



FCC 47 CFR PART 15 SUBPART C

**CERTIFICATION TEST REPORT
FOR**

GSM1900 Phone + Bluetooth & WLAN 2.4GHz b/g/n + NFC

MODEL NUMBER: SM-G3508I

FCC ID: A3LSMG3508I

REPORT NUMBER: 13I16428-2, Revision A

ISSUE DATE: December 5, 2013

Prepared for

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/15/13	Initial Issue	P. Kim
A	12/5/13	Updated statement in section 8.4	P. Kim

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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: GSM1900 Phone + Bluetooth & WLAN 2.4GHz b/g/n + NFC.

MODEL: SM-G3508I

SERIAL NUMBER: FK-338-A (RADIATED)
FK-338-B (RADIATED)
FK-338-D (CONDUCTED)

DATE TESTED: November 11 – 15, 2013

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

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

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

Approved & Released For
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PHILIP KIM
WiSE PROGRAM MANAGER
UL Verification Services Inc.

Tested By:



CHARLES VERGONIO
WiSE LAB TECHNICIAN
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, 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 Verification Services Inc. 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:

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

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	3.52 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 mobile bar phone that supports 802.11bgn(HT20), GSM/EGRPS 1900MHz, and BT3.0+EDR.

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	10.85	12.16
2402 - 2480	Enhanced 8PSK	11.33	13.58

Note: GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode to showing compliance. For average power data please refer to section 8.6.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -3.1 dBi.

5.4. SOFTWARE AND FIRMWARE

Software version was cs02vemzm-eng 4.1.2 JZO54K.

The firmware used was G3508IZMUAMJ1.

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	SAMSUNG	ETAOU42CBC	GB4943.1-2011	N/A
Earphone	SAMSUNG	N/A	N/A	N/A

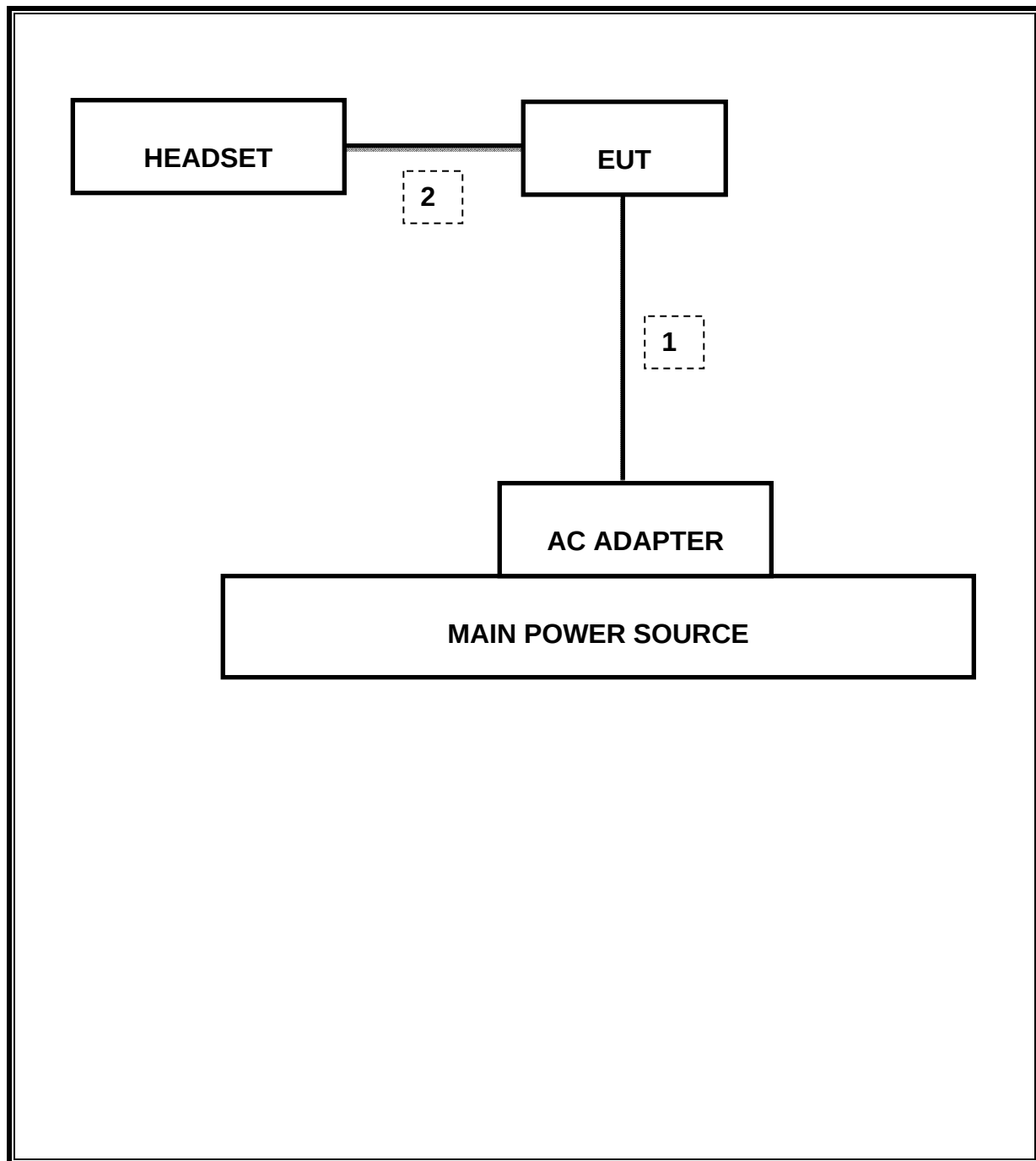
I/O CABLES

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

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	03/23/12	02/13/14
Antenna, Horn, 18GHz	EMCO	3117	C01006	10/25/12	02/19/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/13	01/28/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/12	12/20/13
CBT Bluetooth Tester	R & S	CBT	None	07/12/13	07/12/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/12	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/12	12/13/13
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/13	01/14/14
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR	CNR

7. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	RSS-GEN 4.6	Occupied Band width (99%)	N/A	Conducted	Pass	1.1652MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-38.79dBm
15.247 (b)(1)	RSS-210 A8.4	TX conducted output power	<21dBm		Pass	11.33dBm
15.247 (a)(1)	RSS-210 A8.1(b)	Hopping frequency separation	> 25KHz		Pass	1MHz
15.247 (a)(1)(iii)	RSS-210 A8.1(d)	Number of Hopping channels	More than 15 non-overlapping channels		Pass	79
15.247 (a)(1)(iii)	RSS-210 A8.1(d)	Avg Time of Occupancy	< 0.4sec		Pass	-0.023
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	37.96dBuV
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	40.91dBuV/m

8. ANTENNA PORT TEST RESULTS

8.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

DA 00-705: 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

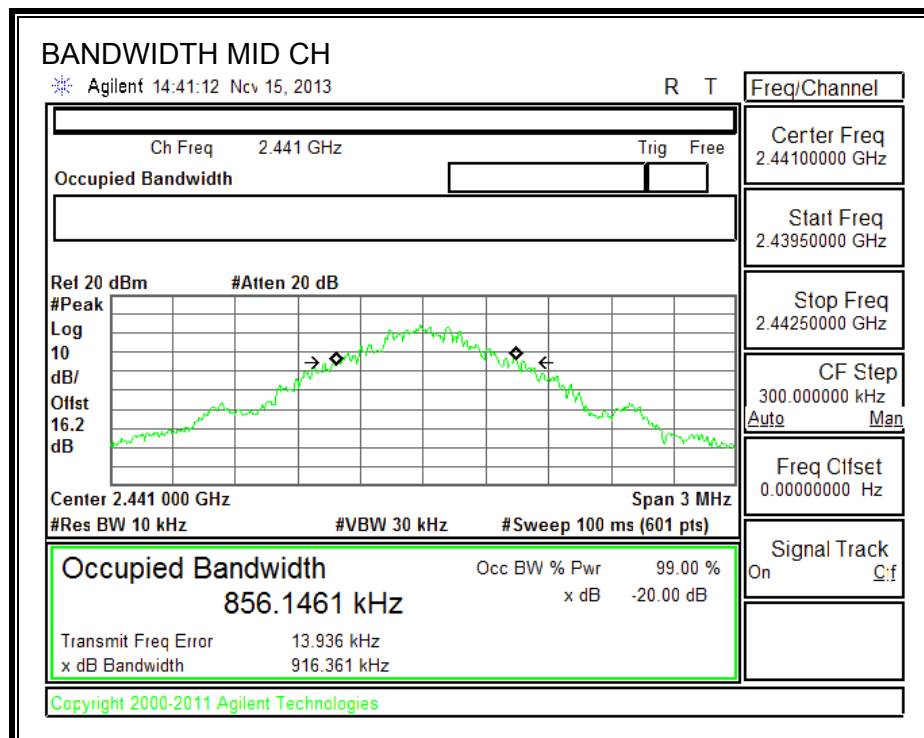
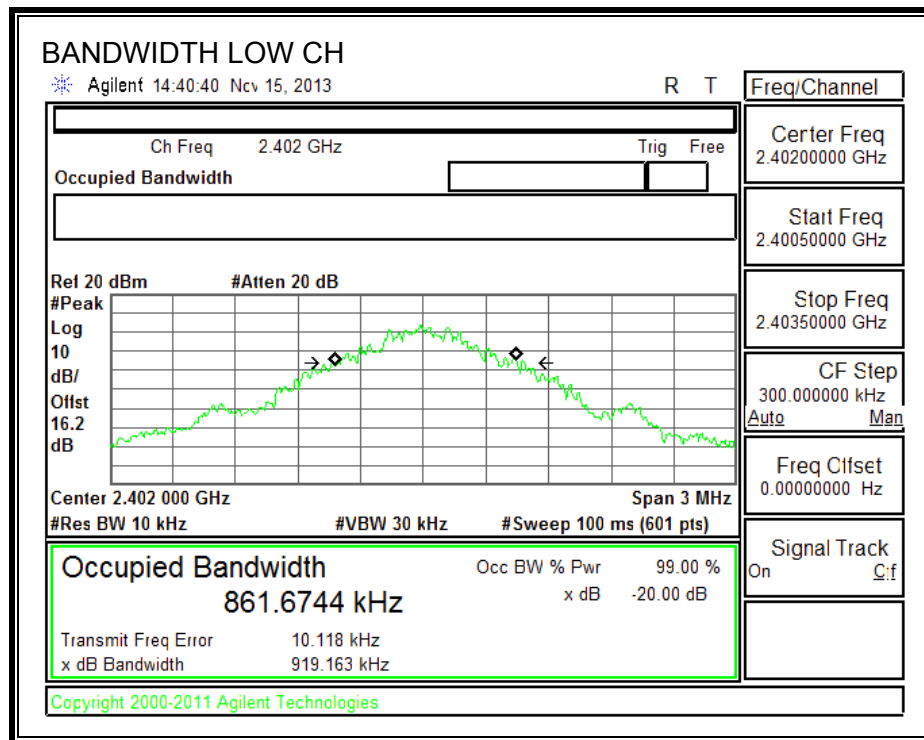
8.1.1. BASIC DATA RATE GFSK MODULATION

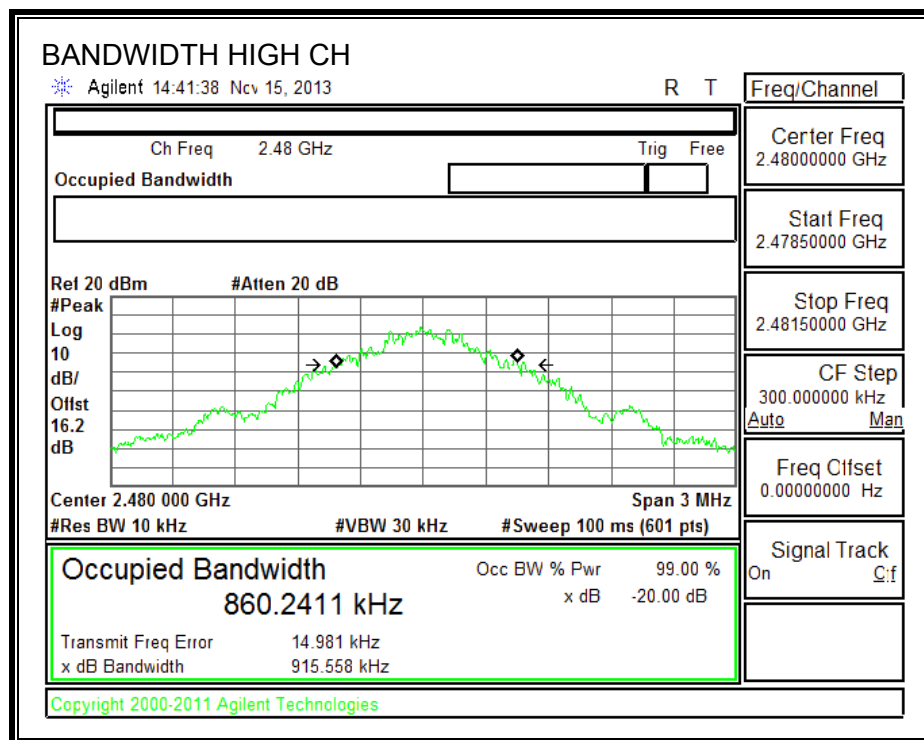
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	919.2	844.6
Middle	2441	916.4	896.2
High	2480	915.6	905.9
Worst		919.2	905.9

8.1.1. ENHANCED DATA RATE 8PSK MODULATION

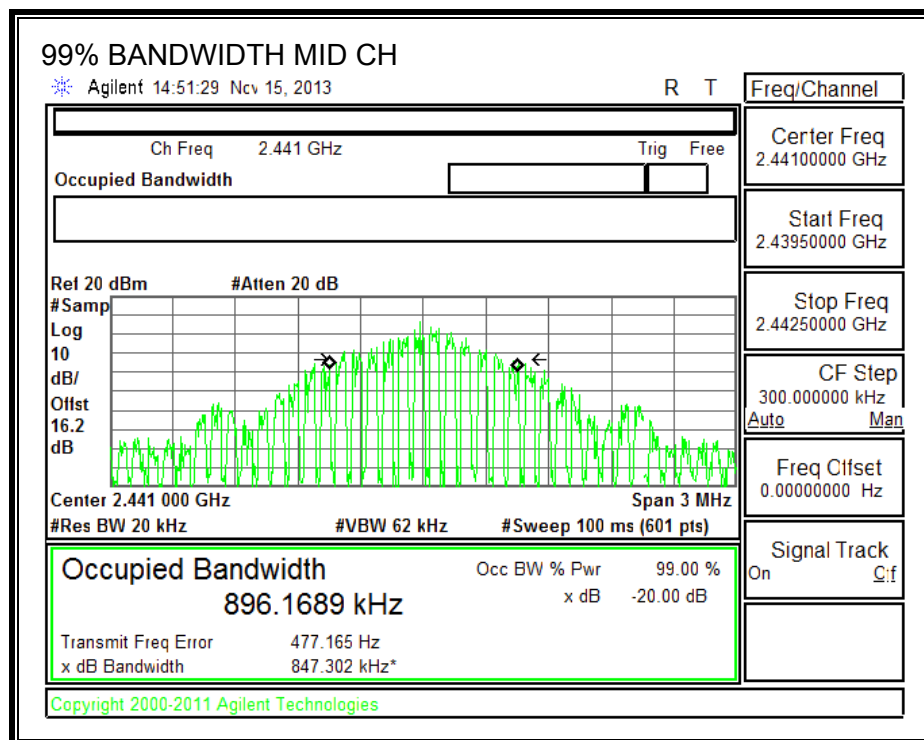
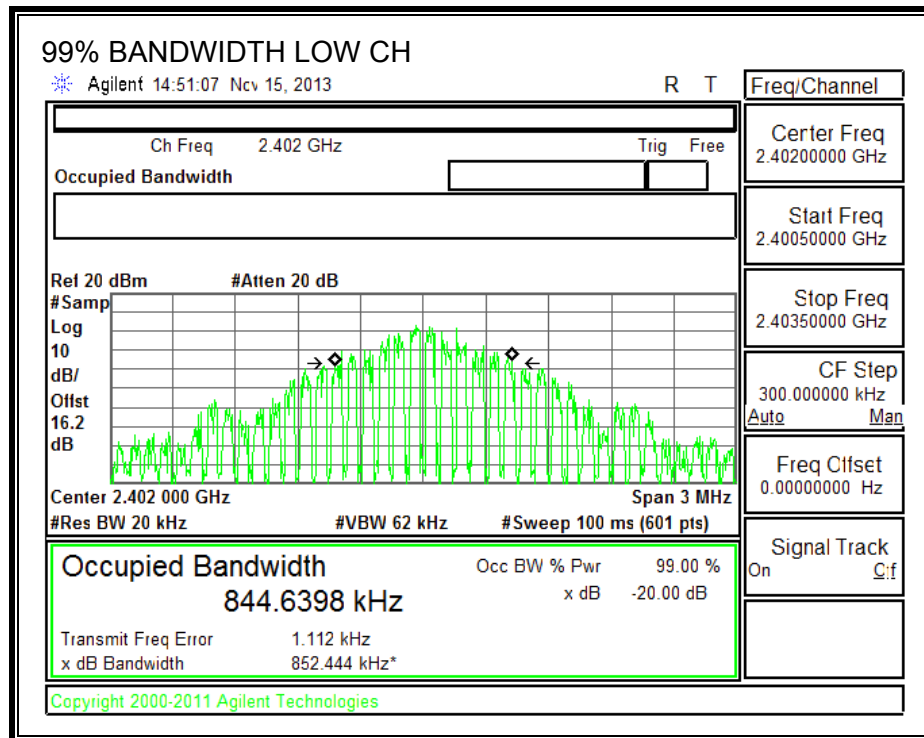
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.282	1.1636
Middle	2441	1.215	1.1652
High	2480	1.273	1.1311
Worst		1.282	1.1652

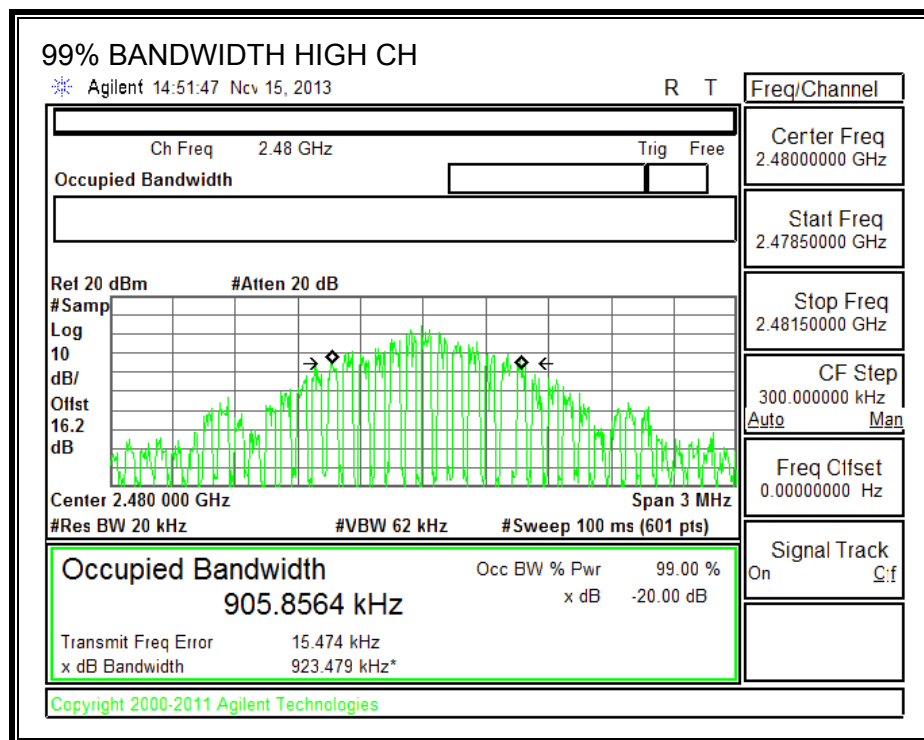
GFSK 20 dB BANDWIDTH



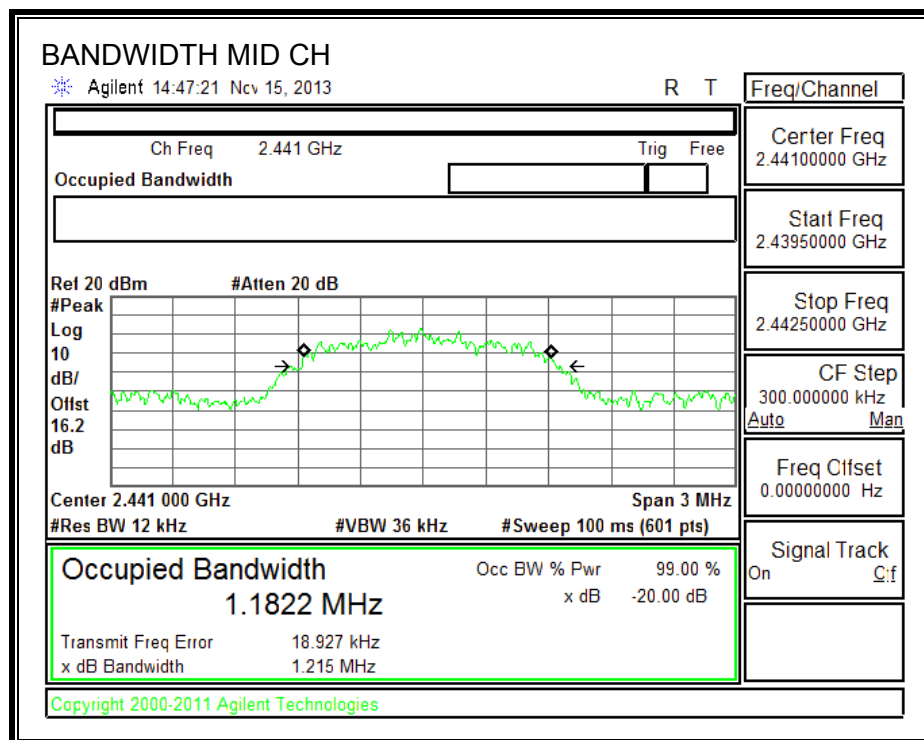
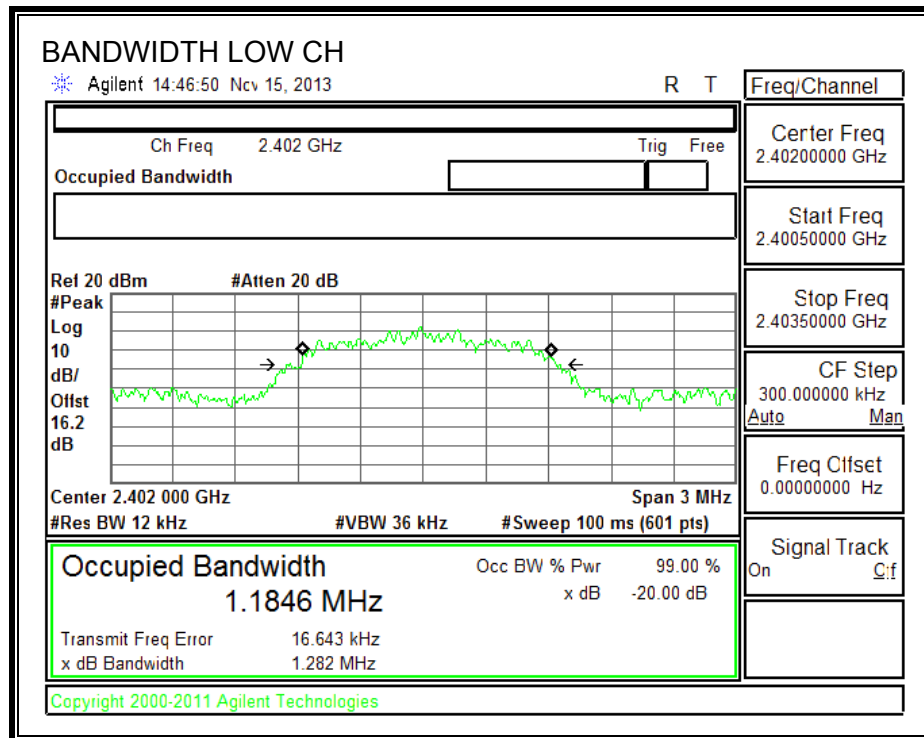


