FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

MODEL NUMBER: 1645

FCC: C3K1645

REPORT NUMBER: 14U19051-E6 REVISION.C

ISSUE DATE: MARCH 25, 2015

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

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
	01/12/2015	Initial Issue	C. Pang
A	02/09/15	Removed Heading on Page 1, and Removed Setup Photos	N. Garcia
B	03/20/15	Add Setup Photo	C. Pang
C	3/25/2015	Address TCB's Questions on Section 6,	C. Pang

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: HANDHELD COMPUTING DEVICE

MODEL: 1645

SERIAL NUMBER: 000200544952 (CONDUCTED); 000207544952 (RADIATED)

DATE TESTED: DECEMBER 18, 2014 – DECEMBER 29, 2014

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:

Chin Pang
Senior Engineer
UL VERIFICATION SERVICES INC.

Tested By:

TINA CHU
Lab Technician
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 and Bluetooth 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 - 2472	802.11b	17.31	53.83
2412 - 2472	802.11g	20.69	117.22
2412 - 2472	802.11n HT20	20.68	116.95

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency Range (MHz)	MIMO Antenna Wi-Fi MIMO Peak Gain (dBi) Chain A	MAIN Antenna Wi-Fi Main/ BT Peak Gain (dbi) Chain B
2400 - 2483.5	2.3	3.6

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	5399926	DoC
Laptop AC/DC adapter	Lenovo	ADLX65NCT2A	11S36200293ZZ10049556A	DoC
Headset	N/A	N/A	N/A	N/A

I/O CABLES (CONDUCTED TEST)

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

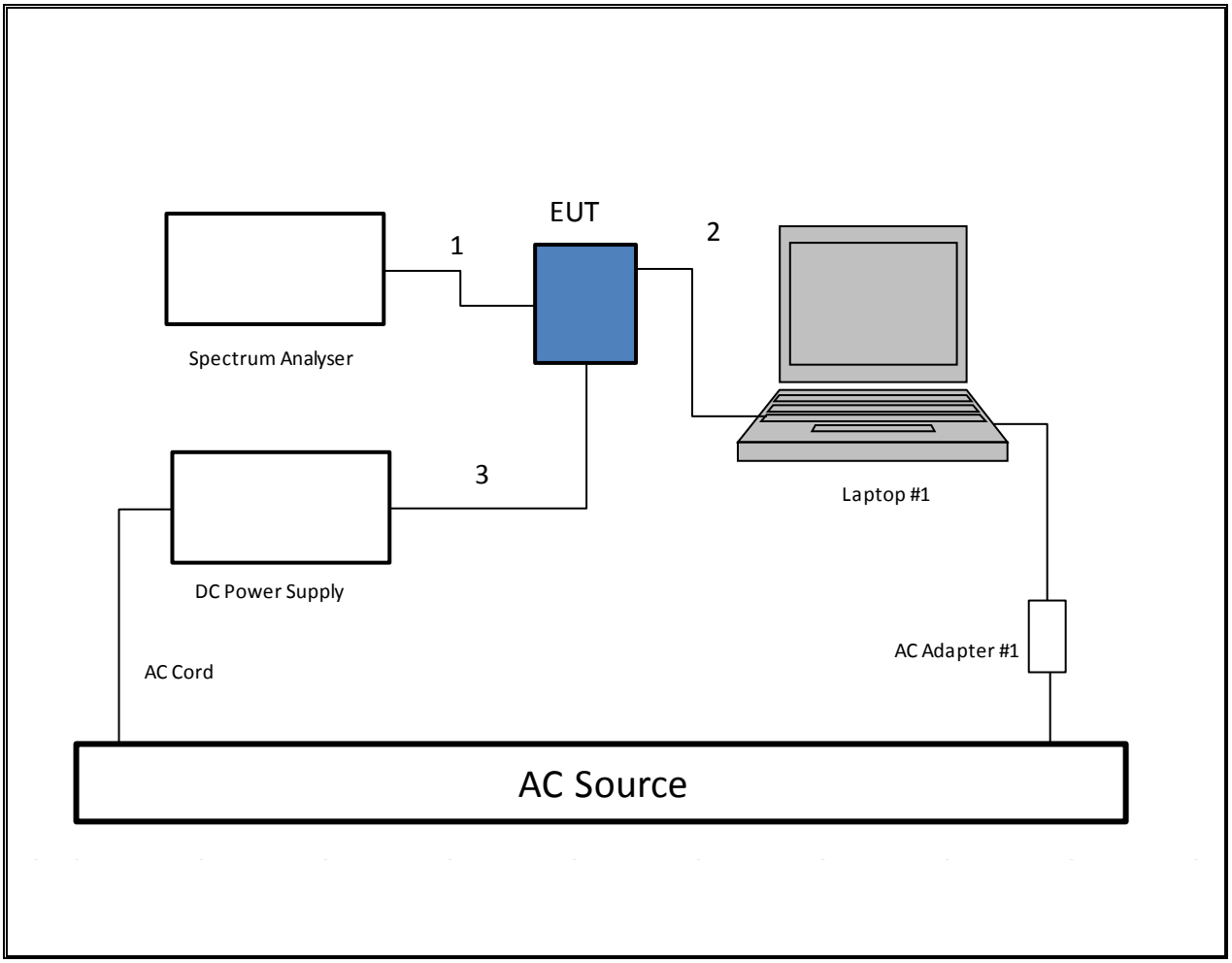
I/O CABLES (BELOW 1GHZ & AC LINE CONDUCTED TESTS)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC Main	1	115VAC	Un-Shielded	1.2	NA
2	DC	1	DC	Un-Shielded	0.8	NA
3	Audio Jack	1	Headset	Un-shielded	1	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.

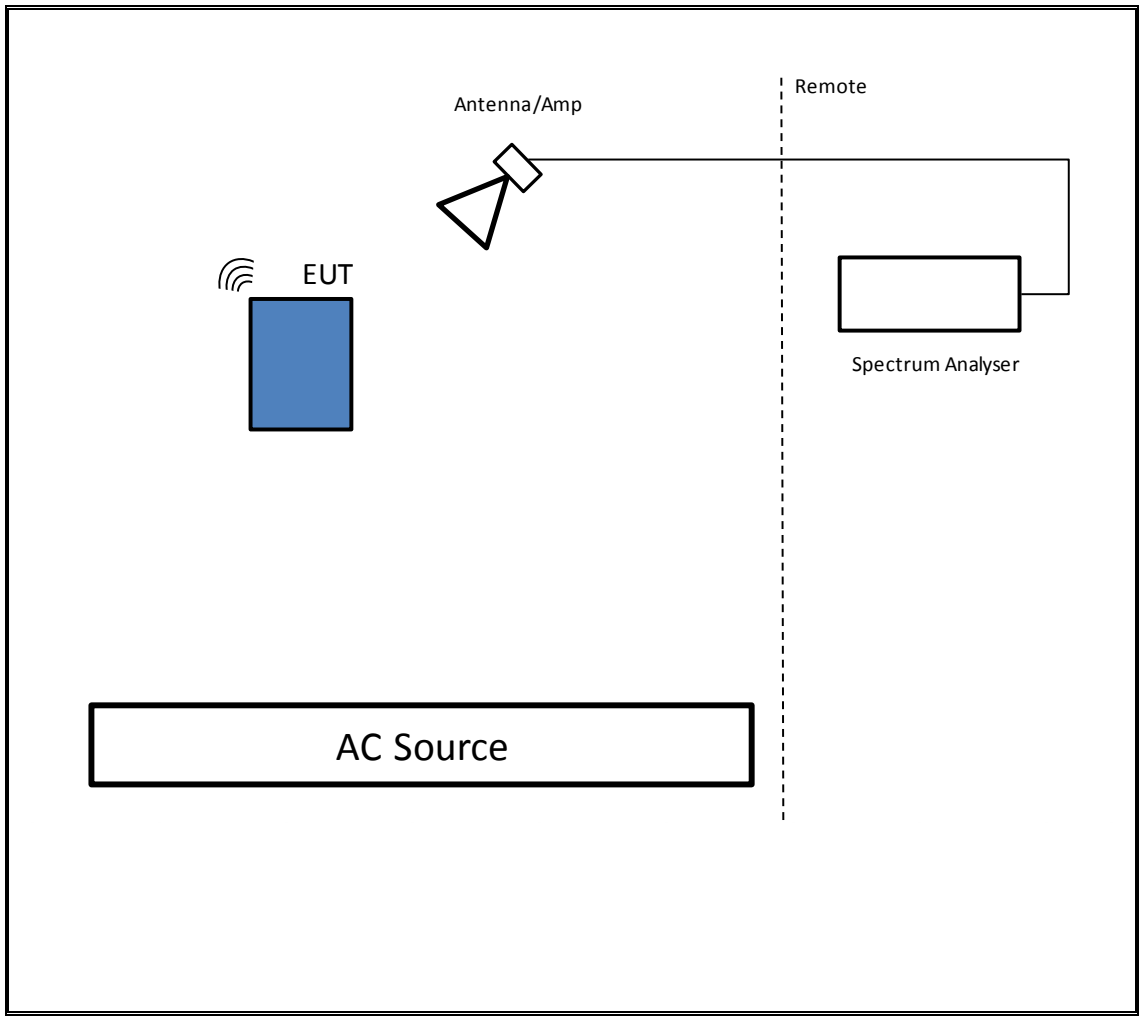
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

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

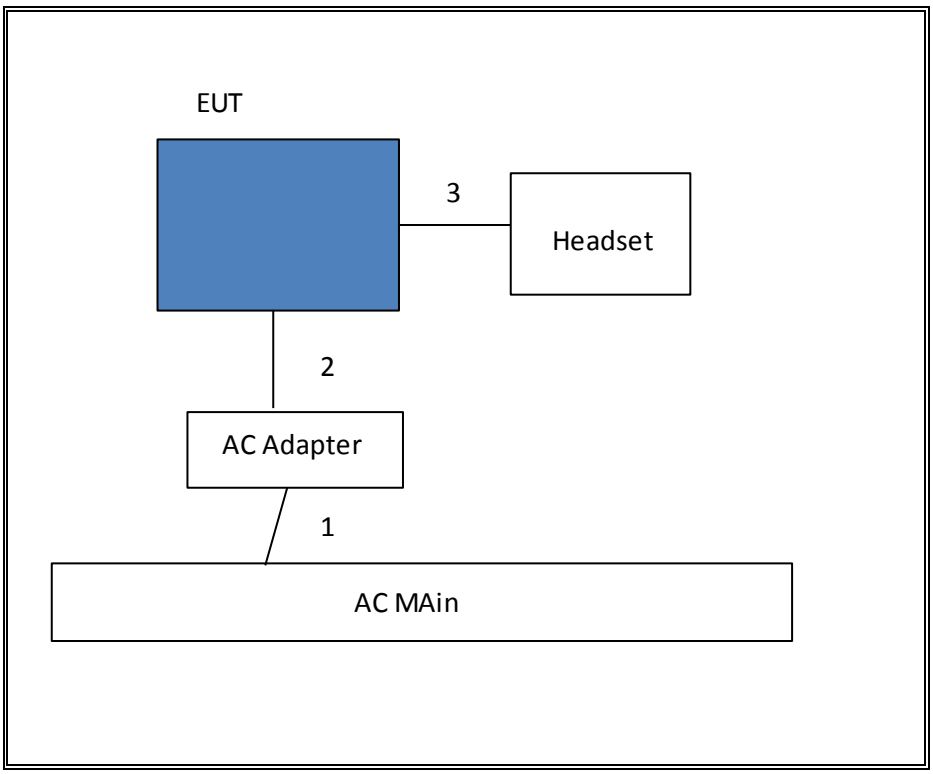
SETUP DIAGRAM



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**	**Serial Number**	**Cal Due**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	00029310	3/20/2015
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	A121003	1/28/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	None	1/20/2016
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	1049	12/17/2015
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	3008A04710	3/25/2015
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY53260010	7/12/2015
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	185623	6/7/2015
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ECSI7	N/A	9/16/2015
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	N/A	1/16/2016
Power Cable, Line Conducted Emissions ANSI 63.4	U L	PG1	N/A	7/28/2015
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	MY53310972	5/8/2015
Power Meter, P-series single channel	Agilent	N1911A	MY53060011	4/9/2015

7. MEASUREMENT METHODS

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

Output Power: KDB 558074 D01 v03r02, Section 9.1.3.

Power Spectral Density: KDB 558074 D01 v03r02, Section 10.2.

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.

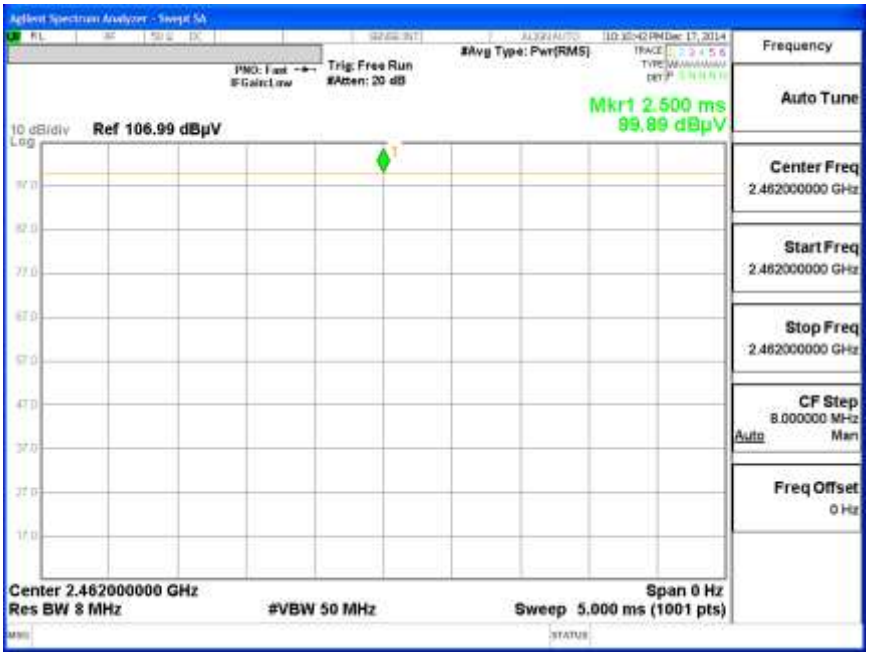
8.1. ON TIME AND DUTY CYCLE RESULTS

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	1.000	1.000	1.000	100.00%	0.00	0.010
802.11g 2TX	3.145	3.190	0.986	98.59%	0.00	0.010
802.11n HT20 2TX	2.920	2.965	0.985	98.48%	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	10.125	10.125	0.5
Mid	2437	10.125	10.125	0.5
High	2462	10.125	10.260	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

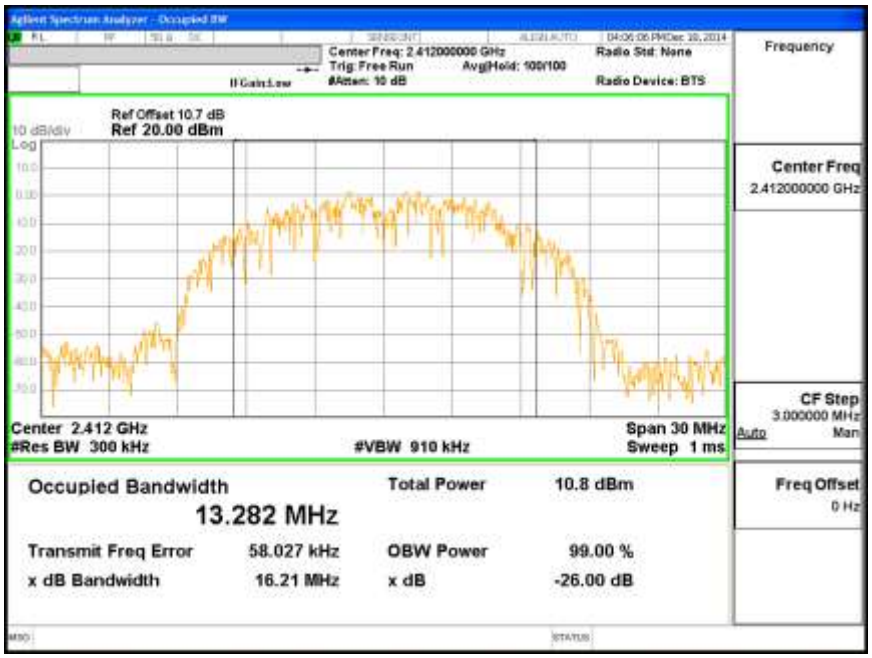
None; for reporting purposes only.

RESULTS

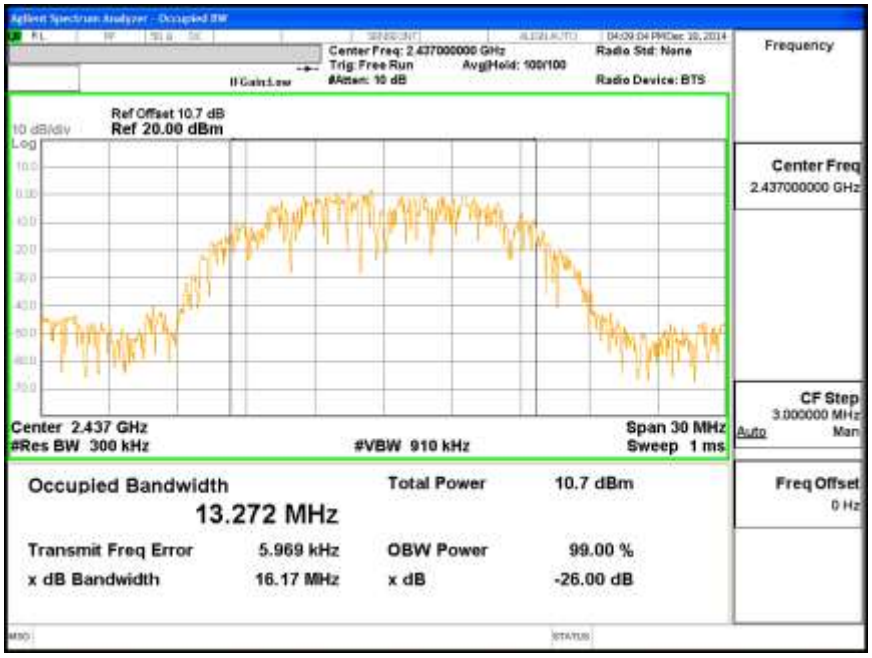
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	2412	13.282	13.337
Mid	2437	13.272	13.231
High	2462	13.160	13.137

99% BANDWIDTH, Chain 0

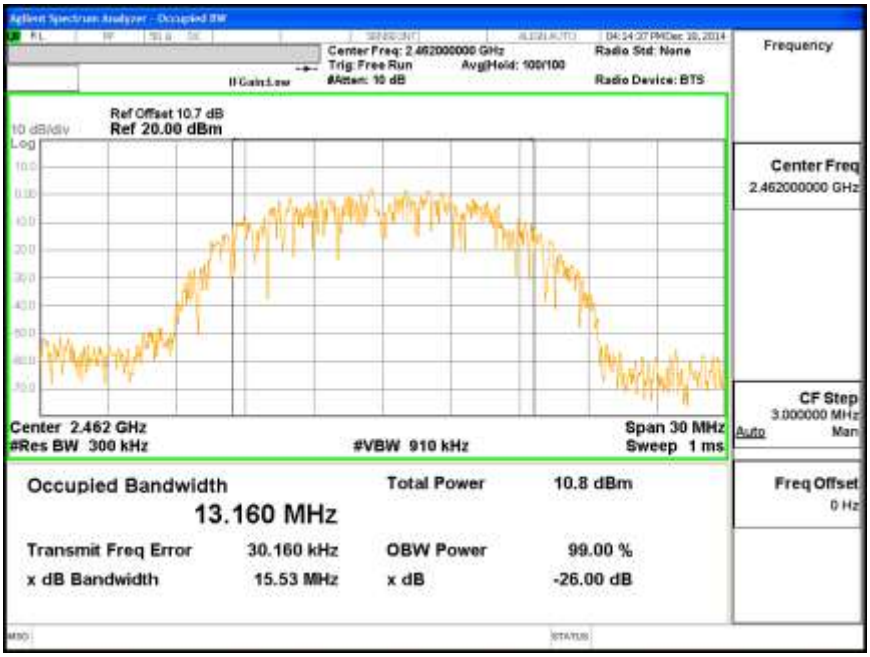
99% BANDWIDTH Chain 0 LOW CH



99% BANDWIDTH Chain 0 MID CH

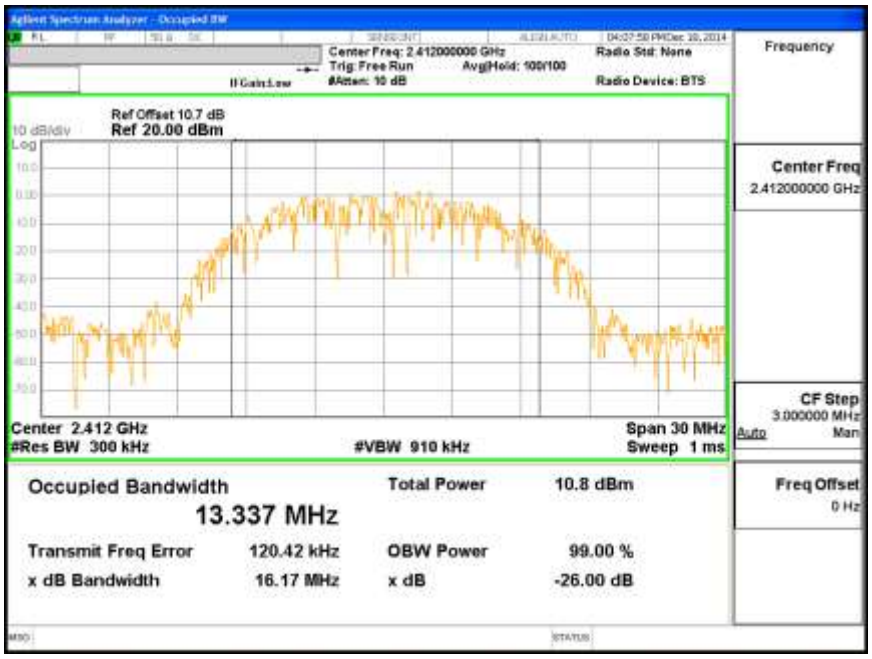


99% BANDWIDTH Chain 0 HIGH CH

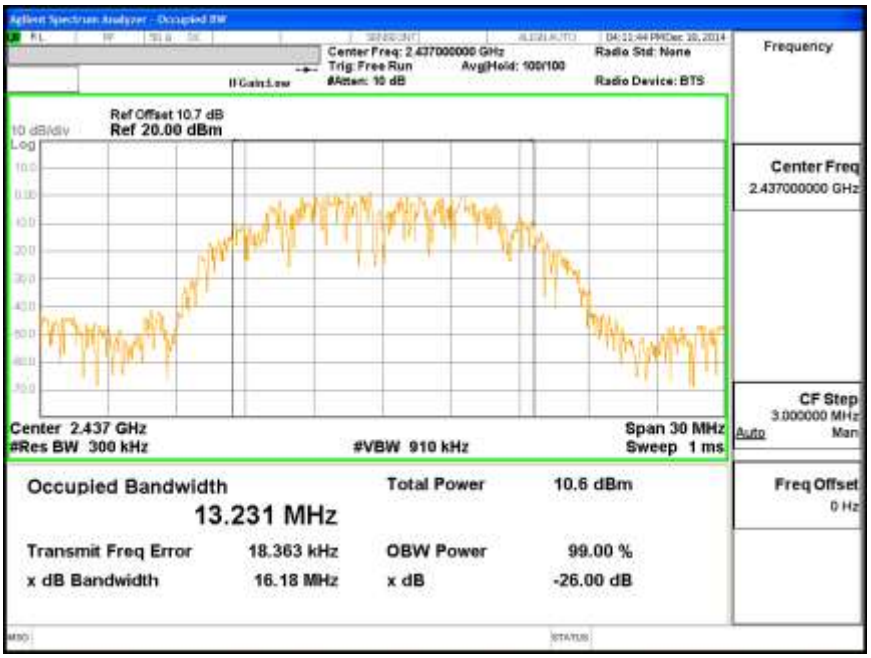


99% BANDWIDTH, Chain 1

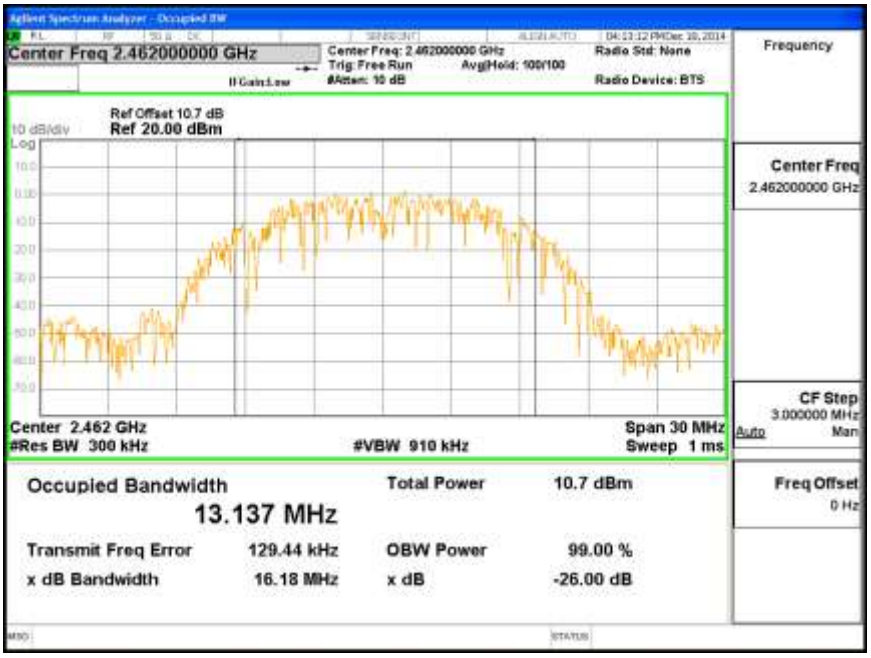
99% BANDWIDTH Chain 1 LOW CH



99% BANDWIDTH Chain 1 MID CH



99% BANDWIDTH Chain 1 HIGH CH



9.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	10.18	11.38	13.83
Mid	2437	10.51	11.15	13.85
High	2462	10.02	11.08	13.59

9.1.4. 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)
2.30	3.60	3.00

RESULTS

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	3.00	30	36	30.00
Mid	2437	3.00	30	36	30.00
High	2462	3.00	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	13.91	14.64	17.30	30.00	-12.70
Mid	2437	13.99	14.58	17.31	30.00	-12.69
High	2462	13.87	14.25	17.07	30.00	-12.93

9.1.5. 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.

