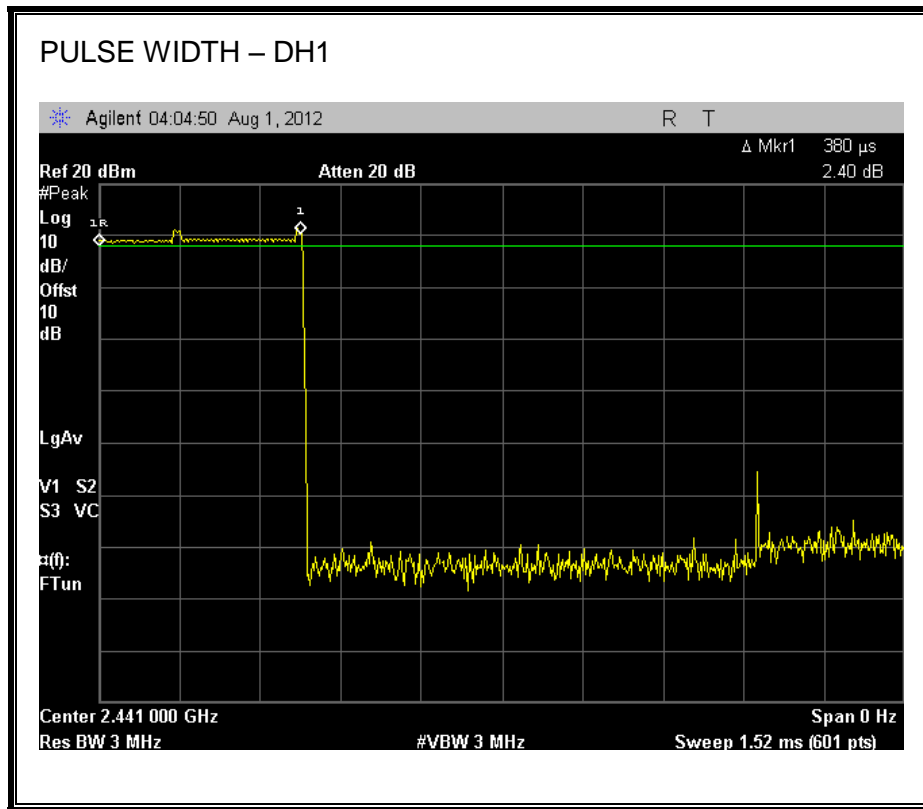
QPSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.38	31	0.118	0.4	0.282
DH3	1.625	17	0.276	0.4	0.124
DH5	2.85	11	0.314	0.4	0.087

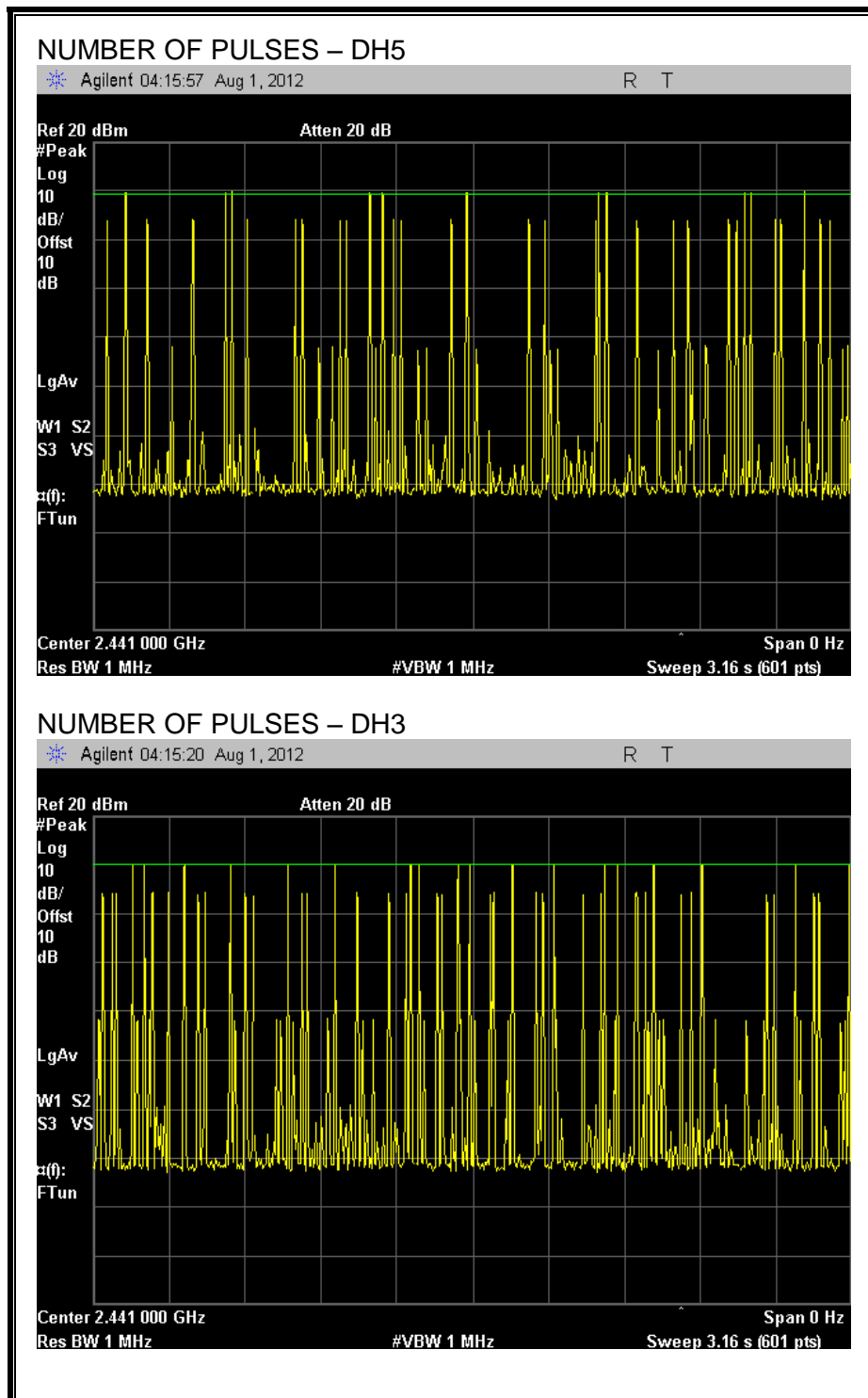
PULSE WIDTH



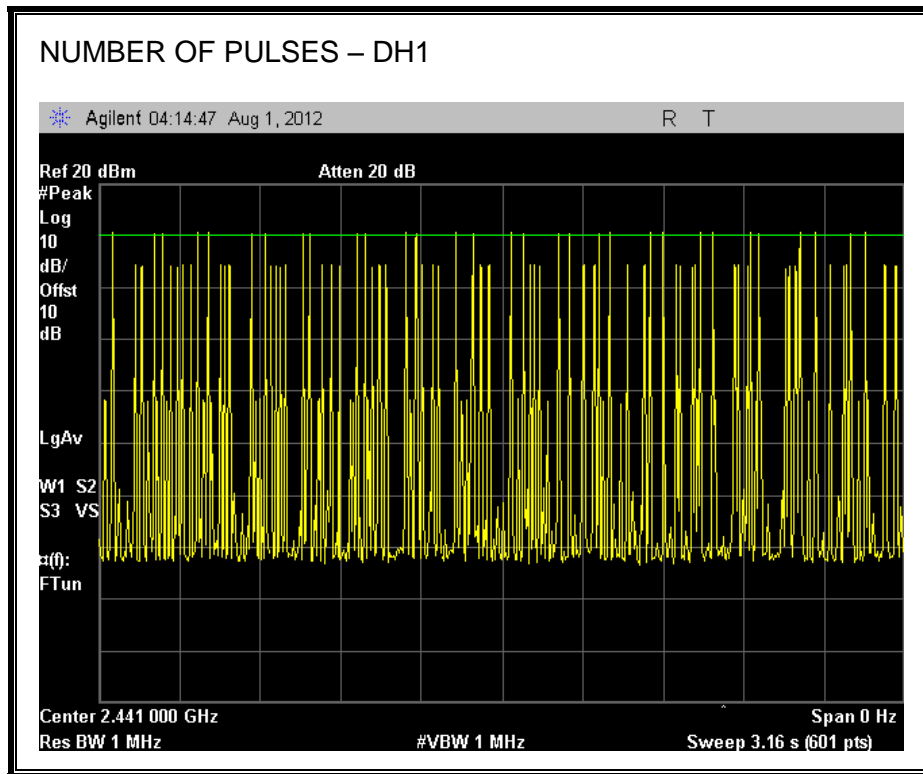
PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi and channel separation is \geq two thirds the 20 dB BW or \geq 25 kHz, therefore the limit is 20.9 dBm.

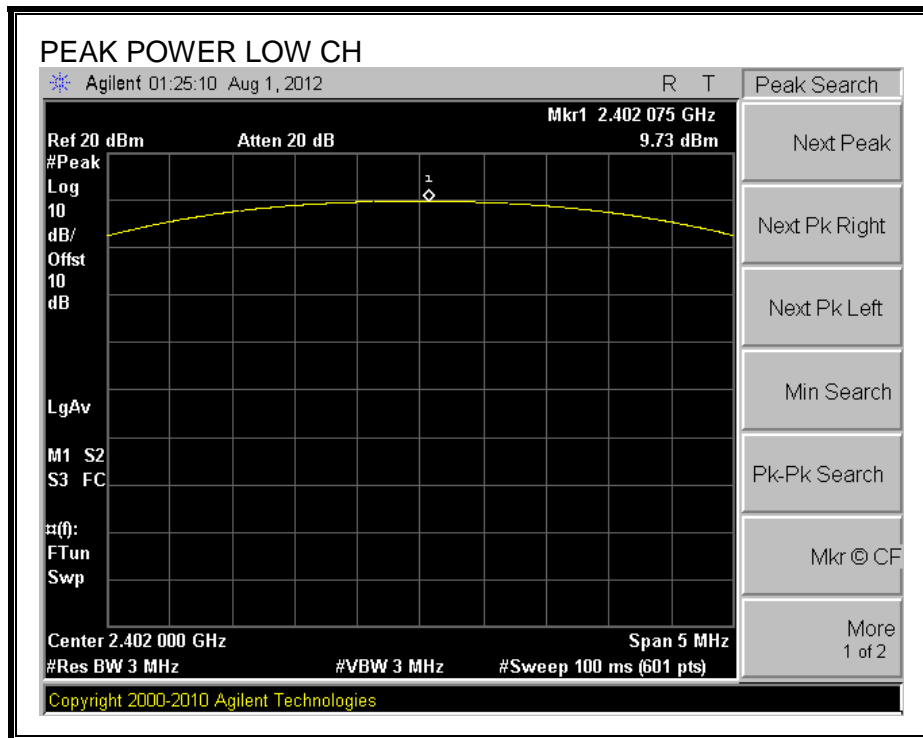
TEST PROCEDURE

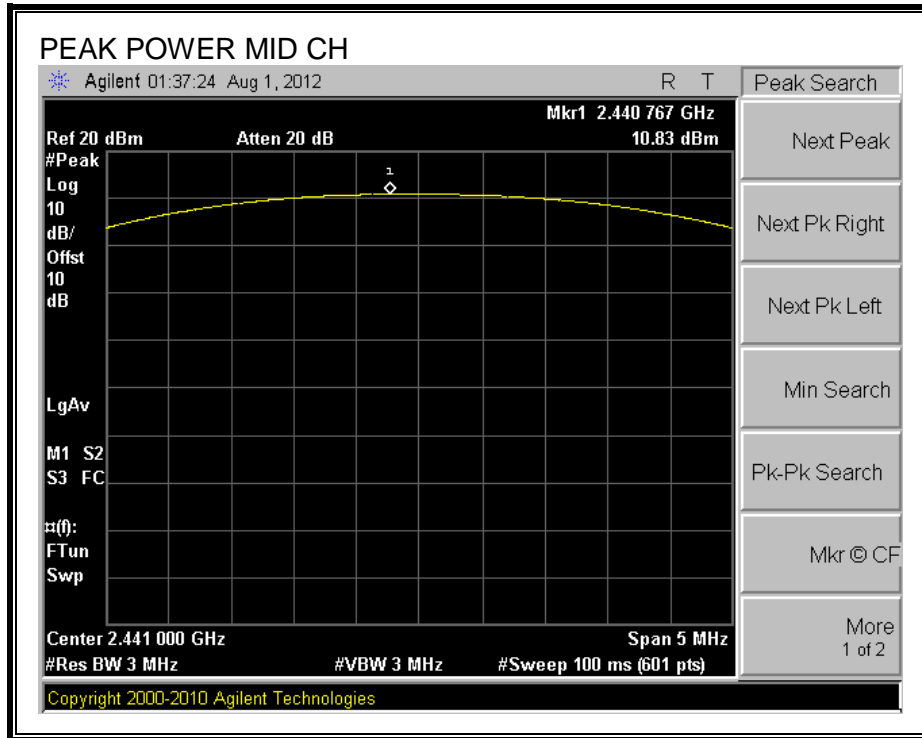
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

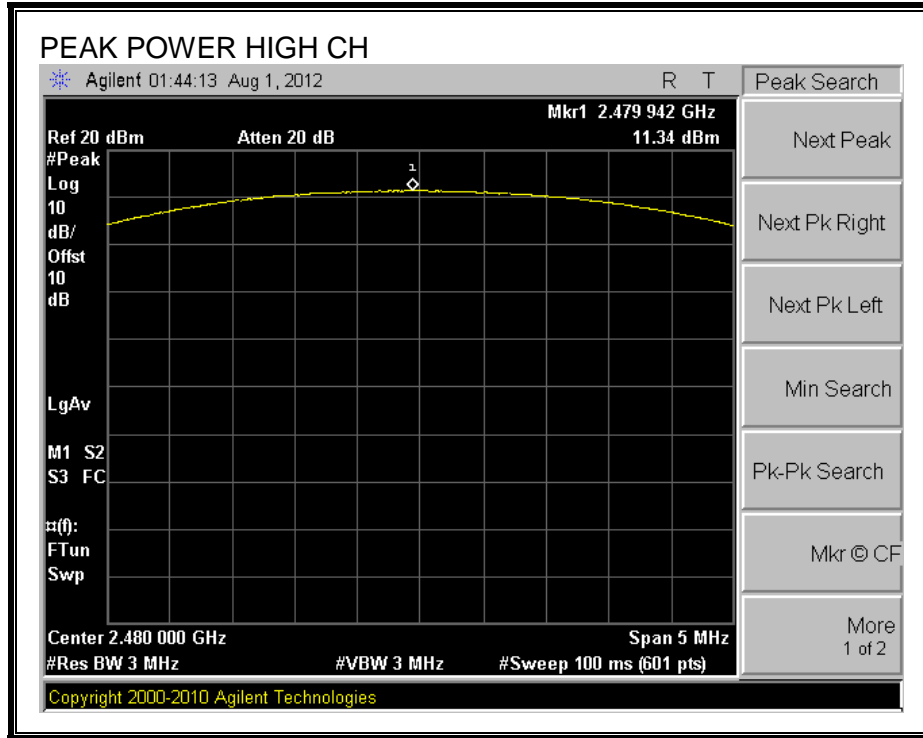
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.73	20.9	-11.17
Middle	2441	10.83	20.9	-10.07
High	2480	11.34	20.9	-9.56

OUTPUT POWER







7.2.6. 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 10 dB (including 10 dB pad and 0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.34
Middle	2441	7.65
High	2480	8.00

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

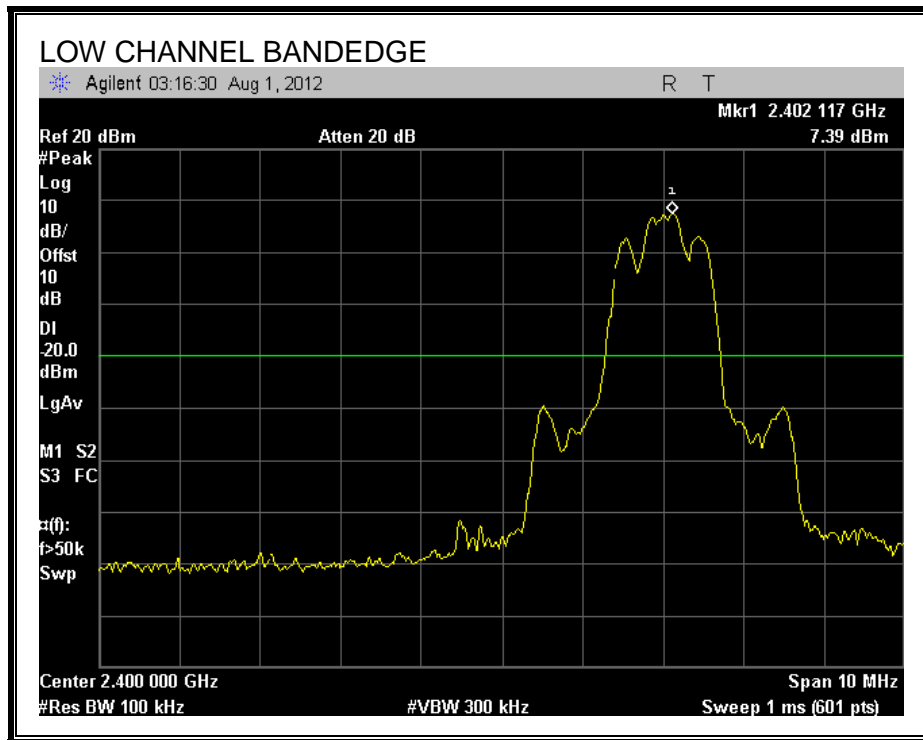
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

