FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

Tablet with cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA /CDMA 1xRTT /1x Advanced/EV-DO Rev 0, A, B/LTE/IEEE 802.11a/b/g/n (MIMO 2x2) and Bluetooth radio

MODEL NUMBER: A1490

FCC ID: BCGA1490
IC: 579C-A1490

REPORT NUMBER: 13U15668-3

ISSUE DATE: SEPTEMBER 13, 2013

Prepared for
APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	09/13/13	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: Tablet with cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/CDMA1xRTT/1x Advanced/EV-DO Rev 0, A, B/LTE/IEEE 802.11a/b/g/n (MIMO 2x2) and Bluetooth radio.

MODEL: A1490

SERIAL NUMBER: DLXL2008FW7N

DATE TESTED: AUGUST 22-SEPTEMBER 05, 2013

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

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

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

Approved & Released For
UL Verification Services Inc. By:

Thu Chan
WiSE Operations Manager
UL Verification Services Inc.

Tested By:

Oliver Su
WiSE Senior Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☐ Chamber B	☒ Chamber E
☐ Chamber C	☒ Chamber F

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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The Apple iPad Model A1475 is a Tablet with cellular GSM/GPRS/EGPRS/WCDMA/HSPA+ DC-HSDPA/ CDMA 1xRTT/1x Advanced/EV-DO Rev 0, A, B/LTE/IEEE 802.11a/b/g/n (MIMO 2x2) and Bluetooth radio.

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	13.21	20.94
2402 - 2480	Enhanced 8PSK	11.63	14.55

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA antenna, with a maximum gain as below table.

Frequency (MHz)	Antenna Gain (dBi)
2402 -2480	0.81

5.4. SOFTWARE AND FIRMWARE

Firmware installed in the EUT during testing was Broadcom Bluetool 1.5.6.2.

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT is a portable device that has three orientations; therefore, X (Lay down), Y (Landscape) and Z orientations (Standup) have been investigated, and the worst case was found to be at X (Lay down) position without AC Adapter and Headset.

Worst-case data rates from the base line scans of output powers were:
GFSK: 1Mbps
8PSK: 3Mbps

The worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was including headset, AC charger and the mode and channel with the highest output power.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC/DC Adapter	Apple	A1357	A/12981EA	DoC
Earphone	Apple	NA	NA	NA

I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	SMA	Un-Shielded	0.1m	To Spectrum Analyzer

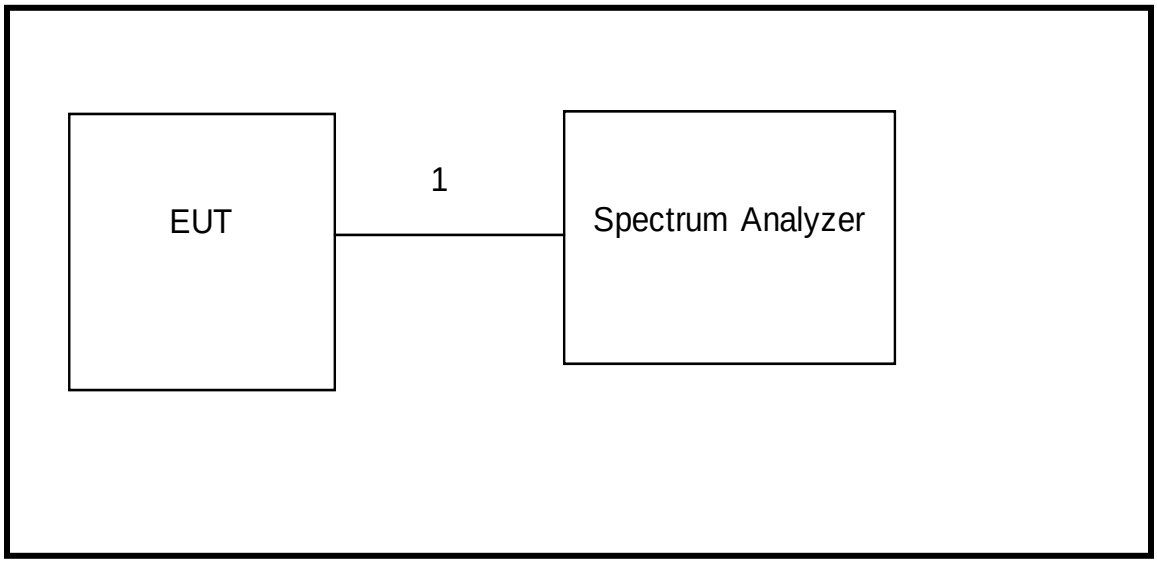
I/O CABLES (RADIATED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Audio	1	Jack	Un-Shielded	0.5m	NA

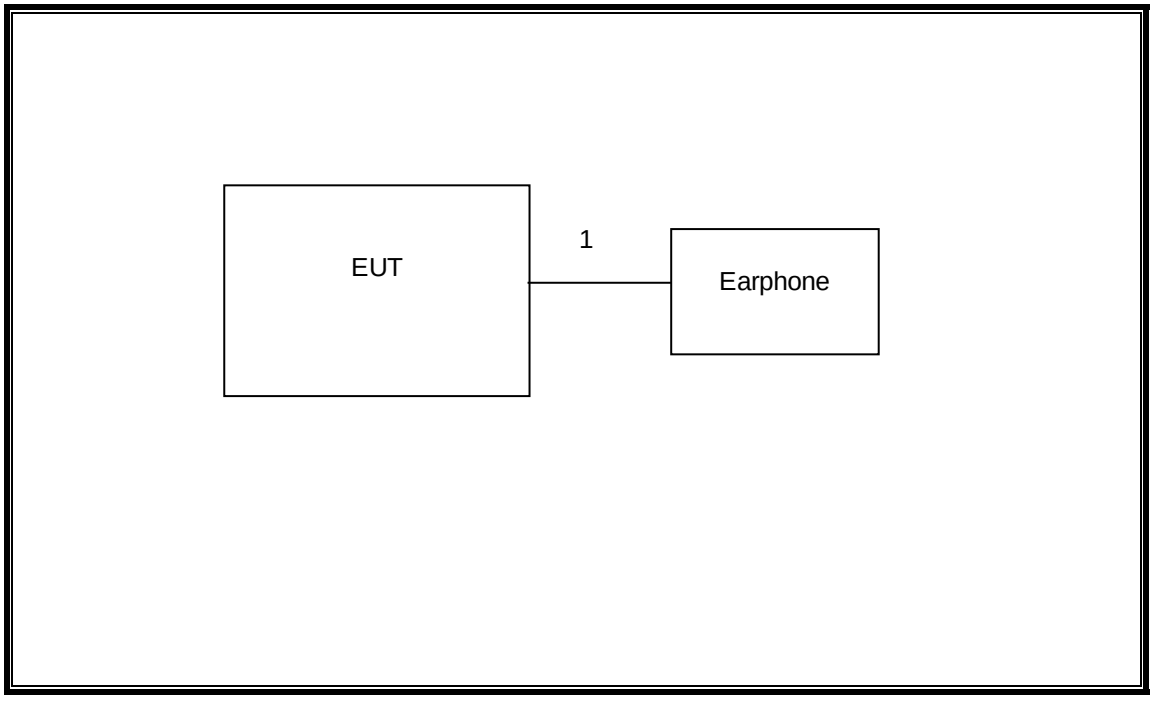
I/O CABLES (AC POWER CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	US115	Un-Shielded	2m	NA
2	DC	1	USB	Un-Shielded	2m	NA
3	Audio	1	Jack	Un-Shielded	0.5m	NA

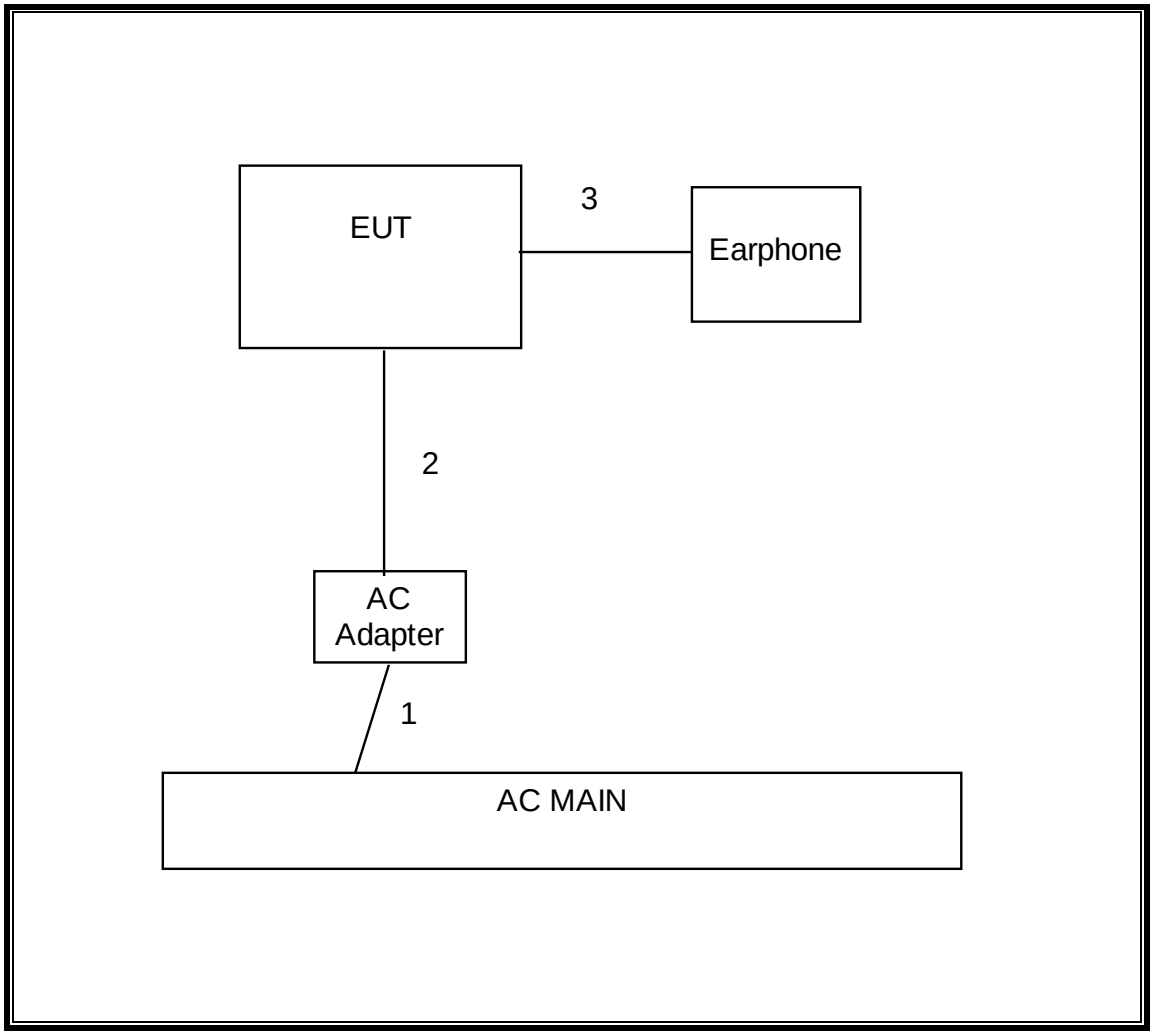
SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR BELOW 1GHZ & AC POWER CONDUCTED 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 Due**
Antenna, Horn, 18 GHz	ETS Lindgren	3117	F00131	02/19/14
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	04/28/14
Peak / Average Power Sensor	Agilent / HP	N1911A	F00153	04/05/14
Peak Power Meter	Agilent / HP	E9323A	F00025	04/03/14
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	F00126	02/22/14
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	F00168	03/07/14
Preamplifier, 1300 MHz	Sonoma	310	F00008	11/06/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	F00165	03/18/14
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESHS20	N02396	08/15/14
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	04/17/14

7. ANTENNA PORT TEST RESULTS

7.1. 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 ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

GFSK

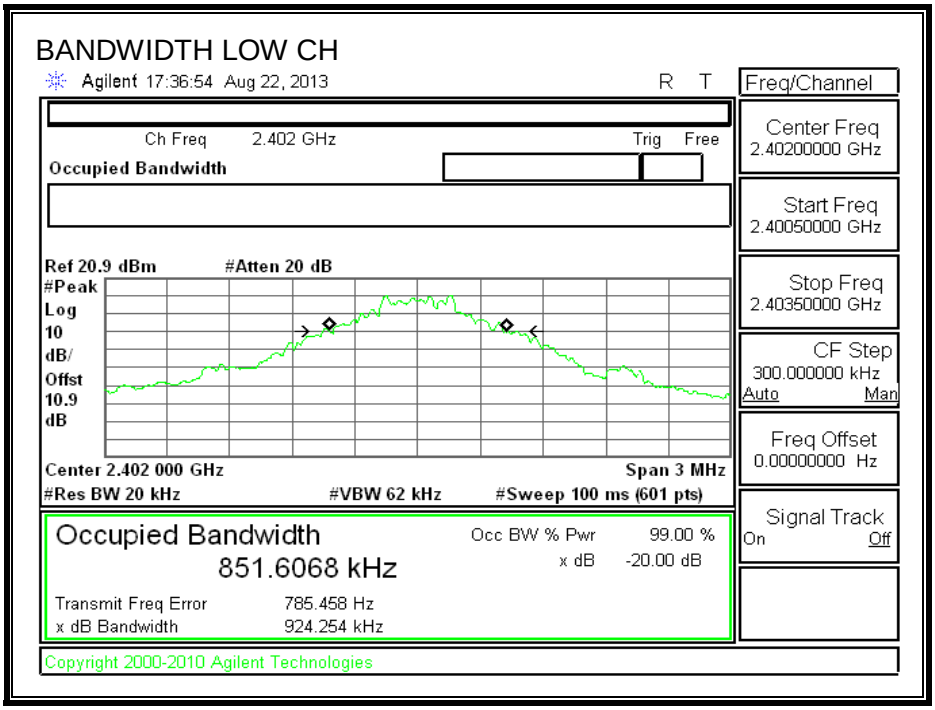
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	924.254	891.7983
Middle	2441	927.932	858.4823
High	2480	927.403	934.4285

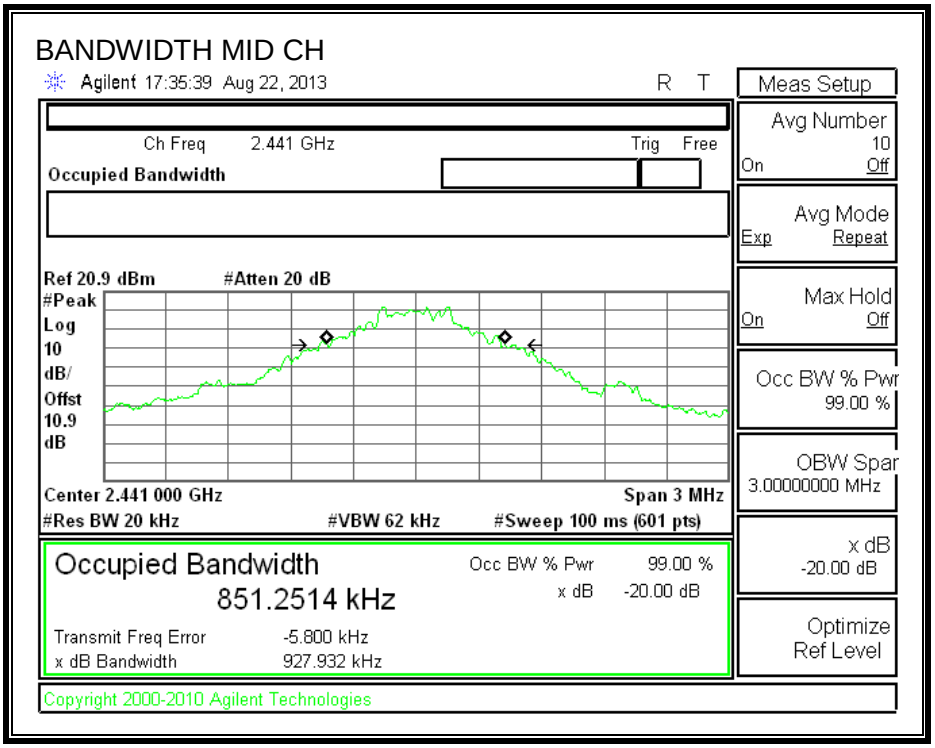
8PSK

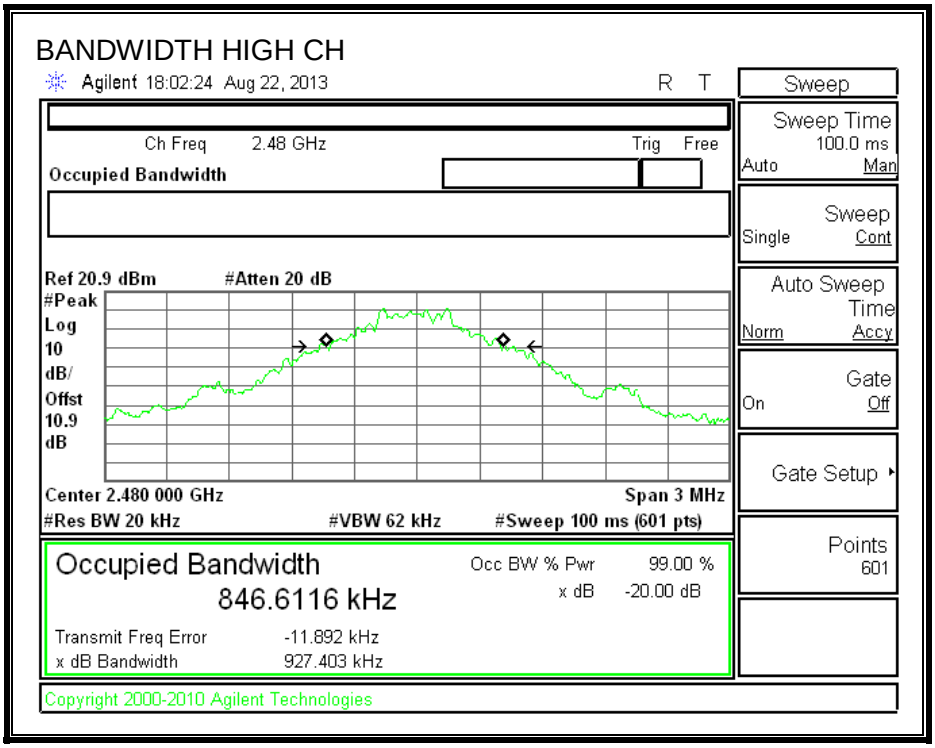
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1335	1296.7
Middle	2441	1332	1296.4
High	2480	1314	1254.1