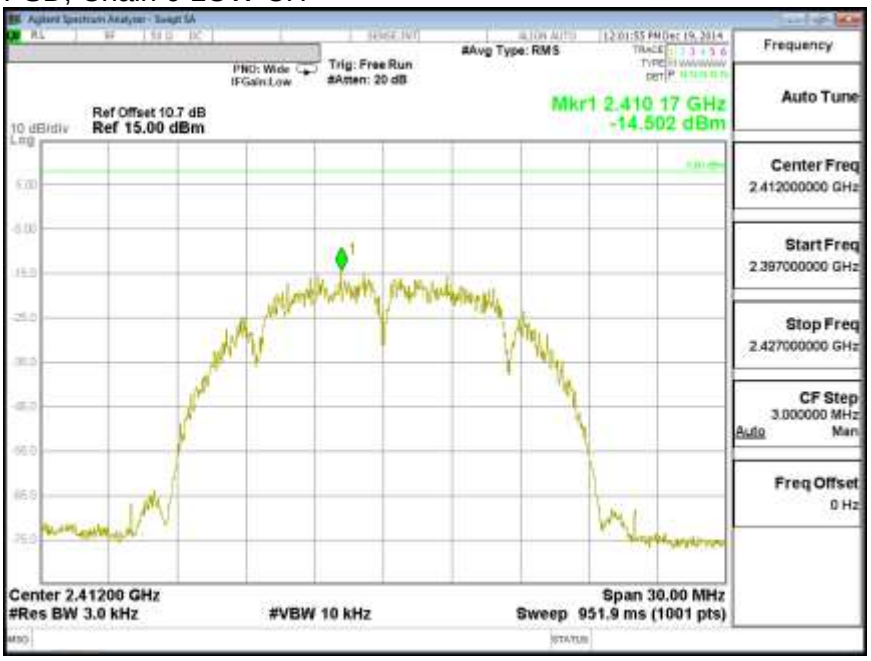
RESULTS

PSD Results

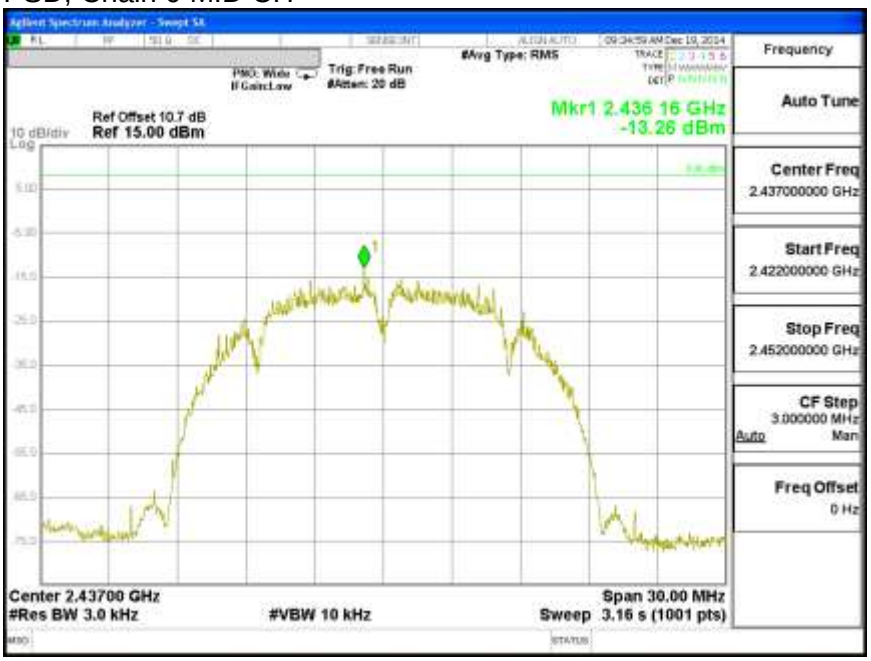
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-14.50	-14.35	-11.42	8.0	-19.4
Mid	2437	-13.26	-14.34	-10.76	8.0	-18.8
High	2462	-13.94	-14.07	-10.99	8.0	-19.0

PSD, Chain 0

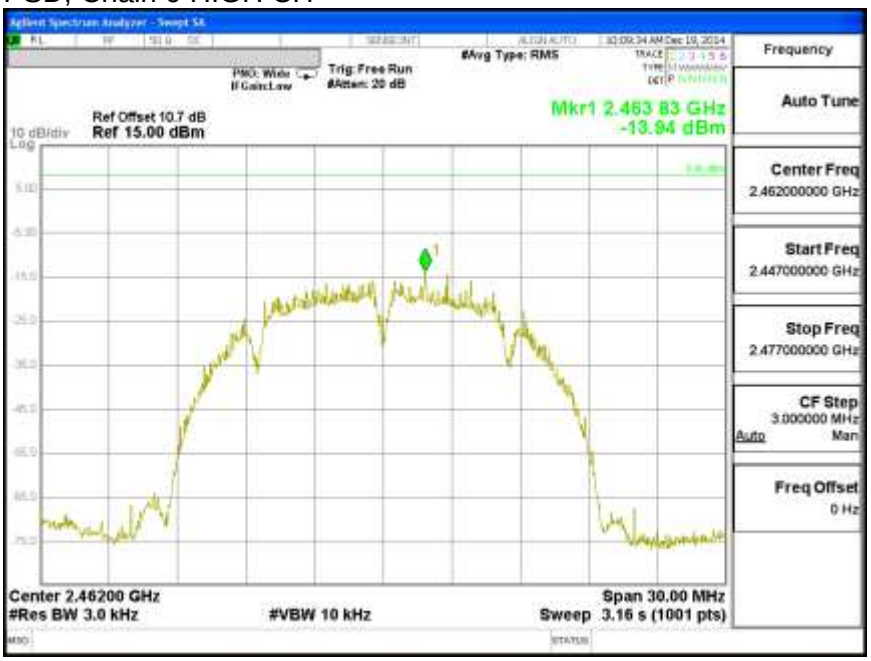
PSD, Chain 0 LOW CH



PSD, Chain 0 MID CH



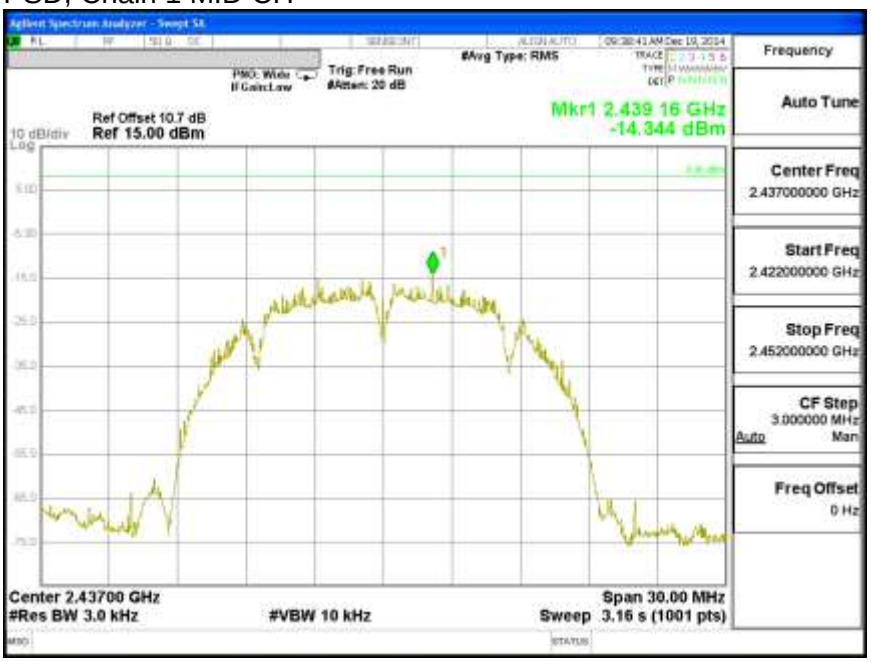
PSD, Chain 0 HIGH CH



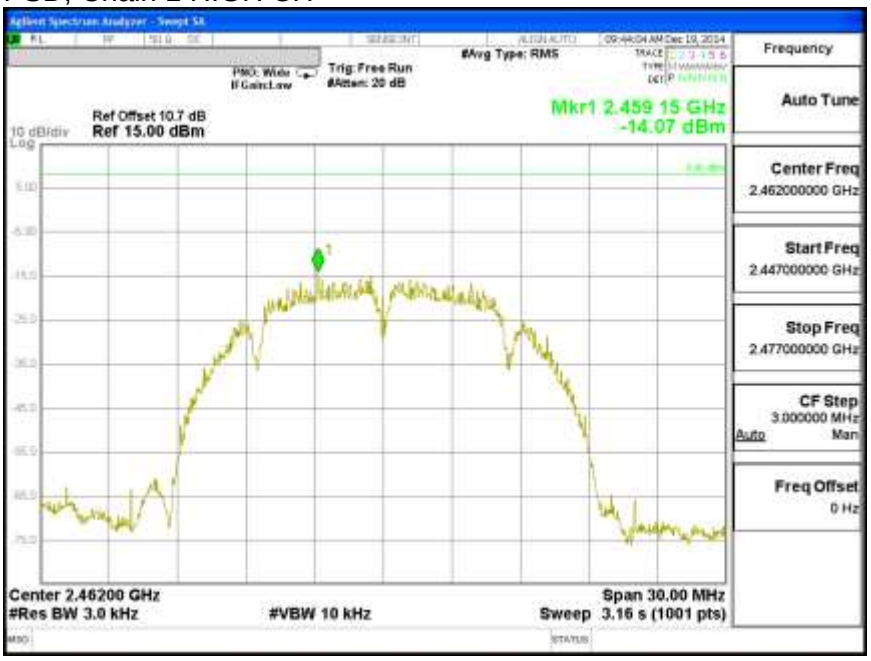
PSD, Chain 1

PSD, Chain 1 LOW CH

PSD, Chain 1 MID CH



PSD, Chain 1 HIGH CH



9.1.6. OUT-OF-BAND EMISSIONS

LIMITS

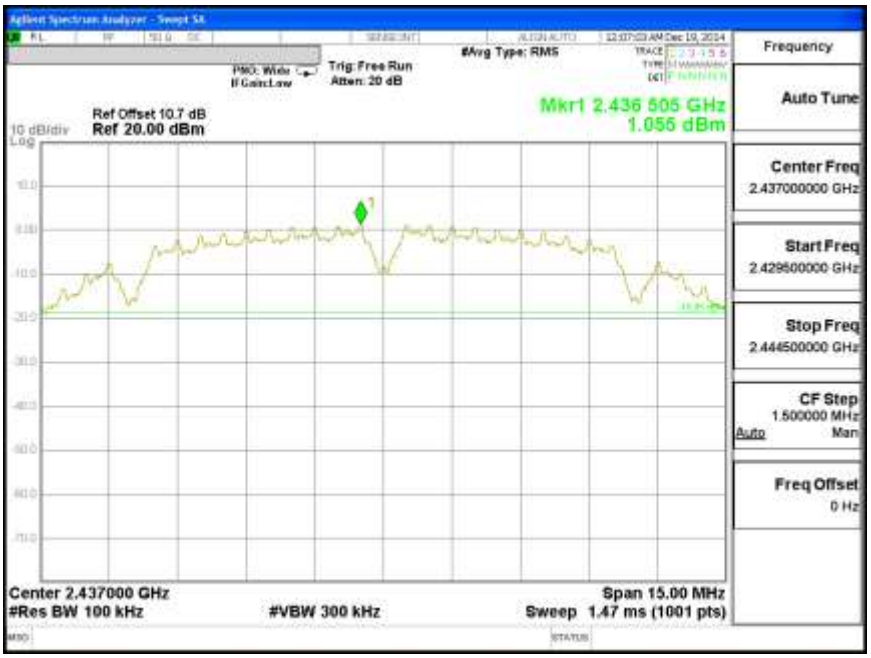
FCC §15.247 (d)

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

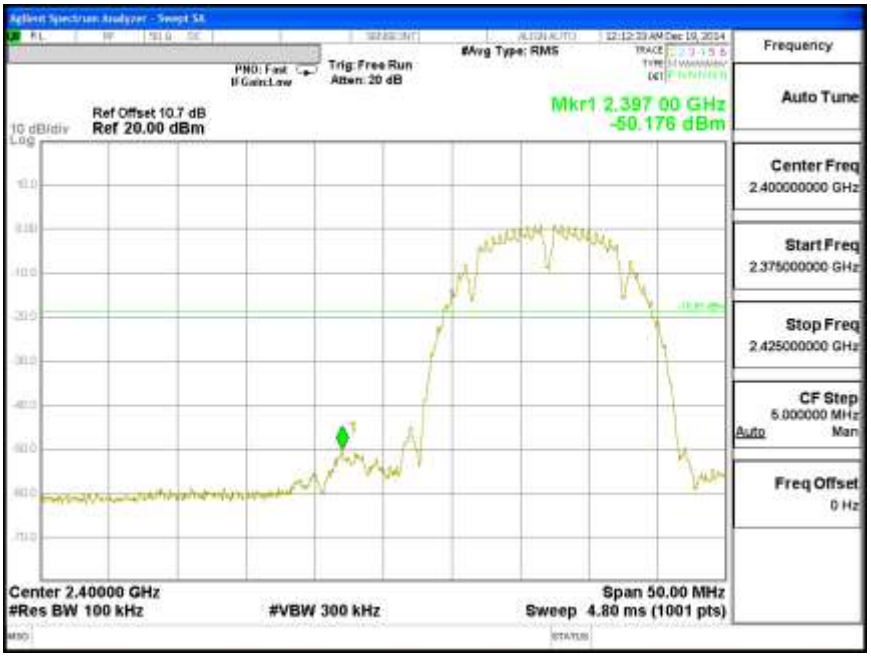
IN-BAND REFERENCE LEVEL, Chain 0

REFERENCE LEVEL Chain 0 MID CH



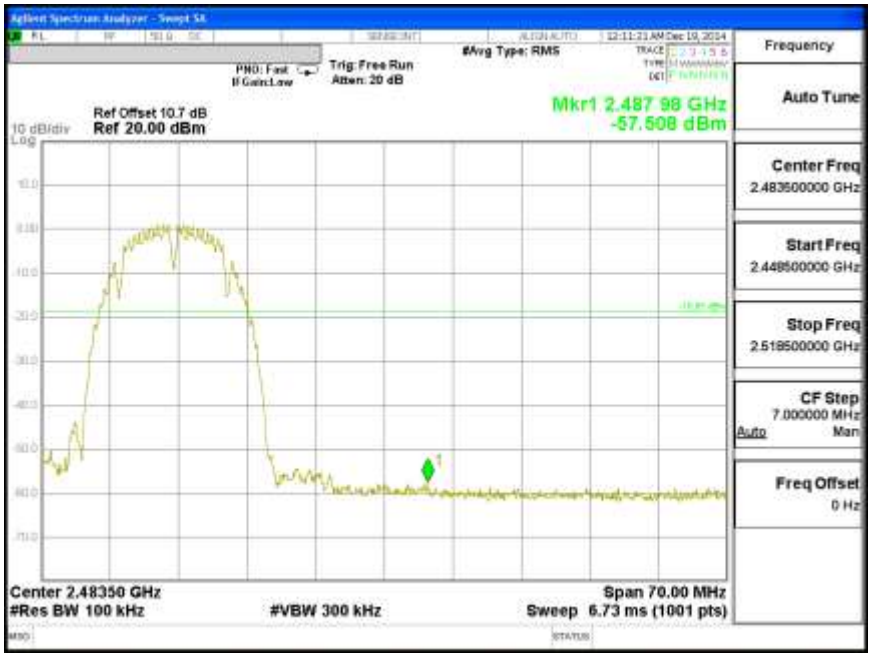
LOW CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 LOW CH



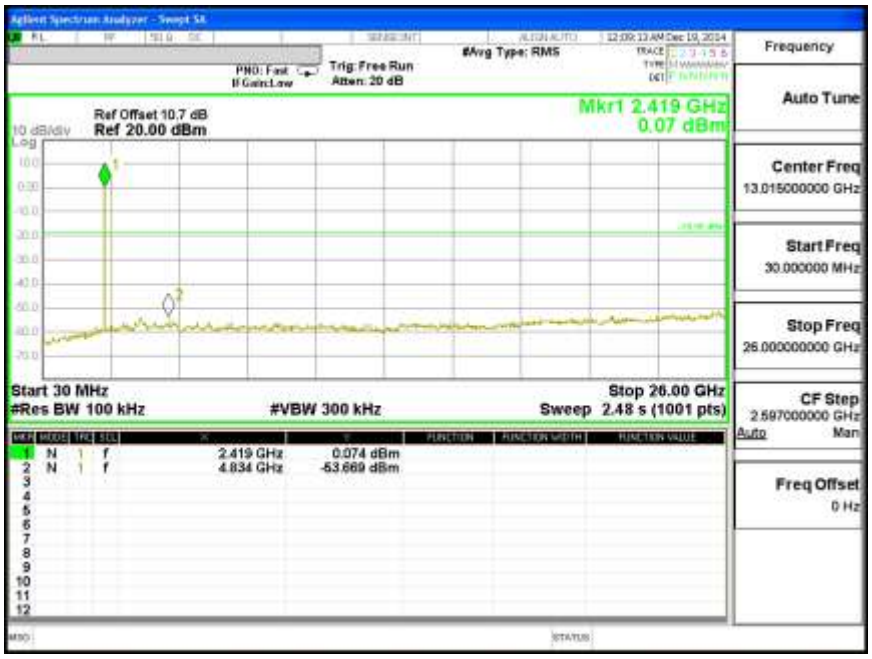
HIGH CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 HIGH CH

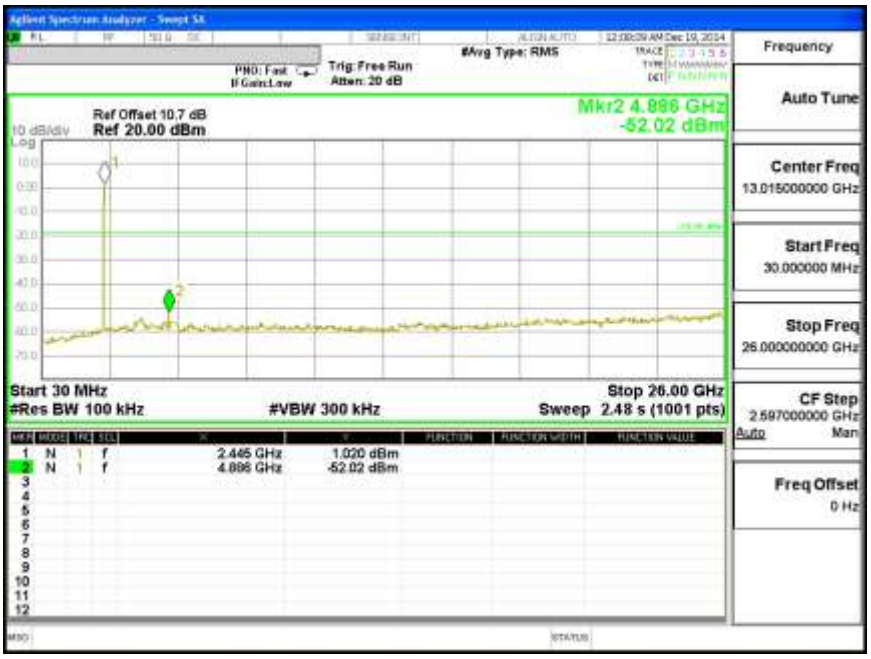


OUT-OF-BAND EMISSIONS, Chain 0

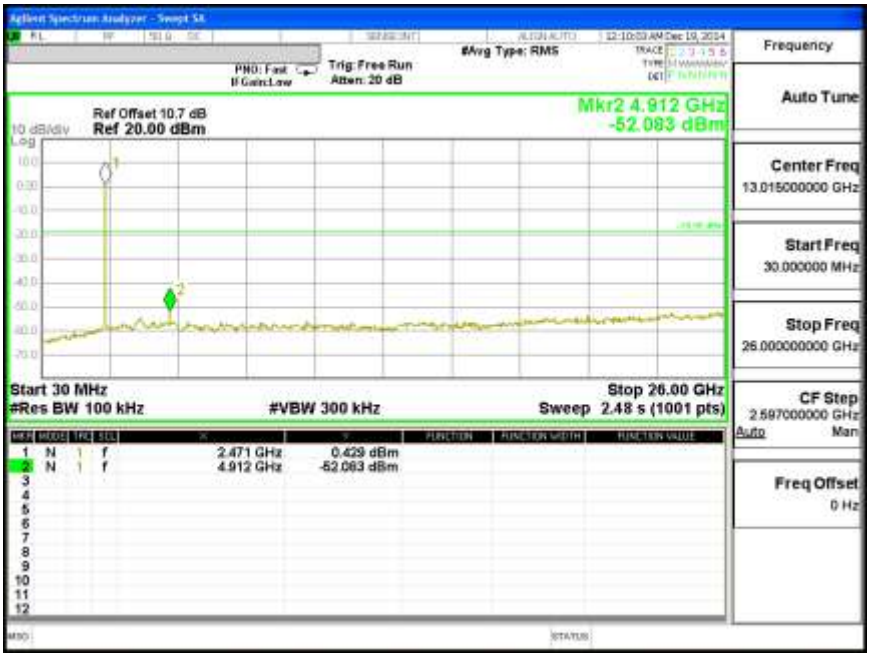
OUT OF BAND Chain 0 LOW CH



OUT OF BAND Chain 0 MID CH

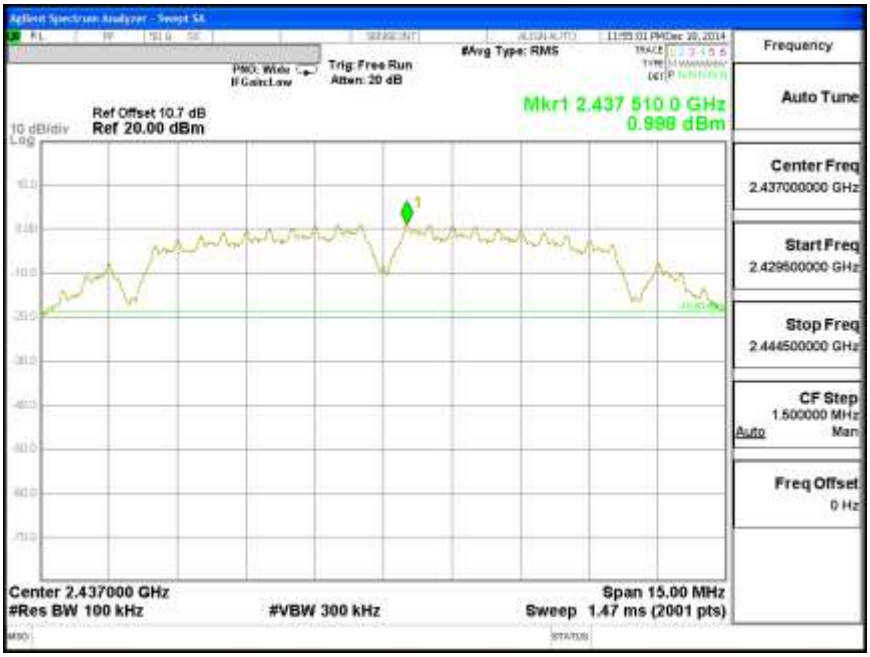


OUT OF BAND Chain 0 HIGH CH



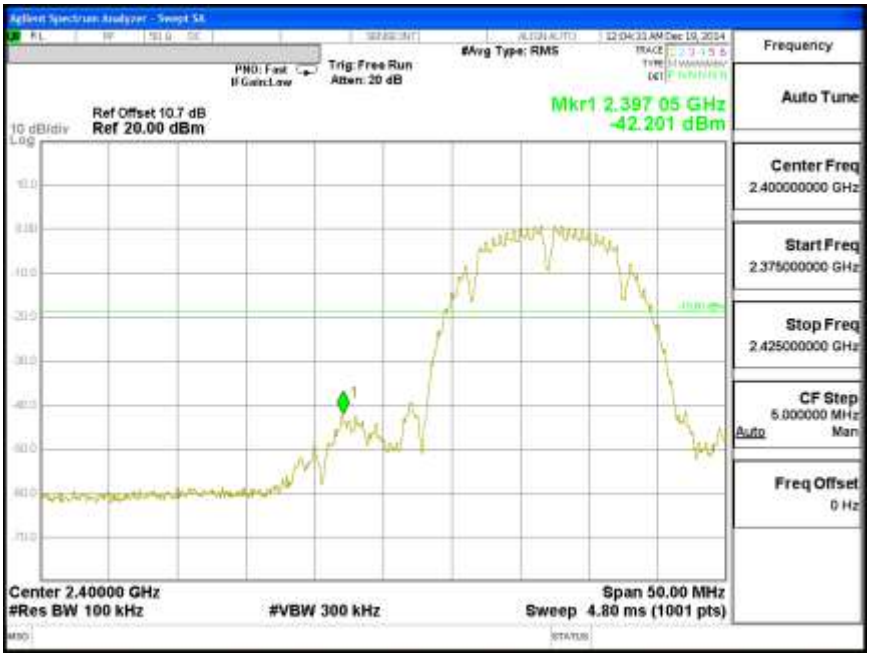
IN-BAND REFERENCE LEVEL, Chain 1

REFERENCE LEVEL Chain 1 MID CH



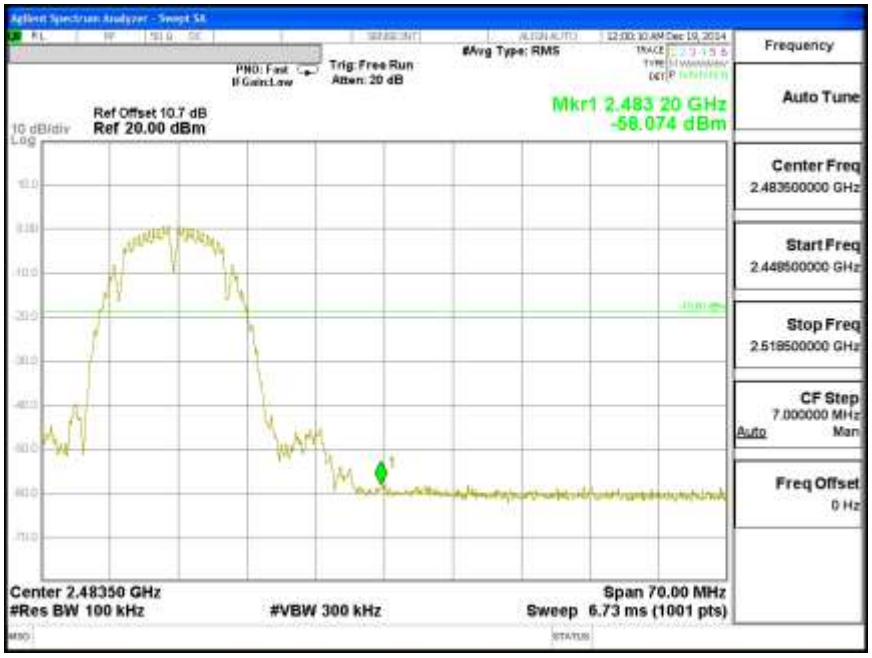
LOW CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 LOW CH



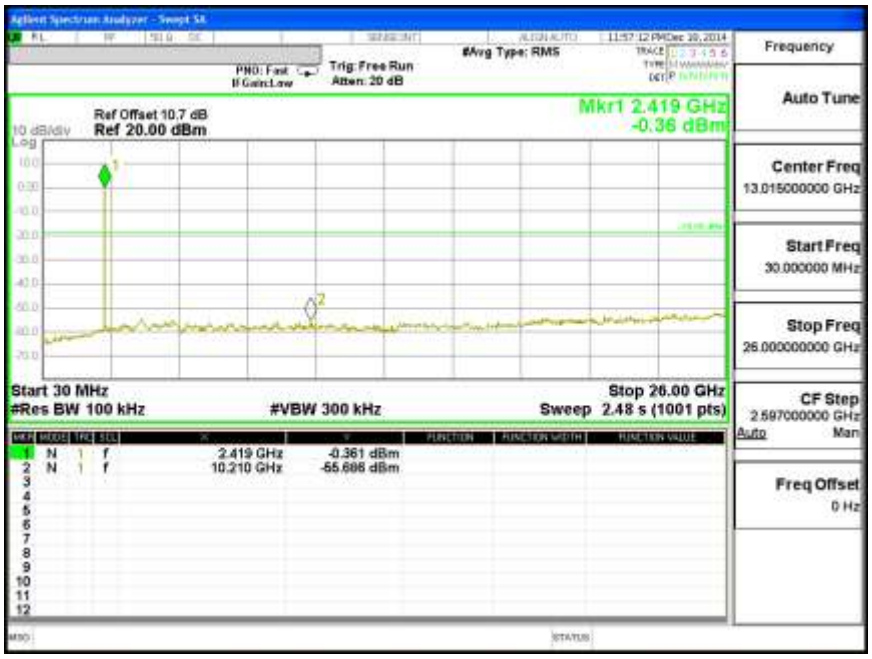
HIGH CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 HIGH CH

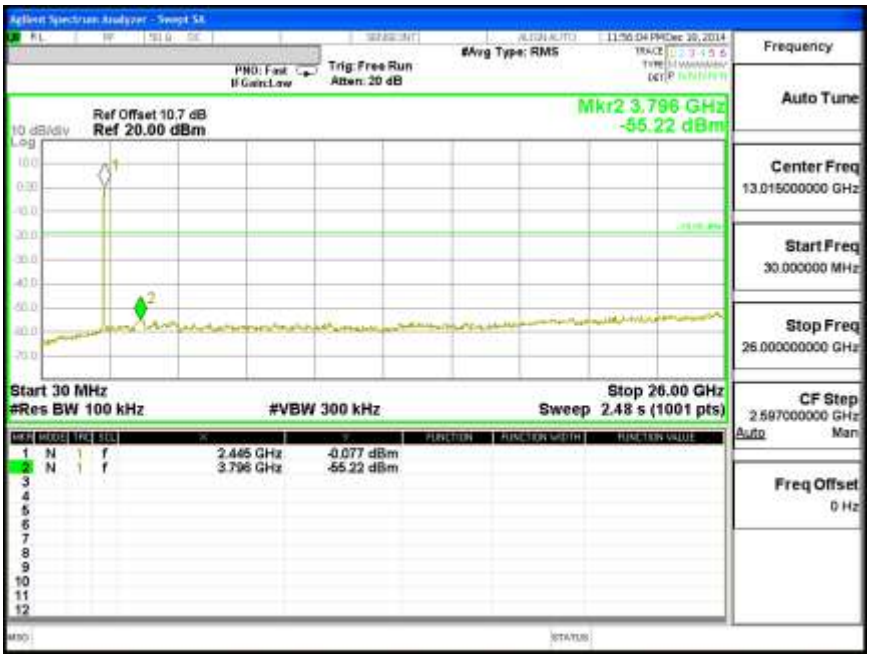


OUT-OF-BAND EMISSIONS, Chain 1

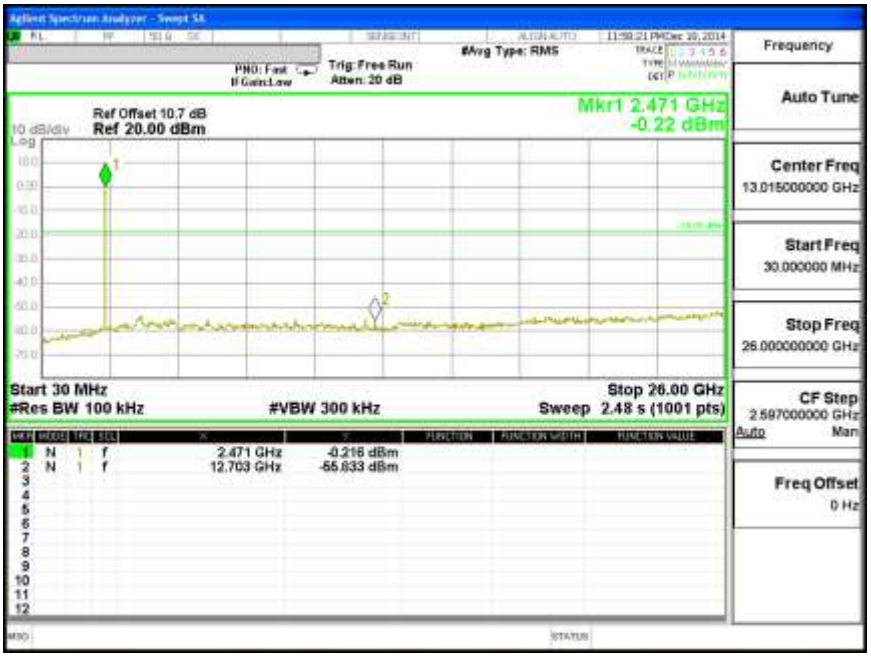
OUT OF BAND Chain 1 LOW CH



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	16.375	16.425	0.5
Mid	2437	16.375	16.425	0.5
High	2462	16.400	16.425	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

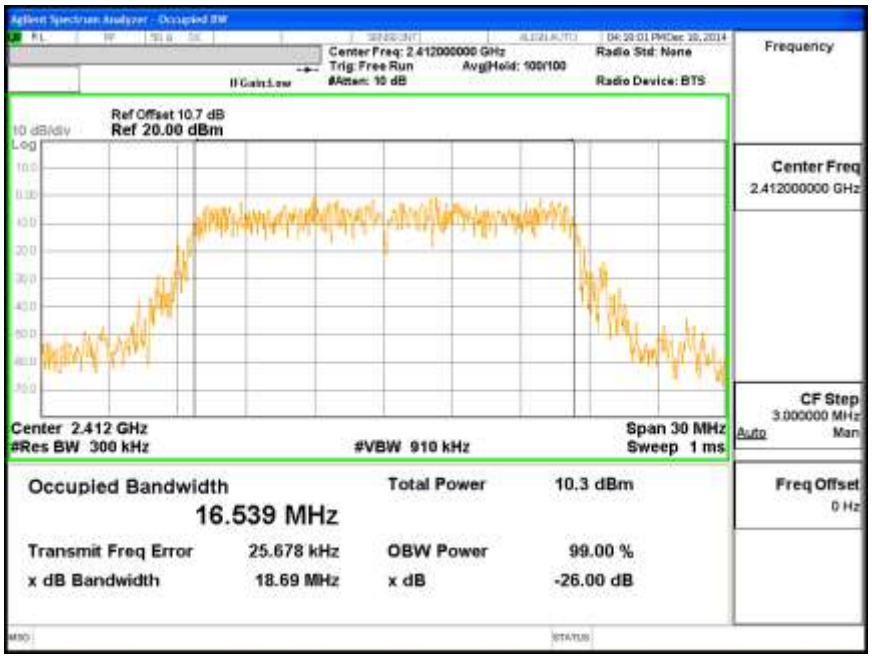
None; for reporting purposes only.

