CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

Tablet with IEEE 802.11a/b/g/n (MIMO 2x2) and Bluetooth radio

MODEL NUMBER: A1474

FCC ID: BCGA1474
IC: 579C-A1474

REPORT NUMBER: 13U15555-1

ISSUE DATE: SEPTEMBER 17, 2013

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

UL VERIFICATION SERVICES INC.
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	09/17/13	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 IEEE 802.11a/b/g/n (MIMO 2x2) and Bluetooth radio

MODEL: A1474

SERIAL NUMBER: DLXKW04QFMN4

DATE TESTED: AUGUST 6 - AUGUST 26, 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

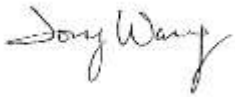
UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services based on interpretations and/or observations of test results. Measurement Uncertainties 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 and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services 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:



TONY WANG
WiSE Lab Technician
UL Verification Services Inc.

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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 is a tablet with 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	12.66	18.45
2402 - 2480	Enhanced 8PSK	12.02	15.92

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	0.5

5.4. SOFTWARE AND FIRMWARE

The 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	A1401	60812	NA
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

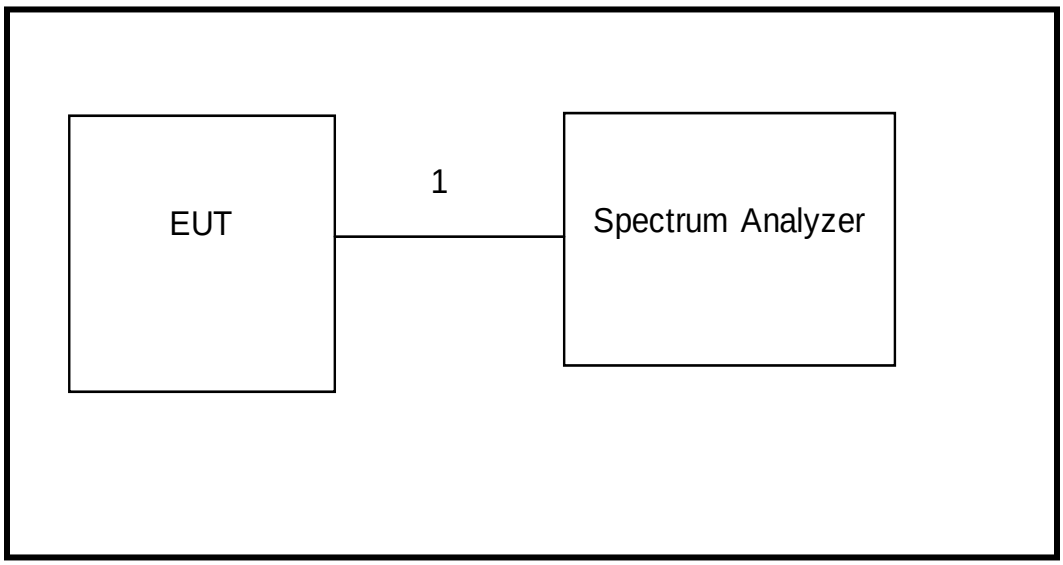
I/O CABLES (RADIATED TEST)

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

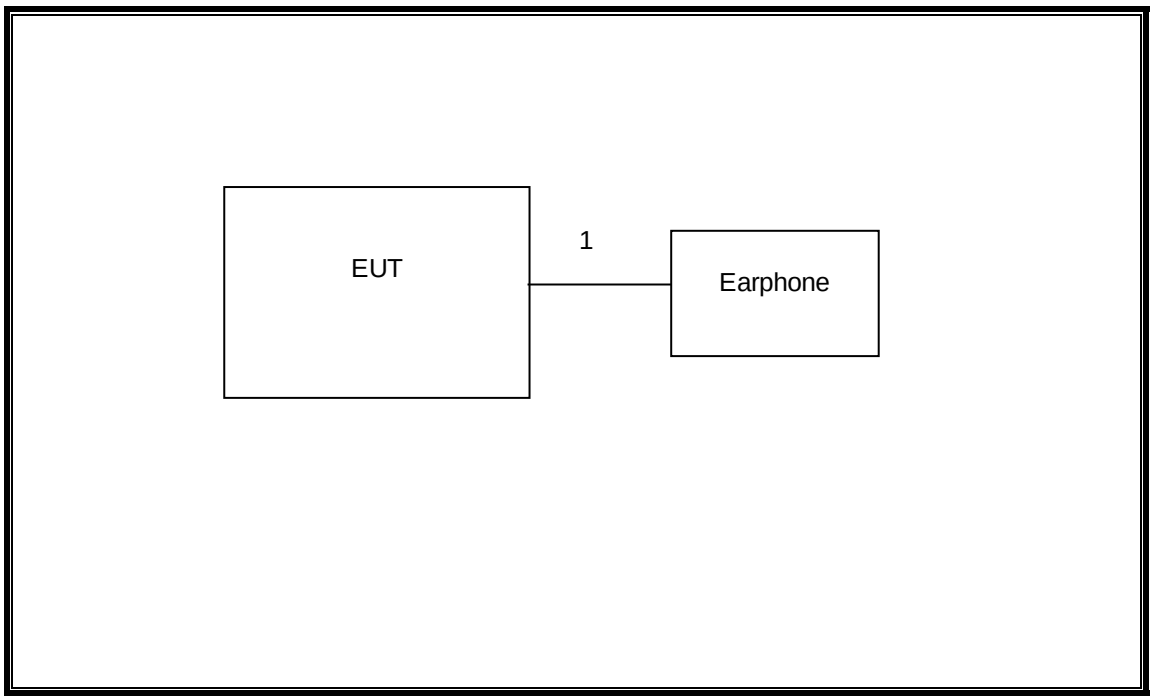
I/O CABLES (AC POWER CONDUCTED TEST)

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

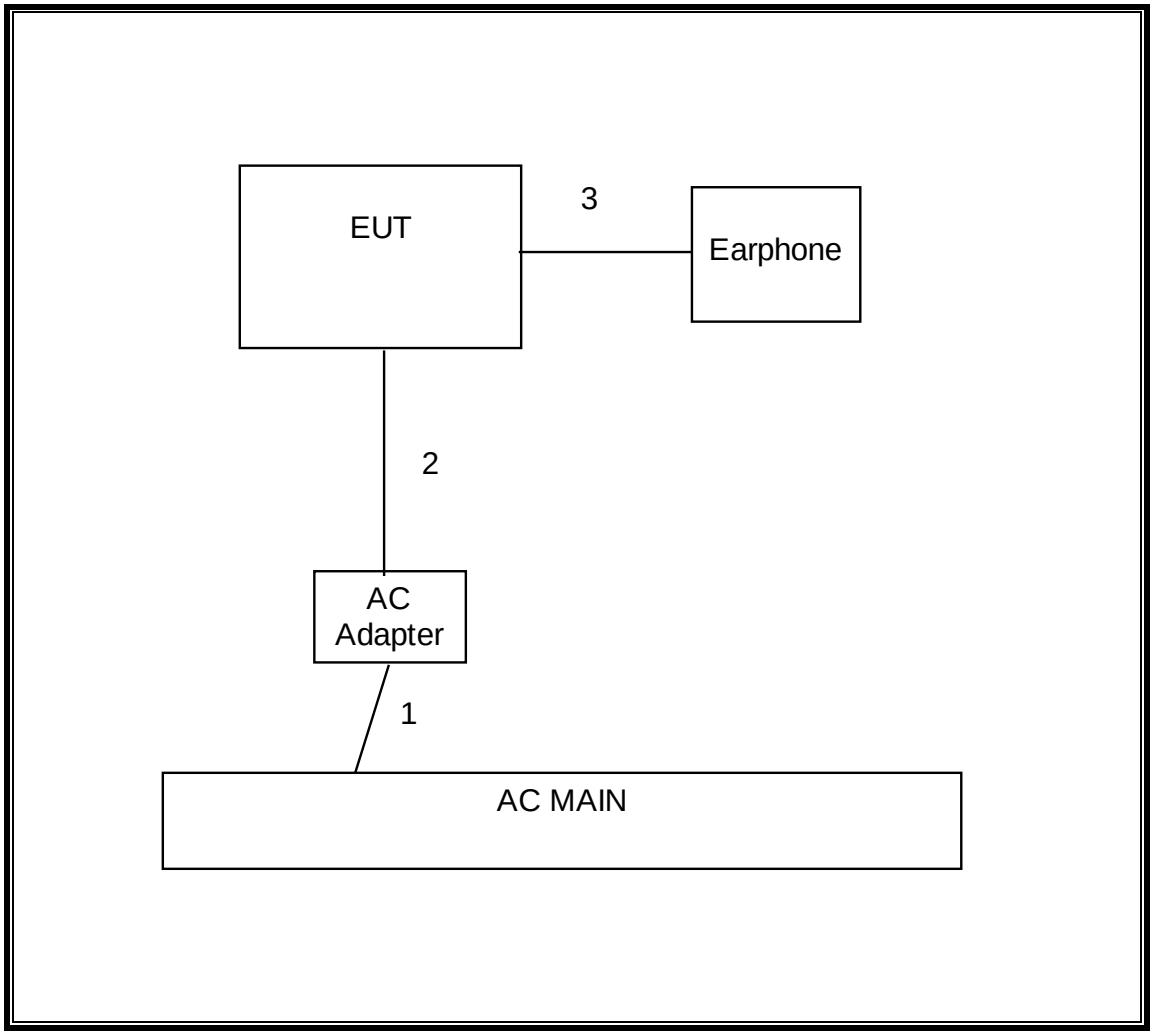
SETUP DIAGRAM FOR CONDUCTED TESTS



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	950.800	888.93
Middle	2441	946.600	893.18
High	2480	947.600	889.72

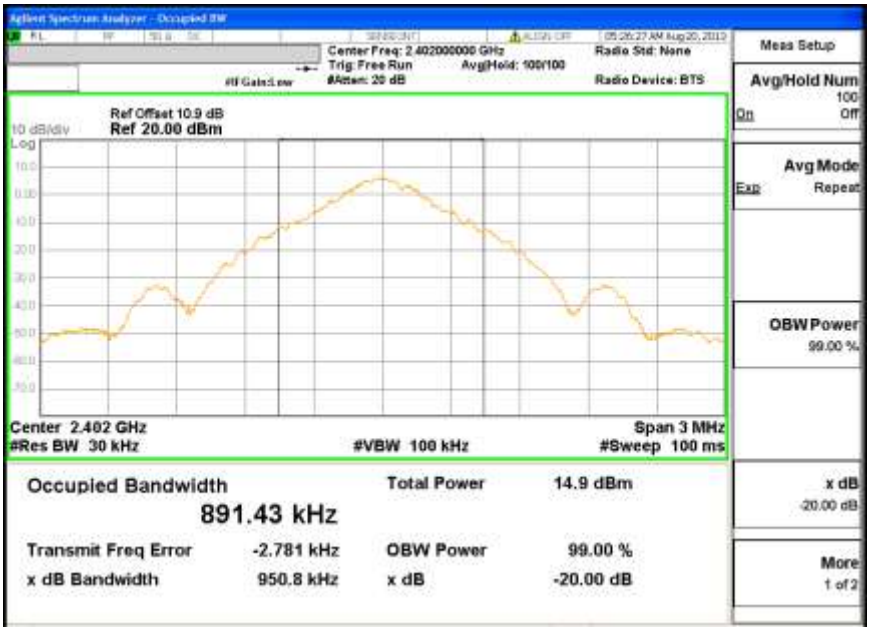
8PSK

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.387	1.2401
Middle	2441	1.389	1.2353
High	2480	1.384	1.2373

