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

CERTIFICATION TEST REPORT

FOR

APPLE WATCH

MODEL NUMBER: A1553

FCC ID: BCG-E2870
IC: 579C-E2870

REPORT NUMBER: 14U19383-E1, REVISION C

ISSUE DATE: MARCH 03, 2015

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

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/20/2015	Initial Issue	C. Pang
A	02/25/2015	Address TCB's Question and change EUT name	C. Pang
B	02/27/2015	Address TCB's Questions	T. Chu
C	03/03/2015	Address TCB's Questions	T. Chu

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: APPLE WATCH

MODEL: A1553

SERIAL NUMBER: 227LGA-SiP (CONDUCTED), FH7P3054G9HN (ANTENNA 1 RADIATED), FH7P20CSG9HM (ANTENNA 2 RADIATED)

DATE TESTED: NOVEMBER 24, 2014 – FEBRUARY 05, 2015

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 4	Pass

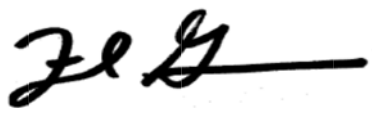
UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement 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:

CHIN PANG
SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Tested By:



FRANCISCO GUARNERO
LAB TECHNICIAN
UL VERIFICATION SERVICES INC.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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
	☐ Chamber G
	☐ Chamber H

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an Apple Watch with WLAN, Bluetooth and NFC support.

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	12.69	18.6
2402 - 2480	Enhanced 8PSK	12.49	17.7

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Planar Inverted-F Antenna (PIFA) with a maximum gain as below table:

Frequency Band (GHz)	Antenna 1 Gain (dBi)	Antenna 2 Gain (dBi)
2.4	-12.1	-12.1

The EUT has one WiFi/BT antenna port. The antenna used in any given unit can be either antenna 1 or antenna 2.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 12.3.1051.1701

The software used in the EUT during Bluetooth FHSS testing was version 12.3.748.1192

5.5. WORST-CASE CONFIGURATION AND MODE

EUT has 3 types of enclosures and various kinds of metallic and non-metallic wristbands. There are 2 types of metallic bands; Metal Links, and Metal Mesh. Worst case configuration was investigated; and it was found that the stainless steel enclosure and metal mesh wristband was the worst case. All testing are performed on the worst case.

The following configurations were investigated and EUT powered by AC/DC adapter was the worst-case scenario. AC power line and below 1G radiated tests were conducted on configuration 1.

Configuration	Descriptions
1	EUT powered by AC/DC adapter via USB cable with wireless charger
2	EUT powered by host PC via USB cable with wireless charger

Radiated emission, 30-1000MHz and 18-26GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

All testing was performed with the EUT in three orthogonal orientations X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait). It was found that Y-orientation (landscape) was the worst-case.

Worst-case data rates were:

GFSK mode: DH5
8PSK mode: 3-DH5

DQPSK mode has been verified to have the lowest power.

The EUT has one WiFi/BT antenna port. The antenna used in any given unit can be either antenna 1 or antenna 2. Therefore, all radiated tests were performed on both antennas.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Lenovo	92P1160	11S92P1160Z1ZBGH798B12	N/A
Laptop	Lenovo	7659	L3-AL664 08/03	N/A
Wireless Charger	Apple	A1570	DLC451508N5FTPG3K	BCGA1570
AC/DC adapter	Apple	A1265	1X3276SZZ08QZ	N/A

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	0.2	To spectrum Analyzer
2	USB	1	USB to mini USB	Shielded	1	To laptop and fixture

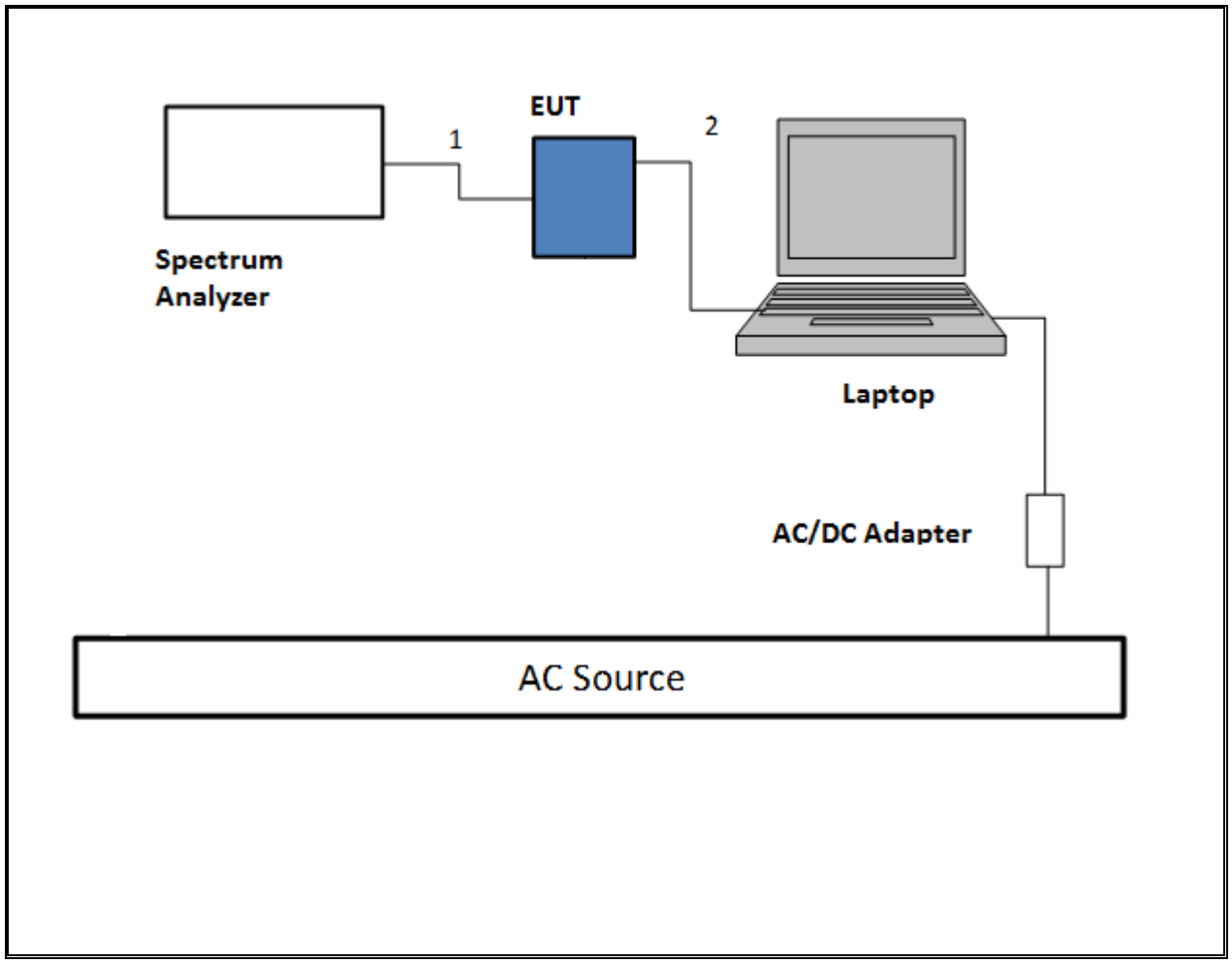
I/O CABLES (BELOW 1G RADIATED AND AC POWERLINE CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Un-Shielded	2	To AC/DC adapter

TEST SETUP- CONDUCTED PORT

The EUT was tested connected to a host Laptop via USB cable adapter and spectrum analyzer to antenna port. Test software exercised the EUT.

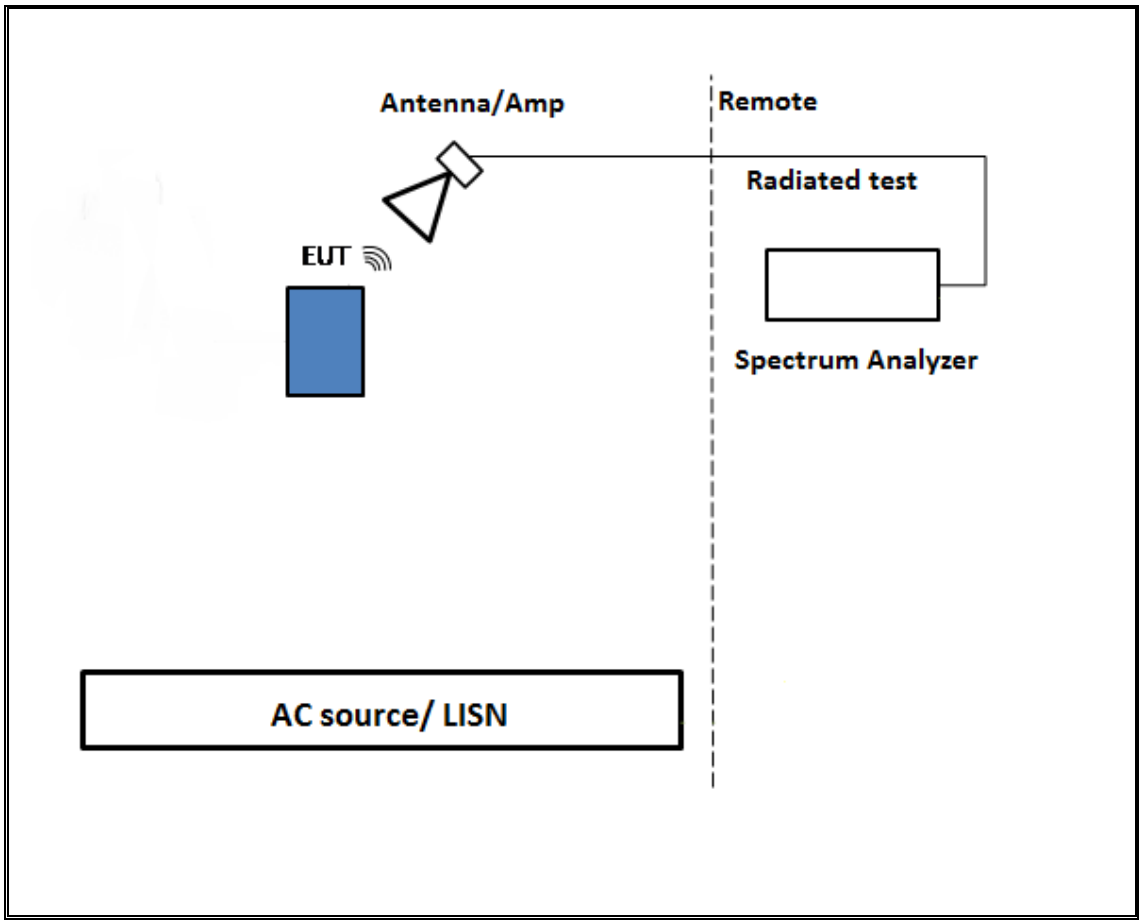
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was tested battery powered. Test software exercised the EUT.

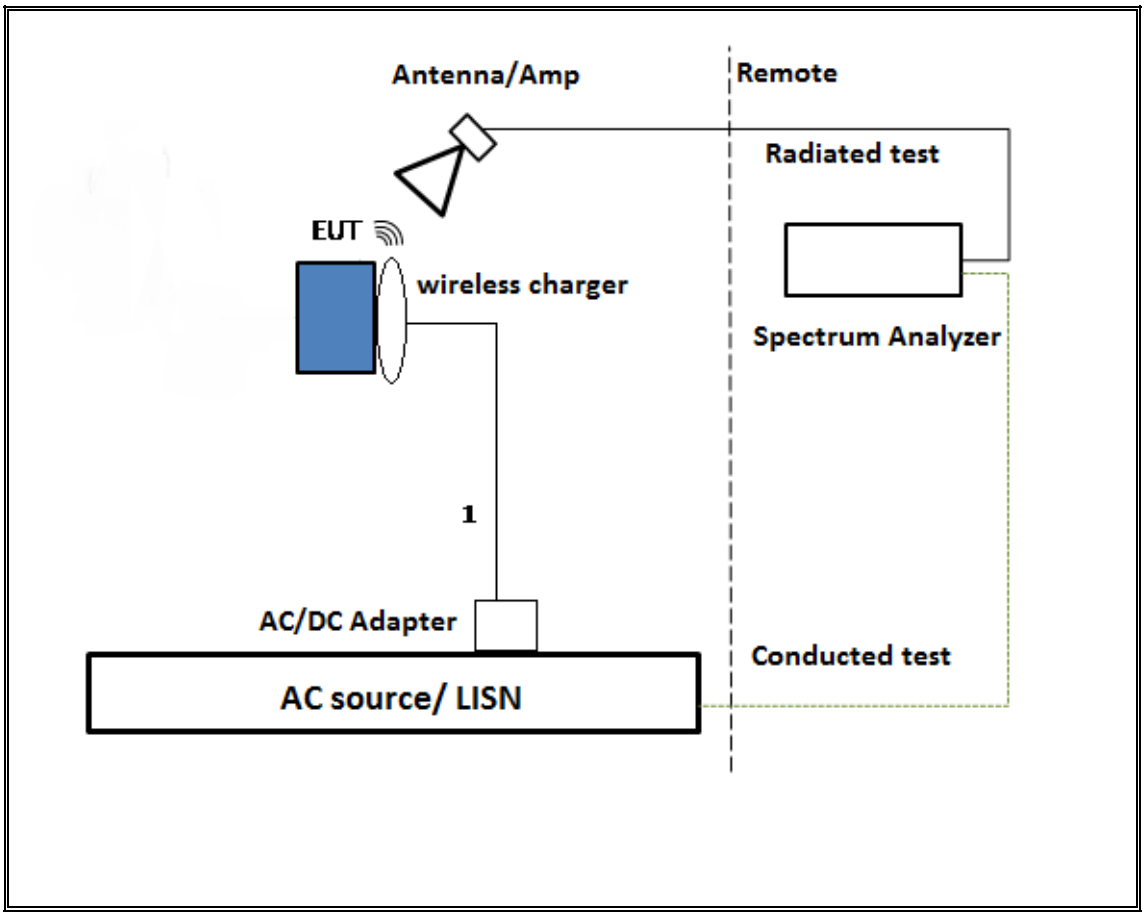
SETUP DIAGRAM



TEST SETUP- BELOW 1GHZ & AC LINE CONDUCTED TESTS

The EUT was powered by wireless charger. Test software exercised the EUT.

SETUP DIAGRAM



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**	**T Numbe**	**Cal Due**
PXA Signal Analyzer	Agilent	N9030A	T342	06/25/15
Power Meter	Agilent	N1911A	T382	04/09/15
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T119	01/15/16
Antenna, Hybrid 30MHz to 2GHz	Sunol Sciences	JB3	T407	05/05/15
PXA Signal Analyzer 3Hz to 44GHz	Agilent	N9030A	T340	03/11/15
Amplifier, 10KHz to 1GHz	Sonoma	310N	T286	04/23/15
Amplifier, 1 to 18GHz	Miteq	AFS42-00101	T740	01/26/16
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	T284	09/16/15
LISN, 30 MHz	FCC	LISN-50 /250-25-2	T24	01/16/16
Amplifier, 1 to 26.5 Ghz	Agilent	8449B	T404	03/25/15
Antenna, Horn 18 to 26.5GHz	ARA	SWH-28	T125	05/09/15
Spectrum Analyzer	Agilent	8564E	T106	08/06/15

7. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

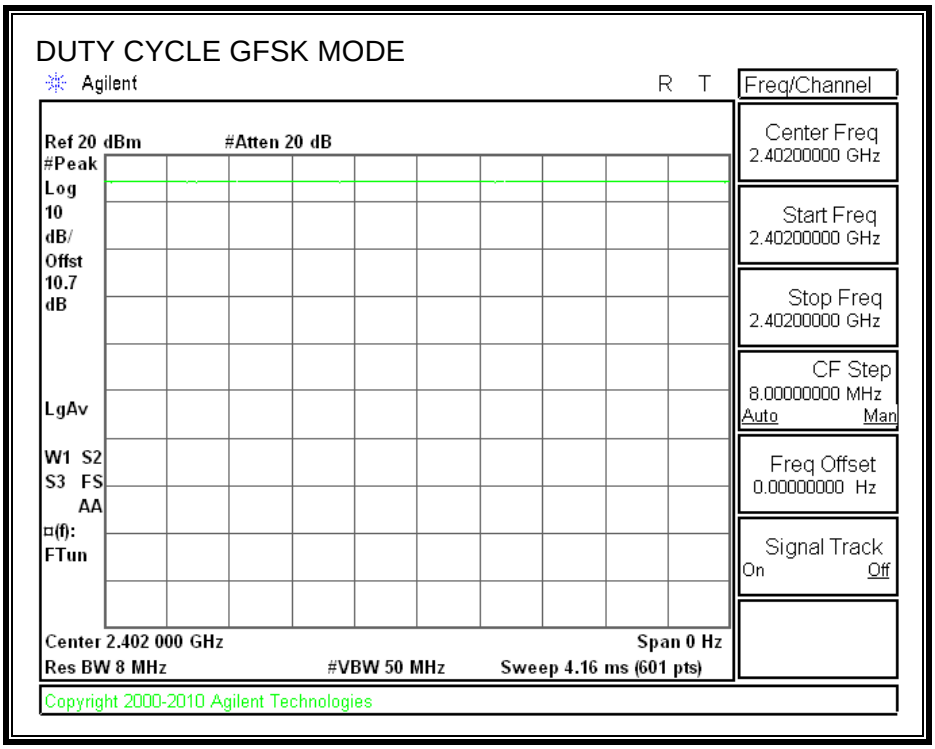
PROCEDURE

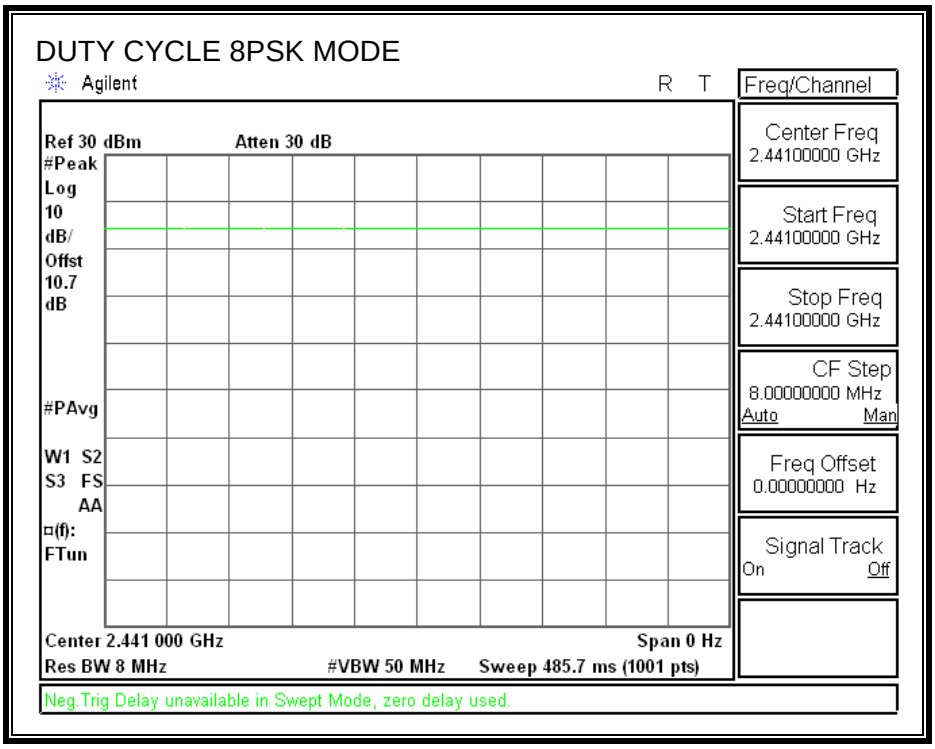
KDB 789033 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4 GHz band (Hopping OFF)						
Bluetooth GFSK	1.000	1.000	1.000	100.00%	0.00	0.010
Bluetooth 8PSK	1.000	1.000	1.000	100.00%	0.00	0.010

DUTY CYCLE PLOTS





8. ANTENNA PORT TEST RESULTS

8.1. BASIC DATA RATE GFSK MODULATION

8.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

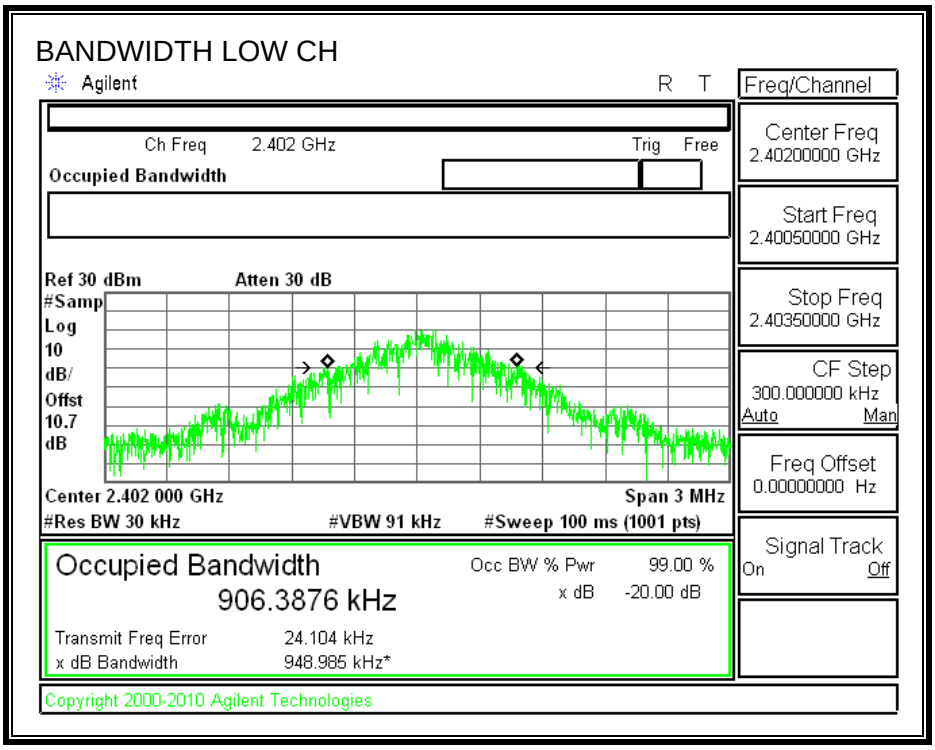
TEST PROCEDURE

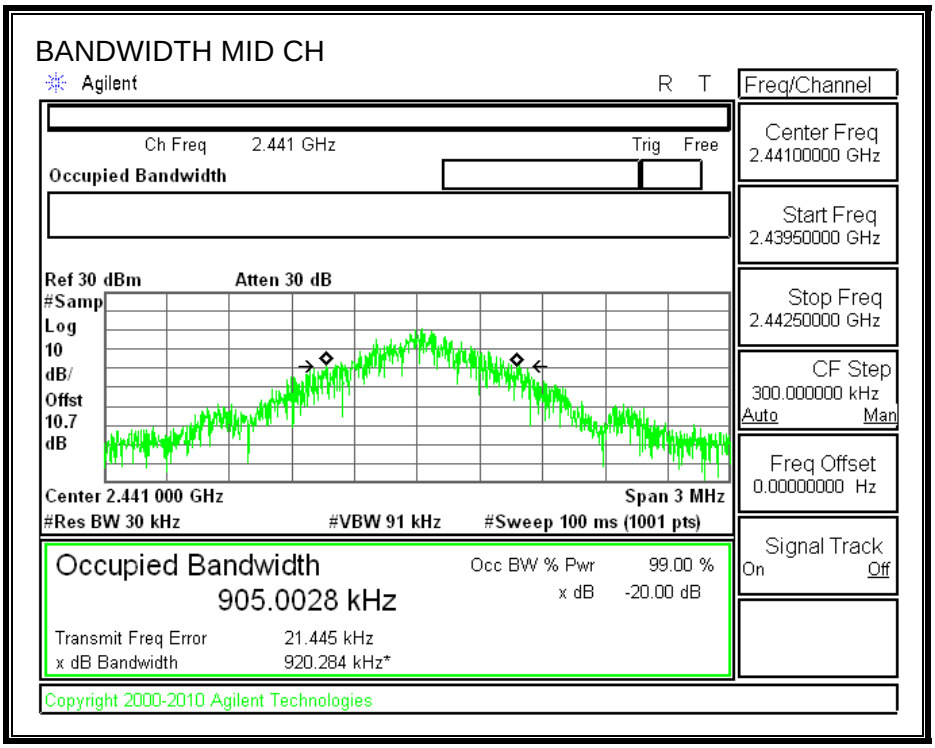
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

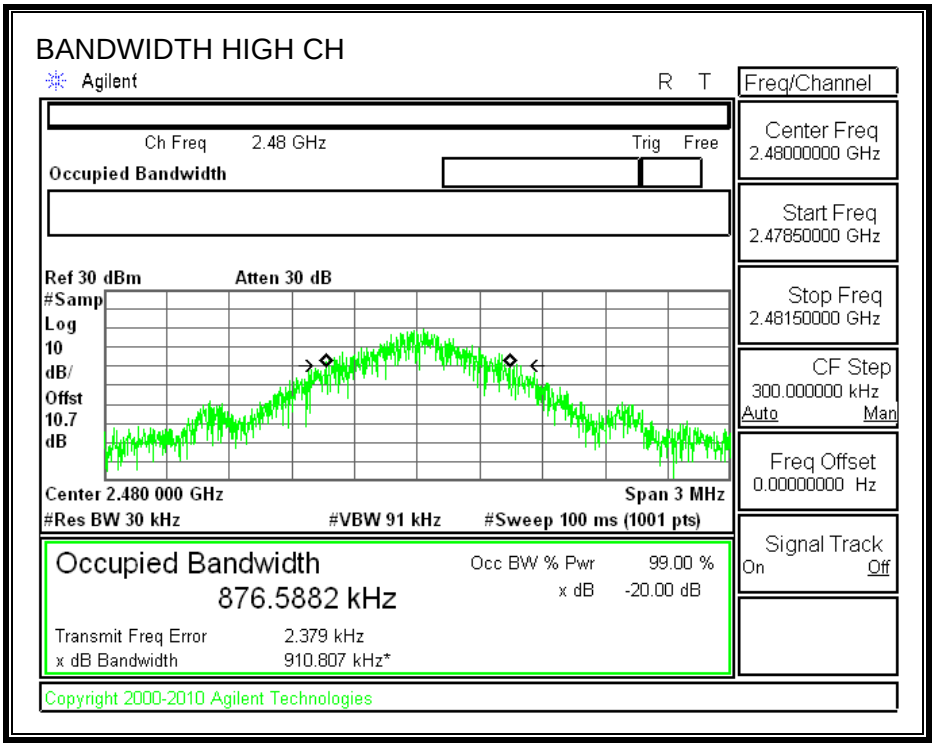
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (kHz)	20 dB Bandwidth (kHz)
Low	2402	906.3876	948.985
Middle	2441	905.0028	920.284
High	2480	876.5882	910.807

20 dB AND 99% BANDWIDTH







8.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

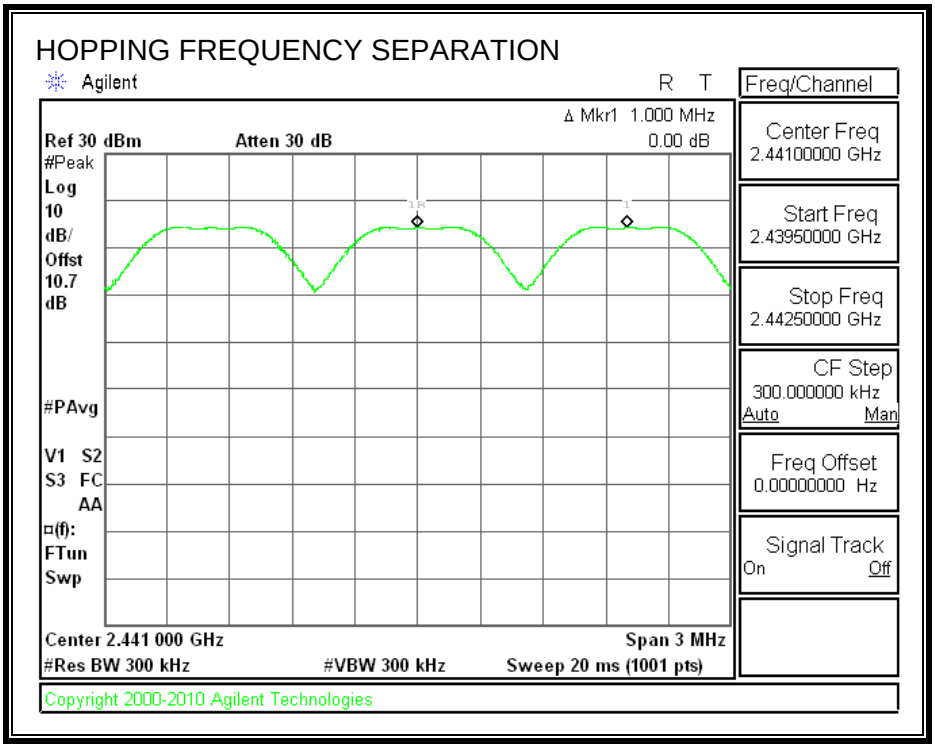
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



8.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

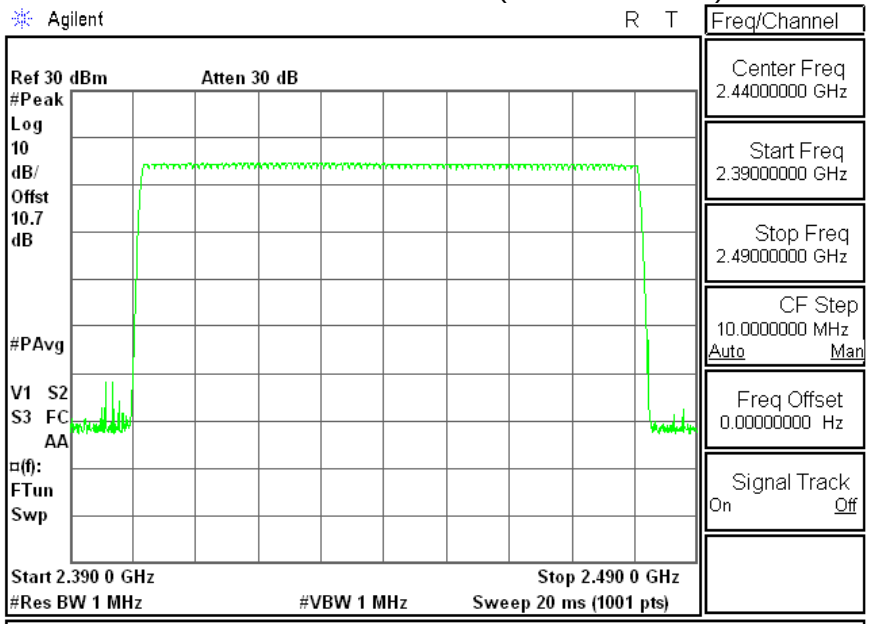
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

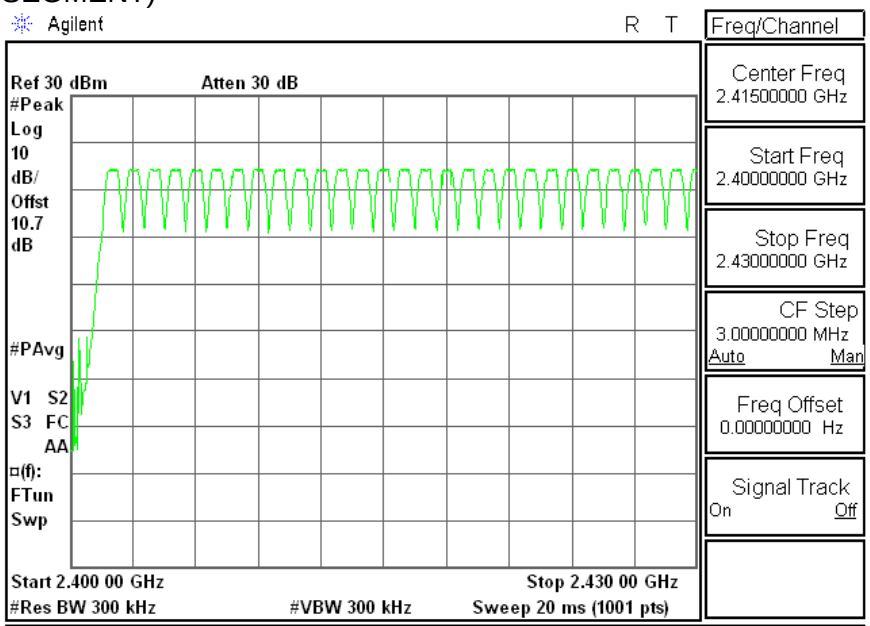
Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS

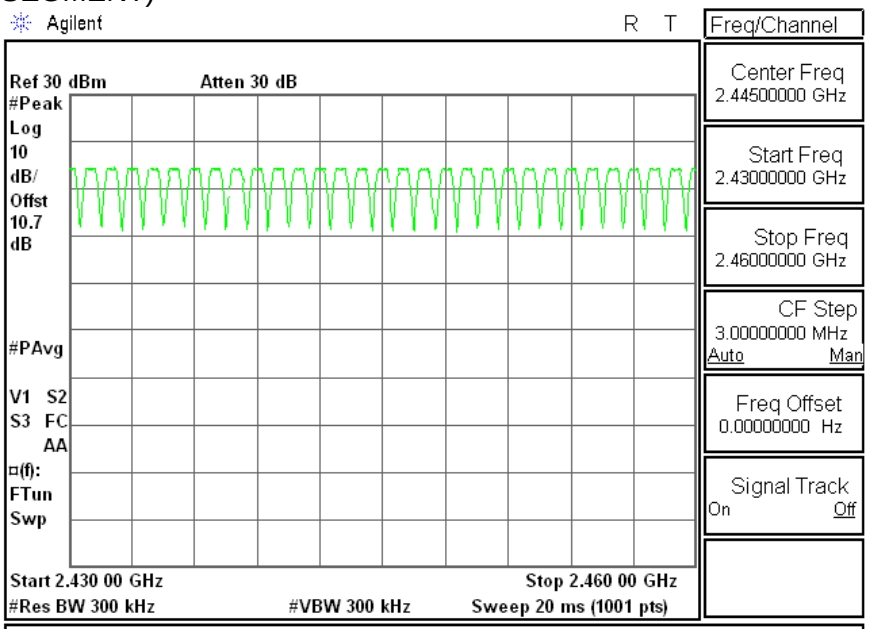
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