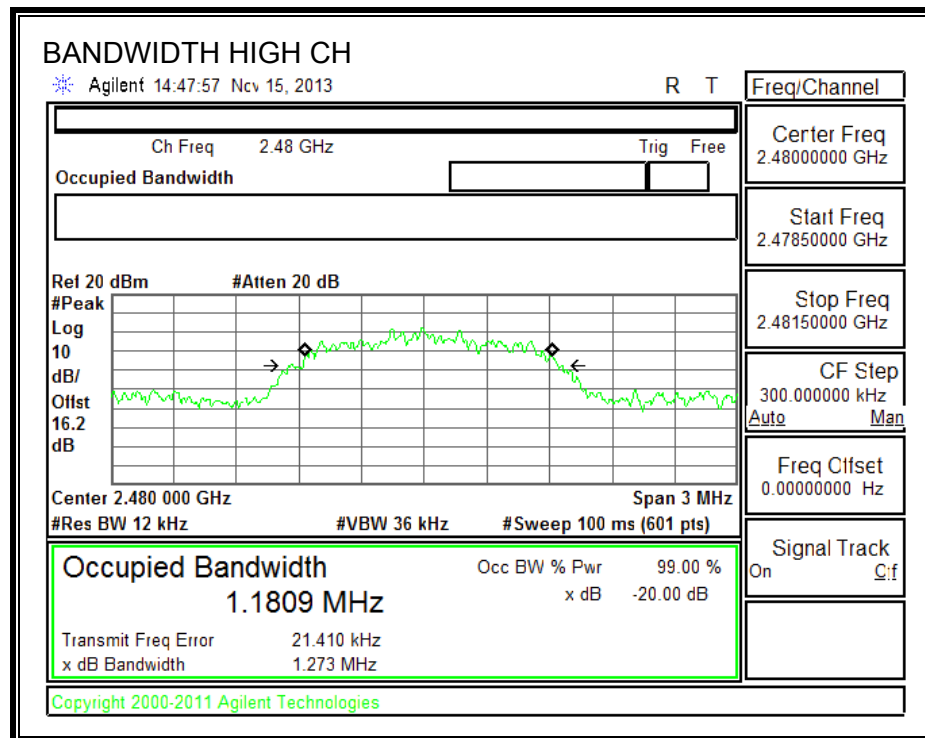
GFSK 99% BANDWIDTH



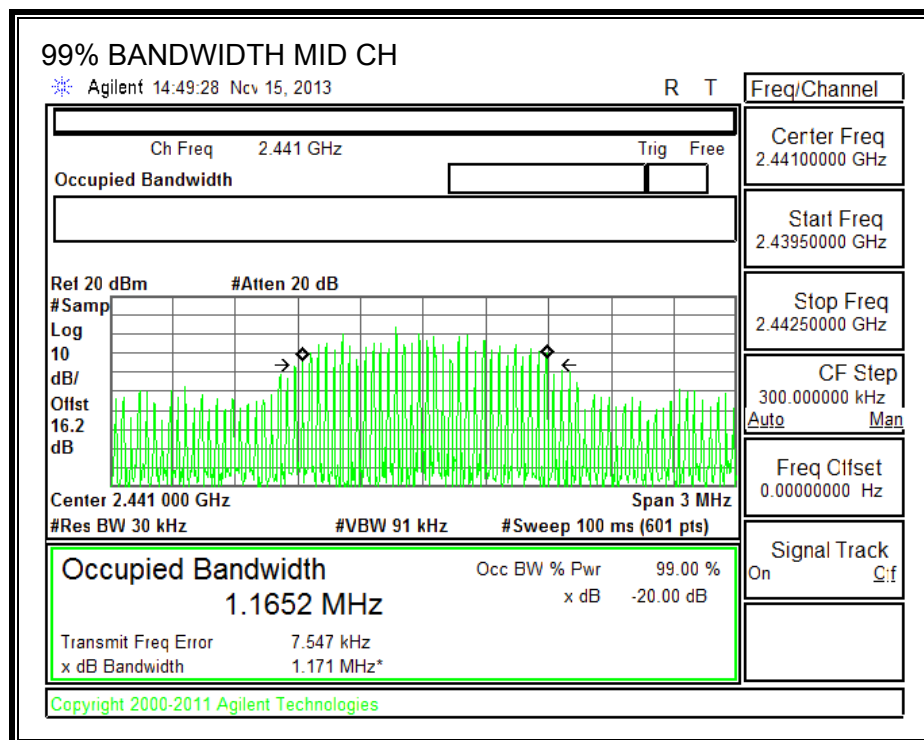
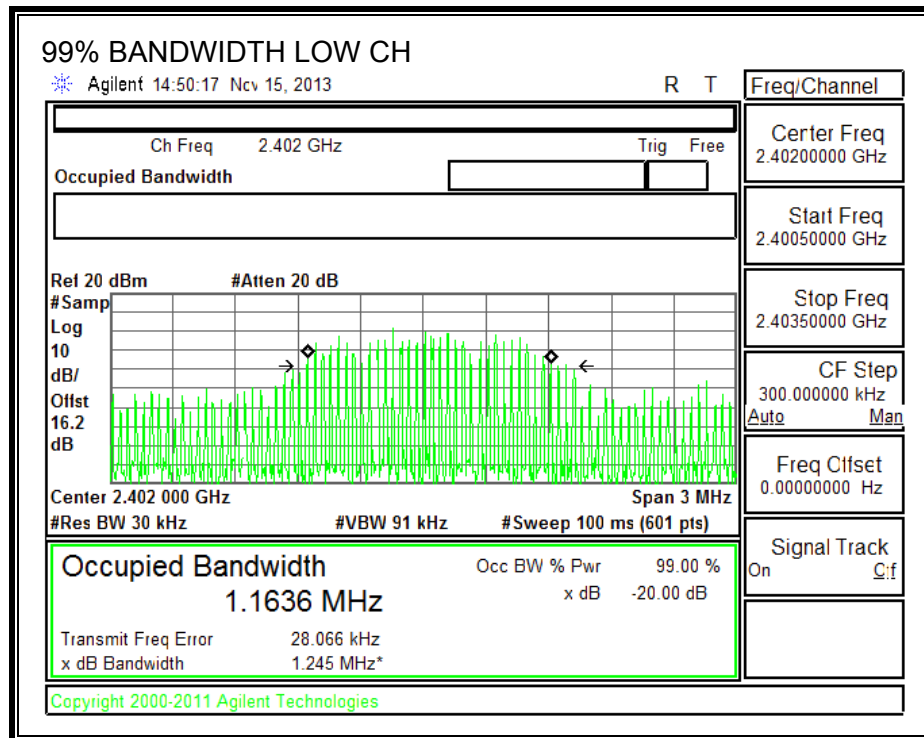


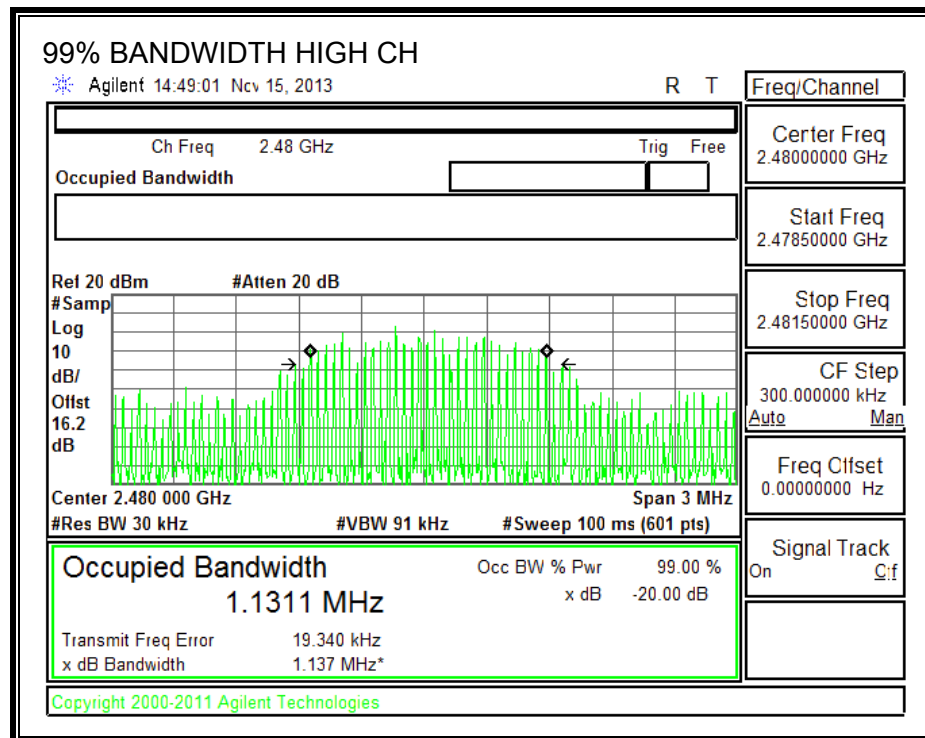
8PSK 20 dB BANDWIDTH





8PSK 99% BANDWIDTH





8.2. 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.

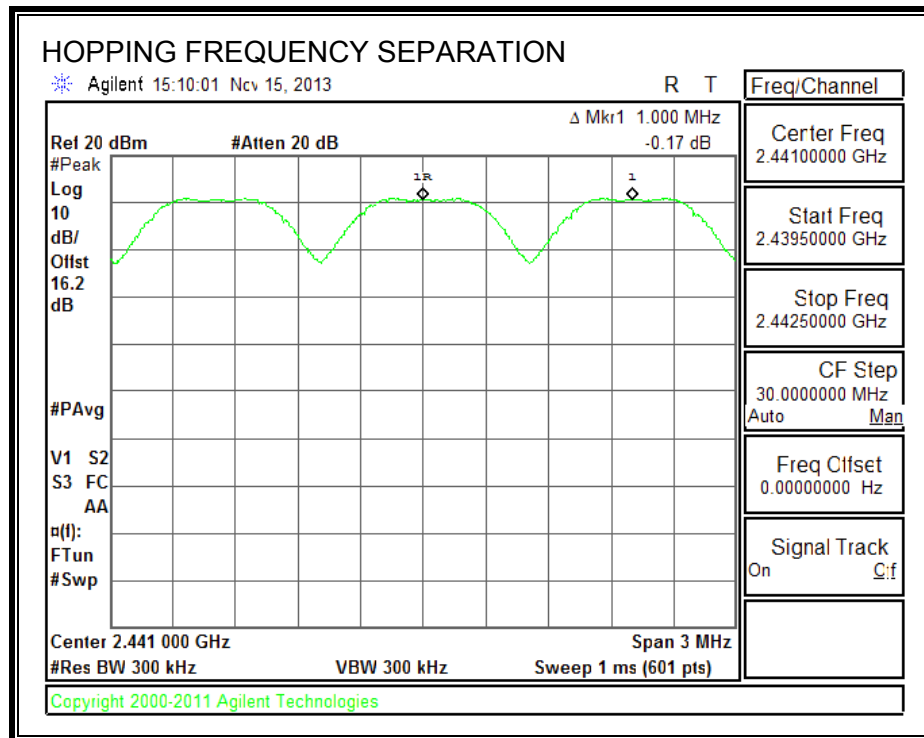
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



8.3. 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.

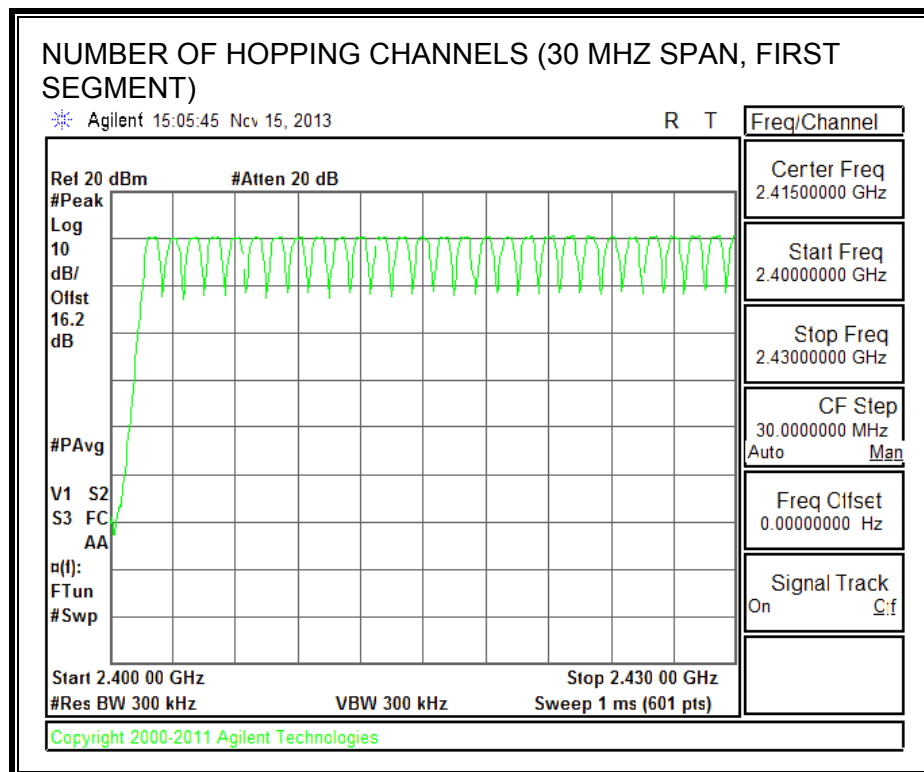
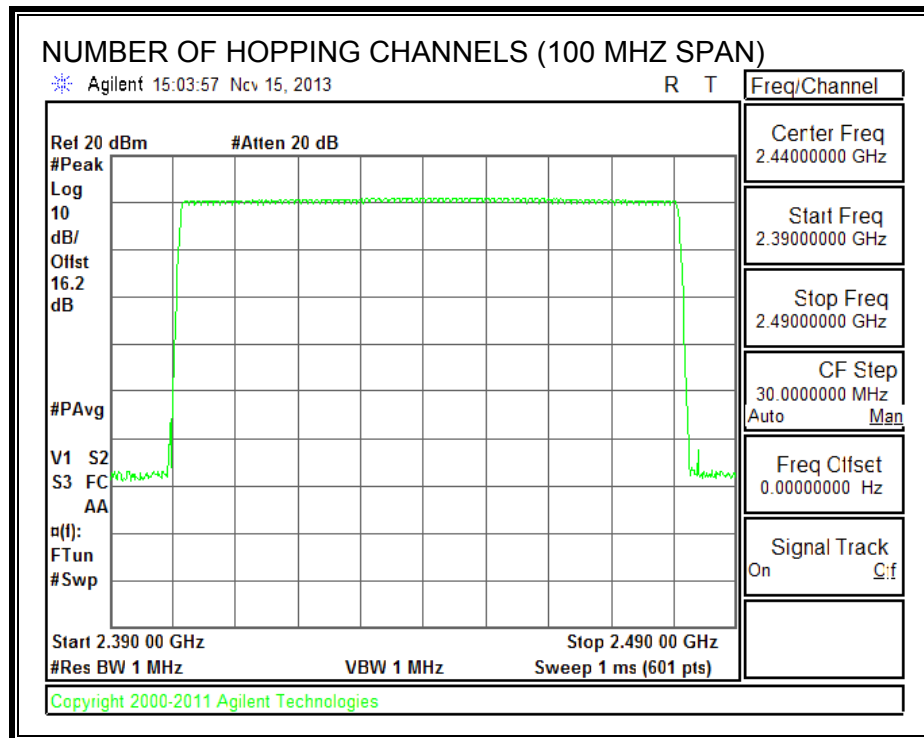
TEST PROCEDURE

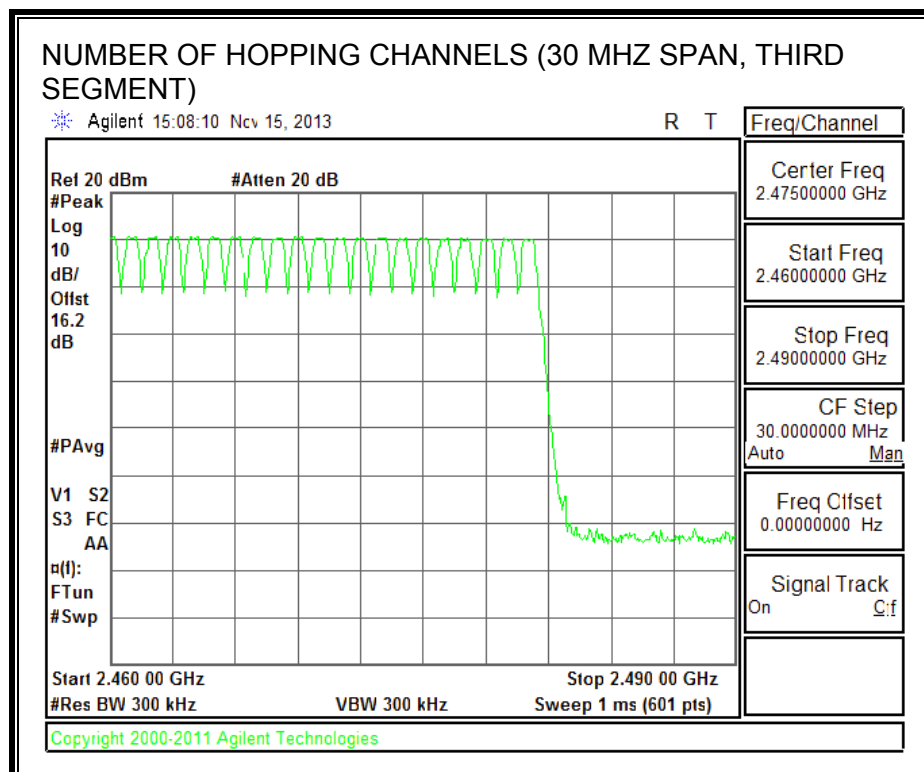
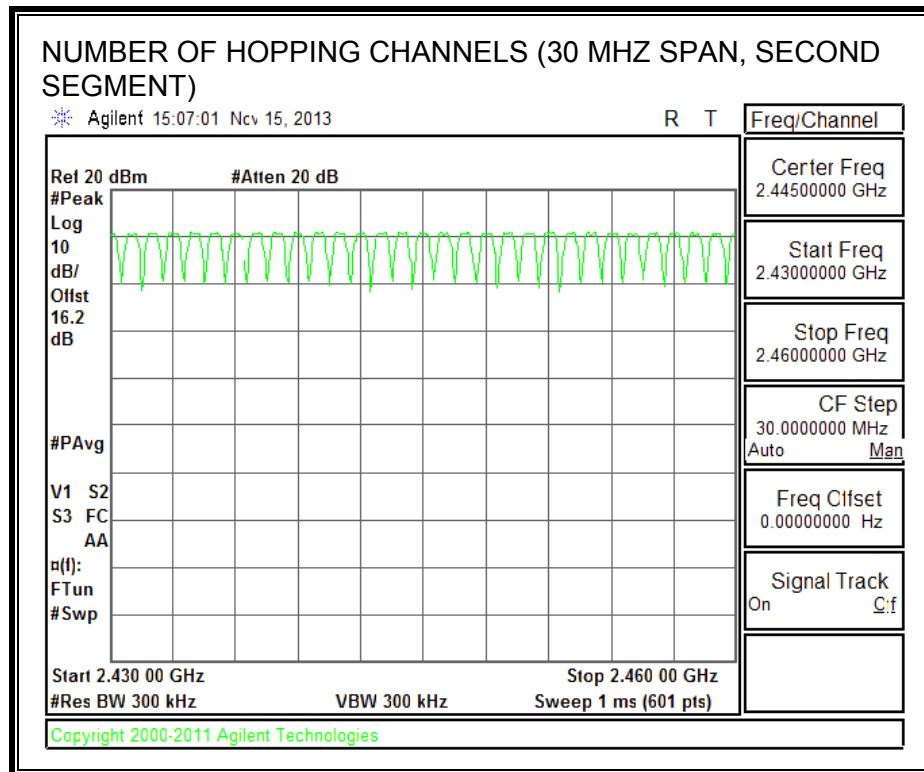
DA 00-705: The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS





8.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

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

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

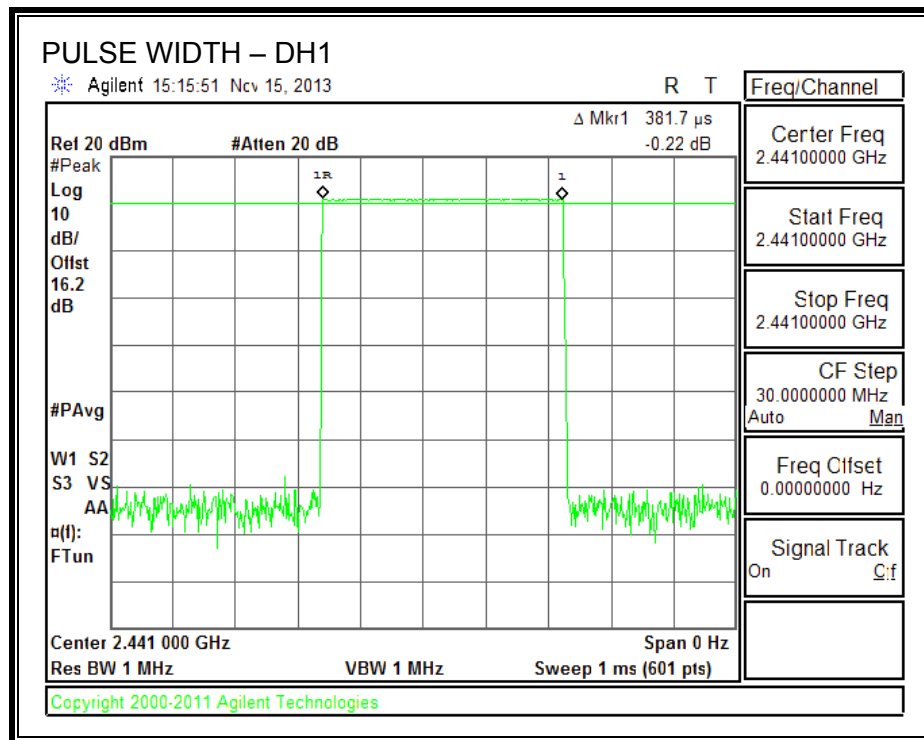
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{pulse width}$.

Note: This unit is follow BT protocol and minimum 20 channels will be utilized during normal operation.