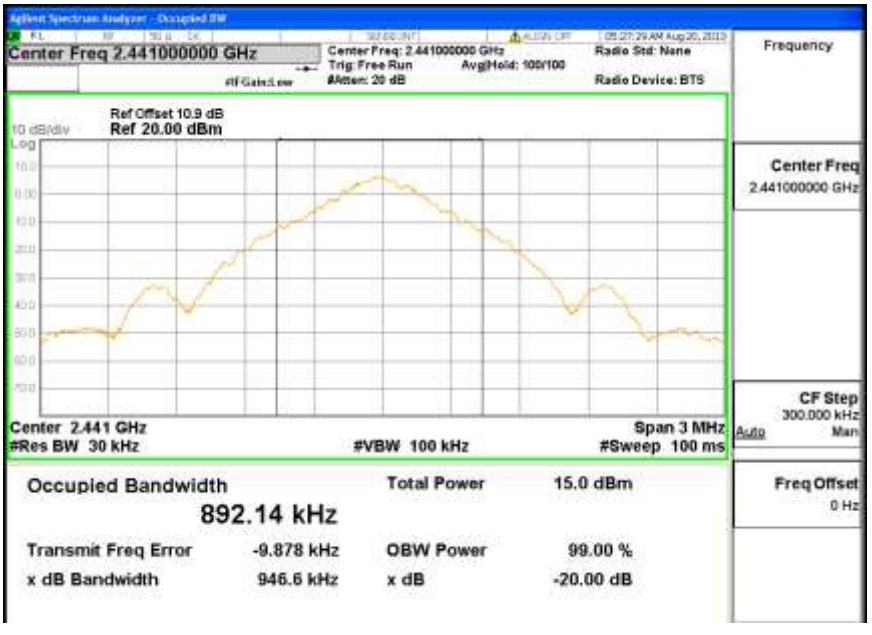
GFSK

20 dB BANDWIDTH

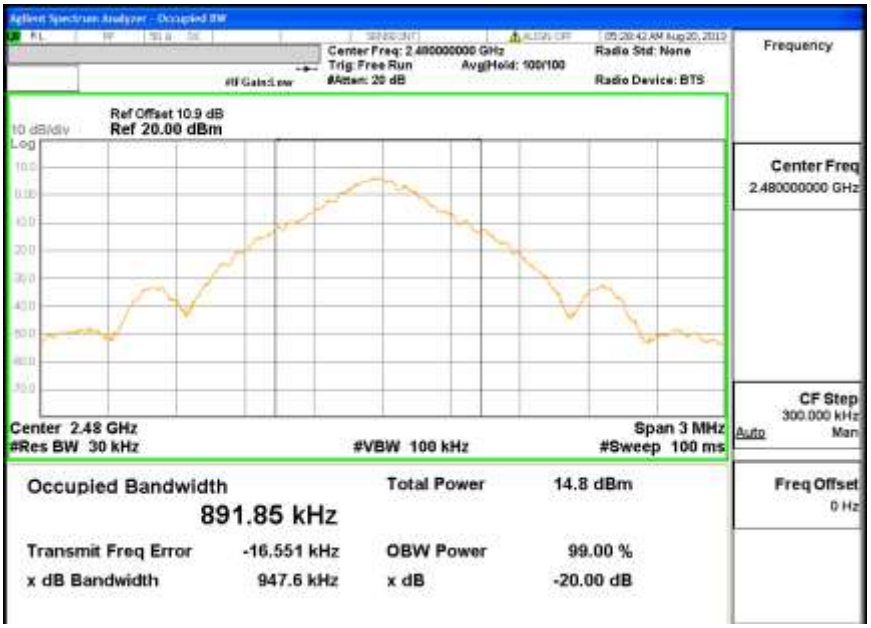
BANDWIDTH LOW CH



BANDWIDTH MID CH



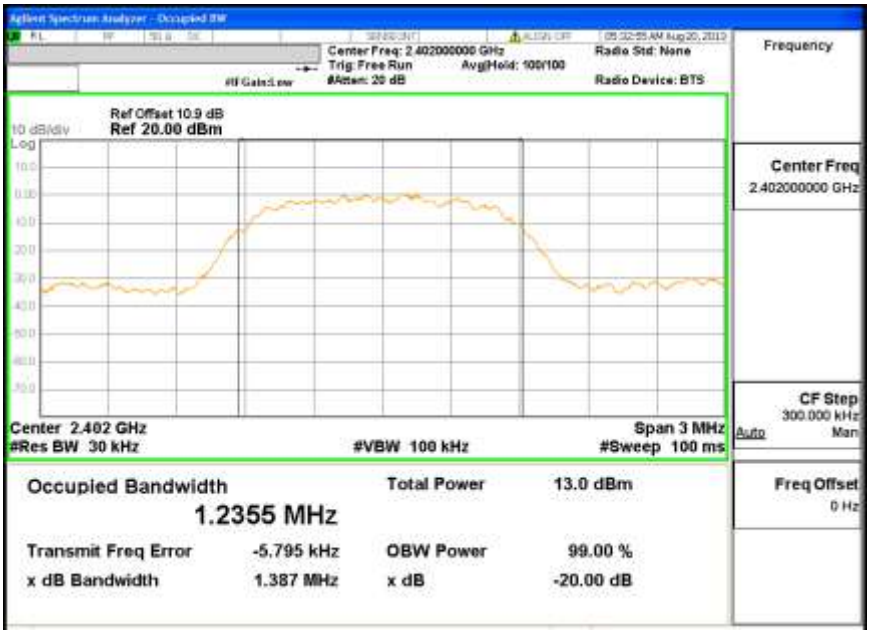
BANDWIDTH HIGH CH



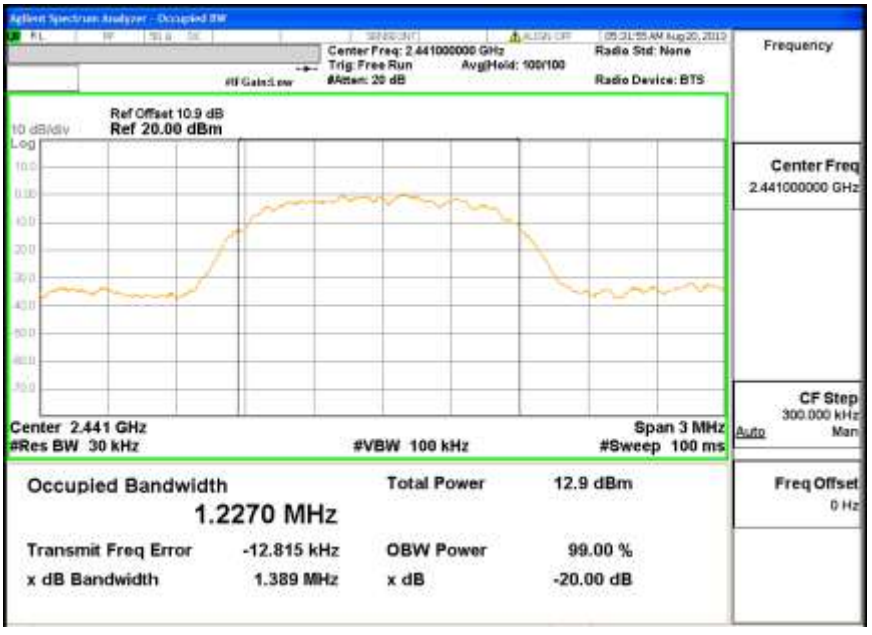
8PSK

20 dB BANDWIDTH

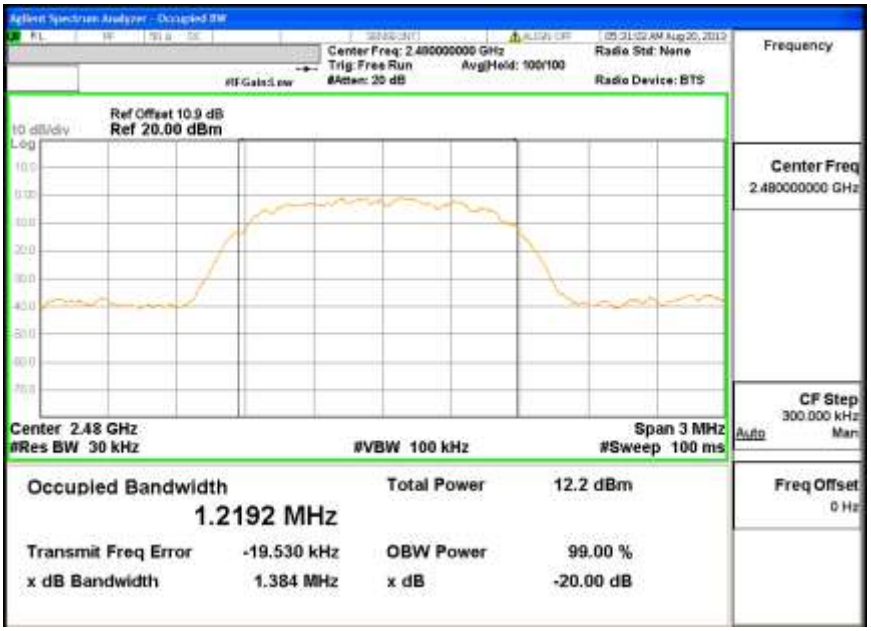
BANDWIDTH LOW CH



BANDWIDTH MID CH



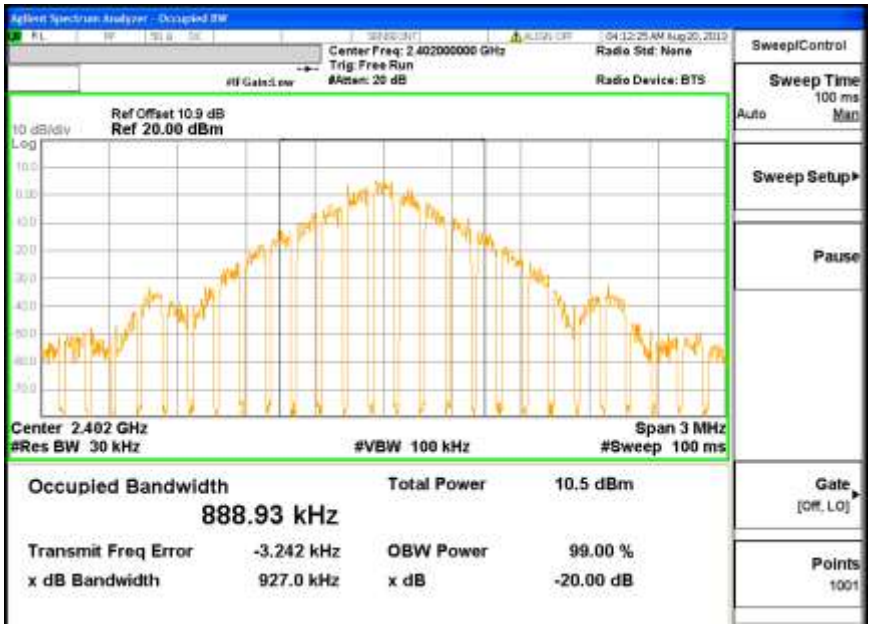
BANDWIDTH HIGH CH



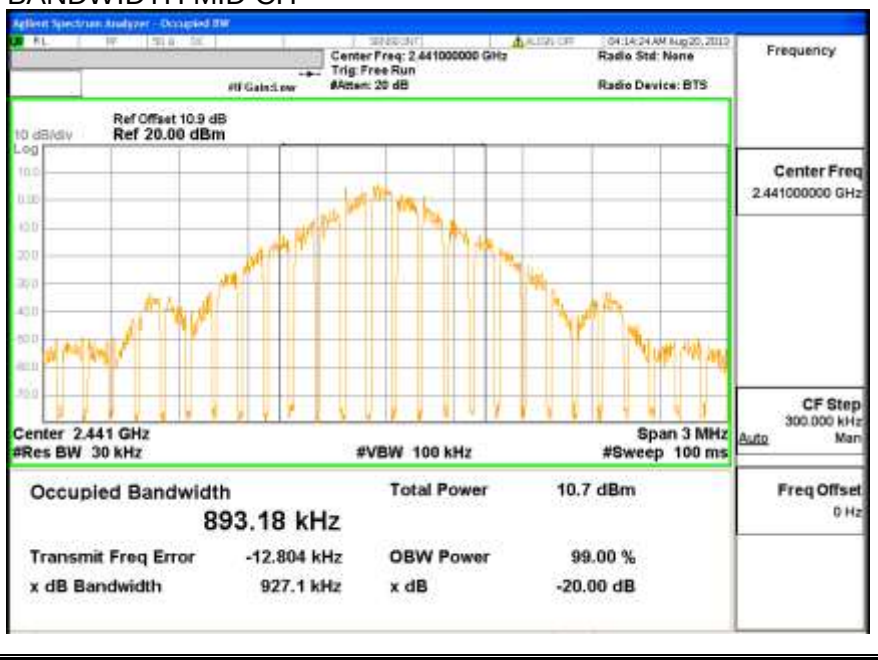
GFSK

99% BANDWIDTH

BANDWIDTH LOW CH



BANDWIDTH MID CH

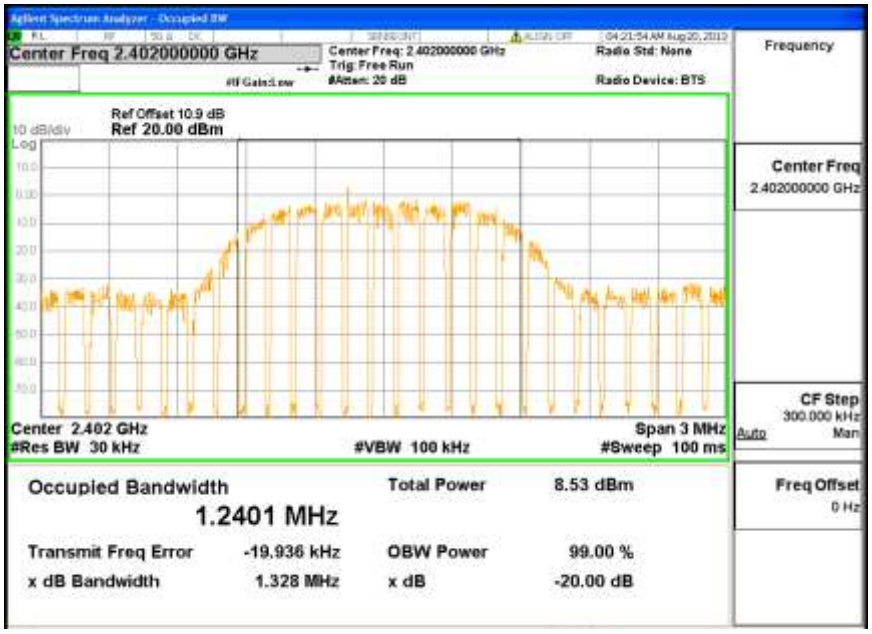


BANDWIDTH HIGH CH

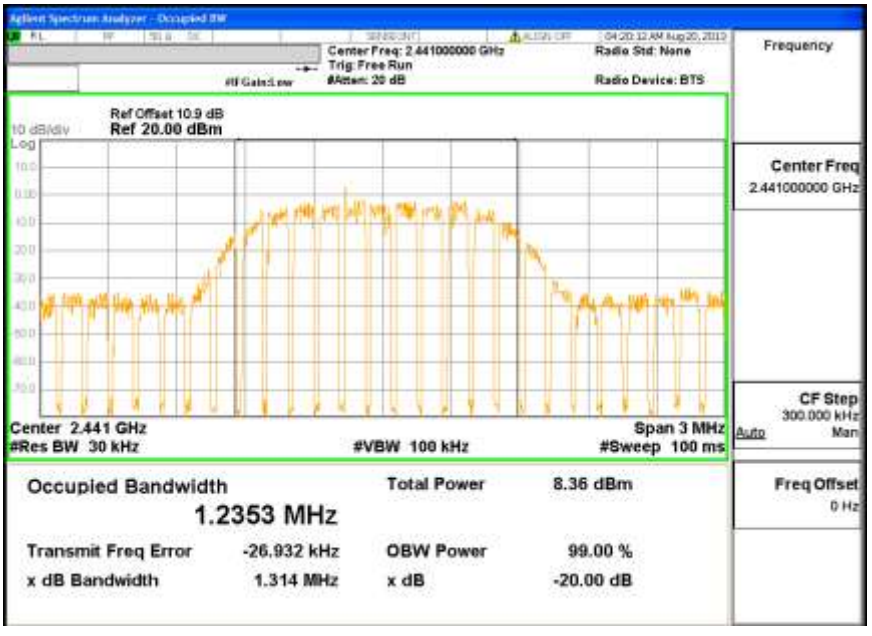
8PSK

99% BANDWIDTH

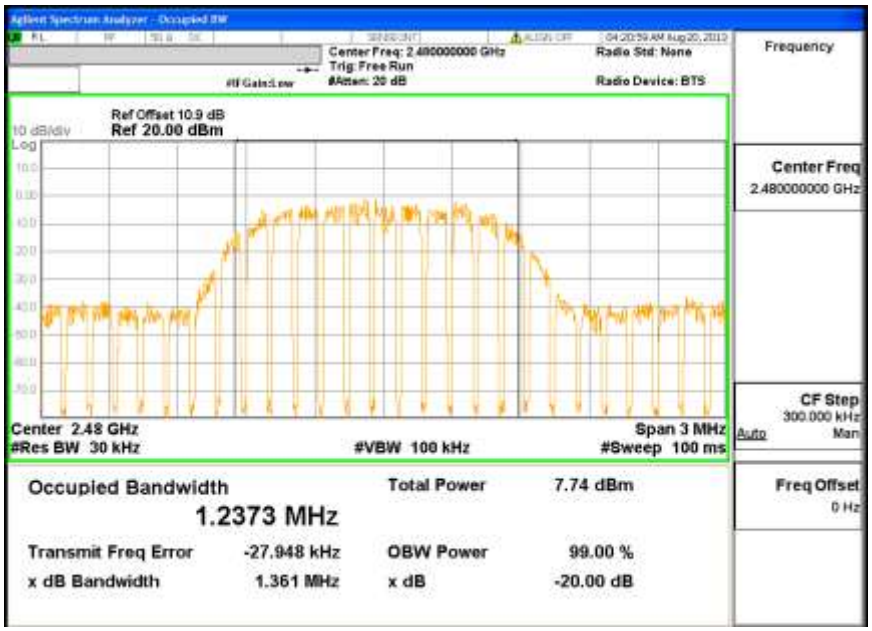
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



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.

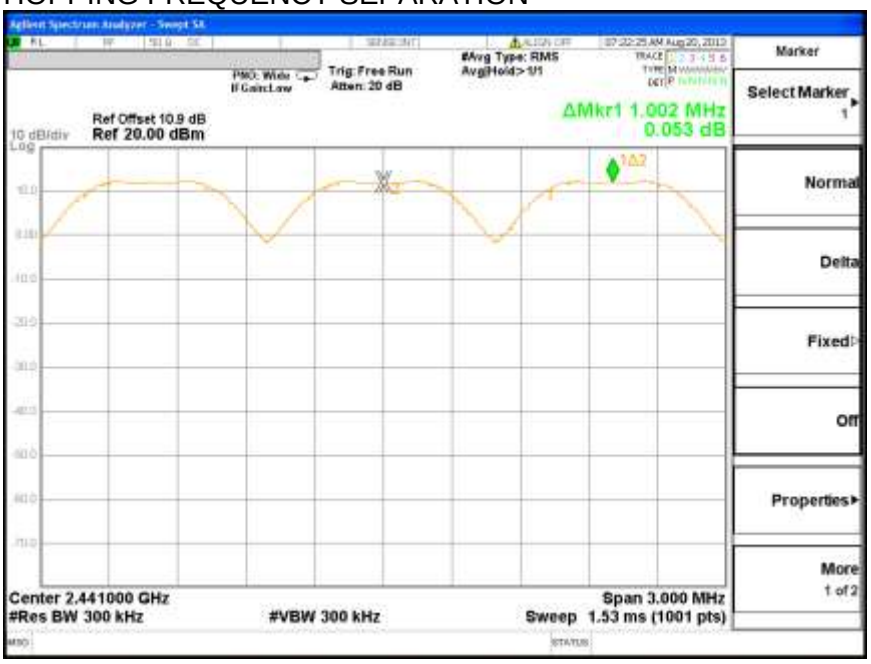
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

HOPPING FREQUENCY SEPARATION

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.

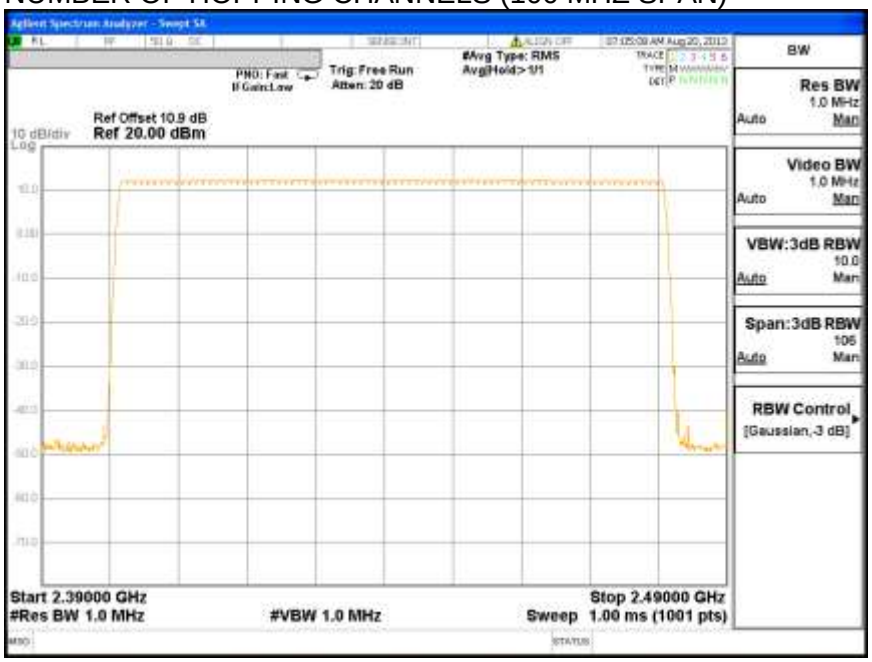
RESULTS

79 Channels observed.

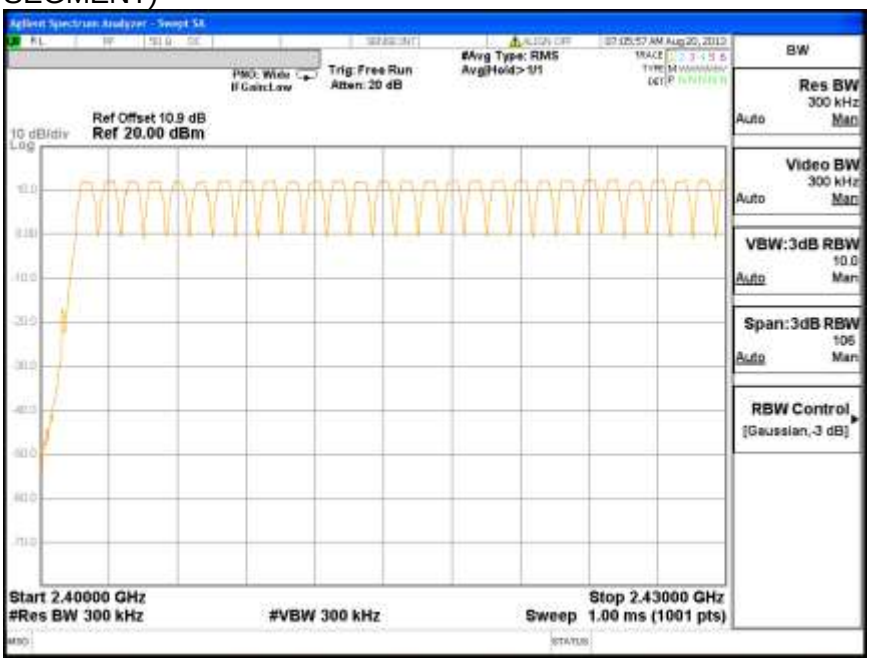
GFSK

NUMBER OF HOPPING CHANNELS

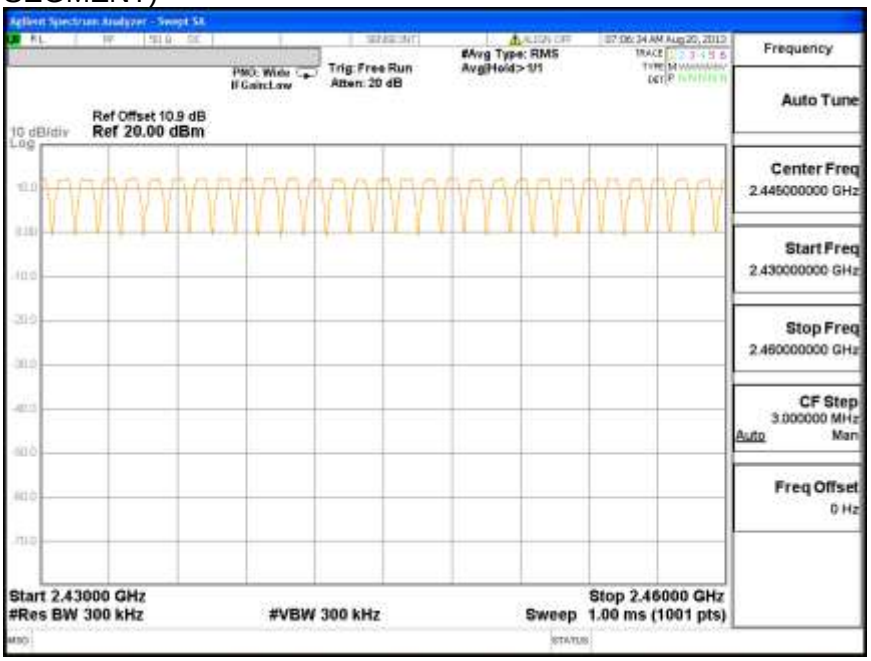
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



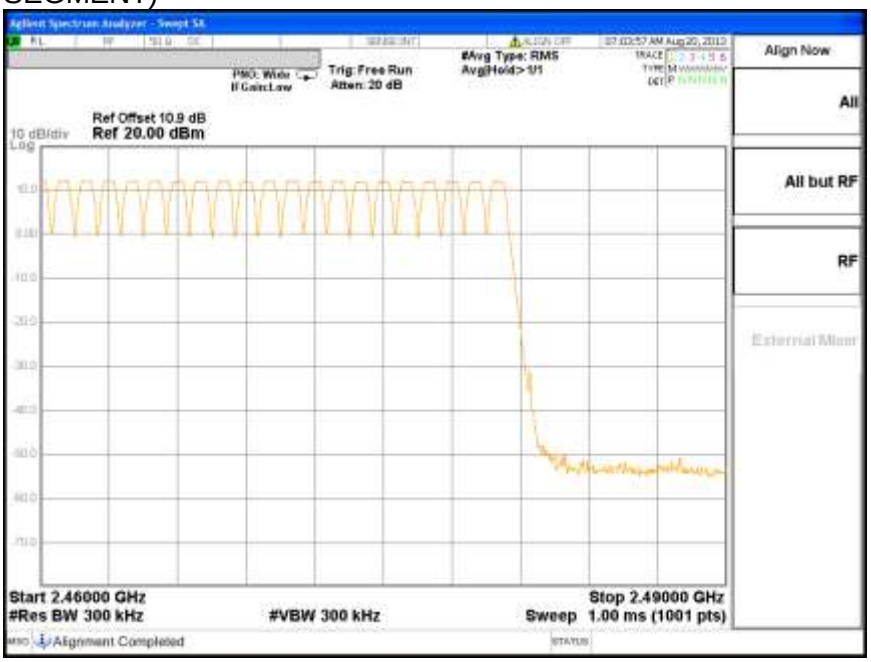
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



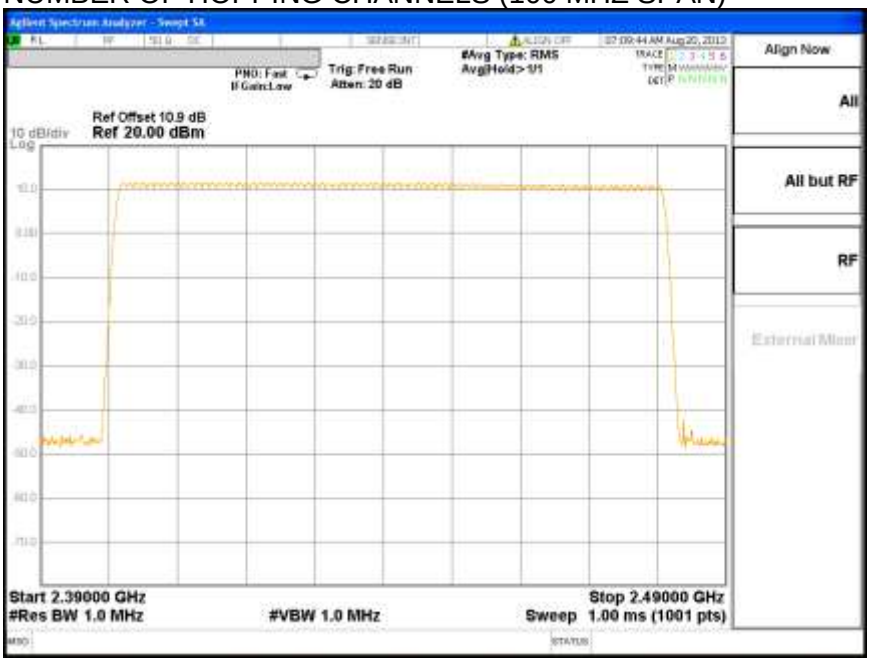
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



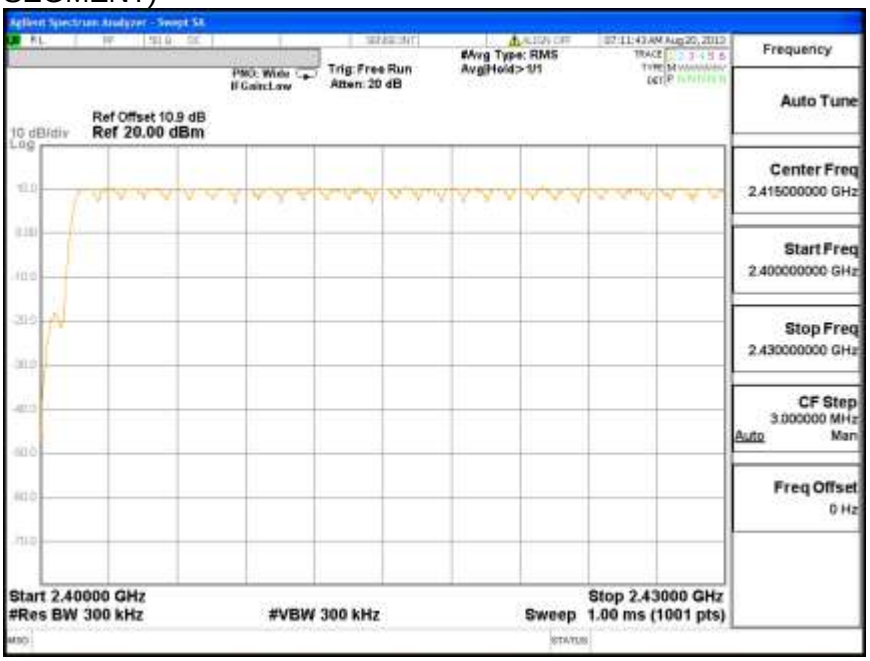
8PSK

NUMBER OF HOPPING CHANNELS

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



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



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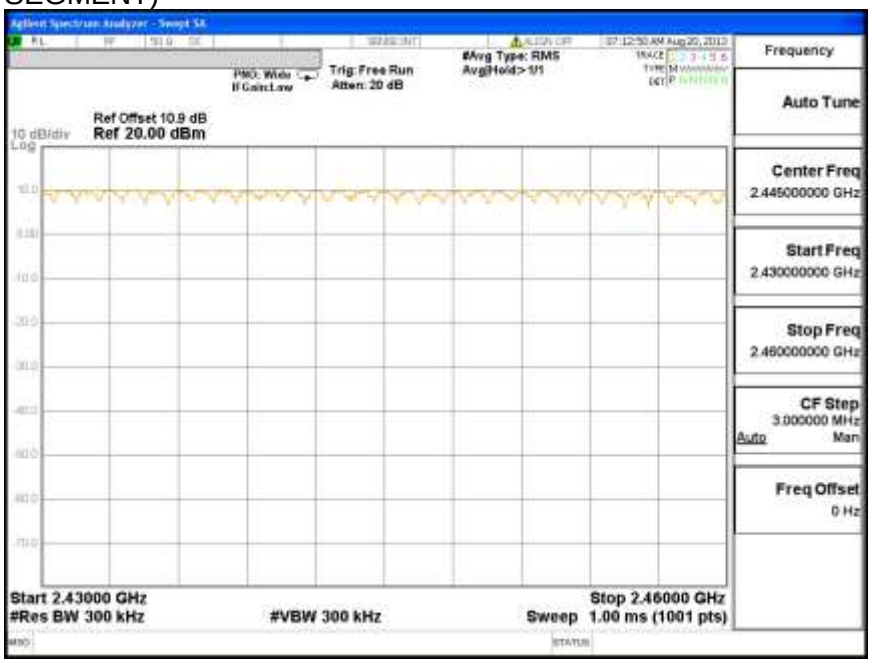
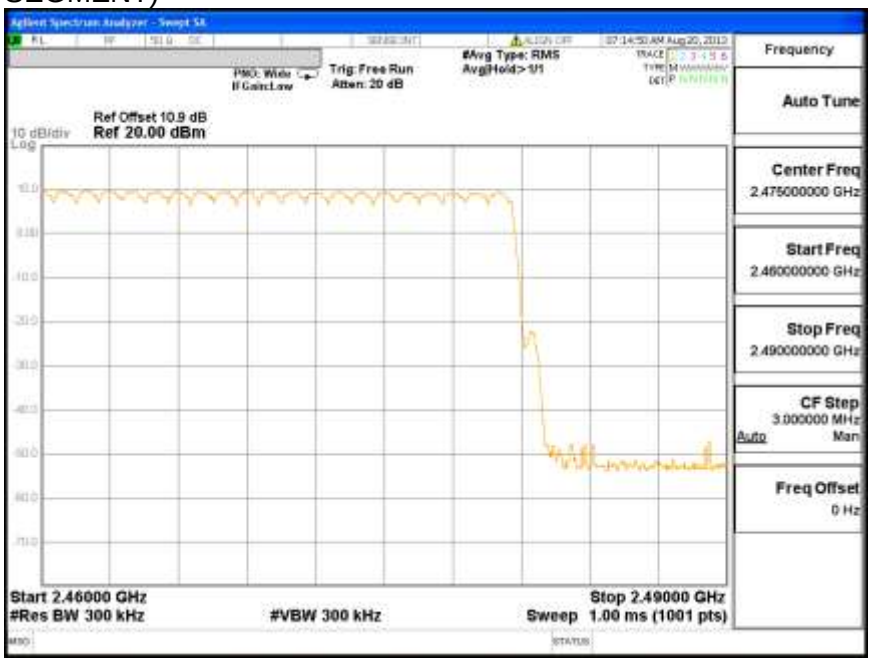


NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



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

GFSK

GFSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.390	32	0.125	0.4	-0.275
DH3	1.651	19	0.314	0.4	-0.086
DH5	2.899	13	0.377	0.4	-0.023

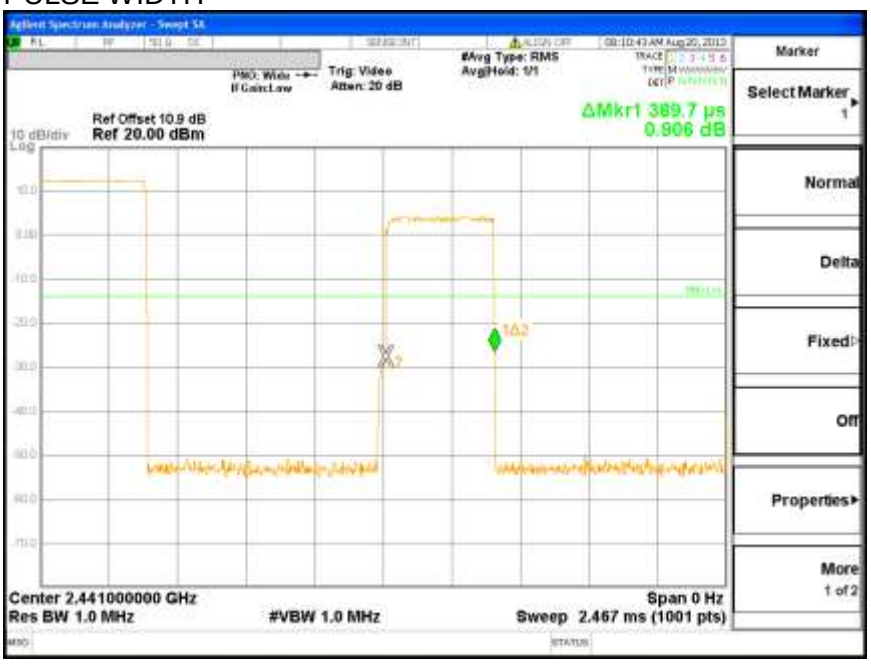
8PSK

8PSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.4060	30	0.122	0.4	-0.278
DH3	1.6650	17	0.283	0.4	-0.117
DH5	2.9050	13	0.378	0.4	-0.022

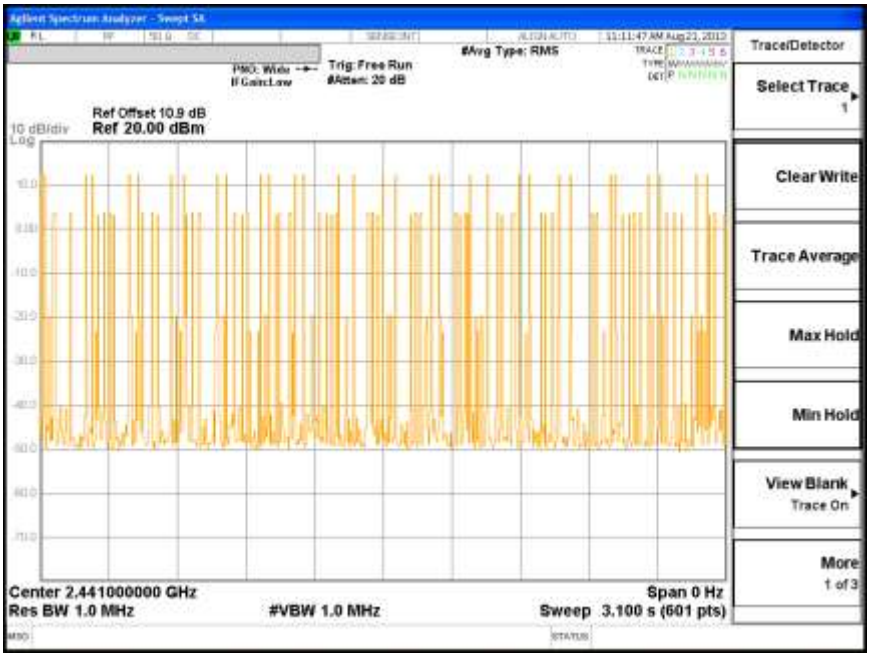
GFSK, DH1

PULSE WIDTH



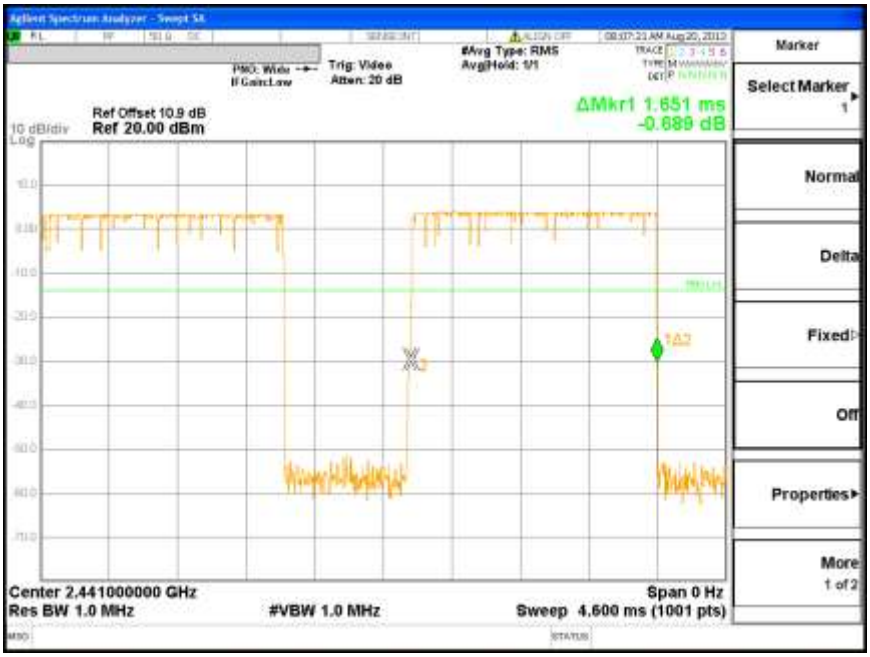
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES



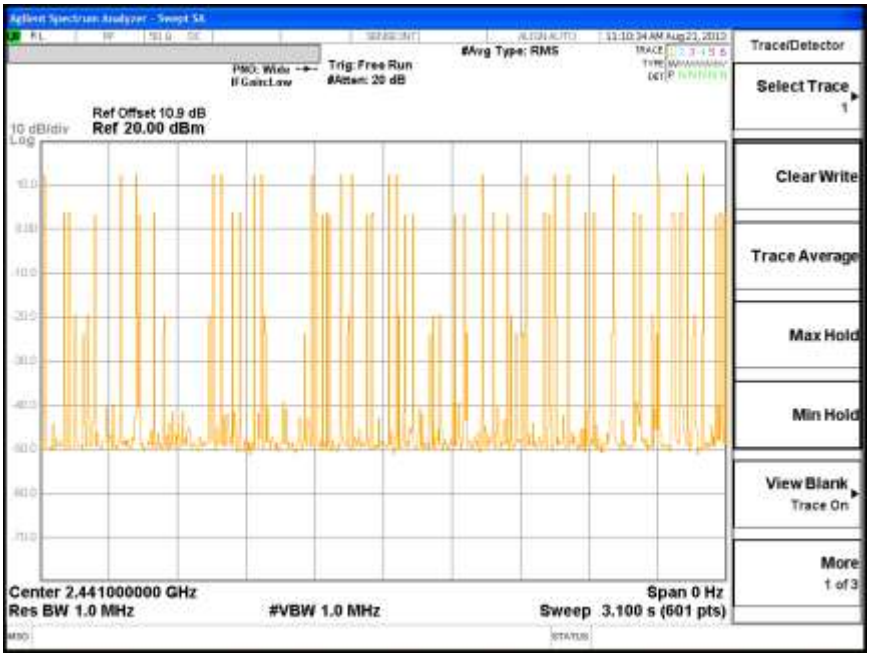
PULSE WIDTH GFSK DH3

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES

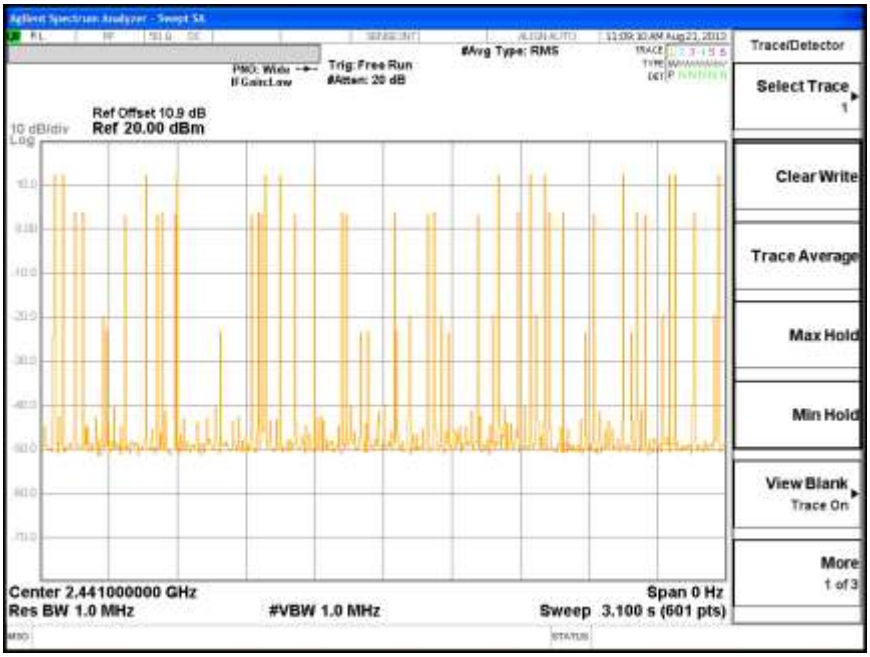


PULSE WIDTH GFSK DH5

PULSE WIDTH

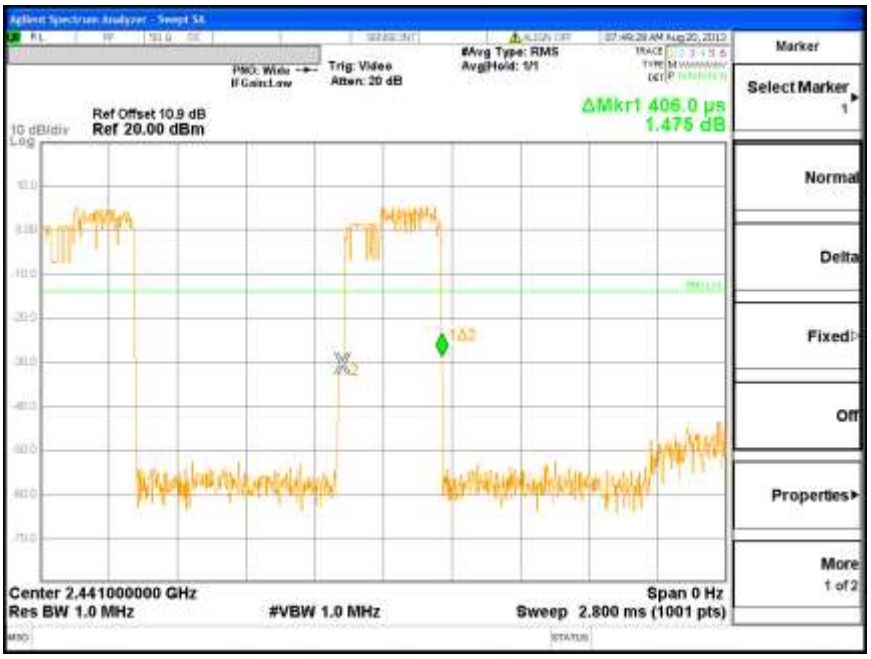
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES



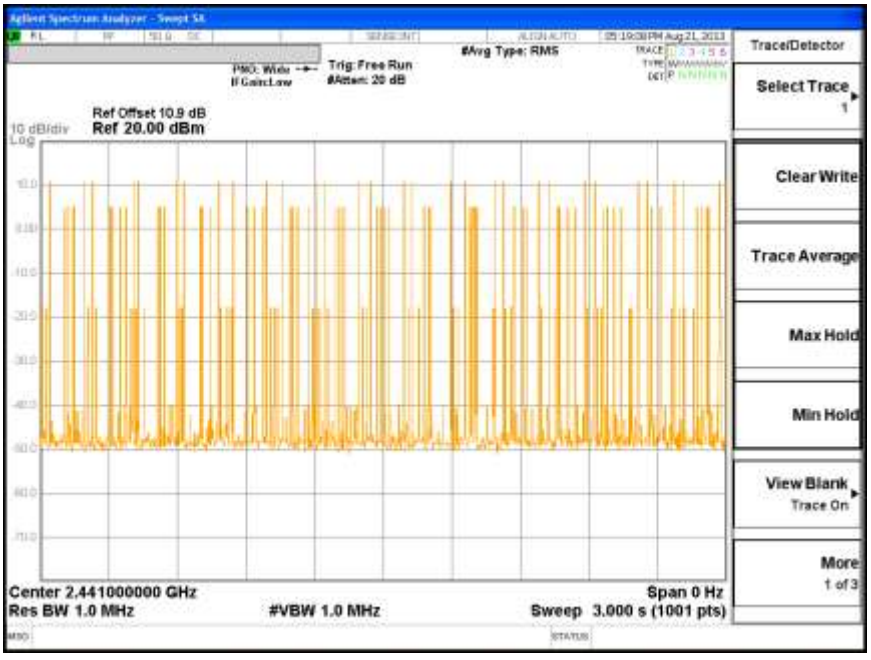
8PSK, DH1

PULSE WIDTH



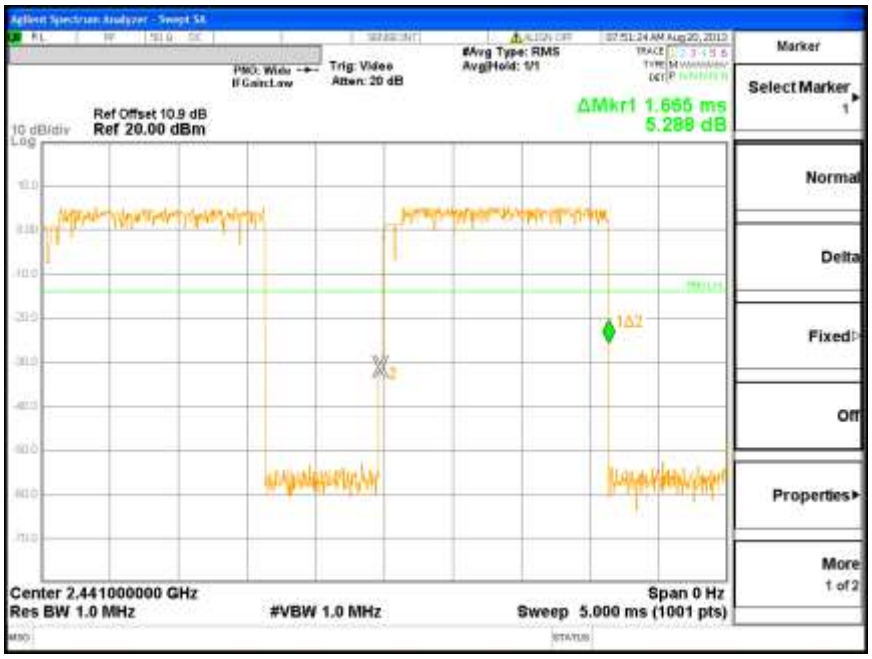
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES



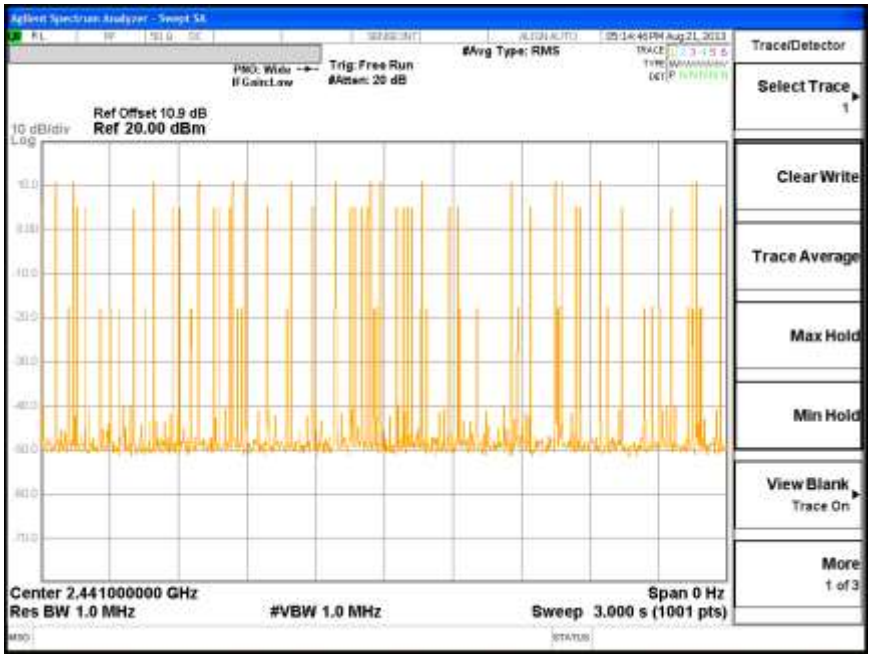
PULSE WIDTH 8PSK DH3

PULSE WIDTH



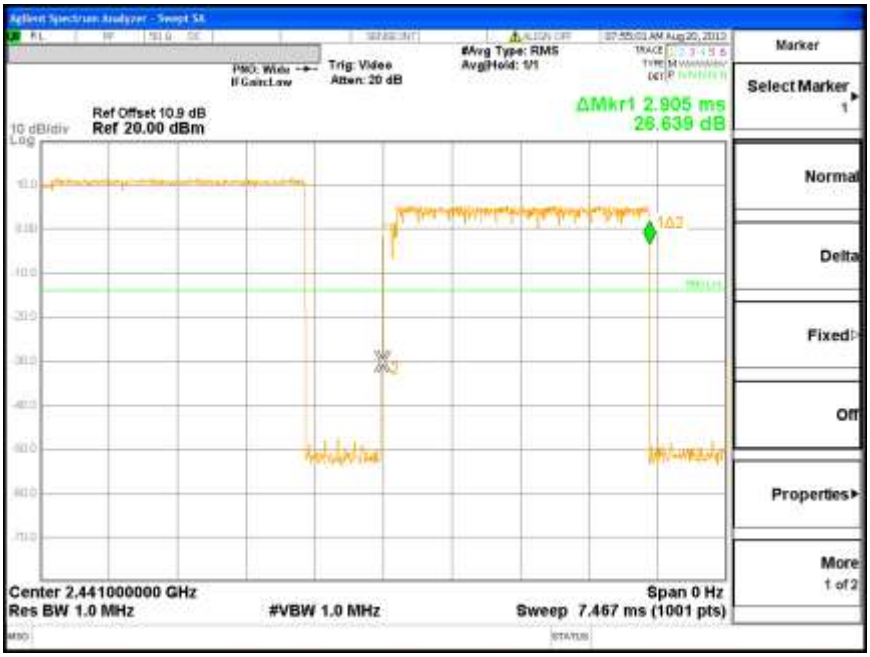
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES



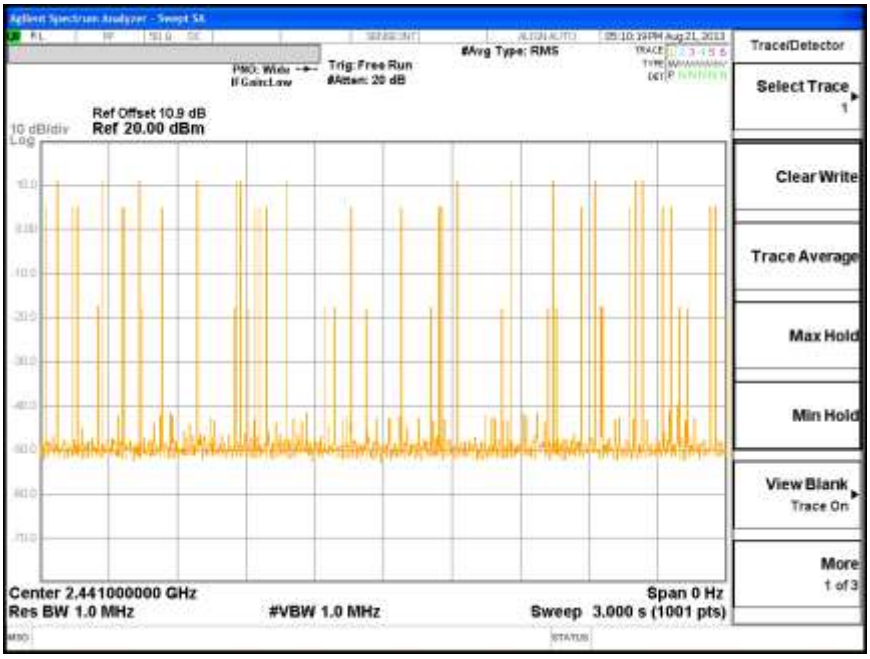
PULSE WIDTH 8PSK DH5

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES



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.