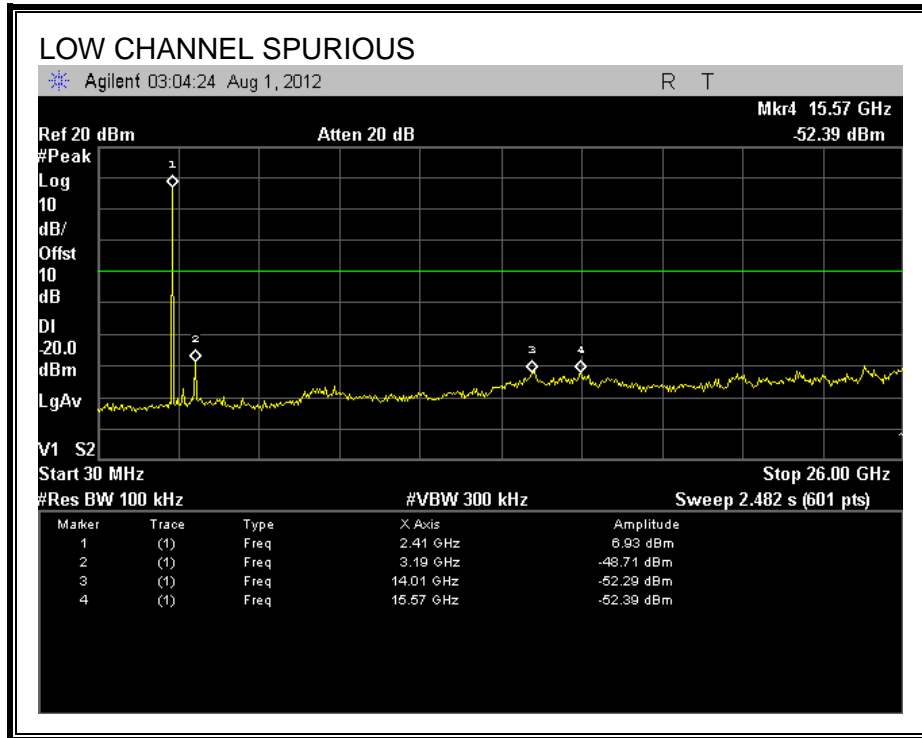
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

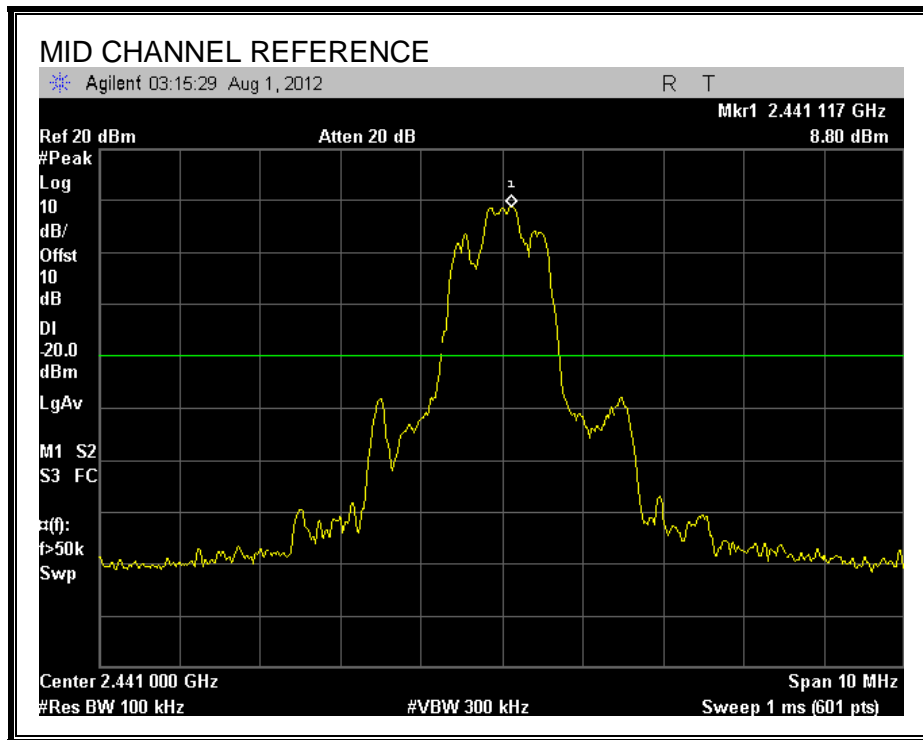
RESULTS

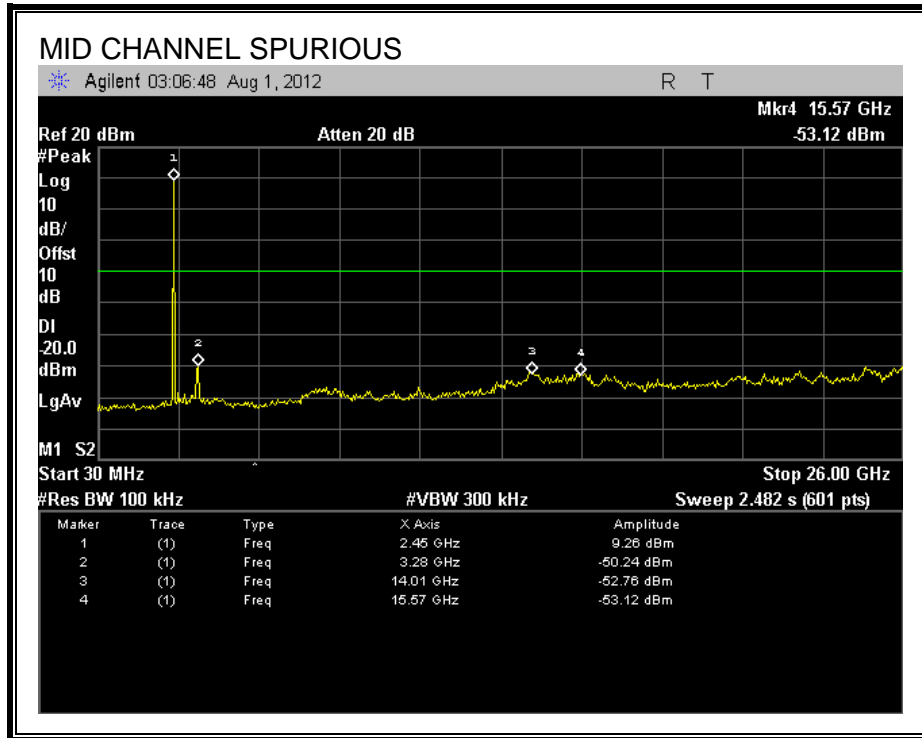
SPURIOUS EMISSIONS, LOW CHANNEL



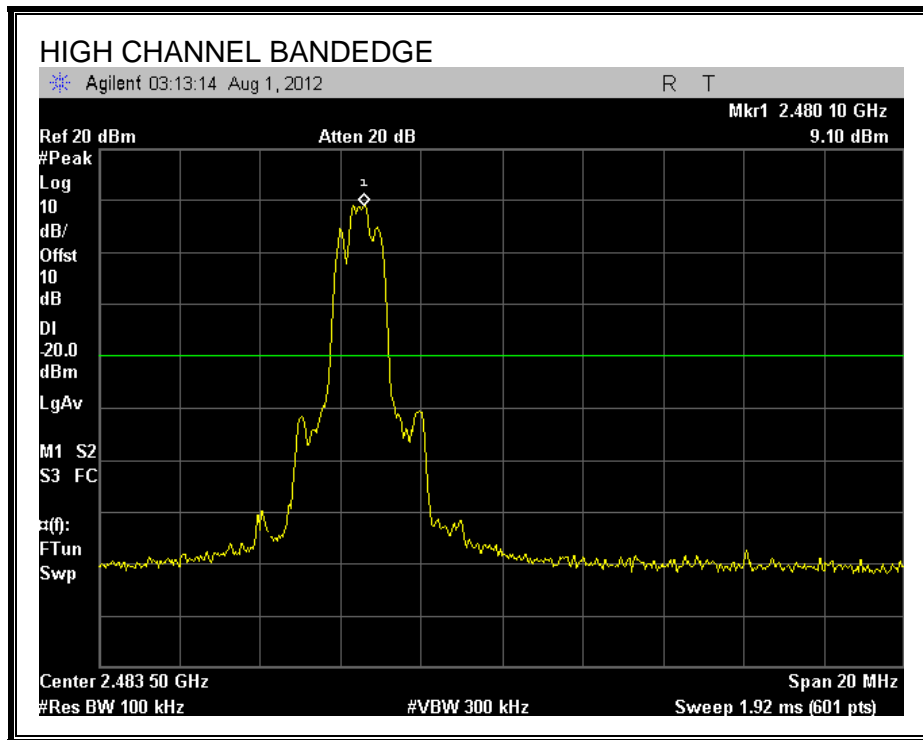


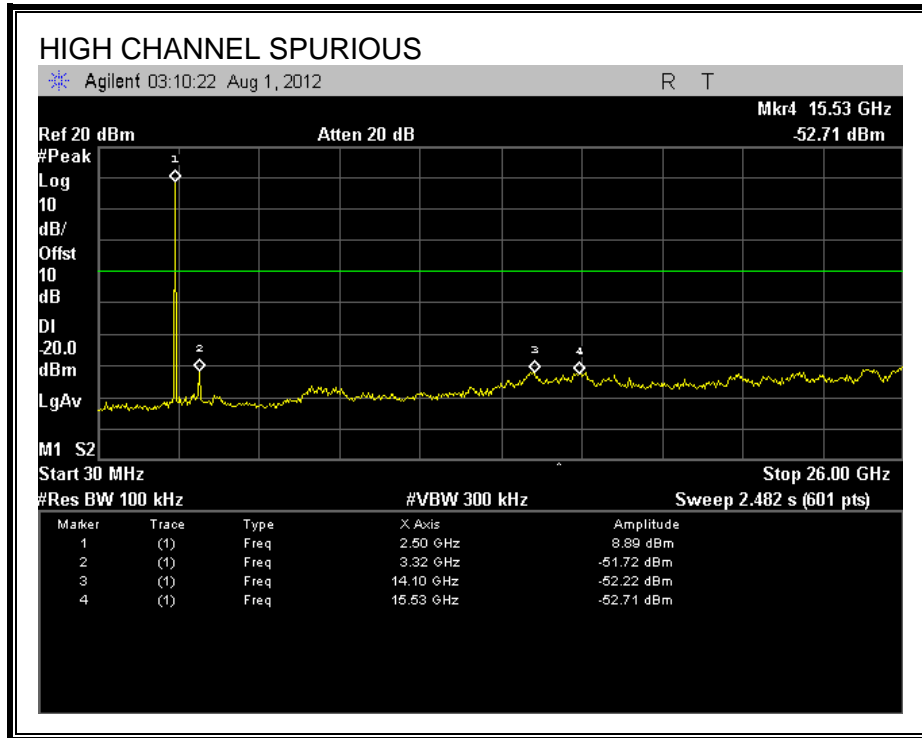
SPURIOUS EMISSIONS, MID CHANNEL



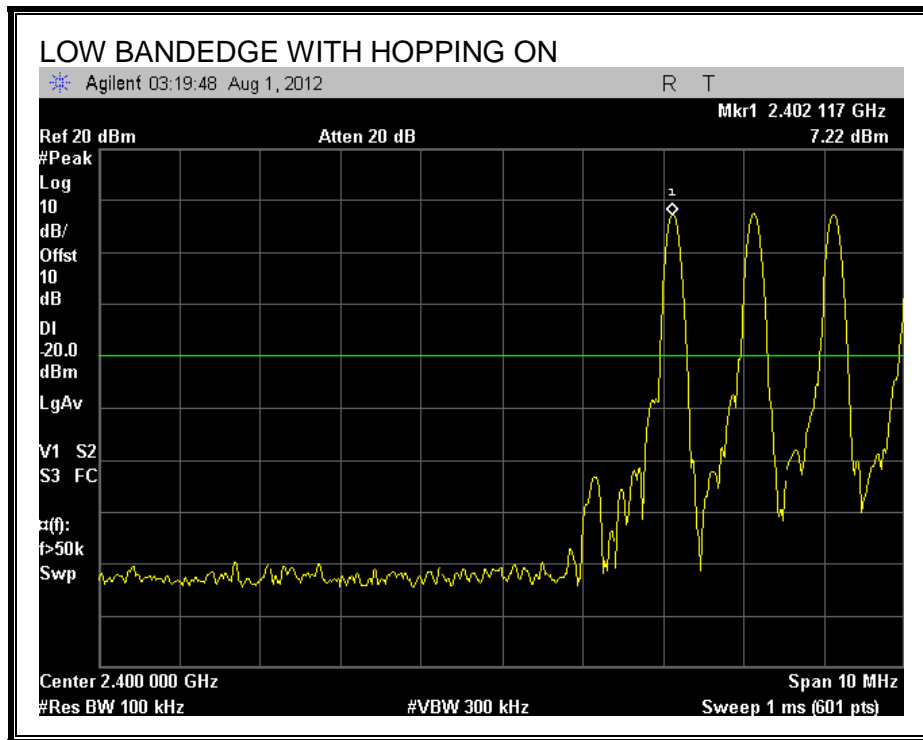


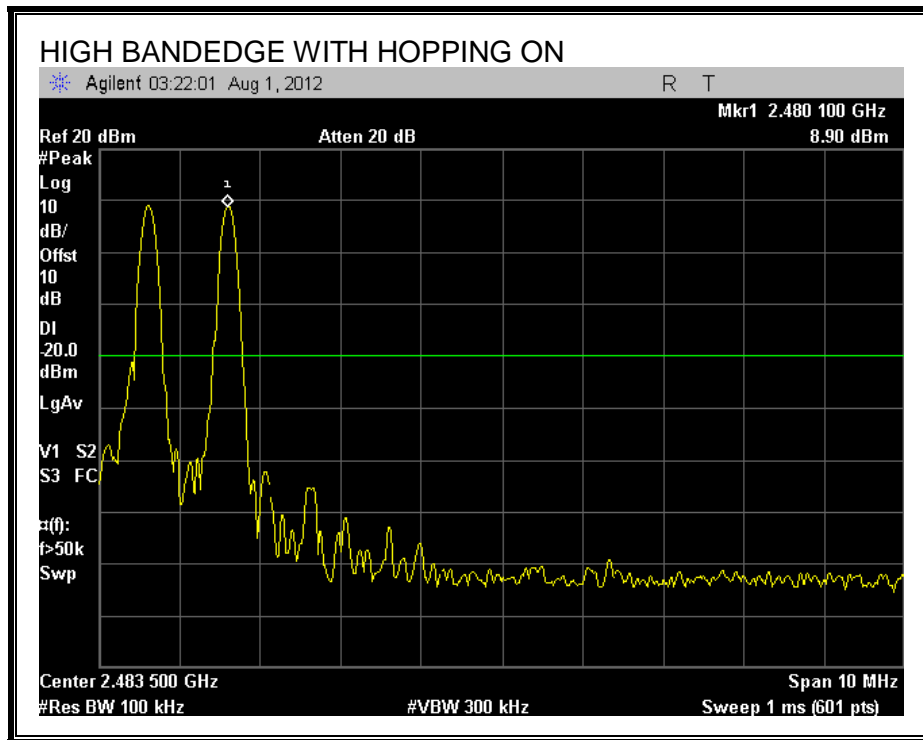
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