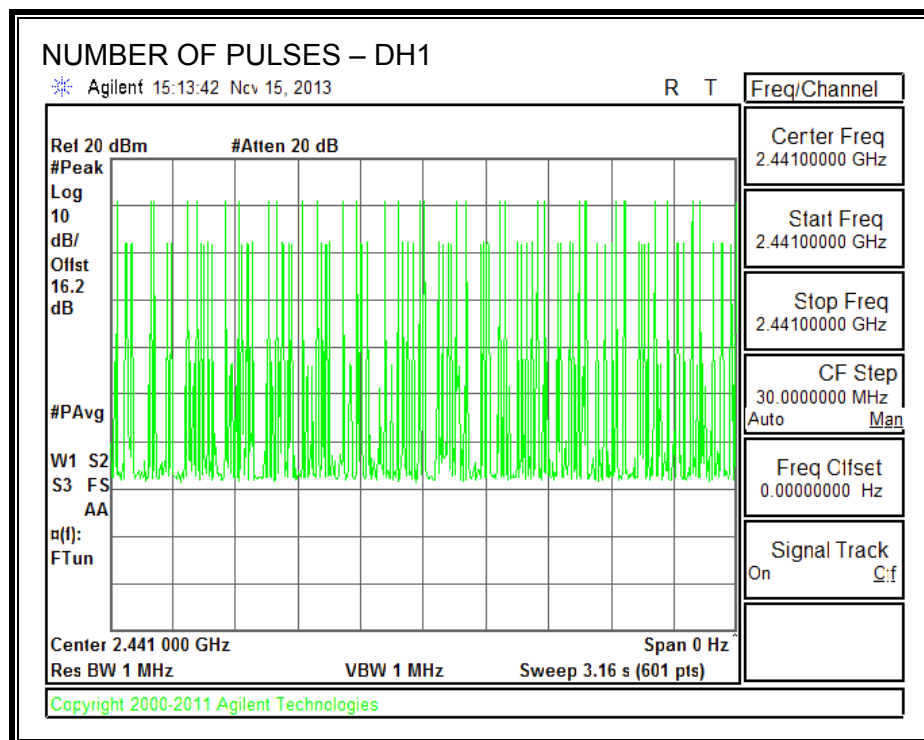
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.382	31	0.118	0.4	-0.282
DH3	1.638	16	0.262	0.4	-0.138
DH5	2.898	10	0.290	0.4	-0.110
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.382	8	0.031	0.4	-0.369
DH3	1.638	4	0.066	0.4	-0.334
DH5	2.898	3	0.087	0.4	-0.313

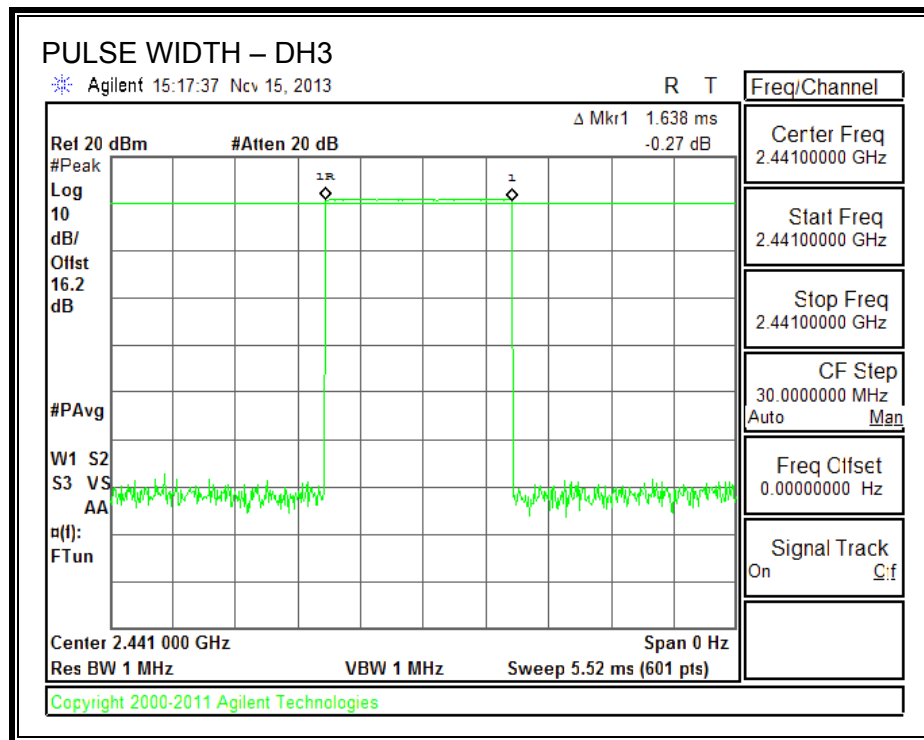
PULSE WIDTH - DH1



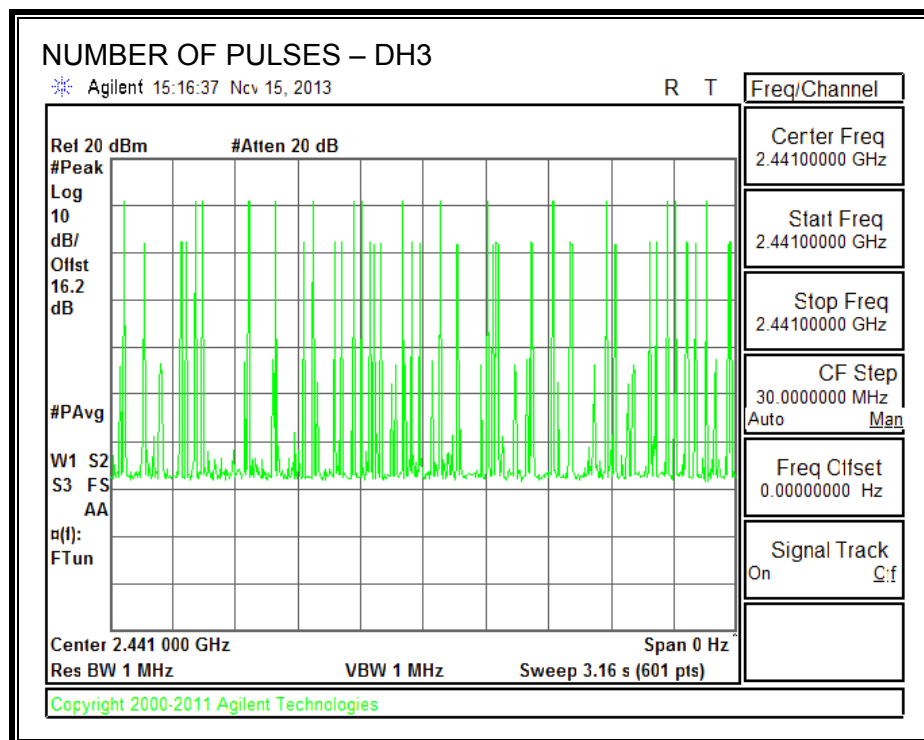
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



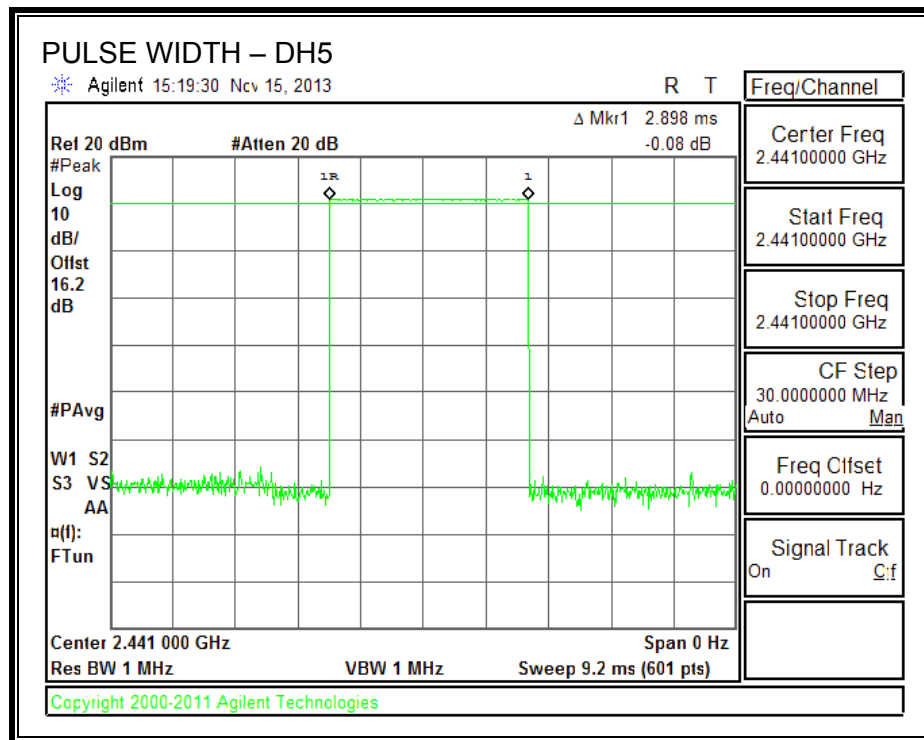
PULSE WIDTH – DH3



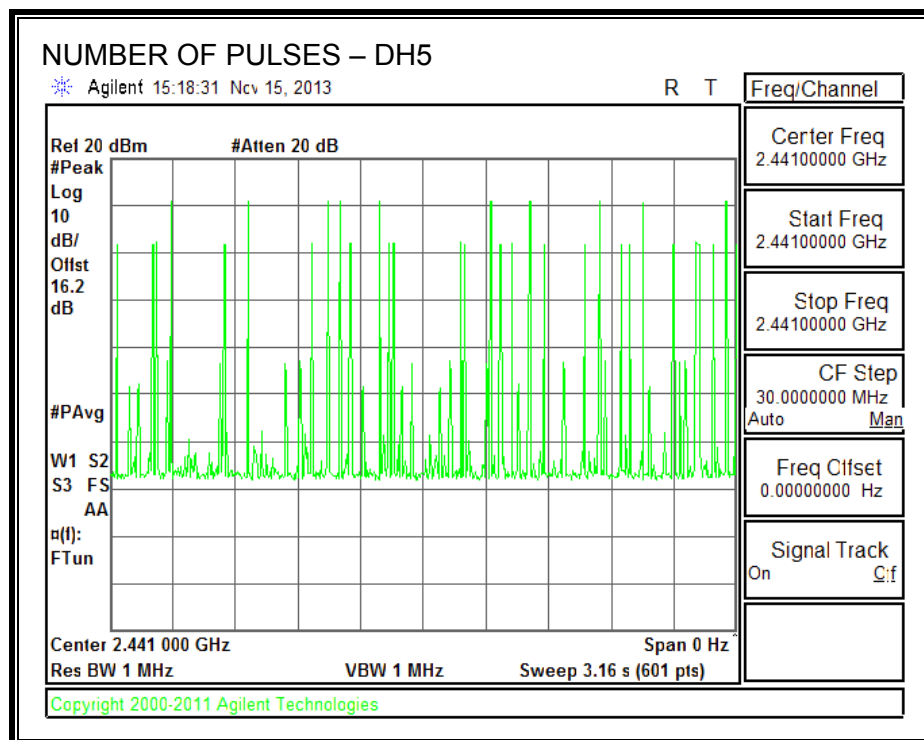
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

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

TEST PROCEDURE

DA 00-705: 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

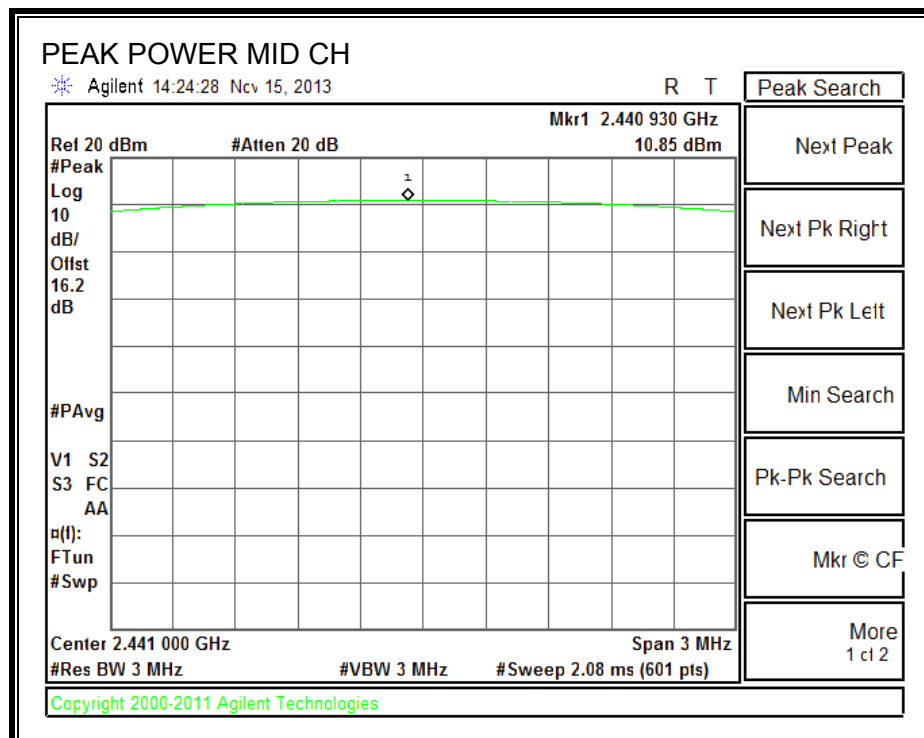
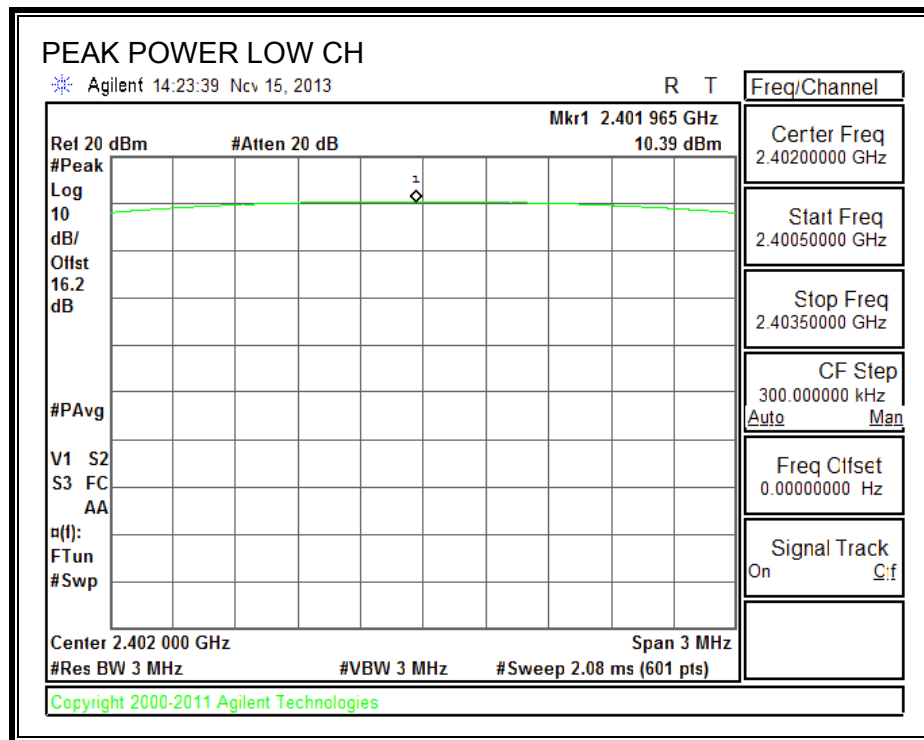
8.5.1. BASIC DATA RATE GFSK MODULATION

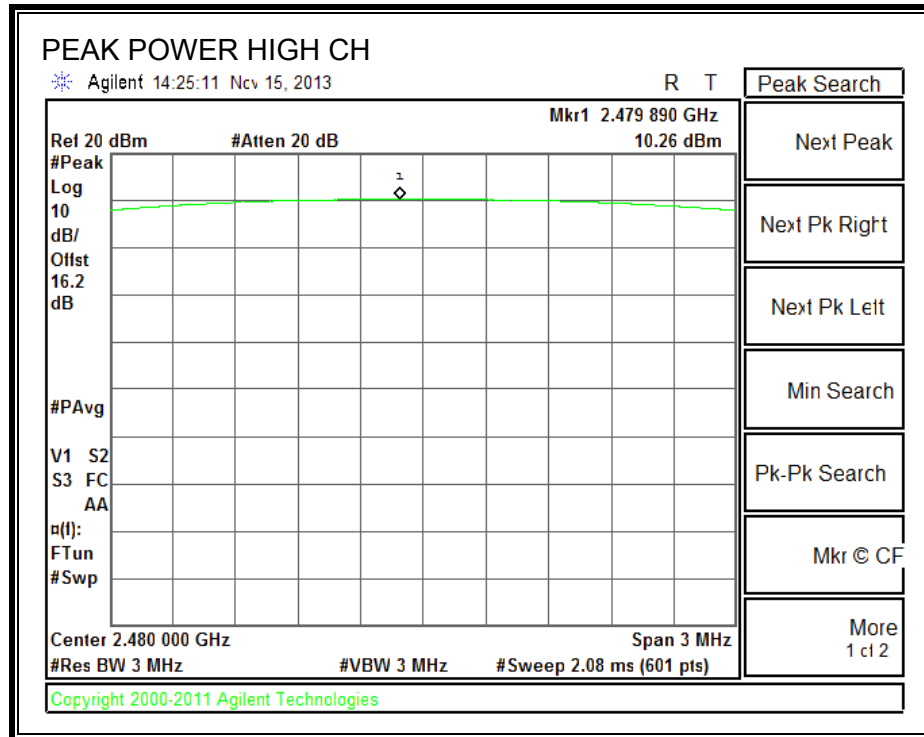
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.39	21	-10.61
Middle	2441	10.85	21	-10.15
High	2480	10.26	21	-10.74
Worst		10.85		-10.15

8.5.2. ENHANCED DATA RATE 8PSK MODULATION

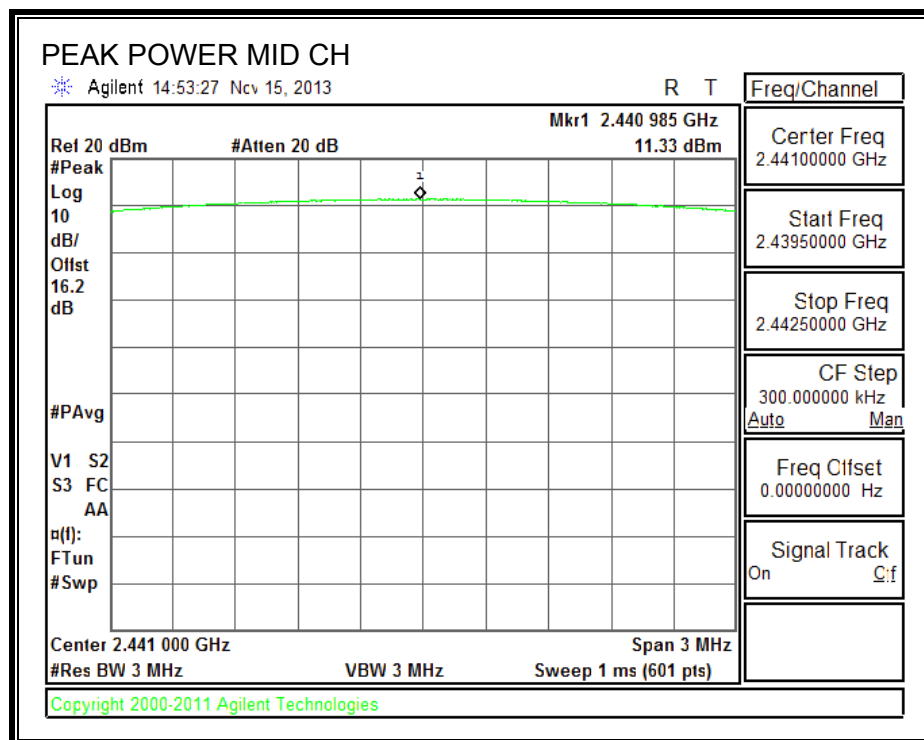
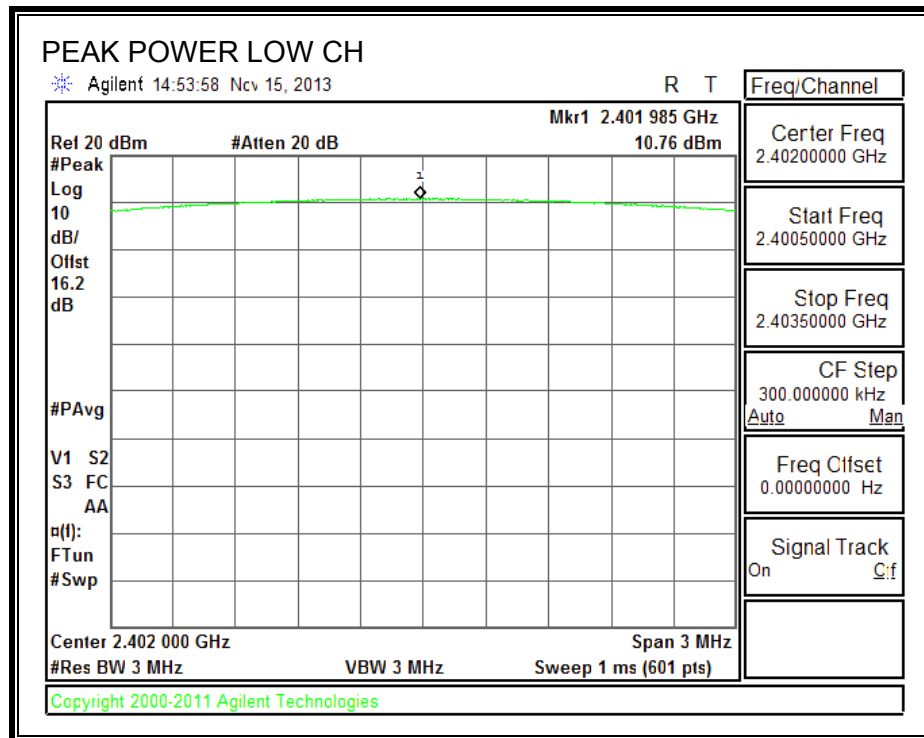
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.76	21	-10.24
Middle	2441	11.33	21	-9.67
High	2480	10.73	21	-10.27
Worst		11.33		-9.67

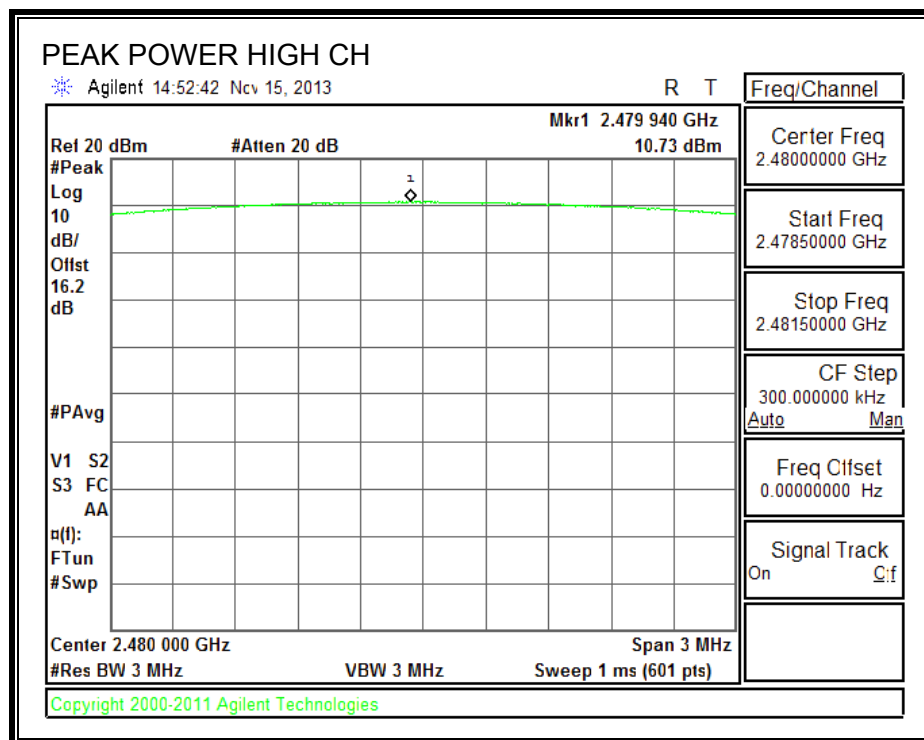
GFSK OUTPUT POWER





8PSK OUTPUT POWER





8.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

8.6.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	10.30
Middle	2441	10.50
High	2480	10.00
Worst		10.50

8.6.2. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.40
Middle	2441	8.90
High	2480	8.40
Worst		8.90

8.7. 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.

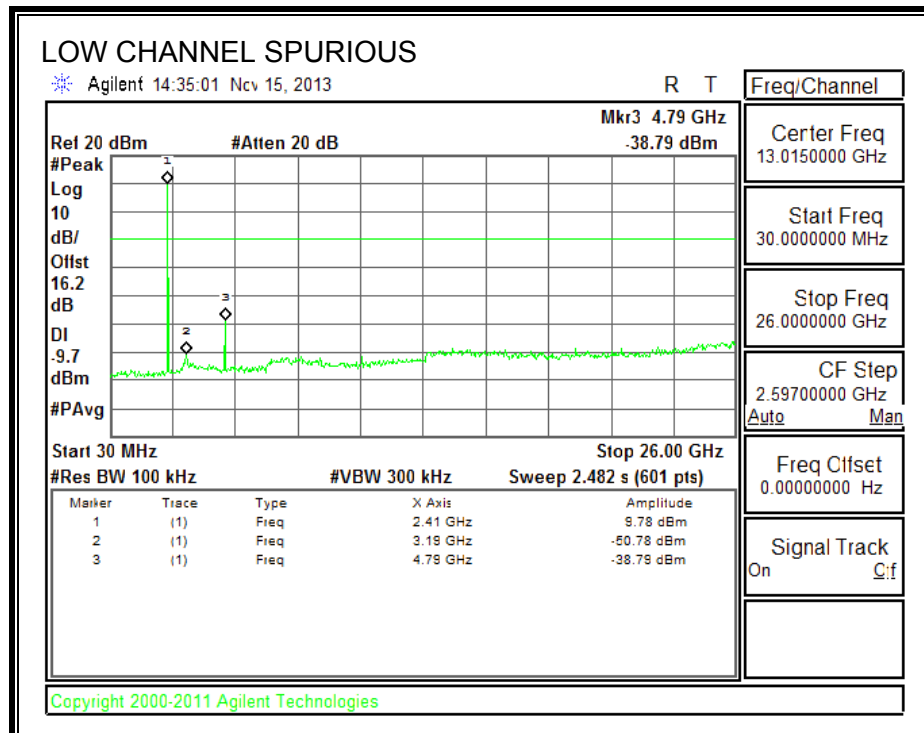
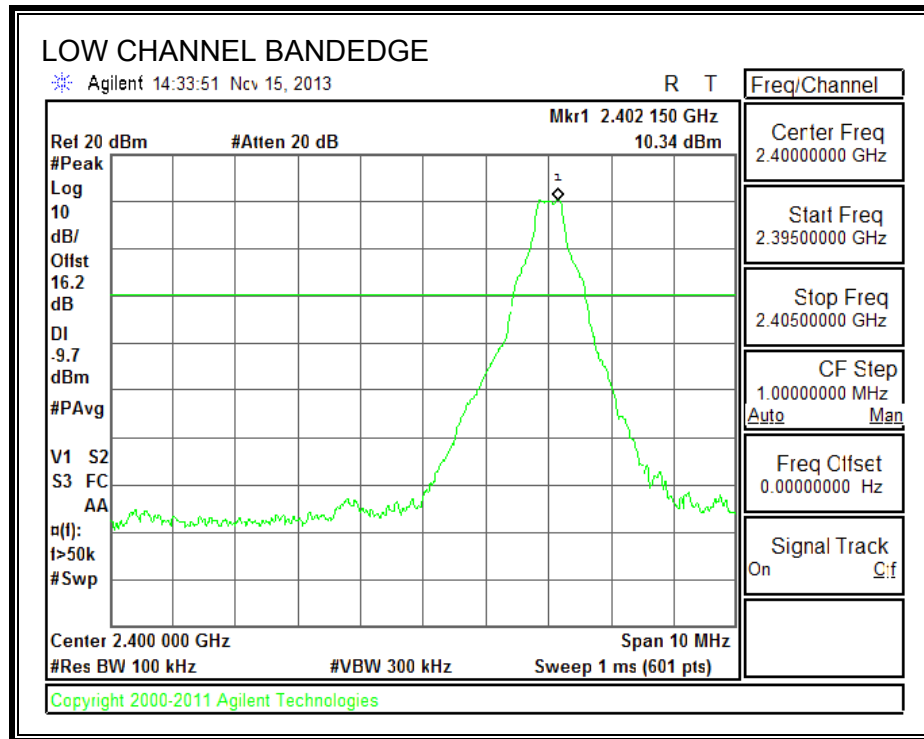
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

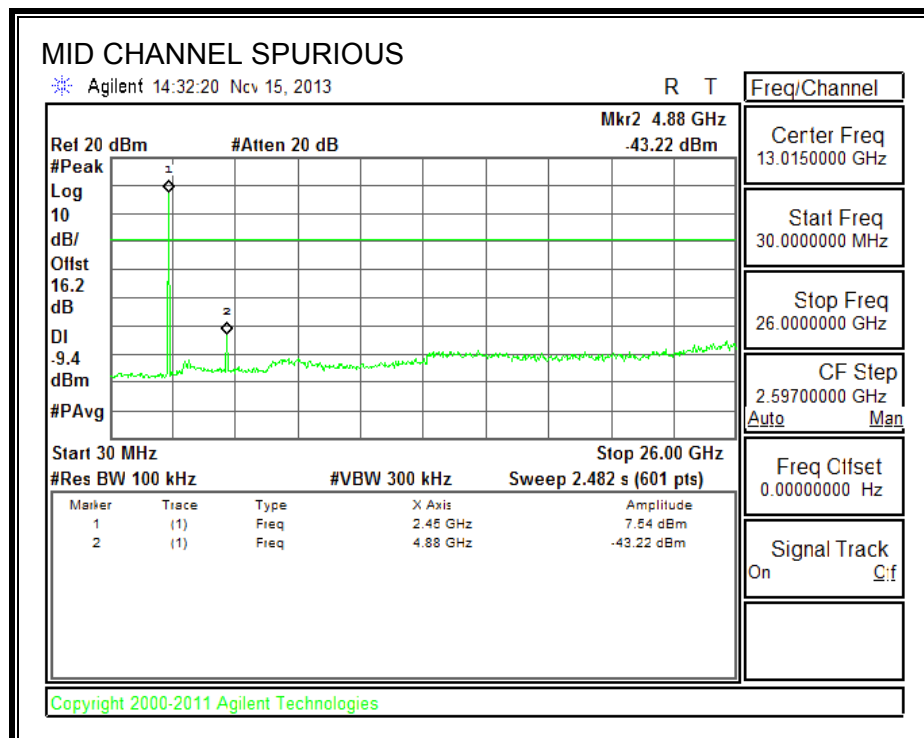
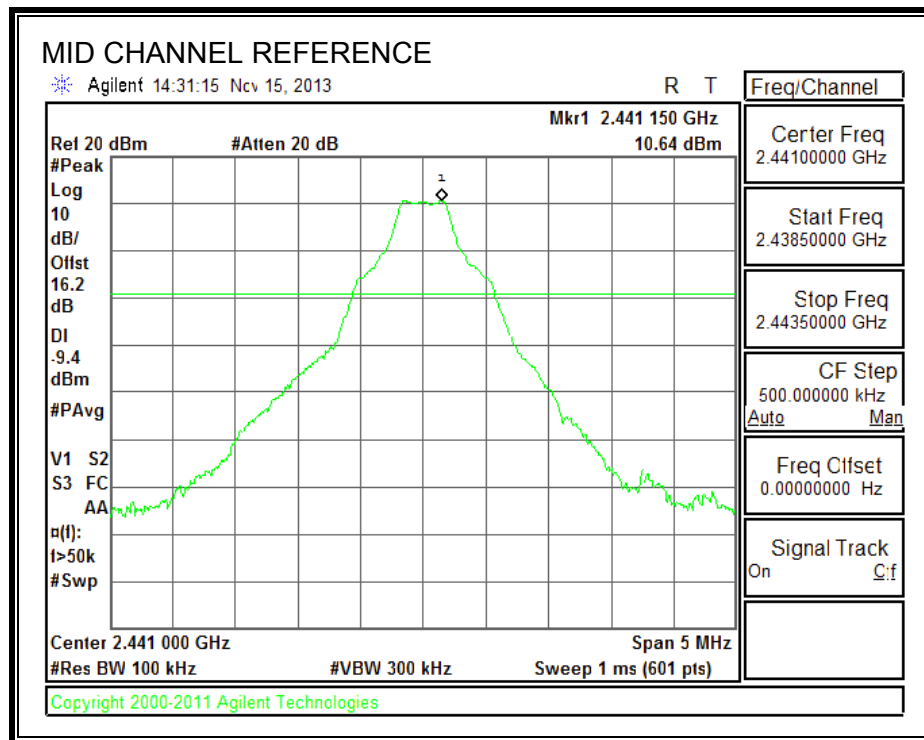
RESULTS

8.7.1. BASIC DATA RATE GFSK MODULATION

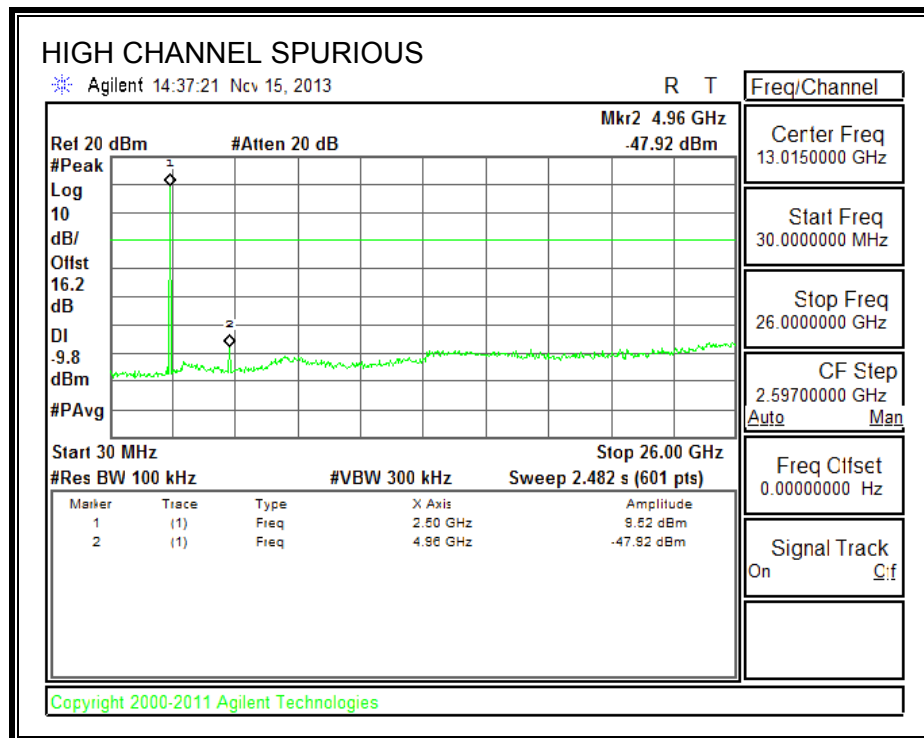
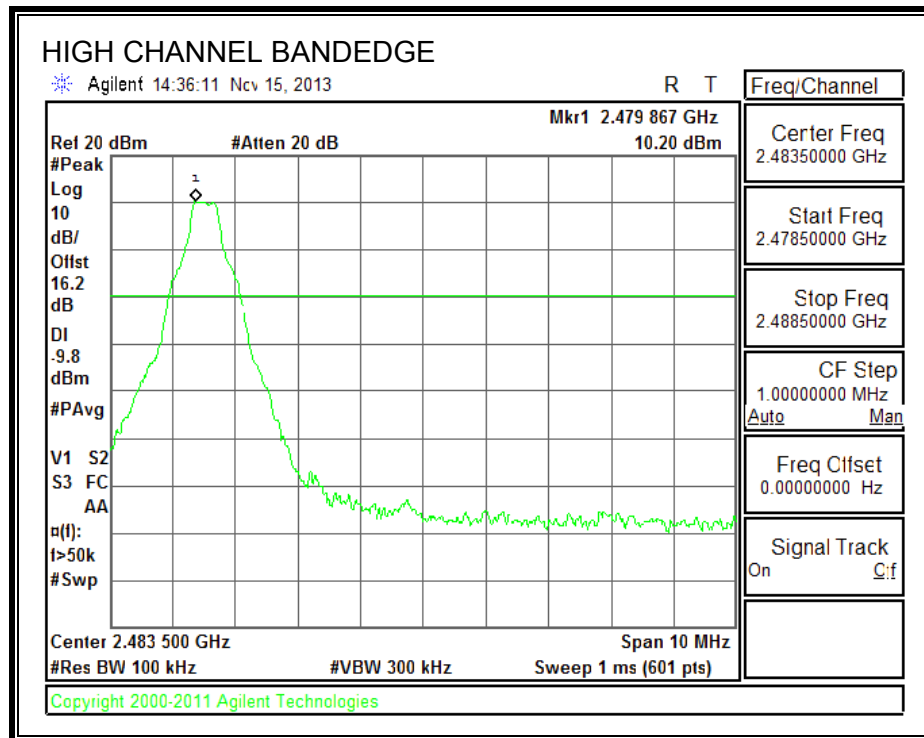
SPURIOUS EMISSIONS, LOW CHANNEL



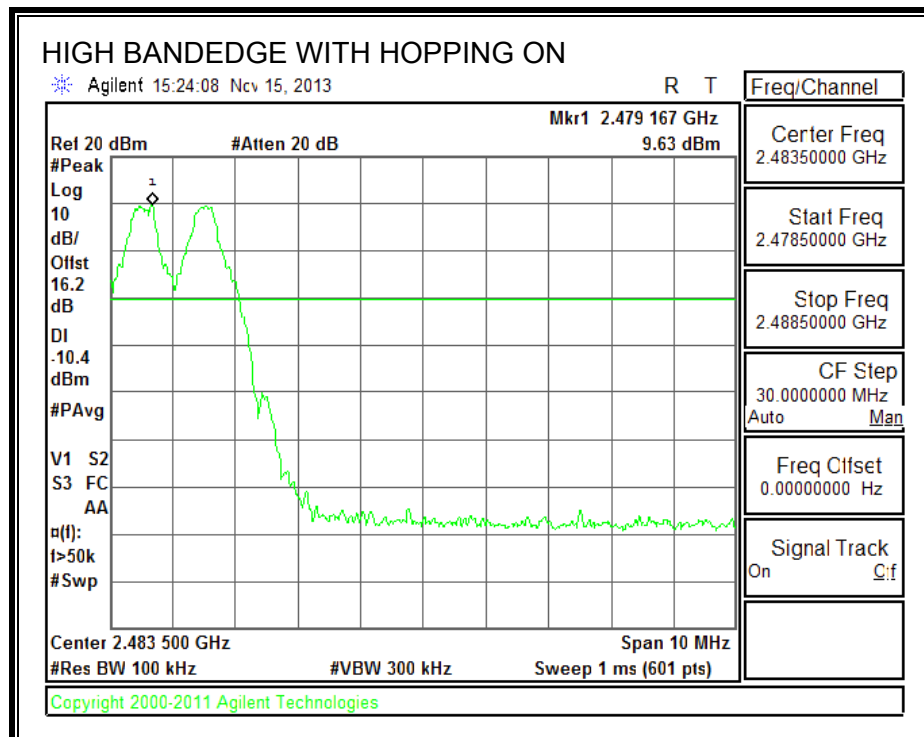
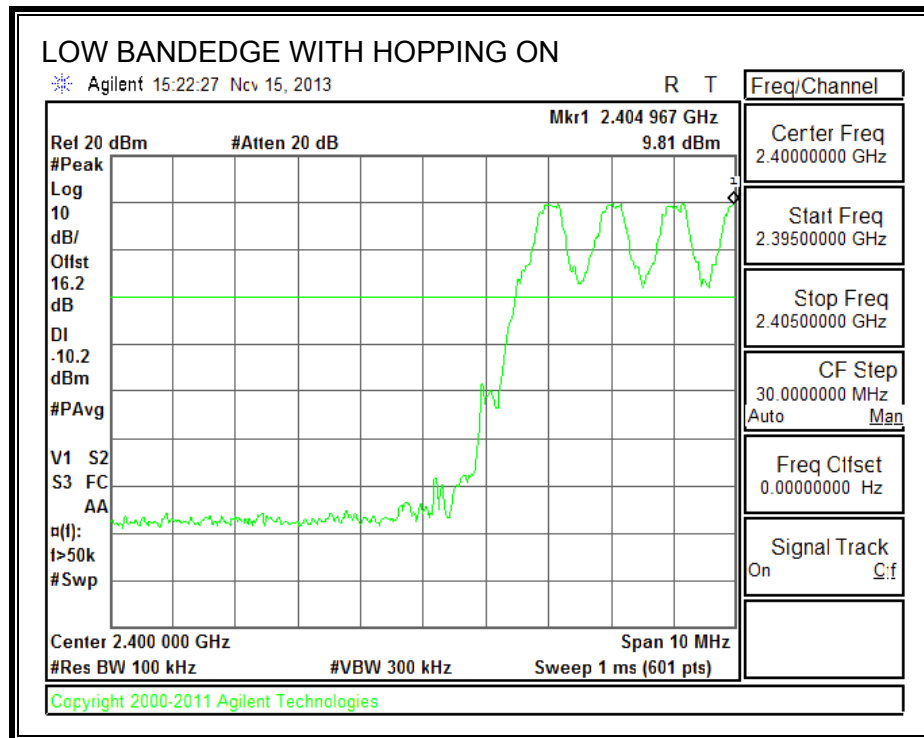
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL

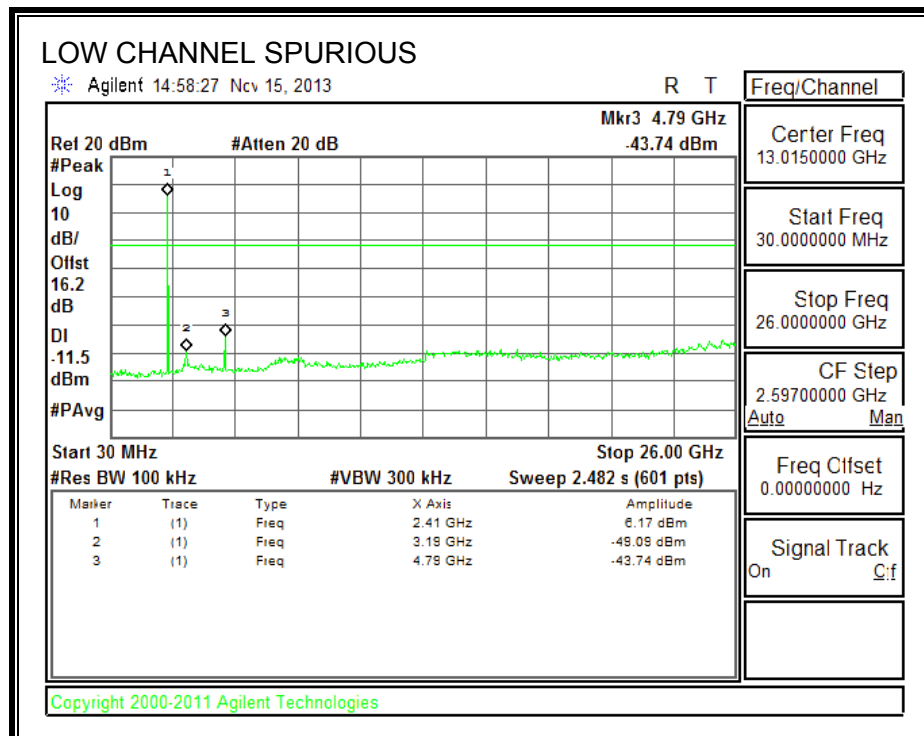
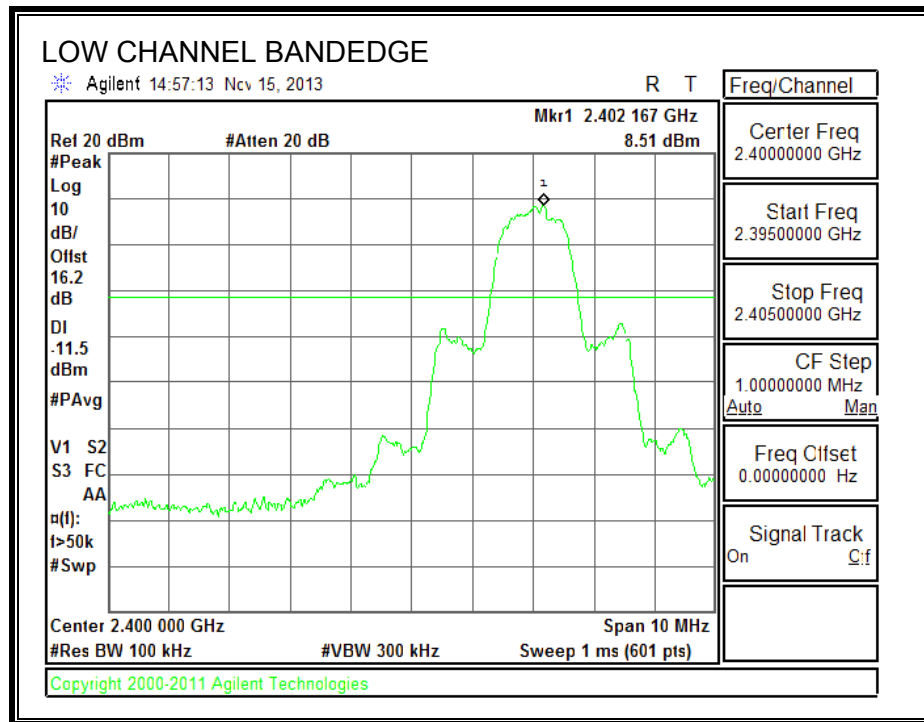


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

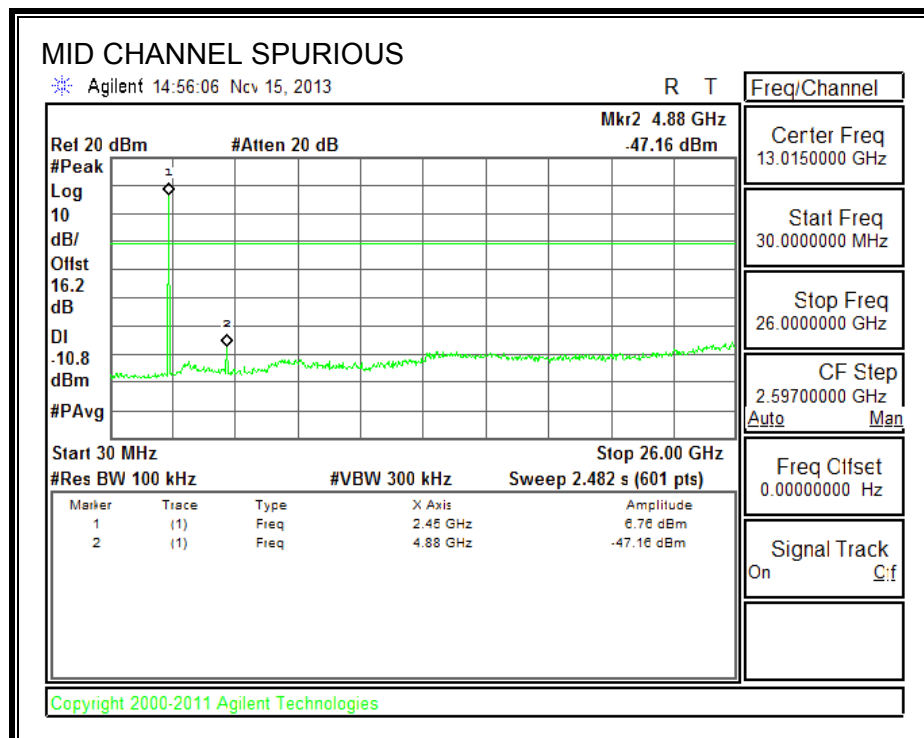
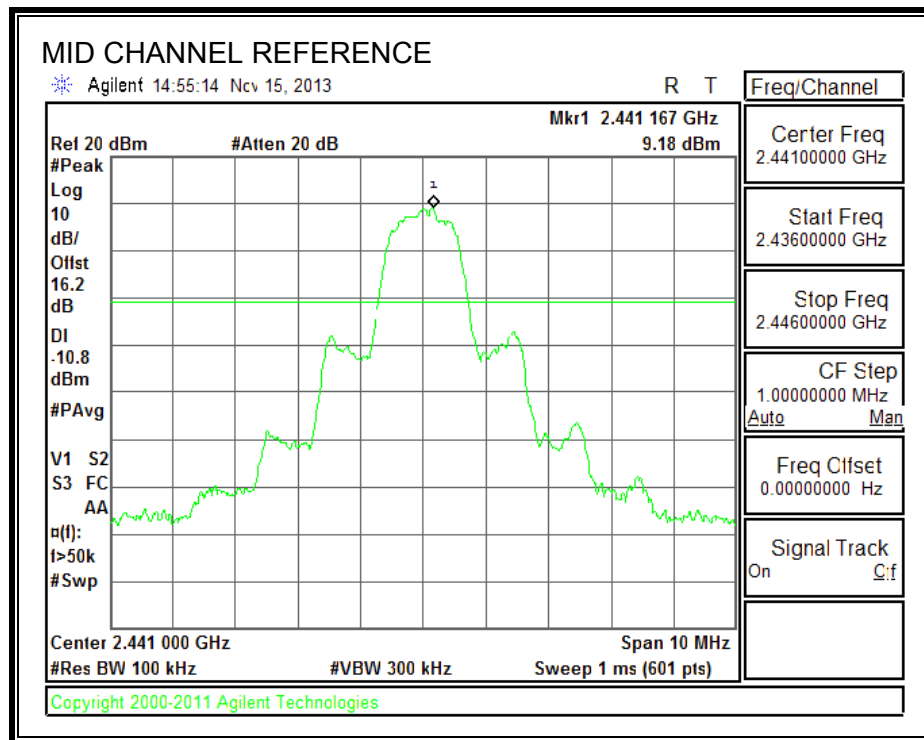


8.7.1. ENHANCED DATA RATE 8PSK MODULATION

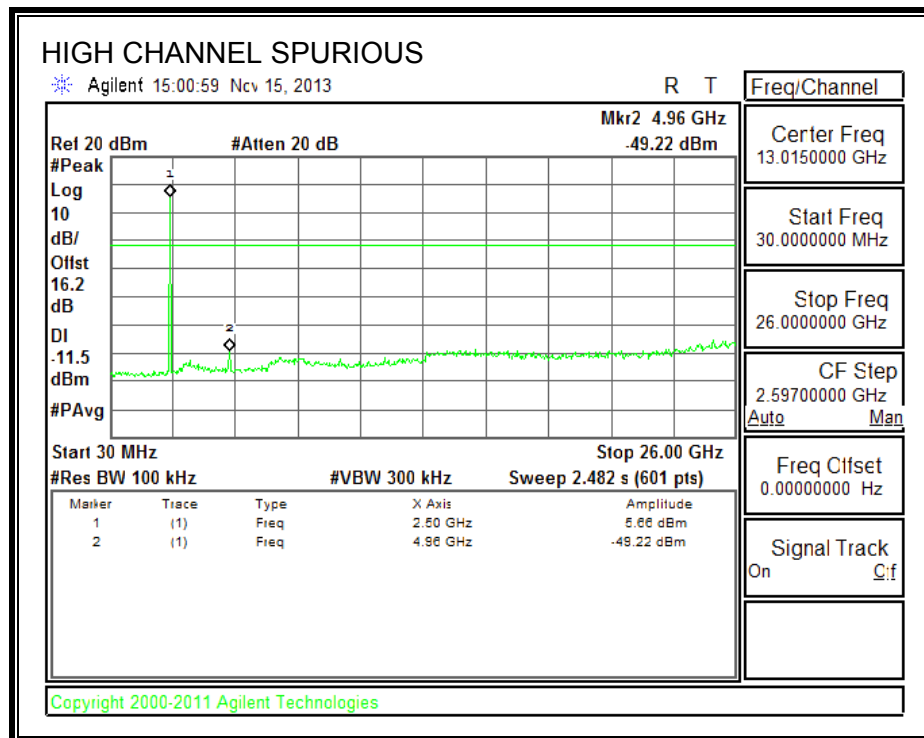
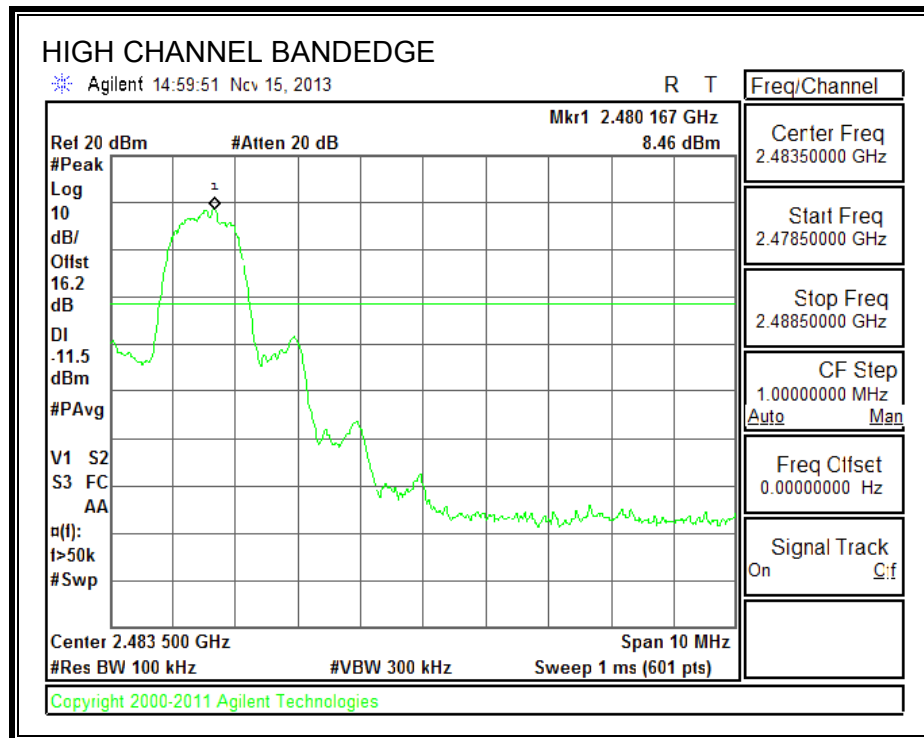
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



9. RADIATED TEST RESULTS

9.1. 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 1/T (on time) for average measurement. $GFSK = 1/T = 1 / 0.0029S = 360Hz$.

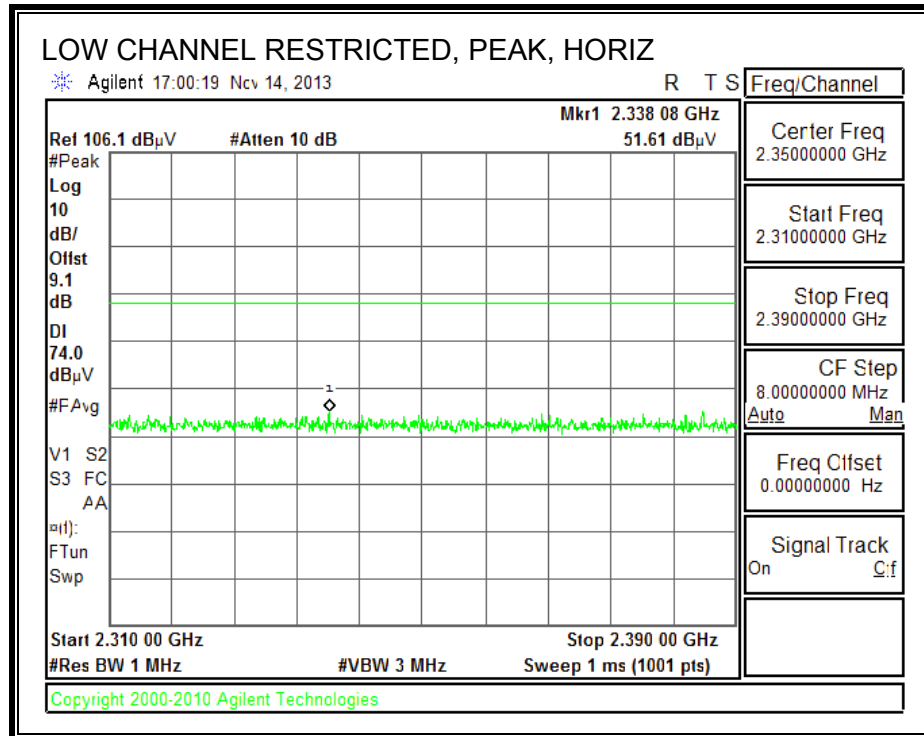
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

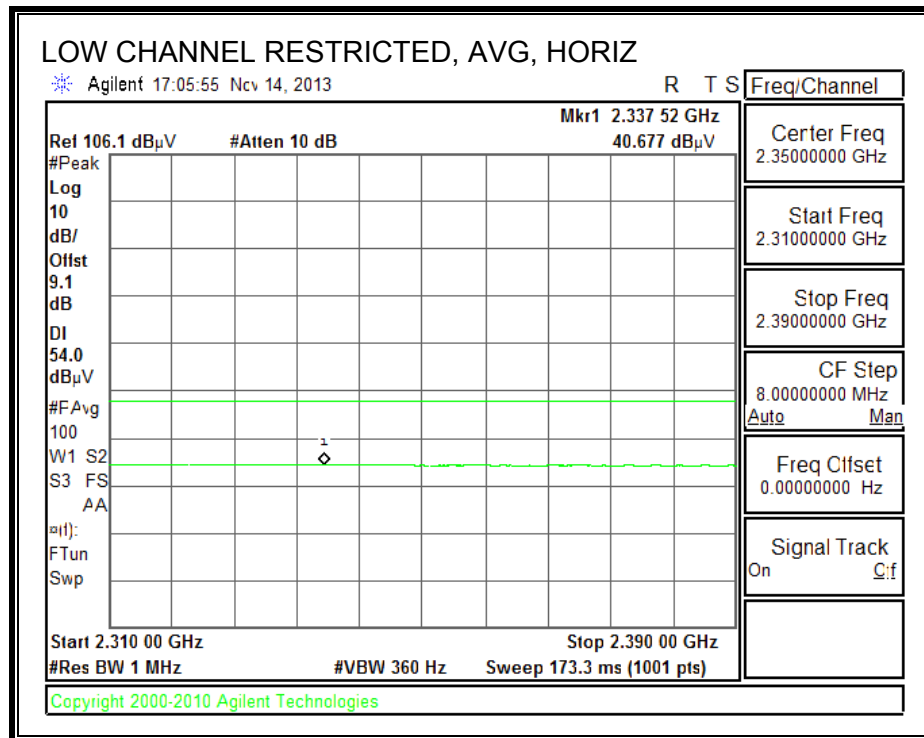
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. TRANSMITTER ABOVE 1 GHz

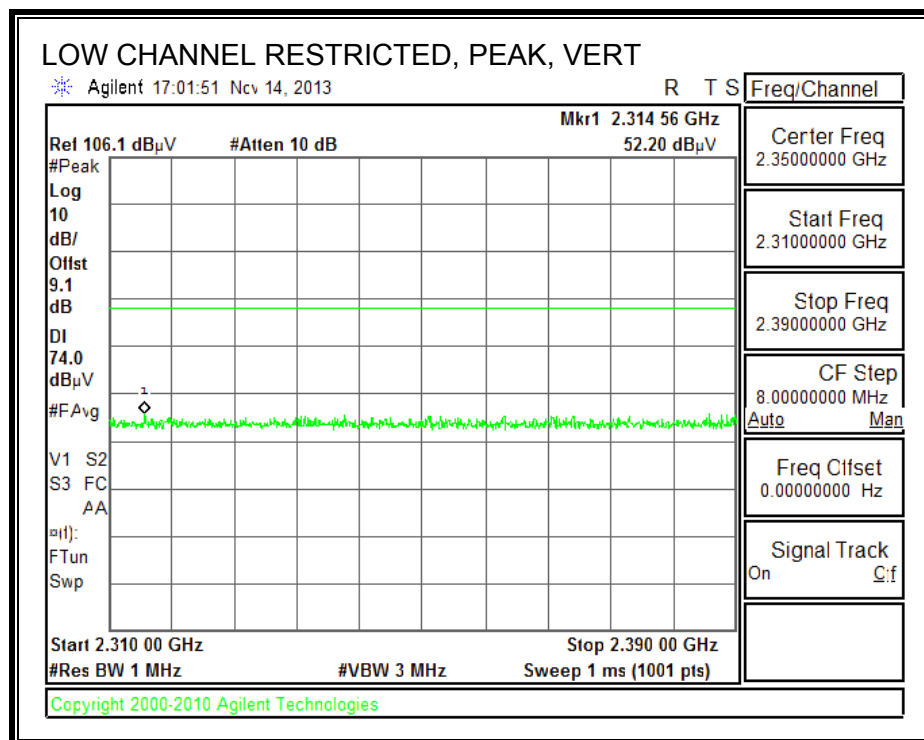
9.2.1. BASIC DATA RATE GFSK MODULATION

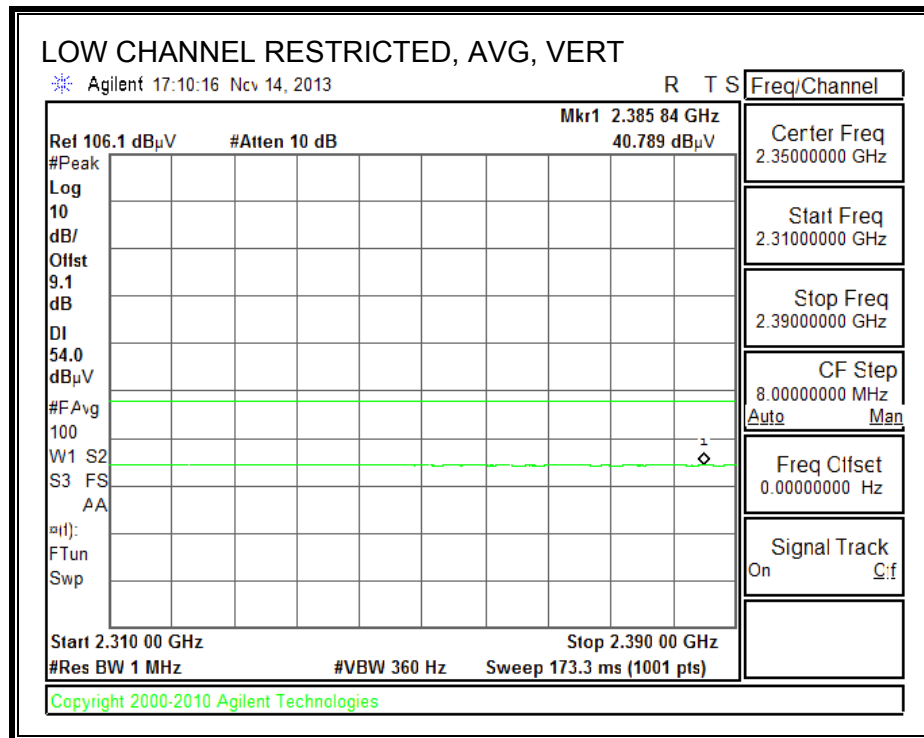
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



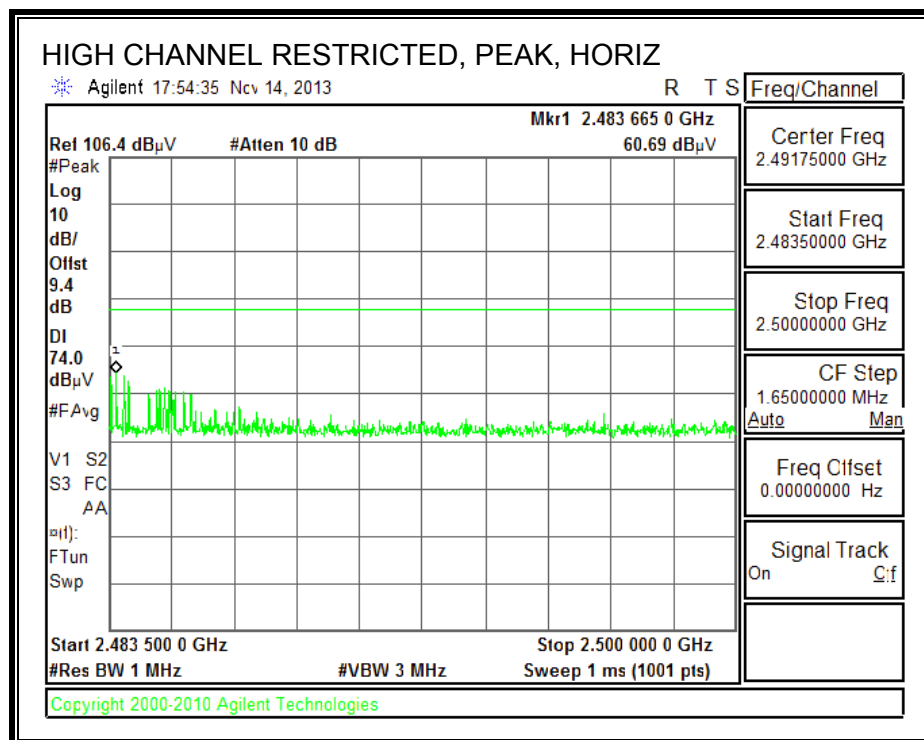


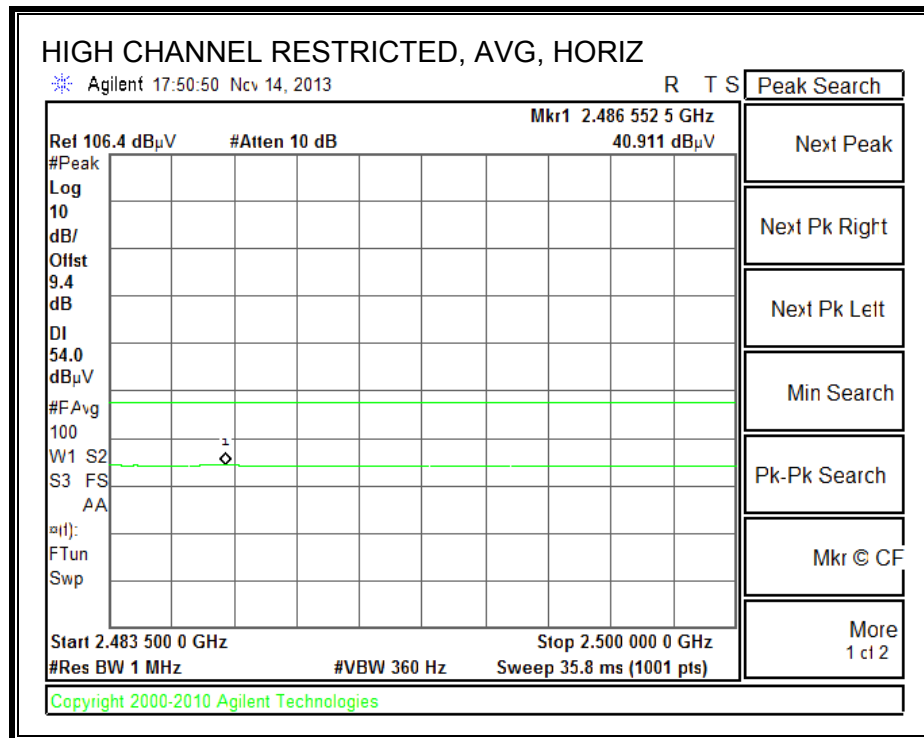
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



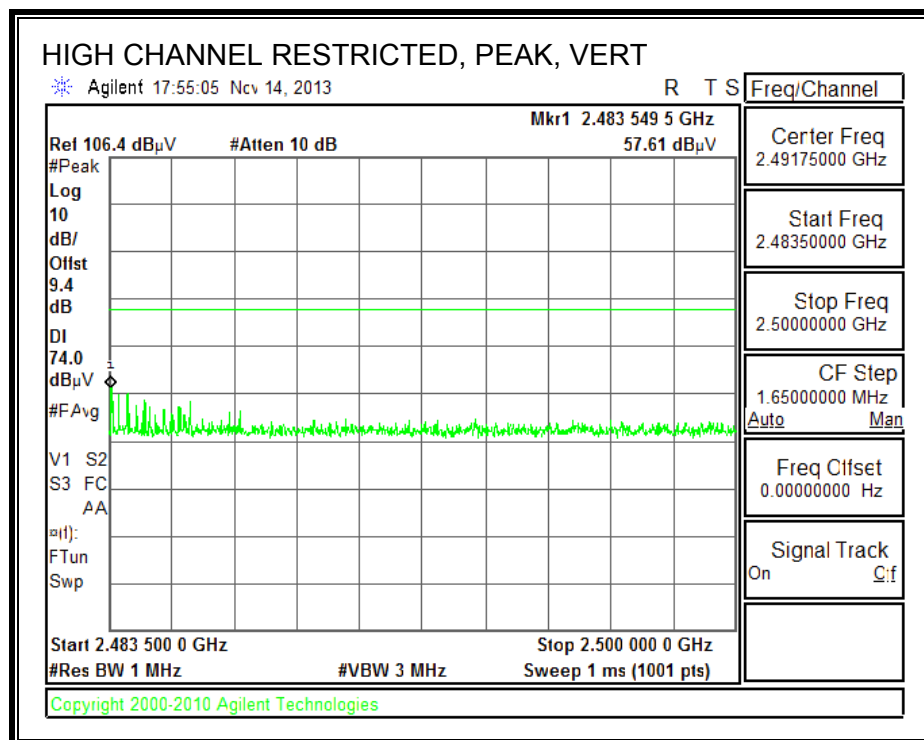


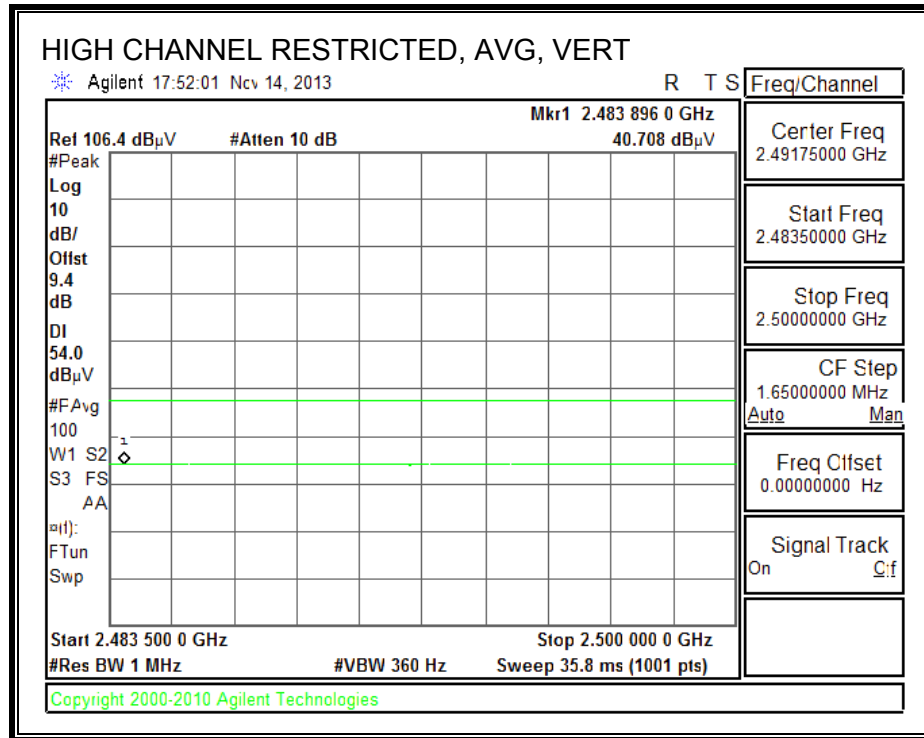
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





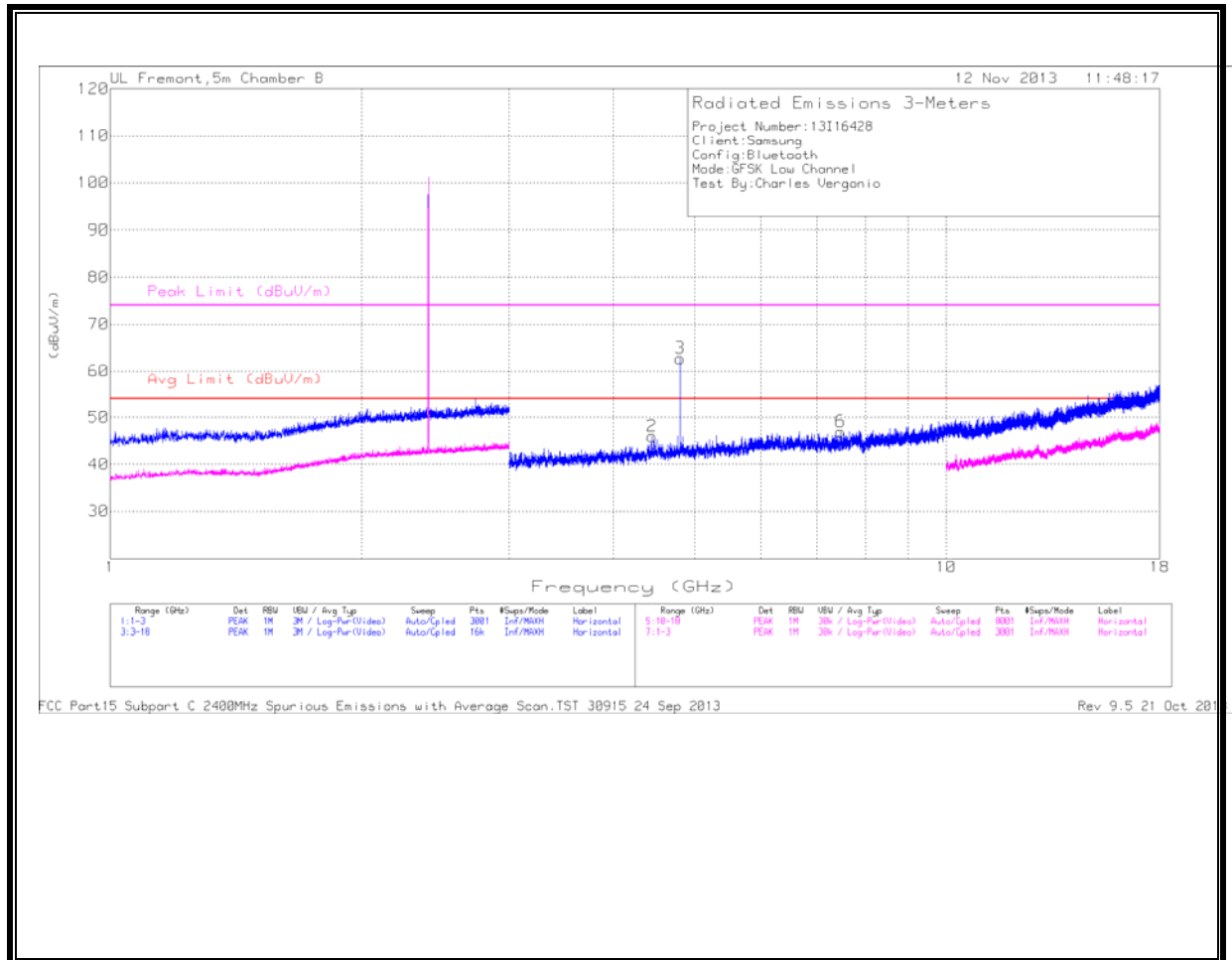
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





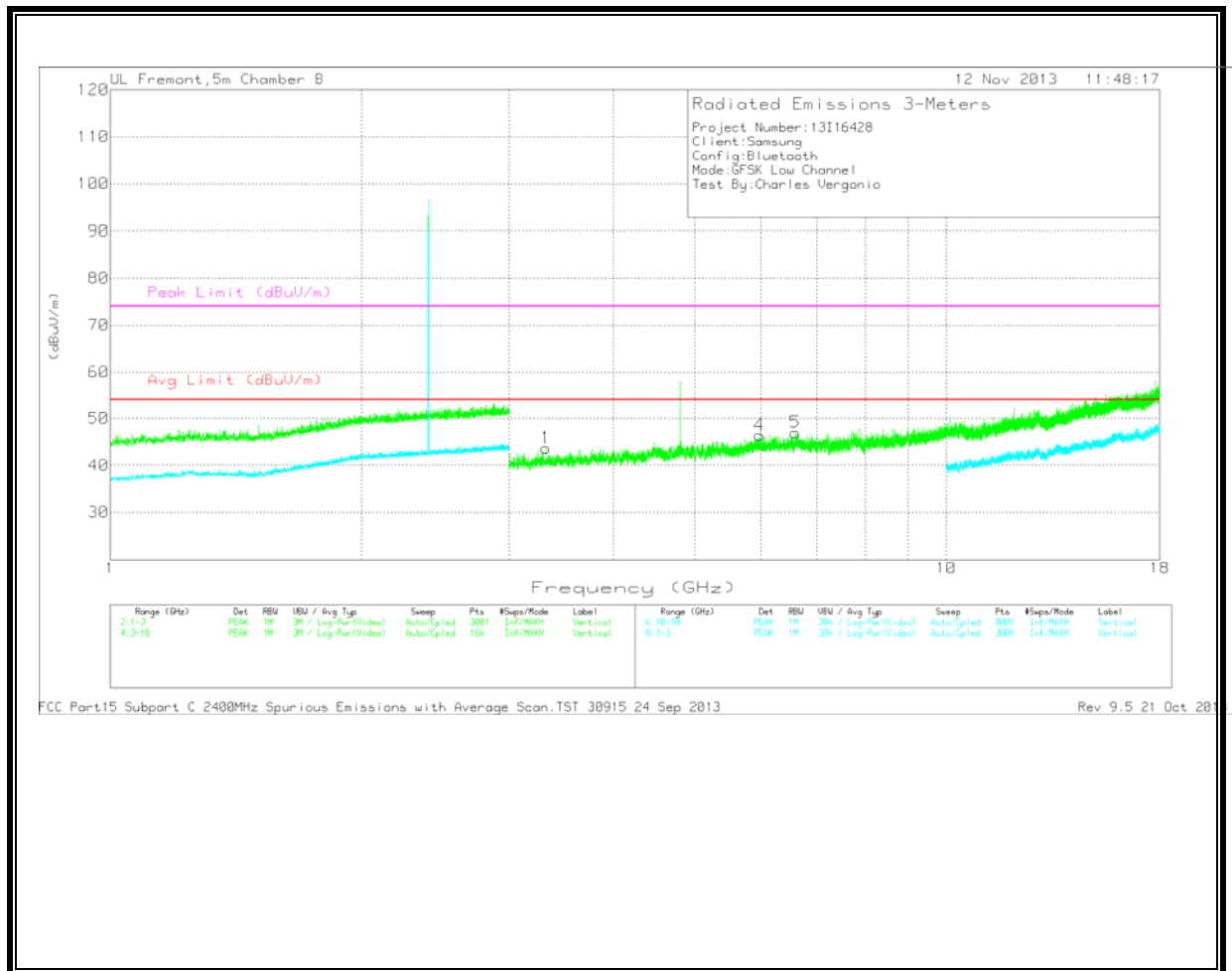
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	4.446	40.55	PK	34.4	-29	45.95	53.97	-8.02	74	-28.05	0-360	201	H
3	4.804	56.82	PK	34.7	-28.8	62.72	53.97	8.75	74	-11.28	0-360	99	H
6	7.477	37.65	PK	36	-26.7	46.95	53.97	-7.02	74	-27.05	0-360	99	H
1	3.321	41.91	PK	33.3	-31.6	43.61	53.97	-10.36	74	-30.39	0-360	99	V
4	5.98	39.4	PK	35.8	-28.8	46.4	53.97	-7.57	74	-27.6	0-360	99	V
5	6.598	38.6	PK	35.9	-27.5	47	53.97	-6.97	74	-27	0-360	99	V

PK - Peak detector

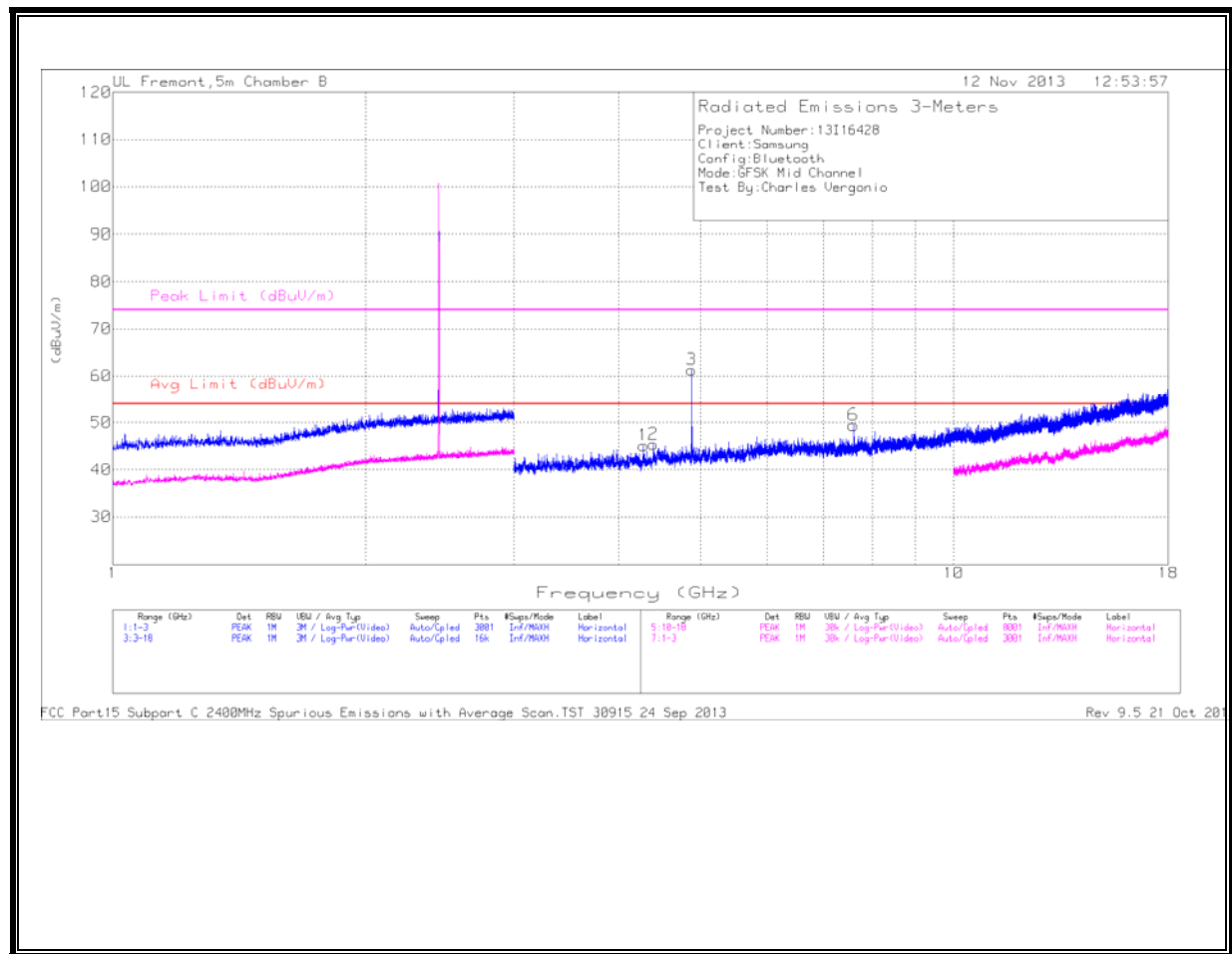
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 21 Oct 2013

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	4.804	35.94	PK	34.7	-28.8	41.84	53.97	-12.13	74	-32.16	0-360	99	H

ON time (get from the average on time section 8.4) = $(0.295/3.165)/10=9.18\text{ms}$ per 100ms

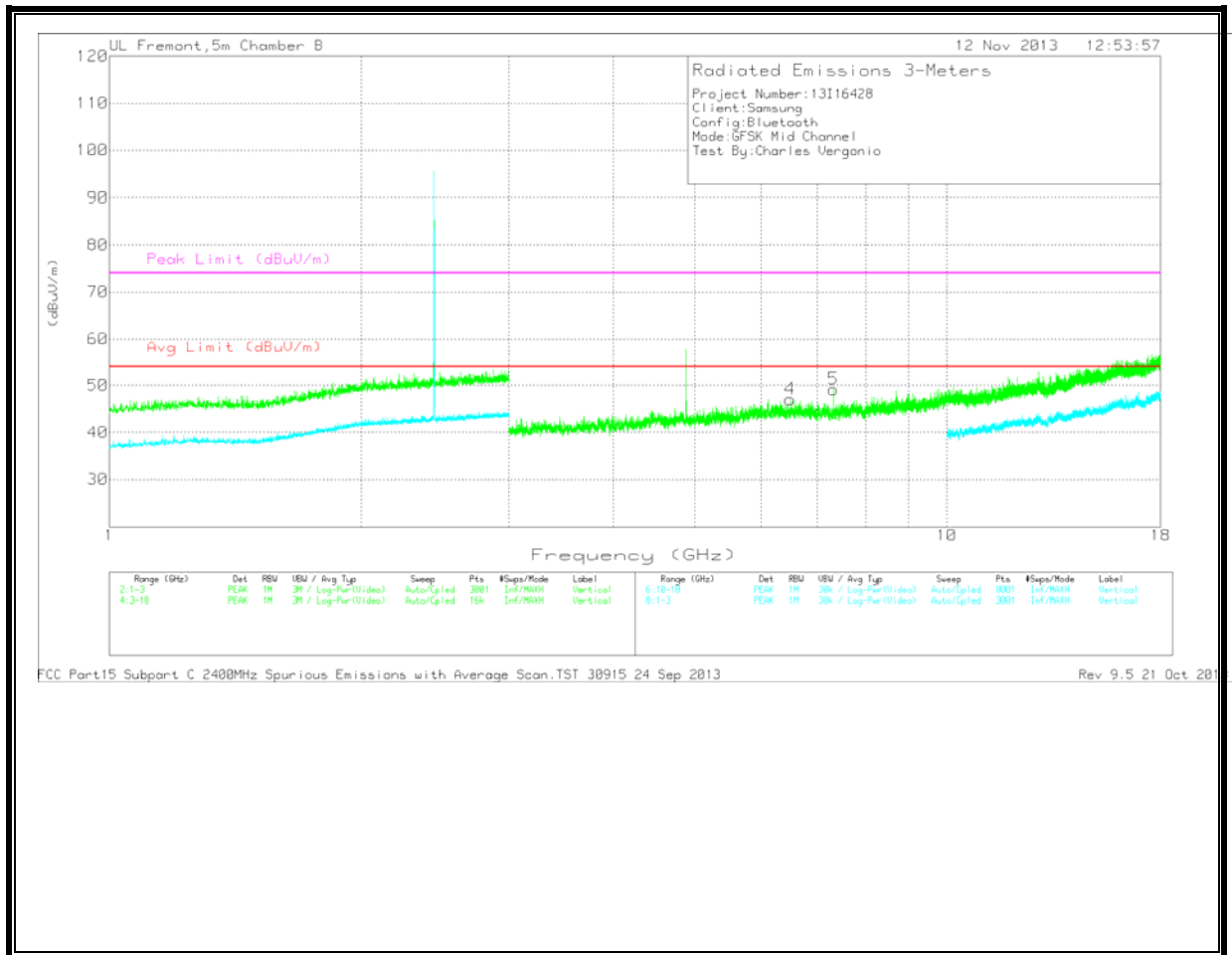
DCCF = $20*\log(100\text{ms}/\text{ON time}) = 20*\log(100\text{ms}/9.18) = 20.8\text{dB}$

MID CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	4.278	42.03	PK	34.1	-31	45.13	53.97	-8.84	74	-28.87	0-360	201	H
2	4.396	41.06	PK	34.3	-30	45.36	53.97	-8.61	74	-28.64	0-360	201	H
3	4.882	57.34	PK	34.6	-30.6	61.34	53.97	7.37	74	-12.66	0-360	99	H
6	7.601	40.72	PK	36.1	-27.4	49.42	53.97	-4.55	74	-24.58	0-360	201	H
4	6.499	39.14	PK	35.9	-28	47.04	53.97	-6.93	74	-26.96	0-360	202	V
5	7.323	41.07	PK	35.9	-27.8	49.17	53.97	-4.8	74	-24.83	0-360	99	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/F lter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.605	27.92	MAV1	36.1	-27.4	36.62	53.97	-17.35	74	-37.38	51	181	H
7.323	35.36	MAV1	35.9	-27.8	43.46	53.97	-10.51	74	-30.54	170	197	V
*4.882	36.53	PK	34.6	-30.6	40.53	53.97	-13.44	74	-33.47	0	0	H

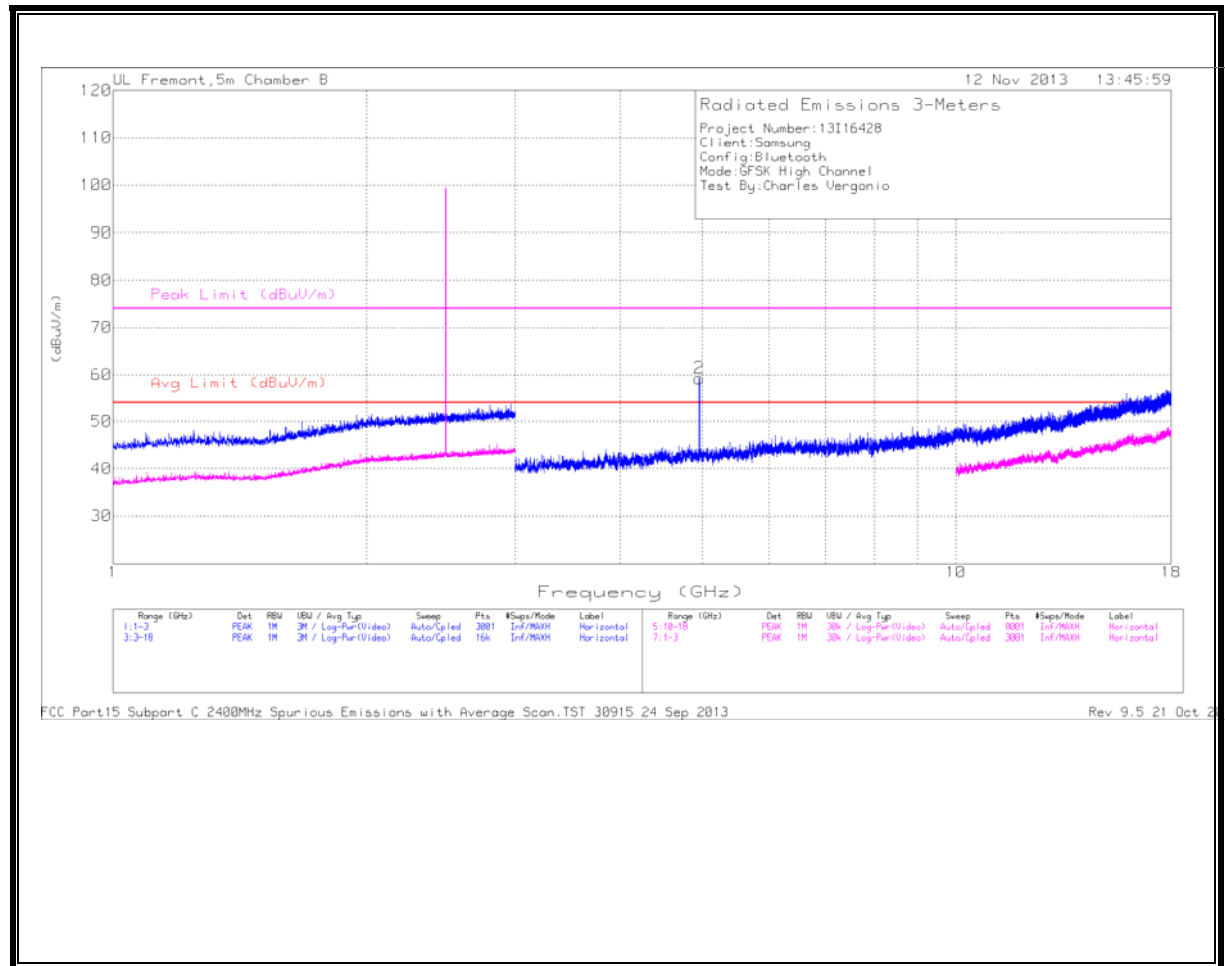
MAV1 - KDB558074 Option 1 Maximum RMS Average

ON time (get from the average on time section 8.4) = $(0.29S/3.16S)/10=9.18ms$ per 100ms

DCCF = $20*\log(100ms/ON\ time) = 20*\log(100ms/9.18) = 20.8dB$

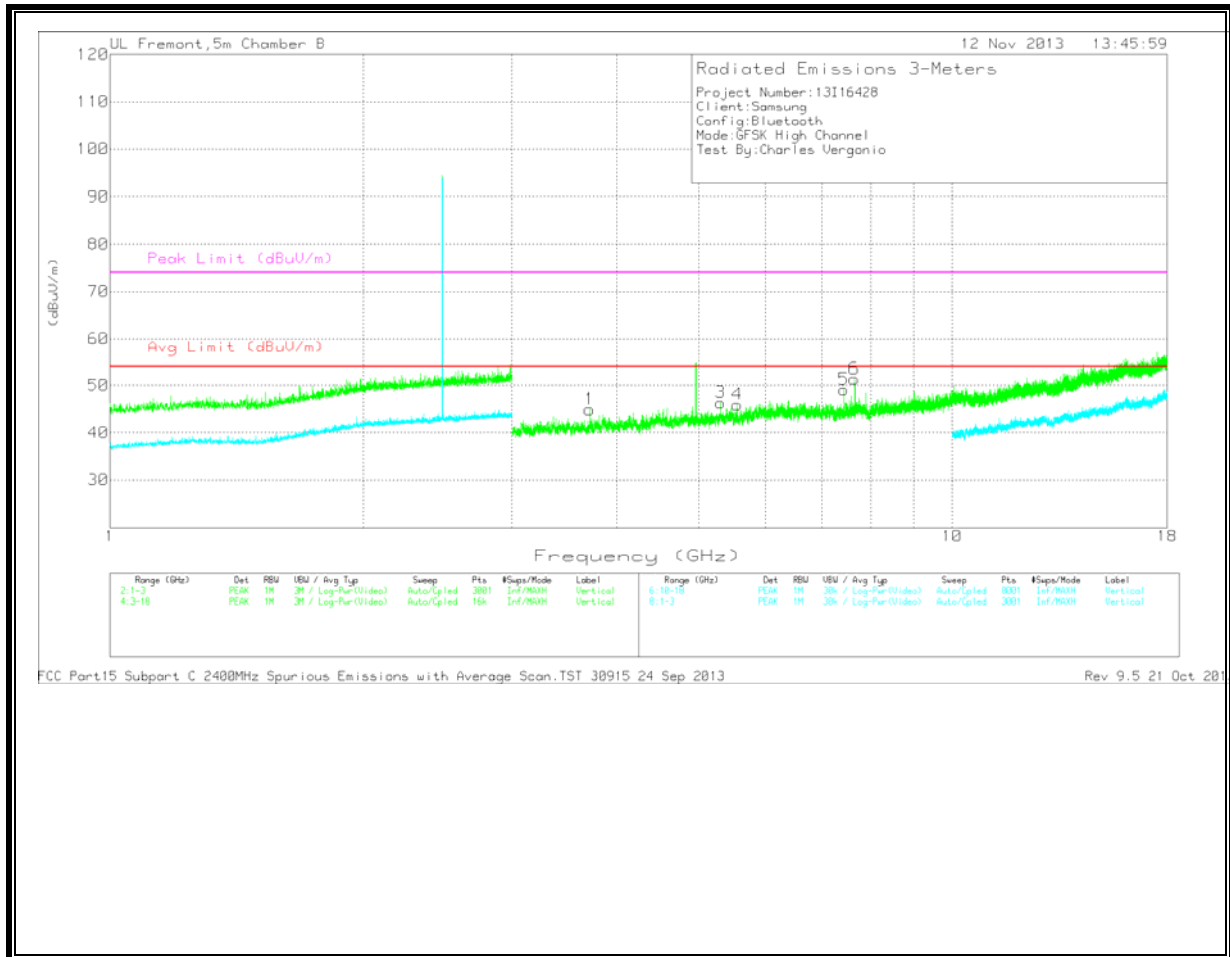
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 21 Oct 2013

HIGH CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	4.959	54.86	PK	34.6	-30.2	59.26	53.97	5.29	74	-14.74	0-360	99	H
1	3.711	42.31	PK	33.7	-31.1	44.91	53.97	-9.06	74	-29.09	0-360	202	V
3	5.311	40.12	PK	34.9	-28.7	46.32	53.97	-7.65	74	-27.68	0-360	99	V
4	5.555	40.54	PK	35	-29.6	45.94	53.97	-8.03	74	-28.06	0-360	99	V
5	7.44	39.88	PK	36	-26.8	49.08	53.97	-4.89	74	-24.92	0-360	99	V
6	7.652	42.83	PK	36.1	-27.6	51.33	53.97	-2.64	74	-22.67	0-360	99	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/F litr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.44	20.45	MAV1	36	-26.8	29.65	53.97	-24.32	74	-44.35	167	120	V
7.654	27.85	MAV1	36.1	-27.6	36.35	53.97	-17.62	74	-37.65	319	211	V
*4.959	34.05	PK	34.6	-30.2	38.45	53.97	-15.52	74	-35.55	0	0	H

PK - Peak detector

MAV1 - KDB558074 Option 1 Maximum RMS Average

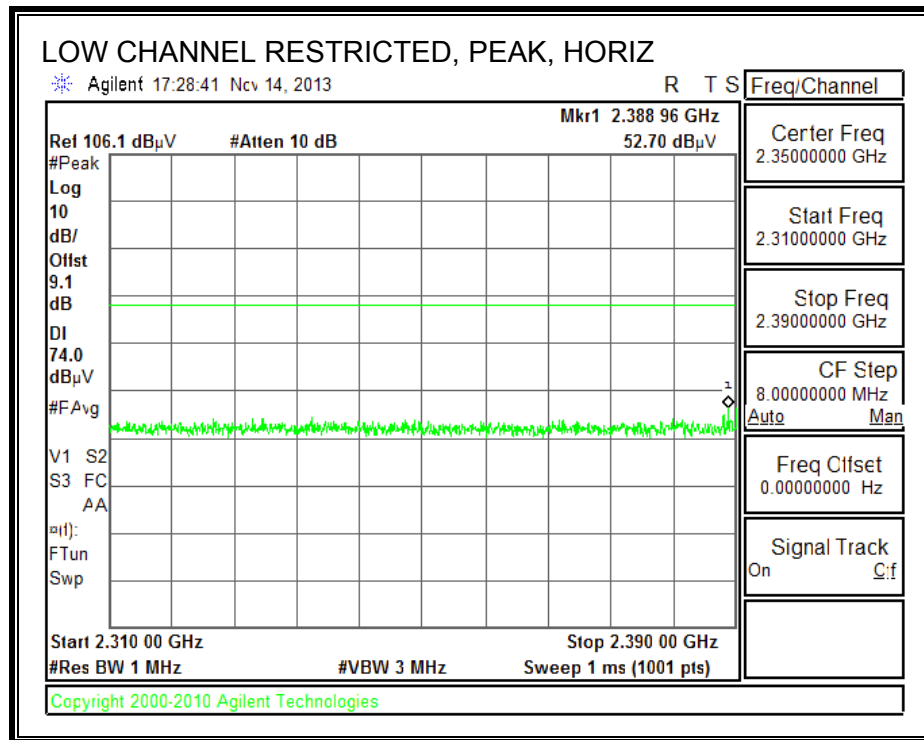
ON time (get from the average on time section 8.4) = $(0.29S/3.16S)/10=9.18ms$ per 100ms

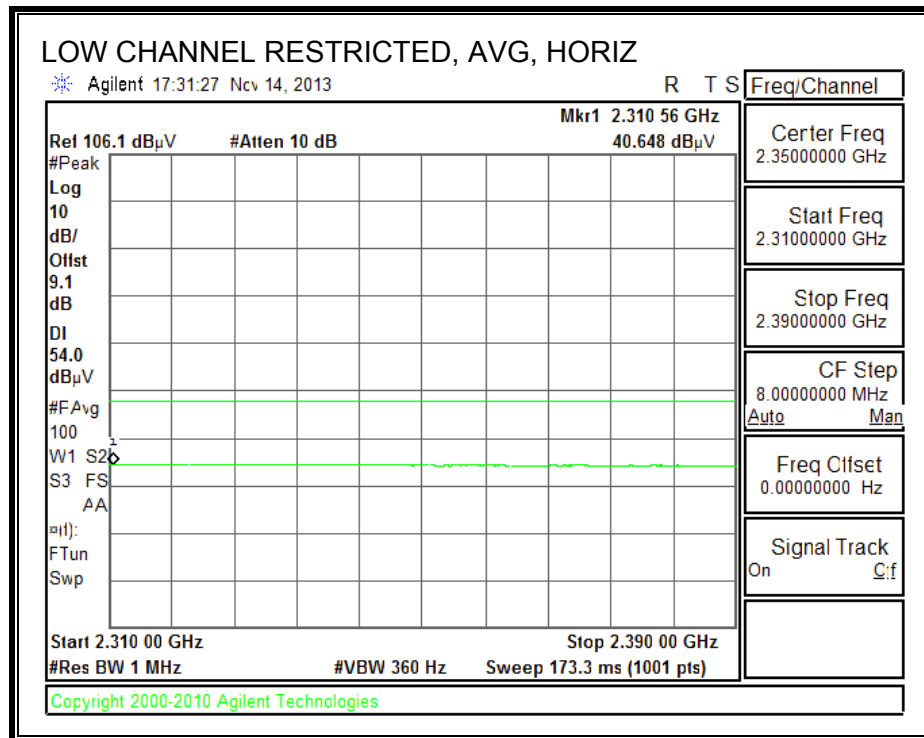
DCCF = $20*\log(100ms/ON\ time) = 20*\log(100ms/9.18) = 20.8dB$