RESULTS

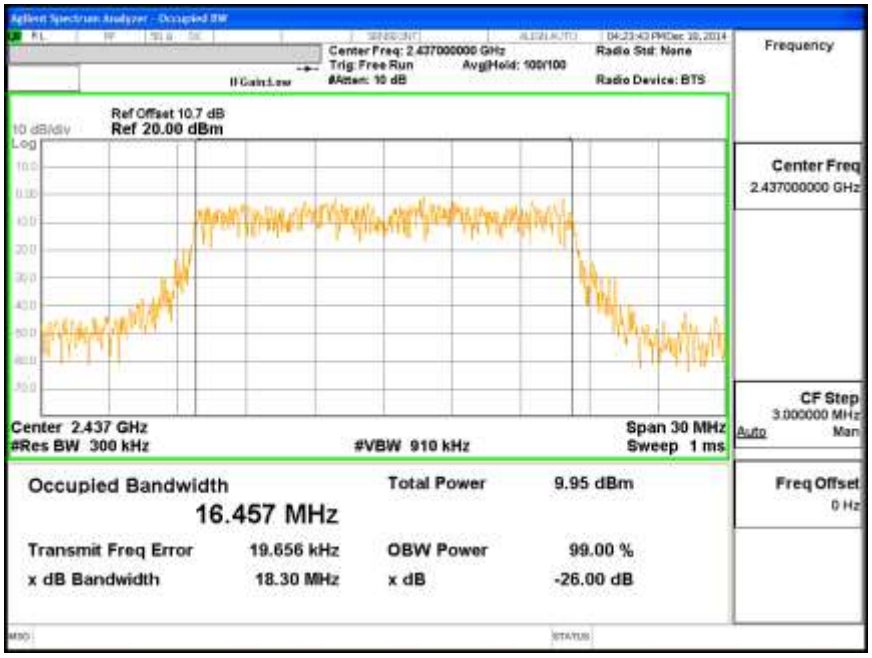
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	2412	16.539	16.466
Mid	2437	16.457	16.491
High	2462	16.515	16.524

99% BANDWIDTH, Chain 0

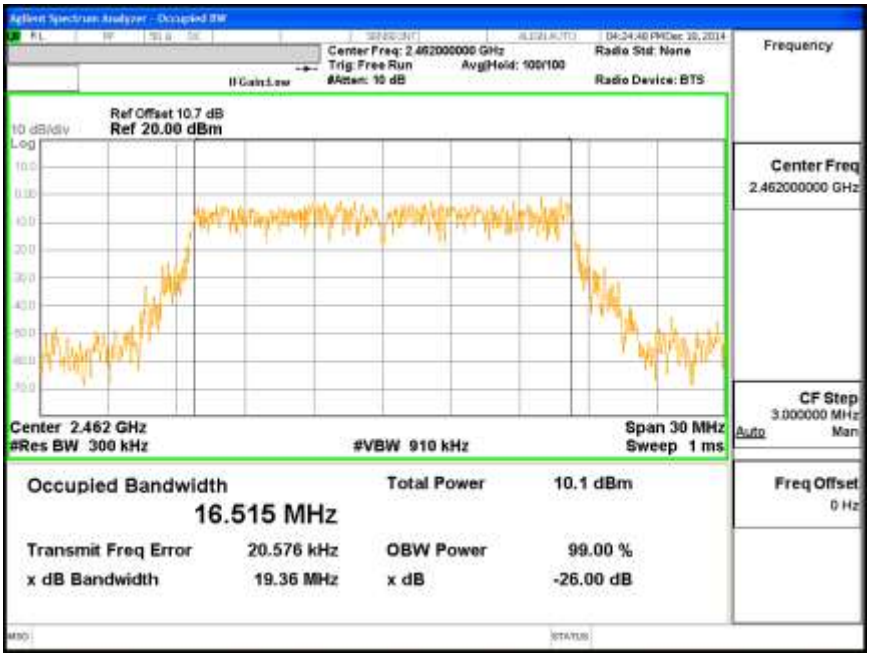
99% BANDWIDTH Chain 0 LOW CH



99% BANDWIDTH Chain 0 MID CH

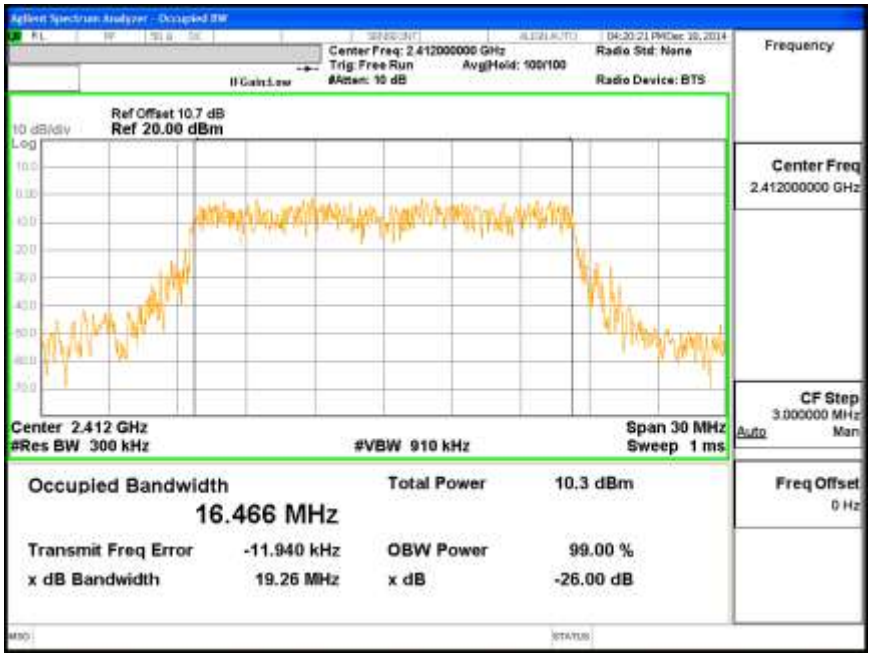


99% BANDWIDTH Chain 0 HIGH CH

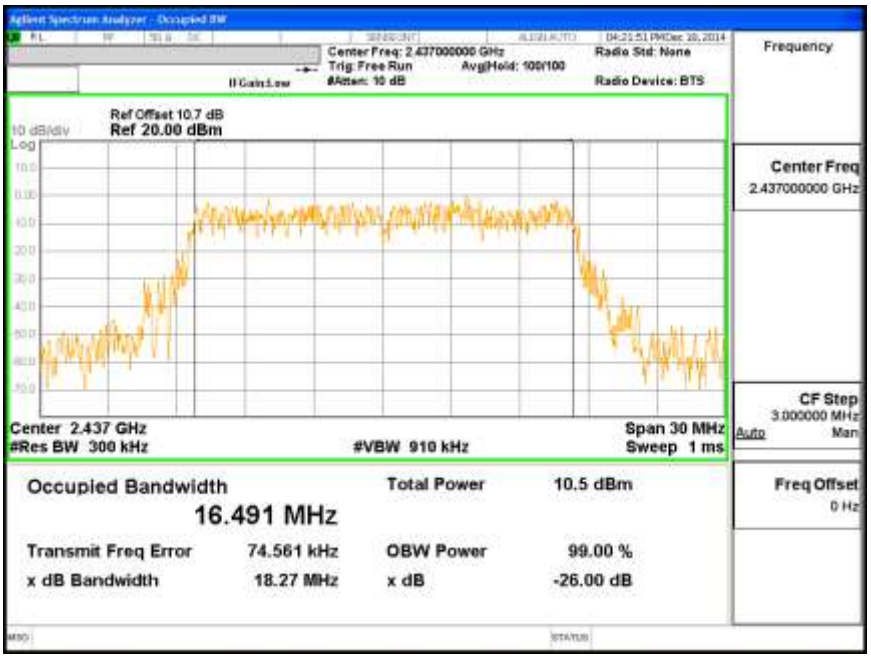


99% BANDWIDTH, Chain 1

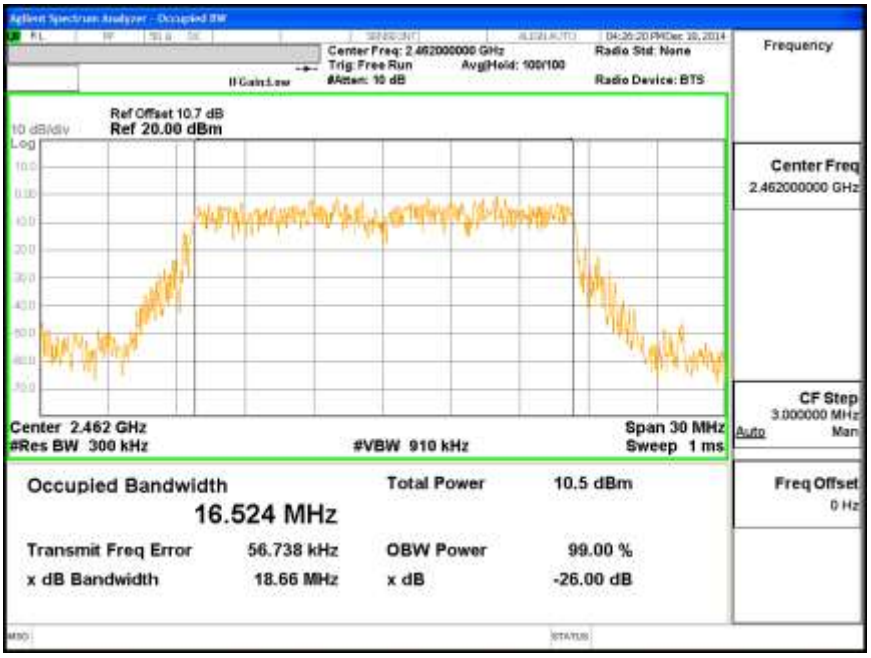
99% BANDWIDTH Chain 1 LOW CH



99% BANDWIDTH Chain 1 MID CH



99% BANDWIDTH Chain 1 HIGH CH



9.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	9.79	10.16	12.99
Mid	2437	9.91	10.36	13.15
High	2462	9.88	9.96	12.93

9.2.4. 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)
2.30	3.60	3.00

RESULTS

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	3.00	30	36	30.00
Mid	2437	3.00	30	36	30.00
High	2462	3.00	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	17.74	17.10	20.44	30.00	-9.56
Mid	2437	18.02	17.31	20.69	30.00	-9.31
High	2462	17.96	16.76	20.41	30.00	-9.59

9.2.5. 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.

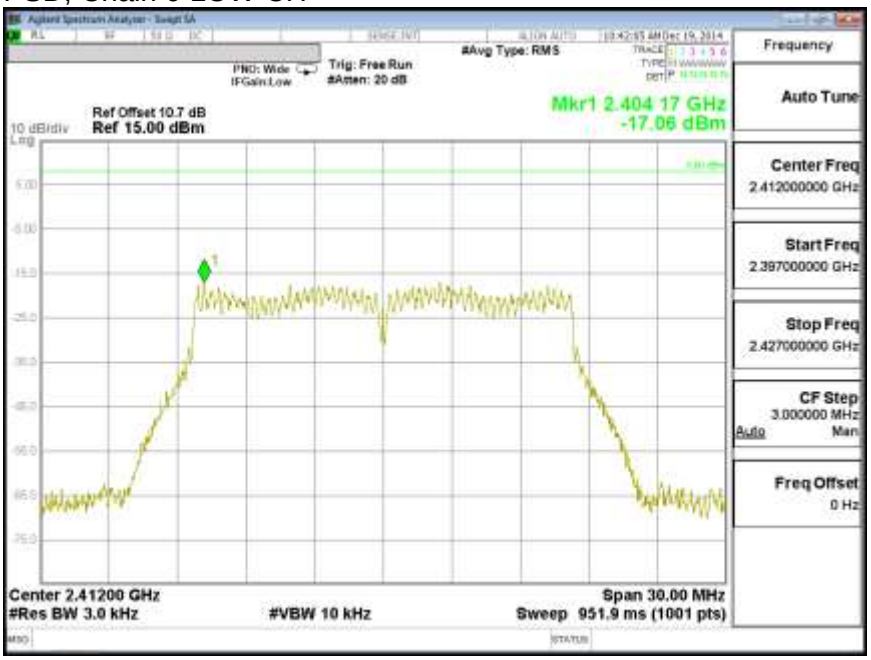
RESULTS

PSD Results

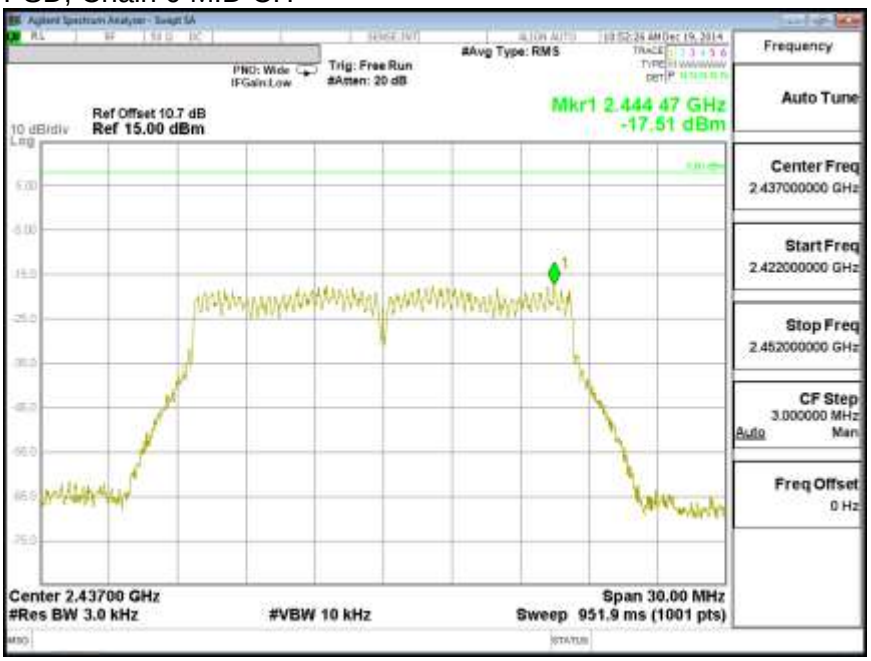
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-17.06	-15.66	-13.29	8.0	-21.3
Mid	2437	-17.51	-17.38	-14.43	8.0	-22.4
High	2462	-17.03	-16.30	-13.64	8.0	-21.6

PSD, Chain 0

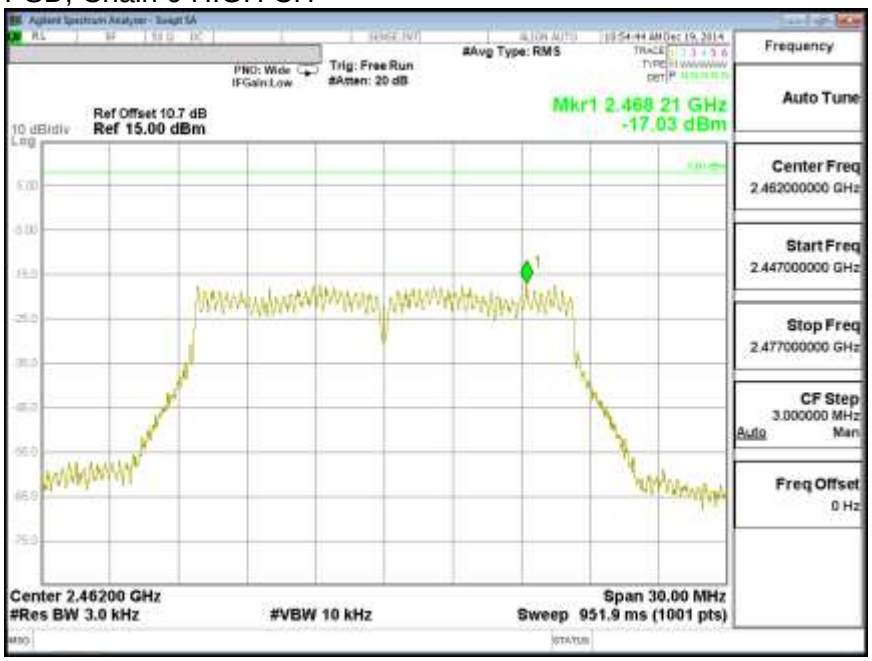
PSD, Chain 0 LOW CH



PSD, Chain 0 MID CH

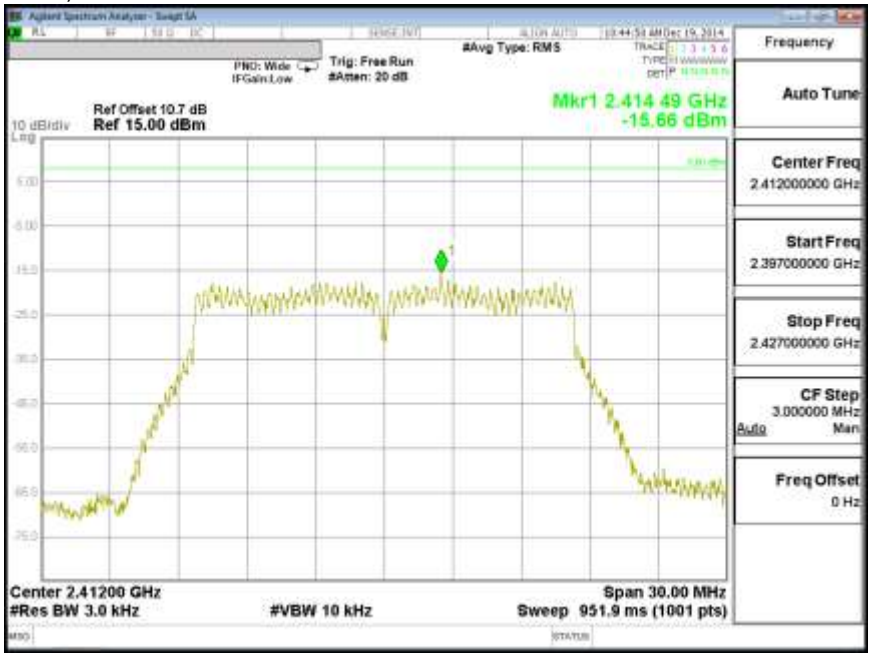


PSD, Chain 0 HIGH CH

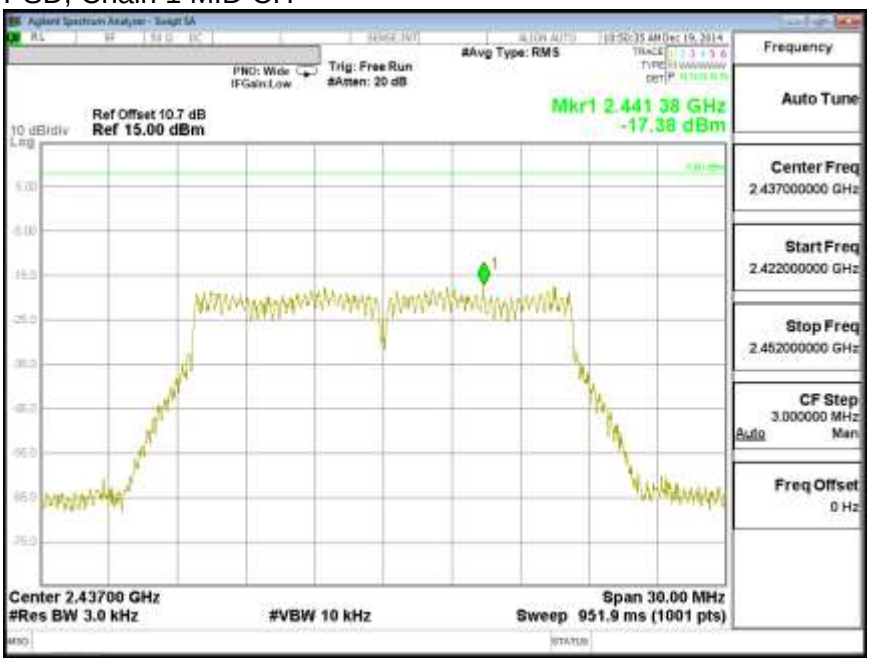


PSD, Chain 1

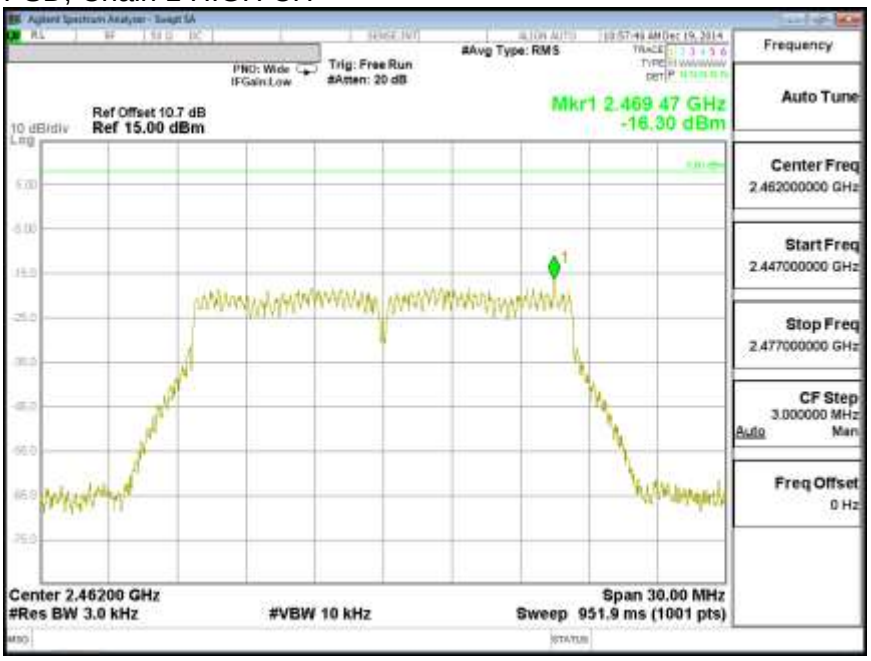
PSD, Chain 1 LOW CH



PSD, Chain 1 MID CH



PSD, Chain 1 HIGH CH



9.2.6. OUT-OF-BAND EMISSIONS

LIMITS

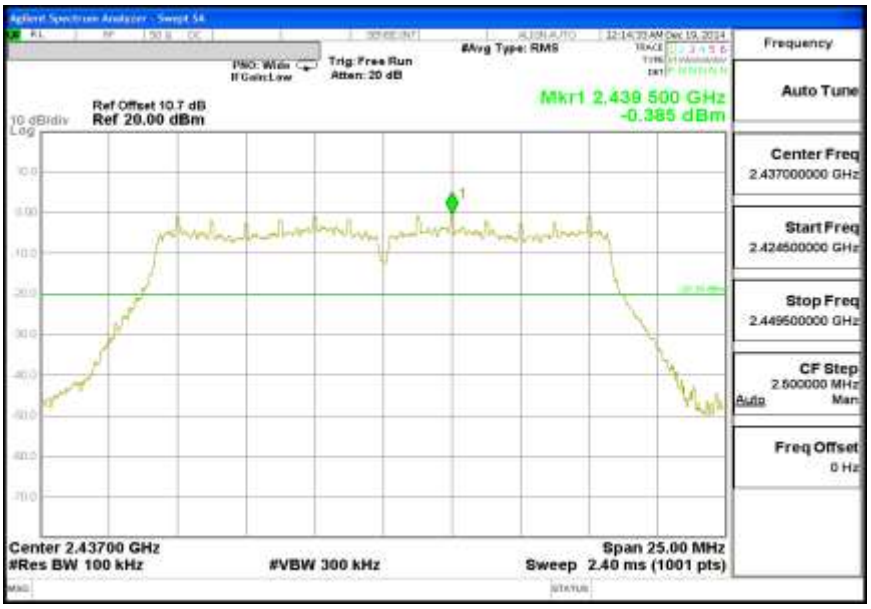
FCC §15.247 (d)

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

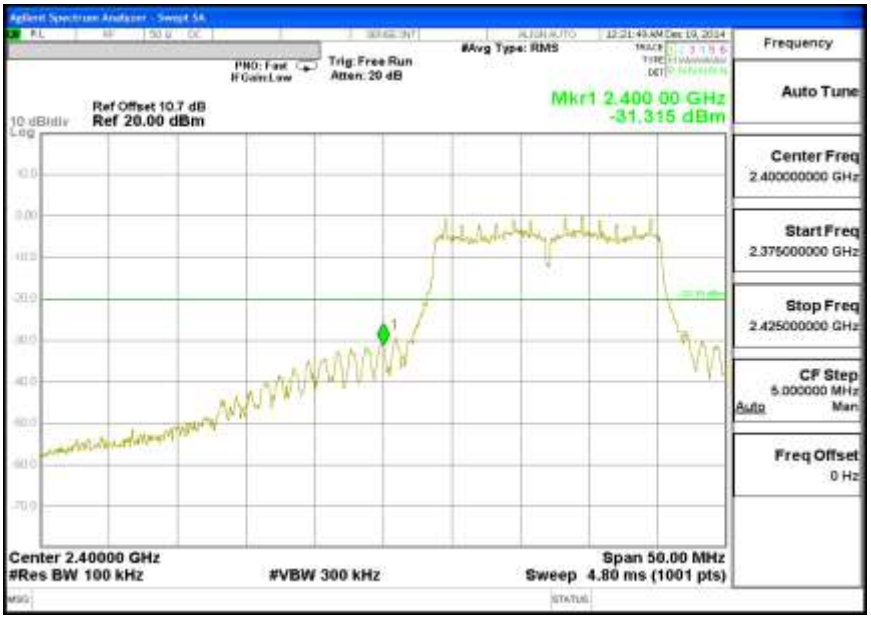
IN-BAND REFERENCE LEVEL, Chain 0

REFERENCE LEVEL Chain 0 MID CH



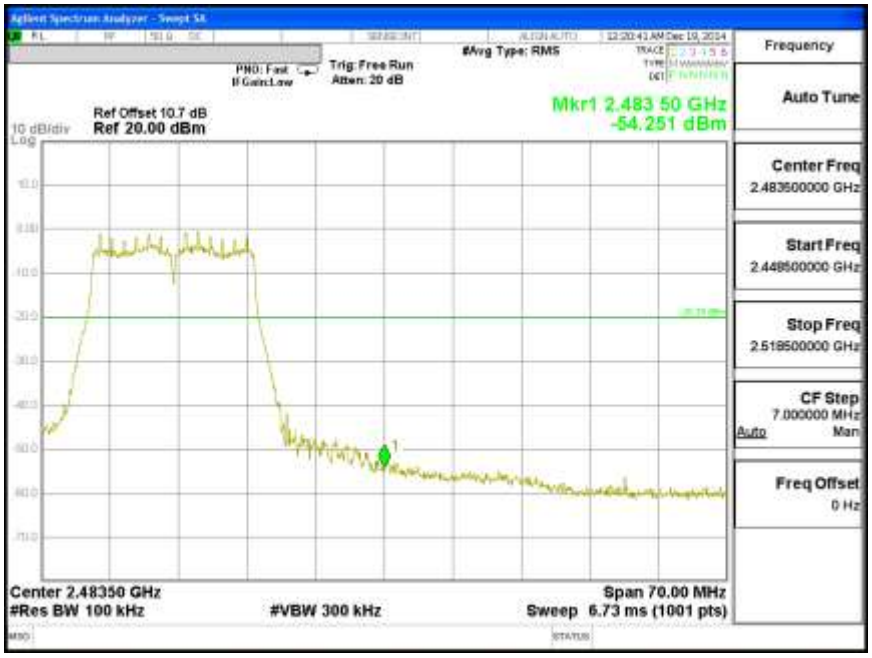
LOW CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 LOW CH