7.3. ENHANCED DATA RATE 8PSK MODULATION

7.3.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

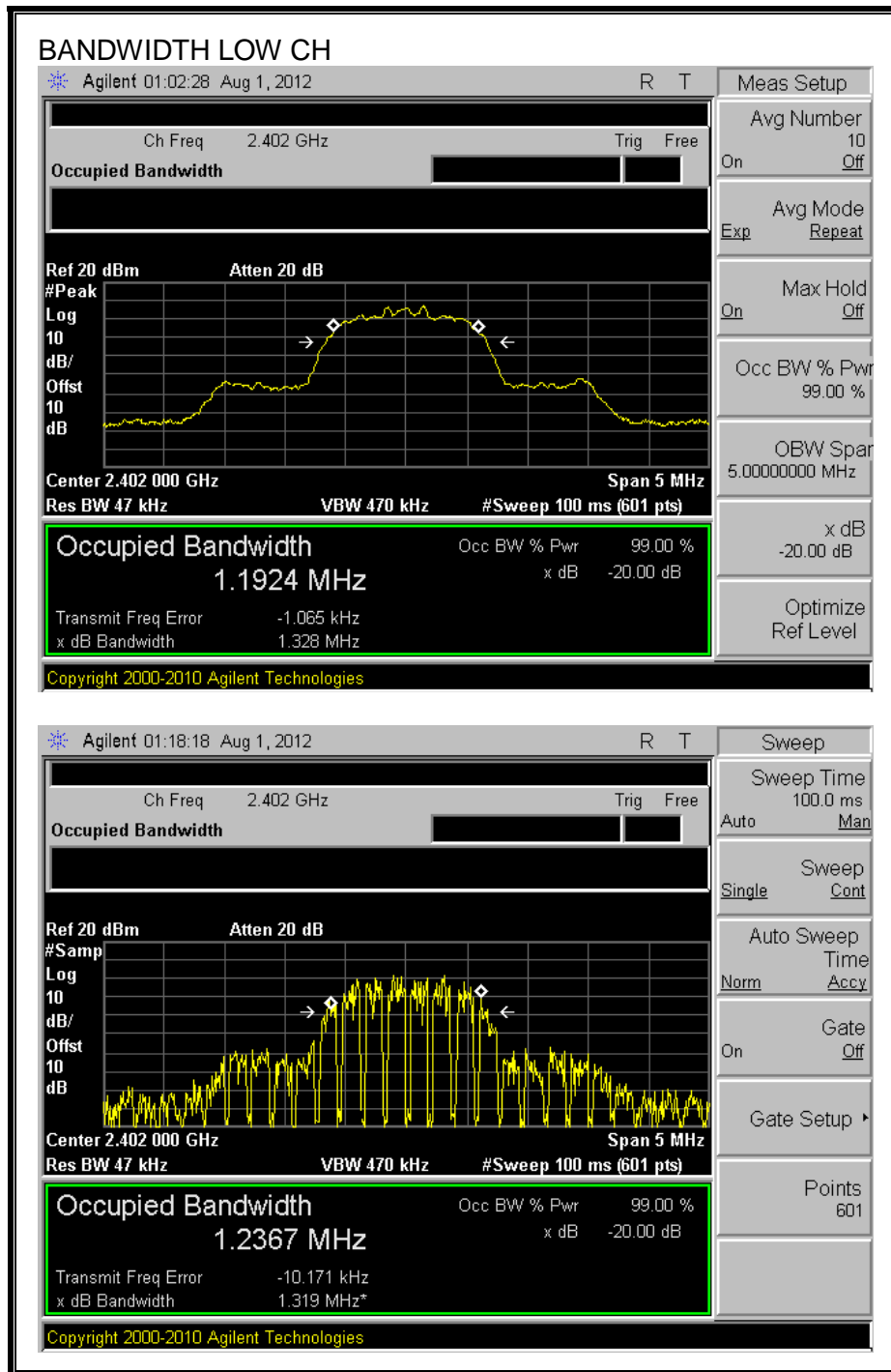
TEST PROCEDURE

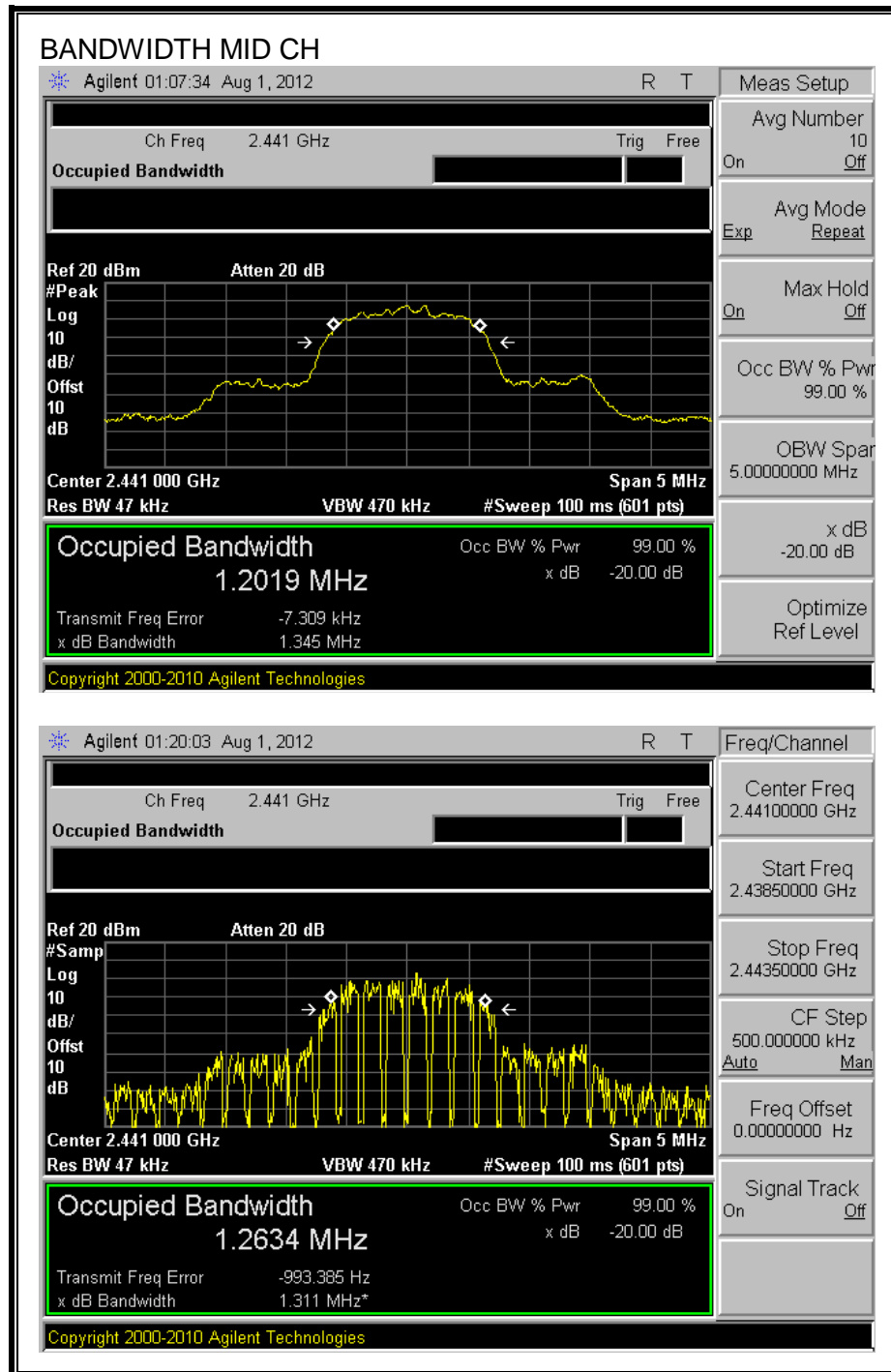
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

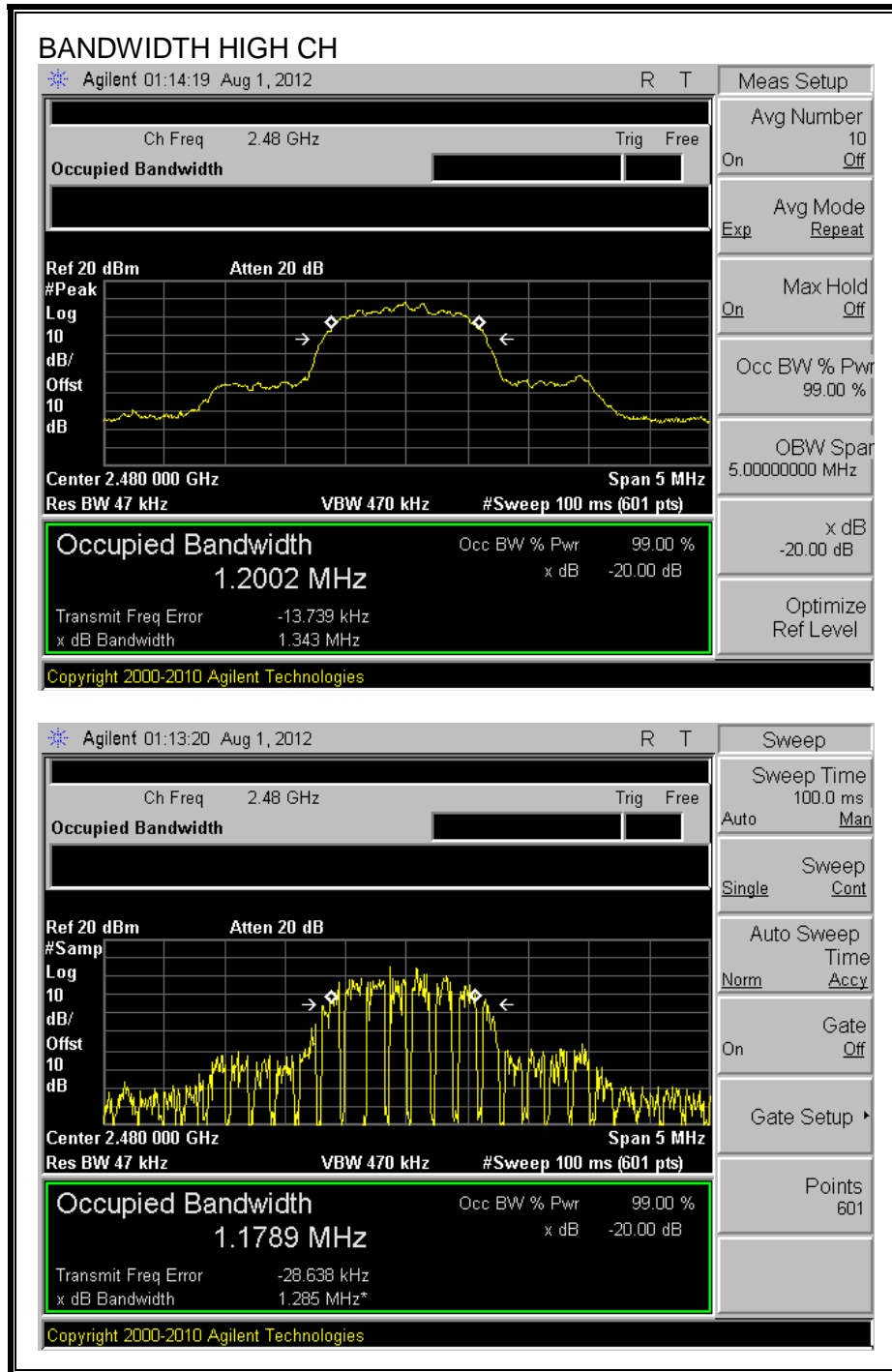
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1328	1237
Middle	2441	1345	1263
High	2480	1343	1285

20 dB AND 99% BANDWIDTH







7.3.2. 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.

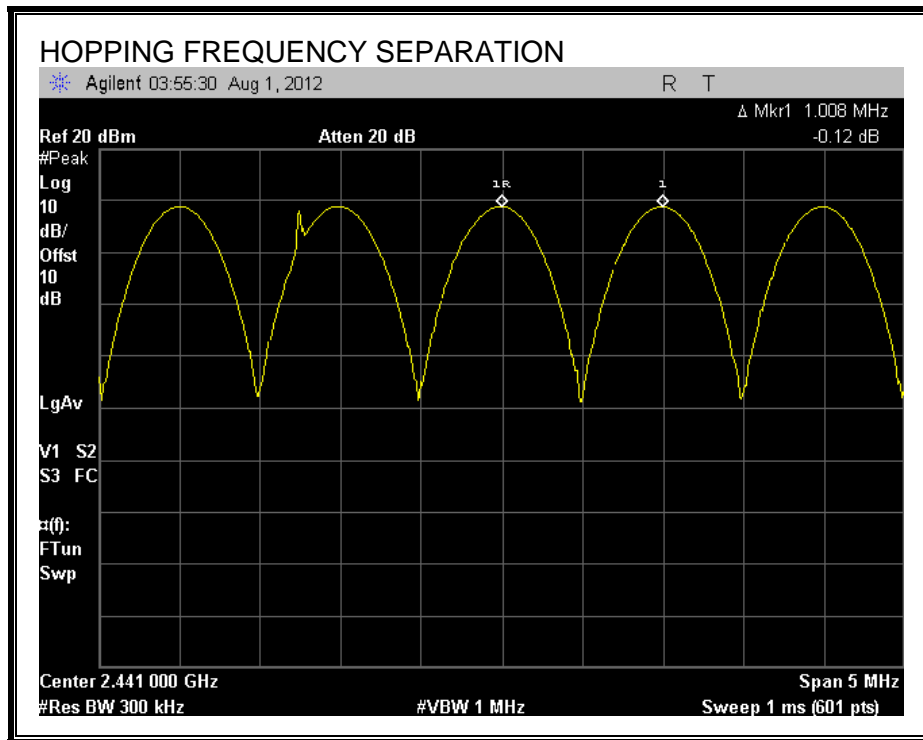
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.3.3. 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.

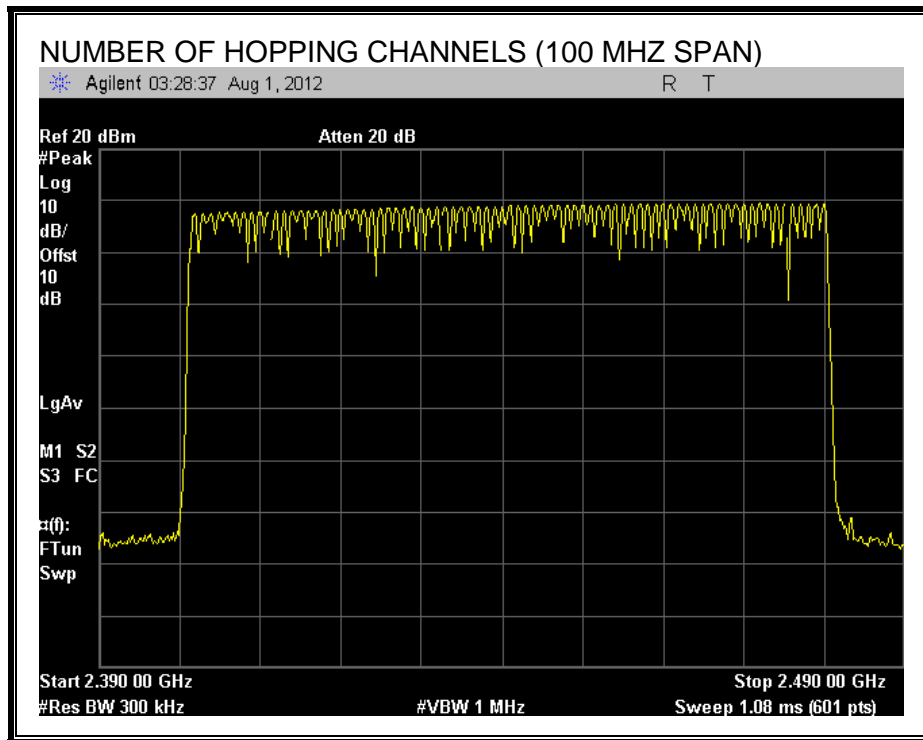
TEST PROCEDURE

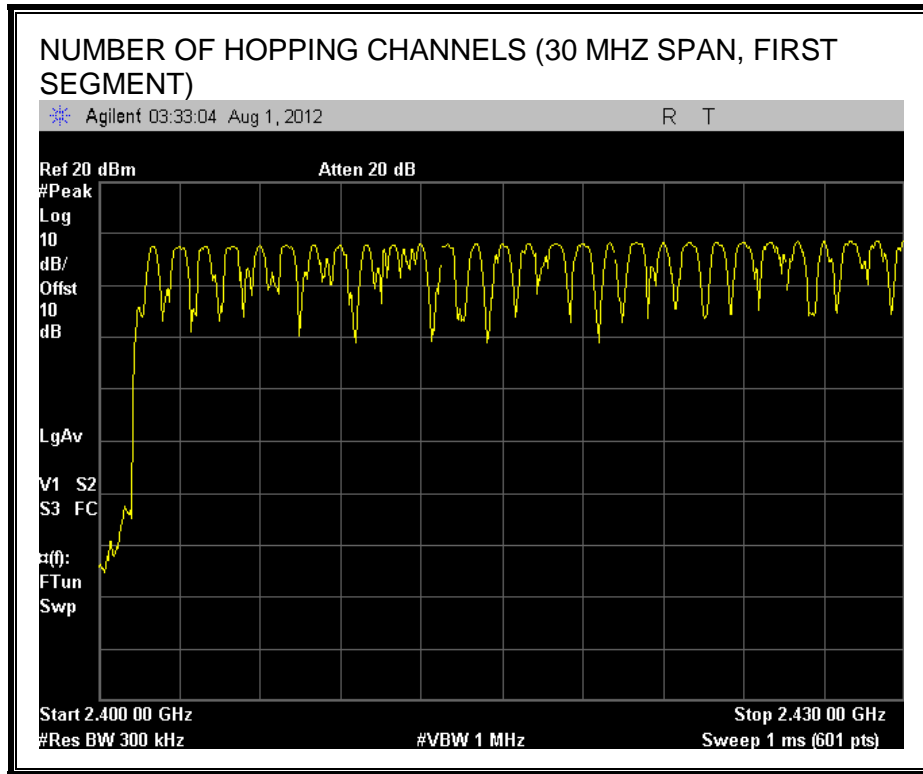
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