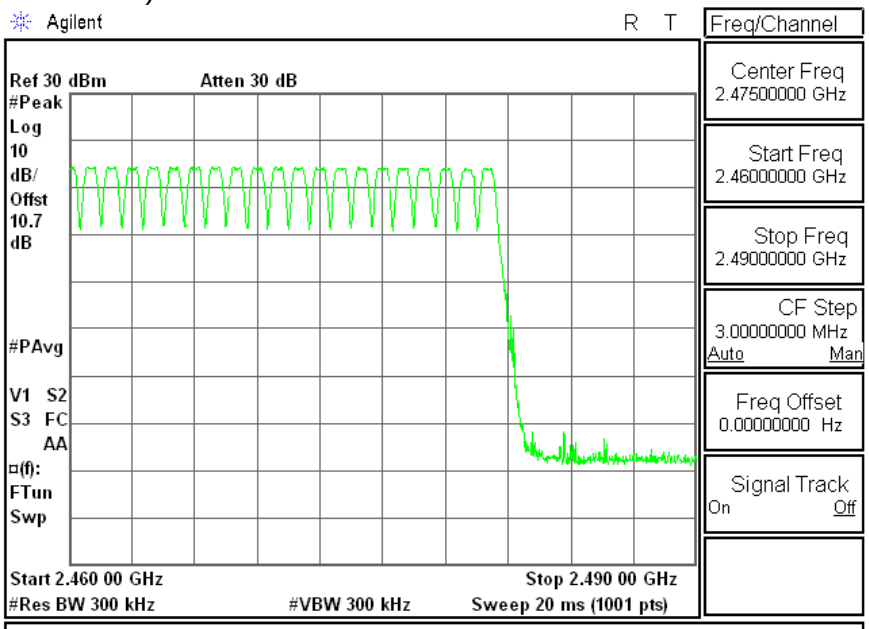
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



8.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

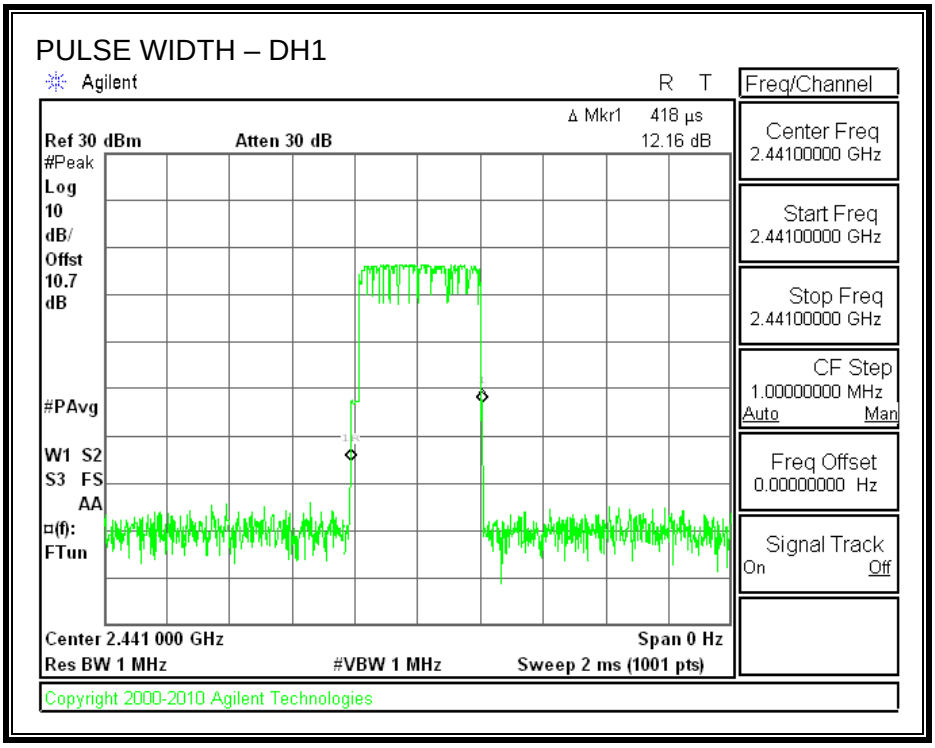
The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

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

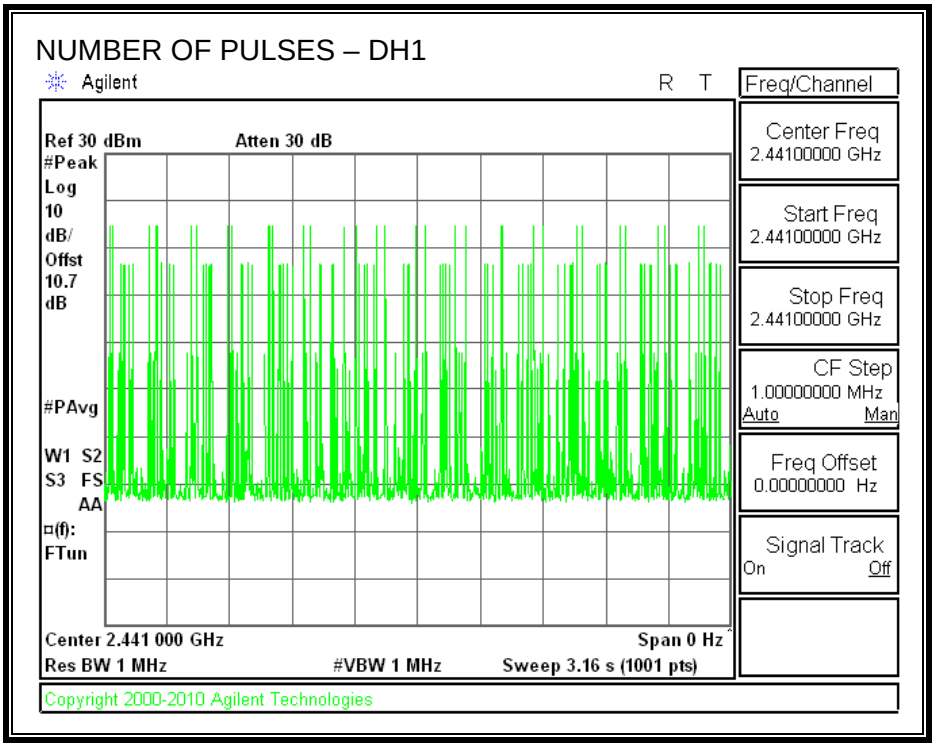
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.418	34	0.142	0.4	-0.258
DH3	1.673	19	0.318	0.4	-0.082
DH5	2.915	13	0.379	0.4	-0.021

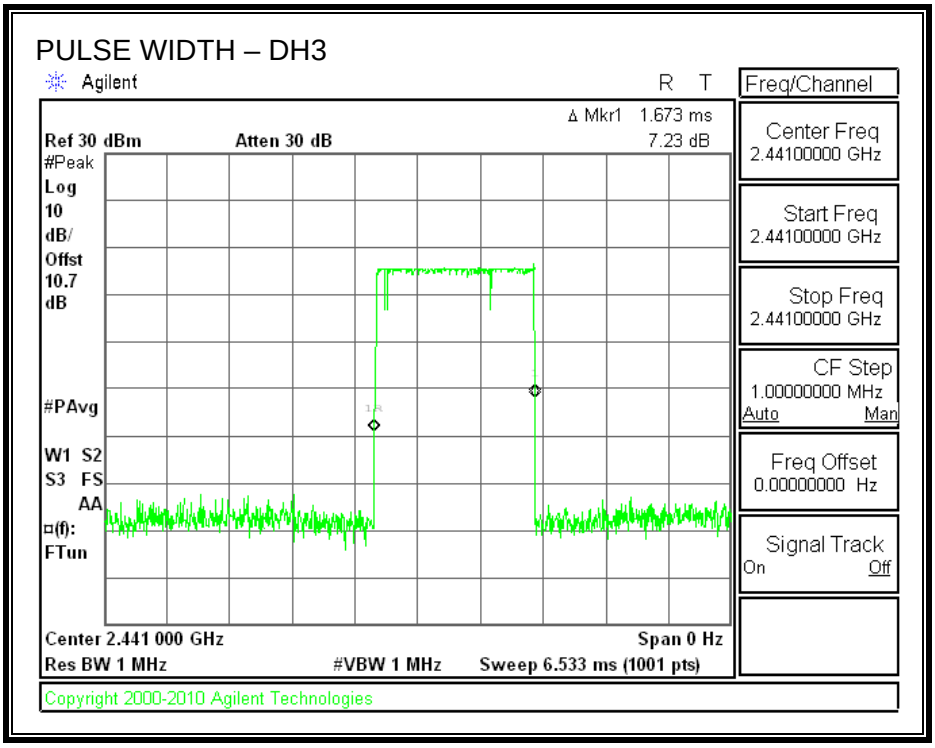
PULSE WIDTH - DH1



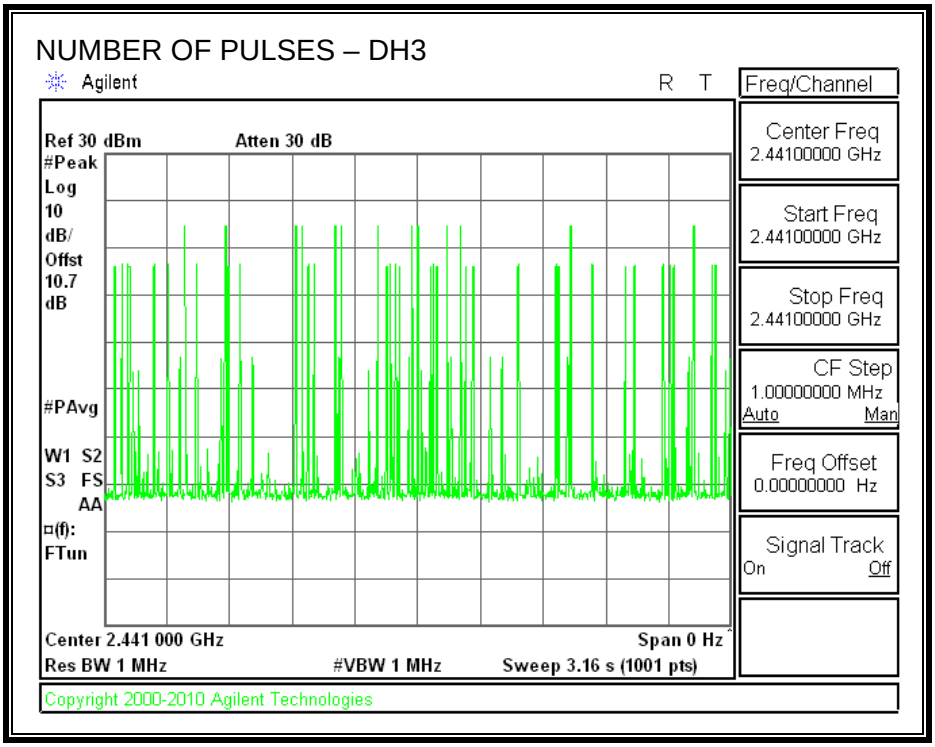
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



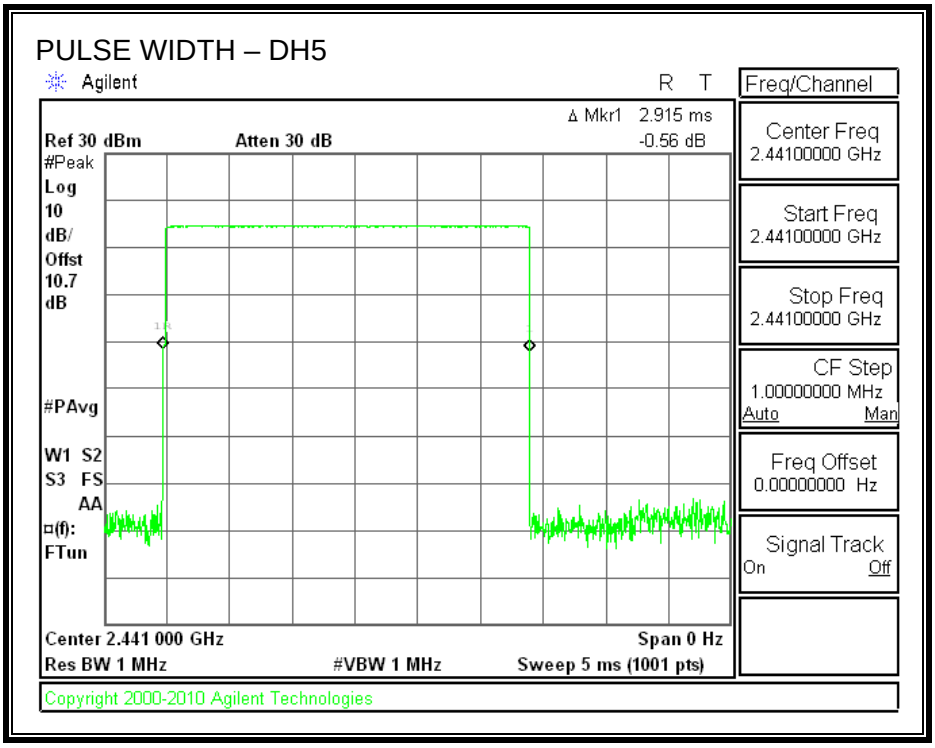
PULSE WIDTH – DH3



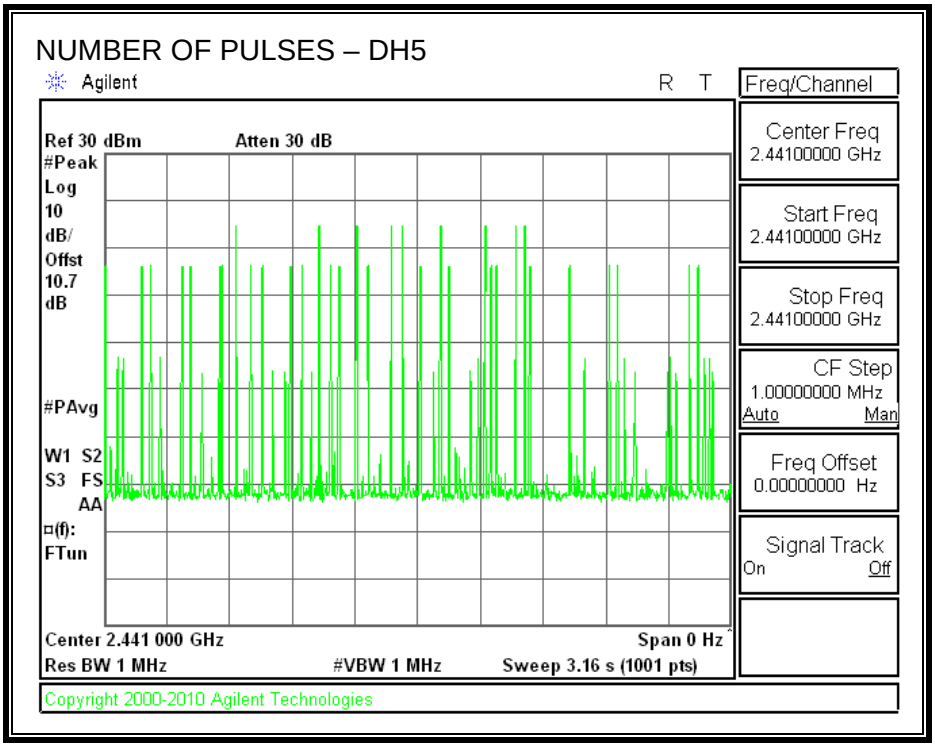
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.1.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 8 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

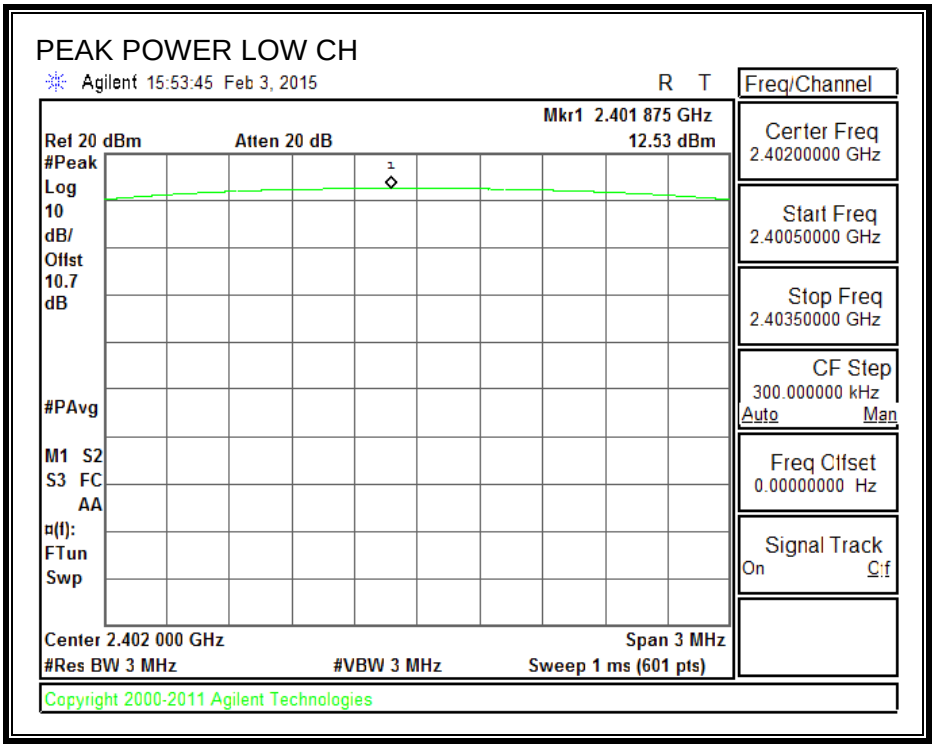
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

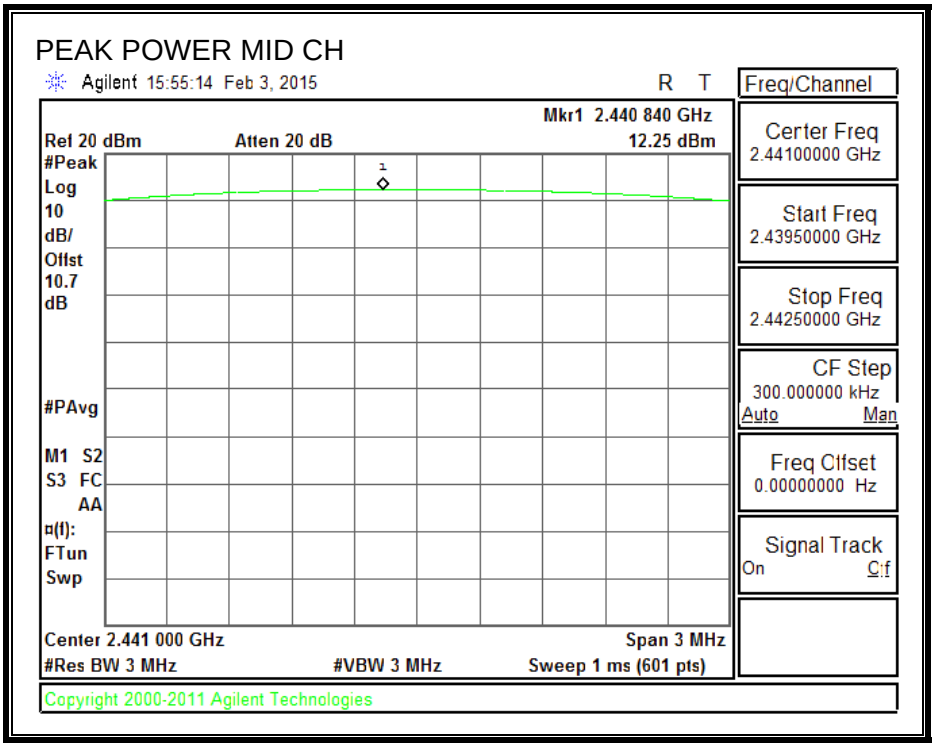
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.53	30	-17.47
Middle	2441	12.25	30	-17.75
High	2480	12.69	30	-17.31

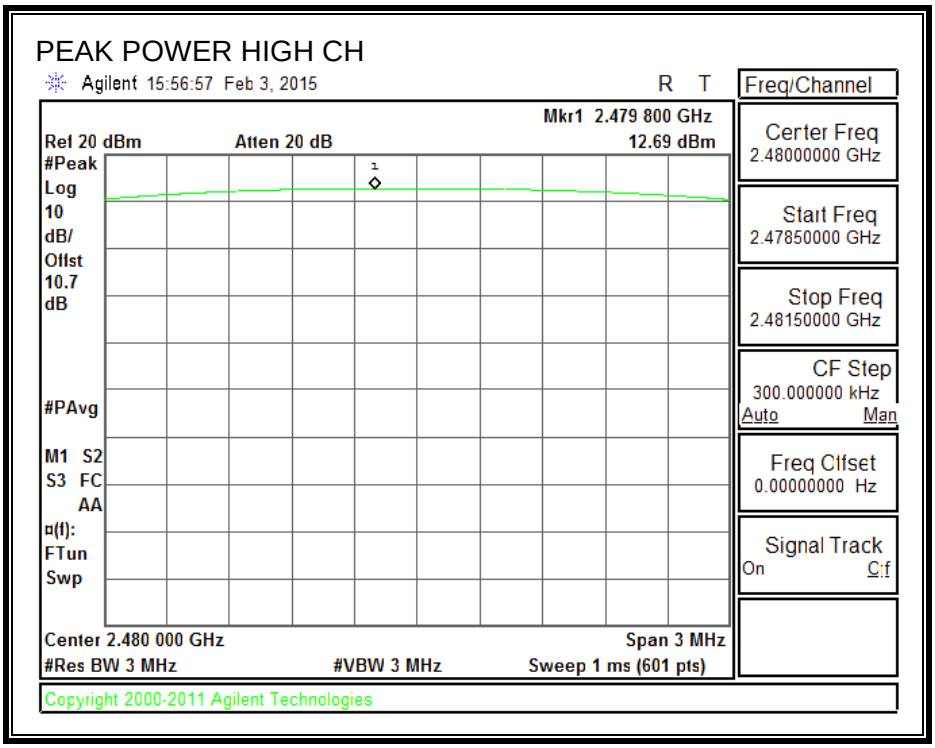
OUTPUT POWER

PEAK POWER LOW CH



PEAK POWER MID CH





8.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	12.43
Middle	2441	12.12
High	2480	12.47

8.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

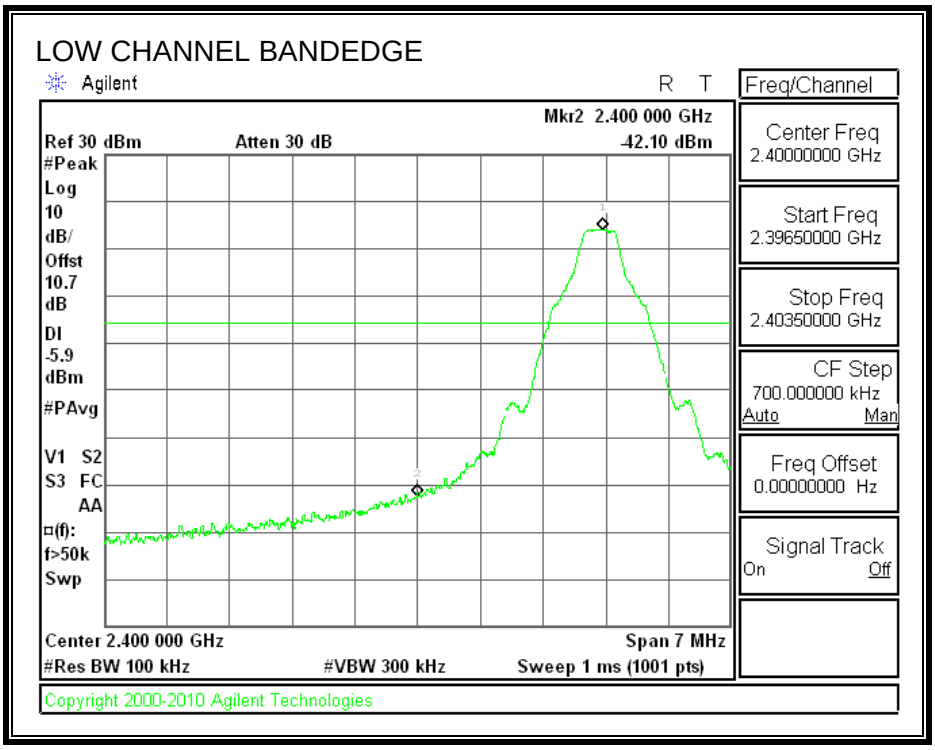
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

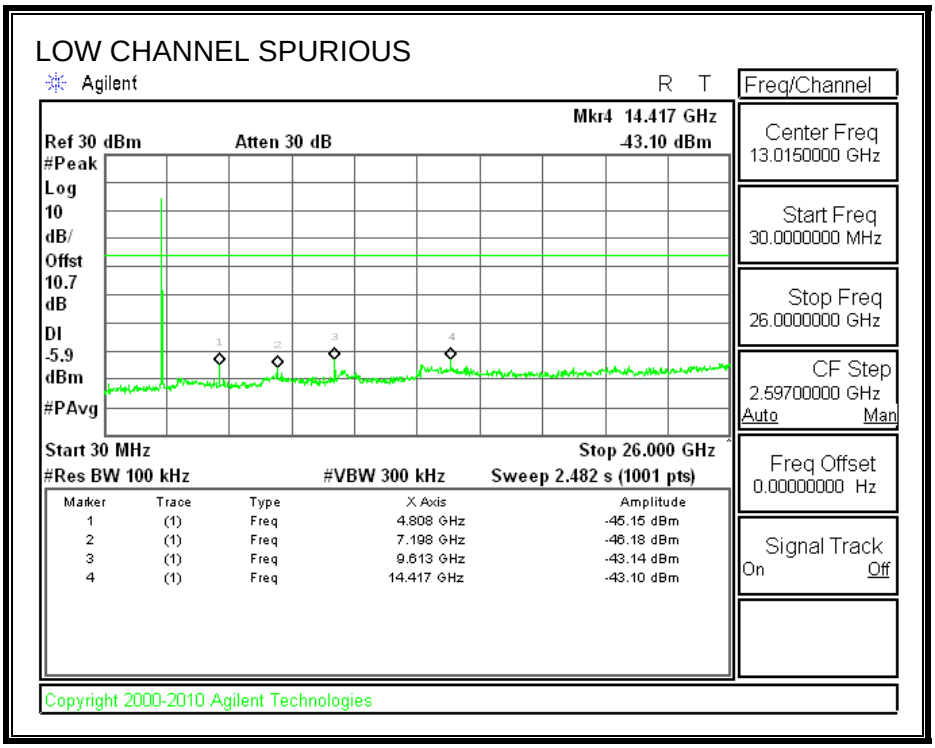
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

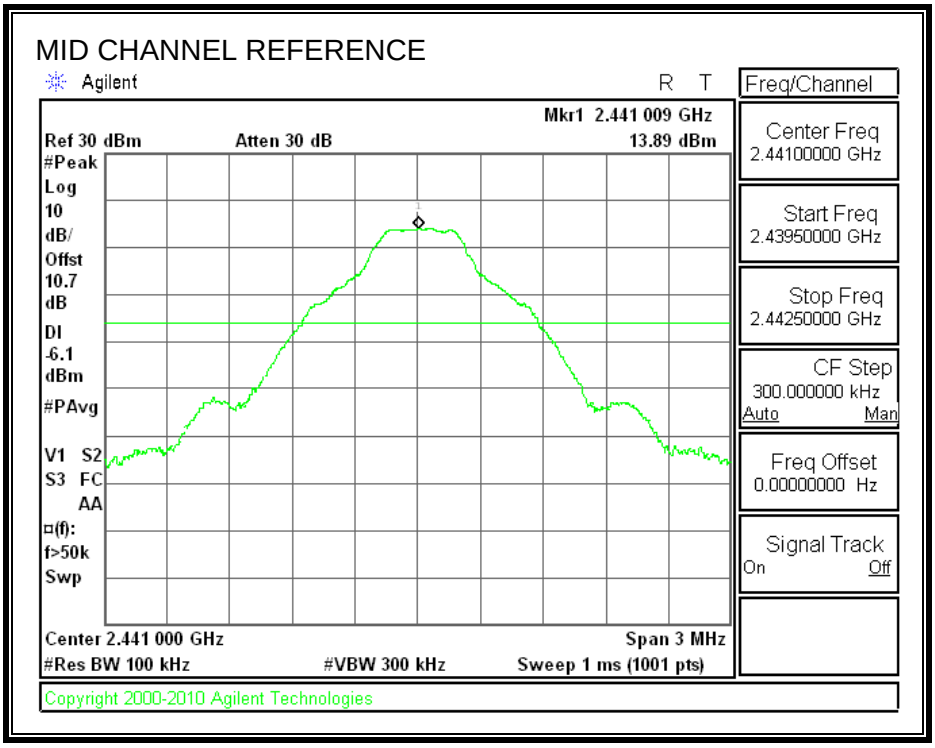
RESULTS

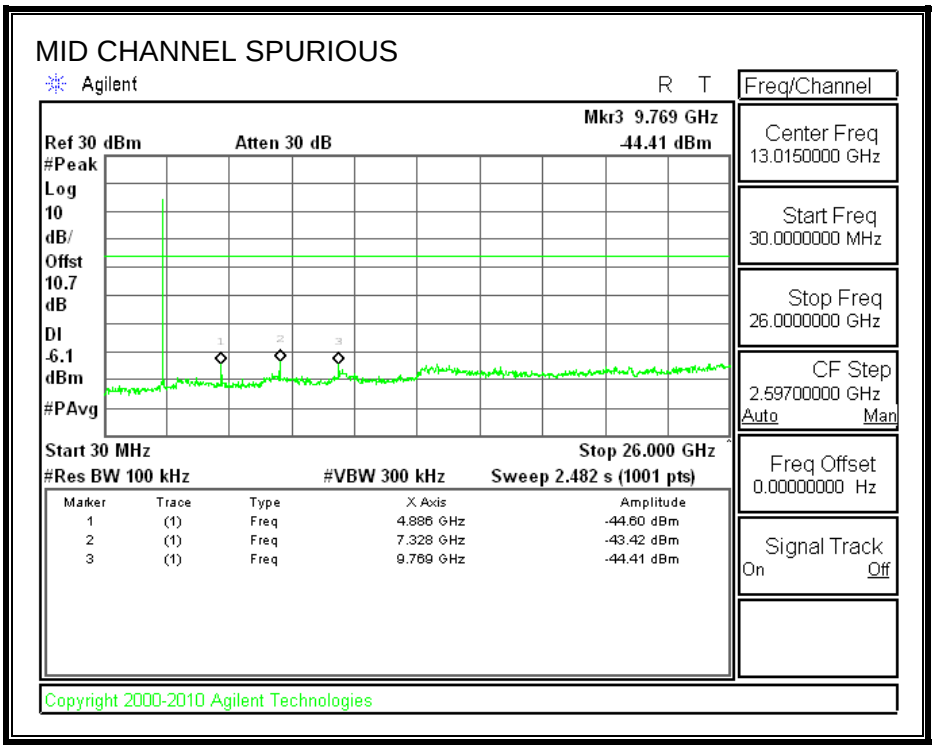
SPURIOUS EMISSIONS, LOW CHANNEL



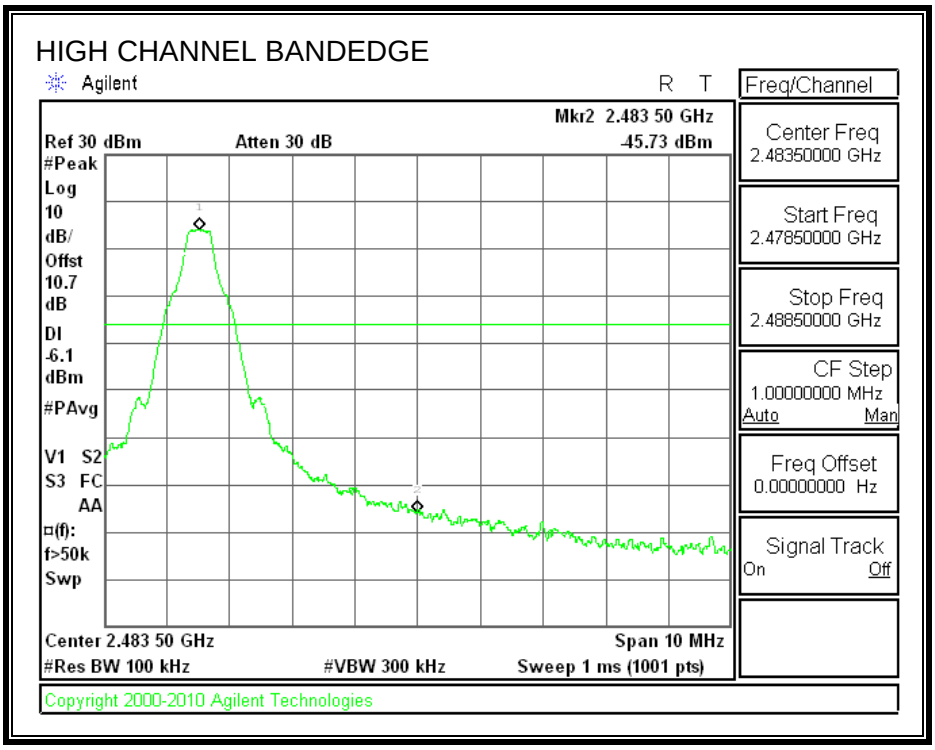


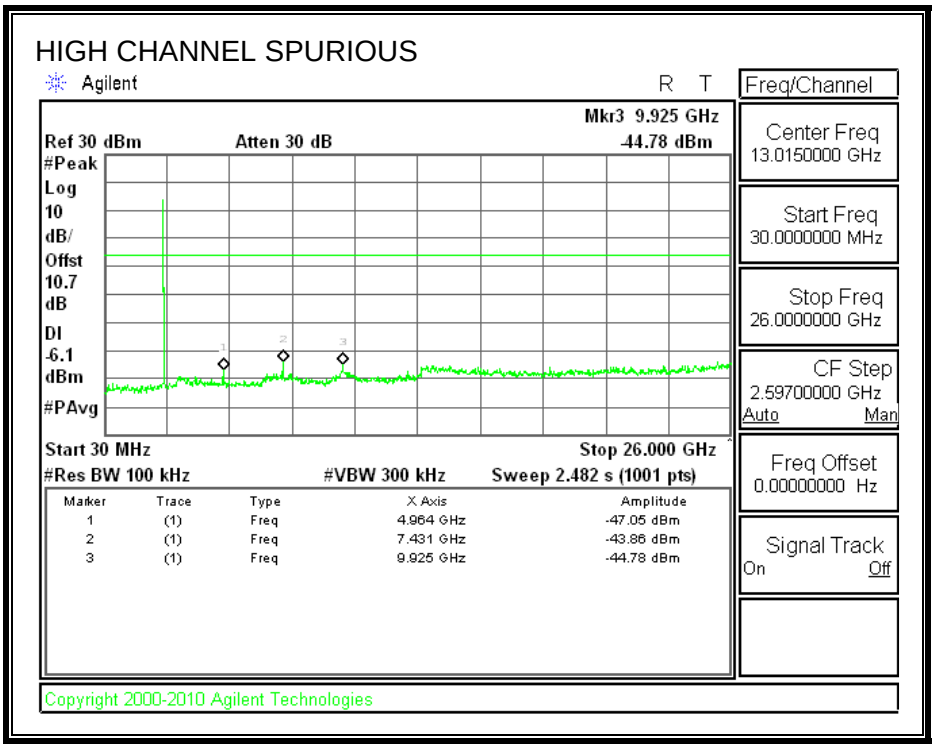
SPURIOUS EMISSIONS, MID CHANNEL





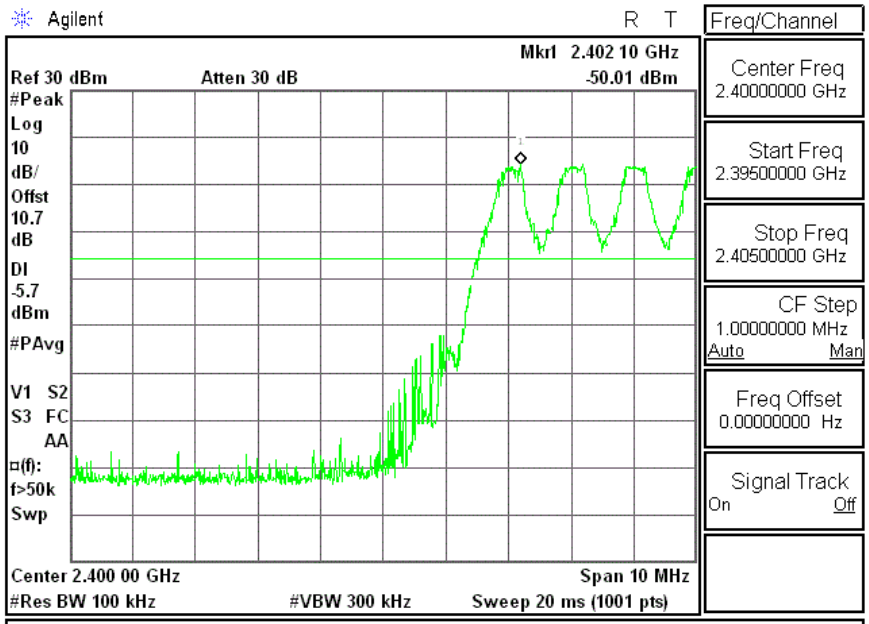
SPURIOUS EMISSIONS, HIGH CHANNEL



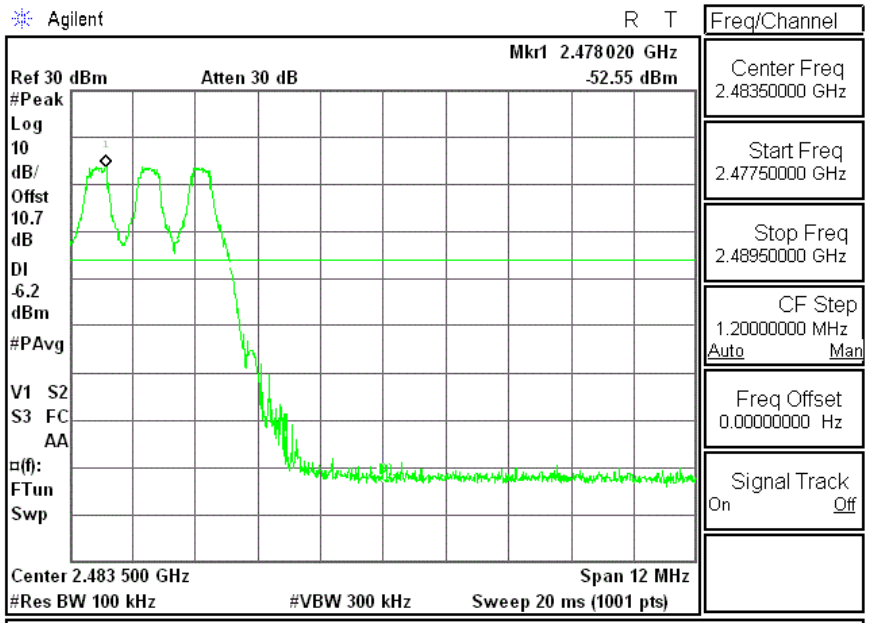


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



8.2. ENHANCED DATA RATE QPSK MODULATION

8.2.1. 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 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.61
Middle	2441	8.34
High	2480	7.96