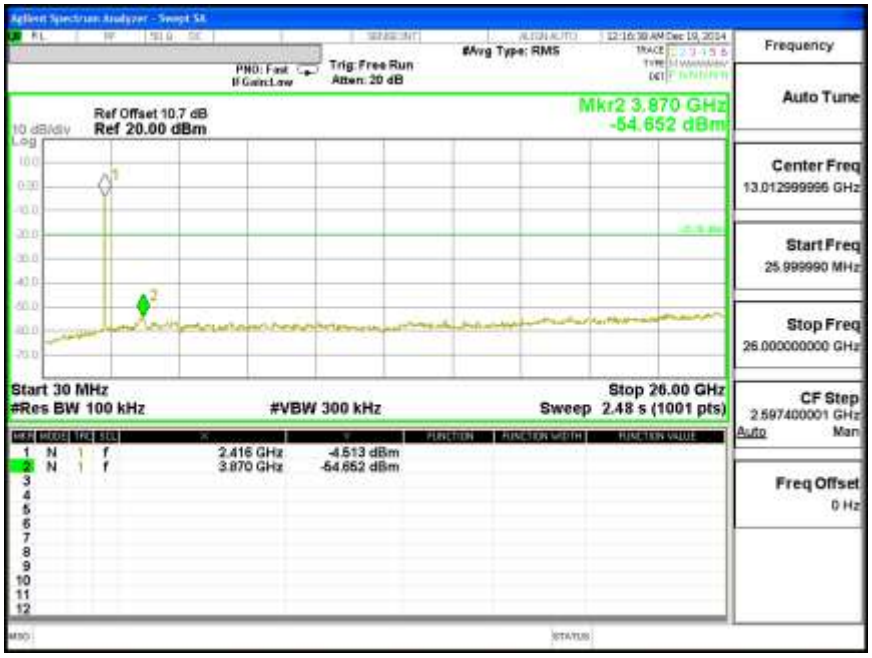
HIGH CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 HIGH CH

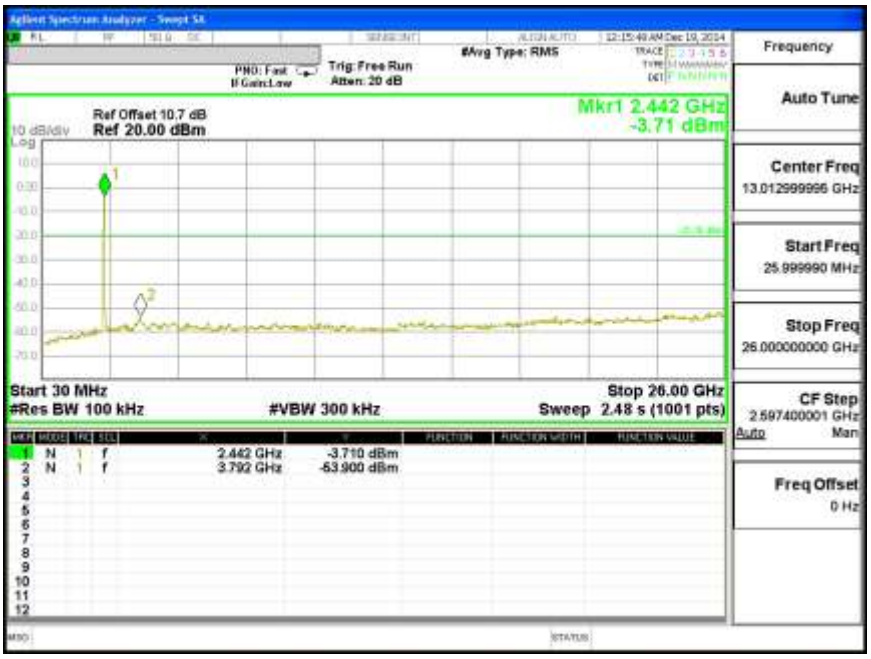


OUT-OF-BAND EMISSIONS, Chain 0

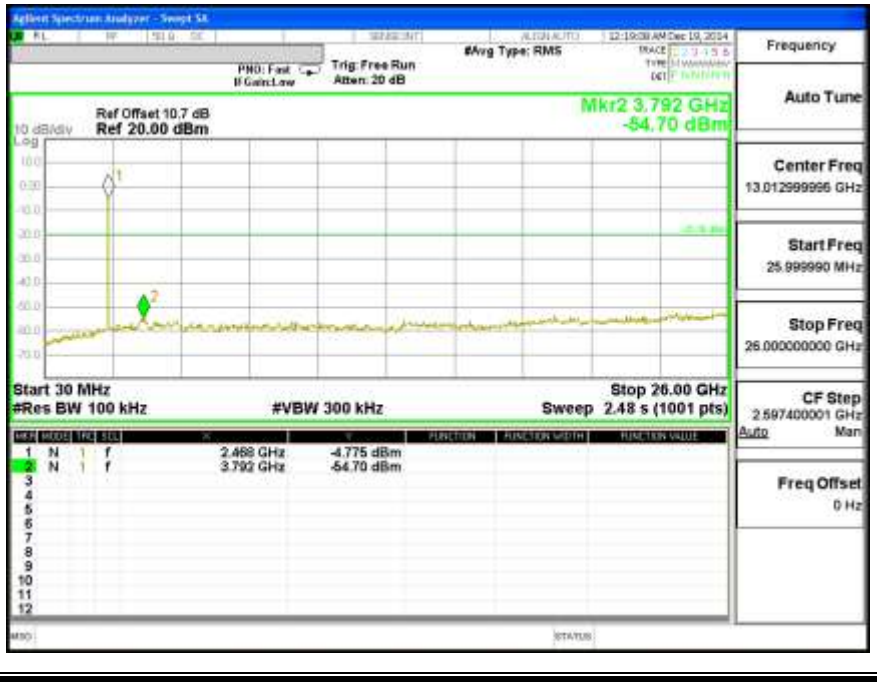
OUT OF BAND Chain 0 LOW CH



OUT OF BAND Chain 0 MID CH

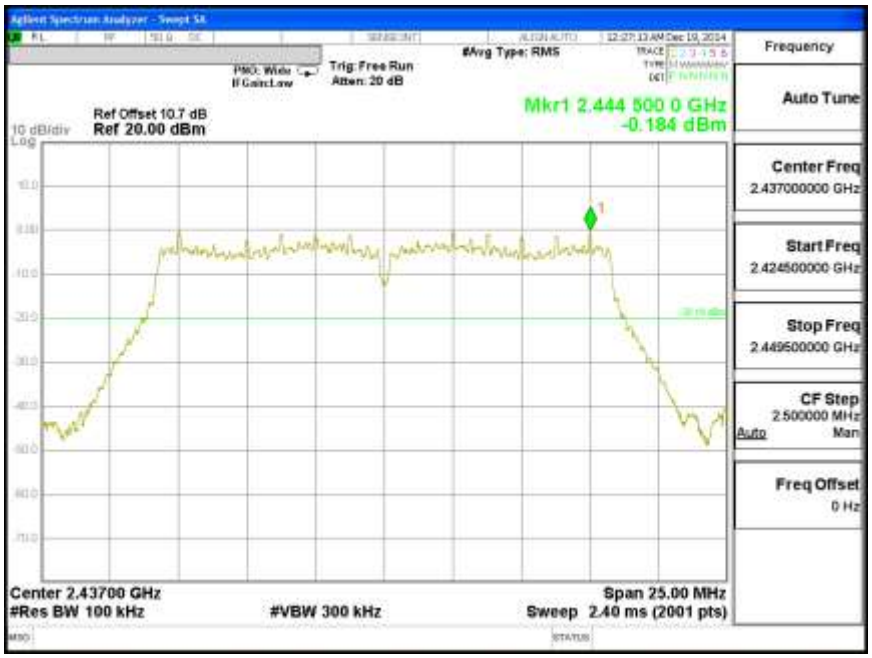


OUT OF BAND Chain 0 HIGH CH



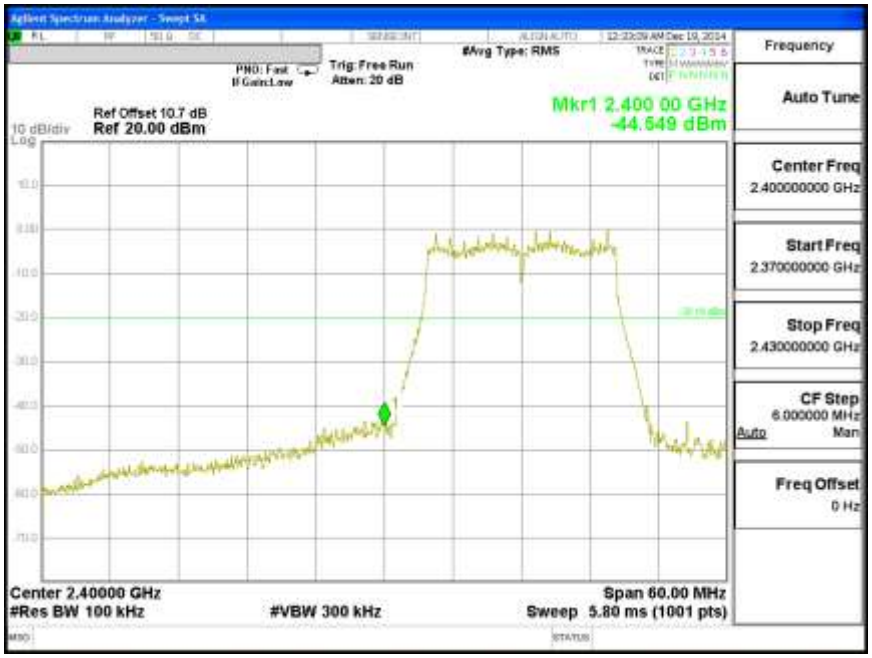
IN-BAND REFERENCE LEVEL, Chain 1

REFERENCE LEVEL Chain 1 MID CH



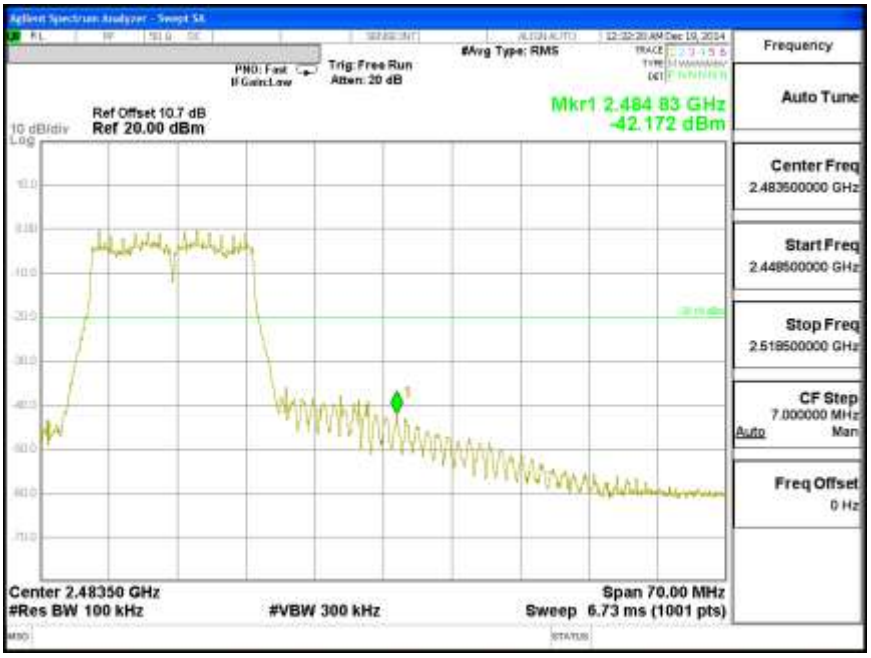
LOW CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 LOW CH



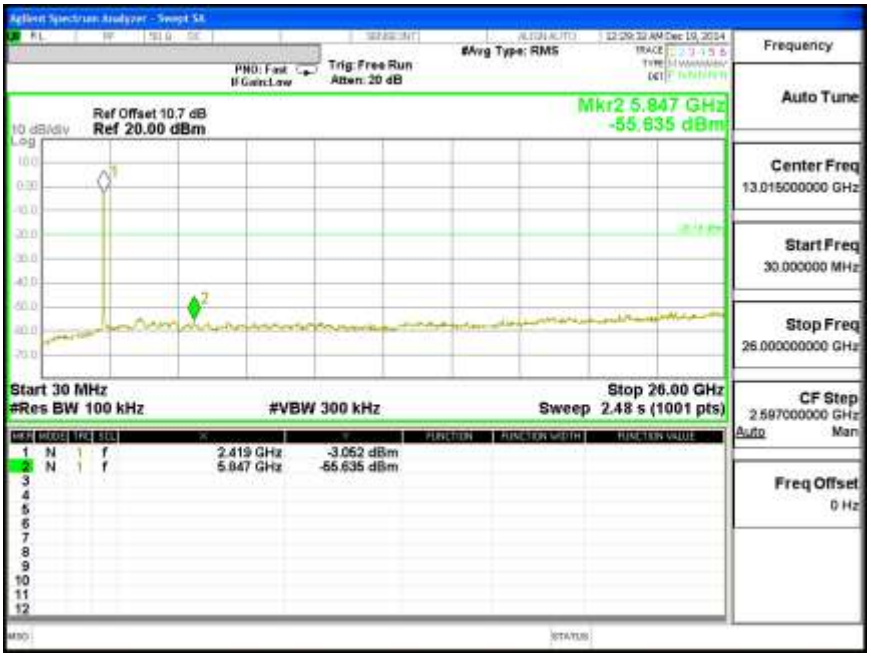
HIGH CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 HIGH CH



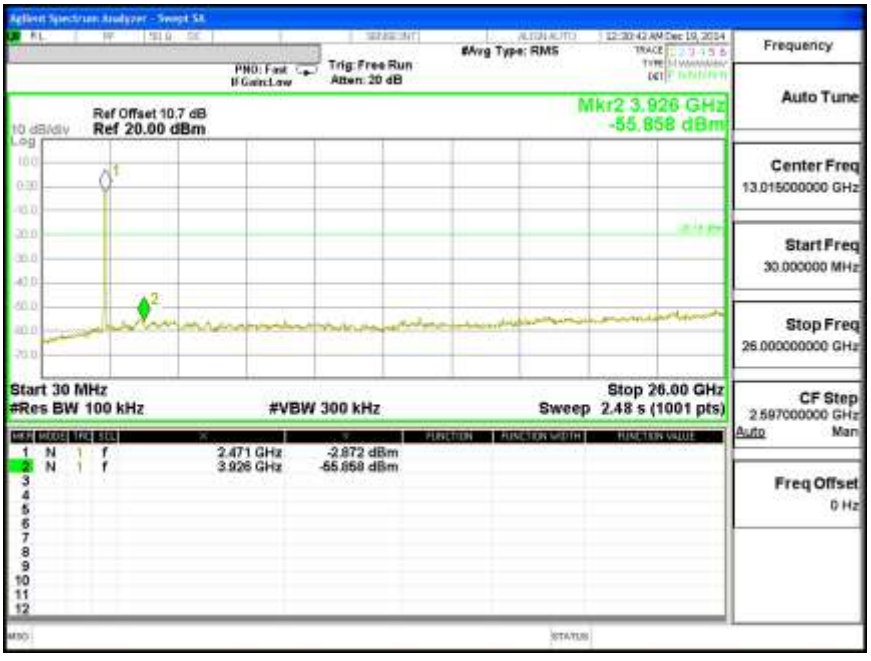
OUT-OF-BAND EMISSIONS, Chain 1

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	17.523	17.550	0.5
Mid	2437	17.523	17.631	0.5
High	2462	17.523	17.631	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

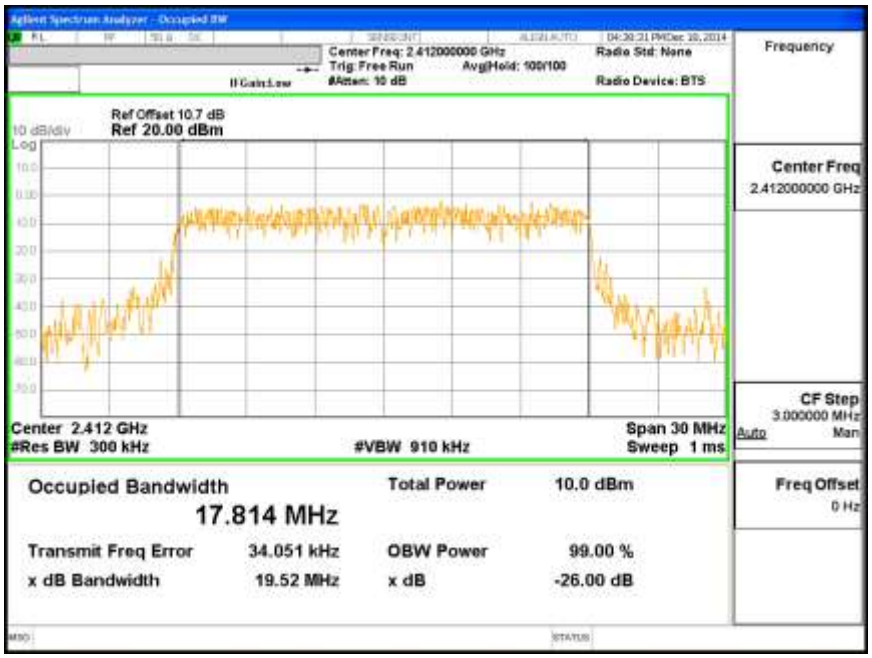
None; for reporting purposes only.

RESULTS

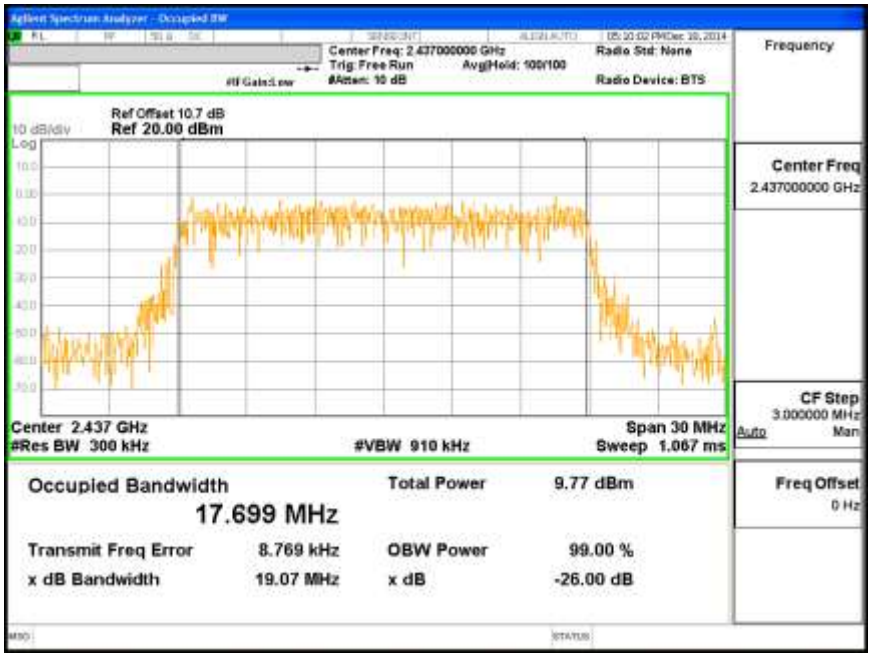
Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1(MHz)
Low	2412	17.814	17.650
Mid	2437	17.699	17.572
High	2462	17.621	17.666

99% BANDWIDTH, Chain 0

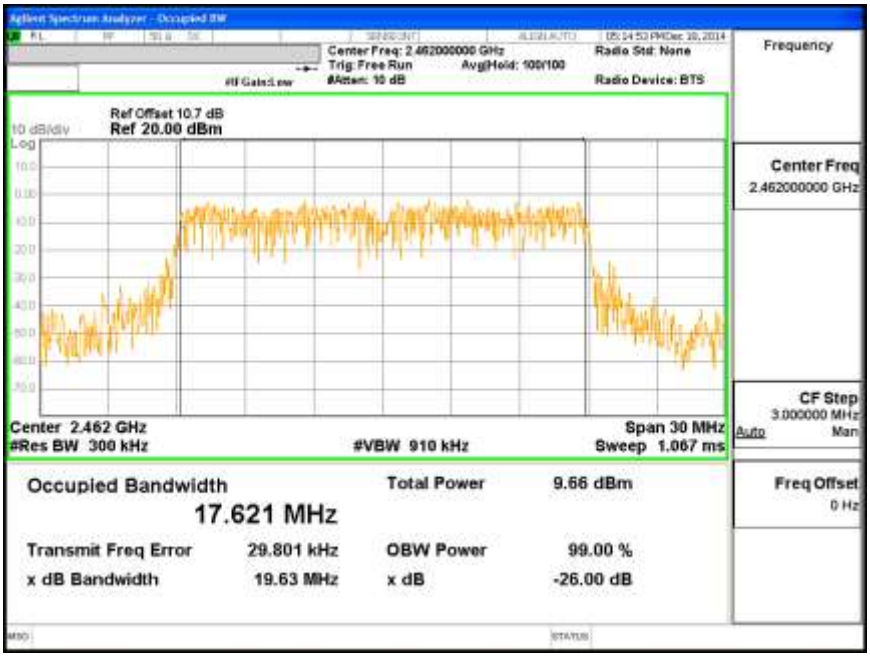
99% BANDWIDTH Chain 0 LOW CH



99% BANDWIDTH Chain 0 MID CH

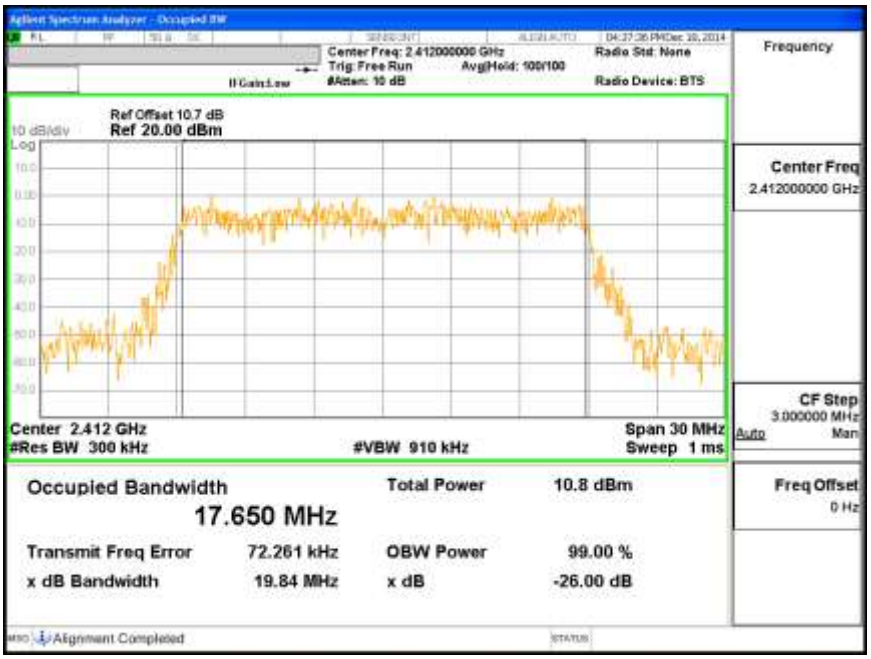


99% BANDWIDTH Chain 0 HIGH CH

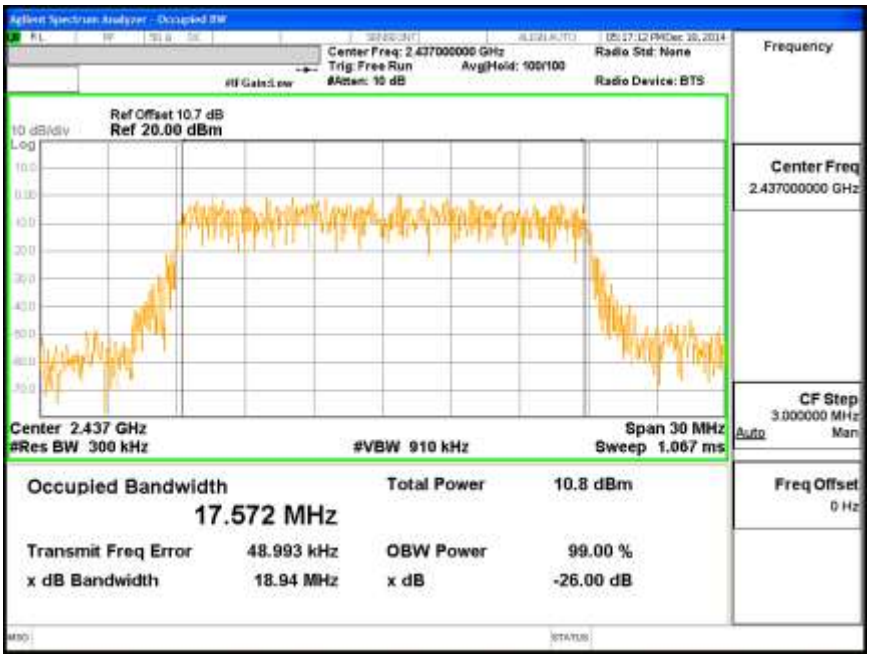


99% BANDWIDTH, Chain 1

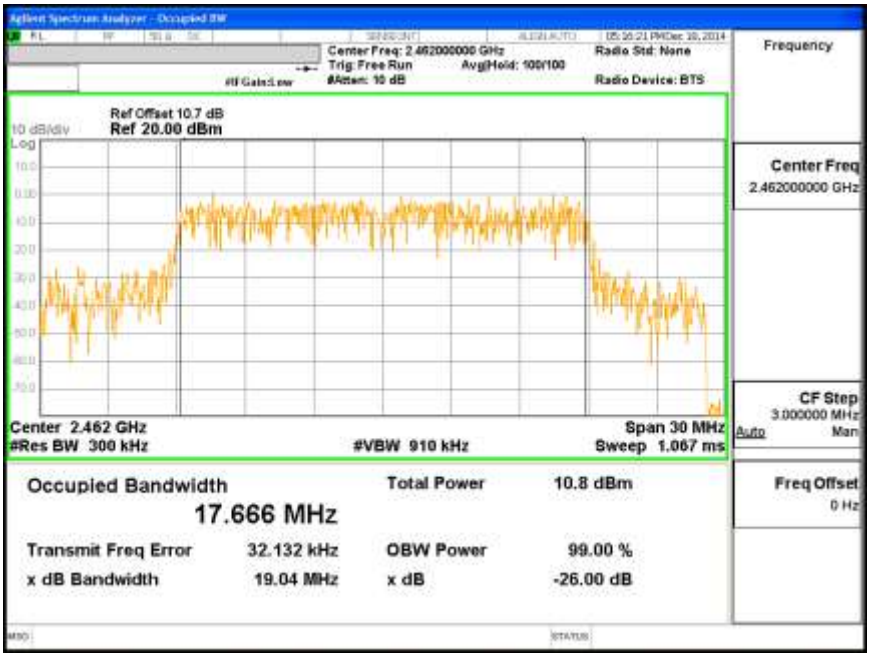
99% BANDWIDTH Chain 1 LOW CH



99% BANDWIDTH Chain 1 MID CH



99% BANDWIDTH Chain 1 HIGH CH



9.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	9.81	10.12	12.98
Mid	2437	9.91	10.08	13.01
High	2462	9.75	10.16	12.97

9.3.4. 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)
2.30	3.60	3.00

RESULTS

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	3.00	30	36	30.00
Mid	2437	3.00	30	36	30.00
High	2462	3.00	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	17.50	17.70	20.61	30.00	-9.39
Mid	2437	18.15	17.14	20.68	30.00	-9.32
High	2462	17.48	17.21	20.36	30.00	-9.64

9.3.5. 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.

