FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1

CERTIFICATION TEST REPORT

FOR

BLUETOOTH HEADSET

MODEL NUMBER: WEARABLE CONCEPT 2

FCC ID: AL8-WC2
IC: 457A-WC2

REPORT NUMBER: 15U20565-E1V5

ISSUE DATE: FEBRUARY 25, 2016

Prepared for
PLANTRONICS, INC.
345 ENCINAL STREET
SANTA CRUZ, CA 95060
USA

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	10/01/2015	Initial Issue	C. Pang
V2	11/02/2015	Add duty cycle on spurious data and delete Yellow Highlighted section	C. Pang
V3	11/19/2015	Address TCB's Questions	C. Pang
V4	2/18/2016	Address TCB's Question on Section 7.2.4	C. Pang
V5	02/25/2016	Address TCB's Questions	C. Pang

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PLANTRONICS INC.
345 ENCINAL STREET
SANTA CRUZ, CA 95060

EUT DESCRIPTION: BLUETOOTH HEADSET

MODEL: WEARABLE CONCEPT 2

SERIAL NUMBER: BLD2_COMP06 (CONDUCTED) & BLD2_COMP02 (RADIATED)

DATE TESTED: APRIL 09-15, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	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:

JOEY GOMEZ
EMC ENGINEER
UL VERIFICATION SERVICES INC.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 1.

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

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

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 a Bluetooth headset.

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	7.05	5.07
2402 - 2480	DQPSK	6.47	4.44
2402 - 2480	Enhanced 8PSK	6.67	4.65

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a monopole antenna, with a maximum gain of -6.1dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 10400

The test utility software used during testing was BlueTest3 2.5.0

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	D400	45426167881	N/A
AC/DC Adapter	Dell	LA90PS0-00	0DF266-71615-67J-34B1	N/A

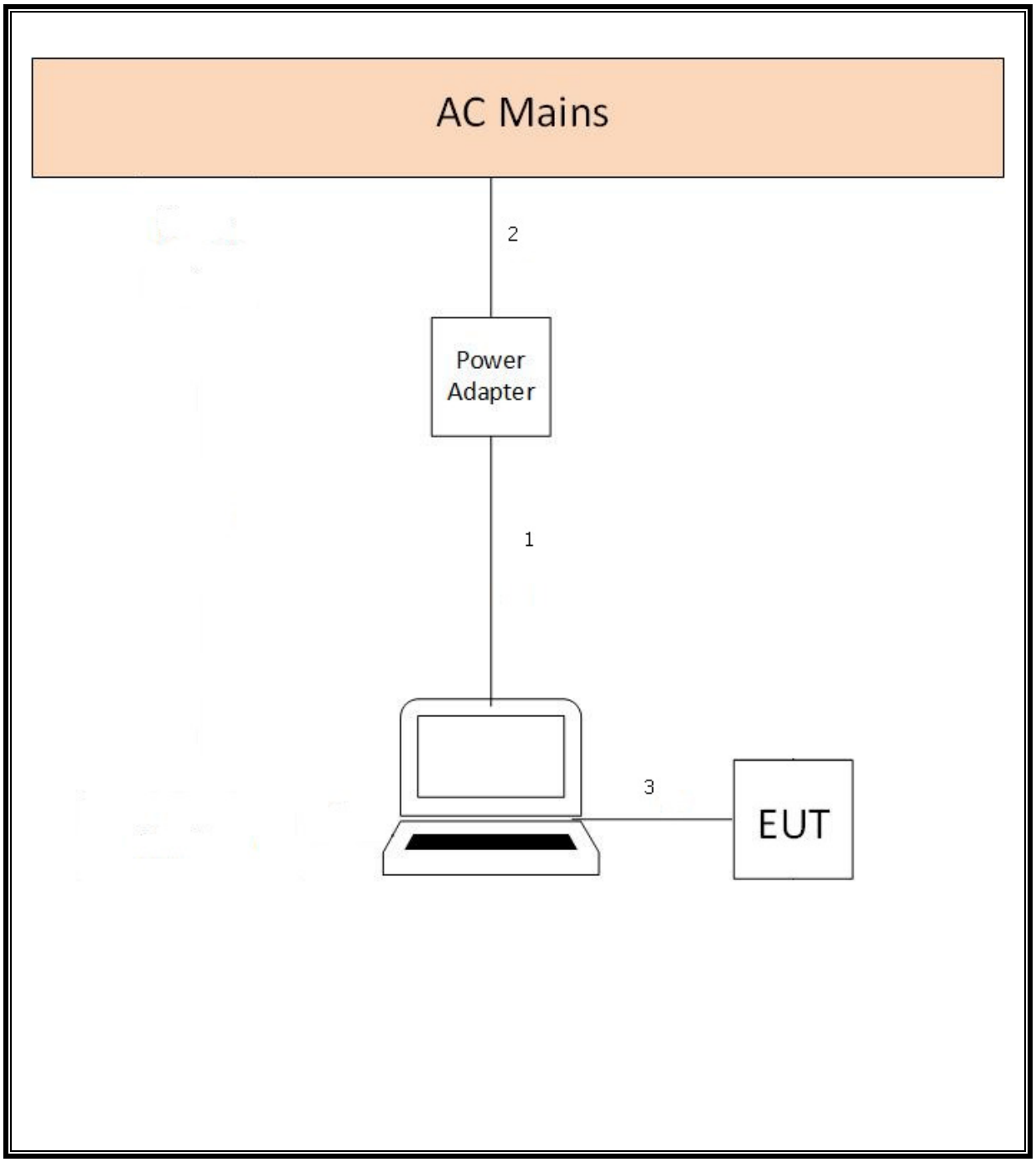
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	Barrel	Unshielded	1	N/A
2	AC	1	3-Prong	Unshielded	1	N/A
3	USB	1	USB	Unshielded	0.25	N/A

TEST SETUP

The EUT is connected to a host laptop via USB cable, test software exercises the radio.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	**Manufacturer**	**Model**	**T No.**	**Cal Date**	**Cal Due**
Horn Antenna 1-18 GHz	ETS Lindgren	3117	863	01/07/15	01/07/16
Hybrid Antenna 30 - 2000MHz	Sunol Sciences	JB3	900	05/14/14	05/14/15
3GHz HPF	Micro-Tronics	HPM17543	897	05/13/14	05/13/15
Amplifier 1-18GHz	Miteq	AFS42-00101800-25-S-42	495	06/05/14	06/05/15
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	MY52200012	9/8/2014	9/8/2015
Power Meter, P-series dual channel	Keysight	N1912A	MY55136012	6/8/2014	6/8/2015
Amplifier 10kHz - 1GHz	Sonoma	310N	835	06/05/14	06/05/15
Spectrum Analyzer PXA 3Hz - 44GHz	Agilent	N9030A	906	05/07/14	05/07/15
Horn Antenna 18-26GHz	ARA	MWH-1826	89	12/17/14	12/17/15
Amplifier 1-26.5GHz	Agilent	8449B	404	06/05/14	06/05/15
Spectrum Analyzer 40GHz	Agilent	8564E	106	08/06/14	08/06/15
LISN	FCC	50/250-25-2	24	01/16/15	01/16/16
EMI Receiver	Rohde & Schwartz	ESCI7	284	09/16/14	09/16/15
UL SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014		
Conducted Software	UL	UL EMC	Ver 2.2, March 31, 2015		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, April 3, 2015		

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

RESULTS

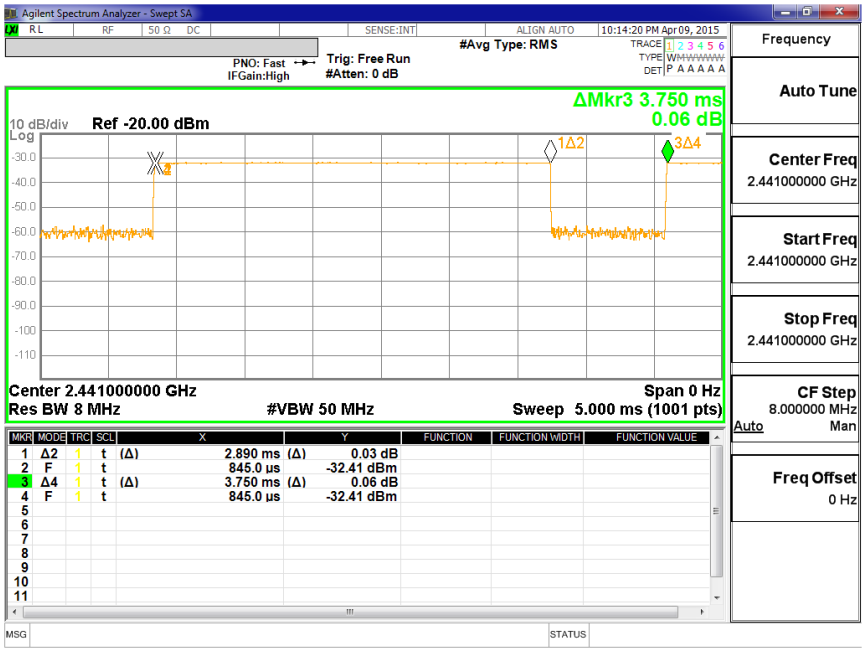
ON TIME AND DUTY CYCLE

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	2.890	3.750	0.771	77.07%	1.13	0.346
Bluetooth 8PSK	0.384	1.248	0.308	30.77%	5.12	2.604

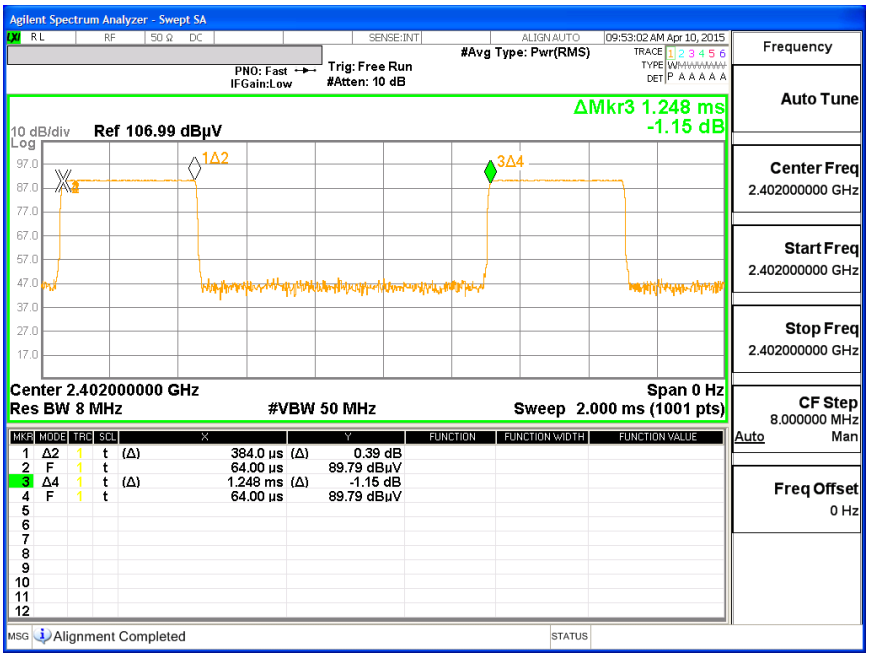
DUTY CYCLE PLOTS

HOPPING OFF

DUTY CYCLE GFSK MODE



DUTY CYCLE 8PSK MODE



7.2. BASIC DATA RATE GFSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

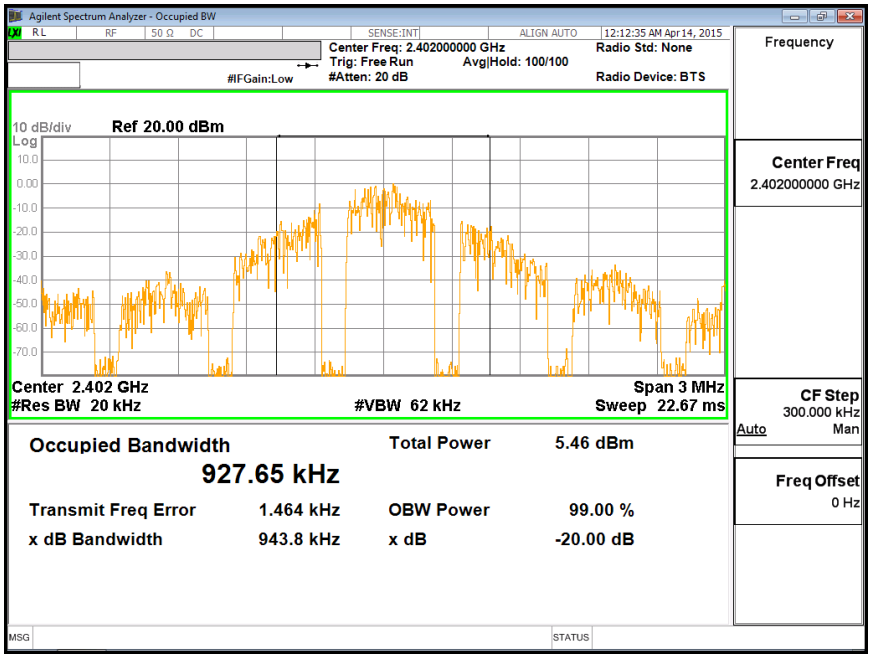
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

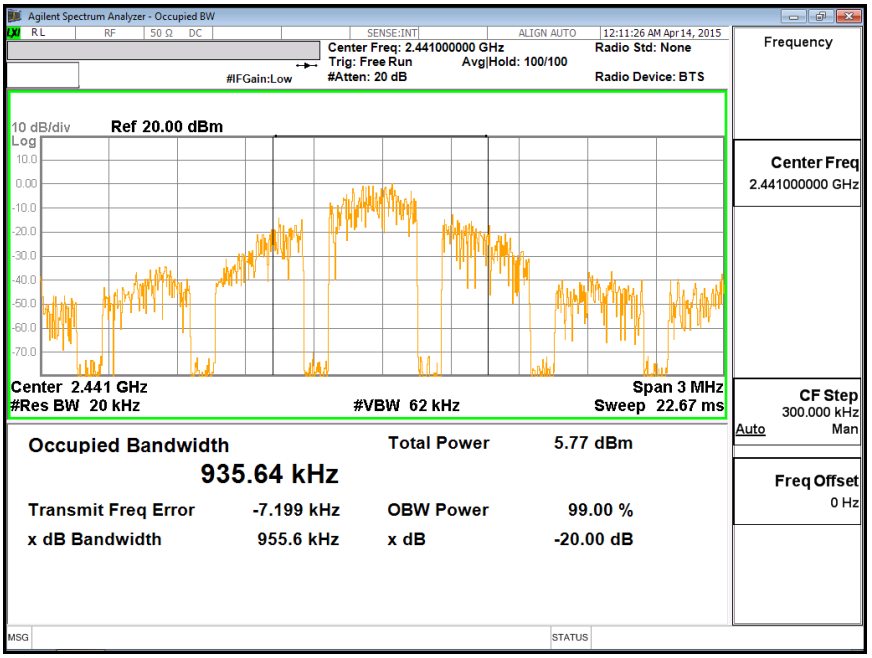
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	943.8	927.65
Middle	2441	955.6	935.64
High	2480	927.7	935.83

20 dB AND 99% BANDWIDTH

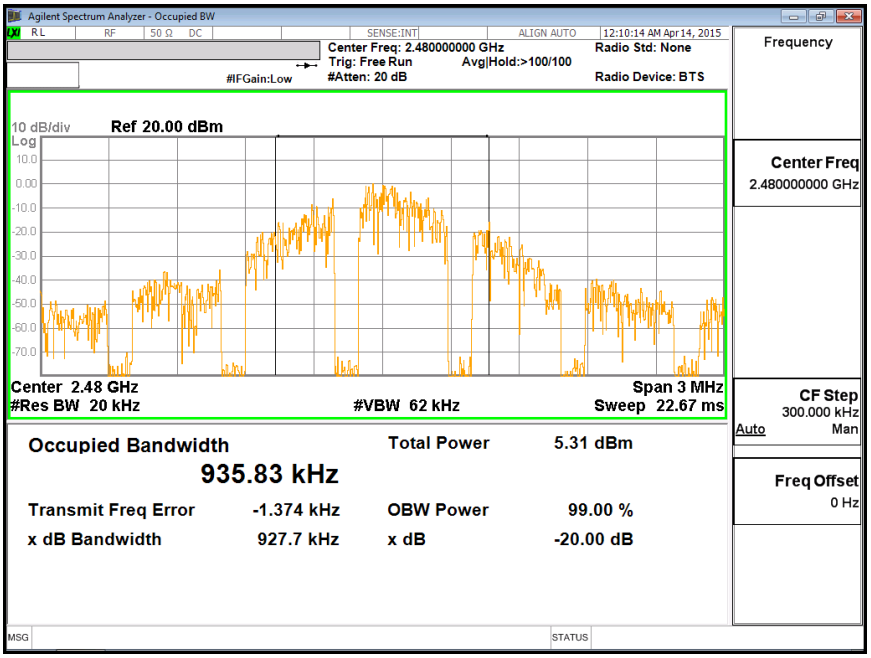
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

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.

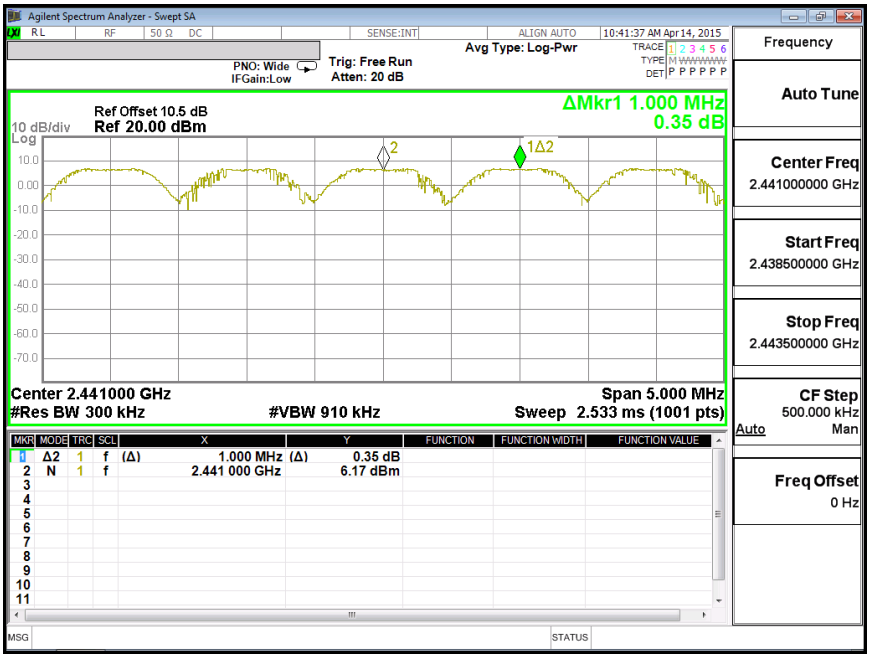
TEST PROCEDURE

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.

RESULTS

HOPPING FREQUENCY SEPARATION

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

TEST PROCEDURE

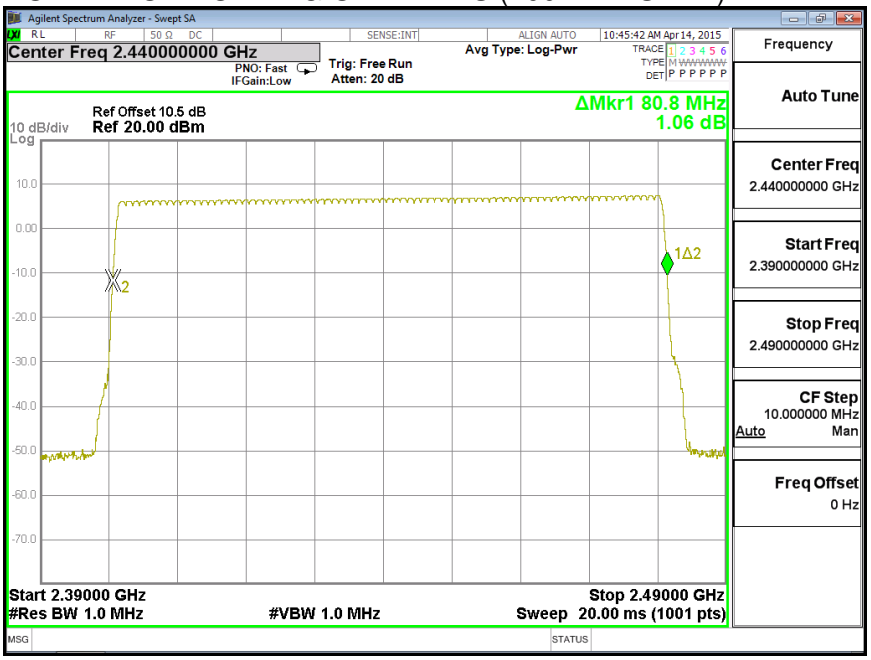
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

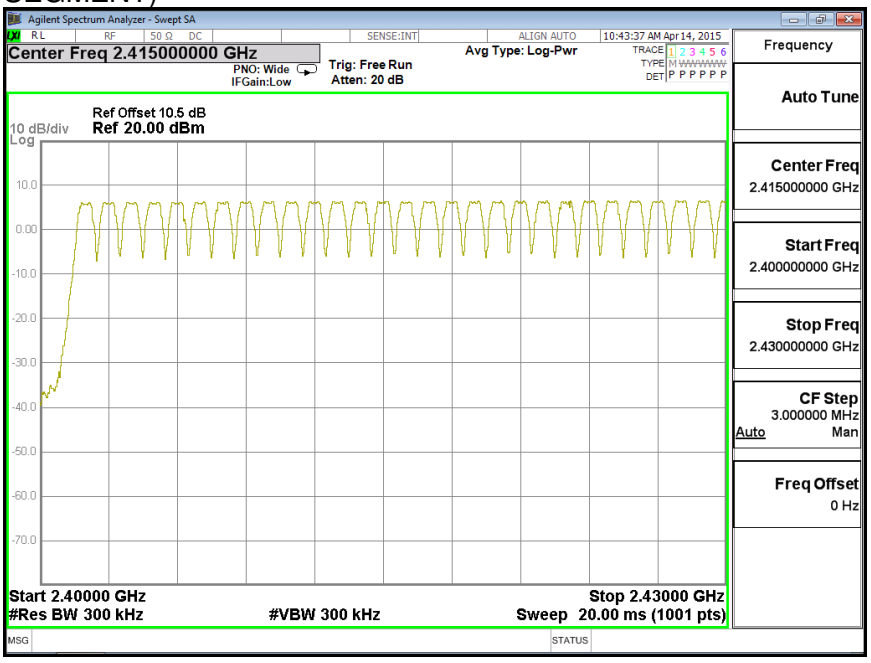
Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS

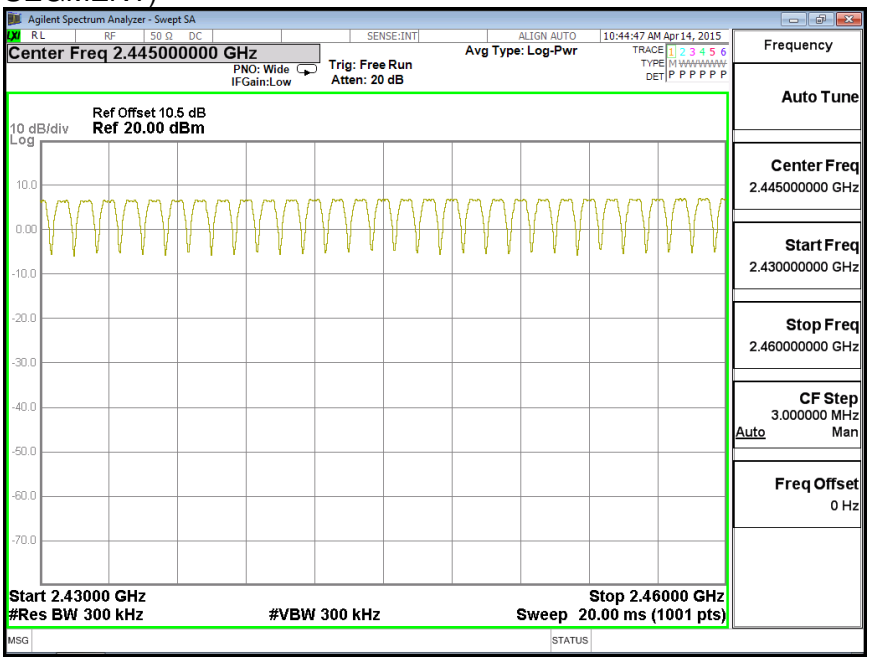
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



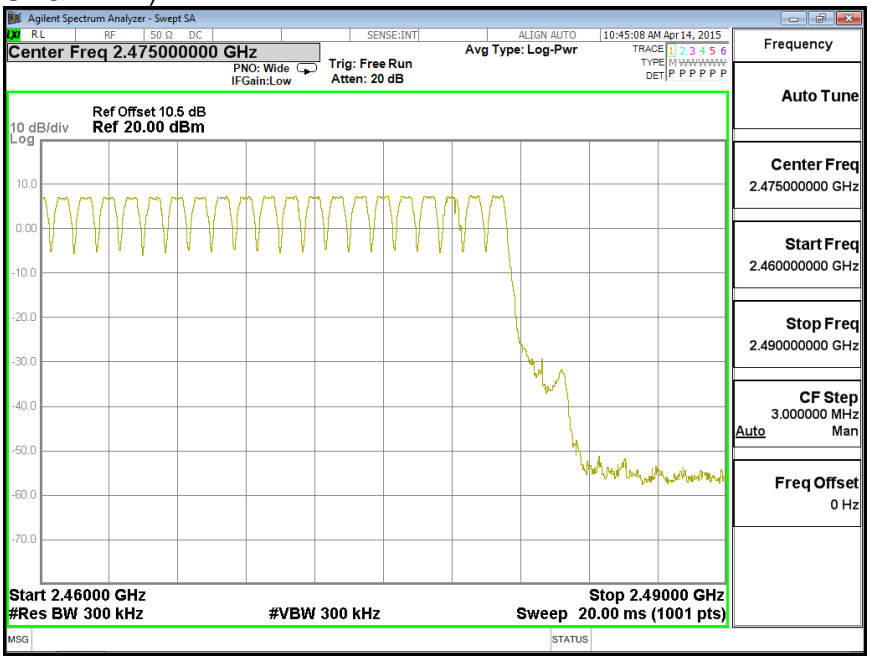
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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.