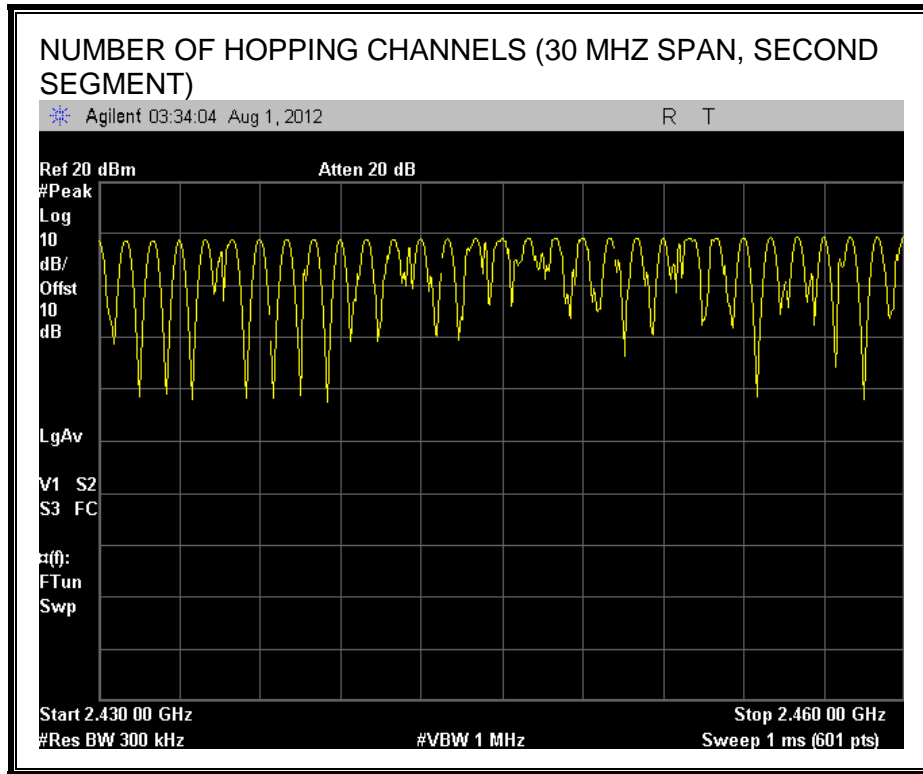
RESULTS

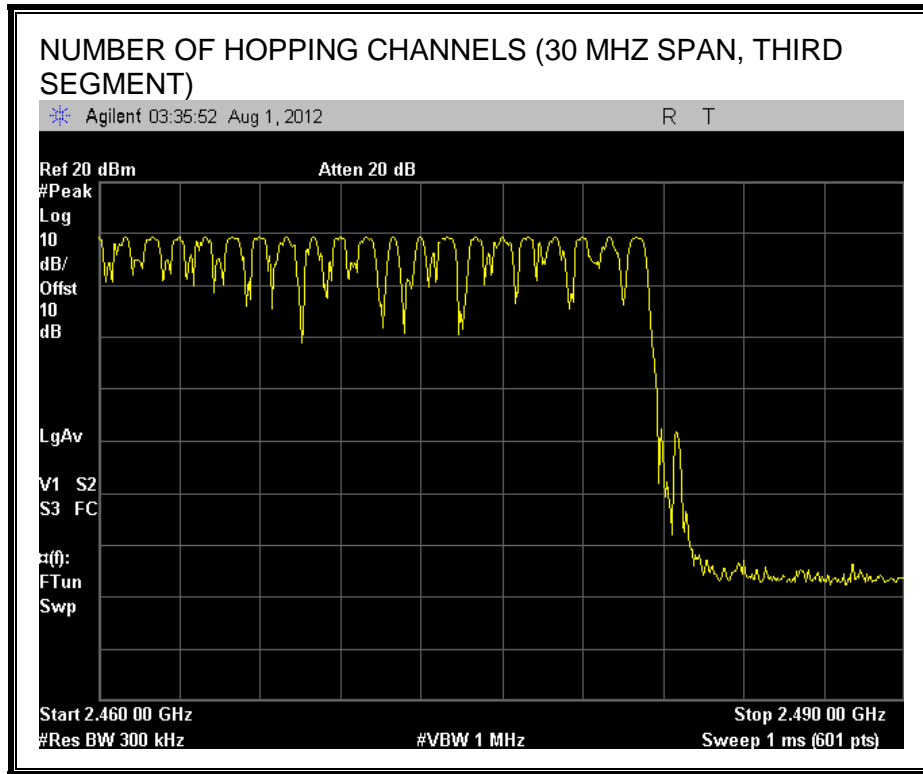
79 Channels observed.

NUMBER OF HOPPING CHANNELS









7.3.4. 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 * (# of pulses in 3.16 s) * pulse width.

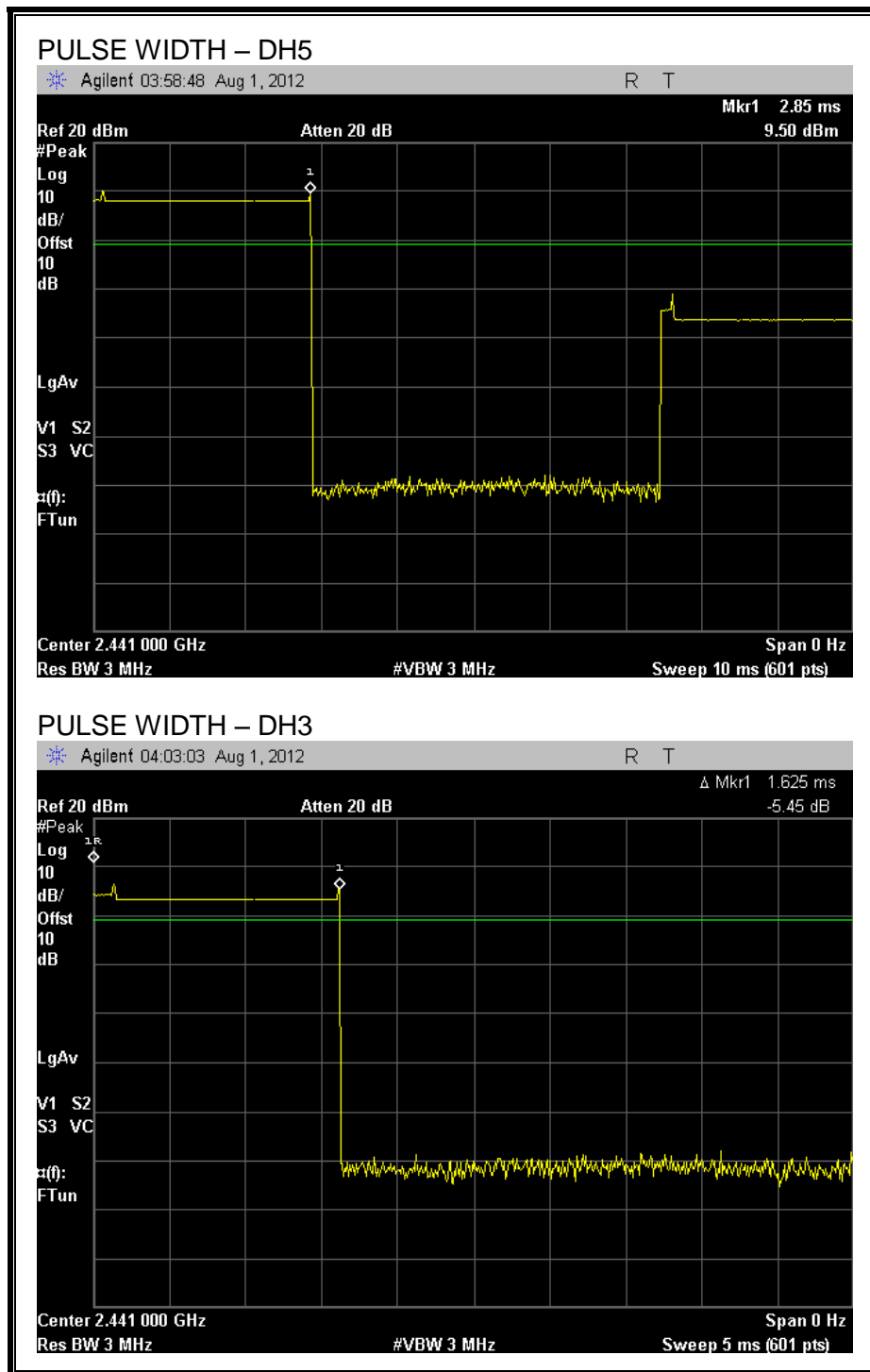
RESULTS

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

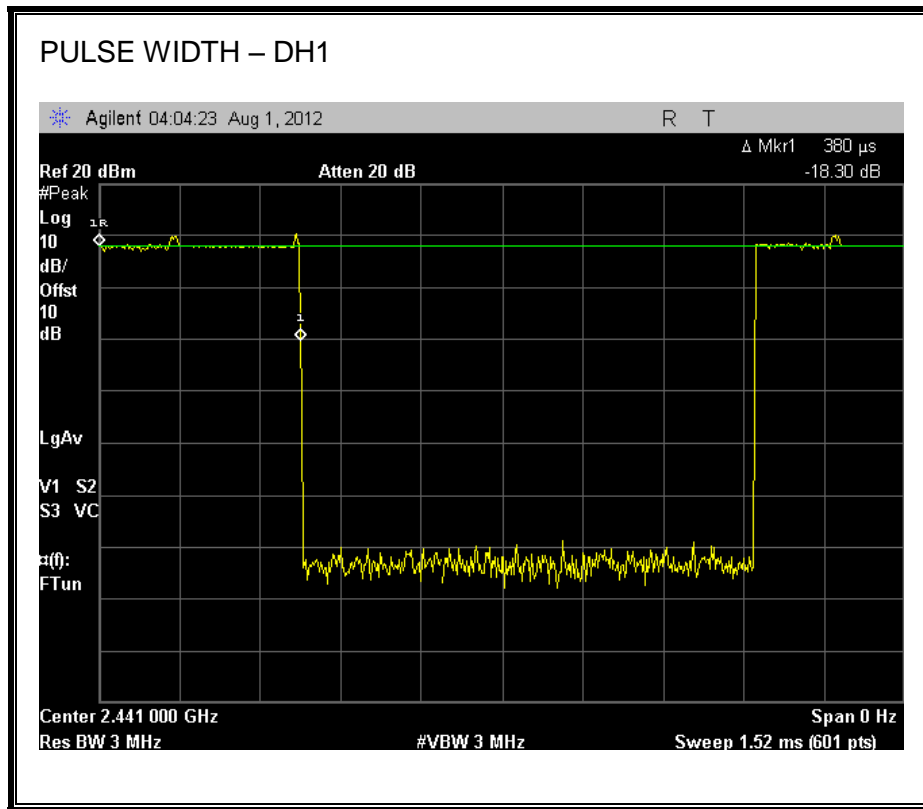
8DPSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.38	31	0.118	0.4	0.282
DH3	1.625	17	0.276	0.4	0.124
DH5	2.85	9	0.257	0.4	0.144

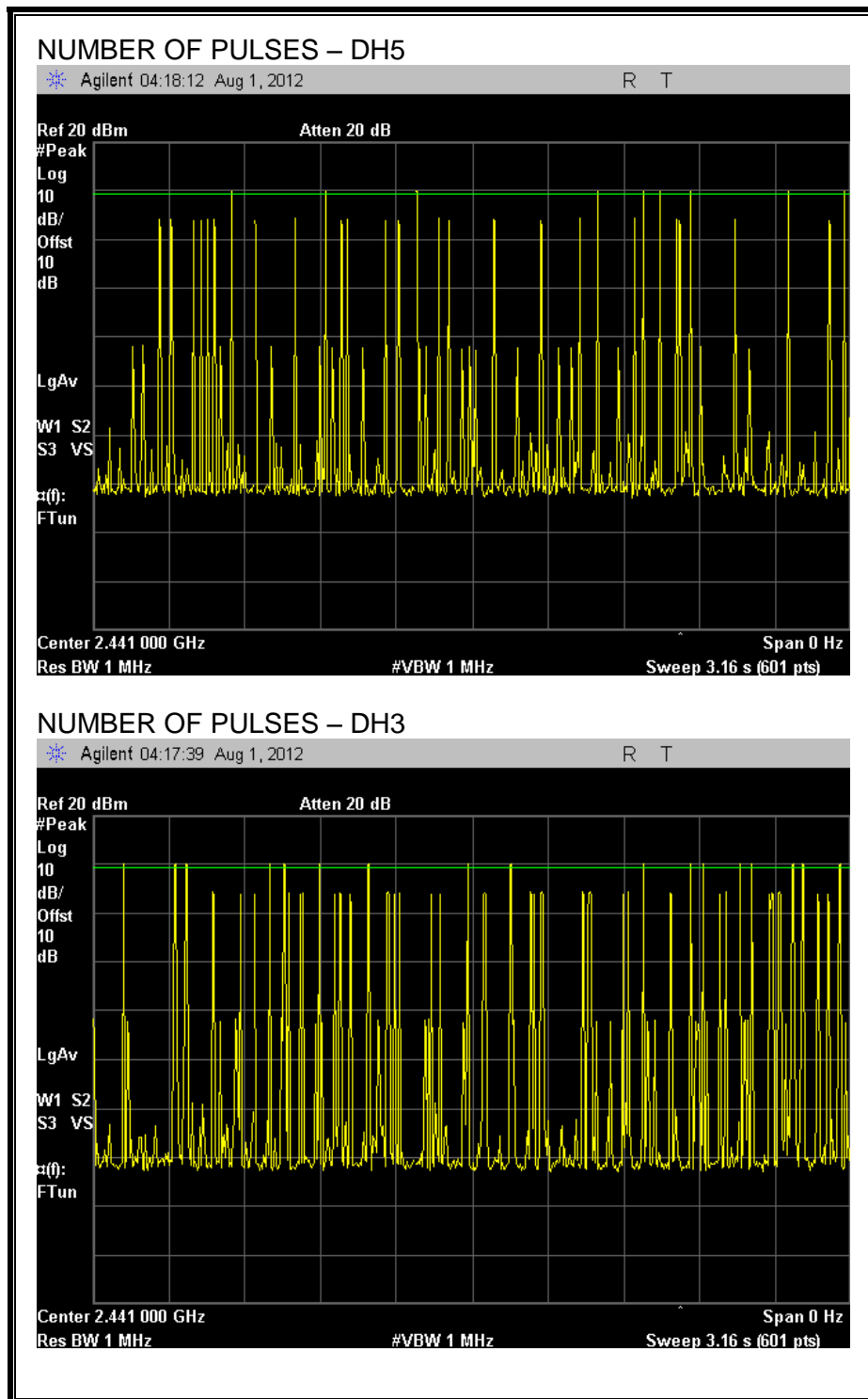
PULSE WIDTH



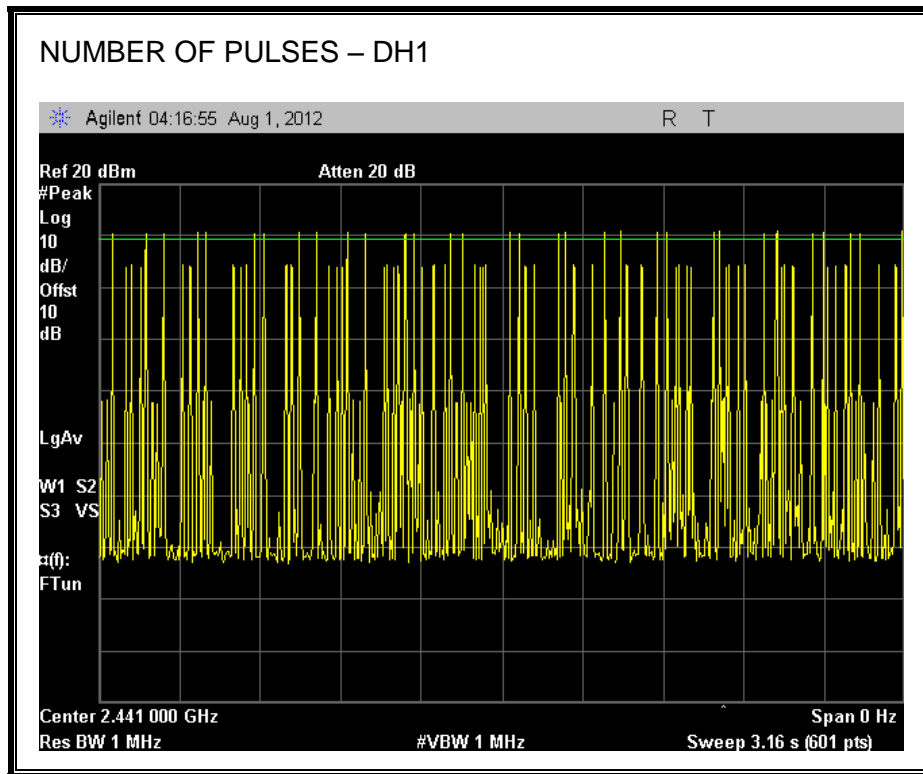
PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.3.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi and channel separation is \geq two thirds the 20 dB BW or \geq 25 kHz, therefore the limit is 20.9 dBm.