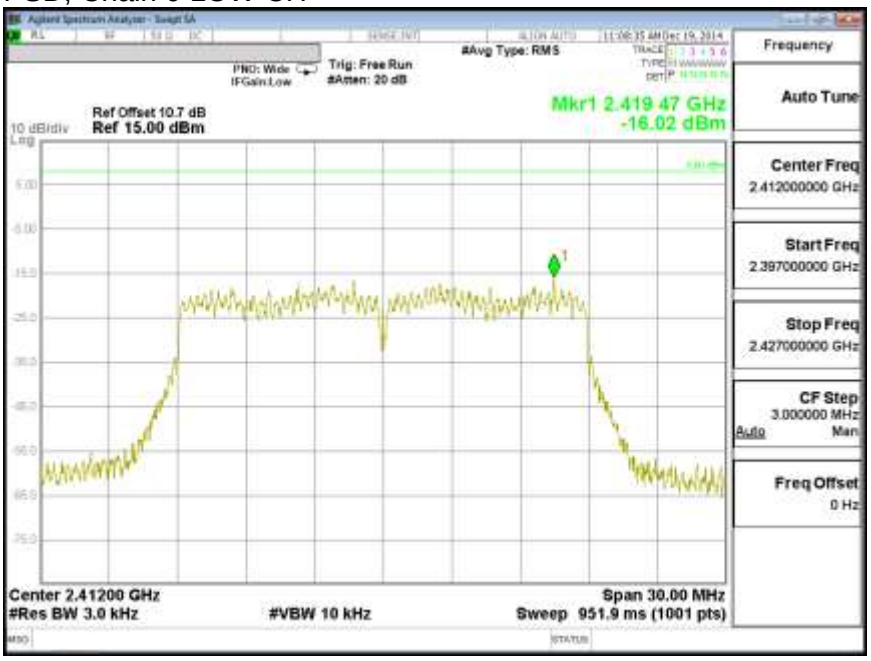
RESULTS

PSD Results

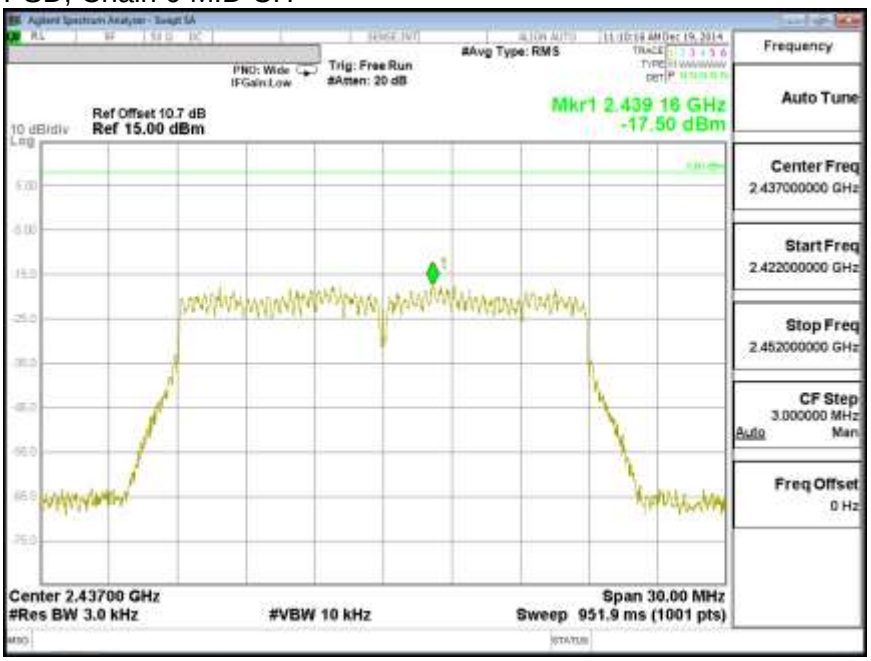
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-16.02	-16.50	-13.24	8.0	-21.2
Mid	2437	-17.50	-17.02	-14.24	8.0	-22.2
High	2462	-17.16	-17.41	-14.27	8.0	-22.3

PSD, Chain 0

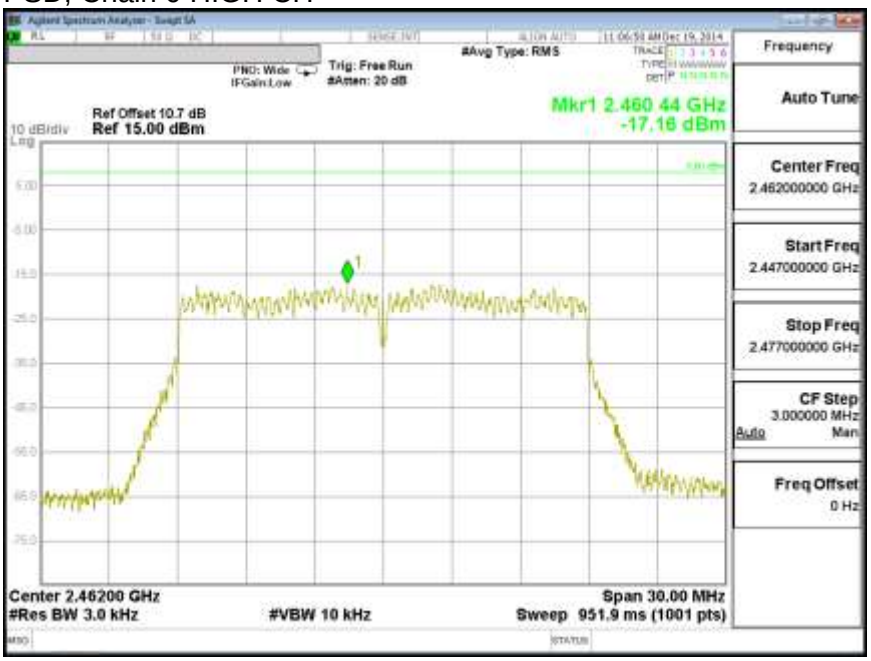
PSD, Chain 0 LOW CH



PSD, Chain 0 MID CH

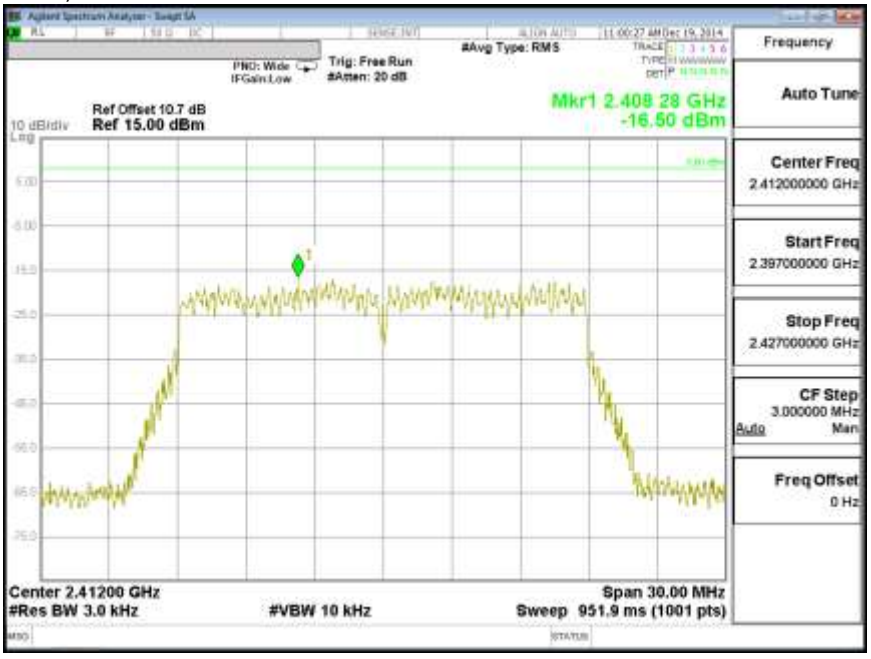


PSD, Chain 0 HIGH CH

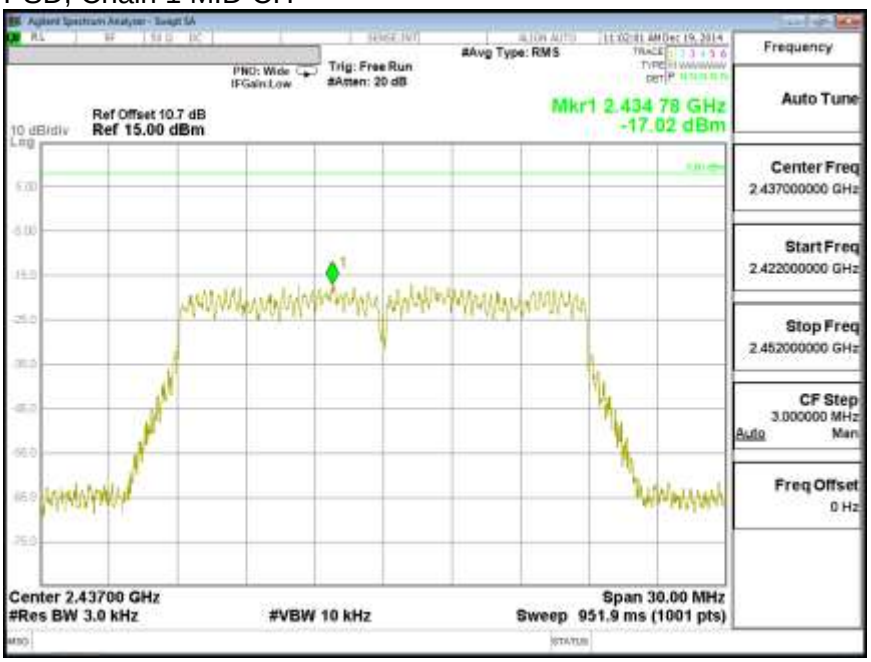


PSD, Chain 1

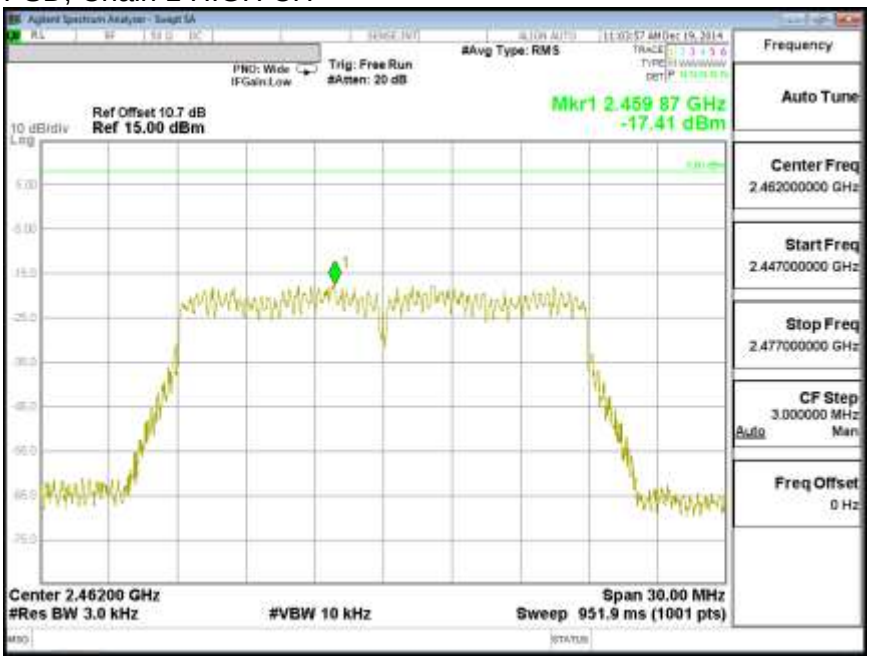
PSD, Chain 1 LOW CH



PSD, Chain 1 MID CH



PSD, Chain 1 HIGH CH



9.3.6. OUT-OF-BAND EMISSIONS

LIMITS

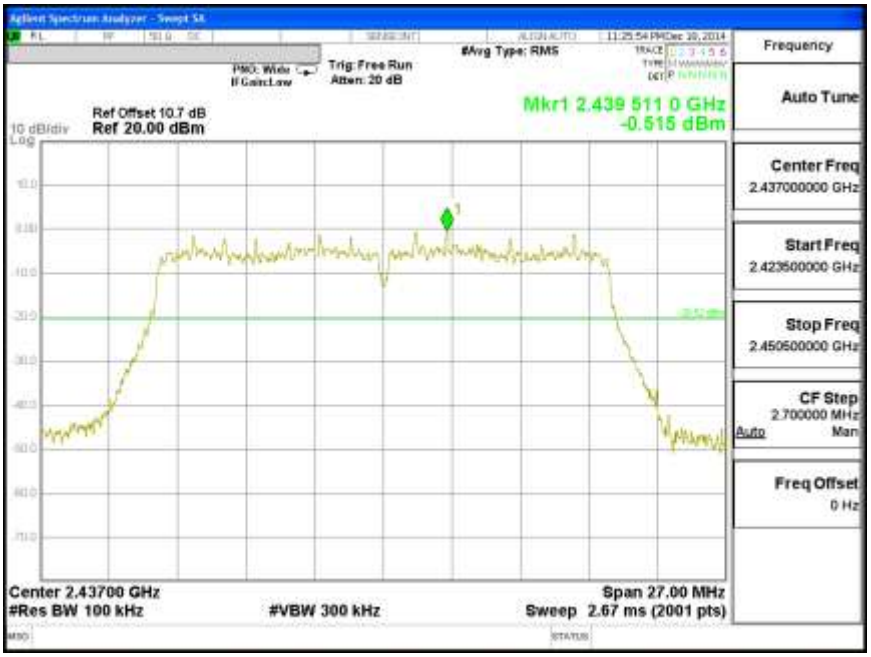
FCC §15.247 (d)

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

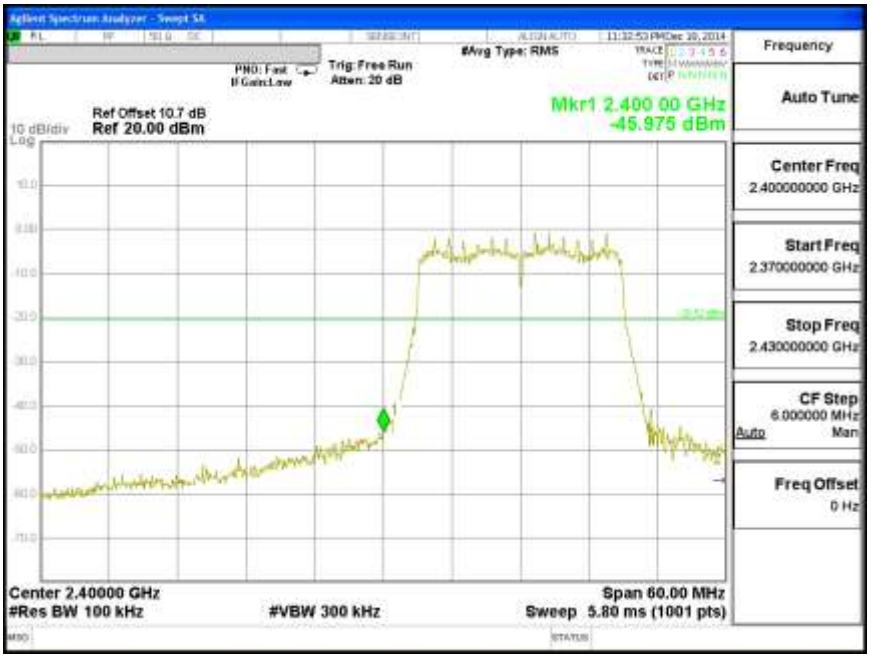
IN-BAND REFERENCE LEVEL, Chain 0

REFERENCE LEVEL Chain 0 MID CH



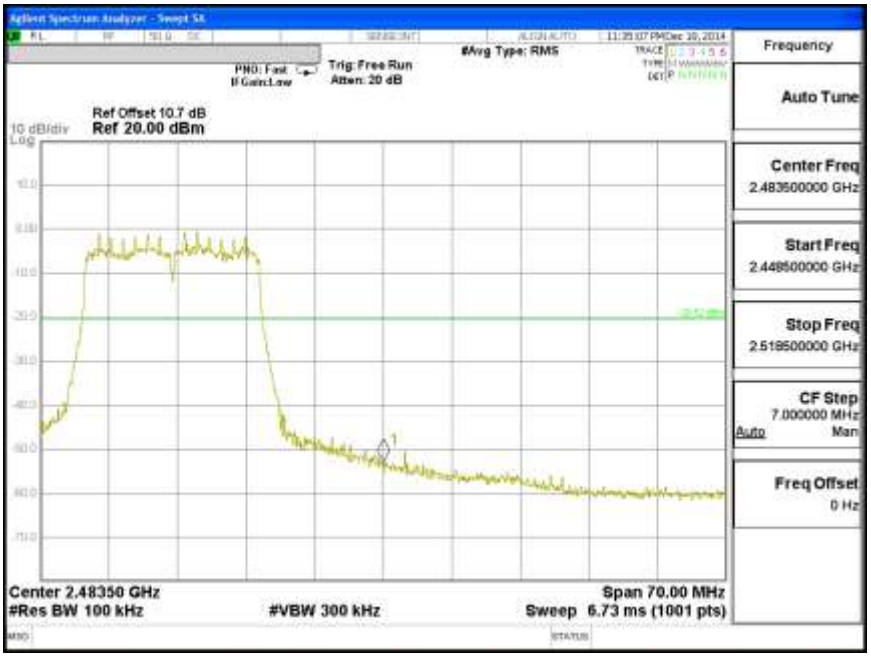
LOW CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 LOW CH



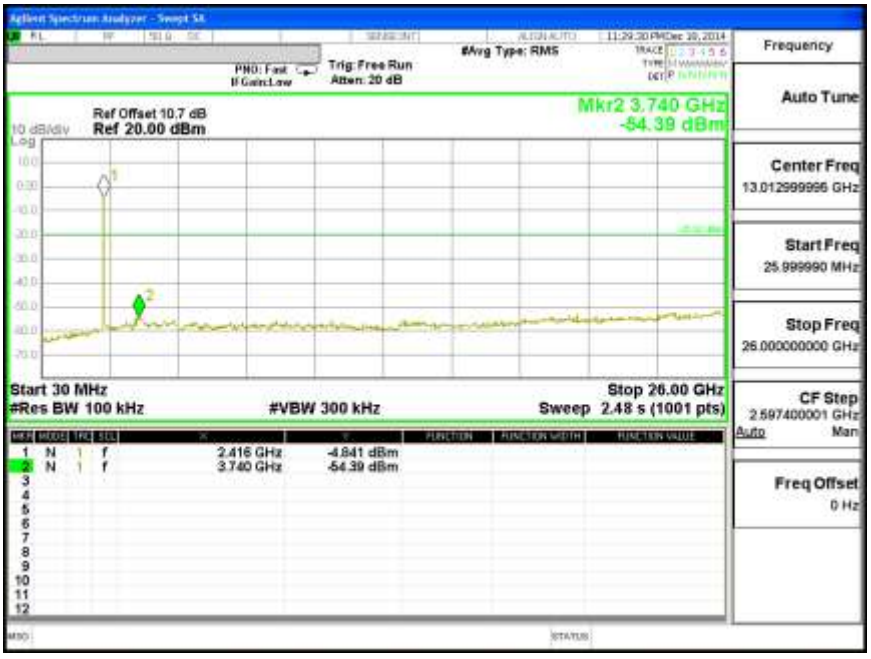
HIGH CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 HIGH CH

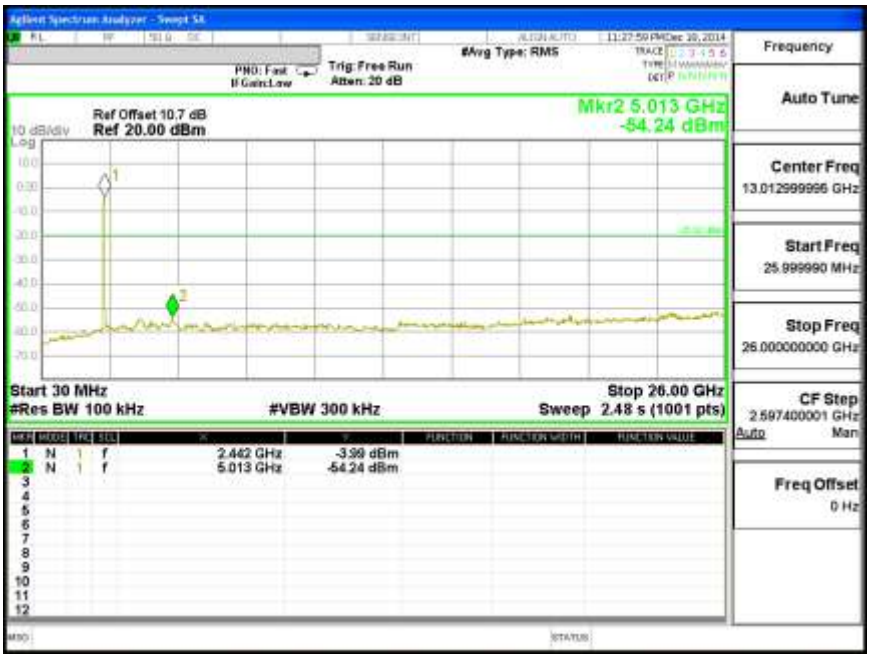


OUT-OF-BAND EMISSIONS, Chain 0

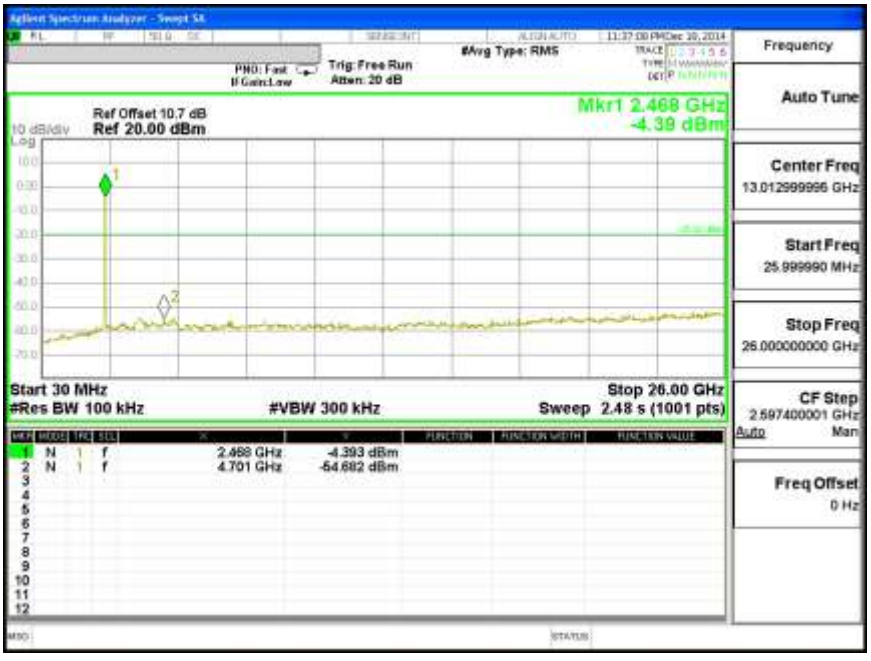
OUT OF BAND Chain 0 LOW CH



OUT OF BAND Chain 0 MID CH

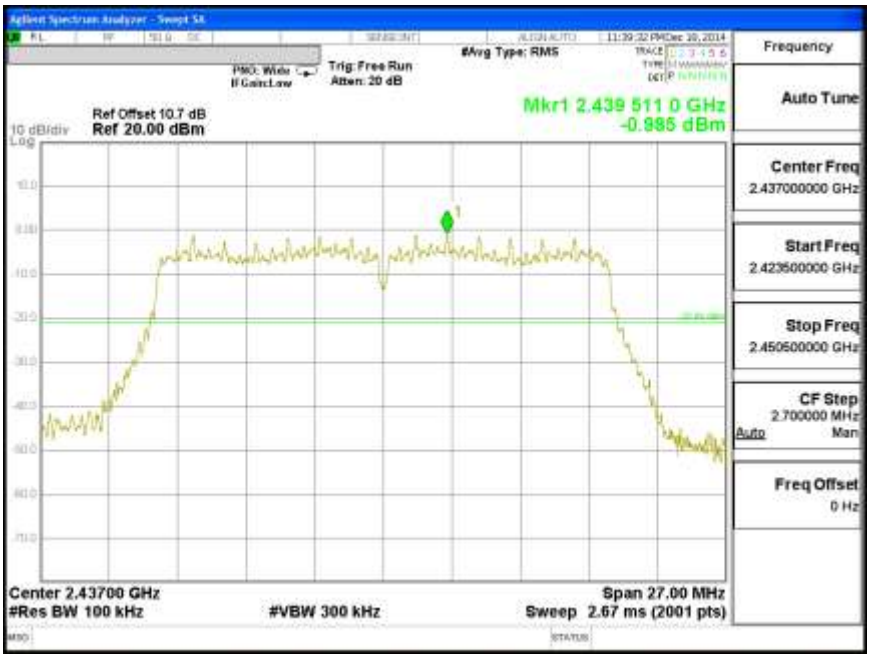


OUT OF BAND Chain 0 HIGH CH



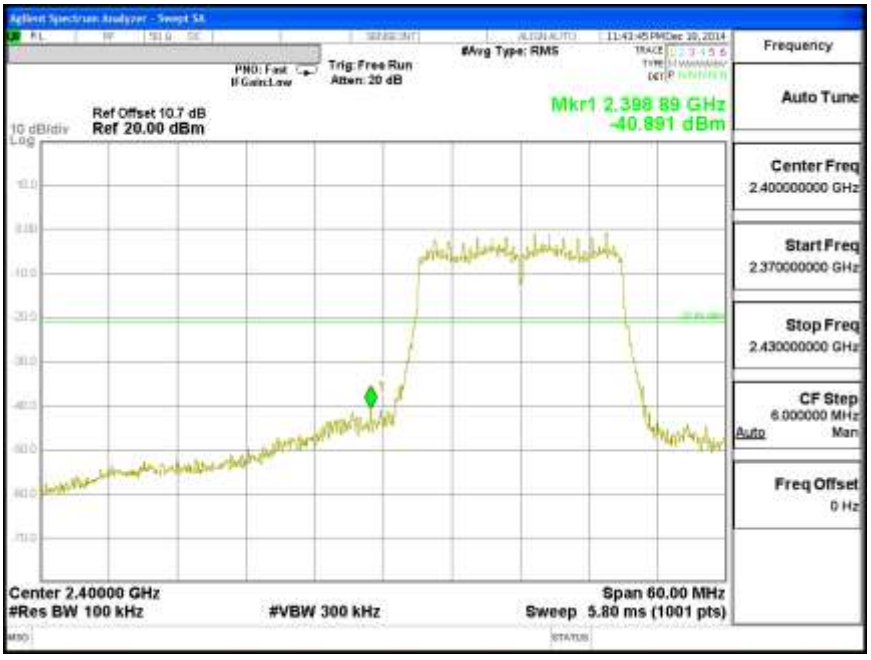
IN-BAND REFERENCE LEVEL, Chain 1

REFERENCE LEVEL Chain 1 MID CH



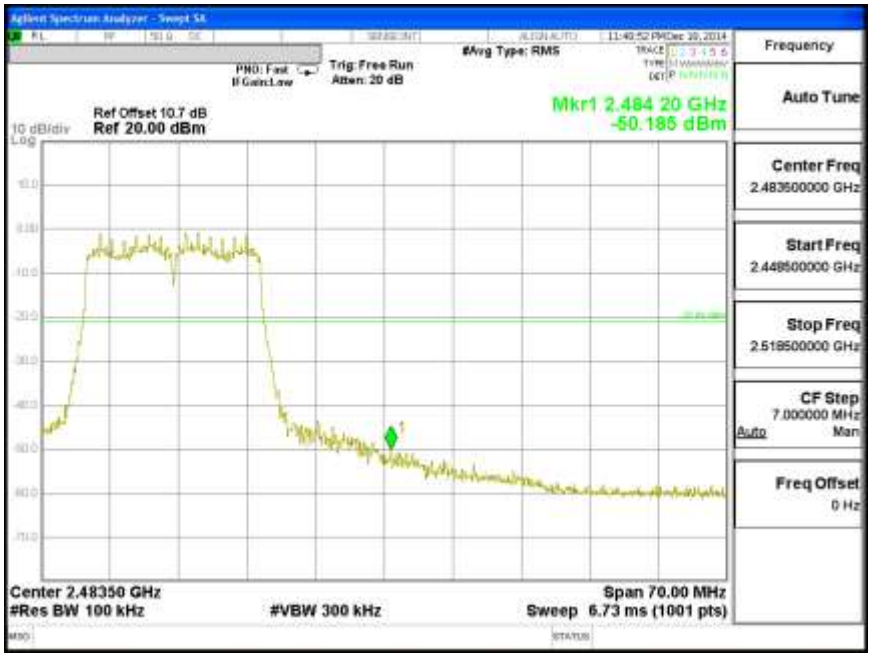
LOW CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 LOW CH



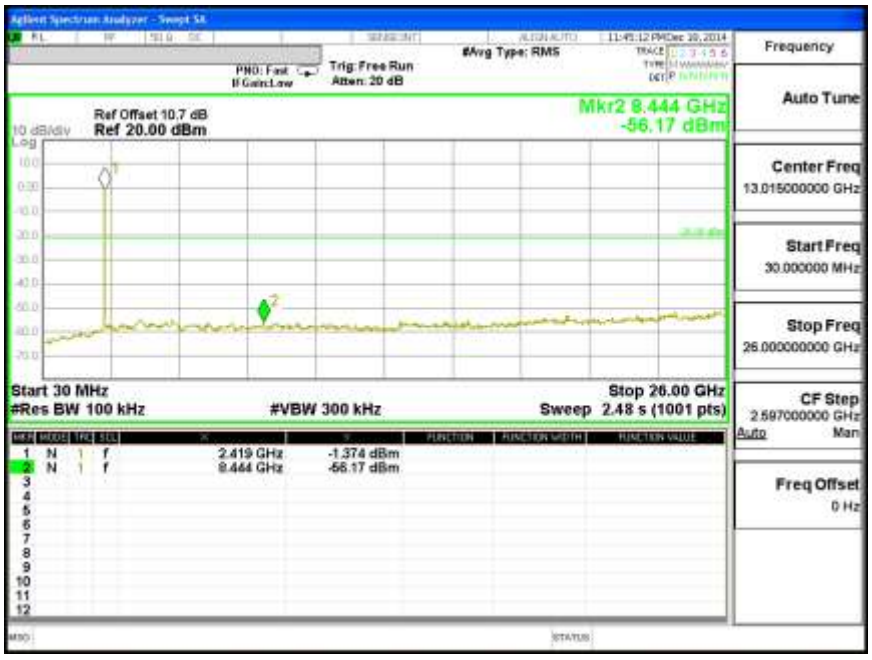
HIGH CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 HIGH CH

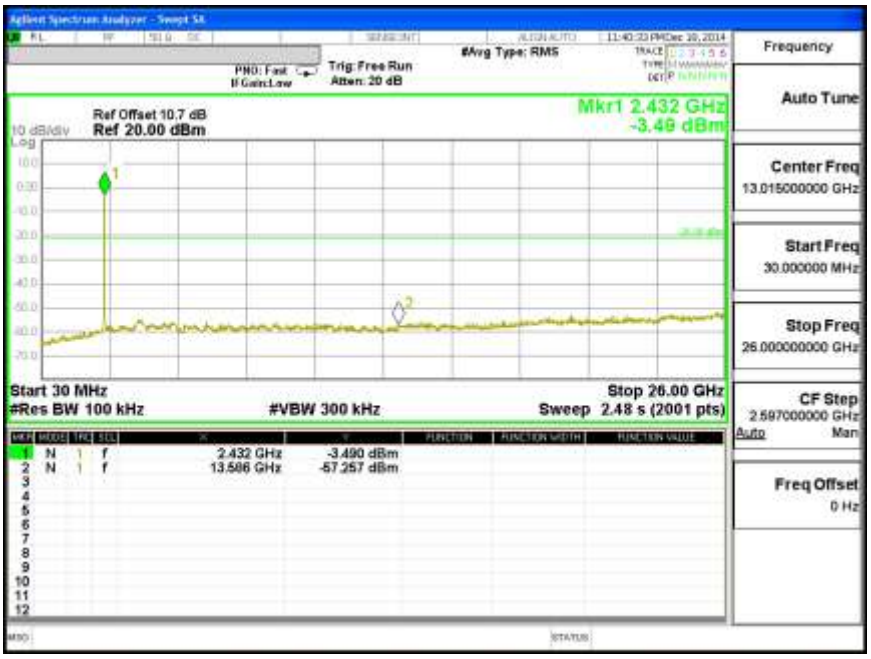


OUT-OF-BAND EMISSIONS, Chain 1

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.