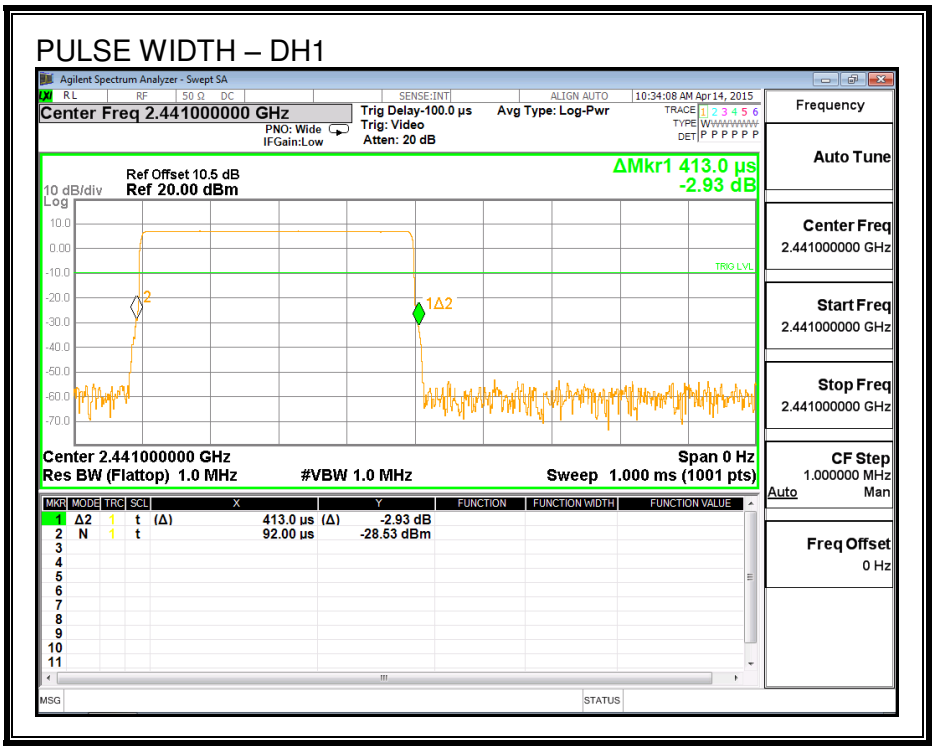
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

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

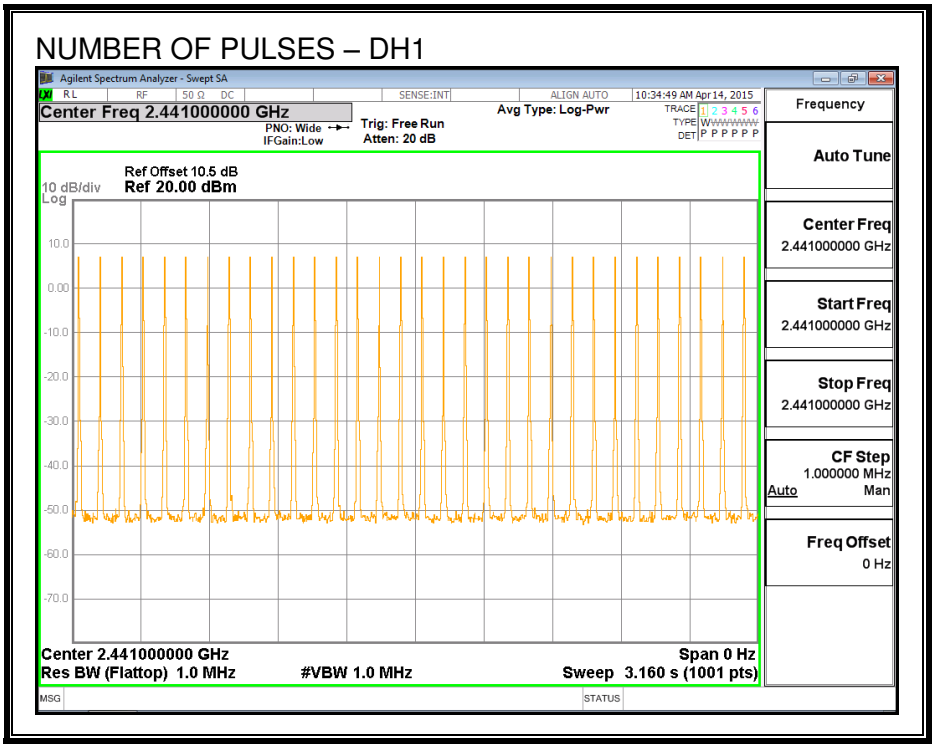
RESULTS

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	0.413	32	0.132	0.4	-0.268
DH3	1.666	16	0.267	0.4	-0.133
DH5	2.908	10	0.291	0.4	-0.109
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.413	8	0.033	0.4	-0.367
DH3	1.666	4	0.067	0.4	-0.333
DH5	2.908	2.5	0.073	0.4	-0.327

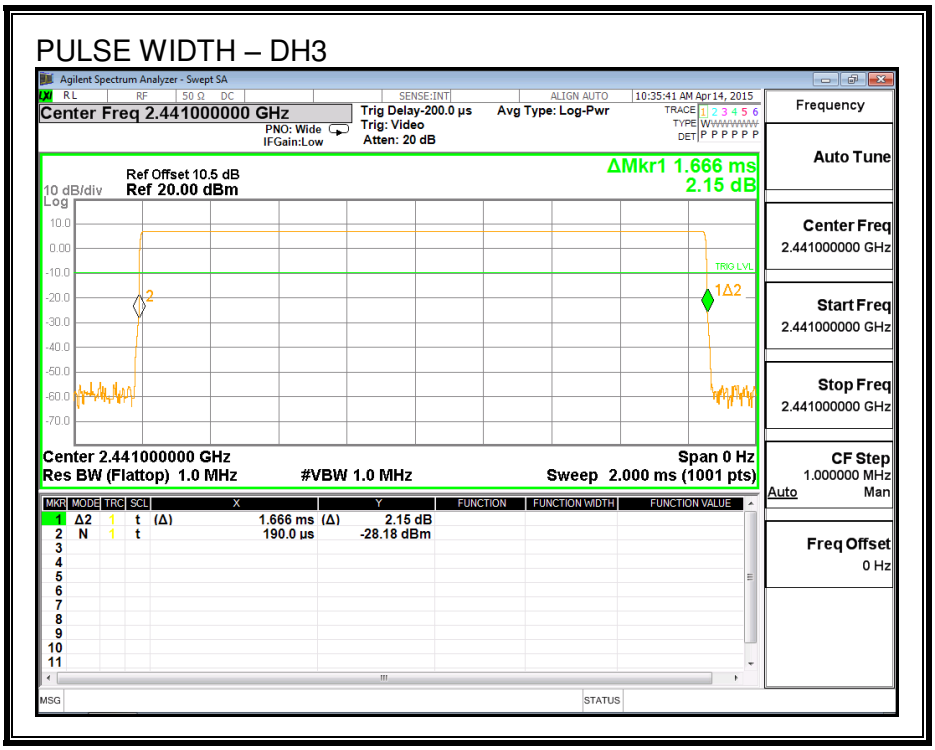
PULSE WIDTH - DH1



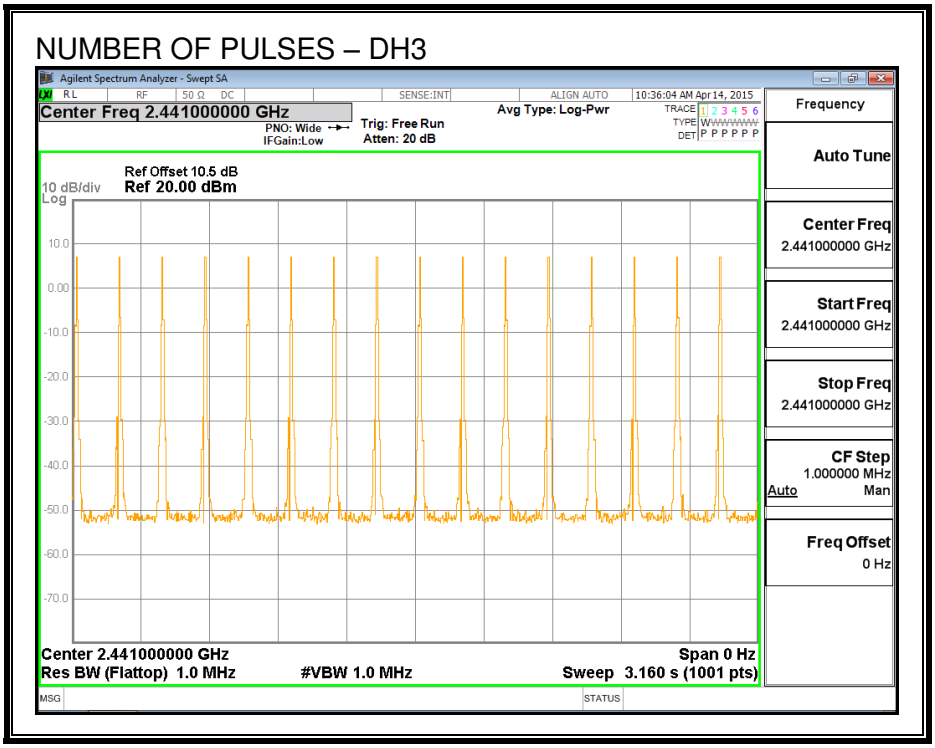
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



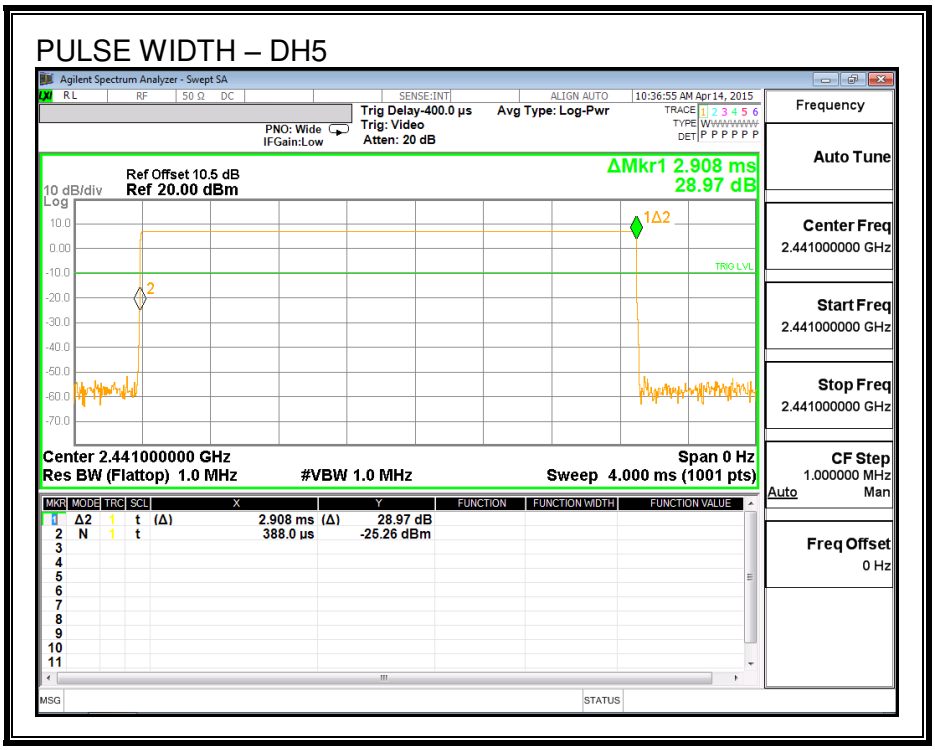
PULSE WIDTH – DH3



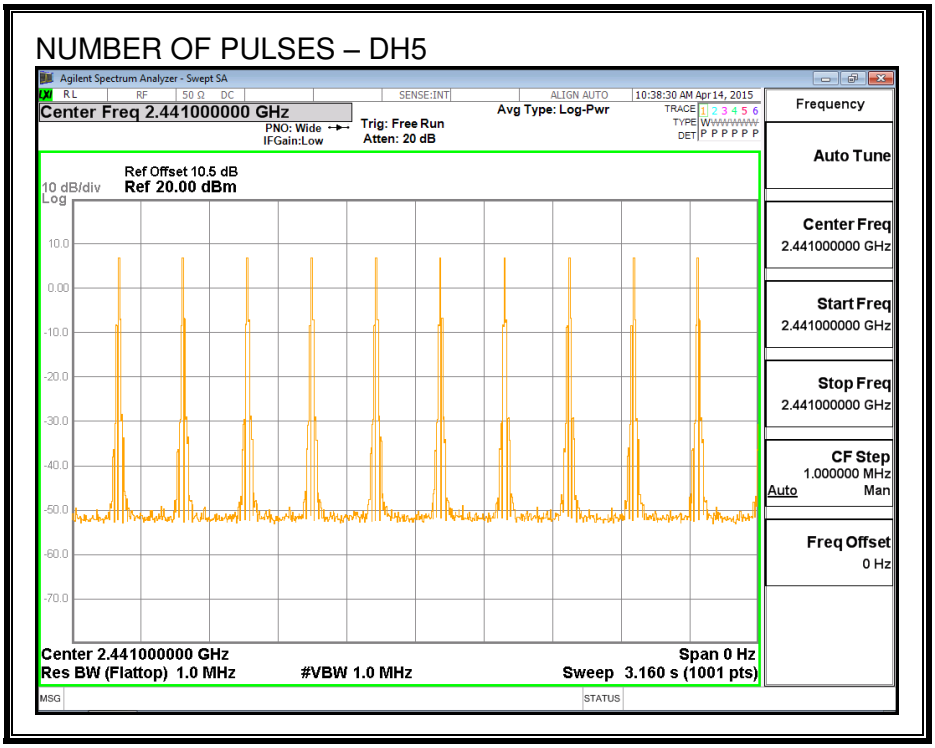
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 (5.4) (2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	5.74	-6.10	21	-15.26
Middle	2441	6.42	-6.10	21	-14.58
High	2480	7.05	-6.10	21	-13.95

7.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 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	5.60
Middle	2441	6.32
High	2480	6.95

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-247 (5.5)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

TEST PROCEDURE

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

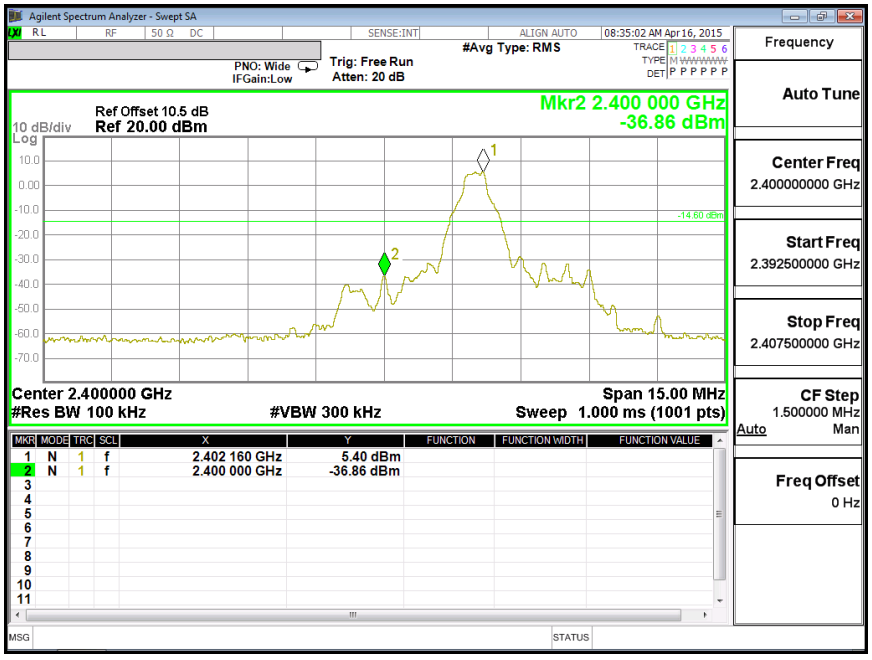
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

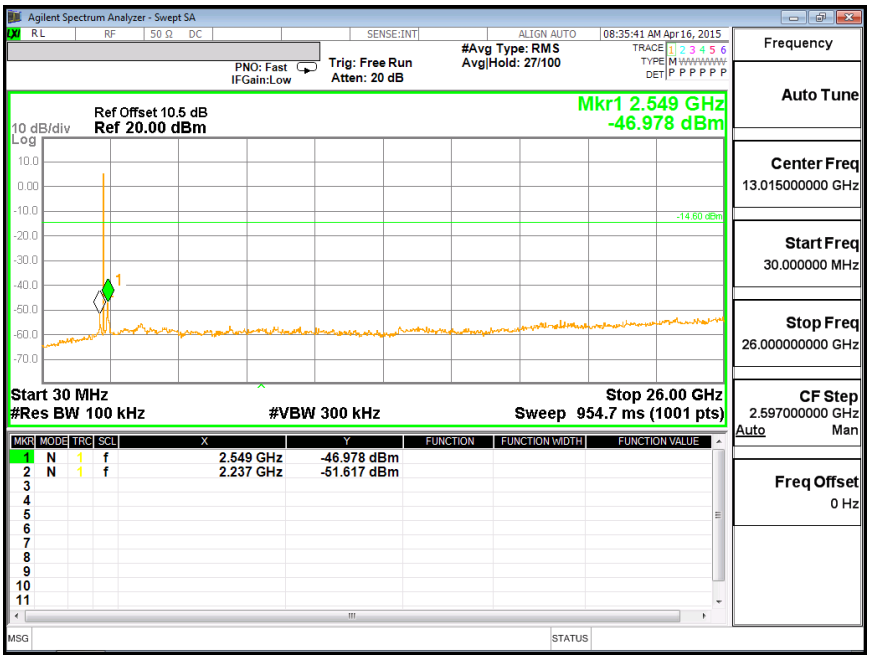
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE

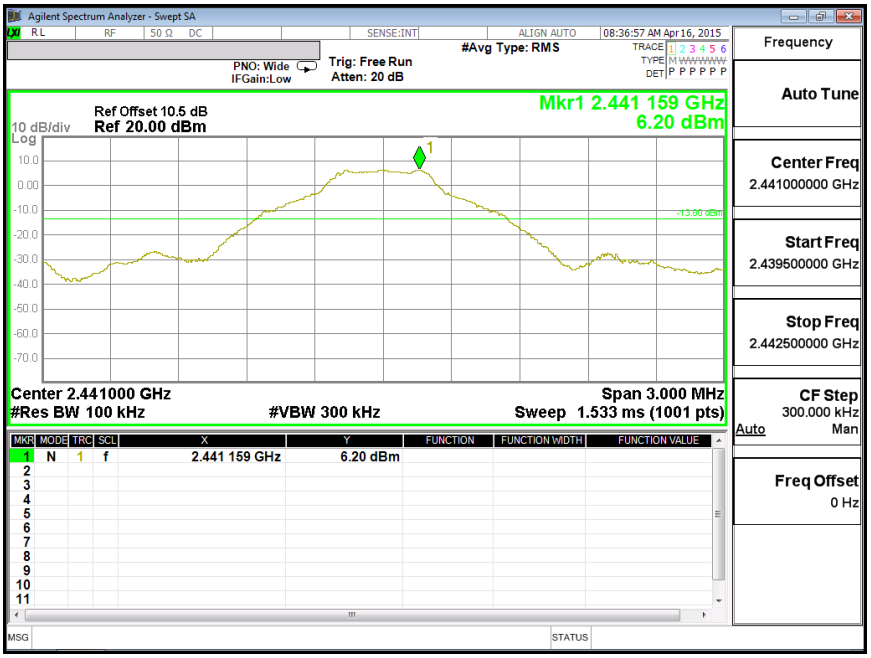


LOW CHANNEL SPURIOUS

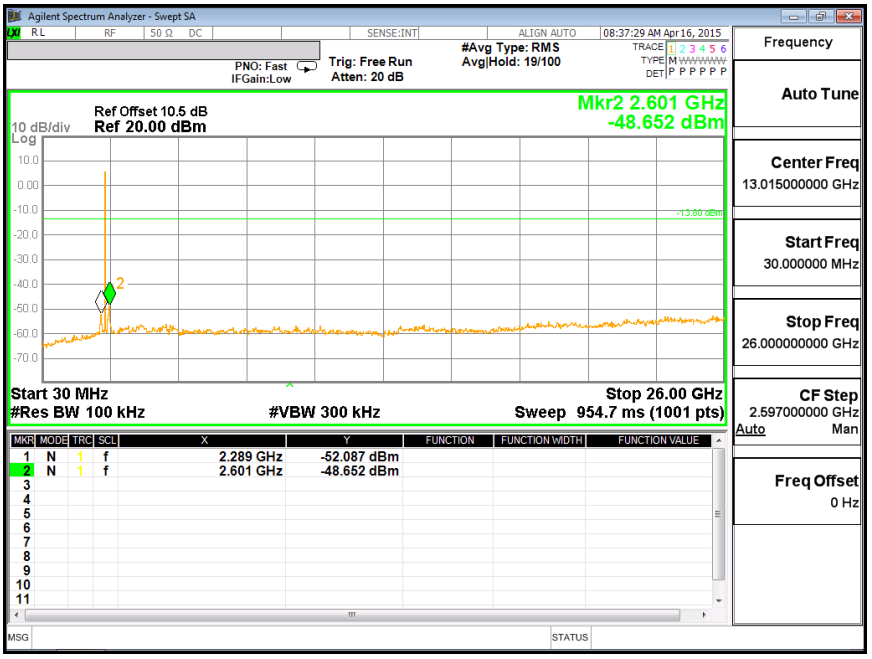


SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE

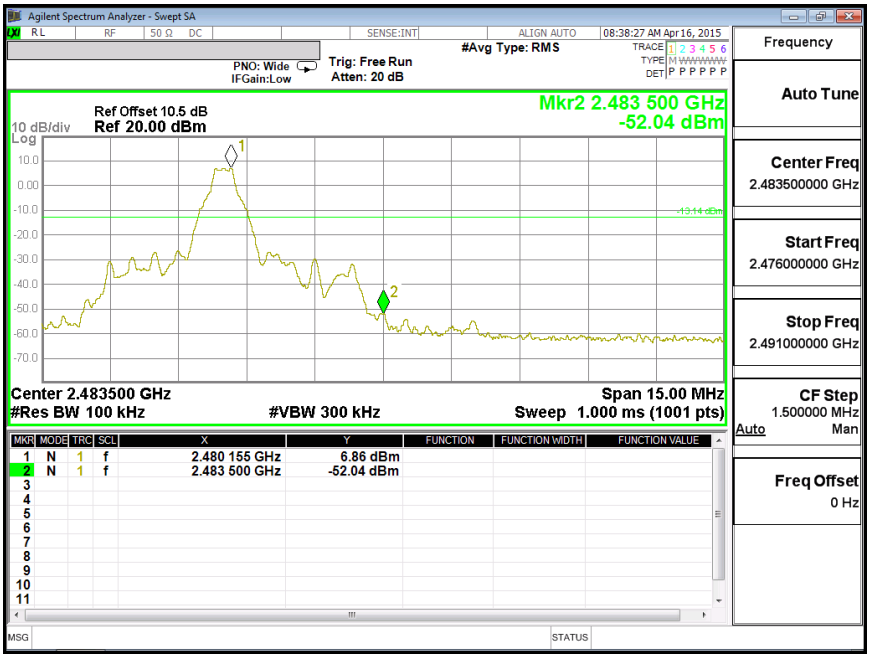


MID CHANNEL SPURIOUS

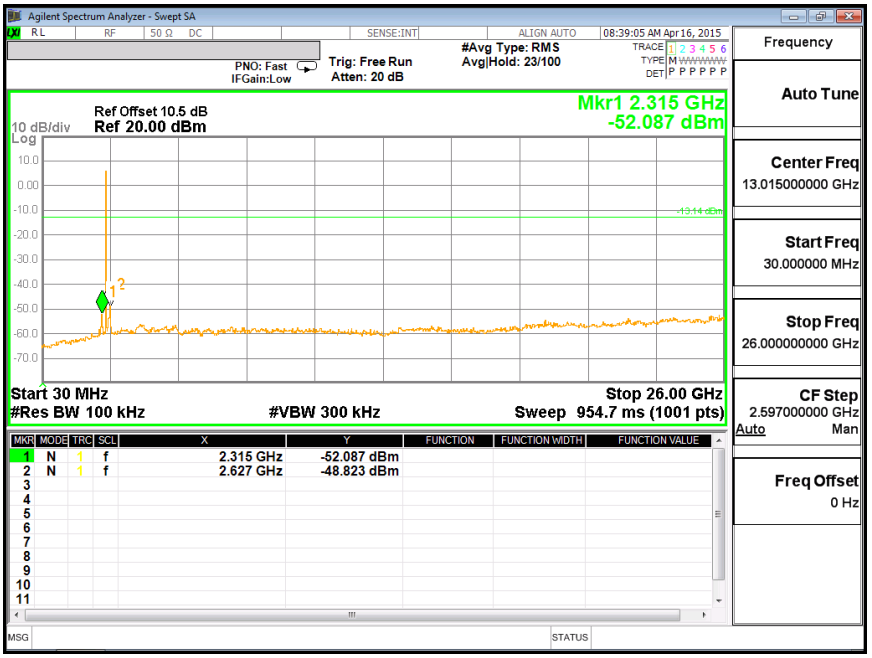


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE

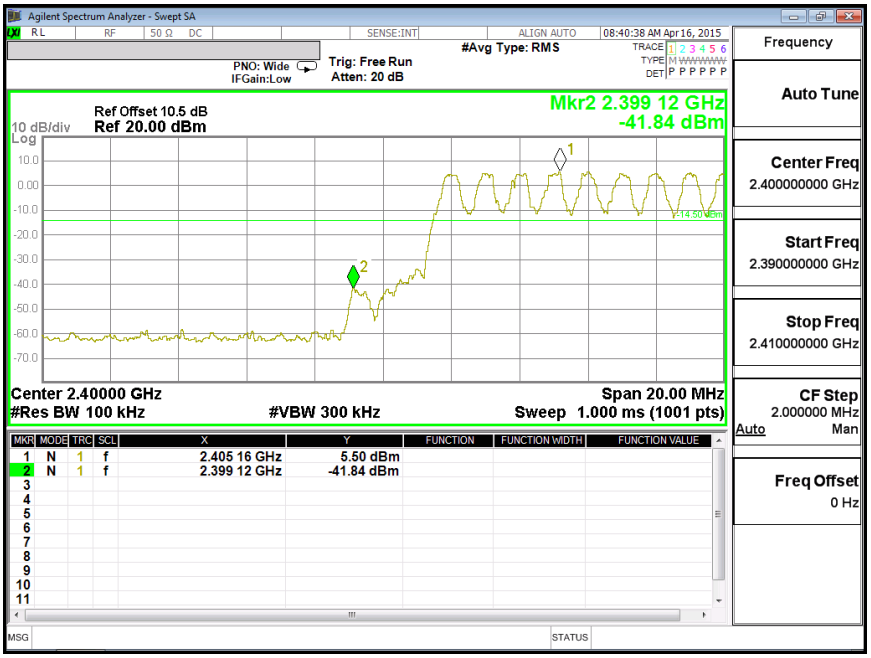


HIGH CHANNEL SPURIOUS

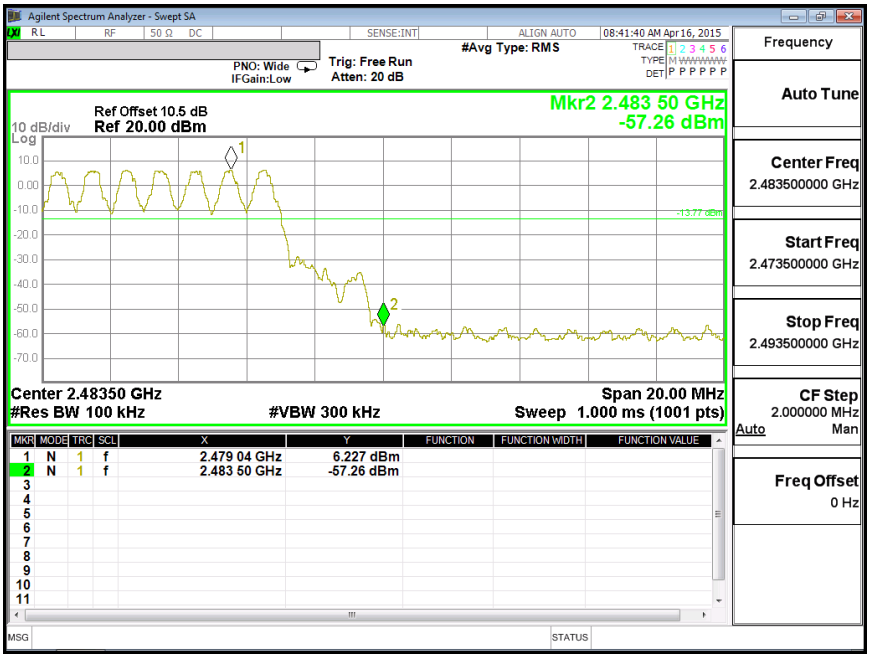


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



7.3. ENHANCED DATA RATE QPSK MODULATION

7.3.1. OUTPUT POWER

LIMIT

§15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 (5.4) (2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	4.70	-6.10	21	-16.30
Middle	2441	5.40	-6.10	21	-15.60
High	2480	6.05	-6.10	21	-14.95

7.3.2. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	2.95
Middle	2441	3.78
High	2480	4.72

7.4. ENHANCED DATA RATE 8PSK MODULATION

7.4.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

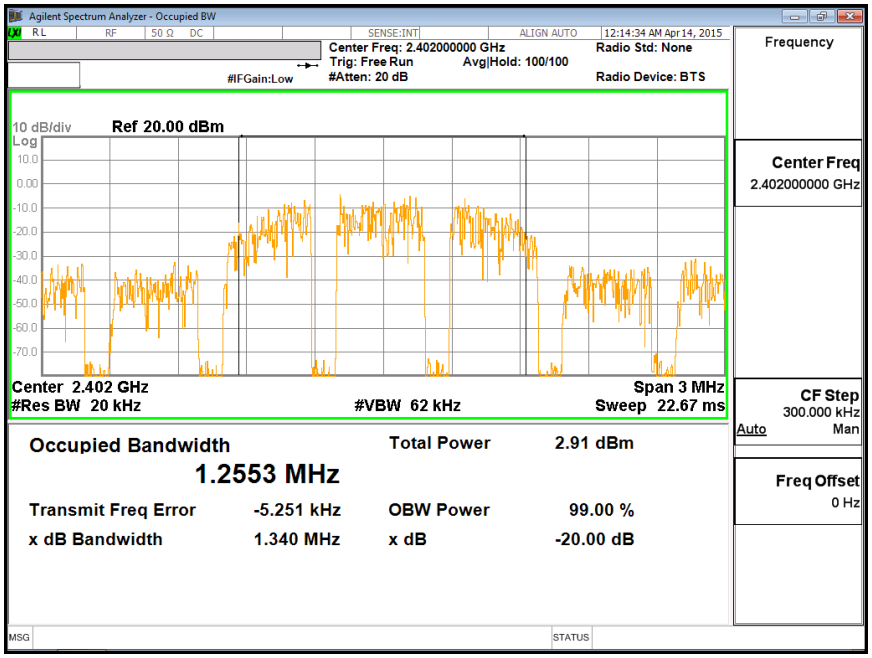
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

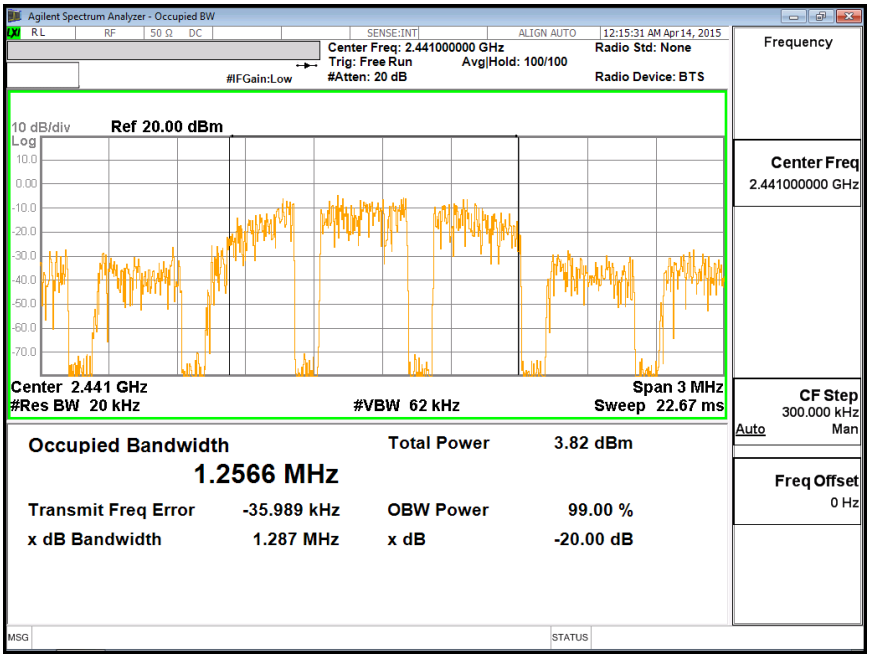
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1.340	1.2553
Middle	2441	1.287	1.2566
High	2480	1.260	1.3569

20 dB AND 99% BANDWIDTH

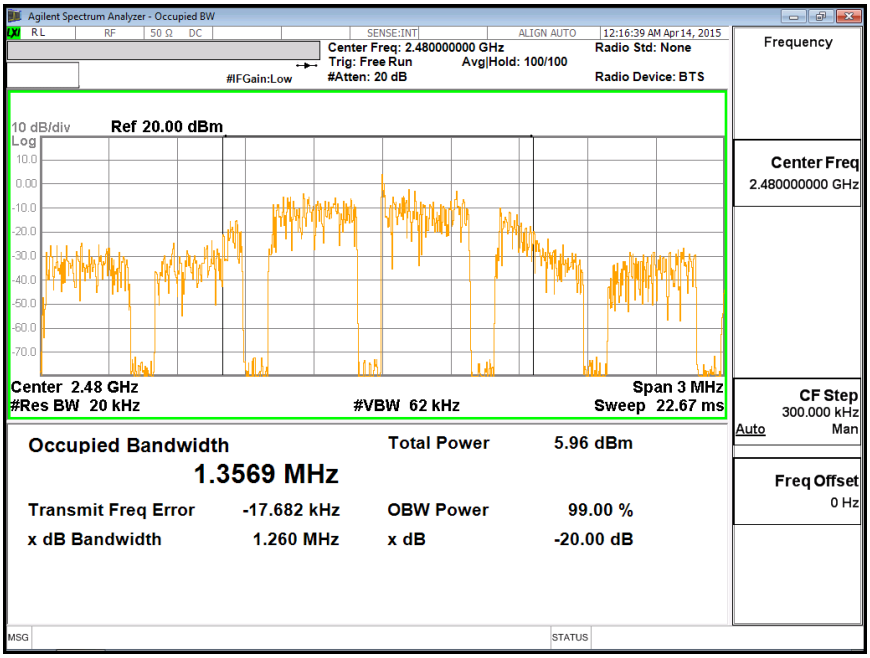
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



7.4.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

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.

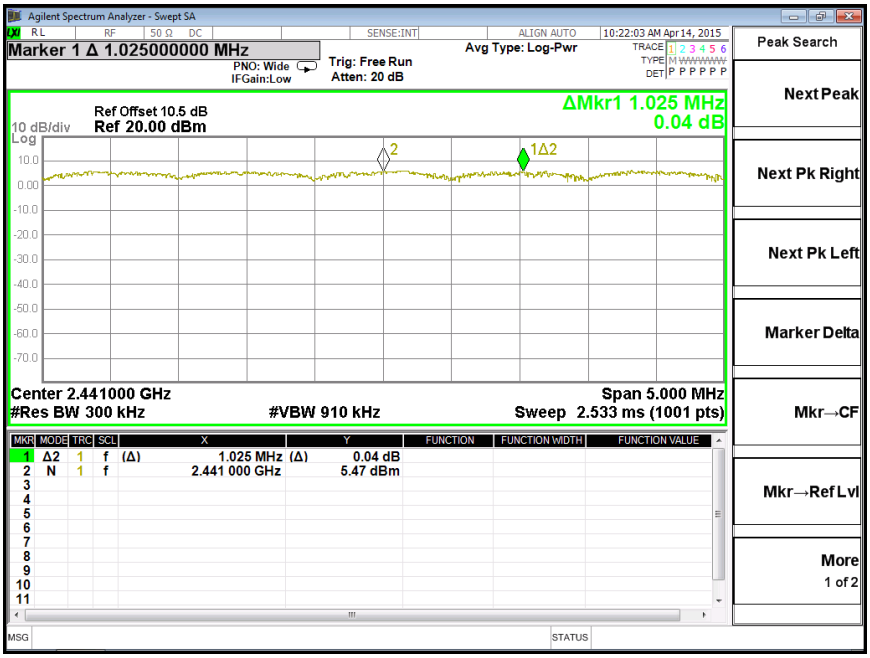
TEST PROCEDURE

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.

RESULTS

HOPPING FREQUENCY SEPARATION

HOPPING FREQUENCY SEPARATION



7.4.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

TEST PROCEDURE

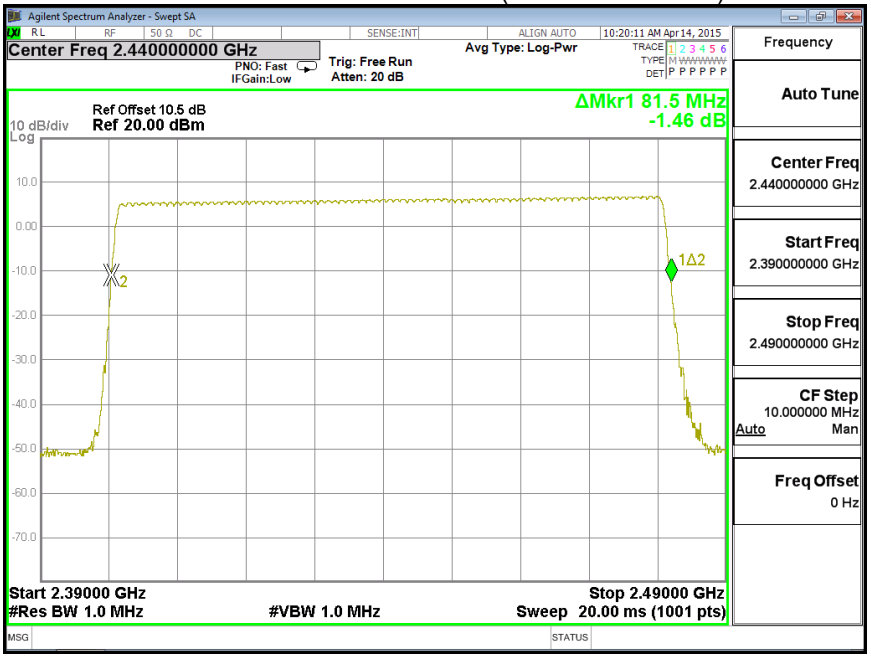
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

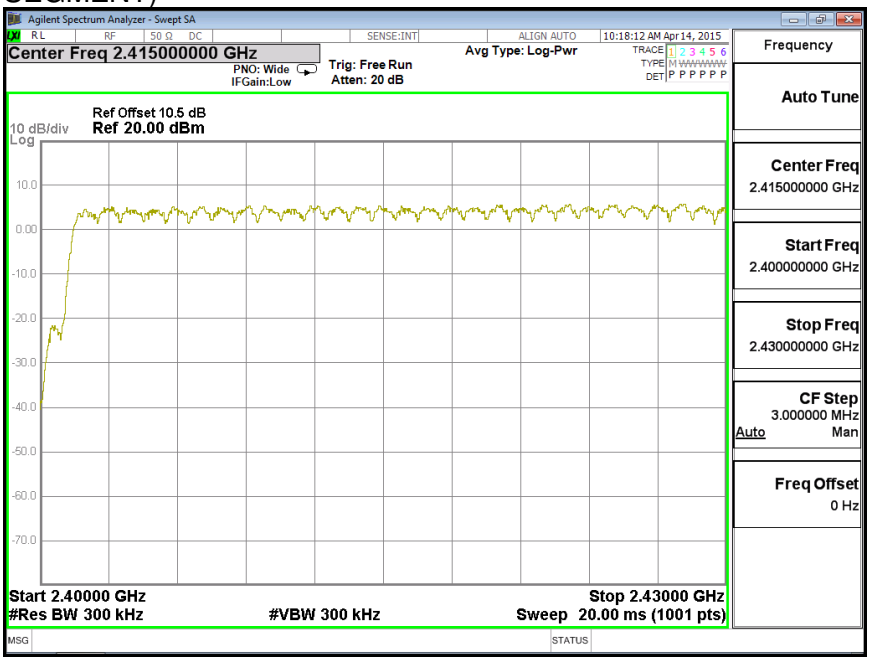
Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS

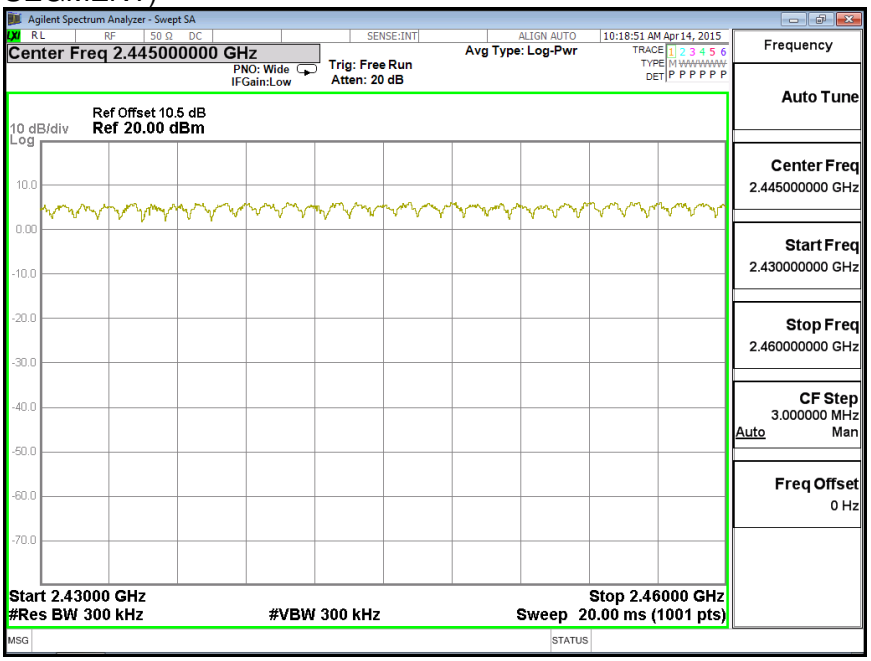
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