8.3. ENHANCED DATA RATE 8PSK MODULATION

8.3.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

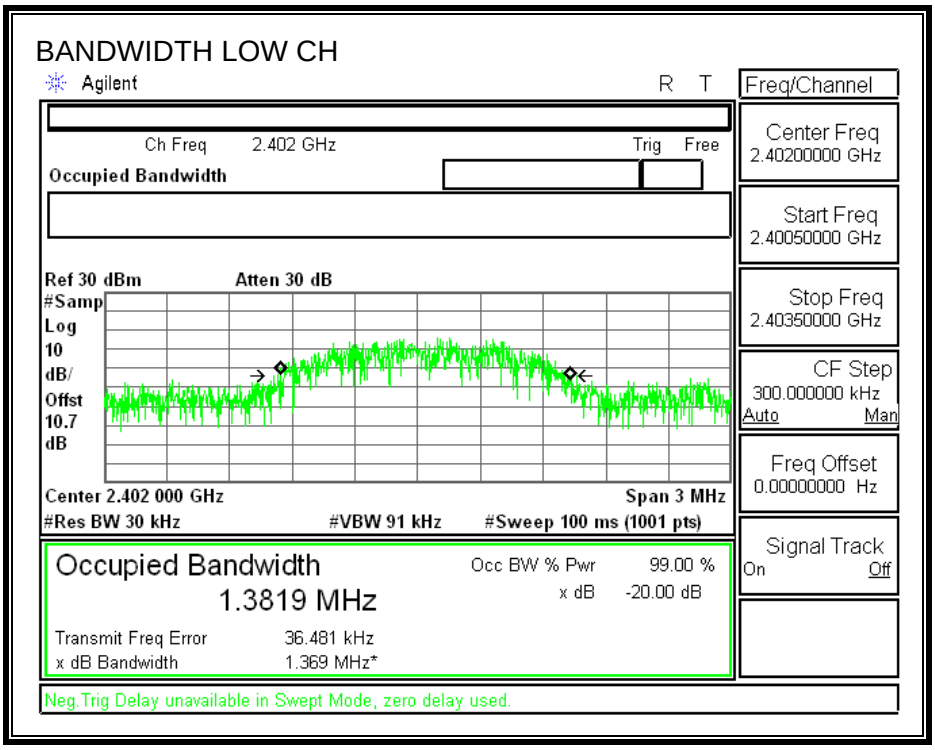
TEST PROCEDURE

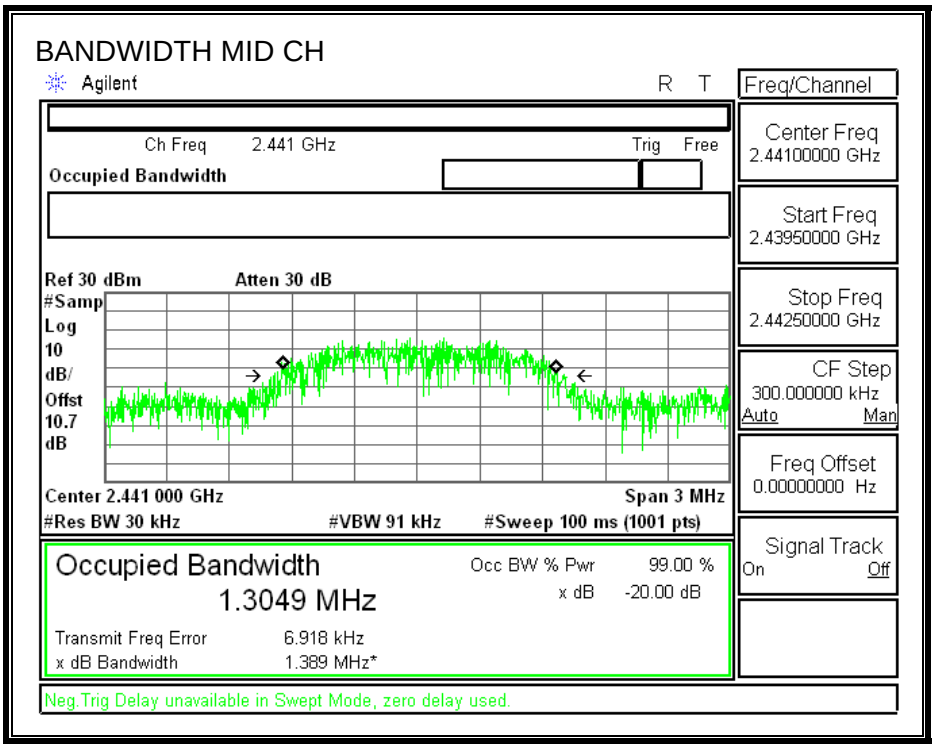
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

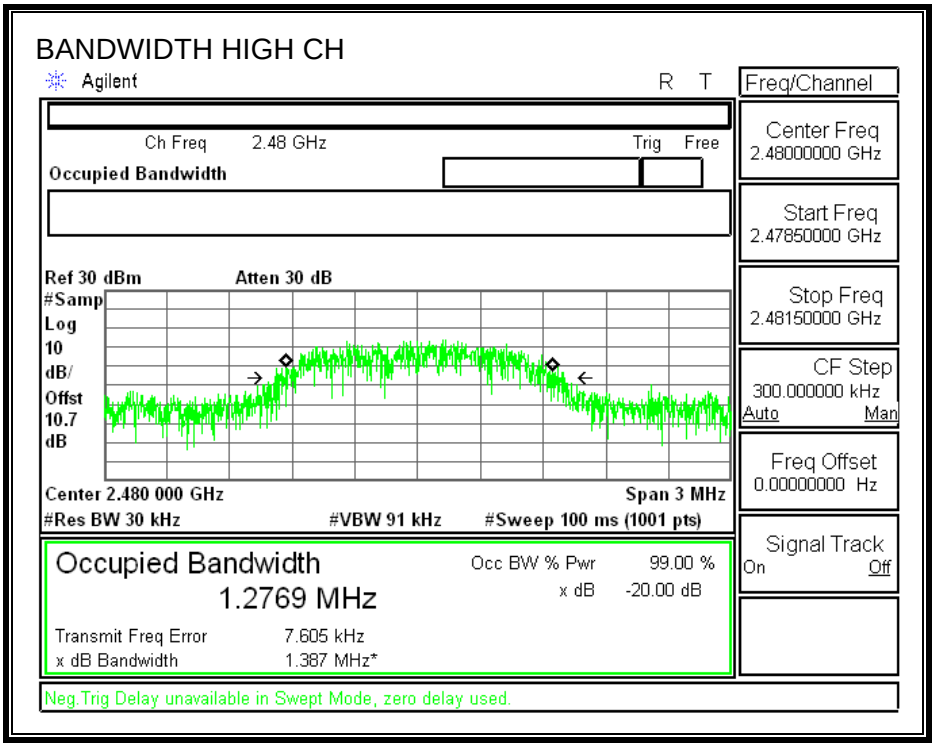
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (kHz)	20 dB Bandwidth (kHz)
Low	2402	1.3819	1.3690
Middle	2441	1.3049	1.3890
High	2480	1.2769	1.3870

20 dB AND 99% BANDWIDTH







8.3.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

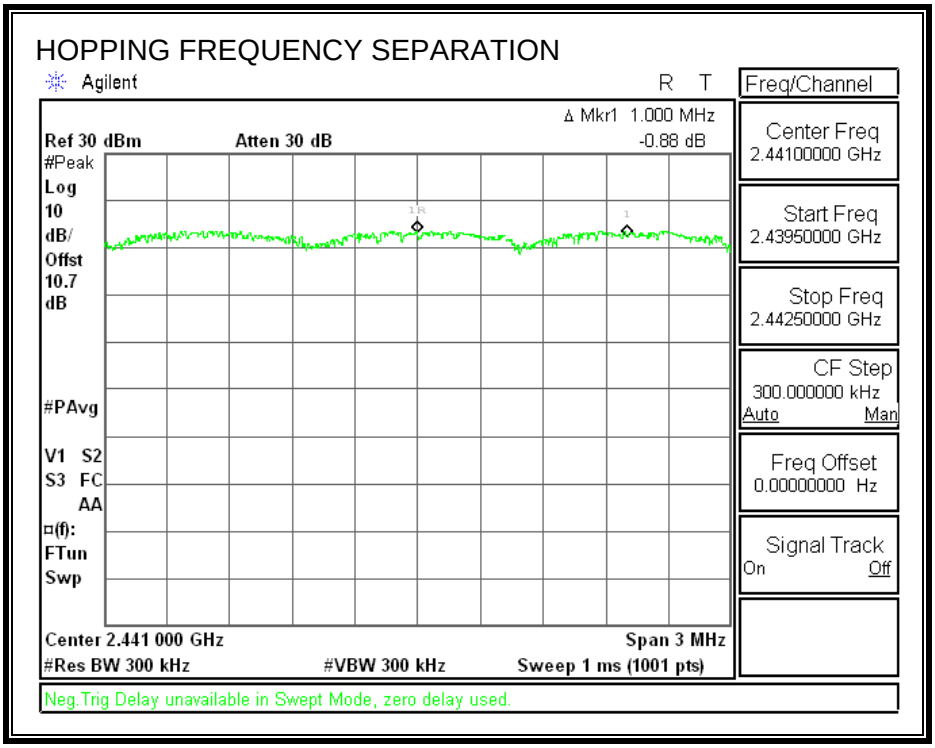
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



8.3.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

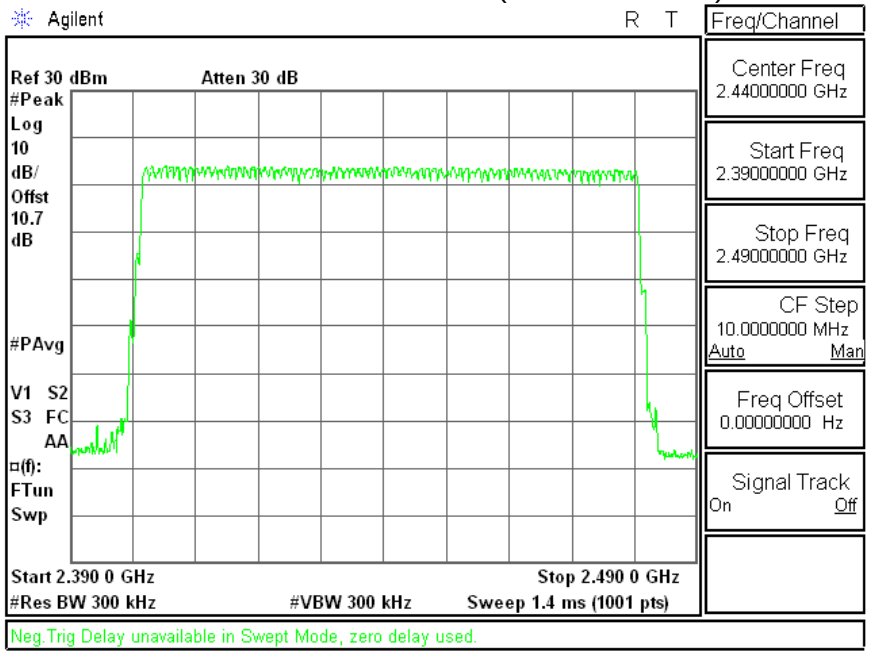
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

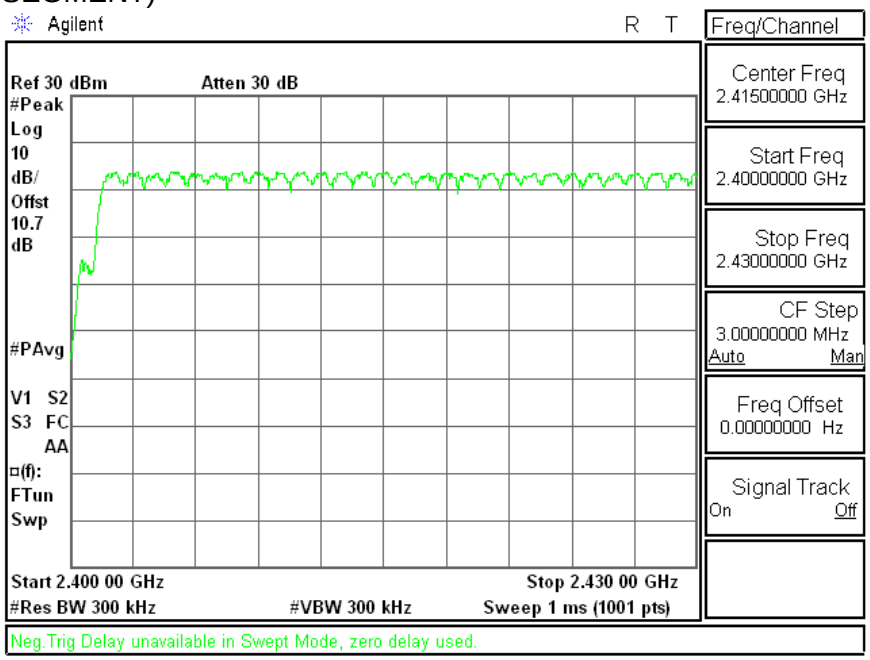
Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS

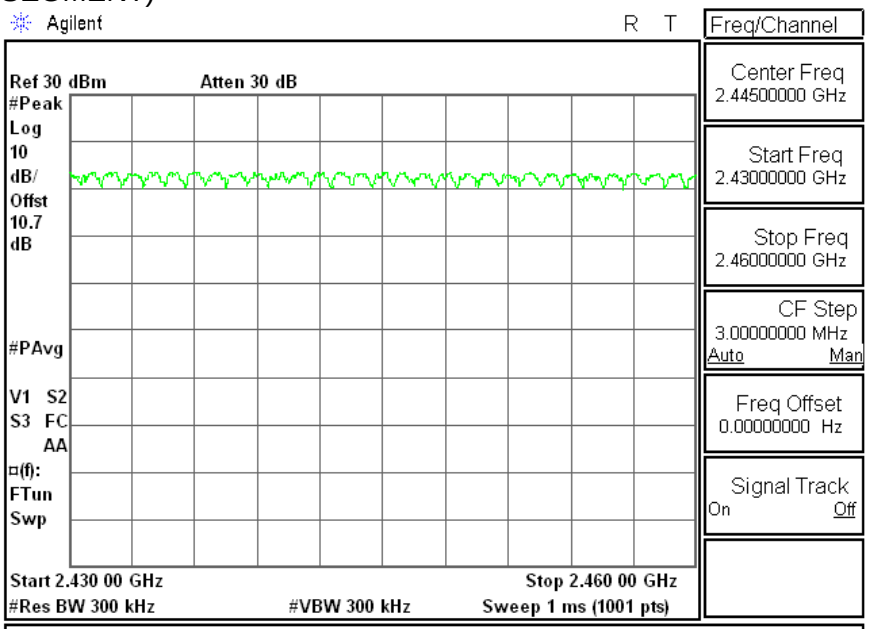
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



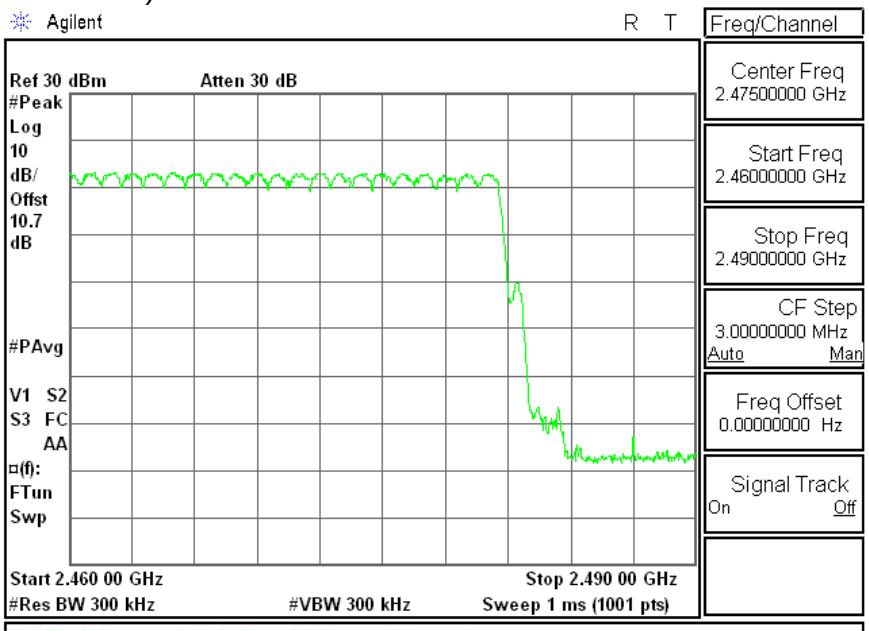
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



8.3.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

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

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

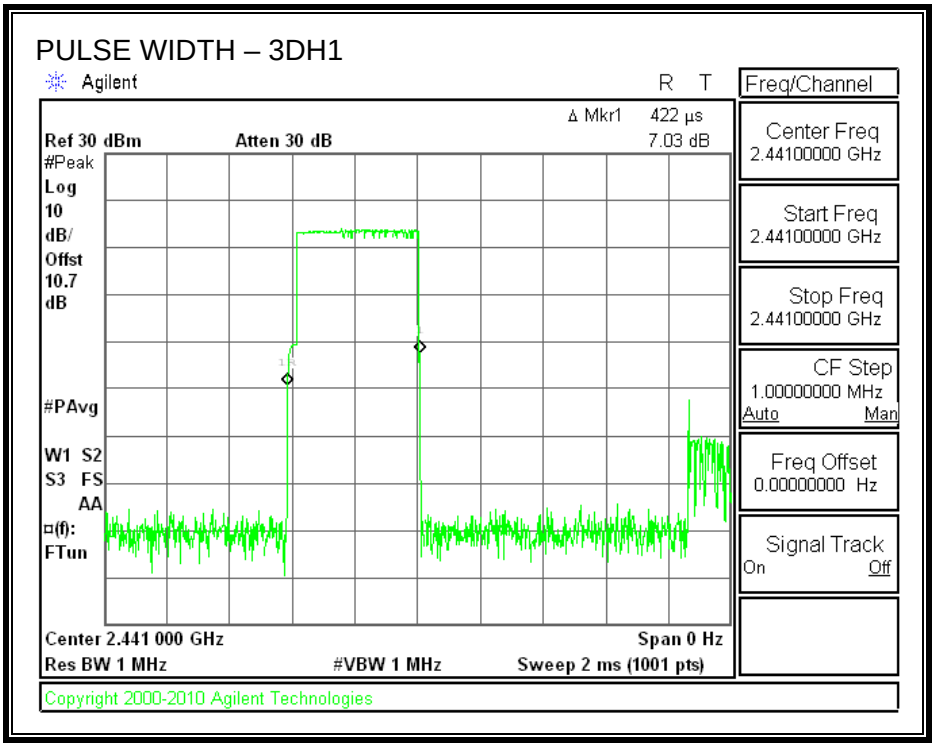
RESULTS

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

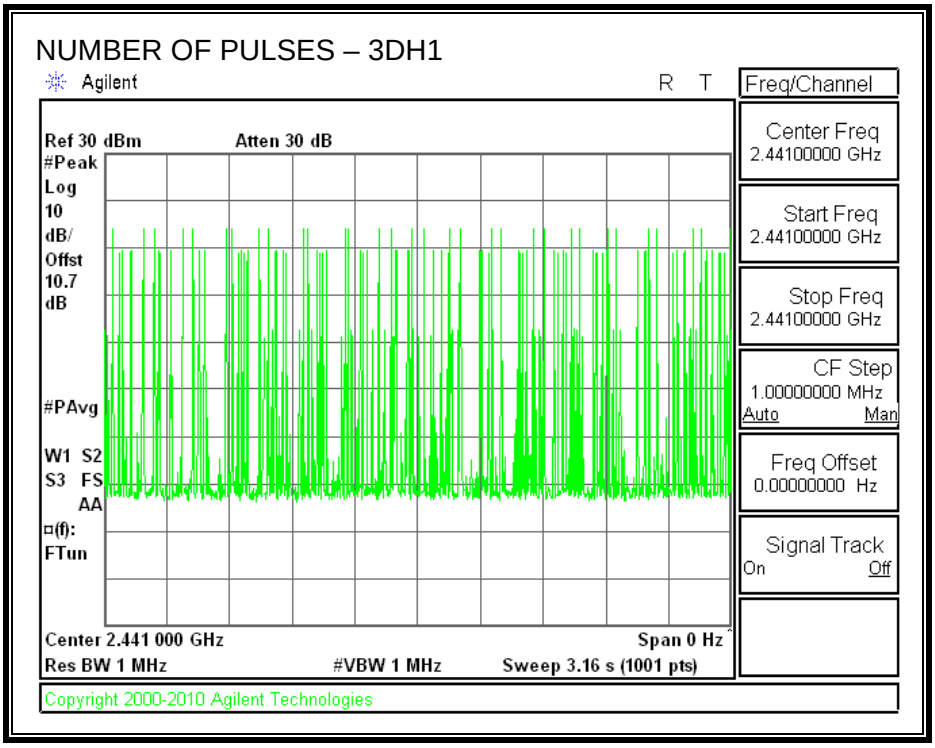
8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
3DH1	0.422	32	0.135	0.4	-0.265
3DH3	1.671	22	0.368	0.4	-0.032
3DH5	2.928	13	0.381	0.4	-0.019

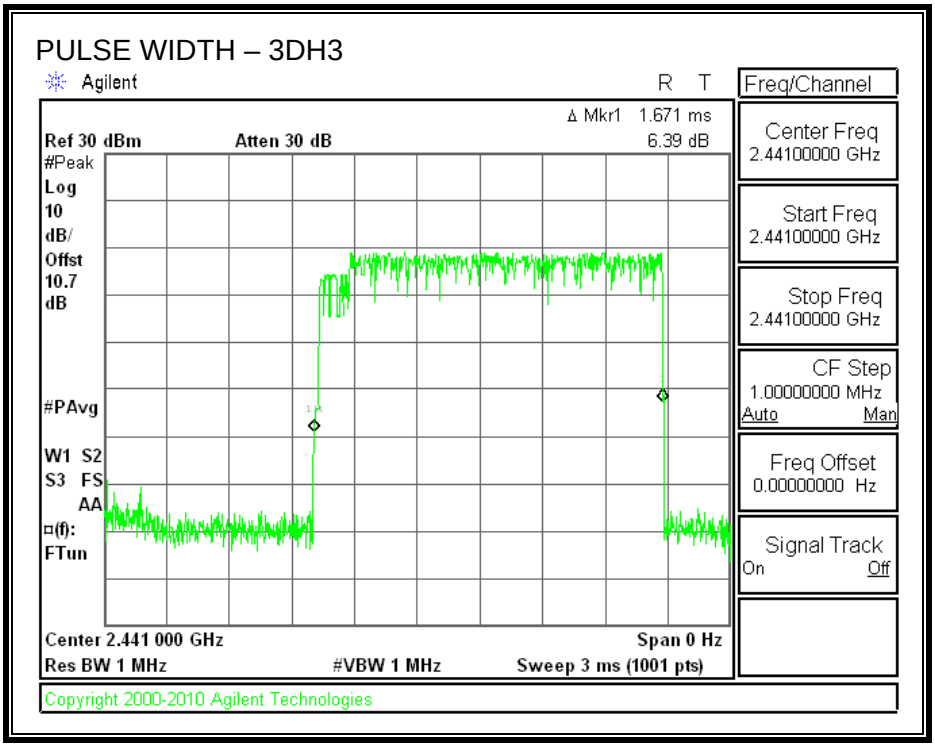
PULSE WIDTH - 3DH1



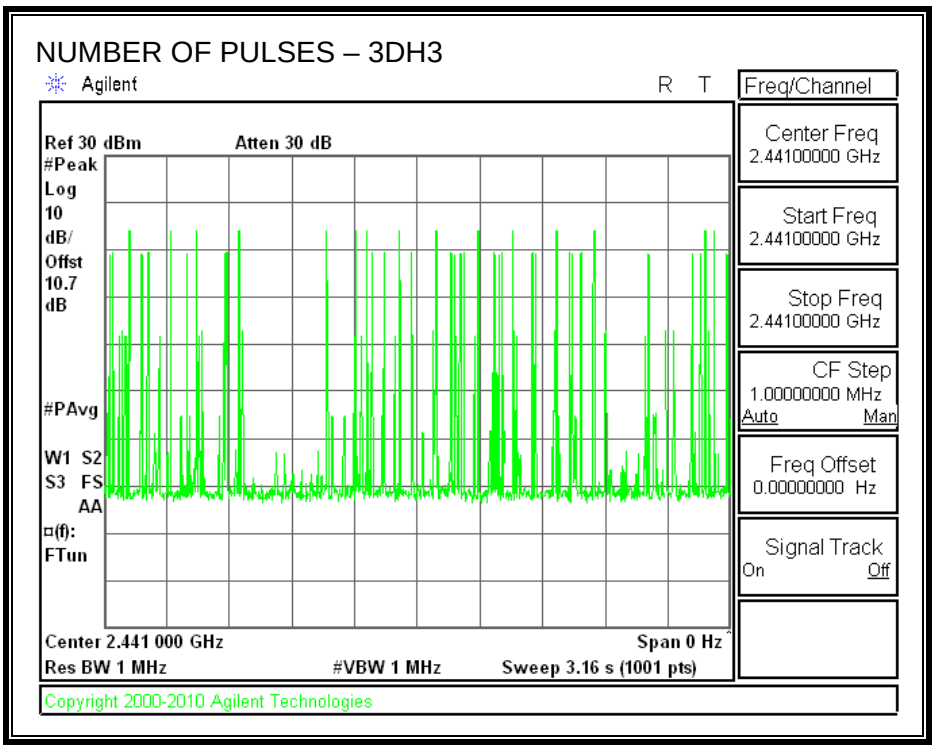
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



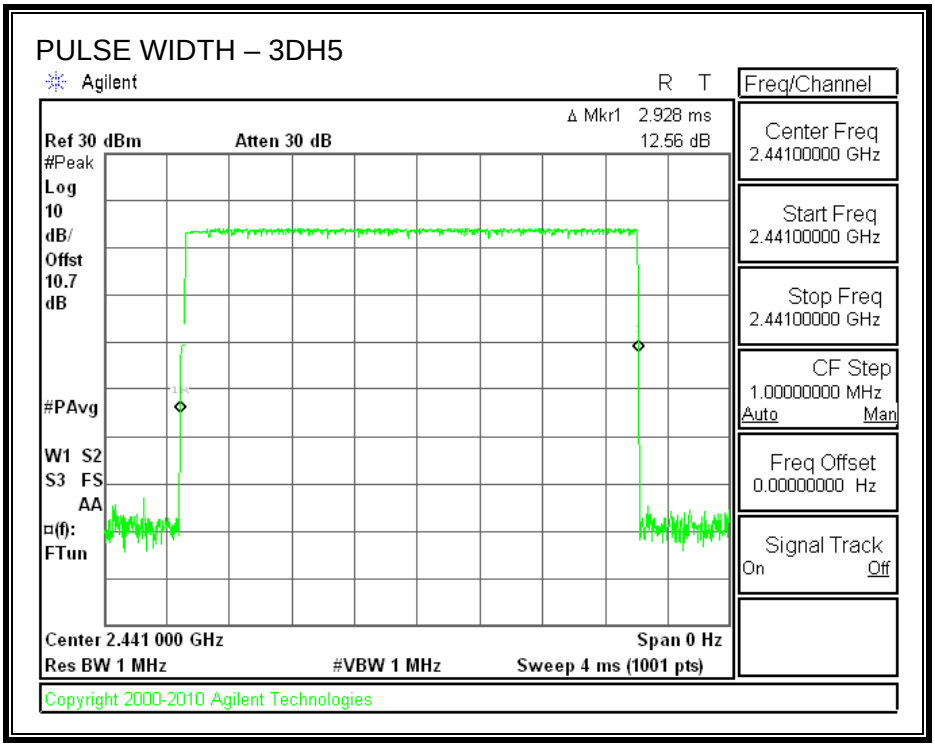
PULSE WIDTH – 3DH3



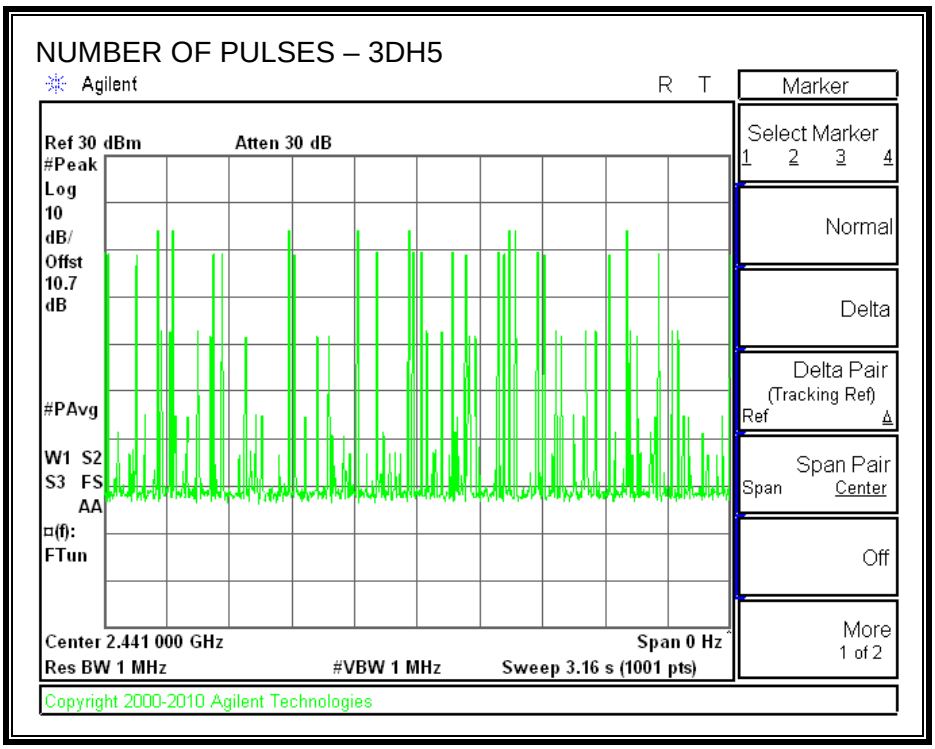
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5



8.3.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 8 Clause A8.4

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

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

TEST PROCEDURE

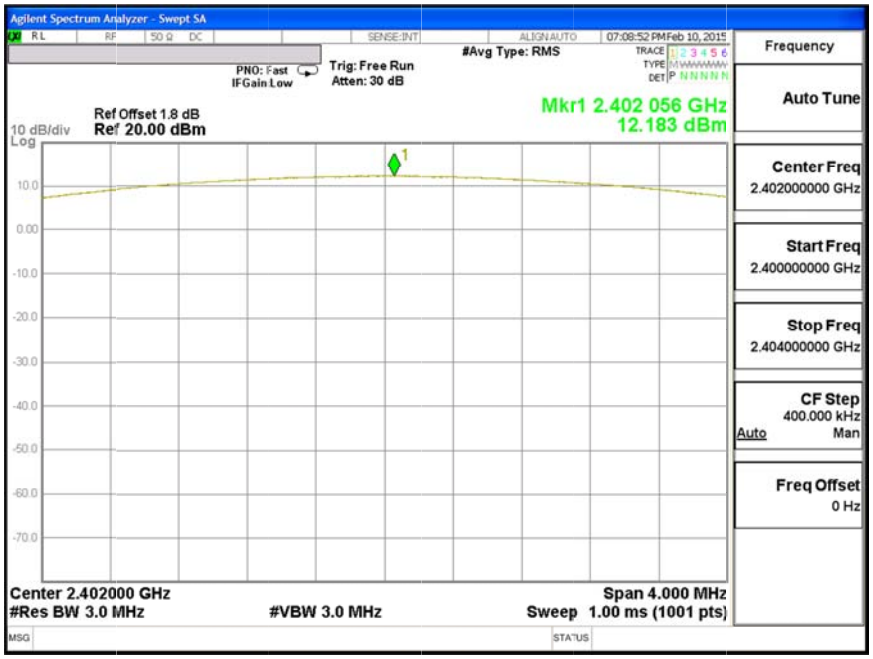
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