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 21 Oct 2013

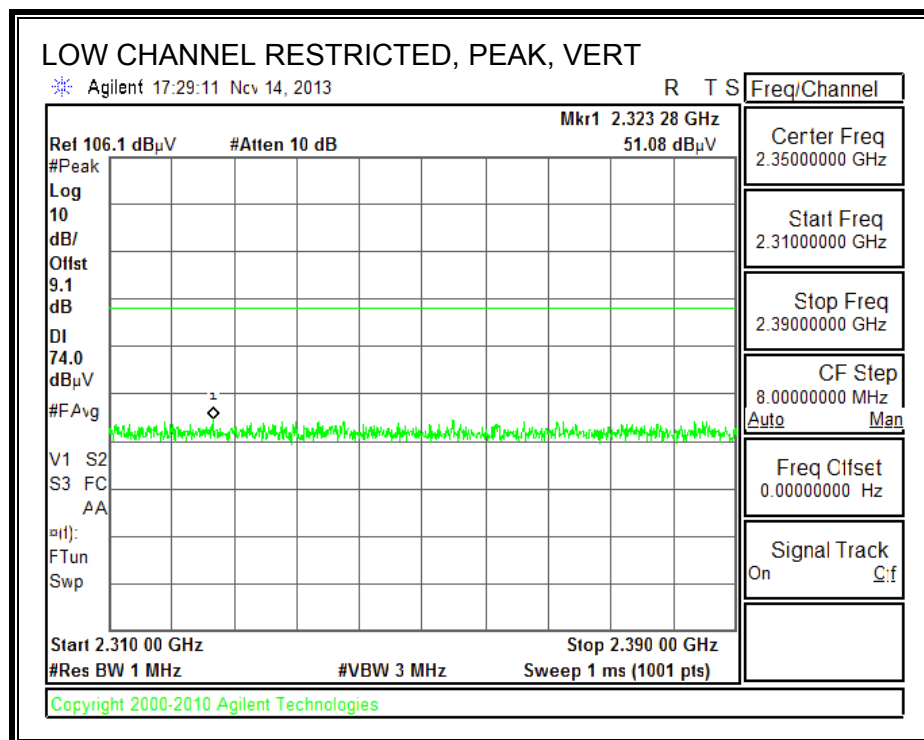
9.2.2. ENHANCED DATA RATE 8PSK MODULATION

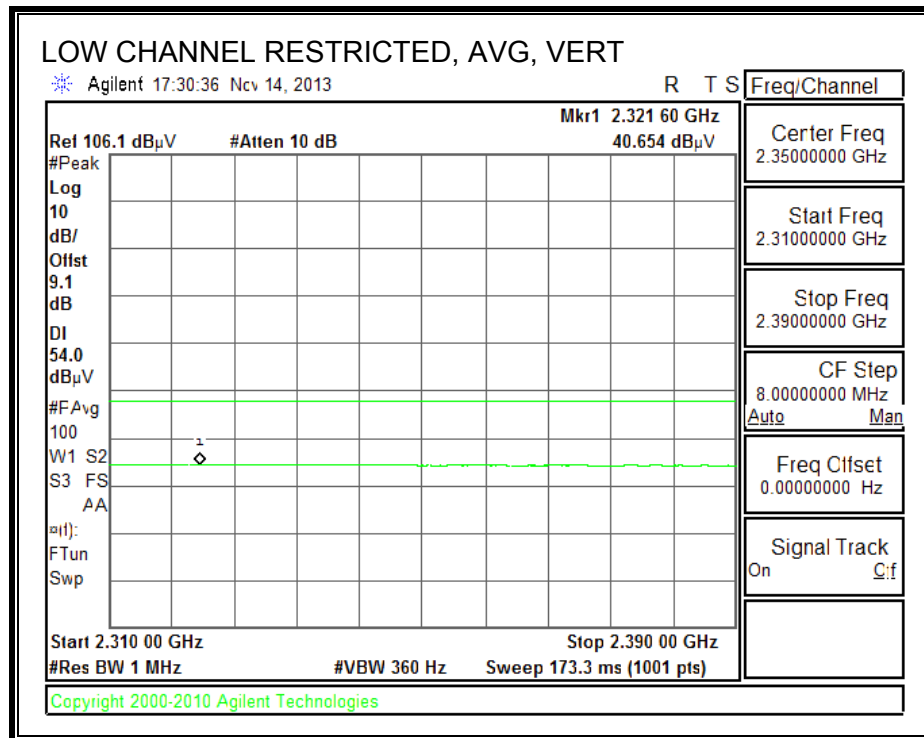
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



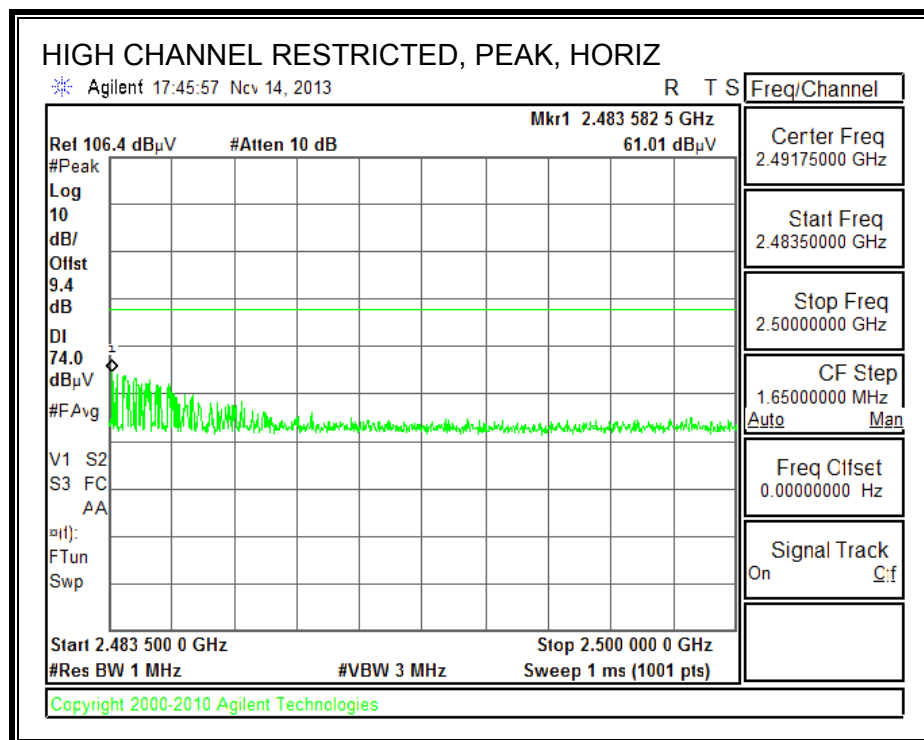


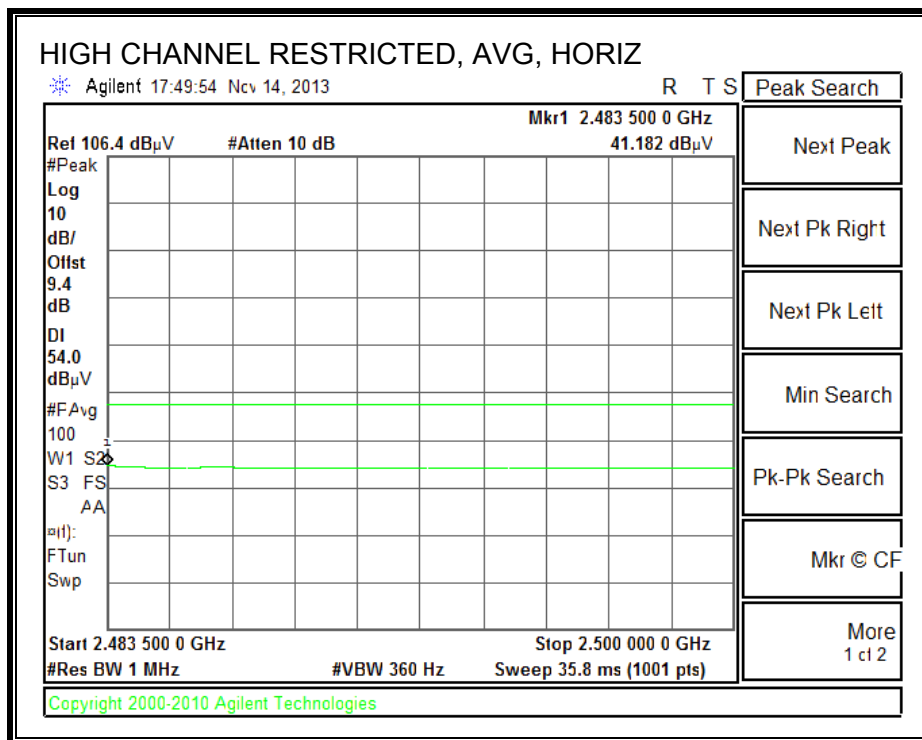
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



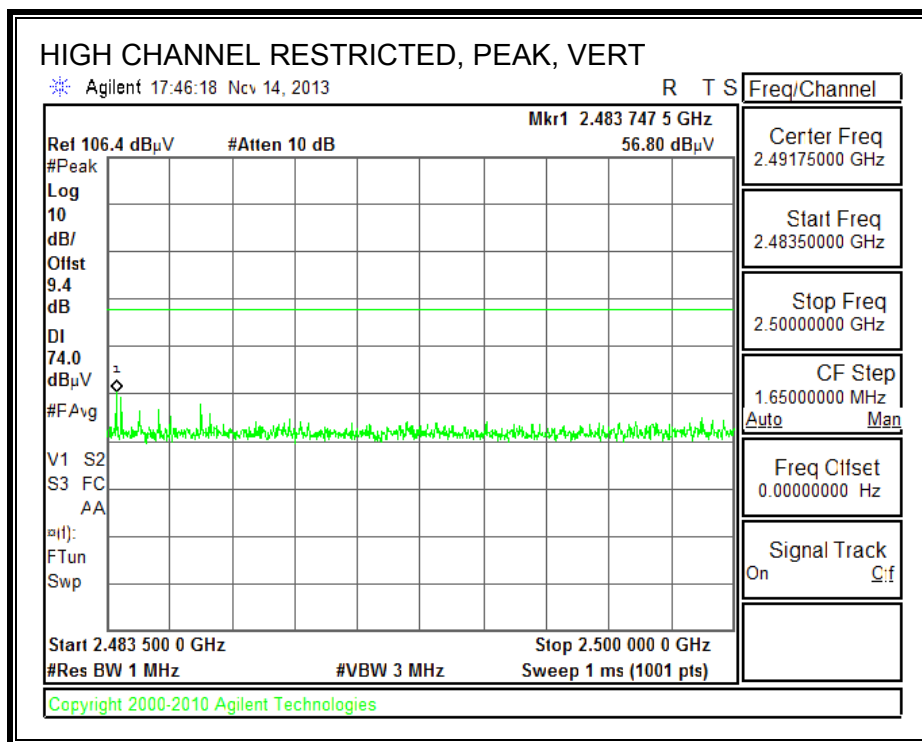


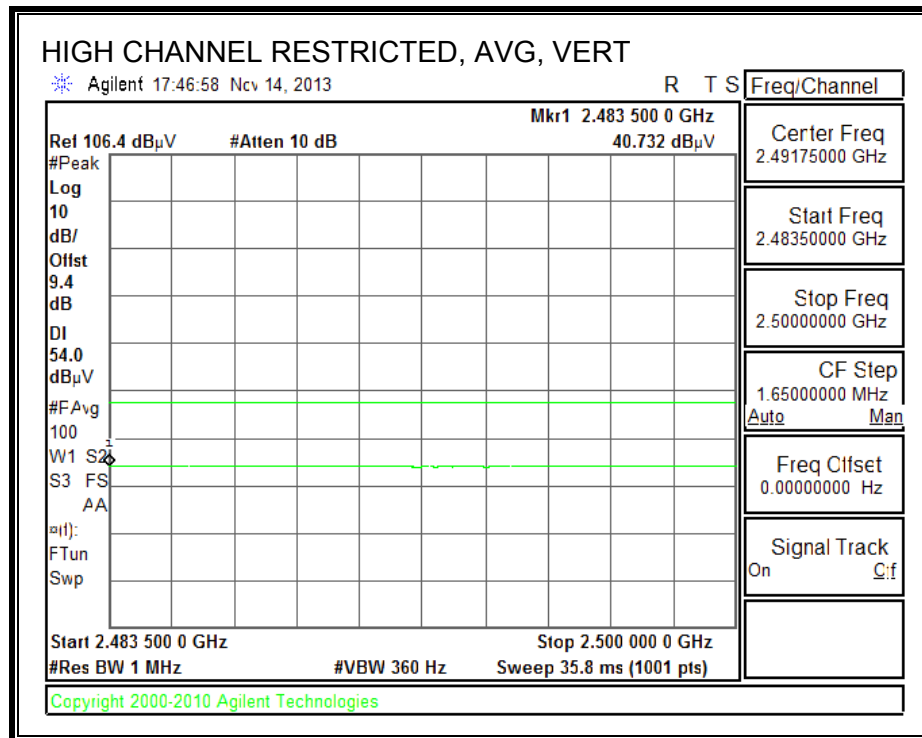
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





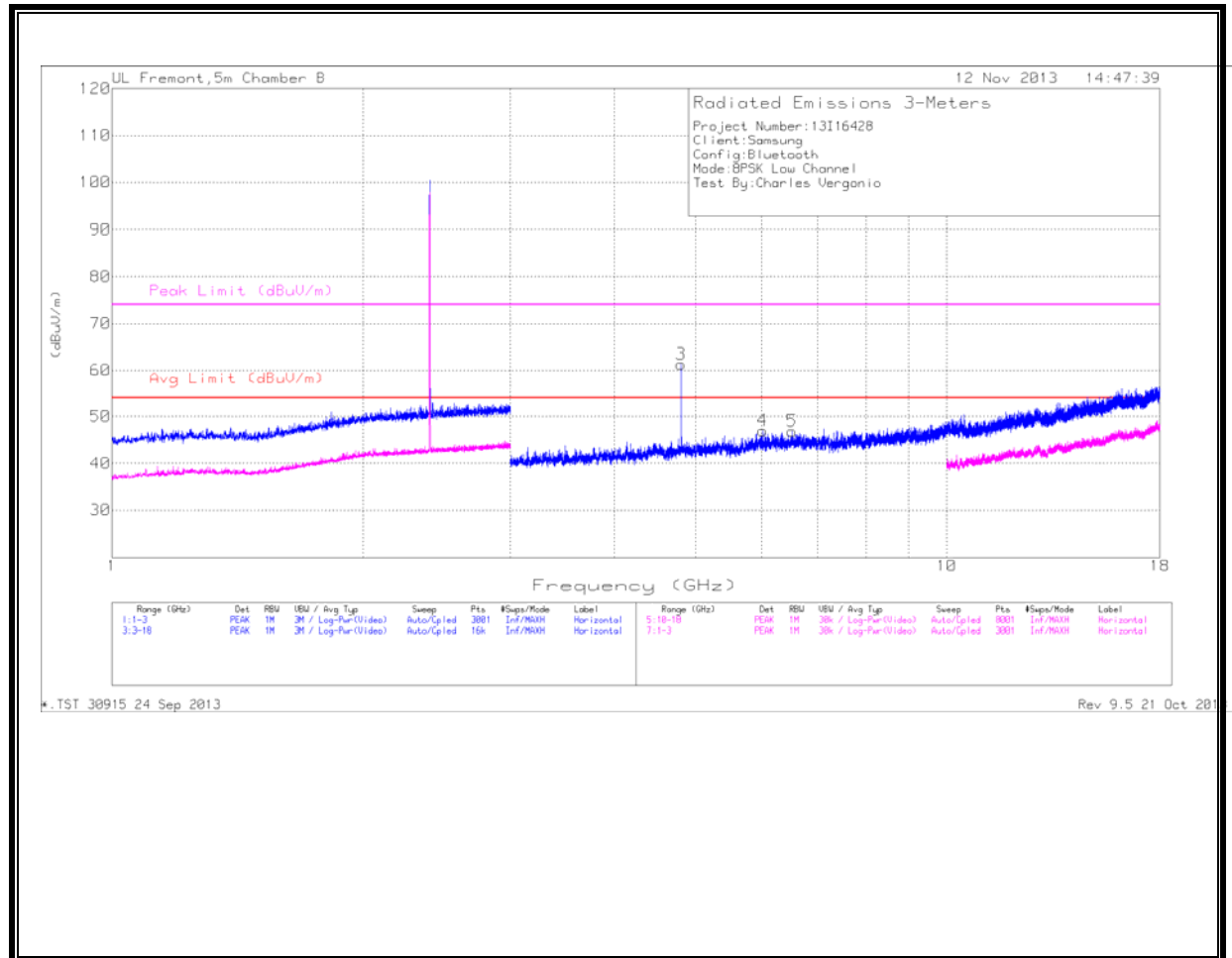
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





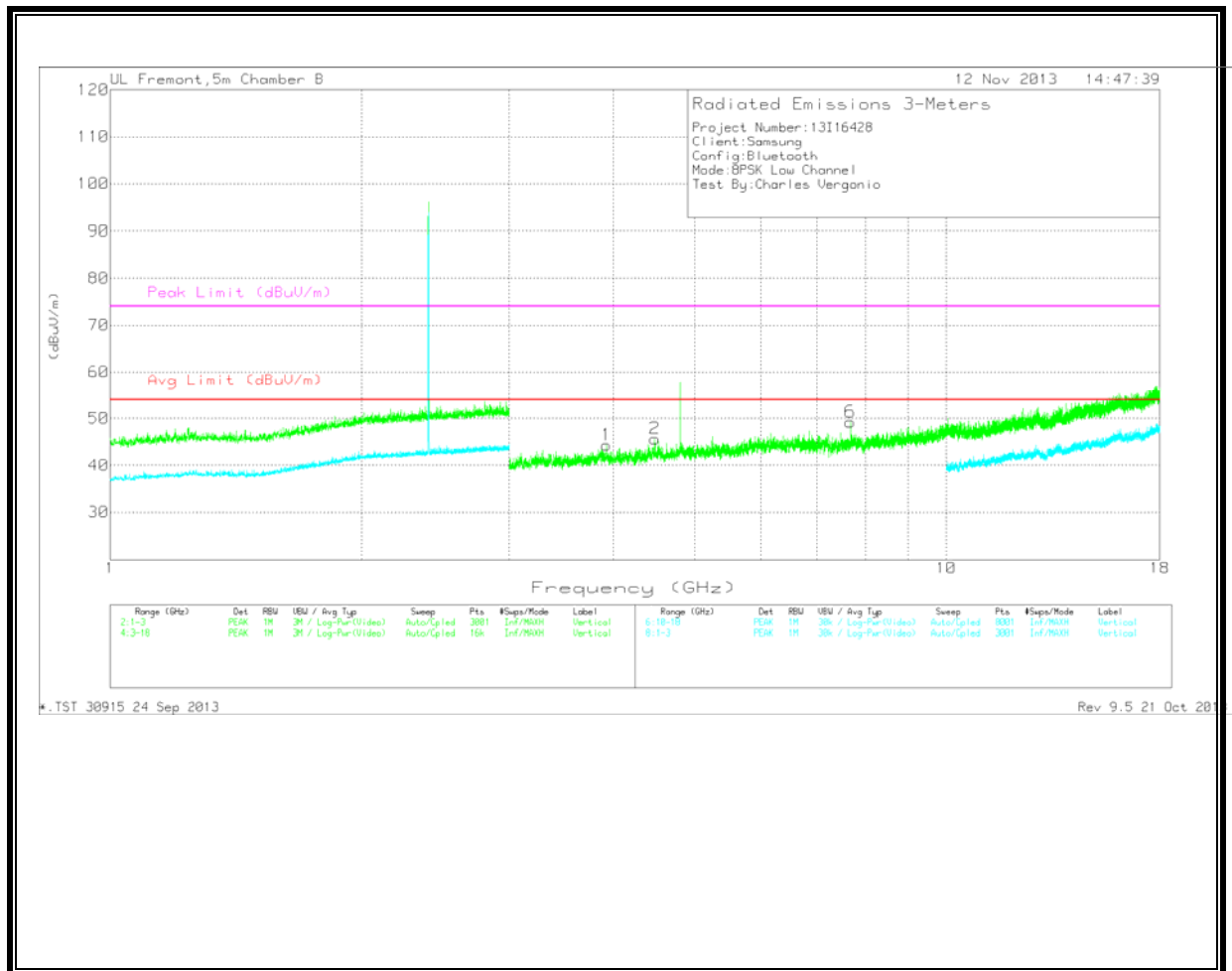
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Fitr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	4.804	55.39	PK	34.7	-28.8	61.29	53.97	7.32	74	-12.71	0-360	99	H
4	6.019	39.66	PK	35.9	-28.6	46.96	53.97	-7.01	74	-27.04	0-360	201	H
5	6.527	38.43	PK	35.9	-27.5	46.83	53.97	-7.14	74	-27.17	0-360	99	H
1	3.922	40.88	PK	33.9	-30.5	44.28	53.97	-9.69	74	-29.72	0-360	99	V
2	4.481	40.38	PK	34.5	-29.2	45.68	53.97	-8.29	74	-28.32	0-360	99	V
6	7.678	40.1	PK	36.1	-27	49.2	53.97	-4.77	74	-24.8	0-360	99	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/F litr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.681	27.16	MAV1	36.1	-26.8	36.46	53.97	-17.51	74	-37.54	127	235	V
*4.804	34.62	PK	34.7	-28.8	40.52	53.97	-13.45	74	-33.48	0	0	H

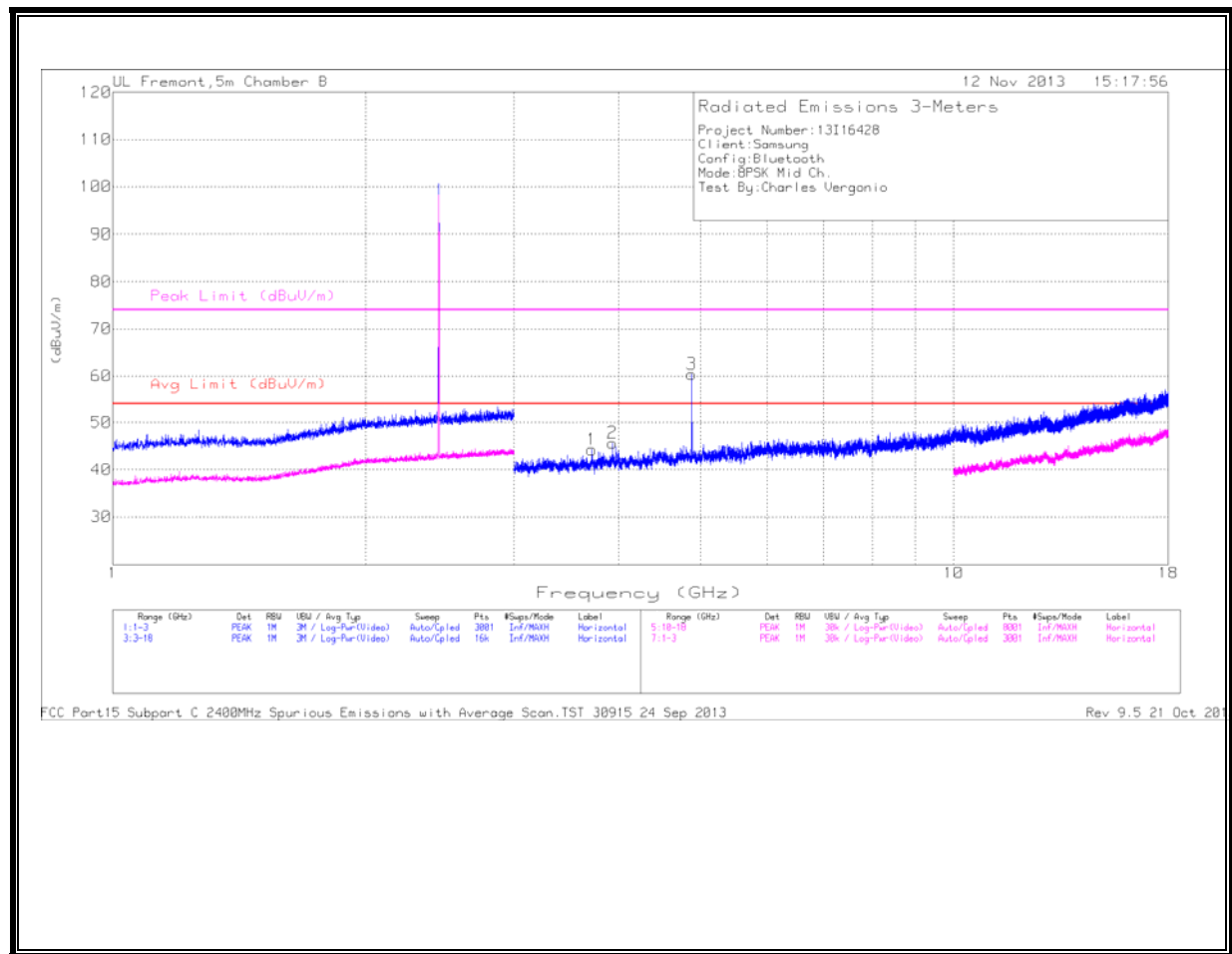
MAV1 - KDB558074 Option 1 Maximum RMS Average

*ON time (get from the average on time section 8.4) = $(0.29S/3.16S)/10=9.18ms$ per 100ms