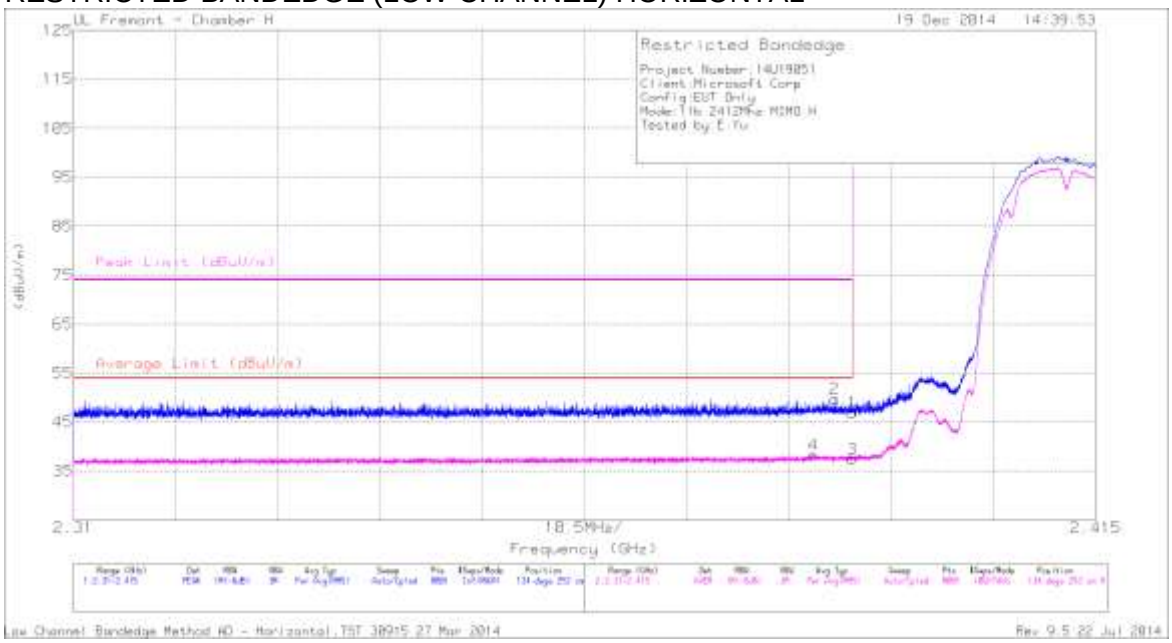
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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

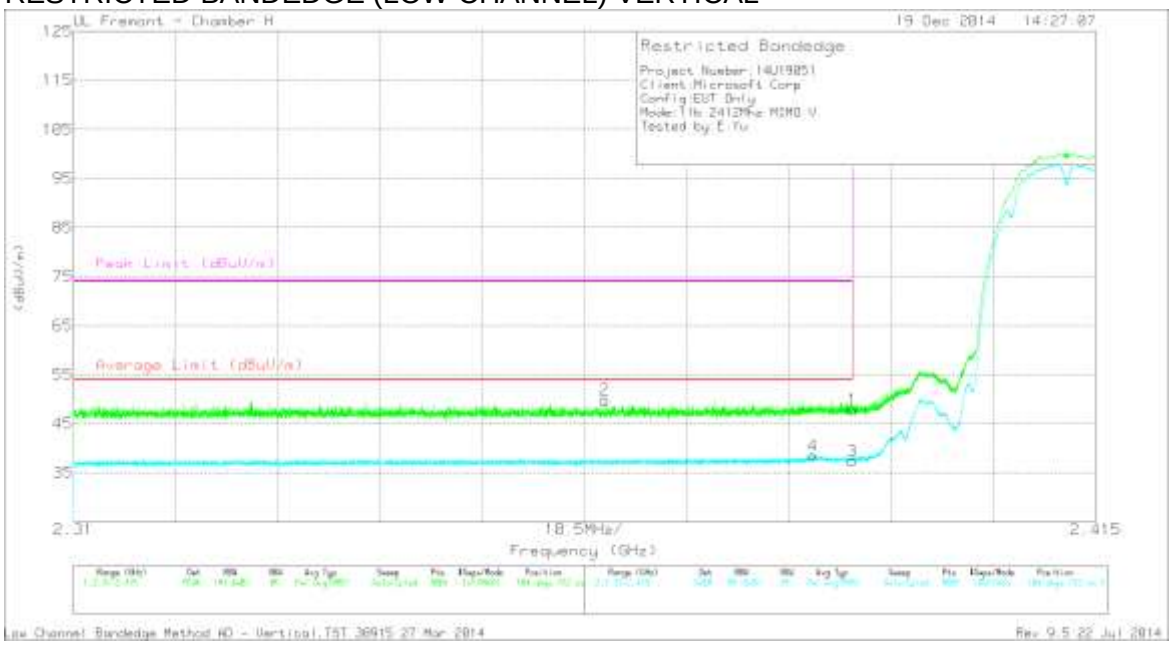


DATA

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
1	* 2.390	39.48	PK	32.0	-24.6	46.88	-	-	74	-27.12	134	252	H
2	* 2.388	42.35	PK	32.0	-24.6	49.75	-	-	74	-24.25	134	252	H
3	* 2.390	30.07	RMS	32.0	-24.6	37.47	54	-16.53	-	-	134	252	H
4	* 2.386	30.79	RMS	32.0	-24.5	38.29	54	-15.71	-	-	134	252	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

RESTRICTED BANDEDGE (LOW CHANNEL) VERTICAL

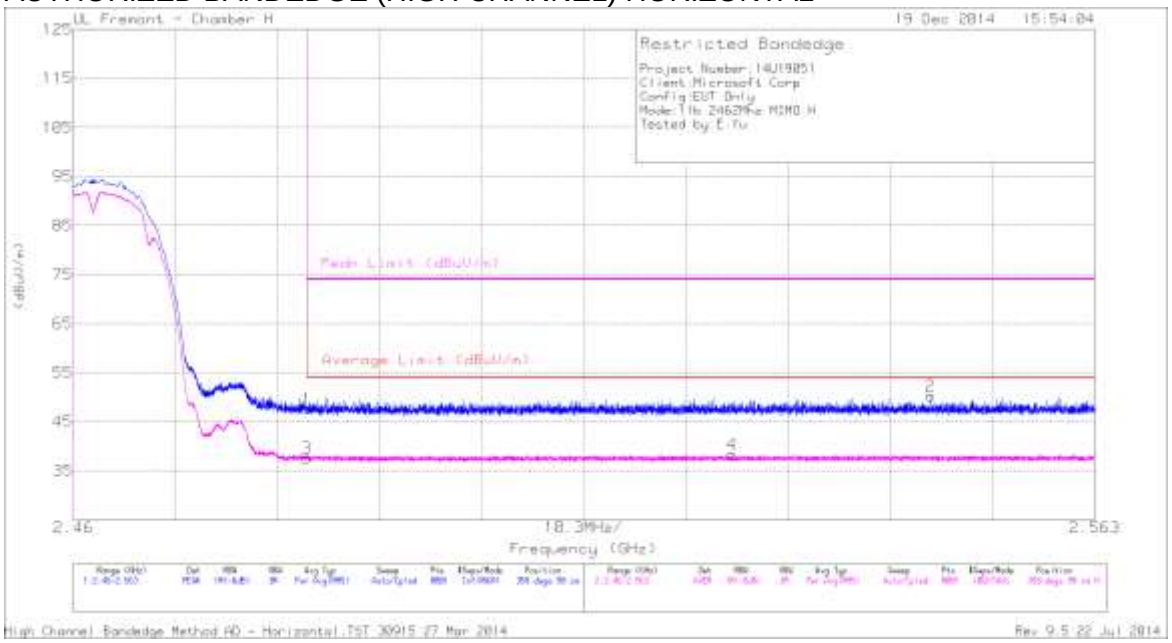


DATA

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	* 2.390	40.55	PK	32.0	-24.6	47.95	-	-	74	-26.05	104	152	V
2	* 2.365	42.56	PK	31.9	-24.6	49.86	-	-	74	-24.14	104	152	V
3	* 2.390	30.01	RMS	32.0	-24.6	37.41	54	-16.59	-	-	104	152	V
4	* 2.386	31.04	RMS	32.0	-24.5	38.54	54	-15.46	-	-	104	152	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) HORIZONTAL

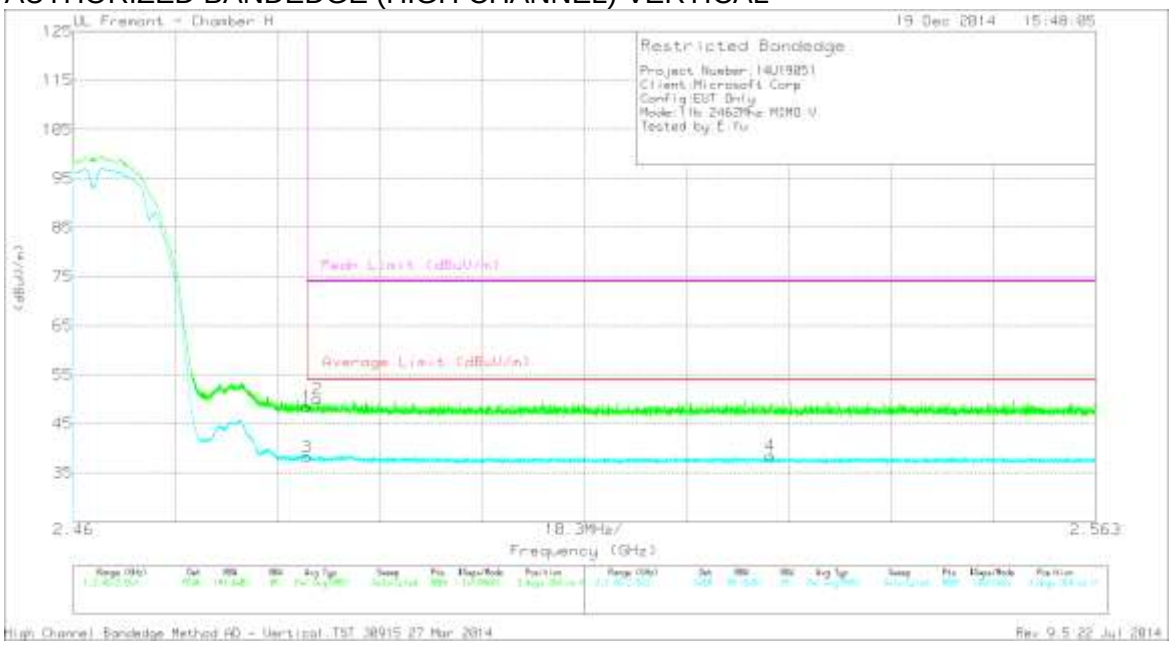


DATA

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	39.83	PK	32.2	-24.5	47.53	-	-	74	-26.47	358	98	H
2	2.546	42.51	PK	32.2	-24.4	50.31	-	-	74	-23.69	358	98	H
3	* 2.484	29.96	RMS	32.2	-24.5	37.66	54	-16.34	-	-	358	98	H
4	2.526	30.55	RMS	32.2	-24.4	38.35	54	-15.65	-	-	358	98	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) VERTICAL



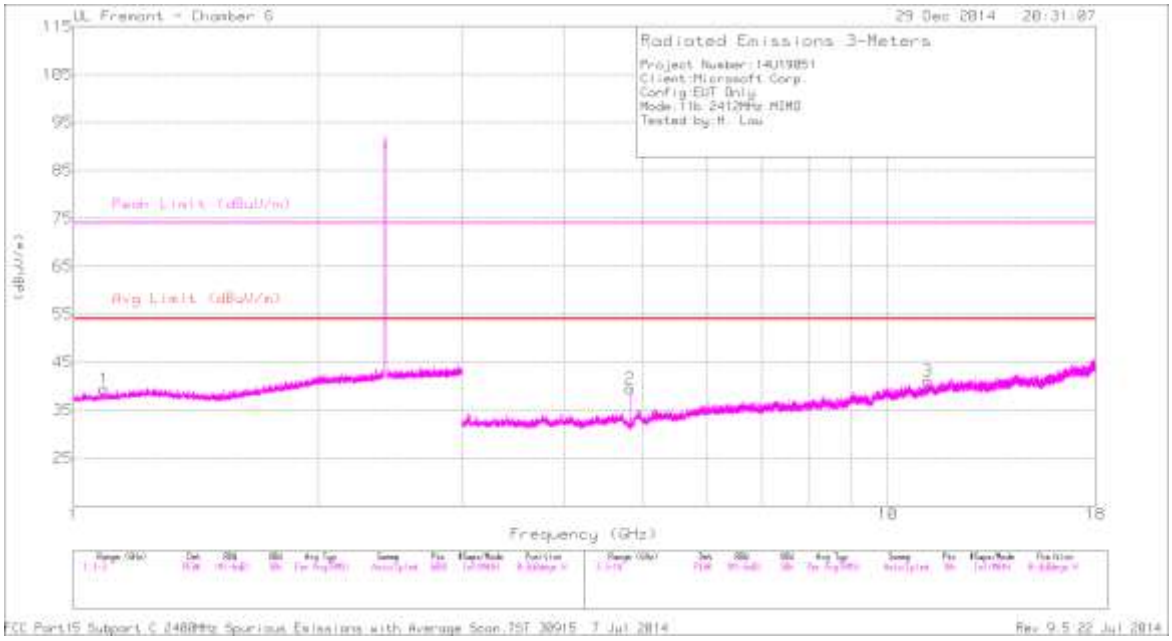
DATA

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	40.80	PK	32.2	-24.5	48.50	-	-	74	-25.50	3	364	V
2	* 2.485	42.29	PK	32.2	-24.5	49.99	-	-	74	-24.01	3	364	V
3	* 2.484	30.54	RMS	32.2	-24.5	38.24	54	-15.76	-	-	3	364	V
4	2.530	30.70	RMS	32.2	-24.4	38.50	54	-15.50	-	-	3	364	V

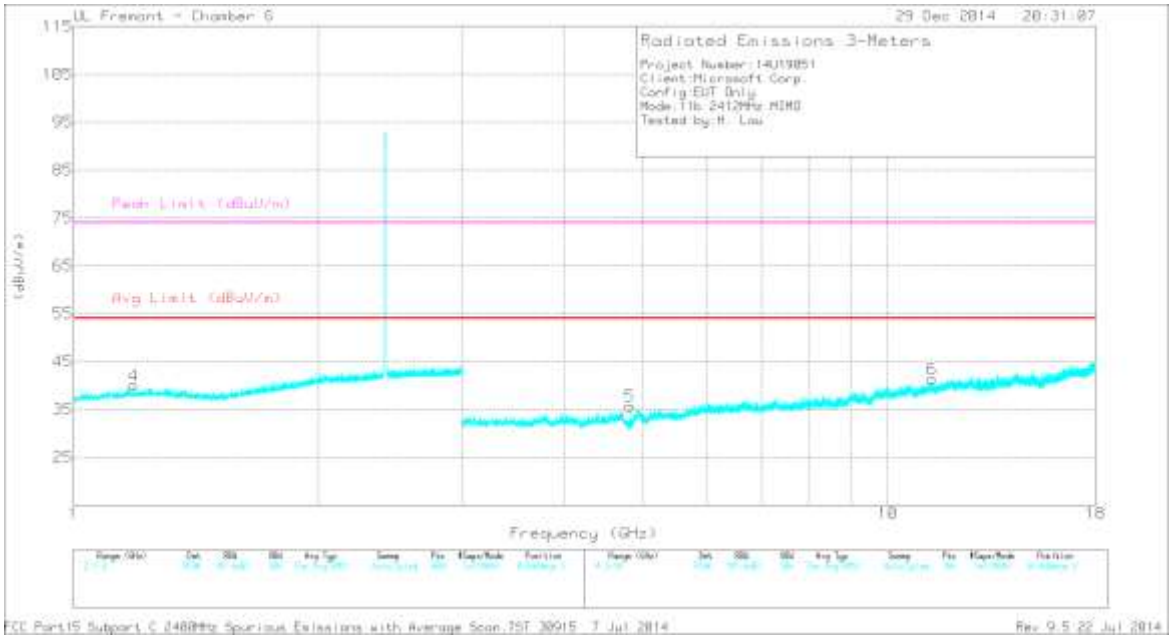
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



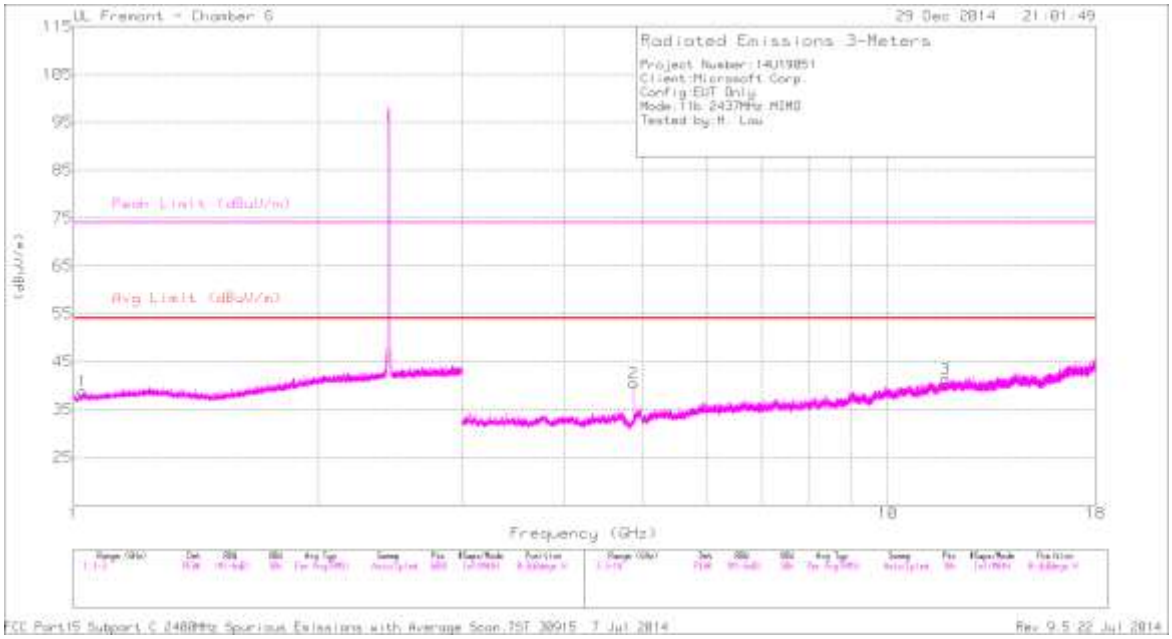
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	* 1.089	43.79	PK2	28.4	-26.1	46.09	-	-	74	-27.91	65	136	H
	* 1.089	32.66	MAv1	28.4	-26.1	34.96	54	-19.04	-	-	65	136	H
2	* 4.824	44.92	PK2	34.1	-33.0	46.02	-	-	74	-27.98	33	169	H
	* 4.824	38.60	MAv1	34.1	-33.0	39.70	54	-14.30	-	-	33	169	H
3	* 11.202	36.89	PK2	38.0	-26.6	48.29	-	-	74	-25.71	113	159	H
	* 11.203	25.66	MAv1	38.0	-26.6	37.06	54	-16.94	-	-	113	159	H
4	* 1.188	44.03	PK2	28.9	-26.0	46.93	-	-	74	-27.07	147	166	V
	* 1.187	32.70	MAv1	28.9	-26.0	35.60	54	-18.40	-	-	147	166	V
5	* 4.824	42.56	PK2	34.1	-33.0	43.66	-	-	74	-30.34	299	398	V
	* 4.824	34.67	MAv1	34.1	-33.0	35.77	54	-18.23	-	-	299	398	V
6	* 11.336	36.71	PK2	38.1	-26.0	48.81	-	-	74	-25.19	212	152	V
	* 11.335	25.25	MAv1	38.1	-26.0	37.35	54	-16.65	-	-	212	152	V

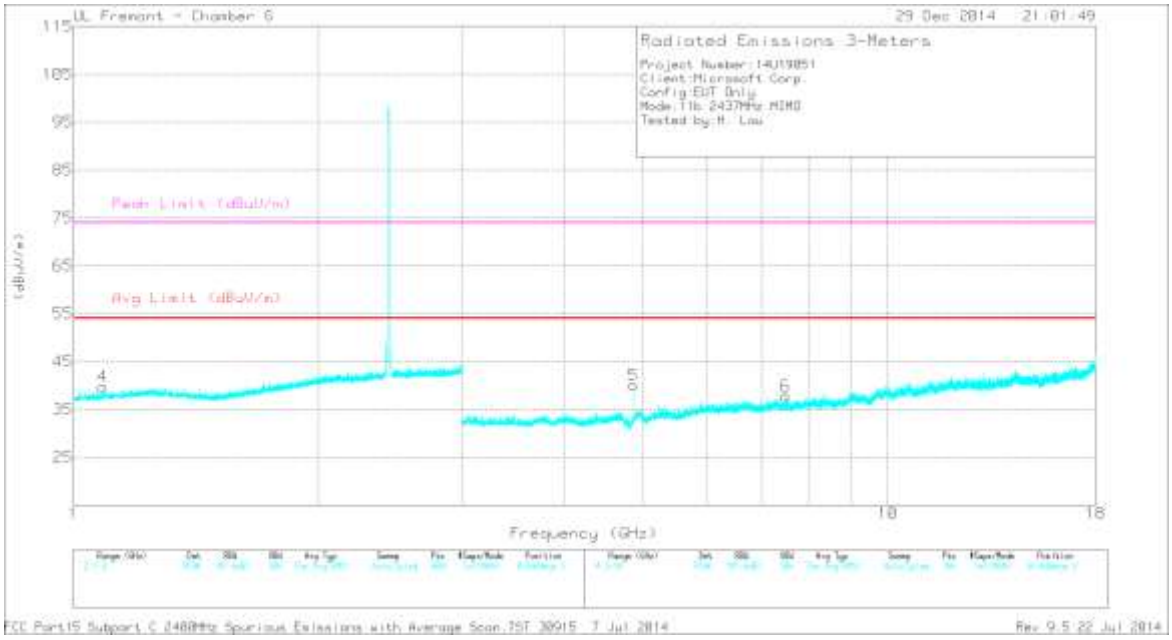
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



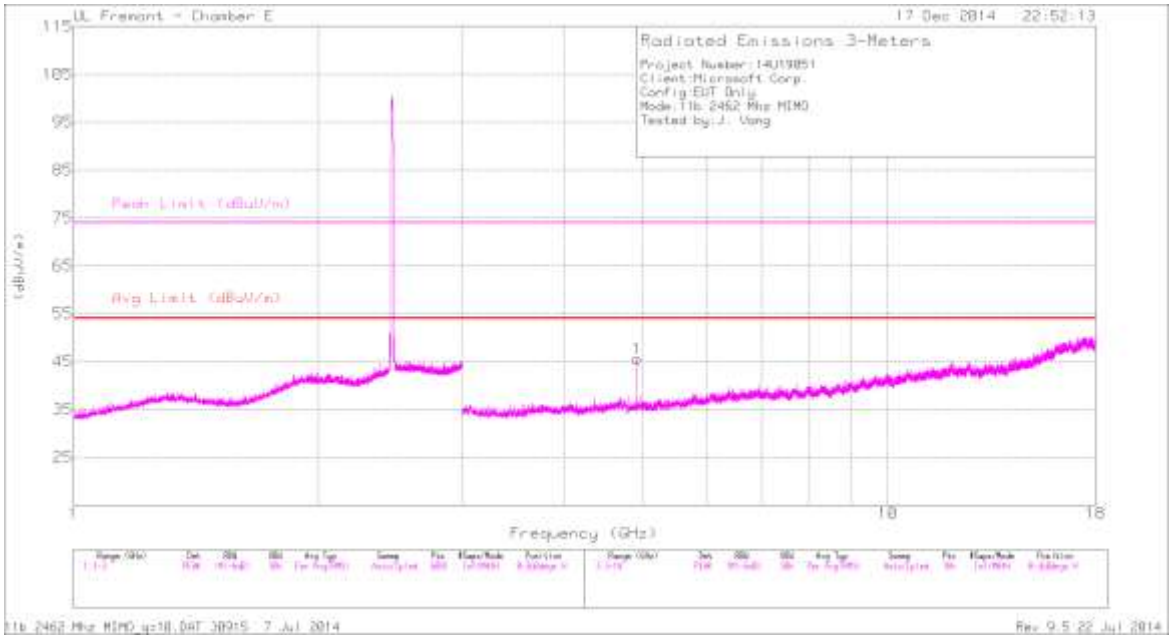
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	* 1.024	44.15	PK2	28.1	-26.2	46.05	-	-	74	-27.95	172	116	H
	* 1.024	32.78	MAv1	28.1	-26.2	34.68	54	-19.32	-	-	172	116	H
2	* 4.874	44.34	PK2	34.1	-33.1	45.34	-	-	74	-28.66	45	102	H
	* 4.874	38.39	MAv1	34.1	-33.1	39.39	54	-14.61	-	-	45	102	H
3	* 11.775	37.46	PK2	38.7	-27.2	48.96	-	-	74	-25.04	134	136	H
	* 11.776	25.89	MAv1	38.7	-27.2	37.39	54	-16.61	-	-	134	136	H
4	* 1.086	43.90	PK2	28.4	-26.1	46.20	-	-	74	-27.80	101	178	V
	* 1.086	32.75	MAv1	28.4	-26.1	35.05	54	-18.95	-	-	101	178	V
5	* 4.874	44.35	PK2	34.1	-33.1	45.35	-	-	74	-28.65	297	228	V
	* 4.874	38.05	MAv1	34.1	-33.1	39.05	54	-14.95	-	-	297	228	V
6	* 7.491	39.95	PK2	35.6	-30.9	44.65	-	-	74	-29.35	242	124	V
	* 7.491	28.73	MAv1	35.6	-30.9	33.43	54	-20.57	-	-	242	124	V

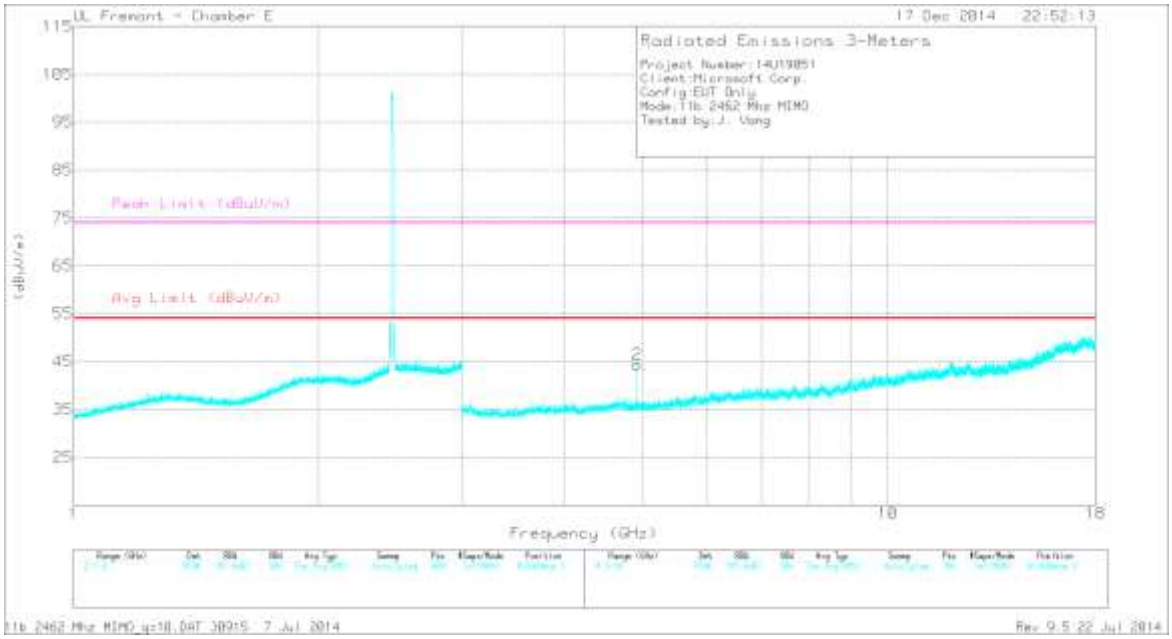
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