GFSK

20 dB BANDWIDTH

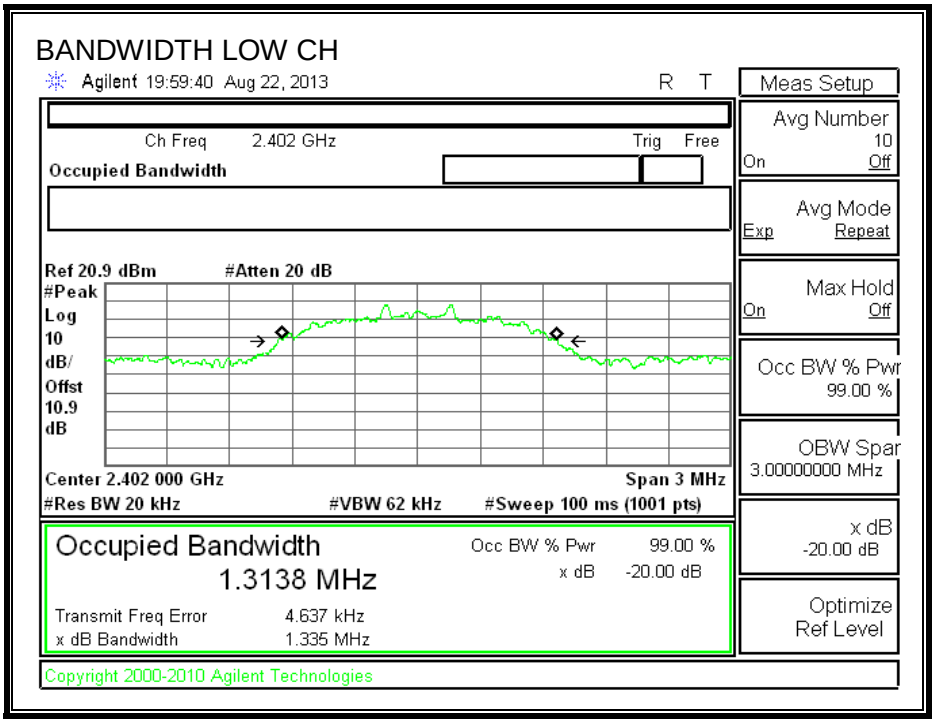


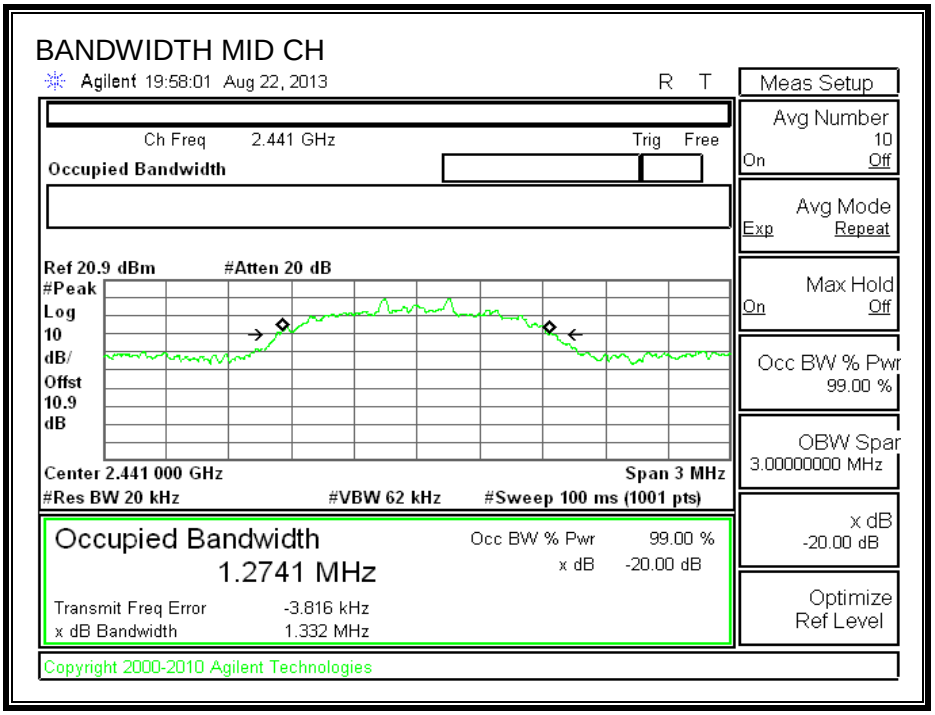


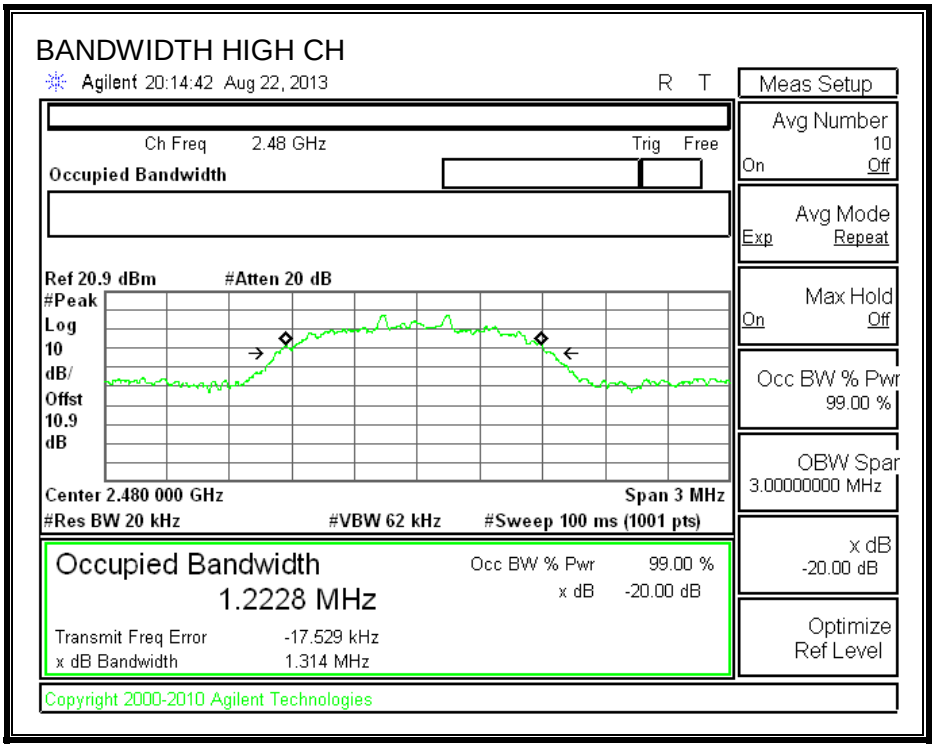


8PSK

20 dB BANDWIDTH

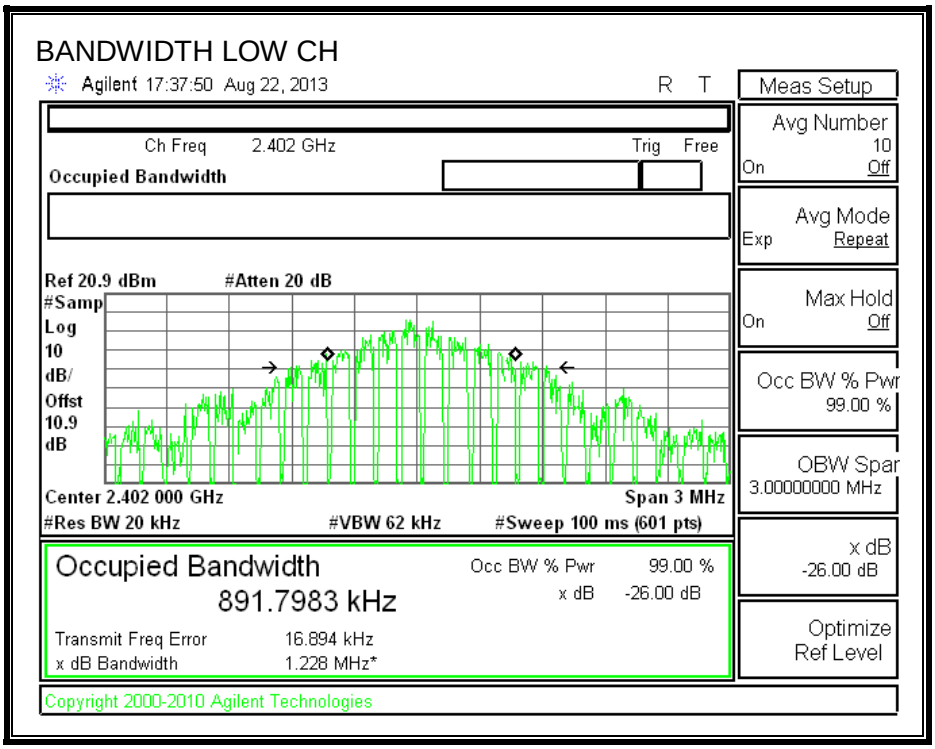


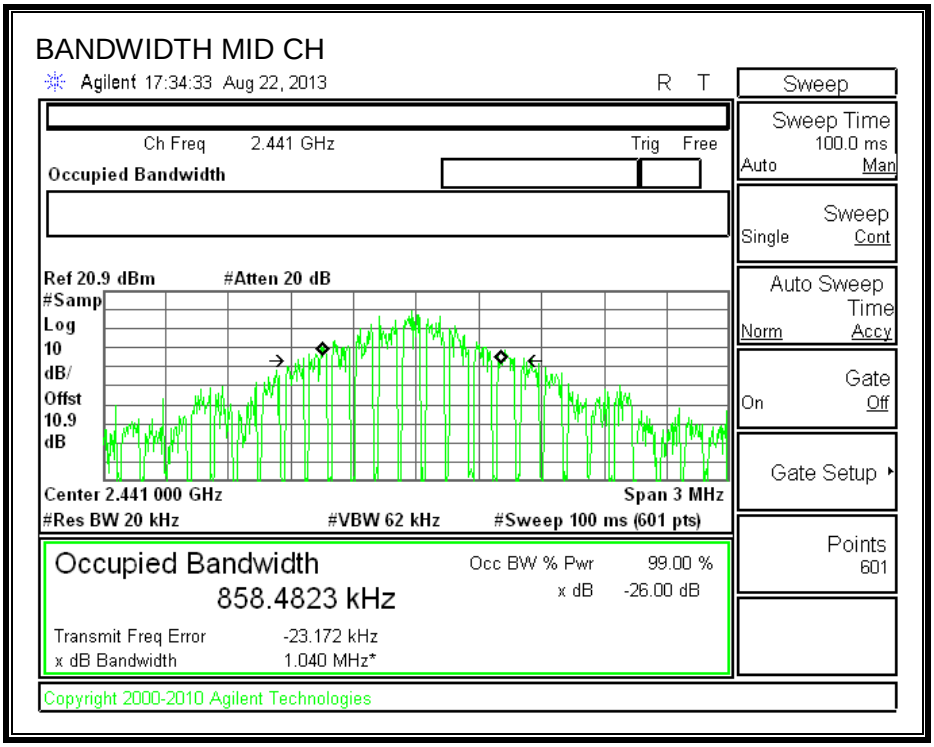


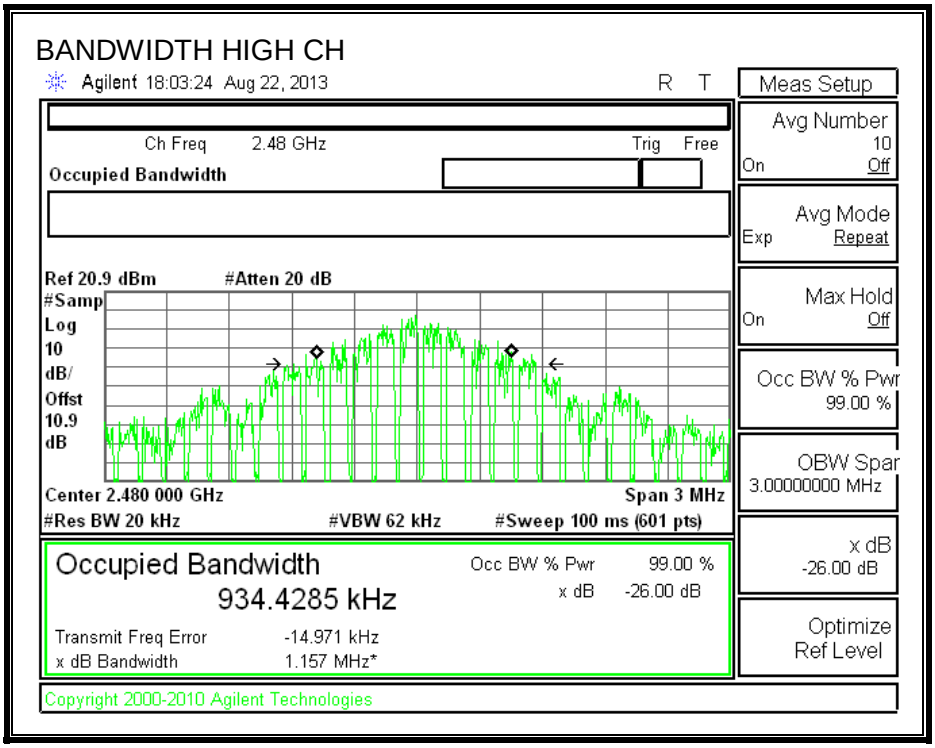


GFSK

99% BANDWIDTH

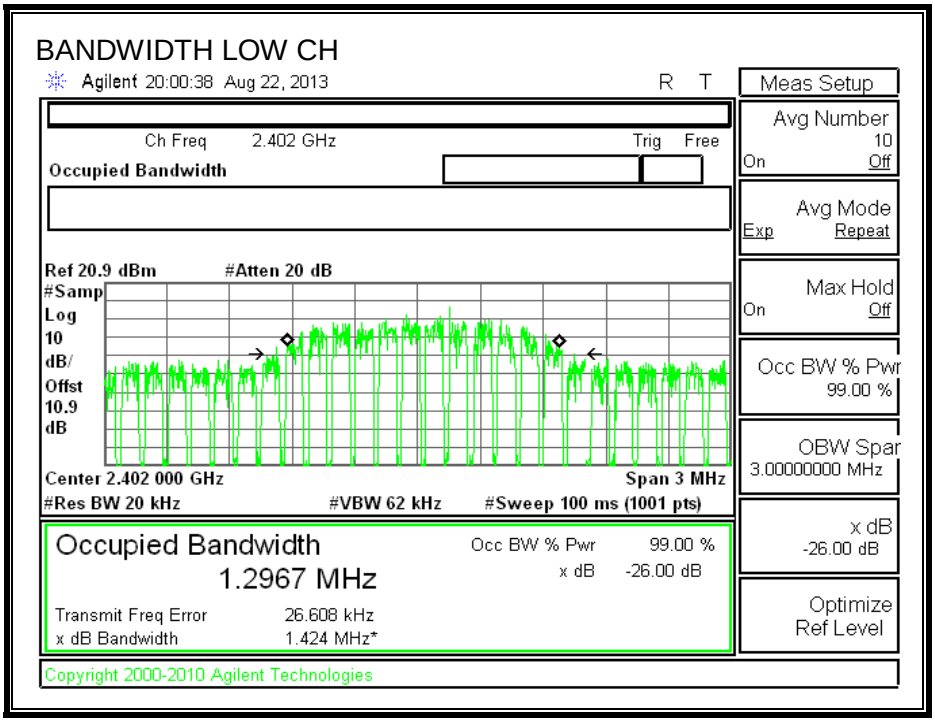


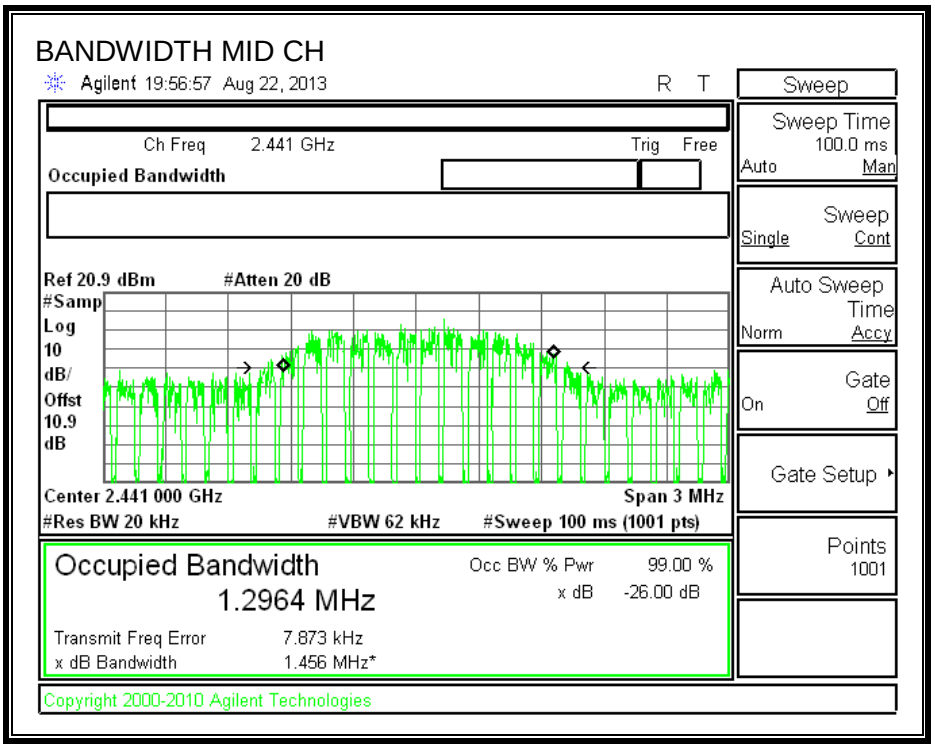


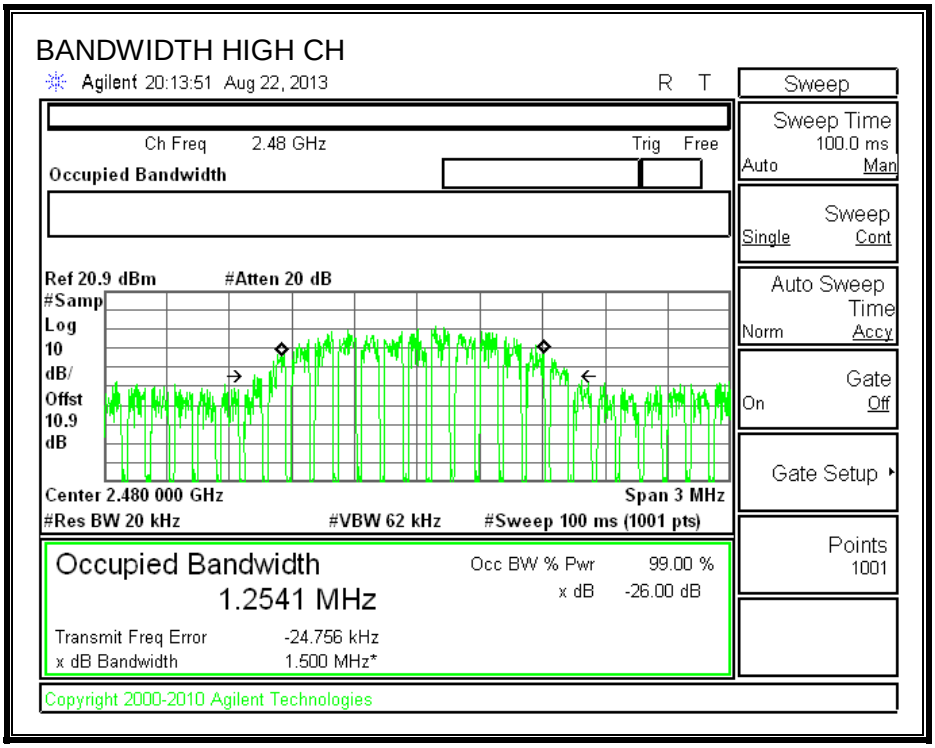


8PSK

99% BANDWIDTH







7.2. 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 hoping channel, whichever is greater.

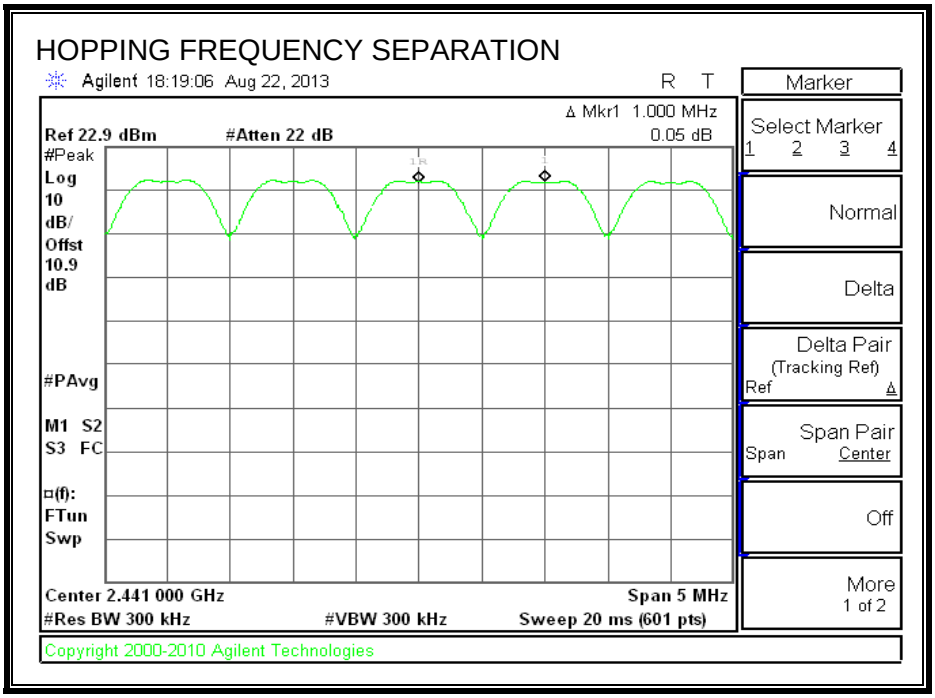
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

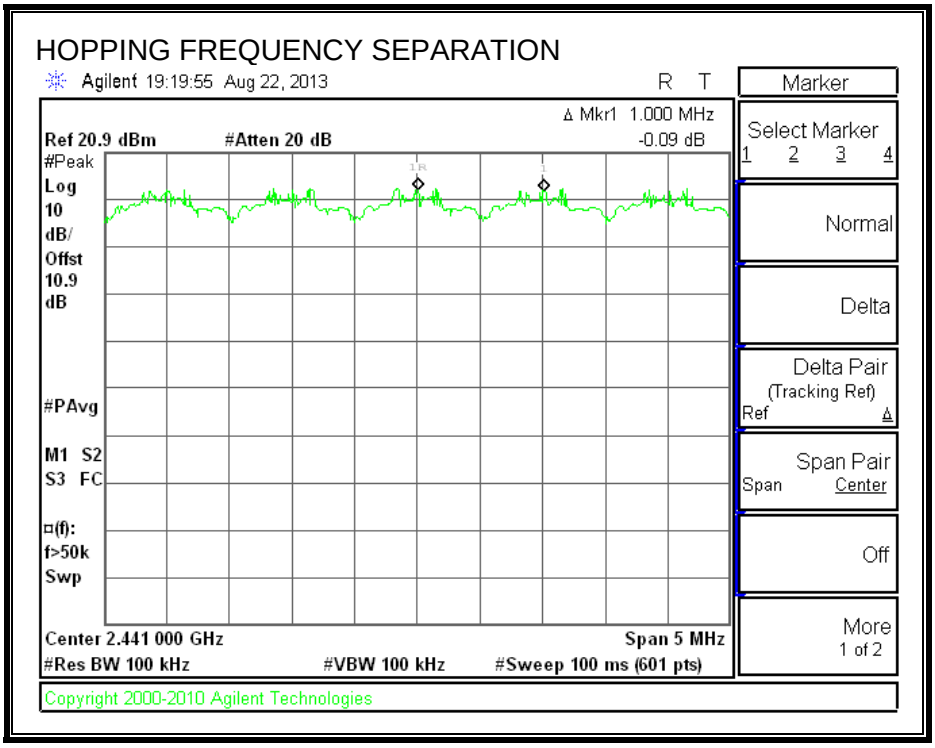
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

GFSK

HOPPING FREQUENCY SEPARATION



8PSK



7.3. 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.

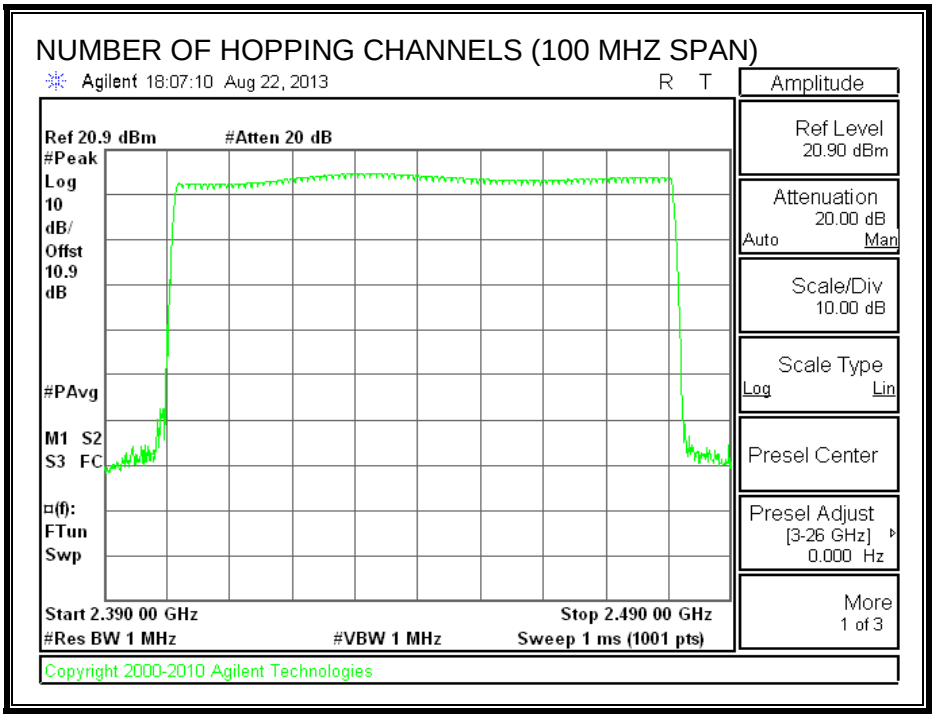
RESULTS

79 Channels observed

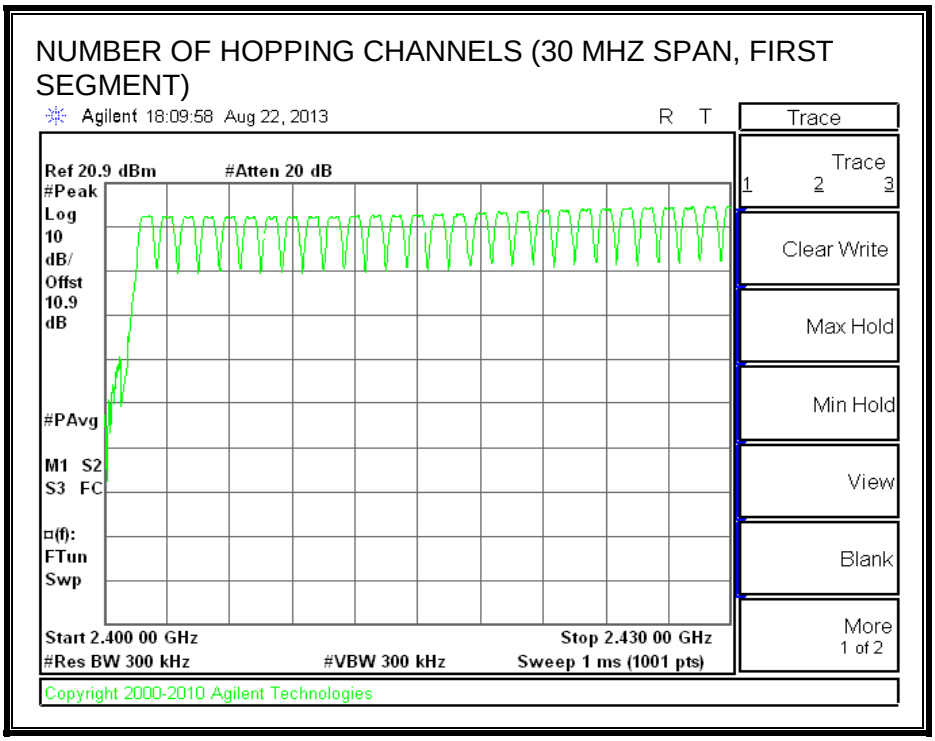
GFSK

NUMBER OF HOPPING CHANNELS

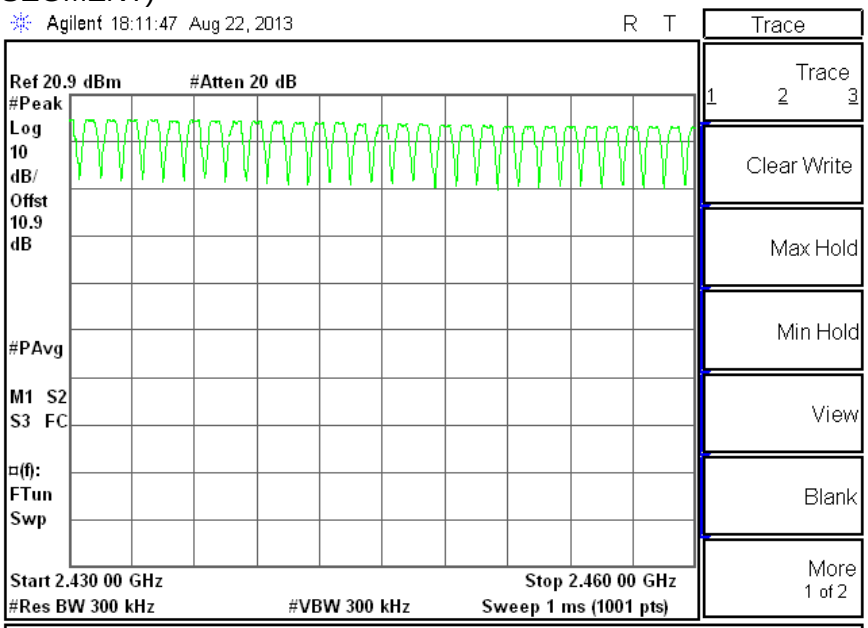
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



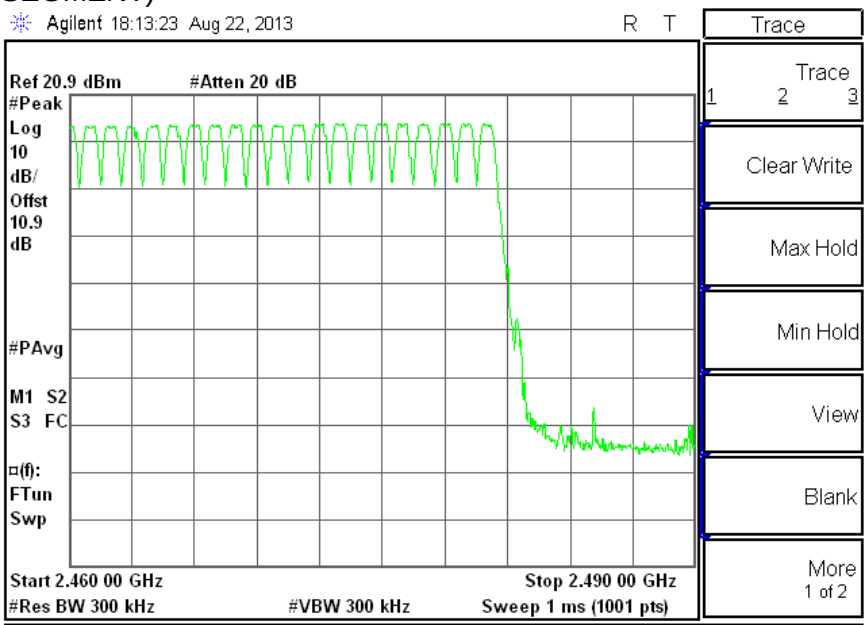
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



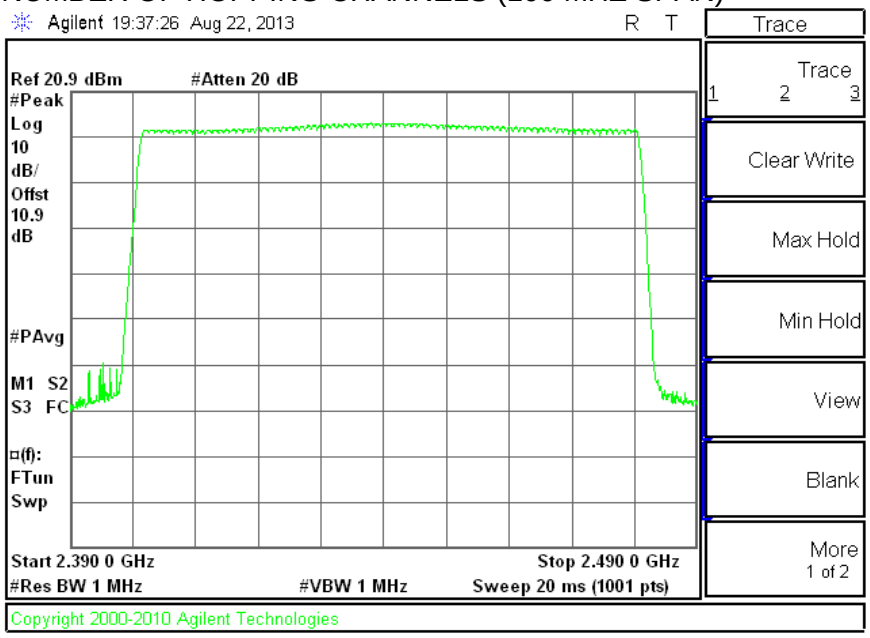
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



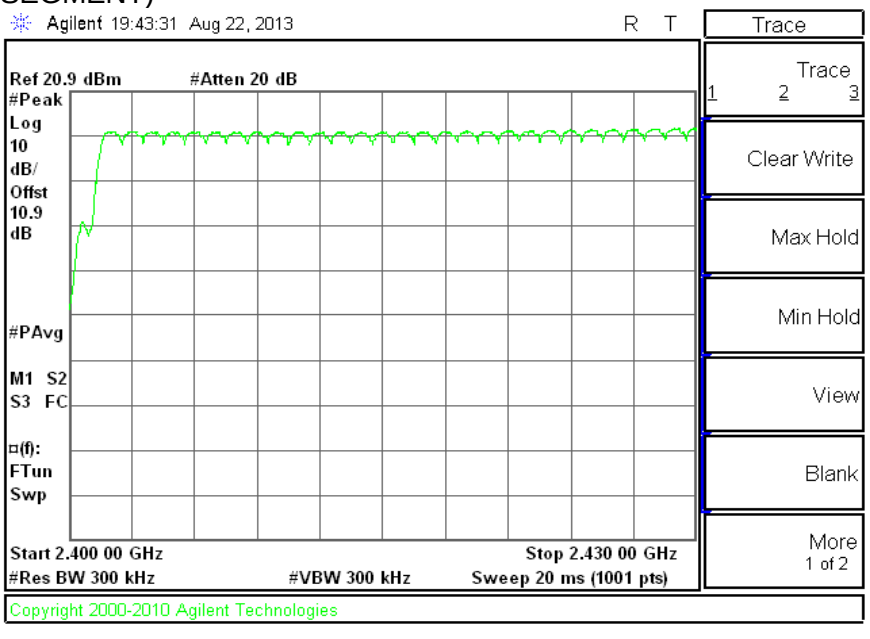
8PSK

NUMBER OF HOPPING CHANNELS

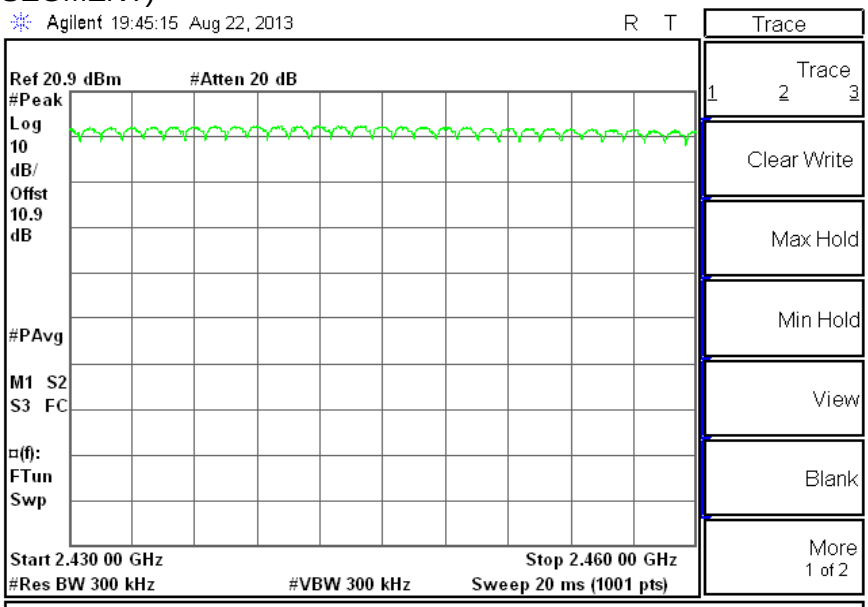
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



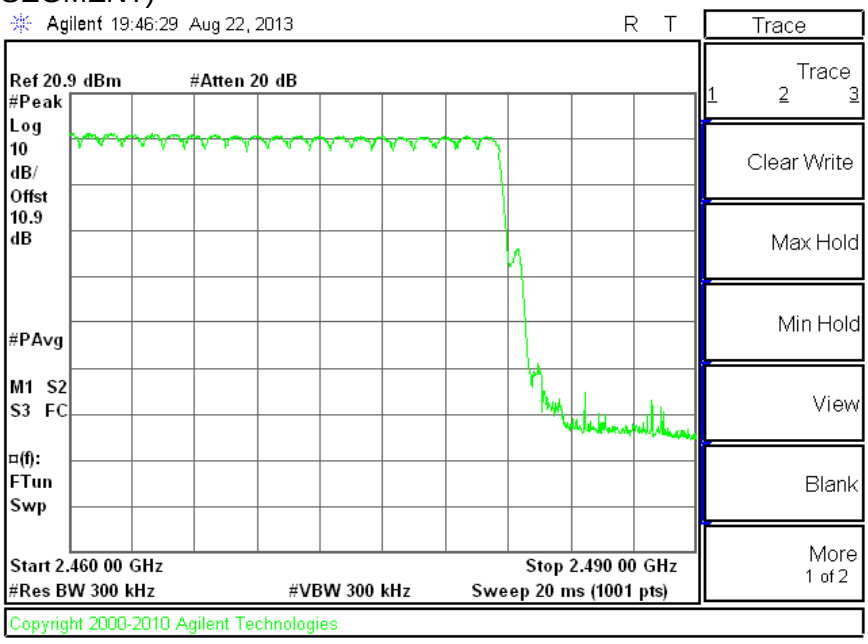
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



7.4. 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.