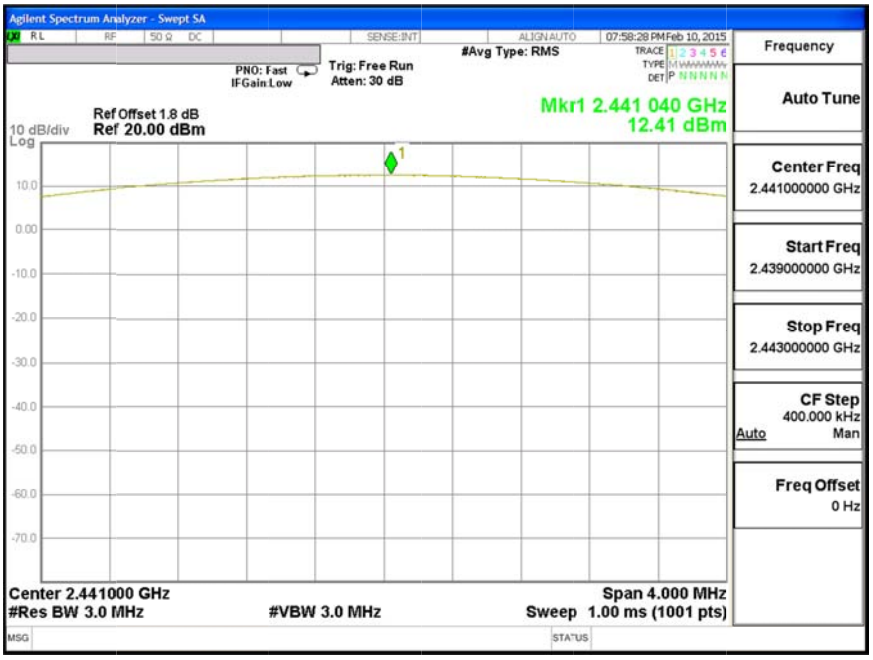
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.18	30	-17.82
Middle	2441	12.41	30	-17.59
High	2480	12.49	30	-17.51

OUTPUT POWER

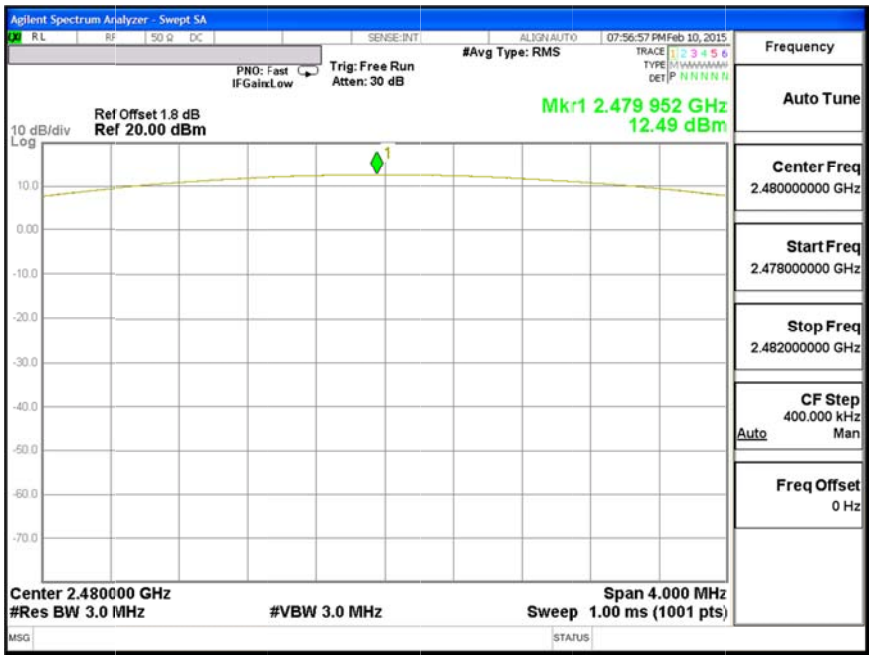
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH CH



8.3.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.8 dB (including 10 dB pad and 1.8 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.87
Middle	2441	9.96
High	2480	10.00

8.3.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

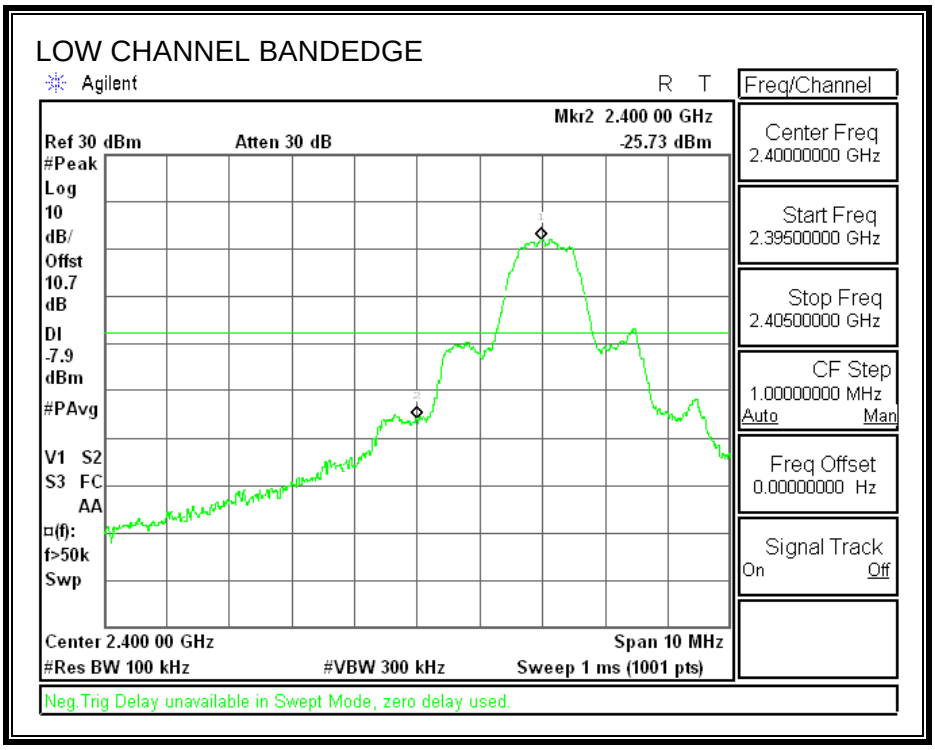
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

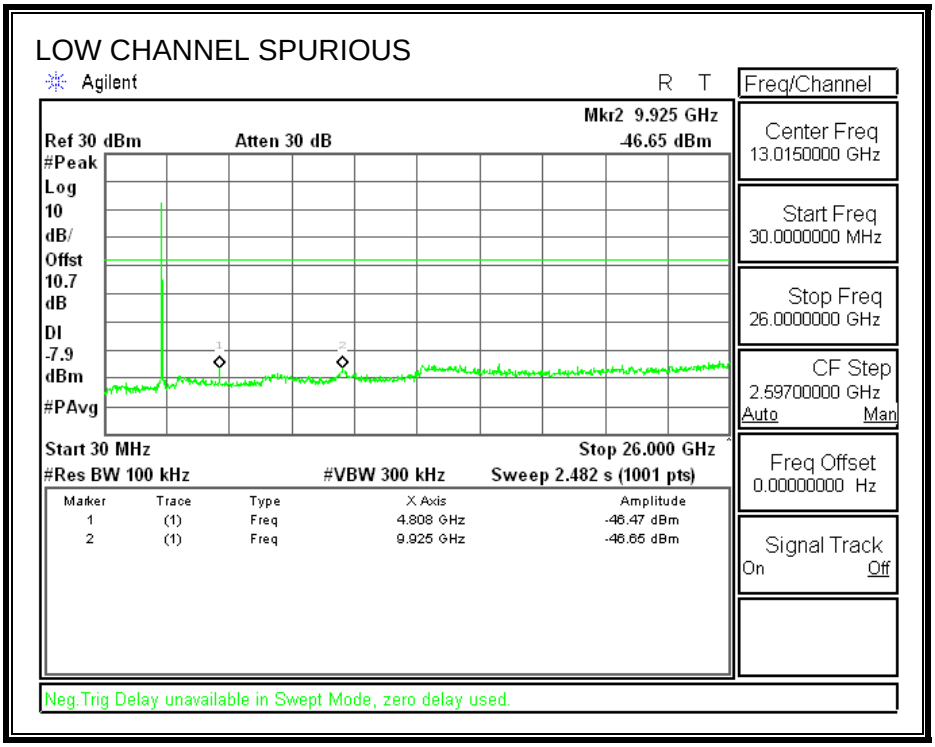
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

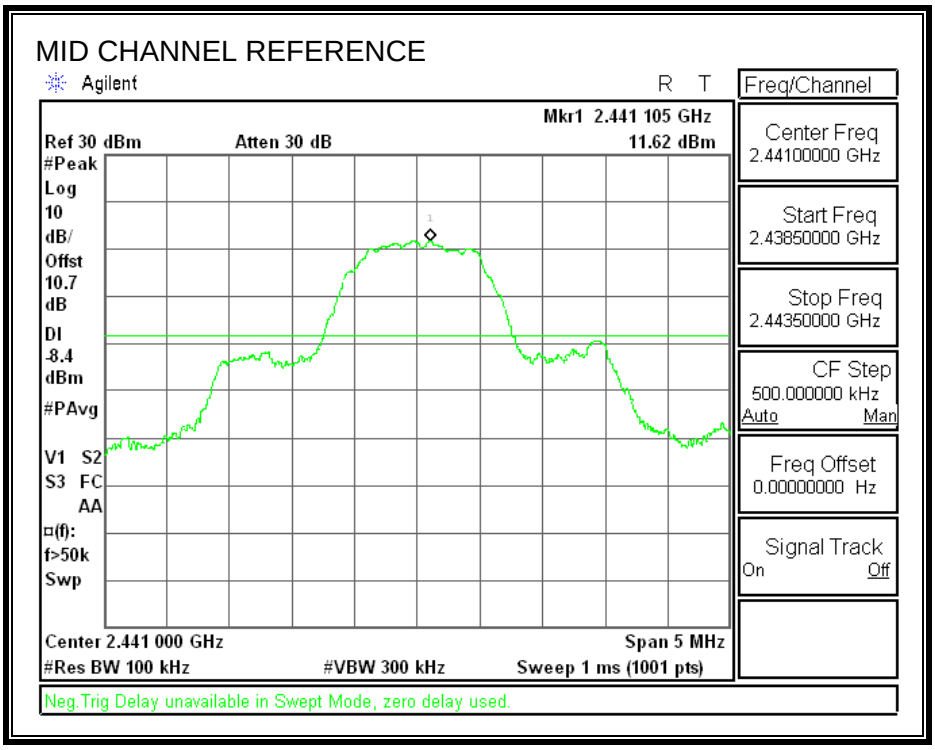
RESULTS

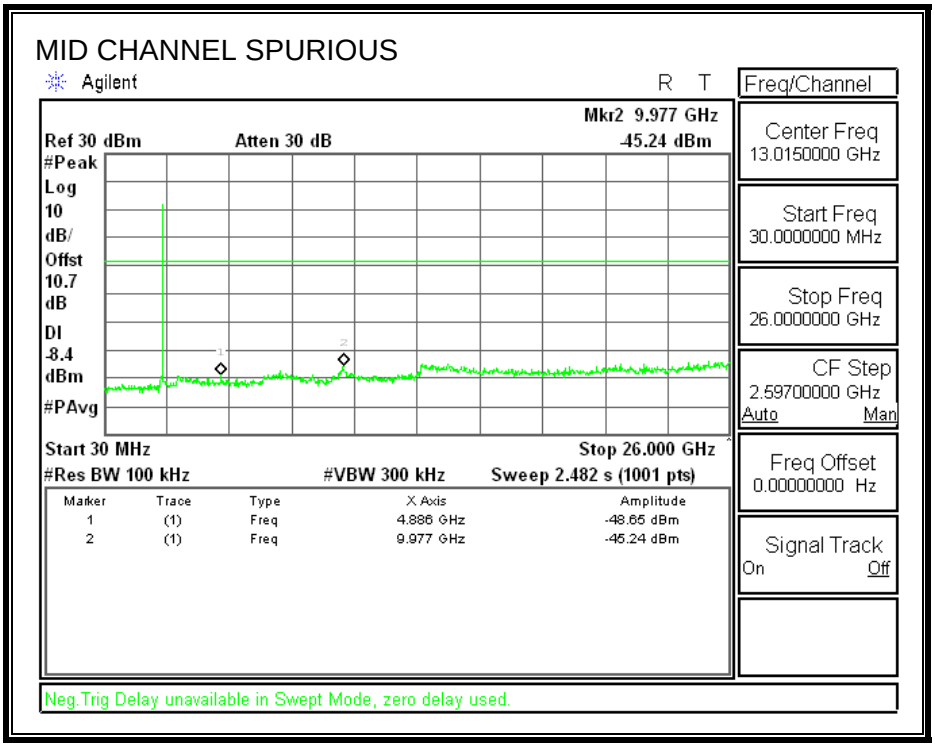
SPURIOUS EMISSIONS, LOW CHANNEL





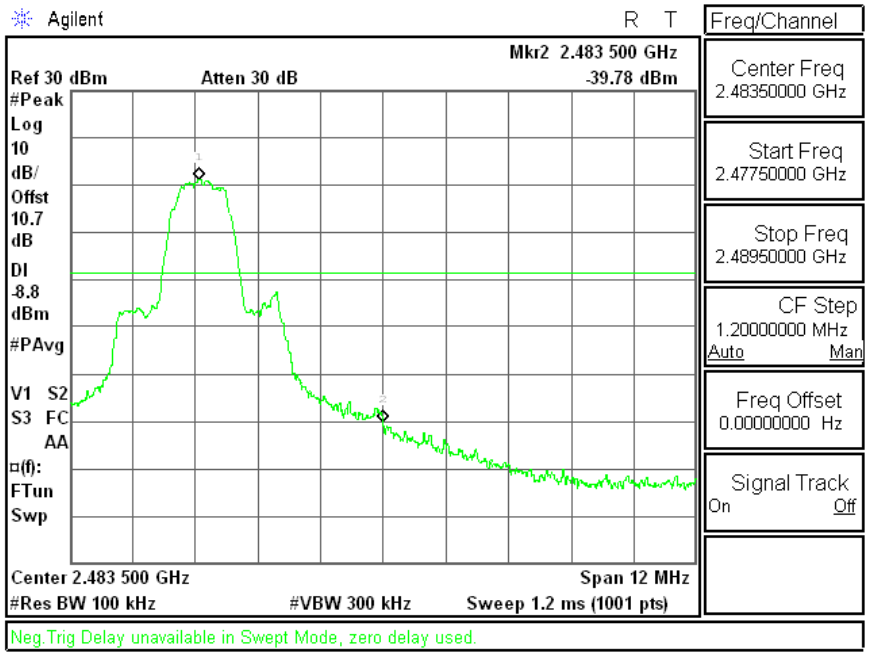
SPURIOUS EMISSIONS, MID CHANNEL



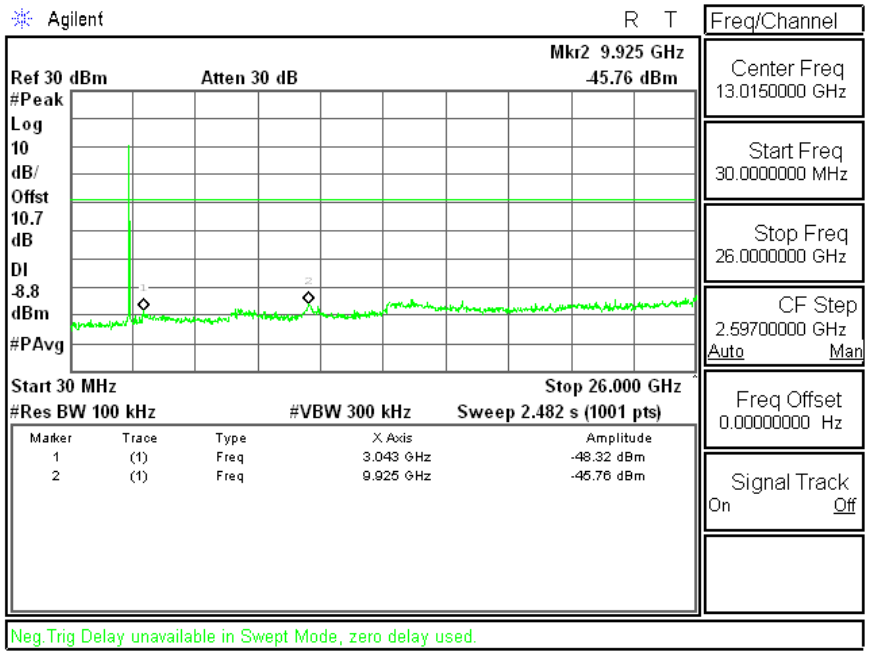


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE

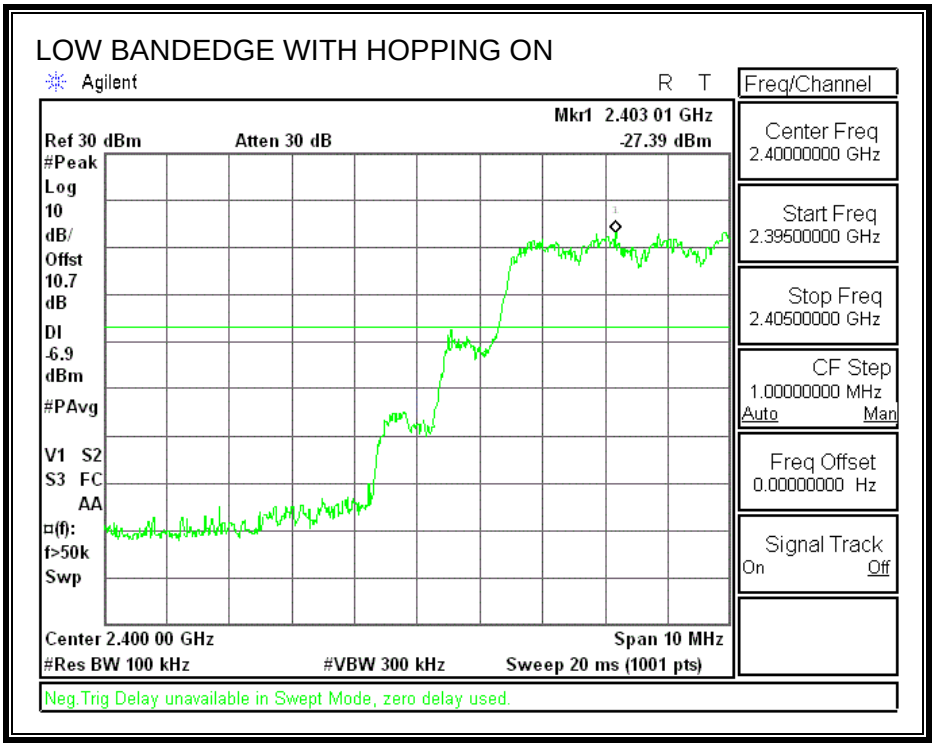


HIGH CHANNEL SPURIOUS

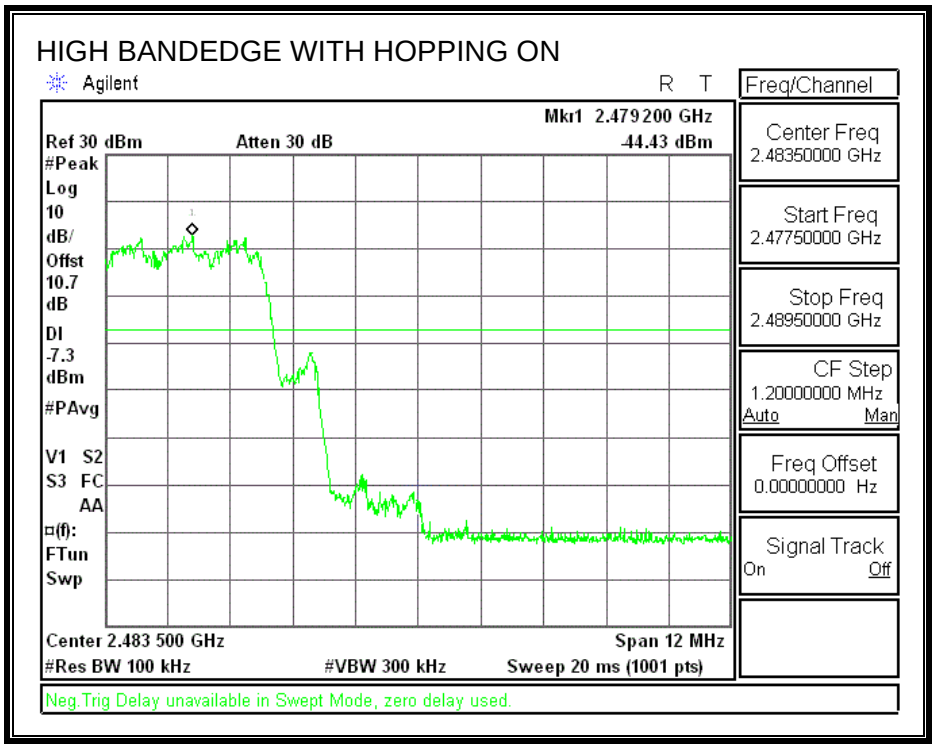


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.
IC RSS-GEN, Section 7 (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 3 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.

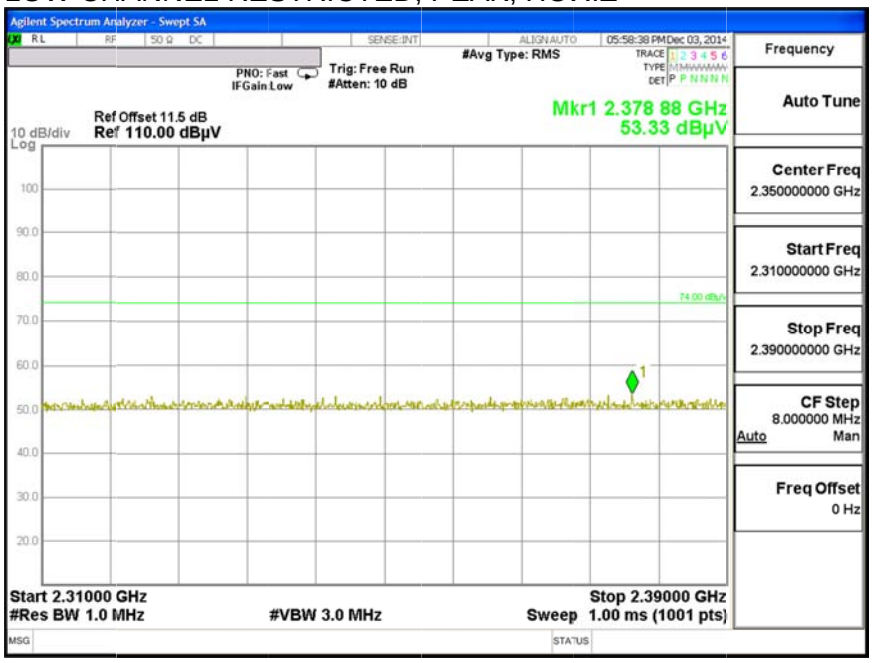
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. TRANSMITTER ABOVE 1 GHz ANTENNA 1

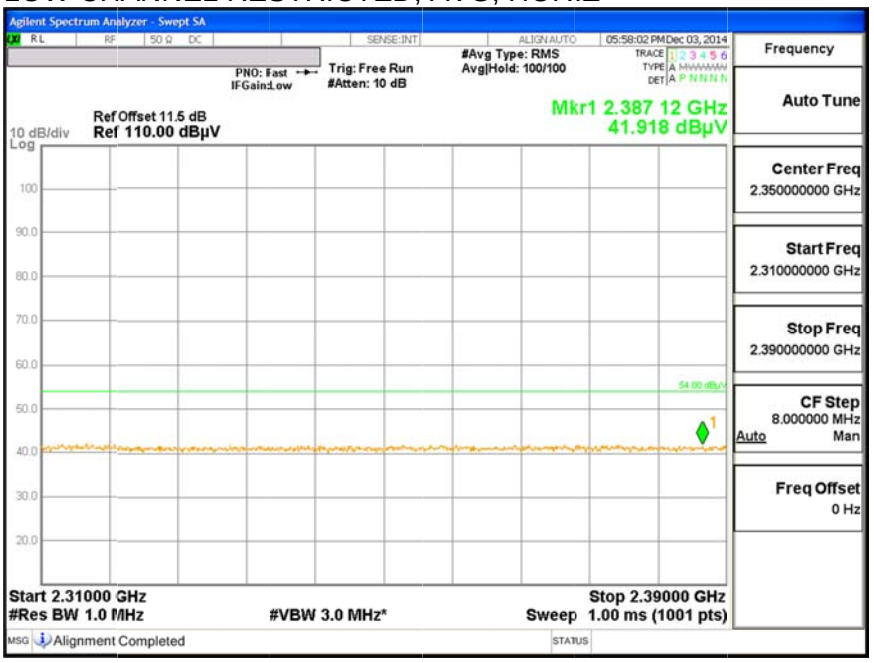
9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

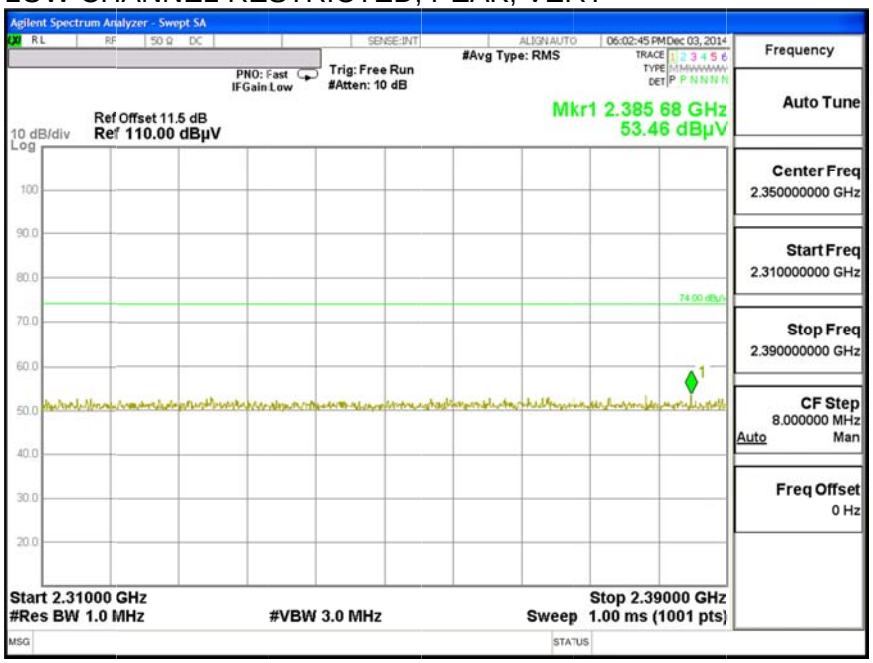


LOW CHANNEL RESTRICTED, AVG, HORIZ

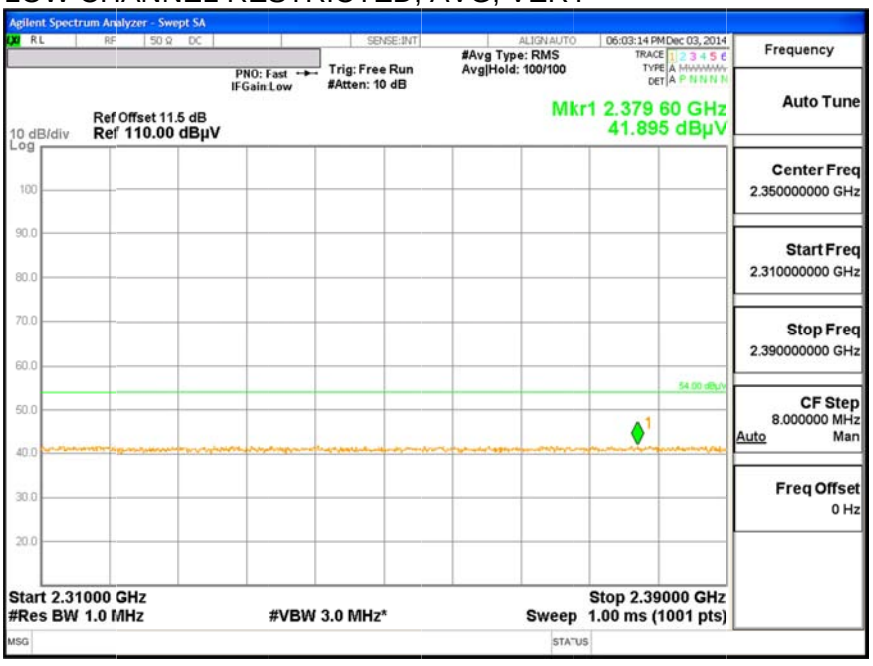


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

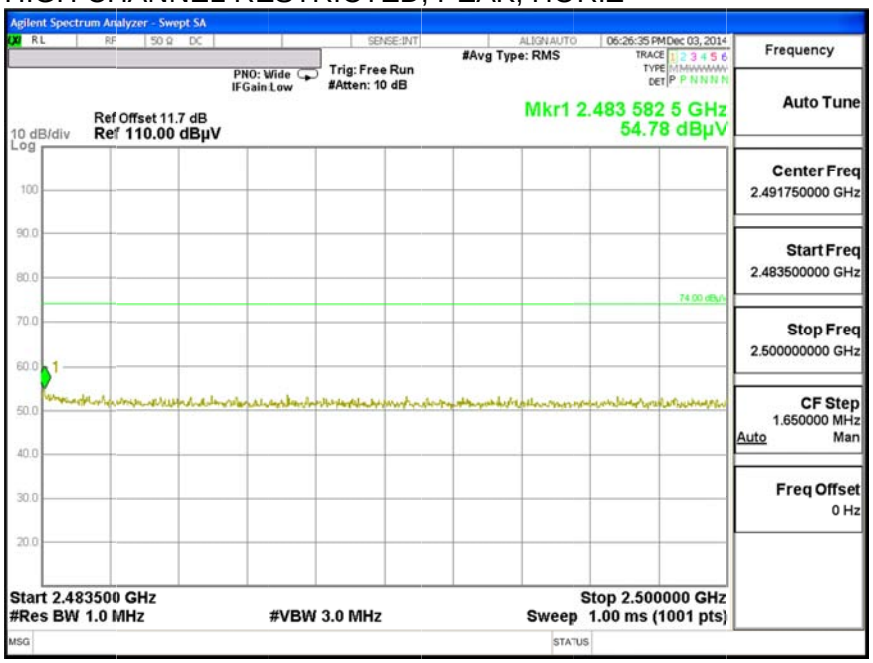


LOW CHANNEL RESTRICTED, AVG, VERT

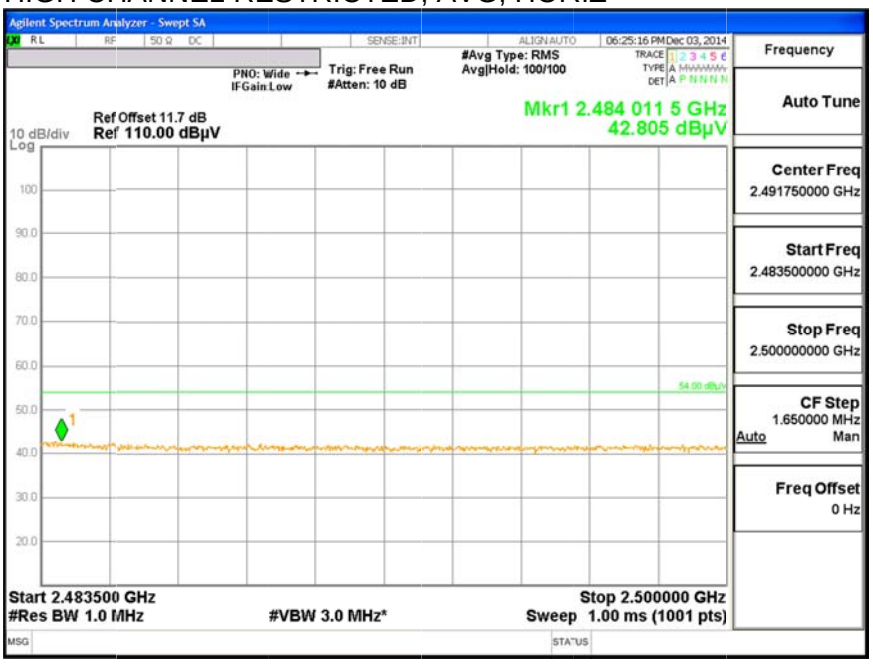


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

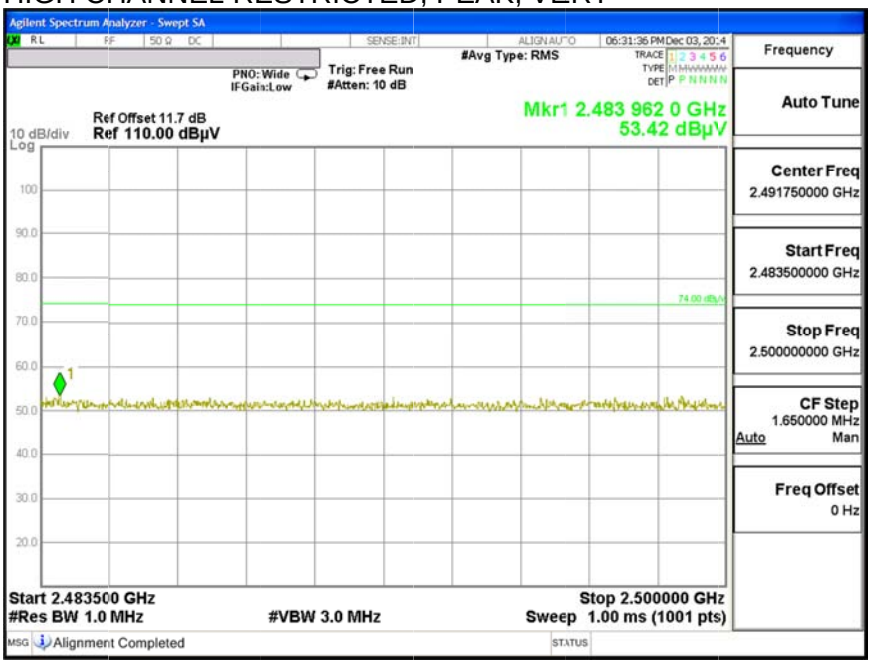


HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

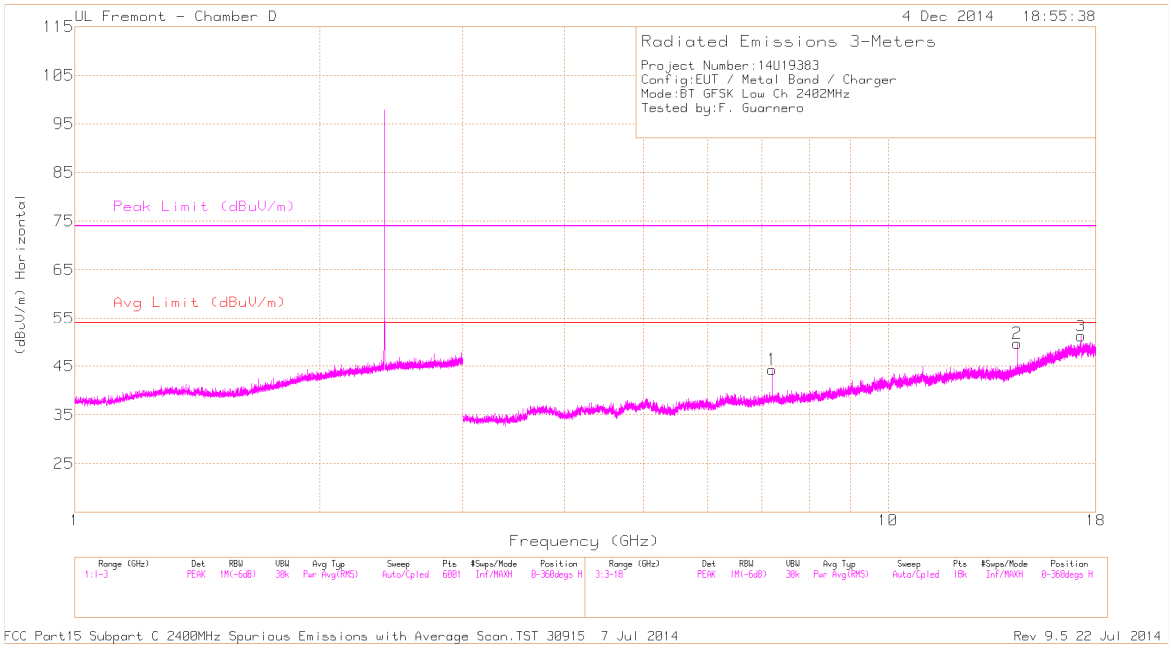
HIGH CHANNEL RESTRICTED, PEAK, VERT



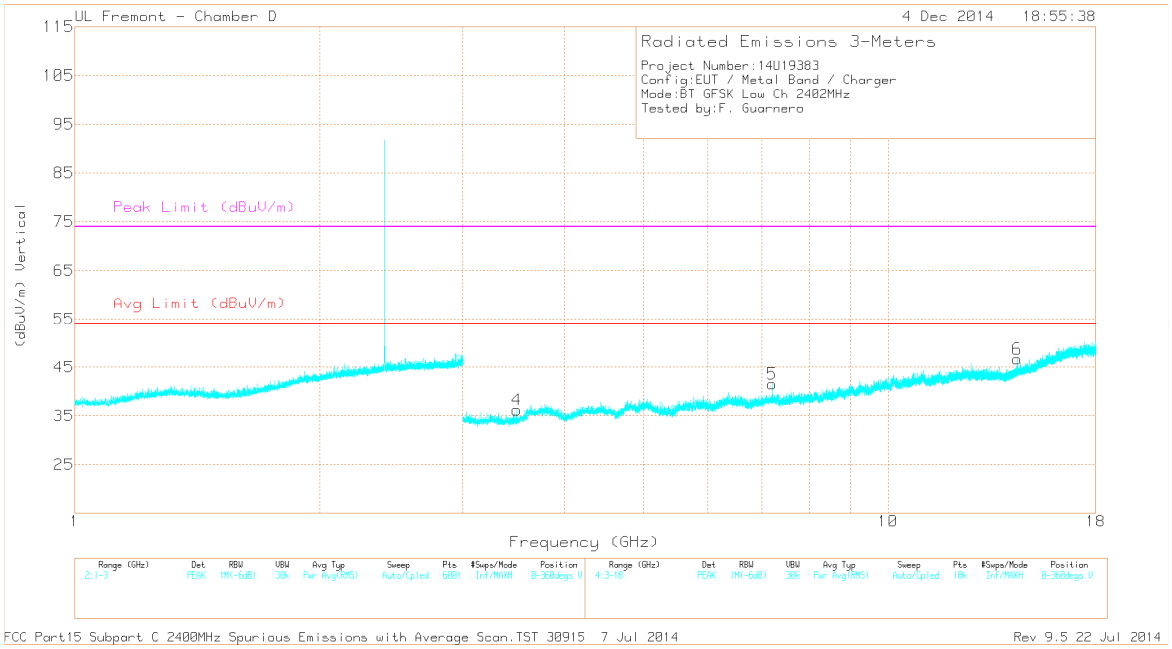
HIGH CHANNEL RESTRICTED, AVG, VERT

HARMONICS AND SPURIOUS EMISSIONS (LOW)