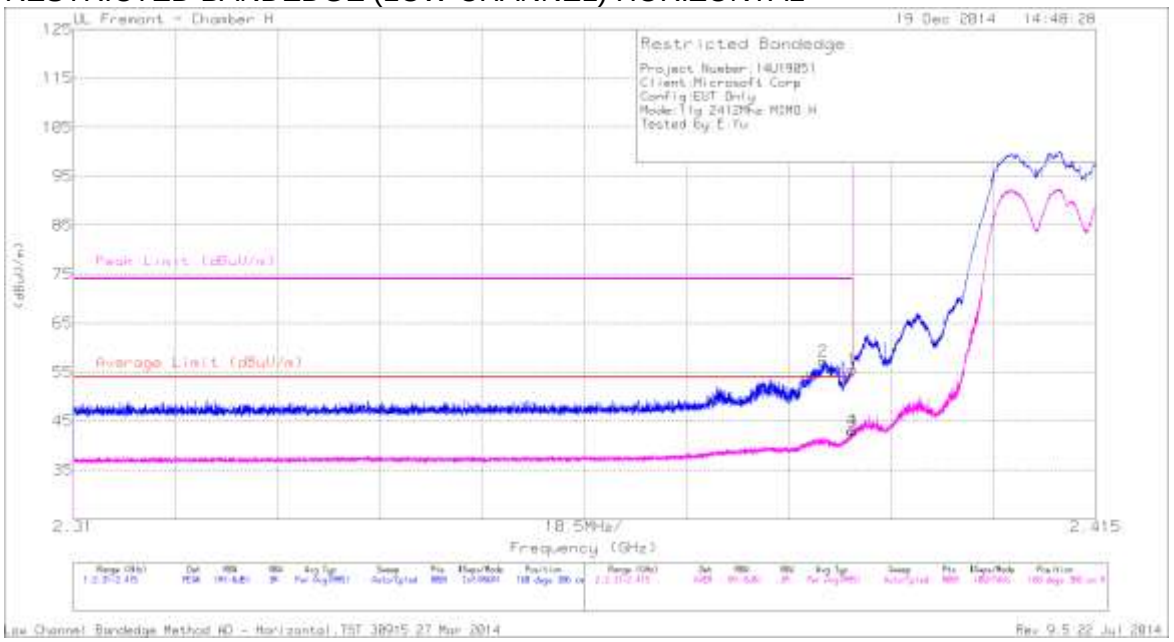
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 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	* 4.924	46.56	PK2	34.1	-30.5	50.16	-	-	74	-23.84	338	313	H
	* 4.924	42.68	MAv1	34.1	-30.5	46.28	54	-7.72	-	-	338	313	H
2	* 4.924	44.86	PK2	34.1	-30.5	48.46	-	-	74	-25.54	39	210	V
	* 4.924	39.79	MAv1	34.1	-30.5	43.39	54	-10.61	-	-	39	210	V

* - indicates frequency in CFR15.205/IC7.2.2 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

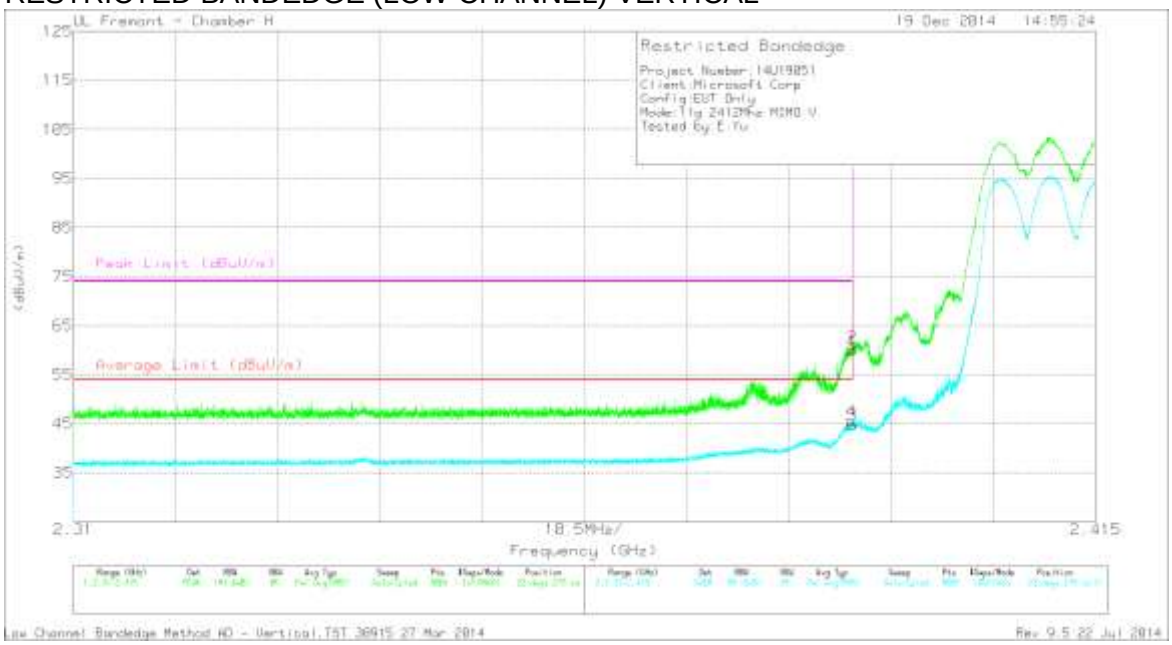


DATA

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	* 2.390	48.28	PK	32	-24.6	55.68	-	-	74	-18.32	160	306	H
2	* 2.387	49.76	PK	32	-24.5	57.26	-	-	74	-16.74	160	306	H
3	* 2.390	35.45	RMS	32	-24.6	42.85	54	-11.15	-	-	160	306	H
4	* 2.390	35.66	RMS	32	-24.6	43.06	54	-10.94	-	-	160	306	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

RESTRICTED BANDEDGE (LOW CHANNEL) VERTICAL

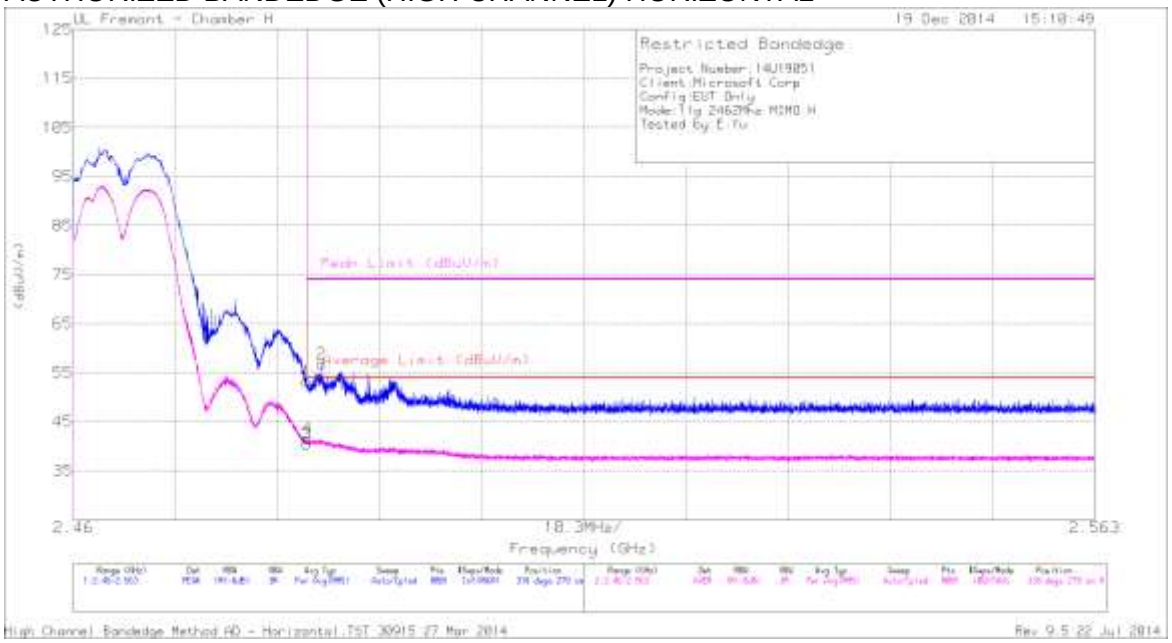


DATA

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	* 2.390	52.45	PK	32	-24.6	59.85	-	-	74	-14.15	22	275	V
2	* 2.390	53.15	PK	32	-24.6	60.55	-	-	74	-13.45	22	275	V
3	* 2.390	37.39	RMS	32	-24.6	44.79	54	-9.21	-	-	22	275	V
4	* 2.390	38.21	RMS	32	-24.6	45.61	54	-8.39	-	-	22	275	V

* - indicates frequency in CFR15.205/IC7.2.2 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	45.54	PK	32.2	-24.5	53.24	-	-	74	-20.76	318	279	H
2	* 2.485	49.20	PK	32.2	-24.5	56.90	-	-	74	-17.10	318	279	H
3	* 2.484	32.85	RMS	32.2	-24.5	40.55	54	-13.45	-	-	318	279	H
4	* 2.484	33.95	RMS	32.2	-24.5	41.65	54	-12.35	-	-	318	279	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) VERTICAL

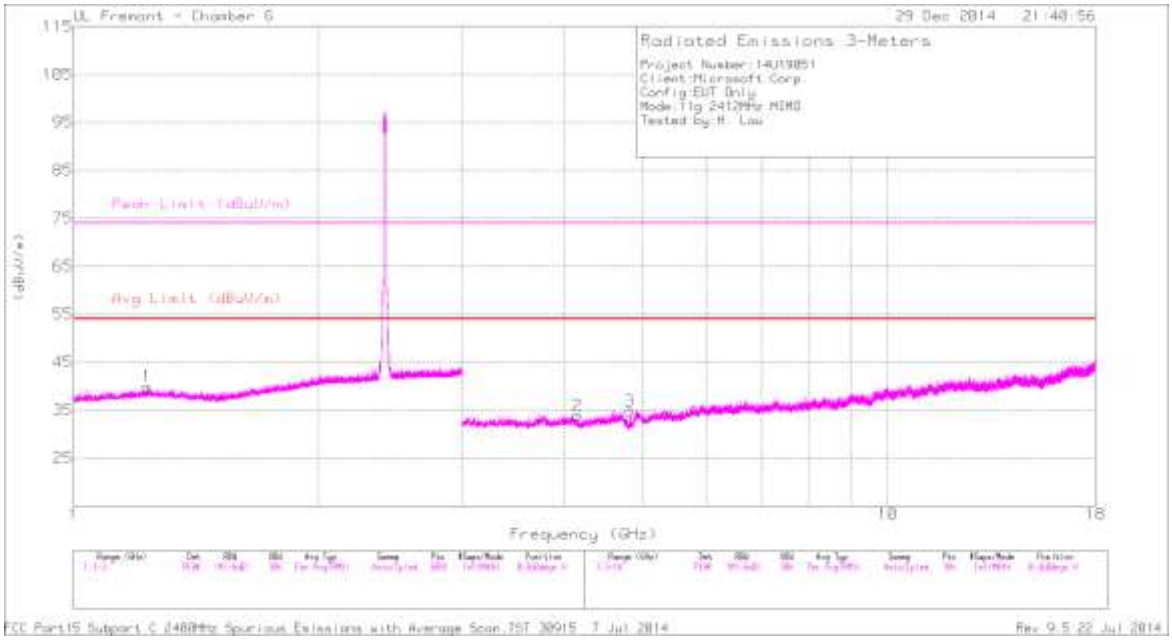
DATA

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	50.80	PK	32.2	-24.5	58.50	-	-	74	-15.50	264	158	V
2	* 2.484	53.36	PK	32.2	-24.5	61.06	-	-	74	-12.94	264	158	V
3	* 2.484	38.23	RMS	32.2	-24.5	45.93	54	-8.07	-	-	264	158	V
4	* 2.484	38.66	RMS	32.2	-24.5	46.36	54	-7.64	-	-	264	158	V

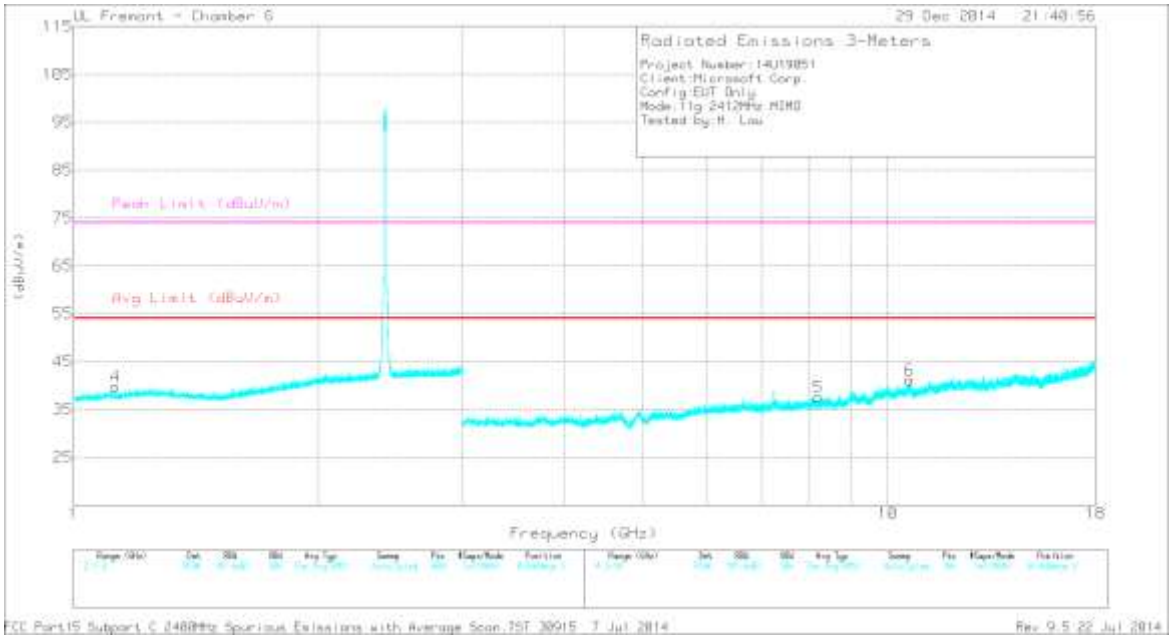
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



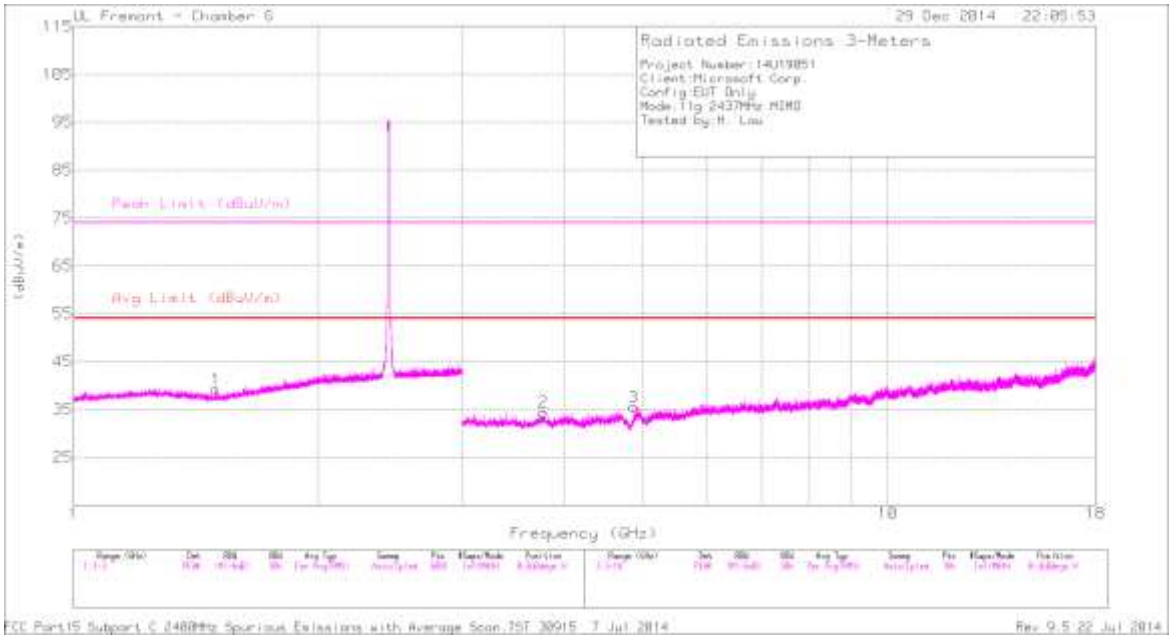
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	* 1.233	43.93	PK2	29.1	-26.0	47.03	-	-	74	-26.97	292	172	H
	* 1.231	32.85	MAv1	29.1	-26.0	35.95	54	-18.05	-	-	292	172	H
2	* 4.158	42.27	PK2	33.4	-33.8	41.87	-	-	74	-32.13	131	164	H
	* 4.158	30.41	MAv1	33.4	-33.8	30.01	54	-23.99	-	-	131	164	H
3	* 4.825	39.99	PK2	34.1	-33.0	41.09	-	-	74	-32.91	195	157	H
	* 4.824	29.33	MAv1	34.1	-33.0	30.43	54	-23.57	-	-	195	157	H
4	* 1.125	44.65	PK2	28.6	-26.0	47.25	-	-	74	-26.75	235	153	V
	* 1.124	32.60	MAv1	28.6	-26.0	35.20	54	-18.80	-	-	235	153	V
5	* 8.211	38.77	PK2	35.8	-29.9	44.67	-	-	74	-29.33	46	119	V
	* 8.213	28.15	MAv1	35.8	-29.9	34.05	54	-19.95	-	-	46	119	V
6	* 10.636	37.15	PK2	37.7	-26.0	48.85	-	-	74	-25.15	134	136	V
	* 10.637	26.01	MAv1	37.7	-26.0	37.71	54	-16.29	-	-	134	136	V

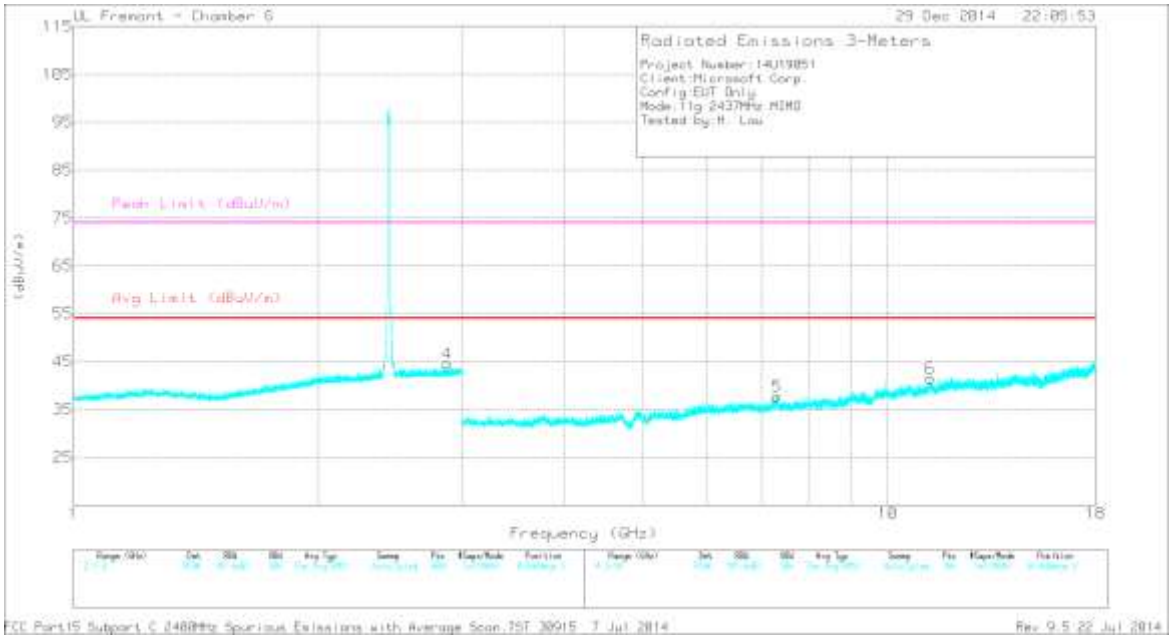
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



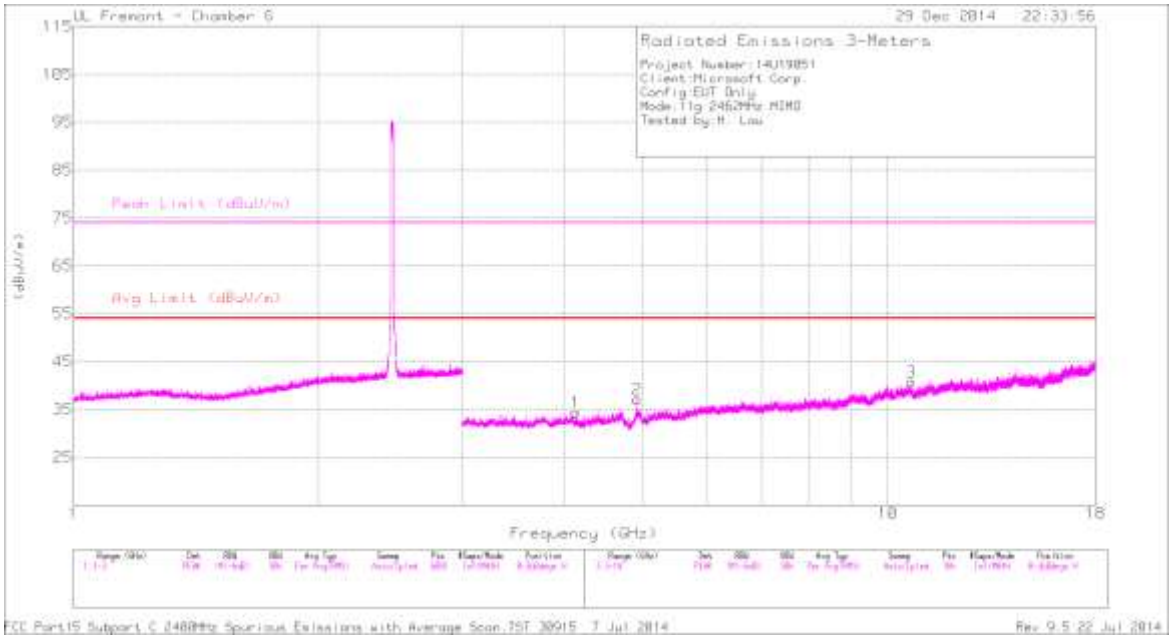
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	* 1.495	43.88	PK2	27.9	-25.6	46.18	-	-	74	-27.82	86	119	H
	* 1.493	32.36	MAv1	27.9	-25.6	34.66	54	-19.34	-	-	86	119	H
2	* 3.779	41.43	PK2	33.0	-32.8	41.63	-	-	74	-32.37	227	175	H
	* 3.780	30.59	MAv1	33.0	-32.8	30.79	54	-23.21	-	-	227	175	H
3	* 4.874	42.05	PK2	34.1	-33.1	43.05	-	-	74	-30.95	15	164	H
	* 4.874	31.03	MAv1	34.1	-33.1	32.03	54	-21.97	-	-	15	164	H
4	* 2.88	43.10	PK2	32.3	-24.8	50.60	-	-	74	-23.40	153	148	V
	* 2.879	31.91	MAv1	32.3	-24.8	39.41	54	-14.59	-	-	153	148	V
5	* 7.313	40.38	PK2	35.6	-31.1	44.88	-	-	74	-29.12	93	132	V
	* 7.313	29.47	MAv1	35.6	-31.1	33.97	54	-20.03	-	-	93	132	V
6	* 11.268	36.51	PK2	38.0	-25.9	48.61	-	-	74	-25.39	171	219	V
	* 11.268	25.39	MAv1	38.0	-25.9	37.49	54	-16.51	-	-	171	219	V

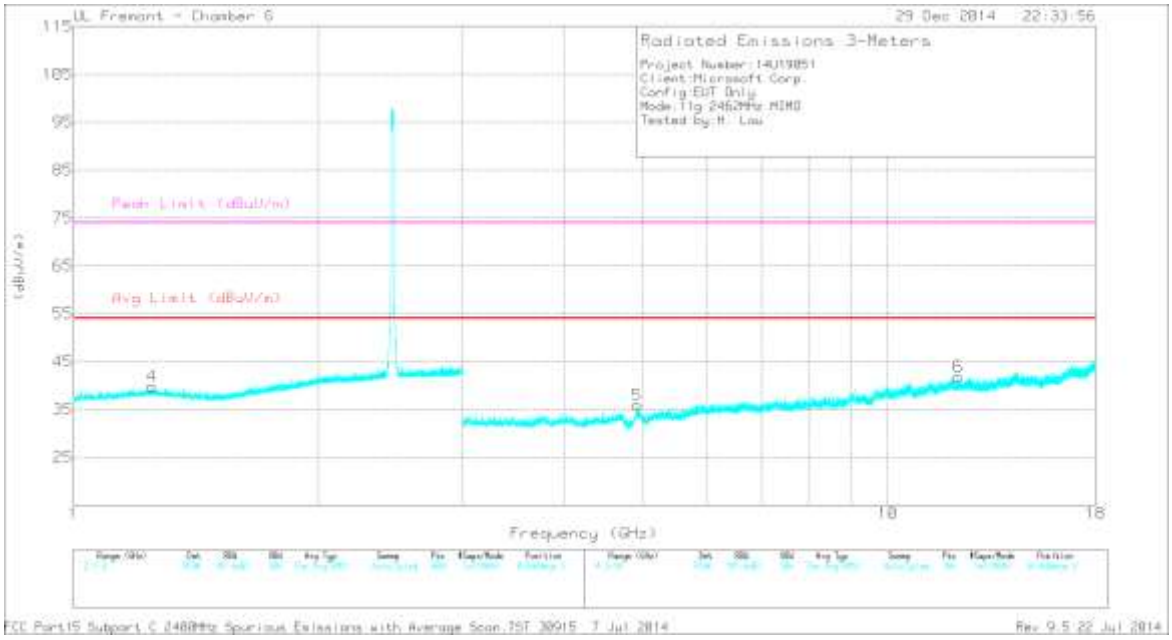
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



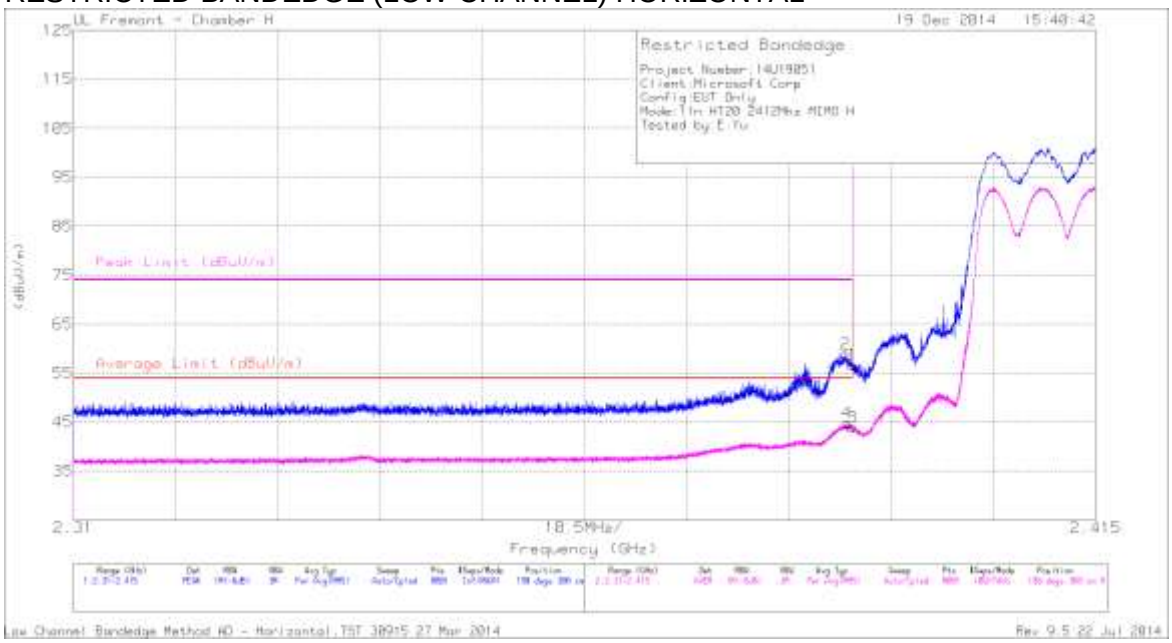
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	* 4.138	41.49	PK2	33.4	-33.5	41.39	-	-	74	-32.61	105	224	H
	* 4.139	30.12	MAv1	33.4	-33.6	29.92	54	-24.08	-	-	105	224	H
2	* 4.924	44.33	PK2	34.1	-33.1	45.33	-	-	74	-28.67	4	366	H
	* 4.924	33.54	MAv1	34.1	-33.1	34.54	54	-19.46	-	-	4	366	H
3	* 10.684	37.39	PK2	37.7	-26.7	48.39	-	-	74	-25.61	208	178	H
	* 10.684	25.53	MAv1	37.7	-26.7	36.53	54	-17.47	-	-	208	178	H
4	* 1.248	43.53	PK2	29.2	-26.1	46.63	-	-	74	-27.37	41	132	V
	* 1.246	32.55	MAv1	29.2	-26.1	35.65	54	-18.35	-	-	41	132	V
5	* 4.924	41.77	PK2	34.1	-33.1	42.77	-	-	74	-31.23	141	174	V
	* 4.924	30.86	MAv1	34.1	-33.1	31.86	54	-22.14	-	-	141	174	V
6	* 12.211	36.64	PK2	38.8	-26.4	49.04	-	-	74	-24.96	251	116	V
	* 12.209	25.10	MAv1	38.8	-26.4	37.50	54	-16.50	-	-	251	116	V

* - indicates frequency in CFR15.205/IC7.2.2 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	* 2.390	49.34	PK	32	-24.6	56.74	-	-	74	-17.26	190	308	H
2	* 2.389	51.62	PK	32	-24.6	59.02	-	-	74	-14.98	190	308	H
3	* 2.390	36.52	RMS	32	-24.6	43.92	54	-10.08	-	-	190	308	H
4	* 2.389	37.46	RMS	32	-24.6	44.86	54	-9.14	-	-	190	308	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