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 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	12.44	30	-17.56
Middle	2441	12.66	30	-17.34
High	2480	12.54	30	-17.46

QPSK

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.76	20.97	-9.21
Middle	2441	11.71	20.97	-9.26
High	2480	11.21	20.97	-9.76

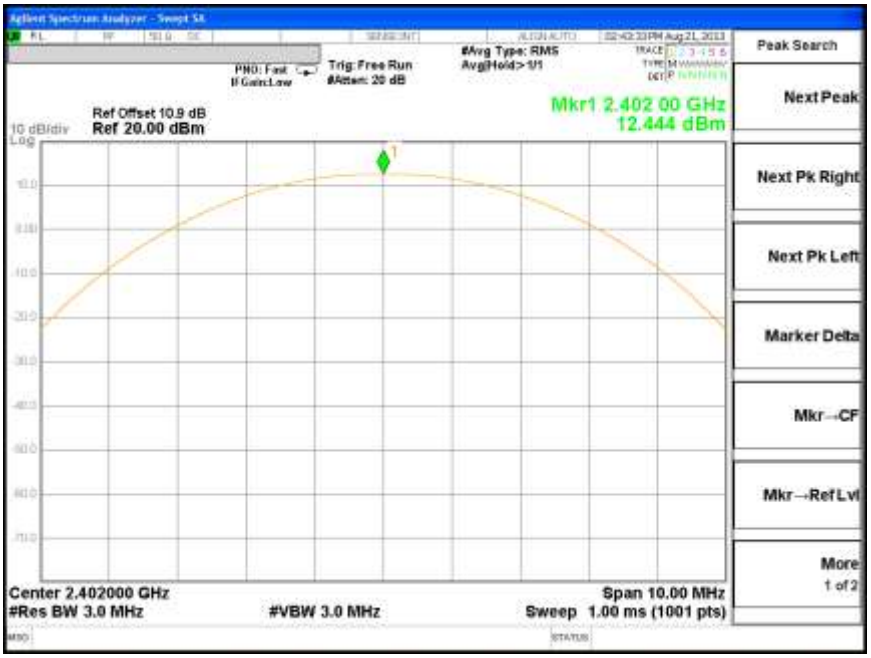
8PSK

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.00	20.97	-8.97
Middle	2441	12.02	20.97	-8.95
High	2480	11.52	20.97	-9.45

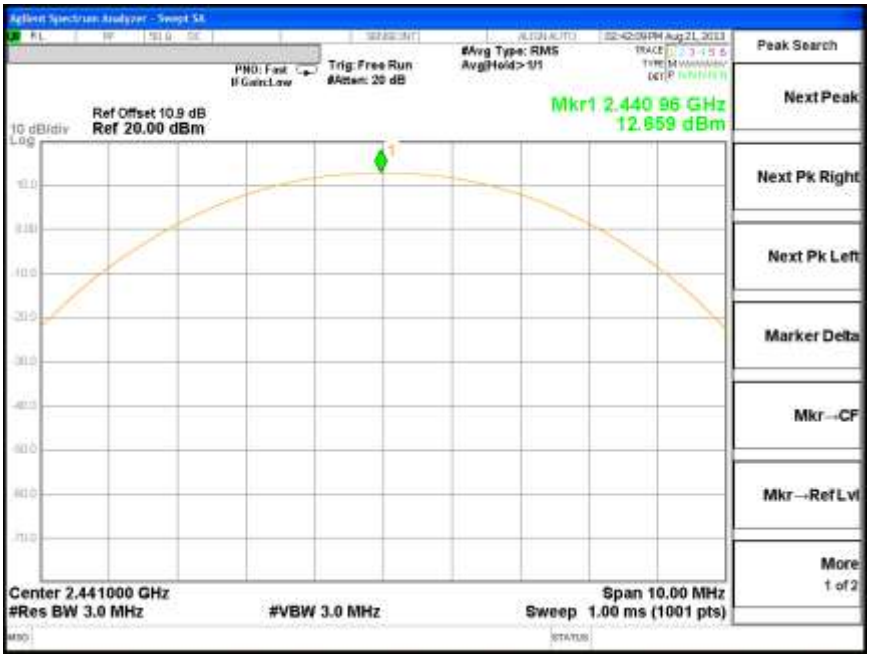
GFSK

OUTPUT POWER

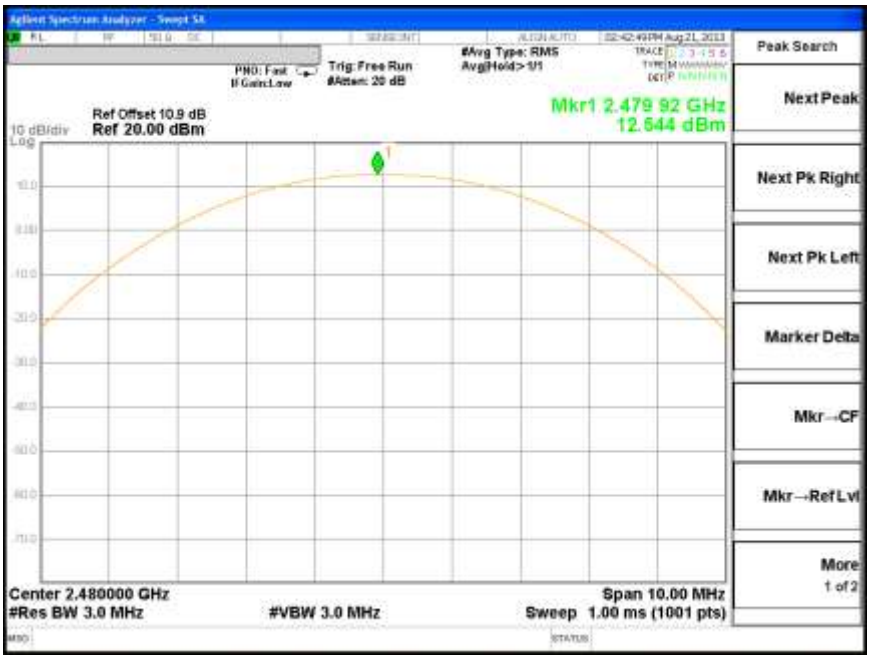
PEAK POWER LOW CH



PEAK POWER MID CH



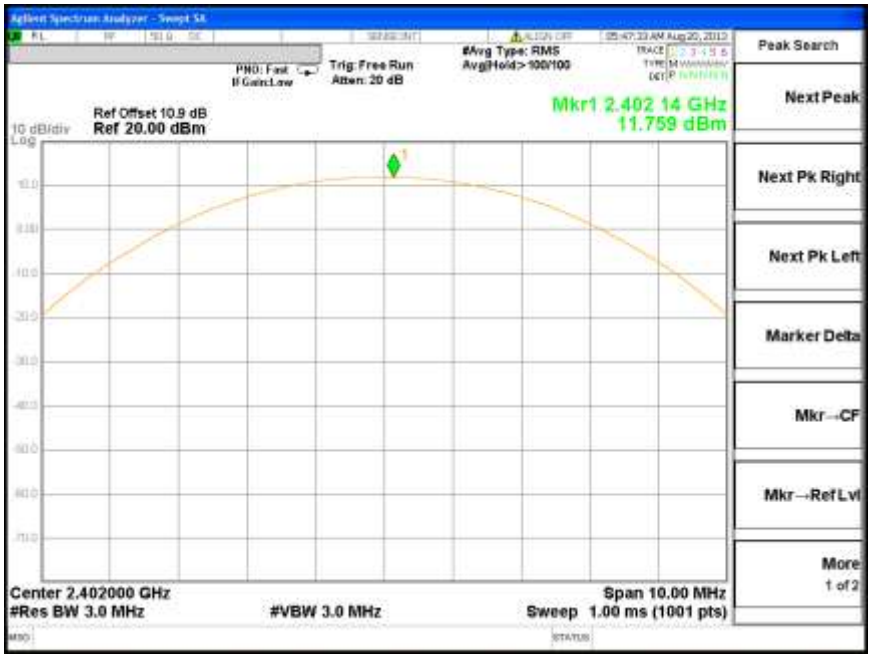
PEAK POWER HIGH CH



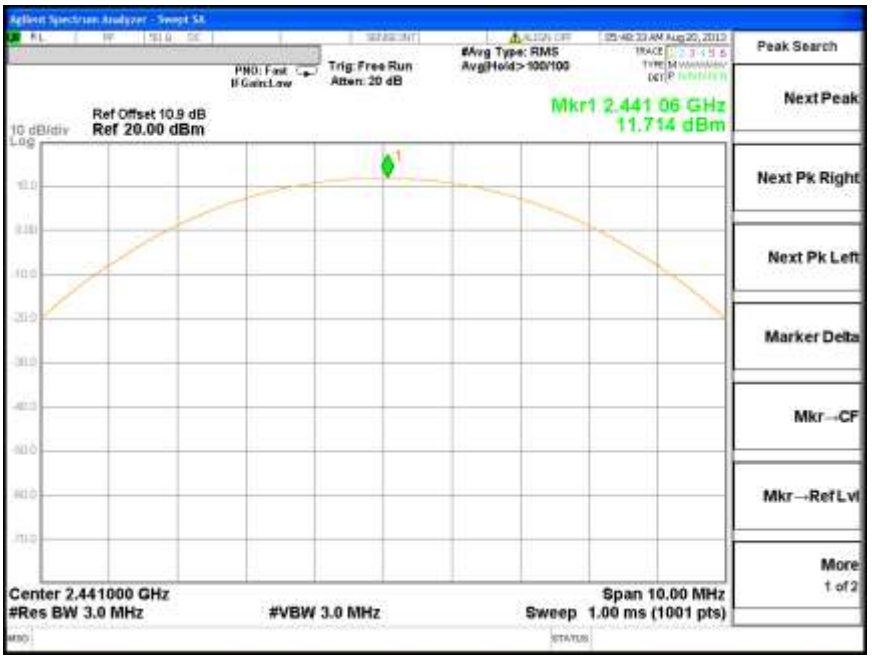
QPSK

OUTPUT POWER

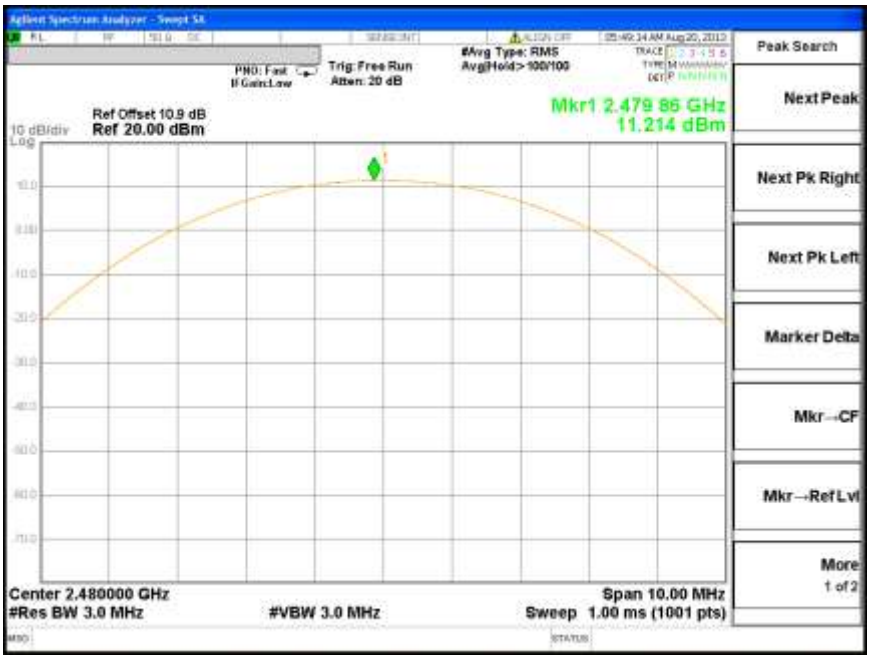
PEAK POWER LOW CH



PEAK POWER MID CH



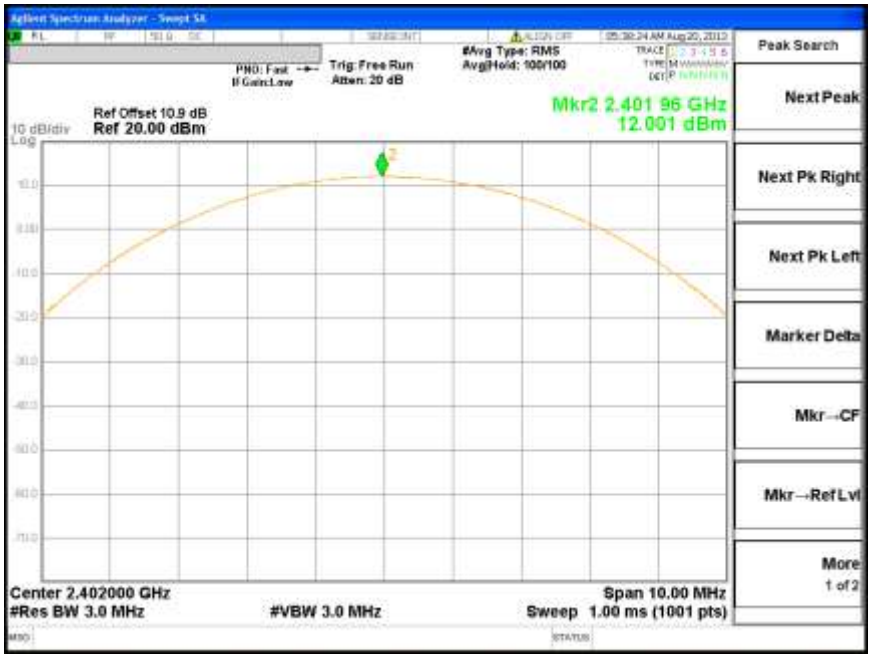
PEAK POWER HIGH CH



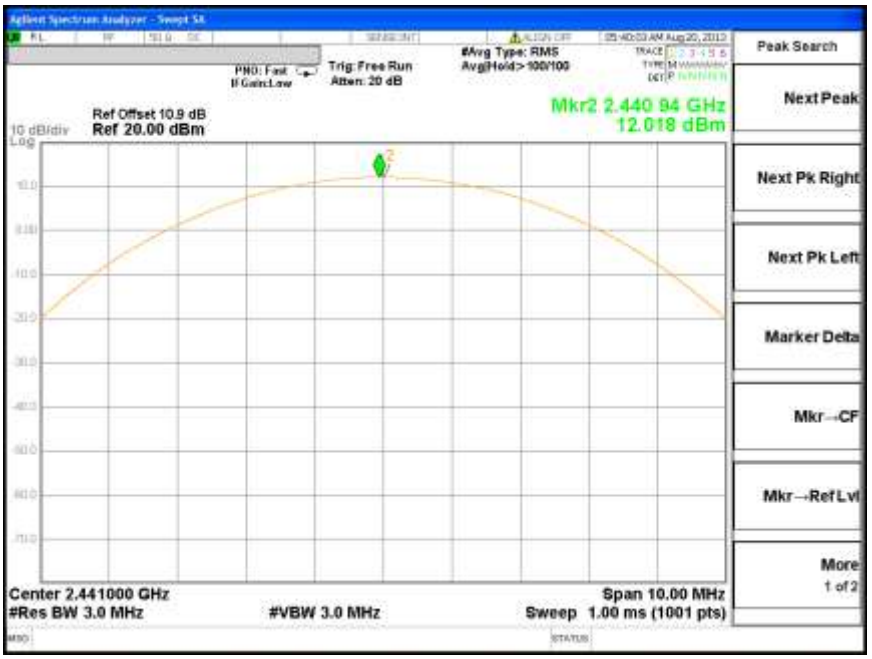
8PSK

OUTPUT POWER

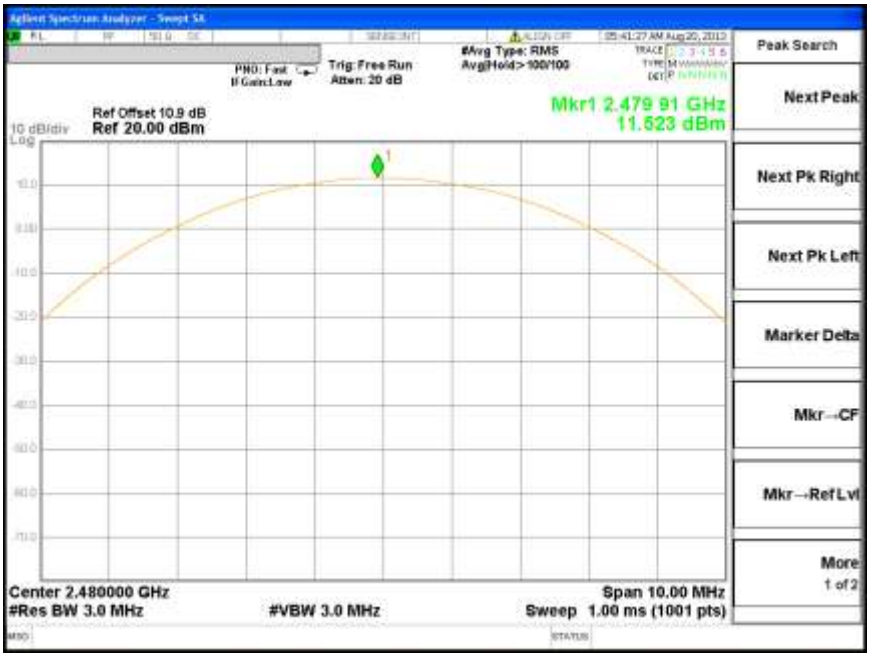
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH 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	11.90
Middle	2441	11.89
High	2480	11.85

QPSK

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.95
Middle	2441	9.91
High	2480	9.84

8PSK

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	10.00
Middle	2441	10.00
High	2480	9.92

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.

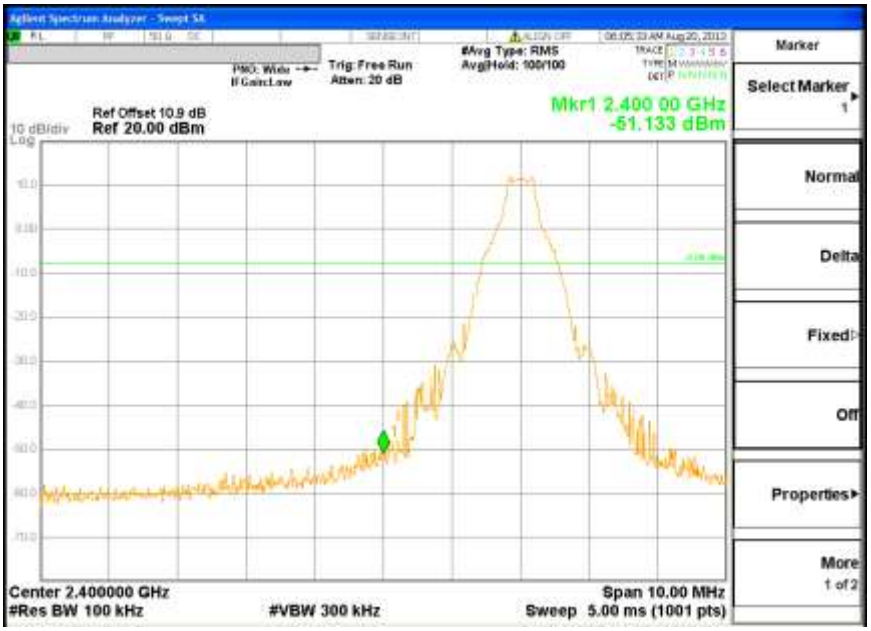
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