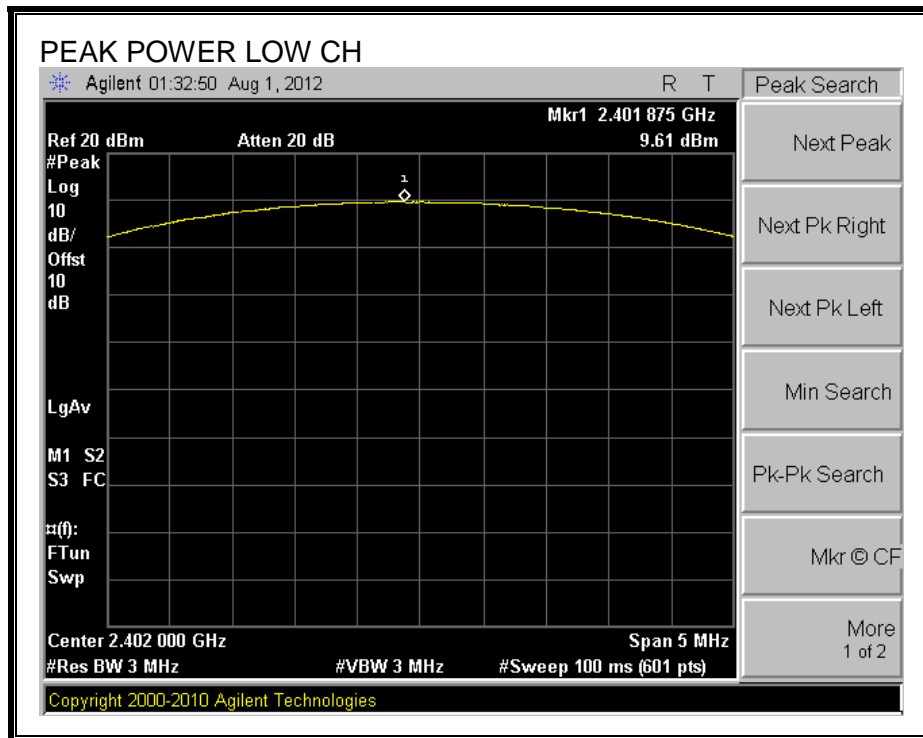
TEST PROCEDURE

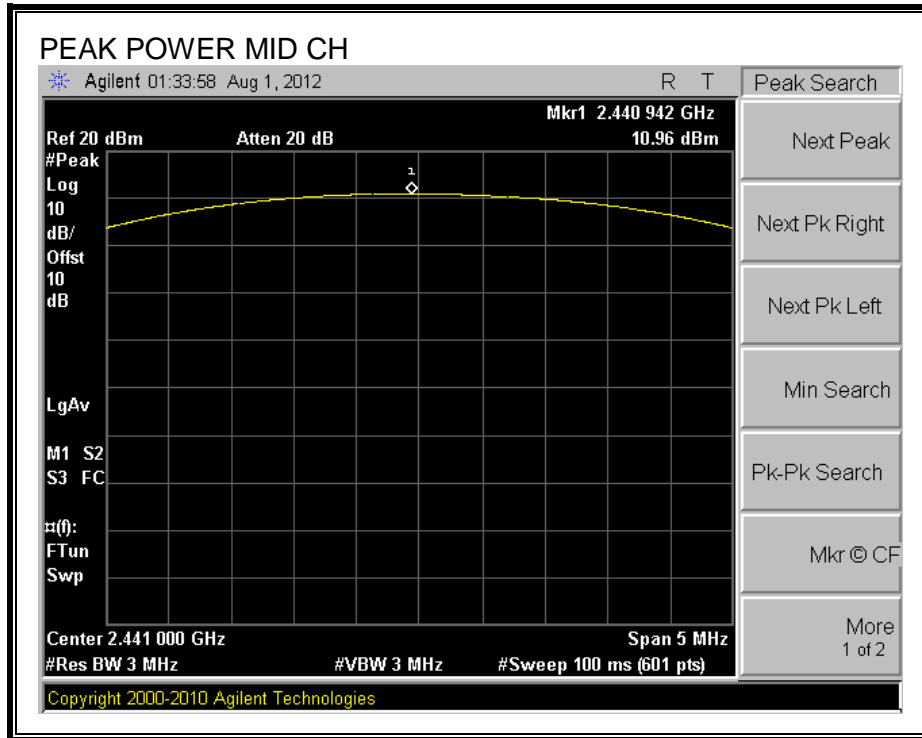
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

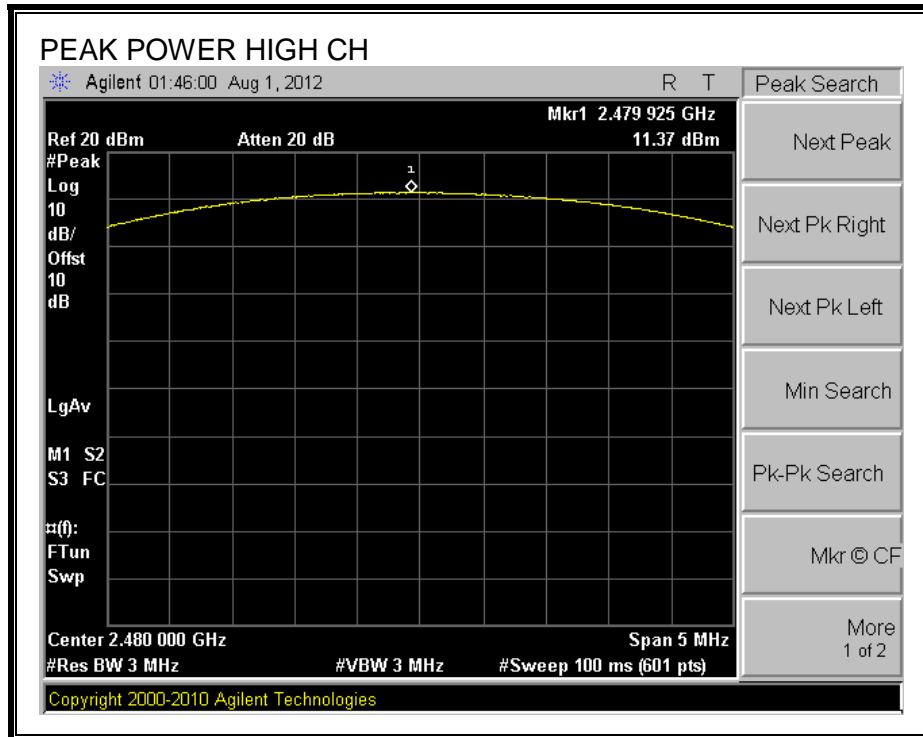
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.61	20.9	-11.29
Middle	2441	10.96	20.9	-9.94
High	2480	11.37	20.9	-9.53

OUTPUT POWER







7.3.6. 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 10 dB (including 10 dB pad and 0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.54
Middle	2441	7.82
High	2480	8.17

7.3.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

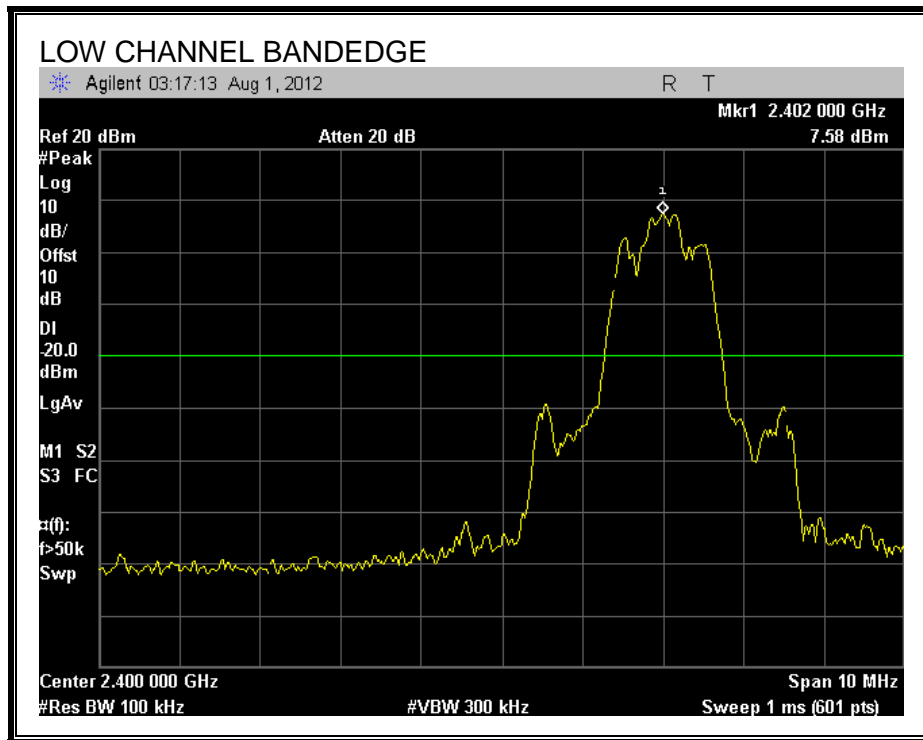
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

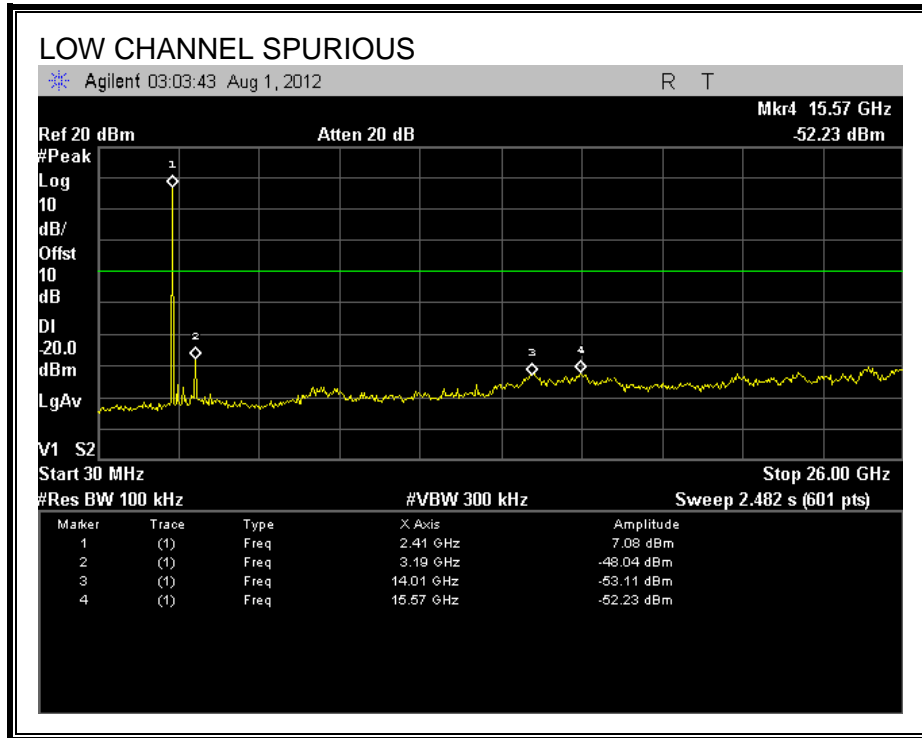
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