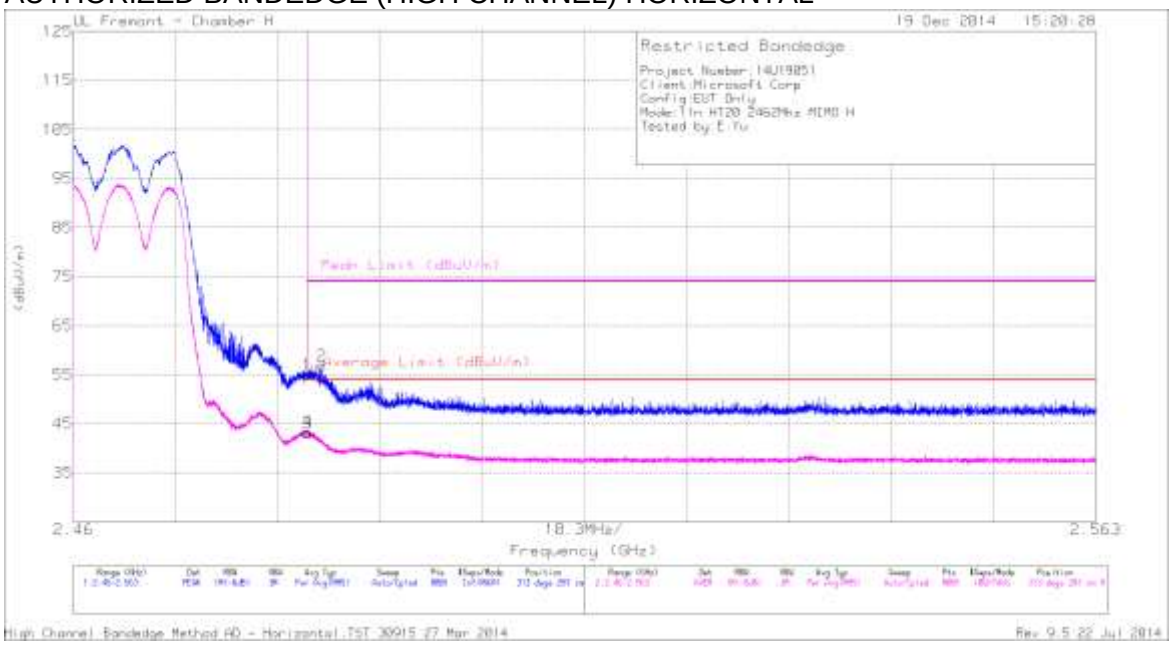
RESTRICTED BANDEDGE (LOW CHANNEL) VERTICAL

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	* 2.390	51.28	PK	32	-24.6	58.68	-	-	74	-15.32	262	138	V
2	* 2.389	52.43	PK	32	-24.6	59.83	-	-	74	-14.17	262	138	V
3	* 2.390	39.30	RMS	32	-24.6	46.70	54	-7.30	-	-	262	138	V
4	* 2.390	39.78	RMS	32	-24.6	47.18	54	-6.82	-	-	262	138	V

* - indicates frequency in CFR15.205/IC7.2.2 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	47.31	PK	32.2	-24.5	55.01	-	-	74	-18.99	313	281	H
2	* 2.485	49.20	PK	32.2	-24.5	56.90	-	-	74	-17.10	313	281	H
3	* 2.484	35.35	RMS	32.2	-24.5	43.05	54	-10.95	-	-	313	281	H
4	* 2.484	35.70	RMS	32.2	-24.5	43.40	54	-10.60	-	-	313	281	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL) VERTICAL

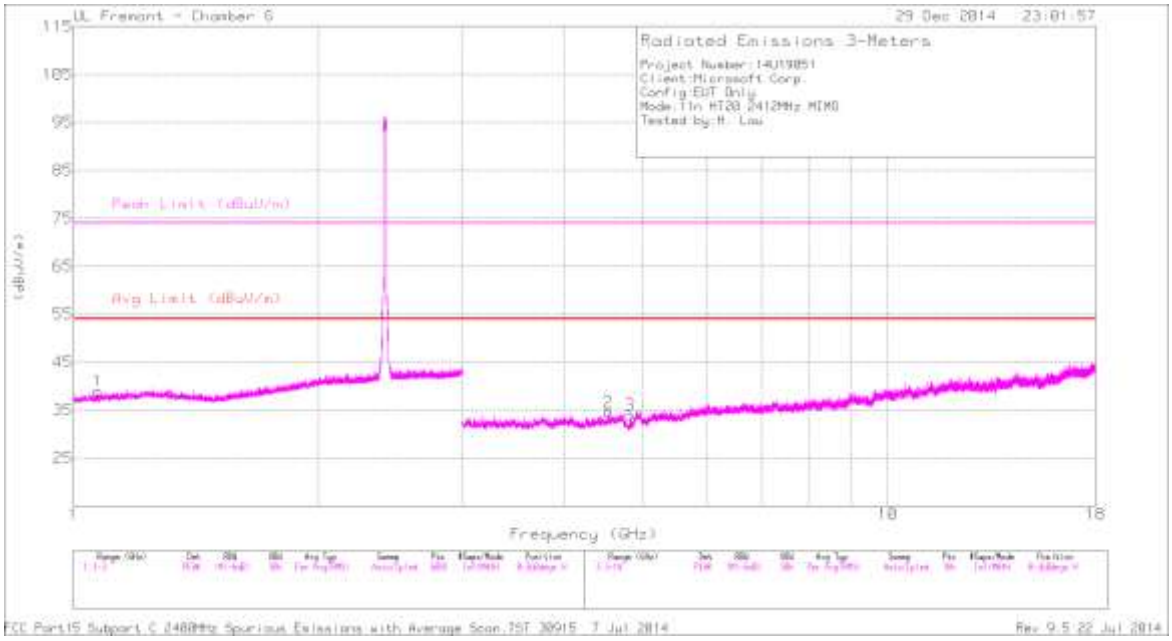
DATA

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	48.69	PK	32.2	-24.5	56.39	-	-	74	-17.61	276	153	V
2	* 2.484	52.66	PK	32.2	-24.5	60.36	-	-	74	-13.64	276	153	V
3	* 2.484	36.96	RMS	32.2	-24.5	44.66	54	-9.34	-	-	276	153	V
4	* 2.484	36.39	RMS	32.2	-24.5	44.09	54	-9.91	-	-	276	153	V

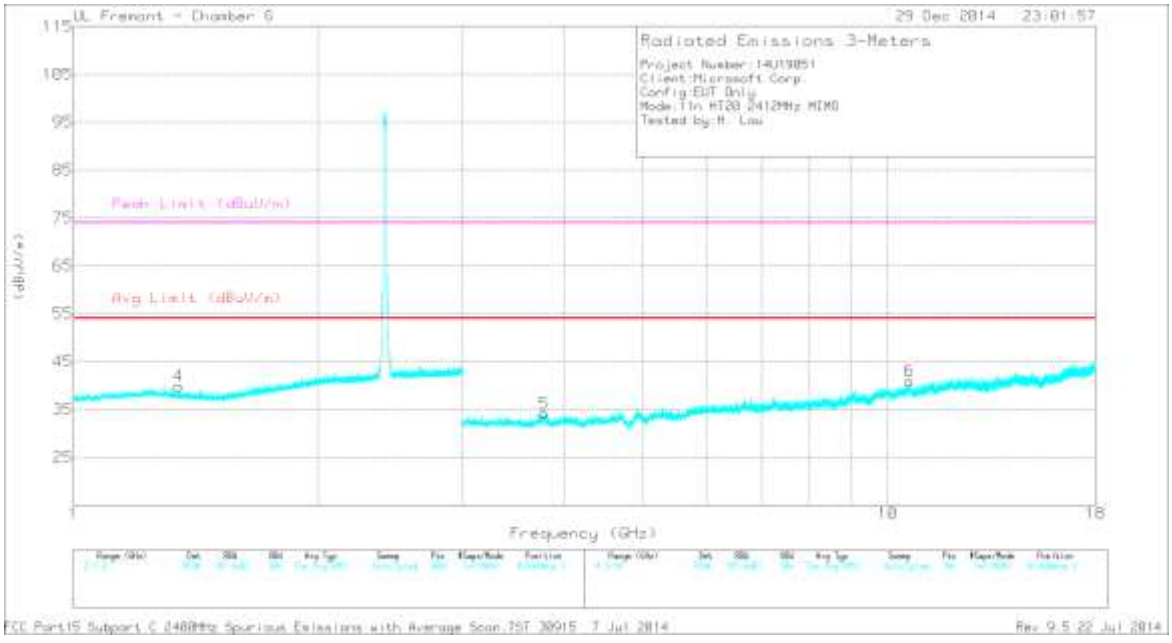
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector
RMS - RMS detection

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



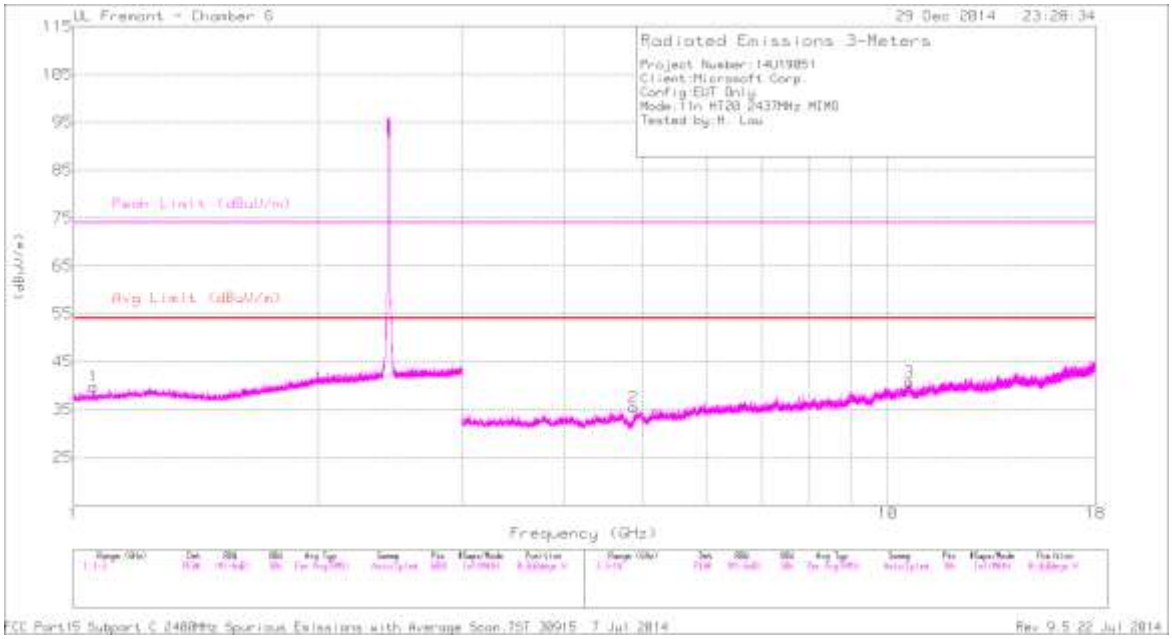
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	* 1.069	43.32	PK2	28.3	-26.1	45.52	-	-	74	-28.48	316	112	H
	* 1.072	32.45	MAv1	28.3	-26.1	34.65	54	-19.35	-	-	316	112	H
2	* 4.544	40.98	PK2	33.8	-33.3	41.48	-	-	74	-32.52	254	134	H
	* 4.540	30.13	MAv1	33.8	-33.3	30.63	54	-23.37	-	-	254	134	H
3	* 4.824	42.78	PK2	34.1	-33.0	43.88	-	-	74	-30.12	5	108	H
	* 4.824	31.46	MAv1	34.1	-33.0	32.56	54	-21.44	-	-	5	108	H
4	* 1.346	44.21	PK2	28.7	-25.9	47.01	-	-	74	-26.99	204	147	V
	* 1.347	32.34	MAv1	28.7	-25.9	35.14	54	-18.86	-	-	204	147	V
5	* 3.786	41.89	PK2	33.0	-32.9	41.99	-	-	74	-32.01	97	135	V
	* 3.786	30.83	MAv1	33.0	-32.9	30.93	54	-23.07	-	-	97	135	V
6	* 10.629	36.81	PK2	37.7	-26.2	48.31	-	-	74	-25.69	55	159	V
	* 10.63	25.56	MAv1	37.7	-26.2	37.06	54	-16.94	-	-	55	159	V

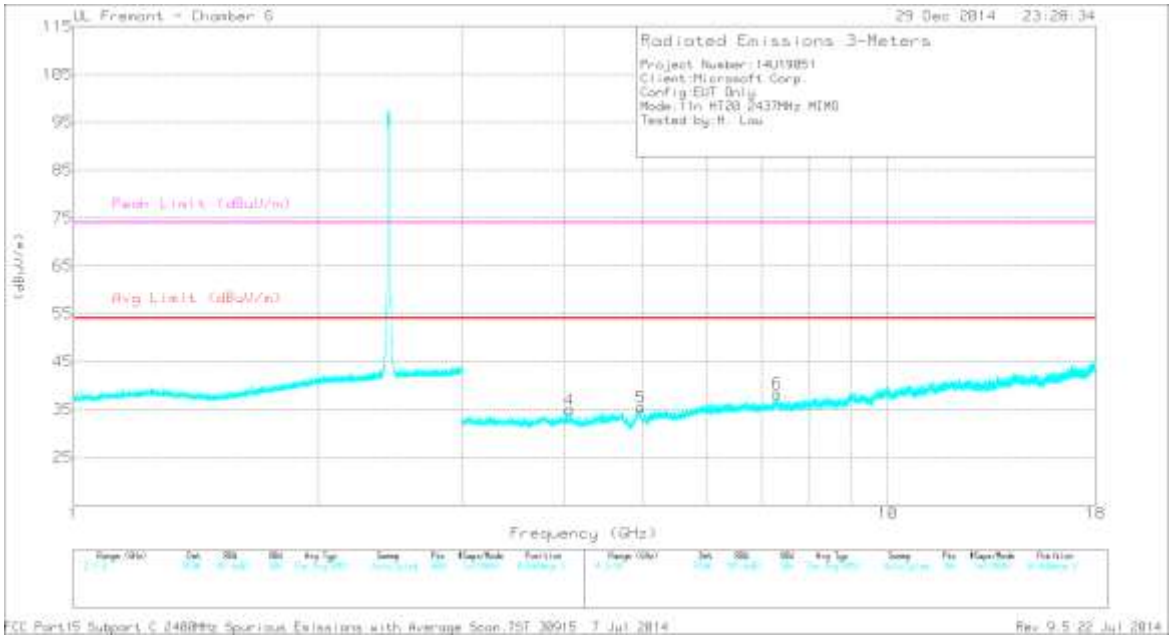
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



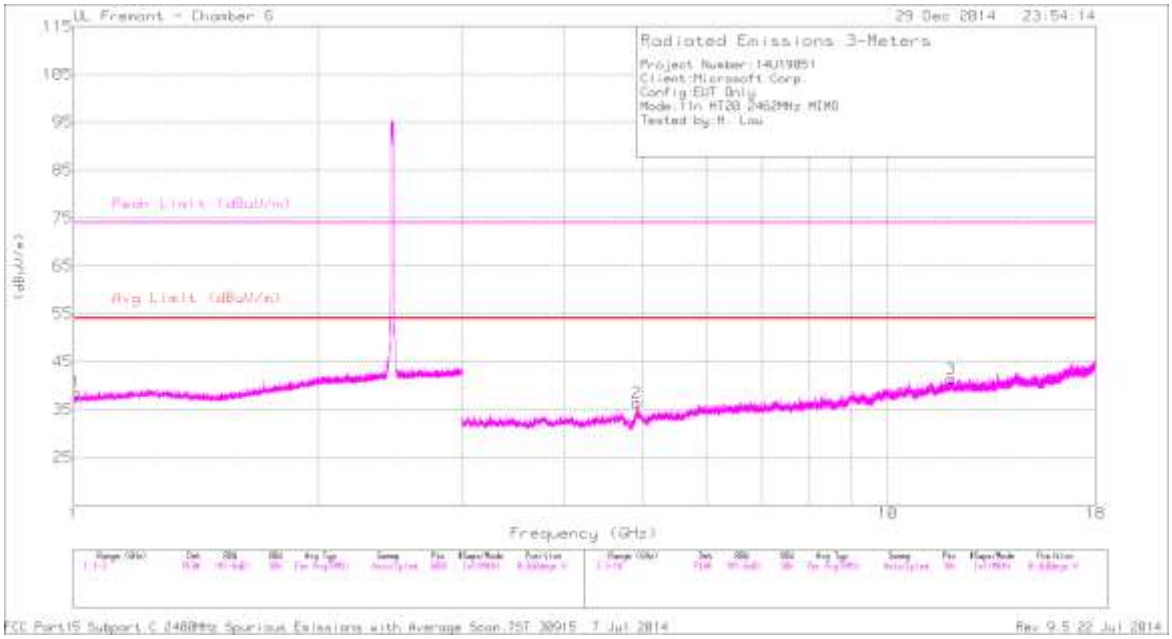
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	* 1.058	44.04	PK2	28.3	-26.1	46.24	-	-	74	-27.76	38	120	H
	* 1.060	32.46	MAv1	28.3	-26.1	34.66	54	-19.34	-	-	38	120	H
2	* 4.873	42.43	PK2	34.1	-33.1	43.43	-	-	74	-30.57	1	218	H
	* 4.874	31.08	MAv1	34.1	-33.1	32.08	54	-21.92	-	-	1	218	H
3	* 10.629	36.65	PK2	37.7	-26.2	48.15	-	-	74	-25.85	117	158	H
	* 10.630	25.44	MAv1	37.7	-26.2	36.94	54	-17.06	-	-	117	158	H
4	* 4.070	41.09	PK2	33.4	-32.7	41.79	-	-	74	-32.21	204	226	V
	* 4.070	30.02	MAv1	33.4	-32.7	30.72	54	-23.28	-	-	204	226	V
5	* 4.972	41.47	PK2	34.1	-33.0	42.57	-	-	74	-31.43	143	175	V
	* 4.971	30.36	MAv1	34.1	-33.0	31.46	54	-22.54	-	-	143	175	V
6	* 7.315	41.28	PK2	35.6	-31.1	45.78	-	-	74	-28.22	231	125	V
	* 7.313	29.29	MAv1	35.6	-31.1	33.79	54	-20.21	-	-	231	125	V

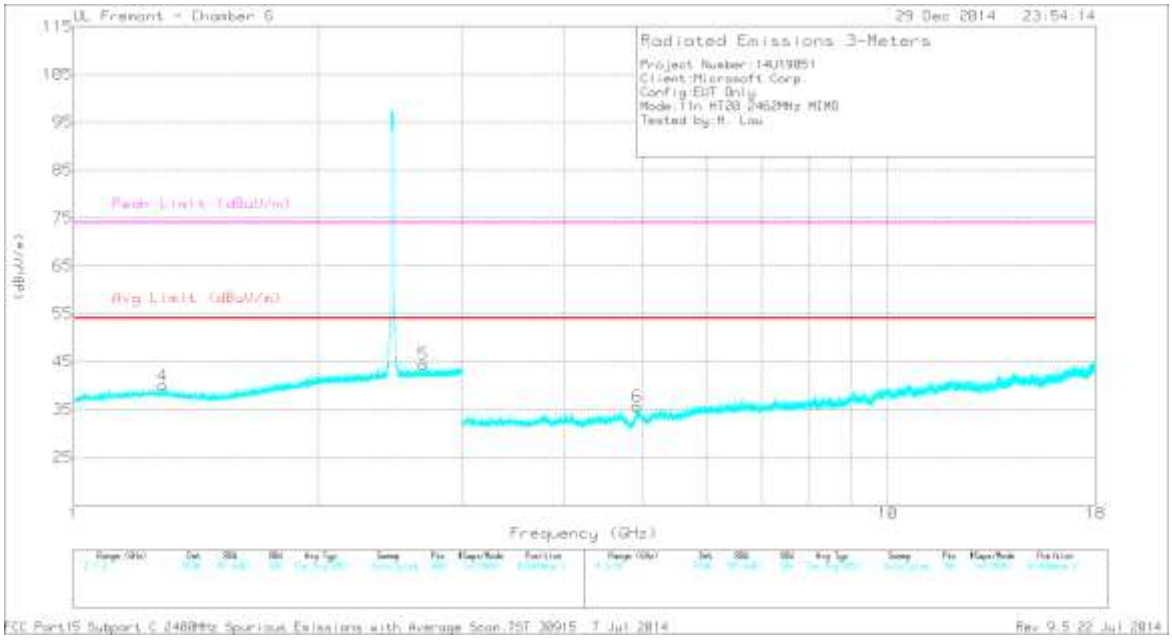
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



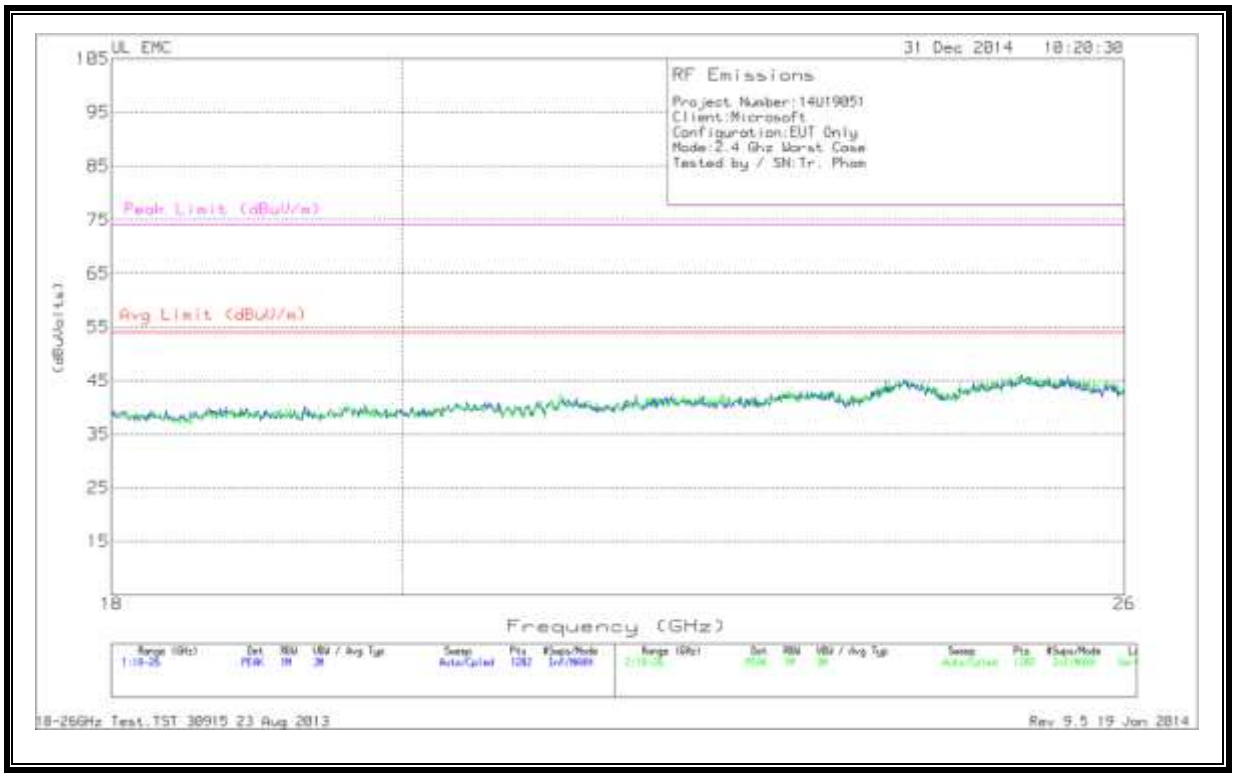
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	* 1.006	43.79	PK2	28.0	-26.2	45.59	-	-	74	-28.41	302	188	H
	* 1.008	32.68	MAv1	28.0	-26.2	34.48	54	-19.52	-	-	302	188	H
2	* 4.923	45.31	PK2	34.1	-33.1	46.31	-	-	74	-27.69	34	168	H
	* 4.924	34.21	MAv1	34.1	-33.1	35.21	54	-18.79	-	-	34	168	H
3	* 11.957	35.96	PK2	38.8	-26.0	48.76	-	-	74	-25.24	93	234	H
	* 11.957	25.14	MAv1	38.8	-26.0	37.94	54	-16.06	-	-	93	234	H
4	* 1.286	43.53	PK2	29.0	-26.0	46.53	-	-	74	-27.47	259	121	V
	* 1.286	32.56	MAv1	29.0	-26.0	35.56	54	-18.44	-	-	259	121	V
5	* 2.690	43.47	PK2	32.2	-24.8	50.87	-	-	74	-23.13	188	217	V
	* 2.688	32.03	MAv1	32.2	-24.8	39.43	54	-14.57	-	-	188	217	V
6	* 4.924	41.01	PK2	34.1	-33.1	42.01	-	-	74	-31.99	12	155	V
	* 4.924	30.81	MAv1	34.1	-33.1	31.81	54	-22.19	-	-	12	155	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

10.3. WORST-CASE ABOVE 18 to 26GHz

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



DATA

No emissions found between 18-26GHz

PK - Peak detector

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

6 WORST EMISSIONS

Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.186	41.99	PK	1	0	42.99	64.2	-21.21	-	-
2	.186	26.19	Av	1	0	27.19	-	-	54.2	-27.01
3	.681	39.15	PK	.3	0	39.45	56	-16.55	-	-
4	.681	22.84	Av	.3	0	23.14	-	-	46	-22.86
5	4.7085	40.51	PK	.2	.1	40.81	56	-15.19	-	-
6	4.7085	29.24	Av	.2	.1	29.54	-	-	46	-16.46
7	24.1665	40.69	PK	.3	.2	41.19	60	-18.81	-	-
8	24.1665	28.72	Av	.3	.2	29.22	-	-	50	-20.78

Line-L2 .15 - 30MHz

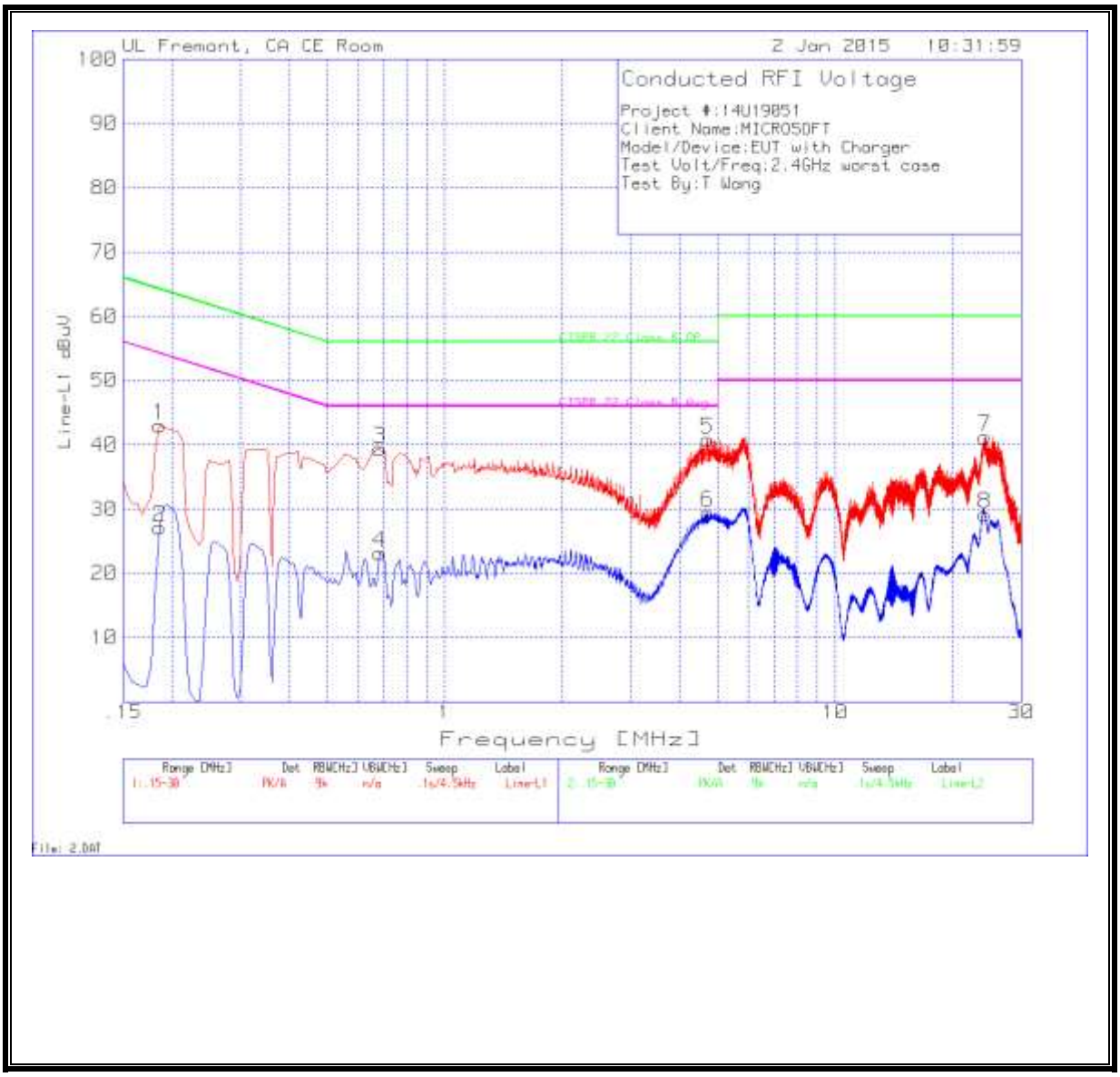
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
9	.186	41.78	PK	1.1	0	42.88	64.2	-21.32	-	-
10	.186	26.25	Av	1.1	0	27.35	-	-	54.2	-26.85
11	.654	39.24	PK	.3	0	39.54	56	-16.46	-	-
12	.654	19.47	Av	.3	0	19.77	-	-	46	-26.23
13	4.767	39.69	PK	.2	.1	39.99	56	-16.01	-	-
14	4.767	28.08	Av	.2	.1	28.38	-	-	46	-17.62
15	23.9145	39.19	PK	.3	.2	39.69	60	-20.31	-	-
16	23.9145	24.6	Av	.3	.2	25.1	-	-	50	-24.9

PK - Peak detector

Av - average detection

LINE 1 RESULTS



LINE 2 RESULTS