DCCF = $20*\log(100ms/ON\ time) = 20*\log(100ms/9.18) = 20.8dB$

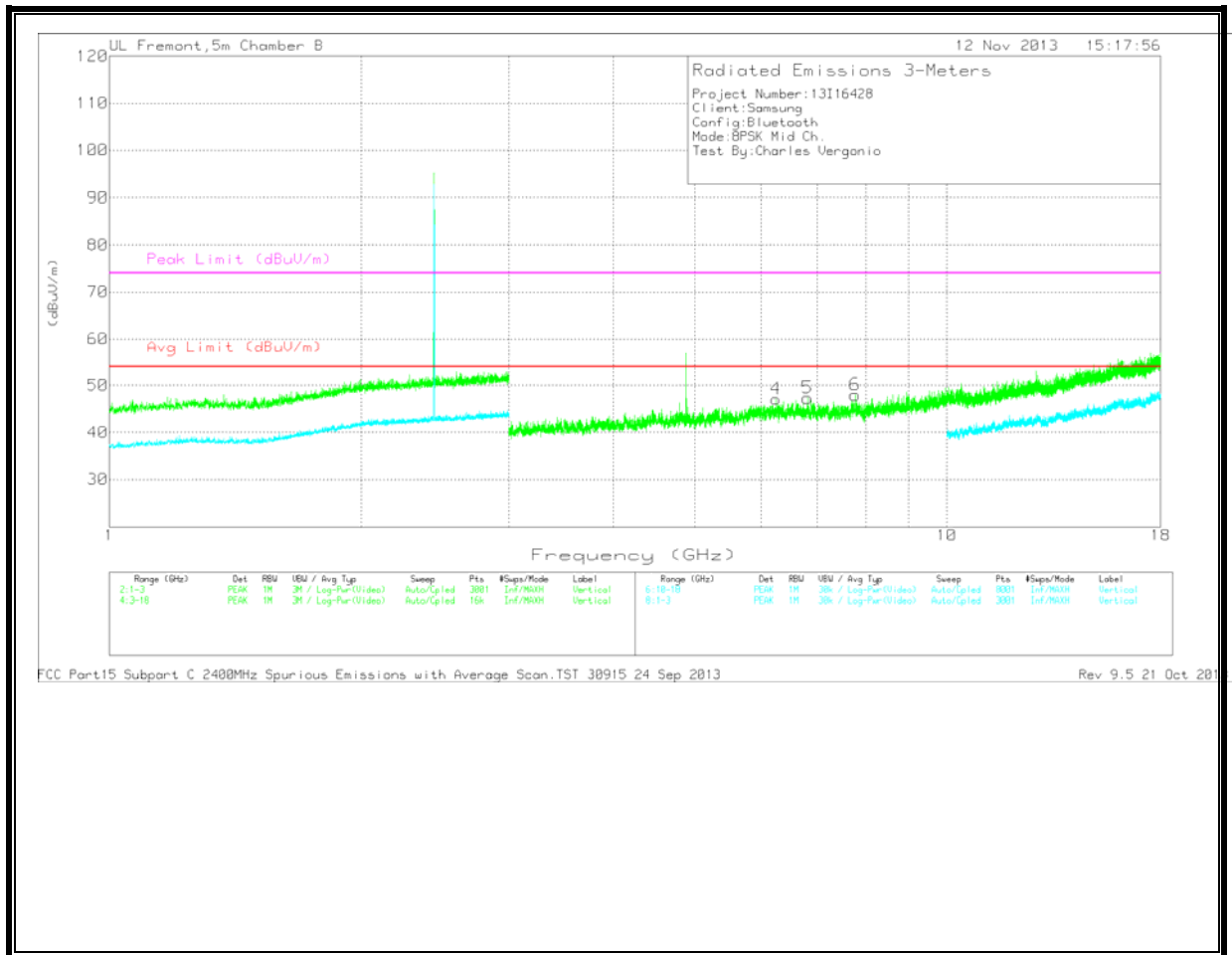
*.TST 30915 24 Sep 2013 Rev 9.5 21 Oct 2013

MID CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.713	41.73	PK	33.7	-31.2	44.23	53.97	-9.74	74	-29.77	0-360	201	H
2	3.93	42.34	PK	33.9	-30.6	45.64	53.97	-8.33	74	-28.36	0-360	201	H
3	4.882	56.37	PK	34.6	-30.6	60.37	53.97	6.4	74	-13.63	0-360	201	H
4	6.252	39.1	PK	36	-28	47.1	53.97	-6.87	74	-26.9	0-360	99	V
5	6.819	39.2	PK	35.8	-27.7	47.3	53.97	-6.67	74	-26.7	0-360	201	V
6	7.773	37.77	PK	36.2	-26	47.97	53.97	-6	74	-26.03	0-360	99	V

PK - Peak detector

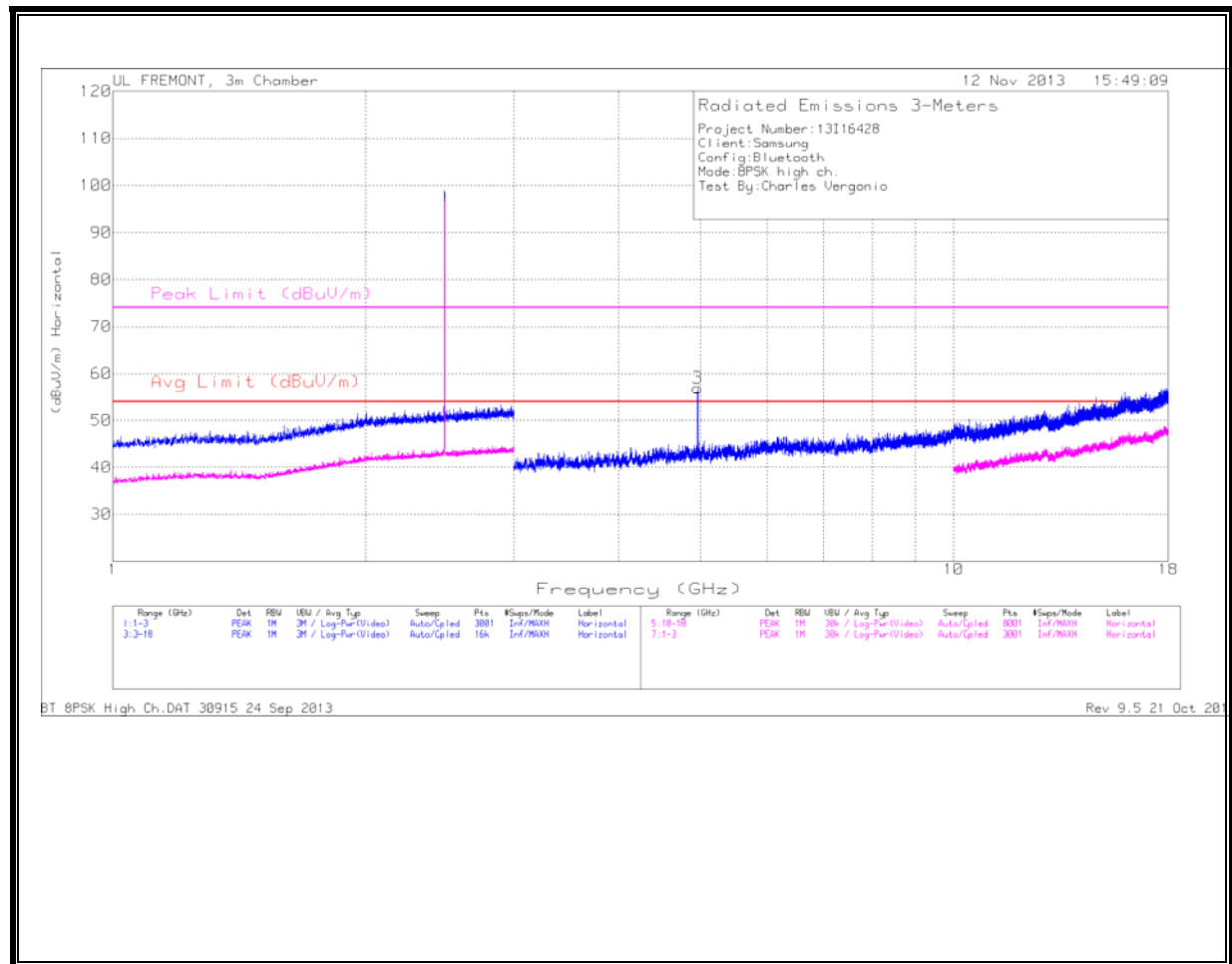
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
*4.882	35.57	PK	34.7	-28.8	41.47	53.97	-12.5	74	-32.53	0	0	H

*ON time (get from the average on time section 8.4) = $(0.29S/3.16S)/10=9.18ms$ per 100ms

DCCF = $20*\log(100ms/ON\ time) = 20*\log(100ms/9.18) = 20.8dB$

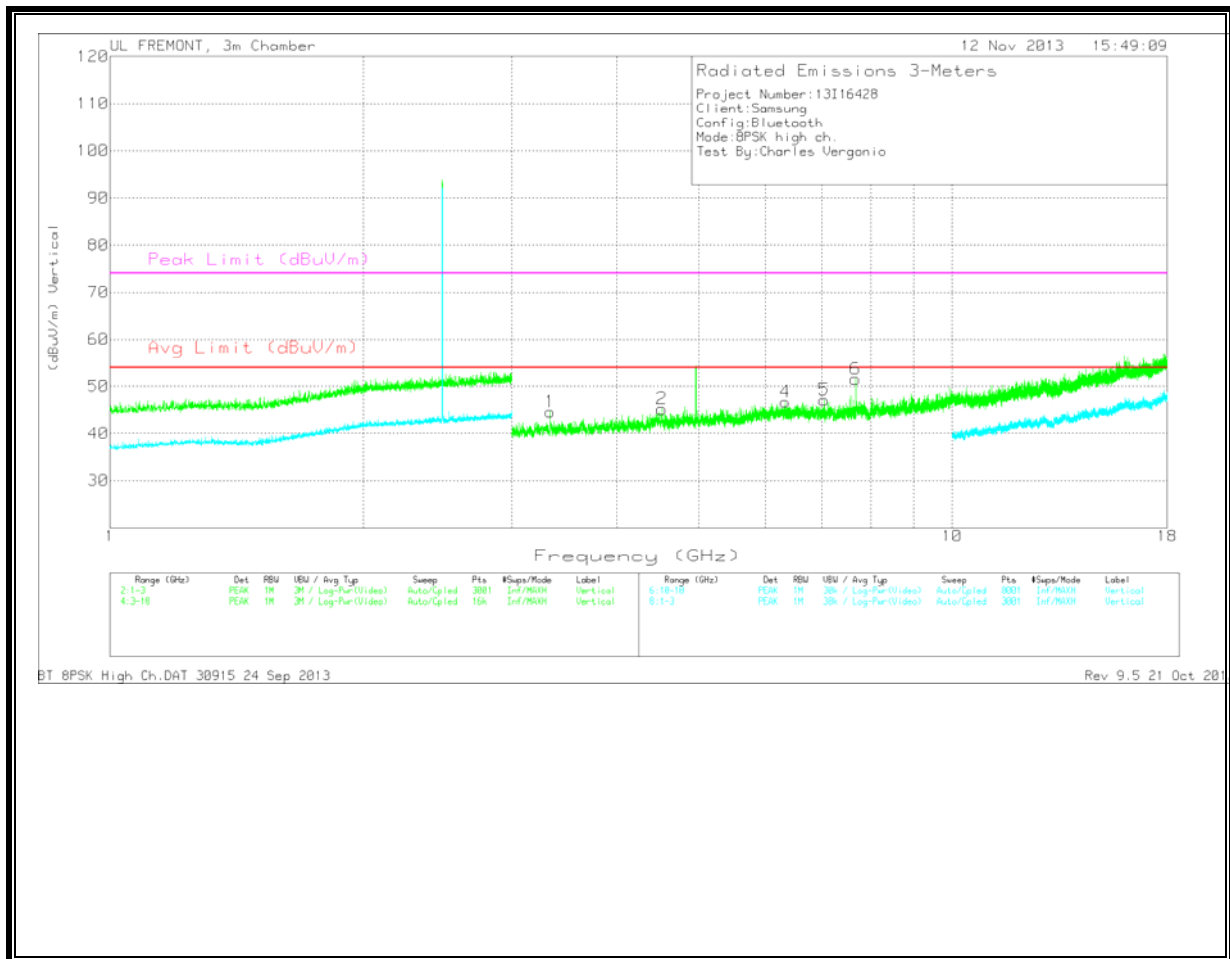
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 21 Oct 2013

HIGH CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.331	42.87	PK	33.3	-31.6	44.57	53.97	-9.4	74	-29.43	0-360	99	V
2	4.521	39.98	PK	34.5	-29.3	45.18	53.97	-8.79	74	-28.82	0-360	202	V
3	*4.96	52.53	PK	34.6	-30.2	56.93	53.97	2.96	74	-17.07	0-360	99	H
4	6.338	39.57	PK	36	-28.9	46.67	53.97	-7.3	74	-27.33	0-360	99	V
5	7.046	38.81	PK	35.9	-27.6	47.11	53.97	-6.86	74	-26.89	0-360	202	V
6	7.678	42.44	PK	36.1	-27	51.54	53.97	-2.43	74	-22.46	0-360	99	V

PK - Peak detector

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.685	27.55	MAv1	36.1	-26.7	36.95	53.97	-17.02	74	-37.05	297	383	V
*4.96	31.73	PK	34.6	-30.2	36.13	53.97	-17.84	74	-37.87	0	0	H

MAv1 - KDB558074 Option 1 Maximum RMS Average

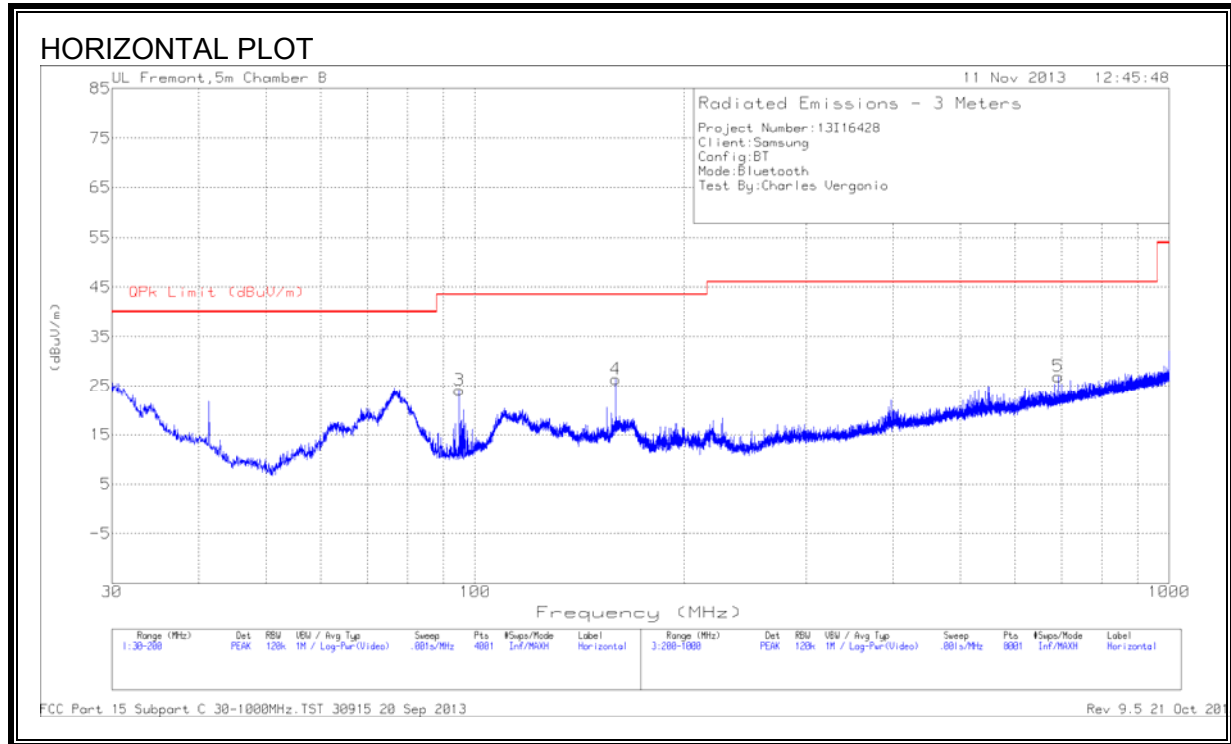
BT 8PSK High Ch.DAT 30915 24 Sep 2013 Rev 9.5 21 Oct 2013

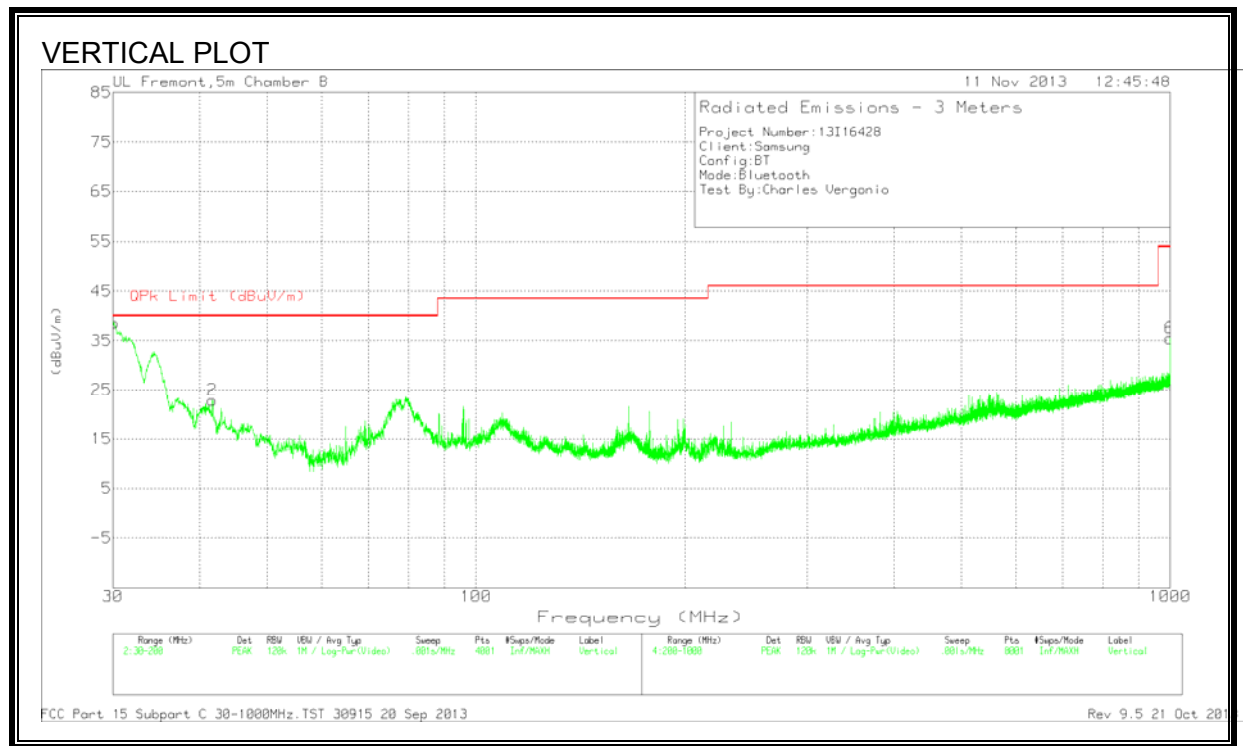
*ON time (get from the average on time section 8.4) = $(0.29S/3.16S)/10=9.18ms$ per 100ms

DCCF = $20*\log(100ms/ON\ time) = 20*\log(100ms/9.18) = 20.8dB$

9.3. WORST-CASE BELOW 1 GHz

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





DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	94.94	43.55	PK	8.7	-28.1	24.15	43.52	-19.37	0-360	300	H
4	159.54	41.58	PK	12.1	-27.3	26.38	43.52	-17.14	0-360	400	H
1	30.1275	46.66	PK	20.8	-28.9	38.56	40	-1.44	0-360	100	V
2	41.73	39.35	PK	12.2	-28.7	22.85	40	-17.15	0-360	100	V
5	692	31.73	PK	19.9	-24.7	26.93	46.02	-19.09	0-360	200	H
6	1000	34.57	PK	23.3	-22.4	35.47	53.97	-18.5	0-360	100	V

PK - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
31.6228	37.5	QP	19.9	-28.9	28.5	40	-11.5	1	100	V

QP - Quasi-Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 30915 20 Sep 2013 Rev 9.5 21 Oct 2013

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

^{*} Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS

6 WORST EMISSIONS

Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.186	34.83	PK	.1	0	34.93	64.2	-29.27	-	-
2	.186	11.89	Av	.1	0	11.99	-	-	54.2	-42.21
3	.402	30.13	PK	.1	0	30.23	57.8	-27.57	-	-
4	.402	24.91	Av	.1	0	25.01	-	-	47.8	-22.79
5	2.157	37.05	PK	.1	.1	37.25	56	-18.75	-	-
6	2.157	19.38	Av	.1	.1	19.58	-	-	46	-26.42
7	2.796	37.96	PK	.1	.1	38.16	56	-17.84	-	-
8	2.796	20.81	Av	.1	.1	21.01	-	-	46	-24.99

Line-L2 .15 - 30MHz

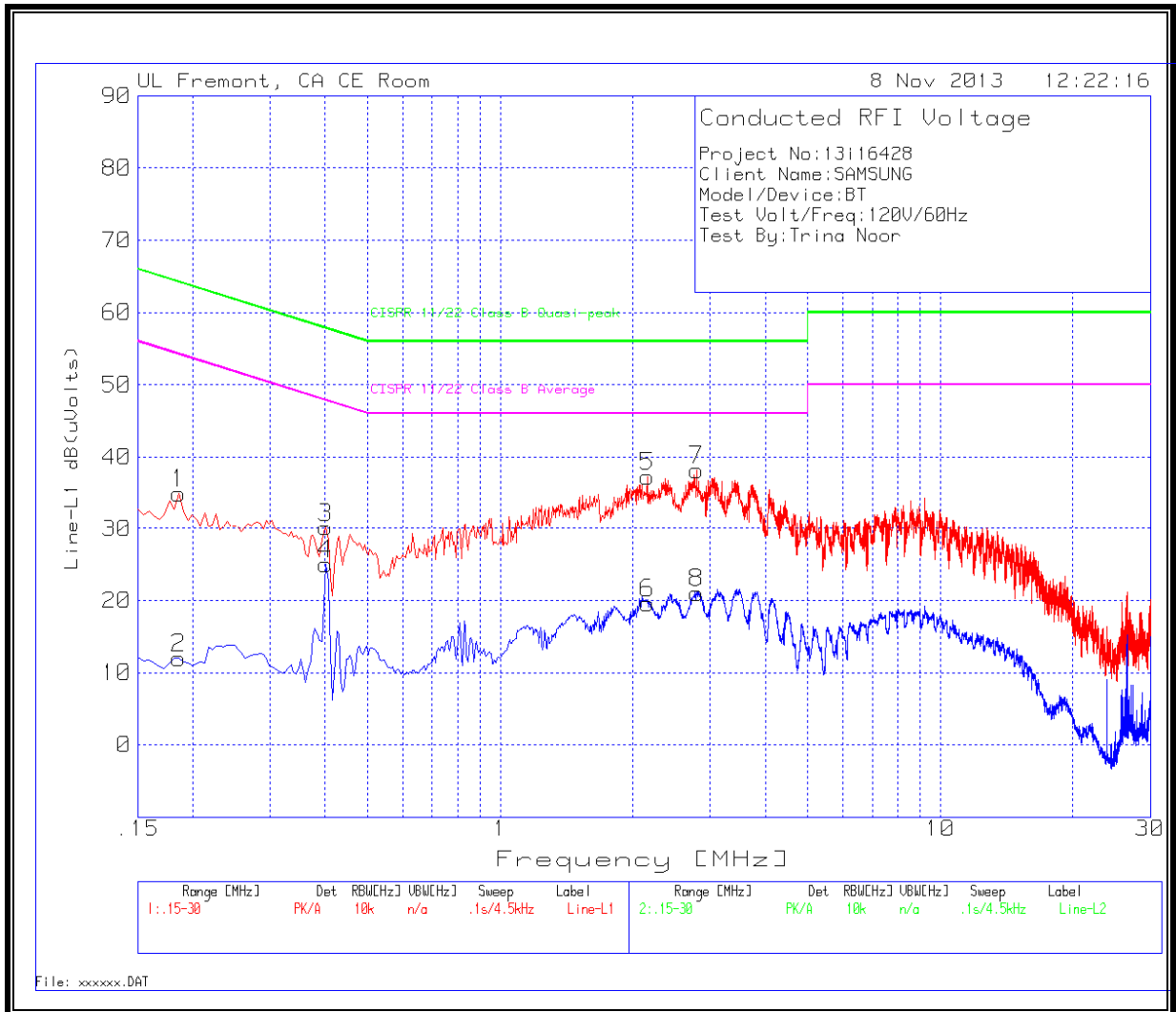
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
9	.402	29.4	PK	.1	0	29.5	57.8	-28.3	-	-
10	.402	15.14	Av	.1	0	15.24	-	-	47.8	-32.56
11	.825	28.1	PK	.1	0	28.2	56	-27.8	-	-
12	.825	10.64	Av	.1	0	10.74	-	-	46	-35.26
13	27.312	29.21	PK	.5	.3	30.01	60	-29.99	-	-
14	27.312	-54	Av	.5	.3	.26	-	-	50	-49.74

PK - Peak detector

Av - average detection

LINE 1 RESULTS



LINE 2 RESULTS

