



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

**BT3.0+HS, 802.11 B/G/N 1X1 HT20, GSM850/1900 BAR PHONE WITH HOTSPOTS,
EDGE RX ONLY**

MODEL NUMBER: GT-S6102E

FCC ID: A3LGT6102E

REPORT NUMBER: 12I14319-3

ISSUE DATE: MARCH 26, 2012

Prepared for

**SAMSUNG ELECTRONICS CO., LTD.
416, MAETAN 3-DONG, YEONGTONG-GU
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA**

Prepared by

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



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	03/26/12	Initial Issue	F. Ibrahim

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. MEASURING INSTRUMENT CALIBRATION	6
4.2. SAMPLE CALCULATION.....	6
4.3. MEASUREMENT UNCERTAINTY	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT.....	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	7
5.4. SOFTWARE AND FIRMWARE	7
5.5. WORST-CASE CONFIGURATION AND MODE.....	7
5.6. DESCRIPTION OF TEST SETUP.....	8
6. TEST AND MEASUREMENT EQUIPMENT	11
7. ANTENNA PORT TEST RESULTS	12
7.1. BASIC DATA RATE GFSK MODULATION.....	12
7.1.1. 20 dB BANDWIDTH	12
7.1.2. HOPPING FREQUENCY SEPARATION	16
7.1.3. NUMBER OF HOPPING CHANNELS.....	18
7.1.4. AVERAGE TIME OF OCCUPANCY	23
7.1.5. OUTPUT POWER	30
7.1.6. AVERAGE POWER	34
7.1.7. CONDUCTED SPURIOUS EMISSIONS.....	35
7.2. ENHANCED DATA RATE 8PSK MODULATION	44
7.2.1. 20 dB BANDWIDTH	44
7.2.2. HOPPING FREQUENCY SEPARATION	48
7.2.3. NUMBER OF HOPPING CHANNELS.....	50
7.2.4. AVERAGE TIME OF OCCUPANCY	55
7.2.5. OUTPUT POWER	62
7.2.6. AVERAGE POWER	66
7.2.7. CONDUCTED SPURIOUS EMISSIONS.....	67
8. RADIATED TEST RESULTS	76
8.1. LIMITS AND PROCEDURE	76
8.2. TRANSMITTER ABOVE 1 GHz	77
8.2.1. BASIC DATA RATE GFSK MODULATION.....	77

8.2.2.	ENHANCED DATA RATE 8PSK MODULATION	82
8.3.	WORST-CASE BELOW 1 GHz	87
9.	AC POWER LINE CONDUCTED EMISSIONS	90
10.	MAXIMUM PERMISSIBLE EXPOSURE	94
11.	SETUP PHOTOS	98
11.1.	ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP	98
11.2.	RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION	99
11.3.	WORST POSITION: EUT WITH AC ADAPTER & EARPHONE.....	101
11.4.	POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP.....	102

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
416, MAETAN 3-DONG, YEONGTONG-GU
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

EUT DESCRIPTION: BT3.0+HS, 802.11 B/G/N 1X1 HT20, GSM850/1900 BAR PHONE
WITH HOTSPOTS, EDGE RX ONLY

MODEL: GT-S6102E

SERIAL NUMBER: 01039 (RADIATED), FJ-051-D (CONDUCTED)

DATE TESTED: MARCH 16 - MARCH 24, 2012

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

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:



FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:



STEVE AGUILAR
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, 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 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.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 BT3.0+HS, 802.11 b/g/n 1x1 HT20, GSM850/1900 Bar phone with hotspots, EDGE Rx only. The model number is: GT-S6102E.

The manufacturer of the radio module is Samsung Electronics Co., Ltd.

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	8.94	7.83
2402 - 2480	Enhanced 8PSK	8.80	7.59

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of -4.5 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was S6102E.001.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1 GHz and power line conducted emission tests were performed with the EUT transmitting at the channel with highest output power as worst-case scenario.

The fundamental frequency was investigated for the EUT in three orthogonal orientations X,Y, and Z (battery-operated), also for EUT with AC/DC adapter and with headset connected; it was found that the worst-case orientation among them was X orientation with AC/DC adapter and with headset. All final radiated emission testing was performed using the worst-case orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	ATADS20C	RT1C119DS/7-E	DoC
Headset	Samsung	N/A	FS-050-A	N/A

I/O CABLES (CONDUCTED SETUP)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	100-240	--	Wall adapter
2	AC	1	AC	AC	1.5	Unshielded
3	DC	1	USB	DC	1,3	Unshielded
4	RF In/Out	1	SMA	--	0.1	--

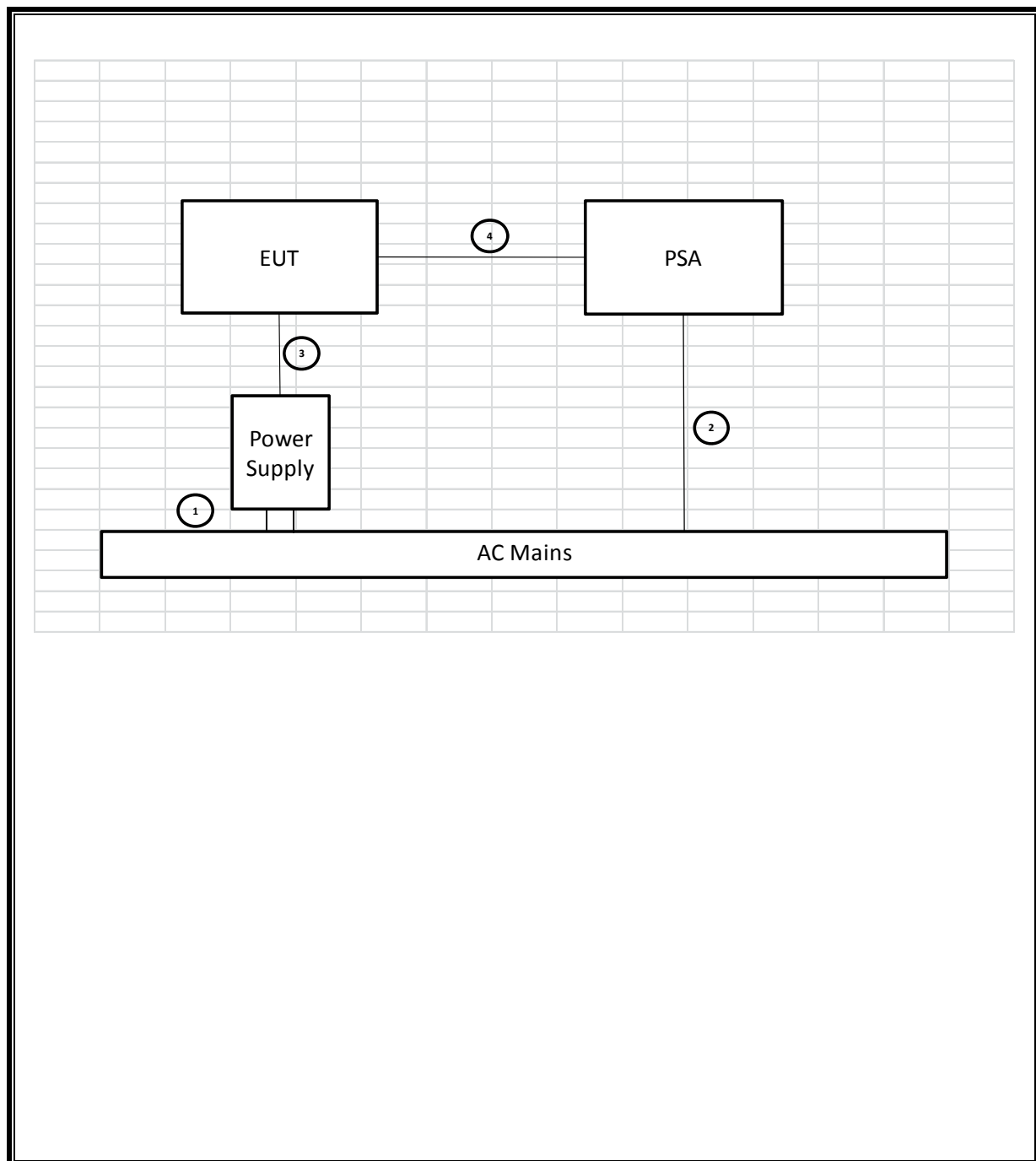
I/O CABLES (RADIATED SETUP)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	Mini USB	1	USB	shielded	1m	N/A
2	Audio	1	Mini-Jack	Unshielded	1.2 m	Volume control attached

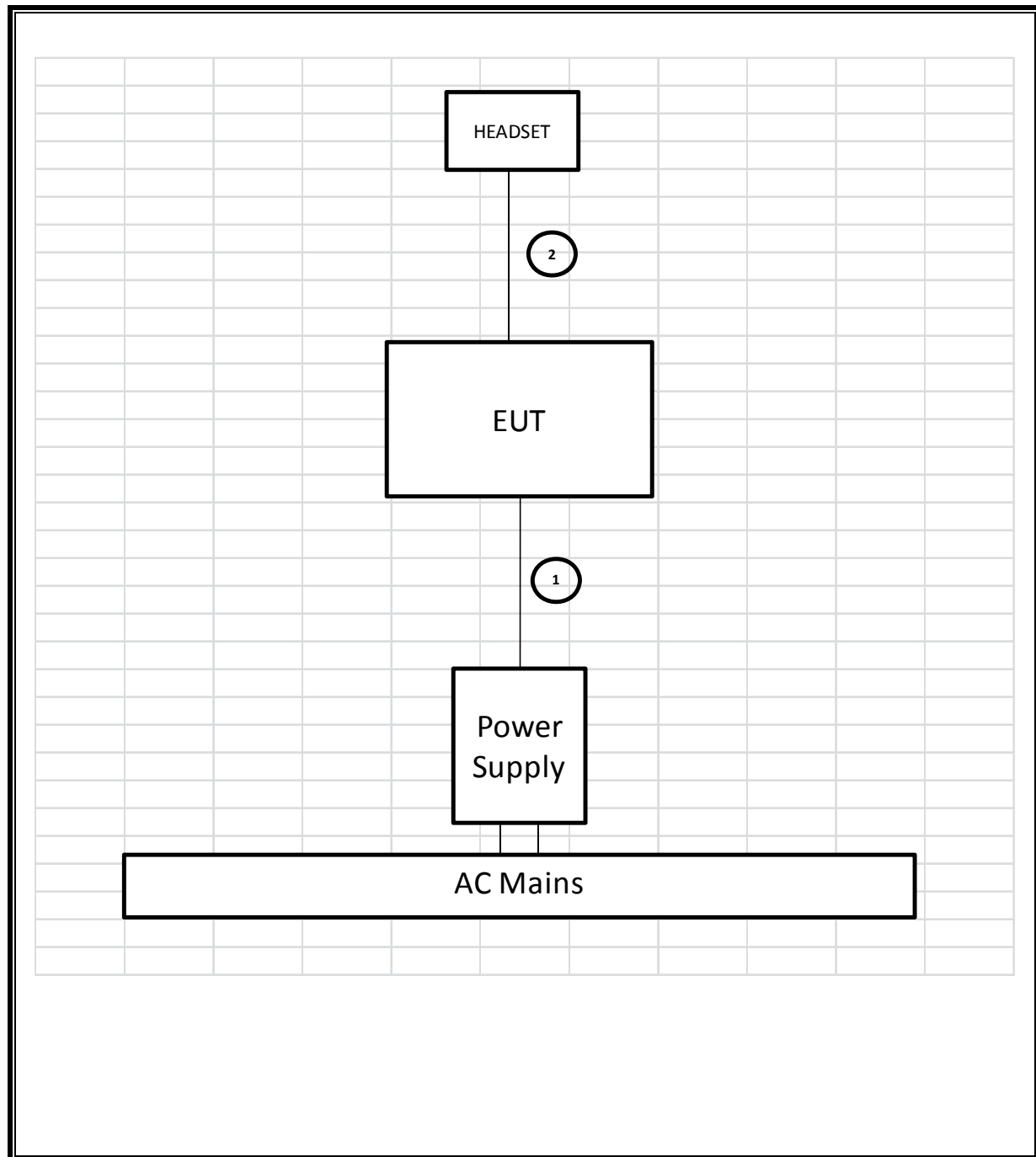
TEST SETUP

The EUT is standalone. Adapter and headset is attached as required by the test.
Test software loaded in the EUT is exercised for testing.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4407B	C01098	01/30/11	04/30/12
P-Series single channel Power Meter	Agilent / HP	N1911A	–	08/04/11	08/04/12
Peak / Average Power Sensor	Agilent / HP	E9323A	–	08/04/11	08/04/12
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	12/17/10	03/17/12
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/11	06/29/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/12/11	07/12/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	11/11/11	11/11/12
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	05/11/11	05/11/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/12/11	07/12/12
Antenna, Horn, 26.5 GHz	ARA	MMH-1826/B	C00980	07/28/11	07/28/12
Antenna, Bilog, 2MHz	Sunol Sciences	JB1	–	02/07/12	02/07/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	11/11/11	11/11/12
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	07/06/11	07/06/12
LISN, 30 MHz	FCC	50/250-25-2	C00626	12/13/11	12/13/12

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

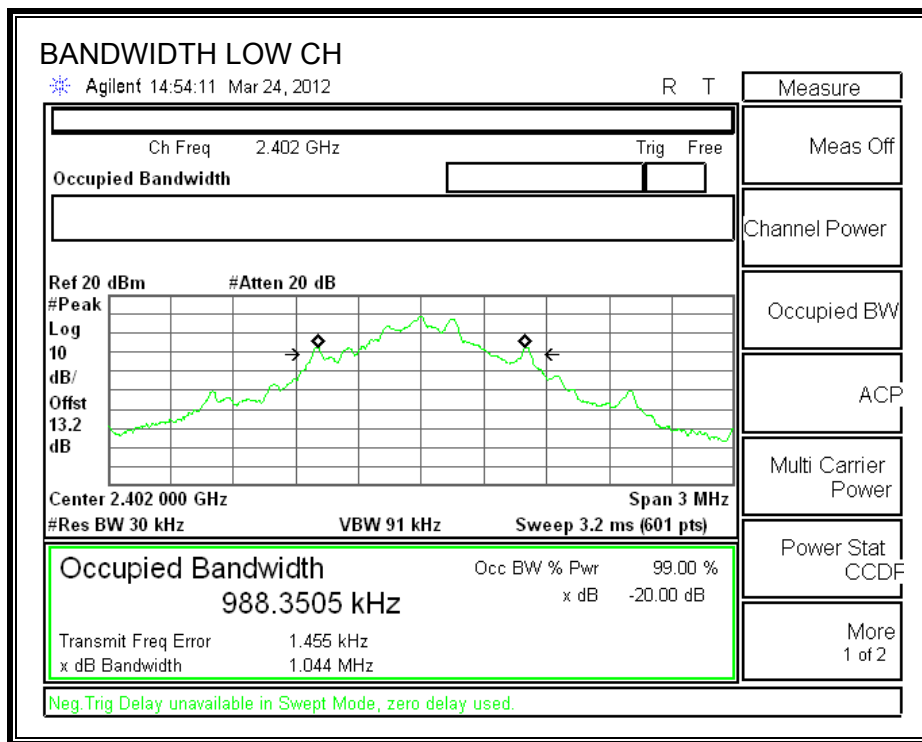
TEST PROCEDURE

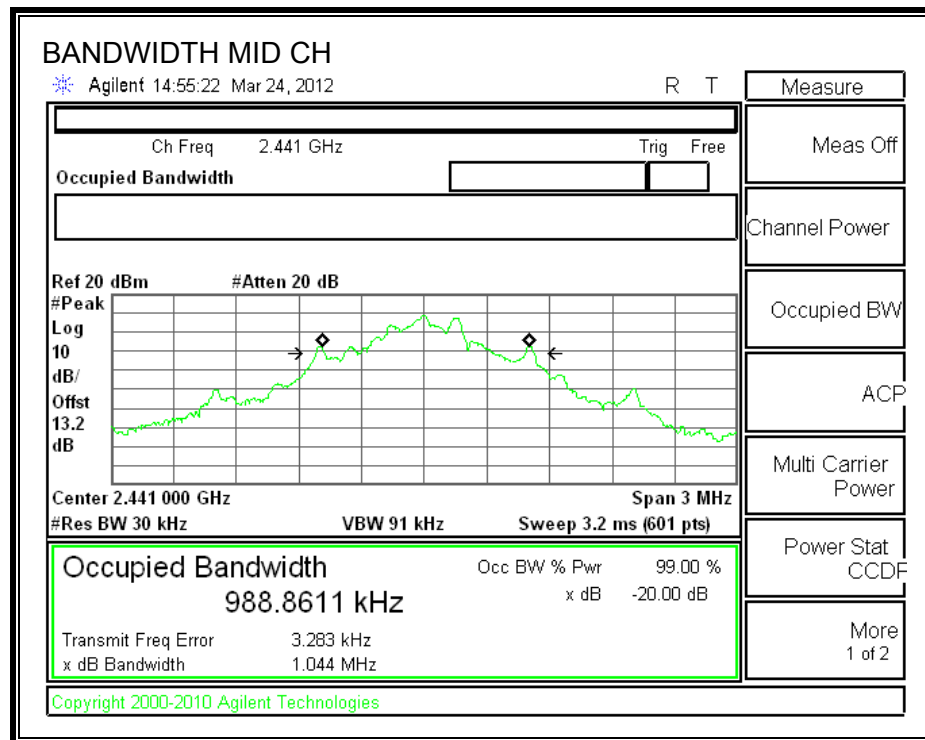
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

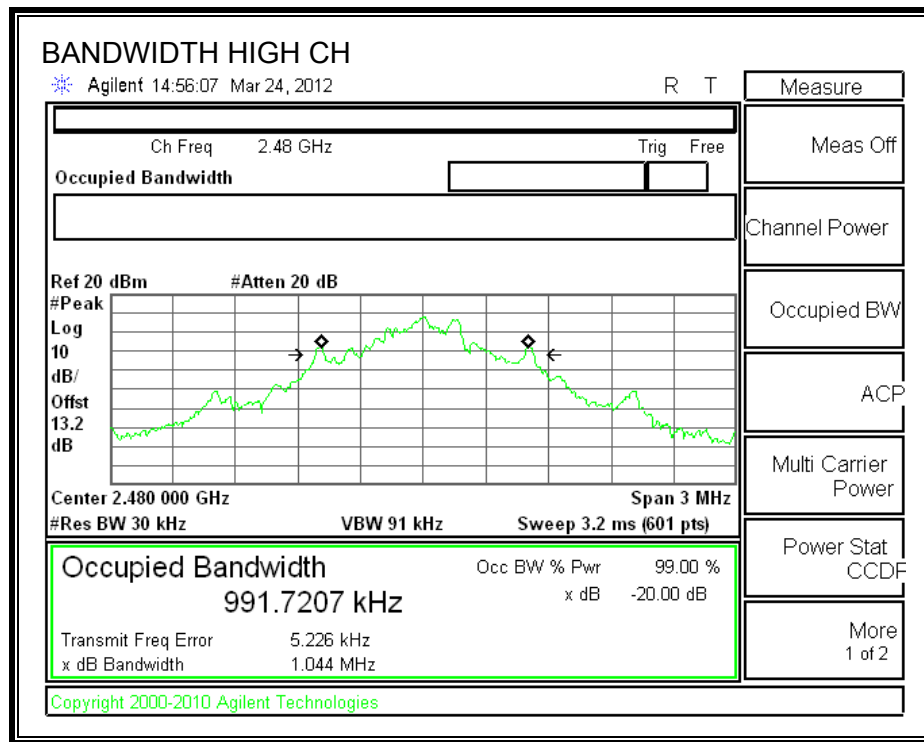
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	1044
Middle	2441	1044
High	2480	1044

20 dB BANDWIDTH







7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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.