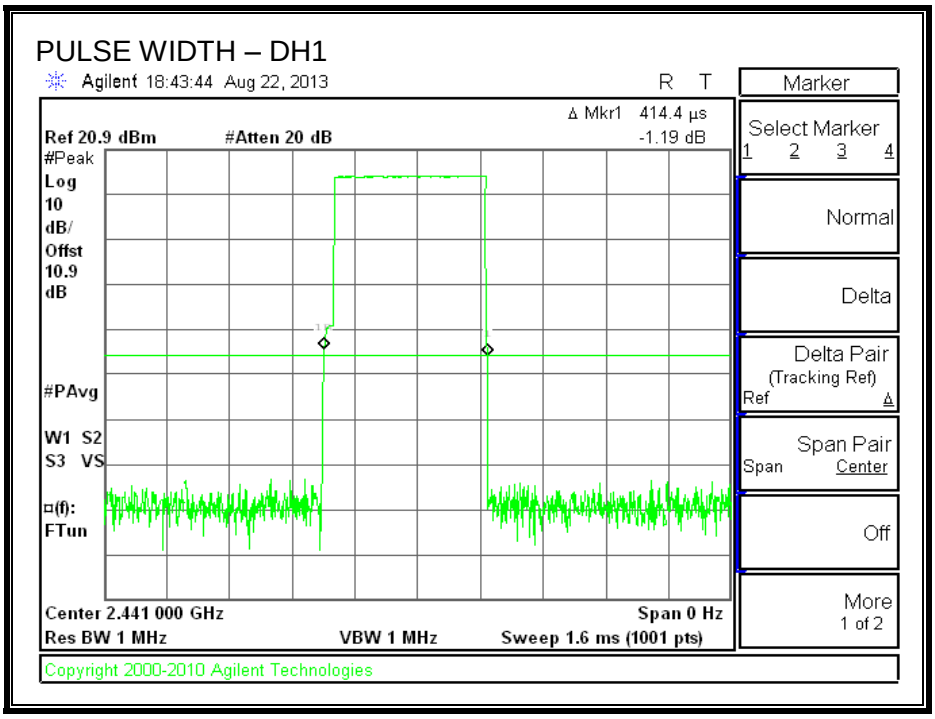
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULT

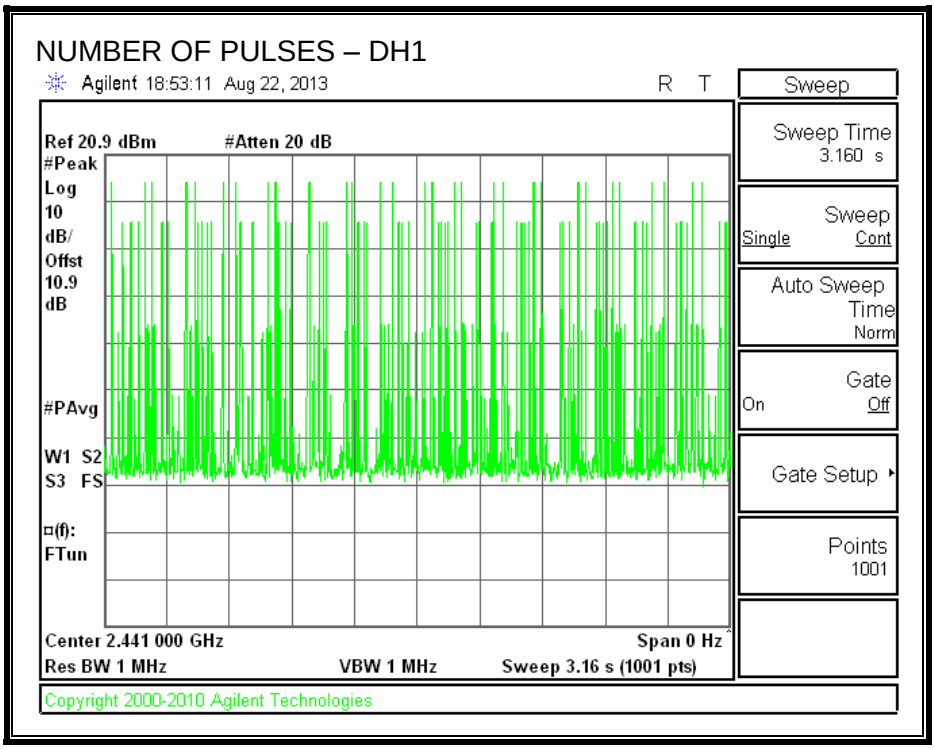
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Mode					
DH1	0.4144	30	0.124	0.4	-0.276
DH3	1.675	17	0.285	0.4	-0.115
DH5	2.923	12	0.351	0.4	-0.049
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Mode					
DH1	0.420	31	0.130	0.4	-0.270
DH3	1.660	19	0.315	0.4	-0.085
DH5	2.915	11	0.321	0.4	-0.079

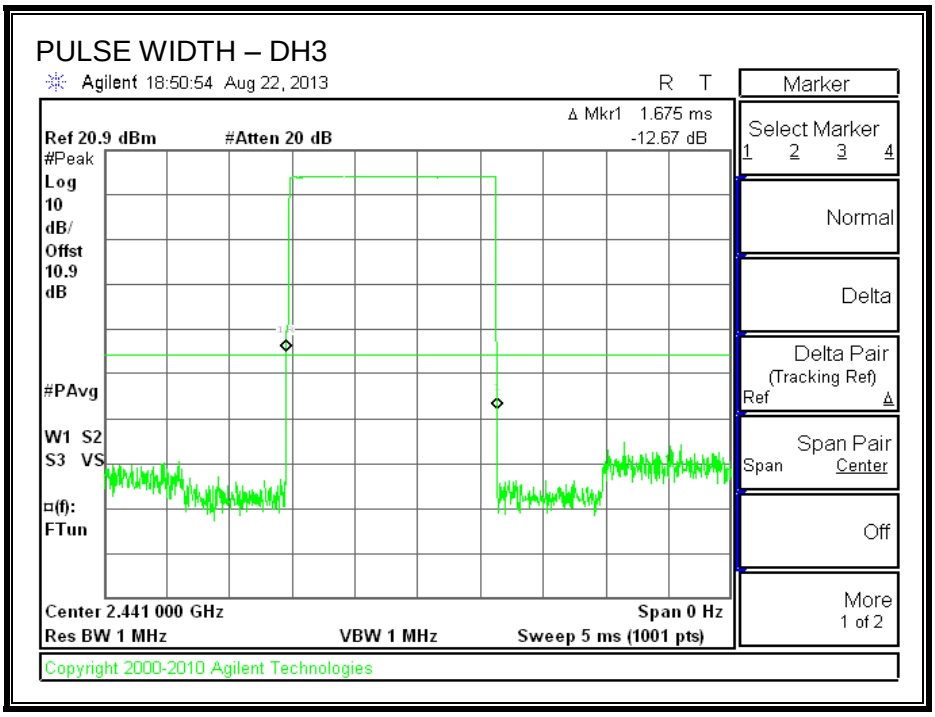
GFSK, DH1



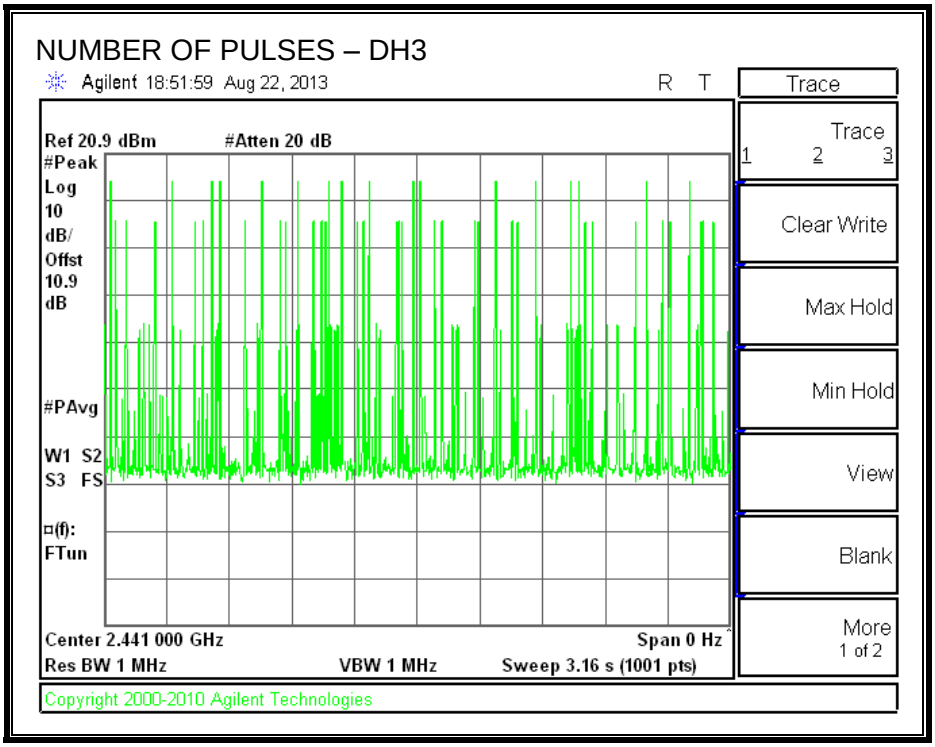
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



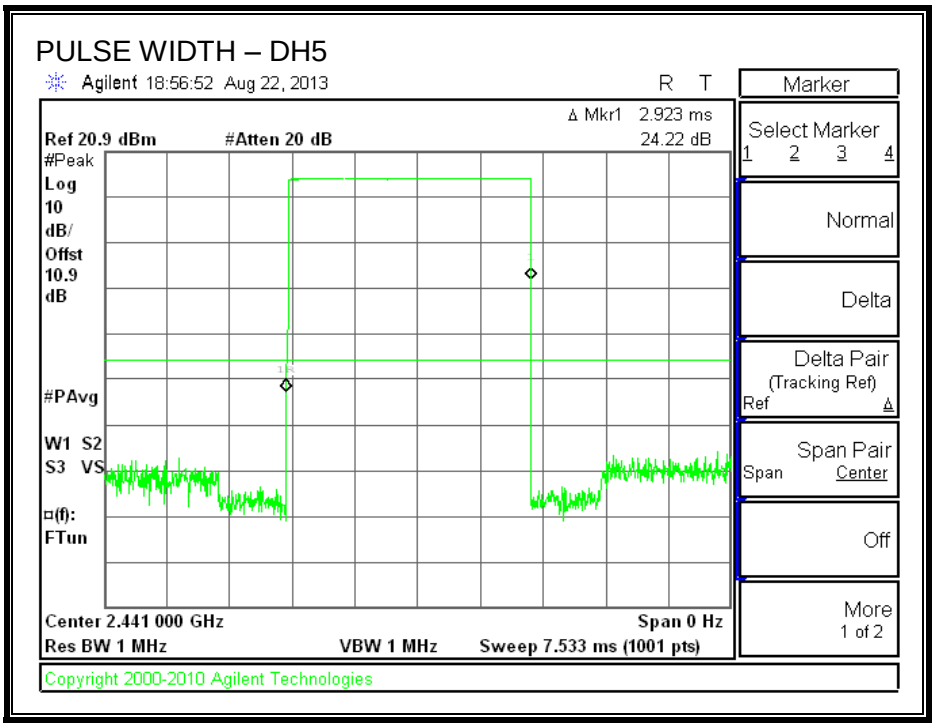
PULSE WIDTH – DH3



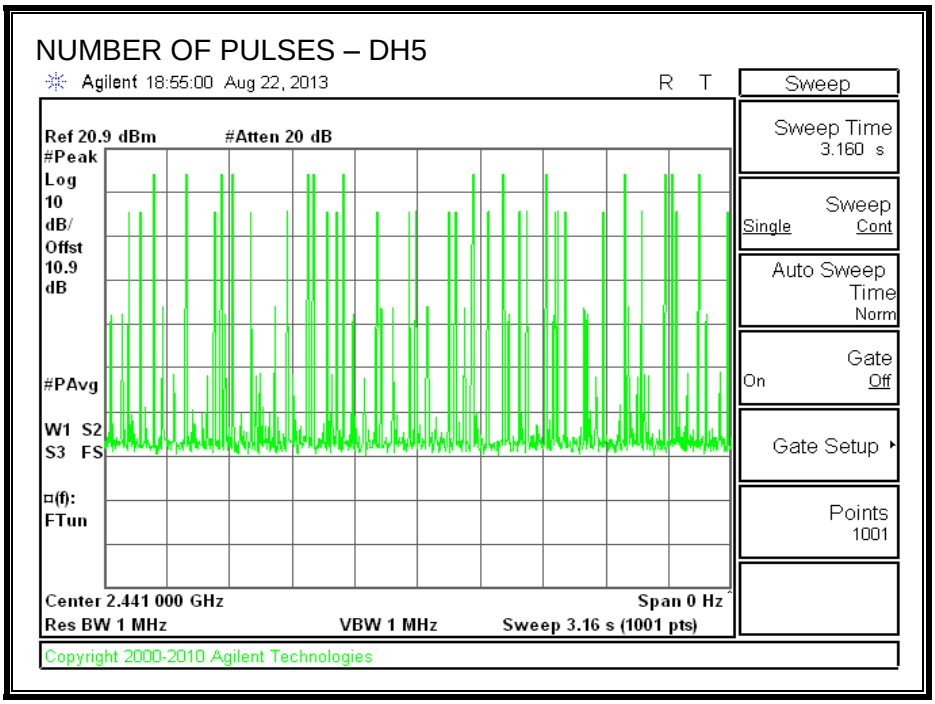
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



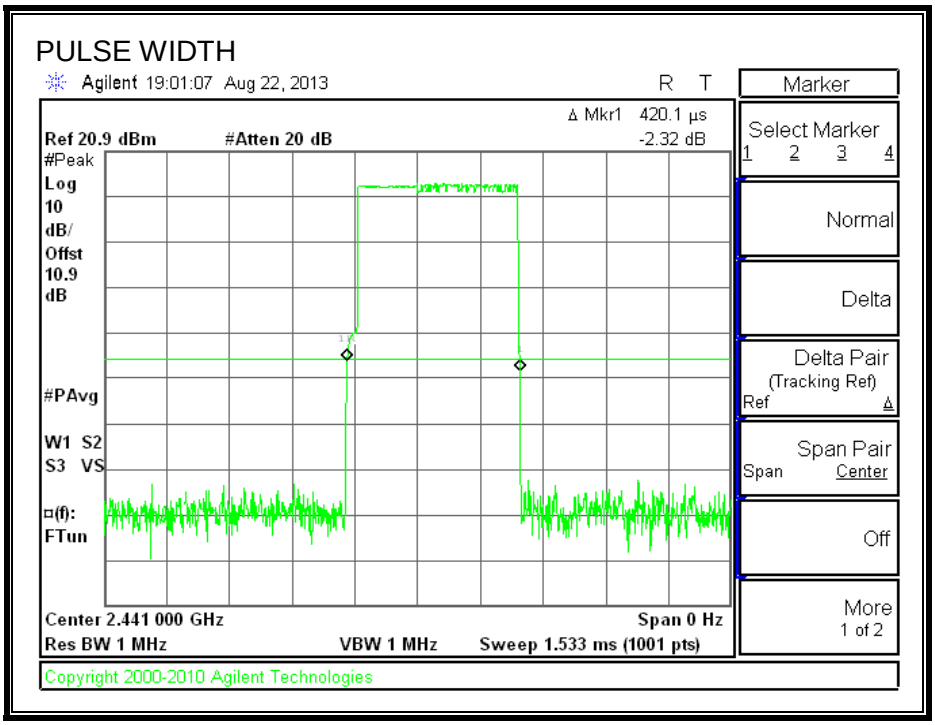
PULSE WIDTH – DH5



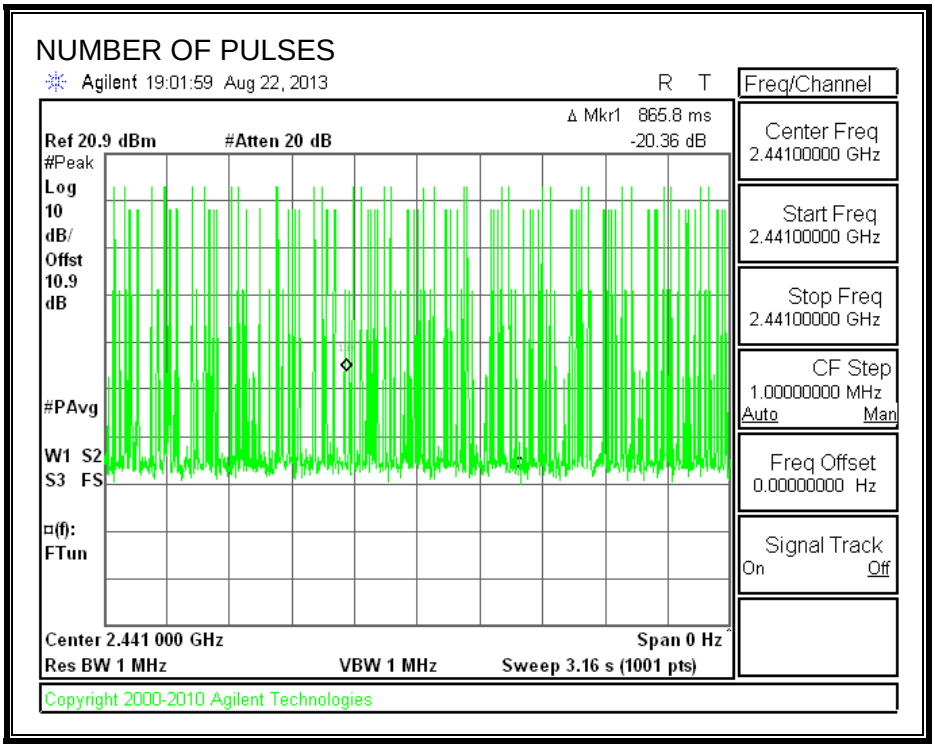
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



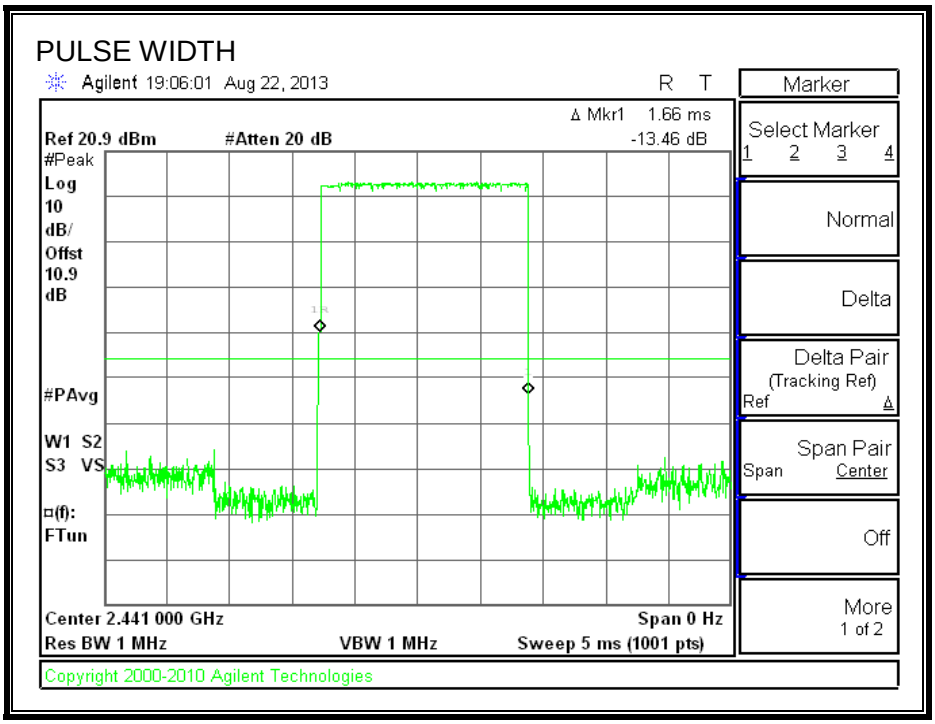
8PSK, DH1



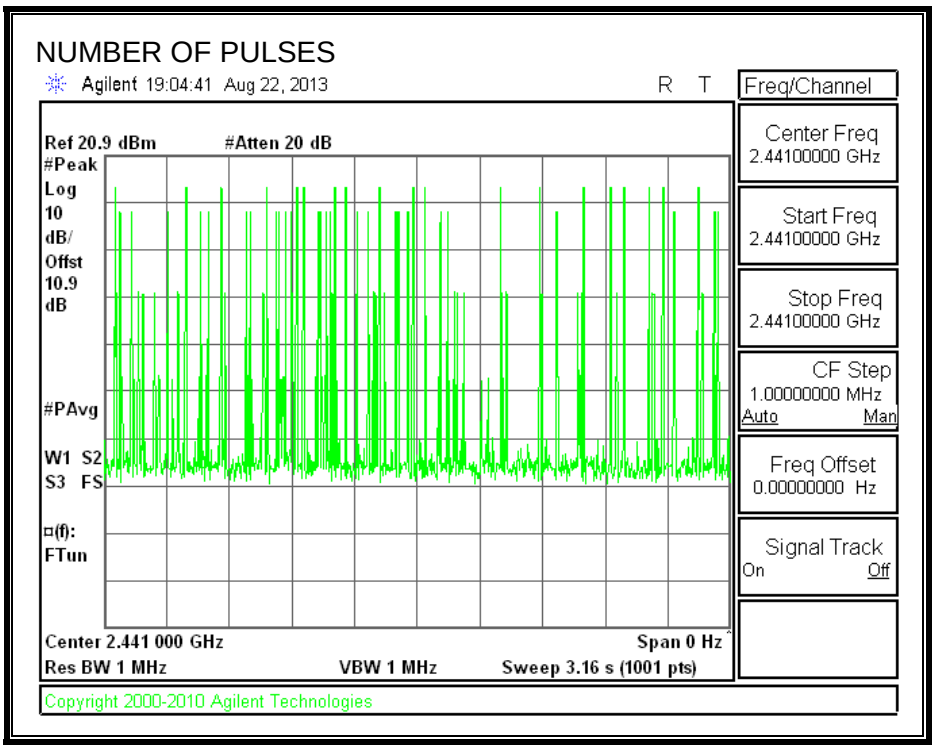
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



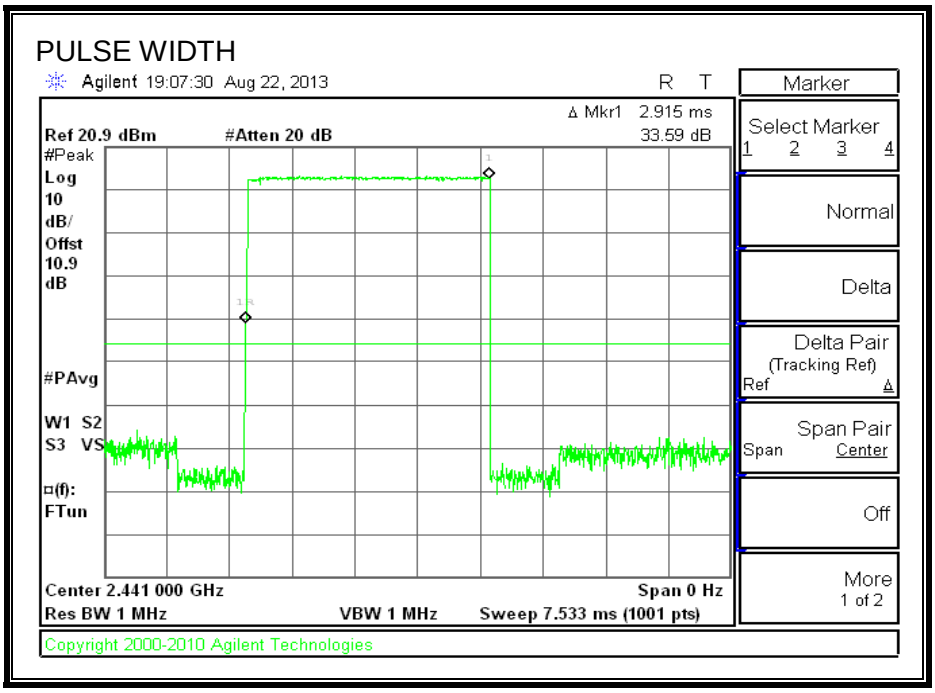
PULSE WIDTH 8PSK DH3



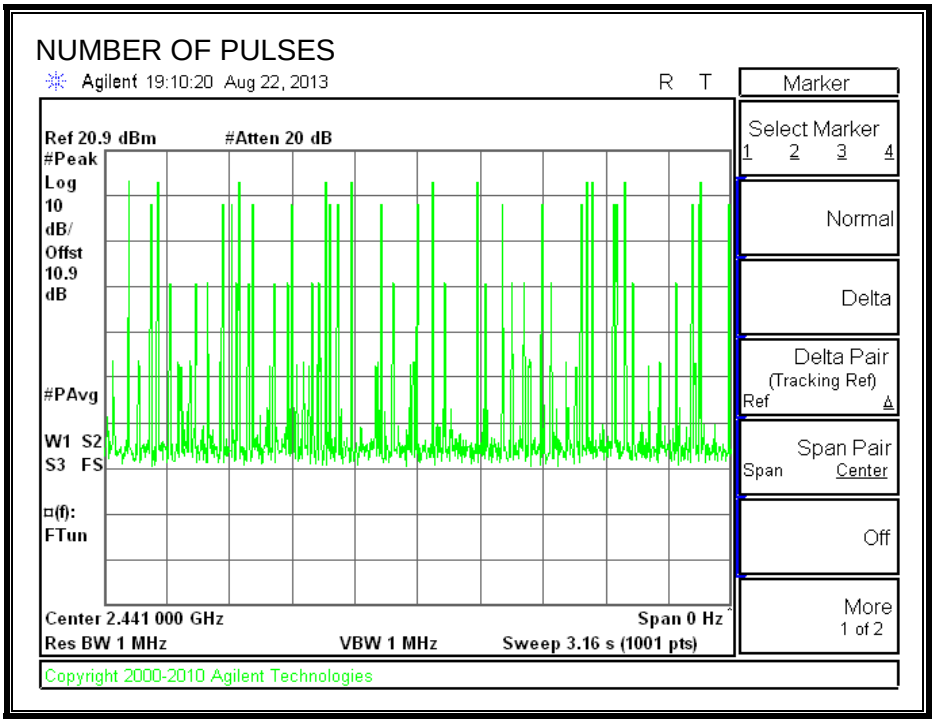
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



PULSE WIDTH 8PSK DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.5. 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 30 dBm.