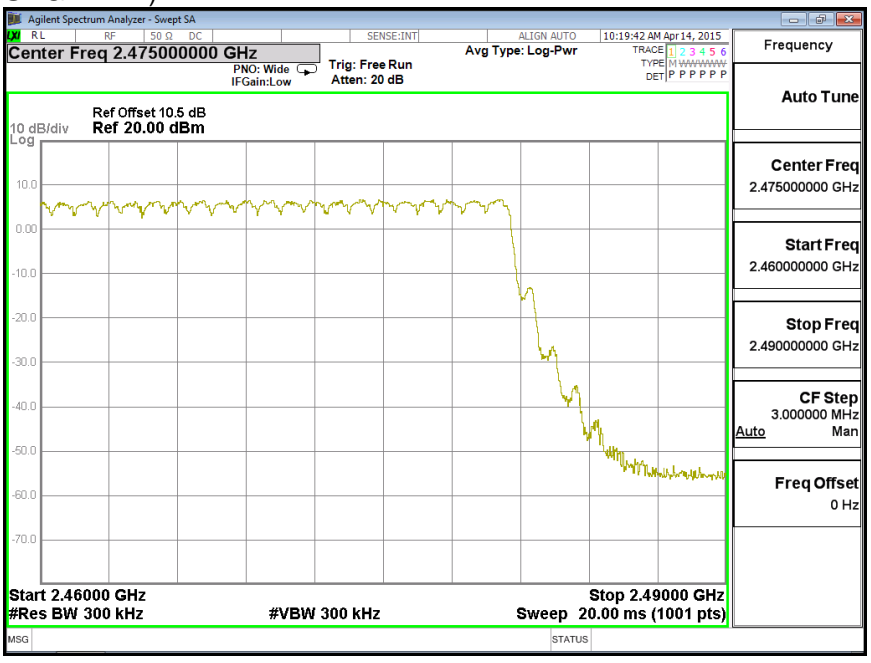
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



7.4.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

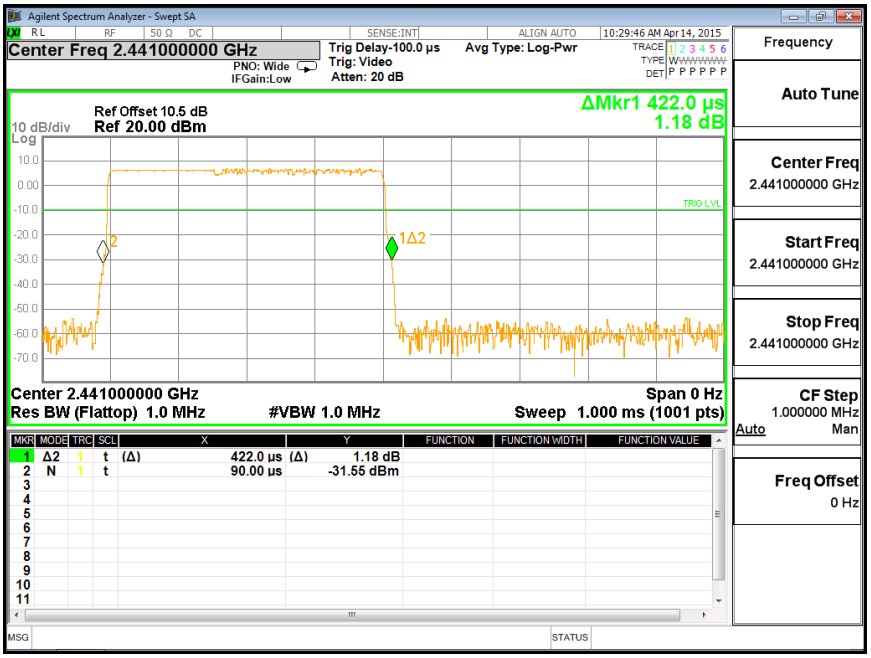
8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.42	32	0.134	0.4	-0.266
DH3	1.676	16	0.268	0.4	-0.132
DH5	2.92	10	0.292	0.4	-0.108

Note: for AFH (8PSK) mode, please refer to the results of AFH (GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate on page 22 demonstrates compliance with channel occupancy when AFH is employed

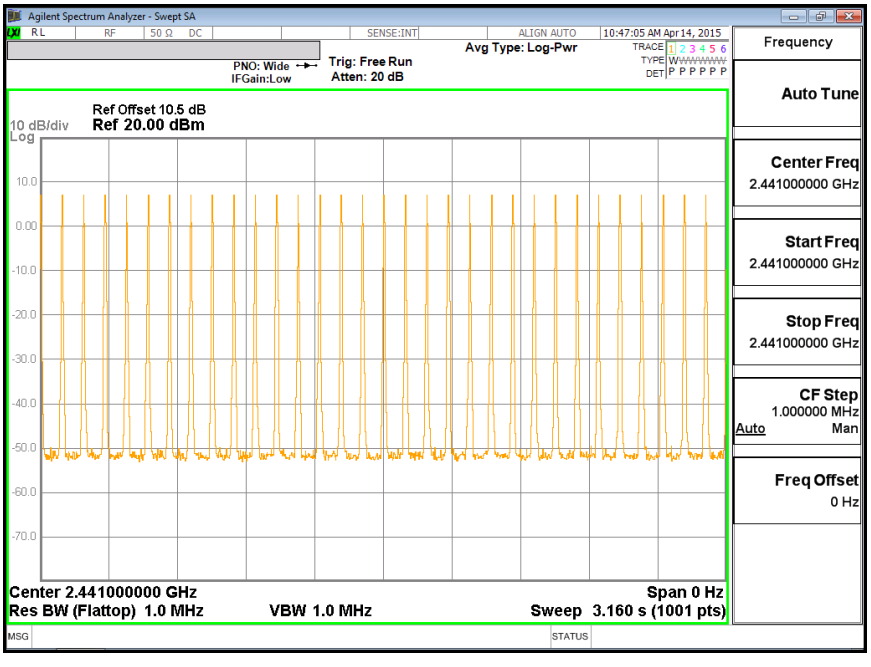
PULSE WIDTH - DH1

PULSE WIDTH – DH1

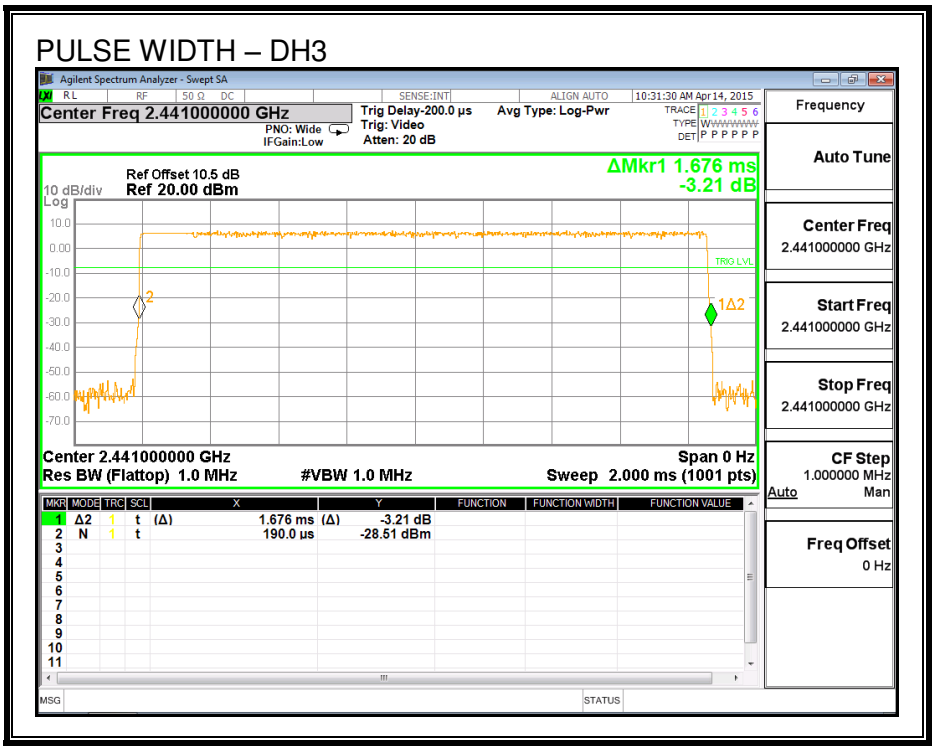


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

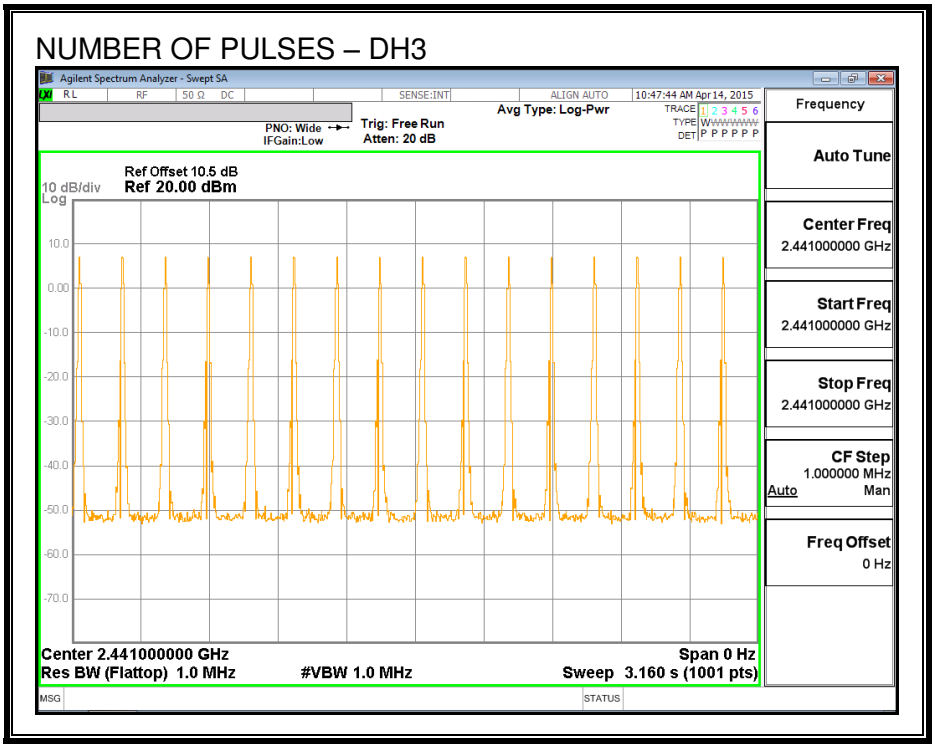
NUMBER OF PULSES – DH1



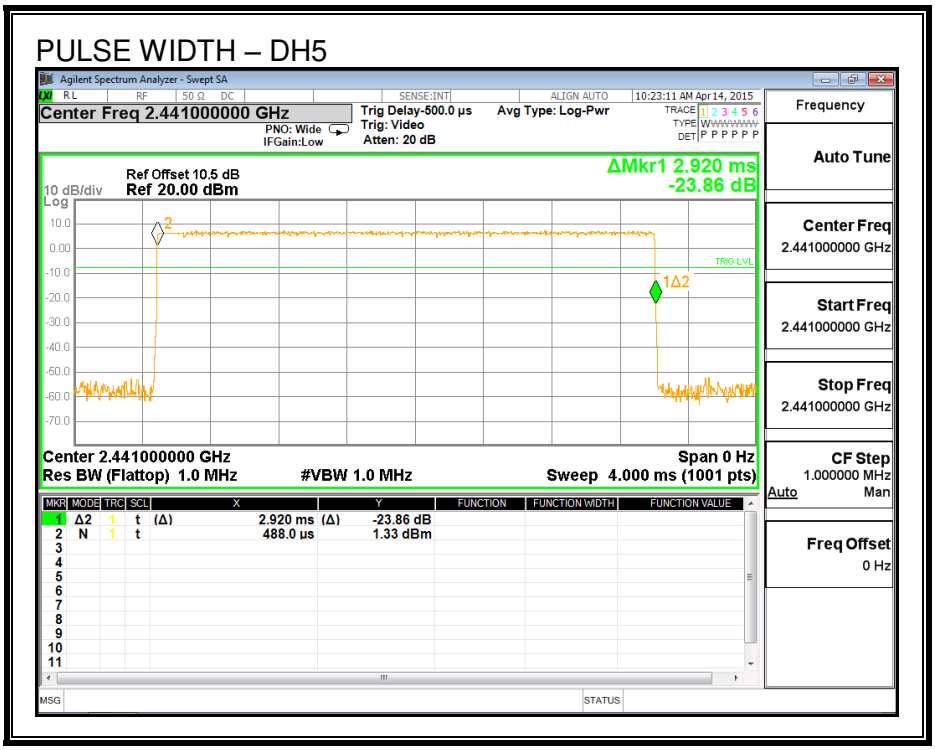
PULSE WIDTH – DH3



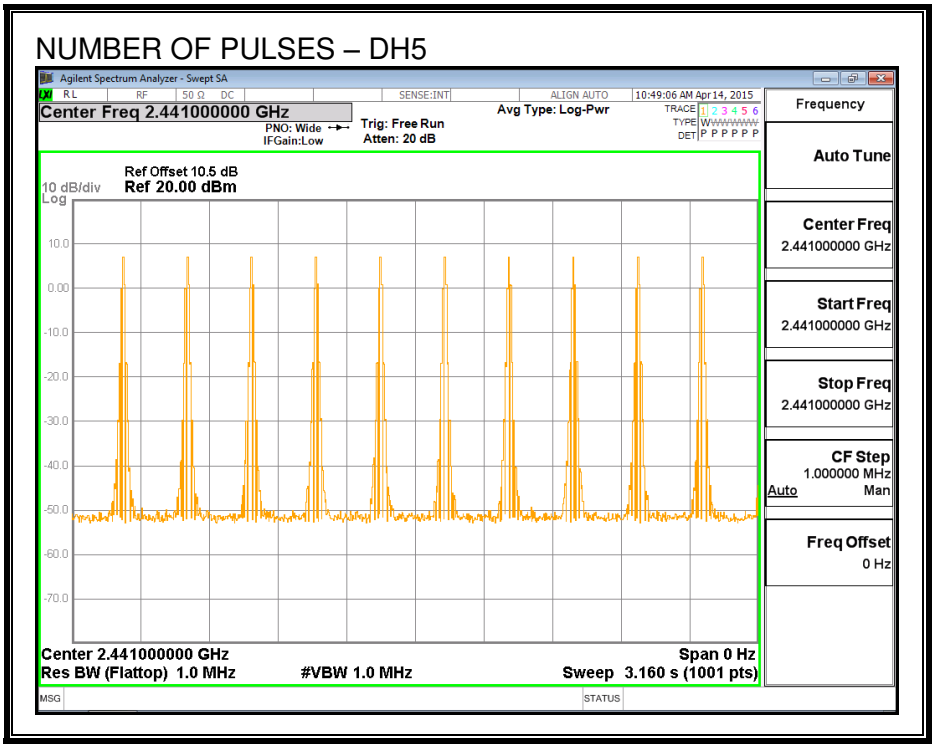
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.4.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 (5.4) (2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2402	5.12	-6.10	21	-15.88
Middle	2441	6.01	-6.10	21	-14.99
High	2480	6.67	-6.10	21	-14.33

7.4.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a wideband gated power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 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	3.66
Middle	2441	5.21
High	2480	5.95

7.4.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-247 (5.5)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

TEST PROCEDURE

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

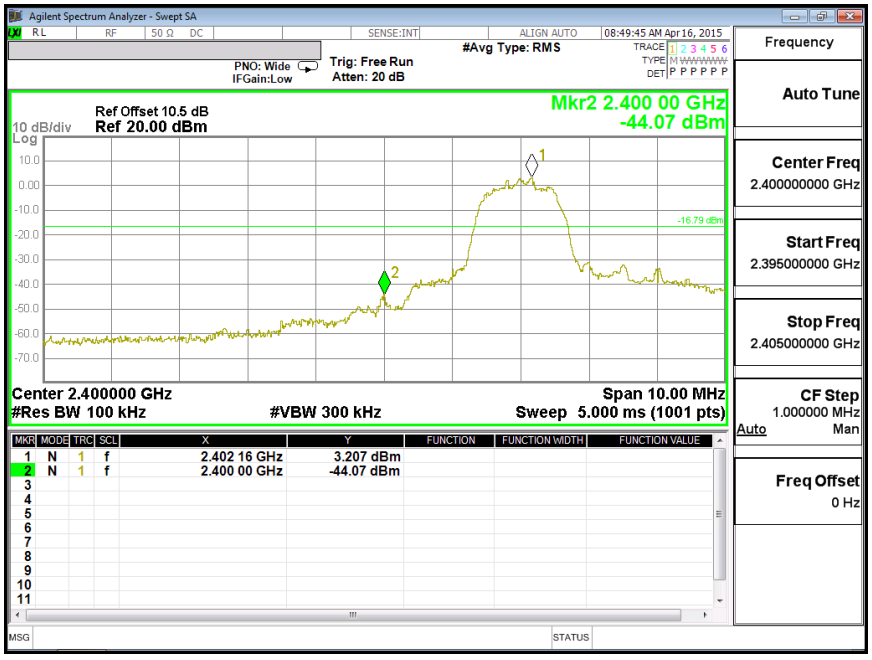
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

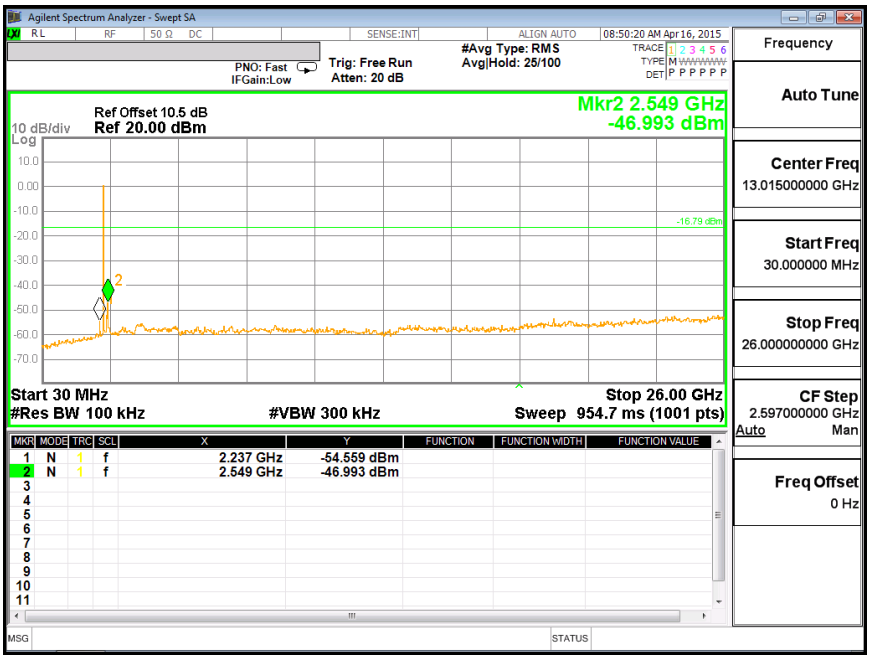
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE

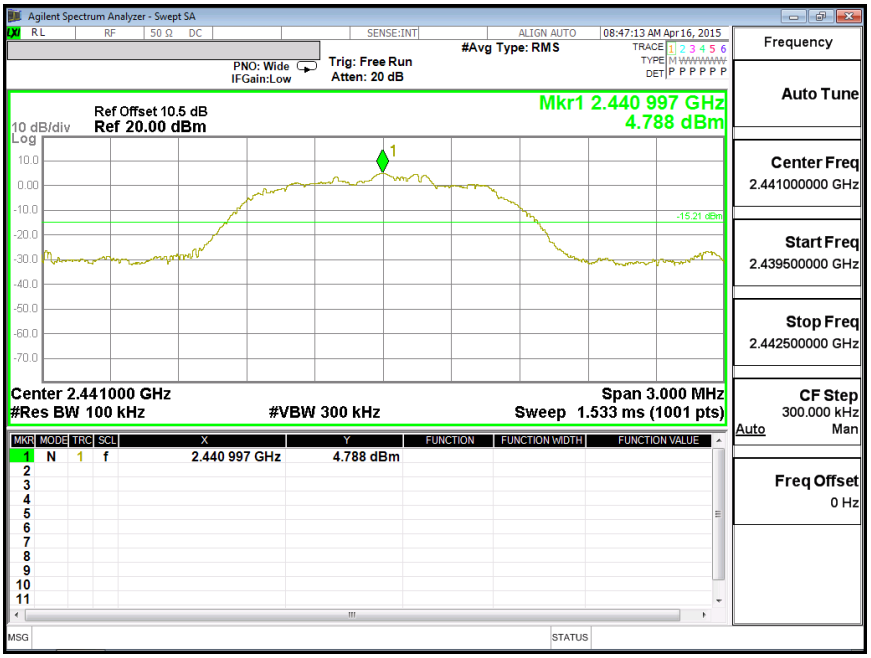


LOW CHANNEL SPURIOUS

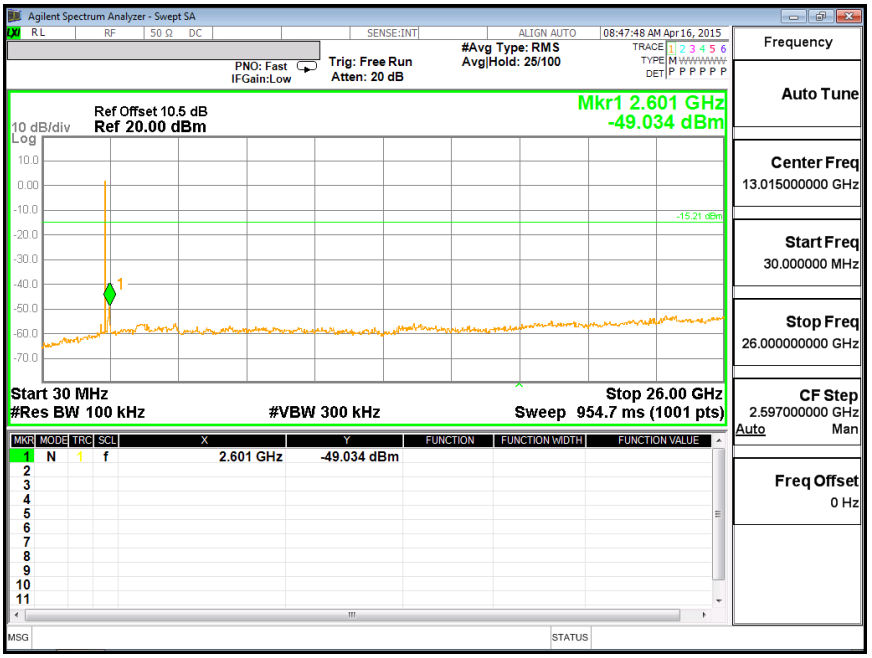


SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE

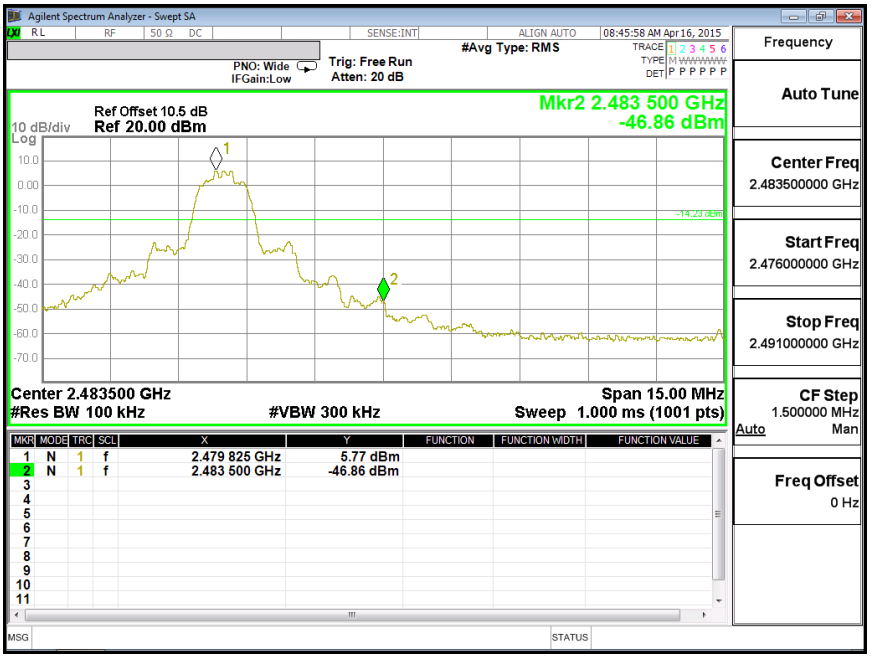


MID CHANNEL SPURIOUS

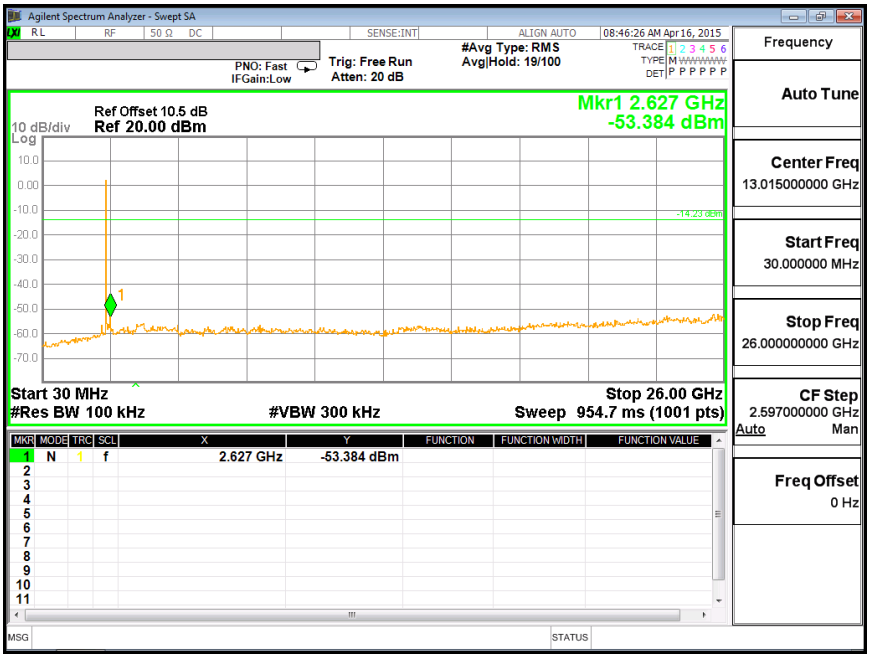


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE

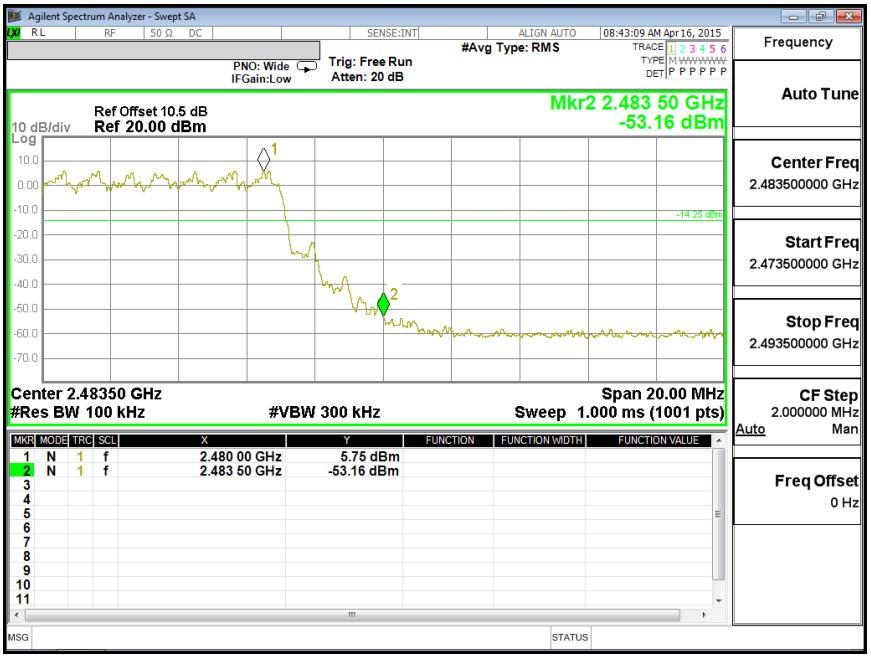


HIGH CHANNEL SPURIOUS

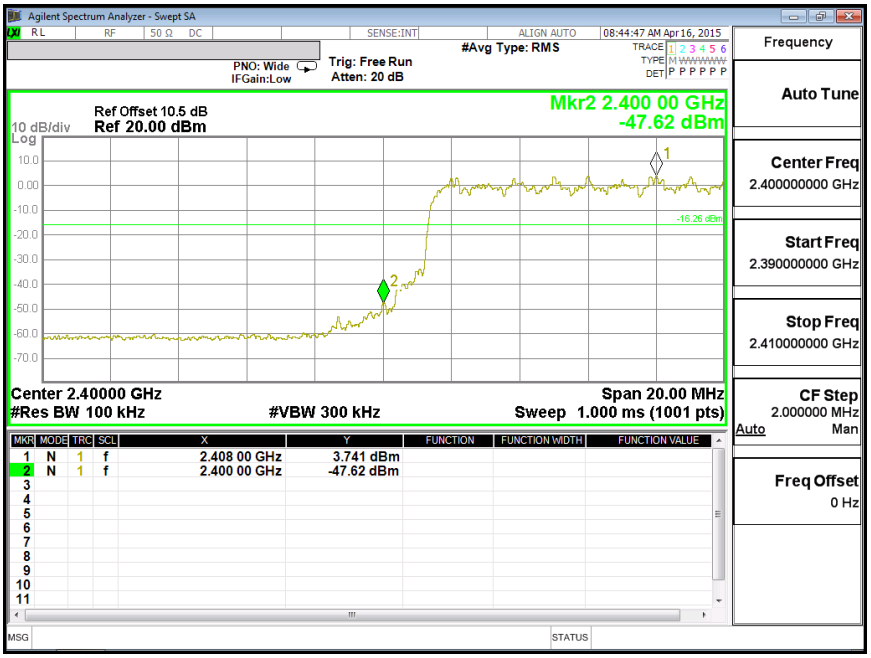


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

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-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. 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 1 MHz resolution bandwidth with 3MHz video bandwidth with average detector for average measurements.

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

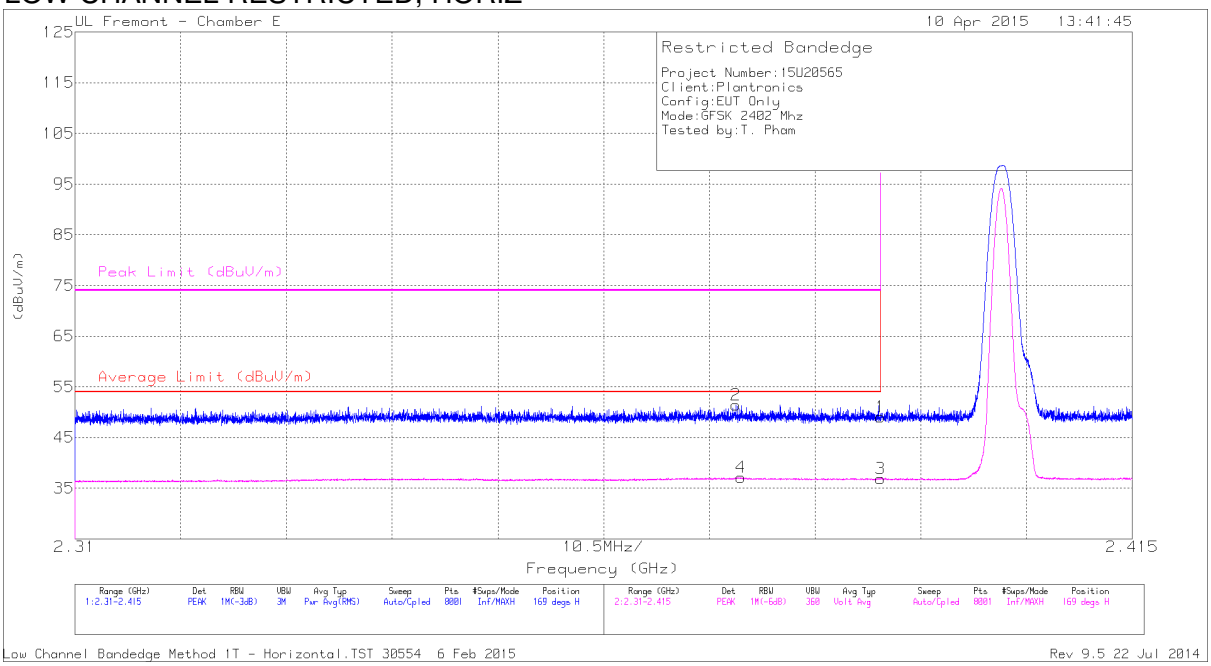
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZ



Trace Markers

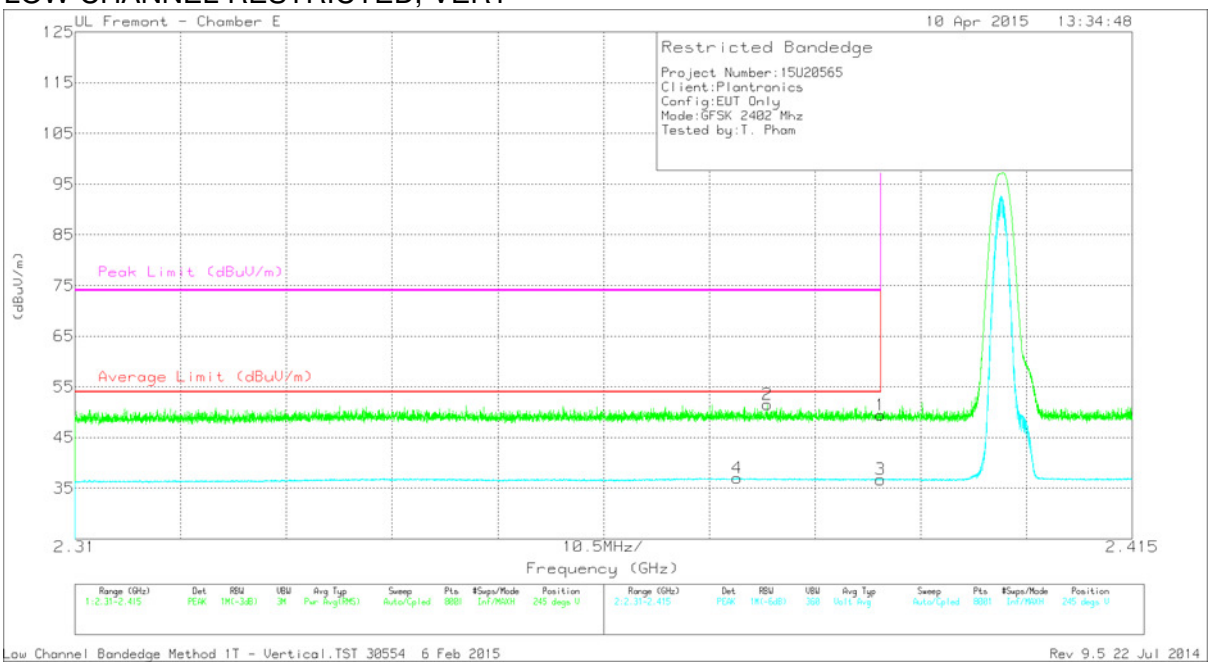
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.376	44	PK	32	-24.6	51.4	-	-	74	-22.6	169	223	H
4	* 2.376	29.71	VB1T	32	-24.6	37.11	54	-16.89	-	-	169	223	H
1	* 2.39	41.64	PK	32.1	-24.7	49.04	-	-	74	-24.96	169	223	H
3	* 2.39	29.44	VB1T	32.1	-24.7	36.84	54	-17.16	-	-	169	223	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

LOW CHANNEL RESTRICTED, VERT



Trace Markers

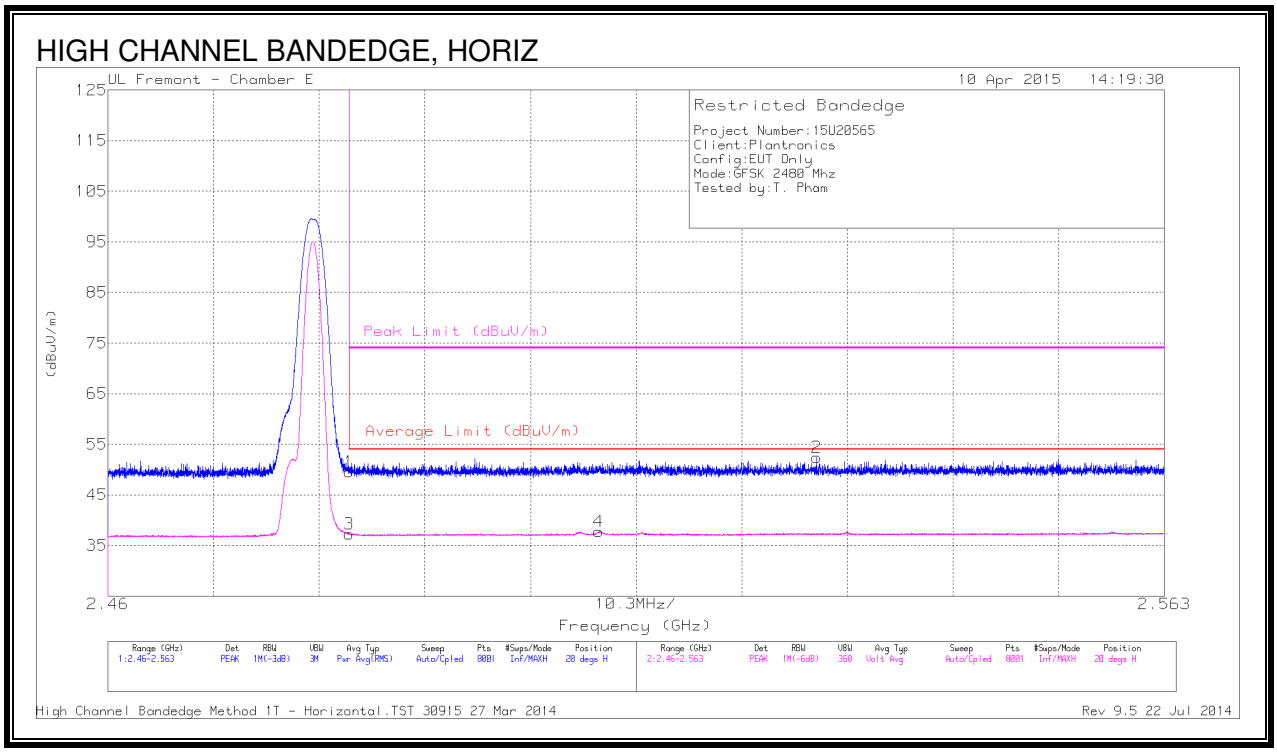
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.376	29.61	VB1T	32	-24.6	37.01	54	-16.99	-	-	245	353	V
2	* 2.379	44.13	PK	32	-24.6	51.53	-	-	74	-22.47	245	353	V
1	* 2.39	42.03	PK	32.1	-24.7	49.43	-	-	74	-24.57	245	353	V
3	* 2.39	29.3	VB1T	32.1	-24.7	36.7	54	-17.3	-	-	245	353	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

AUTHORIZED BANDEDGE (HIGH CHANNEL)



Trace Markers

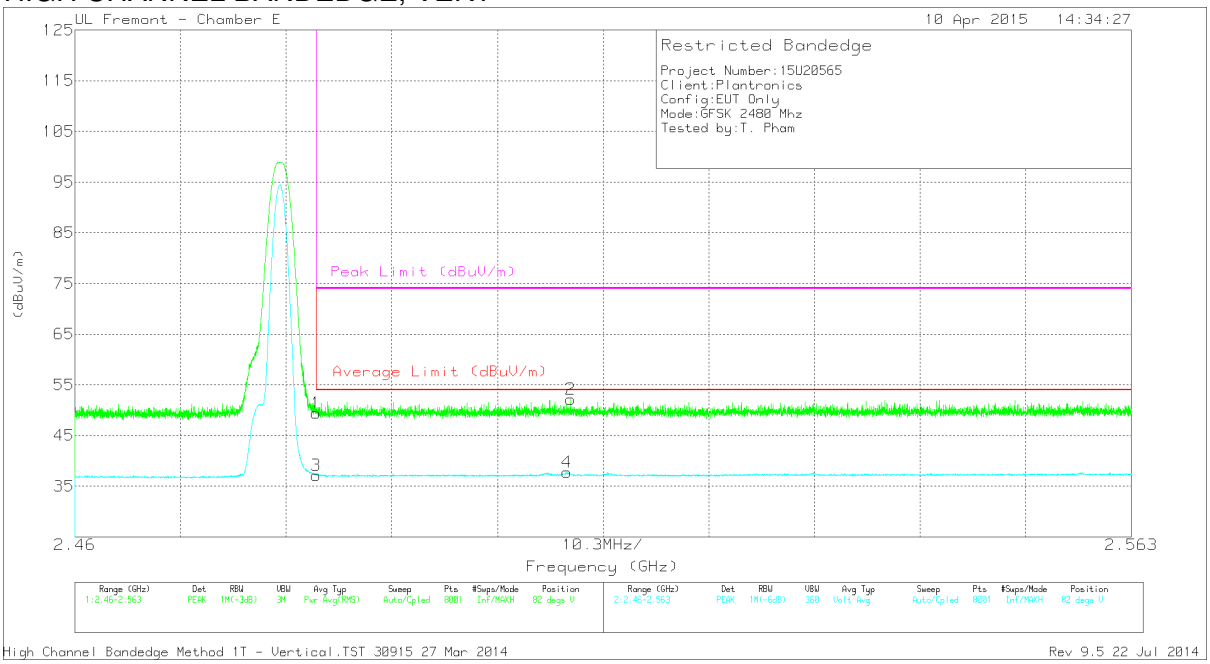
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.66	PK	32.2	-24.3	49.56	-	-	74	-24.44	20	320	H
3	* 2.484	29.35	VB1T	32.2	-24.3	37.25	54	-16.75	-	-	20	320	H
4	2.508	29.78	VB1T	32.2	-24.2	37.78	54	-16.22	-	-	20	320	H
2	2.529	44.3	PK	32.2	-24.1	52.4	-	-	74	-21.6	20	320	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

HIGH CHANNEL BANDEDGE, VERT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.53	PK	32.2	-24.3	49.43	-	-	74	-24.57	82	400	V
3	* 2.484	29.25	VB1T	32.2	-24.3	37.15	54	-16.85	-	-	82	400	V
2	2.508	44.15	PK	32.2	-24.2	52.15	-	-	74	-21.85	82	400	V
4	2.508	29.78	VB1T	32.2	-24.2	37.78	54	-16.22	-	-	82	400	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

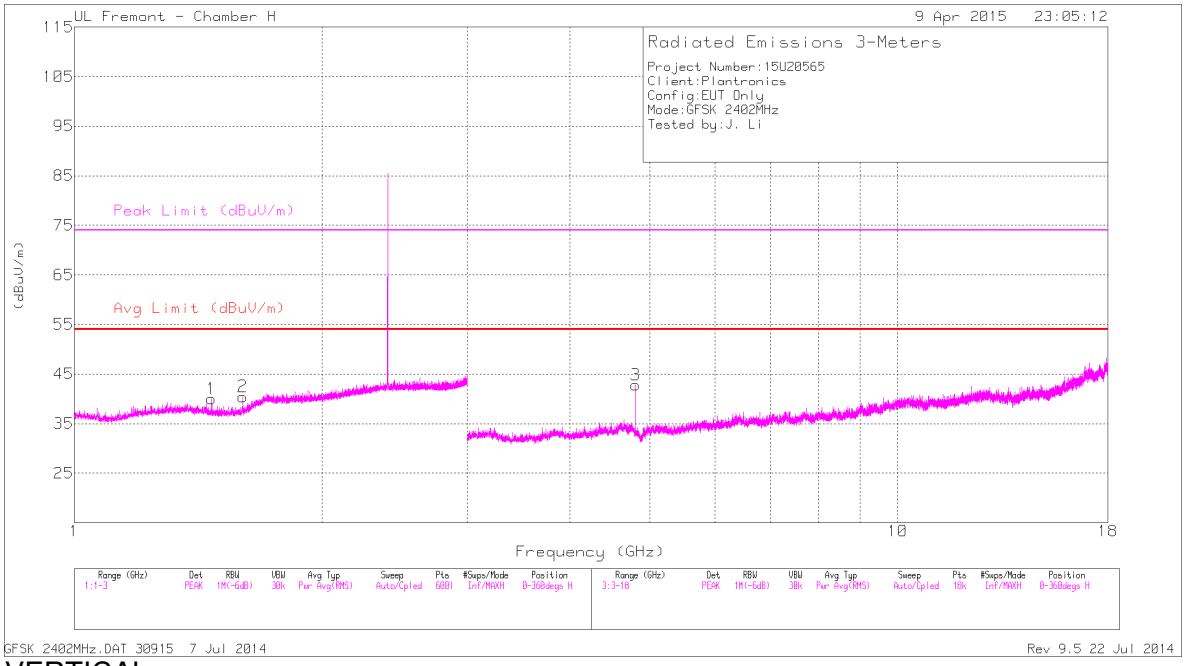
PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