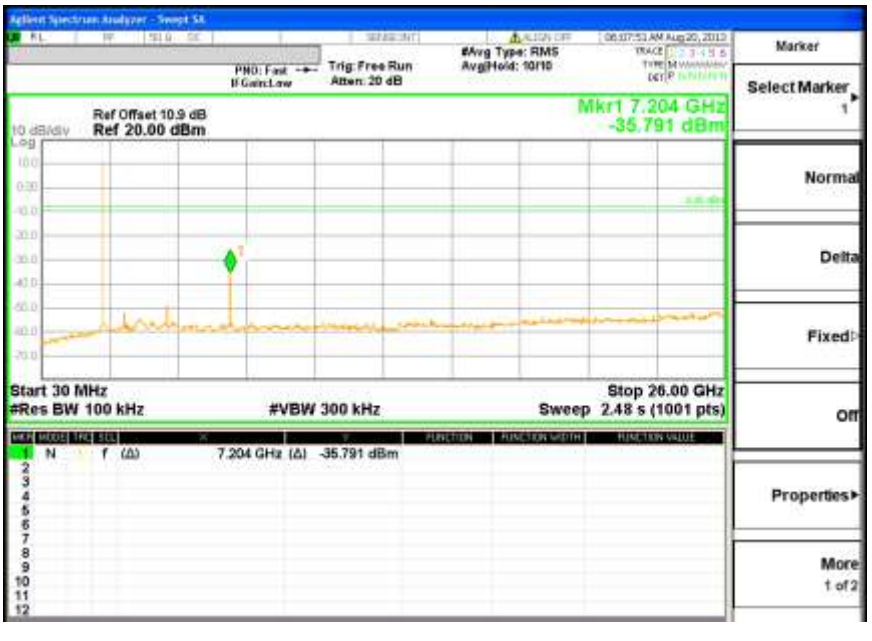
GFSK

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE

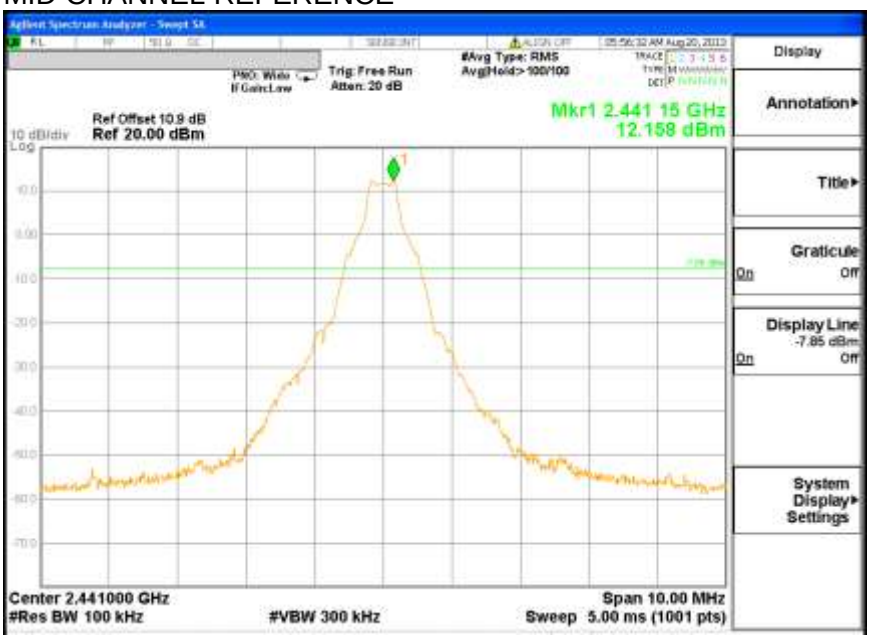


LOW CHANNEL SPURIOUS



SPURIOUS EMISSIONS, MID CHANNEL

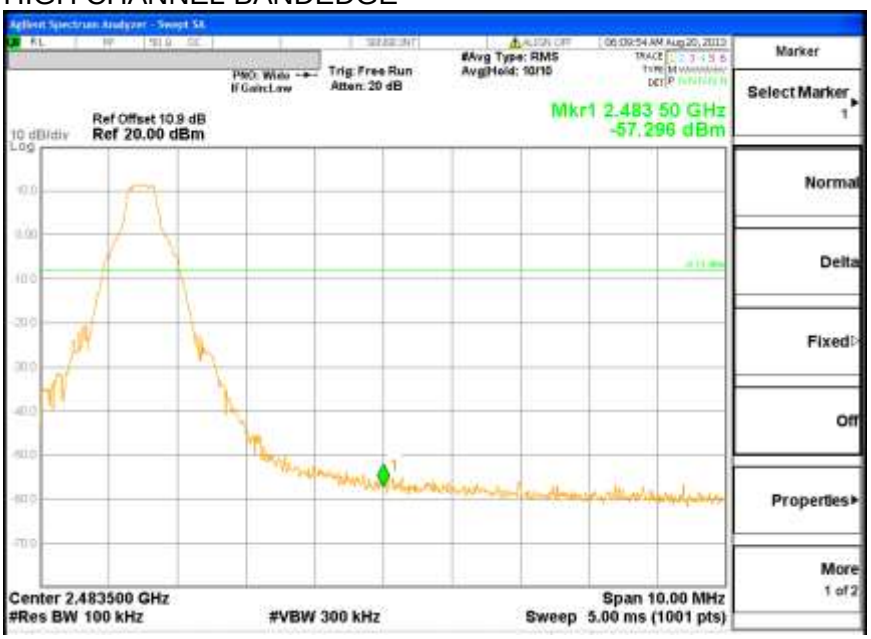
MID CHANNEL REFERENCE



MID CHANNEL SPURIOUS

SPURIOUS EMISSIONS, HIGH CHANNEL

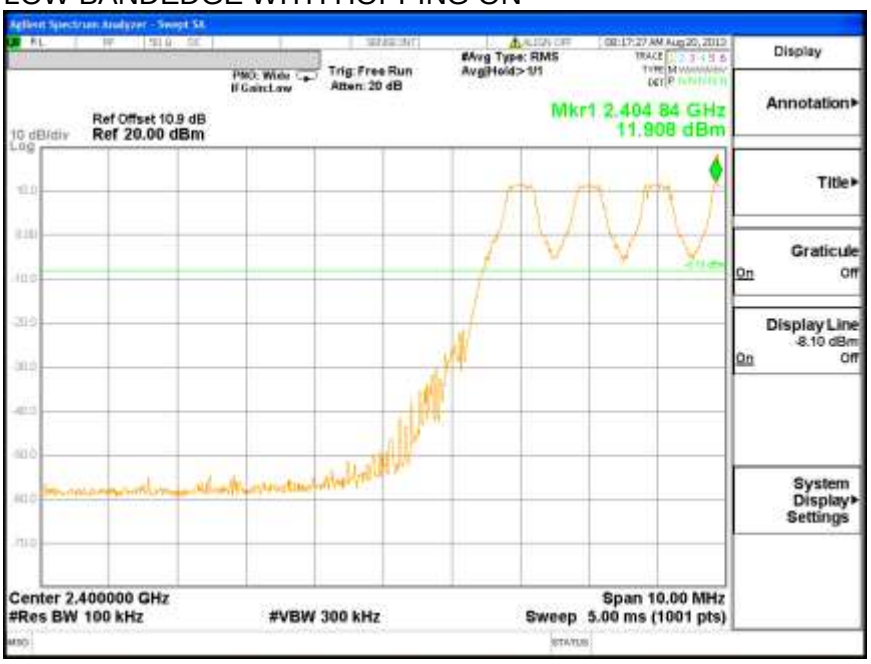
HIGH CHANNEL BANDEDGE



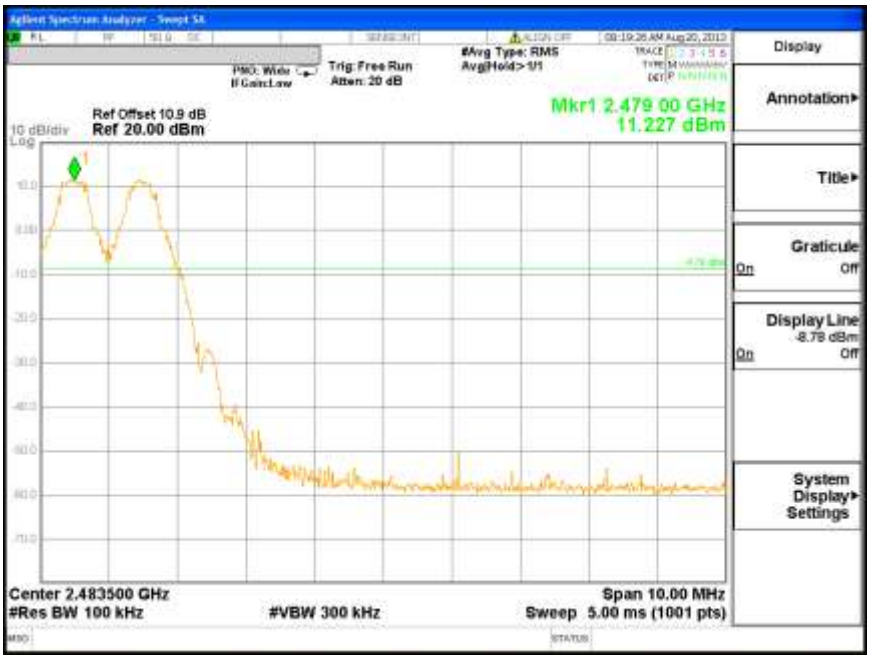
HIGH CHANNEL SPURIOUS

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON

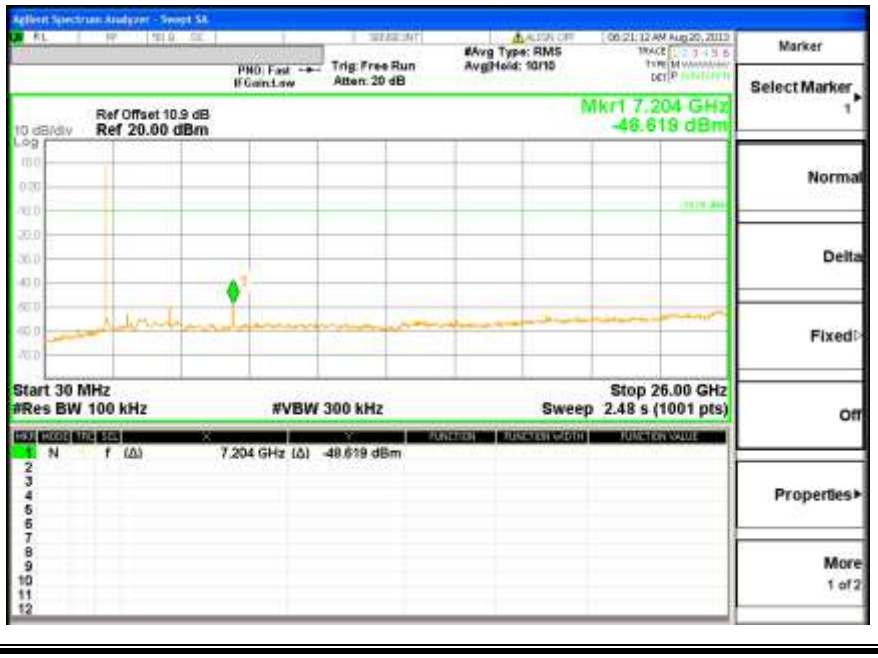


8PSK

SPURIOUS EMISSIONS, LOW CHANNEL

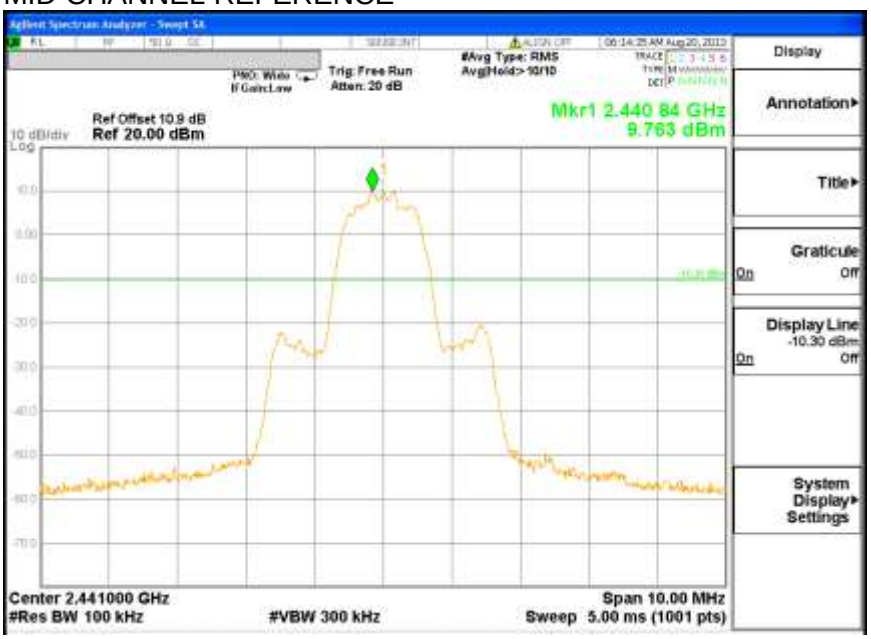
LOW CHANNEL BANDEDGE

LOW CHANNEL SPURIOUS

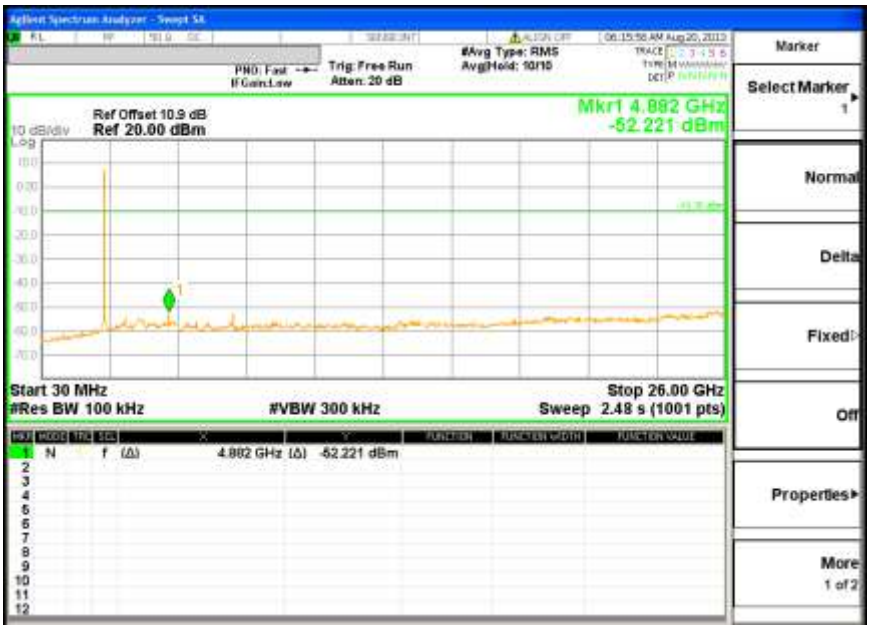


SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE

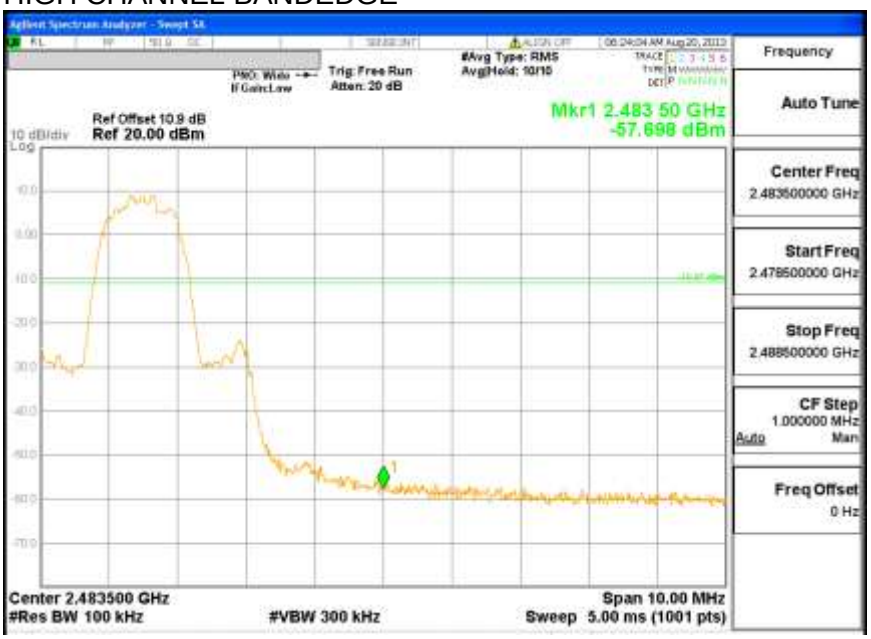


MID CHANNEL SPURIOUS

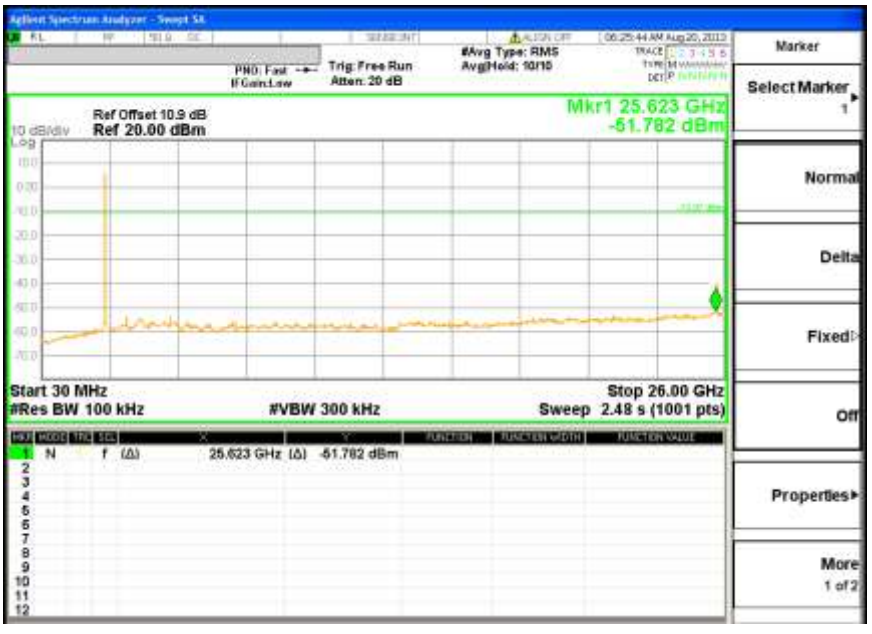


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE



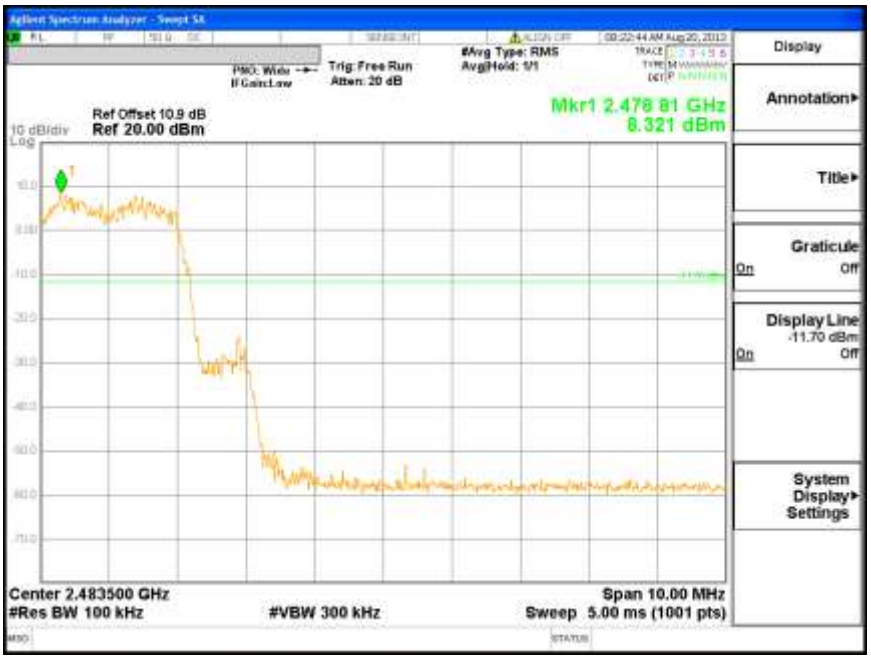
HIGH CHANNEL SPURIOUS



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.

RESULTS

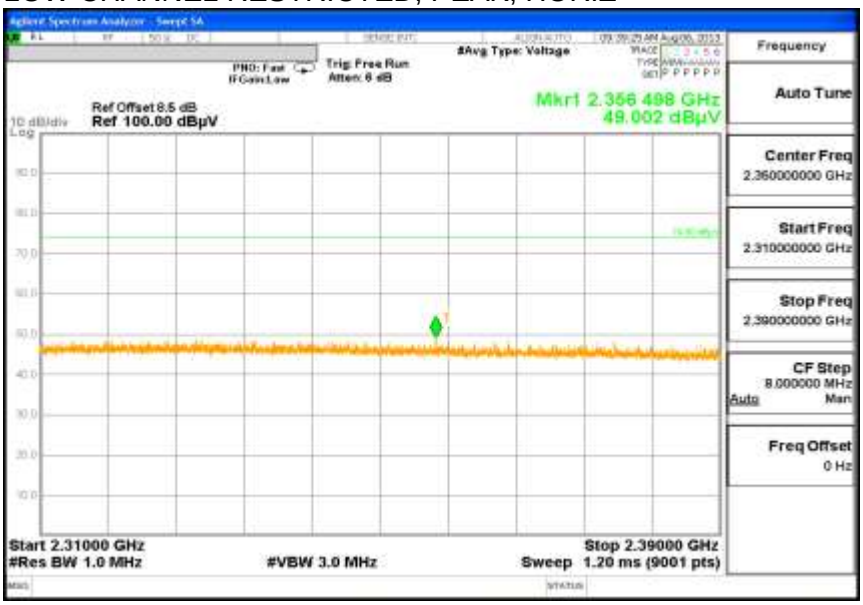
For the Bandedge measurement, there is no need for the average reading since the peak reading passed with the peak limit. The average reading = peak reading – 20*log (1/duty cycle), and the 20*log (1/duty cycle) is greater than 20dB.

8.2. TRANSMITTER ABOVE 1 GHz

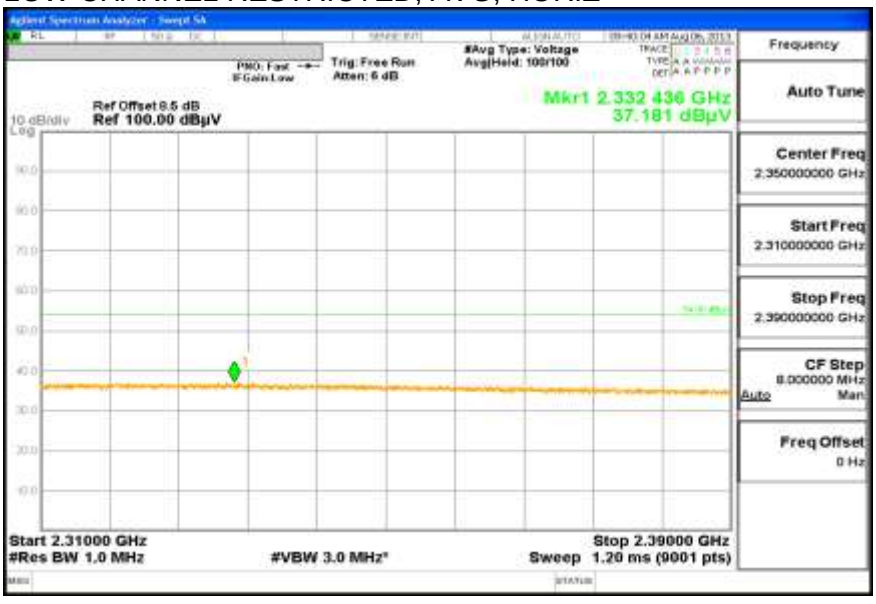
8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

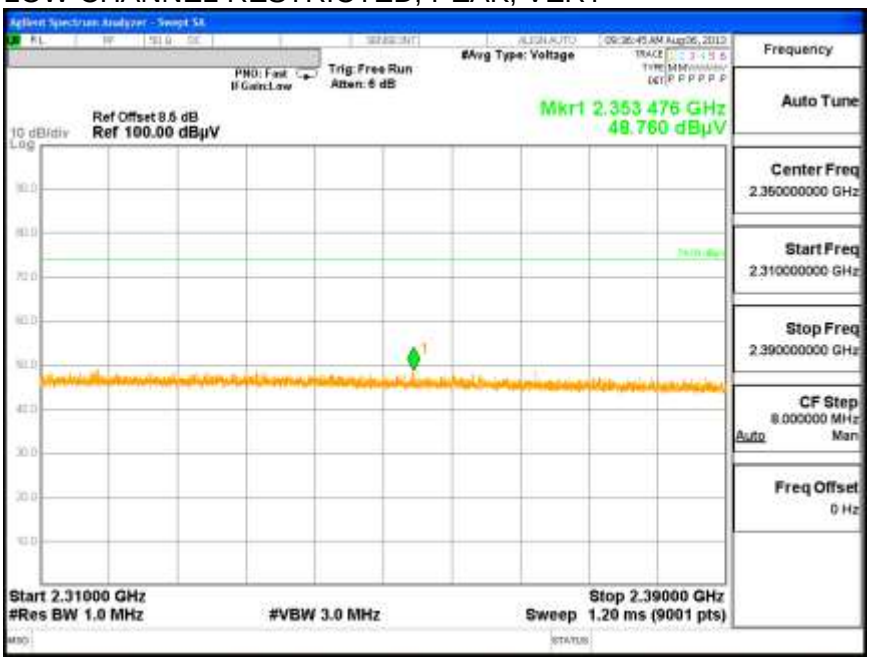
LOW CHANNEL RESTRICTED, PEAK, HORIZ



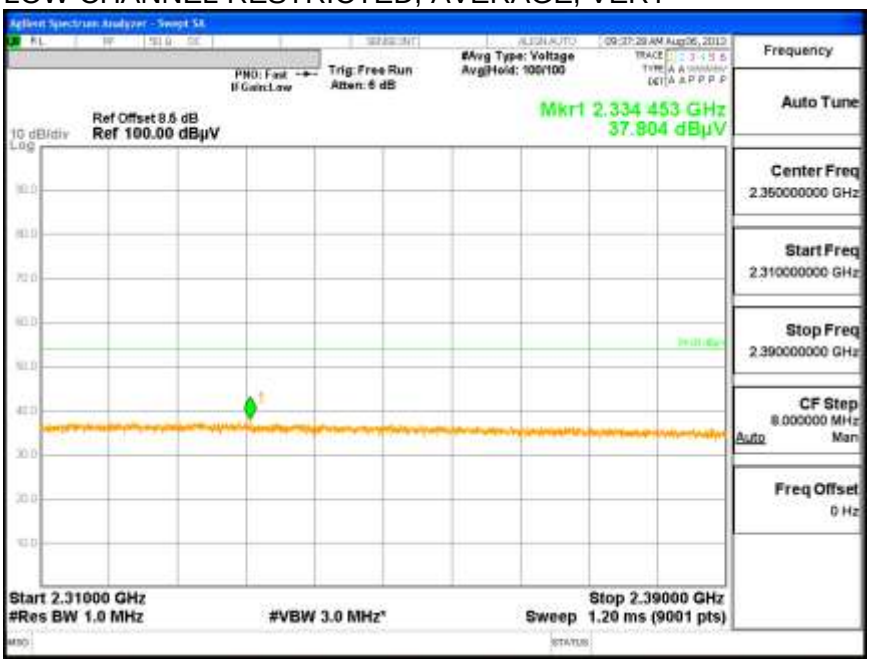
LOW CHANNEL RESTRICTED, AVG, HORIZ



LOW CHANNEL RESTRICTED, PEAK, VERT

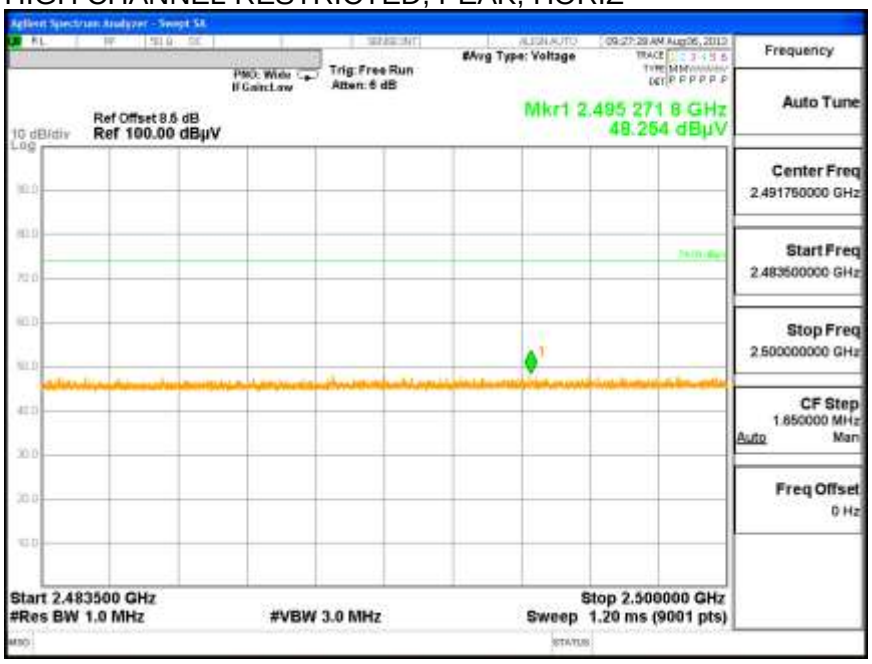


LOW CHANNEL RESTRICTED, AVERAGE, VERT

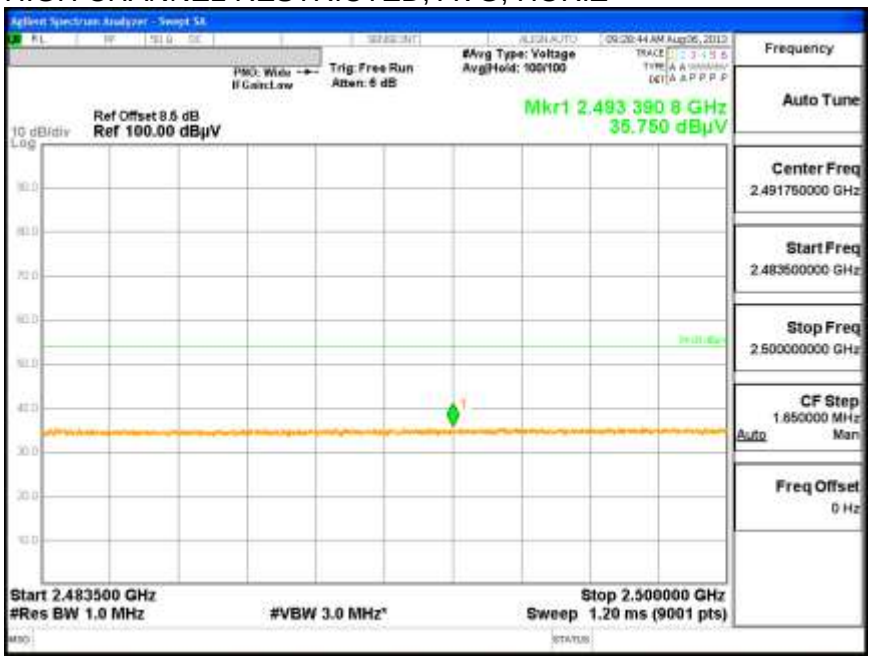


RESTRICTED BANDEDGE (HIGH CHANNEL)

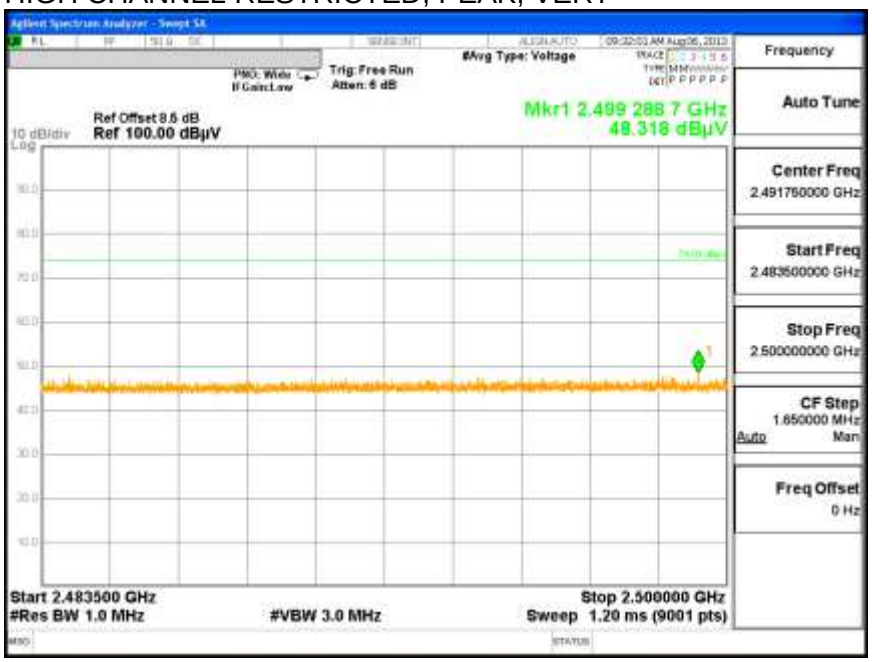
HIGH CHANNEL RESTRICTED, PEAK, HORIZ



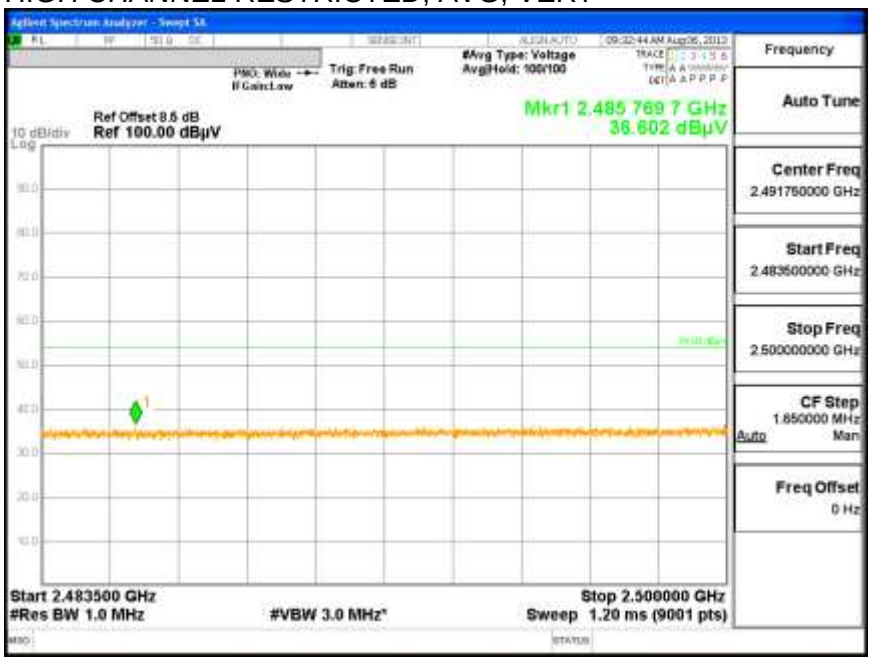
HIGH CHANNEL RESTRICTED, AVG, HORIZ



HIGH CHANNEL RESTRICTED, PEAK, VERT



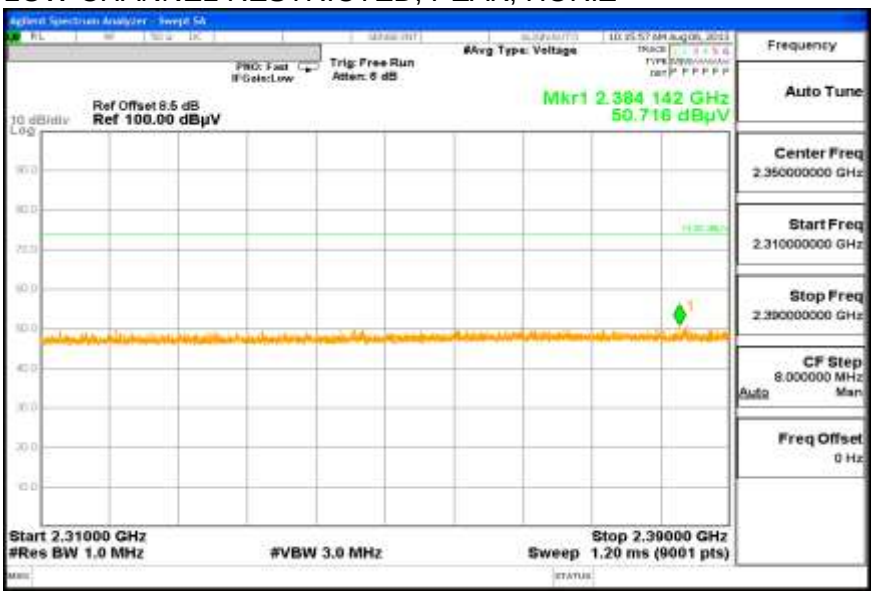
HIGH CHANNEL RESTRICTED, AVG, VERT



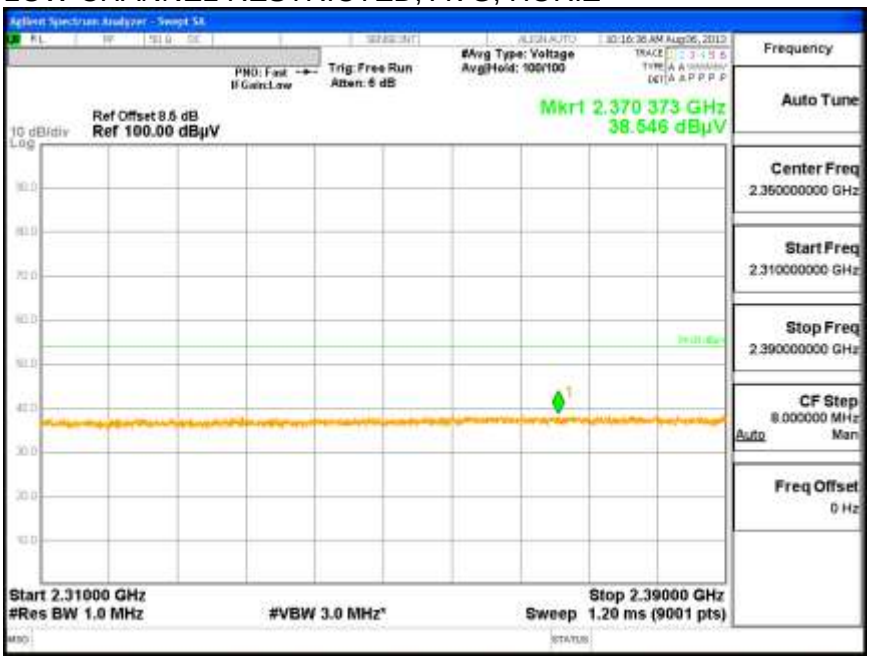
8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

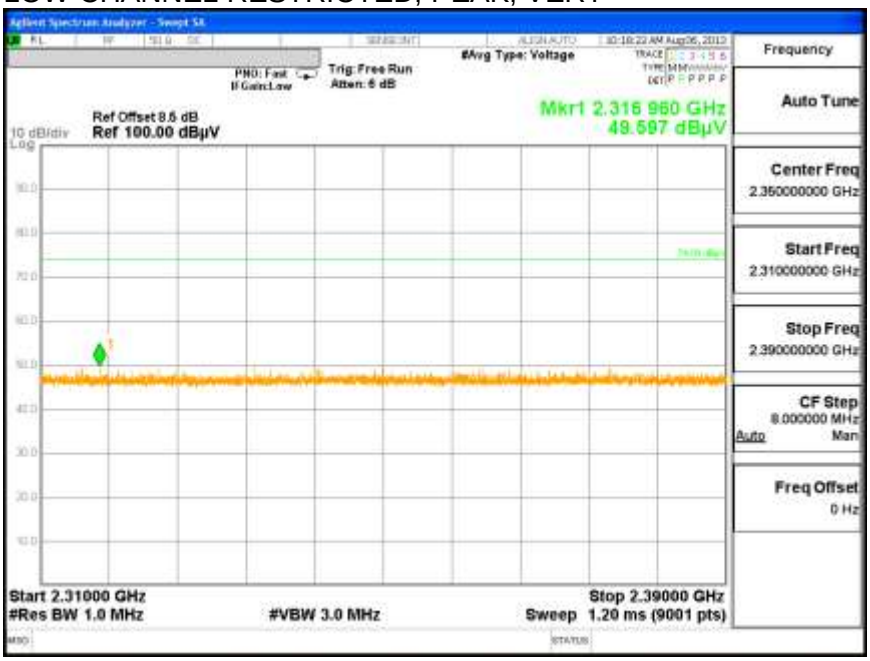
LOW CHANNEL RESTRICTED, PEAK, HORIZ



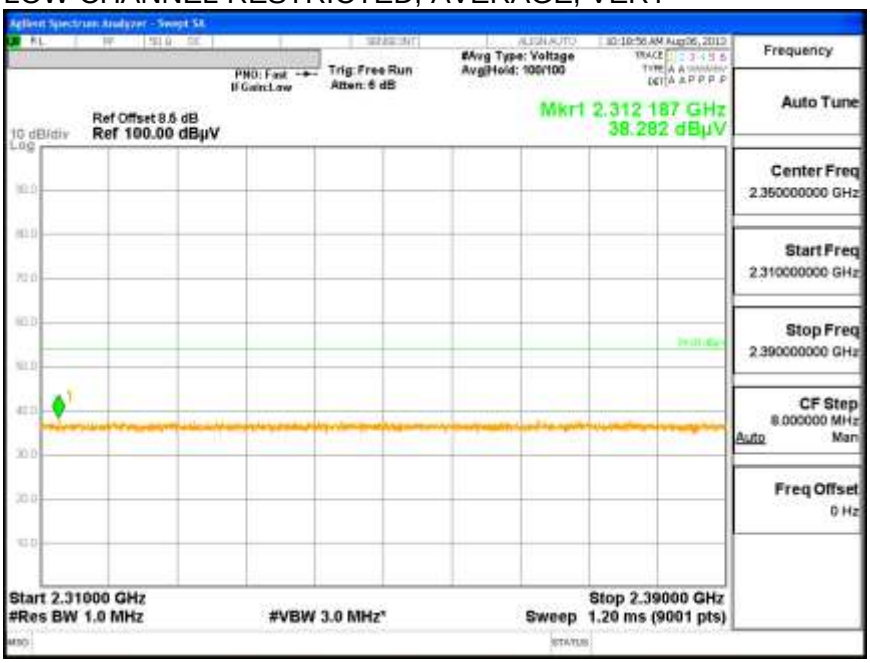
LOW CHANNEL RESTRICTED, AVG, HORIZ



LOW CHANNEL RESTRICTED, PEAK, VERT

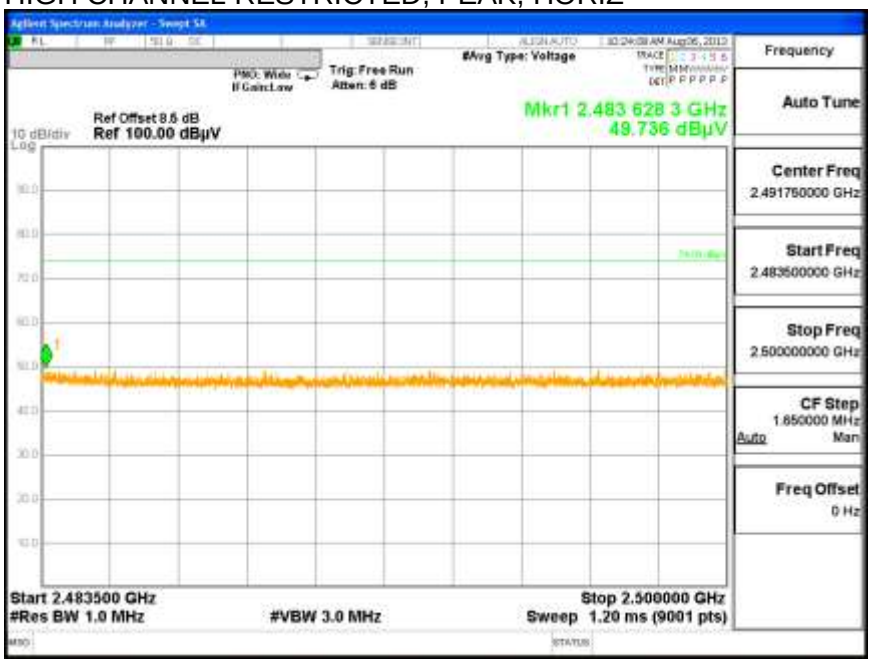


LOW CHANNEL RESTRICTED, AVERAGE, VERT

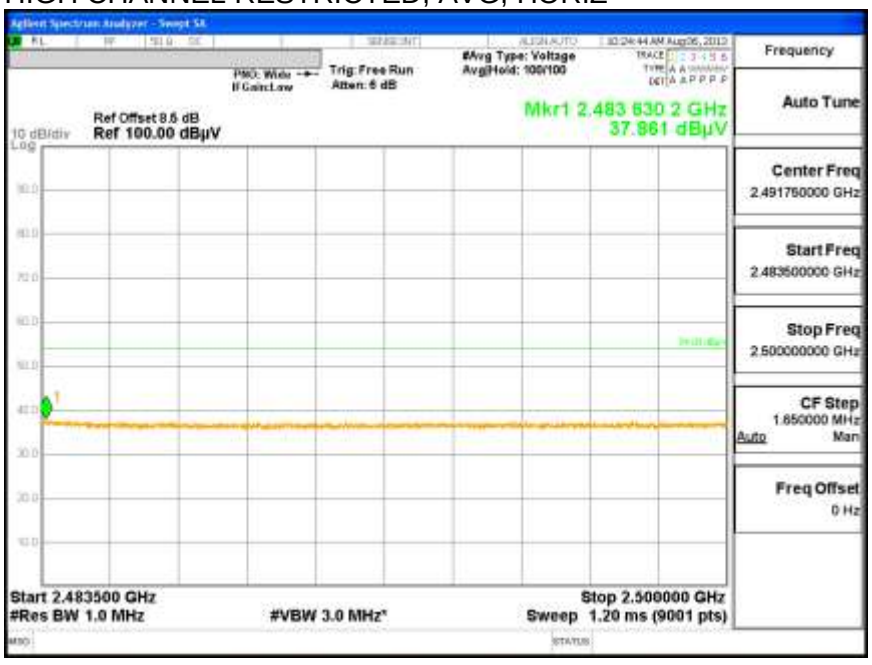


RESTRICTED BANDEDGE (HIGH CHANNEL)