TEST PROCEDURE

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

RESULTS

GFSK

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.26	30	-17.74
Middle	2441	13.21	30	-16.79
High	2480	12.14	30	-17.86

QPSK

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.87	21.0	-12.10
Middle	2441	10.21	21.0	-10.76
High	2480	8.08	21.0	-12.89

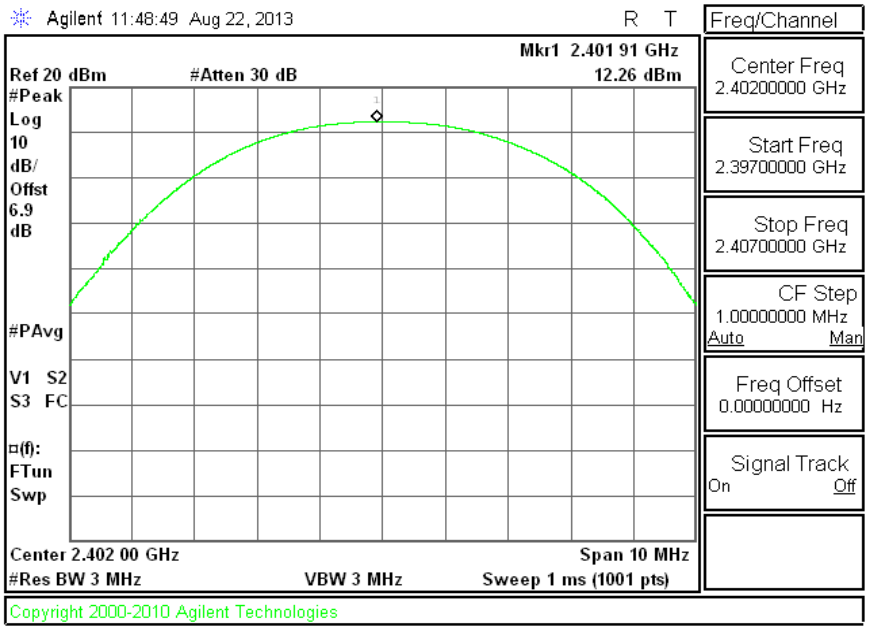
8PSK

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.06	21	-9.91
Middle	2441	11.63	21	-9.34
High	2480	10.50	21	-10.47

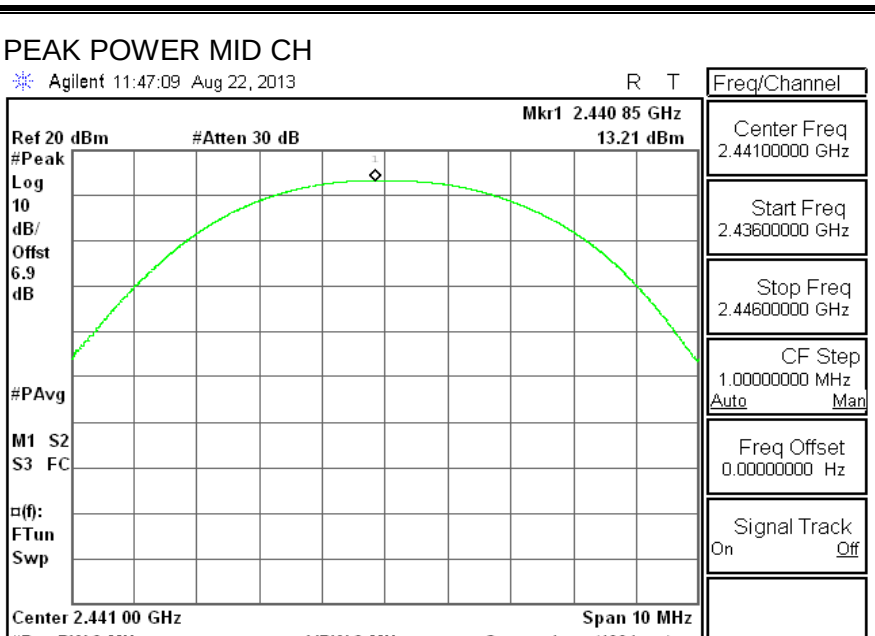
GFSK

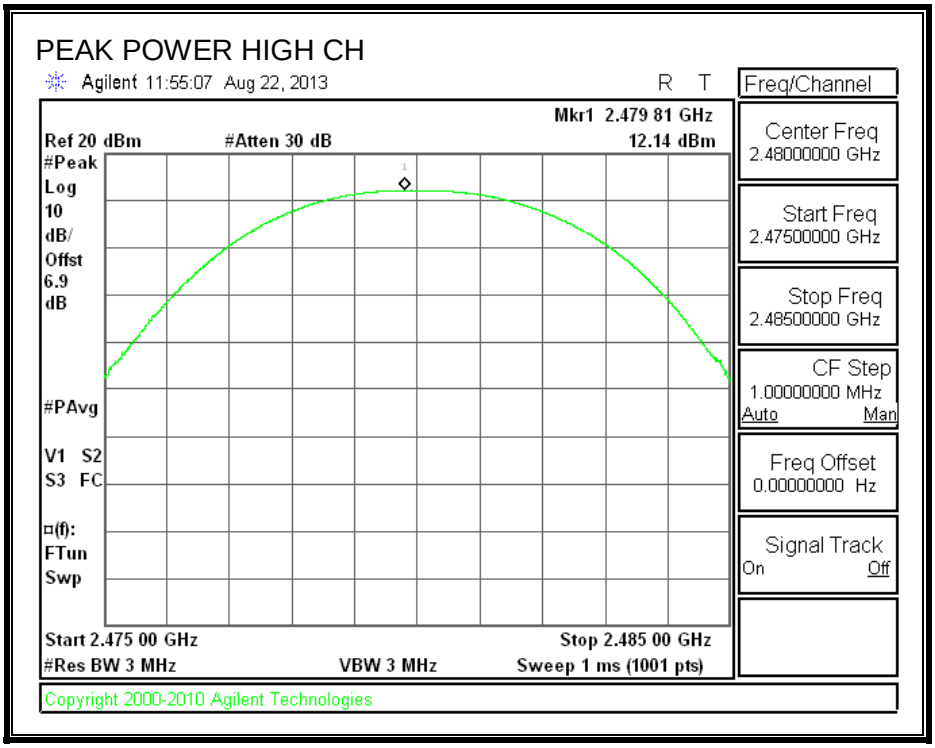
OUTPUT POWER

PEAK POWER LOW CH



PEAK POWER MID CH

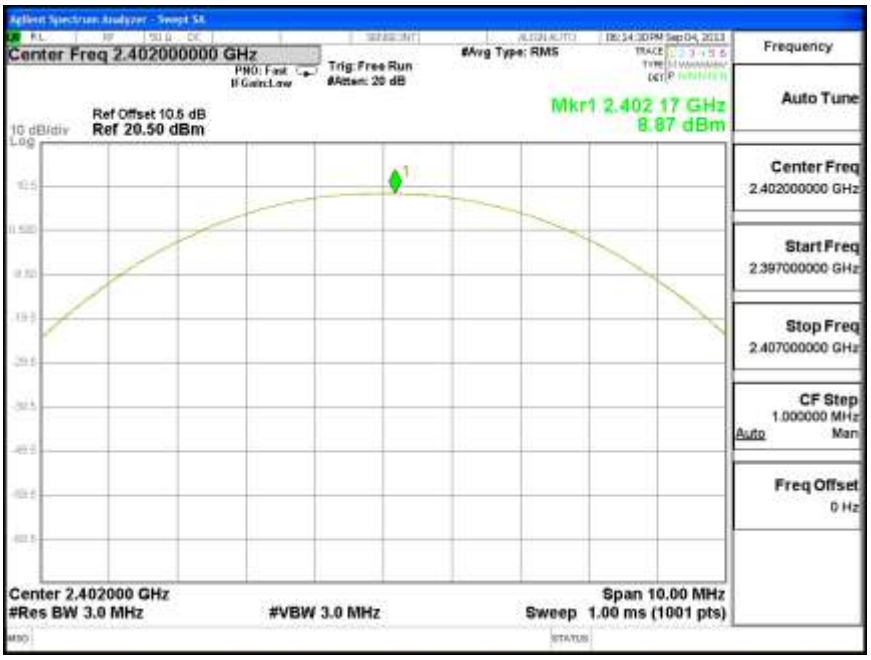




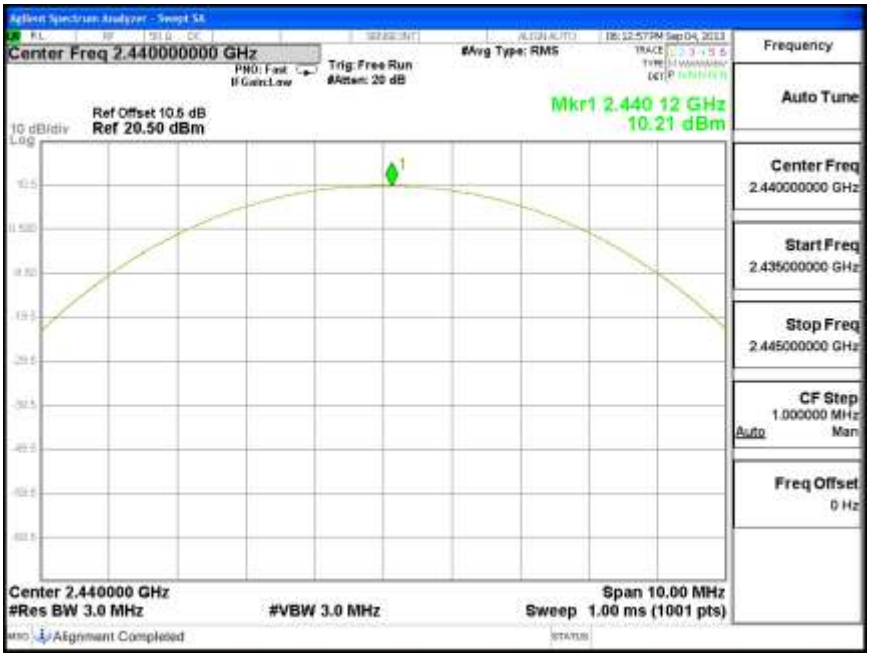
QPSK

OUTPUT POWER

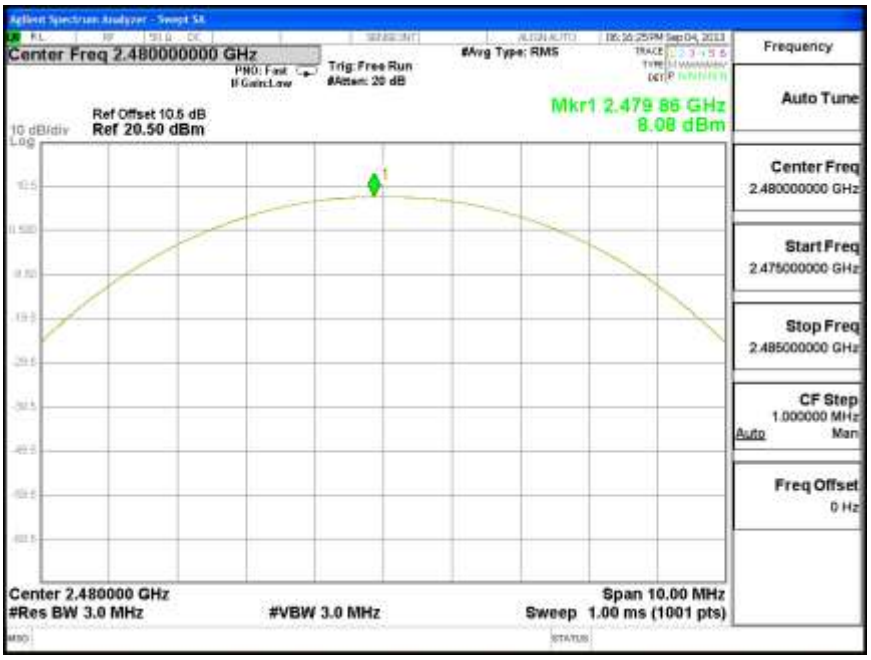
PEAK POWER LOW CH



PEAK POWER MID CH



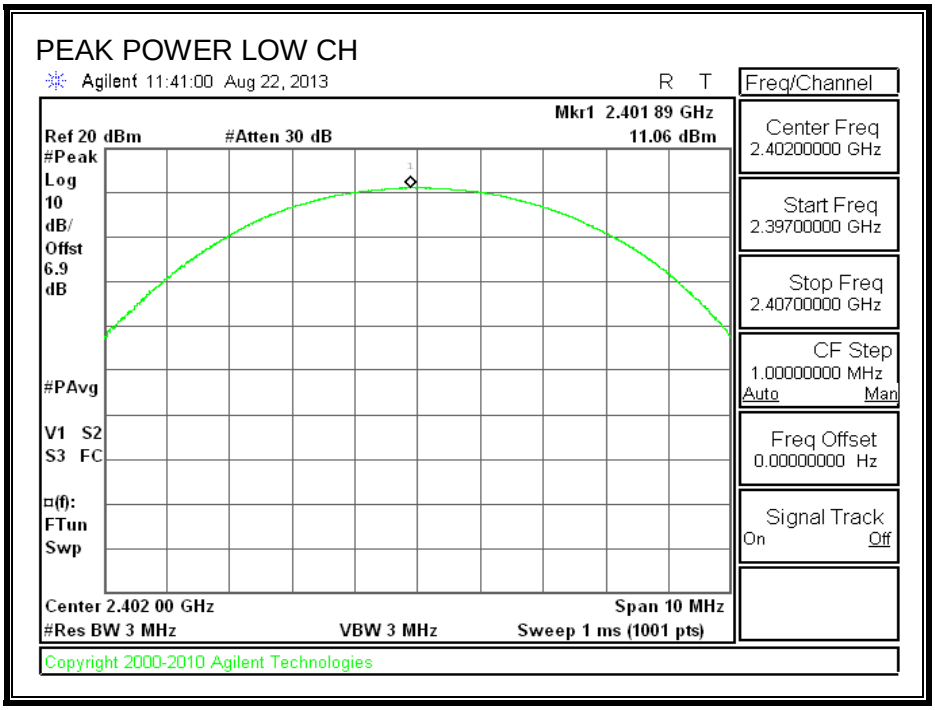
PEAK POWER HIGH CH



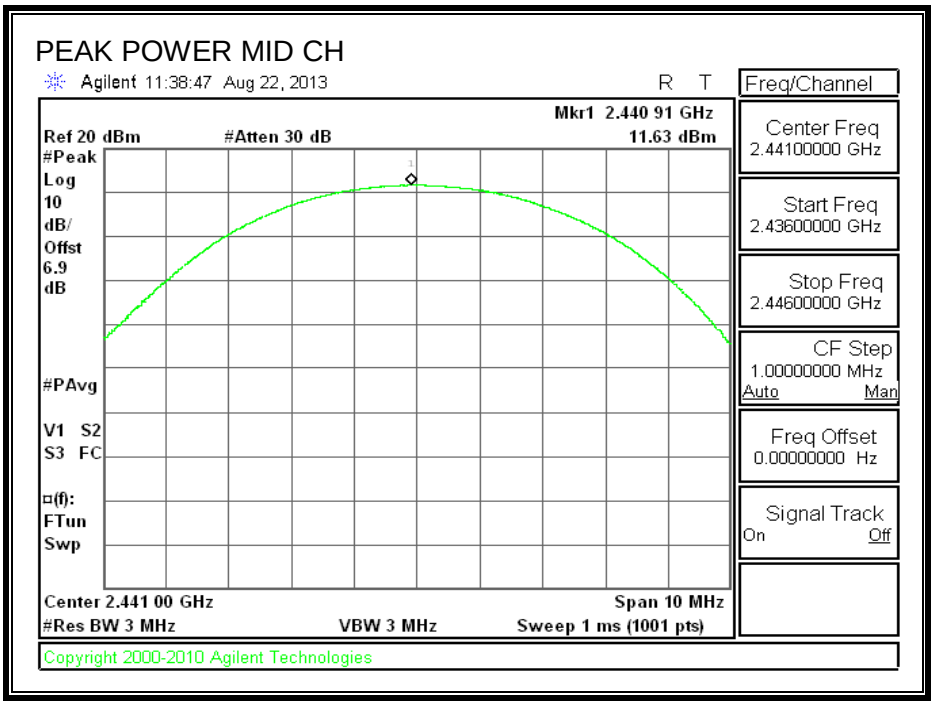
8PSK

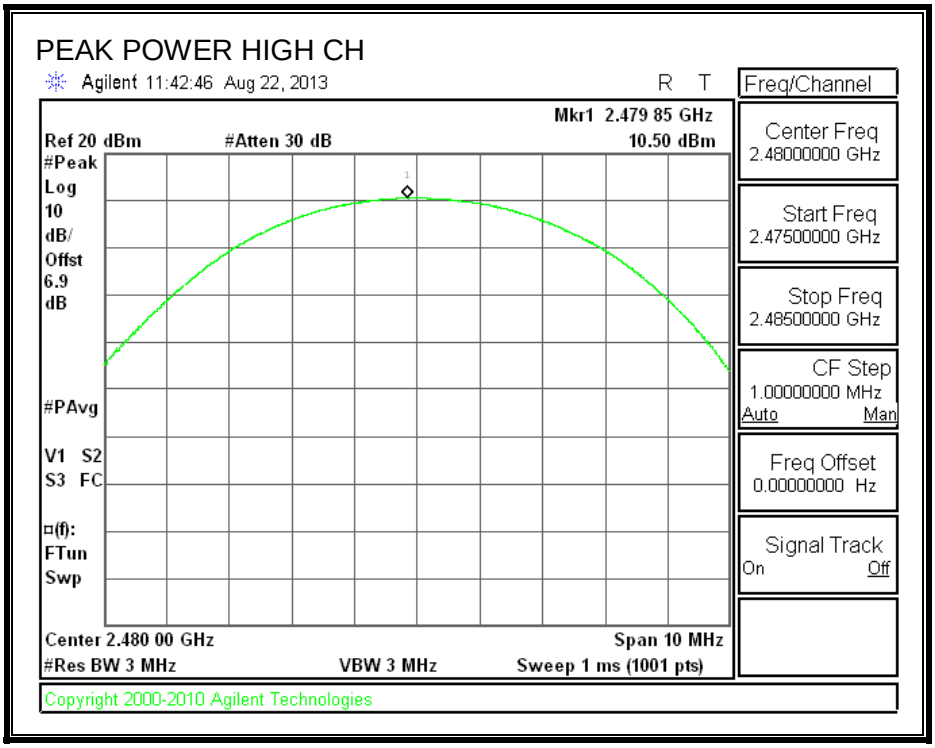
OUTPUT POWER

PEAK POWER LOW CH



PEAK POWER MID CH





7.6. 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 10.9 dB (including 10 dB pad and 0.9 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

GFSK

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	12.04
Middle	2441	12.97
High	2480	12.10

QPSK

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.46
Middle	2441	9.82
High	2480	7.76

8PSK

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	10.92
Middle	2441	11.00
High	2480	10.42

7.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

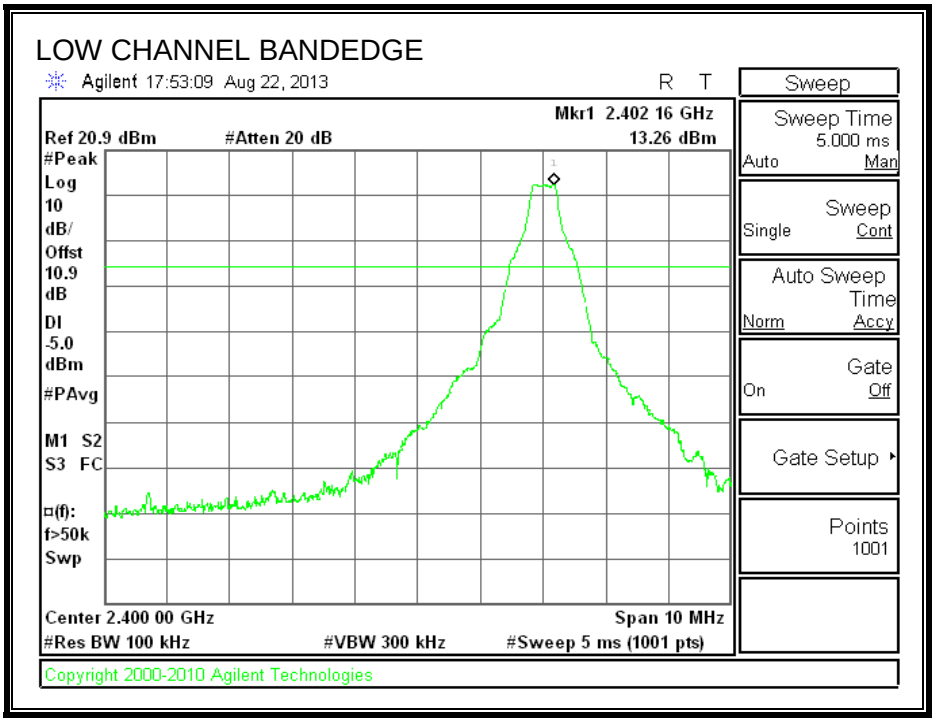
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

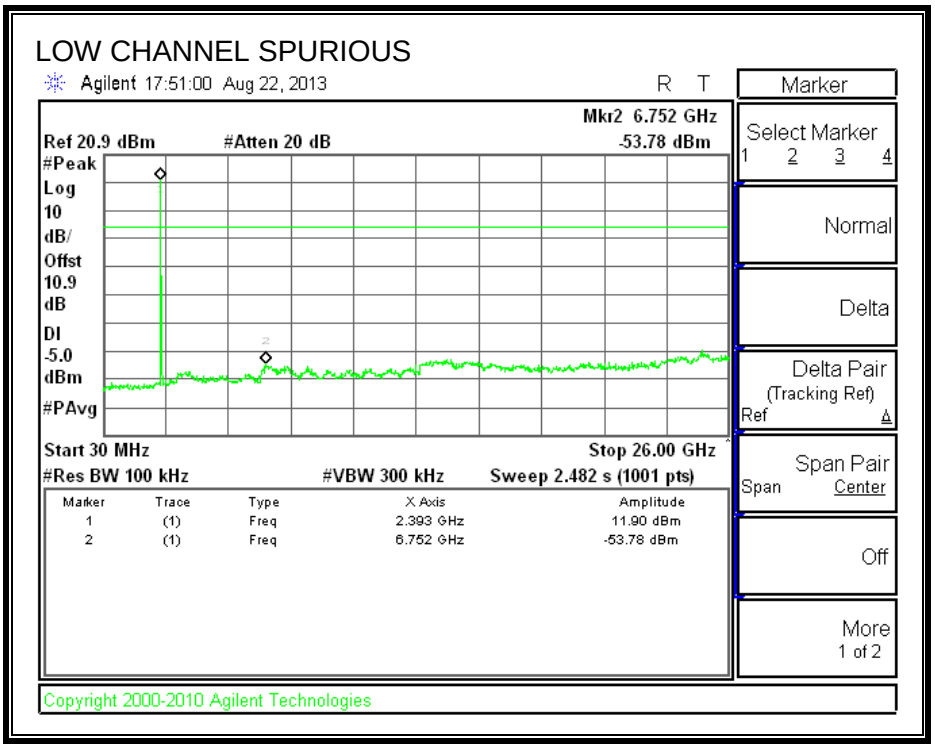
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