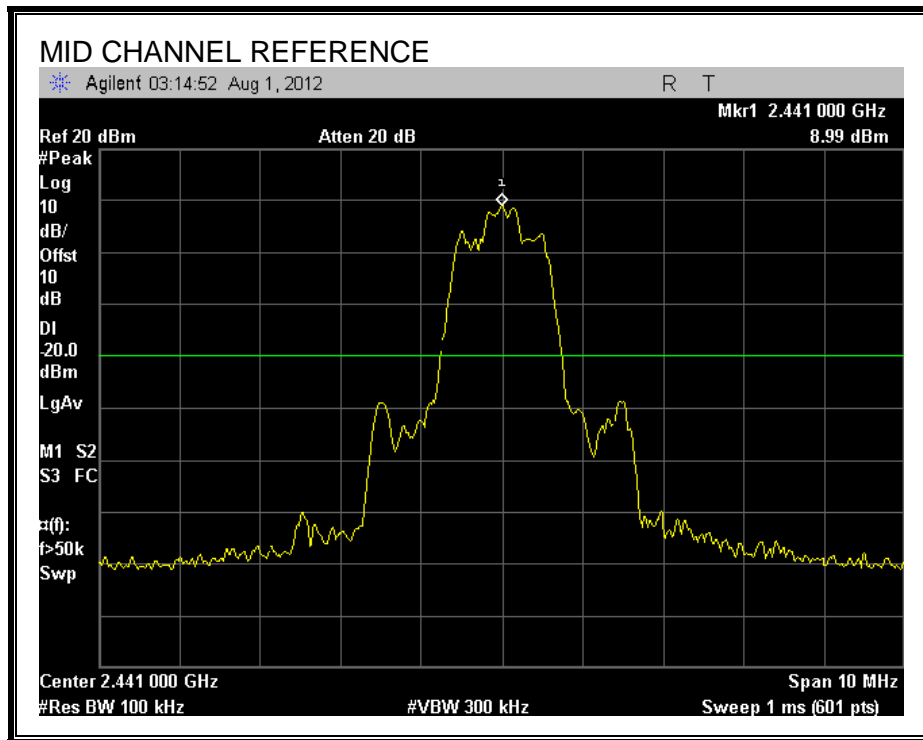
RESULTS

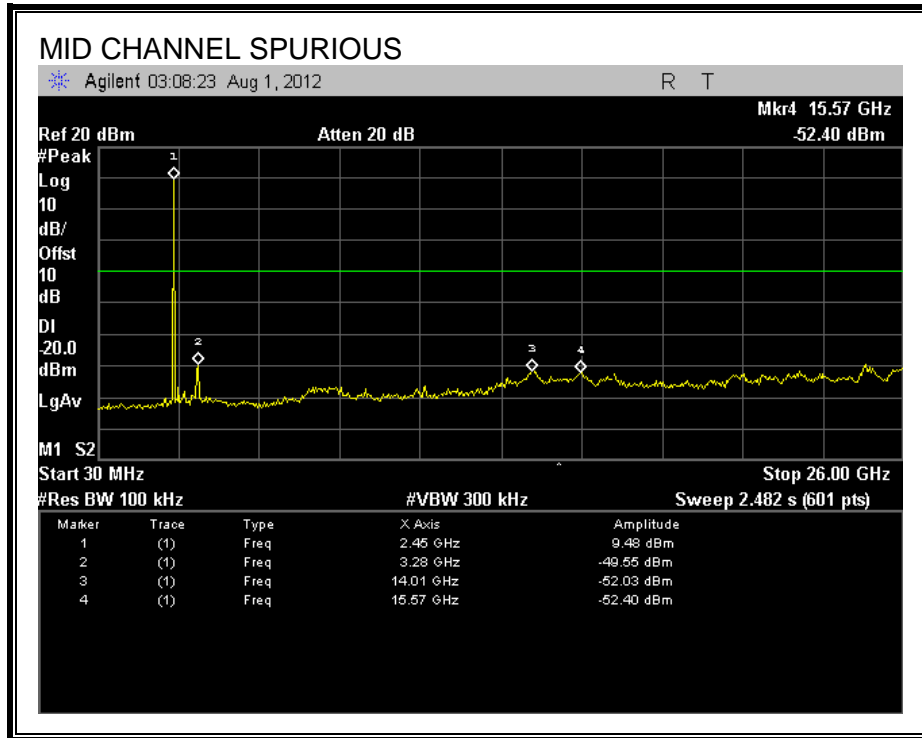
SPURIOUS EMISSIONS, LOW CHANNEL



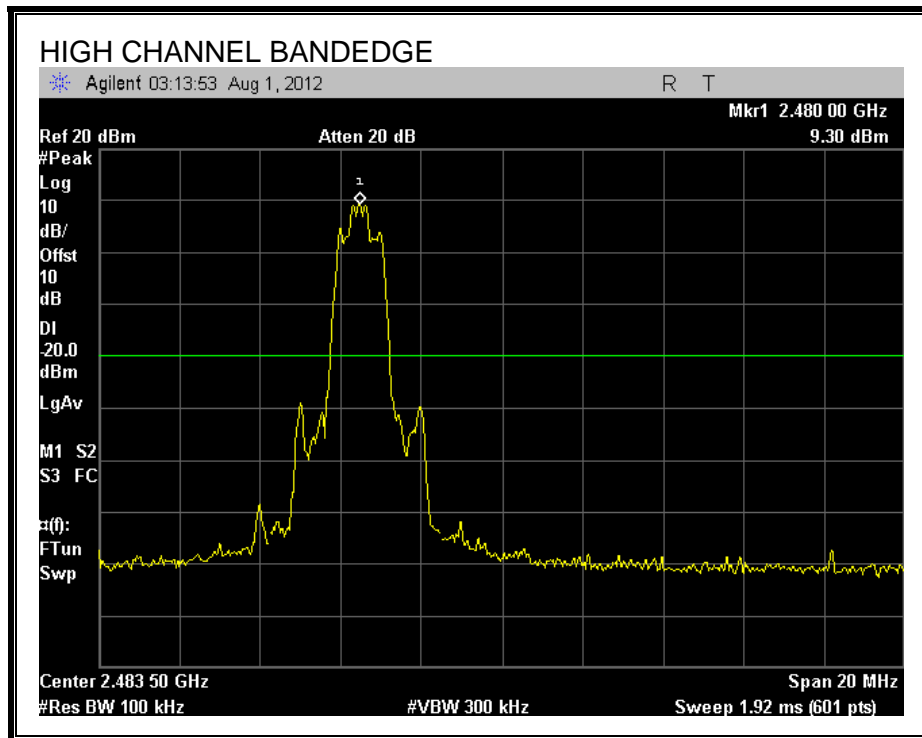


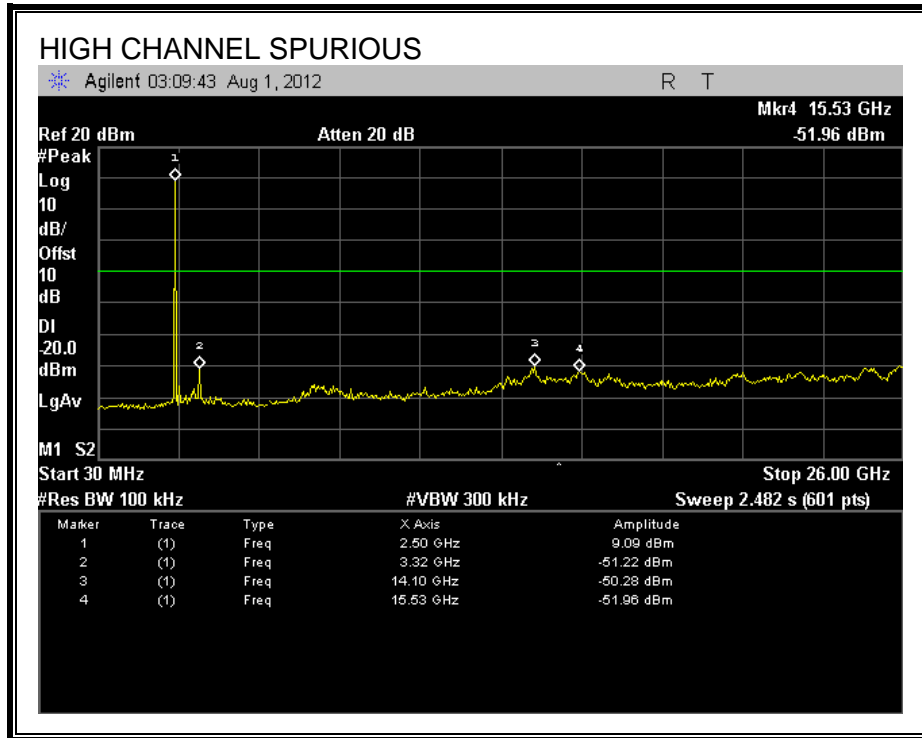
SPURIOUS EMISSIONS, MID CHANNEL



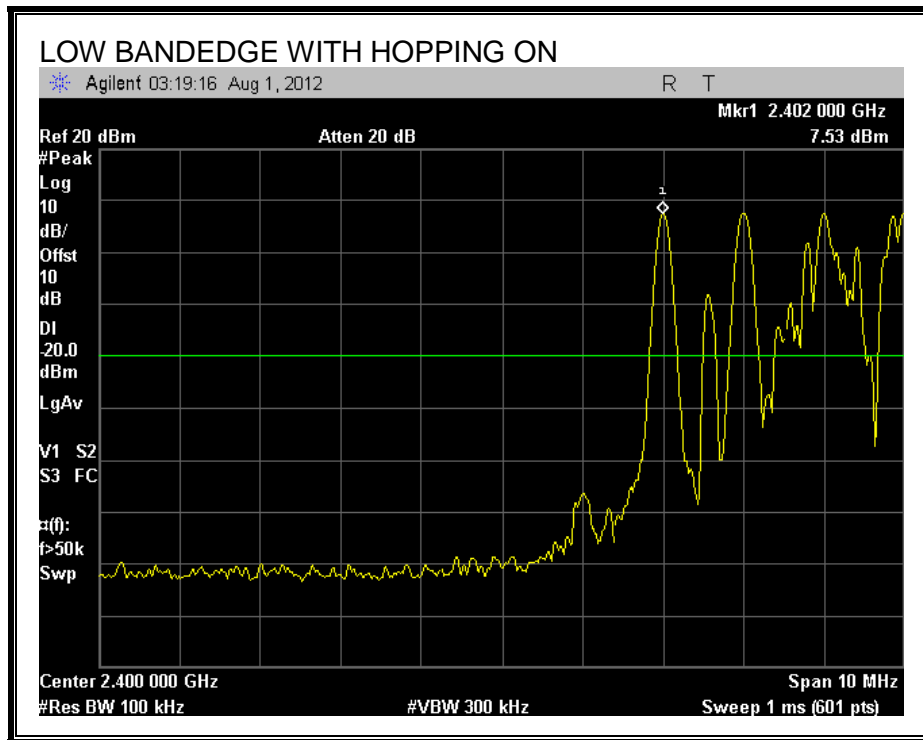


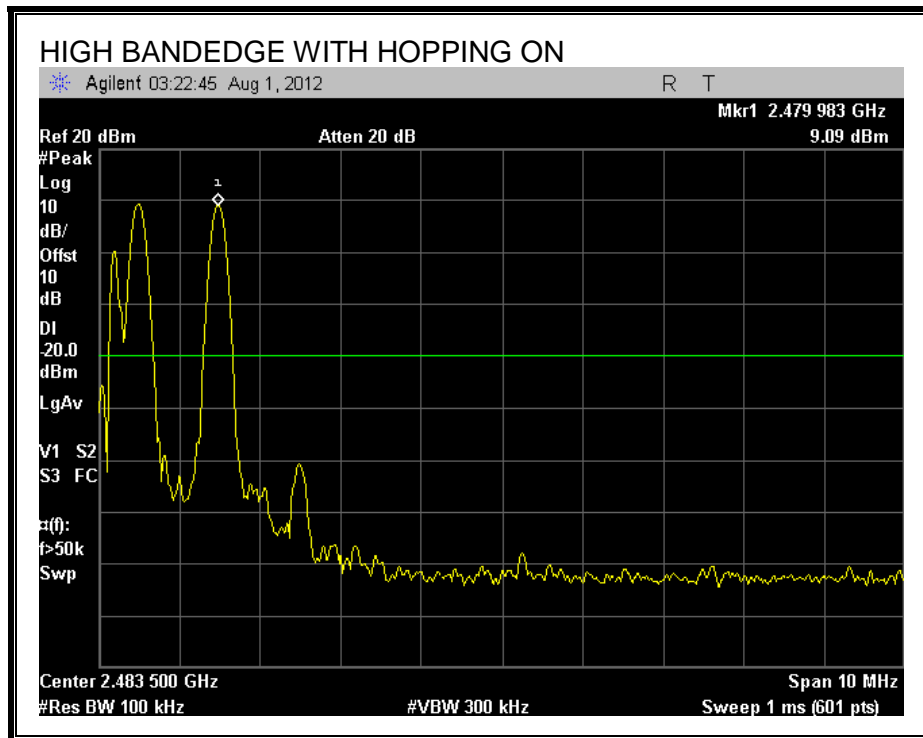
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





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.

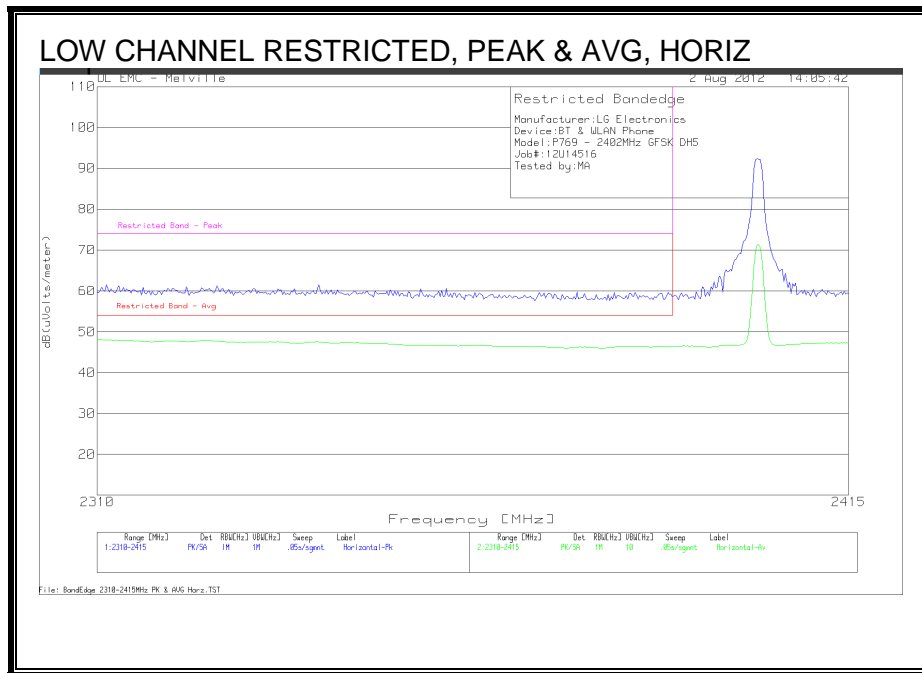
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

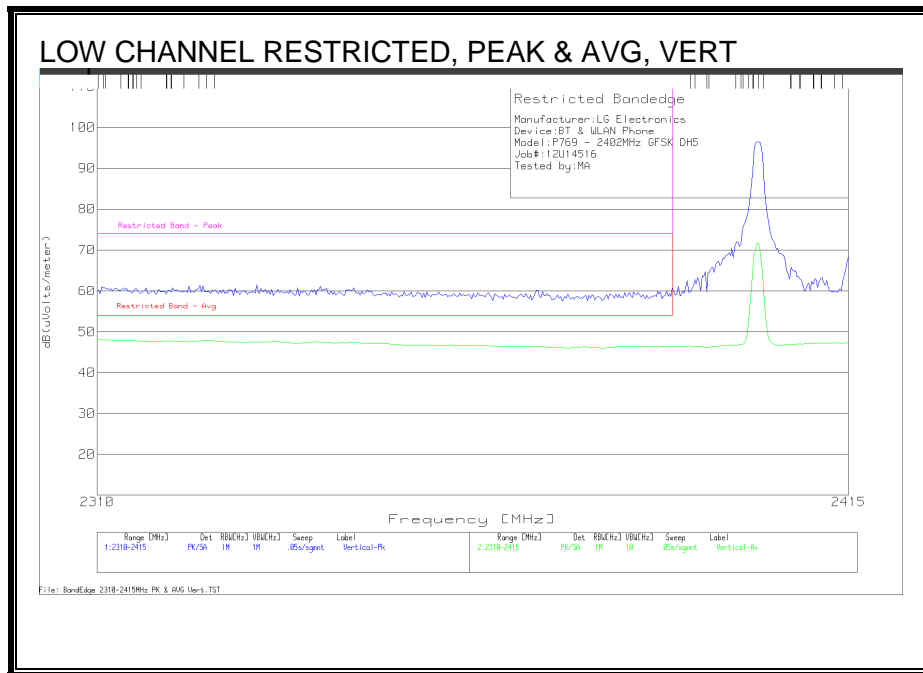
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

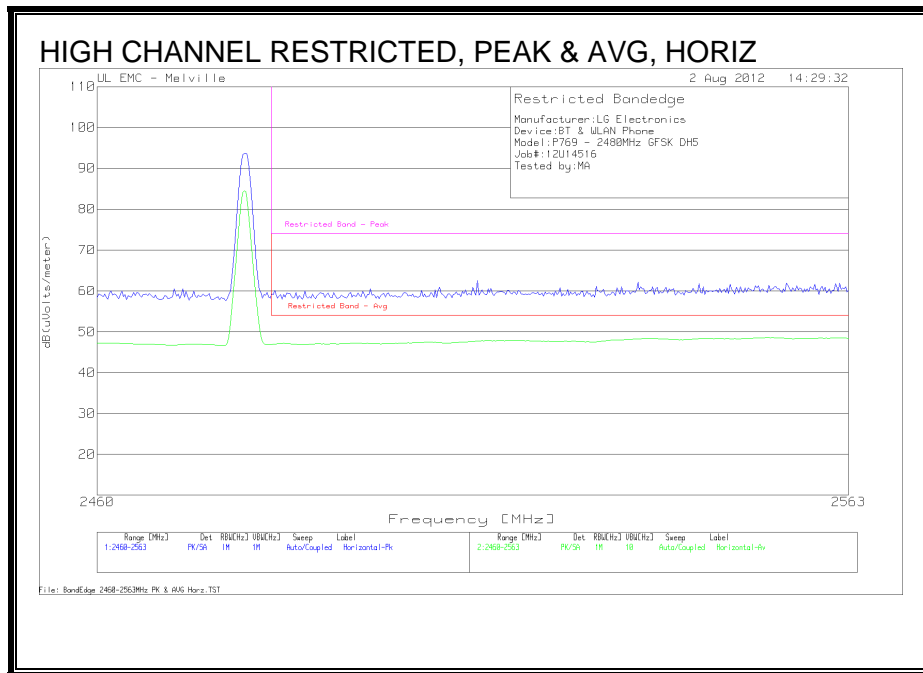
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



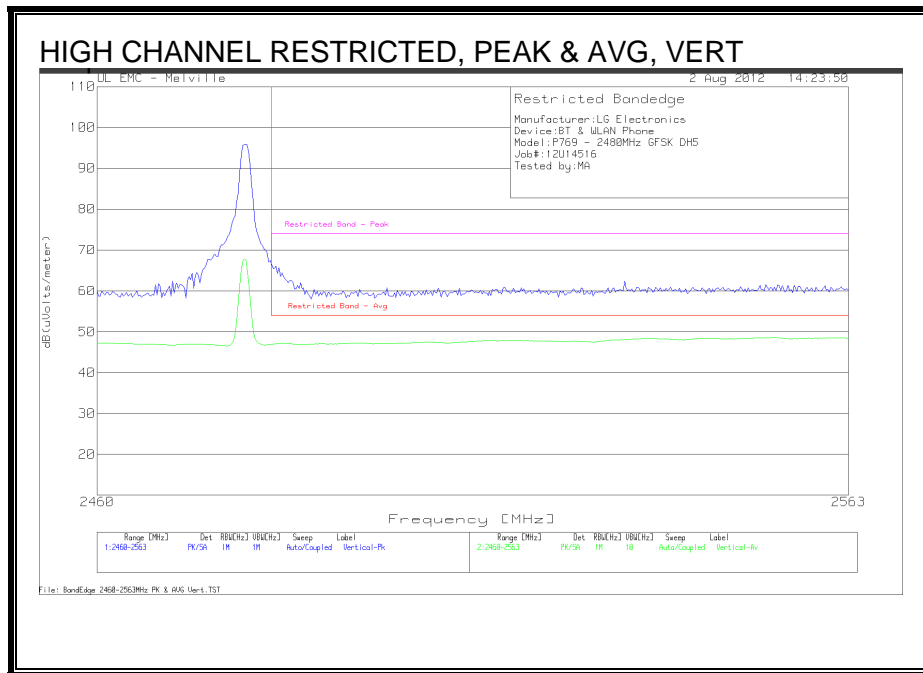
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