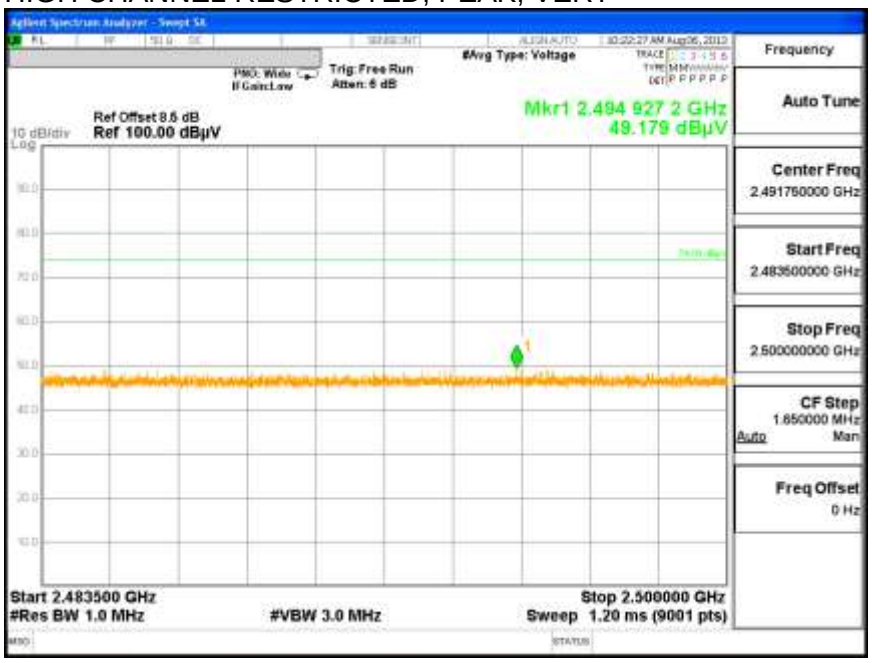
HIGH CHANNEL RESTRICTED, PEAK, HORIZ



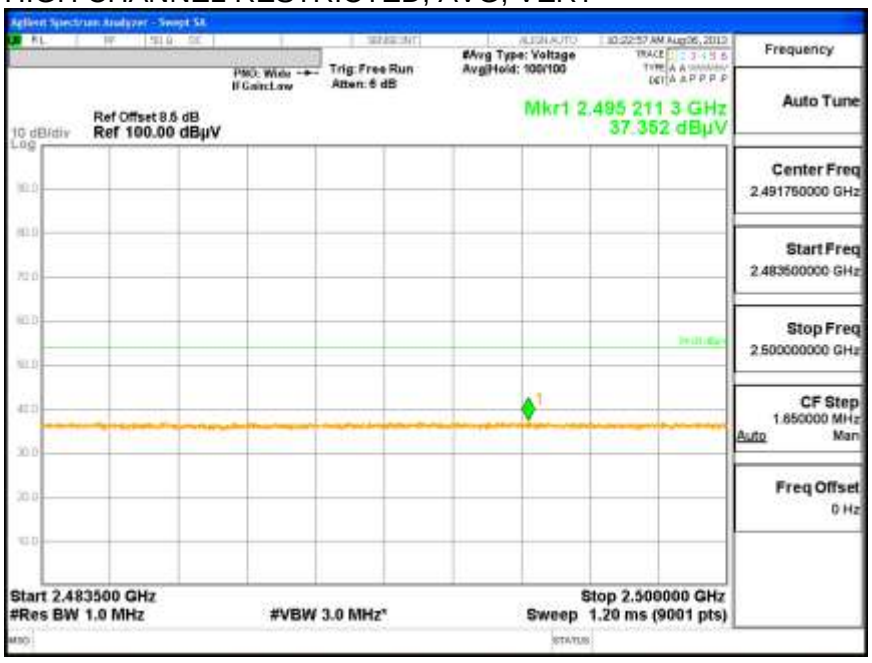
HIGH CHANNEL RESTRICTED, AVG, HORIZ



HIGH CHANNEL RESTRICTED, PEAK, VERT



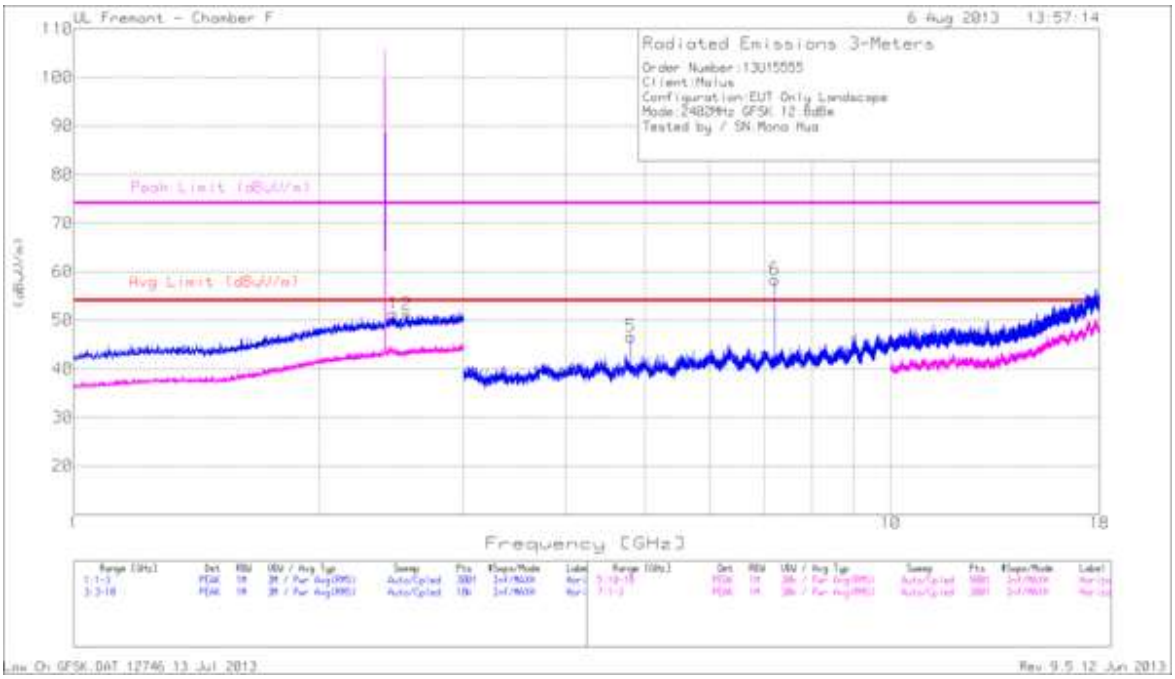
HIGH CHANNEL RESTRICTED, AVG, VERT



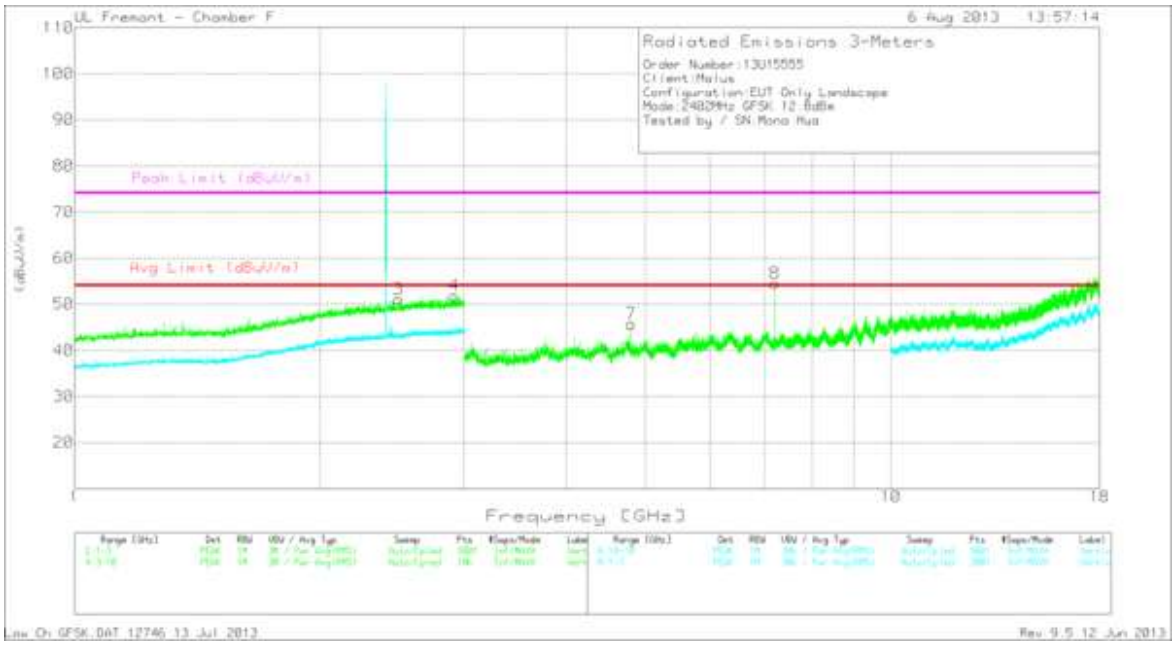
HARMONICS AND SPURIOUS EMISSIONS GFSK

LOW CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



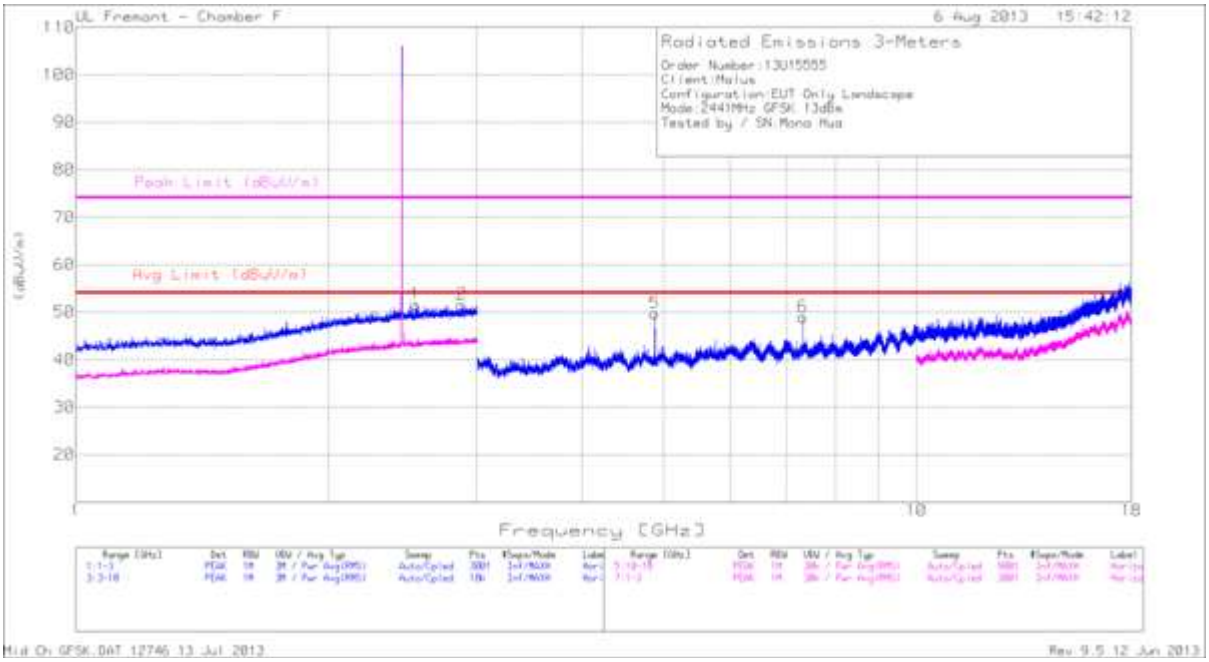
DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	T344 Ant Factor [dB/m]	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
*2.46	43.09	PK	32.4	-24.2	51.29					100	H
*2.556	42.64	PK	32.5	-24	51.14					100	H
2.494	42.82	PK	32.4	-24.2	51.02	53.97	-2.95	74	-22.98	300	V
*2.917	42.66	PK	33	-23.8	51.86					201	V
4.804	43.81	PK	34.4	-31.6	46.61	53.97	-7.36	74	-27.39	400	H
*7.206	45.36	AVG	35.9	-29.4	51.86					232	H
4.805	42.89	PK	34.4	-31.6	45.69	53.97	-8.28	74	-28.31	201	V
*7.207	41.52	AVG	35.9	-29.4	48.02					300	V

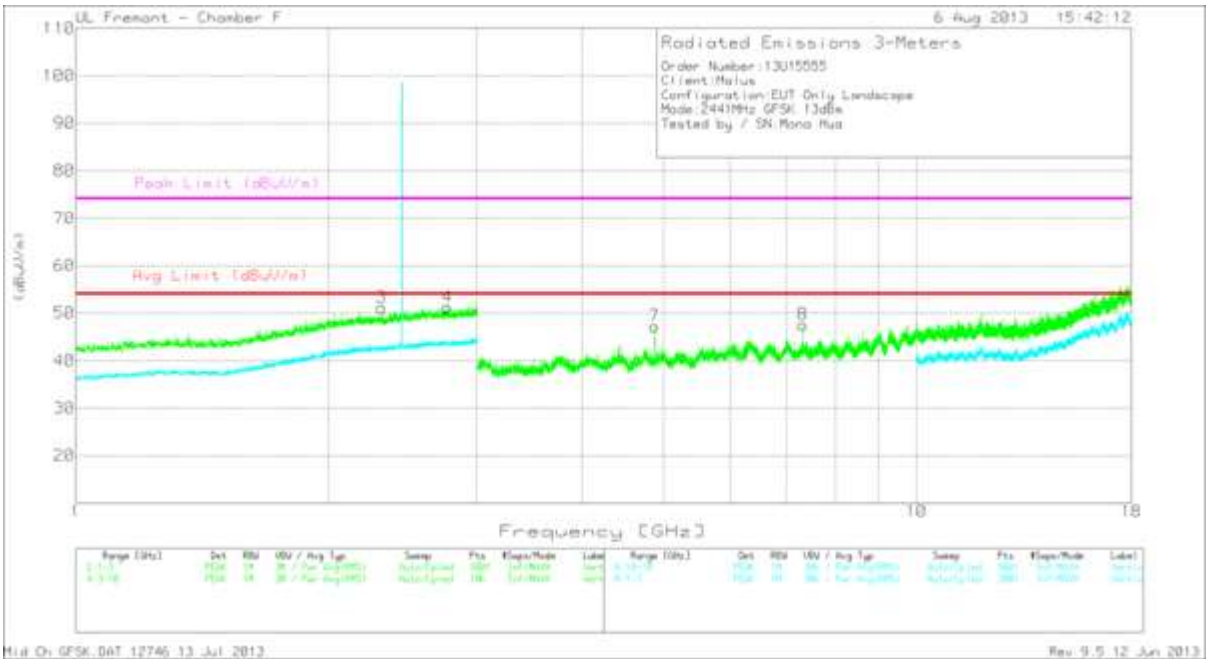
*Not in Restricted Band

MID CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



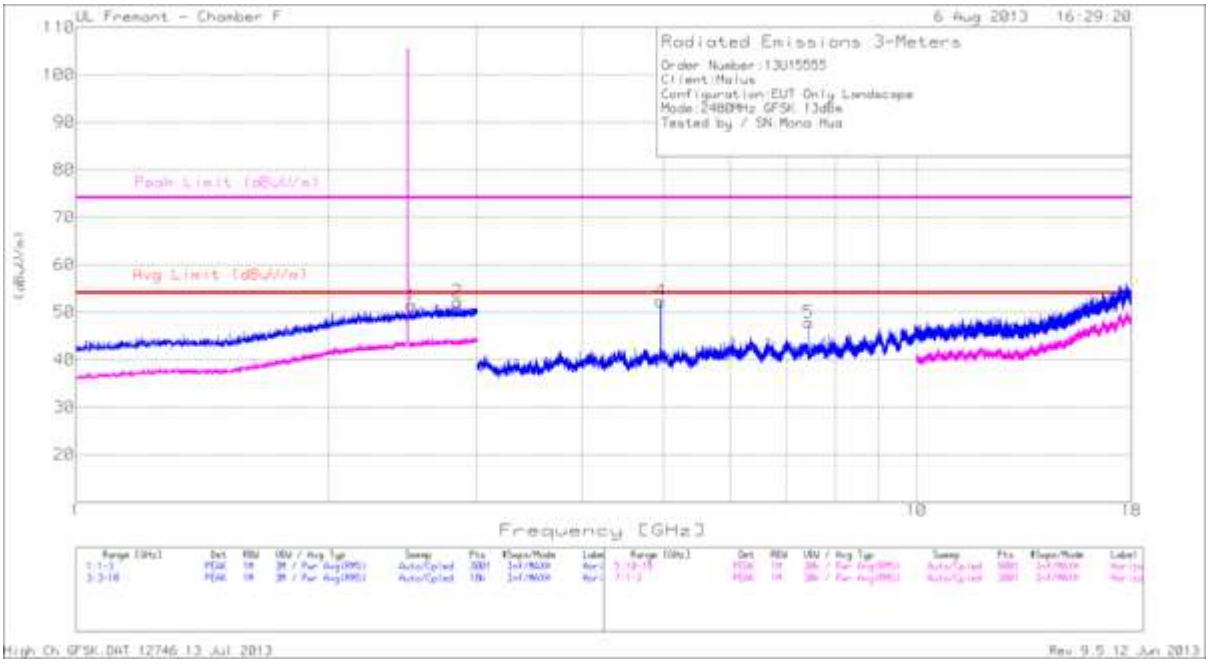
DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	T344 Ant Factor [dB/m]	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
*2.535	43.1	PK	32.5	-24	51.6					401	H
2.879	42.42	PK	33	-23.8	51.62	53.97	-2.35	74	-22.38	401	H
2.31	43.13	PK	32.4	-24.4	51.13	53.97	-2.84	74	-22.87	400	V
2.766	42.23	PK	32.9	-23.9	51.23	53.97	-2.74	74	-22.77	201	V
4.882	46.95	AVG	34.3	-31.5	49.75	53.97	-4.22	74	-24.25	305	H
7.323	36.15	AVG	35.9	-28.4	43.65	53.97	-10.32	74	-30.35	294	H
4.882	44.37	PK	34.3	-31.5	47.17	53.97	-6.8	74	-26.83	201	V
7.323	40.04	PK	35.9	-28.4	47.54	53.97	-6.43	74	-26.46	201	V

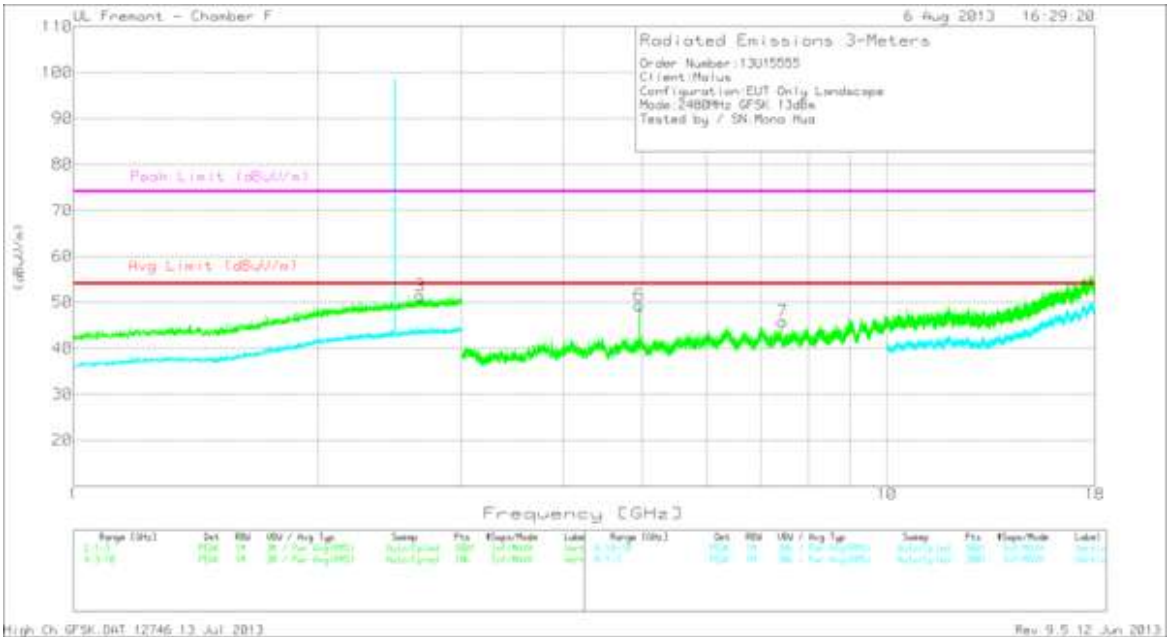
*Not in Restricted Band

HIGH CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



DATA

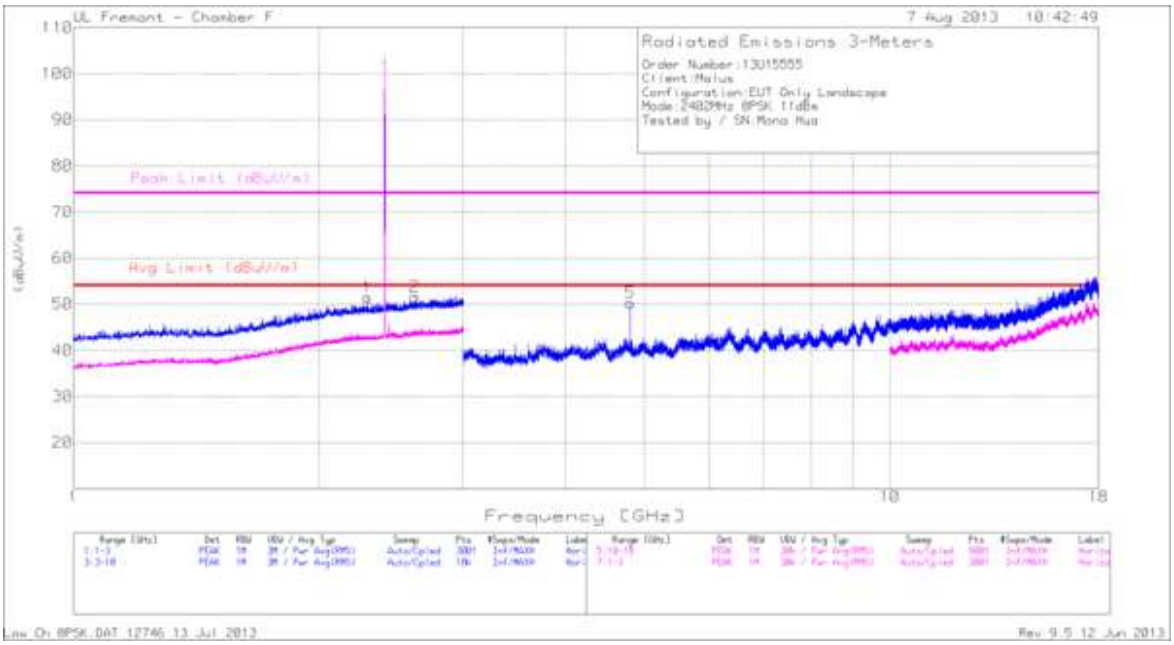
Frequency (GHz)	Meter Reading (dBuV)	Det	T344 Ant Factor [dB/m]	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
*2.51	43.08	PK	32.4	-24.1	51.38					401	H
2.847	43.12	PK	33	-23.9	52.22	53.97	-1.75	74	-21.78	100	H
*2.666	42.61	PK	32.7	-23.9	51.41					201	V
4.96	41.71	AVG	34.3	-31.4	44.61	53.97	-9.36	74	-29.39	357	H
7.44	41.14	PK	35.9	-29.2	47.84	53.97	-6.13	74	-26.16	201	H
4.961	46.41	PK	34.3	-31.4	49.31	53.97	-4.66	74	-24.69	201	V
7.441	39.1	PK	35.9	-29.2	45.8	53.97	-8.17	74	-28.2	301	V

*Not in Restricted Band

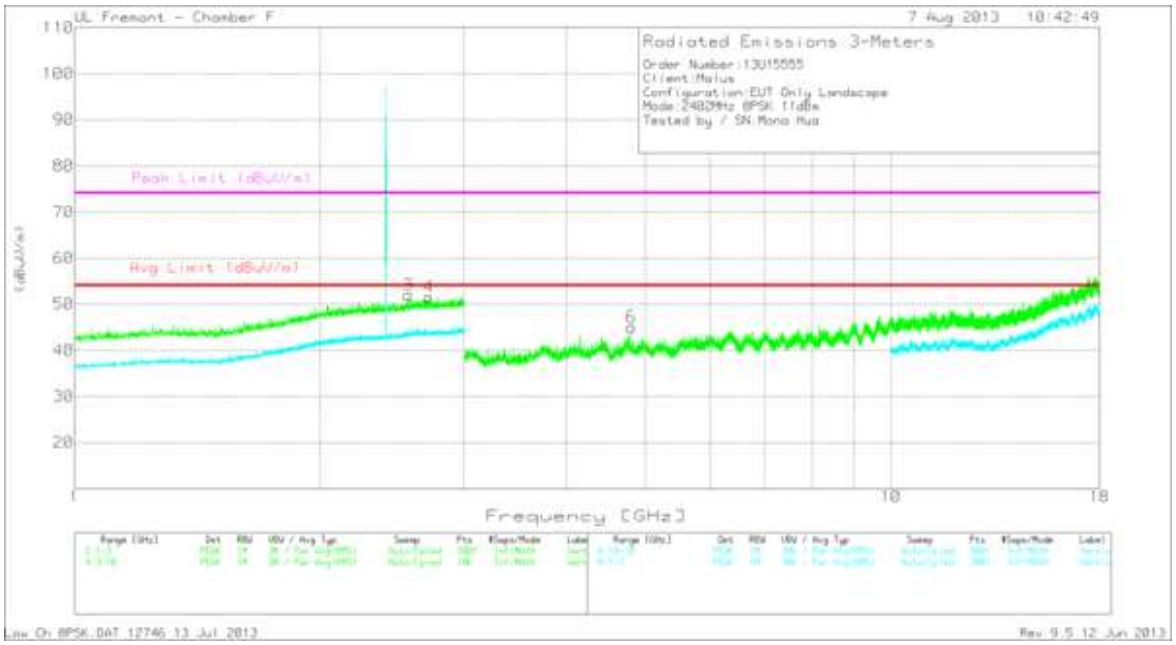
HARMONICS AND SPURIOUS EMISSIONS 8PSK

LOW CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



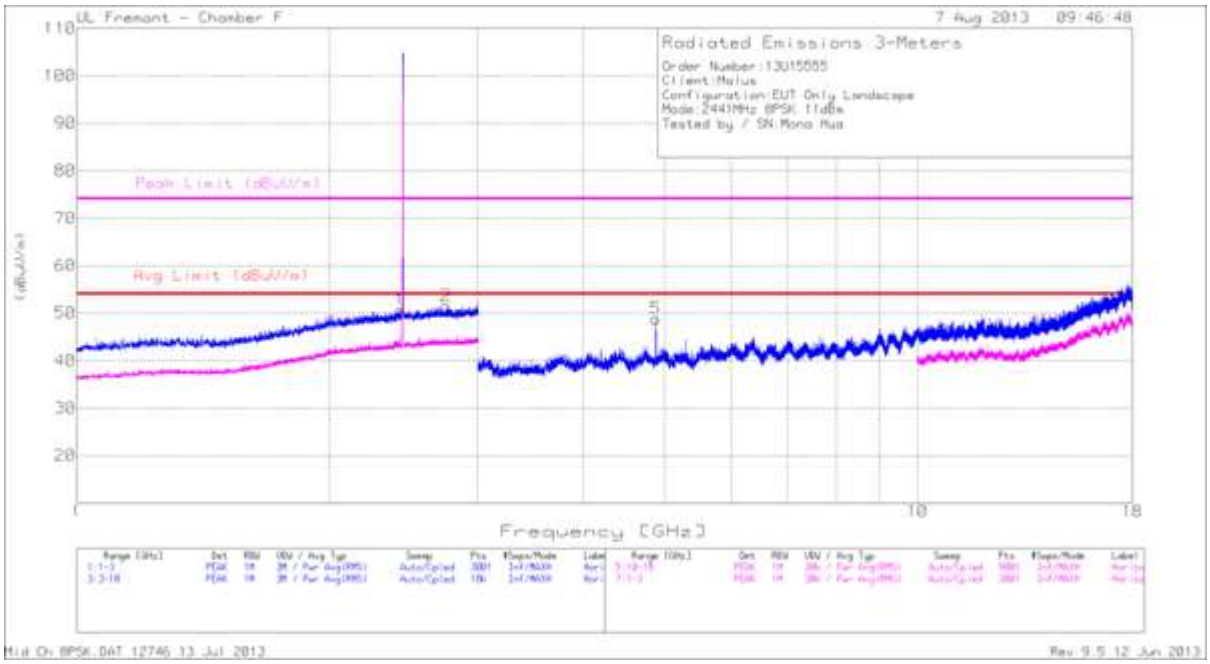
DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	T344 Ant Factor [dB/m]	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
2.29	43.38	PK	32.4	-24.3	51.48	53.97	-2.49	74	-22.52	201	H
*2.617	43.04	PK	32.6	-24	51.64					301	H
*2.563	43.53	PK	32.5	-24	52.03					301	V
2.715	42.66	PK	32.8	-23.9	51.56	53.97	-2.41	74	-22.44	201	V
4.804	32.67	AVG	34.4	-31.6	35.47	53.97	-18.50	74	-38.53	262	140
4.804	42.21	PK	34.4	-31.6	45.01	53.97	-8.96	74	-28.99	301	V

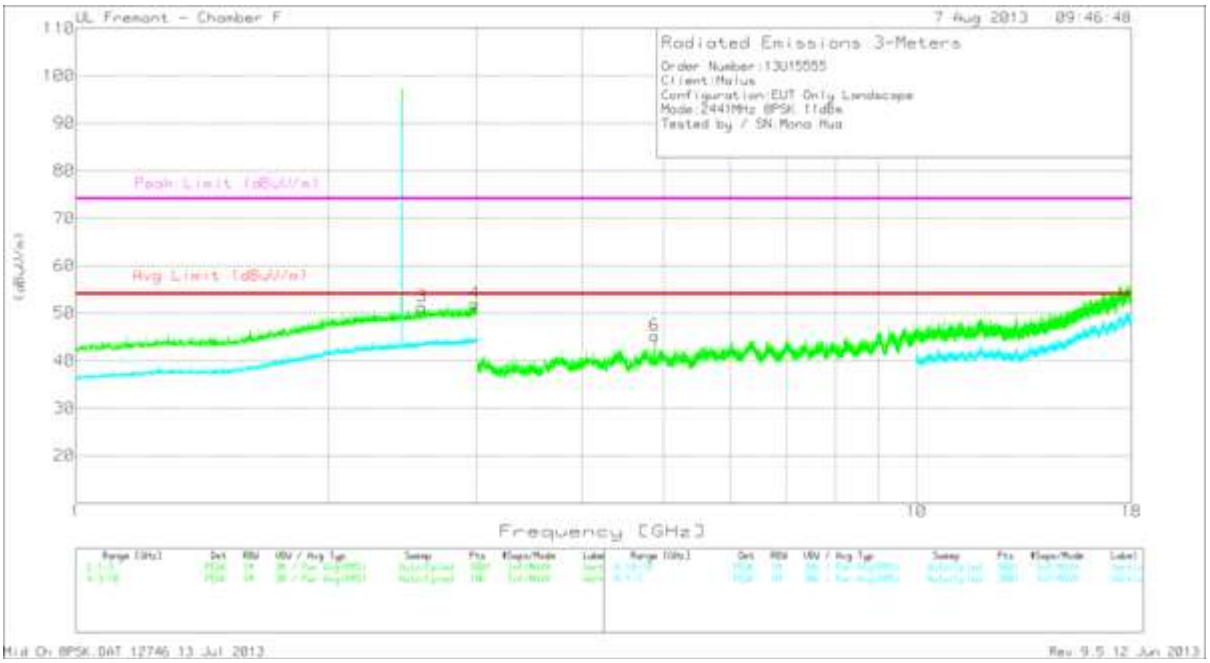
*Not in Restricted Band

MID CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



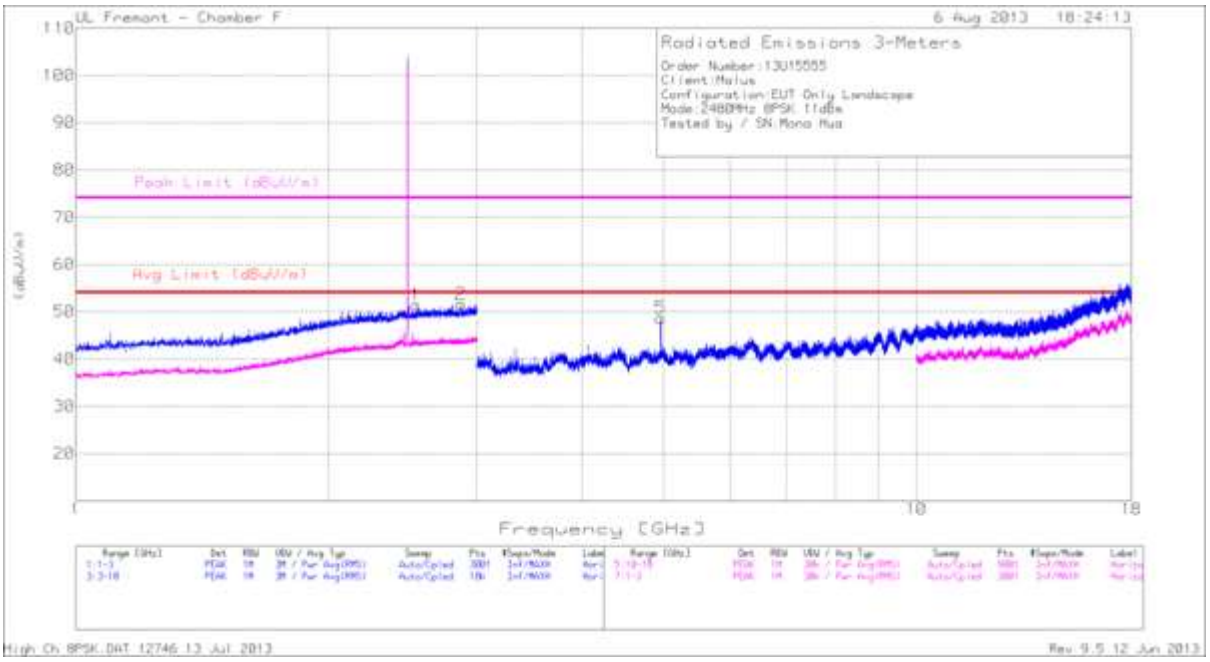
DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	T344 Ant Factor [dB/m]	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
*2.424	42.59	PK	32.4	-24.3	50.69					100	H
2.751	42.39	PK	32.9	-23.9	51.39	53.97	-2.58	74	-22.61	300	H
*2.581	42.66	PK	32.6	-23.9	51.36					200	V
*2.979	42.51	PK	33.1	-23.6	52.01					401	V
4.882	37	AVG	34.3	-31.5	39.8	53.97	-14.17	74	-34.20	113	H
4.882	42.42	PK	34.3	-31.5	45.22	53.97	-8.75	74	-28.78	401	V

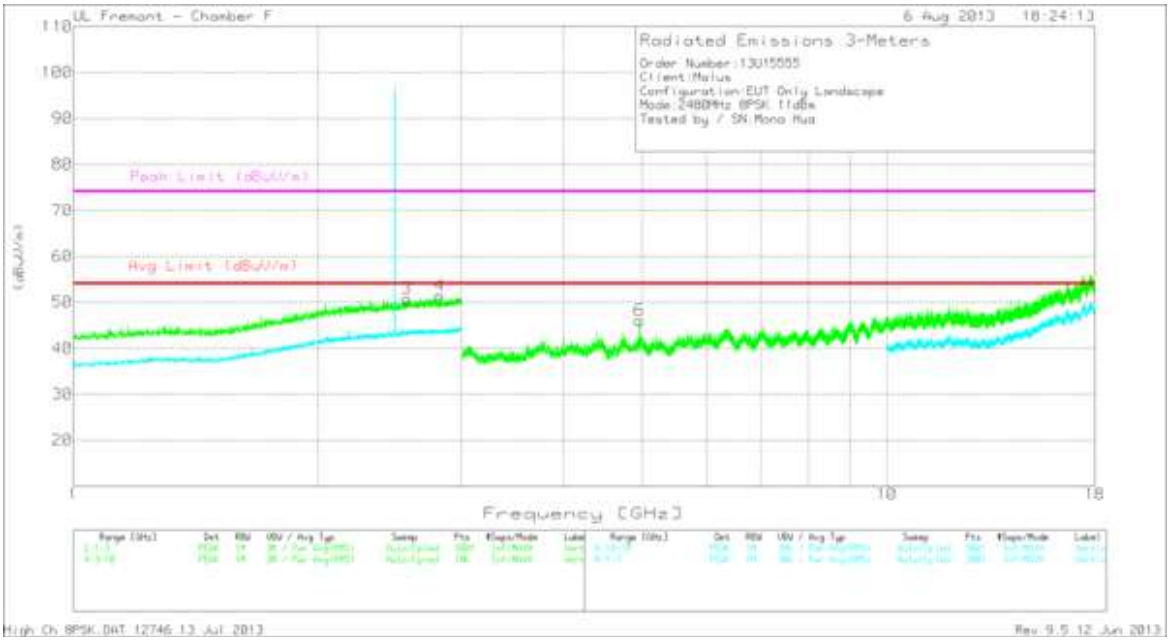
*Not in Restricted Band

HIGH CHANNEL

HORIZONTAL PLOT



VERTICAL PLOT



DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	T344 Ant Factor [dB/m]	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
*2.539	42.83	PK	32.5	-23.9	51.43					200	H
2.871	42.29	PK	33	-23.7	51.59	53.97	-2.38	74	-22.41	100	H
*2.571	42.42	PK	32.5	-24.1	50.82					401	V
2.82	42.34	PK	33	-23.9	51.44	53.97	-2.53	74	-22.56	100	V
4.96	46.99	AVG	34.3	-31.4	49.89	53.97	-4.08	74	-24.11	106	H
4.961	43.14	PK	34.3	-31.4	46.04	53.97	-7.93	74	-27.96	200	V

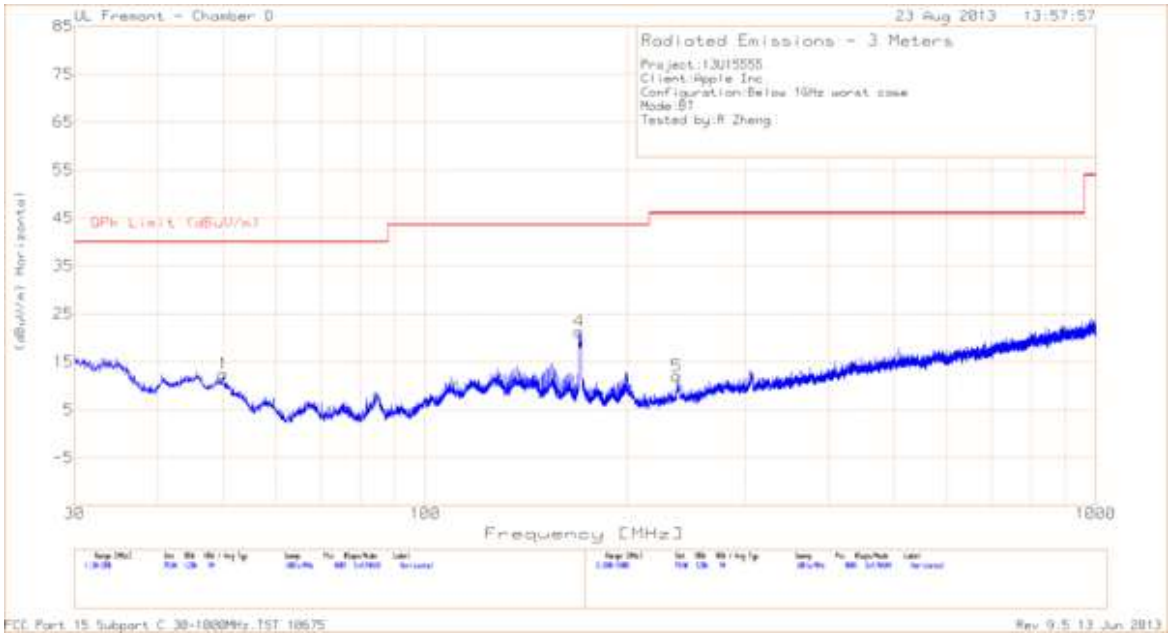
*Not in Restricted Band

8.3. WORST-CASE ABOVE 18GHz

8.4. WORST-CASE BELOW 1 GHz

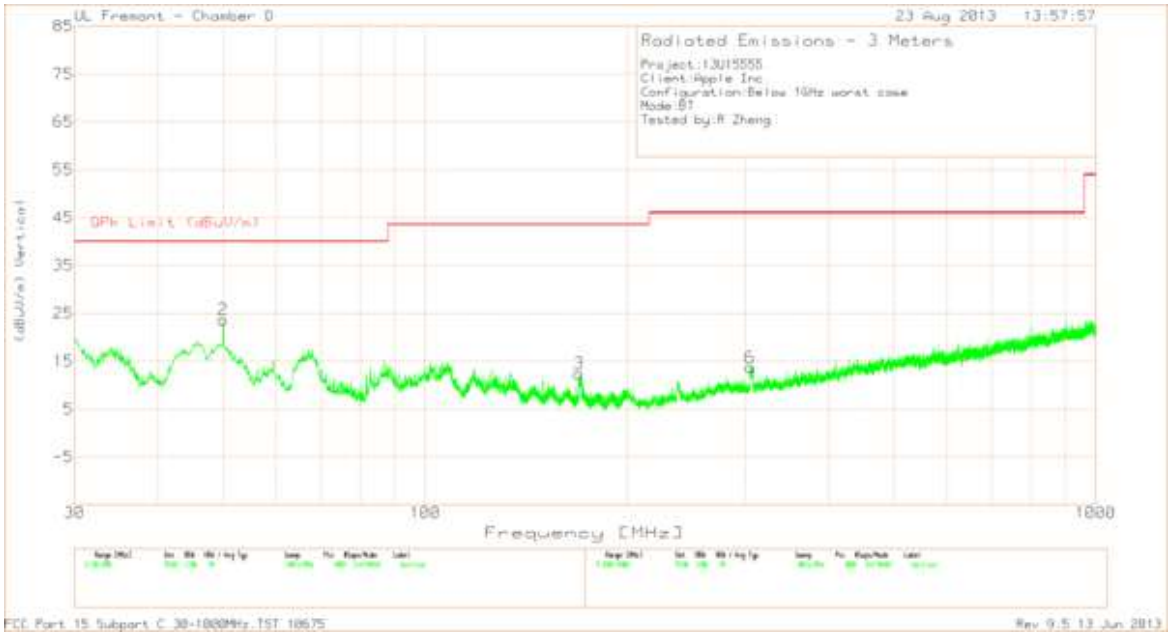
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



DATA

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T408 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
49.975	36.49	PK	7.9	-31.9	12.49	40	-27.51	399	H
169.6125	40.91	PK	11.7	-31.3	21.31	43.52	-22.21	98	H
237.4	31.64	PK	11.4	-31	12.04	46.02	-33.98	100	H
50.0175	47.67	PK	7.9	-31.9	23.67	40	-16.33	100	V
169.655	32.02	PK	11.7	-31.3	12.42	43.52	-31.1	100	V
305.3	31.12	PK	13.3	-30.7	13.72	46.02	-32.3	299	V

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

Line-L1 .15 - 30MHz

Trace Markers

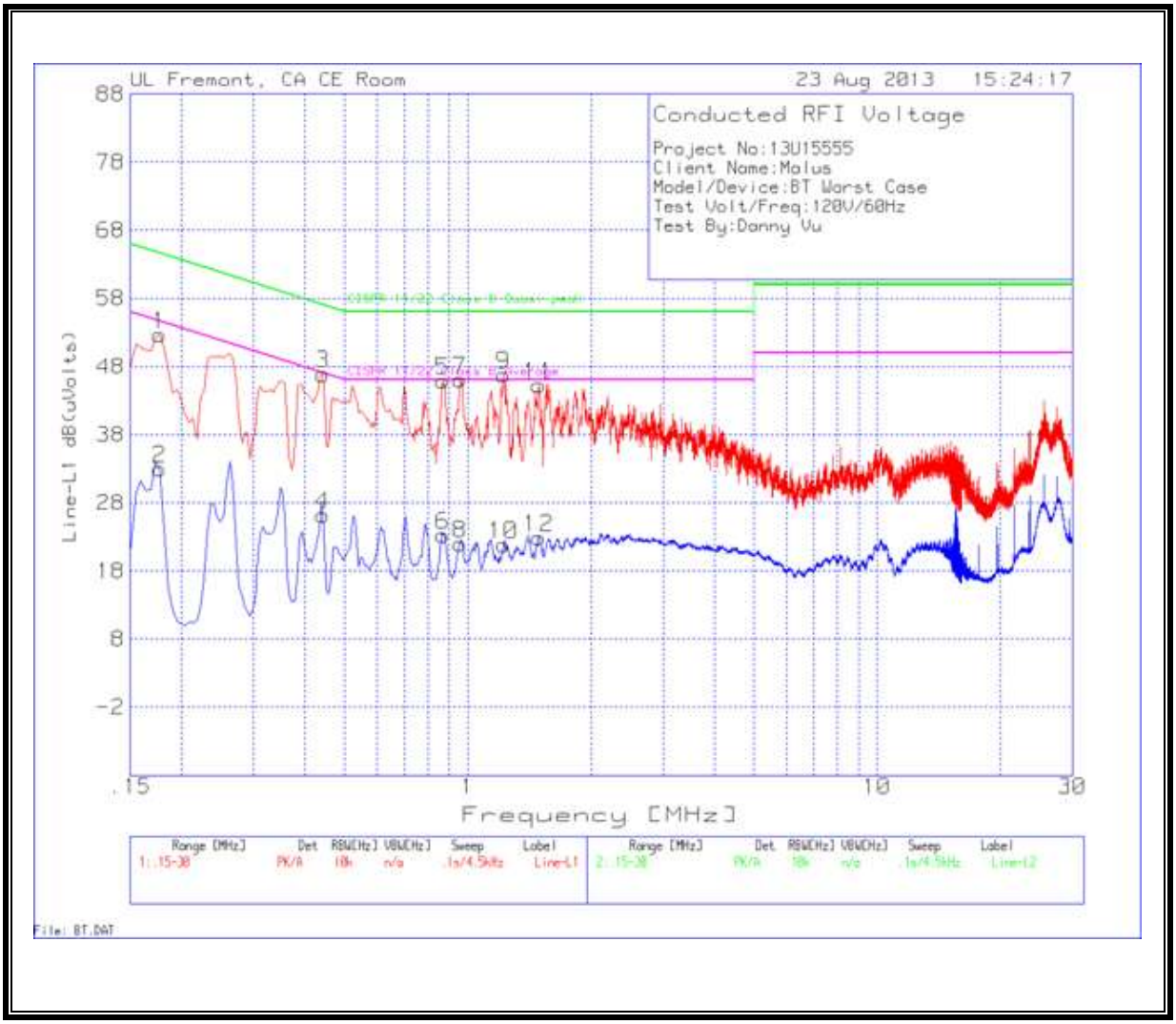
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.177	52.59	PK	.1	0	52.69	64.6	-11.91	-	-
2	.177	32.86	Av	.1	0	32.96	-	-	54.6	-21.64
3	.4425	46.78	PK	.1	0	46.88	57	-10.12	-	-
4	.4425	26.14	Av	.1	0	26.24	-	-	47	-20.76
5	.87	45.8	PK	.1	0	45.9	56	-10.1	-	-
6	.87	23.12	Av	.1	0	23.22	-	-	46	-22.78
7	.96	45.95	PK	.1	0	46.05	56	-9.95	-	-
8	.96	21.94	Av	.1	0	22.04	-	-	46	-23.96
9	1.2255	46.58	PK	.1	.1	46.78	56	-9.22	-	-
10	1.2255	21.61	Av	.1	.1	21.81	-	-	46	-24.19
11	1.491	45.05	PK	.1	.1	45.25	56	-10.75	-	-
12	1.491	22.67	Av	.1	.1	22.87	-	-	46	-23.13

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)
13	.177	54.56	PK	.1	0	54.66	64.6	-9.94	-	-
14	.177	29.55	Av	.1	0	29.65	-	-	54.6	-24.95
15	.438	48.54	PK	.1	0	48.64	57.1	-8.46	-	-
16	.438	27.91	Av	.1	0	28.01	-	-	47.1	-19.09
17	.87	47.63	PK	.1	0	47.73	56	-8.27	-	-
18	.87	28.38	Av	.1	0	28.48	-	-	46	-17.52
19	.9555	47.18	PK	.1	0	47.28	56	-8.72	-	-
20	.9555	26.56	Av	.1	0	26.66	-	-	46	-19.34
21	1.203	49.12	PK	.1	.1	49.32	56	-6.68	-	-
22	1.203	28.09	Av	.1	.1	28.29	-	-	46	-17.71
23	1.491	46.86	PK	.1	.1	47.06	56	-8.94	-	-
24	1.491	29.46	Av	.1	.1	29.66	-	-	46	-16.34

LINE 1 RESULTS



LINE 2 RESULTS