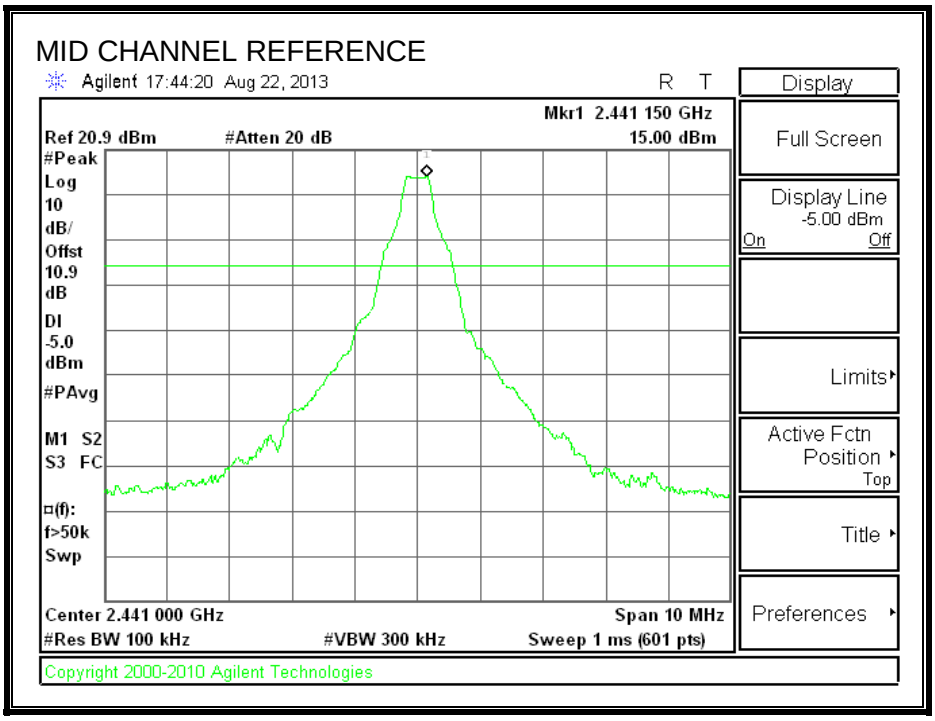
GFSK

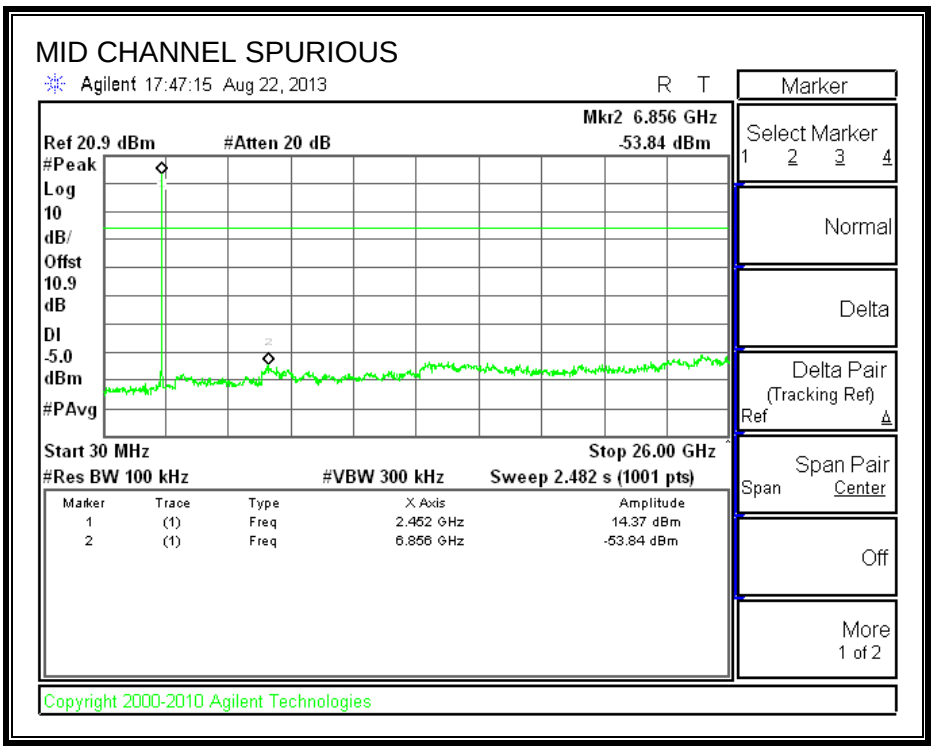
SPURIOUS EMISSIONS, LOW CHANNEL



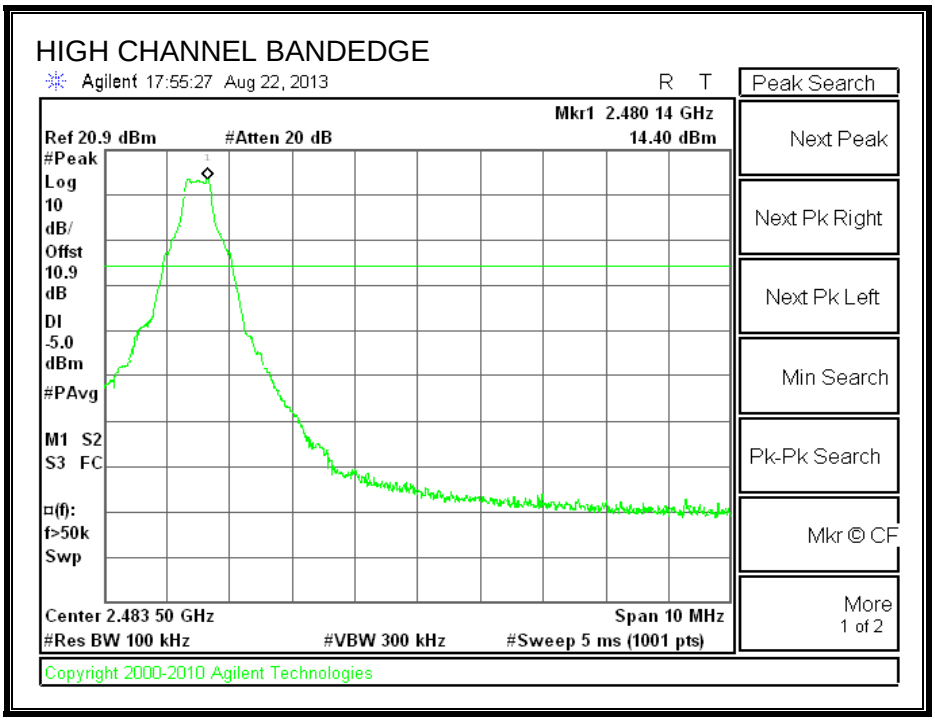


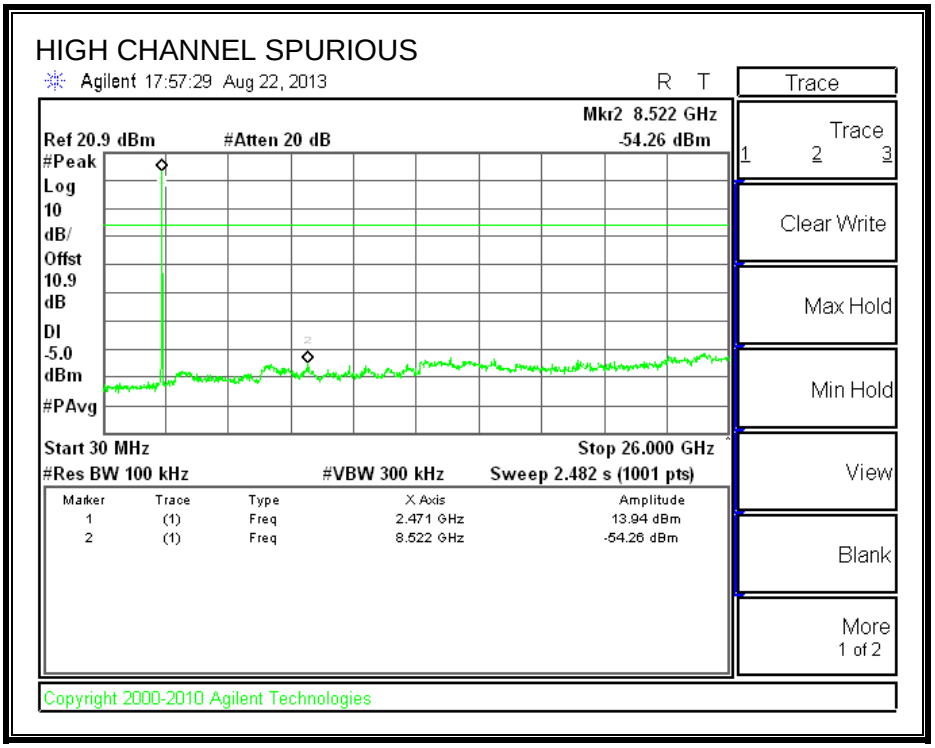
SPURIOUS EMISSIONS, MID CHANNEL





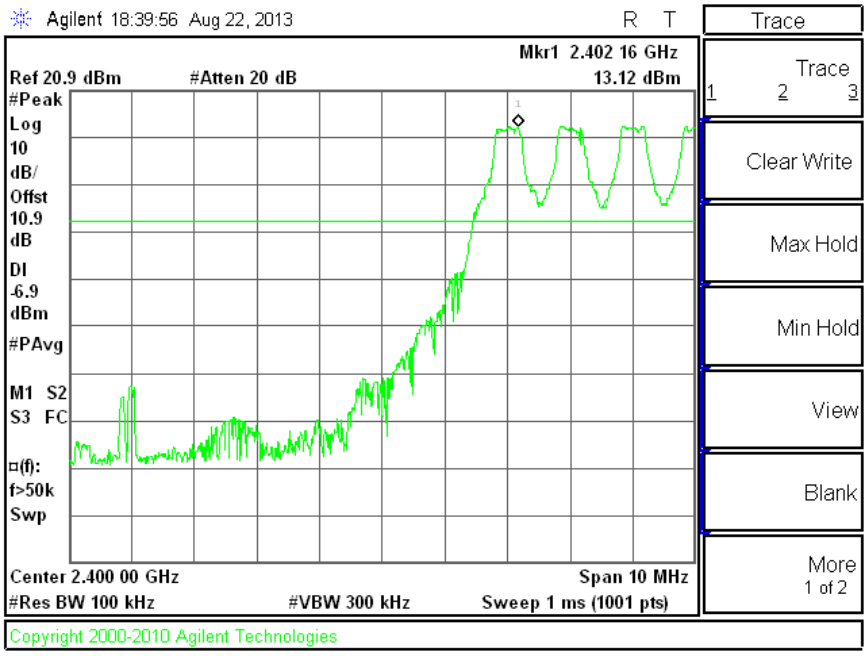
SPURIOUS EMISSIONS, HIGH CHANNEL



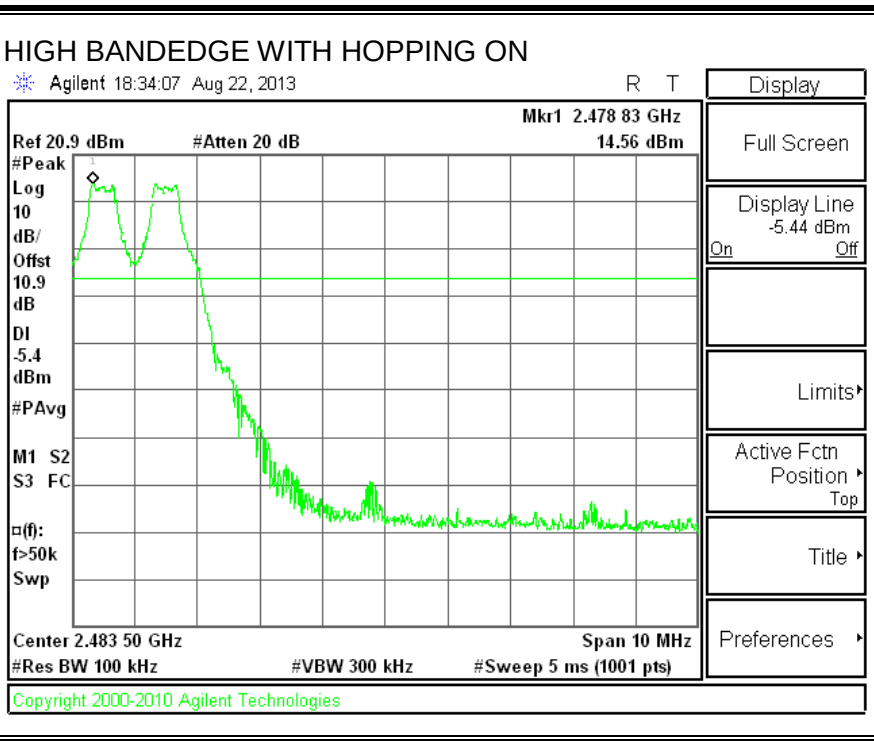


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON

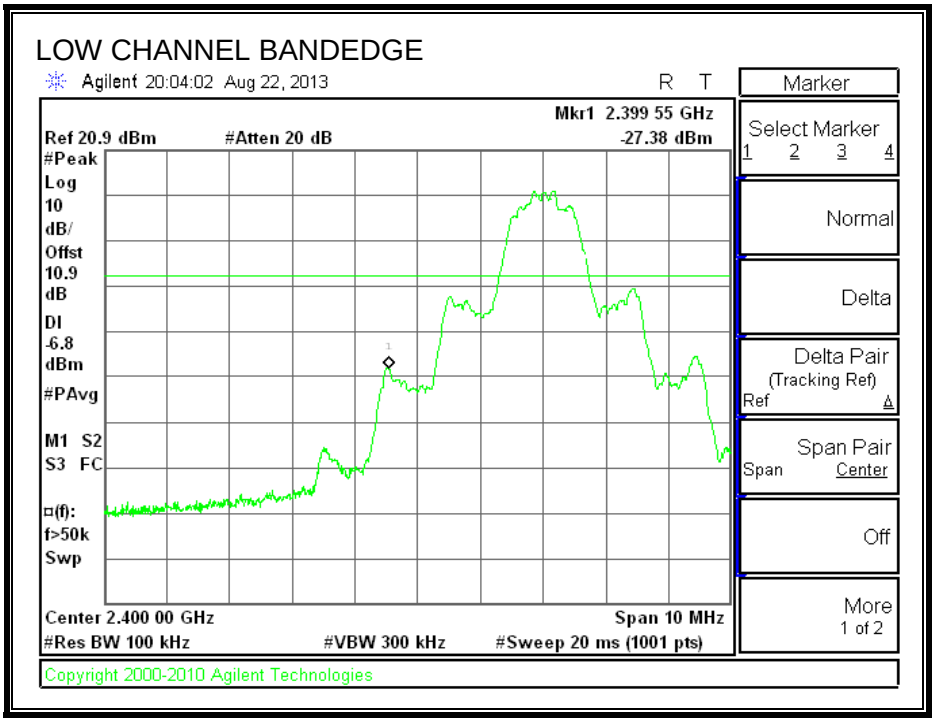


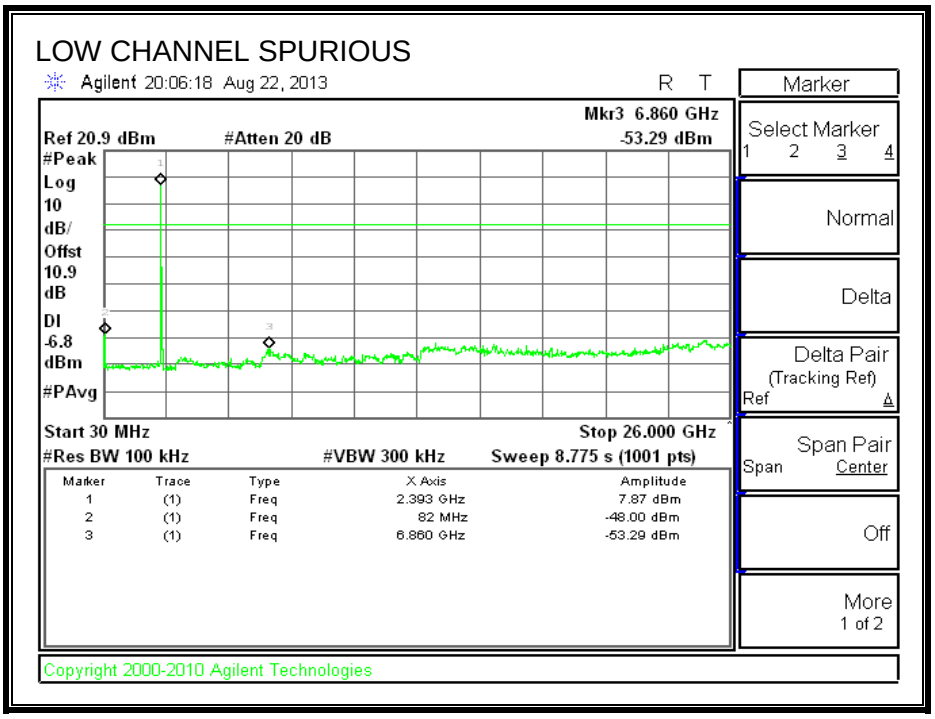
HIGH BANDEDGE WITH HOPPING ON



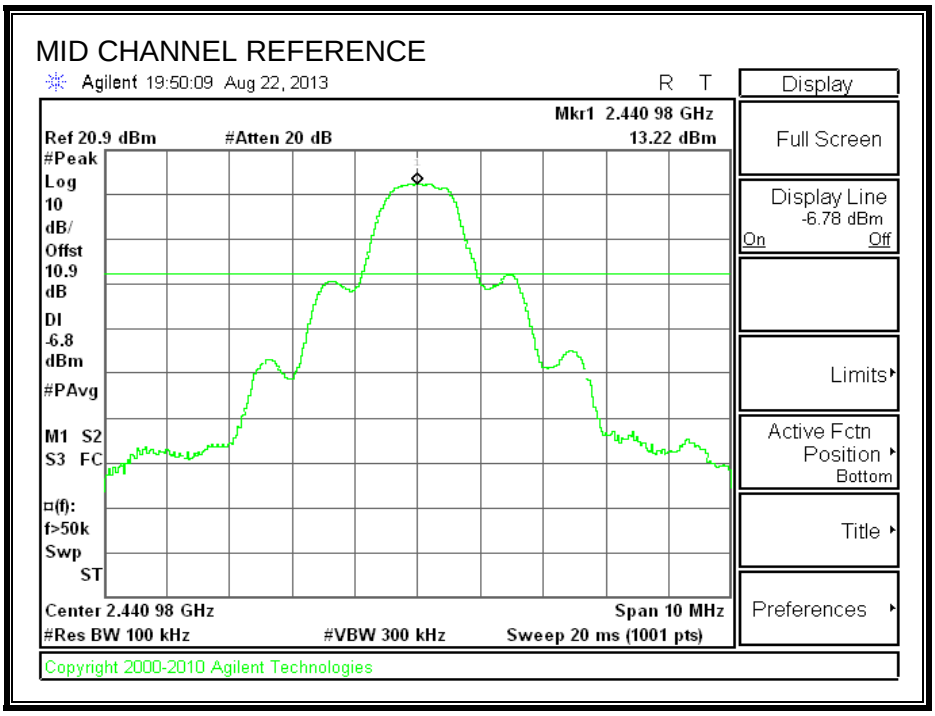
8PSK

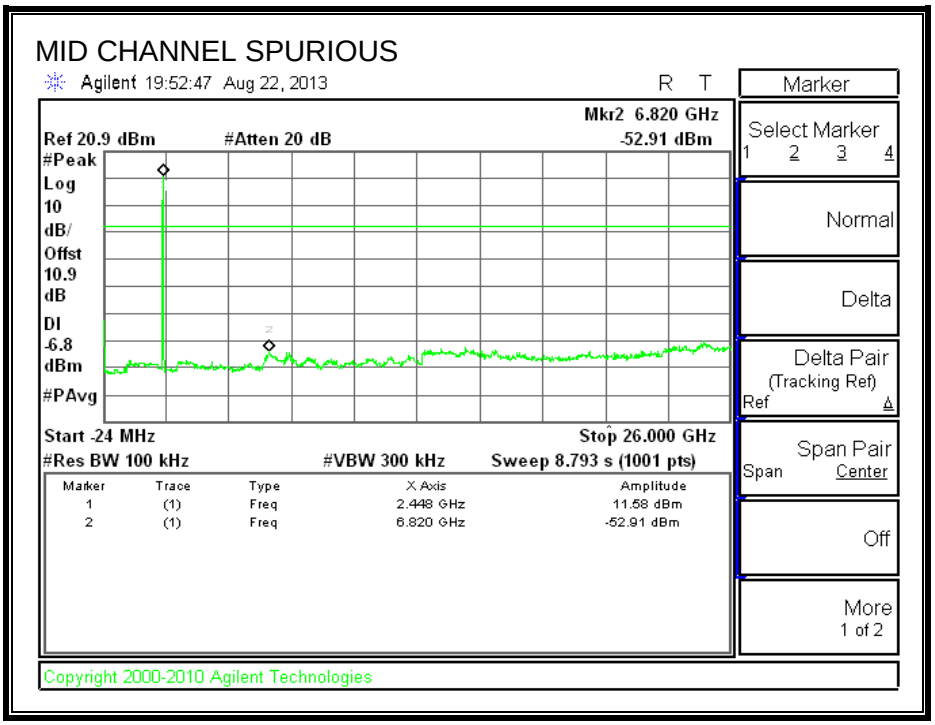
SPURIOUS EMISSIONS, LOW CHANNEL



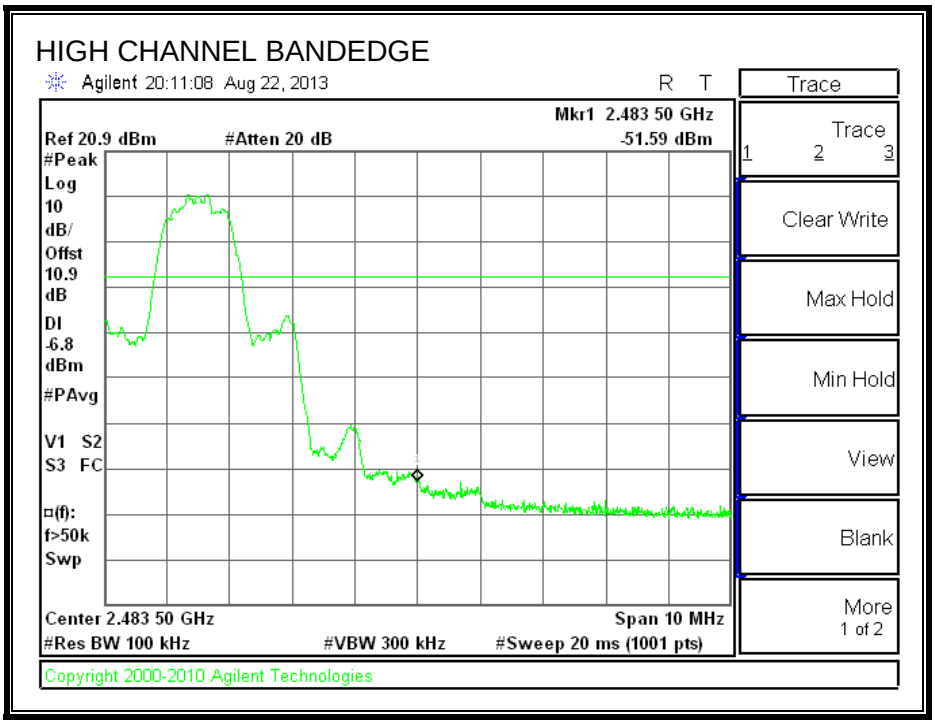


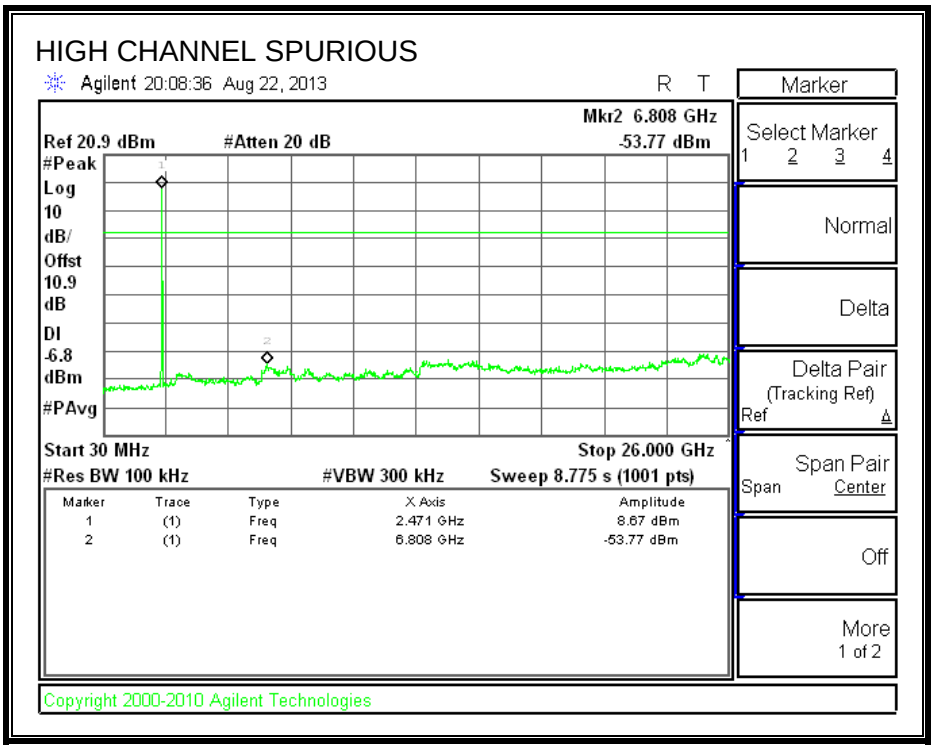
SPURIOUS EMISSIONS, MID CHANNEL





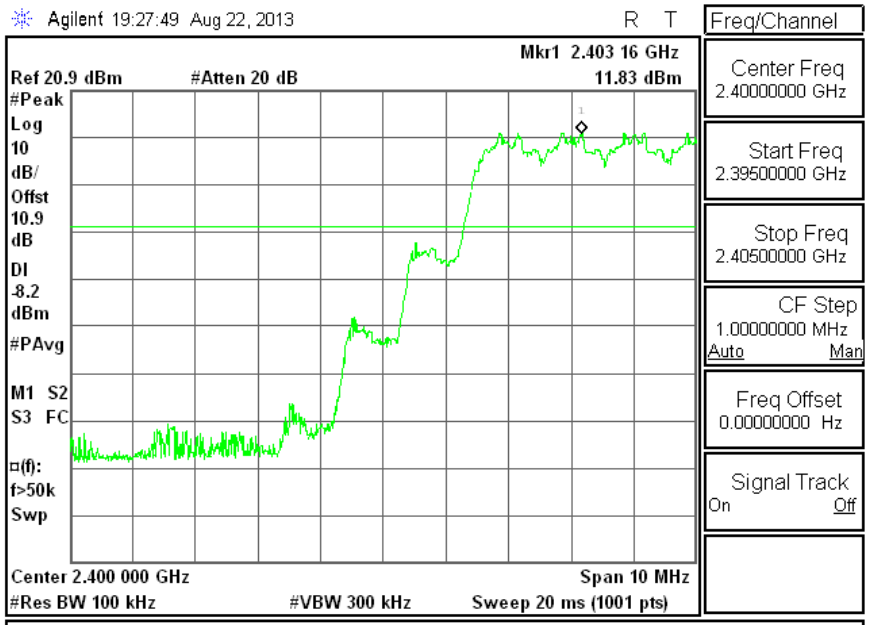
SPURIOUS EMISSIONS, HIGH CHANNEL



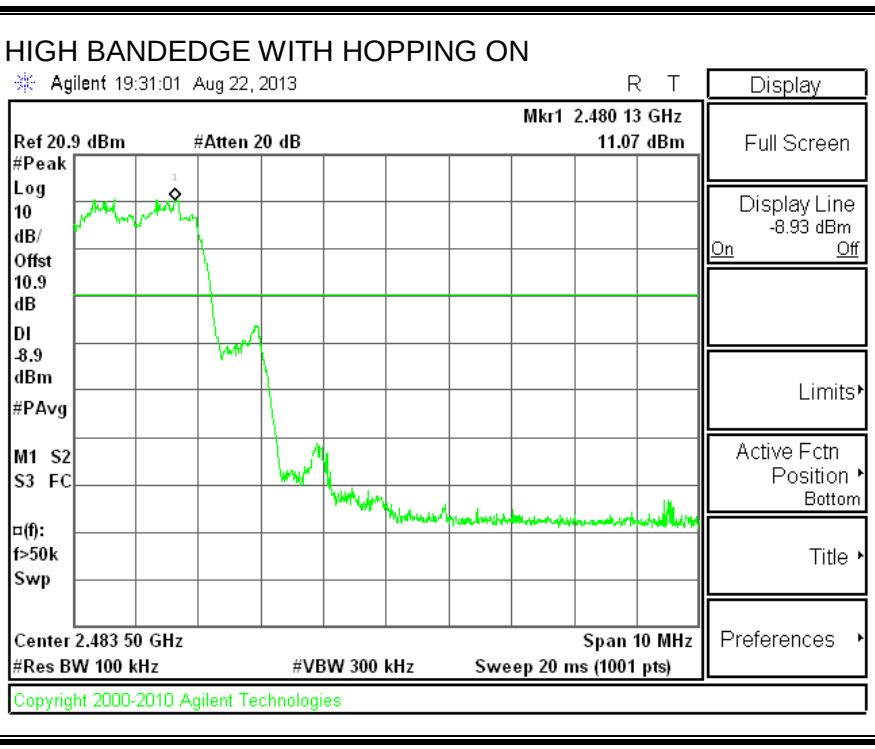


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE 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.