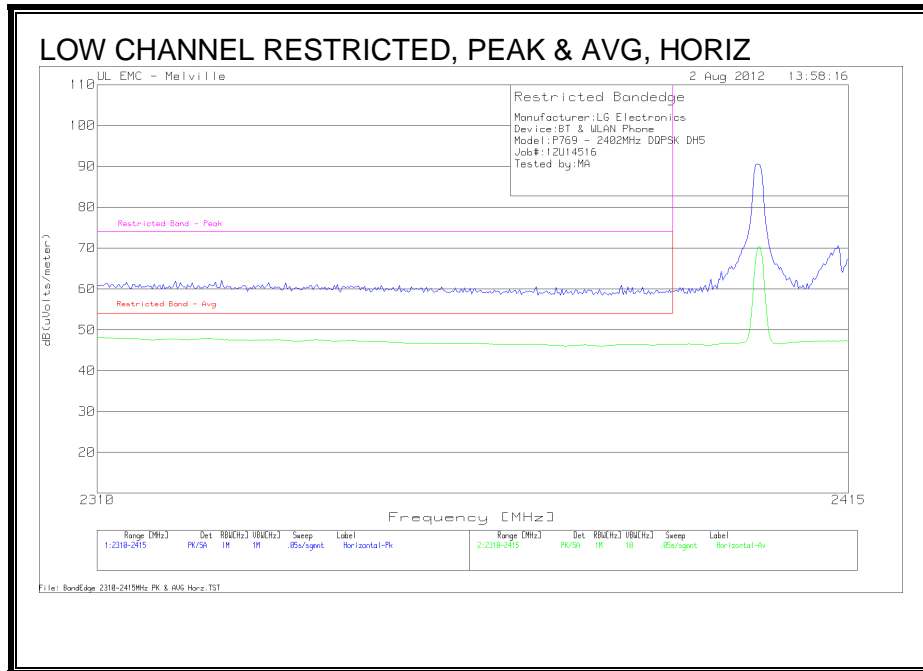


HARMONICS AND SPURIOUS EMISSIONS

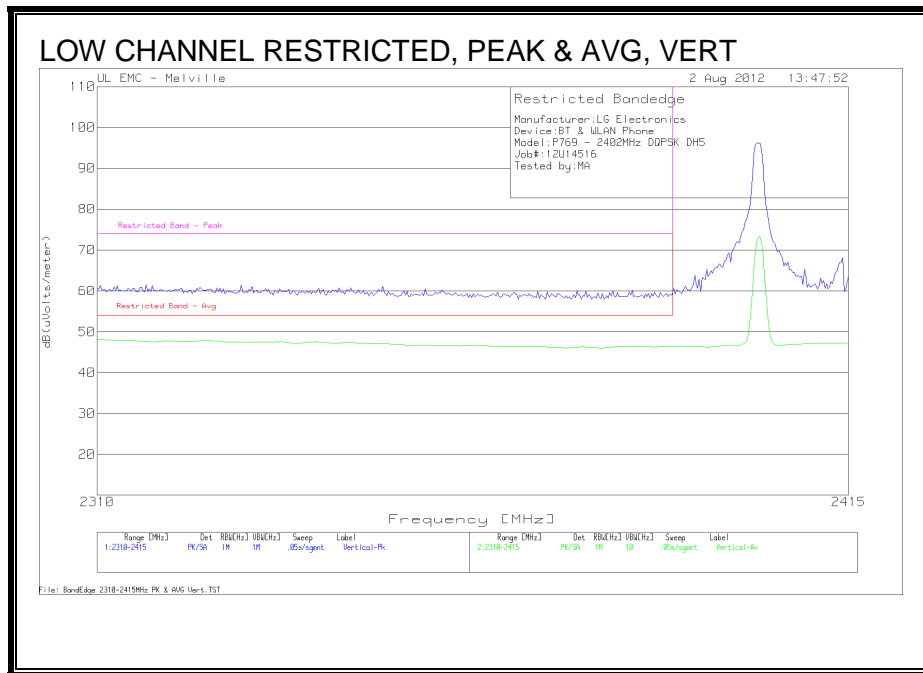
Manufacturer:LG Electronics												
Device:BT & WLAN Phone												
Model:P769 - GFSK DHS												
Job#:12U14516												
Tested by:MA												
Low Channel - 2402MHz												
			AF-48106	BOMS		FCC Part 15		FCC Part 15				
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	Azimuth	Height	Polarity
4803.7395	64.74	PK	27.1	-52.7	39.14	15.209	54	74	-34.86	344	176	Horz
4803.7395	41.2	Av	27.1	-52.7	15.6	15.209	54	74	-58.4	344	176	Horz
			AF-48106	BOMS		FCC Part 15		FCC Part 15				
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	Azimuth	Height	Polarity
4803.6994	65.91	PK	27.3	-52.7	40.51	15.209	54	74	-33.49	1	298	Vert
4803.6994	48.71	Av	27.3	-52.7	23.31	15.209	54	74	-50.69	1	298	Vert
Mid Channel - 2441MHz												
			AF-48106	BOMS		FCC Part 15		FCC Part 15				
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	Azimuth	Height	Polarity
4881.737	65.11	PK	27.2	-52.5	39.81	15.209	54	74	-34.19	16	129	Horz
4881.737	39.23	Av	27.2	-52.5	13.93	15.209	54	74	-60.07	16	129	Horz
			AF-48106	BOMS		FCC Part 15		FCC Part 15				
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	Azimuth	Height	Polarity
4881.7345	66.58	PK	27.5	-52.5	41.58	15.209	54	74	-32.42	296	226	Horz
4881.7345	42.2	Av	27.5	-52.5	17.2	15.209	54	74	-56.8	296	226	Horz
High Channel - 2480MHz												
			AF-48106	BOMS		FCC Part 15		FCC Part 15				
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	Azimuth	Height	Polarity
4959.5942	65.61	PK	27.3	-52.36	40.55	15.209	54	74	-33.45	300	181	Horz
4959.5942	57.17	Av	27.3	-52.36	32.11	15.209	54	74	-41.89	300	181	Horz
			AF-48106	BOMS		FCC Part 15		FCC Part 15				
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	Azimuth	Height	Polarity
4959.6794	65.15	PK	27.4	-52.35	40.2	15.209	54	74	-33.8	127	373	Vert
4959.6794	56.3	Av	27.4	-52.35	31.35	15.209	54	74	-42.65	127	373	Vert
PK - Peak detector												
Av - Average detector												
Note: No other emissions were detected above the system noise floor.												

8.2.2. ENHANCED DATA RATE QPSK MODULATION

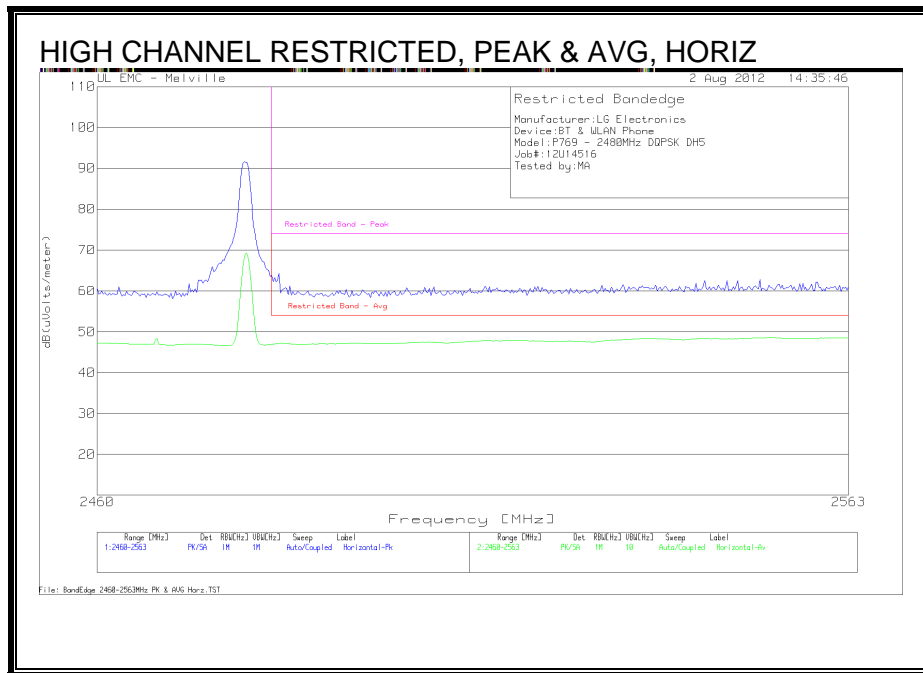
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



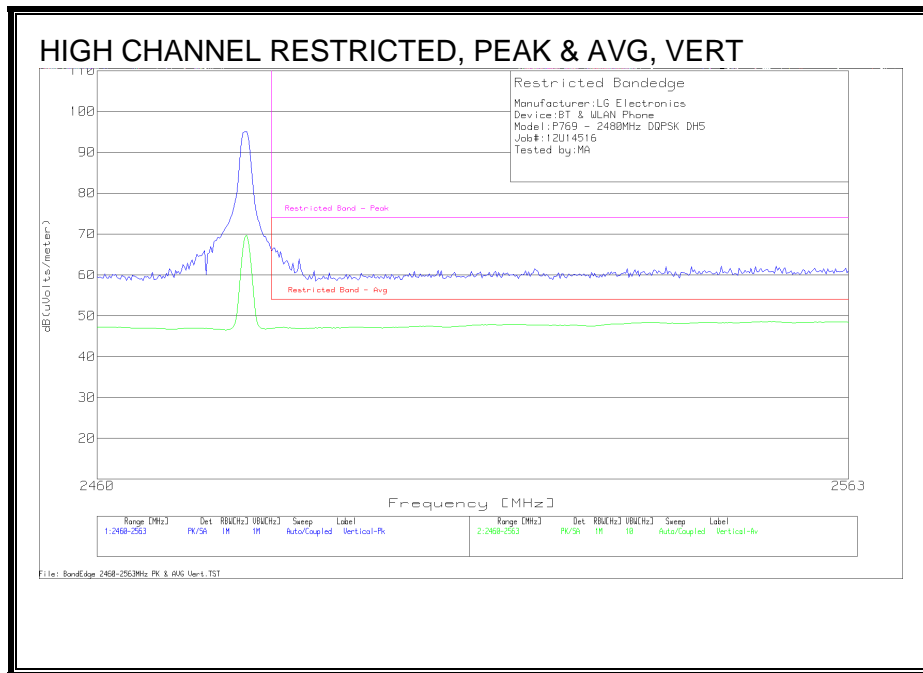
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



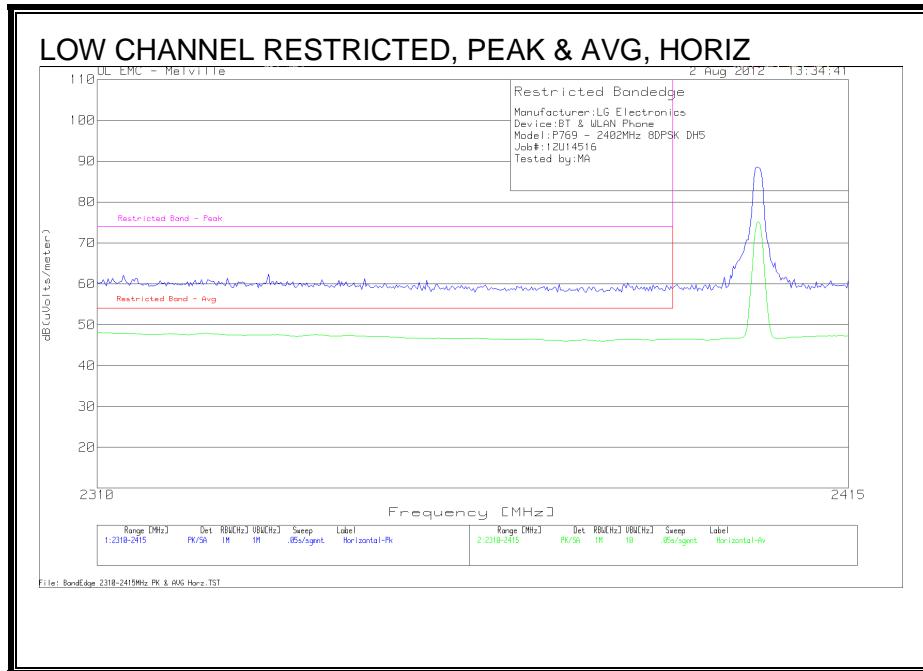
HARMONICS AND SPURIOUS EMISSIONS

Manufacturer: LG Electronics												
Device: BT & WLAN Phone												
Model: P769 - DQPSK DH5												
Job#: 12U14516												
Tested by: MA												
Mid Channel - 2441MHz												
			AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	[Degs]	[cm]	Polarity
4882.0752	62.51	PK	27.2	-52.5	37.21	54	-16.79	74	-36.79	114	228	Horz
4882.0752	39.54	Av	27.2	-52.5	14.24	54	-39.76	74	-59.76	114	228	Horz
			AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	[Degs]	[cm]	Polarity
4882.2355	60.72	PK	27.5	-52.5	35.72	54	-18.28	74	-38.28	127	187	Vert
4882.2355	41.72	Av	27.5	-52.5	16.72	54	-37.28	74	-57.28	127	187	Vert
High Channel - 2480MHz												
			AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	[Degs]	[cm]	Polarity
4960.1102	63.07	PK	27.3	-52.34	38.03	54	-15.97	74	-35.97	246	375	Horz
4960.1102	43.42	Av	27.3	-52.34	18.38	54	-35.62	74	-55.62	246	375	Horz
			AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB]	Factor [dB]	dB(uVolts/meter)	Subpart C	Margin	Subpart C	Margin	[Degs]	[cm]	Polarity
4960.1703	64.36	PK	27.4	-52.34	39.42	54	-14.58	74	-34.58	7	336	Vert
4960.1703	53.54	Av	27.4	-52.34	28.6	54	-25.4	74	-45.4	7	336	Vert
PK - Peak detector												
Av - Average detector												

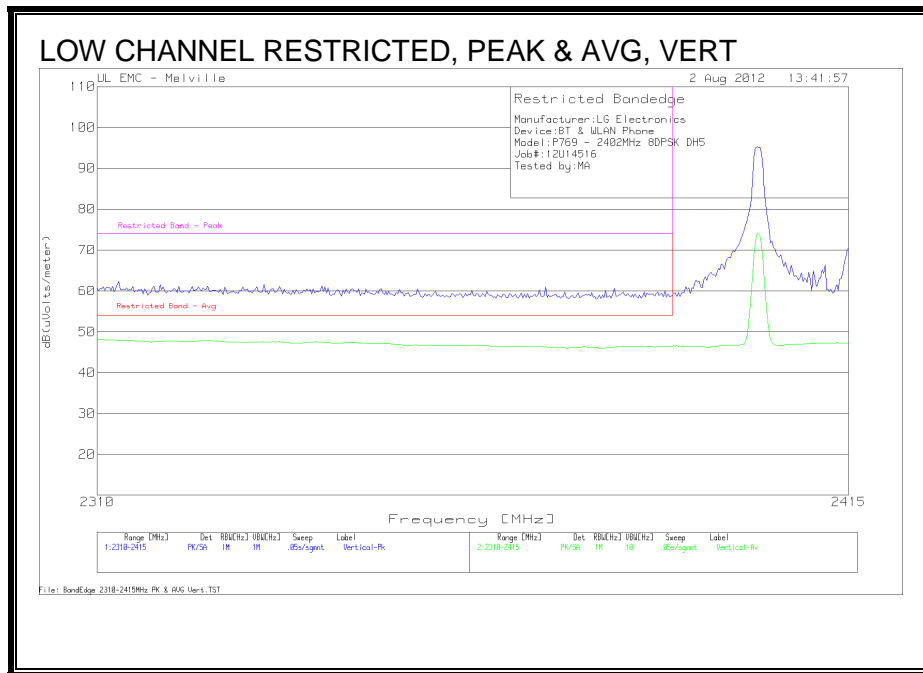
Note: No other emissions were detected above the system noise floor.

8.2.3. ENHANCED DATA RATE 8PSK MODULATION

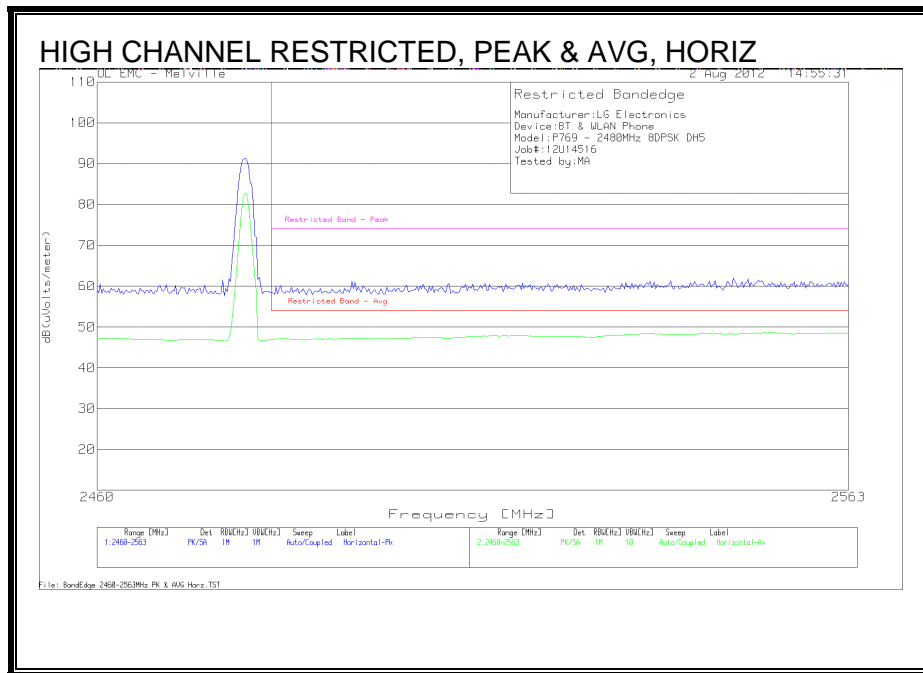
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



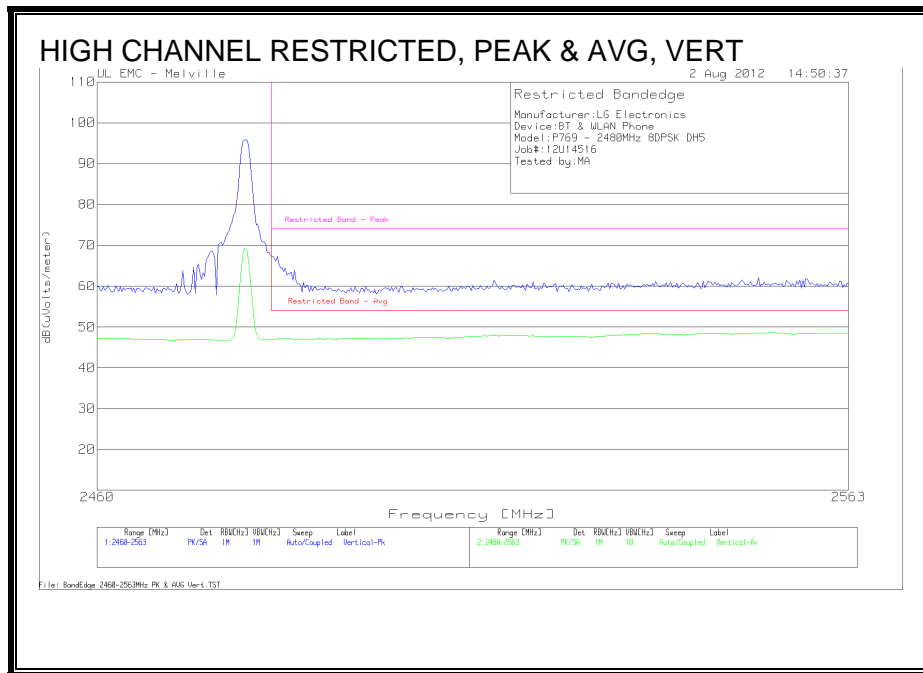
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



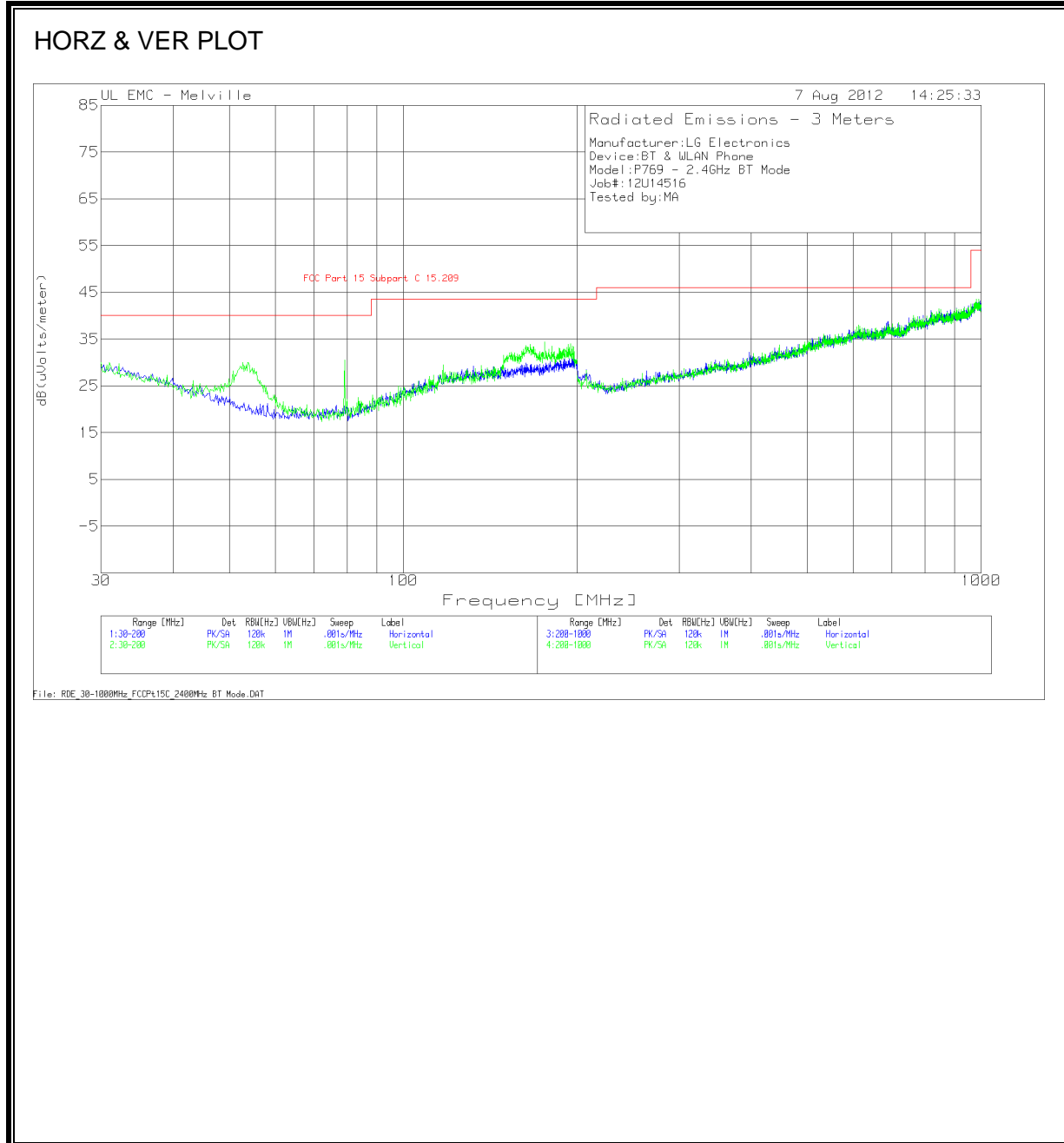
HARMONICS AND SPURIOUS EMISSIONS

Manufacturer: LG Electronics												
Device: BT & WLAN Phone												
Model: P769 - 8DPSK DH5												
Job#: 12U14516												
Tested by: MA												
Mid Channel - 2441MHz												
Test Frequency	Meter Reading	Detector	AF-48106 [dB]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin	FCC Part 15 Subpart C Peak	Margin	Azimuth [Degs]	Height [cm]	Polarity
4882.005	64.37	PK	27.2	-52.5	39.07	54	-14.93	74	-34.93	311	272	Horz
4882.005	44.33	Av	27.2	-52.5	19.03	54	-34.97	74	-54.97	311	272	Horz
Test Frequency	Meter Reading	Detector	AF-48106 [dB]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin	FCC Part 15 Subpart C Peak	Margin	Azimuth [Degs]	Height [cm]	Polarity
4882.0551	62.84	PK	27.5	-52.5	37.84	54	-16.16	74	-36.16	137	109	Vert
4882.0551	39.51	Av	27.5	-52.5	14.51	54	-39.49	74	-59.49	137	109	Vert
PK - Peak detector												
Av - Average detector												

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

8.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORZ & VERT)



HORZ & VERT DATA

Manufacturer:LG Electronics											
Device:BT & WLAN Phone											
Model:P769 - 2.4GHz BT Mode											
Job#:12U14516											
Tested by:MA											
Horizontal 30 - 200MHz											
Marker No.	Test Frequency	Meter Reading	Detector	AF-54 (dB)	GL-3M (dB)	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin	Azimuth [Degs]	Height [cm]	Polarity
1	132.953	12.43	PK	14.1	1.2	27.73	43.5	-15.77	331	400	Horz
Vertical 30 - 200MHz											
Marker No.	Test Frequency	Meter Reading	Detector	AF-54 (dB)	GL-3M (dB)	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin	Azimuth [Degs]	Height [cm]	Polarity
2	53.4835	20.38	PK	8.4	0.7	29.48	40	-10.52	344	100	Vert
3	79.1792	22.95	PK	6.7	0.9	30.55	40	-9.45	358	100	Vert
4	165.966	17.81	PK	14.8	1.3	33.91	43.5	-9.59	17	100	Vert
5	175.6657	17.82	PK	15.1	1.4	34.32	43.5	-9.18	138	100	Vert
6	193.023	17.01	PK	15.4	1.5	33.91	43.5	-9.59	83	100	Vert
PK - 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.

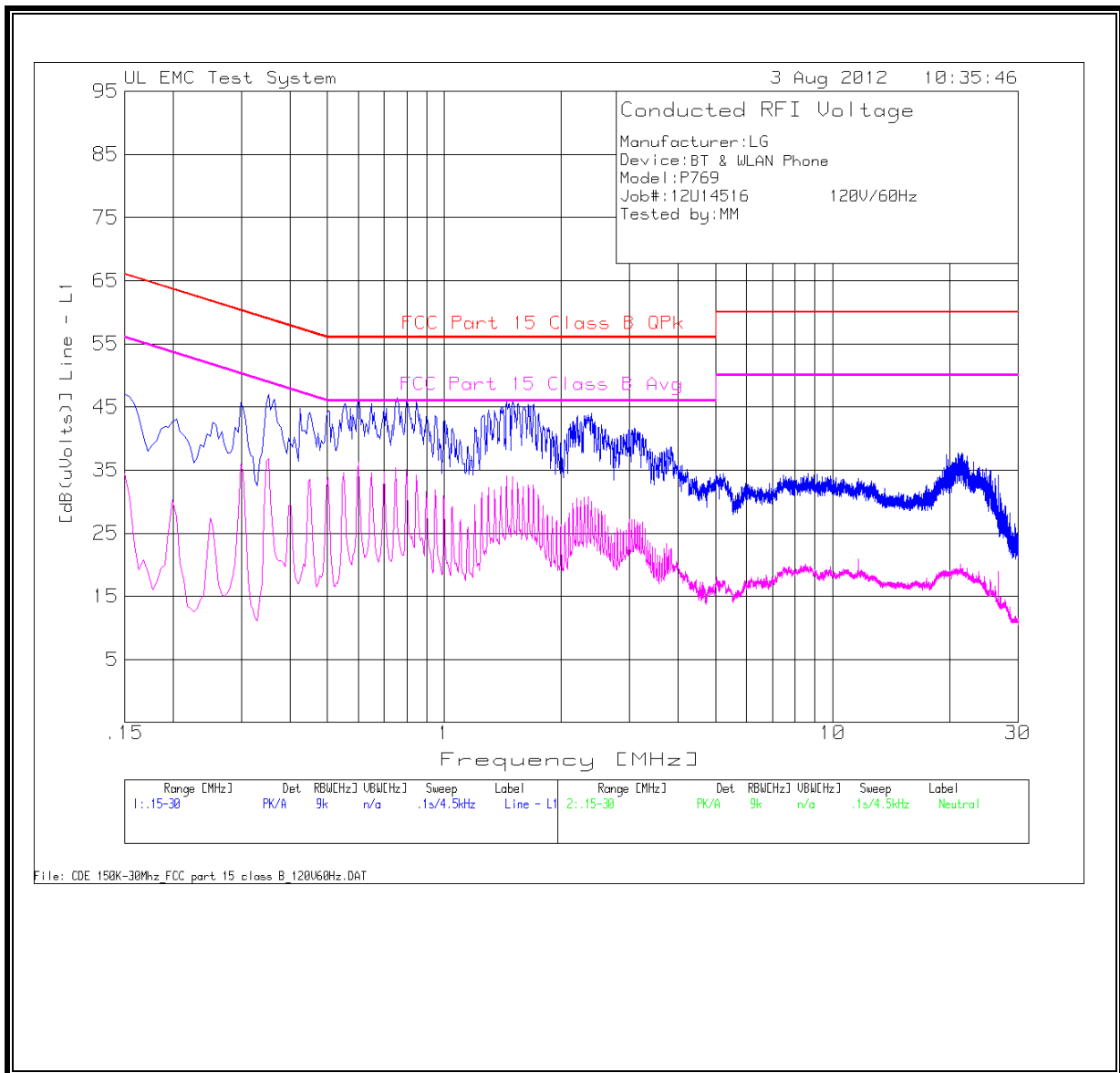
TEST PROCEDURE

ANSI C63.4

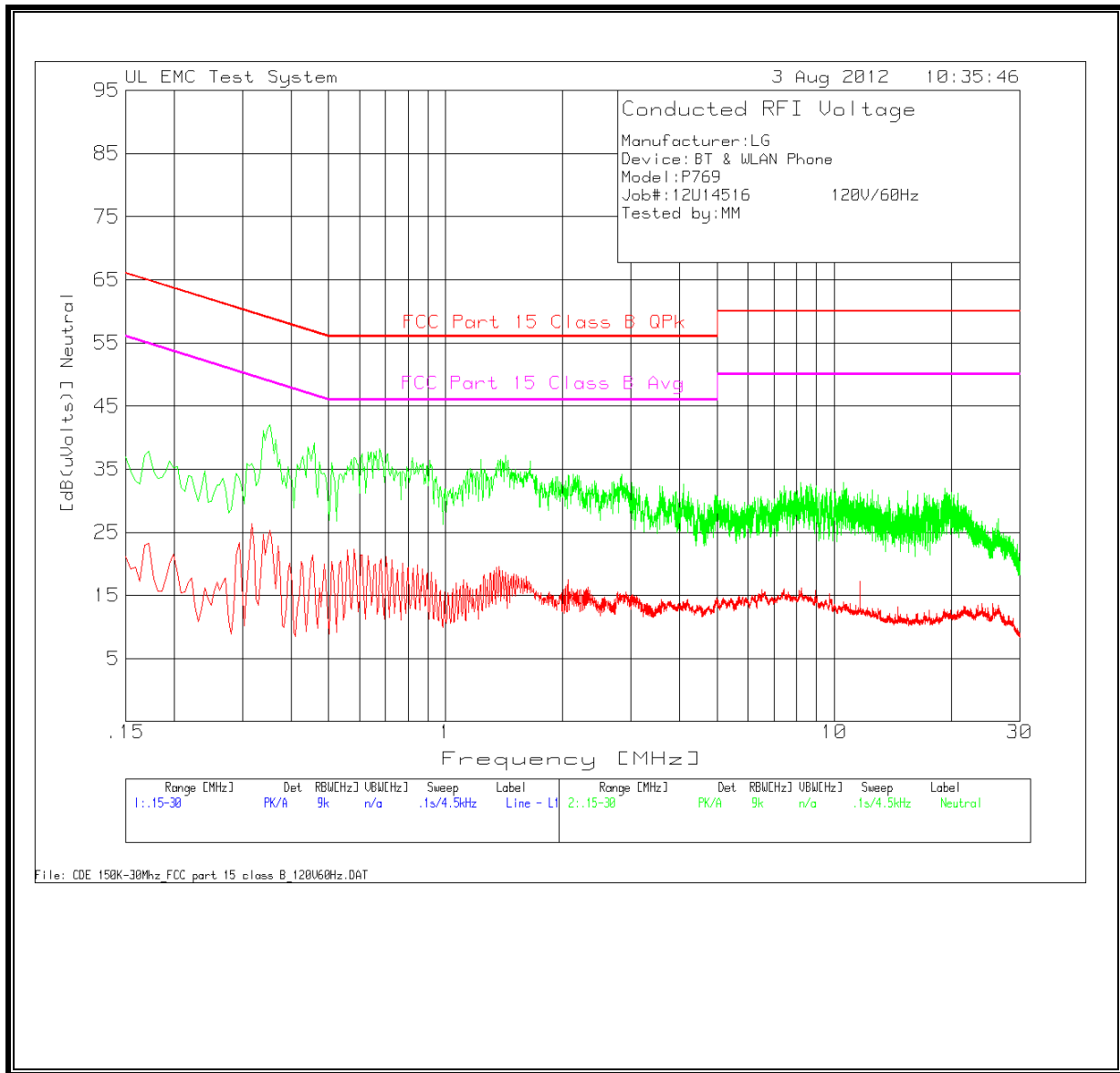
RESULTS

6 WORST EMISSIONS

LINE 1 RESULTS



LINE 2 RESULTS



NUMERICAL RESULTS

Manufacturer:LG								
Device: Phone with BT & WLAN								
Model:P769								
Job#:12U14516 120V/60Hz								
Tested by:MM								
Line - L1 .15 - 30MHz								
			LISN					
			5A636 L1		FCC Part 15		FCC Part 15	
Test Frequency	Meter Reading	Detector	[dB]	[dB(uVolts)]	Class B QPk	Margin	Class B Avg	Margin
0.2985	35.65	PK	10	45.65	60.3	-14.65	50.3	-4.65
0.2985	25.88	Av	10	35.88	60.3	-24.42	50.3	-14.42
0.3525	36.95	PK	10	46.95	58.9	-11.95	48.9	-1.95
0.3525	26.81	Av	10	36.81	58.9	-22.09	48.9	-12.09
0.555	35.5	PK	10.1	45.6	56	-10.4	46	-0.4
0.555	19.87	Av	10.1	29.97	56	-26.03	46	-16.03
0.6495	35.51	PK	10.1	45.61	56	-10.39	46	-0.39
0.6495	24.51	Av	10.1	34.61	56	-21.39	46	-11.39
0.7575	36.3	PK	10.1	46.4	56	-9.6	46	0.4
0.7575	16.4	Av	10.1	26.5	56	-29.5	46	-19.5
0.8475	35.78	PK	10.1	45.88	56	-10.12	46	-0.12
0.8475	24.14	Av	10.1	34.24	56	-21.76	46	-11.76
1.446	35.8	PK	10.1	45.9	56	-10.1	46	-0.1
1.446	23.97	Av	10.1	34.07	56	-21.93	46	-11.93
1.698	35.35	PK	10.1	45.45	56	-10.55	46	-0.55
1.698	21.3	Av	10.1	31.4	56	-24.6	46	-14.6
Neutral .15 - 30MHz								
			LISN					
			5A636 L2		FCC Part 15		FCC Part 15	
Test Frequency	Meter Reading	Detector	[dB]	[dB(uVolts)]	Class B QPk	Margin	Class B Avg	Margin
0.3525	32.07	PK	10	42.07	58.9	-16.83	48.9	-6.83
0.3525	15.32	Av	10	25.32	58.9	-33.58	48.9	-23.58
0.4605	29.06	PK	10.1	39.16	56.7	-17.54	46.7	-7.54
0.4605	7.54	Av	10.1	17.64	56.7	-39.06	46.7	-29.06
0.6765	28.2	PK	10.1	38.3	56	-17.7	46	-7.7
0.6765	9.72	Av	10.1	19.82	56	-36.18	46	-26.18
0.8205	26.7	PK	10.1	36.8	56	-19.2	46	-9.2
0.8205	7.85	Av	10.1	17.95	56	-38.05	46	-28.05
1.167	24.77	PK	10.1	34.87	56	-21.13	46	-11.13
1.167	2.8	Av	10.1	12.9	56	-43.1	46	-33.1
1.4235	27.06	PK	10.1	37.16	56	-18.84	46	-8.84
1.4235	8.55	Av	10.1	18.65	56	-37.35	46	-27.35
PK - Peak detector								
Av - Average detector								