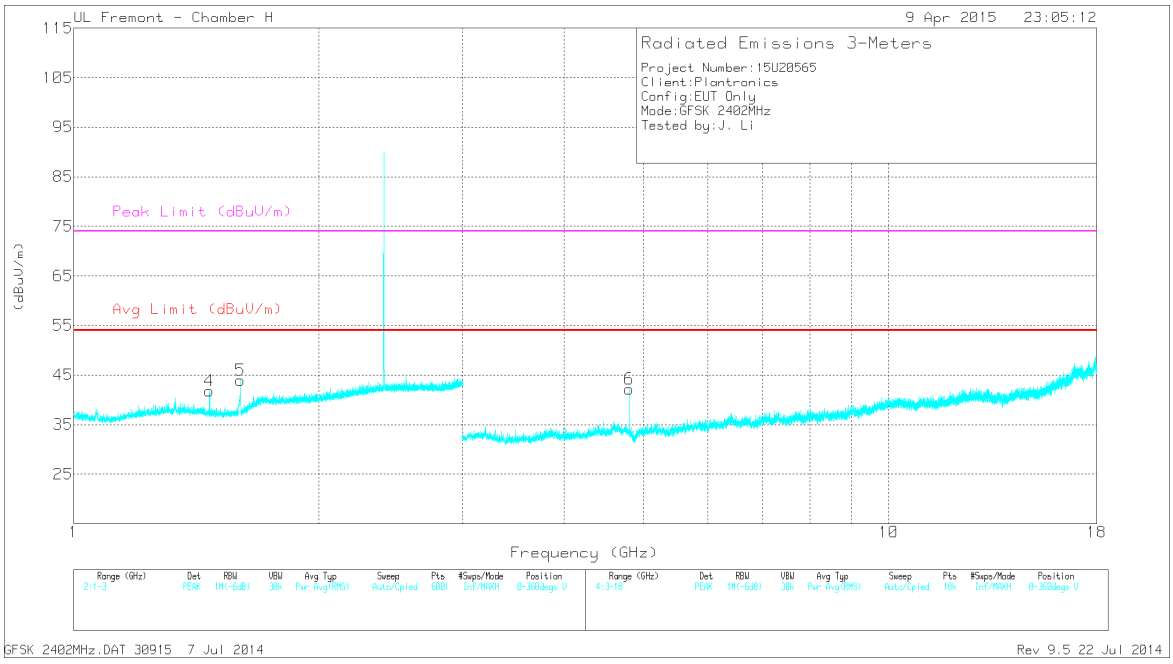
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

HORIZONTAL



VERTICAL



Trace Markers

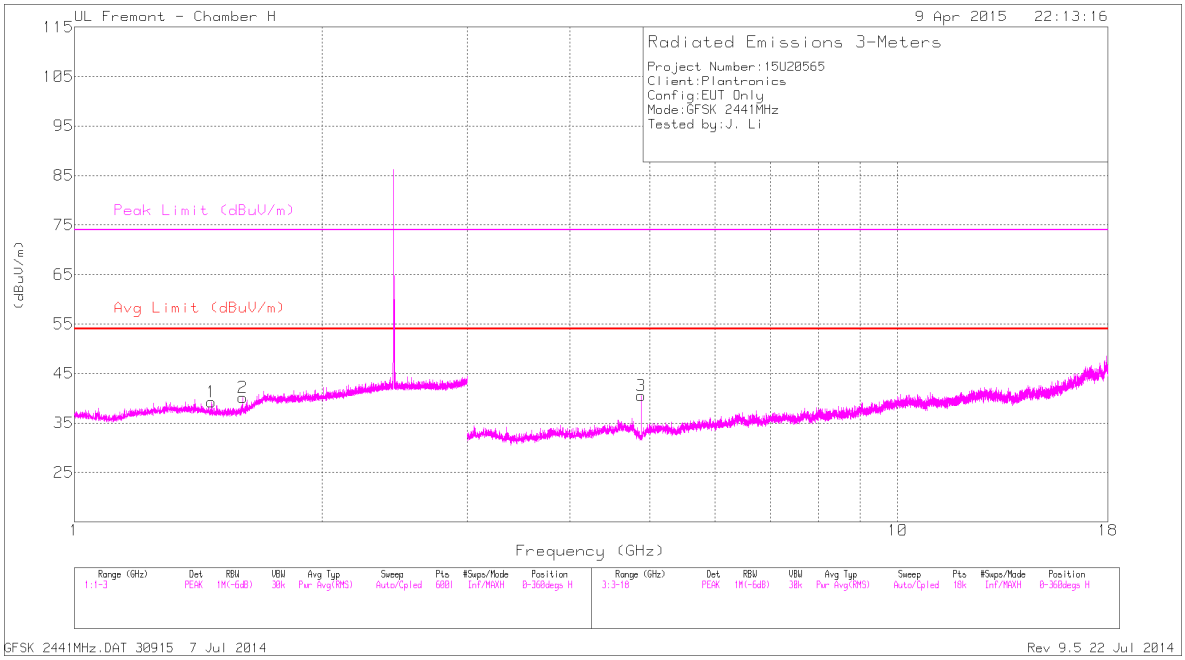
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.468	43.46	PK3	27.9	-25.5	45.86	-	-	74	-28.14	360	100	H
	* 1.468	30.42	VB1T	27.9	-25.5	32.82	54	-21.18	-	-	360	100	H
2	* 1.602	45.06	PK3	27.7	-25.1	47.66	-	-	74	-26.34	193	325	H
	* 1.601	34.11	VB1T	27.7	-25.1	36.71	54	-17.29	-	-	193	325	H
3	* 4.804	47.42	PK3	33.9	-32.5	48.82	-	-	74	-25.18	159	192	H
	* 4.804	40.86	VB1T	33.9	-32.5	42.26	54	-11.74	-	-	159	192	H
4	* 1.468	46.22	PK3	27.9	-25.5	48.62	-	-	74	-25.38	176	151	V
	* 1.468	38.15	VB1T	27.9	-25.5	40.55	54	-13.45	-	-	176	151	V
5	* 1.601	49.12	PK3	27.7	-25.1	51.72	-	-	74	-22.28	169	202	V
	* 1.601	39.53	VB1T	27.7	-25.1	42.13	54	-11.87	-	-	169	202	V
6	* 4.804	47.66	PK3	33.9	-32.5	49.06	-	-	74	-24.94	354	236	V
	* 4.804	41.08	VB1T	33.9	-32.5	42.48	54	-11.52	-	-	354	236	V

* - indicates frequency in CFR 47, Part 15 Restricted Band" and "Industry Canada RSS-Restricted Band

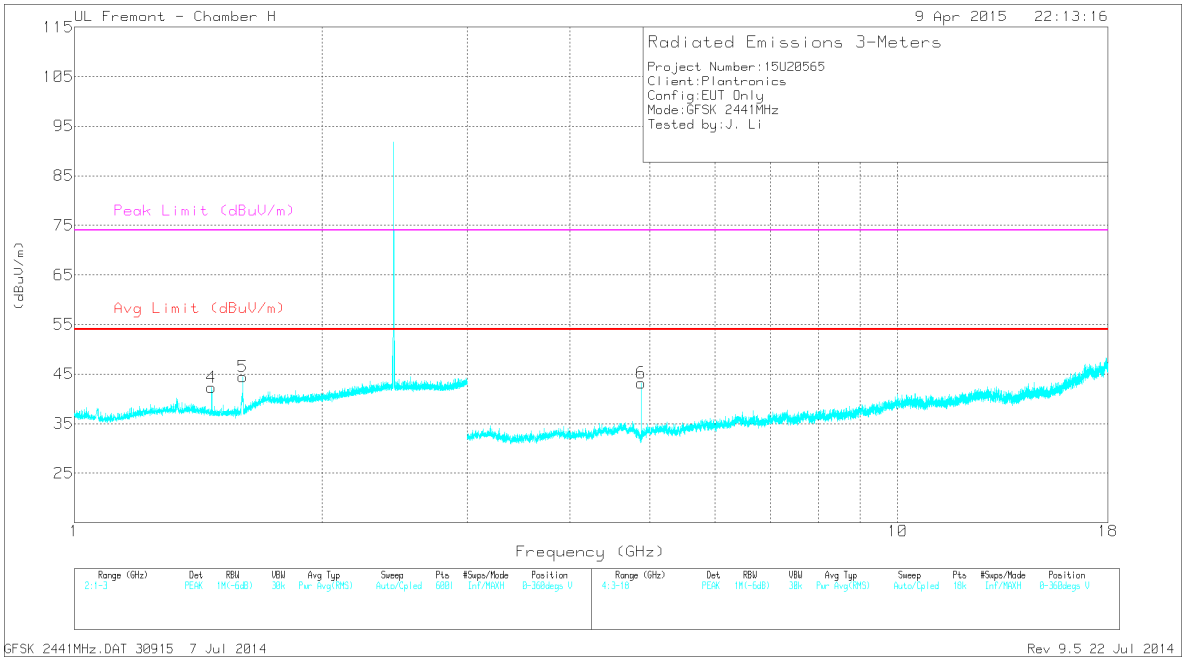
PK3 - KDB558074 Method: Maximum Peak
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

MID CHANNEL

HORIZONTAL



VERTICAL



Trace Markers

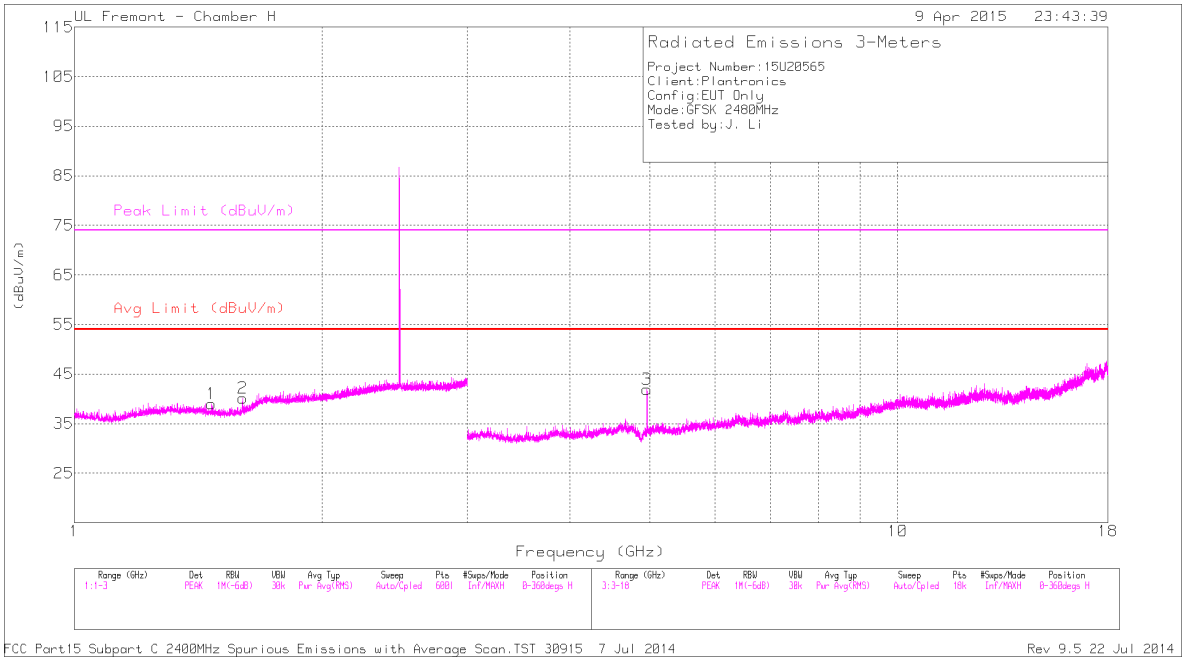
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.469	44.06	PK3	27.9	-25.5	46.46	-	-	74	-27.54	198	311	H
	* 1.468	32.55	VB10	27.9	-25.5	34.95	54	-19.05	-	-	198	311	H
2	* 1.601	45	PK3	27.7	-25.1	47.6	-	-	74	-26.4	198	311	H
	* 1.601	36.25	VB10	27.7	-25.1	38.85	54	-15.15	-	-	198	311	H
3	* 4.882	46.22	PK3	33.8	-32.1	47.92	-	-	74	-26.08	160	183	H
	* 4.882	41.03	VB10	33.8	-32.1	42.73	54	-11.27	-	-	160	183	H
4	* 1.468	46.23	PK3	27.9	-25.5	48.63	-	-	74	-25.37	172	185	V
	* 1.468	38.99	VB10	27.9	-25.5	41.39	54	-12.61	-	-	172	185	V
5	* 1.601	49.13	PK3	27.7	-25.1	51.73	-	-	74	-22.27	175	277	V
	* 1.601	38.76	VB10	27.7	-25.1	41.36	54	-12.64	-	-	175	277	V
6	* 4.882	46.49	PK3	33.9	-32.1	48.29	-	-	74	-25.71	347	176	V
	* 4.882	41.18	VB10	33.8	-32.1	42.88	54	-11.12	-	-	347	176	V

* - indicates frequency in CFR 47, Part 15 Restricted Band" and "Industry Canada RSS-Restricted Band

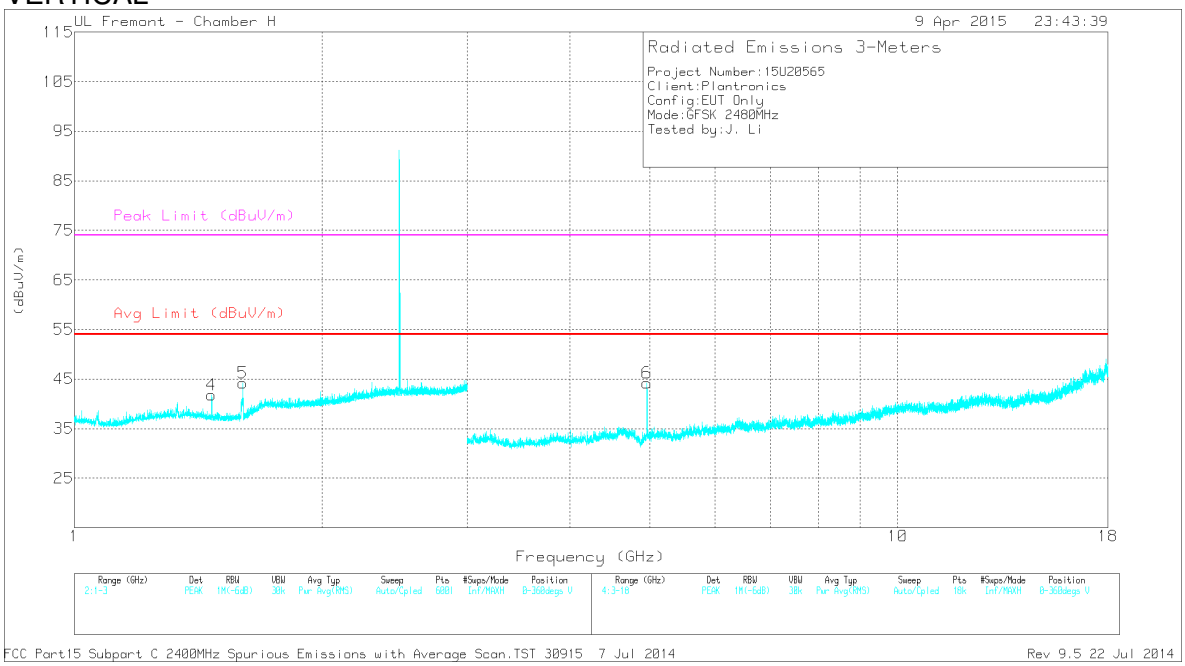
PK3 - KDB558074 Method: Maximum Peak
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

HIGH CHANNEL

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (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	* 1.47	44.04	PK3	27.9	-25.5	46.44	-	-	74	-27.56	360	100	H
	* 1.468	31.53	VB10	27.9	-25.5	33.94	54	-20.06	-	-	360	100	H
2	* 1.603	43.98	PK3	27.8	-25.1	46.68	-	-	74	-27.32	360	100	H
	* 1.601	31.56	VB10	27.7	-25.1	34.16	54	-19.84	-	-	360	100	H
3	* 4.96	45.37	PK3	33.9	-31.8	47.47	-	-	74	-26.53	163	164	H
	* 4.96	39.54	VB10	33.9	-31.8	41.64	54	-12.36	-	-	163	164	H
4	* 1.468	46.99	PK3	27.9	-25.5	49.39	-	-	74	-24.61	179	152	V
	* 1.468	39.21	VB10	27.9	-25.5	41.44	54	-12.56	-	-	179	152	V
5	* 1.602	48.75	PK3	27.7	-25.1	51.35	-	-	74	-22.65	170	303	V
	* 1.601	39.7	VB10	27.7	-25.1	42.3	54	-11.7	-	-	170	303	V
6	* 4.96	47.86	PK3	33.9	-31.8	49.96	-	-	74	-24.04	353	156	V
	* 4.96	43.04	VB10	33.9	-31.8	45.14	54	-8.86	-	-	353	156	V

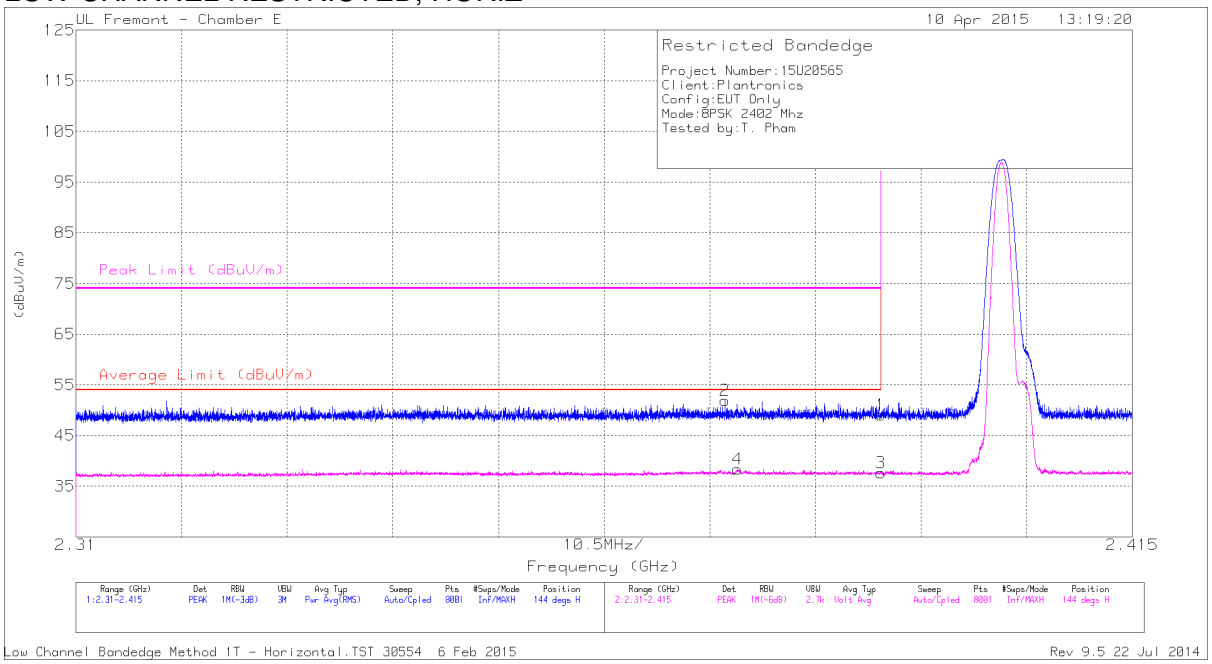
* - indicates frequency in CFR 47, Part 15 Restricted Band" and "Industry Canada RSS-Restricted Band

PK3 - KDB558074 Method: Maximum Peak
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZ



Trace Markers

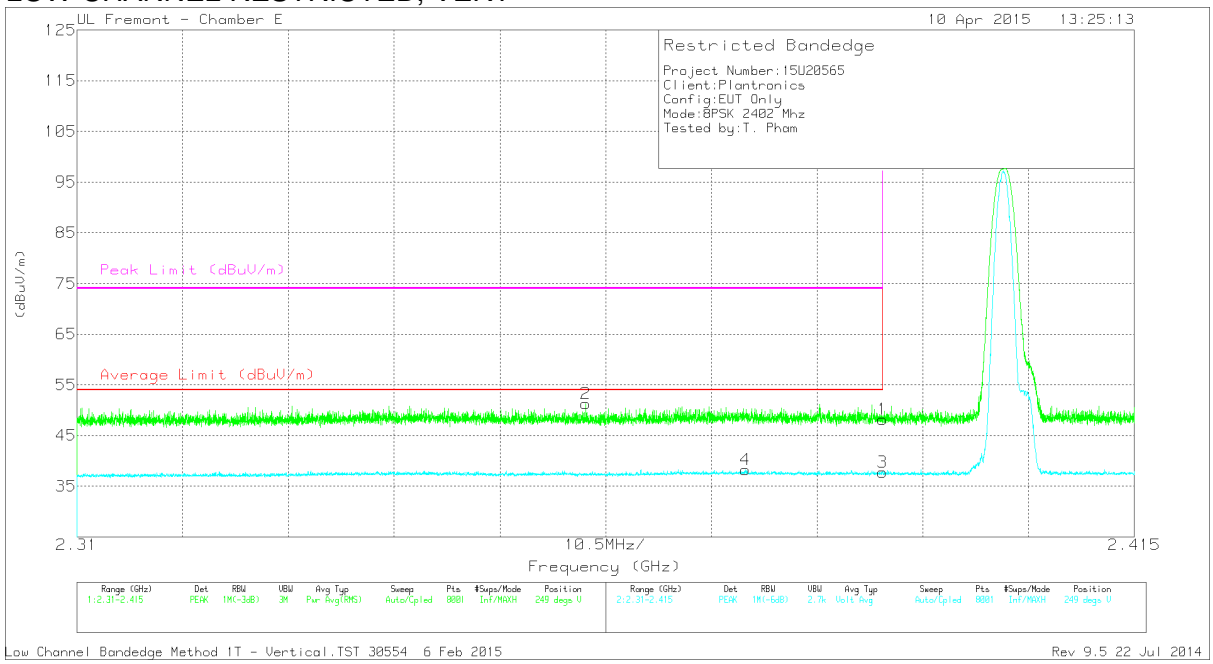
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.375	44.52	PK	32	-24.6	51.92	-	-	74	-22.08	144	338	H
4	* 2.376	31.01	VB1T	32	-24.6	38.41	54	-15.59	-	-	144	338	H
1	* 2.39	41.65	PK	32.1	-24.7	49.05	-	-	74	-24.95	144	338	H
3	* 2.39	30.2	VB1T	32.1	-24.7	37.6	54	-16.4	-	-	144	338	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

LOW CHANNEL RESTRICTED, VERT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.361	44.08	PK	32	-24.8	51.28	-	-	74	-22.72	249	360	V
4	* 2.376	30.9	VB1T	32	-24.6	38.3	54	-15.7	-	-	249	360	V
1	* 2.39	40.76	PK	32.1	-24.7	48.16	-	-	74	-25.84	249	360	V
3	* 2.39	30.4	VB1T	32.1	-24.7	37.8	54	-16.2	-	-	249	360	V