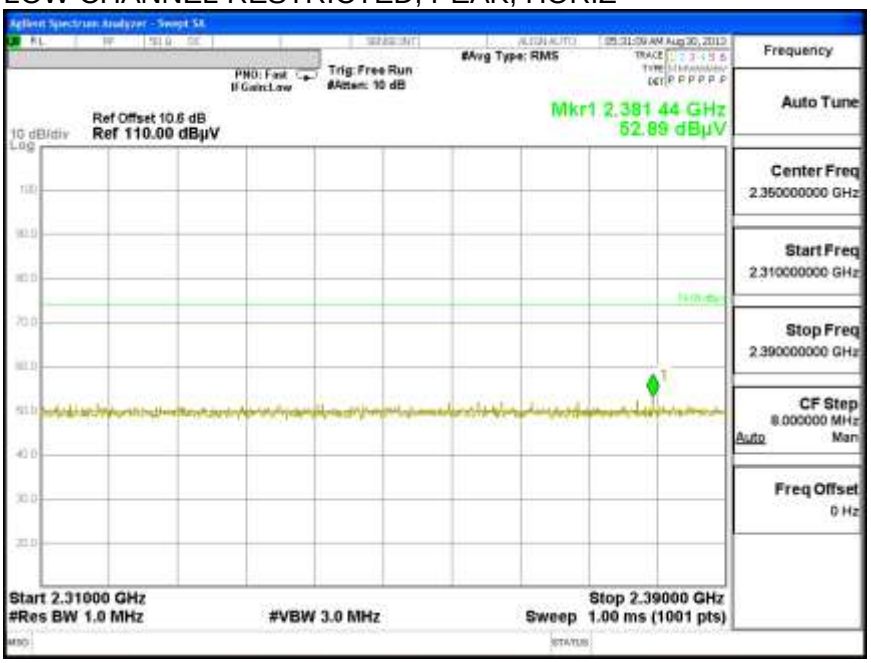
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

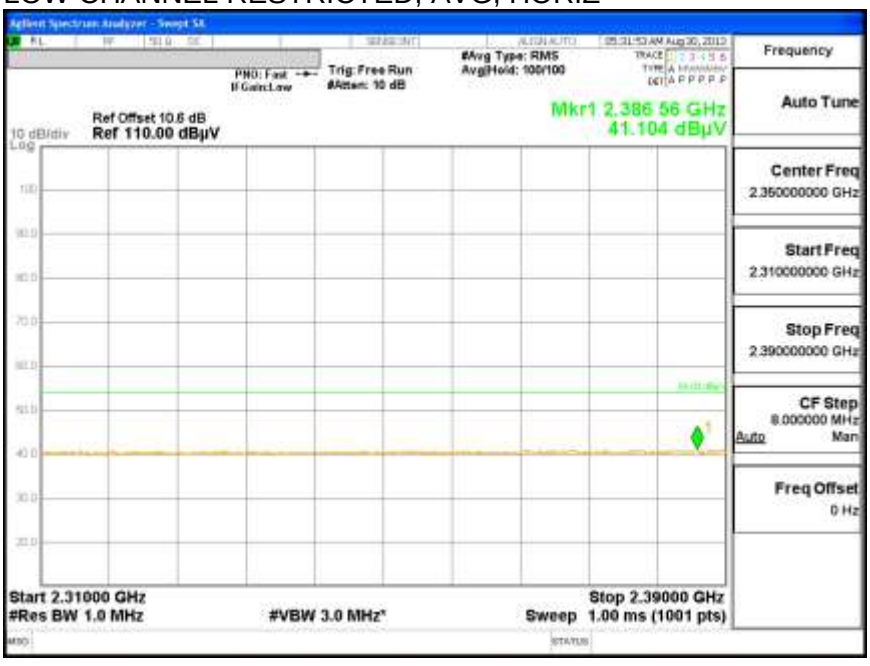
8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

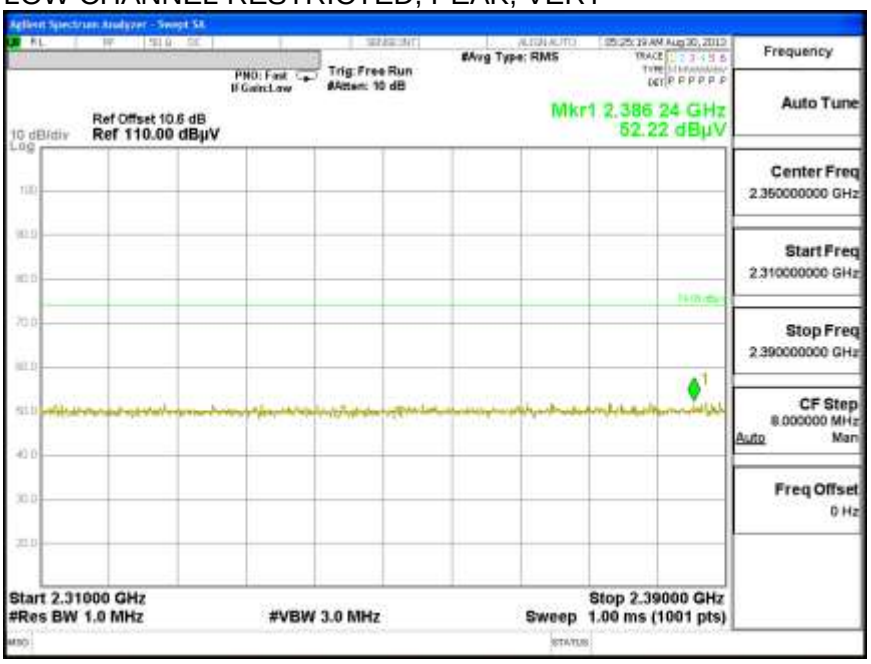


LOW CHANNEL RESTRICTED, AVG, HORIZ

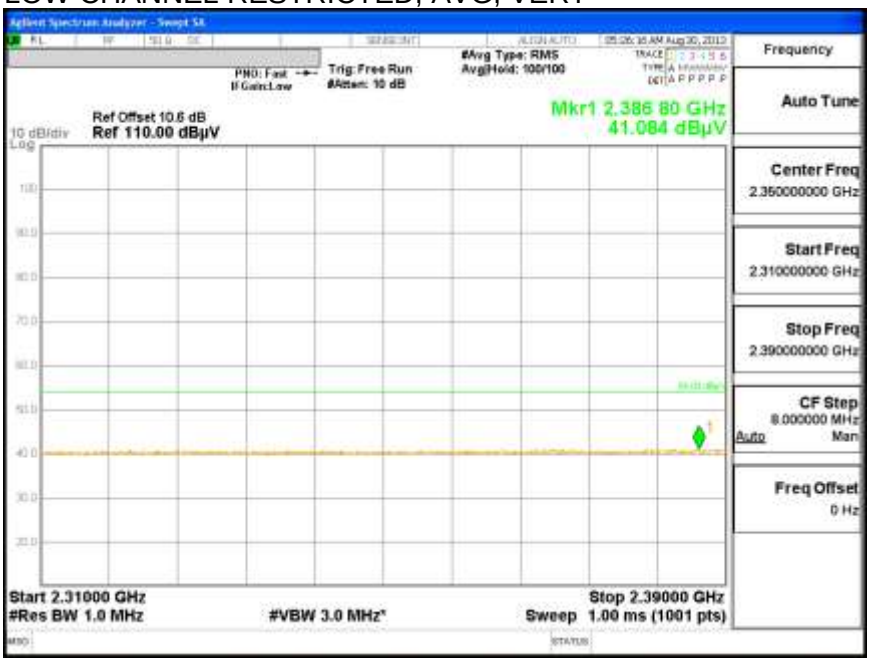


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

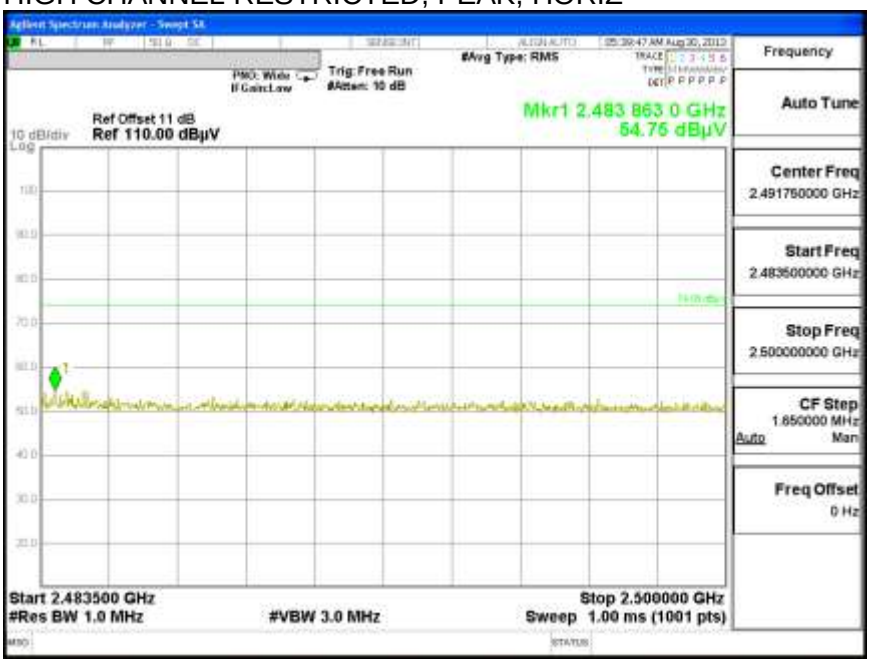


LOW CHANNEL RESTRICTED, AVG, VERT

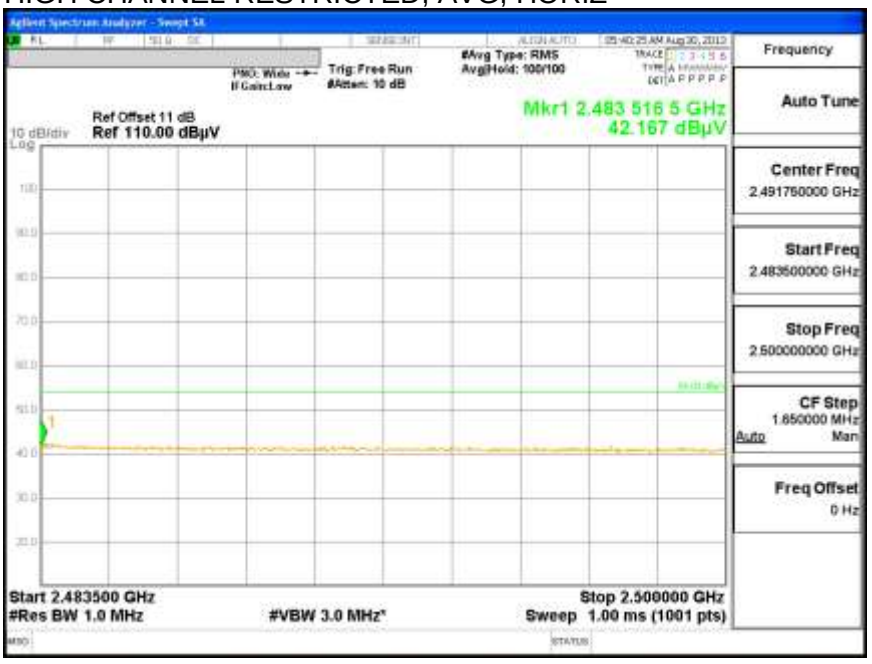


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

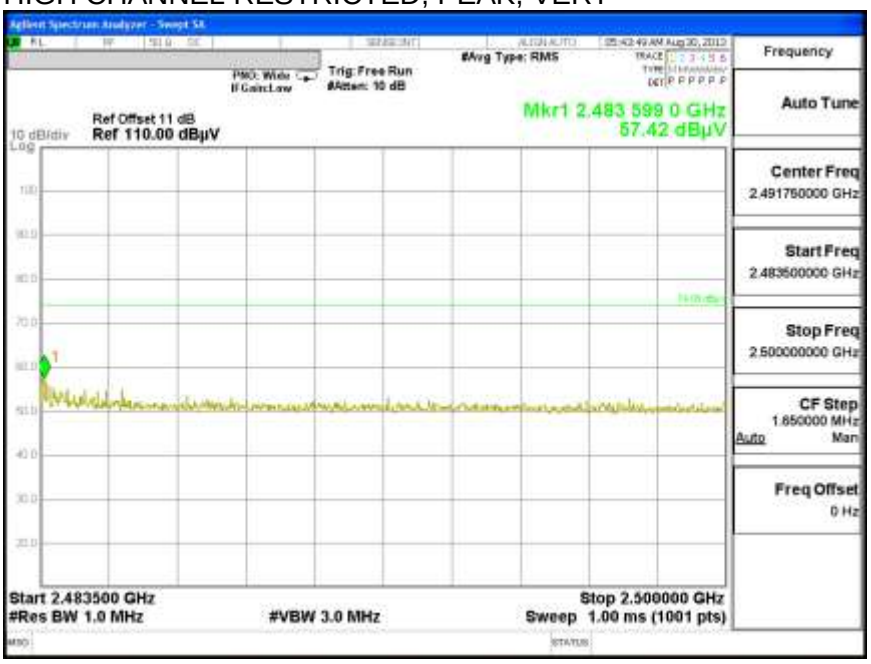


HIGH CHANNEL RESTRICTED, AVG, HORIZ

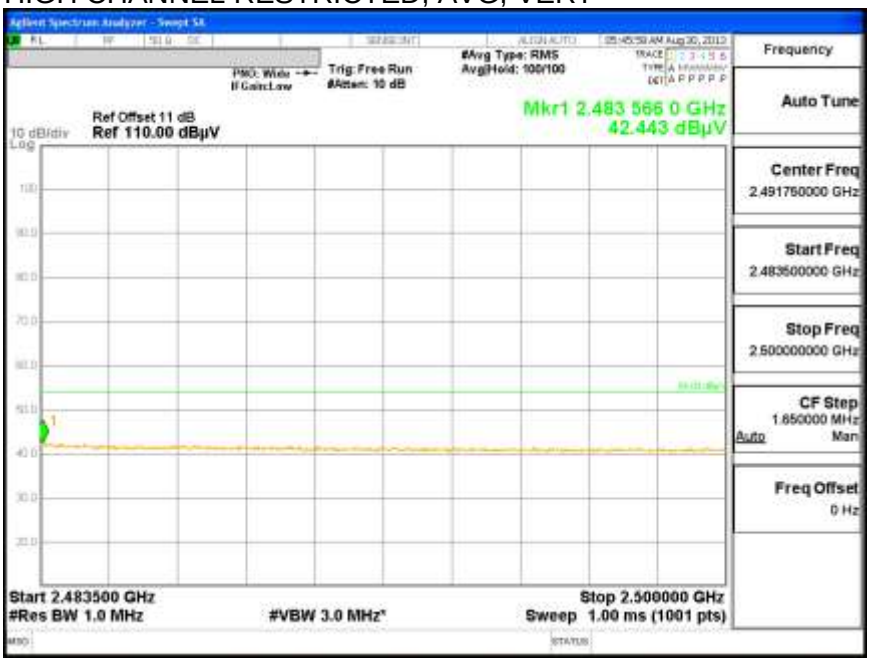


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT

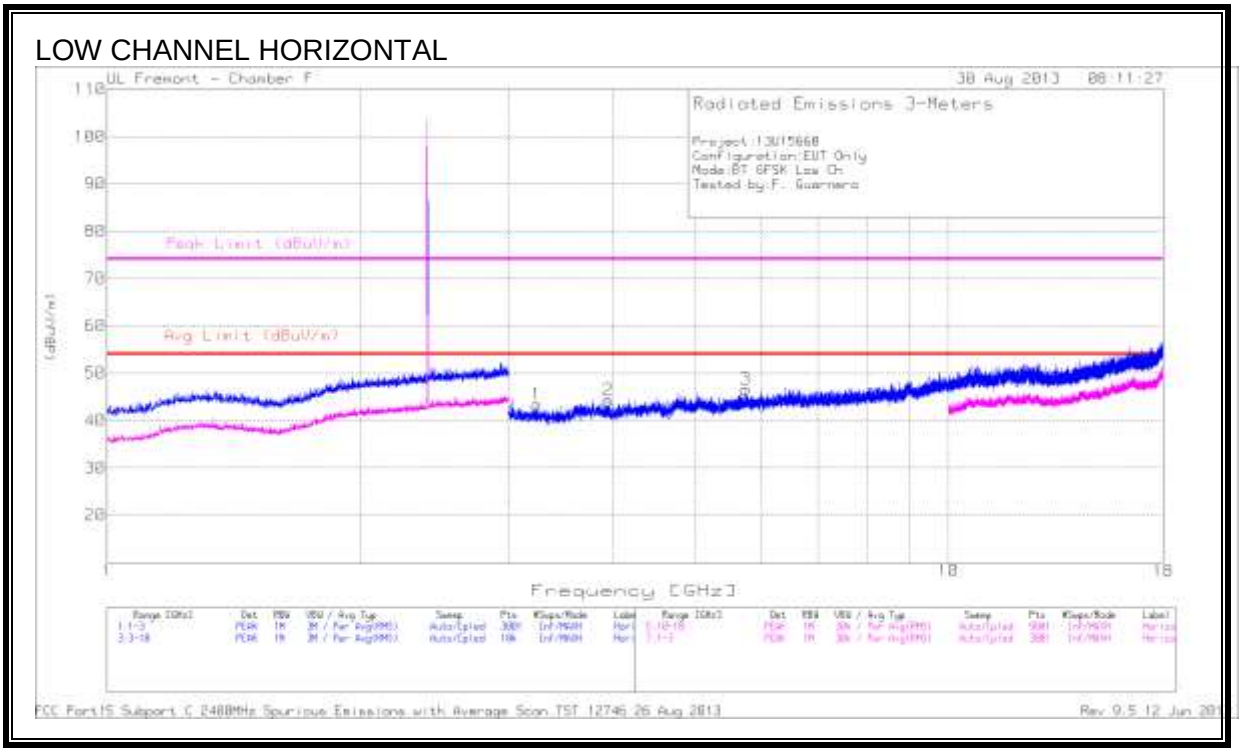


HIGH CHANNEL RESTRICTED, AVG, VERT

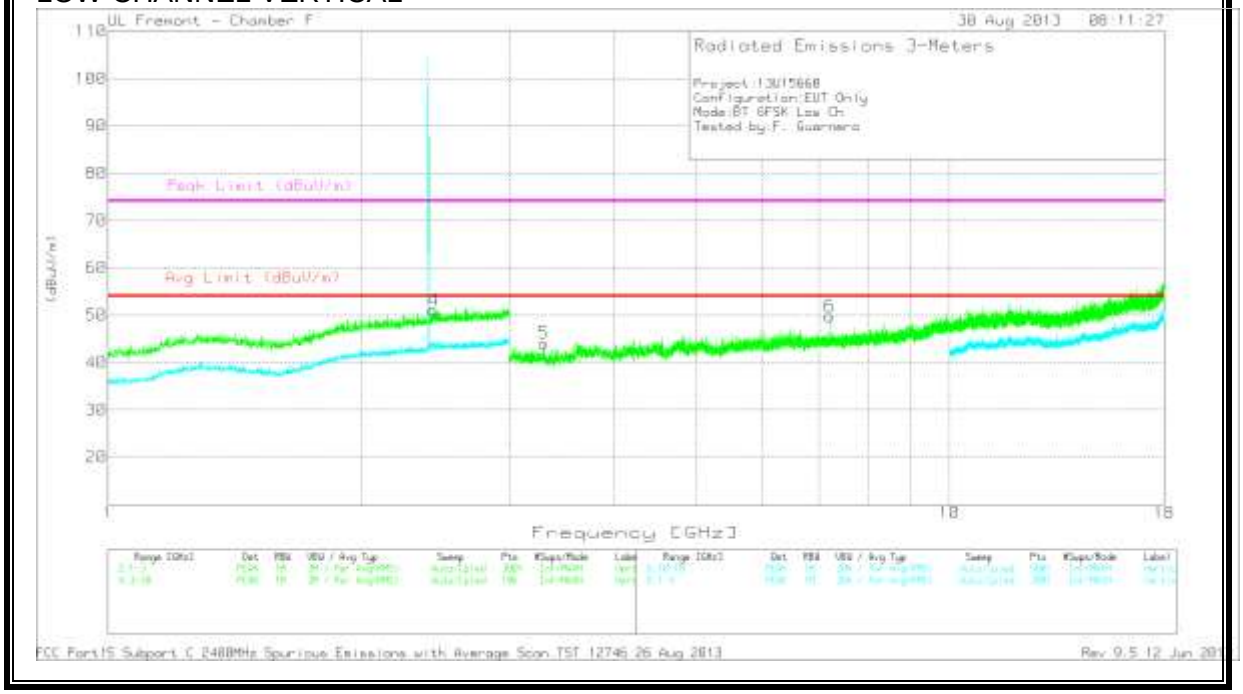


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



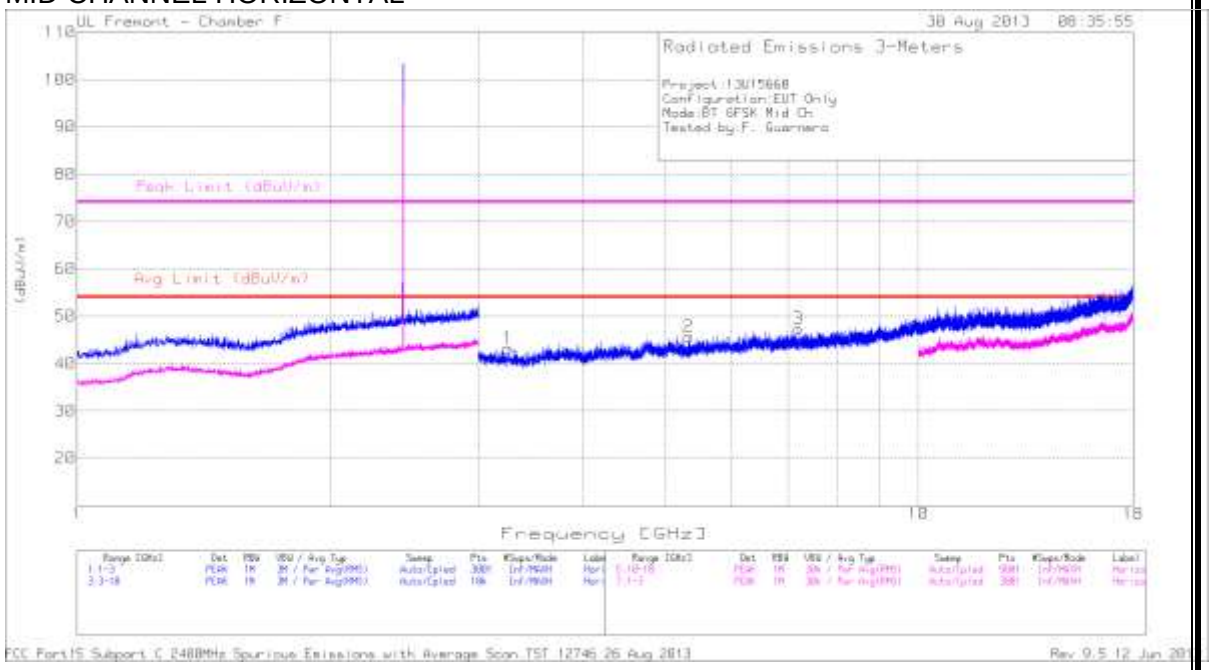
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/ Cbl/3 GHz HPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/ m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.242	39.09	PK	33.2	-28.9	1.14	44.53	53.97	-9.44	74	-29.47	0-360	199	H
2	3.942	39.72	PK	33.5	-29	1.14	45.36	53.97	-8.61	74	-28.64	0-360	100	H
3	5.742	38.74	PK	34.9	-27	1.14	47.78	53.97	-6.19	74	-26.22	0-360	199	H
*4	2.439	41.13	PK	32.3	-22.4	1.14	52.17	--	--	--	--	0-360	201	V
5	3.298	40.04	PK	33.1	-29.1	1.14	45.18	53.97	-8.79	74	-28.82	0-360	101	V
*6	7.206	40.61	PK	35.7	-26.6	1.14	50.85	--	--	--	--	0-360	201	V