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



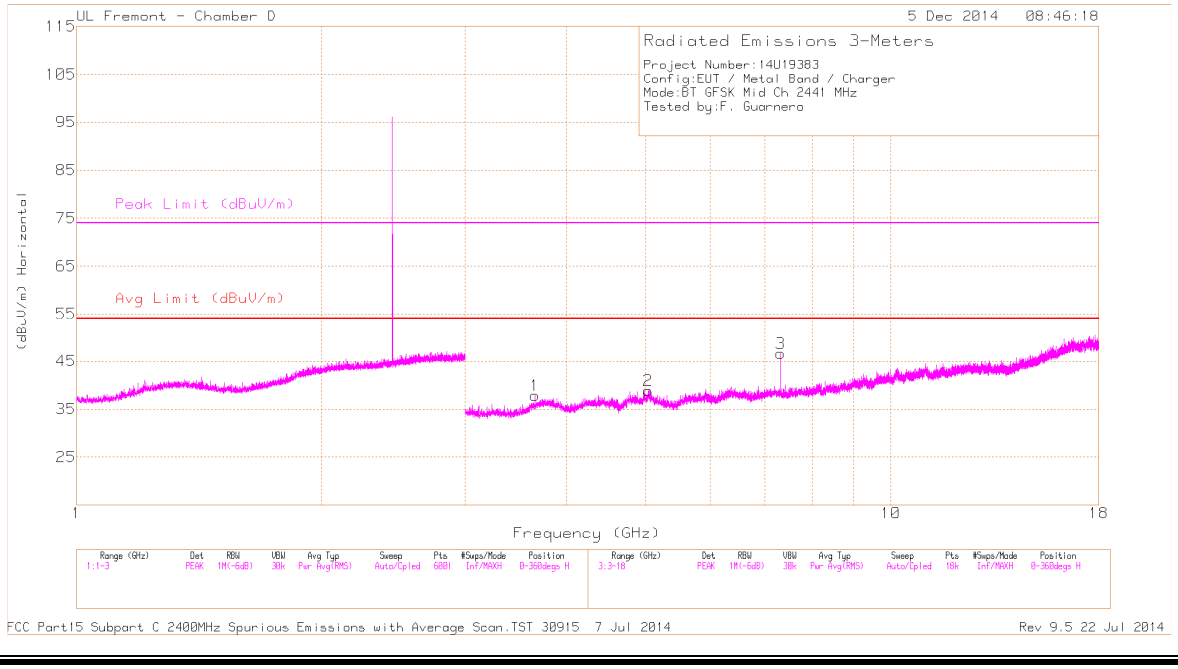
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	7.206	41.20	PK3	35.7	-24.8	52.10	-	-	-	-	344	285	H
2	14.413	39.30	PK3	39.4	-22.5	56.20	-	-	-	-	36	138	H
3	17.258	32.79	PK3	41.6	-17.1	57.29	-	-	-	-	360	309	H
4	3.498	38.60	PK3	32.9	-28.3	43.20	-	-	-	-	353	202	V
5	7.206	37.26	PK3	35.7	-24.8	48.16	-	-	-	-	48	244	V
6	14.413	37.70	PK3	39.4	-22.5	54.60	-	-	-	-	354	154	V

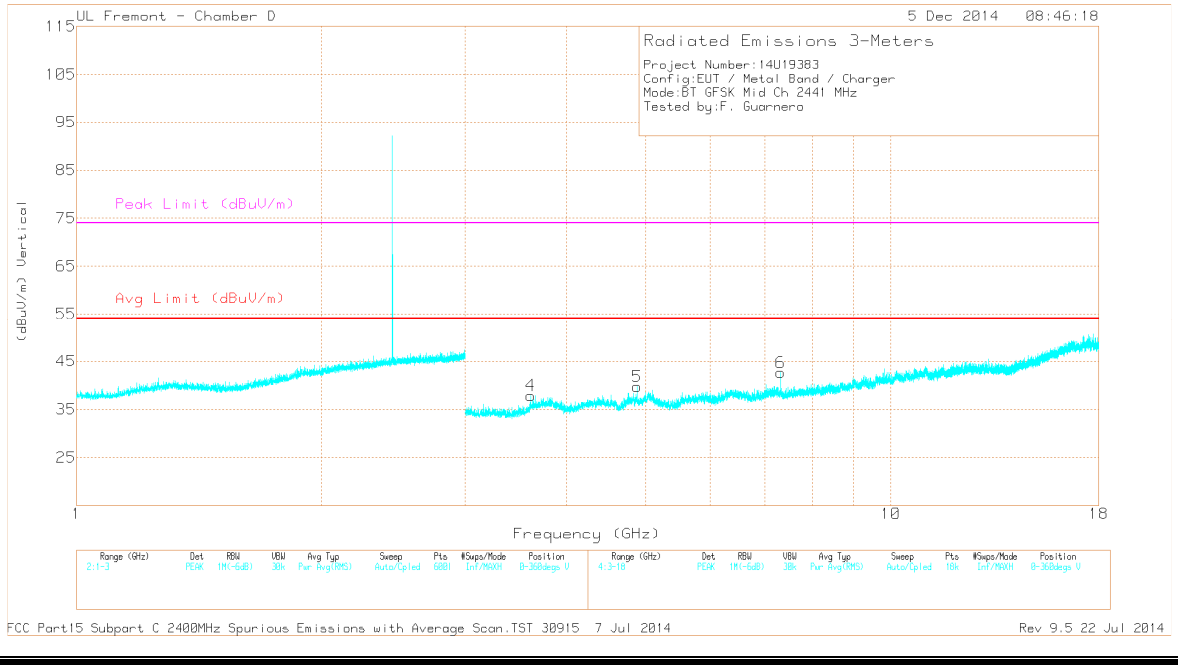
PK3 - FHSS Method: Maximum Peak

HARMONICS AND SPURIOUS EMISSIONS (MID)

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.657	38.97	PK3	33.3	-28.9	43.37	-	-	74	-30.63	280	238	H
	* 3.658	25.9	VB10	33.3	-28.9	30.3	54	-23.7	-	-	280	238	H
2	* 5.032	37.31	PK3	34.2	-26.2	45.31	-	-	74	-28.69	194	244	H
	* 5.033	24.61	VB10	34.2	-26.2	32.61	54	-21.39	-	-	194	244	H
3	* 7.323	41.4	PK3	35.7	-24.9	52.2	-	-	74	-21.8	354	173	H
	* 7.323	34.98	VB10	35.7	-24.9	45.78	54	-8.22	-	-	354	173	H
4	* 3.611	38.55	PK3	33.5	-28.5	43.55	-	-	74	-30.45	281	335	V
	* 3.612	25.76	VB10	33.5	-28.5	30.76	54	-23.24	-	-	281	335	V
5	* 4.882	39.23	PK3	34.2	-27.9	45.53	-	-	74	-28.47	303	110	V
	* 4.882	29.81	VB10	34.2	-28	36.01	54	-17.99	-	-	303	110	V
6	* 7.323	39.12	PK3	35.7	-24.9	49.92	-	-	74	-24.08	186	274	V
	* 7.323	30.65	VB10	35.7	-24.9	41.45	54	-12.55	-	-	186	274	V

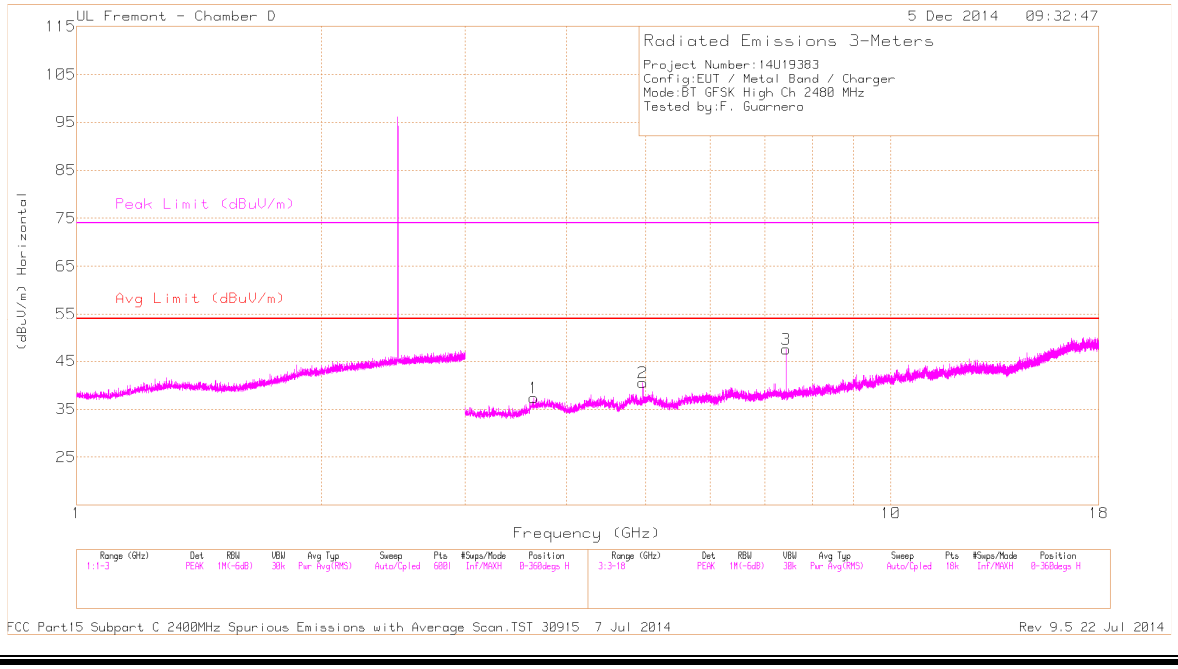
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK3 FHSS Method: Maximum Peak

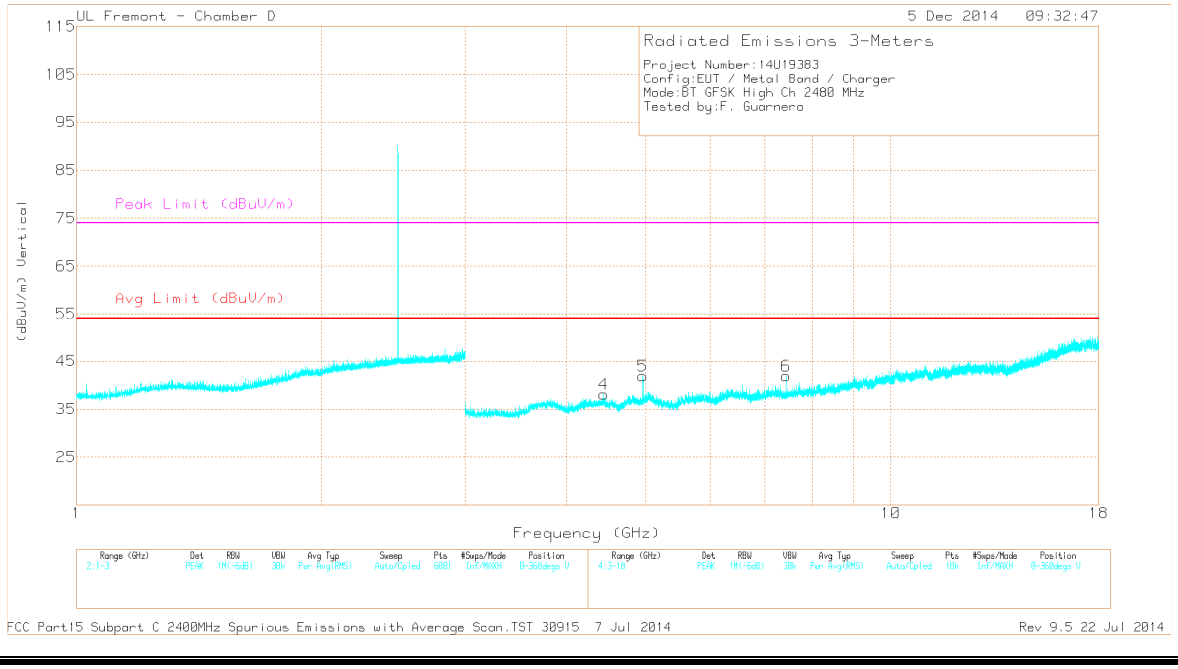
VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS (HIGH)

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.641	38.58	PK3	33.4	-28.8	43.18	-	-	74	-30.82	207	312	H
	* 3.640	25.73	VB10	33.4	-28.8	30.33	54	-23.67	-	-	207	312	H
2	* 4.959	39.84	PK3	34.2	-27.4	46.64	-	-	74	-27.36	230	210	H
	* 4.96	30.13	VB10	34.2	-27.4	36.93	54	-17.07	-	-	230	210	H
3	* 7.441	41.76	PK3	35.6	-24.8	52.56	-	-	74	-21.44	333	284	H
	* 7.440	34.94	VB10	35.6	-24.8	45.74	54	-8.26	-	-	333	284	H
4	4.439	38.41	PK3	33.9	-27.6	44.71	-	-	-	-	342	294	V
5	* 4.960	41.13	PK3	34.2	-27.4	47.93	-	-	74	-26.07	306	105	V
	* 4.960	31.72	VB10	34.2	-27.4	38.52	54	-15.48	-	-	306	105	V
6	* 7.440	38.95	PK3	35.6	-24.8	49.75	-	-	74	-24.25	143	247	V
	* 7.440	29.82	VB10	35.6	-24.8	40.62	54	-13.38	-	-	143	247	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

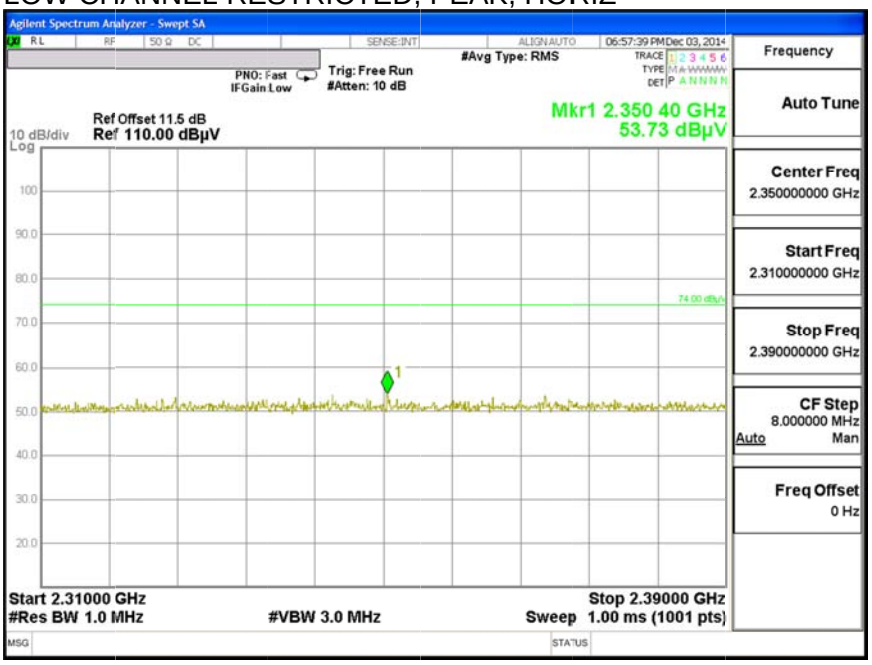
PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

9.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

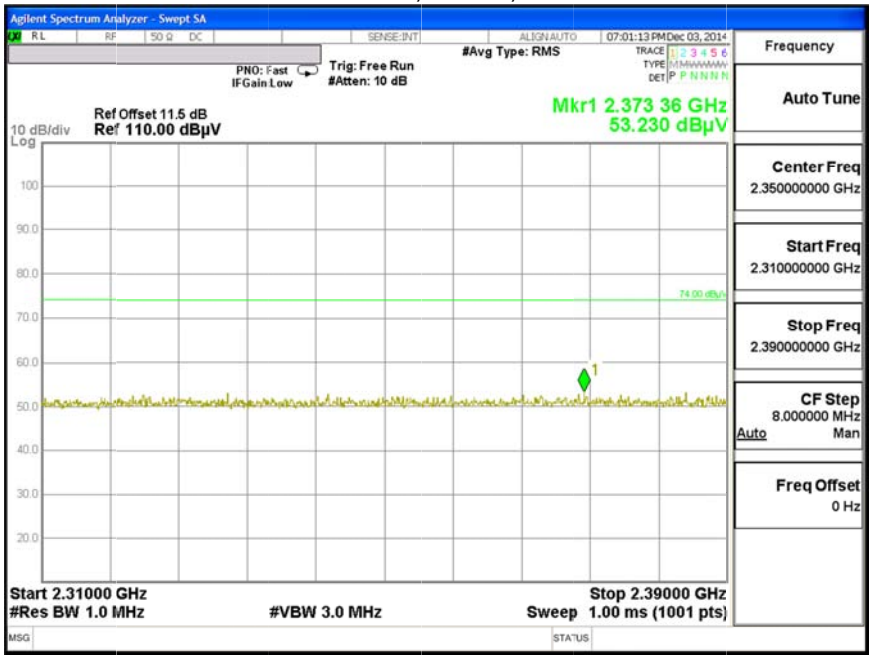
LOW CHANNEL RESTRICTED, PEAK, HORIZ



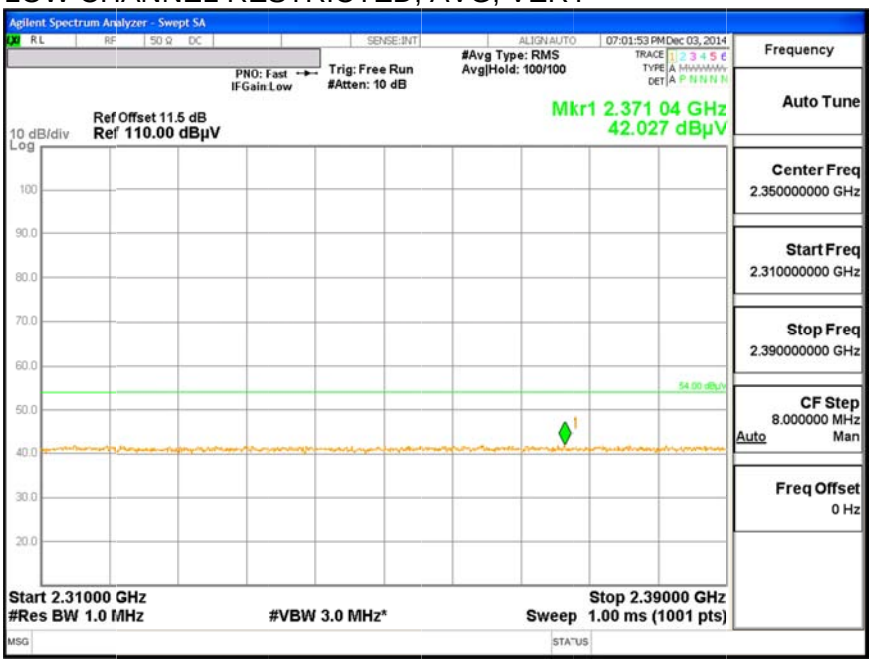
LOW CHANNEL RESTRICTED, AVG, HORIZ

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

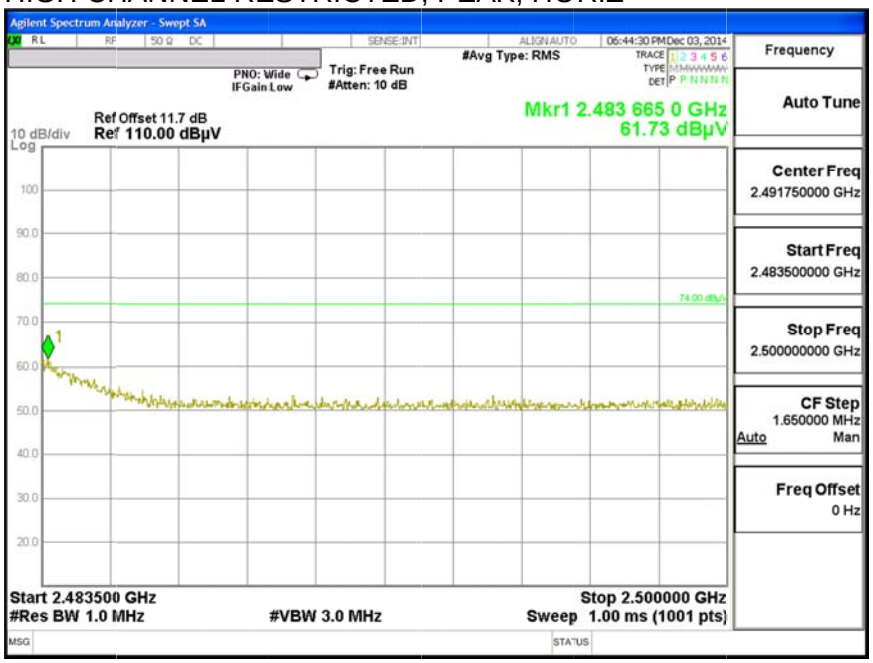


LOW CHANNEL RESTRICTED, AVG, VERT

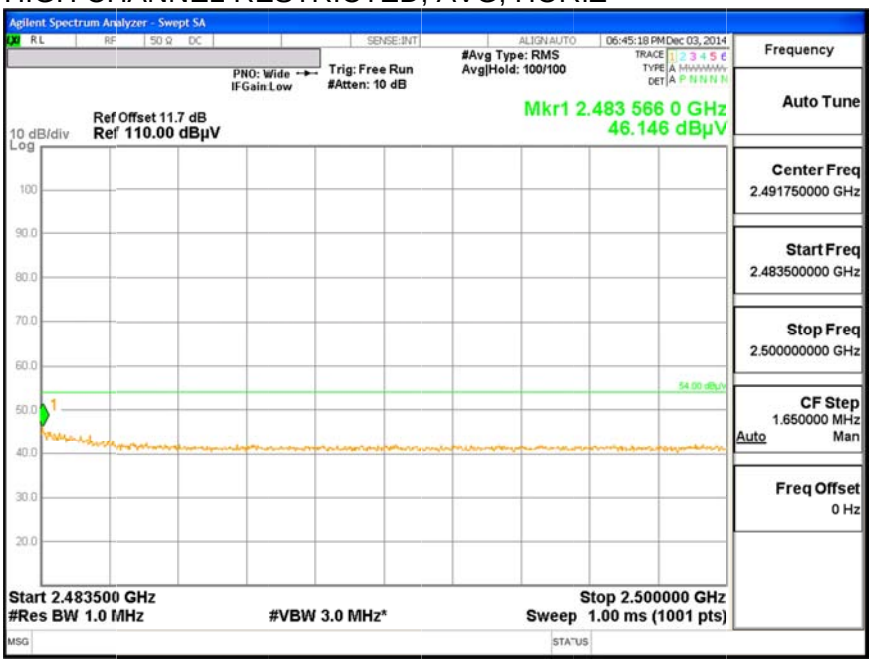


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

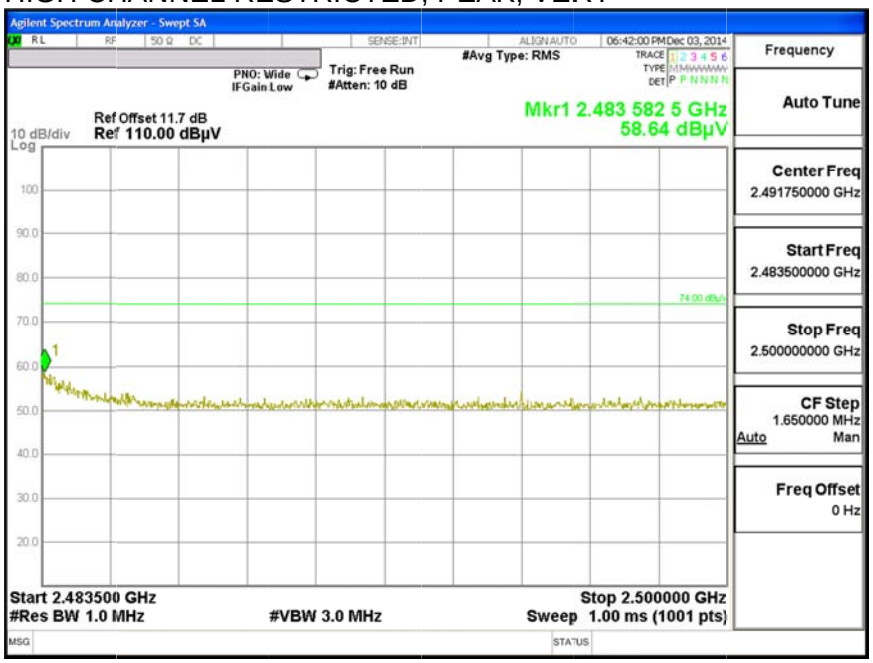


HIGH CHANNEL RESTRICTED, AVG, HORIZ

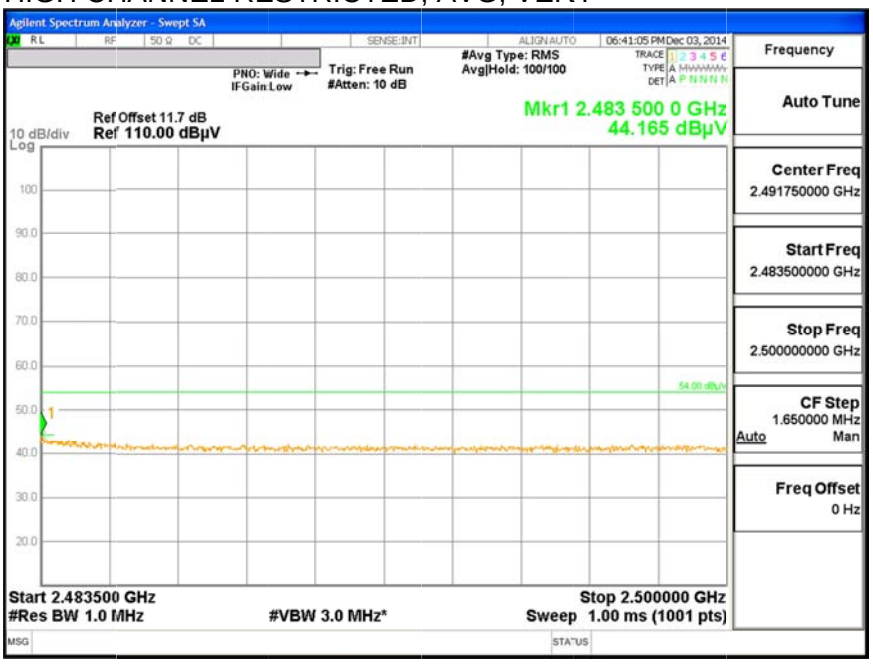


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT

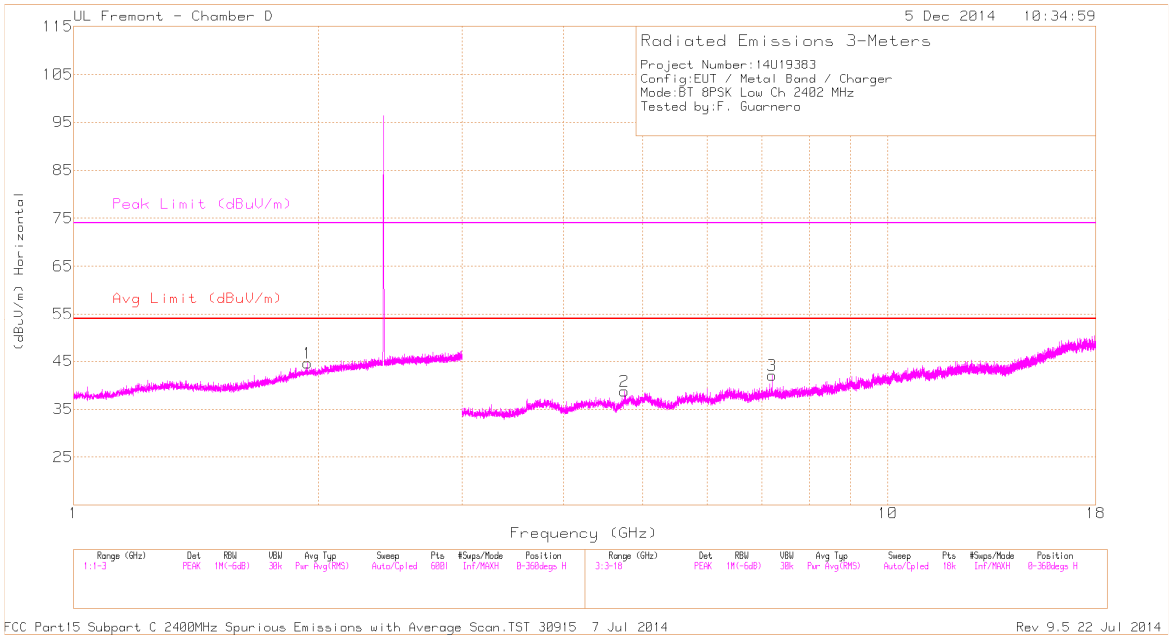


HIGH CHANNEL RESTRICTED, AVG, VERT

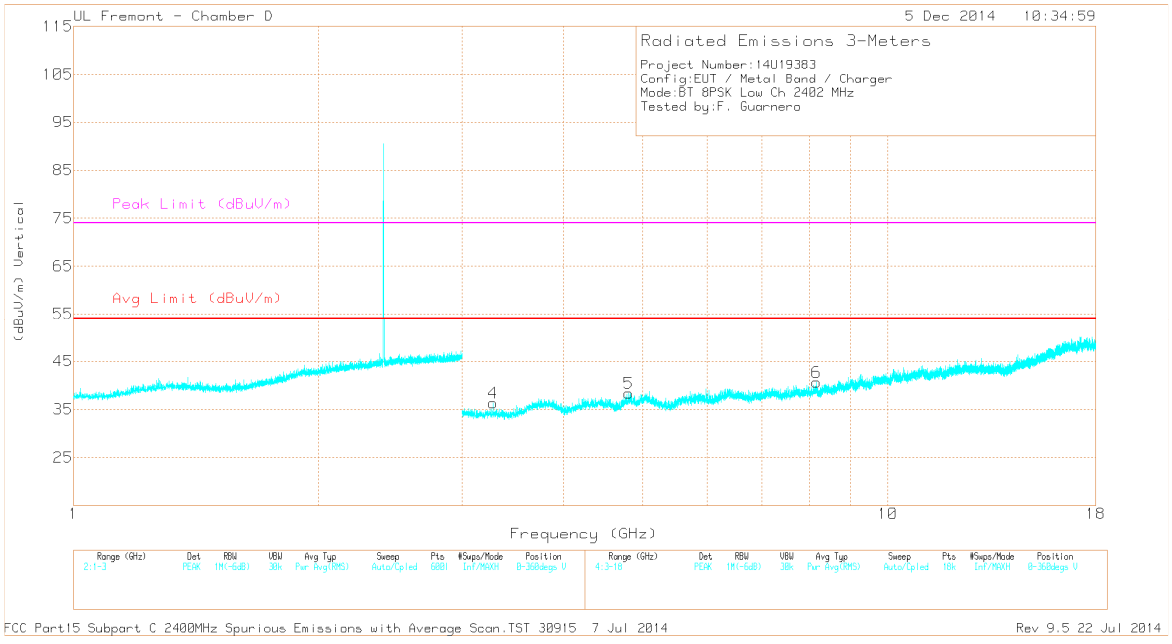


HARMONICS AND SPURIOUS EMISSIONS (LOW)