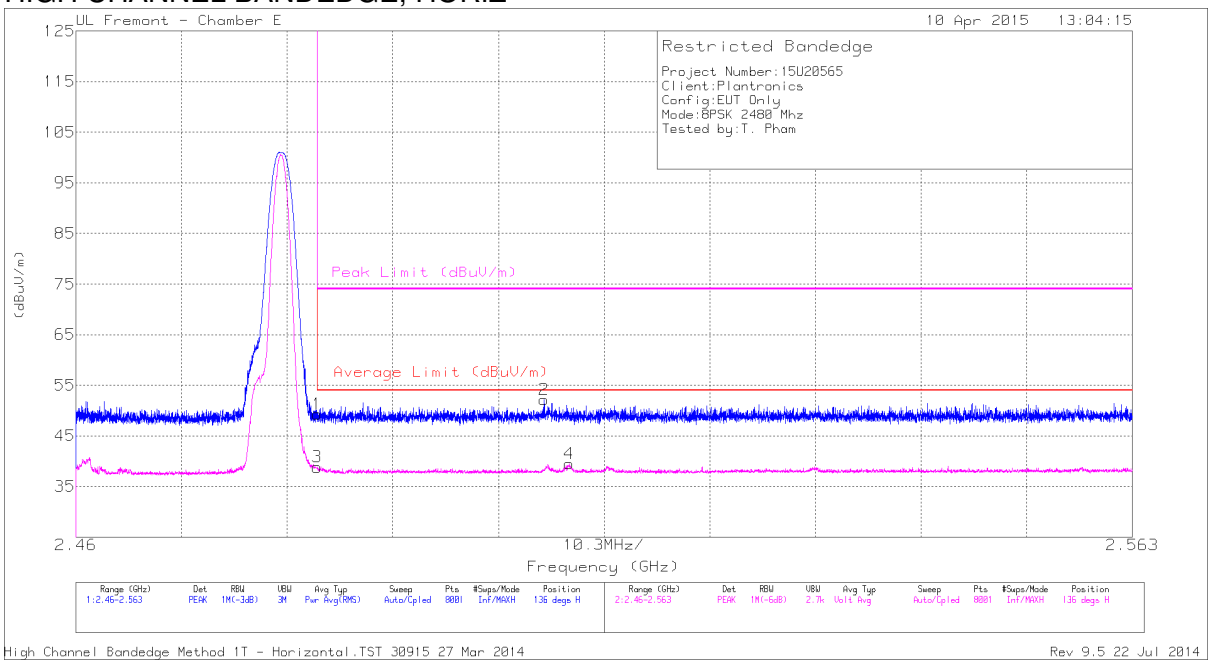
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, HORIZ



Trace Markers

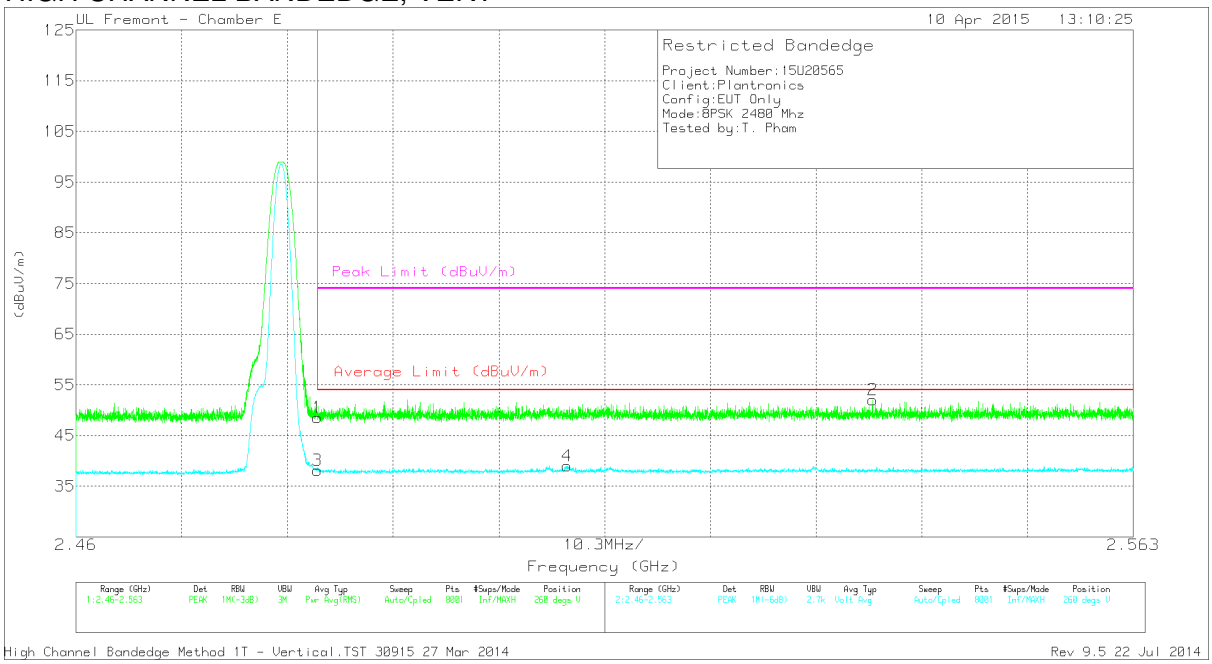
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.42	PK	32.2	-24.3	49.32	-	-	74	-24.68	136	315	H
3	* 2.484	30.91	VB1T	32.2	-24.3	38.81	54	-15.19	-	-	136	315	H
2	2.506	44.15	PK	32.2	-24.2	52.15	-	-	74	-21.85	136	315	H
4	2.508	31.44	VB1T	32.2	-24.2	39.44	54	-14.56	-	-	136	315	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

HIGH CHANNEL BANDEDGE, VERT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.6	PK	32.2	-24.3	48.5	-	-	74	-25.5	260	399	V
3	* 2.484	30.26	VB1T	32.2	-24.3	38.16	54	-15.84	-	-	260	399	V
4	2.508	31.02	VB1T	32.2	-24.2	39.02	54	-14.98	-	-	260	399	V
2	2.538	43.93	PK	32.2	-24.1	52.03	-	-	74	-21.97	260	399	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

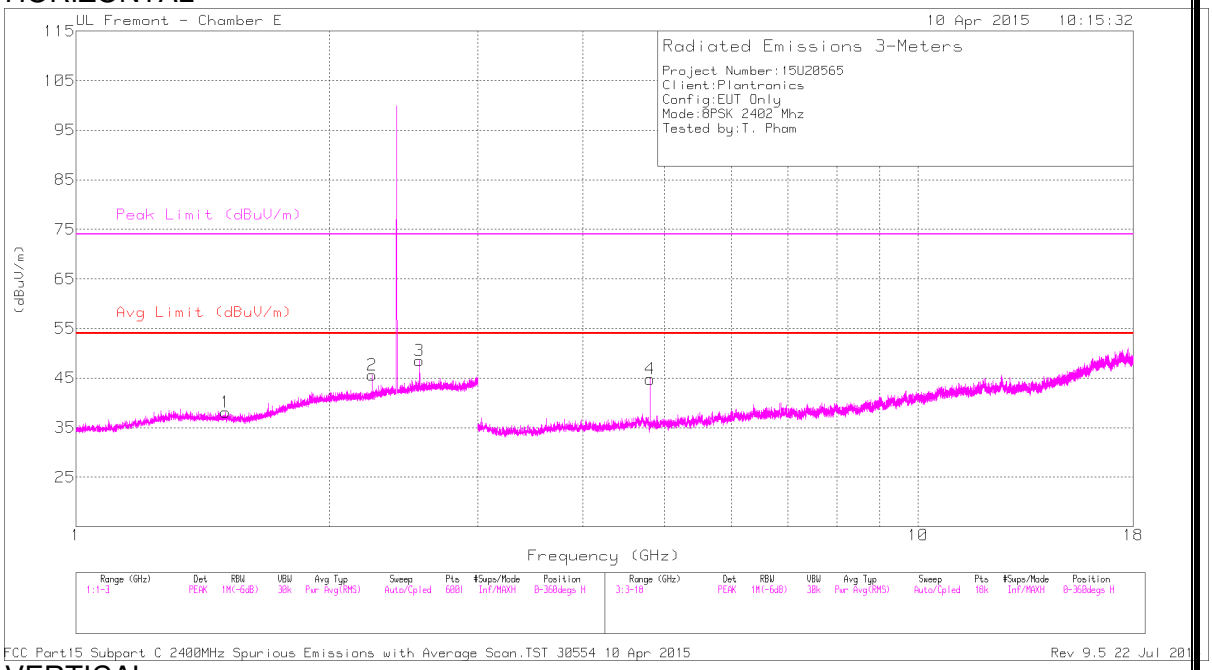
PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

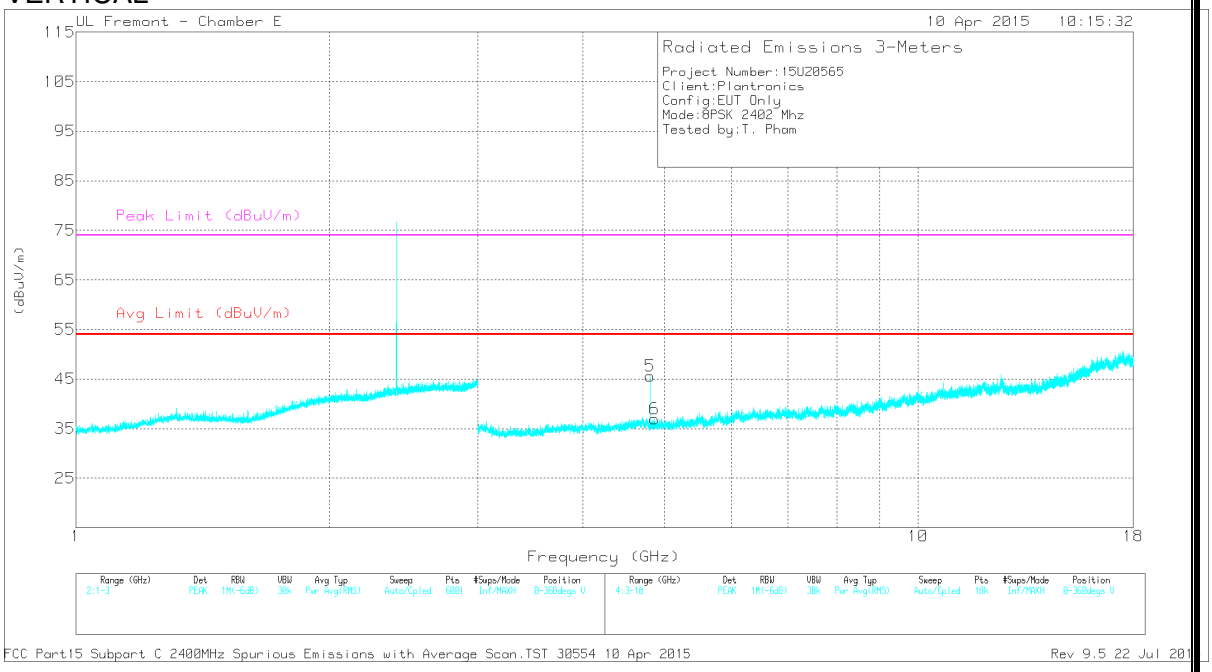
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

HORIZONTAL



VERTICAL



Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (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
* 1.504	43.6	PK3	28.2	-26.3	45.5	-	-	74	-28.5	360	101	H
* 1.506	32.46	VB1T	28.2	-26.3	34.36	54	-19.64	-	-	360	101	H
* 2.246	46.94	PK3	31.6	-25.2	53.34	-	-	74	-20.66	147	400	H
* 2.246	39.84	VB1T	31.6	-25.2	46.24	54	-7.76	-	-	147	400	H
* 4.804	48.9	PK3	34.1	-30.9	52.1	-	-	74	-21.9	239	323	H
* 4.804	43.81	VB1T	34.1	-30.9	47.01	54	-6.99	-	-	239	323	H
* 4.804	47.08	PK3	34.1	-30.9	50.28	-	-	74	-23.72	251	314	V
* 4.804	41.23	VB1T	34.1	-30.9	44.43	54	-9.57	-	-	251	314	V
* 4.86	42.32	PK3	34.1	-31.1	45.32	-	-	74	-28.68	251	314	V
* 4.86	31.08	VB1T	34.1	-31.1	34.08	54	-19.92	-	-	251	314	V
2.558	47.61	PK3	32.3	-24.1	55.81	-	-	-	-	102	245	H
2.558	41.2	VB1T	32.3	-24.1	49.4	-	-	-	-	102	245	H

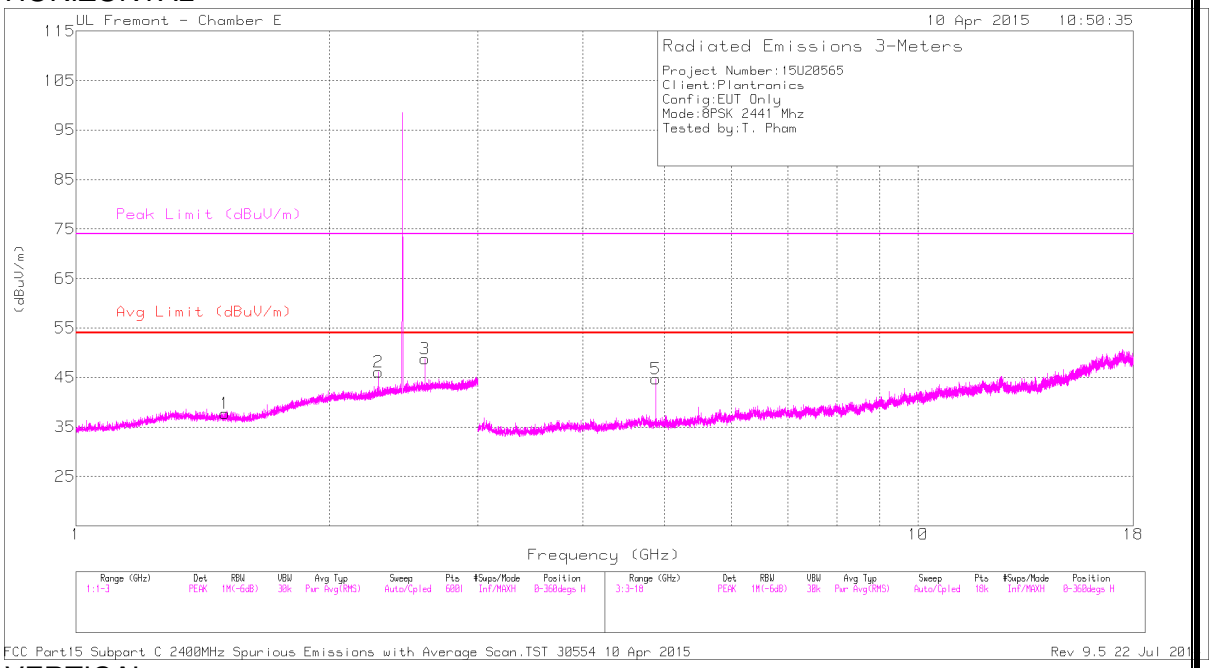
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 FHSS Method: Maximum Peak

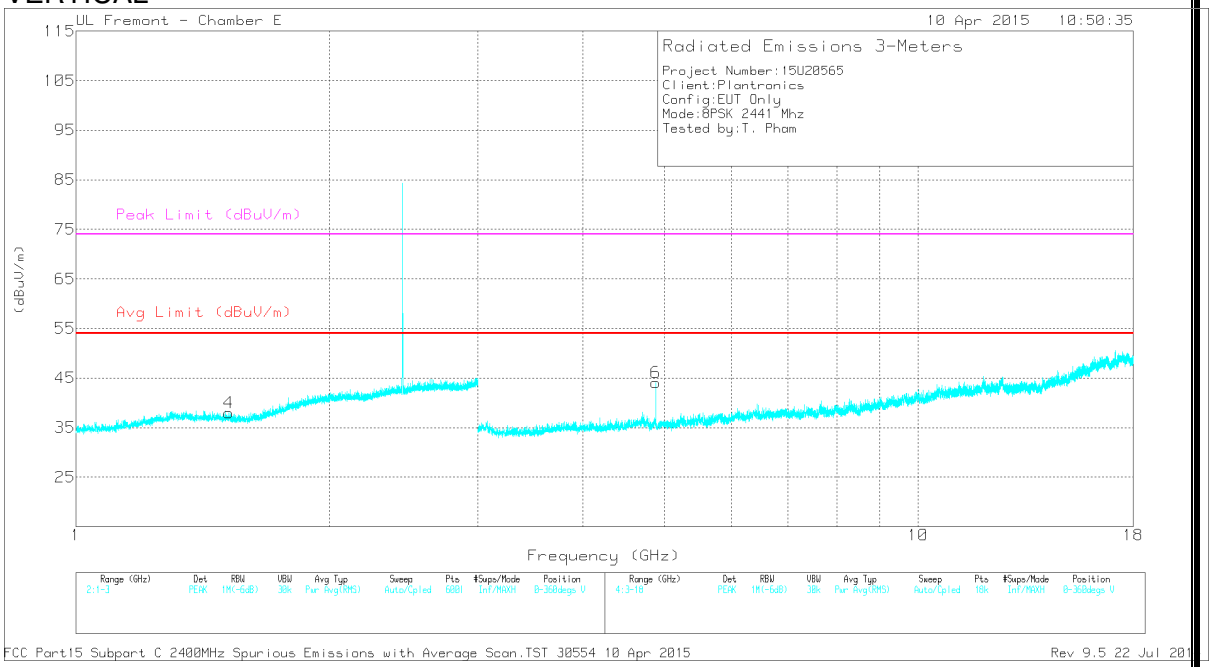
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

MID CHANNEL

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.503	43.93	PK3	28.2	-26.3	0	45.83	-	-	74	-28.17	360	101	H
	* 1.504	32.44	VB1T	28.2	-26.3	0	34.34	54	-19.66	-	-	360	101	H
2	* 2.285	46.97	PK3	31.8	-25.1	0	53.67	-	-	74	-20.33	123	305	H
	* 2.285	39.95	VB1T	31.8	-25.1	0	46.65	54	-7.35	-	-	123	305	H
4	* 1.519	44.44	PK3	28.2	-26.3	0	46.34	-	-	74	-27.66	108	247	V
	* 1.519	32.27	VB1T	28.2	-26.3	0	34.17	54	-19.83	-	-	108	247	V
5	* 4.882	47.82	PK3	34.1	-30.9	0	51.02	-	-	74	-22.98	108	258	H
	* 4.882	42.57	VB1T	34.1	-30.9	0	45.77	54	-8.23	-	-	108	258	H
6	* 4.882	48.8	PK3	34.1	-30.9	0	52	-	-	74	-22	250	308	V
	* 4.882	44.23	VB1T	34.1	-30.9	0	47.43	54	-6.57	-	-	250	308	V
3	2.597	46.08	PK3	32.4	-24.1	0	54.38	-	-	-	-	108	247	H

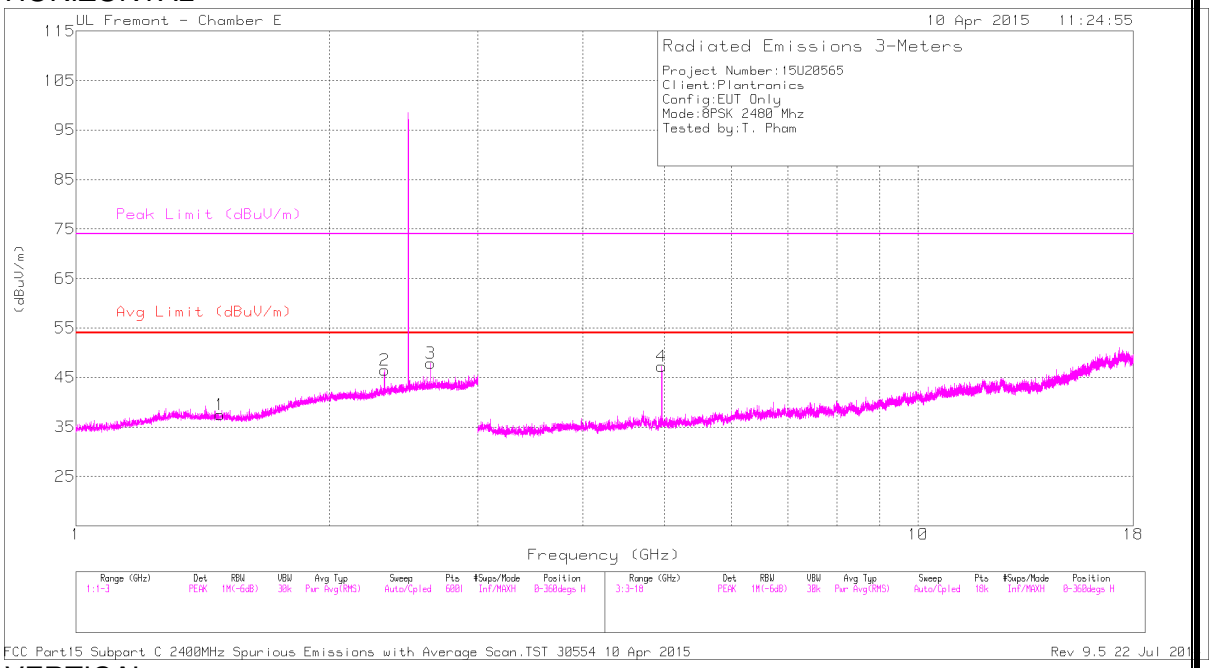
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 -FHSS Method: Maximum Peak

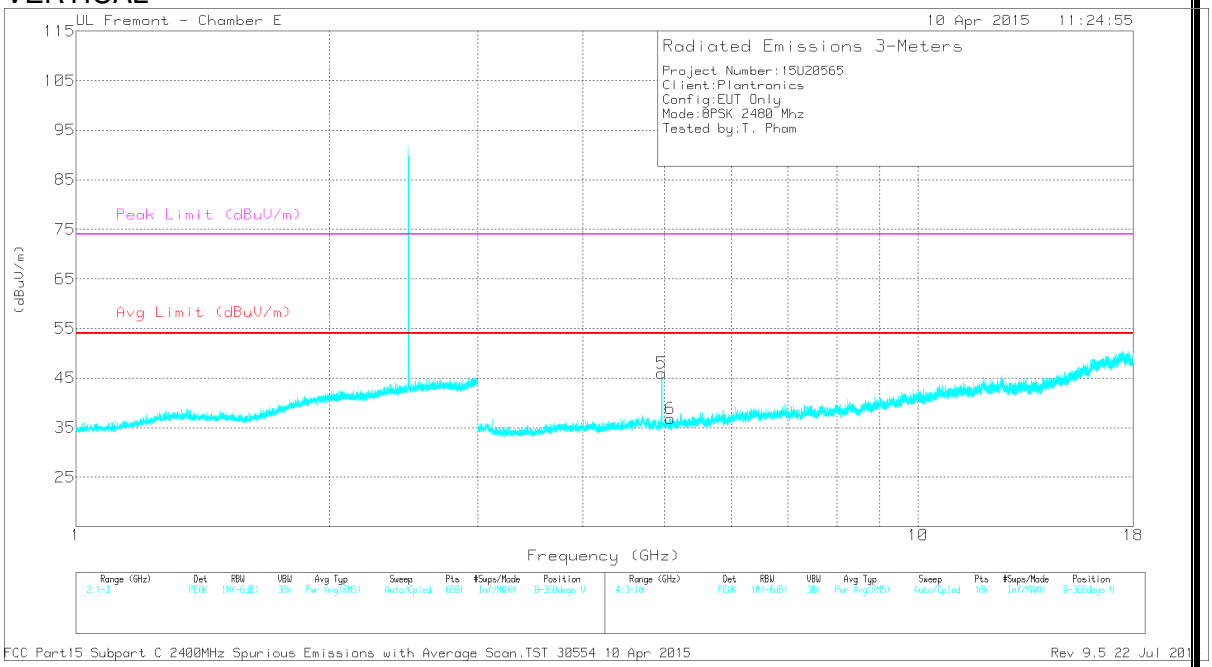
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