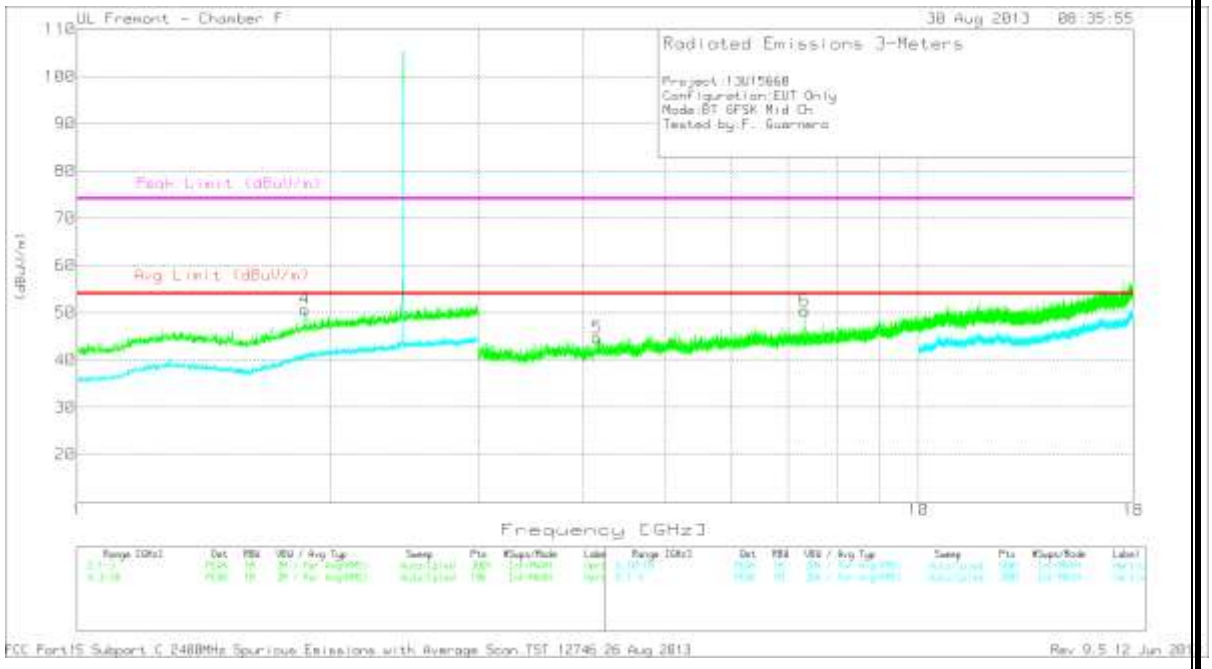
Note: *****: Not in restricted band

PK: Peak detector

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Trace Markers

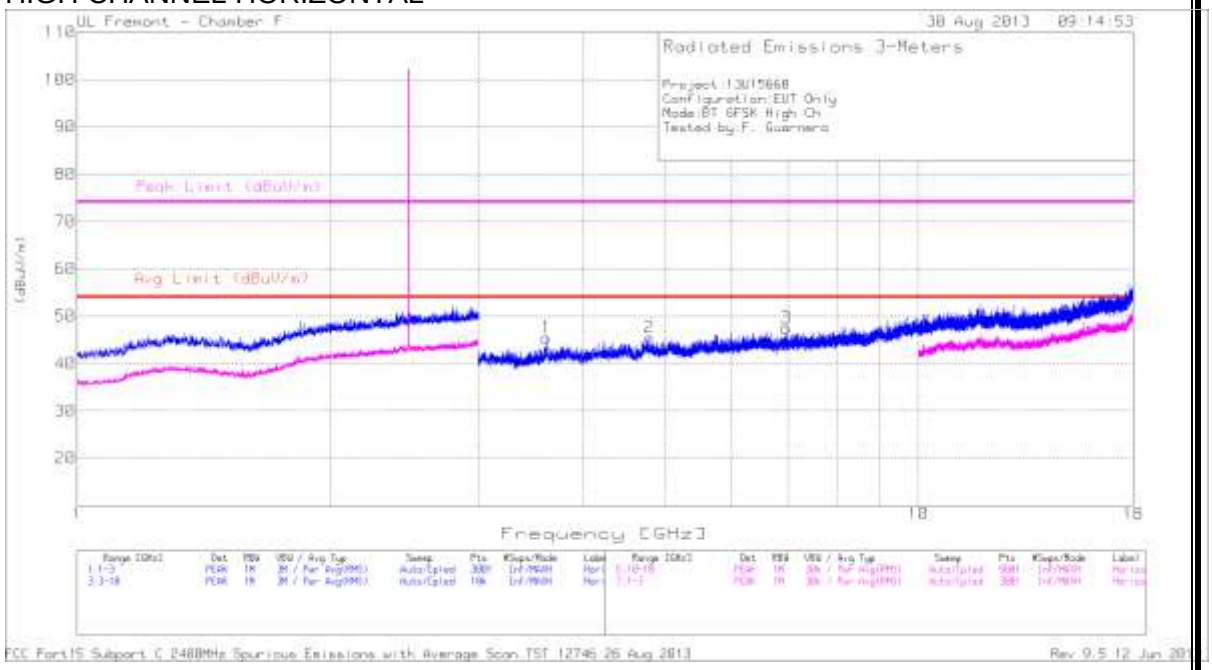
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/ Cbl/3 GHz HPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.251	38.91	PK	33.1	-28.8	1.14	44.35	53.97	-9.62	74	-29.65	0-360	100	H
2	5.331	39.56	PK	34.5	-28.4	1.14	46.8	53.97	-7.17	74	-27.20	0-360	100	H
3	7.199	38.22	PK	35.7	-26.6	1.14	48.46	53.97	-5.51	74	-25.54	0-360	199	H
*4	1.867	42.98	PK	30.8	-23.1	1.14	51.82	--	--	--	--	0-360	201	V
5	4.151	39.96	PK	33.4	-28.7	1.14	45.8	53.97	-8.17	74	-28.20	0-360	101	V
6	7.323	41.57	PK	35.7	-26.8	1.14	51.61	53.97	-2.36	74	-22.39	0-360	200	V
	7.323	35.05	MAv1	35.7	-26.8	1.1	45.05	53.97	-8.92	74	-28.95	235	158	V

Note: *****: Not in restricted band

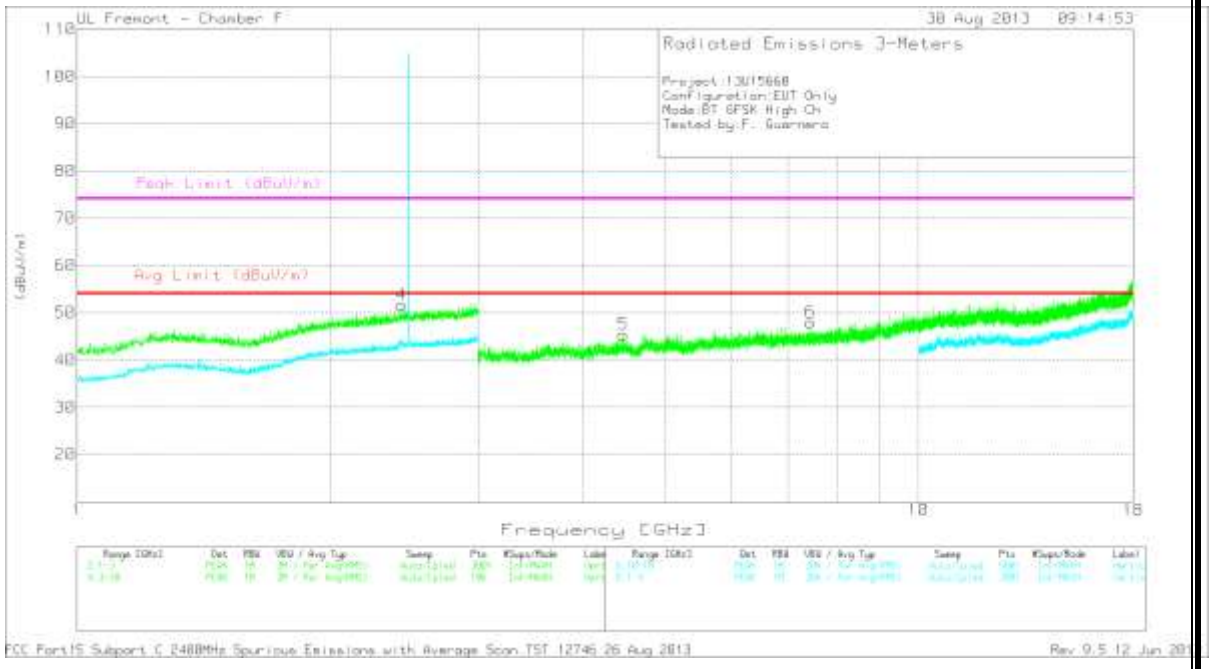
PK: Peak detector

MAv1 - KDB558074 v02 10.2.3.2/8.2.1 Option 1 Maximum RMS Average

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/3GHz HPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.613	40.73	PK	33.7	-29	1.14	46.57	53.97	-7.4	74	-27.43	0-360	200	H
2	4.789	39.21	PK	34.1	-27.8	1.14	46.65	53.97	-7.32	74	-27.35	0-360	101	H
*4	2.433	41.94	PK	32.2	-22.5	1.14	48.68	-	-	-	-	0-360	199	V
*3	6.96	38.44	PK	35.7	-26.6	1.14	52.78	-	-	-	-	0-360	101	H
5	4.459	39.98	PK	33.8	-28.4	1.14	46.52	53.97	-7.45	74	-27.48	0-360	100	V
6	7.441	38.38	PK	35.8	-26.2	1.14	49.12	53.97	-4.85	74	-24.88	0-360	199	V

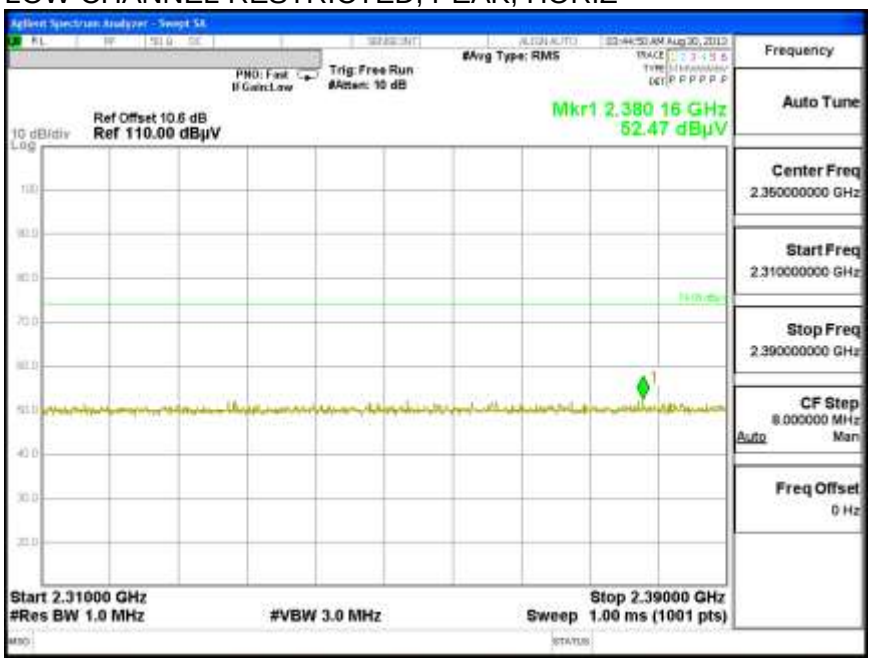
Note: *****: Not in restricted band

PK: Peak detector

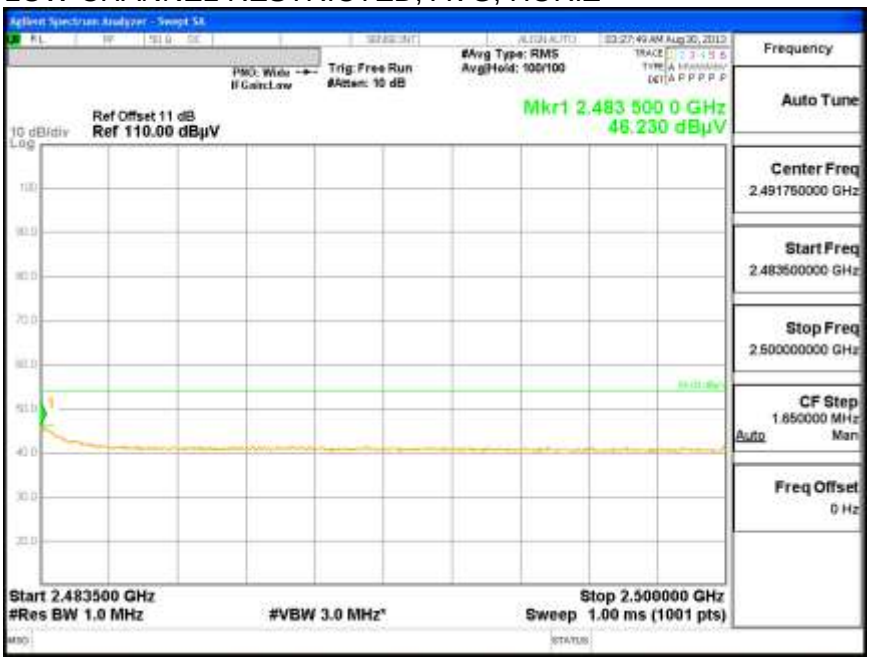
8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

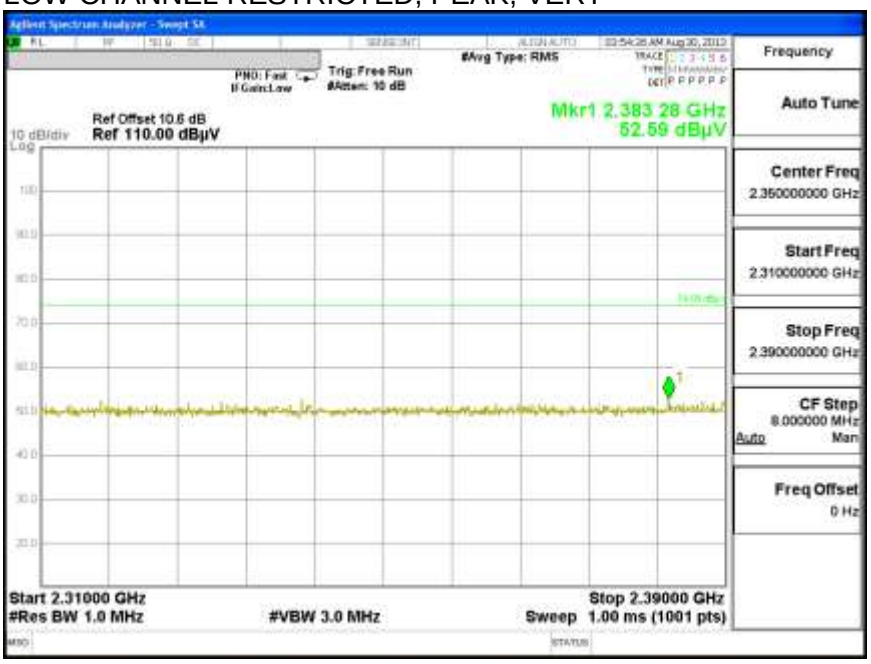


LOW CHANNEL RESTRICTED, AVG, HORIZ

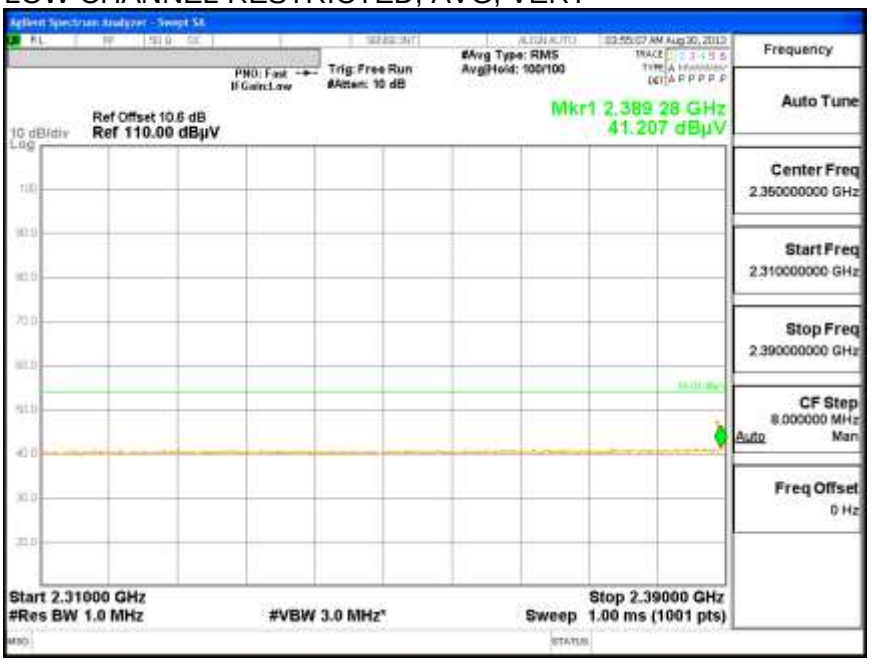


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

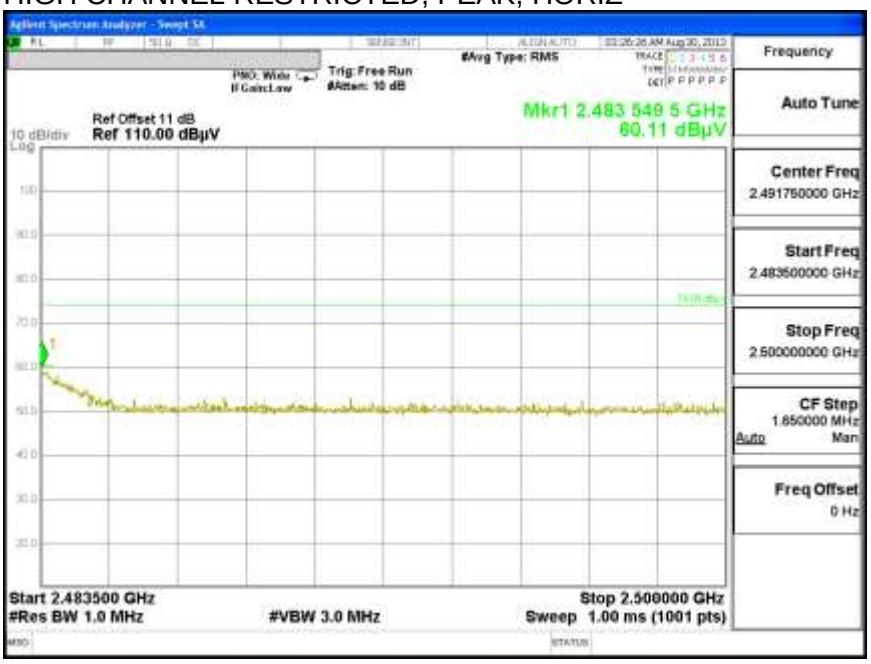


LOW CHANNEL RESTRICTED, AVG, VERT

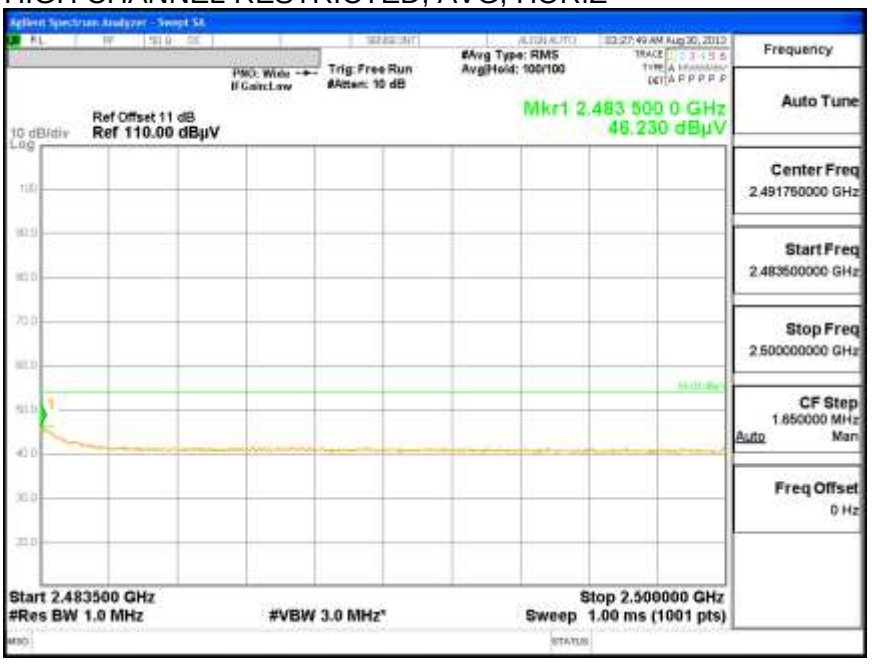


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

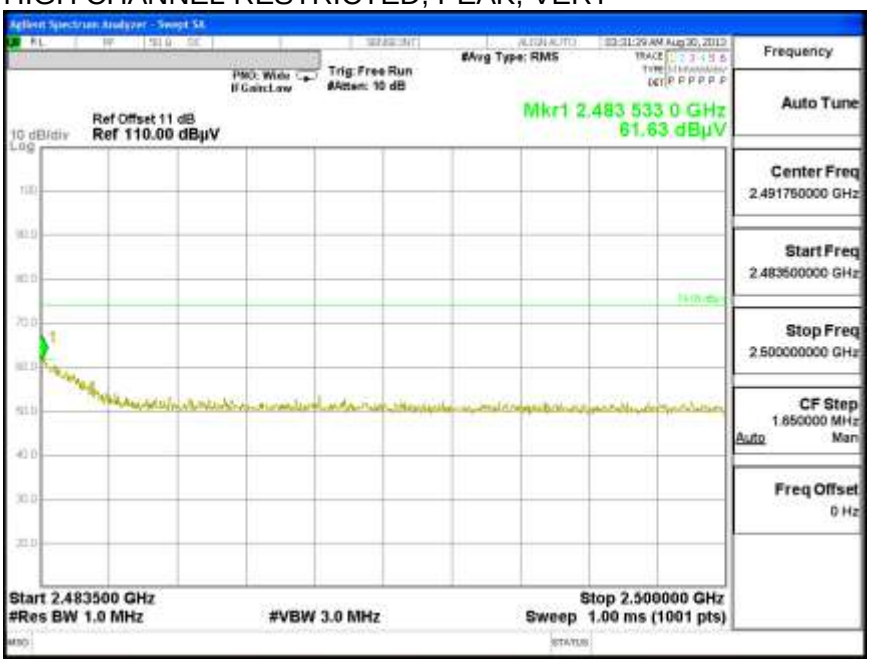


HIGH CHANNEL RESTRICTED, AVG, HORIZ

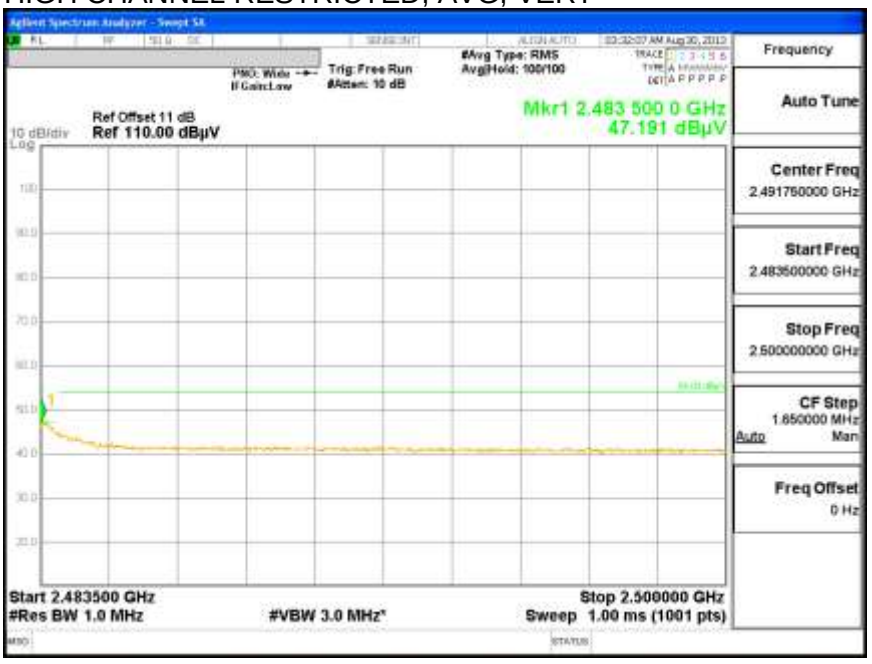


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT

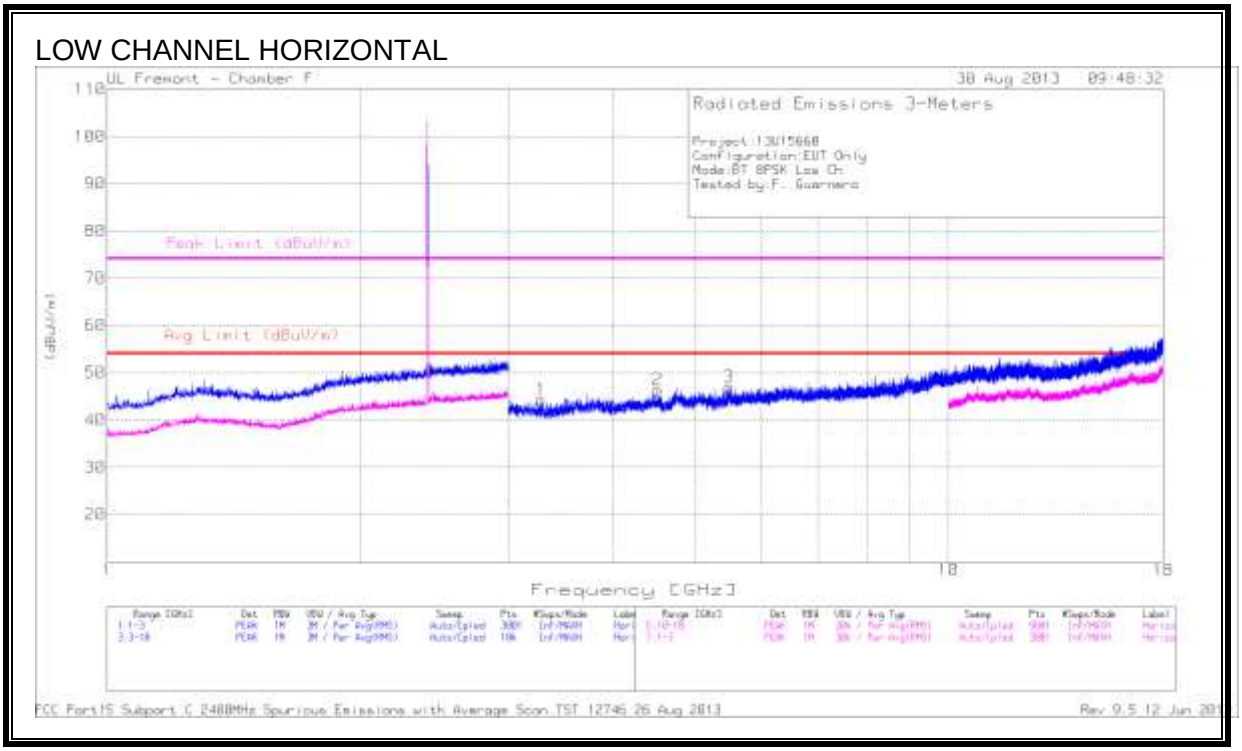


HIGH CHANNEL RESTRICTED, AVG, VERT

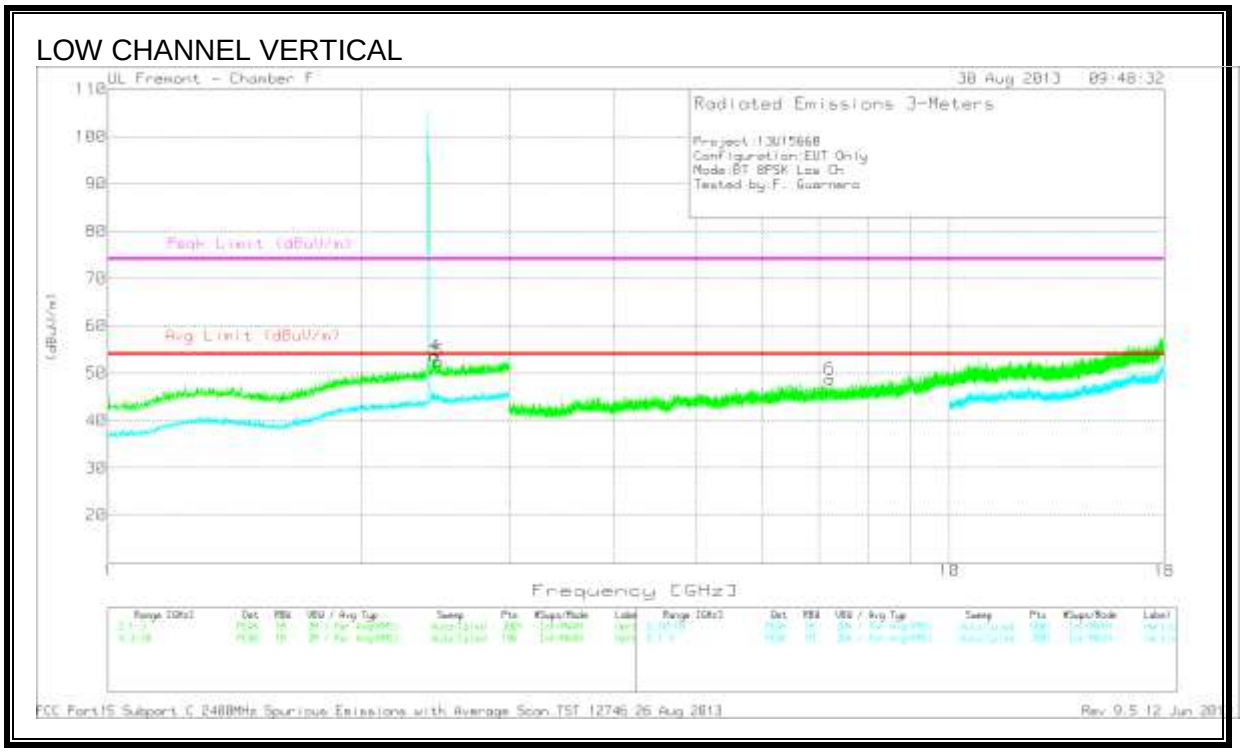


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/10dB Pad	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.281	39.05	PK	33.1	-29	1.1	44.25	53.97	-9.72	74	-29.75	0-360	200	H
2	4.512	39.35	PK	34	-28.1	1.1	46.35	53.97	-7.62	74	-27.65	0-360	100	H
3	5.487	38.98	PK	34.7	-27.8	1.1	46.98	53.97	-6.99	74	-27.02	0-360	100	H

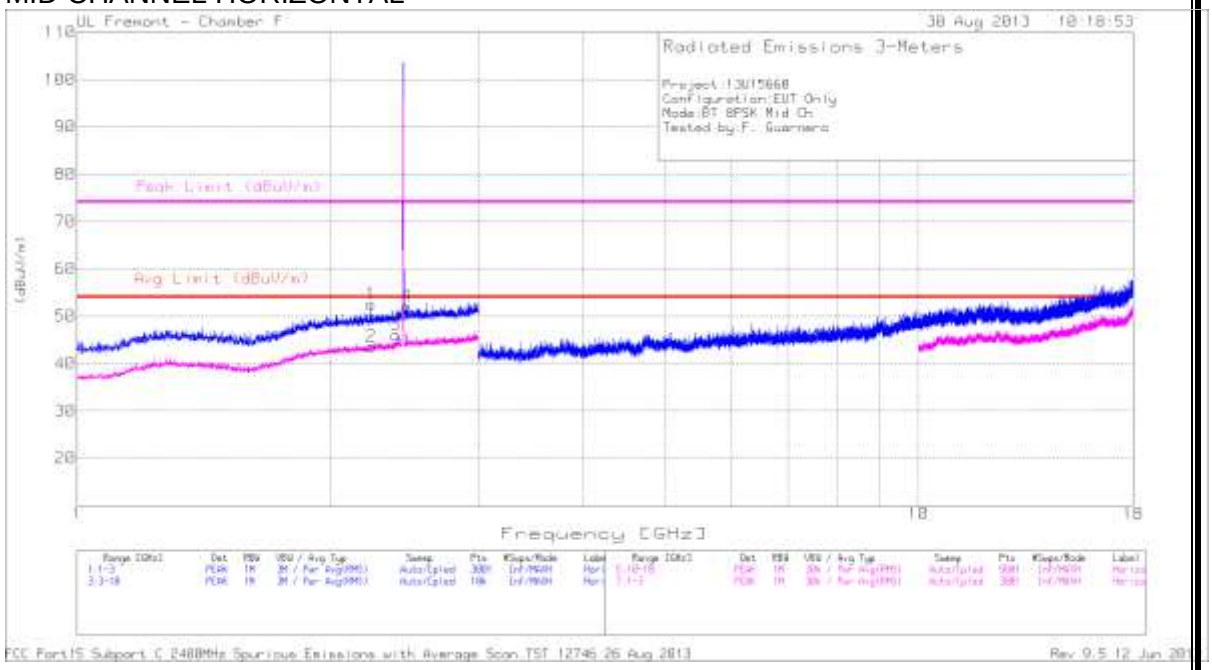
PK - Peak detector

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/3GHz HPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
*4	2.449	42.62	PK	32.3	-22.4	1.1	53.62	-	-	-	-	0-360	199	V
*5	2.475	41.23	PK	32.4	-22.2	1.1	52.53	-	-	-	-	0-360	199	V
*6	7.207	38.59	PK	35.7	-26.6	1.1	48.79	-	-	-	-	0-360	199	V

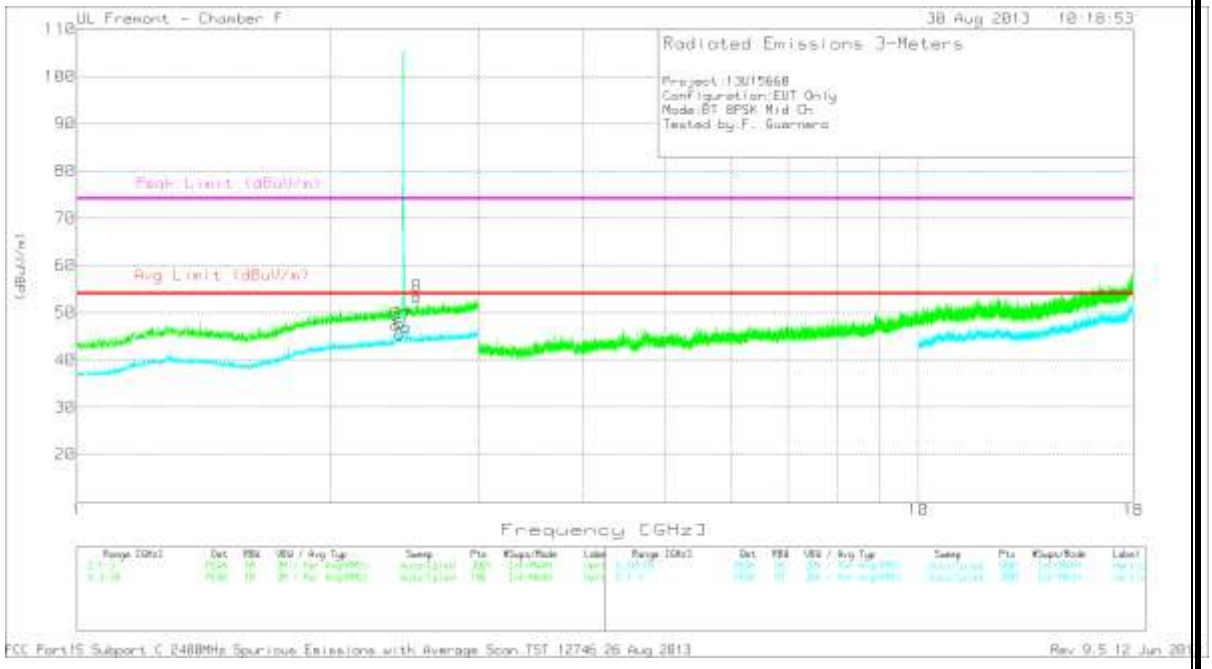
Note: *****: Not in restricted band

PK: Peak detector

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



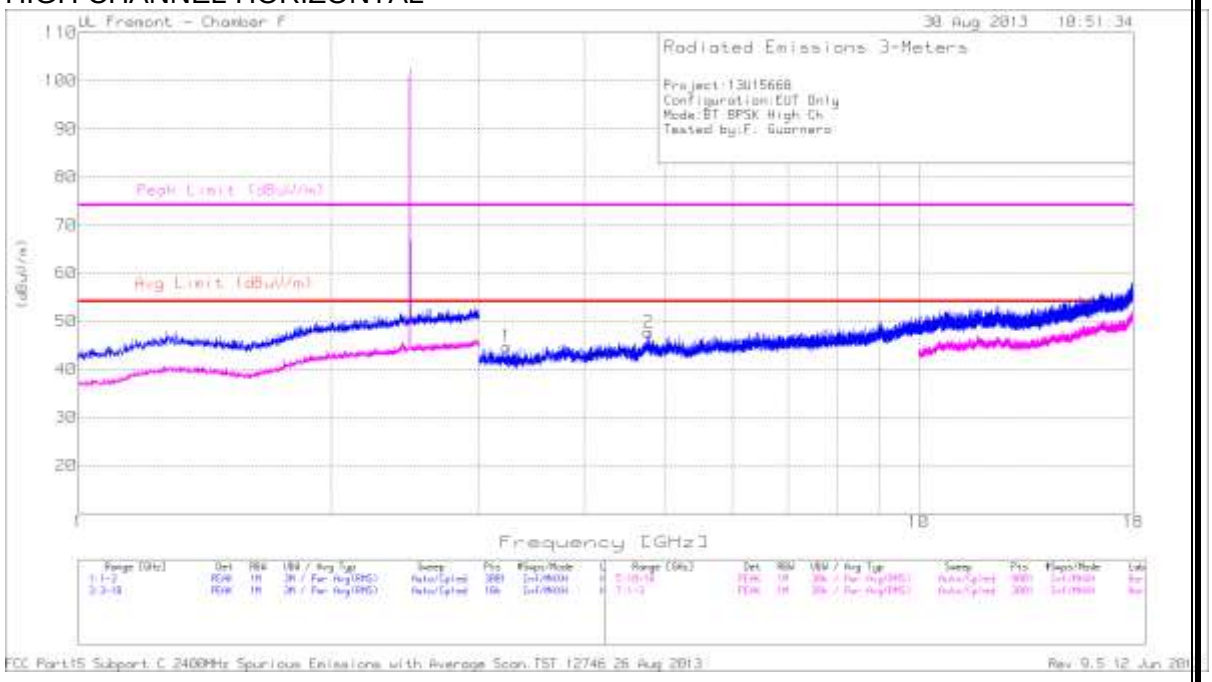
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/10dB Pad	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.237	42.1	PK	31.9	-22.6	1.1	52.5	-	-	74	-21.5	0-360	201	H
2	2.241	33.09	PK (VB)	31.9	-22.5	1.1	43.59	53.97	-10.38	-	-	0-360	200	H
*3	2.395	35.35	PK	32.1	-22.5	1.1	46.05	-	-	-	-	0-360	200	H
*4	2.465	40.87	PK	32.4	-22.3	1.1	52.07	-	-	-	-	0-360	201	H
*5	2.395	36.68	PK	32.1	-22.5	1.1	47.38	-	-	-	-	0-360	199	V
*6	2.418	34.71	PK	32.2	-22.5	1.1	45.51	-	-	-	-	0-360	199	V
*7	2.463	35.76	PK	32.4	-22.3	1.1	46.96	-	-	-	-	0-360	199	V
*8	2.535	41.9	PK	32.5	-22.1	1.1	53.4	-	-	-	-	0-360	199	V

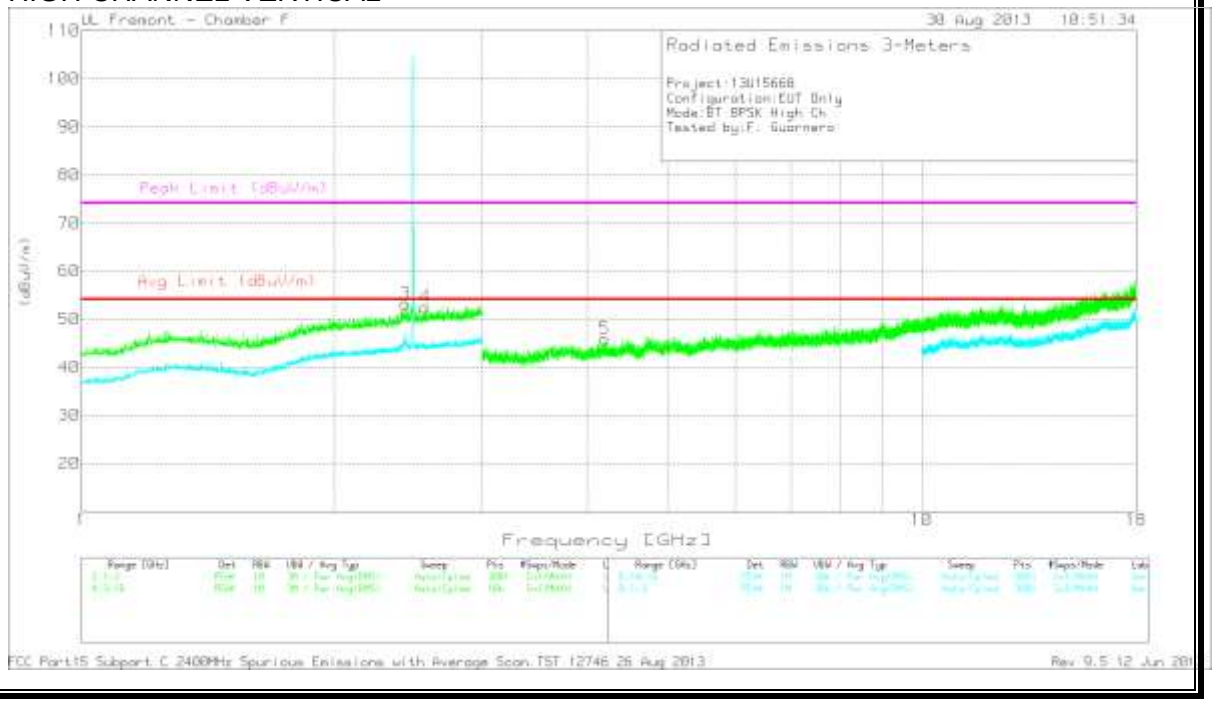
Note: *****: Not in restricted band

PK: Peak detector

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/10dB Pad	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.235	39.26	PK	33.2	-28.9	1.1	44.66	53.97	-9.31	74	-29.34	0-360	101	H
2	4.776	40.5	PK	34.1	-28	1.1	47.7	53.97	-6.27	74	-26.3	0-360	101	H

PK - Peak detector

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/3GHz HPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
*3	2.432	42.36	PK	32.2	-22.5	1.1	53.16	-	-	-	-	0-360	199	V
*4	2.567	40.98	PK	32.6	-22.2	1.1	52.48		-	-	-	0-360	100	V
5	4.197	39.89	PK	33.4	-28.5	1.1	45.89	53.97	-8.08	74	-28.11	0-360	100	V

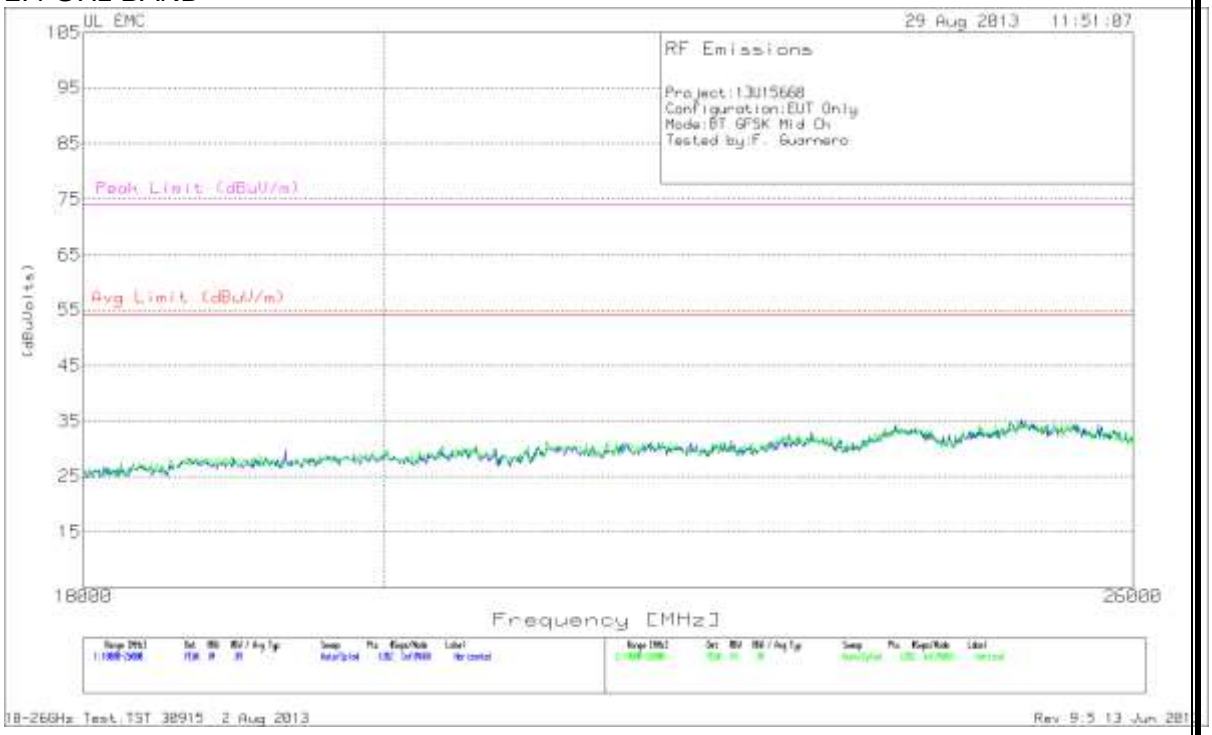
Note: *****: Not in restricted band

PK: Peak detector

8.3. WORST-CASE ABOVE 18 GHz

SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

2.4 GHz BAND

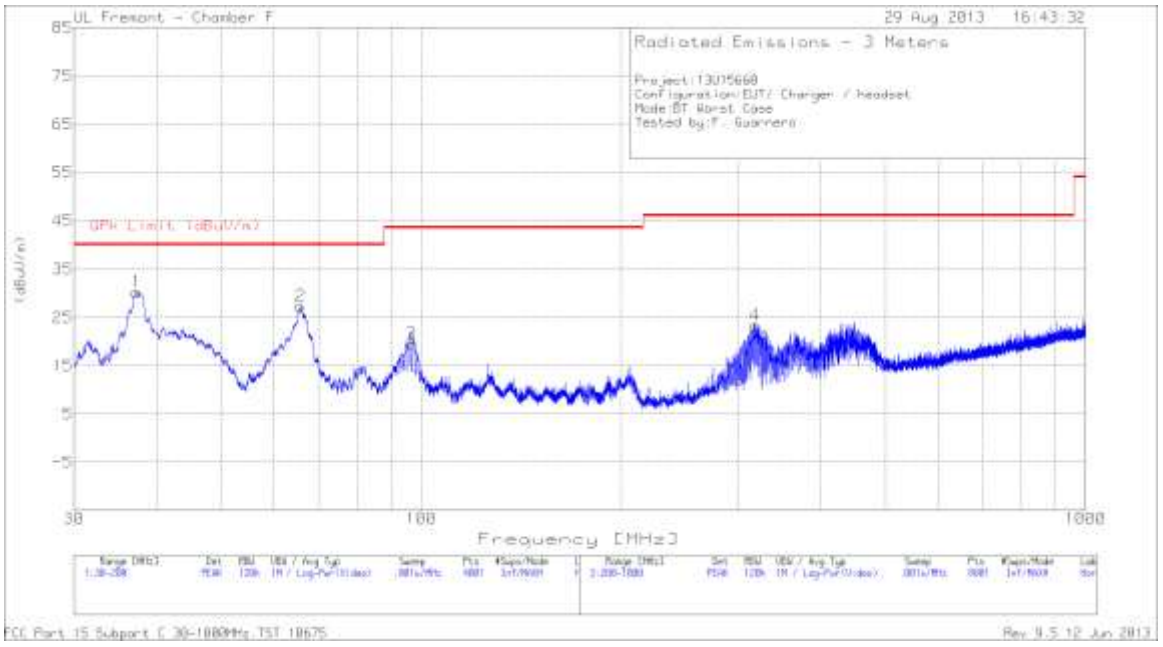


Note: There were no emissions detected above system noise floor.

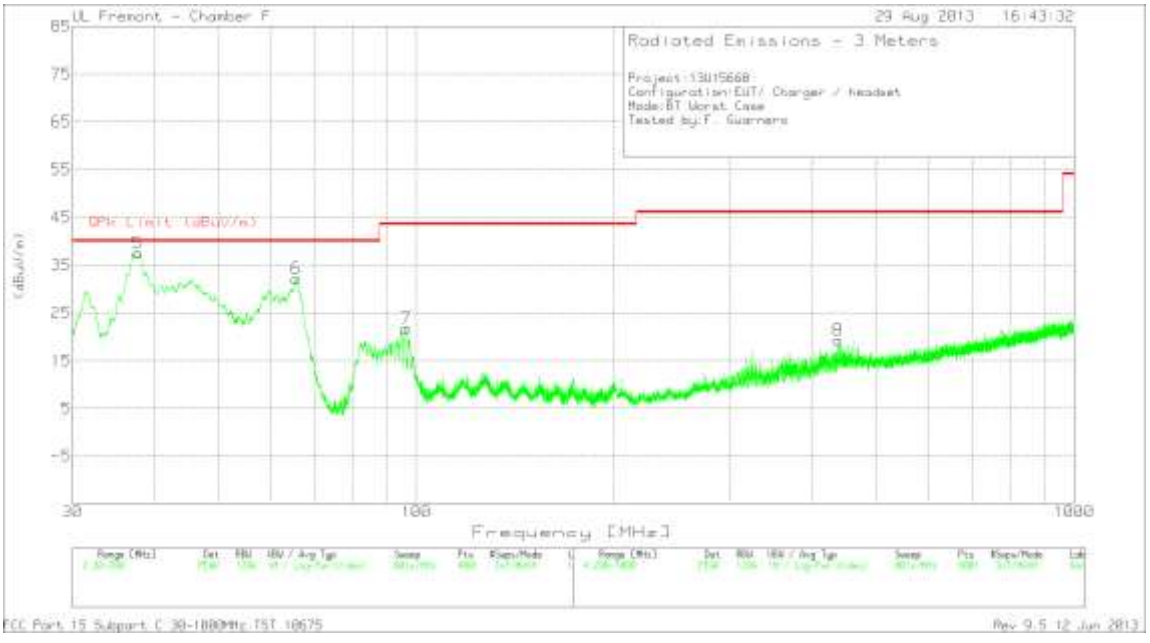
8.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



DATA

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	37.2675	46.3	PK	15.9	-32	30.2	40	-9.8	0-360	300	H
2	65.785	51.2	PK	7.9	-31.8	27.3	40	-12.7	0-360	300	H
3	96.64	41.76	PK	9.5	-31.7	19.56	43.52	-23.96	0-360	200	H
4	318.6	40.17	PK	13.9	-30.7	23.37	46.02	-22.65	0-360	100	H
5	37.735	53.93	PK	15.6	-32	37.53	40	-2.47	0-360	100	V
6	65.6575	56.07	PK	7.9	-31.8	32.17	40	-7.83	0-360	100	V
7	96.5125	43.91	PK	9.5	-31.7	21.71	43.52	-21.81	0-360	100	V
8	437.9	33.02	PK	16.7	-30.4	19.32	46.02	-26.7	0-360	200	V

PK - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
37.8737	51.21	QP	15.5	-32	34.71	40	-5.29	146	112	V

QP - Quasi-Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 10675 Rev 9.5 12 Jun 2013

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS

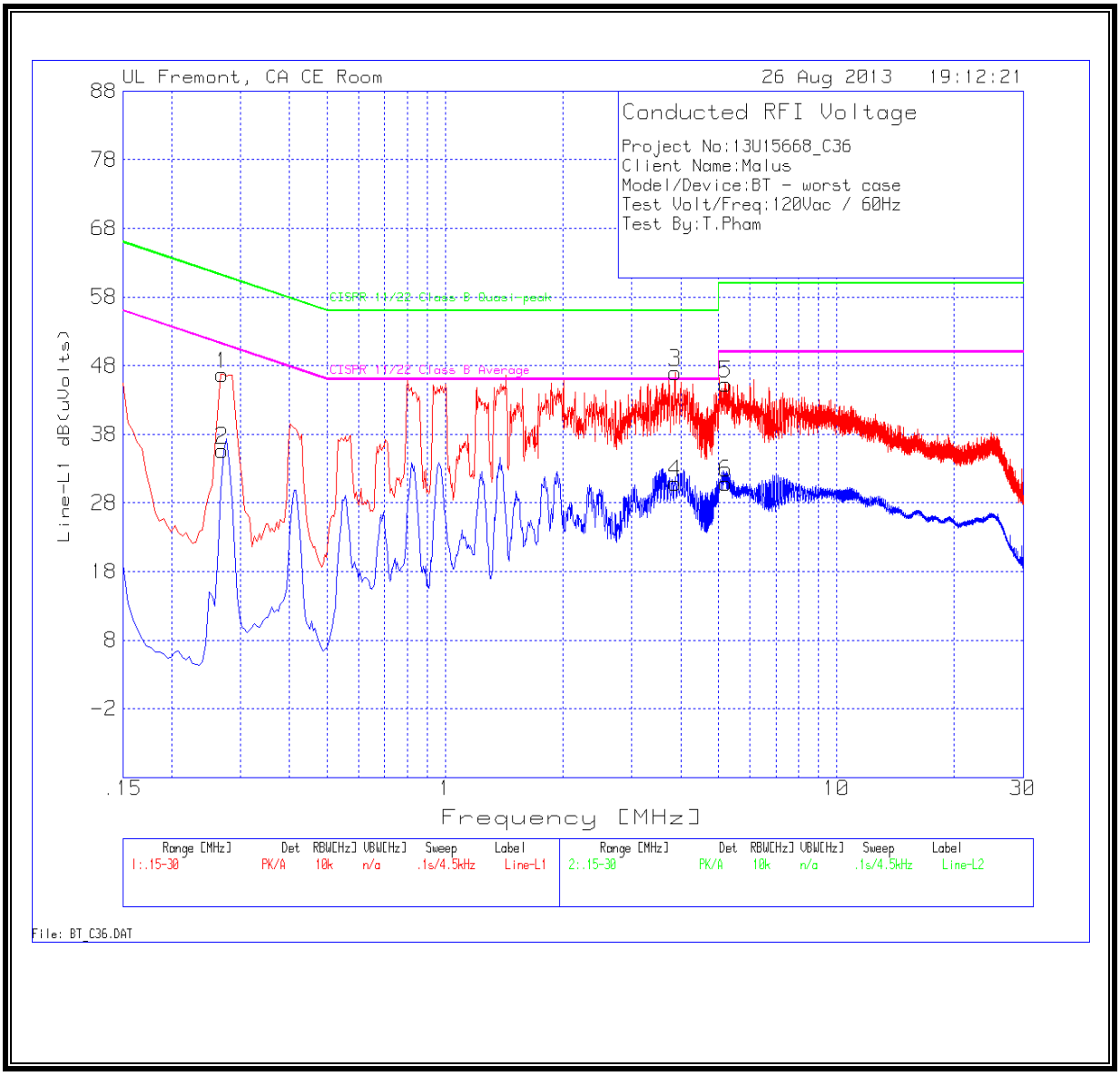
6 WORST EMISSIONS

Line-L1 .15 - 30MHz

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	0.26925	46.58	PK	0.1	0	46.68	61.1	-14.42	-	-
2	0.26925	35.5	Av	0.1	0	35.6	-	-	51.1	-15.5
3	3.867	46.78	PK	0.1	0.1	46.98	56	-9.02	-	-
4	3.867	30.69	Av	0.1	0.1	30.89	-	-	46	-15.11
5	5.2125	45.16	PK	0.1	0.1	45.36	60	-14.64	-	-
6	5.2125	30.68	Av	0.1	0.1	30.88	-	-	50	-19.12

PK - Peak detector
Av - average detection

LINE 1 RESULTS



6 WORST EMISSIONS

Line-L2 .15 - 30MHz

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)
7	0.267	47.64	PK	0.1	0	47.74	61.2	-13.46	-	-
8	0.267	29.55	Av	0.1	0	29.65	-	-	51.2	-21.55
9	1.0005	43.93	PK	0.1	0	44.03	56	-11.97	-	-
10	1.0005	24.76	Av	0.1	0	24.86	-	-	46	-21.14
11	5.208	44.21	PK	0.1	0.1	44.41	60	-15.59	-	-
12	5.208	29.13	Av	0.1	0.1	29.33	-	-	50	-20.67

PK - Peak detector
Av - average detection

LINE 2 RESULTS