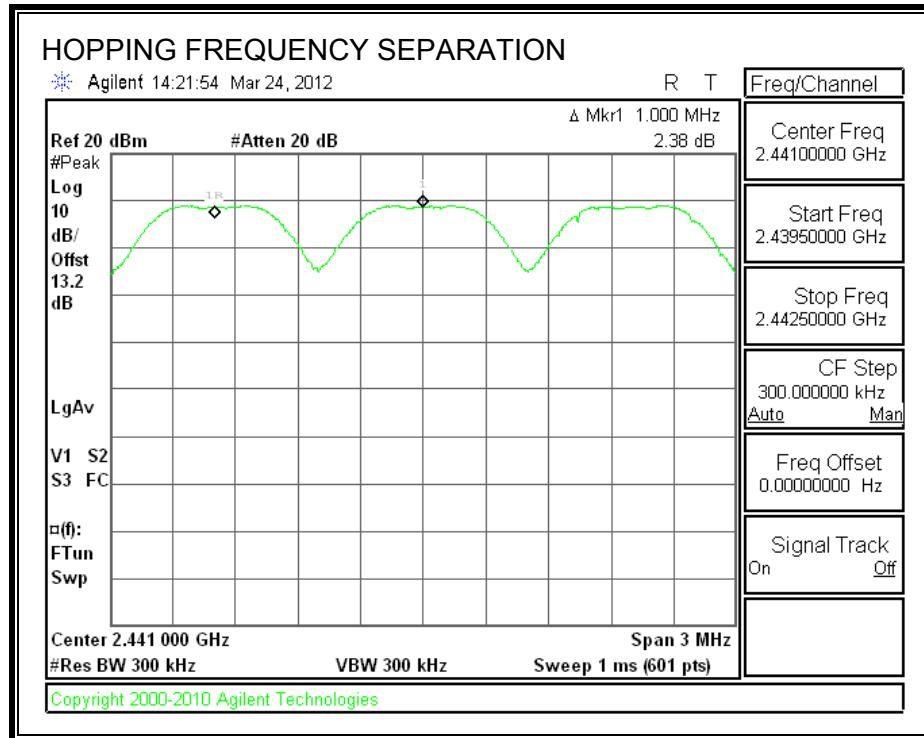
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

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

TEST PROCEDURE

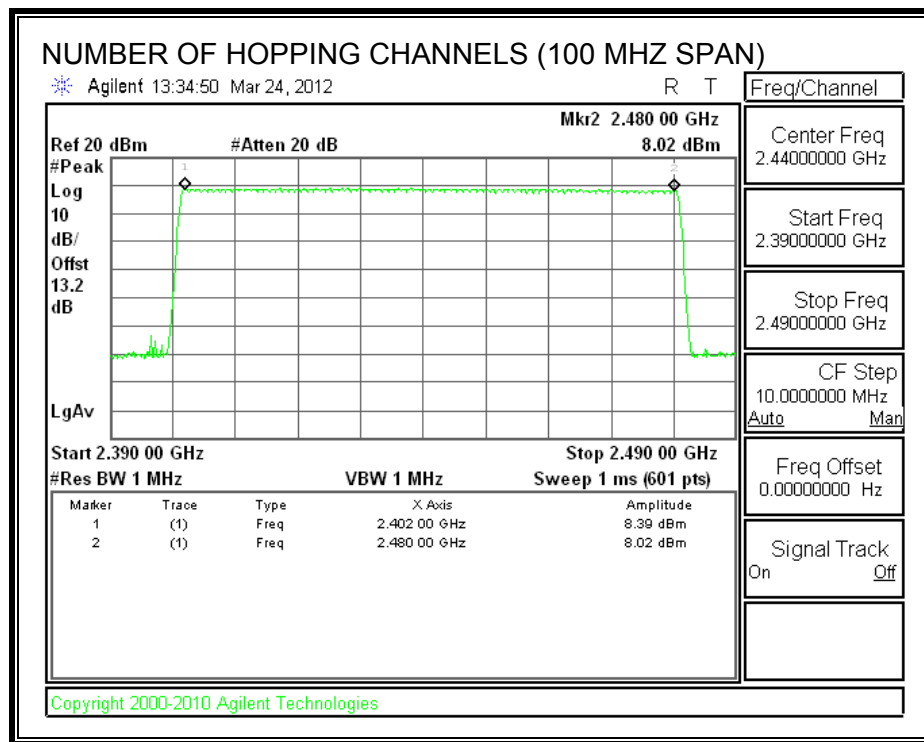
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

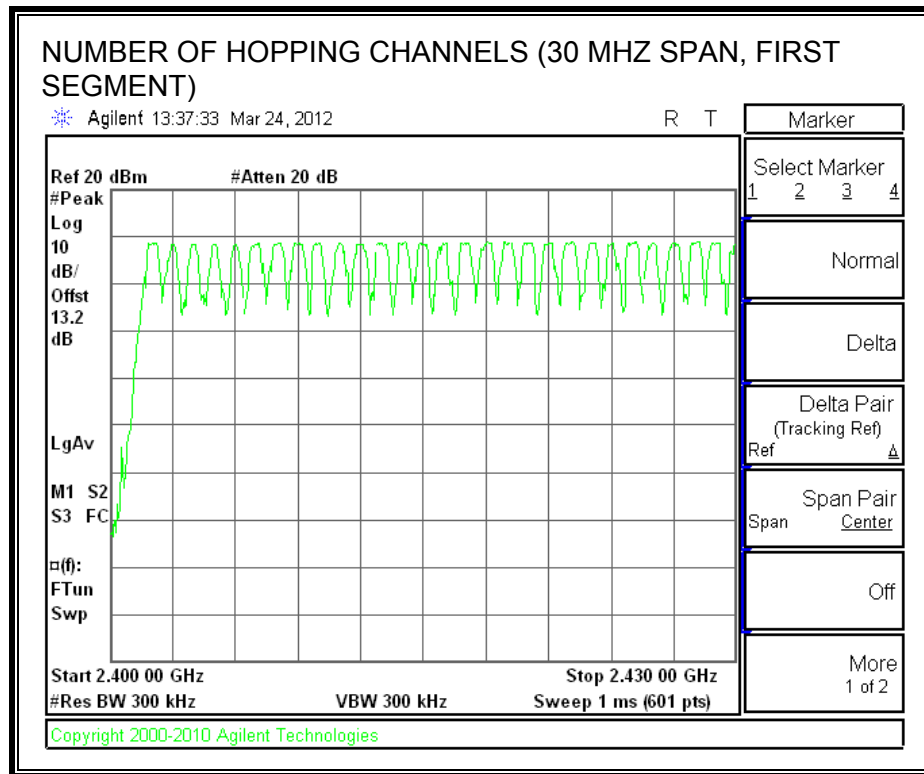
RESULTS

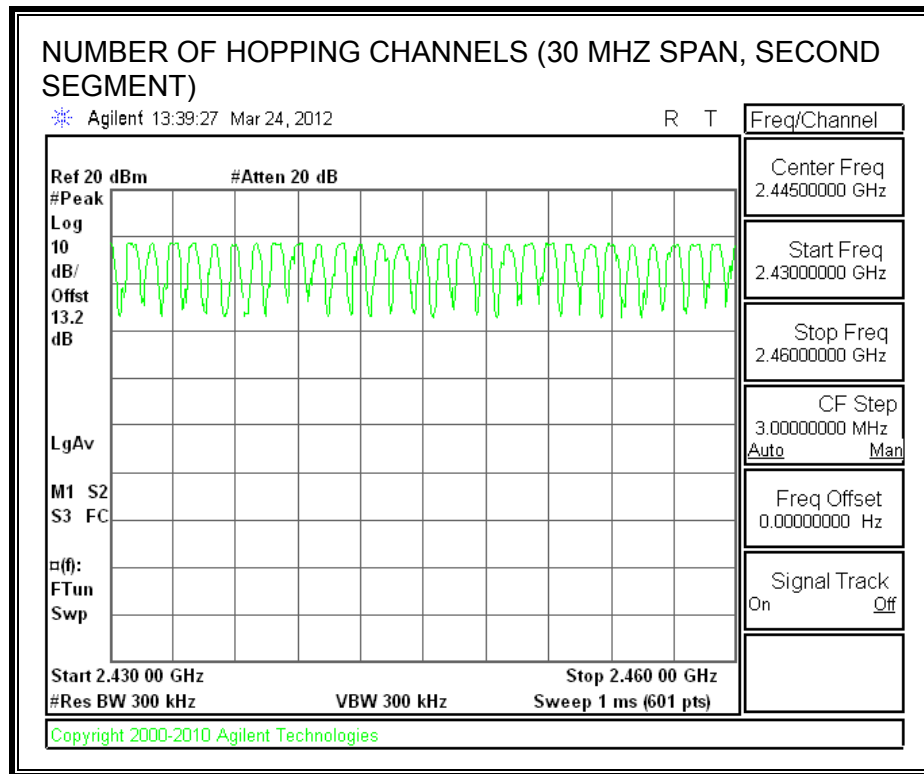
Normal mode: 79 Channels observed.

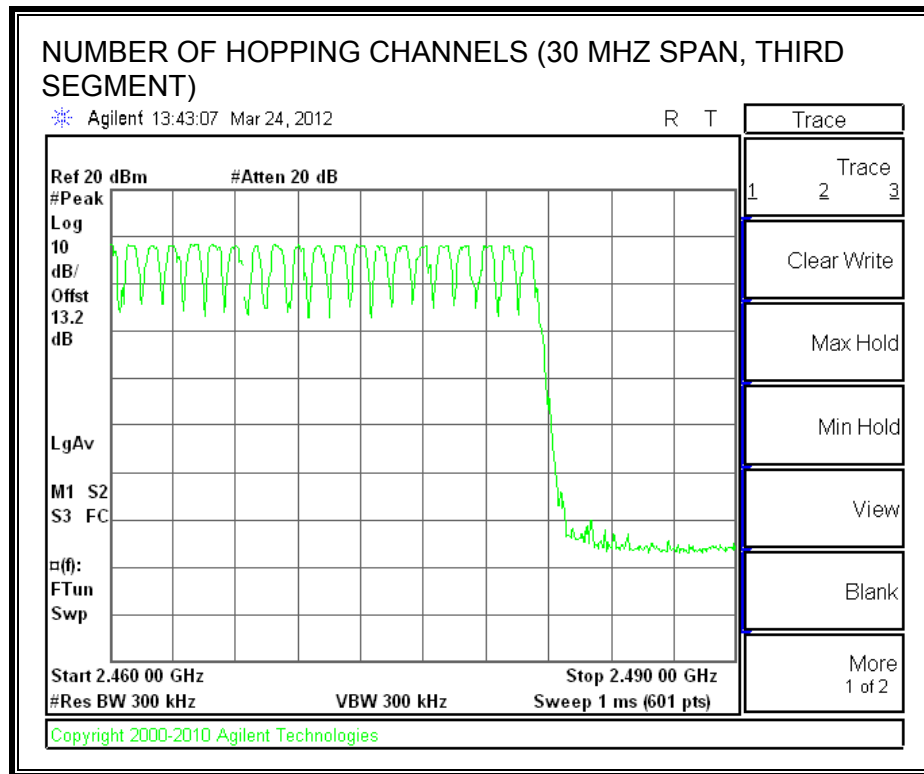
AFH mode: 79 channels based on client's declaration.

NUMBER OF HOPPING CHANNELS









7.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

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

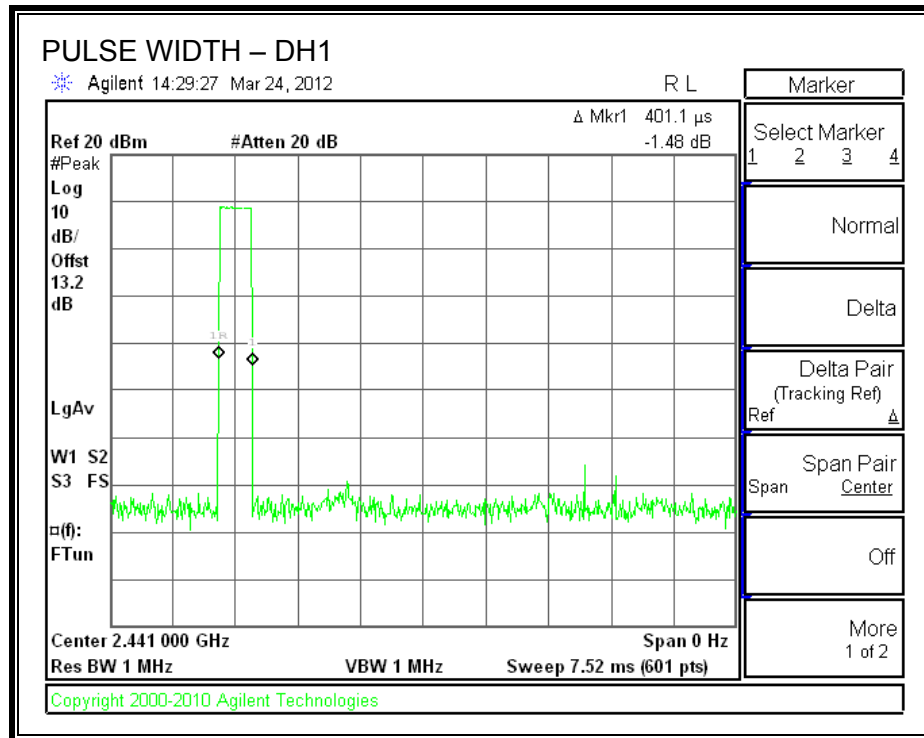
RESULTS

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

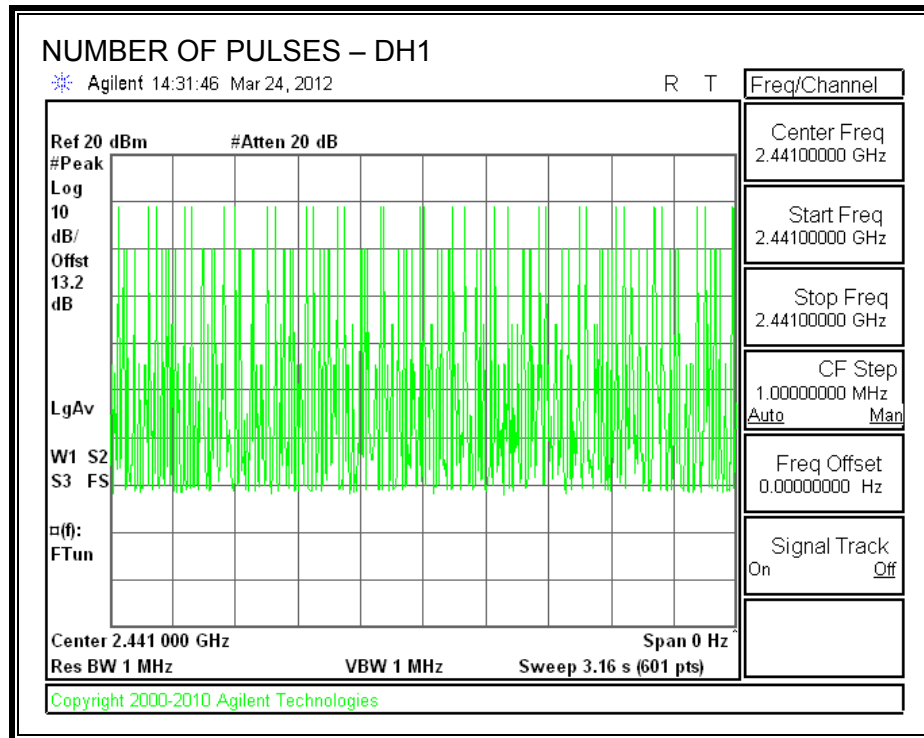
GFSK Mode

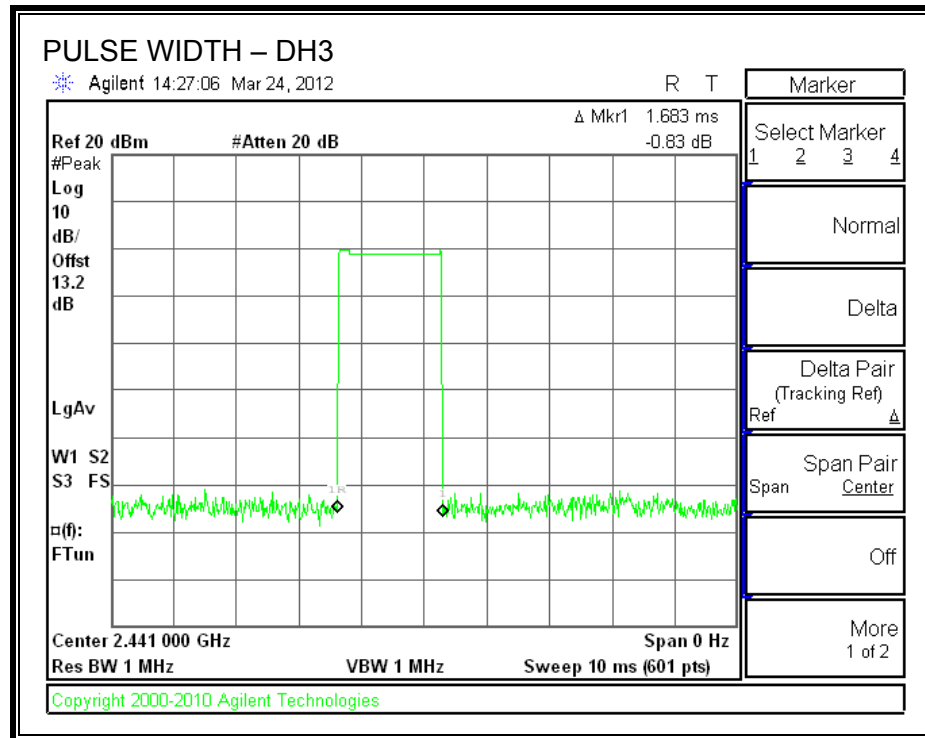
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.4011	32	0.1284	0.4	-0.2716
DH3	1.6830	12	0.2020	0.4	-0.1980
DH5	2.9170	10	0.2917	0.4	-0.1083

PULSE WIDTH - DH1

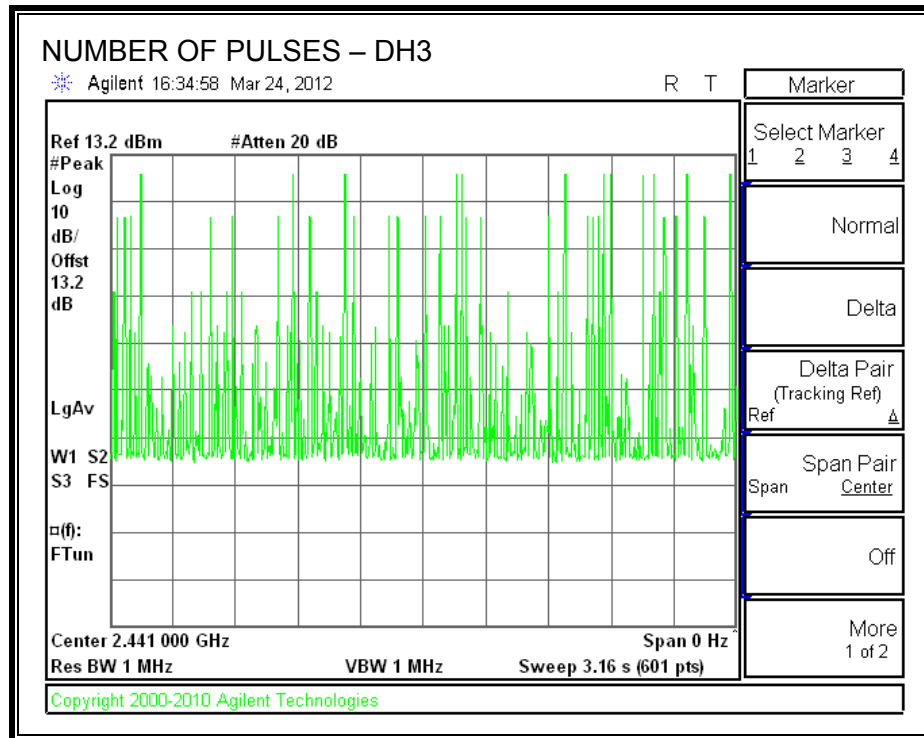


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

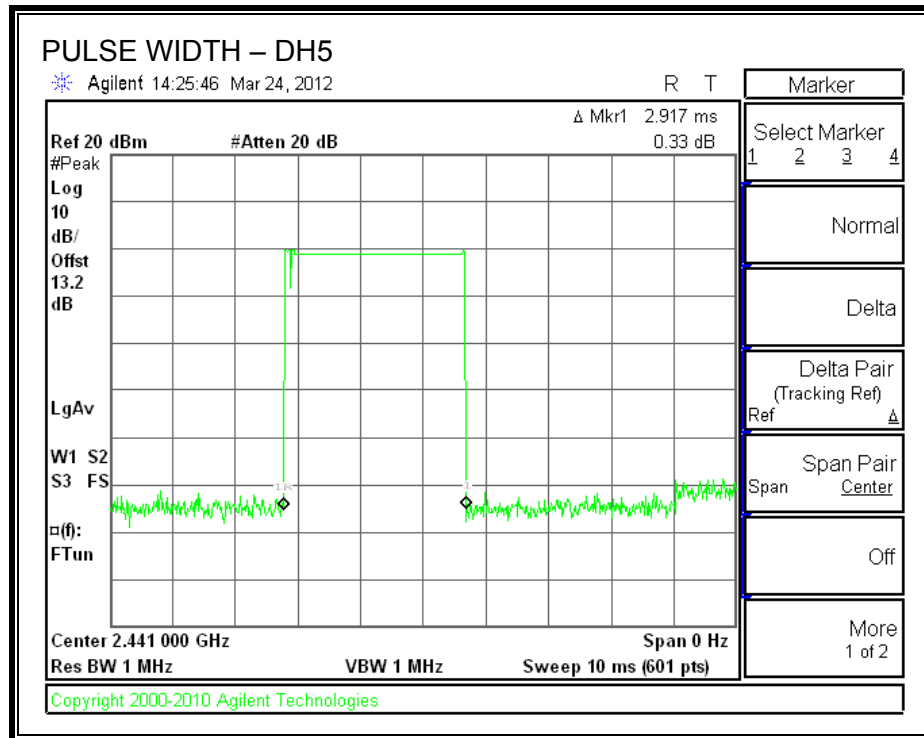




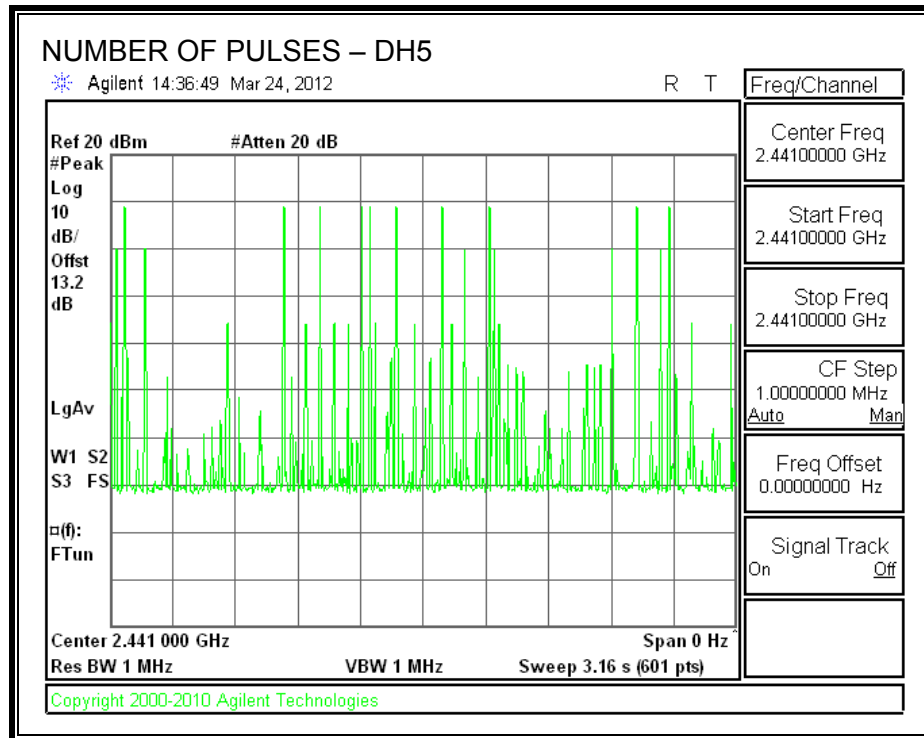
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.1.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

The maximum antenna gain is less than 6 dBi, therefore the limit is 20.97 dBm.