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.938	41.07	PK3	30.9	-21.2	50.77	-	-	-	-	239	244	H
2	* 4.747	38.55	PK3	34.1	-26.9	45.75	-	-	74	-28.25	156	286	H
	* 4.747	25.44	VB10	34.1	-26.9	32.64	54	-21.36	-	-	156	286	H
3	7.205	39.14	PK3	35.7	-24.8	50.04	-	-	-	-	342	303	H
4	3.275	38.38	PK3	32.7	-28.0	43.08	-	-	-	-	284	348	V
5	* 4.806	37.51	PK3	34.2	-26.9	44.81	-	-	74	-29.19	316	259	V
	* 4.804	25.57	VB10	34.2	-26.9	32.87	54	-21.13	-	-	316	259	V
6	* 8.169	35.32	PK3	35.8	-23.4	47.72	-	-	74	-26.28	303	361	V
	* 8.168	22.44	VB10	35.8	-23.4	34.84	54	-19.16	-	-	303	361	V

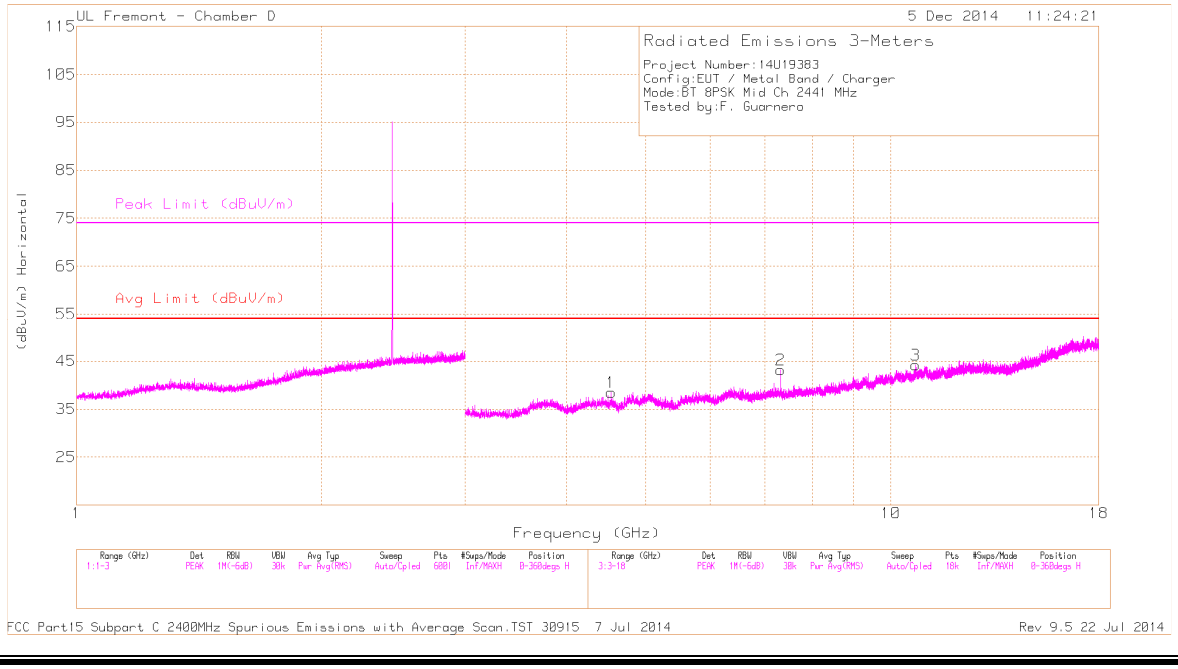
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK3 FHSS Method: Maximum Peak

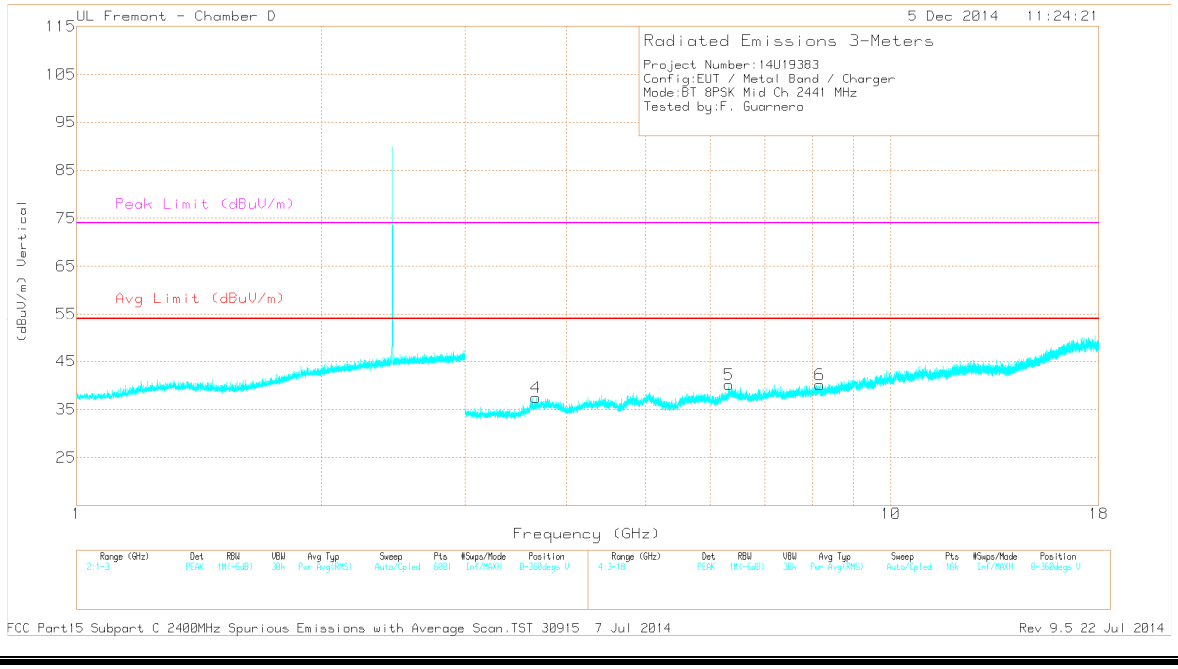
VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS (MID)

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.536	37.59	PK3	34	-27.5	44.09	-	-	74	-29.91	309	218	H
	* 4.537	25.00	VB10	34	-27.5	31.50	54	-22.50	-	-	309	218	H
2	* 7.323	39.21	PK3	35.7	-24.9	50.01	-	-	74	-23.99	313	220	H
	* 7.323	29.20	VB10	35.7	-24.9	40.00	54	-14.00	-	-	313	220	H
3	* 10.732	33.62	PK3	38	-21	50.62	-	-	74	-23.38	308	217	H
	* 10.731	21.12	VB10	38	-21	38.12	54	-15.88	-	-	308	217	H
4	* 3.664	38.88	PK3	33.3	-28.9	43.28	-	-	74	-30.72	348	315	V
	* 3.663	25.74	VB10	33.3	-28.9	30.14	54	-23.86	-	-	348	315	V
6	* 8.18	35.45	PK3	35.8	-23.5	47.75	-	-	74	-26.25	328	312	V
	* 8.179	22.45	VB10	35.8	-23.5	34.75	54	-19.25	-	-	328	312	V
5	6.331	36.33	PK3	35.6	-26	45.93	-	-	-	-	341	341	V

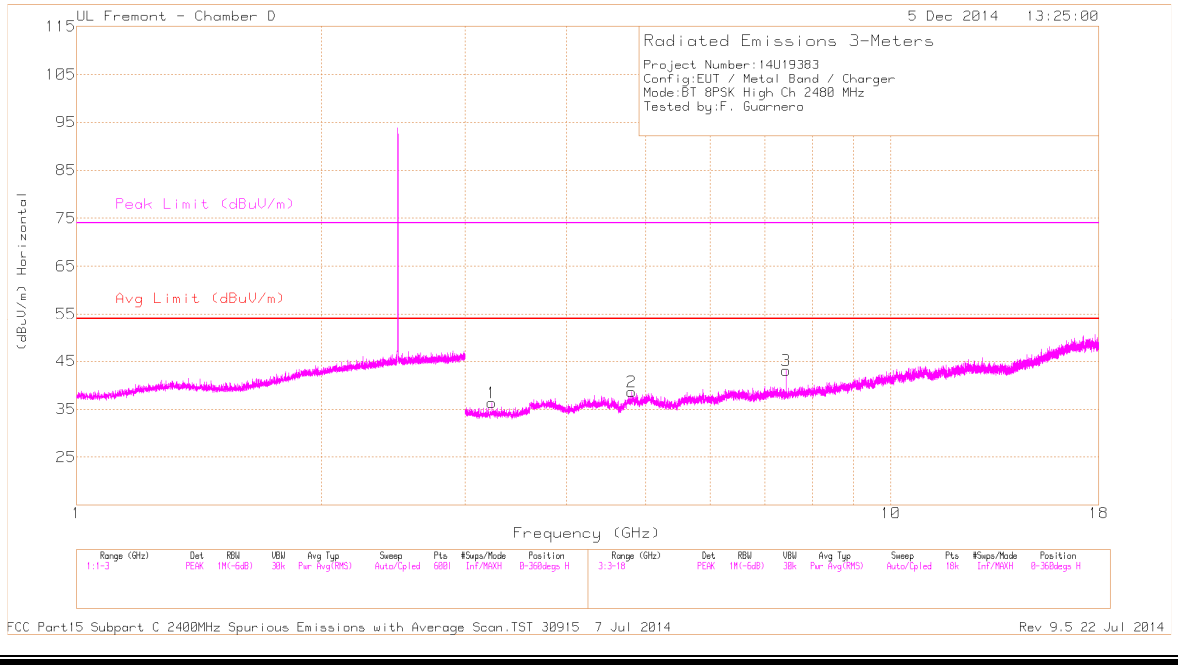
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK3 - FHSS Method: Maximum Peak

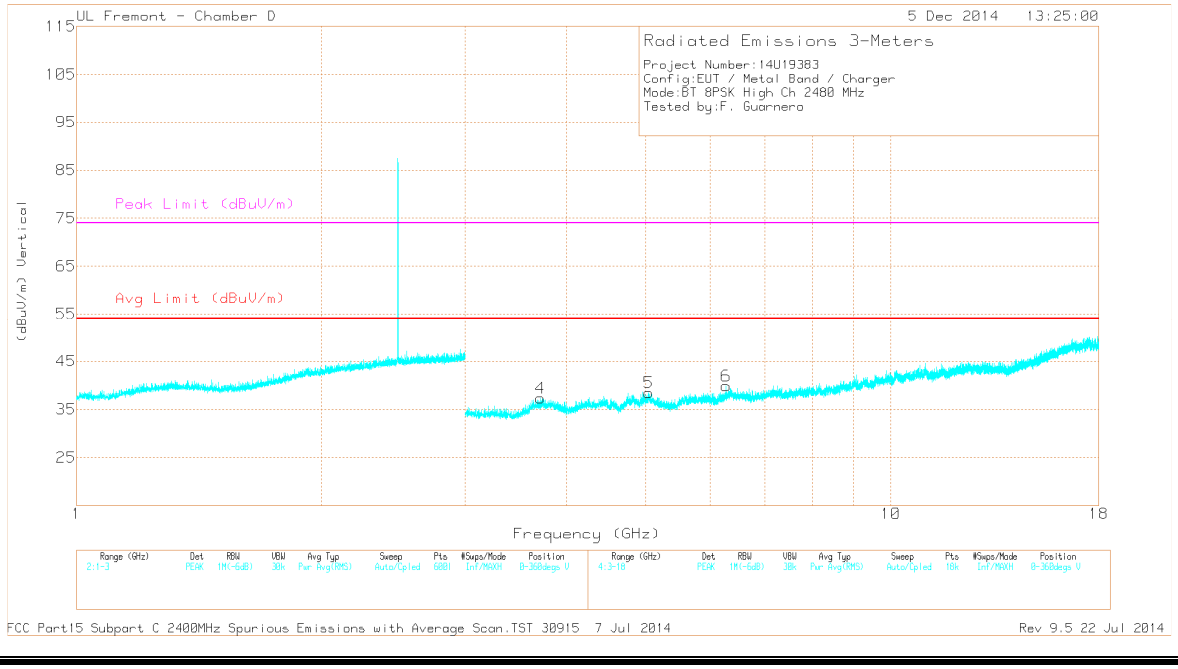
VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS (HIGH)

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



DATA

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.235	38.4	PK3	32.7	-28.4	42.70	-	-	-	-	306	225	H
2	* 4.81	37.62	PK3	34.2	-26.9	44.92	-	-	74	-29.08	291	220	H
	* 4.809	24.7	VB10	34.2	-26.9	32.00	54	-22.00	-	-	291	220	H
3	* 7.440	39.58	PK3	35.6	-24.8	50.38	-	-	74	-23.62	335	157	H
	* 7.440	29.73	VB10	35.6	-24.8	40.53	54	-13.47	-	-	335	157	H
4	* 3.712	39.31	PK3	33.2	-28.8	43.71	-	-	74	-30.29	354	302	V
	* 3.714	25.72	VB10	33.2	-28.8	30.12	54	-23.88	-	-	354	302	V
5	* 5.041	37.17	PK3	34.3	-26.2	45.27	-	-	74	-28.73	352	306	V
	* 5.041	24.50	VB10	34.3	-26.2	32.60	54	-21.40	-	-	352	306	V
6	6.276	36.46	PK3	35.6	-26.1	45.96	-	-	-	-	350	310	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK3 - FHSS Method: Maximum Peak

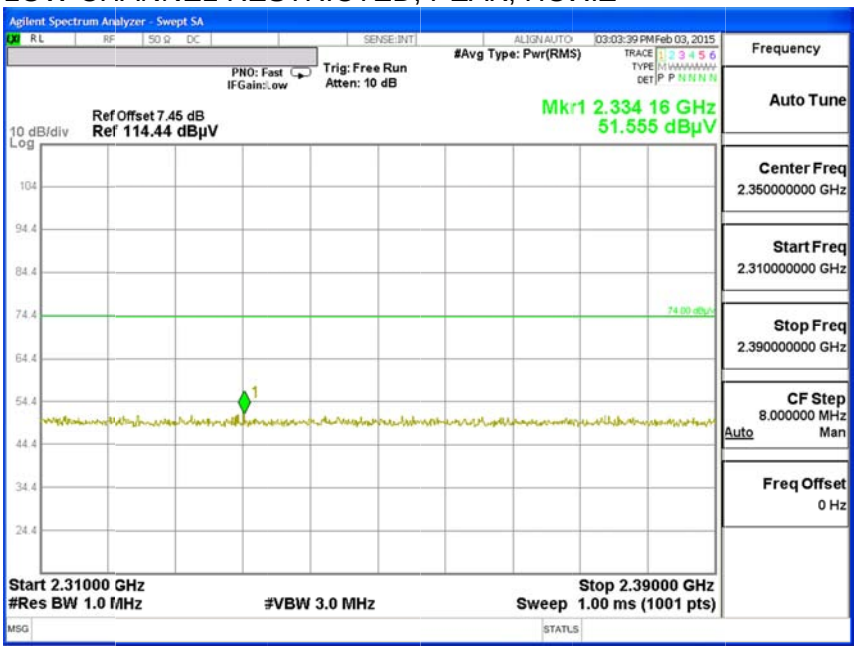
VB10Hz - FHSS Method: 10Hz Video Bandwidth

9.3. TRANSMITTER ABOVE 1 GHz ANTENNA 2

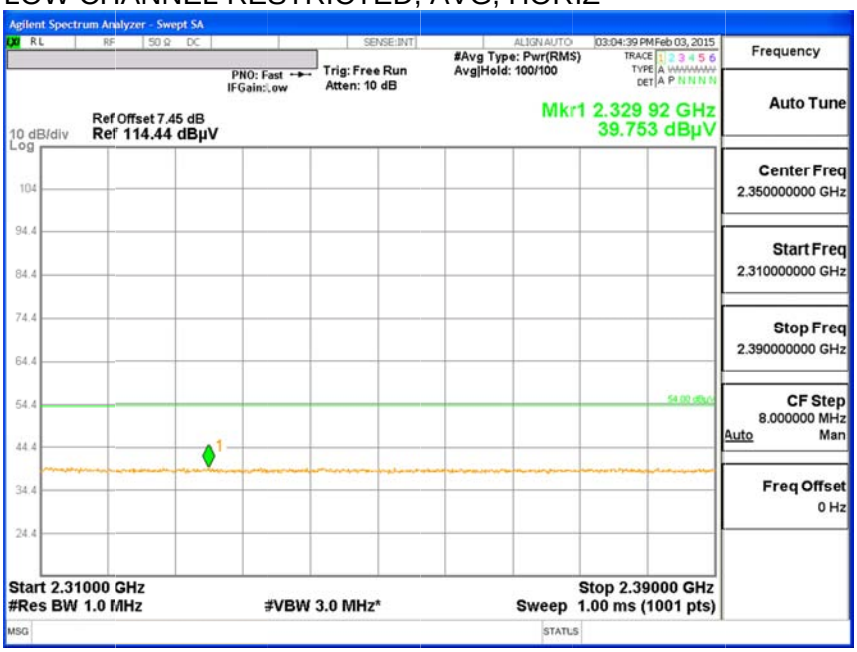
9.3.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

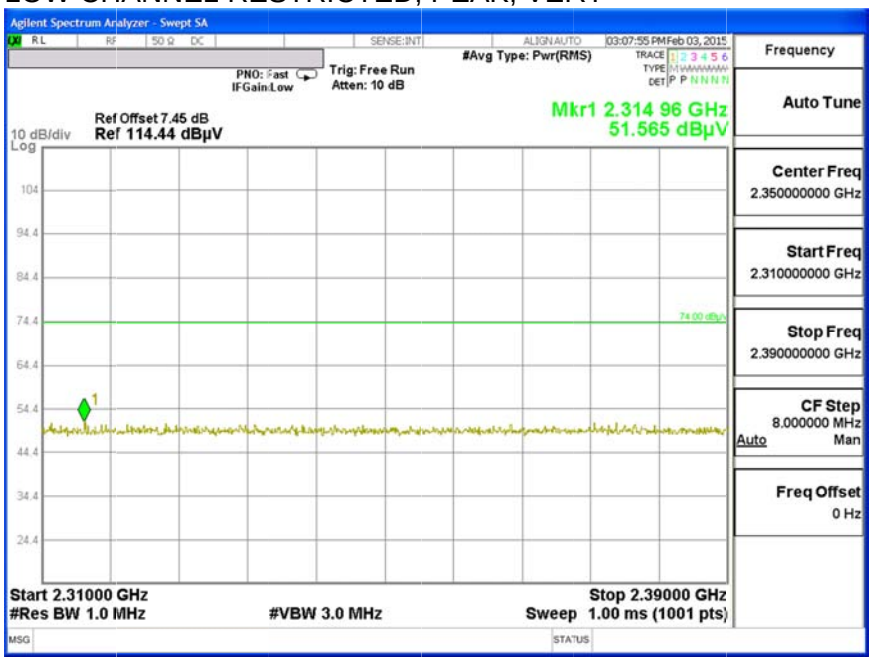


LOW CHANNEL RESTRICTED, AVG, HORIZ

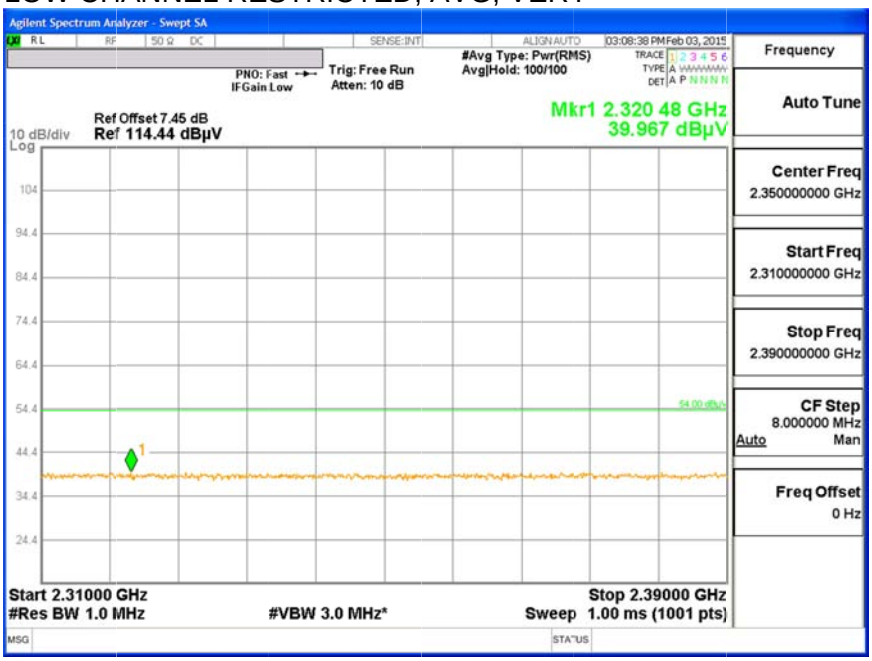


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

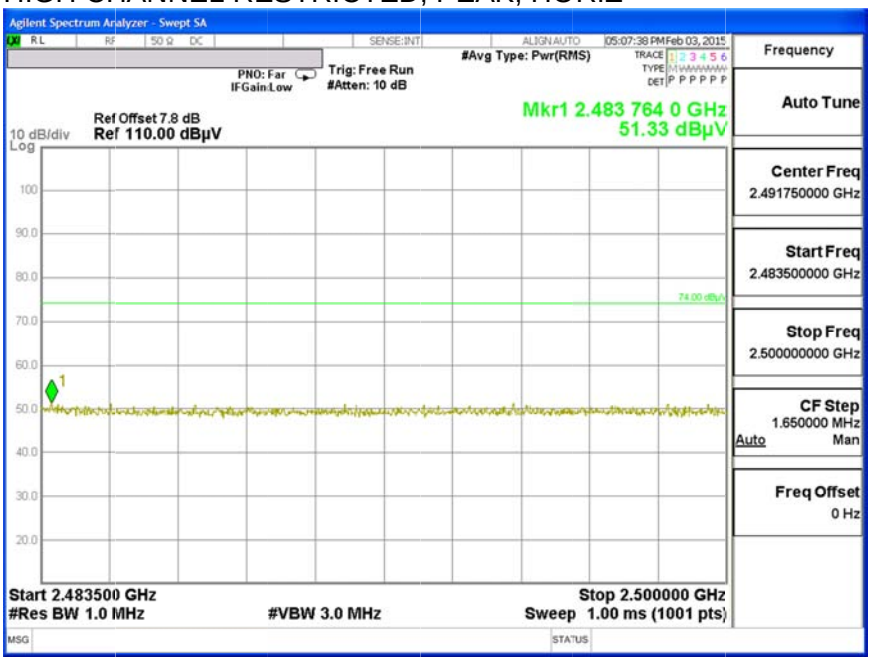


LOW CHANNEL RESTRICTED, AVG, VERT

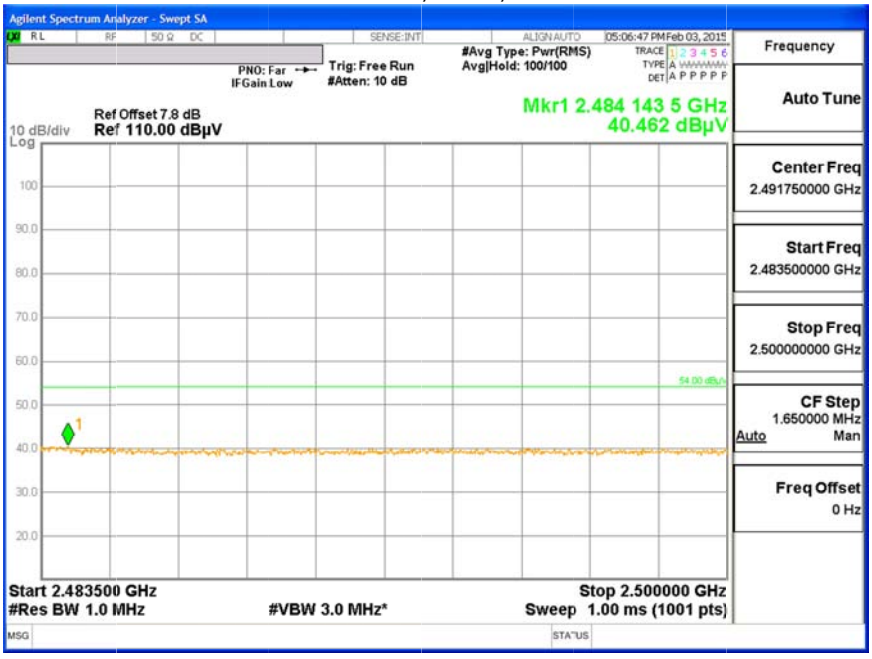


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

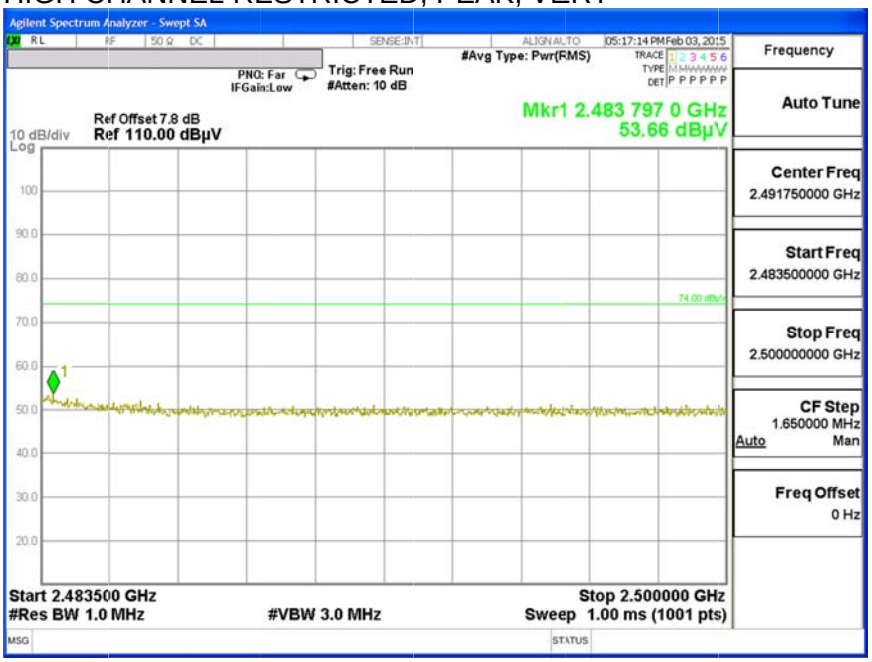


HIGH CHANNEL RESTRICTED, AVG, HORIZ

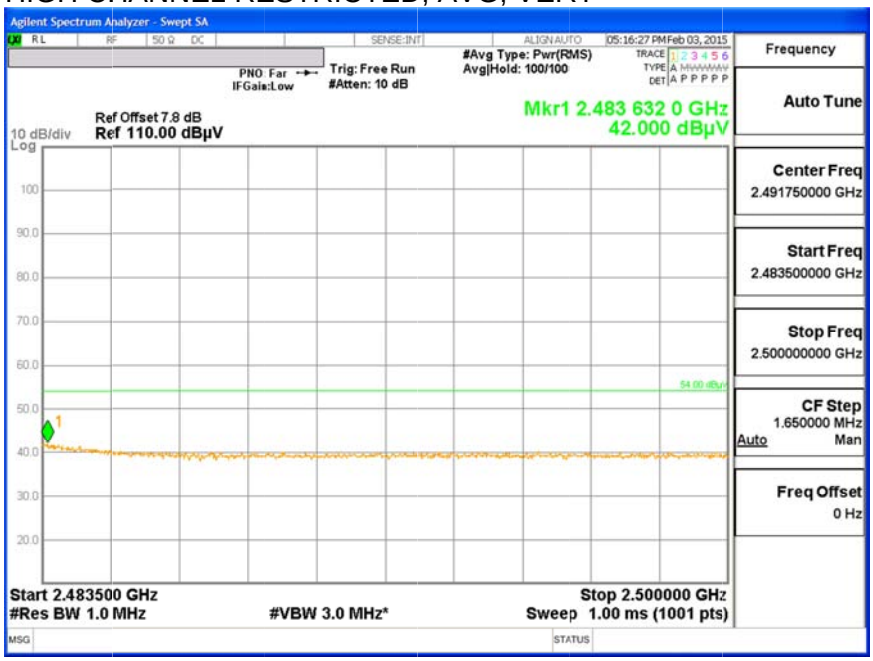


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT

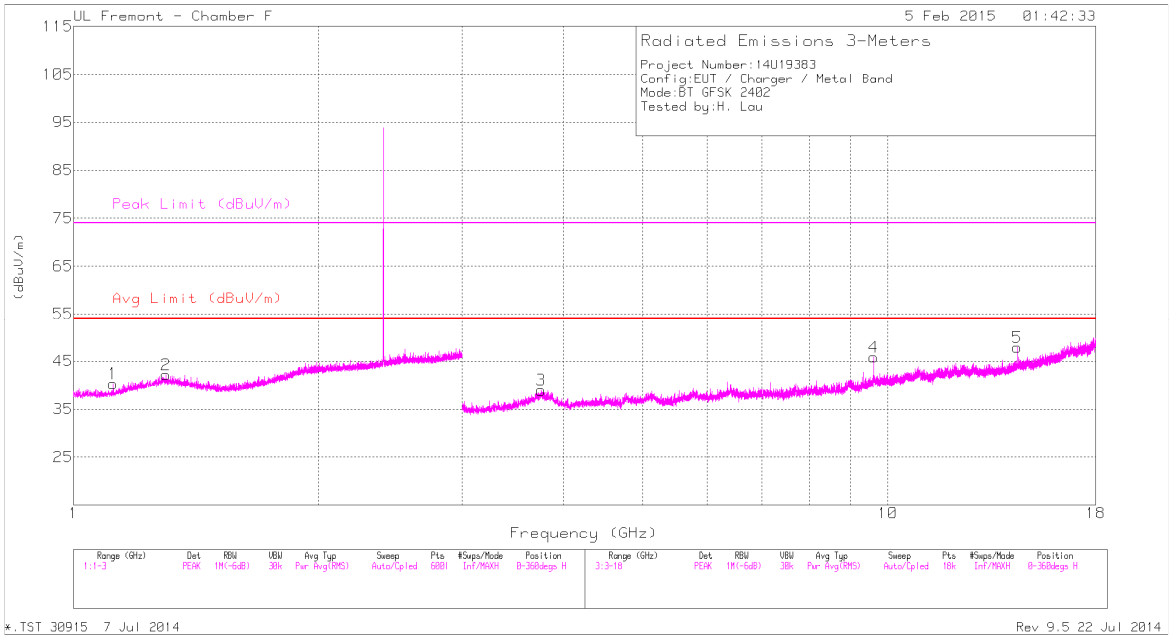


HIGH CHANNEL RESTRICTED, AVG, VERT

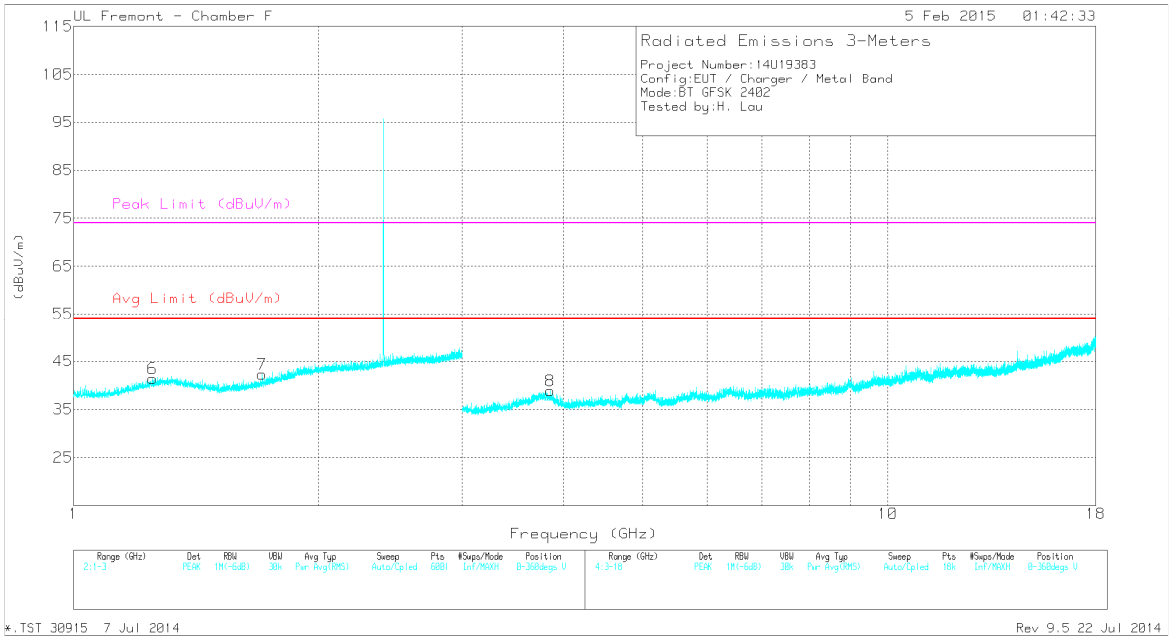


HARMONICS AND SPURIOUS EMISSIONS (LOW)

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



DATA

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.119	42.15	PK3	27.8	-22.6	47.35	-	-	74	-26.65	60	122	H
	* 1.118	28.93	VB10	27.8	-22.6	34.13	54	-19.87	-	-	60	122	H
2	* 1.297	42.20	PK3	30.0	-22.2	50.00	-	-	74	-24.00	108	146	H
	* 1.297	28.72	VB10	30.0	-22.2	36.52	54	-17.48	-	-	108	146	H
3	* 3.748	39.23	PK3	34.6	-290	44.83	-	-	74	-29.17	163	174	H
	* 3.748	26.16	VB10	34.6	-29.0	31.76	54	-22.24	-	-	163	174	H
4**	9.607	30.10	PK	36.9	-21.2	45.80	-	-	-	-	0-360	201	H
5**	14.411	31.66	PK	39.7	-23.5	47.86	-	-	-	-	0-360	201	H
6	* 1.249	41.57	PK3	29.5	-22.3	48.77	-	-	74	-25.23	156	163	V
	* 1.249	28.78	VB10	29.5	-22.3	35.98	54	-18.02	-	-	156	163	V
7	* 1.705	41.41	PK3	29.3	-21.7	49.01	-	-	74	-24.99	99	144	V
	* 1.703	28.49	VB10	29.3	-21.7	36.09	54	-17.91	-	-	99	144	V
8	* 3.849	39.49	PK3	34.2	-28.7	44.99	-	-	74	-29.01	204	197	V
	* 3.848	26.05	VB10	34.2	-28.7	31.55	54	-22.45	-	-	204	197	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