HIGH CHANNEL

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.483	44.72	PK3	28.3	-26.3	0	46.72	-	-	74	-27.28	360	101	H
	* 1.482	32.39	VB1T	28.3	-26.3	0	34.39	54	-19.61	-	-	360	101	H
2	* 2.324	47.37	PK3	31.9	-25	0	54.27	-	-	74	-19.73	311	295	H
	* 2.324	40.02	VB1T	31.9	-25	0	46.92	54	-7.08	-	-	311	295	H
4	* 4.96	47.04	PK3	34.1	-30.2	0	50.94	-	-	74	-23.06	356	274	H
	* 4.96	42.44	VB1T	34.1	-30.2	0	46.34	54	-7.66	-	-	356	274	H
5	* 4.96	47.35	PK3	34.1	-30.2	0	51.25	-	-	74	-22.75	226	309	V
	* 4.96	43.05	VB1T	34.1	-30.2	0	46.95	54	-7.05	-	-	226	309	V
6	* 5.077	41.31	PK3	34.2	-30.7	0	44.81	-	-	74	-29.19	226	309	V
	* 5.077	29.38	VB1T	34.2	-30.7	0	32.88	54	-21.12	-	-	226	309	V
3	2.636	39.54	PK	32.4	-24	0	47.94	-	-	-	-	0-360	200	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

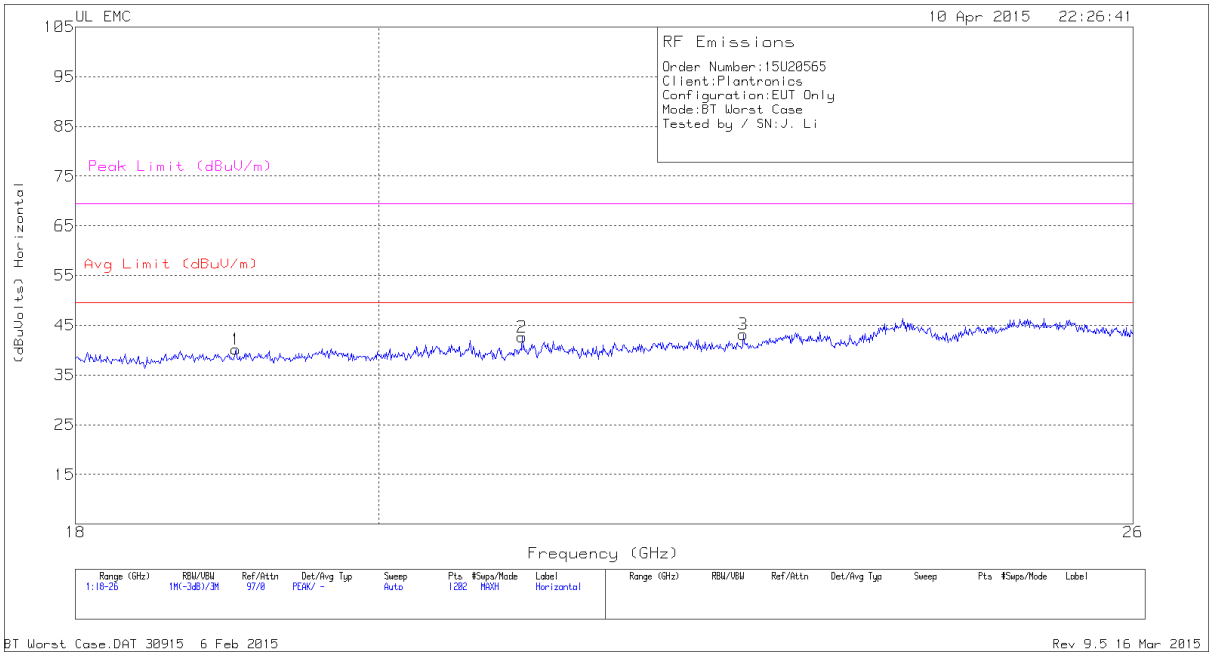
PK3 -FHSS Method: Maximum Peak

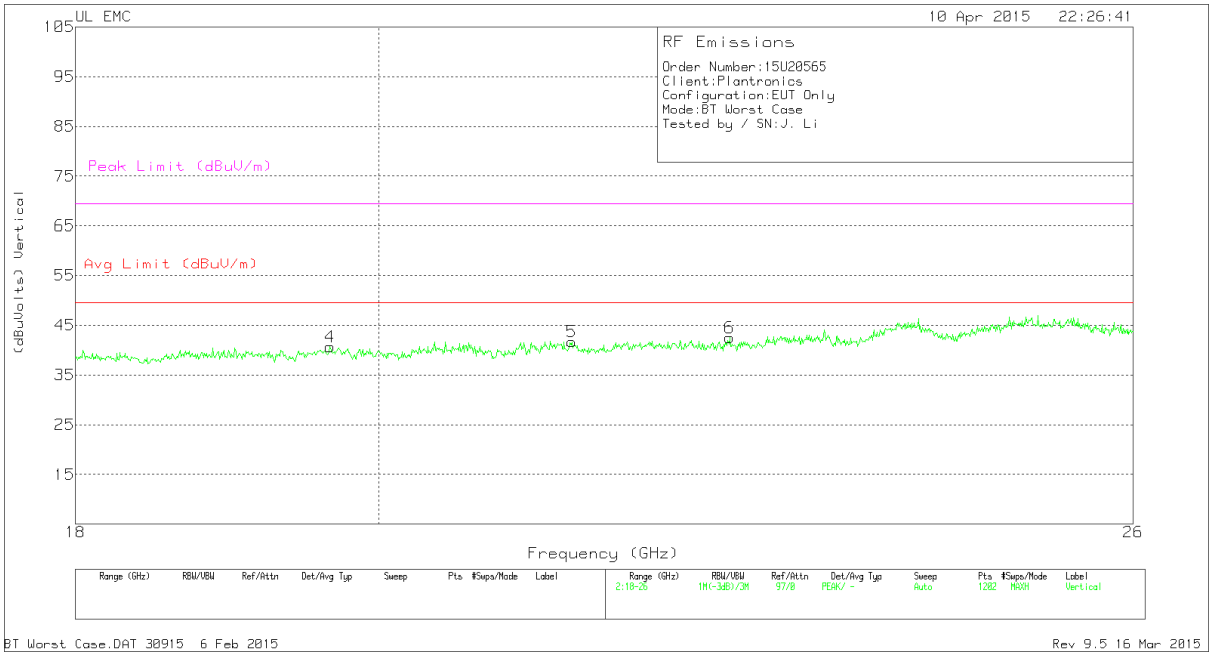
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

8.3. WORST-CASE ABOVE 18GHz

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

HORIZONTAL AND VERTICAL PLOT





Trace Markers

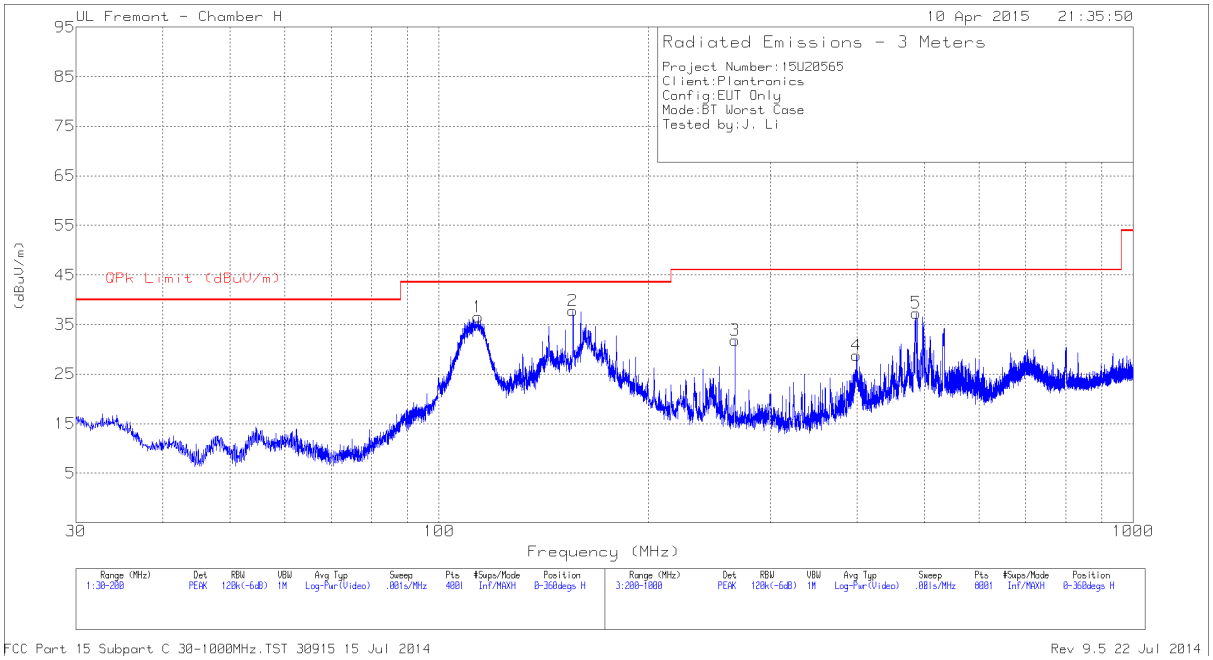
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.032	41.07	Pk	32.9	-24.3	-9.5	40.17	49.5	-9.33	69.5	-29.33
2	21.024	42.67	Pk	33.3	-23.8	-9.5	42.67	49.5	-6.83	69.5	-26.83
3	22.703	42.27	Pk	33.8	-23.4	-9.5	43.17	49.5	-6.33	69.5	-26.33
4	19.665	41.57	Pk	32.9	-24.3	-9.5	40.67	49.5	-8.83	69.5	-28.83
5	21.391	41.57	Pk	33.3	-23.7	-9.5	41.67	49.5	-7.83	69.5	-27.83
6	22.596	41.5	Pk	33.7	-23.2	-9.5	42.50	49.5	-7.00	69.5	-27.00

PK - Peak detector

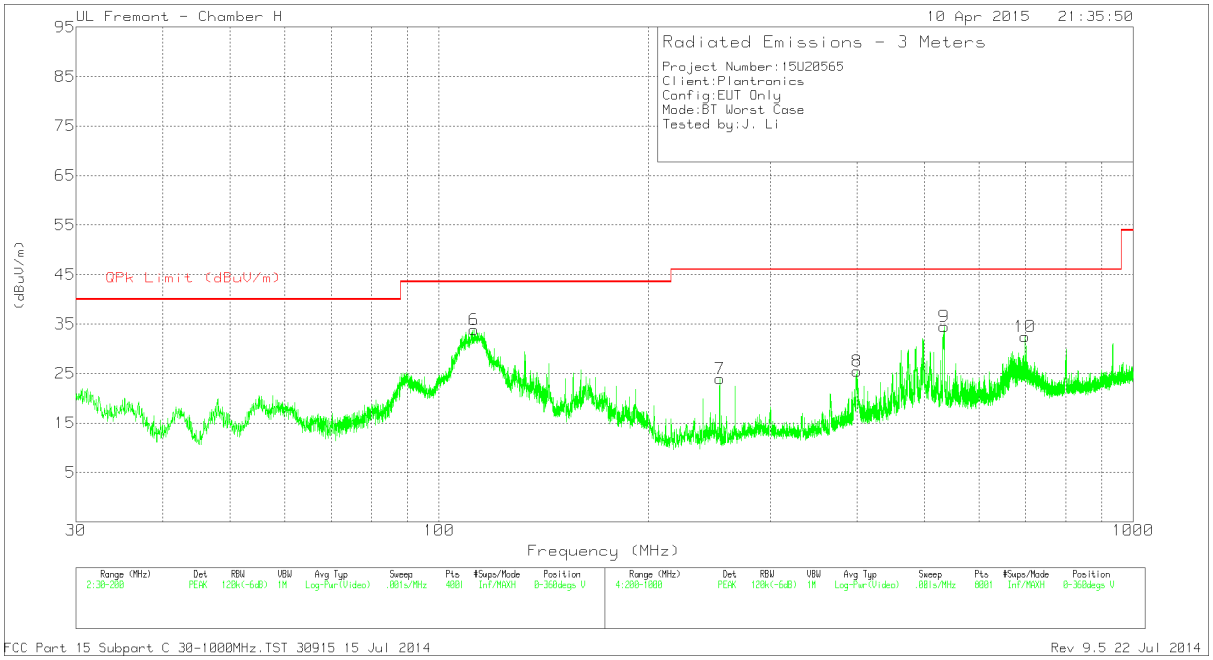
8.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



Trace Markers

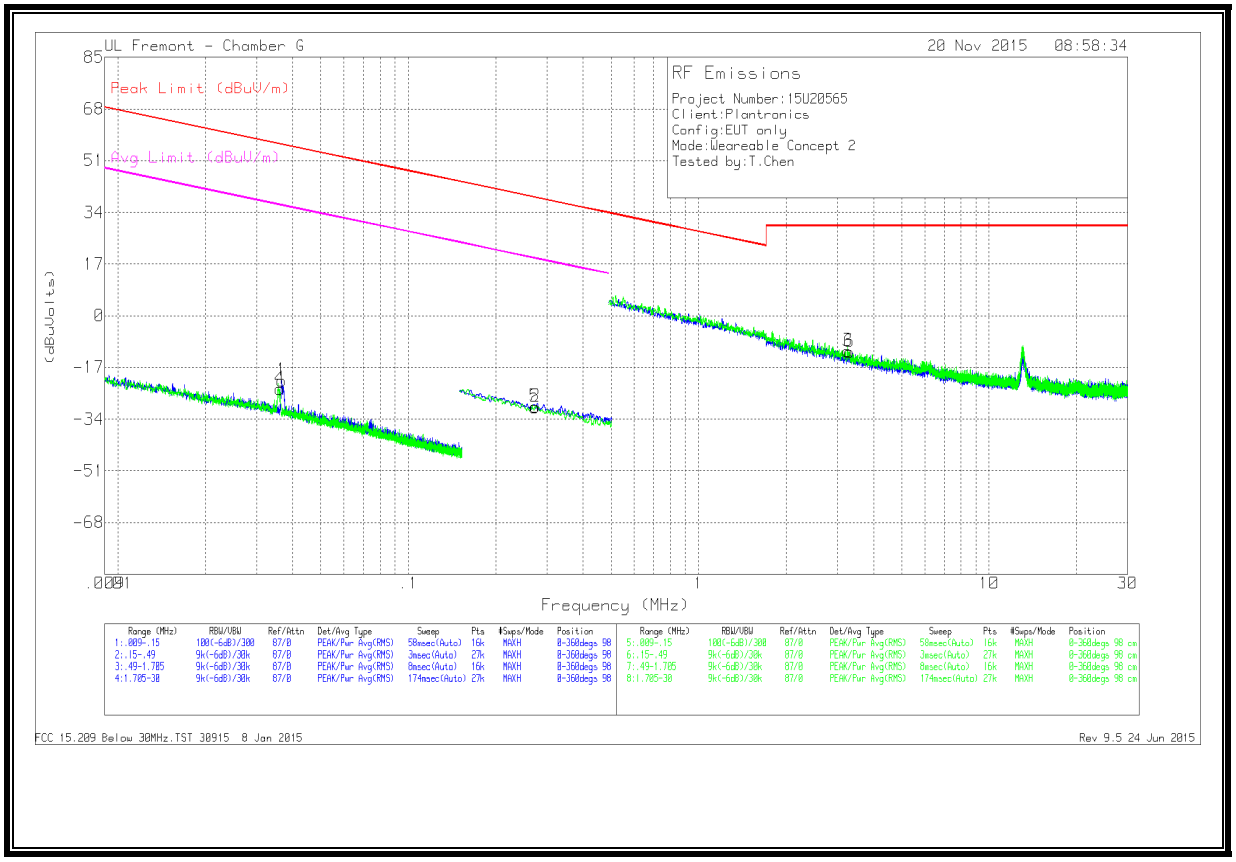
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 113.8525	53.72	PK	13.2	-30.4	36.52	43.52	-7	0-360	301	H
6	* 112.28	51.2	PK	13	-30.4	33.8	43.52	-9.72	0-360	100	V
3	* 266.9	48.16	PK	13	-29.3	31.86	46.02	-14.16	0-360	100	H
7	* 253.8	41.9	PK	11.5	-29.4	24	46.02	-22.02	0-360	201	V
8	* 400.3	38.56	PK	15.5	-28.6	25.46	46.02	-20.56	0-360	100	V
2	156.018	53.17	QP	12.4	-30	35.57	43.52	-7.95	97	169	H
4	399.6	41.88	PK	15.5	-28.6	28.78	46.02	-17.24	0-360	100	H
5	486.7	48.04	PK	17.7	-28.4	37.34	46.02	-8.68	0-360	100	H
9	534.1	44.55	PK	18.1	-28.2	34.45	46.02	-11.57	0-360	201	V
10	698.9	40.11	PK	20.2	-27.8	32.51	46.02	-13.51	0-360	100	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

QP - Quasi-Peak detector

8.5. TX SPURIOUS FROM 0.15 TO 30 MHz



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
FACE ON												
1	.0366	44.99	Pk	13.6	.1	-80	-21.31	56.33	-77.64	36.33	-57.64	0-360
2	.2734	39.61	Pk	10.3	.1	-80	-29.99	38.87	-68.86	18.87	-48.86	0-360
3	3.25709	17.62	Pk	10.4	.3	-40	-11.68	29.54	-41.22	-	-	0-360
FACE OFF												
4	.0361	42.34	Pk	13.6	.1	-80	-23.96	56.45	-80.41	36.45	-60.41	0-360
5	.27223	39.57	Pk	10.3	.1	-80	-30.03	38.91	-68.94	18.91	-48.94	0-360
6	3.3011	17.41	Pk	10.4	.3	-40	-11.89	29.54	-41.43	-	-	0-360

8.6. 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 C63.10.

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

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

RESULTS

6 WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.1905	44.68	Qp	1	0	45.68	-	-	54.01	-8.33
2	.1905	33.62	Ca	1	0	34.62	-	-	54.01	-19.39
3	.5055	35.57	Qp	.3	0	35.87	-	-	46	-10.13
4	.5055	28.46	Ca	.3	0	28.76	-	-	46	-17.24
5	1.0635	37.76	Pk	.2	0	37.96	-	-	46	-8.04
6	1.0635	26.73	Av	.2	0	26.93	56	-29.07	46	-19.07

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
7	.2715	40.82	Pk	.7	0	41.52	-	-	51.07	-9.55
8	.2715	37.34	Av	.7	0	38.04	61.07	-23.03	51.07	-13.03
9	.6585	37.19	Pk	.3	0	37.49	-	-	46	-8.51
10	.6315	27.9	Av	.3	0	28.2	56	-27.8	46	-17.8
11	.87	37.35	Pk	.3	0	37.65	-	-	46	-8.35
12	.8655	29	Av	.3	0	29.3	56	-26.7	46	-16.7

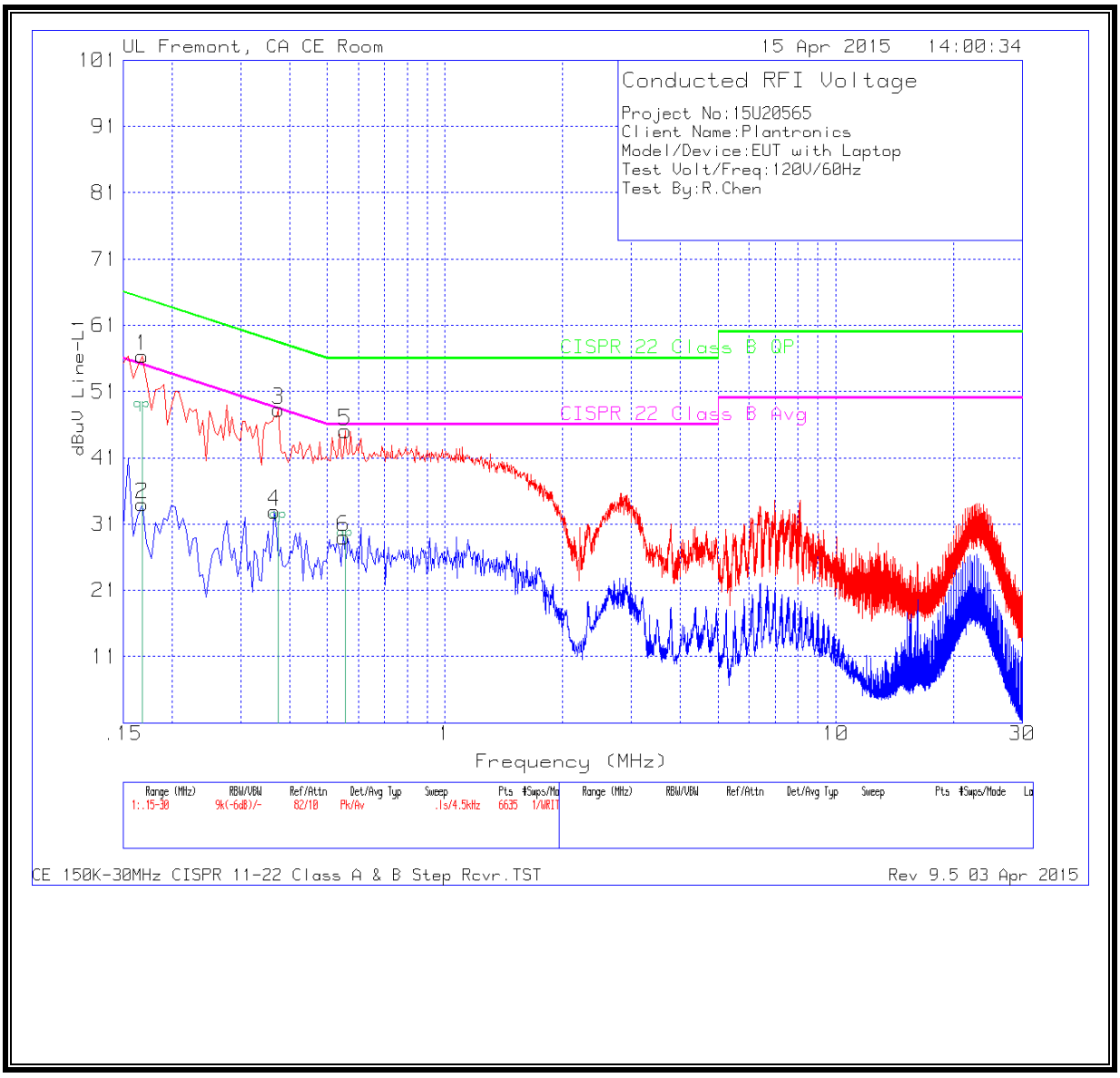
Pk - Peak detector

Av - Average detection

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS