FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

PORTABLE COMPUTING DEVICE

MODEL NUMBER: 1657

FCC: C3K1657

REPORT NUMBER: 14U19730-1, REVISION B

ISSUE DATE: MAY 4, 2015

Prepared for
MICROSOFT CORPORATION
ONE MICROSOFT WAY
REDMOND, WA 98052, U.S.A.

Prepared by
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	03/17/2015	Initial Issue	F. de Anda
A	04/07/2015	Reduced Power On 11b Mode	T. C.
B	04/16/2015	Removed setup photos per client request, increased 11g and HT20 powers to initial measurements.	J. Gomez

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORPORATION
ONE MICROSOFT WAY
REDMOND, WA 98052, U.S.A.

EUT DESCRIPTION: PORTABLE COMPUTING DEVICE

MODEL: 1657

SERIAL NUMBER: 00010154252, 000044645252

DATE TESTED: MARCH 08, 2015 – APRIL 06, 2015

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

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

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

Approved & Released For
UL Verification Services Inc. By:

FRANCISCO DE ANDA
PROJECT LEAD
UL VERIFICATION SERVICES INC.

Tested By:

JOSEPH 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, KDB558074 and ANSI C63.10-2009.

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a handheld computing device with 802.11 2x2, a/b/g/n/ac WLAN radios.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode 2TX	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	13.33	21.53
2412 - 2462	802.11g	13.18	20.80
2412 - 2462	802.11n HT20	12.87	19.36

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integrated antenna, with a maximum gain of antenna as follows:

Frequency Range (MHz)	Chain 0	Chain 1
2400 - 2483.5	3.4	2.1

5.4. SOFTWARE

The test utitlity software used during testing was WIFI Tool v2.3.2

5.5. WORST-CASE CONFIGURATION AND MODE

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

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z, it was determined that Y orientation was worst-case orientation for 2.4GHz band; therefore, all final radiated testing was performed with the EUT in Y (Landscape) orientation for 2.4GHz band

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20mode: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	E545	MP-06P906	DoC
Laptop AC/DC adapter	Lenovo	ADLX65NCT2A	11S362002293ZZ7004954LO	DoC
Ethernet to USB Adapter	Linksys	MUSB300M	CU906M718557	N/A
EUT AC/DC adapter	Microsoft	1623	2068010	DoC

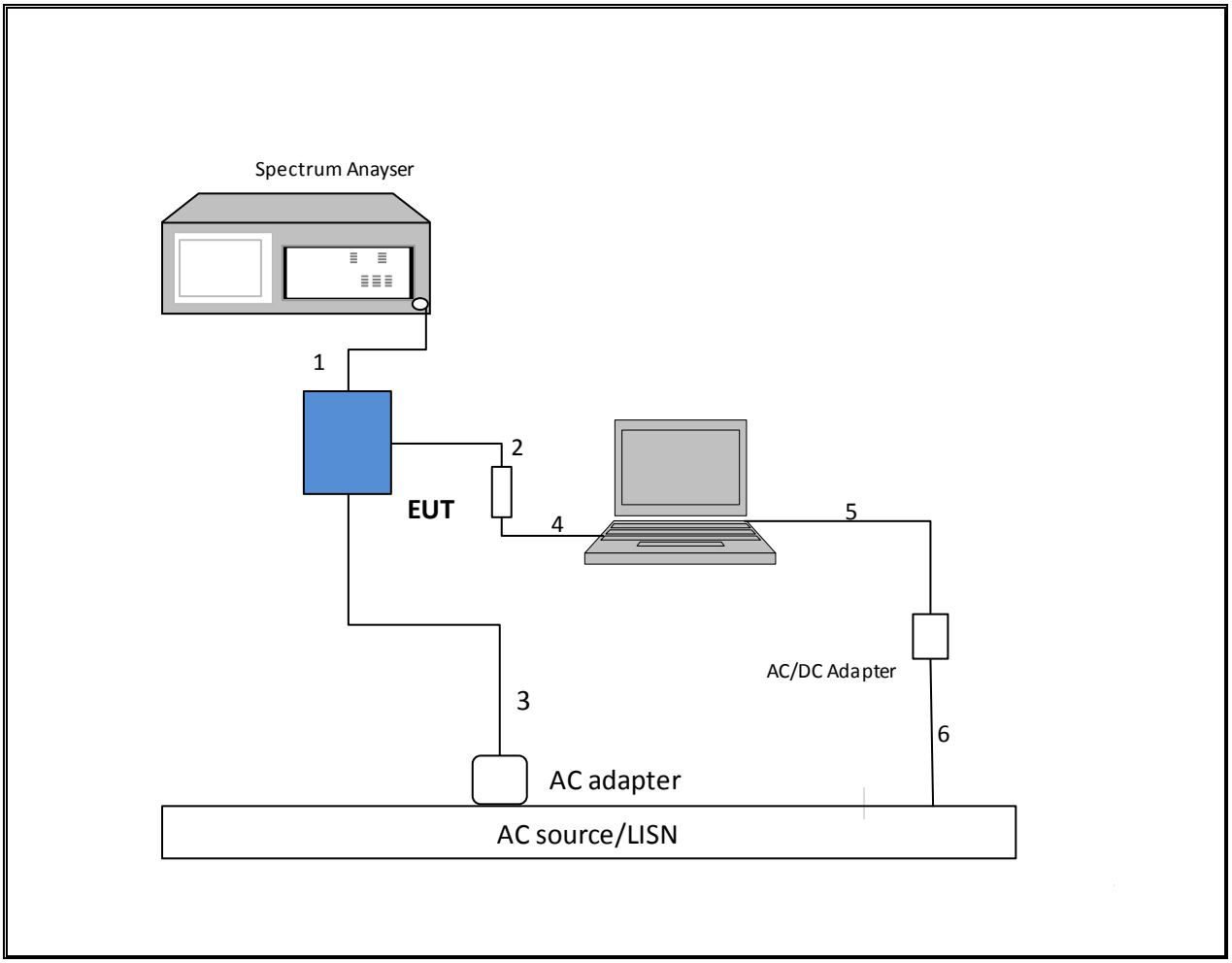
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna	1	SMA	Un-Shielded	0.3	To spectrum Analyzer
2	USB	1	USB	Shielded	0.2	To EUT
3	DC	1	DC	Un-shielded	0.8	N/A
4	Ether cable	1	RJ45- USB	Un-shielded	1	To laptop
5	DC	1	DC	Un-shielded	0.8	N/A
6	AC	1	2-Prong	Un-shielded	1.5	N/A

TEST SETUP- CONDUCTED PORT

The EUT was tested connected to a host Laptop via RJ45/USB cable and spectrum analyzer to antenna port. Test software exercised the EUT.

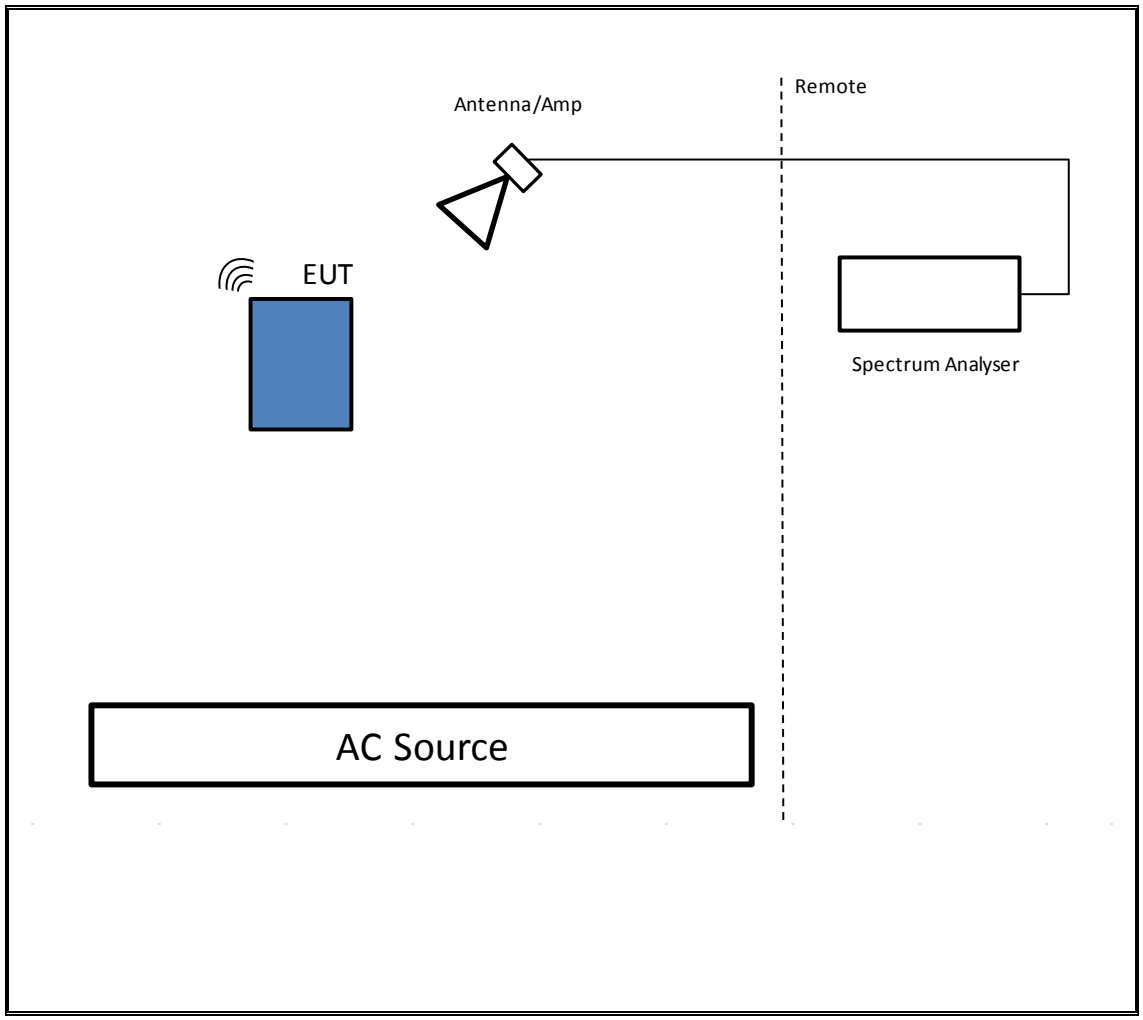
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

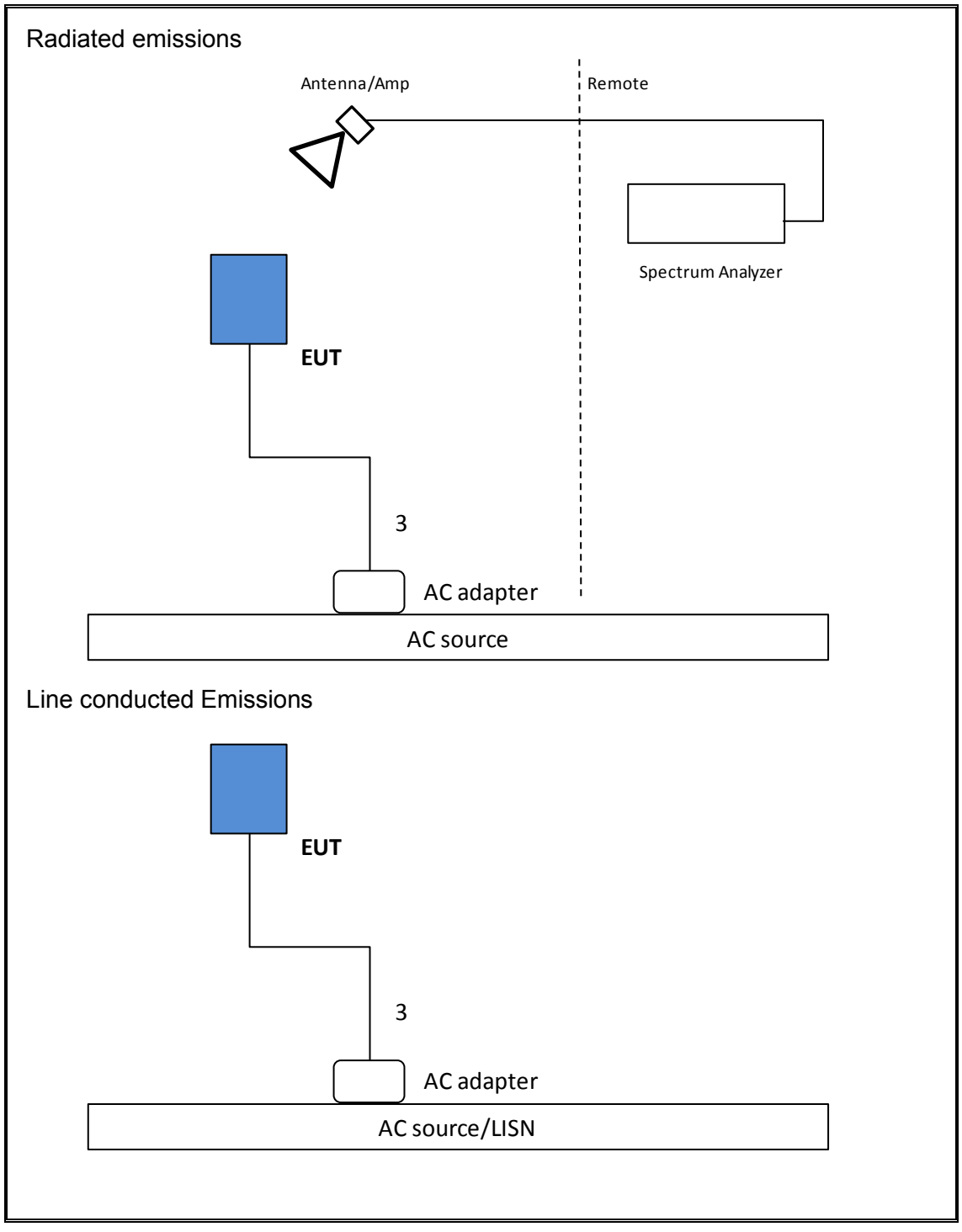
The EUT was tested battery powered. Test software exercised the EUT.

SETUP DIAGRAM



TEST SETUP - BELOW 1GHZ & AC LINE CONDUCTED TESTS

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 No.**	**Cal Date**	**Cal Due**
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014		
Horn Antenna 1-18 GHz	ETS Lindgren	3117	863	04/14/14	04/14/15
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
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

7. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r02, Section 8.1.

Output Power: KDB 558074 D01 v03r02, Section 9.1.2.

Power Spectral Density: KDB 558074 D01 v03r02, Section 10.3.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r02, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r02, Section 12.0.

Band-edge: KDB 558074 D01 v03r02, Section 13.3.1.

8. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

8.1. ON TIME AND DUTY CYCLE RESULTS

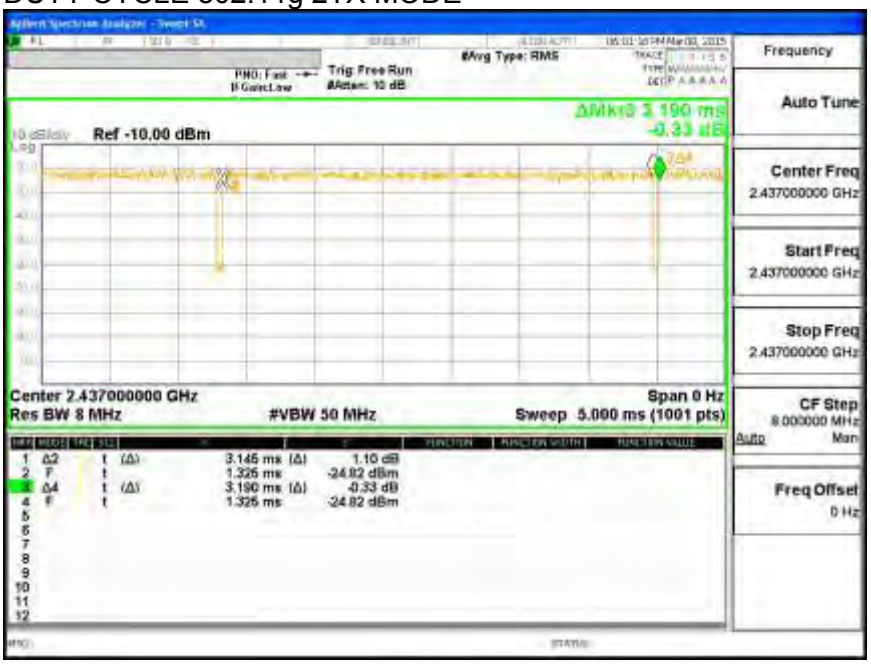
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
802.11b 2TX	18.930	18.980	0.997	99.74%	0.00	0.010
802.11g 2TX	3.145	3.190	0.986	98.59%	0.00	0.010
802.11n HT20 2TX	2.925	2.965	0.987	98.65%	0.00	0.010

8.2. DUTY CYCLE PLOTS

2.4 GHz BAND

DUTY CYCLE 802.11b 2TX MODE

DUTY CYCLE 802.11g 2TX MODE



DUTY CYCLE 802.11n HT20 2TX MODE

9. ANTENNA PORT TEST RESULTS

9.1. 802.11b 2Tx MODE IN THE 2.4 GHz BAND

9.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	2412	10.075	10.094	0.5
Mid	2437	10.064	10.109	0.5
High	2462	10.109	10.090	0.5

6 dB BANDWIDTH, Chain 0

6 dB BANDWIDTH Chain 0 LOW CH

6 dB BANDWIDTH Chain 0 MID CH

6 dB BANDWIDTH Chain 0 HIGH CH

6 dB BANDWIDTH, Chain 1

6 dB BANDWIDTH Chain 1 LOW CH

6 dB BANDWIDTH Chain 1 MID CH

6 dB BANDWIDTH Chain 1 HIGH CH

9.1.2. 99% BANDWIDTH

LIMITS

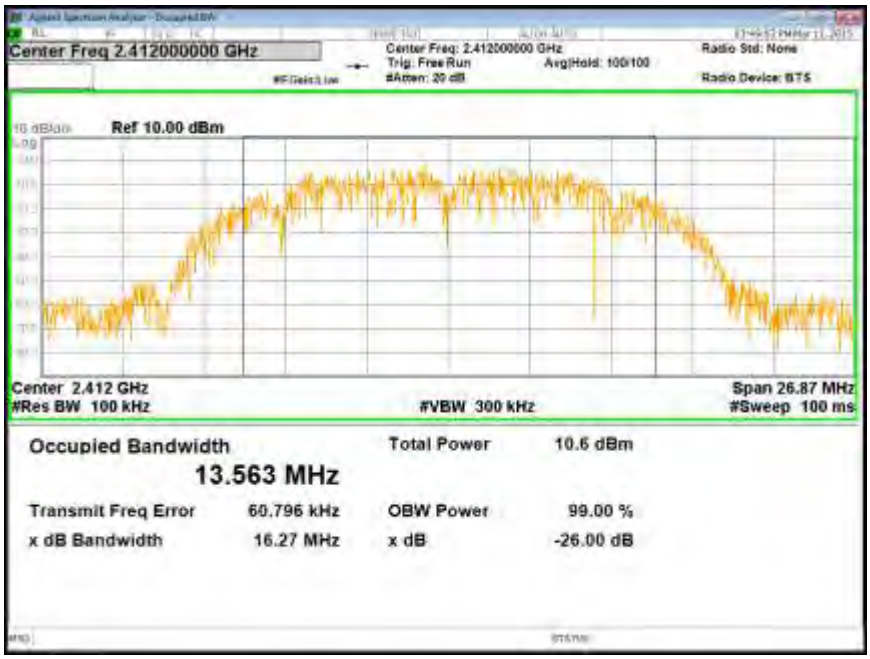
None; for reporting purposes only.

RESULTS

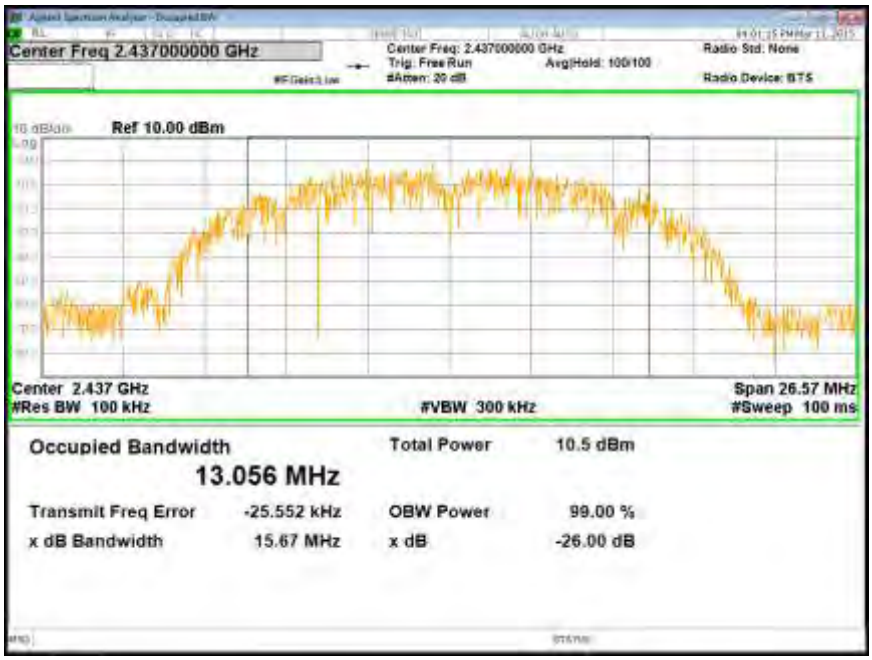
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	2412	13.563	13.155
Mid	2437	13.056	13.281
High	2462	13.106	12.206

99% BANDWIDTH, Chain 0

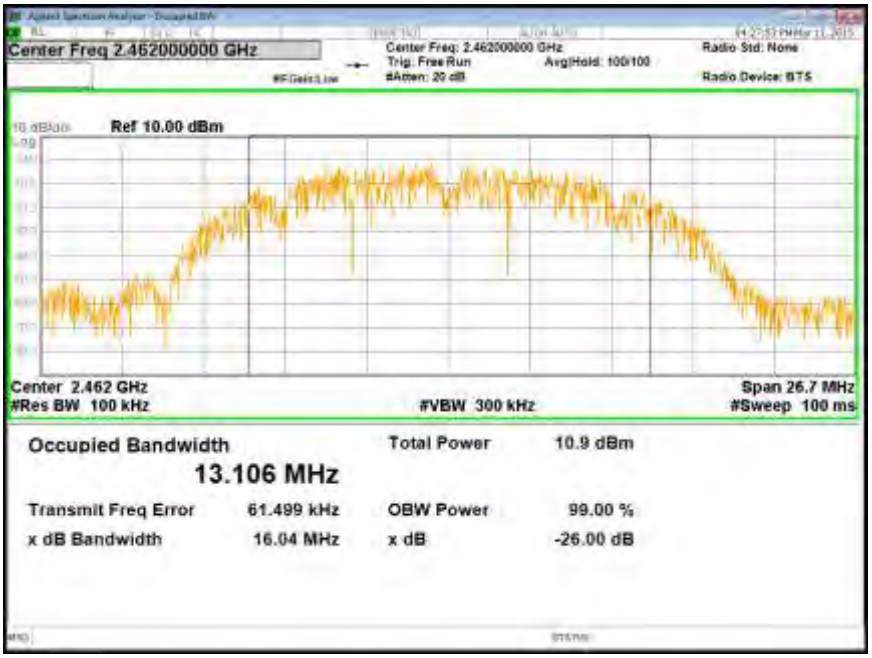
99% BANDWIDTH Chain 0 LOW CH



99% BANDWIDTH Chain 0 MID CH

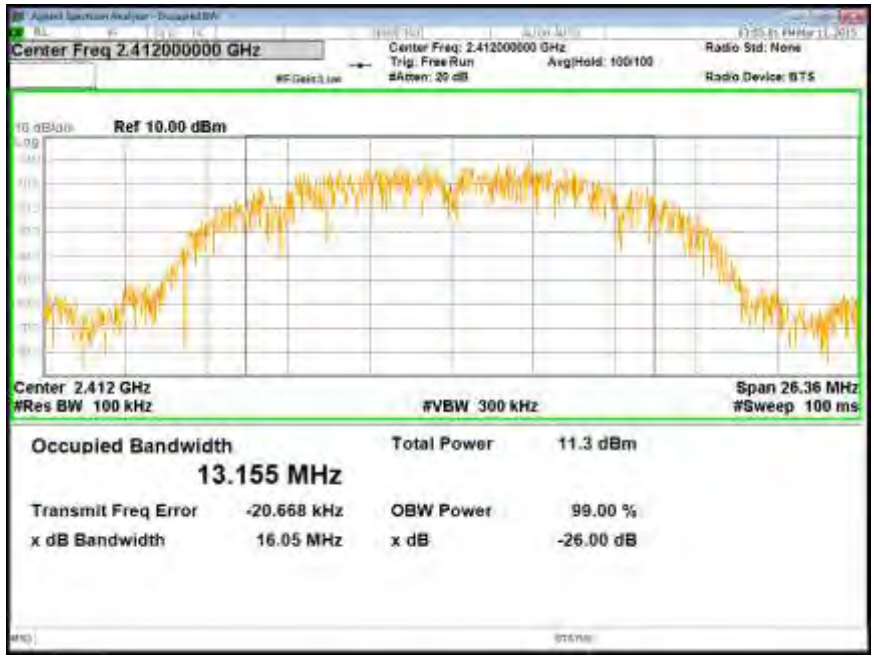


99% BANDWIDTH Chain 0 HIGH CH

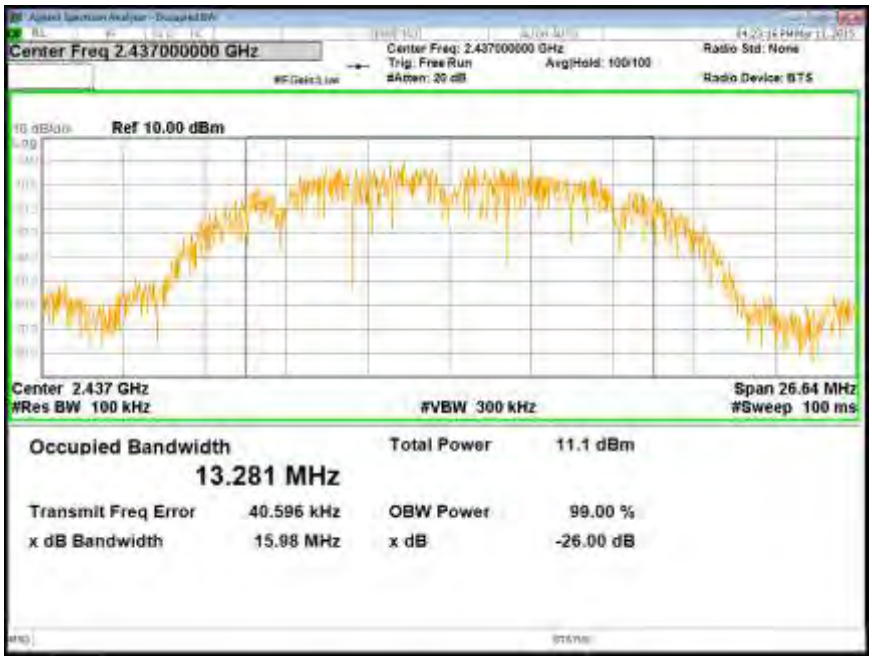


99% BANDWIDTH, Chain 1

99% BANDWIDTH Chain 1 LOW CH



99% BANDWIDTH Chain 1 MID CH



99% BANDWIDTH Chain 1 HIGH CH

9.1.3. OUTPUT POWER

LIMITS

FCC §15.247

For systems using digital modulation in the 2400–2483.5 MHz, based on the use of antennas with directional gains that do not exceed 6dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Gain (dBi)	Chain 1 Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.40	2.10	2.80

RESULTS

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	2.80	30	36	30.00
Mid	2437	2.80	30	36	30.00
High	2462	2.80	30	36	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	10.14	10.15	13.16	30.00	-16.84
Mid	2437	10.47	10.17	13.33	30.00	-16.67
High	2462	10.40	10.14	13.28	30.00	-16.72

9.1.4. PSD

LIMITS

FCC §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

RESULTS

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.435	-11.763	-8.59	8.0	-16.6
Mid	2437	-11.915	-11.634	-8.76	8.0	-16.8
High	2462	-11.989	-12.107	-9.04	8.0	-17.0

PSD, Chain 0

PSD, Chain 0 LOW CH

PSD, Chain 0 MID CH

PSD, Chain 0 HIGH CH

PSD, Chain 1

PSD, Chain 1 LOW CH

PSD, Chain 1 MID CH

PSD, Chain 1 HIGH CH

9.1.5. OUT-OF-BAND 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.

RESULTS

IN-BAND REFERENCE LEVEL, Chain 0

REFERENCE LEVEL Chain 0 MID CH

LOW CHANNEL BANDEDGE, Chain 0

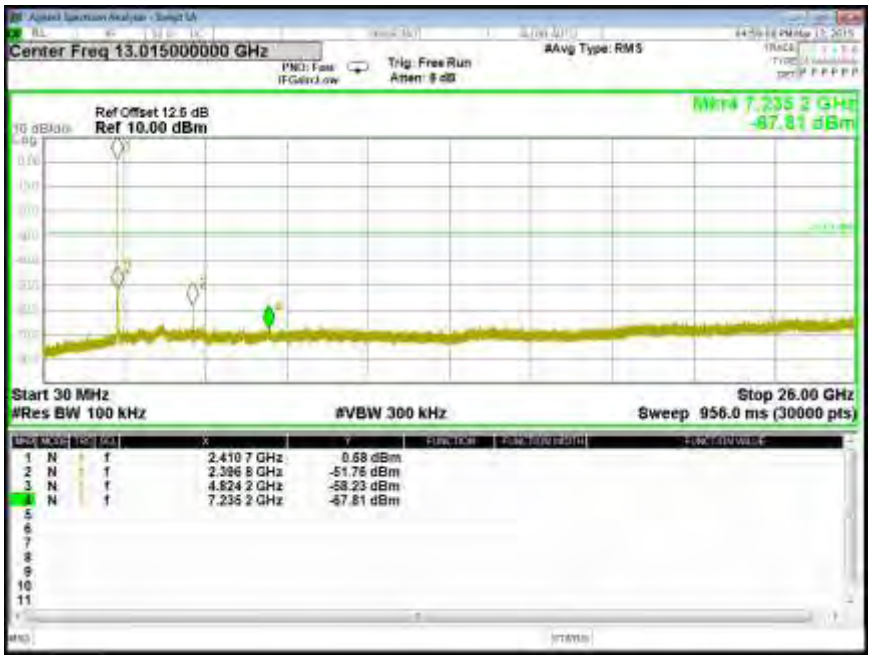
AUTHORIZED BAND EDGE Chain 0 LOW CH

HIGH CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 HIGH CH

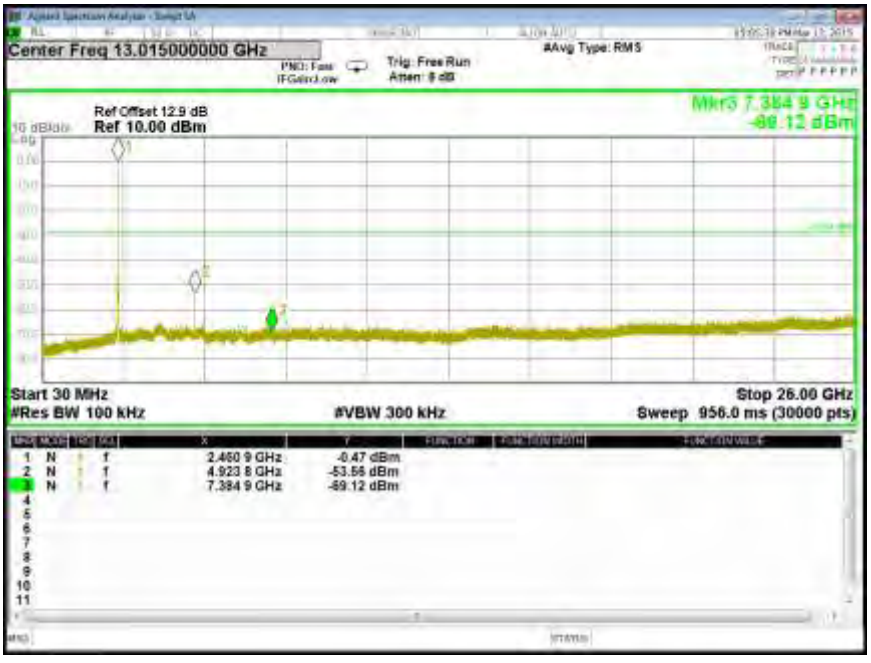
OUT-OF-BAND EMISSIONS, Chain 0

OUT OF BAND Chain 0 LOW CH



OUT OF BAND Chain 0 MID CH

OUT OF BAND Chain 0 HIGH CH



IN-BAND REFERENCE LEVEL, Chain 1

REFERENCE LEVEL Chain 1 MID CH

LOW CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 LOW CH

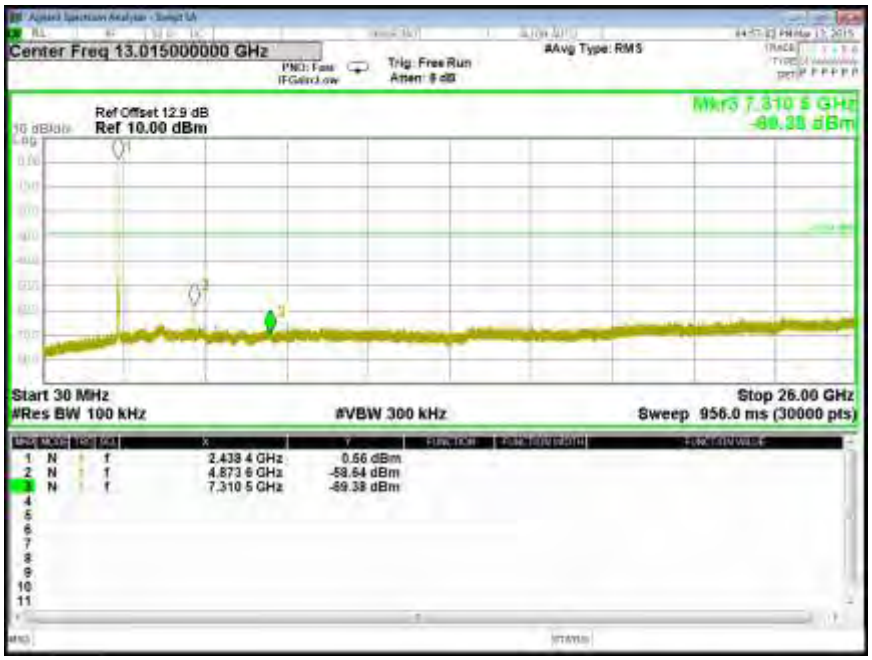
HIGH CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 HIGH CH

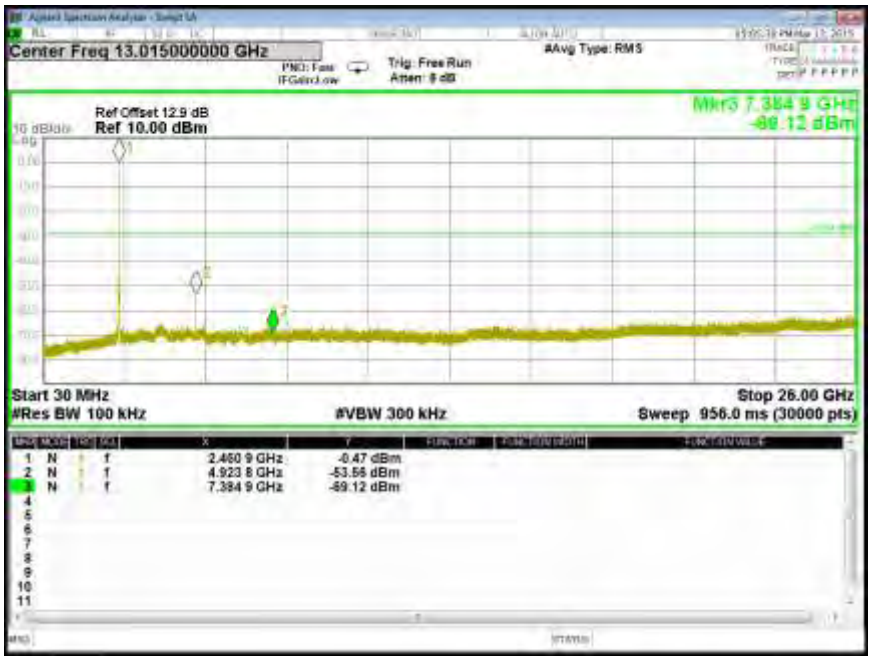
OUT-OF-BAND EMISSIONS, Chain 1

OUT OF BAND Chain 1 LOW CH

OUT OF BAND Chain 1 MID CH



OUT OF BAND Chain 1 HIGH CH



9.2. 802.11g 2Tx MODE IN THE 2.4 GHz BAND

9.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	2412	16.359	16.334	0.5
Mid	2437	16.383	16.334	0.5
High	2462	16.358	16.358	0.5

6 dB BANDWIDTH, Chain 0

6 dB BANDWIDTH Chain 0 LOW CH

6 dB BANDWIDTH Chain 0 MID CH

6 dB BANDWIDTH Chain 0 HIGH CH

6 dB BANDWIDTH, Chain 1

6 dB BANDWIDTH Chain 1 LOW CH

6 dB BANDWIDTH Chain 1 MID CH

6 dB BANDWIDTH Chain 1 HIGH CH

9.2.2. 99% BANDWIDTH

LIMITS

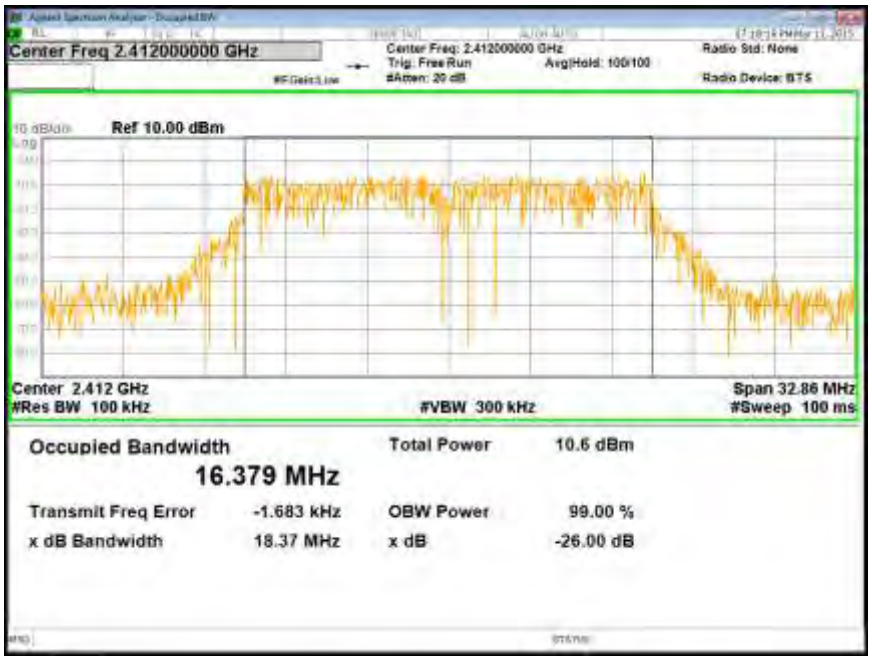
None; for reporting purposes only.

RESULTS

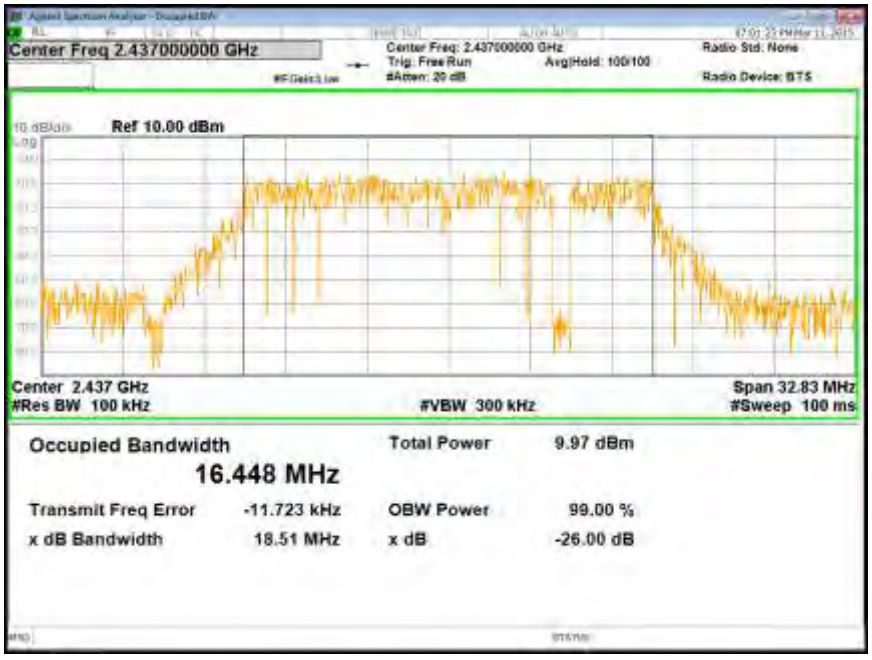
Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
2412	16.379	16.434
2437	16.448	16.447
2462	16.434	16.464

99% BANDWIDTH, Chain 0

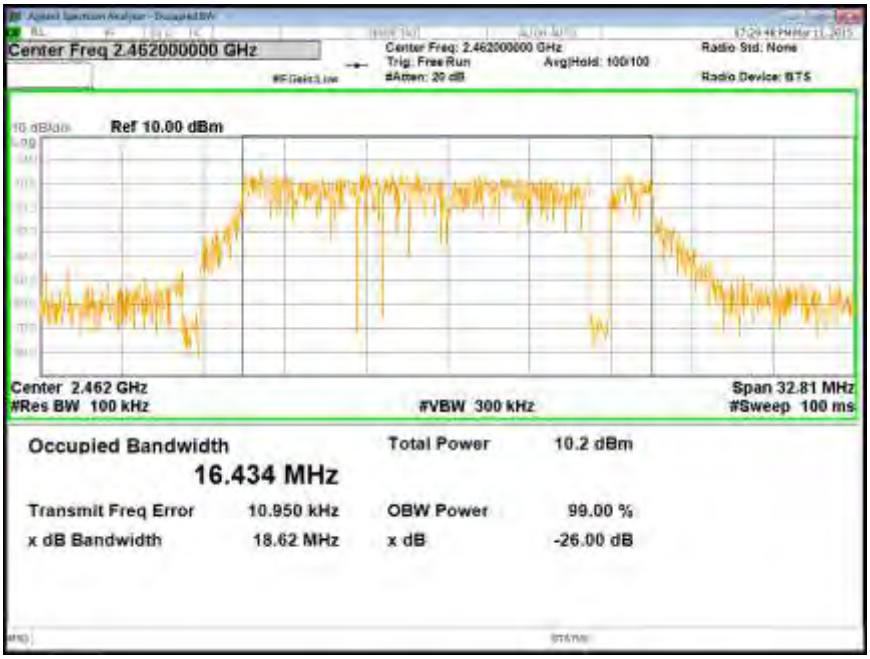
99% BANDWIDTH Chain 0 LOW CH



99% BANDWIDTH Chain 0 MID CH

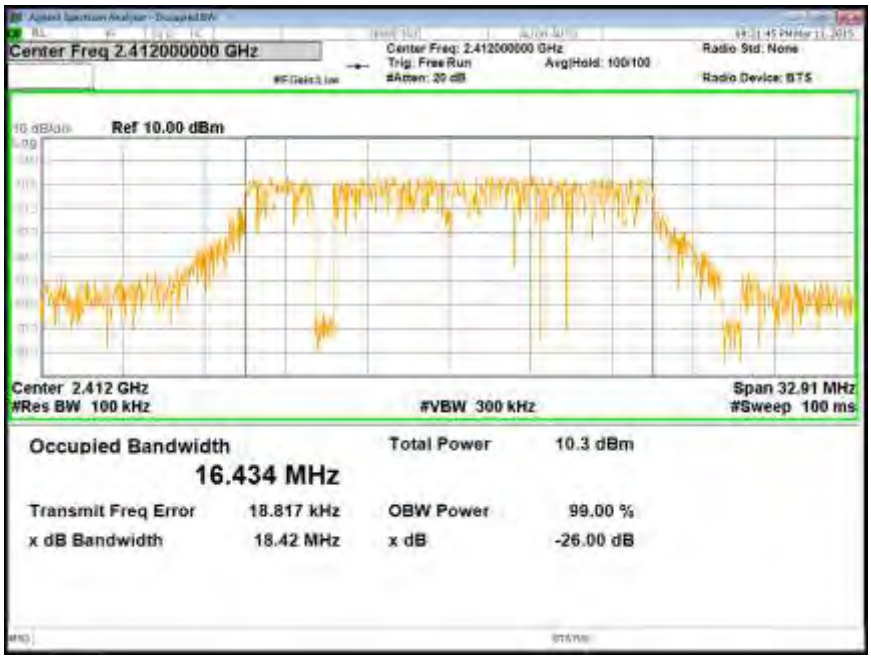


99% BANDWIDTH Chain 0 HIGH CH

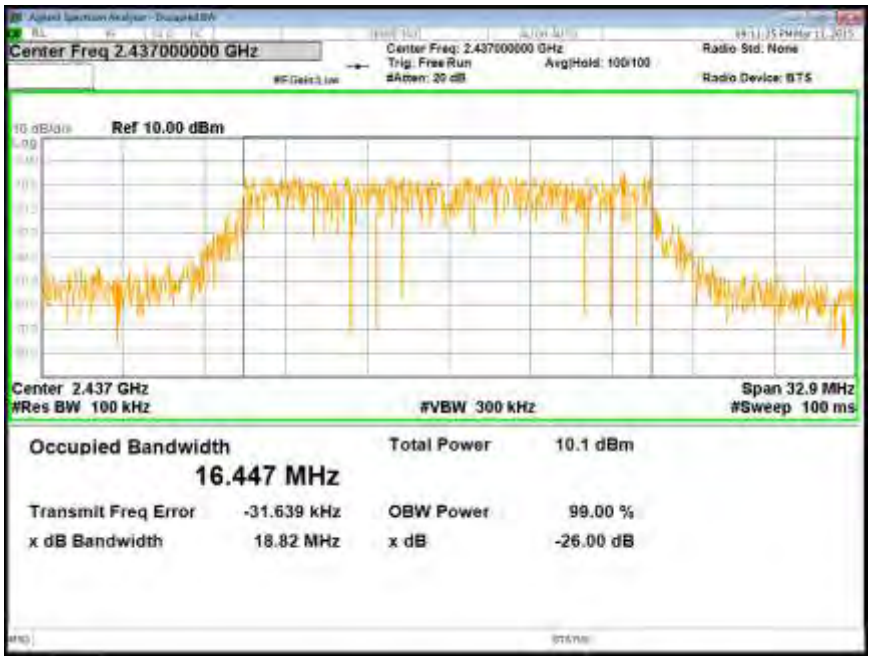


99% BANDWIDTH, Chain 1

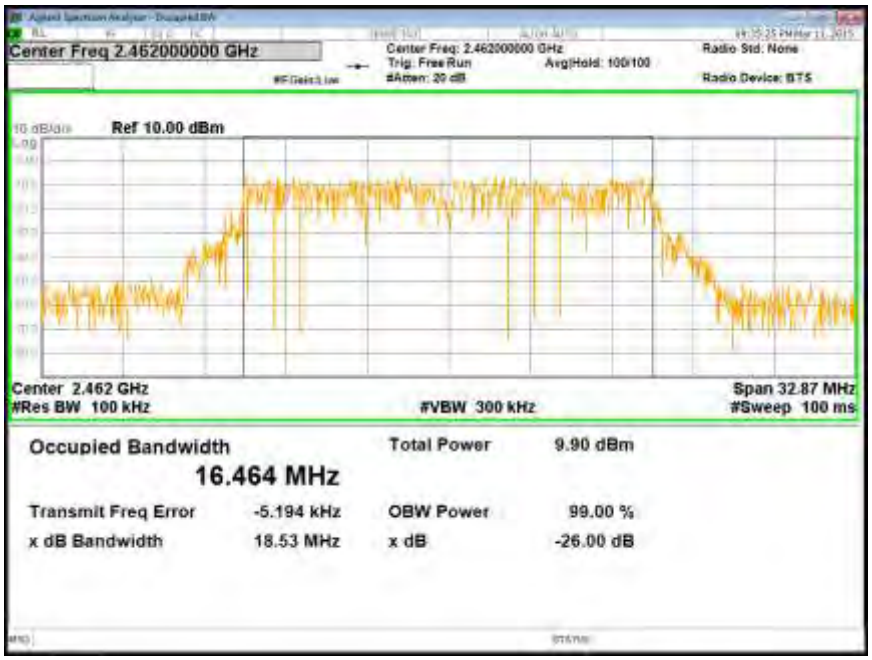
99% BANDWIDTH Chain 1 LOW CH



99% BANDWIDTH Chain 1 MID CH



99% BANDWIDTH Chain 1 HIGH CH



9.2.3. OUTPUT POWER

LIMITS

FCC §15.247

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Gain (dBi)	Chain 1 Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.40	2.10	2.80

RESULTS

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	2.80	30	36	30.00
Mid	2437	2.80	30	36	30.00
High	2462	2.80	30	36	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	10.22	10.12	13.18	30.00	-16.82
Mid	2437	10.30	9.95	13.14	30.00	-16.86
High	2462	10.23	9.97	13.11	30.00	-16.89

9.2.4. PSD

LIMITS

FCC §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

RESULTS

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-14.442	-14.825	-11.62	8.0	-19.6
Mid	2437	-14.370	-15.090	-11.70	8.0	-19.7
High	2462	-14.006	-15.207	-11.55	8.0	-19.6

PSD, Chain 0

PSD, Chain 0 LOW CH

PSD, Chain 0 MID CH

PSD, Chain 0 HIGH CH

PSD, Chain 1

PSD, Chain 1 LOW CH

PSD, Chain 1 MID CH

PSD, Chain 1 HIGH CH

9.2.5. OUT-OF-BAND 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.

RESULTS

IN-BAND REFERENCE LEVEL, Chain 0

REFERENCE LEVEL Chain 0 MID CH

LOW CHANNEL BANDEDGE, Chain 0

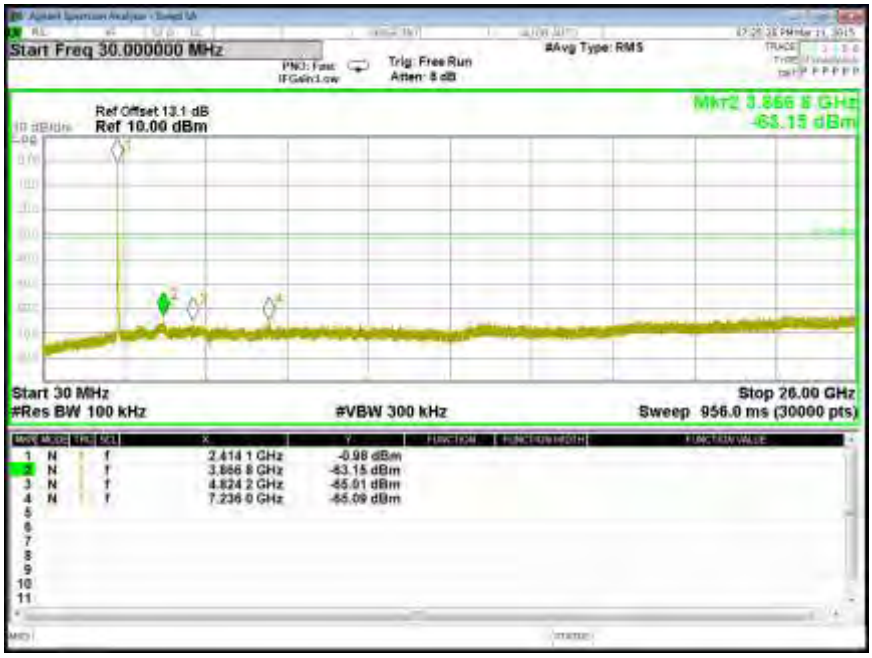
AUTHORIZED BAND EDGE Chain 0 LOW CH

HIGH CHANNEL BANDEDGE, Chain 0

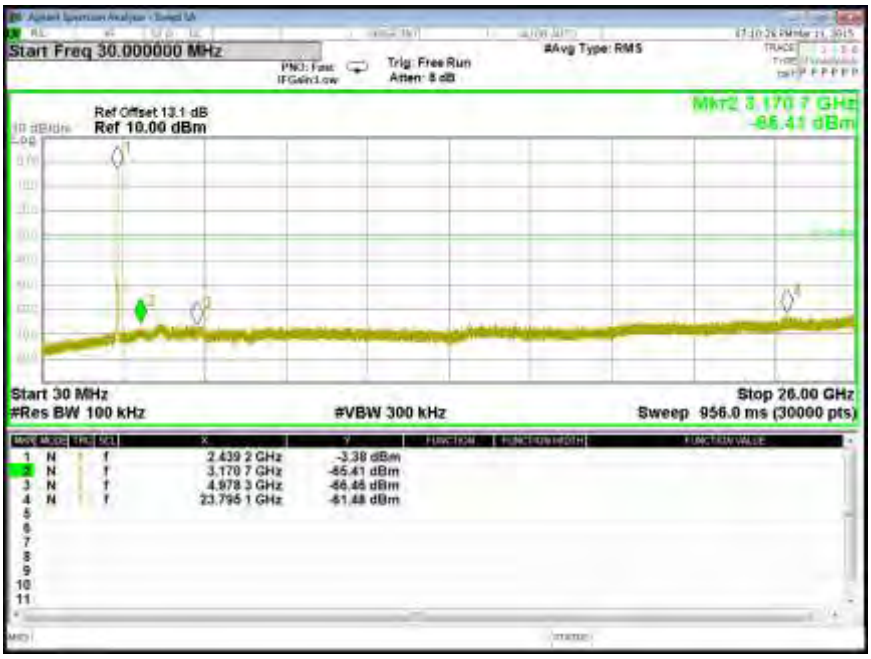
AUTHORIZED BAND EDGE Chain 0 HIGH CH

OUT-OF-BAND EMISSIONS, Chain 0

OUT OF BAND Chain 0 LOW CH



OUT OF BAND Chain 0 MID CH



OUT OF BAND Chain 0 HIGH CH

IN-BAND REFERENCE LEVEL, Chain 1

REFERENCE LEVEL Chain 1 MID CH

LOW CHANNEL BANDEDGE, Chain 1

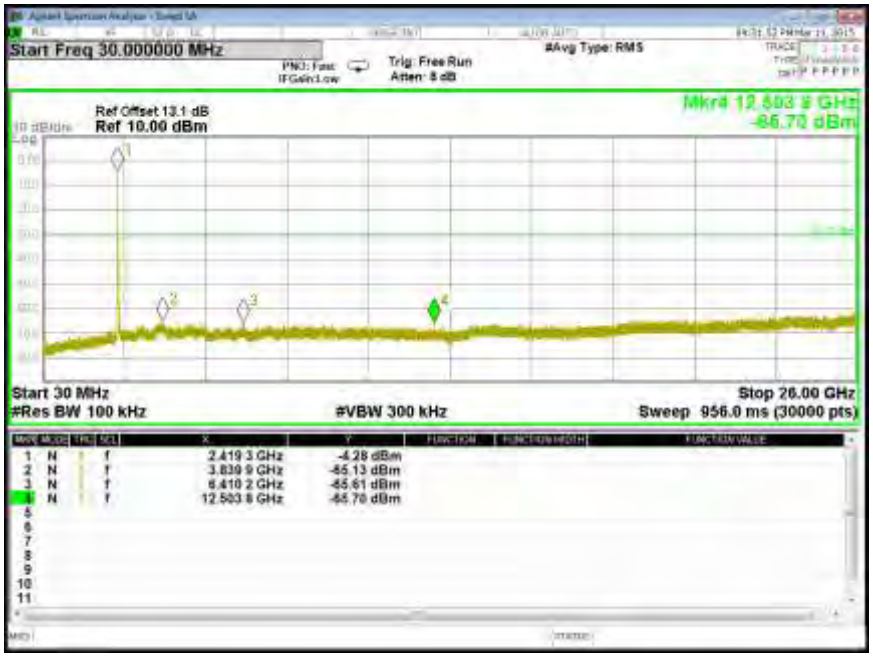
AUTHORIZED BAND EDGE Chain 1 LOW CH

HIGH CHANNEL BANDEDGE, Chain 1

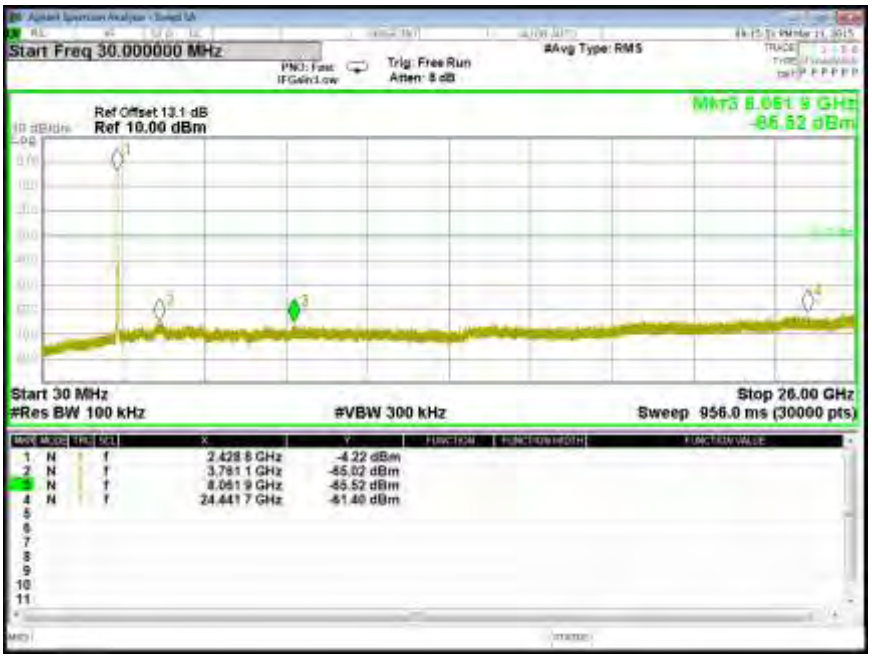
AUTHORIZED BAND EDGE Chain 1 HIGH CH

OUT-OF-BAND EMISSIONS, Chain 1

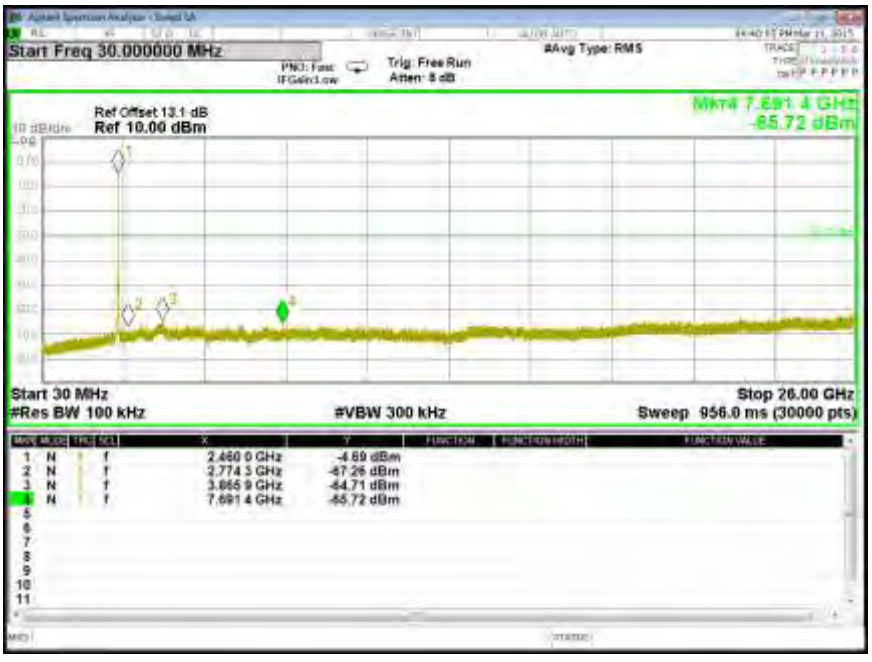
OUT OF BAND Chain 1 LOW CH



OUT OF BAND Chain 1 MID CH



OUT OF BAND Chain 1 HIGH CH



9.3.802.11n HT20 2Tx MODE IN THE 2.4 GHz BAND

9.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	2412	17.131	17.292	0.5
Mid	2437	17.541	17.582	0.5
High	2462	17.567	17.585	0.5

6 dB BANDWIDTH, Chain 0

6 dB BANDWIDTH Chain 0 LOW CH

6 dB BANDWIDTH Chain 0 MID CH

6 dB BANDWIDTH Chain 0 HIGH CH

6 dB BANDWIDTH, Chain 1

6 dB BANDWIDTH Chain 1 LOW CH

6 dB BANDWIDTH Chain 1 MID CH

6 dB BANDWIDTH Chain 1 HIGH CH

9.3.2. 99% BANDWIDTH

LIMITS

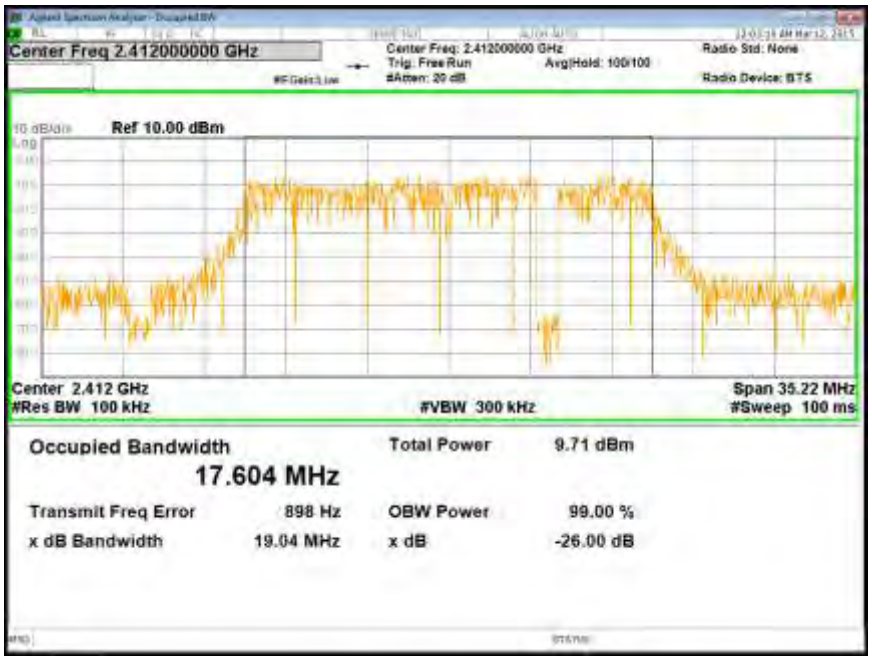
None; for reporting purposes only.

RESULTS

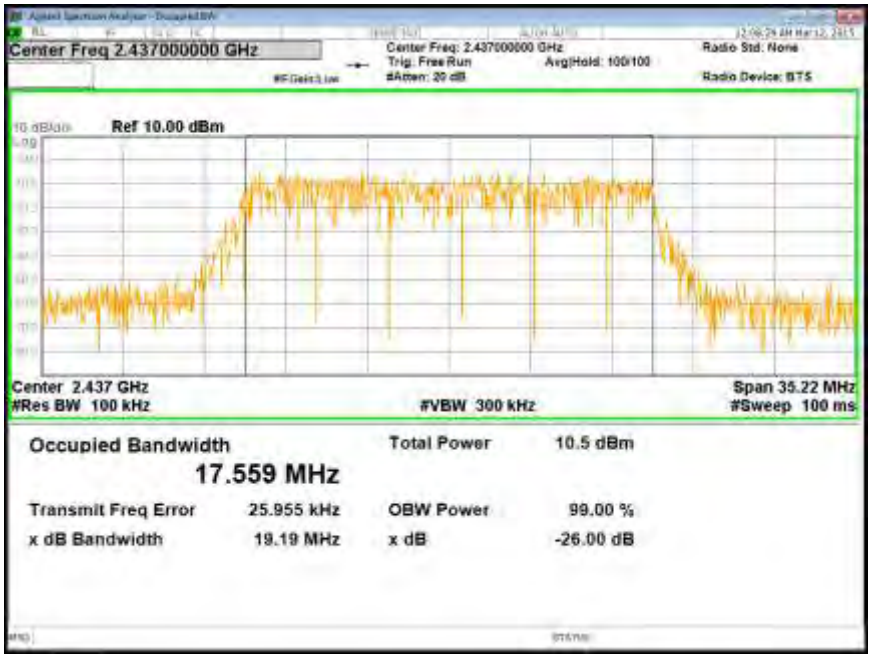
Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1(MHz)
Low	2412	17.604	17.643
Mid	2437	17.559	17.647
High	2462	17.582	17.567

99% BANDWIDTH, Chain 0

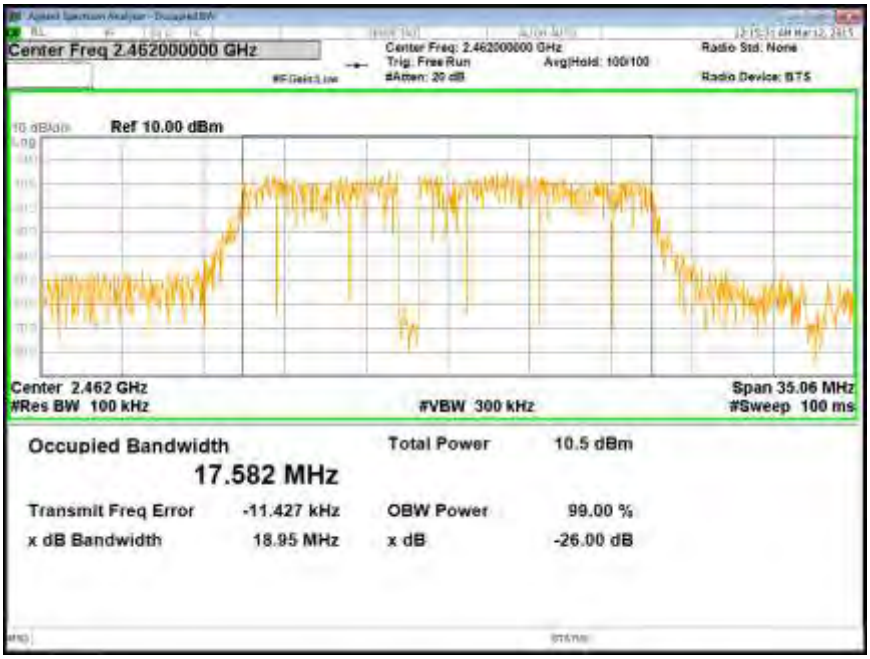
99% BANDWIDTH Chain 0 LOW CH



99% BANDWIDTH Chain 0 MID CH

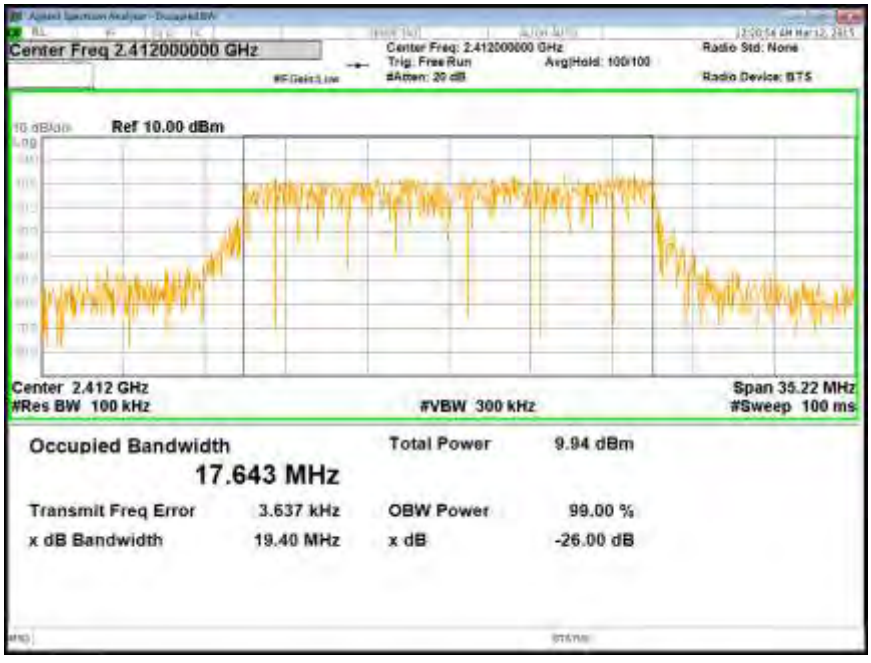


99% BANDWIDTH Chain 0 HIGH CH

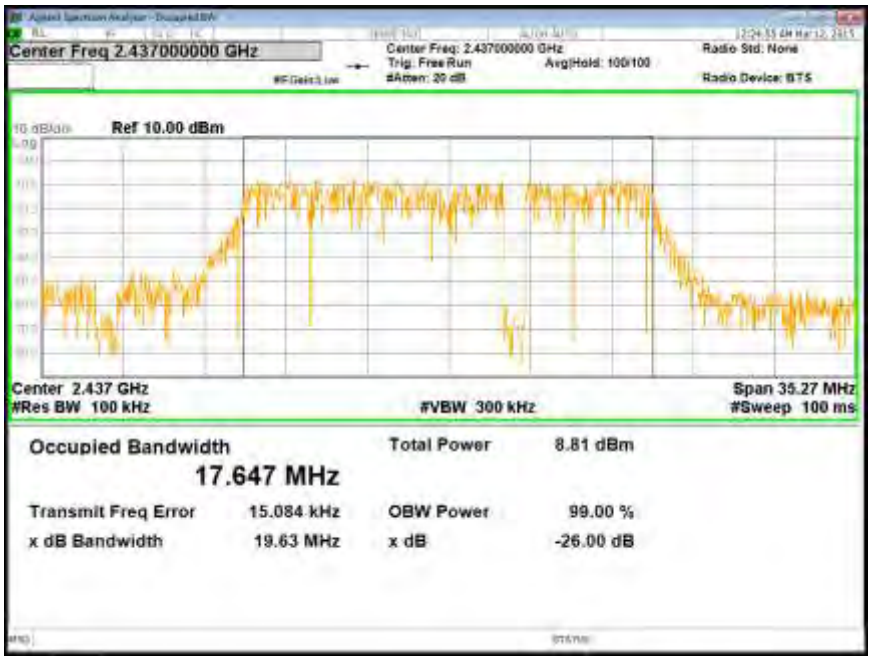


99% BANDWIDTH, Chain 1

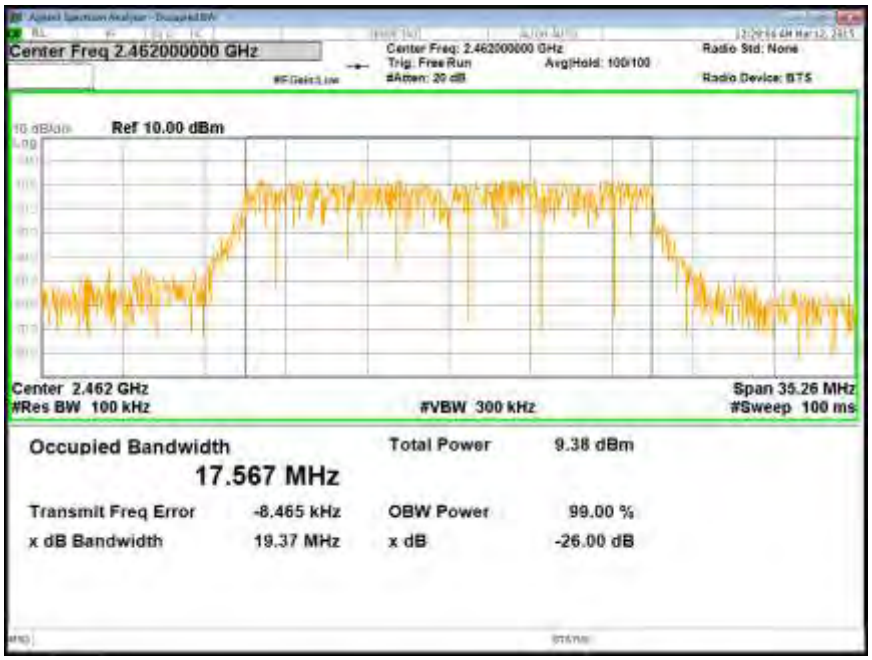
99% BANDWIDTH Chain 1 LOW CH



99% BANDWIDTH Chain 1 MID CH



99% BANDWIDTH Chain 1 HIGH CH



9.3.3. OUTPUT POWER

LIMITS

FCC §15.247

For systems using digital modulation in the 2400–2483.5 MHz, band: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Gain (dBi)	Chain 1 Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.40	2.10	2.80

RESULTS

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	2.80	30	36	30.00
Mid	2437	2.80	30	36	30.00
High	2462	2.80	30	36	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	10.02	9.60	12.83	30.00	-17.17
Mid	2437	10.20	9.50	12.87	30.00	-17.13
High	2462	10.01	9.53	12.79	30.00	-17.21

9.3.4. PSD

LIMITS

FCC §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

RESULTS

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-14.610	-15.059	-11.82	8.0	-19.8
Mid	2437	-15.024	-15.343	-12.17	8.0	-20.2
High	2462	-14.013	-14.886	-11.42	8.0	-19.4

PSD, Chain 0

PSD, Chain 0 LOW CH

PSD, Chain 0 MID CH

PSD, Chain 0 HIGH CH

PSD, Chain 1

PSD, Chain 1 LOW CH

PSD, Chain 1 MID CH

PSD, Chain 1 HIGH CH

9.3.5. OUT-OF-BAND 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.

RESULTS

IN-BAND REFERENCE LEVEL, Chain 0

REFERENCE LEVEL Chain 0 MID CH

LOW CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 LOW CH

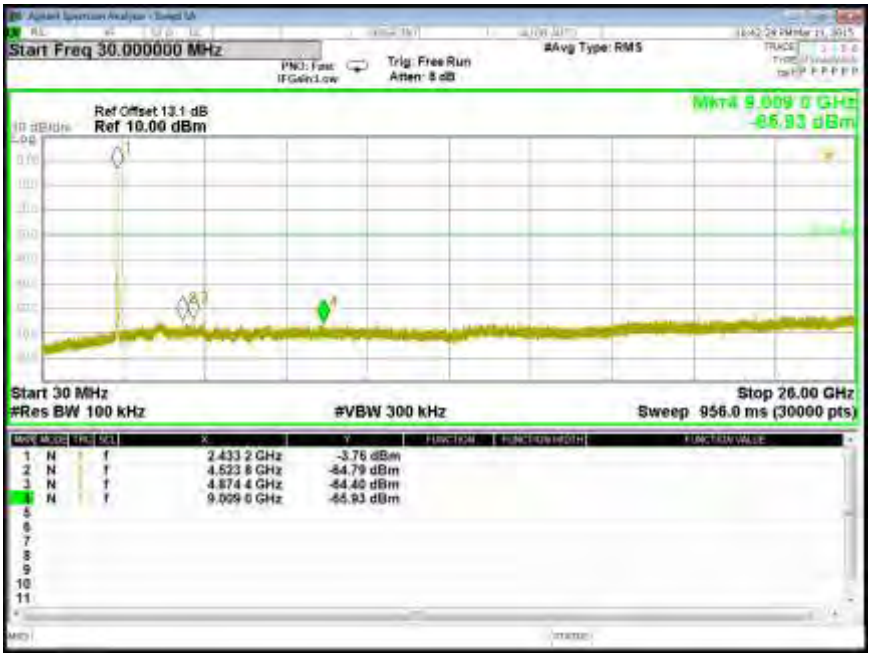
HIGH CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 HIGH CH

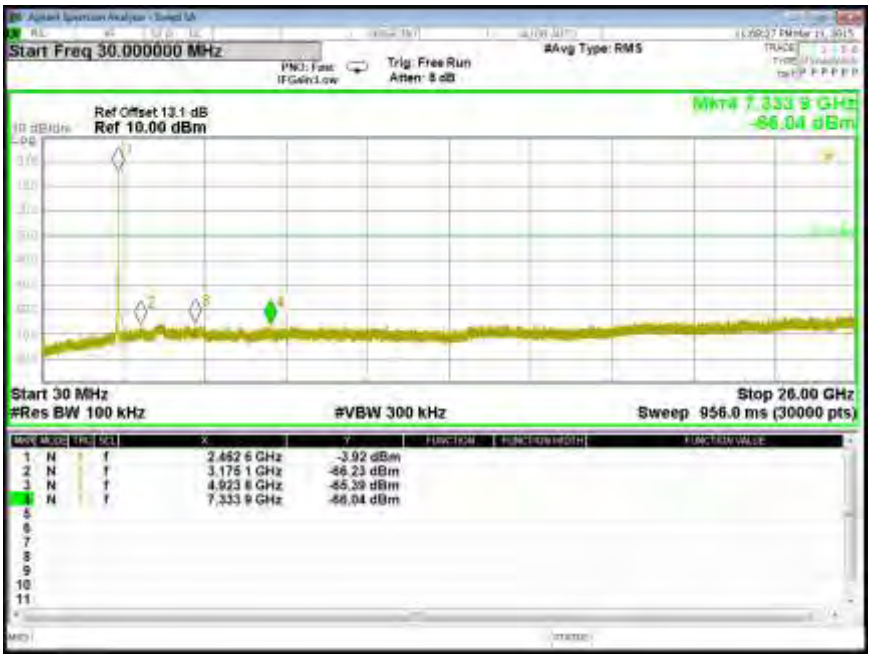
OUT-OF-BAND EMISSIONS, Chain 0

OUT OF BAND Chain 0 LOW CH

OUT OF BAND Chain 0 MID CH



OUT OF BAND Chain 0 HIGH CH



IN-BAND REFERENCE LEVEL, Chain 1

REFERENCE LEVEL Chain 1 MID CH

LOW CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 LOW CH

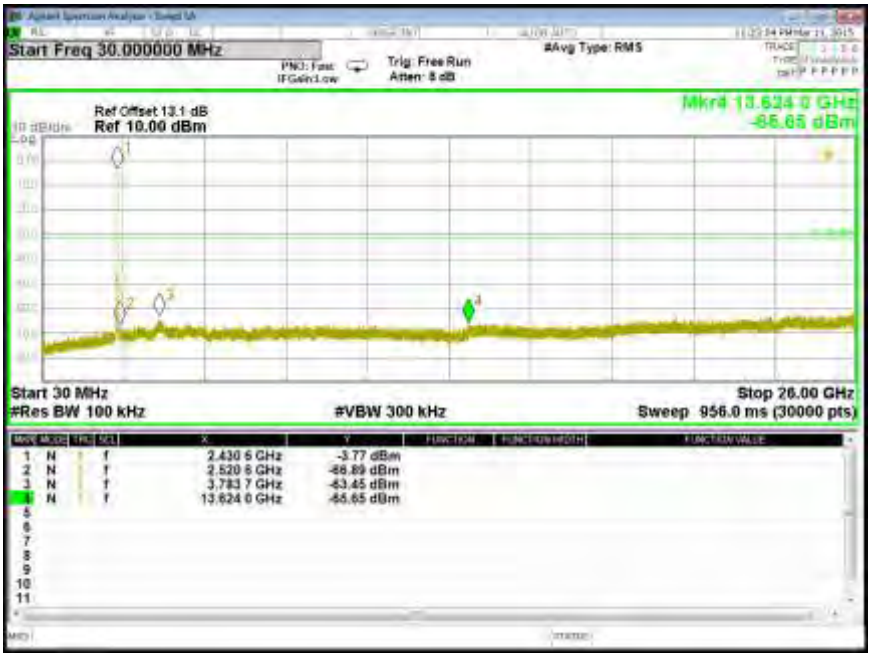
HIGH CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 HIGH CH

OUT-OF-BAND EMISSIONS, Chain 1

OUT OF BAND Chain 1 LOW CH

OUT OF BAND Chain 1 MID CH



OUT OF BAND Chain 1 HIGH CH

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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.

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; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

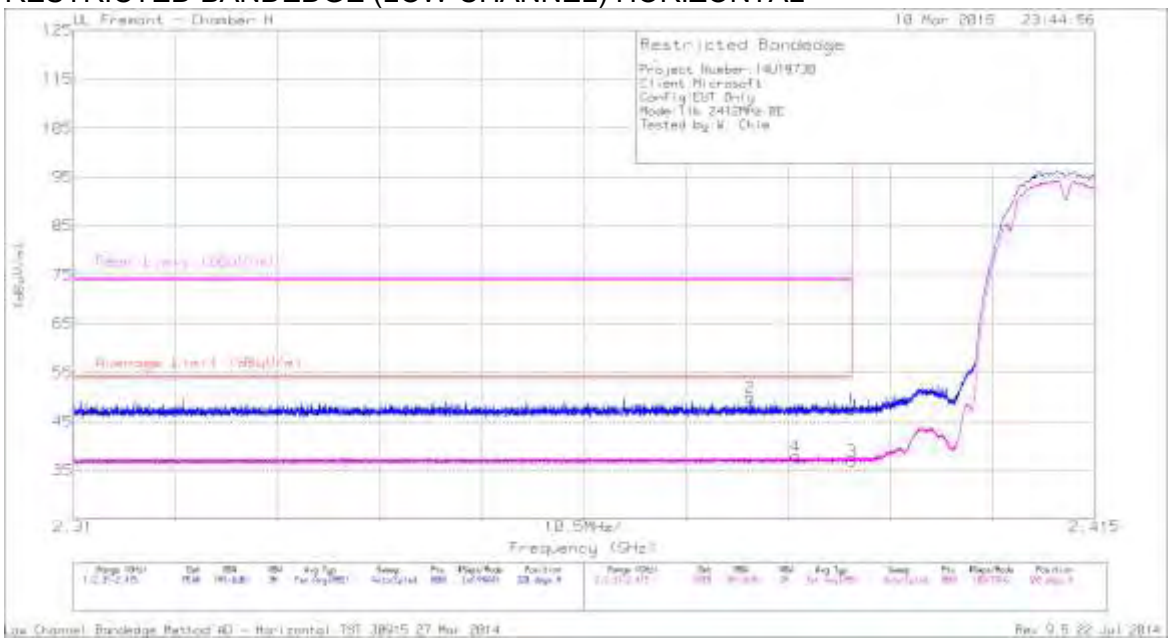
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. 802.11b MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL) HORIZONTAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	* 2.38	42.57	PK	32	-24.6	49.97	-	-	74	-24.03	320	124	H
4	* 2.384	30.39	RMS	32	-24.6	37.79	54	-16.21	-	-	320	124	H
1	* 2.39	39.93	PK	32	-24.6	47.33	-	-	74	-26.67	320	124	H
3	* 2.39	29.43	RMS	32	-24.6	36.83	54	-17.17	-	-	320	124	H

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

PK - Peak detector

RMS - RMS detection

RESTRICTED BANDEDGE (LOW CHANNEL) VERTICAL

DATA

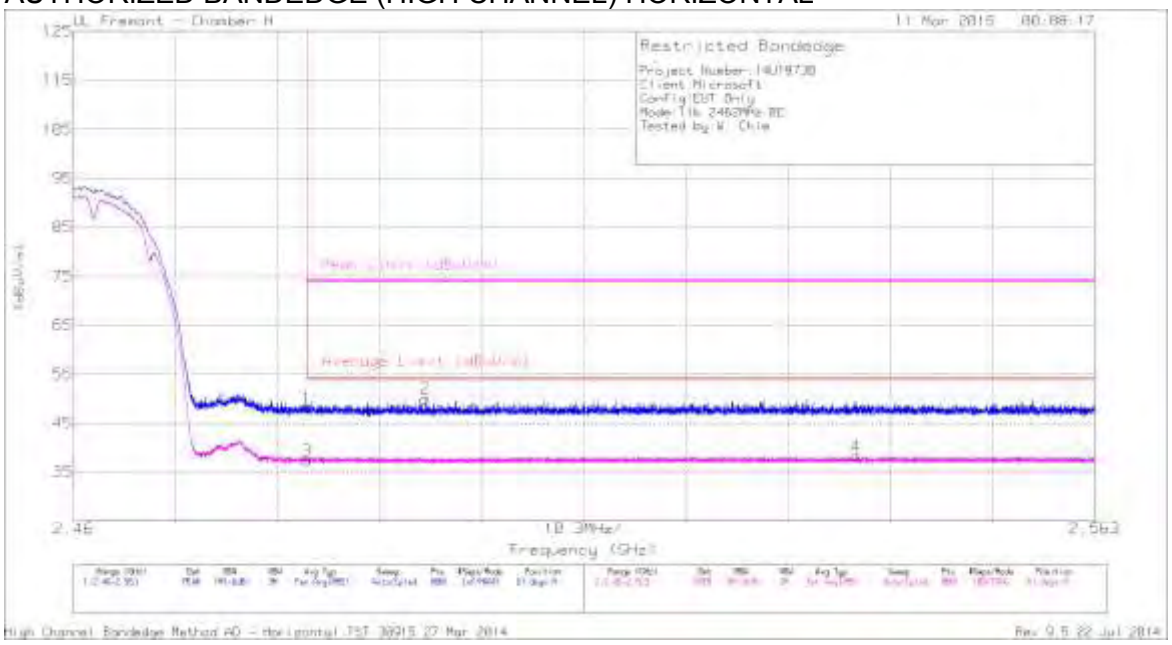
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.325	42.54	PK	31.9	-24.6	49.84	-	-	74	-24.16	55	198	V
4	* 2.387	30.4	RMS	32	-24.5	37.9	54	-16.1	-	-	55	198	V
1	* 2.39	40.2	PK	32	-24.6	47.6	-	-	74	-26.4	55	198	V
3	* 2.39	29.48	RMS	32	-24.6	36.88	54	-17.12	-	-	55	198	V

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

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) HORIZONTAL



DATA

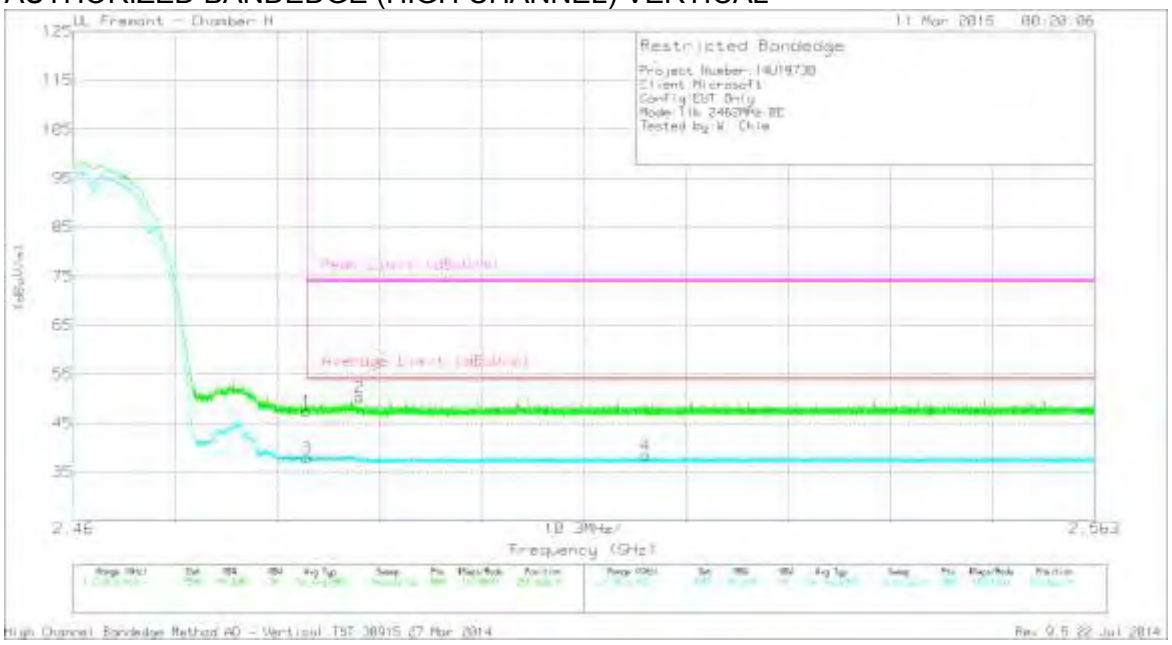
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.48	PK	32.2	-24.5	48.18	-	-	74	-25.82	61	262	H
3	* 2.484	29.56	RMS	32.2	-24.5	37.26	54	-16.74	-	-	61	262	H
2	* 2.495	42.4	PK	32.2	-24.5	50.1	-	-	74	-23.9	61	262	H
4	2.539	30.34	RMS	32.2	-24.4	38.14	54	-15.86	-	-	61	262	H

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

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	39.67	PK	32.2	-24.5	47.37	-	-	74	-26.63	293	275	V
3	* 2.484	30.09	RMS	32.2	-24.5	37.79	54	-16.21	-	-	293	275	V
2	* 2.489	42.55	PK	32.2	-24.5	50.25	-	-	74	-23.75	293	275	V
4	2.518	30.42	RMS	32.2	-24.4	38.22	54	-15.78	-	-	293	275	V

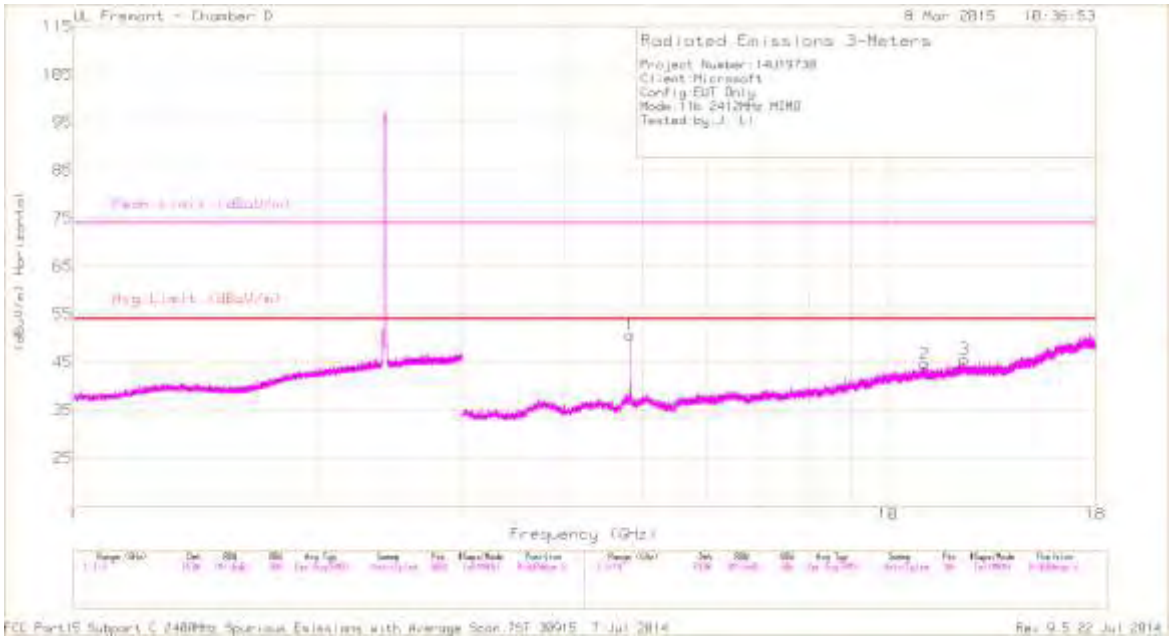
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

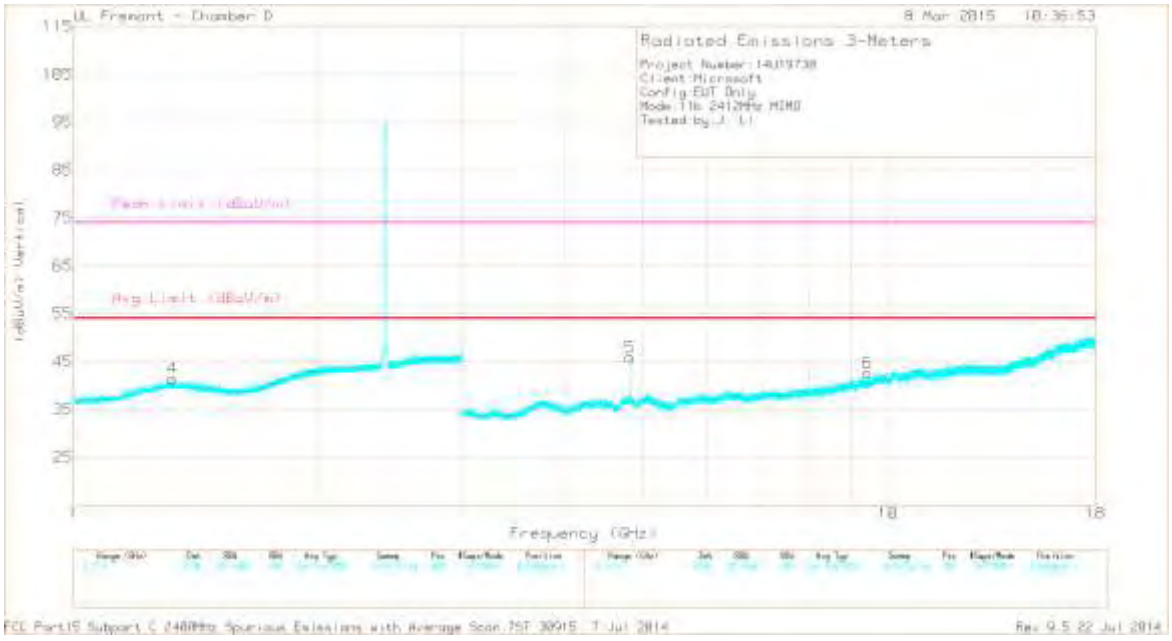
RMS - RMS detection

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 4.824	45.57	PK2	34.1	-27.4	52.27	-	-	74	-21.73	27	222	H
	* 4.824	41.85	MAv1	34.1	-27.4	48.55	54	-5.45	-	-	27	222	H
2	* 11.098	33.97	PK2	38	-21.2	50.77	-	-	74	-23.23	69	132	H
	* 11.098	22.79	MAv1	38	-21.2	39.59	54	-14.41	-	-	69	132	H
3	* 12.411	34.72	PK2	39	-21.2	52.52	-	-	74	-21.48	145	251	H
	* 12.412	23.15	MAv1	39	-21.2	40.95	54	-13.05	-	-	145	251	H
4	* 1.319	42.04	PK2	28.9	-22.2	48.74	-	-	74	-25.26	163	189	V
	* 1.319	30.49	MAv1	28.9	-22.2	37.19	54	-16.81	-	-	163	189	V
5	* 4.824	43.91	PK2	34.1	-27.4	50.61	-	-	74	-23.39	165	191	V
	* 4.824	39.38	MAv1	34.1	-27.4	46.08	54	-7.92	-	-	165	191	V
6	* 9.449	35.02	PK2	36.5	-21.6	49.92	-	-	74	-24.08	177	268	V
	* 9.446	22.68	MAv1	36.5	-21.7	37.48	54	-16.52	-	-	177	268	V

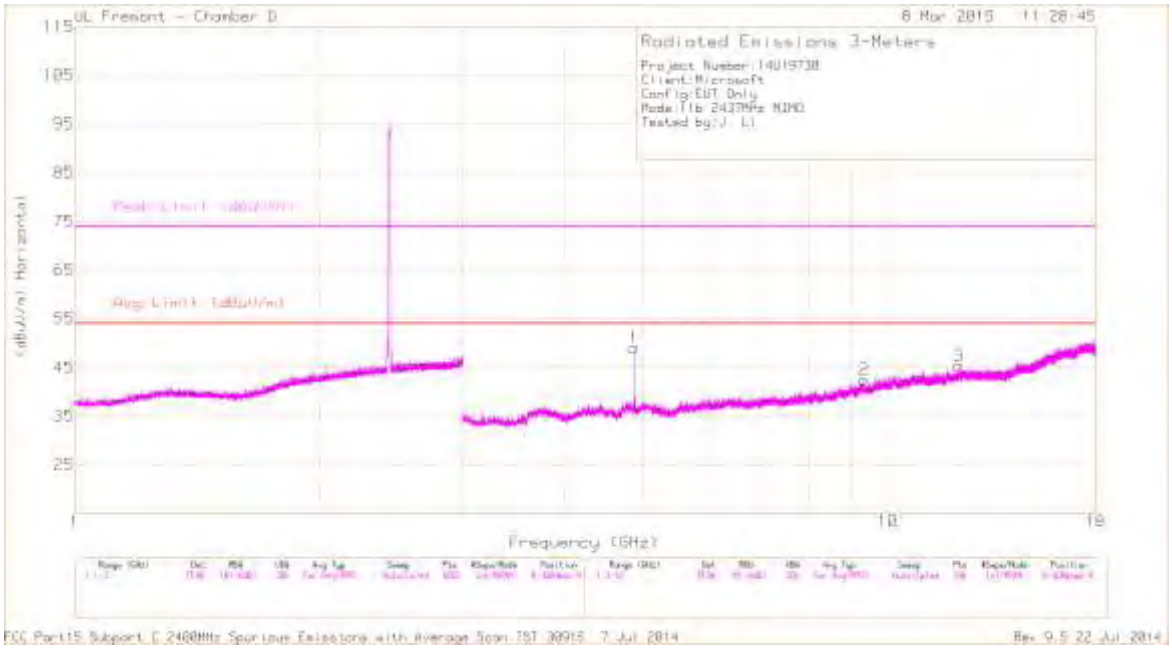
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

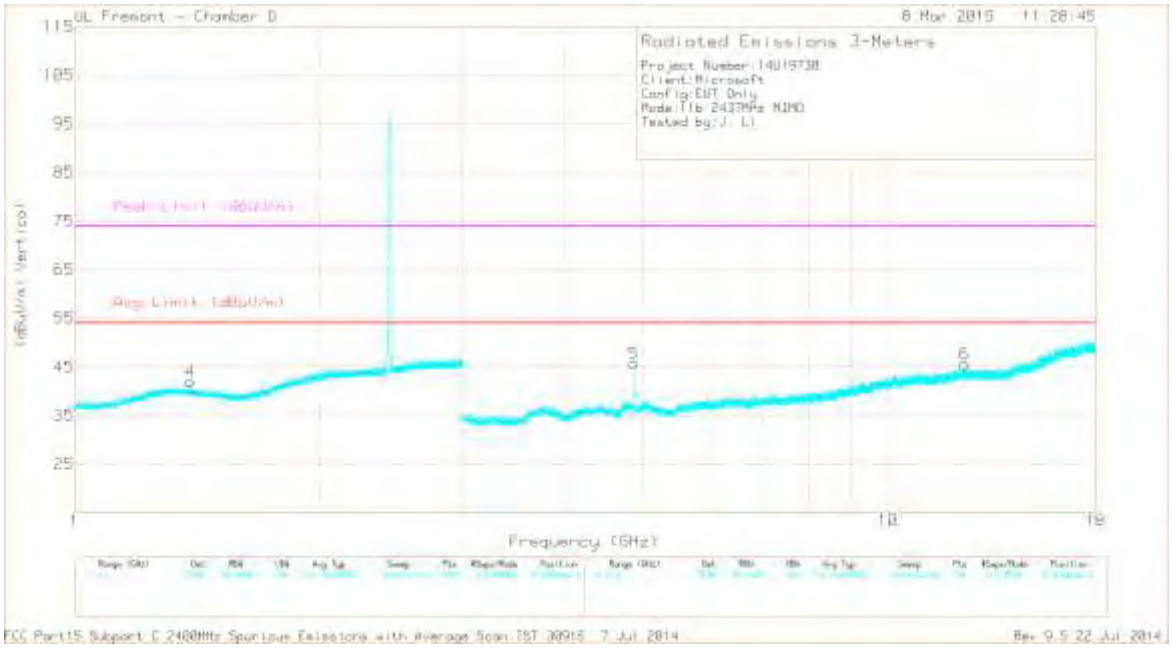
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 4.874	47.05	PK2	34.1	-28.1	53.05	-	-	74	-20.95	218	338	H
	* 4.874	43.59	MAv1	34.1	-28.1	49.59	54	-4.41	-	-	218	338	H
2	* 9.341	33.88	PK2	36.4	-21.3	48.98	-	-	74	-25.02	176	212	H
	* 9.34	22.73	MAv1	36.4	-21.3	37.83	54	-16.17	-	-	176	212	H
3	* 12.224	34.56	PK2	38.9	-21.6	51.86	-	-	74	-22.14	209	267	H
	* 12.225	23.11	MAv1	38.9	-21.6	40.41	54	-13.59	-	-	209	267	H
4	* 1.392	41.51	PK2	28.6	-22.1	48.01	-	-	74	-25.99	194	316	V
	* 1.384	30.35	MAv1	28.7	-22.1	36.95	54	-17.05	-	-	194	316	V
5	* 4.874	42.56	PK2	34.1	-28.1	48.56	-	-	74	-25.44	329	205	V
	* 4.874	37.71	MAv1	34.1	-28.1	43.71	54	-10.29	-	-	329	205	V
6	* 12.421	34.34	PK2	39	-21.1	52.24	-	-	74	-21.76	187	265	V
	* 12.42	22.92	MAv1	39	-21.1	40.82	54	-13.18	-	-	187	265	V

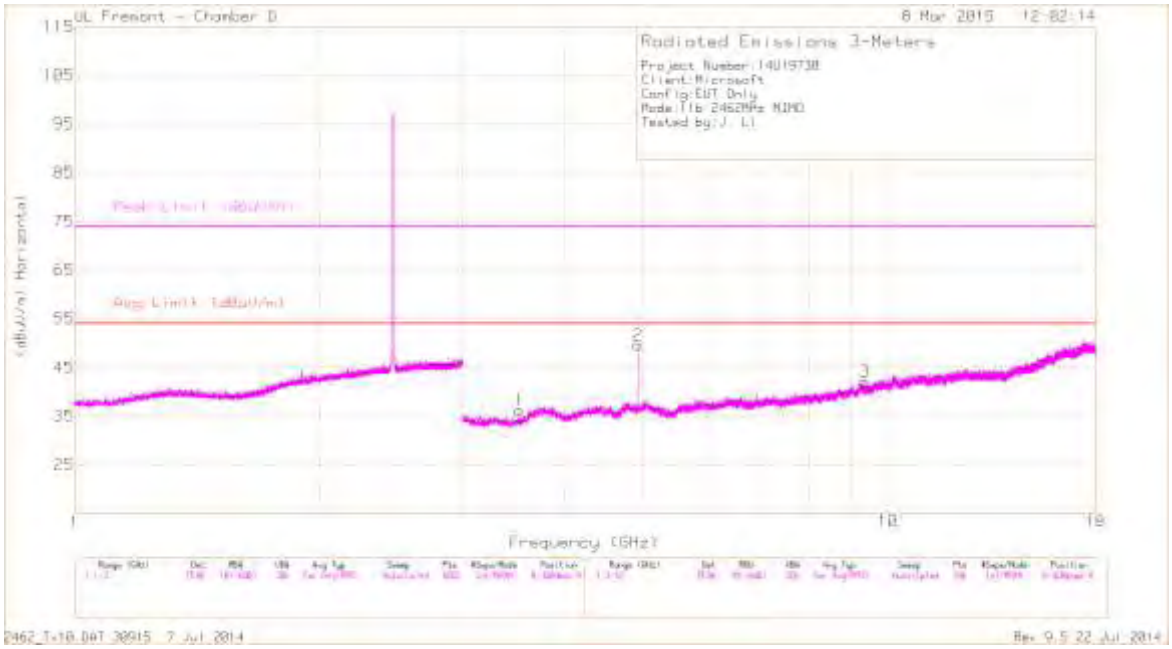
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

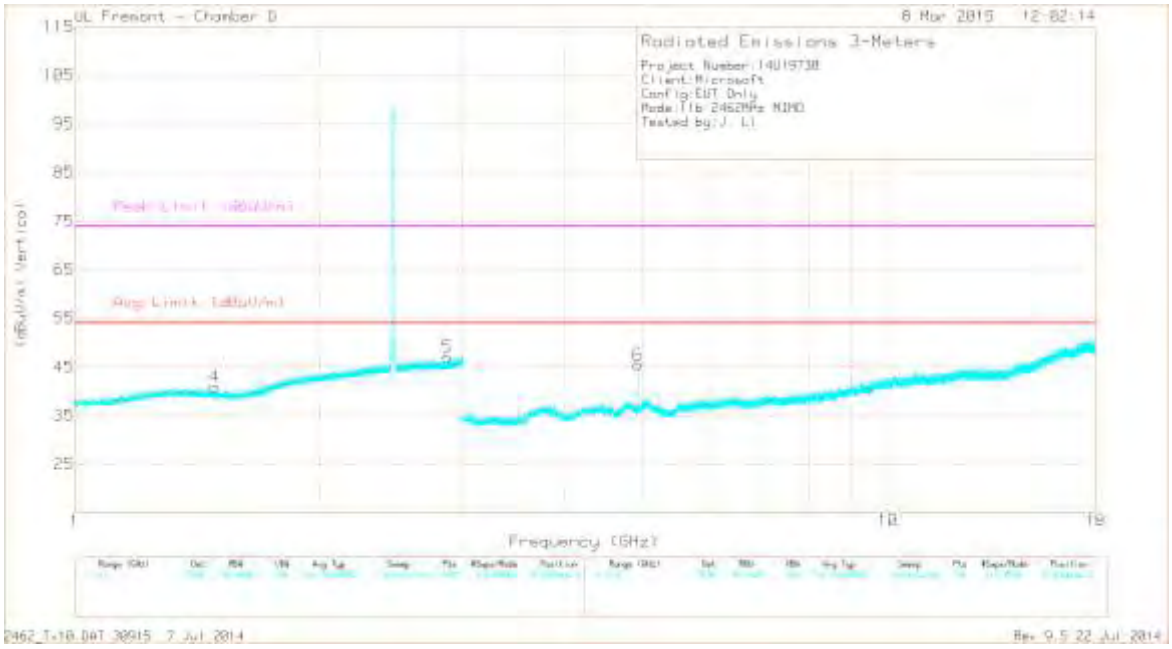
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 3.524	38.56	PK2	32.9	-28.5	42.96	-	-	74	-31.04	184	231	H
	* 3.518	27.41	MAv1	32.9	-28.5	31.81	54	-22.19	-	-	184	231	H
2	* 4.924	46.66	PK2	34.1	-28.2	52.56	-	-	74	-21.44	218	333	H
	* 4.924	43.5	MAv1	34.1	-28.2	49.4	54	-4.6	-	-	218	333	H
3	* 9.357	33.93	PK2	36.4	-21.8	48.53	-	-	74	-25.47	261	219	H
	* 9.359	22.81	MAv1	36.4	-21.9	37.31	54	-16.69	-	-	261	219	H
4	* 1.487	41.27	PK2	28.3	-22	47.57	-	-	74	-26.43	196	273	V
	* 1.489	30.28	MAv1	28.3	-21.9	36.68	54	-17.32	-	-	196	273	V
5	* 2.878	41.14	PK2	32.6	-20.2	53.54	-	-	74	-20.46	328	177	V
	* 2.87	30.02	MAv1	32.6	-20.3	42.32	54	-11.68	-	-	328	177	V
6	* 4.924	42.02	PK2	34.1	-28.2	47.92	-	-	74	-26.08	319	252	V
	* 4.924	36.53	MAv1	34.1	-28.2	42.43	54	-11.57	-	-	319	252	V

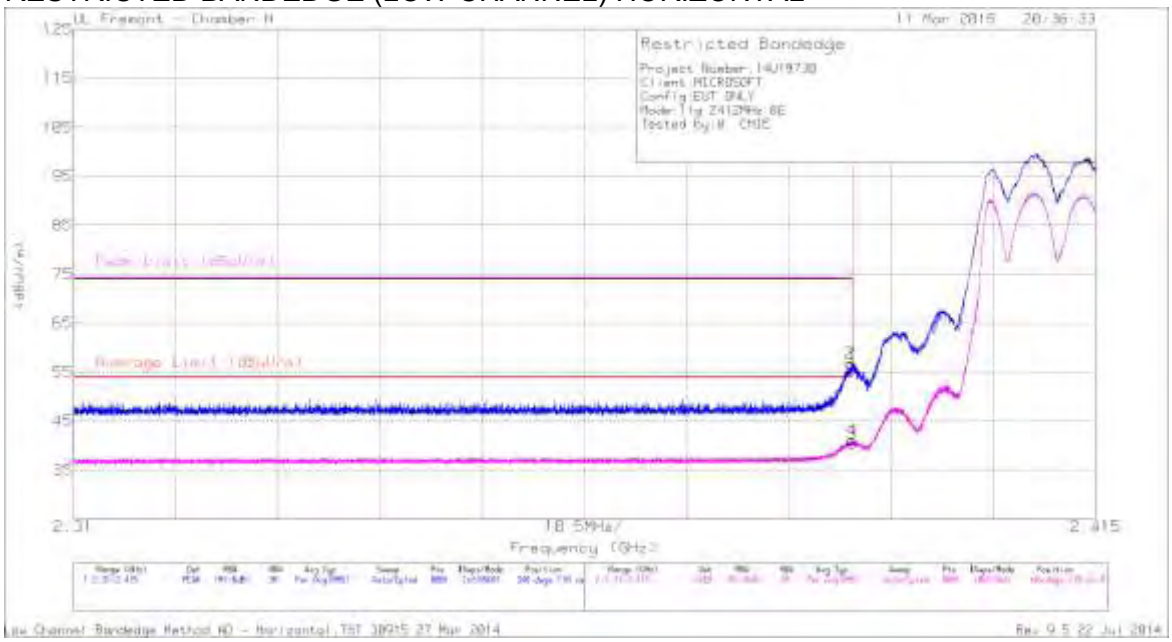
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

10.2.2. 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL) HORIZONTAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	* 2.39	49.28	PK	32	-24.6	56.68	-	-	74	-17.32	346	110	H
2	* 2.39	49.44	PK	32	-24.6	56.84	-	-	74	-17.16	346	110	H
3	* 2.39	32.98	RMS	32	-24.6	40.38	54	-13.62	-	-	346	110	H
4	* 2.39	33.61	RMS	32	-24.6	41.01	54	-12.99	-	-	346	110	H

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

PK - Peak detector

RMS - RMS detection

RESTRICTED BANDEDGE (LOW CHANNEL) VERTICAL

DATA

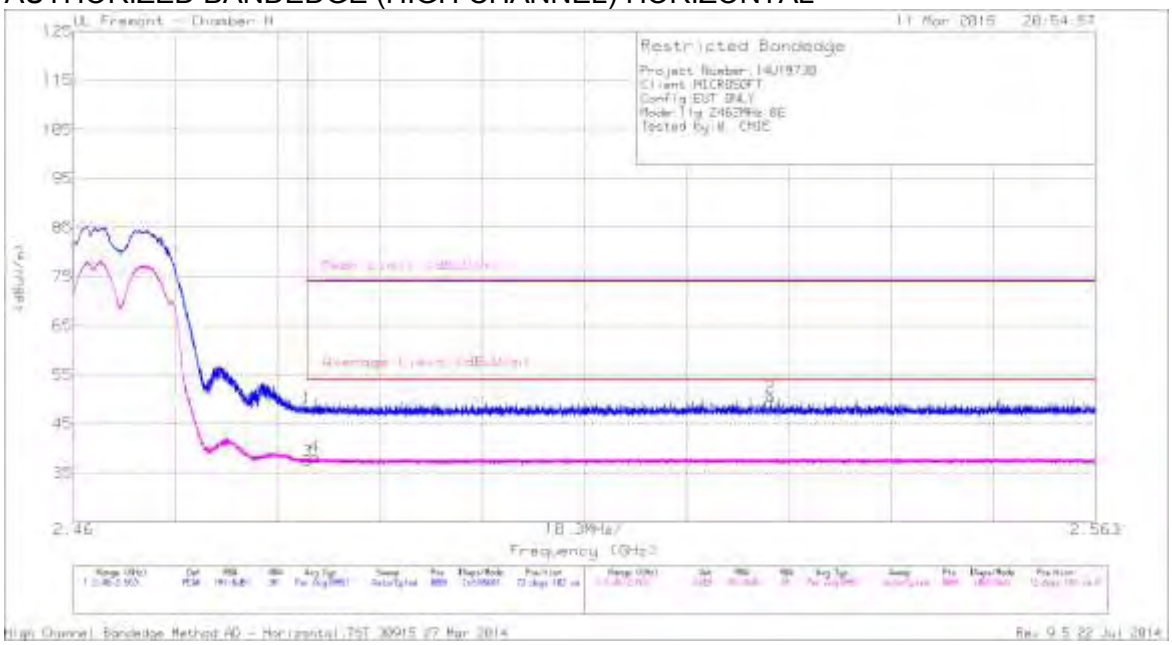
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	49.33	PK	32	-24.6	56.73	-	-	74	-17.27	122	299	V
2	* 2.39	50.49	PK	32	-24.6	57.82	-	-	74	-16.11	122	299	V
3	* 2.39	33.59	RMS	32	-24.6	41.05	54	-12.95	-	-	122	299	V
4	* 2.39	34.74	RMS	32	-24.6	42.14	54	-11.86	-	-	122	299	V

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

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) HORIZONTAL



DATA

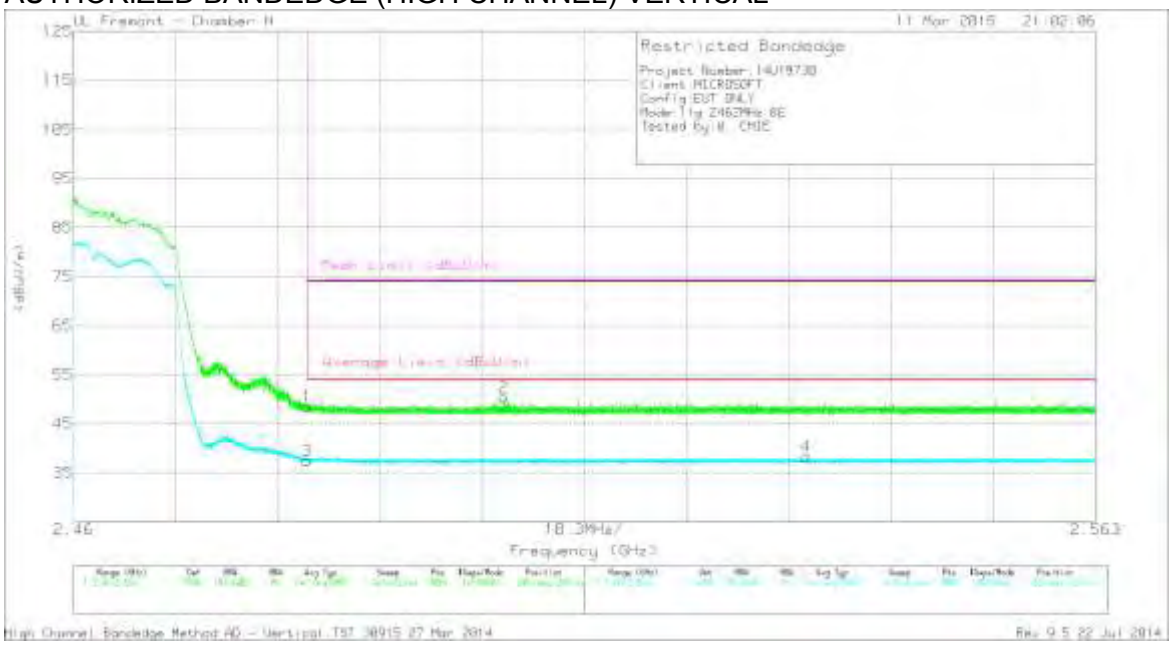
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.43	PK	32.2	-24.5	48.13	-	-	74	-25.87	73	102	H
3	* 2.484	29.71	RMS	32.2	-24.5	37.41	54	-16.59	-	-	73	102	H
4	* 2.484	30.48	RMS	32.2	-24.5	38.18	54	-15.82	-	-	73	102	H
2	2.53	42.6	PK	32.2	-24.4	50.4	-	-	74	-23.6	73	102	H

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

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	40.84	PK	32.2	-24.5	48.54	-	-	74	-25.46	248	269	V
3	* 2.484	29.78	RMS	32.2	-24.5	37.48	54	-16.52	-	-	248	269	V
2	2.503	42.56	PK	32.2	-24.4	50.36	-	-	74	-23.64	248	269	V
4	2.534	30.42	RMS	32.2	-24.4	38.22	54	-15.78	-	-	248	269	V

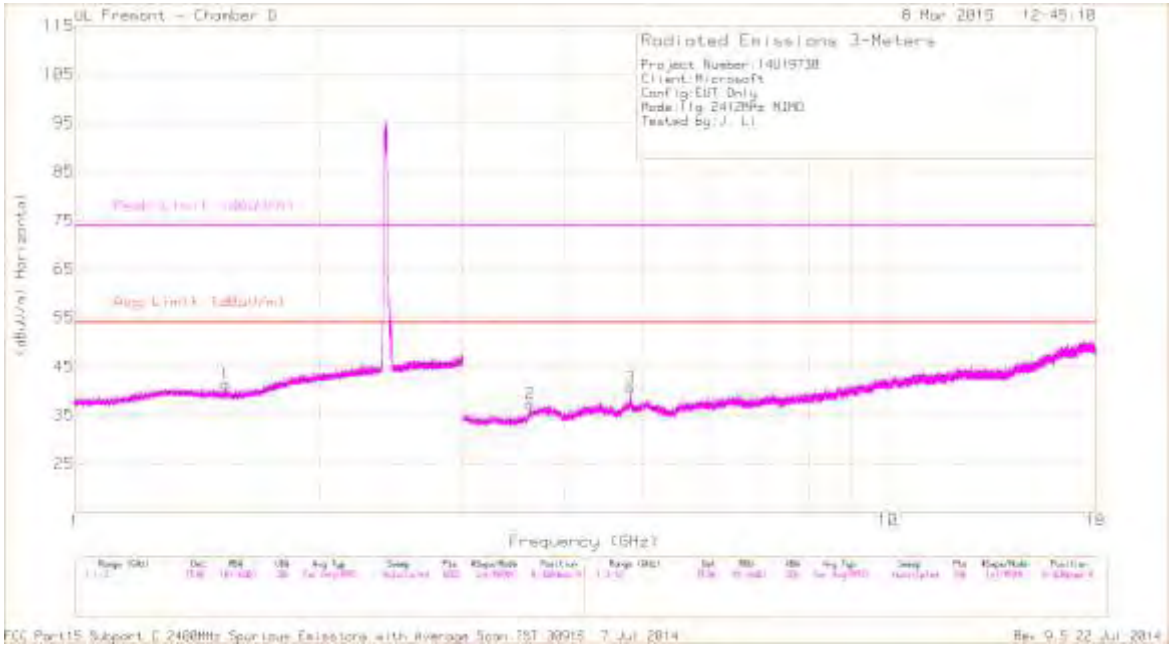
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

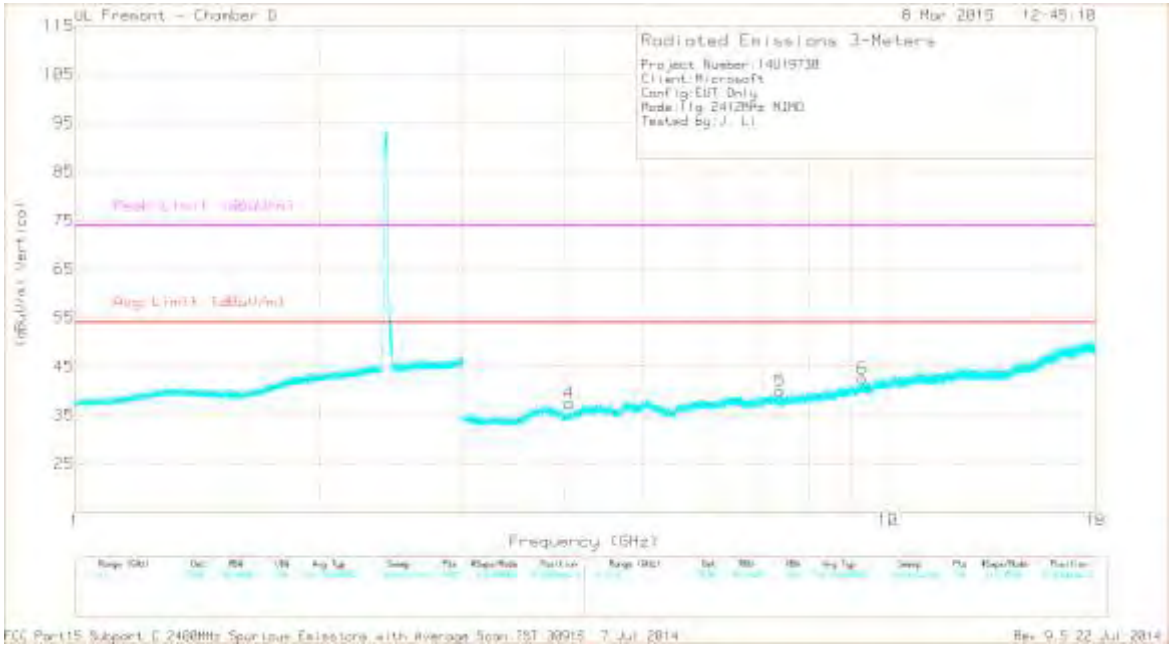
RMS - RMS detection

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 1.537	41.35	PK2	28.1	-21.9	47.55	-	-	74	-26.45	314	179	H
	* 1.534	30.26	MAv1	28.1	-21.9	36.46	54	-17.54	-	-	314	179	H
2	* 3.632	38.63	PK2	33.1	-28.7	43.03	-	-	74	-30.97	216	192	H
	* 3.638	27.79	MAv1	33.1	-28.8	32.09	54	-21.91	-	-	216	192	H
3	* 4.825	42.32	PK2	34.1	-27.4	49.02	-	-	74	-24.98	207	278	H
	* 4.824	31.33	MAv1	34.1	-27.4	38.03	54	-15.97	-	-	207	278	H
4	* 4.056	38.22	PK2	33.4	-28.5	43.12	-	-	74	-30.88	233	251	V
	* 4.058	27.38	MAv1	33.4	-28.5	32.28	54	-21.72	-	-	233	251	V
5	* 7.375	36.23	PK2	35.5	-25.4	46.33	-	-	74	-27.67	164	198	V
	* 7.373	25.26	MAv1	35.5	-25.4	35.36	54	-18.64	-	-	164	198	V
6	* 9.301	34.23	PK2	36.4	-21.1	49.53	-	-	74	-24.47	183	229	V
	* 9.302	23.21	MAv1	36.4	-21.1	38.51	54	-15.49	-	-	183	229	V

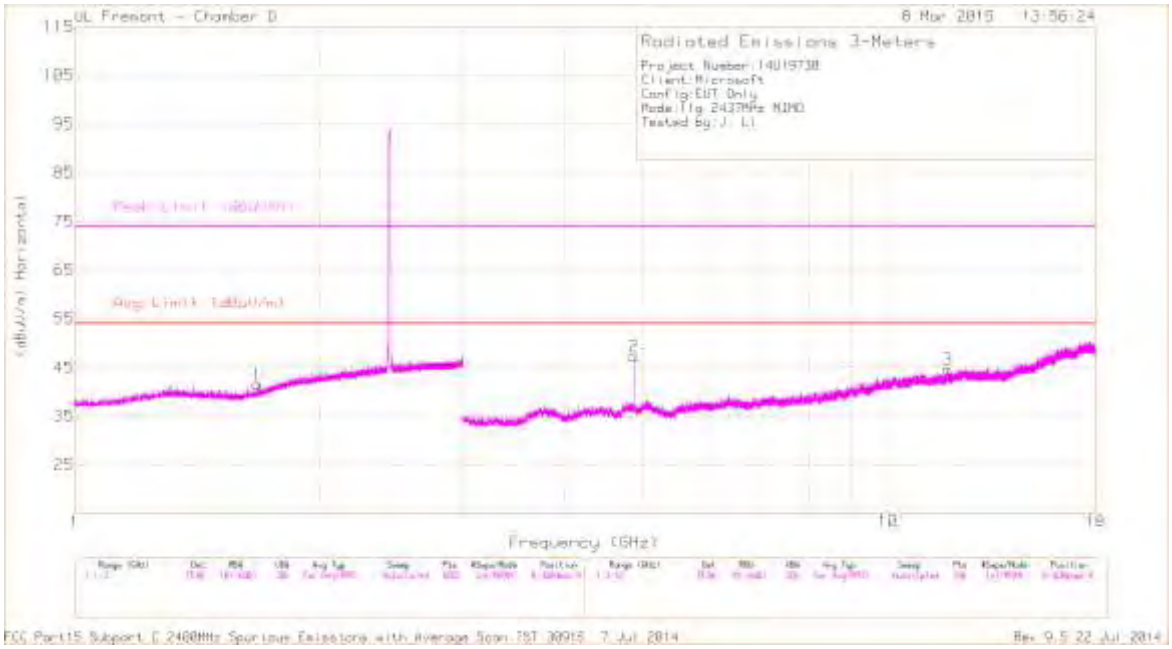
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

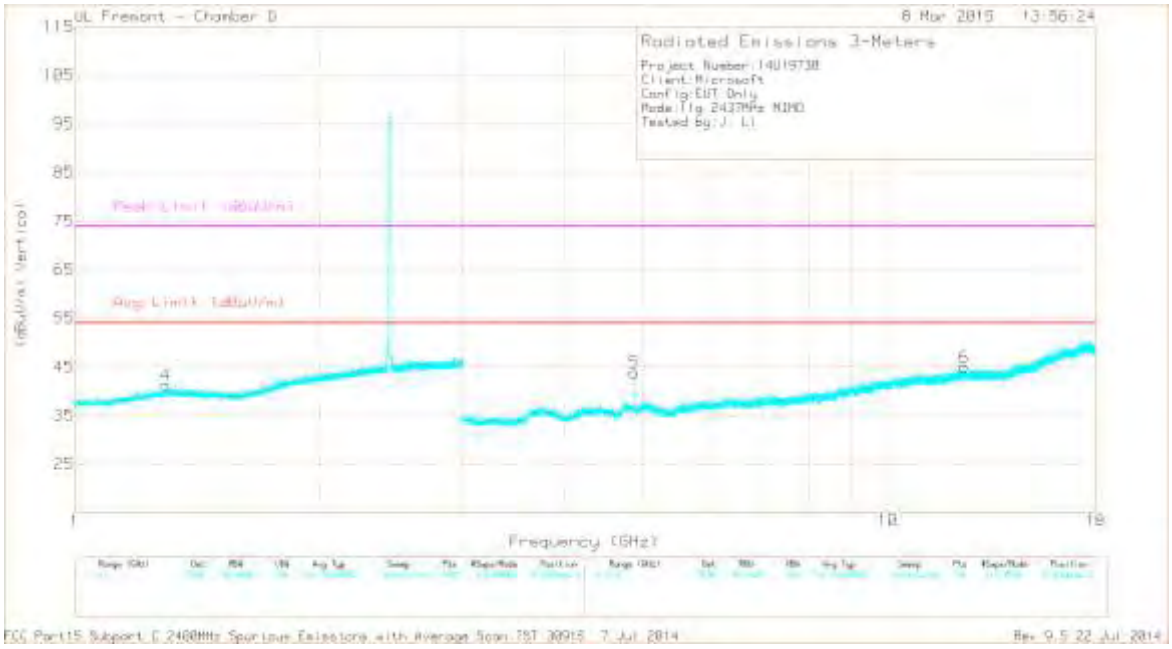
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 1.679	41.63	PK2	28.6	-21.7	48.53	-	-	74	-25.47	312	199	H
	* 1.68	30.12	MAv1	28.6	-21.7	37.02	54	-16.98	-	-	312	199	H
2	* 4.874	45.01	PK2	34.1	-28.1	51.01	-	-	74	-22.99	219	307	H
	* 4.874	41.03	MAv1	34.1	-28.1	47.03	54	-6.97	-	-	219	307	H
3	* 11.844	33.79	PK2	38.3	-20.9	51.19	-	-	74	-22.81	267	243	H
	* 11.843	22.78	MAv1	38.3	-21	40.08	54	-13.92	-	-	267	243	H
4	* 1.292	41.62	PK2	28.9	-22.3	48.22	-	-	74	-25.78	187	275	V
	* 1.294	30.37	MAv1	28.9	-22.3	36.97	54	-17.03	-	-	187	275	V
5	* 4.874	41.94	PK2	34.1	-28.1	47.94	-	-	74	-26.06	335	231	V
	* 4.874	36.16	MAv1	34.1	-28.1	42.16	54	-11.84	-	-	335	231	V
6	* 12.408	34.4	PK2	39	-21.2	52.2	-	-	74	-21.8	285	268	V
	* 12.41	23.03	MAv1	39	-21.2	40.83	54	-13.17	-	-	285	268	V

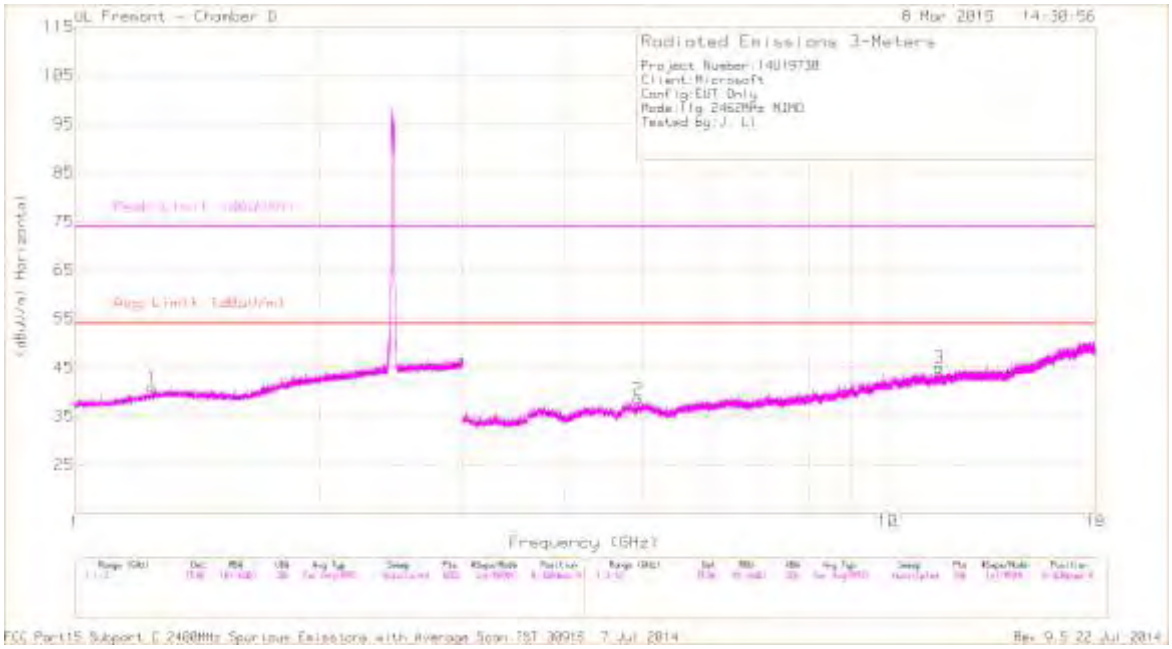
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

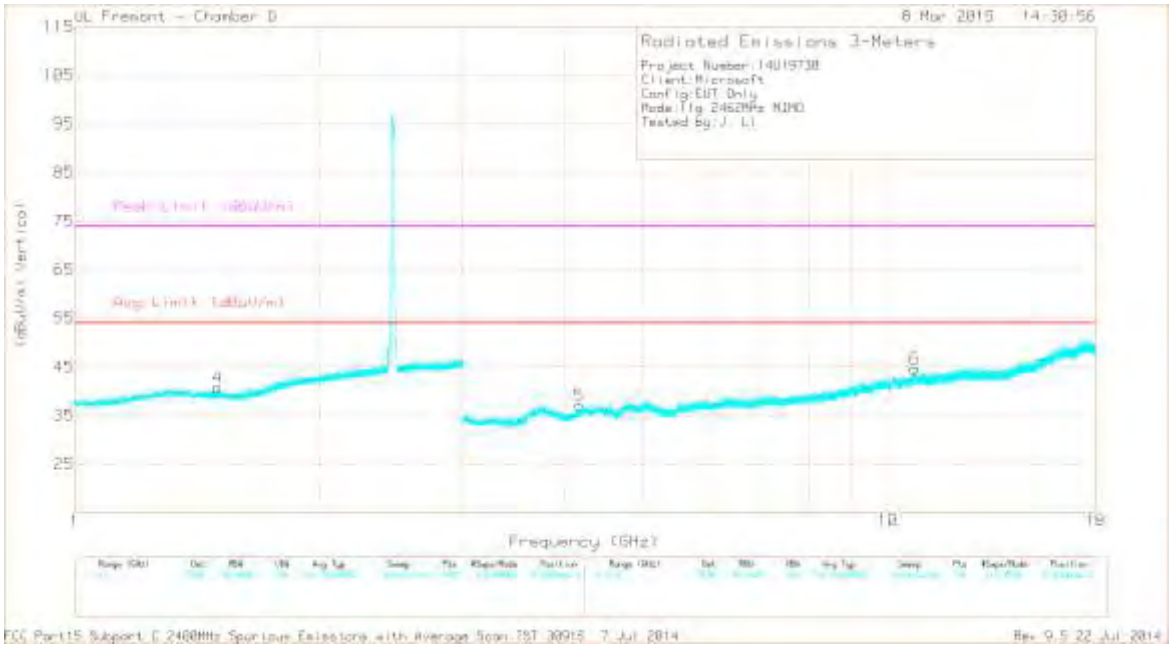
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 1.247	41.99	PK2	28.5	-22.4	48.09	-	-	74	-25.91	247	198	H
	* 1.246	30.48	MAv1	28.5	-22.4	36.58	54	-17.42	-	-	247	198	H
2	* 4.927	38.03	PK2	34.1	-28.1	44.03	-	-	74	-29.97	325	277	H
	* 4.927	27	MAv1	34.1	-28.1	33	54	-21	-	-	325	277	H
3	* 11.567	34.35	PK2	38.1	-21	51.45	-	-	74	-22.55	238	252	H
	* 11.558	23.27	MAv1	38.1	-21.1	40.27	54	-13.73	-	-	238	252	H
4	* 1.496	41.24	PK2	28.3	-21.9	47.64	-	-	74	-26.36	176	281	V
	* 1.497	30.13	MAv1	28.3	-21.9	36.53	54	-17.47	-	-	176	281	V
5	* 4.173	38.13	PK2	33.4	-28	43.53	-	-	74	-30.47	188	319	V
	* 4.173	27.19	MAv1	33.4	-28	32.59	54	-21.41	-	-	188	319	V
6	* 10.781	33.23	PK2	37.9	-20.6	50.53	-	-	74	-23.47	203	296	V
	* 10.787	22.69	MAv1	37.9	-20.8	39.79	54	-14.21	-	-	203	296	V

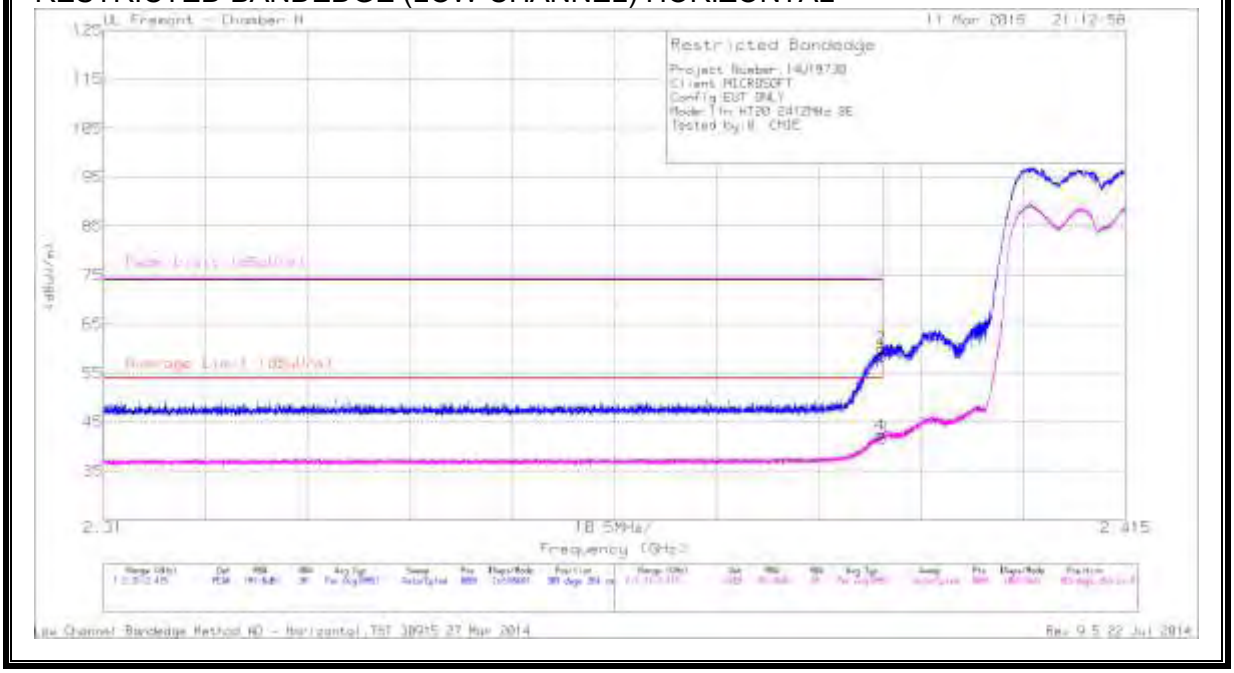
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

10.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL) HORIZONTAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	* 2.39	51.15	PK	32	-24.6	58.55	-	-	74	-15.45	309	364	H
2	* 2.39	52.76	PK	32	-24.6	60.16	-	-	74	-13.84	309	364	H
3	* 2.39	34.31	RMS	32	-24.6	41.71	54	-12.29	-	-	309	364	H
4	* 2.39	34.86	RMS	32	-24.6	42.26	54	-11.74	-	-	309	364	H

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

PK - Peak detector

RMS - RMS detection

RESTRICTED BANDEDGE (LOW CHANNEL) VERTICAL

DATA

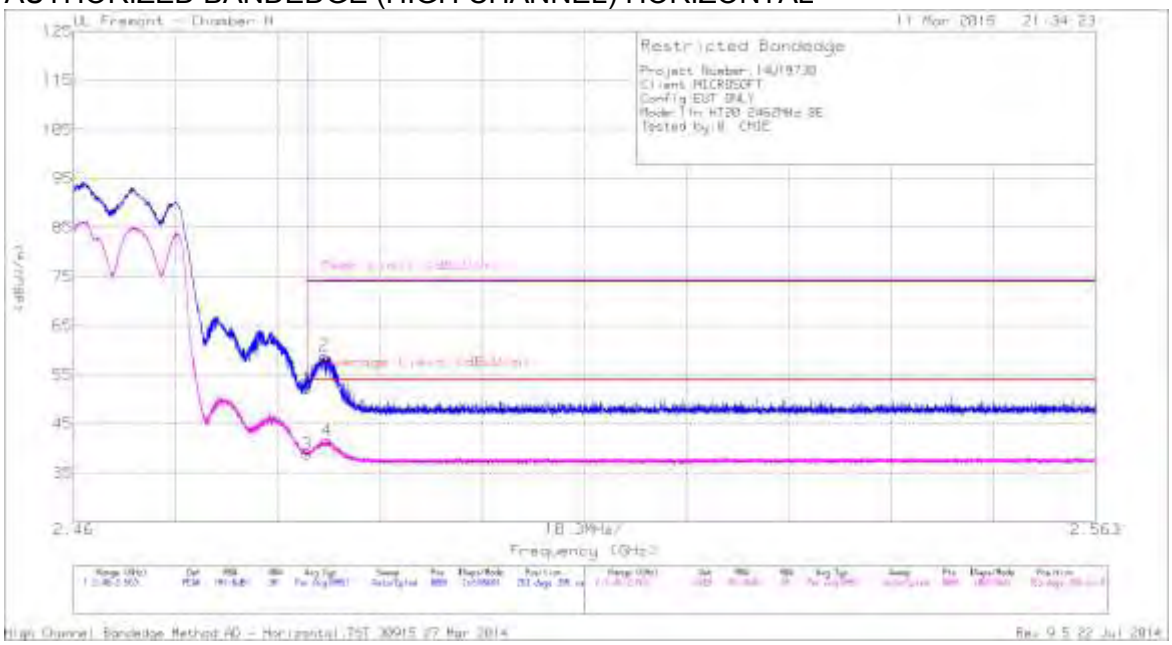
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	54.52	PK	32	-24.6	61.92	-	-	74	-12.08	109	374	V
2	* 2.39	54.88	PK	32	-24.6	62.28	-	-	74	-11.72	109	374	V
3	* 2.39	37	RMS	32	-24.6	44.40	54	-9.6	-	-	109	374	V
4	* 2.39	37.52	RMS	32	-24.6	44.92	54	-9.08	-	-	109	374	V

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

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) HORIZONTAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	44.55	PK	32.2	-24.5	0	52.25	-	-	74	-21.75	253	395
3	* 2.484	31.12	RMS	32.2	-24.5	.06	38.82	54	-15.18	-	-	253	395
2	* 2.485	51.22	PK	32.2	-24.5	0	58.92	-	-	74	-15.08	253	395
4	* 2.486	33.87	RMS	32.2	-24.5	.06	41.77	54	-12.23	-	-	253	395

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

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) VERTICAL

DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	50.81	PK	32.2	-24.5	0	58.51	-	-	74	-15.49	109	272
3	* 2.484	34.03	RMS	32.2	-24.5	.06	41.73	54	-12.27	-	-	109	272
2	* 2.485	57.45	PK	32.2	-24.5	0	65.15	-	-	74	-8.85	109	272
4	* 2.485	38.83	RMS	32.2	-24.5	.06	46.53	54	-7.47	-	-	109	272

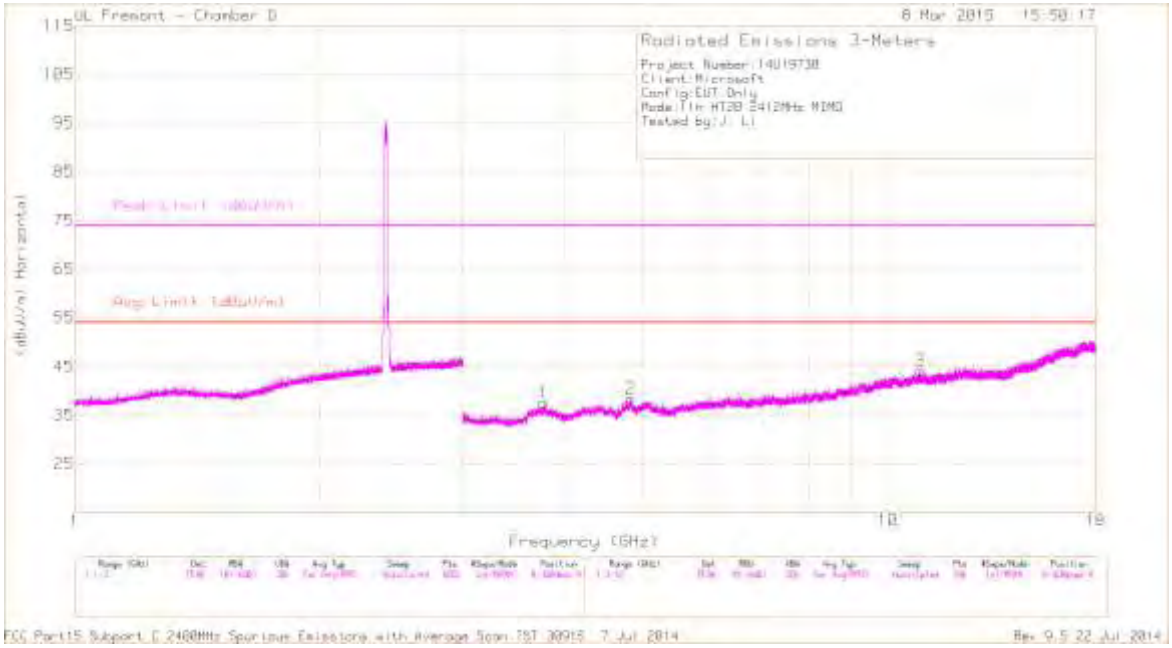
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

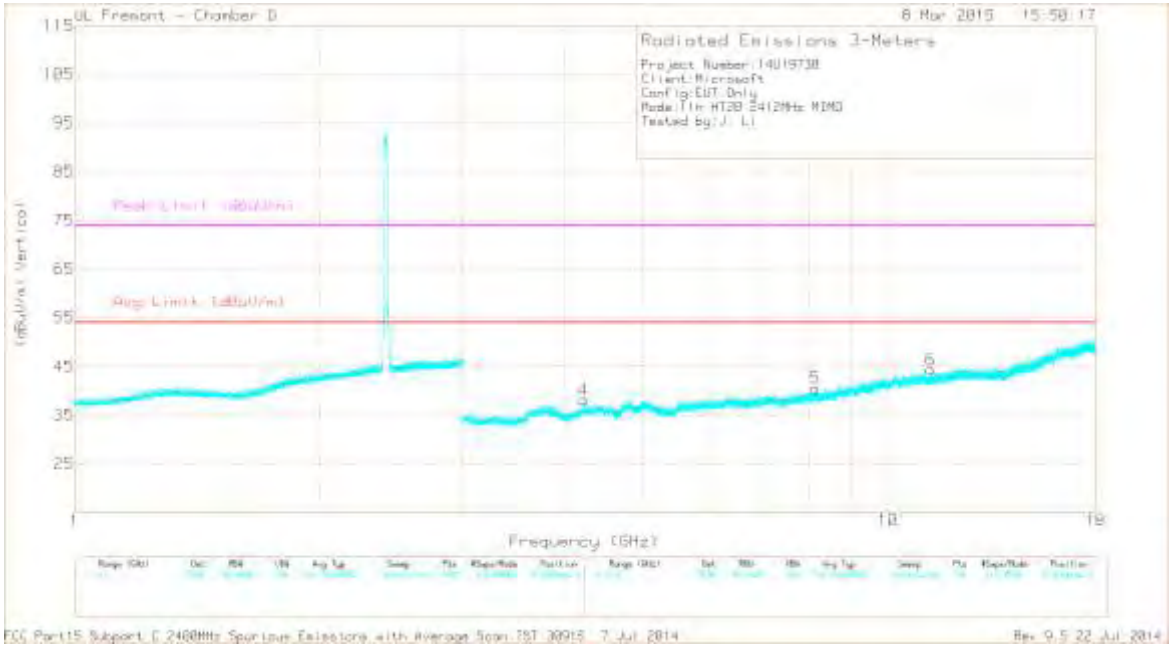
RMS - RMS detection

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 3.768	37.97	PK2	33.3	-28.3	42.97	-	-	74	-31.03	325	197	H
	* 3.772	27.68	MAv1	33.3	-28.3	32.68	54	-21.32	-	-	325	197	H
2	* 4.832	38.14	PK2	34.1	-27.6	44.64	-	-	74	-29.36	237	223	H
	* 4.833	27.23	MAv1	34.1	-27.6	33.73	54	-20.27	-	-	237	223	H
3	* 10.937	34.27	PK2	38	-21	51.27	-	-	74	-22.73	159	254	H
	* 10.943	23.01	MAv1	38	-21.1	39.91	54	-14.09	-	-	159	254	H
4	* 4.219	37.62	PK2	33.5	-27.5	43.62	-	-	74	-30.38	227	312	V
	* 4.224	26.61	MAv1	33.5	-27.5	32.61	54	-21.39	-	-	227	312	V
5	* 8.14	34.99	PK2	35.6	-23.1	47.49	-	-	74	-26.51	173	287	V
	* 8.143	24.19	MAv1	35.6	-23	36.79	54	-17.21	-	-	173	287	V
6	* 11.286	34.07	PK2	38	-21.1	50.97	-	-	74	-23.03	304	284	V
	* 11.276	23.13	MAv1	38	-21.1	40.03	54	-13.97	-	-	304	284	V

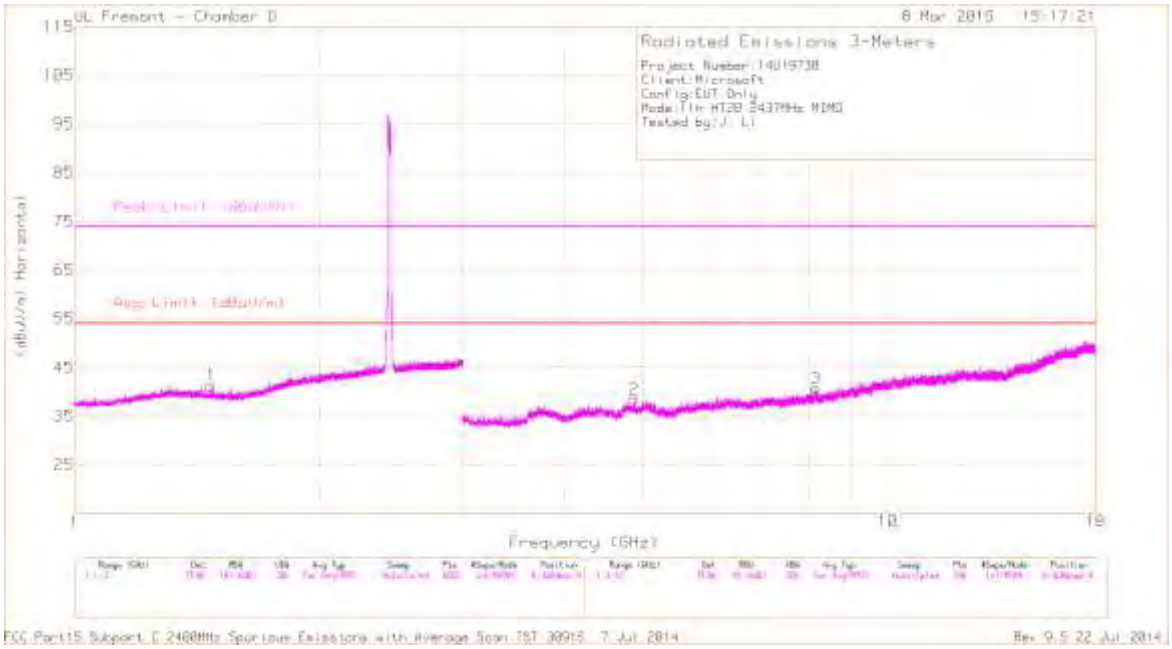
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

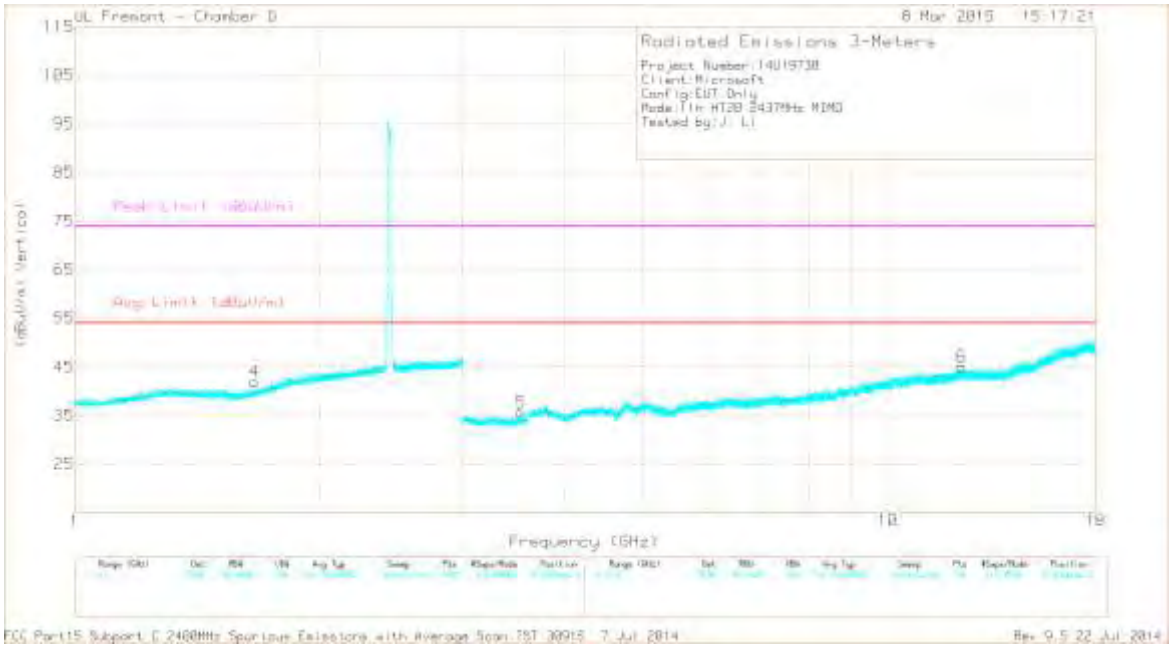
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 1.477	41.45	PK2	28.3	-22	47.75	-	-	74	-26.25	310	226	H
	* 1.476	30.29	MAv1	28.3	-22	36.59	54	-17.41	-	-	310	226	H
2	* 4.874	37.98	PK2	34.1	-28.1	43.98	-	-	74	-30.02	198	175	H
	* 4.874	27.93	MAv1	34.1	-28.1	33.93	54	-20.07	-	-	198	175	H
3	* 8.157	35.32	PK2	35.6	-23.2	47.72	-	-	74	-26.28	247	282	H
	* 8.157	24.31	MAv1	35.6	-23.1	36.81	54	-17.19	-	-	247	282	H
4	* 1.667	41.34	PK2	28.5	-21.7	48.14	-	-	74	-25.86	98	305	V
	* 1.668	29.6	MAv1	28.5	-21.7	36.4	54	-17.6	-	-	98	305	V
5	* 3.537	38.44	PK2	32.9	-28.6	42.74	-	-	74	-31.26	172	295	V
	* 3.536	27.5	MAv1	32.9	-28.6	31.8	54	-22.2	-	-	172	295	V
6	* 12.31	33.97	PK2	39	-21.9	51.07	-	-	74	-22.93	167	324	V
	* 12.307	23.74	MAv1	39	-21.9	40.84	54	-13.16	-	-	167	324	V

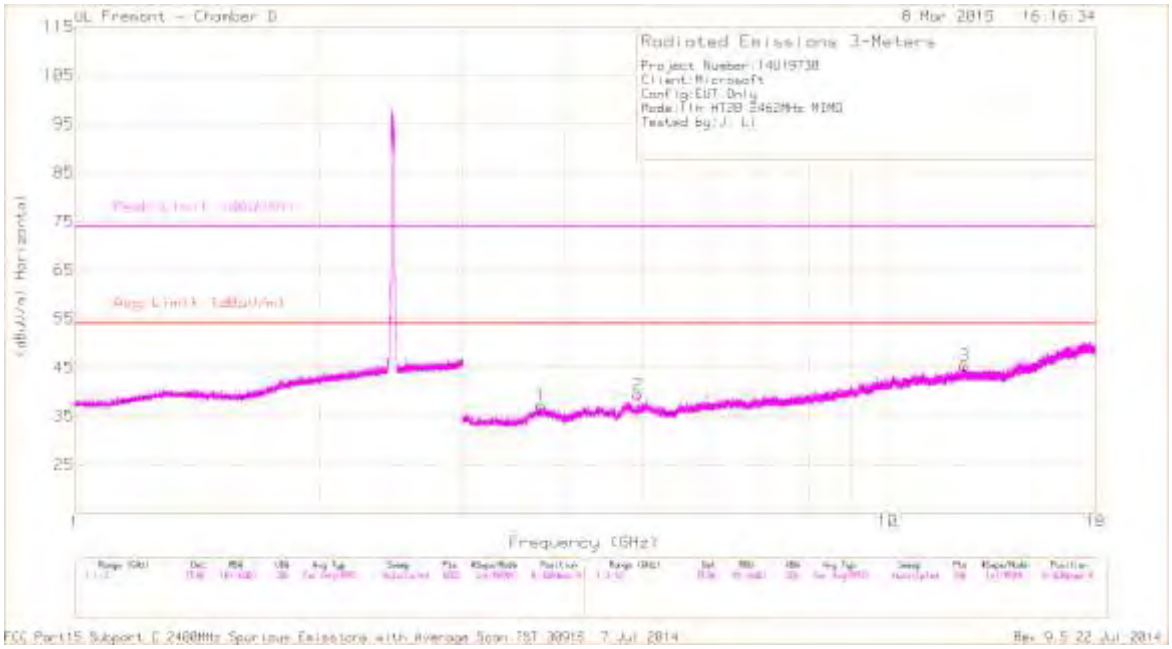
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

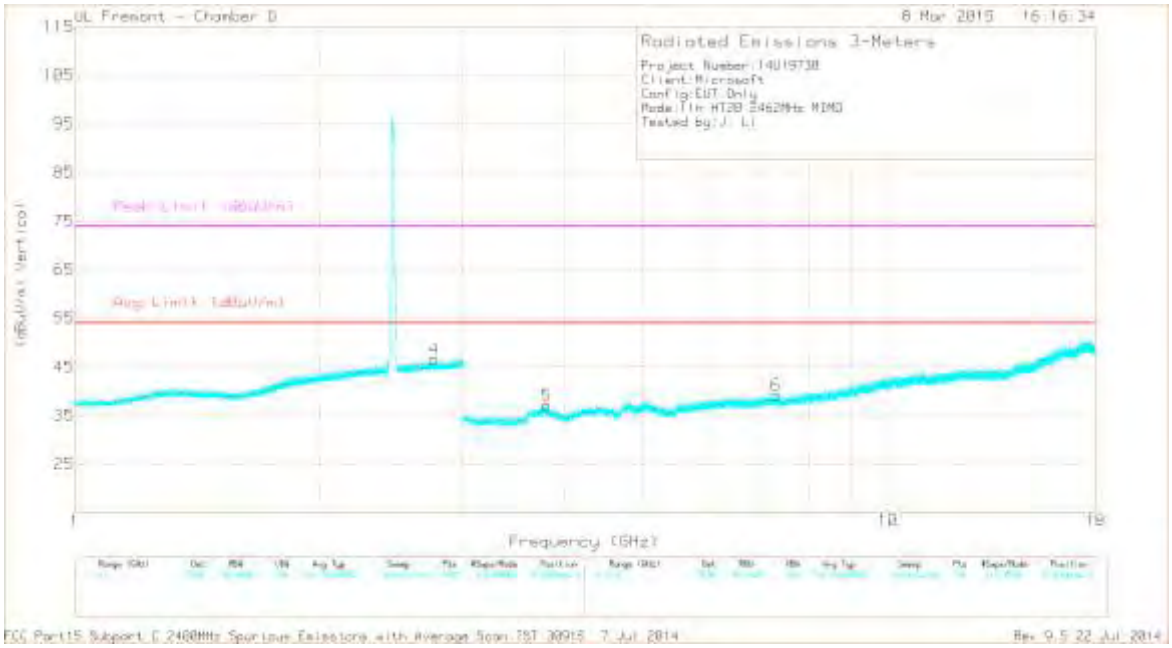
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

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	* 3.738	37.91	PK2	33.2	-28.6	42.51	-	-	74	-31.49	109	238	H
	* 3.74	27.64	MAv1	33.3	-28.6	32.34	54	-21.66	-	-	109	238	H
2	* 4.925	40.72	PK2	34.1	-28.2	46.62	-	-	74	-27.38	65	101	H
	* 4.924	28.94	MAv1	34.1	-28.2	34.84	54	-19.16	-	-	65	101	H
3	* 12.411	34.6	PK2	39	-21.2	52.4	-	-	74	-21.6	331	194	H
	* 12.411	23.01	MAv1	39	-21.2	40.81	54	-13.19	-	-	331	194	H
4	* 2.769	41.65	PK2	32.5	-20.4	53.75	-	-	74	-20.25	227	194	V
	* 2.77	30.09	MAv1	32.5	-20.4	42.19	54	-11.81	-	-	227	194	V
5	* 3.807	38.72	PK2	33.4	-28.5	43.62	-	-	74	-30.38	158	289	V
	* 3.801	27.67	MAv1	33.3	-28.4	32.57	54	-21.43	-	-	158	289	V
6	* 7.292	37.01	PK2	35.5	-24.8	47.71	-	-	74	-26.29	206	225	V
	* 7.288	25.14	MAv1	35.5	-24.9	35.74	54	-18.26	-	-	206	225	V

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

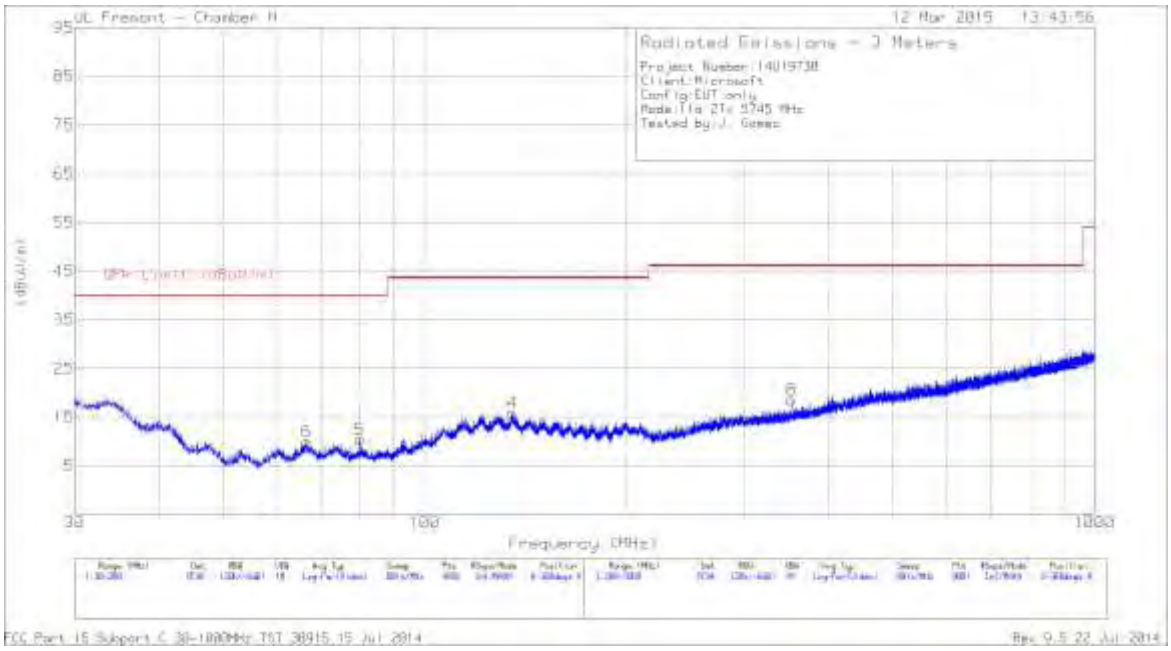
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

10.3. WORST-CASE BELOW 1 GHz

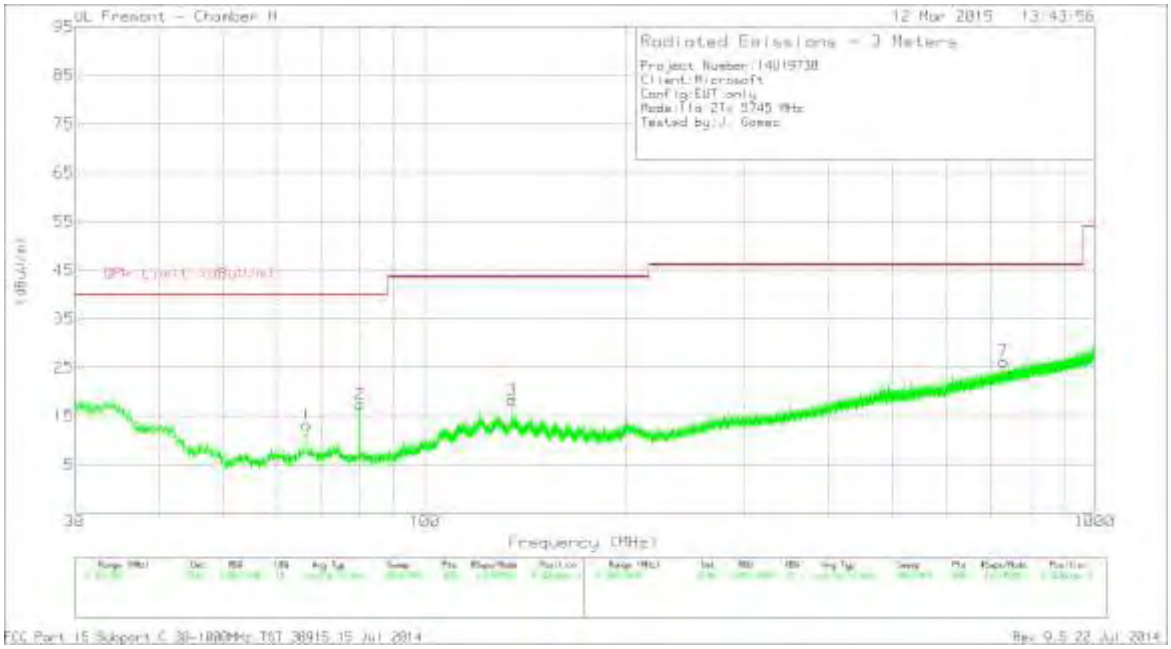
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL DATA



DATA

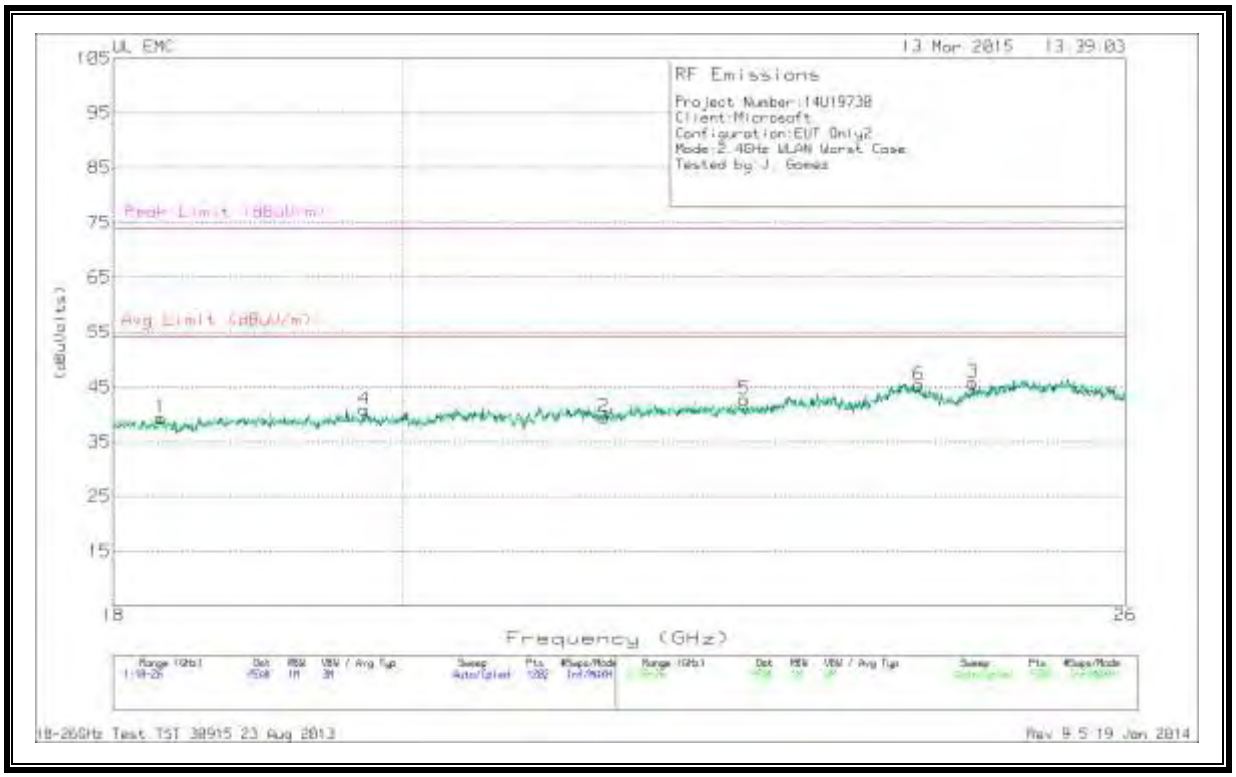
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	SS JB3 SN A051314-1	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 134.975	29.32	PK	16.8	-30.2	15.92	43.52	-27.6	0-360	302	H
3	* 134.975	31.76	PK	16.8	-30.2	18.36	43.52	-25.16	0-360	100	V
6	66.5925	29.54	PK	11.3	-30.8	10.04	40	-29.96	0-360	201	H
1	66.635	32.67	PK	11.3	-30.8	13.17	40	-26.83	0-360	100	V
5	79.98	30.74	PK	10.4	-30.7	10.44	40	-29.56	0-360	401	H
2	80.0225	37.76	PK	10.4	-30.7	17.46	40	-22.54	0-360	100	V
8	352.7	29.97	PK	17.4	-28.8	18.57	46.02	-27.45	0-360	201	H
7	730.5	30.41	PK	23.4	-27.5	26.31	46.02	-19.71	0-360	301	V

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

PK - Peak detector

10.4. WORST-CASE ABOVE 18 to 26GHz

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



DATA

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	18.313	40.93	PK	32.5	-24.6	-9.5	39.33	54	-14.67	74	-34.67
2	21.51	39.9	PK	33.3	-24.2	-9.5	39.5	54	-14.5	74	-34.5
3	24.595	43.93	PK	34.3	-22.9	-9.5	45.83	54	-8.17	74	-28.17
4	19.719	41.23	PK	33	-23.9	-9.5	40.83	54	-13.17	74	-33.17
5	22.636	42.07	PK	33.8	-23.7	-9.5	42.67	54	-11.33	74	-31.33
6	24.122	43.33	PK	34.2	-22.7	-9.5	45.33	54	-8.67	74	-28.67

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

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 C63.10-2009

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

WORST EMISSIONS

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	.1815	40.63	Pk	1.1	0	41.73	64.42	-22.69	--	--
2	.186	28.9	Av	1	0	29.9	--	--	54.21	-24.31
3	.672	37.91	Pk	.3	0	38.21	56	-17.79	--	--
4	.654	21.45	Av	.3	0	21.75	--	--	46	-24.25
5	5.586	42.62	Pk	.2	.1	42.92	60	-17.08	--	--
6	5.5905	30.63	Av	.2	.1	30.93	--	--	50	-19.07
7	18.5865	46.21	Pk	.3	.2	46.71	60	-13.29	--	--
8	18.618	30.27	Av	.3	.2	30.77	--	--	50	-19.23

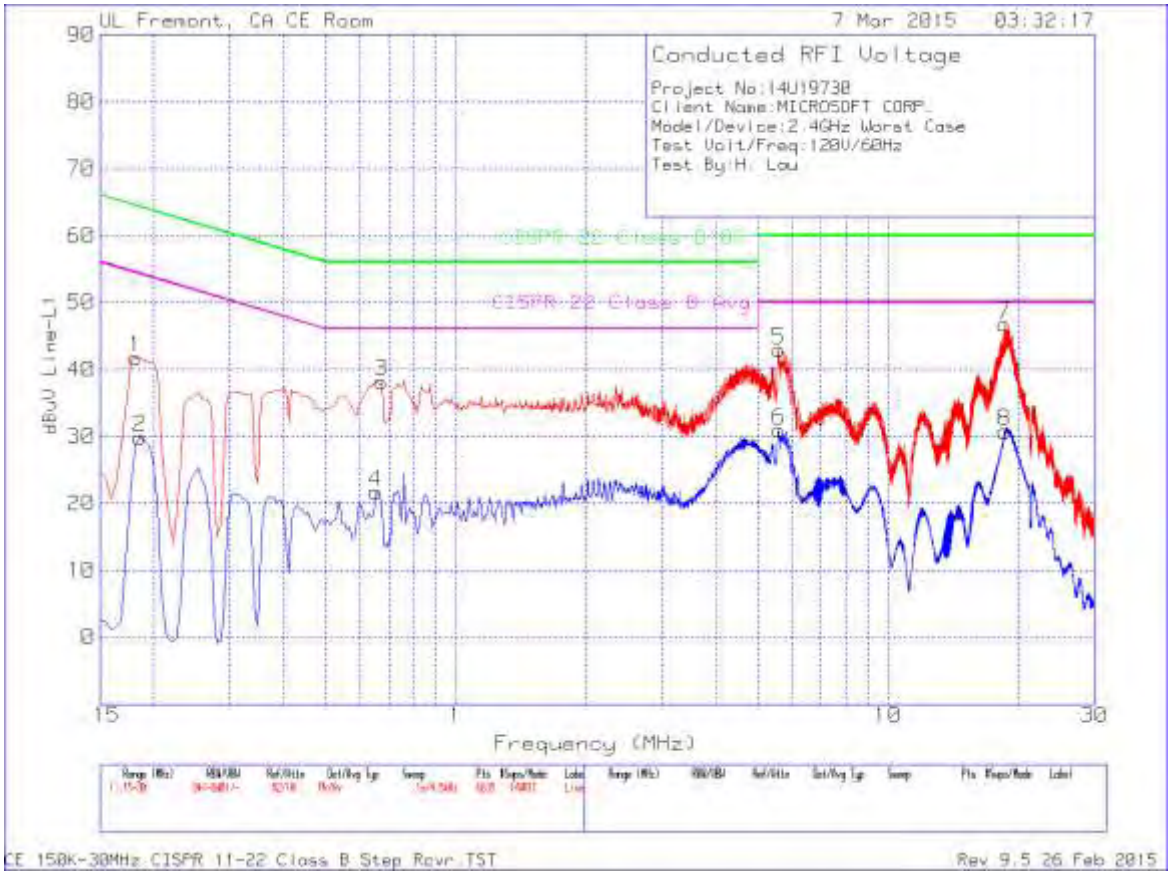
Line-L2 .15 - 30MHz

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)
9	.177	40.6	Pk	1.2	0	41.8	64.63	-22.83	--	--
10	.186	28.87	Av	1.1	0	29.97	--	--	54.21	-24.24
11	.672	38.71	Pk	.3	0	39.01	56	-16.99	--	--
12	.6675	22.59	Av	.3	0	22.89	--	--	46	-23.11
13	4.5915	40.87	Pk	.2	.1	41.17	56	-14.83	--	--
14	4.6185	29.97	Av	.2	.1	30.27	--	--	46	-15.73
15	18.573	49.12	Pk	.3	.2	49.62	60	-10.38	--	--
16	18.564	33.53	Av	.3	.2	34.03	--	--	50	-15.97

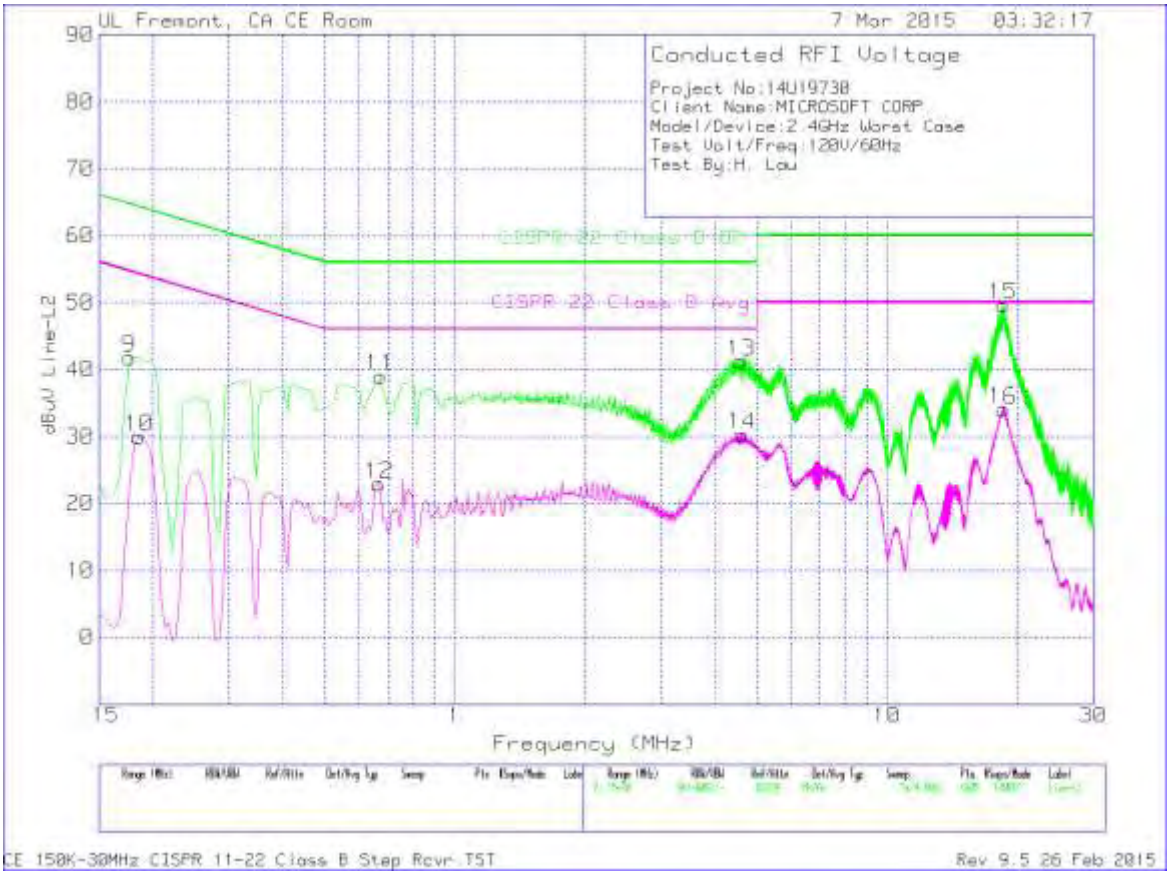
Pk - Peak detector

Av - Average detection

LINE 1 RESULTS



LINE 2 RESULTS



END OF REPORT