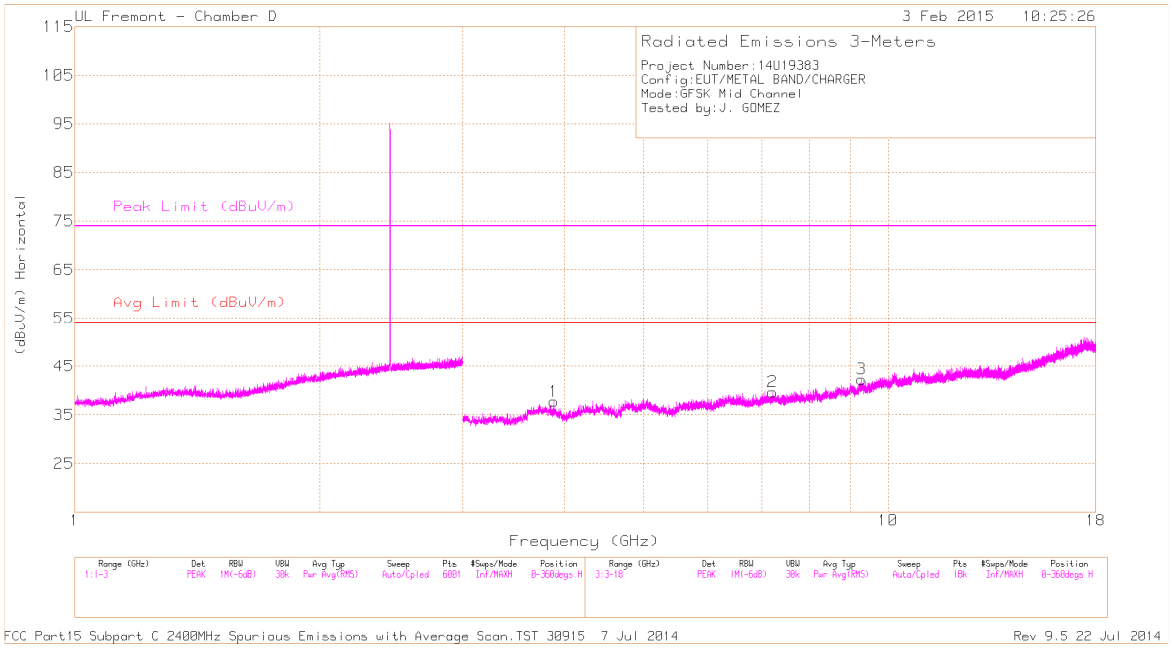
** - indicates frequency in the Non-Restricted Band therefore no need to maximize

PK3 - FHSS Method: Maximum Peak

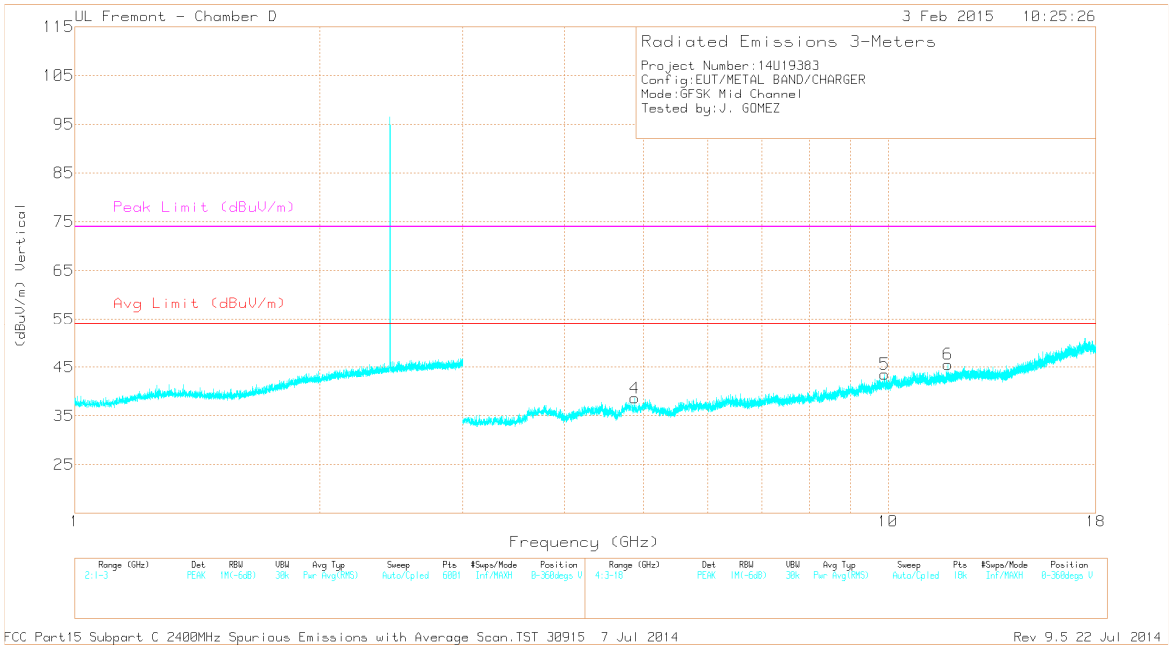
VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS (MID)

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.884	38.87	PK3	33.5	-28.3	44.07	-	-	74	-29.93	138	292	H
	* 3.887	26.21	VB10	33.5	-28.3	31.41	54	-22.59	-	-	138	292	H
2	7.211	35.9	PK3	35.7	-25.2	46.40	-	-	-	-	66	121	H
3	9.277	34.91	PK3	36.4	-20.7	50.61	-	-	-	-	23	258	H
4	* 4.882	39.29	PK3	34.2	-28.2	45.29	-	-	74	-28.71	56	203	V
	* 4.882	27.71	VB10	34.2	-28.2	33.71	54	-20.29	-	-	56	203	V
5	9.900	33.82	PK3	37.1	-20.9	50.02	-	-	-	-	311	169	V
6	* 11.848	34.62	PK3	38.5	-20.9	52.22	-	-	74	-21.78	184	121	V
	* 11.845	21.50	VB10	38.5	-20.9	39.10	54	-14.90	-	-	184	121	V

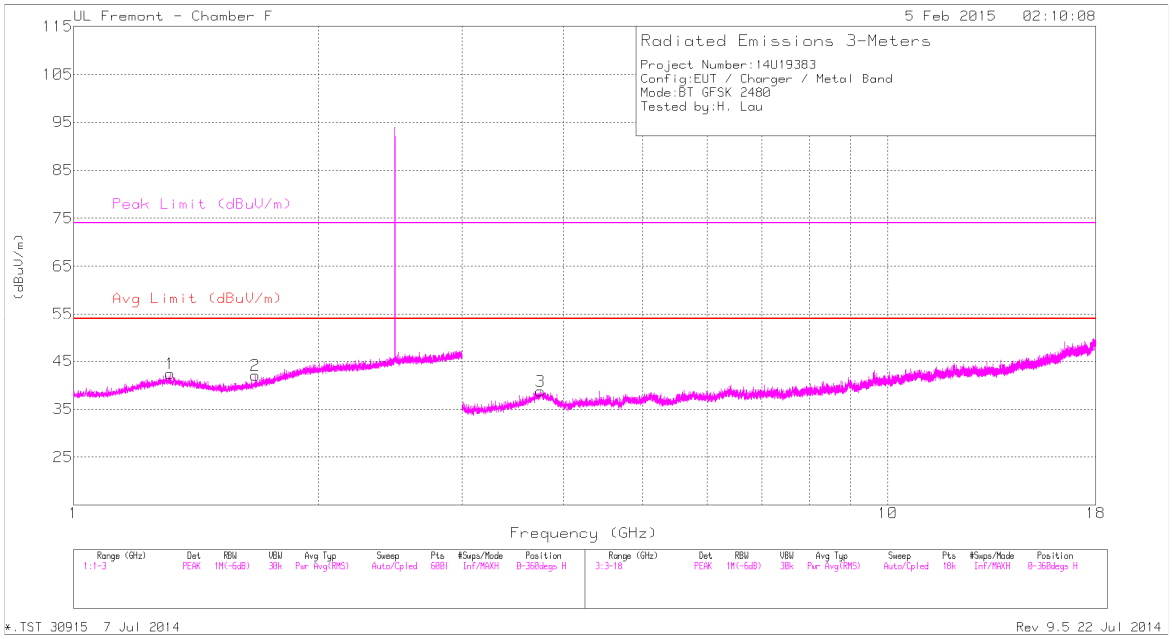
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK3 - FHSS Method: Maximum Peak

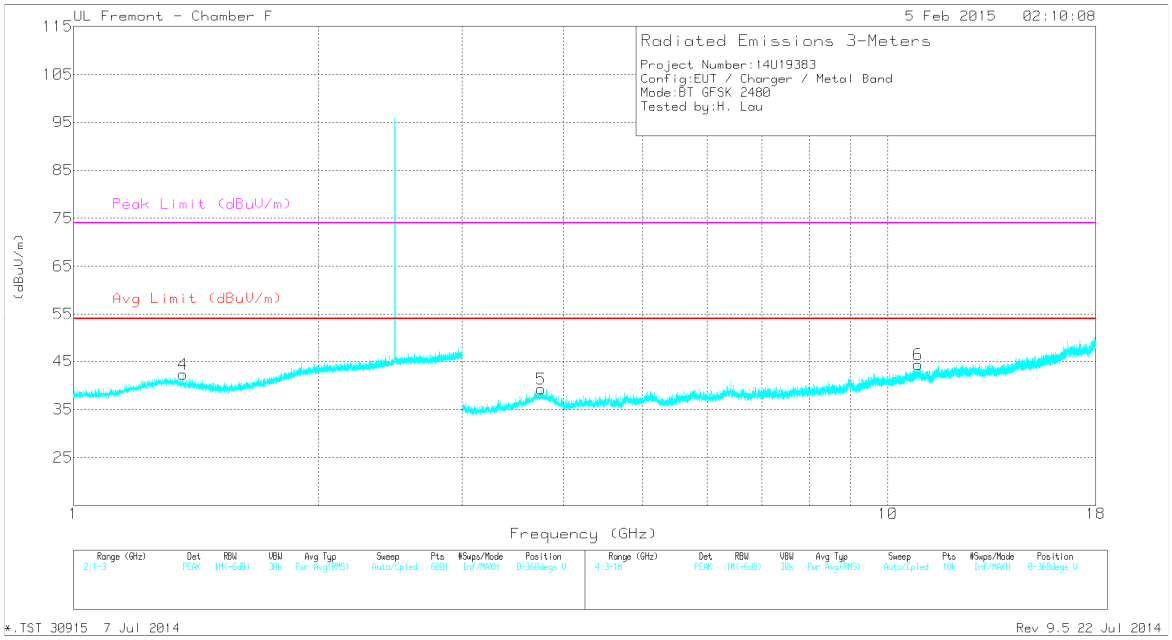
VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS (HIGH)

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.313	41.87	PK3	29.9	-22.2	49.57	-	-	74	-24.43	326	122	H
	* 1.314	28.68	VB10	29.9	-22.2	36.38	54	-17.62	-	-	326	122	H
2	* 1.672	41.99	PK3	29.0	-21.7	49.29	-	-	74	-24.71	294	134	H
	* 1.670	28.44	VB10	29.0	-21.7	35.74	54	-18.26	-	-	294	134	H
4	* 1.362	42.13	PK3	29.5	-22.1	49.53	-	-	74	-24.47	331	161	V
	* 1.362	28.59	VB10	29.5	-22.1	35.99	54	-18.01	-	-	331	161	V
3	* 3.746	39.44	PK3	34.6	-29.0	45.04	-	-	74	-28.96	274	190	H
	* 3.746	26.15	VB10	34.6	-29.0	31.75	54	-22.25	-	-	274	190	H
5	* 3.750	39.38	PK3	34.6	-28.9	45.08	-	-	74	-28.92	208	212	V
	* 3.750	26.06	VB10	34.6	-28.9	31.76	54	-22.24	-	-	208	212	V
6	* 10.887	34.84	PK3	38.1	-21.4	51.54	-	-	74	-22.46	161	177	V
	* 10.887	21.19	VB10	38.1	-21.4	37.89	54	-16.11	-	-	161	177	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

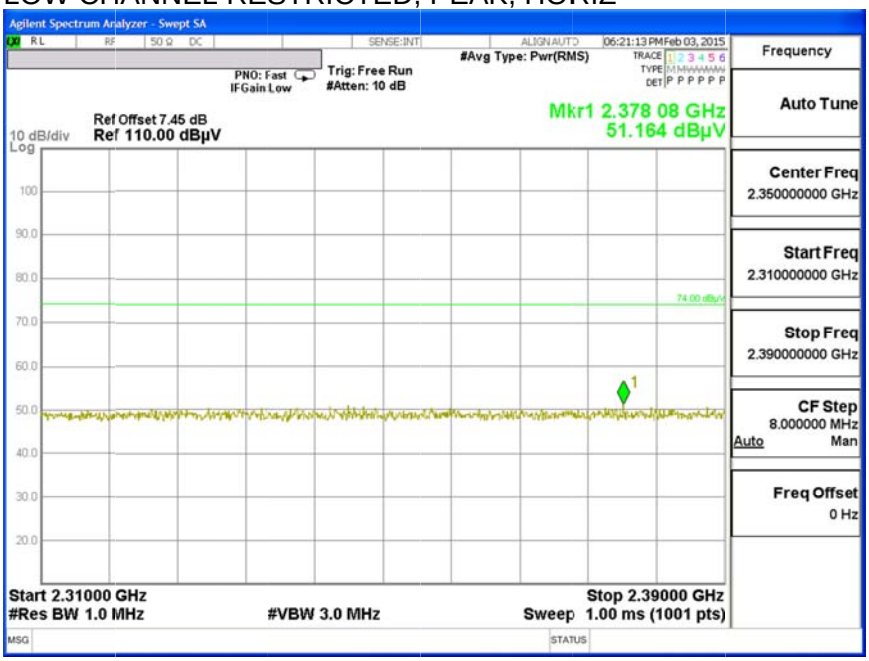
PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

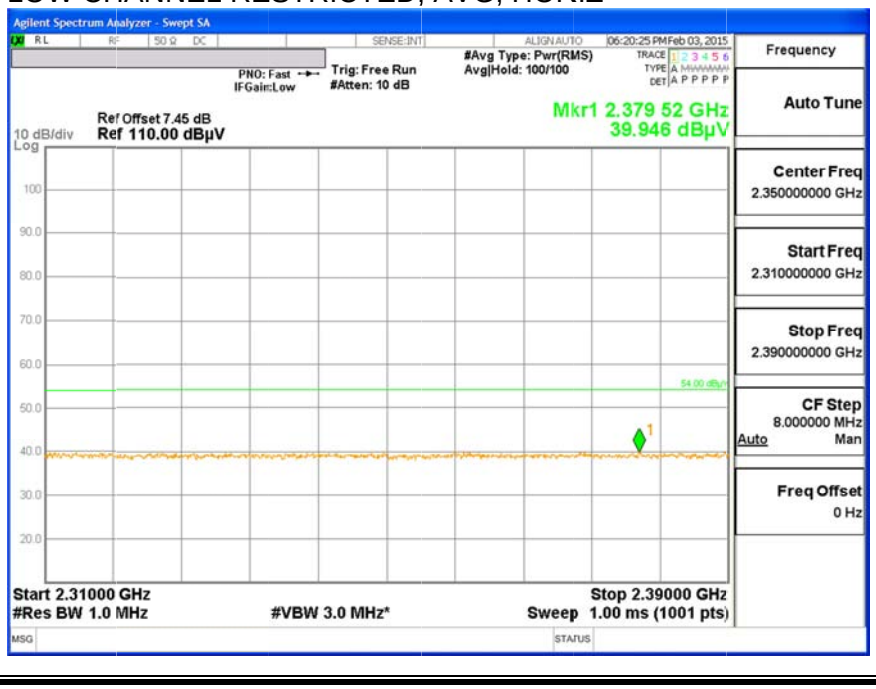
9.3.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL RESTRICTED, PEAK, HORIZ

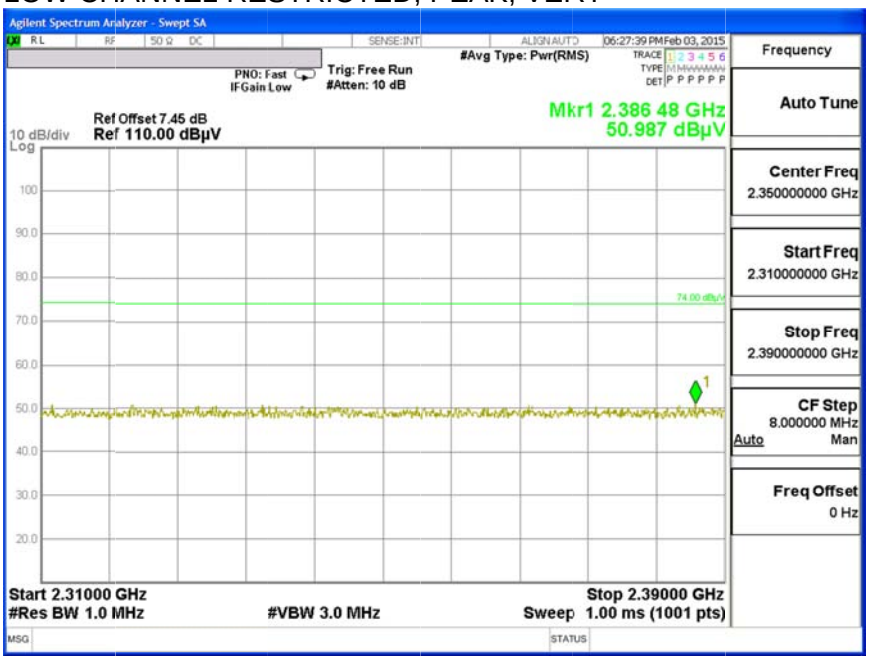


LOW CHANNEL RESTRICTED, AVG, HORIZ

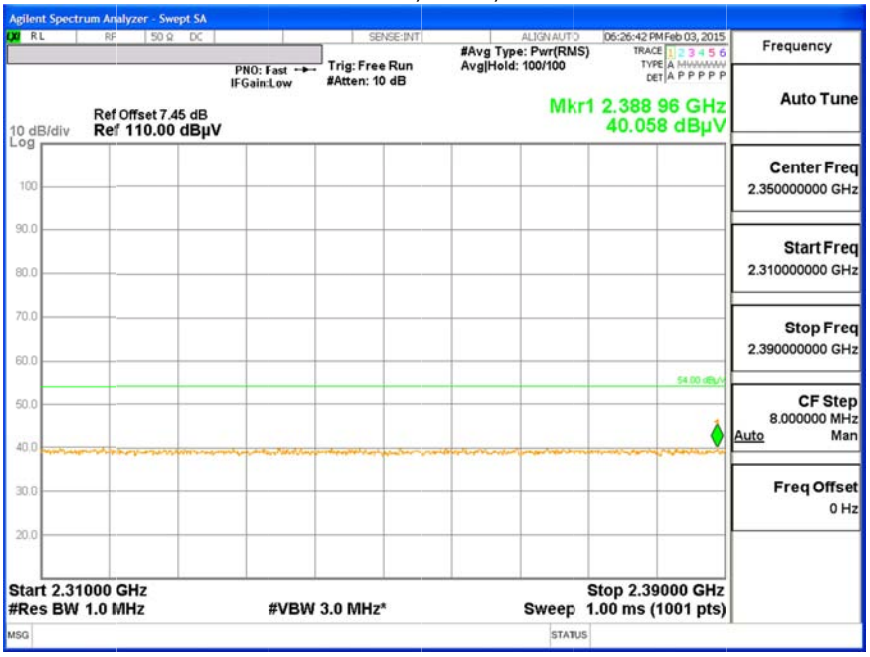


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

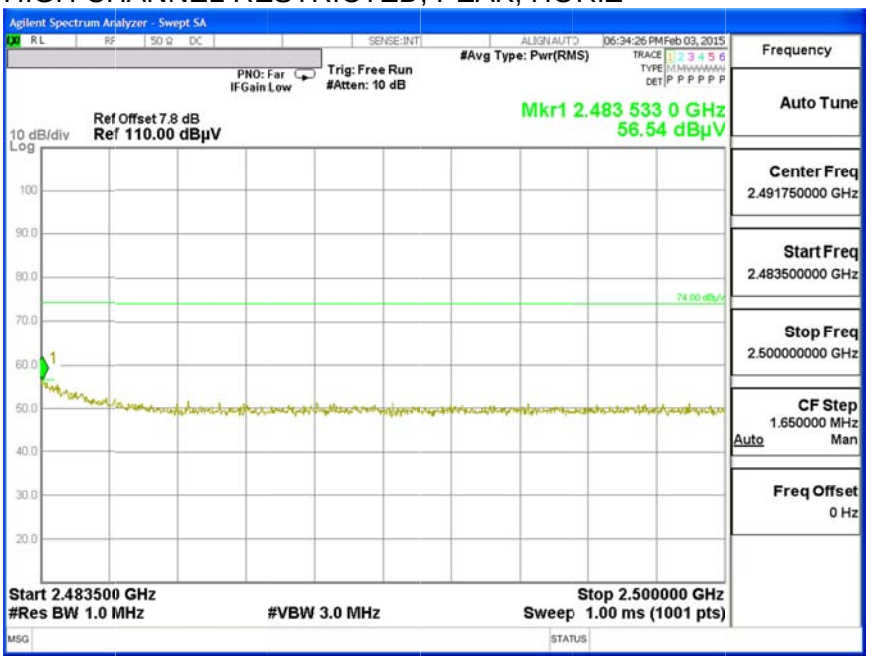


LOW CHANNEL RESTRICTED, AVG, VERT

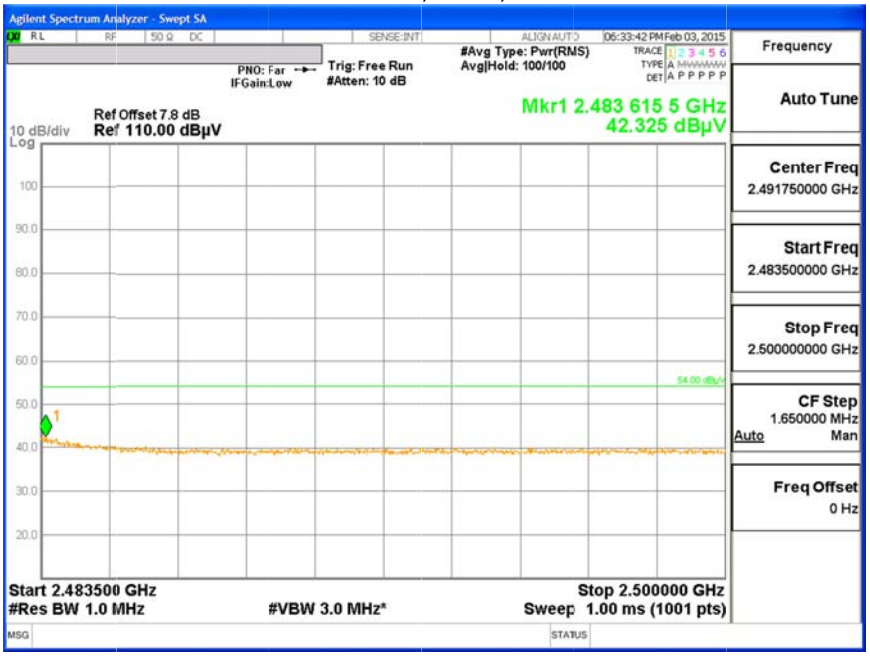


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

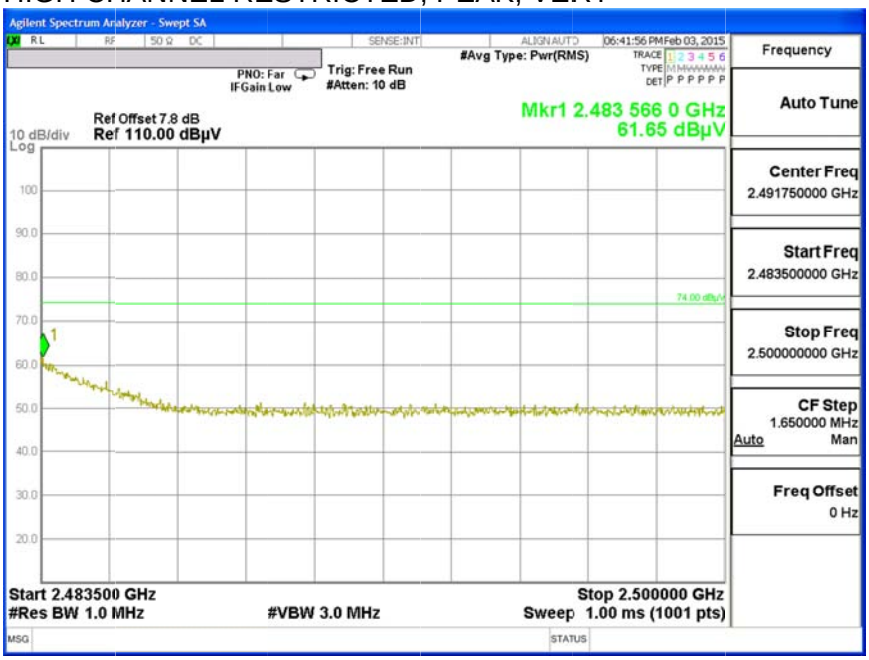


HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

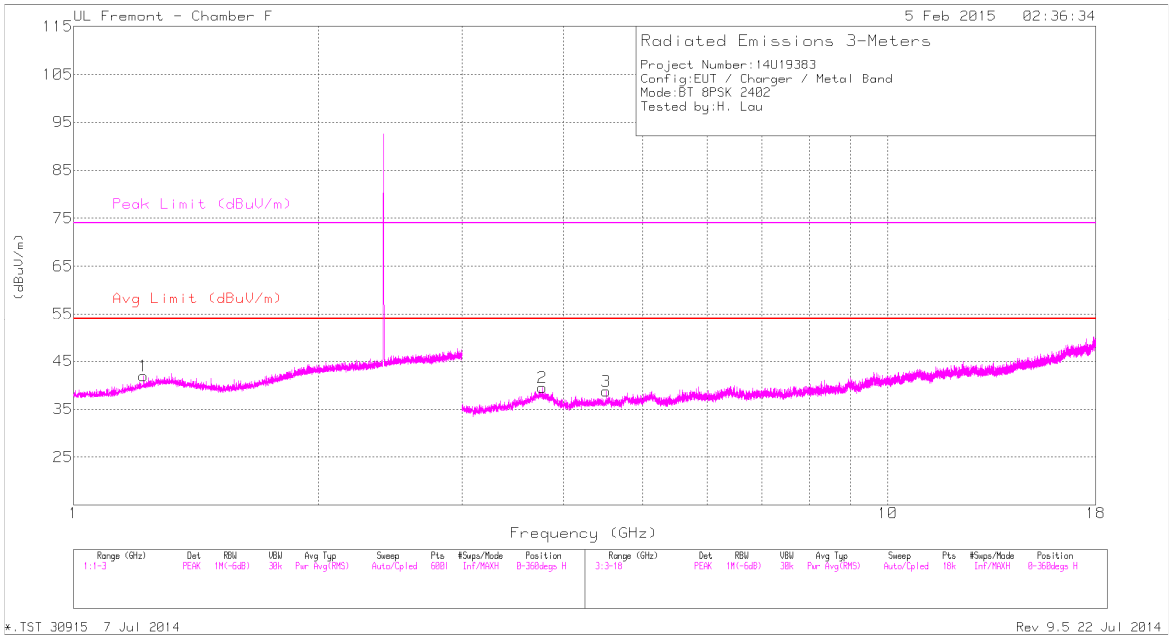
HIGH CHANNEL RESTRICTED, PEAK, VERT



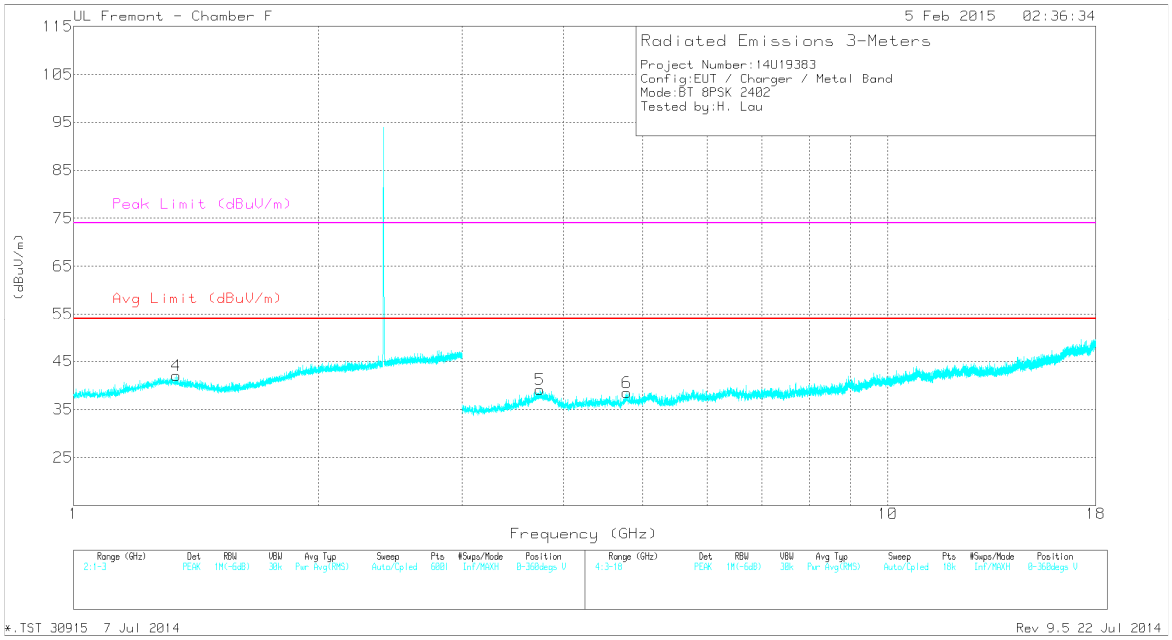
HIGH CHANNEL RESTRICTED, AVG, VERT

HARMONICS AND SPURIOUS EMISSIONS (LOW)

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.219	42.10	PK3	29.2	-22.4	48.90	-	-	74	-25.10	43	114	H
	* 1.219	28.92	VB10	29.2	-22.4	35.72	54	-18.28	-	-	43	114	H
2	* 3.764	38.97	PK3	34.6	-28.7	44.87	-	-	74	-29.13	162	167	H
	* 3.763	25.78	VB10	34.6	-28.7	31.68	54	-22.32	-	-	162	167	H
3	* 4.507	38.33	PK3	34.0	-27.9	44.43	-	-	74	-29.57	207	150	H
	* 4.506	25.10	VB10	34.0	-27.9	31.20	54	-22.80	-	-	207	150	H
4	* 1.338	41.49	PK3	29.7	-22.2	48.99	-	-	74	-25.01	111	135	V
	* 1.339	28.72	VB10	29.7	-22.2	36.22	54	-17.78	-	-	111	135	V
5	* 3.736	39.02	PK3	34.7	-29.2	44.52	-	-	74	-29.48	251	121	V
	* 3.736	26.22	VB10	34.7	-29.2	31.72	54	-22.28	-	-	251	121	V
6	* 4.783	38.75	PK3	34.1	-27.4	45.45	-	-	74	-28.55	186	139	V
	* 4.784	25.59	VB10	34.1	-27.5	32.19	54	-21.81	-	-	186	139	V

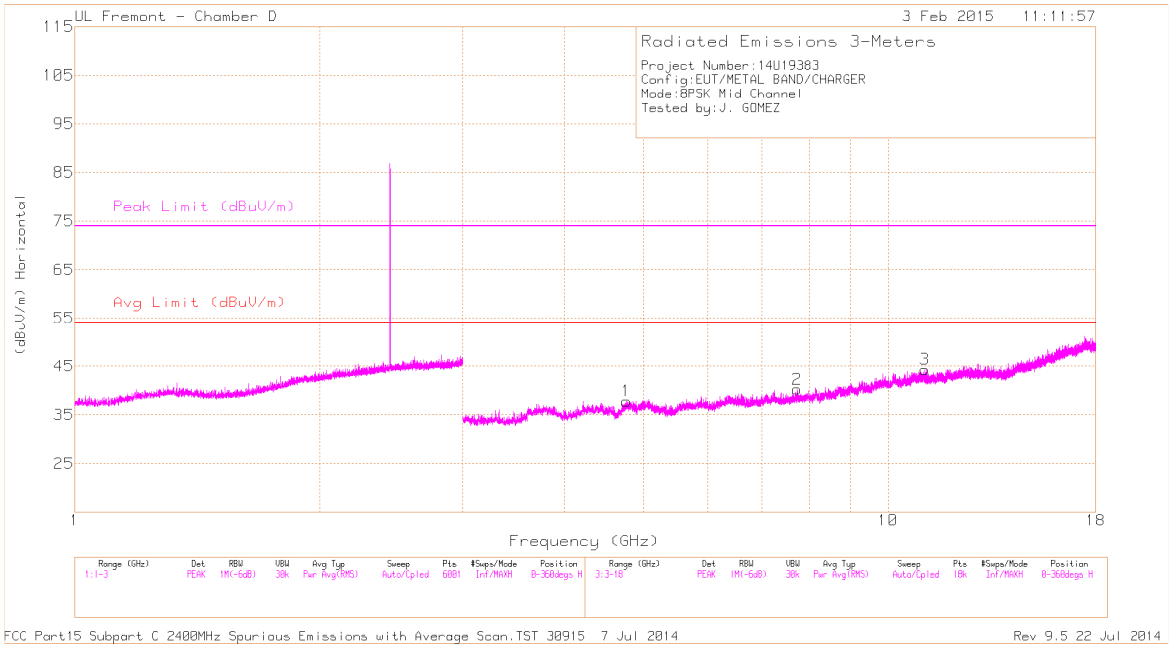
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK3 - FHSS Method: Maximum Peak

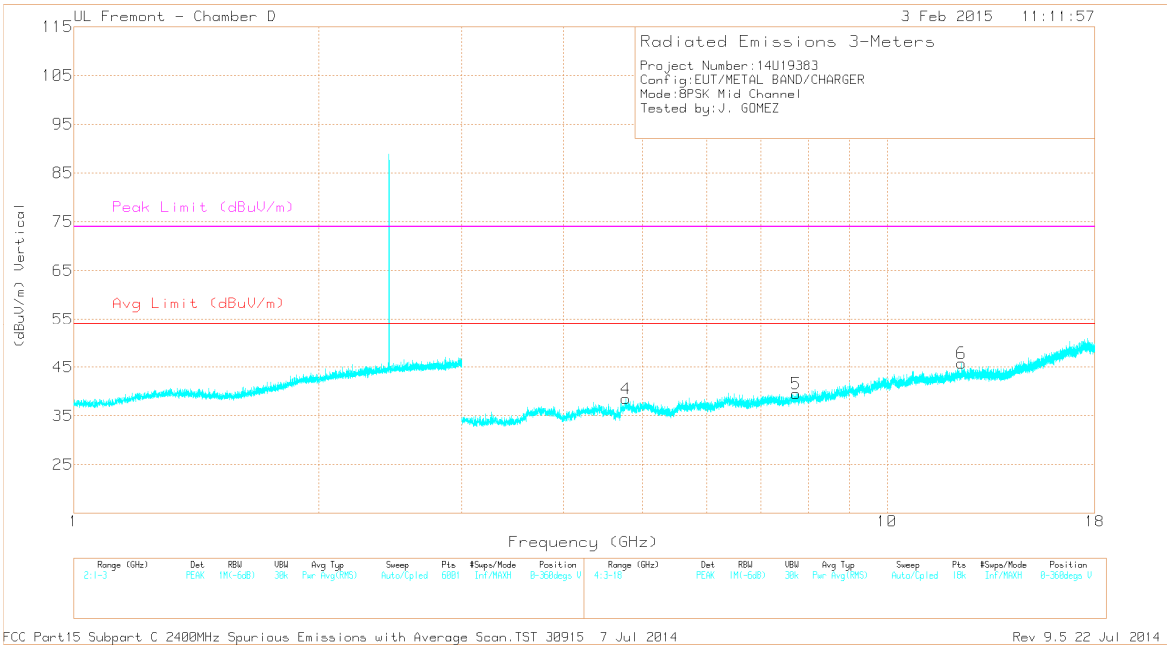
VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS (MID)