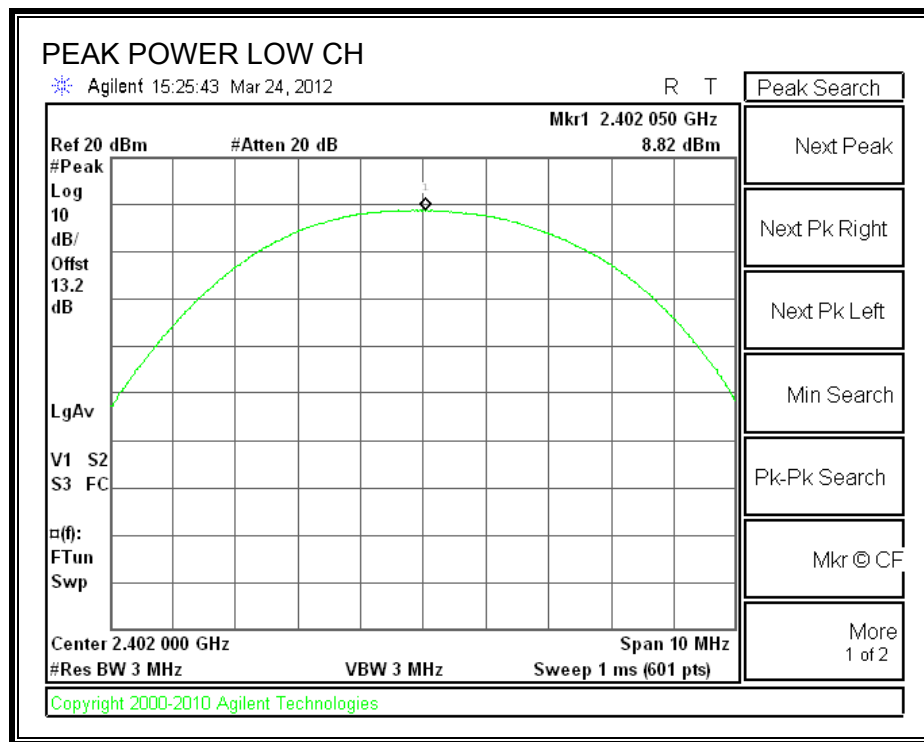
TEST PROCEDURE

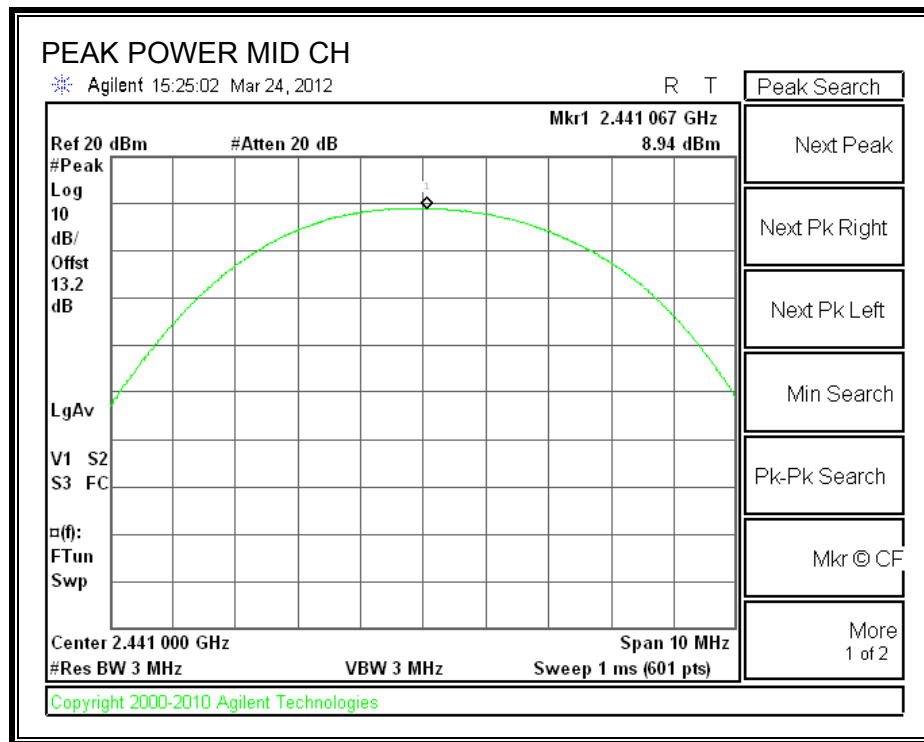
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

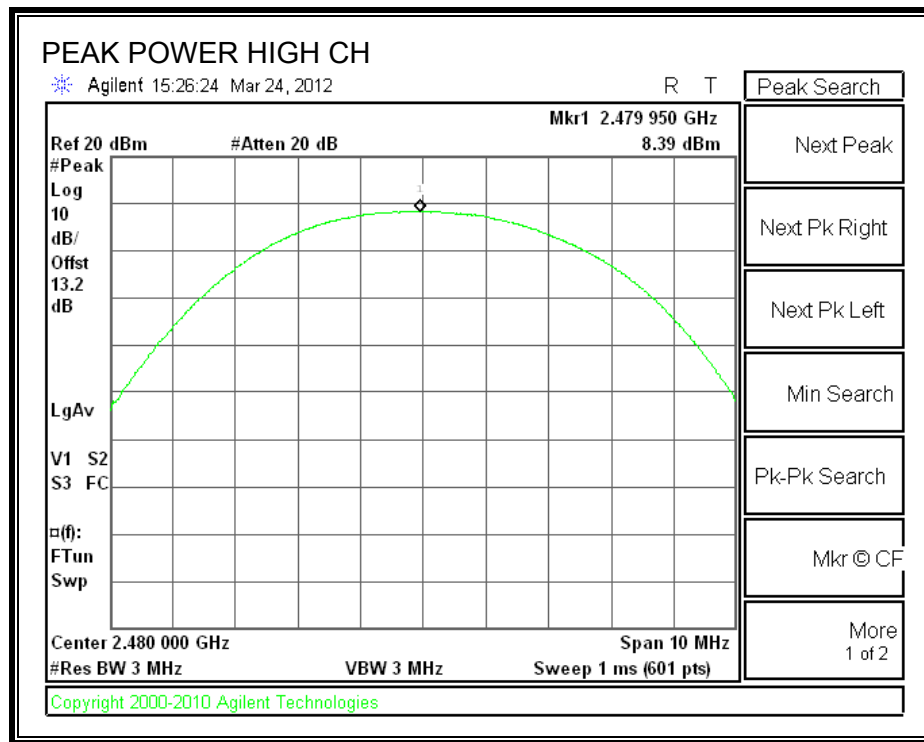
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.82	20.97	-12.15
Middle	2441	8.94	20.97	-12.03
High	2480	8.39	20.97	-12.58

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 12.7 dB (including 12 dB pad and 0.7 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	4.33
Middle	2441	4.62
High	2480	4.07

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

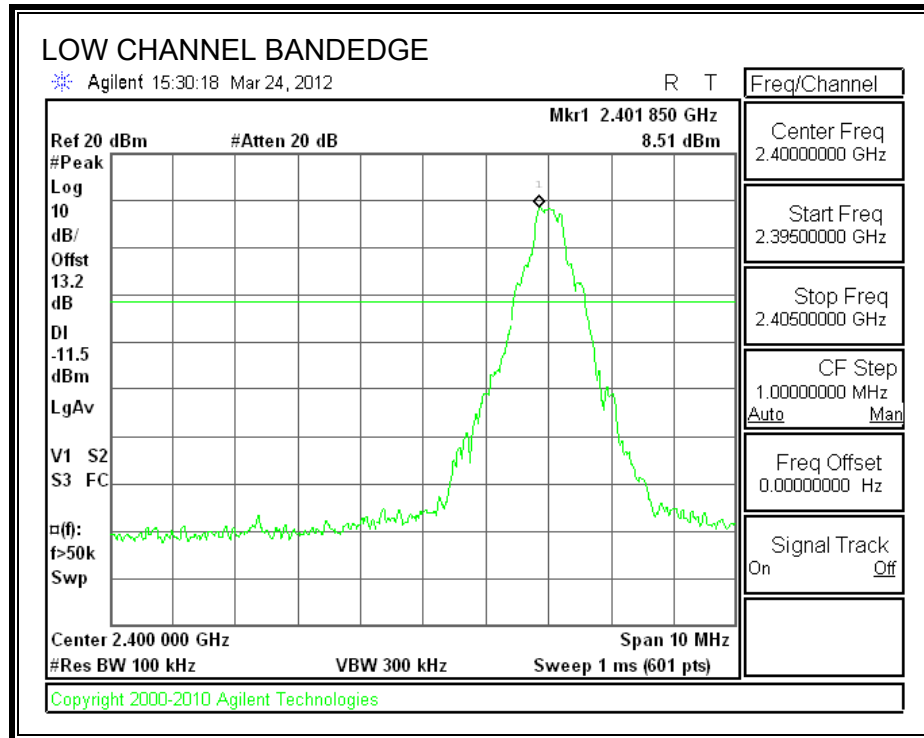
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

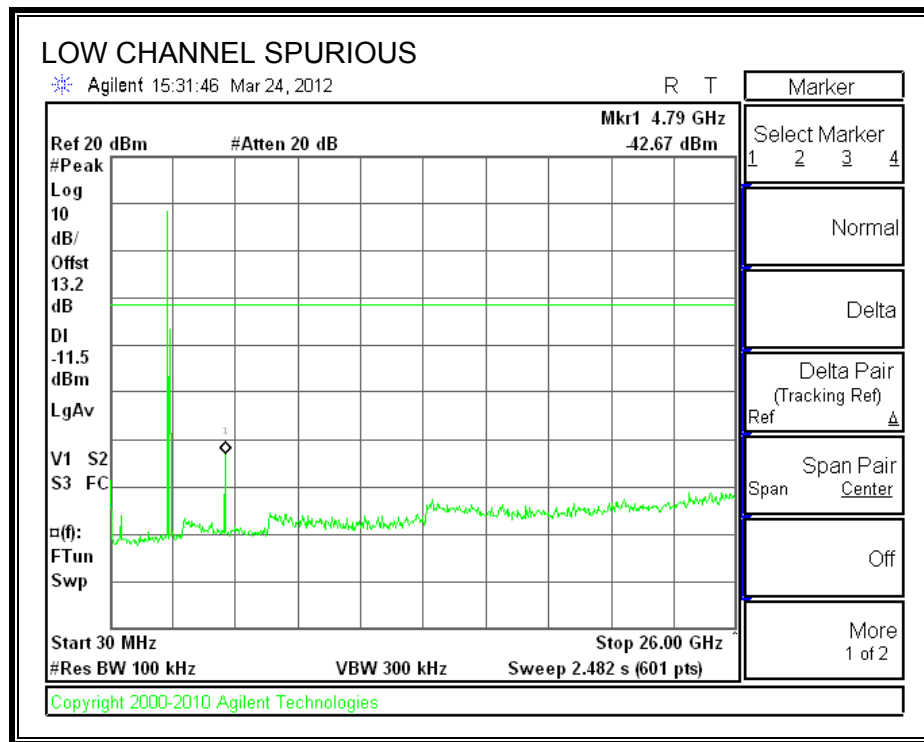
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

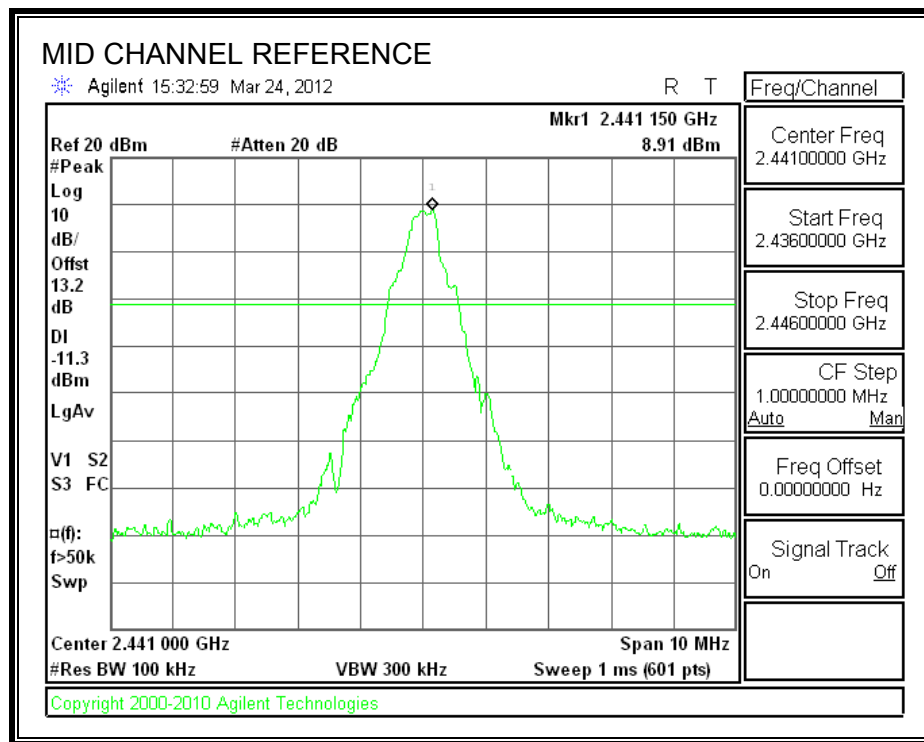
RESULTS

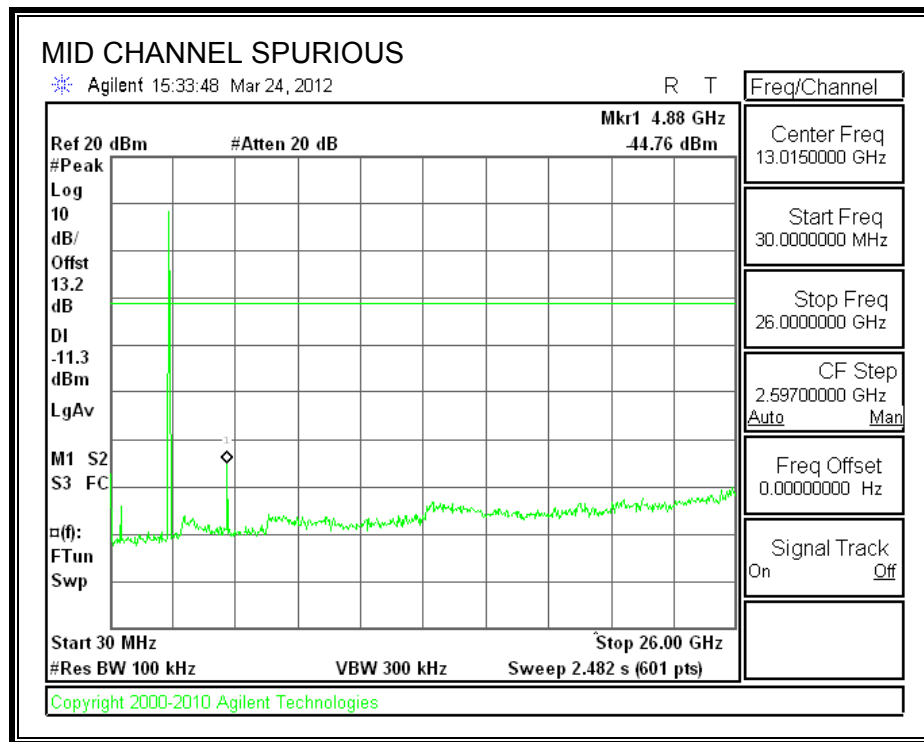
SPURIOUS EMISSIONS, LOW CHANNEL



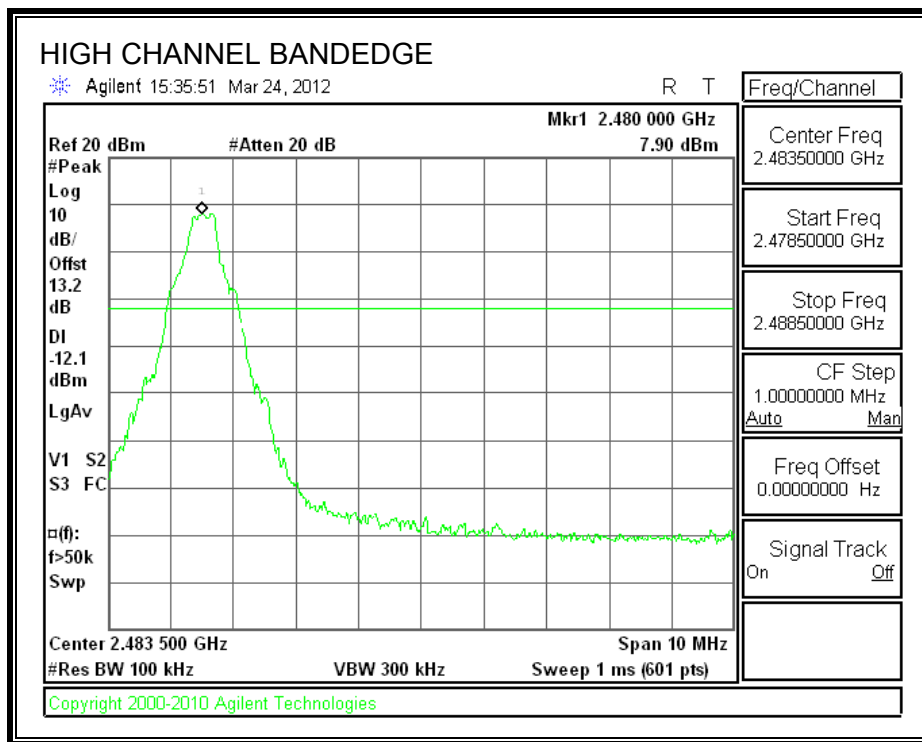


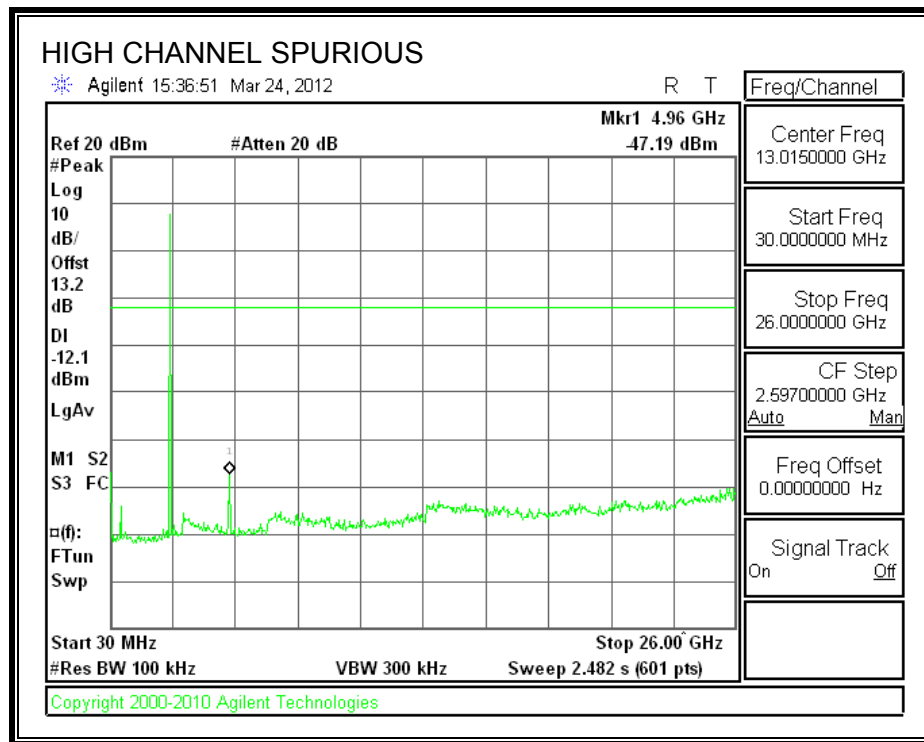
SPURIOUS EMISSIONS, MID CHANNEL



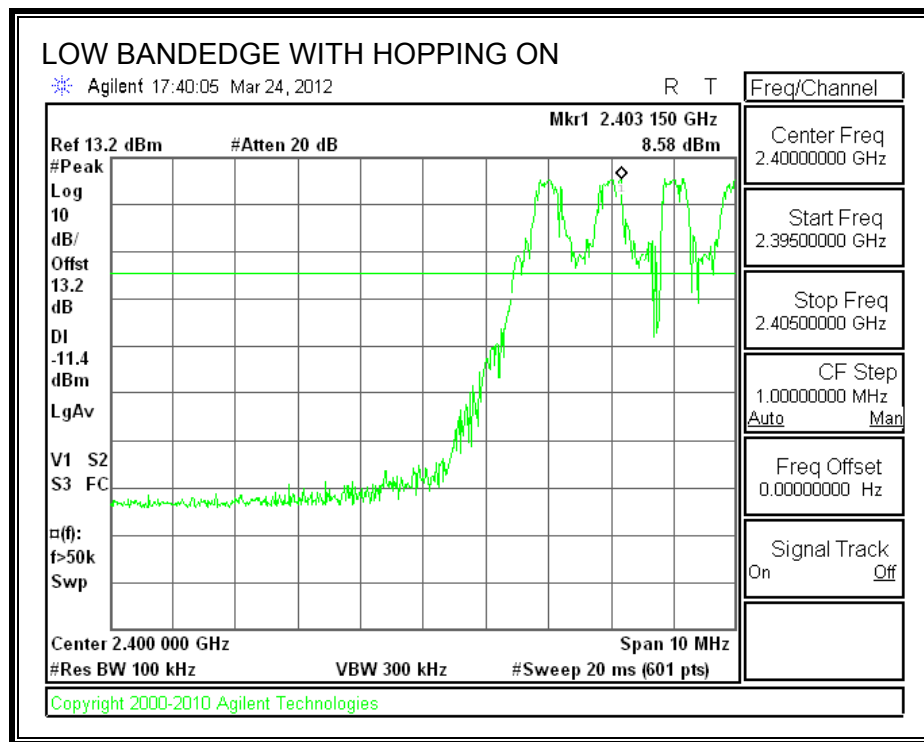


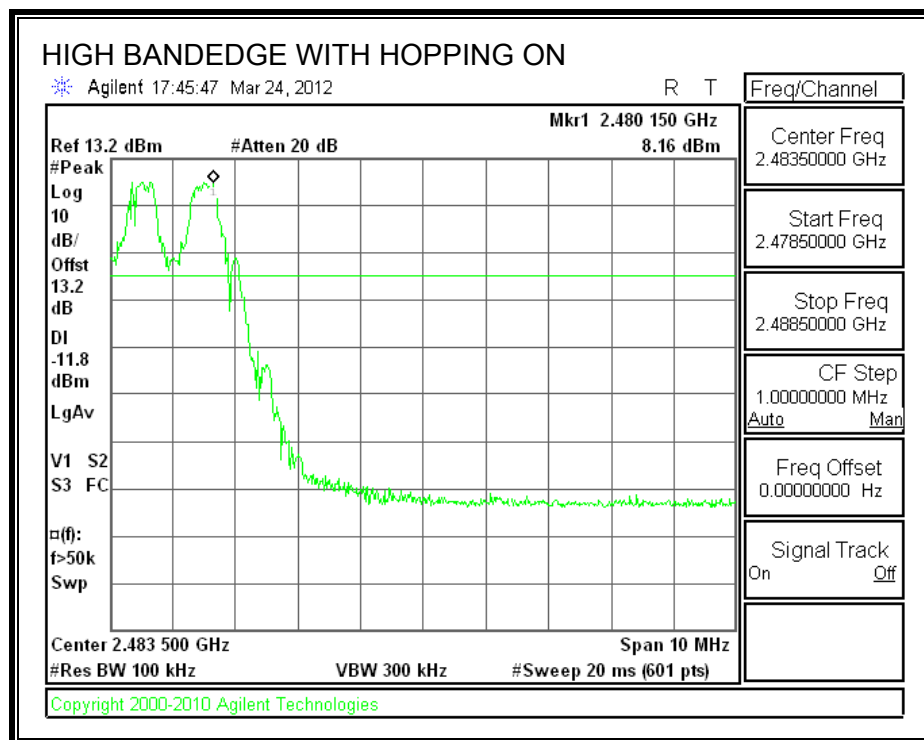
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