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.771	37.89	PK3	34.2	-26.6	45.49	-	-	74	-28.51	213	342	H
	* 4.768	25.11	VB10	34.2	-26.6	32.71	54	-21.29	-	-	213	342	H
2	* 7.728	36.21	PK3	35.8	-24.9	47.11	-	-	74	-26.89	354	312	H
	* 7.727	23.48	VB10	35.8	-24.9	34.38	54	-19.62	-	-	354	312	H
3	* 11.095	33.92	PK3	38.1	-21.2	50.82	-	-	74	-23.18	187	232	H
	* 11.092	21.49	VB10	38.1	-21.2	38.39	54	-15.61	-	-	187	232	H
4	* 4.775	37.51	PK3	34.2	-26.6	45.11	-	-	74	-28.89	360	134	V
	* 4.768	25.25	VB10	34.2	-26.6	32.85	54	-21.15	-	-	360	134	V
5	* 7.731	35.60	PK3	35.8	-24.8	46.60	-	-	74	-27.40	272	278	V
	* 7.726	23.53	VB10	35.8	-24.9	34.43	54	-19.57	-	-	272	278	V
6	* 12.344	34.53	PK3	39.0	-21.6	51.93	-	-	74	-22.07	359	153	V
	* 12.346	21.88	VB10	39.0	-21.6	39.28	54	-14.72	-	-	359	153	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

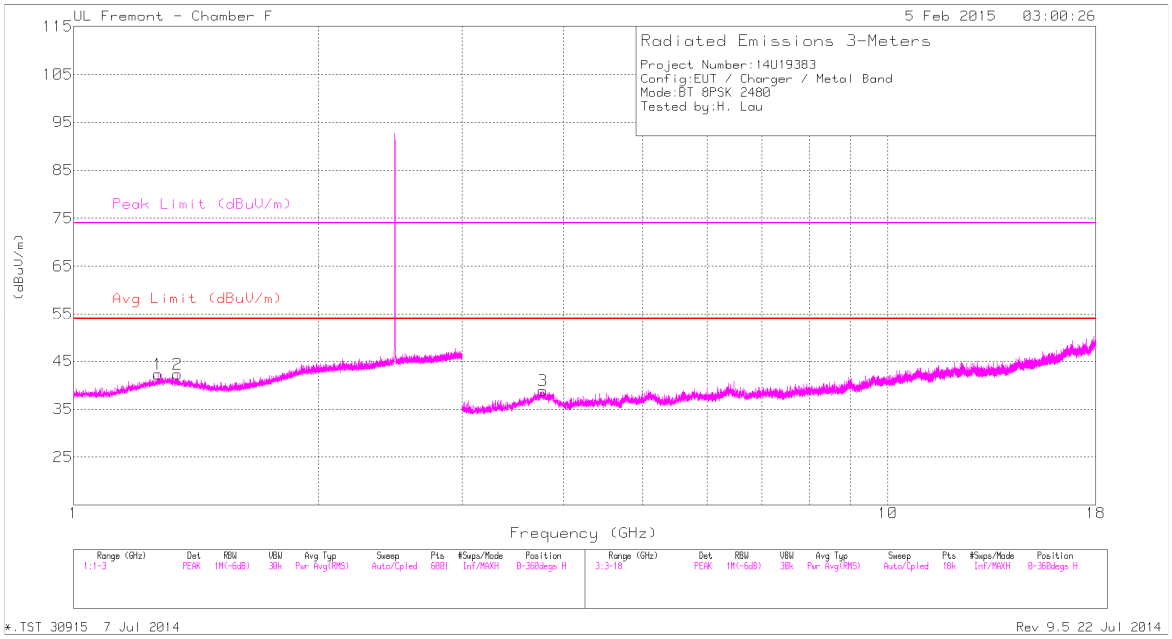
PK - Peak detector

PK3 - FHSS Method: Maximum Peak

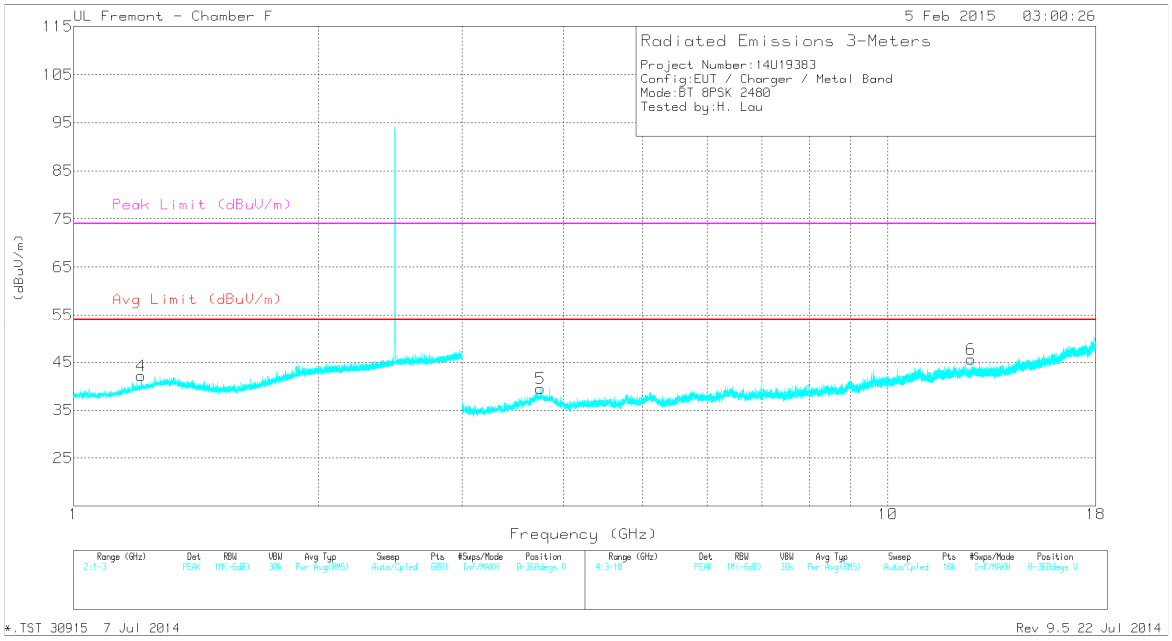
VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS (HIGH)

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.271	42.60	PK3	29.7	-22.3	50.00	-	-	74	-24.00	315	119	H
	* 1.270	28.88	VB10	29.7	-22.3	36.28	54	-17.72	-	-	315	119	H
2	* 1.343	42.18	PK3	29.7	-22.2	49.68	-	-	74	-24.32	273	136	H
	* 1.342	28.76	VB10	29.7	-22.2	36.26	54	-17.74	-	-	273	136	H
4	* 1.212	42.08	PK3	29.1	-22.4	48.78	-	-	74	-25.22	220	154	V
	* 1.213	28.88	VB10	29.1	-22.4	35.58	54	-18.42	-	-	220	154	V
3	* 3.769	39.26	PK3	34.5	-28.7	45.06	-	-	74	-28.94	262	174	H
	* 3.769	25.74	VB10	34.5	-28.7	31.54	54	-22.46	-	-	262	174	H
5	* 3.748	38.68	PK3	34.6	-29.0	44.28	-	-	74	-29.72	205	144	V
	* 3.748	26.17	VB10	34.6	-29.0	31.77	54	-22.23	-	-	205	144	V
6	* 12.652	35.74	PK3	39.1	-23.0	51.84	-	-	74	-22.16	156	119	V
	* 12.652	22.42	VB10	39.1	-23.0	38.52	54	-15.48	-	-	156	119	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK3 - FHSS Method: Maximum Peak

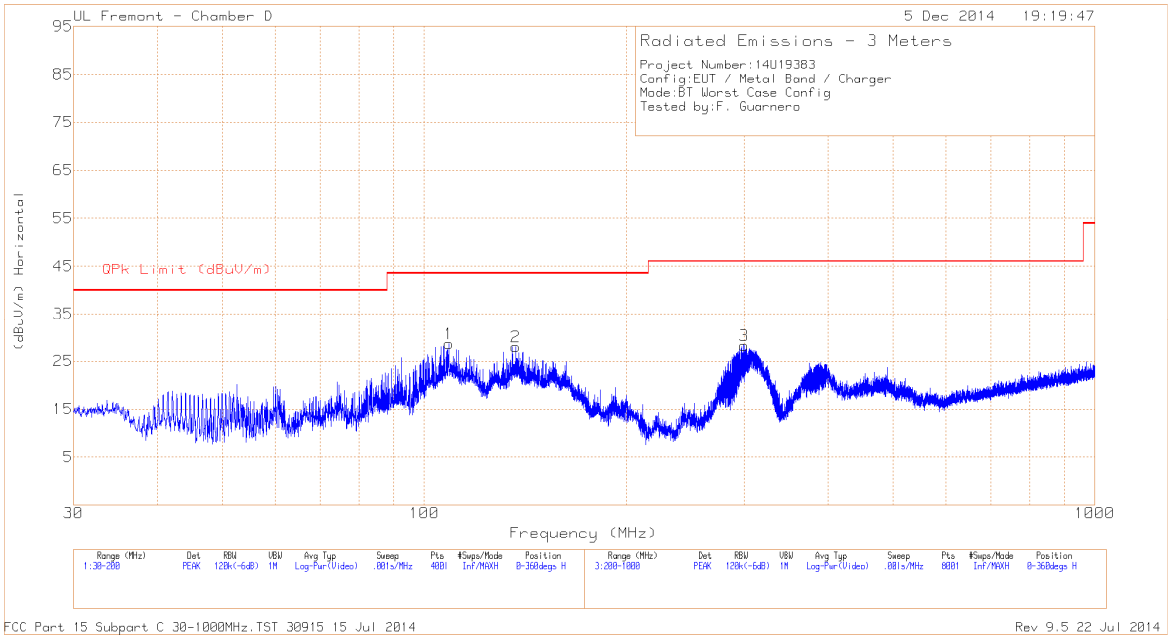
VB10Hz - FHSS Method: 10Hz Video Bandwidth

9.4. WORST-CASE BELOW 1 GHz

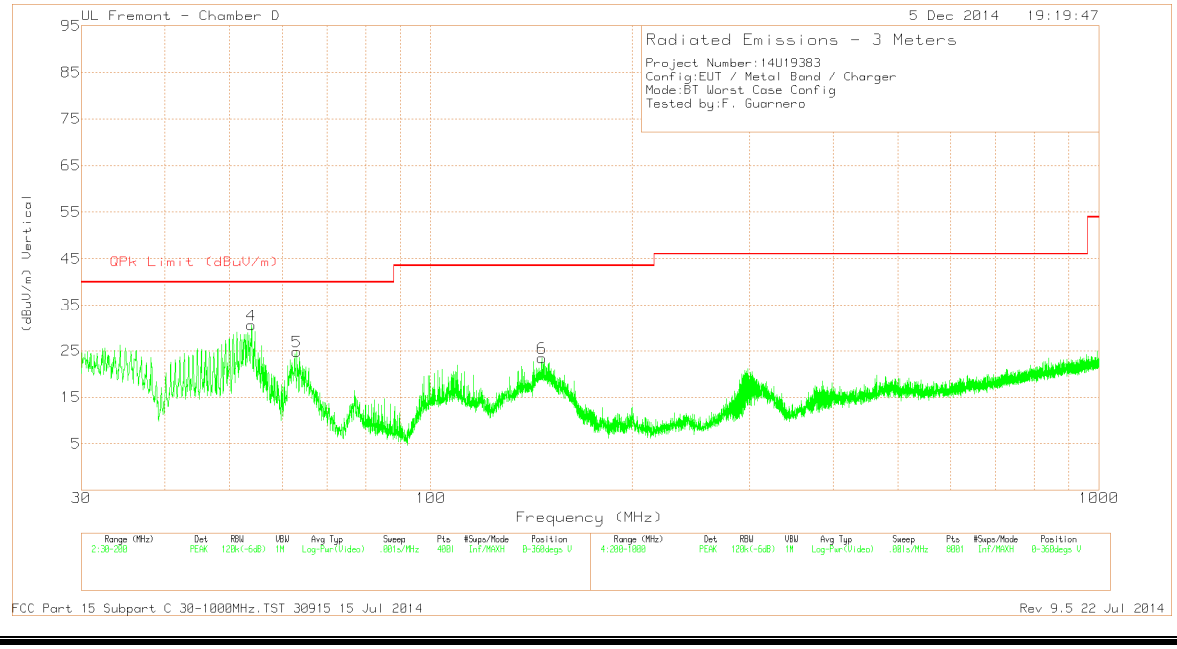
ANTENNA 1

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

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Hybrid	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 108.795	47.44	PK	12.5	-31.3	28.64	43.52	-14.88	0-360	201	H
2	* 137.015	46.04	PK	13.2	-31.2	28.04	43.52	-15.48	0-360	201	H
3	300.100	45.24	PK	13.4	-30.4	28.24	46.02	-17.78	0-360	99	H
4	53.9275	54.97	PK	7.3	-31.7	30.57	40.00	-9.43	0-360	100	V
5	63.065	48.53	PK	7.9	-31.6	24.83	40.00	-15.17	0-360	100	V
6	146.79	41.96	PK	12.6	-31.1	23.46	43.52	-20.06	0-360	100	V

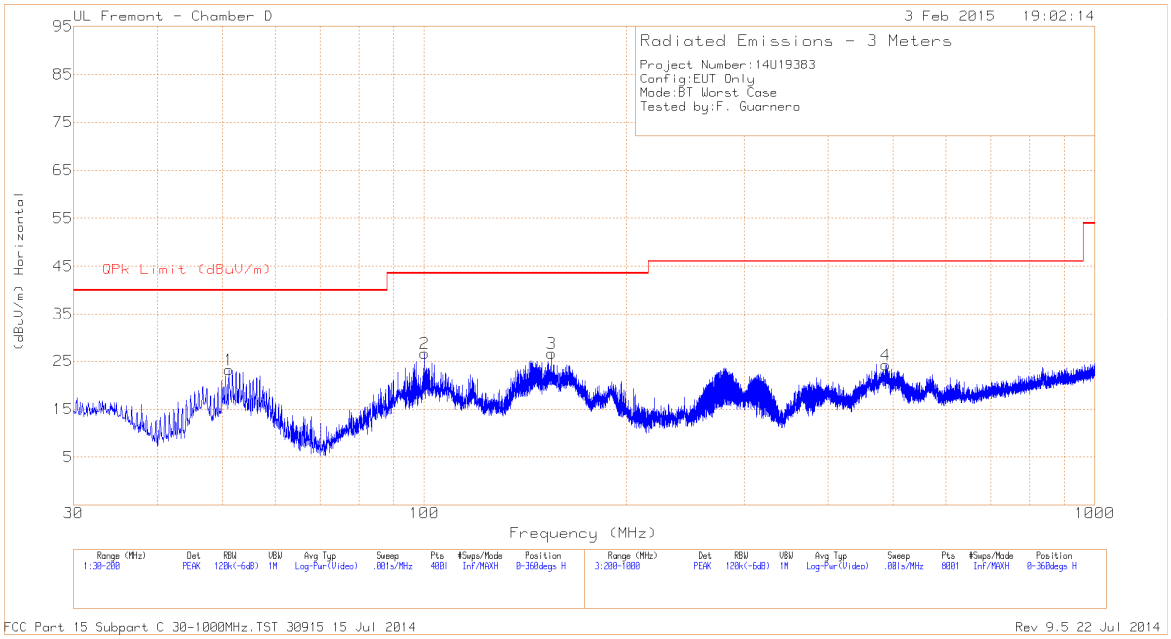
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK - Peak detector

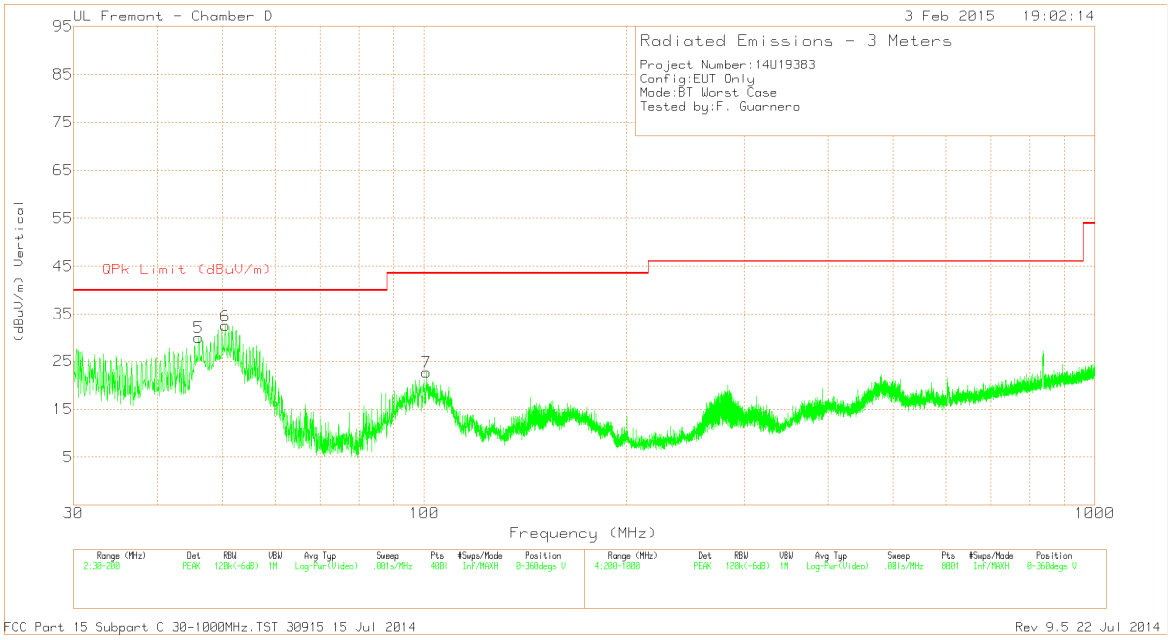
ANTENNA 2

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

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

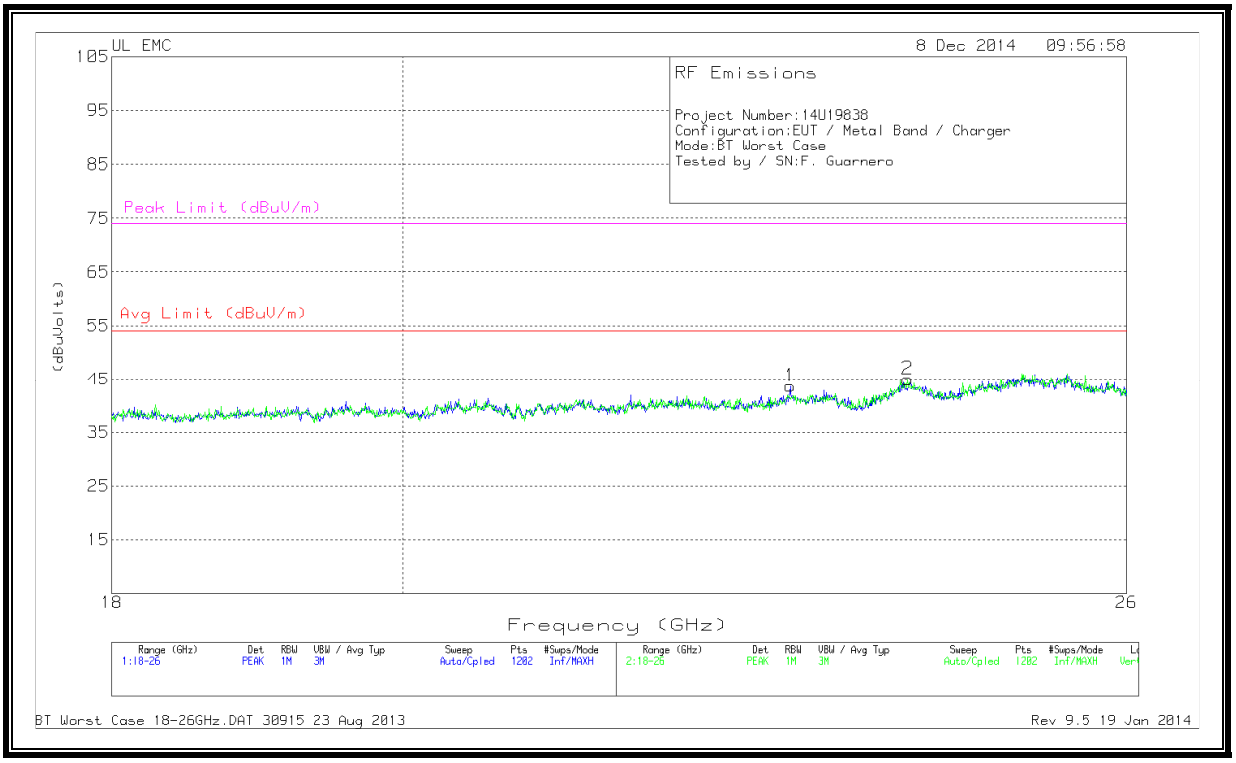
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Hybrid	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	51.165	47.32	PK	7.6	-31.7	23.22	40.00	-16.78	0-360	401	H
2	100.1675	47.62	PK	10.4	-31.4	26.62	43.52	-16.90	0-360	301	H
3	154.950	45.32	PK	12.3	-31.0	26.62	43.52	-16.90	0-360	202	H
4	487.900	36.15	PK	17.8	-29.7	24.25	46.02	-21.77	0-360	201	H
5	46.1075	51.98	PK	9.7	-31.8	29.88	40.00	-10.12	0-360	100	V
6	50.5275	56.41	PK	7.7	-31.7	32.41	40.00	-7.59	0-360	100	V
7	100.805	43.60	PK	10.5	-31.4	22.70	43.52	-20.82	0-360	100	V

PK - Peak detector

9.5. WORST-CASE ABOVE 18 GHz

ANTENNA 1

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



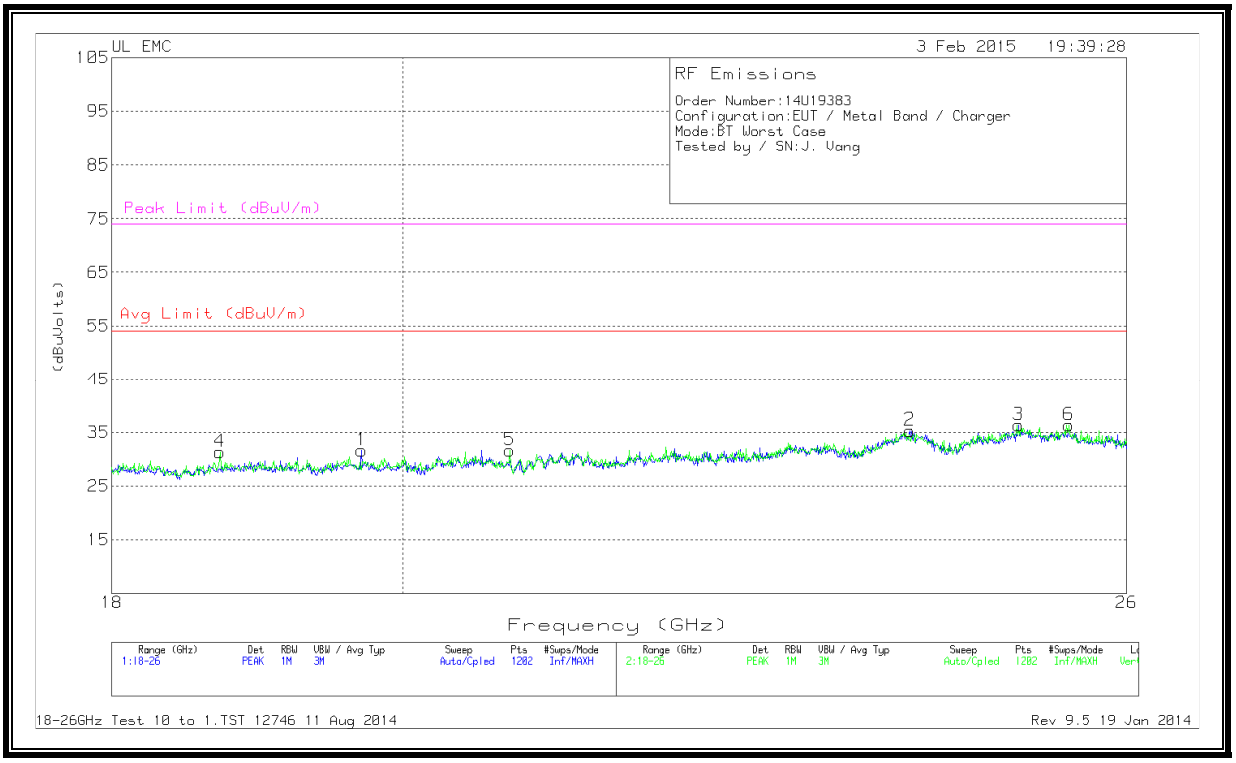
HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T125 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	23.016	42.97	PK	33.6	-23.4	-9.5	43.67	54	-10.33	74	-30.33
2	24.015	43.40	PK	33.9	-22.8	-9.5	45.00	54	-9.00	74	-29

PK - Peak detector

ANTENNA 2

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



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.705	42.77	PK	33	-24.1	-20	31.66	54	-22.33	74	-42.33
2	24.035	44.03	PK	34.2	-22.9	-20	35.33	54	-18.66	74	-38.66
3	25.001	44.73	PK	34.5	-22.9	-20	36.33	54	-17.66	74	-37.66
4	18.719	42.73	PK	32.7	-24.1	-20	31.33	54	-22.66	74	-42.66
5	20.791	42.47	PK	33.2	-24.0	-20	31.66	54	-22.33	74	-42.33
6	25.46	44.23	PK	34.6	-22.5	-20	36.33	54	-17.66	74	-37.66

PK - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-GEN 8.8

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

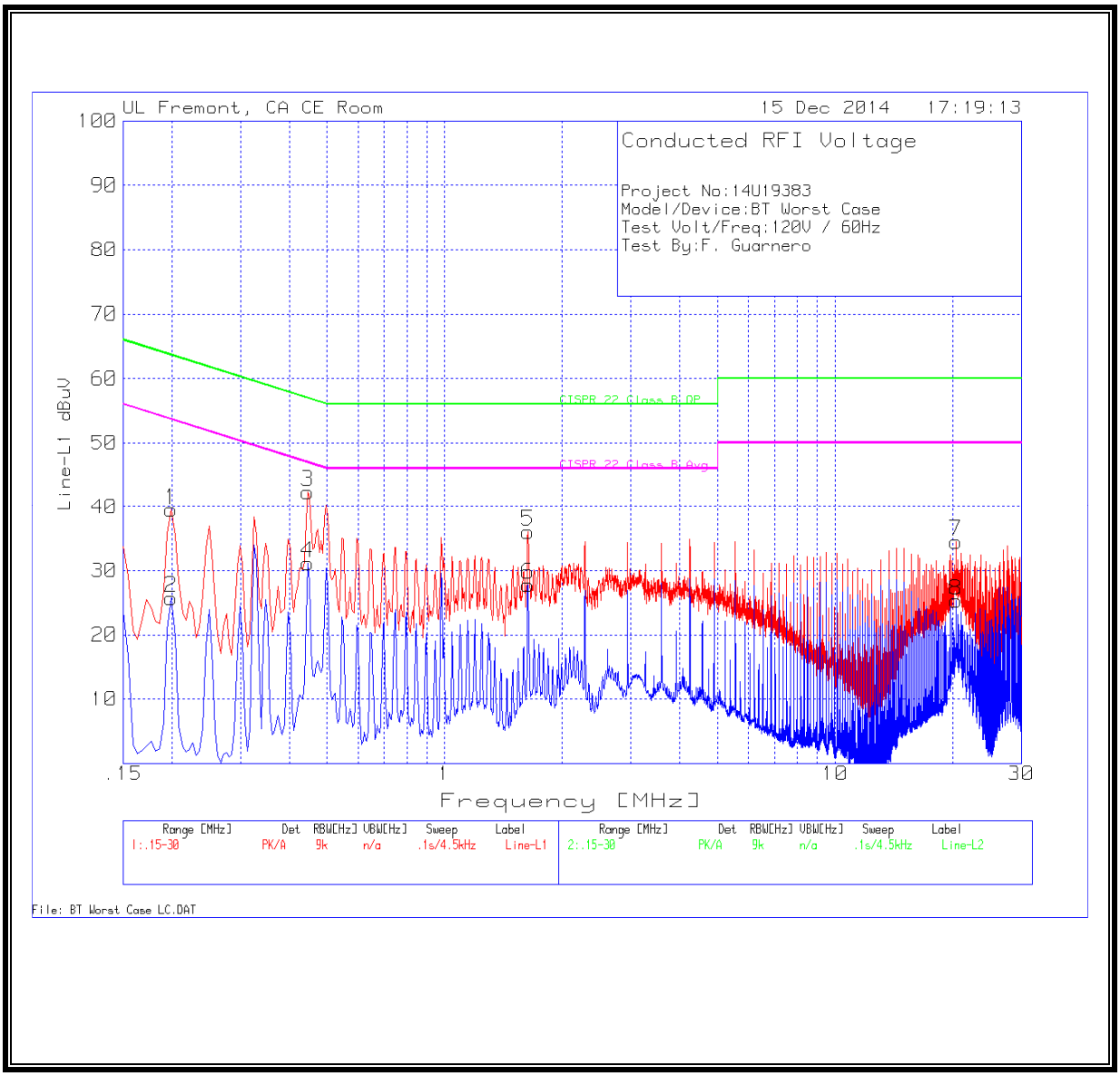
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4-2009

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

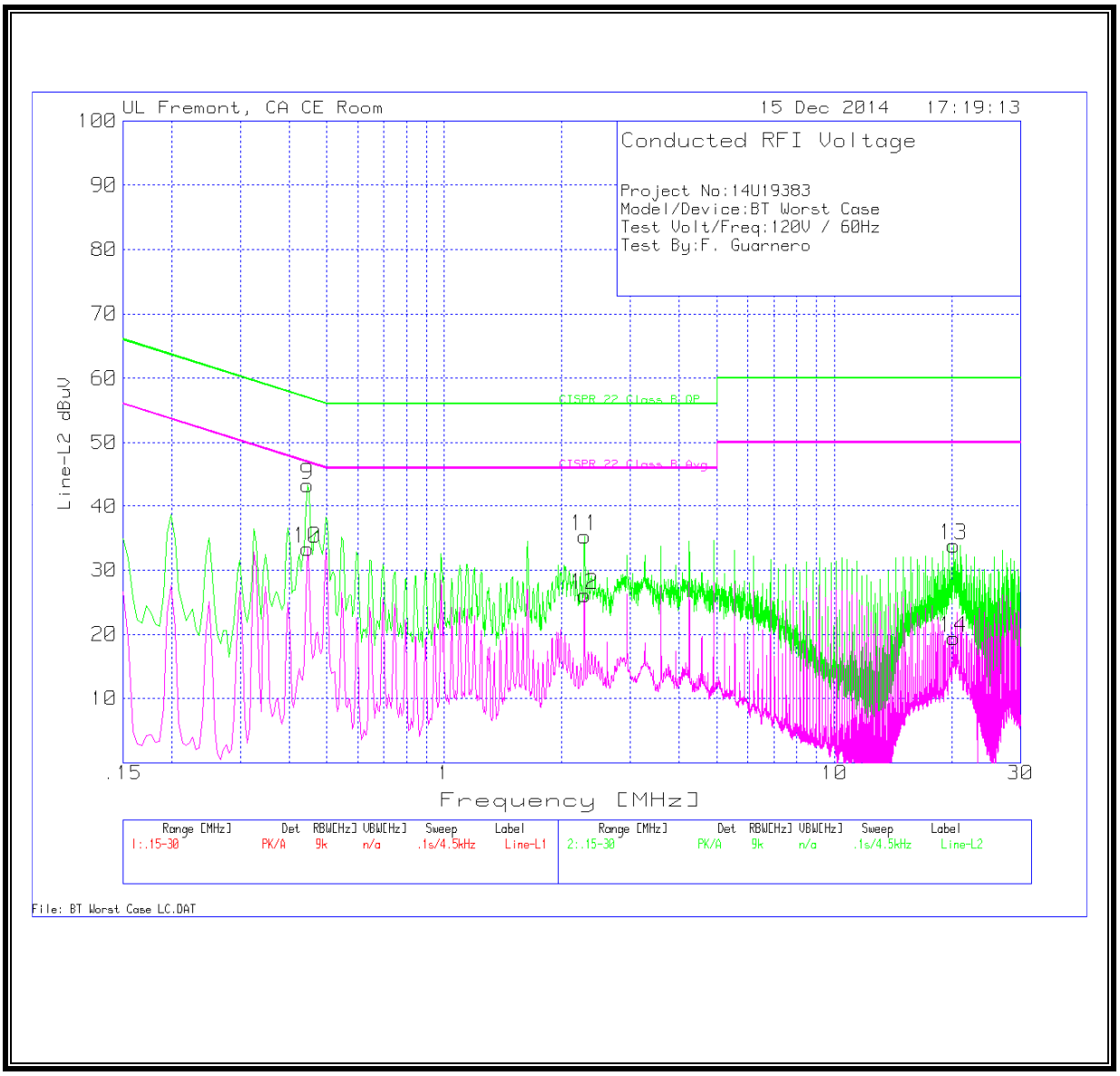
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

LINE 1 PLOT



LINE 2 PLOT



WORST EMISSIONS DATA

Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.1995	38.60	PK	.9	0	39.50	63.6	-24.10	-	-
2	.1995	24.82	Av	.9	0	25.72	-	-	53.6	-27.88
3	.4470	41.95	PK	.4	0	42.35	56.9	-14.55	-	-
4	.4470	30.74	Av	.4	0	31.14	-	-	46.9	-15.76
5	1.635	35.81	PK	.2	.1	36.11	56	-19.89	-	-
6	1.635	27.45	Av	.2	.1	27.75	-	-	46.0	-18.25
7	20.409	34.04	PK	.3	.2	34.54	60	-25.46	-	-
8	20.409	24.79	Av	.3	.2	25.29	-	-	50.0	-24.71

Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
9	.4470	43.05	PK	.4	0	43.45	56.9	-13.45	-	-
10	.4470	32.94	Av	.4	0	33.34	-	-	46.9	-13.56
11	2.2875	35.02	PK	.2	.1	35.32	56	-20.68	-	-
12	2.2875	25.82	Av	.2	.1	26.12	-	-	46.0	-19.88
13	20.247	33.39	PK	.3	.2	33.89	60	-26.11	-	-
14	20.247	18.95	Av	.3	.2	19.45	-	-	50.0	-30.55

PK - Peak detector

Av - average detection