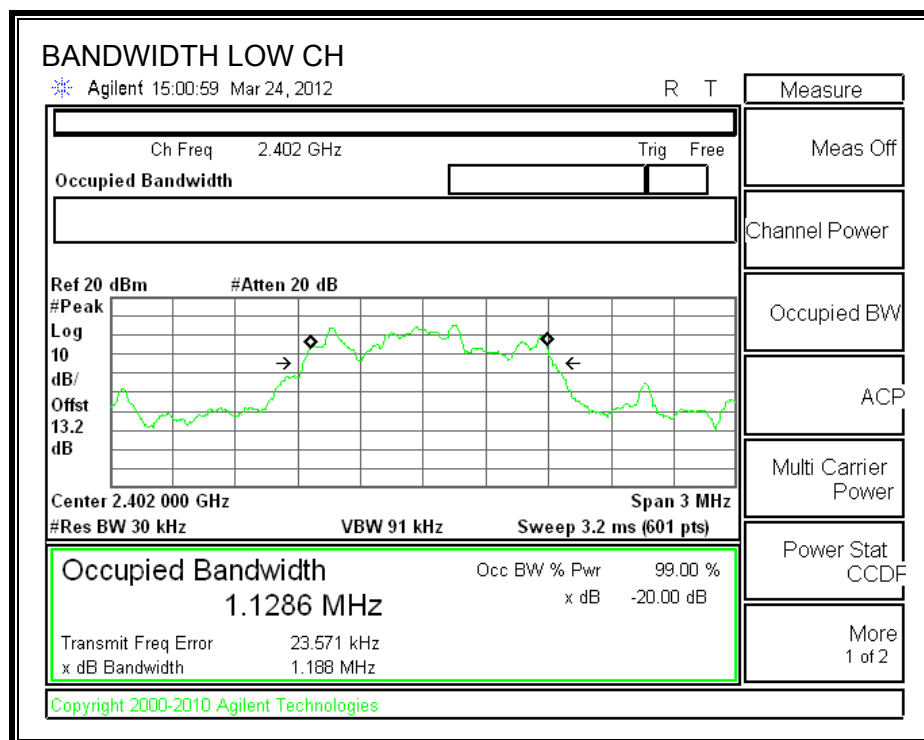
TEST PROCEDURE

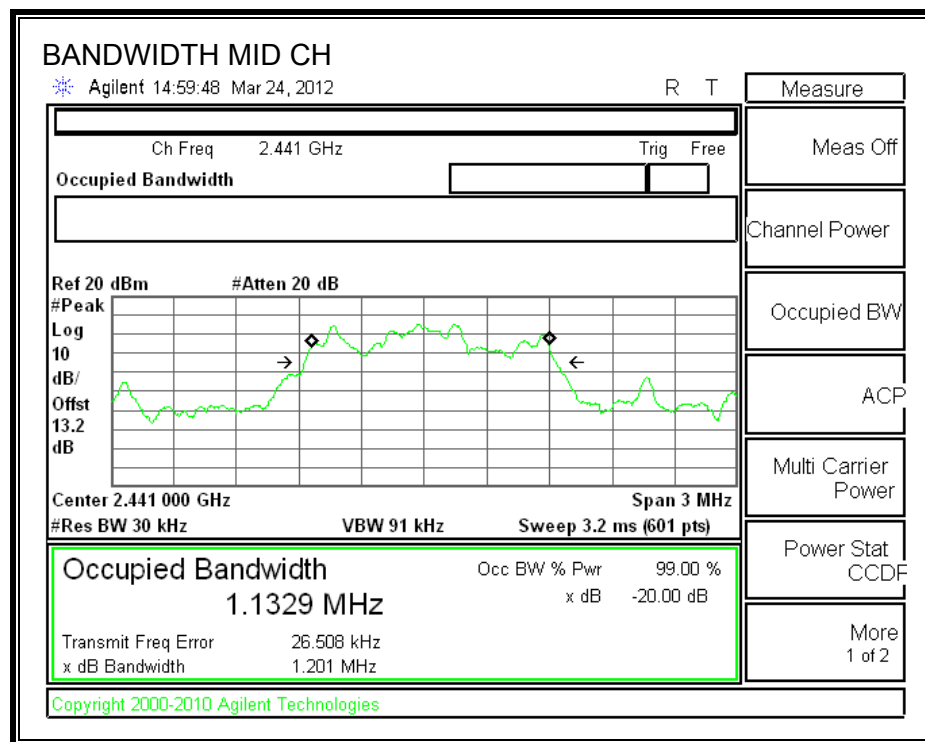
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

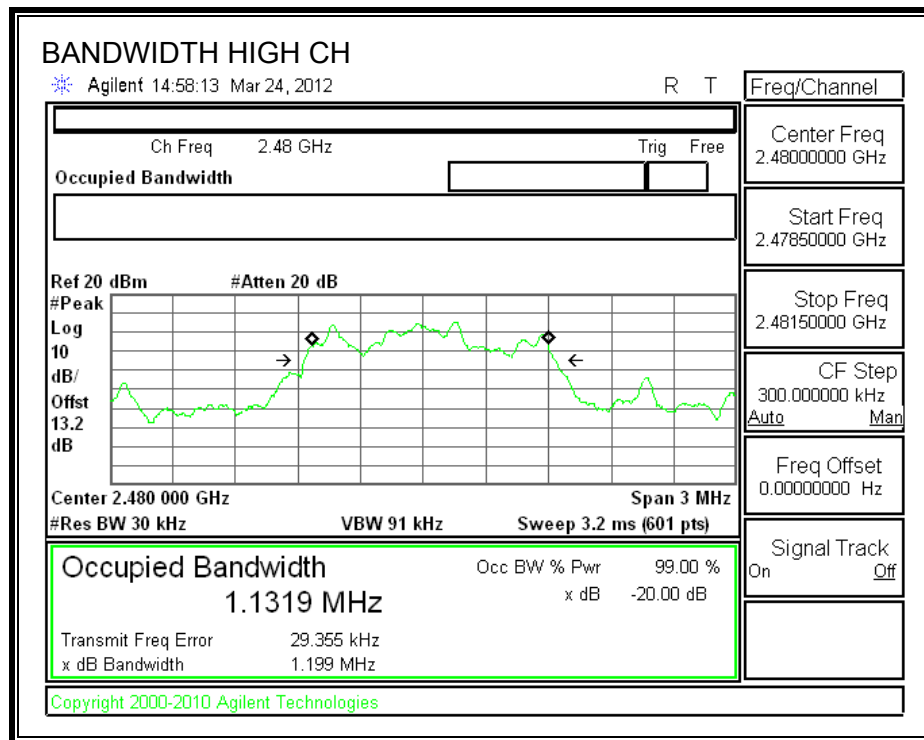
RESULTS

Frequency (MHz)	20 dB Bandwidth (kHz)
2402	1188
2441	1201
2480	1199

20 dB BANDWIDTH







7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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.

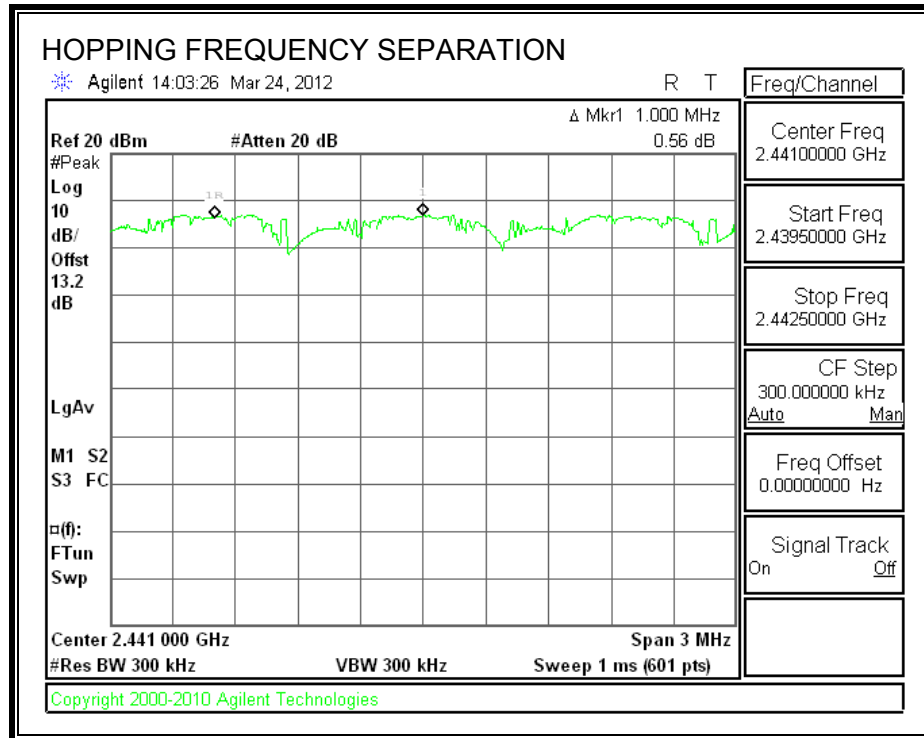
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

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

TEST PROCEDURE

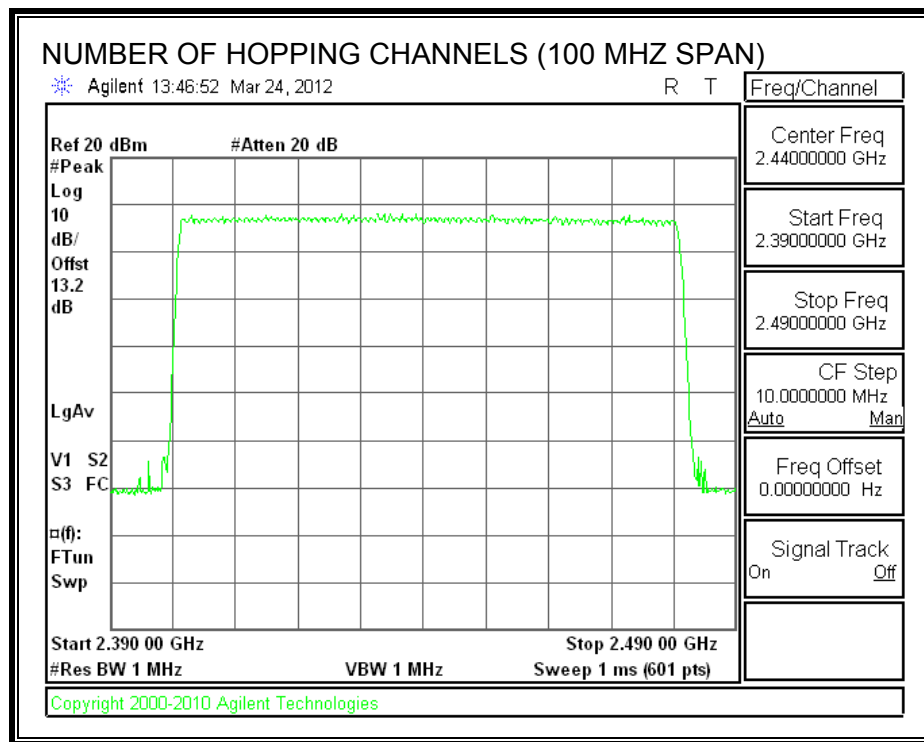
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

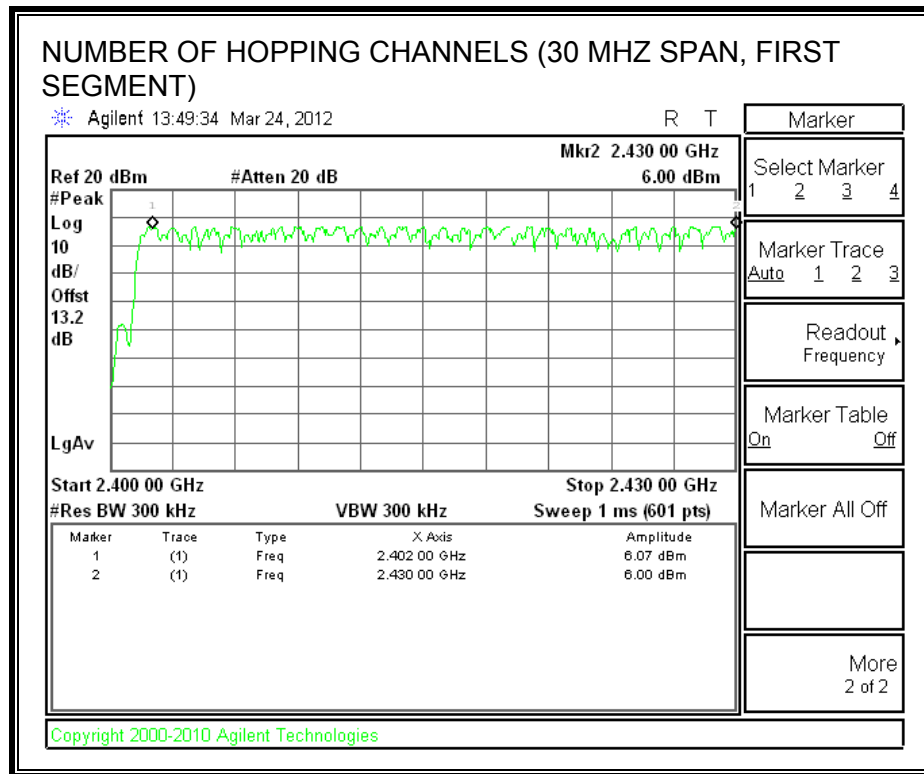
RESULTS

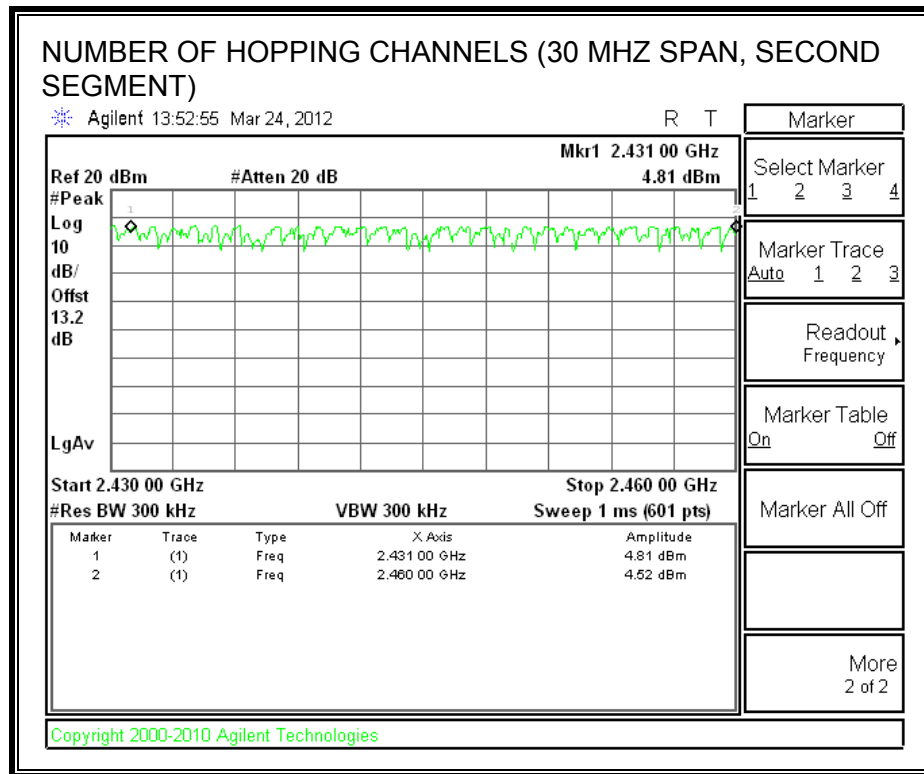
Normal mode: 79 Channels observed.

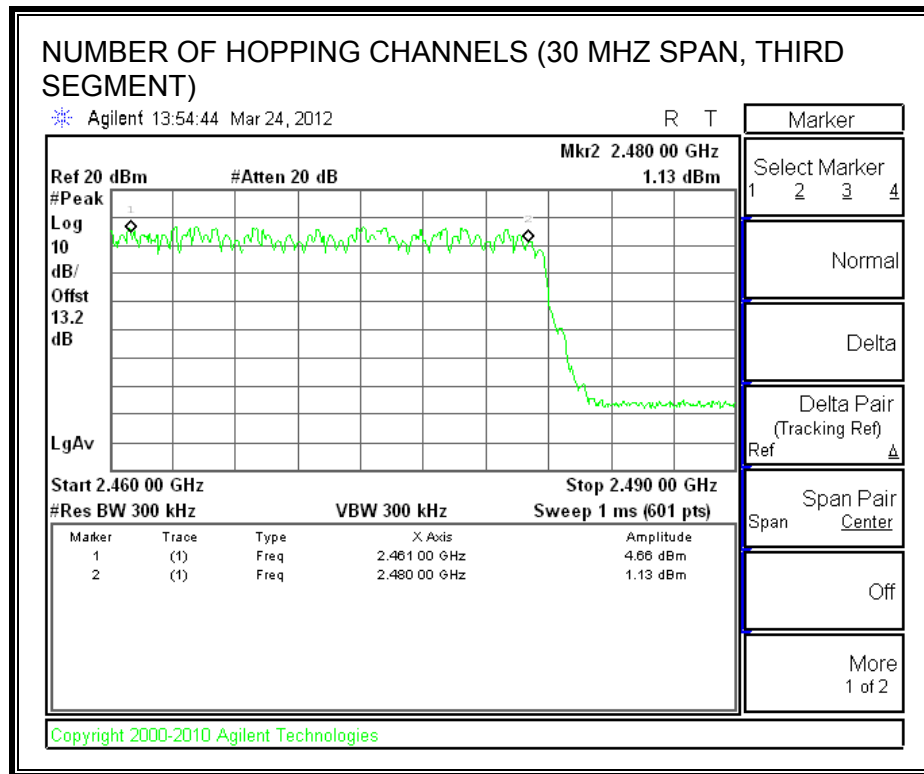
AFH mode: 79 channels based on client's declaration.

NUMBER OF HOPPING CHANNELS









7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

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

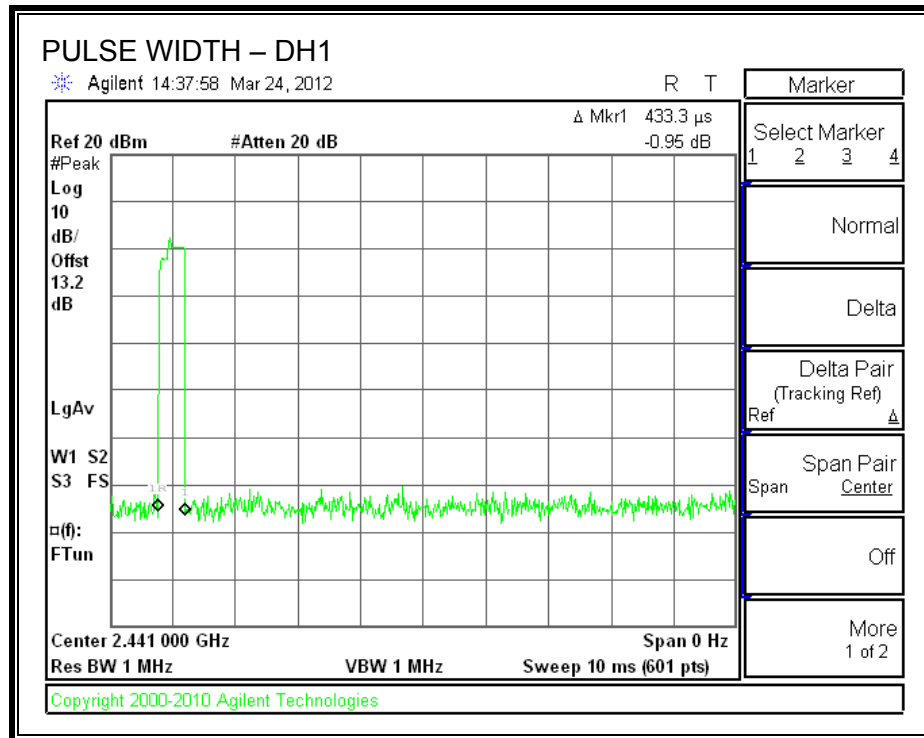
RESULTS

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

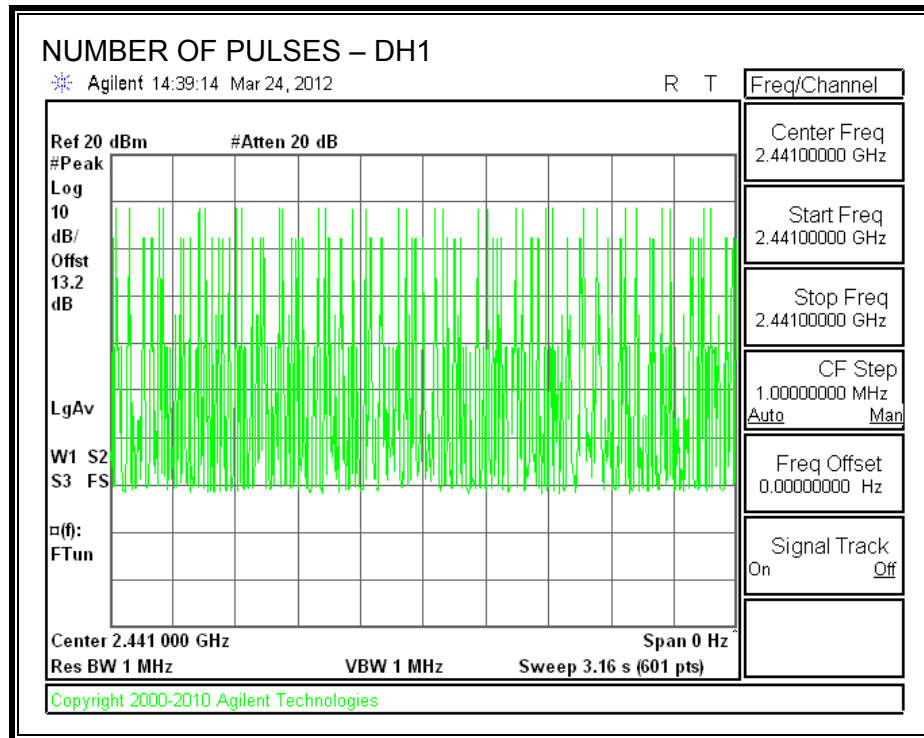
8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.4333	32	0.1387	0.4	-0.2613
DH3	1.6830	15	0.2525	0.4	-0.1476
DH5	2.9500	9	0.2655	0.4	-0.1345

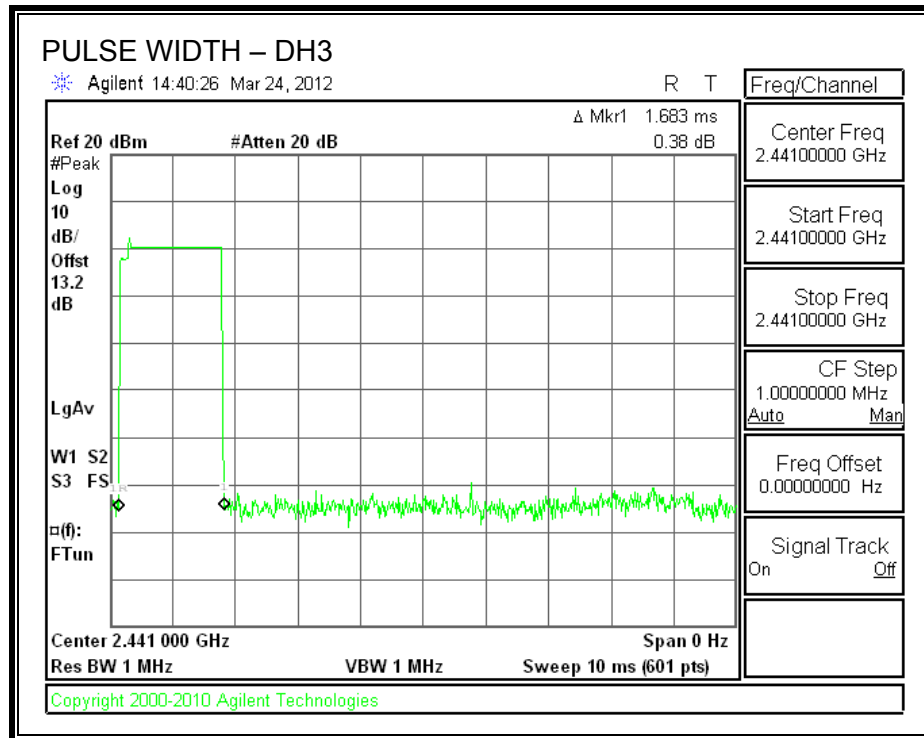
PULSE WIDTH - DH1



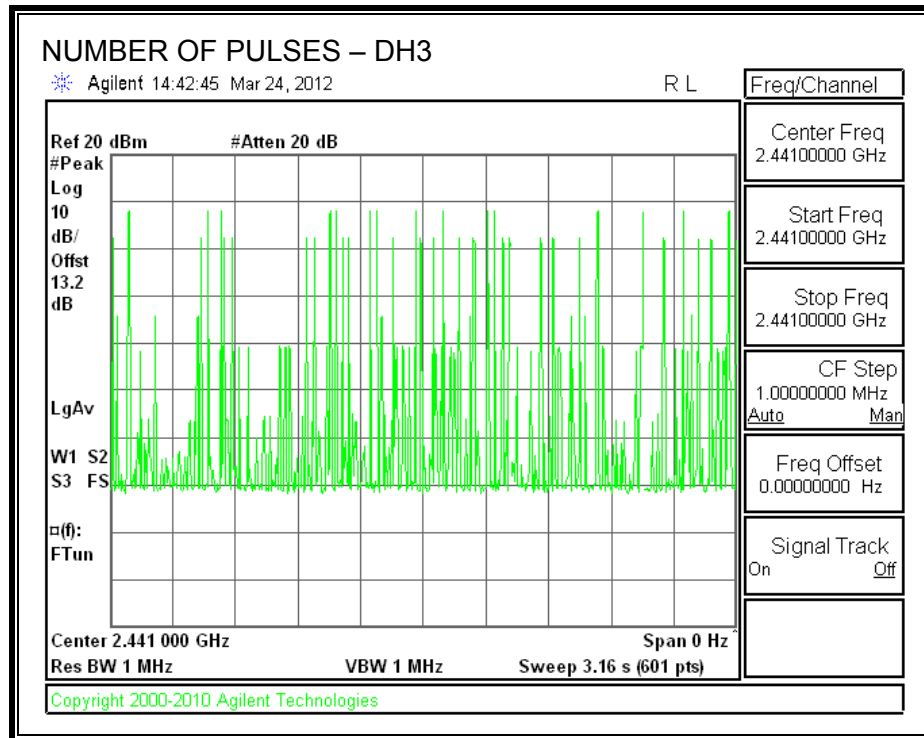
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



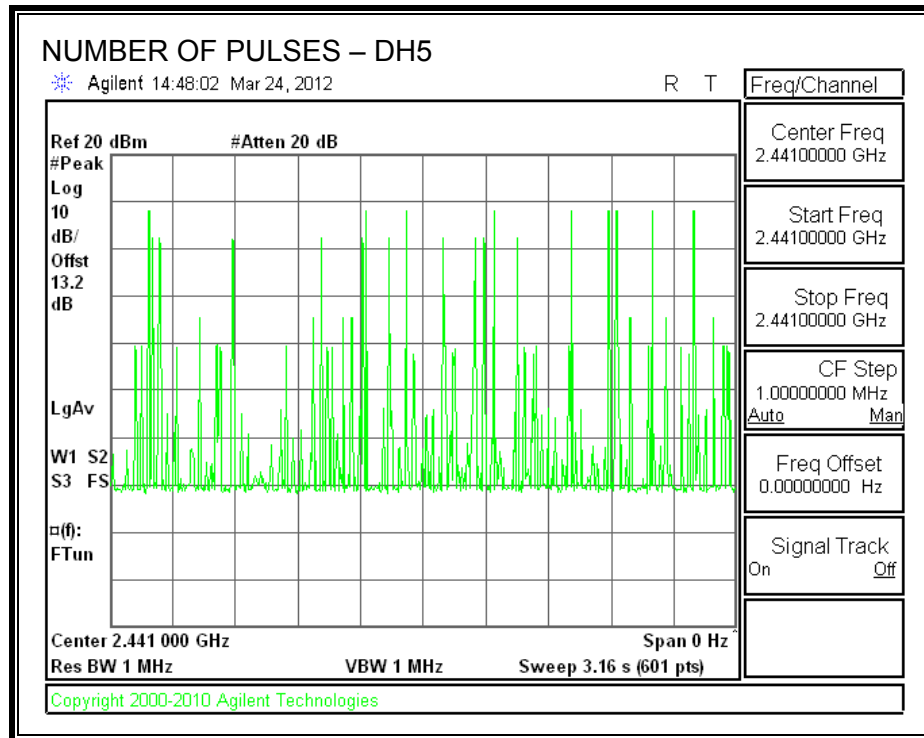
PULSE WIDTH – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

The maximum antenna gain is less than 6 dBi, therefore the limit is 20.97 dBm.

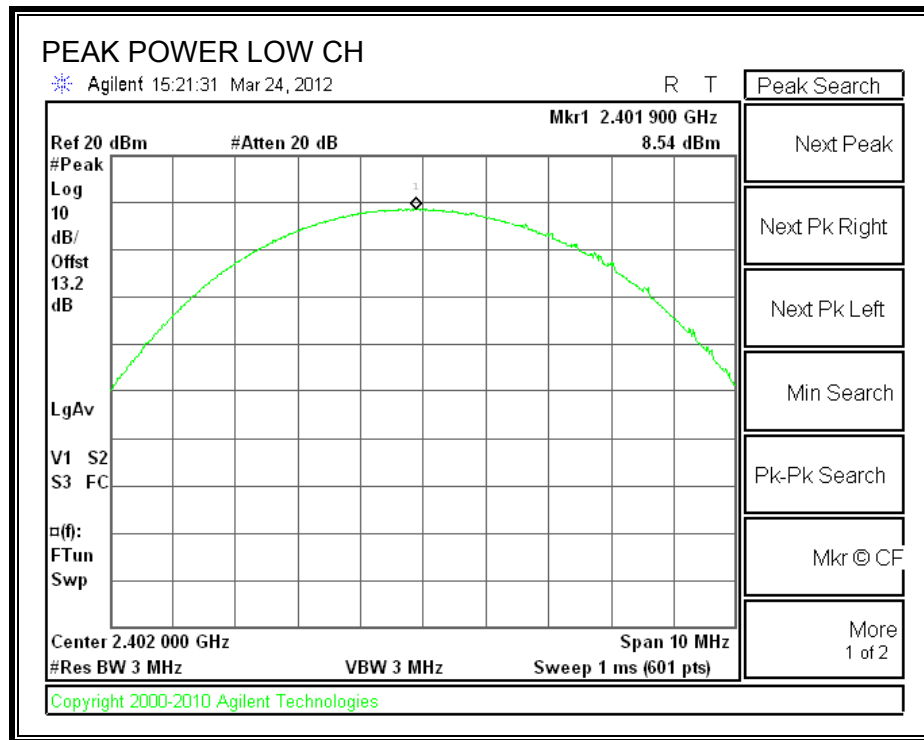
TEST PROCEDURE

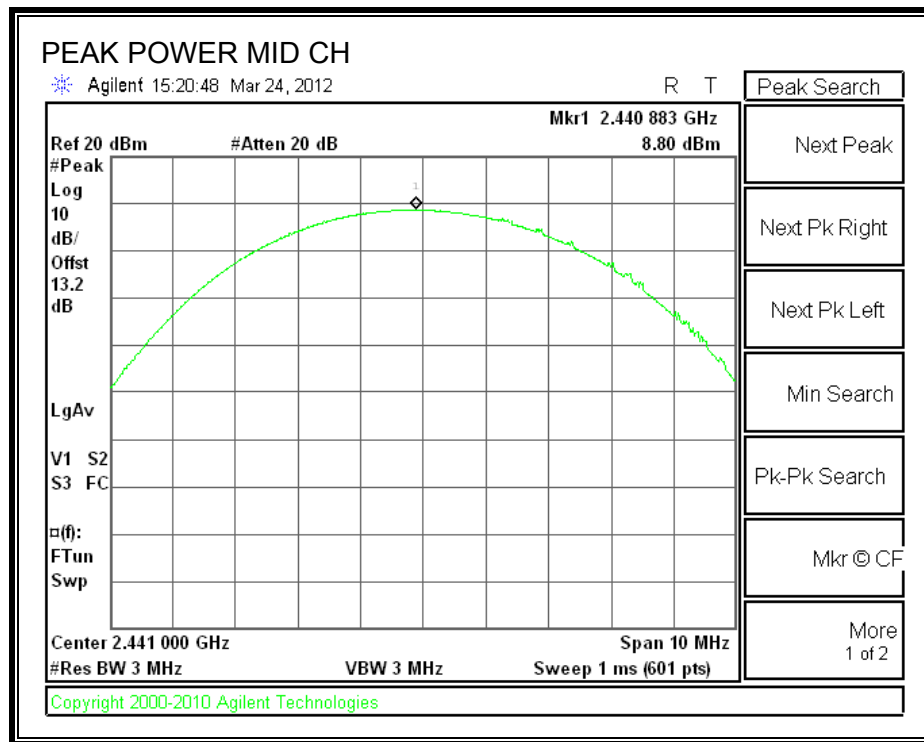
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

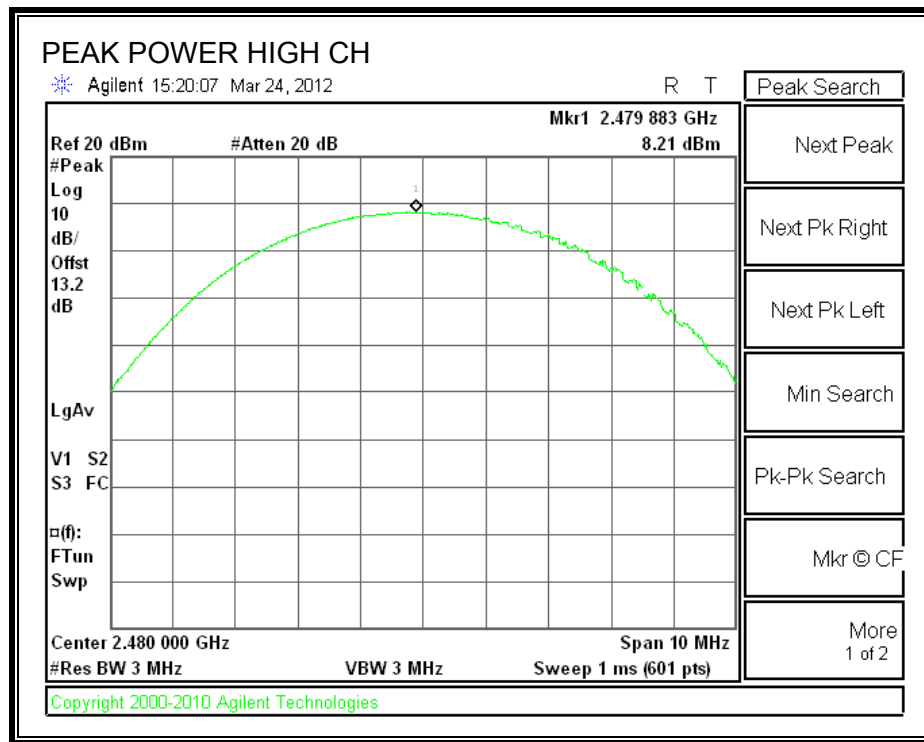
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.54	20.97	-12.43
Middle	2441	8.80	20.97	-12.17
High	2480	8.21	20.97	-12.76

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 12.7 dB (including 12 dB pad and 0.7 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	2.3
Middle	2441	2.61
High	2480	2.1

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

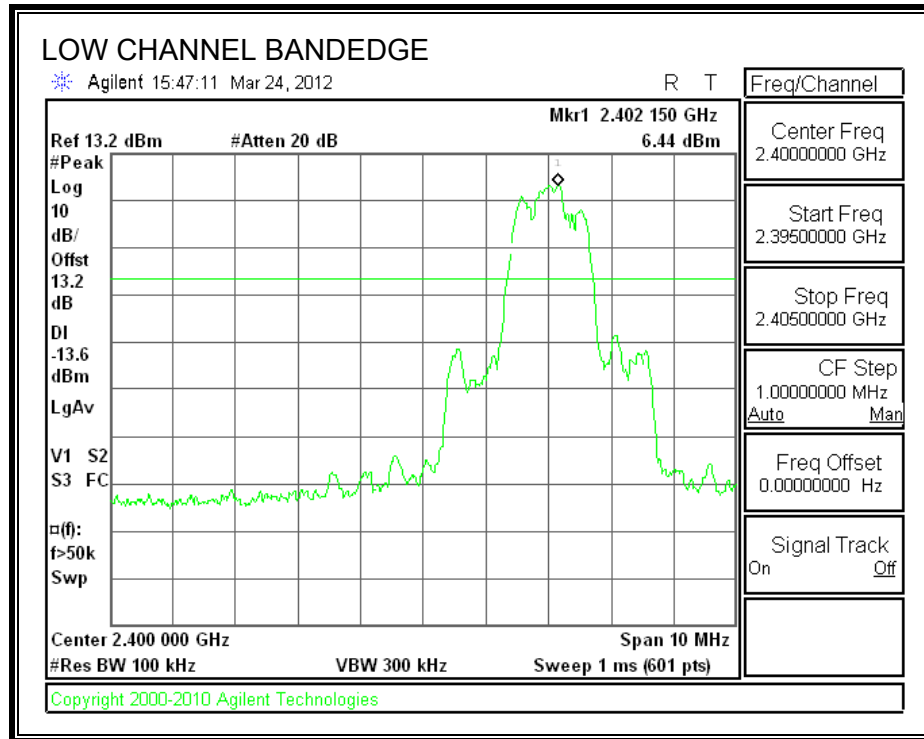
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

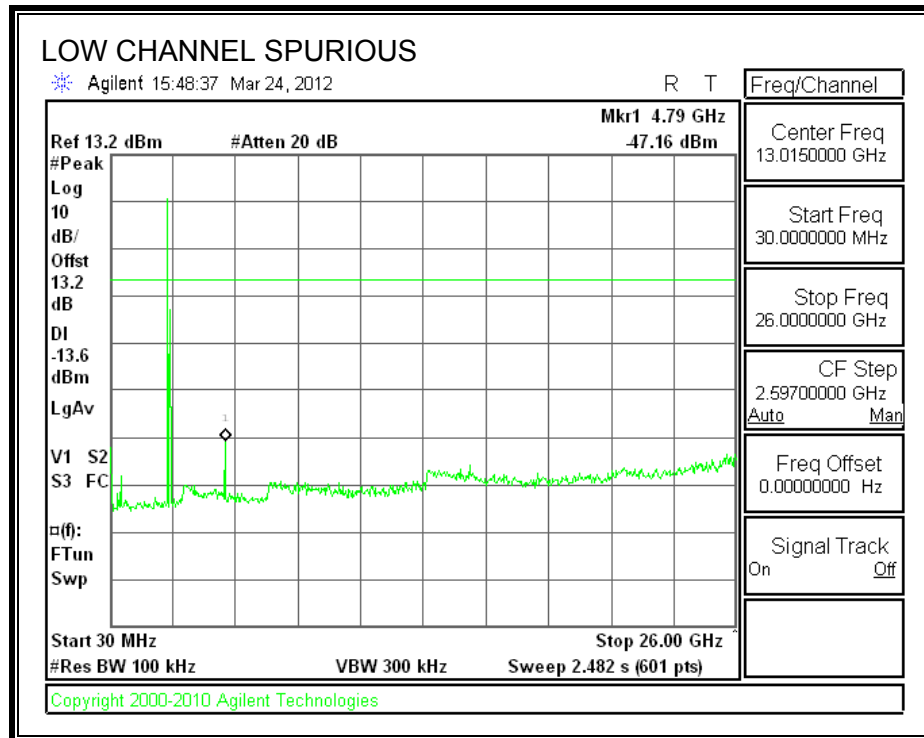
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

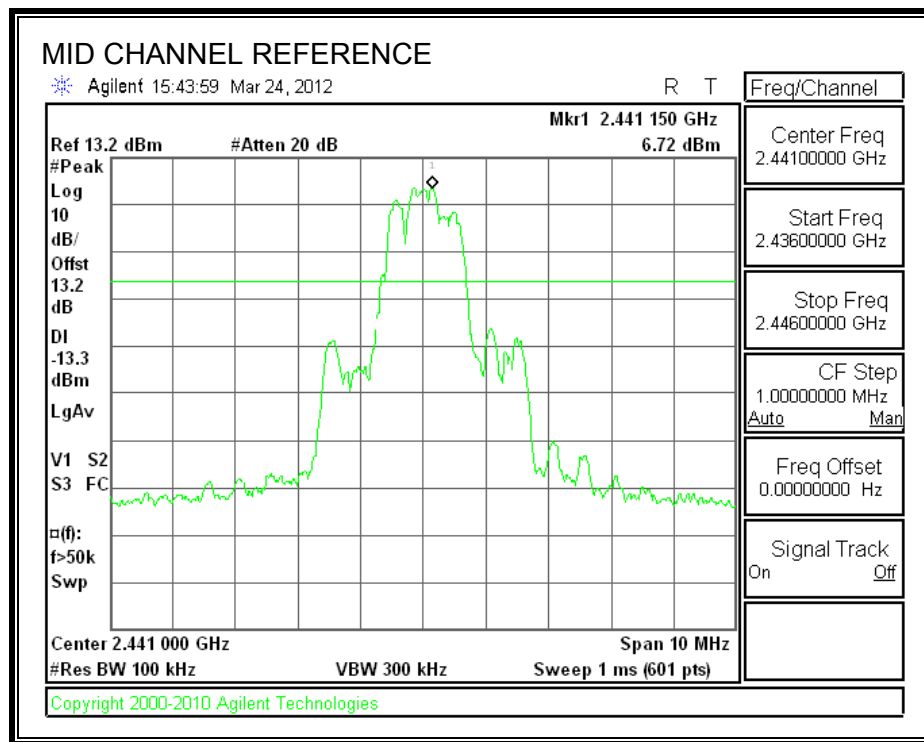
RESULTS

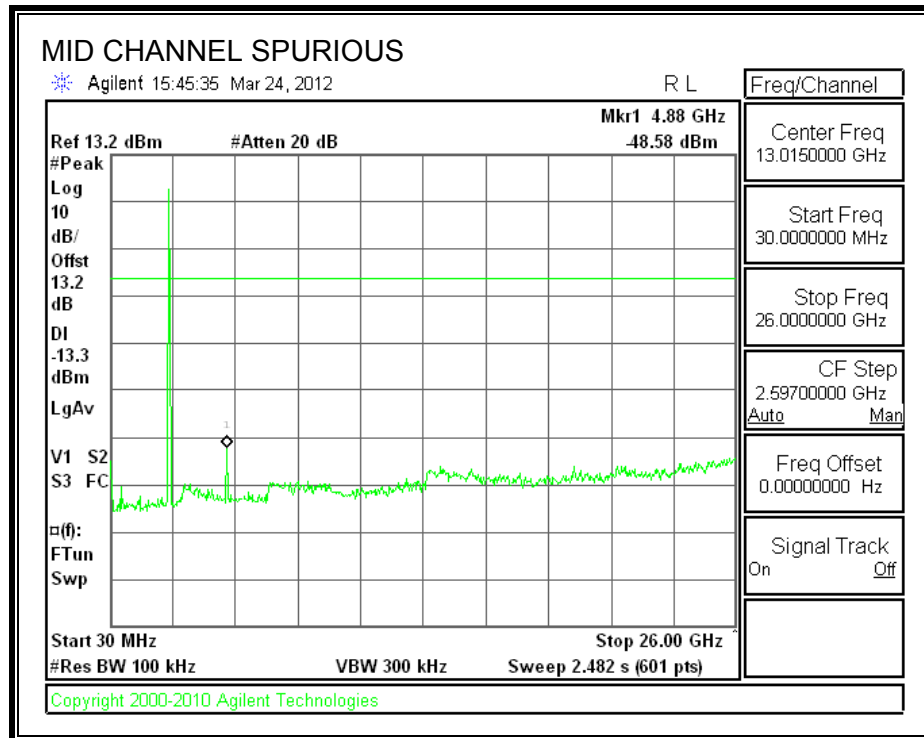
SPURIOUS EMISSIONS, LOW CHANNEL



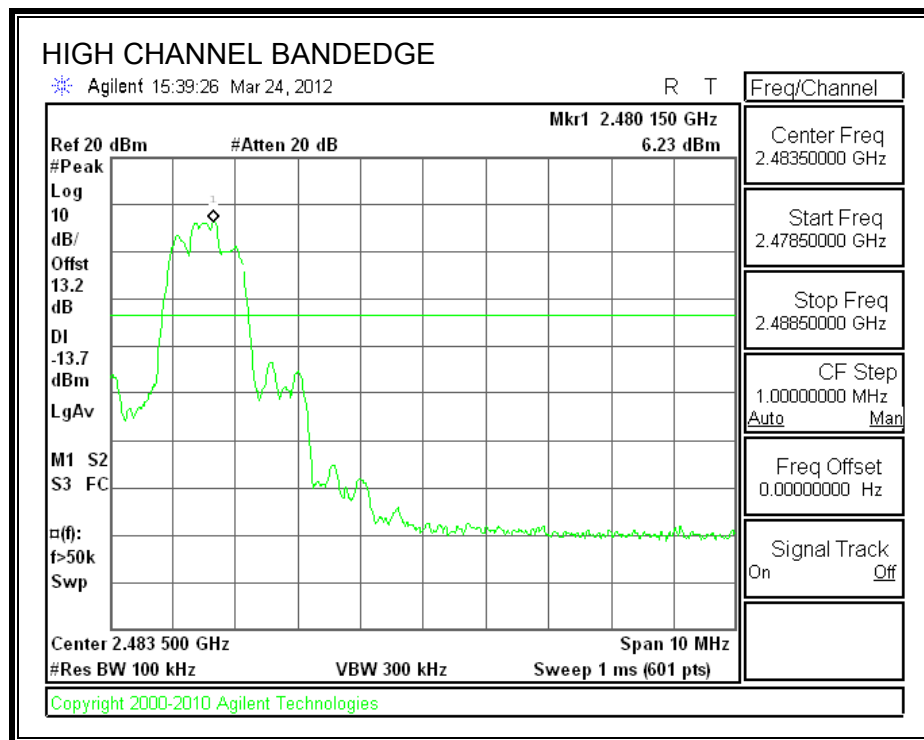


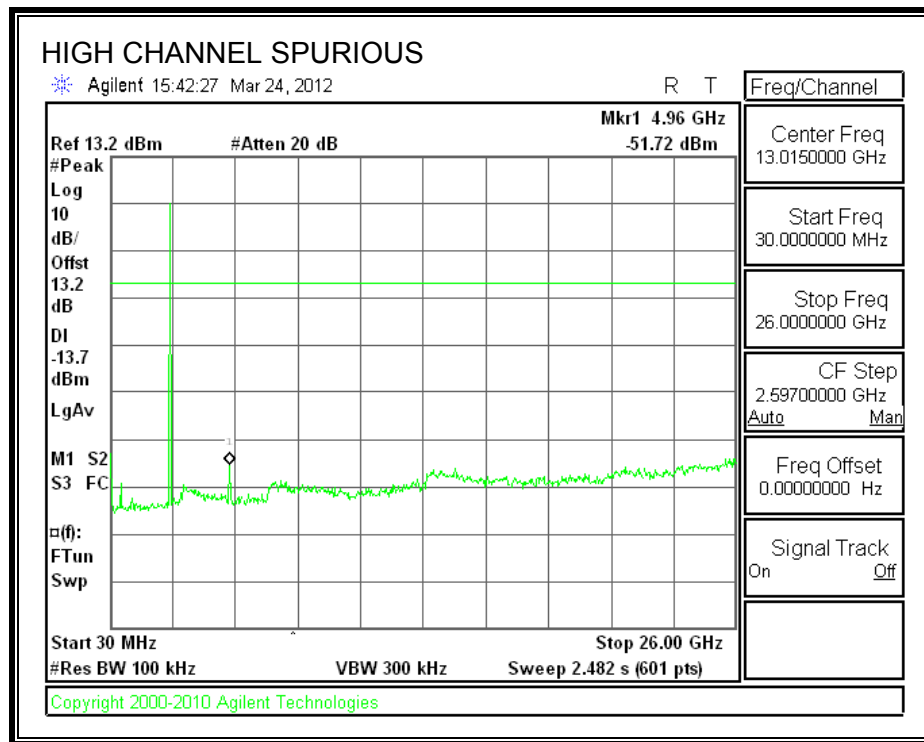
SPURIOUS EMISSIONS, MID CHANNEL



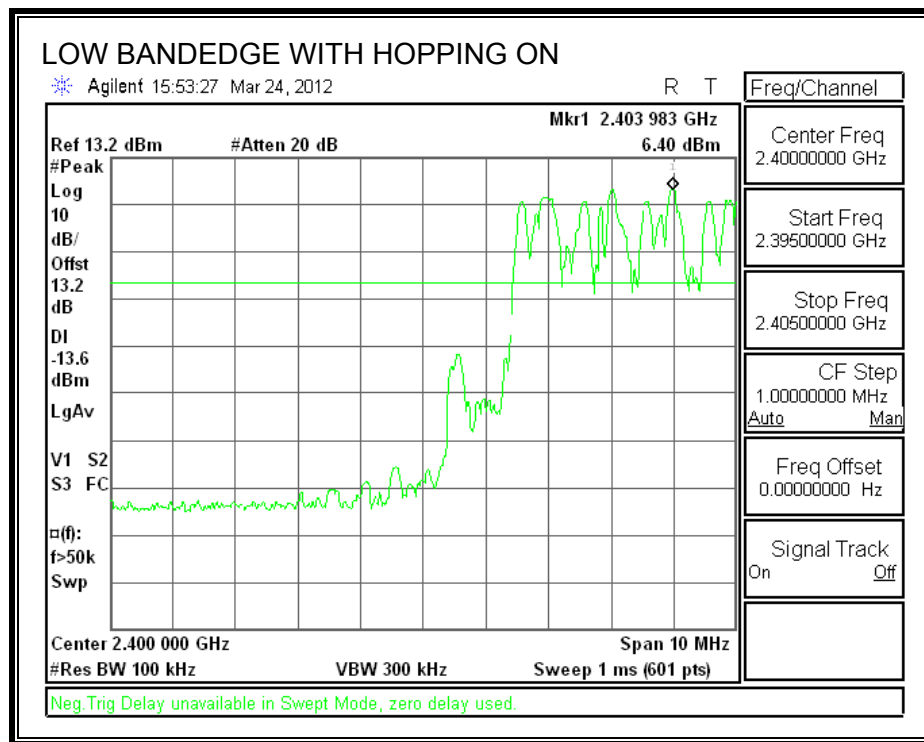


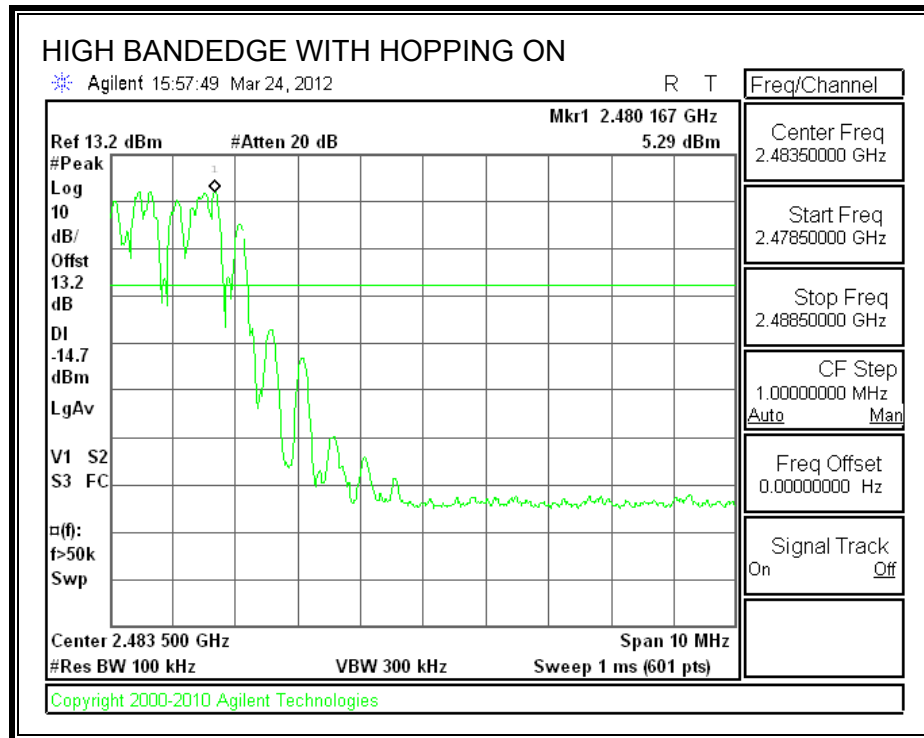
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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.

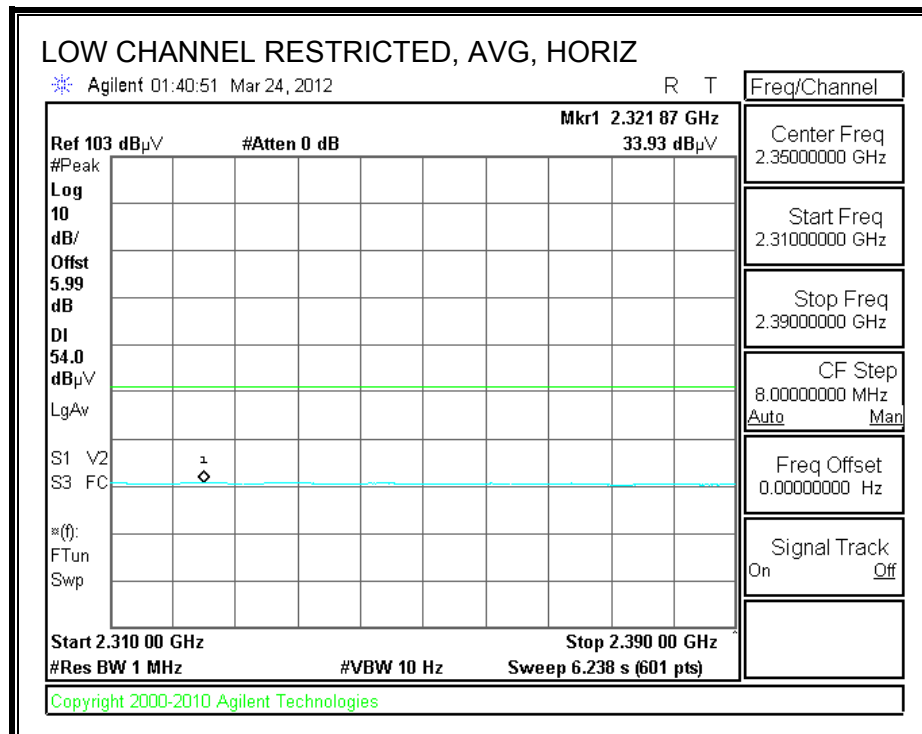
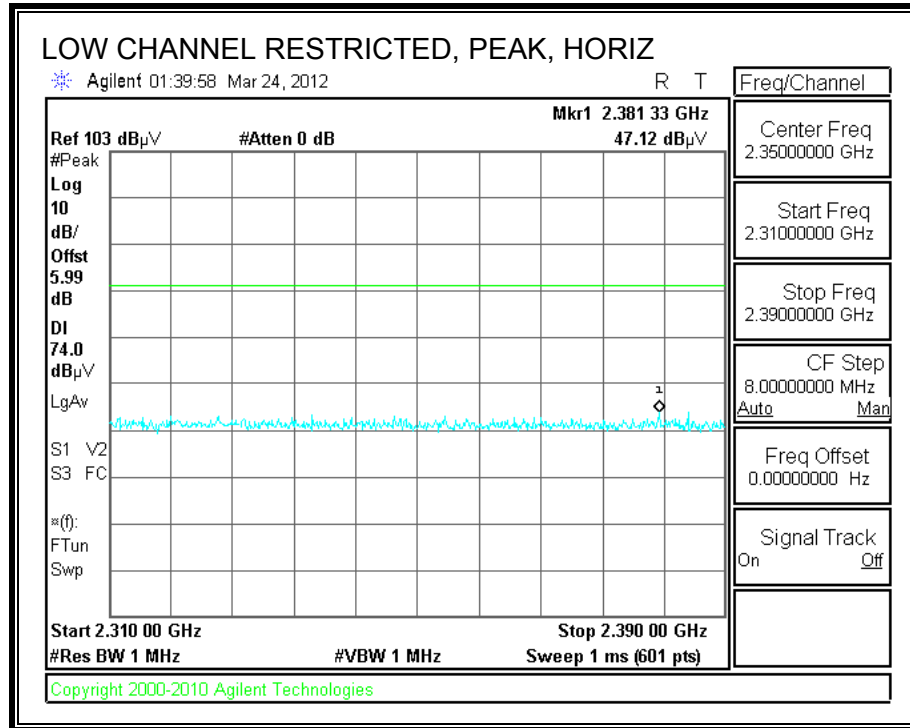
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

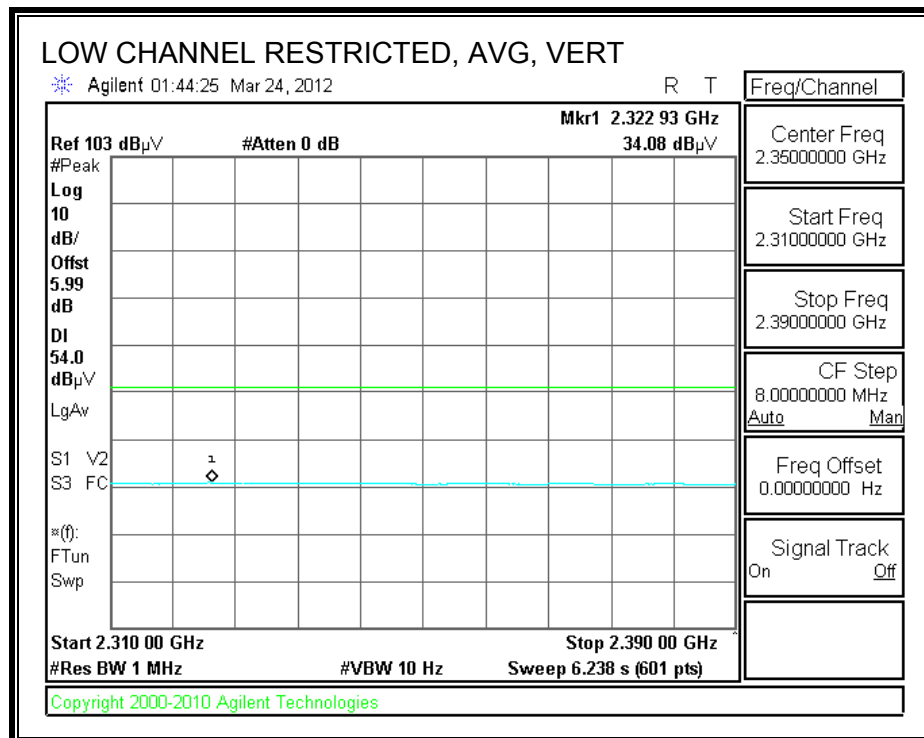
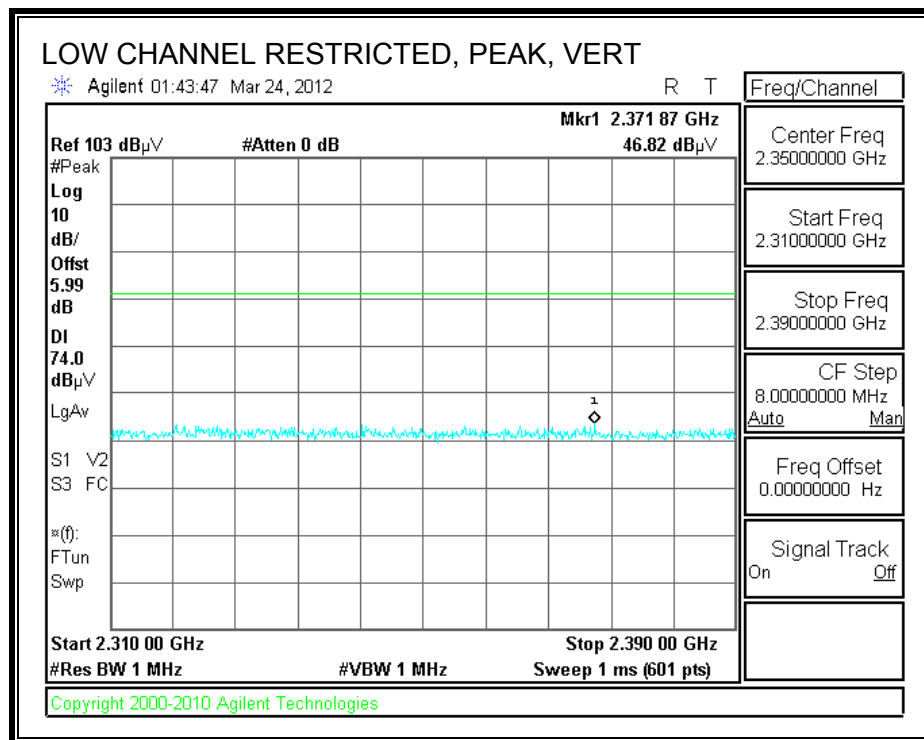
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

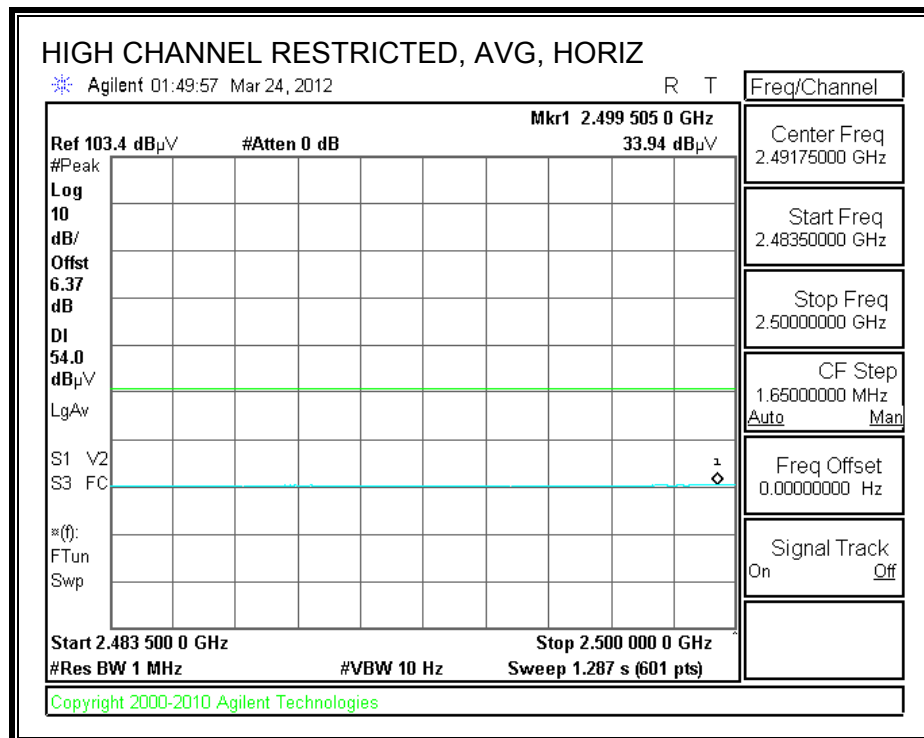
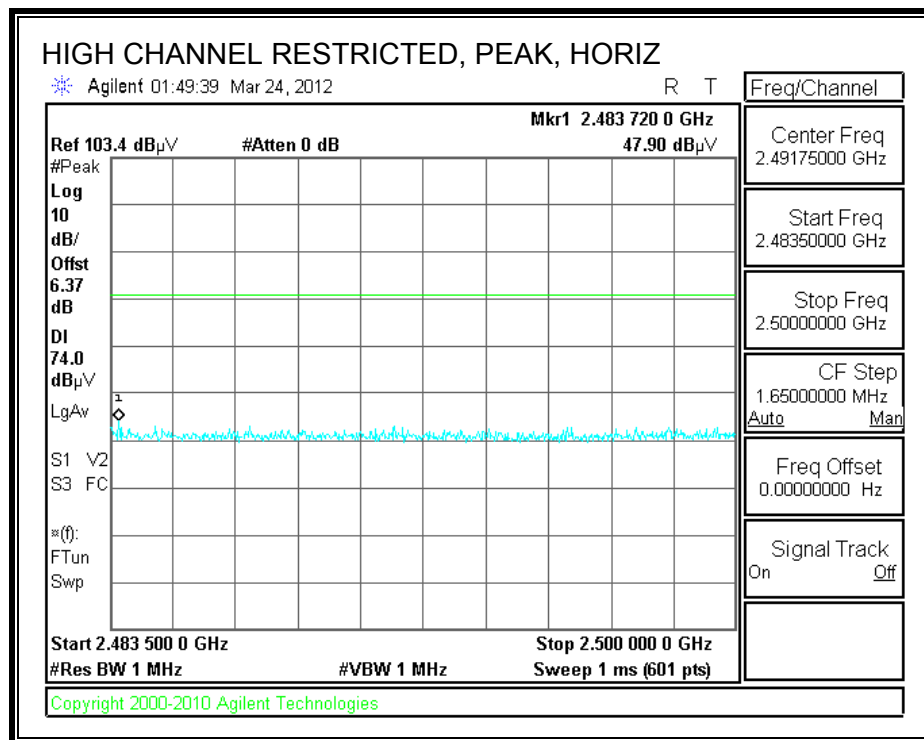
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



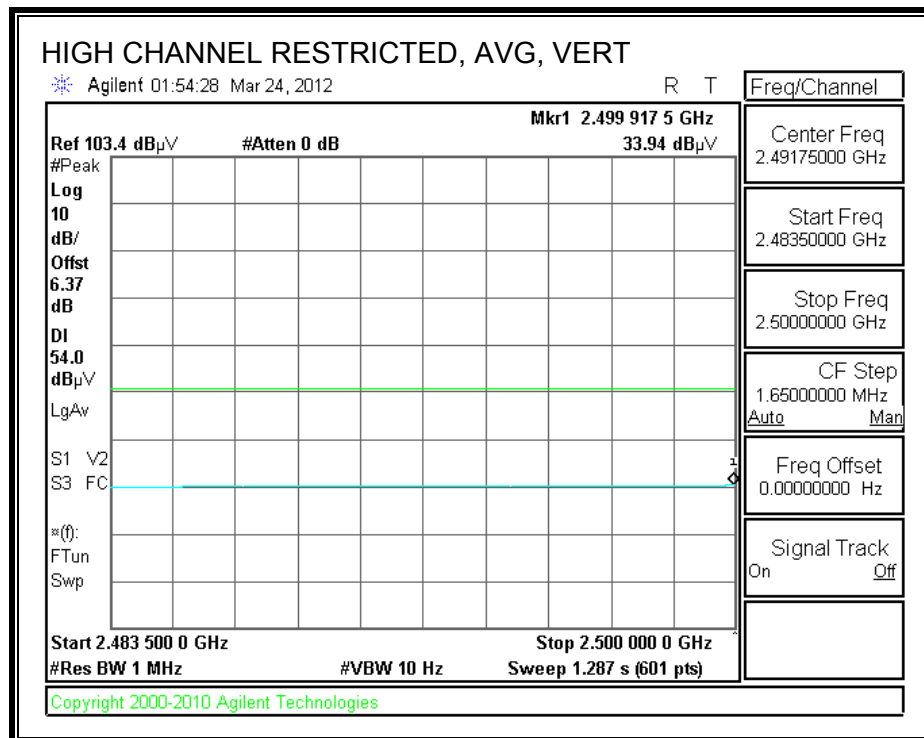
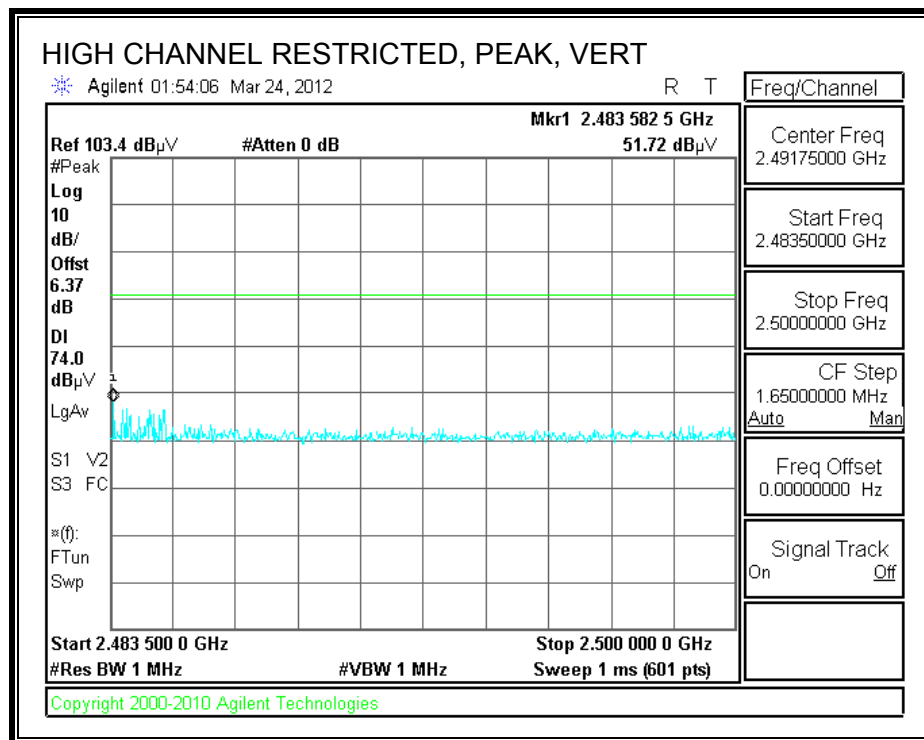
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

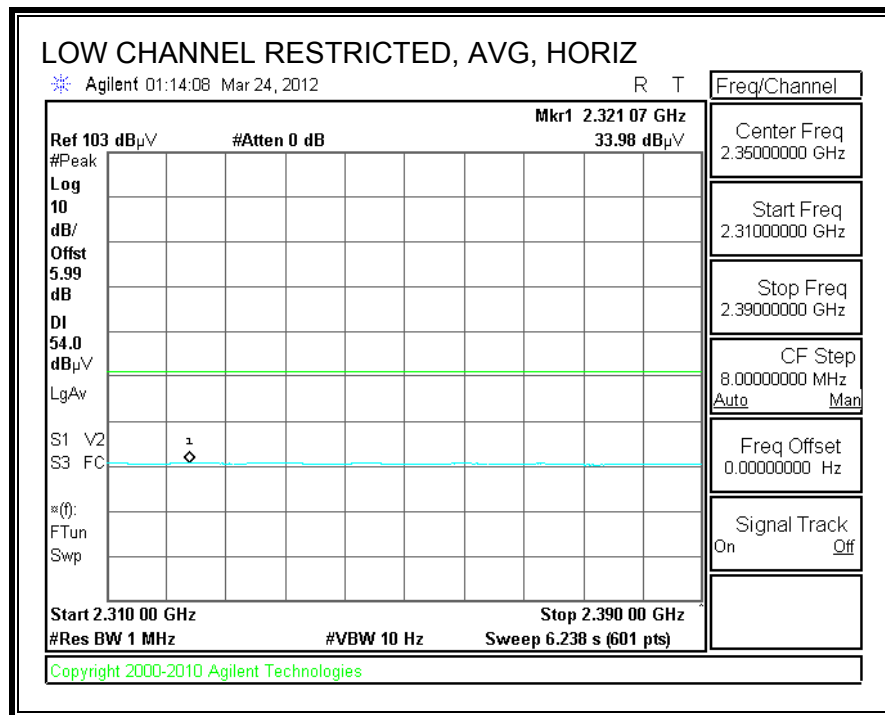
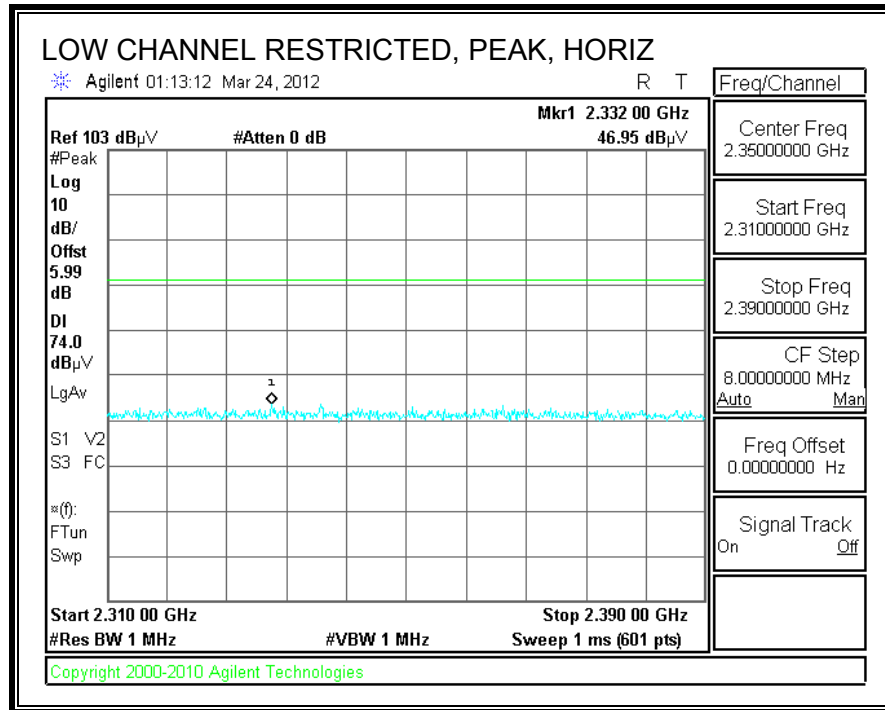


HARMONICS AND SPURIOUS EMISSIONS

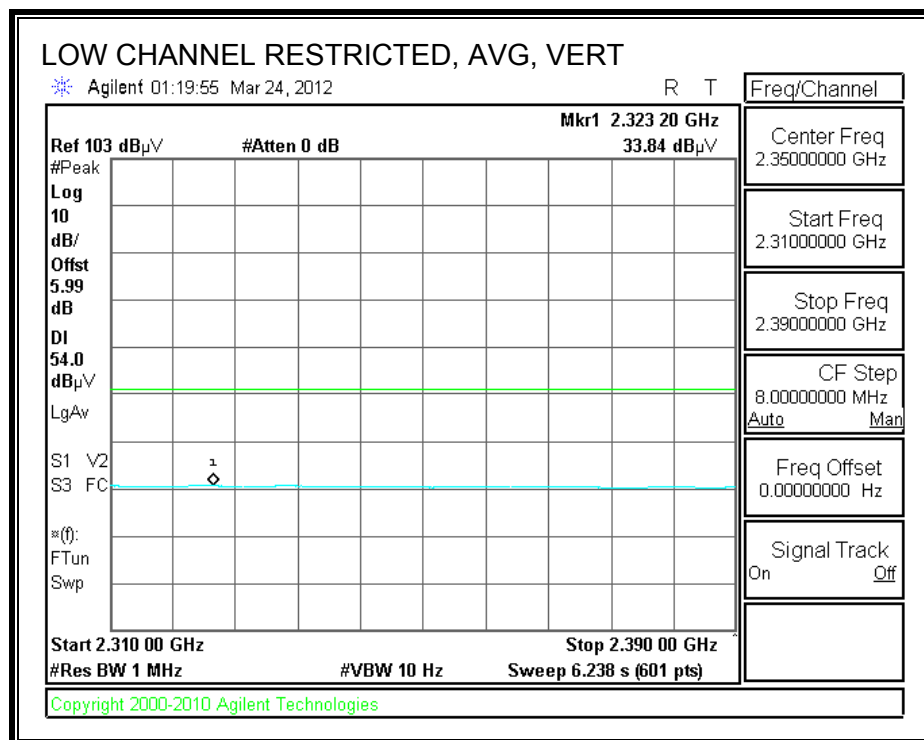
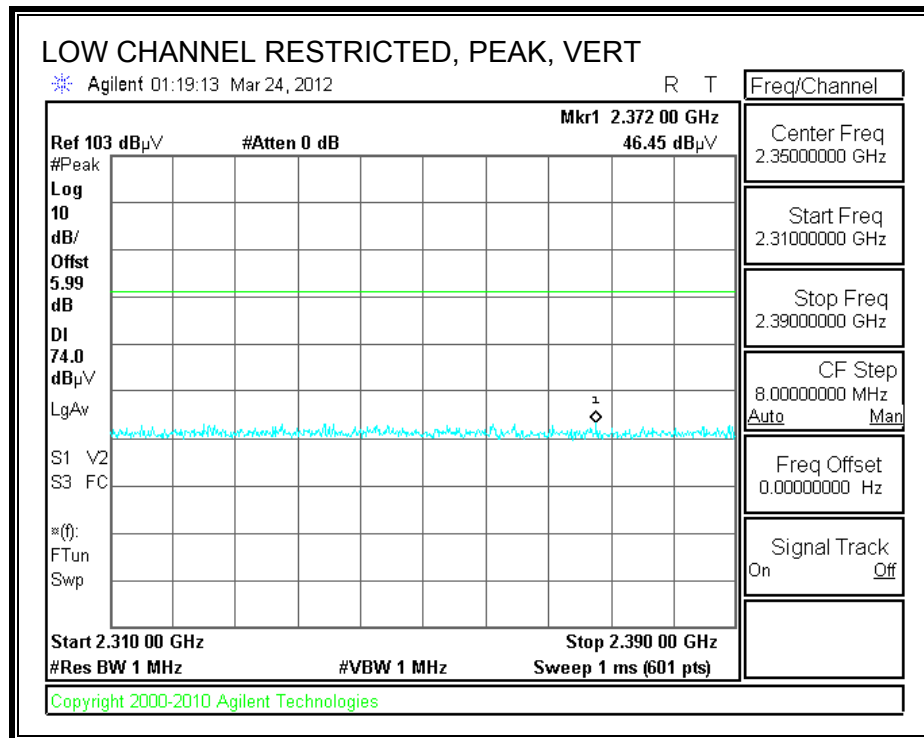
High Frequency Measurement																			
Compliance Certification Services, Fremont 5m Chamber-A																			
Company:		Samsung Electronics																	
Project #:		12I14319																	
Date:		3/23/2012																	
Test Engineer:		S.Aguilar																	
Configuration:		EUT + Adapter + headset (EUT S/N 01039)																	
Mode:		GFSK TX Mode																	
Test Equipment:																			
Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz				Limit			
T73; S/N: 6717 @3m				T144 Mite q 3008A00931								T89; ARA 18-26GHz; S/N:1049				FCC 15.205			
Hi Frequency Cables																			
3' cable 22807700				12' cable 22807600				20' cable 22807500				HPF				Reject Filter			
3' cable 22807700				12' cable 22807600				20' cable 22807500								R_001			
Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz																			
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)				
Low Channel (2402 MHz)																			
4.804	3.0	37.9	26.3	33.4	6.2	-35.5	0.0	0.0	42.0	30.4	74	54	-32.0	-23.6	H				
4.804	3.0	26.3	33.4	33.4	6.2	-35.5	0.0	0.0	30.4	37.5	74	54	-43.6	-16.5	V				
Mid Channel (2441 MHz)																			
4.882	3.0	36.8	33.5	33.5	6.2	-35.5	0.0	0.0	41.0	37.7	74	54	-33.0	-16.3	H				
4.882	3.0	38.4	27.9	33.5	6.2	-35.5	0.0	0.0	42.6	32.2	74	54	-31.4	-21.8	V				
7.323	3.0	35.4	23.2	35.7	8.4	-35.4	0.0	0.0	44.1	31.9	74	54	-29.9	-22.1	H				
7.323	3.0	35.8	23.2	35.7	8.4	-35.4	0.0	0.0	44.4	31.9	74	54	-29.6	-22.1	V				
High Channel																			
4.960	3.0	37.6	26.6	33.6	6.3	-35.5	0.0	0.0	42.0	30.9	74	54	-32.0	-23.1	H				
4.960	3.0	36.3	24.7	33.6	6.3	-35.5	0.0	0.0	40.7	29.1	74	54	-33.3	-24.9	V				
7.440	3.0	35.9	23.6	35.9	8.4	-35.5	0.0	0.0	44.7	32.5	74	54	-29.3	-21.5	H				
7.440	3.0	36.3	23.6	35.9	8.4	-35.5	0.0	0.0	45.1	32.5	74	54	-28.9	-21.5	V				
Rev. 11.10.11																			
f	Measurement Frequency		Amp	Preamp Gain		Avg Lim	Average Field Strength Limit												
Dist	Distance to Antenna		D Corr	Distance Correct to 3 meters		Pk Lim	Peak Field Strength Limit												
Read	Analyzer Reading		Avg	Average Field Strength @ 3 m		Avg Mar	Margin vs. Average Limit												
AF	Antenna Factor		Peak	Calculated Peak Field Strength		Pk Mar	Margin vs. Peak Limit												
CL	Cable Loss		HPF	High Pass Filter															

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

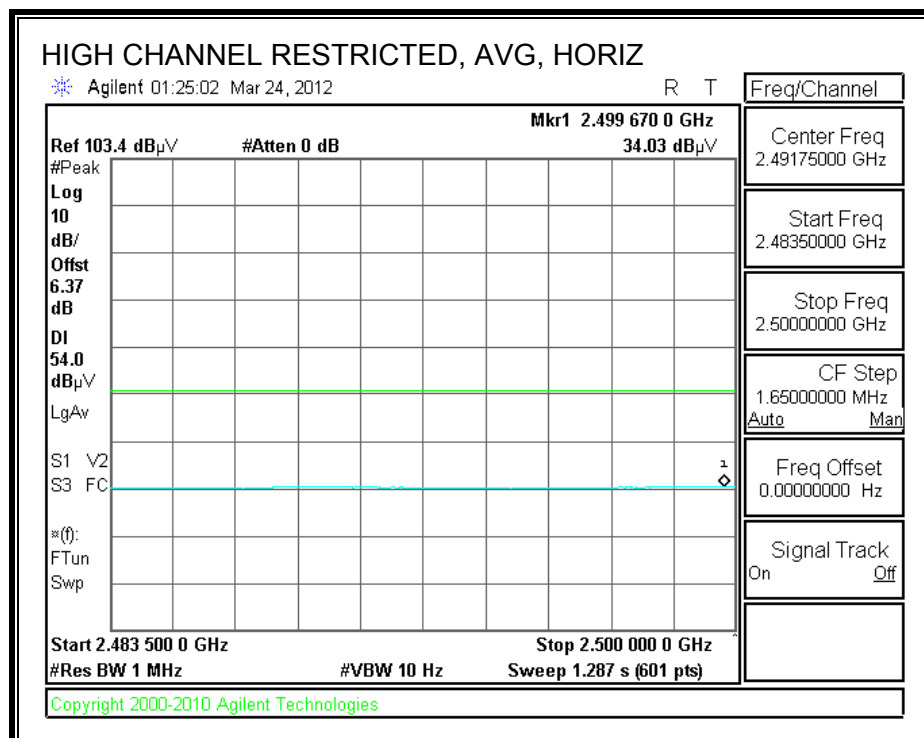
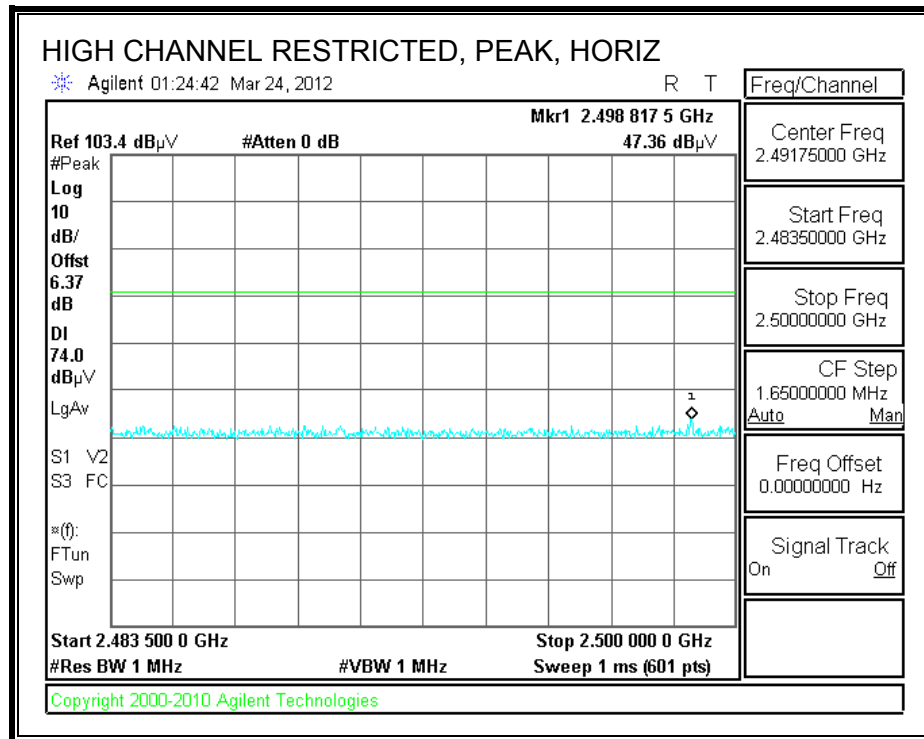
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



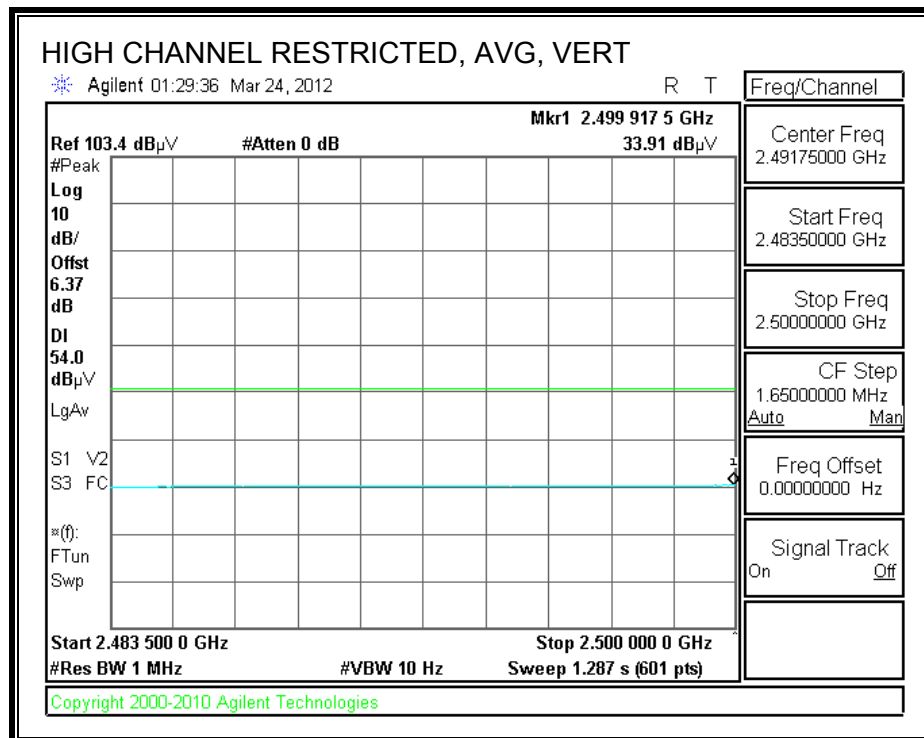
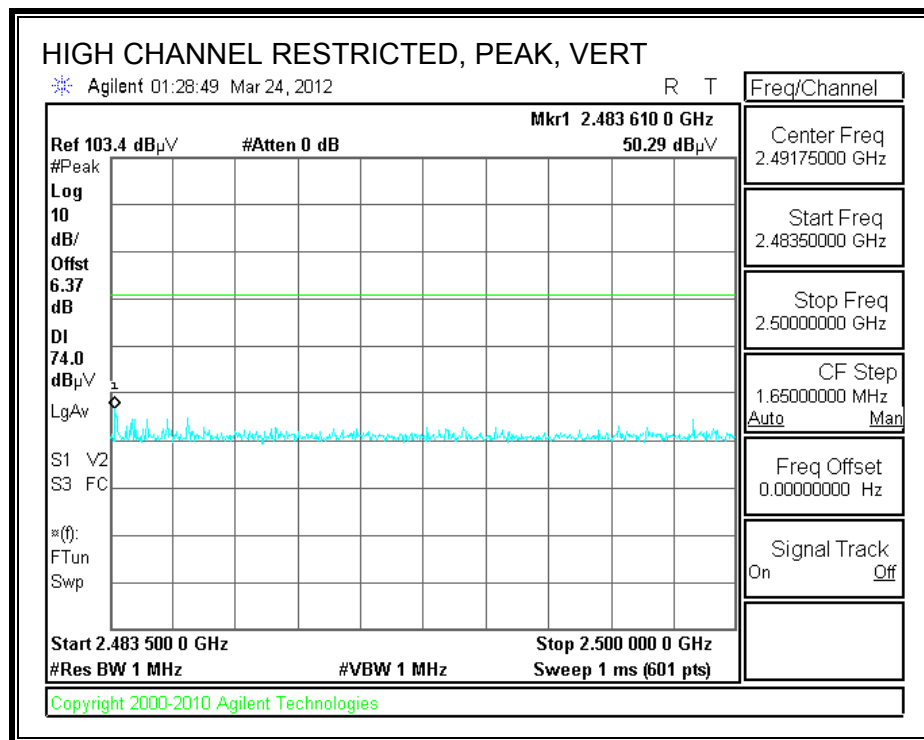
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

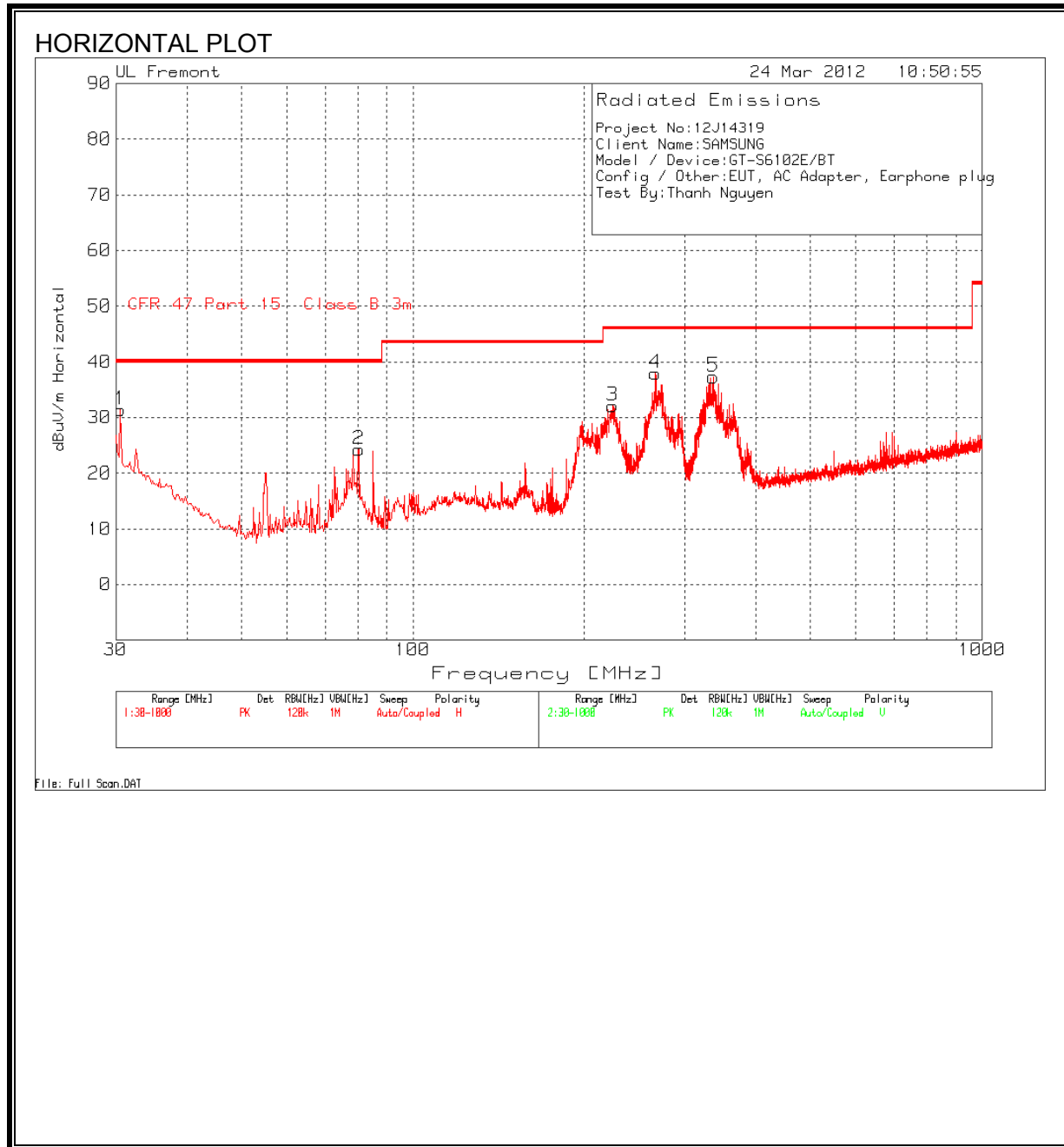


HARMONICS AND SPURIOUS EMISSIONS

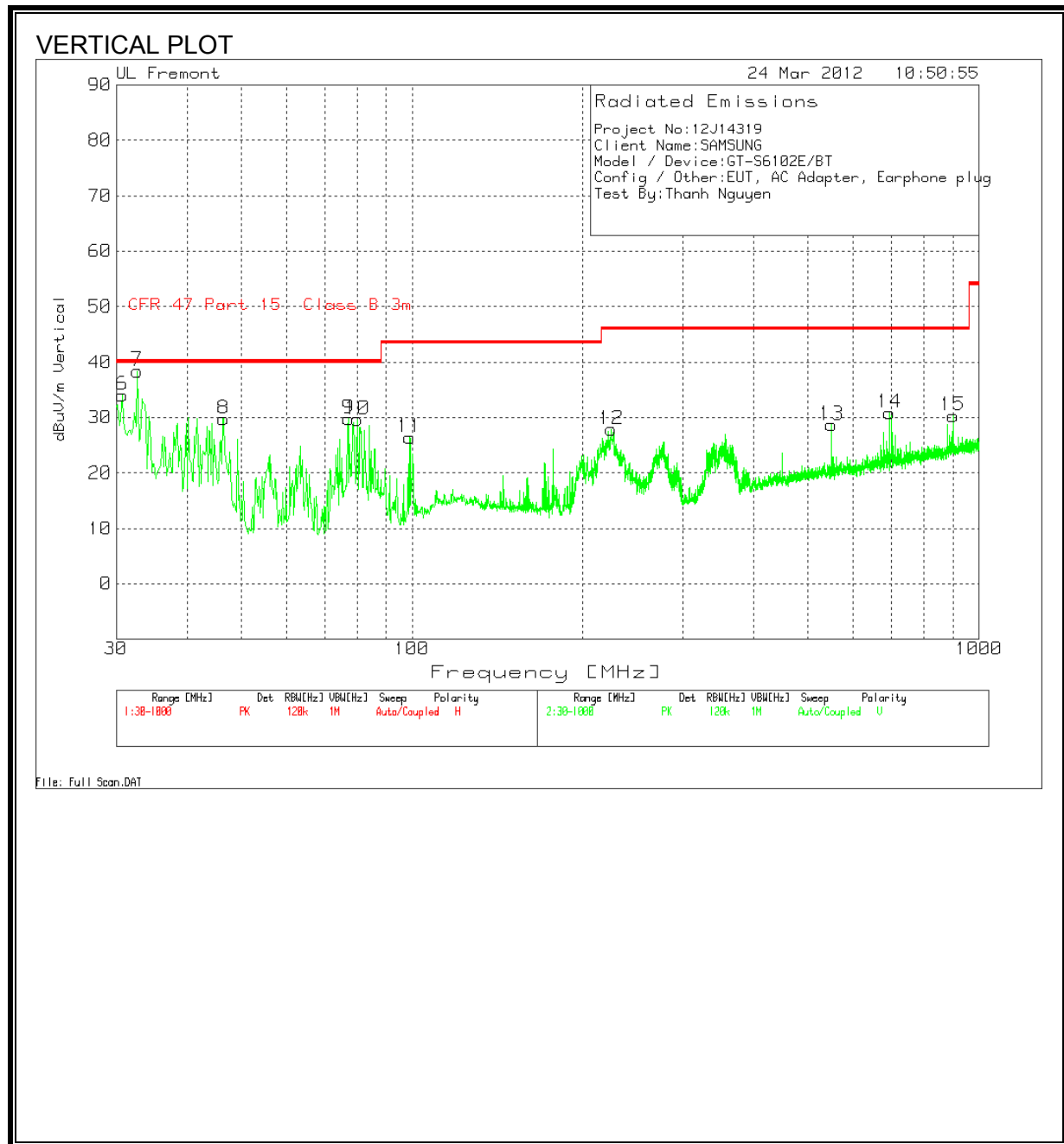
High Frequency Measurement																			
Compliance Certification Services, Fremont 5m Chamber-A																			
Company:		Samsung Electronics																	
Project #:		12I14319																	
Date:		3/23/2012																	
Test Engineer:		S.Aguilar																	
Configuration:		EUT + Adapter + headset (EUT S/N 01039)																	
Mode:		8PSK TX Mode																	
Test Equipment:																			
Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz				Limit			
T73; S/N: 6717 @3m				T144 Miteq 3008A00931								T89; ARA 18-26GHz; S/N:1049				FCC 15.205			
Hi Frequency Cables																			
3' cable 22807700				12' cable 22807600				20' cable 22807500				HPF				Reject Filter			
3' cable 22807700				12' cable 22807600				20' cable 22807500								R_001			
Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz																			
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)				
Low Channel (2402 MHz)																			
4.804	3.0	36.6	25.1	33.4	6.2	-35.5	0.0	0.0	40.7	29.2	74	54	-33.3	-24.8	H				
4.804	3.0	39.0	27.5	33.4	6.2	-35.5	0.0	0.0	43.1	31.6	74	54	-30.9	-22.4	V				
Mid Channel (2441 MHz)																			
4.882	3.0	36.4	25.2	33.5	6.2	-35.5	0.0	0.0	40.6	29.4	74	54	-33.4	-24.6	H				
4.882	3.0	37.5	26.7	33.5	6.2	-35.5	0.0	0.0	41.7	31.0	74	54	-32.3	-23.0	V				
7.323	3.0	35.2	23.2	35.7	8.4	-35.4	0.0	0.0	43.9	31.9	74	54	-30.1	-22.1	H				
7.323	3.0	36.4	23.3	35.7	8.4	-35.4	0.0	0.0	45.1	31.9	74	54	-28.9	-22.1	V				
High Channel																			
4.960	3.0	36.7	25.4	33.6	6.3	-35.5	0.0	0.0	41.1	29.8	74	54	-32.9	-24.2	H				
4.960	3.0	37.4	26.2	33.6	6.3	-35.5	0.0	0.0	41.8	30.6	74	54	-32.2	-23.4	V				
7.440	3.0	36.6	23.6	35.9	8.4	-35.5	0.0	0.0	45.5	32.5	74	54	-28.5	-21.5	H				
7.440	3.0	36.4	23.6	35.9	8.4	-35.5	0.0	0.0	45.3	32.5	74	54	-28.7	-21.5	V				
Rev. 11.10.11																			
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit						
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit						
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit						
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit						
CL	Cable Loss					HPF	High Pass Filter												

8.3. WORST-CASE BELOW 1 GHz

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



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



HORIZONTAL AND VERTICAL DATA

Project No:12J14319									
Client Name:SAMSUNG									
Model / Device:GT-S6102E/BT									
Config / Other:EUT, AC Adapter, Earphone plug									
Test By:Thanh Nguyen									
Range 1 30 - 1000MHz									
Test Freq. MHz	Meter Reading dB(μV/m)	Detector	Gain [dB] + Cable Loss dB	Antenna Factor (dB)	Corrected Reading dB(μV/m)	CFR 47 Part 15 Class B 3m	Margin	Height cm	Polarity V/H
30.5815	38.11	PK	-27.5	20.8	31.41	40	-8.59	300	Horz
80.2058	43.64	PK	-27.1	7.7	24.24	40	-15.76	400	Horz
224.2326	47.52	PK	-26	10.6	32.12	46	-13.88	200	Horz
266.4908	50.8	PK	-25.8	12.9	37.9	46	-8.1	100	Horz
337.0504	49.23	PK	-25.6	13.7	37.33	46	-8.67	100	Horz
Range 1 30 - 1000MHz									
Test Freq. MHz	Meter Reading dB(μV/m)	Detector	Gain [dB] + Cable Loss dB	Antenna Factor (dB)	Corrected Reading dB(μV/m)	CFR 47 Part 15 Class B 3m	Margin	Height cm	Polarity V/H
30.7754	40.94	PK	-27.5	20.6	34.04	40	-5.96	300	Vert
32.7138	46.8	PK	-27.6	19.2	38.4	40	-1.6	100	Vert
32.7138	27.37	QP	-27.6	19.2	18.97	40	-21.03	128	Vert
46.3799	47.45	PK	-27.4	9.7	29.75	40	-10.25	100	Vert
77.2982	48.98	PK	-27.1	7.9	29.78	40	-10.22	100	Vert
80.012	49.07	PK	-27.1	7.7	29.67	40	-10.33	100	Vert
99.0088	43.42	PK	-26.9	9.9	26.42	43.5	-17.08	100	Vert
224.6203	43.27	PK	-26	10.6	27.87	46	-18.13	100	Vert
549.8921	35.16	PK	-24.4	17.9	28.66	46	-17.34	100	Vert
696.0512	34.46	PK	-23.2	19.6	30.86	46	-15.14	100	Vert
899.976	31.49	PK	-23.4	22.2	30.29	46	-15.71	200	Vert

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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.

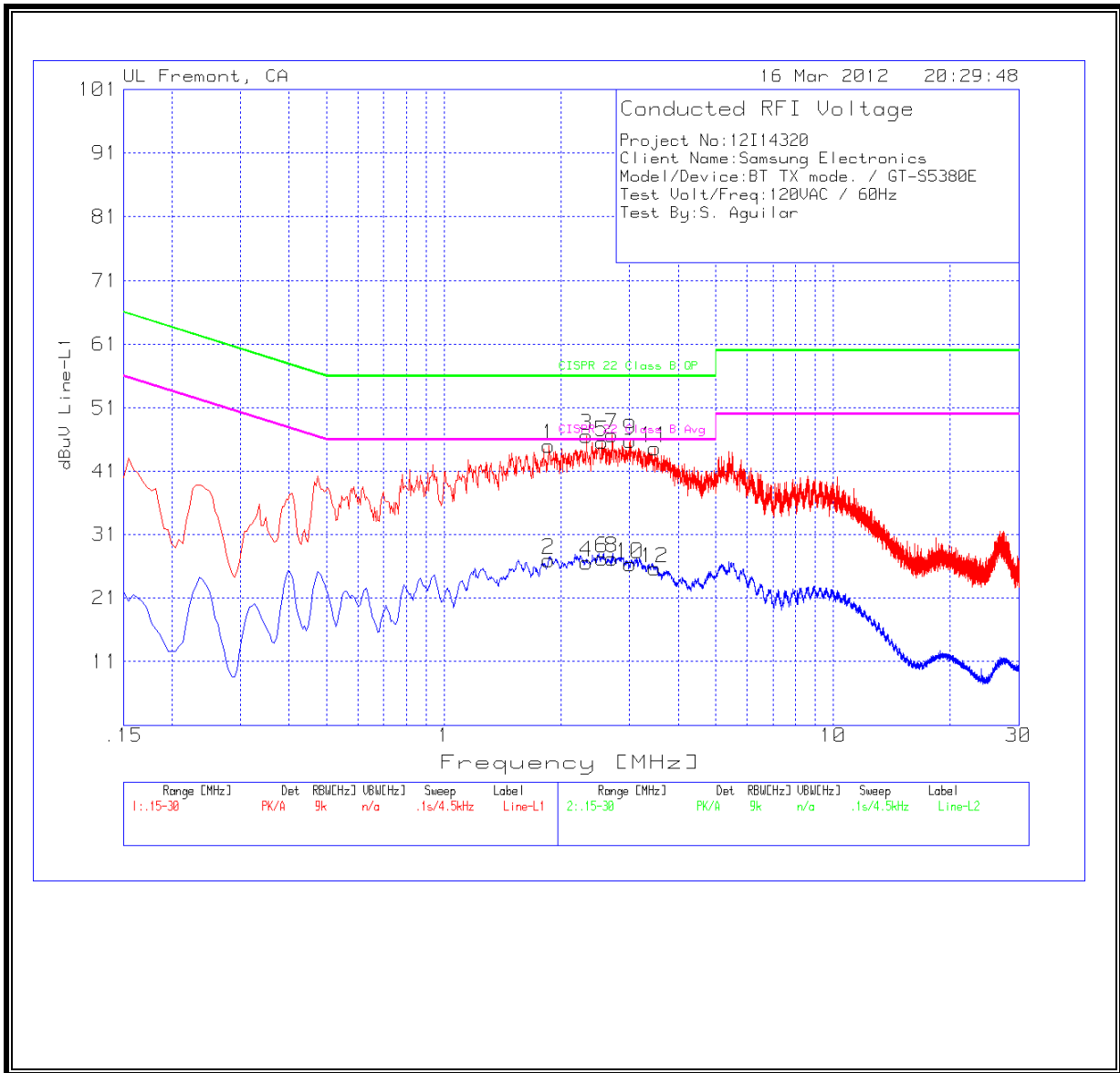
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

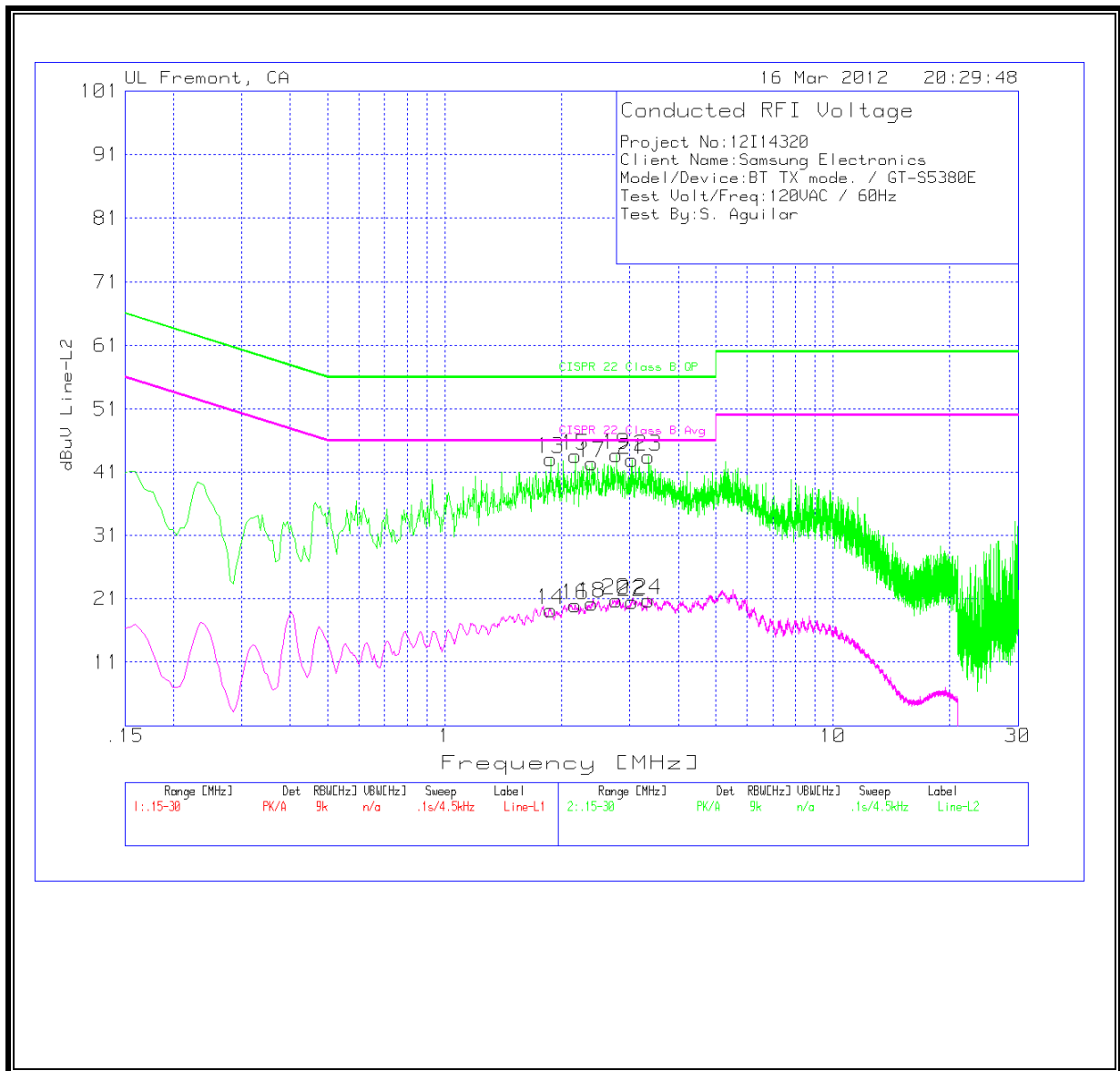
6 WORST EMISSIONS

Company Name:		Samsung Electronics							
Project:		12I14320							
Date:		3/16/2012							
Configuraiton:		EUT + Adapter + Headset							
Mode:		TX Mode BT, Worst case							
Tested by:		S. Aguilar							
Line-L1 .15 - 30MHz									
Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	LISN [dB]	Cables [dB]	Corrected [dB(uV)]	Class B QP Limit	QP Margin	Class B Av Limit [dB(uV)]	Av Margin [dB]
1.8555	44.88	PK	0.1	0.1	45.08	56	-10.92	-	-
1.8555	26.77	Av	0.1	0.1	26.97	-	-	46	-19.03
2.3235	46.39	PK	0.1	0.1	46.59	56	-9.41	-	-
2.3235	26.41	Av	0.1	0.1	26.61	-	-	46	-19.39
2.553	45.46	PK	0.1	0.1	45.66	56	-10.34	-	-
2.553	26.99	Av	0.1	0.1	27.19	-	-	46	-18.81
2.706	46.6	PK	0.1	0.1	46.8	56	-9.2	-	-
2.706	27.08	Av	0.1	0.1	27.28	-	-	46	-18.72
3.012	45.71	PK	0.1	0.1	45.91	56	-10.09	-	-
3.012	26.17	Av	0.1	0.1	26.37	-	-	46	-19.63
3.4845	44.48	PK	0.1	0.1	44.68	56	-11.32	-	-
3.4845	25.41	Av	0.1	0.1	25.61	-	-	46	-20.39
Line-L2 .15 - 30MHz									
Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	LISN [dB]	Cables [dB]	Corrected [dB(uV)]	Class B QP Limit	QP Margin	Class B Av Limit [dB(uV)]	Av Margin [dB]
1.8735	42.97	PK	0.1	0.1	43.17	56	-12.83	-	-
1.8735	19.04	Av	0.1	0.1	19.24	-	-	46	-26.76
2.1705	43.41	PK	0.1	0.1	43.61	56	-12.39	-	-
2.1705	19.81	Av	0.1	0.1	20.01	-	-	46	-25.99
2.3955	42.34	PK	0.1	0.1	42.54	56	-13.46	-	-
2.3955	20.05	Av	0.1	0.1	20.25	-	-	46	-25.75
2.7735	43.55	PK	0.1	0.1	43.75	56	-12.25	-	-
2.7735	20.54	Av	0.1	0.1	20.74	-	-	46	-25.26
3.039	42.76	PK	0.1	0.1	42.96	56	-13.04	-	-
3.039	20.26	Av	0.1	0.1	20.46	-	-	46	-25.54
3.354	43.28	PK	0.1	0.1	43.48	56	-12.52	-	-
3.354	20.58	Av	0.1	0.1	20.78	-	-	46	-25.22
PK - Peak detector									
QP - Quasi-Peak detector									
Av - Average detector									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

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

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

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

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Ex-
posed Workers (Including the General Public)

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

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

- Notes:**
1. Frequency, *f*, is in MHz.
 2. A power density of 10 W/m² is equivalent to 1 mW/cm².
 3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

$$S = \text{EIRP} / (4 * \pi * D^2)$$

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \pi * S))$$

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

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

$$\text{Total EIRP} = (P_1 * G_1) + (P_2 * G_2) + \dots + (P_n * G_n)$$

where

P_x = Power of transmitter x

G_x = Numeric gain of antenna x

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

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m²)	FCC Power Density (mW/cm²)
2.4 GHz	Bluetooth	0.20	4.62	-4.50	0.002	0.0002